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H. O. PUB. NO. 214
VOL. V

TABLES OF COMPUTED ALTITUDE AND AZIMUTH

LATITUDES 40° — 49°, INCLUSIVE

U. S. NAVY HYDROGRAPHIC OFFICE

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SPEED-TIME-DISTANCE TABLE

SPEED IN KNOTS

TIME

Min.	Hr.	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	.017	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4
2	.033	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.9
3	.050	0.3	0.4	0.4	0.4	0.5	0.6	0.6	0.6	0.7	0.8	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.2	1.2	1.2	1.3	1.4
4	.067	0.4	0.5	0.5	0.6	0.7	0.7	0.8	0.9	0.9	1.0	1.1	1.1	1.2	1.3	1.3	1.4	1.5	1.5	1.6	1.7	1.7	1.8
5	.083	0.5	0.6	0.7	0.8	0.8	0.9	1.0	1.1	1.2	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.8	1.9	2.0	2.1	2.2	2.2
6	.100	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7
7	.117	0.7	0.8	0.9	1.0	1.2	1.3	1.4	1.5	1.6	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.6	2.7	2.8	2.9	3.0	3.2
8	.133	0.8	0.9	1.1	1.2	1.3	1.5	1.6	1.7	1.9	2.0	2.1	2.3	2.4	2.5	2.7	2.8	2.9	3.1	3.2	3.3	3.5	3.6
9	.150	0.9	1.0	1.2	1.4	1.5	1.6	1.8	2.0	2.1	2.2	2.4	2.6	2.7	2.8	3.0	3.2	3.3	3.4	3.6	3.8	3.9	4.0
10	.167	1.0	1.2	1.3	1.5	1.7	1.8	2.0	2.2	2.3	2.5	2.7	2.8	3.0	3.2	3.3	3.5	3.7	3.8	4.0	4.2	4.3	4.5
11	.183	1.1	1.3	1.5	1.6	1.8	2.0	2.2	2.4	2.6	2.8	2.9	3.1	3.3	3.5	3.7	3.8	4.0	4.2	4.4	4.6	4.8	5.0
12	.200	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0	5.2	5.4
13	.217	1.3	1.5	1.7	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.5	3.7	3.9	4.1	4.3	4.6	4.8	5.0	5.2	5.4	5.6	5.8
14	.233	1.4	1.6	1.9	2.1	2.3	2.6	2.8	3.0	3.3	3.5	3.7	4.0	4.2	4.4	4.7	4.9	5.1	5.4	5.6	5.8	6.1	6.3
15	.250	1.5	1.8	2.0	2.2	2.5	2.8	3.0	3.2	3.5	3.8	4.0	4.2	4.5	4.8	5.0	5.2	5.5	5.8	6.0	6.2	6.5	6.8
16	.267	1.6	1.9	2.1	2.4	2.7	2.9	3.2	3.5	3.7	4.0	4.3	4.5	4.8	5.1	5.3	5.6	5.9	6.1	6.4	6.7	6.9	7.2
17	.283	1.7	2.0	2.3	2.6	2.8	3.1	3.4	3.7	4.0	4.2	4.5	4.8	5.1	5.4	5.7	6.0	6.2	6.5	6.8	7.1	7.4	7.6
18	.300	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.4	5.7	6.0	6.3	6.6	6.9	7.2	7.5	7.8	8.1
19	.317	1.9	2.2	2.5	2.8	3.2	3.5	3.8	4.1	4.4	4.8	5.1	5.4	5.7	6.0	6.3	6.6	7.0	7.3	7.6	7.9	8.2	8.6
20	.333	2.0	2.3	2.7	3.0	3.3	3.7	4.0	4.3	4.7	5.0	5.3	5.7	6.0	6.3	6.7	7.0	7.3	7.7	8.0	8.3	8.7	9.0
21	.350	2.1	2.4	2.8	3.2	3.5	3.8	4.2	4.6	4.9	5.2	5.6	6.0	6.3	6.6	7.0	7.4	7.7	8.0	8.4	8.8	9.1	9.4
22	.367	2.2	2.6	2.9	3.3	3.7	4.0	4.4	4.8	5.1	5.5	5.9	6.2	6.6	7.0	7.3	7.7	8.1	8.4	8.8	9.2	9.5	9.9
23	.383	2.3	2.7	3.1	3.4	3.8	4.2	4.6	5.0	5.4	5.8	6.1	6.5	6.9	7.3	7.7	8.0	8.4	8.8	9.2	9.6	10.0	10.4
24	.400	2.4	2.8	3.2	3.6	4.0	4.4	4.8	5.2	5.6	6.0	6.4	6.8	7.2	7.6	8.0	8.4	8.8	9.2	9.6	10.0	10.4	10.8
25	.417	2.5	2.9	3.3	3.8	4.2	4.6	5.0	5.4	5.8	6.2	6.7	7.1	7.5	7.9	8.3	8.8	9.2	9.6	10.0	10.4	10.8	11.2
26	.433	2.6	3.0	3.5	3.9	4.3	4.8	5.2	5.6	6.1	6.5	6.9	7.4	7.8	8.2	8.7	9.1	9.5	10.0	10.4	10.8	11.3	11.7
27	.450	2.7	3.2	3.6	4.0	4.5	5.0	5.4	5.8	6.3	6.8	7.2	7.6	8.1	8.6	9.0	9.4	9.9	10.4	10.8	11.2	11.7	12.2
28	.467	2.8	3.3	3.7	4.2	4.7	5.1	5.6	6.1	6.5	7.0	7.5	7.9	8.4	8.9	9.3	9.8	10.3	10.7	11.2	11.7	12.1	12.6
29	.483	2.9	3.4	3.9	4.4	4.8	5.3	5.8	6.3	6.8	7.2	7.7	8.2	8.7	9.2	9.7	10.2	10.6	11.1	11.6	12.1	12.6	13.0
30	.500	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5
31	.517	3.1	3.6	4.1	4.6	5.2	5.7	6.2	6.7	7.2	7.8	8.3	8.8	9.3	9.8	10.3	10.8	11.4	11.9	12.4	12.9	13.4	14.0
32	.533	3.2	3.7	4.3	4.8	5.3	5.9	6.4	6.9	7.5	8.0	8.5	9.1	9.6	10.1	10.7	11.2	11.7	12.3	12.8	13.3	13.9	14.4
33	.550	3.3	3.8	4.4	5.0	5.5	6.0	6.6	7.2	7.7	8.2	8.8	9.4	9.9	10.4	11.0	11.6	12.1	12.6	13.2	13.8	14.3	14.8
34	.567	3.4	4.0	4.5	5.1	5.7	6.2	6.8	7.4	7.9	8.5	9.1	9.6	10.2	10.8	11.3	11.9	12.5	13.0	13.6	14.2	14.7	15.3
35	.583	3.5	4.1	4.7	5.2	5.8	6.4	7.0	7.6	8.2	8.8	9.3	9.9	10.5	11.1	11.7	12.2	12.8	13.4	14.0	14.6	15.2	15.8
36	.600	3.6	4.2	4.8	5.4	6.0	6.6	7.2	7.8	8.4	9.0	9.6	10.2	10.8	11.4	12.0	12.6	13.2	13.8	14.4	15.0	15.6	16.2
37	.617	3.7	4.3	4.9	5.6	6.2	6.8	7.4	8.0	8.6	9.2	9.9	10.5	11.1	11.7	12.3	13.0	13.6	14.2	14.8	15.4	16.0	16.6
38	.633	3.8	4.4	5.1	5.7	6.3	7.0	7.6	8.2	8.9	9.5	10.1	10.8	11.4	12.0	12.7	13.3	13.9	14.6	15.2	15.8	16.5	17.1
39	.650	3.9	4.6	5.2	5.8	6.5	7.2	7.8	8.4	9.1	9.8	10.4	11.0	11.7	12.4	13.0	13.6	14.3	15.0	15.6	16.2	16.9	17.6
40	.667	4.0	4.7	5.3	6.0	6.7	7.3	8.0	8.7	9.3	10.0	10.7	11.3	12.0	12.7	13.3	14.0	14.7	15.3	16.0	16.7	17.3	18.0
41	.683	4.1	4.8	5.5	6.2	6.8	7.5	8.2	8.9	9.6	10.2	10.9	11.6	12.3	13.0	13.7	14.4	15.0	15.7	16.4	17.1	17.8	18.4
42	.700	4.2	4.9	5.6	6.3	7.0	7.7	8.4	9.1	9.8	10.5	11.2	11.9	12.6	13.3	14.0	14.7	15.4	16.1	16.8	17.5	18.2	18.9
43	.717	4.3	5.0	5.7	6.4	7.2	7.9	8.6	9.3	10.0	10.8	11.5	12.2	12.9	13.6	14.3	15.0	15.8	16.5	17.2	17.9	18.6	19.4
44	.733	4.4	5.1	5.9	6.6	7.3	8.1	8.8	9.5	10.3	11.0	11.7	12.5	13.2	13.9	14.7	15.4	16.1	16.9	17.6	18.3	19.1	19.8
45	.750	4.5	5.2	6.0	6.8	7.5	8.2	9.0	9.8	10.5	11.2	12.0	12.8	13.5	14.2	15.0	15.8	16.5	17.2	18.0	18.8	19.5	20.2
46	.767	4.6	5.4	6.1	6.9	7.7	8.4	9.2	10.0	10.7	11.5	12.3	13.0	13.8	14.6	15.3	16.1	16.9	17.6	18.4	19.2	19.9	20.7
47	.783	4.7	5.5	6.3	7.0	7.8	8.6	9.4	10.2	11.0	11.8	12.5	13.3	14.1	14.9	15.7	16.4	17.2	18.0	18.8	19.6	20.4	21.2
48	.800	4.8	5.6	6.4	7.2	8.0	8.8	9.6	10.4	11.2	12.0	12.8	13.6	14.4	15.2	16.0	16.8	17.6	18.4	19.2	20.0	20.8	21.6
49	.817	4.9	5.7	6.5	7.4	8.2	9.0	9.8	10.6	11.4	12.2	13.1	13.9	14.7	15.5	16.3	17.2	18.0	18.8	19.6	20.4	21.2	22.0
50	.833	5.0	5.8	6.7	7.5	8.3	9.2	10.0	10.8	11.7	12.5	13.3	14.2	15.0	15.8	16.7	17.5	18.3	19.2	20.0	20.8	21.7	22.5
51	.850	5.1	6.0	6.8	7.6	8.5	9.4	10.2	11.0	11.9	12.8	13.6	14.4	15.3	16.2	17.0	17.8	18.7	19.6	20.4	21.2	22.1	23.0
52	.867	5.2	6.1	6.9	7.8	8.7	9.5	10.4	11.3	12.1	13.0	13.9	14.7	15.6	16.5	17.3	18.2	19.1	19.9	20.8	21.7	22.5	23.4
53	.883	5.3	6.2	7.1	8.0	8.8	9.7	10.6	11.5	12.4	13.2	14.1	15.0	15.9	16.8	17.7	18.6	19.4	20.3	21.2	22.1	23.0	23.8
54	.900	5.4	6.3	7.2	8.1	9.0	9.9	10.8	11.7	12.6	13.5	14.4	15.3	16.2	17.1	18.0	18.9	19.8	20.7	21.6	22.5	23.4	24.3
55	.917	5.5	6.4	7.3	8.2	9.2	10.1	11.0	11.9	12.8	13.8	14.7	15.6	16.5	17.4	18.3	19.2	20.2	21.1	22.0	22.9	23.8	24.8
56	.933	5.6	6.5	7.5	8.4	9.3	10.3	11.2	12.1	13.1	14.0	14.9	15.9	16.8	17.7	18.7	19.6	20.5	21.5	22.4	23.3	24.3	25.2
57	.950	5.7	6.6	7.6	8.6	9.5	10.4	11.4	12.4	13.3	14.2	15.2	16.2	17.1	18.0	19.0	20.0	20.9	21.8	22.8	23.8	24.7	25.6
58	.967	5.8	6.8	7.7	8.7	9.7	10.6	11.6	12.6	13.5	14.5	15.5	16.4	17.4	18.4	19.3	20.3	21.3	22.2	23.2	24.2	25.1	26.1
59	.983	5.9	6.9	7.9	8.8	9.8	10.8	11.8	12.8	13.8	14.8	15.7	16.7	17.7	18.7	19.7	20.6	21.6	22.6	23.6	24.6	25.6	26.6
	1	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
	2	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
	3	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63	66	69	72	75	78	81
	4	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84	88	92	96	100	104	108
	5	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135
	6	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132	138	144	150	156	162
	7	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147	154	161	168	175	182	189
	8	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160	168	176	184	192	200	208	216
	9	54	63	72	81	90	99	108	117	126	135	144	153	162	171	180	189	198	207	216	225	234	243
	10	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270
	11	66	77	88	99	110	121	132	143	154	165	176	187	198	209	220	231	242	253	264	275	286	297
	12	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240	252	264	276	288	300	312	324
	13	78	91	104	117	130	143	156	169	182	195	208	221	234	247	260	273	286	299	312	325	338	351
	14	84	98	112	126	140	154	168	182	196	210	224	238	252	266	280	294	308	322	336	350	364	378
	15	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345	360	375	390	405
	16	96	112	128	144	160	176	192	208	224	240	256	272	288	304	320	336	352	368	384	400	416	432
	17	102	119	136	153	170	187	204	221	238	255	272	289	306	323	340	357	374	391	408	425	442	459
	18	108	126	144	162	180	198	216	234	252	270	288	306	324	342	360	378	396	414	432	450	468	486
	19	114	133	152	171	190	209	228	247	266	285	304	323	342	361	380	399	418	437	456	475	494	513
	20	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420	440	460	480	500	520	540
	21	126	147	168	189	210	231	252	273	294	315	336	357	378	399	420	441	462	483	504	525	546	567
	22	132	154	176	198	220	242	264	286	308	330	352	374	396	418	440	462	484	506	528	550	572	594
	23	138	161	184	207	230	253	276	299	322	345	368	391	414	437	460	483	506	529	552	575	598	621
	24	144	168	192	216	240	264	288	312	336	360	384	408	432	456	480	504	528	552	576	600	624	648
	25	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675

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SPEED-T[illegible]

TIME

Min.	Hr.	28	29	30	31	32	33	34	35	36	37	38	39	40	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
1	.017	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	.033	0.9	1.0	1.0	1.0	1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	.050	1.4	1.4	1.5	1.6	1.6	1.6	1.7	1.8	1.8	1.8	1.9	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	.067	1.9	1.9	2.0	2.1	2.1	2.2	2.3	2.3	2.4	2.5	2.5	2.6	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
5	.083	2.3	2.4	2.5	2.6	2.7	2.8	2.8	2.9	3.0	3.1	3.2	3.2	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
6	.100	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
7	.117	3.3	3.4	3.5	3.6	3.7	3.8	4.0	4.1	4.2	4.3	4.4	4.6	4.7	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
8	.133	3.7	3.9	4.0	4.1	4.3	4.4	4.5	4.7	4.8	4.9	5.1	5.2	5.3	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
9	.150	4.2	4.4	4.5	4.6	4.8	5.0	5.1	5.2	5.4	5.6	5.7	5.8	6.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2
10	.167	4.7	4.8	5.0	5.2	5.3	5.5	5.7	5.8	6.0	6.2	6.3	6.5	6.7	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
11	.183	5.1	5.3	5.5	5.7	5.9	6.0	6.2	6.4	6.6	6.8	7.0	7.2	7.3	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
12	.200	5.6	5.8	6.0	6.2	6.4	6.6	6.8	7.0	7.2	7.4	7.6	7.8	8.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2
13	.217	6.1	6.3	6.5	6.7	6.9	7.2	7.4	7.6	7.8	8.0	8.2	8.4	8.7	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
14	.233	6.5	6.8	7.0	7.2	7.5	7.7	7.9	8.2	8.4	8.6	8.9	9.1	9.3	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
15	.250	7.0	7.2	7.5	7.8	8.0	8.2	8.5	8.8	9.0	9.2	9.5	9.8	10.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2
16	.267	7.5	7.7	8.0	8.3	8.5	8.8	9.1	9.3	9.6	9.9	10.1	10.4	10.7	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3
17	.283	7.9	8.2	8.5	8.8	9.1	9.4	9.6	9.9	10.2	10.5	10.8	11.0	11.3	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3
18	.300	8.4	8.7	9.0	9.3	9.6	9.9	10.2	10.5	10.8	11.1	11.4	11.7	12.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3
19	.317	8.9	9.2	9.5	9.8	10.1	10.4	10.8	11.1	11.4	11.7	12.0	12.4	12.7	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3
20	.333	9.3	9.7	10.0	10.3	10.7	11.0	11.3	11.7	12.0	12.3	12.7	13.0	13.3	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3
21	.350	9.8	10.2	10.5	10.8	11.2	11.6	11.9	12.2	12.6	13.0	13.3	13.6	14.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4
22	.367	10.3	10.6	11.0	11.4	11.7	12.1	12.5	12.8	13.2	13.6	13.9	14.3	14.7	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.4
23	.383	10.7	11.1	11.5	11.9	12.3	12.6	13.0	13.4	13.8	14.2	14.6	15.0	15.3	0.0	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4
24	.400	11.2	11.6	12.0	12.4	12.8	13.2	13.6	14.0	14.4	14.8	15.2	15.6	16.0	0.0	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.4
25	.417	11.7	12.1	12.5	12.9	13.3	13.8	14.2	14.6	15.0	15.4	15.8	16.2	16.7	0.0	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.4
26	.433	12.1	12.6	13.0	13.4	13.9	14.3	14.7	15.2	15.6	16.0	16.5	16.9	17.3	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.4	0.4
27	.450	12.6	13.0	13.5	14.0	14.4	14.8	15.3	15.8	16.2	16.6	17.1	17.6	18.0	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.4
28	.467	13.1	13.5	14.0	14.5	14.9	15.4	15.9	16.3	16.8	17.3	17.7	18.2	18.7	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5
29	.483	13.5	14.0	14.5	15.0	15.5	16.0	16.4	16.9	17.4	17.9	18.4	18.8	19.3	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5
30	.500	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5	20.0	0.0	0.1	0.2	0.2	0.2	0.3	0.4	0.4	0.4	0.5
31	.517	14.5	15.0	15.5	16.0	16.5	17.0	17.6	18.1	18.6	19.1	19.6	20.2	20.7	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5
32	.533	14.9	15.5	16.0	16.5	17.1	17.6	18.1	18.7	19.2	19.7	20.3	20.8	21.3	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5
33	.550	15.4	16.0	16.5	17.0	17.6	18.2	18.7	19.2	19.8	20.4	20.9	21.4	22.0	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.6
34	.567	15.9	16.4	17.0	17.6	18.1	18.7	19.3	19.8	20.4	21.0	21.5	22.1	22.7	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.5	0.5	0.6
35	.583	16.3	16.9	17.5	18.1	18.7	19.2	19.8	20.4	21.0	21.6	22.2	22.8	23.3	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.5	0.6
36	.600	16.8	17.4	18.0	18.6	19.2	19.8	20.4	21.0	21.6	22.2	22.8	23.4	24.0	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.5	0.6
37	.617	17.3	17.9	18.5	19.1	19.7	20.4	21.0	21.6	22.2	22.8	23.4	24.0	24.7	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.6	0.6
38	.633	17.7	18.4	19.0	19.6	20.3	20.9	21.5	22.2	22.8	23.4	24.1	24.7	25.3	0.1	0.1	0.2	0.3	0.3	0.4	0.4	0.5	0.6	0.6
39	.650	18.2	18.8	19.5	20.2	20.8	21.4	22.1	22.8	23.4	24.0	24.7	25.4	26.0	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.5	0.6	0.6
40	.667	18.7	19.3	20.0	20.7	21.3	22.0	22.7	23.3	24.0	24.7	25.3	26.0	26.7	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.5	0.6	0.7
41	.683	19.1	19.8	20.5	21.2	21.9	22.6	23.2	23.9	24.6	25.3	26.0	26.6	27.3	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.5	0.6	0.7
42	.700	19.6	20.3	21.0	21.7	22.4	23.1	23.8	24.5	25.2	25.9	26.6	27.3	28.0	0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.6	0.7
43	.717	20.1	20.8	21.5	22.2	22.9	23.6	24.4	25.1	25.8	26.5	27.2	28.0	28.7	0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.6	0.7
44	.733	20.5	21.3	22.0	22.7	23.5	24.2	24.9	25.7	26.4	27.1	27.9	28.6	29.3	0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.7
45	.750	21.0	21.8	22.5	23.2	24.0	24.8	25.5	26.2	27.0	27.8	28.5	29.2	30.0	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.8
46	.767	21.5	22.2	23.0	23.8	24.5	25.3	26.1	26.8	27.6	28.4	29.1	29.9	30.7	0.1	0.2	0.2	0.3	0.4	0.5	0.5	0.6	0.7	0.8
47	.783	21.9	22.7	23.5	24.3	25.1	25.8	26.6	27.4	28.2	29.0	29.8	30.6	31.3	0.1	0.2	0.2	0.3	0.4	0.5	0.5	0.6	0.7	0.8
48	.800	22.4	23.2	24.0	24.8	25.6	26.4	27.2	28.0	28.8	29.6	30.4	31.2	32.0	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.8
49	.817	22.9	23.7	24.5	25.3	26.1	27.0	27.8	28.6	29.4	30.2	31.0	31.8	32.7	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.7	0.8
50	.833	23.3	24.2	25.0	25.8	26.7	27.5	28.3	29.2	30.0	30.8	31.7	32.5	33.3	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.8
51	.850	23.8	24.6	25.5	26.4	27.2	28.0	28.9	29.8	30.6	31.4	32.3	33.2	34.0	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.8
52	.867	24.3	25.1	26.0	26.9	27.7	28.6	29.5	30.3	31.2	32.1	32.9	33.8	34.7	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9
53	.883	24.7	25.6	26.5	27.4	28.3	29.2	30.0	30.9	31.8	32.7	33.6	34.4	35.3	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.8	0.9
54	.900	25.2	26.1	27.0	27.9	28.8	29.7	30.6	31.5	32.4	33.3	34.2	35.1	36.0	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.8	0.9
55	.917	25.7	26.6	27.5	28.4	29.3	30.2	31.2	32.1	33.0	33.9	34.8	35.8	36.7	0.1	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.8	0.9
56	.933	26.1	27.1	28.0	28.9	29.9	30.8	31.7	32.7	33.6	34.5	35.5	36.4	37.3	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.7	0.8	0.9
57	.950	26.6	27.6	28.5	29.4	30.4	31.4	32.3	33.2	34.2	35.2	36.1	37.0	38.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
58	.967	27.1	28.0	29.0	30.0	30.9	31.9	32.9	33.8	34.8	35.8	36.7	37.7	38.7	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
59	.983	27.5	28.5	29.5	30.5	31.5	32.4	33.4	34.4	35.4	36.4	37.4	38.4	39.3	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
	1	28	29	30	31	32	33	34	35	36	37	38	39	40	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
	2	56	58	60	62	64	66	68	70	72	74	76	78	80	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0
	3	84	87	90	93	96	99	102	105	108	111	114	117	120	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0
	4	112	116	120	124	128	132	136	140	144	148	152	156	160	0.4	0.8	1.2	1.6	2.0	2.4	2.8	3.2	3.6	4.0
	5	140	145	150	155	160	165	170	175	180	185	190	195	200	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
	6	168	174	180	186	192	198	204	210	216	222	228	234	240	0.6	1.2	1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0
	7	196	203	210	217	224	231	238	245	252	259	266	273	280	0.7	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3	7.0
	8	224	232	240	248	256	264	272	280	288	296	304	312	320	0.8	1.6	2.4	3.2	4.0	4.8	5.6	6.4	7.2	8.0
	9	252	261	270	279	288	297	306	315	324	333	342	351	360	0.9	1.8	2.7	3.6	4.5	5.4	6.3	7.2	8.1	9.0
	10	280	290	300	310	320	330	340	350	360	370	380	390	400	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0
	11	308	319	330	341	352	363	374	385	396	407	418	429	440	1.1	2.2	3.3	4.4	5.5	6.6	7.7	8.8	9.9	11.0
	12	336	348	360	372	384	396	408	420	432	444	456	468	480	1.2	2.4	3.6	4.8	6.0	7.2	8.4	9.6	10.8	12.0
	13	364	377	390	403	416	429	442	455	468	481	494	507	520	1.3	2.6	3.9	5.2	6.5	7.8	9.1	10.4	11.7	13.0
	14	392	406	420	434	448	462	476	490	504	518	532	546	560	1.4	2.8	4.2	5.6	7.0	8.4	9.8	11.2	12.6	14.0
	15	420	435	450	465	480	495	510	525	540	555	570	585	600	1.5	3.0	4.5	6.0	7.5	9.0	10.5	12.0	13.5	15.0
	16	448	464	480	496	512	528	544	560	576	592	608	624	640	1.6	3.2	4.8	6.4	8.0	9.6	11.2	12.8	14.4	16.0
	17	476	493	510	527	544	561	578	595	612	629	646	663	680	1.7	3.4	5.1	6.8	8.5	10.2	11.9	13.6	15.3	17.0
	18	504	522	540	558	576	594	612	630	648	666	684	702	720	1.8	3.6	5.4	7.2	9.0	10.8	12.6	14.4	16.2	18.0
	19	532	551	570	589	608	627	646	665	684	703	722	741	760	1.9	3.8	5.7	7.6	9.5	11.4	13.3	15.2	17.1	19.0
	20	560	580	600	620	640	660	680	700	720	740	760	780	800	2.0	4.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0
	21	588	609	630	651	672	693	714	735	756	777	798	819	840	2.1	4.2	6.3	8.4	10.5	12.6	14.7	16.8	18.9	21.0
	22	616	638	660	682	704	726	748	770	792	814	836	858	880	2.2	4.4	6.6	8.8	11.0	13.2	15.4	17.6	19.8	22.0
	23	644	667	690	713	736	759	782	805	828	851	874	897	920	2.3	4.6	6.9	9.2	11.5	13.8	16.1	18.4	20.7	23.0
	24	672	696	720	744	768	792	816	840	864	888	912	936	960	2.4	4.8	7.2	9.6	12.0	14.4	16.8	19.2	21.6	24.0
	25	700	725	750	775	800	825	850	875	900	925	950	975	1000	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	22.5	25.0

FOR CONVERSION OF ARC TO TIME

°	h m	°	h m	°	h m	°	h m	°	h m	°	h m
0	0 0	60	4 0	120	8 0	180	12 0	240	16 0	300	20 0
1	0 4	61	4 4	121	8 4	181	12 4	241	16 4	301	20 4
2	0 8	62	4 8	122	8 8	182	12 8	242	16 8	302	20 8
3	0 12	63	4 12	123	8 12	183	12 12	243	16 12	303	20 12
4	0 16	64	4 16	124	8 16	184	12 16	244	16 16	304	20 16
5	0 20	65	4 20	125	8 20	185	12 20	245	16 20	305	20 20
6	0 24	66	4 24	126	8 24	186	12 24	246	16 24	306	20 24
7	0 28	67	4 28	127	8 28	187	12 28	247	16 28	307	20 28
8	0 32	68	4 32	128	8 32	188	12 32	248	16 32	308	20 32
9	0 36	69	4 36	129	8 36	189	12 36	249	16 36	309	20 36
10	0 40	70	4 40	130	8 40	190	12 40	250	16 40	310	20 40
11	0 44	71	4 44	131	8 44	191	12 44	251	16 44	311	20 44
12	0 48	72	4 48	132	8 48	192	12 48	252	16 48	312	20 48
13	0 52	73	4 52	133	8 52	193	12 52	253	16 52	313	20 52
14	0 56	74	4 56	134	8 56	194	12 56	254	16 56	314	20 56
15	1 0	75	5 0	135	9 0	195	13 0	255	17 0	315	21 0
16	1 4	76	5 4	136	9 4	196	13 4	256	17 4	316	21 4
17	1 8	77	5 8	137	9 8	197	13 8	257	17 8	317	21 8
18	1 12	78	5 12	138	9 12	198	13 12	258	17 12	318	21 12
19	1 16	79	5 16	139	9 16	199	13 16	259	17 16	319	21 16
20	1 20	80	5 20	140	9 20	200	13 20	260	17 20	320	21 20
21	1 24	81	5 24	141	9 24	201	13 24	261	17 24	321	21 24
22	1 28	82	5 28	142	9 28	202	13 28	262	17 28	322	21 28
23	1 32	83	5 32	143	9 32	203	13 32	263	17 32	323	21 32
24	1 36	84	5 36	144	9 36	204	13 36	264	17 36	324	21 36
25	1 40	85	5 40	145	9 40	205	13 40	265	17 40	325	21 40
26	1 44	86	5 44	146	9 44	206	13 44	266	17 44	326	21 44
27	1 48	87	5 48	147	9 48	207	13 48	267	17 48	327	21 48
28	1 52	88	5 52	148	9 52	208	13 52	268	17 52	328	21 52
29	1 56	89	5 56	149	9 56	209	13 56	269	17 56	329	21 56
30	2 0	90	6 0	150	10 0	210	14 0	270	18 0	330	22 0
31	2 4	91	6 4	151	10 4	211	14 4	271	18 4	331	22 4
32	2 8	92	6 8	152	10 8	212	14 8	272	18 8	332	22 8
33	2 12	93	6 12	153	10 12	213	14 12	273	18 12	333	22 12
34	2 16	94	6 16	154	10 16	214	14 16	274	18 16	334	22 16
35	2 20	95	6 20	155	10 20	215	14 20	275	18 20	335	22 20
36	2 24	96	6 24	156	10 24	216	14 24	276	18 24	336	22 24
37	2 28	97	6 28	157	10 28	217	14 28	277	18 28	337	22 28
38	2 32	98	6 32	158	10 32	218	14 32	278	18 32	338	22 32
39	2 36	99	6 36	159	10 36	219	14 36	279	18 36	339	22 36
40	2 40	100	6 40	160	10 40	220	14 40	280	18 40	340	22 40
41	2 44	101	6 44	161	10 44	221	14 44	281	18 44	341	22 44
42	2 48	102	6 48	162	10 48	222	14 48	282	18 48	342	22 48
43	2 52	103	6 52	163	10 52	223	14 52	283	18 52	343	22 52
44	2 56	104	6 56	164	10 56	224	14 56	284	18 56	344	22 56
45	3 0	105	7 0	165	11 0	225	15 0	285	19 0	345	23 0
46	3 4	106	7 4	166	11 4	226	15 4	286	19 4	346	23 4
47	3 8	107	7 8	167	11 8	227	15 8	287	19 8	347	23 8
48	3 12	108	7 12	168	11 12	228	15 12	288	19 12	348	23 12
49	3 16	109	7 16	169	11 16	229	15 16	289	19 16	349	23 16
50	3 20	110	7 20	170	11 20	230	15 20	290	19 20	350	23 20
51	3 24	111	7 24	171	11 24	231	15 24	291	19 24	351	23 24
52	3 28	112	7 28	172	11 28	232	15 28	292	19 28	352	23 28
53	3 32	113	7 32	173	11 32	233	15 32	293	19 32	353	23 32
54	3 36	114	7 36	174	11 36	234	15 36	294	19 36	354	23 36
55	3 40	115	7 40	175	11 40	235	15 40	295	19 40	355	23 40
56	3 44	116	7 44	176	11 44	236	15 44	296	19 44	356	23 44
57	3 48	117	7 48	177	11 48	237	15 48	297	19 48	357	23 48
58	3 52	118	7 52	178	11 52	238	15 52	298	19 52	358	23 52
59	3 56	119	7 56	179	11 56	239	15 56	299	19 56	359	23 56
60	4 0	120	8 0	180	12 0	240	16 0	300	20 0	360	24 0

′	m s
0	0 0
1	0 4
2	0 8
3	0 12
4	0 16
5	0 20
6	0 24
7	0 28
8	0 32
9	0 36
10	0 40
11	0 44
12	0 48
13	0 52
14	0 56
15	1 0
16	1 4
17	1 8
18	1 12
19	1 16
20	1 20
21	1 24
22	1 28
23	1 32
24	1 36
25	1 40
26	1 44
27	1 48
28	1 52
29	1 56
30	2 0
31	2 4
32	2 8
33	2 12
34	2 16
35	2 20
36	2 24
37	2 28
38	2 32
39	2 36
40	2 40
41	2 44
42	2 48
43	2 52
44	2 56
45	3 0
46	3 4
47	3 8
48	3 12
49	3 16
50	3 20
51	3 24
52	3 28
53	3 32
54	3 36
55	3 40
56	3 44
57	3 48
58	3 52
59	3 56
60	4 0

″	s
0	0. 00
1	0. 07
2	0. 13
3	0. 20
4	0. 27
5	0. 33
6	0. 40
7	0. 47
8	0. 53
9	0. 60
10	0. 67
11	0. 73
12	0. 80
13	0. 87
14	0. 93
15	1. 00
16	1. 07
17	1. 13
18	1. 20
19	1. 27
20	1. 33
21	1. 40
22	1. 47
23	1. 53
24	1. 60
25	1. 67
26	1. 73
27	1. 80
28	1. 87
29	1. 93
30	2. 00
31	2. 07
32	2. 13
33	2. 20
34	2. 27
35	2. 33
36	2. 40
37	2. 47
38	2. 53
39	2. 60
40	2. 67
41	2. 73
42	2. 80
43	2. 87
44	2. 93
45	3. 00
46	3. 07
47	3. 13
48	3. 20
49	3. 27
50	3. 33
51	3. 40
52	3. 47
53	3. 53
54	3. 60
55	3. 67
56	3. 73
57	3. 80
58	3. 87
59	3. 93
60	4. 00

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H. O. PUB. NO. 214

VOL. V

U.S. Hydrographic Office.

TABLES OF COMPUTED ALTITUDE AND AZIMUTH

LATITUDES 40° — 49°, INCLUSIVE

Published by the U. S. Navy Hydrographic Office
under the authority of the SECRETARY OF THE NAVY

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PREFACE

These tables consist of tabulated solutions of the navigational triangle, so arranged as to yield computed altitude and azimuth angle by inspection. The scheme of precomputing such values for ready use is a long-established one. It is in the scope, arrangement, and convenience of interpolation, developed by the Hydrographic Office, that these tables are unique.

The tables are applicable equally to observations of the sun, moon, planets, and navigational stars, whether observed in north or south latitude. For convenience, the values for only 10 degrees of latitude are included in each volume. This series of tables, commonly known as H. O. Pub. No. 214, is intended primarily for marine navigation. For air navigation the H. O. Pub. No. 249 series of tables consisting of 3 volumes and entitled "Sight Reduction Tables for Air Navigation" is recommended.

In the 1952 reprint the basic information remains unchanged. Some modification has been made in the descriptive text, and the illustrative examples have been changed to reflect recent modifications of the *Nautical Almanac*. A speed-time-distance table replaces the sextant altitude correction tables formerly shown on the inside front cover but now omitted because recent almanac changes render them unnecessary.

ALLEN HOBBS,
Captain, U. S. Navy (Ret.),
Hydrographer.

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TABLES OF COMPUTED ALTITUDE AND AZIMUTH

Description of the Tables

The tables are equally applicable to sights of the sun, moon, planets, and navigational stars.

The arrangement is on the basis of whole degrees of latitude, the data for each degree comprising a section of 24 pages, with 2 additional pages for star identification.

Declination arguments in degrees and half degrees head the main columns of each page, while meridian angle arguments in whole degrees appear at the sides. Within the limits of each declination column are four groups of figures representing, from left to right—the altitude (Alt.); the multiplier (Δd) for declination difference; the multiplier (Δt) for meridian angle difference; and the azimuth angle (Az.). The declination arguments for celestial bodies not commonly used in practical navigation are omitted.

The altitudes have been computed to an accuracy of one-tenth of a minute of arc by seven place logarithms.

The azimuth angle has been computed to an accuracy of one-tenth of a degree.

Δd represents the change in altitude due to a change of 1′ of arc of declination, computed for the tabulated entering arguments.

Δt represents the change in altitude due to a change of 1′ of arc of meridian angle, and is one-sixtieth of the difference between the tabulated altitude and that for the next larger meridian angle.

ΔL represents the change in altitude due to a change of 1′ of arc of latitude. A special table on pages 262–263 gives the corrections for minutes of latitude.

The following procedures are available for finding a line of position:

(1) Assuming both latitude and longitude, using only the Δd correction.

(2) Assuming latitude with the DR longitude, using the Δd and Δt corrections.

(3) Working from the DR position, using the Δd, Δt, and ΔL corrections.

When either Δd or Δt is changing rapidly, or when Δd changes sign (at the maximum altitude for any given meridian angle), interpolation may be somewhat less accurate than in other parts of the tables, but should not introduce a significant error unless the body is near the zenith.

(1) SOLUTION FOR LINE OF POSITION USING Δd CORRECTION ONLY

This is the primary method for which the tables were designed. The solution is short and simple. The tables are entered with arguments of nearest whole degree of latitude, nearest whole or half degree of declination, and nearest whole degree of meridian angle. Alt., Δd, and Az. are taken from the body of the tables.

The azimuth angle obtained from the tables is correct for the values with which the tables are entered and, for plotting lines of position, generally needs no correction. If extreme accuracy is desired, the azimuth angle may be interpolated by inspection. The tabulated azimuth angle (Az.) is reckoned from the elevated pole of the observer, to the east when the body is rising or east of the meridian; and to the west when the body is setting or west of the meridian. Azimuth angle is customarily converted to azimuth (Zn) before plotting.

The altitude (Alt.) obtained from the tables is correct for the values with which the tables are entered; but since the exact declination of the body usually differs from the tabulated declination, a correction to the tabulated altitude must be made for this difference. For example, if the exact declination of a star is 57° 28′.7 and the table is entered with a declination of 57° 30′.0, the declination difference is 1′.3. Since Δd represents the change in altitude due to a change of 1′ of arc of declination, if Δd is multiplied by the declination difference, the correction to the altitude for declination difference is obtained. When this correction is applied to the tabulated altitude (Alt.), the altitude thus obtained is the correct computed altitude for arguments of whole degree of latitude, whole degree of meridian angle, and the exact declination of the body. The correction can be obtained by inspection from a multiplication table on the back cover pages. The multiplication table is entered with arguments, Δd at the side, and the declination difference at the top. The correction to the altitude for declination difference is taken from the body of the table. The multiplication table is so arranged that it may be entered at the top with both whole numbers and tenths. For example, using Δd 65, and declination difference 6′.4, the multiplication table is entered with 65 at the side and 6′ at the top, the correction is 3′.9; with 65 at the side and 0′.4 at the top, the correction is 0′.3; the total correction to the altitude for declination difference being 3′.9+0′.3=4′.2.

By comparing the tabulated altitude for the entering declination with the values of altitude for adjoining tabulated declinations, one can determine whether the altitude is increasing or decreasing as the tabulated declination approaches the exact declination. The correction is applied to the tabulated altitude, plus if the altitude is increasing, and minus if the altitude is decreasing. *Watch the plus or minus signs for Δd, and apply correctly, remembering that Δd may change sign between entries at the maximum altitude.* The multiplier Δd should not be interpolated.

When the Δd correction only is made to the tabulated altitude, the sight must be plotted from an assumed position as follows:

Latitude.—The whole degree with which the tables were entered.

Longitude.—The longitude which was assumed in finding the meridian angle in whole degrees.

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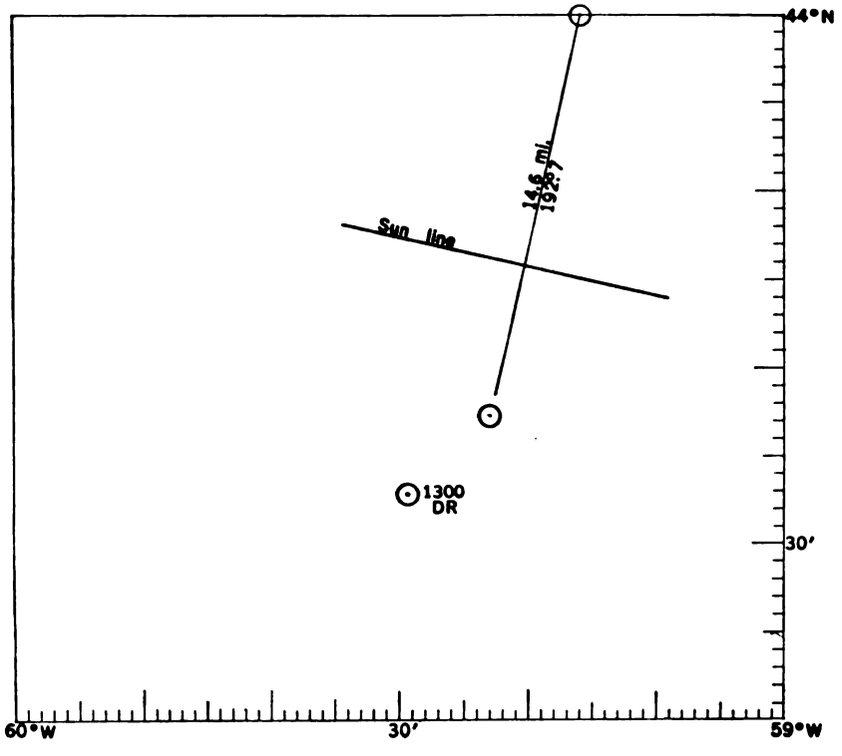
Example 1.—On January 28, 1951, the 1300 dead reckoning position of a ship is lat. 43° 32′.8 N, long. 59° 29′.4 W. About this time the navigator observes the lower limb of the sun, as follows: watch time (W) $12^h\ 58^m\ 45^s$ PM, watch error (WE) on zone time 45^s fast, height of eye 29 feet, index correction (IC) (+) 1′.3, sextant altitude (hs) 26° 49′.4. Solve the observation for altitude difference (a) and azimuth (Zn), using Δd only.

	January 28, 1951	
W	$12^h\ 58^m\ 45^s$ PM	
WE	(F) 45^s	
ZT	$12^h\ 58^m\ 00^s$	
ZD	(+) 4^h	
GMT*	$16^h\ 58^m\ 00^s$	Jan. 28
GHA for 16^h GMT	56° 45′.8	
Correction for $58^m\ 00^s$	14° 30′.0	
GHA	71° 15′.8	
aλ	59° 15′.8	W (assumed longitude)
LHA	12° 00′.0	
t (H. A.)	12° 00′.0	W
d	18° 16′.9	S d diff. 13′.1
aL	44° 00′.0	N (assumed latitude)
ht (Alt.)	26° 32′.5	Δd (+) 0.99
Correction	(+) 13′.0	
Hc	26° 45′.5	
Ho	27° 00′.1	
a	14.6	miles toward
Zn	192°.7	

	+	☉	−
IC	1′.3		
Additional	0′.6		
Correction	13′.9		
Dip			5′.1
Sum	15′.8		5′.1
Correction			(+) 10′.7
hs			26° 49′.4
Ho			27° 00′.1
d for 16^h GMT		(−)	18° 17′.6
Correction		(+)	0′.7
d			18° 16′.9 S
Z (Az.)			N 167°.3 W



NOTE.—Plus 0.99 is obtained from the Δd column abreast Alt. in the tables. The value (+) 13′.0 (correction for 13′.1 of declination difference) is obtained by multiplying 13′.1 by (+) 0.99 or by referring to the multiplication table on the inside back cover, entering with 13′ and then with 0′.1 at the top and with 99 at the side. The two values (12′.9 and 0′.1) thus obtained are then added to obtain the correction. The correction 13′.0 is added because as the tabulated declination (18° 30′) approaches the exact declination of the body (18° 16′.9), the altitude increases, as determined by inspection of the table. The tabulated azimuth angle, taken from the table without correction, is reckoned from the observer's elevated pole toward the west when the body is setting, or west of the meridian. The sight is plotted from the nearest whole degree of latitude (44° 00′.0 N) and the assumed longitude (59° 15′.8 W).

*Greenwich mean time, called *Greenwich civil time* (*GCT*) in the United States before January 1, 1953.

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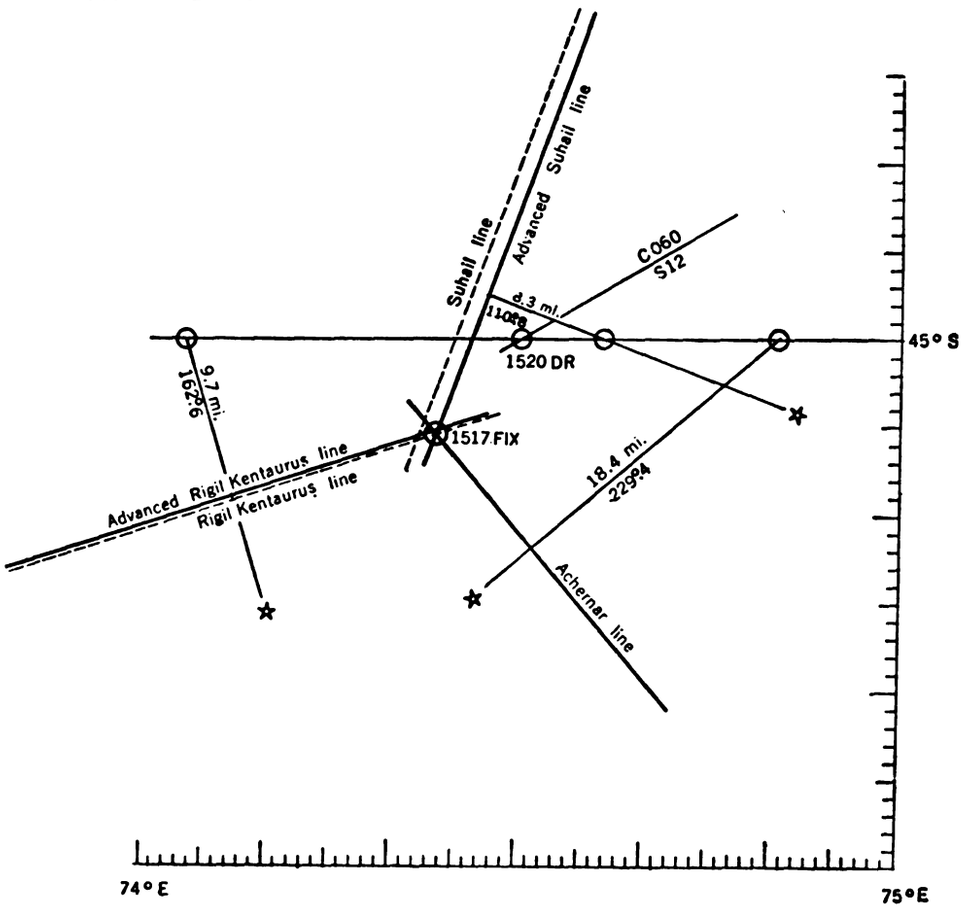
Example 2.—On February 2, 1951, the GMT 1520 dead reckoning position of a ship is lat. 45° 00′.0 S, long. 74° 30′.0 E. The ship is on course 060°, speed 12 knots. Observations are made as indicated below. Solve for a and Zn, using Δd only.

Stars	*GMT*	*Declination*	*Obs. Alt. (Ho)*
Suhail	15h 07m 48s	43° 14′.0 S	45° 46′.3
Rigil Kentaurus	15h 12m 03s	60° 38′.0 S	19° 33′.8
Achernar	15h 16m 32s	57° 29′.3 S	56° 26′.0

	SUHAIL		RIGIL KENTAURUS		ACHERNAR	
GMT	15h 07m 48s		15h 12m 03s		15h 16m 32s	
GHA ♈ for 15h GMT	356° 59′.7		356° 59′.7		356° 59′.7	
Correction for 7m 48s	1° 57′.3		(12m 03s) 3° 01′.2		(16m 32s) 4° 08′.7	
SHA	223° 26′.7		140° 56′.2		336° 01′.5	
GHA ☆	222° 23′.7		140° 57′.1		337° 09′.9	
aλ	74° 36′.3 E		74° 02′.9 E		74° 50′.1 E	
LHA	297° 00′.0		215° 00′.0		52° 00′.0	
t (H. A.)	63° 00′.0 E		145° 00′.0 E		52° 00′.0 W	
d	43° 14′.0 S	d diff. 14′.0	60° 38′.0 S	d diff. 8′.0	57° 29′.3 S	d diff. 0′.7
aL	45° 00′.0 S		45° 00′.0 S		45° 00′.0 S	
Δd and correction (+) 0.43	(+) 6′.0	(+) 0.90	(+) 7′.2	(−) 0.02	0′.0	
ht (Alt.)	45° 48′.6		19° 16′.9		56° 07′.6	
Hc	45° 54′.6		19° 24′.1		56° 07′.6	
Ho	45° 46′.3		19° 33′.8		56° 26′.0	
a	8.3 miles away		9.7 miles toward		18.4 miles toward	
Z (Az.) and Zn S 69°.2 E	110°.8	S 17°.4 E	162°.6	S 49°.4 W	229°.4	



NOTE.—The Suhail sight is plotted from lat. 45° 00′.0 S, long. 74° 36′.3 E; the Rigil Kentaurus sight from lat. 45° 00′.0 S, long. 74° 02′.9 E, and the Achernar sight from lat. 45° 00′.0 S, long. 74° 50′.1 E. In the illustration the Suhail line of position is advanced 1.8 miles for a 9-minute run and the Rigil Kentaurus line is advanced 0.8 miles for a 4-minute run, both in the direction of the course 060°, to obtain a fix at the time of the Achernar sight.

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(2) SOLUTION FOR LINE OF POSITION USING BOTH Δd AND Δt CORRECTIONS

If the navigator desires to plot the sight from his dead reckoning longitude (and the nearest whole degree of latitude to his dead reckoning position), he may do so by applying an additional correction to the altitude for hour angle difference. For example, if the exact hour angle of a star is 20° 10′.2 and the tables are entered with an hour angle of 20°, the hour angle difference is 10′.2. The correction is determined as follows:

Since Δt represents the change in altitude due to a change of 1′ of arc of hour angle, if Δt is multiplied by the hour angle difference, the correction for hour angle difference is obtained. When this correction, together with the Δd correction, is applied to the tabulated altitude, the value thus obtained is the correct computed altitude for arguments of whole degree of latitude, the exact hour angle, and the exact declination of the body.

When successive Δt values have large differences in numerical value, always make the altitude interpolation forward from the smaller entering hour angle, never interpolating backward from the nearest entering hour angle. Even with this precaution, the computed altitude will not be of the usual accuracy. In general it is preferable to not use Δt in this situation.

The Δt correction is obtained from the multiplication table in exactly the same manner as the Δd correction, i. e., by entering the multiplication table with Δt at the side and the hour angle difference at the top of the page, the Δt correction is taken from the body of the table by inspection.

By comparing the values of altitude for the tabulated hour angles between which the exact hour angle lies, one can determine whether the altitude is increasing or decreasing as the tabulated hour angle approaches the exact hour angle. The correction is applied to the tabulated altitude, plus if the altitude is increasing, and minus if the altitude is decreasing.

When both the Δd and the Δt corrections have been made to the tabulated altitude, the sight is plotted from the following position:

Latitude.—The whole degree with which the tables were entered.

Longitude.—The dead reckoning longitude.

Example 3.—On July 24, 1951, the 0700 dead reckoning position of a ship is lat. 40° 56′.9 N, long. 4° 29′.9 E. About this time the navigator observes the upper limb of the moon, as follows: watch time (W) $7^h\ 10^m\ 20^s$ AM, watch error (WE) on zone time 6^s slow, height of eye 22 feet, index correction (IC) (−) 1′.3, sextant altitude (hs) 39° 19′.9. Solve the observation for a and Zn, using Δd and Δt.

	July 24, 1951			
W	$7^h\ 10^m\ 20^s$ AM			
WE	(S) 6^s			
ZT	$7^h\ 10^m\ 26^s$			
ZD	0			
GMT	$7^h\ 10^m\ 26^s$ July 24, 1951			
GHA for 7^h GMT	35° 21′.1			
Correction for $10^m\ 26^s$	2° 29′.4 code			
Code correction	2′.5 (+) 144			
GHA	37° 53′.0	d for 7^h GMT	(+) 7° 41′.3 code	
aλ	4° 29′.9 E	Correction	(+) 2′.6	(+) 149
LHA	42° 22′.9	d		7° 43′.9 N
t (H. A.)	42° 22′.9 W	t diff. 22′.9		
d	7° 43′.9 N	d diff. 13′.9		
aL	41° 00′.0 N			
ht (Alt.)	39° 55′.1	Δd (+) 0.75;	Δt (−) 0.66	
Correction	(−) 4′.6			
Hc	39° 50′.5			
Ho	39° 41′.3			
a	9. 2 miles away			
Zn	239°.9			

	+	−
IC		1′.3
Additional		15′.8
Correction	42′.9	
Dip		4′.4
Sum	42′.9	21′.5
Correction		(+) 21′.4
hs		39° 19′.9
Ho		39° 41′.3

t correction	(−) 15′.1
d correction	(+) 10′.5
Correction	(−) 4′.6
Z(Az.)	N 120°.1 W

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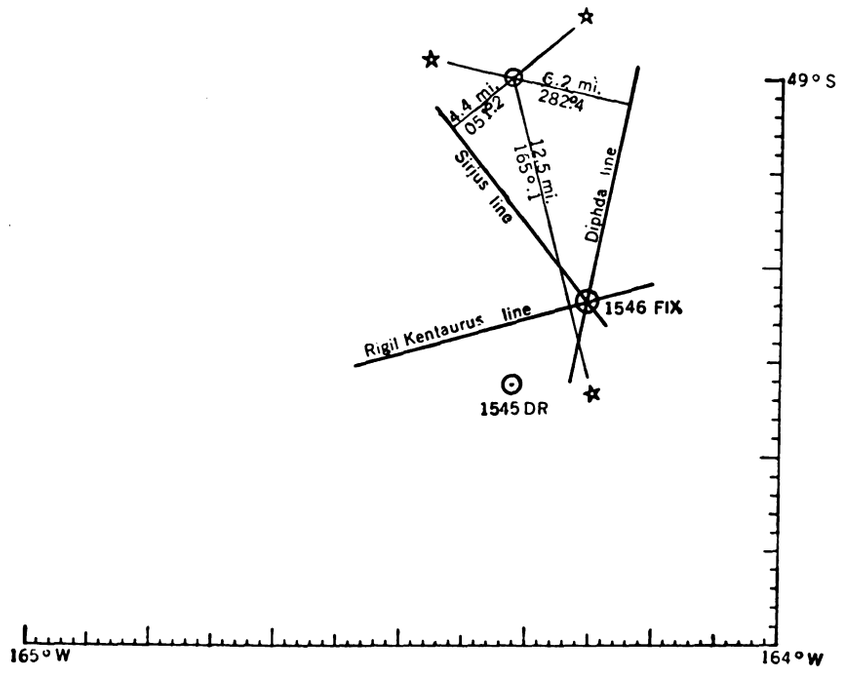
Example 4.—On September 17, 1951, the GMT 1545 dead reckoning position of a ship is lat. 49° 16′.5 S, long. 164° 21′.3 W. Nearly simultaneous observations are made as follows:

Stars	*GMT*	*Declination*	*Obs. Alt. (Ho)*
Sirius	15h 45m 53s	16° 38′.5 S	48° 00′.5
Rigil Kentaurus	15h 46m 21s	60° 38′.6 S	22° 18′.8
Diphda*	15h 46m 57s	18° 14′.9 S	34° 30′.0

	SIRIUS		RIGIL KENTAURUS		DIPHDA	
GMT	15h 45m 53s		15h 46m 21s		15h 46m 57s	
GHA ♈ for 15h GMT	220° 44′.2		220° 44′.2		220° 44′.2	
Correction for 45m 53s	11° 30′.1	(46m 21s)	11° 37′.2	(46m 57s)	11° 46′.2	
SHA	259° 14′.7		140° 56′.0		349° 42′.0	
GHA ☆	131° 29′.0		13° 17′.4		222° 12′.4	
aλ	164° 21′.3 W		164° 21′.3 W		164° 21′.3 W	
LHA	327° 07′.7		208° 56′.1		57° 51′.1	
t (H. A.)	32° 52′.3 E	t diff. 7′.7	151° 03′.9 E	t diff. 3′.9	57° 51′.1 W	t diff. 8′.9
d	16° 38′.5 S	d diff. 8′.5	60° 38′.6 S	d diff. 8′.6	18° 14′.9 S	d diff. 14′.9
aL	49° 00′.0 S		49° 00′.0 S		49° 00′.0 S	
Δd and correction (+) 0.85	(+) 7′.2	(+) 0.94	(+) 8′.1	(+) 0.74	(+) 11′.1	
Δt and correction (+) 0.52	(+) 4′.0	(−) 0.17	(−) 0′.7	(+) 0.64	(+) 5′.7	
ht (Alt.)	47° 53′.7		21° 58′.9		34° 19′.4	
Hc	48° 04′.9		22° 06′.3		34° 36′.2	
Ho	48° 00′.5		22° 18′.8		34° 30′.0	
a	4.4 miles away		12.5 miles toward		6.2 miles away	
Z (Az.) and Zn S 128°.8 E	051°.2	S 14°.9 E	165°.1	S 102°.4 W	282°.4	



NOTE.—All three sights are plotted from lat. 49° 00′.0 S, long. 164° 21′.3 W.
*Called *Deneb Kaitos* in the United States prior to January 1, 1953.

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(3) SOLUTION FOR LINE OF POSITION FROM THE DEAD RECKONING POSITION USING Δd, Δt, AND ΔL

If the navigator desires to plot the sight from the dead reckoning position, in addition to the Δd and Δt corrections, a correction to the altitude for latitude (called the ΔL correction) must be applied. If the nearest whole degree of latitude is used for entering the table, it will be necessary to correct for as much as 30′ difference in latitude between the integral degree with which the table is entered and the dead reckoning latitude. On pages 262 and 263 of this book is given a ΔL multiplication table from which corrections for minutes of latitude can be taken directly by inspection. The values in this table are the product of the ΔL value times the minutes of latitude. The value ΔL is the natural cosine of the azimuth angle, so that it is necessary to know only the azimuth angle of observation and the difference of latitude between the dead reckoning position and the nearest whole degree, as arguments for entry. In working from the dead reckoning position, corrections are made for Δd and Δt exactly as shown in the previous examples, in addition to the ΔL correction.

The LHA for the dead reckoning longitude is found by applying the dead reckoning longitude to the GHA.

With the nearest whole degree of latitude, the t (H.A.), and declination as arguments, take from the main table Alt., Δd, Δt, and Az. With the arguments azimuth angle and the difference of latitude between the dead reckoning position and the nearest whole degree, take the correction for latitude directly by inspection from the ΔL multiplication table on page 262 or 263. The sign of the ΔL correction is determined as follows:

Azimuth angle greater than 90°:

If DR latitude is greater than selected tabulated latitude, ΔL correction is minus; but for DR latitude less than selected tabulated latitude, the correction is plus.

Azimuth angle less than 90°:

If DR latitude is greater than selected tabulated latitude, ΔL correction is plus; but for DR latitude less than selected tabulated latitude, the correction is minus.

Example 5.—On August 1, 1951, the 0800 dead reckoning position of a ship is lat. 40° 12′.4 N, long. 50° 23′.5 W. About this time the navigator observes the lower limb of the sun for a line of position, as follows: Watch time (W) $7^h\ 57^m\ 00^s$ AM, watch error (WE) on zone time 34^s fast, height of eye 36 feet, index correction (IC) (+) 1′.0, sextant altitude (hs) 28°01.6. Solve the observation for altitude difference (a) and azimuth (Zn), using Δd, Δt, and ΔL.

	August 1, 1951		
W	$7^h\ 57^m\ 00^s$ AM		
WE	(F) 34^s		
ZT	$7^h\ 56^m\ 26^s$		
ZD	(+) 3^h		
GMT	$10^h\ 56^m\ 26^s$ Aug. 1		
GHA for 10^h GMT	328° 26′.0		
Correction for $56^m\ 26^s$	14° 06′.5	d for 10^h GMT (+) 18° 11′.0 code	
GHA	342° 32′.5	Correction (−) 0′.6 (−) 6	
aλ	50° 23′.5 W	d 18° 10′.4 N	
LHA	292° 09′.0		
t (H. A.)	67° 51′.0 E	t diff. 9′.0	
d	18° 10′.4 N	d diff. 10′.4	
aL	40° 12′.4 N	L diff. 12′.4	
ht (Alt.)	28° 08′.1	Δd (+) 0.59; Δt (+) 0.77	
Correction	(+) 13′.2		
Hc	28° 21′.3		
Ho	28° 11′.0		
a	10.3 miles away		
Zn	089°.5		

	+ ⊙ −	
IC	1′.0	
Additional	0′.1	
Correction	14′.0	
Dip		5′.7
Sum	15′.1	5′.7
Correction		(+) 9′.4
hs		28° 01′.6
Ho		28° 11′.0

	+	−
t correction	6′.9	
d correction	6′.1	
L correction	0′.2	
Sum	13′.2	0′.0
Correction		(+)13′.2

Z (Az.) N 89°.5 E

NOTE.—The sun line is plotted from the dead reckoning position.

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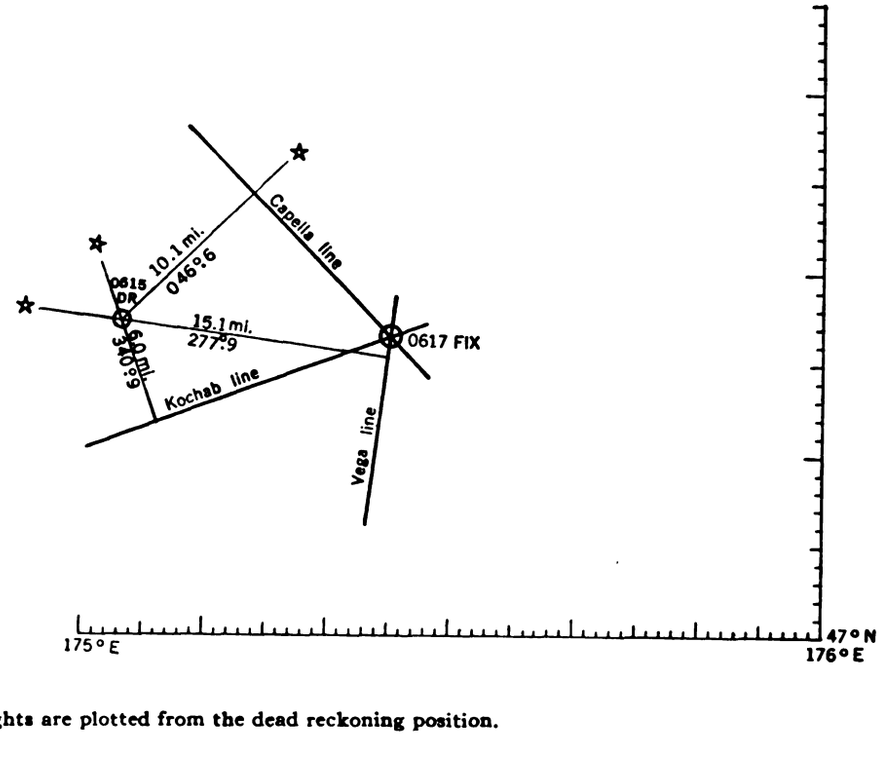
Example 6.—On November 25, 1951, the GMT 0615 dead reckoning position of a ship is lat. 47° 17′.6 N, long. 175° 03′.2 E: Nearly simultaneous observations are made, as follows:

Stars	*GMT*	*Declination*	*Obs. Alt. (Ho)*
Vega	$6^h\ 15^m\ 49^s$	38° 44′.3 N	50° 28′.0
Kochab	$6^h\ 16^m\ 37^s$	74° 20′.9 N	40° 05′.2
Capella	$6^h\ 17^m\ 15^s$	45° 57′.2 N	23° 51′.7

	VEGA		KOCHAB		CAPELLA	
GMT	$6^h\ 15^m\ 49^s$		$6^h\ 16^m\ 37^s$		$6^h\ 17^m\ 15^s$	
GHA ♈ for 6^h GMT	153° 22′.6		153° 22′.6		153° 22′.6	
Correction for $15^m\ 49^s$	3° 57′.9	($16^m\ 37^s$)	4° 09′.9	($17^m\ 15^s$)	4° 19′.5	
SHA	81° 10′.7		137° 18′.5		281° 42′.5	
GHA ☆	238° 31′.2		294° 51′.0		79° 24′.6	
aλ	175° 03′.2 E		175° 03′.2 E		175° 03′.2 E	
LHA	53° 34′.4		109° 54′.2		254° 27′.8	
t (H. A.)	53° 34′.4 W	t diff. 25′.6	109° 54′.2 W	t diff. 5′.8	105° 32′.2 E	t diff. 27′.8
d	38° 44′.3 N	d diff. 14′.3	74° 20′.9 N	d diff. 9′.1	45° 57′.2 N	d diff. 2′.8
aL	47° 17′.6 N	L diff. 17′.6	47° 17′.6 N	L diff. 17′.6	47° 17′.6 N	L diff. 17′.6
Δd and correction (+) 0.51	(+) 7′.3	(−) 0.55	(−) 5′.1	(−) 0.70	(−) 2′.0	
Δt and correction (+) 0.68	(+) 17′.4	(+) 0.22	(+) 1′.3	(+) 0.49	(+) 13′.6	
ΔL correction	(+) 2′.5		(+) 16′.7		(+) 12′.1	
ht (Alt.)	50° 15′.9		39° 58′.3		23° 17′.9	
Hc	50° 43′.1		40° 11′.2		23° 41′.6	
Ho	50° 28′.0		40° 05′.2		23° 51′.7	
a	15.1 miles away		6.0 miles away		10.1 miles toward	
Z (Az.) and Zn	N 82°.1 W	277°.9	N 19°.1 W	340°.9	N 46°.6 E	046°.6



NOTE.—All three sights are plotted from the dead reckoning position.

16—11430-1

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STAR IDENTIFICATION

With the sextant altitude and azimuth angle of the unknown star, enter the double-page Star Identification Table immediately following the applicable latitude section and extract the tabulated values of declination and hour angle. Eye interpolation will suffice for accuracy.

Combine the LHA with the longitude to determine the GHA of the star, and from this subtract the GHA ♈ to obtain the SHA. Enter the *Nautical Almanac* with the declination and SHA, and identify the star.

Example 7.—On April 19, 1951, the GMT 0930 dead reckoning position of a ship is lat. 46° 00′.0 S, long. 149° 15′.0 E. About this time the navigator observes a star through a break in the clouds, as follows: sextant altitude (hs) 30° 35′.8, azimuth 015°. Identify the star.

SOLUTION

Enter the star identification table for latitude 46° S with the approximate arguments Alt. 31° and Az. S 165° E (Zn 015°=S 165° E in south latitude) and find approximate:

Dec. 12° N, t (H. A.) 13° E

t (H. A.)	13° E	GMT	9h 30m
LHA☆	347°	GHA ♈ for 9h	341° 39′.4
Longitude	149° E	Correction for 30m 00s	7° 31′.2
GHA☆	198°	GHA ♈	349° 10′.6
GHA ♈	349°		
SHA	209°		

Enter the *Nautical Almanac* star list with the approximate sidereal hour angle (SHA) 209° and declination 12° N and identify the star as Regulus.

GREAT-CIRCLE SAILING

These tables can be used to solve for initial course and distance in great-circle sailing problems. Substitute latitude of departure for assumed latitude, latitude of destination for declination, and difference of longitude between the point of departure and the destination for hour angle. Great-circle distance in nautical miles is found by subtracting computed altitude (Hc) from 90° and converting the answer to minutes of arc. The azimuth becomes the initial great-circle course.

Example 8.—Find the great-circle distance and the initial course between New York, N. Y. and the Strait of Gibraltar.

Departure	*Destination*
Lat. (L_1) 40° 42′.0 N	Lat. (L_2) 35° 57′.0 N
Long. (λ_1) 74° 01′.0 W	Long. (λ_2) 5° 45′.0 W

SOLUTION

Enter the tables with the nearest tabulated value to L_1 as latitude, L_2 as declination, and DLo ($\lambda_1-\lambda_2$=74° 01′.0−5° 45′.0=68° 16′.0) as meridian angle (H.A.).

Alt.	*Δd*	*Δt*	*Az.*
37° 54′.3	(−) 0.46	(−) 0.72	N 71°.9 E

Δd correction for 3′.0	(−) 1′.4	
Δt correction for 16′.0	(−) 11′.5	
ΔL correction for 18′.0	(−) 5′.6	
	(−) 18′.5	(−) 18′.5
Hc		37° 35′.8
Subtract from		90°
Zenith distance (great-circle distance)		52° 24′.2=3144.2 nautical miles.
Great-circle course (N 71°.9 E)		071°.9.

If the combination of latitude of departure, latitude of destination, and difference of longitude cannot be found in the table, the name of the latitude of destination is reversed and the supplement of the difference of longitude is used for entering the table. The distance is found by *adding* the altitude to 90°; the great-circle course angle is the supplement of the azimuth angle. In the example, if the latitude of the destination is 35° 57′.0 S, the name is changed to N and the supplement of the difference of longitude is found (180°−68° 16′.0=111° 44′.0). Enter the table with lat. 41°, dec. 36° 00′ (same name as latitude), and H. A. 112°.

Alt.	*Δd*	*Δt*	*Az.*
9° 01′.6	(−) 0.71	(+) 0.57	49°.4

Δd correction for 3′.0	(−) 2′.1	
Δt correction for 16′.0	(+) 9′.1	
ΔL correction for 18′.0	(−) 11′.7	
	(−) 4′.7	(−) 4′.7
Hc		8° 56′.9
Add to		90°
Zenith distance (great-circle distance)		98° 56′.9=5,936.9 nautical miles.
Great-circle course (180°−49°.4=N 130°.6 E)		130°.6.

In those cases where neither combination of entering arguments can be found in the tables, this method of solution cannot be used.

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Lat. 40°

H.A.	0° 00′ Alt.	Az.	0° 30′ Alt.	Az.	1° 00′ Alt.	Az.	1° 30′ Alt.	Az.	2° 00′ Alt.	Az.	2° 30′ Alt.	Az.	3° 00′ Alt.	Az.	3° 30′ Alt.	Az.	H.A.
°	′	Δd Δt °	′	Δd Δt °	′	Δd Δt °	′	Δd Δt °	′	Δd Δt °	′	Δd Δt °	′	Δd Δt °	′	Δd Δt °	°
00	50 00.0	1.0 01 180.0	50 30.0	1.0 01 180.0	51 00.0	1.0 01 180.0	51 30.0	1.0 01 180.0	52 00.0	1.0 01 180.0	52 30.0	1.0 01 180.0	53 00.0	1.0 01 180.0	53 30.0	1.0 01 180.0	00
1	49 59.4	1.0 03 178.4	50 29.4	1.0 03 178.4	50 59.4	1.0 03 178.4	51 29.4	1.0 03 178.4	51 59.3	1.0 03 178.4	52 29.3	1.0 03 178.4	52 59.3	1.0 03 178.3	53 29.3	1.0 03 178.3	1
2	49 57.5	1.0 05 176.9	50 27.5	1.0 05 176.9	50 57.5	1.0 05 176.8	51 27.4	1.0 05 176.8	51 57.4	1.0 05 176.8	52 27.4	1.0 05 176.7	52 57.3	1.0 06 176.7	53 27.3	1.0 06 176.6	2
3	49 54.4	1.0 07 175.3	50 24.3	1.0 07 175.3	50 54.3	1.0 07 175.2	51 24.2	1.0 08 175.2	51 54.1	1.0 08 175.1	52 24.1	1.0 08 175.1	52 54.0	1.0 08 175.0	53 24.0	1.0 08 175.0	3
4	49 50.9	1.0 09 173.8	50 19.9	1.0 09 173.7	50 49.8	1.0 10 173.7	51 19.7	1.0 10 173.6	51 49.6	1.0 10 173.5	52 19.5	1.0 10 173.5	52 49.4	1.0 10 173.4	53 19.3	1.0 10 173.3	4
05	49 44.5	99 11 172.2	50 14.3	99 11 172.2	50 44.1	99 12 172.1	51 14.0	99 12 172.0	51 43.8	99 12 171.9	52 13.6	99 12 171.8	52 43.4	99 12 171.7	53 13.2	99 12 171.6	05
6	49 37.6	99 13 170.7	50 07.4	99 14 170.6	50 37.2	99 14 170.5	51 06.9	99 14 170.4	51 36.7	99 14 170.3	52 06.4	99 14 170.2	52 36.2	99 14 170.1	53 05.9	99 14 170.0	6
7	49 29.6	99 15 169.2	49 59.3	99 16 169.1	50 29.0	99 16 169.0	50 58.7	99 16 168.8	51 28.3	99 16 168.7	51 58.0	99 16 168.6	52 27.6	99 16 168.5	52 57.3	99 17 168.4	7
8	49 20.4	99 17 167.7	49 50.0	99 18 167.5	50 19.6	99 18 167.4	50 49.1	99 18 167.3	51 18.7	99 18 167.1	51 48.3	99 18 167.0	52 17.8	98 18 166.9	52 47.4	98 19 166.7	8
9	49 10.0	98 19 166.2	49 39.5	98 20 166.0	50 09.0	98 20 165.9	50 38.4	98 20 165.7	51 07.9	98 20 165.6	51 37.3	98 20 165.4	52 06.7	98 21 165.3	52 36.2	98 21 165.1	9
10	48 58.4	98 21 164.7	49 27.8	98 21 164.5	49 57.1	98 22 164.3	50 26.5	98 22 164.2	50 55.8	98 22 164.0	51 25.1	98 22 163.8	51 54.4	98 23 163.7	52 23.7	98 23 163.5	10
1	48 45.7	98 23 163.2	49 14.9	97 23 163.0	49 44.2	97 24 162.8	50 13.4	97 24 162.7	50 42.6	97 24 162.5	51 11.8	97 24 162.3	51 40.9	97 25 162.1	52 10.1	97 25 161.9	1
2	48 31.8	98 25 161.7	49 00.9	97 25 161.5	49 30.0	97 25 161.3	49 59.1	97 26 161.1	50 28.1	97 26 160.9	50 57.2	97 26 160.7	51 26.2	97 26 160.5	51 55.2	97 27 160.3	2
3	48 16.8	97 27 160.2	48 45.8	97 27 160.0	49 14.7	96 27 159.8	49 43.7	96 28 159.6	50 12.6	96 28 159.4	50 41.4	96 28 159.2	51 10.3	96 28 159.0	51 39.1	96 29 158.8	3
4	48 00.7	96 29 158.8	48 29.6	96 29 158.6	48 58.4	96 29 158.4	49 27.1	96 29 158.2	49 55.9	96 30 157.9	50 24.6	96 30 157.7	50 53.3	96 30 157.5	51 21.9	96 31 157.2	4
15	47 43.6	96 30 157.4	48 12.2	96 31 157.2	48 40.9	96 31 156.9	49 09.5	96 31 156.7	49 38.0	96 32 156.5	50 06.6	96 32 156.2	50 35.1	96 32 156.0	51 03.6	96 32 155.7	15
6	47 25.4	96 32 156.0	47 53.9	96 32 155.7	48 22.3	96 33 155.5	48 50.8	96 33 155.2	49 19.2	96 33 155.0	49 47.5	96 34 154.8	50 15.9	94 34 154.5	50 44.2	94 34 154.2	6
7	47 06.1	94 34 154.6	47 34.5	94 34 154.3	48 02.7	94 34 154.1	48 31.0	94 35 153.8	48 59.2	94 35 153.6	49 27.4	94 35 153.3	49 55.5	94 36 153.0	50 23.6	94 36 152.8	7
8	46 45.9	94 35 153.2	47 14.0	94 36 152.9	47 42.1	94 36 152.7	48 10.2	93 36 152.4	48 38.2	93 37 152.1	49 06.2	93 37 151.9	49 34.2	93 37 151.6	50 02.1	93 38 151.3	8
9	46 24.7	93 37 151.8	46 52.6	93 37 151.6	47 20.5	93 38 151.3	47 48.4	93 38 151.0	48 16.3	93 38 150.7	48 44.1	93 39 150.5	49 11.8	92 39 150.2	49 39.5	92 39 149.9	9
20	46 02.5	93 38 150.5	46 30.3	92 39 150.2	46 58.0	92 39 149.9	47 25.7	92 40 149.6	47 53.3	92 40 149.4	48 20.9	92 40 149.1	48 48.4	92 41 148.8	49 15.9	92 41 148.5	20
1	45 39.4	92 40 149.2	46 07.0	92 40 148.9	46 34.5	92 41 148.6	47 02.0	92 41 148.3	47 29.4	91 41 148.0	47 56.8	91 42 147.7	48 24.1	91 42 147.4	48 51.4	91 42 147.1	1
2	45 15.4	91 42 147.8	45 42.8	91 42 147.6	46 10.1	91 42 147.3	46 37.4	91 42 147.0	47 04.6	91 43 146.7	47 31.8	91 43 146.3	47 58.9	90 44 146.0	48 26.0	90 44 145.7	2
3	44 50.5	91 43 146.6	45 17.7	90 43 146.3	45 44.8	90 44 146.0	46 11.9	90 44 145.6	46 38.9	90 44 145.3	47 05.9	90 45 145.0	47 32.8	90 45 144.7	47 59.6	89 45 144.4	3
4	44 24.7	90 44 145.3	44 51.7	90 45 145.0	45 18.6	90 45 144.7	45 45.5	89 45 144.4	46 12.3	89 46 144.0	46 39.1	89 46 143.7	47 05.8	89 46 143.4	47 32.4	89 47 143.0	4
25	43 58.2	89 46 144.0	44 24.9	89 46 143.7	44 51.6	89 46 143.4	45 18.3	89 47 143.1	45 44.9	89 47 142.8	46 11.4	88 47 142.4	46 37.9	88 48 142.1	47 04.4	88 48 141.7	25
6	43 30.8	89 47 142.8	43 57.3	88 47 142.5	44 23.8	88 48 142.2	44 50.3	88 48 141.8	45 16.7	88 48 141.5	45 43.0	88 49 141.2	46 09.3	87 49 140.8	46 35.5	87 49 140.5	6
7	43 02.6	88 48 141.6	43 29.0	88 49 141.3	43 55.3	88 49 140.9	44 21.5	87 49 140.6	44 47.7	87 50 140.3	45 13.8	87 50 139.9	45 39.8	87 50 139.6	46 05.8	87 51 139.2	7
8	42 33.7	87 49 140.4	42 59.8	87 50 140.1	43 25.9	87 50 139.7	43 51.9	87 50 139.4	44 17.9	86 51 139.0	44 43.8	86 51 138.7	45 09.7	86 52 138.3	45 35.4	86 52 138.0	8
9	42 04.0	87 51 139.2	42 30.0	86 51 138.9	42 55.8	86 51 138.5	43 21.7	86 52 138.2	43 47.4	86 52 137.8	44 13.1	86 52 137.5	44 38.7	85 53 137.1	45 04.3	85 53 136.7	9
30	41 33.6	86 52 138.1	41 59.4	86 52 137.7	42 25.1	85 52 137.4	42 50.7	85 53 137.0	43 16.2	85 53 136.7	43 41.7	85 53 136.3	44 07.1	85 54 135.9	44 32.5	84 54 135.6	30
1	41 02.6	85 53 136.9	41 28.1	85 53 136.6	41 53.6	85 54 136.2	42 19.0	85 54 135.9	42 44.3	84 54 135.5	43 09.6	84 55 135.1	43 34.8	84 55 134.8	43 59.9	84 55 134.4	1
2	40 30.9	85 54 135.8	40 56.2	84 54 135.5	41 21.5	84 55 135.1	41 46.7	84 55 134.7	42 11.8	84 55 134.4	42 36.9	83 56 134.0	43 01.9	83 56 133.6	43 26.8	83 56 133.2	2
3	39 58.5	84 55 134.7	40 23.7	84 55 134.4	40 48.7	83 56 134.0	41 13.7	83 56 133.6	41 38.6	83 56 133.3	42 03.5	83 57 132.9	42 28.3	82 57 132.5	42 53.0	82 57 132.1	3
4	39 25.6	83 56 133.6	39 50.5	83 56 133.3	40 15.3	83 57 132.9	40 40.1	83 57 132.5	41 04.9	82 57 132.2	41 29.5	82 58 131.8	41 54.1	82 58 131.4	42 18.6	82 58 131.0	4
35	38 52.0	83 57 132.6	39 16.7	82 57 132.2	39 41.4	82 58 131.8	40 06.0	82 58 131.4	40 30.5	82 58 131.1	40 54.9	81 59 130.7	41 19.3	81 59 130.3	41 43.6	81 59 129.9	35
6	38 17.8	82 58 131.5	38 42.4	82 58 131.1	39 06.8	81 58 130.8	39 31.2	81 59 130.4	39 55.6	81 59 130.0	40 19.8	81 59 129.6	40 44.0	80 60 129.2	41 08.1	80 60 128.8	6
7	37 43.1	81 59 130.5	38 07.5	81 59 130.1	38 31.8	81 59 129.7	38 56.0	81 60 129.3	39 20.1	80 60 129.0	39 44.1	80 60 128.6	40 08.1	80 61 128.2	40 32.0	79 61 127.8	7
8	37 07.9	81 60 129.4	37 32.1	80 60 129.1	37 56.1	80 60 128.7	38 20.2	80 61 128.3	38 44.1	80 61 127.9	39 07.9	79 61 127.5	39 31.7	79 61 127.1	39 55.4	79 62 126.7	8
9	36 32.2	80 60 128.4	36 56.1	80 61 128.1	37 20.0	80 61 127.7	37 43.8	79 61 127.3	38 07.6	79 62 126.9	38 31.3	79 62 126.5	38 54.8	78 62 126.1	39 18.3	78 63 125.7	9
40	35 55.9	79 61 127.5	36 19.7	79 62 127.1	36 43.4	79 62 126.7	37 07.0	79 62 126.3	37 30.6	78 62 125.9	37 54.1	78 63 125.5	38 17.5	78 63 125.1	38 40.8	78 63 124.7	40
1	35 19.2	79 62 126.5	35 42.8	79 62 126.1	36 06.3	78 63 125.7	36 29.8	78 63 125.3	36 53.1	78 63 124.9	37 16.4	78 63 124.5	37 39.7	77 64 124.1	38 02.8	77 64 123.7	1
2	34 42.9	78 63 125.5	35 05.4	78 63 125.1	35 28.8	78 63 124.8	35 52.1	77 64 124.4	36 15.2	77 64 124.0	36 38.4	77 64 123.6	37 01.4	77 64 123.2	37 24.4	76 65 122.8	2
3	34 04.4	78 63 124.6	34 27.6	77 64 124.2	34 50.8	77 64 123.8	35 13.9	77 64 123.4	35 36.9	77 65 123.0	35 59.9	76 65 122.6	36 22.7	76 65 122.2	36 45.5	76 65 121.8	3
4	33 26.3	77 64 123.6	33 49.4	77 64 123.3	34 12.4	77 65 122.9	34 35.3	76 65 122.5	34 58.2	76 65 122.1	35 21.0	76 66 121.7	35 43.7	76 66 121.3	36 06.3	75 66 120.9	4
45	32 47.9	76 65 122.7	33 10.8	76 65 122.3	33 33.6	76 65 122.0	33 56.4	76 66 121.6	34 19.0	75 66 121.2	34 41.7	75 66 120.8	35 04.2	75 66 120.4	35 26.6	75 67 120.0	45
6	32 09.0	76 65 121.8	32 31.7	76 66 121.4	32 54.4	75 66 121.1	33 17.0	75 66 120.7	33 39.5	75 66 120.3	34 02.0	75 67 119.9	34 24.3	74 67 119.5	34 46.6	74 67 119.1	6
7	31 29.8	75 66 120.9	31 52.3	75 66 120.6	32 14.9	75 66 120.2	32 37.3	75 67 119.8	32 59.7	74 67 119.4	33 21.9	74 67 119.0	33 44.2	74 68 118.6	34 06.3	74 68 118.2	7
8	30 50.2	75 67 120.1	31 12.6	75 67 119.7	31 34.9	74 67 119.3	31 57.2	74 67 118.9	32 19.4	74 68 118.5	32 41.6	74 68 118.1	33 03.6	73 68 117.7	33 25.6	73 68 117.3	8
9	30 10.2	74 67 119.2	30 32.5	74 67 118.8	30 54.7	74 68 118.4	31 16.8	74 68 118.0	31 38.9	73 68 117.6	32 00.9	73 68 117.2	32 22.8	73 69 116.8	32 44.6	73 69 116.4	9
50	29 29.9	74 68 118.3	29 52.0	74 68 118.0	30 14.1	73 68 117.6	30 36.1	73 68 117.2	30 58.0	73 69 116.8	31 19.8	73 69 116.4	31 41.6	72 69 116.0	32 03.3	72 69 115.6	50
1	28 49.3	73 68 117.5	29 11.3	73 68 117.1	29 33.2	73 69 116.7	29 55.0	73 69 116.3	30 16.8	72 69 115.9	30 38.5	72 69 115.5	31 00.1	72 70 115.1	31 21.7	72 70 114.7	1
2	28 08.4	73 69 116.7	28 30.2	73 69 116.3	28 52.0	72 69 115.9	29 13.7	72 69 115.5	29 35.3	72 70 115.1	29 56.9	72 70 114.7	30 18.4	71 70 114.3	30 39.8	71 70 113.9	2
3	27 27.2	72 69 115.8	27 48.9	72 69 115.5	28 10.5	72 70 115.1	28 32.1	72 70 114.7	28 53.6	72 70 114.3	29 15.0	71 70 113.9	29 36.3	71 70 113.5	29 57.6	71 71 113.1	3
4	26 45.7	72 70 115.0	27 07.2	72 70 114.6	27 28.7	72 70 114.3	27 50.2	71 70 113.9	28 11.5	71 70 113.5	28 32.8	71 71 113.1	28 54.0	71 71 112.7	29 15.2	70 71 112.2	4
55	26 03.9	72 70 114.2	26 25.3	71 70 113.8	26 46.7	71 70 113.4	27 08.0	71 71 113.1	27 29.2	71 71 112.7	27 50.4	70 71 112.3	28 11.5	70 71 111.9	28 32.5	70 72 111.4	55
6	25 21.8	71 70 113.4	25 43.1	71 71 113.1	26 04.4	71 71 112.7	26 25.6	71 71 112.3	26 46.7	70 71 111.9	27 07.7	70 72 111.5	27 28.7	70 72 111.1	27 49.6	70 72 110.7	6
7	24 39.5	71 71 112.7	25 00.7	71 71 112.3	25 21.9	70 71 111.9	25 42.9	70 71 111.5	26 03.9	70 72 111.1	26 24.9	70 72 110.7	26 45.7	69 72 110.3	27 06.5	69 72 109.9	7
8	23 57.0	70 71 111.9	24 18.1	70 71 111.5	24 39.1	70 72 111.1	25 00.0	70 72 110.7	25 20.9	70 72 110.3	25 41.7	69 72 109.9	26 02.5	69 72 109.5	26 23.2	69 73 109.1	8
9	23 14.2	70 72 111.1	23 35.2	70 72 110.7	23 56.1	70 72 110.3	24 16.9	69 72 109.9	24 37.7	69 72 109.6	24 58.4	69 73 109.1	25 19.1	69 73 108.7	25 39.7	68 73 108.3	9
60	22 31.3	70 72 110.4	22 52.1	69 72 110.0	23 12.9	69 72 109.6	23 33.6	69 73 109.2	23 54.3	69 73 108.8	24 14.9	69 73 108.4	24 35.5	68 73 108.0	24 55.9	68 73 107.6	60
1	21 48.1	69 72 109.6	22 08.8	69 72 109.2	22 29.5	69 73 108.8	22 50.1	69 73 108.4	23 10.7	68 73 108.0	23 31.2	68 73 107.6	23 51.7	68 73 107.2	24 12.0	68 73 106.8	1
2	21 04.7	69 73 108.9	21 25.3	69 73 108.5	21 45.9	69 73 108.1	22 06.4	68 73 107.7	22 26.9	68 73 107.3	22 47.3	68 73 106.9	23 07.7	68 74 106.5	23 28.0	68 74 106.1	2
3	20 21.1	69 73 108.1	20 41.6	68 73 107.7	21 02.1	68 73 107.4	21 22.6	68 73 107.0	21 42.9	68 74 106.6	22 03.3	68 74 106.2	22 23.5	67 74 105.8	22 43.8	67 74 105.4	3
4	19 37.3	68 73 107.4	19 57.8	68 73 107.0	20 18.2	68 74 106.6	20 38.5	68 74 106.2	20 58.8	68 74 105.8	21 19.0	67 74 105.4	21 39.2	67 74 105.0	21 59.3	67 74 104.6	4
65	18 53.4	68 74 106.7	19 13.7	68 74 106.3	19 34.0	68 74 105.9	19 54.3	67 74 105.5	20 14.5	67 74 105.1	20 34.7	67 74 104.7	20 54.7	67 74 104.3	21 14.8	67 74 103.9	65
6	18 09.3	68 74 106.0	18 29.5	67 74 105.6	18 49.8	67 74 105.2	19 09.9	67 74 104.8	19 30.1	67 74 104.4	19 50.1	67 74 104.0	20 10.1	67 75 103.6	20 30.1	66 75 103.2	6
7	17 25.0	67 74 105.3	17 45.2	67 74 104.9	18 05.3	67 74 104.5	18 25.4	67 74 104.1	18 45.5	67 75 103.7	19 05.5	67 75 103.3	19 25.4	66 75 102.9	19 45.3	66 75 102.5	7
8	16 40.6	67 74 104.6	17 00.7	67 74 104.2	17 20.8	67 74 103.8	17 40.8	67 75 103.4	18 00.7	66 75 103.0	18 20.7	66 75 102.6	18 40.5	66 75 102.2	19 00.4	66 75 101.8	8
9	15 56.0	67 74 103.9	16 16.1	67 75 103.5	16 36.0	67 75 103.1	16 56.0	66 75 102.7	17 15.9	66 75 102.3	17 35.8	66 75 101.9	17 55.6	66 75 101.5	18 15.3	66 75 101.1	9
70	15 11.3	67 75 103.2	15 31.3	66 75 102.8	15 51.2	66 75 102.4	16 11.1	66 75 102.0	16 30.9	66 75 101.6	16 50.7	66 75 101.2	17 10.5	66 75 100.8	17 30.2	66 75 100.4	70
1	14 26.5	66 75 102.5	14 46.4	66 75 102.1	15 06.3	66 75 101.7	15 26.1	66 75 101.3	15 45.9	66 75 100.9	16 05.6	66 75 100.5	16 25.3	66 76 100.1	16 44.9	65 76 99.7	1
2	13 41.6	66 75 101.8	14 01.4	66 75 101.4	14 21.2	66 75 101.0	14 41.0	66 75 100.6	15 00.7	66 75 100.2	15 20.4	66 76 99.9	15 40.0	65 76 99.5	15 59.6	65 76 99.1	2
3	12 56.5	66 75 101.1	13 16.3	66 75 100.7	13 36.0	66 75 100.4	13 55.7	66 76 100.0	14 15.4	65 76 99.6	14 35.0	65 76 99.2	14 54.6	65 76 98.8	15 14.2	65 76 98.4	3
4	12 11.4	66 75 100.4	12 31.1	66 76 100.1	12 50.8	66 76 99.7	13 10.4	65 76 99.3	13 30.0	65 76 98.9	13 49.6	65 76 98.5	14 09.1	65 76 98.1	14 28.6	65 76 97.7	4
75	11 26.1	66 76 99.8	11 45.8	65 76 99.4	12 05.4	65 76 99.0	12 25.0	65 76 98.6	12 44.6	65 76 98.2	13 04.1	65 76 97.8	13 23.6	65 76 97.4	13 43.1	65 76 97.1	75
6	10 40.8	65 76 99.1	11 00.4	65 76 98.7	11 20.0	65 76 98.3	11 39.5	65 76 97.9	11 59.1	65 76 97.6	12 18.5	65 76 97.2	12 38.0	65 76 96.8	12 57.4	65 76 96.4	6
7	9 55.4	65 76 98.4	10 14.9	65 76 98.1	10 34.5	65 76 97.7	10 54.0	65 76 97.3	11 13.5	65 76 96.9	11 32.9	65 76 96.5	11 52.3	65 76 96.1	12 11.7	65 76 95.7	7
8	9 09.9	65 76 97.8	9 29.4	65 76 97.4	9 48.9	65 76 97.0	10 08.4	65 76 96.6	10 27.8	65 76 96.2	10 47.2	65 76 95.8	11 06.6	65 76 95.5	11 26.0	64 76 95.1	8
9	8 24.3	65 76 97.1	8 43.8	65 76 96.7	9 03.2	65 76 96.4	9 22.7	65 76 96.0	9 42.1	65 76 95.6	10 01.5	65 76 95.2	10 20.8	64 76 94.8	10 40.1	64 76 94.4	9
80	7 38.7	65 76 96.5	7 58.1	65 76 96.1	8 17.5	65 76 95.7	8 36.9	65 76 95.3	8 56.3	65 76 94.9	9 15.7	64 76 94.5	9 35.0	64 76 94.2	9 54.3	64 76 93.8	80
1	6 53.0	65 76 95.8	7 12.4	65 76 95.4	7 31.8	65 76 95.0	7 51.1	65 76 94.7	8 10.5	64 76 94.3	8 29.8	64 76 93.9	8 49.1	64 76 93.5	9 08.4	64 76 93.1	1
2	6 07.2	65 76 95.2	6 26.6	65 76 94.8	6 46.0	65 76 94.4	7 05.3	64 76 94.0	7 24.6	64 76 93.6	7 44.0	64 76 93.2	8 03.2	64 77 92.9	8 22.5	64 77 92.5	2
3	5 21.4	65 76 94.5	5 40.8	65 76 94.1	6 00.1	64 76 93.7	6 19.4	64 76 93.4	6 38.8	64 76 93.0	6 58.1	64 77 92.6	7 17.3	64 77 92.2	7 36.6	64 77 91.8	3
4					5 14.2	64 77 93.1	5 33.5	64 77 92.7	5 52.8	64 77 92.3	6 12.1	64 77 91.9	6 31.4	64 77 91.6	6 50.6	64 77 91.2	4
85									5 06.9	64 77 91.7	5 26.2	64 77 91.3	5 45.4	64 77 90.9	6 04.7	64 77 90.5	85
6															5 18.7	64 77 89.9	6

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H.A.	0° 00′ Alt.	Δd	Δt	Az.	0° 30′ Alt.	Δd	Δt	Az.	1° 00′ Alt.	Δd	Δt	Az.	1° 30′ Alt.	Δd	Δt	Az.	2° 00′ Alt.	Δd	Δt	Az.	2° 30′ Alt.	Δd	Δt	Az.	3° 00′ Alt.	Δd	Δt	Az.	3° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
00	50 00.0	1.0	01	180.0	49 30.0	1.0	01	180.0	49 00.0	1.0	01	180.0	48 30.0	1.0	01	180.0	48 00.0	1.0	01	180.0	47 30.0	1.0	01	180.0	47 00.0	1.0	01	180.0	46 30.0	1.0	01	180.0	00
1	49 59.4	1.0	03	178.4	49 29.4	1.0	03	178.5	48 59.4	1.0	03	178.5	48 29.4	1.0	03	178.5	47 59.4	1.0	03	178.5	47 29.4	1.0	03	178.5	46 59.4	1.0	03	178.5	46 29.4	1.0	03	178.5	1
2	49 57.5	1.0	05	176.9	49 27.5	1.0	05	176.9	48 57.6	1.0	05	177.0	48 27.6	1.0	05	177.0	47 57.6	1.0	05	177.0	47 27.6	1.0	05	177.0	46 57.7	1.0	05	177.1	46 27.7	1.0	05	177.1	2
3	49 54.4	1.0	07	175.3	49 24.4	1.0	07	175.4	48 54.5	1.0	07	175.4	48 24.6	1.0	07	175.5	47 54.6	1.0	07	175.5	47 24.7	1.0	07	175.6	46 54.7	1.0	07	175.6	46 24.8	1.0	07	175.7	3
4	49 50.0	1.0	09	173.8	49 20.1	1.0	09	173.9	48 50.2	1.0	09	173.9	48 20.3	1.0	09	174.0	47 50.4	1.0	09	174.0	47 20.5	1.0	09	174.1	46 50.6	1.0	09	174.2	46 20.7	1.0	09	174.2	4
05	49 44.5	99	11	172.2	49 14.6	99	11	172.3	48 44.8	99	11	172.4	48 14.9	99	11	172.5	47 45.1	1.0	11	172.6	47 15.2	1.0	11	172.6	46 45.4	1.0	11	172.7	46 15.5	1.0	11	172.8	05
6	49 37.6	99	13	170.7	49 07.9	99	13	170.8	48 38.1	99	13	170.9	48 08.3	99	13	171.0	47 38.5	99	13	171.1	47 08.7	99	13	171.2	46 38.9	99	13	171.3	46 09.1	99	12	171.3	6
7	49 29.6	99	15	169.2	48 59.9	99	15	169.3	48 30.2	99	15	169.4	48 00.5	99	15	169.5	47 30.8	99	15	169.6	47 01.1	99	15	169.7	46 31.4	99	14	169.8	46 01.7	99	14	169.9	7
8	49 20.4	99	17	167.7	48 50.8	99	17	167.8	48 21.2	99	17	167.9	47 51.6	99	17	168.0	47 22.0	99	17	168.2	46 52.3	99	16	168.3	46 22.7	99	16	168.4	45 53.0	99	16	168.5	8
9	49 10.0	98	19	166.2	48 40.5	98	19	166.3	48 11.0	98	19	166.4	47 41.5	98	19	166.6	47 11.9	98	19	166.7	46 42.4	98	18	166.8	46 12.9	98	18	167.0	45 43.3	99	18	167.1	9
10	48 58.4	98	21	164.7	48 29.0	98	21	164.8	47 59.6	98	21	165.0	47 30.2	98	21	165.1	47 00.8	98	20	165.3	46 31.4	98	20	165.4	46 01.9	98	20	165.5	45 32.5	98	20	165.7	10
1	48 45.7	98	23	163.2	48 16.4	98	23	163.3	47 47.1	98	23	163.5	47 17.9	98	22	163.7	46 48.6	98	22	163.8	46 19.2	98	22	164.0	45 49.9	98	22	164.1	45 20.6	98	22	164.3	1
2	48 31.8	98	25	161.7	48 02.7	97	25	161.9	47 33.5	97	24	162.1	47 04.4	97	24	162.2	46 35.2	97	24	162.4	46 06.0	97	24	162.6	45 36.8	97	24	162.7	45 07.6	97	23	162.9	2
3	48 16.8	97	27	160.2	47 47.8	97	27	160.4	47 18.8	97	26	160.6	46 49.8	97	26	160.8	46 20.8	97	26	161.0	45 51.7	97	26	161.2	45 22.6	97	25	161.3	44 53.5	97	25	161.5	3
4	48 00.7	96	29	158.8	47 31.9	96	28	159.0	47 03.0	96	28	159.2	46 34.2	96	28	159.4	46 05.3	96	28	159.6	45 36.4	96	27	159.8	45 07.4	96	27	160.0	44 38.5	97	27	160.2	4
15	47 43.6	96	30	157.4	47 14.9	96	30	157.6	46 46.2	96	30	157.8	46 17.5	96	30	158.0	45 48.7	96	29	158.2	45 20.0	96	29	158.4	44 51.2	96	29	158.6	44 22.4	96	29	158.8	15
6	47 25.4	95	32	156.0	46 56.9	95	32	156.2	46 28.3	95	31	156.4	45 59.8	95	31	156.6	45 31.2	95	31	156.8	45 02.5	95	31	157.1	44 33.9	96	30	157.3	44 05.2	96	30	157.5	6
7	47 06.1	94	34	154.6	46 37.8	95	33	154.8	46 09.4	95	33	155.0	45 41.0	95	33	155.3	45 12.6	95	33	155.5	44 44.1	95	32	155.7	44 15.7	95	32	155.9	43 47.1	95	32	156.2	7
8	46 45.9	94	35	153.2	46 17.7	94	35	153.4	45 49.5	94	35	153.7	45 21.3	94	34	153.9	44 53.0	94	34	154.2	44 24.8	94	34	154.4	43 56.4	94	34	154.6	43 28.1	95	33	154.9	8
9	46 24.7	93	37	151.8	45 56.7	93	37	152.1	45 28.7	93	36	152.3	45 00.6	94	36	152.6	44 32.5	94	36	152.8	44 04.4	94	35	153.1	43 36.3	94	35	153.3	43 08.1	94	35	153.6	9
20	46 02.5	93	38	150.5	45 34.7	93	38	150.7	45 06.9	93	38	151.0	44 39.0	93	38	151.3	44 11.1	93	37	151.5	43 43.1	93	37	151.8	43 15.2	93	37	152.0	42 47.2	93	36	152.3	20
1	45 39.4	92	40	149.2	45 11.8	92	40	149.4	44 44.1	92	39	149.7	44 16.5	92	39	150.0	43 48.7	92	39	150.2	43 21.0	93	38	150.5	42 53.2	93	38	150.8	42 25.3	93	38	151.0	1
2	45 15.4	91	42	147.8	44 48.0	91	41	148.1	44 20.5	92	41	148.4	43 53.0	92	41	148.7	43 25.5	92	40	149.0	42 57.9	92	40	149.2	42 30.3	92	40	149.5	42 02.6	92	39	149.8	2
3	44 50.5	91	43	146.6	44 23.3	91	43	146.9	43 56.0	91	42	147.1	43 28.7	91	42	147.4	43 01.3	91	42	147.7	42 34.0	91	41	148.0	42 06.5	91	41	148.3	41 39.1	92	41	148.5	3
4	44 24.7	90	44	145.3	43 57.7	90	44	145.6	43 30.6	90	44	145.9	43 03.5	90	43	146.2	42 36.4	91	43	146.5	42 09.2	91	43	146.8	41 41.9	91	42	147.0	41 14.7	91	42	147.3	4
25	43 58.2	89	46	144.0	43 31.3	89	45	144.4	43 04.5	90	45	144.7	42 37.6	90	45	145.0	42 10.6	90	44	145.3	41 43.6	90	44	145.5	41 16.5	90	44	145.8	40 49.4	90	43	146.1	25
6	43 30.8	89	47	142.8	43 04.2	89	47	143.1	42 37.5	89	46	143.4	42 10.8	89	46	143.7	41 44.0	89	46	144.1	41 17.2	89	45	144.3	40 50.3	90	45	144.6	40 23.4	90	45	144.9	6
7	43 02.6	88	48	141.6	42 36.2	88	48	141.9	42 09.7	88	48	142.2	41 43.2	88	47	142.6	41 16.6	89	47	142.9	40 50.0	89	47	143.2	40 23.3	89	46	143.5	39 56.6	89	46	143.8	7
8	42 33.7	87	49	140.4	42 07.5	87	49	140.7	41 41.2	88	49	141.1	41 14.9	88	48	141.4	40 48.5	88	48	141.7	40 22.1	88	48	142.0	39 55.6	88	47	142.3	39 29.1	88	47	142.6	8
9	42 04.0	87	51	139.2	41 38.0	87	50	139.6	41 11.9	87	50	139.9	40 45.8	87	50	140.2	40 19.7	87	49	140.5	39 53.4	88	49	140.9	39 27.2	88	49	141.2	39 00.8	88	48	141.5	9
30	41 33.6	86	52	138.1	41 07.8	86	51	138.4	40 42.0	86	51	138.7	40 16.1	86	51	139.1	39 50.1	87	50	139.4	39 24.1	87	50	139.7	38 58.0	87	50	140.0	38 31.8	87	49	140.4	30
1	41 02.6	85	53	136.9	40 37.0	85	53	137.3	40 11.3	86	52	137.6	39 45.6	86	52	138.0	39 19.8	86	52	138.3	38 54.0	86	51	138.6	38 28.1	86	51	138.9	38 02.2	87	51	139.3	1
2	40 30.9	85	54	135.8	40 05.5	85	54	136.2	39 40.0	85	53	136.5	39 14.5	85	53	136.8	38 48.9	85	53	137.2	38 23.3	86	52	137.5	37 57.6	86	52	137.8	37 31.9	86	52	138.2	2
3	39 58.5	84	55	134.7	39 33.3	84	55	135.1	39 08.1	84	54	135.4	38 42.8	85	54	135.8	38 17.4	85	54	136.1	37 51.9	85	53	136.4	37 26.4	85	53	136.8	37 00.9	85	53	137.1	3
4	39 25.6	83	56	133.6	39 00.6	83	56	134.0	38 35.5	84	55	134.3	38 10.4	84	55	134.7	37 45.2	84	55	135.0	37 19.9	84	54	135.4	36 54.6	84	54	135.7	36 29.3	85	54	136.0	4
35	38 52.0	83	57	132.6	38 27.2	83	57	132.9	38 02.3	83	56	133.3	37 37.4	83	56	133.6	37 12.4	83	56	134.0	36 47.3	84	55	134.3	36 22.2	84	55	134.7	35 57.1	84	55	135.0	35
6	38 17.8	82	58	131.5	37 53.2	82	58	131.9	37 28.6	82	57	132.2	37 03.8	83	57	132.6	36 39.0	83	57	132.9	36 14.2	83	56	133.3	35 49.3	83	56	133.6	35 24.3	83	56	134.0	6
7	37 43.1	81	59	130.5	37 18.7	81	58	130.8	36 54.3	82	58	131.2	36 29.7	82	58	131.6	36 05.1	82	57	131.9	35 40.4	82	57	132.3	35 15.7	83	57	132.6	34 50.9	83	57	132.9	7
8	37 07.9	81	60	129.4	36 43.7	81	59	129.8	36 19.4	81	59	130.2	35 55.0	81	59	130.5	35 30.6	82	58	130.9	35 06.1	82	58	131.3	34 41.6	82	58	131.6	34 17.0	82	57	132.0	8
9	36 32.2	80	60	128.4	36 08.1	80	60	128.8	35 44.0	80	60	129.2	35 19.9	81	59	129.5	34 55.6	81	59	129.9	34 31.3	81	59	130.3	34 07.0	81	59	130.6	33 42.5	81	58	131.0	9
40	35 55.9	79	61	127.5	35 32.1	80	61	127.8	35 08.1	80	61	128.2	34 44.2	80	60	128.6	34 20.1	80	60	128.9	33 56.0	80	60	129.3	33 31.8	81	59	129.6	33 07.6	81	59	130.0	40
1	35 19.2	79	62	126.5	34 55.5	79	62	126.9	34 31.8	79	61	127.2	34 08.0	79	61	127.6	33 44.1	80	61	128.0	33 20.2	80	60	128.3	32 56.2	80	60	128.7	32 32.1	80	60	129.0	1
2	34 42.0	78	63	125.5	34 18.5	78	62	125.9	33 55.0	79	62	126.3	33 31.3	79	62	126.6	33 07.6	79	62	127.0	32 43.9	79	61	127.4	32 20.1	79	61	127.7	31 56.2	80	61	128.1	2
3	34 04.4	78	63	124.6	33 41.1	78	63	125.0	33 17.7	78	63	125.3	32 54.2	78	63	125.7	32 30.7	78	62	126.1	32 07.1	79	62	126.4	31 43.5	79	62	126.8	31 19.8	79	61	127.2	3
4	33 26.3	77	64	123.6	33 03.2	77	64	124.0	32 40.0	77	64	124.4	32 16.7	78	63	124.8	31 53.3	78	63	125.2	31 29.9	78	63	125.5	31 06.5	78	62	125.9	30 42.9	79	62	126.2	4
45	32 47.9	76	65	122.7	32 24.9	77	64	123.1	32 01.8	77	64	123.5	31 38.7	77	64	123.9	31 15.6	77	64	124.2	30 52.3	78	63	124.6	30 29.0	78	63	125.0	30 05.7	78	63	125.3	45
6	32 09.0	76	65	121.8	31 46.2	76	65	122.2	31 23.3	76	65	122.6	31 00.4	77	65	123.0	30 37.4	77	64	123.3	30 14.3	77	64	123.7	29 51.2	77	64	124.1	29 28.0	77	64	124.4	6
7	31 29.8	75	66	120.9	31 07.1	76	66	121.3	30 44.4	76	65	121.7	30 21.6	76	65	122.1	29 58.8	76	65	122.5	29 35.9	76	65	122.8	29 12.9	77	64	123.2	28 49.8	77	64	123.6	7
8	30 50.2	75	67	120.1	30 27.7	75	66	120.4	30 05.1	75	66	120.8	29 42.5	76	66	121.2	29 19.8	76	66	121.6	28 57.0	76	65	122.0	28 34.2	76	65	122.3	28 11.4	76	65	122.7	8
9	30 10.2	74	67	119.2	29 47.9	75	67	119.6	29 25.5	75	67	120.0	29 03.0	75	66	120.3	28 40.5	75	66	120.7	28 17.9	75	66	121.1	27 55.2	76	66	121.5	27 32.5	76	65	121.8	9
50	29 29.9	74	68	118.3	29 07.7	74	67	118.7	28 45.5	74	67	119.1	28 23.2	75	67	119.5	28 00.8	75	67	119.9	27 38.3	75	66	120.2	27 15.8	75	66	120.6	26 53.3	75	66	121.0	50
1	28 49.3	73	68	117.5	28 27.3	74	68	117.9	28 05.2	74	68	118.3	27 43.0	74	67	118.6	27 20.8	74	67	119.0	26 58.5	74	67	119.4	26 36.1	75	67	119.8	26 13.7	75	66	120.1	1
2	28 08.4	73	69	116.7	27 46.5	73	68	117.1	27 24.5	73	68	117.4	27 02.5	74	68	117.8	26 40.4	74	68	118.2	26 18.3	74	68	118.6	25 56.0	74	67	118.9	25 33.8	74	67	119.3	2
3	27 27.2	72	69	115.8	27 05.4	73	69	116.2	26 43.6	73	69	116.6	26 21.7	73	68	117.0	25 59.7	73	68	117.4	25 37.7	73	68	117.8	25 15.7	74	68	118.1	24 53.5	74	68	118.5	3
4	26 45.7	72	70	115.0	26 24.0	72	69	115.4	26 02.3	72	69	115.8	25 40.6	73	69	116.2	25 18.8	73	69	116.6	24 56.9	73	69	116.9	24 35.0	73	68	117.3	24 13.0	73	68	117.7	4
55	26 03.9	72	70	114.2	25 42.4	72	70	114.6	25 20.8	72	70	115.0	24 59.2	72	69	115.4	24 37.5	72	69	115.8	24 15.8	73	69	116.1	23 54.0	73	69	116.5	23 32.2	73	69	116.9	55
6	25 21.8	71	70	113.4	25 00.5	71	70	113.8	24 39.0	72	70	114.2	24 17.5	72	70	114.6	23 56.0	72	70	115.0	23 34.4	72	69	115.4	23 12.7	72	69	115.7	22 51.0	72	69	116.1	6
7	24 39.5	71	71	112.7	24 18.3	71	71	113.0	23 57.0	71	70	113.4	23 35.6	71	70	113.8	23 14.2	71	70	114.2	22 52.7	72	70	114.6	22 31.2	72	70	115.0	22 09.6	72	69	115.3	7
8	23 57.0	70	71	111.9	23 35.9	71	71	112.3	23 14.7	71	71	112.7	22 53.4	71	71	113.0	22 32.2	71	70	113.4	22 10.8	71	70	113.8	21 49.4	71	70	114.2	21 27.9	72	70	114.6	8
9	23 14.2	70	72	111.1	22 53.2	70	71	111.5	22 32.2	70	71	111.9	22 11.0	71	71	112.3	21 49.9	71	71	112.7	21 28.6	71	71	113.0	21 07.3	71	70	113.4	20 46.0	71	70	113.8	9
60	22 31.3	70	72	110.4	22 10.4	70	72	110.7	21 49.4	70	72	111.1	21 28.4	70	71	111.5	21 07.3	70	71	111.9	20 46.2	70	71	112.3	20 25.0	71	71	112.7	20 03.8	71	71	113.0	60
1	21 48.1	69	72	109.6	21 27.3	69	72	110.0	21 06.4	70	72	110.4	20 45.5	70	72	110.8	20 24.6	70	72	111.2	20 03.6	70	71	111.5	19 42.5	70	71	111.9	19 21.4	70	71	112.3	1
2	21 04.7	69	73	108.9	20 44.0	69	72	109.3	20 23.2	69	72	109.6	20 02.4	69	72	110.0	19 41.6	70	72	110.4	19 20.7	70	72	110.8	18 59.8	70	72	111.2	18 38.8	70	71	111.5	2
3	20 21.1	69	73	108.1	20 00.5	69	73	108.5	19 39.8	69	73	108.9	19 19.2	69	72	109.3	18 58.4	69	72	109.7	18 37.6	69	72	110.1	18 16.8	70	72	110.4	17 55.9	70	72	110.8	3
4	19 37.3	68	73	107.4	19 16.8	68	73	107.8	18 56.3	69	73	108.2	18 35.7	69	73	108.6	18 15.0	69	73	108.9	17 54.4	69	72	109.3	17 33.6	69	72	109.7	17 12.8	69	72	110.1	4
65	18 53.4	68	74	106.7	18 33.0	68	73	107.1	18 12.5	68	73	107.5	17 52.0	68	73	107.8	17 31.5	69	73	108.2	17 10.9	69	73	108.6	16 50.3	69	73	109.0	16 29.6	69	72	109.4	65
6	18 09.3	68	74	106.0	17 48.9	68	74	106.4	17 28.6	68	74	106.7	17 08.2	68	73	107.1	16 47.7	68	73	107.5	16 27.2	68	73	107.9	16 06.7	69	73	108.3	15 46.1	69	73	108.6	6
7	17 25.0	67	74	105.3	17 04.8	68	74	105.6	16 44.5	68	74	106.0	16 24.2	68	74	106.4	16 03.8	68	73	106.8	15 43.4	68	73	107.2	15 23.0	68	73	107.6	15 02.5	68	73	107.9	7
8	16 40.6	67	74	104.6	16 20.4	67	74	104.9	16 00.2	67	74	105.3	15 40.0	68	74	105.7	15 19.7	68	74	106.1	14 59.4	68	74	106.5	14 39.1	68	73	106.9	14 18.7	68	73	107.2	8
9	15 56.0	67	74	103.9	15 36.0	67	74	104.2	15 15.8	67	74	104.6	14 55.7	67	74	105.0	14 35.5	67	74	105.4	14 15.3	67	74	105.8	13 55.0	68	74	106.2	13 34.7	68	74	106.5	9
70	15 11.3	67	75	103.2	14 51.3	67	75	103.6	14 31.3	67	74	103.9	14 11.2	67	74	104.3	13 51.1	67	74	104.7	13 31.0	67	74	105.1	13 10.8	67	74	105.5	12 50.6	67	74	105.8	70
1	14 26.5	66	75	102.5	14 06.6	67	75	102.9	13 46.6	67	75	103.2	13 26.6	67	75	103.6	13 06.6	67	74	104.0	12 46.5	67	74	104.4	12 26.4	67	74	104.8	12 06.3	67	74	105.2	1
2	13 41.6	66	75	101.8	13 21.7	66	75	102.2	13 01.8	66	75	102.6	12 41.9	67	75	102.9	12 21.9	67	75	103.3	12 01.9	67	75	103.7	11 41.9	67	74	104.1	11 21.8	67	74	104.5	2
3	12 56.5	66	75	101.1	12 36.7	66	75	101.5	12 16.9	66	75	101.9	11 57.0	66	75	102.3	11 37.1	66	75	102.7	11 17.2	66	75	103.0	10 57.2	67	75	103.4	10 37.3	67	74	103.8	3
4	12 11.4	66	75	100.4	11 51.6	66	75	100.8	11 31.9	66	75	101.2	11 12.1	66	75	101.6	10 52.2	66	75	102.0	10 32.4	66	75	102.4	10 12.5	66	75	102.7	9 52.6	66	75	103.1	4
75	11 26.1	66	76	99.8	11 06.4	66	75	100.2	10 46.7	66	75	100.5	10 27.0	66	75	100.9	10 07.2	66	75	101.3	9 47.4	66	75	101.7	9 27.6	66	75	102.1	9 07.7	66	75	102.4	75
6	10 40.8	65	76	99.1	10 21.2	65	76	99.5	10 01.5	66	76	99.9	9 41.8	66	75	100.3	9 22.1	66	75	100.6	9 02.3	66	75	101.0	8 42.6	66	75	101.4	8 22.8	66	75	101.8	6
7	9 55.4	65	76	98.4	9 35.8	65	76	98.8	9 16.2	65	76	99.2	8 56.5	65	76	99.6	8 36.9	66	76	100.0	8 17.2	66	75	100.4	7 57.5	66	75	100.7	7 37.7	66	75	101.1	7
8	9 09.9	65	76	97.8	8 50.3	65	76	98.2	8 30.8	65	76	98.5	8 11.2	65	76	98.9	7 51.6	65	76	99.3	7 31.9	65	76	99.7	7 12.3	66	76	100.1	6 52.6	66	75	100.5	8
9	8 24.3	65	76	97.1	8 04.8	65	76	97.5	7 45.3	65	76	97.9	7 25.7	65	76	98.3	7 06.2	65	76	98.7	6 46.6	65	76	99.0	6 27.0	65	76	99.4	6 07.3	65	76	99.8	9
80	7 38.7	65	76	96.5	7 19.2	65	76	96.9	6 59.7	65	76	97.2	6 40.2	65	76	97.6	6 20.7	65	76	98.0	6 01.1	65	76	98.4	5 41.6	65	76	98.8	5 22.0	65	76	99.1	80
1	6 53.0	65	76	95.8	6 33.5	65	76	96.2	6 14.1	65	76	96.6	5 54.6	65	76	97.0	5 35.1	65	76	97.3	5 15.6	65	76	97.7									1
2	6 07.2	65	76	95.2	5 47.8	65	76	95.5	5 28.4	65	76	95.9	5 09.0	65	76	96.3																	2
3	5 21.4	65	76	94.5	5 02.0	65	76	94.9																									3

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Lat. 40°

H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	
00	54 00.0	1.0 01	180.0	54 30.0	1.0 01	180.0	55 00.0	1.0 01	180.0	55 30.0	1.0 01	180.0	56 00.0	1.0 01	180.0	56 30.0	1.0 01	180.0	57 00.0	1.0 01	180.0	57 30.0	1.0 01	180.0	00
1	53 59.3	1.0 03	178.3	54 29.3	1.0 03	178.3	54 59.3	1.0 03	178.3	55 29.3	1.0 04	178.2	55 59.3	1.0 04	178.2	56 29.3	1.0 04	178.2	56 59.3	1.0 04	178.2	57 29.3	1.0 04	178.2	1
2	53 57.3	1.0 06	176.6	54 27.2	1.0 06	176.6	54 57.2	1.0 06	176.5	55 27.2	1.0 06	176.5	55 57.1	1.0 06	176.4	56 27.1	1.0 06	176.4	56 57.1	1.0 06	176.4	57 27.0	1.0 06	176.3	2
3	53 53.9	1.0 08	174.9	54 23.8	1.0 08	174.9	54 53.7	1.0 08	174.8	55 23.7	1.0 08	174.7	55 53.6	1.0 08	174.7	56 23.5	1.0 08	174.6	56 53.4	1.0 08	174.5	57 23.4	1.0 09	174.5	3
4	53 49.1	1.0 10	173.2	54 19.0	1.0 10	173.2	54 48.9	1.0 10	173.1	55 18.8	1.0 10	173.0	55 48.6	1.0 11	172.9	56 18.5	1.0 11	172.8	56 48.3	1.0 11	172.7	57 18.2	1.0 11	172.6	4
05	53 43.1	99 12	171.6	54 12.9	99 12	171.5	54 42.7	99 13	171.4	55 12.5	99 13	171.3	55 42.2	99 13	171.2	56 12.0	99 13	171.0	56 41.8	99 13	170.9	57 11.6	99 13	170.8	05
6	53 35.6	99 15	169.9	54 05.4	99 15	169.8	54 35.1	99 15	169.6	55 04.8	99 15	169.5	55 34.5	99 15	169.4	56 04.2	99 15	169.3	56 33.9	99 16	169.1	57 03.5	99 16	169.0	6
7	53 26.9	99 17	168.2	53 56.5	99 17	168.1	54 26.1	99 17	168.0	54 55.8	99 17	167.8	55 25.3	99 18	167.7	55 54.9	99 18	167.5	56 24.5	99 18	167.4	56 54.1	99 18	167.2	7
8	53 16.9	98 19	166.6	53 46.4	98 19	166.4	54 15.9	98 19	166.3	54 45.4	98 20	166.1	55 14.9	98 20	166.0	55 44.3	98 20	165.8	56 13.8	98 20	165.6	56 43.2	98 20	165.4	8
9	53 05.6	98 21	164.9	53 35.0	98 21	164.8	54 04.3	98 21	164.6	54 33.7	98 22	164.4	55 03.0	98 22	164.2	55 32.4	98 22	164.1	56 01.7	98 22	163.9	56 31.0	98 23	163.7	9
10	52 53.0	98 23	163.3	53 22.2	97 23	163.1	53 51.5	97 24	162.9	54 20.7	97 24	162.8	54 49.9	97 24	162.6	55 19.1	97 24	162.4	55 48.2	97 25	162.1	56 17.4	97 25	161.9	10
1	52 39.2	97 25	161.7	53 08.3	97 25	161.5	53 37.4	97 26	161.3	54 06.4	97 26	161.1	54 35.5	97 26	160.9	55 04.5	97 26	160.7	55 33.5	97 27	160.4	56 02.5	97 27	160.2	1
2	52 24.2	97 27	160.1	52 53.1	96 27	159.9	53 22.0	96 28	159.7	53 50.9	96 28	159.5	54 19.8	96 28	159.2	54 48.6	96 28	159.0	55 17.5	96 29	158.8	55 46.3	96 29	158.5	2
3	52 07.9	96 29	158.6	52 36.7	96 29	158.3	53 05.5	96 30	158.1	53 34.2	96 30	157.8	54 02.9	96 30	157.6	54 31.6	95 30	157.3	55 00.2	95 31	157.1	55 28.8	95 31	156.8	3
4	51 50.6	95 31	157.0	52 19.2	95 31	156.8	52 47.7	95 31	156.5	53 16.3	95 32	156.3	53 44.8	95 32	156.0	54 13.3	95 32	155.7	54 41.7	95 33	155.5	55 10.1	95 33	155.2	4
15	51 32.0	95 33	155.5	52 00.5	95 33	155.2	52 28.8	95 33	155.0	52 57.2	94 34	154.7	53 25.5	94 34	154.4	53 53.8	94 34	154.1	54 22.0	94 35	153.8	54 50.2	94 35	153.5	15
6	51 12.4	94 34	154.0	51 40.6	94 35	153.7	52 08.8	94 35	153.4	52 37.0	94 36	153.1	53 05.1	94 36	152.8	53 33.1	93 36	152.5	54 01.2	93 37	152.2	54 29.1	93 37	151.9	6
7	50 51.7	93 36	152.5	51 19.7	93 37	152.2	51 47.7	93 37	151.9	52 15.7	93 37	151.6	52 43.6	93 38	151.3	53 11.4	93 38	151.0	53 39.2	93 38	150.7	54 07.0	92 39	150.4	7
8	50 30.0	93 38	151.0	50 57.8	93 38	150.7	51 25.6	93 39	150.4	51 53.3	92 39	150.1	52 21.0	92 39	149.8	52 48.6	92 40	149.5	53 16.2	92 40	149.1	53 43.7	92 41	148.8	8
9	50 07.2	92 40	149.6	50 34.8	92 40	149.3	51 02.4	92 40	148.9	51 29.9	92 41	148.6	51 57.3	91 41	148.3	52 24.7	91 41	148.0	52 52.1	91 42	147.6	53 19.4	91 42	147.3	9
20	49 43.4	91 41	148.1	50 10.8	91 42	147.8	50 38.1	91 42	147.5	51 05.4	91 42	147.2	51 32.7	91 43	146.8	51 59.9	90 43	146.5	52 27.0	90 43	146.2	52 54.0	90 44	145.8	20
1	49 18.7	91 43	146.7	49 45.8	91 43	146.4	50 13.0	90 44	146.1	50 40.0	90 44	145.7	51 07.1	90 44	145.4	51 34.0	90 45	145.1	52 00.9	89 45	144.7	52 27.7	89 45	144.3	1
2	48 53.0	90 44	145.4	49 20.0	90 45	145.0	49 46.9	90 45	144.7	50 13.7	89 45	144.3	50 40.5	89 46	144.0	51 07.2	89 46	143.6	51 33.9	89 47	143.3	52 00.4	88 47	142.9	2
3	48 26.4	89 46	144.0	48 53.2	89 46	143.7	49 19.9	89 46	143.3	49 46.5	89 47	143.0	50 13.0	88 47	142.6	50 39.5	88 48	142.2	51 05.9	88 48	141.9	51 32.3	88 48	141.5	3
4	47 59.0	88 47	142.7	48 25.5	88 48	142.3	48 52.0	88 48	142.0	49 18.4	88 48	141.6	49 44.7	88 49	141.2	50 10.9	87 49	140.9	50 37.1	87 49	140.5	51 03.2	87 50	140.1	4
25	47 30.7	88 48	141.4	47 57.0	88 49	141.0	48 23.2	87 49	140.7	48 49.4	87 50	140.3	49 15.5	87 50	139.9	49 41.5	87 50	139.5	50 07.4	86 51	139.1	50 33.3	86 51	138.7	25
6	47 01.6	87 50	140.1	47 27.7	87 50	139.7	47 53.7	87 51	139.4	48 19.6	86 51	139.0	48 45.5	86 51	138.6	49 11.3	86 52	138.2	49 37.0	86 52	137.8	50 02.6	85 52	137.4	6
7	46 31.8	86 51	138.8	46 57.6	86 51	138.5	47 23.4	86 52	138.1	47 49.1	86 52	137.7	48 14.7	85 53	137.3	48 40.3	85 53	136.9	49 05.7	85 53	136.5	49 31.1	84 54	136.1	7
8	46 01.1	86 52	137.6	46 26.8	85 53	137.2	46 52.3	85 53	136.8	47 17.8	85 53	136.4	47 43.2	85 54	136.1	48 08.5	84 54	135.7	48 33.7	84 55	135.2	48 58.9	84 55	134.8	8
9	45 29.8	85 53	136.4	45 55.2	85 54	136.0	46 20.5	84 54	135.6	46 45.8	84 55	135.2	47 10.9	84 55	134.8	47 36.0	83 55	134.4	48 01.0	83 56	134.0	48 25.9	83 56	133.6	9
30	44 57.7	84 55	135.2	45 22.9	84 55	134.8	45 48.0	84 55	134.4	46 13.0	83 56	134.0	46 38.0	83 56	133.6	47 02.8	83 56	133.2	47 27.6	82 57	132.8	47 52.3	82 57	132.4	30
1	44 25.0	83 56	134.0	44 49.9	83 56	133.6	45 14.8	83 56	133.2	45 39.6	83 57	132.8	46 04.4	82 57	132.4	46 29.0	82 57	132.0	46 53.5	82 58	131.6	47 18.0	81 58	131.2	1
2	43 51.6	83 57	132.8	44 16.4	82 57	132.5	44 41.0	82 57	132.1	45 05.6	82 58	131.7	45 30.1	82 58	131.2	45 54.5	81 58	130.8	46 18.8	81 59	130.4	46 43.1	81 59	130.0	2
3	43 17.6	82 58	131.7	43 42.1	82 58	131.3	44 06.6	81 58	130.9	44 31.0	81 59	130.5	44 55.3	81 59	130.1	45 19.4	80 59	129.7	45 43.5	80 60	129.3	46 07.5	80 60	128.8	3
4	42 43.0	81 59	130.6	43 07.3	81 59	130.2	43 31.6	81 59	129.8	43 55.7	80 60	129.4	44 19.8	80 60	129.0	44 43.8	80 60	128.6	45 07.7	79 61	128.1	45 31.5	79 61	127.7	4
35	42 07.8	81 60	129.5	42 31.9	80 60	129.1	42 56.0	80 60	128.7	43 19.9	80 61	128.3	43 43.8	79 61	127.9	44 07.6	79 61	127.4	44 31.2	79 62	127.0	44 54.8	78 62	126.6	35
6	41 32.1	80 60	128.4	41 56.0	80 61	128.0	42 19.8	79 61	127.6	42 43.6	79 61	127.2	43 07.2	79 62	126.8	43 30.8	78 62	126.4	43 54.3	78 62	125.9	44 17.6	78 63	125.5	6
7	40 55.8	79 61	127.4	41 19.5	79 62	127.0	41 43.2	79 62	126.6	42 06.7	78 62	126.1	42 30.2	78 63	125.7	42 53.5	78 63	125.3	43 16.8	77 63	124.9	43 40.0	77 64	124.4	7
8	40 19.0	79 62	126.3	40 42.6	78 62	125.9	41 06.0	78 63	125.5	41 29.4	78 63	125.1	41 52.6	77 63	124.7	42 15.8	77 64	124.3	42 38.9	77 64	123.8	43 01.8	76 64	123.4	8
9	39 41.8	78 63	125.3	40 05.1	78 63	124.9	40 28.4	77 64	124.5	40 51.5	77 64	124.1	41 14.6	77 64	123.7	41 37.6	76 64	123.2	42 00.4	76 65	122.8	42 23.2	76 65	122.4	9
40	39 04.0	77 64	124.3	39 27.2	77 64	123.9	39 50.3	77 64	123.5	40 13.2	76 65	123.1	40 36.1	76 65	122.7	40 58.9	76 65	122.2	41 21.6	75 65	121.8	41 44.2	75 66	121.3	40
1	38 25.9	77 64	123.3	38 48.8	76 65	122.9	39 11.7	76 65	122.5	39 34.5	76 65	122.1	39 57.2	76 66	121.7	40 19.8	75 66	121.2	40 42.3	75 66	120.8	41 04.7	75 66	120.4	1
2	37 47.2	76 65	122.4	38 10.0	76 65	122.0	38 32.7	76 66	121.5	38 55.4	75 66	121.1	39 17.9	75 66	120.7	39 40.3	75 66	120.3	40 02.6	74 67	119.8	40 24.9	74 67	119.4	2
3	37 08.2	76 66	121.4	37 30.8	75 66	121.0	37 53.4	75 66	120.6	38 15.8	75 67	120.2	38 38.2	74 67	119.7	39 00.4	74 67	119.3	39 22.6	74 67	118.9	39 44.6	73 68	118.4	3
4	36 28.8	75 66	120.5	36 51.2	75 67	120.1	37 13.6	74 67	119.6	37 35.9	74 67	119.2	37 58.1	74 67	118.8	38 20.2	73 68	118.4	38 42.1	73 68	117.9	39 04.0	73 68	117.5	4
45	35 49.0	74 67	119.6	36 11.3	74 67	119.1	36 33.5	74 67	118.7	36 55.6	74 68	118.3	37 17.6	73 68	117.9	37 39.5	73 68	117.4	38 01.4	73 69	117.0	38 23.1	72 69	116.6	45
6	35 08.8	74 68	118.6	35 31.0	74 68	118.2	35 53.0	73 68	117.8	36 14.9	73 68	117.4	36 36.8	73 69	117.0	36 58.6	72 69	116.5	37 20.2	72 69	116.1	37 41.8	72 69	115.7	6
7	34 28.3	73 68	117.8	34 50.3	73 68	117.3	35 12.2	73 69	116.9	35 34.0	72 69	116.5	35 55.7	72 69	116.1	36 17.3	72 69	115.6	36 38.8	72 70	115.2	37 00.2	71 70	114.8	7
8	33 47.5	73 69	116.9	34 09.3	73 69	116.5	34 31.0	72 69	116.0	34 52.7	72 69	115.6	35 14.2	72 70	115.2	35 35.7	71 70	114.8	35 57.1	71 70	114.3	36 18.4	71 70	113.9	8
9	33 06.3	72 69	116.0	33 28.0	72 69	115.6	33 49.6	72 70	115.2	34 11.1	72 70	114.8	34 32.5	71 70	114.3	34 53.8	71 70	113.9	35 15.1	71 70	113.5	35 36.2	70 71	113.0	9
50	32 24.9	72 70	115.1	32 46.4	72 70	114.7	33 07.8	71 70	114.3	33 29.2	71 70	113.9	33 50.5	71 70	113.5	34 11.7	70 71	113.0	34 32.8	70 71	112.6	34 53.8	70 71	112.2	50
1	31 43.1	71 70	114.3	32 04.5	71 70	113.9	32 25.8	71 70	113.5	32 47.1	71 71	113.1	33 08.2	70 71	112.6	33 29.2	70 71	112.2	33 50.2	70 71	111.8	34 11.1	69 72	111.3	1
2	31 01.1	71 70	113.5	31 22.4	71 71	113.1	31 43.5	70 71	112.6	32 04.6	70 71	112.2	32 25.6	70 71	111.8	32 46.6	70 72	111.4	33 07.4	69 72	110.9	33 28.2	69 72	110.5	2
3	30 18.8	71 71	112.7	30 39.9	70 71	112.2	31 01.0	70 71	111.8	31 22.0	70 72	111.4	31 42.8	69 72	111.0	32 03.6	69 72	110.6	32 24.4	69 72	110.1	32 45.0	69 72	109.7	3
4	29 36.3	70 71	111.8	29 57.3	70 72	111.4	30 18.2	70 72	111.0	30 39.1	69 72	110.6	30 59.8	69 72	110.2	31 20.5	69 72	109.8	31 41.1	69 72	109.3	32 01.6	68 73	108.9	4
55	28 53.5	70 72	111.0	29 14.4	69 72	110.6	29 35.2	69 72	110.2	29 55.9	69 72	109.8	30 16.6	69 72	109.4	30 37.1	68 73	109.0	30 57.6	68 73	108.5	31 18.0	68 73	108.1	55
6	28 10.5	69 72	110.3	28 31.3	69 72	109.8	28 51.9	69 72	109.4	29 12.6	69 73	109.0	29 33.1	68 73	108.6	29 53.6	68 73	108.2	30 13.9	68 73	107.8	30 34.2	68 73	107.3	6
7	27 27.3	69 72	109.5	27 47.9	69 73	109.1	28 08.5	68 73	108.7	28 29.0	68 73	108.2	28 49.4	68 73	107.8	29 09.8	68 73	107.4	29 30.1	67 73	107.0	29 50.3	67 74	106.6	7
8	26 43.8	69 73	108.7	27 04.4	68 73	108.3	27 24.9	68 73	107.9	27 45.3	68 73	107.5	28 05.6	68 73	107.1	28 25.9	67 74	106.6	28 46.0	67 74	106.2	29 06.1	67 74	105.8	8
9	26 00.2	68 73	107.9	26 20.6	68 73	107.5	26 41.0	68 73	107.1	27 01.3	68 74	106.7	27 21.6	67 74	106.3	27 41.7	67 74	105.9	28 01.8	67 74	105.5	28 21.8	67 74	105.0	9
60	25 16.4	68 73	107.2	25 36.7	68 73	106.8	25 57.0	68 74	106.4	26 17.2	67 74	106.0	26 37.4	67 74	105.5	26 57.4	67 74	105.1	27 17.4	67 74	104.7	27 37.4	66 74	104.3	60
1	24 32.4	68 74	106.4	24 52.6	67 74	106.0	25 12.8	67 74	105.6	25 32.9	67 74	105.2	25 53.0	67 74	104.8	26 13.0	67 74	104.4	26 32.9	66 74	104.0	26 52.7	66 75	103.5	1
2	23 48.2	67 74	105.7	24 08.4	67 74	105.3	24 28.5	67 74	104.9	24 48.5	67 74	104.5	25 08.5	66 74	104.1	25 28.4	66 75	103.7	25 48.2	66 75	103.2	26 08.0	66 75	102.8	2
3	23 03.9	67 74	105.0	23 24.0	67 74	104.6	23 44.0	67 74	104.2	24 03.9	66 75	103.8	24 23.8	66 75	103.3	24 43.7	66 75	102.9	25 03.4	66 75	102.5	25 23.1	66 75	102.1	3
4	22 19.4	67 74	104.2	22 39.4	67 74	103.8	22 59.3	66 75	103.4	23 19.2	66 75	103.0	23 39.0	66 75	102.6	23 58.8	66 75	102.2	24 18.5	66 75	101.8	24 38.1	65 75	101.4	4
65	21 34.8	67 75	103.5	21 54.7	66 75	103.1	22 14.6	66 75	102.7	22 34.4	66 75	102.3	22 54.1	66 75	101.9	23 13.8	66 75	101.5	23 33.4	65 75	101.1	23 53.0	65 75	100.7	65
6	20 50.0	66 75	102.8	21 09.9	66 75	102.4	21 29.7	66 75	102.0	21 49.4	66 75	101.6	22 09.1	66 75	101.2	22 28.7	65 75	100.8	22 48.3	65 75	100.4	23 07.8	65 76	100.0	6
7	20 05.1	66 75	102.1	20 24.9	66 75	101.7	20 44.7	66 75	101.3	21 04.3	65 75	100.9	21 24.0	65 75	100.5	21 43.5	65 75	100.1	22 03.0	65 76	99.7	22 22.5	65 76	99.3	7
8	19 20.2	66 75	101.4	19 39.9	66 75	101.0	19 59.5	65 75	100.6	20 19.2	65 75	100.2	20 38.7	65 76	99.8	20 58.2	65 76	99.4	21 17.7	65 76	99.0	21 37.1	65 76	98.6	8
9	18 35.0	66 75	100.7	18 54.7	65 75	100.3	19 14.3	65 76	99.9	19 33.9	65 76	99.5	19 53.4	65 76	99.1	20 12.8	65 76	98.7	20 32.2	65 76	98.3	20 51.6	64 76	97.9	9
70	17 49.8	65 76	100.0	18 09.4	65 76	99.6	18 29.0	65 76	99.2	18 48.5	65 76	98.8	19 08.0	65 76	98.4	19 27.4	65 76	98.0	19 46.7	64 76	97.6	20 06.0	64 76	97.2	70
1	17 04.5	65 76	99.4	17 24.1	65 76	99.0	17 43.6	65 76	98.6	18 03.0	65 76	98.2	18 22.5	65 76	97.8	18 41.8	64 76	97.4	19 01.1	64 76	96.9	19 20.4	64 76	96.5	1
2	16 19.1	65 76	98.7	16 38.6	65 76	98.3	16 58.1	65 76	97.9	17 17.5	65 76	97.5	17 36.9	64 76	97.1	17 56.2	64 76	96.7	18 15.5	64 76	96.3	18 34.7	64 76	95.9	2
3	15 33.7	65 76	98.0	15 53.1	65 76	97.6	16 12.5	65 76	97.2	16 31.9	65 76	96.8	16 51.2	64 76	96.4	17 10.5	64 76	96.0	17 29.8	64 76	95.6	17 48.9	64 76	95.2	3
4	14 48.1	65 76	97.3	15 07.5	65 76	96.9	15 26.9	65 76	96.5	15 46.2	64 76	96.1	16 05.5	64 76	95.7	16 24.8	64 76	95.3	16 44.0	64 76	94.9	17 03.1	64 76	94.5	4
75	14 02.5	65 76	96.7	14 21.9	65 76	96.3	14 41.2	64 76	95.9	15 00.5	64 76	95.5	15 19.8	64 76	95.1	15 39.0	64 76	94.7	15 58.2	64 76	94.3	16 17.3	64 76	93.9	75
6	13 16.8	65 76	96.0	13 36.1	64 76	95.6	13 55.5	64 76	95.2	14 14.7	64 76	94.8	14 34.0	64 76	94.4	14 53.2	64 76	94.0	15 12.3	64 76	93.6	15 31.4	64 77	93.2	6
7	12 31.1	64 76	95.3	12 50.4	64 76	94.9	13 09.7	64 76	94.6	13 28.9	64 76	94.2	13 48.1	64 76	93.8	14 07.3	64 76	93.4	14 26.4	64 77	93.0	14 45.5	64 77	92.6	7
8	11 45.3	64 76	94.7	12 04.6	64 76	94.3	12 23.8	64 76	93.9	12 43.1	64 76	93.5	13 02.2	64 77	93.1	13 21.4	64 77	92.7	13 40.5	64 77	92.3	13 59.6	64 77	91.9	8
9	10 59.4	64 76	94.0	11 18.7	64 76	93.6	11 38.0	64 76	93.2	11 57.2	64 77	92.9	12 16.3	64 77	92.5	12 35.5	64 77	92.1	12 54.6	64 77	91.7	13 13.7	64 77	91.3	9
80	10 13.6	64 76	93.4	10 32.8	64 77	93.0	10 52.1	64 77	92.6	11 11.2	64 77	92.2	11 30.4	64 77	91.8	11 49.5	64 77	91.4	12 08.6	64 77	91.0	12 27.7	63 77	90.6	80
1	9 27.7	64 77	92.7	9 46.9	64 77	92.3	10 06.1	64 77	91.9	10 25.3	64 77	91.6	10 44.5	64 77	91.2	11 03.6	64 77	90.8	11 22.7	64 77	90.4	11 41.7	63 77	90.0	1
2	8 41.8	64 77	92.1	9 01.0	64 77	91.7	9 20.2	64 77	91.3	9 39.4	64 77	90.9	9 58.5	64 77	90.5	10 17.6	64 77	90.1	10 36.7	64 77	89.7	10 55.8	63 77	89.3	2
3	7 55.8	64 77	91.4	8 15.0	64 77	91.0	8 34.2	64 77	90.7	8 53.4	64 77	90.3	9 12.5	64 77	89.9	9 31.7	64 77	89.5	9 50.7	64 77	89.1	10 09.8	64 77	88.7	3
4	7 09.9	64 77	90.8	7 29.1	64 77	90.4	7 48.3	64 77	90.0	8 07.4	64 77	89.6	8 26.6	64 77	89.2	8 45.7	64 77	88.8	9 04.8	64 77	88.5	9 23.9	64 77	88.1	4
85	6 23.9	64 77	90.1	6 43.1	64 77	89.8	7 02.3	64 77	89.4	7 21.5	64 77	89.0	7 40.6	64 77	88.6	7 59.8	64 77	88.2	8 18.9	64 77	87.8	8 37.9	64 77	87.4	85
6	5 37.9	64 77	89.5	5 57.2	64 77	89.1	6 16.3	64 77	88.7	6 35.5	64 77	88.3	6 54.7	64 77	88.0	7 13.8	64 76	87.6	7 32.9	64 76	87.2	7 52.0	64 76	86.8	6
7				5 11.2	64 77	88.5	5 30.4	64 77	88.1	5 49.6	64 77	87.7	6 08.8	64 76	87.3	6 27.9	64 76	86.9	6 47.0	64 76	86.5	7 06.2	64 76	86.1	7
8										5 03.7	64 77	87.1	5 22.9	64 76	86.7	5 42.0	64 76	86.3	6 01.2	64 76	85.9	6 20.3	64 76	85.5	8
9																			5 15.4	64 76	85.3	5 34.5	64 76	84.9	9

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H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	46 00.0	1.0 01	180.0	45 30.0	1.0 01	180.0	45 00.0	1.0 01	180.0	44 30.0	1.0 01	180.0	44 00.0	1.0 01	180.0	43 30.0	1.0 01	180.0	43 00.0	1.0 01	180.0	42 30.0	1.0 01	180.0	00
1	45 59.4	1.0 03	178.6	45 29.4	1.0 03	178.6	44 59.4	1.0 03	178.6	44 29.4	1.0 03	178.6	43 59.4	1.0 03	178.6	43 29.4	1.0 03	178.6	42 59.5	1.0 03	178.6	42 29.5	1.0 03	178.7	1
2	45 57.7	1.0 05	177.1	45 27.7	1.0 05	177.2	44 57.7	1.0 05	177.2	44 27.8	1.0 05	177.2	43 57.8	1.0 05	177.2	43 27.8	1.0 05	177.3	42 57.8	1.0 05	177.3	42 27.8	1.0 04	177.3	2
3	45 54.8	1.0 07	175.7	45 24.9	1.0 07	175.7	44 54.9	1.0 07	175.8	44 25.0	1.0 06	175.8	43 55.0	1.0 06	175.9	43 25.1	1.0 06	175.9	42 55.1	1.0 06	175.9	42 25.2	1.0 06	176.0	3
4	45 50.8	1.0 09	174.3	45 20.9	1.0 08	174.3	44 51.0	1.0 08	174.4	44 21.1	1.0 08	174.4	43 51.1	1.0 08	174.5	43 21.2	1.0 08	174.5	42 51.3	1.0 08	174.6	42 21.4	1.0 08	174.6	4
05	45 45.6	1.0 10	172.8	45 15.8	1.0 10	172.9	44 45.9	1.0 10	173.0	44 16.0	1.0 10	173.0	43 46.2	1.0 10	173.1	43 16.3	1.0 10	173.2	42 46.4	1.0 10	173.2	42 16.5	1.0 10	173.3	05
6	45 39.3	99 12	171.4	45 09.5	99 12	171.5	44 39.7	99 12	171.6	44 09.9	99 12	171.7	43 40.1	99 12	171.7	43 10.3	99 12	171.8	42 40.5	99 12	171.9	42 10.6	99 12	172.0	6
7	45 31.9	99 14	170.0	45 02.2	99 14	170.1	44 32.5	99 14	170.2	44 02.7	99 14	170.3	43 33.0	99 14	170.4	43 03.2	99 14	170.5	42 33.5	99 13	170.5	42 03.7	99 13	170.6	7
8	45 23.4	99 16	168.6	44 53.7	99 16	168.7	44 24.1	99 16	168.8	43 54.4	99 16	168.9	43 24.7	99 15	169.0	42 55.1	99 15	169.1	42 25.4	99 15	169.2	41 55.7	99 15	169.3	8
9	45 13.8	99 18	167.2	44 44.2	99 18	167.3	44 14.6	99 18	167.4	43 45.0	99 17	167.6	43 15.5	99 17	167.7	42 45.9	99 17	167.8	42 16.3	99 17	167.9	41 46.6	99 17	168.0	9
10	45 03.0	98 20	165.8	44 33.6	98 20	165.9	44 04.1	98 19	166.1	43 34.6	98 19	166.2	43 05.1	98 19	166.3	42 35.6	98 19	166.4	42 06.1	98 19	166.6	41 36.6	98 18	166.7	10
1	44 51.2	98 21	164.4	44 21.9	98 21	164.6	43 52.5	98 21	164.7	43 23.1	98 21	164.9	42 53.7	98 21	165.0	42 24.3	98 21	165.1	41 54.9	98 20	165.3	41 25.5	98 20	165.4	1
2	44 38.4	97 23	163.1	44 09.1	98 23	163.2	43 39.9	98 23	163.4	43 10.6	98 23	163.5	42 41.3	98 22	163.7	42 12.0	98 22	163.8	41 42.7	98 22	164.0	41 13.4	98 22	164.1	2
3	44 24.4	97 25	161.7	43 55.3	97 26	161.9	43 26.2	97 25	162.0	42 57.0	97 24	162.2	42 27.9	97 24	162.3	41 58.7	97 24	162.5	41 29.5	97 24	162.7	41 00.3	97 23	162.8	3
4	44 09.5	97 27	160.3	43 40.5	97 26	160.5	43 11.5	97 26	160.7	42 42.5	97 26	160.9	42 13.4	97 26	161.0	41 44.4	97 25	161.2	41 15.3	97 25	161.4	40 46.2	97 25	161.5	4
15	43 53.5	96 28	159.0	43 24.7	96 28	159.2	42 55.8	96 28	159.4	42 26.9	96 28	159.6	41 58.0	96 27	159.7	41 29.1	96 27	159.9	41 00.1	96 27	160.1	40 31.2	97 27	160.3	15
6	43 36.6	96 30	157.7	43 07.8	96 30	157.9	42 39.1	96 29	158.1	42 10.4	96 29	158.3	41 41.6	96 29	158.5	41 12.8	96 29	158.7	40 44.0	96 28	158.8	40 15.2	96 28	159.0	6
7	43 18.6	95 32	156.4	42 50.1	95 31	156.6	42 21.5	95 31	156.8	41 52.9	95 31	157.0	41 24.3	95 30	157.2	40 55.6	95 30	157.4	40 27.0	95 30	157.6	39 58.3	95 30	157.8	7
8	42 59.7	95 33	155.1	42 31.3	95 33	155.3	42 02.9	95 33	155.5	41 34.4	95 32	155.7	41 06.0	95 32	155.9	40 37.5	95 32	156.1	40 09.0	95 31	156.3	39 40.4	95 31	156.5	8
9	42 39.9	94 35	153.8	42 11.6	94 34	154.0	41 43.4	94 34	154.2	41 15.1	94 34	154.5	40 46.8	94 34	154.7	40 18.4	95 33	154.9	39 50.1	95 33	155.1	39 21.7	95 33	155.3	9
20	42 19.1	94 36	152.5	41 51.1	94 36	152.8	41 23.0	94 36	153.0	40 54.8	94 35	153.2	40 26.7	94 35	153.5	39 58.5	94 35	153.7	39 30.3	94 34	153.9	39 02.1	94 34	154.1	20
1	41 57.5	93 38	151.3	41 29.6	93 37	151.5	41 01.6	93 37	151.8	40 33.7	93 37	152.0	40 05.7	93 36	152.2	39 37.7	93 36	152.5	39 09.6	94 36	152.7	38 41.6	94 36	152.9	1
2	41 34.9	92 39	150.0	41 07.2	92 39	150.3	40 39.5	93 38	150.5	40 11.7	93 38	150.8	39 43.9	93 38	151.0	39 16.0	93 38	151.3	38 48.1	93 37	151.5	38 20.2	93 37	151.7	2
3	41 11.6	92 40	148.8	40 44.0	92 40	149.1	40 16.4	92 40	149.3	39 48.8	92 39	149.6	39 21.2	92 39	149.8	38 53.5	92 39	150.1	38 25.8	92 39	150.3	37 58.0	93 38	150.6	3
4	40 47.3	91 42	147.6	40 20.0	91 41	147.9	39 52.6	91 41	148.1	39 25.1	92 41	148.4	38 57.7	92 40	148.7	38 30.2	92 40	148.9	38 02.6	92 40	149.2	37 35.1	92 40	149.4	4
25	40 22.3	91 43	146.4	39 55.1	91 43	146.7	39 27.9	91 42	147.0	39 00.7	91 42	147.2	38 33.4	91 42	147.5	38 06.0	91 42	147.8	37 38.7	91 41	148.0	37 11.3	91 41	148.3	25
6	39 56.5	90 44	145.2	39 29.5	90 44	145.5	39 02.4	90 44	145.8	38 35.4	90 43	146.1	38 08.3	90 43	146.3	37 41.1	91 43	146.6	37 13.9	91 42	146.9	36 46.7	91 42	147.1	6
7	39 29.9	89 46	144.1	39 03.1	89 45	144.4	38 36.2	90 45	144.6	38 09.3	90 45	144.9	37 42.4	90 44	145.2	37 15.4	90 44	145.5	36 48.4	90 44	145.8	36 21.4	90 43	146.0	7
8	39 02.5	89 47	142.9	38 35.9	89 46	143.2	38 09.3	89 46	143.5	37 42.6	89 46	143.8	37 15.8	89 46	144.1	36 49.0	89 45	144.4	36 22.2	89 45	144.6	35 55.3	90 45	144.9	8
9	38 34.4	88 48	141.8	38 08.0	88 48	142.1	37 41.6	88 47	142.4	37 15.0	88 47	142.7	36 48.5	89 47	143.0	36 21.9	89 46	143.3	35 55.3	89 46	143.5	35 28.6	89 46	143.8	9
30	38 05.7	87 49	140.7	37 39.4	88 49	141.0	37 13.2	88 48	141.3	36 46.8	88 48	141.6	36 20.5	88 48	141.9	35 54.0	88 48	142.2	35 27.6	88 47	142.5	35 01.1	88 47	142.7	30
1	37 36.2	87 50	139.6	37 10.2	87 50	139.9	36 44.1	87 50	140.2	36 17.9	87 49	140.5	35 51.7	87 49	140.8	35 25.5	88 49	141.1	34 59.2	88 48	141.4	34 32.9	88 48	141.7	1
2	37 06.1	86 51	138.5	36 40.2	86 51	138.8	36 14.3	86 51	139.1	35 48.4	87 50	139.4	35 22.4	87 50	139.7	34 56.3	87 50	140.0	34 30.2	87 49	140.3	34 04.1	87 49	140.6	2
3	36 35.3	85 52	137.4	36 09.6	86 52	137.7	35 43.9	86 53	138.1	35 18.1	86 51	138.4	34 52.3	86 51	138.7	34 26.5	86 51	139.0	34 00.6	86 50	139.3	33 34.6	87 50	139.6	3
4	36 03.9	85 53	136.4	35 38.4	85 53	136.7	35 12.9	85 53	137.0	34 47.3	85 52	137.3	34 21.7	85 52	137.6	33 56.0	86 52	138.0	33 30.3	86 52	138.3	33 04.5	86 51	138.6	4
35	35 31.8	84 54	135.3	35 06.6	84 54	135.7	34 41.2	85 54	136.0	34 15.9	85 53	136.3	33 50.4	85 53	136.6	33 24.9	85 53	136.9	32 59.4	85 52	137.3	32 33.8	85 52	137.6	35
6	34 59.2	84 55	134.3	34 34.1	84 55	134.6	34 09.0	84 55	135.0	33 43.8	84 54	135.3	33 18.6	84 54	135.6	32 53.3	84 54	135.9	32 27.9	85 53	136.3	32 02.5	85 53	136.6	6
7	34 26.1	83 56	133.3	34 01.2	83 56	133.6	33 36.2	83 56	134.0	33 11.2	83 55	134.3	32 46.1	84 55	134.6	32 21.0	84 55	134.9	31 55.8	84 54	135.3	31 30.6	84 54	135.6	7
8	33 52.3	82 57	132.3	33 27.6	82 57	132.6	33 02.8	83 56	133.0	32 38.0	83 56	133.3	32 13.1	83 56	133.6	31 48.2	83 56	134.0	31 23.2	83 55	134.3	30 58.2	84 55	134.6	8
9	33 18.1	82 58	131.3	32 53.5	82 58	131.7	32 28.9	82 57	132.0	32 04.3	82 57	132.3	31 39.6	82 57	132.7	31 14.9	83 56	133.0	30 50.0	83 56	133.3	30 25.2	83 56	133.7	9
40	32 43.3	81 59	130.3	32 18.9	81 58	130.7	31 54.5	81 58	131.0	31 30.1	82 58	131.4	31 05.5	82 58	131.7	30 41.0	82 57	132.0	30 16.4	82 57	132.4	29 51.7	82 57	132.7	40
1	32 08.0	80 60	129.4	31 43.8	81 59	129.7	31 19.6	81 59	130.1	30 55.3	81 59	130.4	30 31.0	81 58	130.8	30 06.6	81 58	131.1	29 42.1	82 58	131.4	29 17.7	82 58	131.8	1
2	31 32.2	80 60	128.4	31 08.3	80 60	128.8	30 44.2	80 60	129.1	30 20.1	80 60	129.5	29 55.9	81 59	129.8	29 31.7	81 59	130.2	29 07.4	81 59	130.5	28 43.1	81 58	130.8	2
3	30 56.0	79 61	127.5	30 32.2	79 61	127.9	30 08.3	80 61	128.2	29 44.4	80 60	128.6	29 20.4	80 60	128.9	28 56.4	80 60	129.3	28 32.3	80 59	129.6	28 08.1	81 59	129.9	3
4	30 19.3	79 62	126.6	29 55.7	79 62	127.0	29 32.0	79 61	127.3	29 08.2	79 61	127.7	28 44.4	79 61	128.0	28 20.5	80 60	128.4	27 56.6	80 60	128.7	27 32.6	80 60	129.0	4
45	29 42.2	78 63	125.7	29 18.8	78 62	126.1	28 55.2	79 62	126.4	28 31.6	79 62	126.8	28 08.0	79 61	127.1	27 44.3	79 61	127.5	27 20.5	79 61	127.8	26 56.7	79 61	128.1	45
6	29 04.7	78 63	124.8	28 41.4	78 63	125.2	28 18.0	78 63	125.5	27 54.6	78 62	125.9	27 31.1	78 62	126.2	27 07.6	79 62	126.6	26 44.0	79 62	126.9	26 20.4	79 61	127.3	6
7	28 26.8	77 64	123.9	28 03.6	77 64	124.3	27 40.4	77 63	124.6	27 17.1	78 63	125.0	26 53.8	78 63	125.4	26 30.5	78 63	125.7	26 07.0	78 62	126.1	25 43.6	78 62	126.4	7
8	27 48.4	77 65	123.1	27 25.4	77 64	123.4	27 02.4	77 64	123.8	26 39.3	77 64	124.1	26 16.1	77 63	124.5	25 52.9	77 63	124.8	25 29.7	78 63	125.2	25 06.4	78 63	125.5	8
9	27 09.7	76 65	122.2	26 46.9	76 65	122.6	26 24.0	76 65	122.9	26 01.1	77 64	123.3	25 38.1	77 64	123.6	25 15.0	77 64	124.0	24 51.9	77 64	124.3	24 28.8	77 63	124.7	9
50	26 30.6	75 66	121.4	26 08.0	76 65	121.7	25 45.2	76 65	122.1	25 22.5	76 65	122.4	24 59.6	76 65	122.8	24 36.7	76 64	123.2	24 13.8	77 64	123.5	23 50.8	77 64	123.9	50
1	25 51.2	75 66	120.5	25 28.7	75 66	120.9	25 06.1	75 66	121.2	24 43.5	76 66	121.6	24 20.8	76 65	122.0	23 58.1	76 65	122.3	23 35.3	76 65	122.7	23 12.5	76 65	123.0	1
2	25 11.5	74 67	119.7	24 49.1	75 67	120.1	24 26.7	75 66	120.4	24 04.2	75 66	120.8	23 41.6	75 66	121.1	23 19.1	75 66	121.5	22 56.4	76 65	121.9	22 33.7	76 65	122.2	2
3	24 31.4	74 67	118.9	24 09.1	74 67	119.2	23 46.9	74 67	119.6	23 24.5	75 67	120.0	23 02.1	75 66	120.3	22 39.7	75 66	120.7	22 17.2	75 66	121.1	21 54.7	75 66	121.4	3
4	23 51.0	74 68	118.1	23 28.9	74 68	118.4	23 06.7	74 67	118.8	22 44.5	74 67	119.2	22 22.3	74 67	119.5	22 00.0	74 67	119.9	21 37.7	75 66	120.3	21 15.3	75 66	120.6	4
55	23 10.3	73 68	117.3	22 48.3	73 68	117.6	22 26.3	73 68	118.0	22 04.3	74 68	118.4	21 42.2	74 67	118.7	21 20.0	74 67	119.1	20 57.8	74 67	119.5	20 35.6	74 67	119.8	55
6	22 29.3	73 69	116.5	22 07.4	73 69	116.9	21 45.6	73 68	117.2	21 23.7	73 68	117.6	21 01.7	73 68	118.0	20 39.7	73 68	118.3	20 17.6	74 67	118.7	19 55.5	74 67	119.0	6
7	21 48.0	72 69	115.7	21 26.3	72 69	116.1	21 04.6	73 69	116.4	20 42.8	73 69	116.8	20 21.0	73 68	117.2	19 59.1	73 68	117.5	19 37.2	73 68	117.9	19 15.2	73 68	118.3	7
8	21 06.4	72 70	114.9	20 44.9	72 69	115.3	20 23.3	72 69	115.7	20 01.6	72 69	116.0	19 39.9	72 69	116.4	19 18.2	73 69	116.8	18 56.4	73 68	117.1	18 34.6	73 68	117.5	8
9	20 24.6	71 70	114.2	20 03.2	72 70	114.5	19 41.7	72 70	114.9	19 20.2	72 70	115.3	18 58.6	72 69	115.6	18 37.0	72 69	116.0	18 15.4	72 69	116.4	17 53.7	72 69	116.7	9
60	19 42.6	71 70	113.4	19 21.3	71 70	113.8	18 59.9	71 70	114.2	18 38.5	71 70	114.5	18 17.1	72 70	114.9	17 55.6	72 70	115.3	17 34.1	72 69	115.6	17 12.5	72 69	116.0	60
1	19 00.3	71 71	112.7	18 39.1	71 71	113.0	18 17.8	71 70	113.4	17 56.6	71 70	113.8	17 35.2	71 70	114.1	17 13.9	71 70	114.5	16 52.5	71 70	114.9	16 31.0	72 70	115.2	1
2	18 17.7	70 71	111.9	17 56.7	70 71	112.3	17 35.5	70 71	112.7	17 14.4	71 71	113.0	16 53.2	71 70	113.4	16 31.9	71 70	113.8	16 10.7	71 70	114.1	15 49.4	71 70	114.5	2
3	17 35.0	70 72	111.2	17 14.0	70 71	111.6	16 53.0	70 71	111.9	16 32.0	70 71	112.3	16 10.9	70 71	112.7	15 49.8	70 71	113.0	15 28.6	71 70	113.4	15 07.4	71 70	113.8	3
4	16 52.0	69 72	110.5	16 31.2	70 72	110.8	16 10.3	70 72	111.2	15 49.3	70 71	111.6	15 28.4	70 71	112.0	15 07.4	70 71	112.3	14 46.3	70 71	112.7	14 25.2	70 71	113.1	4
65	16 08.9	69 72	109.7	15 48.1	69 72	110.1	15 27.3	69 72	110.5	15 06.5	69 72	110.9	14 45.6	70 72	111.2	14 24.7	70 71	111.6	14 03.8	70 71	112.0	13 42.8	70 71	112.3	65
6	15 25.5	69 73	109.0	15 04.9	69 72	109.4	14 44.2	69 72	109.8	14 23.5	69 72	110.1	14 02.7	69 72	110.5	13 41.9	69 72	110.9	13 21.1	69 72	111.3	13 00.2	70 71	111.6	6
7	14 42.0	68 73	108.3	14 21.4	69 73	108.7	14 00.8	69 73	109.1	13 40.2	69 72	109.4	13 19.5	69 72	109.8	12 58.9	69 72	110.2	12 38.1	69 72	110.6	12 17.4	69 72	110.9	7
8	13 58.2	68 73	107.6	13 37.8	68 73	108.0	13 17.3	68 73	108.4	12 56.8	68 73	108.7	12 36.2	69 73	109.1	12 15.6	69 72	109.5	11 55.0	69 72	109.9	11 34.4	69 72	110.2	8
9	13 14.4	68 73	106.9	12 54.0	68 73	107.3	12 33.6	68 73	107.7	12 13.2	68 73	108.0	11 52.7	68 73	108.4	11 32.2	68 73	108.8	11 11.7	68 72	109.2	10 51.1	69 72	109.5	9
70	12 30.3	68 74	106.2	12 10.0	68 74	106.6	11 49.7	68 73	107.0	11 29.4	68 73	107.4	11 09.0	68 73	107.7	10 48.6	68 73	108.1	10 28.2	68 73	108.5	10 07.7	68 73	108.8	70
1	11 46.1	67 74	105.5	11 25.9	67 74	105.9	11 05.7	67 74	106.3	10 45.4	68 74	106.7	10 25.1	68 73	107.0	10 04.8	68 73	107.4	9 44.5	68 73	107.8	9 24.1	68 73	108.2	1
2	11 01.7	67 74	104.9	10 41.6	67 74	105.2	10 21.5	67 74	105.6	10 01.3	67 74	106.0	9 41.1	67 74	106.4	9 20.9	67 73	106.7	9 00.6	68 73	107.1	8 40.4	68 73	107.5	2
3	10 17.2	67 74	104.2	9 57.2	67 74	104.6	9 37.1	67 74	104.9	9 17.0	67 74	105.3	8 56.9	67 74	105.7	8 36.8	67 74	106.1	8 16.6	67 74	106.4	7 56.5	67 73	106.8	3
4	9 32.6	67 75	103.5	9 12.6	67 74	103.9	8 52.7	67 74	104.3	8 32.6	67 74	104.6	8 12.6	67 74	105.0	7 52.6	67 74	105.4	7 32.5	67 74	105.8	7 12.4	67 74	106.1	4
75	8 47.9	66 75	102.8	8 28.0	66 75	103.2	8 08.0	66 75	103.6	7 48.1	67 74	104.0	7 28.1	67 74	104.3	7 08.2	67 74	104.7	6 48.2	67 74	105.1	6 28.2	67 74	105.5	75
6	8 03.0	66 75	102.2	7 43.2	66 75	102.5	7 23.3	66 75	102.9	7 03.4	66 75	103.3	6 43.5	66 75	103.7	6 23.6	66 74	104.0	6 03.7	66 74	104.4	5 43.8	66 74	104.8	6
7	7 18.0	66 75	101.5	6 58.2	66 75	101.9	6 38.4	66 75	102.3	6 18.6	66 75	102.6	5 58.8	66 75	103.0	5 39.0	66 75	103.4	5 19.1	66 75	103.8				7
8	6 32.9	66 75	100.8	6 13.2	66 75	101.2	5 53.5	66 75	101.6	5 33.7	66 75	102.0	5 14.0	66 75	102.3										8
9	5 47.7	65 75	100.2	5 28.1	66 75	100.6	5 08.4	66 75	100.9																9
80	5 02.4	65 76	99.5																						80

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Lat. 40°

H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
	° ′	d Δ	°	° ′	d Δ	°	° ′	d Δ	°	° ′	d Δ	°	° ′	d Δ	°	° ′	d Δ	°	° ′	d Δ	°	° ′	d Δ	°	
00	58 00.0	1.0 01	180.0	58 30.0	1.0 01	180.0	59 00.0	1.0 01	180.0	59 30.0	1.0 01	180.0	60 00.0	1.0 01	180.0	60 30.0	1.0 01	180.0	61 00.0	1.0 01	180.0	61 30.0	1.0 01	180.0	00
1	57 59.2	1.0 04	178.1	58 29.2	1.0 04	178.1	58 59.2	1.0 04	178.1	59 29.2	1.0 04	178.1	59 59.2	1.0 04	178.0	60 29.2	1.0 04	178.0	60 59.2	1.0 04	178.0	61 29.2	1.0 04	177.9	1
2	57 57.0	1.0 06	176.3	58 27.0	1.0 06	176.2	58 56.9	1.0 06	176.2	59 26.9	1.0 06	176.1	59 56.8	1.0 07	176.1	60 26.8	1.0 07	176.0	60 56.8	1.0 07	176.0	61 26.7	1.0 07	175.9	2
3	57 53.3	1.0 09	174.4	58 23.2	1.0 09	174.3	58 53.1	1.0 09	174.3	59 23.0	1.0 09	174.2	59 52.9	1.0 09	174.1	60 22.8	1.0 09	174.0	60 52.7	1.0 09	173.9	61 22.6	1.0 10	173.9	3
4	57 48.0	99 11	172.6	58 17.9	99 11	172.5	58 47.7	99 11	172.4	59 17.6	99 12	172.3	59 47.4	99 12	172.2	60 17.2	99 12	172.0	60 47.1	99 12	171.9	61 16.9	99 12	171.8	4
05	57 41.4	99 14	170.7	58 11.1	99 14	170.6	58 40.9	99 14	170.5	59 10.6	99 14	170.3	59 40.4	99 14	170.2	60 10.1	99 14	170.1	60 39.8	99 15	169.9	61 09.5	99 15	169.8	05
6	57 33.2	99 16	168.9	58 02.9	99 16	168.7	58 32.5	99 16	168.6	59 02.2	99 17	168.4	59 31.8	99 17	168.3	60 01.4	99 17	168.1	60 31.0	99 17	168.0	61 00.6	99 17	167.8	6
7	57 23.6	98 18	167.1	57 53.2	98 19	166.9	58 22.7	98 19	166.7	58 52.2	98 19	166.6	59 21.7	98 19	166.4	59 51.2	98 20	166.2	60 20.7	98 20	166.0	60 50.1	98 20	165.8	7
8	57 12.6	98 21	165.3	57 42.0	98 21	165.1	58 11.4	98 21	164.9	58 40.8	98 21	164.7	59 10.1	98 22	164.5	59 39.5	98 22	164.3	60 08.8	98 22	164.1	60 38.1	98 23	163.9	8
9	57 00.2	98 23	163.5	57 29.5	97 23	163.3	57 58.7	97 23	163.1	58 27.9	97 24	162.8	58 57.1	97 24	162.6	59 26.3	97 24	162.4	59 55.4	97 25	162.2	60 24.6	97 25	161.9	9
10	56 46.5	97 25	161.7	57 15.6	97 25	161.5	57 44.6	97 26	161.3	58 13.7	97 26	161.0	58 42.7	97 26	160.8	59 11.7	97 27	160.5	59 40.6	96 27	160.3	60 09.6	96 27	160.0	10
1	56 31.4	96 27	160.0	57 00.3	96 28	159.7	57 29.2	96 28	159.5	57 58.1	96 28	159.2	58 26.9	96 29	159.0	58 55.7	96 29	158.7	59 24.4	96 29	158.4	59 53.1	96 30	158.1	1
2	56 15.8	96 29	158.2	56 43.7	96 30	158.0	57 12.4	96 30	157.7	57 41.1	96 30	157.4	58 09.7	96 31	157.2	58 38.3	96 31	156.9	59 06.8	95 32	156.6	59 35.3	95 32	156.3	2
3	55 57.3	95 32	156.6	56 25.9	95 32	156.3	56 54.4	95 32	156.0	57 22.8	95 33	155.7	57 51.2	95 33	155.4	58 19.6	94 33	155.1	58 47.9	94 34	154.8	59 16.2	94 34	154.4	3
4	55 38.4	94 34	154.9	56 06.8	94 34	154.6	56 35.0	94 34	154.3	57 03.3	94 35	154.0	57 31.4	94 35	153.7	57 59.6	94 35	153.3	58 27.7	94 36	153.0	58 55.7	93 36	152.7	4
15	55 18.3	94 35	153.2	55 46.4	94 36	152.9	56 14.5	93 36	152.6	56 42.5	93 37	152.3	57 10.4	93 37	152.0	57 38.3	93 37	151.6	58 06.2	93 38	151.3	58 33.9	92 38	150.9	15
6	54 57.1	93 37	151.6	55 24.9	93 38	151.3	55 52.8	93 38	151.0	56 20.5	92 39	150.6	56 48.2	92 39	150.3	57 15.9	92 39	149.9	57 43.5	92 40	149.6	58 11.0	92 40	149.2	6
7	54 34.7	92 39	150.0	55 02.3	92 40	149.7	55 29.9	92 40	149.3	55 57.4	92 40	149.0	56 24.9	91 41	148.6	56 52.3	91 41	148.3	57 19.6	91 42	147.9	57 46.9	91 42	147.5	7
8	54 11.2	91 41	148.5	54 38.6	91 41	148.1	55 05.9	91 42	147.8	55 33.2	91 42	147.4	56 00.4	91 43	147.0	56 27.5	90 43	146.6	56 54.6	90 43	146.2	57 21.6	90 44	145.8	8
9	53 46.6	91 43	146.9	54 13.8	90 43	146.6	54 40.9	90 43	146.2	55 07.9	90 44	145.8	55 34.8	90 44	145.4	56 01.7	89 45	145.0	56 28.5	89 45	144.6	56 55.3	89 46	144.2	9
20	53 21.0	90 44	145.4	53 47.9	90 45	145.1	54 14.8	89 45	144.7	54 41.6	89 46	144.3	55 08.3	89 46	143.9	55 34.9	89 46	143.5	56 01.4	88 47	143.1	56 27.9	88 47	142.7	20
1	52 54.5	89 46	144.0	53 21.1	89 46	143.6	53 47.7	89 47	143.2	54 14.3	88 47	142.8	54 40.7	88 48	142.4	55 07.1	88 48	142.0	55 33.3	87 48	141.5	55 59.5	87 49	141.1	1
2	52 26.9	88 47	142.5	52 53.4	88 48	142.1	53 19.7	88 48	141.7	53 46.0	87 49	141.3	54 12.2	87 49	140.9	54 38.3	87 50	140.5	55 04.3	87 50	140.0	55 30.2	86 50	139.6	2
3	51 58.5	87 49	141.1	52 24.7	87 49	140.7	52 50.8	87 50	140.3	53 16.8	87 50	139.9	53 42.7	86 51	139.4	54 08.6	86 51	139.0	54 34.3	86 51	138.6	54 59.9	85 52	138.1	3
4	51 29.2	87 50	139.7	51 55.1	86 51	139.3	52 21.0	86 51	138.9	52 46.7	86 52	138.4	53 12.4	85 52	138.0	53 38.9	85 52	137.6	54 03.5	85 53	137.1	54 28.8	84 53	136.7	4
25	50 59.1	86 52	138.3	51 24.7	85 52	137.9	51 50.3	85 52	137.5	52 15.9	85 53	137.1	52 41.3	85 53	136.6	53 06.6	84 54	136.2	53 31.8	84 54	135.7	53 56.9	84 55	135.3	25
6	50 28.1	85 53	137.0	50 53.5	85 53	136.6	51 18.9	84 54	136.2	51 44.2	84 54	135.7	52 09.3	84 55	135.3	52 34.4	83 55	134.8	52 59.3	83 55	134.4	53 24.2	83 56	133.9	6
7	49 56.4	84 54	135.7	50 21.6	84 54	135.3	50 46.7	84 55	134.8	51 11.7	83 55	134.4	51 36.6	83 56	134.0	52 01.4	82 56	133.5	52 26.1	82 57	133.0	52 50.7	82 57	132.6	7
8	49 23.9	83 55	134.4	49 48.9	83 56	134.0	50 13.7	83 56	133.5	50 38.5	82 56	133.1	51 03.1	82 57	132.7	51 27.7	82 57	132.2	51 52.1	81 58	131.7	52 16.5	81 58	131.2	8
9	48 50.7	83 56	133.2	49 15.4	82 57	132.7	49 40.1	82 57	132.3	50 04.6	82 58	131.8	50 29.0	81 58	131.4	50 53.3	81 58	130.9	51 17.5	80 59	130.4	51 41.6	80 59	130.0	9
30	48 16.9	82 58	131.9	48 41.3	81 58	131.5	49 05.7	81 58	131.0	49 30.0	81 59	130.6	49 54.2	80 59	130.1	50 18.2	80 59	129.7	50 42.2	80 60	129.2	51 06.0	79 60	128.7	30
1	47 42.3	81 59	130.7	48 06.6	81 59	130.3	48 30.7	80 59	129.8	48 54.8	80 60	129.4	49 18.7	80 60	128.9	49 42.6	79 60	128.5	50 06.3	79 61	128.0	50 29.9	78 61	127.5	1
2	47 07.2	80 60	129.5	47 31.2	80 60	129.1	47 55.1	80 60	128.6	48 19.0	79 61	128.2	48 42.7	79 61	127.7	49 06.3	78 61	127.3	49 29.7	78 62	126.8	49 53.1	78 62	126.3	2
3	46 31.5	80 60	128.4	46 55.3	79 61	127.9	47 19.0	79 61	127.5	47 42.6	78 62	127.0	48 06.0	78 62	126.6	48 29.4	78 62	126.1	48 52.6	77 63	125.6	49 15.8	77 63	125.1	3
4	45 55.1	79 61	127.3	46 18.7	78 62	126.8	46 42.2	78 62	126.4	47 05.6	78 62	125.9	47 28.8	77 63	125.4	47 52.0	77 63	125.0	48 15.0	77 64	124.5	48 37.9	76 64	124.0	4
35	45 18.3	78 62	126.1	45 41.7	78 63	125.7	46 04.9	77 63	125.2	46 28.1	77 63	124.8	46 51.1	77 64	124.3	47 14.1	76 64	123.8	47 36.9	76 64	123.4	47 59.6	75 65	122.9	35
6	44 40.9	77 63	125.1	45 04.1	77 63	124.6	45 27.1	77 64	124.1	45 50.1	76 64	123.7	46 12.9	76 64	123.2	46 35.6	76 65	122.7	46 58.2	75 65	122.3	47 20.7	75 66	121.8	6
7	44 03.0	77 64	124.0	44 26.0	76 64	123.5	44 48.9	76 65	123.1	45 11.6	76 65	122.6	45 34.2	75 65	122.2	45 56.8	75 66	121.7	46 19.2	74 66	121.2	46 41.4	74 66	120.7	7
8	43 24.7	76 65	122.9	43 47.5	76 65	122.5	44 10.1	75 65	122.0	44 32.7	75 66	121.6	44 55.1	75 66	121.1	45 17.4	74 66	120.6	45 39.6	74 67	120.2	46 01.7	73 67	119.7	8
9	42 45.9	75 65	121.9	43 08.5	75 66	121.5	43 30.9	75 66	121.0	43 53.3	74 66	120.5	44 15.5	74 67	120.1	44 37.7	74 67	119.6	44 59.7	73 67	119.1	45 21.6	73 68	118.6	9
40	42 06.7	75 66	120.9	42 29.1	74 66	120.5	42 51.3	74 67	120.0	43 13.5	74 67	119.5	43 35.6	73 67	119.1	43 57.5	73 68	118.6	44 19.3	73 68	118.1	44 41.0	72 68	117.6	40
1	41 27.0	74 67	119.9	41 49.2	74 67	119.5	42 11.3	73 67	119.0	42 33.3	73 68	118.5	42 55.2	73 68	118.1	43 17.0	72 68	117.6	43 38.6	72 68	117.1	44 00.1	72 69	116.7	1
2	40 47.0	74 67	118.9	41 09.0	73 68	118.5	41 31.0	73 68	118.0	41 52.8	73 68	117.6	42 14.5	72 68	117.1	42 36.1	72 69	116.6	42 57.5	71 69	116.2	43 18.9	71 69	115.7	2
3	40 06.6	73 68	118.0	40 28.5	73 68	117.5	40 50.2	72 68	117.1	41 11.8	72 69	116.6	41 33.4	72 69	116.2	41 54.8	71 69	115.7	42 16.1	71 70	115.2	42 37.3	70 70	114.7	3
4	39 25.8	72 68	117.1	39 47.5	72 69	116.6	40 09.1	72 69	116.2	40 30.6	71 69	115.7	40 52.0	71 70	115.2	41 13.2	71 70	114.8	41 34.4	70 70	114.3	41 55.4	70 70	113.8	4
45	38 44.7	72 69	116.1	39 06.3	72 69	115.7	39 27.7	71 70	115.2	39 49.0	71 70	114.8	40 10.2	71 70	114.3	40 31.3	70 70	113.8	40 52.3	70 71	113.4	41 13.2	69 71	112.9	45
6	38 03.3	71 70	115.2	38 24.7	71 70	114.8	38 46.0	71 70	114.3	39 07.1	70 70	113.9	39 28.2	70 71	113.4	39 49.2	70 71	112.9	40 10.0	69 71	112.5	40 30.7	69 71	112.0	6
7	37 21.6	71 70	114.3	37 42.8	71 70	113.9	38 03.9	70 70	113.4	38 25.0	70 71	113.0	38 45.9	70 71	112.5	39 06.7	69 71	112.1	39 27.4	69 71	111.6	39 48.0	68 72	111.1	7
8	36 39.6	70 70	113.5	37 00.6	70 71	113.0	37 21.6	70 71	112.6	37 42.5	69 71	112.1	38 03.3	69 71	111.7	38 24.0	69 72	111.2	38 44.5	68 72	110.7	39 05.0	68 72	110.3	8
9	35 57.3	70 71	112.6	36 18.2	70 71	112.2	36 39.0	69 71	111.7	36 59.8	69 72	111.3	37 20.4	69 72	110.8	37 41.0	68 72	110.3	38 01.4	68 72	109.9	38 21.7	68 72	109.4	9
50	35 14.7	70 71	111.7	35 35.5	69 72	111.3	35 56.2	69 72	110.9	36 16.8	69 72	110.4	36 37.4	68 72	110.0	36 57.8	68 72	109.5	37 18.1	68 73	109.0	37 38.3	67 73	108.6	50
1	34 31.9	69 72	110.9	34 52.6	69 72	110.5	35 13.2	68 72	110.0	35 33.6	68 72	109.6	35 54.0	68 73	109.1	36 14.3	67 73	108.7	36 34.5	67 73	108.2	36 54.6	67 73	107.7	1
2	33 48.8	69 72	110.1	34 09.4	68 72	109.6	34 29.9	68 72	109.2	34 50.2	68 73	108.8	35 10.5	67 73	108.3	35 30.7	67 73	107.9	35 50.8	67 73	107.4	36 10.7	66 73	106.9	2
3	33 05.5	68 72	109.3	33 26.0	68 73	108.8	33 46.3	68 73	108.4	34 06.6	67 73	107.9	34 26.8	67 73	107.5	34 46.8	67 73	107.0	35 06.8	66 74	106.6	35 26.7	66 74	106.1	3
4	32 22.0	68 73	108.5	32 42.4	68 73	108.0	33 02.6	67 73	107.6	33 22.8	67 73	107.1	33 42.8	67 74	106.7	34 02.8	66 74	106.3	34 22.7	66 74	105.8	34 42.4	66 74	105.3	4
55	31 38.3	68 73	107.7	31 58.6	67 73	107.2	32 18.7	67 73	106.8	32 38.8	67 74	106.4	32 58.7	66 74	105.9	33 18.6	66 74	105.5	33 38.4	66 74	105.0	33 58.0	65 74	104.6	55
6	30 54.5	67 73	106.9	31 14.6	67 74	106.5	31 34.6	67 74	106.0	31 54.6	66 74	105.6	32 14.4	66 74	105.1	32 34.2	66 74	104.7	32 53.9	65 74	104.2	33 13.5	65 75	103.8	6
7	30 10.4	67 74	106.1	30 30.4	67 74	105.7	30 50.4	66 74	105.3	31 10.2	66 74	104.8	31 30.0	66 74	104.4	31 49.7	65 74	103.9	32 09.3	65 75	103.5	32 28.8	65 75	103.0	7
8	29 26.2	67 74	105.4	29 46.1	66 74	104.9	30 05.9	66 74	104.5	30 25.7	66 74	104.1	30 45.4	65 75	103.6	31 05.0	65 75	103.2	31 24.5	65 75	102.7	31 43.9	65 75	102.3	8
9	28 41.8	66 74	104.6	29 01.6	66 74	104.2	29 21.4	66 75	103.7	29 41.1	65 75	103.3	30 00.7	65 75	102.9	30 20.2	65 75	102.4	30 39.6	65 75	102.0	30 58.9	64 75	101.6	9
60	27 57.2	66 74	103.9	28 17.0	66 75	103.4	28 36.7	65 75	103.0	28 56.3	65 75	102.6	29 15.8	65 75	102.1	29 35.2	65 75	101.7	29 54.6	64 75	101.3	30 13.8	64 75	100.8	60
1	27 12.5	66 75	103.1	27 32.2	66 75	102.7	27 51.8	65 75	102.3	28 11.3	65 75	101.8	28 30.8	65 75	101.4	28 50.2	64 75	101.0	29 09.4	64 75	100.5	29 28.6	64 76	100.1	1
2	26 27.7	66 75	102.4	26 47.3	65 75	102.0	27 06.8	65 75	101.6	27 26.3	65 75	101.1	27 45.7	64 75	100.7	28 05.0	64 75	100.3	28 24.2	64 76	99.8	28 43.3	64 76	99.4	2
3	25 42.7	65 75	101.7	26 02.3	65 75	101.3	26 21.8	65 75	100.8	26 41.1	65 75	100.4	27 00.5	64 76	100.0	27 19.7	64 76	99.5	27 38.9	64 76	99.1	27 58.0	63 76	98.7	3
4	24 57.7	65 75	101.0	25 17.1	65 75	100.5	25 36.6	65 75	100.1	25 55.9	64 76	99.7	26 15.2	64 76	99.3	26 34.3	64 76	98.8	26 53.4	64 76	98.4	27 12.5	63 76	98.0	4
65	24 12.5	65 75	100.3	24 31.9	65 76	99.8	24 51.3	64 76	99.4	25 10.5	64 76	99.0	25 29.7	64 76	98.6	25 48.9	64 76	98.1	26 07.9	63 76	97.7	26 26.9	63 76	97.3	65
6	23 27.2	65 76	99.6	23 46.6	64 76	99.1	24 05.9	64 76	98.7	24 25.1	64 76	98.3	24 44.3	64 76	97.9	25 03.3	63 76	97.5	25 22.4	63 76	97.0	25 41.3	63 76	96.6	6
7	22 41.8	64 76	98.9	23 01.2	64 76	98.4	23 20.4	64 76	98.0	23 39.6	64 76	97.6	23 58.7	64 76	97.2	24 17.7	63 76	96.8	24 36.7	63 76	96.3	24 55.6	63 76	95.9	7
8	21 56.4	64 76	98.2	22 15.6	64 76	97.8	22 34.8	64 76	97.3	22 54.0	64 76	96.9	23 13.1	63 76	96.5	23 32.1	63 76	96.1	23 51.0	63 76	95.7	24 09.9	63 76	95.2	8
9	21 10.9	64 76	97.5	21 30.1	64 76	97.1	21 49.2	64 76	96.7	22 08.3	64 76	96.2	22 27.4	63 76	95.8	22 46.3	63 76	95.4	23 05.2	63 76	95.0	23 24.1	63 76	94.6	9
70	20 25.2	64 76	96.8	20 44.4	64 76	96.4	21 03.5	64 76	96.0	21 22.6	63 76	95.6	21 41.6	63 76	95.2	22 00.5	63 76	94.7	22 19.4	63 76	94.3	22 38.2	63 76	93.9	70
1	19 39.6	64 76	96.1	19 58.7	64 76	95.7	20 17.8	64 76	95.3	20 36.8	63 76	94.9	20 55.8	63 76	94.5	21 14.7	63 76	94.1	21 33.6	63 76	93.7	21 52.4	63 76	93.2	1
2	18 53.8	64 76	95.5	19 13.0	64 76	95.1	19 32.0	63 76	94.6	19 51.0	63 76	94.2	20 10.0	63 76	93.8	20 28.9	63 76	93.4	20 47.7	63 77	93.0	21 06.5	62 77	92.6	2
3	18 08.1	64 76	94.8	18 27.2	64 76	94.4	18 46.2	63 76	94.0	19 05.2	63 76	93.6	19 24.1	63 76	93.2	19 43.0	63 77	92.8	20 01.8	63 77	92.3	20 20.5	62 77	91.9	3
4	17 22.2	64 76	94.1	17 41.3	63 76	93.7	18 00.3	63 76	93.3	18 19.3	63 77	92.9	18 38.2	63 77	92.5	18 57.0	63 77	92.1	19 15.8	63 77	91.7	19 34.6	62 77	91.3	4
75	16 36.4	64 76	93.5	16 55.4	63 77	93.1	17 14.4	63 77	92.7	17 33.4	63 77	92.3	17 52.3	63 77	91.9	18 11.1	63 77	91.4	18 29.9	63 77	91.0	18 48.6	62 77	90.6	75
6	15 50.5	63 77	92.8	16 09.5	63 77	92.4	16 28.5	63 77	92.0	16 47.4	63 77	91.6	17 06.3	63 77	91.2	17 25.1	63 77	90.8	17 43.9	63 77	90.4	18 02.7	62 77	90.0	6
7	15 04.6	63 77	92.2	15 23.6	63 77	91.8	15 42.6	63 77	91.4	16 01.5	63 77	91.0	16 20.4	63 77	90.6	16 39.2	63 77	90.2	16 58.0	63 77	89.7	17 16.7	62 77	89.3	7
8	14 18.6	63 77	91.5	14 37.6	63 77	91.1	14 56.6	63 77	90.7	15 15.5	63 77	90.3	15 34.4	63 77	89.9	15 53.2	63 77	89.5	16 12.0	63 77	89.1	16 30.7	62 77	88.7	8
9	13 32.7	63 77	90.9	13 51.7	63 77	90.5	14 10.6	63 77	90.1	14 29.6	63 77	89.7	14 48.4	63 77	89.3	15 07.3	63 77	88.9	15 26.1	63 77	88.5	15 44.8	62 77	88.1	9
80	12 46.7	63 77	90.2	13 05.7	63 77	89.8	13 24.7	63 77	89.4	13 43.6	63 77	89.0	14 02.5	63 77	88.6	14 21.3	63 77	88.2	14 40.1	63 77	87.8	14 58.9	62 77	87.4	80
1	12 00.8	63 77	89.6	12 19.8	63 77	89.2	12 38.7	63 77	88.8	12 57.6	63 77	88.4	13 16.5	63 77	88.0	13 35.4	63 77	87.6	13 54.2	63 76	87.2	14 13.0	63 76	86.8	1
2	11 14.8	63 77	88.9	11 33.8	63 77	88.6	11 52.8	63 77	88.2	12 11.7	63 77	87.8	12 30.6	63 76	87.4	12 49.5	63 76	87.0	13 08.3	63 76	86.6	13 27.1	63 76	86.2	2
3	10 28.9	63 77	88.3	10 47.9	63 77	87.9	11 06.8	63 76	87.5	11 25.8	63 76	87.1	11 44.7	63 76	86.7	12 03.6	63 76	86.3	12 22.4	63 76	85.9	12 41.3	63 76	85.5	3
4	9 42.9	63 77	87.7	10 01.9	63 76	87.3	10 20.9	63 76	86.9	10 39.9	63 76	86.5	10 58.8	63 76	86.1	11 17.7	63 76	85.7	11 36.6	63 76	85.3	11 55.5	63 76	84.9	4
85	8 57.0	64 76	87.0	9 16.8	63 76	86.6	9 35.1	63 76	86.2	9 54.0	63 76	85.9	10 13.0	63 76	85.5	10 31.9	63 76	85.1	10 50.8	63 76	84.7	11 09.7	63 76	84.3	85
6	8 11.1	64 76	86.4	8 30.2	63 76	86.0	8 49.2	63 76	85.6	9 08.2	63 76	85.2	9 27.2	63 76	84.8	9 46.2	63 76	84.4	10 05.1	63 76	84.0	10 24.0	63 76	83.6	6
7	7 25.3	64 76	85.8	7 44.3	64 76	85.4	8 03.4	63 76	85.0	8 22.4	63 76	84.6	8 41.4	63 76	84.2	9 00.4	63 76	83.8	9 19.4	63 76	83.4	9 38.3	63 76	83.0	7
8	6 39.4	64 76	85.1	6 58.6	64 76	84.7	7 17.6	64 76	84.3	7 36.7	64 76	84.0	7 55.7	63 76	83.6	8 14.8	63 76	83.2	8 33.8	63 76	82.8	8 52.7	63 76	82.4	8
9	5 53.7	64 76	84.5	6 12.8	64 76	84.1	6 31.9	64 76	83.7	6 51.0	64 76	83.3	7 10.1	64 76	82.9	7 29.2	63 76	82.5	7 48.2	63 76	82.2	8 07.2	63 76	81.8	9
90	5 07.9	64 76	83.9	5 27.1	64 76	83.5	5 46.3	64 76	83.1	6 05.4	64 76	82.7	6 24.5	64 76	82.3	6 43.6	64 76	81.9	7 02.7	64 76	81.5	7 21.8	64 76	81.1	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	8° 00′		8° 30′		9° 00′		9° 30′		10° 00′		10° 30′		11° 00′		11° 30′		H.A.
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
°	° ′	Δd Δt °	° ′	Δd Δt °	° ′	Δd Δt °	° ′	Δd Δt °	° ′	Δd Δt °	° ′	Δd Δt °	° ′	Δd Δt °	° ′	Δd Δt °	°
00	42 00.0	1.0 01 180.0	41 30.0	1.0 01 180.0	41 00.0	1.0 01 180.0	40 30.0	1.0 01 180.0	40 00.0	1.0 01 180.0	39 30.0	1.0 01 180.0	39 00.0	1.0 01 180.0	38 30.0	1.0 01 180.0	00
1	41 59.5	1.0 03 178.7	41 29.5	1.0 03 178.7	40 59.5	1.0 03 178.7	40 29.5	1.0 03 178.7	39 59.5	1.0 03 178.7	39 29.5	1.0 03 178.7	38 59.5	1.0 03 178.7	38 29.5	1.0 02 178.7	1
2	41 57.9	1.0 04 177.3	41 27.9	1.0 04 177.4	40 57.9	1.0 04 177.4	40 27.9	1.0 04 177.4	39 57.9	1.0 04 177.4	39 28.0	1.0 04 177.5	38 58.0	1.0 04 177.5	38 28.0	1.0 04 177.5	2
3	41 55.2	1.0 06 176.0	41 25.2	1.0 06 176.0	40 55.3	1.0 06 176.1	40 25.3	1.0 06 176.1	39 55.4	1.0 06 176.1	39 25.4	1.0 06 176.2	38 55.4	1.0 06 176.2	38 25.5	1.0 06 176.2	3
4	41 51.5	1.0 08 174.7	41 21.5	1.0 08 174.7	40 51.6	1.0 08 174.8	40 21.7	1.0 08 174.8	39 51.8	1.0 08 174.9	39 21.8	1.0 08 174.9	38 51.9	1.0 08 175.0	38 22.0	1.0 08 175.0	4
05	41 46.7	1.0 10 173.4	41 16.8	1.0 10 173.4	40 46.9	1.0 10 173.5	40 17.0	1.0 09 173.5	39 47.1	1.0 09 173.6	39 17.3	1.0 09 173.6	38 47.4	1.0 09 173.7	38 17.5	1.0 09 173.8	05
6	41 40.8	99 11 172.0	41 11.0	99 11 172.1	40 41.2	99 11 172.2	40 11.3	99 11 172.2	39 41.5	99 11 172.3	39 11.7	99 11 172.4	38 41.8	99 11 172.4	38 12.0	99 11 172.5	6
7	41 33.9	99 13 170.7	41 04.2	99 13 170.8	40 34.4	99 13 170.9	40 04.6	99 13 171.0	39 34.8	99 13 171.0	39 05.1	99 13 171.1	38 35.3	99 13 171.2	38 05.5	99 12 171.3	7
8	41 26.0	99 15 169.4	40 56.3	99 15 169.5	40 26.6	99 15 169.6	39 56.9	99 15 169.7	39 27.2	99 14 169.8	38 57.5	99 14 169.9	38 27.7	99 14 170.0	37 58.0	99 14 170.0	8
9	41 17.0	99 17 168.1	40 47.4	99 16 168.2	40 17.8	99 16 168.3	39 48.2	99 16 168.4	39 18.5	99 16 168.5	38 48.9	99 16 168.6	38 19.2	99 16 168.7	37 49.6	99 16 168.8	9
10	41 07.1	98 18 166.8	40 37.5	98 18 166.9	40 08.0	98 18 167.0	39 38.4	98 18 167.1	39 08.9	99 18 167.3	38 39.3	99 18 167.4	38 09.8	99 17 167.5	37 40.2	99 17 167.6	10
1	40 56.1	98 20 165.5	40 26.6	98 20 165.6	39 57.2	98 20 165.8	39 27.7	98 19 165.9	38 58.3	98 19 166.0	38 28.8	98 19 166.1	37 59.3	98 19 166.3	37 29.8	98 19 166.4	1
2	40 44.1	98 22 164.2	40 14.7	98 21 164.4	39 45.4	98 21 164.5	39 16.0	98 21 164.6	38 46.7	98 21 164.8	38 17.3	98 21 164.9	37 47.9	98 21 165.0	37 18.5	98 20 165.2	2
3	40 31.1	97 23 163.0	40 01.9	97 23 163.1	39 32.6	97 23 163.3	39 03.4	98 23 163.4	38 34.1	98 22 163.5	38 04.9	98 22 163.7	37 35.6	98 22 163.8	37 06.3	98 22 164.0	3
4	40 17.1	97 25 161.7	39 48.0	97 25 161.9	39 18.9	97 24 162.0	38 49.8	97 24 162.2	38 20.6	97 24 162.3	37 51.5	97 24 162.5	37 22.3	97 24 162.6	36 53.1	97 23 162.8	4
15	40 02.2	97 26 160.4	39 33.2	97 26 160.6	39 04.2	97 26 160.8	38 35.2	97 26 160.9	38 06.2	97 26 161.1	37 37.2	97 25 161.3	37 08.1	97 25 161.4	36 39.0	97 25 161.6	15
6	39 46.4	96 28 159.2	39 17.5	96 28 159.4	38 48.6	96 28 159.6	38 19.8	96 27 159.7	37 50.9	96 27 159.9	37 21.9	96 27 160.1	36 53.0	96 27 160.2	36 24.1	96 26 160.4	6
7	39 29.6	96 29 158.0	39 00.9	96 29 158.2	38 32.1	96 29 158.3	38 03.4	96 29 158.5	37 34.6	96 29 158.7	37 05.8	96 28 158.9	36 37.0	96 28 159.0	36 08.2	96 28 159.2	7
8	39 11.9	96 31 156.7	38 43.3	96 31 156.9	38 14.7	96 30 157.1	37 46.1	96 30 157.3	37 17.5	96 30 157.5	36 48.8	96 30 157.7	36 20.1	96 30 157.9	35 51.5	96 29 158.1	8
9	38 53.3	96 32 155.5	38 24.9	96 32 155.7	37 56.4	96 32 155.9	37 27.9	96 32 156.1	36 59.4	96 31 156.3	36 30.9	96 31 156.5	36 02.4	96 31 156.7	35 33.9	96 31 156.9	9
20	38 33.8	94 34 154.3	38 05.5	94 34 154.5	37 37.2	94 33 154.8	37 08.9	94 33 155.0	36 40.6	95 33 155.2	36 12.2	95 33 155.4	35 43.8	95 32 155.6	35 15.4	95 32 155.8	20
1	38 13.5	94 35 153.1	37 45.4	94 35 153.4	37 17.2	94 35 153.6	36 49.0	94 34 153.8	36 20.8	94 34 154.0	35 52.6	94 34 154.2	35 24.4	94 34 154.4	34 56.1	94 33 154.6	1
2	37 52.3	93 37 152.0	37 24.3	93 36 152.2	36 56.3	93 36 152.4	36 28.3	93 36 152.6	36 00.3	93 36 152.9	35 32.2	94 35 153.1	35 04.2	94 35 153.3	34 36.0	94 35 153.5	2
3	37 30.3	93 38 150.8	37 02.5	93 38 151.0	36 34.7	93 38 151.3	36 06.8	93 37 151.5	35 38.9	93 37 151.7	35 11.0	93 37 152.0	34 43.1	93 36 152.2	34 15.1	93 36 152.4	3
4	37 07.5	92 39 149.7	36 39.8	92 39 149.9	36 12.2	92 39 150.1	35 44.5	92 38 150.4	35 16.8	92 38 150.6	34 49.0	93 38 150.8	34 21.3	93 38 151.1	33 53.5	93 37 151.3	4
25	36 43.9	91 41 148.5	36 16.4	92 40 148.8	35 48.9	92 40 149.0	35 21.4	92 40 149.3	34 53.8	92 40 149.5	34 26.3	92 39 149.7	33 58.6	92 39 150.0	33 31.0	92 39 150.2	25
6	36 19.5	91 42 147.4	35 52.2	91 42 147.7	35 24.9	91 41 147.9	34 57.5	91 41 148.2	34 30.1	91 41 148.4	34 02.7	91 40 148.7	33 35.3	92 40 148.9	33 07.8	92 40 149.1	6
7	35 54.3	90 43 146.3	35 27.2	90 43 146.6	35 00.1	91 43 146.8	34 32.9	91 42 147.1	34 05.7	91 42 147.3	33 38.4	91 42 147.6	33 11.2	91 41 147.8	32 43.9	91 41 148.1	7
8	35 28.4	90 44 145.2	35 01.5	90 44 145.5	34 34.5	90 44 145.7	34 07.5	90 43 146.0	33 40.5	90 43 146.3	33 13.4	90 43 146.5	32 46.3	90 43 146.8	32 19.2	90 42 147.0	8
9	35 01.9	89 45 144.1	34 35.1	89 45 144.4	34 08.3	89 45 144.7	33 41.5	89 45 144.9	33 14.6	90 44 145.2	32 47.7	90 44 145.5	32 20.8	90 44 145.7	31 53.8	90 43 146.0	9
30	34 34.6	89 47 143.0	34 08.0	89 46 143.3	33 41.4	89 46 143.6	33 14.7	89 46 143.9	32 48.0	89 45 144.1	32 21.3	89 45 144.4	31 54.6	89 45 144.7	31 27.8	89 45 144.9	30
1	34 06.6	88 48 142.0	33 40.2	88 47 142.3	33 13.8	88 47 142.5	32 47.3	88 47 142.8	32 20.8	88 47 143.1	31 54.2	89 46 143.4	31 27.6	89 46 143.7	31 01.0	89 46 143.9	1
2	33 37.9	87 49 140.9	33 11.7	87 49 141.2	32 45.5	88 48 141.5	32 19.2	88 48 141.8	31 52.8	88 48 142.1	31 26.5	88 47 142.4	31 00.1	88 47 142.6	30 33.6	88 47 142.9	2
3	33 08.7	87 50 139.9	32 42.6	87 50 140.2	32 16.5	87 49 140.5	31 50.4	87 49 140.8	31 24.3	87 49 141.1	30 58.1	87 48 141.4	30 31.9	87 48 141.6	30 05.6	88 48 141.9	3
4	32 38.7	86 51 138.9	32 12.9	86 51 139.2	31 47.0	86 50 139.5	31 21.1	87 50 139.8	30 55.1	87 50 140.1	30 29.1	87 49 140.4	30 03.0	87 49 140.6	29 36.9	87 49 140.9	4
35	32 08.2	85 52 137.9	31 42.5	86 52 138.2	31 16.8	86 51 138.5	30 51.1	86 51 138.8	30 25.3	86 51 139.1	29 59.4	86 50 139.4	29 33.6	86 50 139.7	29 07.7	86 50 140.0	35
6	31 37.1	85 53 136.9	31 11.6	85 53 137.2	30 46.1	85 52 137.5	30 20.5	85 52 137.8	29 54.9	85 52 138.1	29 29.2	86 51 138.4	29 03.5	86 51 138.7	28 37.8	86 51 139.0	6
7	31 05.4	84 54 135.9	30 40.1	84 53 136.2	30 14.7	85 53 136.5	29 49.3	85 53 136.8	29 23.9	85 53 137.1	28 58.4	85 52 137.4	28 32.9	85 52 137.7	28 07.3	85 52 138.0	7
8	30 33.1	84 55 134.9	30 08.0	84 54 135.2	29 42.8	84 54 135.6	29 17.6	84 54 135.9	28 52.3	84 54 136.2	28 27.0	84 53 136.5	28 01.7	85 53 136.8	27 36.3	85 53 137.1	8
9	30 00.3	83 56 134.0	29 35.4	83 55 134.3	29 10.4	83 55 134.6	28 45.3	84 55 134.9	28 20.3	84 54 135.2	27 55.1	84 54 135.5	27 30.0	84 54 135.9	27 04.8	84 54 136.2	9
40	29 27.0	82 56 133.0	29 02.2	83 56 133.4	28 37.4	83 56 133.7	28 12.5	83 56 134.0	27 47.6	83 55 134.3	27 22.7	83 55 134.6	26 57.7	83 55 134.9	26 32.7	83 54 135.2	40
1	28 53.1	82 57 132.1	28 28.5	82 57 132.4	28 03.9	82 57 132.7	27 39.2	82 56 133.1	27 14.5	82 56 133.4	26 49.7	83 56 133.7	26 24.9	83 56 134.0	26 00.0	83 55 134.3	1
2	28 18.8	81 58 131.2	27 54.3	81 58 131.5	27 29.9	82 57 131.8	27 05.4	82 57 132.2	26 40.8	82 57 132.5	26 16.2	82 57 132.8	25 51.6	82 56 133.1	25 26.9	82 56 133.4	2
3	27 43.9	81 59 130.3	27 19.7	81 59 130.6	26 55.4	81 58 130.9	26 31.1	81 58 131.3	26 06.7	81 58 131.6	25 42.3	81 57 131.9	25 17.8	82 57 132.2	24 53.3	82 57 132.5	3
4	27 08.6	80 60 129.4	26 44.6	80 59 129.7	26 20.4	80 59 130.0	25 56.3	81 59 130.4	25 32.1	81 58 130.7	25 07.8	81 58 131.0	24 43.5	81 58 131.3	24 19.2	81 58 131.7	4
45	26 32.9	80 60 128.5	26 09.0	80 60 128.8	25 45.0	80 60 129.2	25 21.0	80 59 129.5	24 57.0	80 59 129.8	24 32.9	80 59 130.1	24 08.8	80 59 130.5	23 44.6	81 58 130.8	45
6	25 56.7	79 61 127.6	25 32.9	79 61 128.0	25 09.2	79 60 128.3	24 45.3	79 60 128.6	24 21.5	80 60 129.0	23 57.6	80 60 129.3	23 33.6	80 59 129.6	23 09.6	80 59 129.9	6
7	25 20.1	78 62 126.7	24 56.5	79 61 127.1	24 32.9	79 61 127.4	24 09.2	79 61 127.8	23 45.5	79 61 128.1	23 21.8	79 60 128.4	22 58.0	79 60 128.8	22 34.2	79 60 129.1	7
8	24 43.0	78 62 125.9	24 19.6	78 62 126.2	23 56.2	78 62 126.6	23 32.7	78 62 126.9	23 09.1	79 61 127.3	22 45.6	79 61 127.6	22 21.9	79 61 127.9	21 58.3	79 60 128.3	8
9	24 05.6	77 63 125.0	23 42.3	78 63 125.4	23 19.1	78 63 125.7	22 55.7	78 62 126.1	22 32.4	78 62 126.4	22 08.9	78 62 126.8	21 45.5	78 61 127.1	21 22.0	78 61 127.4	9
50	23 27.8	77 64 124.2	23 04.7	77 63 124.6	22 41.6	77 63 124.9	22 18.4	77 63 125.2	21 55.2	77 63 125.6	21 31.9	78 62 125.9	21 08.6	78 62 126.3	20 45.3	78 62 126.6	50
1	22 49.6	76 64 123.4	22 26.6	76 64 123.7	22 03.7	77 64 124.1	21 40.7	77 64 124.4	21 17.6	77 63 124.8	20 54.5	77 63 125.1	20 31.4	77 63 125.5	20 08.2	77 62 125.8	1
2	22 11.0	76 65 122.6	21 48.2	76 65 122.9	21 25.4	76 64 123.3	21 02.6	76 64 123.6	20 39.7	76 64 124.0	20 16.7	77 64 124.3	19 53.7	77 63 124.7	19 30.7	77 63 125.0	2
3	21 32.1	75 65 121.8	21 09.5	75 65 122.1	20 46.8	76 65 122.5	20 24.1	76 65 122.8	20 01.4	76 64 123.2	19 38.6	76 64 123.5	19 15.8	76 64 123.9	18 52.9	76 64 124.2	3
4	20 52.9	75 66 121.0	20 30.4	75 66 121.3	20 07.9	75 65 121.7	19 45.3	75 65 122.0	19 22.7	75 65 122.4	19 00.1	76 65 122.7	18 37.4	76 64 123.1	18 14.7	76 64 123.4	4
55	20 13.3	74 66 120.2	19 51.0	74 66 120.5	19 28.6	75 66 120.9	19 06.2	75 66 121.2	18 43.7	75 66 121.6	18 21.2	75 65 121.9	17 58.7	75 65 122.3	17 36.2	75 65 122.6	55
6	19 33.4	74 67 119.4	19 11.2	74 67 119.8	18 49.0	74 66 120.1	18 26.7	74 66 120.5	18 04.4	74 66 120.8	17 42.1	75 66 121.2	17 19.7	75 66 121.5	16 57.3	75 65 121.9	6
7	18 53.2	73 67 118.6	18 31.2	74 67 119.0	18 09.1	74 67 119.3	17 47.0	74 67 119.7	17 24.8	74 67 120.0	17 02.6	74 66 120.4	16 40.4	74 66 120.8	16 18.1	74 66 121.1	7
8	18 12.7	73 68 117.9	17 50.8	73 68 118.2	17 28.9	73 68 118.6	17 06.9	73 67 118.9	16 44.9	73 67 119.3	16 22.8	74 67 119.6	16 00.7	74 67 120.0	15 38.6	74 66 120.3	8
9	17 31.9	73 68 117.1	17 10.2	73 68 117.5	16 48.4	73 68 117.8	16 26.5	73 68 118.2	16 04.6	73 68 118.5	15 42.7	73 67 118.9	15 20.7	73 67 119.2	14 58.8	73 67 119.6	9
60	16 50.9	72 69 116.4	16 29.2	72 69 116.7	16 07.6	72 68 117.1	15 45.9	72 68 117.4	15 24.1	73 68 117.8	15 02.3	73 68 118.1	14 40.5	73 68 118.5	14 18.6	73 67 118.9	60
1	16 09.6	72 69 115.6	15 48.1	72 69 116.0	15 26.5	72 69 116.3	15 04.9	72 69 116.7	14 43.3	72 68 117.1	14 21.7	72 68 117.4	14 00.0	72 68 117.8	13 38.3	72 68 118.1	1
2	15 28.0	71 70 114.9	15 06.6	71 70 115.2	14 45.2	71 69 115.6	14 23.7	72 69 116.0	14 02.2	72 69 116.3	13 40.7	72 69 116.7	13 19.2	72 68 117.0	12 57.6	72 68 117.4	2
3	14 46.2	71 70 114.1	14 24.9	71 70 114.5	14 03.6	71 70 114.9	13 42.3	71 70 115.2	13 20.9	71 69 115.6	12 59.5	71 69 116.0	12 38.1	71 69 116.3	12 16.6	72 69 116.7	3
4	14 04.1	70 70 113.4	13 43.0	71 70 113.8	13 21.8	71 70 114.2	13 00.6	71 70 114.5	12 39.3	71 70 114.9	12 18.1	71 70 115.2	11 56.8	71 69 115.6	11 35.4	71 69 116.0	4
65	13 21.8	70 71 112.7	13 00.8	70 71 113.1	12 39.7	70 70 113.4	12 18.6	70 70 113.8	11 57.5	70 70 114.2	11 36.4	71 70 114.5	11 15.2	71 70 114.9	10 54.0	71 70 115.3	65
6	12 39.3	70 71 112.0	12 18.4	70 71 112.4	11 57.5	70 71 112.7	11 36.5	70 71 113.1	11 15.5	70 70 113.5	10 54.4	70 70 113.8	10 33.4	70 70 114.2	10 12.3	70 70 114.6	6
7	11 56.6	69 72 111.3	11 35.8	69 71 111.7	11 15.0	70 71 112.0	10 54.1	70 71 112.4	10 33.2	70 71 112.8	10 12.3	70 71 113.1	9 51.3	70 70 113.5	9 30.4	70 70 113.9	7
8	11 13.7	69 72 110.6	10 53.0	69 72 111.0	10 32.2	69 72 111.3	10 11.5	69 71 111.7	9 50.7	69 71 112.1	9 29.9	69 71 112.4	9 09.1	69 71 112.8	8 48.2	70 71 113.2	8
9	10 30.6	69 72 109.9	10 10.0	69 72 110.3	9 49.3	69 72 110.6	9 28.7	69 72 111.0	9 08.0	69 72 111.4	8 47.3	69 71 111.7	8 26.6	69 71 112.1	8 05.9	69 71 112.5	9
70	9 47.2	68 72 109.2	9 26.7	68 72 109.6	9 06.2	68 72 110.0	8 45.7	69 72 110.3	8 25.1	69 72 110.7	8 04.5	69 72 111.1	7 43.9	69 71 111.4	7 23.3	69 71 111.8	70
1	9 03.8	68 73 108.5	8 43.4	68 73 108.9	8 22.9	68 72 109.3	8 02.5	68 72 109.6	7 42.0	68 72 110.0	7 21.5	68 72 110.4	7 01.0	68 72 110.7	6 40.5	68 72 111.1	1
2	8 20.1	68 73 107.9	7 59.8	68 73 108.2	7 39.5	68 73 108.6	7 19.1	68 73 109.0	6 58.7	68 72 109.3	6 38.4	68 72 109.7	6 18.0	68 72 110.1	5 57.5	68 72 110.4	2
3	7 36.3	67 73 107.2	7 16.0	67 73 107.5	6 55.8	67 73 107.9	6 35.6	68 73 108.3	6 15.3	68 73 108.7	5 55.0	68 73 109.0	5 34.7	68 72 109.4	5 14.4	68 72 109.8	3
4	6 52.3	67 74 106.5	6 32.1	67 73 106.9	6 12.0	67 73 107.3	5 51.8	67 73 107.6	5 31.7	67 73 108.0	5 11.5	67 73 108.4					4
75	6 08.1	67 74 105.8	5 48.1	67 74 106.2	5 28.0	67 74 106.6	5 07.9	67 73 107.0									75
6	5 23.8	67 74 105.2	5 03.9	67 74 105.5													6

DECLINATION SAME NAME AS LATITUDE

H.A.	8° 00′		8° 30′		9° 00′		9° 30′		10° 00′		10° 30′		11° 00′		11° 30′		H.A.
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
°	° ′	Δd Δt °	° ′	Δd Δt °	° ′	Δd Δt °	° ′	Δd Δt °	° ′	Δd Δt °	° ′	Δd Δt °	° ′	Δd Δt °	° ′	Δd Δt °	°
91					5 00.7	64 76 82.4	5 19.8	64 76 82.1	5 39.0	64 76 81.7	5 58.2	64 76 81.3	6 17.3	64 76 80.9	6 36.4	64 76 80.5	91
2											5 12.8	64 76 80.7	5 31.9	64 76 80.3	5 51.1	64 75 79.9	2
3															5 05.9	64 75 79.3	3

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Lat. 40°

H.A.	12° 00′ Alt.	Δd Δt	Az.	12° 30′ Alt.	Δd Δt	Az.	13° 00′ Alt.	Δd Δt	Az.	13° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	62 00.0	1.0 01	180.0	62 30.0	1.0 01	180.0	63 00.0	1.0 01	180.0	63 30.0	1.0 01	180.0
1	61 59.2	1.0 04	177.9	62 29.2	1.0 04	177.9	62 59.1	1.0 04	177.9	63 29.1	1.0 04	177.8
2	61 56.7	1.0 07	175.8	62 26.6	1.0 07	175.8	62 56.6	1.0 07	175.7	63 26.5	1.0 07	175.6
3	61 52.5	1.0 10	173.8	62 22.4	1.0 10	173.7	62 52.3	1.0 10	173.6	63 22.2	1.0 10	173.5
4	61 46.7	99 12	171.7	62 16.5	99 13	171.6	62 46.3	99 13	171.5	63 16.1	99 13	171.3
05	61 39.2	99 15	169.7	62 08.9	99 15	169.5	62 38.6	99 16	169.4	63 08.3	99 16	169.2
6	61 30.2	99 18	167.6	61 59.8	99 18	167.4	62 29.3	98 18	167.3	62 58.8	98 18	167.1
7	61 19.5	98 20	165.6	61 49.0	98 21	165.4	62 18.4	98 21	165.2	62 47.7	98 21	165.0
8	61 07.4	98 23	163.6	61 36.6	97 23	163.4	62 05.8	97 24	163.2	62 35.0	97 24	162.9
9	60 53.6	97 25	161.7	61 22.7	97 26	161.4	61 51.7	97 26	161.1	62 20.7	97 26	160.9
10	60 38.5	96 28	159.7	61 07.3	96 28	159.4	61 36.1	96 28	159.2	62 04.9	96 29	158.9
1	60 21.8	96 30	157.8	60 50.5	96 30	157.5	61 19.1	96 31	157.2	61 47.6	96 31	156.9
2	60 03.8	95 32	156.0	60 32.2	95 33	155.6	61 00.5	94 33	155.3	61 28.8	94 34	154.9
3	59 44.4	94 35	154.1	60 12.5	94 35	153.8	60 40.6	94 35	153.4	61 08.7	93 36	153.0
4	59 23.6	93 37	152.3	59 51.6	93 37	151.9	60 19.4	93 38	151.6	60 47.2	93 38	151.2
15	59 01.7	92 39	150.5	59 29.3	92 39	150.2	59 56.9	92 40	149.8	60 24.4	92 40	149.4
6	58 38.4	91 41	148.8	59 05.8	91 41	148.4	59 33.1	91 42	148.0	60 00.4	91 42	147.6
7	58 14.0	91 43	147.1	58 41.2	90 43	146.7	59 08.2	90 43	146.3	59 35.1	90 44	145.8
8	57 48.5	90 44	145.4	58 15.4	89 45	145.0	58 42.1	89 45	144.6	59 08.8	89 46	144.1
9	57 21.9	89 46	143.8	57 48.5	88 47	143.4	58 14.9	88 47	142.9	58 41.3	88 48	142.5
20	56 54.3	88 48	142.2	57 20.5	87 48	141.8	57 46.7	87 49	141.3	58 12.8	87 49	140.8
1	56 25.6	87 49	140.7	56 51.6	86 50	140.2	57 17.5	86 50	139.7	57 43.3	86 51	139.3
2	55 56.0	86 51	139.2	56 21.7	86 51	138.7	56 47.3	85 52	138.2	57 12.8	85 52	137.7
3	55 25.5	85 52	137.7	55 50.9	85 53	137.2	56 16.2	84 53	136.7	56 41.5	84 54	136.2
4	54 54.1	84 54	136.2	55 19.3	84 54	135.7	55 44.3	83 55	135.3	56 09.2	83 55	134.8
25	54 21.9	83 55	134.8	54 46.8	83 55	134.3	55 11.5	82 56	133.8	55 36.2	82 56	133.3
6	53 48.9	82 56	133.4	54 13.5	82 57	132.9	54 38.0	81 57	132.4	55 02.4	81 58	131.9
7	53 15.1	81 57	132.1	53 39.5	81 58	131.6	54 03.7	81 58	131.1	54 27.8	80 59	130.6
8	52 40.7	81 59	130.8	53 04.8	80 59	130.3	53 28.7	80 59	129.8	53 52.6	79 60	129.3
9	52 05.5	80 60	129.5	52 29.4	79 60	129.0	52 53.1	79 60	128.5	53 16.7	78 61	128.0
30	51 29.7	79 61	128.2	51 53.3	78 61	127.7	52 16.8	78 62	127.2	52 40.1	78 62	126.7
1	50 53.3	78 62	127.0	51 16.7	78 62	126.5	51 39.9	77 62	126.0	52 03.0	77 63	125.5
2	50 16.3	77 63	125.8	50 39.4	77 63	125.3	51 02.4	76 63	124.8	51 25.3	76 64	124.3
3	49 38.8	76 63	124.6	50 01.7	76 64	124.1	50 24.4	76 64	123.6	50 47.0	75 65	123.1
4	49 00.7	76 64	123.5	49 23.4	75 65	123.0	49 45.9	75 65	122.5	50 08.3	74 65	122.0
35	48 22.1	75 65	122.4	48 44.6	75 65	121.9	49 06.9	74 66	121.4	49 29.0	74 66	120.9
6	47 43.1	74 66	121.3	48 05.3	74 66	120.8	48 27.4	73 66	120.3	48 49.4	73 67	119.8
7	47 03.6	74 67	120.2	47 25.6	73 67	119.7	47 47.5	73 67	119.2	48 09.2	72 68	118.7
8	46 23.7	73 67	119.2	46 45.5	73 68	118.7	47 07.2	72 68	118.2	47 28.7	72 68	117.7
9	45 43.3	72 68	118.1	46 05.0	72 68	117.7	46 26.5	71 68	117.2	46 47.8	71 69	116.6
40	45 02.6	72 68	117.1	45 24.1	71 69	116.6	45 45.4	71 69	116.1	46 06.6	70 69	115.6
1	44 21.5	71 69	116.2	44 42.8	71 69	115.7	45 04.0	70 70	115.2	45 25.0	70 70	114.7
2	43 40.1	71 70	115.2	44 01.2	70 70	114.7	44 22.2	70 70	114.2	44 43.0	69 70	113.7
3	42 58.4	70 70	114.3	43 19.3	70 70	113.8	43 40.1	69 71	113.3	44 00.8	69 71	112.8
4	42 16.3	69 71	113.3	42 37.1	69 71	112.8	42 57.7	69 71	112.3	43 18.3	68 71	111.8
45	41 34.0	69 71	112.4	41 54.6	69 71	111.9	42 15.1	68 72	111.4	42 35.5	68 72	110.9
6	40 51.3	68 71	111.5	41 11.8	68 72	111.0	41 32.2	68 72	110.6	41 52.4	67 72	110.1
7	40 08.4	68 72	110.6	40 28.8	68 72	110.2	40 49.0	67 72	109.7	41 09.1	67 73	109.2
8	39 25.3	68 72	109.8	39 45.5	67 72	109.3	40 05.6	67 73	108.8	40 25.6	66 73	108.3
9	38 41.9	67 73	108.9	39 02.0	67 73	108.5	39 22.0	66 73	108.0	39 41.9	66 73	107.5
50	37 58.4	67 73	108.1	38 18.3	66 73	107.6	38 38.2	66 73	107.1	38 57.9	66 74	106.7
1	37 14.6	66 73	107.3	37 34.4	66 73	106.8	37 54.2	66 74	106.3	38 13.8	65 74	105.8
2	36 30.6	66 74	106.5	36 50.3	66 74	106.0	37 10.0	65 74	105.5	37 29.5	65 74	105.0
3	35 46.4	66 74	105.7	36 06.1	65 74	105.2	36 25.6	65 74	104.7	36 45.0	65 74	104.3
4	35 02.1	65 74	104.9	35 21.6	65 74	104.4	35 41.1	65 74	104.0	36 00.4	64 75	103.5
55	34 17.6	65 74	104.1	34 37.0	65 75	103.6	34 56.4	64 75	103.2	35 15.7	64 75	102.7
6	33 32.9	65 75	103.3	33 52.3	64 75	102.9	34 11.6	64 75	102.4	34 30.8	64 75	102.0
7	32 48.1	64 75	102.6	33 07.4	64 75	102.1	33 26.6	64 75	101.7	33 45.7	63 75	101.2
8	32 03.2	64 75	101.8	32 22.4	64 75	101.4	32 41.6	64 75	100.9	33 00.6	63 75	100.5
9	31 18.2	64 75	101.1	31 37.3	64 75	100.7	31 56.4	63 75	100.2	32 15.3	63 76	99.7
60	30 33.0	64 75	100.4	30 52.1	63 76	99.9	31 11.1	63 76	99.5	31 30.0	63 76	99.0
1	29 47.8	64 76	99.7	30 06.8	63 76	99.2	30 25.7	63 76	98.8	30 44.5	63 76	98.3
2	29 02.4	63 76	98.9	29 21.4	63 76	98.5	29 40.2	63 76	98.1	29 59.0	62 76	97.6
3	28 17.0	63 76	98.2	28 35.9	63 76	97.8	28 54.7	63 76	97.4	29 13.4	62 76	96.9
4	27 31.4	63 76	97.5	27 50.3	63 76	97.1	28 09.1	62 76	96.7	28 27.8	62 76	96.2
65	26 45.8	63 76	96.8	27 04.6	63 76	96.4	27 23.4	62 76	96.0	27 42.1	62 76	95.5
6	26 00.2	63 76	96.2	26 18.9	62 76	95.7	26 37.7	62 76	95.3	26 56.3	62 76	94.9
7	25 14.4	63 76	95.5	25 33.2	62 76	95.0	25 51.9	62 76	94.6	26 10.5	62 76	94.2
8	24 28.7	63 76	94.8	24 47.4	62 76	94.4	25 06.0	62 76	93.9	25 24.6	62 76	93.5
9	23 42.8	62 76	94.1	24 01.5	62 76	93.7	24 20.2	62 76	93.3	24 38.7	62 77	92.8
70	22 57.0	62 76	93.5	23 15.6	62 77	93.0	23 34.3	62 77	92.6	23 52.8	62 77	92.2
1	22 11.1	62 77	92.8	22 29.7	62 77	92.4	22 48.3	62 77	92.0	23 06.9	62 77	91.5
2	21 25.2	62 77	92.2	21 43.8	62 77	91.7	22 02.4	62 77	91.3	22 20.9	62 77	90.9
3	20 39.2	62 77	91.5	20 57.9	62 77	91.1	21 16.4	62 77	90.7	21 34.9	62 77	90.2
4	19 53.3	62 77	90.9	20 11.9	62 77	90.4	20 30.5	62 77	90.0	20 49.0	62 77	89.6
75	19 07.3	62 77	90.2	19 25.9	62 77	89.8	19 44.5	62 77	89.4	20 03.0	62 77	89.0
6	18 21.3	62 77	89.6	18 40.0	62 77	89.2	18 58.5	62 77	88.7	19 17.1	62 77	88.3
7	17 35.4	62 77	88.9	17 54.0	62 77	88.5	18 12.6	62 77	88.1	18 31.1	62 77	87.7
8	16 49.4	62 77	88.3	17 08.1	62 77	87.9	17 26.7	62 77	87.5	17 45.2	62 76	87.1
9	16 03.5	62 77	87.7	16 22.2	62 76	87.2	16 40.8	62 76	86.8	16 59.3	62 76	86.4
80	15 17.6	62 76	87.0	15 36.3	62 76	86.6	15 54.9	62 76	86.2	16 13.5	62 76	85.8
1	14 31.7	62 76	86.4	14 50.4	62 76	86.0	15 09.0	62 76	85.6	15 27.7	62 76	85.2
2	13 45.9	62 76	85.8	14 04.6	62 76	85.4	14 23.2	62 76	85.0	14 41.9	62 76	84.6
3	13 00.0	63 76	85.1	13 18.8	62 76	84.7	13 37.5	62 76	84.3	13 56.1	62 76	83.9
4	12 14.3	63 76	84.5	12 33.0	63 76	84.1	12 51.8	62 76	83.7	13 10.5	62 76	83.3
85	11 28.5	63 76	83.9	11 47.3	63 76	83.5	12 06.1	63 76	83.1	12 24.8	62 76	82.7
6	10 42.9	63 76	83.3	11 01.7	63 76	82.9	11 20.5	63 76	82.5	11 39.3	63 76	82.1
7	9 57.2	63 76	82.6	10 16.1	63 76	82.2	10 35.0	63 76	81.8	10 53.8	63 76	81.4
8	9 11.7	63 76	82.0	9 30.6	63 76	81.6	9 49.5	63 76	81.2	10 08.4	63 76	80.8
9	8 26.2	63 76	81.4	8 45.2	63 76	81.0	9 04.1	63 76	80.6	9 23.1	63 75	80.2
90	7 40.8	63 76	80.8	7 59.8	63 75	80.4	8 18.8	63 75	80.0	8 37.8	63 75	79.6

H.A.	14° 00′ Alt.	Δd Δt	Az.	14° 30′ Alt.	Δd Δt	Az.	15° 00′ Alt.	Δd Δt	Az.	15° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	64 00.0	1.0 01	180.0	64 30.0	1.0 02	180.0	65 00.0	1.0 02	180.0	65 30.0	1.0 02	180.0
1	63 59.1	1.0 04	177.8	64 29.1	1.0 04	177.8	64 59.1	1.0 05	177.7	65 29.1	1.0 05	177.7
2	63 56.5	1.0 07	175.6	64 26.4	1.0 08	175.5	64 56.3	1.0 08	175.4	65 26.3	1.0 08	175.4
3	63 52.0	1.0 10	173.4	64 21.9	1.0 10	173.3	64 51.8	1.0 11	173.2	65 21.6	1.0 11	173.1
4	63 45.9	99 13	171.2	64 15.6	99 13	171.1	64 45.4	99 14	170.9	65 15.2	99 14	170.8
05	63 38.0	99 16	169.0	64 07.6	99 16	168.9	64 37.3	99 16	168.7	65 06.9	99 17	168.5
6	63 28.4	98 19	166.9	63 57.9	98 19	166.7	64 27.4	98 19	166.5	64 56.8	98 20	166.2
7	63 17.1	98 22	164.7	63 46.4	98 22	164.5	64 15.7	98 22	164.3	64 45.0	98 22	164.0
8	63 04.2	97 24	162.7	63 33.3	97 25	162.4	64 02.5	97 25	162.1	64 31.5	97 25	161.8
9	62 49.7	96 27	160.6	63 18.6	96 27	160.3	63 47.5	96 28	160.0	64 16.4	96 28	159.7
10	62 33.7	96 29	158.6	63 02.4	96 30	158.2	63 31.0	96 30	157.9	63 59.6	95 31	157.6
1	62 16.1	95 32	156.6	62 44.6	95 32	156.2	63 13.0	95 33	155.9	63 41.3	94 33	155.5
2	61 57.1	94 34	154.6	62 25.3	94 34	154.2	62 53.4	94 35	153.9	63 21.5	93 35	153.5
3	61 36.7	93 36	152.7	62 04.6	93 37	152.3	62 32.5	93 37	151.9	63 00.3	93 38	151.5
4	61 14.9	92 38	150.8	61 42.6	92 39	150.4	62 10.1	92 39	150.0	62 37.6	92 40	149.5
15	60 51.8	91 41	148.9	61 19.2	91 41	148.5	61 46.5	91 42	148.1	62 13.7	90 42	147.6
6	60 27.5	90 43	147.2	60 54.6	90 43	146.7	61 21.6	90 44	146.3	61 48.4	89 44	145.8
7	60 02.0	89 44	145.4	60 28.8	89 45	144.9	60 55.4	89 45	144.5	61 22.0	88 46	144.0
8	59 35.3	88 46	143.7	60 01.8	88 47	143.2	60 28.2	88 47	142.7	60 54.4	87 48	142.2
9	59 07.6	87 48	142.0	59 33.7	87 49	141.5	59 59.8	87 49	141.0	60 25.7	86 50	140.5
20	58 38.8	86 50	140.4	59 04.6	86 50	139.9	59 30.4	86 51	139.4	59 56.0	85 51	138.9
1	58 09.0	85 51	138.8	58 34.5	85 52	138.3	59 00.0	85 52	137.8	59 25.3	84 53	137.2
2	57 38.2	84 53	137.2	58 03.5	84 53	136.7	58 28.6	84 54	136.2	58 53.6	83 54	135.7
3	57 06.5	83 54	135.7	57 31.5	83 55	135.2	57 56.4	83 55	134.7	58 21.1	82 56	134.1
4	56 34.0	82 56	134.3	56 58.7	82 56	133.7	57 23.3	82 56	133.2	57 47.7	81 57	132.7
25	56 00.7	82 57	132.8	56 25.1	81 57	132.3	56 49.4	81 58	131.8	57 13.5	80 58	131.2
6	55 26.6	81 58	131.4	55 50.7	80 58	130.9	56 14.7	80 59	130.4	56 38.5	79 59	129.8
7	54 51.8	80 59	130.1	55 15.6	79 60	129.5	55 39.3	79 60	129.0	56 02.9	78 61	128.4
8	54 16.3	79 60	128.7	54 39.8	78 61	128.2	55 03.3	78 61	127.7	55 26.5	77 62	127.1
9	53 40.1	78 61	127.4	54 03.4	77 62	126.9	54 26.6	77 62	126.4	54 49.6	76 63	125.8
30	53 03.3	77 62	126.2	53 26.3	77 63	125.6	53 49.2	76 63	125.1	54 12.0	76 64	124.5
1	52 25.9	76 63	125.0	52 48.7	76 64	124.4	53 11.4	75 64	123.9	53 33.9	75 64	123.3
2	51 48.0	75 64	123.8	52 10.5	75 64	123.2	52 32.9	74 65	122.7	52 55.2	74 65	122.1
3	51 09.5	75 65	122.6	51 31.8	74 65	122.0	51 54.0	74 66	121.5	52 16.0	73 66	121.0
4	50 30.5	74 66	121.4	50 52.6	73 66	120.9	51 14.6	73 66	120.4	51 36.4	72 67	119.8
35	49 51.1	73 66	120.3	50 13.0	73 67	119.8	50 34.7	72 67	119.3	50 56.3	72 68	118.7
6	49 11.2	72 67	119.2	49 32.8	72 68	118.7	49 54.4	71 68	118.2	50 15.7	71 68	117.6
7	48 30.9	72 68	118.2	48 52.3	71 68	117.6	49 13.7	71 68	117.1	49 34.8	70 69	116.6
8	47 50.2	71 68	117.1	48 11.4	71 69	116.6	48 32.6	70 69	116.1	48 53.5	70 69	115.5
9	47 09.1	71 69	116.1	47 30.2	70 69	115.6	47 51.1	70 70	115.1	48 11.9	69 70	114.5
40	46 27.6	70 70	115.1	46 48.5	69 70	114.6	47 09.3	69 70	114.1	47 29.9	68 70	113.5
1	45 45.8	69 70	114.1	46 06.6	69 70	113.6	46 27.2	68 71	113.1	46 47.6	68 71	112.6
2	45 03.7	69 71	113.2	45 24.3	68 71	112.7	45 44.7	68 71	112.2	46 05.0	67 71	111.6
3	44 21.3	68 71	112.3	44 41.8	68 71	111.7	45 02.0	67 72	111.2	45 22.2	67 72	110.7
4	43 38.7	68 72	111.3	43 58.9	67 72	110.8	44 19.1	67 72	110.3	44 39.0	66 72	109.8
45	42 55.7	67 72	110.4	43 15.8	67 72	109.9	43 35.8	66 72	109.4	43 55.7	66 73	108.9
6	42 12.5	67 72	109.6	42 32.5	66 73	109.1	42 52.4	66 73	108.5	43 12.1	65 73	108.0
7	41 29.1	66 73	108.7	41 49.0	66 73	108.2	42 08.7	65 73	107.7	42 28.3	65 73	107.2
8	40 45.5	66 73	107.8	41 05.2	66 73	107.3	41 24.8	65 73	106.8	41 44.2	65 74	106.3
9	40 01.6	66 73	107.0	40 21.2	65 74	106.5	40 40.7	65 74	106.0	41 00.0	64 74	105.5
50	39 17.6	65 74	106.2	39 37.1	65 74	105.7	39 56.4	64 74	105.2	40 15.7	64 74	104.7
1	38 33.3	65 74	105.4	38 52.7	64 74	104.9	39 12.0	64 74	104.4	39 31.1	64 74	103.9
2	37 48.9	65 74	104.6	38 08.2	64 74	104.1	38 27.4	64 75	103.6	38 46.4	63 75	103.1
3	37 04.4	64 75	103.8	37 23.6	64 75	103.3	37 42.6	63 75	102.8	38 01.6	63 75	102.3
4	36 19.6	64 75	103.0	36 38.8	64 75	102.5	36 57.8	63 75	102.0	37 16.6	63 75	101.6
55	35 34.8	64 75	102.2	35 53.8	63 75	101.8	36 12.7	63 75	101.3	36 31.5	62 75	100.8
6	34 49.8	63 75	101.5	35 08.8	63 75	101.0	35 27.6	63 75	100.5	35 46.3	62 76	100.1
7	34 04.7	63 75	100.7	34 23.6	63 75	100.3	34 42.4	62 76	99.8	35 01.0	62 76	99.3
8	33 19.5	63 76	100.0	33 38.3	63 76	99.5	33 57.0	62 76	99.1	34 15.6	62 76	98.6
9	32 34.2	63 76	99.3	32 52.9	62 76	98.8	33 11.6	62 76	98.3	33 30.1	62 76	97.9
60	31 48.8	62 76	98.6	32 07.5	62 76	98.1	32 26.1	62 76	97.6	32 44.6	61 76	97.2
1	31 03.3	62 76	97.9	31 21.9	62 76	97.4	31 40.5	62 76	96.9	31 58.9	61 76	96.5
2	30 17.7	62 76	97.2	30 36.3	62 76	96.7	30 54.8	62 76	96.2	31 13.2	61 76	95.8
3	29 32.1	62 76	96.5	29 50.6	62 76	96.0	30 09.1	61 76	95.5	30 27.5	61 76	95.1
4	28 46.4	62 76	95.8	29 04.9	62 76	95.3	29 23.3	61 76	94.9	29 41.7	61 76	94.4
65	28 00.6	62 76	95.1	28 19.1	61 76	94.6	28 37.5	61 76	94.2	28 55.8	61 76	93.7
6	27 14.8	62 76	94.4	27 33.3	61 76	94.0	27 51.7	61 76	93.5	28 09.9	61 77	93.1
7	26 29.0	62 76	93.7	26 47.4	61 76	93.3	27 05.8	61 77	92.9	27 24.0	61 77	92.4
8	25 43.1	62 77	93.1	26 01.5	61 77	92.6	26 19.8	61 77	92.2	26 38.1	61 77	91.8
9	24 57.2	61 77	92.4	25 15.6	61 77	92.0	25 33.9	61 77	91.5	25 52.2	61 77	91.1
70	24 11.3	61 77	91.8	24 29.6	61 77	91.3	24 48.0	61 77	90.9	25 06.2	61 77	90.5
1	23 25.3	61 77	91.1	23 43.7	61 77	90.7	24 02.0	61 77	90.2	24 20.2	61 77	89.8
2	22 39.3	61 77	90.5	22 57.7	61 77	90.0	23 16.0	61 77	89.6	23 34.3	61 77	89.2
3	21 53.4	61 77	89.8	22 11.8	61 77	89.4	22 30.1	61 77	89.0	22 48.3	61 77	88.5
4	21 07.4	61 77	89.2	21 25.8	61 77	88.8	21 44.1	61 77	88.3	22 02.4	61 77	87.9
75	20 21.5	61 77	88.5	20 39.9	61 77	88.1	20 58.2	61 77	87.7	21 16.5	61 76	87.3
6	19 35.5	61 77	87.9	19 53.9	61 76	87.5	20 12.3	61 76	87.1	20 30.6	61 76	86.6
7	18 49.6	61 76	87.3	19 08.0	61 76	86.9	19 26.4	61 76	86.4	19 44.7	61 76	86.0
8	18 03.7	62 76	86.6	18 22.1	61 76	86.2	18 40.5	61 76	85.8	18 58.9	61 76	85.4
9	17 17.8	62 76	86.0	17 36.3	61 76	85.6	17 54.7	61 76	85.2	18 13.1	61 76	84.8
80	16 32.0	62 76	85.4	16 50.5	62 76	85.0	17 08.9	61 76	84.6	17 27.3	61 76	84.2
1	15 46.2	62 76	84.8	16 04.7	62 76	84.4	16 23.2	61 76	83.9	16 41.6	61 76	83.5
2	15 00.5	62 76	84.1	15 19.0	62 76	83.7	15 37.5	62 76	83.3	15 56.0	61 76	82.9
3	14 14.8	62 76	83.5	14 33.4	62 76	83.1	14 51.9	62 76	82.7	15 10.4	62 76	82.3
4	13 29.1	62 76	82.9	13 47.8	62 76	82.5	14 06.3	62 76	82.1	14 24.9	62 76	81.7
85	12 43.6	62 76	82.3	13 02.2	62 76	81.9	13 20.8	62 76	81.5	13 39.4	62 76	81.1
6	11 58.0	62 76	81.7	12 16.8	62 76	81.3	12 35.4	62 76	80.9	12 54.1	62 75	80.5
7	11 12.6	63 76	81.0	11 31.4	63 76	80.6	11 50.1	62 75	80.2	12 08.8	62 75	79.8
8	10 27.2	63 75	80.4	10 46.0	63 75	80.0	11 04.8	63 75	79.6	11 23.6	62 75	79.2
9	9 42.0	63 75	79.8	10 00.8	63 75	79.4	10 19.7	63 75	79.0	10 38.5	63 75	78.6
90	8 56.8	63 75	79.2	9 15.7	63 75	78.8	9 34.6	63 75	78.4	9 53.5	63 75	78.0

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16—11430

H.A.	12° 00′			12° 30′			13° 00′			13° 30′			14° 00′			14° 30′			15° 00′			15° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	
00	38 00.0	1.0 01	180.0	37 30.0	1.0 01	180.0	37 00.0	1.0 01	180.0	36 30.0	1.0 01	180.0	36 00.0	1.0 01	180.0	35 30.0	1.0 01	180.0	35 00.0	1.0 01	180.0	34 30.0	1.0 01	180.0	00
1	37 59.5	1.0 02	178.8	37 29.5	1.0 02	178.8	36 59.5	1.0 02	178.8	36 29.5	1.0 02	178.8	35 59.5	1.0 02	178.8	35 29.5	1.0 02	178.8	34 59.5	1.0 02	178.8	34 29.5	1.0 02	178.8	1
2	37 58.0	1.0 04	177.5	37 28.0	1.0 04	177.5	36 58.0	1.0 04	177.6	36 28.1	1.0 04	177.6	35 58.1	1.0 04	177.6	35 28.1	1.0 04	177.6	34 58.1	1.0 04	177.6	34 28.1	1.0 04	177.7	2
3	37 55.5	1.0 06	176.3	37 25.6	1.0 06	176.3	36 55.6	1.0 06	176.3	36 25.6	1.0 06	176.4	35 55.7	1.0 06	176.4	35 25.7	1.0 06	176.4	34 55.7	1.0 06	176.5	34 25.8	1.0 05	176.5	3
4	37 52.0	1.0 07	175.0	37 22.1	1.0 07	175.1	36 52.2	1.0 07	175.1	36 22.2	1.0 07	175.2	35 52.3	1.0 07	175.2	35 22.4	1.0 07	175.2	34 52.4	1.0 07	175.3	34 22.5	1.0 07	175.3	4
05	37 47.6	1.0 09	173.8	37 17.7	1.0 09	173.9	36 47.8	1.0 09	173.9	36 17.9	1.0 09	174.0	35 48.0	1.0 09	174.0	35 18.1	1.0 09	174.1	34 48.2	1.0 09	174.1	34 18.3	1.0 09	174.2	05
6	37 42.1	99 11	172.6	37 12.3	99 11	172.6	36 42.4	1.0 11	172.7	36 12.6	1.0 10	172.8	35 42.7	1.0 10	172.8	35 12.9	1.0 10	172.9	34 43.0	1.0 10	172.9	34 13.2	1.0 10	173.0	6
7	37 35.7	99 12	171.3	37 05.9	99 12	171.4	36 36.1	99 12	171.5	36 06.3	99 12	171.6	35 36.5	99 12	171.6	35 06.7	99 12	171.7	34 36.9	99 12	171.8	34 07.1	99 12	171.8	7
8	37 28.3	99 14	170.1	36 58.6	99 14	170.2	36 28.8	99 14	170.3	35 59.1	99 14	170.4	35 29.4	99 14	170 5	34 59.6	99 13	170.5	34 29.9	99 13	170.6	34 00.1	99 13	170.7	8
9	37 19.9	99 16	168.9	36 50.3	99 15	169.0	36 20.6	99 15	169.1	35 50.9	99 15	169.2	35 21.3	99 15	169.3	34 51.6	99 15	169.4	34 21.9	99 15	169.5	33 52.2	99 15	169.5	9
10	37 10.6	99 17	167.7	36 41.0	99 17	167.8	36 11.4	99 17	167.9	35 41.9	99 17	168.0	35 12.3	99 17	168.1	34 42.7	99 16	168.2	34 13.0	99 16	168.3	33 43.4	99 16	168.4	10
1	37 00.3	98 19	166.5	36 30.8	98 19	166.6	36 01.3	98 18	166.7	35 31.8	98 18	166.8	35 02.3	98 18	166.9	34 32.8	98 18	167.0	34 03.3	98 18	167.1	33 33.7	98 18	167.3	1
2	36 49.1	98 20	165.3	36 19.7	98 20	165.4	35 50.3	98 20	165.5	35 20.9	98 20	165.6	34 51.5	98 20	165.8	34 22.0	98 19	165.9	33 52.6	98 19	166.0	33 23.2	98 19	166.1	2
3	36 37.0	98 22	164.1	36 07.7	98 22	164.2	35 38.4	98 21	164.4	35 09.1	98 21	164.5	34 39.7	98 21	164.6	34 10.4	98 21	164.7	33 41.0	98 21	164.9	33 11.7	98 21	165.0	3
4	36 23.9	97 23	162.9	35 54.7	97 23	163.0	35 25.5	97 23	163.2	34 56.3	97 23	163.3	34 27.1	97 23	163.5	33 57.8	97 22	163.6	33 28.6	98 22	163.7	32 59.3	98 22	163.9	4
15	36 10.0	97 25	161.7	35 40.9	97 25	161.9	35 11.8	97 24	162.0	34 42.7	97 24	162.2	34 13.6	97 24	162.3	33 44.4	97 24	162.5	33 15.3	97 24	162.6	32 46.1	97 23	162.7	15
6	35 55.1	97 26	160.6	35 26.1	97 26	160.7	34 57.2	97 26	160.9	34 28.2	97 26	161.0	33 59.2	97 25	161.2	33 30.1	97 25	161.3	33 01.1	97 25	161.5	32 32.1	97 25	161.6	6
7	35 39.4	96 28	159.4	35 10.5	96 27	159.6	34 41.7	96 27	159.7	34 12.8	96 27	159.9	33 43.9	96 27	160.1	33 15.0	96 27	160.2	32 46.1	96 26	160.4	32 17.2	96 26	160.5	7
8	35 22.8	96 29	158.2	34 54.0	96 29	158.4	34 25.3	96 29	158.6	33 56.6	96 28	158.8	33 27.8	96 28	158.9	32 59.0	96 28	159.1	32 30.3	96 28	159.3	32 01.5	96 28	159.4	8
9	35 05.3	95 30	157.1	34 36.7	95 30	157.3	34 08.1	95 30	157.5	33 39.5	95 30	157.6	33 10.9	95 30	157.8	32 42.2	96 29	158.0	32 13.6	96 29	158.2	31 44.9	96 29	158.4	9
20	34 47.0	95 32	156.0	34 18.6	95 32	156.2	33 50.1	95 31	156.3	33 21.6	95 31	156.5	32 53.1	95 31	156.7	32 24.6	95 31	156.9	31 56.1	95 30	157.1	31 27.5	95 30	157.3	20
1	34 27.9	94 33	154.8	33 59.6	94 33	155.0	33 31.2	94 33	155.2	33 02.9	94 33	155.4	32 34.6	95 32	155.6	32 06.2	95 32	155.8	31 37.8	95 32	156.0	31 09.4	95 32	156.2	1
2	34 07.9	94 35	153.7	33 39.8	94 34	153.9	33 11.6	94 34	154.1	32 43.4	94 34	154.3	32 15.2	94 34	154.5	31 47.0	94 33	154.7	31 18.7	94 33	154.9	30 50.4	94 33	155.1	2
3	33 47.2	93 36	152.6	33 19.2	93 36	152.8	32 51.2	93 35	153.1	32 23.1	94 35	153.3	31 55.0	94 35	153.5	31 27.0	94 35	153.7	30 58.9	94 34	153.9	30 30.7	94 34	154.1	3
4	33 25.6	93 37	151.5	32 57.8	93 37	151.8	32 29.9	93 37	152.0	32 02.0	93 36	152.2	31 34.1	93 36	152.4	31 06.2	93 36	152.6	30 38.3	93 36	152.8	30 10.3	93 35	153.0	4
25	33 03.4	92 38	150.4	32 35.7	92 38	150.7	32 08.0	92 38	150.9	31 40.2	92 38	151.1	31 12.5	93 37	151.4	30 44.7	93 37	151.6	30 16.9	93 37	151.8	29 49.1	93 37	152.0	25
6	32 40.3	92 40	149.4	32 12.8	92 39	149.6	31 45.2	92 39	149.8	31 17.7	92 39	150.1	30 50.1	92 39	150.3	30 22.4	92 38	150.5	29 54.8	92 38	150.8	29 27.1	92 38	151.0	6
7	32 16.5	91 41	148.3	31 49.2	91 41	148.6	31 21.8	91 40	148.8	30 54.4	91 40	149.0	30 26.9	92 40	149.3	29 59.5	92 39	149.5	29 32.0	92 39	149.7	29 04.5	92 39	150.0	7
8	31 52.0	91 42	147.3	31 24.8	91 42	147.5	30 57.6	91 41	147.8	30 30.4	91 41	148.0	30 03.1	91 41	148.2	29 35.8	91 41	148.5	29 08.5	91 40	148.7	28 41.1	91 40	149.0	8
9	31 26.8	90 43	146.2	30 59.8	90 43	146.5	30 32.8	90 43	146.7	30 05.7	90 42	147.0	29 38.6	90 42	147.2	29 11.4	90 42	147.5	28 44.3	91 41	147.7	28 17.1	91 41	148.0	9
30	31 00.9	89 44	145.2	30 34.1	90 44	145.5	30 07.2	90 44	145.7	29 40.3	90 43	146.0	29 13.4	90 43	146.2	28 46.4	90 43	146.5	28 19.4	90 43	146.7	27 52.4	90 42	147.0	30
1	30 34.4	89 45	144.2	30 07.7	89 45	144.5	29 41.0	89 45	144.7	29 14.2	89 44	145.0	28 47.5	89 44	145.2	28 20.7	89 44	145.5	27 53.8	89 44	145.7	27 27.0	90 43	146.0	1
2	30 07.2	88 46	143.2	29 40.7	88 46	143.5	29 14.1	89 46	143.7	28 47.5	89 46	144.0	28 20.9	89 45	144.3	27 54.3	89 45	144.5	27 27.6	89 45	144.8	27 01.0	89 44	145.0	2
3	29 39.3	88 47	142.2	29 13.0	88 47	142.5	28 46.6	88 47	142.7	28 20.2	88 47	143.0	27 53.8	88 46	143.3	27 27.3	88 46	143.5	27 00.8	88 46	143.8	26 34.3	88 45	144.1	3
4	29 10.8	87 48	141.2	28 44.7	87 48	141.5	28 18.5	87 48	141.8	27 52.2	87 48	142.0	27 26.0	88 47	142.3	26 59.7	88 47	142.6	26 33.4	88 47	142.9	26 07.0	88 46	143.1	4
35	28 41.7	87 49	140.2	28 15.7	87 49	140.5	27 49.7	87 49	140.8	27 23.7	87 49	141.1	26 57.6	87 48	141.4	26 31.5	87 48	141.6	26 05.3	87 48	141.9	25 39.1	87 47	142.2	35
6	28 12.0	86 50	139.3	27 46.2	86 50	139.6	27 20.4	86 50	139.9	26 54.5	86 50	140.1	26 28.6	86 49	140.4	26 02.6	87 49	140.7	25 36.7	87 49	141.0	25 10.7	87 48	141.3	6
7	27 41.8	85 51	138.3	27 16.1	85 51	138.6	26 50.5	86 51	138.9	26 24.8	86 51	139.2	25 59.0	86 50	139.5	25 33.2	86 50	139.8	25 07.4	86 50	140.1	24 41.6	86 49	140.3	7
8	27 10.9	85 52	137.4	26 45.5	85 52	137.7	26 20.0	85 52	138.0	25 54.4	85 51	138.3	25 28.9	85 51	138.6	25 03.3	85 51	138.9	24 37.6	85 51	139.1	24 12.0	86 50	139.4	8
9	26 39.5	84 53	136.5	26 14.2	84 53	136.8	25 48.9	84 53	137.1	25 23.6	85 52	137.4	24 58.2	85 52	137.7	24 32.8	85 52	137.9	24 07.3	85 51	138.2	23 41.8	85 51	138.5	9
40	26 07.6	84 54	135.5	25 42.5	84 54	135.9	25 17.4	84 54	136.2	24 52.2	84 53	136.5	24 27.0	84 53	136.8	24 01.7	84 53	137.0	23 36.4	84 52	137.3	23 11.1	84 52	137.6	40
1	25 35.2	83 55	134.6	25 10.2	83 55	135.0	24 45.3	83 54	135.3	24 20.3	83 54	135.6	23 55.2	84 54	135.9	23 30.1	84 53	136.2	23 05.0	84 53	136.5	22 39.9	84 53	136.8	1
2	25 02.2	82 56	133.7	24 37.4	83 55	134.1	24 12.6	83 55	134.4	23 47.8	83 55	134.7	23 22.9	83 55	135.0	22 58.0	83 54	135.3	22 33.1	83 54	135.6	22 08.1	83 54	135.9	2
3	24 28.8	82 57	132.9	24 04.2	82 56	133.2	23 39.5	82 56	133.5	23 14.9	82 56	133.8	22 50.2	82 55	134.1	22 25.5	82 55	134.4	22 00.7	83 55	134.7	21 35.9	83 55	135.0	3
4	23 54.8	81 57	132.0	23 30.4	81 57	132.3	23 06.0	82 57	132.6	22 41.5	82 56	132.9	22 17.0	82 56	133.2	21 52.4	82 56	133.6	21 27.8	82 56	133.9	21 03.2	82 55	134.2	4
45	23 20.4	81 58	131.1	22 56.2	81 58	131.4	22 31.9	81 58	131.8	22 07.6	81 57	132.1	21 43.2	81 57	132.4	21 18.8	81 57	132.7	20 54.4	81 56	133.0	20 30.0	82 56	133.3	45
6	22 45.6	80 59	130.3	22 21.5	80 59	130.6	21 57.4	80 58	130.9	21 33.2	81 58	131.2	21 09.1	81 58	131.6	20 44.8	81 57	131.9	20 20.6	81 57	132.2	19 56.3	81 57	132.5	6
7	22 10.3	80 60	129.4	21 46.4	80 59	129.7	21 22.4	80 59	130.1	20 58.5	80 59	130.4	20 34.4	80 58	130.7	20 10.4	80 58	131.0	19 46.3	80 58	131.4	19 22.2	80 58	131.7	7
8	21 34.6	79 60	128.6	21 10.8	79 60	128.9	20 47.1	79 60	129.2	20 23.2	79 59	129.6	19 59.4	80 59	129.9	19 35.5	80 59	130.2	19 11.6	80 59	130.5	18 47.6	80 58	130.8	8
9	20 58.4	79 61	127.8	20 34.9	79 61	128.1	20 11.3	79 60	128.4	19 47.6	79 60	128.7	19 23.9	79 60	129.1	19 00.2	79 60	129.4	18 36.4	79 59	129.7	18 12.6	79 59	130.0	9
50	20 21.9	78 62	126.9	19 58.5	78 61	127.3	19 35.0	78 61	127.6	19 11.5	78 61	127.9	18 48.0	78 60	128.3	18 24.5	79 60	128.6	18 00.9	79 60	128.9	17 37.3	79 60	129.2	50
1	19 45.0	77 62	126.1	19 21.7	78 62	126.5	18 58.4	78 62	126.8	18 35.1	78 61	127.1	18 11.7	78 61	127.5	17 48.3	78 61	127.8	17 24.9	78 61	128.1	17 01.5	78 60	128.4	1
2	19 07.7	77 63	125.3	18 44.6	77 63	125.7	18 21.4	77 62	126.0	17 58.3	77 62	126.3	17 35.1	77 62	126.7	17 11.8	78 62	127.0	16 48.6	78 61	127.3	16 25.3	78 61	127.7	2
3	18 30.0	76 63	124.5	18 07.0	77 63	124.9	17 44.1	77 63	125.2	17 21.1	77 63	125.6	16 58.0	77 62	125.9	16 34.9	77 62	126.2	16 11.8	77 62	126.6	15 48.7	77 62	126.9	3
4	17 51.9	76 64	123.8	17 29.2	76 64	124.1	17 06.3	76 63	124.4	16 43.5	76 63	124.8	16 20.6	76 63	125.1	15 57.7	76 63	125.4	15 34.7	77 62	125.8	15 11.7	77 62	126.1	4
55	17 13.6	75 65	123.0	16 50.9	76 64	123.3	16 28.3	76 64	123.7	16 05.6	76 64	124.0	15 42.8	76 64	124.3	15 20.1	76 63	124.7	14 57.3	76 63	125.0	14 34.4	76 63	125.4	55
6	16 34.8	75 65	122.2	16 12.3	75 65	122.6	15 49.8	75 65	122.9	15 27.3	75 64	123.2	15 04.7	75 64	123.6	14 42.1	75 64	123.9	14 19.4	76 64	124.3	13 56.8	76 63	124.6	6
7	15 55.8	74 66	121.4	15 33.4	75 65	121.8	15 11.1	75 65	122.1	14 48.7	75 65	122.5	14 26.2	75 65	122.8	14 03.8	75 64	123.2	13 41.3	75 64	123.5	13 18.8	75 64	123.9	7
8	15 16.4	74 66	120.7	14 54.2	74 66	121.0	14 32.0	74 66	121.4	14 09.7	74 65	121.7	13 47.5	74 65	122.1	13 25.1	74 65	122.4	13 02.8	75 65	122.8	12 40.4	75 64	123.1	8
9	14 36.7	73 67	120.0	14 14.7	74 66	120.3	13 52.6	74 66	120.6	13 30.5	74 66	121.0	13 08.4	74 66	121.3	12 46.2	74 65	121.7	12 24.0	74 65	122.0	12 01.8	74 65	122.4	9
60	13 56.8	73 67	119.2	13 34.9	73 67	119.6	13 12.9	73 67	119.9	12 50.9	73 66	120.3	12 28.9	73 66	120.6	12 06.9	73 66	121.0	11 44.9	74 66	121.3	11 22.8	74 65	121.7	60
1	13 16.5	73 68	118.5	12 54.7	73 67	118.8	12 32.9	73 67	119.2	12 11.1	73 67	119.5	11 49.2	73 67	119.9	11 27.4	73 66	120.2	11 05.5	73 66	120.6	10 43.5	73 66	120.9	1
2	12 36.0	72 68	117.8	12 14.3	72 68	118.1	11 52.7	72 68	118.5	11 31.0	72 67	118.8	11 09.2	72 67	119.2	10 47.5	73 67	119.5	10 25.7	73 67	119.9	10 03.9	73 66	120.2	2
3	11 55.2	72 68	117.0	11 33.7	72 68	117.4	11 12.1	72 68	117.7	10 50.6	72 68	118.1	10 29.0	72 68	118.5	10 07.4	72 67	118.8	9 45.7	72 67	119.2	9 24.1	72 67	119.5	3
4	11 14.1	71 69	116.3	10 52.7	71 69	116.7	10 31.3	71 68	117.0	10 09.9	71 68	117.4	9 48.4	72 68	117.7	9 27.0	72 68	118.1	9 05.5	72 68	118.5	8 43.9	72 67	118.8	4
65	10 32.8	71 69	115.6	10 11.5	71 69	116.0	9 50.2	71 69	116.3	9 28.9	71 69	116.7	9 07.6	71 68	117.0	8 46.3	71 68	117.4	8 24.9	71 68	117.8	8 03.5	71 68	118.1	65
6	9 51.2	70 70	114.9	9 30.1	70 69	115.3	9 08.9	71 69	115.6	8 47.7	71 69	116.0	8 26.6	71 69	116.3	8 05.3	71 69	116.7	7 44.1	71 68	117.1	7 22.9	71 68	117.4	6
7	9 09.4	70 70	114.2	8 48.4	70 70	114.6	8 27.4	70 70	114.9	8 06.3	70 69	115.3	7 45.2	70 69	115.7	7 24.2	70 69	116.0	7 03.1	70 69	116.4	6 41.9	70 69	116.7	7
8	8 27.4	70 70	113.5	8 06.5	70 70	113.9	7 45.6	70 70	114.2	7 24.6	70 70	114.6	7 03.7	70 70	115.0	6 42.7	70 69	115.3	6 21.8	70 69	115.7	6 00.8	70 69	116.1	8
9	7 45.1	69 71	112.8	7 24.3	69 71	113.2	7 03.5	69 70	113.6	6 42.7	69 70	113.9	6 21.9	69 70	114.3	6 01.1	69 70	114.7	5 40.2	70 70	115.0	5 19.4	70 69	115.4	9
70	7 02.6	69 71	112.2	6 42.0	69 71	112.5	6 21.3	69 71	112.9	6 00.6	69 71	113.3	5 39.9	69 70	113.6	5 19.2	69 70	114.0							70
1	6 20.0	68 71	111.5	5 59.4	69 71	111.8	5 38.9	69 71	112.2	5 18.3	69 71	112.6													1
2	5 37.1	68 72	110.8	5 16.7	68 72	111.2																			2

DECLINATION SAME NAME AS LATITUDE

H.A.	12° 00′			12° 30′			13° 00′			13° 30′			14° 00′			14° 30′			15° 00′			15° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	
91	6 55.5	64 75	80.1	7 14.6	64 75	79.7	7 33.6	63 75	79.3	7 52.7	63 75	79.0	8 11.7	63 75	78.6	8 30.7	63 75	78.2	8 49.6	63 75	77.8	9 08.6	63 75	77.4	91
2	6 10.2	64 75	79.5	6 29.4	64 75	79.1	6 48.5	64 75	78.7	7 07.6	64 75	78.3	7 26.7	64 75	77.9	7 45.7	63 75	77.6	8 04.8	63 75	77.2	8 23.8	63 74	76.8	2
3	5 25.1	64 75	78.9	5 44.3	64 75	78.5	6 03.5	64 75	78.1	6 22.6	64 75	77.7	6 41.8	64 75	77.3	7 00.9	64 75	76.9	7 20.0	64 74	76.5	7 39.1	64 74	76.2	3
4							5 18.5	64 75	77.5	5 37.8	64 75	77.1	5 57.0	64 74	76.7	6 16.2	64 74	76.3	6 35.4	64 74	75.9	6 54.5	64 74	75.5	4
95													5 12.3	64 74	76.1	5 31.6	64 74	75.7	5 50.8	64 74	75.3	6 10.1	64 74	74.9	95
6																			5 06.4	64 74	74.7	5 25.8	64 74	74.3	6

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Lat. 40°

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	66 00.0	1.0 02	180.0	66 30.0	1.0 02	180.0	67 00.0	1.0 02	180.0	67 30.0	1.0 02	180.0	68 00.0	1.0 02	180.0	68 30.0	1.0 02	180.0	69 00.0	1.0 02	180.0	69 30.0	1.0 02	180.0	00
1	65 59.1	1.0 05	177.6	66 29.0	1.0 05	177.6	66 59.0	1.0 05	177.6	67 29.0	1.0 05	177.5	67 59.0	1.0 05	177.5	68 29.0	1.0 05	177.4	68 58.9	1.0 05	177.4	69 28.9	1.0 05	177.3	1
2	65 56.2	1.0 08	175.3	66 26.1	1.0 08	175.2	66 56.1	1.0 08	175.1	67 26.0	1.0 08	175.0	67 55.9	1.0 08	174.9	68 25.9	1.0 09	174.8	68 55.8	1.0 09	174.7	69 25.7	1.0 09	174.6	2
3	65 51.5	1.0 11	172.9	66 21.3	1.0 11	172.8	66 51.2	99 11	172.7	67 21.0	99 12	172.6	67 50.9	99 12	172.4	68 20.7	99 12	172.3	68 50.5	99 12	172.1	69 20.3	99 12	172.0	3
4	65 44.9	99 14	170.6	66 14.7	99 14	170.4	66 44.4	99 14	170.3	67 14.1	99 15	170.1	67 43.8	99 15	169.9	68 13.5	99 15	169.7	68 43.2	99 16	169.5	69 12.8	99 16	169.3	4
05	65 36.5	99 17	168.3	66 06.1	99 17	168.1	66 35.7	99 18	167.9	67 05.2	99 18	167.7	67 34.8	98 18	167.4	68 04.3	98 19	167.2	68 33.8	98 19	167.0	69 03.3	98 19	166.7	05
6	65 26.3	98 20	166.0	65 55.7	98 20	165.8	66 25.1	98 21	165.5	66 54.5	98 21	165.3	67 23.8	98 21	165.0	67 53.2	98 22	164.7	68 22.5	98 22	164.4	68 51.7	98 23	164.1	6
7	65 14.3	97 23	163.8	65 43.5	97 23	163.5	66 12.7	97 24	163.2	66 41.9	97 24	162.9	67 11.0	97 24	162.6	67 40.1	97 25	162.3	68 09.2	97 25	162.0	68 38.2	97 26	161.6	7
8	65 00.6	97 26	161.5	65 29.6	97 26	161.2	65 58.6	97 26	160.9	66 27.5	96 27	160.6	66 56.4	96 27	160.2	67 25.2	96 28	159.9	67 54.0	96 28	159.5	68 22.8	96 29	159.1	8
9	64 45.2	96 28	159.4	65 14.0	96 29	159.0	65 42.7	96 29	158.7	66 11.4	95 30	158.3	66 40.0	95 30	157.9	67 08.5	95 31	157.5	67 37.1	95 31	157.1	68 05.5	95 32	156.7	9
10	64 28.2	95 31	157.2	64 56.7	95 31	156.8	65 25.2	95 32	156.5	65 53.5	95 32	156.1	66 21.9	94 33	155.7	66 50.1	94 33	155.3	67 18.3	94 34	154.8	67 46.5	94 35	154.4	10
1	64 09.6	94 34	155.1	64 37.8	94 34	154.7	65 06.0	94 34	154.3	65 34.1	94 35	153.9	66 02.1	93 36	153.5	66 30.1	93 36	153.0	66 58.0	93 37	152.5	67 25.7	92 37	152.1	1
2	63 49.5	93 36	153.1	64 17.5	93 36	152.6	64 45.3	93 37	152.2	65 13.1	92 37	151.8	65 40.8	92 38	151.3	66 08.5	92 39	150.8	66 36.0	92 39	150.3	67 03.4	91 40	149.8	2
3	63 28.0	92 38	151.1	63 55.6	92 39	150.6	64 23.2	92 39	150.2	64 50.6	91 40	149.7	65 18.0	91 40	149.2	65 45.3	91 41	148.7	66 12.5	90 42	148.2	66 39.6	90 42	147.6	3
4	63 05.0	91 40	149.1	63 32.4	91 41	148.6	63 59.6	91 42	148.2	64 26.8	90 42	147.7	64 53.8	90 43	147.2	65 20.7	90 43	146.6	65 47.5	89 44	146.1	66 14.2	89 44	145.5	4
15	62 40.8	90 43	147.2	63 07.8	90 43	146.7	63 34.7	90 44	146.2	64 01.5	89 44	145.7	64 28.2	89 45	145.2	64 54.8	88 45	144.6	65 21.2	88 46	144.1	65 47.6	88 47	143.5	15
6	62 15.2	89 45	145.3	62 41.9	89 45	144.8	63 08.5	88 46	144.3	63 35.0	88 46	143.8	64 01.3	88 47	143.2	64 27.5	87 47	142.7	64 53.6	87 48	142.1	65 19.6	86 49	141.5	6
7	61 48.5	88 47	143.5	62 14.8	88 47	143.0	62 41.1	87 48	142.5	63 07.2	87 48	141.9	63 33.2	86 49	141.4	63 59.1	86 49	140.8	64 24.8	86 50	140.2	64 50.4	85 51	139.6	7
8	61 20.6	87 48	141.7	61 46.6	87 49	141.2	62 12.5	86 49	140.7	62 38.3	86 50	140.1	63 03.9	85 51	139.5	63 29.4	85 51	139.0	63 54.8	84 52	138.4	64 20.0	84 52	137.7	8
9	60 51.6	86 50	140.0	61 17.3	85 51	139.5	61 42.8	85 51	138.9	62 08.3	85 52	138.4	62 33.6	84 52	137.8	62 58.7	84 53	137.2	63 23.7	83 54	136.6	63 48.6	82 54	135.9	9
20	60 21.5	85 52	138.3	60 46.9	84 52	137.8	61 12.1	84 53	137.2	61 37.2	83 53	136.7	62 02.2	83 54	136.1	62 27.0	82 55	135.5	62 51.6	82 55	134.9	63 16.1	81 56	134.2	20
1	59 50.5	84 53	136.7	60 15.5	83 54	136.2	60 40.4	83 54	135.6	61 05.2	82 55	135.0	61 29.8	82 55	134.4	61 54.3	81 56	133.8	62 18.6	81 57	133.2	62 42.7	80 57	132.5	1
2	59 18.5	83 55	135.1	59 43.2	82 55	134.6	60 07.8	82 56	134.0	60 32.3	81 56	133.4	60 56.6	81 57	132.8	61 20.7	80 57	132.2	61 44.6	80 58	131.6	62 08.4	79 59	130.9	2
3	58 45.6	82 56	133.6	59 10.1	81 57	133.0	59 34.3	81 57	132.5	59 58.5	80 58	131.9	60 22.4	80 58	131.3	60 46.2	79 59	130.6	61 09.8	78 59	130.0	61 33.3	78 60	129.4	3
4	58 11.9	81 57	132.1	58 36.1	80 58	131.5	59 00.0	80 58	131.0	59 23.8	79 59	130.4	59 47.5	79 60	129.8	60 10.9	78 60	129.1	60 34.2	77 61	128.5	60 57.3	77 61	127.8	4
25	57 37.4	80 59	130.7	58 01.3	79 59	130.1	58 24.9	79 60	129.5	58 48.4	78 60	128.9	59 11.8	77 61	128.3	59 34.9	77 61	127.7	59 57.9	76 62	127.0	60 20.7	76 62	126.4	25
6	57 02.2	79 60	129.2	57 25.7	78 60	128.7	57 49.1	78 61	128.1	58 12.3	77 61	127.5	58 35.3	76 62	126.9	58 58.2	76 62	126.2	59 20.9	75 63	125.6	59 43.3	75 63	125.0	6
7	56 26.3	78 61	127.9	56 49.5	77 61	127.3	57 12.6	77 62	126.7	57 35.5	76 62	126.1	57 58.2	76 63	125.5	58 20.8	75 63	124.9	58 43.2	74 64	124.2	59 05.3	74 64	123.6	7
8	55 49.7	77 62	126.5	56 12.6	76 62	126.0	56 35.4	76 63	125.4	56 58.1	75 63	124.8	57 20.5	75 64	124.2	57 42.8	74 64	123.5	58 04.9	73 65	122.9	58 26.8	73 65	122.3	8
9	55 12.4	76 63	125.2	55 35.1	75 63	124.7	55 57.6	75 64	124.1	56 20.0	74 64	123.5	56 42.2	74 65	122.9	57 04.2	73 65	122.2	57 26.0	72 66	121.6	57 47.6	72 66	121.0	9
30	54 34.6	75 64	124.0	54 57.0	75 64	123.4	55 19.3	74 65	122.8	55 41.4	73 65	122.2	56 03.3	73 66	121.6	56 25.1	72 66	121.0	56 46.6	72 66	120.4	57 08.0	71 67	119.7	30
1	53 56.2	74 65	122.8	54 18.4	74 65	122.2	54 40.4	73 66	121.6	55 02.3	73 66	121.0	55 23.9	72 66	120.4	55 45.4	71 67	119.8	56 06.7	71 67	119.1	56 27.8	70 68	118.5	1
2	53 17.3	73 66	121.6	53 39.2	73 66	121.0	54 01.0	72 66	120.4	54 22.6	72 67	119.8	54 44.0	71 67	119.2	55 05.3	70 68	118.6	55 26.3	70 68	118.0	55 47.2	69 68	117.3	2
3	52 37.9	73 66	120.4	52 59.6	72 67	119.8	53 21.1	72 67	119.2	53 42.5	71 68	118.7	54 03.7	70 68	118.0	54 24.7	70 68	117.4	54 45.5	69 69	116.8	55 06.1	68 69	116.2	3
4	51 58.0	72 67	119.3	52 19.5	71 68	118.7	52 40.8	71 68	118.1	53 01.9	70 68	117.5	53 22.9	70 69	116.9	53 43.7	69 69	116.3	54 04.3	68 69	115.7	54 24.7	68 70	115.1	4
35	51 17.7	71 68	118.1	51 39.0	71 68	117.6	52 00.1	70 69	117.0	52 21.0	69 69	116.4	52 41.7	69 69	115.8	53 02.3	68 70	115.2	53 22.7	68 70	114.6	53 42.9	67 70	114.0	35
6	50 37.0	70 69	117.1	50 58.0	70 69	116.5	51 18.9	69 69	115.9	51 39.6	69 70	115.4	52 00.2	68 70	114.8	52 20.5	68 70	114.2	52 40.7	67 70	113.6	53 00.7	66 71	112.9	6
7	49 55.8	70 69	116.0	50 16.7	69 69	115.5	50 37.4	69 70	114.9	50 57.9	68 70	114.3	51 18.3	68 70	113.7	51 38.4	67 71	113.1	51 58.4	66 71	112.5	52 18.2	66 71	111.9	7
8	49 14.4	69 70	115.0	49 35.0	69 70	114.4	49 55.5	68 70	113.9	50 15.9	67 71	113.3	50 36.0	67 71	112.7	50 56.0	66 71	112.1	51 15.8	66 72	111.5	51 35.4	65 72	110.9	8
9	48 32.5	69 70	114.0	48 53.0	68 71	113.4	49 13.3	67 71	112.9	49 33.5	67 71	112.3	49 53.5	66 71	111.7	50 13.3	66 72	111.1	50 32.9	65 72	110.5	50 52.4	65 72	109.9	9
40	47 50.4	68 71	113.0	48 10.7	67 71	112.4	48 30.8	67 71	111.9	48 50.8	66 72	111.3	49 10.6	66 72	110.7	49 30.3	65 72	110.2	49 49.7	65 72	109.6	50 09.0	64 73	109.0	40
1	47 07.9	67 71	112.0	47 28.1	67 72	111.5	47 48.0	66 72	110.9	48 07.8	66 72	110.4	48 27.5	65 72	109.8	48 47.0	65 73	109.2	49 06.3	64 73	108.6	49 25.5	63 73	108.0	1
2	46 25.2	67 72	111.1	46 45.1	66 72	110.5	47 05.0	66 72	110.0	47 24.6	65 72	109.4	47 44.1	65 73	108.9	48 03.5	64 73	108.3	48 22.7	64 73	107.7	48 41.6	63 73	107.1	2
3	45 42.1	66 72	110.2	46 02.0	66 72	109.6	46 21.7	65 73	109.1	46 41.2	65 73	108.5	47 00.5	64 73	108.0	47 19.7	64 73	107.4	47 38.8	63 74	106.8	47 57.6	63 74	106.3	3
4	44 58.9	66 73	109.3	45 18.6	65 73	108.7	45 38.1	65 73	108.2	45 57.5	64 73	107.6	46 16.7	64 73	107.1	46 35.8	63 74	106.5	46 54.7	63 74	106.0	47 13.4	62 74	105.4	4
45	44 15.4	65 73	108.4	44 34.9	65 73	107.8	44 54.3	64 73	107.3	45 13.6	64 74	106.8	45 32.7	63 74	106.2	45 51.6	63 74	105.7	46 10.4	62 74	105.1	46 29.0	62 74	104.5	45
6	43 31.6	65 73	107.5	43 51.1	65 73	107.0	44 10.3	64 74	106.4	44 29.5	64 74	105.9	44 48.4	63 74	105.4	45 07.3	62 74	104.8	45 25.9	62 74	104.3	45 44.4	61 75	103.7	6
7	42 47.7	65 74	106.7	43 07.0	64 74	106.1	43 26.2	64 74	105.6	43 45.2	63 74	105.1	44 04.0	63 74	104.5	44 22.7	62 74	104.0	44 41.3	62 75	103.4	44 59.7	61 75	102.9	7
8	42 03.6	64 74	105.8	42 22.8	64 74	105.3	42 41.8	63 74	104.8	43 00.7	63 74	104.2	43 19.5	62 75	103.7	43 38.1	62 75	103.2	43 56.5	61 75	102.6	44 14.8	61 75	102.1	8
9	41 19.3	64 74	105.0	41 38.3	63 74	104.5	41 57.3	63 74	104.0	42 16.1	62 75	103.4	42 34.7	62 75	102.9	42 53.2	61 75	102.4	43 11.6	61 75	101.8	43 29.8	60 75	101.3	9
50	40 34.8	63 74	104.2	40 53.8	63 75	103.7	41 12.6	63 75	103.2	41 31.3	62 75	102.6	41 49.9	62 75	102.1	42 08.3	61 75	101.6	42 26.5	61 75	101.0	42 44.7	60 75	100.5	50
1	39 50.1	63 75	103.4	40 09.0	63 75	102.9	40 27.8	62 75	102.4	40 46.4	62 75	101.8	41 04.9	61 75	101.3	41 23.2	61 75	100.8	41 41.4	60 75	100.3	41 59.4	60 76	99.7	1
2	39 05.4	63 75	102.6	39 24.1	62 75	102.1	39 42.8	62 75	101.6	40 01.3	62 75	101.1	40 19.7	61 75	100.6	40 38.0	61 76	100.0	40 56.1	60 76	99.5	41 14.1	60 76	99.0	2
3	38 20.4	63 75	101.8	38 39.1	62 75	101.3	38 57.7	62 75	100.8	39 16.2	61 75	100.3	39 34.5	61 76	99.8	39 52.7	60 76	99.3	40 10.7	60 76	98.8	40 28.6	59 76	98.2	3
4	37 35.4	62 75	101.1	37 54.0	62 75	100.6	38 12.5	61 76	100.1	38 30.9	61 76	99.6	38 49.1	61 76	99.1	39 07.3	60 76	98.5	39 25.2	60 76	98.0	39 43.1	59 76	97.5	4
55	36 50.2	62 75	100.3	37 08.8	62 76	99.8	37 27.2	61 76	99.3	37 45.5	61 76	98.8	38 03.7	60 76	98.3	38 21.8	60 76	97.8	38 39.7	60 76	97.3	38 57.5	59 76	96.8	55
6	36 04.9	62 76	99.6	36 23.4	61 76	99.1	36 41.8	61 76	98.6	37 00.1	61 76	98.1	37 18.2	60 76	97.6	37 36.2	60 76	97.1	37 54.1	59 76	96.6	38 11.8	59 76	96.1	6
7	35 19.6	62 76	98.8	35 38.0	61 76	98.4	35 56.3	61 76	97.9	36 14.5	60 76	97.4	36 32.6	60 76	96.9	36 50.5	60 76	96.4	37 08.4	59 76	95.9	37 26.1	59 76	95.4	7
8	34 34.1	61 76	98.1	34 52.5	61 76	97.6	35 10.8	61 76	97.2	35 28.9	60 76	96.7	35 46.9	60 76	96.2	36 04.8	59 76	95.7	36 22.6	59 76	95.2	36 40.3	59 76	94.7	8
9	33 48.6	61 76	97.4	34 06.9	61 76	96.9	34 25.1	61 76	96.4	34 43.2	60 76	96.0	35 01.2	60 76	95.5	35 19.1	59 76	95.0	35 36.8	59 76	94.5	35 54.5	59 76	94.0	9
60	33 03.0	61 76	96.7	33 21.2	61 76	96.2	33 39.4	60 76	95.7	33 57.5	60 76	95.3	34 15.4	60 76	94.8	34 33.3	59 76	94.3	34 51.0	59 76	93.8	35 08.6	58 76	93.3	60
1	32 17.3	61 76	96.0	32 35.5	61 76	95.5	32 53.7	60 76	95.1	33 11.7	60 76	94.6	33 29.6	60 76	94.1	33 47.4	59 76	93.6	34 05.1	59 76	93.1	34 22.7	58 77	92.6	1
2	31 31.5	61 76	95.3	31 49.7	61 76	94.8	32 07.9	60 76	94.4	32 25.8	60 76	93.9	32 43.7	59 76	93.4	33 01.5	59 77	92.9	33 19.2	59 77	92.5	33 36.8	58 77	92.0	2
3	30 45.8	61 76	94.6	31 03.9	60 76	94.2	31 22.0	60 76	93.7	31 40.0	60 77	93.2	31 57.8	59 77	92.8	32 15.6	59 77	92.3	32 33.3	59 77	91.8	32 50.8	58 77	91.3	3
4	29 59.9	61 76	94.0	30 18.1	60 76	93.5	30 36.1	60 77	93.0	30 54.1	60 77	92.6	31 11.9	59 77	92.1	31 29.7	59 77	91.6	31 47.3	59 77	91.1	32 04.9	58 77	90.7	4
65	29 14.0	61 76	93.3	29 32.2	60 77	92.8	29 50.2	60 77	92.4	30 08.1	60 77	91.9	30 26.0	59 77	91.4	30 43.7	59 77	91.0	31 01.4	59 77	90.5	31 18.9	58 77	90.0	65
6	28 28.1	61 77	92.6	28 46.3	60 77	92.2	29 04.3	60 77	91.7	29 22.2	60 77	91.2	29 40.0	59 77	90.8	29 57.8	59 77	90.3	30 15.4	59 77	89.9	30 32.9	58 77	89.4	6
7	27 42.2	60 77	92.0	28 00.3	60 77	91.5	28 18.3	60 77	91.1	28 36.2	60 77	90.6	28 54.1	59 77	90.1	29 11.8	59 77	89.7	29 29.4	59 77	89.2	29 47.0	58 77	88.7	7
8	26 56.3	60 77	91.3	27 14.4	60 77	90.9	27 32.4	60 77	90.4	27 50.3	60 77	90.0	28 08.1	59 77	89.5	28 25.8	59 77	89.0	28 43.5	59 77	88.6	29 01.0	58 77	88.1	8
9	26 10.3	60 77	90.7	26 28.4	60 77	90.2	26 46.4	60 77	89.8	27 04.3	60 77	89.3	27 22.1	59 77	88.9	27 39.9	59 77	88.4	27 57.5	59 77	87.9	28 15.1	58 76	87.5	9
70	25 24.4	60 77	90.0	25 42.4	60 77	89.6	26 00.4	60 77	89.1	26 18.4	60 77	88.7	26 36.2	59 77	88.2	26 54.0	59 77	87.8	27 11.6	59 76	87.3	27 29.2	58 76	86.9	70
1	24 38.4	60 77	89.4	24 56.5	60 77	88.9	25 14.5	60 77	88.5	25 32.4	60 77	88.0	25 50.3	59 76	87.6	26 08.0	59 76	87.2	26 25.7	59 76	86.7	26 43.3	59 76	86.2	1
2	23 52.4	60 77	88.7	24 10.5	60 77	88.3	24 28.6	60 77	87.9	24 46.5	60 77	87.4	25 04.4	59 76	87.0	25 22.1	59 76	86.5	25 39.8	59 76	86.1	25 57.5	59 76	85.6	2
3	23 06.5	60 77	88.1	23 24.6	60 77	87.7	23 42.6	60 76	87.2	24 00.6	60 76	86.8	24 18.5	60 76	86.4	24 36.3	59 76	85.9	24 54.0	59 76	85.5	25 11.7	59 76	85.0	3
4	22 20.6	61 76	87.5	22 38.7	60 76	87.0	22 56.7	60 76	86.6	23 14.7	60 76	86.2	23 32.6	60 76	85.7	23 50.5	59 76	85.3	24 08.2	59 76	84.9	24 25.9	59 76	84.4	4
75	21 34.7	61 76	86.8	21 52.8	60 76	86.4	22 10.9	60 76	86.0	22 28.9	60 76	85.6	22 46.8	60 76	85.1	23 04.7	59 76	84.7	23 22.5	59 76	84.2	23 40.2	59 76	83.8	75
6	20 48.8	61 76	86.2	21 06.9	60 76	85.8	21 25.0	60 76	85.4	21 43.1	60 76	84.9	22 01.0	60 76	84.5	22 18.9	60 76	84.1	22 36.8	59 76	83.6	22 54.5	59 76	83.2	6
7	20 02.9	61 76	85.6	20 21.1	61 76	85.2	20 39.2	60 76	84.7	20 57.3	60 76	84.3	21 15.3	60 76	83.9	21 33.2	60 76	83.5	21 51.1	59 76	83.0	22 08.9	59 76	82.6	7
8	19 17.1	61 76	85.0	19 35.3	61 76	84.6	19 53.5	60 76	84.1	20 11.6	60 76	83.7	20 29.6	60 76	83.3	20 47.6	60 76	82.9	21 05.5	60 76	82.4	21 23.4	59 76	82.0	8
9	18 31.4	61 76	84.4	18 49.6	61 76	83.9	19 07.8	61 76	83.5	19 25.9	60 76	83.1	19 44.0	60 76	82.7	20 02.0	60 76	82.2	20 20.0	60 76	81.8	20 37.9	60 76	81.4	9
80	17 45.7	61 76	83.7	18 03.9	61 76	83.3	18 22.2	61 76	82.9	18 40.3	60 76	82.5	18 58.5	60 76	82.1	19 16.5	60 76	81.6	19 34.5	60 76	81.2	19 52.5	60 76	80.8	80
1	17 00.0	61 76	83.1	17 18.3	61 76	82.7	17 36.6	61 76	82.3	17 54.8	61 76	81.9	18 13.0	60 76	81.5	18 31.1	60 76	81.0	18 49.1	60 76	80.6	19 07.1	60 75	80.2	1
2	16 14.4	61 76	82.5	16 32.8	61 76	82.1	16 51.1	61 76	81.7	17 09.3	61 76	81.3	17 27.6	61 76	80.9	17 45.7	60 75	80.4	18 03.8	60 75	80.0	18 21.9	60 75	79.6	2
3	15 28.9	61 76	81.9	15 47.3	61 76	81.5	16 05.6	61 76	81.1	16 23.9	61 76	80.7	16 42.2	61 75	80.2	17 00.4	61 75	79.8	17 18.6	60 75	79.4	17 36.7	60 75	79.0	3
4	14 43.4	62 76	81.3	15 01.8	61 76	80.9	15 20.3	61 76	80.5	15 38.6	61 75	80.1	15 57.0	61 75	79.6	16 15.2	61 75	79.2	16 33.5	61 75	78.8	16 51.6	61 75	78.4	4
85	13 58.0	62 76	80.7	14 16.5	62 75	80.3	14 35.0	61 75	79.9	14 53.4	61 75	79.5	15 11.8	61 75	79.0	15 30.1	61 75	78.6	15 48.4	61 75	78.2	16 06.7	61 75	77.8	85
6	13 12.7	62 75	80.1	13 31.2	62 75	79.7	13 49.8	62 75	79.3	14 08.3	62 75	78.8	14 26.7	61 75	78.4	14 45.1	61 75	78.0	15 03.5	61 75	77.6	15 21.8	61 75	77.2	6
7	12 27.4	62 75	79.4	12 46.1	62 75	79.0	13 04.7	62 75	78.6	13 23.2	62 75	78.2	13 41.7	62 75	77.8	14 00.2	62 75	77.4	14 18.6	61 75	77.0	14 37.0	61 74	76.6	7
8	11 42.3	62 75	78.8	12 01.0	62 75	78.4	12 19.6	62 75	78.0	12 38.3	62 75	77.6	12 56.9	62 75	77.2	13 15.4	62 74	76.8	13 33.9	62 74	76.4	13 52.4	61 74	76.0	8
9	10 57.3	62 75	78.2	11 16.0	62 75	77.8	11 34.7	62 75	77.4	11 53.4	62 75	77.0	12 12.1	62 74	76.6	12 30.7	62 74	76.2	12 49.3	62 74	75.8	13 07.8	62 74	75.4	9
90	10 12.3	63 75	77.6	10 31.1	63 75	77.2	10 49.9	63 74	76.8	11 08.7	62 74	76.4	11 27.4	62 74	76.0	11 46.1	62 74	75.6	12 04.8	62 74	75.2	12 23.4	62 74	74.8	90

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	34 00.0	1.0 01	180.0	33 30.0	1.0 01	180.0	33 00.0	1.0 01	180.0	32 30.0	1.0 01	180.0	32 00.0	1.0 01	180.0	31 30.0	1.0 01	180.0	31 00.0	1.0 01	180.0	30 30.0	1.0 01	180.0	00
1	33 59.5	1.0 02	178.8	33 29.5	1.0 02	178.9	32 59.5	1.0 02	178.9	32 29.5	1.0 02	178.9	31 59.6	1.0 02	178.9	31 29.6	1.0 02	178.9	30 59.6	1.0 02	178.9	30 29.6	1.0 02	178.9	1
2	33 58.1	1.0 04	177.7	33 28.2	1.0 04	177.7	32 58.2	1.0 04	177.7	32 28.2	1.0 04	177.7	31 58.2	1.0 04	177.8	31 28.2	1.0 04	177.8	30 58.2	1.0 04	177.8	30 28.2	1.0 04	177.8	2
3	33 55.8	1.0 05	176.5	33 25.9	1.0 05	176.6	32 55.9	1.0 05	176.6	32 25.9	1.0 05	176.6	31 56.0	1.0 05	176.6	31 26.0	1.0 05	176.7	30 56.0	1.0 05	176.7	30 26.1	1.0 05	176.7	3
4	33 52.6	1.0 07	175.4	33 22.6	1.0 07	175.4	32 52.7	1.0 07	175.4	32 22.8	1.0 07	175.5	31 52.8	1.0 07	175.5	31 22.9	1.0 07	175.6	30 52.9	1.0 07	175.6	30 23.0	1.0 07	175.6	4
05	33 48.4	1.0 08	174.2	33 18.5	1.0 08	174.3	32 48.6	1.0 08	174.3	32 18.7	1.0 08	174.4	31 48.8	1.0 08	174.4	31 18.9	1.0 08	174.4	30 49.0	1.0 08	174.5	30 19.0	1.0 08	174.5	05
6	33 43.3	1.0 10	173.1	33 13.4	1.0 10	173.1	32 43.6	1.0 10	173.2	32 13.7	1.0 10	173.2	31 43.8	1.0 10	173.3	31 14.0	1.0 10	173.3	30 44.1	1.0 10	173.4	30 14.2	1.0 09	173.5	6
7	33 37.3	99 12	171.9	33 07.5	99 11	172.0	32 37.7	99 11	172.0	32 07.8	99 11	172.1	31 38.0	99 11	172.2	31 08.2	99 11	172.2	30 38.4	99 11	172.3	30 08.6	99 11	172.4	7
8	33 30.4	99 13	170.8	33 00.6	99 13	170.8	32 30.9	99 13	170.9	32 01.1	99 13	171.0	31 31.3	99 13	171.1	31 01.6	99 13	171.1	30 31.8	99 12	171.2	30 02.0	99 12	171.3	8
9	33 22.5	99 15	169.6	32 52.9	99 14	169.7	32 23.2	99 14	169.8	31 53.5	99 14	169.9	31 23.8	99 14	170.0	30 54.1	99 14	170.0	30 24.3	99 14	170.1	29 54.6	99 14	170.2	9
10	33 13.8	99 16	168.5	32 44.2	99 16	168.6	32 14.6	99 16	168.7	31 44.9	99 16	168.8	31 15.3	99 16	168.9	30 45.7	99 15	169.0	30 16.0	99 15	169.0	29 46.4	99 15	169.1	10
1	33 04.2	98 18	167.4	32 34.7	98 17	167.5	32 05.1	99 17	167.6	31 35.6	99 17	167.7	31 06.0	99 17	167.8	30 36.4	99 17	167.9	30 06.9	99 17	168.0	29 37.3	99 17	168.1	1
2	32 53.7	98 19	166.2	32 24.2	98 19	166.3	31 54.8	98 19	166.5	31 25.3	98 18	166.6	30 55.8	98 18	166.7	30 26.4	98 18	166.8	29 56.9	98 18	166.9	29 27.4	98 18	167.0	2
3	32 42.3	98 20	165.1	32 13.0	98 20	165.2	31 43.6	98 20	165.4	31 14.2	98 20	165.5	30 44.8	98 20	165.6	30 15.4	98 20	165.7	29 46.0	98 19	165.8	29 16.6	98 19	165.9	3
4	32 30.1	98 22	164.0	32 00.8	98 22	164.1	31 31.5	98 22	164.3	31 02.2	98 21	164.4	30 33.0	98 21	164.5	30 03.7	98 21	164.6	29 34.3	98 21	164.8	29 05.0	98 21	164.9	4
15	32 17.0	97 23	162.9	31 47.8	97 23	163.0	31 18.6	97 23	163.2	30 49.5	97 23	163.3	30 20.3	97 23	163.4	29 51.1	97 22	163.6	29 21.8	97 22	163.7	28 52.6	97 22	163.8	15
6	32 03.0	97 25	161.8	31 34.0	97 24	161.9	31 04.9	97 24	162.1	30 35.8	97 24	162.2	30 06.7	97 24	162.4	29 37.6	97 24	162.5	29 08.5	97 24	162.6	28 39.4	97 23	162.8	6
7	31 48.2	96 26	160.7	31 19.3	97 26	160.8	30 50.3	97 26	161.0	30 21.4	97 25	161.1	29 52.4	97 25	161.3	29 23.4	97 25	161.4	28 54.4	97 25	161.6	28 25.4	97 25	161.7	7
8	31 32.6	96 27	159.6	31 03.8	96 27	159.8	30 35.0	96 27	159.9	30 06.1	96 27	160.1	29 37.3	96 27	160.2	29 08.4	96 26	160.4	28 39.5	96 26	160.6	28 10.6	96 26	160.7	8
9	31 16.2	96 29	158.5	30 47.5	96 28	158.7	30 18.8	96 28	158.9	29 50.1	96 28	159.0	29 21.3	96 28	159.2	28 52.6	96 28	159.4	28 23.8	96 27	159.5	27 55.0	96 27	159.7	9
20	30 59.0	95 30	157.4	30 30.4	95 30	157.6	30 01.8	95 30	157.8	29 33.2	95 29	158.0	29 04.6	95 29	158.1	28 36.0	95 29	158.3	28 07.3	95 29	158.5	27 38.7	96 29	158.7	20
1	30 41.0	95 31	156.4	30 12.5	95 31	156.6	29 44.1	95 31	156.8	29 15.6	95 31	156.9	28 47.1	95 30	157.1	28 18.6	95 30	157.3	27 50.1	95 30	157.5	27 21.6	95 30	157.6	1
2	30 22.2	94 33	155.3	29 53.9	94 32	155.5	29 25.5	94 32	155.7	28 57.2	94 32	155.9	28 28.9	95 32	156.1	28 00.5	95 31	156.3	27 32.1	95 31	156.5	27 03.7	95 31	156.6	2
3	30 02.6	94 34	154.3	29 34.4	94 34	154.5	29 06.3	94 33	154.7	28 38.1	94 33	154.9	28 09.9	94 33	155.1	27 41.6	94 33	155.3	27 13.4	94 32	155.5	26 45.1	94 32	155.6	3
4	29 42.3	93 35	153.2	29 14.3	93 35	153.5	28 46.2	93 35	153.7	28 18.2	94 34	153.9	27 50.1	94 34	154.1	27 22.0	94 34	154.3	26 53.9	94 34	154.5	26 25.8	94 33	154.6	4
25	29 21.2	93 36	152.2	28 53.4	93 36	152.4	28 25.5	93 36	152.6	27 57.6	93 36	152.8	27 29.7	93 35	153.1	27 01.7	93 35	153.3	26 33.8	93 35	153.5	26 05.8	93 35	153.7	25
6	28 59.4	92 38	151.2	28 31.7	92 37	151.4	28 04.0	92 37	151.6	27 36.2	93 37	151.9	27 08.5	93 36	152.1	26 40.7	93 36	152.3	26 12.9	93 36	152.5	25 45.0	93 36	152.7	6
7	28 36.9	92 39	150.2	28 09.4	92 38	150.4	27 41.8	92 38	150.6	27 14.2	92 38	150.9	26 46.6	92 38	151.1	26 19.0	92 37	151.3	25 51.3	92 37	151.5	25 23.6	92 37	151.7	7
8	28 13.7	91 40	149.2	27 46.4	91 40	149.4	27 18.9	91 39	149.6	26 51.5	92 39	149.9	26 24.0	92 39	150.1	25 56.5	92 38	150.3	25 29.0	92 38	150.5	25 01.5	92 38	150.8	8
9	27 49.9	91 41	148.2	27 22.6	91 41	148.4	26 55.4	91 40	148.7	26 28.1	91 40	148.9	26 00.8	91 40	149.1	25 33.4	91 40	149.4	25 06.1	91 39	149.6	24 38.7	91 39	149.8	9
30	27 25.3	90 42	147.2	26 58.2	90 42	147.5	26 31.1	90 41	147.7	26 04.0	90 41	147.9	25 36.9	91 41	148.2	25 09.7	91 41	148.4	24 42.5	91 40	148.6	24 15.3	91 40	148.9	30
1	27 00.1	90 43	146.2	26 33.2	90 43	146.5	26 06.2	90 43	146.7	25 39.3	90 42	147.0	25 12.3	90 42	147.2	24 45.3	90 42	147.5	24 18.3	90 41	147.7	23 51.2	90 41	147.9	1
2	26 34.2	89 44	145.3	26 07.5	89 44	145.5	25 40.7	89 44	145.8	25 13.9	89 43	146.0	24 47.1	89 43	146.3	24 20.3	90 43	146.5	23 53.4	90 42	146.8	23 26.5	90 42	147.0	2
3	26 07.7	89 45	144.3	25 41.2	89 45	144.6	25 14.6	89 45	144.8	24 47.9	89 44	145.1	24 21.3	89 44	145.3	23 54.6	89 44	145.6	23 27.9	89 43	145.8	23 01.2	89 43	146.1	3
4	25 40.6	88 46	143.4	25 14.2	88 46	143.6	24 47.8	88 46	143.9	24 21.3	88 45	144.2	23 54.8	88 45	144.4	23 28.3	88 45	144.7	23 01.8	89 44	144.9	22 35.2	89 44	145.2	4
35	25 12.9	87 47	142.5	24 46.7	88 47	142.7	24 20.4	88 47	143.0	23 54.1	88 46	143.2	23 27.8	88 46	143.5	23 01.5	88 46	143.8	22 35.1	88 45	144.0	22 08.7	88 45	144.3	35
6	24 44.6	87 48	141.5	24 18.6	87 48	141.8	23 52.5	87 48	142.1	23 26.3	87 47	142.3	23 00.2	87 47	142.6	22 34.0	87 47	142.9	22 07.8	87 46	143.1	21 41.6	87 46	143.4	6
7	24 15.7	86 49	140.6	23 49.8	86 49	140.9	23 23.9	86 48	141.2	22 58.0	87 48	141.4	22 32.0	87 48	141.7	22 06.0	87 48	142.0	21 39.9	87 47	142.2	21 13.9	87 47	142.5	7
8	23 46.3	86 50	139.7	23 20.6	86 50	140.0	22 54.8	86 49	140.3	22 29.0	86 49	140.5	22 03.2	86 49	140.8	21 37.4	86 49	141.1	21 11.5	86 48	141.4	20 45.6	86 48	141.6	8
9	23 16.3	85 51	138.8	22 50.7	85 51	139.1	22 25.2	85 50	139.4	21 59.5	85 50	139.7	21 33.9	86 50	139.9	21 08.2	86 49	140.2	20 42.5	86 49	140.5	20 16.8	86 49	140.8	9
40	22 45.8	85 52	137.9	22 20.4	85 51	138.2	21 55.0	85 51	138.5	21 29.5	85 51	138.8	21 04.1	85 51	139.1	20 38.6	85 50	139.4	20 13.0	85 50	139.6	19 47.5	85 50	139.9	40
1	22 14.7	84 53	137.1	21 49.5	84 52	137.3	21 24.3	84 52	137.6	20 59.0	84 52	137.9	20 33.7	84 51	138.2	20 08.4	84 51	138.5	19 43.0	85 51	138.8	19 17.6	85 51	139.1	1
2	21 43.1	83 53	136.2	21 18.1	84 53	136.5	20 53.0	84 53	136.8	20 27.9	84 53	137.1	20 02.8	84 52	137.4	19 37.7	84 52	137.6	19 12.5	84 52	137.9	18 47.3	84 51	138.2	2
3	21 11.1	83 54	135.3	20 46.2	83 54	135.6	20 21.3	83 54	135.9	19 56.4	83 53	136.2	19 31.4	83 53	136.5	19 06.4	83 53	136.8	18 41.4	83 53	137.1	18 16.4	84 52	137.4	3
4	20 38.5	82 55	134.5	20 13.8	82 55	134.8	19 49.1	82 54	135.1	19 24.3	83 54	135.4	18 59.5	83 54	135.7	18 34.7	83 54	136.0	18 09.9	83 53	136.3	17 45.0	83 53	136.6	4
45	20 05.5	82 56	133.6	19 40.9	82 56	133.9	19 16.4	82 55	134.2	18 51.8	82 55	134.5	18 27.2	82 55	134.9	18 02.6	82 54	135.2	17 37.9	82 54	135.4	17 13.2	82 54	135.7	45
6	19 32.0	81 57	132.8	19 07.6	81 56	133.1	18 43.2	81 56	133.4	18 18.8	81 56	133.7	17 54.4	82 55	134.0	17 29.9	82 55	134.3	17 05.4	82 55	134.6	16 40.9	82 55	134.9	6
7	18 58.0	81 57	132.0	18 33.8	81 57	132.3	18 09.6	81 57	132.6	17 45.4	81 56	132.9	17 21.1	81 56	133.2	16 56.8	81 56	133.5	16 32.5	81 56	133.8	16 08.1	81 55	134.1	7
8	18 23.6	80 58	131.2	17 59.6	80 58	131.5	17 35.6	80 57	131.8	17 11.5	80 57	132.1	16 47.4	80 57	132.4	16 23.3	80 57	132.7	15 59.1	81 56	133.0	15 34.9	81 56	133.3	8
9	17 48.8	79 59	130.4	17 25.0	80 58	130.7	17 01.1	80 58	131.0	16 37.2	80 58	131.3	16 13.3	80 58	131.6	15 49.3	80 57	131.9	15 25.3	80 57	132.2	15 01.3	80 57	132.6	9
50	17 13.6	79 59	129.6	16 49.9	79 59	129.9	16 26.2	79 59	130.2	16 02.5	79 59	130.5	15 38.7	79 58	130.8	15 14.9	79 58	131.2	14 51.1	79 58	131.5	14 27.2	80 57	131.8	50
1	16 38.0	78 60	128.8	16 14.4	78 60	129.1	15 50.9	79 60	129.4	15 27.3	79 59	129.7	15 03.7	79 59	130.1	14 40.1	79 59	130.4	14 16.4	79 58	130.7	13 52.7	79 58	131.0	1
2	16 01.9	78 61	128.0	15 38.6	78 60	128.3	15 15.2	78 60	128.6	14 51.8	78 60	129.0	14 28.3	78 60	129.3	14 04.9	78 59	129.6	13 41.4	78 59	129.9	13 17.8	78 59	130.2	2
3	15 25.5	77 61	127.2	15 02.3	77 61	127.5	14 39.1	77 61	127.9	14 15.8	78 61	128.2	13 52.6	78 60	128.5	13 29.3	78 60	128.8	13 05.9	78 60	129.2	12 42.6	78 59	129.5	3
4	14 48.7	77 62	126.4	14 25.7	77 62	126.8	14 02.6	77 61	127.1	13 39.5	77 61	127.4	13 16.4	77 61	127.8	12 53.3	77 61	128.1	12 30.1	77 60	128.4	12 06.9	77 60	128.7	4
55	14 11.6	76 63	125.7	13 48.7	76 62	126.0	13 25.8	76 62	126.4	13 02.9	76 62	126.7	12 39.9	77 61	127.0	12 16.9	77 61	127.3	11 53.9	77 61	127.7	11 30.9	77 61	128.0	55
6	13 34.1	76 63	124.9	13 11.3	76 63	125.3	12 48.6	76 63	125.6	12 25.8	76 62	125.9	12 03.0	76 62	126.3	11 40.2	76 62	126.6	11 17.3	76 62	126.9	10 54.5	76 61	127.3	6
7	12 56.2	75 64	124.2	12 33.6	75 63	124.5	12 11.0	75 63	124.9	11 48.4	75 63	125.2	11 25.8	76 63	125.5	11 03.1	76 62	125.9	10 40.4	76 62	126.2	10 17.7	76 62	126.5	7
8	12 18.0	75 64	123.5	11 55.6	75 64	123.8	11 33.2	75 64	124.1	11 10.7	75 63	124.5	10 48.2	75 63	124.8	10 25.7	75 63	125.1	10 03.2	75 63	125.5	9 40.6	75 62	125.8	8
9	11 39.5	74 65	122.7	11 17.3	74 64	123.1	10 55.0	74 64	123.4	10 32.6	74 64	123.7	10 10.3	74 64	124.1	9 47.9	75 63	124.4	9 25.6	75 63	124.8	9 03.2	75 63	125.1	9
60	11 00.7	74 65	122.0	10 38.6	74 65	122.3	10 16.4	74 65	122.7	9 54.3	74 64	123.0	9 32.1	74 64	123.4	9 09.9	74 64	123.7	8 47.6	74 64	124.0	8 25.4	74 63	124.4	60
1	10 21.6	73 66	121.3	9 59.6	73 65	121.6	9 37.6	73 65	122.0	9 15.6	73 65	122.3	8 53.5	73 65	122.7	8 31.5	74 64	123.0	8 09.4	74 64	123.3	7 47.3	74 64	123.7	1
2	9 42.1	73 66	120.6	9 20.3	73 66	120.9	8 58.4	73 66	121.3	8 36.6	73 65	121.6	8 14.7	73 65	122.0	7 52.8	73 65	122.3	7 30.9	73 65	122.6	7 08.9	73 65	123.0	2
3	9 02.4	72 67	119.9	8 40.7	72 66	120.2	8 19.0	72 66	120.6	7 57.3	72 66	120.9	7 35.5	73 66	121.3	7 13.8	73 65	121.6	6 52.0	73 65	121.9	6 30.2	73 65	122.3	3
4	8 22.4	72 67	119.2	8 00.9	72 67	119.5	7 39.3	72 67	119.9	7 17.7	72 66	120.2	6 56.1	72 66	120.6	6 34.5	72 66	120.9	6 12.9	72 66	121.3	5 51.2	72 65	121.6	4
65	7 42.1	71 68	118.5	7 20.7	71 67	118.8	6 59.3	71 67	119.2	6 37.8	72 67	119.5	6 16.4	72 67	119.9	5 54.9	72 66	120.2	5 33.4	72 66	120.6	5 11.9	72 66	120.9	65
6	7 01.6	71 68	117.8	6 40.3	71 68	118.1	6 19.0	71 68	118.5	5 57.7	71 67	118.8	5 36.4	71 67	119.2	5 15.1	71 67	119.5							6
7	6 20.8	70 68	117.1	5 59.7	71 68	117.4	5 38.5	71 68	117.8	5 17.3	71 68	118.2													7
8	5 39.8	70 69	116.4	5 18.7	70 69	116.8																			8

DECLINATION SAME NAME AS LATITUDE

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	9 27.5	63 75	77.0	9 46.4	63 74	76.6	10 05.2	63 74	76.2	10 24.1	63 74	75.8	10 42.9	63 74	75.4	11 01.7	63 74	75.0	11 20.4	62 74	74.6	11 39.1	62 74	74.2	91
2	8 42.8	63 74	76.4	9 01.7	63 74	76.0	9 20.7	63 74	75.6	9 39.6	63 74	75.2	9 58.5	63 74	74.8	10 17.3	63 74	74.4	10 36.1	63 74	74.0	10 54.9	63 73	73.6	2
3	7 58.1	64 74	75.8	8 17.2	63 74	75.4	8 36.2	63 74	75.0	8 55.2	63 74	74.6	9 14.2	63 74	74.2	9 33.1	63 73	73.8	9 52.0	63 73	73.4	10 10.9	63 73	73.0	3
4	7 13.7	64 74	75.2	7 32.8	64 74	74.8	7 51.9	64 74	74.4	8 10.9	64 74	74.0	8 30.0	63 73	73.6	8 49.0	63 73	73.2	9 08.0	63 73	72.8	9 27.0	63 73	72.4	4
95	6 29.3	64 74	74.5	6 48.5	64 74	74.1	7 07.7	64 73	73.8	7 26.8	64 73	73.4	7 46.0	64 73	73.0	8 05.1	64 73	72.6	8 24.2	64 73	72.2	8 43.3	64 73	71.8	95
6	5 45.1	64 73	73.9	6 04.3	64 73	73.5	6 23.6	64 73	73.1	6 42.9	64 73	72.8	7 02.1	64 73	72.4	7 21.3	64 73	72.0	7 40.5	64 73	71.6	7 59.7	64 72	71.2	6
7	5 01.0	65 73	73.3	5 20.3	65 73	72.9	5 39.7	65 73	72.5	5 59.0	64 73	72.1	6 18.4	64 73	71.8	6 37.7	64 72	71.4	6 57.0	64 72	71.0	7 16.3	64 72	70.6	7
8										5 15.4	65 73	71.5	5 34.8	65 72	71.1	5 54.2	65 72	70.8	6 13.6	65 72	70.4	6 33.0	65 72	70.0	8
9																5 10.9	65 72	70.1	5 30.4	65 72	69.8	5 49.9	65 72	69.4	9
100																						5 07.0	65 71	68.8	100

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Lat. 40°

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	70 00.0	1.0 02	180.0	70 30.0	1.0 02	180.0	71 00.0	1.0 02	180.0	71 30.0	1.0 02	180.0	72 00.0	1.0 02	180.0	72 30.0	1.0 02	180.0	73 00.0	1.0 02	180.0	73 30.0	1.0 02	180.0	00
1	69 58.9	1.0 06	177.3	70 28.9	1.0 06	177.2	70 58.9	1.0 06	177.1	71 28.8	1.0 06	177.1	71 58.8	1.0 06	177.0	72 28.8	1.0 06	176.9	72 58.7	1.0 06	176.9	73 28.7	1.0 06	176.8	1
2	69 55.6	1.0 09	174.5	70 25.5	1.0 09	174.4	70 55.4	1.0 10	174.3	71 25.3	1.0 10	174.2	71 55.2	1.0 10	174.0	72 25.1	1.0 10	173.9	72 55.0	1.0 10	173.7	73 24.8	1.0 11	173.6	2
3	69 50.1	99 13	171.8	70 19.9	99 13	171.6	70 49.7	99 13	171.4	71 19.5	99 14	171.3	71 49.2	99 14	171.1	72 19.0	99 14	170.8	72 48.7	99 14	170.6	73 18.4	99 15	170.4	3
4	69 42.5	99 16	169.1	70 12.1	99 17	168.9	70 41.7	99 17	168.6	71 11.3	99 17	168.4	71 40.9	99 18	168.1	72 10.5	98 18	167.8	72 40.0	98 18	167.6	73 09.5	98 19	167.2	4
05	69 32.8	98 20	166.4	70 02.2	98 20	166.2	70 31.6	98 20	165.9	71 01.0	98 21	165.6	71 30.3	98 21	165.2	71 59.6	98 22	164.9	72 28.9	98 22	164.5	72 58.1	97 23	164.2	05
6	69 21.0	97 23	163.8	69 50.2	97 23	163.5	70 19.3	97 24	163.2	70 48.4	97 24	162.8	71 17.5	97 25	162.4	71 46.5	97 25	162.0	72 15.5	96 26	161.6	72 44.4	96 27	161.2	6
7	69 07.2	97 26	161.3	69 36.1	96 27	160.9	70 05.0	96 27	160.5	70 33.8	96 28	160.1	71 02.6	96 28	159.6	71 31.3	96 29	159.2	71 59.9	95 30	158.7	72 28.5	95 30	158.2	7
8	68 51.5	96 29	158.7	69 20.1	95 30	158.3	69 48.7	95 30	157.9	70 17.2	95 31	157.4	70 45.6	95 32	156.9	71 13.9	94 32	156.4	71 42.2	94 33	155.9	72 10.4	94 34	155.4	8
9	68 33.9	94 32	156.3	69 02.2	94 33	155.8	69 30.4	94 33	155.3	69 58.6	94 34	154.8	70 26.6	93 35	154.3	70 54.6	93 35	153.8	71 22.4	93 36	153.2	71 50.2	92 37	152.6	9
10	68 14.5	93 35	153.9	68 42.5	93 36	153.4	69 10.3	93 36	152.9	69 38.1	92 37	152.3	70 05.8	92 38	151.8	70 33.3	92 38	151.2	71 00.8	91 39	150.6	71 28.1	91 40	149.9	10
1	67 53.4	92 38	151.6	68 21.0	92 38	151.0	68 48.5	91 39	150.5	69 15.9	91 40	149.9	69 43.2	91 40	149.3	70 10.3	90 41	148.7	70 37.3	90 42	148.0	71 04.2	89 43	147.4	1
2	67 30.7	91 40	149.3	67 58.0	91 41	148.7	68 25.1	90 42	148.2	68 52.0	90 42	147.6	69 18.9	89 43	146.9	69 45.6	89 44	146.3	70 12.2	88 45	145.6	70 38.5	88 45	144.9	2
3	67 06.5	90 43	147.1	67 33.3	89 44	146.5	68 00.0	89 44	145.9	68 26.6	88 45	145.3	68 53.0	88 46	144.6	69 19.3	87 46	143.9	69 45.4	87 47	143.2	70 11.3	86 48	142.5	3
4	66 40.8	88 45	145.0	67 07.3	88 46	144.3	67 33.6	87 46	143.7	67 59.7	87 47	143.1	68 25.7	86 48	142.4	68 51.5	86 49	141.7	69 17.2	85 49	141.0	69 42.6	85 50	140.2	4
15	66 13.7	87 47	142.9	66 39.8	87 48	142.3	67 05.7	86 49	141.6	67 31.4	86 49	141.0	67 57.0	85 50	140.3	68 22.4	84 51	139.6	68 47.6	84 52	138.8	69 12.6	83 52	138.0	15
6	65 45.4	86 49	140.9	66 11.0	85 50	140.3	66 36.5	85 51	139.6	67 01.8	84 51	138.9	67 27.0	83 52	138.2	67 51.9	83 53	137.5	68 16.7	82 54	136.7	68 41.2	81 54	135.9	6
7	65 15.8	84 51	139.0	65 41.0	84 52	138.3	66 06.1	83 53	137.6	66 31.0	83 53	136.9	66 55.8	82 54	136.2	67 20.3	81 55	135.5	67 44.6	81 55	134.7	68 08.6	80 56	133.9	7
8	64 45.0	83 53	137.1	65 09.9	83 54	136.4	65 34.6	82 54	135.8	65 59.1	81 55	135.1	66 23.4	81 56	134.3	66 47.5	80 56	133.6	67 11.4	79 57	132.8	67 35.0	78 58	132.0	8
9	64 13.2	82 55	135.3	64 37.7	81 55	134.6	65 02.0	81 56	133.9	65 26.1	80 57	133.2	65 50.0	79 57	132.5	66 13.7	79 58	131.7	66 37.2	78 59	131.0	67 00.4	77 59	130.2	9
20	63 40.4	81 56	133.6	64 04.5	80 57	132.9	64 28.4	79 58	132.2	64 52.1	79 58	131.5	65 15.6	78 59	130.7	65 38.9	77 59	130.0	66 02.0	76 60	129.2	66 24.8	76 61	128.4	20
1	63 06.6	79 58	131.9	63 30.4	79 58	131.2	63 53.9	78 59	130.5	64 17.3	77 60	129.8	64 40.4	77 60	129.0	65 03.3	76 61	128.3	65 25.9	75 61	127.5	65 48.3	74 62	126.7	1
2	62 32.0	78 59	130.3	62 55.4	78 60	129.6	63 18.5	77 60	128.9	63 41.5	76 61	128.1	64 04.3	75 61	127.4	64 26.8	75 62	126.6	64 49.1	74 63	125.9	65 11.1	73 63	125.1	2
3	61 56.5	77 60	128.7	62 19.5	76 61	128.0	62 42.4	76 62	127.3	63 05.0	75 62	126.6	63 27.4	74 63	125.8	63 49.5	73 63	125.1	64 11.4	73 64	124.3	64 33.1	72 64	123.5	3
4	61 20.2	76 62	127.2	61 42.9	75 62	126.5	62 05.4	75 63	125.8	62 27.7	74 63	125.1	62 49.8	73 64	124.3	63 11.6	72 64	123.6	63 33.1	71 65	122.8	63 54.4	71 65	122.0	4
25	60 43.3	75 63	125.7	61 05.6	74 63	125.0	61 27.8	74 64	124.3	61 49.8	73 64	123.6	62 11.5	72 65	122.9	62 33.0	71 65	122.1	62 54.2	70 66	121.3	63 15.2	69 66	120.6	25
6	60 05.6	74 64	124.3	60 27.7	73 64	123.6	60 49.5	72 65	122.9	61 11.2	72 65	122.2	61 32.6	71 66	121.5	61 53.7	70 66	120.7	62 14.6	69 67	119.9	62 35.3	68 67	119.2	6
7	59 27.3	73 65	122.9	59 49.1	72 65	122.2	60 10.6	71 66	121.5	60 32.0	71 66	120.8	60 53.1	70 67	120.1	61 13.9	69 67	119.4	61 34.6	68 68	118.6	61 54.9	67 68	117.8	7
8	58 48.5	72 66	121.6	59 09.9	71 66	120.9	59 31.2	71 67	120.2	59 52.2	70 67	119.5	60 13.1	69 68	118.8	60 33.6	68 68	118.1	60 54.0	67 68	117.3	61 14.0	66 69	116.5	8
9	58 09.0	71 67	120.3	58 30.2	70 67	119.6	58 51.2	70 67	118.9	59 12.0	69 68	118.2	59 32.5	68 68	117.5	59 52.8	67 69	116.8	60 12.9	66 69	116.1	60 32.7	66 70	115.3	9
30	57 29.1	70 67	119.1	57 50.0	69 68	118.4	58 10.8	69 68	117.7	58 31.3	68 69	117.0	58 51.6	67 69	116.3	59 11.6	66 69	115.6	59 31.4	66 70	114.8	59 50.9	65 70	114.1	30
1	56 48.7	69 68	117.9	57 09.4	69 68	117.2	57 29.9	68 69	116.5	57 50.1	67 69	115.8	58 10.1	66 70	115.1	58 29.9	66 70	114.4	58 49.5	65 70	113.7	59 08.8	64 71	112.9	1
2	56 07.8	69 69	116.7	56 28.3	68 69	116.0	56 48.5	67 70	115.4	57 08.5	66 70	114.7	57 28.3	66 70	114.0	57 47.9	65 71	113.3	58 07.2	64 71	112.5	58 26.3	63 71	111.8	2
3	55 26.6	68 69	115.5	55 46.8	67 70	114.9	56 06.8	66 70	114.2	56 26.6	66 70	113.5	56 46.2	65 71	112.9	57 05.5	64 71	112.2	57 24.6	63 72	111.4	57 43.4	62 72	110.7	3
4	54 44.9	67 70	114.4	55 04.9	66 70	113.8	55 24.7	66 71	113.1	55 44.3	65 71	112.5	56 03.6	64 71	111.8	56 22.8	63 72	111.1	56 41.6	63 72	110.4	57 00.3	62 72	109.7	4
35	54 02.9	66 71	113.4	54 22.7	66 71	112.7	54 42.3	65 71	112.1	55 01.6	64 72	111.4	55 20.8	63 72	110.7	55 39.7	63 72	110.0	55 58.4	62 72	109.3	56 16.9	61 73	108.6	35
6	53 20.5	66 71	112.3	53 40.1	65 71	111.7	53 59.5	64 72	111.0	54 18.7	64 72	110.4	54 37.7	63 72	109.7	54 56.4	62 73	109.0	55 14.9	61 73	108.3	55 33.2	61 73	107.6	6
7	52 37.8	65 72	111.3	52 57.3	64 72	110.7	53 16.5	64 72	110.0	53 35.5	63 72	109.4	53 54.3	62 73	108.7	54 12.8	62 73	108.0	54 31.2	61 73	107.4	54 49.3	60 74	106.7	7
8	51 54.9	64 72	110.3	52 14.1	64 72	109.7	52 33.2	63 73	109.0	52 52.0	62 73	108.4	53 10.6	62 73	107.7	53 29.0	61 73	107.1	53 47.2	60 74	106.4	54 05.1	59 74	105.7	8
9	51 11.6	64 73	109.3	51 30.7	63 73	108.7	51 49.6	63 73	108.1	52 08.3	62 73	107.4	52 26.7	61 74	106.8	52 45.0	60 74	106.1	53 03.0	60 74	105.5	53 20.8	59 74	104.8	9
40	50 28.1	63 73	108.4	50 47.1	63 73	107.8	51 05.8	62 73	107.1	51 24.3	61 74	106.5	51 42.6	61 74	105.9	52 00.7	60 74	105.2	52 18.6	59 74	104.6	52 36.3	59 74	103.9	40
1	49 44.4	63 73	107.5	50 03.2	62 73	106.8	50 21.7	62 74	106.2	50 40.1	61 74	105.6	50 58.3	60 74	105.0	51 16.3	60 74	104.3	51 34.0	59 75	103.7	51 51.6	58 75	103.0	1
2	49 00.5	62 74	106.6	49 19.1	62 74	106.0	49 37.5	61 74	105.3	49 55.8	61 74	104.7	50 13.8	60 74	104.1	50 31.7	59 75	103.5	50 49.3	58 75	102.8	51 06.7	58 75	102.2	2
3	48 16.3	62 74	105.7	48 34.8	61 74	105.1	48 53.1	61 74	104.5	49 11.2	60 75	103.9	49 29.2	59 75	103.3	49 46.9	59 75	102.6	50 04.4	58 75	102.0	50 21.7	57 75	101.4	3
4	47 32.0	62 74	104.8	47 50.3	61 74	104.2	48 08.5	60 75	103.6	48 26.5	60 75	103.0	48 44.3	59 75	102.4	49 02.0	58 75	101.8	49 19.4	58 75	101.2	49 36.6	57 75	100.5	4
45	46 47.4	61 74	104.0	47 05.7	61 75	103.4	47 23.8	60 75	102.8	47 41.7	59 75	102.2	47 59.4	59 75	101.6	48 16.9	58 75	101.0	48 34.2	57 75	100.4	48 51.4	57 76	99.7	45
6	46 02.7	61 75	103.1	46 20.9	60 75	102.5	46 38.9	60 75	102.0	46 56.7	59 75	101.4	47 14.3	58 75	100.8	47 31.7	58 76	100.2	47 49.0	57 76	99.6	48 06.0	56 76	99.0	6
7	45 17.9	60 75	102.3	45 36.0	60 75	101.7	45 53.8	59 75	101.2	46 11.6	59 75	100.6	46 29.1	58 76	100.0	46 46.4	58 76	99.4	47 03.6	57 76	98.8	47 20.6	56 76	98.2	7
8	44 32.9	60 75	101.5	44 50.9	60 75	100.9	45 08.7	59 75	100.4	45 26.3	58 76	99.8	45 43.8	58 76	99.2	46 01.0	57 76	98.6	46 18.1	57 76	98.0	46 35.0	56 76	97.4	8
9	43 47.8	60 75	100.7	44 05.7	59 76	100.2	44 23.4	59 76	99.6	44 41.0	58 76	99.0	44 58.4	58 76	98.5	45 15.6	57 76	97.9	45 32.6	56 76	97.3	45 49.4	56 76	96.7	9
50	43 02.6	60 76	99.9	43 20.4	59 76	99.4	43 38.1	59 76	98.8	43 55.5	58 76	98.3	44 12.8	57 76	97.7	44 30.0	57 76	97.1	44 46.9	56 76	96.6	45 03.7	56 76	96.0	50
1	42 17.3	60 76	99.2	42 35.0	59 76	98.6	42 52.6	58 76	98.1	43 10.0	58 76	97.5	43 27.3	57 76	97.0	43 44.3	57 76	96.4	44 01.3	56 76	95.8	44 18.0	56 76	95.3	1
2	41 31.9	59 76	98.4	41 49.5	59 76	97.9	42 07.1	58 76	97.4	42 24.4	58 76	96.8	42 41.6	57 76	96.2	42 58.6	57 76	95.7	43 15.5	56 76	95.1	43 32.2	55 76	94.5	2
3	40 46.4	59 76	97.7	41 04.0	58 76	97.2	41 21.4	58 76	96.6	41 38.7	57 76	96.1	41 55.9	57 76	95.5	42 12.9	56 76	95.0	42 29.7	56 76	94.4	42 46.4	55 76	93.9	3
4	40 00.8	59 76	97.0	40 18.3	58 76	96.4	40 35.7	58 76	95.9	40 53.0	57 76	95.4	41 10.1	57 76	94.8	41 27.1	56 76	94.3	41 43.9	56 76	93.7	42 00.5	55 76	93.2	4
55	39 15.1	59 76	96.3	39 32.6	58 76	95.7	39 50.0	58 76	95.2	40 07.2	57 76	94.7	40 24.3	57 76	94.1	40 41.2	56 76	93.6	40 58.0	56 77	93.0	41 14.6	55 77	92.5	55
6	38 29.4	58 76	95.6	38 46.9	58 76	95.0	39 04.2	58 76	94.5	39 21.4	57 76	94.0	39 38.4	57 76	93.4	39 55.3	56 77	92.9	40 12.1	56 77	92.4	40 28.6	55 77	91.8	6
7	37 43.6	58 76	94.9	38 01.1	58 76	94.3	38 18.4	57 76	93.8	38 35.5	57 76	93.3	38 52.5	56 77	92.8	39 09.4	56 77	92.2	39 26.1	55 77	91.7	39 42.7	55 77	91.2	7
8	36 57.8	58 76	94.2	37 15.2	58 76	93.7	37 32.5	57 77	93.1	37 49.6	57 77	92.6	38 06.6	56 77	92.1	38 23.5	56 77	91.6	38 40.2	55 77	91.0	38 56.7	55 77	90.5	8
9	36 12.0	58 76	93.5	36 29.3	58 77	93.0	36 46.6	57 77	92.5	37 03.7	57 77	92.0	37 20.7	56 77	91.4	37 37.5	56 77	90.9	37 54.2	55 77	90.4	38 10.8	55 77	89.9	9
60	35 26.1	58 77	92.8	35 43.4	58 77	92.3	36 00.6	57 77	91.8	36 17.7	57 77	91.3	36 34.7	56 77	90.8	36 51.6	56 77	90.3	37 08.3	55 77	89.8	37 24.8	55 77	89.2	60
1	34 40.1	58 77	92.1	34 57.5	58 77	91.7	35 14.7	57 77	91.2	35 31.8	57 77	90.6	35 48.8	56 77	90.1	36 05.6	56 77	89.6	36 22.3	55 77	89.1	36 38.9	55 77	88.6	1
2	33 54.2	58 77	91.5	34 11.5	58 77	91.0	34 28.7	57 77	90.5	34 45.8	57 77	90.0	35 02.8	56 77	89.5	35 19.6	56 77	89.0	35 36.3	56 77	88.5	35 52.9	55 77	88.0	2
3	33 08.2	58 77	90.8	33 25.6	58 77	90.3	33 42.8	57 77	89.9	33 59.9	57 77	89.4	34 16.8	56 77	88.9	34 33.7	56 77	88.4	34 50.4	56 77	87.9	35 07.0	55 76	87.3	3
4	32 22.3	58 77	90.2	32 39.6	58 77	89.7	32 56.8	57 77	89.2	33 13.9	57 77	88.7	33 30.9	56 77	88.2	33 47.7	56 77	87.7	34 04.5	56 76	87.2	34 21.1	55 76	86.7	4
65	31 36.3	58 77	89.5	31 53.6	58 77	89.1	32 10.9	57 77	88.6	32 28.0	57 77	88.1	32 45.0	56 77	87.6	33 01.8	56 76	87.1	33 18.6	56 76	86.6	33 35.2	55 76	86.1	65
6	30 50.4	58 77	88.9	31 07.7	58 77	88.4	31 24.9	57 77	88.0	31 42.0	57 76	87.5	31 59.0	56 76	87.0	32 15.9	56 76	86.5	32 32.7	56 76	86.0	32 49.4	55 76	85.5	6
7	30 04.4	58 77	88.3	30 21.8	58 77	87.8	30 39.0	57 76	87.3	30 56.1	57 76	86.9	31 13.2	57 76	86.4	31 30.1	56 76	85.9	31 46.9	56 76	85.4	32 03.6	55 76	84.9	7
8	29 18.5	58 77	87.7	29 35.8	58 76	87.2	29 53.1	57 76	86.7	30 10.2	57 76	86.2	30 27.3	57 76	85.8	30 44.2	56 76	85.3	31 01.1	56 76	84.8	31 17.8	56 76	84.3	8
9	28 32.6	58 76	87.0	28 49.9	58 76	86.6	29 07.2	57 76	86.1	29 24.4	57 76	85.6	29 41.5	57 76	85.2	29 58.5	56 76	84.7	30 15.3	56 76	84.2	30 32.1	56 76	83.7	9
70	27 46.7	58 76	86.4	28 04.1	58 76	85.9	28 21.4	58 76	85.5	28 38.6	57 76	85.0	28 55.7	57 76	84.6	29 12.7	57 76	84.1	29 29.6	56 76	83.6	29 46.5	56 76	83.1	70
1	27 00.8	58 76	85.8	27 18.3	58 76	85.3	27 35.6	58 76	84.9	27 52.8	57 76	84.4	28 10.0	57 76	83.9	28 27.0	57 76	83.5	28 44.0	56 76	83.0	29 00.8	56 76	82.5	1
2	26 15.0	58 76	85.2	26 32.5	58 76	84.7	26 49.8	58 76	84.3	27 07.1	57 76	83.8	27 24.3	57 76	83.4	27 41.4	57 76	82.9	27 58.4	57 76	82.4	28 15.3	56 76	82.0	2
3	25 29.2	58 76	84.6	25 46.7	58 76	84.1	26 04.1	58 76	83.7	26 21.4	58 76	83.2	26 38.7	57 76	82.8	26 55.8	57 76	82.3	27 12.9	57 76	81.8	27 29.8	56 76	81.4	3
4	24 43.5	59 76	84.0	25 01.0	58 76	83.5	25 18.5	58 76	83.1	25 35.8	58 76	82.6	25 53.1	57 76	82.2	26 10.3	57 76	81.7	26 27.4	57 76	81.2	26 44.4	57 76	80.8	4
75	23 57.8	59 76	83.4	24 15.4	58 76	82.9	24 32.9	58 76	82.5	24 50.3	58 76	82.0	25 07.6	58 76	81.6	25 24.9	57 76	81.1	25 42.0	57 76	80.7	25 59.1	57 75	80.2	75
6	23 12.2	59 76	82.8	23 29.8	59 76	82.3	23 47.3	58 76	81.9	24 04.8	58 76	81.4	24 22.2	58 76	81.0	24 39.5	58 76	80.5	24 56.7	57 75	80.1	25 13.8	57 75	79.6	6
7	22 26.6	59 76	82.2	22 44.3	59 76	81.7	23 01.9	58 76	81.3	23 19.4	58 76	80.8	23 36.8	58 75	80.4	23 54.2	58 75	79.9	24 11.5	58 75	79.5	24 28.7	57 75	79.0	7
8	21 41.1	59 76	81.6	21 58.8	59 76	81.1	22 16.5	59 76	80.7	22 34.0	58 75	80.2	22 51.5	58 75	79.8	23 09.0	58 75	79.4	23 26.3	58 75	78.9	23 43.6	57 75	78.5	8
9	20 55.7	59 76	81.0	21 13.5	59 76	80.5	21 31.2	59 75	80.1	21 48.8	59 75	79.7	22 06.3	58 75	79.2	22 23.8	58 75	78.8	22 41.3	58 75	78.3	22 58.6	58 75	77.9	9
80	20 10.3	59 75	80.4	20 28.2	59 75	79.9	20 45.9	59 75	79.5	21 03.6	59 75	79.1	21 21.2	59 75	78.6	21 38.8	58 75	78.2	21 56.3	58 75	77.8	22 13.7	58 75	77.3	80
1	19 25.1	60 75	79.8	19 43.0	60 75	79.3	20 00.8	59 75	78.9	20 18.5	59 75	78.5	20 36.2	59 75	78.1	20 53.9	59 75	77.6	21 11.4	58 75	77.2	21 28.9	58 74	76.8	1
2	18 39.9	60 75	79.2	18 57.8	60 75	78.8	19 15.7	60 75	78.3	19 33.5	59 75	77.9	19 51.3	59 75	77.5	20 09.0	59 75	77.0	20 26.7	59 74	76.6	20 44.2	58 74	76.2	2
3	17 54.8	60 75	78.6	18 12.8	60 75	78.2	18 30.7	60 75	77.7	18 48.6	60 75	77.3	19 06.5	59 74	76.9	19 24.3	59 74	76.5	19 42.0	59 74	76.0	19 59.7	59 74	75.6	3
4	17 09.8	60 75	78.0	17 27.9	60 75	77.6	17 45.9	60 75	77.1	18 03.9	60 74	76.7	18 21.8	60 74	76.3	18 39.6	59 74	75.9	18 57.4	59 74	75.5	19 15.2	59 74	75.0	4
85	16 24.9	61 75	77.4	16 43.0	60 75	77.0	17 01.1	60 74	76.6	17 19.2	60 74	76.1	17 37.2	60 74	75.7	17 55.1	60 74	75.3	18 13.0	60 74	74.9	18 30.8	59 74	74.5	85
6	15 40.1	61 74	76.8	15 58.3	61 74	76.4	16 16.5	61 74	76.0	16 34.6	60 74	75.6	16 52.7	60 74	75.1	17 10.7	60 74	74.7	17 28.7	60 74	74.3	17 46.6	60 74	73.9	6
7	14 55.4	61 74	76.2	15 13.7	61 74	75.8	15 31.9	61 74	75.4	15 50.2	61 74	75.0	16 08.3	60 74	74.6	16 26.4	60 74	74.1	16 44.5	60 73	73.7	17 02.5	60 73	73.3	7
8	14 10.8	61 74	75.6	14 29.2	61 74	75.2	14 47.5	61 74	74.8	15 05.8	61 74	74.4	15 24.1	61 74	74.0	15 42.3	61 73	73.6	16 00.5	60 73	73.1	16 18.6	60 73	72.7	8
9	13 26.3	62 74	75.0	13 44.8	61 74	74.6	14 03.2	61 74	74.2	14 21.6	61 73	73.8	14 40.0	61 73	73.4	14 58.3	61 73	73.0	15 16.5	61 73	72.6	15 34.8	61 73	72.2	9
90	12 42.9	62 74	74.4	13 00.6	62 74	74.0	13 19.1	62 73	73.6	13 37.6	62 73	73.2	13 56.0	61 73	72.8	14 14.4	61 73	72.4	14 32.8	61 73	72.0	14 51.1	61 73	71.6	90

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H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	30 00.0	1.0 01	180.0	29 30.0	1.0 01	180.0	29 00.0	1.0 01	180.0	28 30.0	1.0 01	180.0	28 00.0	1.0 01	180.0	27 30.0	1.0 01	180.0	27 00.0	1.0 01	180.0	26 30.0	1.0 01	180.0	00
1	29 59.6	1.0 02	178.9	29 29.6	1.0 02	178.9	28 59.6	1.0 02	178.9	28 29.6	1.0 02	178.9	27 59.6	1.0 02	179.0	27 29.6	1.0 02	179.0	26 59.6	1.0 02	179.0	26 29.6	1.0 02	179.0	1
2	29 58.3	1.0 04	177.8	29 28.3	1.0 04	177.8	28 58.3	1.0 04	177.9	28 28.3	1.0 04	177.9	27 58.3	1.0 04	177.9	27 28.3	1.0 03	177.9	26 58.3	1.0 03	177.9	26 28.4	1.0 03	178.0	2
3	29 56.1	1.0 05	176.7	29 26.1	1.0 05	176.8	28 56.1	1.0 05	176.8	28 26.2	1.0 05	176.8	27 56.2	1.0 05	176.9	27 26.2	1.0 05	176.9	26 56.3	1.0 05	176.9	26 26.3	1.0 05	176.9	3
4	29 53.0	1.0 07	175.7	29 23.1	1.0 06	175.7	28 53.2	1.0 06	175.7	28 23.2	1.0 06	175.8	27 53.3	1.0 06	175.8	27 23.3	1.0 06	175.8	26 53.4	1.0 06	175.9	26 23.4	1.0 06	175.9	4
05	29 49.1	1.0 08	174.6	29 19.2	1.0 08	174.6	28 49.3	1.0 08	174.7	28 19.4	1.0 08	174.7	27 49.5	1.0 08	174.8	27 19.6	1.0 08	174.8	26 49.7	1.0 08	174.8	26 19.7	1.0 08	174.9	05
6	29 44.4	1.0 09	173.5	29 14.5	1.0 09	173.6	28 44.6	1.0 09	173.6	28 14.7	1.0 09	173.7	27 44.9	1.0 09	173.7	27 15.0	1.0 09	173.8	26 45.1	1.0 09	173.8	26 15.2	1.0 09	173.9	6
7	29 38.7	99 11	172.4	29 08.9	99 11	172.5	28 39.1	99 11	172.6	28 09.3	99 11	172.6	27 39.4	99 10	172.7	27 09.6	99 10	172.7	26 39.8	99 10	172.8	26 09.9	99 10	172.8	7
8	29 32.3	99 12	171.4	29 02.5	99 12	171.4	28 32.7	99 12	171.5	28 02.9	99 12	171.6	27 33.1	99 12	171.6	27 03.4	99 12	171.7	26 33.6	99 12	171.8	26 03.8	99 12	171.8	8
9	29 24.9	99 14	170.3	28 55.2	99 14	170.4	28 25.5	99 13	170.4	27 55.8	99 13	170.5	27 26.0	99 13	170.6	26 56.3	99 13	170.7	26 26.6	99 13	170.7	25 56.9	99 13	170.8	9
10	29 16.7	99 15	169.2	28 47.1	99 15	169.3	28 17.4	99 15	169.4	27 47.8	99 15	169.5	27 18.1	99 15	169.6	26 48.5	99 14	169.6	26 18.8	99 14	169.7	25 49.1	99 14	169.8	10
1	29 07.7	99 16	168.2	28 38.1	99 16	168.3	28 08.6	99 16	168.3	27 39.0	99 16	168.4	27 09.4	99 16	168.5	26 39.8	99 16	168.6	26 10.2	99 16	168.7	25 40.6	99 16	168.8	1
2	28 57.9	98 18	167.1	28 28.4	98 18	167.2	27 58.9	98 18	167.3	27 29.4	98 17	167.4	26 59.8	98 17	167.5	26 30.3	98 17	167.6	26 00.8	98 17	167.7	25 31.3	98 17	167.8	2
3	28 47.2	98 19	166.0	28 17.8	98 19	166.2	27 48.4	98 19	166.3	27 18.9	98 19	166.4	26 49.5	98 19	166.5	26 20.1	98 18	166.6	25 50.6	98 18	166.7	25 21.2	98 18	166.8	3
4	28 35.7	98 21	165.0	28 06.4	98 20	165.1	27 37.0	98 20	165.2	27 07.7	98 20	165.4	26 38.4	98 20	165.5	26 09.0	98 20	165.6	25 39.7	98 20	165.7	25 10.3	98 19	165.8	4
15	28 23.4	97 22	164.0	27 54.2	97 22	164.1	27 24.9	97 22	164.2	26 55.7	97 21	164.3	26 26.4	98 21	164.5	25 57.2	98 21	164.6	25 27.9	98 21	164.7	24 58.6	98 21	164.8	15
6	28 10.3	97 23	162.9	27 41.2	97 23	163.0	27 12.0	97 23	163.2	26 42.9	97 23	163.3	26 13.7	97 22	163.4	25 44.6	97 22	163.6	25 15.4	97 22	163.7	24 46.2	97 22	163.8	6
7	27 56.4	97 24	161.9	27 27.4	97 24	162.0	26 58.3	97 24	162.2	26 29.3	97 24	162.3	26 00.2	97 24	162.4	25 31.2	97 24	162.6	25 02.1	97 23	162.7	24 33.1	97 23	162.9	7
8	27 41.7	96 26	160.9	27 12.8	96 26	161.0	26 43.9	96 25	161.2	26 14.9	96 25	161.3	25 46.0	96 25	161.4	25 17.1	97 25	161.6	24 48.1	97 25	161.7	24 19.1	97 24	161.9	8
9	27 26.3	96 27	159.8	26 57.5	96 27	160.0	26 28.7	96 27	160.2	25 59.8	96 26	160.3	25 31.0	96 26	160.5	25 02.2	96 26	160.6	24 33.3	96 26	160.8	24 04.5	96 26	160.9	9
20	27 10.0	96 28	158.8	26 41.4	96 28	159.0	26 12.7	96 28	159.2	25 44.0	96 28	159.3	25 15.3	96 27	159.5	24 46.5	96 27	159.6	24 17.8	96 27	159.8	23 49.1	96 27	159.9	20
1	26 53.0	95 30	157.8	26 24.5	95 29	158.0	25 55.9	95 29	158.2	25 27.4	95 29	158.3	24 58.8	95 29	158.5	24 30.2	95 28	158.7	24 01.6	95 28	158.8	23 33.0	95 28	159.0	1
2	26 35.3	96 31	156.8	26 06.9	95 31	157.0	25 38.5	95 30	157.2	25 10.0	95 30	157.4	24 41.6	95 30	157.5	24 13.1	95 30	157.7	23 44.6	95 29	157.9	23 16.1	95 29	158.0	2
3	26 16.9	94 32	155.8	25 48.6	94 32	156.0	25 20.3	94 32	156.2	24 52.0	94 31	156.4	24 23.6	94 31	156.6	23 55.3	94 31	156.7	23 26.9	95 31	156.9	22 58.6	95 30	157.1	3
4	25 57.7	94 33	154.8	25 29.5	94 33	155.0	25 01.4	94 33	155.2	24 33.2	94 32	155.4	24 05.0	94 32	155.6	23 36.8	94 32	155.8	23 08.6	94 32	156.0	22 40.3	94 32	156.2	4
25	25 37.8	93 34	153.9	25 09.8	93 34	154.1	24 41.8	93 34	154.3	24 13.7	93 34	154.5	23 45.7	94 33	154.6	23 17.6	94 33	154.8	22 49.5	94 33	155.0	22 21.4	94 33	155.2	25
6	25 17.2	93 35	152.9	24 49.3	93 35	153.1	24 21.5	93 35	153.3	23 53.6	93 35	153.5	23 25.7	93 34	153.7	22 57.7	93 34	153.9	22 29.8	93 34	154.1	22 01.8	93 34	154.3	6
7	24 55.9	92 37	151.9	24 28.2	92 36	152.1	24 00.5	92 36	152.4	23 32.7	93 36	152.6	23 05.0	93 36	152.8	22 37.2	93 35	153.0	22 09.4	93 35	153.2	21 41.6	93 35	153.4	7
8	24 34.0	92 38	151.0	24 06.4	92 37	151.2	23 38.8	92 37	151.4	23 11.2	92 37	151.6	22 43.6	92 37	151.8	22 16.0	92 36	152.1	21 48.3	92 36	152.3	21 20.6	92 36	152.5	8
9	24 11.3	91 39	150.0	23 43.9	91 39	150.3	23 16.5	91 38	150.5	22 49.0	92 38	150.7	22 21.6	92 38	150.9	21 54.1	92 38	151.1	21 26.6	92 37	151.4	20 59.1	92 37	151.6	9
30	23 48.1	91 40	149.1	23 20.8	91 40	149.3	22 53.5	91 39	149.6	22 26.2	91 39	149.8	21 58.9	91 39	150.0	21 31.6	91 39	150.2	21 04.2	91 38	150.4	20 36.9	91 38	150.7	30
1	23 24.1	90 41	148.2	22 57.0	90 41	148.4	22 29.9	90 40	148.6	22 02.8	90 40	148.9	21 35.6	91 40	149.1	21 08.4	91 40	149.3	20 41.3	91 39	149.6	20 14.0	91 39	149.8	1
2	22 59.6	90 42	147.3	22 32.6	90 42	147.5	22 05.7	90 41	147.7	21 38.7	90 41	148.0	21 11.7	90 41	148.2	20 44.7	90 41	148.4	20 17.7	90 40	148.7	19 50.6	90 40	148.9	2
3	22 34.4	89 43	146.3	22 07.6	89 43	146.6	21 40.8	89 42	146.8	21 14.0	89 42	147.1	20 47.2	89 42	147.3	20 20.3	90 42	147.5	19 53.5	90 41	147.8	19 26.6	90 41	148.0	3
4	22 08.6	89 44	145.4	21 42.0	89 44	145.7	21 15.4	89 43	145.9	20 48.7	89 43	146.2	20 22.1	89 43	146.4	19 55.4	89 43	146.7	19 28.7	89 42	146.9	19 01.9	89 42	147.1	4
35	21 42.3	88 45	144.5	21 15.8	88 45	144.8	20 49.3	88 44	145.0	20 22.9	88 44	145.3	19 56.3	88 44	145.5	19 29.8	88 44	145.8	19 03.3	89 43	146.0	18 36.7	89 43	146.3	35
6	21 15.3	88 46	143.7	20 49.0	88 46	143.9	20 22.7	88 45	144.2	19 56.4	88 45	144.4	19 30.1	88 45	144.7	19 03.7	88 44	144.9	18 37.3	88 44	145.2	18 10.9	88 44	145.4	6
7	20 47.8	87 47	142.8	20 21.7	87 47	143.0	19 55.5	87 46	143.3	19 29.4	87 46	143.6	19 03.2	87 46	143.8	18 37.0	87 45	144.1	18 10.8	87 45	144.3	17 44.5	88 45	144.6	7
8	20 19.7	86 48	141.9	19 53.8	87 47	142.2	19 27.8	87 47	142.4	19 01.8	87 47	142.7	18 35.8	87 47	143.0	18 09.8	87 46	143.2	17 43.7	87 46	143.5	17 17.6	87 46	143.7	8
9	19 51.1	86 49	141.0	19 25.3	86 48	141.3	18 59.5	86 48	141.6	18 33.7	86 48	141.9	18 07.8	86 47	142.1	17 42.0	86 47	142.4	17 16.1	86 47	142.7	16 50.2	86 47	142.9	9
40	19 21.9	85 50	140.2	18 56.3	85 49	140.5	18 30.7	85 49	140.7	18 05.0	86 49	141.0	17 39.4	86 48	141.3	17 13.7	86 48	141.6	16 47.9	86 48	141.8	16 22.2	86 48	142.1	40
1	18 52.2	85 50	139.3	18 26.8	85 50	139.6	18 01.3	85 50	139.9	17 35.9	85 49	140.2	17 10.4	85 49	140.5	16 44.8	85 49	140.7	16 19.3	85 49	141.0	15 53.7	85 48	141.3	1
2	18 22.0	84 51	138.5	17 56.8	84 51	138.8	17 31.5	84 51	139.1	17 06.2	84 50	139.4	16 40.8	84 50	139.6	16 15.5	85 50	139.9	15 50.1	85 49	140.2	15 24.7	85 49	140.5	2
3	17 51.3	84 52	137.7	17 26.2	84 52	138.0	17 01.1	84 51	138.3	16 36.0	84 51	138.5	16 10.8	84 51	138.8	15 45.6	84 51	139.1	15 20.4	84 50	139.4	14 55.2	84 50	139.7	3
4	17 20.1	83 53	136.9	16 55.2	83 52	137.1	16 30.3	83 52	137.4	16 05.3	83 52	137.7	15 40.3	83 52	138.0	15 15.3	83 51	138.3	14 50.3	83 51	138.6	14 25.2	84 51	138.9	4
45	16 48.5	82 54	136.0	16 23.7	83 53	136.3	15 58.9	83 53	136.6	15 34.2	83 53	136.9	15 09.3	83 52	137.2	14 44.5	83 52	137.5	14 19.6	83 52	137.8	13 54.7	83 52	138.1	45
6	16 16.3	82 54	135.2	15 51.8	82 54	135.5	15 27.2	82 54	135.8	15 02.5	82 53	136.1	14 37.9	82 53	136.4	14 13.2	82 53	136.7	13 48.5	82 53	137.0	13 23.8	82 52	137.3	6
7	15 43.7	81 55	134.4	15 19.3	81 55	134.7	14 54.9	81 54	135.0	14 30.4	82 54	135.3	14 06.0	82 54	135.6	13 41.5	82 54	135.9	13 16.9	82 53	136.2	12 52.4	82 53	136.5	7
8	15 10.7	81 55	133.7	14 46.5	81 56	134.0	14 22.2	81 55	134.3	13 57.9	81 55	134.6	13 33.6	81 55	134.9	13 09.3	81 54	135.2	12 44.9	81 54	135.5	12 20.6	81 54	135.8	8
9	14 37.2	80 56	132.9	14 13.2	80 56	133.2	13 49.1	80 56	133.5	13 25.0	80 56	133.8	13 00.8	80 55	134.1	12 36.7	81 55	134.4	12 12.5	81 55	134.7	11 48.3	81 55	135.0	9
50	14 03.3	80 57	132.1	13 39.4	80 57	132.4	13 15.5	80 57	132.7	12 51.6	80 56	133.0	12 27.6	80 56	133.3	12 03.6	80 56	133.6	11 39.6	80 56	133.9	11 15.6	80 55	134.3	50
1	13 29.0	79 58	131.3	13 05.3	79 58	131.6	12 41.5	79 57	132.0	12 17.8	79 57	132.3	11 54.0	79 57	132.6	11 30.1	79 56	132.9	11 06.3	79 56	133.2	10 42.4	80 56	133.5	1
2	12 54.3	79 59	130.6	12 30.7	79 58	130.9	12 07.1	79 58	131.2	11 43.5	79 58	131.5	11 19.9	79 57	131.8	10 56.3	79 57	132.1	10 32.6	79 57	132.5	10 08.9	79 57	132.8	2
3	12 19.2	78 59	129.8	11 55.8	78 59	130.1	11 32.4	78 59	130.4	11 08.9	78 58	130.8	10 45.5	78 58	131.1	10 22.0	78 58	131.4	9 58.5	78 58	131.7	9 35.0	78 57	132.0	3
4	11 43.7	77 60	129.1	11 20.5	77 60	129.4	10 57.2	78 59	129.7	10 33.9	78 59	130.0	10 10.6	78 59	130.4	9 47.3	78 58	130.7	9 24.0	78 58	131.0	9 00.6	78 58	131.3	4
55	11 07.8	77 60	128.3	10 44.7	77 60	128.7	10 21.7	77 60	129.0	9 58.5	77 60	129.3	9 35.4	77 59	129.6	9 12.3	77 59	129.9	8 49.1	77 59	130.3	8 25.9	77 58	130.6	55
6	10 31.6	76 61	127.6	10 08.7	76 61	127.9	9 45.7	76 60	128.2	9 22.8	77 60	128.6	8 59.8	77 60	128.9	8 36.8	77 60	129.2	8 13.8	77 59	129.6	7 50.8	77 59	129.9	6
7	9 55.0	76 62	126.9	9 32.2	76 61	127.2	9 09.5	76 61	127.5	8 46.7	76 61	127.9	8 23.9	76 60	128.2	8 01.0	76 60	128.5	7 38.2	76 60	128.8	7 15.4	76 60	129.2	7
8	9 18.0	75 62	126.1	8 55.4	75 62	126.5	8 32.8	75 62	126.8	8 10.2	75 61	127.1	7 47.6	76 61	127.5	7 24.9	76 61	127.8	7 02.2	76 61	128.1	6 39.5	76 60	128.5	8
9	8 40.8	75 63	125.4	8 18.3	75 62	125.8	7 55.9	75 62	126.1	7 33.4	75 62	126.4	7 10.9	75 62	126.8	6 48.4	75 61	127.1	6 25.9	75 61	127.4	6 03.4	75 61	127.8	9
60	8 03.1	74 63	124.7	7 40.9	74 63	125.1	7 18.6	74 63	125.4	6 56.3	74 62	125.7	6 33.9	74 62	126.1	6 11.6	74 62	126.4	5 49.2	75 62	126.7	5 26.9	75 61	127.1	60
1	7 25.2	74 64	124.0	7 03.1	74 63	124.4	6 40.9	74 63	124.7	6 18.8	74 63	125.0	5 56.6	74 63	125.4	5 34.4	74 62	125.7	5 12.3	74 62	126.1				1
2	6 47.0	73 64	123.3	6 25.0	73 64	123.7	6 03.0	73 64	124.0	5 41.0	73 63	124.4	5 19.0	73 63	124.7										2
3	6 08.4	73 65	122.6	5 46.6	73 65	123.0	5 24.7	73 64	123.3	5 02.9	73 64	123.7													3
4	5 29.5	72 65	122.0	5 07.9	72 65	122.3																			4

DECLINATION SAME NAME AS LATITUDE

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
91	11 57.8	62 73	73.8	12 16.4	62 73	73.4	12 35.0	62 73	73.0	12 53.6	62 73	72.6	13 12.2	62 73	72.2	13 30.7	62 73	71.8	13 49.1	61 72	71.4	14 07.5	61 72	71.0	91
2	11 13.7	63 73	73.2	11 32.5	62 73	72.8	11 51.2	62 73	72.4	12 09.8	62 73	72.0	12 28.5	62 73	71.6	12 47.1	62 72	71.2	13 05.6	62 72	70.8	13 24.2	62 72	70.4	2
3	10 29.8	63 73	72.6	10 48.6	63 73	72.2	11 07.4	63 73	71.8	11 26.2	63 72	71.4	11 44.9	62 73	71.0	12 03.6	62 72	70.6	12 22.3	62 72	70.2	12 40.9	62 72	69.8	3
4	9 46.0	63 73	72.0	10 04.9	63 73	71.6	10 23.8	63 72	71.2	10 42.7	63 72	70.8	11 01.5	63 72	70.4	11 20.3	63 72	70.0	11 39.1	63 72	69.6	11 57.9	62 71	69.3	4
95	9 02.3	63 72	71.4	9 21.4	63 72	71.0	9 40.4	63 72	70.6	9 59.4	63 72	70.2	10 18.3	63 72	69.9	10 37.2	63 72	69.5	10 56.1	63 71	69.1	11 15.0	63 71	68.7	95
6	8 18.9	64 72	70.8	8 38.0	64 72	70.4	8 57.1	64 72	70.0	9 16.2	64 72	69.6	9 35.2	63 72	69.3	9 54.3	63 71	68.9	10 13.3	63 71	68.5	10 32.2	63 71	68.1	6
7	7 35.5	64 72	70.2	7 54.8	64 72	69.8	8 14.0	64 72	69.4	8 33.2	64 71	69.0	8 52.3	64 71	68.7	9 11.5	64 71	68.3	9 30.6	64 71	67.9	9 49.7	64 71	67.5	7
8	6 52.4	65 72	69.6	7 11.7	64 71	69.2	7 31.0	64 71	68.8	7 50.3	64 71	68.4	8 09.6	64 71	68.1	8 28.9	64 71	67.7	8 48.1	64 70	67.3	9 07.3	64 70	66.9	8
9	6 09.4	65 71	69.0	6 28.8	65 71	68.6	6 48.3	65 71	68.2	7 07.7	65 71	67.8	7 27.1	65 71	67.5	7 46.5	65 70	67.1	8 05.8	64 70	66.7	8 25.2	64 70	66.3	9
100	5 26.5	65 71	68.4	5 46.1	65 71	68.0	6 05.7	65 71	67.6	6 25.2	65 70	67.2	6 44.7	65 70	66.8	7 04.2	65 70	66.5	7 23.7	65 70	66.1	7 43.2	65 70	65.7	100
1				5 03.6	66 70	67.4	5 23.3	66 70	67.0	5 42.9	65 70	66.6	6 02.6	65 70	66.2	6 22.2	65 70	65.9	6 41.8	65 70	65.5	7 01.4	65 69	65.1	1
2										5 00.8	66 70	66.0	5 20.6	66 70	65.6	5 40.3	66 69	65.2	6 00.1	66 69	64.9	6 19.8	66 69	64.5	2
3																			5 18.6	66 69	64.3	5 38.4	66 69	63.9	3

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Lat. 40°

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	70 00.0	1.0 02	180.0	70 30.0	1.0 02	180.0	71 00.0	1.0 02	180.0	71 30.0	1.0 02	180.0	72 00.0	1.0 02	180.0	72 30.0	1.0 02	180.0	73 00.0	1.0 02	180.0	73 30.0	1.0 02	180.0	00
1	69 58.9	1.0 06	177.3	70 28.9	1.0 06	177.2	70 58.9	1.0 06	177.1	71 28.8	1.0 06	177.1	71 58.8	1.0 06	177.0	72 28.8	1.0 06	176.9	72 58.7	1.0 06	176.9	73 28.7	1.0 06	176.8	1
2	69 55.6	1.0 09	174.5	70 25.5	1.0 09	174.4	70 55.4	1.0 10	174.3	71 25.3	1.0 10	174.2	71 55.2	1.0 10	174.0	72 25.1	1.0 10	173.9	72 55.0	1.0 10	173.7	73 24.8	1.0 11	173.6	2
3	69 50.1	99 13	171.8	70 19.9	99 13	171.6	70 49.7	99 13	171.4	71 19.5	99 14	171.3	71 49.2	99 14	171.1	72 19.0	99 14	170.8	72 48.7	99 14	170.6	73 18.4	99 15	170.4	3
4	69 42.5	99 16	169.1	70 12.1	99 17	168.9	70 41.7	99 17	168.6	71 11.3	99 17	168.4	71 40.9	99 18	168.1	72 10.5	98 18	167.8	72 40.0	98 18	167.6	73 09.5	98 19	167.2	4
05	69 32.8	98 20	166.4	70 02.2	98 20	166.2	70 31.6	98 20	165.9	71 01.0	98 21	165.6	71 30.3	98 21	165.2	71 59.6	98 22	164.9	72 28.9	98 22	164.5	72 58.1	97 23	164.2	05
6	69 21.0	97 23	163.8	69 50.2	97 23	163.5	70 19.3	97 24	163.2	70 48.4	97 24	162.8	71 17.5	97 25	162.4	71 46.5	97 25	162.0	72 15.5	96 26	161.6	72 44.4	96 27	161.2	6
7	69 07.2	97 26	161.3	69 36.1	96 27	160.9	70 05.0	96 27	160.5	70 33.8	96 28	160.1	71 02.6	96 28	159.6	71 31.3	96 29	159.2	71 59.9	95 30	158.7	72 28.5	95 30	158.2	7
8	68 51.5	96 29	158.7	69 20.1	95 30	158.3	69 48.7	95 30	157.9	70 17.2	95 31	157.4	70 45.6	95 32	156.9	71 13.9	94 32	156.4	71 42.2	94 33	155.9	72 10.4	94 34	155.4	8
9	68 33.9	94 32	156.3	69 02.2	94 33	155.8	69 30.4	94 33	155.3	69 58.6	94 34	154.8	70 26.6	93 35	154.3	70 54.6	93 35	153.8	71 22.4	93 36	153.2	71 50.2	92 37	152.6	9
10	68 14.5	93 35	153.9	68 42.5	93 36	153.4	69 10.3	93 36	152.9	69 38.1	92 37	152.3	70 05.8	92 38	151.8	70 33.3	92 38	151.2	71 00.8	91 39	150.6	71 28.1	91 40	149.9	10
1	67 53.4	92 38	151.6	68 21.0	92 38	151.0	68 48.5	91 39	150.5	69 15.9	91 40	149.9	69 43.2	91 40	149.3	70 10.3	90 41	148.7	70 37.3	90 42	148.0	71 04.2	89 43	147.4	1
2	67 30.7	91 40	149.3	67 58.0	91 41	148.7	68 25.1	90 42	148.2	68 52.0	90 42	147.6	69 18.9	89 43	146.9	69 45.6	89 44	146.3	70 12.2	88 45	145.6	70 38.5	88 45	144.9	2
3	67 06.5	90 43	147.1	67 33.3	89 44	146.5	68 00.0	89 44	145.9	68 26.6	88 45	145.3	68 53.0	88 46	144.6	69 19.3	87 46	143.9	69 45.4	87 47	143.2	70 11.3	86 48	142.5	3
4	66 40.8	88 45	145.0	67 07.3	88 46	144.3	67 33.6	87 46	143.7	67 59.7	87 47	143.1	68 25.7	86 48	142.4	68 51.5	86 49	141.7	69 17.2	85 49	141.0	69 42.6	85 50	140.2	4
15	66 13.7	87 47	142.9	66 39.8	87 48	142.3	67 05.7	86 49	141.6	67 31.4	86 49	141.0	67 57.0	85 50	140.3	68 22.4	84 51	139.6	68 47.6	84 52	138.8	69 12.6	83 52	138.0	15
6	65 45.4	86 49	140.9	66 11.0	85 50	140.3	66 36.5	85 51	139.6	67 01.8	84 51	138.9	67 27.0	83 52	138.2	67 51.9	83 53	137.5	68 16.7	82 54	136.7	68 41.2	81 54	135.9	6
7	65 15.8	84 51	139.0	65 41.0	84 52	138.3	66 06.1	83 53	137.6	66 31.0	83 53	136.9	66 55.8	82 54	136.2	67 20.3	81 55	135.5	67 44.6	81 55	134.7	68 08.6	80 56	133.9	7
8	64 45.0	83 53	137.1	65 09.9	83 54	136.4	65 34.6	82 54	135.8	65 59.1	81 55	135.1	66 23.4	81 56	134.3	66 47.5	80 56	133.6	67 11.4	79 57	132.8	67 35.0	78 58	132.0	8
9	64 13.2	82 55	135.3	64 37.7	81 55	134.6	65 02.0	81 56	133.9	65 26.1	80 57	133.2	65 50.0	79 57	132.5	66 13.7	79 58	131.7	66 37.2	78 59	131.0	67 00.4	77 59	130.2	9
20	63 40.4	81 56	133.6	64 04.5	80 57	132.9	64 28.4	79 58	132.2	64 52.1	79 58	131.5	65 15.6	78 59	130.7	65 38.9	77 59	130.0	66 02.0	76 60	129.2	66 24.8	76 61	128.4	20
1	63 06.6	79 58	131.9	63 30.4	79 58	131.2	63 53.9	78 59	130.5	64 17.3	77 60	129.8	64 40.4	77 60	129.0	65 03.3	76 61	128.3	65 25.9	75 61	127.5	65 48.3	74 62	126.7	1
2	62 32.0	78 59	130.3	62 55.4	78 60	129.6	63 18.5	77 60	128.9	63 41.5	76 61	128.1	64 04.3	75 61	127.4	64 26.8	75 62	126.6	64 49.1	74 63	125.9	65 11.1	73 63	125.1	2
3	61 56.5	77 60	128.7	62 19.5	76 61	128.0	62 42.4	76 62	127.3	63 05.0	75 62	126.6	63 27.4	74 63	125.8	63 49.5	73 63	125.1	64 11.4	73 64	124.3	64 33.1	72 64	123.5	3
4	61 20.2	76 62	127.2	61 42.9	75 62	126.5	62 05.4	75 63	125.8	62 27.7	74 63	125.1	62 49.8	73 64	124.3	63 11.6	72 64	123.6	63 33.1	71 65	122.8	63 54.4	71 65	122.0	4
25	60 43.3	75 63	125.7	61 05.6	74 63	125.0	61 27.8	74 64	124.3	61 49.8	73 64	123.6	62 11.5	72 65	122.9	62 33.0	71 65	122.1	62 54.2	70 66	121.3	63 15.2	69 66	120.6	25
6	60 05.6	74 64	124.3	60 27.7	73 64	123.6	60 49.5	72 65	122.9	61 11.2	72 65	122.2	61 32.6	71 66	121.5	61 53.7	70 66	120.7	62 14.6	69 67	119.9	62 35.3	68 67	119.2	6
7	59 27.3	73 65	122.9	59 49.1	72 65	122.2	60 10.6	71 66	121.5	60 32.0	71 66	120.8	60 53.1	70 67	120.1	61 13.9	69 67	119.4	61 34.6	68 68	118.6	61 54.9	67 68	117.8	7
8	58 48.5	72 66	121.6	59 09.9	71 66	120.9	59 31.2	71 67	120.2	59 52.2	70 67	119.5	60 13.1	69 68	118.8	60 33.6	68 68	118.1	60 54.0	67 68	117.3	61 14.0	66 69	116.5	8
9	58 09.0	71 67	120.3	58 30.2	70 67	119.6	58 51.2	70 67	118.9	59 12.0	69 68	118.2	59 32.5	68 68	117.5	59 52.8	67 69	116.8	60 12.9	66 69	116.1	60 32.7	66 70	115.3	9
30	57 29.1	70 67	119.1	57 50.0	69 68	118.4	58 10.8	69 68	117.7	58 31.3	68 69	117.0	58 51.6	67 69	116.3	59 11.6	66 69	115.6	59 31.4	66 70	114.8	59 50.9	65 70	114.1	30
1	56 48.7	69 68	117.9	57 09.4	69 68	117.2	57 29.9	68 69	116.5	57 50.1	67 69	115.8	58 10.1	66 70	115.1	58 29.9	66 70	114.4	58 49.5	65 70	113.7	59 08.8	64 71	112.9	1
2	56 07.8	69 69	116.7	56 28.3	68 69	116.0	56 48.5	67 70	115.4	57 08.5	66 70	114.7	57 28.3	66 70	114.0	57 47.9	65 71	113.3	58 07.2	64 71	112.5	58 26.3	63 71	111.8	2
3	55 26.6	68 69	115.5	55 46.8	67 70	114.9	56 06.8	66 70	114.2	56 26.6	66 70	113.5	56 46.2	65 71	112.9	57 05.5	64 71	112.2	57 24.6	63 72	111.4	57 43.4	62 72	110.7	3
4	54 44.9	67 70	114.4	55 04.9	66 70	113.8	55 24.7	66 71	113.1	55 44.3	65 71	112.5	56 03.6	64 71	111.8	56 22.8	63 72	111.1	56 41.6	63 72	110.4	57 00.3	62 72	109.7	4
35	54 02.9	66 71	113.4	54 22.7	66 71	112.7	54 42.3	65 71	112.1	55 01.6	64 72	111.4	55 20.8	63 72	110.7	55 39.7	63 72	110.0	55 58.4	62 72	109.3	56 16.9	61 73	108.6	35
6	53 20.5	66 71	112.3	53 40.1	65 71	111.7	53 59.5	64 72	111.0	54 18.7	64 72	110.4	54 37.7	63 72	109.7	54 56.4	62 73	109.0	55 14.9	61 73	108.3	55 33.2	61 73	107.6	6
7	52 37.8	65 72	111.3	52 57.3	64 72	110.7	53 16.5	64 72	110.0	53 35.5	63 72	109.4	53 54.3	62 73	108.7	54 12.8	62 73	108.0	54 31.2	61 73	107.4	54 49.3	60 74	106.7	7
8	51 54.9	64 72	110.3	52 14.1	64 72	109.7	52 33.2	63 73	109.0	52 52.0	62 73	108.4	53 10.6	62 73	107.7	53 29.0	61 73	107.1	53 47.2	60 74	106.4	54 05.1	59 74	105.7	8
9	51 11.6	64 73	109.3	51 30.7	63 73	108.7	51 49.6	63 73	108.1	52 08.3	62 73	107.4	52 26.7	61 74	106.8	52 45.0	60 74	106.1	53 03.0	60 74	105.5	53 20.8	59 74	104.8	9
40	50 28.1	63 73	108.4	50 47.1	63 73	107.8	51 05.8	62 73	107.1	51 24.3	61 74	106.5	51 42.6	61 74	105.9	52 00.7	60 74	105.2	52 18.6	59 74	104.6	52 36.3	59 74	103.9	40
1	49 44.4	63 73	107.5	50 03.2	62 73	106.8	50 21.7	62 74	106.2	50 40.1	61 74	105.6	50 58.3	60 74	105.0	51 16.3	60 74	104.3	51 34.0	59 75	103.7	51 51.6	58 75	103.0	1
2	49 00.5	62 74	106.6	49 19.1	62 74	106.0	49 37.5	61 74	105.3	49 55.8	61 74	104.7	50 13.8	60 74	104.1	50 31.7	59 75	103.5	50 49.3	58 75	102.8	51 06.7	58 75	102.2	2
3	48 16.3	62 74	105.7	48 34.8	61 74	105.1	48 53.1	61 74	104.5	49 11.2	60 75	103.9	49 29.2	59 75	103.3	49 46.9	59 75	102.6	50 04.4	58 75	102.0	50 21.7	57 75	101.4	3
4	47 32.0	62 74	104.8	47 50.3	61 74	104.2	48 08.5	60 75	103.6	48 26.5	60 75	103.0	48 44.3	59 75	102.4	49 02.0	58 75	101.8	49 19.4	58 75	101.2	49 36.6	57 75	100.5	4
45	46 47.4	61 74	104.0	47 05.7	61 75	103.4	47 23.8	60 75	102.8	47 41.7	59 75	102.2	47 59.4	59 75	101.6	48 16.9	58 75	101.0	48 34.2	57 75	100.4	48 51.4	57 76	99.7	45
6	46 02.7	61 75	103.1	46 20.9	60 75	102.5	46 38.9	60 75	102.0	46 56.7	59 75	101.4	47 14.3	58 75	100.8	47 31.7	58 76	100.2	47 49.0	57 76	99.6	48 06.0	56 76	99.0	6
7	45 17.9	60 75	102.3	45 36.0	60 75	101.7	45 53.8	59 75	101.2	46 11.6	59 75	100.6	46 29.1	58 76	100.0	46 46.4	58 76	99.4	47 03.6	57 76	98.8	47 20.6	56 76	98.2	7
8	44 32.9	60 75	101.5	44 50.9	60 75	100.9	45 08.7	59 75	100.4	45 26.3	58 76	99.8	45 43.8	58 76	99.2	46 01.0	57 76	98.6	46 18.1	57 76	98.0	46 35.0	56 76	97.4	8
9	43 47.8	60 75	100.7	44 05.7	59 76	100.2	44 23.4	59 76	99.6	44 41.0	58 76	99.0	44 58.4	58 76	98.5	45 15.6	57 76	97.9	45 32.6	56 76	97.3	45 49.4	56 76	96.7	9
50	43 02.6	60 76	99.9	43 20.4	59 76	99.4	43 38.1	59 76	98.8	43 55.5	58 76	98.3	44 12.8	57 76	97.7	44 30.0	57 76	97.1	44 46.9	56 76	96.6	45 03.7	56 76	96.0	50
1	42 17.3	59 76	99.2	42 35.0	59 76	98.6	42 52.6	58 76	98.1	43 10.0	58 76	97.5	43 27.3	57 76	97.0	43 44.3	57 76	96.4	44 01.3	56 76	95.8	44 18.0	56 76	95.3	1
2	41 31.9	59 76	98.4	41 49.5	59 76	97.9	42 07.1	58 76	97.4	42 24.4	58 76	96.8	42 41.6	57 76	96.2	42 58.6	57 76	95.7	43 15.5	56 76	95.1	43 32.2	55 76	94.5	2
3	40 46.4	59 76	97.7	41 04.0	58 76	97.2	41 21.4	58 76	96.6	41 38.7	57 76	96.1	41 55.9	57 76	95.5	42 12.9	56 76	95.0	42 29.7	56 76	94.4	42 46.4	55 76	93.9	3
4	40 00.8	59 76	97.0	40 18.3	58 76	96.4	40 35.7	58 76	95.9	40 53.0	57 76	95.4	41 10.1	57 76	94.8	41 27.1	56 76	94.3	41 43.9	56 76	93.7	42 00.5	55 76	93.2	4
55	39 15.1	59 76	96.3	39 32.6	58 76	95.7	39 50.0	58 76	95.2	40 07.2	57 76	94.7	40 24.3	57 76	94.1	40 41.2	56 76	93.6	40 58.0	56 77	93.0	41 14.6	55 77	92.5	55
6	38 29.4	58 76	95.6	38 46.9	58 76	95.0	39 04.2	58 76	94.5	39 21.4	57 76	94.0	39 38.4	57 76	93.4	39 55.3	56 77	92.9	40 12.1	56 77	92.4	40 28.6	55 77	91.8	6
7	37 43.6	58 76	94.9	38 01.1	58 76	94.3	38 18.4	57 76	93.8	38 35.5	57 76	93.3	38 52.5	56 77	92.8	39 09.4	56 77	92.2	39 26.1	55 77	91.7	39 42.7	55 77	91.2	7
8	36 57.8	58 76	94.2	37 15.2	58 76	93.7	37 32.5	57 77	93.1	37 49.6	57 77	92.6	38 06.6	56 77	92.1	38 23.5	56 77	91.6	38 40.2	55 77	91.0	38 56.7	55 77	90.5	8
9	36 12.0	58 76	93.5	36 29.3	58 77	93.0	36 46.6	57 77	92.5	37 03.7	57 77	92.0	37 20.7	56 77	91.4	37 37.5	56 77	90.9	37 54.2	55 77	90.4	38 10.8	55 77	89.9	9
60	35 26.1	58 77	92.8	35 43.4	58 77	92.3	36 00.6	57 77	91.8	36 17.7	57 77	91.3	36 34.7	56 77	90.8	36 51.6	56 77	90.3	37 08.3	55 77	89.8	37 24.8	55 77	89.2	60
1	34 40.1	58 77	92.1	34 57.5	58 77	91.7	35 14.7	57 77	91.2	35 31.8	57 77	90.6	35 48.8	56 77	90.1	36 05.6	56 77	89.6	36 22.3	55 77	89.1	36 38.9	55 77	88.6	1
2	33 54.2	58 77	91.5	34 11.5	58 77	91.0	34 28.7	57 77	90.5	34 45.8	57 77	90.0	35 02.8	56 77	89.5	35 19.6	56 77	89.0	35 36.3	56 77	88.5	35 52.9	55 77	88.0	2
3	33 08.2	58 77	90.8	33 25.6	58 77	90.3	33 42.8	57 77	89.9	33 59.9	57 77	89.4	34 16.8	56 77	88.9	34 33.7	56 77	88.4	34 50.4	56 77	87.9	35 07.0	55 76	87.3	3
4	32 22.3	58 77	90.2	32 39.6	58 77	89.7	32 56.8	57 77	89.2	33 13.9	57 77	88.7	33 30.9	56 77	88.2	33 47.7	56 77	87.7	34 04.5	56 76	87.2	34 21.1	55 76	86.7	4
65	31 36.3	58 77	89.5	31 53.6	58 77	89.1	32 10.9	57 77	88.6	32 28.0	57 77	88.1	32 45.0	56 77	87.6	33 01.8	56 76	87.1	33 18.6	56 76	86.6	33 35.2	55 76	86.1	65
6	30 50.4	58 77	88.9	31 07.7	58 77	88.4	31 24.9	57 77	88.0	31 42.0	57 76	87.5	31 59.0	56 76	87.0	32 15.9	56 76	86.5	32 32.7	56 76	86.0	32 49.4	55 76	85.5	6
7	30 04.4	58 77	88.3	30 21.8	58 77	87.8	30 39.0	57 76	87.3	30 56.1	57 76	86.9	31 13.2	57 76	86.4	31 30.1	56 76	85.9	31 46.9	56 76	85.4	32 03.6	55 76	84.9	7
8	29 18.5	58 77	87.7	29 35.8	58 76	87.2	29 53.1	57 76	86.7	30 10.2	57 76	86.2	30 27.3	57 76	85.8	30 44.2	56 76	85.3	31 01.1	56 76	84.8	31 17.8	56 76	84.3	8
9	28 32.6	58 76	87.0	28 49.9	58 76	86.6	29 07.2	57 76	86.1	29 24.4	57 76	85.6	29 41.5	57 76	85.2	29 58.5	56 76	84.7	30 15.3	56 76	84.2	30 32.1	56 76	83.7	9
70	27 46.7	58 76	86.4	28 04.1	58 76	85.9	28 21.4	58 76	85.5	28 38.6	57 76	85.0	28 55.7	57 76	84.6	29 12.7	57 76	84.1	29 29.6	56 76	83.6	29 46.5	56 76	83.1	70
1	27 00.8	58 76	85.8	27 18.3	58 76	85.3	27 35.6	58 76	84.9	27 52.8	57 76	84.4	28 10.0	57 76	83.9	28 27.0	57 76	83.5	28 44.0	56 76	83.0	29 00.8	56 76	82.5	1
2	26 15.0	58 76	85.2	26 32.5	58 76	84.7	26 49.8	58 76	84.3	27 07.1	57 76	83.8	27 24.3	57 76	83.4	27 41.4	57 76	82.9	27 58.4	57 76	82.4	28 15.3	56 76	82.0	2
3	25 29.2	58 76	84.6	25 46.7	58 76	84.1	26 04.1	58 76	83.7	26 21.4	58 76	83.2	26 38.7	57 76	82.8	26 55.8	57 76	82.3	27 12.9	57 76	81.8	27 29.8	56 76	81.4	3
4	24 43.5	59 76	84.0	25 01.0	58 76	83.5	25 18.5	58 76	83.1	25 35.8	58 76	82.6	25 53.1	57 76	82.2	26 10.3	57 76	81.7	26 27.4	57 76	81.2	26 44.4	57 76	80.8	4
75	23 57.8	59 76	83.4	24 15.4	58 76	82.9	24 32.9	58 76	82.5	24 50.3	58 76	82.0	25 07.6	58 76	81.6	25 24.9	57 76	81.1	25 42.0	57 76	80.7	25 59.1	57 75	80.2	75
6	23 12.2	59 76	82.8	23 29.8	59 76	82.3	23 47.3	58 76	81.9	24 04.8	58 76	81.4	24 22.2	58 76	81.0	24 39.5	58 76	80.5	24 56.7	57 75	80.1	25 13.8	57 75	79.6	6
7	22 26.6	59 76	82.2	22 44.3	59 76	81.7	23 01.9	58 76	81.3	23 19.4	58 76	80.8	23 36.8	58 75	80.4	23 54.2	58 75	79.9	24 11.5	58 75	79.5	24 28.7	57 75	79.0	7
8	21 41.1	59 76	81.6	21 58.8	59 76	81.1	22 16.5	59 76	80.7	22 34.0	58 75	80.2	22 51.5	58 75	79.8	23 09.0	58 75	79.4	23 26.3	58 75	78.9	23 43.6	57 75	78.5	8
9	20 55.7	59 76	81.0	21 13.5	59 76	80.5	21 31.2	59 75	80.1	21 48.8	59 75	79.7	22 06.3	58 75	79.2	22 23.8	58 75	78.8	22 41.3	58 75	78.3	22 58.6	58 75	77.9	9
80	20 10.3	59 75	80.4	20 28.2	59 75	79.9	20 45.9	59 75	79.5	21 03.6	59 75	79.1	21 21.2	59 75	78.6	21 38.8	58 75	78.2	21 56.3	58 75	77.8	22 13.7	58 75	77.3	80
1	19 25.1	60 75	79.8	19 43.0	60 75	79.3	20 00.8	59 75	78.9	20 18.5	59 75	78.5	20 36.2	59 75	78.1	20 53.9	59 75	77.6	21 11.4	58 75	77.2	21 28.9	58 74	76.8	1
2	18 39.9	60 75	79.2	18 57.8	60 75	78.8	19 15.7	60 75	78.3	19 33.5	59 75	77.9	19 51.3	59 75	77.5	20 09.0	59 75	77.0	20 26.7	59 74	76.6	20 44.2	58 74	76.2	2
3	17 54.8	60 75	78.6	18 12.8	60 75	78.2	18 30.7	60 75	77.7	18 48.6	60 75	77.3	19 06.5	59 74	76.9	19 24.3	59 74	76.5	19 42.0	59 74	76.0	19 59.7	59 74	75.6	3
4	17 09.8	60 75	78.0	17 27.9	60 75	77.6	17 45.9	60 75	77.1	18 03.9	60 74	76.7	18 21.8	60 74	76.3	18 39.6	59 74	75.9	18 57.4	59 74	75.5	19 15.2	59 74	75.0	4
85	16 24.9	61 75	77.4	16 43.0	60 75	77.0	17 01.1	60 74	76.6	17 19.2	60 74	76.1	17 37.2	60 74	75.7	17 55.1	60 74	75.3	18 13.0	60 74	74.9	18 30.8	59 74	74.5	85
6	15 40.1	61 74	76.8	15 58.3	61 74	76.4	16 16.5	61 74	76.0	16 34.6	60 74	75.6	16 52.7	60 74	75.1	17 10.7	60 74	74.7	17 28.7	60 74	74.3	17 46.6	60 74	73.9	6
7	14 55.4	61 74	76.2	15 13.7	61 74	75.8	15 31.9	61 74	75.4	15 50.2	61 74	75.0	16 08.3	60 74	74.6	16 26.4	60 74	74.1	16 44.5	60 73	73.7	17 02.5	60 73	73.3	7
8	14 10.8	61 74	75.6	14 29.2	61 74	75.2	14 47.5	61 74	74.8	15 05.8	61 74	74.4	15 24.1	61 74	74.0	15 42.3	61 73	73.6	16 00.5	60 73	73.1	16 18.6	60 73	72.7	8
9	13 26.3	62 74	75.0	13 44.8	61 74	74.6	14 03.2	61 74	74.2	14 21.6	61 73	73.8	14 40.0	61 73	73.4	14 58.3	61 73	73.0	15 16.5	61 73	72.6	15 34.8	61 73	72.2	9
90	12 42.9	62 74	74.4	13 00.6	62 74	74.0	13 19.1	62 73	73.6	13 37.6	62 73	73.2	13 56.0	61 73	72.8	14 14.4	61 73	72.4	14 32.8	61 73	72.0	14 51.1	61 73	71.6	90

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H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
00	30 00.0	1.0 01	180.0	29 30.0	1.0 01	180.0	29 00.0	1.0 01	180.0	28 30.0	1.0 01	180.0	28 00.0	1.0 01	180.0	27 30.0	1.0 01	180.0	27 00.0	1.0 01	180.0	26 30.0	1.0 01	180.0	00
1	29 59.6	1.0 02	178.9	29 29.6	1.0 02	178.9	28 59.6	1.0 02	178.9	28 29.6	1.0 02	178.9	27 59.6	1.0 02	179.0	27 29.6	1.0 02	179.0	26 59.6	1.0 02	179.0	26 29.6	1.0 02	179.0	1
2	29 58.3	1.0 04	177.8	29 28.3	1.0 04	177.8	28 58.3	1.0 04	177.9	28 28.3	1.0 04	177.9	27 58.3	1.0 04	177.9	27 28.3	1.0 03	177.9	26 58.3	1.0 03	177.9	26 28.4	1.0 03	178.0	2
3	29 56.1	1.0 05	176.7	29 26.1	1.0 05	176.8	28 56.1	1.0 05	176.8	28 26.2	1.0 05	176.8	27 56.2	1.0 05	176.9	27 26.2	1.0 05	176.9	26 56.3	1.0 05	176.9	26 26.3	1.0 05	176.9	3
4	29 53.0	1.0 07	175.7	29 23.1	1.0 06	175.7	28 53.2	1.0 06	175.7	28 23.2	1.0 06	175.8	27 53.3	1.0 06	175.8	27 23.3	1.0 06	175.8	26 53.4	1.0 06	175.9	26 23.4	1.0 06	175.9	4
05	29 49.1	1.0 08	174.6	29 19.2	1.0 08	174.6	28 49.3	1.0 08	174.7	28 19.4	1.0 08	174.7	27 49.5	1.0 08	174.8	27 19.6	1.0 08	174.8	26 49.7	1.0 08	174.8	26 19.7	1.0 08	174.9	05
6	29 44.4	1.0 09	173.5	29 14.5	1.0 09	173.6	28 44.6	1.0 09	173.6	28 14.7	1.0 09	173.7	27 44.9	1.0 09	173.7	27 15.0	1.0 09	173.8	26 45.1	1.0 09	173.8	26 15.2	1.0 09	173.9	6
7	29 38.7	99 11	172.4	29 08.9	99 11	172.5	28 39.1	99 11	172.6	28 09.3	99 11	172.6	27 39.4	99 10	172.7	27 09.6	99 10	172.7	26 39.8	99 10	172.8	26 09.9	99 10	172.8	7
8	29 32.3	99 12	171.4	29 02.5	99 12	171.4	28 32.7	99 12	171.5	28 02.9	99 12	171.6	27 33.1	99 12	171.6	27 03.4	99 12	171.7	26 33.6	99 12	171.8	26 03.8	99 12	171.8	8
9	29 24.9	99 14	170.3	28 55.2	99 14	170.4	28 25.5	99 13	170.4	27 55.8	99 13	170.5	27 26.0	99 13	170.6	26 56.3	99 13	170.7	26 26.6	99 13	170.7	25 56.9	99 13	170.8	9
10	29 16.7	99 15	169.2	28 47.1	99 15	169.3	28 17.4	99 15	169.4	27 47.8	99 15	169.5	27 18.1	99 15	169.6	26 48.5	99 14	169.6	26 18.8	99 14	169.7	25 49.1	99 14	169.8	10
1	29 07.7	99 16	168.2	28 38.1	99 16	168.3	28 08.6	99 16	168.3	27 39.0	99 16	168.4	27 09.4	99 16	168.5	26 39.8	99 16	168.6	26 10.2	99 16	168.7	25 40.6	99 16	168.8	1
2	28 57.9	98 18	167.1	28 28.4	98 18	167.2	27 58.9	98 18	167.3	27 29.4	98 17	167.4	26 59.8	98 17	167.5	26 30.3	98 17	167.6	26 00.8	98 17	167.7	25 31.3	98 17	167.8	2
3	28 47.2	98 19	166.0	28 17.8	98 19	166.2	27 48.4	98 19	166.3	27 18.9	98 19	166.4	26 49.5	98 19	166.5	26 20.1	98 18	166.6	25 50.6	98 18	166.7	25 21.2	98 18	166.8	3
4	28 35.7	98 21	165.0	28 06.4	98 20	165.1	27 37.0	98 20	165.2	27 07.7	98 20	165.4	26 38.4	98 20	165.5	26 09.0	98 20	165.6	25 39.7	98 20	165.7	25 10.3	98 19	165.8	4
15	28 23.4	97 22	164.0	27 54.2	97 22	164.1	27 24.9	97 22	164.2	26 55.7	97 21	164.3	26 26.4	98 21	164.5	25 57.2	98 21	164.6	25 27.9	98 21	164.7	24 58.6	98 21	164.8	15
6	28 10.3	97 23	162.9	27 41.2	97 23	163.0	27 12.0	97 23	163.2	26 42.9	97 23	163.3	26 13.7	97 22	163.4	25 44.6	97 22	163.6	25 15.4	97 22	163.7	24 46.2	97 22	163.8	6
7	27 56.4	97 24	161.9	27 27.4	97 24	162.0	26 58.3	97 24	162.2	26 29.3	97 24	162.3	26 00.2	97 24	162.4	25 31.2	97 24	162.6	25 02.1	97 23	162.7	24 33.1	97 23	162.9	7
8	27 41.7	96 26	160.9	27 12.8	96 26	161.0	26 43.9	96 25	161.2	26 14.9	96 25	161.3	25 46.0	96 25	161.4	25 17.1	97 25	161.6	24 48.1	97 25	161.7	24 19.1	97 24	161.9	8
9	27 26.3	96 27	159.8	26 57.5	96 27	160.0	26 28.7	96 27	160.2	25 59.8	96 26	160.3	25 31.0	96 26	160.5	25 02.2	96 26	160.6	24 33.3	96 26	160.8	24 04.5	96 26	160.9	9
20	27 10.9	96 28	158.8	26 41.4	96 28	159.0	26 12.7	96 28	159.2	25 44.0	96 28	159.3	25 15.3	96 27	159.5	24 46.5	96 27	159.6	24 17.8	96 27	159.8	23 49.1	96 27	159.9	20
1	26 53.0	95 30	157.8	26 24.5	95 29	158.0	25 55.9	95 29	158.2	25 27.4	95 29	158.3	24 58.8	95 29	158.5	24 30.2	95 28	158.7	24 01.6	95 28	158.8	23 33.0	95 28	159.0	1
2	26 35.3	95 31	156.8	26 06.9	95 31	157.0	25 38.5	95 30	157.2	25 10.0	95 30	157.4	24 41.6	95 30	157.5	24 13.1	95 30	157.7	23 44.6	95 29	157.9	23 16.1	95 29	158.0	2
3	26 16.9	94 32	155.8	25 48.6	94 32	156.0	25 20.3	94 32	156.2	24 52.0	94 31	156.4	24 23.6	94 31	156.6	23 55.3	94 31	156.7	23 26.9	95 31	156.9	22 58.6	95 30	157.1	3
4	25 57.7	94 33	154.8	25 29.5	94 33	155.0	25 01.4	94 33	155.2	24 33.2	94 32	155.4	24 05.0	94 32	155.6	23 36.8	94 32	155.8	23 08.6	94 32	156.0	22 40.3	94 32	156.2	4
25	25 37.8	93 34	153.9	25 09.8	93 34	154.1	24 41.8	93 34	154.3	24 13.7	93 34	154.5	23 45.7	94 33	154.6	23 17.6	94 33	154.8	22 49.5	94 33	155.0	22 21.4	94 33	155.2	25
6	25 17.2	93 35	152.9	24 49.3	93 35	153.1	24 21.5	93 35	153.3	23 53.6	93 35	153.5	23 25.7	93 34	153.7	22 57.7	93 34	153.9	22 29.8	93 34	154.1	22 01.8	93 34	154.3	6
7	24 55.9	92 37	151.9	24 28.2	92 36	152.1	24 00.5	92 36	152.4	23 32.7	93 36	152.6	23 05.0	93 36	152.8	22 37.2	93 35	153.0	22 09.4	93 35	153.2	21 41.6	93 35	153.4	7
8	24 34.0	92 38	151.0	24 06.4	92 37	151.2	23 38.8	92 37	151.4	23 11.2	92 37	151.6	22 43.6	92 37	151.8	22 16.0	92 36	152.1	21 48.3	92 36	152.3	21 20.6	92 36	152.5	8
9	24 11.3	91 39	150.0	23 43.9	91 39	150.3	23 16.5	91 38	150.5	22 49.0	92 38	150.7	22 21.6	92 38	150.9	21 54.1	92 38	151.1	21 26.6	92 37	151.4	20 59.1	92 37	151.6	9
30	23 48.1	91 40	149.1	23 20.8	91 40	149.3	22 53.5	91 39	149.6	22 26.2	91 39	149.8	21 58.9	91 39	150.0	21 31.6	91 39	150.2	21 04.2	91 38	150.4	20 36.9	91 38	150.7	30
1	23 24.1	90 41	148.2	22 57.0	90 41	148.4	22 29.9	90 40	148.6	22 02.8	90 40	148.9	21 35.6	91 40	149.1	21 08.4	91 40	149.3	20 41.3	91 39	149.6	20 14.0	91 39	149.8	1
2	22 59.6	90 42	147.3	22 32.6	90 42	147.5	22 05.7	90 41	147.7	21 38.7	90 41	148.0	21 11.7	90 41	148.2	20 44.7	90 41	148.4	20 17.7	90 40	148.7	19 50.6	90 40	148.9	2
3	22 34.4	89 43	146.3	22 07.6	89 43	146.6	21 40.8	89 42	146.8	21 14.0	89 42	147.1	20 47.2	89 42	147.3	20 20.3	90 42	147.5	19 53.5	90 41	147.8	19 26.6	90 41	148.0	3
4	22 08.6	89 44	145.4	21 42.0	89 44	145.7	21 15.4	89 43	145.9	20 48.7	89 43	146.2	20 22.1	89 43	146.4	19 55.4	89 43	146.7	19 28.7	89 42	146.9	19 01.9	89 42	147.1	4
35	21 42.3	88 45	144.5	21 15.8	88 45	144.8	20 49.3	88 44	145.0	20 22.9	88 44	145.3	19 56.3	88 44	145.5	19 29.8	88 44	145.8	19 03.3	89 43	146.0	18 36.7	89 43	146.3	35
6	21 15.3	88 46	143.7	20 49.0	88 46	143.9	20 22.7	88 45	144.2	19 56.4	88 45	144.4	19 30.1	88 45	144.7	19 03.7	88 44	144.9	18 37.3	88 44	145.2	18 10.9	88 44	145.4	6
7	20 47.8	87 47	142.8	20 21.7	87 47	143.0	19 55.5	87 46	143.3	19 29.4	87 46	143.6	19 03.2	87 46	143.8	18 37.0	87 45	144.1	18 10.8	87 45	144.3	17 44.5	88 45	144.6	7
8	20 19.7	86 48	141.9	19 53.8	87 47	142.2	19 27.8	87 47	142.4	19 01.8	87 47	142.7	18 35.8	87 47	143.0	18 09.8	87 46	143.2	17 43.7	87 46	143.5	17 17.6	87 46	143.7	8
9	19 51.1	86 49	141.0	19 25.3	86 48	141.3	18 59.5	86 48	141.6	18 33.7	86 48	141.9	18 07.8	86 47	142.1	17 42.0	86 47	142.4	17 16.1	86 47	142.7	16 50.2	86 47	142.9	9
40	19 21.9	85 50	140.2	18 56.3	85 49	140.5	18 30.7	85 49	140.7	18 05.0	86 49	141.0	17 39.4	86 48	141.3	17 13.7	86 48	141.6	16 47.9	86 48	141.8	16 22.2	86 48	142.1	40
1	18 52.2	85 50	139.3	18 26.8	85 50	139.6	18 01.3	85 50	139.9	17 35.9	85 49	140.2	17 10.4	85 49	140.5	16 44.8	85 49	140.7	16 19.3	85 49	141.0	15 53.7	85 48	141.3	1
2	18 22.0	84 51	138.5	17 56.8	84 51	138.8	17 31.5	84 51	139.1	17 06.2	84 50	139.4	16 40.8	84 50	139.6	16 15.5	85 50	139.9	15 50.1	85 49	140.2	15 24.7	85 49	140.5	2
3	17 51.3	84 52	137.7	17 26.2	84 52	138.0	17 01.1	84 51	138.3	16 36.0	84 51	138.5	16 10.8	84 51	138.8	15 45.6	84 51	139.1	15 20.4	84 50	139.4	14 55.2	84 50	139.7	3
4	17 20.1	83 53	136.9	16 55.2	83 52	137.1	16 30.3	83 52	137.4	16 05.3	83 52	137.7	15 40.3	83 52	138.0	15 15.3	83 51	138.3	14 50.3	83 51	138.6	14 25.2	84 51	138.9	4
45	16 48.5	82 54	136.0	16 23.7	83 53	136.3	15 58.9	83 53	136.6	15 34.2	83 53	136.9	15 09.3	83 52	137.2	14 44.5	83 52	137.5	14 19.6	83 52	137.8	13 54.7	83 52	138.1	45
6	16 16.3	82 54	135.2	15 51.8	82 54	135.5	15 27.2	82 54	135.8	15 02.5	82 53	136.1	14 37.9	82 53	136.4	14 13.2	82 53	136.7	13 48.5	82 53	137.0	13 23.8	82 52	137.3	6
7	15 43.7	81 55	134.4	15 19.3	81 55	134.7	14 54.9	81 54	135.0	14 30.4	82 54	135.3	14 06.0	82 54	135.6	13 41.5	82 54	135.9	13 16.9	82 53	136.2	12 52.4	82 53	136.5	7
8	15 10.7	81 56	133.7	14 46.5	81 56	134.0	14 22.2	81 55	134.3	13 57.9	81 55	134.6	13 33.6	81 55	134.9	13 09.3	81 54	135.2	12 44.9	81 54	135.5	12 20.6	81 54	135.8	8
9	14 37.2	80 56	132.9	14 13.2	80 56	133.2	13 49.1	80 56	133.5	13 25.0	80 56	133.8	13 00.8	80 55	134.1	12 36.7	81 55	134.4	12 12.5	81 55	134.7	11 48.3	81 55	135.0	9
50	14 03.3	80 57	132.1	13 39.4	80 57	132.4	13 15.5	80 57	132.7	12 51.6	80 56	133.0	12 27.6	80 56	133.3	12 03.6	80 56	133.6	11 39.6	80 56	133.9	11 15.6	80 55	134.3	50
1	13 29.0	79 58	131.3	13 05.3	79 58	131.6	12 41.5	79 57	132.0	12 17.8	79 57	132.3	11 54.0	79 57	132.6	11 30.1	79 56	132.9	11 06.3	79 56	133.2	10 42.4	80 56	133.5	1
2	12 54.3	79 59	130.6	12 30.7	79 58	130.9	12 07.1	79 58	131.2	11 43.5	79 58	131.5	11 19.9	79 57	131.8	10 56.3	79 57	132.1	10 32.6	79 57	132.5	10 08.9	79 57	132.8	2
3	12 19.2	78 59	129.8	11 55.8	78 59	130.1	11 32.4	78 59	130.4	11 08.9	78 58	130.8	10 45.5	78 58	131.1	10 22.0	78 58	131.4	9 58.5	78 58	131.7	9 35.0	78 57	132.0	3
4	11 43.7	77 60	129.1	11 20.5	77 60	129.4	10 57.2	78 59	129.7	10 33.9	78 59	130.0	10 10.6	78 59	130.4	9 47.3	78 58	130.7	9 24.0	78 58	131.0	9 00.6	78 58	131.3	4
55	11 07.8	77 60	128.3	10 44.7	77 60	128.7	10 21.7	77 60	129.0	9 58.5	77 60	129.3	9 35.4	77 59	129.6	9 12.3	77 59	129.9	8 49.1	77 59	130.3	8 25.9	77 58	130.6	55
6	10 31.6	76 61	127.6	10 08.7	76 61	127.9	9 45.7	76 60	128.2	9 22.8	77 60	128.6	8 59.8	77 60	128.9	8 36.8	77 60	129.2	8 13.8	77 59	129.6	7 50.8	77 59	129.9	6
7	9 55.0	76 62	126.9	9 32.2	76 61	127.2	9 09.5	76 61	127.5	8 46.7	76 61	127.9	8 23.9	76 60	128.2	8 01.0	76 60	128.5	7 38.2	76 60	128.8	7 15.4	76 60	129.2	7
8	9 18.0	75 62	126.1	8 55.4	75 62	126.5	8 32.8	75 62	126.8	8 10.2	75 61	127.1	7 47.6	76 61	127.5	7 24.9	76 61	127.8	7 02.2	76 61	128.1	6 39.5	76 60	128.5	8
9	8 40.8	75 63	125.4	8 18.3	75 62	125.8	7 55.9	75 62	126.1	7 33.4	75 62	126.4	7 10.9	75 62	126.8	6 48.4	75 61	127.1	6 25.9	75 61	127.4	6 03.4	75 61	127.8	9
60	8 03.1	74 63	124.7	7 40.9	74 63	125.1	7 18.6	74 63	125.4	6 56.3	74 62	125.7	6 33.9	74 62	126.1	6 11.6	74 62	126.4	5 49.2	75 62	126.7	5 26.9	75 61	127.1	60
1	7 25.2	74 64	124.0	7 03.1	74 63	124.4	6 40.9	74 63	124.7	6 18.8	74 63	125.0	5 56.6	74 63	125.4	5 34.4	74 62	125.7	5 12.3	74 62	126.1				1
2	6 47.0	73 64	123.3	6 25.0	73 64	123.7	6 03.0	73 64	124.0	5 41.0	73 63	124.4	5 19.0	73 63	124.7										2
3	6 08.4	73 65	122.6	5 46.6	73 65	123.0	5 24.7	73 64	123.3	5 02.9	73 64	123.7													3
4	5 29.5	72 65	122.0	5 07.9	72 65	122.3																			4

DECLINATION SAME NAME AS LATITUDE

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
91	11 57.8	62 73	73.8	12 16.4	62 73	73.4	12 35.0	62 73	73.0	12 53.6	62 73	72.6	13 12.2	62 73	72.2	13 30.7	62 73	71.8	13 49.1	61 72	71.4	14 07.5	61 72	71.0	91
2	11 13.7	63 73	73.2	11 32.5	62 73	72.8	11 51.2	62 73	72.4	12 09.8	62 73	72.0	12 28.5	62 73	71.6	12 47.1	62 72	71.2	13 05.6	62 72	70.8	13 24.2	62 72	70.4	2
3	10 29.8	63 73	72.6	10 48.6	63 73	72.2	11 07.4	63 73	71.8	11 26.2	63 72	71.4	11 44.9	62 72	71.0	12 03.6	62 72	70.6	12 22.3	62 72	70.2	12 40.9	62 72	69.8	3
4	9 46.0	63 73	72.0	10 04.9	63 73	71.6	10 23.8	63 72	71.2	10 42.7	63 72	70.8	11 01.5	63 72	70.4	11 20.3	63 72	70.0	11 39.1	63 72	69.6	11 57.9	62 71	69.3	4
95	9 02.3	63 72	71.4	9 21.4	63 72	71.0	9 40.4	63 72	70.6	9 59.4	63 72	70.2	10 18.3	63 72	69.9	10 37.2	63 72	69.5	10 56.1	63 71	69.1	11 15.0	63 71	68.7	95
6	8 18.9	64 72	70.8	8 38.0	64 72	70.4	8 57.1	64 72	70.0	9 16.2	64 72	69.6	9 35.2	63 72	69.3	9 54.3	63 71	68.9	10 13.3	63 71	68.5	10 32.2	63 71	68.1	6
7	7 35.5	64 72	70.2	7 54.8	64 72	69.8	8 14.0	64 72	69.4	8 33.2	64 71	69.0	8 52.3	64 71	68.7	9 11.5	64 71	68.3	9 30.6	64 71	67.9	9 49.7	64 71	67.5	7
8	6 52.4	65 72	69.6	7 11.7	64 71	69.2	7 31.0	64 71	68.8	7 50.3	64 71	68.4	8 09.6	64 71	68.1	8 28.9	64 71	67.7	8 48.1	64 70	67.3	9 07.3	64 70	66.9	8
9	6 09.4	65 71	69.0	6 28.8	65 71	68.6	6 48.3	65 71	68.2	7 07.7	65 71	67.8	7 27.1	65 71	67.5	7 46.5	65 70	67.1	8 05.8	64 70	66.7	8 25.2	64 70	66.3	9
100	5 26.5	65 71	68.4	5 46.1	65 71	68.0	6 05.7	65 71	67.6	6 25.2	65 70	67.2	6 44.7	65 70	66.8	7 04.2	65 70	66.5	7 23.7	65 70	66.1	7 43.2	65 70	65.7	100
1				5 03.6	66 70	67.4	5 23.3	66 70	67.0	5 42.9	65 70	66.6	6 02.6	65 70	66.2	6 22.2	65 70	65.9	6 41.8	65 70	65.5	7 01.4	65 69	65.1	1
2										5 00.8	66 70	66.0	5 20.6	66 70	65.6	5 40.3	66 69	65.2	6 00.1	66 69	64.9	6 19.8	66 69	64.5	2
3																			5 18.6	66 69	64.3	5 38.4	66 69	63.9	3

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Lat. 40°

H.A.	24° 00′		24° 30′		25° 00′		25° 30′		26° 00′		26° 30′		27° 00′		27° 30′		H.A.
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	°
00	74 00.0 1.0 02	180.0	74 30.0 1.0 02	180.0	75 00.0 1.0 02	180.0	75 30.0 1.0 02	180.0	76 00.0 1.0 02	180.0	76 30.0 1.0 03	180.0	77 00.0 1.0 03	180.0	77 30.0 1.0 03	180.0	00
1	73 58.7 1.0 07	176.7	74 28.6 1.0 07	176.6	74 58.6 1.0 07	176.5	75 28.6 1.0 07	176.4	75 58.5 1.0 07	176.3	76 28.5 1.0 08	176.2	76 58.4 1.0 08	176.0	77 28.4 1.0 08	175.9	1
2	73 54.7 1.0 11	173.4	74 24.6 1.0 11	173.2	74 54.4 99 12	173.0	75 24.2 99 12	172.8	75 54.1 99 12	172.6	76 23.9 99 13	172.4	76 53.7 99 13	172.1	77 23.5 99 14	171.8	2
3	73 48.1 99 15	170.1	74 17.8 99 16	169.9	74 47.4 99 16	169.6	75 17.1 99 17	169.3	75 46.7 99 17	169.0	76 16.3 99 18	168.6	76 45.8 98 18	168.2	77 15.4 98 19	167.9	3
4	73 39.0 98 19	166.9	74 08.4 98 20	166.6	74 37.8 98 20	166.2	75 07.2 98 21	165.8	75 36.5 98 22	165.4	76 05.8 97 22	164.9	76 35.0 97 23	164.5	77 04.2 97 24	163.9	4
05	73 27.3 97 23	163.8	73 56.5 97 24	163.3	74 25.6 97 25	162.9	74 54.6 97 25	162.4	75 23.5 96 26	161.9	75 52.4 96 27	161.4	76 21.3 96 27	160.8	76 50.0 96 28	160.2	05
6	73 13.3 96 27	160.7	73 42.1 96 28	160.2	74 10.8 96 29	159.7	74 39.4 95 29	159.1	75 08.0 95 30	158.5	75 36.4 95 31	157.9	76 04.8 94 32	157.2	76 33.0 94 33	156.5	6
7	72 57.0 95 31	157.7	73 25.4 94 32	157.1	73 53.6 94 32	156.5	74 21.8 94 33	155.9	74 49.9 93 34	155.3	75 17.9 93 35	154.5	75 45.7 93 36	153.8	76 13.4 92 37	153.0	7
8	72 38.4 93 34	154.8	73 06.4 93 35	154.2	73 34.2 93 36	153.5	74 02.0 92 37	152.8	74 29.5 92 38	152.1	74 57.0 91 39	151.3	75 24.2 91 40	150.5	75 51.3 90 41	149.7	8
9	72 17.8 92 38	152.0	72 45.3 91 38	151.3	73 12.7 91 39	150.6	73 39.9 91 40	149.9	74 07.0 90 41	149.1	74 33.9 89 42	148.3	75 00.5 89 43	147.4	75 27.0 88 44	146.5	9
10	71 55.3 90 41	149.3	72 22.3 90 41	148.5	72 49.2 89 42	147.8	73 15.9 89 43	147.0	73 42.4 88 44	146.2	74 08.7 87 45	145.3	74 34.8 87 46	144.4	75 00.6 86 47	143.4	10
1	71 30.9 89 44	146.6	71 57.4 88 44	145.9	72 23.8 88 45	145.1	72 49.9 87 46	144.3	73 15.9 86 47	143.4	73 41.6 85 48	142.5	74 07.1 85 49	141.6	74 32.3 84 50	140.6	1
2	71 04.8 87 46	144.1	71 30.8 86 47	143.4	71 56.6 86 48	142.6	72 22.3 85 49	141.7	72 47.7 84 50	140.8	73 12.8 83 51	139.9	73 37.7 82 52	138.9	74 02.3 82 53	137.9	2
3	70 37.1 85 49	141.7	71 02.6 85 49	140.9	71 27.9 84 50	140.1	71 53.0 83 51	139.2	72 17.9 82 52	138.3	72 42.4 81 53	137.4	73 06.7 81 54	136.4	73 30.7 79 55	135.3	3
4	70 07.9 84 51	139.4	70 32.9 83 52	138.6	70 57.7 82 53	137.8	71 22.3 81 53	136.9	71 46.6 81 54	135.9	72 10.6 80 55	135.0	72 34.3 79 56	134.0	72 57.7 77 57	132.9	4
15	69 37.3 82 53	137.2	70 01.9 81 54	136.4	70 26.2 81 55	135.5	70 50.2 80 56	134.6	71 14.0 79 56	133.7	71 37.5 78 57	132.7	72 00.6 77 58	131.7	72 23.5 76 59	130.6	15
6	69 05.5 81 55	135.1	69 29.6 80 56	134.3	69 53.4 79 57	133.4	70 16.9 78 57	132.5	70 40.2 77 58	131.5	71 03.1 76 59	130.6	71 25.7 75 60	129.5	71 48.0 74 61	128.5	6
7	68 32.5 79 57	133.1	68 56.1 78 58	132.3	69 19.4 77 58	131.4	69 42.5 76 59	130.5	70 05.2 75 60	129.5	70 27.7 74 61	128.5	70 49.8 73 62	127.5	71 11.5 72 62	126.4	7
8	67 58.4 78 58	131.2	68 21.5 77 59	130.3	68 44.4 76 60	129.4	69 07.0 75 61	128.5	69 29.3 74 61	127.6	69 51.2 73 62	126.6	70 12.8 71 63	125.6	70 34.1 70 64	124.5	8
9	67 23.3 76 60	129.3	67 46.0 75 61	128.5	68 08.4 74 61	127.6	68 30.6 73 62	126.7	68 52.4 72 63	125.7	69 13.9 71 64	124.7	69 35.0 70 64	123.7	69 55.8 69 65	122.7	9
20	66 47.3 75 61	127.6	67 09.6 74 62	126.7	67 31.6 73 63	125.8	67 53.3 72 63	124.9	68 14.7 71 64	124.0	68 35.7 70 65	123.0	68 56.4 68 66	122.0	69 16.8 67 66	121.0	20
1	66 10.5 73 63	125.9	66 32.3 72 63	125.0	66 53.9 71 64	124.1	67 15.2 70 65	123.2	67 36.2 69 65	122.3	67 56.8 68 66	121.3	68 17.1 67 67	120.3	68 37.0 66 67	119.3	1
2	65 32.8 72 64	124.2	65 54.3 71 65	123.4	66 15.5 70 65	122.5	66 36.4 69 66	121.6	66 57.0 68 66	120.7	67 17.2 67 67	119.7	67 37.1 66 68	118.8	67 56.6 65 68	117.8	2
3	64 54.5 71 65	122.7	65 15.6 70 66	121.8	65 36.4 69 66	121.0	65 56.9 68 67	120.1	66 17.1 67 67	119.2	66 37.0 66 68	118.2	66 56.5 65 69	117.3	67 15.7 63 69	116.3	3
4	64 15.5 70 66	121.2	64 36.2 69 67	120.3	64 56.7 68 67	119.5	65 16.9 67 68	118.6	65 36.7 66 68	117.7	65 56.2 65 69	116.8	66 15.4 63 69	115.8	66 34.2 62 70	114.9	4
25	63 35.9 69 67	119.7	63 56.3 68 67	118.9	64 16.4 67 68	118.1	64 36.3 66 69	117.2	64 55.8 65 69	116.3	65 15.0 63 70	115.4	65 33.8 62 70	114.5	65 52.3 61 71	113.5	25
6	62 55.7 67 68	118.4	63 15.8 67 68	117.5	63 35.6 66 69	116.7	63 55.1 65 69	115.8	64 14.3 63 70	115.0	64 33.2 62 70	114.1	64 51.8 61 71	113.1	65 10.0 60 71	112.2	6
7	62 15.0 66 69	117.0	62 34.8 66 69	116.2	62 54.3 65 70	115.4	63 13.5 64 70	114.5	63 32.4 63 70	113.7	63 51.0 61 71	112.8	64 09.3 60 71	111.9	64 27.2 59 72	111.0	7
8	61 33.8 66 69	115.8	61 53.3 65 70	115.0	62 12.6 64 70	114.1	62 31.5 63 71	113.3	62 50.2 62 71	112.4	63 08.5 61 72	111.6	63 26.5 59 72	110.7	63 44.1 58 72	109.8	8
9	60 52.2 65 70	114.5	61 11.5 64 70	113.7	61 30.4 63 71	112.9	61 49.1 62 71	112.1	62 07.5 61 72	111.3	62 25.6 60 72	110.4	62 43.3 59 72	109.5	63 00.7 57 73	108.6	9
30	60 10.2 64 71	113.3	60 29.2 63 71	112.5	60 47.9 62 71	111.7	61 06.4 61 72	110.9	61 24.5 60 72	110.1	61 42.3 59 73	109.3	61 59.8 58 73	108.4	62 17.0 57 73	107.5	30
1	59 27.8 63 71	112.2	59 46.6 62 72	111.4	60 05.1 61 72	110.6	60 23.3 60 72	109.8	60 41.2 59 73	109.0	60 58.8 58 73	108.2	61 16.1 57 73	107.3	61 33.1 56 74	106.5	1
2	58 45.1 62 72	111.1	59 03.6 61 72	110.3	59 21.9 60 72	109.5	59 39.9 59 73	108.7	59 57.6 58 73	107.9	60 15.0 58 73	107.1	60 32.1 56 74	106.3	60 48.9 55 74	105.4	2
3	58 02.0 62 72	110.0	58 20.4 61 73	109.2	58 38.4 60 73	108.5	58 56.2 59 73	107.7	59 13.7 58 74	106.9	59 30.9 57 74	106.1	59 47.9 56 74	105.3	60 04.5 55 74	104.4	3
4	57 18.7 61 73	108.9	57 36.8 60 73	108.2	57 54.7 59 73	107.4	58 12.3 58 74	106.7	58 29.6 57 74	105.9	58 46.7 56 74	105.1	59 03.4 55 74	104.3	59 19.9 54 75	103.5	4
35	56 35.1 60 73	107.9	56 53.0 59 73	107.2	57 10.7 59 74	106.4	57 28.2 58 74	105.7	57 45.3 57 74	104.9	58 02.2 56 74	104.2	58 18.8 55 75	103.4	58 35.1 54 75	102.6	35
6	55 51.2 60 73	106.9	56 09.0 59 74	106.2	56 26.6 58 74	105.5	56 43.8 57 74	104.7	57 00.8 56 74	104.0	57 17.5 55 75	103.2	57 34.0 54 75	102.4	57 50.1 53 75	101.7	6
7	55 07.2 59 74	106.0	55 24.8 58 74	105.3	55 42.2 58 74	104.5	55 59.3 57 75	103.8	56 16.1 56 75	103.1	56 32.7 55 75	102.3	56 49.0 54 75	101.6	57 05.1 53 75	100.8	7
8	54 22.9 59 74	105.0	54 40.3 58 74	104.3	54 57.6 57 75	103.6	55 14.6 56 75	102.9	55 31.3 55 75	102.2	55 47.7 54 75	101.4	56 03.9 54 75	100.7	56 19.8 53 76	99.9	8
9	53 38.4 58 74	104.1	53 55.7 57 75	103.4	54 12.8 57 75	102.7	54 29.7 56 75	102.0	54 46.3 55 75	101.3	55 02.6 54 75	100.6	55 18.7 53 76	99.8	55 34.5 52 76	99.1	9
40	52 53.7 58 75	103.2	53 10.9 57 75	102.6	53 27.9 56 75	101.9	53 44.7 55 75	101.2	54 01.1 55 75	100.5	54 17.4 54 76	99.8	54 33.4 53 76	99.0	54 49.1 52 76	98.3	40
1	52 08.9 57 75	102.4	52 26.0 57 75	101.7	52 42.9 56 75	101.0	52 59.5 55 75	100.3	53 15.9 54 76	99.6	53 32.0 53 76	98.9	53 47.9 53 76	98.2	54 03.6 52 76	97.5	1
2	51 23.9 57 75	101.5	51 40.9 56 75	100.9	51 57.7 55 76	100.2	52 14.2 55 76	99.5	52 30.5 54 76	98.8	52 46.6 53 76	98.1	53 02.4 52 76	97.4	53 17.9 51 76	96.7	2
3	50 38.8 57 75	100.7	50 55.7 56 76	100.1	51 12.4 55 76	99.4	51 28.8 54 76	98.7	51 45.1 54 76	98.1	52 01.0 53 76	97.4	52 16.8 52 76	96.7	52 32.3 51 76	96.0	3
4	49 53.6 56 76	99.9	50 10.4 56 76	99.3	50 27.0 55 76	98.6	50 43.4 54 76	97.9	50 59.5 53 76	97.3	51 15.4 53 76	96.6	51 31.1 52 76	95.9	51 46.5 51 76	95.2	4
45	49 08.3 56 76	99.1	49 25.0 55 76	98.5	49 41.5 55 76	97.8	49 57.8 54 76	97.2	50 13.9 53 76	96.5	50 29.7 52 76	95.9	50 45.3 52 76	95.2	51 00.7 51 76	94.5	45
6	48 22.9 56 76	98.3	48 39.5 55 76	97.7	48 55.9 54 76	97.1	49 12.2 54 76	96.4	49 28.2 53 76	95.8	49 44.0 52 76	95.1	49 59.5 52 76	94.5	50 14.9 51 76	93.8	6
7	47 37.3 56 76	97.6	47 53.9 55 76	97.0	48 10.3 54 76	96.3	48 26.5 54 76	95.7	48 42.4 53 76	95.1	48 58.2 52 76	94.4	49 13.7 51 76	93.8	49 29.0 51 77	93.1	7
8	46 51.7 55 76	96.8	47 08.3 55 76	96.2	47 24.6 54 76	95.6	47 40.7 53 76	95.0	47 56.6 53 76	94.3	48 12.3 52 76	93.7	48 27.8 51 77	93.1	48 43.1 51 77	92.4	8
9	46 06.1 55 76	96.1	46 22.5 55 76	95.5	46 38.8 54 76	94.9	46 54.9 53 76	94.3	47 10.8 53 76	93.6	47 26.4 52 77	93.0	47 41.9 51 77	92.4	47 57.2 50 77	91.7	9
50	45 20.3 55 76	95.4	45 36.8 54 76	94.8	45 53.0 54 76	94.2	46 09.0 53 76	93.6	46 24.9 52 77	93.0	46 40.5 52 77	92.3	46 56.0 51 77	91.7	47 11.2 50 77	91.1	50
1	44 34.6 55 76	94.7	44 50.9 54 76	94.1	45 07.1 54 76	93.5	45 23.1 53 77	92.9	45 39.0 52 77	92.3	45 54.6 52 77	91.7	46 10.0 51 77	91.0	46 25.3 50 77	90.4	1
2	43 48.7 55 76	94.0	44 05.1 54 76	93.4	44 21.2 54 77	92.8	44 37.2 53 77	92.2	44 53.0 52 77	91.6	45 08.6 52 77	91.0	45 24.1 51 77	90.4	45 39.3 50 77	89.8	2
3	43 02.9 55 76	93.3	43 19.2 54 77	92.7	43 35.3 54 77	92.1	43 51.3 53 77	91.5	44 07.1 52 77	90.9	44 22.7 52 77	90.4	44 38.1 51 77	89.8	44 53.3 50 77	89.1	3
4	42 17.0 55 77	92.6	42 33.3 54 77	92.0	42 49.4 53 77	91.5	43 05.3 53 77	90.9	43 21.1 52 77	90.3	43 36.7 52 77	89.7	43 52.1 51 77	89.1	44 07.4 50 77	88.5	4
55	41 31.0 55 77	91.9	41 47.3 54 77	91.4	42 03.4 53 77	90.8	42 19.4 53 77	90.2	42 35.2 52 77	89.7	42 50.8 52 77	89.1	43 06.2 51 77	88.5	43 21.4 51 77	87.9	55
6	40 45.1 55 77	91.3	41 01.4 54 77	90.7	41 17.5 53 77	90.2	41 33.4 53 77	89.6	41 49.2 52 77	89.0	42 04.8 52 77	88.4	42 20.3 51 77	87.9	42 35.5 51 78	87.3	6
7	39 59.1 54 77	90.6	40 15.4 54 77	90.1	40 31.5 53 77	89.5	40 47.5 53 77	89.0	41 03.2 52 77	88.4	41 18.9 52 77	87.8	41 34.3 51 78	87.3	41 49.6 51 78	86.7	7
8	39 13.2 54 77	90.0	39 29.4 54 77	89.4	39 45.5 53 77	88.9	40 01.5 53 77	88.3	40 17.3 52 77	87.8	40 33.0 52 78	87.2	40 48.4 51 78	86.6	41 03.7 51 78	86.1	8
9	38 27.2 55 77	89.3	38 43.5 54 77	88.8	38 59.6 54 77	88.3	39 15.6 53 77	87.7	39 31.4 52 78	87.2	39 47.1 52 78	86.6	40 02.6 51 78	86.0	40 17.9 51 78	85.5	9
60	37 41.2 55 77	88.7	37 57.5 54 77	88.2	38 13.7 54 77	87.6	38 29.7 53 78	87.1	38 45.5 53 78	86.5	39 01.2 52 78	86.0	39 16.7 52 78	85.4	39 32.1 51 78	84.9	60
1	36 55.3 55 77	88.1	37 11.6 54 77	87.6	37 27.8 54 78	87.0	37 43.8 53 78	86.5	37 59.6 53 78	85.9	38 15.4 52 78	85.4	38 30.9 52 78	84.9	38 46.3 51 78	84.3	1
2	36 09.4 55 78	87.5	36 25.7 54 78	86.9	36 41.9 54 78	86.4	36 57.9 53 78	85.9	37 13.8 53 78	85.3	37 29.6 52 78	84.8	37 45.2 52 78	84.3	38 00.6 51 78	83.7	2
3	35 23.5 55 78	86.8	35 39.8 54 78	86.3	35 56.0 54 78	85.8	36 12.1 53 78	85.3	36 28.0 53 78	84.8	36 43.8 52 78	84.2	36 59.5 52 78	83.7	37 15.0 51 78	83.2	3
4	34 37.6 55 78	86.2	34 54.0 54 78	85.7	35 10.2 54 78	85.2	35 26.3 53 78	84.7	35 42.3 53 78	84.2	35 58.1 53 78	83.6	36 13.8 52 78	83.1	36 29.4 52 78	82.6	4
65	33 51.7 55 78	85.6	34 08.1 54 78	85.1	34 24.4 54 78	84.6	34 40.6 54 78	84.1	34 56.6 53 78	83.6	35 12.5 53 78	83.1	35 28.2 52 78	82.5	35 43.8 52 78	82.0	65
6	33 05.9 55 78	85.0	33 22.4 55 78	84.5	33 38.7 54 78	84.0	33 54.9 54 78	83.5	34 10.9 53 78	83.0	34 26.9 53 78	82.5	34 42.7 52 78	82.0	34 58.3 52 78	81.5	6
7	32 20.2 55 78	84.4	32 36.6 55 78	83.9	32 53.0 54 78	83.4	33 09.2 54 78	82.9	33 25.3 54 78	82.4	33 41.3 53 78	81.9	33 57.2 53 78	81.4	34 12.9 52 78	80.9	7
8	31 34.4 55 78	83.8	31 51.0 55 78	83.3	32 07.4 54 78	82.8	32 23.6 54 78	82.3	32 39.8 54 78	81.8	32 55.8 53 78	81.3	33 11.8 53 78	80.8	33 27.6 52 78	80.3	8
9	30 48.8 55 78	83.2	31 05.3 55 78	82.8	31 21.8 55 78	82.3	31 38.1 54 78	81.8	31 54.3 54 78	81.3	32 10.4 53 78	80.8	32 26.4 53 78	80.3	32 42.3 53 78	79.8	9
70	30 03.2 55 78	82.6	30 19.8 55 78	82.2	30 36.3 55 78	81.7	30 52.7 54 78	81.2	31 08.9 54 78	80.7	31 25.1 54 78	80.2	31 41.2 53 78	79.7	31 57.1 53 78	79.2	70
1	29 17.6 55 78	82.1	29 34.3 55 78	81.6	29 50.8 55 78	81.1	30 07.3 55 78	80.6	30 23.6 54 78	80.1	30 39.9 54 78	79.7	30 56.0 54 78	79.2	31 12.0 53 78	78.7	1
2	28 32.1 55 78	81.5	28 48.8 55 78	81.0	29 05.5 55 78	80.5	29 22.0 55 78	80.1	29 38.4 55 78	79.6	29 54.7 54 78	79.1	30 10.9 54 78	78.6	30 27.0 53 78	78.1	2
3	27 46.7 55 78	80.9	28 03.5 55 78	80.4	28 20.2 55 78	80.0	28 36.7 55 78	79.5	28 53.2 55 78	79.0	29 09.6 54 78	78.5	29 25.9 54 78	78.0	29 42.0 54 78	77.6	3
4	27 01.4 55 78	80.3	27 18.2 55 78	79.9	27 34.9 55 78	79.4	27 51.6 55 78	78.9	28 08.1 55 78	78.4	28 24.6 55 78	78.0	28 41.0 54 78	77.5	28 57.2 54 78	77.0	4
75	26 16.1 55 78	79.7	26 33.0 55 78	79.3	26 49.8 55 78	78.8	27 06.5 55 78	78.4	27 23.2 55 78	77.9	27 39.7 55 78	77.4	27 56.1 55 78	76.9	28 12.5 54 78	76.5	75
6	25 30.9 55 78	79.2	25 47.9 55 78	78.7	26 04.8 55 78	78.3	26 21.6 55 78	77.8	26 38.3 55 78	77.3	26 54.9 55 78	76.9	27 11.4 55 78	76.4	27 27.8 55 78	75.9	6
7	24 45.8 57 78	78.6	25 02.8 57 78	78.1	25 19.8 56 78	77.7	25 36.7 56 78	77.2	25 53.5 56 78	76.8	26 10.2 56 78	76 3	26 26.8 55 78	75.8	26 43.3 55 78	75.4	7
8	24 00.8 57 78	78.0	24 17.9 57 78	77.6	24 34.9 57 78	77.1	24 51.9 56 78	76.7	25 08.8 56 78	76.2	25 25.6 56 78	75.8	25 42.3 56 78	75.3	25 58.9 55 78	74.8	8
9	23 15.9 57 78	77.5	23 33.1 57 78	77.0	23 50.2 57 78	76.6	24 07.2 57 78	76.1	24 24.2 56 78	75.7	24 41.1 56 78	75.2	24 57.9 56 78	74.7	25 14.6 56 78	74.3	9
80	22 31.1 58 78	76.9	22 48.3 57 78	76.4	23 05.5 57 78	76.0	23 22.7 57 78	75.6	23 39.7 57 78	75.1	23 56.7 56 78	74.7	24 13.6 56 78	74.2	24 30.4 56 78	73.7	80
1	21 46.3 58 78	76.3	22 03.7 58 78	75.9	22 21.0 58 78	75.4	22 38.2 57 78	75.0	22 55.4 57 78	74.5	23 12.4 57 78	74.1	23 29.4 57 78	73.6	23 46.3 56 78	73.2	1
2	21 01.7 58 78	75.7	21 19.2 58 78	75.3	21 36.6 58 78	74.9	21 53.9 58 78	74.4	22 11.1 57 78	74.0	22 28.3 57 78	73.5	22 45.4 57 78	73.1	23 02.4 57 78	72.7	2
3	20 17.3 59 78	75.2	20 34.8 58 78	74.7	20 52.3 58 78	74.3	21 09.7 58 78	73.9	21 27.0 58 78	73.4	21 44.3 57 78	73.0	22 01.5 57 78	72.6	22 18.6 57 78	72.1	3
4	19 32.9 59 78	74.6	19 50.5 59 78	74.2	20 08.1 58 78	73.7	20 25.6 58 78	73.3	20 43.0 58 78	72.9	21 00.4 58 78	72.4	21 17.7 58 78	72.0	21 34.9 57 78	71.6	4
85	18 48.6 59 78	74.0	19 06.3 59 78	73.6	19 24.0 59 78	73.2	19 41.6 59 78	72.7	19 59.1 58 78	72.3	20 16.6 58 78	71.9	20 34.0 58 78	71.4	20 51.4 58 78	71.0	85
6	18 04.5 59 78	73.5	18 22.3 59 78	73.0	18 40.1 59 78	72.6	18 57.8 59 78	72.2	19 15.4 59 78	71.8	19 33.0 59 78	71.3	19 50.5 58 78	70.9	20 08.0 58 78	70.5	6
7	17 20.5 60 78	72.9	17 38.4 60 78	72.5	17 56.3 59 78	72.0	18 14.1 59 78	71.6	18 31.8 59 78	71.2	18 49.5 59 78	70.8	19 07.2 59 78	70.3	19 24.8 58 78	69.9	7
8	16 36.6 60 78	72.3	16 54.7 60 78	71.9	17 12.6 60 78	71.5	17 30.5 60 78	71.1	17 48.4 59 78	70.6	18 06.2 59 78	70.2	18 24.0 59 78	69.8	18 41.7 59 78	69.4	8
9	15 52.9 60 78	71.7	16 11.0 60 78	71.3	16 29.1 60 78	70.9	16 47.1 60 78	70.5	17 05.1 60 78	70.1	17 23.0 59 78	69.7	17 40.9 59 78	69.2	17 58.7 59 78	68.8	9
90	15 09.4 61 78	71.2	15 27.6 61 78	70.8	15 45.8 61 78	70.3	16 03.9 60 78	69.9	16 22.0 60 78	69.5	16 40.0 60 78	69.1	16 58.0 60 78	68.7	17 16.0 60 78	68.3	90

16—11659

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	24° 00′		24° 30′		25° 00′		25° 30′		26° 00′		26° 30′		27° 00′		27° 30′		H.A.
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
°	′ Δd Δt °		′ Δd Δt °		′ Δd Δt °		′ Δd Δt °		′ Δd Δt °		′ Δd Δt °		′ Δd Δt °		′ Δd Δt °		°
00	26 00.0 1.0 01 180.0		25 30.0 1.0 01 180.0		25 00.0 1.0 01 180.0		24 30.0 1.0 01 180.0		24 00.0 1.0 01 180.0		23 30.0 1.0 01 180.0		23 00.0 1.0 01 180.0		22 30.0 1.0 01 180.0		00
1	25 59.6 1.0 02 179.0		25 29.6 1.0 02 179.0		24 59.6 1.0 02 179.0		24 29.6 1.0 02 179.0		23 59.6 1.0 02 179.0		23 29.6 1.0 02 179.0		22 59.6 1.0 02 179.0		22 29.6 1.0 02 179.0		1
2	25 58.4 1.0 03 178.0		25 28.4 1.0 03 178.0		24 58.4 1.0 03 178.0		24 28.4 1.0 03 178.0		23 58.4 1.0 03 178.0		23 28.4 1.0 03 178.0		22 58.4 1.0 03 178.1		22 28.5 1.0 03 178.1		2
3	25 56.3 1.0 05 177.0		25 26.4 1.0 05 177.0		24 56.4 1.0 05 177.0		24 26.4 1.0 05 177.0		23 56.5 1.0 05 177.0		23 26.5 1.0 05 177.1		22 56.5 1.0 04 177.1		22 26.5 1.0 04 177.1		3
4	25 53.5 1.0 06 175.9		25 23.5 1.0 06 176.0		24 53.6 1.0 06 176.0		24 23.6 1.0 06 176.0		23 53.7 1.0 06 176.1		23 23.7 1.0 06 176.1		22 53.8 1.0 06 176.1		22 23.8 1.0 06 176.2		4
05	25 49.8 1.0 07 174.9		25 19.9 1.0 07 175.0		24 50.0 1.0 07 175.0		24 20.1 1.0 07 175.0		23 50.1 1.0 07 175.1		23 20.2 1.0 07 175.1		22 50.3 1.0 07 175.2		22 20.4 1.0 07 175.2		05
6	25 45.4 1.0 09 173.9		25 15.5 1.0 09 174.0		24 45.6 1.0 09 174.0		24 15.7 1.0 09 174.1		23 45.8 1.0 08 174.1		23 15.9 1.0 08 174.2		22 46.0 1.0 08 174.2		22 16.2 1.0 08 174.2		6
7	25 40.1 99 10 172.9		25 10.2 99 10 173.0		24 40.4 99 10 173.0		24 10.6 99 10 173.1		23 40.7 99 10 173.1		23 10.9 99 10 173.2		22 41.0 99 10 173.2		22 11.2 99 10 173.3		7
8	25 34.0 99 11 171.9		25 04.2 99 11 172.0		24 34.4 99 11 172.0		24 04.6 99 11 172.1		23 34.8 99 11 172.2		23 05.0 99 11 172.2		22 35.2 99 11 172.3		22 05.4 99 11 172.3		8
9	25 27.1 99 13 170.9		24 57.4 99 13 171.0		24 27.6 99 13 171.0		23 57.9 99 12 171.1		23 28.2 99 12 171.2		22 58.4 99 12 171.3		22 28.7 99 12 171.3		21 58.9 99 12 171.4		9
10	25 19.5 99 14 169.9		24 49.8 99 14 170.0		24 20.1 99 14 170.1		23 50.4 99 14 170.1		23 20.7 99 14 170.2		22 51.1 99 14 170.3		22 21.4 99 13 170.4		21 51.7 99 13 170.4		10
1	25 11.0 99 15 168.9		24 41.4 99 15 169.0		24 11.8 99 15 169.1		23 42.2 99 15 169.2		23 12.5 99 15 169.2		22 42.9 99 15 169.3		22 13.3 99 15 169.4		21 43.7 99 15 169.5		1
2	25 01.7 98 17 167.9		24 32.2 98 17 168.0		24 02.7 98 16 168.1		23 33.1 98 16 168.2		23 03.6 98 16 168.3		22 34.0 99 16 168.4		22 04.5 99 16 168.5		21 34.9 99 16 168.6		2
3	24 51.7 98 18 166.9		24 22.3 98 18 167.0		23 52.8 98 18 167.1		23 23.3 98 18 167.2		22 53.9 98 17 167.3		22 24.4 98 17 167.4		21 54.9 98 17 167.5		21 25.4 98 17 167.6		3
4	24 40.9 98 19 165.9		24 11.6 98 19 166.0		23 42.2 98 19 166.1		23 12.8 98 19 166.3		22 43.4 98 19 166.4		22 14.0 98 19 166.5		21 44.6 98 18 166.6		21 15.2 98 18 166.7		4
15	24 29.4 98 21 164.9		24 00.1 98 20 165.1		23 30.8 98 20 165.2		23 01.5 98 20 165.3		22 32.2 98 20 165.4		22 02.9 98 20 165.5		21 33.6 98 20 165.6		21 04.3 98 19 165.8		15
6	24 17.0 97 22 164.0		23 47.9 97 22 164.1		23 18.7 97 21 164.2		22 49.5 97 21 164.3		22 20.3 97 21 164.5		21 51.1 97 21 164.6		21 21.8 97 21 164.7		20 52.6 97 21 164.8		6
7	24 04.0 97 23 163.0		23 34.9 97 23 163.1		23 05.8 97 23 163.3		22 36.7 97 23 163.4		22 07.6 97 22 163.5		21 38.5 97 22 163.7		21 09.4 97 22 163.8		20 40.2 97 22 163.9		7
8	23 50.2 97 24 162.0		23 21.2 97 24 162.2		22 52.2 97 24 162.3		22 23.2 97 24 162.4		21 54.2 97 24 162.6		21 25.2 97 23 162.7		20 56.2 97 23 162.9		20 27.1 97 23 163.0		8
9	23 35.6 96 25 161.1		23 06.7 96 25 161.2		22 37.9 96 25 161.4		22 09.0 96 25 161.5		21 40.1 96 25 161.6		21 11.2 96 25 161.8		20 42.3 96 24 161.9		20 13.3 96 24 162.1		9
20	23 20.3 96 27 160.1		22 51.6 96 26 160.3		22 22.8 96 26 160.4		21 54.0 96 26 160.6		21 25.2 96 26 160.7		20 56.5 96 26 160.9		20 27.7 96 25 161.0		19 58.8 96 25 161.2		20
1	23 04.3 95 28 159.2		22 35.7 95 28 159.3		22 07.0 96 27 159.5		21 38.4 96 27 159.6		21 09.7 96 27 159.8		20 41.0 96 27 160.0		20 12.4 96 27 160.1		19 43.7 96 26 160.3		1
2	22 47.6 95 29 158.2		22 19.1 95 29 158.4		21 50.6 95 29 158.5		21 22.0 95 28 158.7		20 53.5 95 28 158.9		20 24.9 95 28 159.0		19 56.4 95 28 159.2		19 27.8 95 28 159.4		2
3	22 30.2 95 30 157.3		22 01.8 95 30 157.4		21 33.4 95 30 157.6		21 05.0 95 30 157.8		20 36.6 95 29 158.0		20 08.2 95 29 158.1		19 39.7 95 29 158.3		19 11.3 95 29 158.5		3
4	22 12.1 94 31 156.3		21 43.8 94 31 156.5		21 15.6 94 31 156.7		20 47.3 94 31 156.9		20 19.0 94 30 157.1		19 50.7 94 30 157.2		19 22.4 94 30 157.4		18 54.1 94 30 157.6		4
25	21 53.3 94 32 155.4		21 25.2 94 32 155.6		20 57.1 94 32 155.8		20 28.9 94 32 156.0		20 00.8 94 32 156.2		19 32.6 94 31 156.3		19 04.4 94 31 156.5		18 36.2 94 31 156.7		25
6	21 33.9 93 34 154.5		21 05.9 93 33 154.7		20 37.9 93 33 154.9		20 09.9 93 33 155.1		19 41.9 93 33 155.3		19 13.8 93 32 155.4		18 45.8 94 32 155.6		18 17.7 94 32 155.8		6
7	21 13.7 93 35 153.6		20 45.9 93 34 153.8		20 18.0 93 34 154.0		19 50.2 93 34 154.2		19 22.3 93 34 154.4		18 54.4 93 33 154.6		18 26.5 93 33 154.8		17 58.6 93 33 155.0		7
8	20 53.0 92 36 152.7		20 25.3 92 35 152.9		19 57.6 92 35 153.1		19 29.8 92 35 153.3		19 02.1 92 35 153.5		18 34.3 93 34 153.7		18 06.6 93 34 153.9		17 38.8 93 34 154.1		8
9	20 31.5 92 37 151.8		20 04.0 92 36 152.0		19 36.4 92 36 152.2		19 08.9 92 36 152.4		18 41.3 92 36 152.6		18 13.7 92 36 152.8		17 46.0 92 35 153.0		17 18.4 92 35 153.2		9
30	20 09.5 91 38 150.9		19 42.1 91 38 151.1		19 14.7 91 37 151.3		18 47.3 91 37 151.5		18 19.8 91 37 151.7		17 52.4 92 37 152.0		17 24.9 92 36 152.2		16 57.4 92 36 152.4		30
1	19 46.8 91 39 150.0		19 19.6 91 39 150.2		18 52.3 91 38 150.4		18 25.0 91 38 150.7		17 57.7 91 38 150.9		17 30.4 91 38 151.1		17 03.1 91 37 151.3		16 35.8 91 37 151.5		1
2	19 23.5 90 40 149.1		18 56.4 90 40 149.3		18 29.3 90 39 149.6		18 02.2 90 39 149.8		17 35.1 90 39 150.0		17 07.9 91 38 150.2		16 40.8 91 38 150.5		16 13.6 91 38 150.7		2
3	18 59.6 90 41 148.3		18 32.7 90 41 148.5		18 05.8 90 40 148.7		17 38.8 90 40 148.9		17 11.8 90 40 149.2		16 44.8 90 39 149.4		16 17.8 90 39 149.6		15 50.8 90 39 149.9		3
4	18 35.2 89 42 147.4		18 08.4 89 42 147.6		17 41.6 89 41 147.9		17 14.8 89 41 148.1		16 48.0 89 41 148.3		16 21.1 89 40 148.6		15 54.3 90 40 148.8		15 27.4 90 40 149.0		4
35	18 10.1 89 43 146.5		17 43.5 89 42 146.8		17 16.9 89 42 147.0		16 50.2 89 42 147.3		16 23.6 89 42 147.5		15 56.9 89 41 147.7		15 30.2 89 41 148.0		15 03.5 89 41 148.2		35
6	17 44.5 88 44 145.7		17 18.0 88 43 145.9		16 51.6 88 43 146.2		16 25.1 88 43 146.4		15 58.6 88 43 146.7		15 32.1 88 42 146.9		15 05.5 88 42 147.2		14 39.0 89 42 147.4		6
7	17 18.3 88 45 144.8		16 52.0 88 44 145.1		16 25.7 88 44 145.3		15 59.4 88 44 145.6		15 33.1 88 43 145.8		15 06.7 88 43 146.1		14 40.3 88 43 146.3		14 14.0 88 43 146.6		7
8	16 51.5 87 45 144.0		16 25.4 87 45 144.3		15 59.3 87 45 144.5		15 33.1 87 45 144.8		15 07.0 87 44 145.0		14 40.8 87 44 145.3		14 14.6 87 44 145.5		13 48.4 87 44 145.8		8
9	16 24.3 86 46 143.2		15 58.3 87 46 143.4		15 32.4 87 46 143.7		15 06.4 87 46 144.0		14 40.4 87 45 144.2		14 14.3 87 45 144.5		13 48.3 87 45 144.7		13 22.3 87 44 145.0		9
40	15 56.5 86 47 142.4		15 30.7 86 47 142.6		15 04.9 86 47 142.9		14 39.1 86 46 143.2		14 13.2 86 46 143.4		13 47.4 86 46 143.7		13 21.5 86 46 143.9		12 55.6 86 45 144.2		40
1	15 28.1 85 48 141.5		15 02.5 85 48 141.8		14 36.9 85 47 142.1		14 11.2 86 47 142.4		13 45.6 86 47 142.6		13 19.9 86 47 142.9		12 54.2 86 46 143.2		12 28.5 86 46 143.4		1
2	14 59.3 85 49 140.7		14 33.9 85 49 141.0		14 08.4 85 48 141.3		13 42.9 85 48 141.6		13 17.4 85 48 141.8		12 51.9 85 47 142.1		12 26.4 85 47 142.4		12 00.8 85 47 142.6		2
3	14 30.0 84 50 139.9		14 04.7 84 49 140.2		13 39.4 84 49 140.5		13 14.1 84 49 140.8		12 48.8 84 49 141.1		12 23.4 84 48 141.3		11 58.1 85 48 141.6		11 32.7 85 48 141.9		3
4	14 00.1 84 50 139.2		13 35.0 84 50 139.4		13 09.9 84 50 139.7		12 44.8 84 50 140.0		12 19.6 84 49 140.3		11 54.5 84 49 140.6		11 29.3 84 49 140.8		11 04.1 84 48 141.1		4
45	13 29.8 83 51 138.4		13 04.9 83 51 138.7		12 40.0 83 51 138.9		12 15.0 83 50 139.2		11 50.0 83 50 139.5		11 25.0 83 50 139.8		11 00.0 83 50 140.1		10 35.0 83 49 140.4		45
6	12 59.1 82 52 137.6		12 34.3 83 52 137.9		12 09.5 83 51 138.2		11 44.8 83 51 138.5		11 20.0 83 51 138.7		10 55.1 83 51 139.0		10 30.3 83 50 139.3		10 05.4 83 50 139.6		6
7	12 27.8 82 53 136.8		12 03.3 82 52 137.1		11 38.7 82 52 137.4		11 14.1 82 52 137.7		10 49.4 82 52 138.0		10 24.8 82 51 138.3		10 00.1 82 51 138.6		9 35.4 82 51 138.9		7
8	11 56.2 81 54 136.1		11 31.8 81 53 136.4		11 07.3 81 53 136.7		10 42.9 82 53 136.9		10 18.4 82 52 137.2		9 54.0 82 52 137.5		9 29.5 82 52 137.8		9 05.0 82 52 138.1		8
9	11 24.1 81 54 135.3		10 59.8 81 54 135.6		10 35.6 81 54 135.9		10 11.3 81 53 136.2		9 47.0 81 53 136.5		9 22.7 81 53 136.8		8 58.4 81 53 137.1		8 34.1 81 52 137.4		9
50	10 51.5 80 55 134.6		10 27.5 80 55 134.9		10 03.4 80 54 135.2		9 39.3 80 54 135.5		9 15.2 80 54 135.8		8 51.0 80 54 136.1		8 26.9 81 53 136.4		8 02.7 81 53 136.7		50
1	10 18.6 80 56 133.8		9 54.7 80 55 134.1		9 30.8 80 55 134.4		9 06.8 80 55 134.7		8 42.9 80 54 135.0		8 18.9 80 54 135.3		7 55.0 80 54 135.6		7 31.0 80 54 135.9		1
2	9 45.2 79 56 133.1		9 21.5 79 56 133.4		8 57.7 79 56 133.7		8 34.0 79 55 134.0		8 10.2 79 55 134.3		7 46.4 79 55 134.6		7 22.6 79 55 134.9		6 58.8 79 54 135.2		2
3	9 11.4 78 57 132.3		8 47.9 79 57 132.7		8 24.3 79 56 133.0		8 00.7 79 56 133.3		7 37.1 79 56 133.6		7 13.5 79 56 133.9		6 49.9 79 55 134.2		6 26.3 79 55 134.5		3
4	8 37.3 78 58 131.6		8 13.9 78 57 131.9		7 50.5 78 57 132.3		7 27.1 78 57 132.6		7 03.6 78 56 132.9		6 40.2 78 56 133.2		6 16.8 78 56 133.5		5 53.3 78 56 133.8		4
55	8 02.7 77 58 130.9		7 39.5 77 58 131.2		7 16.3 77 58 131.5		6 53.0 77 57 131.9		6 29.8 78 57 132.2		6 06.5 78 57 132.5		5 43.2 78 56 132.8		5 19.9 78 56 133.1		55
6	7 27.8 77 59 130.2		7 04.7 77 59 130.5		6 41.7 77 58 130.8		6 18.6 77 58 131.2		5 55.5 77 58 131.5		5 32.4 77 57 131.8		5 09.3 77 57 132.1				6
7	6 52.5 76 59 129.5		6 29.6 76 59 129.8		6 06.7 76 59 130.1		5 43.8 76 59 130.5		5 20.9 76 58 130.8								7
8	6 16.8 76 60 128.8		5 54.1 76 60 129.1		5 31.4 76 59 129.4		5 08.7 76 59 129.8										8
9	5 40.8 75 61 128.1		5 18.3 76 60 128.4														9
60	5 04.5 75 61 127.4																60

DECLINATION SAME NAME AS LATITUDE

H.A.	24° 00′		24° 30′		25° 00′		25° 30′		26° 00′		26° 30′		27° 00′		27° 30′		H.A.
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
°	′ Δd Δt °		′ Δd Δt °		′ Δd Δt °		′ Δd Δt °		′ Δd Δt °		′ Δd Δt °		′ Δd Δt °		′ Δd Δt °		°
91	14 25.9 61 72 70.6		14 44.3 61 72 70.2		15 02.6 61 72 69.8		15 20.8 61 72 69.4		15 39.0 61 71 68.9		15 57.2 60 71 68.5		16 15.3 60 71 68.1		16 33.3 60 71 67.7		91
2	13 42.7 62 72 70.0		14 01.1 61 72 69.6		14 19.5 61 71 69.2		14 37.9 61 71 68.8		14 56.2 61 71 68.4		15 14.5 61 71 68.0		15 32.7 61 71 67.6		15 50.9 61 70 67.1		2
3	12 59.5 62 72 69.4		13 18.1 62 71 69.0		13 36.6 62 71 68.6		13 55.1 62 71 68.2		14 13.6 61 71 67.8		14 32.0 61 71 67.4		14 50.3 61 70 67.0		15 08.6 61 70 66.6		3
4	12 16.6 62 71 68.9		12 35.3 62 71 68.5		12 53.9 62 71 68.0		13 12.5 62 71 67.6		13 31.1 62 71 67.2		13 49.6 62 70 66.8		14 08.1 62 70 66.4		14 26.5 61 70 66.0		4
95	11 33.8 63 71 68.3		11 52.6 63 71 67.9		12 11.4 62 71 67.5		12 30.1 62 70 67.1		12 48.8 62 70 66.7		13 07.4 62 70 66.3		13 26.1 62 70 65.9		13 44.6 62 70 65.5		95
6	10 51.2 63 71 67.7		11 10.1 63 71 67.3		11 29.0 63 70 66.9		11 47.9 63 70 66.5		12 06.7 63 70 66.1		12 25.5 63 70 65.7		12 44.2 62 69 65.3		13 02.9 62 69 64.9		6
7	10 08.8 64 70 67.1		10 27.8 63 70 66.7		10 46.8 63 70 66.3		11 05.8 63 70 65.9		11 24.7 63 70 65.5		11 43.7 63 69 65.1		12 02.6 63 69 64.7		12 21.4 63 69 64.3		7
8	9 26.5 64 70 66.5		9 45.7 64 70 66.1		10 04.8 64 70 65.7		10 23.9 64 69 65.3		10 43.0 64 69 64.9		11 02.1 63 69 64.5		11 21.1 63 69 64.2		11 40.1 63 69 63.8		8
9	8 44.5 64 70 65.9		9 03.8 64 70 65.5		9 23.0 64 69 65.1		9 42.3 64 69 64.7		10 01.5 64 69 64.4		10 20.7 64 68 64.0		10 39.8 64 68 63.6		10 59.0 64 68 63.2		9
100	8 02.6 65 69 65.3		8 22.0 65 69 64.9		8 41.4 65 69 64.5		9 00.8 65 69 64.2		9 20.1 64 69 63.8		9 39.5 64 68 63.4		9 58.8 64 68 63.0		10 18.0 64 68 62.6		100
1	7 20.9 65 69 64.7		7 40.5 65 69 64.3		8 00.0 65 69 63.9		8 19.5 65 68 63.6		8 39.0 65 68 63.2		8 58.5 65 68 62.8		9 17.9 65 68 62.4		9 37.3 65 67 62.0		1
2	6 39.5 66 69 64.1		6 59.2 66 69 63.7		7 18.8 66 68 63.4		7 38.5 65 68 63.0		7 58.1 65 68 62.6		8 17.7 65 68 62.2		8 37.3 65 67 61.8		8 56.9 65 67 61.4		2
3	5 58.2 66 68 63.5		6 18.1 66 68 63.1		6 37.9 66 68 62.8		6 57.7 66 68 62.4		7 17.4 66 67 62.0		7 37.2 66 67 61.6		7 56.9 66 67 61.2		8 16.6 66 67 60.9		3
4	5 17.2 67 68 62.9		5 37.2 67 68 62.5		5 57.1 66 68 62.1		6 17.0 66 67 61.8		6 37.0 66 67 61.4		6 56.8 66 67 61.0		7 16.7 66 67 60.6		7 36.6 66 66 60.3		4
105					5 16.6 67 67 61.5		5 36.7 67 67 61.2		5 56.7 67 67 60.8		6 16.8 67 66 60.4		6 36.8 67 66 60.0		6 56.8 67 66 59.7		105
6									5 16.7 67 66 60.2		5 36.9 67 66 59.8		5 57.1 67 66 59.4		6 17.2 67 66 59.1		6
7													5 17.6 68 66 58.8		5 37.9 68 65 58.5		7

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Lat. 40°

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
00	74 00.0	1.0 02	180.0	74 30.0	1.0 02	180.0	75 00.0	1.0 02	180.0	75 30.0	1.0 02	180.0	76 00.0	1.0 02	180.0	76 30.0	1.0 03	180.0	77 00.0	1.0 03	180.0	77 30.0	1.0 03	180.0	00
1	73 58.7	1.0 07	176.7	74 28.6	1.0 07	176.6	74 58.6	1.0 07	176.5	75 28.6	1.0 07	176.4	75 58.5	1.0 07	176.3	76 28.5	1.0 08	176.2	76 58.4	1.0 08	176.0	77 28.4	1.0 08	175.9	1
2	73 54.7	1.0 11	173.4	74 24.6	1.0 11	173.2	74 54.4	99 12	173.0	75 24.2	99 12	172.8	75 54.1	99 12	172.6	76 23.9	99 13	172.4	76 53.7	99 13	172.1	77 23.5	99 14	171.8	2
3	73 48.1	99 15	170.1	74 17.8	99 16	169.9	74 47.4	99 16	169.6	75 17.1	99 17	169.3	75 46.7	99 17	169.0	76 16.3	99 18	168.6	76 45.8	98 18	168.2	77 15.4	98 19	167.9	3
4	73 39.0	98 19	166.9	74 08.4	98 20	166.6	74 37.8	98 20	166.2	75 07.2	98 21	165.8	75 36.5	98 22	165.4	76 05.8	97 22	164.9	76 35.0	97 23	164.5	77 04.2	97 24	163.9	4
05	73 27.3	97 23	163.8	73 56.5	97 24	163.3	74 25.6	97 25	162.9	74 54.6	97 25	162.4	75 23.5	96 26	161.9	75 52.4	96 27	161.4	76 21.3	96 27	160.8	76 50.0	96 28	160.2	05
6	73 13.3	96 27	160.7	73 42.1	96 28	160.2	74 10.8	96 29	159.7	74 39.4	95 29	159.1	75 08.0	95 30	158.5	75 36.4	95 31	157.9	76 04.8	94 32	157.2	76 33.0	94 33	156.5	6
7	72 57.0	95 31	157.7	73 25.4	94 32	157.1	73 53.6	94 32	156.5	74 21.8	94 33	155.9	74 49.9	93 34	155.3	75 17.9	93 35	154.5	75 45.7	93 36	153.8	76 13.4	92 37	153.0	7
8	72 38.4	93 34	154.8	73 06.4	93 35	154.2	73 34.2	93 36	153.5	74 02.0	92 37	152.8	74 29.5	92 38	152.1	74 57.0	91 39	151.3	75 24.2	91 40	150.5	75 51.3	90 41	149.7	8
9	72 17.8	92 38	152.0	72 45.3	91 38	151.3	73 12.7	91 39	150.6	73 39.9	91 40	149.9	74 07.0	90 41	149.1	74 33.9	89 42	148.3	75 00.5	89 43	147.4	75 27.0	88 44	146.5	9
10	71 55.3	90 41	149.3	72 22.3	90 41	148.5	72 49.2	89 42	147.8	73 15.9	89 43	147.0	73 42.4	88 44	146.2	74 08.7	87 45	145.3	74 34.8	87 46	144.4	75 00.6	86 47	143.4	10
1	71 30.9	89 44	146.6	71 57.4	88 44	145.9	72 23.8	88 45	145.1	72 49.9	87 46	144.3	73 15.9	86 47	143.4	73 41.6	85 48	142.5	74 07.1	85 49	141.6	74 32.3	84 50	140.6	1
2	71 04.8	87 46	144.1	71 30.8	86 47	143.4	71 56.6	86 48	142.6	72 22.3	85 49	141.7	72 47.7	84 50	140.8	73 12.8	83 51	139.9	73 37.7	82 52	138.9	74 02.3	82 53	137.9	2
3	70 37.1	85 49	141.7	71 02.6	85 49	140.9	71 27.9	84 50	140.1	71 53.0	83 51	139.2	72 17.9	82 52	138.3	72 42.4	81 53	137.4	73 06.7	81 54	136.4	73 30.7	79 55	135.3	3
4	70 07.9	84 51	139.4	70 32.9	83 52	138.6	70 57.7	82 53	137.8	71 22.3	81 53	136.9	71 46.6	81 54	135.9	72 10.6	80 55	135.0	72 34.3	79 56	134.0	72 57.7	77 57	132.9	4
15	69 37.3	82 53	137.2	70 01.9	81 54	136.4	70 26.2	81 55	135.5	70 50.2	80 56	134.6	71 14.0	79 56	133.7	71 37.5	78 57	132.7	72 00.6	77 58	131.7	72 23.5	76 59	130.6	15
6	69 05.5	81 55	135.1	69 29.6	80 56	134.3	69 53.4	79 57	133.4	70 16.9	78 57	132.5	70 40.2	77 58	131.5	71 03.1	76 59	130.6	71 25.7	75 60	129.5	71 48.0	74 61	128.5	6
7	68 32.5	79 57	133.1	68 56.1	78 58	132.3	69 19.4	77 58	131.4	69 42.5	76 59	130.5	70 05.2	75 60	129.5	70 27.7	74 61	128.5	70 49.8	73 62	127.5	71 11.5	72 62	126.4	7
8	67 58.4	78 58	131.2	68 21.5	77 59	130.3	68 44.4	76 60	129.4	69 07.0	75 61	128.5	69 29.3	74 61	127.6	69 51.2	73 62	126.6	70 12.8	71 63	125.6	70 34.1	70 64	124.5	8
9	67 23.3	76 60	129.3	67 46.0	75 61	128.5	68 08.4	74 61	127.6	68 30.6	73 62	126.7	68 52.4	72 63	125.7	69 13.9	71 64	124.7	69 35.0	70 64	123.7	69 55.8	69 65	122.7	9
20	66 47.3	75 61	127.6	67 09.6	74 62	126.7	67 31.6	73 63	125.8	67 53.3	72 63	124.9	68 14.7	71 64	124.0	68 35.7	70 65	123.0	68 56.4	68 66	122.0	69 16.8	67 66	121.0	20
1	66 10.5	73 63	125.9	66 32.3	72 63	125.0	66 53.9	71 64	124.1	67 15.2	70 65	123.2	67 36.2	69 65	122.3	67 56.8	68 66	121.3	68 17.1	67 67	120.3	68 37.0	66 67	119.3	1
2	65 32.8	72 64	124.2	65 54.3	71 65	123.4	66 15.5	70 65	122.5	66 36.4	69 66	121.6	66 57.0	68 66	120.7	67 17.2	67 67	119.7	67 37.1	66 68	118.8	67 56.6	65 68	117.8	2
3	64 54.5	71 65	122.7	65 15.6	70 66	121.8	65 36.4	69 66	121.0	65 56.9	68 67	120.1	66 17.1	67 67	119.2	66 37.0	66 68	118.2	66 56.5	65 69	117.3	67 15.7	63 69	116.3	3
4	64 15.5	70 66	121.2	64 36.2	69 67	120.3	64 56.7	68 67	119.5	65 16.9	67 68	118.6	65 36.7	66 68	117.7	65 56.2	65 69	116.8	66 15.4	63 69	115.8	66 34.2	63 70	114.9	4
25	63 35.9	69 67	119.7	63 56.3	68 67	118.9	64 16.4	67 68	118.1	64 36.3	66 69	117.2	64 55.8	65 69	116.3	65 15.0	63 70	115.4	65 33.8	62 70	114.5	65 52.3	61 71	113.5	25
6	62 55.7	67 68	118.4	63 15.8	67 68	117.5	63 35.6	66 69	116.7	63 55.1	65 69	115.8	64 14.3	63 70	115.0	64 33.2	62 70	114.1	64 51.8	61 71	113.1	65 10.0	60 71	112.2	6
7	62 15.0	66 69	117.0	62 34.8	66 69	116.2	62 54.3	65 70	115.4	63 13.5	64 70	114.5	63 32.4	63 70	113.7	63 51.0	61 71	112.8	64 09.3	60 71	111.9	64 27.2	59 72	111.0	7
8	61 33.8	66 69	115.8	61 53.3	65 70	115.0	62 12.6	64 70	114.1	62 31.5	63 71	113.3	62 50.2	62 71	112.4	63 08.5	61 72	111.6	63 26.5	59 72	110.7	63 44.1	58 72	109.8	8
9	60 52.2	65 70	114.5	61 11.5	64 70	113.7	61 30.4	63 71	112.9	61 49.1	62 71	112.1	62 07.5	61 72	111.3	62 25.6	60 72	110.4	62 43.3	59 72	109.5	63 00.7	57 73	108.6	9
30	60 10.2	64 71	113.3	60 29.2	63 71	112.5	60 47.9	62 71	111.7	61 06.4	61 72	110.9	61 24.5	60 72	110.1	61 42.3	59 73	109.3	61 59.8	58 73	108.4	62 17.0	57 73	107.5	30
1	59 27.8	63 71	112.2	59 46.6	62 72	111.4	60 05.1	61 72	110.6	60 23.3	60 72	109.8	60 41.2	59 73	109.0	60 58.8	58 73	108.2	61 16.1	57 73	107.3	61 33.1	56 74	106.5	1
2	58 45.1	62 72	111.1	59 03.6	61 72	110.3	59 21.9	60 72	109.5	59 39.9	59 73	108.7	59 57.6	58 73	107.9	60 15.0	58 73	107.1	60 32.1	56 74	106.3	60 48.9	55 74	105.4	2
3	58 02.0	62 72	110.0	58 20.4	61 73	109.2	58 38.4	60 73	108.5	58 56.2	59 73	107.7	59 13.7	58 74	106.9	59 30.9	57 74	106.1	59 47.9	56 74	105.3	60 04.5	55 74	104.4	3
4	57 18.7	61 73	108.9	57 36.8	60 73	108.2	57 54.7	59 73	107.4	58 12.3	58 74	106.7	58 29.6	57 74	105.9	58 46.7	56 74	105.1	59 03.4	55 74	104.3	59 19.9	54 75	103.5	4
35	56 35.1	60 73	107.9	56 53.0	59 73	107.2	57 10.7	59 74	106.4	57 28.2	58 74	105.7	57 45.3	57 74	104.9	58 02.2	56 74	104.2	58 18.8	55 75	103.4	58 35.1	54 75	102.6	35
6	55 51.2	60 73	106.9	56 09.0	59 74	106.2	56 26.6	58 74	105.5	56 43.8	57 74	104.7	57 00.8	56 74	104.0	57 17.5	55 75	103.2	57 34.0	54 75	102.4	57 50.1	53 75	101.7	6
7	55 07.2	59 74	106.0	55 24.8	58 74	105.3	55 42.2	58 74	104.5	55 59.3	57 75	103.8	56 16.1	56 75	103.1	56 32.7	55 75	102.3	56 49.0	54 75	101.6	57 05.1	53 75	100.8	7
8	54 22.9	59 74	105.0	54 40.3	58 74	104.3	54 57.6	57 75	103.6	55 14.6	56 75	102.9	55 31.3	55 75	102.2	55 47.7	54 75	101.4	56 03.9	54 75	100.7	56 19.8	53 76	99.9	8
9	53 38.4	58 74	104.1	53 55.7	57 75	103.4	54 12.8	57 75	102.7	54 29.7	56 75	102.0	54 46.3	55 75	101.3	55 02.6	54 75	100.6	55 18.7	53 76	99.8	55 34.5	52 76	99.1	9
40	52 53.7	58 75	103.2	53 10.9	57 75	102.6	53 27.9	56 75	101.9	53 44.7	55 75	101.2	54 01.1	55 75	100.5	54 17.4	54 76	99.8	54 33.4	53 76	99.0	54 49.1	52 76	98.3	40
1	52 08.9	57 75	102.4	52 26.0	57 75	101.7	52 42.9	56 75	101.0	52 59.5	55 75	100.3	53 15.9	54 76	99.6	53 32.0	53 76	98.9	53 47.9	53 76	98.2	54 03.6	52 76	97.5	1
2	51 23.9	57 75	101.5	51 40.9	56 75	100.9	51 57.7	55 76	100.2	52 14.2	55 76	99.5	52 30.5	54 76	98.8	52 46.6	53 76	98.1	53 02.4	52 76	97.4	53 17.9	51 76	96.7	2
3	50 38.8	57 75	100.7	50 55.7	56 76	100.1	51 12.4	55 76	99.4	51 28.8	54 76	98.7	51 45.1	54 76	98.1	52 01.0	53 76	97.4	52 16.8	52 76	96.7	52 32.3	51 76	96.0	3
4	49 53.6	56 76	99.9	50 10.4	56 76	99.3	50 27.0	55 76	98.6	50 43.4	54 76	97.9	50 59.5	53 76	97.3	51 15.4	53 76	96.6	51 31.1	52 76	95.9	51 46.5	51 76	95.2	4
45	49 08.3	56 76	99.1	49 25.0	55 76	98.5	49 41.5	55 76	97.8	49 57.8	54 76	97.2	50 13.9	53 76	96.5	50 29.7	52 76	95.9	50 45.3	52 76	95.2	51 00.7	51 76	94.5	45
6	48 22.9	56 76	98.3	48 39.5	55 76	97.7	48 55.9	54 76	97.1	49 12.2	54 76	96.4	49 28.2	53 76	95.8	49 44.0	52 76	95.1	49 59.5	52 76	94.5	50 14.9	51 76	93.8	6
7	47 37.3	56 76	97.6	47 53.9	55 76	97.0	48 10.3	54 76	96.3	48 26.5	54 76	95.7	48 42.4	53 76	95.1	48 58.2	52 76	94.4	49 13.7	51 76	93.8	49 29.0	51 77	93.1	7
8	46 51.7	55 76	96.8	47 08.3	55 76	96.2	47 24.6	54 76	95.6	47 40.7	53 76	95.0	47 56.6	53 76	94.3	48 12.3	52 76	93.7	48 27.8	51 77	93.1	48 43.1	51 77	92.4	8
9	46 06.1	55 76	96.1	46 22.5	55 76	95.5	46 38.8	54 76	94.9	46 54.9	53 76	94.3	47 10.8	53 76	93.6	47 26.4	52 77	93.0	47 41.9	51 77	92.4	47 57.2	50 77	91.7	9
50	45 20.3	55 76	95.4	45 36.8	54 76	94.8	45 53.0	54 76	94.2	46 09.0	53 76	93.6	46 24.9	52 77	93.0	46 40.5	52 77	92.3	46 56.0	51 77	91.7	47 11.2	50 77	91.1	50
1	44 34.6	55 76	94.7	44 50.9	54 76	94.1	45 07.1	54 76	93.5	45 23.1	53 77	92.9	45 39.0	52 77	92.3	45 54.6	52 77	91.7	46 10.0	51 77	91.0	46 25.3	50 77	90.4	1
2	43 48.7	55 76	94.0	44 05.1	54 76	93.4	44 21.2	54 77	92.8	44 37.2	53 77	92.2	44 53.0	52 77	91.6	45 08.6	52 77	91.0	45 24.1	51 77	90.4	45 39.3	50 77	89.8	2
3	43 02.9	55 76	93.3	43 19.2	54 77	92.7	43 35.3	54 77	92.1	43 51.3	53 77	91.5	44 07.1	52 77	90.9	44 22.7	52 77	90.4	44 38.1	51 77	89.8	44 53.3	50 77	89.1	3
4	42 17.0	55 77	92.6	42 33.3	54 77	92.0	42 49.4	53 77	91.5	43 05.3	53 77	90.9	43 21.1	52 77	90.3	43 36.7	52 77	89.7	43 52.1	51 77	89.1	44 07.4	50 77	88.5	4
55	41 31.0	55 77	91.9	41 47.3	54 77	91.4	42 03.4	53 77	90.8	42 19.4	53 77	90.2	42 35.2	52 77	89.7	42 50.8	52 77	89.1	43 06.2	51 77	88.5	43 21.4	51 77	87.9	55
6	40 45.1	55 77	91.3	41 01.4	54 77	90.7	41 17.5	53 77	90.2	41 33.4	53 77	89.6	41 49.2	52 77	89.0	42 04.8	52 77	88.4	42 20.3	51 77	87.9	42 35.5	51 76	87.3	6
7	39 59.1	54 77	90.6	40 15.4	54 77	90.1	40 31.5	53 77	89.5	40 47.5	53 77	89.0	41 03.2	52 77	88.4	41 18.9	52 77	87.8	41 34.3	51 76	87.3	41 49.6	51 76	86.7	7
8	39 13.2	54 77	90.0	39 29.4	54 77	89.4	39 45.5	53 77	88.9	40 01.5	53 77	88.3	40 17.3	52 77	87.8	40 33.0	52 76	87.2	40 48.4	51 76	86.6	41 03.7	51 76	86.1	8
9	38 27.2	55 77	89.3	38 43.5	54 77	88.8	38 59.6	54 77	88.3	39 15.6	53 77	87.7	39 31.4	52 76	87.2	39 47.1	52 76	86.6	40 02.6	51 76	86.0	40 17.9	51 76	85.5	9
60	37 41.2	55 77	88.7	37 57.5	54 77	88.2	38 13.7	54 77	87.6	38 29.7	53 76	87.1	38 45.5	53 76	86.5	39 01.2	52 76	86.0	39 16.7	52 76	85.4	39 32.1	51 76	84.9	60
1	36 55.3	55 77	88.1	37 11.6	54 77	87.6	37 27.8	54 76	87.0	37 43.8	53 76	86.5	37 59.6	53 76	85.9	38 15.4	52 76	85.4	38 30.9	52 76	84.9	38 46.3	51 76	84.3	1
2	36 09.4	55 76	87.5	36 25.7	54 76	86.9	36 41.9	54 76	86.4	36 57.9	53 76	85.9	37 13.8	53 76	85.3	37 29.6	52 76	84.8	37 45.2	52 76	84.3	38 00.6	51 76	83.7	2
3	35 23.5	55 76	86.8	35 39.8	54 76	86.3	35 56.0	54 76	85.8	36 12.1	53 76	85.3	36 28.0	53 76	84.8	36 43.8	52 76	84.2	36 59.5	52 76	83.7	37 15.0	51 76	83.2	3
4	34 37.6	55 76	86.2	34 54.0	54 76	85.7	35 10.2	54 76	85.2	35 26.3	53 76	84.7	35 42.3	53 76	84.2	35 58.1	53 76	83.6	36 13.8	52 76	83.1	36 29.4	52 76	82.6	4
65	33 51.7	55 76	85.6	34 08.1	54 76	85.1	34 24.4	54 76	84.6	34 40.6	54 76	84.1	34 56.6	53 76	83.6	35 12.5	53 76	83.1	35 28.2	52 76	82.5	35 43.8	52 76	82.0	65
6	33 05.9	55 76	85.0	33 22.4	55 76	84.5	33 38.7	54 76	84.0	33 54.9	54 76	83.5	34 10.9	53 76	83.0	34 26.9	53 76	82.5	34 42.7	52 76	82.0	34 58.3	52 76	81.5	6
7	32 20.2	55 76	84.4	32 36.6	55 76	83.9	32 53.0	54 76	83.4	33 09.2	54 76	82.9	33 25.3	54 76	82.4	33 41.3	53 76	81.9	33 57.2	53 76	81.4	34 12.9	52 76	80.9	7
8	31 34.4	55 76	83.8	31 51.0	55 76	83.3	32 07.4	54 76	82.8	32 23.6	54 76	82.3	32 39.8	54 76	81.8	32 55.8	53 76	81.3	33 11.8	53 76	80.8	33 27.6	52 75	80.3	8
9	30 48.8	55 76	83.2	31 05.3	55 76	82.8	31 21.8	55 76	82.3	31 38.1	54 76	81.8	31 54.3	54 76	81.3	32 10.4	53 76	80.8	32 26.4	53 75	80.3	32 42.3	53 75	79.8	9
70	30 03.2	55 76	82.6	30 19.8	55 76	82.2	30 36.3	55 76	81.7	30 52.7	54 76	81.2	31 08.9	54 76	80.7	31 25.1	54 75	80.2	31 41.2	53 75	79.7	31 57.1	53 75	79.2	70
1	29 17.6	55 76	82.1	29 34.3	55 76	81.6	29 50.8	55 76	81.1	30 07.3	55 76	80.6	30 23.6	54 75	80.1	30 39.9	54 75	79.7	30 56.0	54 75	79.2	31 12.0	53 75	78.7	1
2	28 32.1	55 76	81.5	28 48.8	55 76	81.0	29 05.5	55 76	80.5	29 22.0	55 75	80.1	29 38.4	55 75	79.6	29 54.7	54 75	79.1	30 10.9	54 75	78.6	30 27.0	53 75	78.1	2
3	27 46.7	55 76	80.9	28 03.5	55 75	80.4	28 20.2	55 75	80.0	28 36.7	55 75	79.5	28 53.2	55 75	79.0	29 09.6	54 75	78.5	29 25.9	54 75	78.0	29 42.0	54 75	77.6	3
4	27 01.4	55 75	80.3	27 18.2	55 75	79.9	27 34.9	55 75	79.4	27 51.6	55 75	78.9	28 08.1	55 75	78.4	28 24.6	55 75	78.0	28 41.0	54 75	77.5	28 57.2	54 75	77.0	4
75	26 16.1	55 75	79.7	26 33.0	55 75	79.3	26 49.8	55 75	78.8	27 06.5	55 75	78.4	27 23.2	55 75	77.9	27 39.7	55 75	77.4	27 56.1	55 75	76.9	28 12.5	54 74	76.5	75
6	25 30.9	57 75	79.2	25 47.9	56 75	78.7	26 04.8	56 75	78.3	26 21.6	56 75	77.8	26 38.3	56 75	77.3	26 54.9	55 75	76.9	27 11.4	55 74	76.4	27 27.8	55 74	75.9	6
7	24 45.8	57 75	78.6	25 02.8	57 75	78.1	25 19.8	56 75	77.7	25 36.7	56 75	77.2	25 53.5	56 74	76.8	26 10.2	56 74	76 3	26 26.8	55 74	75.8	26 43.3	55 74	75.4	7
8	24 00.8	57 75	78.0	24 17.9	57 75	77.6	24 34.9	57 75	77.1	24 51.9	56 74	76.7	25 08.8	56 74	76.2	25 25.6	56 74	75.8	25 42.3	56 74	75.3	25 58.9	55 74	74.8	8
9	23 15.9	57 75	77.5	23 33.1	57 75	77.0	23 50.2	57 74	76.6	24 07.2	57 74	76.1	24 24.2	56 74	75.7	24 41.1	56 74	75.2	24 57.9	56 74	74.7	25 14.6	56 74	74.3	9
80	22 31.1	56 74	76.9	22 48.3	57 74	76.4	23 05.5	57 74	76.0	23 22.7	57 74	75.6	23 39.7	57 74	75.1	23 56.7	56 74	74.7	24 13.6	56 74	74.2	24 30.4	56 73	73.7	80
1	21 46.3	58 74	76.3	22 03.7	58 74	75.9	22 21.0	58 74	75.4	22 38.2	57 74	75.0	22 55.4	57 74	74.5	23 12.4	57 74	74.1	23 29.4	57 73	73.6	23 46.3	56 73	73.2	1
2	21 01.7	58 74	75.7	21 19.2	58 74	75.3	21 36.6	58 74	74.9	21 53.9	58 74	74.4	22 11.1	57 74	74.0	22 28.3	57 73	73.5	22 45.4	57 73	73.1	23 02.4	57 73	72.7	2
3	20 17.3	59 74	75.2	20 34.8	58 74	74.7	20 52.3	58 74	74.3	21 09.7	58 74	73.9	21 27.0	58 73	73.4	21 44.3	57 73	73.0	22 01.5	57 73	72.6	22 18.6	57 73	72.1	3
4	19 32.9	59 74	74.6	19 50.5	59 74	74.2	20 08.1	58 73	73.7	20 25.6	58 73	73.3	20 43.0	58 73	72.9	21 00.4	58 73	72.4	21 17.7	58 73	72.0	21 34.9	57 73	71.6	4
85	18 48.6	59 74	74.0	19 06.3	59 73	73.6	19 24.0	59 73	73.2	19 41.6	59 73	72.7	19 59.1	58 73	72.3	20 16.6	58 73	71.9	20 34.0	58 72	71.4	20 51.4	58 72	71.0	85
6	18 04.5	59 73	73.5	18 22.3	59 73	73.0	18 40.1	59 73	72.6	18 57.8	59 73	72.2	19 15.4	59 73	71.8	19 33.0	59 72	71.3	19 50.5	58 72	70.9	20 08.0	58 72	70.5	6
7	17 20.5	60 73	72.9	17 38.4	60 73	72.5	17 56.3	59 73	72.0	18 14.1	59 73	71.6	18 31.8	59 72	71.2	18 49.5	59 72	70.8	19 07.2	59 72	70.3	19 24.8	58 72	69.9	7
8	16 36.6	60 73	72.3	16 54.7	60 73	71.9	17 12.6	60 73	71.5	17 30.5	60 72	71.1	17 48.4	59 72	70.6	18 06.2	59 72	70.2	18 24.0	59 72	69.8	18 41.7	59 72		8
9	15 52.9	60 73	71.7	16 11.0	60 72	71.3	16 29.1	60 72	70.9	16 47.1	60 72	70.5	17 05.1	60 72	70.1	17 23.0	59 72	69.7	17 40.9	59 72					9
90	15 09.4	61 72	71.2	15 27.6	61 72	70.8	15 45.8	61 72	70.3	16 03.9	60 72	69.9	16 22.0	60 72	69.5	16 40.0	60 71	69.1	16 58.0	60 71					90

Lat. 40°

H.A.	24° 00′ Alt.	Δd	Δt	Az.	24° 30′ Alt.	Δd	Δt	Az.	25° 00′ Alt.	Δd	Δt	Az.	25° 30′ Alt.	Δd	Δt	Az.	26° 00′ Alt.	Δd	Δt	Az.	26° 30′ Alt.	Δd	Δt	Az.	27° 00′ Alt.	Δd	Δt	Az.	27° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
00	26 00.0	1.0	01	180.0	25 30.0	1.0	01	180.0	25 00.0	1.0	01	180.0	24 30.0	1.0	01	180.0	24 00.0	1.0	01	180.0	23 30.0	1.0	01	180.0	23 00.0	1.0	01	180.0	22 30.0	1.0	01	180.0	00
1	25 59.6	1.0	02	179.0	25 29.6	1.0	02	179.0	24 59.6	1.0	02	179.0	24 29.6	1.0	02	179.0	23 59.6	1.0	02	179.0	23 29.6	1.0	02	179.0	22 59.6	1.0	02	179.0	22 29.6	1.0	02	179.0	1
2	25 58.4	1.0	03	178.0	25 28.4	1.0	03	178.0	24 58.4	1.0	03	178.0	24 28.4	1.0	03	178.0	23 58.4	1.0	03	178.0	23 28.4	1.0	03	178.0	22 58.4	1.0	03	178.1	22 28.5	1.0	03	178.1	2
3	25 56.3	1.0	05	177.0	25 26.4	1.0	05	177.0	24 56.4	1.0	05	177.0	24 26.4	1.0	05	177.0	23 56.5	1.0	05	177.0	23 26.5	1.0	05	177.1	22 56.5	1.0	04	177.1	22 26.5	1.0	04	177.1	3
4	25 53.5	1.0	06	175.9	25 23.5	1.0	06	176.0	24 53.6	1.0	06	176.0	24 23.6	1.0	06	176.0	23 53.7	1.0	06	176.1	23 23.7	1.0	06	176.1	22 53.8	1.0	06	176.1	22 23.8	1.0	06	176.2	4
05	25 49.8	1.0	07	174.9	25 19.9	1.0	07	175.0	24 50.0	1.0	07	175.0	24 20.1	1.0	07	175.0	23 50.1	1.0	07	175.1	23 20.2	1.0	07	175.1	22 50.3	1.0	07	175.2	22 20.4	1.0	07	175.2	05
6	25 45.4	1.0	09	173.9	25 15.5	1.0	09	174.0	24 45.6	1.0	09	174.0	24 15.7	1.0	09	174.1	23 45.8	1.0	08	174.1	23 15.9	1.0	08	174.2	22 46.0	1.0	08	174.2	22 16.2	1.0	08	174.2	6
7	25 40.1	99	10	172.9	25 10.2	99	10	173.0	24 40.4	99	10	173.0	24 10.6	99	10	173.1	23 40.7	99	10	173.1	23 10.9	99	10	173.2	22 41.0	99	10	173.2	22 11.2	99	10	173.3	7
8	25 34.0	99	11	171.9	25 04.2	99	11	172.0	24 34.4	99	11	172.0	24 04.6	99	11	172.1	23 34.8	99	11	172.2	23 05.0	99	11	172.2	22 35.2	99	11	172.3	22 05.4	99	11	172.3	8
9	25 27.1	99	13	170.9	24 57.4	99	13	171.0	24 27.6	99	13	171.0	23 57.9	99	12	171.1	23 28.2	99	12	171.2	22 58.4	99	12	171.3	22 28.7	99	12	171.3	21 58.9	99	12	171.4	9
10	25 19.5	99	14	169.9	24 49.8	99	14	170.0	24 20.1	99	14	170.1	23 50.4	99	14	170.1	23 20.7	99	14	170.2	22 51.1	99	14	170.3	22 21.4	99	13	170.4	21 51.7	99	13	170.4	10
1	25 11.9	99	15	168.9	24 41.4	99	15	169.0	24 11.8	99	15	169.1	23 42.2	99	15	169.2	23 12.5	99	15	169.2	22 42.9	99	15	169.3	22 13.3	99	15	169.4	21 43.7	99	15	169.5	1
2	25 01.7	98	17	167.9	24 32.2	98	17	168.0	24 02.7	98	16	168.1	23 33.1	98	16	168.2	23 03.6	98	16	168.3	22 34.0	99	16	168.4	22 04.5	99	16	168.5	21 34.9	99	16	168.6	2
3	24 51.7	98	18	166.9	24 22.3	98	18	167.0	23 52.8	98	18	167.1	23 23.3	98	18	167.2	22 53.9	98	17	167.3	22 24.4	98	17	167.4	21 54.9	98	17	167.5	21 25.4	98	17	167.6	3
4	24 40.9	98	19	165.9	24 11.6	98	19	166.0	23 42.2	98	19	166.1	23 12.8	98	19	166.3	22 43.4	98	19	166.4	22 14.0	98	19	166.5	21 44.6	98	18	166.6	21 15.2	98	18	166.7	4
15	24 29.4	98	21	164.9	24 00.1	98	20	165.1	23 30.8	98	20	165.2	23 01.5	98	20	165.3	22 32.2	98	20	165.4	22 02.9	98	20	165.5	21 33.6	98	20	165.6	21 04.3	98	19	165.8	15
6	24 17.0	97	22	164.0	23 47.9	97	22	164.1	23 18.7	97	21	164.2	22 49.5	97	21	164.3	22 20.3	97	21	164.5	21 51.1	97	21	164.6	21 21.8	97	21	164.7	20 52.6	97	21	164.8	6
7	24 04.0	97	23	163.0	23 34.9	97	23	163.1	23 05.8	97	23	163.3	22 36.7	97	23	163.4	22 07.6	97	22	163.5	21 38.5	97	22	163.7	21 09.4	97	22	163.8	20 40.2	97	22	163.9	7
8	23 50.2	97	24	162.0	23 21.2	97	24	162.2	22 52.2	97	24	162.3	22 23.2	97	24	162.4	21 54.2	97	24	162.6	21 25.2	97	23	162.7	20 56.2	97	23	162.9	20 27.1	97	23	163.0	8
9	23 35.6	96	25	161.1	23 06.7	96	25	161.2	22 37.9	96	25	161.4	22 09.0	96	25	161.5	21 40.1	96	25	161.6	21 11.2	96	25	161.8	20 42.3	96	24	161.9	20 13.3	96	24	162.1	9
20	23 20.3	96	27	160.1	22 51.6	96	26	160.3	22 22.8	96	26	160.4	21 54.0	96	26	160.6	21 25.2	96	26	160.7	20 56.5	96	26	160.9	20 27.7	96	26	161.0	19 58.8	96	25	161.2	20
1	23 04.3	95	28	159.2	22 35.7	95	28	159.3	22 07.0	96	27	159.5	21 38.4	96	27	159.6	21 09.7	96	27	159.8	20 41.0	96	27	160.0	20 12.4	96	27	160.1	19 43.7	96	26	160.3	1
2	22 47.6	95	29	158.2	22 19.1	95	29	158.4	21 50.6	95	29	158.5	21 22.0	95	28	158.7	20 53.5	95	28	158.9	20 24.9	95	28	159.0	19 56.4	95	28	159.2	19 27.8	95	28	159.4	2
3	22 30.2	95	30	157.3	22 01.8	95	30	157.4	21 33.4	95	30	157.6	21 05.0	95	30	157.8	20 36.6	95	29	158.0	20 08.2	95	29	158.1	19 39.7	95	29	158.3	19 11.3	95	29	158.5	3
4	22 12.1	94	31	156.3	21 43.8	94	31	156.5	21 15.6	94	31	156.7	20 47.3	94	31	156.9	20 19.0	94	30	157.1	19 50.7	94	30	157.2	19 22.4	94	30	157.4	18 54.1	94	30	157.6	4
25	21 53.3	94	32	155.4	21 25.2	94	32	155.6	20 57.1	94	32	155.8	20 28.9	94	32	156.0	20 00.8	94	32	156.2	19 32.6	94	31	156.3	19 04.4	94	31	156.5	18 36.2	94	31	156.7	25
6	21 33.9	93	34	154.5	21 05.9	93	33	154.7	20 37.9	93	33	154.9	20 09.9	93	33	155.1	19 41.9	93	33	155.3	19 13.8	93	32	155.4	18 45.8	94	32	155.6	18 17.7	94	32	155.8	6
7	21 13.7	93	35	153.6	20 45.9	93	34	153.8	20 18.0	93	34	154.0	19 50.2	93	34	154.2	19 22.3	93	34	154.4	18 54.4	93	33	154.6	18 26.5	93	33	154.8	17 58.6	93	33	155.0	7
8	20 53.0	92	36	152.7	20 25.3	92	35	152.9	19 57.6	92	35	153.1	19 29.8	92	35	153.3	19 02.1	92	35	153.5	18 34.3	93	34	153.7	18 06.6	93	34	153.9	17 38.8	93	34	154.1	8
9	20 31.5	92	37	151.8	20 04.0	92	36	152.0	19 36.4	92	36	152.2	19 08.9	92	36	152.4	18 41.3	92	36	152.6	18 13.7	92	36	152.8	17 46.0	92	35	153.0	17 18.4	92	35	153.2	9
30	20 09.5	91	38	150.9	19 42.1	91	38	151.1	19 14.7	91	37	151.3	18 47.3	91	37	151.5	18 19.8	91	37	151.7	17 52.4	92	37	152.0	17 24.9	92	36	152.2	16 57.4	92	36	152.4	30
1	19 46.8	91	39	150.0	19 19.6	91	39	150.2	18 52.3	91	38	150.4	18 25.0	91	38	150.7	17 57.7	91	38	150.9	17 30.4	91	38	151.1	17 03.1	91	37	151.3	16 35.8	91	37	151.5	1
2	19 23.5	90	40	149.1	18 56.4	90	40	149.3	18 29.3	90	39	149.6	18 02.2	90	39	149.8	17 35.1	90	39	150.0	17 07.9	91	38	150.2	16 40.8	91	38	150.5	16 13.6	91	38	150.7	2
3	18 59.6	90	41	148.3	18 32.7	90	41	148.5	18 05.8	90	40	148.7	17 38.8	90	40	148.9	17 11.8	90	40	149.2	16 44.8	90	39	149.4	16 17.8	90	39	149.6	15 50.8	90	39	149.9	3
4	18 35.2	89	42	147.4	18 08.4	89	42	147.6	17 41.6	89	41	147.9	17 14.8	89	41	148.1	16 48.0	89	41	148.3	16 21.1	89	40	148.6	15 54.3	90	40	148.8	15 27.4	90	40	149.0	4
35	18 10.1	89	43	146.5	17 43.5	89	42	146.8	17 16.9	89	42	147.0	16 50.2	89	42	147.3	16 23.6	89	42	147.5	15 56.9	89	41	147.7	15 30.2	89	41	148.0	15 03.5	89	41	148.2	35
6	17 44.5	88	44	145.7	17 18.0	88	43	145.9	16 51.6	88	43	146.2	16 25.1	88	43	146.4	15 58.6	88	43	146.7	15 32.1	88	42	146.9	15 05.5	88	42	147.2	14 39.0	89	42	147.4	6
7	17 18.3	88	45	144.8	16 52.0	88	44	145.1	16 25.7	88	44	145.3	15 59.4	88	44	145.6	15 33.1	88	43	145.8	15 06.7	88	43	146.1	14 40.3	88	43	146.3	14 14.0	88	43	146.6	7
8	16 51.5	87	45	144.0	16 25.4	87	45	144.3	15 59.3	87	45	144.5	15 33.1	87	45	144.8	15 07.0	87	44	145.0	14 40.8	87	44	145.3	14 14.6	87	44	145.5	13 48.4	87	44	145.8	8
9	16 24.3	86	46	143.2	15 58.3	87	46	143.4	15 32.4	87	46	143.7	15 06.4	87	46	144.0	14 40.4	87	45	144.2	14 14.3	87	45	144.5	13 48.3	87	45	144.7	13 22.3	87	44	145.0	9
40	15 56.5	86	47	142.4	15 30.7	86	47	142.6	15 04.9	86	47	142.9	14 39.1	86	46	143.2	14 13.2	86	46	143.4	13 47.4	86	46	143.7	13 21.5	86	46	143.9	12 55.6	86	45	144.2	40
1	15 28.1	85	48	141.5	15 02.5	85	48	141.8	14 36.9	85	47	142.1	14 11.2	86	47	142.4	13 45.6	86	47	142.6	13 19.9	86	47	142.9	12 54.2	86	46	143.2	12 28.5	86	46	143.4	1
2	14 59.3	85	49	140.7	14 33.9	85	49	141.0	14 08.4	85	48	141.3	13 42.9	85	48	141.6	13 17.4	85	48	141.8	12 51.9	85	47	142.1	12 26.4	85	47	142.4	12 00.8	85	47	142.6	2
3	14 30.0	84	50	139.9	14 04.7	84	49	140.2	13 39.4	84	49	140.5	13 14.1	84	49	140.8	12 48.8	84	49	141.1	12 23.4	84	48	141.3	11 58.1	85	48	141.6	11 32.7	85	48	141.9	3
4	14 00.1	84	50	139.2	13 35.0	84	50	139.4	13 09.9	84	50	139.7	12 44.8	84	50	140.0	12 19.6	84	49	140.3	11 54.5	84	49	140.6	11 29.3	84	49	140.8	11 04.1	84	48	141.1	4
45	13 29.8	83	51	138.4	13 04.9	83	51	138.7	12 40.0	83	51	138.9	12 15.0	83	50	139.2	11 50.0	83	50	139.5	11 25.0	83	50	139.8	11 00.0	83	50	140.1	10 35.0	83	49	140.4	45
6	12 59.1	82	52	137.6	12 34.3	83	52	137.9	12 09.5	83	51	138.2	11 44.8	83	51	138.5	11 20.0	83	51	138.7	10 55.1	83	51	139.0	10 30.3	83	50	139.3	10 05.4	83	50	139.6	6
7	12 27.8	82	53	136.8	12 03.3	82	52	137.1	11 38.7	82	52	137.4	11 14.1	82	52	137.7	10 49.4	82	52	138.0	10 24.8	82	51	138.3	10 00.1	82	51	138.6	9 35.4	82	51	138.9	7
8	11 56.2	81	54	136.1	11 31.8	81	53	136.4	11 07.3	81	53	136.7	10 42.9	82	53	136.9	10 18.4	82	52	137.2	9 54.0	82	52	137.5	9 29.5	82	52	137.8	9 05.0	82	52	138.1	8
9	11 24.1	81	54	135.3	10 59.8	81	54	135.6	10 35.6	81	54	135.9	10 11.3	81	53	136.2	9 47.0	81	53	136.5	9 22.7	81	53	136.8	8 58.4	81	53	137.1	8 34.1	81	52	137.4	9
50	10 51.5	80	55	134.6	10 27.5	80	55	134.9	10 03.4	80	54	135.2	9 39.3	80	54	135.5	9 15.2	80	54	135.8	8 51.0	80	54	136.1	8 26.9	81	53	136.4	8 02.7	81	53	136.7	50
1	10 18.6	80	56	133.8	9 54.7	80	55	134.1	9 30.8	80	55	134.4	9 06.8	80	55	134.7	8 42.9	80	54	135.0	8 18.9	80	54	135.3	7 55.0	80	54	135.6	7 31.0	80	54	135.9	1
2	9 45.2	79	56	133.1	9 21.5	79	56	133.4	8 57.7	79	56	133.7	8 34.0	79	55	134.0	8 10.2	79	55	134.3	7 46.4	79	55	134.6	7 22.6	79	55	134.9	6 58.8	79	54	135.2	2
3	9 11.4	78	57	132.3	8 47.9	79	57	132.7	8 24.3	79	56	133.0	8 00.7	79	56	133.3	7 37.1	79	56	133.6	7 13.5	79	56	133.9	6 49.9	79	55	134.2	6 26.3	79	55	134.5	3
4	8 37.3	78	58	131.6	8 13.9	78	57	131.9	7 50.5	78	57	132.3	7 27.1	78	57	132.6	7 03.6	78	56	132.9	6 40.2	78	56	133.2	6 16.8	78	56	133.5	5 53.3	78	56	133.8	4
55	8 02.7	77	58	130.9	7 39.5	77	58	131.2	7 16.3	77	58	131.5	6 53.0	77	57	131.9	6 29.8	78	57	132.2	6 06.5	78	57	132.5	5 43.2	78	56	132.8	5 19.9	78	56	133.1	55
6	7 27.8	77	59	130.2	7 04.7	77	59	130.5	6 41.7	77	58	130.8	6 18.6	77	58	131.2	5 55.5	77	58	131.5	5 32.4	77	57	131.8	5 09.3	77	57	132.1					6
7	6 52.5	76	59	129.5	6 29.6	76	59	129.8	6 06.7	76	59	130.1	5 43.8	76	59	130.5	5 20.9	76	58	130.8													7
8	6 16.8	76	60	128.8	5 54.1	76	60	129.1	5 31.4	76	59	129.4	5 08.7	76	59	129.8																	8
9	5 40.8	75	61	128.1	5 18.3	75	60	128.4																									9
60	5 04.5	75	61	127.4																													60

DECLINATION SAME NAME AS LATITUDE

H.A.	24° 00′ Alt.	Δd	Δt	Az.	24° 30′ Alt.	Δd	Δt	Az.	25° 00′ Alt.	Δd	Δt	Az.	25° 30′ Alt.	Δd	Δt	Az.	26° 00′ Alt.	Δd	Δt	Az.	26° 30′ Alt.	Δd	Δt	Az.	27° 00′ Alt.	Δd	Δt	Az.	27° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
91	14 25.9	61	72	70.6	14 44.3	61	72	70.2	15 02.6	61	72	69.8	15 20.8	61	72	69.4	15 39.0	61	71	68.9	15 57.2				16 15.3								00
2	13 42.7	62	72	70.0	14 01.1	61	72	69.6	14 19.5	61	71	69.2	14 37.9	61	71	68.8	14 56.2	61	71	68.4	15 14.5				15 32.7								1
3	12 59.5	62	72	69.4	13 18.1	62	71	69.0	13 36.6	62	71	68.6	13 55.1	62	71	68.2	14 13.6	61	71	67.8	14 32.0				14 50.3								2
4	12 16.6	62	71	68.9	12 35.3	62	71	68.5	12 53.9	62	71	68.0	13 12.5	62	71	67.6	13 31.1	62	71	67.2	13 49.6				14 08.1								3
95	11 33.8	63	71	68.3	11 52.6	63	71	67.9	12 11.4	62	71	67.5	12 30.1	62	70	67.1	12 48.8	62	70	66.7	13 07.4				13 25.9								4
6	10 51.2	63	71	67.7	11 10.1	63	71	67.3	11 29.0	63	70	66.9	11 47.9	63	70	66.5	12 06.7	63	70	66.1	12 25.5				12 44.2								105
7	10 08.8	64	70	67.1	10 27.8	63	70	66.7	10 46.8	63	70	66.3	11 05.8	63	70	65.9	11 24.7	63	70	65.5	11 43.6				12 02.4								6
8	9 26.5	64	70	66.5	9 45.7	64	70	66.1	10 04.8	64	70	65.7	10 23.9	64	69	65.3	10 43.0	64	69	64.9	11 02.1				11 21.1								7
9	8 44.5	64	70	65.9	9 03.8	64	70	65.5	9 23.0	64	69	65.1	9 42.3	64	69	64.7	10 01.5	64	69	64.3	10 20.7				10 39.8								8
100	8 02.6	65	69	65.3	8 22.0	65	69	64.9	8 41.4	65	69	64.5	9 00.8	65	69	64.2	9 20.1	64	69	63.8	9 39.3				9 58.5								9
1	7 20.9	65	69	64.7	7 40.5	65	69	64.3	8 00.0	65	69	63.9	8 19.5	65	68	63.6	8 38.9	64	68	63.2	8 58.2				9 17.5								110
2	6 39.5	66	69	64.1	6 59.2	66	69	63.7	7 18.8	66	68	63.4	7 38.5	65	68	63.0	7 57.7	65	68	62.6	8 17.8				8 36.9								1
3	5 58.2	66	68	63.5	6 18.1	66	68	63.1	6 37.9	66	68	62.8	6 57.7	66	68	62.4	7 17.4	66	67	62.1	7 36.9				7 56.3								2
4	5 17.2	67	68	62.9	5 37.2	67	68	62.5	5 57.1	66	68	62.1	6 17.0	66	67	61.8	6 36.9	66	67	61.4	6 56.8				7 16.7								3
									5 16.6	67	67	61.5	5 36.7	67	67	61.2	5 56.7	67	67	60.8	6 16.7				6 36.6								

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Lat. 40°

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	
00	78 00.0	1.0 03	180.0	78 30.0	1.0 03	180.0	79 00.0	1.0 03	180.0	80 00.0	1.0 03	180.0	82 00.0	1.0 04	180.0	84 00.0	1.0 05	180.0	84 30.0	1.0 06	180.0	85 30.0	1.0 07	180.0	00
1	77 58.3	1.0 08	175.8	78 28.2	1.0 09	175.6	78 58.2	1.0 09	175.5	79 58.0	1.0 10	175.0	81 57.6	1.0 12	173.9	83 56.8	99 16	172.1	84 26.6	99 17	171.5	85 25.9	99 20	169.7	1
2	77 53.2	99 14	171.6	78 23.0	99 14	171.2	78 52.7	99 15	170.9	79 52.0	99 16	170.1	81 50.3	98 20	168.0	83 47.5	97 25	164.5	84 16.5	96 27	163.2	85 13.8	95 32	160.0	2
3	77 44.8	98 19	167.4	78 14.3	98 20	167.0	78 43.7	98 21	166.5	79 42.3	97 22	165.3	81 38.5	96 27	162.2	83 32.4	93 34	157.3	84 00.3	92 36	155.6	84 54.8	89 41	151.3	3
4	77 33.2	97 24	163.4	78 02.3	97 25	162.8	78 31.2	96 26	162.1	79 28.8	96 28	160.7	81 22.4	93 33	156.8	83 12.3	89 41	150.7	83 38.8	88 43	148.7	84 30.1	83 49	143.7	4
05	77 18.6	95 29	159.5	77 47.1	95 30	158.8	78 15.5	94 31	158.0	79 11.9	93 33	156.2	81 02.4	90 39	151.7	82 47.7	85 47	144.8	83 12.8	83 49	142.6	84 00.7	77 55	137.1	05
6	77 01.1	93 34	155.7	77 29.1	93 35	154.9	77 56.9	92 36	154.1	78 51.9	91 38	152.0	80 38.9	87 44	146.9	82 19.5	80 52	139.5	82 43.2	78 54	137.2	83 27.9	71 59	131.6	6
7	76 40.9	91 38	152.2	77 08.2	91 39	151.2	77 35.4	90 40	150.3	78 28.9	88 42	148.1	80 12.4	84 49	142.6	81 48.3	76 56	134.9	82 10.5	73 58	132.5	82 52.2	66 63	126.9	7
8	76 18.2	89 42	148.7	76 44.9	89 43	147.8	77 11.3	88 44	146.7	78 03.4	86 46	144.4	79 43.2	80 52	138.6	81 14.5	71 60	130.7	81 35.5	68 62	128.3	82 14.6	61 66	122.9	8
9	75 53.3	87 45	145.5	76 19.3	86 46	144.5	76 45.0	85 47	143.3	77 35.5	83 50	140.9	79 11.7	77 56	135.0	80 38.8	68 62	127.1	80 58.6	65 64	124.7	81 35.2	57 68	119.5	9
10	75 26.2	85 48	142.4	75 51.5	84 49	141.3	76 16.5	83 51	140.2	77 05.5	80 53	137.7	78 38.2	74 59	131.6	80 01.3	64 65	123.8	80 20.1	61 66	121.5	80 54.6	54 69	116.5	10
1	74 57.3	83 51	139.5	75 21.9	82 52	138.4	75 46.2	80 53	137.2	76 33.7	78 56	134.7	78 03.1	71 61	128.6	79 22.5	61 67	120.9	79 40.3	58 68	118.7	80 13.0	51 71	113.9	1
2	74 26.6	80 54	136.8	74 50.6	79 55	135.7	75 14.2	78 56	134.5	76 00.2	75 58	131.9	77 26.4	68 63	125.8	78 42.5	58 68	118.3	78 59.5	55 69	116.2	79 30.6	48 72	111.6	2
3	73 54.4	78 56	134.2	74 17.7	77 57	133.1	74 40.7	76 58	131.9	75 25.3	73 60	129.3	76 48.6	66 65	123.3	78 01.6	56 69	116.0	78 17.9	53 71	113.9	78 47.6	46 73	109.6	3
4	73 20.8	76 58	131.8	73 43.5	75 59	130.7	74 05.8	74 60	129.5	74 49.1	71 62	126.9	76 09.6	63 66	120.9	77 19.9	53 71	113.9	77 35.5	51 72	111.9	78 04.1	44 73	107.7	4
15	72 45.9	74 60	129.5	73 08.0	73 61	128.4	73 29.7	72 62	127.2	74 11.8	69 64	124.6	75 29.8	61 68	118.8	76 37.6	52 72	111.9	76 52.6	49 72	110.0	77 20.1	43 74	106.1	15
6	72 09.9	72 62	127.4	72 31.5	71 63	126.2	72 52.6	70 64	125.0	73 33.5	67 65	122.5	74 49.1	59 69	116.8	75 54.7	50 72	110.2	76 09.2	47 73	108.3	76 35.7	41 74	104.5	6
7	71 32.9	71 63	125.3	71 53.9	69 64	124.2	72 14.5	68 65	123.0	72 54.3	65 67	120.5	74 07.8	57 70	114.9	75 11.3	48 73	108.5	75 25.4	46 74	106.8	75 51.1	40 75	103.1	7
8	70 55.0	69 65	123.4	71 15.5	68 65	122.3	71 35.6	66 66	121.1	72 14.3	63 68	118.7	73 25.8	56 71	113.2	74 27.5	47 73	107.0	74 41.2	44 74	105.4	75 06.2	39 75	101.9	8
9	70 16.2	67 66	121.6	70 36.3	66 67	120.5	70 55.8	65 67	119.4	71 33.7	61 69	116.9	72 43.3	54 72	111.6	73 43.4	46 74	105.6	73 56.8	43 75	104.0	74 21.2	38 75	100.7	9
20	69 36.7	66 67	119.9	69 56.3	65 68	118.8	70 15.5	63 68	117.7	70 52.4	60 70	115.3	72 00.4	53 72	110.1	72 59.0	45 74	104.3	73 12.0	42 75	102.8	73 35.9	37 76	99.6	20
1	68 56.6	65 68	118.3	69 15.7	63 69	117.2	69 34.5	62 69	116.1	70 10.6	59 70	113.8	71 17.0	52 73	108.7	72 14.4	44 75	103.1	72 27.1	41 75	101.6	72 50.5	37 76	98.5	1
2	68 15.8	63 69	116.7	68 34.6	62 69	115.7	68 52.9	60 70	114.6	69 28.3	57 71	112.3	70 33.3	51 73	107.4	71 29.5	43 75	101.9	71 42.0	41 75	100.5	72 05.0	36 76	97.5	2
3	67 34.5	62 70	115.3	67 52.9	61 70	114.2	68 10.9	59 71	113.2	68 45.6	56 72	110.9	69 49.3	50 74	106.1	70 44.4	42 75	100.9	70 56.7	40 76	99.5	71 19.4	36 76	96.6	3
4	66 52.7	61 70	113.9	67 10.8	60 71	112.8	67 28.4	58 71	111.8	68 02.5	55 72	109.6	69 05.0	49 74	104.9	69 59.2	41 76	99.8	70 11.3	39 76	98.5	70 33.7	35 76	95.7	4
25	66 10.4	60 71	112.5	66 28.2	59 72	111.5	66 45.5	57 72	110.5	67 19.0	54 73	108.4	68 20.5	48 75	103.8	69 13.9	41 76	98.9	69 25.8	39 76	97.6	69 47.9	35 76	94.9	25
6	65 27.8	59 72	111.2	65 45.2	58 72	110.3	66 02.3	56 73	109.3	66 35.2	53 73	107.2	67 35.8	47 75	102.7	68 28.4	40 76	97.9	68 40.2	38 76	96.7	69 02.1	35 76	94.1	6
7	64 44.8	58 72	110.0	65 02.0	57 73	109.1	65 18.8	55 73	108.1	65 51.2	53 74	106.0	66 50.8	47 75	101.7	67 42.8	40 76	97.0	67 54.5	38 76	95.8	68 16.2	34 76	93.3	7
8	64 01.4	57 73	108.8	64 18.4	56 73	107.9	64 34.9	55 74	106.9	65 06.9	52 74	104.9	66 05.8	46 75	100.7	66 57.2	40 76	96.2	67 08.8	38 76	95.0	67 30.3	34 77	92.6	8
9	63 17.8	56 73	107.7	63 34.5	55 74	106.8	63 50.8	54 74	105.8	64 22.4	51 75	103.9	65 20.5	46 76	99.8	66 11.5	39 76	95.4	66 23.0	37 76	94.2	66 44.4	34 77	91.9	9
30	62 33.9	56 74	106.6	62 50.4	54 74	105.7	63 06.5	53 74	104.8	63 37.7	51 75	102.9	64 35.2	45 76	98.9	65 25.7	39 76	94.6	65 37.1	37 76	93.5	65 58.5	34 77	91.2	30
1	61 49.7	55 74	105.6	62 06.0	54 74	104.7	62 22.0	53 75	103.8	62 52.8	50 75	101.9	63 49.7	45 76	98.0	64 39.8	39 76	93.8	64 51.2	37 77	92.7	65 12.5	34 77	90.5	1
2	61 05.3	54 74	104.6	61 21.5	53 75	103.7	61 37.2	52 75	102.8	62 07.7	50 75	101.0	63 04.1	44 76	97.1	63 53.9	39 77	93.1	64 05.3	37 77	92.0	64 26.6	34 77	89.9	2
3	60 20.8	54 75	103.6	60 36.7	53 75	102.7	60 52.3	52 75	101.9	61 22.5	49 76	100.1	62 18.5	44 76	96.3	63 08.0	38 77	92.4	63 19.3	37 77	91.3	63 40.6	34 77	89.2	3
4	59 36.0	53 75	102.7	59 51.8	52 75	101.8	60 07.3	51 75	101.0	60 37.2	49 76	99.2	61 32.8	44 76	95.5	62 22.1	38 77	91.7	62 33.4	37 77	90.7	62 54.6	34 77	88.6	4
35	58 51.1	53 75	101.8	59 06.7	52 75	100.9	59 22.1	51 76	100.1	59 51.8	48 76	98.4	60 47.0	44 76	94.8	61 36.2	38 77	91.0	61 47.4	37 77	90.0	62 08.7	34 77	88.0	35
6	58 06.0	52 75	100.9	58 21.5	51 76	100.0	58 36.8	50 76	99.2	59 06.3	48 76	97.5	60 01.2	43 76	94.0	60 50.2	38 77	90.3	61 01.5	37 77	89.4	61 22.8	34 76	87.4	6
7	57 20.8	52 76	100.0	57 36.2	51 76	99.2	57 51.4	50 76	98.4	58 20.7	48 76	96.7	59 15.3	43 76	93.3	60 04.2	38 77	89.7	60 15.5	37 77	88.7	60 36.9	34 76	86.9	7
8	56 35.5	52 76	99.2	56 50.8	51 76	98.4	57 05.8	50 76	97.6	57 35.0	48 76	96.0	58 29.4	43 77	92.6	59 18.3	38 77	89.1	59 29.6	37 77	88.1	59 51.0	34 76	86.3	8
9	55 50.0	51 76	98.3	56 05.3	50 76	97.6	56 20.2	49 76	96.8	56 49.3	47 76	95.2	57 43.5	43 77	91.9	58 32.3	38 77	88.4	58 43.6	37 77	87.5	59 05.1	35 76	85.7	9
40	55 04.5	51 76	97.5	55 19.7	50 76	96.8	55 34.6	49 76	96.0	56 03.4	47 76	94.5	56 57.5	43 77	91.2	57 46.4	38 77	87.8	57 57.7	37 76	87.0	58 19.3	35 76	85.2	40
1	54 18.9	51 76	96.8	54 34.0	50 76	96.0	54 48.8	49 76	95.3	55 17.6	47 76	93.7	56 11.6	43 77	90.6	57 00.5	38 76	87.2	57 11.8	37 76	86.4	57 33.5	35 76	84.7	1
2	53 33.2	51 76	96.0	53 48.3	50 76	95.3	54 03.0	49 76	94.5	54 31.7	47 76	93.0	55 25.6	43 77	89.9	56 14.6	39 76	86.7	56 26.0	37 76	85.8	56 47.8	35 76	84.1	2
3	52 47.5	50 76	95.3	53 02.5	49 76	94.5	53 17.2	49 76	93.8	53 45.8	47 77	92.3	54 39.7	43 77	89.3	55 28.7	39 76	86.1	55 40.2	38 76	85.3	56 02.1	35 76	83.6	3
4	52 01.7	50 76	94.5	52 16.6	49 76	93.8	52 31.3	49 77	93.1	52 59.9	47 77	91.7	53 53.7	43 77	88.7	54 42.8	39 76	85.5	54 54.4	38 76	84.7	55 16.4	36 76	83.1	4
45	51 15.9	50 76	93.8	51 30.8	49 76	93.1	51 45.4	48 77	92.4	52 13.9	47 77	91.0	53 07.8	43 77	88.0	53 57.0	39 76	85.0	54 08.6	38 76	84.2	54 30.8	36 76	82.6	45
6	50 30.0	50 77	93.1	50 44.8	49 77	92.4	50 59.5	48 77	91.7	51 28.0	47 77	90.3	52 21.8	43 76	87.4	53 11.3	39 76	84.4	53 22.9	38 76	83.7	53 45.3	36 76	82.1	6
7	49 44.1	50 77	92.4	49 58.9	49 77	91.8	50 13.5	48 77	91.1	50 42.0	47 77	89.7	51 35.9	43 76	86.8	52 25.6	39 76	83.9	52 37.3	39 76	83.1	52 59.8	37 76	81.6	7
8	48 58.1	50 77	91.8	49 13.0	49 77	91.1	49 27.6	48 77	90.4	49 56.0	47 77	89.1	50 50.0	43 76	86.3	51 39.9	40 76	83.4	51 51.6	39 76	82.6	52 14.3	37 76	81.1	8
9	48 12.2	50 77	91.1	48 27.0	49 77	90 4	48 41.6	48 77	89 8	49 10.1	47 77	88.4	50 04.2	43 76	85.7	50 54.2	40 76	82.8	51 06.1	39 76	82.1	51 29.0	37 76	80.6	9
50	47 26.2	50 77	90.4	47 41.0	49 77	89.8	47 55.6	48 77	89.1	48 24.2	47 77	87.8	49 18.4	44 76	85.1	50 08.7	40 76	82.3	50 20.6	39 76	81.6	50 43.6	38 75	80.1	50
1	46 40.3	50 77	89.8	46 55.1	49 77	89.2	47 09.7	48 77	88.5	47 38.2	47 76	87.2	48 32.6	44 76	84.5	49 23.2	40 76	81.8	49 35.2	40 76	81.1	49 58.4	38 75	79.7	1
2	45 54.3	50 77	89.2	46 09.1	49 77	88.5	46 23.7	48 77	87.9	46 52.3	47 76	86.6	47 46.9	44 76	84.0	48 37.7	41 76	81.3	48 49.8	40 76	80.6	49 13.2	38 75	79.2	2
3	45 08.4	50 77	88.5	45 23.2	49 77	87.9	45 37.8	48 76	87.3	46 06.5	47 76	86.0	47 01.2	44 76	83.4	47 52.3	41 76	80.8	48 04.5	40 75	80.1	48 28.1	39 75	78.7	3
4	44 22.4	50 77	87.9	44 37.3	49 76	87.3	44 51.9	49 76	86.7	45 20.6	47 76	85.4	46 15.6	44 76	82.9	47 07.0	41 75	80.3	47 19.2	41 75	79.6	47 43.1	39 75	78.2	4
55	43 36.5	50 76	87.3	43 51.4	49 76	86.7	44 06.1	49 76	86.1	44 34.8	47 76	84.9	45 30.0	45 76	82.4	46 21.7	42 75	79.8	46 34.1	41 75	79.1	46 58.1	39 75	77.8	55
6	42 50.6	50 76	86.7	43 05.5	49 76	86.1	43 20.2	49 76	85.5	43 49.1	47 76	84.3	44 44.4	45 76	81.8	45 36.5	42 75	79.3	45 49.0	41 75	78.6	46 13.2	40 75	77.3	6
7	42 04.7	50 76	86.1	42 19.7	49 76	85.5	42 34.4	49 76	84.9	43 03.4	48 76	83.7	43 59.0	45 76	81.3	44 51.4	42 75	78.8	45 04.0	42 75	78.1	45 28.4	40 74	76.8	7
8	41 18.9	50 76	85.5	41 33.9	50 76	84.9	41 48.7	49 76	84.3	42 17.7	48 76	83.2	43 13.6	45 76	80.8	44 06.3	43 75	78.3	44 19.0	42 75	77.6	44 43.7	40 74	76.4	8
9	40 33.1	50 76	84.9	40 48.1	50 76	84.3	41 02.9	49 76	83 8	41 32.1	48 76	82.6	42 28.3	46 75	80.2	43 21.4	43 75	77.8	43 34.2	42 75	77.2	43 59.1	41 74	75.9	9
60	39 47.3	50 76	84.3	40 02.4	50 76	83.8	40 17.3	49 76	83.2	40 46.5	48 76	82.1	41 43.0	46 75	79.7	42 36.5	43 75	77.3	42 49.4	43 74	76.7	43 14.6	41 74	75.4	60
1	39 01.6	51 76	83.8	39 16.7	50 76	83.2	39 31.7	50 76	82.6	40 01.1	48 76	81.5	40 57.8	46 75	79.2	41 51.7	44 74	76.8	42 04.7	43 74	76.2	42 30.1	42 74	75.0	1
2	38 15.9	51 76	83.2	38 31.1	50 76	82.6	38 46.1	50 76	82.1	39 15.6	49 76	81.0	40 12.7	46 75	78.7	41 07.0	44 74	76.3	41 20.1	43 74	75.7	41 45.8	42 74	74.5	2
3	37 30.3	51 76	82.6	37 45.6	50 76	82.1	38 00.6	50 76	81.5	38 30.3	49 75	80.4	39 27.7	47 75	78.2	40 22.4	44 74	75.8	40 35.6	44 74	75.2	41 01.5	43 74	74.1	3
4	36 44.8	51 76	82.0	37 00.1	51 76	81.5	37 15.2	50 76	81.0	37 45.0	49 75	79.9	38 42.7	47 75	77.6	39 37.9	45 74	75.4	39 51.2	44 74	74.8	40 17.4	43 73	73.6	4
65	35 59.3	51 76	81.5	36 14.6	51 76	81.0	36 29.8	50 75	80.4	36 59.8	49 75	79.3	37 57.9	47 75	77.1	38 53.4	45 74	74.9	39 06.9	45 74	74.3	39 33.4	43 73	73.1	65
6	35 13.9	52 76	80.9	35 29.3	51 75	80.4	35 44.5	51 75	79.9	36 14.7	50 75	78.8	37 13.1	48 74	76.6	38 09.1	46 74	74.4	38 22.7	45 73	73.8	38 49.4	44 73	72.7	6
7	34 28.5	52 75	80.4	34 44.0	51 75	79.9	34 59.3	51 75	79.3	35 29.6	50 75	78.3	36 28.5	48 74	76.1	37 24.9	46 74	73.9	37 38.6	45 73	73.3	38 05.6	44 73	72.2	7
8	33 43.2	52 75	79.8	33 58.8	52 75	79.3	34 14.2	51 75	78.8	34 44.6	50 75	77.7	35 43.9	48 74	75.6	36 40.8	46 73	73.4	36 54.7	46 73	72.9	37 21.9	45 73	71.8	8
9	32 58.6	52 75	79.3	33 13.7	52 75	78.8	33 29.2	51 75	78.2	33 59.8	51 75	77.2	34 59.4	49 74	75.1	35 56.8	47 73	72.9	36 10.8	46 73	72.4	36 38.3	45 72	71.3	9
70	32 12.9	53 75	78.7	32 28.6	52 75	78.2	32 44.2	52 75	77.7	33 15.0	51 74	76.7	34 15.0	49 74	74.6	35 12.9	47 73	72.5	35 27.0	47 73	71.9	35 54.8	46 72	70.8	70
1	31 27.9	53 75	78.2	31 43.7	52 75	77.7	31 59.4	52 75	77.2	32 30.3	51 74	76.2	33 30.8	50 74	74.1	34 29.2	48 73	72.0	34 43.4	47 72	71.5	35 11.5	46 72	70.4	1
2	30 43.0	53 75	77.6	30 58.8	53 75	77.1	31 14.6	52 74	76.6	31 45.8	52 74	75.6	32 46.6	50 73	73.6	33 45.5	48 73	71.5	33 59.9	48 72	71.0	34 28.2	47 72	69.9	2
3	29 58.1	53 75	77.1	30 14.1	53 74	76.6	30 29.9	53 74	76.1	31 01.3	52 74	75.1	32 02.6	50 73	73.1	33 02.0	49 72	71.0	33 16.5	48 72	70.5	33 45.1	47 72	69.5	3
4	29 13.4	54 74	76.5	29 29.4	53 74	76.1	29 45.4	53 74	75.6	30 16.9	53 74	74.6	31 18.7	51 73	72.6	32 18.6	49 72	70.5	32 33.2	49 72	70.0	33 02.2	48 71	69.0	4
75	28 28.7	54 74	76.0	28 44.9	54 74	75.5	29 00.9	53 74	75.0	29 32.7	53 74	74.1	30 34.9	51 73	72.1	31 35.3	50 72	70.1	31 50.1	49 72	69.6	32 19.3	48 71	68.5	75
6	27 44.2	54 74	75.5	28 00.4	54 74	75.0	28 16.5	54 74	74.5	28 48.5	53 73	73.5	29 51.2	52 73	71.6	30 52.2	50 72	69.6	31 07.1	50 71	69.1	31 36.6	49 71	68.1	6
7	26 59.7	55 74	74.9	27 16.1	54 74	74.4	27 32.3	54 74	74.0	28 04.5	53 73	73.0	29 07.7	52 72	71.1	30 09.2	51 71	69.1	30 24.2	50 71	68.6	30 54.1	49 71	67.6	7
8	26 15.4	55 74	74.4	26 31.9	55 74	73.9	26 48.2	54 73	73.4	27 20.6	54 73	72.5	28 24.3	52 72	70.6	29 26.3	51 71	68.6	29 41.5	51 71	68.1	30 11.7	50 70	67.1	8
9	25 31.2	55 73	73.8	25 47.8	55 73	73.4	26 04.2	55 73	72.9	26 36.8	54 73	72.0	27 41.0	53 72	70.1	28 43.6	51 71	68.1	28 58.9	51 71	67.6	29 29.4	50 70	66.7	9
80	24 47.1	56 73	73.3	25 03.8	55 73	72.8	25 20.3	55 73	72.4	25 53.2	54 72	71.4	26 57.9	53 72	69.6	28 01.0	52 71	67.6	28 16.5	52 70	67.2	28 47.3	51 70	66.2	80
1	24 03.2	56 73	72.7	24 19.9	56 73	72.3	24 36.6	55 73	71.8	25 09.7	55 72	70.9	26 14.9	54 71	69.1	27 18.5	52 70	67.2	27 34.2	52 70	66.7	28 05.3	51 70	65.7	1
2	23 19.3	56 73	72.2	23 36.2	56 73	71.8	23 53.0	56 72	71.3	24 26.3	55 72	70.4	25 32.0	54 71	68.5	26 36.3	53 70	66.7	26 52.1	53 70	66.2	27 23.5	52 69	65.2	2
3	22 35.6	57 73	71.7	22 52.6	56 72	71.2	23 09.5	56 72	70.8	23 43.1	56 72	69.9	24 49.3	55 71	68.0	25 54.1	53 70	66.2	26 10.1	53 70	65.7	26 41.8	53 69	64.8	3
4	21 52.1	57 72	71.1	22 09.2	57 72	70.7	22 26.2	57 72	70.2	23 00.0	56 72	69.3	24 06.8	55 71	67.5	25 12.2	54 70	65.7	25 28.3	54 69	65.2	26 00.3	53 69	64.3	4
85	21 08.7	58 72	70.6	21 25.9	57 72	70.1	21 43.0	57 72	69.7	22 17.1	57 71	68.8	23 24.4	56 70	67.0	24 30.4	54 69	65.2	24 46.7	54 69	64.7	25 19.0	54 69	63.8	85
0	20 25.4	58 72	70.0	20 42.7	58 72	69.6	21 00.0	57 71	69.2	21 34.3	57 71	68.3	22 42.1	56 70	66.5	23 48.7	55 69	64.7	24 05.2	55 69	64.2	24 37.9	54 68	63.3	6
7	19 42.3	58 72	69.5	19 59.7	58 71	69.1	20 17.1	58 71	68.6	20 51.7	57 71	67.7	22 00.1	56 70	66.0	23 07.3	56 69	64.2	23 23.9	55 69	63.7	23 56.9	55 68	62.8	7
8	18 59.3	59 71	68.9	19 16.9	58 71	68.5	19 34.4	58 71	68.1	20 09.2	58 70	67.2	21 18.2	57 70	65.5	22 26.0	56 69	63.7	22 42.8	56 68	63.2	23 16.1	55 68	62.3	8
9	18 16.5	59 71	68.4	18 34.2	59 71	68.0	18 51.8	59 71	67.5	19 27.0	58 70	66.7	20 36.4	57 69	65.0	21 44.9	57 68	63.2	22 01.8	56 68	62.7	22 35.5	56 67	61.8	9
90	17 33.8	60 71	67.8	17 51.7	59 71	67.4	18 09.4	59 70	67.0	18 44.8	59 70	66.1	19 54.9	58 69	64.4	21 04.0	57 68	62.7	21 21.1	57 68	62.2	21 55.0	56 67	61.3	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	22 00.0	1.0 01	180.0	21 30.0	1.0 01	180.0	21 00.0	1.0 01	180.0	20 00.0	1.0 01	180.0	18 00.0	1.0 01	180.0	16 00.0	1.0 01	180.0	15 30.0	1.0 01	180.0	14 30.0	1.0 01	180.0	00
1	21 59.6	1.0 02	179.0	21 29.6	1.0 02	179.1	20 59.6	1.0 02	179.1	19 59.6	1.0 02	179.1	17 59.6	1.0 02	179.1	15 59.7	1.0 02	179.1	15 29.7	1.0 02	179.1	14 29.7	1.0 02	179.2	1
2	21 58.5	1.0 03	178.1	21 28.5	1.0 03	178.1	20 58.5	1.0 03	178.1	19 58.5	1.0 03	178.2	17 58.6	1.0 03	178.2	15 58.6	1.0 03	178.3	15 28.6	1.0 03	178.3	14 28.7	1.0 03	178.3	2
3	21 56.6	1.0 04	177.1	21 26.6	1.0 04	177.2	20 56.6	1.0 04	177.2	19 56.7	1.0 04	177.2	17 56.8	1.0 04	177.3	15 56.9	1.0 04	177.4	15 26.9	1.0 04	177.4	14 27.0	1.0 04	177.5	3
4	21 53.9	1.0 06	176.2	21 23.9	1.0 06	176.2	20 54.0	1.0 06	176.3	19 54.1	1.0 06	176.3	17 54.3	1.0 05	176.4	15 54.5	1.0 05	176.6	15 24.5	1.0 05	176.6	14 24.6	1.0 05	176.6	4
05	21 50.5	1.0 07	175.2	21 20.5	1.0 07	175.3	20 50.6	1.0 07	175.3	19 50.8	1.0 07	175.4	17 51.1	1.0 07	175.5	15 51.4	1.0 06	175.7	15 21.4	1.0 06	175.7	14 21.6	1.0 06	175.8	05
6	21 46.3	1.0 08	174.3	21 16.4	1.0 08	174.3	20 46.5	1.0 08	174.4	19 46.7	1.0 08	174.5	17 47.1	1.0 08	174.7	15 47.6	1.0 07	174.8	15 17.7	1.0 07	174.9	14 17.9	1.0 07	175.0	6
7	21 41.3	99 10	173.4	21 11.5	99 09	173.4	20 41.6	1.0 09	173.5	19 41.9	1.0 09	173.6	17 42.5	1.0 09	173.8	15 43.1	1.0 09	174.0	15 13.2	1.0 09	174.0	14 13.5	1.0 08	174.1	7
8	21 35.6	99 11	172.4	21 05.8	99 11	172.5	20 36.0	99 11	172.5	19 36.4	99 10	172.6	17 37.2	99 10	172.9	15 37.9	99 10	173.1	15 08.1	99 10	173.2	14 08.5	99 10	173.3	8
9	21 29.2	99 12	171.5	20 59.4	99 12	171.5	20 29.7	99 12	171.6	19 30.2	99 12	171.7	17 31.1	99 11	172.0	15 32.1	99 11	172.3	15 02.3	99 11	172.3	14 02.8	99 11	172.5	9
10	21 22.0	99 13	170.5	20 52.3	99 13	170.6	20 22.6	99 13	170.7	19 23.2	99 13	170.8	17 24.4	99 12	171.1	15 25.5	99 12	171.4	14 55.8	99 12	171.5	13 56.4	99 12	171.6	10
1	21 14.0	99 14	169.6	20 44.4	99 14	169.7	20 14.8	99 14	169.8	19 15.5	99 14	169.9	17 16.9	99 14	170.2	15 18.3	99 13	170.6	14 48.7	99 13	170.6	13 49.4	99 13	170.8	1
2	21 05.4	99 16	168.7	20 35.8	99 16	168.7	20 06.2	99 15	168.8	19 07.1	99 15	169.0	17 08.8	99 15	169.4	15 10.5	99 14	169.7	14 40.9	99 14	169.8	13 41.7	99 14	170.0	2
3	20 56.0	98 17	167.7	20 26.5	98 17	167.8	19 57.0	98 17	167.9	18 58.0	98 16	168.1	17 00.0	98 16	168.5	15 01.9	98 15	168.9	14 32.4	98 15	169.0	13 33.4	98 15	169.1	3
4	20 45.8	98 18	166.8	20 16.4	98 18	166.9	19 47.0	98 18	167.0	18 48.2	98 18	167.2	16 50.5	98 17	167.6	14 52.7	98 16	168.0	14 23.3	98 16	168.1	13 24.4	98 16	168.3	4
15	20 35.0	98 19	165.9	20 05.6	98 19	166.0	19 36.3	98 19	166.1	18 37.7	98 19	166.3	16 40.3	98 18	166.8	14 42.9	98 18	167.2	14 13.5	98 17	167.3	13 14.8	98 17	167.5	15
6	20 23.4	97 20	165.0	19 54.2	97 20	165.1	19 24.9	97 20	165.2	18 26.4	97 20	165.4	16 29.4	98 19	165.9	14 32.3	98 19	166.3	14 03.0	98 18	166.5	13 04.5	98 18	166.7	6
7	20 11.1	97 22	164.0	19 42.0	97 22	164.2	19 12.8	97 21	164.3	18 14.5	97 21	164.5	16 17.9	97 20	165.0	14 21.2	97 20	165.5	13 52.0	97 20	165.6	12 53.6	97 19	165.9	7
8	19 58.1	97 23	163.1	19 29.1	97 23	163.3	19 00.0	97 22	163.4	18 01.9	97 22	163.7	16 05.7	97 21	164.2	14 09.3	97 21	164.7	13 40.2	97 21	164.8	12 42.0	97 20	165.1	8
9	19 44.4	96 24	162.2	19 15.5	96 24	162.4	18 46.5	96 24	162.5	17 48.7	97 23	162.8	15 52.8	97 23	163.3	13 56.9	97 22	163.9	13 27.9	97 22	164.0	12 29.9	97 21	164.2	9
20	19 30.0	96 25	161.3	19 01.2	96 25	161.5	18 32.4	96 25	161.6	17 34.7	96 24	161.9	15 39.3	96 24	162.5	13 43.8	96 23	163.0	13 14.9	96 23	163.2	12 17.1	96 22	163.4	20
1	19 15.0	96 26	160.4	18 46.3	96 26	160.6	18 17.5	96 26	160.7	17 20.1	96 25	161.0	15 25.1	96 25	161.6	13 30.0	96 24	162.2	13 01.3	96 24	162.4	12 03.7	96 23	162.6	1
2	18 59.2	95 27	159.5	18 30.6	95 27	159.7	18 02.0	95 27	159.8	17 04.8	95 27	160.2	15 10.3	95 26	160.8	13 15.7	96 25	161.4	12 47.0	96 25	161.5	11 49.7	96 24	161.8	2
3	18 42.8	95 28	158.6	18 14.3	95 28	158.8	17 45.9	95 28	159.0	16 48.9	95 28	159.3	14 54.9	95 27	159.9	13 00.7	95 26	160.6	12 32.2	95 26	160.7	11 35.0	95 25	161.1	3
4	18 25.7	94 30	157.8	17 57.4	94 29	157.9	17 29.1	95 29	158.1	16 32.3	95 29	158.4	14 38.8	95 28	159.1	12 45.1	95 27	159.8	12 16.7	95 27	159.9	11 19.8	95 26	160.3	4
25	18 08.0	94 31	156.9	17 39.8	94 30	157.1	17 11.6	94 30	157.2	16 15.1	94 30	157.6	14 22.1	94 29	158.3	12 28.9	94 28	159.0	12 00.6	94 28	159.1	11 04.0	94 27	159.5	25
6	17 49.7	94 32	156.0	17 21.6	94 31	156.2	16 53.5	94 31	156.4	15 57.3	94 31	156.7	14 04.8	94 30	157.5	12 12.1	94 29	158.2	11 44.0	94 29	158.3	10 47.6	94 28	158.7	6
7	17 30.6	93 33	155.1	17 02.7	93 32	155.3	16 34.8	93 32	155.5	15 38.8	93 32	155.9	13 46.9	93 31	156.6	11 54.8	93 30	157.4	11 26.7	93 30	157.6	10 30.6	94 29	157.9	7
8	17 11.0	93 34	154.3	16 43.2	93 34	154.5	16 15.4	93 33	154.7	15 19.8	93 33	155.1	13 28.3	93 32	155.8	11 36.8	93 31	156.6	11 08.9	93 31	156.8	10 13.0	93 30	157.1	8
9	16 50.8	92 35	153.4	16 23.1	92 35	153.6	15 55.4	92 34	153.8	15 00.1	92 34	154.2	13 09.2	92 33	155.0	11 18.2	93 32	155.8	10 50.5	93 32	156.0	9 54.9	93 31	156.4	9
30	16 29.9	92 36	152.6	16 02.4	92 36	152.8	15 34.9	92 35	153.0	14 39.8	92 35	153.4	12 49.5	92 34	154.2	10 59.1	92 33	155.0	10 31.5	92 33	155.2	9 36.2	92 32	155.6	30
1	16 08.4	91 37	151.7	15 41.1	91 36	152.0	15 13.7	91 36	152.2	14 18.9	91 36	152.6	12 29.3	91 35	153.4	10 39.4	92 34	154.2	10 11.9	92 34	154.5	9 17.0	92 33	154.9	1
2	15 46.4	91 38	150.9	15 19.2	91 37	151.1	14 52.0	91 37	151.3	13 57.5	91 37	151.8	12 08.4	91 36	152.6	10 19.2	91 35	153.5	9 51.8	91 34	153.7	8 57.1	91 34	154.1	2
3	15 23.8	90 39	150.1	14 56.7	90 38	150.3	14 29.6	90 38	150.5	13 35.5	90 38	151.0	11 47.0	90 37	151.8	9 58.4	91 36	152.7	9 31.2	91 35	152.9	8 36.8	91 35	153.4	3
4	15 00.5	90 40	149.3	14 33.6	90 39	149.5	14 06.7	90 39	149.7	13 12.9	90 39	150.2	11 25.0	90 38	151.1	9 37.0	90 36	152.0	9 10.0	90 36	152.2	8 15.9	90 36	152.6	4
35	14 36.8	89 41	148.4	14 10.0	89 40	148.7	13 43.3	89 40	148.9	12 49.7	89 40	149.4	11 02.5	89 38	150.3	9 15.1	90 37	151.2	8 48.3	90 37	151.4	7 54.5	90 37	151.9	35
6	14 12.4	89 41	147.6	13 45.9	89 41	147.9	13 19.3	89 41	148.1	12 26.1	89 40	148.6	10 39.5	89 39	149.5	8 52.7	89 38	150.4	8 26.0	89 38	150.7	7 32.6	89 37	151.1	6
7	13 47.6	88 42	146.8	13 21.1	88 42	147.1	12 54.7	88 42	147.3	12 01.8	88 41	147.8	10 15.9	88 40	148.8	8 29.8	88 39	149.7	8 03.3	88 39	149.9	7 10.2	89 38	150.4	7
8	13 22.1	87 43	146.0	12 55.9	88 43	146.3	12 29.6	88 43	146.5	11 37.1	88 42	147.0	9 51.8	88 41	148.0	8 06.4	88 40	149.0	7 40.0	88 40	149.2	6 47.2	88 39	149.7	8
9	12 56.2	87 44	145.2	12 30.1	87 44	145.5	12 04.0	87 44	145.7	11 11.8	87 43	146.2	9 27.2	87 42	147.2	7 42.4	87 41	148.2	7 16.2	87 40	148.5	6 23.8	87 40	149.0	9
40	12 29.7	86 45	144.5	12 03.8	86 45	144.7	11 37.9	86 44	145.0	10 46.0	87 44	145.5	9 02.1	87 43	146.5	7 18.0	87 42	147.5	6 51.9	87 41	147.8	5 59.8	87 41	148.3	40
1	12 02.8	86 46	143.7	11 37.0	86 46	143.9	11 11.3	86 45	144.2	10 19.7	86 45	144.7	8 36.5	86 44	145.8	6 53.0	86 42	146.8	6 27.2	86 42	147.0	5 35.4	86 42	147.5	1
2	11 35.3	85 47	142.9	11 09.7	85 46	143.2	10 44.1	85 46	143.4	9 52.9	85 45	144.0	8 10.3	86 44	145.0	6 27.6	86 43	146.1	6 01.9	86 43	146.3	5 10.5	86 42	146.8	2
3	11 07.3	85 47	142.1	10 41.9	85 47	142.4	10 16.5	85 47	142.7	9 25.6	85 46	143.2	7 43.8	85 45	144.3	6 01.7	85 44	145.4	5 36.2	85 44	145.6				3
4	10 38.9	84 48	141.4	10 13.7	84 48	141.7	9 48.4	84 48	141.9	8 57.9	84 47	142.5	7 16.7	84 46	143.6	5 35.4	84 45	144.6	5 10.0	85 44	144.9				4
45	10 10.0	84 49	140.6	9 44.9	84 49	140.9	9 19.8	84 48	141.2	8 29.7	84 48	141.7	6 49.2	84 47	142.8	5 08.5	84 45	143.9							45
6	9 40.6	83 50	139.9	9 15.7	83 49	140.2	8 50.8	83 49	140.5	8 01.0	83 49	141.0	6 21.2	83 47	142.1										6
7	9 10.7	82 50	139.1	8 46.0	82 50	139.4	8 21.3	82 50	139.7	7 31.8	82 49	140.3	5 52.7	83 48	141.4										7
8	8 40.4	82 51	138.4	8 15.9	82 51	138.7	7 51.4	82 51	139.0	7 02.2	82 50	139.6	5 23.9	82 49	140.7										8
9	8 09.7	81 52	137.7	7 45.4	81 52	138.0	7 21.0	81 51	138.3	6 32.2	81 51	138.9													9
50	7 38.6	81 53	137.0	7 14.4	81 52	137.3	6 50.2	81 52	137.6	6 01.8	81 51	138.2													50
1	7 07.0	80 53	136.3	6 43.0	80 53	136.6	6 19.0	80 53	136.9	5 30.9	80 52	137.5													1
2	6 35.0	79 54	135.5	6 11.2	79 54	135.8	5 47.3	79 53	136.2																2
3	6 02.6	79 55	134.8	5 39.0	79 54	135.1	5 15.3	79 54	135.5																3
4	5 29.8	78 55	134.1	5 06.3	78 55	134.5																			4

DECLINATION SAME NAME AS LATITUDE

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	16 51.4	60 70	67.3	17 09.3	60 70	66.9	17 27.2	60 70	66.4	18 02.9	59 70	65.6	19 13.5	58 69	63.9	20 23.2	58 68	62.2	20 40.5	57 67	61.7	21 14.8	57 67	60.9	91
2	16 09.0	60 70	66.7	16 27.1	60 70	66.3	16 45.2	60 70	65.9	17 21.1	60 69	65.1	18 32.4	59 68	63 4	19 42.7	58 67	61.7	20 00.1	58 67	61.2	20 34.8	58 66	60.4	2
3	15 26.9	61 70	66.2	15 45.1	61 70	65.8	16 03.3	61 69	65.4	16 39.5	60 69	64.5	17 51.4	60 68	62.9	19 02.3	59 67	61.1	19 19.9	59 67	60.7	19 54.9	58 66	59.8	3
4	14 45.0	61 70	65.6	15 03.3	61 69	65.2	15 21.6	61 69	64.8	15 58.1	61 69	64.0	17 10.6	60 68	62.3	18 22.2	59 67	60.6	18 39.9	59 66	60.2	19 15.3	59 66	59.3	4
95	14 03.2	62 69	65.1	14 21.7	62 69	64.7	14 40.1	61 69	64.2	15 16.9	61 68	63.4	16 30.0	61 67	61.8	17 42.2	60 66	60.1	18 00.1	60 66	59.7	18 35.8	59 65	58.8	95
6	13 21.6	62 69	64.5	13 40.2	62 69	64.1	13 58.8	62 68	63.7	14 35.9	62 68	62.9	15 49.6	61 67	61.2	17 02.5	60 66	59.6	17 20.6	60 66	59.2	17 56.6	60 65	58.3	6
7	12 40.2	63 69	63.9	12 59.0	63 68	63.5	13 17.7	62 68	63.1	13 55.1	62 68	62.3	15 09.4	62 67	60.7	16 22.9	61 66	59.1	16 41.2	61 65	58.6	17 17.6	60 65	57.8	7
8	11 59.0	63 68	63.4	12 18.0	63 68	63.0	12 36.8	63 68	62.6	13 14.5	63 67	61.8	14 29.4	62 66	60.2	15 43.6	62 65	58.5	16 02.1	61 65	58.1	16 38.8	61 64	57.3	8
9	11 18.1	64 68	62.8	11 37.1	64 68	62.4	11 56.2	63 67	62.0	12 34.1	63 67	61.2	13 49.6	63 66	59.6	15 04.5	62 65	58.0	15 23.2	62 64	57.6	16 00.3	62 64	56.8	9
100	10 37.3	64 68	62.2	10 56.5	64 67	61.8	11 15.7	64 67	61.4	11 54.0	64 67	60.6	13 10.1	63 66	59.1	14 25.7	63 64	57.5	14 44.5	63 64	57.1	15 21.9	62 64	56.2	100
1	9 56.7	65 67	61.6	10 16.1	64 67	61.2	10 35.4	64 67	60.9	11 14.0	64 66	60.1	12 30.8	64 65	58.5	13 47.0	63 64	56.9	14 06.0	63 64	56.5	14 43.8	63 63	55.7	1
2	9 16.4	65 67	61.1	9 35.9	65 67	60.7	9 55.4	65 66	60.3	10 34.3	65 66	59.5	11 51.7	64 65	58.0	13 08.6	64 64	56.4	13 27.8	64 63	56.0	14 06.0	63 63	55.2	2
3	8 36.3	66 66	60.5	8 56.0	65 66	60.1	9 15.6	65 66	59.7	9 54.8	65 65	58.9	11 12.9	65 64	57.4	12 30.5	64 63	55.8	12 49.8	64 63	55.4	13 28.3	64 62	54.7	3
4	7 56.4	66 66	59.9	8 16.2	66 66	59.5	8 36.0	66 66	59.1	9 15.5	66 65	58.4	10 34.3	65 64	56.8	11 52.6	65 63	55.3	12 12.1	65 62	54.9	12 51.0	65 62	54.1	4
105	7 16.8	67 66	59.3	7 36.7	67 65	58.9	7 56.7	66 65	58.5	8 36.5	66 65	57.8	9 55.9	66 64	56.3	11 14.9	66 62	54.7	11 34.6	66 62	54.3	12 13.9	65 61	53.6	105
6	6 37.4	67 65	58.7	6 57.5	67 65	58.3	7 17.6	67 65	58.0	7 57.8	67 64	57.2	9 17.8	67 63	55.7	10 37.5	66 62	54.2	10 57.4	66 62	53.8	11 37.0	66 61	53.0	6
7	5 58.2	68 65	58.1	6 18.5	68 65	57.7	6 38.8	68 64	57.4	7 19.3	67 64	56.6	8 40.0	67 63	55.1	10 00.4	67 61	53.6	10 20.4	67 61	53.2	11 00.4	67 61	52.5	7
8	5 19.3	68 65	57.5	5 39.8	68 64	57.1	6 00.2	68 64	56.8	6 41.0	68 63	56.0	8 02.4	68 62	54.5	9 23.5	67 61	53.1	9 43.7	67 61	52.7	10 24.1	67 60	51.9	8
9				5 01.3	69 64	56.5	5 21.9	69 64	56.2	6 03.0	69 63	55.4	7 25.1	68 62	54.0	8 46.9	68 61	52.5	9 07.3	68 60	52.1	9 48.1	68 60	51.4	9
110										5 25.3	69 62	54.8	6 48.1	69 61	53.4	8 10.6	69 60	51.9	8 31.2	69 60	51.5	9 12.3	68 59	50.8	110
1													6 11.4	69 61	52.8	7 34.6	69 60	51.3	7 55.4	69 59	51.0	8 36.8	69 59	50.2	1
2													5 34.9	70 60	52.2	6 58.8	70 59	50.8	7 19.8	70 59	50.4	8 01.6	70 58	49.7	2
3																6 23.4	70 59	50.2	6 44.5	70 58	49.8	7 26.8	70 58	49.1	3
4																5 48.3	71 58	49.6	6 09.6	71 58	49.2	6 52.2	71 57	48.5	4
115																5 13.4	72 58	49.0	5 34.9	72 57	48.6	6 17.9	72 57	47.9	115
6																			5 00.6	72 57	48.0	5 43.9	72 56	47.3	6
7																						5 10.3	73 56	46.7	7

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Lat. 40°

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	78 00.0	1.0 03	180.0	78 30.0	1.0 03	180.0	79 00.0	1.0 03	180.0	80 00.0	1.0 03	180.0	82 00.0	1.0 04	180.0	84 00.0	1.0 05	180.0	84 30.0	1.0 06	180.0	85 30.0	1.0 07	180.0	00
1	77 58.3	1.0 08	175.8	78 28.2	1.0 09	175.6	78 58.2	1.0 09	175.5	79 58.0	1.0 10	175.0	81 57.6	1.0 12	173.9	83 56.8	99 16	172.1	84 26.6	99 17	171.5	85 25.9	99 20	169.7	1
2	77 53.2	99 14	171.6	78 23.0	99 14	171.2	78 52.7	99 15	170.9	79 52.0	99 16	170.1	81 50.3	98 20	168.0	83 47.5	97 25	164.5	84 16.5	96 27	163.2	85 13.8	95 32	160.0	2
3	77 44.8	98 19	167.4	78 14.3	98 20	167.0	78 43.7	98 21	166.5	79 42.3	97 22	165.3	81 38.5	96 27	162.2	83 32.4	93 34	157.3	84 00.3	92 36	155.6	84 54.8	89 41	151.3	3
4	77 33.2	97 24	163.4	78 02.3	97 25	162.8	78 31.2	96 26	162.1	79 28.8	96 28	160.7	81 22.4	93 33	156.8	83 12.3	89 41	150.7	83 38.8	88 43	148.7	84 30.1	83 49	143.7	4
05	77 18.6	95 29	159.5	77 47.1	95 30	158.8	78 15.5	94 31	158.0	79 11.9	93 33	156.2	81 02.4	90 39	151.7	82 47.7	85 47	144.8	83 12.8	83 49	142.6	84 00.7	77 55	137.1	05
6	77 01.1	93 34	155.7	77 29.1	93 35	154.9	77 56.9	92 36	154.1	78 51.9	91 38	152.0	80 38.9	87 44	146.9	82 19.5	80 52	139.5	82 43.2	78 54	137.2	83 27.9	71 59	131.6	6
7	76 40.9	91 38	152.2	77 08.2	91 39	151.2	77 35.4	90 40	150.3	78 28.9	88 42	148.1	80 12.4	84 49	142.6	81 48.3	76 56	134.9	82 10.5	73 58	132.5	82 52.2	66 63	126.9	7
8	76 18.2	89 42	148.7	76 44.9	89 43	147.8	77 11.3	88 44	146.7	78 03.4	86 46	144.4	79 43.2	80 52	138.6	81 14.5	71 60	130.7	81 35.5	68 62	128.3	82 14.6	61 66	122.9	8
9	75 53.3	87 45	145.5	76 19.3	86 46	144.5	76 45.0	85 47	143.3	77 35.5	83 50	140.9	79 11.7	77 56	135.0	80 38.8	68 62	127.1	80 58.6	65 64	124.7	81 35.2	57 68	119.5	9
10	75 26.2	85 48	142.4	75 51.5	84 49	141.3	76 16.5	83 51	140.2	77 05.5	80 53	137.7	78 38.2	74 59	131.6	80 01.3	64 65	123.8	80 20.1	61 66	121.5	80 54.6	54 69	116.5	10
1	74 57.3	83 51	139.5	75 21.9	82 52	138.4	75 46.2	80 53	137.2	76 33.7	78 56	134.7	78 03.1	71 61	128.6	79 22.5	61 67	120.9	79 40.3	58 68	118.7	80 13.0	51 71	113.9	1
2	74 26.6	80 54	136.8	74 50.6	79 55	135.7	75 14.2	78 56	134.5	76 00.2	75 58	131.9	77 26.4	68 63	125.8	78 42.5	58 68	118.3	78 59.5	55 69	116.2	79 30.6	48 72	111.6	2
3	73 54.4	78 56	134.2	74 17.7	77 57	133.1	74 40.7	76 58	131.9	75 25.3	73 60	129.3	76 48.6	66 65	123.3	78 01.6	56 69	116.0	78 17.9	53 71	113.9	78 47.6	46 73	109.6	3
4	73 20.8	76 58	131.8	73 43.5	75 59	130.7	74 05.8	74 60	129.5	74 49.1	71 62	126.9	76 09.6	63 66	120.9	77 19.9	53 71	113.9	77 35.5	51 72	111.9	78 04.1	44 73	107.7	4
15	72 45.9	74 60	129.5	73 08.0	73 61	128.4	73 29.7	72 62	127.2	74 11.8	69 64	124.6	75 29.8	61 68	118.8	76 37.6	52 72	111.9	76 52.6	49 72	110.0	77 20.1	43 74	106.1	15
6	72 09.9	72 62	127.4	72 31.5	71 63	126.2	72 52.6	70 64	125.0	73 33.5	67 65	122.5	74 49.1	59 69	116.8	75 54.7	50 72	110.2	76 09.2	47 73	108.3	76 35.7	41 74	104.5	6
7	71 32.9	71 63	125.3	71 53.9	69 64	124.2	72 14.5	68 65	123.0	72 54.3	65 67	120.5	74 07.8	57 70	114.9	75 11.3	48 73	108.5	75 25.4	46 74	106.8	75 51.1	40 75	103.1	7
8	70 55.0	69 65	123.4	71 15.5	68 65	122.3	71 35.6	66 66	121.1	72 14.3	63 68	118.7	73 25.8	56 71	113.2	74 27.5	47 73	107.0	74 41.2	44 74	105.4	75 06.2	39 75	101.9	8
9	70 16.2	67 66	121.6	70 36.3	66 67	120.5	70 55.8	65 67	119.4	71 33.7	61 69	116.9	72 43.3	54 72	111.6	73 43.4	46 74	105.6	73 56.8	43 75	104.0	74 21.2	38 75	100.7	9
20	69 36.7	66 67	119.9	69 56.3	65 68	118.8	70 15.5	63 68	117.7	70 52.4	60 70	115.3	72 00.4	53 72	110.1	72 59.0	45 74	104.3	73 12.0	42 75	102.8	73 35.9	37 76	99.6	20
1	68 56.6	65 68	118.3	69 15.7	63 69	117.2	69 34.5	62 69	116.1	70 10.6	59 70	113.8	71 17.0	52 73	108.7	72 14.4	44 75	103.1	72 27.1	41 75	101.6	72 50.5	37 76	98.5	1
2	68 15.8	63 69	116.7	68 34.6	62 69	115.7	68 52.9	60 70	114.6	69 28.3	57 71	112.3	70 33.3	51 73	107.4	71 29.5	43 75	101.9	71 42.0	41 75	100.5	72 05.0	36 76	97.5	2
3	67 34.5	62 70	115.3	67 52.9	61 70	114.2	68 10.9	59 71	113.2	68 45.6	56 72	110.9	69 49.3	50 74	106.1	70 44.4	42 75	100.9	70 56.7	40 76	99.5	71 19.4	36 76	96.6	3
4	66 52.7	61 70	113.9	67 10.8	60 71	112.8	67 28.4	58 71	111.8	68 02.5	55 72	109.6	69 05.0	49 74	104.9	69 59.2	41 76	99.8	70 11.3	39 76	98.5	70 33.7	35 76	95.7	4
25	66 10.4	60 71	112.5	66 28.2	59 72	111.5	66 45.5	57 72	110.5	67 19.0	54 73	108.4	68 20.5	48 75	103.8	69 13.9	41 76	98.9	69 25.8	39 76	97.6	69 47.9	35 76	94.9	25
6	65 27.8	59 72	111.2	65 45.2	58 72	110.3	66 02.3	56 73	109.3	66 35.2	53 73	107.2	67 35.8	47 75	102.7	68 28.4	40 76	97.9	68 40.2	38 76	96.7	69 02.1	35 76	94.1	6
7	64 44.8	58 72	110.0	65 02.0	57 73	109.1	65 18.8	55 73	108.1	65 51.2	53 74	106.0	66 50.8	47 75	101.7	67 42.8	40 76	97.0	67 54.5	38 76	95.8	68 16.2	34 76	93.3	7
8	64 01.4	57 73	108.8	64 18.4	56 73	107.9	64 34.9	55 74	106.9	65 06.9	52 74	104.9	66 05.8	46 75	100.7	66 57.2	40 76	96.2	67 08.8	38 76	95.0	67 30.3	34 77	92.6	8
9	63 17.8	56 73	107.7	63 34.5	55 74	106.8	63 50.8	54 74	105.8	64 22.4	51 75	103.9	65 20.5	46 76	99.8	66 11.5	39 76	95.4	66 23.0	37 76	94.2	66 44.4	34 77	91.9	9
30	62 33.9	56 74	106.6	62 50.4	54 74	105.7	63 06.5	53 74	104.8	63 37.7	51 75	102.9	64 35.2	45 76	98.9	65 25.7	39 76	94.6	65 37.1	37 76	93.5	65 58.5	34 77	91.2	30
1	61 49.7	55 74	105.6	62 06.0	54 74	104.7	62 22.0	53 75	103.8	62 52.8	50 75	101.9	63 49.7	45 76	98.0	64 39.8	39 76	93.8	64 51.2	37 77	92.7	65 12.5	34 77	90.5	1
2	61 05.3	54 74	104.6	61 21.5	53 75	103.7	61 37.2	52 75	102.8	62 07.7	50 75	101.0	63 04.1	44 76	97.1	63 53.9	39 77	93.1	64 05.3	37 77	92.0	64 26.6	34 77	89.9	2
3	60 20.8	54 75	103.6	60 36.7	53 75	102.7	60 52.3	52 75	101.9	61 22.5	49 76	100.1	62 18.5	44 76	96.3	63 08.0	38 77	92.4	63 19.3	37 77	91.3	63 40.6	34 77	89.2	3
4	59 36.0	53 75	102.7	59 51.8	52 75	101.8	60 07.3	51 75	101.0	60 37.2	49 76	99.2	61 32.8	44 76	95.5	62 22.1	38 77	91.7	62 33.4	37 77	90.7	62 54.6	34 77	88.6	4
35	58 51.1	53 75	101.8	59 06.7	52 75	100.9	59 22.1	51 76	100.1	59 51.8	48 76	98.4	60 47.0	44 76	94.8	61 36.2	38 77	91.0	61 47.4	37 77	90.0	62 08.7	34 77	88.0	35
6	58 06.0	52 75	100.9	58 21.5	51 76	100.0	58 36.8	50 76	99.2	59 06.3	48 76	97.5	60 01.2	43 76	94.0	60 50.2	38 77	90.3	61 01.5	37 77	89.4	61 22.8	34 76	87.4	6
7	57 20.8	52 76	100.0	57 36.2	51 76	99.2	57 51.4	50 76	98.4	58 20.7	48 76	96.7	59 15.3	43 76	93.3	60 04.2	38 77	89.7	60 15.5	37 77	88.7	60 36.9	34 76	86.9	7
8	56 35.5	52 76	99.2	56 50.8	51 76	98.4	57 05.8	50 76	97.6	57 35.0	48 76	96.0	58 29.4	43 77	92.6	59 18.3	38 77	89.1	59 29.6	37 77	88.1	59 51.0	34 76	86.3	8
9	55 50.0	51 76	98.3	56 05.3	50 76	97.6	56 20.2	49 76	96.8	56 49.3	47 76	95.2	57 43.5	43 77	91.9	58 32.3	38 77	88.4	58 43.6	37 77	87.5	59 05.1	35 76	85.7	9
40	55 04.5	51 76	97.5	55 19.7	50 76	96.8	55 34.6	49 76	96.0	56 03.4	47 76	94.5	56 57.5	43 77	91.2	57 46.4	38 77	87.8	57 57.7	37 76	87.0	58 19.3	35 76	85.2	40
1	54 18.9	51 76	96.8	54 34.0	50 76	96.0	54 48.8	49 76	95.3	55 17.6	47 76	93.7	56 11.6	43 77	90.6	57 00.5	38 76	87.2	57 11.8	37 76	86.4	57 33.5	35 76	84.7	1
2	53 33.2	51 76	96.0	53 48.3	50 76	95.3	54 03.0	49 76	94.5	54 31.7	47 76	93.0	55 25.6	43 77	89.9	56 14.6	39 76	86.7	56 26.0	37 76	85.8	56 47.8	35 76	84.1	2
3	52 47.5	50 76	95.3	53 02.5	49 76	94.5	53 17.2	49 76	93.8	53 45.8	47 77	92.3	54 39.7	43 77	89.3	55 28.7	39 76	86.1	55 40.2	38 76	85.3	56 02.1	35 76	83.6	3
4	52 01.7	50 76	94.5	52 16.6	49 76	93.8	52 31.3	49 77	93.1	52 59.9	47 77	91.7	53 53.7	43 77	88.7	54 42.8	39 76	85.5	54 54.4	38 76	84.7	55 16.4	36 76	83.1	4
45	51 15.9	50 76	93.8	51 30.8	49 76	93.1	51 45.4	48 77	92.4	52 13.9	47 77	91.0	53 07.8	43 77	88.0	53 57.0	39 76	85.0	54 08.6	38 76	84.2	54 30.8	36 76	82.6	45
6	50 30.0	50 77	93.1	50 44.8	49 77	92.4	50 59.5	48 77	91.7	51 28.0	47 77	90.3	52 21.8	43 76	87.4	53 11.3	39 76	84.4	53 22.9	38 76	83.7	53 45.3	36 76	82.1	6
7	49 44.1	50 77	92.4	49 58.9	49 77	91.8	50 13.5	48 77	91.1	50 42.0	47 77	89.7	51 35.9	43 76	86.8	52 25.6	39 76	83.9	52 37.3	38 76	83.1	52 59.8	37 76	81.6	7
8	48 58.1	50 77	91.8	49 13.0	49 77	91.1	49 27.6	48 77	90.4	49 56.0	47 77	89.1	50 50.0	43 76	86.3	51 39.9	40 76	83.4	51 51.6	39 76	82.6	52 14.3	37 76	81.1	8
9	48 12.2	50 77	91.1	48 27.0	49 77	90 4	48 41.6	48 77	89 8	49 10.1	47 77	88.4	50 04.2	43 76	85.7	50 54.2	40 76	82.8	51 06.1	39 76	82.1	51 29.0	37 76	80.6	9
50	47 26.2	50 77	90.4	47 41.0	49 77	89.8	47 55.6	48 77	89.1	48 24.2	47 77	87.8	49 18.4	44 76	85.1	50 08.7	40 76	82.3	50 20.6	39 76	81.6	50 43.6	38 75	80.1	50
1	46 40.3	50 77	89.8	46 55.1	49 77	89.2	47 09.7	48 77	88.5	47 38.2	47 76	87.2	48 32.6	44 76	84.5	49 23.2	40 76	81.8	49 35.2	40 76	81.1	49 58.4	38 75	79.7	1
2	45 54.3	50 77	89.2	46 09.1	49 77	88.5	46 23.7	48 77	87.9	46 52.3	47 76	86.6	47 46.9	44 76	84.0	48 37.7	41 76	81.3	48 49.8	40 76	80.6	49 13.2	38 75	79.2	2
3	45 08.4	50 77	88.5	45 23.2	49 77	87.9	45 37.8	48 76	87.3	46 06.5	47 76	86.0	47 01.2	44 76	83.4	47 52.3	41 76	80.8	48 04.5	40 75	80.1	48 28.1	39 75	78.7	3
4	44 22.4	50 77	87.9	44 37.3	49 76	87.3	44 51.9	49 76	86.7	45 20.6	47 76	85.4	46 15.6	44 76	82.9	47 07.0	41 75	80.3	47 19.2	41 75	79.6	47 43.1	39 75	78.2	4
55	43 36.5	50 76	87.3	43 51.4	49 76	86.7	44 06.1	49 76	86.1	44 34.8	47 76	84.9	45 30.0	45 76	82.4	46 21.7	42 75	79.8	46 34.1	41 75	79.1	46 58.1	39 75	77.8	55
6	42 50.6	50 76	86.7	43 05.5	49 76	86.1	43 20.2	49 76	85.5	43 49.1	47 76	84.3	44 44.4	45 76	81.8	45 36.5	42 75	79.3	45 49.0	41 75	78.6	46 13.2	40 75	77.3	6
7	42 04.7	50 76	86.1	42 19.7	49 76	85.5	42 34.4	49 76	84.9	43 03.4	48 76	83.7	43 59.0	45 76	81.3	44 51.4	42 75	78.8	45 04.0	42 75	78.1	45 28.4	40 74	76.8	7
8	41 18.9	50 76	85.5	41 33.9	50 76	84.9	41 48.7	49 76	84.3	42 17.7	48 76	83.2	43 13.6	45 76	80.8	44 06.3	43 75	78.3	44 19.0	42 75	77.6	44 43.7	40 74	76.4	8
9	40 33.1	50 76	84.9	40 48.1	50 76	84.3	41 02.9	49 76	83 8	41 32.1	48 76	82.6	42 28.3	46 75	80.2	43 21.4	43 75	77.8	43 34.2	42 75	77.2	43 59.1	41 74	75.9	9
60	39 47.3	50 76	84.3	40 02.4	50 76	83.8	40 17.3	49 76	83.2	40 46.5	48 76	82.1	41 43.0	46 75	79.7	42 36.5	43 75	77.3	42 49.4	43 74	76.7	43 14.6	41 74	75.4	60
1	39 01.6	51 76	83.8	39 16.7	50 76	83.2	39 31.7	50 76	82.6	40 01.1	48 76	81.5	40 57.8	46 75	79.2	41 51.7	44 74	76.8	42 04.7	43 74	76.2	42 30.1	42 74	75.0	1
2	38 15.9	51 76	83.2	38 31.1	50 76	82.6	38 46.1	50 76	82.1	39 15.6	49 76	81.0	40 12.7	46 75	78.7	41 07.0	44 74	76.3	41 20.1	43 74	75.7	41 45.8	42 74	74.5	2
3	37 30.3	51 76	82.6	37 45.6	50 76	82.1	38 00.6	50 76	81.5	38 30.3	49 75	80.4	39 27.7	47 75	78.2	40 22.4	44 74	75.8	40 35.6	44 74	75.2	41 01.5	43 74	74.1	3
4	36 44.8	51 76	82.0	37 00.1	51 76	81.5	37 15.2	50 76	81.0	37 45.0	49 75	79.9	38 42.7	47 75	77.6	39 37.9	45 74	75.4	39 51.2	44 74	74.8	40 17.4	43 73	73.6	4
65	35 59.3	51 76	81.5	36 14.6	51 76	81.0	36 29.8	50 75	80.4	36 59.8	49 75	79.3	37 57.9	47 75	77.1	38 53.4	45 74	74.9	39 06.9	45 74	74.3	39 33.4	43 73	73.1	65
6	35 13.9	52 76	80.9	35 29.3	51 75	80.4	35 44.5	51 75	79.9	36 14.7	50 75	78.8	37 13.1	48 74	76.6	38 09.1	46 74	74.4	38 22.7	45 73	73.8	38 49.4	44 73	72.7	6
7	34 28.5	52 75	80.4	34 44.0	51 75	79.9	34 59.3	51 75	79.3	35 29.6	50 75	78.3	36 28.5	48 74	76.1	37 24.9	46 74	73.9	37 38.6	45 73	73.3	38 05.6	44 73	72.2	7
8	33 43.2	52 75	79.8	33 58.8	52 75	79.3	34 14.2	51 75	78.8	34 44.6	50 75	77.7	35 43.9	48 74	75.6	36 40.8	46 73	73.4	36 54.7	46 73	72.9	37 21.9	45 73	71.8	8
9	32 58.0	52 75	79.3	33 13.7	52 75	78.8	33 29.2	51 75	78.2	33 59.8	51 75	77.2	34 59.4	49 74	75.1	35 56.8	47 73	72.9	36 10.8	46 73	72.4	36 38.3	45 72	71.3	9
70	32 12.9	53 75	78.7	32 28.6	52 75	78.2	32 44.2	52 75	77.7	33 15.0	51 74	76.7	34 15.0	49 74	74.6	35 12.9	47 73	72.5	35 27.0	47 73	71.9	35 54.8	46 72	70.8	70
1	31 27.9	53 75	78.2	31 43.7	52 75	77.7	31 59.4	52 75	77.2	32 30.3	51 74	76.2	33 30.8	50 74	74.1	34 29.2	48 73	72.0	34 43.4	47 72	71.5	35 11.5	46 72	70.4	1
2	30 43.0	53 75	77.6	30 58.8	53 75	77.1	31 14.6	52 74	76.6	31 45.8	52 74	75.6	32 46.6	50 73	73.6	33 45.5	48 73	71.5	33 59.9	48 72	71.0	34 28.2	47 72	69.9	2
3	29 58.1	53 75	77.1	30 14.1	53 74	76.6	30 29.9	53 74	76.1	31 01.3	52 74	75.1	32 02.6	50 73	73.1	33 02.0	49 72	71.0	33 16.5	48 72	70.5	33 45.1	47 72	69.5	3
4	29 13.4	54 74	76.5	29 29.4	53 74	76.1	29 45.4	53 74	75.6	30 16.9	52 74	74.6	31 18.7	51 73	72.6	32 18.6	49 72	70.5	32 33.2	49 72	70.0	33 02.2	48 71	69.0	4
75	28 28.7	54 74	76.0	28 44.9	54 74	75.5	29 00.9	53 74	75.0	29 32.7	53 74	74.1	30 34.9	51 73	72.1	31 35.3	50 72	70.1	31 50.1	49 72	69.6	32 19.3	48 71	68.5	75
6	27 44.2	54 74	75.5	28 00.4	54 74	75.0	28 16.5	54 74	74.5	28 48.5	53 73	73.5	29 51.2	52 73	71.6	30 52.2	50 72	69.6	31 07.1	50 71	69.1	31 36.6	49 71	68.1	6
7	26 59.7	55 74	74.9	27 16.1	54 74	74.4	27 32.3	54 74	74.0	28 04.5	53 73	73.0	29 07.7	52 72	71.1	30 09.2	51 71	69.1	30 24.2	50 71	68.6	30 54.1	49 71	67.6	7
8	26 15.4	55 74	74.4	26 31.9	55 74	73.9	26 48.2	54 73	73.4	27 20.6	54 73	72.5	28 24.3	52 72	70.6	29 26.3	51 71	68.6	29 41.5	51 71	68.1	30 11.7	50 70	67.1	8
9	25 31.2	55 73	73.8	25 47.8	55 73	73.4	26 04.2	55 73	72.9	26 36.8	54 73	72.0	27 41.0	53 72	70.1	28 43.6	51 71	68.1	28 58.9	51 71	67.6	29 29.4	50 70	66.7	9
80	24 47.1	56 73	73.3	25 03.8	55 73	72.8	25 20.3	55 73	72.4	25 53.2	54 72	71.4	26 57.9	53 72	69.6	28 01.0	52 71	67.6	28 16.5	52 70	67.2	28 47.3	51 70	66.2	80
1	24 03.2	56 73	72.7	24 19.9	56 73	72.3	24 36.6	55 73	71.8	25 09.7	55 72	70.9	26 14.9	54 71	69.1	27 18.5	52 70	67.2	27 34.2	52 70	66.7	28 05.3	51 70	65.7	1
2	23 19.3	56 73	72.2	23 36.2	56 73	71.8	23 53.0	56 72	71.3	24 26.3	55 72	70.4	25 32.0	54 71	68.5	26 36.3	53 70	66.7	26 52.1	53 70	66.2	27 23.5	52 69	65.2	2
3	22 35.6	57 73	71.7	22 52.6	56 72	71.2	23 09.5	56 72	70.8	23 43.1	56 72	69.9	24 49.3	55 71	68.0	25 54.1	53 70	66.2	26 10.1	53 70	65.7	26 41.8	53 69	64.8	3
4	21 52.1	57 72	71.1	22 09.2	57 72	70.7	22 26.2	57 72	70.2	23 00.0	56 72	69.3	24 06.8	55 71	67.5	25 12.2	54 70	65.7	25 28.3	54 69	65.2	26 00.3	53 69	64.3	4
85	21 08.7	58 72	70.6	21 25.9	57 72	70.1	21 43.0	57 72	69.7	22 17.1	57 71	68.8	23 24.4	56 70	67.0	24 30.4	54 69	65.2	24 46.7	54 69	64.7	25 19.0	54 69	63.8	85
6	20 25.4	58 72	70.0	20 42.7	58 72	69.6	21 00.0	57 71	69.2	21 34.3	57 71	68.3	22 42.1	56 70	66.5	23 48.7	55 69	64.7	24 05.2	55 69	64.2	24 37.9	54 68	63.3	6
7	19 42.3	58 72	69.5	19 59.7	58 71	69.1	20 17.1	58 71	68.6	20 51.7	57 71	67.7	22 00.1	56 70	66.0	23 07.3	55 69	64.2	23 23.9	55 69	63.7	23 56.9	55 68	62.8	7
8	18 59.3	59 71	68.9	19 16.9	58 71	68.5	19 34.4	58 71	68.1	20 09.2	58 70	67.2	21 18.2	57 70	65.5	22 26.0	55 69	63.7	22 42.8	56 68	63.2	23 16.1	55 68	62.3	8
9	18 16.5	59 71	68.4	18 34.2	59 71	68.0	18 51.8	59 71	67.5	19 27.0	58 70	66.7	20 36.4	57 69	65.0	21 44.9	57 68	63.2	22 01.8	56 68	62.7	22 35.5	56 67	61.8	9
90	17 33.8	60 71	67.8	17 51.7	59 71	67.4	18 09.4	59 70	67.0	18 44.8	59 70	66.1	19 54.9	58 69	64.4	21 04.0	57 68	62.7	21 21.1	57 68	62.2	21 55.0	56 67	61.3	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	28° 00′		28° 30′		29° 00′		30° 00′		32° 00′		34° 00′		34° 30′		35° 30′		H.A.
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	°
00	22 00.0 1.0 01	180.0	21 30.0 1.0 01	180.0	21 00.0 1.0 01	180.0	20 00.0 1.0 01	180.0	18 00.0 1.0 01	180.0	16 00.0 1.0 01	180.0	15 30.0 1.0 01	180.0	14 30.0 1.0 01	180.0	00
1	21 59.6 1.0 02	179.0	21 29.6 1.0 02	179.1	20 59.6 1.0 02	179.1	19 59.6 1.0 02	179.1	17 59.6 1.0 02	179.1	15 59.7 1.0 02	179.1	15 29.7 1.0 02	179.1	14 29.7 1.0 02	179.2	1
2	21 58.5 1.0 03	178.1	21 28.5 1.0 03	178.1	20 58.5 1.0 03	178.1	19 58.5 1.0 03	178.2	17 58.6 1.0 03	178.2	15 58.6 1.0 03	178.3	15 28.6 1.0 03	178.3	14 28.7 1.0 03	178.3	2
3	21 56.6 1.0 04	177.1	21 26.6 1.0 04	177.2	20 56.6 1.0 04	177.2	19 56.7 1.0 04	177.2	17 56.8 1.0 04	177.3	15 56.9 1.0 04	177.4	15 26.9 1.0 04	177.4	14 27.0 1.0 04	177.5	3
4	21 53.9 1.0 06	176.2	21 23.9 1.0 06	176.2	20 54.0 1.0 06	176.3	19 54.1 1.0 06	176.3	17 54.3 1.0 05	176.4	15 54.5 1.0 05	176.6	15 24.5 1.0 05	176.6	14 24.6 1.0 05	176.6	4
05	21 50.5 1.0 07	175.2	21 20.5 1.0 07	175.3	20 50.6 1.0 07	175.3	19 50.8 1.0 07	175.4	17 51.1 1.0 07	175.5	15 51.4 1.0 06	175.7	15 21.4 1.0 06	175.7	14 21.6 1.0 06	175.8	05
6	21 46.3 1.0 08	174.3	21 16.4 1.0 08	174.3	20 46.5 1.0 08	174.4	19 46.7 1.0 08	174.5	17 47.1 1.0 08	174.7	15 47.6 1.0 07	174.8	15 17.7 1.0 07	174.9	14 17.9 1.0 07	175.0	6
7	21 41.3 99 10	173.4	21 11.5 99 09	173.4	20 41.6 1.0 09	173.5	19 41.9 1.0 09	173.6	17 42.5 1.0 09	173.8	15 43.1 1.0 09	174.0	15 13.2 1.0 09	174.0	14 13.5 1.0 08	174.1	7
8	21 35.6 99 11	172.4	21 05.8 99 11	172.5	20 36.0 99 11	172.5	19 36.4 99 10	172.6	17 37.2 99 10	172.9	15 37.9 99 10	173.1	15 08.1 99 10	173.2	14 08.5 99 10	173.3	8
9	21 29.2 99 12	171.5	20 59.4 99 12	171.5	20 29.7 99 12	171.6	19 30.2 99 12	171.7	17 31.1 99 11	172.0	15 32.1 99 11	172.3	15 02.3 99 11	172.3	14 02.8 99 11	172.5	9
10	21 22.0 99 13	170.5	20 52.3 99 13	170.6	20 22.6 99 13	170.7	19 23.2 99 13	170.8	17 24.4 99 12	171.1	15 25.5 99 12	171.4	14 55.8 99 12	171.5	13 56.4 99 12	171.6	10
1	21 14.0 99 14	169.6	20 44.4 99 14	169.7	20 14.8 99 14	169.8	19 15.5 99 14	169.9	17 16.9 99 14	170.2	15 18.3 99 13	170.6	14 48.7 99 13	170.6	13 49.4 99 13	170.8	1
2	21 05.4 99 16	168.7	20 35.8 99 16	168.7	20 06.2 99 15	168.8	19 07.1 99 15	169.0	17 08.8 99 15	169.4	15 10.5 99 14	169.7	14 40.9 99 14	169.8	13 41.7 99 14	170.0	2
3	20 56.0 98 17	167.7	20 26.5 98 17	167.8	19 57.0 98 17	167.9	18 58.0 98 16	168.1	17 00.0 98 16	168.5	15 01.9 98 15	168.9	14 32.4 98 15	169.0	13 33.4 98 15	169.1	3
4	20 45.8 98 18	166.8	20 16.4 98 18	166.9	19 47.0 98 18	167.0	18 48.2 98 18	167.2	16 50.5 98 17	167.6	14 52.7 98 16	168.0	14 23.3 98 16	168.1	13 24.4 98 16	168.3	4
15	20 35.0 98 19	165.9	20 05.6 98 19	166.0	19 36.3 98 19	166.1	18 37.7 98 19	166.3	16 40.3 98 18	166.8	14 42.9 98 18	167.2	14 13.5 98 17	167.3	13 14.8 98 17	167.5	15
6	20 23.4 97 20	165.0	19 54.2 97 20	165.1	19 24.9 97 20	165.2	18 26.4 97 20	165.4	16 29.4 98 19	165.9	14 32.3 98 19	166.3	14 03.0 98 18	166.5	13 04.5 98 18	166.7	6
7	20 11.1 97 22	164.0	19 42.0 97 22	164.2	19 12.8 97 21	164.3	18 14.5 97 21	164.5	16 17.9 97 20	165.0	14 21.2 97 20	165.5	13 52.0 97 20	165.6	12 53.6 97 19	165.9	7
8	19 58.1 97 23	163.1	19 29.1 97 23	163.3	19 00.0 97 22	163.4	18 01.9 97 22	163.7	16 05.7 97 21	164.2	14 09.3 97 21	164.7	13 40.2 97 21	164.8	12 42.0 97 20	165.1	8
9	19 44.4 96 24	162.2	19 15.5 96 24	162.4	18 46.5 96 24	162.5	17 48.7 97 23	162.8	15 52.8 97 23	163.3	13 56.9 97 22	163.9	13 27.9 97 22	164.0	12 29.9 97 21	164.2	9
20	19 30.0 96 25	161.3	19 01.2 96 25	161.5	18 32.4 96 25	161.6	17 34.7 96 24	161.9	15 39.3 96 24	162.5	13 43.8 96 23	163.0	13 14.9 96 23	163.2	12 17.1 96 22	163.4	20
1	19 15.0 96 26	160.4	18 46.3 96 26	160.6	18 17.5 96 26	160.7	17 20.1 96 25	161.0	15 25.1 96 25	161.6	13 30.0 96 24	162.2	13 01.3 96 24	162.4	12 03.7 96 23	162.6	1
2	18 59.2 95 27	159.5	18 30.6 95 27	159.7	18 02.0 95 27	159.8	17 04.8 95 27	160.2	15 10.3 95 26	160.8	13 15.7 96 25	161.4	12 47.0 96 25	161.5	11 49.7 96 24	161.8	2
3	18 42.8 95 28	158.6	18 14.3 95 28	158.8	17 45.9 95 28	159.0	16 48.9 95 28	159.3	14 54.9 95 27	159.9	13 00.7 95 26	160.6	12 32.2 95 26	160.7	11 35.0 95 25	161.1	3
4	18 25.7 94 30	157.8	17 57.4 94 29	157.9	17 29.1 95 29	158.1	16 32.3 95 29	158.4	14 38.8 95 28	159.1	12 45.1 95 27	159.8	12 16.7 95 27	159.9	11 19.8 95 26	160.3	4
25	18 08.0 94 31	156.9	17 39.8 94 30	157.1	17 11.6 94 30	157.2	16 15.1 94 30	157.6	14 22.1 94 29	158.3	12 28.9 94 28	159.0	12 00.6 94 28	159.1	11 04.0 94 27	159.5	25
6	17 49.7 94 32	156.0	17 21.6 94 31	156.2	16 53.5 94 31	156.4	15 57.3 94 31	156.7	14 04.8 94 30	157.5	12 12.1 94 29	158.2	11 44.0 94 29	158.3	10 47.6 94 28	158.7	6
7	17 30.6 93 33	155.1	17 02.7 93 32	155.3	16 34.8 93 32	155.5	15 38.8 93 32	155.9	13 46.9 93 31	156.6	11 54.8 93 30	157.4	11 26.7 93 30	157.6	10 30.6 94 29	157.9	7
8	17 11.0 93 34	154.3	16 43.2 93 34	154.5	16 15.4 93 33	154.7	15 19.8 93 33	155.1	13 28.3 93 32	155.8	11 36.8 93 31	156.6	11 08.9 93 31	156.8	10 13.0 93 30	157.1	8
9	16 50.8 92 35	153.4	16 23.1 92 35	153.6	15 55.4 92 34	153.8	15 00.1 92 34	154.2	13 09.2 92 33	155.0	11 18.2 93 32	155.8	10 50.5 93 32	156.0	9 54.9 93 31	156.4	9
30	16 29.9 92 36	152.6	16 02.4 92 36	152.8	15 34.9 92 35	153.0	14 39.8 92 35	153.4	12 49.5 92 34	154.2	10 59.1 92 33	155.0	10 31.5 92 33	155.2	9 36.2 92 32	155.6	30
1	16 08.4 91 37	151.7	15 41.1 91 36	152.0	15 13.7 91 36	152.2	14 18.9 91 36	152.6	12 29.3 91 35	153.4	10 39.4 92 34	154.2	10 11.9 92 34	154.5	9 17.0 92 33	154.9	1
2	15 46.4 91 38	150.9	15 19.2 91 37	151.1	14 52.0 91 37	151.3	13 57.5 91 37	151.8	12 08.4 91 36	152.6	10 19.2 91 35	153.5	9 51.8 91 34	153.7	8 57.1 91 34	154.1	2
3	15 23.8 90 39	150.1	14 56.7 90 38	150.3	14 29.6 90 38	150.5	13 35.5 90 38	151.0	11 47.0 90 37	151.8	9 58.4 91 36	152.7	9 31.2 91 35	152.9	8 36.8 91 35	153.4	3
4	15 00.5 90 40	149.3	14 33.6 90 39	149.5	14 06.7 90 39	149.7	13 12.9 90 39	150.2	11 25.0 90 38	151.1	9 37.0 90 36	152.0	9 10.0 90 36	152.2	8 15.9 90 36	152.6	4
35	14 36.8 89 41	148.4	14 10.0 89 40	148.7	13 43.3 89 40	148.9	12 49.7 89 40	149.4	11 02.5 89 38	150.3	9 15.1 90 37	151.2	8 48.3 90 37	151.4	7 54.5 90 37	151.9	35
6	14 12.4 89 41	147.6	13 45.9 89 41	147.9	13 19.3 89 41	148.1	12 26.1 89 40	148.6	10 39.5 89 39	149.5	8 52.7 89 38	150.4	8 26.0 89 38	150.7	7 32.6 89 37	151.1	6
7	13 47.6 88 42	146.8	13 21.1 88 42	147.1	12 54.7 88 42	147.3	12 01.8 88 41	147.8	10 15.9 88 40	148.8	8 29.8 88 39	149.7	8 03.3 88 39	149.9	7 10.2 89 38	150.4	7
8	13 22.1 87 43	146.0	12 55.9 88 43	146.3	12 29.6 88 43	146.5	11 37.1 88 42	147.0	9 51.8 88 41	148.0	8 06.4 88 40	149.0	7 40.0 88 40	149.2	6 47.2 88 39	149.7	8
9	12 56.2 87 44	145.2	12 30.1 87 44	145.5	12 04.0 87 44	145.7	11 11.8 87 43	146.2	9 27.2 87 42	147.2	7 42.4 87 41	148.2	7 16.2 87 40	148.5	6 23.8 87 40	149.0	9
40	12 29.7 86 45	144.5	12 03.8 86 45	144.7	11 37.9 86 44	145.0	10 46.0 87 44	145.5	9 02.1 87 43	146.5	7 18.0 87 42	147.5	6 51.9 87 41	147.8	5 59.8 87 41	148.3	40
1	12 02.8 86 46	143.7	11 37.0 86 46	143.9	11 11.3 86 45	144.2	10 19.7 86 45	144.7	8 36.5 86 44	145.8	6 53.0 86 42	146.8	6 27.2 86 42	147.0	5 35.4 86 42	147.5	1
2	11 35.3 85 47	142.9	11 09.7 85 46	143.2	10 44.1 85 46	143.4	9 52.9 85 45	144.0	8 10.3 86 44	145.0	6 27.6 86 43	146.1	6 01.9 86 43	146.3	5 10.5 86 42	146.8	2
3	11 07.3 85 47	142.1	10 41.9 85 47	142.4	10 16.5 85 47	142.7	9 25.6 85 46	143.2	7 43.8 85 45	144.3	6 01.7 85 44	145.4	5 36.2 85 44	145.6			3
4	10 38.9 84 48	141.4	10 13.7 84 48	141.7	9 48.4 84 48	141.9	8 57.9 84 47	142.5	7 16.7 84 46	143.6	5 35.4 84 45	144.6	5 10.0 85 44	144.9			4
45	10 10.0 84 49	140.6	9 44.9 84 49	140.9	9 19.8 84 48	141.2	8 29.7 84 48	141.7	6 49.2 84 47	142.8	5 08.5 84 45	143.9					45
6	9 40.6 83 50	139.9	9 15.7 83 49	140.2	8 50.8 83 49	140.5	8 01.0 83 49	141.0	6 21.2 83 47	142.1							6
7	9 10.7 82 50	139.1	8 46.0 82 50	139.4	8 21.3 82 50	139.7	7 31.8 82 49	140.3	5 52.7 83 48	141.4							7
8	8 40.4 82 51	138.4	8 15.9 82 51	138.7	7 51.4 82 51	139.0	7 02.2 82 50	139.6	5 23.9 82 49	140.7							8
9	8 09.7 81 52	137.7	7 45.4 81 52	138.0	7 21.0 81 51	138.3	6 32.2 81 51	138.9									9
50	7 38.6 81 53	137.0	7 14.4 81 52	137.3	6 50.2 81 52	137.6	6 01.8 81 51	138.2									50
1	7 07.0 80 53	136.3	6 43.0 80 53	136.6	6 19.0 80 53	136.9	5 30.9 80 52	137.5									1
2	6 35.0 79 54	135.5	6 11.2 79 54	135.8	5 47.3 79 53	136.2											2
3	6 02.6 79 55	134.8	5 39.0 79 54	135.1	5 15.3 79 54	135.5											3
4	5 29.8 78 55	134.1	5 06.3 78 55	134.5													4

DECLINATION SAME NAME AS LATITUDE

H.A.	28° 00′		28° 30′		29° 00′		30° 00′		32° 00′		34° 00′		34° 30′		35° 30′		H.A.
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	°
91	16 51.4 60 70	67.3	17 09.3 60 70	66.9	17 27.2 60 70	66.4	18 02.9 59 70	65.6	19 13.5 58 69	63.9	20 23.2 58 68	62.2	20 40.5 57 67	61.7	21 14.8 57 67	60.9	91
2	16 09.0 60 70	66.7	16 27.1 60 70	66.3	16 45.2 60 70	65.9	17 21.1 60 69	65.1	18 32.4 59 68	63 4	19 42.7 58 67	61.7	20 00.1 58 66	61.2	20 34.8 58 66	60.4	2
3	15 26.9 61 70	66.2	15 45.1 61 70	65.8	16 03.3 61 69	65.4	16 39.5 60 69	64.5	17 51.4 60 68	62.9	19 02.3 59 67	61.1	19 19.9 59 67	60.7	19 54.9 58 66	59.8	3
4	14 45.0 61 70	65.6	15 03.3 61 69	65.2	15 21.6 61 69	64.8	15 58.1 61 69	64.0	17 10.6 60 68	62.3	18 22.2 59 67	60.6	18 39.9 59 66	60.2	19 15.3 59 66	59.3	4
95	14 03.2 62 69	65.1	14 21.7 62 69	64.7	14 40.1 61 69	64.2	15 16.9 61 68	63.4	16 30.0 61 67	61.8	17 42.2 60 66	60.1	18 00.1 60 66	59.7	18 35.8 59 65	58.8	95
6	13 21.6 62 69	64.5	13 40.2 62 69	64.1	13 58.8 62 68	63.7	14 35.9 62 68	62.9	15 49.6 61 67	61.2	17 02.5 60 66	59.6	17 20.6 60 66	59.2	17 56.6 60 65	58.3	6
7	12 40.2 63 69	63.9	12 59.0 63 68	63.5	13 17.7 62 68	63.1	13 55.1 62 68	62.3	15 09.4 62 67	60.7	16 22.9 61 66	59.1	16 41.2 61 65	58.6	17 17.6 60 65	57.8	7
8	11 59.0 63 68	63.4	12 18.0 63 68	63.0	12 36.8 63 68	62.6	13 14.5 63 67	61.8	14 29.4 62 66	60.2	15 43.6 62 65	58.5	16 02.1 61 65	58.1	16 38.8 61 64	57.3	8
9	11 18.1 64 68	62.8	11 37.1 64 68	62.4	11 56.2 63 67	62.0	12 34.1 63 67	61.2	13 49.6 63 66	59.6	15 04.5 62 65	58.0	15 23.2 62 64	57.6	16 00.3 62 64	56.8	9
100	10 37.3 64 68	62.2	10 56.5 64 67	61.8	11 15.7 64 67	61.4	11 54.0 64 67	60.6	13 10.1 63 66	59.1	14 25.7 63 64	57.5	14 44.5 63 64	57.1	15 21.9 62 64	56.2	100
1	9 56.7 65 67	61.6	10 16.1 64 67	61.2	10 35.4 64 67	60.9	11 14.0 64 66	60.1	12 30.8 64 65	58.5	13 47.0 63 64	56.9	14 06.0 63 64	56.5	14 43.8 63 63	55.7	1
2	9 16.4 65 67	61.1	9 35.9 65 67	60.7	9 55.4 65 66	60.3	10 34.3 65 66	59.5	11 51.7 64 65	58.0	13 08.6 64 64	56.4	13 27.8 64 63	56.0	14 06.0 63 63	55.2	2
3	8 36.3 66 66	60.5	8 56.0 65 66	60.1	9 15.6 65 66	59.7	9 54.8 65 65	58.9	11 12.9 65 64	57.4	12 30.5 64 63	55.8	12 49.8 64 63	55.4	13 28.3 64 62	54.7	3
4	7 56.4 66 66	59.9	8 16.2 66 66	59.5	8 36.0 66 66	59.1	9 15.5 66 65	58.4	10 34.3 65 64	56.8	11 52.6 65 63	55.3	12 12.1 65 62	54.9	12 51.0 65 62	54.1	4
105	7 16.8 67 66	59.3	7 36.7 67 65	58.9	7 56.7 66 65	58.5	8 36.5 66 65	57.8	9 55.9 66 64	56.3	11 14.9 66 62	54.7	11 34.6 66 62	54.3	12 13.9 65 61	53.6	105
6	6 37.4 67 65	58.7	6 57.5 67 65	58.3	7 17.6 67 65	58.0	7 57.8 67 64	57.2	9 17.8 67 63	55.7	10 37.5 66 62	54.2	10 57.4 66 62	53.8	11 37.0 66 61	53.0	6
7	5 58.2 68 65	58.1	6 18.5 68 65	57.7	6 38.8 68 64	57.4	7 19.3 67 64	56.6	8 40.0 67 63	55.1	10 00.4 67 61	53.6	10 20.4 67 61	53.2	11 00.4 67 61	52.5	7
8	5 19.3 68 65	57.5	5 39.8 68 64	57.1	6 00.2 68 64	56.8	6 41.0 68 63	56.0	8 02.4 68 62	54.5	9 23.5 67 61	53.1	9 43.7 67 61	52.7	10 24.1 67 60	51.9	8
9			5 01.3 69 64	56.5	5 21.9 69 64	56.2	6 03.0 69 63	55.4	7 25.1 68 62	54.0	8 46.9 68 61	52.5	9 07.3 68 60	52.1	9 48.1 68 60	51.4	9
110							5 25.3 69 62	54.8	6 48.1 69 61	53.4	8 10.6 69 60	51.9	8 31.2 69 60	51.5	9 12.3 68 59	50.8	110
1									6 11.4 69 61	52.8	7 34.6 69 60	51.3	7 55.4 69 59	51.0	8 36.8 69 59	50.2	1
2									5 34.9 70 60	52.2	6 58.8 70 59	50.8	7 19.8 70 59	50.4	8 01.6 70 58	49.7	2
3											6 23.4 70 59	50.2	6 44.5 70 58	49.8	7 26.8 70 58	49.1	3
4											5 48.3 71 58	49.6	6 09.6 71 58	49.2	6 52.2 71 57	48.5	4
115											5 13.4 72 58	49.0	5 34.9 72 57	48.6	6 17.9 72 57	47.9	115
6													5 00.6 72 57	48.0	5 43.9 72 56	47.3	6
7															5 10.3 73 56	46.7	7

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Lat. 40°

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	86 00.0	1.0 08	180.0	87 00.0	1.0 10	180.0	88 30.0	1.0 19	180.0	90 00.0	. . 77	. . . .	88 00.0	1.0 14	00.0	87 30.0	1.0 11	00.0	87 00.0	1.0 09	00.0	85 00.0	1.0 05	00.0	00
1	85 55.4	98 22	168.5	86 54.9	97 28	165.1	88 18.7	89 47	152.4	89 14.0	01 77	89.7	87 51.8	93 37	20.3	87 23.4	96 31	16.4	86 54.5	97 26	13.7	84 56.8	99 16	08.1	1
2	85 42.0	93 35	157.9	86 37.0	89 42	151.8	87 50.6	70 61	133.4	88 28.1	01 77	89.4	87 29.7	79 51	36.4	87 05.0	85 45	30.4	86 38.8	89 39	25.9	84 47.2	96 25	15.8	2
3	85 21.3	87 45	148.5	86 11.5	80 53	141.0	87 14.1	56 68	121.9	87 42.1	02 77	89.0	86 58.8	65 60	47.6	86 38.0	73 64	41.1	86 15.2	79 49	35.8	84 32.0	91 34	22.9	3
4	84 54.5	80 52	140.5	85 39.9	71 59	132.5	86 33.5	46 71	114.6	86 56.2	02 77	88.7	86 22.8	53 65	55.2	86 05.4	62 60	49.0	85 45.7	69 56	43.6	84 11.8	85 41	29.2	4
05	84 23.2	73 58	133.9	85 04.2	63 64	125.9	85 50.9	39 73	109.6	86 10.2	03 77	88.4	85 43.8	44 68	60.5	85 29.2	53 64	54.7	85 12.2	60 60	49.7	83 47.4	79 46	34.7	05
6	83 48.6	67 62	128.4	84 25.8	57 67	120.7	85 07.1	34 74	106.0	85 24.3	03 77	88.1	85 03.1	37 70	64.2	84 50.7	45 67	59.1	84 35.9	53 64	54.3	83 19.7	72 51	39.5	6
7	83 11.4	62 65	123.8	83 45.4	51 70	116.5	84 22.6	30 75	103.2	84 38.3	04 77	87.7	84 21.2	32 71	67.0	84 10.6	39 69	62.3	83 57.8	46 66	57.9	82 49.2	67 55	43.6	7
8	82 32.3	57 67	119.9	83 03.7	47 71	113.1	83 37.7	28 75	101.1	83 52.4	04 76	87.4	83 38.6	27 72	69.1	83 29.4	34 70	64.8	83 18.2	41 68	60.8	82 16.5	61 57	47.1	8
9	81 51.8	53 69	116.6	82 20.9	44 72	110.2	82 52.5	26 76	99.3	83 06.5	05 76	87.1	82 55.4	23 73	70.7	82 47.5	30 71	66.8	82 37.6	36 69	63.1	81 42.0	56 60	50.0	9
10	81 10.2	50 71	113.8	81 37.5	41 73	107.8	82 07.0	24 76	97.8	82 20.6	06 76	86.8	82 11.9	20 73	71.9	82 05.0	26 72	68.4	81 56.3	32 70	64.9	81 06.1	51 62	52.5	10
1	80 27.8	47 72	111.3	80 53.5	38 74	105.7	81 21.4	23 76	96.5	81 34.7	06 76	86.5	81 28.0	17 73	72.9	81 22.0	23 72	69.6	81 14.4	28 71	66.4	80 29.1	47 63	54.7	1
2	79 44.6	45 73	109.1	80 09.0	36 75	103.9	80 35.7	22 76	95.3	80 48.9	07 76	86.1	80 44.0	15 74	73.6	80 38.8	20 72	70.6	80 32.1	25 71	67.6	79 51.2	43 65	56.6	2
3	79 01.0	43 74	107.2	79 24.3	35 75	102.3	79 49.9	22 76	94.3	80 03.0	07 76	85.8	79 59.8	13 74	74.3	79 55.4	17 73	71.4	79 49.5	22 72	68.6	79 12.4	39 66	58.2	3
4	78 16.9	41 74	105.5	78 39.2	34 75	100.9	79 04.0	21 76	93.4	79 17.2	08 76	85.5	79 15.6	11 74	74.7	79 11.7	15 73	72.1	79 06.5	19 72	69.5	78 33.1	36 66	59.5	4
15	77 32.4	39 75	104.0	77 54.0	32 76	99.6	78 18.1	21 77	92.6	78 31.4	08 76	85.2	78 31.2	09 74	75.1	78 27.9	13 73	72.6	78 23.4	17 72	70.1	77 53.2	33 67	60.7	15
6	76 47.7	38 75	102.5	77 08.6	32 76	98.4	77 32.2	21 77	91.8	77 45.6	09 76	84.8	77 46.7	07 74	75.4	77 44.0	11 73	73.0	77 40.1	15 72	70.7	77 13.0	30 68	61.7	6
7	76 02.7	37 75	101.2	76 23.1	31 76	97.3	76 46.2	21 77	91.1	76 59.8	10 76	84.5	77 02.2	06 74	75.6	77 00.0	09 73	73.2	76 56.6	13 73	71.2	76 32.3	27 68	62.6	7
8	75 17.5	36 76	100.1	75 37.4	30 76	96.3	76 00.3	20 77	90.4	76 14.1	10 76	84.2	76 17.7	04 74	75.8	76 15.9	08 74	73.7	76 13.1	11 73	71.6	75 51.3	25 69	63.4	8
9	74 32.2	35 76	98.9	74 51.7	30 76	95.4	75 14.3	20 77	89.7	75 28.4	11 76	83.9	75 33.1	03 74	75.9	75 31.8	06 74	73.9	75 29.4	10 73	71.9	75 10.1	23 69	64.1	9
20	73 46.7	35 76	97.9	74 05.9	29 76	94.5	74 28.4	21 77	89.1	74 42.7	11 76	83.5	74 48.6	02 74	75.9	74 47.6	05 74	74.0	74 45.7	08 73	72.1	74 28.7	20 69	64.7	20
1	73 01.1	34 76	96.9	73 20.1	29 76	93.6	73 42.4	21 77	88.5	73 57.0	12 76	83.2	74 04.0	00 74	76.0	74 03.4	03 74	74.1	74 02.0	06 73	72.3	73 47.1	18 70	65.2	1
2	72 15.5	34 76	96.0	72 34.2	29 77	92.9	72 56.5	21 77	88.0	73 11.4	12 76	82.9	73 19.4	01 74	75.9	73 19.2	02 74	74.2	73 18.1	05 73	72.5	73 05.3	16 70	65.6	2
3	71 29.7	33 76	95.1	71 48.3	28 77	92.1	72 10.5	21 76	87.4	72 25.8	13 76	82.5	72 34.8	02 74	75.9	72 35.0	01 74	74.2	72 34.3	04 73	72.6	72 23.4	15 70	66.0	3
4	70 43.9	33 76	94.3	71 02.3	28 77	91.4	71 24.6	21 76	86.9	71 40.3	14 76	82.2	71 50.2	03 74	75.9	71 50.7	00 74	74.2	71 50.4	02 73	72.6	71 41.3	13 70	66.3	4
25	69 58.1	33 76	93.5	70 16.4	28 77	90.7	70 38.7	21 76	86.4	70 54.7	14 76	81.9	71 05.7	04 74	75.8	71 06.5	02 74	74.2	71 06.6	01 73	72.7	70 59.2	11 70	66.5	25
6	69 12.2	33 77	92.8	69 30.4	28 77	90.1	69 52.9	22 76	85.9	70 09.3	15 76	81.6	70 21.1	05 74	75.7	70 22.3	03 74	74.2	70 22.7	00 73	72.7	70 17.0	10 70	66.8	6
7	68 26.2	32 77	92.0	68 44.4	28 77	89.4	69 07.1	22 76	85.4	69 23.8	15 76	81.2	69 36.6	06 74	75.5	69 38.1	04 74	74.1	69 38.8	01 73	72.7	69 34.8	08 70	66.9	7
8	67 40.3	32 77	91.3	67 58.5	28 77	88.8	68 21.3	22 76	84.9	68 38.4	16 76	80.9	68 52.1	07 74	75.4	68 53.9	05 74	74.0	68 54.9	02 73	72.6	68 52.4	07 71	67.1	8
9	66 54.3	32 77	90.7	67 12.5	28 77	88.2	67 35.5	23 76	84.4	67 53.0	16 76	80.6	68 07.6	08 74	75.3	68 09.7	06 74	73.9	68 11.1	04 73	72.6	68 10.1	05 71	67.2	9
30	66 08.4	32 77	90.0	66 26.6	29 77	87.6	66 49.8	23 76	84.0	67 07.7	17 75	80.2	67 23.2	09 74	75.1	67 25.5	07 74	73.8	67 27.2	05 73	72.5	67 27.7	04 71	67.3	30
1	65 22.4	32 77	89.4	65 40.7	29 76	87.1	66 04.1	23 76	83.5	66 22.5	18 75	79.9	66 38.8	10 74	74.9	66 41.4	08 73	73.7	66 43.4	06 73	72.4	66 45.3	08 71	67.3	1
2	64 36.5	32 77	88.8	64 54.8	29 76	86.5	65 18.4	24 76	83.1	65 37.2	18 75	79.6	65 54.4	11 74	74.7	65 57.3	09 73	73.5	65 59.6	07 73	72.3	66 02.9	01 71	67.4	2
3	63 50.5	32 77	88.2	64 08.9	29 76	86.0	64 32.8	24 76	82.7	64 52.0	19 75	79.2	65 10.1	11 74	74.5	65 13.3	09 73	73.4	65 15.8	08 73	72.2	65 20.5	00 71	67.4	3
4	63 04.6	32 76	87.6	63 23.1	29 76	85.5	63 47.3	24 76	82.2	64 06.9	19 75	78.9	64 25.8	12 74	74.3	64 29.2	10 73	73.2	64 32.1	09 73	72.0	64 38.0	01 71	67.4	4
35	62 18.7	33 76	87.0	62 37.3	30 76	84.9	63 01.7	25 76	81.8	63 21.9	20 75	78.5	63 41.6	13 74	74.1	63 45.3	11 73	73.0	63 48.4	10 73	71.9	63 55.6	02 71	67.3	35
6	61 32.8	33 76	86.4	61 51.5	30 76	84.4	62 16.3	25 76	81.4	62 36.8	20 75	78.2	62 57.4	14 74	73.9	63 01.3	12 73	72.8	63 04.7	10 73	71.7	63 13.2	04 71	67.3	6
7	60 46.9	33 76	85.9	61 05.8	30 76	83.9	61 30.9	26 76	80.9	61 51.9	21 75	77.9	62 13.3	15 73	73.7	62 17.5	13 73	72.6	62 21.1	11 73	71.5	62 30.8	05 71	67.2	7
8	60 01.1	33 76	85.4	60 20.1	30 76	83.4	60 45.5	26 76	80.5	61 07.0	22 75	77.5	61 29.2	15 73	73.4	61 33.6	14 73	72.4	61 37.5	12 73	71.3	61 48.4	06 71	67.1	8
9	59 15.3	33 76	84.8	59 34.5	31 76	83.0	60 00.2	26 75	80.1	60 22.1	22 75	77.2	60 45.2	16 73	73.2	60 49.8	15 73	72.2	60 54.0	13 72	71.2	61 06.1	07 71	67.0	9
40	58 29.6	33 76	84.3	58 48.9	31 76	82.5	59 14.9	27 75	79.7	59 37.3	23 75	76.8	60 01.2	17 73	72.9	60 06.1	16 73	71.9	60 10.6	14 72	71.0	60 23.8	08 70	66.9	40
1	57 43.8	34 76	83.8	58 03.3	31 76	82.0	58 29.8	27 75	79.3	58 52.6	23 74	76.5	59 17.3	18 73	72.7	59 22.4	16 73	71.7	59 27.1	15 72	70.7	59 41.5	09 70	66.8	1
2	56 58.2	34 76	83.3	57 17.9	32 76	81.5	57 44.6	28 75	78.9	58 08.0	24 74	76.1	58 33.5	19 73	72.4	58 38.8	17 73	71.5	58 43.8	16 72	70.5	58 59.3	10 70	66.7	2
3	56 12.5	34 76	82.8	56 32.4	32 76	81.1	56 59.6	28 75	78.5	57 23.4	25 74	75.8	57 49.7	19 73	72.1	57 55.3	18 72	71.2	58 00.5	17 72	70.3	58 17.1	11 70	66.5	3
4	55 27.0	35 76	82.3	55 47.0	32 76	80.6	56 14.6	29 75	78.1	56 38.8	25 74	75.4	57 06.0	20 73	71.9	57 11.8	19 72	71.0	57 17.2	17 72	70.1	57 35.0	12 70	66.4	4
45	54 41.5	35 76	81.8	55 01.7	33 75	80.2	55 29.6	29 75	77.7	55 54.4	26 74	75.1	56 22.3	21 73	71.6	56 28.4	20 72	70.7	56 34.1	18 72	69.8	56 52.9	13 70	66.2	45
6	53 56.0	35 76	81.3	54 16.5	33 75	79.7	54 44.8	30 75	77.2	55 10.0	26 74	74.7	55 38.8	22 72	71.3	55 45.0	20 72	70.5	55 50.9	19 72	69.6	56 10.9	14 70	66.0	6
7	53 10.6	36 76	80.8	53 31.3	33 75	79.2	54 00.0	30 75	76.8	54 25.7	27 74	74.4	54 55.2	22 72	71.0	55 01.8	21 72	70.2	55 07.9	20 72	69.3	55 28.9	15 70	65.9	7
8	52 25.2	36 75	80.3	52 46.2	34 75	78.8	53 15.2	31 74	76.4	53 41.5	28 74	74.0	54 11.8	23 72	70.7	54 18.6	22 72	69.9	54 24.9	21 71	69.1	54 47.0	16 70	65.7	8
9	51 40.0	36 75	79.9	52 01.1	34 75	78.4	52 30.6	31 74	76.0	52 57.3	28 73	73.7	53 28.5	24 72	70.4	53 35.4	23 72	69.6	53 42.0	22 71	68.8	54 05.1	17 70	65.5	9
50	50 54.8	37 75	79.4	51 16.1	35 75	77.9	51 46.0	32 74	75.6	52 13.3	29 73	73.3	52 45.2	25 72	70.1	52 52.4	23 72	69.3	52 59.2	22 71	68.5	53 23.3	18 70	65.3	50
1	50 09.6	37 75	78.9	50 31.2	35 75	77.5	51 01.6	32 74	75.2	51 29.3	29 73	73.0	52 02.0	25 72	69.8	52 09.4	24 71	69.1	52 16.5	23 71	68.3	52 41.6	19 69	65.1	1
2	49 24.5	37 75	78.5	49 46.4	36 75	77.0	50 17.2	33 74	74.8	50 45.4	30 73	72.6	51 18.9	26 72	69.5	51 26.5	25 71	68.8	51 33.8	24 71	68.0	52 00.0	20 69	64.8	2
3	48 39.5	38 75	78.0	49 01.6	36 74	76.6	49 32.8	33 74	74.4	50 01.6	31 73	72.2	50 35.9	27 72	69.2	50 43.7	26 71	68.5	50 51.3	25 71	67.7	51 18.4	21 69	64.6	3
4	47 54.6	38 75	77.5	48 17.0	36 74	76.2	48 48.6	34 74	74.0	49 17.8	31 73	71.9	49 52.9	27 71	68.9	50 01.0	26 71	68.2	50 08.8	25 71	67.4	50 36.9	21 69	64.4	4
55	47 09.8	39 75	77.1	47 32.4	37 74	75.7	48 04.5	34 73	73.6	48 34.2	32 73	71.5	49 10.1	28 71	68.6	49 18.4	27 71	67.9	49 26.4	26 70	67.1	49 55.6	22 69	64.1	55
6	46 25.0	39 74	76.6	46 47.9	37 74	75.3	47 20.4	35 73	73.2	47 50.7	32 72	71.1	48 27.4	29 71	68.3	48 35.9	28 71	67.6	48 44.1	27 70	66.8	49 14.2	23 69	63.9	6
7	45 40.3	39 74	76.2	46 03.5	38 74	74.8	46 36.4	35 73	72.8	47 07.2	33 72	70.8	47 44.7	30 71	68.0	47 53.4	29 71	67.2	48 01.9	28 70	66.5	48 33.0	24 69	63.6	7
8	44 55.8	40 74	75.7	45 19.2	38 74	74.4	45 52.6	36 73	72.4	46 23.9	34 72	70.4	47 02.2	30 71	67.6	47 11.1	29 70	66.9	47 19.8	29 70	66.2	47 51.9	25 68	63.4	8
9	44 11.3	40 74	75.3	44 34.9	39 74	74.0	45 08.8	37 73	72.0	45 40.6	34 72	70.0	46 19.7	31 71	67.3	46 28.9	30 70	66.6	46 37.8	29 70	65.9	47 10.9	26 68	63.1	9
60	43 26.9	41 74	74.8	43 50.8	39 73	73.5	44 25.1	37 73	71.6	44 57.5	35 72	69.6	45 37.4	32 70	67.0	45 46.7	31 70	66.3	45 55.9	30 70	65.6	46 29.9	27 68	62.8	60
1	42 42.6	41 74	74.4	43 06.8	40 73	73.1	43 41.6	38 72	71.2	44 14.4	35 72	69.3	44 55.1	32 70	66.6	45 04.7	32 70	66.0	45 14.1	31 70	65.3	45 49.1	28 68	62.5	1
2	41 58.3	42 74	73.9	42 22.9	40 73	72.7	42 58.1	38 72	70.8	43 31.5	36 71	68.9	44 13.0	33 70	66.3	44 22.8	32 70	65.6	44 32.4	32 69	65.0	45 08.3	28 68	62.3	2
3	41 14.2	42 73	73.5	41 39.0	41 73	72.2	42 14.8	39 72	70.4	42 48.7	37 71	68.5	43 31.0	34 70	65.9	43 41.0	33 70	65.3	43 50.8	32 69	64.6	44 27.7	29 68	62.0	3
4	40 30.2	42 73	73.0	40 55.3	41 73	71.8	41 31.5	39 72	70.0	42 06.0	37 71	68.1	42 49.1	35 70	65.6	42 59.3	34 69	64.9	43 09.3	33 69	64.3	43 47.2	30 67	61.7	4
65	39 46.3	43 73	72.5	40 11.7	42 72	71.4	40 48.4	40 72	69.6	41 23.4	38 71	67.7	42 07.3	35 69	65.2	42 17.7	35 69	64.6	42 28.0	34 69	64.0	43 06.8	31 67	61.4	65
6	39 02.5	43 73	72.1	39 28.2	42 72	70.9	40 05.4	40 72	69.2	40 40.9	39 71	67.3	41 25.6	36 69	64.9	41 36.2	35 69	64.3	41 46.7	35 69	63.6	42 26.5	32 67	61.1	6
7	38 18.9	44 73	71.6	38 44.8	43 72	70.5	39 22.5	41 71	68.7	39 58.6	39 70	67.0	40 44.0	37 69	64.5	40 54.9	36 69	63.9	41 05.6	35 68	63.3	41 46.3	33 67	60.8	7
8	37 35.3	44 72	71.2	38 01.6	43 72	70.1	38 39.7	42 71	68.3	39 16.3	40 70	66.6	40 02.6	37 69	64.2	40 13.7	37 68	63.6	40 24.6	36 68	62.9	41 06.3	33 67	60.5	8
9	36 51.8	45 72	70.7	37 18.4	44 72	69.6	37 57.1	42 71	67.9	38 34.2	40 70	66.2	39 21.3	38 69	63.8	39 32.6	37 68	63.2	39 43.7	37 68	62.6	40 26.3	34 66	60.2	9
70	36 08.5	45 72	70.3	36 35.4	44 72	69.2	37 14.6	43 71	67.5	37 52.2	41 70	65.8	38 40.1	39 68	63.4	38 51.6	38 68	62.8	39 03.0	38 68	62.2	39 46.5	35 66	59.8	70
1	35 25.3	46 72	69.8	35 52.5	45 71	68.7	36 32.2	43 70	67.1	37 10.4	42 70	65.4	37 59.1	39 68	63.1	38 10.8	39 68	62.5	38 22.4	38 67	61.9	39 06.9	36 66	59.5	1
2	34 42.2	46 72	69.4	35 09.7	45 71	68.3	35 49.9	44 70	66.6	36 28.7	42 69	65.0	37 18.2	40 68	62.7	37 30.1	40 68	62.1	37 41.9	39 67	61.5	38 27.3	37 66	59.2	2
3	33 59.3	47 71	68.9	34 27.1	46 71	67.8	35 07.8	44 70	66.2	35 47.1	43 69	64.6	36 37.4	41 68	62.3	36 49.6	40 67	61.7	37 01.6	40 67	61.2	37 47.9	37 65	58.8	3
4	33 16.4	47 71	68.5	33 44.6	46 71	67.4	34 25.8	45 70	65.8	35 05.7	44 69	64.2	35 56.8	42 67	61.9	36 09.2	41 67	61.4	36 21.4	40 67	60.8	37 08.7	38 65	58.5	4
75	32 33.8	48 71	68.0	33 02.2	47 70	67.0	33 43.9	46 70	65.4	34 24.4	44 69	63.7	35 16.3	42 67	61.5	35 28.9	42 67	61.0	35 41.3	41 66	60.4	36 29.5	39 65	58.2	75
6	31 51.2	48 71	67.5	32 20.0	48 70	66.5	33 02.2	46 69	64.9	33 43.2	45 68	63.3	34 35.9	43 67	61.2	34 48.8	42 67	60.6	35 01.4	42 66	60.1	35 50.6	40 65	57.8	6
7	31 06.8	49 70	67.1	31 37.9	48 70	66.1	32 20.7	47 69	64.5	33 02.2	46 68	62.9	33 55.8	44 67	60.8	34 08.8	43 66	60.2	34 21.7	43 66	59.7	35 11.7	41 64	57.5	7
8	30 26.5	49 70	66.6	30 56.0	49 70	65.6	31 39.2	47 69	64.1	32 21.4	46 68	62.5	33 15.7	44 66	60.4	33 29.0	44 66	59.8	33 42.1	43 66	59.3	34 33.1	41 64	57.1	8
9	29 44.4	50 70	66.2	30 14.2	49 69	65.2	30 58.0	48 68	63.6	31 40.7	47 68	62.1	32 35.8	45 66	60.0	32 49.3	45 66	59.5	33 02.6	44 65	58.9	33 54.5	42 64	56.8	9
80	29 02.5	51 70	65.7	29 32.6	50 69	64.7	30 16.9	49 68	63.2	31 00.2	47 67	61.7	31 56.1	46 66	59.6	32 09.8	45 66	59.1	32 23.3	45 65	58.5	33 16.2	43 64	56.4	80
1	28 20.7	51 69	65.2	28 51.1	50 69	64.2	29 35.9	49 68	62.7	30 19.8	48 67	61.2	31 16.6	47 66	59.2	31 30.5	46 65	58.7	31 44.2	46 65	58.1	32 38.0	44 63	56.0	1
2	27 39.0	52 69	64.7	28 09.8	51 69	63.8	28 55.2	50 68	62.3	29 39.6	49 67	60.8	30 37.2	47 65	58.8	30 51.3	47 65	58.3	31 05.3	46 65	57.7	31 59.9	45 63	55.7	2
3	26 57.5	52 69	64.3	27 28.6	52 68	63.3	28 14.6	51 67	61.9	28 59.5	49 66	60.4	29 58.0	48 65	58.4	30 12.3	48 65	57.9	30 26.5	47 64	57.3	31 22.1	45 63	55.3	3
4	26 16.2	53 69	63.8	26 47.7	52 68	62.8	27 34.1	51 67	61.4	28 19.7	50 66	59.9	29 18.9	49 65	58.0	29 33.5	48 64	57.5	29 47.9	48 64	56.9	30 44.4	46 63	54.9	4
85	25 35.0	53 68	63.3	26 06.8	53 68	62.4	26 53.8	52 67	61.0	27 40.0	51 66	59.5	28 40.0	49 64	57.5	28 54.8	49 64	57.0	29 09.4	49 64	56.5	30 06.9	47 62	54.5	85
6	24 54.1	54 68	62.8	25 26.2	53 67	61.9	26 13.8	52 66	60.5	27 00.5	51 66	59.1	28 01.4	50 64	57.1	28 16.3	50 64	56.6	28 31.2	49 63	56.1	29 29.5	48 62	54.1	6
7	24 13.3	54 68	62.4	24 45.8	54 67	61.4	25 33.8	53 66	60.0	26 21.1	52 65	58.6	27 22.9	51 64	56.7	27 38.0	50 64	56.2	27 53.1	50 63	55.7	28 52.4	49 62	53.7	7
8	23 32.6	55 67	61.9	24 05.5	54 67	61.0	24 54.1	54 66	59.6	25 42.0	53 65	58.2	26 44.5	52 64	56.3	26 59.9	51 63	55.8	27 15.2	51 63	55.3	28 15.4	49 61	53.3	8
9	22 52.2	56 67	61.4	23 25.4	55 66	60.5	24 14.6	54 66	59.1	25 03.0	53 65	57.7	26 06.4	52 63	55.8	26 22.0	52 63	55.4	26 37.5	52 62	54.9	27 38.6	50 61	52.9	9
90	22 11.9	56 67	60.9	22 45.5	56 66	60.0	23 35.2	55 65	58.6	24 24.3	54 64	57.3	25 28.5	53 63	55.4	25 44.3	53 63	54.9	26 00.0	52 62	54.5	27 02.0	51 61	52.5	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	36° 00′		37° 00′		38° 30′		40° 00′		42° 00′		42° 30′		43° 00′		45° 00′		H.A.
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
°	° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		°
00	14 00.0 1.0 01	180.0	13 00.0 1.0 01	180.0	11 30.0 1.0 01	180.0	10 00.0 1.0 01	180.0	8 00.0 1.0 01	180.0	7 30.0 1.0 00	180.0	7 00.0 1.0 00	180.0	5 00.0 1.0 00	180.0	00
1	13 59.7 1.0 02	179.2	12 59.7 1.0 02	179.2	11 29.7 1.0 02	179.2	9 59.7 1.0 02	179.2	7 59.7 1.0 02	179.2	7 29.7 1.0 01	179.3	6 59.7 1.0 01	179.3			1
2	13 58.7 1.0 03	178.3	12 58.7 1.0 03	178.4	11 28.7 1.0 03	178.4	9 58.8 1.0 03	178.4	7 58.8 1.0 03	178.5	7 28.8 1.0 02	178.5	6 58.8 1.0 02	178.5			2
3	13 57.8 1.0 04	177.5	12 57.0 1.0 04	177.5	11 27.1 1.0 04	177.6	9 57.2 1.0 04	177.7	7 57.3 1.0 04	177.7	7 27.3 1.0 03	177.8	6 57.3 1.0 03	177.8			3
4	13 54.7 1.0 05	176.7	12 54.7 1.0 05	176.7	11 24.9 1.0 05	176.8	9 55.0 1.0 05	176.9	7 55.2 1.0 05	177.0	7 25.2 1.0 04	177.0	6 55.3 1.0 04	177.1			4
05	13 51.6 1.0 06	175.8	12 51.8 1.0 06	175.9	11 22.0 1.0 06	176.0	9 52.2 1 0 06	176.1	7 52.5 1.0 06	176.3	7 22.5 1.0 05	176.3	6 52.6 1.0 05	176.3			05
6	13 48.0 1.0 07	175.0	12 48.2 1.0 07	175.1	11 18.5 1.0 07	175.2	9 48.8 1.0 07	175.3	7 49.2 1.0 07	175.5	7 19.3 1.0 06	175.5	6 49.4 1.0 06	175.6			6
7	13 43.6 1.0 08	174.2	12 43.9 1.0 08	174.3	11 14.3 1.0 08	174.4	9 44.7 1.0 08	174.6	7 45.3 1.0 08	174.8	7 15.4 1.0 07	174.8	6 45.5 1.0 07	174.9			7
8	13 38.6 99 09	173.3	12 39.0 99 09	173.5	11 09.5 99 09	173.6	9 40.1 99 09	173.8	7 40.8 99 08	174.0	7 10.9 99 08	174.1	6 41.1 99 08	174.1			8
9	13 33.0 99 11	172.5	12 33.4 99 10	172.6	11 04.1 99 10	172.8	9 34.8 99 10	173.0	7 35.7 99 09	173.3	7 05.9 99 09	173.3	6 36.1 99 09	173.4			9
10	13 26.7 99 12	171.7	12 27.2 99 11	171.8	10 58.1 99 11	172.0	9 28.9 99 11	172.2	7 30.0 99 10	172.5	7 00.3 99 10	172.6	6 30.5 99 10	172.7			10
1	13 19.7 99 13	170.9	12 20.4 99 12	171.0	10 51.4 99 12	171.3	9 22.4 99 12	171.5	7 23.7 99 11	171.8	6 54.0 99 11	171.9	6 24.4 99 11	171.9			1
2	13 12.1 99 14	170.1	12 12.9 99 14	170.2	10 44.1 99 13	170.5	9 15.3 99 13	170.7	7 16.9 99 12	171.0	6 47.2 99 12	171.1	6 17.6 99 12	171.2			2
3	13 03.8 98 15	169.2	12 04.8 98 15	169.4	10 36.2 98 14	169.7	9 07.6 98 14	169.9	7 09.4 98 13	170.3	6 39.9 98 13	170.4	6 10.3 98 13	170.5			3
4	12 54.9 98 16	168.4	11 56.0 98 16	168.6	10 27.6 98 15	168.9	8 59.2 98 15	169.2	7 01.4 98 14	169.6	6 31.9 98 14	169.7	6 02.4 98 14	169.8			4
15	12 45.4 98 17	167.6	11 46.6 98 17	167.8	10 18.5 98 16	168.1	8 50.3 98 16	168.4	6 52.7 98 15	168.8	6 23.4 98 15	168.9	5 54.0 98 15	169.0			15
6	12 35.2 98 18	166.8	11 36.6 98 18	167.0	10 08.7 98 17	167.3	8 40.8 98 17	167.7	6 43.6 98 16	168.1	6 14.2 98 16	168.2	5 44.9 98 16	168.3			6
7	12 24.4 97 19	166.0	11 26.0 97 19	166.2	9 58.3 97 18	166.6	8 30.7 97 18	166.9	6 33.8 97 17	167.4	6 04.6 97 17	167.5	5 35.3 97 17	167.6			7
8	12 12.9 97 20	165.2	11 14.7 97 20	165.4	9 47.4 97 19	165.8	8 20.0 97 19	166.2	6 23.5 97 18	166.6	5 54.3 97 18	166.8	5 25.2 97 18	166.9			8
9	12 00.9 97 21	164.4	11 02.8 97 21	164.6	9 35.8 97 20	165.0	8 08.7 97 20	165.4	6 12.5 97 19	165.9	5 43.5 97 19	166.0	5 14.5 97 19	166.2			9
20	11 48.2 96 22	163.6	10 50.4 96 22	163.9	9 23.6 96 21	164.3	7 56.8 96 21	164.7	6 01.1 96 20	165.2	5 32.1 96 20	165.3	5 03.2 96 20	165.5			20
1	11 34.9 96 23	162.8	10 37.3 96 23	163.1	9 10.8 96 22	163.5	7 44.4 96 22	163.9	5 49.1 96 21	164.5	5 20.2 96 21	164.6					1
2	11 21.0 96 24	162.0	10 23.6 96 24	162.3	8 57.5 96 23	162.7	7 31.4 96 23	163.2	5 36.5 96 22	163.8	5 07.7 96 22	163.9					2
3	11 06.5 95 25	161.2	10 09.3 95 26	161.5	8 43.6 95 24	162.0	7 17.8 95 24	162.4	5 23.3 95 23	163.0							3
4	10 51.4 95 26	160.4	9 54.5 95 26	160.7	8 29.1 95 25	161.2	7 03.6 95 24	161.7	5 09.7 95 24	162.3							4
25	10 35.7 94 27	159.6	9 39.0 94 27	160.0	8 14.0 94 26	160.5	6 48.9 95 25	161.0									25
6	10 19.4 94 28	158.9	9 23.0 94 28	159.2	7 58.3 94 27	159.7	6 33.7 94 26	160.2									6
7	10 02.5 94 29	158.1	9 06.4 94 29	158.5	7 42.1 94 28	159.0	6 17.8 94 27	159.5									7
8	9 45.1 93 30	157.3	8 49.2 93 30	157.7	7 25.4 93 29	158.3	6 01.5 93 28	158.8									8
9	9 27.1 93 31	156.6	8 31.5 93 30	157.0	7 08.1 93 30	157.5	5 44.6 93 29	158.1									9
30	9 08.6 92 32	155.8	8 13.2 92 31	156.2	6 50.2 92 31	156.8	5 27.2 92 30	157.4									30
1	8 49.4 92 33	155.1	7 54.4 92 32	155.5	6 31.8 92 32	156.1	5 09.2 92 31	156.7									1
2	8 29.8 91 34	154.3	7 35.1 91 33	154.7	6 12.9 91 32	155.3											2
3	8 09.6 91 35	153.6	7 15.2 91 34	154.0	5 53.5 91 33	154.6											3
4	7 48.9 90 35	152.8	6 54.8 90 35	153.3	5 33.6 90 34	153.9											4
35	7 27.6 90 36	152.1	6 33.8 90 36	152.5	5 13.1 90 35	153.2											35
6	7 05.9 89 37	151.4	6 12.4 89 37	151.8													6
7	6 43.6 89 38	150.6	5 50.4 89 37	151.1													7
8	6 20.8 88 39	149.9	5 28.0 88 38	150.4													8
9	5 57.5 87 40	149.2	5 05.0 88 39	149.7													9
40	5 33.7 87 40	148.5															40
1	5 09.5 86 41	147.8															1

DECLINATION SAME NAME AS LATITUDE

H.A.	36° 00′		37° 00′		38° 30′		40° 00′		42° 00′		42° 30′		43° 00′		45° 00′		H.A.
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
°	° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		°
91	21 31.9 57 66	60.4	22 05.8 56 66	59.5	22 56.1 56 65	58.2	23 45.7 55 64	56.8	24 50.7 54 63	55.0	25 06.8 53 62	54.5	25 22.7 53 62	54.0	26 25.7 52 60	52.1	91
2	20 52.0 57 66	59.9	21 26.3 57 65	59.0	22 17.1 56 65	57.7	23 07.3 55 64	56.4	24 13.2 54 62	54.5	24 29.5 54 62	54.1	24 45.6 54 61	53.6	25 49.5 53 60	51.7	2
3	20 12.3 58 66	59.4	20 46.9 57 65	58.5	21 38.4 57 64	57.2	22 29.2 56 63	55.9	23 35.9 55 62	54.1	23 52.3 55 62	53.6	24 08.7 55 61	53.2	25 13.5 53 60	51.3	3
4	19 32.9 59 65	58.9	20 07.8 58 65	58.1	20 59.8 57 64	56.7	21 51.2 57 63	55.4	22 58.8 56 62	53.6	23 15.4 56 61	53.2	23 32.1 55 61	52.7	24 37.7 54 59	50.9	4
95	18 53.6 59 65	58.4	19 28.9 59 64	57.6	20 21.5 58 64	56.3	21 13.5 57 63	55.0	22 21.9 56 61	53.2	22 38.8 56 61	52.7	22 55.6 56 60	52.3	24 02.2 55 59	50.5	95
6	18 14.6 60 65	57.9	18 50.3 59 64	57.1	19 43.4 59 63	55.8	20 36.0 58 62	54.5	21 45.2 57 61	52.7	22 02.3 57 60	52.3	22 19.3 57 60	51.8	23 26.8 56 59	50.0	6
7	17 35.7 60 64	57.4	18 11.8 60 64	56.6	19 05.5 59 63	55.3	19 58.7 59 62	54.0	21 08.7 58 60	52.3	21 26.0 58 60	51.8	21 43.3 57 60	51.4	22 51.7 56 58	49.6	7
8	16 57.1 61 64	56.9	17 33.6 61 63	56.0	18 27.8 60 62	54.8	19 21.6 59 61	53.5	20 32.5 59 60	51.8	20 50.0 58 60	51.4	21 07.5 58 59	50.9	22 16.8 57 58	49.2	8
9	16 18.7 62 64	56.4	16 55.6 61 63	55.5	17 50.4 61 62	54.3	18 44.8 60 61	53.0	19 56.5 59 60	51.3	20 14.2 59 59	50.9	20 31.9 59 59	50.5	21 42.1 58 57	48.7	9
100	15 40.6 62 63	55.8	16 17.8 62 63	55.0	17 13.2 61 62	53.8	18 08.2 61 61	52.5	19 20.7 60 59	50.9	19 38.7 60 59	50.4	19 56.6 60 58	50.0	21 07.7 59 57	48.3	100
1	15 02.7 63 63	55.3	15 40.2 62 62	54.5	16 36.2 62 61	53.3	17 31.8 61 60	52.1	18 45.2 61 59	50.4	19 03.4 61 58	50.0	19 21.5 60 58	49.5	20 33.5 60 57	47.8	1
2	14 25.0 63 62	54.8	15 02.9 63 62	54.0	15 59.5 63 61	52.8	16 55.7 62 60	51.6	18 09.9 61 58	49.9	18 28.3 61 58	49.5	18 46.7 61 58	49.1	19 59.6 60 56	47.4	2
3	13 47.6 64 62	54.3	14 25.9 64 61	53.5	15 23.0 63 60	52.3	16 19.8 63 59	51.1	17 34.8 62 58	49.4	17 53.5 62 58	49.0	18 12.1 62 57	48.6	19 25.9 61 56	46.9	3
4	13 10.4 65 62	53.7	13 49.1 64 61	52.9	14 46.8 64 60	51.8	15 44.2 64 59	50.6	17 00.1 63 58	48.9	17 18.9 63 57	48.5	17 37.7 63 57	48.1	18 52.4 62 55	46.5	4
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6	11 56.8 66 61	52.6	12 36.2 66 60	51.9	13 35.1 65 59	50.7	14 33.7 65 58	49.5	15 51.3 64 57	48.0	16 10.5 64 56	47.6	16 29.8 64 56	47.2	17 46.3 63 54	45.5	6
7	11 20.4 66 60	52.1	12 00.2 66 60	51.3	12 59.7 66 59	50.2	13 58.9 66 58	49.0	15 17.3 65 56	47.5	15 36.8 65 56	47.1	15 56.2 65 56	46.7	17 13.6 64 54	45.1	7
8	10 44.3 67 60	51.6	11 24.4 67 59	50.8	12 24.5 67 58	49.7	13 24.3 66 57	48.5	14 43.5 66 56	47.0	15 03.2 66 55	46.6	15 22.9 65 55	46.2	16 41.2 65 54	44.6	8
9	10 08.4 68 59	51.0	10 49.0 68 59	50.2	11 49.6 67 58	49.1	12 50.0 67 57	48.0	14 10.1 66 55	46.4	14 30.0 66 55	46.1	14 49.9 66 55	45.7	16 09.1 66 53	44.1	9
110	9 32.8 68 59	50.4	10 13.8 68 58	49.7	11 15.0 68 57	48.6	12 16.0 68 56	47.4	13 36.9 67 55	45.9	13 57.1 67 54	45.6	14 17.2 67 54	45.2	15 37.2 66 53	43.6	110
1	8 57.5 69 58	49.9	9 38.9 69 58	49.1	10 40.7 69 57	48.0	11 42.3 68 56	46.9	13 04.0 68 54	45.4	13 24.4 68 54	45.0	13 44.7 68 54	44.7	15 05.6 67 52	43.1	1
2	8 22.5 70 58	49.3	9 04.3 69 57	48.6	10 06.7 69 56	47.5	11 08.9 69 55	46.4	12 31.5 69 54	44.9	12 52.0 68 53	44.5	13 12.6 68 53	44.1	14 34.3 68 52	42.6	2
3	7 47.8 70 57	48.7	8 29.9 70 57	48.0	9 33.0 70 56	46.9	10 35.8 70 55	45.8	11 59.2 69 53	44.4	12 19.9 69 53	44.0	12 40.7 69 53	43.6	14 03.4 69 51	42.1	3
4	7 13.4 71 57	48.2	7 55.9 71 56	47.4	8 59.5 71 55	46.4	10 02.9 70 54	45.3	11 27.2 70 53	43.8	11 48.2 70 52	43.5	12 09.1 70 52	43.1	13 32.7 69 51	41.6	4
115	6 39.4 72 56	47.6	7 22.2 71 56	46.9	8 26.4 71 55	45.8	9 30.4 71 54	44.7	10 55.5 71 52	43.3	11 16.7 71 52	43.0	11 37.9 71 52	42.6	13 02.3 70 50	41.1	115
6	6 05.6 72 56	47.0	6 48.8 72 55	46.3	7 53.6 72 54	45.2	8 58.2 72 53	44.2	10 24.1 71 52	42.8	10 45.5 71 51	42.4	11 06.9 71 51	42.1	12 32.2 71 50	40.6	6
7	5 32.1 73 55	46.4	6 15.8 73 55	45.7	7 21.1 73 54	44.7	8 26.4 72 53	43.6	9 53.1 72 51	42.2	10 14.7 72 51	41.9	10 36.3 72 51	41.5	12 02.4 72 49	40.1	7
8			5 43.0 73 54	45.1	6 49.0 73 53	44.1	7 54.8 73 52	43.1	9 22.3 73 51	41.7	9 44.2 73 50	41.3	10 06.0 73 50	41.0	11 33.0 72 49	39.6	8
9			5 10.6 74 54	44.5	6 17.2 74 52	43.5	7 23.6 74 51	42.5	8 51.9 73 50	41.1	9 14.0 73 50	40.8	9 36.0 73 49	40.4	11 03.9 73 48	39.1	9
120					5 45.7 75 52	42.9	6 52.7 74 51	41.9	8 21.9 74 50	40.6	8 44.1 74 49	40.2	9 06.3 74 49	39.9	10 35.1 74 47	38.5	120
1					5 14.6 75 51	42.3	6 22.2 75 50	41.4	7 52.1 75 49	40.0	8 14.6 75 49	39.7	8 37.0 75 48	39.3	10 06.6 75 47	38.0	1
2							5 52.0 76 50	40.8	7 22.8 76 48	39.5	7 45.4 76 48	39.1	8 08.1 75 48	38.8	9 38.5 75 46	37.5	2
3							5 22.1 76 49	40.2	6 53.7 76 48	38.9	7 16.6 76 47	38.6	7 39.4 76 47	38.2	9 10.7 76 46	36.9	3
4									6 25.0 77 47	38.3	6 48.1 77 47	38.0	7 11.2 77 47	37.7	8 43.2 77 45	36.4	4
125									5 56.7 78 47	37.7	6 20.0 78 46	37.4	6 43.3 77 46	37.1	8 16.2 77 45	35.8	125
6									5 28.8 78 46	37.2	5 52.3 78 46	36.8	6 15.7 78 45	36.5	7 49.4 78 44	35.3	6
7									5 01.2 79 46	36.6	5 24.9 79 45	36.3	5 48.5 79 45	36.0	7 23.1 79 43	34.7	7
8													5 21.7 80 44	35.4	6 57.1 79 43	34.1	8
9															6 31.5 80 42	33.6	9
130															6 06.3 81 41	33.0	130
1															5 41.4 81 41	32.4	1
2															5 17.0 82 40	31.9	

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Lat. 40°

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt °	°	′	Δt °	°	′	Δt °	°	′	Δt °	°	′	Δt °	°	′	Δt °	°	′	Δt °	°	′	Δt °	°	
00	84 00.0	1.0 04	00.0	83 00.0	1.0 04	00.0	81 30.0	1.0 03	00.0	80 30.0	1.0 03	00.0	79 30.0	1.0 02	00.0	78 30.0	1.0 02	00.0	77 30.0	1.0 02	00.0	76 00.0	1.0 02	00.0	00
1	83 57.4	99 13	06.6	82 57.8	99 11	05.6	81 28.2	1.0 00	04.5	80 28.4	1.0 08	03.9	79 28.6	1.0 07	03.5	78 28.8	1.0 06	03.1	77 28.9	1.0 06	02.8	75 59.0	1.0 05	02.4	1
2	83 49.5	97 21	13.0	82 51.1	98 18	11.0	81 22.9	98 15	08.9	80 23.7	99 13	07.8	79 24.4	99 12	06.9	78 25.0	99 10	06.2	77 25.5	99 09	05.6	75 56.1	99 08	04.8	2
3	83 36.8	93 29	19.1	82 40.3	96 25	16.2	81 14.1	96 20	13.2	80 16.0	97 18	11.6	79 17.5	98 16	10.3	78 18.8	98 14	09.3	77 19.9	98 13	08.4	75 51.3	99 11	07.2	3
4	83 19.6	89 35	24.6	82 25.5	91 30	21.2	81 02.0	94 25	17.3	80 05.3	95 22	15.3	79 08.0	96 20	13.6	78 10.2	97 18	12.2	77 12.2	97 16	11.1	75 44.6	98 14	09.6	4
05	82 58.6	84 41	29.7	82 07.2	87 36	25.7	80 46.9	91 30	21.1	79 51.8	93 27	18.8	78 55.9	94 24	16.8	77 59.4	95 22	15.1	77 02.3	95 20	13.7	75 36.0	96 17	11.9	05
6	82 34.3	79 45	34.2	81 45.8	83 40	29.8	80 29.0	87 34	24.8	79 35.8	90 31	22.1	78 41.5	91 28	19.8	77 46.3	93 25	17.9	76 50.4	94 23	16.2	75 25.6	95 20	14.1	6
7	82 07.2	73 49	38.1	81 21.6	78 44	33.6	80 08.5	84 38	28.1	79 17.3	86 34	25.2	78 24.8	89 31	22.7	77 31.2	90 28	20.6	76 36.7	92 26	18.7	75 13.6	93 23	16.3	7
8	81 37.7	68 52	41.6	80 55.0	74 48	37.0	79 45.7	80 41	31.3	78 56.7	83 38	28.1	78 06.1	86 34	25.4	77 14.1	88 32	23.1	76 21.0	89 29	21.0	74 59.8	91 26	18.4	8
9	81 06.2	63 55	44.6	80 26.4	69 51	40.0	79 20.8	78 44	34.1	78 34.1	80 41	30.8	77 45.4	82 37	28.0	76 55.2	85 34	25.5	76 03.7	87 32	23.3	74 44.5	89 28	20.5	9
10	80 33.2	59 57	47.3	79 56.1	65 53	42.7	78 54.2	72 47	36.7	78 09.6	76 43	33.3	77 23.0	79 40	30.4	76 34.6	82 37	27.8	75 44.7	84 34	25.4	74 27.7	87 30	22.4	10
1	79 58.8	54 59	49.6	79 24.2	61 55	45.0	78 26.0	68 49	39.1	77 43.6	73 46	35.7	76 59.0	76 42	32.6	76 12.4	79 39	29.9	75 24.3	81 36	27.4	74 09.5	84 33	24.3	1
2	79 23.2	50 61	51.6	78 51.1	57 57	47.2	77 56.3	65 52	41.2	77 16.1	69 48	37.8	76 33.5	73 45	34.7	75 48.8	76 42	31.9	75 02.4	79 39	29.4	73 50.0	82 35	26.0	2
3	78 46.7	46 62	53.4	78 16.9	53 59	49.1	77 25.4	61 53	43.2	76 47.3	66 50	39.7	76 06.7	70 47	36.6	75 23.9	73 44	33.7	74 39.2	76 41	31.2	73 29.2	80 37	27.7	3
4	78 09.4	43 63	55.0	77 41.7	49 60	50.7	76 53.4	58 55	45.0	76 17.4	62 52	41.5	75 38.7	66 48	38.4	74 57.8	70 45	35.5	74 14.9	73 42	32.9	73 07.3	77 38	29.3	4
15	77 31.5	40 64	56.3	77 05.7	46 61	52.2	76 20.5	54 56	46.6	75 46.4	59 53	43.2	75 09.7	63 50	40.0	74 30.6	67 47	37.1	73 49.4	70 44	34.4	72 44.2	74 40	30.8	15
6	76 53.0	37 65	57.5	76 29.1	43 62	53.5	75 46.7	51 58	48.0	75 14.6	56 54	44.6	74 39.7	60 51	41.5	74 02.4	64 49	38.6	73 22.9	67 46	35.9	72 20.2	72 42	32.3	6
7	76 14.0	34 66	58.6	75 51.8	40 63	54.7	75 12.2	48 59	49.3	74 41.9	53 56	46.0	74 08.8	57 53	42.9	73 33.2	61 50	40.0	72 55.5	65 47	37.3	71 55.2	69 43	33.6	7
8	75 34.5	31 66	59.5	75 14.1	37 64	55.8	74 37.0	45 60	50.5	74 08.4	50 57	47.3	73 37.1	54 54	44.2	73 03.3	58 51	41.3	72 27.2	62 48	38.6	71 29.3	67 44	34.9	8
9	74 54.8	29 67	60.3	74 35.8	34 64	56.7	74 01.2	42 60	51.6	73 34.4	47 58	48.4	73 04.8	52 55	45.4	72 32.6	56 52	42.5	71 58.1	59 50	39.8	71 02.6	64 46	36.1	9
20	74 14.7	26 67	61.0	73 57.2	32 65	57.6	73 25.0	40 61	52.6	72 59.7	44 59	49.4	72 31.7	49 56	46.4	72 01.2	53 53	43.6	71 28.4	57 51	40.9	70 35.2	62 47	37.2	20
1	73 34.3	24 68	61.7	73 18.3	29 65	58.3	72 48.3	37 62	53.4	72 24.6	42 59	50.4	71 58.2	46 57	47.4	71 29.2	50 54	44.6	70 57.9	54 52	42.0	70 07.0	59 48	38.3	1
2	72 53.8	22 68	62.2	72 39.0	27 66	59.0	72 11.2	35 62	54.2	71 49.0	39 60	51.2	71 24.1	44 58	48.3	70 56.6	48 55	45.6	70 26.9	51 53	43.0	69 38.2	57 49	39.3	2
3	72 13.0	20 68	62.7	71 59.5	25 66	59.5	71 33.7	32 63	54.9	71 12.9	37 61	52.0	70 49.5	41 58	49.2	70 23.6	45 56	46.5	69 55.3	49 53	43.9	69 08.9	54 50	40.2	3
4	71 32.1	18 68	63.1	71 19.8	23 67	60.1	70 55.9	30 63	55.6	70 36.5	35 61	52.7	70 14.5	39 59	49.9	69 50.0	43 57	47.3	69 23.2	47 54	44.7	68 38.9	52 51	41.0	4
25	70 51.0	16 69	63.5	70 39.9	21 67	60.5	70 17.9	28 64	56.2	69 59.8	32 62	53.4	69 39.2	36 59	50.6	69 16.1	40 57	48.0	68 50.7	44 55	45.5	68 08.5	49 52	41.9	25
6	70 09.8	14 69	63.8	69 59.8	19 67	60.9	69 39.6	26 64	56.7	69 22.8	30 62	53.9	69 03.5	34 60	51.3	68 41.7	38 58	48.7	68 17.7	42 56	46.2	67 37.6	47 52	42.6	6
7	69 28.5	13 69	64.1	69 19.6	17 67	61.3	69 01.1	24 64	57.2	68 45.5	28 63	54.5	68 27.5	32 60	51.9	68 07.0	36 58	49.3	67 44.3	40 56	46.8	67 06.3	45 53	43.3	7
8	68 47.1	11 69	64.3	68 39.2	15 67	61.6	68 22.4	22 65	57.6	68 08.0	26 63	54.9	67 51.2	30 61	52.4	67 32.0	34 59	49.9	67 10.6	37 57	47.5	66 34.6	43 53	44.0	8
9	68 05.7	09 69	64.5	67 58.7	14 68	61.9	67 43.5	20 65	57.9	67 30.3	24 63	55.4	67 14.6	28 61	52.9	66 56.7	32 59	50.4	66 36.6	35 57	48.0	66 02.5	40 54	44.6	9
30	67 24.2	08 69	64.7	67 18.1	12 68	62.1	67 04.5	18 65	58.3	66 52.3	22 63	55.8	66 37.9	26 62	53.3	66 21.2	30 60	50.9	66 02.3	33 58	48.5	65 30.1	38 55	45.1	30
1	66 42.6	07 69	64.8	66 37.5	11 68	62.3	66 25.3	16 65	58.6	66 14.3	20 64	56.1	66 00.9	24 62	53.7	65 45.4	28 60	51.3	65 27.7	31 58	49.0	64 57.4	36 55	45.7	1
2	66 01.0	05 69	64.9	65 56.7	09 68	62.5	65 46.0	15 66	58.8	65 36.0	19 64	56.4	65 23.8	22 62	54.1	65 09.4	26 60	51.7	64 52.9	29 58	49.5	64 24.3	34 55	46.1	2
3	65 19.4	04 69	65.0	65 16.0	08 68	62.6	65 06.7	13 66	59.0	64 57.7	17 64	56.7	64 46.5	20 62	54.4	64 33.2	24 61	52.1	64 17.9	27 59	49.9	63 51.1	32 56	46.6	3
4	64 37.7	02 69	65.0	64 35.1	06 68	62.7	64 27.2	12 66	59.2	64 19.2	15 64	56.9	64 09.1	19 63	54.7	63 56.9	22 61	52.4	63 42.6	25 59	50.2	63 17.6	30 56	47.0	4
35	63 56.0	01 69	65.1	63 54.3	05 68	62.8	63 47.7	10 66	59.4	63 40.7	13 64	57.1	63 31.5	17 63	54.9	63 20.4	20 61	52.7	63 07.2	24 59	50.6	62 43.9	28 57	47.4	35
6	63 14.3	00 69	65.1	63 13.4	03 68	62.8	63 06.1	08 66	59.5	63 02.0	12 65	57.3	62 53.9	15 63	55.2	62 43.7	19 61	53.0	62 31.7	22 60	50.9	62 09.9	26 57	47.7	6
7	62 32.7	01 69	65.1	62 32.5	02 68	62.9	62 28.5	07 66	59.6	62 23.3	10 65	57.5	62 16.1	14 63	55.4	62 07.0	17 61	53.2	61 55.9	20 60	51.1	61 35.8	25 57	48.0	7
8	61 51.0	03 69	65.0	61 51.6	01 68	62.9	61 48.8	06 66	59.7	61 44.5	09 65	57.6	61 38.3	12 63	55.5	61 30.1	15 62	53.4	61 20.1	18 60	51.4	61 01.6	23 57	48.3	8
9	61 09.3	04 69	65.0	61 10.7	01 68	62.9	61 09.1	04 66	59.8	61 05.6	07 65	57.7	61 00.3	10 63	55.7	60 53.1	14 62	53.6	60 44.1	17 60	51.6	60 27.2	21 58	48.6	9
40	60 27.7	05 69	64.9	60 29.7	02 68	62.9	60 29.3	03 66	59.8	60 26.8	06 65	57.8	60 22.3	09 63	55.8	60 16.1	12 62	53.8	60 08.0	15 60	51.8	59 52.6	19 58	48.8	40
1	59 46.1	06 69	64.8	59 48.8	03 68	62.9	59 49.6	01 66	59.9	59 47.8	04 65	57.9	59 44.3	07 63	55.9	59 39.0	10 62	53.9	59 31.9	13 60	52.0	59 18.0	18 58	49.1	1
2	59 04.5	07 69	64.8	59 07.9	04 68	62.8	59 09.8	00 66	59.9	59 08.9	03 65	57.9	59 06.2	06 64	56.0	59 01.8	09 62	54.0	58 55.6	12 61	52.1	58 43.2	16 58	49.2	2
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4	57 41.4	09 69	64.5	57 46.2	07 68	62.7	57 50.3	02 66	59.9	57 51.0	00 65	58.0	57 50.0	03 64	56.1	57 47.3	06 62	54.2	57 43.0	09 61	52.4	57 33.4	13 58	49.6	4
45	56 59.9	10 69	64.4	57 05.4	08 68	62.6	57 10.6	04 66	59.8	57 12.0	01 65	58.0	57 11.8	02 64	56.1	57 10.0	04 62	54.3	57 06.6	07 61	52.4	56 58.4	11 58	49.7	45
6	56 18.5	11 69	64.3	56 24.6	09 68	62.5	56 30.9	05 66	59.8	56 33.1	02 65	57.9	56 33.7	00 64	56.1	56 32.7	03 62	54.3	56 30.1	06 61	52.5	56 23.3	10 59	49.8	6
7	55 37.1	13 69	64.1	55 43.9	10 68	62.4	55 51.2	06 66	59.7	55 54.1	04 65	57.9	55 55.5	01 64	56.1	55 55.3	02 62	54.3	55 53.6	04 61	52.6	55 48.2	08 59	49.9	7
8	54 55.8	14 69	64.0	55 03.2	11 68	62.2	55 11.5	07 66	59.6	55 15.2	05 65	57.9	55 17.3	02 64	56.1	55 18.0	00 62	54.4	55 17.1	03 61	52.6	55 13.0	06 59	50.0	8
9	54 14.5	15 69	63.8	54 22.6	12 68	62.1	54 31.9	09 66	59.5	54 36.3	06 65	57.8	54 39.2	04 64	56.1	54 40.6	01 62	54.3	54 40.6	01 61	52.6	54 37.8	05 59	50.0	9
50	53 33.3	16 69	63.6	53 42.0	13 68	61.9	53 52.3	10 66	59.4	53 57.4	07 65	57.7	54 01.1	05 64	56.0	54 03.3	03 62	54.3	54 04.1	00 61	52.6	54 02.6	03 59	50.1	50
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2	52 11.1	17 68	63.2	52 21.0	15 67	61.6	52 33.2	12 66	59.2	52 39.7	10 65	57.5	52 44.9	07 63	55.9	52 48.6	05 62	54.2	52 51.0	03 61	52.6	52 52.0	01 59	50.1	2
3	51 30.1	18 68	63.0	51 40.6	16 67	61.4	51 53.8	13 66	59.0	52 01.0	11 65	57.4	52 06.8	09 63	55.8	52 11.4	06 62	54.2	52 14.5	04 61	52.6	52 16.8	01 59	50.1	3
4	50 49.2	19 68	62.8	51 00.2	17 67	61.3	51 14.4	14 66	58.9	51 22.3	12 64	57.3	51 28.8	10 63	55.7	51 34.1	08 62	54.1	51 38.1	05 61	52.5	51 41.5	02 59	50.1	4
55	50 08.4	20 68	62.6	50 20.0	18 67	61.1	50 35.1	15 65	58.8	50 43.6	13 64	57.2	50 50.9	11 63	55.6	50 56.9	09 62	54.0	51 01.6	07 61	52.5	51 06.3	04 59	50.1	55
6	49 27.6	21 68	62.4	49 39.8	19 67	60.9	49 55.8	16 65	58.6	50 05.0	14 64	57.0	50 13.0	12 63	55.5	50 19.7	10 62	53.9	50 25.2	08 61	52.4	50 31.0	05 59	50.0	6
7	48 46.9	22 68	62.1	48 59.7	20 67	60.7	49 16.6	17 65	58.4	49 26.5	15 64	56.9	49 35.1	13 63	55.4	49 42.6	11 62	53.8	49 48.8	09 61	52.3	49 55.8	06 59	50.0	7
8	48 06.3	23 68	61.9	48 19.6	21 67	60.4	48 37.5	18 65	58.2	48 48.0	17 64	56.7	48 57.3	15 63	55.2	49 05.5	13 62	53.7	49 12.4	11 60	52.2	49 20.6	08 59	49.9	8
9	47 25.8	24 67	61.7	47 39.7	22 66	60.2	47 58.5	19 65	58.0	48 09.6	18 64	56.6	48 19.6	16 63	55.1	48 28.5	14 62	53.6	48 36.1	12 60	52.1	48 45.5	09 58	49.8	9
60	46 45.4	25 67	61.4	46 59.9	23 66	60.0	47 19.5	21 65	57.8	47 31.3	19 64	56.4	47 42.0	17 63	54.9	47 51.5	15 62	53.5	47 59.9	13 60	52.0	48 10.4	10 58	49.8	60
1	46 05.1	26 67	61.2	46 20.1	24 66	59.8	46 40.7	22 65	57.6	46 53.1	20 64	56.2	47 04.4	18 62	54.8	47 14.6	16 61	53.3	47 23.7	14 60	51.9	47 35.3	11 58	49.7	1
2	45 24.9	27 67	60.9	45 40.4	25 66	59.5	46 01.9	23 64	57.4	46 14.9	21 63	56.0	46 26.9	19 62	54.6	46 37.8	17 61	53.2	46 47.6	15 60	51.7	47 00.3	13 58	49.6	2
3	44 44.8	28 67	60.6	45 00.9	26 66	59.3	45 23.2	24 64	57.2	45 36.8	22 63	55.8	45 49.4	20 62	54.4	46 01.0	18 61	53.0	46 11.6	17 60	51.6	46 25.4	14 58	49.4	3
4	44 04.8	29 66	60.4	44 21.4	27 66	59.0	44 44.6	25 64	57.0	44 58.9	23 63	55.6	45 12.1	21 62	54.2	45 24.4	20 61	52.8	45 35.6	18 60	51.4	45 50.5	15 58	49.3	4
65	43 24.9	29 66	60.1	43 42.1	28 65	58.8	44 06.1	26 64	56.7	44 21.0	24 63	55.4	44 34.9	22 62	54.0	44 47.8	21 61	52.7	44 59.7	19 60	51.3	45 15.6	16 58	49.2	65
6	42 45.1	30 66	59.8	43 02.8	29 65	58.5	43 27.7	27 64	56.5	43 43.2	25 63	55.2	43 57.7	23 62	53.8	44 11.3	22 61	52.5	44 23.9	20 60	51.1	44 40.9	18 58	49.0	6
7	42 05.4	31 66	59.5	42 23.7	30 65	58.2	42 49.5	28 64	56.3	43 05.5	26 63	54.9	43 20.7	24 62	53.6	43 34.9	23 61	52.3	43 48.1	21 59	50.9	44 06.2	19 58	48.9	7
8	41 25.9	32 66	59.2	41 44.7	31 65	57.9	42 11.3	28 63	56.0	42 27.9	27 62	54.7	42 43.7	26 61	53.4	42 58.6	24 60	52.1	43 12.5	22 59	50.7	43 31.6	20 58	48.7	8
9	40 46.5	33 65	58.9	41 05.8	32 65	57.7	41 33.2	29 63	55.8	41 50.5	28 62	54.5	42 06.9	27 61	53.2	42 22.3	25 60	51.9	42 36.9	24 59	50.6	42 57.1	21 57	48.6	9
70	40 07.2	34 65	58.6	40 27.0	32 64	57.4	40 55.3	30 63	55.5	41 13.1	29 62	54.2	41 30.1	28 61	52.9	41 46.2	26 60	51.7	42 01.5	25 59	50.4	42 22.7	22 57	48.4	70
1	39 28.0	35 65	58.3	39 48.4	33 64	57.1	40 17.5	31 63	55.2	40 35.9	30 62	54.0	40 53.5	29 61	52.7	41 10.2	27 60	51.4	41 26.2	26 59	50.2	41 48.4	24 57	48.2	1
2	38 49.0	35 65	58.0	39 00.9	34 64	56.8	39 39.8	32 63	54.9	39 58.8	31 62	53.7	40 17.0	30 61	52.5	40 34.4	28 60	51.2	40 50.9	27 59	49.9	41 14.2	25 57	48.0	2
3	38 10.1	36 65	57.7	38 31.5	35 64	56.5	39 02.2	33 62	54.7	39 21.8	32 61	53.4	39 40.6	31 60	52.2	39 58.6	29 59	51.0	40 15.8	28 58	49.7	40 40.1	26 57	47.8	3
4	37 31.3	37 64	57.3	37 53.2	36 64	56.2	38 24.8	34 62	54.4	38 44.9	33 61	53.2	39 04.3	32 60	52.0	39 23.0	30 59	50.7	39 40.8	29 58	49.5	40 06.1	27 56	47.6	4
75	36 52.7	38 64	57.0	37 15.1	37 63	55.9	37 47.5	35 62	54.1	38 08.2	34 61	52.9	38 28.2	33 60	51.7	38 47.4	31 59	50.5	39 05.9	30 58	49.3	39 32.2	28 56	47.4	75
6	36 14.2	39 64	56.7	36 37.2	38 63	55.5	37 10.4	36 62	53.8	37 31.6	35 61	52.6	37 52.2	34 60	51.4	38 12.0	32 59	50.2	38 31.1	31 58	49.0	38 58.4	29 56	47.2	6
7	35 35.9	40 64	56.3	35 59.3	39 63	55.2	36 33.3	37 61	53.5	36 55.2	36 61	52.3	37 16.3	35 60	51.2	37 36.8	33 59	50.0	37 56.5	32 58	48.8	38 24.7	30 56	47.0	7
8	34 57.7	41 63	56.0	35 21.7	39 63	54.9	35 56.5	38 61	53.2	36 18.9	37 60	52.0	36 40.6	36 59	50.9	37 01.7	35 58	49.7	37 22.0	33 57	48.5	37 51.2	32 56	46.7	8
9	34 19.6	41 63	55.7	34 44.1	40 62	54.6	35 19.8	39 61	52.9	35 42.7	38 60	51.7	36 05.0	37 59	50.6	36 26.7	36 58	49.4	36 47.6	34 57	48.3	37 17.8	33 55	46.5	9
80	33 41.8	42 63	55.3	34 06.8	41 62	54.2	34 43.2	40 61	52.6	35 06.7	39 60	51.4	35 29.6	38 59	50.3	35 51.8	37 58	49.2	36 13.4	35 57	48.0	36 44.5	34 55	46.2	80
1	33 04.1	43 63	55.0	33 29.6	42 62	53.9	34 06.8	41 60	52.2	34 30.8	40 60	51.1	34 54.3	39 59	50.0	35 17.1	38 58	48.9	35 39.3	36 57	47.7	36 11.4	35 55	46.0	1
2	32 26.5	44 62	54.6	32 52.5	43 61	53.5	33 30.5	42 60	51.9	33 55.1	41 59	50.8	34 19.2	40 58	49.7	34 42.6	39 57	48.6	35 05.4	37 56	47.5	35 38.4	36 55	45.7	2
3	31 49.1	45 62	54.2	32 15.7	44 61	53.2	32 54.4	42 60	51.6	33 19.6	41 59	50.5	33 44.2	41 58	49.4	34 08.2	40 57	48.3	34 31.6	39 56	47.2	35 05.6	37 54	45.5	3
4	31 11.9	45 62	53.9	31 38.9	45 61	52.8	32 18.5	43 60	51.2	32 44.2	42 59	50.2	33 09.4	41 58	49.1	33 34.0	40 57	48.0	33 58.0	40 56	46.9	34 32.9	38 54	45.2	4
85	30 34.9	46 61	53.5	31 02.4	45 61	52.5	31 42.8	44 59	50.9	32 09.0	43 58	49.8	32 34.7	42 57	48.8	32 59.9	41 57	47.7	33 24.5	41 56	46.6	34 00.3	39 54	44.9	85
6	29 58.0	47 61	53.1	30 26.1	46 60	52.1	31 07.2	45 59	50.5	31 34.0	44 58	49.5	32 00.2	43 57	48.4	32 26.0	42 56	47.4	32 51.2	42 55	46.3	33 27.9	40 54	44.7	6
7	29 21.4	48 61	52.7	29 49.9	47 60	51.7	30 31.8	46 59	50.2	30 59.1	45 58	49.2	31 25.9	44 57	48.1	31 52.3	43 56	47.1	32 18.0	43 55	46.0	32 55.7	41 53	44.4	7
8	28 44.9	49 60	52.4	29 13.9	48 60	51.4	29 56.6	47 58	49.8	30 24.4	46 58	48.8	30 51.8	45 57	47.8	31 18.7	44 56	46.7	31 45.1	44 55	45.7	32 23.6	42 53	44.1	8
9	28 08.6	50 60	52.0	28 38.1	49 59	51.0	29 21.5	48 58	49.5	29 49.9	47 57	48.5	30 17.9	46 56	47.4	30 45.3	45 55	46.4	31 12.3	45 54	45.4	31 51.8	43 53	43.8	9
90	27 32.5	50 60	51.6	28 02.5	50 59	50.6	28 46.7	49 58	49.1	29 15.6	48 57	48.1	29 44.1	47 56	47.1	30 12.1	46 55	46.1	30 39.7	45 54	45.0	31 29.0	44 53	43.5	90

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	26 56.5	51 60	51.2	27 27.1	51 59	50.2	28 12.0	49 57	48.7	28 41.5	49 57	47.8	29 10.5	48 56	46.8	29 39.1	47 55	45.7	30 07.2	46 54	44.7	30 48.5	45 52	43.2	91
2	26 20.8	52 59	50.8	26 51.8	51 58	49.8	27 37.6	50 57	48.4	28 07.6	50 56	47.4	28 37.2	49 55	46.4	29 06.3	48 54	45.4	29 35.0	47 53	44.4	30 17.1	46 52	42.9	2
3	25 45.3	53 59	50.4	26 16.8	52 58	49.4	27 03.3	51 57	48.0	27 33.9	51 56	47.0	28 04.0	50 55	46.0	28 33.7	49 54	45.1	29 02.9	48 53	44.1	29 46.0	47 52	42.5	3
4	25 10.0	54 58	50.0	25 42.0	53 58	49.0	26 29.3	52 56	47.6	27 00.3	51 56	46.6	27 31.0	51 55	45.7	28 01.2	50 54	44.7	28 31.1	49 53	43.7	29 15.0	48 51	42.2	4
95	24 35.0	54 58	49.6	25 07.4	54 57	48.6	25 55.4	53 56	47.2	26 27.0	52 55	46.3	26 58.2	52 54	45.3	27 29.0	51 53	44.3	27 59.4	50 52	43.4	28 44.2	49 51	41.9	95
6	24 00.1	55 58	49.1	24 33.0	55 57	48.2	25 21.8	54 56	46.8	25 53.9	53 55	45.9	26 25.6	53 54	44.9	26 57.0	52 53	44.0	27 27.9	51 52	43.0	28 13.6	50 51	41.6	6
7	23 25.4	56 57	48.7	23 58.9	55 57	47.8	24 48.4	55 55	46.4	25 21.0	54 54	45.5	25 53.3	53 54	44.6	26 25.1	53 53	43.6	26 56.7	52 52	42.7	27 43.2	51 50	41.2	7
8	22 51.0	57 57	48.3	23 24.9	56 56	47.4	24 15.2	55 55	46.0	24 48.3	55 54	45.1	25 21.1	54 53	44.2	25 53.5	54 52	43.3	26 25.6	53 51	42.3	27 13.0	52 50	40.9	8
9	22 16.8	58 57	47.9	22 51.2	57 56	47.0	23 42.2	56 55	45.6	24 15.9	56 54	44.7	24 49.2	55 53	43.8	25 22.2	55 52	42.9	25 54.8	54 51	41.9	26 43.0	53 50	40.5	9
100	21 42.9	58 56	47.4	22 17.7	58 55	46.5	23 09.5	57 54	45.2	23 43.7	57 53	44.3	24 17.5	56 52	43.4	24 51.0	56 52	42.5	25 24.2	55 51	41.6	26 13.3	54 49	40.2	100
1	21 09.1	59 56	47.0	21 44.5	59 55	46.1	22 37.0	58 54	44.8	23 11.7	58 53	43.9	23 46.0	57 52	43.0	24 20.1	56 51	42.1	24 53.8	56 50	41.2	25 43.7	55 49	39.8	1
2	20 35.6	60 55	46.5	21 11.5	60 55	45.7	22 04.7	59 53	44.4	22 39.9	58 53	43.5	23 14.8	58 52	42.6	23 49.3	57 51	41.7	24 23.6	57 50	40.8	25 14.4	56 48	39.5	2
3	20 02.4	61 55	46.1	20 38.7	60 54	45.2	21 32.7	60 53	44.0	22 08.4	59 52	43.1	22 43.8	59 51	42.2	23 18.9	58 50	41.3	23 53.7	58 50	40.4	24 45.3	57 48	39.1	3
4	19 29.4	61 55	45.6	20 06.2	61 54	44.8	21 00.9	61 53	43.5	21 37.1	60 52	42.7	22 13.0	60 51	41.8	22 48.6	59 50	40.9	23 24.0	59 49	40.1	24 16.4	58 48	38.7	4
105	18 56.7	62 54	45.2	19 33.9	62 53	44.4	20 29.4	61 52	43.1	21 06.1	61 51	42.3	21 42.5	60 50	41.4	22 18.6	60 50	40.5	22 54.5	60 49	39.7	23 47.8	59 47	38.4	105
6	18 24.2	63 54	44.7	19 01.9	63 53	43.9	19 58.1	62 52	42.7	20 35.3	62 51	41.8	21 12.2	61 50	41.0	21 48.9	61 49	40.1	22 25.3	60 48	39.3	23 19.4	60 47	38.0	6
7	17 52.0	64 53	44.3	18 30.2	63 52	43.5	19 27.1	63 51	42.2	20 04.8	63 50	41.4	20 42.2	62 50	40.6	21 19.4	62 49	39.7	21 56.3	61 48	38.9	22 51.2	61 46	37.6	7
8	17 20.0	65 53	43.8	17 58.7	64 52	43.0	18 56.3	64 51	41.8	19 34.5	63 50	41.0	20 12.4	63 49	40.1	20 50.1	63 48	39.3	21 27.6	62 47	38.5	22 23.3	62 46	37.2	8
9	16 48.4	65 52	43.3	17 27.5	65 52	42.5	18 25.9	65 50	41.3	19 04.5	64 50	40.5	19 42.9	64 49	39.7	20 21.2	63 48	38.9	20 59.1	63 47	38.1	21 55.6	62 46	36.8	9
110	16 17.0	66 52	42.8	16 56.6	66 51	42.1	17 55.6	65 50	40.9	18 34.8	65 49	40.1	19 13.7	65 48	39.3	19 52.4	64 47	38.5	20 30.9	64 47	37.6	21 28.2	63 45	36.4	110
1	15 45.9	67 51	42.4	16 25.9	67 51	41.6	17 25.7	66 49	40.4	18 05.3	66 49	39.6	18 44.8	66 48	38.8	19 24.0	65 47	38.0	20 03.0	65 46	37.2	21 01.1	64 45	36.0	1
2	15 15.0	68 51	41.9	15 55.6	67 50	41.1	16 56.0	67 49	40.0	17 36.1	67 48	39.2	18 16.1	66 47	38.4	18 55.8	66 47	37.6	19 35.3	66 46	36.8	20 34.2	65 44	35.6	2
3	14 44.5	68 50	41.4	15 25.5	68 50	40.6	16 26.7	68 48	39.5	17 07.3	67 48	38.7	17 47.7	67 47	37.9	18 27.9	67 46	37.2	19 07.9	67 45	36.4	20 07.6	66 44	35.2	3
4	14 14.3	69 50	40.9	14 55.7	69 49	40.2	15 57.6	69 48	39.0	16 38.6	68 47	38.3	17 19.5	68 46	37.5	18 00.3	68 46	36.7	18 40.8	67 45	35.9	19 41.2	67 43	34.8	4
115	13 44.3	70 49	40.4	14 26.2	70 49	39.7	15 28.8	69 47	38.5	16 10.3	69 47	37.8	16 51.7	69 46	37.0	17 32.9	69 45	36.3	18 14.0	68 44	35.5	19 15.2	68 43	34.4	115
6	13 14.7	71 49	39.9	13 57.0	70 48	39.2	15 00.3	70 47	38.1	15 42.3	70 46	37.3	16 24.2	70 45	36.6	17 05.9	69 45	35.8	17 47.4	69 44	35.1	18 49.4	69 43	33.9	6
7	12 45.3	71 48	39.4	13 28.1	71 48	38.7	14 32.1	71 46	37.6	15 14.6	71 46	36.9	15 56.9	70 45	36.1	16 39.1	70 44	35.4	17 21.1	70 43	34.6	18 23.9	69 42	33.5	7
8	12 16.3	72 48	38.9	12 59.6	72 47	38.2	14 04.2	72 46	37.1	14 47.2	71 45	36.4	15 30.0	71 44	35.6	16 12.6	71 44	34.9	16 55.2	71 43	34.2	17 58.6	70 42	33.1	8
9	11 47.7	73 47	38.4	12 31.3	73 47	37.7	13 36.7	72 45	36.6	14 20.1	72 45	35.9	15 03.4	72 44	35.2	15 46.5	72 43	34.5	16 29.5	72 42	33.7	17 33.7	71 41	32.6	9
120	11 19.3	74 47	37.8	12 03.4	73 46	37.2	13 09.4	73 45	36.1	13 53.3	73 44	35.4	14 37.0	73 43	34.7	15 20.6	73 43	34.0	16 04.1	72 42	33.3	17 09.1	72 41	32.2	120
1	10 51.3	74 46	37.3	11 35.8	74 45	36.6	12 42.5	74 44	35.6	13 26.8	74 44	34.9	14 11.0	74 43	34.2	14 55.1	73 42	33.5	15 39.1	73 41	32.8	16 44.7	73 40	31.7	1
2	10 23.6	75 46	36.8	11 08.6	75 45	36.1	12 15.9	75 44	35.1	13 00.7	75 43	34.4	13 45.3	74 42	33.7	14 29.9	74 42	33.0	15 14.3	74 41	32.3	16 20.7	74 40	31.3	2
3	9 56.2	76 45	36.3	10 41.6	76 44	35.6	11 49.6	75 43	34.6	12 34.9	75 42	33.9	13 20.0	75 42	33.3	14 05.0	75 41	32.6	14 49.9	75 40	31.9	15 57.0	74 39	30.8	3
4	9 29.2	77 44	35.7	10 15.1	76 44	35.1	11 23.7	76 43	34.1	12 09.4	76 42	33.4	12 54.9	76 41	32.8	13 40.4	76 40	32.1	14 25.8	75 40	31.4	15 33.6	75 38	30.4	4
125	9 02.5	77 44	35.2	9 48.8	77 43	34.5	10 58.1	77 42	33.6	11 44.2	77 41	32.9	12 30.2	77 41	32.3	13 16.2	76 40	31.6	14 02.0	76 39	30.9	15 10.5	76 38	29.9	125
6	8 36.2	78 43	34.6	9 22.9	78 43	34.0	10 32.9	78 41	33.0	11 19.4	77 41	32.4	12 05.9	77 40	31.8	12 52.2	77 39	31.1	13 38.5	77 39	30.5	14 47.7	77 37	29.5	6
7	8 10.3	79 43	34.1	8 57.4	79 42	33.5	10 08.0	78 41	32.5	10 55.0	78 40	31.9	11 41.9	78 39	31.3	12 28.7	78 39	30.6	13 15.4	78 38	30.0	14 25.3	78 37	29.0	7
8	7 44.7	79 42	33.5	8 32.3	79 41	32.9	9 43.5	79 40	32.0	10 30.9	79 40	31.4	11 18.2	79 39	30.7	12 05.4	79 38	30.1	12 52.6	79 37	29.5	14 03.2	78 36	28.5	8
9	7 19.5	80 41	33.0	8 07.5	80 41	32.4	9 19.3	80 40	31.5	10 07.1	80 39	30.8	10 54.9	80 38	30.2	11 42.6	79 38	29.6	12 30.1	79 37	29.0	13 41.4	79 36	28.0	9
130	6 54.7	81 41	32.4	7 43.0	81 40	31.8	8 55.5	80 39	30.9	9 43.7	80 38	30.3	10 31.9	80 38	29.7	11 20.0	80 37	29.1	12 08.0	80 36	28.5	13 19.9	80 35	27.6	130
1	6 30.2	81 40	31.8	7 19.0	81 39	31.3	8 32.1	81 38	30.4	9 20.7	81 38	29.8	10 09.3	81 37	29.2	10 57.8	81 36	28.6	11 46.3	81 36	28.0	12 58.8	81 35	27.1	1
2	6 06.2	82 39	31.3	6 55.3	82 39	30.7	8 09.0	82 38	29.8	8 58.1	82 37	29.2	9 47.1	82 36	28.6	10 36.0	82 36	28.1	11 24.9	81 35	27.5	12 38.1	81 34	26.6	2
3	5 42.5	83 39	30.7	6 32.1	83 38	30.1	7 46.3	82 37	29.3	8 35.8	82 36	28.7	9 25.2	82 36	28.1	10 14.6	82 35	27.6	11 03.9	82 34	27.0	12 17.7	82 33	26.1	3
4	5 19.2	83 38	30.1	6 09.2	83 37	29.6	7 24.1	83 36	28.7	8 13.9	83 36	28.2	9 03.7	83 35	27.6	9 53.5	83 34	27.0	10 43.2	83 34	26.5	11 57.6	83 33	25.6	4
135				5 46.7	84 37	29.0	7 02.2	84 36	28.2	7 52.4	84 35	27.6	8 42.6	84 35	27.1	9 32.8	84 34	26.5	10 22.9	83 33	26.0	11 38.0	83 32	25.1	135
6				5 24.6	85 36	28.4	6 40.7	84 35	27.6	7 31.3	84 35	27.1	8 21.9	84 34	26.5	9 12.5	84 33	26.0	10 03.0	84 33	25.4	11 18.6	84 32	24.6	6
7				5 03.0	85 36	27.8	6 19.6	85 34	27.0	7 10.6	85 34	26.5	8 01.6	85 33	26.0	8 52.5	85 33	25.4	9 43.4	85 32	24.9	10 59.7	85 31	24.1	7
8							5 58.9	86 34	26.5	6 50.3	86 33	26.0	7 41.6	86 33	25.4	8 33.0	86 32	24.9	9 24.3	85 31	24.4	10 41.1	85 30	23.6	8
9							5 38.6	86 33	25.9	6 30.4	86 32	25.4	7 22.1	86 32	24.9	8 13.8	86 31	24.4	9 05.5	86 31	23.9	10 22.9	86 30	23.1	9
140							5 18.7	87 32	25.3	6 10.9	87 32	24.8	7 03.0	87 31	24.3	7 55.0	87 31	23.8	8 47.1	87 30	23.3	10 05.1	87 29	22.6	140
1										5 51.8	87 31	24.3	6 44.2	87 31	23.8	7 36.7	87 30	23.3	8 29.1	87 29	22.8	9 47.6	87 28	22.0	1
2										5 33.1	88 30	23.7	6 25.9	88 30	23.2	7 18.7	88 29	22.7	8 11.5	88 29	22.3	9 30.6	88 28	21.5	2
3										5 14.8	89 30	23.1	6 08.0	89 29	22.6	7 01.2	89 29	22.2	7 54.3	89 28	21.7	9 13.9	88 27	21.0	3
4													5 50.5	89 28	22.1	6 44.0	89 28	21.6	7 37.5	89 27	21.2	8 57.6	89 26	20.5	4
145													5 33.5	90 28	21.5	6 27.3	90 27	21.1	7 21.1	90 27	20.6	8 41.7	90 26	19.9	145
6													5 16.8	90 27	20.9	6 11.0	90 26	20.5	7 05.1	90 26	20.1	8 26.3	90 25	19.4	6
7													5 00.6	91 26	20.4	5 55.1	91 26	19.9	6 49.6	91 25	19.5	8 11.2	91 24	18.9	7
8																5 39.6	91 25	19.4	6 34.4	91 25	18.9	7 56.5	91 24	18.3	8
9																5 24.6	92 24	18.8	6 19.7	92 24	18.4	7 42.3	92 23	17.8	9
150																5 10.0	92 24	18.2	6 05.4	92 23	17.8	7 28.5	92 22	17.2	150
1																			5 51.6	93 22	17.3	7 15.0	93 22	16.7	1
2																			5 38.2	93 22	16.7	7 02.1	93 21	16.1	2
3																			5 25.2	94 21	16.1	6 49.5	94 20	15.6	3
4																			5 12.6	94 20	15.5	6 37.3	94 20	15.0	4
155																			5 00.5	95 20	15.0	6 25.6	95 19	14.5	155
6																						6 14.4	95 18	13.9	6
7																						6 03.5	95 17	13.4	7
8																						5 53.1	96 17	12.8	8
9																						5 43.2	96 16	12.2	9
160																						5 33.7	96 15	11.7	160
1																						5 24.6	97 14	11.1	1
2																						5 16.0	97 14	10.5	2
3																						5 07.9	97 13	09.9	3
4																						5 00.2	98 12	09.4	4

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Lat. 40°

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
°	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	°
00	75 30.0	1.0 02	00.0	75 00.0	1.0 01	00.0	74 00.0	1.0 01	00.0	73 30.0	1.0 01	00.0	73 00.0	1.0 01	00.0	72 30.0	1.0 01	00.0	71 00.0	1.0 01	00.0	70 30.0	1.0 01	00.0	00
1	75 29.1	1.0 05	02.3	74 59.1	1.0 04	02.2	73 59.2	1.0 04	02.0	73 29.2	1.0 04	01.9	72 59.3	1.0 04	01.9	72 29.3	1.0 04	01.8	70 59.4	1.0 03	01.6	70 29.4	1.0 03	01.5	1
2	75 26.3	99 08	04.6	74 56.4	99 07	04.4	73 56.7	1.0 07	04.0	73 26.9	1.0 06	03.9	72 57.0	1.0 06	03.7	72 27.1	1.0 06	03.6	70 57.5	1.0 05	03.2	70 27.6	1.0 05	03.0	2
3	75 21.7	99 11	06.9	74 52.0	99 10	06.6	73 52.7	99 09	06.0	73 23.0	99 09	05.8	72 53.3	99 09	05.6	72 23.6	99 08	05.3	70 54.3	99 07	04.7	70 24.5	99 07	04.5	3
4	75 15.2	98 14	09.2	74 45.9	98 13	08.8	73 47.1	98 12	08.0	73 17.6	98 11	07.7	72 48.1	98 11	07.4	72 18.6	98 11	07.1	70 49.9	99 09	06.3	70 20.3	99 09	06.0	4
05	75 07.1	97 16	11.4	74 38.1	97 16	10.9	73 39.9	97 15	10.0	73 10.7	97 14	09.6	72 41.5	97 13	09.2	72 12.2	98 13	08.8	70 44.3	98 11	07.8	70 14.9	98 11	07.5	05
6	74 57.1	95 19	13.5	74 28.6	95 18	12.9	73 31.2	96 17	11.9	73 02.3	96 16	11.4	72 33.5	96 16	10.9	72 04.5	97 15	10.5	70 37.4	97 13	09.3	70 08.3	97 13	09.0	6
7	74 45.6	93 22	15.6	74 17.5	94 21	15.0	73 20.9	95 19	13.8	72 52.5	95 19	13.2	72 24.0	95 18	12.7	71 55.5	95 17	12.2	70 29.3	96 15	10.8	70 00.5	96 15	10.4	7
8	74 32.4	92 24	17.6	74 04.9	92 24	16.9	73 09.3	93 22	15.6	72 41.4	93 21	15.0	72 13.3	94 20	14.4	71 45.1	94 19	13.8	70 20.1	95 17	12.3	69 51.6	95 17	11.8	8
9	74 17.7	90 27	19.6	73 50.7	90 26	18.8	72 56.3	91 24	17.3	72 28.8	92 23	16.7	72 01.2	92 22	16.0	71 33.5	93 21	15.4	70 09.8	94 19	13.7	69 41.7	94 18	13.2	9
10	74 01.6	88 29	21.5	73 35.2	88 28	20.6	72 41.9	89 26	19.1	72 15.0	90 25	18.3	71 47.9	90 24	17.6	71 20.7	91 23	17.0	69 58.3	92 21	15.1	69 30.6	92 20	14.6	10
1	73 44.1	85 31	23.3	73 18.4	86 30	22.4	72 26.3	87 28	20.7	71 59.9	88 27	19.9	71 33.4	89 26	19.2	71 06.7	89 25	18.5	69 45.8	91 23	16.5	69 18.5	91 22	15.9	1
2	73 25.3	83 33	25.0	73 00.2	84 32	24.1	72 09.4	85 30	22.3	71 43.7	86 29	21.5	71 17.8	87 28	20.7	70 51.6	87 27	19.9	69 32.2	89 24	17.8	69 05.4	89 23	17.2	2
3	73 05.2	81 35	26.7	72 40.9	82 34	25.7	71 51.4	83 32	23.8	71 26.3	84 31	23.0	71 01.0	85 30	22.1	70 35.4	86 29	21.3	69 17.6	87 26	19.1	68 51.4	88 25	18.5	3
4	72 44.0	78 37	28.2	72 20.4	79 36	27.2	71 32.3	81 34	25.3	71 07.9	82 32	24.4	70 43.2	83 31	23.5	70 18.2	84 30	22.7	69 02.1	86 27	20.4	68 36.3	86 27	19.7	4
15	72 21.7	76 39	29.7	71 58.9	77 38	28.7	71 12.2	79 35	26.7	70 48.4	80 34	25.8	70 24.3	81 33	24.9	70 00.0	81 32	24.0	68 45.6	84 29	21.6	68 20.4	84 28	20.8	15
6	71 58.4	73 40	31.1	71 36.3	74 39	30.1	70 51.0	77 37	28.0	70 27.9	78 36	27.1	70 04.5	78 34	26.1	69 40.8	79 33	25.2	68 28.3	82 30	22.8	68 03.6	82 29	22.0	6
7	71 34.2	71 42	32.5	71 12.8	72 41	31.4	70 29.0	74 38	29.3	70 06.6	75 37	28.3	69 43.8	76 36	27.4	69 20.8	77 35	26.4	68 10.1	80 32	23.9	67 46.0	81 31	23.1	7
8	71 09.1	68 43	33.7	70 48.5	69 42	32.6	70 06.1	72 40	30.5	69 44.4	73 38	29.5	69 22.3	74 37	28.5	68 59.9	75 36	27.6	67 51.1	78 33	25.0	67 27.6	79 32	24.2	8
9	70 43.2	66 44	34.9	70 23.3	67 43	33.8	69 42.3	70 41	31.7	69 21.3	71 40	30.6	68 59.9	72 39	29.7	68 38.2	73 37	28.7	67 31.3	76 34	26.0	67 08.4	77 33	25.2	9
20	70 16.5	63 46	36.0	69 57.3	64 44	34.9	69 17.8	67 42	32.8	68 57.5	68 41	31.7	68 36.8	70 40	30.7	68 15.8	71 39	29.7	67 10.8	74 35	27.0	66 48.5	75 34	26.2	20
1	69 49.1	61 47	37.1	69 30.7	62 46	36.0	68 52.6	65 43	33.8	68 33.0	66 42	32.7	68 13.0	67 41	31.7	67 52.6	68 40	30.8	66 49.6	72 36	28.0	66 27.9	73 35	27.1	1
2	69 21.0	58 48	38.1	69 03.4	60 47	36.9	68 26.7	62 44	34.8	68 07.8	64 43	33.7	67 48.5	65 42	32.7	67 28.8	66 41	31.7	66 27.7	70 38	28.9	66 06.7	71 36	28.0	2
3	68 52.4	56 49	39.0	68 35.4	57 48	37.9	68 00.2	60 45	35.7	67 42.0	61 44	34.6	67 23.4	63 43	33.6	67 04.3	64 42	32.6	66 05.2	67 38	29.8	65 44.8	68 37	28.9	3
4	68 23.2	53 50	39.9	68 06.9	55 48	38.7	67 33.1	58 46	36.6	67 15.6	59 45	35.5	66 57.6	61 44	34.5	66 39.3	62 43	33.5	65 42.0	65 39	30.6	65 22.3	66 38	29.7	4
25	67 53.5	51 50	40.7	67 37.9	53 49	39.6	67 05.5	56 47	37.4	66 48.6	57 46	36.3	66 31.3	58 45	35.3	66 13.7	60 44	34.3	65 18.4	63 40	31.4	64 59.2	64 39	30.5	25
6	67 23.3	49 51	41.5	67 08.4	50 50	40.3	66 37.3	53 48	38.2	66 21.1	55 47	37.1	66 04.5	56 46	36.1	65 47.5	57 44	35.1	64 54.2	61 41	32.2	64 35.7	62 40	31.2	6
7	66 52.6	46 52	42.2	66 38.4	48 51	41.1	66 08.7	51 48	38.9	65 53.2	52 47	37.8	65 37.2	54 46	36.8	65 20.9	55 45	35.8	64 29.4	59 42	32.9	64 11.6	60 41	32.0	7
8	66 21.6	44 52	42.8	66 08.0	46 51	41.7	65 39.6	49 49	39.6	65 24.8	50 48	38.5	65 09.5	52 47	37.5	64 53.8	53 46	36.5	64 04.3	57 43	33.6	63 47.0	58 42	32.6	8
9	65 50.1	42 53	43.5	65 37.3	44 52	42.4	65 10.2	47 50	40.2	64 55.9	48 49	39.2	64 41.3	50 48	38.1	64 26.2	51 47	37.1	63 38.6	55 43	34.2	63 22.0	56 42	33.3	9
30	65 18.3	40 54	44.0	65 06.1	42 52	42.9	64 40.3	45 50	40.8	64 26.7	46 49	39.8	64 12.7	47 48	38.8	63 58.3	49 47	37.7	63 12.6	53 44	34.8	62 56.6	54 43	33.9	30
1	64 46.2	38 54	44.6	64 34.7	39 53	43.5	64 10.1	42 51	41.4	63 57.1	44 50	40.3	63 43.8	45 49	39.3	63 30.0	47 48	38.3	62 46.1	51 45	35.4	62 30.7	52 44	34.5	1
2	64 13.8	36 54	45.1	64 02.9	37 53	44.0	63 39.6	40 51	41.9	63 27.2	42 50	40.9	63 14.5	43 49	39.9	63 01.3	45 48	38.9	62 19.3	49 45	36.0	62 04.5	50 44	35.1	2
3	63 41.2	34 55	45.5	63 30.8	35 54	44.5	63 08.7	38 52	42.4	62 57.0	40 51	41.4	62 44.8	41 50	40.4	62 32.3	43 49	39.4	61 52.1	47 46	36.5	61 37.9	48 45	35.6	3
4	63 08.3	32 55	45.9	62 58.5	33 54	44.9	62 37.6	36 52	42.8	62 26.5	38 51	41.8	62 14.9	39 50	40.8	62 02.9	41 49	39.9	61 24.6	45 46	37.0	61 11.0	46 45	36.1	4
35	62 35.1	30 56	46.3	62 25.9	31 55	45.3	62 06.2	34 53	43.3	61 55.7	36 52	42.3	61 44.7	37 51	41.3	61 33.3	39 50	40.3	60 56.8	43 47	37.5	60 43.8	44 46	36.5	35
6	62 01.8	28 56	46.7	61 53.2	29 55	45.7	61 34.6	32 53	43.7	61 24.6	34 52	42.7	61 14.3	35 51	41.7	61 03.5	37 50	40.7	60 28.7	41 47	37.9	60 16.3	42 46	37.0	6
7	61 28.2	26 56	47.0	61 20.2	28 55	46.0	61 02.7	31 53	44.0	60 53.4	32 52	43.1	60 43.6	33 52	42.1	60 33.4	35 51	41.1	60 00.3	39 48	38.3	59 48.5	40 47	37.4	7
8	60 54.5	24 56	47.3	60 47.0	26 56	46.3	60 30.7	29 54	44.4	60 21.9	30 53	43.4	60 12.6	31 52	42.4	60 03.0	33 51	41.5	59 31.7	37 48	38.7	59 20.5	38 47	37.8	8
9	60 20.6	23 57	47.6	60 13.7	24 56	46.6	59 58.4	27 54	44.7	59 50.2	28 53	43.7	59 41.5	30 52	42.8	59 32.5	31 51	41.8	59 02.8	35 48	39.1	58 52.2	36 48	38.2	9
40	59 46.6	21 57	47.9	59 40.2	22 56	46.9	59 26.0	25 54	45.0	59 18.3	26 53	44.0	59 10.2	28 52	43.1	59 01.7	29 52	42.1	58 33.8	33 49	39.4	58 23.7	34 48	38.5	40
1	59 12.5	19 57	48.1	59 06.6	20 56	47.1	58 53.5	23 54	45.2	58 46.3	25 54	44.3	58 38.7	26 53	43.4	58 30.8	27 52	42.4	58 04.5	31 49	39.7	57 55.0	32 48	38.8	1
2	58 38.2	17 57	48.3	58 32.8	19 56	47.4	58 20.8	21 55	45.5	58 14.1	23 54	44.6	58 07.1	24 53	43.6	57 59.7	25 52	42.7	57 35.0	29 49	40.0	57 26.1	31 48	89.1	2
3	58 03.9	16 57	48.5	57 59.0	17 57	47.5	57 47.9	20 55	45.7	57 41.8	21 54	44.8	57 35.3	22 53	43.9	57 28.4	24 52	43.0	57 05.4	27 50	40.3	56 57.0	29 49	39.4	3
4	57 29.4	14 58	48.6	57 25.0	15 57	47.7	57 15.0	18 55	45.9	57 09.4	19 54	45.0	57 03.4	21 53	44.1	56 57.0	22 53	43.2	56 35.6	26 50	40.5	56 27.7	27 49	39.7	4
45	56 54.9	12 58	48.8	56 50.9	14 57	47.9	56 41.9	16 55	46.1	56 36.8	18 54	45.2	56 31.4	19 54	44.3	56 25.5	20 53	43.4	56 05.7	24 50	40.8	55 58.3	25 49	39.9	45
6	56 20.3	11 58	48.9	56 16.8	12 57	48.0	56 08.8	15 55	46.2	56 04.2	16 55	45.3	55 59.2	17 54	44.5	55 53.9	18 53	43.6	55 35.6	22 50	41.0	55 28.8	23 49	40.1	6
7	55 45.6	09 58	49.0	55 42.6	11 57	48.1	55 35.6	13 56	46.4	55 31.5	14 55	45.5	55 27.0	16 54	44.6	55 22.1	17 53	43.7	55 05.4	20 51	41.2	54 59.1	22 50	40.3	7
8	55 10.9	08 58	49.1	55 08.4	09 57	48.2	55 02.3	11 56	46.5	54 58.6	13 55	45.6	54 54.7	14 54	44.8	54 50.3	15 53	43.9	54 35.1	19 51	41.3	54 29.3	20 50	40.5	8
9	54 36.1	06 58	49.2	54 34.1	07 57	48.3	54 28.9	10 56	46.6	54 25.8	11 55	45.7	54 22.3	12 54	44.9	54 18.4	13 53	44.0	54 04.7	17 51	41.5	53 59.4	18 50	40.7	9
50	54 01.3	05 58	49.2	53 59.7	06 57	48.4	53 55.5	08 56	46.7	53 52.8	09 55	45.8	53 49.8	11 54	45.0	53 46.4	12 53	44.1	53 34.2	15 51	41.6	53 29.4	16 50	40.8	50
1	53 26.5	03 58	49.3	53 25.4	04 57	48.4	53 22.0	07 56	46.7	53 19.8	08 55	45.9	53 17.3	09 54	45.1	53 14.4	10 53	44.2	53 03.6	14 51	41.8	52 59.4	15 50	40.9	1
2	52 51.7	02 58	49.3	52 51.0	03 57	48.5	52 48.5	05 56	46.8	52 46.8	06 55	46.0	52 44.7	08 54	45.2	52 42.3	09 54	44.3	52 33.0	12 51	41.9	52 29.2	13 50	41.1	2
3	52 16.8	00 58	49.3	52 16.6	01 57	48.5	52 15.0	04 56	46.8	52 13.7	05 55	46.0	52 12.1	06 54	45.2	52 10.2	07 54	44.4	52 02.3	10 51	42.0	51 59.0	12 50	41.2	3
4	51 42.0	01 58	49.3	51 42.2	00 57	48.5	51 41.5	02 56	46.9	51 40.6	03 55	46.1	51 39.5	04 54	45.3	51 38.0	06 54	44.5	51 31.5	09 51	42.0	51 28.7	10 51	41.2	4
55	51 07.2	02 58	49.3	51 07.7	01 57	48.5	51 07.9	01 56	46.9	51 07.5	02 55	46.1	51 06.8	03 54	45.3	51 05.8	04 54	44.5	51 00.7	07 51	42.1	50 58.4	08 51	41.3	55
6	50 32.3	04 58	49.2	50 33.3	03 57	48.5	50 34.4	01 56	46.9	50 34.4	00 55	46.1	50 34.2	01 54	45.3	50 33.6	03 54	44.5	50 29.9	06 51	42.2	50 28.0	07 51	41.4	6
7	49 57.5	05 58	49.2	49 58.9	04 57	48.4	50 00.8	02 56	46.9	50 01.3	01 55	46.1	50 01.5	00 54	45.3	50 01.3	01 54	44.5	49 59.0	04 51	42.2	49 57.6	05 51	41.4	7
8	49 22.8	07 58	49.1	49 24.6	06 57	48.4	49 27.3	04 56	46.8	49 28.2	03 55	46.1	49 28.8	01 54	45.3	49 29.1	00 54	44.5	49 28.1	03 51	42.2	49 27.2	04 51	41.5	8
9	48 48.0	08 58	49.1	48 50.2	07 57	48.3	48 53.8	05 56	46.8	48 55.1	04 55	46.1	48 56.1	03 54	45.3	48 56.9	02 54	44.5	48 57.2	01 51	42.2	48 56.8	02 51	41.5	9
60	48 13.3	09 58	49.0	48 15.9	08 57	48.3	48 20.3	06 56	46.8	48 22.0	05 55	46.0	48 23.5	04 54	45.3	48 24.6	03 54	44.5	48 26.3	00 51	42.2	48 26.3	01 51	41.5	60
1	47 38.6	11 58	48.9	47 41.6	10 57	48.2	47 46.8	08 56	46.7	47 49.0	07 55	46.0	47 50.8	06 54	45.2	47 52.4	05 54	44.5	47 55.4	02 51	42.2	47 55.9	01 51	41.5	1
2	47 04.0	12 58	48.8	47 07.4	11 57	48.1	47 13.4	09 56	46.6	47 15.9	08 55	45.9	47 18.2	07 54	45.2	47 20.2	06 54	44.4	47 24.5	03 51	42.2	47 25.4	02 51	41.5	2
3	46 29.4	13 58	48.7	46 33.2	12 57	48.0	46 40.0	10 56	46.6	46 43.0	09 55	45.8	46 45.6	09 54	45.1	46 48.1	08 54	44.4	46 53.7	05 51	42.2	46 55.0	04 51	41.5	3
4	45 54.9	14 57	48.6	45 59.1	13 57	47.9	46 06.6	12 56	46.5	46 10.0	11 55	45.7	46 13.1	10 54	45.0	46 15.9	09 53	44.3	46 22.8	06 51	42.1	46 24.5	05 51	41.4	4
65	45 20.5	16 57	48.5	45 25.0	15 57	47.8	45 33.3	13 55	46.4	45 37.1	12 55	45.7	45 40.6	11 54	44.9	45 43.9	10 53	44.2	45 52.0	08 51	42.1	45 54.2	07 51	41.4	65
6	44 46.1	17 57	48.3	44 51.0	16 57	47.7	45 00.1	14 55	46.3	45 04.3	13 55	45.6	45 08.2	13 54	44.9	45 11.8	12 53	44.2	45 21.2	09 51	42.0	45 23.8	08 51	41.3	6
7	44 11.8	18 57	48.2	44 17.1	17 56	47.5	44 26.9	16 55	46.1	44 31.5	15 55	45.4	44 35.8	14 54	44.8	44 39.8	13 53	44.1	44 50.4	11 51	42.0	44 53.5	10 50	41.3	7
8	43 37.5	19 57	48.1	43 43.2	18 56	47.4	43 53.8	17 55	46.0	43 58.8	16 54	45.3	44 03.4	15 54	44.6	44 07.9	14 53	44.0	44 19.7	12 51	41.9	44 23.2	11 50	41.2	8
9	43 03.4	21 57	47.9	43 09.4	20 56	47.2	43 20.8	18 55	45.9	43 26.1	17 54	45.2	43 31.2	17 54	44.5	43 36.0	16 53	43.8	43 49.1	13 51	41.8	43 52.9	12 50	41.1	9
70	42 29.3	22 57	47.7	42 35.7	21 56	47.1	42 47.8	19 55	45.7	42 53.5	19 54	45.1	42 59.0	18 54	44.4	43 04.2	17 53	43.7	43 18.5	15 51	41.7	43 22.7	14 50	41.0	70
1	41 55.4	23 56	47.6	42 02.1	22 56	46.9	42 15.0	21 55	45.6	42 21.0	20 54	44.9	42 26.9	19 53	44.3	42 32.5	18 53	43.6	42 47.9	16 51	41.6	42 52.6	15 50	40.9	1
2	41 21.5	24 56	47.4	41 28.6	23 56	46.7	41 42.2	22 54	45.4	41 48.6	21 54	44.8	41 54.8	20 53	44.1	42 00.8	20 53	43.5	42 17.5	17 51	41.5	42 22.5	17 50	40.8	2
3	40 47.7	25 56	47.2	40 55.2	25 56	46.6	41 09.5	23 54	45.3	41 16.3	22 54	44.6	41 22.9	22 53	44.0	41 29.3	21 52	43.3	41 47.1	19 51	41.3	41 52.5	18 50	40.7	3
4	40 14.1	26 56	47.0	40 21.9	26 55	46.4	40 36.9	24 54	45.1	40 44.1	24 54	44.4	40 51.0	23 53	43.8	40 57.8	22 52	43.2	41 16.7	20 50	41.2	41 22.6	19 50	40.6	4
75	39 40.5	28 56	46.8	39 48.7	27 55	46.2	40 04.4	25 54	44.9	40 11.9	25 53	44.3	40 19.3	24 53	43.6	40 26.4	23 52	43.0	40 46.5	21 50	41.1	40 52.8	21 50	40.4	75
6	39 07.1	29 56	46.6	39 15.6	28 55	46.0	39 32.0	27 54	44.7	39 39.9	26 53	44.1	39 47.6	25 53	43.5	39 55.1	25 52	42.8	40 16.4	23 50	40.9	40 23.0	22 49	40.3	6
7	38 33.8	30 55	46.4	38 42.6	29 55	45.7	38 59.7	28 54	44.5	39 08.0	27 53	43.9	39 16.0	27 52	43.3	39 23.9	26 52	42.6	39 46.3	24 50	40.8	39 53.4	23 49	40.1	7
8	38 00.6	31 55	46.1	38 09.8	30 55	45.5	38 27.6	29 53	44.3	38 36.2	28 53	43.7	38 44.6	28 52	43.1	38 52.8	27 52	42.5	39 16.3	25 50	40.6	39 23.8	24 49	40.0	8
9	37 27.5	32 55	45.9	37 37.0	31 54	45.3	37 55.5	30 53	44.1	38 04.5	30 53	43.5	38 13.3	29 52	42.9	38 21.9	28 51	42.3	38 46.5	26 50	40.4	38 54.3	26 49	39.8	9
80	36 54.6	33 55	45.7	37 04.4	33 54	45.1	37 23.6	31 53	43.9	37 32.9	31 52	43.3	37 42.0	30 52	42.7	37 51.0	30 51	42.1	38 16.7	28 49	40.2	38 24.9	27 49	39.6	80
1	36 21.8	34 54	45.4	36 31.9	34 54	44.8	36 51.8	33 53	43.7	37 01.5	32 52	43.1	37 10.9	31 52	42.5	37 20.3	31 51	41.9	37 47.1	29 49	40.1	37 55.7	28 49	39.5	1
2	35 49.1	35 54	45.2	35 59.6	35 54	44.6	36 20.1	34 53	43.4	36 30.1	33 52	42.8	36 40.0	33 51	42.3	36 49.6	32 51	41.7	37 17.6	30 49	39.9	37 26.5	30 48	39.3	2
3	35 16.6	36 54	44.9	35 27.4	36 53	44.3	35 48.6	35 52	43.2	35 59.0	34 52	42.6	36 09.1	34 51	42.0	36 19.1	33 51	41.4	36 48.2	31 49	39.7	36 57.5	31 48	39.1	3
4	34 44.2	37 54	44.6	34 55.4	37 53	44.1	35 17.2	36 52	42.9	35 27.9	35 52	42.4	35 38.4	35 51	41.8	35 48.8	34 50	41.2	36 18.9	33 49	39.5	36 28.6	32 48	38.9	4
85	34 12.0	38 53	44.4	34 23.5	38 53	43.8	34 46.0	37 52	42.7	34 57.0	36 51	42.1	35 07.9	36 51	41.6	35 18.6	35 50	41.0	35 49.7	34 48	39.3	35 59.8	33 48	38.7	85
6	33 39.9	40 53	44.1	33 51.7	39 53	43.6	34 14.9	38 52	42.4	34 26.2	38 51	41.9	34 37.4	37 50	41.3	34 48.5	37 50	40.8	35 20.7	35 48	39.0	35 31.1	34 48	38.5	6
7	33 08.0	41 53	43.8	33 20.1	40 52	43.3	33 43.9	39 51	42.2	33 55.6	39 51	41.6	34 07.2	38 50	41.1	34 18.6	38 50	40.5	34 51.8	36 48	38.8	35 02.6	36 47	38.2	7
8	32 36.2	42 53	43.5	32 48.7	41 52	43.0	33 13.2	40 51	41.9	33 25.2	40 50	41.4	33 37.1	39 50	40.8	33 48.8	39 49	40.3	34 23.1	37 48	38.6	34 34.2	37 47	38.0	8
9	32 04.7	43 52	43.3	32 17.4	42 52	42.7	32 42.5	41 51	41.6	32 54.9	41 50	41.1	33 07.1	40 50	40.6	33 19.2	40 49	40.0	33 54.5	39 47	38.4	34 06.0	38 47	87.8	9
90	31 33.2	44 52	43.0	31 46.3	43 52	42.4	32 12.1	42 50	41.4	32 24.8	42 50	40.8	32 37.3	42 49	40.3	32 49.7	41 49	39.7	33 26.0	40 47	38.1	33 37.9	39 47	87.6	90

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H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	
91	31 02.0	45 52	42.7	31 15.4	44 51	42.1	31 41.8	44 50	41.1	31 54.8	43 50	40.6	32 07.7	43 49	40.0	32 20.4	42 49	39.5	32 57.8	41 47	37.9	33 09.9	40 46	37.3	91
2	30 31.0	46 51	42.3	30 44.7	45 51	41.8	31 11.7	45 50	40.8	31 25.0	44 49	40.3	31 38.2	44 49	39.7	31 51.2	43 48	39.2	32 29.6	42 47	37.6	32 42.1	42 46	37.1	2
3	30 00.1	47 51	42.0	30 14.1	46 51	41.5	30 41.7	46 50	40.5	30 55.4	45 49	40.0	31 08.9	45 49	39.5	31 22.3	44 48	38.9	32 01.7	43 46	37.3	32 14.5	43 46	36.8	3
4	29 29.4	48 51	41.7	29 43.7	47 50	41.2	30 12.0	47 49	40.2	30 25.9	46 49	39.7	30 39.8	46 48	39.2	30 53.5	45 48	38.7	31 33.9	44 46	37.1	31 47.1	44 46	36.6	4
95	28 58.9	49 50	41.4	29 13.5	49 50	40.9	29 42.4	48 49	39.9	29 56.7	47 48	39.4	30 10.8	47 48	38.9	30 24.9	47 47	38.4	31 06.2	45 46	36.8	31 19.8	45 45	36.3	95
6	28 28.6	50 50	41.1	28 43.5	50 50	40.6	29 13.0	49 49	39.6	29 27.6	48 48	39.1	29 42.1	48 48	38.6	29 56.4	48 47	38.1	30 38.8	46 45	36.5	30 52.6	46 45	36.0	6
7	27 58.5	51 50	40.7	28 13.7	51 49	40.3	28 43.8	50 48	39.3	28 58.7	49 48	38.8	29 13.5	49 47	38.3	29 28.2	49 47	37.8	30 11.5	48 45	36.3	30 25.7	47 45	35.7	7
8	27 28.6	52 49	40.4	27 44.1	52 49	39.9	28 14.8	51 48	38.9	28 30.0	50 47	38.5	28 45.1	50 47	38.0	29 00.1	50 46	37.5	29 44.4	49 45	36.0	29 58.9	48 44	35.5	8
9	26 58.9	53 49	40.1	27 14.7	53 49	39.6	27 46.0	52 48	38.6	28 01.6	52 47	38.1	28 17.0	51 47	37.7	28 32.2	51 46	37.2	29 17.5	50 45	35.7	29 32.4	49 44	35.2	9
100	26 29.5	54 49	39.7	26 45.6	53 48	39.2	27 17.5	53 47	38.3	27 33.3	53 47	37.8	27 49.0	52 46	37.3	28 04.6	52 46	36.8	28 50.8	51 44	35.4	29 06.0	50 44	34.9	100
1	26 00.2	55 48	39.4	26 16.6	54 48	38.9	26 49.1	54 47	38.0	27 05.2	54 46	37.5	27 21.2	53 46	37.0	27 37.1	53 45	36.5	28 24.3	52 44	35.1	28 39.8	52 43	34.6	1
2	25 31.2	56 48	39.0	25 47.8	55 48	38.5	26 20.9	55 47	37.6	26 37.3	55 46	37.2	26 53.6	54 46	36.7	27 09.9	54 45	36.2	27 58.0	53 44	34.8	28 13.8	53 43	34.3	2
3	25 02.3	57 48	38.6	25 19.3	56 47	38.2	25 53.0	56 46	37.3	26 09.7	56 46	36.8	26 26.3	55 45	36.3	26 42.8	55 45	35.9	27 31.8	54 43	34.5	27 48.0	54 43	34.0	3
4	24 33.8	58 47	38.3	24 51.0	57 47	37.8	25 25.3	57 46	36.9	25 42.3	57 45	36.5	25 59.2	56 45	36.0	26 16.0	56 44	35.5	27 05.9	55 43	34.1	27 22.4	55 42	33.7	4
105	24 05.4	59 47	37.9	24 22.9	58 46	37.5	24 57.8	58 45	36.6	25 15.0	58 45	36.1	25 32.3	57 44	35.7	25 49.4	57 44	35.2	26 40.2	56 42	33.8	26 57.0	56 42	33.4	105
6	23 37.3	59 46	37.5	23 55.1	59 46	37.1	24 30.5	59 45	36.2	24 48.1	58 45	35.8	25 05.6	58 44	35.3	25 23.0	58 44	34.9	26 14.8	57 42	33.5	26 31.8	57 42	33.0	6
7	23 09.4	60 46	37.2	23 27.5	60 46	36.7	24 03.4	60 45	35.8	24 21.3	59 44	35.4	24 39.1	59 44	35.0	24 56.8	59 43	34.5	25 49.5	58 42	33.2	26 06.9	58 41	32.7	7
8	22 41.7	61 46	36.8	23 00.1	61 45	36.3	23 36.7	61 44	35.5	23 54.8	60 44	35.0	24 12.9	60 43	34.6	24 30.9	60 43	34.2	25 24.5	59 41	32.8	25 42.2	59 41	32.4	8
9	22 14.4	62 45	36.4	22 33.0	62 45	36.0	23 10.1	62 44	35.1	23 28.5	61 43	34.7	23 46.9	61 43	34.2	24 05.2	61 42	33.8	24 59.7	60 41	32.5	25 17.6	60 40	32.1	9
110	21 47.2	63 45	36.0	22 06.1	63 44	35.6	22 43.8	63 43	34.7	23 02.5	62 43	34.3	23 21.2	62 42	33.9	23 39.7	62 42	33.5	24 35.1	61 41	32.2	24 53.4	61 40	31.7	110
1	21 20.3	64 44	35.6	21 39.5	64 44	35.2	22 17.7	63 43	34.3	22 36.7	63 43	33.9	22 55.7	63 42	33.5	23 14.5	63 42	33.1	24 10.7	62 40	31.8	24 29.3	62 40	31.4	1
2	20 53.7	65 44	35.2	21 13.2	65 44	34.8	21 51.9	64 43	34.0	22 11.2	64 42	33.6	22 30.4	64 42	33.1	22 49.6	64 41	32.7	23 46.6	63 40	31.5	24 05.5	63 39	31.0	2
3	20 27.4	66 43	34.8	20 47.1	66 43	34.4	21 26.4	65 42	33.6	21 45.9	65 42	33.2	22 05.4	65 41	32.8	22 24.8	65 41	32.3	23 22.8	64 39	31.1	23 41.9	64 39	30.7	3
4	20 01.3	67 43	34.4	20 21.3	67 43	34.0	21 01.1	66 42	33.2	21 20.9	66 41	32.8	21 40.7	66 41	32.4	22 00.4	66 40	32.0	22 59.1	65 39	30.7	23 18.6	65 38	30.3	4
115	19 35.5	68 43	34.0	19 55.7	67 42	33.6	20 36.1	67 41	32.8	20 56.2	67 41	32.4	21 16.2	67 40	32.0	21 36.2	67 40	31.6	22 35.8	66 39	30.4	22 55.5	66 38	30.0	115
6	19 09.9	68 42	33.5	19 30.4	68 42	33.2	20 11.3	68 41	32.4	20 31.7	68 40	32.0	20 52.0	68 40	31.6	21 12.2	67 39	31.2	22 12.7	67 38	30.0	22 32.7	67 38	29.6	6
7	18 44.7	69 42	33.1	19 05.4	69 41	32.7	19 46.8	69 40	32.0	20 07.5	69 40	31.6	20 28.0	68 39	31.2	20 48.6	68 39	30.8	21 49.8	68 38	29.6	22 10.1	68 37	29.2	7
8	18 19.7	70 41	32.7	18 40.7	70 41	32.3	19 22.6	70 40	31.6	19 43.5	70 39	31.2	20 04.4	69 39	30.8	20 25.2	69 39	30.4	21 27.2	69 37	29.2	21 47.8	69 37	28.9	8
9	17 55.0	71 41	32.3	18 16.3	71 40	31.9	18 58.7	71 39	31.1	19 19.9	70 39	30.8	19 41.0	70 39	30.4	20 02.0	70 38	30.0	21 04.9	70 37	28.9	21 25.8	69 36	28.5	9
120	17 30.6	72 40	31.8	17 52.2	72 40	31.5	18 35.1	71 39	30.7	18 56.5	71 38	30.3	19 17.9	71 38	30.0	19 39.2	71 38	29.6	20 42.8	70 36	28.5	21 04.0	70 36	28.1	120
1	17 06.5	73 40	31.4	17 28.3	73 39	31.0	18 11.8	72 38	30.3	18 33.4	72 38	29.9	18 55.0	72 38	29.6	19 16.6	72 37	29.2	20 21.1	71 36	28.1	20 42.5	71 35	27.7	1
2	16 42.8	73 39	30.9	17 04.8	73 39	30.6	17 48.7	73 38	29.9	18 10.6	73 37	29.5	18 32.5	73 37	29.2	18 54.3	73 37	28.8	19 59.6	72 35	27.7	20 21.2	72 35	27.3	2
3	16 19.3	74 39	30.5	16 41.5	74 38	30.1	17 26.0	74 37	29.4	17 48.1	74 37	29.1	18 10.3	74 37	28.7	18 32.3	74 36	28.4	19 38.3	73 35	27.3	20 00.3	73 34	26.9	3
4	15 56.1	75 38	30.0	16 18.6	75 38	29.7	17 03.5	75 37	29.0	17 25.9	75 36	28.7	17 48.3	75 36	28.3	18 10.6	74 36	28.0	19 17.4	74 34	26.9	19 39.6	74 34	26.5	4
125	15 33.3	76 38	29.6	15 56.0	76 37	29.2	16 41.4	76 36	28.6	17 04.1	75 36	28.2	17 26.7	75 36	27.9	17 49.2	75 35	27.5	18 56.8	75 34	26.5	19 19.2	75 34	26.1	125
6	15 10.7	77 37	29.1	15 33.7	77 37	28.8	16 19.6	76 36	28.1	16 42.5	76 35	27.8	17 05.3	76 35	27.4	17 28.1	76 35	27.1	18 36.4	76 33	26.1	18 59.1	76 33	25.7	6
7	14 48.5	77 36	28.7	15 11.7	77 36	28.3	15 58.1	77 35	27.7	16 21.2	77 35	27.3	16 44.3	77 35	27.0	17 07.4	77 34	26.7	18 16.3	76 33	25.7	18 39.3	76 33	25.3	7
8	14 26.6	78 36	28.2	14 50.1	78 36	27.9	15 36.9	78 35	27.2	16 00.2	78 34	26.9	16 23.6	78 34	26.6	16 46.9	78 34	26.2	17 56.6	77 32	25.3	18 19.8	77 32	24.9	8
9	14 05.1	79 35	27.7	14 28.7	79 35	27.4	15 16.0	79 34	26.8	15 39.6	79 34	26.5	16 03.2	78 33	26.1	16 26.7	78 33	25.8	17 37.1	78 32	24.8	18 00.5	78 31	24.5	9
130	13 43.9	80 35	27.3	14 07.8	80 34	26.9	14 55.5	79 34	26.3	15 19.3	79 33	26.0	15 43.1	79 33	25.7	16 06.9	79 33	25.4	17 18.0	79 31	24.4	17 41.6	79 31	24.1	130
1	13 23.0	80 34	26.8	13 47.1	80 34	26.5	14 35.3	80 33	25.9	14 59.3	80 33	25.5	15 23.3	80 32	25.2	15 47.3	80 32	24.9	16 59.1	80 31	24.0	17 23.0	80 30	23.7	1
2	13 02.4	81 34	26.3	13 26.8	81 33	26.0	14 15.4	81 33	25.4	14 39.7	81 32	25.1	15 03.9	81 32	24.8	15 28.1	81 31	24.5	16 40.6	80 30	23.5	17 04.7	80 30	23.2	2
3	12 42.3	82 33	25.8	13 06.8	82 33	25.5	13 55.8	82 32	24.9	14 20.3	82 32	24.6	14 44.8	82 31	24.3	15 09.2	81 31	24.0	16 22.4	81 30	23.1	16 46.8	81 29	22.8	3
4	12 22.4	83 32	25.3	12 47.2	83 32	25.0	13 36.7	82 31	24.4	14 01.4	82 31	24.2	14 26.0	82 31	23.9	14 50.7	82 30	23.6	16 04.5	82 29	22.7	16 29.1	82 29	22.4	4
135	12 02.9	83 32	24.8	12 27.9	83 32	24.5	13 17.8	83 31	24.0	13 42.7	83 30	23.7	14 07.6	83 30	23.4	14 32.5	83 30	23.1	15 47.0	83 29	22.2	16 11.8	83 28	21.9	135
6	11 43.8	84 31	24.3	12 09.0	84 31	24.1	12 59.3	84 30	23.5	13 24.4	84 30	23.2	13 49.5	84 30	22.9	14 14.6	84 29	22.6	15 29.7	83 28	21.8	15 54.7	83 28	21.5	6
7	11 25.1	85 31	23.8	11 50.5	85 30	23.6	12 41.2	84 30	23.0	13 06.5	84 29	22.7	13 31.8	84 29	22.5	13 57.1	84 29	22.2	15 12.8	84 28	21.3	15 38.1	84 27	21.1	7
8	11 06.7	85 30	23.3	11 32.3	85 30	23.1	12 23.4	85 29	22.5	12 48.9	85 29	22.3	13 14.4	85 28	22.0	13 39.9	85 28	21.7	14 56.3	85 27	20.9	15 21.7	85 27	20.6	8
9	10 48.7	86 29	22.8	11 14.4	86 29	22.6	12 05.9	86 28	22.0	12 31.7	86 28	21.8	12 57.4	86 28	21.5	13 23.1	86 27	21.2	14 40.1	85 26	20.4	15 05.7	85 26	20.2	9
140	10 31.0	87 29	22.3	10 57.0	87 28	22.1	11 48.9	86 28	21.5	12 14.8	86 28	21.3	12 40.7	86 27	21.0	13 06.6	86 27	20.8	14 24.2	86 26	20.0	14 50.0	86 26	19.7	140
1	10 13.8	87 28	21.8	10 39.9	87 28	21.6	11 32.2	87 27	21.0	11 58.3	87 27	20.8	12 24.4	87 27	20.5	12 50.5	87 26	20.3	14 08.6	87 25	19.5	14 34.7	87 25	19.3	1
2	9 56.9	88 27	21.3	10 23.2	88 27	21.0	11 15.9	88 27	20.6	11 42.2	88 26	20.3	12 08.4	88 26	20.1	12 34.7	88 26	19.8	13 53.5	87 25	19.1	14 19.7	87 24	18.8	2
3	9 40.4	88 27	20.8	10 06.9	88 27	20.5	10 59.9	88 26	20.0	11 26.4	88 26	19.8	11 52.9	88 25	19.6	12 19.3	88 25	19.3	13 38.6	88 24	18.6	14 05.0	88 24	18.4	3
4	9 24.3	89 26	20.2	9 51.0	89 26	20.0	10 44.4	89 25	19.5	11 11.0	89 25	19.3	11 37.7	89 25	19.1	12 04.3	89 24	18.8	13 24.1	89 24	18.1	13 50.7	89 23	17.9	4
145	9 08.6	90 26	19.7	9 35.5	90 25	19.5	10 29.2	89 25	19.0	10 56.0	89 24	18.8	11 22.8	89 24	18.6	11 49.6	89 24	18.4	13 10.0	89 23	17.7	13 36.8	89 23	17.4	145
6	8 53.3	90 25	19.2	9 20.3	90 25	19.0	10 14.4	90 24	18.5	10 41.4	90 24	18.3	11 08.4	90 23	18.1	11 35.4	90 23	17.9	12 56.2	90 22	17.2	13 23.2	90 22	17.0	6
7	8 38.4	91 24	18.7	9 05.6	91 24	18.4	10 00.0	91 23	18.0	10 27.1	91 23	17.8	10 54.3	91 23	17.6	11 21.4	90 23	17.4	12 42.8	90 22	16.7	13 10.0	90 21	16.5	7
8	8 23.9	91 24	18.1	8 51.3	91 23	17.9	9 45.9	91 23	17.5	10 13.3	91 22	17.3	10 40.6	91 22	17.1	11 07.9	91 22	16.9	12 29.8	91 21	16.2	12 57.1	91 21	16.0	8
9	8 09.8	92 23	17.6	8 37.3	92 23	17.4	9 32.3	92 22	17.0	9 59.8	92 22	16.8	10 27.3	92 22	16.6	10 54.8	92 21	16.4	12 17.1	91 20	15.8	12 44.6	91 20	15.5	9
150	7 56.1	92 22	17.0	8 23.8	92 22	16.9	9 19.1	92 21	16.5	9 46.7	92 21	16.3	10 14.4	92 21	16.1	10 42.0	92 21	15.9	12 04.9	92 20	15.3	12 32.5	92 20	15.1	150
1	7 42.9	93 21	16.5	8 10.7	93 21	16.3	9 06.3	93 21	15.9	9 34.1	93 20	15.7	10 01.9	93 20	15.6	10 29.6	93 20	15.4	11 52.9	93 19	14.8	12 20.7	92 19	14.6	1
2	7 30.0	93 21	16.0	7 58.0	93 20	15.8	8 53.9	93 20	15.4	9 21.8	93 20	15.2	9 49.7	93 20	15.0	10 17.7	93 19	14.9	11 41.4	93 19	14.3	12 09.3	93 18	14.1	2
3	7 17.6	94 20	15.4	7 45.7	94 20	15.2	8 41.9	94 19	14.9	9 09.9	94 19	14.7	9 38.0	94 19	14.5	10 06.1	94 19	14.3	11 30.2	93 18	13.8	11 58.3	93 18	13.6	3
4	7 05.6	94 19	14.9	7 33.8	94 19	14.7	8 30.3	94 19	14.4	8 58.5	94 18	14.2	9 26.7	94 18	14.0	9 54.9	94 18	13.8	11 19.5	94 17	13.3	11 47.6	94 17	13.1	4
155	6 54.0	95 19	14.3	7 22.4	95 18	14.1	8 19.1	95 18	13.8	8 47.4	94 18	13.7	9 15.8	94 18	13.5	9 44.1	94 17	13.3	11 09.1	94 17	12.8	11 37.4	94 16	12.6	155
6	6 42.9	95 18	13.8	7 11.3	95 18	13.6	8 08.3	95 17	13.3	8 36.8	95 17	13.1	9 05.2	95 17	13.0	9 33.7	95 17	12.8	10 59.1	95 16	12.3	11 27.5	95 16	12.2	6
7	6 32.1	95 17	13.2	7 00.7	95 17	13.0	7 57.9	95 17	12.7	8 26.5	95 16	12.6	8 55.1	95 16	12.4	9 23.7	95 16	12.3	10 49.5	95 15	11.8	11 18.0	95 15	11.7	7
8	6 21.9	96 16	12.6	6 50.6	96 16	12.5	7 48.0	96 16	12.2	8 16.7	96 16	12.1	8 45.4	96 15	11.9	9 14.1	96 15	11.8	10 40.2	96 15	11.3	11 08.9	96 15	11.2	8
9	6 12.0	96 16	12.1	6 40.9	96 15	11.9	7 38.5	96 15	11.7	8 07.3	96 15	11.5	8 36.2	96 15	11.4	9 05.0	96 15	11.2	10 31.4	96 14	10.8	11 00.2	96 14	10.7	9
160	6 02.6	96 15	11.5	6 31.6	96 15	11.4	7 29.4	96 14	11.1	7 58.4	96 14	11.0	8 27.3	96 14	10.9	8 56.2	96 14	10.7	10 23.0	96 13	10.3	10 51.9	96 13	10.2	160
1	5 53.7	97 14	11.0	6 22.7	97 14	10.8	7 20.8	97 14	10.6	7 49.8	97 14	10.5	8 18.8	97 13	10.3	8 47.9	97 13	10.2	10 15.0	97 13	09.8	10 44.0	97 13	09.7	1
2	5 45.1	97 13	10.4	6 14.3	97 13	10.3	7 12.6	97 13	10.0	7 41.7	97 13	09.9	8 10.8	97 13	09.8	8 39.9	97 13	09.7	10 07.3	97 12	09.3	10 36.4	97 12	09.2	2
3	5 37.1	97 13	09.8	6 06.3	97 13	09.7	7 04.8	97 12	09.5	7 34.0	97 12	09.4	8 03.2	97 12	09.3	8 32.4	97 12	09.1	10 00.1	97 11	08.8	10 29.3	97 11	08.7	3
4	5 29.5	98 12	09.3	5 58.8	98 12	09.1	6 57.4	98 12	08.9	7 26.7	98 11	08.8	7 56.0	98 11	08.7	8 25.3	98 11	08.6	9 53.3	98 11	08.3	10 22.6	98 11	08.2	4
165	5 22.3	98 11	08.7	5 51.7	98 11	08.6	6 50.5	98 11	08.4	7 19.9	98 11	08.3	7 49.3	98 11	08.2	8 18.7	98 10	08.1	9 46.8	98 10	07.8	10 16.2	98 10	07.7	165
6	5 15.6	98 10	08.1	5 45.1	98 10	08.0	6 44.0	98 10	07.8	7 13.5	98 10	07.7	7 43.0	98 10	07.6	8 12.4	98 10	07.5	9 40.8	98 09	07.3	10 10.3	98 09	07.2	6
7	5 09.3	98 10	07.5	5 38.9	98 10	07.4	6 38.0	98 09	07.3	7 07.5	98 09	07.2	7 37.1	98 09	07.1	8 06.6	98 09	07.0	9 35.2	98 09	06.7	10 04.8	98 09	06.7	7
8	5 03.5	99 09	07.0	5 33.1	99 09	06.9	6 32.4	99 09	06.7	7 02.0	99 08	06.6	7 31.6	99 08	06.6	8 01.2	99 08	06.5	9 30.0	99 08	06.2	9 59.6	99 08	06.2	8
9				5 27.9	99 08	06.3	6 27.2	99 08	06.2	6 56.9	99 08	06.1	7 26.6	99 08	06.0	7 56.2	99 08	05.9	9 25.2	99 07	05.7	9 54.9	99 07	05.6	9
170				5 23.0	99 07	05.7	6 22.5	99 07	05.6	6 52.2	99 07	05.5	7 22.0	99 07	05.5	7 51.7	99 07	05.4	9 20.9	99 07	05.2	9 50.6	99 07	05.1	170
1				5 18.7	99 06	05.2	6 18.2	99 06	05.0	6 48.0	99 06	05.0	7 17.8	99 06	04.9	7 47.6	99 06	04.9	9 16.9	99 06	04.7	9 46.7	99 06	04.6	1
2				5 14.8	99 06	04.6	6 14.4	99 06	04.5	6 44.2	99 06	04.4	7 14.1	99 06	04.4	7 43.9	99 05	04.3	9 13.4	99 05	04.2	9 43.2	99 05	04.1	2
3				5 11.3	1 00 05	04.0	6 11.0	1 00 05	03.9	6 40.9	1 00 05	03.9	7 10.8	1 00 05	03.8	7 40.6	1 00 05	03.8	9 10.2	1 00 05	03.6	9 40.1	1 00 04	03.6	3
4				5 08.3	1 00 04	03.5	6 08.1	1 00 04	03.4	6 38.0	1 00 04	03.3	7 07.9	1 00 04	03.3	7 37.8	1 00 04	03.2	9 07.5	1 00 04	03.1	9 37.4	1 00 04	03.1	4
175				5 05.8	1 00 03	02.9	6 05.6	1 00 03	02.8	6 35.6	1 00 03	02.8	7 05.5	1 00 03	02.7	7 35.4	1 00 03	02.7	9 05.2	1 00 03	02.6	9 35.2	1 00 03	02.6	175
6				5 03.7	1 00 03	02.3	6 03.6	1 00 03	02.2	6 33.6	1 00 03	02.2	7 03.5	1 00 03	02.2	7 33.5	1 00 03	02.2	9 03.3	1 00 02	02.1	9 33.3	1 00 02	02.1	6
7				5 02.1	1 00 02	01.7	6 02.0	1 00 02	01.7	6 32.0	1 00 02	01.7	7 02.0	1 00 02	01.6	7 32.0	1 00 02	01.6	9 01.9	1 00 02	01.6	9 31.9	1 00 02	01.5	7
8				5 00.9	1 00 01	01.2	6 00.9	1 00 01	01.1	6 30.9	1 00 01	01.1	7 00.9	1 00 01	01.1	7 30.9	1 00 01	01.1	9 00.8	1 00 01	01.0	9 30.8	1 00 01	01.0	8
9				5 00.2	1 00 00	00.6	6 00.2	1 00 00	00.6	6 30.2	1 00 00	00.6	7 00.2	1 00 00	00.5	7 30.2	1 00 00	00.5	9 00.2	1 00 00	00.5	9 30.2	1 00 00	00.5	9
180				5 00.0	1 00 00	00.0	6 00.0	1 00 00	00.0	6 30.0	1 00 00	00.0	7 00.0	1 00 00	00.0	7 30.0	1 00 00	00.0	9 00.0	1 00 00	00.0	9 30.0	1 00 00	00.0	180

Digitized by ARCHIVE

Lat. 40°

H.A.	60° 00′ Alt.	Δd Δt	Az.	60° 30′ Alt.	Δd Δt	Az.	62° 00′ Alt.	Δd Δt	Az.	62° 30′ Alt.	Δd Δt	Az.	63° 00′ Alt.	Δd Δt	Az.	69° 00′ Alt.	Δd Δt	Az.	69° 30′ Alt.	Δd Δt	Az.	74° 30′ Alt.	Δd Δt	Az.	H.A.
°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	°
00	70 00.0	1.0 01	00.0	69 30.0	1.0 01	00.0	68 00.0	1.0 01	00.0	67 30.0	1.0 01	00.0	67 00.0	1.0 01	00.0	61 00.0	1.0 00	00.0	60 30.0	1.0 00	00.0	55 30.0	1.0 00	00.0	00
1	69 59.4	1.0 03	01.5	69 29.4	1.0 03	01.4	67 59.5	1.0 03	01.3	67 29.5	1.0 02	01.2	66 59.5	1.0 02	01.2	60 59.7	1.0 01	00.8	60 29.7	1.0 01	00.7	55 29.8	1.0 01	00.5	1
2	69 57.7	1.0 05	02.9	69 27.7	1.0 05	02.8	67 58.0	1.0 04	02.5	67 28.1	1.0 04	02.4	66 58.1	1.0 04	02.3	60 58.8	1.0 02	01.5	60 28.9	1.0 02	01.4	55 29.2	1.0 02	00.9	2
3	69 54.7	99 07	04.4	69 24.9	99 07	04.2	67 55.5	99 06	03.7	67 25.7	99 06	03.6	66 55.8	99 05	03.5	60 57.3	1.0 03	02.2	60 27.4	1.0 03	02.1	55 28.3	1.0 02	01.4	3
4	69 50.7	99 09	05.8	69 21.0	99 08	05.6	67 52.0	99 07	05.0	67 22.3	99 07	04.8	66 52.6	99 07	04.6	60 55.3	99 04	02.9	60 25.4	99 04	02.8	55 27.0	1.0 03	01.9	4
05	69 45.4	98 11	07.2	69 16.0	98 10	07.0	67 47.5	98 09	06.2	67 18.0	98 09	06.0	66 48.4	99 08	05.8	60 52.6	99 05	03.7	60 22.9	99 05	03.5	55 25.3	99 03	02.4	05
6	69 39.1	97 12	08.6	69 09.9	97 12	08.3	67 42.0	98 11	07.4	67 12.7	98 10	07.2	66 43.3	98 10	06.9	60 49.4	99 06	04.4	60 19.8	99 06	04.2	55 23.2	99 04	02.8	6
7	69 31.6	96 14	10.0	69 02.7	97 14	09.7	67 35.6	97 12	08.6	67 06.5	97 12	08.3	66 37.4	97 11	08.0	60 45.5	98 07	05.1	60 16.1	98 07	04.9	55 20.8	99 05	03.3	7
8	69 23.1	96 16	11.4	68 54.5	96 15	11.0	67 28.2	96 14	09.8	66 59.4	96 13	09.5	66 30.5	96 13	09.1	60 41.1	98 08	05.8	60 11.9	98 08	05.6	55 17.9	98 05	03.7	8
9	69 13.5	94 18	12.7	68 45.2	94 17	12.3	67 19.9	95 15	11.0	66 51.4	95 15	10.6	66 22.8	95 14	10.2	60 36.2	97 09	06.6	60 07.1	97 09	06.3	55 14.8	98 06	04.2	9
10	69 02.8	93 19	14.1	68 34.9	93 19	13.5	67 10.7	94 17	12.1	66 42.5	94 16	11.7	66 14.2	94 16	11.3	60 30.7	96 10	07.3	60 01.8	96 10	07.0	55 11.2	97 07	04.7	10
1	68 51.2	91 21	15.3	68 23.7	92 20	14.8	67 00.6	93 18	13.3	66 32.8	93 18	12.8	66 04.8	93 17	12.3	60 24.6	96 11	08.0	59 55.9	96 11	07.7	55 07.3	97 07	05.1	1
2	68 38.5	90 23	16.6	68 11.5	90 22	16.0	66 49.7	91 20	14.4	66 22.2	92 19	13.9	65 54.6	92 18	13.4	60 17.9	95 12	08.6	59 49.5	95 12	08.3	55 03.0	96 08	05.6	2
3	68 24.9	88 24	17.8	67 58.4	89 23	17.2	66 37.8	90 21	15.4	66 10.8	90 20	14.9	65 43.6	91 20	14.4	60 10.7	94 13	09.3	59 42.6	94 12	09.0	54 58.4	95 08	06.0	3
4	68 10.4	87 26	19.0	67 44.3	87 25	18.3	66 25.2	89 22	16.5	65 58.5	89 22	15.9	65 31.8	89 21	15.4	60 03.0	93 14	10.0	59 35.1	93 13	09.6	54 53.4	95 09	06.5	4
15	67 55.0	85 27	20.1	67 29.5	86 26	19.4	66 11.7	87 24	17.5	65 45.5	88 23	16.9	65 19.2	88 22	16.3	59 54.8	92 15	10.7	59 27.2	92 14	10.3	54 48.0	94 09	06.9	15
6	67 38.8	83 28	21.2	67 13.7	84 28	20.5	65 57.5	86 25	18.5	65 31.8	86 24	17.9	65 05.9	87 23	17.3	59 46.0	91 15	11.3	59 18.7	91 15	10.9	54 42.3	93 10	07.3	6
7	67 21.7	81 30	22.3	66 57.2	82 29	21.6	65 42.6	84 26	19.5	65 17.3	84 25	18.8	64 51.9	85 25	18.2	59 36.8	90 16	12.0	59 09.8	90 16	11.5	54 36.3	92 11	07.8	7
8	67 03.9	79 31	23.4	66 39.9	80 30	22.6	65 26.9	82 27	20.4	65 02.1	83 26	19.8	64 37.2	83 26	19.1	59 27.0	88 17	12.6	59 00.4	89 16	12.1	54 29.9	91 11	08.2	8
9	66 45.3	77 32	24.4	66 21.9	78 31	23.6	65 10.5	80 28	21.3	64 46.2	81 28	20.7	64 21.8	82 27	20.0	59 16.7	87 18	13.2	58 50.5	88 17	12.7	54 23.2	90 12	08.6	9
20	66 26.0	76 33	25.3	66 03.2	76 32	24.5	64 53.4	79 30	22.2	64 29.7	79 29	21.5	64 05.8	80 28	20.8	59 06.0	86 19	13.8	58 40.1	86 18	13.3	54 16.2	89 12	09.0	20
1	66 06.0	74 34	26.2	65 43.8	74 33	25.4	64 35.7	77 31	23.1	64 12.5	78 30	22.4	63 49.1	78 29	21.6	58 54.8	85 19	14.4	58 29.3	85 19	13.9	54 08.9	88 13	09.4	1
2	65 45.3	72 35	27.1	65 23.7	72 34	26.3	64 17.4	75 32	23.9	63 54.7	76 31	23.2	63 31.9	77 30	22.4	58 43.1	83 20	15.0	58 18.1	84 20	14.5	54 01.2	87 13	09.8	2
3	65 24.1	69 36	28.0	65 03.1	70 35	27.1	63 58.4	73 32	24.7	63 36.4	74 32	23.9	63 14.1	75 31	23.2	58 31.0	82 21	15.6	58 06.4	82 20	15.0	53 53.2	86 14	10.2	3
4	65 02.2	67 37	28.8	64 41.8	68 36	27.9	63 38.9	71 33	25.5	63 17.4	72 32	24.7	62 55.7	73 32	23.9	58 18.5	81 22	16.1	57 54.3	81 21	15.6	53 44.9	85 14	10.6	4
25	64 39.8	65 38	29.6	64 20.0	66 37	28.7	63 18.9	69 34	26.2	62 58.0	70 33	25.4	62 36.8	71 32	24.7	58 05.5	79 22	16.7	57 41.7	80 22	16.1	53 36.3	84 15	11.0	25
6	64 16.8	63 39	30.3	63 57.7	64 38	29.5	62 58.3	67 35	26.9	62 38.0	68 34	26.1	62 17.4	69 33	25.3	57 52.2	78 23	17.2	57 28.8	78 22	16.6	53 27.4	83 15	11.3	6
7	63 53.4	61 40	31.0	63 34.8	62 39	30.2	62 37.3	65 36	27.6	62 17.5	66 35	26.8	61 57.5	67 34	26.0	57 38.4	76 24	17.7	57 15.5	77 23	17.1	53 18.2	81 16	11.7	7
8	63 29.4	59 41	31.7	63 11.5	60 40	30.8	62 15.7	63 37	28.3	61 56.6	64 36	27.4	61 37.1	65 35	26.6	57 24.2	74 24	18.2	57 01.8	75 23	17.6	53 08.7	80 16	12.1	8
9	63 05.0	57 41	32.4	62 47.7	58 40	31.5	61 53.8	62 37	28.9	61 35.1	63 36	28.1	61 16.2	63 35	27.2	57 09.7	73 25	18.7	56 47.7	73 24	18.1	52 59.0	79 17	12.4	9
30	62 40.2	55 42	33.0	62 23.5	56 41	32.1	61 31.3	60 38	29.5	61 13.3	61 37	28.7	60 55.0	62 36	27.8	56 54.8	71 25	19.2	56 33.3	72 25	18.5	52 49.0	77 17	12.8	30
1	62 15.0	53 43	33.6	61 58.9	54 42	32.7	61 08.5	58 39	30.1	60 51.1	59 38	29.2	60 33.3	60 37	28.4	56 39.5	70 26	19.6	56 18.5	70 25	19.0	52 38.7	76 18	13.1	1
2	61 49.4	51 43	34.1	61 33.9	52 42	33.2	60 45.3	56 39	30.6	60 28.4	57 38	29.8	60 11.3	58 37	28.9	56 23.9	68 27	20.1	56 03.4	69 26	19.4	52 28.1	75 18	13.4	2
3	61 23.4	49 44	34.7	61 08.5	50 43	33.8	60 21.7	54 40	31.1	60 05.4	55 39	30.3	59 48.8	56 38	29.5	56 08.0	66 27	20.5	55 48.0	67 26	19.8	52 17.3	73 18	13.8	3
4	60 57.1	47 44	35.2	60 42.8	48 43	34.3	59 57.8	52 40	31.6	59 42.1	53 40	30.8	59 26.1	54 38	29.9	55 51.7	65 28	20.9	55 32.2	65 27	20.2	52 06.2	72 19	14.1	4
35	60 30.5	45 45	35.6	60 16.8	46 44	34.7	59 33.5	50 41	32.1	59 18.4	51 40	31.3	59 03.0	52 39	30.4	55 35.1	63 28	21.3	55 16.2	64 27	20.6	51 54.9	70 19	14.4	35
6	60 03.6	43 45	36.1	59 50.4	44 44	35.2	59 08.9	48 41	32.6	58 54.4	49 41	31.7	58 39.5	50 40	30.9	55 18.3	61 29	21.7	54 59.8	62 28	21.0	51 43.4	69 20	14.7	6
7	59 36.4	41 46	36.5	59 23.8	42 45	35.6	58 44.0	46 42	33.0	58 30.1	47 41	32.1	58 15.8	48 40	31.3	55 01.1	59 29	22.1	54 43.2	60 28	21.4	51 31.6	67 20	15.0	7
8	59 08.9	39 46	36.9	58 56.9	40 45	36.0	58 18.9	44 42	33.4	58 05.5	45 41	32.5	57 51.8	46 40	31.7	54 43.7	58 30	22.5	54 26.3	59 29	21.8	51 19.6	66 20	15.3	8
9	58 41.2	37 47	37.3	58 29.8	39 46	36.4	57 53.5	42 43	33.8	57 40.6	43 42	32.9	57 27.5	44 41	32.1	54 26.0	56 30	22.8	54 09.1	57 29	22.1	51 07.4	64 21	15.5	9
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1	57 45.1	34 47	37.9	57 34.8	35 46	37.1	57 01.9	38 44	34.5	56 50.2	40 43	33.6	56 38.2	41 42	32.8	53 49.9	52 31	23.5	53 34.0	53 30	22.8	50 42.4	61 21	16.1	1
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3	56 48.2	30 48	38.5	56 39.0	31 47	37.7	56 09.4	35 44	35.1	55 58.9	36 43	34.3	55 48.0	37 42	33.4	53 12.8	49 31	24.1	52 58.0	50 31	23.4	50 16.5	58 22	16.6	3
4	56 19.5	28 48	38.8	56 10.9	29 47	37.9	55 42.9	33 45	35.4	55 32.9	34 44	34.5	55 22.6	35 43	33.7	52 53.9	47 32	24.4	52 39.7	48 31	23.6	50 03.3	56 22	16.8	4
45	55 50.6	26 48	39.0	55 42.5	28 47	38.2	55 16.2	31 45	35.6	55 06.8	32 44	34.8	54 57.0	33 43	34.0	52 34.9	45 32	24.6	52 21.1	46 31	23.9	49 50.0	54 23	17.0	45
6	55 21.6	25 49	39.3	55 14.1	26 48	38.4	54 49.4	29 45	35.9	54 40.4	30 44	35.1	54 31.2	31 43	34.2	52 15.6	44 32	24.9	52 02.4	44 32	24.2	49 36.4	53 23	17.3	6
7	54 52.5	23 49	39.5	54 45.4	24 48	38.6	54 22.3	27 45	36.1	54 14.0	29 44	35.3	54 05.2	30 43	34.5	51 56.1	42 33	25.2	51 43.5	43 32	24.4	49 22.7	51 23	17.5	7
8	54 23.2	21 49	39.6	54 16.7	22 48	38.8	53 55.2	26 46	36.3	53 47.3	27 45	35.5	53 39.1	28 44	34.7	51 36.5	40 33	25.4	51 24.4	41 32	24.7	49 08.8	49 23	17.7	8
9	53 53.8	19 49	39.8	53 47.8	20 48	39.0	53 27.9	24 46	36.5	53 20.6	25 45	35.7	53 12.9	26 44	34.9	51 16.7	38 33	25.6	51 05.1	39 32	24.9	48 54.8	48 24	17.9	9
50	53 24.3	18 49	40.0	53 18.9	19 48	39.2	53 00.5	22 46	36.7	52 53.7	23 45	35.9	52 46.5	24 44	35.1	50 56.8	36 34	25.8	50 45.7	37 33	25.1	48 40.6	46 24	18.1	50
1	52 54.7	16 49	40.1	52 49.8	17 49	39.3	52 32.9	20 46	36.9	52 26.7	21 45	36.1	52 20.1	23 44	35.3	50 36.7	35 34	26.0	50 26.2	36 33	25.3	48 26.3	44 24	18.2	1
2	52 25.1	14 50	40.2	52 20.6	15 49	39.4	52 05.3	19 46	37.0	51 59.6	20 45	36.2	51 53.5	21 44	35.4	50 16.4	33 34	26.2	50 06.4	34 33	25.5	48 11.8	42 24	18.4	2
3	51 55.4	13 50	40.4	51 51.4	14 49	39.5	51 37.6	17 46	37.2	51 32.4	18 45	36.4	51 26.8	19 45	35.6	49 56.1	31 34	26.4	49 46.6	32 33	25.7	47 57.3	41 25	18.6	3
4	51 25.6	11 50	40.4	51 22.1	12 49	39.7	51 09.8	15 46	37.3	51 05.1	16 46	36.5	51 00.0	17 45	35.7	49 35.6	29 34	26.6	49 26.6	30 33	25.8	47 42.6	39 25	18.7	4
55	50 55.7	09 50	40.5	50 52.8	10 49	39.7	50 41.9	14 47	37.4	50 37.7	15 46	36.6	50 33.1	16 45	35.8	49 15.0	28 35	26.7	49 06.5	28 34	26.0	47 27.7	37 25	18.9	55
6	50 25.8	08 50	40.6	50 23.3	09 49	39.8	50 14.0	12 47	37.5	50 10.2	13 46	36.7	50 06.2	14 45	35.9	48 54.2	26 35	26.9	48 46.3	27 34	26.1	47 12.8	35 25	19.0	6
7	49 55.9	06 50	40.7	49 53.9	07 49	39.9	49 46.0	10 47	37.6	49 42.7	11 46	36.8	49 39.2	12 45	36.0	48 33.4	24 35	27.0	48 26.1	25 34	26.3	46 57.7	34 25	19.2	7
8	49 26.0	05 50	40.7	49 24.4	06 49	39.9	49 18.0	09 47	37.6	49 15.2	10 46	36.9	49 12.1	11 45	36.1	48 12.5	22 35	27.1	48 05.7	23 34	26.4	46 42.6	32 25	19.3	8
9	48 56.0	03 50	40.7	48 54.9	04 49	40.0	48 49.9	07 47	37.7	48 47.6	08 46	36.9	48 45.0	09 45	36.2	47 51.5	21 35	27.2	47 45.2	21 34	26.5	46 27.4	30 26	19.4	9
60	48 26.0	02 50	40.7	48 25.4	03 49	40.0	48 21.8	05 47	37.7	48 20.0	06 46	37.0	48 17.9	07 45	36.2	47 30.4	19 35	27.4	47 24.6	20 34	26.6	46 12.0	29 26	19.5	60
1	47 56.0	00 50	40.7	47 55.8	01 49	40.0	47 53.6	04 47	37.8	47 52.3	05 46	37.0	47 50.7	06 45	36.3	47 09.3	17 35	27.4	47 04.0	18 34	26.7	45 56.6	27 26	19.6	1
2	47 26.0	01 50	40.7	47 26.3	01 49	40.0	47 25.5	02 47	37.8	47 24.6	03 46	37.0	47 23.5	04 45	36.3	46 48.0	15 35	27.5	46 43.3	16 35	26.8	45 41.1	25 26	19.7	2
3	46 56.0	03 50	40.7	46 56.7	02 49	40.0	46 57.3	01 47	37.8	46 56.9	02 46	37.1	46 56.3	03 45	36.3	46 26.8	14 36	27.6	46 22.5	15 35	26.9	45 25.6	23 26	19.8	3
4	46 26.0	04 50	40.7	46 27.2	04 49	40.0	46 29.1	01 47	37.8	46 29.2	00 46	37.1	46 29.0	01 45	36.3	46 05.4	12 36	27.7	46 01.7	13 35	27.0	45 10.0	22 26	19.9	4
65	45 56.1	06 50	40.7	45 57.7	05 49	39.9	46 01.0	02 47	37.8	46 01.5	01 46	37.1	46 01.8	00 45	36.3	45 44.1	10 36	27.7	45 40.8	11 35	27.0	44 54.3	20 26	20.0	65
6	45 26.1	07 50	40.6	45 28.2	06 49	39.9	45 32.8	04 47	37.8	45 33.8	03 46	37.0	45 34.6	02 45	36.3	45 22.7	09 36	27.8	45 20.0	09 35	27.1	44 38.5	18 26	20.1	6
7	44 56.2	09 50	40.6	44 58.7	08 49	39.9	45 04.7	05 47	37.7	45 06.1	04 46	37.0	45 07.3	04 45	36.3	45 01.2	07 36	27.8	44 59.0	08 35	27.1	44 22.7	16 26	20.1	7
8	44 26.4	10 50	40.5	44 29.3	09 49	39.8	44 36.6	07 47	37.7	44 38.5	06 46	37.0	44 40.1	05 45	36.3	44 39.8	05 36	27.9	44 38.1	06 35	27.1	44 06.9	15 26	20.2	8
9	43 56.5	12 50	40.4	43 59.9	11 49	39.7	44 08.5	08 47	37.6	44 10.8	07 46	36.9	44 12.9	07 45	36.3	44 18.3	04 36	27.9	44 17.1	04 35	27.2	43 51.0	13 27	20.2	9
70	43 26.8	13 50	40.3	43 30.5	12 49	39.6	43 40.4	10 47	37.6	43 43.2	09 46	36.9	43 45.8	08 45	36.2	43 56.8	02 36	27.9	43 56.1	03 35	27.2	43 35.1	11 27	20.3	70
1	42 57.0	14 49	40.2	43 01.2	14 49	39.6	43 12.4	11 47	37.5	43 15.6	10 46	36.8	43 18.6	10 45	36.2	43 35.3	00 36	27.9	43 35.1	01 35	27.2	43 19.1	09 27	20.3	1
2	42 27.4	16 49	40.1	42 32.0	15 49	39.5	42 44.4	13 47	37.4	42 48.1	12 46	36.8	42 51.5	11 45	36.1	43 13.8	01 36	27.9	43 14.1	00 35	27.2	43 03.2	08 27	20.4	2
3	41 57.8	17 49	40.0	42 02.8	16 49	39.4	42 16.5	14 46	37.4	42 20.6	13 46	36.7	42 24.5	13 45	36.0	42 52.3	03 36	27.9	42 53.0	02 35	27.2	42 47.2	06 27	20.4	3
4	41 28.3	19 49	39.9	41 33.7	18 48	39.2	41 48.7	15 46	37.3	41 53.2	15 46	36.6	41 57.5	14 45	35.9	42 30.8	05 36	27.9	42 32.0	04 35	27.2	42 31.2	04 27	20.4	4
75	40 58.8	20 49	39.8	41 04.7	19 48	39.1	41 20.9	17 46	37.2	41 25.8	16 46	36.5	41 30.5	15 45	35.8	42 09.3	06 36	27.8	42 11.0	05 35	27.2	42 15.1	03 27	20.4	75
6	40 29.5	21 49	39.6	40 35.7	20 48	39.0	40 53.1	18 46	37.1	40 58.5	18 45	36.4	41 03.7	17 45	35.7	41 47.9	08 36	27.8	41 50.1	07 35	27.1	41 59.1	01 27	20.4	6
7	40 00.2	22 49	39.5	40 06.8	22 48	38.9	40 25.5	20 46	36.9	40 31.3	19 45	36.3	40 36.8	18 45	35.6	41 26.5	09 36	27.8	41 29.1	09 35	27.1	41 43.1	01 27	20.4	7
8	39 31.0	24 48	39.3	39 38.0	23 48	38.7	39 57.9	21 46	36.8	40 04.1	20 45	36.2	40 10.1	20 44	35.5	41 05.1	11 36	27.7	41 08.2	10 35	27.1	41 27.0	02 27	20.4	8
9	39 01.9	25 48	39.2	39 09.3	24 48	38.6	39 30.4	22 46	36.7	39 37.0	22 45	36.0	39 43.4	21 44	35.4	40 43.7	12 36	27.7	40 47.3	12 35	27.0	41 11.0	04 27	20.4	9
80	38 32.9	26 48	39.0	38 40.7	26 47	38.4	39 03.0	24 46	36.5	39 10.0	23 45	35.9	39 16.8	22 44	35.3	40 22.4	14 35	27.6	40 26.5	13 35	26.9	40 55.0	06 27	20.4	80
1	38 04.0	28 48	38.8	38 12.2	27 47	38.2	38 35.7	25 45	36.4	38 43.1	24 45	35.8	38 50.3	24 44	35.1	40 01.1	15 35	27.5	40 05.7	15 35	26.9	40 39.0	07 27	20.4	1
2	37 35.3	29 48	38.7	37 43.8	28 47	38.1	38 08.5	26 45	36.2	38 16.3	26 45	35.6	38 23.9	25 44	35.0	39 39.9	17 35	27.5	39 44.9	16 35	26.8	40 23.0	09 27	20.3	2
3	37 06.6	30 48	38.5	37 15.6	30 47	37.9	37 41.3	28 45	36.1	37 49.6	27 44	35.5	37 57.6	26 44	34.9	39 18.8	19 35	27.4	39 24.2	18 34	26.7	40 07.1	11 27	20.3	3
4	36 38.1	31 47	38.3	36 47.4	31 47	37.7	37 14.3	29 45	35.9	37 23.0	28 44	35.3	37 31.4	28 44	34.7	38 57.7	20 35	27.3	39 03.6	19 34	26.7	39 51.1	12 26	20.3	4
85	36 09.6	33 47	38.1	36 19.4	32 47	37.5	36 47.4	30 45	35.7	36 56.4	30 44	35.1	37 05.3	29 43	34.5	38 36.6	22 35	27.2	38 43.0	21 34	26.6	39 35.2	14 26	20.2	85
6	35 41.4	34 47	37.9	35 51.4	33 46	37.3	36 20.7	32 44	35.6	36 30.0	31 44	35.0	36 39.3	30 43	34.4	38 15.7	23 35	27.1	38 22.5	22 34	26.5	39 19.4	16 26	20.2	6
7	35 13.2	35 47	37.7	35 23.6	35 46	37.1	35 54.0	33 44	35.4	36 03.8	32 44	34.8	36 13.4	32 43	34.2	37 54.8	24 35	27.0	38 02.0	24 34	26.4	39 03.6	17 26	20.1	7
8	34 45.2	36 46	37.5	34 56.0	36 46	36.9	35 27.4	34 44	35.2	35 37.6	34 43	34.6	35 47.6	33 43	34.0	37 34.0	26 35	26.9	37 41.6	25 34	26.3	38 47.8	19 26	20.0	8
9	34 17.3	38 46	37.2	34 28.5	37 46	36.7	35 01.0	35 44	35.0	35 11.6	35 43	34.4	35 22.0	34 43	33.8	37 13.2	27 34	26.8	37 21.3	27 34	26.1	38 32.1	20 26	20.0	9
90	33 49.6	39 46	37.0	34 01.1	38 45	36.4	34 34.8	37 44	34.8	34 45.7	36 43	34.2	34 56.4	36 42	33.6	36 52.6	29 34	26.6	37 01.1	28 34	26.0	38 16.4	22 26	19.9	90

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H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	33 22.0	40 46	36.8	33 33.9	39 45	36.2	34 08.6	38 43	34.6	34 19.9	37 43	34.0	34 31.1	37 42	33.4	36 32.1	30 34	26.5	36 41.0	30 33	25.9	38 00.8	23 26	19.8	91
2	32 54.5	41 45	36.5	33 06.8	41 45	36.0	33 42.6	39 43	34.3	33 54.3	39 42	33.8	34 05.8	38 42	33.2	36 11.6	32 34	26.4	36 21.0	31 33	25.8	37 45.2	25 26	19.7	2
3	32 27.2	42 45	36.3	32 39.8	42 45	35.7	33 16.8	40 43	34.1	33 28.8	40 42	33.6	33 40.7	39 42	33.0	35 51.3	33 34	26.2	36 01.1	32 33	25.6	37 29.7	27 26	19.7	3
4	32 00.1	43 45	36.0	32 13.1	43 44	35.5	32 51.1	42 43	33.9	33 03.5	41 42	33.3	33 15.7	41 41	32.8	35 31.0	34 34	26.1	35 41.3	34 33	25.5	37 14.3	28 26	19.6	4
95	31 33.2	45 45	35.8	31 46.5	44 44	35.2	32 25.5	43 42	33.6	32 38.3	42 42	33.1	32 50.9	42 41	32.6	35 10.9	36 33	25.9	35 21.5	35 33	25.3	36 58.9	30 25	19.5	95
6	31 06.4	46 44	35.5	31 20.0	45 44	35.0	32 00.1	44 42	33.4	32 13.3	43 41	32.9	32 26.2	43 41	32.3	34 50.9	37 33	25.7	35 01.9	37 32	25.2	36 43.7	31 25	19.4	6
7	30 39.8	47 44	35.2	30 53.8	46 44	34.7	31 34.9	45 42	33.2	31 48.4	45 41	32.6	32 01.7	44 41	32.1	34 31.0	39 33	25.6	34 42.4	38 32	25.0	36 28.5	33 25	19.3	7
8	30 13.4	48 44	35.0	30 27.7	47 43	34.5	31 09.9	46 41	32.9	31 23.7	46 41	32.4	31 37.4	45 40	31.9	34 11.2	40 33	25.4	34 23.1	39 32	24.8	36 13.3	34 25	19.1	8
9	29 47.1	49 43	34.7	30 01.8	49 43	34.2	30 45.0	47 41	32.7	30 59.1	47 41	32.1	31 13.2	47 40	31.6	33 51.5	41 33	25.2	34 03.8	41 32	24.7	35 58.3	35 25	19.0	9
100	29 21.1	50 43	34.4	29 36.0	50 43	33.9	30 20.3	49 41	32.4	30 34.8	48 40	31.9	30 49.2	48 40	31.4	33 32.0	43 32	25.1	33 44.7	42 32	24.5	35 43.4	37 25	18.9	100
1	28 55.2	51 43	34.1	29 10.5	51 42	33.6	29 55.7	50 41	32.1	30 10.6	49 40	31.6	30 25.3	49 39	31.1	33 12.6	44 32	24.9	33 25.7	43 31	24.3	35 28.5	38 25	18.8	1
2	28 29.5	52 42	33.8	28 45.1	52 42	33.3	29 31.4	51 40	31.9	29 46.6	50 40	31.4	30 01.7	50 39	30.9	32 53.4	45 32	24.7	33 06.8	45 31	24.1	35 13.7	40 24	18.7	2
3	28 04.0	53 42	33.5	28 20.0	53 42	33.0	29 07.2	52 40	31.6	29 22.8	52 39	31.1	29 38.2	51 39	30.6	32 34.2	46 32	24.5	32 48.1	46 31	24.0	34 59.1	41 24	18.5	3
4	27 38.8	54 42	33.2	27 55.0	54 41	32.7	28 43.3	53 40	31.3	28 59.1	53 39	30.8	29 14.9	52 38	30.3	32 15.3	48 31	24.3	32 29.5	47 31	23.8	34 44.5	43 24	18.4	4
105	27 13.7	55 41	32.9	27 30.3	55 41	32.4	28 19.5	54 39	31.0	28 35.7	54 39	30.5	28 51.8	53 38	30.0	31 56.4	49 31	24.1	32 11.1	49 30	23.6	34 30.1	44 24	18.3	105
6	26 48.8	57 41	32.6	27 05.7	56 41	32.1	27 55.9	55 39	30.7	28 12.4	55 38	30.2	28 28.9	55 38	29.8	31 37.8	50 31	23.9	31 52.8	50 30	23.4	34 15.7	45 24	18.1	6
7	26 24.2	58 41	32.3	26 41.4	57 40	31.8	27 32.5	56 39	30.4	27 49.4	56 38	30.0	28 06.1	56 38	29.5	31 19.3	51 31	23.7	31 34.6	51 30	23.1	34 01.5	47 24	18.0	7
8	25 59.8	59 40	31.9	26 17.3	58 40	31.5	27 09.4	57 38	30.1	27 26.5	57 38	29.7	27 43.6	57 37	29.2	31 00.9	53 30	23.4	31 16.6	52 30	22.9	33 47.4	48 23	17.8	8
9	25 35.6	60 40	31.6	25 53.4	59 39	31.2	26 46.4	58 38	29.8	27 03.9	58 37	29.4	27 21.3	58 37	28.9	30 42.7	54 30	23.2	30 58.8	54 29	22.7	33 33.4	49 23	17.6	9
110	25 11.6	61 40	31.3	25 29.7	60 39	30.8	26 23.7	60 38	29.5	26 41.5	59 37	29.1	26 59.2	59 36	28.6	30 24.7	55 30	23.0	30 41.1	55 29	22.5	33 19.5	51 23	17.5	110
1	24 47.8	62 39	30.9	25 06.3	61 39	30.5	26 01.1	61 37	29.2	26 19.3	60 37	28.7	26 37.3	60 36	28.3	30 06.8	56 29	22.8	30 23.6	56 29	22.3	33 05.8	52 23	17.3	1
2	24 24.3	63 39	30.6	24 43.1	62 38	30.2	25 38.8	62 37	28.9	25 57.3	61 36	28.4	26 15.6	61 36	28.0	29 49.1	57 29	22.5	30 06.3	57 29	22.0	32 52.1	53 22	17.2	2
3	24 01.0	64 38	30.3	24 20.1	63 38	29.8	25 16.7	63 36	28.5	25 35.5	62 36	28.1	25 54.1	62 35	27.7	29 31.6	59 29	22.3	29 49.1	58 28	21.8	32 38.7	55 23	17.0	3
4	23 38.0	65 38	29.9	23 57.3	64 37	29.5	24 54.9	64 36	28.2	25 13.9	63 36	27.8	25 32.9	63 35	27.4	29 14.3	60 29	22.0	29 32.1	59 28	21.6	32 25.3	56 22	16.8	4
115	23 15.2	65 38	29.6	23 34.8	65 37	29.1	24 33.3	65 36	27.9	24 52.6	64 35	27.5	25 11.9	64 35	27.0	28 57.1	61 28	21.8	29 15.3	61 28	21.3	32 12.1	57 22	16.6	115
6	22 52.7	66 37	29.2	23 12.6	66 37	28.8	24 11.9	66 35	27.6	24 31.5	65 35	27.1	24 51.1	65 34	26.7	28 40.1	62 28	21.5	28 58.7	62 27	21.1	31 59.0	58 22	16.4	6
7	22 30.4	67 37	28.8	22 50.6	67 36	28.4	23 50.7	67 35	27.2	24 10.7	66 34	26.8	24 30.6	66 34	26.4	28 23.4	63 28	21.3	28 42.2	63 27	20.8	31 46.0	60 21	16.3	7
8	22 08.3	68 36	28.5	22 28.8	68 36	28.1	23 29.8	68 34	26.9	23 50.1	67 34	26.5	24 10.2	67 33	26.1	28 06.8	64 27	21.0	28 26.0	64 27	20.6	31 33.2	61 21	16.1	8
9	21 46.6	69 36	28.1	22 07.3	69 35	27.7	23 09.2	68 34	26.5	23 29.7	68 34	26.1	23 50.2	68 33	25.7	27 50.4	65 27	20.8	28 09.9	65 26	20.3	31 20.6	62 21	15.9	9
120	21 25.0	70 35	27.7	21 46.1	70 35	27.3	22 48.8	69 34	26.2	23 09.6	69 33	25.8	23 30.3	69 33	25.4	27 34.2	66 27	20.5	27 54.1	66 26	20.1	31 08.1	63 21	15.7	120
1	21 03.8	71 35	27.3	21 25.1	71 34	27.0	22 28.7	70 33	25.8	22 49.7	70 33	25.4	23 10.8	70 32	25.0	27 18.2	67 26	20.2	27 38.4	67 26	19.8	30 55.7	64 20	15.5	1
2	20 42.8	72 34	27.0	21 04.4	72 34	26.6	22 08.8	71 33	25.5	22 30.1	71 32	25.1	22 51.4	71 32	24.7	27 02.4	68 26	20.0	27 22.9	68 25	19.5	30 43.5	65 20	15.3	2
3	20 22.1	73 34	26.6	20 44.0	73 34	26.2	21 49.1	72 32	25.1	22 10.8	72 32	24.7	22 32.4	72 31	24.3	26 46.8	69 26	19.7	27 07.6	69 25	19.3	30 31.5	67 20	15.1	3
4	20 01.7	74 34	26.2	20 23.8	74 33	25.8	21 29.8	73 32	24.7	21 51.7	73 31	24.4	22 13.5	73 31	24.0	26 31.5	70 25	19.4	26 52.6	70 25	19.0	30 19.6	68 20	14.9	4
125	19 41.6	75 33	25.8	20 03.9	74 33	25.4	21 10.7	74 31	24.4	21 32.9	74 31	24.0	21 55.0	74 30	23.6	26 16.3	71 25	19.1	26 37.7	71 24	18.7	30 07.9	69 19	14.7	125
6	19 21.7	76 33	25.4	19 44.3	75 32	25.0	20 51.9	75 31	24.0	21 14.3	75 30	23.6	21 36.7	75 30	23.3	26 01.4	72 25	18.8	26 23.1	72 24	18.4	29 56.4	70 19	14.4	6
7	19 02.2	76 32	25.0	19 25.0	76 32	24.6	20 33.3	76 30	23.6	20 56.0	76 30	23.3	21 18.7	75 30	22.9	25 46.7	73 24	18.5	26 08.6	73 24	18.2	29 45.0	71 19	14.2	7
8	18 42.9	77 32	24.6	19 06.0	77 31	24.2	20 15.1	77 30	23.2	20 38.0	76 30	22.9	21 00.9	76 29	22.5	25 32.2	74 24	18.2	25 54.4	74 23	17.9	29 33.8	72 18	14.0	8
9	18 23.9	78 31	24.2	18 47.3	78 31	23.8	19 57.1	77 30	22.8	20 20.3	77 29	22.5	20 43.4	77 29	22.2	25 17.9	75 23	17.9	25 40.4	75 23	17.6	29 22.7	73 18	13.8	9
130	18 05.2	79 31	23.8	18 28.8	79 30	23.4	19 39.4	78 29	22.4	20 02.8	78 29	22.1	20 26.2	78 28	21.8	25 03.8	76 23	17.6	25 26.7	76 23	17.3	29 11.8	74 18	13.6	130
1	17 46.9	79 30	23.3	18 10.7	79 30	23.0	19 22.0	79 28	22.1	19 45.7	79 28	21.7	20 09.3	79 28	21.4	24 50.0	77 23	17.3	25 13.1	77 22	17.0	29 01.2	75 18	13.3	1
2	17 28.8	80 30	22.9	17 52.9	80 29	22.6	19 04.9	80 28	21.7	19 28.8	80 28	21.3	19 52.7	80 27	21.0	24 36.5	78 22	17.0	24 59.8	78 22	16.7	28 50.6	76 17	13.1	2
3	17 11.1	81 29	22.5	17 35.4	81 29	22.2	18 48.0	81 28	21.3	19 12.2	81 27	21.0	19 36.3	80 27	20.6	24 23.1	79 22	16.7	24 46.7	79 21	16.4	28 40.3	77 17	12.9	3
4	16 53.6	82 29	22.1	17 18.1	82 28	21.8	18 31.5	81 27	20.9	18 55.9	81 27	20.6	19 20.3	81 26	20.2	24 10.0	80 21	16.4	24 33.9	80 21	16.1	28 30.2	78 17	12.6	4
135	16 36.5	82 28	21.7	17 01.3	82 28	21.4	18 15.3	82 27	20.5	18 39.9	82 26	20.2	19 04.5	82 26	19.9	23 57.1	81 21	16.1	24 21.3	80 21	15.8	28 20.2	79 16	12.4	135
6	16 19.7	83 27	21.2	16 44.7	83 27	20.9	17 59.4	83 26	20.1	18 24.2	83 26	19.8	18 49.1	83 25	19.5	23 44.5	81 21	15.8	24 08.9	81 20	15.5	28 10.4	80 16	12.2	6
7	16 03.2	84 27	20.8	16 28.4	84 27	20.5	17 43.8	84 26	19.6	18 08.9	84 25	19.4	18 33.9	83 25	19.1	23 32.1	82 20	15.5	23 56.8	82 20	15.2	28 00.8	81 16	11.9	7
8	15 47.1	85 26	20.3	16 12.5	85 26	20.1	17 28.5	84 25	19.2	17 53.8	84 25	18.9	18 19.0	84 24	18.7	23 20.0	83 20	15.1	23 44.9	83 19	14.8	27 51.5	81 15	11.7	8
9	15 31.3	85 26	19.9	15 56.9	85 25	19.6	17 13.5	85 24	18.8	17 39.0	85 24	18.5	18 04.5	85 24	18.3	23 08.1	84 19	14.8	23 33.2	84 19	14.5	27 42.3	82 15	11.4	9
140	15 15.8	86 25	19.5	15 41.6	86 25	19.2	16 58.8	86 24	18.4	17 24.6	86 24	18.1	17 50.2	86 23	17.9	22 56.5	85 19	14.5	23 21.8	84 19	14.2	27 33.3	83 15	11.2	140
1	15 00.7	87 25	19.0	15 26.7	87 24	18.8	16 44.5	86 23	18.0	17 10.4	86 23	17.7	17 36.3	86 23	17.4	22 45.1	85 19	14.2	23 10.7	85 18	13.9	27 24.4	84 14	10.9	1
2	14 45.9	87 24	18.6	15 12.0	87 24	18.3	16 30.5	87 23	17.5	16 56.6	87 22	17.3	17 22.7	87 22	17.0	22 34.0	86 18	13.8	22 59.8	86 18	13.5	27 15.8	85 14	10.7	2
3	14 31.4	88 24	18.1	14 57.8	88 23	17.9	16 16.8	88 22	17.1	16 43.1	88 22	16.9	17 09.4	88 22	16.6	22 23.2	87 18	13.5	22 49.2	87 17	13.2	27 07.4	86 14	10.4	3
4	14 17.3	89 23	17.7	14 43.8	88 23	17.4	16 03.4	88 22	16.7	16 29.9	88 21	16.4	16 56.4	88 21	16.2	22 12.6	87 17	13.2	22 38.8	87 17	12.9	26 59.2	86 13	10.2	4
145	14 03.5	89 22	17.2	14 30.3	89 22	17.0	15 50.4	89 21	16.3	16 17.1	89 21	16.0	16 43.7	89 21	15.8	22 02.3	88 17	12.8	22 28.7	88 16	12.6	26 51.2	87 13	09.9	145
6	13 50.1	90 22	16.7	14 17.0	90 21	16.5	15 37.7	90 21	15.8	16 04.6	90 20	15.6	16 31.4	89 20	15.4	21 52.2	89 16	12.5	22 18.8	89 16	12.2	26 43.4	88 13	09.6	6
7	13 37.1	90 21	16.3	14 04.1	90 21	16.0	15 25.3	90 20	15.4	15 52.4	90 20	15.2	16 19.4	90 19	14.9	21 42.4	89 16	12.1	22 09.2	89 16	11.9	26 35.8	88 12	09.4	7
8	13 24.4	91 21	15.8	13 51.6	91 20	15.6	15 13.3	91 19	14.9	15 40.5	91 19	14.7	16 07.7	91 19	14.5	21 32.9	90 15	11.8	21 59.9	90 15	11.5	26 28.5	89 12	09.1	8
9	13 12.0	91 20	15.3	13 39.4	91 20	15.1	15 01.6	91 19	14.5	15 29.0	91 19	14.3	15 56.4	91 18	14.1	21 23.6	91 15	11.4	21 50.8	91 15	11.2	26 21.3	90 12	08.8	9
150	13 00.0	92 19	14.9	13 27.6	92 19	14.7	14 50.3	92 18	14.1	15 17.8	92 18	13.8	15 45.4	92 18	13.6	21 14.7	91 14	11.1	21 42.0	91 14	10.9	26 14.4	90 11	08.6	150
1	12 48.4	92 19	14.4	13 16.2	92 18	14.2	14 39.3	92 18	13.6	15 07.0	92 17	13.4	15 34.7	92 17	13.2	21 06.0	92 14	10.7	21 33.5	92 14	10.5	26 07.6	91 11	08.3	1
2	12 37.2	93 18	13.9	13 05.1	93 18	13.7	14 28.7	93 17	13.2	14 56.5	93 17	13.0	15 24.4	93 17	12.8	20 57.5	92 14	10.4	21 25.2	92 13	10.2	26 01.1	92 10	08.0	2
3	12 26.3	93 18	13.4	12 54.4	93 17	13.3	14 18.4	93 17	12.7	14 46.4	93 16	12.5	15 14.4	93 16	12.3	20 49.4	93 13	10.0	21 17.2	93 13	09.8	25 54.8	92 10	07.8	3
4	12 15.8	94 17	13.0	12 44.0	94 17	12.8	14 08.5	94 16	12.3	14 36.6	94 16	12.1	15 04.7	94 16	11.9	20 41.5	93 13	09.7	21 09.5	93 12	09.5	25 48.7	93 10	07.5	4
155	12 05.7	94 16	12.5	12 34.0	94 16	12.3	13 58.9	94 15	11.8	14 27.2	94 15	11.6	14 55.4	94 15	11.5	20 34.0	94 12	09.3	21 02.1	94 12	09.1	25 42.8	93 09	07.2	155
6	11 56.0	95 16	12.0	12 24.4	95 15	11.8	13 49.7	95 15	11.3	14 18.1	95 15	11.2	14 46.5	95 14	11.0	20 26.7	94 12	09.0	20 55.0	94 11	08.8	25 37.2	94 09	06.9	6
7	11 46.6	95 15	11.5	12 15.2	95 15	11.4	13 40.8	95 14	10.9	14 09.3	95 14	10.7	14 37.9	95 14	10.6	20 19.7	95 11	08.6	20 48.1	95 11	08.4	25 31.7	94 09	06.6	7
8	11 37.6	96 14	11.0	12 06.3	96 14	10.9	13 32.3	96 14	10.4	14 01.0	96 13	10.3	14 29.6	96 13	10.1	20 13.0	95 11	08.2	20 41.5	95 11	08.1	25 26.5	95 08	06.4	8
9	11 29.0	96 14	10.5	11 57.8	96 14	10.4	13 24.2	96 13	10.0	13 53.0	96 13	09.8	14 21.7	96 13	09.7	20 06.5	96 10	07.9	20 35.2	96 10	07.7	25 21.5	95 08	06.1	9
160	11 20.8	96 13	10.0	11 49.7	96 13	09.9	13 16.4	96 12	09.5	13 45.3	96 12	09.4	14 14.2	96 12	09.2	20 00.4	96 10	07.5	20 29.2	96 10	07.3	25 16.8	96 08	05.8	160
1	11 13.0	97 12	09.6	11 42.0	97 12	09.4	13 09.0	97 12	09.0	13 38.0	97 12	08.9	14 07.0	97 11	08.8	19 54.5	96 09	07.1	20 23.5	96 09	07.0	25 12.3	96 07	05.5	1
2	11 05.6	97 12	09.1	11 34.7	97 12	08.9	13 02.0	97 11	08.6	13 31.1	97 11	08.4	14 00.2	97 11	08.3	19 49.0	97 09	06.8	20 18.0	97 09	06.6	25 07.9	97 07	05.2	2
3	10 58.5	97 11	08.6	11 27.7	97 11	08.4	12 55.3	97 10	08.1	13 24.5	97 10	08.0	13 53.7	97 10	07.9	19 43.7	97 08	06.4	20 12.8	97 08	06.3	25 03.9	97 06	04.9	3
4	10 51.9	98 10	08.1	11 21.2	98 10	08.0	12 49.0	98 10	07.6	13 18.3	98 10	07.5	13 47.6	98 10	07.4	19 38.7	97 08	06.0	20 08.0	97 08	05.9	25 00.0	97 06	04.7	4
165	10 45.6	98 10	07.6	11 15.0	98 10	07.5	12 43.1	98 09	07.2	13 12.5	98 09	07.1	13 41.9	98 09	06.9	19 34.1	98 07	05.6	20 03.4	98 07	05.5	24 56.4	98 06	04.4	165
6	10 39.8	98 09	07.1	11 09.2	98 09	07.0	12 37.6	98 09	06.7	13 07.0	98 08	06.6	13 36.5	98 08	06.5	19 29.7	98 07	05.3	19 59.1	98 07	05.2	24 53.0	98 05	04.1	6
7	10 34.3	98 08	06.6	11 03.8	98 08	06.5	12 32.4	98 08	06.2	13 02.0	98 08	06.1	13 31.5	98 08	06.0	19 25.6	98 06	04.9	19 55.1	98 06	04.8	24 49.8	98 05	03.8	7
8	10 29.2	99 08	06.1	10 58.8	99 08	06.0	12 27.6	99 07	05.7	12 57.2	99 07	05.7	13 26.8	99 07	05.6	19 21.8	99 06	04.5	19 51.4	99 06	04.4	24 46.9	98 04	03.5	8
9	10 24.6	99 07	05.6	10 54.2	99 07	05.5	12 23.2	99 07	05.3	12 52.9	99 07	05.2	13 22.6	99 07	05.1	19 18.4	99 05	04.2	19 48.0	99 05	04.1	24 44.2	99 04	03.2	9
170	10 20.3	99 06	05.1	10 50.0	99 06	05.0	12 19.2	99 06	04.8	12 48.9	99 06	04.7	13 18.7	99 06	04.6	19 15.2	99 05	03.8	19 44.9	99 05	03.7	24 41.8	99 04	02.9	170
1	10 16.5	99 06	04.6	10 46.2	99 06	04.5	12 15.6	99 05	04.3	12 45.3	99 05	04.2	13 15.1	99 05	04.2	19 12.3	99 04	03.4	19 42.1	99 04	03.3	24 39.5	99 03	02.6	1
2	10 13.0	99 05	04.1	10 42.8	99 05	04.0	12 12.3	99 05	03.8	12 42.1	99 05	03.8	13 11.9	99 05	03.7	19 09.7	99 04	03.0	19 39.5	99 04	03.0	24 37.5	99 03	02.3	2
3	10 10.0	1.0 04	03.5	10 39.8	1.0 04	03.5	12 09.4	1.0 04	03.4	12 39.3	1.0 04	03.3	13 09.1	1.0 04	03.3	19 07.4	1.0 03	02.6	19 37.3	1.0 03	02.6	24 35.8	99 03	02.1	3
4	10 07.3	1.0 04	03.0	10 37.2	1.0 04	03.0	12 06.9	1.0 04	02.9	12 36.8	1.0 03	02.8	13 06.7	1.0 03	02.8	19 05.5	1.0 03	02.3	19 35.4	1.0 03	02.2	24 34.2	1.0 02	01.8	4
175	10 05.1	1.0 03	02.5	10 35.0	1.0 03	02.5	12 04.8	1.0 03	02.4	12 34.7	1.0 03	02.4	13 04.7	1.0 03	02.3	19 03.8	1.0 02	01.9	19 33.7	1.0 02	01.9	24 32.9	1.0 02	01.5	175
6	10 03.3	1.0 02	02.0	10 33.2	1.0 02	02.0	12 03.1	1.0 02	01.9	12 33.0	1.0 02	01.9	13 03.0	1.0 02	01.9	19 02.4	1.0 02	01.5	19 32.4	1.0 02	01.5	24 31.9	1.0 01	01.2	6
7	10 01.8	1.0 02	01.5	10 31.8	1.0 02	01.5	12 01.7	1.0 02	01.4	12 31.7	1.0 02	01.4	13 01.7	1.0 02	01.4	19 01.4	1.0 01	01.1	19 31.3	1.0 01	01.1	24 31.1	1.0 01	00.9	7
8	10 00.8	1.0 01	01.0	10 30.8	1.0 01	01.0	12 00.8	1.0 01	01.0	12 30.8	1.0 01	00.9	13 00.7	1.0 01	00.9	19 00.6	1.0 01	00.8	19 30.6	1.0 01	00.7	24 30.5	1.0 01	00.6	8
9	10 00.2	1.0 00	00.5	10 30.2	1.0 00	00.5	12 00.2	1.0 00	00.5	12 30.2	1.0 00	00.5	13 00.2	1.0 00	00.5	19 00.2	1.0 00	00.4	19 30.1	1.0 00	00.4	24 30.1	1.0 00	00.3	9
180	10 00.0	1.0 00	00.0	10 30.0	1.0 00	00.0	12 00.0	1.0 00	00.0	12 30.0	1.0 00	00.0	13 00.0	1.0 00	00.0	19 00.0	1.0 00	00.0	19 30.0	1.0 00	00.0	24 30.0	1.0 00	00.0	180

STAR IDENTIFICATION TABLE

26

ALTITUDE

Lat. 40°

AZ.	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	54	180	58	180	62	180	66	180	70	180	74	180	78	180	82	180	86	180	90	...	86	00	00
4	54	173	58	173	62	172	66	171	70	169	74	167	78	163	81	157	85	141	87	89	85	35	4
8	53	167	57	165	61	164	65	162	69	159	73	155	76	149	80	139	83	120	84	87	83	53	8
12	52	160	56	158	60	156	64	153	68	149	71	144	74	137	77	126	80	109	81	86	80	62	12
16	51	154	55	152	59	149	62	145	66	141	69	135	72	127	75	117	77	103	78	85	77	66	16
20	50	148	53	145	57	142	60	138	64	134	67	128	70	120	72	110	74	98	75	84	75	68	20
24	48	143	51	140	55	136	58	132	61	127	64	121	67	114	69	105	71	94	72	82	72	69	24
28	46	138	49	134	53	131	56	127	59	122	62	116	64	109	66	101	68	91	69	81	69	70	28
32	44	133	47	130	50	126	53	122	56	117	59	111	61	105	63	97	65	89	66	80	66	70	32
36	42	128	45	125	48	121	51	117	53	112	56	107	58	101	60	94	62	86	63	78	63	70	36
40	39	124	42	121	45	117	48	113	50	108	53	103	55	98	57	91	58	84	60	77	60	69	40
44	36	120	39	117	42	113	45	109	48	105	50	100	52	95	54	89	55	82	57	75	57	68	44
48	34	117	37	113	39	110	42	106	45	102	47	97	49	92	51	86	52	80	54	74	55	67	48
52	31	113	34	110	37	106	39	103	42	98	44	94	46	89	48	84	49	78	51	73	52	66	52
56	28	110	31	107	34	103	36	100	38	96	41	91	43	87	45	82	46	77	48	71	49	65	56
60	25	107	28	104	31	100	33	97	35	93	38	89	40	84	42	80	43	75	45	70	46	64	60
64	22	104	25	101	28	98	30	94	32	90	35	86	37	82	39	78	41	73	42	68	43	63	64
68	19	101	22	98	24	95	27	91	29	88	32	84	34	80	36	76	38	71	39	67	41	62	68
72	16	99	19	95	21	92	24	89	26	85	29	81	31	78	33	74	35	69	36	65	38	60	72
76	13	96	16	93	18	90	21	86	23	83	26	79	28	75	30	72	32	68	34	63	35	59	76
80	10	93	13	90	15	87	18	84	20	80	23	77	25	73	27	70	29	66	31	62	33	57	80
84	07	91	10	88	12	85	15	81	17	78	20	75	22	71	24	68	26	64	28	60	30	56	84
88	04	88	07	85	09	82	12	79	14	76	17	72	19	69	21	65	24	62	26	58	28	54	88
92	01	86	04	83	06	79	09	76	11	73	14	70	16	67	19	63	21	60	23	56	25	53	92
96	*02*	83	01	80	03	77	06	74	08	71	11	68	13	65	16	61	18	58	21	54	23	51	96
100	*05*	80	*02*	77	00	74	03	71	05	68	08	65	11	62	13	59	16	56	18	53	21	49	100
104	*08*	78	*05*	75	*03*	71	*00*	69	03	65	05	63	08	60	11	57	13	54	16	51	18	47	104
108	*11*	75	*08*	72	*06*	69	*03*	66	*00*	63	03	60	05	58	08	55	11	52	13	49	16	45	108
112	*14*	72	*11*	69	*08*	66	*06*	64	*03*	61	*00*	58	03	55	06	52	08	49	11	46	14	43	112
116	*17*	70	*14*	67	*11*	64	*08*	61	*05*	58	*03*	55	00	53	03	50	06	47	09	44	12	41	116
120	*20*	67	*17*	64	*14*	61	*11*	58	*08*	55	*05*	53	*02*	50	01	47	04	44	07	42	10	39	120
124	*22*	64	*20*	61	*17*	58	*14*	55	*11*	52	*07*	50	*04*	47	*01*	45	02	42	05	40	08	37	124
128	*25*	60	*22*	57	*19*	55	*16*	52	*13*	49	*10*	47	*07*	44	*03*	42	*00*	40	03	37	06	35	128
132	*28*	57	*25*	54	*22*	51	*18*	49	*15*	46	*12*	44	*09*	42	*05*	39	*02*	37	01	35	04	32	132
136	*30*	53	*27*	51	*24*	48	*21*	46	*17*	43	*14*	41	*11*	39	*07*	36	*04*	34	*01*	32	03	30	136
140	*33*	50	*29*	47	*26*	44	*23*	42	*19*	40	*16*	38	*12*	36	*09*	34	*06*	32	*02*	30	01	28	140
144	*35*	46	*32*	43	*28*	41	*25*	38	*21*	36	*18*	34	*14*	32	*11*	30	*07*	29	*04*	27	00	25	144
148	*37*	42	*34*	39	*30*	37	*27*	35	*23*	33	*19*	31	*16*	29	*12*	27	*08*	26	*05*	24	*01*	22	148
152	*39*	37	*35*	35	*32*	33	*28*	31	*25*	29	*21*	27	*17*	26	*13*	24	*10*	23	*06*	21	*02*	20	152
156	*41*	32	*37*	30	*33*	28	*30*	27	*26*	25	*22*	24	*18*	22	*15*	21	*11*	20	*07*	18	*03*	17	156
160	*42*	27	*39*	26	*35*	24	*31*	23	*27*	21	*23*	20	*20*	19	*16*	18	*12*	16	*08*	15	*04*	14	160
164	*44*	22	*40*	21	*36*	19	*32*	18	*28*	17	*24*	16	*20*	15	*16*	14	*13*	13	*09*	12	*05*	11	164
168	*45*	17	*41*	16	*37*	15	*33*	14	*29*	13	*25*	12	*21*	11	*17*	11	*13*	10	*09*	09	*05*	09	168
172	*45*	11	*41*	11	*37*	10	*34*	09	*30*	09	*26*	08	*22*	08	*18*	07	*14*	07	*10*	06	*06*	06	172
176	*46*	06	*42*	05	*38*	05	*34*	05	*30*	04	*26*	04	*22*	04	*18*	04	*14*	03	*10*	03	*06*	03	176
180	*46*	00	*42*	00	*38*	00	*34*	00	*30*	00	*26*	00	*22*	00	*18*	00	*14*	00	*10*	00	*06*	00	180
	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		

16—11439

FIGURES IN ITALICS INDICATE THAT DECLINATION IS OF CONTRARY NAME TO LATITUDE

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STAR IDENTIFICATION TABLE

AZ.	48°		52°		56°		60°		64°		68°		72°		76°		80°		84°		88°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	82	00	78	00	74	00	70	00	66	00	62	00	58	00	54	00	50	00	46	00	42	00	00
4	81	18	78	12	74	08	70	06	66	04	62	03	58	02	54	02	50	01	46	01	42	00	4
8	80	33	77	22	73	16	69	11	66	08	62	06	58	05	54	03	50	02	46	01	42	00	8
12	78	43	75	31	72	22	69	17	65	12	61	09	57	07	54	05	50	03	46	02	42	01	12
16	76	50	74	37	71	28	68	21	64	16	61	12	57	09	53	06	50	04	46	02	42	01	16
20	74	54	72	42	69	33	66	25	63	19	60	15	56	11	53	08	49	05	46	03	42	01	20
24	71	57	70	46	68	37	65	29	62	22	59	17	56	13	52	09	49	06	45	03	42	01	24
28	68	59	67	49	66	40	63	32	61	25	58	19	55	15	52	11	49	07	45	04	42	01	28
32	66	60	65	51	64	42	62	34	60	27	57	21	54	16	51	12	48	08	45	04	42	01	32
36	63	61	63	52	62	44	60	36	58	29	56	23	53	18	51	13	48	09	45	05	42	02	36
40	60	61	60	53	59	45	58	38	57	31	55	25	52	19	50	14	47	09	44	05	42	02	40
44	58	61	58	53	57	46	56	39	55	32	53	26	51	20	49	15	47	10	44	06	41	02	44
48	55	60	55	53	55	46	54	40	53	33	52	27	50	21	48	16	46	11	44	06	41	02	48
52	52	60	53	53	53	47	52	40	52	34	51	28	49	22	48	16	46	11	44	07	41	02	52
56	50	59	50	53	51	47	50	41	50	34	49	28	48	23	47	17	45	12	43	07	41	02	56
60	47	59	48	53	48	47	48	41	48	35	48	29	47	23	46	17	44	12	43	07	41	02	60
64	45	58	46	52	46	46	46	41	46	35	46	29	46	23	45	18	44	12	42	07	41	02	64
68	42	57	43	51	44	46	44	40	45	35	45	29	44	24	44	18	43	13	42	07	41	02	68
72	40	56	41	51	42	45	42	40	43	35	43	29	43	24	43	18	42	13	42	08	41	03	72
76	37	54	38	50	40	45	40	40	41	34	42	29	42	24	42	18	42	13	41	08	40	03	76
80	35	53	36	49	37	44	39	39	39	34	40	29	41	24	41	18	41	13	41	08	40	03	80
84	32	52	34	47	35	43	37	38	38	33	39	29	39	23	40	18	40	13	40	08	40	03	84
88	30	50	32	46	33	42	35	37	36	33	37	28	38	23	39	18	40	13	40	08	40	03	88
92	27	49	29	45	31	41	33	37	34	32	36	28	37	23	38	18	39	13	40	08	40	03	92
96	25	47	27	44	29	40	31	36	33	31	34	27	36	22	37	18	38	13	39	08	40	03	96
100	23	46	25	42	27	38	29	34	31	30	33	26	35	22	36	17	38	12	39	08	40	03	100
104	21	44	23	41	25	37	28	33	30	29	32	25	34	21	35	17	37	12	38	07	39	03	104
108	19	42	21	39	24	35	26	32	28	28	30	24	33	20	35	16	36	12	38	07	39	02	108
112	17	40	19	37	22	34	24	31	27	27	29	23	32	20	34	16	36	11	38	07	39	02	112
116	15	38	17	35	20	32	23	29	26	26	28	22	31	19	33	15	35	11	37	07	39	02	116
120	13	36	16	34	19	31	21	28	24	25	27	21	30	18	32	14	35	11	37	06	39	02	120
124	11	34	14	32	17	29	20	26	23	23	26	20	29	17	31	14	34	10	36	06	39	02	124
128	09	32	12	30	16	27	19	25	22	22	25	19	28	16	31	13	33	09	36	06	39	02	128
132	08	30	11	28	14	25	17	23	21	20	24	18	27	15	30	12	33	09	36	05	39	02	132
136	06	28	10	26	13	23	16	21	20	19	23	16	26	14	29	11	33	08	36	05	39	02	136
140	05	26	08	24	12	22	15	19	19	17	22	15	25	13	29	10	32	08	35	05	38	02	140
144	04	23	07	21	11	20	14	18	18	16	21	14	25	12	28	09	32	07	35	04	38	01	144
148	02	21	06	19	10	17	13	16	17	14	21	12	24	10	28	08	31	06	35	04	38	01	148
152	01	18	05	17	09	15	13	14	16	12	20	11	24	09	27	07	31	05	35	03	38	01	152
156	01	16	04	15	08	13	12	12	16	11	20	09	23	08	27	06	31	05	34	03	38	01	156
160	*00*	13	04	12	07	11	11	10	15	09	19	08	23	07	27	05	31	04	34	02	38	01	160
164	*01*	11	03	10	07	09	11	08	15	07	19	06	23	05	26	04	30	03	34	02	38	01	164
168	*01*	08	03	07	07	07	10	06	14	05	18	05	22	04	26	03	30	02	34	02	38	01	168
172	*02*	05	02	05	06	04	10	04	14	04	18	03	22	03	26	02	30	02	34	01	38	00	172
176	*02*	03	02	02	06	02	10	02	14	02	18	02	22	01	26	01	30	01	34	01	38	00	176
180	*02*	00	02	00	06	00	10	00	14	00	18	00	22	00	26	00	30	00	34	00	38	00	180
	48°		52°		56°		60°		64°		68°		72°		76°		80°		84°		88°		

16—11439

FIGURES IN ITALICS INDICATE THAT DECLINATION IS OF CONTRARY NAME TO LATITUDE

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Lat. 41°

H.A.	0° 00′			0° 30′			1° 00′			1° 30′			2° 00′			2° 30′			3° 00′			3° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	49 00.0	1.0 01	180.0	49 30.0	1.0 01	180.0	50 00.0	1.0 01	180.0	50 30.0	1.0 01	180.0	51 00.0	1.0 01	180.0	51 30.0	1.0 01	180.0	52 00.0	1.0 01	180.0	52 30.0	1.0 01	180.0	00
1	48 59.4	1.0 03	178.5	49 29.4	1.0 03	178.5	49 59.4	1.0 03	178.4	50 29.4	1.0 03	178.4	50 59.4	1.0 03	178.4	51 29.4	1.0 03	178.4	51 59.4	1.0 03	178.4	52 29.4	1.0 03	178.4	1
2	48 57.6	1.0 05	177.0	49 27.6	1.0 05	176.9	49 57.5	1.0 05	176.9	50 27.5	1.0 05	176.9	50 57.5	1.0 05	176.8	51 27.5	1.0 05	176.8	51 57.4	1.0 05	176.8	52 27.4	1.0 05	176.7	2
3	48 54.6	1.0 07	175.4	49 24.5	1.0 07	175.4	49 54.5	1.0 07	175.3	50 24.4	1.0 07	175.3	50 54.4	1.0 07	175.2	51 24.3	1.0 07	175.2	51 54.2	1.0 07	175.1	52 24.2	1.0 08	175.1	3
4	48 50.4	1.0 09	173.9	49 20.3	1.0 09	173.9	49 50.2	1.0 09	173.8	50 20.1	1.0 09	173.7	50 50.0	1.0 09	173.7	51 19.9	1.0 09	173.6	51 49.8	1.0 10	173.5	52 19.7	1.0 10	173.5	4
05	48 45.0	1.0 11	172.4	49 14.8	99 11	172.3	49 44.7	99 11	172.2	50 14.5	99 11	172.2	50 44.4	99 11	172.1	51 14.2	99 12	172.0	51 44.0	99 12	171.9	52 13.9	99 12	171.8	05
6	48 38.4	99 13	170.9	49 08.2	99 13	170.8	49 38.0	99 13	170.7	50 07.8	99 13	170.6	50 37.5	99 13	170.5	51 07.3	99 14	170.4	51 37.0	99 14	170.3	52 06.8	99 14	170.2	6
7	48 30.7	99 15	169.4	49 00.4	99 15	169.3	49 30.1	99 15	169.2	49 59.8	99 15	169.1	50 29.5	99 15	169.0	50 59.1	99 16	168.8	51 28.8	99 16	168.7	51 58.5	99 16	168.6	7
8	48 21.8	99 17	167.9	48 51.4	99 17	167.8	49 21.0	99 17	167.7	49 50.6	99 17	167.5	50 20.2	99 17	167.4	50 49.8	99 18	167.3	51 19.4	99 18	167.2	51 48.9	99 18	167.0	8
9	48 11.7	98 19	166.4	48 41.2	98 19	166.3	49 10.7	98 19	166.2	49 40.2	98 19	166.0	50 09.7	98 19	165.9	50 39.2	98 20	165.7	51 08.7	98 20	165.6	51 38.1	98 20	165.4	9
10	48 00.5	98 20	165.0	48 29.9	98 21	164.8	48 59.3	98 21	164.7	49 28.7	98 21	164.5	49 58.1	98 21	164.3	50 27.5	98 22	164.2	50 56.8	98 22	164.0	51 26.1	98 22	163.9	10
1	47 48.2	98 22	163.5	48 17.5	98 23	163.3	48 46.8	98 23	163.2	49 16.0	98 23	163.0	49 45.3	97 23	162.8	50 14.5	97 23	162.7	50 43.8	97 24	162.5	51 13.0	97 24	162.3	1
2	47 34.8	97 24	162.0	48 04.0	97 24	161.9	48 33.1	97 25	161.7	49 02.2	97 25	161.5	49 31.4	97 25	161.3	50 00.5	97 26	161.1	50 29.5	97 26	161.0	50 58.6	97 26	160.8	2
3	47 20.3	97 26	160.6	47 49.3	97 26	160.4	48 18.3	97 26	160.2	48 47.3	97 27	160.0	49 16.3	97 27	159.8	49 45.3	96 27	159.6	50 14.2	96 27	159.4	50 43.1	96 28	159.2	3
4	47 04.7	96 28	159.2	47 33.6	96 28	159.0	48 02.5	96 28	158.8	48 31.3	96 28	158.6	49 00.2	96 29	158.4	49 29.0	96 29	158.2	49 57.7	96 29	157.9	50 26.5	96 30	157.7	4
15	46 48.1	96 29	157.8	47 16.9	96 30	157.6	47 45.6	96 30	157.4	48 14.3	96 30	157.1	48 42.9	96 30	156.9	49 11.6	95 31	156.7	49 40.2	95 31	156.5	50 08.8	95 31	156.2	15
6	46 30.5	95 31	156.4	46 59.1	95 31	156.2	47 27.6	95 32	155.9	47 56.2	95 32	155.7	48 24.7	95 32	155.5	48 53.1	95 32	155.2	49 21.6	95 33	155.0	49 50.0	95 33	154.8	6
7	46 11.9	95 33	155.0	46 40.3	95 33	154.8	47 08.7	95 33	154.5	47 37.0	94 34	154.3	48 05.4	94 34	154.1	48 33.7	94 34	153.8	49 01.9	94 34	153.6	49 30.2	94 35	153.3	7
8	45 52.2	94 34	153.7	46 20.5	94 35	153.4	46 48.7	94 35	153.2	47 16.9	94 35	152.9	47 45.1	94 35	152.7	48 13.2	94 36	152.4	48 41.3	94 36	152.1	49 09.3	93 36	151.9	8
9	45 31.7	94 36	152.3	45 59.8	94 36	152.1	46 27.8	93 36	151.8	46 55.8	93 37	151.5	47 23.8	93 37	151.3	47 51.7	93 37	151.0	48 19.6	93 38	150.7	48 47.5	93 38	150.4	9
20	45 10.2	93 37	151.0	45 38.1	93 38	150.7	46 05.9	93 38	150.5	46 33.8	93 38	150.2	47 01.5	93 39	149.9	47 29.3	92 39	149.6	47 57.0	92 39	149.3	48 24.7	92 40	149.0	20
1	44 47.7	92 39	149.7	45 15.5	92 39	149.4	45 43.1	92 39	149.1	46 10.8	92 40	148.8	46 38.4	92 40	148.6	47 05.9	92 40	148.3	47 33.4	92 41	148.0	48 00.9	91 41	147.7	1
2	44 24.4	92 40	148.4	44 52.0	92 41	148.1	45 19.5	92 41	147.8	45 46.9	91 41	147.5	46 14.3	91 42	147.2	46 41.7	91 42	146.9	47 09.0	91 42	146.6	47 36.2	91 43	146.3	2
3	44 00.3	91 42	147.1	44 27.6	91 42	146.8	44 54.9	91 42	146.5	45 22.2	91 43	146.2	45 49.4	91 43	145.9	46 16.5	90 43	145.6	46 43.6	90 44	145.3	47 10.7	90 44	145.0	3
4	43 35.3	91 43	145.8	44 02.4	90 43	145.5	44 29.5	90 44	145.2	44 56.6	90 44	144.9	45 23.6	90 44	144.6	45 50.5	90 45	144.3	46 17.4	90 45	144.0	46 44.3	89 45	143.7	4
25	43 09.4	90 44	144.6	43 36.4	90 45	144.3	44 03.3	90 45	144.0	44 30.1	89 45	143.7	44 56.9	89 46	143.4	45 23.7	89 46	143.0	45 50.4	89 46	142.7	46 17.0	89 47	142.4	25
6	42 42.8	89 46	143.4	43 09.6	89 46	143.1	43 36.3	89 46	142.8	44 02.9	89 47	142.4	44 29.5	89 47	142.1	44 56.1	88 47	141.8	45 22.6	88 48	141.4	45 49.0	88 48	141.1	6
7	42 15.4	89 47	142.2	42 42.0	88 47	141.9	43 08.5	88 48	141.5	43 34.9	88 48	141.2	44 01.3	88 48	140.9	44 27.7	88 49	140.5	44 54.0	88 49	140.2	45 20.2	87 49	139.9	7
8	41 47.2	88 48	141.0	42 13.6	88 48	140.7	42 39.9	88 49	140.3	43 06.2	87 49	140.0	43 32.4	87 49	139.7	43 58.5	87 50	139.3	44 24.6	87 50	139.0	44 50.6	87 50	138.6	8
9	41 18.4	87 49	139.8	41 44.6	87 50	139.5	42 10.7	87 50	139.1	42 36.7	87 50	138.8	43 02.7	87 51	138.5	43 28.7	86 51	138.1	43 54.5	86 51	137.8	44 20.3	86 52	137.4	9
30	40 48.8	87 50	138.7	41 14.8	87 51	138.3	41 40.7	86 51	138.0	42 06.6	86 51	137.6	42 32.4	86 52	137.3	42 58.1	86 52	136.9	43 23.8	85 52	136.6	43 49.4	85 53	136.2	30
1	40 18.6	86 52	137.5	40 44.3	86 52	137.2	41 10.1	86 52	136.8	41 35.7	85 52	136.5	42 01.3	85 53	136.1	42 26.8	85 53	135.8	42 52.3	85 54	135.4	43 17.7	85 54	135.1	1
2	39 47.6	85 53	136.4	40 13.2	85 53	136.1	40 38.8	85 53	135.7	41 04.2	85 54	135.4	41 29.6	85 54	135.0	41 54.9	84 54	134.6	42 20.2	84 55	134.3	42 45.4	84 55	133.9	2
3	39 16.1	85 54	135.3	39 41.5	85 54	134.9	40 06.8	84 54	134.6	40 32.1	84 55	134.2	40 57.3	84 55	133.9	41 22.4	84 55	133.5	41 47.5	83 56	133.2	42 12.5	83 56	132.8	3
4	38 43.9	84 55	134.2	39 09.1	84 55	133.9	39 34.3	84 55	133.5	39 59.3	83 56	133.1	40 24.4	83 56	132.8	40 49.3	83 56	132.4	41 14.2	83 57	132.0	41 38.9	83 57	131.7	4
35	38 11.2	83 56	133.1	38 36.2	83 56	132.8	39 01.1	83 56	132.4	39 26.0	83 56	132.1	39 50.8	83 57	131.7	40 15.6	82 57	131.3	40 40.2	82 57	131.0	41 04.8	82 58	130.6	35
6	37 37.9	83 56	132.1	38 02.7	83 57	131.7	38 27.4	82 57	131.4	38 52.1	82 57	131.0	39 16.7	82 58	130.6	39 41.3	82 58	130.3	40 05.8	81 58	129.9	40 30.2	81 59	129.5	6
7	37 04.0	82 57	131.0	37 28.6	82 58	130.7	37 53.2	82 58	130.3	38 17.7	82 58	130.0	38 42.1	81 59	129.6	39 06.5	81 59	129.2	39 30.8	81 59	128.8	39 55.0	81 60	128.4	7
8	36 29.6	82 58	130.0	36 54.0	81 58	129.7	37 18.4	81 59	129.3	37 42.7	81 59	128.9	38 06.9	81 59	128.6	38 31.1	80 60	128.2	38 55.2	80 60	127.8	39 19.2	80 60	127.4	8
9	35 54.6	81 59	129.0	36 18.9	81 59	128.6	36 43.1	81 60	128.3	37 07.2	80 60	127.9	37 31.3	80 60	127.5	37 55.3	80 61	127.2	38 19.2	80 61	126.8	38 43.0	79 61	126.4	9
40	35 19.2	80 60	128.0	35 43.3	80 60	127.7	36 07.3	80 60	127.3	36 31.3	80 61	126.9	36 55.1	79 61	126.5	37 18.9	79 61	126.2	37 42.7	79 62	125.8	38 06.3	79 62	125.4	40
1	34 43.3	80 61	127.0	35 07.2	80 61	126.7	35 31.0	79 61	126.3	35 54.8	79 61	125.9	36 18.5	79 62	125.5	36 42.2	79 62	125.2	37 05.7	78 62	124.8	37 29.2	78 63	124.4	1
2	34 06.9	79 61	126.1	34 30.7	79 62	125.7	34 54.3	79 62	125.3	35 17.9	79 62	125.0	35 41.5	78 62	124.6	36 04.9	78 63	124.2	36 28.3	78 63	123.8	36 51.6	78 63	123.4	2
3	33 30.1	79 62	125.1	33 53.7	78 62	124.8	34 17.2	78 63	124.4	34 40.6	78 63	124.0	35 04.0	78 63	123.6	35 27.2	78 63	123.2	35 50.5	77 64	122.8	36 13.6	77 64	122.4	3
4	32 52.8	78 63	124.2	33 16.2	78 63	123.8	33 39.6	78 63	123.4	34 02.8	77 64	123.1	34 26.0	77 64	122.7	34 49.2	77 64	122.3	35 12.2	77 64	121.9	35 35.2	76 65	121.5	4
45	32 15.2	78 63	123.3	32 38.4	77 64	122.9	33 01.6	77 64	122.5	33 24.7	77 64	122.1	33 47.7	77 64	121.7	34 10.7	76 65	121.4	34 33.6	76 65	121.0	34 56.4	76 65	120.6	45
6	31 37.1	77 64	122.4	32 00.2	77 64	122.0	32 23.2	77 65	121.6	32 46.2	76 65	121.2	33 09.0	76 65	120.8	33 31.8	76 65	120.4	33 54.6	76 66	120.1	34 17.2	75 66	119.7	6
7	30 58.7	77 65	121.5	31 21.6	76 65	121.1	31 44.5	76 65	120.7	32 07.3	76 65	120.3	32 30.0	76 66	119.9	32 52.6	75 66	119.5	33 15.2	75 66	119.1	33 37.7	75 66	118.8	7
8	30 19.9	76 65	120.6	30 42.6	76 66	120.2	31 05.4	76 66	119.8	31 28.0	75 66	119.4	31 50.6	75 66	119.0	32 13.1	75 67	118.7	32 35.5	75 67	118.3	32 57.8	74 67	117.9	8
9	29 40.7	76 66	119.7	30 03.3	75 66	119.3	30 25.9	75 66	118.9	30 48.4	75 67	118.6	31 10.8	75 67	118.2	31 33.1	74 67	117.8	31 55.4	74 67	117.4	32 17.6	74 68	117.0	9
50	29 01.2	75 66	118.8	29 23.7	75 67	118.5	29 46.1	75 67	118.1	30 08.4	74 67	117.7	30 30.7	74 67	117.3	30 52.9	74 68	116.9	31 15.1	74 68	116.5	31 37.1	73 68	116.1	50
1	28 21.4	75 67	118.0	28 43.7	74 67	117.6	29 06.0	74 67	117.2	29 28.2	74 68	116.8	29 50.3	74 68	116.4	30 12.4	73 68	116.1	30 34.4	73 68	115.7	30 56.3	73 68	115.3	1
2	27 41.2	74 67	117.1	28 03.4	74 68	116.8	28 25.6	74 68	116.4	28 47.6	73 68	116.0	29 09.6	73 68	115.6	29 31.6	73 69	115.2	29 53.4	73 69	114.8	30 15.2	73 69	114.4	2
3	27 00.8	74 68	116.3	27 22.9	73 68	115.9	27 44.9	73 68	115.5	28 06.8	73 69	115.2	28 28.7	73 69	114.8	28 50.5	73 69	114.4	29 12.2	72 69	114.0	29 33.9	72 69	113.6	3
4	26 20.1	73 68	115.5	26 42.0	73 69	115.1	27 03.9	73 69	114.7	27 25.7	73 69	114.3	27 47.4	72 69	113.9	28 09.1	72 69	113.6	28 30.7	72 70	113.2	28 52.2	72 70	112.8	4
55	25 39.0	73 69	114.7	26 00.8	73 69	114.3	26 22.6	72 69	113.9	26 44.3	72 69	113.5	27 05.9	72 70	113.1	27 27.4	72 70	112.7	27 48.9	72 70	112.3	28 10.3	71 70	112.0	55
6	24 57.8	72 69	113.9	25 19.4	72 69	113.5	25 41.1	72 70	113.1	26 02.6	72 70	112.7	26 24.1	72 70	112.3	26 45.6	71 70	111.9	27 06.9	71 70	111.5	27 28.2	71 71	111.1	6
7	24 16.2	72 70	113.1	24 37.8	72 70	112.7	24 59.3	72 70	112.3	25 20.7	71 70	111.9	25 42.1	71 70	111.5	26 03.4	71 71	111.1	26 24.7	71 71	110.8	26 45.9	71 71	110.4	7
8	23 34.4	72 70	112.3	23 55.9	71 70	111.9	24 17.3	71 70	111.5	24 38.6	71 71	111.1	24 59.9	71 71	110.8	25 21.1	71 71	110.4	25 42.2	70 71	110.0	26 03.3	70 71	109.6	8
9	22 52.4	71 70	111.5	23 13.8	71 71	111.1	23 35.0	71 71	110.7	23 56.3	71 71	110.4	24 17.4	70 71	110.0	24 38.5	70 71	109.6	24 59.6	70 71	109.2	25 20.6	70 72	108.8	9
60	22 10.2	71 71	110.7	22 31.4	71 71	110.4	22 52.6	70 71	110.0	23 13.7	70 71	109.6	23 34.8	70 71	109.2	23 55.8	70 72	108.8	24 16.7	70 72	108.4	24 37.6	70 72	108.0	60
1	21 27.7	71 71	110.0	21 48.9	70 71	109.6	22 09.9	70 71	109.2	22 31.0	70 72	108.8	22 51.9	70 72	108.4	23 12.8	70 72	108.1	23 33.7	69 72	107.7	23 54.4	69 72	107.3	1
2	20 45.1	70 71	109.2	21 06.1	70 72	108.8	21 27.1	70 72	108.5	21 48.0	70 72	108.1	22 08.9	69 72	107.7	22 29.7	69 72	107.3	22 50.4	69 72	106.9	23 11.1	69 72	106.5	2
3	20 02.2	70 72	108.5	20 23.2	70 72	108.1	20 44.0	70 72	107.7	21 04.9	69 72	107.3	21 25.6	69 72	106.9	21 46.3	69 72	106.6	22 07.0	69 73	106.2	22 27.6	69 73	105.8	3
4	19 19.2	70 72	107.7	19 40.0	69 72	107.4	20 00.8	69 72	107.0	20 21.5	69 72	106.6	20 42.2	69 73	106.2	21 02.9	69 73	105.8	21 23.4	68 73	105.4	21 44.0	68 73	105.0	4
65	18 36.0	69 72	107.0	18 56.7	69 72	106.6	19 17.4	69 73	106.2	19 38.1	69 73	105.9	19 58.7	69 73	105.5	20 19.2	68 73	105.1	20 39.7	68 73	104.7	21 00.2	68 73	104.3	65
6	17 52.6	69 73	106.3	18 13.3	69 73	105.9	18 33.9	69 73	105.5	18 54.4	68 73	105.1	19 15.0	68 73	104.7	19 35.4	68 73	104.4	19 55.8	68 73	104.0	20 16.2	68 73	103.6	6
7	17 09.1	69 73	105.6	17 29.6	69 73	105.2	17 50.2	68 73	104.8	18 10.6	68 73	104.4	18 31.1	68 73	104.0	18 51.5	68 73	103.6	19 11.8	68 74	103.3	19 32.1	68 74	102.9	7
8	16 25.4	68 73	104.8	16 45.9	68 73	104.5	17 06.3	68 73	104.1	17 26.7	68 73	103.7	17 47.1	68 74	103.3	18 07.4	68 74	102.9	18 27.7	68 74	102.5	18 47.9	67 74	102.1	8
9	15 41.5	68 73	104.1	16 01.9	68 73	103.8	16 22.3	68 74	103.4	16 42.7	68 74	103.0	17 03.0	68 74	102.6	17 23.2	67 74	102.2	17 43.4	67 74	101.8	18 03.6	67 74	101.4	9
70	14 57.5	68 74	103.4	15 17.9	68 74	103.0	15 38.2	68 74	102.7	15 58.5	68 74	102.3	16 18.7	67 74	101.9	16 38.9	67 74	101.5	16 59.1	67 74	101.1	17 19.2	67 74	100.7	70
1	14 13.4	68 74	102.7	14 33.7	68 74	102.3	14 54.0	67 74	102.0	15 14.2	67 74	101.6	15 34.3	67 74	101.2	15 54.5	67 74	100.8	16 14.6	67 74	100.4	16 34.6	67 74	100.0	1
2	13 29.2	67 74	102.0	13 49.4	67 74	101.7	14 09.6	67 74	101.3	14 29.8	67 74	100.9	14 49.9	67 74	100.5	15 09.9	67 74	100.1	15 30.0	67 74	99.7	15 50.0	67 75	99.3	2
3	12 44.9	67 74	101.3	13 05.0	67 74	101.0	13 25.1	67 74	100.6	13 45.2	67 74	100.2	14 05.3	67 74	99.8	14 25.3	67 75	99.4	14 45.3	67 75	99.0	15 05.3	66 75	98.7	3
4	12 00.4	67 74	100.7	12 20.5	67 74	100.3	12 40.6	67 74	99.9	13 00.6	67 75	99.5	13 20.6	67 75	99.1	13 40.6	67 75	98.7	14 00.5	66 75	98.4	14 20.4	66 75	98.0	4
75	11 15.9	67 74	100.0	11 35.9	67 74	99.6	11 55.9	67 75	99.2	12 15.9	67 75	98.8	12 35.9	66 75	98.4	12 55.8	66 75	98.1	13 15.7	66 75	97.7	13 35.6	66 75	97.3	75
6	10 31.2	67 75	99.3	10 51.2	67 75	98.9	11 11.2	67 75	98.5	11 31.1	66 75	98.2	11 51.1	66 75	97.8	12 10.9	66 75	97.4	12 30.8	66 75	97.0	12 50.6	66 75	96.6	6
7	9 46.5	67 75	98.6	10 06.4	66 75	98.2	10 26.4	66 75	97.9	10 46.3	66 75	97.5	11 06.2	66 75	97.1	11 26.0	66 75	96.7	11 45.8	66 75	96.3	12 05.6	66 75	95.9	7
8	9 01.7	66 75	97.9	9 21.6	66 75	97.6	9 41.5	66 75	97.2	10 01.3	66 75	96.8	10 21.2	66 75	96.4	10 41.0	66 75	96.0	11 00.8	66 75	95.7	11 20.5	66 75	95.3	8
9	8 16.8	66 75	97.3	8 36.7	66 75	96.9	8 56.5	66 75	96.5	9 16.3	66 75	96.1	9 36.2	66 75	95.7	9 55.9	66 75	95.4	10 15.7	66 75	95.0	10 35.4	66 75	94.6	9
80	7 31.8	66 75	96.6	7 51.7	66 75	96.2	8 11.5	66 75	95.8	8 31.3	66 75	95.5	8 51.1	66 75	95.1	9 10.8	66 75	94.7	9 30.6	66 75	94.3	9 50.3	66 75	93.9	80
1	6 46.8	66 75	95.9	7 06.6	66 75	95.6	7 26.4	66 75	95.2	7 46.2	66 75	94.8	8 06.0	66 75	94.4	8 25.7	66 75	94.0	8 45.4	66 75	93.7	9 05.1	66 75	93.3	1
2	6 01.3	66 75	95.3	6 21.5	66 75	94.9	6 41.3	66 75	94.5	7 01.1	66 75	94.1	7 20.8	66 75	93.8	7 40.5	66 75	93.4	8 00.2	66 75	93.0	8 19.9	66 75	92.6	2
3	5 16.6	66 75	94.6	5 36.4	66 75	94.2	5 56.1	66 75	93.8	6 15.9	66 75	93.5	6 35.6	66 75	93.1	6 55.3	66 75	92.7	7 15.0	66 75	92.3	7 34.6	66 75	91.9	3
4							5 10.9	66 75	93.2	5 30.7	66 75	92.8	5 50.4	66 75	92.4	6 10.0	66 75	92.1	6 29.7	66 75	91.7	6 49.3	66 75	91.3	4
85													5 05.1	66 75	91.8	5 24.8	66 75	91.4	5 44.4	66 75	91.0	6 04.1	66 75	90.6	85
6																						5 18.8	66 75	90.0	6

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H.A.	0° 00′ Alt.	Az.	0° 30′ Alt.	Az.	1° 00′ Alt.	Az.	1° 30′ Alt.	Az.	2° 00′ Alt.	Az.	2° 30′ Alt.	Az.	3° 00′ Alt.	Az.	3° 30′ Alt.	Az.	H.A.
°	′ Δd Δt °	°	′ Δd Δt °	°	′ Δd Δt °	°	′ Δd Δt °	°	′ Δd Δt °	°	′ Δd Δt °	°	′ Δd Δt °	°	′ Δd Δt °	°	°
00	49 00.0 1.0 01	180.0	48 30.0 1.0 01	180.0	48 00.0 1.0 01	180.0	47 30.0 1.0 01	180.0	47 00.0 1.0 01	180.0	46 30.0 1.0 01	180.0	46 00.0 1.0 01	180.0	45 30.0 1.0 01	180.0	00
1	48 59.4 1.0 03	178.5	48 29.4 1.0 03	178.5	47 59.4 1.0 03	178.5	47 29.4 1.0 03	178.5	46 59.4 1.0 03	178.5	46 29.4 1.0 03	178.5	45 59.4 1.0 03	178.6	45 29.4 1.0 03	178.6	1
2	48 57.6 1.0 05	177.0	48 27.6 1.0 05	177.0	47 57.6 1.0 05	177.0	47 27.7 1.0 05	177.0	46 57.7 1.0 05	177.1	46 27.7 1.0 05	177.1	45 57.7 1.0 05	177.1	45 27.8 1.0 05	177.2	2
3	48 54.6 1.0 07	175.4	48 24.6 1.0 07	175.5	47 54.7 1.0 07	175.5	47 24.7 1.0 07	175.6	46 54.8 1.0 07	175.6	46 24.8 1.0 07	175.7	45 54.9 1.0 07	175.7	45 24.9 1.0 07	175.7	3
4	48 50.4 1.0 09	173.9	48 20.5 1.0 09	174.0	47 50.6 1.0 09	174.0	47 20.7 1.0 09	174.1	46 50.8 1.0 09	174.2	46 20.8 1.0 09	174.3	45 50.9 1.0 08	174.3	45 21.0 1.0 08	174.3	4
05	48 45.0 1.0 11	172.4	48 15.1 1.0 11	172.5	47 45.3 1.0 11	172.6	47 15.4 1.0 11	172.6	46 45.6 1.0 11	172.7	46 15.7 1.0 10	172.8	45 45.8 1.0 10	172.8	45 16.0 1.0 10	172.9	05
6	48 38.4 99 13	170.9	48 08.6 99 13	171.0	47 38.8 99 13	171.1	47 09.0 99 13	171.2	46 39.2 99 12	171.2	46 09.4 99 12	171.3	45 39.6 99 12	171.4	45 09.8 99 12	171.5	6
7	48 30.7 99 15	169.4	48 01.0 99 15	169.5	47 31.2 99 15	169.6	47 01.5 99 14	169.7	46 31.8 99 14	169.8	46 02.1 99 14	169.9	45 32.3 99 14	170.0	45 02.6 99 14	170.1	7
8	48 21.8 99 17	167.9	47 52.1 99 17	168.0	47 22.5 99 16	168.1	46 52.9 99 16	168.3	46 23.2 99 16	168.4	45 53.6 99 16	168.5	45 23.9 99 16	168.6	44 54.2 99 16	168.7	8
9	48 11.7 98 19	166.4	47 42.2 98 18	166.6	47 12.6 98 18	166.7	46 43.1 99 18	166.8	46 13.5 99 18	166.9	45 44.0 99 18	167.1	45 14.4 99 18	167.2	44 44.8 99 17	167.3	9
10	48 00.5 98 20	165.0	47 31.1 98 20	165.1	47 01.6 98 20	165.2	46 32.2 98 20	165.4	46 02.7 98 20	165.5	45 33.3 98 20	165.7	45 03.8 98 19	165.8	44 34.3 98 19	165.9	10
1	47 48.2 98 22	163.5	47 18.9 98 22	163.7	46 49.6 98 22	163.8	46 20.2 98 22	164.0	45 50.9 98 22	164.1	45 21.5 98 21	164.3	44 52.2 98 21	164.4	44 22.8 98 21	164.5	1
2	47 34.8 97 24	162.0	47 05.6 97 24	162.2	46 36.4 97 24	162.4	46 07.2 97 24	162.6	45 38.0 97 23	162.7	45 08.7 97 23	162.9	44 39.5 98 23	163.0	44 10.2 98 23	163.2	2
3	47 20.3 97 26	160.6	46 51.2 97 26	160.8	46 22.2 97 26	161.0	45 53.1 97 25	161.2	45 24.0 97 25	161.3	44 54.9 97 25	161.5	44 25.7 97 26	161.7	43 56.6 97 24	161.8	3
4	47 04.7 96 28	159.2	46 35.8 96 27	159.4	46 06.9 96 27	159.6	45 37.9 97 27	159.8	45 09.0 97 27	160.0	44 40.0 97 26	160.1	44 11.0 97 26	160.3	43 42.0 97 26	160.5	4
15	46 48.1 96 29	157.8	46 19.4 96 29	158.0	45 50.6 96 29	158.2	45 21.8 96 29	158.4	44 52.9 96 28	158.6	44 24.1 96 28	158.8	43 55.2 96 28	159.0	43 26.3 96 28	159.2	15
6	46 30.5 95 31	156.4	46 01.9 95 31	156.6	45 33.2 95 31	156.8	45 04.6 96 30	157.0	44 35.9 96 30	157.2	44 07.2 96 30	157.4	43 38.5 96 30	157.6	43 09.7 96 29	157.8	6
7	46 11.9 95 33	155.0	45 43.4 95 32	155.2	45 14.9 95 32	155.5	44 46.4 95 32	155.7	44 17.9 95 32	155.9	43 49.4 95 31	156.1	43 20.8 95 31	156.3	42 52.2 95 31	156.5	7
8	45 52.2 94 34	153.7	45 24.0 94 34	153.9	44 55.7 94 34	154.1	44 27.3 95 33	154.4	43 58.9 95 33	154.6	43 30.6 95 33	154.8	43 02.1 95 33	155.0	42 33.7 95 32	155.2	8
9	45 31.7 94 36	152.3	45 03.6 94 36	152.6	44 35.4 94 35	152.8	44 07.2 94 35	153.0	43 39.0 94 35	153.3	43 10.8 94 34	153.5	42 42.6 94 34	153.7	42 14.3 94 34	154.0	9
20	45 10.2 93 37	151.0	44 42.2 93 37	151.2	44 14.3 93 37	151.5	43 46.3 93 36	151.7	43 18.2 93 36	152.0	42 50.2 94 36	152.2	42 22.1 94 36	152.5	41 53.9 94 35	152.7	20
1	44 47.7 92 39	149.7	44 20.0 93 39	149.9	43 52.2 93 38	150.2	43 24.4 93 38	150.5	42 56.5 93 38	150.7	42 28.6 93 37	151.0	42 00.7 93 37	151.2	41 32.7 93 37	151.4	1
2	44 24.4 92 40	148.4	43 56.9 92 40	148.6	43 29.3 92 40	148.9	43 01.6 92 39	149.2	42 33.9 92 39	149.4	42 06.2 92 39	149.7	41 38.5 93 38	150.0	41 10.7 93 38	150.2	2
3	44 00.3 91 42	147.1	43 32.9 91 41	147.4	43 05.5 91 41	147.7	42 38.0 92 41	147.9	42 10.5 92 40	148.2	41 42.9 92 40	148.5	41 15.4 92 40	148.7	40 47.8 92 40	149.0	3
4	43 35.3 91 43	145.8	43 08.1 91 43	146.1	42 40.8 91 42	146.4	42 13.5 91 42	146.7	41 46.2 91 42	147.0	41 18.9 91 42	147.2	40 51.5 91 41	147.5	40 24.0 92 41	147.8	4
25	43 09.4 90 44	144.6	42 42.4 90 44	144.9	42 15.4 90 44	145.2	41 48.3 90 43	145.5	41 21.1 91 43	145.8	40 54.0 91 43	146.0	40 26.7 91 42	146.3	39 59.5 91 42	146.6	25
6	42 42.8 89 46	143.4	42 16.0 89 45	143.7	41 49.1 90 45	144.0	41 22.2 90 45	144.3	40 55.3 90 44	144.6	40 28.3 90 44	144.9	40 01.2 90 44	145.1	39 34.2 90 43	145.4	6
7	42 15.4 89 47	142.2	41 48.8 89 47	142.5	41 22.1 89 46	142.8	40 55.4 89 46	143.1	40 28.6 89 46	143.4	40 01.8 89 45	143.7	39 35.0 90 45	144.0	39 08.1 90 45	144.3	7
8	41 47.2 88 48	141.0	41 20.8 88 48	141.3	40 54.3 88 47	141.6	40 27.8 88 47	141.9	40 01.3 89 47	142.2	39 34.6 89 47	142.5	39 08.0 89 46	142.8	38 41.3 89 46	143.1	8
9	41 18.4 87 49	139.8	40 52.1 88 49	140.1	40 25.9 88 49	140.4	39 59.5 88 48	140.8	39 33.2 88 48	141.1	39 06.7 88 48	141.4	38 40.2 88 47	141.7	38 13.7 88 47	142.0	9
30	40 48.8 87 50	138.7	40 22.8 87 50	139.0	39 56.7 87 50	139.3	39 30.5 87 49	139.6	39 04.3 87 49	139.9	38 38.1 88 49	140.2	38 11.8 88 48	140.6	37 45.5 88 48	140.9	30
1	40 18.6 86 52	137.5	39 52.7 86 51	137.8	39 26.8 86 51	138.2	39 00.9 87 51	138.5	38 34.9 87 50	138.8	38 08.8 87 50	139.1	37 42.7 87 50	139.4	37 16.6 87 49	139.8	1
2	39 47.6 85 53	136.4	39 22.0 86 52	136.7	38 56.3 86 52	137.1	38 30.5 86 52	137.4	38 04.7 86 51	137.7	37 38.9 86 51	138.0	37 12.9 86 51	138.4	36 47.0 87 50	138.7	2
3	39 16.1 85 54	135.3	38 50.6 85 53	135.6	38 25.1 85 53	136.0	37 59.6 85 53	136.3	37 33.9 86 52	136.6	37 08.3 86 52	137.0	36 42.5 86 52	137.3	36 16.8 86 51	137.6	3
4	38 43.9 84 55	134.2	38 18.7 84 54	134.6	37 53.4 84 54	134.9	37 28.0 85 54	135.2	37 02.5 85 53	135.6	36 37.1 85 53	135.9	36 11.5 85 53	136.2	35 45.9 85 52	136.5	4
35	38 11.2 83 56	133.1	37 46.1 84 55	133.5	37 21.0 84 55	133.8	36 55.8 84 55	134.2	36 30.5 84 54	134.5	36 05.2 84 54	134.8	35 39.9 85 54	135.2	35 14.5 85 53	135.5	35
6	37 37.9 83 56	132.1	37 13.8 83 56	132.4	36 48.0 83 56	132.8	36 23.0 83 56	133.1	35 58.0 84 55	133.5	35 32.8 84 55	133.8	35 07.7 84 55	134.1	34 42.4 84 54	134.5	6
7	37 04.9 82 57	131.0	36 39.3 82 57	131.4	36 14.5 83 57	131.7	35 49.7 83 56	132.1	35 24.8 83 56	132.4	34 59.9 83 56	132.8	34 34.9 83 56	133.1	34 09.8 84 55	133.5	7
8	36 29.6 82 58	130.0	36 05.0 82 58	130.4	35 40.5 82 58	130.7	35 15.8 82 57	131.1	34 51.1 82 57	131.4	34 26.4 83 57	131.8	34 01.6 83 56	132.1	33 36.7 83 56	132.4	8
9	35 54.6 81 59	129.0	35 30.3 81 59	129.4	35 05.9 81 58	129.7	34 41.4 82 58	130.1	34 16.9 82 58	130.4	33 52.3 82 58	130.8	33 27.7 82 57	131.1	33 03.0 82 57	131.5	9
40	35 19.2 80 60	128.0	34 55.0 81 60	128.4	34 30.8 81 59	128.7	34 06.5 81 59	129.1	33 42.2 81 59	129.4	33 17.8 81 58	129.8	32 53.3 82 58	130.1	32 28.8 82 58	130.5	40
1	34 43.3 80 61	127.0	34 19.3 80 60	127.4	33 55.3 80 60	127.8	33 31.2 80 60	128.1	33 07.0 81 59	128.5	32 42.8 81 59	128.8	32 18.5 81 59	129.2	31 54.1 81 59	129.5	1
2	34 06.9 79 61	126.1	33 43.1 79 61	126.4	33 19.2 80 61	126.8	32 55.3 80 60	127.2	32 31.3 80 60	127.5	32 07.3 80 60	127.9	31 43.1 80 60	128.2	31 19.0 81 59	128.6	2
3	33 30.1 79 62	125.1	33 06.5 79 62	125.5	32 42.8 79 62	125.9	32 19.0 79 61	126.2	31 55.2 80 61	126.6	31 31.3 80 61	126.9	31 07.3 80 60	127.3	30 43.3 80 60	127.6	3
4	32 52.8 78 63	124.2	32 29.4 78 62	124.6	32 05.8 79 62	124.9	31 42.2 79 62	125.3	31 18.6 79 62	125.7	30 54.9 79 61	126.0	30 31.1 79 61	126.4	30 07.3 80 61	126.7	4
45	32 15.2 78 63	123.3	31 51.9 78 63	123.6	31 28.5 78 63	124.0	31 05.1 78 63	124.4	30 41.6 78 62	124.7	30 18.0 79 62	125.1	29 54.4 79 62	125.5	29 30.8 79 62	125.8	45
6	31 37.1 77 64	122.4	31 14.0 77 64	122.7	30 50.8 77 64	123.1	30 27.5 78 63	123.5	30 04.2 78 63	123.8	29 40.8 78 63	124.2	29 17.3 78 62	124.5	28 53.8 78 62	124.9	6
7	30 58.7 77 65	121.5	30 35.7 77 64	121.8	30 12.6 77 64	122.2	29 49.5 77 64	122.6	29 26.4 77 64	122.9	29 03.1 78 63	123.3	28 39.8 78 63	123.7	28 16.5 78 63	124.0	7
8	30 19.9 76 65	120.6	29 57.0 76 65	120.9	29 34.1 76 65	121.3	29 11.2 77 65	121.7	28 48.2 77 64	122.1	28 25.1 77 64	122.4	28 01.9 77 64	122.8	27 38.8 77 64	123.1	8
9	29 40.7 76 66	119.7	29 18.0 76 66	120.1	28 55.3 76 65	120.4	28 32.5 76 65	120.8	28 09.6 76 65	121.2	27 46.7 77 65	121.5	27 23.7 77 64	121.9	27 00.6 77 64	122.3	9
50	29 01.2 75 66	118.8	28 38.7 75 66	119.2	28 16.1 75 66	119.6	27 53.4 76 66	120.0	27 30.7 76 65	120.3	27 07.9 76 65	120.7	26 45.1 76 65	121.1	26 22.2 76 65	121.4	50
1	28 21.4 75 67	118.0	27 59.0 75 67	118.4	27 36.5 75 66	118.7	27 14.0 75 66	119.1	26 51.4 75 66	119.5	26 28.8 76 66	119.8	26 06.1 76 66	120.2	25 43.4 76 65	120.6	1
2	27 41.2 74 67	117.1	27 19.0 74 67	117.5	26 56.7 74 67	117.9	26 34.3 75 67	118.3	26 11.8 75 66	118.6	25 49.4 75 66	119.0	25 26.8 75 66	119.4	25 04.2 75 66	119.7	2
3	27 00.8 74 68	116.3	26 38.7 74 68	116.7	26 16.5 74 67	117.1	25 54.2 74 67	117.4	25 31.9 74 67	117.8	25 09.6 75 67	118.2	24 47.2 75 67	118.5	24 24.7 75 66	118.9	3
4	26 20.1 73 68	115.5	25 58.1 73 68	115.9	25 36.0 74 68	116.2	25 13.9 74 68	116.6	24 51.7 74 67	117.0	24 29.5 74 67	117.4	24 07.3 74 67	117.7	23 44.9 75 67	118.1	4
55	25 39.0 73 69	114.7	25 17.2 73 69	115.1	24 55.3 73 68	115.4	24 33.3 73 68	115.8	24 11.2 74 68	116.2	23 49.2 74 68	116.5	23 27.0 74 68	116.9	23 04.8 74 67	117.3	55
6	24 57.8 72 69	113.9	24 36.0 73 69	114.3	24 14.2 73 69	114.6	23 52.4 73 69	115.0	23 30.5 73 68	115.4	23 08.5 73 68	115.7	22 46.5 73 68	116.1	22 24.4 74 68	116.5	6
7	24 16.2 72 70	113.1	23 54.6 72 69	113.5	23 32.9 72 69	113.8	23 11.2 73 69	114.2	22 49.4 73 69	114.6	22 27.6 73 69	115.0	22 05.7 73 68	115.3	21 43.8 73 68	115.7	7
8	23 34.4 72 70	112.3	23 12.9 72 70	112.7	22 51.4 72 70	113.0	22 29.8 72 69	113.4	22 08.1 72 69	113.8	21 46.4 72 69	114.2	21 24.6 73 69	114.5	21 02.8 73 69	114.9	8
9	22 52.4 71 70	111.5	22 31.0 71 70	111.9	22 09.6 72 70	112.3	21 48.1 72 70	112.6	21 26.6 72 70	113.0	21 05.0 72 69	113.4	20 43.3 72 69	113.8	20 21.6 72 69	114.1	9
60	22 10.2 71 71	110.7	21 48.9 71 71	111.1	21 27.6 71 70	111.5	21 06.2 71 70	111.9	20 44.8 72 70	112.3	20 23.3 72 70	112.6	20 01.8 72 70	113.0	19 40.2 72 69	113.4	60
1	21 27.7 71 71	110.0	21 06.6 71 71	110.4	20 45.3 71 71	110.7	20 24.1 71 71	111.1	20 02.7 71 70	111.5	19 41.4 71 70	111.9	19 20.0 71 70	112.2	18 58.5 72 70	112.6	1
2	20 45.1 70 71	109.2	20 24.0 70 71	109.6	20 02.9 70 71	110.0	19 41.7 71 71	110.4	19 20.5 71 71	110.7	18 59.2 71 71	111.1	18 37.9 71 70	111.5	18 16.6 71 70	111.9	2
3	20 02.2 70 72	108.5	19 41.3 70 72	108.9	19 20.2 70 71	109.2	18 59.2 70 71	109.6	18 38.1 70 71	110.0	18 16.9 71 71	110.4	17 55.7 71 71	110.7	17 34.5 71 71	111.1	3
4	19 19.2 70 72	107.7	18 58.3 70 72	108.1	18 37.4 70 72	108.5	18 16.4 70 72	108.9	17 55.4 70 71	109.3	17 34.3 70 71	109.6	17 13.2 70 71	110.0	16 52.1 71 71	110.4	4
65	18 36.0 69 72	107.0	18 15.2 69 72	107.4	17 54.4 70 72	107.8	17 33.5 70 72	108.1	17 12.6 70 72	108.5	16 51.6 70 72	108.9	16 30.6 70 71	109.3	16 09.6 70 71	109.6	65
6	17 52.6 69 73	106.3	17 31.9 69 72	106.7	17 11.1 69 72	107.0	16 50.4 69 72	107.4	16 29.5 69 72	107.8	16 08.7 70 72	108.2	15 47.8 70 72	108.5	15 26.8 70 72	108.9	6
7	17 09.1 69 73	105.6	16 48.4 69 73	105.9	16 27.8 69 73	106.3	16 07.1 69 72	106.7	15 46.3 69 72	107.1	15 25.6 69 72	107.4	15 04.7 69 72	107.8	14 43.9 70 72	108.2	7
8	16 25.4 68 73	104.8	16 04.8 69 73	105.2	15 44.2 69 73	105.6	15 23.6 69 73	106.0	15 03.0 69 73	106.4	14 42.3 69 72	106.7	14 21.5 69 72	107.1	14 00.8 69 72	107.5	8
9	15 41.5 68 73	104.1	15 21.0 68 73	104.5	15 00.5 68 73	104.9	14 40.0 69 73	105.3	14 19.4 69 73	105.6	13 58.8 69 73	106.0	13 38.2 69 73	106.4	13 17.5 69 72	106.8	9
70	14 57.5 68 74	103.4	14 37.1 68 73	103.8	14 16.7 68 73	104.2	13 56.3 68 73	104.6	13 35.8 68 73	104.9	13 15.2 68 73	105.3	12 54.7 69 73	105.7	12 34.1 69 73	106.1	70
1	14 13.4 68 74	102.7	13 53.1 68 74	103.1	13 32.7 68 74	103.5	13 12.4 68 73	103.9	12 51.9 68 73	104.2	12 31.5 68 73	104.6	12 11.0 68 73	105.0	11 50.5 68 73	105.4	1
2	13 29.2 67 74	102.0	13 08.9 68 74	102.4	12 48.6 68 74	102.8	12 28.3 68 74	103.2	12 08.0 68 73	103.5	11 47.6 68 73	103.9	11 27.2 68 73	104.3	11 06.7 68 73	104.7	2
3	12 44.9 67 74	101.3	12 24.7 67 74	101.7	12 04.4 67 74	102.1	11 44.2 68 74	102.5	11 23.9 68 74	102.9	11 03.6 68 74	103.2	10 43.2 68 73	103.6	10 22.9 68 73	104.0	3
4	12 00.4 67 74	100.7	11 40.3 67 74	101.0	11 20.1 67 74	101.4	10 59.9 67 74	101.8	10 39.7 67 74	102.2	10 19.4 68 74	102.5	9 59.2 68 74	102.9	9 38.9 68 74	103.3	4
75	11 15.9 67 74	100.0	10 55.8 67 74	100.3	10 35.7 67 74	100.7	10 15.5 67 74	101.1	9 55.4 67 74	101.5	9 35.2 67 74	101.9	9 15.0 67 74	102.2	8 54.7 67 74	102.6	75
6	10 31.2 67 75	99.3	10 11.2 67 74	99.7	9 51.1 67 74	100.0	9 31.0 67 74	100.4	9 10.9 67 74	100.8	8 50.8 67 74	101.2	8 30.6 67 74	101.5	8 10.5 67 74	101.9	6
7	9 46.5 67 75	98.6	9 26.5 67 75	99.0	9 06.5 67 75	99.4	8 46.5 67 74	99.7	8 26.4 67 74	100.1	8 06.3 67 74	100.5	7 46.2 67 74	100.9	7 26.1 67 74	101.2	7
8	9 01.7 66 75	97.9	8 41.7 67 75	98.3	8 21.8 67 75	98.7	8 01.8 67 75	99.1	7 41.8 67 74	99.4	7 21.8 67 74	99.8	7 01.7 67 74	100.2	6 41.6 67 74	100.6	8
9	8 16.8 66 75	97.3	7 56.9 66 75	97.6	7 37.0 66 75	98.0	7 17.0 67 75	98.4	6 57.1 67 75	98.8	6 37.1 67 75	99.2	6 17.1 67 74	99.5	5 57.1 67 74	99.9	9
80	7 31.8 66 75	96.6	7 12.0 66 75	97.0	6 52.1 66 75	97.4	6 32.2 66 75	97.7	6 12.3 66 75	98.1	5 52.3 66 75	98.5	5 32.4 67 74	98.9	5 12.4 67 74	99.2	80
1	6 46.8 66 75	95.9	6 27.0 66 75	96.3	6 07.1 66 75	96.7	5 47.3 66 75	97.1	5 27.4 66 75	97.4	5 07.5 66 75	97.8					1
2	6 01.8 66 75	95.3	5 42.0 66 75	95.6	5 22.1 66 75	96.0	5 02.3 66 75	96.4									2
3	5 16.6 66 75	94.6															3

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Lat. 41°

H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	°
00	53 00.0	1.0 01	180.0	53 30.0	1.0 01	180.0	54 00.0	1.0 01	180.0	54 30.0	1.0 01	180.0	55 00.0	1.0 01	180.0	55 30.0	1.0 01	180.0	56 00.0	1.0 01	180.0	56 30.0	1.0 01	180.0	00
1	52 59.3	1.0 03	178.3	53 29.3	1.0 03	178.3	53 59.3	1.0 03	178.3	54 29.3	1.0 03	178.3	54 59.3	1.0 03	178.3	55 29.3	1.0 03	178.2	55 59.3	1.0 04	178.2	56 29.3	1.0 04	178.2	1
2	52 57.4	1.0 05	176.7	53 27.4	1.0 06	176.7	53 57.3	1.0 06	176.6	54 27.3	1.0 06	176.6	54 57.3	1.0 06	176.5	55 27.2	1.0 06	176.5	55 57.2	1.0 06	176.5	56 27.2	1.0 06	176.4	2
3	52 54.1	1.0 08	175.0	53 24.0	1.0 08	175.0	53 54.0	1.0 08	174.9	54 23.9	1.0 08	174.9	54 53.8	1.0 08	174.8	55 23.8	1.0 08	174.7	55 53.7	1.0 08	174.7	56 23.6	1.0 08	174.6	3
4	52 49.5	1.0 10	173.4	53 19.4	1.0 10	173.3	53 49.3	1.0 10	173.2	54 19.2	1.0 10	173.2	54 49.1	1.0 10	173.1	55 18.9	1.0 10	173.0	55 48.8	1.0 10	172.9	56 18.7	1.0 11	172.8	4
05	52 43.7	99 12	171.7	53 13.5	99 12	171.7	53 43.3	99 12	171.6	54 13.1	99 12	171.5	54 42.9	99 12	171.4	55 12.7	99 13	171.3	55 42.5	99 13	171.2	56 12.3	99 13	171.1	05
6	52 36.5	99 14	170.1	53 06.3	99 14	170.0	53 36.0	99 14	169.9	54 05.8	99 14	169.8	54 35.5	99 15	169.7	55 05.2	99 15	169.5	55 34.9	99 15	169.4	56 04.6	99 15	169.3	6
7	52 28.1	99 16	168.5	52 57.8	99 16	168.4	53 27.4	99 16	168.2	53 57.1	99 17	168.1	54 26.7	99 17	168.0	54 56.3	99 17	167.8	55 25.9	99 17	167.7	55 55.5	99 17	167.5	7
8	52 18.5	99 18	166.9	52 48.0	98 18	166.7	53 17.6	98 19	166.6	53 47.1	98 19	166.4	54 16.6	98 19	166.3	54 46.1	98 19	166.1	55 15.6	98 19	166.0	55 45.1	98 20	165.8	8
9	52 07.6	98 20	165.3	52 37.0	98 20	165.1	53 06.4	98 21	165.0	53 35.8	98 21	164.8	54 05.2	98 21	164.6	54 34.6	98 21	164.4	55 04.0	98 22	164.3	55 33.3	98 22	164.1	9
10	51 55.5	98 22	163.7	52 24.8	98 22	163.5	52 54.1	98 23	163.3	53 23.3	98 23	163.2	53 52.6	97 23	163.0	54 21.8	97 23	162.8	54 51.1	97 24	162.6	55 20.3	97 24	162.4	10
1	51 42.1	97 24	162.1	52 11.3	97 24	161.9	52 40.5	97 25	161.7	53 09.6	97 25	161.5	53 38.7	97 25	161.3	54 07.8	97 25	161.1	54 36.9	97 26	160.9	55 05.9	97 26	160.7	1
2	51 27.7	97 26	160.6	51 56.7	97 26	160.4	52 25.7	97 27	160.1	52 54.7	97 27	159.9	53 23.6	96 27	159.7	53 52.5	96 27	159.5	54 21.4	96 28	159.3	54 50.3	96 28	159.0	2
3	51 12.0	96 28	159.0	51 40.9	96 28	158.8	52 09.7	96 29	158.6	52 38.5	96 29	158.3	53 07.3	96 29	158.1	53 36.1	96 29	157.9	54 04.8	96 30	157.6	54 33.5	96 30	157.4	3
4	50 55.2	96 30	157.5	51 23.9	96 30	157.3	51 52.6	96 30	157.0	52 21.2	96 31	156.8	52 49.9	96 31	156.5	53 18.4	95 31	156.3	53 47.0	95 32	156.0	54 15.5	95 32	155.8	4
15	50 37.3	95 32	156.0	51 05.9	95 32	155.7	51 34.4	95 32	155.5	52 02.8	95 33	155.2	52 31.3	95 33	155.0	52 59.7	95 33	154.7	53 28.0	94 34	154.4	53 56.3	94 34	154.2	15
6	50 18.4	95 33	154.5	50 46.7	94 34	154.2	51 15.0	94 34	154.0	51 43.3	94 34	153.7	52 11.6	94 35	153.4	52 39.8	94 35	153.2	53 07.9	94 35	152.9	53 36.0	94 36	152.6	6
7	49 58.4	94 35	153.0	50 26.5	94 35	152.8	50 54.6	94 36	152.5	51 22.7	94 36	152.2	51 50.8	93 36	151.9	52 18.8	93 37	151.6	52 46.7	93 37	151.3	53 14.6	93 37	151.0	7
8	49 37.3	93 37	151.6	50 05.3	93 37	151.3	50 33.2	93 37	151.0	51 01.1	93 38	150.7	51 28.9	93 38	150.4	51 56.7	93 38	150.1	52 24.5	92 39	149.8	52 52.2	92 39	149.5	8
9	49 15.3	93 38	150.2	49 43.0	92 39	149.9	50 10.8	92 39	149.6	50 38.5	92 39	149.3	51 06.1	92 40	149.0	51 33.7	92 40	148.6	52 01.2	92 40	148.3	52 28.7	91 41	148.0	9
20	48 52.3	92 40	148.8	49 19.8	92 40	148.5	49 47.4	92 41	148.1	50 14.8	91 41	147.8	50 42.3	91 41	147.5	51 09.6	91 42	147.2	51 36.9	91 42	146.9	52 04.2	91 42	146.5	20
1	48 28.3	91 41	147.4	48 55.7	91 42	147.1	49 23.0	91 42	146.7	49 50.3	91 42	146.4	50 17.5	91 43	146.1	50 44.6	90 43	145.8	51 11.7	90 44	145.4	51 38.7	90 44	145.1	1
2	48 03.4	91 43	146.0	48 30.6	90 43	145.7	48 57.7	90 44	145.4	49 24.8	90 44	145.0	49 51.7	90 44	144.7	50 18.7	90 45	144.4	50 45.5	89 45	144.0	51 12.3	89 46	143.6	2
3	47 37.7	90 44	144.7	48 04.6	90 45	144.3	48 31.5	90 45	144.0	48 58.4	89 45	143.7	49 25.1	89 46	143.3	49 51.8	89 46	143.0	50 18.5	89 47	142.6	50 45.1	88 47	142.2	3
4	47 11.1	89 46	143.3	47 37.8	89 46	143.0	48 04.5	89 46	142.7	48 31.1	89 47	142.3	48 57.7	88 47	142.0	49 24.1	88 48	141.6	49 50.6	88 48	141.2	50 16.9	88 48	140.9	4
25	46 43.6	89 47	142.0	47 10.2	88 47	141.7	47 36.6	88 48	141.4	48 03.0	88 48	141.0	48 29.3	88 49	140.6	48 55.6	87 49	140.3	49 21.8	87 49	139.9	49 47.9	87 50	139.5	25
6	46 15.4	88 48	140.8	46 41.7	88 49	140.4	47 07.9	87 49	140.1	47 34.1	87 49	139.7	48 00.2	87 50	139.3	48 26.3	87 50	139.0	48 52.2	86 51	138.6	49 18.1	86 51	138.2	6
7	45 46.4	87 50	139.5	46 12.5	87 50	139.2	46 38.5	87 50	138.8	47 04.4	86 51	138.4	47 30.3	86 51	138.1	47 56.2	86 51	137.7	48 21.9	86 52	137.3	48 47.6	85 52	136.9	7
8	45 16.6	86 51	138.3	45 42.5	86 51	137.9	46 08.3	86 52	137.5	46 34.0	86 52	137.2	46 59.7	85 52	136.8	47 25.3	85 53	136.4	47 50.8	85 53	136.0	48 16.3	85 53	135.6	8
9	44 46.1	86 52	137.1	45 11.8	85 52	136.7	45 37.4	85 53	136.3	46 02.9	85 53	135.9	46 28.4	85 53	135.6	46 53.7	84 54	135.2	47 19.0	84 54	134.8	47 44.2	84 55	134.4	9
30	44 14.9	85 53	135.9	44 40.4	85 53	135.5	45 05.8	85 54	135.1	45 31.1	84 54	134.7	45 56.3	84 55	134.4	46 21.5	84 55	134.0	46 46.5	83 55	133.6	47 11.5	83 56	133.2	30
1	43 43.0	84 54	134.7	44 08.3	84 55	134.3	44 33.5	84 55	133.9	44 58.6	84 55	133.6	45 23.6	83 56	133.2	45 48.5	83 56	132.8	46 13.4	83 56	132.4	46 38.2	82 57	132.0	1
2	43 10.5	84 55	133.5	43 35.6	83 56	133.2	44 00.6	83 56	132.8	44 25.4	83 56	132.4	44 50.3	83 57	132.0	45 15.0	82 57	131.6	45 39.6	82 57	131.2	46 04.2	82 58	130.8	2
3	42 37.4	83 56	132.4	43 02.2	83 57	132.0	43 27.0	82 57	131.6	43 51.7	82 57	131.2	44 16.3	82 58	130.8	44 40.8	82 58	130.4	45 05.3	81 58	130.0	45 29.6	81 59	129.6	3
4	42 03.7	82 57	131.3	42 28.3	82 58	130.9	42 52.9	82 58	130.5	43 17.4	81 58	130.1	43 41.8	81 59	129.7	44 06.1	81 59	129.3	44 30.3	81 59	128.9	44 54.4	80 60	128.5	4
35	41 29.4	82 58	130.2	41 53.8	81 58	129.8	42 18.2	81 59	129.4	42 42.5	81 59	129.0	43 06.7	81 59	128.6	43 30.8	80 60	128.2	43 54.8	80 60	127.8	44 18.7	80 60	127.4	35
6	40 54.5	81 59	129.1	41 18.7	81 59	128.7	41 42.9	80 60	128.3	42 07.0	80 60	127.9	42 31.0	80 60	127.5	42 54.9	80 61	127.1	43 18.7	79 61	126.7	43 42.5	79 61	126.3	6
7	40 19.1	80 60	128.1	40 43.2	80 60	127.7	41 07.1	80 60	127.3	41 31.0	79 61	126.9	41 54.8	79 61	126.5	42 18.6	79 61	126.0	42 42.2	79 62	125.6	43 05.7	78 62	125.2	7
8	39 43.2	80 61	127.0	40 07.1	79 61	126.6	40 30.8	79 61	126.2	40 54.6	79 62	125.8	41 18.2	79 62	125.4	41 41.7	78 62	125.0	42 05.1	78 63	124.6	42 28.5	78 63	124.2	8
9	39 06.8	79 61	126.0	39 30.5	79 62	125.6	39 54.1	79 62	125.2	40 17.6	78 62	124.8	40 41.0	78 63	124.4	41 04.4	78 63	124.0	41 27.6	77 63	123.5	41 50.8	77 64	123.1	9
40	38 29.9	78 62	125.0	38 53.4	78 62	124.6	39 16.8	78 63	124.2	39 40.2	78 63	123.8	40 03.4	77 63	123.4	40 26.6	77 64	122.9	40 49.7	77 64	122.5	41 12.6	76 64	122.1	40
1	37 52.6	78 63	124.0	38 15.9	78 63	123.6	38 39.2	77 64	123.2	39 02.3	77 64	122.8	39 25.4	77 64	122.4	39 48.4	76 64	121.9	40 11.3	76 65	121.5	40 34.1	76 65	121.1	1
2	37 14.8	77 64	123.0	37 38.0	77 64	122.6	38 01.1	77 64	122.2	38 24.0	76 64	121.8	38 46.9	76 65	121.4	39 09.7	76 65	121.0	39 32.5	76 65	120.5	39 55.1	75 66	120.1	2
3	36 36.7	77 64	122.1	36 59.6	76 65	121.7	37 22.5	76 65	121.2	37 45.4	76 65	120.8	38 08.1	76 65	120.4	38 30.7	75 66	120.0	38 53.3	75 66	119.6	39 15.7	75 66	119.2	3
4	35 58.1	76 65	121.1	36 20.9	76 65	120.7	36 43.6	76 65	120.3	37 06.3	75 66	119.9	37 28.8	75 66	119.5	37 51.3	75 66	119.1	38 13.7	74 67	118.6	38 36.0	74 67	118.2	4
45	35 19.1	76 66	120.2	35 41.8	75 66	119.8	36 04.4	75 66	119.4	36 26.8	75 66	119.0	36 49.2	75 67	118.5	37 11.6	74 67	118.1	37 33.8	74 67	117.7	37 55.9	74 67	117.3	45
6	34 39.8	75 66	119.3	35 02.3	75 66	118.9	35 24.7	75 67	118.4	35 47.0	74 67	118.0	36 09.3	74 67	117.6	36 31.5	74 67	117.2	36 53.5	73 68	116.8	37 15.5	73 68	116.4	6
7	34 00.1	75 67	118.4	34 22.5	74 67	117.9	34 44.7	74 67	117.5	35 06.9	74 67	117.1	35 29.0	74 68	116.7	35 51.0	73 68	116.3	36 12.9	73 68	115.9	36 34.8	73 68	115.5	7
8	33 20.1	74 67	117.5	33 42.3	74 67	117.1	34 04.4	74 68	116.7	34 26.4	73 68	116.2	34 48.4	73 68	115.8	35 10.3	73 68	115.4	35 32.1	72 69	115.0	35 53.7	72 69	114.6	8
9	32 39.8	74 68	116.6	33 01.8	73 68	116.2	33 23.8	73 68	115.8	33 45.7	73 68	115.4	34 07.5	73 69	114.9	34 29.2	72 69	114.5	34 50.9	72 69	114.1	35 12.4	72 69	113.7	9
50	31 59.1	73 68	115.7	32 21.0	73 68	115.3	32 42.9	73 69	114.9	33 04.6	72 69	114.5	33 26.3	72 69	114.1	33 47.9	72 69	113.7	34 09.4	72 70	113.2	34 30.8	71 70	112.8	50
1	31 18.2	73 69	114.9	31 39.9	72 69	114.5	32 01.6	72 69	114.1	32 23.3	72 69	113.6	32 44.8	72 70	113.2	33 06.3	71 70	112.8	33 27.7	71 70	112.4	33 48.9	71 70	112.0	1
2	30 36.9	72 69	114.0	30 58.6	72 69	113.6	31 20.2	72 70	113.2	31 41.7	72 70	112.8	32 03.1	71 70	112.4	32 24.4	71 70	112.0	32 45.7	71 70	111.6	33 06.8	70 71	111.1	2
3	29 55.4	72 70	113.2	30 17.0	72 70	112.8	30 38.4	71 70	112.4	30 59.8	71 70	112.0	31 21.1	71 70	111.6	31 42.3	71 71	111.1	32 03.4	70 71	110.7	32 24.5	70 71	110.3	3
4	29 13.7	71 70	112.4	29 35.1	71 70	112.0	29 56.4	71 70	111.6	30 17.7	71 71	111.1	30 38.8	70 71	110.7	30 59.9	70 71	110.3	31 21.0	70 71	109.9	31 41.9	70 71	109.5	4
55	28 31.7	71 70	111.6	28 53.0	71 71	111.1	29 14.2	71 71	110.7	29 35.3	70 71	110.3	29 56.4	70 71	109.9	30 17.4	70 71	109.5	30 38.3	70 71	109.1	30 59.1	69 72	108.7	55
6	27 49.5	71 71	110.8	28 10.6	70 71	110.3	28 31.7	70 71	109.9	28 52.8	70 71	109.5	29 13.7	70 71	109.1	29 34.6	69 72	108.7	29 55.4	69 72	108.3	30 16.1	69 72	107.9	6
7	27 07.0	70 71	110.0	27 28.1	70 71	109.6	27 49.1	70 71	109.2	28 10.0	70 72	108.7	28 30.8	69 72	108.3	28 51.6	69 72	107.9	29 12.3	69 72	107.5	29 32.9	69 72	107.1	7
8	26 24.3	70 71	109.2	26 45.3	70 72	108.8	27 06.2	70 72	108.4	27 27.0	69 72	108.0	27 47.7	69 72	107.6	28 08.4	69 72	107.1	28 29.0	69 72	106.7	28 49.5	68 73	106.3	8
9	25 41.5	70 72	108.4	26 02.3	69 72	108.0	26 23.1	69 72	107.6	26 43.8	69 72	107.2	27 04.5	69 72	106.8	27 25.1	68 73	106.4	27 45.6	68 73	106.0	28 06.0	68 73	105.6	9
60	24 58.4	69 72	107.6	25 19.2	69 72	107.2	25 39.9	69 72	106.8	26 00.5	69 73	106.4	26 21.0	68 73	106.0	26 41.5	68 73	105.6	27 01.9	68 73	105.2	27 22.3	68 73	104.8	60
1	24 15.2	69 72	106.9	24 35.8	69 72	106.5	24 56.4	69 73	106.1	25 17.0	68 73	105.7	25 37.4	68 73	105.3	25 57.8	68 73	104.9	26 18.2	68 73	104.5	26 38.4	67 73	104.0	1
2	23 31.8	69 73	106.1	23 52.3	68 73	105.7	24 12.8	68 73	105.3	24 33.3	68 73	104.9	24 53.7	68 73	104.5	25 14.0	68 73	104.1	25 34.3	67 73	103.7	25 54.4	67 74	103.3	2
3	22 48.2	68 73	105.4	23 08.7	68 73	105.0	23 29.1	68 73	104.6	23 49.5	68 73	104.2	24 09.8	68 73	103.8	24 30.0	67 74	103.4	24 50.2	67 74	103.0	25 10.3	67 74	102.6	3
4	22 04.4	68 73	104.6	22 24.8	68 73	104.2	22 45.2	68 73	103.8	23 05.5	68 74	103.4	23 25.7	67 74	103.0	23 45.9	67 74	102.6	24 06.0	67 74	102.2	24 26.0	67 74	101.8	4
65	21 20.5	68 73	103.9	21 40.9	68 73	103.5	22 01.2	67 74	103.1	22 21.4	67 74	102.7	22 41.5	67 74	102.3	23 01.6	67 74	101.9	23 21.7	67 74	101.5	23 41.7	66 74	101.1	65
6	20 36.5	68 74	103.2	20 56.8	67 74	102.8	21 17.0	67 74	102.4	21 37.1	67 74	102.0	21 57.2	67 74	101.6	22 17.3	67 74	101.2	22 37.3	67 74	100.8	22 57.2	66 74	100.4	6
7	19 52.4	67 74	102.5	20 12.6	67 74	102.1	20 32.7	67 74	101.7	20 52.8	67 74	101.3	21 12.8	67 74	100.9	21 32.8	67 74	100.5	21 52.7	66 74	100.1	22 12.6	66 74	99.7	7
8	19 08.1	67 74	101.8	19 28.2	67 74	101.4	19 48.3	67 74	101.0	20 08.3	67 74	100.6	20 28.3	66 74	100.2	20 48.2	66 74	99.8	21 08.1	66 75	99.4	21 27.9	66 75	99.0	8
9	18 23.7	67 74	101.1	18 43.8	67 74	100.7	19 03.8	67 74	100.3	19 23.8	66 74	99.9	19 43.7	66 75	99.5	20 03.6	66 75	99.1	20 23.4	66 75	98.7	20 43.1	66 75	98.3	9
70	17 39.2	67 74	100.3	17 59.2	67 74	100.0	18 19.2	66 74	99.6	18 39.1	66 75	99.2	18 59.0	66 75	98.8	19 18.8	66 75	98.4	19 38.6	66 75	98.0	19 58.3	66 75	97.6	70
1	16 54.6	67 74	99.7	17 14.6	66 75	99.3	17 34.5	66 75	98.9	17 54.4	66 75	98.5	18 14.2	66 75	98.1	18 34.0	66 75	97.7	18 53.7	66 75	97.3	19 13.4	65 75	96.9	1
2	16 09.9	66 75	99.0	16 29.8	66 75	98.6	16 49.7	66 75	98.2	17 09.5	66 75	97.8	17 29.3	66 75	97.4	17 49.1	66 75	97.0	18 08.7	66 75	96.6	18 28.4	65 75	96.2	2
3	15 25.2	66 75	98.3	15 45.0	66 75	97.9	16 04.9	66 75	97.5	16 24.6	66 75	97.1	16 44.4	66 75	96.7	17 04.1	66 75	96.3	17 23.7	65 75	95.9	17 43.3	65 75	95.5	3
4	14 40.3	66 75	97.6	15 00.1	66 75	97.2	15 19.9	66 75	96.8	15 39.7	66 75	96.4	15 59.4	66 75	96.0	16 19.0	65 75	95.6	16 38.7	65 75	95.2	16 58.2	65 75	94.8	4
75	13 55.4	66 75	96.9	14 15.2	66 75	96.5	14 34.9	66 75	96.1	14 54.6	66 75	95.7	15 14.3	66 75	95.4	15 34.0	65 75	95.0	15 53.5	65 75	94.6	16 13.1	65 75	94.2	75
6	13 10.4	66 75	96.2	13 30.2	66 75	95.8	13 49.9	66 75	95.5	14 09.6	66 75	95.1	14 29.2	65 75	94.7	14 48.8	65 75	94.3	15 08.4	65 75	93.9	15 27.9	65 75	93.5	6
7	12 25.4	66 75	95.6	12 45.1	66 75	95.2	13 04.8	66 75	94.8	13 24.4	65 75	94.4	13 44.1	65 75	94.0	14 03.6	65 75	93.6	14 23.2	65 75	93.2	14 42.7	65 75	92.8	7
8	11 40.3	66 75	94.9	12 00.0	66 75	94.5	12 19.6	65 75	94.1	12 39.3	65 75	93.7	12 58.9	65 75	93.3	13 18.4	65 75	93.0	13 38.0	65 75	92.6	13 57.5	65 75	92.2	8
9	10 55.1	66 75	94.2	11 14.8	66 75	93.8	11 34.5	65 75	93.4	11 54.1	65 75	93.1	12 13.6	65 75	92.7	12 33.2	65 75	92.3	12 52.7	65 75	91.9	13 12.2	65 75	91.5	9
80	10 10.0	66 75	93.6	10 29.6	65 75	93.2	10 49.2	65 75	92.8	11 08.8	65 75	92.4	11 28.4	65 75	92.0	11 47.9	65 75	91.6	12 07.4	65 75	91.2	12 26.9	65 75	90.8	80
1	9 24.7	65 75	92.9	9 44.4	65 75	92.5	10 04.0	65 75	92.1	10 23.6	65 75	91.7	10 43.1	65 75	91.4	11 02.7	65 75	91.0	11 22.2	65 75	90.6	11 41.6	65 75	90.2	1
2	8 39.5	65 75	92.2	8 59.1	65 75	91.8	9 18.7	65 75	91.5	9 38.3	65 75	91.1	9 57.9	65 75	90.7	10 17.4	65 75	90.3	10 36.9	65 75	89.9	10 56.4	65 75	89.5	2
3	7 54.2	65 75	91.6	8 13.9	65 75	91.2	8 33.5	65 75	90.8	8 53.0	65 75	90.4	9 12.6	65 75	90.0	9 32.1	65 75	89.7	9 51.6	65 75	89.3	10 11.1	65 75	88.9	3
4	7 09.0	65 75	90.9	7 28.6	65 75	90.5	7 48.2	65 75	90.1	8 07.8	65 75	89.8	8 27.3	65 75	89.4	8 46.8	65 75	89.0	9 06.3	65 75	88.6	9 25.8	65 75	88.2	4
85	6 23.7	65 75	90.3	6 43.3	65 75	89.9	7 02.9	65 75	89.5	7 22.5	65 75	89.1	7 42.0	65 75	88.7	8 01.6	65 75	88.3	8 21.1	65 75	88.0	8 40.6	65 75	87.6	85
6	5 38.4	65 75	89.6	5 58.0	65 75	89.2	6 17.6	65 75	88.8	6 37.2	65 75	88.5	6 56.8	65 75	88.1	7 16.3	65 75	87.7	7 35.8	65 75	87.3	7 55.3	65 75	86.9	6
7				5 12.8	65 75	88.6	5 32.4	65 75	88.2	5 51.9	65 75	87.8	6 11.5	65 75	87.4	6 31.1	65 75	87.0	6 50.6	65 75	86.7	7 10.1	65 75	86.3	7
8										5 06.7	65 75	87.1	5 26.3	65 75	86.8	5 45.9	65 75	86.4	6 05.4	65 75	86.0	6 25.0	65 75	85.6	8
9																5 00.7	65 75	85.7	5 20.3	65 75	85.4	5 39.8	65 75	85.0	9

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Lat. 41°

H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
00	45 00.0	1.0 01	180.0	44 30.0	1.0 01	180.0	44 00.0	1.0 01	180.0	43 30.0	1.0 01	180 0	43 00.0	1.0 01	180.0	42 30.0	1.0 01	180.0	42 00.0	1.0 01	180.0	41 30.0	1.0 01	180.0	00
1	44 59.4	1.0 03	178.6	44 29.4	1.0 03	178.6	43 59.5	1.0 03	178.6	43 29.5	1.0 03	178.6	42 59.5	1.0 03	178.6	42 29.5	1.0 03	178.7	41 59.5	1.0 03	178.7	41 29.5	1.0 03	178.7	1
2	44 57.8	1.0 05	177.2	44 27.8	1.0 05	177.2	43 57.8	1.0 05	177.2	43 27.8	1.0 05	177.3	42 57.9	1.0 04	177.3	42 27.9	1.0 04	177.3	41 57.9	1.0 04	177.3	41 27.9	1.0 04	177.4	2
3	44 55.0	1.0 06	175.8	44 25.0	1.0 06	175.8	43 55.1	1.0 06	175.8	43 25.1	1.0 06	175.9	42 55.2	1.0 06	175.9	42 25.2	1.0 06	176.0	41 55.3	1.0 06	176.0	41 25.3	1.0 06	176.0	3
4	44 51.1	1.0 08	174.4	44 21.2	1.0 08	174.4	43 51.3	1.0 08	174.5	43 21.3	1.0 08	174.5	42 51.4	1.0 08	174.6	42 21.5	1.0 08	174.6	41 51.6	1.0 08	174.7	41 21.6	1.0 08	174.7	4
05	44 46.1	1.0 10	173.0	44 16.2	1.0 10	173.0	43 46.4	1.0 10	173.1	43 16.5	1.0 10	173.2	42 46.6	1.0 10	173.2	42 16.7	1.0 10	173.3	41 46.8	1.0 10	173.3	41 17.0	1.0 10	173.4	05
6	44 40.0	99 12	171.6	44 10.2	99 12	171.6	43 40.4	99 12	171.7	43 10.5	99 12	171.8	42 40.7	99 12	171.9	42 10.9	99 11	171.9	41 41.1	99 11	172.0	41 11.2	99 11	172.1	6
7	44 32.8	99 14	170.2	44 03.1	99 14	170.3	43 33.3	99 14	170.4	43 03.6	99 13	170.4	42 33.8	99 13	170.5	42 04.0	99 13	170.6	41 34.3	99 13	170.7	41 04.5	99 13	170.8	7
8	44 24.6	99 16	168.8	43 54.9	99 15	168.9	43 25.2	99 15	169.0	42 55.5	99 15	169.1	42 25.8	99 15	169.2	41 56.1	99 15	169.3	41 26.4	99 15	169.4	40 56.7	99 15	169.5	8
9	44 15.2	99 17	167.4	43 45.6	99 17	167.5	43 16.0	99 17	167.6	42 46.4	99 17	167.8	42 16.8	99 17	167.9	41 47.2	99 17	168.0	41 17.6	99 16	168.1	40 47.9	99 16	168.2	9
10	44 04.8	98 19	166.0	43 35.3	98 19	166.2	43 05.8	98 19	166.3	42 36.3	98 19	166.4	42 06.8	98 18	166.5	41 37.3	98 18	166.7	41 07.7	98 18	166.8	40 38.2	98 18	166.9	10
1	43 53.4	98 21	164.7	43 24.0	98 21	164.8	42 54.6	98 20	165.0	42 25.2	98 20	165.1	41 55.7	98 20	165.2	41 26.3	98 20	165.4	40 56.9	98 20	165.5	40 27.4	98 20	165.6	1
2	43 40.9	98 22	163.3	43 11.6	98 22	163.5	42 42.3	98 22	163.6	42 13.0	98 22	163.8	41 43.7	98 22	163.9	41 14.4	98 22	164.1	40 45.0	98 21	164.2	40 15.7	98 21	164.3	2
3	43 27.4	97 24	162.0	42 58.2	97 24	162.2	42 29.1	97 24	162.3	41 59.9	97 24	162.5	41 30.6	97 23	162.6	41 01.4	97 23	162.8	40 32.2	97 23	162.9	40 02.9	98 23	163.1	3
4	43 12.9	97 26	160.7	42 43.9	97 26	160.8	42 14.8	97 25	161.0	41 45.7	97 25	161.2	41 16.6	97 25	161.3	40 47.5	97 25	161.5	40 18.4	97 25	161.6	39 49.3	97 24	161.8	4
15	42 57.4	96 27	159.3	42 28.5	96 27	159.5	41 59.6	96 27	159.7	41 30.6	97 27	159.9	41 01.7	97 27	160.0	40 32.7	97 26	160.2	40 03.7	97 26	160.4	39 34.7	97 26	160.6	15
6	42 41.0	96 29	158.0	42 12.2	96 29	158.2	41 43.4	96 29	158.4	41 14.6	96 28	158.6	40 45.7	96 28	158.8	40 16.9	96 28	159.0	39 48.0	96 28	159.1	39 19.1	96 27	159.3	6
7	42 23.6	96 31	156.7	41 54.9	96 30	156.9	41 26.3	96 30	157.1	40 57.6	96 30	157.3	40 28.9	96 30	157.5	40 00.2	96 29	157.7	39 31.4	96 29	157.9	39 02.7	96 29	158.1	7
8	42 05.2	96 32	155.5	41 36.7	96 32	155.7	41 08.2	95 32	155.9	40 39.7	96 31	156.1	40 11.1	96 31	156.3	39 42.5	95 31	156.5	39 13.9	95 31	156.7	38 45.3	96 30	156.9	8
9	41 46.0	94 34	154.2	41 17.6	95 33	154.4	40 49.3	95 33	154.6	40 20.9	95 33	154.8	39 52.5	95 33	155.0	39 24.0	95 32	155.3	38 55.6	95 32	155.5	38 27.1	95 32	155.7	9
20	41 25.8	94 35	152.9	40 57.6	94 35	153.2	40 29.4	94 35	153.4	40 01.2	94 34	153.6	39 32.9	94 34	153.8	39 04.6	94 34	154.0	38 36.3	94 34	154.3	38 08.0	94 33	154.5	20
1	41 04.8	93 36	151.7	40 36.7	93 36	151.9	40 08.7	94 36	152.2	39 40.6	94 36	152.4	39 12.5	94 35	152.6	38 44.4	94 35	152.8	38 16.2	94 35	153.1	37 48.1	94 35	153.3	1
2	40 42.8	93 38	150.5	40 15.0	93 38	150.7	39 47.1	93 37	150.9	39 19.2	93 37	151.2	38 51.3	93 37	151.4	38 23.3	93 37	151.7	37 55.3	93 36	151.9	37 27.3	93 36	152.1	2
3	40 20.1	92 39	149.2	39 52.4	92 39	149.5	39 24.7	92 39	149.7	38 57.0	93 38	150.0	38 29.2	93 38	150.2	38 01.4	93 38	150.5	37 33.6	93 38	150.7	37 05.7	93 37	150.9	3
4	39 56.5	92 41	148.0	39 29.0	92 40	148.3	39 01.5	92 40	148.6	38 33.9	92 40	148.8	38 06.3	92 39	149.1	37 38.7	92 39	149.3	37 11.0	92 39	149.6	36 43.3	92 39	149.8	4
25	39 32.2	91 42	146.9	39 04.9	91 42	147.1	38 37.5	91 41	147.4	38 10.1	91 41	147.7	37 42.6	92 41	147.9	37 15.2	92 40	148.2	36 47.7	92 40	148.4	36 20.1	92 40	148.7	25
6	39 07.0	90 43	145.7	38 39.9	91 43	146.0	38 12.7	91 43	146.2	37 45.5	91 42	146.5	37 18.2	91 42	146.8	36 50.9	91 42	147.0	36 23.6	91 41	147.3	35 56.2	91 41	147.5	6
7	38 41.1	90 44	144.5	38 14.2	90 44	144.8	37 47.2	90 44	145.1	37 20.1	90 44	145.4	36 53.0	90 43	145.6	36 25.9	90 43	145.9	35 58.7	91 43	146.2	35 31.5	91 42	146.4	7
8	38 14.5	89 46	143.4	37 47.7	89 45	143.7	37 20.9	90 45	144.0	36 54.0	90 45	144.2	36 27.1	90 44	144.5	36 00.1	90 44	144.8	35 33.1	90 44	145.1	35 06.1	90 44	145.3	8
9	37 47.2	89 47	142.3	37 20.5	89 46	142.6	36 53.9	89 46	142.8	36 27.2	89 46	143.1	36 00.4	89 46	143.4	35 33.7	89 45	143.7	35 06.9	89 45	144.0	34 40.0	90 45	144.2	9
30	37 19.1	88 48	141.2	36 52.7	88 48	141.5	36 26.2	88 47	141.7	35 59.7	88 47	142.0	35 33.1	89 47	142.3	35 06.5	89 46	142.6	34 39.9	89 46	142.9	34 13.2	89 46	143.2	30
1	36 50.4	87 49	140.1	36 24.1	88 49	140.4	35 57.8	88 48	140.7	35 31.5	88 48	141.0	35 05.1	88 48	141.2	34 38.7	88 48	141.5	34 12.2	88 47	141.8	33 45.7	88 47	142.1	1
2	36 21.0	87 50	139.0	35 54.9	87 50	139.3	35 28.8	87 49	139.6	35 02.6	87 49	139.9	34 36.4	87 49	140.2	34 10.2	88 49	140.5	33 43.9	88 48	140.8	33 17.6	88 48	141.1	2
3	35 50.9	86 51	137.9	35 25.0	86 51	138.2	34 59.1	87 50	138.5	34 33.1	87 50	138.8	34 07.1	87 50	139.1	33 41.1	87 50	139.4	33 15.0	87 49	139.7	32 48.8	87 49	140.0	3
4	35 20.3	86 52	136.9	34 54.6	86 52	137.2	34 28.8	86 51	137.5	34 03.0	86 51	137.8	33 37.2	86 51	138.1	33 11.3	86 51	138.4	32 45.4	87 50	138.7	32 19.4	87 50	139.0	4
35	34 49.0	85 53	135.8	34 23.5	85 53	136.1	33 57.9	85 52	136.5	33 32.3	85 52	136.8	33 06.6	86 52	137.1	32 40.9	86 52	137.4	32 15.2	86 51	137.7	31 49.4	86 51	138.0	35
6	34 17.1	84 54	134.8	33 51.8	85 54	135.1	33 26.4	85 53	135.4	33 01.0	85 53	135.8	32 35.5	85 53	136.1	32 10.0	85 53	136.4	31 44.4	85 52	136.7	31 18.8	85 52	137.0	6
7	33 44.7	84 55	133.8	33 19.6	84 55	134.1	32 54.4	84 54	134.4	32 29.1	84 54	134.8	32 03.8	84 54	135.1	31 38.5	85 53	135.4	31 13.1	85 53	135.7	30 47.6	85 53	136.0	7
8	33 11.8	83 56	132.8	32 46.8	83 56	133.1	32 21.8	84 55	133.4	31 56.7	84 55	133.8	31 31.6	84 55	134.1	31 06.4	84 54	134.4	30 41.2	84 54	134.7	30 15.9	84 54	135.0	8
9	32 38.3	83 57	131.8	32 13.5	83 56	132.1	31 48.6	83 56	132.5	31 23.7	83 56	132.8	30 58.8	83 56	133.1	30 33.8	83 55	133.4	30 08.7	84 55	133.8	29 43.6	84 55	134.1	9
40	32 04.3	82 58	130.8	31 39.6	82 57	131.2	31 15.0	82 57	131.5	30 50.2	83 57	131.8	30 25.4	83 56	132.2	30 00.6	83 56	132.5	29 35.7	83 56	132.8	29 10.8	83 56	133.1	40
1	31 29.7	81 58	129.9	31 05.3	82 58	130.2	30 40.8	82 58	130.5	30 16.2	82 57	130.9	29 51.6	82 57	131.2	29 27.0	82 57	131.5	29 02.3	82 57	131.9	28 37.5	83 56	132.2	1
2	30 54.7	81 59	128.9	30 30.5	81 59	129.3	30 06.1	81 59	129.6	29 41.8	81 58	129.9	29 17.3	82 58	130.3	28 52.8	82 58	130.6	28 28.3	82 57	130.9	28 03.7	82 57	131.3	2
3	30 19.3	80 60	128.0	29 55.2	80 60	128.3	29 31.0	81 59	128.7	29 06.8	81 59	129.0	28 42.5	81 59	129.3	28 18.2	81 58	129.7	27 53.9	81 58	130.0	27 29.4	81 58	130.3	3
4	29 43.4	80 61	127.1	29 19.4	80 60	127.4	28 55.4	80 60	127.8	28 31.4	80 60	128.1	28 07.3	80 59	128.4	27 43.1	81 59	128.8	27 18.9	81 59	129.1	26 54.7	81 59	129.4	4
45	29 07.0	79 61	126.2	28 43.2	79 61	126.5	28 19.4	80 61	126.8	27 55.5	80 60	127.2	27 31.6	80 60	127.5	27 07.6	80 60	127.9	26 43.6	80 60	128.2	26 19.5	80 59	128.5	45
6	28 30.3	79 62	125.3	28 06.6	79 62	125.6	27 43.0	79 61	126.0	27 19.2	79 61	126.3	26 55.5	79 61	126.6	26 31.6	79 61	127.0	26 07.8	80 60	127.3	25 43.9	80 60	127.7	6
7	27 53.1	78 63	124.4	27 29.6	78 62	124.7	27 06.1	78 62	125.1	26 42.5	79 62	125.4	26 18.9	79 62	125.8	25 55.3	79 61	126.1	25 31.6	79 61	126.4	25 07.8	79 61	126.8	7
8	27 15.5	78 63	123.5	26 52.2	78 63	123.8	26 28.8	78 63	124.2	26 05.4	78 62	124.5	25 42.0	78 62	124.9	25 18.5	78 62	125.2	24 54.9	79 62	125.6	24 31.3	79 61	125.9	8
9	26 37.6	77 64	122.6	26 14.4	77 64	123.0	25 51.2	77 63	123.3	25 28.0	78 63	123.7	25 04.7	78 63	124.0	24 41.3	78 63	124.4	24 17.9	78 62	124.7	23 54.5	78 62	125.1	9
50	25 59.2	77 64	121.8	25 36.2	77 64	122.1	25 13.2	77 64	122.5	24 50.1	77 64	122.8	24 26.9	77 63	123.2	24 03.7	77 63	123.5	23 40.5	78 63	123.9	23 17.2	78 63	124.2	50
1	25 20.6	76 65	120.9	24 57.7	76 65	121.3	24 34.8	76 65	121.6	24 11.9	77 64	122.0	23 48.9	77 64	122.3	23 25.8	77 64	122.7	23 02.7	77 64	123.0	22 39.6	77 63	123.4	1
2	24 41.6	76 66	120.1	24 18.8	76 65	120.5	23 56.1	76 65	120.8	23 33.3	76 65	121.2	23 10.4	76 65	121.5	22 47.5	76 64	121.9	22 24.6	77 64	122.2	22 01.6	77 64	122.6	2
3	24 02.2	75 66	119.3	23 39.6	75 66	119.6	23 17.0	75 66	120.0	22 54.4	76 65	120.3	22 31.7	76 65	120.7	22 08.9	76 65	121.0	21 46.1	76 65	121.4	21 23.3	76 64	121.7	3
4	23 22.6	75 67	118.5	23 00.1	75 66	118.8	22 37.7	75 66	119.2	22 15.1	75 66	119.5	21 52.6	75 66	119.9	21 29.9	75 65	120.2	21 07.3	76 65	120.6	20 44.6	76 65	120.9	4
55	22 42.6	74 67	117.6	22 20.3	74 67	118.0	21 58.0	75 67	118.4	21 35.6	75 66	118.7	21 13.1	75 66	119.1	20 50.7	75 66	119.4	20 28.1	75 66	119.8	20 05.6	75 66	120.1	55
6	22 02.3	74 68	116.8	21 40.2	74 67	117.2	21 18.0	74 67	117.6	20 55.7	74 67	117.9	20 33.4	74 67	118.3	20 11.1	75 66	118.6	19 48.7	75 66	119.0	19 26.3	75 66	119.4	6
7	21 21.8	73 68	116.1	20 59.8	74 68	116.4	20 37.7	74 68	116.8	20 15.6	74 67	117.1	19 53.4	74 67	117.5	19 31.2	74 67	117.9	19 08.9	74 67	118.2	18 46.7	74 67	118.6	7
8	20 41.0	73 68	115.3	20 19.1	73 68	115.6	19 57.1	73 68	116.0	19 35.1	73 68	116.4	19 13.1	74 68	116.7	18 51.0	74 67	117.1	18 28.9	74 67	117.4	18 06.7	74 67	117.8	8
9	19 59.9	73 69	114.5	19 38.1	73 69	114.9	19 16.3	73 68	115.2	18 54.4	73 68	115.6	18 32.5	73 68	116.0	18 10.6	73 68	116.3	17 48.6	73 68	116.7	17 26.5	73 67	117.0	9
60	19 18.6	72 69	113.7	18 56.9	72 69	114.1	18 35.2	72 69	114.5	18 13.5	73 69	114.8	17 51.7	73 68	115.2	17 29.8	73 68	115.6	17 08.0	73 68	115.9	16 46.1	73 68	116.3	60
1	18 37.0	72 70	113.0	18 15.5	72 69	113.3	17 53.9	72 69	113.7	17 32.2	72 69	114.1	17 10.6	72 69	114.4	16 48.9	72 69	114.8	16 27.1	73 69	115.2	16 05.3	73 68	115.5	1
2	17 55.2	71 70	112.2	17 33.8	72 70	112.6	17 12.3	72 70	113.0	16 50.8	72 70	113.3	16 29.2	72 69	113.7	16 07.6	72 69	114.0	15 46.0	72 69	114.4	15 24.3	72 69	114.8	2
3	17 13.2	71 70	111.5	16 51.8	71 70	111.8	16 30.5	71 70	112.2	16 09.1	71 70	112.6	15 47.6	72 70	112.9	15 26.2	72 70	113.3	15 04.6	72 69	113.7	14 43.1	72 69	114.0	3
4	16 30.9	71 71	110.7	16 09.7	71 71	111.1	15 48.4	71 70	111.5	15 27.1	71 70	111.8	15 05.8	71 70	112.2	14 44.5	71 70	112.6	14 23.1	71 70	112.9	14 01.6	71 70	113.3	4
65	15 48.5	70 71	110.0	15 27.4	70 71	110.4	15 06.2	71 71	110.7	14 45.0	71 71	111.1	14 23.8	71 70	111.5	14 02.5	71 70	111.8	13 41.2	71 70	112.2	13 19.9	71 70	112.6	65
6	15 05.8	70 71	109.3	14 44.8	70 71	109.7	14 23.8	70 71	110.0	14 02.7	70 71	110.4	13 41.5	70 71	110.8	13 20.4	71 71	111.1	12 59.2	71 70	111.5	12 38.0	71 70	111.8	6
7	14 23.0	70 72	108.6	14 02.1	70 72	108.9	13 41.1	70 71	109.3	13 20.1	70 71	109.7	12 59.1	70 71	110.0	12 38.0	70 71	110.4	12 17.0	70 71	110.8	11 55.9	70 71	111.1	7
8	13 40.0	69 72	107.8	13 19.1	69 72	108.2	12 58.3	70 72	108.6	12 37.4	70 72	109.0	12 16.5	70 71	109.3	11 55.5	70 71	109.7	11 34.5	70 71	110.1	11 13.5	70 71	110.4	8
9	12 56.8	69 72	107.1	12 36.0	69 72	107.5	12 15.3	69 72	107.9	11 54.5	69 72	108.2	11 33.6	69 72	108.6	11 12.8	70 72	109.0	10 51.9	70 71	109.3	10 31.0	70 71	109.7	9
70	12 13.4	69 73	106.4	11 52.8	69 72	106.8	11 32.1	69 72	107.2	11 11.4	69 72	107.5	10 50.6	69 72	107.9	10 29.9	69 72	108.3	10 09.1	69 72	108.6	9 48.3	69 72	109.0	70
1	11 29.9	69 73	105.7	11 09.3	69 73	106.1	10 48.7	69 72	106.5	10 28.1	69 72	106.8	10 07.5	69 72	107.2	9 46.8	69 72	107.6	9 26.1	69 72	107.9	9 05.4	69 72	108.3	1
2	10 46.3	68 73	105.0	10 25.8	68 73	105.4	10 05.2	68 73	105.8	9 44.7	69 73	106.1	9 24.1	69 72	106.5	9 03.5	69 72	106.9	8 42.9	69 72	107.3	8 22.3	69 72	107.6	2
3	10 02.5	68 73	104.3	9 42.0	68 73	104.7	9 21.6	68 73	105.1	9 01.1	68 73	105.5	8 40.6	68 73	105.8	8 20.1	68 73	106.2	7 59.6	68 72	106.6	7 39.0	69 72	106.9	3
4	9 18.5	68 73	103.7	8 58.2	68 73	104.0	8 37.8	68 73	104.4	8 17.4	68 73	104.8	7 57.0	68 73	105.1	7 36.6	68 73	105.5	7 16.1	68 73	105.9	6 55.7	68 73	106.3	4
75	8 34.5	68 74	103.0	8 14.2	68 74	103.3	7 53.9	68 73	103.7	7 33.6	68 73	104.1	7 13.2	68 73	104.5	6 52.9	68 73	104.8	6 32.5	68 73	105.2	6 12.1	68 73	105.6	75
6	7 50.3	67 74	102.3	7 30.1	67 74	102.7	7 09.8	67 74	103.0	6 49.6	68 74	103.4	6 29.3	68 73	103.8	6 09.0	68 73	104.2	5 48.7	68 73	104.5	5 28.4	68 73	104.9	6
7	7 06.0	67 74	101.6	6 45.8	67 74	102.0	6 25.7	67 74	102.4	6 05.5	67 74	102.7	5 45.3	67 74	103.1	5 25.1	67 73	103.5	5 04.8	67 73	103.9				7
8	6 21.6	67 74	100.9	6 01.5	67 74	101.3	5 41.4	67 74	101.7	5 21.2	67 74	102.1	5 01.1	67 74	102.4										8
9	5 37.1	67 74	100.3	5 17.0	67 74	100.6																			9

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H.A.	8° 00′ Alt.	Az.	8° 30′ Alt.	Az.	9° 00′ Alt.	Az.	9° 30′ Alt.	Az.	10° 00′ Alt.	Az.	10° 30′ Alt.	Az.	11° 00′ Alt.	Az.	11° 30′ Alt.	Az.	H.A.
°	° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		°
00	57 00.0 1.0 01	180.0	57 30.0 1.0 01	180.0	58 00.0 1.0 01	180.0	58 30.0 1.0 01	180.0	59 00.0 1.0 01	180.0	59 30.0 1.0 01	180.0	60 00.0 1.0 01	180.0	60 30.0 1.0 01	180.0	00
1	56 59.3 1.0 04	178.2	57 29.3 1.0 04	178.2	57 59.3 1.0 04	178.1	58 29.3 1.0 04	178.1	58 59.2 1.0 04	178.1	59 29.2 1.0 04	178.1	59 59.2 1.0 04	178.0	60 29.2 1.0 04	178.0	1
2	56 57.1 1.0 06	176.4	57 27.1 1.0 06	176.3	57 57.1 1.0 06	176.3	58 27.0 1.0 06	176.2	58 57.0 1.0 06	176.2	59 26.9 1.0 06	176.1	59 56.9 1.0 06	176.1	60 26.9 1.0 07	176.0	2
3	56 53.5 1.0 08	174.6	57 23.5 1.0 08	174.5	57 53.4 1.0 09	174.4	58 23.3 1.0 09	174.3	58 53.2 1.0 09	174.3	59 23.1 1.0 09	174.2	59 53.0 1.0 09	174.1	60 22.9 1.0 09	174.0	3
4	56 48.5 1.0 11	172.8	57 18.4 1.0 11	172.7	57 48.3 1.0 11	172.6	58 18.1 99 11	172.5	58 48.0 99 11	172.4	59 17.8 99 11	172.3	59 47.6 99 12	172.2	60 17.5 99 12	172.1	4
05	56 42.1 99 13	171.0	57 11.9 99 13	170.8	57 41.7 99 13	170.7	58 11.4 99 14	170.6	58 41.2 99 14	170.5	59 11.0 99 14	170.4	59 40.7 99 14	170.2	60 10.4 99 14	170.1	05
6	56 34.3 99 15	169.2	57 04.0 99 16	169.0	57 33.7 99 16	168.9	58 03.3 99 16	168.8	58 33.0 99 16	168.6	59 02.6 99 16	168.5	59 32.3 99 16	168.3	60 01.9 99 17	168.2	6
7	56 25.1 99 18	167.4	56 54.7 99 18	167.2	57 24.3 99 18	167.1	57 53.8 98 18	166.9	58 23.3 98 18	166.8	58 52.9 98 19	166.6	59 22.4 98 19	166.4	59 51.9 98 19	166.2	7
8	56 14.6 98 20	165.6	56 44.0 98 20	165.5	57 13.4 98 20	165.3	57 42.9 98 21	165.1	58 12.3 98 21	164.9	58 41.7 98 21	164.7	59 11.0 98 21	164.5	59 40.4 98 22	164.3	8
9	56 02.7 98 22	163.9	56 32.0 98 22	163.7	57 01.3 98 23	163.5	57 30.5 98 23	163.3	57 59.8 97 23	163.1	58 29.0 97 23	162.9	58 58.2 97 24	162.7	59 27.4 97 24	162.4	9
10	55 49.4 97 24	162.2	56 18.6 97 24	162.0	56 47.7 97 25	161.7	57 16.9 97 25	161.5	57 46.0 97 25	161.3	58 15.0 97 26	161.1	58 44.1 97 26	160.8	59 13.1 97 26	160.6	10
1	55 34.9 97 26	160.5	56 03.9 97 27	160.2	56 32.9 97 27	160.0	57 01.9 96 27	159.8	57 30.8 96 27	159.5	57 59.7 96 28	159.3	58 28.5 96 28	159.0	58 57.3 96 28	158.7	1
2	55 19.2 96 28	158.8	55 48.0 96 29	158.5	56 16.8 96 29	158.3	56 45.6 96 29	158.0	57 14.3 96 30	157.8	57 43.0 96 30	157.5	58 11.6 96 30	157.2	58 40.3 96 31	156.9	2
3	55 02.2 96 30	157.1	55 30.8 96 31	156.9	55 59.4 96 31	156.6	56 28.0 96 31	156.3	56 56.5 96 32	156.0	57 25.0 96 32	155.7	57 53.5 96 32	155.5	58 21.9 96 33	155.1	3
4	54 44.0 95 32	155.5	55 12.4 95 33	155.2	55 40.8 95 33	154.9	56 09.2 94 33	154.6	56 37.5 94 34	154.3	57 05.8 94 34	154.0	57 34.0 94 34	153.7	58 02.2 94 35	153.4	4
15	54 24.6 94 34	153.9	54 52.9 94 35	153.6	55 21.0 94 35	153.3	55 49.2 94 35	153.0	56 17.3 94 36	152.7	56 45.4 93 36	152.3	57 13.4 93 36	152.0	57 41.3 93 37	151.7	15
6	54 04.1 94 36	152.3	54 32.1 93 36	152.0	55 00.1 93 37	151.7	55 28.0 93 37	151.3	55 55.9 93 37	151.0	56 23.8 93 38	150.7	56 51.5 92 38	150.3	57 19.2 92 39	150.0	6
7	53 42.5 93 38	150.7	54 10.3 93 38	150.4	54 38.1 92 39	150.1	55 05.8 92 39	149.7	55 33.4 92 39	149.4	56 01.0 92 40	149.0	56 28.6 92 40	148.7	56 56.0 91 41	148.3	7
8	53 19.8 92 40	149.2	53 47.4 92 40	148.8	54 14.9 92 40	148.5	54 42.4 91 41	148.2	55 09.8 91 41	147.8	55 37.2 91 42	147.4	56 04.5 91 42	147.1	56 31.7 91 42	146.7	8
9	52 56.1 91 41	147.7	53 23.5 91 42	147.3	53 50.8 91 42	147.0	54 18.0 91 42	146.6	54 45.2 90 43	146.2	55 12.3 90 43	145.9	55 39.3 90 44	145.5	56 06.3 90 44	145.1	9
20	52 31.4 91 43	146.2	52 58.5 90 43	145.8	53 25.6 90 44	145.5	53 52.6 90 44	145.1	54 19.5 90 44	144.7	54 46.4 89 45	144.3	55 13.2 89 45	143.9	55 39.9 89 46	143.5	20
1	52 05.7 90 44	144.7	52 32.6 90 45	144.4	52 59.4 89 45	144.0	53 26.2 89 46	143.6	53 52.9 89 46	143.2	54 19.5 89 46	142.8	54 46.1 88 47	142.4	55 12.5 88 47	142.0	1
2	51 39.1 89 46	143.3	52 05.8 89 46	142.9	52 32.4 89 47	142.5	52 58.9 88 47	142.1	53 25.3 88 47	141.8	53 51.7 88 48	141.4	54 18.0 87 48	140.9	54 44.2 87 49	140.5	2
3	51 11.6 88 47	141.9	51 38.0 88 48	141.5	52 04.4 88 48	141.1	52 30.6 87 48	140.7	52 56.8 87 49	140.3	53 23.0 87 49	139.9	53 49.0 87 50	139.5	54 14.9 86 50	139.1	3
4	50 43.2 87 49	140.5	51 09.4 87 49	140.1	51 35.5 87 49	139.7	52 01.5 87 50	139.3	52 27.5 86 50	138.9	52 53.4 86 51	138.5	53 19.2 86 51	138.1	53 44.8 85 52	137.6	4
25	50 14.0 87 50	139.1	50 39.9 86 50	138.7	51 05.8 86 51	138.3	51 31.6 86 51	137.9	51 57.3 86 52	137.5	52 22.9 85 52	137.1	52 48.5 85 52	136.7	53 13.9 85 53	136.2	25
6	49 43.9 86 51	137.8	50 09.7 86 52	137.4	50 35.3 85 52	137.0	51 00.9 85 52	136.6	51 26.3 85 53	136.2	51 51.7 84 53	135.7	52 17.0 84 54	135.3	52 42.2 84 54	134.9	6
7	49 13.1 85 53	136.5	49 38.6 85 53	136.1	50 04.1 85 53	135.7	50 29.4 84 54	135.3	50 54.6 84 54	134.8	51 19.7 84 55	134.4	51 44.8 83 55	134.0	52 09.7 83 55	133.5	7
8	48 41.6 84 54	135.2	49 06.9 84 54	134.8	49 32.1 84 54	134.4	49 57.1 83 55	134.0	50 22.1 83 55	133.5	50 47.0 83 56	133.1	51 11.8 82 56	132.7	51 36.5 82 56	132.2	8
9	48 09.4 84 55	134.0	48 34.4 83 55	133.6	48 59.4 83 56	133.1	49 24.2 83 56	132.7	49 49.0 82 56	132.3	50 13.6 83 57	131.8	50 38.2 82 57	131.4	51 02.6 81 58	130.9	9
30	47 36.4 83 56	132.7	48 01.3 83 56	132.3	48 26.0 82 57	131.9	48 50.6 82 57	131.5	49 15.1 82 57	131.0	49 39.6 81 58	130.6	50 03.9 81 58	130.1	50 28.1 81 59	129.7	30
1	47 02.9 82 57	131.5	47 27.5 82 57	131.1	47 52.0 82 58	130.7	48 16.4 81 58	130.3	48 40.7 81 58	129.8	49 04.9 80 59	129.4	49 29.0 80 59	128.9	49 52.9 80 60	128.4	1
2	46 28.7 81 58	130.4	46 53.0 81 58	129.9	47 17.3 81 59	129.5	47 41.5 80 59	129.1	48 05.6 80 59	128.6	48 29.6 80 60	128.2	48 53.4 79 60	127.7	49 17.2 79 61	127.2	2
3	45 53.9 81 59	129.2	46 18.0 80 59	128.8	46 42.1 80 60	128.3	47 06.1 80 60	127.9	47 29.9 79 60	127.4	47 53.7 79 61	127.0	48 17.3 79 61	126.5	48 40.8 78 61	126.1	3
4	45 18.5 80 60	128.1	45 42.4 80 60	127.6	46 06.3 79 61	127.2	46 30.0 79 61	126.8	46 53.7 79 61	126.3	47 17.2 78 62	125.8	47 40.7 78 62	125.4	48 04.0 78 62	124.9	4
35	44 42.6 79 61	126.9	45 06.3 79 61	126.5	45 30.0 79 61	126.1	45 53.5 78 62	125.6	46 16.9 78 62	125.2	46 40.3 78 62	124.7	47 03.5 77 63	124.3	47 26.6 77 63	123.8	35
6	44 06.1 79 62	125.8	44 29.7 78 62	125.4	44 53.1 78 62	125.0	45 16.4 78 63	124.5	45 39.7 77 63	124.1	46 02.8 77 63	123.6	46 25.8 77 64	123.2	46 48.7 76 64	122.7	6
7	43 29.2 78 62	124.8	43 52.5 78 63	124.3	44 15.8 77 63	123.9	44 38.9 77 63	123.5	45 01.9 77 64	123.0	45 24.9 76 64	122.5	45 47.7 76 64	122.1	46 10.4 75 65	121.6	7
8	42 51.7 77 63	123.7	43 14.9 77 63	123.3	43 37.9 77 64	122.8	44 00.9 76 64	122.4	44 23.7 76 64	121.9	44 46.5 76 65	121.5	45 09.1 75 65	121.0	45 31.6 75 65	120.6	8
9	42 13.8 77 64	122.7	42 36.8 76 64	122.2	42 59.7 76 64	121.8	43 22.4 76 65	121.4	43 45.1 75 65	120.9	44 07.6 75 65	120.5	44 30.1 75 66	120.0	44 52.4 74 66	119.5	9
40	41 35.5 76 65	121.7	41 58.3 76 65	121.2	42 21.0 75 65	120.8	42 43.6 75 65	120.3	43 06.0 75 66	119.9	43 28.4 74 66	119.4	43 50.7 74 66	119.0	44 12.8 74 67	118.5	40
1	40 56.8 76 65	120.7	41 19.4 75 66	120.2	41 41.9 75 66	119.8	42 04.3 75 66	119.3	42 26.6 74 66	118.9	42 48.8 74 67	118.4	43 10.9 73 67	118.0	43 32.8 73 67	117.5	1
2	40 17.6 75 66	119.7	40 40.1 75 66	119.3	41 02.4 74 66	118.8	41 24.6 74 67	118.4	41 46.7 74 67	117.9	42 08.8 73 67	117.5	42 30.7 73 68	117.0	42 52.5 72 68	116.5	2
3	39 38.1 74 66	118.7	40 00.4 74 67	118.3	40 22.5 74 67	117.8	40 44.6 73 67	117.4	41 06.6 73 68	116.9	41 28.4 73 68	116.5	41 50.2 72 68	116.0	42 11.8 72 68	115.6	3
4	38 58.2 74 67	117.8	39 20.3 74 67	117.3	39 42.3 73 68	116.9	40 04.2 73 68	116.5	40 26.0 72 68	116.0	40 47.7 72 68	115.5	41 09.3 72 69	115.1	41 30.8 71 69	114.6	4
45	38 18.9 73 68	116.8	38 39.9 73 68	116.4	39 01.8 73 68	116.0	39 23.5 72 68	115.5	39 45.2 72 69	115.1	40 06.7 72 69	114.6	40 28.1 71 69	114.2	40 49.5 71 69	113.7	45
6	37 37.4 73 68	115.9	37 59.2 72 68	115.5	38 20.9 72 69	115.0	38 42.5 72 69	114.6	39 04.0 71 69	114.2	39 25.4 71 69	113.7	39 46.7 71 70	113.2	40 07.9 70 70	112.8	6
7	36 56.5 72 69	115.0	37 18.2 72 69	114.6	37 39.7 72 69	114.1	38 01.2 71 69	113.7	38 22.5 71 70	113.3	38 43.8 71 70	112.8	39 04.9 70 70	112.4	39 26.0 70 70	111.9	7
8	36 15.3 72 69	114.1	36 36.9 72 69	113.7	36 58.3 71 70	113.3	37 19.6 71 70	112.8	37 40.8 71 70	112.4	38 01.9 70 70	111.9	38 22.9 70 70	111.5	38 43.8 70 71	111.0	8
9	35 33.9 71 70	113.3	35 55.2 71 70	112.8	36 16.5 71 70	112.4	36 37.7 70 70	111.9	36 58.8 70 70	111.5	37 19.8 70 71	111.1	37 40.7 69 71	110.6	38 01.4 69 71	110.1	9
50	34 52.1 71 70	112.4	35 13.4 71 70	112.0	35 34.5 70 70	111.5	35 55.6 70 71	111.1	36 16.5 70 71	110.6	36 37.4 69 71	110.2	36 58.2 69 71	109.7	37 18.8 69 71	109.3	50
1	34 10.1 71 70	111.5	34 31.3 70 71	111.1	34 52.3 70 71	110.7	35 13.2 70 71	110.2	35 34.1 69 71	109.8	35 54.8 69 71	109.4	36 15.4 69 72	108.9	36 36.0 68 72	108.5	1
2	33 27.9 70 71	110.7	33 48.9 70 71	110.3	34 09.8 70 71	109.8	34 30.6 69 71	109.4	34 51.3 69 72	109.0	35 12.0 69 72	108.5	35 32.5 68 72	108.1	35 52.9 68 72	107.6	2
3	32 45.4 70 71	109.9	33 06.3 69 71	109.4	33 27.1 69 72	109.0	33 47.8 69 72	108.6	34 08.4 69 72	108.1	34 28.9 68 72	107.7	34 49.3 68 72	107.3	35 09.7 68 72	106.8	3
4	32 02.7 69 72	109.1	32 23.5 69 72	108.6	32 44.2 69 72	108.2	33 04.8 68 72	107.8	33 25.3 68 72	107.3	33 45.7 68 72	106.9	34 06.0 68 73	106.5	34 26.2 67 73	106.0	4
55	31 19.8 69 72	108.3	31 40.5 69 72	107.8	32 01.1 68 72	107.4	32 21.6 68 72	107.0	32 42.0 68 72	106.5	33 02.3 68 73	106.1	33 22.5 67 73	105.7	33 42.6 67 73	105.2	55
6	30 36.7 69 72	107.5	30 57.3 68 72	107.0	31 17.8 68 72	106.6	31 38.2 68 73	106.2	31 58.5 68 73	105.7	32 18.7 67 73	105.3	32 38.8 67 73	104.9	32 58.8 67 73	104.4	6
7	29 53.5 68 72	106.7	30 13.9 68 73	106.3	30 34.3 68 73	105.8	30 54.6 68 73	105.4	31 14.8 67 73	105.0	31 34.9 67 73	104.5	31 55.0 67 73	104.1	32 14.9 66 73	103.7	7
8	29 10.0 68 73	105.9	29 30.4 68 73	105.5	29 50.6 67 73	105.1	30 10.9 67 73	104.6	30 31.0 67 73	104.2	30 51.0 67 73	103.8	31 11.0 66 74	103.3	31 30.8 66 74	102.9	8
9	28 26.4 68 73	105.1	28 46.6 67 73	104.7	29 06.8 67 73	104.3	29 27.0 67 73	103.9	29 47.0 67 74	103.4	30 07.0 66 74	103.0	30 26.8 66 74	102.6	30 46.6 66 74	102.1	9
60	27 42.6 67 73	104.4	28 02.8 67 73	104.0	28 22.9 67 73	103.5	28 42.9 67 74	103.1	29 02.9 66 74	102.7	29 22.8 66 74	102.3	29 42.6 66 74	101.8	30 02.3 66 74	101.4	60
1	26 58.6 67 73	103.6	27 18.7 67 74	103.2	27 38.8 67 74	102.8	27 58.8 66 74	102.4	28 18.7 66 74	101.9	28 38.5 66 74	101.5	28 58.2 66 74	101.1	29 17.8 65 74	100.7	1
2	26 14.6 67 74	102.9	26 34.6 67 74	102.5	26 54.6 66 74	102.0	27 14.5 66 74	101.6	27 34.3 66 74	101.2	27 54.0 66 74	100.8	28 13.7 65 74	100.4	28 33.3 65 74	99.9	2
3	25 30.3 67 74	102.1	25 50.3 66 74	101.7	26 10.2 66 74	101.3	26 30.1 66 74	100.9	26 49.8 66 74	100.5	27 09.5 65 74	100.1	27 29.1 65 74	99.6	27 48.6 65 75	99.2	3
4	24 46.0 66 74	101.4	25 05.9 66 74	101.0	25 25.8 66 74	100.6	25 45.5 66 74	100.2	26 05.2 66 74	99.8	26 24.9 65 75	99.3	26 44.4 65 75	98.9	27 03.9 65 75	98.5	4
65	24 01.6 66 74	100.7	24 21.4 66 74	100.3	24 41.2 66 74	99.9	25 00.9 66 75	99.5	25 20.6 65 75	99.0	25 40.1 65 75	98.6	25 59.6 65 75	98.2	26 19.1 65 75	97.8	65
6	23 17.0 66 74	100.0	23 36.8 66 74	99.6	23 56.5 66 75	99.2	24 16.2 65 75	98.7	24 35.8 65 75	98.3	24 55.3 65 75	97.9	25 14.8 65 75	97.5	25 34.2 64 75	97.1	6
7	22 32.4 66 75	99.3	22 52.1 66 75	98.9	23 11.8 65 75	98.5	23 31.4 65 75	98.0	23 51.0 65 75	97.6	24 10.4 65 75	97.2	24 29.8 65 75	96.8	24 49.2 64 75	96.4	7
8	21 47.6 66 75	98.6	22 07.3 66 75	98.2	22 27.0 65 75	97.8	22 46.5 65 75	97.3	23 06.0 65 75	96.9	23 25.5 65 75	96.5	23 44.8 64 75	96.1	24 04.2 64 75	95.7	8
9	21 02.8 66 75	97.9	21 22.5 65 75	97.5	21 42.1 65 75	97.1	22 01.6 65 75	96.6	22 21.1 65 75	96.2	22 40.5 65 75	95.8	22 59.8 64 75	95.4	23 19.1 64 75	95.0	9
70	20 17.9 65 75	97.2	20 37.5 65 75	96.8	20 57.1 65 75	96.4	21 16.6 65 75	96.0	21 36.0 65 75	95.6	21 55.4 64 75	95.1	22 14.7 64 75	94.7	22 33.9 64 75	94.3	70
1	19 33.0 65 75	96.5	19 52.5 65 75	96.1	20 12.1 65 75	95.7	20 31.5 65 75	95.3	20 50.9 65 75	94.9	21 10.3 64 75	94.5	21 29.5 64 75	94.0	21 48.8 64 75	93.6	1
2	18 48.0 65 75	95.8	19 07.5 65 75	95.4	19 27.0 65 75	95.0	19 46.4 65 75	94.6	20 05.8 64 75	94.2	20 25.1 64 75	93.8	20 44.4 64 75	93.4	21 03.6 64 75	93.0	2
3	18 02.9 65 75	95.1	18 22.4 65 75	94.7	18 41.8 65 75	94.3	19 01.2 65 75	93.9	19 20.6 64 75	93.5	19 39.9 64 75	93.1	19 59.1 64 75	92.7	20 18.3 64 75	92.3	3
4	17 17.8 65 75	94.4	17 37.2 65 75	94.0	17 56.7 65 75	93.6	18 16.1 65 75	93.2	18 35.4 64 75	92.8	18 54.7 64 75	92.4	19 13.9 64 75	92.0	19 33.1 64 75	91.6	4
75	16 32.6 65 75	93.8	16 52.0 65 75	93.4	17 11.5 65 75	93.0	17 30.8 64 75	92.6	17 50.1 64 75	92.2	18 09.4 64 75	91.8	18 28.6 64 75	91.4	18 47.8 64 75	91.0	75
6	15 47.4 65 75	93.1	16 06.8 65 75	92.7	16 26.2 65 75	92.3	16 45.6 64 75	91.9	17 04.9 64 75	91.5	17 24.1 64 75	91.1	17 43.4 64 75	90.7	18 02.5 64 75	90.3	6
7	15 02.2 65 75	92.4	15 21.6 65 75	92.0	15 41.0 65 75	91.6	16 00.3 64 75	91.3	16 19.6 64 75	90.9	16 38.9 64 75	90.5	16 58.1 64 75	90.1	17 17.2 64 75	89.6	7
8	14 16.9 65 75	91.8	14 36.3 65 75	91.4	14 55.7 65 75	91.0	15 15.0 64 75	90.6	15 34.3 64 75	90.2	15 53.6 64 75	89.8	16 12.8 64 75	89.4	16 32.0 64 75	89.0	8
9	13 31.6 65 75	91.1	13 51.1 65 75	90.7	14 10.4 65 75	90.3	14 29.8 64 75	89.9	14 49.0 64 75	89.5	15 08.3 64 75	89.1	15 27.5 64 75	88.7	15 46.7 64 75	88.3	9
80	12 46.4 65 75	90.5	13 05.8 65 75	90.1	13 25.1 65 75	89.7	13 44.5 64 75	89.3	14 03.8 64 75	88.9	14 23.0 64 75	88.5	14 42.2 64 75	88.1	15 01.4 64 75	87.7	80
1	12 01.1 65 75	89.8	12 20.5 65 75	89.4	12 39.9 65 75	89.0	12 59.2 64 75	88.6	13 18.5 64 75	88.2	13 37.8 64 75	87.8	13 57.0 64 75	87.4	14 16.2 64 75	87.0	1
2	11 15.8 65 75	89.1	11 35.2 65 75	88.8	11 54.6 65 75	88.4	12 13.9 64 75	88.0	12 33.3 64 75	87.6	12 52.5 64 75	87.2	13 11.8 64 75	86.8	13 31.0 64 75	86.4	2
3	10 30.5 65 75	88.5	10 49.9 65 75	88.1	11 09.3 65 75	87.7	11 28.7 64 75	87.3	11 48.0 64 75	86.9	12 07.3 64 75	86.5	12 26.6 64 75	86.2	12 45.8 64 75	85.8	3
4	9 45.3 65 75	87.8	10 04.7 65 75	87.5	10 24.1 65 75	87.1	10 43.5 65 75	86.7	11 02.8 64 75	86.3	11 22.1 64 75	85.9	11 41.4 64 75	85.5	12 00.7 64 75	85.1	4
85	9 00.0 65 75	87.2	9 19.5 65 75	86.8	9 38.9 65 75	86.4	9 58.3 65 75	86.0	10 17.6 65 75	85.6	10 37.0 64 75	85.3	10 56.3 64 75	84.9	11 15.6 64 75	84.5	85
6	8 14.8 65 75	86.5	8 34.3 65 75	86.2	8 53.7 65 75	85.8	9 13.1 65 75	85.4	9 32.5 65 75	85.0	9 51.9 65 75	84.6	10 11.2 64 75	84.2	10 30.5 64 75	83.8	6
7	7 29.6 65 75	85.9	7 49.1 65 75	85.5	8 08.6 65 75	85.1	8 28.0 65 75	84.7	8 47.4 65 75	84.4	9 06.8 65 75	84.0	9 26.2 65 75	83.6	9 45.5 64 75	83.2	7
8	6 44.5 65 75	85.2	7 04.0 65 75	84.9	7 23.5 65 75	84.5	7 42.9 65 75	84.1	8 02.4 65 75	83.7	8 21.8 65 75	83.3	8 41.2 65 75	82.9	9 00.6 65 75	82.6	8
9	5 59.4 65 75	84.6	6 18.9 65 75	84.2	6 38.4 65 75	83.8	6 57.9 65 75	83.4	7 17.4 65 75	83.1	7 36.9 65 75	82.7	7 56.3 65 75	82.3	8 15.7 65 75	81.9	9
90	5 14.3 65 75	83.9	5 33.9 65 75	83.6	5 53.4 65 75	83.2	6 13.0 65 75	82.8	6 32.5 65 75	82.4	6 52.0 65 75	82.0	7 11.5 65 75	81.7	7 30.9 65 75	81.3	90

16—11488

Lat 41°

H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	41 00.0	1.0 01	180.0	40 30.0	1.0 01	180.0	40 00.0	1.0 01	180.0	39 30.0	1.0 01	180.0	39 00.0	1.0 01	180.0	38 30.0	1.0 01	180.0	38 00.0	1.0 01	180.0	37 30.0	1.0 01	180.0	00
1	40 59.5	1.0 03	178.7	40 29.5	1.0 03	178.7	39 59.5	1.0 03	178.7	39 29.5	1.0 03	178.7	38 59.5	1.0 02	178.7	38 29.5	1.0 02	178.7	37 59.5	1.0 02	178.8	37 29.5	1.0 02	178.8	1
2	40 57.9	1.0 04	177.4	40 27.9	1.0 04	177.4	39 58.0	1.0 04	177.4	39 28.0	1.0 04	177.4	38 58.0	1.0 04	177.5	38 28.0	1.0 04	177.5	37 58.0	1.0 04	177.5	37 28.0	1.0 04	177.5	2
3	40 55.3	1.0 06	176.1	40 25.4	1.0 06	176.1	39 55.4	1.0 06	176.1	39 25.5	1.0 06	176.2	38 55.5	1.0 06	176.2	38 25.5	1.0 06	176.2	37 55.6	1.0 06	176.3	37 25.6	1.0 06	176.3	3
4	40 51.7	1.0 08	174.8	40 21.8	1.0 08	174.8	39 51.9	1.0 08	174.9	39 21.9	1.0 08	174.9	38 52.0	1.0 08	174.9	38 22.1	1.0 07	175.0	37 52.1	1.0 07	175.0	37 22.2	1.0 07	175.1	4
05	40 47.1	1.0 09	173.5	40 17.2	1.0 09	173.5	39 47.3	1.0 09	173.6	39 17.4	1.0 09	173.6	38 47.5	1.0 09	173.7	38 17.6	1.0 09	173.7	37 47.7	1.0 09	173.8	37 17.8	1.0 09	173.8	05
6	40 41.4	99 11	172.2	40 11.6	99 11	172.2	39 41.7	99 11	172.3	39 11.9	99 11	172.4	38 42.0	99 11	172.4	38 12.2	99 11	172.5	37 42.3	1.0 11	172.5	37 12.5	1.0 10	172.6	6
7	40 34.7	99 13	170.9	40 04.9	99 13	170.9	39 35.1	99 13	171.0	39 05.4	99 12	171.1	38 35.6	99 12	171.2	38 05.8	99 12	171.2	37 36.0	99 12	171.3	37 06.2	99 12	171.4	7
8	40 27.0	99 14	169.6	39 57.3	99 14	169.7	39 27.6	99 14	169.7	38 57.8	99 14	169.8	38 28.1	99 14	169.9	37 58.4	99 14	170.0	37 28.7	99 14	170.1	36 58.9	99 14	170.2	8
9	40 18.3	99 16	168.3	39 48.7	99 16	168.4	39 19.0	99 16	168.5	38 49.4	99 16	168.6	38 19.7	99 16	168.7	37 50.1	99 16	168.8	37 20.4	99 15	168.9	36 50.7	99 15	169.0	9
10	40 08.6	99 18	167.0	39 39.1	99 18	167.1	39 09.5	99 18	167.2	38 39.9	99 17	167.3	38 10.3	99 17	167.4	37 40.8	99 17	167.5	37 11.2	99 17	167.6	36 41.6	99 17	167.7	10
1	39 57.9	98 19	165.7	39 28.5	98 19	165.8	38 59.0	98 19	166.0	38 29.5	98 19	166.1	38 00.0	98 19	166.2	37 30.5	98 19	166.3	37 01.0	98 18	166.4	36 31.5	98 18	166.5	1
2	39 46.3	98 21	164.5	39 16.9	98 21	164.6	38 47.5	98 21	164.7	38 18.1	98 20	164.9	37 48.7	98 20	165.0	37 19.3	98 20	165.1	36 49.9	98 20	165.2	36 20.5	98 20	165.3	2
3	39 33.7	98 23	163.2	39 04.4	98 22	163.3	38 35.1	98 22	163.5	38 05.8	98 22	163.6	37 36.5	98 22	163.8	37 07.2	98 22	163.9	36 37.9	98 22	164.0	36 08.6	98 21	164.2	3
4	39 20.1	97 24	162.0	38 51.0	97 24	162.1	38 21.8	97 24	162.3	37 52.6	97 24	162.4	37 23.4	97 23	162.6	36 54.2	97 23	162.7	36 25.0	97 23	162.8	35 55.8	97 23	163.0	4
15	39 05.6	97 26	160.7	38 36.6	97 26	160.9	38 07.5	97 25	161.0	37 38.5	97 25	161.2	37 09.4	97 25	161.3	36 40.3	97 25	161.5	36 11.2	97 24	161.7	35 42.1	97 24	161.8	15
6	38 50.2	96 27	159.5	38 21.3	96 27	159.7	37 52.4	96 27	159.8	37 23.4	97 27	160.0	36 54.5	97 26	160.2	36 25.5	97 26	160.3	35 56.5	97 26	160.5	35 27.5	97 26	160.6	6
7	38 33.9	96 29	158.3	38 05.1	96 28	158.4	37 36.3	96 28	158.6	37 07.5	96 28	158.8	36 38.7	96 28	159.0	36 09.8	96 28	159.1	35 40.9	96 27	159.3	35 12.1	96 27	159.5	7
8	38 17.6	95 30	157.1	37 48.0	96 30	157.2	37 19.4	96 30	157.4	36 50.7	96 29	157.6	36 22.0	96 29	157.8	35 53.2	96 29	158.0	35 24.5	96 29	158.2	34 55.8	96 29	158.3	8
9	37 58.6	95 32	155.9	37 30.1	95 31	156.1	37 01.6	95 31	156.2	36 33.0	95 31	156.4	36 04.4	95 31	156.6	35 35.8	95 30	156.8	35 07.2	96 30	157.0	34 38.6	95 30	157.2	9
20	37 39.7	95 33	154.7	37 11.3	95 33	154.9	36 42.9	95 32	155.1	36 14.5	95 32	155.3	35 46.0	95 32	155.5	35 17.6	95 32	155.7	34 49.1	95 32	155.9	34 20.6	95 31	156.1	20
1	37 19.9	94 34	153.5	36 51.6	94 34	153.7	36 23.4	94 34	153.9	35 55.1	94 34	154.1	35 26.8	94 33	154.3	34 58.5	94 33	154.5	34 30.2	94 33	154.7	34 01.9	95 33	154.9	1
2	36 59.2	94 36	152.3	36 31.2	94 35	152.5	36 03.1	94 35	152.8	35 35.0	94 35	153.0	35 06.8	94 35	153.2	34 38.7	94 34	153.4	34 10.5	94 34	153.6	33 42.3	94 34	153.8	2
3	36 37.8	93 37	151.2	36 09.9	93 37	151.4	35 42.0	93 36	151.6	35 14.0	93 36	151.8	34 46.0	93 36	152.1	34 18.0	93 36	152.3	33 50.0	93 35	152.5	33 21.9	94 35	152.7	3
4	36 15.6	92 38	150.0	35 47.8	93 38	150.3	35 20.0	93 38	150.5	34 52.2	93 38	150.7	34 24.4	93 37	151.0	33 56.5	93 37	151.2	33 28.7	93 37	151.4	33 00.8	93 36	151.6	4
25	35 52.6	92 40	148.9	35 25.0	92 39	149.1	34 57.4	92 39	149.4	34 29.7	92 39	149.6	34 02.0	92 39	149.9	33 34.3	92 38	150.1	33 06.6	92 38	150.3	32 38.9	93 38	150.5	25
6	35 28.8	91 41	147.8	35 01.4	91 41	148.0	34 33.9	92 40	148.3	34 06.4	92 40	148.5	33 38.9	92 40	148.8	33 11.4	92 39	149.0	32 43.8	92 39	149.2	32 16.2	92 39	149.5	6
7	35 04.3	91 42	146.7	34 37.0	91 42	146.9	34 09.7	91 42	147.2	33 42.4	91 41	147.4	33 15.1	91 41	147.7	32 47.7	91 41	147.9	32 20.3	91 40	148.2	31 52.8	91 40	148.4	7
8	34 39.1	90 43	145.6	34 12.0	90 43	145.8	33 44.9	90 43	146.1	33 17.7	91 42	146.4	32 50.5	91 42	146.6	32 23.3	91 42	146.9	31 56.0	91 42	147.1	31 28.8	91 41	147.4	8
9	34 13.1	90 44	144.5	33 46.2	90 44	144.8	33 19.3	90 44	145.0	32 52.3	90 44	145.3	32 25.2	90 43	145.6	31 58.2	90 43	145.8	31 31.1	90 43	146.1	31 04.0	90 42	146.3	9
30	33 46.5	89 46	143.4	33 19.7	89 45	143.7	32 53.0	89 45	144.0	32 26.1	89 45	144.2	31 59.3	90 44	144.5	31 32.4	90 44	144.8	31 05.5	90 44	145.0	30 38.5	90 44	145.3	30
1	33 19.2	89 47	142.4	32 52.6	89 46	142.7	32 26.0	89 46	142.9	31 59.4	89 46	143.2	31 32.7	89 45	143.5	31 06.0	89 45	143.7	30 39.2	89 45	144.0	30 12.4	89 45	144.3	1
2	32 51.2	88 48	141.3	32 24.8	88 47	141.6	31 58.4	88 47	141.9	31 31.9	88 47	142.2	31 05.4	88 47	142.5	30 38.9	89 46	142.7	30 12.3	89 46	143.0	29 45.7	89 46	143.3	2
3	32 22.6	87 49	140.3	31 56.4	87 48	140.6	31 30.1	88 48	140.9	31 03.8	88 48	141.2	30 37.5	88 48	141.4	30 11.1	88 47	141.7	29 44.7	88 47	142.0	29 18.3	88 47	142.3	3
4	31 53.4	87 50	139.3	31 27.3	87 49	139.6	31 01.2	87 49	139.9	30 35.1	87 49	140.2	30 09.0	87 49	140.4	29 42.8	87 48	140.7	29 16.5	88 48	141.0	28 50.2	88 48	141.3	4
35	31 23.6	86 51	138.3	30 57.7	86 50	138.6	30 31.8	86 50	138.9	30 05.8	87 50	139.2	29 39.8	87 50	139.5	29 13.8	87 49	139.7	28 47.7	87 49	140.0	28 21.6	87 49	140.3	35
6	30 53.1	86 52	137.3	30 27.4	86 51	137.6	30 01.7	86 51	137.9	29 35.9	86 51	138.2	29 10.1	86 50	138.5	28 44.2	86 50	138.8	28 18.3	86 50	139.1	27 52.4	87 50	139.3	6
7	30 22.1	85 53	136.3	29 56.6	85 52	136.6	29 31.0	85 52	136.9	29 05.4	85 52	137.2	28 39.8	86 51	137.5	28 14.1	86 51	137.8	27 48.4	86 51	138.1	27 22.6	86 51	138.4	7
8	29 50.6	84 54	135.3	29 25.2	85 53	135.6	28 59.8	85 53	136.0	28 34.4	85 53	136.3	28 08.9	85 52	136.6	27 43.4	85 52	136.9	27 17.8	85 52	137.2	26 52.3	85 52	137.4	8
9	29 18.5	84 54	134.4	28 53.3	84 54	134.7	28 28.1	84 54	135.0	28 02.8	84 54	135.3	27 37.5	84 53	135.6	27 12.2	85 53	135.9	26 46.8	85 53	136.2	26 21.4	85 52	136.5	9
40	28 45.9	83 55	133.4	28 20.9	83 55	133.8	27 55.8	84 55	134.1	27 30.7	84 54	134.4	27 05.6	84 54	134.7	26 40.4	84 54	135.0	26 15.2	84 54	135.3	25 49.9	84 53	135.6	40
1	28 12.7	83 56	132.5	27 47.9	83 56	132.8	27 23.0	83 56	133.1	26 58.1	83 55	133.4	26 33.1	83 55	133.8	26 08.1	83 55	134.1	25 43.1	84 54	134.4	25 18.0	84 54	134.7	1
2	27 39.1	82 57	131.6	27 14.4	82 57	131.9	26 49.7	82 56	132.2	26 25.0	83 56	132.5	26 00.2	83 56	132.8	25 35.3	83 55	133.2	25 10.5	83 55	133.5	24 45.5	83 55	133.8	2
3	27 05.0	82 58	130.7	26 40.5	82 57	131.0	26 15.9	82 57	131.3	25 51.4	82 57	131.6	25 26.7	82 57	131.9	25 02.1	82 56	132.3	24 37.3	82 56	132.6	24 12.6	83 56	132.9	3
4	26 30.4	81 58	129.8	26 06.1	81 58	130.1	25 41.7	81 58	130.4	25 17.3	81 58	130.7	24 52.8	82 57	131.1	24 28.3	82 57	131.4	24 03.8	82 57	131.7	23 39.2	82 56	132.0	4
45	25 55.4	80 59	128.9	25 31.2	81 59	129.2	25 07.0	81 59	129.5	24 42.7	81 58	129.9	24 18.4	81 58	130.2	23 54.1	81 58	130.5	23 29.7	81 58	130.8	23 05.3	81 57	131.1	45
6	25 19.9	80 60	128.0	24 55.9	80 60	128.3	24 31.8	80 59	128.7	24 07.7	80 59	129.0	23 43.6	81 59	129.3	23 19.4	81 58	129.6	22 55.2	81 58	129.9	22 31.0	81 58	130.3	6
7	24 44.0	79 61	127.1	24 20.2	80 60	127.5	23 56.3	80 60	127.8	23 32.3	80 60	128.1	23 08.4	80 59	128.4	22 44.3	80 59	128.8	22 20.3	80 59	129.1	21 56.2	80 59	129.4	7
8	24 07.7	79 61	126.3	23 44.0	79 61	126.6	23 20.3	79 61	126.9	22 56.5	79 60	127.3	22 32.7	79 60	127.6	22 08.8	80 60	127.9	21 44.9	80 60	128.2	21 21.0	80 59	128.6	8
9	23 31.0	78 62	125.4	23 07.4	79 62	125.7	22 43.9	79 61	126.1	22 20.3	79 61	126.4	21 56.6	79 61	126.7	21 32.9	79 61	127.1	21 09.2	79 60	127.4	20 45.4	79 60	127.7	9
50	22 53.9	78 62	124.6	22 30.5	78 62	124.9	22 07.1	78 62	125.2	21 43.6	78 62	125.6	21 20.1	78 61	125.9	20 56.6	79 61	126.2	20 33.0	79 61	126.6	20 09.4	79 61	126.9	50
1	22 16.4	77 63	123.7	21 53.2	77 63	124.1	21 29.9	78 63	124.4	21 06.6	78 62	124.8	20 43.2	78 62	125.1	20 19.9	78 62	125.4	19 56.4	78 62	125.8	19 33.0	78 61	126.1	1
2	21 38.6	77 64	122.9	21 15.5	77 63	123.3	20 52.4	77 63	123.6	20 29.2	77 63	123.9	20 06.0	77 63	124.3	19 42.8	78 62	124.6	19 19.5	78 62	124.9	18 56.2	78 62	125.3	2
3	21 00.4	76 64	122.1	20 37.4	77 64	122.4	20 14.5	77 64	122.8	19 51.5	77 64	123.1	19 28.4	77 63	123.5	19 05.3	77 63	123.8	18 42.2	77 63	124.1	18 19.0	77 63	124.5	3
4	20 21.8	76 65	121.3	19 59.1	76 65	121.6	19 36.2	76 64	122.0	19 13.4	76 64	122.3	18 50.5	76 64	122.7	18 27.5	77 64	123.0	18 04.5	77 63	123.3	17 41.5	77 63	123.7	4
55	19 43.0	75 65	120.5	19 20.3	76 65	120.8	18 57.7	76 65	121.2	18 34.9	76 65	121.5	18 12.2	76 64	121.9	17 49.4	76 64	122.2	17 26.5	76 64	122.6	17 03.7	76 64	122.9	55
6	19 03.8	75 66	119.7	18 41.3	75 66	120.1	18 18.8	75 65	120.4	17 56.2	75 65	120.7	17 33.6	75 65	121.1	17 10.9	76 65	121.4	16 48.2	76 64	121.8	16 25.5	76 64	122.1	6
7	18 24.3	75 66	118.9	18 02.0	75 66	119.3	17 39.5	75 66	119.6	17 17.1	75 66	120.0	16 54.6	75 65	120.3	16 32.1	75 65	120.7	16 09.6	75 65	121.0	15 47.0	75 65	121.3	7
8	17 44.5	74 67	118.1	17 22.3	74 67	118.5	17 00.0	74 66	118.9	16 37.7	74 66	119.2	16 15.4	75 66	119.5	15 53.0	75 66	119.9	15 30.6	75 65	120.2	15 08.2	75 65	120.6	8
9	17 04.5	74 67	117.4	16 42.4	74 67	117.7	16 20.2	74 67	118.1	15 58.1	74 67	118.4	15 35.8	74 66	118.8	15 13.6	74 66	119.1	14 51.3	74 66	119.5	14 29.0	74 66	119.8	9
60	16 24.1	73 68	116.6	16 02.1	73 67	117.0	15 40.1	73 67	117.3	15 18.1	74 67	117.7	14 56.0	74 67	118.0	14 33.9	74 67	118.4	14 11.8	74 66	118.7	13 49.6	74 66	119.1	60
1	15 43.5	73 68	115.9	15 21.7	73 68	116.2	14 59.8	73 68	116.6	14 37.9	73 68	116.9	14 15.9	73 67	117.3	13 53.9	73 67	117.6	13 31.9	73 67	118.0	13 09.9	74 67	118.3	1
2	15 02.6	72 69	115.1	14 40.9	72 68	115.5	14 19.1	73 68	115.8	13 57.4	73 68	116.2	13 35.5	73 68	116.5	13 13.7	73 68	116.9	12 51.8	73 67	117.2	12 29.9	73 67	117.6	2
3	14 21.5	72 69	114.4	13 59.9	72 69	114.7	13 38.3	72 69	115.1	13 16.6	72 68	115.5	12 54.9	72 68	115.8	12 33.2	72 68	116.2	12 11.4	73 68	116.5	11 49.6	73 68	116.9	3
4	13 40.2	72 69	113.7	13 18.7	72 69	114.0	12 57.1	72 69	114.4	12 35.6	72 69	114.7	12 14.0	72 69	115.1	11 52.4	72 68	115.4	11 30.8	72 68	115.8	11 09.1	72 68	116.1	4
65	12 58.6	71 70	112.9	12 37.2	71 70	113.3	12 15.8	71 69	113.6	11 54.3	72 69	114.0	11 32.9	72 69	114.4	11 11.4	72 69	114.7	10 49.9	72 69	115.1	10 28.3	72 68	115.4	65
6	12 16.7	71 70	112.2	11 55.5	71 70	112.6	11 34.2	71 70	112.9	11 12.9	71 70	113.3	10 51.5	71 69	113.6	10 30.1	71 69	114.0	10 08.7	71 69	114.4	9 47.3	71 69	114.7	6
7	11 34.7	71 70	111.5	11 13.6	71 70	111.9	10 52.4	71 70	112.2	10 31.1	71 70	112.6	10 09.9	71 70	112.9	9 48.6	71 70	113.3	9 27.4	71 69	113.6	9 06.0	71 69	114.0	7
8	10 52.5	70 71	110.8	10 31.4	70 71	111.1	10 10.3	70 70	111.5	9 49.2	70 70	111.9	9 28.1	70 70	112.2	9 06.9	71 70	112.6	8 45.8	71 70	112.9	8 24.6	71 69	113.3	8
9	10 10.0	70 71	110.1	9 49.1	70 71	110.4	9 28.1	70 71	110.8	9 07.1	70 71	111.2	8 46.1	70 70	111.5	8 25.0	70 70	111.9	8 04.0	70 70	112.2	7 42.9	70 70	112.6	9
70	9 27.4	70 71	109.4	9 06.6	70 71	109.7	8 45.7	70 71	110.1	8 24.8	70 71	110.5	8 03.8	70 71	110.8	7 42.9	70 71	111.2	7 21.9	70 70	111.5	7 01.0	70 70	111.9	70
1	8 44.6	69 72	108.7	8 23.8	69 71	109.0	8 03.1	69 71	109.4	7 42.3	69 71	109.8	7 21.4	69 71	110.1	7 00.6	70 71	110.5	6 39.7	70 71	110.9	6 18.8	70 71	111.2	1
2	8 01.6	69 72	108 0	7 41.0	69 72	108.4	7 20.3	69 72	108.7	6 59.5	69 71	109.1	6 38.8	69 71	109.4	6 18.1	69 71	109.8	5 57.3	69 71	110.2	5 36.5	69 71	110.5	2
3	7 18.5	69 72	107.3	6 57.9	69 72	107.7	6 37.3	69 72	108.0	6 16.7	69 72	108.4	5 56.0	69 72	108.8	5 35.4	69 72	109.1	5 14.7	69 71	109.5				3
4	6 35.2	68 72	106.6	6 14.7	68 72	107.0	5 54.1	68 72	107.4	5 33.6	68 72	107.7	5 13.1	68 72	108.1										4
75	5 51.7	68 73	105.9	5 31.3	68 72	106.3	5 10.8	68 72	106.7																75
6	5 08.1	68 73	105.3																						6

DECLINATION SAME NAME AS LATITUDE

H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
91																									91
2							5 08.5	65 75	82.5	5 28.1	65 75	82.2	5 47.6	65 75	81.8	6 07.2	65 75	81.4	6 26.7	65 74	81.0	6 46.2	65 74	80.6	2
3													5 02.9	65 75	81.1	5 22.4	65 74	80.7	5 42.0	65 74	80.4	6 01.6	65 74	80.0	3
																						5 17.0	65 74	79.3	

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Lat. 41°

H.A.	12° 00′ Alt.	Az.	12° 30′ Alt.	Az.	13° 00′ Alt.	Az.	13° 30′ Alt.	Az.	14° 00′ Alt.	Az.	14° 30′ Alt.	Az.	15° 00′ Alt.	Az.	15° 30′ Alt.	Az.	H.A.
°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	°
00	61 00.0 1.0 01	180.0	61 30.0 1.0 01	180.0	62 00.0 1.0 01	180.0	62 30.0 1.0 01	180.0	63 00.0 1.0 01	180.0	63 30.0 1.0 01	180.0	64 00.0 1.0 01	180.0	64 30.0 1.0 01	180.0	00
1	60 59.2 1.0 04	178.0	61 29.2 1.0 04	178.0	61 59.2 1.0 04	177.9	62 29.2 1.0 04	177.9	62 59.2 1.0 04	177.9	63 29.1 1.0 04	177.8	63 59.1 1.0 04	177.8	64 29.1 1.0 04	177.8	1
2	60 56.8 1.0 07	176.0	61 26.8 1.0 07	175.9	61 56.7 1.0 07	175.9	62 26.7 1.0 07	175.8	62 56.6 1.0 07	175.7	63 26.6 1.0 07	175.7	63 56.5 1.0 07	175.6	64 26.5 1.0 07	175.5	2
3	60 52.8 1.0 09	174.0	61 22.7 1.0 09	173.9	61 52.6 1.0 10	173.8	62 22.5 1.0 10	173.7	62 52.4 1.0 10	173.6	63 22.3 1.0 10	173.5	63 52.2 1.0 10	173.4	64 22.1 1.0 10	173.3	3
4	60 47.3 99 12	172.0	61 17.1 99 12	171.9	61 46.9 99 12	171.7	62 16.7 99 12	171.6	62 46.5 99 13	171.5	63 16.3 99 13	171.4	63 46.1 99 13	171.2	64 15.9 99 13	171.1	4
05	60 40.2 99 14	170.0	61 09.9 99 15	169.8	61 39.6 99 15	169.7	62 09.3 99 15	169.5	62 39.0 99 15	169.4	63 08.7 99 15	169.2	63 38.4 99 16	169.1	64 08.0 99 16	168.9	05
6	60 31.5 99 17	168.0	61 01.1 99 17	167.8	61 30.7 99 17	167.7	62 00.3 99 18	167.5	62 29.9 99 18	167.3	62 59.4 98 18	167.1	63 29.0 98 18	166.9	63 58.5 98 19	166.7	6
7	60 21.4 98 19	166.1	60 50.8 98 20	165.9	61 20.3 98 20	165.7	61 49.7 98 20	165.5	62 19.1 98 21	165.3	62 48.5 98 21	165.0	63 17.9 98 21	164.8	63 47.3 98 21	164.6	7
8	60 09.7 98 22	164.1	60 39.0 98 22	163.9	61 08.3 98 22	163.7	61 37.6 98 23	163.5	62 06.8 97 23	163.2	62 36.1 97 23	163.0	63 05.3 97 24	162.7	63 34.4 97 24	162.5	8
9	59 56.6 97 24	162.2	60 25.7 97 25	162.0	60 54.9 97 25	161.7	61 23.9 97 25	161.5	61 53.0 97 26	161.2	62 22.0 97 26	160.9	62 51.0 97 26	160.7	63 20.0 96 27	160.4	9
10	59 42.1 97 27	160.3	60 11.0 96 27	160.1	60 39.9 96 27	159.8	61 08.8 96 28	159.5	61 37.7 96 28	159.2	62 06.5 96 28	158.9	62 35.3 96 29	158.6	63 04.0 96 29	158.3	10
1	59 26.1 96 29	158.5	59 54.9 96 29	158.2	60 23.6 96 30	157.9	60 52.3 96 30	157.6	61 20.9 95 30	157.3	61 49.5 95 31	157.0	62 18.0 95 31	156.6	62 46.5 96 32	156.3	1
2	59 08.8 95 31	156.6	59 37.4 95 31	156.3	60 05.9 95 32	156.0	60 34.3 95 32	155.7	61 02.7 95 33	155.4	61 31.1 94 33	155.0	61 59.4 94 33	154.7	62 27.6 94 34	154.3	2
3	58 50.2 94 33	154.8	59 18.5 94 34	154.5	59 46.8 94 34	154.2	60 15.0 94 34	153.8	60 43.2 94 35	153.5	61 11.3 94 35	153.1	61 39.3 93 36	152.8	62 07.3 93 36	152.4	3
4	58 30.3 94 35	153.1	58 58.4 94 36	152.7	59 26.4 93 36	152.4	59 54.4 93 36	152.0	60 22.3 93 37	151.7	60 50.2 93 37	151.3	61 18.0 92 38	150.9	61 45.7 92 38	150.5	4
15	58 09.2 93 37	151.3	58 37.1 93 38	151.0	59 04.8 92 38	150.6	59 32.6 92 38	150.2	60 00.2 92 39	149.8	60 27.8 92 39	149.5	60 55.3 92 40	149.0	61 22.7 91 40	148.6	15
6	57 46.9 92 39	149.6	58 14.5 92 40	149.3	58 42.0 92 40	148.9	59 09.5 91 40	148.5	59 36.8 91 41	148.1	60 04.2 91 41	147.7	60 31.4 91 42	147.2	60 58.5 90 42	146.8	6
7	57 23.4 91 41	147.9	57 50.8 91 41	147.6	58 18.0 91 42	147.2	58 45.2 90 42	146.8	59 12.3 90 43	146.4	59 39.4 90 43	145.9	60 06.3 90 44	145.5	60 33.2 89 44	145.0	7
8	56 58.9 90 43	146.3	57 25.9 90 43	145.9	57 52.9 90 44	145.5	58 19.8 90 44	145.1	58 46.7 89 45	144.7	59 13.4 89 45	144.2	59 40.1 89 46	143.8	60 06.6 88 46	143.3	8
9	56 33.2 90 44	144.7	57 00.0 89 45	144.3	57 26.8 89 45	143.9	57 53.4 89 46	143.4	58 20.0 88 46	143.0	58 46.4 88 47	142.6	59 12.8 88 47	142.1	59 39.1 87 48	141.6	9
20	56 06.5 89 46	143.1	56 33.1 88 47	142.7	56 59.6 88 47	142.3	57 25.9 88 47	141.8	57 52.2 87 48	141.4	58 18.4 87 48	140.9	58 44.5 87 49	140.5	59 10.4 86 49	140.0	20
1	55 38.9 88 48	141.6	56 05.2 87 48	141.2	56 31.4 87 49	140.7	56 57.5 87 49	140.3	57 23.5 87 49	139.8	57 49.4 86 50	139.3	58 15.1 86 50	138.9	58 40.8 85 51	138.4	1
2	55 10.3 87 49	140.1	55 36.3 87 50	139.7	56 02.2 86 50	139.2	56 28.1 86 51	138.7	56 53.8 86 51	138.3	57 19.4 85 51	137.8	57 44.9 85 52	137.3	58 10.3 84 52	136.8	2
3	54 40.8 86 51	138.6	55 06.6 86 51	138.2	55 32.2 85 51	137.7	55 57.8 85 52	137.3	56 23.2 85 52	136.8	56 48.5 84 53	136.3	57 13.8 84 53	135.8	57 38.8 83 54	135.3	3
4	54 10.4 85 52	137.2	54 35.9 85 52	136.7	55 01.3 84 53	136.3	55 26.6 84 53	135.8	55 51.8 84 54	135.3	56 16.8 83 54	134.8	56 41.8 83 55	134.3	57 06.6 82 55	133.8	4
25	53 39.2 84 53	135.8	54 04.5 84 54	135.3	54 29.6 84 54	134.8	54 54.6 83 55	134.4	55 19.5 83 55	133.9	55 44.3 82 55	133.4	56 09.0 82 56	132.9	56 33.5 82 56	132.4	25
6	53 07.3 83 55	134.4	53 32.3 83 55	133.9	53 57.1 83 55	133.5	54 21.9 82 56	133.0	54 46.5 82 56	132.5	55 11.0 81 57	132.0	55 35.4 81 57	131.5	55 59.7 81 58	130.9	6
7	52 34.6 83 56	133.1	52 59.3 82 56	132.6	53 23.9 82 57	132.1	53 48.4 81 57	131.6	54 12.8 81 57	131.1	54 37.0 81 58	130.6	55 01.1 80 58	130.1	55 25.1 80 59	129.6	7
8	52 01.1 82 57	131.7	52 25.6 81 57	131.3	52 49.9 81 58	130.8	53 14.2 81 58	130.3	53 38.3 80 59	129.8	54 02.3 80 59	129.3	54 26.1 79 59	128.8	54 49.9 79 60	128.2	8
9	51 27.0 81 58	130.5	51 51.2 81 58	130.0	52 15.3 80 59	129.5	52 39.3 80 59	129.0	53 03.2 79 60	128.5	53 26.9 79 60	128.0	53 50.5 78 60	127.5	54 14.0 78 61	126.9	9
30	50 52.2 80 59	129.2	51 16.2 80 59	128.7	51 40.1 79 60	128.2	52 03.8 79 60	127.7	52 27.4 79 61	127.2	52 50.9 78 61	126.7	53 14.3 78 61	126.2	53 37.5 77 62	125.7	30
1	50 16.8 79 60	128.0	50 40.6 79 60	127.5	51 04.2 79 61	127.0	51 27.7 78 61	126.5	51 51.1 78 62	126.0	52 14.3 77 62	125.5	52 37.4 77 62	125.0	53 00.4 76 63	124.4	1
2	49 40.8 79 61	126.8	50 04.3 78 61	126.3	50 27.7 78 62	125.8	50 51.0 77 62	125.3	51 14.2 77 62	124.8	51 37.2 76 63	124.3	52 00.1 76 63	123.8	52 22.8 76 64	123.2	2
3	49 04.3 78 62	125.6	49 27.6 77 62	125.1	49 50.7 77 63	124.6	50 13.8 77 63	124.1	50 36.7 76 63	123.6	50 59.5 76 64	123.1	51 22.2 75 64	122.6	51 44.7 75 64	122.0	3
4	48 27.2 77 63	124.4	48 50.3 77 63	124.0	49 13.2 76 63	123.5	49 36.1 76 64	123.0	49 58.8 75 64	122.5	50 21.3 75 64	121.9	50 43.8 75 65	121.4	51 06.0 74 65	120.9	4
35	47 49.6 76 63	123.3	48 12.5 76 64	122.8	48 35.2 76 64	122.3	48 57.8 75 64	121.8	49 20.3 75 65	121.3	49 42.7 74 65	120.8	50 04.9 74 66	120.3	50 27.0 73 66	119.8	35
6	47 11.5 76 64	122.2	47 34.2 75 65	121.7	47 56.7 75 65	121.2	48 19.1 74 65	120.7	48 41.4 74 66	120.2	49 03.6 74 66	119.7	49 25.6 73 66	119.2	49 47.4 73 67	118.7	6
7	46 33.0 75 65	121.1	46 55.4 75 65	120.7	47 17.8 74 66	120.2	47 40.0 74 66	119.7	48 02.1 73 66	119.2	48 24.0 73 67	118.6	48 45.8 72 67	118.1	49 07.5 72 67	117.6	7
8	45 54.0 74 66	120.1	46 16.3 74 66	119.6	46 38.4 74 66	119.1	47 00.4 73 67	118.6	47 22.3 73 67	118.1	47 44.1 72 67	117.6	48 05.7 72 68	117.1	48 27.2 71 68	116.6	8
9	45 14.6 74 66	119.0	45 36.7 73 67	118.6	45 58.7 73 67	118.1	46 20.5 73 67	117.6	46 42.2 72 68	117.1	47 03.8 72 68	116.6	47 25.2 71 68	116.1	47 46.5 71 68	115.5	9
40	44 34.8 73 67	118.0	44 56.7 73 67	117.5	45 18.5 72 68	117.1	45 40.2 72 68	116.6	46 01.7 72 68	116.1	46 23.1 71 68	115.6	46 44.4 71 69	115.0	47 05.5 70 69	114.5	40
1	43 54.7 73 68	117.0	44 16.4 72 68	116.6	44 38.0 72 68	116.1	44 59.5 71 68	115.6	45 20.9 71 69	115.1	45 42.1 71 69	114.6	46 03.2 70 69	114.1	46 24.1 70 69	113.5	1
2	43 14.2 72 68	116.1	43 35.7 72 68	115.6	43 57.2 71 69	115.1	44 18.5 71 69	114.6	44 39.7 70 69	114.1	45 00.7 70 69	113.6	45 21.7 70 70	113.1	45 42.5 69 70	112.6	2
3	42 33.3 72 69	115.1	42 54.7 71 69	114.6	43 16.0 71 69	114.1	43 37.2 70 69	113.6	43 58.2 70 70	113.2	44 19.1 69 70	112.7	44 39.9 69 70	112.1	45 00.5 69 70	111.6	3
4	41 52.1 71 69	114.2	42 13.4 71 69	113.7	42 34.5 70 70	113.2	42 55.5 70 70	112.7	43 16.4 69 70	112.2	43 37.2 69 70	111.7	43 57.8 69 71	111.2	44 18.3 68 71	110.7	4
45	41 10.7 71 70	113.2	41 31.8 70 70	112.8	41 52.8 70 70	112.3	42 13.6 69 70	111.8	42 34.4 69 71	111.3	42 55.0 68 71	110.8	43 15.4 68 71	110.3	43 35.8 68 71	109.8	45
6	40 28.9 70 70	112.3	40 49.9 70 70	111.8	41 10.7 69 70	111.4	41 31.4 69 71	110.9	41 52.0 68 71	110.4	42 12.5 68 71	109.9	42 32.9 68 71	109.4	42 53.1 67 72	108.9	6
7	39 46.9 70 70	111.4	40 07.7 69 71	111.0	40 28.4 69 71	110.5	40 49.0 68 71	110.0	41 09.5 68 71	109.5	41 29.8 68 72	109.0	41 50.0 67 72	108.5	42 10.1 67 72	108.0	7
8	39 04.6 69 71	110.5	39 25.3 69 71	110.1	39 45.9 68 71	109.6	40 06.3 68 72	109.1	40 26.7 68 72	108.6	40 46.9 67 72	108.2	41 07.0 67 72	107.7	41 27.0 66 72	107.2	8
9	38 22.1 69 71	109.7	38 42.7 68 71	109.2	39 03.1 68 72	108.7	39 23.5 68 72	108.3	39 43.7 67 72	107.8	40 03.8 67 72	107.3	40 23.7 66 72	106.8	40 43.6 66 73	106.3	9
50	37 39.4 68 72	108.8	37 59.8 68 72	108.4	38 20.1 68 72	107.9	38 40.4 67 72	107.4	39 00.5 67 72	107.0	39 20.4 66 73	106.5	39 40.3 66 73	106.0	40 00.0 66 73	105.5	50
1	36 56.4 68 72	108.0	37 16.7 68 72	107.5	37 36.9 67 72	107.1	37 57.0 67 72	106.6	38 17.0 66 73	106.1	38 36.9 66 73	105.6	38 56.7 66 73	105.2	39 16.3 65 73	104.7	1
2	36 13.2 68 72	107.2	36 33.4 67 72	106.7	36 53.6 67 73	106.2	37 13.6 67 73	105.8	37 33.5 66 73	105.3	37 53.2 66 73	104.8	38 12.9 65 73	104.4	38 32.4 65 73	103.9	2
3	35 29.9 67 73	106.4	35 50.0 67 73	105.9	36 10.0 67 73	105.4	36 29.9 66 73	105.0	36 49.7 66 73	104.5	37 09.4 65 73	104.0	37 29.0 65 73	103.6	37 48.4 65 74	103.1	3
4	34 46.3 67 73	105.6	35 06.4 67 73	105.1	35 26.3 66 73	104.6	35 46.1 66 73	104.2	36 05.8 65 73	103.7	36 25.4 65 74	103.2	36 44.9 65 74	102.8	37 04.2 64 74	102.3	4
55	34 02.6 67 73	104.8	34 22.6 66 73	104.3	34 42.4 66 73	103.9	35 02.1 66 74	103.4	35 21.7 65 74	102.9	35 41.2 65 74	102.5	36 00.6 65 74	102.0	36 19.9 64 74	101.5	55
6	33 18.8 66 73	104.0	33 38.6 66 74	103.5	33 58.3 66 74	103.1	34 18.0 65 74	102.6	34 37.5 65 74	102.2	34 57.0 65 74	101.7	35 16.3 64 74	101.2	35 35.5 64 74	100.8	6
7	32 34.8 66 74	103.2	32 54.5 66 74	102.8	33 14.2 65 74	102.3	33 33.7 65 74	101.9	33 53.2 65 74	101.4	34 12.5 64 74	100.9	34 31.8 64 74	100.5	34 51.0 64 74	100.0	7
8	31 50.6 66 74	102.5	32 10.3 65 74	102.0	32 29.9 65 74	101.6	32 49.4 65 74	101.1	33 08.7 64 74	100.7	33 28.0 64 74	100.2	33 47.2 64 74	99.7	34 06.3 63 75	99.3	8
9	31 06.3 66 74	101.7	31 25.9 65 74	101.3	31 45.4 65 74	100.8	32 04.9 65 74	100.4	32 24.2 64 74	99.9	32 43.4 64 75	99.5	33 02.5 64 75	99.0	33 21.6 63 75	98.5	9
60	30 21.9 65 74	101.0	30 41.5 65 74	100.5	31 00.9 65 74	100.1	31 20.3 64 74	99.6	31 39.5 64 75	99.2	31 58.7 64 75	98.7	32 17.8 63 75	98.3	32 36.8 63 75	97.8	60
1	29 37.4 65 74	100.2	29 56.9 65 74	99.8	30 16.3 64 75	99.3	30 35.6 64 75	98.9	30 54.8 64 75	98.4	31 13.9 64 75	98.0	31 32.9 63 75	97.5	31 51.9 63 75	97.1	1
2	28 52.8 65 74	99.5	29 12.2 65 75	99.1	29 31.5 64 75	98.6	29 50.8 64 75	98.2	30 10.0 64 75	97.7	30 29.0 63 75	97.3	30 48.0 63 75	96.8	31 06.9 63 75	96.4	2
3	28 08.1 65 75	98.8	28 27.4 64 75	98.3	28 46.7 64 75	97.9	29 05.9 64 75	97.5	29 25.0 64 75	97.0	29 44.1 63 75	96.6	30 03.0 63 75	96.1	30 21.8 63 75	95.7	3
4	27 23.3 65 75	98.1	27 42.6 64 75	97.6	28 01.8 64 75	97.2	28 21.0 64 75	96.8	28 40.1 63 75	96.3	28 59.1 63 75	95.9	29 18.0 63 75	95.4	29 36.8 63 75	95.0	4
65	26 38.4 64 75	97.3	26 57.7 64 75	96.9	27 16.9 64 75	96.5	27 36.0 64 75	96.1	27 55.0 63 75	95.6	28 14.0 63 75	95.2	28 32.8 63 75	94.7	28 51.6 62 75	94.3	65
6	25 53.5 64 75	96.6	26 12.7 64 75	96.2	26 31.9 64 75	95.8	26 50.9 63 75	95.4	27 09.9 63 75	94.9	27 28.9 63 75	94.5	27 47.7 63 75	94.0	28 06.5 62 75	93.6	6
7	25 08.5 64 75	95.9	25 27.7 64 75	95.5	25 46.8 64 75	95.1	26 05.8 63 75	94.7	26 24.8 63 75	94.2	26 43.7 63 75	93.8	27 02.5 63 75	93.4	27 21.2 62 75	92.9	7
8	24 23.4 64 75	95.3	24 42.6 64 75	94.8	25 01.7 64 75	94.4	25 20.7 63 75	94.0	25 39.6 63 75	93.6	25 58.5 63 75	93.1	26 17.3 63 75	92.7	26 36.0 62 75	92.3	8
9	23 38.3 64 75	94.6	23 57.4 64 75	94.2	24 16.5 63 75	93.7	24 35.5 63 75	93.3	24 54.4 63 75	92.9	25 13.3 63 75	92.4	25 32.0 62 75	92.0	25 50.8 62 75	91.6	9
70	22 53.1 64 75	93.9	23 12.2 64 75	93.5	23 31.3 63 75	93.1	23 50.3 63 75	92.6	24 09.2 63 75	92.2	24 28.0 63 75	91.8	24 46.8 62 75	91.4	25 05.5 62 75	90.9	70
1	22 07.9 64 75	93.2	22 27.0 64 75	92.8	22 46.1 63 75	92.4	23 05.0 63 75	92.0	23 23.9 63 75	91.5	23 42.7 63 75	91.1	24 01.5 62 75	90.7	24 20.2 62 75	90.3	1
2	21 22.7 64 75	92.5	21 41.8 63 75	92.1	22 00.8 63 75	91.7	22 19.8 63 75	91.3	22 38.6 63 75	90.9	22 57.5 63 75	90.5	23 16.2 62 75	90.0	23 34.9 62 75	89.6	2
3	20 37.4 64 75	91.9	20 56.5 63 75	91.5	21 15.5 63 75	91.1	21 34.5 63 75	90.6	21 53.4 63 75	90.2	22 12.2 63 75	89.8	22 30.9 62 75	89.4	22 49.6 62 75	89.0	3
4	19 52.2 64 75	91.2	20 11.2 63 75	90.8	20 30.2 63 75	90.4	20 49.2 63 75	90.0	21 08.1 63 75	89.6	21 26.9 63 75	89.1	21 45.7 62 75	88.7	22 04.4 62 75	88.3	4
75	19 06.9 64 75	90.6	19 26.0 63 75	90.1	19 45.0 63 75	89.7	20 03.9 63 75	89.3	20 22.8 63 75	88.9	20 41.6 63 75	88.5	21 00.4 62 75	88.1	21 19.1 62 75	87.7	75
6	18 21.6 64 75	89.9	18 40.7 63 75	89.5	18 59.7 63 75	89.1	19 18.6 63 75	88.7	19 37.5 63 75	88.3	19 56.4 63 75	87.8	20 15.2 63 75	87.4	20 33.9 62 75	87.0	6
7	17 36.3 64 75	89.2	17 55.4 63 75	88.8	18 14.4 63 75	88.4	18 33.4 63 75	88.0	18 52.3 63 75	87.6	19 11.1 63 75	87.2	19 29.9 63 75	86.8	19 48.7 62 75	86.4	7
8	16 51.1 64 75	88.6	17 10.1 63 75	88.2	17 29.2 63 75	87.8	17 48.1 63 75	87.4	18 07.1 63 75	87.0	18 25.9 63 75	86.6	18 44.7 63 75	86.2	19 03.5 62 75	85.7	8
9	16 05.8 64 75	87.9	16 24.9 64 75	87.5	16 43.9 63 75	87.1	17 02.9 63 75	86.7	17 21.8 63 75	86.3	17 40.7 63 75	85.9	17 59.6 63 75	85.5	18 18.4 63 75	85.1	9
80	15 20.6 64 75	87.3	15 39.7 64 75	86.9	15 58.7 63 75	86.5	16 17.7 63 75	86.1	16 36.7 63 75	85.7	16 55.6 63 75	85.3	17 14.5 63 75	84.9	17 33.3 63 75	84.5	80
1	14 35.3 64 75	86.7	14 54.5 64 75	86.3	15 13.5 63 75	85.9	15 32.6 63 75	85.5	15 51.5 63 75	85.1	16 10.5 63 75	84.6	16 29.4 63 75	84.2	16 48.2 63 75	83.8	1
2	13 50.2 64 75	86.0	14 09.3 64 75	85.6	14 28.4 64 75	85.2	14 47.4 63 75	84.8	15 06.4 63 75	84.4	15 25.4 63 75	84.0	15 44.3 63 75	83.6	16 03.2 63 75	83.2	2
3	13 05.0 64 75	85.4	13 24.2 64 75	85.0	13 43.3 64 75	84.6	14 02.4 64 75	84.2	14 21.4 63 75	83.8	14 40.4 63 75	83.4	14 59.4 63 75	83.0	15 18.3 63 75	82.6	3
4	12 19.9 64 75	84.7	12 39.1 64 75	84.3	12 58.2 64 75	83.9	13 17.3 64 75	83.5	13 36.4 64 75	83.1	13 55.5 63 75	82.7	14 14.5 63 75	82.3	14 33.4 63 75	81.9	4
85	11 34.8 64 75	84.1	11 54.0 64 75	83.7	12 13.2 64 75	83.3	12 32.4 64 75	82.9	12 51.5 64 75	82.5	13 10.6 64 75	82.1	13 29.6 63 75	81.7	13 48.6 63 75	81.3	85
6	10 49.8 64 75	83.4	11 09.1 64 75	83.1	11 28.3 64 75	82.7	11 47.5 64 75	82.3	12 06.6 64 75	81.9	12 25.8 64 75	81.5	12 44.8 64 74	81.1	13 03.9 63 74	80.7	6
7	10 04.9 64 75	82.8	10 24.1 64 75	82.4	10 43.4 64 75	82.0	11 02.6 64 75	81.6	11 21.8 64 75	81.2	11 41.0 64 74	80.9	12 00.1 64 74	80.5	12 19.3 64 74	80.1	7
8	9 20.0 64 75	82.2	9 39.3 64 75	81.8	9 58.6 64 75	81.4	10 17.9 64 74	81.0	10 37.1 64 74	80.6	10 56.3 64 74	80.2	11 15.5 64 74	79.8	11 34.7 64 74	79.4	8
9	8 35.1 65 75	81.5	8 54.5 65 75	81.1	9 13.9 64 74	80.8	9 33.2 64 74	80.4	9 52.5 64 74	80.0	10 11.8 64 74	79.6	10 31.0 64 74	79.2	10 50.2 64 74	78.8	9
90	7 50.4 65 74	80.9	8 09.8 65 74	80.5	8 29.2 65 74	80.1	8 48.6 65 74	79.7	9 07.9 64 74	79.3	9 27.3 64 74	79.0	9 46.6 64 74	78.6	10 05.9 64 74	78.2	90

Lat 41°

H.A.	12° 00′ Alt.	Δd	Δt	Az.	12° 30′ Alt.	Δd	Δt	Az.	13° 00′ Alt.	Δd	Δt	Az.	13° 30′ Alt.	Δd	Δt	Az.	14° 00′ Alt.	Δd	Δt	Az.	14° 30′ Alt.	Δd	Δt	Az.	15° 00′ Alt.	Δd	Δt	Az.	15° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
00	37 00.0	1.0	01	180.0	36 30.0	1.0	01	180.0	36 00.0	1.0	01	180.0	35 30.0	1.0	01	180.0	35 00.0	1.0	01	180.0	34 30.0	1.0	01	180.0	34 00.0	1.0	01	180.0	33 30.0	1.0	01	180.0	00
1	36 59.5	1.0	02	178.8	36 29.5	1.0	02	178.8	35 59.5	1.0	02	178.8	35 29.5	1.0	02	178.8	34 59.5	1.0	02	178.8	34 29.5	1.0	02	178.8	33 59.5	1.0	02	178.8	33 29.5	1.0	02	178.8	1
2	36 58.1	1.0	04	177.6	36 28.1	1.0	04	177.6	35 58.1	1.0	04	177.6	35 28.1	1.0	04	177.6	34 58.1	1.0	04	177.6	34 28.1	1.0	04	177.7	33 58.2	1.0	04	177.7	33 28.2	1.0	04	177.7	2
3	36 55.6	1.0	06	176.3	36 25.7	1.0	06	176.4	35 55.7	1.0	06	176.4	35 25.8	1.0	06	176.4	34 55.8	1.0	06	176.4	34 25.8	1.0	05	176.5	33 55.9	1.0	05	176.5	33 25.9	1.0	05	176.5	3
4	36 52.3	1.0	07	175.1	36 22.3	1.0	07	175.1	35 52.4	1.0	07	175.2	35 22.5	1.0	07	175.2	34 52.5	1.0	07	175.3	34 22.6	1.0	07	175.3	33 52.6	1.0	07	175.3	33 22.7	1.0	07	175.4	4
05	36 47.9	1.0	09	173.9	36 18.0	1.0	09	173.9	35 48.1	1.0	09	174.0	35 18.2	1.0	09	174.0	34 48.3	1.0	09	174.1	34 18.4	1.0	08	174.1	33 48.5	1.0	08	174.2	33 18.6	1.0	08	174.2	05
6	36 42.6	1.0	10	172.7	36 12.8	1.0	10	172.7	35 42.9	1.0	10	172.8	35 13.1	1.0	10	172.9	34 43.2	1.0	10	172.9	34 13.3	1.0	10	173.0	33 43.5	1.0	10	173.0	33 13.6	1.0	10	173.1	6
7	36 36.4	99	12	171.5	36 06.6	99	12	171.5	35 36.8	99	12	171.6	35 07.0	99	12	171.7	34 37.1	99	12	171.7	34 07.3	99	12	171.8	33 37.5	99	11	171.9	33 07.7	99	11	171.9	7
8	36 29.2	99	14	170.3	35 59.4	99	13	170.3	35 29.7	99	13	170.4	34 59.9	99	13	170.5	34 30.2	99	13	170.6	34 00.4	99	13	170.6	33 30.7	99	13	170.7	33 00.9	99	13	170.8	8
9	36 21.0	99	15	169.0	35 51.4	99	15	169.1	35 21.7	99	15	169.2	34 52.0	99	15	169.3	34 22.3	99	15	169.4	33 52.6	99	15	169.5	33 22.9	99	14	169.6	32 53.2	99	14	169.7	9
10	36 12.0	99	17	167.8	35 42.4	99	16	167.9	35 12.8	99	16	168.0	34 43.1	99	16	168.1	34 13.5	99	16	168.2	33 43.9	99	16	168.3	33 14.3	99	16	168.4	32 44.6	99	16	168.5	10
1	36 02.0	98	18	166.7	35 32.5	98	18	166.8	35 02.9	98	18	166.9	34 33.4	98	18	167.0	34 03.9	98	18	167.1	33 34.3	98	17	167.2	33 04.8	99	17	167.3	32 35.2	99	17	167.4	1
2	35 51.1	98	20	165.5	35 21.6	98	20	165.6	34 52.2	98	19	165.7	34 22.7	98	19	165.8	33 53.3	98	19	165.9	33 23.8	98	19	166.0	32 54.4	98	19	166.2	32 24.9	98	19	166.3	2
3	35 39.3	98	21	164.3	35 09.9	98	21	164.4	34 40.6	98	21	164.5	34 11.2	98	21	164.7	33 41.8	98	21	164.8	33 12.5	98	20	164.9	32 43.1	98	20	165.0	32 13.7	98	20	165.2	3
4	35 26.6	97	23	163.1	34 57.3	97	22	163.3	34 28.1	98	22	163.4	33 58.8	98	22	163.5	33 29.5	98	22	163.7	33 00.3	98	22	163.8	32 31.0	98	22	163.9	32 01.7	98	21	164.0	4
15	35 13.0	97	24	161.9	34 43.8	97	24	162.1	34 14.7	97	24	162.2	33 45.5	97	24	162.4	33 16.4	97	23	162.5	32 47.2	97	23	162.7	32 18.0	97	23	162.8	31 48.8	97	23	162.9	15
6	34 58.5	97	26	160.8	34 29.5	97	25	160.9	34 00.4	97	25	161.1	33 31.4	97	25	161.2	33 02.3	97	25	161.4	32 33.3	97	25	161.5	32 04.2	97	24	161.7	31 35.1	97	24	161.8	6
7	34 43.2	96	27	159.6	34 14.3	96	27	159.8	33 45.3	96	27	160.0	33 16.4	96	26	160.1	32 47.5	96	26	160.3	32 18.5	97	26	160.4	31 49.6	97	26	160.6	31 20.6	97	26	160.7	7
8	34 27.9	96	28	158.5	33 58.2	96	28	158.7	33 29.4	96	28	158.8	33 00.6	96	28	159.0	32 31.8	96	28	159.2	32 02.9	96	27	159.3	31 34.1	96	27	159.5	31 05.2	96	27	159.7	8
9	34 10.0	95	30	157.4	33 41.3	96	30	157.5	33 12.7	96	29	157.7	32 44.0	96	29	157.9	32 15.3	96	29	158.1	31 46.6	96	29	158.2	31 17.8	96	28	158.4	30 49.1	96	28	158.6	9
20	33 52.1	95	31	156.2	33 23.6	95	31	156.4	32 55.1	95	31	156.6	32 26.5	95	30	156.8	31 58.0	95	30	157.0	31 29.4	95	30	157.2	31 00.8	95	30	157.3	30 32.2	95	30	157.5	20
1	33 33.5	95	32	155.1	33 05.1	95	32	155.3	32 36.7	95	32	155.5	32 08.3	95	32	155.7	31 39.8	95	32	155.9	31 11.4	95	31	156.1	30 42.9	95	31	156.3	30 14.4	95	31	156.4	1
2	33 14.0	94	34	154.0	32 45.8	94	33	154.2	32 17.5	94	33	154.4	31 49.3	94	33	154.6	31 21.0	94	33	154.8	30 52.6	94	33	155.0	30 24.3	94	32	155.2	29 56.0	95	32	155.4	2
3	32 53.8	94	35	152.9	32 25.7	94	35	153.1	31 57.6	94	34	153.3	31 29.5	94	34	153.5	31 01.3	94	34	153.7	30 33.1	94	34	153.9	30 04.9	94	34	154.1	29 36.7	94	33	154.3	3
4	32 32.8	93	36	151.8	32 04.9	93	36	152.1	31 36.9	93	36	152.3	31 08.9	93	36	152.5	30 40.9	93	35	152.7	30 12.9	93	35	152.9	29 44.8	94	35	153.1	29 16.7	94	34	153.3	4
25	32 11.1	93	37	150.8	31 43.3	93	37	151.0	31 15.5	93	37	151.2	30 47.6	93	37	151.4	30 19.7	93	36	151.6	29 51.9	93	36	151.8	29 24.0	93	36	152.1	28 56.0	93	36	152.3	25
6	31 48.6	92	39	149.7	31 21.0	92	38	149.9	30 53.3	92	38	150.2	30 25.6	92	38	150.4	29 57.9	92	38	150.6	29 30.1	92	37	150.8	29 02.4	93	37	151.0	28 34.6	93	37	151.2	6
7	31 25.4	92	40	148.6	30 57.9	92	40	148.9	30 30.4	92	39	149.1	30 02.8	92	39	149.3	29 35.3	92	39	149.6	29 07.7	92	39	149.8	28 40.1	92	38	150.0	28 12.5	92	38	150.2	7
8	31 01.5	91	41	147.6	30 34.1	91	41	147.8	30 06.8	91	40	148.1	29 39.4	91	40	148.3	29 12.0	91	40	148.5	28 44.6	91	40	148.8	28 17.1	92	39	149.0	27 49.6	92	39	149.2	8
9	30 36.9	91	42	146.6	30 09.7	91	42	146.8	29 42.5	91	42	147.1	29 15.3	91	41	147.3	28 48.0	91	41	147.5	28 20.8	91	41	147.8	27 53.5	91	41	148.0	27 26.1	91	40	148.2	9
30	30 11.6	90	43	145.5	29 44.6	90	43	145.8	29 17.5	90	43	146.0	28 50.5	90	42	146.3	28 23.4	90	42	146.5	27 56.3	90	42	146.8	27 29.1	91	42	147.0	27 02.0	91	41	147.3	30
1	29 45.6	89	44	144.5	29 18.8	90	44	144.8	28 51.9	90	44	145.0	28 25.0	90	44	145.3	27 58.1	90	43	145.5	27 31.1	90	43	145.8	27 04.2	90	43	146.0	26 37.2	90	42	146.3	1
2	29 19.0	89	45	143.5	28 52.3	89	45	143.8	28 25.6	89	45	144.0	27 58.9	89	45	144.3	27 32.1	89	44	144.6	27 05.4	89	44	144.8	26 38.5	89	44	145.1	26 11.7	90	43	145.3	2
3	28 51.8	88	46	142.5	28 25.3	88	46	142.8	27 58.7	89	46	143.1	27 32.2	89	46	143.3	27 05.6	89	45	143.6	26 39.0	89	45	143.8	26 12.3	89	45	144.1	25 45.6	89	44	144.4	3
4	28 23.9	88	47	141.6	27 57.6	88	47	141.8	27 31.2	88	47	142.1	27 04.8	88	47	142.4	26 38.4	88	46	142.6	26 11.9	88	46	142.9	25 45.4	88	46	143.1	25 18.9	88	45	143.4	4
35	27 55.5	87	48	140.6	27 29.3	87	48	140.9	27 03.1	87	48	141.1	26 36.9	87	48	141.4	26 10.6	88	47	141.7	25 44.3	88	47	141.9	25 18.0	88	47	142.2	24 51.6	88	46	142.5	35
6	27 26.4	87	49	139.6	27 00.4	87	49	139.9	26 34.4	87	49	140.2	26 08.3	87	49	140.5	25 42.2	87	48	140.7	25 16.1	87	48	141.0	24 50.0	87	48	141.3	24 23.8	87	47	141.5	6
7	26 56.8	86	50	138.7	26 31.0	86	50	139.0	26 05.1	86	50	139.2	25 39.2	86	49	139.5	25 13.3	86	49	139.8	24 47.3	87	49	140.1	24 21.3	87	49	140.4	23 55.3	87	48	140.6	7
8	26 26.6	85	51	137.7	26 01.0	86	51	138.0	25 35.3	86	51	138.3	25 09.5	86	50	138.6	24 43.8	86	50	138.9	24 18.0	86	50	139.2	23 52.2	86	50	139.4	23 26.3	86	49	139.7	8
9	25 55.9	85	52	136.8	25 30.4	85	52	137.1	25 04.9	85	52	137.4	24 39.3	85	51	137.7	24 13.7	85	51	138.0	23 48.1	85	51	138.2	23 22.4	86	50	138.5	22 56.8	86	50	138.8	9
40	25 24.6	84	53	135.9	24 59.3	84	53	136.2	24 34.0	85	52	136.5	24 08.6	85	52	136.8	23 43.1	85	52	137.1	23 17.7	85	52	137.3	22 52.2	85	51	137.6	22 26.7	85	51	137.9	40
1	24 52.9	84	54	135.0	24 27.7	84	54	135.3	24 02.5	84	53	135.6	23 37.3	84	53	135.9	23 12.0	84	53	136.2	22 46.7	84	52	136.5	22 21.4	84	52	136.7	21 56.1	85	52	137.0	1
2	24 20.6	83	55	134.1	23 55.6	83	54	134.4	23 30.6	83	54	134.7	23 05.5	84	54	135.0	22 40.4	84	54	135.3	22 15.3	84	53	135.6	21 50.1	84	53	135.9	21 25.0	84	53	136.2	2
3	23 47.8	83	56	133.2	23 23.0	83	55	133.5	22 58.1	83	55	133.8	22 33.2	83	55	134.1	22 08.3	83	54	134.4	21 43.4	83	54	134.7	21 18.4	83	54	135.0	20 53.3	83	54	135.3	3
4	23 14.6	82	56	132.3	22 49.9	82	56	132.6	22 25.2	82	56	132.9	22 00.5	82	55	133.2	21 35.7	83	55	133.5	21 10.9	83	55	133.8	20 46.1	83	55	134.1	20 21.3	83	54	134.4	4
45	22 40.8	82	57	131.4	22 16.4	82	57	131.8	21 51.8	82	56	132.1	21 27.3	82	56	132.4	21 02.7	82	56	132.7	20 38.0	82	56	133.0	20 13.4	82	55	133.3	19 48.7	82	55	133.6	45
6	22 06.7	81	58	130.6	21 42.3	81	57	130.9	21 18.0	81	57	131.2	20 53.6	81	57	131.5	20 29.2	81	57	131.8	20 04.7	82	56	132.1	19 40.2	82	56	132.4	19 15.7	82	56	132.8	6
7	21 32.1	80	58	129.7	21 07.9	81	58	130.0	20 43.7	81	58	130.4	20 19.5	81	58	130.7	19 55.2	81	57	131.0	19 30.9	81	57	131.3	19 06.6	81	57	131.6	18 42.2	81	57	131.9	7
8	20 57.0	80	59	128.9	20 33.0	80	59	129.2	20 09.0	80	59	129.5	19 44.9	80	58	129.8	19 20.8	80	58	130.2	18 56.7	81	58	130.5	18 32.5	81	57	130.8	18 08.3	81	57	131.1	8
9	20 21.6	79	60	128.1	19 57.7	80	60	128.4	19 33.9	80	59	128.7	19 09.9	80	59	129.0	18 46.0	80	59	129.3	18 22.0	80	58	129.7	17 58.0	80	58	130.0	17 34.0	80	58	130.3	9
50	19 45.7	79	60	127.2	19 22.0	79	60	127.6	18 58.3	79	60	127.9	18 34.6	79	60	128.2	18 10.8	79	59	128.5	17 46.9	79	59	128.8	17 23.1	80	59	129.2	16 59.2	80	59	129.5	50
1	19 09.5	78	61	126.4	18 45.9	78	61	126.7	18 22.4	79	61	127.1	17 58.8	79	60	127.4	17 35.1	79	60	127.7	17 11.5	79	60	128.0	16 47.8	79	60	128.4	16 24.1	79	59	128.7	1
2	18 32.8	78	62	125.6	18 09.5	78	61	125.9	17 46.1	78	61	126.3	17 22.6	78	61	126.6	16 59.1	78	61	126.9	16 35.6	78	60	127.2	16 12.1	79	60	127.6	15 48.5	79	60	127.9	2
3	17 55.8	77	62	124.8	17 32.6	77	62	125.1	17 09.4	78	62	125.5	16 46.1	78	62	125.8	16 22.7	78	61	126.1	15 59.4	78	61	126.5	15 36.0	78	61	126.8	15 12.6	78	60	127.1	3
4	17 18.5	77	63	124.0	16 55.4	77	63	124.4	16 32.3	77	62	124.7	16 09.2	77	62	125.0	15 46.0	77	62	125.3	15 22.8	77	62	125.7	14 59.5	77	61	126.0	14 36.3	78	61	126.3	4
55	16 40.8	76	63	123.2	16 17.9	76	63	123.6	15 54.9	77	63	123.9	15 31.9	77	63	124.2	15 08.9	77	62	124.6	14 45.8	77	62	124.9	14 22.7	77	62	125.2	13 59.6	77	62	125.6	55
6	16 02.7	76	64	122.5	15 40.0	76	64	122.8	15 17.1	76	63	123.1	14 54.3	76	63	123.5	14 31.4	76	63	123.8	14 08.5	76	63	124.1	13 45.6	76	62	124.5	13 22.6	77	62	124.8	6
7	15 24.4	75	64	121.7	15 01.7	76	64	122.0	14 39.1	76	64	122.4	14 16.3	76	64	122.7	13 53.6	76	64	123.0	13 30.9	76	63	123.4	13 08.1	76	63	123.7	12 45.3	76	63	124.0	7
8	14 45.7	75	65	120.9	14 23.2	75	65	121.3	14 00.6	75	65	121.6	13 38.1	75	64	121.9	13 15.5	75	64	122.3	12 52.9	75	64	122.6	12 30.2	76	64	123.0	12 07.6	76	63	123.3	8
9	14 06.7	75	65	120.2	13 44.3	75	65	120.5	13 21.9	75	65	120.9	12 59.5	75	65	121.2	12 37.1	75	65	121.5	12 14.6	75	64	121.9	11 52.1	75	64	122.2	11 29.6	75	64	122.6	9
60	13 27.4	74	66	119.4	13 05.2	74	66	119.8	12 42.9	74	66	120.1	12 20.6	74	65	120.5	11 58.3	74	65	120.8	11 36.0	74	65	121.1	11 13.6	75	65	121.5	10 51.2	75	64	121.8	60
1	12 47.8	74	66	118.7	12 25.7	74	66	119.0	12 03.6	74	66	119.4	11 41.4	74	66	119.7	11 19.3	74	66	120.1	10 57.1	74	65	120.4	10 34.8	74	65	120.7	10 12.6	74	65	121.1	1
2	12 07.9	73	67	117.9	11 46.0	73	67	118.3	11 24.0	73	66	118.6	11 02.0	73	66	119.0	10 39.9	73	66	119.3	10 17.9	74	66	119.7	9 55.8	74	66	120.0	9 33.7	74	65	120.4	2
3	11 27.8	73	67	117.2	11 06.0	73	67	117.6	10 44.1	73	67	117.9	10 22.2	73	67	118.3	10 00.3	73	66	118.6	9 38.4	73	66	119.0	9 16.4	73	66	119.3	8 54.5	73	66	119.6	3
4	10 47.4	72	68	116.5	10 25.7	72	68	116.8	10 04.0	72	67	117.2	9 42.2	73	67	117.5	9 20.4	73	67	117.9	8 58.6	73	67	118.2	8 36.8	73	66	118.6	8 15.0	73	66	118.9	4
65	10 06.8	72	68	115.8	9 45.2	72	68	116.1	9 23.6	72	68	116.5	9 01.9	72	68	116.8	8 40.3	72	67	117.2	8 18.6	72	67	117.5	7 56.9	72	67	117.9	7 35.2	72	67	118.2	65
6	9 25.9	72	69	115.1	9 04.4	72	68	115.4	8 42.9	72	68	115.8	8 21.4	72	68	116.1	7 59.9	72	68	116.5	7 38.3	72	68	116.8	7 16.8	72	67	117.2	6 55.2	72	67	117.5	6
7	8 44.7	71	69	114.4	8 23.4	71	69	114.7	8 02.0	71	69	115.1	7 40.6	71	68	115.4	7 19.2	71	68	115.8	6 57.8	71	68	116.1	6 36.4	71	68	116.5	6 14.9	72	68	116.8	7
8	8 03.4	71	69	113.7	7 42.1	71	69	114.0	7 20.9	71	69	114.4	6 59.6	71	69	114.7	6 38.3	71	69	115.1	6 17.0	71	68	115.4	5 55.7	71	68	115.8	5 34.4	71	68	116.1	8
9	7 21.8	70	70	113.0	7 00.6	70	70	113.3	6 39.5	70	69	113.7	6 18.4	71	69	114.0	5 57.2	71	69	114.4	5 36.0	71	69	114.7	5 14.8	71	68	115.1					9
70	6 40.0	70	70	112.3	6 19.0	70	70	112.6	5 57.9	70	70	113.0	5 36.9	70	69	113.3	5 15.8	70	69	113.7													70
1	5 58.0	70	70	111.6	5 37.1	70	70	111.9	5 16.1	70	70	112.3																					1
2	5 15.8	69	71	110.9																													2

DECLINATION SAME NAME AS LATITUDE

H.A.	12° 00′ Alt.	Δd	Δt	Az.	12° 30′ Alt.	Δd	Δt	Az.	13° 00′ Alt.	Δd	Δt	Az.	13° 30′ Alt.	Δd	Δt	Az.	14° 00′ Alt.	Δd	Δt	Az.	14° 30′ Alt.	Δd	Δt	Az.	15° 00′ Alt.	Δd	Δt	Az.	15° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
91	7 05.7	65	74	80.2	7 25.2	65	74	79.9	7 44.6	65	74	79.5	8 04.1	65	74	79.1	8 23.5	65	74	78.7	8 42.9	65	74	78.3	9 02.2	65	74	77.9	9 21.6	64	74	77.6	91
2	6 21.1	65	74	79.6	6 40.7	65	74	79.2	7 00.2	65	74	78.8	7 19.7	65	74	78.5	7 39.1	65	74	78.1	7 58.6	65	74	77.7	8 18.0	65	74	77.3	8 37.4	65	73	76.9	2
3	5 36.6	65	74	79.0	5 56.2	65	74	78.6	6 15.8	65	74	78.2	6 35.3	65	74	77.8	6 54.9	65	74	77.4	7 14.4	65	73	77.1	7 33.9	65	73	76.7	7 53.4	65	73	76.3	3
4					5 11.9	65	74	77.9	5 31.5	65	74	77.6	5 51.1	65	74	77.2	6 10.7	65	73	76.8	6 30.3	65	73	76.4	6 49.9	65	73	76.0	7 09.4	65	73	75.7	4
95													5 07.0	66	73	76.5	5 26.7	66	73	76.2	5 46.4	65	73	75.8	6 06.0	65	73	75.4	6 25.6	65	73	75.0	95
6																					5 02.5	66	73	75.1	5 22.2	66	73	74.8	5 41.9	66	73	74.4	6

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Lat. 41°

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	
00	65 00.0	1.0 02	180.0	65 30.0	1.0 02	180.0	66 00.0	1.0 02	180.0	66 30.0	1.0 02	180.0	67 00.0	1.0 02	180.0	67 30.0	1.0 02	180.0	68 00.0	1.0 02	180.0	68 30.0	1.0 02	180.0	00
1	64 59.1	1.0 04	177.7	65 29.1	1.0 05	177.7	65 59.1	1.0 05	177.6	66 29.1	1.0 05	177.6	66 59.0	1.0 05	177.6	67 29.0	1.0 05	177.5	67 59.0	1.0 05	177.5	68 29.0	1.0 05	177.4	1
2	64 56.4	1.0 07	175.5	65 26.4	1.0 08	175.4	65 56.3	1.0 08	175.3	66 26.2	1.0 08	175.2	66 56.2	1.0 08	175.1	67 26.1	1.0 08	175.1	67 56.0	1.0 08	175.0	68 25.9	1.0 08	174.9	2
3	64 51.9	1.0 10	173.2	65 21.8	1.0 11	173.1	65 51.7	1.0 11	173.0	66 21.5	1.0 11	172.8	66 51.4	99 11	172.7	67 21.2	99 11	172.6	67 51.1	99 12	172.5	68 20.9	99 12	172.3	3
4	64 45.7	99 13	171.0	65 15.5	99 14	170.8	65 45.2	99 14	170.7	66 15.0	99 14	170.5	66 44.7	99 14	170.3	67 14.4	99 14	170.2	67 44.1	99 15	170.0	68 13.8	99 15	169.8	4
05	64 37.7	99 16	168.7	65 07.3	99 16	168.5	65 37.0	99 17	168.4	66 06.6	99 17	168.2	66 36.2	99 17	168.0	67 05.7	99 18	167.7	67 35.3	99 18	167.5	68 04.8	98 18	167.3	05
6	64 28.0	98 19	166.5	64 57.5	98 19	166.3	65 26.9	98 20	166.1	65 56.4	98 20	165.8	66 25.8	98 20	165.6	66 55.2	98 21	165.4	67 24.6	98 21	165.1	67 53.9	98 21	164.8	6
7	64 16.6	98 22	164.3	64 45.9	98 22	164.1	65 15.2	98 22	163.8	65 44.4	97 23	163.6	66 13.7	97 23	163.3	66 42.9	97 24	163.0	67 12.0	97 24	162.7	67 41.1	97 24	162.4	7
8	64 03.6	97 24	162.2	64 32.7	97 25	161.9	65 01.7	97 26	161.6	65 30.8	97 26	161.3	65 59.8	97 26	161.0	66 28.7	96 26	160.7	66 57.7	96 27	160.4	67 26.5	96 27	160.0	8
9	63 48.9	96 27	160.1	64 17.8	96 27	159.8	64 46.6	96 28	159.4	65 15.5	96 28	159.1	65 44.2	96 29	158.8	66 12.9	96 29	158.4	66 41.6	95 30	158.0	67 10.2	95 30	157.7	9
10	63 32.7	96 30	158.0	64 01.4	95 30	157.7	64 30.0	95 30	157.3	64 58.5	95 31	157.0	65 27.0	95 31	156.6	65 55.4	95 32	156.2	66 23.8	94 32	155.8	66 52.1	94 33	155.4	10
1	63 15.0	95 32	156.0	63 43.4	95 32	155.6	64 11.7	94 33	155.2	64 40.0	94 33	154.8	65 08.2	94 34	154.4	65 36.4	94 34	154.0	66 04.5	93 35	153.6	66 32.5	93 35	153.1	1
2	62 55.8	94 34	153.9	63 24.0	94 35	153.6	63 52.0	93 35	153.2	64 20.0	93 36	152.8	64 47.9	93 36	152.3	65 15.8	93 37	151.9	65 43.6	92 37	151.4	66 11.2	92 38	151.0	2
3	62 35.2	93 37	152.0	63 03.1	93 37	151.6	63 30.9	92 38	151.2	63 58.6	92 38	150.7	64 26.2	92 39	150.3	64 53.7	92 39	149.8	65 21.2	91 40	149.3	65 48.5	91 40	148.8	3
4	62 13.3	92 39	150.1	62 40.9	92 39	149.6	63 08.4	91 40	149.2	63 35.8	91 40	148.7	64 03.1	91 41	148.3	64 30.3	91 41	147.8	64 57.4	90 42	147.3	65 24.4	90 42	146.8	4
15	61 50.1	91 41	148.2	62 17.3	91 41	147.7	62 44.5	90 42	147.3	63 11.6	90 42	146.8	63 38.6	90 43	146.3	64 05.5	89 43	145.8	64 32.3	89 44	145.3	64 58.9	89 45	144.8	15
6	61 25.6	90 43	146.4	61 52.6	90 43	145.9	62 19.4	89 44	145.4	62 46.2	89 44	144.9	63 12.9	89 45	144.4	63 39.4	88 45	143.9	64 05.9	88 46	143.4	64 32.2	88 47	142.8	6
7	60 59.9	89 45	144.6	61 26.6	89 45	144.1	61 53.1	88 46	143.6	62 19.6	88 46	143.1	62 45.9	88 47	142.6	63 12.2	87 47	142.0	63 38.3	87 48	141.5	64 04.2	86 48	140.9	7
8	60 33.1	88 46	142.8	60 59.5	88 47	142.3	61 25.7	87 48	141.8	61 51.8	87 48	141.3	62 17.9	87 49	140.8	62 43.7	86 49	140.2	63 09.5	86 50	139.7	63 35.1	85 50	139.1	8
9	60 05.2	87 48	141.1	60 31.3	87 49	140.6	60 57.2	86 49	140.1	61 23.0	86 50	139.6	61 48.7	85 50	139.0	62 14.3	85 51	138.5	62 39.7	84 51	137.9	63 04.9	84 52	137.3	9
20	59 36.3	86 50	139.5	60 02.0	86 50	139.0	60 27.7	85 51	138.4	60 53.2	85 51	137.9	61 18.5	84 52	137.3	61 43.7	84 52	136.8	62 08.8	83 53	136.2	62 33.7	83 54	135.6	20
1	59 06.4	85 51	137.9	59 31.8	85 52	137.3	59 57.1	84 52	136.8	60 22.3	84 53	136.3	60 47.4	83 53	135.7	61 12.3	83 54	135.1	61 37.0	82 55	134.5	62 01.6	82 55	133.9	1
2	58 35.5	84 53	136.3	59 00.7	84 53	135.8	59 25.7	83 54	135.2	59 50.6	83 54	134.7	60 15.3	82 55	134.1	60 39.9	82 55	133.5	61 04.3	81 56	132.9	61 28.5	81 57	132.3	2
3	58 03.8	83 54	134.8	58 28.7	83 55	134.2	58 53.4	82 55	133.7	59 17.9	82 56	133.1	59 42.3	81 56	132.5	60 06.6	81 57	132.0	60 30.7	80 57	131.4	60 54.6	80 58	130.7	3
4	57 31.3	82 56	133.3	57 55.8	82 56	132.7	58 20.2	81 57	132.2	58 44.5	81 57	131.6	59 08.6	80 58	131.0	59 32.5	80 58	130.5	59 56.3	79 59	129.8	60 19.9	78 59	129.2	4
25	56 57.9	81 57	131.8	57 22.2	81 57	131.3	57 46.3	80 58	130.7	58 10.2	80 58	130.2	58 34.0	79 59	129.6	58 57.7	79 59	129.0	59 21.2	78 60	128.4	59 44.5	77 60	127.8	25
6	56 23.8	80 58	130.4	56 47.8	80 58	129.9	57 11.6	79 59	129.3	57 35.3	79 59	128.7	57 58.8	78 60	128.2	58 22.2	78 60	127.6	58 45.3	77 61	127.0	59 08.4	76 61	126.3	6
7	55 48.9	79 59	129.0	56 12.7	79 60	128.5	56 36.2	78 60	127.9	56 59.6	78 61	127.4	57 22.9	77 61	126.8	57 45.9	77 61	126.2	58 08.8	76 62	125.6	58 31.6	75 62	125.0	7
8	55 13.4	78 60	127.7	55 36.9	78 61	127.2	56 00.2	77 61	126.6	56 23.3	77 62	126.0	56 46.3	76 62	125.4	57 09.1	76 62	124.8	57 31.7	75 63	124.2	57 54.1	75 63	123.6	8
9	54 37.3	77 61	126.4	55 00.5	77 62	125.8	55 23.5	76 62	125.3	55 46.4	76 62	124.7	56 09.1	75 63	124.1	56 31.6	75 63	123.5	56 54.0	74 64	122.9	57 16.1	74 64	122.3	9
30	54 00.6	77 62	125.1	54 23.5	76 63	124.6	54 46.3	76 63	124.0	55 08.9	75 63	123.4	55 31.3	75 64	122.9	55 53.6	74 64	122.3	56 15.7	73 65	121.7	56 37.6	73 65	121.0	30
1	53 23.2	76 63	123.9	53 45.9	75 63	123.3	54 08.4	75 64	122.8	54 30.8	74 64	122.2	54 53.0	74 65	121.6	55 15.0	73 65	121.0	55 36.9	73 65	120.4	55 58.6	72 66	119.8	1
2	52 45.4	75 64	122.7	53 07.8	75 64	122.1	53 30.1	74 65	121.6	53 52.2	73 65	121.0	54 14.2	73 65	120.4	54 36.0	72 66	119.8	54 57.6	72 66	119.2	55 19.0	71 67	118.6	2
3	52 07.0	74 65	121.5	52 29.2	74 65	121.0	52 51.3	73 66	120.4	53 13.2	73 66	119.8	53 34.9	72 66	119.2	53 56.5	72 67	118.7	54 17.9	71 67	118.1	54 39.1	70 67	117.5	3
4	51 28.2	74 66	120.4	51 50.2	73 66	119.8	52 12.0	73 66	119.2	52 33.7	72 67	118.7	52 55.2	71 67	118.1	53 16.5	71 67	117.5	53 37.7	70 68	116.9	53 58.7	70 68	116.3	4
35	50 48.9	73 66	119.2	51 10.7	72 67	118.7	51 32.3	72 67	118.1	51 53.7	71 67	117.6	52 15.0	71 68	117.0	52 36.2	70 68	116.4	52 57.1	70 68	115.8	53 17.9	69 69	115.2	35
6	50 09.2	72 67	118.1	50 30.7	72 67	117.6	50 52.1	71 68	117.0	51 13.4	71 68	116.5	51 34.5	70 68	115.9	51 55.4	69 69	115.3	52 16.2	69 69	114.7	52 36.8	68 69	114.1	6
7	49 29.0	72 68	117.1	49 50.4	71 68	116.5	50 11.6	70 68	116.0	50 32.7	70 68	115.4	50 53.6	69 69	114.9	51 14.3	69 69	114.3	51 34.9	68 69	113.7	51 55.3	68 70	113.1	7
8	48 48.5	71 68	116.0	49 09.7	70 68	115.5	49 30.7	70 69	114.9	49 51.6	69 69	114.4	50 12.3	69 69	113.8	50 32.9	68 70	113.2	50 53.3	68 70	112.7	51 13.5	67 70	112.1	8
9	48 07.7	70 69	115.0	48 28.7	70 69	114.5	48 49.5	69 69	113.9	49 10.2	69 70	113.4	49 30.7	68 70	112.8	49 51.1	68 70	112.2	50 11.3	67 70	111.7	50 31.4	66 71	111.1	9
40	47 26.4	70 69	114.0	47 47.3	69 70	113.5	48 08.0	69 70	112.9	48 28.5	68 70	112.4	48 48.9	68 70	111.8	49 09.1	67 71	111.3	49 29.1	67 71	110.7	49 49.0	66 71	110.1	40
1	46 44.9	69 70	113.0	47 05.6	69 70	112.5	47 26.1	68 70	111.9	47 46.5	68 70	111.4	48 06.7	67 71	110.9	48 26.7	67 71	110.3	48 46.6	66 71	109.7	49 06.3	65 72	109.2	1
2	46 03.1	69 70	112.1	46 23.6	68 70	111.5	46 44.0	68 71	111.0	47 04.2	67 71	110.5	47 24.2	67 71	109.9	47 44.1	66 71	109.4	48 03.9	65 72	108.8	48 23.4	65 72	108.2	2
3	45 21.0	68 71	111.1	45 41.3	68 71	110.6	46 01.6	67 71	110.1	46 21.6	67 71	109.5	46 41.5	66 72	109.0	47 01.3	66 72	108.4	47 20.9	65 72	107.9	47 40.3	64 72	107.3	3
4	44 38.6	68 71	110.2	44 58.8	67 71	109.7	45 18.9	67 71	109.1	45 38.8	66 72	108.6	45 58.6	66 72	108.1	46 18.2	65 72	107.5	46 37.7	65 72	107.0	46 57.0	64 73	106.4	4
45	43 56.0	67 71	109.3	44 16.1	67 72	108.8	44 36.0	66 72	108.2	44 55.8	66 72	107.7	45 15.4	65 72	107.2	45 34.9	65 72	106.6	45 54.3	64 73	106.1	46 13.4	64 73	105.5	45
6	43 13.1	67 72	108.4	43 33.1	66 72	107.9	43 52.9	66 72	107.4	44 12.6	65 72	106.8	44 32.1	65 73	106.3	44 51.4	64 73	105.8	45 10.7	64 73	105.2	45 29.7	63 73	104.7	6
7	42 30.1	66 72	107.5	42 49.9	66 72	107.0	43 09.6	65 73	106.5	43 29.1	65 73	106.0	43 48.5	64 73	105.5	44 07.8	64 73	104.9	44 26.9	63 73	104.4	44 45.8	63 73	103.8	7
8	41 46.8	66 72	106.7	42 06.5	65 73	106.2	42 26.1	65 73	105.7	42 45.5	65 73	105.1	43 04.8	64 73	104.6	43 23.9	64 73	104.1	43 42.9	63 74	103.6	44 01.8	63 74	103.0	8
9	41 03.3	66 73	105.8	41 22.9	65 73	105.3	41 42.4	65 73	104.8	42 01.7	64 73	104.3	42 20.9	64 73	103.8	42 39.9	63 74	103.3	42 58.8	63 74	102.7	43 17.6	62 74	102.2	9
50	40 19.7	65 73	105.0	40 39.2	65 73	104.5	40 58.5	64 73	104.0	41 17.7	64 74	103.5	41 36.8	63 74	103.0	41 55.8	63 74	102.5	42 14.6	62 74	101.9	42 33.3	62 74	101.4	50
1	39 35.8	65 73	104.2	39 55.2	64 73	103.7	40 14.5	64 74	103.2	40 33.6	64 74	102.7	40 52.6	63 74	102.2	41 11.5	63 74	101.7	41 30.2	62 74	101.1	41 48.8	62 74	100.6	1
2	38 51.9	65 74	103.4	39 11.2	64 74	102.9	39 30.3	64 74	102.4	39 49.4	63 74	101.9	40 08.3	63 74	101.4	40 27.1	62 74	100.9	40 45.7	62 74	100.4	41 04.2	61 74	99.8	2
3	38 07.7	64 74	102.6	38 27.0	64 74	102.1	38 46.1	63 74	101.6	39 05.0	63 74	101.1	39 23.9	63 74	100.6	39 42.6	62 74	100.1	40 01.1	62 74	99.6	40 19.6	61 75	99.1	3
4	37 23.5	64 74	101.8	37 42.6	64 74	101.3	38 01.6	63 74	100.8	38 20.5	63 74	100.3	38 39.3	62 74	99.8	38 57.9	62 75	99.3	39 16.4	61 75	98.8	39 34.8	61 75	98.3	4
55	36 39.1	64 74	101.0	36 58.2	63 74	100.6	37 17.1	63 74	100.1	37 35.9	63 74	99.6	37 54.6	62 75	99.1	38 13.2	62 75	98.6	38 31.7	61 75	98.1	38 50.0	61 75	97.6	55
6	35 54.6	63 74	100.3	36 13.6	63 74	99.8	36 32.5	63 75	99.3	36 51.2	62 75	98.8	37 09.9	62 75	98.3	37 28.4	62 75	97.9	37 46.8	61 75	97.4	38 05.0	61 75	96.9	6
7	35 10.0	63 75	99.5	35 28.9	63 75	99.1	35 47.7	63 75	98.6	36 06.4	62 75	98.1	36 25.0	62 75	97.6	36 43.5	61 75	97.1	37 01.8	61 75	96.6	37 20.1	61 75	96.1	7
8	34 25.3	63 75	98.8	34 44.2	63 75	98.3	35 02.9	62 75	97.9	35 21.6	62 75	97.4	35 40.1	62 75	96.9	35 58.5	61 75	96.4	36 16.8	61 75	95.9	36 35.0	60 75	95.4	8
9	33 40.5	63 75	98.1	33 59.3	63 75	97.6	34 18.0	62 75	97.1	34 36.6	62 75	96.7	34 55.1	61 75	96.2	35 13.5	61 75	95.7	35 31.8	61 75	95.2	35 49.9	60 75	94.7	9
60	32 55.6	63 75	97.3	33 14.4	62 75	96.9	33 33.1	62 75	96.4	33 51.6	62 75	95.9	34 10.1	61 75	95.5	34 28.4	61 75	95.0	34 46.6	61 75	94.5	35 04.7	60 75	94.0	60
1	32 10.7	63 75	96.6	32 29.4	62 75	96.2	32 48.0	62 75	95.7	33 06.6	62 75	95.2	33 25.0	61 75	94.8	33 43.3	61 75	94.3	34 01.5	60 75	93.8	34 19.6	60 75	93.3	1
2	31 25.7	62 75	95.9	31 44.4	62 75	95.5	32 02.9	62 75	95.0	32 21.4	61 75	94.5	32 39.8	61 75	94.1	32 58.1	61 75	93.6	33 16.3	60 75	93.1	33 34.3	60 75	92.6	2
3	30 40.6	62 75	95.2	30 59.3	62 75	94.8	31 17.8	62 75	94.3	31 36.3	61 75	93.8	31 54.6	61 75	93.4	32 12.9	61 75	92.9	32 31.0	60 75	92.4	32 49.1	60 75	92.0	3
4	29 55.5	62 75	94.5	30 14.1	62 75	94.1	30 32.6	62 75	93.6	30 51.1	61 75	93.2	31 09.4	61 75	92.7	31 27.7	61 75	92.2	31 45.8	60 75	91.8	32 03.8	60 75	91.3	4
65	29 10.3	62 75	93.8	29 28.9	62 75	93.4	29 47.4	62 75	92.9	30 05.8	61 75	92.5	30 24.2	61 75	92.0	30 42.4	61 75	91.6	31 00.5	60 75	91.1	31 18.6	60 75	90.6	65
6	28 25.1	62 75	93.2	28 43.7	62 75	92.7	29 02.2	61 75	92.3	29 20.6	61 75	91.8	29 38.9	61 75	91.4	29 57.1	61 75	90.9	30 15.2	60 75	90.4	30 33.3	60 75	90.0	6
7	27 39.9	62 75	92.5	27 58.5	62 75	92.0	28 16.9	61 75	91.6	28 35.3	61 75	91.1	28 53.6	61 75	90.7	29 11.8	61 75	90.2	29 30.0	60 75	89.8	29 48.0	60 75	89.3	7
8	26 54.6	62 75	91.8	27 13.2	62 75	91.4	27 31.7	61 75	90.9	27 50.1	61 75	90.5	28 08.4	61 75	90.0	28 26.6	61 75	89.6	28 44.7	60 75	89.1	29 02.7	60 75	88.7	8
9	26 09.4	62 75	91.1	26 27.9	62 75	90.7	26 46.4	61 75	90.3	27 04.8	61 75	89.8	27 23.1	61 75	89.4	27 41.3	61 75	88.9	27 59.4	60 75	88.5	28 17.4	60 75	88.0	9
70	25 24.1	62 75	90.5	25 42.6	62 75	90.1	26 01.1	61 75	89.6	26 19.5	61 75	89.2	26 37.8	61 75	88.7	26 56.0	61 75	88.3	27 14.2	60 75	87.8	27 32.2	60 75	87.4	70
1	24 38.8	62 75	89.8	24 57.4	62 75	89.4	25 15.8	61 75	89.0	25 34.2	61 75	88.5	25 52.5	61 75	88.1	26 10.8	61 75	87.6	26 28.9	60 75	87.2	26 47.0	60 75	86.8	1
2	23 53.5	62 75	89.2	24 12.1	62 75	88.7	24 30.6	61 75	88.3	24 49.0	61 75	87.9	25 07.3	61 75	87.4	25 25.5	61 75	87.0	25 43.7	60 75	86.6	26 01.8	60 75	86.1	2
3	23 08.3	62 75	88.5	23 26.8	62 75	88.1	23 45.3	61 75	87.7	24 03.7	61 75	87.2	24 22.1	61 75	86.8	24 40.3	61 75	86.4	24 58.5	61 75	85.9	25 16.6	60 75	85.5	3
4	22 23.0	62 75	87.9	22 41.6	62 75	87.5	23 00.1	62 75	87.0	23 18.5	61 75	86.6	23 36.9	61 75	86.2	23 55.1	61 75	85.7	24 13.4	61 75	85.3	24 31.5	60 75	84.9	4
75	21 37.8	62 75	87.2	21 56.3	62 75	86.8	22 14.9	62 75	86.4	22 33.3	61 75	86.0	22 51.7	61 75	85.5	23 10.0	61 75	85.1	23 28.3	61 75	84.7	23 46.4	60 75	84.2	75
6	20 52.5	62 75	86.6	21 11.1	62 75	86.2	21 29.7	62 75	85.8	21 48.2	61 75	85.3	22 06.6	61 75	84.9	22 24.9	61 75	84.5	22 43.2	61 75	84.0	23 01.4	61 75	83.6	6
7	20 07.4	62 75	86.0	20 26.0	62 75	85.5	20 44.5	62 75	85.1	21 03.0	62 75	84.7	21 21.5	61 75	84.3	21 39.9	61 75	83.9	21 58.2	61 75	83.4	22 16.4	61 75	83.0	7
8	19 22.2	62 75	85.3	19 40.9	62 75	84.9	19 59.4	62 75	84.5	20 18.0	62 75	84.1	20 36.5	61 75	83.7	20 54.9	61 75	83.2	21 13.2	61 75	82.8	21 31.5	61 75	82.4	8
9	18 37.1	62 75	84.7	18 55.8	62 75	84.3	19 14.4	62 75	83.9	19 33.0	62 75	83.4	19 51.5	62 75	83.0	20 09.9	61 75	82.6	20 28.3	61 75	82.2	20 46.7	61 75	81.8	9
80	17 52.0	62 75	84.1	18 10.7	62 75	83.6	18 29.4	62 75	83.2	18 48.0	62 75	82.8	19 06.6	62 75	82.4	19 25.1	62 75	82.0	19 43.5	61 75	81.6	20 01.9	61 75	81.1	80
1	17 07.0	62 75	83.4	17 25.8	62 75	83.0	17 44.5	62 75	82.6	18 03.1	62 75	82.2	18 21.7	62 75	81.8	18 40.3	62 75	81.4	18 58.7	62 74	81.0	19 17.2	61 74	80.5	1
2	16 22.1	63 75	82.8	16 40.9	63 75	82.4	16 59.6	62 75	82.0	17 18.3	62 75	81.6	17 36.9	62 75	81.2	17 55.5	62 74	80.8	18 14.1	62 74	80.3	18 32.5	62 74	79.9	2
3	15 37.2	63 75	82.2	15 56.0	63 75	81.8	16 14.8	63 75	81.4	16 33.5	62 74	81.0	16 52.2	62 74	80.5	17 10.9	62 74	80.1	17 29.5	62 74	79.7	17 48.0	62 74	79.3	3
4	14 52.3	63 75	81.5	15 11.2	63 74	81.1	15 30.1	63 74	80.7	15 48.9	63 74	80.3	16 07.6	62 74	79.9	16 26.3	62 74	79.5	16 45.0	62 74	79.1	17 03.6	62 74	78.7	4
85	14 07.6	63 74	80.9	14 26.5	63 74	80.5	14 45.4	63 74	80.1	15 04.3	63 74	79.7	15 23.1	63 74	79.3	15 41.8	62 74	78.9	16 00.5	62 74	78.5	16 19.2	62 74	78.1	85
6	13 22.9	63 74	80.3	13 41.9	63 74	79.9	14 00.8	63 74	79.5	14 19.7	63 74	79.1	14 38.6	63 74	78.7	14 57.4	63 74	78.3	15 16.2	63 74	77.9	15 34.9	62 74	77.5	6
7	12 38.3	64 74	79.7	12 57.4	63 74	79.3	13 16.4	63 74	78.9	13 35.3	63 74	78.5	13 54.2	63 74	78.1	14 13.1	63 74	77.7	14 32.0	63 74	77.3	14 50.8	63 73	76.9	7
8	11 53.8	64 74	79.0	12 12.9	64 74	78.6	12 32.0	63 74	78.3	12 51.0	63 74	77.9	13 10.0	63 74	77.5	13 29.0	63 73	77.1	13 47.9	63 73	76.7	14 06.7	63 73	76.3	8
9	11 09.4	64 74	78.4	11 28.6	64 74	78.0	11 47.7	64 74	77.6	12 06.8	64 74	77.2	12 25.8	63 73	76.8	12 44.9	63 73	76.4	13 03.9	63 73	76.0	13 22.8	63 73	75.6	9
90	10 25.1	64 74	77.8	10 44.3	64 74	77.4	11 03.5	64 73	77.0	11 22.7	64 73	76.6	11 41.8	64 73	76.2	12 00.9	64 73	75.8	12 20.0	63 73	75.4	12 39.0	63 73	75.0	90

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	33 00.0	1.0 01	180.0	32 30.0	1.0 01	180.0	32 00.0	1.0 01	180.0	31 30.0	1.0 01	180.0	31 00.0	1.0 01	180.0	30 30.0	1.0 01	180.0	30 00.0	1.0 01	180.0	29 30.0	1.0 01	180.0	00
1	32 59.5	1.0 02	178.9	32 29.5	1.0 02	178.9	31 59.6	1.0 02	178.9	31 29.6	1.0 02	178.9	30 59.6	1.0 02	178.9	30 29.6	1.0 02	178.9	29 59.6	1.0 02	178.9	29 29.6	1.0 02	178.9	1
2	32 58.2	1.0 04	177.7	32 28.2	1.0 04	177.7	31 58.2	1.0 04	177.7	31 28.2	1.0 04	177.8	30 58.2	1.0 04	177.8	30 28.3	1.0 04	177.8	29 58.3	1.0 04	177.8	29 28.3	1.0 04	177.8	2
3	32 55.9	1.0 05	176.6	32 26.0	1.0 05	176.6	31 56.0	1.0 05	176.6	31 26.0	1.0 05	176.6	30 56.1	1.0 05	176.7	30 26.1	1.0 05	176.7	29 56.1	1.0 05	176.7	29 26.2	1.0 05	176.8	3
4	32 52.8	1.0 07	175.4	32 22.8	1.0 07	175.5	31 52.9	1.0 07	175.5	31 22.9	1.0 07	175.5	30 53.0	1.0 07	175.6	30 23.0	1.0 06	175.6	29 53.1	1.0 06	175.6	29 23.2	1.0 06	175.7	4
05	32 48.7	1.0 08	174.3	32 18.8	1.0 08	174.3	31 48.9	1.0 08	174.4	31 19.0	1.0 08	174.4	30 49.1	1.0 08	174.5	30 19.1	1.0 08	174.5	29 49.2	1.0 08	174.5	29 19.3	1.0 08	174.6	05
6	32 43.7	1.0 10	173.1	32 13.9	1.0 10	173.2	31 44.0	1.0 10	173.3	31 14.1	1.0 10	173.3	30 44.3	1.0 09	173.4	30 14.4	1.0 09	173.4	29 44.5	1.0 09	173.5	29 14.6	1.0 09	173.5	6
7	32 37.9	99 11	172.0	32 08.1	99 11	172.1	31 38.2	99 11	172.1	31 08.4	99 11	172.2	30 38.6	99 11	172.3	30 08.8	99 11	172.3	29 38.9	99 11	172.4	29 09.1	99 11	172.4	7
8	32 31.1	99 13	170.9	32 01.4	99 13	170.9	31 31.6	99 12	171.0	31 01.8	99 12	171.1	30 32.1	99 12	171.2	30 02.3	99 12	171.2	29 32.5	99 12	171.3	29 02.7	99 12	171.4	8
9	32 23.5	99 14	169.7	31 53.8	99 14	169.8	31 24.1	99 14	169.9	30 54.4	99 14	170.0	30 24.7	99 14	170.1	29 54.9	99 14	170.1	29 25.2	99 14	170.2	28 55.5	99 13	170.3	9
10	32 15.0	99 16	168.6	31 45.4	99 16	168.7	31 15.7	99 15	168.8	30 46.1	99 15	168.9	30 16.4	99 15	169.0	29 46.8	99 15	169.1	29 17.1	99 15	169.1	28 47.5	99 15	169.2	10
1	32 05.6	99 17	167.5	31 36.1	99 17	167.6	31 06.5	99 17	167.7	30 36.9	99 17	167.8	30 07.4	99 17	167.9	29 37.8	99 16	168.0	29 08.2	99 16	168.1	28 38.6	99 16	168.2	1
2	31 55.4	98 18	166.4	31 25.9	98 18	166.5	30 56.4	98 18	166.6	30 26.9	98 18	166.7	29 57.4	98 18	166.8	29 27.9	98 18	166.9	28 58.4	98 18	167.0	28 28.9	98 18	167.1	2
3	31 44.3	98 20	165.3	31 14.9	98 20	165.4	30 45.5	98 20	165.5	30 16.1	98 19	165.6	29 46.7	98 19	165.7	29 17.3	98 19	165.8	28 47.8	98 19	166.0	28 18.4	98 19	166.1	3
4	31 32.4	98 21	164.2	31 03.1	98 21	164.3	30 33.8	98 21	164.4	30 04.4	98 21	164.5	29 35.1	98 21	164.7	29 05.8	98 20	164.8	28 36.4	98 20	164.9	28 07.1	98 20	165.0	4
15	31 19.6	97 23	163.1	30 50.4	97 22	163.2	30 21.2	97 22	163.3	29 52.0	97 22	163.5	29 22.7	97 22	163.6	28 53.5	97 22	163.7	28 24.2	98 22	163.8	27 55.0	98 22	164.0	15
6	31 06.0	97 24	162.0	30 36.9	97 24	162.1	30 07.8	97 24	162.3	29 38.7	97 24	162.4	29 09.5	97 23	162.5	28 40.4	97 23	162.7	28 11.2	97 23	162.8	27 42.1	97 23	162.9	6
7	30 51.6	97 25	160.9	30 22.6	97 25	161.0	29 53.6	97 25	161.2	29 24.6	97 25	161.3	28 55.5	97 25	161.5	28 26.5	97 24	161.6	27 57.5	97 24	161.8	27 28.4	97 24	161.9	7
8	30 36.4	96 27	159.8	30 07.5	96 27	160.0	29 38.6	96 26	160.1	29 09.7	96 26	160.3	28 40.8	96 26	160.4	28 11.8	96 26	160.6	27 42.9	96 26	160.7	27 14.0	97 25	160.9	8
9	30 20.3	96 28	158.7	29 51.6	96 28	158.9	29 22.8	96 28	159.1	28 54.0	96 27	159.2	28 25.2	96 27	159.4	27 56.4	96 27	159.5	27 27.6	96 27	159.7	26 58.7	96 27	159.9	9
20	30 03.5	96 29	157.7	29 34.9	95 29	157.8	29 06.2	96 29	158.0	28 37.6	96 29	158.2	28 08.9	96 28	158.4	27 40.2	96 28	158.5	27 11.5	96 28	158.7	26 42.8	96 28	158.8	20
1	29 45.9	95 31	156.6	29 17.4	95 30	156.8	28 48.9	95 30	157.0	28 20.4	95 30	157.2	27 51.8	95 30	157.3	27 23.2	95 30	157.5	26 54.7	95 29	157.7	26 26.1	95 29	157.8	1
2	29 27.6	95 32	155.6	28 59.2	95 32	155.8	28 30.8	95 31	155.9	28 02.4	95 31	156.1	27 34.0	95 31	156.3	27 05.5	95 31	156.5	26 37.1	95 31	156.7	26 08.6	95 30	156.8	2
3	29 08.5	94 33	154.5	28 40.2	94 33	154.7	28 12.0	94 33	154.9	27 43.7	94 32	155.1	27 15.4	94 32	155.3	26 47.1	94 32	155.5	26 18.8	94 32	155.7	25 50.4	94 31	155.8	3
4	28 48.6	94 34	153.7	28 20.5	94 34	153.7	27 52.4	94 34	153.9	27 24.3	94 34	154.1	26 56.1	94 33	154.3	26 27.9	94 33	154.5	25 59.8	94 33	154.7	25 31.6	94 33	154.9	4
25	28 28.1	93 35	152.5	28 00.1	93 35	152.7	27 32.1	93 35	152.9	27 04.1	93 35	153.1	26 36.1	93 35	153.3	26 08.1	93 34	153.5	25 40.0	94 34	153.7	25 12.0	94 34	153.9	25
6	28 06.8	93 37	151.5	27 39.0	93 36	151.7	27 11.1	93 36	151.9	26 43.3	93 36	152.1	26 15.4	93 36	152.3	25 47.5	93 35	152.5	25 19.6	93 35	152.7	24 51.7	93 35	152.9	6
7	27 44.8	92 38	150.5	27 17.1	92 38	150.7	26 49.5	92 37	150.9	26 21.7	92 37	151.1	25 54.0	92 37	151.3	25 26.3	93 37	151.5	24 58.5	93 36	151.7	24 30.7	93 36	151.9	7
8	27 22.1	92 39	149.5	26 54.6	92 39	149.7	26 27.1	92 38	149.9	25 59.5	92 38	150.1	25 31.9	92 38	150.3	25 04.3	92 38	150.6	24 36.7	92 37	150.8	24 09.1	92 37	151.0	8
9	26 58.8	91 40	148.5	26 31.4	91 40	148.7	26 04.0	91 40	148.9	25 36.6	91 39	149.2	25 09.2	91 39	149.4	24 41.8	92 39	149.6	24 14.3	92 38	149.8	23 46.8	92 38	150.0	9
30	26 34.8	91 41	147.5	26 07.6	91 41	147.7	25 40.3	91 41	148.0	25 13.1	91 40	148.2	24 45.8	91 40	148.4	24 18.5	91 40	148.6	23 51.2	91 40	148.9	23 23.9	91 39	149.1	30
1	26 10.1	90 42	146.5	25 43.1	90 42	146.8	25 16.0	90 42	147.0	24 48.9	90 41	147.2	24 21.8	90 41	147.5	23 54.6	91 41	147.7	23 27.5	91 41	147.9	23 00.3	91 40	148.2	1
2	25 44.8	90 43	145.6	25 17.9	90 43	145.8	24 51.0	90 43	146.0	24 24.1	90 42	146.3	23 57.1	90 42	146.5	23 30.1	90 42	146.8	23 03.1	90 42	147.0	22 36.1	90 41	147.2	2
3	25 18.9	89 44	144.6	24 52.2	89 44	144.9	24 25.4	89 44	145.1	23 58.6	89 43	145.4	23 31.8	89 43	145.6	23 05.0	89 43	145.8	22 38.2	90 43	146.1	22 11.3	90 42	146.3	3
4	24 52.4	89 45	143.7	24 25.8	89 45	143.9	23 59.2	89 45	144.2	23 32.6	89 44	144.4	23 06.0	89 44	144.7	22 39.3	89 44	144.9	22 12.6	89 44	145.2	21 45.9	89 43	145.4	4
35	24 25.3	88 46	142.7	23 58.9	88 46	143.0	23 32.4	88 46	143.3	23 06.0	88 45	143.5	22 39.5	88 45	143.8	22 13.0	88 45	144.0	21 46.4	88 45	144.3	21 19.9	89 44	144.5	35
6	23 57.6	87 47	141.8	23 31.3	88 47	142.1	23 05.0	88 47	142.3	22 38.7	88 46	142.6	22 12.4	88 46	142.9	21 46.1	88 46	143.1	21 19.7	88 46	143.4	20 53.3	88 45	143.6	6
7	23 29.3	87 48	140.9	23 03.2	87 48	141.2	22 37.1	87 48	141.4	22 11.0	87 47	141.7	21 44.8	87 47	142.0	21 18.6	87 47	142.2	20 52.4	87 46	142.5	20 26.2	87 46	142.7	7
8	23 00.4	86 49	140.0	22 34.5	86 49	140.3	22 08.6	87 48	140.5	21 42.6	87 48	140.8	21 16.6	87 48	141.1	20 50.6	87 48	141.3	20 24.6	87 47	141.6	19 58.5	87 47	141.9	8
9	22 31.0	86 50	139.1	22 05.3	86 50	139.4	21 39.5	86 49	139.6	21 13.7	86 49	139.9	20 47.9	86 49	140.2	20 22.0	86 48	140.5	19 56.2	86 48	140.7	19 30.3	86 48	141.0	9
40	22 01.1	85 51	138.2	21 35.5	85 50	138.5	21 09.9	85 50	138.8	20 44.3	85 50	139.0	20 18.6	86 50	139.3	19 53.0	86 49	139.6	19 27.2	86 49	139.9	19 01.5	86 49	140.1	40
1	21 30.7	85 52	137.3	21 05.3	85 51	137.6	20 39.8	85 51	137.9	20 14.4	85 51	138.2	19 48.9	85 50	138.5	19 23.3	85 50	138.7	18 57.8	85 50	139.0	18 32.2	85 50	139.3	1
2	20 59.7	84 52	136.5	20 34.5	84 52	136.7	20 09.2	84 52	137.0	19 43.9	84 52	137.3	19 18.6	84 51	137.6	18 53.2	85 51	137.9	18 27.8	85 51	138.2	18 02.4	85 50	138.4	2
3	20 28.3	84 53	135.6	20 03.2	84 53	135.9	19 38.1	84 53	136.2	19 13.0	84 52	136.5	18 47.8	84 52	136.8	18 22.6	84 52	137.0	17 57.4	84 52	137.3	17 32.2	84 51	137.6	3
4	19 56.4	83 54	134.7	19 31.5	83 54	135.0	19 06.5	83 53	135.3	18 41.5	83 53	135.6	18 16.5	83 53	135.9	17 51.5	83 53	136.2	17 26.5	84 52	136.5	17 01.4	84 52	136.8	4
45	19 24.0	82 55	133.9	18 59.2	83 55	134.2	18 34.4	83 54	134.5	18 09.6	83 54	134.8	17 44.8	83 54	135.1	17 19.9	83 53	135.4	16 55.0	83 53	135.7	16 30.1	83 53	136.0	45
6	18 51.1	82 56	133.1	18 26.5	82 55	133.4	18 01.9	82 55	133.7	17 37.3	82 55	134.0	17 12.6	82 54	134.3	16 47.9	82 54	134.6	16 23.2	82 54	134.9	15 58.4	83 54	135.1	6
7	18 17.8	81 56	132.2	17 53.4	81 56	132.5	17 28.9	82 56	132.8	17 04.4	82 55	133.1	16 39.9	82 55	133.4	16 15.4	82 55	133.7	15 50.8	82 55	134.0	15 26.3	82 54	134.3	7
8	17 44.1	81 57	131.4	17 19.8	81 57	131.7	16 55.5	81 56	132.0	16 31.2	81 56	132.3	16 06.8	81 56	132.6	15 42.5	81 56	132.9	15 18.1	81 55	133.2	14 53.7	81 55	133.5	8
9	17 09.9	80 58	130.6	16 45.8	80 57	130.9	16 21.7	80 57	131.2	15 57.5	81 57	131.5	15 33.3	81 57	131.8	15 09.1	81 56	132.1	14 44.9	81 56	132.4	14 20.6	81 56	132.8	9
50	16 35.3	80 58	129.8	16 11.4	80 58	130.1	15 47.4	80 58	130.4	15 23.4	80 58	130.7	14 59.4	80 57	131.0	14 35.3	80 57	131.4	14 11.3	80 57	131.7	13 47.2	80 56	132.0	50
1	16 00.3	79 59	129.0	15 36.5	79 59	129.3	15 12.7	79 58	129.6	14 48.9	79 58	129.9	14 25.0	80 58	130.3	14 01.1	80 58	130.6	13 37.2	80 57	130.9	13 13.3	80 57	131.2	1
2	15 24.9	79 60	128.2	15 01.3	79 59	128.5	14 37.6	79 59	128.8	14 14.0	79 59	129.2	13 50.3	79 59	129.5	13 26.5	79 58	129.8	13 02.8	79 58	130.1	12 39.0	79 58	130.4	2
3	14 49.1	78 60	127.4	14 25.7	78 60	127.7	14 02.2	78 60	128.1	13 38.7	78 59	128.4	13 15.1	79 59	128.7	12 51.5	79 59	129.0	12 28.0	79 59	129.3	12 04.3	79 58	129.7	3
4	14 13.0	78 61	126.7	13 49.7	78 61	127.0	13 26.3	78 60	127.3	13 03.0	78 60	127.6	12 39.6	78 60	127.9	12 16.2	78 60	128.3	11 52.7	78 59	128.6	11 29.3	78 59	128.9	4
55	13 36.5	77 61	125.9	13 13.3	77 61	126.2	12 50.1	77 61	126.5	12 26.9	77 61	126.9	12 03.7	77 60	127.2	11 40.4	78 60	127.5	11 17.2	78 60	127.8	10 53.9	78 60	128.2	55
6	12 59.6	77 62	125.1	12 36.6	77 62	125.5	12 13.6	77 62	125.8	11 50.5	77 61	126.1	11 27.4	77 61	126.4	11 04.3	77 61	126.8	10 41.2	77 60	127.1	10 18.1	77 60	127.4	6
7	12 22.4	76 63	124.4	11 59.6	76 62	124.7	11 36.7	76 62	125.0	11 13.8	76 62	125.4	10 50.8	76 62	125.7	10 27.9	77 61	126.0	10 04.9	77 61	126.3	9 41.9	77 61	126.7	7
8	11 44.9	76 63	123.6	11 22.2	76 63	124.0	10 59.4	76 63	124.3	10 36.7	76 62	124.6	10 13.9	76 62	125.0	9 51.1	76 62	125.3	9 28.3	76 62	125.6	9 05.4	76 61	125.9	8
9	11 07.0	75 64	122.9	10 44.4	75 63	123.2	10 21.9	75 63	123.6	9 59.2	75 63	123.9	9 36.6	75 63	124.2	9 14.0	76 62	124.6	8 51.3	76 62	124.9	8 28.6	76 62	125.2	9
60	10 28.8	75 64	122.2	10 06.4	75 64	122.5	9 44.0	75 64	122.8	9 21.5	75 63	123.2	8 59.0	75 63	123.5	8 36.5	75 63	123.8	8 14.0	75 63	124.2	7 51.5	75 62	124.5	60
1	9 50.3	74 65	121.4	9 28.1	74 64	121.8	9 05.8	74 64	122.1	8 43.4	74 64	122.4	8 21.1	74 64	122.8	7 58.7	75 63	123.1	7 36.4	75 63	123.5	7 14.0	75 63	123.8	1
2	9 11.6	74 65	120.7	8 49.4	74 65	121.0	8 27.3	74 65	121.4	8 05.1	74 64	121.7	7 42.9	74 64	122.1	7 20.7	74 64	122.4	6 58.4	74 64	122.7	6 36.2	74 63	123.1	2
3	8 32.5	73 66	120.0	8 10.5	73 65	120.3	7 48.5	73 65	120.7	7 26.4	73 65	121.0	7 04.4	74 65	121.4	6 42.3	74 64	121.7	6 20.2	74 64	122.0	5 58.1	74 64	122.4	3
4	7 53.1	73 66	119.3	7 31.3	73 66	119.6	7 09.4	73 66	120.0	6 47.5	73 65	120.3	6 25.5	73 65	120.7	6 03.6	73 65	121.0	5 41.7	73 65	121.3	5 19.7	73 64	121.7	4
65	7 13.5	72 66	118.6	6 51.8	72 66	118.9	6 30.0	73 66	119.3	6 08.2	73 66	119.6	5 46.5	73 66	120.0	5 24.7	73 65	120.3	5 02.9	73 65	120.7				65
6	6 33.6	72 67	117.9	6 12.0	72 67	118.2	5 50.4	72 67	118.6	5 28.7	72 66	118.9	5 07.1	72 66	119.3										6
7	5 53.4	72 67	117.2	5 32.0	72 67	117.5	5 10.5	72 67	117.9																7
8	5 13.0	71 68	116.5																						8

Lat. 41°

Lat. 42°

Lat. 43°

Lat. 44°

Lat. 45°

Lat. 46°

Lat. 47°

Lat. 48°

DECLINATION SAME NAME AS LATITUDE

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	9 40.9	64 74	77.2	10 08.2	64 73	76.8	10 19.4	64 73	76.4	10 38.7	64 73	76.0	10 57.9	64 73	75.6	11 17.1	64 73	75.2	11 36.2	64 73	74.8	11 55.3	64 73	74.4	91
2	8 56.8	65 73	76.5	9 16.2	65 73	76.1	9 35.5	64 73	75.8	9 54.8	64 73	75.4	10 14.1	64 73	75.0	10 33.3	64 73	74.6	10 52.6	64 72	74.2	11 11.8	64 72	73.8	2
3	8 12.8	65 73	75.9	8 32.3	65 73	75.5	8 51.7	65 73	75.1	9 11.1	65 73	74.7	9 30.4	65 73	74.4	9 49.8	64 72	74.0	10 09.1	64 72	73.6	10 28.4	64 72	73.2	3
4	7 29.0	65 73	75.3	7 48.5	65 73	74.9	8 08.0	65 73	74.5	8 27.4	65 72	74.1	8 46.9	65 72	73.7	9 06.3	65 72	73.4	9 25.7	65 72	73.0	9 45.1	65 72	72.6	4
95	6 45.2	65 73	74.6	7 04.8	65 73	74.3	7 24.4	65 72	73.9	7 43.9	65 72	73.5	8 03.5	65 72	73.1	8 23.0	65 72	72.7	8 42.5	65 72	72.3	9 01.9	65 72	72.0	95
6	6 01.6	66 72	74.0	6 21.3	66 72	73.6	6 41.0	65 72	73.3	7 00.6	65 72	72.9	7 20.2	65 72	72.5	7 39.8	65 72	72.1	7 59.4	65 72	71.7	8 19.0	65 71	71.3	6
7	5 18.2	66 72	73.4	5 37.9	66 72	73.0	5 57.7	66 72	72.6	6 17.4	66 72	72.2	6 37.1	66 72	71.9	6 56.8	66 71	71.5	7 16.5	66 71	71.1	7 36.1	65 71	70.7	7
8							5 14.5	66 72	72.0	5 34.4	66 72	71.6	5 54.2	66 71	71.2	6 13.9	66 71	70.9	6 33.7	66 71	70.5	6 53.5	66 71	70.1	8
9													5 11.4	66 71	70.6	5 31.3	66 71	70.2	5 51.1	66 71	69.8	6 11.0	66 71	69.5	9
100																			5 08.7	67 70	69.2	5 28.7	67 70	68.8	100

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Lat. 41°

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	69 00.0	1.0 02	180.0	69 30.0	1.0 02	180.0	70 00.0	1.0 02	180.0	70 30.0	1.0 02	180.0	71 00.0	1.0 02	180.0	71 30.0	1.0 02	180.0	72 00.0	1.0 02	180.0	72 30.0	1.0 02	180.0	00
1	68 59.0	1.0 05	177.4	69 28.9	1.0 05	177.3	69 58.9	1.0 05	177.3	70 28.9	1.0 06	177.2	70 58.9	1.0 06	177.2	71 28.8	1.0 06	177.1	71 58.8	1.0 06	177.0	72 28.8	1.0 06	177.0	1
2	68 55.9	1.0 09	174.8	69 25.8	1.0 09	174.7	69 55.7	1.0 09	174.6	70 25.6	1.0 09	174.4	70 55.5	1.0 09	174.3	71 25.4	1.0 10	174.2	71 55.3	1.0 10	174.1	72 25.2	1.0 10	173.9	2
3	68 50.7	99 12	172.2	69 20.5	99 12	172.0	69 50.3	99 12	171.9	70 20.1	99 13	171.7	70 49.9	99 13	171.5	71 19.7	99 13	171.3	71 49.5	99 14	171.1	72 19.2	99 14	170.9	3
4	68 43.5	99 15	169.6	69 13.2	99 16	169.4	69 42.9	99 16	169.2	70 12.5	99 16	168.9	70 42.1	99 17	168.7	71 11.7	99 17	168.5	71 41.3	99 17	168.2	72 10.9	99 18	167.9	4
05	68 34.4	98 19	167.0	69 03.9	98 19	166.8	69 33.3	98 19	166.5	70 02.8	98 20	166.3	70 32.2	98 20	166.0	71 01.6	98 20	165.7	71 31.0	98 21	165.3	72 00.3	98 21	165.0	05
6	68 23.2	98 22	164.5	68 52.5	98 22	164.2	69 21.8	97 22	163.9	69 51.0	97 23	163.6	70 20.2	97 23	163.3	70 49.3	97 24	162.9	71 18.4	97 24	162.5	71 47.5	97 25	162.1	6
7	68 10.2	97 25	162.1	68 39.3	97 25	161.7	69 08.3	97 26	161.4	69 37.2	96 26	161.0	70 06.1	96 27	160.6	70 35.0	96 27	160.2	71 03.8	96 28	159.8	71 32.5	96 28	159.3	7
8	67 55.4	96 28	159.6	68 24.2	96 28	159.3	68 52.9	96 29	158.9	69 21.5	95 29	158.4	69 50.2	95 30	158.0	70 18.7	95 30	157.6	70 47.2	95 31	157.1	71 15.6	95 32	156.6	8
9	67 38.7	96 31	157.3	68 07.2	95 31	156.8	68 35.6	95 32	156.4	69 04.0	94 32	156.0	69 32.3	94 33	155.5	70 00.5	94 33	155.0	70 28.6	94 34	154.5	70 56.6	93 35	153.9	9
10	67 20.4	94 33	154.9	67 48.6	94 34	154.5	68 16.7	94 34	154.0	68 44.7	93 35	153.5	69 12.6	93 36	153.0	69 40.4	93 36	152.5	70 08.2	92 37	151.9	70 35.8	92 38	151.4	10
1	67 00.4	93 36	152.7	67 28.2	93 36	152.2	67 56.0	92 37	151.7	68 23.7	92 38	151.2	68 51.2	92 38	150.6	69 18.7	91 39	150.1	69 46.0	91 40	149.5	70 13.2	90 40	148.9	1
2	66 38.8	92 38	150.5	67 06.3	92 39	150.0	67 33.7	91 40	149.4	68 01.0	91 40	148.9	68 28.2	90 41	148.3	68 55.3	90 42	147.7	69 22.2	90 42	147.1	69 49.0	89 43	146.5	2
3	66 15.8	91 41	148.3	66 42.9	90 41	147.8	67 10.0	90 42	147.2	67 36.9	90 43	146.7	68 03.7	89 43	146.1	68 30.3	89 44	145.4	68 56.8	88 45	144.8	69 23.2	88 45	144.1	3
4	65 51.3	89 43	146.2	66 18.1	89 44	145.7	66 44.8	89 44	145.1	67 11.3	88 45	144.5	67 37.7	88 46	143.9	68 03.9	87 46	143.2	68 30.0	87 47	142.6	68 56.0	86 48	141.9	4
15	65 25.5	88 45	144.2	65 51.9	88 46	143.6	66 18.2	87 46	143.0	66 44.3	87 47	142.4	67 10.3	86 48	141.8	67 36.2	86 48	141.1	68 01.8	85 49	140.4	68 27.3	85 50	139.7	15
6	64 58.4	87 47	142.2	65 24.4	87 48	141.7	65 50.3	86 48	141.0	66 16.1	86 49	140.4	66 41.7	85 50	139.8	67 07.1	84 50	139.1	67 32.4	84 51	138.4	67 57.4	83 52	137.7	6
7	64 30.1	86 49	140.3	64 55.7	85 50	139.7	65 21.3	85 50	139.1	65 46.6	84 51	138.5	66 11.9	84 52	137.8	66 36.9	83 52	137.1	67 01.7	82 53	136.4	67 26.4	82 54	135.7	7
8	64 00.6	85 51	138.5	64 25.9	84 52	137.9	64 51.1	84 52	137.2	65 16.1	83 53	136.6	65 40.9	82 53	135.9	66 05.5	82 54	135.2	66 30.0	81 55	134.5	66 54.2	80 55	133.7	8
9	63 30.1	83 53	136.7	63 55.0	83 53	136.1	64 19.8	82 54	135.4	64 44.4	82 54	134.8	65 08.9	81 55	134.1	65 33.1	80 56	133.4	65 57.1	80 56	132.7	66 21.0	79 57	131.9	9
20	62 58.5	82 54	135.0	63 23.1	82 55	134.3	63 47.6	81 55	133.7	64 11.8	81 56	133.0	64 35.9	80 57	132.3	64 59.7	79 57	131.6	65 23.4	78 58	130.9	65 46.8	78 58	130.1	20
1	62 26.0	81 56	133.3	62 50.3	81 56	132.7	63 14.4	80 57	132.0	63 38.2	79 57	131.3	64 01.9	79 58	130.6	64 25.4	78 59	129.9	64 48.7	77 59	129.2	65 11.8	76 60	128.4	1
2	61 52.6	80 57	131.7	62 16.5	79 58	131.0	62 40.3	79 58	130.4	63 03.8	78 59	129.7	63 27.2	77 59	129.0	63 50.3	77 60	128.3	64 13.2	76 60	127.5	64 35.9	75 61	126.8	2
3	61 18.4	79 58	130.1	61 42.0	78 59	129.5	62 05.4	78 59	128.8	62 28.6	77 60	128.1	62 51.6	76 61	127.4	63 14.4	76 61	126.7	63 36.9	75 62	126.0	63 59.2	74 62	125.2	3
4	60 43.4	78 60	128.6	61 06.7	77 60	127.9	61 29.7	77 61	127.3	61 52.6	76 61	126.6	62 15.3	75 62	125.9	62 37.7	74 62	125.2	62 59.9	74 63	124.4	63 21.9	73 63	123.7	4
25	60 07.6	77 61	127.1	60 30.6	76 61	126.5	60 53.3	76 62	125.8	61 15.9	75 62	125.1	61 38.2	74 63	124.4	62 00.4	73 63	123.7	62 22.2	73 64	123.0	62 43.9	72 64	122.2	25
6	59 31.2	76 62	125.7	59 53.8	75 62	125.0	60 16.3	74 63	124.4	60 38.5	74 63	123.7	61 00.6	73 64	123.0	61 22.4	72 64	122.3	61 44.0	72 65	121.6	62 05.3	71 65	120.8	6
7	58 54.1	75 63	124.3	59 16.5	74 63	123.7	59 38.6	74 64	123.0	60 00.6	73 64	122.3	60 22.3	72 65	121.6	60 43.8	71 65	120.9	61 05.1	71 66	120.2	61 26.1	70 66	119.5	7
8	58 16.4	74 64	123.0	58 38.5	73 64	122.3	59 00.3	73 65	121.7	59 22.0	72 65	121.0	59 43.5	71 66	120.3	60 04.7	70 66	119.6	60 25.7	70 66	118.9	60 46.5	69 67	118.1	8
9	57 38.1	73 65	121.7	57 59.9	72 65	121.0	58 21.5	72 66	120.4	58 42.9	71 66	119.7	59 04.1	70 66	119.0	59 25.1	69 67	118.3	59 45.8	69 67	117.6	60 06.3	68 68	116.9	9
30	56 59.3	72 65	120.4	57 20.9	71 66	119.8	57 42.2	71 66	119.1	58 03.4	70 67	118.4	58 24.3	69 67	117.8	58 45.0	69 68	117.1	59 05.4	68 68	116.4	59 25.7	67 68	115.6	30
1	56 20.0	71 66	119.2	56 41.3	71 67	118.5	57 02.4	70 67	117.9	57 23.3	69 67	117.2	57 44.0	69 68	116.6	58 04.4	68 68	115.9	58 24.7	67 69	115.2	58 44.7	66 69	114.5	1
2	55 40.3	71 67	118.0	56 01.3	70 67	117.4	56 22.2	69 68	116.7	56 42.8	68 68	116.1	57 03.3	68 68	115.4	57 23.5	67 69	114.7	57 43.5	66 69	114.0	58 03.2	65 70	113.3	2
3	55 00.1	70 68	116.8	55 20.9	69 68	116.2	55 41.5	68 68	115.6	56 02.0	68 69	114.9	56 22.2	67 69	114.2	56 42.2	66 69	113.6	57 01.9	66 70	112.9	57 21.5	65 70	112.2	3
4	54 19.5	69 68	115.7	54 40.1	68 69	115.1	55 00.5	68 69	114.4	55 20.7	67 69	113.8	55 40.7	66 70	113.1	56 00.5	66 70	112.5	56 20.1	65 70	111.8	56 39.4	64 71	111.1	4
35	53 38.5	68 69	114.6	53 58.9	68 69	114.0	54 19.1	67 70	113.4	54 39.1	66 70	112.7	54 58.9	66 70	112.1	55 18.5	65 71	111.4	55 37.9	64 71	110.7	55 57.0	63 71	110.0	35
6	52 57.1	68 69	113.5	53 17.4	67 70	112.9	53 37.4	66 70	112.3	53 57.2	66 70	111.7	54 16.8	65 71	111.0	54 36.2	64 71	110.4	54 55.4	64 71	109.7	55 14.3	63 72	109.0	6
7	52 15.5	67 70	112.5	52 35.5	66 70	111.9	52 55.3	66 71	111.3	53 14.9	65 71	110.6	53 34.4	64 71	110.0	53 53.6	64 71	109.3	54 12.6	63 72	108.7	54 31.4	62 72	108.0	7
8	51 33.5	66 70	111.5	51 53.3	66 71	110.9	52 13.0	65 71	110.3	52 32.4	65 71	109.6	52 51.7	64 72	109.0	53 10.7	63 72	108.4	53 29.6	62 72	107.7	53 48.2	62 72	107.1	8
9	50 51.2	66 71	110.5	51 10.9	65 71	109.9	51 30.4	65 71	109.3	51 49.7	64 72	108.7	52 08.8	63 72	108.0	52 27.6	63 72	107.4	52 46.3	62 72	106.8	53 04.8	61 73	106.1	9
40	50 08.7	65 71	109.5	50 28.2	65 72	108.9	50 47.5	64 72	108.3	51 06.6	63 72	107.7	51 25.6	63 72	107.1	51 44.3	62 73	106.5	52 02.9	61 73	105.8	52 21.2	61 73	105.2	40
1	49 25.9	65 72	108.6	49 45.2	64 72	108.0	50 04.4	64 72	107.4	50 23.4	63 72	106.8	50 42.2	62 73	106.2	51 00.8	62 73	105.5	51 19.2	61 73	104.9	51 37.4	60 73	104.3	1
2	48 42.8	64 72	107.6	49 02.0	64 72	107.1	49 21.1	63 73	106.5	49 39.9	63 73	105.9	49 58.6	62 73	105.3	50 17.1	61 73	104.7	50 35.4	61 73	104.0	50 53.4	60 74	103.4	2
3	47 59.6	64 72	106.7	48 18.6	63 73	106.2	48 37.6	63 73	105.6	48 56.3	62 73	105.0	49 14.8	61 73	104.4	49 33.2	61 73	103.8	49 51.3	60 74	103.2	50 09.3	60 74	102.5	3
4	47 16.1	63 73	105.9	47 35.1	63 73	105.3	47 53.8	62 73	104.7	48 12.4	62 73	104.1	48 30.9	61 74	103.5	48 49.1	61 74	102.9	49 07.2	60 74	102.3	49 25.0	59 74	101.7	4
45	46 32.4	63 73	105.0	46 51.3	63 73	104.4	47 10.0	62 73	103.8	47 28.5	61 74	103.3	47 46.8	61 74	102.7	48 04.9	60 74	102.1	48 22.9	60 74	101.5	48 40.6	59 74	100.9	45
6	45 48.6	63 73	104.1	46 07.3	62 73	103.6	46 25.9	62 74	103.0	46 44.3	61 74	102.4	47 02.5	60 74	101.8	47 20.6	60 74	101.3	47 38.4	59 74	100.7	47 56.1	59 74	100.1	6
7	45 04.6	62 74	103.3	45 23.2	62 74	102.7	45 41.7	61 74	102.2	46 00.0	61 74	101.6	46 18.1	60 74	101.0	46 36.1	60 74	100.4	46 53.9	59 74	99.9	47 11.5	58 75	99.3	7
8	44 20.5	62 74	102.5	44 39.0	62 74	101.9	44 57.4	61 74	101.4	45 15.6	60 74	100.8	45 33.6	60 74	100.2	45 51.5	59 74	99.7	46 09.2	59 75	99.1	46 26.7	58 75	98.5	8
9	43 36.2	62 74	101.7	43 54.6	61 74	101.1	44 12.9	61 74	100.6	44 31.1	60 74	100.0	44 49.0	60 75	99.4	45 06.8	59 75	98.9	45 24.4	58 75	98.3	45 41.9	58 75	97.7	9
50	42 51.8	61 74	100.9	43 10.1	61 74	100.3	43 28.4	60 74	99.8	43 46.4	60 75	99.2	44 04.3	59 75	98.7	44 22.0	59 75	98.1	44 39.6	58 75	97.5	44 57.0	58 75	97.0	50
1	42 07.2	61 74	100.1	42 25.5	61 74	99.5	42 43.7	60 75	99.0	43 01.7	60 75	98.5	43 19.5	59 75	97.9	43 37.2	59 75	97.4	43 54.7	58 75	96.8	44 12.0	58 75	96.2	1
2	41 22.6	61 75	99.3	41 40.8	60 75	98.8	41 58.9	60 75	98.2	42 16.8	59 75	97.7	42 34.6	59 75	97.2	42 52.2	58 75	96.6	43 09.7	58 75	96.1	43 27.0	57 75	95.5	2
3	40 37.9	61 75	98.6	40 56.0	60 75	98.0	41 14.1	60 75	97.5	41 31.9	59 75	97.0	41 49.6	59 75	96.4	42 07.2	58 75	95.9	42 24.6	58 75	95.3	42 41.8	57 75	94.8	3
4	39 53.1	61 75	97.8	40 11.2	60 75	97.3	40 29.1	60 75	96.8	40 46.9	59 75	96.2	41 04.6	59 75	95.7	41 22.1	58 75	95.2	41 39.5	58 75	94.6	41 56.7	57 75	94.1	4
55	39 08.2	60 75	97.1	39 26.2	60 75	96.6	39 44.1	59 75	96.0	40 01.9	59 75	95.5	40 19.5	59 75	95.0	40 37.0	58 75	94.4	40 54.3	58 75	93.9	41 11.5	57 75	93.4	55
6	38 23.2	60 75	96.3	38 41.2	60 75	95.8	38 59.1	59 75	95.3	39 16.8	59 75	94.8	39 34.4	58 75	94.3	39 51.8	58 75	93.7	40 09.1	57 75	93.2	40 26.3	57 75	92.7	6
7	37 38.2	60 75	95.6	37 56.1	60 75	95.1	38 13.9	59 75	94.6	38 31.6	59 75	94.1	38 49.2	58 75	93.6	39 06.6	58 75	93.1	39 23.9	57 75	92.5	39 41.1	57 75	92.0	7
8	36 53.1	60 75	94.9	37 11.0	60 75	94.4	37 28.8	59 75	93.9	37 46.5	59 75	93.4	38 04.0	58 75	92.9	38 21.4	58 75	92.4	38 38.7	57 75	91.8	38 55.8	57 75	91.3	8
9	36 07.9	60 75	94.2	36 25.8	59 75	93.7	36 43.6	59 75	93.2	37 01.2	59 75	92.7	37 18.8	58 75	92.2	37 36.1	58 75	91.7	37 53.4	57 75	91.2	38 10.5	57 75	90.7	9
60	35 22.7	60 75	93.5	35 40.6	59 75	93.0	35 58.4	59 75	92.5	36 16.0	59 75	92.0	36 33.5	58 75	91.5	36 50.9	58 75	91.0	37 08.1	57 75	90.5	37 25.2	57 75	90.0	60
1	34 37.5	60 75	92.8	34 55.4	59 75	92.3	35 13.1	59 75	91.9	35 30.7	59 75	91.4	35 48.2	58 75	90.9	36 05.6	58 75	90.4	36 22.8	57 75	89.8	36 39.9	57 75	89.3	1
2	33 52.3	60 75	92.2	34 10.1	59 75	91.7	34 27.9	59 75	91.2	34 45.5	58 75	90.7	35 02.9	58 75	90.2	35 20.3	58 75	89.7	35 37.6	57 75	89.2	35 54.7	57 75	88.7	2
3	33 07.0	60 75	91.5	33 24.9	59 75	91.0	33 42.6	59 75	90.5	34 00.2	58 75	90.0	34 17.7	58 75	89.5	34 35.0	58 75	89.1	34 52.3	57 75	88.6	35 09.4	57 75	88.1	3
4	32 21.8	60 75	90.8	32 39.6	59 75	90.3	32 57.3	59 75	89.9	33 14.9	58 75	89.4	33 32.4	58 75	88.9	33 49.8	58 75	88.4	34 07.0	57 75	87.9	34 24.2	57 75	87.4	4
65	31 36.5	60 75	90.2	31 54.3	59 75	89.7	32 12.0	59 75	89.2	32 29.6	59 75	88.7	32 47.1	58 75	88.3	33 04.5	58 75	87.8	33 21.8	57 75	87.3	33 38.9	57 75	86.8	65
6	30 51.2	60 75	89.5	31 09.0	59 75	89.0	31 26.7	59 75	88.6	31 44.4	59 75	88.1	32 01.9	58 75	87.6	32 19.3	58 75	87.1	32 36.6	57 75	86.6	32 53.7	57 75	86.2	6
7	30 05.9	60 75	88.9	30 23.7	59 75	88.4	30 41.5	59 75	87.9	30 59.1	59 75	87.5	31 16.6	58 75	87.0	31 34.1	58 75	86.5	31 51.4	58 75	86.0	32 08.6	57 75	85.5	7
8	29 20.6	60 75	88.2	29 38.5	59 75	87.8	29 56.2	59 75	87.3	30 13.9	59 75	86.8	30 31.4	58 75	86.3	30 48.9	58 75	85.9	31 06.2	58 75	85.4	31 23.5	57 75	84.9	8
9	28 35.4	60 75	87.6	28 53.3	59 75	87.1	29 11.0	59 75	86.7	29 28.7	59 75	86.2	29 46.3	58 75	85.7	30 03.7	58 75	85.3	30 21.1	58 75	84.8	30 38.4	57 75	84.3	9
70	27 50.2	60 75	86.9	28 08.0	59 75	86.5	28 25.8	59 75	86.0	28 43.5	59 75	85.6	29 01.1	58 75	85.1	29 18.6	58 75	84.6	29 36.0	58 75	84.2	29 53.3	58 75	83.7	70
1	27 05.0	60 75	86.3	27 22.9	60 75	85.9	27 40.7	59 75	85.4	27 58.4	59 75	84.9	28 16.0	59 75	84.5	28 33.6	58 75	84.0	28 51.0	58 75	83.6	29 08.4	58 75	83.1	1
2	26 19.8	60 75	85.7	26 37.7	60 75	85.2	26 55.6	59 75	84.8	27 13.3	59 75	84.3	27 31.0	59 75	83.9	27 48.6	58 75	83.4	28 06.0	58 75	83.0	28 23.4	58 75	82.5	2
3	25 34.7	60 75	85.0	25 52.6	60 75	84.6	26 10.5	59 75	84.2	26 28.3	59 75	83.7	26 46.0	59 75	83.3	27 03.6	59 75	82.8	27 21.1	58 75	82.3	27 38.6	58 75	81.9	3
4	24 49.6	60 75	84.4	25 07.6	60 75	84.0	25 25.5	60 75	83.5	25 43.3	59 75	83.1	26 01.0	59 75	82.6	26 18.7	59 75	82.2	26 36.3	58 75	81.7	26 53.8	58 75	81.3	4
75	24 04.5	60 75	83.8	24 22.5	60 75	83.4	24 40.5	60 75	82.9	24 58.4	59 75	82.5	25 16.2	59 75	82.0	25 33.9	59 75	81.6	25 51.5	59 74	81.1	26 09.0	58 74	80.7	75
6	23 19.5	60 75	83.2	23 37.6	60 75	82.7	23 55.6	60 75	82.3	24 13.5	60 75	81.9	24 31.3	59 75	81.4	24 49.1	59 74	81.0	25 06.8	59 74	80.5	25 24.4	59 74	80.1	6
7	22 34.6	60 75	82.6	22 52.7	60 75	82.1	23 10.7	60 75	81.7	23 28.7	60 75	81.3	23 46.6	60 74	80.8	24 04.4	59 74	80.4	24 22.2	59 74	79.9	24 39.8	59 74	79.5	7
8	21 49.7	61 75	82.0	22 07.9	60 75	81.5	22 26.0	60 74	81.1	22 44.0	60 74	80.7	23 01.9	60 74	80.2	23 19.8	59 74	79.8	23 37.6	59 74	79.3	23 55.4	59 74	78.9	8
9	21 04.9	61 75	81.3	21 23.1	61 74	80.9	21 41.3	60 74	80.5	21 59.4	60 74	80.1	22 17.4	60 74	79.6	22 35.3	60 74	79.2	22 53.2	59 74	78.8	23 11.0	59 74	78.3	9
80	20 20.2	61 74	80.7	20 38.5	61 74	80.3	20 56.7	61 74	79.9	21 14.8	60 74	79.5	21 32.9	60 74	79.0	21 50.9	60 74	78.6	22 08.8	60 74	78.2	22 26.7	59 74	77.7	80
1	19 35.5	61 74	80.1	19 53.9	61 74	79.7	20 12.1	61 74	79.3	20 30.3	61 74	78.9	20 48.5	60 74	78.4	21 06.5	60 74	78.0	21 24.5	60 74	77.6	21 42.5	60 74	77.1	1
2	18 51.0	61 74	79.5	19 09.4	61 74	79.1	19 27.7	61 74	78.7	19 45.9	61 74	78.2	20 04.1	61 74	77.8	20 22.3	60 74	77.4	20 40.4	60 73	77.0	20 58.4	60 73	76.5	2
3	18 06.5	62 74	78.9	18 24.9	61 74	78.5	18 43.3	61 74	78.1	19 01.7	61 74	77.6	19 19.9	61 74	77.2	19 38.1	61 73	76.8	19 56.3	60 73	76.4	20 14.4	60 73	76.0	3
4	17 22.1	62 74	78.3	17 40.6	62 74	77.9	17 59.1	61 74	77.5	18 17.5	61 73	77.0	18 35.8	61 73	76.6	18 54.1	61 73	76.2	19 12.3	61 73	75.8	19 30.5	60 73	75.4	4
85	16 37.8	62 74	77.7	16 56.4	62 74	77.3	17 14.9	62 73	76.9	17 33.4	61 73	76.4	17 51.8	61 73	76.0	18 10.2	61 73	75.6	18 28.5	61 73	75.2	18 46.8	61 73	74.8	85
6	15 53.6	62 73	77.1	16 12.3	62 73	76.7	16 30.9	62 73	76.3	16 49.4	62 73	75.8	17 07.9	62 73	75.4	17 26.4	61 73	75.0	17 44.8	61 73	74.6	18 03.1	61 73	74.2	6
7	15 09.6	62 73	76.5	15 28.3	62 73	76.1	15 46.9	62 73	75.7	16 05.6	62 73	75.2	16 24.2	62 73	74.8	16 42.7	62 73	74.4	17 01.2	62 72	74.0	17 19.6	61 72	73.6	7
8	14 25.6	63 73	75.9	14 44.4	63 73	75.5	15 03.1	62 73	75.1	15 21.8	62 73	74.6	15 40.5	62 73	74.2	15 59.1	62 72	73.8	16 17.7	62 72	73.4	16 36.2	62 72	73.0	8
9	13 41.7	63 73	75.3	14 00.6	63 73	74.8	14 19.4	63 73	74.4	14 38.2	63 72	74.0	14 57.0	62 72	73.6	15 15.7	62 72	73.2	15 34.4	62 72	72.8	15 53.0	62 72	72.4	9
90	12 58.0	63 73	74.6	13 17.0	63 73	74.2	13 35.9	63 72	73.8	13 54.8	63 72	73.4	14 13.6	63 72	73.0	14 32.4	63 72	72.6	14 51.2	62 72	72.2	15 09.9	62 72	71.8	90

Lat. 41°

H.A.	20° 00′ Alt.	Δd	Δt	Az.	20° 30′ Alt.	Δd	Δt	Az.	21° 00′ Alt.	Δd	Δt	Az.	21° 30′ Alt.	Δd	Δt	Az.	22° 00′ Alt.	Δd	Δt	Az.	22° 30′ Alt.	Δd	Δt	Az.	23° 00′ Alt.	Δd	Δt	Az.	23° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
00	29 00.0	1.0	01	180.0	28 30.0	1.0	01	180.0	28 00.0	1.0	01	180.0	27 30.0	1.0	01	180.0	27 00.0	1.0	01	180.0	26 30.0	1.0	01	180.0	26 00.0	1.0	01	180.0	25 30.0	1.0	01	180.0	00
1	28 59.6	1.0	02	178.9	28 29.6	1.0	02	178.9	27 59.6	1.0	02	178.9	27 29.6	1.0	02	179.0	26 59.6	1.0	02	179.0	26 29.6	1.0	02	179.0	25 59.6	1.0	02	179.0	25 29.6	1.0	02	179.0	1
2	28 58.3	1.0	04	177.9	28 28.3	1.0	03	177.9	27 58.3	1.0	04	177.9	27 28.3	1.0	03	177.9	26 58.4	1.0	03	177.9	26 28.4	1.0	03	177.9	25 58.4	1.0	03	178.0	25 28.4	1.0	03	178.0	2
3	28 56.2	1.0	05	176.8	28 26.2	1.0	05	176.8	27 56.2	1.0	05	176.8	27 26.3	1.0	05	176.9	26 56.3	1.0	05	176.9	26 26.3	1.0	05	176.9	25 56.4	1.0	05	176.9	25 26.4	1.0	05	177.0	3
4	28 53.2	1.0	06	175.7	28 23.3	1.0	06	175.7	27 53.3	1.0	06	175.8	27 23.4	1.0	06	175.8	26 53.4	1.0	06	175.8	26 23.5	1.0	06	175.9	25 53.5	1.0	06	175.9	25 23.6	1.0	06	175.9	4
05	28 49.4	1.0	08	174.6	28 19.5	1.0	08	174.7	27 49.6	1.0	08	174.7	27 19.7	1.0	08	174.8	26 49.7	1.0	08	174.8	26 19.8	1.0	07	174.8	25 49.9	1.0	07	174.9	25 20.0	1.0	07	174.9	05
6	28 44.7	1.0	09	173.6	28 14.9	1.0	09	173.6	27 45.0	1.0	09	173.7	27 15.1	1.0	09	173.7	26 45.2	1.0	09	173.8	26 15.3	1.0	09	173.8	25 45.5	1.0	09	173.9	25 15.6	1.0	09	173.9	6
7	28 39.3	99	11	172.5	28 09.4	99	10	172.6	27 39.6	99	10	172.6	27 09.7	99	10	172.7	26 39.9	99	10	172.7	26 10.1	99	10	172.8	25 40.2	99	10	172.8	25 10.4	99	10	172.9	7
8	28 32.9	99	12	171.4	28 03.1	99	12	171.5	27 33.4	99	12	171.6	27 03.6	99	12	171.6	26 33.8	99	12	171.7	26 04.0	99	11	171.8	25 34.2	99	11	171.8	25 04.4	99	11	171.9	8
9	28 25.8	99	13	170.4	27 56.0	99	13	170.5	27 26.3	99	13	170.5	26 56.6	99	13	170.6	26 26.8	99	13	170.7	25 57.1	99	13	170.8	25 27.4	99	13	170.8	24 57.6	99	13	170.9	9
10	28 17.8	99	15	169.3	27 48.1	99	15	169.4	27 18.5	99	14	169.5	26 48.8	99	14	169.6	26 19.1	99	14	169.7	25 49.4	99	14	169.7	25 19.7	99	14	169.8	24 50.1	99	14	169.9	10
1	28 09.0	99	16	168.3	27 39.4	99	16	168.4	27 09.8	99	16	168.5	26 40.2	99	16	168.5	26 10.6	99	16	168.6	25 41.0	99	15	168.7	25 11.3	99	15	168.8	24 41.7	99	15	168.9	1
2	27 59.4	98	17	167.2	27 29.9	98	17	167.3	27 00.3	98	17	167.4	26 30.8	98	17	167.5	26 01.3	98	17	167.6	25 31.7	98	17	167.7	25 02.2	98	17	167.8	24 32.6	99	16	167.9	2
3	27 49.0	98	19	166.2	27 19.5	98	19	166.3	26 50.1	98	18	166.4	26 20.6	98	18	166.5	25 51.2	98	18	166.6	25 21.7	98	18	166.7	24 52.2	98	18	166.8	24 22.7	98	18	166.9	3
4	27 37.7	98	20	165.1	27 08.4	98	20	165.2	26 39.0	98	20	165.4	26 09.6	98	20	165.5	25 40.3	98	19	165.6	25 10.9	98	19	165.7	24 41.5	98	19	165.8	24 12.1	98	19	165.9	4
15	27 25.7	98	21	164.1	26 56.5	98	21	164.2	26 27.2	98	21	164.3	25 57.9	98	21	164.5	25 28.6	98	21	164.6	24 59.3	98	21	164.7	24 30.0	98	20	164.8	24 00.7	98	20	164.9	15
6	27 12.9	97	23	163.1	26 43.8	97	22	163.2	26 14.6	97	22	163.3	25 45.4	97	22	163.5	25 16.2	97	22	163.6	24 47.0	97	22	163.7	24 17.8	97	22	163.8	23 48.6	97	21	164.0	6
7	26 59.3	97	24	162.0	26 30.3	97	24	162.2	26 01.2	97	24	162.3	25 32.1	97	23	162.5	25 03.0	97	23	162.6	24 33.9	97	23	162.7	24 04.8	97	23	162.9	23 35.7	97	23	163.0	7
8	26 45.0	97	26	161.0	26 16.0	97	25	161.2	25 47.1	97	25	161.3	25 18.1	97	25	161.5	24 49.1	97	24	161.6	24 20.1	97	24	161.7	23 51.1	97	24	161.9	23 22.1	97	24	162.0	8
9	26 29.9	96	26	160.0	26 01.0	96	26	160.2	25 32.2	96	26	160.3	25 03.3	96	26	160.5	24 34.4	96	26	160.6	24 05.5	96	25	160.8	23 36.6	96	25	160.9	23 07.7	96	25	161.1	9
20	26 14.0	96	28	159.0	25 45.3	96	27	159.2	25 16.6	96	27	159.3	24 47.8	96	27	159.5	24 19.0	96	27	159.6	23 50.3	96	27	159.8	23 21.5	96	26	159.9	22 52.7	96	26	160.1	20
1	25 57.5	95	29	158.0	25 28.8	95	29	158.2	25 00.2	95	28	158.3	24 31.6	95	28	158.5	24 02.9	96	28	158.7	23 34.3	96	28	158.8	23 05.6	96	28	159.0	22 36.9	96	27	159.1	1
2	25 40.1	95	30	157.0	25 11.6	95	30	157.2	24 43.1	95	30	157.4	24 14.6	95	29	157.5	23 46.1	95	29	157.7	23 17.6	95	29	157.9	22 49.0	95	29	158.0	22 20.4	95	29	158.2	2
3	25 22.1	95	31	156.0	24 53.7	95	31	156.2	24 25.3	95	31	156.4	23 57.0	95	31	156.6	23 28.6	95	30	156.7	23 00.1	95	30	156.9	22 31.7	95	30	157.1	22 03.3	95	30	157.3	3
4	25 03.3	94	32	155.0	24 35.1	94	32	155.2	24 06.9	94	32	155.4	23 38.6	94	32	155.6	23 10.3	94	32	155.8	22 42.0	94	31	156.0	22 13.7	94	31	156.1	21 45.4	94	31	156.3	4
25	24 43.9	94	34	154.1	24 15.8	94	33	154.3	23 47.7	94	33	154.5	23 19.5	94	33	154.6	22 51.4	94	33	154.8	22 23.3	94	32	155.0	21 55.1	94	32	155.2	21 26.9	94	32	155.4	25
6	24 23.7	93	35	153.1	23 55.8	93	34	153.3	23 27.8	93	34	153.5	22 59.8	93	34	153.7	22 31.8	93	34	153.9	22 03.8	93	34	154.1	21 35.8	93	33	154.3	21 07.7	94	33	154.5	6
7	24 02.9	93	36	152.2	23 35.1	93	36	152.4	23 07.3	93	35	152.6	22 39.4	93	35	152.8	22 11.6	93	35	153.0	21 43.7	93	35	153.2	21 15.8	93	34	153.4	20 47.9	93	34	153.6	7
8	23 41.4	92	37	151.2	23 13.8	92	37	151.4	22 46.1	92	36	151.6	22 18.4	92	36	151.8	21 50.6	92	36	152.0	21 22.9	92	36	152.2	20 55.2	93	35	152.4	20 27.4	93	35	152.6	8
9	23 19.3	92	38	150.3	22 51.8	92	38	150.5	22 24.2	92	38	150.7	21 56.7	92	37	150.9	21 29.1	92	37	151.1	21 01.5	92	37	151.3	20 33.9	92	36	151.5	20 06.3	92	36	151.7	9
30	22 56.5	91	39	149.3	22 29.1	91	39	149.5	22 01.7	91	39	149.8	21 34.3	91	38	150.0	21 06.9	91	38	150.2	20 39.5	92	38	150.4	20 12.0	92	38	150.6	19 44.5	92	37	150.8	30
1	22 33.1	91	40	148.4	22 05.9	91	40	148.6	21 38.6	91	40	148.8	21 11.4	91	39	149.1	20 44.1	91	39	149.3	20 16.8	91	39	149.5	19 49.5	91	39	149.7	19 22.2	91	38	150.0	1
2	22 09.0	90	41	147.5	21 42.0	90	41	147.7	21 14.9	90	41	147.9	20 47.8	90	40	148.2	20 20.7	90	40	148.4	19 53.5	91	40	148.6	19 26.4	91	40	148.8	18 59.2	91	39	149.1	2
3	21 44.4	90	42	146.6	21 17.5	90	42	146.8	20 50.6	90	42	147.0	20 23.6	90	41	147.3	19 56.6	90	41	147.5	19 29.6	90	41	147.7	19 02.6	90	41	148.0	18 35.6	90	40	148.2	3
4	21 19.2	89	43	145.7	20 52.4	89	43	145.9	20 25.6	89	43	146.1	19 58.8	89	42	146.4	19 32.0	89	42	146.6	19 05.2	89	42	146.9	18 38.3	90	41	147.1	18 11.5	90	41	147.3	4
35	20 53.3	89	44	144.8	20 26.7	89	44	145.0	20 00.1	89	43	145.3	19 33.5	89	43	145.5	19 06.8	89	43	145.7	18 40.1	89	43	146.0	18 13.4	89	42	146.2	17 46.7	89	42	146.5	35
6	20 26.9	88	45	143.9	20 00.5	88	45	144.1	19 34.0	88	44	144.4	19 07.5	88	44	144.6	18 41.0	88	44	144.9	18 14.5	88	44	145.1	17 48.0	88	43	145.4	17 21.4	89	43	145.6	6
7	19 59.9	88	46	143.0	19 33.7	88	46	143.3	19 07.4	88	45	143.5	18 41.1	88	45	143.8	18 14.7	88	45	144.0	17 48.4	88	45	144.3	17 22.0	88	44	144.5	16 55.6	88	44	144.8	7
8	19 32.4	87	47	142.1	19 06.3	87	46	142.4	18 40.2	87	46	142.6	18 14.0	87	46	142.9	17 47.8	87	46	143.2	17 21.6	87	45	143.4	16 55.4	87	45	143.7	16 29.2	87	45	143.9	8
9	19 04.3	86	48	141.3	18 38.4	87	47	141.5	18 12.4	87	47	141.8	17 46.4	87	47	142.1	17 20.4	87	47	142.3	16 54.4	87	46	142.6	16 28.3	87	46	142.8	16 02.3	87	46	143.1	9
40	18 35.7	86	49	140.4	18 10.0	86	48	140.7	17 44.2	86	48	140.9	17 18.3	86	48	141.2	16 52.5	86	47	141.5	16 26.6	86	47	141.7	16 00.7	86	47	142.0	15 34.8	86	47	142.3	40
1	18 06.6	85	49	139.6	17 41.0	85	49	139.8	17 15.4	86	49	140.1	16 49.7	86	49	140.4	16 24.0	86	48	140.6	15 58.3	86	48	140.9	15 32.6	86	48	141.2	15 06.8	86	47	141.4	1
2	17 37.0	85	50	138.7	17 11.6	85	50	139.0	16 46.1	85	50	139.3	16 20.6	85	49	139.6	15 55.1	85	49	139.8	15 29.5	85	49	140.1	15 04.0	85	49	140.4	14 38.4	85	48	140.6	2
3	17 06.9	84	51	137.9	16 41.6	84	51	138.2	16 16.3	84	50	138.5	15 51.0	84	50	138.7	15 25.6	85	50	139.0	15 00.2	85	50	139.3	14 34.8	85	49	139.6	14 09.4	85	49	139.8	3
4	16 36.3	84	52	137.1	16 11.2	84	52	137.4	15 46.0	84	51	137.6	15 20.8	84	51	137.9	14 55.7	84	51	138.2	14 30.4	84	50	138.5	14 05.2	84	50	138.8	13 40.0	84	50	139.0	4
45	16 05.2	83	53	136.2	15 40.2	83	52	136.5	15 15.3	83	52	136.8	14 50.3	83	52	137.1	14 25.2	83	51	137.4	14 00.2	84	51	137.7	13 35.1	84	51	138.0	13 10.0	84	51	138.2	45
6	15 33.7	83	53	135.4	15 08.9	83	53	135.7	14 44.0	83	53	136.0	14 19.2	83	52	136.3	13 54.3	83	52	136.6	13 29.5	83	52	136.9	13 04.6	83	52	137.2	12 39.7	83	51	137.5	6
7	15 01.7	82	54	134.6	14 37.0	82	54	134.9	14 12.4	82	54	135.2	13 47.7	82	53	135.5	13 23.0	82	53	135.8	12 58.3	82	53	136.1	12 33.6	82	52	136.4	12 08.8	83	52	136.7	7
8	14 29.2	82	55	133.8	14 04.7	82	55	134.1	13 40.3	82	54	134.4	13 15.8	82	54	134.7	12 51.2	82	54	135.0	12 26.7	82	53	135.3	12 02.1	82	53	135.6	11 37.5	82	53	135.9	8
9	13 56.3	81	56	133.1	13 32.0	81	55	133.4	13 07.7	81	55	133.7	12 43.4	81	55	134.0	12 19.0	81	54	134.3	11 54.6	81	54	134.6	11 30.2	81	54	134.9	11 05.8	81	54	135.1	9
50	13 23.0	80	56	132.3	12 58.9	81	56	132.6	12 34.7	81	56	132.9	12 10.6	81	55	133.2	11 46.4	81	55	133.5	11 22.1	81	55	133.8	10 57.9	81	55	134.1	10 33.7	81	54	134.4	50
1	12 49.3	80	57	131.5	12 25.4	80	57	131.8	12 01.4	80	56	132.1	11 37.3	80	56	132.4	11 13.3	80	56	132.7	10 49.2	80	56	133.0	10 25.2	80	55	133.3	10 01.1	80	55	133.6	1
2	12 15.2	79	58	130.7	11 51.4	79	57	131.0	11 27.6	79	57	131.4	11 03.7	80	57	131.7	10 39.8	80	56	132.0	10 15.9	80	56	132.3	9 52.0	80	56	132.6	9 28.1	80	56	132.9	2
3	11 40.7	79	58	130.0	11 17.1	79	58	130.3	10 53.4	79	58	130.6	10 29.7	79	57	130.9	10 06.0	79	57	131.2	9 42.2	79	57	131.5	9 18.5	79	57	131.8	8 54.7	79	56	132.2	3
4	11 05.8	78	60	129.2	10 42.3	78	58	129.5	10 18.8	78	58	129.9	9 55.3	78	58	130.2	9 31.7	79	58	130.5	9 08.2	79	57	130.8	8 44.6	79	57	131.1	8 21.0	79	57	131.4	4
55	10 30.5	78	59	128.5	10 07.2	78	59	128.8	9 43.9	78	59	129.1	9 20.5	78	59	129.4	8 57.1	78	58	129.7	8 33.7	78	58	130.1	8 10.3	78	58	130.4	7 46.8	78	58	130.7	55
6	9 54.9	77	60	127.7	9 31.7	77	60	128.1	9 08.5	77	59	128.4	8 45.3	77	59	128.7	8 22.1	77	59	129.0	7 58.8	78	59	129.3	7 35.6	78	58	129.7	7 12.3	78	58	130.0	6
7	9 18.9	77	61	127.0	8 55.9	77	60	127.3	8 32.9	77	60	127.7	8 09.8	77	60	128.0	7 46.7	77	60	128.3	7 23.6	77	59	128.6	7 00.5	77	59	128.9	6 37.4	77	59	129.3	7
8	8 42.6	76	61	126.3	8 19.7	76	61	126.6	7 56.8	76	61	126.9	7 33.9	76	60	127.3	7 11.0	76	60	127.6	6 48.1	76	60	127.9	6 25.1	76	60	128.2	6 02.2	77	59	128.6	8
9	8 05.9	76	62	125.6	7 43.2	76	61	125.9	7 20.5	76	61	126.2	6 57.7	76	61	126.5	6 35.0	76	61	126.9	6 12.2	76	60	127.2	5 49.4	76	60	127.5	5 26.6	76	60	127.8	9
60	7 28.9	75	62	124.8	7 06.3	75	62	125.2	6 43.8	75	62	125.5	6 21.2	75	61	125.8	5 58.6	75	61	126.2	5 35.9	75	61	126.5	5 13.3	75	61	126.8					60
1	6 51.6	75	63	124.1	6 29.2	75	62	124.5	6 06.7	75	62	124.8	5 44.3	75	62	125.1	5 21.8	75	62	125.5													1
2	6 13.9	74	63	123.4	5 51.7	74	63	123.8	5 29.4	74	63	124.1	5 07.1	74	62	124.4																	2
3	5 36.0	74	64	122.7	5 13.9	74	63	123.1																									3

Lat. 42°

Lat. 43°

Lat. 44°

Lat. 45°

Lat. 46°

Lat. 47°

Lat. 48°

DECLINATION SAME NAME AS LATITUDE

H.A.	20° 00′ Alt.	Δd	Δt	Az.	20° 30′ Alt.	Δd	Δt	Az.	21° 00′ Alt.	Δd	Δt	Az.	21° 30′ Alt.	Δd	Δt	Az.	22° 00′ Alt.	Δd	Δt	Az.	22° 30′ Alt.	Δd	Δt	Az.	23° 00′ Alt.	Δd	Δt	Az.	23° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
91	12 14.4	64	72	74.0	12 33.4	63	72	73.6	12 52.5	63	72	73.2	13 11.4	63	72	72.8	13 30.4	63	72	72.4	13 49.3	63	72	72.0	14 08.1	63	72	71.6	14 27.0	63	71	71.2	91
2	11 30.9	64	72	73.4	11 50.1	64	72	73.0	12 09.2	64	72	72.6	12 28.2	63	72	72.2	12 47.3	63	72	71.8	13 06.3	63	71	71.4	13 25.2	63	71	71.0	13 44.2	63	71	70.6	2
3	10 47.6	64	72	72.8	11 06.8	64	72	72.4	11 26.0	64	72	72.0	11 45.2	64	72	71.6	12 04.3	64	71	71.2	12 23.4	64	71	70.8	12 42.5	63	71	70.4	13 01.5	63	71	70.0	3
4	10 04.4	64	72	72.2	10 23.7	64	72	71.8	10 43.0	64	71	71.4	11 02.3	64	71	71.0	11 21.5	64	71	70.6	11 40.7	64	71	70.2	11 59.9	64	71	69.8	12 19.0	64	71	69.5	4
95	9 21.4	65	71	71.6	9 40.8	65	71	71.2	10 00.2	65	71	70.8	10 19.6	65	71	70.4	10 38.9	64	71	70.0	10 58.2	64	71	69.6	11 17.5	64	70	69.2	11 36.7	64	70	68.9	95
6	8 38.5	65	71	71.0	8 58.0	65	71	70.6	9 17.5	65	71	70.2	9 37.0	65	71	69.8	9 56.4	65	71	69.4	10 15.8	65	70	69.0	10 35.2	65	70	68.6	10 54.6	64	70	68.3	6
7	7 55.8	65	71	70.3	8 15.4	65	71	70.0	8 35.0	65	71	69.6	8 54.6	65	70	69.2	9 14.1	65	70	68.8	9 33.6	65	70	68.4	9 53.1	65	70	68.0	10 12.6	65	70	67.6	7
8	7 13.2	66	71	69.7	7 32.9	66	70	69.3	7 52.6	66	70	69.0	8 12.3	66	70	68.6	8 32.0	65	70	68.2	8 51.6	65	70	67.8	9 11.2	65	70	67.4	9 30.8	65	69	67.0	8
9	6 30.8	66	70	69.1	6 50.7	66	70	68.7	7 10.5	66	70	68.3	7 30.3	66	70	68.0	7 50.0	66	70	67.6	8 09.8	66	69	67.2	8 29.5	66	69	66.8	8 49.2	66	69	66.4	9
100	5 48.6	66	70	68.5	6 08.6	66	70	68.1	6 28.5	66	70	67.7	6 48.4	66	69	67.3	7 08.3	66	69	67.0	7 28.1	66	69	66.6	7 48.0	66	69	66.2	8 07.8	66	69	65.8	100
1	5 06.6	67	70	67.8	5 26.6	67	69	67.5	5 46.7	67	69	67.1	6 06.7	67	69	66.7	6 26.7	67	69	66.3	6 46.7	67	69	66.0	7 06.6	67	69	65.6	7 26.6	66	68	65.2	1
2									5 05.1	67	69	66.5	5 25.2	67	69	66.1	5 45.3	67	69	65.7	6 05.4	67	68	65.3	6 25.5	67	68	65.0	6 45.6	67	68	64.6	2
3																	5 04.1	67	68	65.1	5 24.4	67	68	64.7	5 44.6	67	68	64.3	6 04.8	67	68	64.0	3
4																									5 03.9	68	68	63.7	5 24.2	68	67	63.4	4

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Lat. 41°

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.	Δd	Δt	Alt.	Δd	Δt	Alt.	Δd	Δt	Alt.	Δd	Δt	Alt.	Δd	Δt	Alt.	Δd	Δt	Alt.	Δd	Δt	Alt.	Δd	Δt	
°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	
00	73 00.0	1.0 02	180.0	73 30.0	1.0 02	180.0	74 00.0	1.0 02	180.0	74 30.0	1.0 02	180.0	75 00.0	1.0 02	180.0	75 30.0	1.0 02	180.0	76 00.0	1.0 02	180.0	76 30.0	1.0 02	180.0	00
1	72 58.8	1.0 06	176.9	73 28.7	1.0 06	176.8	73 58.7	1.0 06	176.7	74 28.7	1.0 07	176.6	74 58.6	1.0 07	176.5	75 28.6	1.0 07	176.4	75 58.5	1.0 07	176.3	76 28.5	1.0 07	176.2	1
2	72 55.1	1.0 10	173.8	73 25.0	1.0 10	173.6	73 54.8	1.0 11	173.4	74 24.7	1.0 11	173.3	74 54.5	99 11	173.1	75 24.4	99 12	172.9	75 54.2	99 12	172.7	76 24.0	99 12	172.4	2
3	72 48.9	99 14	170.7	73 18.7	99 15	170.5	73 48.4	99 15	170.2	74 18.1	99 15	169.9	74 47.7	99 16	169.7	75 17.4	99 16	169.4	75 47.0	99 17	169.1	76 16.6	99 17	168.7	3
4	72 40.4	98 18	167.6	73 09.9	98 18	167.3	73 39.4	98 19	167.0	74 08.9	98 19	166.7	74 38.3	98 20	166.3	75 07.7	98 20	165.9	75 37.0	98 21	165.5	76 06.3	98 22	165.1	4
05	72 29.6	98 22	164.7	72 58.8	97 22	164.3	73 28.1	97 23	163.9	73 57.2	97 23	163.5	74 26.3	97 24	163.0	74 55.4	97 25	162.6	75 24.4	97 25	162.0	75 53.3	96 26	161.5	05
6	72 16.5	97 25	161.7	72 45.4	96 26	161.3	73 14.3	96 27	160.8	73 43.1	96 27	160.3	74 11.9	96 28	159.8	74 40.6	96 29	159.3	75 09.2	96 29	158.7	75 37.7	96 30	158.1	6
7	72 01.2	96 29	158.9	72 29.8	96 30	158.4	72 58.3	95 30	157.8	73 26.8	95 31	157.3	73 55.1	94 32	156.7	74 23.4	94 32	156.1	74 51.5	94 33	155.4	75 19.5	93 34	154.7	7
8	71 43.9	94 32	156.1	72 12.1	94 33	155.5	72 40.2	94 34	154.9	73 08.2	93 34	154.3	73 36.1	93 35	153.7	74 03.9	92 36	153.0	74 31.6	92 37	152.3	74 59.1	91 38	151.5	8
9	71 24.5	93 35	153.4	71 52.3	93 36	152.8	72 20.0	92 37	152.1	72 47.6	92 38	151.5	73 15.0	91 38	150.8	73 42.3	91 39	150.1	74 09.5	90 40	149.3	74 36.4	90 41	148.5	9
10	71 03.3	91 38	150.8	71 30.7	91 39	150.1	71 57.9	91 40	149.4	72 25.0	90 41	148.7	72 52.0	90 41	148.0	73 18.8	89 42	147.2	73 45.4	88 43	146.4	74 11.8	88 44	145.6	10
1	70 40.3	90 41	148.2	71 07.2	90 42	147.5	71 34.0	89 43	146.8	72 00.6	88 43	146.1	72 27.1	88 44	145.3	72 53.4	87 45	144.5	73 19.4	87 46	143.7	73 45.3	86 47	142.8	1
2	70 15.6	89 44	145.8	70 42.1	88 44	145.1	71 08.4	87 45	144.3	71 34.6	87 46	143.6	72 00.5	86 47	142.8	72 26.2	85 48	141.9	72 51.8	85 49	141.0	73 17.0	84 50	140.1	2
3	69 49.4	87 46	143.4	70 15.4	86 47	142.7	70 41.3	86 48	141.9	71 06.9	85 49	141.1	71 32.4	84 49	140.3	71 57.6	84 50	139.5	72 22.5	83 51	138.5	72 47.2	82 52	137.6	3
4	69 21.7	86 48	141.2	69 47.3	85 49	140.4	70 12.6	84 50	139.6	70 37.8	83 51	138.8	71 02.7	83 52	138.0	71 27.4	82 52	137.1	71 51.8	81 53	136.2	72 16.0	80 54	135.2	4
15	68 52.6	84 51	139.0	69 17.8	83 51	138.2	69 42.7	83 52	137.4	70 07.3	82 53	136.6	70 31.8	81 54	135.7	70 55.9	80 54	134.8	71 19.8	79 55	133.9	71 43.5	78 56	132.9	15
6	68 22.3	83 53	136.9	68 47.0	82 53	136.1	69 11.4	81 54	135.3	69 35.6	80 55	134.5	69 59.6	79 56	133.6	70 23.2	78 56	132.7	70 46.6	78 57	131.8	71 09.7	76 58	130.8	6
7	67 50.8	81 54	134.9	68 15.0	80 55	134.1	68 39.0	80 56	133.3	69 02.7	79 57	132.4	69 26.2	78 57	131.6	69 49.4	77 58	130.7	70 12.3	76 59	129.7	70 34.9	75 60	128.7	7
8	67 18.2	80 56	133.0	67 42.0	79 57	132.2	68 05.5	78 57	131.4	68 28.8	77 58	130.5	68 51.8	76 59	129.6	69 14.6	75 60	128.7	69 37.0	74 60	127.8	69 59.1	73 61	126.8	8
9	66 44.6	78 58	131.1	67 07.9	77 58	130.3	67 31.0	77 59	129.5	67 53.9	76 60	128.6	68 16.5	75 60	127.8	68 38.8	74 61	126.9	69 00.8	73 62	125.9	69 22.4	72 63	124.9	9
20	66 10.0	77 59	129.4	66 33.0	76 60	128.6	66 55.7	75 60	127.7	67 18.1	74 61	126.9	67 40.3	73 62	126.0	68 02.1	72 62	125.1	68 23.7	71 63	124.1	68 44.9	70 64	123.2	20
1	65 34.6	76 60	127.6	65 57.1	75 61	126.8	66 19.4	74 62	126.0	66 41.5	73 62	125.2	67 03.2	72 63	124.3	67 24.7	71 64	123.4	67 45.8	70 64	122.5	68 06.6	69 65	121.5	1
2	64 58.3	74 62	126.0	65 20.5	74 62	125.2	65 42.4	73 63	124.4	66 04.1	72 63	123.5	66 25.5	71 64	122.7	66 46.5	70 65	121.8	67 07.3	69 65	120.8	67 27.7	68 66	119.9	2
3	64 21.3	73 63	124.4	64 43.2	72 63	123.6	65 04.7	71 64	122.8	65 26.0	70 65	122.0	65 47.0	70 65	121.1	66 07.7	68 66	120.2	66 28.1	67 66	119.3	66 48.2	66 67	118.4	3
4	63 43.6	72 64	122.9	64 05.1	71 64	122.1	64 26.3	70 65	121.3	64 47.3	69 66	120.5	65 07.9	68 66	119.6	65 28.3	67 67	118.7	65 48.3	66 67	117.8	66 08.0	65 68	116.9	4
25	63 05.3	71 65	121.5	63 26.5	70 65	120.7	63 47.4	69 66	119.9	64 08.0	68 66	119.0	64 28.3	67 67	118.2	64 48.3	66 67	117.3	65 08.0	65 68	116.4	65 27.4	64 68	115.5	25
6	62 26.4	70 66	120.1	62 47.2	69 66	119.3	63 07.8	68 67	118.5	63 28.1	67 67	117.7	63 48.1	66 68	116.8	64 07.8	65 68	116.0	64 27.2	64 69	115.1	64 46.3	63 69	114.2	6
7	61 46.9	69 67	118.7	62 07.5	68 67	117.9	62 27.8	67 68	117.1	62 47.8	66 68	116.3	63 07.5	65 68	115.5	63 26.9	64 69	114.6	63 46.0	63 69	113.8	64 04.8	62 70	112.9	7
8	61 07.0	68 67	117.4	61 27.2	67 68	116.6	61 47.2	66 68	115.8	62 07.0	65 69	115.0	62 26.4	64 69	114.2	62 45.5	63 70	113.4	63 04.4	62 70	112.5	63 22.9	61 70	111.7	8
9	60 26.5	67 68	116.1	60 46.5	66 69	115.4	61 06.3	65 69	114.6	61 25.7	64 69	113.8	61 44.9	63 70	113.0	62 03.8	62 70	112.2	62 22.4	61 71	111.3	62 40.6	60 71	110.5	9
30	59 45.7	66 69	114.9	60 05.4	65 69	114.2	60 24.9	64 70	113.4	60 44.1	64 70	112.6	61 03.0	63 70	111.8	61 21.7	62 71	111.0	61 40.0	61 71	110.2	61 58.1	60 71	109.3	30
1	59 04.4	65 69	113.7	59 23.9	65 70	113.0	59 43.2	64 70	112.2	60 02.1	63 71	111.5	60 20.8	62 71	110.7	60 39.2	61 71	109.9	60 57.4	60 72	109.0	61 15.2	59 72	108.2	1
2	58 22.8	65 70	112.6	58 42.0	64 70	111.8	59 01.1	63 71	111.1	59 19.8	62 71	110.3	59 38.3	61 71	109.6	59 56.5	60 72	108.8	60 14.4	59 73	108.0	60 32.0	58 72	107.1	2
3	57 40.8	64 70	111.5	57 59.9	63 71	110.7	58 18.7	62 71	110.0	58 37.2	61 71	109.3	58 55.5	60 72	108.5	59 13.5	60 72	107.7	59 31.2	59 72	106.9	59 48.7	58 73	106.1	3
4	56 58.5	63 71	110.4	57 17.4	62 71	109.7	57 36.0	62 72	108.9	57 54.3	61 72	108.2	58 12.4	60 72	107.5	58 30.2	59 72	106.7	58 47.8	58 73	105.9	59 05.0	57 73	105.1	4
35	56 15.9	63 71	109.3	56 34.6	62 72	108.6	56 53.0	61 72	107.9	57 11.2	60 72	107.2	57 29.1	59 73	106.4	57 46.8	58 73	105.7	58 04.1	57 73	104.9	58 21.2	56 73	104.1	35
6	55 33.1	62 72	108.3	55 51.6	61 72	107.6	56 09.8	60 72	106.9	56 27.8	60 73	106.2	56 45.6	59 73	105.5	57 03.1	58 73	104.7	57 20.3	57 73	104.0	57 37.2	56 74	103.2	6
7	54 50.0	61 72	107.3	55 08.3	61 72	106.7	55 26.4	60 73	106.0	55 44.2	59 73	105.2	56 01.8	58 73	104.5	56 19.2	57 73	103.8	56 36.2	56 74	103.0	56 53.1	56 74	102.3	7
8	54 06.6	61 73	106.4	54 24.8	60 73	105.7	54 42.7	59 73	105.0	55 00.4	59 73	104.3	55 17.9	58 74	103.6	55 35.1	57 74	102.9	55 52.1	56 74	102.1	56 08.7	55 74	101.4	8
9	53 23.1	60 73	105.4	53 41.1	60 73	104.8	53 58.9	59 73	104.1	54 16.5	58 74	103.4	54 33.8	57 74	102.7	54 50.9	57 74	102.0	55 07.7	56 74	101.3	55 24.3	55 74	100.5	9
40	52 39.3	60 73	104.5	52 57.2	59 73	103.9	53 14.9	59 74	103.2	53 32.3	58 74	102.5	53 49.6	57 74	101.8	54 06.5	56 74	101.1	54 23.2	55 74	100.4	54 39.7	54 74	99.7	40
1	51 55.4	60 73	103.6	52 13.2	59 74	103.0	52 30.7	58 74	102.3	52 48.1	57 74	101.6	53 05.2	57 74	101.0	53 22.0	56 74	100.3	53 38.6	55 75	99.6	53 55.0	54 75	98.9	1
2	51 11.3	59 74	102.8	51 29.0	59 74	102.1	51 46.4	58 74	101.5	52 03.6	57 74	100.8	52 20.6	56 74	100.1	52 37.4	55 75	99.4	52 53.9	55 75	98.8	53 10.2	54 75	98.1	2
3	50 27.1	59 74	101.9	50 44.6	58 74	101.3	51 02.0	57 74	100.6	51 19.1	57 74	100.0	51 36.0	56 75	99.3	51 52.7	55 75	98.6	52 09.1	54 75	98.0	52 25.3	54 75	97.3	3
4	49 42.7	59 74	101.1	50 00.2	58 74	100.4	50 17.4	57 74	99.8	50 34.5	56 75	99.2	50 51.3	56 75	98.5	51 07.9	55 75	97.8	51 24.2	54 75	97.2	51 40.4	53 75	96.5	4
45	48 58.2	58 74	100.3	49 15.6	58 74	99.6	49 32.7	57 75	99.0	49 49.7	56 75	98.4	50 06.4	55 75	97.7	50 23.0	55 75	97.1	50 39.3	54 75	96.4	50 55.4	53 75	95.7	45
6	48 13.6	58 75	99.4	48 30.9	57 75	98.8	48 48.0	57 75	98.2	49 04.9	56 75	97.6	49 21.5	55 75	96.9	49 38.0	55 75	96.3	49 54.3	54 75	95.7	50 10.3	53 75	95.0	6
7	47 28.9	58 75	98.7	47 46.1	57 75	98.1	48 03.1	56 75	97.4	48 19.9	56 75	96.8	48 36.5	55 75	96.2	48 53.0	54 75	95.6	49 09.2	54 75	94.9	49 25.1	53 75	94.3	7
8	46 44.1	57 75	97.9	47 01.2	57 75	97.3	47 18.2	56 75	96.7	47 34.9	56 75	96.1	47 51.5	55 75	95.4	48 07.9	54 75	94.8	48 24.0	54 75	94.2	48 40.0	53 75	93.6	8
9	45 59.2	57 75	97.1	46 16.3	57 75	96.5	46 33.2	56 75	95.9	46 49.9	55 75	95.3	47 06.4	55 75	94.7	47 22.7	54 75	94.1	47 38.8	53 75	93.5	47 54.8	53 75	92.8	9
50	45 14.2	57 75	96.4	45 31.2	56 75	95.8	45 48.1	56 75	95.2	46 04.8	55 75	94.6	46 21.2	55 75	94.0	46 37.5	54 75	93.4	46 53.6	53 75	92.8	47 09.5	53 75	92.2	50
1	44 29.2	57 75	95.6	44 46.2	56 75	95.1	45 03.0	56 75	94.5	45 19.6	55 75	93.9	45 36.1	55 75	93.3	45 52.3	54 75	92.7	46 08.4	53 75	92.1	46 24.3	53 75	91.5	1
2	43 44.1	57 75	94.9	44 01.0	56 75	94.4	44 17.8	56 75	93.8	44 34.4	55 75	93.2	44 50.8	54 75	92.6	45 07.1	54 75	92.0	45 23.1	53 75	91.4	45 39.0	53 75	90.8	2
3	42 58.9	57 75	94.2	43 15.9	56 75	93.6	43 32.6	56 75	93.1	43 49.2	55 75	92.5	44 05.6	54 75	91.9	44 21.8	54 75	91.3	44 37.8	53 75	90.7	44 53.7	53 75	90.1	3
4	42 13.8	57 75	93.5	42 30.6	56 75	92.9	42 47.4	55 75	92.4	43 03.9	55 75	91.8	43 20.3	54 75	91.2	43 36.5	54 75	90.7	43 52.6	53 75	90.1	44 08.4	53 75	89.5	4
55	41 28.5	56 75	92.8	41 45.4	56 75	92.3	42 02.1	55 75	91.7	42 18.7	55 75	91.1	42 35.0	54 75	90.6	42 51.2	54 75	90.0	43 07.3	53 75	89.4	43 23.1	53 75	88.8	55
6	40 43.3	56 75	92.1	41 00.2	56 75	91.6	41 16.8	55 75	91.0	41 33.4	55 75	90.5	41 49.8	54 75	89.9	42 06.0	54 75	89.3	42 22.0	53 75	88.8	42 37.9	53 75	88.2	6
7	39 58.0	56 75	91.5	40 14.9	56 75	90.9	40 31.6	55 75	90.4	40 48.1	55 75	89.8	41 04.5	54 75	89.3	41 20.7	54 75	88.7	41 36.7	53 75	88.1	41 52.6	53 75	87.6	7
8	39 12.8	56 75	90.8	39 29.6	56 75	90.3	39 46.3	55 75	89.7	40 02.8	55 75	89.2	40 19.2	54 75	88.6	40 35.4	54 75	88.1	40 51.5	53 75	87.5	41 07.4	53 75	86.9	8
9	38 27.5	56 75	90.1	38 44.3	56 75	89.6	39 01.0	55 75	89.1	39 17.5	55 75	88.5	39 33.9	54 75	88.0	39 50.2	54 75	87.4	40 06.3	53 75	86.9	40 22.2	53 75	86.3	9
60	37 42.2	56 75	89.5	37 59.0	56 75	88.9	38 15.7	55 75	88.4	38 32.3	55 75	87.9	38 48.7	54 75	87.4	39 05.0	54 75	86.8	39 21.1	53 75	86.3	39 37.0	53 75	85.7	60
1	36 56.9	56 75	88.8	37 13.8	56 75	88.3	37 30.5	55 75	87.8	37 47.0	55 75	87.3	38 03.5	55 75	86.7	38 19.8	54 75	86.2	38 35.9	54 75	85.7	38 51.9	53 75	85.1	1
2	36 11.7	56 75	88.2	36 28.5	56 75	87.7	36 45.2	56 75	87.2	37 01.8	55 75	86.6	37 18.3	55 75	86.1	37 34.6	54 75	85.6	37 50.8	54 75	85.0	38 06.8	53 75	84.5	2
3	35 26.4	56 75	87.5	35 43.3	56 75	87.0	36 00.0	56 75	86.5	36 16.6	55 75	86.0	36 33.1	55 75	85.5	36 49.5	54 75	85.0	37 05.7	54 75	84.4	37 21.7	53 75	83.9	3
4	34 41.2	57 75	86.9	34 58.1	56 75	86.4	35 14.8	56 75	85.9	35 31.5	55 75	85.4	35 48.0	55 75	84.9	36 04.4	54 75	84.4	36 20.6	54 75	83.8	36 36.7	53 75	83.3	4
65	33 56.0	57 75	86.3	34 12.9	56 75	85.8	34 29.7	56 75	85.3	34 46.4	55 75	84.8	35 02.9	55 75	84.3	35 19.3	55 75	83.8	35 35.6	54 75	83.2	35 51.8	54 75	82.7	65
6	33 10.8	57 75	85.7	33 27.8	56 75	85.2	33 44.6	56 75	84.7	34 01.3	56 75	84.2	34 17.9	55 75	83.7	34 34.3	55 75	83.2	34 50.7	54 75	82.7	35 06.9	54 75	82.1	6
7	32 25.7	57 75	85.1	32 42.7	56 75	84.6	32 59.5	56 75	84.1	33 16.3	56 75	83.6	33 32.9	55 75	83.1	33 49.4	55 75	82.6	34 05.8	54 75	82.1	34 22.1	54 75	81.6	7
8	31 40.6	57 75	84.4	31 57.6	57 75	84.0	32 14.5	56 75	83.5	32 31.3	56 75	83.0	32 48.0	55 75	82.5	33 04.5	55 75	82.0	33 21.0	55 75	81.5	33 37.3	54 74	81.0	8
9	30 55.5	57 75	83.8	31 12.6	57 75	83.4	31 29.5	56 75	82.9	31 46.4	56 75	82.4	32 03.1	56 75	81.9	32 19.7	55 75	81.4	32 36.2	55 74	80.9	32 52.6	54 74	80.4	9
70	30 10.5	57 75	83.2	30 27.6	57 75	82.7	30 44.6	56 75	82.3	31 01.5	56 75	81.8	31 18.3	56 75	81.3	31 35.0	55 74	80.8	31 51.6	55 74	80.3	32 08.0	55 74	79.8	70
1	29 25.6	57 75	82.6	29 42.8	57 75	82.2	29 59.8	57 75	81.7	30 16.8	56 75	81.2	30 33.6	56 74	80.7	30 50.3	56 74	80.2	31 07.0	55 74	79.8	31 23.5	55 74	79.3	1
2	28 40.7	58 75	82.0	28 57.9	57 75	81.6	29 15.0	57 74	81.1	29 32.0	57 74	80.6	29 48.9	56 74	80.1	30 05.7	56 74	79.7	30 22.4	55 74	79.2	30 39.0	55 74	78.7	2
3	27 55.9	58 75	81.4	28 13.2	57 74	81.0	28 30.3	57 74	80.5	28 47.4	57 74	80.0	29 04.4	56 74	79.6	29 21.2	56 74	79.1	29 38.0	56 74	78.6	29 54.7	55 74	78.1	3
4	27 11.2	58 74	80.8	27 28.5	58 74	80.4	27 45.7	57 74	79.9	28 02.8	57 74	79.4	28 19.9	57 74	79.0	28 36.8	56 74	78.5	28 53.7	56 74	78.0	29 10.4	56 74	77.6	4
75	26 26.5	58 74	80.2	26 43.9	58 74	79.8	27 01.2	57 74	79.3	27 18.4	57 74	78.9	27 35.5	57 74	78.4	27 52.5	57 74	77.9	28 09.4	56 74	77.5	28 26.2	56 73	77.0	75
6	25 41.9	58 74	79.6	25 59.4	58 74	79.2	26 16.7	58 74	78.7	26 34.0	57 74	78.3	26 51.2	57 74	77.8	27 08.3	57 74	77.4	27 25.3	57 73	76.9	27 42.2	56 73	76.4	6
7	24 57.4	58 74	79.1	25 14.9	58 74	78.6	25 32.4	58 74	78.2	25 49.7	58 74	77.7	26 07.0	57 74	77.2	26 24.1	57 73	76.8	26 41.2	57 73	76.3	26 58.2	56 73	75.9	7
8	24 13.0	59 74	78.5	24 30.6	58 74	78.0	24 48.1	58 74	77.6	25 05.5	58 74	77.1	25 22.8	58 73	76.7	25 40.1	57 73	76.2	25 57.3	57 73	75.8	26 14.3	57 73	75.3	8
9	23 28.7	59 74	77.9	23 46.3	59 74	77.4	24 03.9	58 73	77.0	24 21.4	58 73	76.5	24 38.8	58 73	76.1	24 56.2	58 73	75.7	25 13.4	57 73	75.2	25 30.6	57 73	74.7	9
80	22 44.5	59 74	77.3	23 02.2	59 73	76.9	23 19.8	59 73	76.4	23 37.4	58 73	76.0	23 54.9	58 73	75.5	24 12.4	58 73	75.1	24 29.7	58 73	74.6	24 47.0	57 72	74.2	80
1	22 00.3	59 73	76.7	22 18.1	59 73	76.3	22 35.9	59 73	75.8	22 53.5	59 73	75.4	23 11.1	59 73	75.0	23 28.7	58 73	74.5	23 46.1	58 72	74.1	24 03.5	58 72	73.6	1
2	21 16.3	60 73	76.1	21 34.2	60 73	75.7	21 52.0	59 73	75.3	22 09.8	59 73	74.8	22 27.5	59 73	74.4	22 45.1	59 72	73.9	23 02.6	58 72	73.5	23 20.1	58 73	73.1	2
3	20 32.4	60 73	75.5	20 50.4	60 73	75.1	21 08.3	60 73	74.7	21 26.1	59 73	74.2	21 43.9	59 72	73.8	22 01.6	59 72	73.4	22 19.3	59 72	72.9	22 36.8	58 72	72.5	3
4	19 48.6	60 73	74.9	20 06.7	60 73	74.5	20 24.7	60 72	74.1	20 42.6	60 72	73.7	21 00.5	59 72	73.2	21 18.3	59 72	72.8	21 36.0	59 72	72.4	21 53.7	59 72	71.9	4
85	19 05.0	61 73	74.4	19 23.1	60 72	73.9	19 41.2	60 72	73.5	19 59.2	60 72	73.1	20 17.2	60 72	72.7	20 35.1	60 72	72.2	20 52.9	59 72	71.8	21 10.7	59 71	71.4	85
6	18 21.4	61 72	73.8	18 39.7	61 72	73.4	18 57.9	61 72	72.9	19 16.0	60 72	72.5	19 34.0	60 72	72.1	19 52.1	60 72	71.7	20 10.0	60 71	71.2	20 27.9	60 71	70.8	6
7	17 38.0	61 73	73.2	17 56.3	61 72	72.8	18 14.6	61 72	72.4	18 32.9	61 72	71.9	18 51.0	60 71	71.5	19 09.1	60 71	71.1	19 27.2	60 71	70.7	19 45.2	60 71	70.3	7
8	16 54.7	62 72	72.6	17 13.2	61 72	72.2	17 31.5	61 72	71.8	17 49.9	61 71	71.4	18 08.1	61 71	70.9	18 26.4	61 71	70.5	18 44.5	60 71	70.1	19 02.7	60 71	69.7	8
9	16 11.6	62 72	72.0	16 30.1	62 72	71.6	16 48.6	62 71	71.2	17 07.0	61 71	70.8	17 25.4	61 71	70 4	17 43.8	61 71	70.0	18 02.0	61 71	69.5	18 20.3	61 70	69.1	9
90	15 28.6	62 71	71.4	15 47.2	62 71	71.0	16 05.8	62 71	70.6	16 24.4	62 71	70.2	16 42.8	62 71	69.8	17 01.3	61 70	69.4	17 19.7	61 70	69.0	17 38.0	61 70	68.6	90

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	
00	25 00.0	1.0 01	180.0	24 30.0	1.0 01	180.0	24 00.0	1.0 01	180.0	23 30.0	1.0 01	180.0	23 00.0	1.0 01	180.0	22 30.0	1.0 01	180.0	22 00.0	1.0 01	180.0	21 30.0	1.0 01	180.0	00
1	24 59.6	1.0 02	179.0	24 29.6	1.0 02	179.0	23 59.6	1.0 02	179.0	23 29.6	1.0 02	179.0	22 59.6	1.0 02	179.0	22 29.6	1.0 02	179.0	21 59.6	1.0 02	179.0	21 29.6	1.0 02	179.0	1
2	24 58.4	1.0 03	178.0	24 28.4	1.0 03	178.0	23 58.4	1.0 03	178.0	23 28.4	1.0 03	178.0	22 58.5	1.0 03	178.0	22 28.5	1.0 03	178.1	21 58.5	1.0 03	178.1	21 28.5	1.0 03	178.1	2
3	24 56.4	1.0 05	177.0	24 26.4	1.0 05	177.0	23 56.5	1.0 05	177.0	23 26.5	1.0 05	177.0	22 56.5	1.0 04	177.1	22 26.6	1.0 04	177.1	21 56.6	1.0 04	177.1	21 26.6	1.0 04	177.1	3
4	24 53.6	1.0 06	176.0	24 23.7	1.0 06	176.0	23 53.7	1.0 06	176.0	23 23.8	1.0 06	176.1	22 53.8	1.0 06	176.1	22 23.9	1.0 06	176.1	21 53.9	1.0 06	176.2	21 24.0	1.0 06	176.2	4
05	24 50.1	1.0 07	175.0	24 20.1	1.0 07	175.0	23 50.2	1.0 07	175.0	23 20.3	1.0 07	175.1	22 50.4	1.0 07	175.1	22 20.4	1.0 07	175.2	21 50.5	1.0 07	175.2	21 20.6	1.0 07	175.2	05
6	24 45.7	1.0 09	174.0	24 15.8	1.0 09	174.0	23 45.9	1.0 08	174.1	23 16.0	1.0 08	174.1	22 46.1	1.0 08	174.2	22 16.2	1.0 08	174.2	21 46.4	1.0 08	174.2	21 16.5	1.0 08	174.3	6
7	24 40.5	99 10	173.0	24 10.7	99 10	173.0	23 40.8	99 10	173.1	23 11.0	99 10	173.1	22 41.1	1.0 10	173.2	22 11.3	1.0 09	173.2	21 41.4	1.0 09	173.3	21 11.6	1.0 09	173.3	7
8	24 34.6	99 11	172.0	24 04.8	99 11	172.0	23 35.0	99 11	172.1	23 05.2	99 11	172.2	22 35.4	99 11	172.2	22 05.6	99 11	172.3	21 35.8	99 11	172.3	21 06.0	99 11	172.4	8
9	24 27.9	99 12	171.0	23 58.1	99 12	171.0	23 28.4	99 12	171.1	22 58.6	99 12	171.2	22 28.9	99 12	171.2	21 59.1	99 12	171.3	21 29.4	99 12	171.4	20 59.6	99 12	171.5	9
10	24 20.4	99 14	170.0	23 50.7	99 14	170.1	23 21.0	99 14	170.1	22 51.3	99 13	170.2	22 21.6	99 13	170.3	21 51.9	99 13	170.4	21 22.2	99 13	170.4	20 52.5	99 13	170.5	10
1	24 12.1	99 15	169.0	23 42.5	99 15	169.1	23 12.9	99 15	169.2	22 43.2	99 15	169.2	22 13.6	99 15	169.3	21 44.0	99 14	169.4	21 14.3	99 14	169.5	20 44.7	99 14	169.6	1
2	24 03.1	99 16	168.0	23 33.5	99 16	168.1	23 04.0	99 16	168.2	22 34.4	99 16	168.3	22 04.8	99 16	168.4	21 35.3	99 16	168.5	21 05.7	99 16	168.5	20 36.1	99 15	168.6	2
3	23 53.3	98 18	167.0	23 23.8	98 17	167.1	22 54.3	98 17	167.2	22 24.8	98 17	167.3	21 55.3	98 17	167.4	21 25.8	98 17	167.5	20 56.3	98 17	167.6	20 26.8	98 17	167.7	3
4	23 42.7	98 19	166.0	23 13.3	98 19	166.1	22 43.9	98 19	166.2	22 14.5	98 18	166.4	21 45.1	98 18	166.5	21 15.7	98 18	166.6	20 46.3	98 18	166.7	20 16.8	98 18	166.8	4
15	23 31.4	98 20	165.1	23 02.1	98 20	165.2	22 32.8	98 20	165.3	22 03.5	98 20	165.4	21 34.1	98 19	165.5	21 04.8	98 19	165.6	20 35.5	98 19	165.7	20 06.1	98 19	165.8	15
6	23 19.4	97 21	164.1	22 50.1	97 21	164.2	22 20.9	97 21	164.3	21 51.7	97 21	164.5	21 22.4	97 21	164.6	20 53.2	97 21	164.7	20 23.9	98 20	164.8	19 54.7	98 20	164.9	6
7	23 06.6	97 23	163.1	22 37.5	97 22	163.2	22 08.3	97 22	163.4	21 39.2	97 22	163.5	21 10.0	97 22	163.6	20 40.9	97 22	163.8	20 11.7	97 22	163.9	19 42.6	97 21	164.0	7
8	22 53.1	97 24	162.2	22 24.0	97 24	162.3	21 55.0	97 23	162.4	21 26.0	97 23	162.6	20 56.9	97 23	162.7	20 27.9	97 23	162.8	19 58.8	97 23	163.0	19 29.7	97 23	163.1	8
9	22 38.8	96 25	161.2	22 09.9	96 25	161.3	21 41.0	96 25	161.5	21 12.0	96 24	161.6	20 43.1	96 24	161.8	20 14.2	97 24	161.9	19 45.2	97 24	162.0	19 16.2	97 24	162.2	9
20	22 23.9	96 26	160.2	21 55.1	96 26	160.4	21 26.3	96 26	160.5	20 57.4	96 26	160.7	20 28.6	96 25	160.8	19 59.7	96 25	161.0	19 30.9	96 25	161.1	19 02.0	96 25	161.3	20
1	22 08.2	96 27	159.3	21 39.5	96 27	159.5	21 10.8	96 27	159.6	20 42.1	96 27	159.8	20 13.4	96 26	159.9	19 44.7	96 26	160.1	19 15.9	96 26	160.2	18 47.2	96 26	160.4	1
2	21 51.9	96 28	158.4	21 23.3	96 28	158.5	20 54.7	96 28	158.7	20 26.1	96 28	158.8	19 57.5	96 28	159.0	19 28.9	96 27	159.2	19 00.3	96 27	159.3	18 31.6	96 27	159.5	2
3	21 34.8	96 30	157.4	21 06.4	96 29	157.6	20 37.9	96 29	157.8	20 09.4	96 29	157.9	19 40.9	96 29	158.1	19 12.5	96 28	158.3	18 43.9	96 28	158.4	18 15.4	96 28	158.6	3
4	21 17.1	94 31	156.5	20 48.8	94 30	156.7	20 20.4	94 30	156.8	19 52.1	96 30	157.0	19 23.7	96 30	157.2	18 55.4	96 30	157.4	18 27.0	96 29	157.5	17 58.6	96 29	157.7	4
25	20 58.7	94 32	155.6	20 30.5	94 32	155.8	20 02.3	94 31	155.9	19 34.1	94 31	156.1	19 05.9	94 31	156.3	18 37.6	94 31	156.5	18 09.4	94 30	156.7	17 41.1	94 30	156.8	25
6	20 39.7	94 33	154.7	20 11.6	94 33	154.8	19 43.5	94 32	155.0	19 15.4	94 32	155.2	18 47.3	94 32	155.4	18 19.2	94 32	155.6	17 51.1	94 32	155.8	17 23.0	94 31	156.0	6
7	20 20.0	93 34	153.7	19 52.0	93 34	153.9	19 24.1	93 33	154.1	18 56.1	93 33	154.3	18 28.2	93 33	154.5	18 00.2	93 33	154.7	17 32.2	93 33	154.9	17 04.2	93 32	155.1	7
8	19 59.6	93 35	152.8	19 31.8	93 35	153.0	19 04.0	93 34	153.2	18 36.2	93 34	153.4	18 08.4	93 34	153.6	17 40.5	93 34	153.8	17 12.7	93 34	154.0	16 44.8	93 33	154.2	8
9	19 38.6	92 36	151.9	19 11.0	92 36	152.2	18 43.3	92 36	152.4	18 15.6	92 35	152.6	17 48.0	92 35	152.8	17 20.3	92 35	153.0	16 52.5	92 35	153.2	16 24.8	92 34	153.4	9
30	19 17.0	92 37	151.1	18 49.5	92 37	151.3	18 22.0	92 37	151.5	17 54.5	92 36	151.7	17 26.9	92 36	151.9	16 59.4	92 36	152.1	16 31.8	92 36	152.3	16 04.2	92 35	152.5	30
1	18 54.8	91 38	150.2	18 27.5	91 38	150.4	18 00.1	91 38	150.6	17 32.7	91 37	150.8	17 05.3	91 37	151.0	16 37.9	91 37	151.2	16 10.5	91 37	151.5	15 43.0	91 36	151.7	1
2	18 32.0	91 39	149.3	18 04.8	91 39	149.5	17 37.6	91 39	149.7	17 10.3	91 38	150.0	16 43.1	91 38	150.2	16 15.8	91 38	150.4	15 48.5	91 38	150.6	15 21.2	91 37	150.8	2
3	18 08.6	90 40	148.4	17 41.5	90 40	148.7	17 14.4	90 40	148.9	16 47.4	90 39	149.1	16 20.3	90 39	149.3	15 53.1	90 39	149.6	15 26.0	90 38	149.8	14 58.9	90 38	150.0	3
4	17 44.6	90 41	147.6	17 17.7	90 41	147.8	16 50.8	90 40	148.0	16 23.8	90 40	148.3	15 56.9	90 40	148.5	15 29.9	90 40	148.7	15 02.9	90 39	148.9	14 35.9	90 39	149.2	4
35	17 20.0	89 42	146.7	16 53.3	89 42	146.9	16 26.5	89 41	147.2	15 59.7	89 41	147.4	15 32.9	89 41	147.6	15 06.1	89 41	147.9	14 39.3	89 40	148.1	14 12.5	89 40	148.3	35
6	16 54.9	89 43	145.9	16 28.3	89 43	146.1	16 01.7	89 42	146.3	15 35.0	89 42	146.6	15 08.4	89 42	146.8	14 41.8	89 42	147.1	14 15.1	89 41	147.3	13 48.4	89 41	147.5	6
7	16 29.2	88 44	145.0	16 02.7	88 43	145.3	15 36.3	88 43	145.5	15 09.8	88 43	145.8	14 43.4	88 43	146.0	14 16.9	88 42	146.2	13 50.4	88 42	146.5	13 23.8	88 42	146.7	7
8	16 02.9	88 45	144.2	15 36.7	88 44	144.4	15 10.4	88 44	144.7	14 44.1	88 44	144.9	14 17.8	88 44	145.2	13 51.4	88 43	145.4	13 25.1	88 43	145.7	12 58.7	88 43	145.9	8
9	15 36.2	87 45	143.4	15 10.1	87 45	143.6	14 43.9	87 45	143.9	14 17.8	87 45	144.1	13 51.6	87 44	144.4	13 25.5	87 44	144.6	12 59.3	87 44	144.9	12 33.1	87 44	145.1	9
40	15 08.9	86 46	142.5	14 42.9	87 46	142.8	14 17.0	87 46	143.0	13 51.0	87 46	143.3	13 25.0	87 45	143.6	12 59.0	87 45	143.8	12 33.0	87 45	144.1	12 06.9	87 44	144.3	40
1	14 41.1	86 47	141.7	14 15.3	86 47	142.0	13 49.5	86 47	142.2	13 23.7	86 46	142.5	12 57.9	86 46	142.8	12 32.0	86 46	143.0	12 06.1	86 46	143.3	11 40.3	86 45	143.5	1
2	14 12.8	85 48	140.9	13 47.2	85 48	141.2	13 21.5	85 47	141.4	12 55.9	86 47	141.7	12 30.2	86 47	142.0	12 04.5	86 47	142.2	11 38.8	86 46	142.5	11 13.1	86 46	142.8	2
3	13 44.0	85 49	140.1	13 18.5	85 49	140.4	12 53.1	85 48	140.6	12 27.6	85 48	140.9	12 02.1	85 48	141.2	11 36.6	85 47	141.5	11 11.0	85 47	141.7	10 45.5	85 47	142.0	3
4	13 14.7	84 50	139.3	12 49.4	84 49	139.6	12 24.1	84 49	139.9	11 58.8	84 49	140.1	11 33.4	84 48	140.4	11 08.1	85 48	140.7	10 42.7	85 48	141.0	10 17.4	85 48	141.2	4
45	12 44.9	84 50	138.5	12 19.8	84 50	138.8	11 54.7	84 50	139.1	11 29.5	84 50	139.4	11 04.4	84 49	139.6	10 39.2	84 49	139.9	10 14.0	84 49	140.2	9 48.8	84 48	140.5	45
6	12 14.7	83 51	137.7	11 49.8	83 51	138.0	11 24.8	83 51	138.3	10 59.8	83 50	138.6	10 34.8	83 50	138.9	10 09.8	83 50	139.2	9 44.8	83 49	139.4	9 19.7	84 49	139.7	6
7	11 44.0	83 52	137.0	11 19.3	83 52	137.3	10 54.4	83 51	137.5	10 29.6	83 51	137.8	10 04.8	83 51	138.1	9 39.9	83 50	138.4	9 15.1	83 50	138.7	8 50.2	83 50	139.0	7
8	11 12.9	82 53	136.2	10 48.3	82 52	136.5	10 23.7	82 52	136.8	9 59.0	82 52	137.1	9 34.3	82 51	137.4	9 09.7	82 51	137.7	8 45.0	82 51	137.9	8 20.3	82 51	138.2	8
9	10 41.4	81 53	135.4	10 16.9	82 53	135.7	9 52.4	82 53	136.0	9 28.0	82 52	136.3	9 03.5	82 52	136.6	8 38.9	82 52	136.9	8 14.4	82 52	137.2	7 49.9	82 51	137.5	9
50	10 09.4	81 54	134.7	9 45.1	81 54	135.0	9 20.8	81 53	135.3	8 56.5	81 53	135.6	8 32.1	81 53	135.9	8 07.8	81 53	136.2	7 43.4	81 52	136.5	7 19.1	81 52	136.8	50
1	9 37.0	80 55	133.9	9 12.9	80 54	134.2	8 48.7	80 54	134.5	8 24.6	81 54	134.8	8 00.4	81 54	135.1	7 36.2	81 53	135.4	7 12.0	81 53	135.7	6 47.8	81 53	136.0	1
2	9 04.2	80 55	133.2	8 40.2	80 55	133.5	8 16.2	80 55	133.8	7 52.3	80 55	134.1	7 28.3	80 54	134.4	7 04.2	80 54	134.7	6 40.2	80 54	135.0	6 16.2	80 53	135.3	2
3	8 31.0	79 56	132.5	8 07.2	79 56	132.8	7 43.4	79 55	133.1	7 19.5	79 55	133.4	6 55.7	79 55	133.7	6 31.9	79 55	134.0	6 08.0	80 54	134.3	5 44.1	80 54	134.6	3
4	7 57.4	79 57	131.7	7 33.7	79 56	132.0	7 10.1	79 56	132.4	6 46.4	79 56	132.7	6 22.8	79 56	133.0	5 59.1	79 55	133.3	5 35.4	79 55	133.6	5 11.7	79 55	133.9	4
55	7 23.4	78 57	131.0	6 59.9	78 57	131.3	6 36.4	78 57	131.6	6 12.9	78 56	132.0	5 49.4	78 56	132.3	5 25.9	78 56	132.6	5 02.4	78 56	132.9				55
6	6 49.0	78 58	130.3	6 25.7	78 58	130.6	6 02.4	78 57	130.9	5 39.1	78 57	131.2	5 15.8	78 57	131.6										6
7	6 14.3	77 58	129.6	5 51.2	77 58	129.9	5 28.0	77 58	130.2	5 04.9	77 58	130.5													7
8	5 39.2	77 59	128.9	5 16.2	77 59	129.2																			8
9	5 03.8	76 59	128.2																						9

DECLINATION SAME NAME AS LATITUDE

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	
91	14 45.7	63 71	70.8	15 04.5	62 71	70.4	15 23.2	62 71	70.0	15 41.8	62 71	69.6	16 00.4	62 70	69.2	16 19.0	62 70	68.8	16 37.5	62 70	68.4	16 56.0	61 70	68.0	91
2	14 03.0	63 71	70.2	14 21.9	63 71	69.8	14 40.7	63 71	69.4	14 59.5	62 70	69.0	15 18.2	62 70	68.6	15 36.9	62 70	68.2	15 55.5	62 70	67.8	16 14.1	62 70	67.4	2
3	13 20.5	63 71	69.7	13 39.5	63 70	69.3	13 58.4	63 70	68.9	14 17.3	63 70	68.5	14 36.1	63 70	68.1	14 54.9	63 70	67.6	15 13.6	62 69	67.2	15 32.4	62 69	66.8	3
4	12 38.1	64 70	69.1	12 57.2	63 70	68.7	13 16.2	63 70	68.3	13 35.2	63 70	67.9	13 54.2	63 70	67.5	14 13.1	63 69	67.1	14 32.0	63 69	66.7	14 50.8	63 69	66.3	4
95	11 55.9	64 70	68.5	12 15.1	64 70	68.1	12 34.3	64 70	67.7	12 53.4	64 69	67.3	13 12.4	64 69	66.9	13 31.5	63 69	66.5	13 50.5	63 69	66.1	14 09.5	63 69	65.7	95
6	11 13.9	64 70	67.9	11 33.2	64 70	67.5	11 52.5	64 69	67.1	12 11.7	64 69	66.7	12 30.9	64 69	66.3	12 50.1	64 69	65.9	13 09.2	64 68	65.5	13 28.3	64 68	65.1	6
7	10 32.0	65 69	67.3	10 51.5	65 69	66.9	11 10.8	65 69	66.5	11 30.2	64 69	66.1	11 49.5	64 69	65.7	12 08.8	64 68	65.3	12 28.1	64 68	64.9	12 47.3	64 68	64.5	7
8	9 50.4	65 69	66.7	10 09.9	65 69	66.3	10 29.4	65 69	65.9	10 48.9	65 69	65.5	11 08.3	65 68	65.1	11 27.8	65 68	64.7	11 47.2	65 68	64.3	12 06.5	64 68	63.9	8
9	9 08.9	66 69	66.1	9 28.5	65 69	65.7	9 48.2	65 68	65.3	10 07.8	65 68	64.9	10 27.4	65 68	64.5	10 46.9	65 68	64.1	11 06.4	65 67	63.7	11 25.9	65 67	63.4	9
100	8 27.6	66 68	65.4	8 47.4	66 68	65.1	9 07.1	66 68	64.7	9 26.9	66 68	64.3	9 46.6	66 68	63.9	10 06.3	66 67	63.5	10 25.9	65 67	63.2	10 45.6	65 67	62.8	100
1	7 46.5	66 68	64.8	8 06.4	66 68	64.5	8 26.3	66 68	64.1	8 46.2	66 67	63.7	9 06.0	66 67	63.3	9 25.9	66 67	62.9	9 45.6	66 67	62.6	10 05.4	66 67	62.2	1
2	7 05.6	67 68	64.2	7 25.7	67 68	63.8	7 45.7	67 67	63.5	8 05.7	67 67	63.1	8 25.7	67 67	62.7	8 45.6	67 67	62.3	9 05.6	66 66	62.0	9 25.5	66 66	61.6	2
3	6 25.0	67 67	63.6	6 45.1	67 67	63.2	7 05.3	67 67	62.9	7 25.4	67 67	62.5	7 45.5	67 67	62.1	8 05.6	67 66	61.7	8 25.7	67 66	61.4	8 45.8	67 66	61.0	3
4	5 44.5	68 67	63.0	6 04.8	68 67	62.6	6 25.1	68 67	62.2	6 45.4	68 66	61.9	7 05.6	67 66	61.5	7 25.9	67 66	61.1	7 46.1	67 66	60.8	8 06.3	67 65	60.4	4
105	5 04.3	68 67	62.4	5 24.7	68 67	62.0	5 45.1	68 66	61.6	6 05.6	68 66	61.3	6 26.0	68 66	60.9	6 46.3	68 66	60.5	7 06.7	68 65	60.1	7 27.0	68 65	59.8	105
6							5 05.4	69 66	61.0	5 26.0	68 66	60.6	5 46.5	68 65	60.3	6 07.0	68 65	59.9	6 27.5	68 65	59.5	6 48.0	68 65	59.2	6
7													5 07.3	69 65	59.7	5 28.0	69 65	59.3	5 48.6	69 64	58.9	6 09.3	69 64	58.6	7
8																			5 10.0	69 64	58.3	5 30.8	69 64	57.9	8

Lat. 41°
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Lat. 41°

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	77 00.0	1.0 03	180.0	77 30.0	1.0 03	180.0	78 00.0	1.0 03	180.0	79 00.0	1.0 03	180.0	81 00.0	1.0 04	180.0	83 00.0	1.0 04	180.0	83 30.0	1.0 05	180.0	84 30.0	1.0 06	180.0	00
1	76 58.4	1.0 08	176.1	77 28.4	1.0 08	175.9	77 58.3	1.0 08	175.8	78 58.2	1.0 09	175.5	80 57.9	1.0 11	174.6	82 57.3	99 13	173.2	83 27.1	99 14	172.8	84 26.7	99 16	171.6	1
2	76 53.8	99 13	172.2	77 23.6	99 13	171.9	77 53.4	99 14	171.6	78 52.9	99 15	171.0	80 51.5	99 17	169.3	82 49.4	98 22	166.6	83 18.7	97 28	165.7	84 16.8	96 26	163.4	2
3	76 46.2	99 18	168.4	77 15.7	98 18	168.0	77 45.2	98 19	167.5	78 44.1	98 20	166.6	80 41.1	97 24	164.1	82 36.5	95 29	160.3	83 04.9	94 31	159.0	84 01.1	93 35	155.9	3
4	76 35.6	97 22	164.6	77 04.8	97 23	164.1	77 33.9	97 24	163.5	78 31.9	96 26	162.3	80 26.8	95 30	159.1	82 19.0	92 36	154.4	82 46.4	91 38	152.8	83 40.1	88 42	149.0	4
05	76 22.2	96 27	160.9	76 50.9	96 28	160.3	77 19.6	95 29	159.7	78 16.6	95 30	158.2	80 08.9	92 35	154.4	81 57.5	88 42	148.9	82 23.7	87 44	147.1	83 14.7	83 48	142.9	05
6	76 06.0	94 31	157.4	76 34.3	94 32	156.7	77 02.5	94 33	155.9	77 58.3	93 35	154.3	79 47.7	90 40	150.0	81 32.4	84 47	143.9	81 57.4	83 49	142.0	82 45.7	78 53	137.5	6
7	75 47.4	93 35	154.0	76 15.1	92 36	153.2	76 42.7	92 37	152.4	77 37.3	90 39	150.5	79 23.7	87 44	145.8	81 04.3	81 51	139.4	81 28.1	78 53	137.4	82 13.7	73 57	132.8	7
8	75 26.4	91 39	150.7	75 53.6	90 40	149.9	76 20.5	90 41	149.0	77 13.8	88 43	147.0	78 57.0	84 48	142.0	80 33.6	77 55	135.3	80 56.3	75 57	133.8	81 39.4	69 60	128.7	8
9	75 03.2	89 42	147.6	75 29.8	88 43	146.7	75 56.1	87 44	145.7	76 48.0	86 46	143.6	78 28.0	81 52	138.4	80 00.7	73 58	131.6	80 22.3	71 60	129.6	81 03.2	65 63	125.0	9
10	74 38.0	87 45	144.7	75 03.9	86 46	143.7	75 29.6	85 47	142.7	76 20.2	83 50	140.5	77 57.0	78 55	135.1	79 26.0	70 60	128.3	79 46.6	67 62	126.3	80 25.4	62 65	121.8	10
1	74 10.8	85 48	141.8	74 36.2	84 49	140.8	75 01.2	83 50	139.8	75 50.4	81 52	137.5	77 24.2	75 57	132.1	78 49.7	67 63	125.3	79 09.4	64 64	123.3	79 46.3	59 67	119.0	1
2	73 42.0	83 51	139.1	74 06.8	82 52	138.1	74 31.2	81 53	137.1	75 19.0	79 55	134.7	76 49.9	72 59	129.3	78 12.1	64 64	122.5	78 31.0	62 66	120.6	79 06.2	56 68	116.4	2
3	73 11.7	81 53	136.6	73 35.8	80 54	135.6	73 59.6	79 55	134.5	74 46.2	76 57	132.1	76 14.2	70 61	126.7	77 33.4	62 66	120.1	77 51.5	59 67	118.2	78 25.3	53 69	114.2	3
4	72 39.9	79 55	134.2	73 03.4	78 56	133.2	73 26.6	77 57	132.1	74 11.9	74 59	129.7	75 37.3	68 63	124.3	76 53.8	59 67	117.8	77 11.2	57 68	116.0	77 43.6	51 70	112.1	4
15	72 06.8	77 57	131.9	72 29.8	76 58	130.9	72 52.4	75 59	129.8	73 36.5	72 61	127.4	74 59.4	66 65	122.1	76 13.3	57 69	115.7	76 30.1	55 69	114.0	77 01.4	49 71	110.2	15
6	71 32.5	75 59	129.8	71 55.0	74 60	128.7	72 17.0	73 61	127.6	73 00.0	70 62	125.3	74 20.6	64 66	120.0	75 32.2	55 70	113.8	75 48.4	53 70	112.1	76 18.7	48 72	108.5	6
7	70 57.2	74 60	127.7	71 19.1	72 61	126.7	71 40.7	71 62	125.6	72 22.6	68 64	123.2	73 41.0	62 67	118.1	74 50.5	54 70	112.0	75 06.2	51 71	110.4	75 35.5	46 72	106.9	7
8	70 29.9	72 62	125.8	70 42.3	71 63	124.7	71 03.4	70 64	123.6	71 44.3	67 65	121.3	73 00.7	60 68	116.2	74 08.3	52 71	110.4	74 23.6	50 72	108.8	74 52.0	45 73	105.5	8
9	69 43.8	71 63	123.9	70 04.7	69 64	122.9	70 25.3	68 65	121.8	71 05.3	65 66	119.6	72 19.8	59 69	114.6	73 25.6	51 72	108.9	73 40.5	49 72	107.3	74 08.3	44 73	104.1	9
20	69 05.8	69 64	122.2	69 26.3	68 65	121.1	69 46.5	67 66	120.1	70 25.6	64 67	117.9	71 38.3	57 70	113.0	72 42.6	50 72	107.4	72 57.2	47 73	106.0	73 24.2	43 74	102.9	20
1	68 27.1	68 66	120.5	68 47.2	66 66	119.5	69 07.0	65 67	118.4	69 45.2	62 68	116.3	70 56.4	56 71	111.5	71 59.2	48 73	106.1	72 13.5	46 73	104.7	72 40.9	42 74	101.7	1
2	67 47.8	66 67	118.9	68 07.5	65 67	117.9	68 26.9	64 68	116.9	69 04.4	61 69	114.7	70 14.1	55 71	110.0	71 15.6	47 73	104.8	71 29.5	45 74	103.5	71 55.6	41 74	100.6	2
3	67 07.9	65 67	117.4	67 27.2	64 68	116.4	67 46.2	63 69	115.4	68 23.0	60 70	113.3	69 31.3	54 72	108.7	70 31.7	47 74	103.6	70 45.4	45 74	102.3	71 11.0	41 75	99.5	3
4	66 27.4	64 68	116.0	66 46.4	63 69	115.0	67 05.1	62 69	114.0	67 41.2	59 70	111.9	68 48.3	53 72	107.4	69 47.6	46 74	102.5	70 01.1	44 74	101.2	70 26.2	40 75	98.5	4
25	65 46.5	63 69	114.6	66 05.2	62 69	113.6	66 23.5	60 70	112.6	66 59.0	58 71	110.6	68 05.0	52 73	106.2	69 03.3	45 74	101.4	69 16.6	43 74	100.2	69 41.4	39 75	97.6	25
6	65 05.1	62 70	113.3	65 23.5	61 70	112.3	65 41.5	60 71	111.3	66 16.4	57 71	109.3	67 21.3	51 73	105.1	68 18.8	45 74	100.4	68 31.9	43 75	99.2	68 56.5	39 75	96.7	6
7	64 23.3	61 70	112.0	64 41.4	60 71	111.1	64 59.1	59 71	110.1	65 33.6	56 72	108.1	66 37.5	50 73	104.0	67 34.2	44 75	99.4	67 47.2	42 75	98.3	68 11.5	38 75	95.8	7
8	63 41.1	60 71	110.8	63 59.0	59 71	109.9	64 16.5	58 72	108.9	64 50.4	55 72	107.0	65 53.5	50 74	102.9	66 49.5	44 75	98.5	67 02.3	42 75	97.4	67 26.4	38 75	95.0	8
9	62 58.6	59 71	109.6	63 16.2	58 72	108.7	63 33.5	57 72	107.8	64 07.0	55 73	105.9	65 09.2	49 74	101.9	66 04.7	43 75	97.6	66 17.4	41 75	96.5	66 41.2	38 75	94.2	9
30	62 15.8	59 72	108.5	62 33.2	57 72	107.6	62 50.2	56 72	106.7	63 23.3	54 73	104.8	64 24.9	49 74	100.9	65 19.7	43 75	96.7	65 32.3	41 75	95.6	65 56.1	38 75	93.4	30
1	61 32.7	58 72	107.4	61 49.9	57 73	106.5	62 06.7	56 73	105.6	62 39.4	53 73	103.8	63 40.3	48 74	100.0	64 34.7	42 75	95.9	64 47.2	41 75	94.8	65 10.8	38 75	92.7	1
2	60 49.4	57 73	106.3	61 06.3	56 73	105.5	61 23.0	55 73	104.6	61 55.3	53 74	102.8	62 55.7	48 75	99.1	63 49.7	42 75	95.1	64 02.1	41 75	94.1	64 25.6	38 75	92.0	2
3	60 05.8	57 73	105.3	60 22.6	56 73	104.5	60 39.1	54 74	103.6	61 11.1	52 74	101.9	62 10.9	47 75	98.2	63 04.5	42 75	94.3	63 16.9	41 75	93.3	63 40.3	38 75	91.3	3
4	59 22.0	56 73	104.3	59 38.7	55 74	103.5	59 55.0	54 74	102.7	60 26.7	52 74	100.9	61 26.0	47 75	97.4	62 19.4	42 75	93.6	62 31.7	40 75	92.6	62 55.1	38 75	90.6	4
35	58 38.0	56 74	103.4	58 54.5	55 74	102.5	59 10.7	53 74	101.7	59 42.2	51 74	100.1	60 41.1	47 75	96.5	61 34.2	42 75	92.8	61 46.4	40 75	91.9	62 09.8	37 75	89.9	35
6	57 53.9	55 74	102.4	58 10.3	54 74	101.6	58 26.3	53 74	100.8	58 57.6	51 75	99.2	59 56.1	46 75	95.7	60 48.9	42 75	92.1	61 01.2	40 75	91.2	61 24.5	38 75	89.3	6
7	57 09.6	55 74	101.5	57 25.8	54 74	100.7	57 41.8	53 74	100.0	58 12.8	51 75	98.3	59 11.0	46 75	95.0	60 03.7	41 75	91.4	60 15.9	40 75	90.5	60 39.2	38 75	88.6	7
8	56 25.2	54 74	100.6	56 41.3	53 74	99.9	56 57.1	52 75	99.1	57 28.0	50 75	97.5	58 25.9	46 75	94.2	59 18.4	41 75	90.7	59 30.6	40 75	89.8	59 54.0	38 75	88.0	8
9	55 40.6	54 74	99.8	55 56.6	53 75	99.0	56 12.4	52 75	98.3	56 43.0	50 75	96.7	57 40.7	46 75	93.5	58 33.1	41 75	90.1	58 45.3	40 75	89.2	59 08.7	38 75	87.4	9
40	54 55.9	54 75	99.0	55 11.9	53 75	98.2	55 27.5	52 75	97.5	55 58.0	50 75	95.9	56 55.5	46 75	92.8	57 47.8	41 75	89.4	58 00.1	40 75	88.6	58 23.5	38 75	86.8	40
1	54 11.1	53 75	98.1	54 27.0	52 75	97.4	54 42.6	52 75	96.7	55 12.9	50 75	95.2	56 10.2	46 75	92.1	57 02.5	41 75	88.8	57 14.8	40 75	87.9	57 38.3	38 75	86.2	1
2	53 26.3	53 75	97.3	53 42.0	52 75	96.6	53 57.6	51 75	95.9	54 27.8	49 75	94.4	55 25.0	46 75	91.4	56 17.3	41 75	88.2	56 29.6	40 75	87.3	56 53.1	38 75	85.7	2
3	52 41.3	53 75	96.6	52 57.0	52 75	95.9	53 12.5	51 75	95.1	53 42.7	49 75	93.7	54 39.7	46 75	90.7	55 32.0	42 75	87.5	55 44.3	41 75	86.7	56 08.0	38 75	85.1	3
4	51 56.3	53 75	95.8	52 12.0	52 75	95.1	52 27.4	51 75	94.4	52 57.4	49 75	93.0	53 54.4	46 75	90.0	54 46.8	42 75	86.9	54 59.1	41 75	86.1	55 22.9	39 75	84.5	4
45	51 11.2	52 75	95.1	51 26.8	52 75	94.4	51 42.2	51 75	93.7	52 12.2	49 75	92.3	53 09.1	46 75	89.4	54 01.6	42 75	86.3	54 14.0	41 75	85.6	54 37.8	39 75	84.0	45
6	50 26.1	52 75	94.3	50 41.7	52 75	93.7	50 57.0	51 75	93.0	51 27.0	49 75	91.6	52 23.8	46 75	88.7	53 16.4	42 75	85.8	53 28.8	41 75	85.0	53 52.8	39 75	83.5	6
7	49 40.9	52 75	93.6	49 56.5	51 75	92.9	50 11.8	51 75	92.3	50 41.7	49 75	90.9	51 38.6	46 75	88.1	52 31.3	42 75	85.2	52 43.8	41 75	84.4	53 07.9	39 75	82.9	7
8	48 55.7	52 75	92.9	49 11.2	51 75	92.3	49 26.5	51 75	91.6	49 56.4	49 75	90.3	50 53.3	46 75	87.5	51 46.2	42 75	84.6	51 58.7	41 75	83.9	52 23.0	39 75	82.4	8
9	48 10.5	52 75	92.2	48 26.0	51 75	91.6	48 41.2	51 75	90.9	49 11.1	49 75	89.6	50 08.1	46 75	86.9	51 01.1	42 75	84.1	51 13.7	42 75	83.3	51 38.1	40 75	81.9	9
50	47 25.2	52 75	91.5	47 40.7	51 75	90.9	47 56.0	51 75	90.3	48 25.8	49 75	89.0	49 22.9	46 75	86.3	50 16.1	43 75	83.5	50 28.8	42 75	82.8	50 53.3	40 75	81.3	50
1	46 39.9	52 75	90.9	46 55.4	51 75	90.2	47 10.7	51 75	89.6	47 40.6	49 75	88.3	48 37.7	46 75	85.7	49 31.1	43 75	82.9	49 43.9	42 75	82.2	50 08.6	40 74	80.8	1
2	45 54.7	52 75	90.2	46 10.1	51 75	89.6	46 25.4	51 75	89.0	46 55.3	49 75	87.7	47 52.6	46 75	85.1	48 46.2	43 75	82.4	48 59.0	42 75	81.7	49 23.9	41 74	80.3	2
3	45 09.4	52 75	89.5	45 24.8	51 75	88.9	45 40.1	51 75	88.3	46 10.1	49 75	87.1	47 07.5	46 75	84.5	48 01.4	43 75	81.9	48 14.2	43 74	81.2	48 39.3	41 74	79.8	3
4	44 24.1	52 75	88.9	44 39.6	51 75	88.3	44 54.9	51 75	87.7	45 24.9	49 75	86.5	46 22.4	47 75	83.9	47 16.6	44 75	81.3	47 29.5	43 74	80.7	47 54.8	41 74	79.3	4
55	43 38.8	52 75	88.3	43 54.3	51 75	87.7	44 09.6	51 75	87.1	44 39.7	49 75	85.8	45 37.4	47 75	83.4	46 31.8	44 74	80.8	46 44.9	43 74	80.1	47 10.3	42 74	78.8	55
6	42 53.6	52 75	87.6	43 09.1	51 75	87.0	43 24.4	51 75	86.4	43 54.5	50 75	85.3	44 52.5	47 75	82.8	45 47.2	44 74	80.3	46 00.3	43 74	79.6	46 25.9	42 74	78.3	6
7	42 08.3	52 75	87.0	42 23.9	52 75	86.4	42 39.2	51 75	85.8	43 09.4	50 75	84.7	44 07.6	47 75	82.2	45 02.6	44 74	79.7	45 15.8	44 74	79.1	45 41.6	42 74	77.8	7
8	41 23.1	52 75	86.4	41 38.7	52 75	85.8	41 54.1	51 75	85.2	42 24.4	50 75	84.1	43 22.7	47 75	81.7	44 18.0	45 74	79.2	44 31.4	44 74	78.6	44 57.4	43 74	77.3	8
9	40 38.0	52 75	85.8	40 53.6	52 75	85.2	41 09.0	51 75	84.6	41 39.4	50 75	83.5	42 38.0	48 74	81.1	43 33.6	45 74	78.7	43 47.0	44 74	78.1	44 13.2	43 73	76.8	9
60	39 52.8	52 75	85.2	40 08.5	52 75	84.6	40 23.9	51 75	84.0	40 54.4	50 75	82.9	41 53.3	48 74	80.6	42 49.2	45 74	78.2	43 02.8	45 74	77.6	43 29.2	43 73	76.4	60
1	39 07.7	53 75	84.6	39 23.4	52 75	84.0	39 38.9	51 75	83.5	40 09.5	50 75	82.3	41 08.6	48 74	80.0	42 05.0	46 74	77.7	42 18.6	45 73	77.1	42 45.2	44 73	75.9	1
2	38 22.7	53 75	84.0	38 38.4	52 75	83.4	38 54.0	52 75	82.9	39 24.6	51 75	81.8	40 24.1	48 74	79.5	41 20.8	46 74	77.2	41 34.5	45 73	76.6	42 01.4	44 73	75.4	2
3	37 37.7	53 75	83.4	37 53.4	52 75	82.8	38 09.1	52 75	82.3	38 39.9	51 75	81.2	39 39.6	49 74	79.0	40 36.6	46 73	76.7	40 50.5	46 73	76.1	41 17.6	45 73	74.9	3
4	36 52.7	53 75	82.8	37 08.5	53 75	82.3	37 24.2	52 75	81.7	37 55.1	51 74	80.6	38 55.2	49 74	78.4	39 52.6	47 73	76.2	40 06.6	46 73	75.6	40 33.9	45 73	74.4	4
65	36 07.8	53 75	82.2	36 23.7	53 75	81.7	36 39.4	52 75	81.2	37 10.5	51 74	80.1	38 10.9	49 74	77.9	39 08.7	47 73	75.7	39 22.8	47 73	75.1	39 50.4	45 72	73.9	65
6	35 23.0	53 75	81.6	35 38.9	53 74	81.1	35 54.7	52 74	80.6	36 25.9	52 74	79.5	37 26.6	50 74	77.4	38 24.9	48 73	75.2	38 39.1	47 73	74.6	39 06.9	46 73	73.4	6
7	34 38.2	54 74	81.1	34 54.2	53 74	80.5	35 10.1	53 74	80.0	35 41.4	52 74	79.0	36 42.5	50 73	76.8	37 41.2	48 73	74.6	37 55.5	47 72	74.1	38 23.6	46 73	73.0	7
8	33 53.5	54 74	80.5	34 09.6	53 74	80.0	34 25.5	53 74	79.5	34 57.0	52 74	78.4	35 58.4	50 73	76.3	36 57.6	48 73	74.1	37 12.0	48 72	73.6	37 40.3	47 72	72.5	8
9	33 08.9	54 74	79.9	33 25.0	54 74	79.4	33 41.1	53 74	78.9	34 12.7	52 74	77.9	35 14.5	51 73	75.8	36 14.1	49 72	73.6	36 28.6	48 72	73.1	36 57.2	47 72	72.0	9
70	32 24.3	54 74	79.3	32 40.6	54 74	78.8	32 56.7	53 74	78.3	33 28.5	53 74	77.3	34 30.6	51 73	75.3	35 30.7	49 72	73.1	35 45.3	49 72	72.6	36 14.2	48 71	71.5	70
1	31 39.9	55 74	78.8	31 56.2	54 74	78.3	32 12.4	54 74	77.8	32 44.4	53 73	76.8	33 46.9	51 73	74.7	34 47.4	49 72	72.6	35 02.2	49 72	72.1	35 31.3	48 71	71.0	1
2	30 55.5	55 74	78.2	31 11.9	54 74	77.7	31 28.2	54 74	77.2	32 00.3	53 73	76.2	33 03.3	52 73	74.2	34 04.2	50 72	72.1	34 19.1	49 72	71.6	34 48.5	49 71	70.6	2
3	30 11.2	55 74	77.6	30 27.7	55 74	77.2	30 44.0	54 73	76.7	31 16.4	54 73	75.7	32 19.8	52 72	73.7	33 21.2	50 72	71.6	33 36.2	50 71	71.1	34 05.9	49 71	70.1	3
4	29 27.1	55 73	77.1	29 43.6	55 73	76.6	30 00.0	55 73	76.1	30 32.6	54 73	75.1	31 36.4	52 72	73.2	32 38.3	51 71	71.1	32 53.4	50 71	70.6	33 23.4	49 71	69.6	4
75	28 43.0	56 73	76.5	28 59.6	55 73	76.0	29 16.1	55 73	75.6	29 48.9	54 73	74.6	30 53.1	53 72	72.6	31 55.5	51 71	70.6	32 10.8	51 71	70.1	32 41.0	50 70	69.1	75
6	27 59.0	56 73	76.0	28 15.7	56 73	75.5	28 32.3	55 73	75.0	29 05.3	55 72	74.1	30 09.9	53 72	72.1	31 12.8	52 71	70.1	31 28.3	51 71	69.6	31 58.8	50 70	68.6	6
7	27 15.1	56 73	75.4	27 31.9	56 73	74.9	27 48.6	56 73	74.5	28 21.8	55 72	73.5	29 26.9	54 72	71.6	30 30.3	52 71	69.6	30 45.9	52 70	69.1	31 16.7	51 70	68.1	7
8	26 31.3	56 73	74.8	26 48.2	56 73	74.4	27 05.1	56 72	73.9	27 38.4	55 72	73.0	28 44.0	54 71	71.1	29 47.9	53 70	69.1	30 03.6	52 70	68.7	30 34.7	51 70	67.7	8
9	25 47.7	57 73	74.3	26 04.7	57 72	73.8	26 21.6	56 72	73.4	26 55.2	56 72	72.4	28 01.2	54 71	70.6	29 05.7	53 70	68.6	29 21.5	53 70	68.2	29 52.9	52 69	67.2	9
80	25 04.2	57 72	73.7	25 21.3	57 72	73.3	25 38.3	57 72	72.8	26 12.1	56 72	71.9	27 18.6	55 71	70.0	28 23.6	53 70	68.1	28 39.6	53 70	67.7	29 11.2	52 69	66.7	80
1	24 20.8	58 72	73.2	24 38.0	57 72	72.7	24 55.1	57 72	72.3	25 29.1	56 71	71.4	26 36.1	55 71	69.5	27 41.6	54 70	67.6	27 57.8	54 69	67.2	28 29.7	53 69	66.2	1
2	23 37.5	58 72	72.6	23 54.8	58 72	72.2	24 12.0	57 72	71.7	24 46.3	57 71	70.8	25 53.7	56 70	69.0	26 59.8	54 69	67.1	27 16.1	54 69	66.7	27 48.4	53 69	65.7	2
3	22 54.3	58 72	72.1	23 11.7	58 71	71.6	23 29.1	58 71	71.2	24 03.6	57 71	70.3	25 11.5	56 70	68.5	26 18.2	55 69	66.6	26 34.6	55 69	66.2	27 07.2	54 68	65.2	3
4	22 11.3	59 71	71.5	22 28.8	58 71	71.1	22 46.3	58 71	70.6	23 21.0	58 71	69.7	24 29.5	57 70	67.9	25 36.7	55 69	66.1	25 53.3	55 69	65.6	26 26.2	55 68	64.7	4
85	21 28.4	59 71	70.9	21 46.1	59 71	70.5	22 03.7	58 71	70.1	22 38.6	58 70	69.2	23 47.6	57 70	67.4	24 55.4	56 69	65.6	25 12.1	56 68	65.1	25 45.3	55 68	64.2	85
6	20 45.7	59 71	70.4	21 03.1	59 71	70.0	21 21.2	59 71	69.5	21 56.4	58 70	68.6	23 05.9	57 69	66.9	24 14.2	56 68	65.1	24 31.1	56 68	64.6	25 04.6	55 68	63.7	6
7	20 03.1	60 71	69.8	20 21.0	59 70	69.4	20 38.8	59 70	69.0	21 14.3	59 70	68.1	22 24.3	58 69	66.4	23 33.2	57 68	64.6	23 50.3	57 68	64.1	24 24.1	56 67	63.2	7
8	19 20.7	60 70	69.3	19 38.7	60 70	68.8	19 56.6	60 70	68.4	20 32.3	59 70	67.6	21 42.9	58 69	65.8	22 52.4	57 68	64.1	23 09.6	57 67	63.6	23 43.8	57 67	62.7	8
9	18 38.4	60 70	68.7	18 56.6	60 70	68.3	19 14.6	60 70	67.9	19 50.6	60 69	67.0	21 01.7	59 68	65.3	22 11.8	58 67	63.5	22 29.1	58 67	63.1	23 03.6	57 67	62.2	9
90	17 56.3	61 70	68.1	18 14.6	61 70	67.7	18 32.8	61 69	67.3	19 09.0	60 69	66.5	20 20.6	59 68	64.8	21 31.3	58 67	63.0	21 48.8	58 67	62.6	22 23.6	58 66	61.7	90

16—11439

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		°
00	21 00.0	1.0 01	180.0	20 30.0	1.0 01	180.0	20 00.0	1.0 01	180.0	19 00.0	1.0 01	180.0	17 00.0	1.0 01	180.0	15 00.0	1.0 01	180.0	14 30.0	1.0 01	180.0	13 30.0	1.0 01	180.0	00
1	20 59.6	1.0 02	179.1	20 29.6	1.0 02	179.1	19 59.6	1.0 02	179.1	18 59.6	1.0 02	179.1	16 59.6	1.0 02	179.1	14 59.7	1.0 02	179.1	14 29.7	1.0 02	179.1	13 29.7	1.0 02	179.2	1
2	20 58.5	1.0 03	178.1	20 28.5	1.0 03	178.1	19 58.5	1.0 03	178.1	18 58.6	1.0 03	178.2	16 58.6	1.0 03	178.2	14 58.6	1.0 03	178.3	14 28.7	1.0 03	178.3	13 28.7	1.0 03	178.3	2
3	20 56.6	1.0 04	177.2	20 26.7	1.0 04	177.2	19 56.7	1.0 04	177.2	18 56.7	1.0 04	177.3	16 56.8	1.0 04	177.3	14 56.9	1.0 04	177.4	14 27.0	1.0 04	177.4	13 27.0	1.0 04	177.5	3
4	20 54.0	1.0 06	176.2	20 24.1	1.0 06	176.2	19 54.1	1.0 06	176.3	18 54.2	1.0 05	176.3	16 54.4	1.0 05	176.5	14 54.6	1.0 05	176.6	14 24.6	1.0 05	176.6	13 24.7	1.0 05	176.7	4
05	20 50.7	1.0 07	175.3	20 20.7	1.0 07	175.3	19 50.8	1.0 07	175.4	18 51.0	1.0 07	175.4	16 51.2	1.0 06	175.6	14 51.5	1.0 06	175.7	14 21.6	1.0 06	175.7	13 21.7	1.0 06	175.8	05
6	20 46.6	1.0 08	174.3	20 16.7	1.0 08	174.4	19 46.8	1.0 08	174.4	18 47.0	1.0 08	174.5	16 47.4	1.0 08	174.7	14 47.8	1.0 07	174.9	14 17.9	1.0 07	174.9	13 18.1	1.0 07	175.0	6
7	20 41.7	1.0 09	173.4	20 11.9	1.0 09	173.4	19 42.0	1.0 09	173.5	18 42.3	1.0 09	173.6	16 42.9	1.0 09	173.8	14 43.4	1.0 08	174.0	14 13.5	1.0 08	174.1	13 13.8	1.0 08	174.1	7
8	20 36.2	99 11	172.5	20 06.3	99 10	172.5	19 36.5	99 10	172.6	18 36.9	99 10	172.7	16 37.6	99 10	172.9	14 38.3	99 10	173.2	14 08.5	99 09	173.2	13 08.9	99 09	173.3	8
9	20 29.8	99 12	171.5	20 00.1	99 12	171.6	19 30.3	99 12	171.7	18 30.8	99 11	171.8	16 31.7	99 11	172.0	14 32.6	99 11	172.3	14 02.8	99 11	172.4	13 03.3	99 10	172.5	9
10	20 22.8	99 13	170.6	19 53.1	99 13	170.7	19 23.4	99 13	170.7	18 24.0	99 13	170.9	16 25.1	99 12	171.2	14 26.2	99 12	171.5	13 56.5	99 12	171.5	12 57.0	99 11	171.7	10
1	20 15.0	99 14	169.7	19 45.4	99 14	169.7	19 15.7	99 14	169.8	18 16.4	99 14	170.0	16 17.8	99 13	170.3	14 19.2	99 13	170.6	13 49.5	99 13	170.7	12 50.1	99 13	170.8	1
2	20 06.5	99 15	168.7	19 37.0	99 15	168.8	19 07.4	99 15	168.9	18 08.2	99 15	169.1	16 09.8	99 14	169.4	14 11.4	99 14	169.8	13 41.8	99 14	170.0	12 42.6	99 14	170.0	2
3	19 57.3	98 17	167.8	19 27.8	98 16	167.9	18 58.3	98 16	168.0	17 59.3	98 16	168.2	16 01.2	98 16	168.6	14 03.1	98 15	168.9	13 33.5	98 15	169.0	12 34.4	98 15	169.2	3
4	19 47.4	98 18	166.9	19 18.0	98 18	167.0	18 48.5	98 17	167.1	17 49.7	98 17	167.3	15 51.9	98 17	167.7	13 54.0	98 16	168.1	13 24.6	98 16	168.2	12 25.6	98 16	168.4	4
15	19 36.8	98 19	166.0	19 07.4	98 19	166.1	18 38.1	98 19	166.2	17 39.3	98 18	166.4	15 41.9	98 18	166.8	13 44.3	98 17	167.2	13 15.0	98 17	167.3	12 16.2	98 17	167.5	15
6	19 25.4	98 20	165.0	18 56.2	98 20	165.2	18 26.9	98 20	165.3	17 28.4	98 19	165.5	15 31.2	98 19	166.0	13 34.0	98 18	166.4	13 04.7	98 18	166.5	12 06.1	98 18	166.7	6
7	19 13.4	97 21	164.1	18 44.2	97 21	164.3	18 15.0	97 21	164.4	17 16.7	97 21	164.6	15 19.9	97 20	165.1	13 23.1	97 19	165.6	12 53.8	97 19	165.7	11 55.4	97 19	165.9	7
8	19 00.7	97 22	163.2	18 31.6	97 22	163.4	18 02.5	97 22	163.5	17 04.3	97 22	163.7	15 07.9	97 21	164.2	13 11.5	97 20	164.7	12 42.3	97 20	164.9	11 44.1	97 20	165.1	8
9	18 47.3	97 23	162.3	18 18.3	97 23	162.5	17 49.3	97 23	162.6	16 51.3	97 23	162.9	14 55.3	97 22	163.4	12 59.2	97 21	163.9	12 30.2	97 21	164.0	11 32.1	97 21	164.3	9
20	18 33.2	96 25	161.4	18 04.3	96 24	161.6	17 35.4	96 24	161.7	16 37.7	96 24	162.0	14 42.1	96 23	162.6	12 46.4	96 22	163.1	12 17.4	96 22	163.2	11 19.6	96 22	163.5	20
1	18 18.4	96 26	160.5	17 49.7	96 26	160.7	17 20.9	96 25	160.8	16 23.3	96 25	161.1	14 28.2	96 24	161.7	12 32.9	96 24	162.3	12 04.1	96 23	162.4	11 06.4	96 23	162.7	1
2	18 03.0	96 27	159.6	17 34.3	96 27	159.8	17 05.7	96 26	160.0	16 08.4	96 26	160.3	14 13.6	96 25	160.9	12 18.8	96 24	161.5	11 50.1	96 24	161.6	10 52.6	96 24	161.9	2
3	17 46.9	95 28	158.8	17 18.4	95 28	158.9	16 49.8	95 27	159.1	15 52.8	95 27	159.4	13 58.5	95 26	160.0	12 04.1	95 25	160.7	11 35.5	95 25	160.8	10 38.3	95 25	161.1	3
4	17 30.2	95 29	157.9	17 01.8	95 29	158.0	16 33.4	95 29	158.2	15 36.5	95 28	158.5	13 42.7	95 27	159.2	11 48.8	95 26	159.8	11 20.3	95 26	160.0	10 23.3	95 26	160.3	4
25	17 12.8	94 30	157.0	16 44.5	94 30	157.2	16 16.2	94 30	157.4	15 19.6	94 29	157.7	13 26.3	94 28	158.4	11 32.9	95 27	159.0	11 04.5	95 27	159.2	10 07.8	95 27	159.5	25
6	16 54.8	94 31	156.1	16 26.7	94 31	156.3	15 58.5	94 31	156.5	15 02.1	94 30	156.9	13 09.3	94 29	157.6	11 16.4	94 28	158.2	10 48.2	94 28	158.4	9 51.7	94 28	158.8	6
7	16 36.2	93 32	155.3	16 08.2	93 32	155.5	15 40.1	93 32	155.6	14 44.0	94 31	156.0	12 51.8	94 30	156.7	10 59.4	94 29	157.5	10 31.2	94 29	157.6	9 35.0	94 29	158.0	7
8	16 16.9	93 33	154.4	15 49.0	93 33	154.6	15 21.1	93 33	154.8	14 25.3	93 32	155.2	12 33.6	93 31	155.9	10 41.7	93 30	156.7	10 13.7	93 30	156.8	9 17.7	93 30	157.2	8
9	15 57.1	92 34	153.6	15 29.3	93 34	153.8	15 01.6	93 34	154.0	14 06.0	93 33	154.3	12 14.8	93 32	155.1	10 23.5	93 31	155.9	9 55.6	93 31	156.1	8 59.9	93 31	156.4	9
30	15 36.6	92 35	152.7	15 09.0	92 35	152.9	14 41.4	92 35	153.1	13 46.1	92 34	153.5	11 55.5	92 33	154.3	10 04.7	92 32	155.1	9 37.0	92 32	155.3	8 41.5	92 32	155.7	30
1	15 15.6	92 36	151.9	14 48.1	92 36	152.1	14 20.6	92 36	152.3	13 25.6	92 35	152.7	11 35.6	92 34	153.5	9 45.4	92 33	154.3	9 17.8	92 33	154.5	8 22.6	92 32	154.9	1
2	14 53.9	91 37	151.0	14 26.6	91 37	151.3	13 59.3	91 37	151.5	13 04.6	91 36	151.9	11 15.1	91 35	152.7	9 25.5	91 34	153.6	8 58.0	91 34	153.8	8 03.2	91 33	154.2	2
3	14 31.7	91 38	150.2	14 04.5	91 38	150.4	13 37.4	91 37	150.7	12 43.0	91 37	151.1	10 54.1	91 36	151.9	9 05.0	91 35	152.8	8 37.7	91 35	153.0	7 43.2	91 34	153.4	3
4	14 08.9	90 39	149.4	13 41.9	90 39	149.6	13 14.9	90 38	149.8	12 20.8	90 38	150.3	10 32.5	90 37	151.2	8 44.1	90 36	152.0	8 16.9	90 36	152.2	7 22.6	90 35	152.7	4
35	13 45.6	90 40	148.6	13 18.7	90 40	148.8	12 51.9	90 39	149.0	11 58.1	90 39	149.5	10 10.4	90 38	150.4	8 22.5	90 37	151.3	7 55.6	90 36	151.5	7 01.6	90 36	151.9	35
6	13 21.7	89 41	147.8	12 55.0	89 40	148.0	12 28.3	89 40	148.2	11 34.8	89 40	148.7	9 47.7	89 39	149.6	8 00.5	89 38	150.5	7 33.7	89 37	150.7	6 40.0	89 37	151.2	6
7	12 57.3	88 42	147.0	12 30.7	89 41	147.2	12 04.2	89 41	147.4	11 11.0	89 41	147.9	9 24.6	89 39	148.8	7 38.0	89 38	149.8	7 11.3	89 38	150.0	6 18.0	89 38	150.5	7
8	12 32.3	88 42	146.2	12 06.0	88 42	146.4	11 39.6	88 42	146.6	10 46.7	88 41	147.1	9 00.9	88 40	148.1	7 14.9	88 39	149.0	6 48.4	88 39	149.3	5 55.4	88 38	149.7	8
9	12 06.9	87 43	145.4	11 40.6	87 43	145.6	11 14.4	87 43	145.9	10 21.9	88 42	146.4	8 36.7	88 41	147.3	6 51.4	88 40	148.3	6 25.0	88 40	148.5	5 32.3	88 39	149.0	9
40	11 40.9	87 44	144.6	11 14.8	87 44	144.8	10 48.7	87 44	145.1	9 56.5	87 43	145.6	8 12.0	87 42	146.6	6 27.3	87 41	147.6	6 01.2	87 41	147.8	5 08.8	87 40	148.3	40
1	11 14.4	86 45	143.8	10 48.5	86 45	144.1	10 22.6	86 44	144.3	9 30.7	86 44	144.8	7 46.8	87 43	145.8	6 02.8	87 42	146.8	5 36.8	87 41	147.1				1
2	10 47.4	86 46	143.0	10 21.7	86 46	143.3	9 55.9	86 45	143.5	9 04.4	86 45	144.1	7 21.2	86 44	145.1	5 37.8	86 42	146.1	5 12.0	86 42	146.4				2
3	10 19.9	85 47	142.3	9 54.3	85 46	142.5	9 28.8	85 46	142.8	8 37.6	85 45	143.3	6 55.0	86 44	144.4	5 12.3	86 43	145.4							3
4	9 52.0	85 47	141.5	9 26.6	85 47	141.8	9 01.1	85 47	142.0	8 10.3	85 46	142.6	6 28.4	85 45	143.6										4
45	9 23.5	84 48	140.7	8 58.3	84 48	141.0	8 33.0	84 48	141.3	7 42.5	84 47	141.8	6 01.3	84 46	142.9										45
6	8 54.7	84 49	140.0	8 29.6	84 49	140.3	8 04.5	84 48	140.5	7 14.3	84 48	141.1	5 33.8	84 47	142.2										6
7	8 25.3	83 50	139.2	8 00.4	83 49	139.5	7 35.5	83 49	139.8	6 45.6	83 48	140.4	5 05.8	83 48	141.5										7
8	7 55.5	82 50	138.5	7 30.8	82 50	138.8	7 06.1	82 50	139.1	6 16.5	83 49	139.6													8
9	7 25.3	82 51	137.8	7 00.8	82 51	138.1	6 36.2	82 50	138.4	5 47.0	82 50	138.9													9
50	6 54.7	81 52	137.1	6 30.3	81 51	137.3	6 05.9	81 51	137.6	5 17.0	81 50	138.2													50
1	6 23.6	81 52	136.3	5 59.4	81 52	136.6	5 35.2	81 52	136.9																1
2	5 52.1	80 53	135.6	5 28.1	80 53	135.9	5 04.0	80 52	136.2																2
3	5 20.3	80 54	134.9																						3

Lat. 41°

Lat. 42°

Lat. 43°

Lat. 44°

Lat. 45°

DECLINATION SAME NAME AS LATITUDE

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		°
91	17 14.4	61 70	67.6	17 32.8	61 69	67.2	17 51.1	61 69	66.7	18 27.5	61 69	65.9	19 39.8	60 68	64.2	20 51.1	59 67	62.5	21 08.7	59 67	62.1	21 43.9	58 66	61.2	91
2	16 32.6	62 69	67.0	16 51.1	62 69	66.6	17 09.6	61 69	66.2	17 46.3	61 68	65.4	18 59.1	60 67	63.7	20 11.0	60 66	62.0	20 28.8	59 66	61.5	21 04.3	59 66	60.7	2
3	15 51.0	62 69	66.4	16 09.6	62 69	66.0	16 28.2	62 69	65.6	17 05.2	61 68	64.8	18 18.6	61 67	63.1	19 31.1	60 66	61.4	19 49.1	60 66	61.0	20 24.9	59 65	60.2	3
4	15 09.6	63 69	65.9	15 28.4	62 68	65.5	15 47.1	62 68	65.0	16 24.3	62 68	64.2	17 38.3	61 67	62.6	18 51.5	61 66	60.9	19 09.6	60 66	60.5	19 45.7	60 65	59.7	4
95	14 28.4	63 68	65.3	14 47.3	63 68	64.9	15 06.1	63 68	64.5	15 43.7	62 67	63.7	16 58.2	62 66	62.0	18 12.0	61 65	60.4	18 30.3	61 65	60.0	19 06.8	61 65	59.1	95
6	13 47.3	63 68	64.7	14 06.4	63 68	64.3	14 25.3	63 68	63.9	15 03.2	63 67	63.1	16 18.3	62 66	61.5	17 32.7	62 65	59.9	17 51.2	61 65	59.4	18 28.0	61 64	58.6	6
7	13 06.5	64 68	64.1	13 25.6	64 68	63.7	13 44.8	64 67	63.3	14 22.9	63 67	62.5	15 38.6	63 66	60.9	16 53.7	62 65	59.3	17 12.3	62 64	58.9	17 49.4	62 64	58.1	7
8	12 25.8	64 67	63.6	12 45.1	64 67	63.2	13 04.4	64 67	62.8	13 42.8	64 66	62.0	14 59.2	63 65	60.4	16 14.8	63 64	58.8	16 33.7	63 64	58.4	17 11.1	62 64	57.6	8
9	11 45.4	65 67	63.0	12 04.8	65 67	62.6	12 24.2	65 67	62.2	13 02.9	64 66	61.4	14 19.9	64 65	59.8	15 36.2	63 64	58.2	15 55.2	63 64	57.8	16 33.0	63 63	57.0	9
100	11 05.2	65 67	62.4	11 24.8	65 66	62.0	11 44.3	65 66	61.6	12 23.3	65 66	60.8	13 40.9	64 65	59.3	14 57.9	64 64	57.7	15 17.0	64 63	57.3	15 55.2	63 63	56.5	100
1	10 25.2	66 66	61.8	10 44.9	66 66	61.4	11 04.6	66 66	61.0	11 43.9	65 65	60.3	13 02.1	65 64	58.7	14 19.7	64 63	57.1	14 39.0	64 63	56.7	15 17.5	64 62	55.9	1
2	9 45.4	66 66	61.2	10 05.2	66 66	60.8	10 25.1	66 65	60.4	11 04.7	66 65	59.7	12 23.5	65 64	58.1	13 41.8	65 63	56.6	14 01.3	65 62	56.2	14 40.1	65 62	55.4	2
3	9 05.8	67 66	60.6	9 25.8	67 65	60.2	9 45.8	67 65	59.9	10 25.7	66 65	59.1	11 45.1	66 64	57.6	13 04.1	66 62	56.0	13 23.8	65 62	55.6	14 03.0	65 62	54.9	3
4	8 26.5	67 65	60.0	8 46.6	67 65	59.6	9 06.8	67 65	59.3	9 47.0	67 64	58.5	11 07.0	67 63	57.0	12 26.7	66 62	55.5	12 46.5	66 62	55.1	13 26.1	66 61	54.3	4
105	7 47.4	68 65	59.4	8 07.7	68 65	59.0	8 28.0	68 64	58.7	9 08.5	67 64	57.9	10 29.2	67 63	56.4	11 49.5	67 62	54.9	12 09.5	67 61	54.5	12 49.4	66 61	53.8	105
6	7 08.5	68 64	58.8	7 29.0	68 64	58.4	7 49.4	68 64	58.1	8 30.2	68 63	57.3	9 51.6	68 62	55.8	11 12.6	67 61	54.3	11 32.8	67 61	54.0	12 13.0	67 60	53.2	6
7	6 29.9	69 64	58.2	6 50.5	69 64	57.8	7 11.1	69 63	57.5	7 52.2	68 63	56.7	9 14.3	68 62	55.3	10 35.9	68 61	53.8	10 56.3	68 60	53.4	11 36.9	68 60	52.6	7
8	5 51.5	69 63	57.6	6 12.3	69 63	57.2	6 33.1	69 63	56.9	7 14.5	69 62	56.1	8 37.2	69 61	54.7	9 59.5	68 60	53.2	10 20.1	68 60	52.8	11 01.1	68 59	52.1	8
9	5 13.5	70 63	57.0	5 34.4	70 63	56.6	5 55.3	70 63	56.2	6 37.0	70 62	55.5	8 00.4	69 61	54.1	9 23.4	69 60	52.6	9 44.1	69 59	52.2	10 25.5	69 59	51.5	9
110							5 17.8	70 62	55.6	5 59.9	70 62	54.9	7 23.9	70 60	53.5	8 47.6	70 59	52.0	9 08.5	70 59	51.7	9 50.2	69 58	50.9	110
1										5 22.9	71 61	54.3	6 47.6	70 60	52.9	8 12.0	70 59	51.4	8 33.1	70 58	51.1	9 15.2	70 58	50.4	1
2													6 11.7	71 59	52.3	7 36.8	71 58	50.9	7 58.0	71 58	50.5	8 40.4	71 57	49.8	2
3													5 36.0	72 59	51.7	7 01.8	71 58	50.3	7 23.2	71 57	49.9	8 06.0	71 57	49.2	3
4													5 00.6	72 58	51.1	6 27.1	72 57	49.7	6 48.7	72 57	49.3	7 31.9	72 56	48.6	4
115																5 52.8	73 57	49.1	6 14.6	73 56	48.7	6 58.1	72 56	48.0	115
6																5 18.7	73 56	48.4	5 40.7	73 56	48.1	6 24.6	73 55	47.4	6
7																			5 07.1	74 55	47.5	5 51.4	74 55	46.8	7
8																						5 18.5	74 54	46.2	8

Lat. 46°

Lat. 47°

Lat. 48°

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Lat. 41°

H.A.	36° 00′ Alt. ° ′	Δd Δt	Az. °	37° 00′ Alt. ° ′	Δd Δt	Az. °	38° 30′ Alt. ° ′	Δd Δt	Az. °	40° 00′ Alt. ° ′	Δd Δt	Az. °
00	85 00.0	1.0 06	180.0	86 00.0	1.0 07	180.0	87 30.0	1.0 12	180.0	89 00.0	1.0 26	180.0
1	84 56.4	99 18	170.8	85 55.5	98 22	168.7	87 23.1	96 32	162.6	88 44.6	80 56	142.4
2	84 45.7	96 28	162.0	85 42.5	94 34	158.1	87 03.9	86 47	147.8	88 10.8	56 67	122.7
3	84 28.6	91 37	153.9	85 22.3	87 44	148.8	86 36.0	75 56	136.3	87 30.6	42 71	112.7
4	84 06.2	86 45	146.7	84 56.1	80 51	140.9	86 02.2	65 62	127.8	86 47.9	33 73	106.9
05	83 39.2	80 51	140.4	84 25.5	74 57	134.2	85 24.9	57 66	121.4	86 04.2	28 74	103.1
6	83 08.7	75 56	134.9	83 51.6	68 61	128.7	84 45.3	51 69	116.5	85 19.8	25 74	100.4
7	82 35.3	70 59	130.2	83 15.1	62 64	124.1	84 04.1	46 70	112.6	84 35.1	22 75	98.4
8	81 59.6	66 62	126.1	82 36.7	58 66	120.2	83 21.8	42 72	109.5	83 50.2	21 75	96.7
9	81 22.2	62 65	122.5	81 56.9	54 68	116.9	82 38.8	39 73	106.9	83 05.2	19 75	95.4
10	80 43.3	58 67	119.4	81 16.0	50 70	114.0	81 55.3	36 73	104.8	82 20.1	19 75	94.2
1	80 03.4	55 68	116.6	80 34.3	48 71	111.5	81 11.3	34 74	102.9	81 34.9	18 75	93.2
2	79 22.4	53 69	114.2	79 51.8	45 72	109.3	80 27.0	32 74	101.3	80 49.7	18 75	92.3
3	78 40.8	50 70	112.0	79 08.9	43 72	107.4	79 42.5	31 74	99.8	80 04.4	17 75	91.5
4	77 58.5	48 71	110.0	78 25.4	41 73	105.7	78 57.8	30 75	98.5	79 19.1	17 75	90.8
15	77 15.7	46 72	108.3	77 41.7	40 73	104.1	78 12.9	29 75	97.3	78 33.9	17 75	90.1
6	76 32.5	45 73	106.6	76 57.6	39 74	102.7	77 28.0	28 75	96.3	77 48.6	17 75	89.5
7	75 49.0	43 73	105.1	76 13.3	38 74	101.3	76 42.9	28 75	95.3	77 03.3	17 75	88.8
8	75 05.1	42 74	103.8	75 28.8	37 74	100.1	75 57.8	27 75	94.4	76 18.0	17 75	88.3
9	74 21.0	41 74	102.5	74 44.2	36 75	99.0	75 12.6	27 75	93.5	75 32.8	18 75	87.7
20	73 36.7	40 74	101.3	73 59.4	35 75	98.0	74 27.4	27 75	92.7	74 47.5	18 75	87.2
1	72 52.2	40 74	100.1	73 14.5	35 75	97.0	73 42.2	27 75	91.9	74 02.3	18 75	86.7
2	72 07.6	39 75	99.1	72 29.5	34 75	96.0	72 56.9	27 75	91.2	73 17.1	18 75	86.2
3	71 22.8	38 75	98.1	71 44.5	34 75	95.1	72 11.6	26 75	90.5	72 32.0	19 75	85.7
4	70 37.9	38 75	97.1	70 59.3	33 75	94.3	71 26.3	26 75	89.9	71 46.8	19 75	85.2
25	69 52.9	37 75	96.2	70 14.1	33 75	93.5	70 41.0	26 75	89.2	71 01.7	19 75	84.8
6	69 07.9	37 75	95.4	69 28.9	33 75	92.7	69 55.8	27 75	88.6	70 16.6	20 75	84.3
7	68 22.8	37 75	94.6	68 43.7	33 75	92.0	69 10.5	27 75	88.0	69 31.6	20 75	83.9
8	67 37.6	37 75	93.8	67 58.4	33 75	91.3	68 25.3	27 75	87.4	68 46.6	21 75	83.4
9	66 52.4	36 75	93.0	67 13.1	33 75	90.6	67 40.0	27 75	86.9	68 01.6	21 75	83.0
30	66 07.2	36 75	92.3	66 27.9	33 75	89.9	66 54.8	27 75	86.3	67 16.7	21 75	82.6
1	65 21.9	36 75	91.6	65 42.6	33 75	89.3	66 09.7	27 75	85.8	66 31.8	22 75	82.2
2	64 36.7	36 75	90.9	64 57.3	33 75	88.7	65 24.5	28 75	85.3	65 47.0	22 75	81.7
3	63 51.4	36 75	90.2	64 12.0	33 75	88.1	64 39.4	28 75	84.7	65 02.2	23 75	81.3
4	63 06.1	36 75	89.5	63 26.8	33 75	87.5	63 54.3	28 75	84.2	64 17.4	23 74	80.9
35	62 20.8	36 75	88.9	62 41.6	33 75	86.9	63 09.3	28 75	83.7	63 32.8	24 74	80.5
6	61 35.5	36 75	88.3	61 56.4	33 75	86.3	62 24.3	29 75	83.3	62 48.1	24 74	80.1
7	60 50.3	36 75	87.7	61 11.2	33 75	85.7	61 39.4	29 75	82.8	62 03.5	25 74	79.7
8	60 05.1	36 75	87.1	60 26.1	34 75	85.2	60 54.5	29 75	82.3	61 19.0	25 74	79.3
9	59 19.8	36 75	86.5	59 41.0	34 75	84.7	60 09.6	30 75	81.8	60 34.6	26 74	78.9
40	58 34.7	37 75	85.9	58 55.9	34 75	84.1	59 24.8	30 75	81.4	59 50.1	26 74	78.5
1	57 49.5	37 75	85.4	58 10.9	34 75	83.6	58 40.1	31 74	80.9	59 05.8	27 74	78.1
2	57 04.4	37 75	84.8	57 25.9	35 75	83.1	57 55.4	31 74	80.4	58 21.5	27 74	77.7
3	56 19.3	37 75	84.3	56 41.0	35 75	82.6	57 10.8	31 74	80.0	57 37.3	28 74	77.3
4	55 34.3	37 75	83.7	55 56.1	35 75	82.1	56 26.2	32 74	79.5	56 53.2	28 73	76.9
45	54 49.3	38 75	83.2	55 11.3	36 75	81.6	55 41.7	32 74	79.1	56 09.1	29 73	76.5
6	54 04.4	38 75	82.7	54 26.5	36 75	81.1	54 57.3	33 74	78.6	55 25.1	29 73	76.1
7	53 19.5	38 75	82.1	53 41.8	36 74	80.6	54 12.9	33 74	78.2	54 41.2	30 73	75.7
8	52 34.6	38 75	81.6	52 57.2	37 74	80.1	53 28.6	33 74	77.8	53 57.3	30 73	75.3
9	51 49.9	39 74	81.1	52 12.6	37 74	79.6	52 44.4	34 74	77.3	53 13.5	31 73	75.0
50	51 05.2	39 74	80.6	51 28.1	37 74	79.1	52 00.3	34 73	76.9	52 29.9	31 73	74.6
1	50 20.5	39 74	80.1	50 43.6	38 74	78.7	51 16.2	35 73	76.4	51 46.3	32 73	74.2
2	49 35.9	40 74	79.6	49 59.3	38 74	78.2	50 32.3	35 73	76.0	51 02.7	32 72	73.8
3	48 51.4	40 74	79.1	49 15.0	38 74	77.7	49 48.4	36 73	75.6	50 19.3	33 72	73.4
4	48 07.0	40 74	78.6	48 30.8	39 74	77.2	49 04.5	36 73	75.1	49 36.0	34 72	73.0
55	47 22.7	41 74	78.1	47 46.7	39 73	76.8	48 20.8	37 73	74.7	48 52.7	34 72	72.6
6	46 38.4	41 74	77.7	47 02.6	40 73	76.3	47 37.2	37 73	74.3	48 09.5	35 72	72.2
7	45 54.2	42 74	77.2	46 18.7	40 73	75.9	46 53.7	38 72	73.8	47 26.5	35 72	71.8
8	45 10.1	42 73	76.7	45 34.8	40 73	75.4	46 10.2	38 72	73.4	46 43.5	36 71	71.4
9	44 26.1	42 73	76.2	44 51.0	41 73	74.9	45 26.9	39 72	73.0	46 00.7	36 71	71.0
60	43 42.1	43 73	75.7	44 07.4	41 73	74.5	44 43.6	39 72	72.5	45 17.9	37 71	70.6
1	42 58.3	43 73	75.3	43 23.8	42 72	74.0	44 00.5	40 72	72.1	44 35.2	38 71	70.2
2	42 14.5	44 73	74.8	42 40.3	42 72	73.5	43 17.4	40 72	71.7	43 52.7	38 71	69.8
3	41 30.9	44 73	74.3	41 56.9	43 72	73.1	42 34.5	41 71	71.2	43 10.3	39 71	69.4
4	40 47.4	44 72	73.8	41 13.6	43 72	72.6	41 51.7	41 71	70.8	42 27.9	39 70	69.0
65	40 03.9	45 72	73.3	40 30.5	44 72	72.2	41 09.0	42 71	70.4	41 45.7	40 70	68.6
6	39 20.6	45 72	72.9	39 47.4	44 72	71.7	40 26.4	42 71	69.9	41 03.6	40 70	68.1
7	38 37.4	46 72	72.4	39 04.5	45 71	71.3	39 43.9	43 71	69.5	40 21.7	41 70	67.7
8	37 54.3	46 72	71.9	38 21.7	45 71	70.8	39 01.5	43 70	69.1	39 39.8	42 70	67.3
9	37 11.3	47 71	71.5	37 39.0	46 71	70.3	38 19.3	44 70	68.6	38 58.1	42 69	66.9
70	36 28.4	47 71	71.0	36 56.4	46 71	69.9	37 37.2	45 70	68.2	38 16.5	43 69	66.5
1	35 45.7	48 71	70.5	36 13.9	47 71	69.4	36 55.2	45 70	67.8	37 35.1	43 69	66.1
2	35 03.0	48 71	70.0	35 31.6	47 70	69.0	36 13.4	46 70	67.3	36 53.7	44 69	65.6
3	34 20.5	49 71	69.6	34 49.4	48 70	68.5	35 31.6	46 69	66.9	36 12.6	45 68	65.2
4	33 38.2	49 70	69.1	34 07.3	48 70	68.0	34 50.1	47 69	66.4	35 31.5	45 68	64.8
75	32 55.9	50 70	68.6	33 25.4	49 70	67.6	34 08.6	47 69	66.0	34 50.6	46 68	64.4
6	32 13.9	50 70	68.1	32 43.6	49 69	67.1	33 27.4	48 69	65.5	34 09.9	47 68	63.9
7	31 31.9	51 70	67.6	32 02.0	50 69	66.6	32 46.2	48 68	65.1	33 29.3	47 67	63.5
8	30 50.1	51 69	67.2	31 20.5	50 69	66.2	32 05.2	49 68	64.6	32 48.8	48 67	63.1
9	30 08.4	52 69	66.7	30 39.2	51 69	65.7	31 24.4	50 68	64.2	32 08.5	48 67	62.6
80	29 26.9	52 69	66.2	29 58.0	51 68	65.2	30 43.7	50 68	63.7	31 28.4	49 67	62.2
1	28 45.6	53 69	65.7	29 16.9	52 68	64.7	30 03.2	51 67	63.3	30 48.4	50 66	61.8
2	28 04.4	53 68	65.2	28 36.1	52 68	64.3	29 22.8	51 67	62.8	30 08.6	50 66	61.3
3	27 23.4	54 68	64.7	27 55.4	53 68	63.8	28 42.6	52 67	62.3	29 29.0	51 66	60.9
4	26 42.5	54 68	64.2	27 14.8	54 67	63.3	28 02.6	53 66	61.9	28 49.5	52 66	60.4
85	26 01.8	55 68	63.8	26 34.5	54 67	62.8	27 22.8	53 66	61.4	28 10.2	52 65	60.0
6	25 21.3	55 67	63.3	25 54.3	55 67	62.3	26 43.1	54 66	60.9	27 31.1	53 65	59.5
7	24 40.9	56 67	62.8	25 14.2	55 66	61.8	26 03.6	54 66	60.5	26 52.2	53 65	59.0
8	24 00.7	56 67	62.3	24 34.4	56 66	61.4	25 24.3	55 65	60.0	26 13.4	54 64	58.6
9	23 20.7	57 66	61.8	23 54.8	56 66	60.9	24 45.2	56 65	59.5	25 34.9	55 64	58.1
90	22 40.9	58 66	61.3	23 15.3	57 65	60.4	24 06.3	56 65	59.0	24 56.5	55 64	57.7

H.A.	42° 00′ Alt. ° ′	Δd Δt	Az. °	42° 30′ Alt. ° ′	Δd Δt	Az. °	43° 00′ Alt. ° ′	Δd Δt	Az. °	45° 00′ Alt. ° ′	Δd Δt	Az. °
00	89 00.0	1.0 25	00.0	88 30.0	1.0 18	00.0	88 00.0	1.0 13	00.0	86 00.0	1.0 07	00.0
1	88 45.0	80 55	36.5	88 19.5	89 44	26.1	87 52.0	94 36	20.1	85 56.0	98 19	10.0
2	88 11.9	55 66	55.6	87 53.1	70 58	44.2	87 30.5	80 50	37.0	85 44.5	94 30	19.4
3	87 32.5	39 70	65.0	87 18.4	54 65	55.2	87 00.3	65 59	47.1	85 26.3	87 39	27.7
4	86 50.5	29 72	70.2	86 39.6	43 68	62.0	86 25.1	54 64	54.7	85 02.7	79 46	34.8
05	86 07.5	23 73	73.4	85 58.8	35 70	66.4	85 46.9	45 67	60.1	84 35.0	72 52	40.8
6	85 23.8	18 73	75.5	85 16.8	28 71	69.5	85 06.9	38 69	63.9	84 03.9	65 56	45.6
7	84 39.9	15 74	76.9	84 34.1	24 72	71.7	84 25.7	32 70	66.7	83 30.4	58 59	49.6
8	83 55.7	12 74	77.9	83 50.9	20 73	73.2	83 43.8	27 71	68.8	82 55.1	52 61	53.0
9	83 11.3	09 74	78.6	83 07.4	17 73	74.4	83 01.4	24 71	70.2	82 18.3	47 63	55.7
10	82 26.9	07 74	79.1	82 23.7	14 73	75.3	82 18.6	20 72	71.6	81 40.4	43 65	58.0
1	81 42.4	06 74	79.5	81 39.8	12 73	76.0	81 35.5	17 72	72.6	81 01.6	38 66	59.9
2	80 57.9	04 74	79.7	80 55.8	10 73	76.5	80 52.2	15 72	73.4	80 22.1	35 67	61.5
3	80 13.3	03 74	79.8	80 11.8	08 74	76.9	80 08.7	13 73	74.0	79 42.0	31 68	62.8
4	79 28.7	01 74	79.9	79 27.6	06 74	77.2	79 25.1	11 73	74.5	79 01.5	28 68	64.0
15	78 44.2	00 74	80.0	78 43.5	05 74	77.4	78 41.5	09 73	74.9	78 20.7	26 69	64.9
6	77 59.6	01 74	79.9	77 59.2	03 74	77.5	77 57.7	07 73	75.1	77 39.5	23 69	65.8
7	77 15.0	02 74	79.9	77 15.0	02 74	77.6	77 13.9	06 73	75.4	76 58.1	21 69	66.5
8	76 30.4	03 74	79.8	76 30.8	01 74	77.7	76 30.1	04 73	75.5	76 16.5	18 70	67.1
9	75 45.8	04 74	79.7	75 46.6	01 74	77.7	75 46.2	03 73	75.6	75 34.7	16 70	67.6
20	75 01.3	05 74	79.6	75 02.3	02 74	77.6	75 02.4	01 73	75.7	74 52.8	14 70	68.0
1	74 16.8	06 74	79.4	74 18.1	03 74	77.6	74 18.5	00 73	75.7	74 10.7	13 70	68.4
2	73 32.3	07 74	79.2	73 33.9	04 74	77.5	73 34.6	01 73	75.7	73 28.6	11 70	68.7
3	72 47.8	08 74	79.0	72 49.7	05 74	77.4	72 50.7	02 73	75.7	72 46.4	09 70	68.9
4	72 03.4	09 74	78.8	72 05.5	06 74	77.2	72 06.9	03 73	75.6	72 04.1	08 71	69.1
25	71 19.0	09 74	78.7	71 21.4	07 74	77.1	71 23.0	04 73	75.5	71 21.8	06 71	69.2
6	70 34.6	10 74	78.4	70 37.2	08 74	76.9	70 39.2	05 73	75.4	70 39.4	05 71	69.4
7	69 50.2	11 74	78.2	69 53.2	09 73	76.7	69 55.4	06 73	75.3	69 57.0	03 71	69.5
8	69 05.9	12 74	77.9	69 09.1	09 73	76.5	69 11.6	07 73	75.1	69 14.6	02 71	69.5
9	68 21.7	12 74	77.7	68 25.1	10 73	76.3	68 27.8	08 73	75.0	68 32.2	01 71	69.5
30	67 37.4	13 74	77.4	67 41.1	11 73	76.1	67 44.1	09 73	74.8	67 49.8	00 71	69.5
1	66 53.3	14 74	77.2	66 57.2	12 73	75.9	67 00.4	10 73	74.6	67 07.4	02 71	69.5
2	66 09.1	15 73	76.9	66 13.2	13 73	75.7	66 16.8	11 73	74.5	66 25.0	03 71	69.5
3	65 25.1	15 73	76.6	65 29.4	14 73	75.5	65 33.2	12 73	74.3	65 42.5	04 71	69.4
4	64 41.0	16 73	76.4	64 45.6	14 73	75.2	64 49.6	12 73	74.0	65 00.2	05 71	69.3
35	63 57.1	17 73	76.1	64 01.8	15 73	75.0	64 06.1	13 72	73.8	64 17.8	06 71	69.3
6	63 13.1	18 73	75.8	63 18.1	16 73	74.7	63 22.6	14 72	73.6	63 35.5	07 70	69.1
7	62 29.3	18 73	75.5	62 34.5	17 73	74.4	62 39.2	15 72	73.4	62 53.2	08 70	69.0
8	61 45.4	19 73	75.2	61 50.9	17 73	74.2	61 55.9	16 72	73.1	62 10.9	09 70	68.9
9	61 01.7	20 73	74.9	61 07.4	18 72	73.9	61 12.6	17 72	72.9	61 28.7	10 70	68.7
40	60 18.0	20 73	74.6	60 23.9	19 72	73.6	60 29.3	17 72	72.6	60 46.5	11 70	68.6
1	59 34.4	21 73	74.3	59 40.5	20 72	73.3	59 46.1	18 72	72.4	60 04.4	12 70	68.4
2	58 50.8	22 72	74.0	58 57.1	20 72	73.0	59 03.0	19 72	72.1	59 22.3	13 70	68.2
3	58 07.3	22 72	73.7	58 13.8	21 72	72.8	58 19.9	20 72	71.8	58 40.3	14 70	68.0
4	57 23.9	23 72	73.4	57 30.6	22 72	72.5	57 37.0	20 72	71.5	57 58.3	15 70	67.9
45	56 40.6	24 72	73.0	56 47.5	22 72	72.2	56 54.0	21 71	71.3	57 16.4	16 70	67.6
6	55 57.3	24 72	72.7	56 04.4	23 72	71.8	56 11.2	22 71	71.0	56 34.5	17 70	67.4
7	55 14.1	25 72	72.4	55 21.4	24 72	71.5	55 28.4	23 71	70.7	55 52.8	18 70	67.2
8	54 31.0	26 72	72.1	54 38.5	25 71	71.2	54 45.7	23 71	70.4	55 11.1	19 69	67.0
9	53 47.9	26 72	71.7	53 55.7	25 71	70.9	54 03.1	24 71	70.1	54 29.4	20 69	66.7
50	53 05.0	27 71	71.4	53 12.9	26 71	70.6	53 20.6	25 71	69.8	53 47.8	20 69	66.5
1	52 22.1	28 71	71.1	52 30.3	27 71	70.3	52 38.1	26 71	69.5	53 06.4	21 69	66.3
2	51 39.3	28 71	70.7	51 47.7	27 71	69.9	51 55.8	26 70	69.2	52 24.9	22 69	66.0
3	50 56.6	29 71	70.4	51 05.2	28 71	69.6	51 13.5	27 70	68.9	51 43.6	23 69	65.7
4	50 14.0	30 71	70.0	50 22.8	29 70	69.3	50 31.3	28 70	68.5	51 02.4	24 69	65.5
55	49 31.5	30 71	69.7	49 40.5	30 70	69.0	49 49.2	29 70	68.2	50 21.2	25 68	65.2
6	48 49.1	31 71	69.3	48 58.3	30 70	68.6	49 07.2	29 70	67.9	49 40.2	26 68	64.9
7	48 06.7	32 70	69.0	48 16.2	31 70	68.3	48 25.3	30 70	67.6	48 59.2	26 68	64.6
8	47 24.5	33 70	68.6	47 34.1	32 70	67.9	47 43.5	31 70	67.2	48 18.3	27 68	64.4
9	46 42.4	33 70	68.3	46 52.2	32 70	67.6	47 01.8	32 69	66.9	47 37.5	28 68	64.1
60	46 00.4	34 70	67.9	46 10.4	33 70	67.2	46 20.2	32 69	66.5	46 56.9	29 68	63.8
1	45 18.5	35 70	67.5	45 28.7	34 69	66.9	45 38.7	33 69	66.2	46 16.3	30 67	63.5
2	44 36.7	35 69	67.2	44 47.1	34 69	66.5	44 57.3	34 69	65.9	45 35.8	30 67	63.2
3	43 55.0	36 69	66.8	44 05.7	35 69	66.2	44 16.1	34 69	65.5	44 55.5	31 67	62.9
4	43 13.4	37 69	66.4	43 24.3	36 69	65.8	43 34.9	35 68	65.2	44 15.3	32 67	62.5
65	42 32.0	37 69	66.1	42 43.1	37 69	65.4	42 53.9	36 68	64.8	43 35.1	33 67	62.2
6	41 50.7	38 69	65.7	42 01.9	37 68	65.1	42 13.0	37 68	64.4	42 55.1	34 66	61.9
7	41 09.5	39 68	65.3	41 20.9	38 68	64.7	41 32.2	37 68	64.1	42 15.3	35 66	61.6
8	40 28.4	39 68	64.9	40 40.1	39 68	64.3	40 51.5	38 68	63.7	41 35.5	35 66	61.2
9	39 47.4	40 68	64.5	39 59.3	39 68	63.9	40 11.0	39 67	63.3	40 55.9	36 66	60.9
70	39 06.6	41 68	64.2	39 18.7	40 67	63.6	39 30.6	39 67	63.0	40 16.4	37 66	60.6
1	38 25.9	41 68	63.8	38 38.2	41 67	63.2	38 50.3	40 67	62.6	39 37.0	38 65	60.2
2	37 45.4	42 67	63.4	37 57.9	41 67	62.8	38 10.2	41 67	62.2	38 57.8	38 65	59.9
3	37 05.0	43 67	63.0	37 17.7	42 67	62.4	37 30.2	42 66	61.8	38 18.7	39 65	59.5
4	36 24.7	43 67	62.6	36 37.6	43 67	62.0	36 50.4	42 66	61.5	37 39.7	40 65	59.2
75	35 44.6	44 67	62.2	35 57.7	43 66	61.6	36 10.7	43 66	61.1	37 00.9	41 64	58.8
6	35 04.6	45 66	61.8	35 17.9	44 66	61.2	35 31.1	44 66	60.7	36 22.2	42 64	58.4
7	34 24.8	45 66	61.4	34 38.3	45 66	60.8	34 51.7	44 65	60.3	35 43.7	42 64	58.1
8	33 45.1	46 66	61.0	33 58.8	46 66	60.4	34 12.4	45 65	59.9	35 05.4	43 64	57.7
9	33 05.6	47 66	60.5	33 19.5	46 65	60.0	33 33.4	46 65	59.5	34 27.2	44 63	57.3
80	32 26.3	47 65	60.1	32 40.4	47 65	59.6	32 54.4	47 65	59.1	33 49.1	45 63	56.9
1	31 47.1	48 65	59.7	32 01.4	48 65	59.2	32 15.7	47 64	58.7	33 11.3	45 63	56.6
2	31 08.1	49 65	59.3	31 22.6	48 64	58.8	31 37.1	48 64	58.3	32 33.6	46 63	56.2
3	30 29.2	49 64	58.9	30 44.0	49 64	58.4	30 58.6	49 64	57.8	31 56.0	47 62	55.8
4	29 50.5	50 64	58.4	30 05.5	50 64	57.9	30 20.4	49 63	57.4	31 18.7	48 62	55.4
85	29 12.0	51 64	58.0	29 27.2	50 64	57.5	29 42.3	50 63	57.0	30 41.5	49 62	55.0
6	28 33.7	52 64	57.6	28 49.1	51 63	57.1	29 04.4	51 63	56.6	30 04.5	49 61	54.6
7	27 55.6	52 63	57.1	28 11.2	52 63	56.6	28 26.7	52 63	56.2	29 27.7	50 61	54.2
8	27 17.7	53 63	56.7	27 33.5	53 63	56.2	27 49.2	52 62	55.7	28 51.0	51 61	53.8
9	26 39.9	54 63	56.2	26 55.9	53 62	55.8	27 11.9	53 62	55.3	28 14.6	52 60	53.4
90	26 02.4	54 62	55.8	26 18.6	54 62	55.3	26 34.7	54 62	54.9	27 38.4	52 60	53.0

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DECLINATION CONTRARY NAME TO LATITUDE

H.A.	36° 00′ Alt.	Δd	Δt	Az.	37° 00′ Alt.	Δd	Δt	Az.	38° 30′ Alt.	Δd	Δt	Az.	40° 00′ Alt.	Δd	Δt	Az.	42° 00′ Alt.	Δd	Δt	Az.	42° 30′ Alt.	Δd	Δt	Az.	43° 00′ Alt.	Δd	Δt	Az.	45° 00′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
00	13 00.0	1.0	01	180.0	12 00.0	1.0	01	180.0	10 30.0	1.0	01	180.0	9 00.0	1.0	01	180.0	7 00.0	1.0	00	180.0	6 30.0	1.0	00	180.0	6 00.0	1.0	00	180.0					00
1	12 59.7	1.0	02	179.2	11 59.7	1.0	02	179.2	10 29.7	1.0	02	179.2	8 59.7	1.0	02	179.2	6 59.7	1.0	01	179.3	6 29.7	1.0	01	179.3	5 59.7	1.0	01	179.3					1
2	12 58.7	1.0	03	178.3	11 58.7	1.0	03	178.4	10 28.7	1.0	03	178.4	8 58.8	1.0	03	178.4	6 58.8	1.0	02	178.5	6 28.8	1.0	02	178.5	5 58.8	1.0	02	178.5					2
3	12 57.0	1.0	04	177.5	11 57.1	1.0	04	177.6	10 27.2	1.0	04	177.6	8 57.2	1.0	04	177.7	6 57.3	1.0	03	177.8	6 27.4	1.0	03	177.8	5 57.4	1.0	03	177.8					3
4	12 54.8	1.0	05	176.7	11 54.8	1.0	05	176.7	10 25.0	1.0	05	176.8	8 55.1	1.0	05	176.9	6 55.3	1.0	04	177.0	6 25.3	1.0	04	177.0	5 55.4	1.0	04	177.1					4
05	12 51.8	1.0	06	175.9	11 51.9	1.0	06	175.9	10 22.1	1.0	06	176.0	8 52.3	1.0	06	176.1	6 52.6	1.0	05	176.3	6 22.7	1.0	05	176.3	5 52.7	1.0	05	176.3					05
6	12 48.2	1.0	07	175.0	11 48.4	1.0	07	175.1	10 18.7	1.0	07	175.2	8 49.0	1.0	07	175.4	6 49.4	1.0	06	175.5	6 19.5	1.0	06	175.6	5 49.6	1.0	06	175.6					6
7	12 44.0	1.0	08	174.2	11 44.2	1.0	08	174.3	10 14.6	1.0	08	174.4	8 45.0	1.0	08	174.6	6 45.5	1.0	07	174.8	6 15.7	1.0	07	174.8	5 45.8	1.0	07	174.9					7
8	12 39.0	99	09	173.4	11 39.4	99	09	173.5	10 09.9	99	09	173.6	8 40.4	99	09	173.8	6 41.1	99	08	174.0	6 11.3	99	08	174.1	5 41.4	99	08	174.1					8
9	12 33.5	99	10	172.6	11 33.9	99	10	172.7	10 04.6	99	10	172.9	8 35.2	99	10	173.0	6 36.1	99	09	173.3	6 06.3	99	09	173.4	5 36.5	99	09	173.4					9
10	12 27.3	99	11	171.7	11 27.8	99	11	171.9	9 58.7	99	11	172.1	8 29.4	99	11	172.3	6 30.5	99	10	172.5	6 00.8	99	10	172.6	5 31.0	99	10	172.7					10
1	12 20.5	99	12	170.9	11 21.1	99	12	171.1	9 52.1	99	12	171.3	8 23.1	99	12	171.5	6 24.3	99	11	171.8	5 54.6	99	11	171.9	5 25.0	99	11	171.9					1
2	12 13.0	99	14	170.1	11 13.8	99	13	170.3	9 44.9	99	13	170.5	8 16.1	99	13	170.7	6 17.6	99	12	171.1	5 48.0	99	12	171.1	5 18.3	99	12	171.2					2
3	12 04.9	98	15	169.3	11 05.8	98	14	169.5	9 37.1	99	14	169.7	8 08.5	99	14	170.0	6 10.3	99	13	170.3	5 40.7	99	13	170.4	5 11.1	99	13	170.5					3
4	11 56.1	98	16	168.5	10 57.2	98	15	168.7	9 28.8	98	15	168.9	8 00.3	98	15	169.2	6 02.4	98	14	169.6	5 32.9	98	14	169.7	5 03.4	98	14	169.8					4
15	11 46.8	98	17	167.6	10 48.0	98	16	167.9	9 19.8	98	16	168.2	7 51.5	98	16	168.5	5 53.9	98	15	168.9	5 24.5	98	15	168.9									15
6	11 36.8	98	18	166.8	10 38.1	98	17	167.1	9 10.2	98	17	167.4	7 42.2	98	17	167.7	5 44.8	98	16	168.1	5 15.5	98	16	168.2									6
7	11 26.2	97	19	166.0	10 27.7	97	18	166.3	9 00.0	97	18	166.6	7 32.2	97	18	166.9	5 35.2	98	17	167.4	5 06.0	98	17	167.5									7
8	11 14.9	97	20	165.2	10 16.6	97	19	165.5	8 49.2	97	19	165.8	7 21.7	97	18	166.2	5 25.1	97	18	166.7													8
9	11 03.1	97	21	164.4	10 05.0	97	20	164.7	8 37.8	97	20	165.1	7 10.6	97	19	165.4	5 14.3	97	19	165.9													9
20	10 50.6	96	22	163.6	9 52.7	97	21	163.9	8 25.8	97	21	164.3	6 59.0	97	20	164.7	5 03.1	97	20	165.2													20
1	10 37.6	96	23	162.8	9 39.9	96	22	163.1	8 13.3	96	22	163.5	6 46.7	96	21	164.0																	1
2	10 23.9	96	24	162.1	9 26.4	96	23	162.3	8 00.2	96	23	162.8	6 33.9	96	22	163.2																	2
3	10 09.7	96	25	161.3	9 12.4	95	24	161.6	7 46.5	95	24	162.0	6 20.6	95	23	162.5																	3
4	9 54.8	95	26	160.5	8 57.8	95	25	160.8	7 32.2	95	25	161.3	6 06.6	95	24	161.7																	4
25	9 39.4	95	27	159.7	8 42.6	95	26	160.0	7 17.4	95	26	160.5	5 52.2	95	25	161.0																	25
6	9 23.4	94	28	158.9	8 26.9	94	27	159.3	7 02.0	94	27	159.8	5 37.2	94	26	160.3																	6
7	9 06.9	94	29	158.2	8 10.6	94	28	158.5	6 46.1	94	27	159.0	5 21.6	94	27	159.6																	7
8	8 49.7	93	29	157.4	7 53.7	93	29	157.8	6 29.6	93	28	158.3	5 05.5	93	28	158.8																	8
9	8 32.0	93	30	156.6	7 36.3	93	30	157.0	6 12.6	93	29	157.6																					9
30	8 13.8	92	31	155.9	7 18.3	92	31	156.3	5 55.1	93	30	156.8																					30
1	7 55.0	92	32	155.1	6 59.8	92	32	155.5	5 37.0	92	31	156.1																					1
2	7 35.7	91	33	154.4	6 40.8	92	33	154.8	5 18.4	92	32	155.4																					2
3	7 15.9	91	34	153.6	6 21.2	91	33	154.0																									3
4	6 55.5	91	35	152.9	6 01.2	91	34	153.3																									4
35	6 34.6	90	36	152.2	5 40.6	90	35	152.6																									35
6	6 13.2	89	37	151.4	5 19.5	90	36	151.9																									6
7	5 51.3	89	37	150.7																													7
8	5 28.9	88	38	150.0																													8
9	5 06.0	88	39	149.3																													9

DECLINATION SAME NAME AS LATITUDE

H.A.	36° 00′ Alt.	Δd	Δt	Az.	37° 00′ Alt.	Δd	Δt	Az.	38° 30′ Alt.	Δd	Δt	Az.	40° 00′ Alt.	Δd	Δt	Az.	42° 00′ Alt.	Δd	Δt	Az.	42° 30′ Alt.	Δd	Δt	Az.	43° 00′ Alt.	Δd	Δt	Az.	45° 00′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
91	22 01.3	58	66	60.8	22 36.0	58	65	59.9	23 27.6	57	64	58.5	24 18.4	56	63	57.2	25 25.0	55	62	55.4	25 41.5	55	62	54.9	25 57.8	54	61	54.4	27 02.3	53	60	52.5	91
2	21 21.9	59	65	60.2	21 57.0	58	65	59.4	22 49.0	57	64	58.1	23 40.4	57	63	56.7	24 47.9	56	62	54.9	25 04.5	55	61	54.4	25 21.1	55	61	54.0	26 26.5	54	59	52.1	2
3	20 42.7	59	65	59.7	21 18.1	59	64	58.9	22 10.7	58	64	57.6	23 02.7	57	63	56.2	24 10.9	56	61	54.4	24 27.8	56	61	54.0	24 44.6	56	61	53.5	25 50.8	55	59	51.7	3
4	20 03.7	60	65	59.2	20 39.4	59	64	58.4	21 32.6	59	63	57.1	22 25.1	58	62	55.8	23 34.2	57	61	54.0	23 51.3	57	61	53.5	24 08.2	57	60	53.1	25 15.4	55	59	51.3	4
95	19 24.9	60	64	58.7	20 01.0	60	64	57.9	20 54.7	59	63	56.6	21 47.8	59	62	55.3	22 57.7	58	61	53.5	23 15.0	57	60	53.1	23 32.2	57	60	52.6	24 40.2	56	58	50.8	95
6	18 46.3	61	64	58.2	19 22.8	61	63	57.3	20 17.0	60	62	56.1	21 10.7	59	62	54.8	22 21.4	58	60	53.0	22 38.9	58	60	52.6	22 56.3	58	59	52.2	24 05.2	57	58	50.4	6
7	18 07.9	62	64	57.7	18 44.8	61	63	56.8	19 39.6	61	62	55.6	20 33.8	60	61	54.3	21 45.3	59	60	52.6	22 03.0	59	59	52.1	22 20.6	59	59	51.7	23 30.4	58	58	49.9	7
8	17 29.8	62	63	57.1	18 07.0	62	63	56.3	19 02.3	61	62	55.1	19 57.2	61	61	53.8	21 09.4	60	59	52.1	21 27.4	60	59	51.7	21 45.2	59	59	51.2	22 55.9	58	57	49.5	8
9	16 51.9	63	63	56.6	17 29.4	62	62	55.8	18 25.3	62	61	54.6	19 20.7	61	60	53.3	20 33.8	61	59	51.6	20 52.0	60	59	51.2	21 10.0	60	58	50.8	22 21.6	59	57	49.0	9
100	16 14.2	63	62	56.1	16 52.1	63	62	55.3	17 48.5	63	61	54.0	18 44.5	62	60	52.8	19 58.5	61	59	51.1	20 16.8	61	58	50.7	20 35.1	61	58	50.3	21 47.5	60	56	48.6	100
1	15 36.7	64	62	55.5	16 15.0	64	61	54.7	17 12.0	63	61	53.5	18 08.6	63	60	52.3	19 23.3	62	58	50.7	19 41.9	62	58	50.2	20 00.3	62	57	49.8	21 13.7	61	56	48.1	1
2	14 59.5	65	62	55.0	15 38.1	64	61	54.2	16 35.7	64	60	53.0	17 32.9	63	59	51.8	18 48.4	63	58	50.2	19 07.2	62	57	49.8	19 25.9	62	57	49.3	20 40.1	61	56	47.7	2
3	14 22.5	65	61	54.5	15 01.5	65	61	53.7	15 59.7	64	60	52.5	16 57.4	64	59	51.3	18 13.8	63	57	49.7	18 32.7	63	57	49.3	18 51.6	63	57	48.9	20 06.7	62	55	47.2	3
4	13 45.8	66	61	53.9	14 25.1	65	60	53.1	15 23.9	65	59	52.0	16 22.2	65	58	50.8	17 39.4	64	57	49.2	17 58.5	64	57	48.8	18 17.7	64	56	48.4	19 33.6	63	55	46.7	4
105	13 09.3	66	60	53.4	13 49.0	66	60	52.6	14 48.3	66	59	51.4	15 47.3	65	58	50.3	17 05.2	65	56	48.7	17 24.6	65	56	48.3	17 44.0	64	56	47.9	19 00.8	64	54	46.3	105
6	12 33.1	67	60	52.8	13 13.2	67	59	52.1	14 13.1	66	58	50.9	15 12.6	66	57	49.7	16 31.4	65	56	48.2	16 51.0	65	56	47.8	17 10.5	65	55	47.4	18 28.2	64	54	45.8	6
7	11 57.2	68	59	52.3	12 37.6	67	59	51.5	13 38.0	67	58	50.4	14 38.1	67	57	49.2	15 57.8	66	56	47.7	16 17.6	66	55	47.3	16 37.3	66	55	46.9	17 55.9	65	53	45.3	7
8	11 21.5	68	59	51.7	12 02.3	68	58	51.0	13 03.3	68	57	49.8	14 04.9	67	56	48.7	15 24.4	67	55	47.1	15 44.4	67	55	46.8	16 04.4	66	54	46.4	17 23.8	66	53	44.8	8
9	10 46.1	69	59	51.1	11 27.3	69	58	50.4	12 28.8	68	57	49.3	13 30.1	68	56	48.2	14 51.4	67	55	46.6	15 11.6	67	54	46.2	15 31.8	67	54	45.9	16 52.1	67	52	44.3	9
110	10 11.0	69	58	50.6	10 52.5	69	57	49.8	11 54.7	69	56	48.7	12 56.5	69	56	47.6	14 18.6	68	54	46.1	14 39.0	68	54	45.7	14 59.4	68	53	45.4	16 20.6	67	52	43.8	110
1	9 36.2	70	58	50.0	10 18.1	70	57	49.3	11 20.8	70	56	48.2	12 23.2	69	55	47.1	13 46.1	69	54	45.6	14 06.7	69	53	45.2	14 27.3	69	53	44.8	15 49.3	68	52	43.3	1
2	9 01.6	71	57	49.4	9 43.9	70	56	48.7	10 47.2	70	55	47.6	11 50.2	70	55	46.5	13 13.9	70	53	45.1	13 34.7	69	53	44.7	13 55.5	69	52	44.3	15 18.4	69	51	42.8	2
3	8 27.4	71	57	48.8	9 10.0	71	56	48.1	10 13.9	71	55	47.1	11 17.5	71	54	46.0	12 42.0	70	53	44.5	13 03.0	70	52	44.2	13 24.1	70	52	43.8	14 47.8	70	51	42.3	3
4	7 53.4	72	56	48.3	8 36.5	72	55	47.6	9 40.9	71	54	46.5	10 45.1	71	54	45.4	12 10.4	71	52	44.0	12 31.6	71	52	43.6	12 52.9	71	51	43.3	14 17.5	70	50	41.8	4
115	7 19.8	72	56	47.7	8 03.2	72	55	47.0	9 08.2	72	54	45.9	10 13.0	72	53	44.9	11 39.1	72	52	43.4	12 00.6	71	51	43.1	12 22.0	71	51	42.7	13 47.4	71	50	41.3	115
6	6 46.5	73	55	47.1	7 30.3	73	54	46.4	8 35.8	73	53	45.3	9 41.2	73	52	44.3	11 08.1	72	51	42.9	11 29.8	72	51	42.5	11 51.4	72	50	42.2	13 17.7	72	49	40.8	6
7	6 13.5	74	54	46.5	6 57.6	74	54	45.8	8 03.8	73	53	44.8	9 09.8	73	52	43.7	10 37.4	73	51	42.4	10 59.3	73	50	42.0	11 21.2	73	50	41.7	12 48.3	72	48	40.2	7
8	5 40.8	74	54	45.9	6 25.3	74	53	45.2	7 32.0	74	52	44.2	8 38.6	74	51	43.2	10 07.1	74	50	41.8	10 29.2	74	50	41.5	10 51.2	73	49	41.1	12 19.2	73	48	39.7	8
9	5 08.5	75	53	45.3	5 53.4	75	53	44.6	7 00.7	75	52	43.6	8 07.8	75	51	42.6	9 37.1	74	49	41.2	9 59.4	74	49	40.9	10 21.6	74	49	40.6	11 50.4	74	47	39.2	9
120					5 21.8	75	52	44.0	6 29.6	75	51	43.0	7 37.3	75	50	42.0	9 07.4	75	49	40.7	9 29.9	75	49	40.3	9 52.3	75	48	40.0	11 22.0	75	47	38.7	120
1									5 58.9	76	51	42.4	7 07.2	76	50	41.4	8 38.1	76	48	40.1	9 00.7	76	48	39.8	9 23.4	76	48	39.4	10 53.8	75	46	38.1	1
2									5 28.5	77	50	41.8	6 37.4	76	49	40.8	8 09.0	76	48	39.5	8 31.9	76	47	39.2	8 54.8	76	47	38.9	10 26.1	76	46	37.6	2
3													6 08.0	77	48	40.3	7 40.4	77	47	39.0	8 03.5	77	47	38.6	8 26.5	77	46	38.3	9 58.6	77	45	37.0	3
4													5 38.9	78	48	39.7	7 12.1	78	47	38.4	7 35.4	78	46	38.1	7 58.6	78	46	37.8	9 31.5	77	45	36.5	4
125													5 10.2	78	47	39.1	6 44.2	78	46	37.8	7 07.6	78	46	37.5	7 31.1	78	45	37.2	9 04.8	78	44	35.9	125
6																	6 16.6	79	45	37.2	6 40.3	79	45	36.9	7 03.9	79	45	36.6	8 38.4	79	43	35.4	6
7																	5 49.4	80	45	36.6	6 13.2	80	44	36.3	6 37.1	79	44	36.0	8 12.4	79	43	34.8	7
8																	5 22.6	80	44	36.0	5 46.6	80	44	35.7	6 10.7	80	43	35.4	7 46.7	80	42	34.2	8
9																					5 20.4	81	43	35.1	5 44.6	81	43	34.8	7 21.5	81	42	33.6	9
130																									5 18.9	81	42	34.2	6 56.6	81	41	33.1	130
1																													6 32.0	82	40	32.5	1
2																													6 07.9	83	40	31.9	2
3																													5 44.2	83	39	31.3	3
4																													5 20.8	84	38	30.7	4

Lat. 41°

Lat. 42°

Lat. 43°

Lat. 44°

Lat. 45°

Lat. 46°

Lat. 47°

Lat. 48°

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Lat. 41°

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	85 00.0	1.0 05	00.0	84 00.0	1.0 04	00.0	82 30.0	1.0 03	00.0	81 30.0	1.0 03	00.0	80 30.0	1.0 03	00.0	79 30.0	1.0 02	00.0	78 30.0	1.0 02	00.0	77 00.0	1.0 02	00.0	00
1	84 56.9	99 15	07.9	83 57.4	99 13	06.5	82 28.0	99 10	05.1	81 28.3	1.0 09	04.4	80 28.5	1.0 08	03.8	79 28.6	1.0 07	03.4	78 28.8	1.0 06	03.0	76 59.0	1.0 05	02.6	1
2	84 47.6	98 25	15.5	83 49.8	97 21	12.8	82 22.0	98 16	10.0	81 23.1	98 14	08.7	80 23.9	99 12	07.6	79 24.6	99 11	06.8	78 25.2	99 10	06.1	76 55.9	99 09	05.2	2
3	84 32.9	91 33	22.5	83 37.5	93 28	18.8	82 12.3	96 22	14.8	81 14.6	97 19	12.9	80 16.5	97 17	11.4	79 18.0	98 15	10.1	78 19.2	98 14	09.1	76 50.8	98 12	07.8	3
4	84 13.3	85 40	28.8	83 20.9	89 34	24.2	81 59.0	93 28	19.4	81 02.9	94 24	16.9	80 06.1	95 22	15.0	79 08.8	96 19	13.3	78 11.0	97 17	12.0	76 43.7	97 15	10.3	4
05	83 49.6	79 45	34.3	83 00.5	84 39	29.2	81 42.4	89 33	23.6	80 48.3	91 29	20.7	79 53.1	93 26	18.4	78 57.1	94 23	16.4	78 00.5	95 21	14.8	76 34.6	96 18	12.7	05
6	83 22.5	73 50	39.0	82 36.8	79 44	33.7	81 22.8	85 37	27.5	80 30.9	88 33	24.3	79 37.6	90 30	21.7	78 43.2	92 27	19.4	77 47.9	93 24	17.5	76 23.7	94 21	15.1	6
7	82 52.8	67 53	43.1	82 10.4	74 48	37.6	81 00.6	81 41	31.1	80 11.1	84 37	27.7	79 19.8	87 33	24.7	78 27.0	89 30	22.3	77 33.2	90 28	20.1	76 11.0	92 24	17.5	7
8	82 20.8	61 56	46.5	81 41.7	69 51	41.1	80 36.1	77 44	34.4	79 49.0	80 40	30.7	78 59.8	84 37	27.6	78 08.9	86 33	25.0	77 16.7	88 30	22.6	75 56.6	90 27	19.7	8
9	81 47.1	56 58	49.5	81 11.0	64 54	44.1	80 09.6	72 47	37.3	79 24.9	77 43	33.6	78 37.8	80 40	30.3	77 48.9	83 36	27.5	76 58.4	85 33	25.0	75 40.5	88 29	21.8	9
10	81 12.0	52 60	52.0	80 38.7	59 56	46.8	79 41.3	68 50	40.0	78 59.0	73 46	36.2	78 14.1	77 42	32.8	77 27.2	80 39	29.8	76 38.5	82 36	27.2	75 22.9	85 32	23.9	10
1	80 35.8	47 62	54.2	80 05.1	55 58	49.1	79 11.4	64 52	42.4	78 31.5	69 48	38.5	77 48.8	73 45	35.1	77 03.9	77 41	32.0	76 17.0	79 38	29.3	75 03.9	83 34	25.8	1
2	79 58.6	43 63	56.1	79 30.4	51 60	51.1	78 40.3	60 54	44.5	78 02.6	65 50	40.7	77 22.1	70 47	37.2	76 39.2	73 43	34.1	75 54.2	76 40	31.3	74 43.5	80 36	27.6	2
3	79 20.7	40 64	57.7	78 54.7	47 61	52.9	78 08.0	56 56	46.5	77 32.5	62 52	42.6	76 54.1	66 49	39.2	76 13.1	70 45	36.0	75 30.0	73 42	33.2	74 21.9	78 38	29.4	3
4	78 42.1	36 65	59.1	78 18.2	43 62	54.5	77 34.7	53 57	48.2	77 01.3	58 54	44.4	76 24.9	63 50	40.9	75 46.0	67 47	37.8	75 04.7	71 44	34.9	73 59.1	75 40	31.0	4
15	78 03.0	33 66	60.3	77 41.0	40 63	55.8	77 00.5	49 58	49.7	76 29.2	55 55	46.0	75 54.8	60 52	42.6	75 17.7	64 49	39.4	74 38.3	68 46	36.5	73 35.3	72 41	32.6	15
6	77 23.5	30 66	61.3	77 03.3	37 64	57.0	76 25.6	46 59	51.1	75 56.2	52 56	47.5	75 23.7	56 53	44.1	74 48.5	61 50	40.9	74 10.8	65 47	38.0	73 10.4	70 43	34.0	6
7	76 43.6	28 67	62.2	76 25.0	34 64	58.1	75 50.1	43 60	52.3	75 22.5	49 57	48.8	74 51.8	53 54	45.4	74 18.4	58 51	42.3	73 42.5	62 49	39.4	72 44.6	67 44	35.4	7
8	76 03.4	25 67	63.0	75 46.4	32 65	59.0	75 14.9	40 61	53.4	74 48.1	46 58	50.0	74 19.2	51 55	46.7	73 47.6	55 53	43.6	73 13.4	59 50	40.7	72 18.0	64 46	36.7	8
9	75 22.9	23 68	63.7	75 07.4	29 66	59.9	74 37.3	38 62	54.4	74 13.2	43 59	51.0	73 46.0	48 56	47.8	73 16.0	52 54	44.7	72 43.5	56 51	41.9	71 50.5	62 47	37.9	9
20	74 42.3	21 68	64.2	74 28.1	27 66	60.6	74 00.3	35 62	55.3	73 37.7	40 60	52.0	73 12.2	45 57	48.8	72 43.9	49 55	45.8	72 13.0	53 52	43.0	71 22.4	59 48	39.0	20
1	74 01.4	19 68	64.7	73 48.5	24 66	61.2	73 22.9	33 63	56.1	73 01.8	38 60	52.9	72 37.8	42 58	49.8	72 11.1	47 55	46.8	71 41.8	51 53	44.0	70 53.5	56 49	40.1	1
2	73 20.4	17 69	65.2	73 08.7	22 67	61.8	72 45.1	30 63	56.8	72 25.5	35 61	53.7	72 03.0	40 59	50.6	71 37.8	44 56	47.7	71 10.1	48 54	45.0	70 24.1	54 50	41.0	2
3	72 39.2	15 69	65.6	72 28.7	20 67	62.3	72 07.1	28 64	57.5	71 48.9	33 62	54.4	71 27.8	37 59	51.4	71 04.1	42 57	48.6	70 37.8	46 54	45.8	69 54.1	51 51	41.9	3
4	71 57.9	13 69	65.9	71 48.6	18 67	62.7	71 28.8	26 64	58.0	71 11.9	30 62	55.0	70 52.3	35 60	52.1	70 30.0	39 58	49.3	70 05.2	43 55	46.6	69 23.6	49 52	42.8	4
25	71 16.6	11 69	66.1	71 08.3	16 67	63.1	70 50.2	24 65	58.6	70 34.7	28 62	55.6	70 16.3	33 60	52.8	69 55.4	37 58	50.0	69 32.0	41 56	47.4	68 52.6	47 52	43.6	25
6	70 35.1	10 69	66.4	70 27.8	15 68	63.4	70 11.5	22 65	59.0	69 57.2	26 63	56.2	69 40.1	31 61	53.4	69 20.6	35 59	50.7	68 58.5	39 56	48.1	68 21.2	44 53	44.3	6
7	69 53.6	08 69	66.5	69 47.3	13 68	63.7	69 32.6	20 65	59.4	69 19.4	24 63	56.6	69 03.7	28 61	53.9	68 45.4	33 59	51.3	68 24.7	36 57	48.7	67 49.4	42 54	45.0	7
8	69 12.0	07 69	66.7	69 06.7	11 68	63.9	68 53.6	18 65	59.8	68 41.5	22 63	57.0	68 27.0	26 62	54.4	68 09.9	30 60	51.8	67 50.5	34 57	49.3	67 17.2	40 54	45.6	8
9	68 30.4	05 69	66.8	68 26.0	10 68	64.1	68 14.4	16 66	60.1	68 03.5	20 64	57.4	67 50.1	24 62	54.8	67 34.2	28 60	52.3	67 16.1	32 58	49.8	66 44.6	38 55	46.2	9
30	67 48.8	04 69	66.9	67 45.2	08 68	64.3	67 35.1	14 66	60.3	67 25.2	18 64	57.7	67 13.0	22 62	55.2	66 58.3	26 60	52.7	66 41.4	30 58	50.3	66 11.8	35 55	46.7	30
1	67 07.1	02 69	66.9	67 04.4	07 68	64.4	66 55.7	13 66	60.6	66 46.9	17 64	58.0	66 35.7	21 62	55.6	66 22.2	24 60	53.1	66 06.4	28 59	50.7	65 38.7	33 56	47.2	1
2	66 25.4	01 69	67.0	66 23.6	05 68	64.5	66 16.2	11 66	60.8	66 08.4	15 64	58.3	65 58.3	19 63	55.9	65 45.9	23 61	53.5	65 31.3	26 59	51.1	65 05.3	31 56	47.7	2
3	65 43.8	00 69	67.0	65 42.7	04 68	64.6	65 36.7	10 66	60.9	65 29.8	13 64	58.5	65 20.7	17 63	56.1	65 09.4	21 61	53.8	64 55.9	24 59	51.5	64 31.7	29 56	48.1	3
4	65 02.1	01 69	67.0	65 01.8	02 68	64.6	64 57.1	08 66	61.1	64 51.2	12 65	58.7	64 43.1	15 63	56.4	64 32.8	19 61	54.1	64 20.4	22 59	51.8	63 57.9	27 57	48.5	4
35	64 20.4	03 69	66.9	64 20.9	01 68	64.6	64 17.4	07 66	61.2	64 12.4	10 65	58.9	64 05.3	14 63	56.6	63 56.0	17 61	54.4	63 44.7	21 60	52.1	63 23.9	26 57	48.8	35
6	63 38.8	04 69	66.9	63 39.9	00 68	64.6	63 37.7	05 66	61.3	63 33.6	09 65	59.0	63 27.5	12 63	56.8	63 19.2	15 62	54.6	63 08.9	19 60	52.4	62 49.7	24 57	49.2	6
7	62 57.1	05 69	66.8	62 59.0	01 68	64.6	62 58.0	04 66	61.3	62 54.8	07 65	59.1	62 49.5	10 63	56.9	62 42.2	14 62	54.8	62 33.0	17 60	52.6	62 15.4	22 57	49.5	7
8	62 15.5	06 69	66.7	62 18.1	03 68	64.6	62 18.3	02 66	61.4	62 15.9	06 65	59.2	62 11.5	09 63	57.1	62 05.2	12 62	55.0	61 56.9	15 60	52.8	61 40.9	20 58	49.7	8
9	61 33.9	07 69	66.7	61 37.2	04 68	64.6	61 38.5	01 66	61.4	61 37.0	04 65	59.3	61 33.5	07 63	57.2	61 28.1	11 62	55.1	61 20.8	14 60	53.0	61 06.3	18 58	50.0	9
40	60 52.4	08 69	66.5	60 56.3	05 68	64.5	60 58.8	00 66	61.4	60 58.0	03 65	59.3	60 55.4	06 64	57.3	60 50.9	09 62	55.2	60 44.6	12 60	53.2	60 31.6	17 58	50.2	40
1	60 10.8	09 69	66.4	60 15.5	06 68	64.4	60 19.0	02 66	61.4	60 19.1	01 65	59.4	60 17.3	04 64	57.3	60 13.7	08 62	55.3	60 08.3	11 61	53.3	59 56.8	15 58	50.4	1
2	59 29.4	10 69	66.3	59 34.7	07 68	64.3	59 39.3	03 66	61.4	59 40.1	00 65	59.4	59 39.2	03 64	57.4	59 36.5	06 62	55.4	59 31.9	09 61	53.5	59 21.9	13 58	50.5	2
3	58 47.9	11 69	66.1	58 53.9	08 68	64.2	58 59.5	04 66	61.3	59 01.2	01 65	59.4	59 01.0	02 64	57.4	58 59.2	05 62	55.5	58 55.5	07 61	53.5	58 46.9	12 58	50.7	3
4	58 06.5	12 69	66.0	58 13.1	10 68	64.1	58 19.8	05 66	61.2	58 22.2	03 65	59.3	58 22.9	00 64	57.4	58 21.8	03 62	55.5	58 19.1	06 61	53.6	58 11.8	10 59	50.8	4
45	57 25.2	13 69	65.8	57 32.4	11 68	64.0	57 40.1	07 66	61.2	57 43.2	04 65	59.3	57 44.7	01 64	57.4	57 44.5	02 62	55.6	57 42.6	05 61	53.7	57 36.7	09 59	50.9	45
6	56 43.9	14 69	65.6	56 51.7	12 68	63.8	57 00.5	08 66	61.1	57 04.3	05 65	59.3	57 06.5	02 64	57.4	57 07.1	00 62	55.6	57 06.1	03 61	53.7	57 01.6	07 59	51.0	6
7	56 02.7	15 69	65.4	56 11.1	13 68	63.7	56 20.9	09 66	61.0	56 25.4	06 65	59.2	56 28.4	04 64	57.4	56 29.8	01 62	55.6	56 29.6	02 61	53.8	56 26.4	06 59	51.0	7
8	55 21.6	16 68	65.3	55 30.6	14 68	63.5	55 41.3	10 66	60.9	55 46.5	07 65	59.1	55 50.3	05 64	57.3	55 52.4	02 62	55.5	55 53.1	00 61	53.8	55 51.1	04 59	51.1	8
9	54 40.5	17 68	65.1	54 50.1	15 67	63.3	55 01.8	11 66	60.8	55 07.7	09 65	59.0	55 12.2	06 63	57.3	55 15.1	04 62	55.5	55 16.6	01 61	53.8	55 15.9	03 59	51.1	9
50	53 59.4	18 68	64.8	54 09.6	16 67	63.2	54 22.3	12 66	60.6	54 28.9	10 65	58.9	54 34.1	07 63	57.2	54 37.8	05 62	55.5	54 40.0	03 61	53.7	54 40.6	01 59	51.1	50
1	53 18.5	19 68	64.6	53 29.3	17 67	63.0	53 42.8	13 66	60.5	53 50.1	11 64	58.8	53 56.0	09 63	57.1	54 00.5	06 62	55.4	54 03.5	04 61	53.7	54 05.4	00 59	51.2	1
2	52 37.6	20 68	64.4	52 49.0	18 67	62.8	53 03.5	14 66	60.3	53 11.4	12 64	58.7	53 18.0	10 63	57.0	53 23.2	07 62	55.3	53 27.0	05 61	53.7	53 30.1	02 59	51.1	2
3	51 56.8	21 68	64.2	52 08.7	19 67	62.6	52 24.2	16 65	60.2	52 32.8	13 64	58.5	52 40.1	11 63	56.9	52 46.0	09 62	55.3	52 50.6	06 61	53.6	52 54.8	03 59	51.1	3
4	51 16.1	22 68	63.9	51 28.6	20 67	62.4	51 44.9	17 65	60.0	51 54.2	14 64	58.4	52 02.2	12 63	56.8	52 08.8	10 62	55.2	52 14.1	08 61	53.5	52 19.6	04 59	51.1	4
55	50 35.5	23 68	63.7	50 48.5	21 67	62.1	51 05.7	18 65	59.8	51 15.7	16 64	58.2	51 24.3	13 63	56.6	51 31.7	11 62	55.0	51 37.7	09 61	53.4	51 44.4	06 59	51.0	55
6	49 54.9	24 67	63.4	50 08.5	22 67	61.9	50 26.6	19 65	59.6	50 37.2	17 64	58.1	50 46.5	14 63	56.5	50 54.6	12 62	54.9	51 01.4	10 61	53.4	51 09.2	07 59	51.0	6
7	49 14.5	25 67	63.2	49 28.6	23 66	61.7	49 47.6	20 65	59.4	49 58.8	18 64	57.9	50 08.8	16 63	56.4	50 17.6	14 62	54.8	50 25.1	11 60	53.3	50 34.0	08 59	50.9	7
8	48 34.1	25 67	62.9	48 48.8	24 66	61.4	49 08.7	21 65	59.2	49 20.5	19 64	57.7	49 31.1	17 63	56.2	49 40.6	15 62	54.7	49 48.8	13 60	53.1	49 58.9	10 58	50.8	8
9	47 53.8	26 67	62.6	48 09.1	24 66	61.2	48 29.8	22 65	59.0	48 42.3	20 64	57.5	48 53.6	18 63	56.0	49 03.7	16 61	54.5	49 12.6	14 60	53.0	49 23.8	11 58	50.7	9
60	47 13.7	27 67	62.4	47 29.4	25 66	60.9	47 51.1	23 64	58.8	48 04.1	21 63	57.3	48 16.0	19 62	55.8	48 26.8	17 61	54.4	48 36.5	15 60	52.9	48 48.8	12 58	50.6	60
1	46 33.6	28 67	62.1	46 49.9	26 66	60.7	47 12.4	24 64	58.5	47 26.0	22 63	57.1	47 38.6	20 62	55.7	47 50.1	18 61	54.2	48 00.4	16 60	52.7	48 13.8	13 58	50.5	1
2	45 53.7	29 66	61.8	46 10.5	27 66	60.4	46 33.8	25 64	58.3	46 48.1	23 63	56.9	47 01.3	21 62	55.5	47 13.4	19 61	54.0	47 24.4	17 60	52.6	47 38.9	15 58	50.4	2
3	45 13.8	30 66	61.5	45 31.2	28 65	60.1	45 55.3	26 64	58.1	46 10.2	24 63	56.7	46 24.0	22 62	55.3	46 36.8	20 61	53.8	46 48.5	19 60	52.4	47 04.0	16 58	50.3	3
4	44 34.1	31 66	61.2	44 51.9	29 65	59.9	45 16.9	27 64	57.8	45 32.4	25 63	56.4	45 46.8	23 62	55.1	46 00.3	22 61	53.7	46 12.6	20 60	52.2	46 29.3	17 58	50.1	4
65	43 54.4	31 66	60.9	44 12.8	30 65	59.6	44 38.7	28 64	57.6	44 54.7	26 63	56.2	45 09.8	24 62	54.8	45 23.8	23 61	53.5	45 36.9	21 59	52.1	45 54.6	18 58	50.0	65
6	43 14.9	32 66	60.6	43 33.8	31 65	59.3	44 00.5	28 63	57.3	44 17.1	27 62	56.0	44 32.8	25 61	54.6	44 47.5	24 60	53.3	45 01.2	22 59	51.9	45 19.9	20 58	49.8	6
7	42 35.5	33 65	60.3	42 55.0	32 65	59.0	43 22.4	29 63	57.0	43 39.6	28 62	55.7	43 55.9	26 61	54.4	44 11.3	25 60	53.0	44 25.6	23 59	51.7	44 45.4	21 57	49.6	7
8	41 56.3	34 65	60.0	42 16.2	33 64	58.7	42 44.5	30 63	56.8	43 02.3	29 62	55.5	43 19.2	27 61	54.2	43 35.1	26 60	52.8	43 50.2	24 59	51.5	44 10.9	22 57	49.5	8
9	41 17.1	35 65	59.7	41 37.6	33 64	58.4	42 06.7	31 63	56.5	42 25.0	30 62	55.2	42 42.5	28 61	53.9	42 59.1	27 60	52.6	43 14.8	25 59	51.3	43 36.6	23 57	49.3	9
70	40 38.1	36 65	59.3	40 59.1	34 64	58.1	41 29.0	32 63	56.2	41 47.9	31 62	54.9	42 06.0	29 61	53.7	42 23.2	28 60	52.4	42 39.5	26 59	51.1	43 02.3	24 57	49.1	70
1	39 59.2	36 65	59.0	40 20.7	35 64	57.8	40 51.4	33 62	55.9	41 10.9	32 61	54.7	41 29.5	30 60	53.4	41 47.4	29 59	52.1	42 04.3	28 58	50.8	42 28.1	25 57	48.9	1
2	39 20.5	37 64	58.7	39 42.4	36 64	57.5	40 14.0	34 62	55.6	40 34.0	33 61	54.4	40 53.3	31 60	53.1	41 11.7	30 59	51.9	41 29.3	29 58	50.6	41 54.1	26 57	48.7	2
3	38 41.9	38 64	58.3	39 04.3	37 63	57.1	39 36.7	35 62	55.3	39 57.3	34 61	54.1	40 17.1	32 60	52.9	40 36.1	31 59	51.6	40 54.3	30 58	50.4	41 20.1	28 56	48.5	3
4	38 03.4	39 64	58.0	38 26.4	38 63	56.8	38 59.5	36 62	55.0	39 20.6	35 61	53.8	39 41.0	33 60	52.6	40 00.7	32 59	51.4	40 19.5	31 58	50.1	40 46.3	29 56	48.3	4
75	37 25.1	40 64	57.7	37 48.5	39 63	56.5	38 22.4	37 61	54.7	38 44.1	36 61	53.5	39 05.1	34 60	52.3	39 25.4	33 59	51.1	39 44.8	32 58	49.9	40 12.5	30 56	48.0	75
6	36 46.9	41 63	57.3	37 10.8	39 63	56.2	37 45.5	38 61	54.4	38 07.8	37 60	53.2	38 29.4	35 59	52.0	38 50.2	34 58	50.8	39 10.3	33 57	49.6	39 38.9	31 56	47.8	6
7	36 08.8	41 63	57.0	36 33.3	40 62	55.8	37 08.8	39 61	54.1	37 31.6	37 60	52.9	37 53.7	36 59	51.8	38 15.1	35 58	50.6	38 35.8	34 57	49.4	39 05.5	32 56	47.6	7
8	35 31.0	42 63	56.6	35 55.9	41 62	55.5	36 32.2	39 61	53.8	36 55.5	38 60	52.6	37 18.2	37 59	51.5	37 40.2	36 58	50.3	38 01.5	35 57	49.1	38 32.1	33 55	47.3	8
9	34 53.2	43 63	56.2	35 18.7	42 62	55.1	35 55.7	40 60	53.4	36 19.6	39 60	52.3	36 42.9	38 59	51.2	37 05.5	37 58	50.0	37 27.4	36 57	48.8	37 58.9	34 55	47.1	9
80	34 15.7	44 62	55.9	34 41.6	43 62	54.8	35 19.4	41 60	53.1	35 43.9	40 59	52.0	36 07.7	39 58	50.9	36 30.8	38 57	49.7	36 53.3	37 56	48.6	37 25.8	35 55	46.8	80
1	33 38.3	45 62	55.5	34 04.7	44 61	54.4	34 43.3	42 60	52.8	35 08.3	41 59	51.7	35 32.6	40 58	50.5	35 56.4	39 57	49.4	36 19.5	38 56	48.3	36 52.9	36 55	46.5	1
2	33 01.0	45 62	55.1	33 28.0	44 61	54.1	34 07.3	43 60	52.4	34 32.8	42 59	51.3	34 57.8	41 58	50.2	35 22.1	40 57	49.1	35 45.8	39 56	48.0	36 20.1	37 54	46.3	2
3	32 24.0	46 62	54.7	32 51.4	45 61	53.7	33 31.5	44 59	52.1	33 57.6	43 59	51.0	34 23.0	42 58	49.9	34 47.9	41 57	48.8	35 12.2	40 56	47.7	35 47.4	38 54	46.0	3
4	31 47.1	47 61	54.4	32 15.0	46 60	53.3	32 55.9	45 59	51.7	33 22.5	44 58	50.7	33 48.5	43 57	49.6	34 13.9	42 56	48.5	34 38.8	41 55	47.4	35 14.9	39 54	45.7	4
85	31 10.4	48 61	54.0	31 38.8	47 60	52.9	32 20.4	46 59	51.4	32 47.5	45 58	50.3	33 14.1	44 57	49.3	33 40.1	43 56	48.2	34 05.5	42 55	47.1	34 42.6	40 54	45.4	85
6	30 33.8	49 61	53.6	31 02.7	48 60	52.6	31 45.1	46 58	51.0	32 12.8	46 58	50.0	32 39.9	45 57	48.9	33 06.4	44 56	47.8	33 32.5	43 55	46.8	34 10.4	41 53	45.1	6
7	29 57.5	49 60	53.2	30 26.9	49 59	52.2	31 10.0	47 58	50.7	31 38.2	47 57	49.6	32 05.8	46 56	48.6	32 33.0	45 56	47.5	32 59.6	44 55	46.5	33 38.4	42 53	44.8	7
8	29 21.3	50 60	52.8	29 51.2	49 59	51.8	30 35.1	48 58	50.3	31 03.8	47 57	49.3	31 32.0	47 56	48.2	31 59.7	46 55	47.2	32 26.8	45 54	46.1	33 06.6	43 53	44.5	8
9	28 45.4	51 60	52.4	29 15.7	50 59	51.4	30 00.3	49 58	49.9	30 29.5	48 57	48.9	30 58.3	47 56	47.9	31 26.5	47 55	46.8	31 54.3	46 54	45.8	32 34.9	44 52	44.2	9
90	28 09.6	52 59	52.0	28 40.4	51 58	51.0	29 25.8	50 57	49.5	29 55.5	49 56	48.5	30 24.8	48 56	47.5	30 53.6	48 55	46.5	31 21.9	47 54	45.5	32 03.4	46 52	43.9	90

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.	Δd Δt	Az.	Alt.	Δd Δt	Az.	Alt.	Δd Δt	Az.	Alt.	Δd Δt	Az.	Alt.	Δd Δt	Az.	Alt.	Δd Δt	Az.	Alt.	Δd Δt	Az.	Alt.	Δd Δt	Az.	
°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	°
91	27 34.0	52 59	51.6	28 05.3	52 58	50.6	28 51.4	51 57	49.2	29 21.7	50 56	48.2	29 51.5	49 55	47.2	30 20.8	49 54	46.2	30 49.7	48 53	45.1	31 32.1	46 52	43.6	91
2	26 58.6	53 59	51.2	27 30.4	53 58	50.2	28 17.3	52 57	48.8	28 48.0	51 56	47.8	29 18.4	50 55	46.8	29 48.3	49 54	45.8	30 17.7	49 53	44.8	31 01.0	47 52	43.3	2
3	26 23.4	54 58	50.8	26 55.7	53 57	49.8	27 43.3	52 56	48.4	28 14.6	52 55	47.4	28 45.5	51 55	46.4	29 15.9	50 54	45.4	29 45.9	50 53	44.5	30 30.0	48 51	42.9	3
4	25 48.5	55 58	50.3	26 21.2	54 57	49.4	27 09.6	53 56	48.0	27 41.4	53 55	47.0	28 12.8	52 54	46.1	28 43.7	51 53	45.1	29 14.3	51 52	44.1	29 59.3	49 51	42.6	4
95	25 13.7	56 58	49.9	25 46.9	55 57	49.0	26 36.1	54 56	47.6	27 08.3	54 55	46.6	27 40.3	53 54	45.7	28 11.8	52 53	44.7	28 42.9	51 52	43.7	29 28.7	50 51	42.3	95
6	24 39.2	56 57	49.5	25 12.9	56 56	48.6	26 02.7	55 55	47.2	26 35.5	54 54	46.2	27 08.0	54 53	45.3	27 40.0	53 53	44.3	28 11.7	52 52	43.4	28 58.4	51 50	41.9	6
7	24 04.9	57 57	49.0	24 39.0	57 56	48.1	25 29.6	56 55	46.8	26 02.9	55 54	45.8	26 35.9	55 53	44.9	27 08.5	54 52	44.0	27 40.7	53 51	43.0	28 28.2	52 50	41.6	7
8	23 30.8	58 56	48.6	24 05.4	57 56	47.7	24 56.7	57 54	46.4	25 30.6	56 54	45.4	26 04.0	55 53	44.5	26 37.1	55 52	43.6	27 09.9	54 51	42.7	27 58.3	53 50	41.2	8
9	22 57.0	59 56	48.2	23 32.0	58 55	47.3	24 24.1	57 54	45.9	24 58.4	57 53	45.0	25 32.4	56 52	44.1	26 06.0	56 52	43.2	26 39.3	55 51	42.3	27 28.5	54 49	40.9	9
100	22 23.3	59 56	47.7	22 58.9	59 55	46.8	23 51.7	58 54	45.5	24 26.5	58 53	44.6	25 01.0	57 52	43.7	25 35.1	57 51	42.8	26 08.9	56 50	41.9	26 59.0	55 49	40.5	100
1	21 50.0	60 55	47.3	22 26.0	60 54	46.4	23 19.5	59 53	45.1	23 54.8	59 52	44.2	24 29.8	58 52	43.3	25 04.5	58 51	42.4	25 38.8	57 50	41.5	26 29.7	56 48	40.1	1
2	21 16.8	61 55	46.8	21 53.3	61 54	46.0	22 47.5	60 53	44.7	23 23.3	59 52	43.8	23 58.8	59 51	42.9	24 34.0	58 50	42.0	25 08.9	58 49	41.1	26 00.6	57 48	39.8	2
3	20 43.9	62 54	46.4	21 20.9	61 54	45.5	22 15.8	61 52	44.2	22 52.1	60 52	43.4	23 28.1	60 51	42.5	24 03.8	59 50	41.6	24 39.2	59 49	40.7	25 31.8	58 48	39.4	3
4	20 11.3	63 54	45.9	20 48.7	62 53	45.1	21 44.3	62 52	43.8	22 21.1	61 51	42.9	22 57.6	61 50	42.1	23 33.9	60 50	41.2	24 09.8	60 49	40.3	25 03.1	59 47	39.0	4
105	19 38.9	63 54	45.4	20 16.7	63 53	44.6	21 13.1	62 52	43.4	21 50.4	62 51	42.5	22 27.4	61 50	41.7	23 04.1	61 49	40.8	23 40.6	61 48	39.9	24 34.7	60 47	38.6	105
6	19 06.7	64 53	45.0	19 45.1	64 52	44.2	20 42.2	63 51	42.9	21 19.9	63 50	42.1	21 57.4	62 50	41.2	22 34.7	62 49	40.4	23 11.7	61 48	39.5	24 06.6	61 47	38.2	6
7	18 34.9	65 53	44.5	19 13.7	64 52	43.7	20 11.5	64 51	42.5	20 49.7	64 50	41.6	21 27.7	63 49	40.8	22 05.4	63 48	40.0	22 42.9	62 47	39.1	23 38.7	62 46	37.9	7
8	18 03.3	66 52	44.0	18 42.5	65 51	43.2	19 41.0	65 50	42.0	20 19.7	64 50	41.2	20 58.2	64 49	40.4	21 36.5	64 48	39.6	22 14.5	63 47	38.7	23 11.0	62 46	37.5	8
9	17 31.9	66 52	43.5	18 11.6	66 51	42.7	19 10.8	66 50	41.6	19 50.0	65 49	40.8	20 29.0	65 48	39.9	21 07.8	64 47	39.1	21 46.3	64 47	38.3	22 43.6	63 45	37.1	9
110	17 00.9	67 51	43.1	17 41.0	67 51	42.3	18 40.9	66 49	41.1	19 20.6	66 49	40.3	20 00.1	66 48	39.5	20 39.3	65 47	38.7	21 18.4	65 46	37.9	22 16.5	64 45	36.6	110
1	16 30.1	68 51	42.6	17 10.7	68 50	41.8	18 11.3	67 49	40.6	18 51.5	67 48	39.8	19 31.4	66 47	39.1	20 11.2	66 46	38.3	20 50.7	66 46	37.5	21 49.6	65 44	36.2	1
2	15 59.6	69 50	42.1	16 40.7	68 50	41.3	17 42.0	68 48	40.2	18 22.6	68 48	39.4	19 03.0	67 47	38.6	19 43.3	67 46	37.8	20 23.3	67 45	37.0	21 22.9	66 44	35.8	2
3	15 29.4	69 50	41.6	16 10.9	69 49	40.8	17 12.9	69 48	39.7	17 54.0	68 47	38.9	18 34.9	68 46	38.1	19 15.6	68 46	37.4	19 56.2	67 45	36.6	20 56.6	67 44	35.4	3
4	14 59.5	70 49	41.1	15 41.5	70 49	40.3	16 44.1	69 47	39.2	17 25.7	69 47	38.5	18 07.1	69 46	37.7	18 48.3	69 45	36.9	19 29.3	68 44	36.2	20 30.5	68 43	35.0	4
115	14 29.9	71 49	40.6	15 12.3	71 48	39.8	16 15.7	70 47	38.7	16 57.7	70 46	38.0	17 39.5	70 45	37.2	18 21.2	69 45	36.5	19 02.7	69 44	35.7	20 04.6	69 43	34.6	115
6	14 00.7	72 48	40.1	14 43.5	71 48	39.3	15 47.5	71 46	38.2	16 30.0	71 46	37.5	17 12.3	70 45	36.8	17 54.5	70 44	36.0	18 36.4	70 43	35.3	19 39.1	69 42	34.1	6
7	13 31.7	72 48	39.5	14 14.9	72 47	38.8	15 19.6	72 46	37.7	16 02.5	71 45	37.0	16 45.3	71 44	36.3	17 28.0	71 44	35.6	18 10.4	71 43	34.8	19 13.8	70 42	33.7	7
8	13 03.0	73 47	39.0	13 46.7	73 47	38.3	14 52.0	72 45	37.3	15 35.4	72 45	36.5	16 18.7	72 44	35.8	17 01.8	72 43	35.1	17 44.7	71 42	34.4	18 48.9	71 41	33.2	8
9	12 34.7	74 47	38.5	13 18.8	73 46	37.8	14 24.8	73 45	36.8	15 06.6	73 44	36.0	15 52.3	73 43	35.3	16 35.9	72 43	34.6	17 19.3	72 42	33.9	18 24.2	72 41	32.8	9
120	12 06.6	74 46	38.0	12 51.2	74 45	37.3	13 57.9	74 44	36.3	14 42.1	74 44	35.6	15 26.3	73 43	34.9	16 10.3	73 42	34.1	16 54.2	73 41	33.4	17 59.8	73 40	32.4	120
1	11 38.9	75 46	37.4	12 23.9	75 45	36.8	13 31.2	75 44	35.7	14 16.0	74 43	35.1	15 00.6	74 42	34.4	15 45.1	74 42	33.7	16 29.4	74 41	33.0	17 35.7	73 40	31.9	1
2	11 11.6	76 45	36.9	11 57.0	76 44	36.2	13 05.0	75 43	35.2	13 50.1	75 43	34.6	14 35.2	75 42	33.9	15 20.1	75 41	33.2	16 05.0	75 40	32.5	17 11.9	74 39	31.5	2
3	10 44.5	76 44	36.4	11 30.4	76 44	35.7	12 39.0	76 43	34.7	13 24.6	76 42	34.1	14 10.1	76 41	33.4	14 55.5	76 40	32.7	15 40.8	75 40	32.0	16 48.4	75 39	31.0	3
4	10 17.9	77 44	35.8	11 04.1	77 43	35.2	12 13.4	77 42	34.2	12 59.4	77 41	33.5	13 45.4	76 41	32.9	14 31.2	76 40	32.2	15 16.9	76 39	31.5	16 25.3	76 38	30.5	4
125	9 51.5	78 43	35.3	10 38.2	78 43	34.6	11 48.1	78 42	33.7	12 34.6	77 41	33.0	13 20.9	77 40	32.4	14 07.2	77 39	31.7	14 53.4	77 39	31.1	16 02.4	77 38	30.1	125
6	9 25.6	79 43	34.7	10 12.7	78 42	34.1	11 23.2	78 41	33.2	12 10.1	78 40	32.5	12 56.9	78 40	31.9	13 43.6	78 39	31.2	14 30.2	78 38	30.6	15 39.9	77 37	29.6	6
7	8 59.9	79 42	34.2	9 47.4	79 41	33.6	10 58.6	79 40	32.6	11 45.9	79 40	32.0	12 33.1	79 39	31.4	13 20.3	78 38	30.7	14 07.3	78 38	30.1	15 17.7	78 36	29.1	7
8	8 34.7	80 41	33.6	9 22.6	80 41	33.0	10 34.3	80 40	32.1	11 22.1	79 39	31.5	12 09.7	79 38	30.8	12 57.3	79 38	30.2	13 44.8	79 37	29.6	14 55.8	79 36	28.6	8
9	8 09.8	81 41	33.1	8 58.1	80 40	32.5	10 10.5	80 39	31.5	10 58.6	80 38	30.9	11 46.7	80 38	30.3	12 34.7	80 37	29.7	13 22.6	80 36	29.1	14 34.3	80 35	28.2	9
130	7 45.3	81 40	32.5	8 34.0	81 40	31.9	9 47.0	81 39	31.0	10 35.5	81 38	30.4	11 24.0	81 37	29.8	12 12.4	81 37	29.2	13 00.8	80 36	28.6	14 13.1	80 35	27.7	130
1	7 21.2	82 40	31.9	8 10.3	82 39	31.3	9 23.8	82 38	30.5	10 12.8	82 37	29.9	11 01.7	81 37	29.3	11 50.5	81 36	28.7	12 39.3	81 35	28.1	13 52.2	81 34	27.2	1
2	6 57.4	83 39	31.3	7 46.9	82 38	30.8	9 01.1	82 37	29.9	9 50.4	82 37	29.3	10 39.7	82 36	28.8	11 28.9	82 35	28.2	12 18.1	82 35	27.6	13 31.7	82 34	26.7	2
3	6 34.1	83 38	30.8	7 23.9	83 38	30.2	8 38.7	83 37	29.4	9 28.4	83 36	28.8	10 18.1	83 35	28.2	11 07.8	83 35	27.6	11 57.3	83 34	27.1	13 11.6	82 33	26.2	3
4	6 11.1	84 38	30.2	7 01.4	84 37	29.6	8 16.7	84 36	28.8	9 06.8	84 35	28.2	9 56.9	83 35	27.7	10 46.9	83 34	27.1	11 36.9	83 33	26.6	12 51.7	83 32	25.7	4
135	5 48.6	84 37	29.6	6 39.2	84 36	29.0	7 55.0	84 35	28.2	8 45.6	84 35	27.7	9 36.0	84 34	27.1	10 26.5	84 33	26.6	11 16.8	84 33	26.0	12 32.3	84 32	25.2	135
6	5 26.4	85 36	29.0	6 17.4	85 36	28.5	7 33.8	85 35	27.7	8 24.7	85 34	27.1	9 15.6	85 33	26.6	10 06.4	85 33	26.1	10 57.1	85 32	25.5	12 13.2	84 31	24.7	6
7	5 04.7	86 36	28.4	5 56.0	86 35	27.9	7 13.0	85 34	27.1	8 04.3	85 33	26.6	8 55.5	85 33	26.0	9 46.7	85 32	25.5	10 37.8	85 32	25.0	11 54.4	85 31	24.2	7
8				5 35.0	86 34	27.3	6 52.6	86 33	26.5	7 44.2	86 33	26.0	8 35.8	86 32	25.5	9 27.4	86 32	25.0	10 18.9	86 31	24.5	11 36.1	86 30	23.7	8
9				5 14.5	87 34	26.7	6 32.5	87 33	25.9	7 24.5	87 32	25.4	8 16.5	87 32	24.9	9 08.4	87 31	24.4	10 00.3	86 30	23.9	11 18.1	86 29	23.2	9
140							6 12.9	87 32	25.4	7 05.3	87 31	24.9	7 57.6	87 31	24.4	8 49.9	87 30	23.9	9 42.2	87 30	23.4	11 00.5	87 29	22.6	140
1							5 53.7	88 31	24.8	6 46.5	88 31	24.3	7 39.1	88 30	23.8	8 31.8	88 30	23.3	9 24.4	88 29	22.9	10 43.2	88 28	22.1	1
2							5 35.0	88 31	24.2	6 28.0	88 30	23.7	7 21.0	88 29	23.3	8 14.0	88 29	22.8	9 07.0	88 28	22.3	10 26.4	88 27	21.6	2
3							5 16.6	89 30	23.6	6 10.0	89 29	23.1	7 03.4	89 29	22.7	7 56.7	89 28	22.2	8 50.0	89 28	21.8	10 09.9	89 27	21.1	3
4										5 52.4	90 29	22.6	6 46.1	89 28	22.1	7 39.8	89 28	21.7	8 33.4	89 27	21.2	9 53.8	89 26	20.5	4
145										5 35.3	90 28	22.0	6 29.3	90 27	21.5	7 23.3	90 27	21.1	8 17.2	90 26	20.7	9 38.1	90 25	20.0	145
6										5 18.5	91 27	21.4	6 12.9	91 27	21.0	7 07.2	91 26	20.5	8 01.5	90 26	20.1	9 22.8	90 25	19.5	6
7										5 02.2	91 27	20.8	5 56.9	91 26	20.4	6 51.5	91 25	20.0	7 46.1	91 25	19.6	9 08.0	91 24	18.9	7
8													5 41.3	92 25	19.8	6 36.2	92 25	19.4	7 31.2	92 24	19.0	8 53.5	91 23	18.4	8
9													5 26.2	92 24	19.2	6 21.4	92 24	18.8	7 16.6	92 24	18.4	8 39.4	92 23	17.8	9
150													5 11.5	93 24	18.6	6 07.0	93 23	18.2	7 02.5	92 23	17.9	8 25.8	92 22	17.3	150
1																5 53.1	93 23	17.7	6 48.9	93 22	17.3	8 12.5	93 21	16.7	1
2																5 39.6	93 22	17.1	6 35.6	93 21	16.7	7 59.7	93 21	16.2	2
3																5 26.5	94 21	16.5	6 22.8	94 21	16.1	7 47.3	94 20	15.6	3
4																5 13.8	94 20	15.9	6 10.4	94 20	15.6	7 35.3	94 19	15.1	4
155																5 01.7	95 20	15.3	5 58.5	95 19	15.0	7 23.7	95 19	14.5	155
6																			5 47.0	95 18	14.4	7 12.6	95 18	13.9	6
7																			5 36.0	96 18	13.8	7 01.9	95 17	13.4	7
8																			5 25.4	96 17	13.2	6 51.6	96 16	12.8	8
9																			5 15.2	96 16	12.7	6 41.8	96 16	12.2	9
160																			5 05.5	97 15	12.1	6 32.4	97 15	11.7	160
1																						6 23.5	97 14	11.1	1
2																						6 15.0	97 13	10.5	2
3																						6 07.0	98 13	10.0	3
4																						5 59.4	98 12	09.4	4
165																						5 52.2	98 11	08.8	165
6																						5 45.5	98 10	08.2	6
7																						5 39.3	99 10	07.6	7
8																						5 33.5	99 09	07.1	8
9																						5 28.1	99 08	06.5	9
170																						5 23.3	99 07	05.9	170
1																						5 18.9	99 07	05.3	1
2																						5 14.9	99 06	04.7	2
3																						5 11.4	1.0 05	04.1	3
4																						5 08.4	1.0 04	03.5	4
175																						5 05.8	1.0 04	02.9	175
6																						5 03.7	1.0 03	02.4	6
7																						5 02.1	1.0 02	01.8	7
8																						5 00.9	1.0 01	01.2	8
9																						5 00.2	1.0 00	00.6	9
180																						5 00.0	1.0 00	00.0	180

Lat. 41°

Lat. 42°

Lat. 43°

Lat. 44°

Lat. 45°

Lat. 46°

Lat. 47°

Lat. 48°

Digitized by Google

Lat. 41°

H.A.	54° 30′			55° 00′			56° 00′			56° 30′		
°	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °
00	76 30.0	1.0 02	00.0	76 00.0	1.0 02	00.0	75 00.0	1.0 01	00.0	74 30.0	1.0 01	00.0
1	76 29.0	1.0 05	02.5	75 59.1	1.0 05	02.4	74 59.1	1.0 04	02.2	74 29.2	1.0 04	02.1
2	76 26.1	99 08	05.0	75 56.3	99 08	04.7	74 56.6	99 07	04.3	74 26.7	1.0 07	04.1
3	76 21.2	99 11	07.4	75 51.6	99 11	07.1	74 52.4	99 10	06.4	74 22.7	99 09	06.2
4	76 14.4	98 14	09.8	75 45.2	98 14	09.4	74 46.4	98 13	08.5	74 17.0	98 12	08.2
05	76 05.8	96 17	12.2	75 36.9	96 17	11.6	74 38.9	97 15	10.6	74 09.8	97 15	10.2
6	75 55.4	95 20	14.5	75 26.9	95 19	13.8	74 29.8	96 18	12.6	74 01.1	96 17	12.1
7	75 43.2	93 23	16.7	75 15.3	93 22	15.9	74 19.1	94 20	14.6	73 50.9	94 19	14.0
8	75 29.4	91 26	18.8	75 02.1	91 25	18.0	74 07.0	92 23	16.5	73 39.2	93 22	15.8
9	75 14.0	89 28	20.9	74 47.3	89 27	20.0	73 53.4	90 25	18.4	73 26.2	91 24	17.6
10	74 57.2	86 30	22.9	74 31.1	87 29	21.9	73 38.4	89 27	20.2	73 11.8	89 26	19.4
1	74 38.9	84 33	24.7	74 13.6	85 31	23.7	73 22.2	86 29	21.9	72 56.2	87 28	21.0
2	74 19.3	81 35	26.5	73 54.7	82 33	25.5	73 04.7	84 31	23.5	72 39.3	85 30	22.6
3	73 58.5	79 37	28.2	73 34.6	80 35	27.2	72 46.0	82 33	25.1	72 21.3	83 32	24.2
4	73 36.5	76 38	29.9	73 13.4	77 37	28.7	72 26.3	80 35	26.6	72 02.2	81 34	25.7
15	73 13.4	74 40	31.4	72 51.1	75 39	30.2	72 05.5	77 36	28.1	71 42.1	78 35	27.1
6	72 49.3	71 42	32.8	72 27.8	72 40	31.6	71 43.7	75 38	29.4	71 21.0	76 37	28.4
7	72 24.3	68 43	34.2	72 03.6	70 42	33.0	71 21.0	72 39	30.7	70 59.1	74 38	29.7
8	71 58.5	66 44	35.4	71 38.5	67 43	34.2	70 57.4	70 41	32.0	70 36.2	71 39	30.9
9	71 31.8	63 46	36.6	71 12.7	65 44	35.4	70 33.0	67 42	33.1	70 12.6	69 41	32.1
20	71 04.5	61 47	37.8	70 46.1	62 46	36.6	70 07.9	65 43	34.2	69 48.2	66 42	33.1
1	70 36.4	58 48	38.8	70 18.7	60 47	37.6	69 42.1	63 44	35.3	69 23.1	64 43	34.2
2	70 07.7	56 49	39.8	69 50.8	57 48	38.6	69 15.6	60 45	36.3	68 57.3	62 44	35.2
3	69 38.4	53 50	40.7	69 22.3	55 48	39.5	68 48.5	58 46	37.2	68 30.9	59 45	36.1
4	69 08.7	51 50	41.6	68 53.2	52 49	40.4	68 20.9	55 47	38.1	68 04.0	57 46	36.9
25	68 38.4	48 51	42.4	68 23.6	50 50	41.2	67 52.7	53 48	38.9	67 36.5	55 47	37.8
6	68 07.6	46 52	43.1	67 53.6	48 51	41.9	67 24.0	51 48	39.6	67 08.5	52 47	38.5
7	67 36.5	44 53	43.8	67 23.1	45 51	42.6	66 54.9	49 49	40.4	66 40.1	50 48	39.2
8	67 05.0	41 53	44.4	66 52.3	43 52	43.3	66 25.4	46 50	41.0	66 11.3	48 49	39.9
9	66 33.1	39 54	45.0	66 21.1	41 53	43.9	65 55.5	44 50	41.6	65 42.0	46 49	40.6
30	66 00.9	37 54	45.6	65 49.5	39 53	44.5	65 25.2	42 51	42.2	65 12.4	44 50	41.2
1	65 28.4	35 55	46.1	65 17.7	37 54	45.0	64 54.6	40 52	42.8	64 42.4	42 50	41.7
2	64 55.7	33 55	46.6	64 45.5	35 54	45.5	64 23.7	38 52	43.3	64 12.1	39 51	42.2
3	64 22.7	31 55	47.0	64 13.1	33 54	45.9	63 52.5	36 52	43.8	63 41.5	37 51	42.7
4	63 49.4	29 56	47.4	63 40.5	31 55	46.3	63 21.1	34 53	44.2	63 10.7	35 52	43.2
35	63 16.0	27 56	47.8	63 07.6	29 55	46.7	62 49.4	32 53	44.6	62 39.6	33 52	43.6
6	62 42.4	25 56	48.1	62 34.6	27 55	47.1	62 17.5	30 54	45.0	62 08.3	31 53	44.0
7	62 08.6	23 57	48.4	62 01.3	25 56	47.4	61 45.4	28 54	45.3	61 36.7	30 53	44.3
8	61 34.7	22 57	48.7	61 27.9	23 56	47.7	61 13.1	26 54	45.6	61 05.0	28 53	44.6
9	61 00.6	20 57	48.9	60 54.4	21 56	47.9	60 40.6	24 54	45.9	60 33.1	26 53	45.0
40	60 26.4	18 57	49.2	60 20.7	20 56	48.2	60 08.0	23 55	46.2	60 01.0	24 54	45.2
1	59 52.1	16 57	49.4	59 46.9	18 56	48.4	59 35.3	21 55	46.4	59 28.8	22 54	45.5
2	59 17.6	15 58	49.5	59 13.0	16 57	48.6	59 02.4	19 55	46.7	58 56.5	20 54	45.7
3	58 43.2	13 58	49.7	58 39.0	15 57	48.8	58 29.4	17 55	46.9	58 24.0	19 54	45.9
4	58 08.6	12 58	49.8	58 04.9	13 57	48.9	57 56.3	16 55	47 0	57 51.4	17 54	46.1
45	57 33.9	10 58	50.0	57 30.7	11 57	49.0	57 23.1	14 55	47.2	57 18.7	15 55	46.3
6	56 59.2	08 58	50.1	56 56.5	10 57	49.1	56 49.9	12 56	47.3	56 46.0	14 55	46.4
7	56 24.5	07 58	50.1	56 22.2	08 57	49.2	56 16.6	11 56	47.4	56 13.1	12 55	46.5
8	55 49.7	05 58	50.2	55 47.9	07 57	49.3	55 43.2	09 56	47.5	55 40.2	10 55	46.7
9	55 14.9	04 58	50.3	55 13.6	05 57	49.4	55 09.7	08 56	47.6	55 07.3	09 55	46.8
50	54 40.1	02 58	50.3	54 39.2	04 57	49.4	54 36.3	06 56	47.7	54 34.2	07 55	46.8
1	54 05.3	01 58	50.3	54 04.8	02 57	49.4	54 02.8	05 56	47.7	54 01.2	06 55	46.9
2	53 30.4	00 58	50.3	53 30.4	01 57	49.5	53 29.2	03 56	47.8	53 28.1	04 55	46.9
3	52 55.6	02 58	50.3	52 56.0	01 57	49.5	52 55.7	02 56	47.8	52 55.0	03 55	47.0
4	52 20.7	03 58	50.3	52 21.6	02 57	49.4	52 22.1	00 56	47.8	52 21.9	01 55	47.0
55	51 45.9	05 58	50.2	51 47.1	04 57	49.4	51 48.6	01 56	47.8	51 48.8	00 55	47.0
6	51 11.1	06 58	50.2	51 12.8	05 57	49.4	51 15.0	03 56	47.8	51 15.7	02 55	47.0
7	50 36.4	07 58	50.1	50 38.4	06 57	49.3	50 41.5	04 56	47.8	50 42.6	03 55	47.0
8	50 01.6	09 58	50.0	50 04.1	08 57	49.3	50 08.0	05 56	47.7	50 09.5	04 55	46.9
9	49 27.0	10 58	50.0	49 29.8	09 57	49.2	49 34.5	07 56	47.7	49 36.4	06 55	46.9
60	48 52.3	11 58	49.9	48 55.5	10 57	49.1	49 01.1	08 56	47.6	49 03.4	07 55	46.8
1	48 17.7	13 58	49.8	48 21.3	12 57	49.0	48 27.6	10 56	47.5	48 30.4	09 55	46.8
2	47 43.2	14 57	49.7	47 47.2	13 57	48.9	47 54.3	11 56	47.4	47 57.4	10 55	46.7
3	47 08.7	15 57	49.5	47 13.0	14 57	48.8	47 20.9	12 55	47.3	47 24.5	11 55	46.6
4	46 34.3	16 57	49.4	46 39.0	15 57	48.7	46 47.7	14 55	47.2	46 51.6	13 55	46.5
65	45 59.9	17 57	49.3	46 05.0	17 56	48.5	46 14.5	15 55	47.1	46 18.8	14 55	46.4
6	45 25.7	19 57	49.1	45 31.1	18 56	48.4	45 41.3	16 55	47.0	45 46.0	15 54	46.3
7	44 51.5	20 57	48.9	44 57.3	19 56	48.3	45 08.2	17 55	46.9	45 13.3	17 54	46.2
8	44 17.4	21 57	48.8	44 23.6	20 56	48.1	44 35.2	19 55	46.7	44 40.7	18 54	46.0
9	43 43.4	22 57	48.6	43 49.9	21 56	47.9	44 02.3	20 55	46.6	44 08.1	19 54	45.9
70	43 09.4	23 56	48.4	43 16.3	23 56	47.8	43 29.5	21 55	46.4	43 35.7	20 54	45.7
1	42 35.6	25 56	48.2	42 42.9	24 56	47.6	42 56.7	22 54	46.2	43 03.3	22 54	45.6
2	42 01.9	26 56	48.0	42 09.5	25 55	47.4	42 24.0	23 54	46.1	42 31.0	23 54	45.4
3	41 28.3	27 56	47.8	41 36.2	26 55	47.2	41 51.5	25 54	45.9	41 58.8	24 54	45.2
4	40 54.8	28 56	47.6	41 03.1	27 55	47.0	41 19.0	26 54	45.7	41 26.7	25 53	45.1
75	40 21.4	29 55	47.4	40 30.0	28 55	46.8	40 46.7	27 54	45.5	40 54.7	26 53	44.9
6	39 48.1	30 55	47.2	39 57.1	30 55	46.6	40 14.4	28 54	45.3	40 22.8	28 53	44.7
7	39 15.0	31 55	46.9	39 24.3	31 54	46.3	39 42.3	29 53	45.1	39 51.0	29 53	44.5
8	38 41.9	32 55	46.7	38 51.6	32 54	46.1	39 10.3	31 53	44.9	39 19.3	30 53	44.3
9	38 09.0	34 55	46.5	38 19.0	33 54	45.9	38 38.4	32 53	44.6	38 47.8	31 52	44.0
80	37 36.3	35 54	46.2	37 46.6	34 54	45.6	38 06.6	33 53	44.4	38 16.4	32 52	43.8
1	37 03.7	36 54	46.0	37 14.3	35 54	45.4	37 35.0	34 52	44.2	37 45.1	33 52	43.6
2	36 31.2	37 54	45.7	36 42.1	36 53	45.1	37 03.5	35 52	43.9	37 14.0	34 52	43.4
3	35 58.9	38 54	45.4	36 10.1	37 53	44.8	36 32.2	36 52	43.7	36 42.9	36 51	43.1
4	35 26.7	39 53	45.1	35 38.3	38 53	44.6	36 01.0	37 52	43.4	36 12.1	37 51	42.9
85	34 54.7	40 53	44.9	35 06.6	39 53	44.3	35 29.9	38 52	43.2	35 41.3	38 51	42.6
6	34 22.8	41 53	44.6	34 35.0	40 52	44.0	34 59.0	39 51	42.9	35 10.8	39 51	42.3
7	33 51.1	42 53	44.3	34 03.6	42 52	43.7	34 28.2	41 51	42.6	34 40.3	40 50	42.1
8	33 19.6	43 52	44.0	33 32.4	43 52	43.5	33 57.6	42 51	42.4	34 10.1	41 50	41.8
9	32 48.2	44 52	43.7	33 01.3	44 51	43.2	33 27.2	43 50	42.1	33 39.9	42 50	41.5
90	32 17.0	45 52	43.4	32 30.5	45 51	42.9	32 57.0	44 50	41.8	33 10.0	43 50	41.3

H.A.	57° 00′			57° 30′			59° 00′			59° 30′		
°	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °
00	74 00.0	1.0 01	00.0	73 30.0	1.0 01	00.0	72 00.0	1.0 01	00.0	71 30.0	1.0 01	00.0
1	73 59.2	1.0 04	02.0	73 29.3	1.0 04	01.9	71 59.3	1.0 03	01.7	71 29.4	1.0 03	01.6
2	73 56.9	1.0 06	03.9	73 27.0	1.0 06	03.8	71 57.4	1.0 05	03.3	71 27.5	1.0 05	03.2
3	73 53.0	99 09	05.9	73 23.3	99 09	05.6	71 54.1	99 08	05.0	71 24.3	99 07	04.8
4	73 47.6	98 12	07.8	73 18.1	98 11	07.5	71 49.5	99 10	06.6	71 19.9	99 09	06.4
05	73 40.7	97 14	09.7	73 11.5	97 13	09.3	71 43.7	98 12	08.2	71 14.3	98 11	07.9
6	73 32.3	96 16	11.6	73 03.5	96 16	11.1	71 36.6	97 14	09.8	71 07.5	97 13	09.4
7	73 22.5	95 19	13.4	72 54.0	95 18	12.9	71 28.2	96 16	11.4	70 59.5	96 15	10.9
8	73 11.3	93 21	15.2	72 43.3	94 20	14.6	71 18.7	94 18	12.9	70 50.3	95 17	12.4
9	72 58.8	92 23	16.9	72 31.3	92 22	16.3	71 08.0	93 20	14.4	70 40.0	93 19	13.9
10	72 45.0	90 25	18.6	72 18.0	90 24	17.9	70 56.1	92 22	15.9	70 28.6	92 21	15.3
1	72 29.9	88 27	20.2	72 03.5	88 26	19.4	70 43.2	90 23	17.3	70 16.1	90 22	16.7
2	72 13.7	86 29	21.8	71 47.8	86 28	21.0	70 29.2	88 25	18.7	70 02.6	89 24	18.0
3	71 56.3	84 31	23.3	71 31.1	84 30	22.4	70 14.2	86 27	20.0	69 48.1	87 26	19.3
4	71 37.9	82 32	24.7	71 13.3	82 31	23.8	69 58.2	85 28	21.3	69 32.7	85 27	20.6
15	71 18.5	79 34	26.1	70 54.6	80 33	25.2	69 41.2	83 30	22.6	69 16.3	83 29	21.8
6	70 58.1	77 35	27.4	70 34.8	78 34	26.5	69 23.4	81 31	23.8	68 59.1	81 30	23.0
7	70 36.8	75 37	28.7	70 14.2	76 36	27.7	69 04.7	79 32	24.9	68 41.0	79 31	24.1
8	70 14.7	72 38	29.9	69 52.8	74 37	28.9	68 45.2	77 34	26.1	68 22.1	77 33	25.2
9	69 51.7	70 39	31.0	69 30.5	71 38	30.0	68 25.0	74 35	27.1	68 02.5	75 34	26.2
20	69 28.0	68 41	32.1	69 07.5	69 40	31.0	68 04.0	72 36	28.1	67 42.1	73 35	27.2
1	69 03.6	65 42	33.1	68 43.8	67 41	32.1	67 42.3	70 37	29.1	67 21.1	71 36	28.2
2	68 38.6	63 43	34.1	68 19.5	64 42	33.0	67 19.9	68 38	30.0	66 59.4	69 37	29.1
3	68 12.9	61 44	35.0	67 54.5	62 43	33.9	66 56.9	66 39	30.9	66 37.0	67 38	30.0
4	67 46.7	58 45	35.9	67 28.9	60 44	34.8	66 33.4	64 40	31.8	66 14.1	65 39	30.8
25	67 19.9	56 45	36.7	67 02.8	58 44	35.6	66 09.3	61 41	32.6	65 50.6	63 40	31.6
6	66 52.6	54 46	37.4	66 36.2	55 45	36.4	65 44.6	59 42	33.3	65 26.7	61 41	32.4
7	66 24.8	52 47	38.2	66 09.1	53 46	37.1	65 19.5	57 43	34.1	65 02.2	58 42	33.1
8	65 56.6	49 48	38.8	65 41.6	51 47	37.8	64 53.9	55 43	34.7	64 37.2	56 42	33.8
9	65 28.0	47 48	39.5	65 13.6	49 47	38.4	64 27.9	53 44	35.4	64 11.8	54 43	34.4
30	64 59.1	45 49	40.1	64 45.3	47 48	39.0	64 01.5	51 45	36.0	63 46.0	52 44	35.0
1	64 29.7	43 49	40.7	64 16.6	44 48	39.6	63 34.6	49 45	36.6	63 19.8	50 44	35.6
2	64 00.1	41 50	41.2	63 47.6	42 49	40.1	63 07.5	47 46	37.1	62 53.3	48 45	36.2
3	63 30.1	39 50	41.7	63 18.2	40 49	40.6	62 40.0	45 46	37.7	62 26.4	46 45	36.7
4	62 59.9	37 51	42.1	62 48.6	38 50	41.1	62 12.2	43 47	38.1	61 59.2	44 46	37.2
35	62 29.4	35 51	42.6	62 18.7	36 50	41.5	61 44.1	41 47	38.6	61 31.7	42 46	37.6
6	61 58.6	33 52	43.0	61 48.5	34 51	42.0	61 15.7	39 48	39.0	61 03.9	40 47	38.1
7	61 27.7	31 52	43.3	61 18.1	32 51	42.3	60 47.0	37 48	39.4	60 35.8	38 47	38.5
8	60 56.5	29 52	43.7	60 47.5	31 51	42.7	60 18.2	35 48	39.8	60 07.6	36 48	38.9
9	60 25.1	27 53	44.0	60 16.8	29 52	43.0	59 49.1	33 49	40.1	59 39.0	34 48	39.2
40	59 53.6	25 53	44.3	59 45.8	27 52	43.3	59 19.8	31 49	40.5	59 10.3	32 48	39.5
1	59 21.9	24 53	44.5	59 14.6	25 52	43.6	58 50.3	29 49	40.8	58 41.4	30 48	39.8
2	58 50.1	22 53	44.8	58 43.4	23 52	43.8	58 20.7	27 50	41.0	58 12.3	29 49	40.1
3	58 18.2	20 53	45.0	58 11.9	21 53	44.1	57 50.8	25 50	41.3	57 43.0	27 49	40.4
4	57 46.1	18 54	45.2	57 40.4	20 53	44.3	57 20.9	24 50	41.5	57 13.6	25 49	40.6
45	57 13.9	17 54	45.4	57 08.7	18 53	44.5	56 50.8	22 50	41.8	56 44.0	23 49	40.9
6	56 41.7	15 54	45.5	56 37.0	16 53	44.6	56 20.6	20 51	42.0	56 14.4	21 50	41.1
7	56 09.3	13 54	45.7	56 05.1	15 53	44.8	55 50.2	18 51	42.1	55 44.5	20 50	41.3
8	55 36.9	12 54	45.8	55 33.2	13 53	44.9	55 19.8	17 51	42.3	55 14.6	18 50	41.4
9	55 04.4	10 54	45.9	55 01.2	11 53	45.0	54 49.3	15 51	42.4	54 44.6	16 50	41.6
50	54 31.9	09 54	46.0	54 29.1	10 54	45.1	54 18.7	13 51	42.6	54 14.5	15 50	41.7
1	53 59.3	07 54	46.0	53 57.0	08 54	45.2	53 48.1	12 51	42.7	53 44.4	13 50	41.8
2	53 26.7	05 54	46.1	53 24.9	07 54	45.3	53 17.4	10 51	42.8	53 14.1	11 50	41.9
3	52 54.0	04 54	46.1	52 52.7	05 54	45.3	52 46.6	09 51	42.8	52 43.9	10 51	42.0
4	52 21.4	02 54	46.2	52 20.5	04 54	45.4	52 15.8	07 51	42.9	52 13.5	08 51	42.1
55	51 48.7	01 54	46.2	51 48.3	02 54	45.4	51 44.9	05 51	43.0	51 43.2	06 51	42.2
6	51 16.0	01 54	46.2	51 16.0	01 54	45.4	51 14.1	04 52	43.0	51 12.8	05 51	42.2
7	50 43.3	02 54	46.2	50 43.8	01 54	45.4	50 43.2	02 52	43.0	50 42.3	03 51	42.2
8	50 10.7	03 54	46.2	50 11.5	02 54	45.4	50 12.3	01 52	43.0	50 11.9	02 51	42.3
9	49 38.0	05 54	46.1	49 39.3	04 54	45.3	49 41.4	01 52	43.0	49 41.4	00 51	42.3
60	49 05.4	06 54	46.1	49 07.1	05 54	45.3	49 10.5	02 51	43.0	49 11.0	01 51	42.3
1	48 32.8	08 54	46.0	48 34.9	07 54	45.3	48 39.6	04 51	43.0	48 40.5	03 51	42.2
2	48 00.2	09 54	45.9	48 02.8	08 54	45.2	48 08.7	05 51	43.0	48 10.1	04 51	42.2
3	47 27.7	10 54	45.9	47 30.7	09 53	45.1	47 37.9	07 51	42.9	47 39.7	06 51	42.2
4	46 55.2	12 54	45.8	46 58.6	11 53	45.1	47 07.0	08 51	42.9	47 09.3	07 51	42.1
65	46 22.8	13 54	45.7	46 26.6	12 53	45.0	46 36.3	09 51	42.8	46 38.9	08 51	42.1
6	45 50.4	14 54	45.6	45 54.6	13 53	44.9	46 05.5	11 51	42.7	46 08.6	10 50	42.0
7	45 18.1	16 54	45.5	45 22.7	15 53	44.8	45 34.8	12 51	42.6	45 38.3	11 50	41.9
8	44 45.9	17 54	45.3	44 50.8	16 53	44.6	45 04.2	14 51	42.5	45 08.1	13 50	41.8
9	44 13.7	18 54	45.2	44 19.1	17 53	44.5	44 33.6	15 51	42.4	44 37.9	14 50	41.7
70	43 41.6	19 53	45.1	43 47.3	19 53	44.4	44 03.1	16 51	42.3	44 07.8	15 50	41.6
1	43 09.6	21 53	44.9	43 15.7	20 53	44.2	43 32.6	18 51	42.2	43 37.7	17 50	41.5
2	42 37.7	22 53	44.7	42 44.2	21 52	44.1	43 02.2	19 51	42.1	43 07.8	18 50	41.4
3	42 05.9	23 53	44.6	42 12.7	22 52	43.9	42 31.9	20 50	41.9	42 37.8	19 50	41.3
4	41 34.1	24 53	44.4	41 41.3	24 52	43.8	42 01.7	21 50	41.8	42 08.0	21 50	41.1
75	41 02.5	26 53	44.2	41 10.1	25 52	43.6	41 31.5	23 50	41.6	41 38.3	22 49	41.0
6	40 30.9	27 52	44.0	40 38.9	26 52	43.4	41 01.5	24 50	41.5	41 08.6	23 49	40.8
7	39 59.5	28 52	43.8	40 07.8	27 52	43.2	40 31.6	25 50	41.3	40 39.0	25 49	40.7
8	39 28.2	29 52	43.6	39 36.9	29 51	43.0	40 01.7	27 50	41.1	40 09.6	26 49	40.5
9	38 57.0	30 52	43.4	39 06.1	30 51	42.8	39 32.0	28 49	41.0	39 40.2	27 49	40.3
80	38 26.0	32 52	43.2	38 35.3	31 51	42.6	39 02.3	29 49	40.8	39 11.0	28 49	40.2
1	37 55.0	33 51	43.0	38 04.8	32 51	42.4	38 32.8	30 49	40.6	38 41.8	30 48	40.0
2	37 24.2	34 51	42.8	37 34.3	33 51	42.2	38 03.4	31 49	40.4	38 12.8	31 48	39.8
3	36 53.5	35 51	42.5	37 04.0	34 50	41.9	37 34.2	33 49	40.2	37 43.9	32 48	39.6
4	36 23.0	36 51	42.3	36 33.8	36 50	41.7	37 05.0	34 48	39.9	37 15.1	33 48	39.4
85	35 52.6	37 50	42.0	36 03.7	37 50	41.5	36 36.0	35 48	39.7	36 46.5	35 48	39.1
6	35 22.4	38 50	41.8	35 33.8	38 50	41.2	36 07.2	36 48	39.5	36 17.9	36 47	38.9
7	34 52.3	40 50	41.5	35 04.0	39 49	41.0	35 38.4	37 48	39.3	35 49.6	37 47	38.7
8	34 22.3	41 50	41.3	34 34.4	40 49	40.7	35 09.8	39 47	39.0	35 21.3	38 47	38.5
9	33 52.5	42 49	41.0	34 05.0	41 49	40.4	34 41.4	40 47	38.8	34 53.2	39 47	38.2
90	33 22.9	43 49	40.7	33 35.7	42 49	40.2	34 13.1	41 47	38.5	34 25.3	40 46	38.0

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H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	31 46.9	46 51	43.1	31 59.7	46 51	42.5	32 26.9	45 50	41.5	32 40.2	44 49	41.0	32 53.5	44 49	40.4	33 06.6	43 48	39.9	33 45.0	42 47	38.3	33 57.5	42 46	37.7	91
2	31 15.2	47 51	42.8	31 29.2	47 51	42.2	31 57.0	46 50	41.2	32 10.6	45 49	40.7	32 24.2	45 48	40.1	32 37.6	44 48	39.6	33 17.0	43 46	38.0	33 29.9	43 46	37.5	2
3	30 44.5	48 51	42.4	30 58.9	48 50	41.9	31 27.2	47 49	40.9	31 41.2	46 49	40.4	31 55.1	46 48	39.8	32 08.8	46 48	39.3	32 49.2	44 46	37.7	33 02.4	44 46	37.2	3
4	30 14.1	49 50	42.1	30 28.7	49 50	41.6	30 57.7	48 49	40.6	31 12.0	47 48	40.1	31 26.2	47 48	39.6	31 40.2	47 47	39.0	32 21.6	45 46	37.5	32 35.1	45 45	36.9	4
95	29 43.8	50 50	41.8	29 58.7	50 50	41.3	30 28.3	49 49	40.3	30 42.9	49 48	39.8	30 57.4	48 48	39.2	31 11.8	48 47	38.7	31 54.1	46 45	37.2	32 08.0	46 45	36.7	95
6	29 13.7	51 50	41.4	29 29.0	51 49	40.9	29 59.1	50 48	39.9	30 14.1	50 48	39.4	30 28.9	49 47	38.9	30 43.5	49 47	38.4	31 26.9	48 45	36.9	31 41.1	47 45	36.4	6
7	28 43.9	52 49	41.1	28 59.4	52 49	40.6	29 30.2	51 48	39.6	29 45.4	51 47	39.1	30 00.5	50 47	38.6	30 15.5	50 46	38.1	30 59.8	49 45	36.6	31 14.3	48 44	36.1	7
8	28 14.2	53 49	40.7	28 30.0	53 49	40.3	29 01.4	52 48	39.3	29 16.9	52 47	38.8	29 32.3	51 47	38.3	29 47.6	51 46	37.8	30 32.9	50 45	36.3	30 47.7	49 44	35.8	8
9	27 44.7	54 49	40.4	28 00.9	54 48	39.9	28 32.8	53 47	39.0	28 48.6	53 47	38.5	29 04.4	52 46	38.0	29 20.0	52 46	37.5	30 06.1	51 44	36.0	30 21.3	50 44	35.5	9
100	27 15.5	55 48	40.0	27 31.9	55 48	39.6	28 04.4	54 47	38.6	28 20.6	54 46	38.1	28 36.6	53 46	37.7	28 52.5	53 45	37.2	29 39.6	52 44	35.7	29 55.1	51 43	35.2	100
1	26 46.5	56 48	39.7	27 03.2	56 48	39.2	27 36.3	55 47	38.3	27 52.7	55 46	37.8	28 09.0	54 46	37.3	28 25.2	54 45	36.8	29 13.3	53 44	35.4	29 29.1	52 43	34.9	1
2	26 17.7	57 48	39.3	26 34.7	56 47	38.9	27 08.3	56 46	37.9	27 25.1	56 46	37.5	27 41.7	55 45	37.0	27 58.2	55 45	36.5	28 47.1	54 43	35.1	29 03.3	54 43	34.6	2
3	25 49.1	58 47	38.9	26 06.4	57 47	38.5	26 40.6	57 46	37.6	26 57.6	56 45	37.1	27 14.5	56 45	36.6	27 31.3	56 44	36.2	28 21.2	55 43	34.8	28 37.7	55 42	34.3	3
4	25 20.8	59 47	38.6	25 38.3	58 46	38.1	26 13.1	58 45	37.2	26 30.4	57 45	36.8	26 47.6	57 44	36.3	27 04.7	57 44	35.8	27 55.5	56 42	34.4	28 12.2	56 42	34.0	4
105	24 52.6	60 46	38.2	25 10.5	59 46	37.7	25 45.9	59 45	36.9	26 03.4	58 45	36.4	26 20.9	58 44	35.9	26 38.3	58 44	35.5	27 30.0	57 42	34.1	27 47.0	57 42	33.7	105
6	24 24.8	60 46	37.8	24 42.9	60 46	37.4	25 18.8	60 45	36.5	25 36.7	59 44	36.0	25 54.4	59 44	35.6	26 12.1	59 43	35.1	27 04.7	58 42	33.8	27 22.1	58 41	33.3	6
7	23 57.1	61 46	37.4	24 15.5	61 45	37.0	24 52.0	61 44	36.1	25 10.1	60 44	35.7	25 28.2	60 43	35.2	25 46.2	60 43	34.8	26 39.6	59 41	33.4	26 57.3	59 41	33.0	7
8	23 29.7	62 45	37.0	23 48.4	62 45	36.6	24 25.4	62 44	35.7	24 43.9	61 43	35.3	25 02.2	61 43	34.9	25 20.5	61 42	34.4	26 14.8	60 41	33.1	26 32.7	60 41	32.7	8
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110	22 35.7	64 44	36.2	22 54.9	64 44	35.8	23 33.0	63 43	35.0	23 52.0	63 43	34.6	24 10.9	63 42	34.1	24 29.7	63 42	33.7	25 25.8	62 40	32.4	25 44.3	62 40	32.0	110
1	22 09.1	65 44	35.8	22 28.5	65 44	35.4	23 07.2	64 43	34.6	23 26.4	64 42	34.2	23 45.6	64 42	33.7	24 04.7	64 41	33.3	25 01.6	63 40	32.0	25 20.5	63 39	31.6	1
2	21 42.7	66 44	35.4	22 02.4	66 43	35.0	22 41.6	65 42	34.2	23 01.1	65 42	33.8	23 20.6	65 41	33.4	23 40.0	65 41	33.0	24 37.7	64 39	31.7	24 56.9	64 39	31.3	2
3	21 16.6	67 43	35.0	21 36.5	66 43	34.6	22 16.3	66 42	33.8	22 36.1	66 41	33.4	22 55.8	66 41	33.0	23 15.5	65 40	32.6	24 14.1	65 39	31.3	24 33.5	65 39	30.9	3
4	20 50.7	68 43	34.6	21 11.0	67 42	34.2	21 51.2	67 41	33.4	22 11.3	67 41	33.0	22 31.3	67 40	32.6	22 51.2	66 40	32.2	23 50.7	66 39	31.0	24 10.3	65 38	30.5	4
115	20 25.2	68 42	34.2	20 45.6	68 42	33.8	21 26.5	68 41	33.0	21 46.8	68 40	32.6	22 07.0	67 40	32.2	22 27.2	67 40	31.8	23 27.5	67 38	30.6	23 47.4	66 38	30.2	115
6	19 59.9	69 42	33.7	20 20.6	69 41	33.4	21 01.9	69 40	32.6	21 22.5	69 40	32.2	21 43.0	68 40	31.8	22 03.5	68 39	31.4	23 04.6	68 38	30.2	23 24.8	67 37	29.8	6
7	19 34.9	70 41	33.3	19 55.9	70 41	32.9	20 37.7	70 40	32.2	20 58.5	69 40	31.8	21 19.3	69 39	31.4	21 40.0	69 39	31.0	22 41.9	68 37	29.8	23 02.4	68 37	29.4	7
8	19 10.1	71 41	32.9	19 31.4	71 40	32.5	20 13.7	70 39	31.7	20 34.8	70 39	31.4	20 55.9	70 39	31.0	21 16.9	70 38	30.6	22 19.5	69 37	29.4	22 40.3	69 36	29.1	8
9	18 45.7	72 40	32.4	19 07.2	72 40	32.1	19 50.0	71 39	31.3	20 11.4	71 39	31.0	20 32.7	71 38	30.6	20 53.9	71 38	30.2	21 57.4	70 36	29.1	22 18.4	70 36	28.7	9
120	18 21.6	73 40	32.0	18 43.3	72 39	31.6	19 26.6	72 39	30.9	19 48.2	72 38	30.5	20 09.8	72 38	30.2	20 31.3	72 37	29.8	21 35.5	71 36	28.7	21 56.9	71 36	28.3	120
1	17 57.7	73 39	31.6	18 19.7	73 39	31.2	19 03.5	73 38	30.5	19 25.4	73 38	30.1	19 47.2	73 37	29.7	20 08.9	72 37	29.4	21 14.0	72 36	28.3	21 35.5	72 35	27.9	1
2	17 34.2	74 39	31.1	17 56.4	74 38	30.8	18 40.7	74 38	30.0	19 02.8	74 37	29.7	19 24.9	73 37	29.3	19 46.9	73 36	29.0	20 52.6	73 35	27.9	21 14.5	73 35	27.5	2
3	17 10.9	75 38	30.6	17 33.4	75 38	30.3	18 18.2	75 37	29.6	18 40.5	74 37	29.2	19 02.8	74 36	28.9	19 25.1	74 36	28.5	20 31.6	74 35	27.5	20 53.7	74 34	27.1	3
4	16 48.0	76 38	30.2	17 10.7	76 37	29.8	17 56.0	75 37	29.2	18 18.6	75 36	28.8	18 41.1	75 36	28.5	19 03.6	75 35	28.1	20 10.9	75 34	27.1	20 33.2	74 34	26.7	4
125	16 25.4	76 37	29.7	16 48.3	76 37	29.4	17 34.1	76 36	28.7	17 56.9	76 36	28.4	18 19.7	76 35	28.0	18 42.4	76 35	27.7	19 50.4	75 34	26.6	20 13.0	75 33	26.3	125
6	16 03.1	77 37	29.3	16 26.3	77 36	28.9	17 12.5	77 36	28.3	17 35.5	77 35	27.9	17 58.5	77 35	27.6	18 21.5	77 34	27.3	19 30.3	76 33	26.2	19 53.1	76 33	25.9	6
7	15 41.1	78 36	28.8	16 04.5	78 36	28.5	16 51.2	78 35	27.8	17 14.5	78 35	27.5	17 37.7	77 34	27.2	18 00.9	77 34	26.8	19 10.4	77 33	25.8	19 33.5	77 32	25.5	7
8	15 19.5	79 36	28.3	15 43.1	79 35	28.0	16 30.2	78 34	27.4	16 53.7	78 34	27.0	17 17.2	78 34	26.7	17 40.7	78 33	26.4	18 50.8	78 32	25.4	19 14.1	78 32	25.1	8
9	14 58.2	79 35	27.8	15 22.0	79 35	27.5	16 09.6	79 34	26.9	16 33.3	79 34	26.6	16 57.0	79 33	26.3	17 20.7	79 33	25.9	18 31.6	79 32	25.0	18 55.1	78 31	24.6	9
130	14 37.2	80 34	27.4	15 01.2	80 34	27.1	15 49.2	80 33	26.4	16 13.2	80 33	26.1	16 37.1	80 33	25.8	17 01.0	80 32	25.5	18 12.6	79 31	24.5	18 36.4	79 31	24.2	130
1	14 16.5	81 34	26.9	14 40.8	81 34	26.6	15 29.2	81 33	26.0	15 53.4	81 32	25.7	16 17.6	80 32	25.4	16 41.7	80 32	25.0	17 53.9	80 31	24.1	18 18.0	80 30	23.8	1
2	13 56.2	82 33	26.4	14 20.7	82 33	26.1	15 09.6	81 32	25.5	15 34.0	81 32	25.2	15 58.3	81 32	24.9	16 22.7	81 31	24.6	17 35.6	81 30	23.7	17 59.8	81 30	23.4	2
3	13 36.3	82 33	25.9	14 00.9	82 32	25.6	14 50.2	82 32	25.0	15 14.9	82 31	24.7	15 39.4	82 31	24.4	16 04.0	82 31	24.1	17 17.6	82 30	23.2	17 42.0	82 29	22.9	3
4	13 16.6	83 32	25.4	13 41.5	83 32	25.1	14 31.3	83 31	24.6	14 56.1	83 31	24.3	15 20.9	83 30	24.0	15 45.7	83 30	23.7	16 59.9	82 29	22.8	17 24.6	82 29	22.5	4
135	12 57.4	84 32	24.9	13 22.5	84 31	24.6	14 12.6	83 30	24.1	14 37.6	83 30	23.8	15 02.7	83 30	23.5	15 27.6	83 29	23.2	16 42.5	83 28	22.3	17 07.4	83 28	22.1	135
6	12 38.5	84 31	24.4	13 03.8	84 31	24.1	13 54.3	84 30	23.6	14 19.6	84 30	23.3	14 44.8	84 29	23.0	15 10.0	84 29	22.7	16 25.4	84 28	21.9	16 50.5	84 28	21.6	6
7	12 19.9	85 30	23.9	12 45.4	85 30	23.6	13 36.4	85 29	23.1	14 01.8	85 29	22.8	14 27.2	85 29	22.6	14 52.6	85 28	22.3	16 08.7	84 27	21.4	16 34.0	84 27	21.2	7
8	12 01.8	86 30	23.4	12 27.5	86 29	23.1	13 18.8	85 29	22.6	13 44.4	85 28	22.3	14 10.0	85 28	22.1	14 35.6	85 28	21.8	15 52.3	85 27	21.0	16 17.8	85 26	20.7	8
9	11 44.0	86 29	22.9	12 09.8	86 29	22.6	13 01.5	86 28	22.1	13 27.4	86 28	21.9	13 53.2	86 27	21.6	14 19.0	86 27	21.3	15 36.3	86 26	20.5	16 02.0	86 26	20.3	9
140	11 26.5	87 28	22.4	11 52.6	87 28	22.1	12 44.7	87 28	21.6	13 10.7	87 27	21.4	13 36.7	87 27	21.1	14 02.7	87 27	20.9	15 20.5	86 26	20.1	15 46.5	86 25	19.8	140
1	11 09.5	88 28	21.9	11 35.7	87 28	21.6	12 28.2	87 27	21.1	12 54.4	87 27	20.9	13 20.6	87 26	20.6	13 46.7	87 26	20.4	15 05.2	87 25	19.6	15 31.3	87 25	19.4	1
2	10 52.8	88 27	21.4	11 19.2	88 27	21.1	12 12.0	88 26	20.6	12 38.4	88 26	20.4	13 04.8	88 26	20.1	13 31.2	88 25	19.9	14 50.1	88 24	19.1	15 16.4	88 24	18.9	2
3	10 36.5	89 26	20.8	11 03.1	89 26	20.6	11 56.3	89 26	20.1	12 22.8	89 25	19.9	12 49.4	88 25	19.6	13 15.9	88 25	19.4	14 35.5	88 24	18.7	15 02.0	88 24	18.4	3
4	10 20.6	89 26	20.3	10 47.4	89 26	20.1	11 40.9	89 25	19.6	12 07.6	89 25	19.4	12 34.4	89 24	19.1	13 01.1	89 24	18.9	14 21.1	89 23	18.2	14 47.8	89 23	18.0	4
145	10 05.1	90 25	19.8	10 32.0	90 25	19.6	11 25.9	90 24	19.1	11 52.8	90 24	18.9	12 19.7	90 24	18.6	12 46.6	90 24	18.4	14 07.2	89 23	17.7	14 34.0	89 22	17.5	145
6	9 50.0	90 25	19.2	10 17.1	90 24	19.0	11 11.2	90 24	18.6	11 38.3	90 23	18.4	12 05.4	90 23	18.1	12 32.5	90 23	17.9	13 53.6	90 22	17.3	14 20.6	90 22	17.0	6
7	9 35.2	91 24	18.7	10 02.5	91 24	18.5	10 57.0	91 23	18.1	11 24.2	91 23	17.9	11 51.5	91 23	17.6	12 18.7	91 22	17.4	13 40.3	91 21	16.8	14 07.5	91 21	16.6	7
8	9 20.9	91 23	18.2	9 48.3	91 23	18.0	10 43.2	91 22	17.6	11 10.6	91 22	17.3	11 37.9	91 22	17.1	12 05.3	91 22	16.9	13 27.4	91 21	16.3	13 54.8	91 21	16.1	8
9	9 07.0	92 23	17.6	9 34.6	92 22	17.4	10 29.7	92 22	17.0	10 57.2	92 22	16.8	11 24.8	92 21	16.6	11 52.3	92 21	16.4	13 14.9	92 20	15.8	13 42.4	92 20	15.6	9
150	8 53.5	92 22	17.1	9 21.2	92 22	16.9	10 16.6	92 21	16.5	10 44.3	92 21	16.3	11 12.0	92 21	16.1	11 39.7	92 20	15.9	13 02.7	92 20	15.3	13 30.4	92 19	15.1	150
1	8 40.4	93 21	16.5	9 08.2	93 21	16.4	10 04.0	93 20	16.0	10 31.8	93 20	15.8	10 59.7	93 20	15.6	11 27.5	93 20	15.4	12 50.9	93 19	14.8	13 18.7	93 19	14.6	1
2	8 27.7	93 20	16.0	8 55.7	93 20	15.8	9 51.7	93 20	15.5	10 19.7	93 20	15.3	10 47.7	93 19	15.1	11 15.6	93 19	14.9	12 39.5	93 18	14.3	13 07.5	93 18	14.2	2
3	8 15.4	94 20	15.4	8 43.6	94 20	15.3	9 39.8	94 19	14.9	10 08.0	94 19	14.7	10 36.1	94 19	14.6	11 04.2	94 18	14.4	12 28.5	94 18	13.9	12 56.6	94 18	13.7	3
4	8 03.6	94 19	14.9	8 31.8	94 19	14.7	9 28.4	94 18	14.4	9 56.6	94 18	14.2	10 24.9	94 18	14.0	10 53.1	94 18	13.9	12 17.8	94 17	13.4	12 46.1	94 17	13.2	4
155	7 52.1	95 18	14.3	8 20.5	95 18	14.2	9 17.3	95 18	13.9	9 45.7	95 18	13.7	10 14.1	95 17	13.5	10 42.5	95 17	13.4	12 07.6	95 16	12.9	12 35.9	95 16	12.7	155
6	7 41.1	95 18	13.8	8 09.7	95 17	13.6	9 06.7	95 17	13.3	9 35.2	95 17	13.2	10 03.7	95 17	13.0	10 32.2	95 16	12.8	11 57.7	95 16	12.4	12 26.2	95 16	12.2	6
7	7 30.6	96 17	13.2	7 59.2	95 17	13.1	8 56.5	95 16	12.8	9 25.1	95 16	12.6	9 53.7	95 16	12.5	10 22.3	95 16	12.3	11 48.2	95 15	11.9	12 16.8	95 15	11.7	7
8	7 20.4	96 16	12.7	7 49.2	96 16	12.5	8 46.7	96 16	12.2	9 15.4	96 15	12.1	9 44.1	96 15	11.9	10 12.9	96 15	11.8	11 39.1	96 15	11.4	12 07.8	96 14	11.2	8
9	7 10.7	96 15	12.1	7 39.6	96 15	12.0	8 37.3	96 15	11.7	9 06.1	96 15	11.6	9 35.0	96 15	11.4	10 03.8	96 14	11.3	11 30.3	96 14	10.9	11 59.2	96 14	10.7	9
160	7 01.4	97 15	11.5	7 30.4	97 15	11.4	8 28.3	97 14	11.1	8 57.3	97 14	11.0	9 26.2	97 14	10.9	9 55.2	97 14	10.8	11 22.0	96 13	10.4	11 51.0	96 13	10.2	160
1	6 52.6	97 14	11.0	7 21.6	97 14	10.9	8 19.8	97 14	10.6	8 48.8	97 13	10.5	9 17.9	97 13	10.4	9 46.9	97 13	10.2	11 14.1	97 13	09.8	11 43.1	97 12	09.7	1
2	6 44.2	97 13	10.4	7 13.3	97 13	10.3	8 11.6	97 13	10.1	8 40.8	97 13	09.9	9 09.9	97 13	09.8	9 39.1	97 12	09.7	11 06.5	97 12	09.3	11 35.7	97 12	09.2	2
3	6 36.2	98 13	09.8	7 05.5	97 12	09.7	8 03.9	97 12	09.5	8 33.2	97 12	09.4	9 02.4	97 12	09.3	9 31.7	97 12	09.2	10 59.4	97 11	08.8	11 28.6	97 11	08.7	3
4	6 28.7	98 12	09.3	6 58.0	98 12	09.2	7 56.7	98 11	09.0	8 26.0	98 11	08.8	8 55.3	98 11	08.7	9 24.7	98 11	08.6	10 52.6	98 11	08.3	11 22.0	98 10	08.2	4
165	6 21.6	98 11	08.7	6 51.0	98 11	08.6	7 49.9	98 11	08.4	8 19.3	98 11	08.3	8 48.7	98 10	08.2	9 18.1	98 10	08.1	10 46.3	98 10	07.8	11 15.7	98 10	07.7	165
6	6 15.0	98 10	08.1	6 44.5	98 10	08.0	7 43.5	98 10	07.8	8 12.9	98 10	07.8	8 42.4	98 10	07.7	9 11.9	98 10	07.6	10 40.3	98 09	07.3	11 09.8	98 09	07.2	6
7	6 08.8	99 10	07.5	6 38.4	99 09	07.5	7 37.5	99 09	07.3	8 07.0	99 09	07.2	8 36.6	99 09	07.1	9 06.2	99 09	07.0	10 34.8	98 09	06.8	11 04.4	98 08	06.7	7
8	6 03.1	99 09	07.0	6 32.7	99 09	06.9	7 32.0	99 08	06.7	8 01.6	99 08	06.7	8 31.2	99 08	06.6	9 00.8	99 08	06.5	10 29.7	99 08	06.3	10 59.3	99 08	06.2	8
9	5 57.8	99 08	06.4	6 27.5	99 08	06.3	7 26.9	99 08	06.2	7 56.6	99 08	06.1	8 26.2	99 08	06.0	8 55.9	99 08	06.0	10 24.9	99 07	05.7	10 54.6	99 07	05.7	9
170	5 53.0	99 07	05.8	6 22.7	99 07	05.8	7 22.2	99 07	05.6	7 52.0	99 07	05.6	8 21.7	99 07	05.5	8 51.4	99 07	05.4	10 20.6	99 07	05.2	10 50.4	99 06	05.1	170
1	5 48.6	99 06	05.2	6 18.4	99 06	05.2	7 18.0	99 06	05.1	7 47.8	99 06	05.0	8 17.6	99 06	04.9	8 47.4	99 06	04.9	10 16.7	99 06	04.7	10 46.5	99 06	04.6	1
2	5 44.7	99 06	04.7	6 14.6	99 06	04.6	7 14.2	99 06	04.5	7 44.1	99 06	04.4	8 13.9	99 05	04.4	8 43.7	99 05	04.3	10 13.2	99 05	04.2	10 43.0	99 05	04.1	2
3	5 41.3	1.0 05	04.1	6 11.2	1.0 05	04.0	7 10.9	1.0 05	03.9	7 40.8	1.0 05	03.9	8 10.6	1.0 05	03.8	8 40.5	1.0 05	03.8	10 10.1	1.0 04	03.7	10 40.0	1.0 04	03.6	3
4	5 38.3	1.0 04	03.5	6 08.2	1.0 04	03.5	7 08.0	1.0 04	03.4	7 37.9	1.0 04	03.3	8 07.8	1.0 04	03.3	8 37.7	1.0 04	03.3	10 07.4	1.0 04	03.1	10 37.3	1.0 04	03.1	4
175	5 35.8	1.0 03	02.9	6 05.7	1.0 03	02.9	7 05.6	1.0 03	02.8	7 35.5	1.0 03	02.8	8 05.4	1.0 03	02.7	8 35.4	1.0 03	02.7	10 05.2	1.0 03	02.6	10 35.1	1.0 03	02.6	175
6	5 33.7	1.0 03	02.3	6 03.6	1.0 03	02.3	7 03.6	1.0 03	02.3	7 33.5	1.0 03	02.2	8 03.5	1.0 03	02.2	8 33.4	1.0 02	02.2	10 03.3	1.0 02	02.1	10 33.3	1.0 02	02.1	6
7	5 32.1	1.0 02	01.7	6 02.1	1.0 02	01.7	7 02.0	1.0 02	01.7	7 32.0	1.0 02	01.7	8 02.0	1.0 02	01.6	8 31.9	1.0 02	01.6	10 01.9	1.0 02	01.6	10 31.8	1.0 02	01.6	7
8	5 30.9	1.0 01	01.2	6 00.9	1.0 01	01.2	7 00.9	1.0 01	01.1	7 30.9	1.0 01	01.1	8 00.9	1.0 01	01.1	8 30.9	1.0 01	01.1	10 00.8	1.0 01	01.0	10 30.8	1.0 01	01.0	8
9	5 30.2	1.0 00	00.6	6 00.2	1.0 00	00.6	7 00.2	1.0 00	00.6	7 30.2	1.0 00	00.6	8 00.2	1.0 00	00.6	8 30.2	1.0 00	00.5	10 00.2	1.0 00	00.5	10 30.2	1.0 00	00.5	9
180	5 30.0	1.0 00	00.0	6 00.0	1.0 00	00.0	7 00.0	1.0 00	00.0	7 30.0	1.0 00	00.0	8 00.0	1.0 00	00.0	8 30.0	1.0 00	00.0	10 00.0	1.0 00	00.0	10 30.0	1.0 00	00.0	180

Lat. 41°

Lat. 42°

Lat. 43°

Lat. 44°

Lat. 45°

Lat. 46°

Lat. 47°

Lat. 48°

Lat. 41°

H.A.	60° 00′ Alt.	Az.	60° 30′ Alt.	Az.	62° 00′ Alt.	Az.	62° 30′ Alt.	Az.	63° 00′ Alt.	Az.	69° 00′ Alt.	Az.	69° 30′ Alt.	Az.	74° 30′ Alt.	Az.	H.A.
°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	°
00	71 00.0 1.0 01	00.0	70 30.0 1.0 01	00.0	69 00.0 1.0 01	00.0	68 30.0 1.0 01	00.0	68 00.0 1.0 01	00.0	62 00.0 1.0 00	00.0	61 30.0 1.0 00	00.0	56 30.0 1.0 00	00.0	00
1	70 59.4 1.0 03	01.5	70 29.4 1.0 03	01.5	68 59.5 1.0 03	01.3	68 29.5 1.0 02	01.3	67 59.5 1.0 02	01.2	61 59.7 1.0 02	00.8	61 29.7 1.0 01	00.7	56 29.8 1.0 01	00.5	1
2	70 57.6 1.0 05	03.1	70 27.7 1.0 05	02.9	68 57.9 1.0 04	02.6	68 28.0 1.0 04	02.5	67 58.1 1.0 04	02.4	61 58.8 1.0 03	01.5	61 28.8 1.0 02	01.5	56 29.2 1.0 02	01.0	2
3	70 54.6 99 07	04.6	70 24.8 99 07	04.4	68 55.4 99 06	03.9	68 25.5 99 06	03.8	67 55.7 99 06	03.6	61 57.3 1.0 04	02.3	61 27.4 1.0 03	02.2	56 28.3 1.0 02	01.5	3
4	70 50.3 99 09	06.1	70 20.7 99 09	05.9	68 51.7 99 08	05.2	68 22.1 99 07	05.0	67 52.4 99 07	04.8	61 55.2 99 04	03.0	61 25.4 99 04	02.9	56 26.9 1.0 03	01.9	4
05	70 44.9 98 11	07.6	70 15.5 98 10	07.3	68 47.1 98 09	06.5	68 17.6 98 09	06.2	67 48.1 98 09	06.0	61 52.5 99 05	03.8	61 22.8 99 05	03.7	56 25.2 99 04	02.4	05
6	70 38.4 97 13	09.1	70 09.2 97 12	08.7	68 41.5 98 11	07.8	68 12.2 98 11	07.5	67 42.9 98 10	07.2	61 49.2 99 06	04.5	61 19.6 99 06	04.4	56 23.1 99 04	02.9	6
7	70 30.7 96 15	10.5	70 01.8 96 14	10.1	68 34.9 97 13	09.0	68 05.8 97 12	08.7	67 36.8 97 12	08.4	61 45.3 98 07	05.3	61 15.9 98 07	05.1	56 20.7 99 05	03.4	7
8	70 21.8 95 17	12.0	69 53.3 95 16	11.5	68 27.3 96 14	10.2	67 58.6 96 14	09.9	67 29.7 96 13	09.5	61 40.8 98 08	06.0	61 11.6 98 08	05.8	56 17.8 98 05	03.8	8
9	70 11.9 94 18	13.3	69 43.8 94 18	12.8	68 18.8 95 16	11.5	67 50.3 95 15	11.0	67 21.8 95 15	10.6	61 35.8 97 09	06.8	61 06.7 97 09	06.5	56 14.6 98 06	04.3	9
10	70 00.9 92 20	14.7	69 33.2 93 19	14.2	68 09.3 94 17	12.7	67 41.2 94 17	12.2	67 13.0 94 16	11.7	61 30.2 96 10	07.5	61 01.3 96 10	07.2	56 11.0 97 07	04.8	10
1	69 48.9 91 22	16.1	69 21.6 91 21	15.5	67 59.0 92 19	13.8	67 31.2 93 18	13.3	67 03.4 93 17	12.8	61 24.0 96 11	08.2	60 55.3 96 11	07.9	56 07.0 97 07	05.2	1
2	69 35.9 89 23	17.3	69 09.0 90 22	16.7	67 47.7 91 20	15.0	67 20.4 91 19	14.4	66 52.9 92 19	13.9	61 17.2 95 12	08.9	60 48.8 96 12	08.6	56 02.7 96 08	05.7	2
3	69 21.9 88 25	18.6	68 55.6 88 24	17.9	67 35.6 90 22	16.1	67 08.7 90 21	15.5	66 41.6 90 20	15.0	61 09.9 94 13	09.6	60 41.8 94 13	09.3	55 58.0 96 08	06.2	3
4	69 07.0 86 26	19.8	68 41.2 86 25	19.1	67 22.6 88 23	17.2	66 56.1 88 22	16.6	66 29.5 89 21	16.0	61 02.1 93 14	10.3	60 34.3 93 13	09.9	55 53.0 95 09	06.6	4
15	68 51.2 84 28	21.0	68 25.9 85 27	20.3	67 08.8 86 24	18.2	66 42.8 87 23	17.6	66 16.7 87 23	17.0	60 53.7 92 15	11.0	60 26.2 92 14	10.6	55 47.6 94 10	07.1	15
6	68 34.5 82 29	22.2	68 09.8 83 28	21.4	66 54.3 85 26	19.3	66 28.8 85 25	18.6	66 03.1 86 24	18.0	60 44.8 90 16	11.7	60 17.6 91 15	11.2	55 41.8 93 10	07.5	6
7	68 17.0 80 30	23.3	67 52.9 81 30	22.5	66 39.0 83 27	20.3	66 14.0 84 26	19.6	65 48.8 84 25	18.9	60 35.4 89 17	12.3	60 08.6 90 16	11.9	55 35.8 92 11	07.9	7
8	67 58.8 78 32	24.3	67 35.2 79 31	23.5	66 22.9 81 28	21.2	65 58.4 82 27	20.5	65 33.8 83 26	19.8	60 25.5 88 17	13.0	59 59.0 88 17	12.5	55 29.3 91 11	08.4	8
9	67 39.7 76 33	25.4	67 16.7 77 32	24.5	66 06.2 80 29	22.2	65 42.2 80 28	21.4	65 18.1 81 27	20.7	60 15.1 87 18	13.6	59 49.0 87 18	13.1	55 22.6 90 12	08.8	9
20	67 20.0 74 34	26.3	66 57.6 75 33	25.5	65 48.8 78 30	23.1	65 25.4 78 29	22.3	65 01.7 79 28	21.6	60 04.2 86 19	14.2	59 38.5 86 18	13.7	55 15.5 89 12	09.2	20
1	66 59.6 72 35	27.3	66 37.8 73 34	26.4	65 30.7 76 31	23.9	65 07.9 77 30	23.2	64 44.8 77 29	22.4	59 52.8 84 20	14.8	59 27.5 85 19	14.3	55 08.0 88 13	09.6	1
2	66 38.5 70 36	28.2	66 17.3 71 35	27.3	65 12.0 74 32	24.8	64 49.7 75 31	24.0	64 27.2 76 30	23.2	59 41.0 83 20	15.4	59 16.1 83 20	14.9	55 00.3 87 13	10.1	2
3	66 16.8 68 37	29.1	65 56.2 69 36	28.2	64 52.7 72 33	25.6	64 31.0 73 32	24.8	64 09.1 74 31	24.0	59 28.8 81 21	16.0	59 04.3 82 20	15.4	54 52.2 86 14	10.5	3
4	65 54.5 66 38	29.9	65 34.6 67 37	29.0	64 32.9 70 34	26.4	64 11.8 71 33	25.6	63 50.4 72 32	24.8	59 16.1 80 22	16.6	58 52.0 80 21	16.0	54 43.9 85 14	10.8	4
25	65 31.7 64 39	30.7	65 12.4 65 38	29.8	64 12.5 68 35	27.1	63 52.0 69 34	26.3	63 31.1 70 33	25.5	59 02.9 78 23	17.1	58 39.3 79 22	16.5	54 35.2 83 15	11.2	25
6	65 08.3 62 40	31.4	64 49.6 63 39	30.5	63 51.6 66 36	27.8	63 31.7 67 35	27.0	63 11.4 69 34	26.2	58 49.4 77 23	17.7	58 26.2 77 22	17.1	54 26.2 82 15	11.6	6
7	64 44.5 60 41	32.1	64 26.4 61 40	31.2	63 30.2 64 36	28.5	63 10.8 65 35	27.7	62 51.2 66 34	26.9	58 35.5 75 24	18.2	58 12.8 76 23	17.6	54 16.9 81 16	12.0	7
8	64 20.2 58 41	32.8	64 02.7 59 40	31.9	63 08.4 62 37	29.2	62 49.6 63 36	28.3	62 30.5 64 35	27.5	58 21.1 74 25	18.7	57 58.9 74 24	18.1	54 07.4 80 16	12.4	8
9	63 55.4 55 42	33.5	63 38.6 57 41	32.5	62 46.0 60 38	29.8	62 27.9 61 37	29.0	62 09.4 62 36	28.1	58 06.4 72 25	19.2	57 44.7 73 24	18.5	53 57.6 78 17	12.7	9
30	63 30.2 53 43	34.1	63 14.0 55 42	33.1	62 23.3 58 39	30.4	62 05.7 59 38	29.6	61 47.8 60 37	28.7	57 51.4 71 26	19.7	57 30.1 71 25	19.0	53 47.4 77 17	13.1	30
1	63 04.7 51 43	34.7	62 49.1 53 42	33.7	62 00.2 56 39	31.0	61 43.2 57 38	30.1	61 25.9 58 37	29.3	57 35.9 69 26	20.1	57 15.2 70 25	19.5	53 37.1 76 18	13.4	1
2	62 38.7 49 44	35.2	62 23.8 51 43	34.3	61 36.7 54 40	31.6	61 20.3 55 39	30.7	61 03.6 56 38	29.8	57 20.2 67 27	20.6	56 59.9 68 26	19.9	53 26.4 74 18	13.8	2
3	62 12.4 47 44	35.7	61 58.1 48 43	34.8	61 12.8 52 40	32.1	60 57.0 53 39	31.2	60 40.9 54 38	30.3	57 04.1 65 27	21.0	56 44.3 66 26	20.4	53 15.5 73 19	14.1	3
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35	61 18.9 43 45	36.7	61 05.8 44 44	35.8	60 24.1 48 41	33.0	60 09.4 49 40	32.2	59 54.5 50 39	31.3	56 30.9 62 28	21.9	56 12.2 63 27	21.2	52 53.0 70 19	14.7	35
6	60 51.7 41 46	37.1	60 39.2 43 45	36.2	59 59.2 46 42	33.5	59 45.2 47 41	32.6	59 30.8 49 40	31.7	56 13.9 60 29	22.3	55 55.7 61 28	21.6	52 41.4 68 20	15.0	6
7	60 24.3 39 46	37.5	60 12.3 41 45	36.6	59 34.1 44 42	33.9	59 20.6 45 41	33.0	59 06.8 47 40	32.2	55 56.6 58 29	22.7	55 38.9 59 28	21.9	52 29.5 67 20	15.3	7
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9	59 28.6 35 47	38.3	59 17.8 37 46	37.4	58 43.1 40 43	34.7	58 30.8 42 42	33.8	58 18.1 43 41	32.9	55 21.2 55 30	23.4	55 04.6 56 29	22.6	52 05.2 63 21	15.9	9
40	59 00.4 34 47	38.6	58 50.2 35 46	37.7	58 17.2 39 44	35.0	58 05.4 40 43	34.2	57 53.4 41 42	33.3	55 03.1 53 31	23.7	54 47.0 54 30	23.0	51 52.7 62 21	16.2	40
1	58 32.1 32 48	38.9	58 22.4 33 47	38.0	57 51.1 37 44	35.4	57 39.9 38 43	34.5	57 28.4 39 42	33.6	54 44.8 51 31	24.0	54 29.2 52 30	23.3	51 40.0 60 21	16.4	1
2	58 03.5 30 48	39.2	57 54.4 31 47	38.3	57 24.8 35 44	35.7	57 14.2 36 43	34.8	57 03.2 37 42	34.0	54 26.2 50 31	24.3	54 11.2 51 30	23.6	51 27.1 59 22	16.7	2
3	57 34.8 28 48	39.5	57 26.2 29 47	38.6	56 58.3 33 44	36.0	56 48.2 34 44	35.1	56 37.8 35 43	34.3	54 07.4 48 32	24.6	53 53.0 49 31	23.9	51 14.0 57 22	16.9	3
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45	56 36.9 24 49	40.0	56 29.4 26 48	39.1	56 04.7 29 45	36.5	55 55.8 30 44	35.7	55 46.5 32 43	34.8	53 29.3 44 32	25.2	53 15.9 45 31	24.5	50 47.3 54 23	17.4	45
6	56 07.8 23 49	40.2	56 00.8 24 48	39.3	55 37.7 27 45	36.7	55 29.3 29 44	35.9	55 20.5 30 43	35.0	53 09.9 42 33	25.5	52 57.0 43 32	24.7	50 33.7 52 23	17.6	6
7	55 38.5 21 49	40.4	55 32.0 22 48	39.5	55 10.5 26 46	37.0	55 02.7 27 45	36.1	54 54.5 28 44	35.3	52 50.3 41 33	25.7	52 38.0 42 32	25.0	50 19.9 50 23	17.8	7
8	55 09.1 19 49	40.6	55 03.2 20 48	39.7	54 43.3 24 46	37.2	54 35.9 25 45	36.3	54 28.2 26 44	35.5	52 30.6 39 33	25.9	52 18.8 40 32	25.2	50 05.9 49 23	18.0	8
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1	53 40.3 14 50	41.0	53 35.9 15 49	40.2	53 20.7 19 46	37.7	53 14.9 20 45	36.9	53 08.8 21 44	36.0	51 30.5 33 34	26.6	51 20.3 34 33	25.8	49 23.2 43 24	18.6	1
2	53 10.6 12 50	41.1	53 06.7 14 49	40.3	52 53.0 17 46	37.8	52 47.7 18 45	37.0	52 42.1 19 45	36.2	51 10.1 32 34	26.8	51 00.5 33 33	26.0	49 08.7 42 24	18.8	2
3	52 40.8 11 50	41.2	52 37.4 12 49	40.4	52 25.2 15 46	37.9	52 20.4 16 46	37.1	52 15.4 17 45	36.3	50 49.7 30 34	26.9	50 40.6 31 33	26.2	48 54.1 40 25	18.9	3
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6	51 11.1 06 50	41.4	51 09.2 07 49	40.6	51 01.4 10 47	38.2	50 58.1 11 46	37.4	50 54.6 12 45	36.6	49 47.6 25 35	27.4	49 40.1 26 34	26.7	48 09.4 35 25	19.4	6
7	50 41.2 04 50	41.4	50 39.7 05 49	40.7	50 33.3 09 47	38.3	50 30.6 10 46	37.5	50 27.5 11 45	36.7	49 26.7 23 35	27.5	49 19.7 24 34	26.8	47 54.4 33 25	19.5	7
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60	49 11.2 00 50	41.5	49 11.1 01 49	40.7	49 09.0 04 47	38.4	49 07.7 05 46	37.7	49 06.1 06 45	36.9	48 23.6 18 35	27.9	48 18.1 19 34	27.1	47 08.5 28 26	19.9	60
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2	48 11.2 03 50	41.5	48 12.0 02 49	40.7	48 12.7 01 47	38.5	48 12.3 02 46	37.7	48 11.7 03 45	37.0	47 41.1 14 36	28.0	47 36.7 15 35	27.3	46 37.6 24 26	20.1	2
3	47 41.2 05 50	41.4	47 42.5 04 49	40.7	47 44.5 01 47	38.5	47 44.6 00 46	37.7	47 44.4 01 45	37.0	47 19.8 13 36	28.1	47 15.9 13 35	27.4	46 22.0 22 26	20.2	3
4	47 11.3 06 50	41.4	47 13.0 05 49	40.7	47 16.3 02 47	38.5	47 16.9 01 46	37.7	47 17.2 00 45	37.0	46 58.5 11 36	28.2	46 55.1 12 35	27.4	46 06.3 21 26	20.3	4
65	46 41.3 08 50	41.3	46 43.5 07 49	40.6	46 48.2 04 47	38.4	46 49.2 03 46	37.7	46 49.9 02 45	37.0	46 37.1 09 36	28.2	46 34.2 10 35	27.5	45 50.6 19 26	20.3	65
6	46 11.4 09 50	41.3	46 14.0 08 49	40.6	46 20.0 05 47	38.4	46 21.5 04 46	37.7	46 22.7 04 45	37.0	46 15.6 07 36	28.3	46 13.3 08 35	27.5	45 34.8 17 26	20.4	6
7	45 41.6 10 50	41.2	45 44.6 10 49	40.5	45 51.9 07 47	38.4	45 53.8 06 46	37.6	45 55.5 05 45	36.9	45 54.2 06 36	28.3	45 52.3 07 35	27.6	45 19.0 15 26	20.5	7
8	45 11.8 12 50	41.1	45 15.2 11 49	40.4	45 23.8 08 47	38.3	45 26.2 07 46	37.6	45 28.3 07 45	36.9	45 32.7 04 36	28.3	45 31.3 05 35	27.6	45 03.1 14 26	20.5	8
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1	43 42.6 16 49	40.8	43 47.3 15 49	40.2	43 59.8 13 47	38.1	44 03.5 12 46	37.4	44 06.9 11 45	36.7	44 28.2 01 36	28.3	44 28.3 00 35	27.6	44 15.3 09 27	20.7	1
2	43 13.1 17 49	40.7	43 18.1 17 48	40.1	43 31.9 14 46	38.0	43 36.0 13 46	37.3	43 39.9 12 45	36.6	44 06.7 02 36	28.3	44 07.3 02 35	27.6	43 59.4 07 27	20.7	2
3	42 43.6 19 49	40.6	42 49.0 18 48	39.9	43 04.0 16 46	37.9	43 08.6 15 46	37.2	43 12.9 14 45	36.6	43 45.2 04 36	28.3	43 46.3 03 35	27.6	43 43.3 05 27	20.7	3
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6	41 15.5 23 49	40.2	41 22.2 22 48	39.5	41 40.9 20 46	37.6	41 46.6 19 45	36.9	41 52.2 18 45	36.3	42 40.9 09 36	28.2	42 43.4 08 35	27.6	42 55.3 00 27	20.7	6
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80	39 19.4 28 48	39.5	39 27.6 27 47	38.9	39 51.1 25 45	37.0	39 58.5 24 45	36.4	40 05.7 24 44	35.8	41 15.5 15 35	28.0	41 19.9 14 35	27.3	41 51.2 07 27	20.7	80
1	38 50.6 29 48	39.4	38 59.2 28 47	38.7	39 23.8 26 45	36.9	39 31.6 26 45	36.2	39 39.3 25 44	35.6	40 54.2 17 35	27.9	40 59.1 16 35	27.3	41 35.2 08 27	20.7	1
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9	35 04.9 39 46	37.7	35 16.5 38 45	37.1	35 50.1 37 44	35.4	36 01.0 36 43	34.8	36 11.7 35 42	34.2	38 06.7 28 34	27.1	38 15.1 28 34	26.5	39 28.4 21 26	20.3	9
90	34 37.3 40 46	37.4	34 49.2 39 45	36.9	35 23.9 38 43	35.2	35 35.2 37 43	34.6	35 46.3 37 42	34.0	37 46.2 30 34	27.0	37 55.0 29 33	26.4	39 12.8 23 26	20.2	90

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H.A.	60° 00′ Alt.		Az.	60° 30′ Alt.		Az.	62° 00′ Alt.		Az.	62° 30′ Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
91	34 09.9	41 45	37.2	34 22.1	41 45	36.6	34 57.9	39 43	34.9	35 09.5	38 42	34.4
2	33 42.6	42 45	36.9	33 55.2	42 45	36.4	34 32.1	40 43	34.7	34 44.0	40 42	34.2
3	33 15.5	43 45	36.7	33 28.4	43 44	36.1	34 06.3	41 43	34.5	34 18.7	41 42	33.9
4	32 48.5	44 45	36.4	33 01.8	44 44	35.9	33 40.8	43 42	34.2	33 53.5	42 42	33.7
95	32 21.8	46 44	36.1	32 35.4	45 44	35.6	33 15.4	44 42	34.0	33 28.4	43 41	33.5
6	31 55.1	47 44	35.9	32 09.1	46 44	35.3	32 50.1	45 42	33.8	33 03.5	44 41	33.2
7	31 28.7	48 44	35.6	31 43.0	47 43	35.1	32 25.1	46 42	33.5	32 38.8	46 41	33.0
8	31 02.4	49 43	35.3	31 17.0	49 43	34.8	32 00.1	47 41	33.2	32 14.3	47 41	32.7
9	30 36.4	50 43	35.0	30 51.3	50 43	34.5	31 35.4	48 41	33.0	31 49.9	48 40	32.5
100	30 10.5	51 43	34.7	30 25.7	51 42	34.2	31 10.8	50 41	32.7	31 25.6	49 40	32.2
1	29 44.8	52 42	34.4	30 00.4	52 42	33.9	30 46.5	51 40	32.4	31 01.6	50 40	31.9
2	29 19.3	53 42	34.1	29 35.2	53 42	33.6	30 22.3	52 40	32.2	30 37.7	51 39	31.7
3	28 54.0	54 42	33.8	29 10.2	54 41	33.3	29 58.3	53 40	31.9	30 14.1	52 39	31.4
4	28 28.9	55 41	33.5	28 45.4	55 41	33.0	29 34.4	54 39	31.6	29 50.6	54 39	31.1
105	28 04.0	56 41	33.2	28 20.9	56 41	32.7	29 10.8	55 39	31.3	29 27.3	55 38	30.8
6	27 39.3	57 41	32.9	27 56.5	57 40	32.4	28 47.4	56 39	31.0	29 04.2	56 38	30.5
7	27 14.9	58 40	32.5	27 32.3	58 40	32.1	28 24.2	57 38	30.7	28 41.3	57 38	30.2
8	26 50.6	59 40	32.2	27 08.4	59 40	31.8	28 01.2	58 38	30.4	28 18.6	58 37	29.9
9	26 26.6	60 40	31.9	26 44.7	60 39	31.4	27 38.4	59 38	30.1	27 56.1	59 37	29.6
110	26 02.8	61 39	31.5	26 21.2	61 39	31.1	27 15.8	60 37	29.8	27 33.9	60 37	29.3
1	25 39.2	62 39	31.2	25 57.9	62 38	30.8	26 53.4	61 37	29.4	27 11.8	61 36	29.0
2	25 15.9	63 38	30.8	25 34.9	63 38	30.4	26 31.3	62 37	29.1	26 50.0	62 36	28.7
3	24 52.8	64 38	30.5	25 12.1	64 38	30.1	26 09.4	63 36	28.8	26 28.3	63 36	28.3
4	24 29.9	65 38	30.1	24 49.5	65 37	29.7	25 47.7	64 36	28.4	26 07.0	64 35	28.0
115	24 07.3	66 37	29.8	24 27.2	66 37	29.4	25 26.2	65 35	28.1	25 45.8	65 35	27.7
6	23 45.0	67 37	29.4	24 05.1	67 36	29.0	25 05.0	66 35	27.8	25 24.9	66 34	27.4
7	23 22.9	68 36	29.0	23 43.3	68 36	28.6	24 44.1	67 35	27.4	25 04.2	67 34	27.0
8	23 01.0	69 36	28.7	23 21.7	69 36	28.3	24 23.3	68 34	27.1	24 43.7	68 34	26.7
9	22 39.4	70 36	28.3	23 00.4	70 35	27.9	24 02.8	69 34	26.7	24 23.5	69 33	26.3
120	22 18.1	71 35	27.9	22 39.3	71 35	27.5	23 42.6	70 33	26.4	24 03.6	70 33	26.0
1	21 57.1	72 35	27.5	22 18.5	71 34	27.1	23 22.6	71 33	26.0	23 43.9	71 32	25.6
2	21 36.3	73 34	27.1	21 58.0	72 34	26.8	23 02.9	72 32	25.6	23 24.4	72 32	25.3
3	21 15.8	73 34	26.7	21 37.7	73 33	26.4	22 43.4	73 32	25.3	23 05.2	73 32	24.9
4	20 55.5	74 33	26.3	21 17.8	74 33	26.0	22 24.2	74 32	24.9	22 46.3	73 31	24.5
125	20 35.6	75 33	25.9	20 58.1	75 32	25.6	22 05.3	74 31	24.5	22 27.6	74 31	24.2
6	20 15.9	76 32	25.5	20 38.6	76 32	25.2	21 46.7	75 31	24.1	22 09.2	75 30	23.8
7	19 56.5	77 32	25.1	20 19.5	77 31	24.8	21 28.3	76 30	23.8	21 51.1	76 30	23.4
8	19 37.4	78 31	24.7	20 00.7	77 31	24.4	21 10.2	77 30	23.4	21 33.3	77 29	23.0
9	19 18.6	78 31	24.3	19 42.1	78 30	24.0	20 52.3	78 29	23.0	21 15.7	78 29	22.6
130	19 00.1	79 30	23.9	19 23.9	79 30	23.6	20 34.8	79 29	22.6	20 58.4	79 28	22.3
1	18 41.9	80 30	23.5	19 05.9	80 29	23.2	20 17.6	79 28	22.2	20 41.4	79 28	21.9
2	18 24.1	81 29	23.1	18 48.2	81 29	22.7	20 00.6	80 28	21.8	20 24.6	80 27	21.5
3	18 06.5	81 29	22.6	18 30.9	81 28	22.3	19 43.9	81 27	21.4	20 08.2	81 27	21.1
4	17 49.2	82 28	22.2	18 13.8	82 28	21.9	19 27.6	82 27	21.0	19 52.1	82 26	20.7
135	17 32.3	83 28	21.8	17 57.1	83 27	21.5	19 11.5	83 26	20.6	19 36.2	82 26	20.3
6	17 15.6	84 27	21.3	17 40.7	84 27	21.0	18 55.7	83 26	20.2	19 20.7	83 25	19.9
7	16 59.3	84 27	20.9	17 24.6	84 26	20.6	18 40.3	84 25	19.8	19 05.4	84 25	19.5
8	16 43.3	85 26	20.4	17 08.8	85 26	20.2	18 25.1	85 25	19.3	18 50.5	85 24	19.1
9	16 27.7	86 26	20.0	16 53.4	86 26	19.7	18 10.3	85 24	18.9	18 35.9	85 24	18.6
140	16 12.4	86 25	19.6	16 38.2	86 25	19.3	17 55.8	86 24	18.5	18 21.6	86 23	18.2
1	15 57.4	87 24	19.1	16 23.5	87 24	18.8	17 41.6	87 23	18.1	18 07.6	87 23	17.8
2	15 42.7	88 24	18.6	16 09.0	88 24	18.4	17 27.7	87 23	17.6	17 53.9	87 22	17.4
3	15 28.4	88 23	18.2	15 54.9	88 23	17.9	17 14.1	88 22	17.2	17 40.5	88 22	17.0
4	15 14.5	89 23	17.7	15 41.1	89 22	17.5	17 00.9	89 22	16.8	17 27.5	89 21	16.5
145	15 00.8	89 22	17.3	15 27.6	89 22	17.0	16 48.0	89 21	16.3	17 14.7	89 21	16.1
6	14 47.6	90 22	16.8	15 14.5	90 21	16.6	16 35.4	90 20	15.9	17 02.3	90 20	15.7
7	14 34.6	91 21	16.3	15 01.8	90 21	16.1	16 23.2	90 20	15.5	16 50.3	90 20	15.2
8	14 22.1	91 20	15.9	14 49.4	91 20	15.7	16 11.3	91 19	15.0	16 38.5	91 19	14.8
9	14 09.9	92 20	15.4	14 37.4	92 19	15.2	15 59.7	91 19	14.6	16 27.2	91 18	14.4
150	13 58.0	92 19	14.9	14 25.7	92 19	14.7	15 48.5	92 18	14.1	16 16.1	92 18	13.9
1	13 46.5	93 19	14.5	14 14.3	93 18	14.3	15 37.6	92 18	13.7	16 05.4	92 17	13.5
2	13 35.4	93 18	14.0	14 03.4	93 18	13.8	15 27.1	93 17	13.2	15 55.0	93 17	13.0
3	13 24.7	94 17	13.5	13 52.7	94 17	13.3	15 16.9	93 16	12.8	15 45.0	93 16	12.6
4	13 14.3	94 17	13.0	13 42.5	94 16	12.8	15 07.1	94 16	12.3	15 35.3	94 16	12.1
155	13 04.3	94 16	12.5	13 32.6	94 16	12.4	14 57.6	94 15	11.9	15 25.9	94 15	11.7
6	12 54.6	95 15	12.0	13 23.1	95 15	11.9	14 48.5	95 15	11.4	15 16.9	95 14	11.2
7	12 45.4	95 15	11.6	13 14.0	95 15	11.4	14 39.7	95 14	10.9	15 08.3	95 14	10.8
8	12 36.5	96 14	11.1	13 05.2	96 14	10.9	14 31.3	96 13	10.5	15 00.0	96 13	10.3
9	12 28.0	96 14	10.6	12 56.8	96 13	10.4	14 23.3	96 13	10.0	14 52.1	96 13	09.9
160	12 19.9	96 13	10.1	12 48.8	96 13	09.9	14 15.6	96 12	09.5	14 44.5	96 12	09.4
1	12 12.2	97 12	09.6	12 41.2	97 12	09.5	14 08.3	97 12	09.1	14 37.3	97 11	08.9
2	12 04.8	97 12	09.1	12 33.9	97 11	09.0	14 01.3	97 11	08.6	14 30.4	97 11	08.5
3	11 57.8	97 11	08.6	12 27.1	97 11	08.5	13 54.7	97 10	08.1	14 23.9	97 10	08.0
4	11 51.3	98 10	08.1	12 20.6	98 10	08.0	13 48.5	98 10	07.7	14 17.8	98 10	07.5
165	11 45.1	98 10	07.6	12 14.5	98 10	07.5	13 42.7	98 09	07.2	14 12.0	98 09	07.1
6	11 39.3	98 09	07.1	12 08.8	98 09	07.0	13 37.2	98 09	06.7	14 06.6	98 08	06.6
7	11 33.9	98 08	06.6	12 03.4	98 08	06.5	13 32.1	98 08	06.2	14 01.6	98 08	06.1
8	11 28.9	99 08	06.1	11 58.5	99 08	06.0	13 27.3	99 07	05.8	13 56.9	99 07	05.7
9	11 24.3	99 07	05.6	11 54.0	99 07	05.5	13 23.0	99 07	05.3	13 52.7	99 07	05.2
170	11 20.1	99 06	05.1	11 49.8	99 06	05.0	13 19.0	99 06	04.8	13 48.7	99 06	04.7
1	11 16.3	99 06	04.6	11 46.1	99 06	04.5	13 15.4	99 05	04.3	13 45.2	99 05	04.3
2	11 12.9	99 05	04.1	11 42.7	99 05	04.0	13 12.2	99 05	03.8	13 42.0	99 05	03.8
3	11 09.9	1.0 04	03.6	11 39.7	1.0 04	03.5	13 09.3	1.0 04	03.4	13 39.2	1.0 04	03.3
4	11 07.2	1.0 04	03.1	11 37.1	1.0 04	03.0	13 06.8	1.0 04	02.9	13 36.8	1.0 03	02.8
175	11 05.0	1.0 03	02.5	11 35.0	1.0 03	02.5	13 04.8	1.0 03	02.4	13 34.7	1.0 03	02.4
6	11 03.2	1.0 02	02.0	11 33.2	1.0 02	02.0	13 03.0	1.0 02	01.9	13 33.0	1.0 02	01.9
7	11 01.8	1.0 02	01.5	11 31.8	1.0 02	01.5	13 01.7	1.0 02	01.4	13 31.7	1.0 02	01.4
8	11 00.8	1.0 01	01.0	11 30.8	1.0 01	01.0	13 00.8	1.0 01	01.0	13 30.8	1.0 01	00.9
9	11 00.2	1.0 00	00.5	11 30.2	1.0 00	00.5	13 00.2	1.0 00	00.5	13 30.2	1.0 00	00.5
180	11 00.0	1.0 00	00.0	11 30.0	1.0 00	00.0	13 00.0	1.0 00	00.0	13 30.0	1.0 00	00.0

63° 00′ Alt.		Az.	69° 00′ Alt.		Az.	69° 30′ Alt.		Az.	74° 30′ Alt.		Az.	H.A.
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
35 21.0	38 42	33.8	37 25.7	31 34	26.8	37 34.9	31 33	26.2	38 57.2	24 26	20.1	91
34 55.9	39 42	33.6	37 05.3	33 34	26.7	37 15.0	32 33	26.1	38 41.6	26 26	20.0	2
34 30.9	40 41	33.4	36 45.0	34 34	26.5	36 55.1	33 33	25.9	38 26.2	27 26	19.9	3
34 06.1	42 41	33.2	36 24.8	35 33	26.4	36 35.4	35 33	25.8	38 10.8	29 26	19.8	4
33 41.4	43 41	32.9	36 04.8	37 33	26.2	36 15.7	36 33	25.6	37 55.5	30 25	19.7	95
33 16.8	44 41	32.7	35 44.8	38 33	26.0	35 56.2	38 32	25.5	37 40.2	32 25	19.6	6
32 52.5	45 40	32.4	35 25.0	39 33	25.9	35 36.8	39 32	25.3	37 25.1	33 25	19.5	7
32 28.2	46 40	32.2	35 05.3	41 33	25.7	35 17.5	40 32	25.1	37 10.0	35 25	19.4	8
32 04.2	48 40	31.9	34 45.7	42 32	25.5	34 58.3	42 32	25.0	36 55.0	36 25	19.3	9
31 40.3	49 40	31.7	34 26.3	43 32	25.3	34 39.2	43 32	24.8	36 40.1	38 25	19.2	100
31 16.6	50 39	31.4	34 07.0	45 32	25.1	34 20.3	44 31	24.6	36 25.3	39 25	19.0	1
30 53.1	51 39	31.2	33 47.8	46 32	24.9	34 01.5	45 31	24.4	36 10.6	40 24	18.9	2
30 29.8	52 39	30.9	33 28.8	47 31	24.7	33 42.9	47 31	24.2	35 55.9	42 24	18.8	3
30 06.6	53 38	30.6	33 09.9	48 31	24.5	33 24.4	48 31	24.0	35 41.4	43 24	18.6	4
29 43.6	54 38	30.3	32 51.2	50 31	24.3	33 06.0	49 30	23.8	35 27.0	45 24	18.5	105
29 20.9	55 38	30.0	32 32.6	51 31	24.1	32 47.8	51 30	23.6	35 12.7	46 24	18.3	6
28 58.3	57 37	29.8	32 14.2	52 30	23.9	32 23.7	52 30	23.4	34 58.5	47 23	18.2	7
28 35.9	58 37	29.5	31 55.9	53 30	23.7	32 11.8	53 30	23.2	34 44.5	49 23	18.0	8
28 13.8	59 37	29.2	31 37.8	55 30	23.5	31 54.1	54 29	23.0	34 30.5	50 23	17.9	9
27 51.8	60 36	28.9	31 19.9	56 30	23.2	31 36.5	55 29	22.7	34 16.7	51 23	17.7	110
27 30.1	61 36	28.5	31 02.1	57 29	23.0	31 19.1	57 29	22.5	34 03.0	53 23	17.5	1
27 08.5	62 36	28.2	30 44.5	58 29	22.7	31 01.9	58 28	22.3	33 49.4	54 22	17.4	2
26 47.2	63 35	27.9	30 27.1	59 29	22.5	30 44.8	59 28	22.0	33 36.0	55 22	17.2	3
26 26.1	64 35	27.6	30 09.8	60 28	22.3	30 27.9	60 28	21.8	33 22.7	56 22	17.0	4
26 05.3	65 34	27.3	29 52.8	61 28	22.0	30 11.2	61 28	21.5	33 09.5	58 22	16.8	115
25 44.6	66 34	26.9	29 35.9	63 28	21.7	29 54.6	62 27	21.3	32 56.5	59 21	16.6	6
25 24.3	67 34	26.6	29 19.2	64 27	21.5	29 38.3	63 27	21.0	32 43.6	60 21	16.4	7
25 04.1	68 33	26.3	29 02.7	65 27	21.2	29 22.1	64 27	20.8	32 30.9	61 21	16.2	8
24 44.2	69 33	25.9	28 46.5	66 27	21.0	29 06.2	66 26	20.5	32 18.3	62 21	16.1	9
24 24.5	70 32	25.6	28 30.4	67 26	20.7	28 50.4	67 26	20.3	32 05.8	64 20	15.9	120
24 05.1	71 32	25.2	28 14.5	68 26	20.4	28 34.8	68 26	20.0	31 53.5	65 20	15.7	1
23 45.9	71 32	24.9	27 58.8	69 26	20.1	28 19.4	69 25	19.7	31 41.4	66 20	15.4	2
23 27.0	72 31	24.5	27 43.3	70 25	19.8	28 04.2	70 25	19.4	31 29.4	67 20	15.2	3
23 08.3	73 31	24.2	27 28.0	71 25	19.6	27 49.3	71 25	19.2	31 17.6	68 19	15.0	4
22 49.9	74 30	23.8	27 13.0	72 25	19.3	27 34.5	72 24	18.9	31 05.9	69 19	14.8	125
22 31.8	75 30	23.4	26 58.1	73 24	19.0	27 20.0	73 24	18.6	30 54.4	70 19	14.6	6
22 13.9	76 29	23.1	26 43.5	74 24	18.7	27 05.6	74 24	18.3	30 43.1	71 19	14.4	7
21 56.3	77 29	22.7	26 29.1	75 24	18.4	26 51.5	75 23	18.0	30 32.0	72 18	14.2	8
21 39.0	78 28	22.3	26 14.9	76 23	18.1	26 37.6	75 23	17.7	30 21.0	73 18	13.9	9
21 21.9	78 28	21.9	26 01.0	77 23	17.8	26 23.9	76 22	17.4	30 10.2	74 18	13.7	130
21 05.2	79 27	21.5	25 47.3	77 22	17.5	26 10.5	77 22	17.1	29 59.5	75 17	13.5	1
20 48.7	80 27	21.2	25 33.8	78 22	17.2	25 57.3	78 22	16.8	29 49.1	76 17	13.2	2
20 32.5	81 27	20.8	25 20.5	79 22	16.9	25 44.3	79 21	16.5	29 38.8	77 17	13.0	3
20 16.6	82 26	20.4	25 07.5	80 21	16.5	25 31.5	80 21	16.2	29 28.7	78 16	12.8	4
20 00.9	82 26	20.0	24 54.8	81 21	16.2	25 19.0	81 20	15.9	29 18.8	79 16	12.5	135
19 45.6	83 25	19.6	24 42.2	82 20	15.9	25 06.7	82 20	15.6	29 09.1	80 16	12.3	6
19 30.6	84 25	19.2	24 29.9	82 20	15.6	24 54.7	82 20	15.3	28 59.5	81 16	12.0	7
19 15.9	84 24	18.8	24 17.9	83 20	15.3	24 42.9	83 19	14.9	28 50.2	82 15	11.8	8
19 01.4	85 24	18.4	24 06.1	84 19	14.9	24 31.3	84 19	14.6	28 41.1	83 15	11.5	9
18 47.3	86 23	18.0	23 54.6	85 19	14.6	24 20.0	85 18	14.3	28 32.1	83 15	11.3	140
18 33.5	87 22	17.5	23 43.3	85 18	14.3	24 08.9	85 18	14.0	28 23.4	84 14	11.0	1
18 20.0	87 22	17.1	23 32.3	86 18	13.9	23 58.1	86 18	13.6	28 14.8	85 14	10.8	2
18 06.9	88 21	16.7	23 21.5	87 18	13.6	23 47.6	87 17	13.3	28 06.4	86 14	10.5	3
17 54.0	88 21	16.3	23 11.0	88 17	13.2	23 37.3	87 17	13.0	27 58.3	86 13	10.2	4
17 41.5	89 20	15.9	23 00.8	88 17	12.9	23 27.2	88 16	12.6	27 50.3	87 13	10.0	145
17 29.3	90 20	15.4	22 50.8	89 16	12.6	23 17.4	89 16	12.3	27 42.6	88 13	09.7	6
17 17.4	90 19	15.0	22 41.1	90 16	12.2	23 07.9	89 15	12.0	27 35.0	89 12	09.5	7
17 05.8	91 19	14.6	22 31.6	90 15	11.9	22 58.6	90 15	11.6	27 27.7	89 12	09.2	8
16 54.6	91 18	14.1	22 22.4	91 15	11.5	22 49.7	91 15	11.3	27 20.6	90 12	08.9	9
16 43.7	92 18	13.7	22 13.5	91 14	11.2	22 40.9	91 14	10.9	27 13.7	91 11	08.6	150
16 33.1	92 17	13.3	22 04.9	92 14	10.8	22 32.5	92 14	10.6	27 07.0	91 11	08.4	1
16 22.9	93 16	12.8	21 56.6	92 13	10.4	22 24.3	92 13	10.2	27 00.5	92 10	08.1	2
16 13.0	93 16	12.4	21 48.5	93 13	10.1	22 16.4	93 13	09.9	26 54.2	92 10	07.8	3
16 03.4	94 15	12.0	21 40.7	93 13	09.7	22 08.7	93 12	09.5	26 48.2	93 10	07.5	4
15 54.2	94 15	11.5	21 33.2	94 12	09.4	22 01.3	94 12	09.2	26 42.3	93 09	07.3	155
15 45.4	95 14	11.1	21 25.9	94 12	09.0	21 54.3	94 11	08.8	26 36.7	94 09	07.0	6
15 36.9	95 14	10.6	21 19.0	95 11	08.6	21 47.4	95 11	08.5	26 31.3	94 09	06.7	7
15 28.7	96 13	10.2	21 12.3	95 11	08.3	21 40.9	95 10	08.1	26 26.2	95 08	06.4	8
15 20.9	96 12	09.7	21 06.0	96 10	07.9	21 34.7	96 10	07.8	26 21.2	95 08	06.1	9
15 13.4	96 12	09.3	20 59.9	96 10	07.5	21 28.7	96 09	07.4	26 16.5	96 08	05.9	160
15 06.3	97 11	08.8	20 54.1	96 09	07.2	21 23.0	96 09	07.0	26 12.0	96 07	05.6	1
14 59.5	97 11	08.4	20 48.6	97 09	06.8	21 17.6	97 09	06.7	26 07.7	97 07	05.3	2
14 53.1	97 10	07.9	20 43.3	97 08	06.4	21 12.5	97 08	06.3	26 03.6	97 06	05.0	3
14 47.1	98 09	07.4	20 38.4	97 08	06.1	21 07.7	97 08	05.9	25 59.8	97 06	04.7	4
14 41.4	98 09	07.0	20 33.8	98 07	05.7	21 03.1	98 07	05.6	25 56.2	98 06	04.4	165
14 36.1	98 08	06.5	20 29.4	98 07	05.3	20 58.9	98 07	05.2	25 52.9	98 05	04.1	6
14 31.1	98 08	06.1	20 25.4	98 06	04.9	20 54.9	98 06	04.8	25 49.7	98 05	03.8	7
14 26.6	99 07	05.6	20 21.6	99 06	04.6	20 51.2	99 06	04.5	25 46.8	98 04	03.5	8
14 22.3	99 06	05.1	20 18.2	99 05	04.2	20 47.8	99 05	04.1	25 44.1	99 04	03.2	9
14 18.5	99 06	04.7	20 15.0	99 05	03.8	20 44.7	99 05	03.7	25 41.7	99 04	03.0	170
14 15.0	99 05	04.2	20 12.2	99 04	03.4	20 42.0	99 04	03.4	25 39.5	99 03	02.7	1
14 11.8	99 05	03.7	20 09.6	99 04	03.0	20 39.4	99 04	03.0	25 37.5	99 03	02.4	2
14 09.1	1.0 04	03.3	20 07.4	1.0 03	02.7	20 37.2	1.0 03	02.6	25 35.7	99 03	02.1	3
14 06.7	1.0 03	02.8	20 05.4	1.0 03	02.3	20 35.3	1.0 03	02.2	25 34.2	1.0 02	01.8	4
14 04.6	1.0 03	02.3	20 03.8	1.0 02	01.9	20 33.7	1.0 02	01.9	25 32.9	1.0 02	01.5	175
14 03.0	1.0 02	01.9	20 02.4	1.0 02	01.5	20 32.4	1.0 02	01.5	25 31.9	1.0 01	01.2	6
14 01.7	1.0 02	01.4	20 01.4	1.0 01	01.1	20 31.3	1.0 01	01.1	25 31.1	1.0 01	00.9	7
14 00.7	1.0 01	00.9	20 00.6	1.0 01	00.8	20 30.6	1.0 01	00.7	25 30.5	1.0 01	00.6	8
14 00.2	1.0 00	00.5	20 00.2	1.0 00	00.4	20 30.1	1.0 00	00.4	25 30.1	1.0 00	00.3	9
14 00.0	1.0 00	00.0	20 00.0	1.0 00	00.0	20 30.0	1.0 00	00.0	25 30.0	1.0 00	00.0	180

Lat. 41°
Lat. 42°
Lat. 43°
Lat. 44°
Lat. 45°
Lat. 46°
Lat. 47°
Lat. 48°

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STAR IDENTIFICATION TABLE

ALTITUDE

Lat. 41°

AZ.	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	53	180	57	180	61	180	65	180	69	180	73	180	77	180	81	180	85	180	89	180	87	00	00
4	53	173	57	173	61	172	65	171	69	170	73	168	77	165	80	159	84	147	87	107	86	43	4
8	52	167	56	166	60	164	64	162	68	160	72	156	75	151	79	142	82	126	84	97	83	60	8
12	51	161	55	159	59	157	63	154	67	150	70	146	74	139	77	129	79	114	81	92	81	67	12
16	50	154	54	152	58	150	61	146	65	142	68	137	72	130	74	120	77	107	78	89	78	70	16
20	49	149	53	146	56	143	60	139	63	135	66	129	69	122	72	113	74	101	75	87	75	72	20
24	47	143	51	140	54	137	58	133	61	129	64	123	66	116	69	107	71	97	72	85	72	72	24
28	45	138	49	135	52	132	55	128	58	123	61	117	64	111	66	103	68	94	69	83	69	72	28
32	43	134	46	130	50	127	53	123	56	118	58	113	61	106	63	99	65	91	66	82	66	72	32
36	41	129	44	126	47	122	50	118	53	114	56	108	58	102	60	96	62	88	63	80	64	71	36
40	38	125	42	122	45	118	47	114	50	110	53	105	55	99	57	93	59	86	60	79	61	71	40
44	36	121	39	118	42	114	45	110	47	106	50	101	52	96	54	90	56	84	57	77	58	70	44
48	33	117	36	114	39	111	42	107	44	102	47	98	49	93	51	87	53	82	54	75	55	69	48
52	31	114	33	111	36	107	39	103	41	99	44	95	46	90	48	85	50	80	51	74	52	68	52
56	28	111	31	107	33	104	36	100	38	96	41	92	43	88	45	83	47	78	48	72	49	66	56
60	25	108	28	104	30	101	33	97	35	94	38	89	40	85	42	81	44	76	45	71	47	65	60
64	22	105	25	101	27	98	30	95	32	91	35	87	37	83	39	78	41	74	42	69	44	64	64
68	19	102	22	99	24	95	27	92	29	88	32	84	34	80	36	76	38	72	40	67	41	62	68
72	16	99	19	96	21	93	24	89	26	86	29	82	31	78	33	74	35	70	37	66	39	61	72
76	13	96	16	93	18	90	21	87	23	83	26	80	28	76	30	72	32	68	34	64	36	60	76
80	10	94	13	90	15	87	18	84	20	81	23	77	25	74	27	70	29	66	31	62	33	58	80
84	07	91	10	88	12	85	15	82	17	78	20	75	22	72	24	68	27	64	29	60	31	56	84
88	04	88	07	85	09	82	12	79	14	76	17	73	19	69	22	66	24	62	26	59	28	55	88
92	01	86	04	83	06	80	09	77	12	73	14	70	17	67	19	64	21	60	24	57	26	53	92
96	02	83	01	80	03	77	06	74	09	71	11	68	14	65	16	61	19	58	21	55	24	51	96
100	05	80	02	77	00	74	03	72	06	68	08	65	11	62	14	59	16	56	19	53	21	49	100
104	08	78	05	75	02	72	00	69	03	66	06	63	08	60	11	57	14	54	16	51	19	48	104
108	11	75	08	72	05	69	02	66	00	63	03	60	06	58	09	55	11	52	14	49	17	46	108
112	14	72	11	69	08	66	05	64	02	61	00	58	03	55	06	52	09	49	12	47	15	44	112
116	17	69	14	66	11	64	08	61	05	58	02	55	01	53	04	50	07	47	10	44	13	41	116
120	19	66	16	63	13	61	10	58	07	55	04	53	01	50	02	47	05	45	08	42	11	39	120
124	22	63	19	60	16	58	13	55	10	52	07	50	04	47	01	45	03	42	06	40	09	37	124
128	25	60	22	57	19	54	15	52	12	49	09	47	06	44	03	42	01	40	04	37	07	35	128
132	27	57	24	54	21	51	18	49	14	46	11	44	08	41	05	39	01	37	02	35	05	32	132
136	30	53	27	50	23	48	20	45	17	43	13	41	10	39	06	36	03	34	00	32	04	30	136
140	32	49	29	47	25	44	22	42	19	40	15	37	12	35	08	33	05	31	01	30	02	28	140
144	34	45	31	43	27	40	24	38	20	36	17	34	13	32	10	30	06	29	03	27	01	25	144
148	36	41	33	39	29	36	26	34	22	33	19	31	15	29	11	27	08	26	04	24	00	22	148
152	38	37	35	34	31	32	27	31	24	29	20	27	16	26	13	24	09	23	05	21	01	20	152
156	40	32	36	30	33	28	29	27	25	25	21	24	18	22	14	21	10	20	06	18	02	17	156
160	41	27	38	25	34	24	30	22	26	21	22	20	19	19	15	17	11	16	07	15	03	14	160
164	43	22	39	21	35	19	31	18	27	17	23	16	19	15	16	14	12	13	08	12	04	11	164
168	44	17	40	16	36	15	32	14	28	13	24	12	20	11	16	11	12	10	08	09	04	09	168
172	44	11	40	10	36	10	33	09	29	09	25	08	21	08	17	07	13	07	09	06	05	06	172
176	45	06	41	05	37	05	33	05	29	04	25	04	21	04	17	04	13	03	09	03	05	03	176
180	45	00	41	00	37	00	33	00	29	00	25	00	21	00	17	00	13	00	09	00	05	00	180
	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		

16—11439

FIGURES IN ITALICS INDICATE THAT DECLINATION IS OF CONTRARY NAME TO LATITUDE

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STAR IDENTIFICATION TABLE

AZ.	48°		52°		56°		60°		64°		68°		72°		76°		80°		84°		88°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	83	00	79	00	75	00	71	00	67	00	63	00	59	00	55	00	51	00	47	00	43	00	00
4	82	21	79	13	75	09	71	06	67	04	63	03	59	02	55	02	51	01	47	01	43	00	4
8	81	36	78	24	74	17	70	12	67	09	63	07	59	05	55	03	51	02	47	01	43	00	8
12	79	47	76	33	73	24	70	17	66	13	62	10	58	07	55	05	51	03	47	02	43	01	12
16	77	53	74	39	72	29	69	22	65	17	62	13	58	09	54	07	51	04	47	02	43	01	16
20	74	57	72	44	70	34	67	26	64	20	61	15	57	11	54	08	50	05	47	03	43	01	20
24	72	60	70	48	68	38	66	30	63	23	60	18	57	13	53	10	50	06	46	04	43	01	24
28	69	61	68	51	66	41	64	33	62	26	59	20	56	15	53	11	50	07	46	04	43	01	28
32	66	62	66	52	64	43	63	35	60	28	58	22	55	17	52	12	49	08	46	05	43	01	32
36	64	62	63	53	62	45	61	37	59	30	57	24	54	18	52	13	49	09	46	05	43	02	36
40	61	62	61	54	60	46	59	39	57	32	56	25	53	19	51	14	48	10	45	05	43	02	40
44	58	62	58	55	58	47	57	40	56	33	54	26	52	21	50	15	48	10	45	06	42	02	44
48	56	62	56	55	56	48	55	41	54	34	53	27	51	22	49	16	47	11	45	06	42	02	48
52	53	61	53	55	53	48	53	41	52	35	51	28	50	22	49	17	47	11	45	07	42	02	52
56	50	60	51	54	51	48	51	41	51	35	50	29	49	23	48	17	46	12	44	07	42	02	56
60	48	59	49	54	49	48	49	41	49	35	49	29	48	23	47	18	45	12	44	07	42	02	60
64	45	59	46	53	47	47	47	41	47	36	47	30	47	24	46	18	45	13	43	07	42	02	64
68	43	57	44	52	45	47	45	41	46	35	46	30	45	24	45	18	44	13	43	08	42	02	68
72	40	56	41	51	42	46	43	41	44	35	44	30	44	24	44	19	43	13	43	08	42	03	72
76	38	55	39	50	40	45	41	40	42	35	43	30	43	24	43	19	43	13	42	08	41	03	76
80	35	54	37	49	38	44	39	40	40	34	41	29	42	24	42	19	42	13	42	08	41	03	80
84	33	52	34	48	36	43	37	39	39	34	40	29	40	24	41	19	41	13	41	08	41	03	84
88	30	51	32	47	34	42	36	38	37	33	38	28	39	23	40	18	41	13	41	08	41	03	88
92	28	49	30	45	32	41	34	37	35	32	37	28	38	23	39	18	40	13	41	08	41	03	92
96	26	48	28	44	30	40	32	36	34	32	35	27	37	23	38	18	39	13	40	08	41	03	96
100	24	46	26	42	28	39	30	35	32	31	34	26	36	22	37	17	39	13	40	08	41	03	100
104	21	44	24	41	26	37	28	34	31	30	33	26	35	21	36	17	38	12	39	08	40	03	104
108	19	42	22	39	24	36	27	32	29	29	31	25	33	21	35	16	37	12	39	07	40	02	108
112	17	41	20	37	23	34	25	31	28	27	30	24	32	20	35	16	37	12	39	07	40	02	112
116	15	39	18	36	21	33	24	29	26	26	29	23	31	19	34	15	36	11	38	07	40	02	116
120	14	37	17	34	19	31	22	28	25	25	28	22	30	18	33	14	35	11	38	07	40	02	120
124	12	35	15	32	18	29	21	26	24	23	27	20	30	17	32	14	35	10	37	06	40	02	124
128	10	32	13	30	17	27	20	25	23	22	26	19	29	16	32	13	34	10	37	06	40	02	128
132	09	30	12	28	15	26	18	23	22	21	25	18	28	15	31	12	34	09	37	06	40	02	132
136	07	28	11	26	14	24	17	21	21	19	24	17	27	14	30	11	33	08	37	05	40	02	136
140	06	26	09	24	13	22	16	20	20	17	23	15	26	13	30	10	33	08	36	05	39	02	140
144	05	23	08	21	12	20	15	18	19	16	22	14	26	12	29	09	33	07	36	04	39	02	144
148	03	21	07	19	11	18	14	16	18	14	22	12	25	10	29	08	32	06	36	04	39	01	148
152	02	18	06	17	10	15	14	14	17	12	21	11	25	09	28	07	32	06	36	03	39	01	152
156	02	16	05	15	09	13	13	12	17	11	20	09	24	08	28	06	32	05	35	03	39	01	156
160	01	13	05	12	08	11	12	10	16	09	20	08	24	07	28	05	32	04	35	03	39	01	160
164	00	11	04	10	08	09	12	08	16	07	20	06	24	05	27	04	31	03	35	02	39	01	164
168	*00*	08	04	07	08	07	11	06	15	05	19	05	23	04	27	03	31	02	35	02	39	01	168
172	*01*	05	03	05	07	04	11	04	15	04	19	03	23	03	27	02	31	02	35	01	39	00	172
176	*01*	03	03	02	07	02	11	02	15	02	19	02	23	01	27	01	31	01	35	01	39	00	176
180	*01*	00	03	00	07	00	11	00	15	00	19	00	23	00	27	00	31	00	35	00	39	00	180
	48°		52°		56°		60°		64°		68°		72°		76°		80°		84°		88°		

Lat. 41° Lat. 42° Lat. 43° Lat. 44° Lat. 45° Lat. 46° Lat. 47° Lat. 48°

16—11439

FIGURES IN ITALICS INDICATE THAT DECLINATION IS OF CONTRARY NAME TO LATITUDE

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Lat. 42°

H.A.	0° 00′			0° 30′			1° 00′			1° 30′			2° 00′			2° 30′			3° 00′			3° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
00	48 00.0	1.0 01	180.0	48 30.0	1.0 01	180.0	49 00.0	1.0 01	180.0	49 30.0	1.0 01	180.0	50 00.0	1.0 01	180.0	50 30.0	1.0 01	180.0	51 00.0	1.0 01	180.0	51 30.0	1.0 01	180.0	00
1	47 59.4	1.0 03	178.5	48 29.4	1.0 03	178.5	48 59.4	1.0 03	178.5	49 29.4	1.0 03	178.5	49 59.4	1.0 03	178.4	50 29.4	1.0 03	178.4	50 59.4	1.0 03	178.4	51 29.4	1.0 03	178.4	1
2	47 57.7	1.0 05	177.0	48 27.7	1.0 05	177.0	48 57.6	1.0 05	177.0	49 27.6	1.0 05	176.9	49 57.6	1.0 05	176.9	50 27.6	1.0 05	176.9	50 57.5	1.0 05	176.8	51 27.5	1.0 05	176.8	2
3	47 54.8	1.0 07	175.5	48 24.7	1.0 07	175.5	48 54.7	1.0 07	175.4	49 24.6	1.0 07	175.4	49 54.6	1.0 07	175.3	50 24.5	1.0 07	175.3	50 54.4	1.0 07	175.2	51 24.4	1.0 07	175.2	3
4	47 50.7	1.0 09	174.0	48 20.6	1.0 09	174.0	48 50.5	1.0 09	173.9	49 20.4	1.0 09	173.9	49 50.3	1.0 09	173.8	50 20.2	1.0 09	173.7	50 50.1	1.0 09	173.7	51 20.0	1.0 09	173.6	4
05	47 45.5	1.0 11	172.6	48 15.4	1.0 11	172.5	48 45.2	1.0 11	172.4	49 15.1	1.0 11	172.3	49 44.9	99 11	172.3	50 14.8	99 11	172.2	50 44.6	99 11	172.1	51 14.5	99 11	172.0	05
6	47 39.2	99 12	171.1	48 09.0	99 13	171.0	48 38.8	99 13	170.9	49 08.5	99 13	170.8	49 38.3	99 13	170.7	50 08.1	99 13	170.6	50 37.9	99 13	170.5	51 07.7	99 13	170.4	6
7	47 31.7	99 14	169.6	48 01.4	99 14	169.5	48 31.1	99 15	169.4	49 00.8	99 15	169.3	49 30.5	99 15	169.2	50 00.2	99 15	169.1	50 29.9	99 15	169.0	50 59.6	99 15	168.9	7
8	47 23.1	99 16	168.1	47 52.7	99 16	168.0	48 22.3	99 16	167.9	48 52.0	99 17	167.8	49 21.6	99 17	167.7	49 51.2	99 17	167.5	50 20.8	99 17	167.4	50 50.4	99 17	167.3	8
9	47 13.3	99 18	166.7	47 42.9	98 18	166.6	48 12.4	98 18	166.4	48 42.0	98 19	166.3	49 11.5	98 19	166.2	49 41.0	98 19	166.0	50 10.5	98 19	165.9	50 40.0	98 19	165.7	9
10	47 02.5	98 20	165.2	47 32.0	98 20	165.1	48 01.4	98 20	165.0	48 30.9	98 20	164.8	49 00.3	98 21	164.7	49 29.7	98 21	164.5	49 59.1	98 21	164.4	50 28.5	98 21	164.2	10
1	46 50.6	98 22	163.8	47 20.0	98 22	163.6	47 49.3	98 22	163.5	48 18.6	98 22	163.3	48 47.9	98 22	163.2	49 17.2	98 23	163.0	49 46.5	98 23	162.8	50 15.7	98 23	162.7	1
2	46 37.7	97 23	162.4	47 06.9	97 24	162.2	47 36.1	97 24	162.0	48 05.3	97 24	161.9	48 34.5	97 24	161.7	49 03.6	97 24	161.5	49 32.8	97 25	161.3	50 01.9	97 25	161.2	2
3	46 23.6	97 25	161.0	46 52.7	97 25	160.8	47 21.8	97 26	160.6	47 50.9	97 26	160.4	48 19.9	97 26	160.2	48 48.9	97 26	160.0	49 18.0	97 26	159.8	49 46.9	97 27	159.7	3
4	46 08.6	97 27	159.6	46 37.5	97 27	159.4	47 06.5	96 27	159.2	47 35.4	96 28	159.0	48 04.3	96 28	158.8	48 33.2	96 28	158.6	49 02.1	96 28	158.4	49 30.9	96 29	158.2	4
15	45 52.5	96 28	158.2	46 21.3	96 29	158.0	46 50.1	96 29	157.8	47 18.9	96 29	157.6	47 47.7	96 29	157.4	48 16.4	96 30	157.1	48 45.1	96 30	156.9	49 13.8	96 30	156.7	15
6	45 35.4	96 30	156.8	46 04.1	96 30	156.6	46 32.8	96 31	156.4	47 01.4	96 31	156.2	47 30.0	95 31	155.9	47 58.6	95 31	155.7	48 27.1	95 32	155.5	48 55.6	95 32	155.2	6
7	45 17.4	96 32	155.4	45 45.9	96 32	155.2	46 14.4	96 32	155.0	46 42.9	96 32	154.8	47 11.3	95 33	154.5	47 39.7	95 33	154.3	48 08.1	95 33	154.1	48 36.4	94 34	153.8	7
8	44 58.4	96 33	154.1	45 26.7	94 34	153.9	45 55.1	94 34	153.6	46 23.4	94 34	153.4	46 51.6	94 34	153.2	47 19.9	94 35	152.9	47 48.1	94 35	152.7	48 16.3	94 35	152.4	8
9	44 38.4	94 35	152.8	45 06.6	94 35	152.5	45 34.8	94 35	152.3	46 02.9	94 36	152.0	46 31.0	94 36	151.8	46 59.1	94 36	151.5	47 27.1	93 36	151.3	47 55.1	93 37	151.0	9
20	44 17.6	93 36	151.5	44 45.6	3 37	151.2	45 13.6	93 37	151.0	45 41.6	93 37	150.7	46 09.5	93 37	150.4	46 37.4	93 38	150.2	47 05.2	93 38	149.9	47 33.0	93 38	149.6	20
1	43 55.8	93 38	150.2	44 23.7	93 38	149.9	44 51.5	93 38	149.6	45 19.3	93 39	149.4	45 47.0	92 39	149.1	46 14.7	92 39	148.8	46 42.4	92 40	148.5	47 10.0	92 40	148.3	1
2	43 33.2	92 39	148.9	44 00.9	92 39	148.6	44 28.5	92 40	148.3	44 56.1	92 40	148.1	45 23.7	92 40	147.8	45 51.2	92 41	147.5	46 18.7	92 41	147.2	46 46.1	91 41	146.9	2
3	43 09.7	92 40	147.6	43 37.2	92 41	147.3	44 04.7	91 41	147.1	44 32.1	91 41	146.8	44 59.5	91 42	146.5	45 26.8	91 42	146.2	45 54.1	91 42	145.9	46 21.4	91 43	145.6	3
4	42 45.4	91 42	146.4	43 12.8	91 42	146.1	43 40.0	91 42	145.8	44 07.3	91 43	145.5	44 34.5	91 43	145.2	45 01.6	90 43	144.9	45 28.7	90 44	144.6	45 55.7	90 44	144.3	4
25	42 20.3	91 43	145.1	42 47.5	90 43	144.8	43 14.6	90 44	144.5	43 41.6	90 44	144.2	44 08.6	90 44	143.9	44 35.6	90 45	143.6	45 02.5	90 45	143.3	45 29.3	89 45	143.0	25
6	41 54.5	90 44	143.9	42 21.4	90 45	143.6	42 48.3	90 45	143.3	43 15.2	89 45	143.0	43 42.0	89 46	142.7	44 08.7	89 46	142.4	44 35.4	89 46	142.1	45 02.1	89 47	141.7	6
7	41 27.8	89 46	142.7	41 54.6	89 46	142.4	42 21.3	89 46	142.1	42 48.0	89 47	141.8	43 14.6	89 47	141.5	43 41.2	88 47	141.2	44 07.7	88 48	140.8	44 34.1	88 48	140.5	7
8	41 00.4	89 47	141.5	41 27.0	89 47	141.2	41 53.6	88 47	140.9	42 20.0	88 48	140.6	42 46.4	88 48	140.3	43 12.8	88 48	139.9	43 39.1	88 49	139.6	44 05.4	87 49	139.3	8
9	40 32.4	88 48	140.4	40 58.7	88 48	140.0	41 25.1	88 49	139.7	41 51.4	88 49	139.4	42 17.6	87 49	139.1	42 43.8	87 50	138.7	43 09.9	87 50	138.4	43 35.9	87 50	138.1	9
30	40 03.6	87 49	139.2	40 29.8	87 49	138.9	40 55.9	87 50	138.6	41 22.0	87 50	138.2	41 48.0	87 50	137.9	42 14.0	87 51	137.6	42 39.9	86 51	137.2	43 05.8	86 51	136.9	30
1	39 34.1	87 50	138.1	40 00.1	87 50	137.8	40 26.1	86 51	137.4	40 52.0	86 51	137.1	41 17.8	86 51	136.8	41 43.6	86 52	136.4	42 09.3	86 52	136.1	42 35.0	85 52	135.7	1
2	39 04.0	86 51	137.0	39 29.8	86 52	136.6	39 55.6	86 52	136.3	40 21.3	86 52	136.0	40 47.0	85 52	135.6	41 12.5	85 53	135.3	41 38.1	85 53	134.9	42 03.5	85 53	134.6	2
3	38 33.2	86 52	135.9	38 58.9	85 53	135.5	39 24.5	85 53	135.2	39 50.0	85 53	134.8	40 15.5	85 54	134.5	40 40.9	85 54	134.2	41 06.2	84 54	133.8	41 31.5	84 54	133.4	3
4	38 01.9	85 53	134.8	38 27.3	85 54	134.4	38 52.7	85 54	134.1	39 18.1	84 54	133.7	39 43.4	84 54	133.4	40 08.6	84 55	133.0	40 33.7	84 55	132.7	40 58.8	83 55	132.3	4
35	37 29.9	84 54	133.7	37 55.2	84 54	133.4	38 20.4	84 55	133.0	38 45.6	84 55	132.7	39 10.7	84 55	132.3	39 35.7	83 56	132.0	40 00.7	83 56	131.6	40 25.5	83 56	131.2	35
6	36 57.4	84 55	132.6	37 22.5	84 55	132.3	37 47.5	83 56	132.0	38 12.5	83 56	131.6	38 37.4	83 56	131.2	39 02.3	83 57	130.9	39 27.0	82 57	130.5	39 51.7	82 57	130.2	6
7	36 24.4	83 56	131.6	36 49.3	83 56	131.3	37 14.1	83 57	130.9	37 38.9	83 57	130.6	38 03.6	82 57	130.2	38 28.3	82 58	129.8	38 52.9	82 58	129.5	39 17.4	82 58	129.1	7
8	35 50.7	83 57	130.6	36 15.5	82 57	130.2	36 40.2	82 57	129.9	37 04.8	82 58	129.5	37 29.3	82 58	129.2	37 53.8	81 58	128.8	38 18.2	81 59	128.4	38 42.5	81 59	128.0	8
9	35 16.6	82 58	129.6	35 41.2	82 58	129.2	36 05.7	82 58	128.9	36 30.1	81 59	128.5	36 54.5	81 59	128.1	37 18.8	81 59	127.8	37 43.0	81 59	127.4	38 07.2	80 60	127.0	9
40	34 42.0	81 58	128.6	35 06.4	81 59	128.2	35 30.7	81 59	127.9	35 55.0	81 59	127.5	36 19.2	81 60	127.1	36 43.3	80 60	126.8	37 07.4	80 60	126.4	37 31.3	80 60	126.0	40
1	34 06.9	81 59	127.6	34 31.1	81 60	127.2	34 55.3	80 60	126.9	35 19.4	80 60	126.5	35 43.4	80 60	126.1	36 07.3	80 61	125.8	36 31.2	79 61	125.4	36 55.0	79 61	125.0	1
2	33 31.4	80 60	126.6	33 55.4	80 60	126.3	34 19.4	80 61	125.9	34 43.3	80 61	125.5	35 07.2	79 61	125.2	35 30.9	79 61	124.8	35 54.7	79 62	124.4	36 18.3	79 62	124.0	2
3	32 55.3	80 61	125.7	33 19.2	80 61	125.3	33 43.0	79 61	124.9	34 06.8	79 62	124.6	34 30.5	79 62	124.2	34 54.1	79 62	123.8	35 17.7	78 62	123.4	35 41.1	78 63	123.1	3
4	32 18.9	79 61	124.7	32 42.6	79 62	124.4	33 06.3	79 62	124.0	33 29.9	79 62	123.6	33 53.4	78 62	123.2	34 16.9	78 63	122.9	34 40.2	78 63	122.5	35 03.6	78 63	122.1	4
45	31 42.0	79 62	123.8	32 05.6	78 62	123.4	32 29.1	78 63	123.1	32 52.5	78 63	122.7	33 15.9	78 63	122.3	33 39.2	78 63	121.9	34 02.4	77 64	121.6	34 25.6	77 64	121.2	45
6	31 04.8	78 63	122.9	31 28.2	78 63	122.5	31 51.5	78 63	122.1	32 14.8	77 63	121.8	32 38.0	77 64	121.4	33 01.2	77 64	121.0	33 24.3	77 64	120.6	33 47.3	77 64	120.2	6
7	30 27.1	78 63	122.0	30 50.4	77 64	121.6	31 13.6	77 64	121.2	31 36.7	77 64	120.9	31 59.8	77 64	120.5	32 22.8	77 65	120.1	32 45.7	76 65	119.7	33 08.6	76 65	119.3	7
8	29 49.1	77 64	121.1	30 12.2	77 64	120.7	30 35.3	77 64	120.3	30 58.3	76 65	120.0	31 21.2	76 65	119.6	31 44.0	76 65	119.2	32 06.8	76 65	118.8	32 29.5	76 66	118.4	8
9	29 10.8	77 65	120.2	29 33.7	76 65	119.8	29 56.6	76 65	119.4	30 19.5	76 65	119.1	30 42.2	76 65	118.7	31 04.9	76 66	118.3	31 27.6	75 66	117.9	31 50.1	75 66	117.5	9
50	28 32.1	76 65	119.3	28 54.9	76 65	118.9	29 17.6	76 66	118.6	29 40.3	76 66	118.2	30 03.0	75 66	117.8	30 25.5	75 66	117.4	30 48.0	75 66	117.0	31 10.5	75 67	116.7	50
1	27 53.0	76 66	118.5	28 15.7	76 66	118.1	28 38.3	75 66	117.7	29 00.9	75 66	117.3	29 23.4	75 66	117.0	29 45.8	75 67	116.6	30 08.2	74 67	116.2	30 30.5	74 67	115.8	1
2	27 13.7	75 66	117.6	27 36.2	75 66	117.2	27 58.7	75 67	116.9	28 21.1	75 67	116.5	28 43.5	74 67	116.1	29 05.8	74 67	115.7	29 28.0	74 67	115.3	29 50.2	74 68	114.9	2
3	26 34.0	75 67	116.8	26 56.4	75 67	116.4	27 18.8	74 67	116.0	27 41.1	74 67	115.6	28 03.3	74 67	115.3	28 25.5	74 68	114.9	28 47.6	74 68	114.5	29 09.6	73 68	114.1	3
4	25 54.0	74 67	115.9	26 16.3	74 67	115.6	26 38.5	74 68	115.2	27 00.7	74 68	114.8	27 22.8	74 68	114.4	27 44.9	73 68	114.0	28 06.9	73 68	113.7	28 28.8	73 68	113.3	4
55	25 13.8	74 67	115.1	25 36.0	74 68	114.7	25 58.1	74 68	114.4	26 20.1	73 68	114.0	26 42.1	73 68	113.6	27 04.0	73 68	113.2	27 25.9	73 69	112.8	27 47.7	73 69	112.4	55
6	24 33.3	74 68	114.3	24 55.3	73 68	113.9	25 17.3	73 68	113.5	25 39.2	73 69	113.2	26 01.1	73 69	112.8	26 22.9	73 69	112.4	26 44.7	72 69	112.0	27 06.4	72 69	111.6	6
7	23 52.5	73 68	113.5	24 14.4	73 69	113.1	24 36.3	73 69	112.7	24 58.1	73 69	112.4	25 19.9	72 69	112.0	25 41.6	72 69	111.6	26 03.2	72 69	111.2	26 24.8	72 70	110.8	7
8	23 11.5	73 69	112.7	23 33.3	73 69	112.3	23 55.1	72 69	111.9	24 16.8	72 69	111.6	24 38.4	72 69	111.2	25 00.0	72 70	110.8	25 21.5	72 70	110.4	25 43.0	71 70	110.0	8
9	22 30.2	72 69	111.9	22 51.9	72 69	111.5	23 13.6	72 70	111.2	23 35.2	72 70	110.8	23 56.7	72 70	110.4	24 18.2	72 70	110.0	24 39.6	71 70	109.6	25 01.0	71 70	109.2	9
60	21 48.8	72 69	111.1	22 10.4	72 70	110.7	22 31.9	72 70	110.4	22 53.4	72 70	110.0	23 14.8	71 70	109.6	23 36.2	71 70	109.2	23 57.5	71 70	108.8	24 18.8	71 71	108.5	60
1	21 07.1	72 70	110.3	21 28.6	72 70	110.0	21 50.0	71 70	109.6	22 11.4	71 70	109.2	22 32.7	71 70	108.8	22 54.0	71 71	108.5	23 15.2	71 71	108.1	23 36.4	70 71	107.7	1
2	20 25.1	71 70	109.6	20 46.5	71 70	109.2	21 07.9	71 70	108.8	21 29.2	71 71	108.5	21 50.4	71 71	108.1	22 11.6	71 71	107.7	22 32.8	70 71	107.3	22 53.9	70 71	106.9	2
3	19 43.0	71 70	108.8	20 04.3	71 71	108.5	20 25.6	71 71	108.1	20 46.8	71 71	107.7	21 08.0	70 71	107.3	21 29.1	70 71	106.9	21 50.1	70 71	106.6	22 11.1	70 72	106.2	3
4	19 00.7	71 71	108.1	19 22.0	71 71	107.7	19 43.1	70 71	107.3	20 04.2	70 71	106.9	20 25.3	70 71	106.6	20 46.3	70 72	106.2	21 07.3	70 72	105.8	21 28.2	70 72	105.4	4
65	18 18.3	70 71	107.3	18 39.4	70 71	107.0	19 00.5	70 71	106.6	19 21.5	70 72	106.2	19 42.5	70 72	105.8	20 03.4	70 72	105.4	20 24.3	70 72	105.1	20 45.1	69 72	104.7	65
6	17 35.6	70 71	106.6	17 56.7	70 71	106.2	18 17.7	70 72	105.8	18 38.6	70 72	105.5	18 59.5	70 72	105.1	19 20.4	69 72	104.7	19 41.2	69 72	104.3	20 01.9	69 72	103.9	6
7	16 52.8	70 72	105.9	17 13.8	70 72	105.5	17 34.7	70 72	105.1	17 55.6	70 72	104.7	18 16.4	69 72	104.4	18 37.2	69 72	104.0	18 57.9	69 72	103.6	19 18.6	69 72	103.2	7
8	16 09.8	70 72	105.1	16 30.7	70 72	104.8	16 51.6	69 72	104.4	17 12.4	69 72	104.0	17 33.1	69 72	103.6	17 53.8	69 72	103.2	18 14.5	69 73	102.9	18 35.1	69 73	102.5	8
9	15 26.7	69 72	104.4	15 47.5	69 72	104.0	16 08.3	69 72	103.7	16 29.0	69 72	103.3	16 49.7	69 73	102.9	17 10.4	69 73	102.5	17 31.0	69 73	102.1	17 51.5	68 73	101.8	9
70	14 43.5	69 72	103.7	15 04.2	69 72	103.3	15 24.9	69 73	102.9	15 45.6	69 73	102.6	16 06.2	69 73	102.2	16 26.8	69 73	101.8	16 47.3	68 73	101.4	17 07.8	68 73	101.0	70
1	14 00.1	69 73	103.0	14 20.8	69 73	102.6	14 41.4	69 73	102.2	15 02.0	69 73	101.8	15 22.5	68 73	101.5	15 43.1	68 73	101.1	16 03.6	68 73	100.7	16 24.0	68 73	100.3	1
2	13 16.6	69 73	102.3	13 37.2	69 73	101.9	13 57.8	69 73	101.5	14 18.3	68 73	101.1	14 38.8	68 73	100.8	14 59.3	68 73	100.4	15 19.7	68 73	100.0	15 40.1	68 73	99.6	2
3	12 32.9	69 73	101.6	12 53.5	68 73	101.2	13 14.0	68 73	100.8	13 34.5	68 73	100.4	13 54.9	68 73	100.1	14 15.4	68 73	99.7	14 35.7	68 73	99.3	14 56.1	68 73	98.9	3
4	11 49.2	68 73	100.9	12 09.7	68 73	100.5	12 30.2	68 73	100.1	12 50.6	68 73	99.7	13 11.0	68 73	99.4	13 31.4	68 73	99.0	13 51.7	68 74	98.6	14 12.0	68 74	98.2	4
75	11 05.4	68 73	100.2	11 25.8	68 73	99.8	11 46.2	68 73	99.4	12 06.6	68 73	99.0	12 27.0	68 74	98.7	12 47.3	68 74	98.3	13 07.6	68 74	97.9	13 27.8	67 74	97.5	75
6	10 21.4	68 73	99.5	10 41.8	68 73	99.1	11 02.2	68 74	98.7	11 22.5	68 74	98.4	11 42.8	68 74	98.0	12 03.1	68 74	97.6	12 23.4	67 74	97.2	12 43.6	67 74	96.8	6
7	9 37.4	68 74	98.8	9 57.8	68 74	98.4	10 18.1	68 74	98.0	10 38.4	68 74	97.7	10 58.6	68 74	97.3	11 18.9	67 74	96.9	11 39.1	67 74	96.5	11 59.3	67 74	96.2	7
8	8 53.3	68 74	98.1	9 13.6	68 74	97.7	9 33.9	68 74	97.3	9 54.1	67 74	97.0	10 14.4	67 74	96.6	10 34.6	67 74	96.2	10 54.8	67 74	95.8	11 14.9	67 74	95.5	8
9	8 09.1	68 74	97.4	8 29.4	68 74	97.0	8 49.6	67 74	96.7	9 09.9	67 74	96.3	9 30.1	67 74	95.9	9 50.2	67 74	95.5	10 10.4	67 74	95.2	10 30.5	67 74	94.8	9
80	7 24.9	67 74	96.7	7 45.1	67 74	96.4	8 05.3	67 74	96.0	8 25.5	67 74	95.6	8 45.7	67 74	95.2	9 05.8	67 74	94.9	9 26.0	67 74	94.5	9 46.1	67 74	94.1	80
1	6 40.6	67 74	96.0	7 00.8	67 74	95.7	7 20.9	67 74	95.3	7 41.1	67 74	94.9	8 01.3	67 74	94.6	8 21.4	67 74	94.2	8 41.5	67 74	93.8	9 01.6	67 74	93.4	1
2	5 56.2	67 74	95.4	6 16.4	67 74	95.0	6 36.5	67 74	94.6	6 56.7	67 74	94.3	7 16.8	67 74	93.9	7 36.9	67 74	93.5	7 57.0	67 74	93.1	8 17.0	67 74	92.8	2
3	5 11.8	67 74	94.7	5 31.9	67 74	94.3	5 52.1	67 74	94.0	6 12.2	67 74	93.6	6 32.3	67 74	93.2	6 52.4	67 74	92.8	7 12.4	67 74	92.5	7 32.5	67 74	92.1	3
4							5 07.6	67 74	93.3	5 27.7	67 74	92.9	5 47.8	67 74	92.5	6 07.8	67 74	92.2	6 27.9	67 74	91.8	6 47.9	67 74	91.4	4
85													5 03.2	67 74	91.9	5 23.3	67 74	91.5	5 43.3	67 74	91.1	6 03.4	67 74	90.7	85
6																						5 18.8	67 74	90.1	6

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H.A.	0° 00′			0° 30′			1° 00′			1° 30′			2° 00′			2° 30′			3° 00′			3° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
60	48 00.0	1.0 01	180.0	47 30.0	1.0 01	180.0	47 00.0	1.0 01	180.0	46 30.0	1.0 01	180.0	46 00.0	1.0 01	180.0	45 30.0	1.0 01	180.0	45 00.0	1.0 01	180.0	44 30.0	1.0 01	180.0	60
1	47 59.4	1.0 03	178.5	47 29.4	1.0 03	178.5	46 59.4	1.0 03	178.5	46 29.4	1.0 03	178.5	45 59.4	1.0 03	178.6	45 29.4	1.0 03	178.6	44 59.5	1.0 03	178.6	44 29.5	1.0 03	178.6	1
2	47 57.7	1.0 05	177.0	47 27.7	1.0 05	177.0	46 57.7	1.0 05	177.1	46 27.7	1.0 05	177.1	45 57.8	1.0 05	177.1	45 27.8	1.0 05	177.2	44 57.8	1.0 05	177.2	44 27.8	1.0 05	177.2	2
3	47 54.8	1.0 07	175.5	47 24.8	1.0 07	175.6	46 54.9	1.0 07	175.6	46 24.9	1.0 07	175.6	45 55.0	1.0 06	175.7	45 25.0	1.0 06	175.7	44 55.1	1.0 06	175.8	44 25.1	1.0 06	175.8	3
4	47 50.7	1.0 09	174.0	47 20.8	1.0 09	174.1	46 50.9	1.0 08	174.1	46 21.0	1.0 08	174.2	45 51.1	1.0 08	174.3	45 21.1	1.0 08	174.3	44 51.2	1.0 08	174.4	44 21.3	1.0 08	174.4	4
05	47 45.5	1.0 11	172.6	47 15.6	1.0 10	172.6	46 45.8	1.0 10	172.7	46 15.9	1.0 10	172.8	45 46.0	1.0 10	172.8	45 16.2	1.0 10	172.9	44 46.3	1.0 10	173.0	44 16.4	1.0 10	173.0	05
6	47 39.2	99 12	171.1	47 09.4	99 12	171.2	46 39.5	99 12	171.2	46 09.7	99 12	171.3	45 39.9	99 12	171.4	45 10.1	99 12	171.5	44 40.3	99 12	171.6	44 10.5	99 12	171.6	6
7	47 31.7	99 14	169.6	47 01.9	99 14	169.7	46 32.2	99 14	169.8	46 02.5	99 14	169.9	45 32.7	99 14	170.0	45 03.0	99 14	170.1	44 33.2	99 14	170.2	44 03.5	99 13	170.3	7
8	47 23.1	99 16	168.1	46 53.4	99 16	168.3	46 23.8	99 16	168.4	45 54.1	99 16	168.5	45 24.4	99 16	168.6	44 54.7	99 15	168.7	44 25.1	99 15	168.8	43 55.4	99 15	168.9	8
9	47 13.3	99 18	166.7	46 43.8	99 18	166.8	46 14.2	99 18	166.9	45 44.6	99 18	167.1	45 15.1	99 17	167.2	44 45.5	99 17	167.3	44 15.9	99 17	167.4	43 46.3	99 17	167.5	9
10	47 02.5	98 20	165.2	46 33.1	98 20	165.4	46 03.6	98 20	165.5	45 34.1	98 19	165.6	45 04.6	98 19	165.8	44 35.1	98 19	165.9	44 05.6	98 19	166.0	43 36.1	98 19	166.2	10
1	46 50.6	98 22	163.8	46 21.3	98 21	164.0	45 51.9	98 21	164.1	45 22.5	98 21	164.2	44 53.1	98 21	164.4	44 23.7	98 21	164.5	43 54.3	98 20	164.7	43 24.9	98 20	164.8	1
2	46 37.7	97 23	162.4	46 08.4	97 23	162.5	45 39.2	98 23	162.7	45 09.9	98 23	162.9	44 40.6	98 23	163.0	44 11.3	98 22	163.2	43 42.0	98 22	163.3	43 12.7	98 22	163.5	2
3	46 23.6	97 25	161.0	45 54.5	97 25	161.1	45 25.4	97 25	161.3	44 56.2	97 24	161.5	44 27.1	97 24	161.6	43 57.9	97 24	161.8	43 28.7	97 24	162.0	42 59.5	97 24	162.1	3
4	46 08.6	97 27	159.6	45 39.6	97 27	159.7	45 10.6	97 26	159.9	44 41.6	97 26	160.1	44 12.5	97 26	160.3	43 43.5	97 26	160.5	43 14.4	97 25	160.6	42 45.4	97 25	160.8	4
15	45 52.5	96 28	158.2	45 23.7	96 28	158.4	44 54.8	96 28	158.6	44 25.9	96 28	158.8	43 57.0	96 28	158.9	43 28.1	96 27	159.1	42 59.2	96 27	159.3	42 30.2	97 27	159.5	15
6	45 35.4	96 30	156.8	45 06.7	96 30	157.0	44 38.0	96 30	157.2	44 09.3	96 29	157.4	43 40.5	96 29	157.6	43 11.7	96 29	157.8	42 42.9	96 29	158.0	42 14.1	96 28	158.2	6
7	45 17.4	95 32	155.4	44 48.8	95 31	155.7	44 20.3	95 31	155.9	43 51.7	95 31	156.1	43 23.1	95 31	156.3	42 54.4	96 30	156.5	42 25.8	96 30	156.7	41 57.1	96 30	156.9	7
8	44 58.4	95 33	154.1	44 30.0	95 33	154.3	44 01.6	95 33	154.6	43 33.1	95 32	154.8	43 04.7	95 32	155.0	42 36.2	95 32	155.2	42 07.7	95 32	155.4	41 39.1	95 31	155.6	8
9	44 38.4	94 35	152.8	44 10.2	94 34	153.0	43 42.0	94 34	153.2	43 13.7	94 34	153.5	42 45.4	94 34	153.7	42 17.0	95 33	153.9	41 48.7	95 33	154.1	41 20.3	95 33	154.4	9
20	44 17.6	93 36	151.5	43 49.5	94 36	151.7	43 21.4	94 36	151.9	42 53.3	94 35	152.2	42 25.2	94 35	152.4	41 57.0	94 35	152.6	41 28.8	94 35	152.9	41 00.5	94 34	153.1	20
1	43 55.8	93 38	150.2	43 27.9	93 37	150.4	43 00.0	93 37	150.7	42 32.1	93 37	150.9	42 04.1	93 37	151.2	41 36.1	93 36	151.4	41 08.0	94 36	151.6	40 39.9	94 36	151.9	1
2	43 33.2	92 39	148.9	43 05.5	92 39	149.1	42 37.7	93 39	149.4	42 10.0	93 38	149.7	41 42.1	93 38	149.9	41 14.3	93 38	150.2	40 46.4	93 37	150.4	40 18.5	93 37	150.6	2
3	43 09.7	92 40	147.6	42 42.2	92 40	147.9	42 14.6	92 40	148.1	41 47.0	92 40	148.4	41 19.4	92 39	148.7	40 51.7	92 39	148.9	40 24.0	92 39	149.2	39 56.2	93 38	149.4	3
4	42 45.4	91 42	146.4	42 18.1	91 42	146.6	41 50.7	91 41	146.9	41 23.2	92 41	147.2	40 55.8	92 41	147.5	40 28.3	92 40	147.7	40 00.7	92 40	148.0	39 33.1	92 40	148.2	4
25	42 20.3	91 43	145.1	41 53.2	91 43	145.4	41 26.0	91 43	145.7	40 58.7	91 42	146.0	40 31.4	91 42	146.2	40 04.1	91 42	146.5	39 36.7	91 41	146.8	39 09.3	91 41	147.0	25
6	41 54.5	90 44	143.9	41 27.5	90 44	144.2	41 00.4	90 44	144.5	40 33.4	90 43	144.8	40 06.2	90 43	145.1	39 39.1	91 43	145.3	39 11.9	91 43	145.6	38 44.6	91 42	145.9	6
7	41 27.8	89 46	142.7	41 01.0	89 45	143.0	40 34.2	90 45	143.3	40 07.3	90 45	143.6	39 40.3	90 44	143.9	39 13.3	90 44	144.2	38 46.3	90 44	144.4	38 19.2	90 44	144.7	7
8	41 00.4	89 47	141.5	40 33.8	89 46	141.8	40 07.2	89 46	142.1	39 40.4	89 46	142.4	39 13.7	89 46	142.7	38 46.9	89 45	143.0	38 20.0	90 45	143.3	37 53.1	90 45	143.6	8
9	40 32.4	88 48	140.4	40 05.9	88 48	140.7	39 39.4	88 47	141.0	39 12.9	89 47	141.3	38 46.3	89 47	141.6	38 19.7	89 46	141.9	37 53.0	89 46	142.2	37 26.3	89 46	142.5	9
30	40 03.6	87 49	139.2	39 37.3	88 49	139.5	39 11.0	88 48	139.8	38 44.7	88 48	140.1	38 18.3	88 48	140.4	37 51.8	88 48	140.7	37 25.3	88 47	141.0	36 58.8	89 47	141.3	30
1	39 34.1	87 50	138.1	39 08.0	87 50	138.4	38 41.9	87 50	138.7	38 15.8	87 49	139.0	37 49.5	87 49	139.3	37 23.3	88 49	139.6	36 57.0	88 48	139.9	36 30.6	88 48	140.2	1
2	39 04.0	86 51	137.0	38 38.1	86 51	137.3	38 12.2	87 51	137.6	37 46.2	87 50	137.9	37 20.2	87 50	138.2	36 54.1	87 50	138.5	36 27.9	87 49	138.8	36 01.8	87 49	139.2	2
3	38 33.2	86 52	135.9	38 07.6	86 52	136.2	37 41.8	86 52	136.5	37 16.0	86 51	136.8	36 50.1	86 51	137.2	36 24.2	86 51	137.5	35 58.3	87 50	137.8	35 32.3	87 50	138.1	3
4	38 01.9	85 53	134.8	37 36.4	85 53	135.1	37 10.8	85 53	135.4	36 45.2	85 52	135.8	36 19.5	86 52	136.1	35 53.8	86 52	136.4	35 28.0	86 51	136.7	35 02.2	86 51	137.0	4
35	37 29.9	84 54	133.7	37 04.6	85 54	134.0	36 39.2	85 54	134.4	36 13.8	85 53	134.7	35 48.3	85 53	135.0	35 22.7	85 53	135.3	34 57.1	85 52	135.7	34 31.5	86 52	136.0	35
6	36 57.4	84 55	132.6	36 32.3	84 55	133.0	36 07.1	84 55	133.3	35 41.8	84 54	133.7	35 16.5	84 54	134.0	34 51.1	85 54	134.3	34 25.7	85 53	134.6	34 00.2	85 53	135.0	6
7	36 24.4	83 56	131.6	35 59.4	83 56	131.9	35 34.4	84 55	132.3	35 09.3	84 55	132.6	34 44.1	84 55	133.0	34 18.9	84 55	133.3	33 53.7	84 54	133.6	33 28.4	84 54	133.9	7
8	35 50.7	83 57	130.6	35 26.0	83 57	130.9	35 01.1	83 56	131.3	34 36.2	83 56	131.6	34 11.2	83 56	131.9	33 46.2	83 55	132.3	33 21.1	84 55	132.6	32 56.0	84 55	132.9	8
9	35 16.6	82 58	129.6	34 52.0	82 57	129.9	34 27.3	82 57	130.3	34 02.6	83 57	130.6	33 37.8	83 57	130.9	33 13.0	83 56	131.3	32 48.1	83 56	131.6	32 23.1	83 56	131.9	9
40	34 42.0	81 58	128.6	34 17.6	82 58	128.9	33 53.1	82 58	129.3	33 28.5	82 58	129.6	33 03.9	82 57	130.0	32 39.2	82 57	130.3	32 14.5	83 57	130.6	31 49.7	83 57	131.0	40
1	34 06.9	81 59	127.6	33 42.6	81 59	127.9	33 18.3	81 59	128.3	32 53.9	81 58	128.6	32 29.5	82 58	129.0	32 04.9	82 58	129.3	31 40.4	82 58	129.7	31 15.8	82 57	130.0	1
2	33 31.4	80 60	126.6	33 07.2	80 60	127.0	32 43.1	81 59	127.3	32 18.8	81 59	127.7	31 54.6	81 59	128.0	31 30.2	81 59	128.4	31 05.8	81 58	128.7	30 41.4	82 58	129.0	2
3	32 55.3	80 61	125.7	32 31.4	80 60	126.0	32 07.4	80 60	126.4	31 43.3	80 60	126.7	31 19.2	81 60	127.1	30 55.0	81 59	127.4	30 30.8	81 59	127.8	30 06.5	81 59	128.1	3
4	32 18.9	79 61	124.7	31 55.1	79 61	125.1	31 31.3	80 61	125.4	31 07.4	80 61	125.8	30 43.4	80 60	126.1	30 19.4	80 60	126.5	29 55.3	80 60	126.8	29 31.2	81 60	127.2	4
45	31 42.0	70 62	123.8	31 18.4	79 62	124.1	30 54.7	79 62	124.5	30 31.0	79 61	124.9	30 07.2	79 61	125.2	29 43.3	80 61	125.6	29 19.4	80 61	125.9	28 55.5	80 60	126.3	45
6	31 04.8	78 63	122.9	30 41.3	78 62	123.2	30 17.8	79 62	123.6	29 54.2	79 62	123.9	29 30.6	79 62	124.3	29 06.9	79 61	124.7	28 43.1	79 61	125.0	28 19.3	79 61	125.4	6
7	30 27.1	78 63	122.0	30 03.8	78 63	122.3	29 40.5	78 63	122.7	29 17.0	78 63	123.0	28 53.5	78 62	123.4	28 30.0	79 62	123.8	28 06.4	79 62	124.1	27 42.7	79 62	124.5	7
8	29 49.1	77 64	121.1	29 26.0	77 64	121.4	29 02.7	78 63	121.8	28 39.5	78 63	122.2	28 16.1	78 63	122.5	27 52.7	78 63	122.9	27 29.3	78 62	123.2	27 05.8	78 62	123.6	8
9	29 10.8	77 65	120.2	28 47.7	77 64	120.6	28 24.7	77 64	120.9	28 01.5	77 64	121.3	27 38.3	77 64	121.6	27 15.1	78 63	122.0	26 51.8	78 63	122.3	26 28.4	78 63	122.7	9
50	28 32.1	76 65	119.3	28 09.2	76 65	119.7	27 46.2	77 65	120.0	27 23.2	77 64	120.4	27 00.2	77 64	120.8	26 37.1	77 64	121.1	26 13.9	77 64	121.5	25 50.7	77 63	121.8	50
1	27 53.0	76 66	118.5	27 30.3	76 65	118.8	27 07.5	76 65	119.2	26 44.6	76 65	119.5	26 21.7	76 65	119.9	25 58.7	77 64	120.3	25 35.7	77 64	120.6	25 12.7	77 64	121.0	1
2	27 13.7	75 66	117.6	26 51.0	75 66	118.0	26 28.4	76 66	118.3	26 05.7	76 65	118.7	25 42.9	76 65	119.1	25 20.1	76 65	119.4	24 57.2	76 65	119.8	24 34.3	77 65	120.1	2
3	26 34.0	75 67	116.8	26 11.5	75 66	117.1	25 49.0	75 66	117.5	25 26.4	75 66	117.9	25 03.8	76 66	118.2	24 41.1	76 66	118.6	24 18.3	76 65	118.9	23 55.5	76 65	119.3	3
4	25 54.0	74 67	115.9	25 31.7	75 67	116.3	25 09.3	75 67	116.7	24 46.8	75 66	117.0	24 24.3	75 66	117.4	24 01.8	75 66	117.8	23 39.2	75 66	118.1	23 16.5	76 66	118.5	4
55	25 13.8	74 67	115.1	24 51.6	74 67	115.5	24 29.3	74 67	115.8	24 07.0	75 67	116.2	23 44.6	75 67	116.6	23 22.2	75 66	116.9	22 59.7	75 66	117.3	22 37.2	75 66	117.7	55
6	24 33.3	74 68	114.3	24 11.2	74 68	114.7	23 49.0	74 68	115.0	23 26.8	74 67	115.4	23 04.6	74 67	115.8	22 42.3	74 67	116.1	22 19.9	75 67	116.5	21 57.5	75 67	116.8	6
7	23 52.5	73 68	113.5	23 30.5	73 68	113.9	23 08.5	74 68	114.2	22 46.4	74 68	114.6	22 24.3	74 68	115.0	22 02.1	74 67	115.3	21 39.9	74 67	115.7	21 17.6	74 67	116.0	7
8	23 11.5	73 69	112.7	22 49.6	73 69	113.1	22 27.7	73 68	113.4	22 05.7	73 68	113.8	21 43.7	73 68	114.2	21 21.7	74 68	114.5	20 59.6	74 68	114.9	20 37.4	74 67	115.3	8
9	22 30.2	72 69	111.9	22 08.5	73 69	112.3	21 46.7	73 69	112.6	21 24.8	73 69	113.0	21 02.9	73 68	113.4	20 41.0	73 68	113.7	20 19.0	73 68	114.1	19 56.9	74 68	114.5	9
60	21 48.8	72 69	111.1	21 27.1	72 69	111.5	21 05.4	72 69	111.9	20 43.7	73 69	112.2	20 21.9	73 69	112.6	20 00.0	73 69	113.0	19 38.2	73 68	113.3	19 16.2	73 68	113.7	60
1	21 07.1	72 70	110.3	20 45.5	72 70	110.7	20 23.9	72 69	111.1	20 02.3	72 69	111.5	19 40.6	72 69	111.8	19 18.9	72 69	112.2	18 57.1	73 69	112.6	18 35.3	73 69	112.9	1
2	20 25.1	71 70	109.6	20 03.7	72 70	110.0	19 42.2	72 70	110.3	19 20.7	72 70	110.7	18 59.1	72 70	111.1	18 37.5	72 69	111.4	18 15.8	72 69	111.8	17 54.1	72 69	112.2	2
3	19 43.0	71 70	108.8	19 21.7	71 70	109.2	19 00.3	71 70	109.6	18 38.9	72 70	109.9	18 17.4	72 70	110.3	17 55.9	72 70	110.7	17 34.3	72 70	111.0	17 12.7	72 69	111.4	3
4	19 00.7	71 71	108.1	18 39.5	71 71	108.4	18 18.2	71 70	108.8	17 56.9	71 70	109.2	17 35.5	71 70	109.6	17 14.0	71 70	109.9	16 52.6	72 70	110.3	16 31.1	72 70	110.7	4
65	18 18.3	70 71	107.3	17 57.1	71 71	107.7	17 35.9	71 71	108.1	17 14.6	71 71	108.4	16 53.4	71 70	108.8	16 32.0	71 70	109.2	16 10.7	71 70	109.5	15 49.3	71 70	109.9	65
6	17 35.6	70 71	106.6	17 14.5	70 71	107.0	16 53.4	70 71	107.3	16 32.3	71 71	107.7	16 11.1	71 71	108.1	15 49.8	71 71	108.4	15 28.5	71 70	108.8	15 07.2	71 70	109.2	6
7	16 52.8	70 72	105.9	16 31.8	70 71	106.2	16 10.8	70 71	106.6	15 49.7	70 71	107.0	15 28.6	70 71	107.3	15 07.4	71 71	107.7	14 46.2	71 71	108.1	14 25.0	71 71	108.4	7
8	16 09.8	70 72	105.1	15 48.9	70 72	105.5	15 28.0	70 72	105.9	15 07.0	70 71	106.2	14 45.9	70 71	106.6	14 24.9	70 71	107.0	14 03.8	70 71	107.3	13 42.6	71 71	107.7	8
9	15 26.7	69 72	104.4	15 05.9	70 72	104.8	14 45.0	70 72	105.2	14 24.1	70 72	105.5	14 03.1	70 72	105.9	13 42.1	70 71	106.3	13 21.1	70 71	106.6	13 00.1	70 71	107.0	9
70	14 43.5	69 72	103.7	14 22.7	69 72	104.1	14 01.9	69 72	104.4	13 41.0	70 72	104.8	13 20.2	70 72	105.2	12 59.3	70 72	105.5	12 38.3	70 72	105.9	12 17.4	70 71	106.3	70
1	14 00.1	69 73	103.0	13 39.4	69 72	103.3	13 18.6	69 72	103.7	12 57.9	69 72	104.1	12 37.1	69 72	104.5	12 16.2	69 72	104.8	11 55.4	70 72	105.2	11 34.5	70 72	105.6	1
2	13 16.6	69 73	102.3	12 55.9	69 73	102.6	12 35.3	69 72	103.0	12 14.6	69 72	103.4	11 53.8	69 72	103.8	11 33.1	69 72	104.1	11 12.3	69 72	104.5	10 51.4	69 72	104.9	2
3	12 32.9	69 73	101.6	12 12.4	69 73	101.9	11 51.7	69 73	102.3	11 31.1	69 73	102.7	11 10.4	69 72	103.0	10 49.7	69 72	103.4	10 29.0	69 72	103.8	10 08.3	69 72	104.1	3
4	11 49.2	68 73	100.9	11 28.7	68 73	101.2	11 08.1	69 73	101.6	10 47.5	69 73	102.0	10 26.9	69 73	102.3	10 06.3	69 73	102.7	9 45.7	69 72	103.1	9 25.0	69 72	103.5	4
75	11 05.4	68 73	100.2	10 44.9	68 73	100.5	10 24.4	68 73	100.9	10 03.9	68 73	101.3	9 43.3	69 73	101.6	9 22.8	69 73	102.0	9 02.2	69 73	102.4	8 41.6	69 73	102.8	75
6	10 21.4	68 73	99.5	10 01.0	68 73	99.8	9 40.6	68 73	100.2	9 20.1	68 73	100.6	8 59.6	68 73	101.0	8 39.1	68 73	101.3	8 18.6	68 73	101.7	7 58.0	69 73	102.1	6
7	9 37.4	68 74	98.8	9 17.0	68 73	99.2	8 56.6	68 73	99.5	8 36.2	68 73	99.9	8 15.8	68 73	100.3	7 55.3	68 73	100.6	7 34.8	68 73	101.0	7 14.3	68 73	101.4	7
8	8 53.3	68 74	98.1	8 33.0	68 74	98.5	8 12.6	68 73	98.8	7 52.2	68 73	99.2	7 31.9	68 73	99.6	7 11.4	68 73	99.9	6 51.0	68 73	100.3	6 30.6	68 73	100.7	8
9	8 09.1	68 74	97.4	7 48.8	68 74	97.8	7 28.5	68 74	98.2	7 08.2	68 74	98.5	6 47.8	68 74	98.9	6 27.5	68 73	99.3	6 07.1	68 73	99.6	5 46.7	68 73	100.0	9
80	7 24.9	67 74	96.7	7 04.6	68 74	97.1	6 44.3	68 74	97.5	6 24.1	68 74	97.8	6 03.8	68 74	98.2	5 43.4	68 74	98.6	5 23.1	68 73	99.0	5 02.8	68 73	99.3	80
1	6 40.6	67 74	96.0	6 20.3	67 74	96.4	6 00.1	67 74	96.8	5 39.9	68 74	97.2	5 19.6	68 74	97.5										1
2	5 56.2	67 74	95.4	5 36.0	67 74	95.7	5 15.8	67 74	96.1																2
3	5 11.8	67 74	94.7																						3

Lat. 42°

Lat. 42°

Lat. 43°

Lat. 44°

Lat. 45°

Lat. 46°

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Lat. 42°

H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	52 00.0	1.0 01	180.0	52 30.0	1.0 01	180.0	53 00.0	1.0 01	180.0	53 30.0	1.0 01	180.0	54 00.0	1.0 01	180.0	54 30.0	1.0 01	180.0	55 00.0	1.0 01	180.0	55 30.0	1.0 01	180.0	00
1	51 59.4	1.0 03	178.4	52 29.4	1.0 03	178.4	52 59.4	1.0 03	178.3	53 29.4	1.0 03	178.3	53 59.3	1.0 03	178.3	54 29.3	1.0 03	178.3	54 59.3	1.0 03	178.3	55 29.3	1.0 03	178.2	1
2	51 57.5	1.0 05	176.8	52 27.5	1.0 05	176.7	52 57.4	1.0 05	176.7	53 27.4	1.0 05	176.7	53 57.4	1.0 05	176.6	54 27.3	1.0 06	176.6	54 57.3	1.0 06	176.5	55 27.3	1.0 06	176.5	2
3	51 54.3	1.0 07	175.1	52 24.3	1.0 07	175.1	52 54.2	1.0 08	175.0	53 24.1	1.0 08	175.0	53 54.1	1.0 08	174.9	54 24.0	1.0 08	174.9	54 53.9	1.0 08	174.8	55 23.9	1.0 08	174.8	3
4	51 49.9	1.0 09	173.5	52 19.8	1.0 10	173.5	52 49.7	1.0 10	173.4	53 19.6	1.0 10	173.3	53 49.5	1.0 10	173.2	54 19.4	1.0 10	173.2	54 49.3	1.0 10	173.1	55 19.1	1.0 10	173.0	4
05	51 44.3	99 11	171.9	52 14.1	99 12	171.8	52 44.0	99 12	171.8	53 13.8	99 12	171.7	53 43.6	99 12	171.6	54 13.4	99 12	171.5	54 43.2	99 12	171.4	55 13.0	99 12	171.3	05
6	51 37.4	99 13	170.3	52 07.2	99 14	170.2	52 36.9	99 14	170.1	53 06.7	99 14	170.0	53 36.4	99 14	169.9	54 06.2	99 14	169.8	54 35.9	99 14	169.7	55 05.6	99 15	169.6	6
7	51 29.3	99 16	168.7	51 59.0	99 16	168.6	52 28.7	99 16	168.5	52 58.3	99 16	168.4	53 28.0	99 16	168.3	53 57.6	99 16	168.1	54 27.3	99 17	168.0	54 56.9	99 17	167.9	7
8	51 20.0	99 18	167.2	51 49.6	99 18	167.0	52 19.2	99 18	166.9	52 48.7	99 18	166.8	53 18.3	98 18	166.6	53 47.8	98 18	166.5	54 17.4	98 19	166.3	54 46.9	98 19	166.2	8
9	51 09.5	98 19	165.6	51 39.0	98 20	165.4	52 08.4	98 20	165.3	52 37.9	98 20	165.1	53 07.3	98 20	165.0	53 36.8	98 20	164.8	54 06.2	98 21	164.6	54 35.6	98 21	164.5	9
10	50 57.8	98 21	164.0	51 27.2	98 22	163.9	51 56.5	98 22	163.7	52 25.9	98 22	163.5	52 55.2	98 22	163.4	53 24.5	98 22	163.2	53 53.7	98 23	163.0	54 23.0	98 23	162.8	10
1	50 45.0	97 23	162.5	51 14.2	97 24	162.3	51 43.4	97 24	162.1	52 12.6	97 24	161.9	52 41.8	97 24	161.8	53 11.0	97 24	161.6	53 40.1	97 25	161.4	54 09.2	97 25	161.2	1
2	50 31.0	97 25	161.0	51 00.1	97 25	160.8	51 29.2	97 26	160.6	51 58.2	97 26	160.4	52 27.3	97 26	160.2	52 56.3	97 26	160.0	53 25.2	97 27	159.7	53 54.2	97 27	159.5	2
3	50 15.9	97 27	159.4	50 44.9	96 27	159.2	51 13.8	96 28	159.0	51 42.7	96 28	158.8	52 11.5	96 28	158.6	52 40.4	96 28	158.4	53 09.2	96 29	158.1	53 38.0	96 29	157.9	3
4	49 59.7	96 29	158.0	50 28.5	96 29	157.7	50 57.3	96 29	157.5	51 26.0	96 30	157.3	51 54.7	96 30	157.0	52 23.4	96 30	156.8	52 52.0	95 30	156.6	53 20.7	95 31	156.3	4
15	49 42.4	95 31	156.5	50 11.1	95 31	156.2	50 39.7	95 31	156.0	51 08.2	95 31	155.8	51 36.8	95 32	155.5	52 05.3	95 32	155.3	52 33.8	95 32	155.0	53 02.2	95 33	154.7	15
6	49 24.1	95 32	155.0	49 52.6	95 33	154.8	50 21.0	95 33	154.5	50 49.4	95 33	154.3	51 17.8	94 33	154.0	51 46.1	94 34	153.7	52 14.4	94 34	153.5	52 42.6	94 34	153.2	6
7	49 04.8	94 34	153.6	49 33.0	94 34	153.3	50 01.3	94 35	153.0	50 29.5	94 35	152.8	50 57.7	94 35	152.5	51 25.8	94 35	152.2	51 53.9	94 36	151.9	52 22.0	93 36	151.7	7
8	48 44.4	94 36	152.1	49 12.5	94 36	151.9	49 40.6	93 36	151.6	50 08.6	93 36	151.3	50 36.6	93 37	151.0	51 04.5	93 37	150.7	51 32.4	93 37	150.5	52 00.3	93 38	150.2	8
9	48 23.1	93 37	150.7	48 51.0	93 37	150.4	49 18.9	93 38	150.2	49 46.7	93 38	149.9	50 14.5	93 38	149.6	50 42.3	92 39	149.3	51 10.0	92 39	149.0	51 37.6	92 39	148.7	9
20	48 00.8	92 39	149.3	48 28.5	92 39	149.0	48 56.2	92 39	148.8	49 23.9	92 40	148.5	49 51.5	92 40	148.2	50 19.0	92 40	147.8	50 46.5	92 41	147.5	51 13.9	91 41	147.2	20
1	47 37.6	92 40	148.0	48 05.1	92 40	147.7	48 32.6	92 41	147.4	49 00.1	91 41	147.1	49 27.5	91 42	146.7	49 54.8	91 42	146.4	50 22.1	91 42	146.1	50 49.3	91 43	145.8	1
2	47 13.5	91 42	146.6	47 40.9	91 42	146.3	48 08.1	91 42	146.0	48 35.4	91 43	145.7	49 02.6	91 43	145.4	49 29.7	90 43	145.0	49 56.8	90 44	144.7	50 23.8	90 44	144.4	2
3	46 48.6	91 43	145.3	47 15.7	90 43	145.0	47 42.8	90 44	144.7	48 09.8	90 44	144.3	48 36.8	90 44	144.0	49 03.7	90 45	143.7	49 30.6	89 45	143.3	49 57.4	89 45	143.0	3
4	46 22.7	90 44	144.0	46 49.7	90 45	143.7	47 16.6	90 45	143.3	47 43.4	89 45	143.0	48 10.2	89 46	142.7	48 36.9	89 46	142.3	49 03.5	89 46	142.0	49 30.1	89 47	141.6	4
25	45 56.1	89 46	142.7	46 22.8	89 46	142.4	46 49.5	89 46	142.0	47 16.2	89 47	141.7	47 42.7	88 47	141.3	48 09.2	88 47	141.0	48 35.7	88 48	140.6	49 02.0	88 48	140.3	25
6	45 28.7	89 47	141.4	45 55.2	88 47	141.1	46 21.7	88 48	140.7	46 48.1	88 48	140.4	47 14.5	88 48	140.0	47 40.8	88 49	139.7	48 07.0	87 49	139.3	48 33.1	87 49	139.0	6
7	45 00.5	88 48	140.2	45 26.8	88 49	139.8	45 53.1	87 49	139.5	46 19.3	87 49	139.1	46 45.5	87 50	138.8	47 11.5	87 50	138.4	47 37.5	87 50	138.0	48 03.5	86 51	137.7	7
8	44 31.6	87 49	138.9	44 57.7	87 50	138.6	45 23.8	87 50	138.2	45 49.8	87 50	137.9	46 15.7	86 51	137.5	46 41.6	86 51	137.2	47 07.4	86 51	136.8	47 33.1	86 52	136.4	8
9	44 01.9	87 51	137.7	44 27.9	86 51	137.4	44 53.7	86 51	137.0	45 19.5	86 52	136.7	45 45.2	86 52	136.3	46 10.9	85 52	135.9	46 36.5	85 53	135.5	47 02.0	85 53	135.2	9
30	43 31.6	86 52	136.5	43 57.3	86 52	136.2	44 23.0	85 52	135.8	44 48.6	85 53	135.5	45 14.1	85 53	135.1	45 39.5	85 53	134.7	46 04.9	84 54	134.3	46 30.2	84 54	133.9	30
1	43 00.6	85 53	135.4	43 26.1	85 53	135.0	43 51.6	85 53	134.6	44 17.0	85 54	134.3	44 42.3	84 54	133.9	45 07.5	84 54	133.5	45 32.7	84 55	133.1	45 57.8	83 55	132.7	1
2	42 28.9	85 54	134.2	42 54.3	84 54	133.8	43 19.5	84 54	133.5	43 44.7	84 55	133.1	44 09.8	84 55	132.7	44 34.9	83 55	132.3	44 59.8	83 56	131.9	45 24.7	83 56	131.5	2
3	41 56.7	84 55	133.1	42 21.8	84 55	132.7	42 46.9	83 55	132.3	43 11.9	83 56	132.0	43 36.8	83 56	131.6	44 01.6	83 56	131.2	44 26.4	82 57	130.8	44 51.0	82 57	130.4	3
4	41 23.8	83 56	132.0	41 48.8	83 56	131.6	42 13.6	83 56	131.2	42 38.4	83 57	130.8	43 03.1	82 57	130.4	43 27.8	82 57	130.1	43 52.3	82 58	129.7	44 16.8	81 58	129.3	4
35	40 50.4	83 57	130.9	41 15.1	82 57	130.5	41 39.8	82 57	130.1	42 04.4	82 58	129.7	42 28.9	82 58	129.3	42 53.4	81 58	128.9	43 17.7	81 59	128.5	43 42.0	81 59	128.1	35
6	40 16.4	82 58	129.8	40 40.9	82 58	129.4	41 05.4	81 58	129.0	41 29.8	81 58	128.6	41 54.2	81 59	128.2	42 18.4	81 59	127.8	42 42.6	80 59	127.4	43 06.7	80 60	127.0	6
7	39 41.8	81 58	128.7	40 06.2	81 59	128.3	40 30.5	81 59	128.0	40 54.7	81 59	127.6	41 18.9	80 60	127.2	41 42.9	80 60	126.8	42 06.9	80 60	126.4	42 30.8	79 61	126.0	7
8	39 06.8	81 59	127.7	39 31.0	81 60	127.3	39 55.1	80 60	126.9	40 19.1	80 60	126.5	40 43.1	80 60	126.1	41 07.0	79 61	125.7	41 30.8	79 61	125.3	41 54.5	79 61	124.9	8
9	38 31.3	80 60	126.6	38 55.3	80 60	126.3	39 19.2	80 61	125.9	39 43.1	79 61	125.5	40 06.8	79 61	125.1	40 30.5	79 61	124.7	40 54.2	79 62	124.3	41 17.7	78 62	123.9	9
40	37 55.2	80 61	125.6	38 19.1	79 61	125.2	38 42.8	79 61	124.8	39 06.5	79 62	124.5	39 30.1	79 62	124.1	39 53.6	78 62	123.7	40 17.1	78 63	123.2	40 40.4	78 63	122.8	40
1	37 18.8	79 62	124.6	37 42.4	79 62	124.2	38 06.0	78 62	123.8	38 29.5	78 62	123.5	38 53.0	78 63	123.1	39 16.3	78 63	122.6	39 39.6	77 63	122.2	40 02.7	77 63	121.8	1
2	36 41.9	78 62	123.6	37 05.4	78 62	123.3	37 28.8	78 63	122.9	37 52.1	78 63	122.5	38 15.4	77 63	122.1	38 38.6	77 64	121.7	39 01.7	77 64	121.2	39 24.7	77 64	120.8	2
3	36 04.5	78 63	122.7	36 27.9	78 63	122.3	36 51.1	77 63	121.9	37 14.3	77 64	121.5	37 37.4	77 64	121.1	38 00.4	77 64	120.7	38 23.3	76 64	120.3	38 46.2	76 65	119.9	3
4	35 26.8	77 64	121.7	35 50.0	77 64	121.3	36 13.1	77 64	120.9	36 36.1	77 64	120.5	36 59.0	76 65	120.1	37 21.9	76 65	119.7	37 44.6	76 65	119.3	38 07.3	75 65	118.9	4
45	34 48.7	77 64	120.8	35 11.7	77 64	120.4	35 34.6	76 65	120.0	35 57.5	76 65	119.6	36 20.3	76 65	119.2	36 43.0	76 65	118.8	37 05.6	75 66	118.4	37 28.1	75 66	118.0	45
6	34 10.2	76 65	119.9	34 33.1	76 65	119.5	34 55.8	76 65	119.1	35 18.6	76 66	118.7	35 41.2	75 66	118.3	36 03.7	75 66	117.9	36 26.2	75 66	117.4	36 48.6	74 66	117.0	6
7	33 31.4	76 65	118.9	33 54.1	76 66	118.5	34 16.7	75 66	118.2	34 39.3	75 66	117.8	35 01.7	75 66	117.3	35 24.1	75 66	116.9	35 46.5	74 67	116.5	36 08.7	74 67	116.1	7
8	32 52.2	75 66	118.0	33 14.7	75 66	117.6	33 37.2	75 66	117.2	33 59.6	75 67	116.8	34 22.0	74 67	116.4	34 44.2	74 67	116.0	35 06.4	74 67	115.6	35 28.5	74 68	115.2	8
9	32 12.6	75 66	117.1	32 35.1	75 67	116.8	32 57.4	74 67	116.4	33 19.7	74 67	116.0	33 41.9	74 67	115.6	34 04.0	74 68	115.2	34 26.1	73 68	114.7	34 48.0	73 68	114.3	9
50	31 32.8	74 67	116.3	31 55.1	74 67	115.9	32 17.3	74 67	115.5	32 39.5	74 68	115.1	33 01.5	73 68	114.7	33 23.5	73 68	114.3	33 45.4	73 68	113.9	34 07.2	73 68	113.4	50
1	30 52.7	74 67	115.4	31 14.8	74 68	115.0	31 36.9	73 68	114.6	31 58.9	73 68	114.2	32 20.9	73 68	113.8	32 42.7	73 68	113.4	33 04.5	72 69	113.0	33 26.2	72 69	112.6	1
2	30 12.3	74 68	114.6	30 34.3	73 68	114.2	30 56.3	73 68	113.8	31 18.1	73 68	113.4	31 39.9	73 69	113.0	32 01.7	72 69	112.6	32 23.3	72 69	112.1	32 44.9	72 69	111.7	2
3	29 31.6	73 68	113.7	29 53.5	73 68	113.3	30 15.3	73 69	112.9	30 37.1	72 69	112.5	30 58.8	72 69	112.1	31 20.4	72 69	111.7	31 41.9	72 69	111.3	32 03.4	71 70	110.9	3
4	28 50.6	73 69	112.9	29 12.4	72 69	112.5	29 34.1	72 69	112.1	29 55.8	72 69	111.7	30 17.3	72 69	111.3	30 38.8	72 70	110.9	31 00.3	71 70	110.5	31 21.6	71 70	110.1	4
55	28 09.4	72 69	112.1	28 31.1	72 69	111.7	28 52.7	72 69	111.3	29 14.2	72 70	110.9	29 35.7	71 70	110.5	29 57.1	71 70	110.1	30 18.4	71 70	109.7	30 39.6	71 70	109.2	55
6	27 28.0	72 69	111.2	27 49.5	72 70	110.8	28 11.0	72 70	110.5	28 32.4	71 70	110.1	28 53.8	71 70	109.7	29 15.1	71 70	109.2	29 36.3	71 70	108.8	29 57.4	70 71	108.4	6
7	26 46.3	72 70	110.4	27 07.7	71 70	110.0	27 29.1	71 70	109.6	27 50.4	71 70	109.3	28 11.7	71 70	108.9	28 32.9	70 71	108.4	28 54.0	70 71	108.0	29 15.0	70 71	107.6	7
8	26 04.4	71 70	109.6	26 25.8	71 70	109.2	26 47.0	71 70	108.9	27 08.2	71 71	108.5	27 29.4	70 71	108.1	27 50.5	70 71	107.7	28 11.5	70 71	107.3	28 32.4	70 71	106.8	8
9	25 22.3	71 70	108.9	25 43.6	71 71	108.5	26 04.7	71 71	108.1	26 25.9	70 71	107.7	26 46.9	70 71	107.3	27 07.9	70 71	106.9	27 28.8	70 71	106.5	27 49.7	69 72	106.1	9
60	24 40.0	71 71	108.1	25 01.2	70 71	107.7	25 22.3	70 71	107.3	25 43.3	70 71	106.9	26 04.2	70 71	106.5	26 25.1	70 72	106.1	26 46.0	69 72	105.7	27 06.7	69 72	105.3	60
1	23 57.5	70 71	107.3	24 18.6	70 71	106.9	24 39.6	70 71	106.5	25 00.5	70 72	106.1	25 21.4	69 72	105.7	25 42.2	69 72	105.3	26 03.0	69 72	104.9	26 23.6	69 72	104.5	1
2	23 14.9	70 71	106.5	23 35.9	70 72	106.1	23 56.8	70 72	105.8	24 17.6	69 72	105.4	24 38.4	69 72	105.0	24 59.1	69 72	104.6	25 19.8	69 72	104.2	25 40.4	69 72	103.8	2
3	22 32.1	70 72	105.8	22 52.9	70 72	105.4	23 13.8	69 72	105.0	23 34.5	69 72	104.6	23 55.3	69 72	104.2	24 15.9	69 72	103.8	24 36.5	69 72	103.4	24 57.0	68 72	103.0	3
4	21 49.1	69 72	105.0	22 09.9	69 72	104.6	22 30.6	69 72	104.3	22 51.3	69 72	103.9	23 12.0	69 72	103.5	23 32.5	68 72	103.1	23 53.1	68 73	102.7	24 13.5	68 73	102.3	4
65	21 05.9	69 72	104.3	21 26.7	69 72	103.9	21 47.3	69 72	103.5	22 08.0	69 72	103.1	22 28.5	68 73	102.7	22 49.0	68 73	102.3	23 09.5	68 73	101.9	23 29.9	68 73	101.5	65
6	20 22.7	69 72	103.6	20 43.3	69 72	103.2	21 03.9	69 73	102.8	21 24.5	68 73	102.4	21 45.0	68 73	102.0	22 05.4	68 73	101.6	22 25.8	68 73	101.2	22 46.1	68 73	100.8	6
7	19 39.2	69 73	102.8	19 59.8	69 73	102.4	20 20.4	68 73	102.0	20 40.9	68 73	101.7	21 01.3	68 73	101.3	21 21.7	68 73	100.9	21 42.0	68 73	100.5	22 02.3	67 73	100.1	7
8	18 55.7	69 73	102.1	19 16.2	68 73	101.7	19 36.7	68 73	101.3	19 57.1	68 73	100.9	20 17.5	68 73	100.5	20 37.8	68 73	100.2	20 58.1	67 73	99.8	21 18.3	67 73	99.4	8
9	18 12.0	68 73	101.4	18 32.5	68 73	101.0	18 52.9	68 73	100.6	19 13.3	68 73	100.2	19 33.6	68 73	99.8	19 53.9	67 73	99.4	20 14.1	67 73	99.0	20 34.3	67 74	98.6	9
70	17 28.3	68 73	100.7	17 48.7	68 73	100.3	18 09.1	68 73	99.9	18 29.4	68 73	99.5	18 49.7	67 73	99.1	19 09.9	67 74	98.7	19 30.1	67 74	98.3	19 50.2	67 74	97.9	70
1	16 44.4	68 73	100.0	17 04.8	68 73	99.6	17 25.1	68 73	99.2	17 45.4	67 74	98.8	18 05.6	67 74	98.4	18 25.8	67 74	98.0	18 45.9	67 74	97.6	19 06.0	67 74	97.2	1
2	16 00.4	68 73	99.2	16 20.8	68 73	98.9	16 41.0	67 74	98.5	17 01.3	67 74	98.1	17 21.4	67 74	97.7	17 41.6	67 74	97.3	18 01.7	67 74	96.9	18 21.7	67 74	96.5	2
3	15 16.4	68 74	98.5	15 36.7	67 74	98.2	15 56.9	67 74	97.8	16 17.1	67 74	97.4	16 37.2	67 74	97.0	16 57.3	67 74	96.6	17 17.4	67 74	96.2	17 37.4	67 74	95.8	3
4	14 32.3	67 74	97.8	14 52.5	67 74	97.5	15 12.7	67 74	97.1	15 32.8	67 74	96.7	15 52.9	67 74	96.3	16 13.0	67 74	95.9	16 33.0	67 74	95.5	16 53.0	67 74	95.1	4
75	13 48.1	67 74	97.2	14 08.2	67 74	96.8	14 28.4	67 74	96.4	14 48.5	67 74	96.0	15 08.6	67 74	95.6	15 28.6	67 74	95.2	15 48.6	67 74	94.8	16 08.6	66 74	94.5	75
6	13 03.8	67 74	96.5	13 23.9	67 74	96.1	13 44.0	67 74	95.7	14 04.1	67 74	95.3	14 24.2	67 74	94.9	14 44.2	67 74	94.6	15 04.2	67 74	94.2	15 24.1	66 74	93.8	6
7	12 19.4	67 74	95.8	12 39.6	67 74	95.4	12 59.7	67 74	95.0	13 19.7	67 74	94.6	13 39.7	67 74	94.2	13 59.7	67 74	93.9	14 19.7	66 74	93.5	14 39.6	66 74	93.1	7
8	11 35.1	67 74	95.1	11 55.2	67 74	94.7	12 15.2	67 74	94.3	12 35.3	67 74	94.0	12 55.3	67 74	93.6	13 15.2	67 74	93.2	13 35.2	66 74	92.8	13 55.1	66 74	92.4	8
9	10 50.6	67 74	94.4	11 10.7	67 74	94.0	11 30.7	67 74	93.7	11 50.8	67 74	93.3	12 10.7	67 74	92.9	12 30.7	66 74	92.5	12 50.6	66 74	92.1	13 10.5	66 74	91.7	9
80	10 06.1	67 74	93.7	10 26.2	67 74	93.4	10 46.2	67 74	93.0	11 06.2	67 74	92.6	11 26.2	67 74	92.2	11 46.1	66 74	91.8	12 06.0	66 74	91.5	12 25.9	66 74	91.1	80
1	9 21.6	67 74	93.1	9 41.7	67 74	92.7	10 01.7	67 74	92.3	10 21.7	67 74	91.9	10 41.6	66 74	91.5	11 01.6	66 74	91.2	11 21.5	66 74	90.8	11 41.3	66 74	90.4	1
2	8 37.1	67 74	92.4	8 57.1	67 74	92.0	9 17.1	67 74	91.6	9 37.1	67 74	91.2	9 57.0	66 74	90.9	10 17.0	66 74	90.5	10 36.9	66 74	90.1	10 56.7	66 74	89.7	2
3	7 52.5	67 74	91.7	8 12.5	67 74	91.3	8 32.5	67 74	91.0	8 52.5	67 74	90.6	9 12.5	66 74	90.2	9 32.4	66 74	89.8	9 52.3	66 74	89.4	10 12.2	66 74	89.1	3
4	7 08.0	67 74	91.0	7 28.0	67 74	90.7	7 48.0	67 74	90.3	8 07.9	67 74	89.9	8 27.9	66 74	89.5	8 47.8	66 74	89.2	9 07.7	66 74	88.8	9 27.6	66 74	88.4	4
85	6 23.4	67 74	90.4	6 43.4	67 74	90.0	7 03.4	67 74	89.6	7 23.3	67 74	89.2	7 43.3	66 74	88.9	8 03.2	66 74	88.5	8 23.1	66 74	88.1	8 43.0	66 74	87.7	85
6	5 38.8	67 74	89.7	5 58.8	67 74	89.3	6 18.8	67 74	88.9	6 38.8	67 74	88.6	6 58.7	67 74	88.2	7 18.7	66 74	87.8	7 38.6	66 74	87.4	7 58.5	66 74	87.1	6
7				5 14.2	67 74	88.7	5 34.2	67 74	88.3	5 54.2	67 74	87.9	6 14.2	67 74	87.5	6 34.1	66 74	87.2	6 54.0	66 74	86.8	7 14.0	66 74	86.4	7
8										5 09.6	67 74	87.2	5 29.6	67 74	86.9	5 49.6	67 74	86.5	6 09.5	66 74	86.1	6 29.5	66 74	85.7	8
9																5 05.1	67 74	85.8	5 25.1	67 74	85.5	5 45.0	67 74	85.1	9
90																						5 00.6	67 74	84.4	90

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H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	
00	44 00.0	1.0 01	180.0	43 30.0	1.0 01	180.0	43 00.0	1.0 01	180.0	42 30.0	1.0 01	180.0	42 00.0	1.0 01	180.0	41 30.0	1.0 01	180.0	41 00.0	1.0 01	180.0	40 30.0	1.0 01	180.0	00
1	43 59.5	1.0 03	178.6	43 29.5	1.0 03	178.6	42 59.5	1.0 03	178.6	42 29.5	1.0 03	178.7	41 59.5	1.0 03	178.7	41 29.5	1.0 03	178.7	40 59.5	1.0 03	178.7	40 29.5	1.0 03	178.7	1
2	43 57.8	1.0 04	177.2	43 27.9	1.0 04	177.3	42 57.9	1.0 04	177.3	42 27.9	1.0 04	177.3	41 57.9	1.0 04	177.3	41 27.9	1.0 04	177.3	40 58.0	1.0 04	177.4	40 28.0	1.0 04	177.4	2
3	43 55.1	1.0 06	175.8	43 25.2	1.0 06	175.9	42 55.2	1.0 06	175.9	42 25.3	1.0 06	176.0	41 55.3	1.0 06	176.0	41 25.4	1.0 06	176.0	40 55.4	1.0 06	176.1	40 25.4	1.0 06	176.1	3
4	43 51.4	1.0 08	174.5	43 21.5	1.0 08	174.5	42 51.5	1.0 08	174.6	42 21.6	1.0 08	174.6	41 51.7	1.0 08	174.7	41 21.8	1.0 08	174.7	40 51.8	1.0 08	174.7	40 21.9	1.0 08	174.8	4
05	43 46.5	1.0 10	173.1	43 16.7	1.0 10	173.1	42 46.8	1.0 10	173.2	42 16.9	1.0 10	173.3	41 47.0	1.0 10	173.3	41 17.1	1.0 09	173.4	40 47.2	1.0 09	173.4	40 17.3	1.0 09	173.5	05
6	43 40.6	99 12	171.7	43 10.8	99 12	171.8	42 41.0	99 11	171.9	42 11.2	99 11	171.9	41 41.3	99 11	172.0	41 11.5	99 11	172.1	40 41.6	99 11	172.1	40 11.8	99 11	172.2	6
7	43 33.7	99 13	170.3	43 03.9	99 13	170.4	42 34.2	99 13	170.5	42 04.4	99 13	170.6	41 34.6	99 13	170.7	41 04.8	99 13	170.8	40 35.0	99 13	170.8	40 05.2	99 13	170.9	7
8	43 25.7	99 15	169.0	42 56.0	99 15	169.1	42 26.3	99 15	169.2	41 56.6	99 15	169.3	41 26.9	99 15	169.4	40 57.2	99 14	169.5	40 27.4	99 14	169.5	39 57.7	99 14	169.6	8
9	43 16.6	99 17	167.6	42 47.0	99 17	167.7	42 17.4	99 16	167.8	41 47.8	99 16	167.9	41 18.1	99 16	168.0	40 48.5	99 16	168.2	40 18.8	99 16	168.3	39 49.2	99 16	168.4	9
10	43 06.6	98 18	166.3	42 37.0	98 18	166.4	42 07.5	98 18	166.5	41 38.0	98 18	166.6	41 08.4	99 18	166.7	40 38.8	99 18	166.9	40 09.3	99 18	167.0	39 39.7	99 17	167.1	10
1	42 55.5	98 20	164.9	42 26.1	98 20	165.1	41 56.6	98 20	165.2	41 27.2	98 20	165.3	40 57.7	98 19	165.4	40 28.2	98 19	165.6	39 58.7	98 19	165.7	39 29.3	98 19	165.8	1
2	42 43.4	98 22	163.6	42 14.1	98 22	163.7	41 44.7	98 21	163.9	41 15.4	98 21	164.0	40 46.0	98 21	164.2	40 16.6	98 21	164.3	39 47.2	98 21	164.4	39 17.9	98 21	164.6	2
3	42 30.3	97 23	162.3	42 01.1	97 23	162.4	41 31.9	97 23	162.6	41 02.6	98 23	162.7	40 33.3	98 23	162.9	40 04.1	98 22	163.0	39 34.8	98 22	163.2	39 05.5	98 22	163.3	3
4	42 16.3	97 25	161.0	41 47.1	97 25	161.1	41 18.0	97 25	161.3	40 48.9	97 24	161.4	40 19.7	97 24	161.6	39 50.6	97 24	161.8	39 21.4	97 24	161.9	38 52.2	97 24	162.1	4
15	42 01.2	97 27	159.7	41 32.3	97 26	159.8	41 03.3	97 26	160.0	40 34.2	97 26	160.2	40 05.2	97 26	160.3	39 36.2	97 26	160.5	39 07.1	97 25	160.7	38 38.0	97 25	160.8	15
6	41 45.3	96 28	158.4	41 16.4	96 28	158.6	40 47.5	96 28	158.7	40 18.7	96 28	158.9	39 49.7	96 27	159.1	39 20.8	96 27	159.3	38 51.9	96 27	159.4	38 22.9	97 27	159.6	6
7	41 28.4	96 30	157.1	40 59.7	96 29	157.3	40 30.9	96 29	157.5	40 02.2	96 29	157.7	39 33.4	96 29	157.8	39 04.6	96 29	158.0	38 35.8	96 28	158.2	38 07.0	96 28	158.4	7
8	41 10.6	96 31	155.8	40 42.0	96 31	156.0	40 13.4	96 31	156.2	39 44.8	96 30	156.4	39 16.1	96 30	156.6	38 47.5	96 30	156.8	38 18.8	96 30	157.0	37 50.1	96 30	157.2	8
9	40 51.9	95 33	154.6	40 23.4	95 32	154.8	39 55.0	95 32	155.0	39 26.5	95 32	155.2	38 58.0	95 32	155.4	38 29.5	95 31	155.6	38 00.9	95 31	155.8	37 32.4	95 31	156.0	9
20	40 32.3	94 34	153.3	40 04.0	94 34	153.5	39 35.7	94 34	153.8	39 07.3	94 33	154.0	38 39.0	95 33	154.2	38 10.6	95 33	154.4	37 42.2	95 33	154.6	37 13.8	95 32	154.8	20
1	40 11.8	94 36	152.1	39 43.7	94 35	152.3	39 15.5	94 35	152.5	38 47.4	94 35	152.8	38 19.2	94 34	153.0	37 50.9	94 34	153.2	37 22.7	94 34	153.4	36 54.4	94 34	153.6	1
2	39 50.5	93 37	150.9	39 22.6	93 37	151.1	38 54.6	93 36	151.3	38 26.5	93 36	151.6	37 58.5	94 36	151.8	37 30.4	94 36	152.0	37 02.3	94 35	152.2	36 34.2	94 35	152.5	2
3	39 28.4	93 38	149.7	39 00.6	93 38	149.9	38 32.8	93 38	150.2	38 04.9	93 37	150.4	37 37.0	93 37	150.6	37 09.1	93 37	150.9	36 41.1	93 37	151.1	36 13.2	93 36	151.3	3
4	39 05.5	92 40	148.5	38 37.9	92 39	148.7	38 10.2	92 39	149.0	37 42.5	92 39	149.2	37 14.7	93 38	149.5	36 47.0	93 38	149.7	36 19.2	93 38	149.9	35 51.4	93 38	150.2	4
25	38 41.8	92 41	147.3	38 14.3	92 40	147.6	37 46.8	92 40	147.8	37 19.3	92 40	148.1	36 51.7	92 40	148.3	36 24.1	92 39	148.6	35 56.5	92 39	148.8	35 28.8	92 39	149.0	25
6	38 17.4	91 42	146.1	37 50.0	91 42	146.4	37 22.7	91 41	146.7	36 55.3	91 41	146.9	36 27.9	91 41	147.2	36 00.5	92 41	147.4	35 33.0	92 40	147.7	35 05.5	92 40	147.9	6
7	37 52.1	90 43	145.0	37 25.0	91 43	145.3	36 57.8	91 43	145.5	36 30.6	91 42	145.8	36 03.4	91 42	146.0	35 36.1	91 42	146.3	35 08.8	91 42	146.6	34 41.4	91 41	146.8	7
8	37 25.2	90 44	143.9	36 59.2	90 44	144.1	36 32.2	90 44	144.4	36 05.2	90 44	144.7	35 38.1	90 43	144.9	35 11.0	90 43	145.2	34 43.8	91 43	145.5	34 16.7	91 42	145.7	8
9	36 59.5	89 46	142.7	36 32.8	89 45	143.0	36 05.9	90 45	143.3	35 39.0	90 45	143.6	35 12.1	90 44	143.8	34 45.2	90 44	144.1	34 18.2	90 44	144.4	33 51.2	90 44	144.6	9
30	36 32.2	89 47	141.6	36 05.6	89 46	141.9	35 38.9	89 46	142.2	35 12.2	89 46	142.5	34 45.5	89 46	142.8	34 18.7	89 45	143.0	33 51.9	89 45	143.3	33 25.1	90 45	143.6	30
1	36 04.2	88 48	140.5	35 37.7	88 48	140.8	35 11.3	88 47	141.1	34 44.7	88 47	141.4	34 18.2	89 47	141.7	33 51.6	89 46	142.0	33 24.9	89 46	142.2	32 58.2	89 46	142.5	1
2	35 35.5	87 49	139.5	35 09.3	88 49	139.7	34 42.9	88 48	140.0	34 16.6	88 48	140.3	33 50.2	88 48	140.6	33 23.8	88 47	140.9	32 57.3	88 47	141.2	32 30.8	88 47	141.5	2
3	35 06.2	87 50	138.4	34 40.1	87 50	138.7	34 14.0	87 49	139.0	33 47.8	87 49	139.3	33 21.6	87 49	139.6	32 55.3	88 48	139.9	32 29.0	88 48	140.1	32 02.7	88 48	140.4	3
4	34 36.3	86 51	137.3	34 10.4	86 51	137.6	33 44.4	87 50	137.9	33 18.4	87 50	138.2	32 52.4	87 50	138.5	32 26.3	87 49	138.8	32 00.2	87 49	139.1	31 34.0	87 49	139.4	4
35	34 05.8	86 52	136.3	33 40.1	86 52	136.6	33 14.3	86 51	136.9	32 48.4	86 51	137.2	32 22.6	86 51	137.5	31 56.6	86 50	137.8	31 30.7	87 50	138.1	31 04.7	87 50	138.4	35
6	33 34.7	85 53	135.8	33 09.1	85 52	135.6	32 43.5	85 52	135.9	32 17.9	86 52	136.2	31 52.1	86 52	136.5	31 26.4	86 51	136.8	31 00.6	86 51	137.1	30 34.8	86 51	137.4	6
7	33 03.0	85 54	134.3	32 37.6	85 53	134.6	32 12.2	85 53	134.9	31 46.7	85 53	135.2	31 21.2	85 53	135.5	30 55.6	85 52	135.8	30 30.0	85 52	136.1	30 04.3	86 52	136.4	7
8	32 30.8	84 55	133.3	32 05.6	84 54	133.6	31 40.3	84 54	133.9	31 15.0	84 54	134.2	30 49.6	85 53	134.5	30 24.2	85 53	134.8	29 58.8	85 53	135.1	29 33.3	85 53	135.4	8
9	31 58.1	83 55	132.3	31 33.0	84 55	132.6	31 07.9	84 55	132.9	30 42.8	84 55	133.2	30 17.6	84 54	133.5	29 52.4	84 54	133.9	29 27.1	84 54	134.2	29 01.7	84 53	134.5	9
40	31 24.8	83 56	131.3	31 00.0	83 56	131.6	30 35.0	83 56	131.9	30 10.0	83 55	132.3	29 45.0	84 55	132.6	29 19.9	84 55	132.9	28 54.8	84 55	133.2	28 29.7	84 54	133.5	40
1	30 51.1	82 57	130.3	30 26.4	82 57	130.7	30 01.6	83 56	131.0	29 36.8	83 56	131.3	29 11.9	83 56	131.6	28 47.0	83 56	131.9	28 22.1	83 55	132.3	27 57.1	83 55	132.6	1
2	30 16.9	82 58	129.4	29 52.3	82 58	129.7	29 27.7	82 57	130.0	29 03.1	82 57	130.4	28 38.4	82 57	130.7	28 13.6	83 56	131.0	27 48.8	83 56	131.3	27 24.0	83 56	131.6	2
3	29 42.2	81 59	128.4	29 17.8	81 58	128.8	28 53.3	82 58	129.1	28 28.9	82 58	129.4	28 04.3	82 58	129.8	27 39.7	82 57	130.1	27 15.1	82 57	130.4	26 50.4	82 57	130.7	3
4	29 07.0	81 59	127.5	28 42.8	81 59	127.9	28 18.5	81 59	128.2	27 54.2	81 59	128.5	27 29.8	81 58	128.8	27 05.4	81 58	129.2	26 40.9	82 58	129.5	26 16.4	82 57	129.8	4
45	28 31.4	80 60	126.6	28 07.4	80 60	126.9	27 43.3	80 59	127.3	27 19.1	81 59	127.6	26 54.9	81 59	127.9	26 30.6	81 59	128.3	26 06.3	81 58	128.6	25 42.0	81 58	128.9	45
6	27 55.4	80 61	125.7	27 31.5	80 60	126.0	27 07.6	80 60	126.4	26 43.6	80 60	126.7	26 19.5	80 60	127.0	25 55.4	80 59	127.4	25 31.2	81 59	127.7	25 07.1	81 59	128.0	6
7	27 19.0	79 61	124.8	26 55.3	79 61	125.1	26 31.5	79 61	125.5	26 07.6	80 61	125.8	25 43.7	80 60	126.2	25 19.8	80 60	126.5	24 55.8	80 60	126.8	24 31.7	80 60	127.2	7
8	26 42.2	79 62	123.9	26 18.6	79 62	124.3	25 54.9	79 62	124.6	25 31.2	79 61	124.9	25 07.5	79 61	125.3	24 43.7	79 61	125.6	24 19.9	80 60	126.0	23 56.0	80 60	126.3	8
9	26 05.0	78 63	123.0	25 41.6	78 62	123.4	25 18.1	78 62	123.7	24 54.5	79 62	124.1	24 30.9	79 62	124.4	24 07.3	79 61	124.8	23 43.6	79 61	125.1	23 19.8	79 61	125.4	9
50	25 27.5	78 63	122.2	25 04.2	78 63	122.5	24 40.8	78 63	122.9	24 17.4	78 62	123.2	23 53.9	78 62	123.6	23 30.4	78 62	123.9	23 06.9	79 62	124.2	22 43.3	79 62	124.6	50
1	24 49.5	77 64	121.3	24 26.4	77 64	121.7	24 03.2	77 63	122.0	23 39.9	78 63	122.4	23 16.6	78 63	122.7	22 53.2	78 63	123.1	22 29.9	78 62	123.4	22 06.4	78 62	123.7	1
2	24 11.3	77 64	120.5	23 48.3	77 64	120.8	23 25.2	77 64	121.2	23 02.1	77 64	121.5	22 38.9	77 63	121.9	22 15.7	77 63	122.2	21 52.4	78 63	122.6	21 29.2	78 63	122.9	2
3	23 32.7	76 65	119.7	23 09.8	76 65	120.0	22 46.9	77 64	120.4	22 23.9	77 64	120.7	22 00.9	77 64	121.0	21 37.8	77 64	121.4	21 14.7	77 63	121.7	20 51.5	77 63	122.1	3
4	22 53.8	76 65	118.8	22 31.0	76 65	119.2	22 08.2	76 65	119.5	21 45.4	76 65	119.9	21 22.5	76 64	120.2	20 59.6	77 64	120.6	20 36.6	77 64	120.9	20 13.6	77 64	121.3	4
55	22 14.6	75 66	118.0	21 52.0	75 66	118.4	21 29.3	76 65	118.7	21 06.6	76 65	119.1	20 43.8	76 65	119.4	20 21.0	76 65	119.8	19 58.2	76 65	120.1	19 35.3	76 64	120.5	55
6	21 35.1	75 66	117.2	21 12.6	75 66	117.6	20 50.0	75 66	117.9	20 27.5	75 66	118.3	20 04.8	75 65	118.6	19 42.2	76 65	119.0	19 19.5	76 65	119.3	18 56.7	76 65	119.7	6
7	20 55.3	74 67	116.4	20 32.9	75 67	116.8	20 10.5	75 66	117.1	19 48.0	75 66	117.5	19 25.5	75 66	117.8	19 03.0	75 66	118.2	18 40.4	75 66	118.5	18 17.8	75 65	118.9	7
8	20 15.2	74 67	115.6	19 53.0	74 67	116.0	19 30.7	74 67	116.3	19 08.3	74 67	116.7	18 46.0	75 66	117.0	18 23.6	75 66	117.4	18 01.1	75 66	117.7	17 38.6	75 66	118.1	8
9	19 34.9	74 68	114.8	19 12.7	74 67	115.2	18 50.6	74 67	115.5	18 28.4	74 67	115.9	18 06.1	74 67	116.3	17 43.8	74 67	116.6	17 21.5	74 66	117.0	16 59.1	75 66	117.3	9
60	18 54.3	73 68	114.1	18 32.3	73 68	114.4	18 10.2	74 68	114.8	17 48.1	74 68	115.1	17 26.0	74 67	115.5	17 03.8	74 67	115.8	16 41.6	74 67	116.2	16 19.4	74 67	116.5	60
1	18 13.4	73 68	113.3	17 51.5	73 68	113.6	17 29.6	73 68	114.0	17 07.6	73 68	114.4	16 45.6	73 68	114.7	16 23.6	74 68	115.1	16 01.5	74 67	115.4	15 39.4	74 67	115.8	1
2	17 32.4	73 69	112.5	17 10.6	73 69	112.9	16 48.7	73 68	113.2	16 26.9	73 68	113.6	16 05.0	73 68	114.0	15 43.1	73 68	114.3	15 21.1	73 68	114.7	14 59.1	73 68	115.0	2
3	16 51.1	72 69	111.8	16 29.4	72 69	112.1	16 07.7	72 69	112.5	15 45.9	73 69	112.8	15 24.1	73 68	113.2	15 02.3	73 68	113.6	14 40.4	73 68	113.9	14 18.6	73 68	114.3	3
4	16 09.5	72 70	111.0	15 48.0	72 69	111.4	15 26.3	72 69	111.7	15 04.7	72 69	112.1	14 43.0	72 69	112.5	14 21.3	72 69	112.8	13 59.6	73 69	113.2	13 37.8	73 68	113.5	4
65	15 27.8	72 70	110.3	15 06.3	72 70	110.6	14 44.8	72 70	111.0	14 23.3	72 69	111.4	14 01.7	72 69	111.7	13 40.1	72 69	112.1	13 18.5	72 69	112.4	12 56.8	72 69	112.8	65
6	14 45.9	71 70	109.5	14 24.5	71 70	109.9	14 03.1	71 70	110.3	13 41.7	72 70	110.6	13 20.2	72 70	111.0	12 58.7	72 69	111.3	12 37.1	72 69	111.7	12 15.6	72 69	112.0	6
7	14 03.8	71 71	108.8	13 42.5	71 70	109.2	13 21.2	71 70	109.5	12 59.8	71 70	109.9	12 38.4	71 70	110.2	12 17.0	71 70	110.6	11 55.6	71 70	111.0	11 34.1	72 69	111.3	7
8	13 21.5	71 71	108.1	13 00.3	71 71	108.4	12 39.0	71 70	108.8	12 17.8	71 70	109.2	11 56.5	71 70	109.5	11 35.2	71 70	109.9	11 13.9	71 70	110.2	10 52.5	71 70	110.6	8
9	12 39.0	70 71	107.4	12 17.9	70 71	107.7	11 56.8	71 71	108.1	11 35.6	71 71	108.4	11 14.4	71 70	108.8	10 53.2	71 70	109.2	10 31.9	71 70	109.5	10 10.7	71 70	109.9	9
70	11 56.4	70 71	106.6	11 35.3	70 71	107.0	11 14.3	70 71	107.4	10 53.2	70 71	107.7	10 32.1	70 71	108.1	10 11.0	70 71	108.5	9 49.8	71 70	108.8	9 28.6	71 70	109.2	70
1	11 13.6	70 72	105.9	10 52.6	70 71	106.3	10 31.6	70 71	106.7	10 10.6	70 71	107.0	9 49.6	70 71	107.4	9 28.6	70 71	107.7	9 07.5	70 71	108.1	8 46.4	70 71	108.5	1
2	10 30.6	70 72	105.2	10 00.7	70 72	105.6	9 48.8	70 72	105.9	9 27.9	70 71	106.3	9 07.0	70 71	106.7	8 46.0	70 71	107.0	8 25.1	70 71	107.4	8 04.1	70 71	107.8	2
3	9 47.5	69 72	104.5	9 26.7	69 72	104.9	9 05.9	69 72	105.2	8 45.1	69 72	105.6	8 24.2	70 72	106.0	8 03.3	70 71	106.3	7 42.4	70 71	106.7	7 21.5	70 71	107.1	3
4	9 04.3	69 72	103.8	8 43.6	69 72	104.2	8 22.8	69 72	104.5	8 02.0	69 72	104.9	7 41.3	69 72	105.3	7 20.5	69 72	105.6	6 59.6	69 72	106.0	6 38.8	69 71	106.4	4
75	8 20.9	69 72	103.1	8 00.3	69 72	103.5	7 39.6	69 72	103.9	7 18.9	69 72	104.2	6 58.2	69 72	104.6	6 37.4	69 72	104.9	6 16.7	69 72	105.3	5 55.9	69 72	105.7	75
6	7 37.4	69 73	102.4	7 16.8	69 73	102.8	6 56.2	69 72	103.2	6 35.6	69 72	103.5	6 15.0	69 72	103.9	5 54.3	69 72	104.3	5 33.6	69 72	104.6	5 12.9	69 72	105.0	6
7	6 53.8	68 73	101.7	6 33.3	68 73	102.1	6 12.8	69 73	102.5	5 52.2	69 73	102.8	5 31.6	69 72	103.2	5 11.0	69 72	103.6							7
8	6 10.1	68 73	101.1	5 49.6	68 73	101.4	5 29.2	68 73	101.8	5 08.7	68 73	102.2													8
9	5 26.3	68 73	100.4	5 05.9	68 73	100.7																			9

Lat. 42°

Lat. 43°

Lat. 44°

Lat. 45°

Lat. 46°

Lat. 47°

Lat. 48°

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Lat. 42°

H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	56 00.0	1.0 01	180.0	56 30.0	1.0 01	180.0	57 00.0	1.0 01	180.0	57 30.0	1.0 01	180.0	58 00.0	1.0 01	180.0	58 30.0	1.0 01	180.0	59 00.0	1.0 01	180.0	59 30.0	1.0 01	180.0	00
1	55 59.3	1.0 03	178.2	56 29.3	1.0 03	178.2	56 59.3	1.0 04	178.2	57 29.3	1.0 04	178.2	57 59.3	1.0 04	178.1	58 29.3	1.0 04	178.1	58 59.3	1.0 04	178.1	59 29.2	1.0 04	178.1	1
2	55 57.2	1.0 06	176.5	56 27.2	1.0 06	176.4	56 57.2	1.0 06	176.4	57 27.1	1.0 06	176.3	57 57.1	1.0 06	176.3	58 27.1	1.0 06	176.2	58 57.0	1.0 06	176.2	59 27.0	1.0 06	176.1	2
3	55 53.8	1.0 08	174.7	56 23.7	1.0 08	174.6	56 53.7	1.0 08	174.6	57 23.6	1.0 08	174.5	57 53.5	1.0 08	174.4	58 23.4	1.0 08	174.4	58 53.3	1.0 09	174.3	59 23.3	1.0 09	174.2	3
4	55 49.0	1.0 10	172.9	56 18.9	1.0 10	172.9	56 48.7	1.0 11	172.8	57 18.6	1.0 11	172.7	57 48.5	1.0 11	172.6	58 18.3	1.0 11	172.5	58 48.2	99 11	172.4	59 18.0	99 11	172.3	4
05	55 42.8	99 12	171.2	56 12.6	99 13	171.1	56 42.4	99 13	171.0	57 12.2	99 13	170.9	57 42.0	99 13	170.8	58 11.8	99 13	170.6	58 41.6	99 13	170.5	59 11.3	99 14	170.4	05
6	55 35.3	99 15	169.4	56 05.1	99 15	169.3	56 34.8	99 15	169.2	57 04.5	99 15	169.1	57 34.1	99 15	168.9	58 03.8	99 16	168.8	58 33.5	99 16	168.7	59 03.2	99 16	168.5	6
7	55 26.5	99 17	167.7	55 56.1	99 17	167.6	56 25.7	99 17	167.4	56 55.3	99 17	167.3	57 24.9	99 18	167.1	57 54.5	99 18	167.0	58 24.0	98 18	166.8	58 53.6	98 18	166.6	7
8	55 16.4	98 19	166.0	55 45.9	98 19	165.8	56 15.4	98 20	165.7	56 44.8	98 20	165.5	57 14.3	98 20	165.3	57 43.7	98 20	165.2	58 13.1	98 20	165.0	58 42.6	98 21	164.8	8
9	55 05.0	98 21	164.3	55 34.3	98 21	164.1	56 03.7	98 22	163.9	56 33.0	98 22	163.7	57 02.3	98 22	163.6	57 31.6	98 22	163.4	58 00.9	98 23	163.1	58 30.2	97 23	162.9	9
10	54 52.3	97 23	162.6	55 21.5	97 24	162.4	55 50.7	97 24	162.2	56 19.9	97 24	162.0	56 49.0	97 24	161.8	57 18.2	97 25	161.6	57 47.3	97 25	161.4	58 16.4	97 25	161.1	10
1	54 38.3	97 25	160.9	55 07.4	97 26	160.7	55 36.4	97 26	160.5	56 05.5	97 26	160.3	56 34.5	97 26	160.1	57 03.4	97 27	159.8	57 32.4	96 27	159.6	58 01.3	96 27	159.3	1
2	54 23.1	96 27	159.3	54 52.1	96 28	159.1	55 20.9	96 28	158.8	55 49.8	96 28	158.6	56 18.6	96 28	158.3	56 47.4	96 29	158.1	57 16.2	96 29	157.8	57 44.9	96 29	157.6	2
3	54 06.8	96 29	157.7	54 35.5	96 30	157.4	55 04.2	96 30	157.2	55 32.9	96 30	156.9	56 01.6	95 30	156.6	56 30.2	95 31	156.4	56 58.7	95 31	156.1	57 27.3	96 31	155.8	3
4	53 49.3	95 31	156.1	54 17.8	95 31	155.8	54 46.3	95 32	155.5	55 14.8	95 32	155.3	55 43.3	95 32	155.0	56 11.7	95 33	154.7	56 40.1	94 33	154.4	57 08.4	94 33	154.1	4
15	53 30.6	95 33	154.5	53 59.0	94 33	154.2	54 27.3	94 34	153.9	54 55.6	94 34	153.6	55 23.8	94 34	153.3	55 52.0	94 35	153.0	56 20.2	94 35	152.7	56 48.3	94 35	152.4	15
6	53 10.8	94 35	152.9	53 39.0	94 35	152.6	54 07.1	94 35	152.3	54 35.2	94 36	152.0	55 03.3	93 36	151.7	55 31.3	93 36	151.4	55 59.2	93 37	151.1	56 27.1	93 37	150.7	6
7	52 50.0	93 36	151.4	53 18.0	93 37	151.1	53 45.9	93 37	150.8	54 13.8	93 38	150.4	54 41.6	93 38	150.1	55 09.4	92 38	149.8	55 37.1	92 39	149.5	56 04.7	92 39	149.1	7
8	52 28.1	93 38	149.8	52 55.9	92 39	149.5	53 23.6	92 39	149.2	53 51.2	92 39	148.9	54 18.9	92 40	148.6	54 46.4	92 40	148.2	55 13.9	92 40	147.9	55 41.3	91 41	147.5	8
9	52 05.2	92 40	148.4	52 32.8	92 40	148.0	53 00.3	92 41	147.7	53 27.7	91 41	147.4	53 55.1	91 41	147.0	54 22.4	91 42	146.7	54 49.7	91 42	146.3	55 16.9	91 42	145.9	9
20	51 41.3	91 41	146.9	52 08.7	91 42	146.5	52 35.9	91 42	146.2	53 03.2	91 42	145.9	53 30.3	90 43	145.5	53 57.4	90 43	145.1	54 24.4	90 44	144.8	54 51.4	90 44	144.4	20
1	51 16.5	90 43	145.4	51 43.6	90 43	145.1	52 10.7	90 44	144.7	52 37.7	90 44	144.4	53 04.6	90 44	144.0	53 31.4	89 45	143.6	53 58.2	89 45	143.3	54 24.9	89 46	142.9	1
2	50 50.8	90 44	144.0	51 17.7	90 45	143.7	51 44.5	89 45	143.3	52 11.2	89 46	142.9	52 37.9	89 46	142.6	53 04.6	89 46	142.2	53 31.1	88 47	141.8	53 57.6	88 47	141.4	2
3	50 24.1	89 46	142.6	50 50.8	89 46	142.3	51 17.4	89 47	141.9	51 43.9	88 47	141.5	52 10.4	88 47	141.1	52 36.8	88 48	140.7	53 03.1	88 48	140.4	53 29.3	87 49	139.9	3
4	49 56.6	88 47	141.3	50 23.1	88 48	140.9	50 49.5	88 48	140.5	51 15.8	88 48	140.1	51 42.0	87 49	139.7	52 08.1	87 49	139.3	52 34.2	87 50	138.9	53 00.2	86 50	138.5	4
25	49 28.3	88 48	139.9	49 54.5	87 49	139.5	50 20.7	87 49	139.1	50 46.8	87 50	138.8	51 12.8	87 50	138.4	51 38.7	86 50	138.0	52 04.5	86 51	137.5	52 30.3	86 51	137.1	25
6	48 59.2	87 50	138.6	49 25.2	87 50	138.2	49 51.1	86 51	137.8	50 17.0	86 51	137.4	50 42.8	86 51	137.0	51 08.4	85 52	136.6	51 34.0	85 52	136.2	51 59.5	85 52	135.8	6
7	48 29.3	86 51	137.3	48 55.1	86 51	136.9	49 20.8	86 52	136.5	49 46.4	85 52	136.1	50 12.0	85 52	135.7	50 37.4	85 53	135.3	51 02.8	84 53	134.9	51 28.1	84 54	134.4	7
8	47 58.7	85 52	136.0	48 24.3	85 53	135.6	48 49.8	85 53	135.2	49 15.2	85 53	134.8	49 40.5	84 54	134.4	50 05.7	84 54	134.0	50 30.8	84 54	133.6	50 55.9	83 55	133.1	8
9	47 27.4	85 53	134.8	47 52.8	84 54	134.4	48 18.0	84 54	134.0	48 43.2	84 54	133.5	49 08.3	83 55	133.1	49 33.3	83 55	132.7	49 58.2	83 56	132.3	50 23.0	83 56	131.8	9
30	46 55.4	84 54	133.5	47 20.5	84 55	133.1	47 45.6	83 55	132.7	48 10.5	83 55	132.3	48 35.4	83 56	131.9	49 00.2	82 56	131.5	49 24.9	82 57	131.0	49 49.4	82 57	130.6	30
1	46 22.8	83 55	132.3	46 47.7	83 56	131.9	47 12.5	83 56	131.5	47 37.3	82 56	131.1	48 01.9	82 57	130.7	48 26.5	82 57	130.2	48 50.9	81 58	129.8	49 15.3	81 58	129.4	1
2	45 49.5	82 56	131.1	46 14.2	82 57	130.7	46 38.8	82 57	130.3	47 03.3	82 57	129.9	47 27.8	81 58	129.5	47 52.1	81 58	129.0	48 16.4	81 59	128.6	48 40.5	80 59	128.2	2
3	45 15.6	82 57	130.0	45 40.1	82 58	129.6	46 04.5	81 58	129.2	46 28.9	81 58	128.7	46 53.1	81 59	128.3	47 17.2	80 59	127.9	47 41.2	80 59	127.4	48 05.1	80 60	127.0	3
4	44 41.2	81 58	128.8	45 05.5	81 59	128.4	45 29.7	81 59	128.0	45 53.8	80 59	127.6	46 17.8	80 60	127.2	46 41.7	80 60	126.7	47 05.5	79 60	126.3	47 29.2	79 61	125.8	4
35	44 06.2	80 59	127.7	44 30.3	80 60	127.3	44 54.3	80 60	126.9	45 18.2	80 60	126.5	45 42.0	79 61	126.0	46 05.7	79 61	125.6	46 29.3	79 61	125.1	46 52.8	78 62	124.7	35
6	43 30.6	80 60	126.6	43 54.5	80 60	126.2	44 18.4	79 61	125.8	44 42.1	79 61	125.4	45 05.7	79 61	124.9	45 29.2	78 62	124.5	45 52.6	78 62	124.0	46 15.9	78 62	123.6	6
7	42 54.6	79 61	125.5	43 18.3	79 61	125.1	43 41.9	79 61	124.7	44 05.5	78 62	124.3	44 28.9	78 62	123.8	44 52.2	78 62	123.4	45 15.4	77 63	122.9	45 38.5	77 63	122.5	7
8	42 18.1	79 62	124.5	42 41.6	78 62	124.1	43 05.0	78 62	123.6	43 28.4	78 63	123.2	43 51.6	77 63	122.8	44 14.8	77 63	122.3	44 37.8	77 63	121.9	45 00.7	76 64	121.4	8
9	41 41.1	78 62	123.4	42 04.5	78 63	123.0	42 27.7	77 63	122.6	42 50.9	77 63	122.2	43 13.9	77 64	121.7	43 36.9	76 64	121.3	43 59.7	76 64	120.8	44 22.4	76 64	120.4	9
40	41 03.7	77 63	122.4	41 26.8	77 63	122.0	41 49.9	77 64	121.6	42 12.9	76 64	121.1	42 35.8	76 64	120.7	42 58.5	76 65	120.2	43 21.2	75 65	119.8	43 43.8	75 65	119.3	40
1	40 25.8	77 64	121.4	40 48.8	76 64	121.0	41 11.7	76 64	120.6	41 34.5	76 65	120.1	41 57.2	76 65	119.7	42 19.8	75 65	119.2	42 42.3	75 65	118.8	43 04.7	74 66	118.3	1
2	39 47.6	76 64	120.4	40 10.4	76 65	120.0	40 33.1	76 65	119.6	40 55.8	75 65	119.1	41 18.3	75 66	118.7	41 40.7	75 66	118.2	42 03.1	74 66	117.8	42 25.3	74 66	117.3	2
3	39 08.9	76 65	119.4	39 31.6	75 65	119.0	39 54.2	75 66	118.6	40 16.6	75 66	118.2	40 39.0	74 66	117.7	41 01.3	74 66	117.3	41 23.5	74 67	116.8	41 45.5	73 67	116.4	3
4	38 29.9	75 66	118.5	38 52.4	75 66	118.1	39 14.8	75 66	117.6	39 37.1	74 66	117.2	39 59.4	74 67	116.8	40 21.5	74 67	116.3	40 43.5	73 67	115.9	41 05.4	73 67	115.4	4
45	37 50.6	75 66	117.5	38 12.9	74 66	117.1	38 35.2	74 67	116.7	38 57.3	74 67	116.3	39 19.4	73 67	115.8	39 41.4	73 67	115.4	40 03.2	73 68	114.9	40 25.0	72 68	114.5	45
6	37 10.9	74 67	116.6	37 33.1	74 67	116.2	37 55.2	74 67	115.8	38 17.2	73 67	115.3	38 39.1	73 68	114.9	39 00.9	73 68	114.5	39 22.6	72 68	114.0	39 44.3	72 68	113.6	6
7	36 30.8	74 67	115.7	36 52.9	73 67	115.3	37 14.8	73 68	114.8	37 36.7	73 68	114.4	37 58.5	72 68	114.0	38 20.2	72 68	113.5	38 41.8	72 69	113.1	39 03.2	71 69	112.6	7
8	35 50.5	73 68	114.8	36 12.4	73 68	114.4	36 34.2	73 68	113.9	36 56.0	72 68	113.5	37 17.6	72 69	113.1	37 39.2	72 69	112.6	38 00.6	71 69	112.2	38 22.0	71 69	111.8	8
9	35 09.9	73 68	113.9	35 31.7	72 68	113.5	35 53.4	72 69	113.1	36 15.0	72 69	112.6	36 36.5	72 69	112.2	36 57.9	71 69	111.8	37 19.2	71 69	111.3	37 40.4	71 70	110.9	9
50	34 29.0	72 69	113.0	34 50.6	72 69	112.6	35 12.2	72 69	112.2	35 33.7	71 69	111.8	35 55.1	71 69	111.3	36 16.3	71 70	110.9	36 37.5	70 70	110.5	36 58.6	70 70	110.0	50
1	33 47.8	72 69	112.2	34 09.3	72 69	111.7	34 30.8	71 69	111.3	34 52.1	71 70	110.9	35 13.4	71 70	110.5	35 34.6	70 70	110.0	35 55.6	70 70	109.6	36 16.6	70 70	109.2	1
2	33 06.4	72 69	111.3	33 27.8	71 70	110.9	33 49.1	71 70	110.5	34 10.4	71 70	110.1	34 31.5	70 70	109.6	34 52.6	70 70	109.2	35 13.5	70 71	108.8	35 34.4	69 71	108.3	2
3	32 24.7	71 70	110.5	32 46.0	71 70	110.1	33 07.2	71 70	109.6	33 28.4	70 70	109.2	33 49.4	70 71	108.8	34 10.3	70 71	108.4	34 31.2	69 71	107.9	34 52.0	69 71	107.5	3
4	31 42.9	71 70	109.6	32 04.0	70 70	109.2	32 25.1	70 70	108.8	32 46.2	70 71	108.4	33 07.1	70 71	108.0	33 27.9	69 71	107.5	33 48.7	69 71	107.1	34 09.3	69 71	106.7	4
55	31 00.8	70 70	108.8	31 21.8	70 71	108.4	31 42.8	70 71	108.0	32 03.7	70 71	107.6	32 24.6	69 71	107.1	32 45.3	69 71	106.7	33 06.0	69 71	106.3	33 26.5	68 72	105.9	55
6	30 18.5	70 71	108.0	30 39.4	70 71	107.6	31 00.3	70 71	107.2	31 21.1	69 71	106.8	31 41.9	69 71	106.3	32 02.5	69 72	105.9	32 23.1	68 72	105.5	32 43.6	68 72	105.1	6
7	29 36.0	70 71	107.2	29 56.8	69 71	106.8	30 17.6	69 71	106.4	30 38.4	69 72	106.0	30 59.0	69 72	105.6	31 19.6	68 72	105.1	31 40.0	68 72	104.7	32 00.4	68 72	104.3	7
8	28 53.3	69 71	106.4	29 14.1	69 72	106.0	29 34.8	69 72	105.6	29 55.4	69 72	105.2	30 16.0	68 72	104.8	30 36.4	68 72	104.3	30 56.8	68 72	103.9	31 17.1	68 72	103.5	8
9	28 10.4	69 72	105.7	28 31.1	69 72	105.2	28 51.8	69 72	104.8	29 12.3	68 72	104.4	29 32.8	68 72	104.0	29 53.2	68 72	103.6	30 13.5	68 72	103.1	30 33.7	67 73	102.7	9
60	27 27.4	69 72	104.9	27 48.0	69 72	104.5	28 08.6	68 72	104.1	28 29.0	68 72	103.6	28 49.4	68 72	103.2	29 09.8	68 73	102.8	29 30.0	67 73	102.4	29 50.1	67 73	102.0	60
1	26 44.2	69 72	104.1	27 04.8	68 72	103.7	27 25.3	68 72	103.3	27 45.6	68 73	102.9	28 06.0	68 73	102.5	28 26.2	67 73	102.0	28 46.4	67 73	101.6	29 06.5	67 73	101.2	1
2	26 00.9	68 72	103.4	26 21.4	68 73	103.0	26 41.8	68 73	102.5	27 02.1	68 73	102.1	27 22.4	67 73	101.7	27 42.5	67 73	101.3	28 02.6	67 73	100.9	28 22.7	67 73	100.5	2
3	25 17.5	68 73	102.6	25 37.9	68 73	102.2	25 58.2	68 73	101.8	26 18.5	67 73	101.4	26 38.7	67 73	101.0	26 58.8	67 73	100.6	27 18.8	67 73	100.1	27 38.8	66 73	99.7	3
4	24 33.9	68 73	101.9	24 54.2	68 73	101.5	25 14.5	67 73	101.1	25 34.7	67 73	100.6	25 54.8	67 73	100.2	26 14.9	67 73	99.8	26 34.9	67 73	99.4	26 54.8	66 73	99.0	4
65	23 50.2	68 73	101.1	24 10.5	67 73	100.7	24 30.7	67 73	100.3	24 50.8	67 73	99.9	25 10.9	67 73	99.5	25 30.9	67 73	99.1	25 50.8	66 74	98.7	26 10.7	66 74	98.3	65
6	23 06.4	67 73	100.4	23 26.6	67 73	100.0	23 46.8	67 73	99.6	24 06.9	67 73	99.2	24 26.9	67 74	98.8	24 46.8	66 74	98.4	25 06.7	66 74	98.0	25 26.5	66 74	97.5	6
7	22 22.5	67 73	99.7	22 42.7	67 73	99.3	23 02.8	67 74	98.9	23 22.8	67 74	98.5	23 42.8	66 74	98.1	24 02.7	66 74	97.7	24 22.5	66 74	97.2	24 42.3	66 74	96.8	7
8	21 38.5	67 73	99.0	21 58.6	67 74	98.6	22 18.7	67 74	98.2	22 38.7	67 74	97.8	22 58.6	66 74	97.4	23 18.4	66 74	96.9	23 38.2	66 74	96.5	23 58.0	66 74	96.1	8
9	20 54.4	67 74	98.2	21 14.5	67 74	97.9	21 34.5	67 74	97.5	21 54.4	66 74	97.0	22 14.3	66 74	96.6	22 34.2	66 74	96.2	22 53.9	66 74	95.8	23 13.6	66 74	95.4	9
70	20 10.3	67 74	97.5	20 30.3	67 74	97.1	20 50.2	66 74	96.7	21 10.2	66 74	96.3	21 30.0	66 74	95.9	21 49.8	66 74	95.5	22 09.5	66 74	95.1	22 29.2	65 74	94.7	70
1	19 26.8	67 74	96.8	19 46.0	67 74	96.4	20 05.9	66 74	96.0	20 25.8	66 74	95.6	20 45.6	66 74	95.2	21 05.4	66 74	94.8	21 25.1	66 74	94.4	21 44.8	65 74	94.0	1
2	18 41.7	67 74	96.1	19 01.7	66 74	95.7	19 21.6	66 74	95.4	19 41.4	66 74	95.0	20 01.2	66 74	94.6	20 20.9	66 74	94.2	20 40.6	66 74	93.7	21 00.3	65 74	93.3	2
3	17 57.4	66 74	95.4	18 17.3	66 74	95.1	18 37.1	66 74	94.7	18 57.0	66 74	94.3	19 16.7	66 74	93.9	19 36.5	66 74	93.5	19 56.1	65 74	93.1	20 15.7	65 74	92.7	3
4	17 12.9	66 74	94.8	17 32.8	66 74	94.4	17 52.7	66 74	94.0	18 12.5	66 74	93.6	18 32.2	66 74	93.2	18 51.9	66 74	92.8	19 11.6	65 74	92.4	19 31.2	65 74	92.0	4
75	16 28.5	66 74	94.1	16 48.4	66 74	93.7	17 08.2	66 74	93.3	17 28.0	66 74	92.9	17 47.7	66 74	92.5	18 07.4	66 74	92.1	18 27.0	65 74	91.7	18 46.6	65 74	91.3	75
6	15 44.0	66 74	93.4	16 03.8	66 74	93.0	16 23.7	66 74	92.6	16 43.4	66 74	92.2	17 03.1	66 74	91.8	17 22.8	66 74	91.4	17 42.4	65 74	91.0	18 02.0	65 74	90.6	6
7	14 59.5	66 74	92.7	15 19.3	66 74	92.3	15 39.1	66 74	91.9	15 58.9	66 74	91.5	16 18.6	66 74	91.1	16 38.2	65 74	90.8	16 57.9	65 74	90.4	17 17.4	65 74	90.0	7
8	14 14.9	66 74	92.0	14 34.7	66 74	91.6	14 54.5	66 74	91.3	15 14.3	66 74	90.9	15 34.0	66 74	90.5	15 53.6	65 74	90.1	16 13.3	65 74	89.7	16 32.8	65 74	89.3	8
9	13 30.3	66 74	91.4	13 50.2	66 74	91.0	14 09.9	66 74	90.6	14 29.7	66 74	90.2	14 49.4	66 74	89.8	15 09.1	65 74	89.4	15 28.7	65 74	89.0	15 48.3	65 74	88.6	9
80	12 45.8	66 74	90.7	13 05.6	66 74	90.3	13 25.4	66 74	89.9	13 45.1	66 74	89.5	14 04.8	66 74	89.1	14 24.5	66 74	88.7	14 44.1	65 74	88.4	15 03.7	65 74	88.0	80
1	12 01.2	66 74	90.0	12 21.0	66 74	89.6	12 40.8	66 74	89.2	13 00.5	66 74	88.9	13 20.2	66 74	88.5	13 39.9	66 74	88.1	13 59.5	65 74	87.7	14 19.1	65 74	87.3	1
2	11 16.6	66 74	89.3	11 36.4	66 74	89.0	11 56.2	66 74	88.6	12 15.9	66 74	88.2	12 35.7	66 74	87.8	12 55.4	66 74	87.4	13 15.0	65 74	87.0	13 34.6	65 74	86.6	2
3	10 32.0	66 74	88.7	10 51.8	66 74	88.3	11 11.6	66 74	87.9	11 31.4	66 74	87.5	11 51.1	66 74	87.1	12 10.8	66 74	86.8	12 30.5	66 74	86.4	12 50.1	65 74	86.0	3
4	9 47.4	66 74	88.0	10 07.3	66 74	87.6	10 27.1	66 74	87.3	10 46.9	66 74	86.9	11 06.6	66 74	86.5	11 26.3	66 74	86.1	11 46.0	66 74	85.7	12 05.7	65 74	85.3	4
85	9 02.9	66 74	87.3	9 22.7	66 74	87.0	9 42.6	66 74	86.6	10 02.3	66 74	86.2	10 22.1	66 74	85.8	10 41.9	66 74	85.4	11 01.6	66 74	85.1	11 21.2	66 74	84.7	85
6	8 18.4	66 74	86.7	8 38.2	66 74	86.3	8 58.1	66 74	85.9	9 17.9	66 74	85.5	9 37.7	66 74	85.2	9 57.4	66 74	84.8	10 17.2	66 74	84.4	10 36.9	66 74	84.0	6
7	7 33.9	66 74	86.0	7 53.7	66 74	85.6	8 13.6	66 74	85.3	8 33.4	66 74	84.9	8 53.3	66 74	84.5	9 13.0	66 74	84.1	9 32.8	66 74	83.7	9 52.6	66 74	83.4	7
8	6 49.4	66 74	85.4	7 09.3	66 74	85.0	7 29.2	66 74	84.6	7 49.0	66 74	84.2	8 08.9	66 74	83.8	8 28.7	66 74	83.5	8 48.5	66 74	83.1	9 08.3	66 74	82.7	8
9	6 05.0	66 74	84.7	6 24.9	66 74	84.3	6 44.8	66 74	83.9	7 04.7	66 74	83.6	7 24.6	66 74	83.2	7 44.4	66 74	82.8	8 04.3	66 74	82.4	8 24.1	66 74	82.1	9
90	5 20.6	67 74	84.0	5 40.6	67 74	83.7	6 00.5	66 74	83.3	6 20.4	66 74	82.9	6 40.3	66 74	82.5	7 00.2	66 74	82.2	7 20.1	66 73	81.8	7 40.0	66 73	81.4	90

Lat. 42°

H.A.	8° 00′ Alt.	Az.	Δd	Δt	8° 30′ Alt.	Az.	Δd	Δt	9° 00′ Alt.	Az.	Δd	Δt	9° 30′ Alt.	Az.	Δd	Δt	10° 00′ Alt.	Az.	Δd	Δt	10° 30′ Alt.	Az.	Δd	Δt	11° 00′ Alt.	Az.	Δd	Δt	11° 30′ Alt.	Az.	Δd	Δt	H.A.
°	° ′	°			° ′	°			° ′	°			° ′	°			° ′	°			° ′	°			° ′	°			° ′	°			°
00	40 00.0	180.0	1.0	01	39 30.0	180.0	1.0	01	39 00.0	180.0	1.0	01	38 30.0	180.0	1.0	01	38 00.0	180.0	1.0	01	37 30.0	180.0	1.0	01	37 00.0	180.0	1.0	01	36 30.0	180.0	1.0	01	00
1	39 59.5	178.7	1.0	03	39 29.5	178.7	1.0	02	38 59.5	178.7	1.0	02	38 29.5	178.7	1.0	02	37 59.5	178.8	1.0	02	37 29.5	178.8	1.0	02	36 59.5	178.8	1.0	02	36 29.5	178.8	1.0	02	1
2	39 58.0	177.4	1.0	04	39 28.0	177.4	1.0	04	38 58.0	177.5	1.0	04	38 28.0	177.5	1.0	04	37 58.1	177.5	1.0	04	37 28.1	177.5	1.0	04	36 58.1	177.5	1.0	04	36 28.1	177.6	1.0	04	2
3	39 55.5	176.1	1.0	06	39 25.5	176.2	1.0	06	38 55.6	176.2	1.0	06	38 25.6	176.2	1.0	06	37 55.6	176.3	1.0	06	37 25.7	176.3	1.0	06	36 55.7	176.3	1.0	06	36 25.7	176.3	1.0	06	3
4	39 52.0	174.8	1.0	08	39 22.0	174.9	1.0	07	38 52.1	175.0	1.0	07	38 22.2	175.0	1.0	07	37 52.2	175.0	1.0	07	37 22.3	175.0	1.0	07	36 52.4	175.1	1.0	07	36 22.4	175.1	1.0	07	4
05	39 47.5	173.6	1.0	09	39 17.6	173.6	1.0	09	38 47.7	173.7	1.0	09	38 17.8	173.7	1.0	09	37 47.9	173.8	1.0	09	37 18.0	173.8	1.0	09	36 48.1	173.9	1.0	09	36 18.2	173.9	1.0	09	05
6	39 41.9	172.3	99	11	39 12.1	172.3	99	11	38 42.2	172.4	1.0	11	38 12.4	172.5	1.0	11	37 42.5	172.5	1.0	10	37 12.7	172.6	1.0	10	36 42.8	172.6	1.0	10	36 13.0	172.7	1.0	10	6
7	39 35.5	171.0	99	12	39 05.7	171.1	99	12	38 35.9	171.1	99	12	38 06.1	171.2	99	12	37 36.3	171.3	99	12	37 06.5	171.4	99	12	36 36.7	171.4	99	12	36 06.8	171.5	99	12	7
8	39 28.0	169.7	99	14	38 58.3	169.8	99	14	38 28.5	169.9	99	14	37 58.8	170.0	99	14	37 29.0	170.1	99	14	36 59.3	170.2	99	14	36 29.5	170.2	99	13	35 59.8	170.3	99	13	8
9	39 19.5	168.4	99	16	38 49.9	168.5	99	16	38 20.2	168.6	99	15	37 59.5	168.7	99	15	37 20.9	168.8	99	15	36 51.2	168.9	99	15	36 21.5	169.0	99	15	35 51.8	169.1	99	15	9
10	39 10.1	167.2	99	17	38 40.5	167.3	99	17	38 11.0	167.4	99	17	37 41.4	167.5	99	17	37 11.8	167.6	99	17	36 42.2	167.7	99	17	36 12.5	167.8	99	16	35 42.9	167.9	99	16	10
1	38 59.8	165.9	98	19	38 30.3	166.0	98	19	38 00.8	166.2	98	19	37 31.2	166.3	98	18	37 01.7	166.4	98	18	36 32.2	166.5	98	18	36 02.7	166.6	98	18	35 33.1	166.7	98	18	1
2	38 48.5	164.7	98	20	38 19.0	164.8	98	20	37 49.6	164.9	98	20	37 20.2	165.1	98	20	36 50.8	165.2	98	20	36 21.3	165.3	98	20	35 51.9	165.4	98	19	35 22.4	165.5	98	19	2
3	38 36.2	163.4	98	22	38 06.9	163.6	98	22	37 37.6	163.7	98	21	37 08.2	163.8	98	21	36 38.9	164.0	98	21	36 09.6	164.1	98	21	35 40.2	164.2	98	21	35 10.8	164.4	98	21	3
4	38 23.0	162.2	97	23	37 53.8	162.4	97	23	37 24.6	162.5	97	23	36 55.4	162.6	97	23	36 26.2	162.8	97	23	35 56.9	162.9	98	23	35 27.6	163.0	98	22	34 58.4	163.2	98	22	4
15	38 09.0	161.0	97	25	37 39.9	161.1	97	25	37 10.8	161.3	97	26	36 41.6	161.4	97	24	36 12.5	161.6	97	24	35 43.4	161.7	97	24	35 14.2	161.9	97	24	34 45.1	162.0	97	24	15
6	37 54.0	159.8	97	26	37 25.0	159.9	97	26	36 56.0	160.1	97	26	36 27.0	160.2	97	26	35 58.0	160.4	97	26	35 29.0	160.6	97	25	34 59.9	160.7	97	25	34 30.9	160.9	97	26	6
7	37 38.1	158.6	96	28	37 09.3	158.7	96	28	36 40.4	158.9	96	27	36 11.5	159.1	96	27	35 42.6	159.2	96	27	35 13.7	159.4	96	27	34 44.8	159.6	96	27	34 15.8	159.7	96	26	7
8	37 21.4	157.4	96	29	36 52.6	157.5	96	29	36 23.9	157.7	96	29	35 55.1	157.9	96	29	35 26.4	158.1	96	28	34 57.6	158.2	96	28	34 28.8	158.4	96	28	34 00.0	158.6	96	28	8
9	37 03.8	156.2	95	31	36 35.2	156.4	95	30	36 06.6	156.5	95	30	35 37.9	156.7	95	30	35 09.3	156.9	96	30	34 40.6	157.1	96	30	34 11.9	157.3	96	29	33 43.3	157.4	96	29	9
20	36 45.4	155.0	95	32	36 16.9	155.2	95	32	35 48.4	155.4	95	32	35 19.9	155.6	95	31	34 51.4	155.8	95	31	34 22.9	156.0	95	31	33 54.3	156.1	95	31	33 25.7	156.3	95	30	20
1	36 26.1	153.8	94	33	35 57.8	154.0	94	33	35 29.4	154.2	94	33	35 01.1	154.4	95	33	34 32.7	154.6	95	32	34 04.3	154.8	95	32	33 35.9	155.0	95	32	33 07.4	155.2	95	32	1
2	36 06.0	152.7	94	35	35 37.8	152.9	94	35	35 09.7	153.1	94	34	34 41.4	153.3	94	34	34 13.2	153.5	94	34	33 44.9	153.7	94	33	33 16.7	153.9	94	33	32 48.4	154.1	94	33	2
3	35 45.2	151.5	93	36	35 17.1	151.7	93	36	34 49.1	152.0	94	36	34 21.0	152.2	94	35	33 52.9	152.4	94	35	33 24.8	152.6	94	35	32 56.7	152.8	94	35	32 28.5	153.0	94	34	3
4	35 23.5	150.4	93	37	34 55.6	150.6	93	37	34 27.7	150.8	93	37	33 59.8	151.1	93	37	33 31.9	151.3	93	36	33 03.9	151.5	93	36	32 35.9	151.7	93	36	32 07.9	151.9	93	36	4
25	35 01.1	149.3	92	39	34 33.4	149.5	92	38	34 05.6	149.7	93	38	33 37.9	150.0	93	38	33 10.1	150.2	93	38	32 42.2	150.4	93	37	32 14.4	150.6	93	37	31 46.5	150.8	93	37	25
6	34 37.9	148.2	92	40	34 10.4	148.4	92	40	33 42.8	148.6	92	39	33 15.2	148.9	92	39	32 47.5	149.1	92	39	32 19.9	149.3	92	38	31 52.2	149.6	92	38	31 24.5	149.8	92	38	6
7	34 14.1	147.1	91	41	33 46.7	147.3	91	41	33 19.2	147.5	91	40	32 51.8	147.8	92	40	32 24.3	148.0	92	40	31 56.8	148.3	92	39	31 29.2	148.5	92	39	31 01.7	148.7	92	39	7
8	33 49.5	146.0	91	42	33 22.2	146.2	91	42	32 54.9	146.5	91	42	32 27.6	146.7	91	41	32 00.3	147.0	91	41	31 33.0	147.2	91	41	31 05.6	147.4	91	40	30 38.2	147.7	91	40	8
9	33 24.2	144.9	90	43	32 57.1	145.2	90	43	32 30.0	145.4	90	43	32 02.8	145.7	91	42	31 35.7	145.9	91	42	31 08.5	146.2	91	42	30 41.2	146.4	91	42	30 14.0	146.6	91	41	9
30	32 58.2	143.8	90	44	32 31.3	144.1	90	44	32 04.3	144.4	90	44	31 37.3	144.6	90	44	31 10.3	144 9	90	43	30 43.3	145.1	90	43	30 16.2	145.4	90	43	29 49.1	145.6	90	43	30
1	32 31.5	142.8	89	46	32 04.8	143.0	89	45	31 38.0	143.3	89	45	31 11.2	143.6	89	45	30 44.3	143.8	90	44	30 17.5	144.1	90	44	29 50.6	144.3	90	44	29 23.6	144.6	90	44	1
2	32 04.2	141.7	89	47	31 37.7	142.0	89	46	31 11.0	142.3	89	46	30 44.4	142.5	89	46	30 17.7	142.8	89	45	29 51.0	143.1	89	45	29 24.3	143.3	89	45	28 57.5	143.6	89	45	2
3	31 36.3	140.7	88	48	31 09.9	141.0	88	47	30 43.4	141.3	88	47	30 17.0	141.5	88	47	29 50.4	141.8	88	46	29 23.9	142.1	89	46	28 57.3	142.3	89	46	28 30.7	142.6	89	46	3
4	31 07.8	139.7	87	49	30 41.5	140.0	88	48	30 15.2	140.3	88	48	29 48.9	140.5	88	48	29 22.6	140.8	88	47	28 56.2	141.1	88	47	28 29.8	141.3	88	47	28 03.3	141.6	88	47	4
35	30 38.6	138.7	87	50	30 12.6	139.0	87	49	29 46.4	139.3	87	49	29 20.3	139.5	87	49	28 54.1	139.8	87	48	28 27.9	140.1	87	48	28 01.6	140.4	88	48	27 35.3	140.6	88	48	35
6	30 08.9	137.7	86	50	29 43.0	138.0	86	50	29 17.0	138.3	87	50	28 51.1	138.6	87	50	28 25.0	138.9	87	49	27 59.0	139.1	87	49	27 32.9	139.4	87	49	27 06.8	139.7	87	49	6
7	29 38.6	136.7	86	51	29 12.9	137.0	86	51	28 47.1	137.3	86	51	28 21.3	137.6	87	50	27 55.4	137.9	86	50	27 29.5	138.2	86	50	27 03.6	138.4	86	50	26 37.6	138.7	87	49	7
8	29 07.8	135.7	85	52	28 42.2	136.0	85	52	28 16.6	136.3	86	51	27 50.9	136.6	86	51	27 25.2	136.9	86	51	26 59.5	137.2	86	51	26 33.7	137.5	86	51	26 07.9	137.8	86	50	8
9	28 36.4	134.8	85	53	28 11.0	135.1	85	53	27 45.5	135.4	85	52	27 20.0	135.7	86	52	26 54.5	136.0	85	52	26 28.9	136.3	86	52	26 03.3	136.6	86	52	25 37.7	136.8	86	51	9
40	28 04.5	133.8	84	54	27 39.2	134.1	84	54	27 13.9	134.4	84	53	26 48.6	134.7	85	53	26 23.3	135.0	85	53	25 57.9	135.3	85	53	25 32.4	135.6	85	52	25 07.0	135.9	85	52	40
1	27 32.0	132.9	84	55	27 07.0	133.2	84	55	26 41.8	133.5	84	54	26 16.7	133.8	84	54	25 51.5	134.1	84	54	25 26.3	134.4	84	54	25 01.0	134.7	84	53	24 35.7	135.0	84	53	1
2	26 59.1	132.0	83	56	26 34.2	132.3	83	55	26 09.3	132.6	83	55	25 44.3	132.9	83	55	25 19.2	133.2	84	55	24 54.2	133.5	84	54	24 29.0	133.8	84	54	24 03.9	134.1	84	54	2
3	26 25.7	131.0	82	56	26 01.0	131.4	83	56	25 36.2	131.7	83	56	25 11.4	132.0	83	56	24 46.5	132.3	83	55	24 21.6	132.6	83	55	23 56.6	132.9	83	55	23 31.6	133.2	83	55	3
4	25 51.9	130.1	82	57	25 27.3	130.5	82	57	25 02.7	130.8	82	57	24 38.0	131.1	82	56	24 13.3	131.4	83	56	23 48.5	131.7	83	56	23 23.7	132.0	83	56	22 58.9	132.3	83	55	4
45	25 17.6	129.2	81	58	24 53.1	129.6	82	58	24 28.7	129.9	82	57	24 04.1	130.2	82	57	23 39.6	130.5	82	57	23 15.0	130.8	82	57	22 50.4	131.1	82	56	22 25.7	131.4	82	56	45
6	24 42.8	128.4	81	59	24 18.5	128.7	81	58	23 54.2	129.0	81	58	23 29.9	129.3	81	58	23 05.5	129.6	81	58	22 41.0	130.0	82	57	22 16.6	130.3	82	57	21 52.1	130.6	82	57	6
7	24 07.6	127.5	80	59	23 43.5	127.8	80	59	23 19.4	128.1	81	59	22 55.2	128.5	81	59	22 30.9	128.8	81	58	22 06.6	129.1	81	58	21 42.3	129.4	81	58	21 18.0	129.7	81	58	7
8	23 32.1	126.6	80	60	23 08.1	126.9	80	60	22 44.1	127.3	80	59	22 20.0	127.6	80	59	21 55.9	127.9	80	59	21 31.8	128.2	80	59	21 07.7	128.6	81	58	20 43.5	128.9	81	58	8
9	22 56.1	125.8	79	61	22 32.2	126.1	79	60	22 08.4	126.4	80	60	21 44.5	126.7	80	60	21 20.6	127.1	80	60	20 56.6	127.4	80	59	20 32.6	127.7	80	59	20 08.5	128.0	80	59	9
50	22 19.7	124.9	79	61	21 56.0	125.2	79	61	21 32.3	125.6	79	60	21 08.6	125.9	79	60	20 44.8	126.2	79	60	20 21.0	126.5	79	60	19 57.1	126.9	80	60	19 33.2	127.2	80	60	50
1	21 42.9	124.1	78	62	21 19.4	124.4	78	62	20 55.9	124.7	79	61	20 32.3	125.1	79	61	20 08.6	125.4	79	61	19 45.0	125.7	79	61	19 21.3	126.0	79	60	18 57.5	126.4	79	60	1
2	21 05.8	123.2	78	62	20 42.4	123.6	78	62	20 19.0	123.9	78	62	19 55.6	124.2	78	62	19 32.1	124.6	78	62	19 08.6	124.9	78	61	18 45.0	125.2	79	61	18 21.4	125.6	79	61	2
3	20 28.4	122.4	77	63	20 05.1	122.8	77	63	19 41.9	123.1	78	63	19 18.5	123.4	78	62	18 55.2	123.8	78	62	18 31.8	124.1	78	62	18 08.4	124.4	78	62	17 45.0	124.7	78	61	3
4	19 50.5	121.6	77	64	19 27.5	121.9	77	63	19 04.3	122.3	77	63	18 41.2	122.6	77	63	18 18.0	122.9	77	63	17 54.7	123.3	78	62	17 31.5	123.6	78	62	17 08.1	123.9	78	62	4
55	19 12.4	120.8	76	64	18 49.4	121.1	77	64	18 26.5	121.5	77	64	18 03.4	121.8	77	63	17 40.4	122.1	77	63	17 17.3	122.5	77	63	16 54.1	122.8	77	63	16 31.0	123.1	77	63	55
6	18 33.9	120.0	76	65	18 11.1	120.3	76	64	17 48.3	120.7	76	64	17 25.4	121.0	76	64	17 02.5	121.4	76	64	16 39.5	121.7	77	64	16 16.5	122.0	77	63	15 53.5	122.4	77	63	6
7	17 55.2	119.2	76	65	17 32.5	119.6	76	65	17 09.8	119.9	76	65	16 47.0	120.2	76	64	16 24.2	120.6	76	64	16 01.4	120.9	76	64	15 38.5	121.2	76	64	15 15.7	121.6	77	64	7
8	17 16.1	118.4	75	66	16 53.6	118.8	75	65	16 31.0	119.1	76	65	16 08.3	119.5	76	65	15 45.7	119.8	76	65	15 23.0	120.1	76	64	15 00.3	120.5	76	64	14 37.5	120.8	76	64	8
9	16 36.8	117.7	75	66	16 14.3	118.0	75	66	15 51.9	118.3	75	66	15 29.4	118.7	75	65	15 06.8	119.0	75	65	14 44.3	119.4	75	65	14 21.7	119.7	76	65	13 59.1	120.0	76	65	9
60	15 57.1	116.9	74	66	15 34.8	117.2	74	66	15 12.5	117.6	75	66	14 50.1	117.9	75	66	14 27.7	118.3	75	66	14 05.3	118.6	75	65	13 42.8	118.9	75	65	13 20.3	119.3	75	65	60
1	15 17.2	116.1	74	67	14 55.0	116.5	74	67	14 32.8	116.8	74	67	14 10.6	117.2	74	66	13 48.3	117.5	74	66	13 26.0	117.9	74	66	13 03.7	118.2	74	66	12 41.3	118.5	75	66	1
2	14 37.1	115.4	73	67	14 15.0	115.7	73	67	13 52.9	116.1	74	67	13 30.8	116.4	74	67	13 08.6	116.8	74	67	12 46.4	117.1	74	66	12 24.2	117.4	74	66	12 02.0	117.8	74	66	2
3	13 56.6	114.6	73	68	13 34.7	115.0	73	68	13 12.7	115.3	73	67	12 50.7	115.7	73	67	12 28.7	116.0	73	67	12 06.6	116.4	74	67	11 44.5	116.7	74	67	11 22.4	117.1	74	66	3
4	13 16.0	113.9	73	68	12 54.1	114.2	73	68	12 32.3	114.6	73	68	12 10.4	114.9	73	68	11 48.5	115.3	73	67	11 26.5	115.6	73	67	11 04.6	116.0	73	67	10 42.6	116.3	73	67	4
65	12 35.1	113.1	72	68	12 13.4	113.5	72	68	11 51.6	113.8	73	68	11 29.8	114.2	73	68	11 08.0	114.5	73	68	10 46.2	114.9	73	68	10 24.4	115.2	73	67	10 02.5	115.6	73	67	65
6	11 54.0	112.4	72	69	11 32.4	112.8	72	69	11 10.7	113.1	72	69	10 49.0	113.5	72	68	10 27.4	113.8	72	68	10 05.6	114.2	73	68	9 43.9	114.5	73	68	9 22.1	114.9	73	68	6
7	11 12.6	111.7	72	69	10 51.1	112.0	72	69	10 29.6	112.4	72	69	10 08.0	112.7	72	69	9 46.4	113.1	72	69	9 24.8	113.4	72	68	9 03.2	113.8	72	68	8 41.6	114.1	72	68	7
8	10 31.1	111.0	71	70	10 09.7	111.3	71	69	9 48.3	111.7	71	69	9 26.8	112.0	72	69	9 05.3	112.4	72	69	8 43.8	112.7	72	69	8 22.3	113.1	72	69	8 00.8	113.4	72	68	8
9	9 49.4	110.2	71	70	9 28.1	110.6	71	70	9 06.7	111.0	71	70	8 45.4	111.3	71	69	8 24.0	111.7	71	69	8 02.6	112.0	71	69	7 41.2	112.4	71	69	7 19.8	112.7	71	69	9
70	9 07.4	109.5	71	70	8 46.2	109.9	71	70	8 25.0	110.2	71	70	8 03.7	110.6	71	70	7 42.5	111.0	71	70	7 21.2	111.3	71	69	6 59.8	111.7	71	69	6 38.5	112.0	71	69	70
1	8 25.3	108.8	70	71	8 04.2	109.2	70	70	7 43.1	109.5	71	70	7 21.9	109.9	71	70	7 00.7	110.3	71	70	6 39.5	110.6	71	70	6 18.3	111.0	71	69	5 57.1	111.3	71	69	1
2	7 43.0	108.1	70	71	7 22.0	108.5	70	71	7 00.9	108.8	70	70	6 39.9	109.2	70	70	6 18.8	109.6	70	70	5 57.7	109.9	70	70	5 36.6	110.3	70	70	5 15.4	110.6	71	70	2
3	7 00.6	107.4	70	71	6 39.6	107.8	70	71	6 18.7	108.1	70	71	5 57.7	108.5	70	71	5 36.7	108.9	70	70	5 15.7	109.2	70	70									3
4	6 18.0	106.7	70	71	5 57.1	107.1	70	71	5 36.2	107.4	70	71	5 15.3	107.8	71	70																	4
75	5 35.2	106.0	69	72	5 14.4	106.4	69	71																									75

Lat. 43°

Lat. 44°

Lat. 45°

Lat. 46°

Lat. 47°

Lat. 48°

DECLINATION SAME NAME AS LATITUDE

H.A.	8° 00′ Alt.	Az.	Δd	Δt	8° 30′ Alt.	Az.	Δd	Δt	9° 00′ Alt.	Az.	Δd	Δt	9° 30′ Alt.	Az.	Δd	Δt	10° 00′ Alt.	Az.	Δd	Δt	10° 30′ Alt.	Az.	Δd	Δt	11° 00′ Alt.	Az.	Δd	Δt	11° 30′ Alt.	Az.	Δd	Δt	H.A.
°	° ′	°			° ′	°			° ′	°			° ′	°			° ′	°			° ′	°			° ′	°			° ′	°			°
90									5 16.3	67 74	82.6		5 36.2	67 74	82.3		5 56.2	66 73	81.9		6 16.1	66 73	81.5		6 36.0	66 73	81.1		6 55.9	66 73	80.7		91
92																	5 12.1	67 73	81.2		5 32.0	67 73	80.8		5 52.0	67 73	80.5		6 12.0	66 73	80.1		2
93																									5 08.1	67 73	79.8		5 28.1	67 73	79.4		3

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Lat. 42°

H.A.	12° 00′ Alt.	Δd	Δt	Az.	12° 30′ Alt.	Δd	Δt	Az.	13° 00′ Alt.	Δd	Δt	Az.	13° 30′ Alt.	Δd	Δt	Az.
°	° ′			°	° ′			°	° ′			°	° ′			°
00	60 00.0	1.0	01	180.0	60 30.0	1.0	01	180.0	61 00.0	1.0	01	180.0	61 30.0	1.0	01	180.0
1	59 59.2	1.0	04	178.0	60 29.2	1.0	04	178.0	60 59.2	1.0	04	178.0	61 29.2	1.0	04	178.0
2	59 57.0	1.0	06	176.1	60 26.9	1.0	06	176.0	60 56.9	1.0	06	176.0	61 26.8	1.0	07	175.9
3	59 53.2	1.0	09	174.1	60 23.1	1.0	09	174.1	60 53.0	1.0	09	174.0	61 22.9	1.0	09	173.9
4	59 47.9	99	11	172.2	60 17.7	99	11	172.1	60 47.5	99	12	172.0	61 17.4	99	12	171.9
05	59 41.1	99	14	170.3	60 10.8	99	14	170.1	60 40.6	99	14	170.0	61 10.3	99	14	169.9
6	59 32.8	99	16	168.4	60 02.4	99	16	168.2	60 32.1	99	17	168.0	61 01.7	99	17	167.9
7	59 23.1	98	19	166.5	59 52.6	98	19	166.3	60 22.1	98	19	166.1	60 51.6	98	19	165.9
8	59 11.9	98	21	164.6	59 41.3	98	21	164.4	60 10.7	98	21	164.2	60 40.0	98	22	164.0
9	58 59.4	97	23	162.7	59 28.6	97	23	162.5	59 57.8	97	24	162.3	60 27.0	97	24	162.0
10	58 45.5	97	26	160.9	59 14.5	97	26	160.6	59 43.5	97	26	160.4	60 12.5	97	26	160.1
1	58 30.2	96	28	159.1	58 59.1	96	28	158.8	59 27.9	96	28	158.5	59 56.7	96	29	158.3
2	58 13.6	96	30	157.3	58 42.3	95	30	157.0	59 10.9	95	30	156.7	59 39.5	95	31	156.4
3	57 55.8	96	32	155.5	58 24.2	95	32	155.2	58 52.6	95	33	154.9	59 21.0	94	33	154.6
4	57 36.7	94	34	153.8	58 04.9	94	34	153.5	58 33.1	94	35	153.1	59 01.2	94	35	152.8
15	57 16.4	93	36	152.1	57 44.4	93	36	151.7	58 12.4	93	37	151.4	58 40.3	93	37	151.1
6	56 54.9	93	38	150.4	57 22.7	92	38	150.1	57 50.4	92	38	149.7	58 18.1	92	39	149.3
7	56 32.4	92	39	148.8	56 59.9	92	40	148.4	57 27.4	91	40	148.0	57 54.8	91	41	147.6
8	56 08.7	91	41	147.1	56 36.0	91	42	146.8	57 03.2	91	42	146.4	57 30.4	90	42	146.0
9	55 44.0	90	43	145.6	56 11.0	90	43	145.2	56 38.0	90	44	144.8	57 04.9	90	44	144.4
20	55 18.3	89	44	144.0	55 45.1	89	45	143.6	56 11.8	89	45	143.2	56 38.4	89	46	142.8
1	54 51.6	89	46	142.5	55 18.1	88	46	142.1	55 44.6	88	47	141.7	56 11.0	88	47	141.2
2	54 24.0	88	48	141.0	54 50.3	88	48	140.6	55 16.5	87	48	140.2	55 42.6	87	49	139.7
3	53 55.5	87	49	139.5	54 21.5	87	49	139.1	54 47.5	86	50	138.7	55 13.4	86	50	138.2
4	53 26.1	86	50	138.1	53 51.9	86	51	137.7	54 17.6	86	51	137.2	54 43.2	85	52	136.8
25	52 55.9	85	52	136.7	53 21.5	85	52	136.3	53 46.9	85	52	135.8	54 12.3	84	53	135.4
6	52 25.0	85	53	135.3	52 50.3	84	53	134.9	53 15.5	84	54	134.4	53 40.6	84	54	134.0
7	51 53.2	84	54	134.0	52 18.3	83	54	133.5	52 43.3	83	55	133.1	53 08.1	83	55	132.6
8	51 20.8	83	55	132.7	51 45.6	83	56	132.2	52 10.4	82	56	131.8	52 35.0	82	56	131.3
9	50 47.7	82	56	131.4	51 12.3	82	57	130.9	51 36.8	81	57	130.5	52 01.1	81	57	130.0
30	50 13.9	81	57	130.1	50 38.3	81	58	129.7	51 02.5	81	58	129.2	51 26.7	80	58	128.7
1	49 39.5	81	58	128.9	50 03.6	80	59	128.4	50 27.7	80	59	128.0	50 51.6	80	59	127.5
2	49 04.5	80	59	127.7	49 28.4	80	60	127.2	49 52.2	79	60	126.8	50 15.9	79	60	126.3
3	48 29.0	79	60	126.5	48 52.7	79	60	126.1	49 16.2	78	61	125.6	49 39.7	78	61	125.1
4	47 52.9	78	61	125.4	48 16.3	78	61	124.9	48 39.7	78	62	124.4	49 03.0	77	62	123.9
35	47 16.2	78	62	124.2	47 39.5	77	62	123.8	48 02.7	77	62	123.3	48 25.7	77	63	122.8
6	46 39.1	77	63	123.1	47 02.2	77	63	122.6	47 25.2	76	63	122.2	47 48.0	76	64	121.7
7	46 01.5	76	63	122.0	46 24.4	76	64	121.6	46 47.2	76	64	121.1	47 09.9	75	64	120.6
8	45 23.5	76	64	121.0	45 46.2	75	64	120.5	46 08.8	75	65	120.0	46 31.3	75	65	119.5
9	44 45.1	75	65	119.9	45 07.6	75	65	119.4	45 30.0	74	65	119.0	45 52.3	74	66	118.5
40	44 06.2	75	65	118.9	44 28.6	74	66	118.4	44 50.8	74	66	117.9	45 12.9	73	66	117.5
1	43 27.0	74	66	117.9	43 49.2	74	66	117.4	44 11.2	73	67	116.9	44 33.2	73	67	116.5
2	42 47.4	74	67	116.9	43 09.4	73	67	116.4	43 31.3	73	67	116.0	43 53.1	72	67	115.5
3	42 07.5	73	67	115.9	42 29.3	73	67	115.5	42 51.1	72	68	115.0	43 12.7	72	68	114.5
4	41 27.2	72	68	115.0	41 48.9	72	68	114.5	42 10.5	72	68	114.0	42 32.0	71	68	113.6
45	40 46.6	72	68	114.0	41 08.2	72	68	113.6	41 29.6	71	69	113.1	41 50.9	71	69	112.6
6	40 05.8	72	69	113.1	40 27.2	71	69	112.6	40 48.5	71	69	112.2	41 09.6	70	69	111.7
7	39 24.6	71	69	112.2	39 45.9	71	69	111.7	40 07.0	70	69	111.3	40 28.1	70	70	110.8
8	38 43.2	71	69	111.3	39 04.3	70	70	110.8	39 25.4	70	70	110.4	39 46.3	70	70	109.9
9	38 01.5	70	70	110.4	38 22.5	70	70	110.0	38 43.5	70	70	109.5	39 04.3	69	70	109.0
50	37 19.6	70	70	109.6	37 40.5	69	70	109.1	38 01.3	69	71	108.6	38 22.0	69	71	108.2
1	36 37.5	69	71	108.7	36 58.3	69	71	108.3	37 19.0	69	71	107.8	37 39.5	68	71	107.3
2	35 55.2	69	71	107.9	36 15.8	69	71	107.4	36 36.4	68	71	107.0	36 56.9	68	71	106.5
3	35 12.6	69	71	107.0	35 33.2	68	71	106.6	35 53.7	68	72	106.1	36 14.0	68	72	105.7
4	34 29.9	68	72	106.2	34 50.4	68	72	105.8	35 10.8	68	72	105.3	35 31.0	67	72	104.9
55	33 47.0	68	72	105.4	34 07.4	68	72	105.0	34 27.7	67	72	104.5	34 47.9	67	72	104.1
6	33 03.9	68	72	104.6	33 24.2	67	72	104.2	33 44.4	67	72	103.7	34 04.5	67	72	103.3
7	32 20.7	68	72	103.8	32 40.9	67	72	103.4	33 01.0	67	73	103.0	33 21.1	67	73	102.5
8	31 37.4	67	72	103.1	31 57.5	67	73	102.6	32 17.5	67	73	102.2	32 37.5	66	73	101.7
9	30 53.9	67	73	102.3	31 13.9	67	73	101.9	31 33.9	66	73	101.4	31 53.8	66	73	101.0
60	30 10.2	67	73	101.5	30 30.2	66	73	101.1	30 50.1	66	73	100.7	31 09.9	66	73	100.2
1	29 26.5	67	73	100.8	29 46.4	66	73	100.3	30 06.2	66	73	99.9	30 26.0	66	73	99.5
2	28 42.6	66	73	100.0	29 02.5	66	73	99.6	29 22.3	66	73	99.2	29 42.0	66	74	98.7
3	27 58.7	66	73	99.3	28 18.5	66	74	98.9	28 38.2	66	74	98.4	28 57.9	65	74	98.0
4	27 14.6	66	74	98.6	27 34.4	66	74	98.1	27 54.1	65	74	97.7	28 13.7	65	74	97.3
65	26 30.5	66	74	97.8	26 50.2	66	74	97.4	27 09.8	65	74	97.0	27 29.4	65	74	96.6
6	25 46.3	66	74	97.1	26 05.9	65	74	96.7	26 25.5	65	74	96.3	26 45.1	65	74	95.9
7	25 02.0	66	74	96.4	25 21.6	65	74	96.0	25 41.2	65	74	95.6	26 00.7	65	74	95.2
8	24 17.7	65	74	95.7	24 37.3	65	74	95.3	24 56.8	65	74	94.9	25 16.3	65	74	94.5
9	23 33.3	65	74	95.0	23 52.8	65	74	94.6	24 12.3	65	74	94.2	24 31.8	65	74	93.8
70	22 48.8	65	74	94.3	23 08.4	65	74	93.9	23 27.9	65	74	93.5	23 47.3	65	74	93.1
1	22 04.3	65	74	93.6	22 23.9	65	74	93.2	22 43.3	65	74	92.8	23 02.7	65	74	92.4
2	21 19.8	65	74	92.9	21 39.3	65	74	92.5	21 58.8	65	74	92.1	22 18.2	65	74	91.7
3	20 35.3	65	74	92.3	20 54.8	65	74	91.8	21 14.2	65	74	91.4	21 33.6	65	74	91.0
4	19 50.7	65	74	91.6	20 10.2	65	74	91.2	20 29.6	65	74	90.8	20 49.0	65	74	90.4
75	19 06.1	65	74	90.9	19 25.6	65	74	90.5	19 45.1	65	74	90.1	20 04.4	65	74	89.7
6	18 21.6	65	74	90.2	18 41.0	65	74	89.8	19 00.5	65	74	89.4	19 19.8	65	74	89.0
7	17 37.0	65	74	89.6	17 56.5	65	74	89.2	18 15.9	65	74	88.8	18 35.3	65	74	88.4
8	16 52.4	65	74	88.9	17 11.9	65	74	88.5	17 31.3	65	74	88.1	17 50.7	65	74	87.7
9	16 07.8	65	74	88.2	16 27.3	65	74	87.8	16 46.8	65	74	87.4	17 06.2	65	74	87.0
80	15 23.3	65	74	87.6	15 42.8	65	74	87.2	16 02.2	65	74	86.8	16 21.6	65	74	86.4
1	14 38.7	65	74	86.9	14 58.2	65	74	86.5	15 17.7	65	74	86.1	15 37.2	65	74	85.7
2	13 54.2	65	74	86.3	14 13.7	65	74	85.9	14 33.3	65	74	85.5	14 52.7	65	74	85.1
3	13 09.7	65	74	85.6	13 29.3	65	74	85.2	13 48.8	65	74	84.8	14 08.3	65	74	84.4
4	12 25.3	65	74	84.9	12 44.9	65	74	84.6	13 04.4	65	74	84.2	13 24.0	65	74	83.8
85	11 40.9	65	74	84.3	12 00.5	65	74	83.9	12 20.1	66	74	83.5	12 39.7	65	74	83.1
6	10 56.6	66	74	83.6	11 16.2	65	74	83.2	11 35.8	65	74	82.9	11 55.4	65	74	82.5
7	10 12.3	66	74	83.0	10 32.0	66	74	82.6	10 51.6	65	74	82.2	11 11.3	65	74	81.8
8	9 28.1	66	74	82.3	9 47.8	66	74	81.9	10 07.5	66	73	81.6	10 27.2	66	73	81.2
9	8 43.9	66	73	81.7	9 03.7	66	73	81.3	9 23.4	66	73	80.9	9 43.1	66	73	80.5
90	7 59.8	66	73	81.0	8 19.6	66	73	80.6	8 39.4	66	73	80.3	8 59.2	66	73	79.9

H.A.	14° 00′ Alt.	Δd	Δt	Az.	14° 30′ Alt.	Δd	Δt	Az.	15° 00′ Alt.	Δd	Δt	Az.	15° 30′ Alt.	Δd	Δt	Az.
°	° ′			°	° ′			°	° ′			°	° ′			°
00	62 00.0	1.0	01	180.0	62 30.0	1.0	01	180.0	63 00.0	1.0	01	180.0	63 30.0	1.0	01	180.0
1	61 59.2	1.0	04	177.9	62 29.2	1.0	04	177.9	62 59.2	1.0	04	177.9	63 29.2	1.0	04	177.8
2	61 56.8	1.0	07	175.9	62 26.7	1.0	07	175.8	62 56.7	1.0	07	175.7	63 26.6	1.0	07	175.7
3	61 52.8	1.0	09	173.8	62 22.7	1.0	09	173.7	62 52.6	1.0	10	173.6	63 22.5	1.0	10	173.5
4	61 47.2	99	12	171.8	62 17.0	99	12	171.7	62 46.8	99	12	171.5	63 16.6	99	12	171.4
05	61 40.0	99	15	169.7	62 09.7	99	15	169.6	62 39.4	99	15	169.4	63 09.1	99	15	169.3
6	61 31.3	99	17	167.7	62 00.9	99	17	167.5	62 30.5	99	18	167.4	63 00.0	99	18	167.2
7	61 21.1	98	20	165.7	61 50.5	98	20	165.5	62 19.9	98	20	165.3	62 49.4	98	20	165.1
8	61 09.3	98	22	163.7	61 38.6	98	22	163.5	62 07.9	98	23	163.3	62 37.1	97	23	163.0
9	60 56.1	97	24	161.8	61 25.2	97	25	161.5	61 54.3	97	25	161.3	62 23.4	97	25	161.0
10	60 41.5	96	27	159.9	61 10.4	96	27	159.6	61 39.3	96	27	159.3	62 08.1	96	28	159.0
1	60 25.4	96	29	158.0	60 54.1	96	29	157.7	61 22.8	96	30	157.4	61 51.4	95	30	157.1
2	60 08.0	95	31	156.1	60 36.5	95	32	155.8	61 05.0	95	32	155.5	61 33.4	95	32	155.1
3	59 49.3	94	33	154.3	60 17.6	94	34	153.9	60 45.8	94	34	153.6	61 14.0	94	35	153.2
4	59 29.3	94	35	152.5	59 57.3	93	36	152.1	60 25.3	93	36	151.7	60 53.2	93	37	151.4
15	59 08.1	93	37	150.7	59 35.9	92	38	150.3	60 03.6	92	38	149.9	60 31.2	92	39	149.5
6	58 45.7	92	39	149.0	59 13.2	92	40	148.6	59 40.7	91	40	148.2	60 08.0	91	41	147.8
7	58 22.1	91	41	147.3	58 49.4	91	42	146.9	59 16.6	91	42	146.4	59 43.7	90	42	146.0
8	57 57.5	90	43	145.6	58 24.5	90	43	145.2	58 51.4	90	44	144.8	59 18.2	89	44	144.3
9	57 31.7	89	45	144.0	57 58.5	89	45	143.5	58 25.1	89	45	143.1	58 51.7	88	46	142.6
20	57 05.0	88	46	142.4	57 31.5	88	47	141.9	57 57.9	88	47	141.5	58 24.1	87	48	141.0
1	56 37.3	88	48	140.8	57 03.5	87	48	140.4	57 29.6	87	49	139.9	57 55.6	87	49	139.4
2	56 08.6	87	49	139.3	56 34.6	86	50	138.8	57 00.4	86	50	138.4	57 26.2	86	51	137.9
3	55 39.1	86	51	137.8	56 04.8	85	51	137.3	56 30.4	85	52	136.8	56 55.8	85	52	136.4
4	55 08.7	85	52	136.3	55 34.1	85	52	135.9	55 59.4	84	53	135.4	56 24.6	84	53	134.9
25	54 37.5	84	53	134.9	55 02.7	84	54	134.4	55 27.7	83	54	133.9	55 52.6	83	55	133.5
6	54 05.6	83	54	133.5	54 30.5	83	55	133.0	54 55.2	82	55	132.5	55 19.9	82	56	132.0
7	53 32.9	82	56	132.1	53 57.5	82	56	131.7	54 22.0	82	56	131.2	54 46.4	81	57	130.7
8	52 59.5	81	57	130.8	53 23.9	81	57	130.3	53 48.1	81	58	129.8	54 12.3	80	58	129.3
9	52 25.4	81	58	129.5	52 49.6	80	58	129.0	53 13.6	80	59	128.5	53 37.5	79	59	128.0
30	51 50.7	80	59	128.3	52 14.6	79	59	127.8	52 38.4	79	60	127.3	53 02.0	79	60	126.8
1	51 15.4	79	60	127.0	51 39.1	79	60	126.5	52 02.6	78	61	126.0	52 26.0	78	61	125.5
2	50 39.5	78	61	125.8	51 02.9	78	61	125.3	51 26.3	78	61	124.8	51 49.5	77	62	124.3
3	50 03.1	78	62	124.6	50 26.3	77	62	124.1	50 49.4	77	62	123.6	51 12.4	76	63	123.1
4	49 26.1	77	62	123.5	49 49.1	76	63	123.0	50 12.0	76	63	122.5	50 34.8	76	63	121.9
35	48 48.7	76	63	122.3	49 11.5	76	64	121.8	49 34.2	75	64	121.3	49 56.7	75	64	120.8
6	48 10.8	76	64	121.2	48 33.4	75	64	120.7	48 55.8	75	65	120.2	49 18.2	74	65	119.7
7	47 32.4	75	65	120.1	47 54.8	74	65	119.6	48 17.1	74	65	119.1	48 39.2	74	66	118.6
8	46 53.6	74	65	119.1	47 15.8	74	66	118.6	47 37.9	73	66	118.1	47 59.9	73	66	117.6
9	46 14.5	74	66	118.0	46 36.5	73	66	117.5	46 58.4	73	66	117.0	47 20.2	72	67	116.5
40	45 34.9	73	66	117.0	45 56.8	73	67	116.5	46 18.5	72	67	116.0	46 40.1	72	67	115.5
1	44 55.0	73	67	116.0	45 16.7	72	67	115.5	45 38.3	72	68	115.0	45 59.7	71	68	114.5
2	44 14.7	72	68	115.0	44 36.3	72	68	114.5	44 57.7	71	68	114.0	45 19.0	71	68	113.5
3	43 34.2	71	68	114.0	43 55.6	71	68	113.5	44 16.8	71	69	113.1	44 37.9	70	69	112.6
4	42 53.3	71	69	113.1	43 14.5	71	69	112.6	43 35.6	70	69	112.1	43 56.6	70	69	111.6
45	42 12.1	70	69	112.2	42 33.2	70	69	111.7	42 54.2	70	70	111.2	43 15.0	69	70	110.7
6	41 30.7	70	69	111.2	41 51.7	70	70	110.8	42 12.5	69	70	110.3	42 33.2	69	70	109.8
7	40 49.0	70	70	110.3	41 09.8	69	70	109.9	41 30.5	69	70	109.4	41 51.1	68	70	108.9
8	40 07.1	69	70	109.5	40 27.8	69	70	109.0	40 48.4	68	71	108.5	41 08.8	68	71	108.0
9	39 24.9	69	71	108.6	39 45.5	68	71	108.1	40 06.0	68	71	107.6	40 26.3	68	71	107.2
50	38 42.6	68	71	107.7	39 03.0	68	71	107.3	39 23.4	68	71	106.8	39 43.6	67	71	106.3
1	38 00.0	68	71	106.9	38 20.4	68	71	106.4	38 40.6	67	72	105.9	39 00.7	67	72	105.5
2	37 17.2	68	72	106.0	37 37.5	67	72	105.6	37 57.6	67	72	105.1	38 17.7	67	72	104.6
3	36 34.3	67	72	105.2	36 54.5	67	72	104.8	37 14.5	67	72	104.3	37 34.4	66	72	103.8
4	35 51.2	67	72	104.4	36 11.3	67	72	104.0	36 31.2	66	72	103.5	36 51.1	66	73	103.0
55	35 07.9	67	72	103.6	35 27.9	66	72	103.2	35 47.8	66	73	102.7	36 07.6	66	73	102.2
6	34 24.5	67	73	102.8	34 44.4	66	73	102.4	35 04.2	66	73	101.9	35 23.9	65	73	101.5
7	33 41.0	66	73	102.1	34 00.8	66	73	101.6	34 20.5	66	73	101.2	34 40.2	65	73	100.7
8	32 57.3	66	73	101.3	33 17.1	66	73	100.8	33 36.7	65	73	100.4	33 56.3	65	73	99.9
9	32 13.5	66	73	100.5	32 33.2	65	73	100.1	32 52.8	65	73	99.6	33 12.3	65	73	99.2
60	31 29.7	66	73	99.8	31 49.3	65	73	99.3	32 08.8	65	74	98.9	32 28.3	65	74	98.4
1	30 45.7	65	73	99.0	31 05.2	65	74	98.6	31 24.7	65	74	98.2	31 44.1	65	74	97.7
2	30 01.6	65	74	98.3	30 21.1	65	74	97.9	30 40.6	65	74	97.4	30 59.9	64	74	97.0
3	29 17.4	65	74	97.6	29 36.9	65	74	97.1	29 56.3	65	74	96.7	30 15.6	64	74	96.3
4	28 33.2	65	74	96.9	28 52.6	65	74	96.4	29 12.0	64	74	96.0	29 31.3	64	74	95.5
65	27 48.9	65	74	96.1	28 08.3	65	74	95.7	28 27.6	64	74	95.3	28 46.9	64	74	94.8
6	27 04.5	65	74	95.4	27 23.9	64	74	95.0	27 43.2	64	74	94.6	28 02.4	64	74	94.1
7	26 20.1	65	74	94.7	26 39.5	64	74	94.3	26 58.7	64	74	93.9	27 17.9	64	74	93.4
8	25 35.7	65	74	94.0	25 55.0	64	74	93.6	26 14.2	64	74	93.2	26 33.4	64	74	92.8
9	24 51.2	64	74	93.3	25 10.5	64	74	92.9	25 29.7	64	74	92.5	25 48.8	64	74	92.1
70	24 06.6	64	74	92.7	24 25.9	64	74	92.2	24 45.1	64	74	91.8	25 04.3	64	74	91.4
1	23 22.1	64	74	92.0	23 41.4	64	74	91.6	24 00.6	64	74	91.1	24 19.7	64	74	90.7
2	22 37.5	64	74	91.3	22 56.8	64	74	90.9	23 16.0	64	74	90.5	23 35.1	64	74	90.0
3	21 52.9	64	74	90.6	22 12.2	64	74	90.2	22 31.4	64	74	89.8	22 50.5	64	74	89.4
4	21 08.3	64	74	89.9	21 27.6	64	74	89.5	21 46.8	64	74	89.1	22 05.9	64	74	88.7
75	20 23.8	64	74	89.3	20 43.0	64	74	88.9	21 02.2	64	74	88.5	21 21.4	64	74	88.0
6	19 39.2	64	74	88.6	19 58.4	64	74	88.2	20 17.7	64	74	87.8	20 36.8	64	74	87.4
7	18 54.6	64	74	88.0	19 13.9	64	74	87.6	19 33.1	64	74	87.1	19 52.3	64	74	86.7
8	18 10.1	64	74	87.3	18 29.3	64	74	86.9	18 48.6	64	74	86.5	19 07.8	64	74	86.1
9	17 25.5	64	74	86.6	17 44.8	64	74	86.2	18 04.1	64	74	85.8	18 23.3	64	74	85.4
80	16 41.0	65	74	86.0	17 00.4	64	74	85.6	17 19.6	64	74	85.2	17 38.9	64	74	84.8
1	15 56.6	65	74	85.3	16 15.9	64	74	84.9	16 35.2	64	74	84.5	16 54.5	64	74	84.1
2	15 12.1	65	74	84.7	15 31.5	65	74	84.3	15 50.9	64	74	83.9	16 10.2	64	74	83.5
3	14 27.8	65	74	84.0	14 47.2	65	74	83.6	15 06.6	65	74	83.2	15 25.9	64	74	82.8
4	13 43.5	65	74	83.4	14 02.9	65	74	83.0	14 22.3	65	74	82.6	14 41.7	65	74	82.2
85	12 59.2	65	74	82.7	13 18.7	65	74	82.3	13 38.1	65	74	82.0	13 57.6	65	73	81.6
6	12 15.0	65	74	82.1	12 34.5	65	73	81.7	12 54.0	65	73	81.3	13 13.5	65	73	80.9
7	11 30.9	65	73	81.4	11 50.4	65	73	81.1	12 10.0	65	73	80.7	12 29.5	65	73	80.3
8	10 46.8	65	73	80.8	11 06.4	65	73	80.4	11 26.0	65	73	80.0	11 45.6	65	73	79.6
9	10 02.8	66	73	80.1	10 22.5	66	73	79.8	10 42.2	65	73	79.4	11 01.8	65	73	79.0
90	9 19.0	66	73	79.5	9 38.7	66	73	79.1	9 58.4	66	73	78.7	10 18.1	66	73	78.4

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DECLINATION CONTRARY NAME TO LATITUDE

H.A.	12° 00′		12° 30′		13° 00′		13° 30′		14° 00′		14° 30′		15° 00′		15° 30′		H.A.
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
	° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		
00	36 60.0 1.0 01	180.0	35 30.0 1.0 01	180.0	35 00.0 1.0 01	180.0	34 30.0 1.0 01	180.0	34 00.0 1.0 01	180.0	33 30.0 1.0 01	180.0	33 60.0 1.0 01	180.0	32 30.0 1.0 01	180.0	00
1	35 59.5 1.0 02	178.8	35 29.5 1.0 02	178.8	34 59.5 1.0 02	178.8	34 29.5 1.0 02	178.8	33 59.5 1.0 02	178.8	33 29.5 1.0 02	178.8	32 59.6 1.0 02	178.8	32 29.6 1.0 02	178.9	1
2	35 58.1 1.0 04	177.6	35 28.1 1.0 04	177.6	34 58.1 1.0 04	177.6	34 28.2 1.0 04	177.6	33 58.2 1.0 04	177.7	33 28.2 1.0 04	177.7	32 58.2 1.0 04	177.7	32 28.2 1.0 04	177.7	2
3	35 55.8 1.0 05	176.4	35 25.8 1.0 05	176.4	34 55.8 1.0 05	176.4	34 25.9 1.0 05	176.5	33 55.9 1.0 05	176.5	33 25.9 1.0 05	176.5	32 56.0 1.0 05	176.5	32 26.0 1.0 05	176.6	3
4	35 52.5 1.0 07	175.2	35 22.5 1.0 07	175.2	34 52.6 1.0 07	175.2	34 22.7 1.0 07	175.3	33 52.7 1.0 07	175.3	33 22.8 1.0 07	175.4	32 52.8 1.0 07	175.4	32 22.9 1.0 07	175.4	4
05	35 48.3 1.0 09	174.0	35 18.4 1.0 08	174.0	34 48.4 1.0 08	174.1	34 18.5 1.0 08	174.1	33 48.6 1.0 08	174.2	33 18.7 1.0 08	174.2	32 48.8 1.0 08	174.3	32 18.9 1.0 08	174.3	05
6	35 43.1 1.0 10	172.8	35 13.2 1.0 10	172.8	34 43.4 1.0 10	172.9	34 13.5 1.0 10	172.9	33 43.6 1.0 10	173.0	33 13.8 1.0 10	173.1	32 43.9 1.0 10	173.1	32 14.0 1.0 10	173.2	6
7	35 37.0 99 12	171.6	35 07.2 99 12	171.6	34 37.4 99 11	171.7	34 07.6 99 11	171.8	33 37.8 99 11	171.8	33 07.9 99 11	171.9	32 38.1 99 11	172.0	32 08.3 99 11	172.0	7
8	35 30.0 99 13	170.4	35 00.3 99 13	170.5	34 30.5 99 13	170.5	34 00.8 99 13	170.6	33 31.0 99 13	170.7	33 01.2 99 13	170.8	32 31.4 99 13	170.8	32 01.7 99 12	170.9	8
9	35 22.1 99 15	169.2	34 52.4 99 15	169.3	34 22.7 99 14	169.4	33 53.0 99 14	169.4	33 23.3 99 14	169.5	32 53.6 99 14	169.6	32 23.9 99 14	169.7	31 54.2 99 14	169.8	9
10	35 13.3 99 16	168.0	34 43.7 99 16	168.1	34 14.0 99 16	168.2	33 44.4 99 16	168.3	33 14.8 99 16	168.4	32 45.1 99 16	168.5	32 15.5 99 15	168.6	31 45.8 99 15	168.6	10
1	35 03.6 98 18	166.8	34 34.0 99 18	166.9	34 04.5 99 17	167.0	33 34.9 99 17	167.1	33 05.4 99 17	167.2	32 35.8 99 17	167.3	32 06.2 99 17	167.4	31 36.6 99 17	167.5	1
2	34 53.9 98 19	165.6	34 23.5 98 19	165.8	33 54.0 98 19	165.9	33 24.6 98 19	166.0	32 55.1 98 19	166.1	32 25.6 98 18	166.2	31 56.1 98 18	166.3	31 26.6 98 18	166.4	2
3	34 41.5 98 21	164.5	34 12.1 98 20	164.6	33 42.7 98 20	164.7	33 13.3 98 20	164.8	32 43.9 98 20	165.0	32 14.5 98 20	165.1	31 45.1 98 20	165.2	31 15.7 98 20	165.3	3
4	34 29.1 98 22	163.3	33 59.8 98 22	163.4	33 30.5 98 22	163.6	33 01.2 98 22	163.7	32 31.9 98 21	163.8	32 02.6 98 21	164.0	31 33.3 98 21	164.1	31 04.0 98 21	164.2	4
15	34 15.9 97 23	162.2	33 46.7 97 23	162.3	33 17.5 97 23	162.4	32 48.3 97 23	162.6	32 19.1 97 23	162.7	31 49.9 97 23	162.8	31 20.7 97 22	163.0	30 51.4 97 22	163.1	15
6	34 01.8 97 25	161.0	33 32.7 97 25	161.2	33 03.6 97 24	161.3	32 34.5 97 24	161.5	32 05.4 97 24	161.6	31 36.3 97 24	161.7	31 07.2 97 24	161.9	30 38.1 97 24	162.0	6
7	33 46.9 97 26	159.9	33 17.9 97 26	160.0	32 48.9 97 26	160.2	32 19.9 97 26	160.3	31 51.0 97 26	160.5	31 21.9 97 25	160.6	30 52.9 97 26	160.8	30 23.9 97 26	160.9	7
8	33 31.1 96 28	158.7	33 02.3 96 27	158.9	32 33.4 96 27	159.1	32 04.5 96 27	159.2	31 35.7 96 27	159.4	31 06.8 96 27	159.5	30 37.9 96 26	159.7	30 08.9 96 26	159.9	8
9	33 14.5 96 29	157.6	32 45.8 96 29	157.8	32 17.1 96 29	158.0	31 48.3 96 28	158.1	31 19.6 96 28	158.3	30 50.8 96 28	158.5	30 22.0 96 28	158.6	29 53.2 96 28	158.8	9
20	32 57.2 95 30	156.5	32 28.6 95 30	156.7	32 00.0 95 30	156.9	31 31.3 95 30	157.0	31 02.7 96 29	157.2	30 34.0 96 29	157.4	30 05.4 96 29	157.6	29 36.7 96 29	157.7	20
1	32 39.0 95 32	155.4	32 10.5 95 31	155.6	31 42.0 95 31	155.8	31 13.5 95 31	156.0	30 45.0 95 31	156.1	30 16.5 95 30	156.3	29 48.0 95 30	156.5	29 19.4 95 30	156.7	1
2	32 20.9 94 33	154.3	31 51.7 94 33	154.5	31 23.4 95 32	154.7	30 55.0 95 32	154.9	30 26.6 95 32	155.1	29 58.2 95 32	155.3	29 29.8 95 32	155.4	29 01.4 95 31	155.6	2
3	32 00.3 94 34	153.2	31 32.1 94 34	153.4	31 03.9 94 34	153.6	30 35.7 94 33	153.8	30 07.4 94 33	154.0	29 39.2 94 33	154.2	29 10.9 94 33	154.4	28 42.6 94 32	154.6	3
4	31 39.9 93 35	152.1	31 11.8 94 35	152.3	30 43.7 94 35	152.5	30 15.6 94 35	152.7	29 47.5 94 34	153.0	29 19.4 94 34	153.2	28 51.2 94 34	153.3	28 23.1 94 34	153.5	4
25	31 18.6 93 37	151.1	30 50.7 93 36	151.3	30 22.8 93 36	151.5	29 54.9 93 36	151.7	29 26.9 93 36	151.9	28 58.9 93 35	152.1	28 30.9 93 35	152.3	28 02.9 93 35	152.5	25
6	30 56.7 93 38	150.0	30 28.9 93 38	150.2	30 01.2 93 37	150.4	29 33.4 93 37	150.7	29 05.5 93 37	150.9	28 37.7 93 36	151.1	28 09.8 93 36	151.3	27 41.9 93 36	151.5	6
7	30 34.1 92 39	149.0	30 06.5 92 39	149.2	29 38.8 92 38	149.4	29 11.2 92 38	149.6	28 43.5 92 38	149.8	28 15.8 92 38	150.1	27 48.1 92 37	150.3	27 20.3 93 37	150.5	7
8	30 10.7 91 40	147.9	29 43.3 92 40	148.1	29 15.8 92 40	148.4	28 48.3 92 39	148.6	28 20.7 92 39	148.8	27 53.2 92 39	149.1	27 25.6 92 39	149.3	26 58.0 92 38	149.5	8
9	29 46.7 91 41	146.9	29 19.4 91 41	147.1	28 52.1 91 41	147.4	28 24.7 91 40	147.6	27 57.3 91 40	147.8	27 29.9 91 40	148.1	27 02.5 91 40	148.3	26 35.1 92 39	148.5	9
30	29 22.0 90 42	145.9	28 54.9 91 42	146.1	28 27.7 91 42	146.3	28 00.5 91 41	146.6	27 33.3 91 41	146.8	27 06.0 91 41	147.1	26 38.7 91 41	147.3	26 11.4 91 40	147.5	30
1	28 56.7 90 43	144.9	28 29.7 90 43	145.1	28 02.6 90 43	145.3	27 35.6 90 43	145.6	27 08.5 90 42	145.8	26 41.4 90 42	146.1	26 14.3 90 42	146.3	25 47.2 91 41	146.6	1
2	28 30.7 89 44	143.9	28 03.8 89 44	144.1	27 37.0 90 44	144.4	27 10.1 90 44	144.6	26 43.2 90 43	144.9	26 16.2 90 43	145.1	25 49.3 90 43	145.3	25 22.3 90 42	145.6	2
3	28 04.1 89 45	142.9	27 37.4 89 45	143.1	27 10.7 89 45	143.4	26 44.0 89 45	143.6	26 17.2 89 44	143.9	25 50.4 89 44	144.1	25 23.6 89 44	144.4	24 56.8 89 44	144.6	3
4	27 36.8 88 46	141.9	27 10.3 88 46	142.1	26 43.8 89 46	142.4	26 17.2 89 46	142.7	25 50.6 89 45	142.9	25 24.0 89 45	143.2	24 57.3 89 45	143.4	24 30.7 89 44	143.7	4
35	27 09.0 88 47	140.9	26 42.7 88 47	141.2	26 16.3 88 47	141.4	25 49.9 88 47	141.7	25 23.4 88 46	142.0	24 57.0 88 46	142.2	24 30.5 88 46	142.5	24 04.0 88 45	142.7	35
6	26 40.6 87 48	140.0	26 14.4 87 48	140.2	25 48.2 87 48	140.5	25 22.0 88 47	140.8	24 55.7 88 47	141.0	24 29.4 88 47	141.3	24 03.0 88 47	141.6	23 36.7 88 46	141.8	6
7	26 11.6 87 49	139.0	25 45.6 87 49	139.3	25 19.6 87 49	139.6	24 53.5 87 48	139.8	24 27.4 87 48	140.1	24 01.2 87 48	140.4	23 35.0 87 48	140.6	23 08.8 87 47	140.9	7
8	25 42.1 86 50	138.1	25 16.3 86 50	138.3	24 50.4 86 50	138.6	24 24.4 86 49	138.9	23 58.5 87 49	139.2	23 32.5 87 49	139.4	23 06.5 87 48	139.7	22 40.5 87 48	140.0	8
9	25 12.9 86 51	137.1	24 46.3 86 51	137.4	24 20.6 86 50	137.7	23 54.9 86 50	138.0	23 29.1 86 50	138.3	23 03.2 86 50	138.5	22 37.4 86 49	138.8	22 11.5 86 49	139.1	9
40	24 41.4 85 52	136.2	24 15.9 85 52	136.5	23 50.3 85 51	136.8	23 24.7 85 51	137.1	22 59.1 85 51	137.4	22 33.5 86 50	137.6	22 07.8 86 50	137.9	21 42.0 86 50	138.2	40
1	24 10.3 85 53	135.3	23 45.0 85 52	135.6	23 19.6 85 52	135.9	22 54.1 85 52	136.2	22 28.7 85 52	136.5	22 03.2 85 51	136.7	21 37.6 85 51	137.0	21 12.1 85 51	137.3	1
2	23 38.7 84 54	134.4	23 13.5 84 53	134.7	22 48.3 84 53	135.0	22 23.0 84 53	135.3	21 57.7 84 52	135.6	21 32.3 85 52	135.9	21 07.0 85 52	136.1	20 41.6 85 52	136.4	2
3	23 06.6 83 54	133.5	22 41.6 84 54	133.8	22 16.5 84 54	134.1	21 51.4 84 54	134.4	21 26.2 84 53	134.7	21 01.0 84 53	135.0	20 35.8 84 53	135.3	20 10.6 84 52	135.6	3
4	22 34.1 83 55	132.6	22 09.2 83 55	132.9	21 44.2 83 55	133.2	21 19.3 83 54	133.5	20 54.3 83 54	133.8	20 29.3 83 54	134.1	20 04.2 84 53	134.4	19 39.1 84 53	134.7	4
45	22 01.0 82 56	131.8	21 36.3 82 56	132.1	21 11.5 83 55	132.4	20 46.7 83 55	132.7	20 21.9 83 55	133.0	19 57.0 83 54	133.3	19 32.1 83 54	133.6	19 07.2 83 54	133.8	45
6	21 27.5 82 57	130.9	21 02.9 82 56	131.2	20 38.3 82 56	131.5	20 13.7 82 56	131.8	19 49.0 82 56	132.1	19 24.3 82 55	132.4	18 59.6 82 55	132.7	18 34.8 83 55	133.0	6
7	20 53.6 81 57	130.0	20 29.2 81 57	130.3	20 04.7 82 57	130.6	19 40.2 82 56	131.0	19 15.7 82 56	131.3	18 51.2 82 56	131.6	18 26.6 82 56	131.9	18 02.0 82 55	132.2	7
8	20 19.2 81 58	129.2	19 55.0 81 58	129.5	19 30.7 81 57	129.8	19 06.4 81 57	130.1	18 42.0 81 57	130.4	18 17.6 81 57	130.7	17 53.2 81 56	131.0	17 28.7 82 56	131.3	8
9	19 44.5 80 59	128.3	19 20.4 80 58	128.7	18 56.2 81 58	129.0	18 32.1 81 58	129.3	18 07.8 81 58	129.6	17 43.6 81 57	129.9	17 19.4 81 57	130.2	16 55.1 81 57	130.5	9
50	19 09.3 80 59	127.5	18 45.3 80 59	127.8	18 21.4 80 59	128.1	17 57.3 80 58	128.5	17 33.3 80 58	128.8	17 09.2 80 58	129.1	16 45.1 80 58	129.4	16 21.0 81 58	129.7	50
1	18 33.7 79 60	126.7	18 09.9 79 60	127.0	17 46.1 80 59	127.3	17 22.2 80 59	127.6	16 58.3 80 59	128.0	16 34.4 80 59	128.3	16 10.4 80 58	128.6	15 46.5 80 58	128.9	1
2	17 57.8 79 61	125.9	17 34.1 79 60	126.2	17 10.5 79 60	126.5	16 46.7 79 60	126.8	16 23.0 79 60	127.2	15 59.2 79 59	127.5	15 35.4 79 59	127.8	15 11.6 79 59	128.1	2
3	17 21.5 78 61	125.1	16 58.0 78 61	125.4	16 34.4 79 61	125.7	16 10.9 79 60	126.0	15 47.3 79 60	126.4	15 23.6 79 60	126.7	15 00.0 79 60	127.0	14 36.3 79 59	127.3	3
4	16 44.8 78 62	124.3	16 21.4 78 61	124.6	15 58.1 78 61	124.9	15 34.6 78 61	125.2	15 11.2 78 61	125.6	14 47.7 78 60	125.9	14 24.2 78 60	126.2	14 00.7 78 60	126.5	4
55	16 07.8 77 62	123.5	15 44.6 77 62	123.8	15 21.3 78 62	124.1	14 58.0 78 62	124.5	14 34.7 78 61	124.8	14 11.4 78 61	125.1	13 48.0 78 61	125.4	13 24.6 78 61	125.8	55
6	15 30.4 77 63	122.7	15 07.4 77 63	123.0	14 44.2 77 62	123.4	14 21.1 77 62	123.7	13 57.9 77 62	124.0	13 34.7 77 62	124.3	13 11.5 77 61	124.7	12 48.3 78 61	125.0	6
7	14 52.7 76 63	121.9	14 29.8 77 63	122.3	14 06.8 77 63	122.6	13 43.8 77 63	122.9	13 20.8 77 62	123.2	12 57.8 77 62	123.6	12 34.7 77 62	123.9	12 11.6 77 62	124.2	7
8	14 14.7 76 64	121.1	13 51.9 76 64	121.5	13 29.1 76 63	121.8	13 06.2 76 63	122.1	12 43.4 76 63	122.5	12 20.4 76 63	122.8	11 57.5 76 62	123.1	11 34.6 77 62	123.5	8
9	13 36.4 76 64	120.4	13 13.8 76 64	120.7	12 51.1 76 64	121.1	12 28.3 76 64	121.4	12 05.6 76 63	121.7	11 42.8 76 63	122.1	11 20.0 76 63	122.4	10 57.2 76 63	122.7	9
60	12 57.8 75 65	119.6	12 35.3 75 65	120.0	12 12.7 75 64	120.3	11 50.1 75 64	120.6	11 27.5 75 64	121.0	11 04.9 75 64	121.3	10 42.2 76 64	121.6	10 19.5 76 63	122.0	60
1	12 18.9 75 65	118.9	11 56.5 75 65	119.2	11 34.1 75 65	119.6	11 11.6 75 65	119.9	10 49.1 75 64	120.2	10 26.6 75 64	120.6	10 04.1 75 64	120.9	9 41.6 75 64	121.2	1
2	11 39.7 74 66	118.1	11 17.4 74 66	118.5	10 55.1 74 65	118.8	10 32.8 74 65	119.2	10 10.5 75 65	119.5	9 48.1 75 65	119.8	9 25.7 75 64	120.2	9 03.3 75 64	120.5	2
3	11 00.3 74 66	117.4	10 38.1 74 66	117.7	10 15.9 74 66	118.1	9 53.7 74 66	118.4	9 31.5 74 65	118.8	9 09.3 74 65	119.1	8 47.0 74 65	119.4	8 24.7 74 65	119.8	3
4	10 20.6 73 67	116.7	9 58.5 73 66	117.0	9 36.5 74 66	117.4	9 14.4 74 66	117.7	8 52.3 74 66	118.0	8 30.2 74 66	118.4	8 08.0 74 65	118.7	7 45.9 74 65	119.1	4
65	9 40.6 73 67	115.9	9 18.7 73 67	116.3	8 56.7 73 67	116.6	8 34.8 73 66	117.0	8 12.8 73 66	117.3	7 50.8 73 66	117.7	7 28.8 73 66	118.0	7 06.8 73 66	118.3	65
6	9 00.4 73 67	115.2	8 38.6 73 67	115.6	8 16.7 73 67	115.9	7 54.9 73 67	116.3	7 33.1 73 67	116.6	7 11.2 73 66	116.9	6 49.3 73 66	117.3	6 27.4 73 66	117.6	6
7	8 19.9 72 68	114.5	7 58.2 72 68	114.8	7 36.5 72 67	115.2	7 14.8 72 67	115.5	6 53.1 72 67	115.9	6 31.3 73 67	116.2	6 09.6 73 67	116.6	5 47.8 73 66	116.9	7
8	7 39.2 72 68	113.8	7 17.6 72 68	114.1	6 56.1 72 68	114.5	6 34.5 72 68	114.8	6 12.8 72 67	115.2	5 51.2 72 67	115.5	5 29.6 72 67	115.9	5 07.9 72 67	116.2	8
9	6 58.3 72 69	113.1	6 36.8 72 68	113.4	6 15.4 72 68	113.8	5 53.9 72 68	114.1	5 32.4 72 68	114.5	5 10.8 72 68	114.8					9
70	6 17.2 71 69	112.4	5 55.8 71 69	112.7	5 34.5 71 68	113.1	5 13.1 71 68	113.4									70
1	5 35.8 71 70	111.7	5 14.6 71 69	112.0													1

Lat. 42°

Lat. 43°

Lat. 44°

Lat. 45°

Lat. 46°

Lat. 47°

Lat. 48°

DECLINATION SAME NAME AS LATITUDE

H.A.	12° 00′		12° 30′		13° 00′		13° 30′		14° 00′		14° 30′		15° 00′		15° 30′		H.A.
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
	° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		
91	7 15.8 66 73	80.4	7 35.7 66 73	80.0	7 55.5 66 73	79.6	8 15.4 66 73	79.2	8 35.2 66 73	78.9	8 54.9 66 73	78.5	9 14.7 66 73	78.1	9 34.4 66 73	77.7	91
2	6 31.9 66 73	79.7	6 51.8 66 73	79.3	7 11.7 66 73	79.0	7 31.6 66 73	78.6	7 51.5 66 73	78.2	8 11.3 66 73	77.8	8 31.1 66 72	77.5	8 50.9 66 72	77.1	2
3	5 48.1 67 73	79.1	6 08.0 67 73	78.7	6 28.0 67 73	78.3	6 47.9 66 73	77.9	7 07.9 66 72	77.6	7 27.8 66 72	77.2	7 47.7 66 72	76.8	8 07.5 66 72	76.4	3
4	5 04.3 67 73	78.4	5 24.4 67 73	78.0	5 44.4 67 73	77.7	6 04.4 67 72	77.3	6 24.4 67 72	76.9	6 44.3 67 72	76.5	7 04.3 66 72	76.2	7 24.2 66 72	75.8	4
95					5 00.9 67 72	77.0	5 21.0 67 72	76.6	5 41.0 67 72	76.3	6 01.0 67 72	75.9	6 21.1 67 72	75.5	6 41.1 67 72	75.1	95
6											5 17.9 67 72	75.2	5 38.0 67 72	74.9	5 58.0 67 72	74.5	6
7															5 15.1 67 71	73.8	7

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Lat. 42°

H.A.	16° 00′ Alt.	Δd Δt	Az.	16° 30′ Alt.	Δd Δt	Az.	17° 00′ Alt.	Δd Δt	Az.	17° 30′ Alt.	Δd Δt	Az.	18° 00′ Alt.	Δd Δt	Az.	18° 30′ Alt.	Δd Δt	Az.	19° 00′ Alt.	Δd Δt	Az.	19° 30′ Alt.	Δd Δt	Az.	H.A.
°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	°
00	64 00.0	1.0 01	180.0	64 30.0	1.0 01	180.0	65 00.0	1.0 01	180.0	65 30.0	1.0 02	180.0	66 00.0	1.0 02	180.0	66 30.0	1.0 02	180.0	67 00.0	1.0 02	180.0	67 30.0	1.0 02	180.0	00
1	63 59.1	1.0 04	177.8	64 29.1	1.0 04	177.8	64 59.1	1.0 04	177.7	65 29.1	1.0 04	177.7	65 59.1	1.0 05	177.7	66 29.1	1.0 05	177.6	66 59.1	1.0 05	177.6	67 29.0	1.0 06	177.5	1
2	63 56.6	1.0 07	175.6	64 26.5	1.0 07	175.6	64 56.5	1.0 07	175.5	65 26.4	1.0 07	175.4	65 56.4	1.0 08	175.3	66 26.3	1.0 08	175.3	66 56.2	1.0 08	175.2	67 26.2	1.0 08	175.1	2
3	63 52.3	1.0 10	173.4	64 22.2	1.0 10	173.3	64 52.1	1.0 10	173.2	65 22.0	1.0 10	173.1	65 51.8	1.0 11	173.0	66 21.7	1.0 11	172.9	66 51.6	1.0 11	172.8	67 21.4	99 11	172.6	3
4	63 46.4	99 13	171.3	64 16.2	99 13	171.1	64 46.0	99 13	171.0	65 15.8	99 13	170.9	65 45.5	99 13	170.7	66 15.3	99 14	170.5	66 45.0	99 14	170.4	67 14.8	99 14	170.2	4
05	63 38.8	99 15	169.1	64 08.5	99 16	169.0	64 38.2	99 16	168.8	65 07.8	99 16	168.6	65 37.4	99 16	168.4	66 07.1	99 17	168.2	66 36.7	99 17	168.0	67 06.2	99 17	167.8	05
6	63 29.6	98 18	167.0	63 59.1	98 18	166.8	64 28.6	98 19	166.6	64 58.1	98 19	166.4	65 27.6	98 19	166.2	65 57.1	98 20	165.9	66 26.5	98 20	165.7	66 55.9	98 20	165.4	6
7	63 18.7	98 21	164.9	63 48.1	98 21	164.7	64 17.5	98 21	164.4	64 46.8	98 22	164.2	65 16.1	98 22	163.9	65 45.4	98 22	163.7	66 14.6	97 23	163.4	66 43.8	97 23	163.1	7
8	63 06.3	97 23	162.8	63 35.5	97 24	162.5	64 04.7	97 24	162.3	64 33.8	97 24	162.0	65 02.9	97 25	161.7	65 32.0	97 25	161.4	66 01.0	97 25	161.1	66 30.0	97 26	160.8	8
9	62 52.4	97 26	160.7	63 21.4	97 26	160.5	63 50.3	96 26	160.2	64 19.3	96 27	159.9	64 48.1	96 27	159.5	65 17.0	96 28	159.2	65 45.8	96 28	158.9	66 14.5	96 29	158.5	9
10	62 36.9	96 28	158.7	63 05.7	96 29	158.4	63 34.4	96 29	158.1	64 03.1	96 29	157.8	64 31.8	95 30	157.4	65 00.4	95 30	157.1	65 28.9	95 31	156.7	65 57.4	95 31	156.3	10
1	62 20.0	95 30	156.7	62 48.6	95 31	156.4	63 17.1	95 31	156.1	63 45.5	95 32	155.7	64 13.9	95 32	155.3	64 42.2	94 33	154.9	65 10.5	94 33	154.6	65 38.7	94 34	154.1	1
2	62 01.7	94 33	154.8	62 30.0	94 33	154.4	62 58.3	94 34	154.1	63 26.5	94 34	153.7	63 54.6	94 35	153.3	64 22.6	93 35	152.9	64 50.6	93 36	152.5	65 18.5	93 36	152.0	2
3	61 42.1	94 35	152.9	62 10.1	93 35	152.5	62 38.1	93 36	152.1	63 06.0	93 36	151.7	63 33.8	93 37	151.3	64 01.6	92 37	150.8	64 29.3	92 38	150.4	64 56.9	92 38	149.9	3
4	61 21.1	93 37	151.0	61 48.8	92 38	150.6	62 16.6	92 38	150.2	62 44.2	92 38	149.8	63 11.7	92 39	149.3	63 39.2	91 39	148.9	64 06.6	91 40	148.4	64 33.9	91 41	147.9	4
15	60 58.8	92 39	149.1	61 26.3	92 40	148.7	61 53.7	91 40	148.3	62 21.1	91 41	147.9	62 48.3	91 41	147.4	63 15.5	90 42	146.9	63 42.6	90 42	146.5	64 09.6	90 43	146.0	15
6	60 35.4	91 41	147.3	61 02.6	91 42	146.9	61 29.7	90 42	146.5	61 56.8	90 42	146.0	62 23.7	90 43	145.5	62 50.6	89 44	145.1	63 17.3	89 44	144.6	63 44.0	89 45	144.0	6
7	60 10.7	90 43	145.6	60 37.7	90 43	145.1	61 04.5	89 44	144.7	61 31.3	89 44	144.2	61 57.9	89 45	143.7	62 24.5	88 45	143.2	62 50.9	88 46	142.7	63 17.2	88 46	142.2	7
8	59 45.0	89 45	143.9	60 11.6	89 45	143.4	60 38.2	88 46	142.9	61 04.6	88 46	142.5	61 31.0	88 47	142.0	61 57.2	87 47	141.4	62 23.3	87 48	140.9	62 49.3	86 48	140.4	8
9	59 18.2	88 46	142.2	59 44.5	88 47	141.7	60 10.8	87 47	141.2	60 36.9	87 48	140.7	61 03.0	87 48	140.2	61 28.9	86 49	139.7	61 54.7	86 49	139.2	62 20.4	85 50	138.6	9
20	58 50.3	87 48	140.6	59 16.4	87 48	140.1	59 42.4	86 49	139.6	60 08.2	86 49	139.1	60 34.0	86 50	138.6	60 59.6	85 50	138.0	61 25.1	85 51	137.5	61 50.4	84 52	136.9	20
1	58 21.5	86 50	139.0	58 47.3	86 50	138.5	59 13.0	85 50	138.0	59 38.5	85 51	137.4	60 04.0	85 52	136.9	60 29.3	84 52	136.4	60 54.4	84 53	135.8	61 19.5	83 53	135.3	1
2	57 51.8	85 51	137.4	58 17.3	85 52	136.9	58 42.7	84 52	136.4	59 07.9	84 52	135.9	59 33.1	84 53	135.3	59 58.1	83 53	134.8	60 22.9	83 54	134.2	60 47.6	82 54	133.6	2
3	57 21.2	84 52	135.9	57 46.4	84 53	135.4	58 11.5	83 53	134.9	58 36.5	83 54	134.3	59 01.3	83 54	133.8	59 26.0	82 55	133.2	59 50.5	82 55	132.7	60 15.0	81 56	132.1	3
4	56 49.7	83 54	134.4	57 14.6	83 54	133.9	57 39.5	83 55	133.4	58 04.1	82 55	132.8	58 28.7	82 56	132.3	58 53.1	81 56	131.7	59 17.4	81 57	131.1	59 41.5	80 57	130.6	4
25	56 17.4	82 55	132.9	56 42.1	82 55	132.4	57 06.7	82 56	131.9	57 31.1	81 56	131.4	57 55.3	81 57	130.8	58 19.4	80 57	130.3	58 43.4	80 58	129.7	59 07.2	79 58	129.1	25
6	55 44.4	82 56	131.5	56 08.8	81 57	131.0	56 33.1	81 57	130.5	56 57.2	80 58	129.9	57 21.2	80 58	129.4	57 45.1	79 58	128.8	58 08.7	79 59	128.2	58 32.3	78 59	127.7	6
7	55 10.7	81 57	130.2	55 34.8	80 58	129.6	55 58.8	80 58	129.1	56 22.7	79 59	128.6	56 46.4	79 59	128.0	57 10.0	78 60	127.4	57 33.4	78 60	126.9	57 56.6	77 60	126.3	7
8	54 36.3	80 58	128.8	55 00.2	79 59	128.3	55 23.9	79 59	127.8	55 47.5	78 60	127.2	56 11.0	78 60	126.7	56 34.3	77 61	126.1	56 57.4	77 61	125.5	57 20.4	76 61	124.9	8
9	54 01.2	79 59	127.5	54 24.9	79 60	127.0	54 48.4	78 60	126.4	55 11.7	78 61	125.9	55 34.9	77 61	125.3	55 57.9	77 62	124.8	56 20.8	76 62	124.2	56 43.5	75 62	123.6	9
30	53 25.6	78 60	126.2	53 48.9	78 61	125.7	54 12.2	77 61	125.2	54 35.3	77 62	124.6	54 58.2	76 62	124.1	55 21.0	76 62	123.5	55 43.6	75 63	122.9	56 06.1	75 63	122.3	30
1	52 49.3	77 61	125.0	53 12.5	77 62	124.5	53 35.5	76 62	123.9	53 58.3	76 63	123.4	54 21.0	75 63	122.8	54 43.6	75 63	122.2	55 05.9	74 64	121.7	55 28.2	74 64	121.1	1
2	52 12.5	77 62	123.8	52 35.4	76 63	123.2	52 58.2	76 63	122.7	53 20.8	75 63	122.2	53 43.3	75 64	121.6	54 05.6	74 64	121.0	54 27.7	74 64	120.5	54 49.7	73 65	119.9	2
3	51 35.2	76 63	122.6	51 57.9	75 63	122.1	52 20.4	75 64	121.5	52 42.8	74 64	121.0	53 05.1	74 64	120.4	53 27.2	73 65	119.8	53 49.1	73 65	119.3	54 10.8	72 66	118.7	3
4	50 57.4	75 64	121.4	51 19.9	75 64	120.9	51 42.2	74 64	120.4	52 04.4	74 65	119.8	52 26.4	73 65	119.3	52 48.3	73 66	118.7	53 10.0	72 66	118.1	53 31.5	72 66	117.5	4
35	50 19.1	74 65	120.3	50 41.4	74 65	119.8	51 03.5	73 65	119.2	51 25.5	73 66	118.7	51 47.3	72 66	118.1	52 08.9	72 66	117.6	52 30.4	71 67	117.0	52 51.8	71 67	116.4	35
6	49 40.4	74 65	119.2	50 02.4	73 66	118.7	50 24.4	73 66	118.1	50 46.1	72 66	117.6	51 07.8	72 66	117.0	51 29.2	71 67	116.5	51 50.5	71 67	115.9	52 11.6	70 67	115.3	6
7	49 01.2	73 66	118.1	49 23.1	73 66	117.6	49 44.8	72 66	117.0	50 06.4	72 67	116.5	50 27.8	71 67	116.0	50 49.1	71 67	115.4	51 10.2	70 68	114.8	51 31.2	70 68	114.3	7
8	48 21.7	73 66	117.0	48 43.4	72 67	116.5	49 04.9	72 67	116.0	49 26.3	71 67	115.4	49 47.6	71 68	114.9	50 08.7	70 68	114.4	50 29.6	69 68	113.8	50 50.4	69 69	113.2	8
9	47 41.8	72 67	116.0	48 03.3	71 67	115.5	48 24.7	71 68	115.0	48 45.9	70 68	114.4	49 07.0	70 68	113.9	49 27.9	69 68	113.3	49 48.6	69 69	112.8	50 09.2	68 69	112.2	9
40	47 01.6	71 68	115.0	47 22.9	71 68	114.5	47 44.1	70 68	113.9	48 05.1	70 68	113.4	48 26.0	69 69	112.9	48 46.8	69 69	112.3	49 07.4	68 69	111.8	49 27.8	68 70	111.2	40
1	46 21.0	71 68	114.0	46 42.2	70 68	113.5	47 03.2	70 69	112.9	47 24.1	69 69	112.4	47 44.8	69 69	111.9	48 05.4	68 69	111.3	48 25.8	68 70	110.8	48 46.1	67 70	110.2	1
2	45 40.1	70 69	113.0	46 01.1	70 69	112.5	46 22.0	69 69	112.0	46 42.7	69 69	111.5	47 03.3	68 70	110.9	47 23.7	68 70	110.4	47 44.0	67 70	109.8	48 04.1	67 70	109.3	2
3	44 58.9	70 69	112.1	45 19.8	69 69	111.5	45 40.5	69 70	111.0	46 01.1	68 70	110.5	46 21.5	68 70	110.0	46 41.8	67 70	109.4	47 01.9	67 70	108.9	47 21.9	66 71	108.4	3
4	44 17.5	69 70	111.1	44 38.2	69 70	110.6	44 58.8	68 70	110.1	45 19.2	68 70	109.6	45 39.5	67 70	109.0	45 59.6	67 71	108.5	46 19.6	66 71	108.0	46 39.5	66 71	107.4	4
45	43 35.7	69 70	110.2	43 56.3	68 70	109.7	44 16.8	68 70	109.2	44 37.1	67 71	108.7	44 57.2	67 71	108.1	45 17.2	67 71	107.6	45 37.1	66 71	107.1	45 56.8	65 71	106.5	45
6	42 53.8	68 70	109.3	43 14.2	68 71	108.8	43 34.5	67 71	108.3	43 54.7	67 71	107.8	44 14.8	67 71	107.2	44 34.6	66 71	106.7	44 54.4	66 72	106.2	45 14.0	65 72	105.7	6
7	42 11.6	68 71	108.4	42 31.9	68 71	107.9	42 52.1	67 71	107.4	43 12.1	67 71	106.9	43 32.1	66 71	106.4	43 51.8	66 72	105.9	44 11.5	65 72	105.3	44 31.0	65 72	104.8	7
8	41 29.2	68 71	107.5	41 49.4	67 71	107.0	42 09.4	67 71	106.5	42 29.4	66 72	106.0	42 49.2	66 72	105.5	43 08.9	65 72	105.0	43 28.4	65 72	104.5	43 47.8	64 72	103.9	8
9	40 46.5	67 71	106.7	41 06.6	67 72	106.2	41 26.6	66 72	105.7	41 46.4	66 72	105.2	42 06.1	65 72	104.7	42 25.7	65 72	104.2	42 45.1	65 72	103.6	43 04.4	64 72	103.1	9
50	40 03.7	67 72	105.8	40 23.7	66 72	105.3	40 43.6	66 72	104.8	41 03.3	66 72	104.3	41 22.9	65 72	103.8	41 42.4	65 72	103.3	42 01.7	64 73	102.8	42 20.9	64 73	102.3	50
1	39 20.7	67 72	105.0	39 40.6	66 72	104.5	40 00.4	66 72	104.0	40 20.0	65 72	103.5	40 39.6	65 72	103.0	40 58.9	64 73	102.5	41 18.2	64 73	102.0	41 37.3	63 73	101.5	1
2	38 37.6	66 72	104.2	38 57.4	66 72	103.7	39 17.1	65 72	103.2	39 36.6	65 73	102.7	39 56.0	65 73	102.2	40 15.3	64 73	101.7	40 34.5	64 73	101.2	40 53.6	63 73	100.7	2
3	37 54.3	66 72	103.4	38 14.0	65 73	102.9	38 33.6	65 73	102.4	38 53.0	65 73	101.9	39 12.4	64 73	101.4	39 31.6	64 73	100.9	39 50.7	63 73	100.4	40 09.7	63 73	99.9	3
4	37 10.8	66 73	102.6	37 30.4	65 73	102.1	37 50.0	65 73	101.6	38 09.4	64 73	101.1	38 28.6	64 73	100.6	38 47.8	64 73	100.1	39 06.8	63 73	99.6	39 25.7	63 73	99.1	4
55	36 27.2	65 73	101.8	36 46.8	65 73	101.3	37 06.2	65 73	100.8	37 25.5	64 73	100.3	37 44.8	64 73	99.9	38 03.8	63 73	99.4	38 22.8	63 74	98.9	38 41.6	63 74	98.4	55
6	35 43.5	65 73	101.0	36 03.0	65 73	100.5	36 22.4	64 73	100.1	36 41.6	64 73	99.6	37 00.8	64 73	99.1	37 19.8	63 74	98.6	37 38.7	63 74	98.1	37 57.5	62 74	97.6	6
7	34 59.7	65 73	100.2	35 19.1	65 73	99.8	35 38.4	64 73	99.3	35 57.6	64 74	98.8	36 16.7	63 74	98.3	36 35.7	63 74	97.9	36 54.5	63 74	97.4	37 13.3	62 74	96.9	7
8	34 15.8	65 73	99.5	34 35.1	64 73	99.0	34 54.4	64 74	98.5	35 13.5	64 74	98.1	35 32.5	63 74	97.6	35 51.5	63 74	97.1	36 10.3	63 74	96.6	36 29.0	62 74	96.2	8
9	33 31.7	65 74	98.7	33 51.0	64 74	98.3	34 10.2	64 74	97.8	34 29.3	63 74	97.3	34 48.3	63 74	96.9	35 07.2	63 74	96.4	35 25.9	62 74	95.9	35 44.6	62 74	95.4	9
60	32 47.6	64 74	98.0	33 06.9	64 74	97.5	33 26.0	64 74	97.1	33 45.1	63 74	96.6	34 04.0	63 74	96.1	34 22.8	63 74	95.7	34 41.6	62 74	95.2	35 00.2	62 74	94.7	60
1	32 03.4	64 74	97.3	32 22.6	64 74	96.8	32 41.7	64 74	96.3	33 00.7	63 74	95.9	33 19.6	63 74	95.4	33 38.4	62 74	94.9	33 57.1	62 74	94.5	34 15.7	62 74	94.0	1
2	31 19.2	64 74	96.5	31 38.3	64 74	96.1	31 57.4	63 74	95.6	32 16.4	63 74	95.2	32 35.2	63 74	94.7	32 54.0	62 74	94.2	33 12.7	62 74	93.8	33 31.2	62 74	93.3	2
3	30 34.8	64 74	95.8	30 54.0	64 74	95.4	31 13.0	63 74	94.9	31 31.9	63 74	94.5	31 50.8	63 74	94.0	32 09.5	62 74	93.5	32 28.2	62 74	93.1	32 46.7	62 74	92.6	3
4	29 50.4	64 74	95.1	30 09.5	63 74	94.7	30 28.5	63 74	94.2	30 47.5	63 74	93.8	31 06.3	63 74	93.3	31 25.0	62 74	92.8	31 43.6	62 74	92.4	32 02.1	62 74	91.9	4
65	29 06.0	64 74	94.4	29 25.1	63 74	94.0	29 44.1	63 74	93.5	30 02.9	63 74	93.1	30 21.7	63 74	92.6	30 40.4	62 74	92.2	30 59.1	62 74	91.7	31 17.6	62 74	91.2	65
6	28 21.5	64 74	93.7	28 40.6	63 74	93.3	28 59.5	63 74	92.8	29 18.4	63 74	92.4	29 37.2	62 74	91.9	29 55.9	62 74	91.5	30 14.5	62 74	91.0	30 33.0	62 74	90.6	6
7	27 37.0	64 74	93.0	27 56.0	63 74	92.6	28 15.0	63 74	92.1	28 33.8	63 74	91.7	28 52.6	62 74	91.2	29 11.3	62 74	90.8	29 29.9	62 74	90.3	29 48.4	62 74	89.9	7
8	26 52.5	63 74	92.3	27 11.5	63 74	91.9	27 30.4	63 74	91.4	27 49.3	63 74	91.0	28 08.0	62 74	90.6	28 26.7	62 74	90.1	28 45.3	62 74	89.7	29 03.8	62 74	89.2	8
9	26 07.9	63 74	91.6	26 26.9	63 74	91.2	26 45.8	63 74	90.8	27 04.7	63 74	90.3	27 23.4	62 74	89.9	27 42.1	62 74	89.5	28 00.7	62 74	89.0	28 19.2	62 74	88.6	9
70	25 23.3	63 74	91.0	25 42.3	63 74	90.5	26 01.3	63 74	90.1	26 20.1	63 74	89.7	26 38.9	62 74	89.2	26 57.5	62 74	88.8	27 16.1	62 74	88.4	27 34.7	62 74	87.9	70
1	24 38.8	63 74	90.3	24 57.7	63 74	89.9	25 16.7	63 74	89.4	25 35.5	63 74	89.0	25 54.3	62 74	88.6	26 13.0	62 74	88.1	26 31.6	62 74	87.7	26 50.1	62 74	87.3	1
2	23 54.2	63 74	89.6	24 13.2	63 74	89.2	24 32.1	63 74	88.8	24 50.9	63 74	88.3	25 09.7	62 74	87.9	25 28.4	62 74	87.5	25 47.0	62 74	87.0	26 05.6	62 74	86.6	2
3	23 09.6	63 74	89.0	23 28.6	63 74	88.5	23 47.5	63 74	88.1	24 06.4	63 74	87.7	24 25.2	63 74	87.3	24 43.9	62 74	86.8	25 02.5	62 74	86.4	25 21.1	62 74	86.0	3
4	22 25.0	63 74	88.3	22 44.0	63 74	87.9	23 03.0	63 74	87.5	23 21.8	63 74	87.0	23 40.6	63 74	86.6	23 59.4	62 74	86.2	24 18.0	62 74	85.7	24 36.6	62 74	85.3	4
75	21 40.4	64 74	87.6	21 59.5	63 74	87.2	22 18.4	63 74	86.8	22 37.3	63 74	86.4	22 56.1	63 74	86.0	23 14.9	62 74	85.5	23 33.6	62 74	85.1	23 52.2	62 74	84.7	75
6	20 55.9	64 74	87.0	21 14.9	63 74	86.6	21 33.9	63 74	86.1	21 52.8	63 74	85.7	22 11.7	63 74	85.3	22 30.5	63 74	84.9	22 49.2	62 74	84.5	23 07.8	62 74	84.0	6
7	20 11.4	64 74	86.3	20 30.5	63 74	85.9	20 49.5	63 74	85.5	21 08.4	63 74	85.1	21 27.3	63 74	84.7	21 46.1	63 74	84.2	22 04.8	62 74	83.8	22 23.5	62 74	83.4	7
8	19 26.9	64 74	85.7	19 46.0	64 74	85.3	20 05.0	63 74	84.9	20 24.0	63 74	84.4	20 42.9	63 74	84.0	21 01.7	63 74	83.6	21 20.5	63 74	83.2	21 39.3	62 74	82.8	8
9	18 42.5	64 74	85.0	19 01.6	64 74	84.6	19 20.6	63 74	84.2	19 39.6	63 74	83.8	19 58.6	63 74	83.4	20 17.5	63 74	83.0	20 36.3	63 74	82.6	20 55.1	62 74	82.1	9
80	17 58.1	64 74	84.4	18 17.2	64 74	84.0	18 36.3	64 74	83.6	18 55.3	63 74	83.2	19 14.3	63 74	82.8	19 33.2	63 74	82.3	19 52.1	63 74	81.9	20 10.9	63 73	81.5	80
1	17 13.7	64 74	83.7	17 32.9	64 74	83.3	17 52.0	64 74	82.9	18 11.1	63 74	82.5	18 30.1	63 74	82.1	18 49.1	63 73	81.7	19 08.0	63 73	81.3	19 26.9	63 73	80.9	1
2	16 29.4	64 74	83.1	16 48.6	64 74	82.7	17 07.8	64 74	82.3	17 26.9	64 74	81.9	17 46.0	63 73	81.5	18 05.0	63 73	81.1	18 24.0	63 73	80.7	18 42.9	63 73	80.3	2
3	15 45.2	64 74	82.5	16 04.4	64 74	82.1	16 23.7	64 73	81.7	16 42.8	64 73	81.2	17 01.9	64 73	80.8	17 21.0	63 73	80.4	17 40.0	63 73	80.0	17 59.0	63 73	79.6	3
4	15 01.0	64 74	81.8	15 20.3	64 73	81.4	15 39.6	64 73	81.0	15 58.8	64 73	80.6	16 17.9	64 73	80.2	16 37.1	64 73	79.8	16 56.1	63 73	79.4	17 15.2	63 73	79.0	4
85	14 16.9	65 73	81.2	14 36.3	64 73	80.8	14 55.6	64 73	80.4	15 14.8	64 73	80.0	15 34.0	64 73	79.6	15 53.2	64 73	79.2	16 12.3	64 73	78.8	16 31.4	64 73	78.4	85
6	13 32.9	65 73	80.5	13 52.3	65 73	80.1	14 11.7	64 73	79.7	14 31.0	64 73	79.3	14 50.2	64 73	79.0	15 09.5	64 73	78.6	15 28.7	64 73	78.2	15 47.8	64 73	77.8	6
7	12 49.0	65 73	79.9	13 08.4	65 73	79.5	13 27.8	65 73	79.1	13 47.2	65 73	78.7	14 06.5	64 73	78.3	14 25.8	64 73	77.9	14 45.1	64 72	77.5	15 04.3	64 72	77.1	7
8	12 05.1	65 73	79.2	12 24.6	65 73	78.9	12 44.1	65 73	78.5	13 03.5	65 73	78.1	13 22.9	65 72	77.7	13 42.3	64 72	77.3	14 01.6	64 72	76.9	14 20.9	64 72	76.5	8
9	11 21.4	65 73	78.6	11 40.9	65 73	78.2	12 00.4	65 73	77.8	12 19.9	65 72	77.4	12 39.4	65 72	77.1	12 58.8	65 72	76.7	13 18.2	65 72	76.3	13 37.6	64 72	75.9	9
90	10 37.7	65 73	78.0	10 57.3	65 72	77.6	11 16.9	65 72	77.2	11 36.5	65 72	76.8	11 56.0	65 72	76.4	12 15.5	65 72	76.0	12 35.0	65 72	75.6	12 54.4	65 72	75.3	90

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H.A.	16° 00′		16° 30′		17° 00′		17° 30′		18° 00′		18° 30′		19° 00′		19° 30′		H.A.
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	°
00	32 00.0 1.0 01	180.0	31 30.0 1.0 01	180.0	31 00.0 1.0 01	180.0	30 30.0 1.0 01	180.0	30 00.0 1.0 01	180.0	29 30.0 1.0 01	180.0	29 00.0 1.0 01	180.0	28 30.0 1.0 01	180.0	00
1	31 59.6 1.0 02	178.9	31 29.6 1.0 02	178.9	30 59.6 1.0 02	178.9	30 29.6 1.0 02	178.9	29 59.6 1.0 02	178.9	29 29.6 1.0 02	178.9	28 59.6 1.0 02	178.9	28 29.6 1.0 02	178.9	1
2	31 58.2 1.0 04	177.7	31 28.3 1.0 04	177.8	30 58.3 1.0 04	177.8	30 28.3 1.0 04	177.8	29 58.3 1.0 04	177.8	29 28.3 1.0 04	177.8	28 58.3 1.0 04	177.8	28 28.3 1.0 03	177.9	2
3	31 56.0 1.0 05	176.6	31 26.1 1.0 05	176.6	30 56.1 1.0 05	176.7	30 26.1 1.0 05	176.7	29 56.2 1.0 05	176.7	29 26.2 1.0 05	176.7	28 56.2 1.0 05	176.8	28 26.2 1.0 05	176.8	3
4	31 53.0 1.0 07	175.5	31 23.0 1.0 07	175.5	30 53.1 1.0 06	175.5	30 23.1 1.0 06	175.6	29 53.2 1.0 06	175.6	29 23.2 1.0 06	175.6	28 53.3 1.0 06	175.7	28 23.3 1.0 06	175.7	4
05	31 49.0 1.0 08	174.3	31 19.1 1.0 08	174.4	30 49.2 1.0 08	174.4	30 19.2 1.0 08	174.5	29 49.3 1.0 08	174.5	29 19.4 1.0 08	174.6	28 49.5 1.0 08	174.6	28 19.6 1.0 08	174.6	05
6	31 44.2 1.0 10	173.2	31 14.3 1.0 09	173.3	30 44.4 1.0 09	173.3	30 14.5 1.0 09	173.4	29 44.6 1.0 09	173.4	29 14.8 1.0 09	173.5	28 44.9 1.0 09	173.5	28 15.0 1.0 09	173.6	6
7	31 38.5 99 11	172.1	31 08.6 99 11	172.2	30 38.8 99 11	172.2	30 09.0 99 11	172.3	29 39.1 99 11	172.3	29 09.3 99 11	172.4	28 39.4 99 10	172.5	28 09.6 99 10	172.5	7
8	31 31.9 99 12	171.0	31 02.1 99 12	171.0	30 32.3 99 12	171.1	30 02.5 99 12	171.2	29 32.8 99 12	171.2	29 03.0 99 12	171.3	28 33.2 99 12	171.4	28 03.4 99 12	171.5	8
9	31 24.5 99 14	169.9	30 54.7 99 14	169.9	30 25.0 99 14	170.0	29 55.3 99 13	170.1	29 25.6 99 13	170.2	28 55.8 99 13	170.2	28 26.1 99 13	170.3	27 56.4 99 13	170.4	9
10	31 16.2 99 15	168.7	30 46.5 99 15	168.8	30 16.9 99 15	168.9	29 47.2 99 15	169.0	29 17.5 99 15	169.1	28 47.9 99 15	169.2	28 18.2 99 15	169.3	27 48.5 99 14	169.3	10
1	31 07.0 99 17	167.6	30 37.5 99 16	167.7	30 07.9 99 16	167.8	29 38.3 99 16	167.9	29 08.7 99 16	168.0	28 39.1 99 16	168.1	28 09.5 99 16	168.2	27 39.9 99 16	168.3	1
2	30 57.1 98 18	166.5	30 27.6 98 18	166.6	29 58.0 98 18	166.7	29 28.5 98 18	166.8	28 59.0 98 17	166.9	28 29.5 98 17	167.0	27 59.9 98 17	167.1	27 30.4 98 17	167.2	2
3	30 46.3 98 19	165.4	30 16.8 98 19	165.5	29 47.4 98 19	165.6	29 18.0 98 19	165.8	28 48.5 98 19	165.9	28 19.1 98 19	166.0	27 49.6 98 19	166.1	27 20.1 98 18	166.2	3
4	30 34.6 98 21	164.3	30 05.3 98 21	164.4	29 35.9 98 20	164.6	29 06.6 98 20	164.7	28 37.2 98 20	164.8	28 07.9 98 20	164.9	27 38.5 98 20	165.0	27 09.1 98 20	165.2	4
15	30 22.2 97 22	163.2	29 52.9 98 22	163.4	29 23.7 98 22	163.5	28 54.4 98 22	163.6	28 25.1 98 21	163.7	27 55.9 98 21	163.9	27 26.6 98 21	164.0	26 57.3 98 21	164.1	15
6	30 08.9 97 23	162.2	29 39.8 97 23	162.3	29 10.6 97 23	162.4	28 41.4 97 23	162.6	28 12.3 97 23	162.7	27 43.1 97 23	162.8	27 13.9 97 22	163.0	26 44.7 97 22	163.1	6
7	29 54.9 97 25	161.1	29 25.8 97 25	161.2	28 56.8 97 24	161.4	28 27.7 97 24	161.5	27 58.6 97 24	161.6	27 29.5 97 24	161.8	27 00.4 97 24	161.9	26 31.4 97 24	162.1	7
8	29 40.0 96 26	160.0	29 11.1 96 26	160.2	28 42.1 97 26	160.3	28 13.2 97 26	160.5	27 44.2 97 25	160.6	27 15.2 97 25	160.8	26 46.2 97 25	160.9	26 17.2 97 25	161.0	8
9	29 24.4 96 27	158.9	28 55.6 96 27	159.1	28 26.7 96 27	159.3	27 57.9 96 27	159.4	27 29.0 96 27	159.6	27 00.1 96 26	159.7	26 31.3 96 26	159 9	26 02.4 96 26	160.0	9
20	29 08.0 96 29	157.9	28 39.3 96 28	158.1	28 10.6 96 28	158.2	27 41.8 96 28	158.4	27 13.1 96 28	158.5	26 44.3 96 28	158.7	26 15.6 96 27	158.9	25 46.8 96 27	159.0	20
1	28 50.8 95 30	156.8	28 22.2 95 30	157.0	27 53.6 95 29	157.2	27 25.0 95 29	157.4	26 56.4 95 29	157.5	26 27.8 95 29	157.7	25 59.1 96 29	157.9	25 30.5 96 28	158.0	1
2	28 32.9 95 31	155.8	28 04.4 95 31	156.0	27 36.0 95 31	156.2	27 07.5 95 30	156.3	26 39.0 95 30	156.5	26 10.5 95 30	156.7	25 41.9 95 30	156.9	25 13.4 95 30	157.0	2
3	28 14.3 94 32	154.8	27 45.9 94 32	155.0	27 17.6 95 32	155.1	26 49.2 95 32	155.3	26 20.9 95 31	155.5	25 52.5 95 31	155.7	25 24.1 95 31	155.9	24 55.7 95 31	156.0	3
4	27 54.9 94 33	153.7	27 26.7 94 33	153.9	26 58.5 94 33	154.1	26 30.3 94 33	154.3	26 02.0 94 33	154.5	25 33.8 94 32	154.7	25 05.5 94 32	154.9	24 37.2 94 32	155.1	4
25	27 34.8 94 35	152.7	27 06.7 94 34	152.9	26 38.7 94 34	153.1	26 10.6 94 34	153.3	25 42.5 94 34	153.5	25 14.3 94 34	153.7	24 46.2 94 33	153.9	24 18.0 94 33	154.1	25
6	27 14.0 93 36	151.7	26 46.1 93 36	151.9	26 18.2 93 35	152.1	25 50.2 93 35	152.3	25 22.2 93 35	152.5	24 54.2 93 35	152.7	24 26.2 93 34	152.9	23 58.2 93 34	153.1	6
7	26 52.6 93 37	150.7	26 24.8 93 37	150.9	25 57.0 93 36	151.1	25 29.2 93 36	151.3	25 01.3 93 36	151.5	24 33.5 93 36	151.7	24 05.6 93 36	152.0	23 37.7 93 35	152.2	7
8	26 30.4 92 38	149.7	26 02.8 92 38	149.9	25 35.1 92 38	150.1	25 07.4 92 37	150.4	24 39.7 92 37	150.6	24 12.0 92 37	150.8	23 44.3 92 37	151.0	23 16.6 93 36	151.2	8
9	26 07.6 92 39	148.7	25 40.1 92 39	149.0	25 12.6 92 39	149.2	24 45.1 92 38	149.4	24 17.5 92 38	149.6	23 49.9 92 38	149.8	23 22.4 92 38	150.0	22 54.8 92 37	150.3	9
30	25 44.1 91 40	147.8	25 16.8 91 40	148.0	24 49.4 91 40	148.2	24 22.0 91 39	148.4	23 54.6 91 39	148.7	23 27.2 91 39	148.9	22 59.8 91 39	149.1	22 32.3 92 38	149.3	30
1	25 20.0 91 41	146.8	24 52.8 91 41	147.0	24 25.6 91 41	147.3	23 58.4 91 40	147.5	23 31.1 91 40	147.7	23 03.9 91 40	147.9	22 36.6 91 40	148.2	22 09.3 91 39	148.4	1
2	24 55.3 90 42	145.8	24 28.2 90 42	146.1	24 01.2 90 42	146.3	23 34.1 90 41	146.5	23 07.0 90 41	146.8	22 39.9 90 41	147.0	22 12.7 91 41	147.2	21 45.6 91 40	147.5	2
3	24 29.9 90 43	144.9	24 03.0 90 43	145.1	23 36.1 90 43	145.4	23 09.2 90 42	145.6	22 42.3 90 42	145.8	22 15.3 90 42	146.1	21 48.3 90 42	146.3	21 21.3 90 41	146.5	3
4	24 04.0 89 44	143.9	23 37.2 89 44	144.2	23 10.5 89 44	144.4	22 43.7 89 43	144.7	22 16.9 89 43	144.9	21 50.1 89 43	145.2	21 23.3 89 43	145.4	20 56.4 90 42	145.6	4
35	23 37.4 89 45	143.0	23 10.9 89 45	143.3	22 44.3 89 45	143.5	22 17.7 89 44	143.8	21 51.0 89 44	144.0	21 24.4 89 44	144.3	20 57.7 89 44	144.5	20 31.0 89 43	144.7	35
6	23 10.3 88 46	142.1	22 43.9 88 46	142.3	22 17.5 88 46	142.6	21 51.0 88 45	142.8	21 24.5 88 45	143.1	20 58.0 88 45	143.4	20 31.5 88 45	143.6	20 04.9 89 44	143.8	6
7	22 42.6 87 47	141.2	22 16.4 88 47	141.4	21 50.1 88 47	141.7	21 23.8 88 46	141.9	20 57.5 88 46	142.2	20 31.1 88 46	142.5	20 04.8 88 45	142.7	19 38.4 88 45	143.0	7
8	22 14.4 87 48	140.3	21 48.3 87 48	140.5	21 22.2 87 47	140.8	20 56.0 87 47	141.0	20 29.9 87 47	141.3	20 03.7 87 47	141.6	19 37.5 87 46	141.8	19 11.2 87 46	142.1	8
9	21 45.6 86 49	139.4	21 19.7 86 49	139.6	20 53.7 87 48	139.9	20 27.7 87 48	140.2	20 01.7 87 48	140.4	19 35.7 87 48	140.7	19 09.6 87 47	141.0	18 43.6 87 47	141.2	9
40	21 16.3 86 50	138.5	20 50.5 86 49	138.7	20 24.7 86 49	139.0	19 58.9 86 49	139.3	19 33.1 86 49	139.6	19 07.2 86 48	139.8	18 41.3 86 48	140.1	18 15.4 86 48	140.4	40
1	20 46.5 85 51	137.6	20 20.9 85 50	137.9	19 55.2 86 50	138.1	19 29.6 86 50	138.4	19 03.9 86 49	138.7	18 38.2 86 49	139.0	18 12.4 86 49	139.2	17 46.7 86 49	139.5	1
2	20 16.2 85 51	136.7	19 50.7 85 51	137.0	19 25.2 85 51	137.3	18 59.7 85 51	137.6	18 34.2 85 50	137.8	18 08.6 85 50	138.1	17 43.1 85 50	138.4	17 17.5 85 50	138.7	2
3	19 45.3 84 52	135.8	19 20.0 84 52	136.1	18 54.7 84 52	136.4	18 29.4 85 51	136.7	18 04.0 85 51	137.0	17 38.6 85 51	137.3	17 13.2 85 51	137.5	16 47.8 85 50	137.8	3
4	19 14.0 84 53	135.0	18 48.9 84 53	135.3	18 23.8 84 52	135.6	17 58.6 84 52	135.9	17 33.4 84 52	136.1	17 08.1 84 52	136.4	16 42.9 84 51	136.7	16 17.6 84 51	137.0	4
45	18 42.3 83 54	134.1	18 17.3 83 53	134.4	17 52.3 83 53	134.7	17 27.3 83 53	135.0	17 02.2 84 53	135.3	16 37.2 84 52	135.6	16 12.1 84 52	135.9	15 46.9 84 52	136.2	45
6	18 10.1 83 54	133.3	17 45.2 83 54	133.6	17 20.4 83 54	133.9	16 55.5 83 54	134.2	16 30.6 83 53	134.5	16 05.7 83 53	134.8	15 40.8 83 53	135.1	15 15.8 83 53	135.3	6
7	17 37.4 82 55	132.5	17 12.7 82 55	132.8	16 48.0 82 55	133.1	16 23.3 82 54	133.4	15 58.6 82 54	133.7	15 33.8 83 54	133.9	15 09.1 83 54	134.2	14 44.3 83 53	134.5	7
8	17 04.3 82 56	131.6	16 39.8 82 56	131.9	16 15.2 82 55	132.2	15 50.7 82 55	132.5	15 26.1 82 55	132.8	15 01.5 82 55	133.1	14 36.9 82 54	133.4	14 12.3 82 54	133.7	8
9	16 30.7 81 57	130.8	16 06.4 81 56	131.1	15 42.0 81 56	131.4	15 17.6 81 56	131.7	14 53.2 81 56	132.0	14 28.8 82 55	132.3	14 04.3 82 55	132.6	13 39.8 82 55	132.9	9
50	15 56.8 81 57	130.0	15 32.6 81 57	130.3	15 08.4 81 57	130.6	14 44.2 81 56	130.9	14 19.9 81 56	131.2	13 55.6 81 56	131.5	13 31.3 81 56	131.8	13 07.0 81 55	132.1	50
1	15 22.5 80 58	129.2	14 58.4 80 58	129.5	14 34.4 80 57	129.8	14 10.3 80 57	130.1	13 46.2 80 57	130.4	13 22.0 80 57	130.8	12 57.9 81 56	131.1	12 33.7 81 56	131.4	1
2	14 47.7 80 59	128.4	14 23.8 80 58	128.7	13 59.9 80 58	129.0	13 36.0 80 58	129.4	13 12.0 80 58	129.7	12 48.1 80 57	130.0	12 24.1 80 57	130.3	12 00.0 80 57	130.6	2
3	14 12.6 79 59	127.6	13 48.9 79 59	127.9	13 25.1 79 59	128.3	13 01.3 79 58	128.6	12 37.5 79 58	128.9	12 13.7 79 58	129.2	11 49.8 80 58	129.5	11 26.0 80 57	129.8	3
4	13 37.1 79 60	126.9	13 13.5 79 60	127.2	12 49.9 79 59	127.5	12 26.3 79 59	127.8	12 02.6 79 59	128.1	11 39.0 79 59	128.4	11 15.3 79 58	128.7	10 51.5 79 58	129.1	4
55	13 01.2 78 60	126.1	12 37.8 78 60	126.4	12 14.3 78 60	126.7	11 50.9 78 60	127.0	11 27.4 78 59	127.4	11 03.8 78 59	127.7	10 40.3 78 59	128.0	10 16.7 79 59	128.3	55
6	12 25.0 78 61	125.3	12 01.7 78 61	125.6	11 38.4 78 60	126.0	11 15.1 78 60	126.3	10 51.7 78 60	126.6	10 28.4 78 60	126.9	10 05.0 78 59	127.2	9 41.6 78 59	127.6	6
7	11 48.5 77 61	124.6	11 25.3 77 61	124.9	11 02.2 77 61	125.2	10 39.0 77 61	125.5	10 15.8 77 61	125.8	9 52.5 77 60	126.2	9 29.3 78 60	126.5	9 06.0 78 60	126.8	7
8	11 11.6 77 62	123.8	10 48.6 77 62	124.1	10 25.6 77 62	124.5	10 02.5 77 61	124.8	9 39.5 77 61	125.1	9 16.4 77 61	125.4	8 53.3 77 61	125.7	8 30.2 77 60	126.1	8
9	10 34.4 76 63	123.1	10 11.5 76 62	123.4	9 48.6 76 62	123.7	9 25.7 76 62	124.0	9 02.8 76 62	124.4	8 39.9 76 61	124.7	8 16.9 77 61	125.0	7 54.0 77 61	125.3	9
60	9 56.8 76 63	122.3	9 34.1 76 63	122.6	9 11.4 76 63	123.0	8 48.6 76 62	123.3	8 25.8 76 62	123.6	8 03.1 76 62	124.0	7 40.2 76 62	124.3	7 17.4 76 61	124.6	60
1	9 19.0 75 64	121.6	8 56.4 75 63	121.9	8 33.8 75 63	122.2	8 11.2 75 63	122.6	7 48.6 75 63	122.9	7 25.9 76 62	123.2	7 03.2 76 62	123.6	6 40.6 76 62	123.9	1
2	8 40.9 75 64	120.8	8 18.4 75 64	121.2	7 55.9 75 64	121.5	7 33.5 75 63	121.8	7 11.0 75 63	122.2	6 48.5 75 63	122.5	6 25.9 75 63	122.8	6 03.4 75 62	123.2	2
3	8 02.4 74 65	120.1	7 40.1 74 64	120.5	7 17.8 74 64	120.8	6 55.4 75 64	121.1	6 33.1 75 64	121.5	6 10.7 75 63	121.8	5 48.3 75 63	122.1	5 25.9 75 63	122.5	3
4	7 23.7 74 65	119.4	7 01.5 74 65	119.7	6 39.3 74 65	120.1	6 17.1 74 64	120.4	5 54.9 74 64	120.8	5 32.7 74 64	121.1	5 10.4 74 64	121.4			4
65	6 44.7 73 65	118.7	6 22.7 74 65	119.0	6 00.6 74 65	119.4	5 38.5 74 65	119.7	5 16.5 74 65	120.0							65
6	6 05.5 73 66	118.0	5 43.6 73 66	118.3	5 21.6 73 65	118.7											6
7	5 26.9 73 66	117.3	5 04.2 73 66	117.6													7

DECLINATION SAME NAME AS LATITUDE

H.A.	16° 00′		16° 30′		17° 00′		17° 30′		18° 00′		18° 30′		19° 00′		19° 30′		H.A.
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	°
91	9 54.1 66 72	77.3	10 13.8 66 72	76.9	10 33.5 65 72	76.6	10 53.1 65 72	76.2	11 12.7 65 72	75.8	11 32.3 65 72	75.4	11 51.8 65 72	75.0	12 11.3 65 72	74.6	91
2	9 10.7 66 72	76.7	9 30.4 66 72	76.3	9 50.2 66 72	75.9	10 09.9 66 72	75.5	10 29.5 66 72	75.2	10 49.2 65 72	74.8	11 08.8 65 71	74.4	11 28.4 65 71	74.0	2
3	8 27.4 66 72	76.0	8 47.2 66 72	75.7	9 07.0 66 72	75.3	9 26.8 66 72	74.9	9 46.5 66 72	74.5	10 06.2 66 71	74.1	10 25.9 66 71	73.8	10 45.6 66 71	73.4	3
4	7 44.2 66 72	75.4	8 04.0 66 72	75.0	8 23.9 66 72	74.6	8 43.8 66 71	74.3	9 03.6 66 71	73.9	9 23.4 66 71	73.5	9 43.2 66 71	73.1	10 03.0 66 71	72.7	4
95	7 01.1 67 72	74.8	7 21.0 67 71	74.4	7 41.0 66 71	74.0	8 00.9 66 71	73.6	8 20.8 66 71	73.3	8 40.7 66 71	72.9	9 00.6 66 71	72.5	9 20.4 66 71	72.1	95
6	6 18.1 67 71	74.1	6 38.2 67 71	73.7	6 58.2 67 71	73.4	7 18.2 67 71	73.0	7 38.2 67 71	72.6	7 58.2 67 71	72.2	8 18.2 67 70	71.9	8 38.1 66 70	71.5	6
7	5 35.3 67 71	73.5	5 55.4 67 71	73.1	6 15.5 67 71	72.7	6 35.7 67 71	72.3	6 55.7 67 71	72.0	7 15.8 67 70	71.6	7 35.9 67 70	71.2	7 55.9 67 70	70.8	7
8			5 12.8 67 71	72.4	5 33.0 67 71	72.1	5 53.2 67 70	71.7	6 13.4 67 70	71.3	6 33.6 67 70	71.0	6 53.7 67 70	70.6	7 13.8 67 70	70.2	8
9							5 11.0 68 70	71.1	5 31.3 68 70	70.7	5 51.5 67 70	70.3	6 11.8 67 70	69.9	6 32.0 67 70	69.6	9
100											5 09.6 68 70	69.7	5 30.0 68 69	69.3	5 50.3 68 69	68.9	100
1															5 08.8 68 69	68.3	1

Lat. 42°
Lat. 43°
Lat. 44°
Lat. 45°
Lat. 46°
Lat. 47°
Lat. 48°

Digitized by Google

Lat. 42°

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	68 00.0	1.0 02	180.0	68 30.0	1.0 02	180.0	69 00.0	1.0 02	180.0	69 30.0	1.0 02	180.0	70 00.0	1.0 02	180.0	70 30.0	1.0 02	180.0	71 00.0	1.0 02	180.0	71 30.0	1.0 02	180.0	00
1	67 59.9	1.0 05	177.5	68 29.9	1.0 05	177.4	68 59.0	1.0 05	177.4	69 29.0	1.0 05	177.3	69 58.9	1.0 05	177.3	70 28.9	1.0 05	177.2	70 58.9	1.0 05	177.2	71 28.9	1.0 06	177.1	1
2	67 56.1	1.0 08	175.0	68 26.0	1.0 08	174.9	68 56.0	1.0 08	174.8	69 25.9	1.0 09	174.7	69 55.8	1.0 09	174.6	70 25.7	1.0 09	174.5	70 55.6	1.0 09	174.4	71 25.5	1.0 09	174.2	2
3	67 51.2	99 11	172.5	68 21.1	99 12	172.4	68 50.9	99 12	172.2	69 20.7	99 12	172.1	69 50.5	99 12	171.9	70 20.3	99 12	171.7	70 50.1	99 13	171.6	71 19.9	99 13	171.4	3
4	67 44.5	99 14	170.0	68 14.2	99 15	169.9	68 43.9	99 15	169.7	69 13.6	99 15	169.5	69 43.2	99 16	169.2	70 12.9	99 16	169.0	70 42.5	99 16	168.8	71 12.2	99 17	168.5	4
05	67 35.8	99 18	167.6	68 05.4	98 18	167.4	68 34.9	98 18	167.1	69 04.4	98 18	166.9	69 33.9	98 19	166.6	70 03.4	98 19	166.3	70 32.8	98 20	166.1	71 02.2	98 20	165.8	05
6	67 25.3	98 20	165.2	67 54.7	98 21	164.9	68 24.0	98 21	164.6	68 53.3	98 22	164.3	69 22.6	98 22	164.0	69 51.9	97 22	163.7	70 21.1	97 23	163.4	70 50.2	97 23	163.0	6
7	67 13.0	97 23	162.8	67 42.2	97 24	162.5	68 11.3	97 24	162.2	68 40.4	97 25	161.8	69 09.4	97 25	161.5	69 38.4	97 26	161.1	70 07.3	96 26	160.7	70 36.2	96 27	160.3	7
8	66 59.0	96 26	160.5	67 27.9	96 27	160.1	67 56.7	96 27	159.8	68 25.6	96 28	159.4	68 54.3	96 28	159.0	69 23.0	96 29	158.6	69 51.7	95 29	158.2	70 20.3	95 30	157.7	8
9	66 43.2	95 29	158.2	67 11.9	95 29	157.8	67 40.5	95 30	157.4	68 09.0	95 30	157.0	68 37.4	95 31	156.6	69 05.8	95 32	156.1	69 34.2	94 32	155.6	70 02.4	94 33	155.1	9
10	66 25.8	95 32	155.9	66 54.2	94 32	155.5	67 22.5	94 33	155.1	67 50.7	94 33	154.6	68 18.9	94 34	154.2	68 46.9	93 34	153.7	69 14.9	93 35	153.2	69 42.8	93 36	152.7	10
1	66 06.8	94 34	153.7	66 34.9	93 35	153.3	67 02.9	93 35	152.8	67 30.8	93 36	152.3	67 58.6	93 36	151.8	68 26.3	92 37	151.3	68 54.0	92 38	150.8	69 21.5	92 38	150.2	1
2	65 46.4	93 37	151.6	66 14.1	92 37	151.1	66 41.8	92 38	150.6	67 09.3	92 38	150.1	67 36.8	91 39	149.6	68 04.2	91 39	149.0	68 31.4	91 40	148.5	68 58.6	90 41	147.9	2
3	65 24.4	92 39	149.5	65 51.8	91 39	149.0	66 19.2	91 40	148.5	66 46.4	91 41	147.9	67 13.5	90 41	147.4	67 40.5	90 42	146.8	68 07.4	89 42	146.2	68 34.1	89 43	145.6	3
4	65 01.1	90 41	147.4	65 28.2	90 42	146.9	65 55.2	90 42	146.4	66 22.0	89 43	145.8	66 48.8	89 43	145.3	67 15.4	89 44	144.7	67 41.9	88 45	144.1	68 08.2	88 45	143.4	4
15	64 36.4	89 43	145.4	65 03.2	89 44	144.9	65 29.8	89 44	144.4	65 56.3	88 45	143.8	66 22.7	88 46	143.2	66 49.0	87 46	142.6	67 15.1	87 47	142.0	67 41.0	86 47	141.3	15
6	64 10.5	88 45	143.5	64 36.9	88 46	143.0	65 03.2	87 46	142.4	65 29.4	87 47	141.8	65 55.4	86 48	141.2	66 21.3	86 48	140.6	66 47.0	85 49	139.9	67 12.5	85 49	139.3	6
7	63 43.4	87 47	141.6	64 09.5	87 48	141.1	64 35.4	86 48	140.5	65 01.2	86 49	139.9	65 26.9	85 49	139.3	65 52.4	85 50	138.6	66 17.7	84 51	138.0	66 42.9	84 51	137.3	7
8	63 15.2	86 49	139.8	63 40.9	86 49	139.2	64 06.5	85 50	138.6	64 32.0	85 51	138.0	64 57.2	84 51	137.4	65 22.4	83 52	136.8	65 47.3	83 52	136.1	66 12.1	82 53	135.4	8
9	62 45.9	85 50	138.0	63 11.3	84 51	137.5	63 36.5	84 52	136.9	64 01.6	83 52	136.2	64 26.6	83 53	135.6	64 51.3	82 53	134.9	65 15.9	82 54	134.3	65 40.3	81 55	133.6	9
20	62 15.6	84 52	136.3	62 40.7	83 53	135.7	63 05.6	83 53	135.1	63 30.3	82 54	134.5	63 54.9	82 54	133.8	64 19.3	81 55	133.2	64 43.5	80 56	132.5	65 07.5	80 56	131.8	20
1	61 44.4	83 54	134.7	62 09.1	82 54	134.1	62 33.6	82 55	133.4	62 58.0	81 55	132.8	63 22.3	80 56	132.2	63 46.3	80 56	131.5	64 10.1	79 57	130.8	64 33.8	78 58	130.1	1
2	61 12.2	82 55	133.0	61 36.6	81 56	132.4	62 00.8	81 56	131.8	62 24.9	80 57	131.2	62 48.8	79 57	130.5	63 12.5	79 58	129.8	63 36.0	78 58	129.1	63 59.3	77 59	128.4	2
3	60 39.2	81 56	131.5	61 03.3	80 57	130.9	61 27.2	79 57	130.2	61 50.9	79 58	129.6	62 14.5	78 58	128.9	62 37.8	78 59	128.3	63 01.0	77 60	127.6	63 23.9	76 60	126.8	3
4	60 05.4	80 58	130.0	60 29.2	79 58	129.3	60 52.8	78 59	128.7	61 16.2	78 59	128.1	61 39.4	77 60	127.4	62 02.5	76 60	126.7	62 25.3	76 61	126.0	62 47.9	75 61	125.3	4
25	59 30.9	79 59	128.5	59 54.3	78 59	127.9	60 17.6	77 60	127.2	60 40.7	77 60	126.6	61 03.7	76 61	125.9	61 26.4	75 61	125.2	61 48.9	75 62	124.5	62 11.2	74 62	123.8	25
6	58 55.6	78 60	127.0	59 18.8	77 60	126.4	59 41.8	76 61	125.8	60 04.6	76 61	125.2	60 27.2	75 62	124.5	60 49.6	74 62	123.8	61 11.9	74 63	123.1	61 33.8	73 63	122.4	6
7	58 19.7	77 61	125.7	58 42.6	76 61	125.0	59 05.3	75 62	124.4	59 27.8	75 62	123.8	59 50.2	74 63	123.1	60 12.3	73 63	122.4	60 34.2	73 64	121.7	60 55.9	72 64	121.0	7
8	57 43.2	76 62	124.3	58 05.8	75 62	123.7	58 28.2	74 63	123.1	58 50.5	74 63	122.4	59 12.5	73 64	121.8	59 34.4	72 64	121.1	59 56.0	72 65	120.4	60 17.4	71 65	119.7	8
9	57 06.9	75 63	123.0	57 28.4	74 63	122.4	57 50.6	74 64	121.7	58 12.6	73 64	121.1	58 34.4	72 64	120.4	58 55.9	72 65	119.8	59 17.3	71 65	119.1	59 38.5	70 66	118.4	9
30	56 28.4	74 64	121.7	56 50.5	73 64	121.1	57 12.4	73 64	120.5	57 34.1	72 65	119.8	57 55.7	71 65	119.2	58 17.0	71 66	118.5	58 38.1	70 66	117.8	58 59.0	69 66	117.1	30
1	55 50.2	73 64	120.5	56 12.1	73 65	119.9	56 33.7	72 65	119.2	56 55.2	71 66	118.6	57 16.5	71 66	118.0	57 37.6	70 66	117.3	57 58.5	69 67	116.6	58 19.1	68 67	115.9	1
2	55 11.5	72 65	119.3	55 33.2	72 66	118.7	55 54.6	71 66	118.0	56 15.9	71 66	117.4	56 36.9	70 67	116.8	56 57.8	69 67	116.1	57 18.4	68 67	115.4	57 38.8	68 68	114.8	2
3	54 32.4	72 66	118.1	54 53.8	71 66	117.5	55 15.0	70 67	116.9	55 36.1	70 67	116.2	55 56.9	69 67	115.6	56 17.5	68 68	114.9	56 37.9	68 68	114.3	56 58.1	67 68	113.6	3
4	53 52.9	71 67	116.9	54 14.1	70 67	116.3	54 35.1	70 67	115.7	54 55.9	69 68	115.1	55 16.5	68 68	114.5	55 36.9	68 68	113.8	55 57.1	67 69	113.2	56 17.1	66 69	112.5	4
35	53 12.9	70 67	115.8	53 33.9	70 68	115.2	53 54.7	69 68	114.6	54 15.3	68 68	114.0	54 35.7	68 68	113.4	54 55.9	67 69	112.7	55 16.0	66 69	112.1	55 35.8	66 69	111.4	35
6	52 32.6	70 68	114.7	52 53.4	69 68	114.1	53 14.0	68 68	113.5	53 34.4	68 69	112.9	53 54.6	67 69	112.3	54 14.7	66 69	111.7	54 34.5	66 70	111.0	54 54.1	65 70	110.4	6
7	51 51.9	69 68	113.7	52 12.5	68 69	113.1	52 33.0	68 69	112.5	52 53.2	67 69	111.9	53 13.2	66 70	111.3	53 33.1	66 70	110.6	53 52.7	65 70	110.0	54 12.2	64 70	109.3	7
8	51 10.9	68 69	112.6	51 31.4	68 69	112.1	51 51.6	67 69	111.5	52 11.7	67 70	110.9	52 31.5	66 70	110.2	52 51.2	65 70	109.6	53 10.7	65 70	109.0	53 30.0	64 71	108.3	8
9	50 29.6	68 69	111.6	50 49.9	67 70	111.0	51 10.0	67 70	110.5	51 29.9	66 70	109.9	51 49.6	65 70	109.2	52 09.1	65 71	108.6	52 28.4	64 71	108.0	52 47.5	63 71	107.4	9
40	49 48.1	67 70	110.6	50 08.1	67 70	110.1	50 28.1	66 70	109.5	50 47.8	65 71	108.9	51 07.4	65 71	108.3	51 26.7	64 71	107.7	51 45.9	64 71	107.1	52 04.9	63 71	106.4	40
1	49 06.2	67 70	109.7	49 26.1	66 70	109.1	49 45.9	66 71	108.5	50 05.5	65 71	107.9	50 24.9	64 71	107.3	50 44.1	64 71	106.7	51 03.2	63 72	106.1	51 22.0	62 72	105.5	1
2	48 24.1	66 71	108.7	48 43.9	66 71	108.2	49 03.5	65 71	107.6	49 23.0	65 71	107.0	49 42.2	64 71	106.4	50 01.3	63 72	105.8	50 20.2	63 72	105.2	50 38.9	62 72	104.6	2
3	47 41.7	66 71	107.8	48 01.4	65 71	107.2	48 20.9	65 71	106.7	48 40.2	64 72	106.1	48 59.4	64 72	105.5	49 18.3	63 72	104.9	49 37.1	62 72	104.3	49 55.7	62 72	103.7	3
4	46 59.2	65 71	106.9	47 18.7	65 72	106.3	47 38.1	64 72	105.8	47 57.3	64 72	105.2	48 16.3	63 72	104.6	48 35.1	63 72	104.0	48 53.8	62 72	103.4	49 12.3	61 73	102.8	4
45	46 16.4	65 72	106.0	46 35.8	64 72	105.4	46 55.1	64 72	104.9	47 14.2	63 72	104.3	47 33.1	63 72	103.7	47 51.8	62 72	103.2	48 10.4	62 73	102.6	48 28.7	61 73	102.0	45
6	45 33.5	65 72	105.1	45 52.8	64 72	104.6	46 11.9	64 72	104.0	46 30.9	63 72	103.5	46 49.7	62 73	102.9	47 08.3	62 73	102.3	47 26.8	61 73	101.7	47 45.1	61 73	101.1	6
7	44 50.3	64 72	104.3	45 09.5	64 72	103.7	45 28.6	63 72	103.2	45 47.4	63 73	102.6	46 06.1	62 73	102.0	46 24.7	62 73	101.5	46 43.1	61 73	100.9	47 01.3	60 73	100.3	7
8	44 07.0	64 72	103.4	44 26.1	63 73	102.9	44 45.1	63 73	102.3	45 03.8	62 73	101.8	45 22.5	62 73	101.2	45 40.9	61 73	100.7	45 59.2	61 73	100.1	46 17.3	60 73	99.5	8
9	43 23.6	64 73	102.6	43 42.6	63 73	102.1	44 01.4	63 73	101.5	44 20.1	62 73	101.0	44 38.7	62 73	100.4	44 57.1	61 73	99.9	45 15.3	60 73	99.3	45 33.3	60 74	98.7	9
50	42 40.0	63 73	101.8	42 58.9	63 73	101.2	43 17.7	62 73	100.7	43 36.3	62 73	100.2	43 54.8	61 73	99.6	44 13.1	61 73	99.1	44 31.2	60 74	98.5	44 49.2	60 74	98.0	50
1	41 56.3	63 73	101.0	42 15.1	63 73	100.4	42 33.8	62 73	99.9	42 52.4	62 73	99.4	43 10.8	61 74	98.8	43 29.0	61 74	98.3	43 47.1	60 74	97.7	44 05.0	59 74	97.2	1
2	41 12.5	63 73	100.2	41 31.2	62 73	99.7	41 49.8	62 73	99.1	42 08.3	61 74	98.6	42 26.6	61 74	98.1	42 44.8	60 74	97.5	43 02.9	60 74	97.0	43 20.7	59 74	96.4	2
3	40 28.5	63 73	99.4	40 47.2	62 73	98.9	41 05.8	62 74	98.4	41 24.2	61 74	97.8	41 42.5	61 74	97.3	42 00.6	60 74	96.8	42 18.6	60 74	96.2	42 36.4	59 74	95.7	3
4	39 44.5	62 74	98.6	40 03.1	62 74	98.1	40 21.6	61 74	97.6	40 40.0	61 74	97.1	40 58.2	61 74	96.6	41 16.3	60 74	96.0	41 34.2	60 74	95.5	41 52.0	59 74	95.0	4
55	39 00.4	62 74	97.9	39 18.9	62 74	97.4	39 37.4	61 74	96.9	39 55.7	61 74	96.3	40 13.9	60 74	95.8	40 31.9	60 74	95.3	40 49.8	59 74	94.8	41 07.5	59 74	94.2	55
6	38 16.1	62 74	97.1	38 34.7	62 74	96.6	38 53.1	61 74	96.1	39 11.4	61 74	95.6	39 29.5	60 74	95.1	39 47.5	60 74	94.6	40 05.3	59 74	94.1	40 23.1	59 74	93.5	6
7	37 31.9	62 74	96.4	37 50.4	61 74	95.9	38 08.7	61 74	95.4	38 26.9	61 74	94.9	38 45.0	60 74	94.4	39 03.0	60 74	93.9	39 20.8	59 74	93.3	39 38.5	59 74	92.8	7
8	36 47.5	62 74	95.7	37 06.0	61 74	95.2	37 24.3	61 74	94.7	37 42.5	60 74	94.2	38 00.6	60 74	93.7	38 18.5	60 74	93.2	38 36.3	59 74	92.6	38 54.0	59 74	92.1	8
9	36 03.1	62 74	94.9	36 21.5	61 74	94.5	36 39.8	61 74	94.0	36 58.0	60 74	93.5	37 16.1	60 74	93.0	37 34.0	60 74	92.5	37 51.8	59 74	92.0	38 09.4	59 74	91.4	9
60	35 18.7	61 74	94.2	35 37.1	61 74	93.7	35 55.3	61 74	93.3	36 13.5	60 74	92.8	36 31.5	60 74	92.3	36 49.4	59 74	91.8	37 07.2	59 74	91.3	37 24.8	59 74	90.8	60
1	34 34.2	61 74	93.5	34 52.6	61 74	93.0	35 10.8	61 74	92.6	35 28.9	60 74	92.1	35 47.0	60 74	91.6	36 04.8	59 74	91.1	36 22.6	59 74	90.6	36 40.3	59 74	90.1	1
2	33 49.7	61 74	92.8	34 08.0	61 74	92.4	34 26.3	61 74	91.9	34 44.4	60 74	91.4	35 02.4	60 74	90.9	35 20.3	59 74	90.4	35 38.0	59 74	89.9	35 55.7	59 74	89.4	2
3	33 05.1	61 74	92.1	33 23.5	61 74	91.7	33 41.7	61 74	91.2	33 59.8	60 74	90.7	34 17.8	60 74	90.2	34 35.7	59 74	89.7	34 53.4	59 74	89.2	35 11.1	59 74	88.8	3
4	32 20.6	61 74	91.5	32 38.9	61 74	91.0	32 57.1	61 74	90.5	33 15.2	60 74	90.0	33 33.2	60 74	89.6	33 51.1	59 74	89.1	34 08.9	59 74	88.6	34 26.5	59 74	88.1	4
65	31 36.0	61 74	90.8	31 54.3	61 74	90.3	32 12.5	61 74	89.8	32 30.6	60 74	89.4	32 48.6	60 74	88.9	33 06.5	59 74	88.4	33 24.3	59 74	87.9	33 42.0	59 74	87.5	65
6	30 51.4	61 74	90.1	31 09.7	61 74	89.6	31 27.9	61 74	89.2	31 46.0	60 74	88.7	32 04.0	60 74	88.2	32 21.9	60 74	87.8	32 39.7	59 74	87.3	32 57.4	59 74	86.8	6
7	30 06.8	61 74	89.4	30 25.1	61 74	89.0	30 43.3	61 74	88.5	31 01.5	60 74	88.1	31 19.5	60 74	87.6	31 37.4	60 74	87.1	31 55.2	59 74	86.6	32 12.9	59 74	86.2	7
8	29 22.2	61 74	88.8	29 40.5	61 74	88.3	29 58.8	61 74	87.9	30 16.9	60 74	87.4	30 34.9	60 74	86.9	30 52.9	60 74	86.5	31 10.7	59 74	86.0	31 28.4	59 74	85.5	8
9	28 37.7	61 74	88.1	28 56.0	61 74	87.7	29 14.2	61 74	87.2	29 32.4	60 74	86.8	29 50.4	60 74	86.3	30 08.4	60 74	85.8	30 26.3	59 74	85.4	30 44.0	59 74	84.9	9
70	27 53.1	61 74	87.5	28 11.4	61 74	87.0	28 29.7	61 74	86.6	28 47.9	60 74	86.1	29 06.0	60 74	85.7	29 23.9	60 74	85.2	29 41.8	59 74	84.7	29 59.6	59 74	84.3	70
1	27 08.6	61 74	86.8	27 26.9	61 74	86.4	27 45.2	61 74	85.9	28 03.4	61 74	85.5	28 21.5	60 74	85.0	28 39.5	60 74	84.6	28 57.5	60 74	84.1	29 15.3	59 74	83.6	1
2	26 24.1	61 74	86.2	26 42.5	61 74	85.7	27 00.8	61 74	85.3	27 19.0	61 74	84.8	27 37.1	60 74	84.4	27 55.2	60 74	83.9	28 13.1	60 74	83.5	28 31.0	59 74	83.0	2
3	25 39.6	62 74	85.5	25 58.0	61 74	85.1	26 16.3	61 74	84.6	26 34.6	61 74	84.2	26 52.8	60 74	83.8	27 10.9	60 74	83.3	27 28.9	60 74	82.9	27 46.8	60 74	82.4	3
4	24 55.2	62 74	84.9	25 13.6	61 74	84.4	25 32.0	61 74	84.0	25 50.3	61 74	83.6	26 08.5	61 74	83.1	26 26.6	60 74	82.7	26 44.6	60 74	82.2	27 02.6	60 74	81.8	4
75	24 10.8	62 74	84.2	24 29.2	61 74	83.8	24 47.7	61 74	83.4	25 06.0	61 74	82.9	25 24.2	61 74	82.5	25 42.4	60 74	82.1	26 00.5	60 73	81.6	26 18.5	60 73	81.2	75
6	23 26.4	62 74	83.6	23 44.9	62 74	83.2	24 03.4	61 74	82.8	24 21.8	61 74	82.3	24 40.1	61 74	81.9	24 58.3	61 73	81.4	25 16.4	60 73	81.0	25 34.5	60 73	80.6	6
7	22 42.1	62 74	83.0	23 00.7	62 74	82.6	23 19.2	61 74	82.1	23 37.6	61 73	81.7	23 55.9	61 73	81.3	24 14.2	61 73	80.8	24 32.4	61 73	80.4	24 50.5	60 73	80.0	7
8	21 57.9	62 74	82.4	22 16.5	62 74	81.9	22 35.1	62 73	81.5	22 53.5	61 73	81.1	23 11.9	61 73	80.6	23 30.2	61 73	80.2	23 48.5	61 73	79.8	24 06.7	60 73	79.3	8
9	21 13.8	62 73	81.7	21 32.4	62 73	81.3	21 51.0	62 73	80.9	22 09.5	62 73	80.5	22 28.0	61 73	80.0	22 46.3	61 73	79.6	23 04.7	61 73	79.2	23 22.9	61 73	78.7	9
80	20 29.7	62 73	81.1	20 48.4	62 73	80.7	21 07.0	62 73	80.3	21 25.6	62 73	79.8	21 44.1	62 73	79.4	22 02.5	61 73	79.0	22 20.9	61 73	78.6	22 39.2	61 73	78.1	80
1	19 45.7	63 73	80.5	20 04.4	62 73	80.1	20 23.1	62 73	79.6	20 41.7	62 73	79.2	21 00.3	62 73	78.8	21 18.8	62 73	78.4	21 37.2	61 73	78.0	21 55.6	61 72	77.5	1
2	19 01.7	63 73	79.8	19 20.5	63 73	79.4	19 39.3	62 73	79.0	19 58.0	62 73	78.6	20 16.6	62 73	78.2	20 35.2	62 73	77.8	20 53.7	62 72	77.3	21 12.1	61 72	76.9	2
3	18 17.9	63 73	79.2	18 36.7	63 73	78.8	18 55.6	63 73	78.4	19 14.3	62 73	78.0	19 33.0	62 72	77.6	19 51.7	62 72	77.2	20 10.2	62 72	76.7	20 28.8	62 72	76.3	3
4	17 34.1	63 73	78.6	17 53.1	63 73	78.2	18 11.9	63 73	77.8	18 30.8	63 72	77.4	18 49.5	62 72	77.0	19 08.2	62 72	76.5	19 26.9	62 72	76.1	19 45.5	62 73	75.7	4
85	16 50.5	63 73	78.0	17 09.5	63 72	77.6	17 28.4	63 72	77.2	17 47.3	63 72	76.8	18 06.1	63 72	76.4	18 24.9	63 72	75.9	18 43.7	62 72	75.5	19 02.3	62 73	75.1	85
6	16 06.9	64 72	77.4	16 26.0	63 72	77.0	16 45.0	63 72	76.5	17 03.9	63 72	76.1	17 22.9	63 72	75.7	17 41.7	63 72	75.3	18 00.5	63 72	74.9	18 19.3	62 72	74.5	6
7	15 23.5	64 72	76.7	15 42.6	64 72	76.3	16 01.7	64 72	75.9	16 20.7	63 72	75.5	16 39.7	63 72	75.1	16 58.7	63 72	74.7	17 17.6	63 71	74.3	17 36.4	63 71	73.9	7
8	14 40.1	64 72	76.1	14 59.3	64 72	75.7	15 18.5	64 72	75.3	15 37.6	64 72	74.9	15 56.7	64 72	74.5	16 15.7	63 71	74.1	16 34.7	63 71	73.7	16 53.6	63 71	73.3	8
9	13 56.9	64 72	75.5	14 16.2	64 72	75.1	14 35.4	64 72	74.7	14 54.6	64 71	74.3	15 13.8	64 71	73.9	15 32.9	64 71	73.5	15 52.0	64 71	73.1	16 11.0	63 71	72.7	9
90	13 13.8	65 72	74.9	13 33.1	64 72	74.5	13 52.5	64 71	74.1	14 11.8	64 71	73.7	14 31.0	64 71	73.3	14 50.2	64 71	72.9	15 09.4	64 71	72.5	15 28.5	64 71	72.1	90

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DECLINATION CONTRARY NAME TO LATITUDE

Lat. 42°

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	
00	28 00.0	1.0 01	180.0	27 30.0	1.0 01	180.0	27 00.0	1.0 01	180.0	26 30.0	1.0 01	180.0	26 00.0	1.0 01	180.0	25 30.0	1.0 01	180.0	25 00.0	1.0 01	180.0	24 30.0	1.0 01	180.0	00
1	27 59.6	1.0 02	178.9	27 29.6	1.0 02	178.9	26 59.6	1.0 02	179.0	26 29.6	1.0 02	179.0	25 59.6	1.0 02	179.0	25 29.6	1.0 02	179.0	24 59.6	1.0 02	179.0	24 29.6	1.0 02	179.0	1
2	27 58.3	1.0 03	177.9	27 28.4	1.0 03	177.9	26 58.4	1.0 03	177.9	26 28.4	1.0 03	177.9	25 58.4	1.0 03	177.9	25 28.4	1.0 03	178.0	24 58.4	1.0 03	178.0	24 28.4	1.0 03	178.0	2
3	27 56.3	1.0 05	176.8	27 26.3	1.0 05	176.8	26 56.3	1.0 05	176.9	26 26.4	1.0 05	176.9	25 56.4	1.0 05	176.9	25 26.4	1.0 05	176.9	24 56.4	1.0 05	177.0	24 26.5	1.0 05	177.0	3
4	27 53.4	1.0 06	175.7	27 23.4	1.0 06	175.8	26 53.5	1.0 06	175.8	26 23.5	1.0 06	175.8	25 53.6	1.0 06	175.9	25 23.6	1.0 06	175.9	24 53.7	1.0 06	175.9	24 23.7	1.0 06	176.0	4
05	27 49.7	1.0 08	174.7	27 19.7	1.0 08	174.7	26 49.8	1.0 07	174.8	26 19.9	1.0 07	174.8	25 50.0	1.0 07	174.8	25 20.1	1.0 07	174.9	24 50.1	1.0 07	174.9	24 20.2	1.0 07	175.0	05
6	27 45.1	1.0 09	173.6	27 15.2	1.0 09	173.7	26 45.4	1.0 09	173.7	26 15.5	1.0 09	173.8	25 45.6	1.0 09	173.8	25 15.7	1.0 09	173.9	24 45.8	1.0 09	173.9	24 15.9	1.0 08	174.0	6
7	27 39.8	99 10	172.6	27 09.9	99 10	172.6	26 40.1	99 10	172.7	26 10.2	99 10	172.7	25 40.4	99 10	172.8	25 10.5	99 10	172.9	24 40.7	1.0 10	172.9	24 10.8	1.0 10	173.0	7
8	27 33.6	99 12	171.5	27 03.8	99 12	171.6	26 34.0	99 11	171.6	26 04.2	99 11	171.7	25 34.4	99 11	171.8	25 04.6	99 11	171.8	24 34.8	99 11	171.9	24 05.0	99 11	172.0	8
9	27 26.6	99 13	170.5	26 56.9	99 13	170.5	26 27.1	99 13	170.6	25 57.4	99 13	170.7	25 27.6	99 13	170.8	24 57.9	99 12	170.8	24 28.1	99 12	170.9	23 58.4	99 12	171.0	9
10	27 18.8	98 14	169.4	26 49.1	99 14	169.5	26 19.5	99 14	169.6	25 49.8	99 14	169.7	25 20.1	99 14	169.7	24 50.4	99 14	169.8	24 20.7	99 14	169.9	23 51.0	99 14	170.0	10
1	27 10.2	98 16	168.4	26 40.6	98 16	168.5	26 11.0	98 15	168.6	25 41.4	98 15	168.6	25 11.7	98 15	168.7	24 42.1	98 15	168.8	24 12.5	98 15	168.9	23 42.8	98 15	169.0	1
2	27 00.9	98 17	167.3	26 31.3	98 17	167.4	26 01.8	98 17	167.5	25 32.2	98 17	167.6	25 02.6	98 16	167.7	24 33.1	98 16	167.8	24 03.5	98 16	167.9	23 33.9	98 16	168.0	2
3	26 50.7	98 18	166.3	26 21.2	98 18	166.4	25 51.7	98 18	166.5	25 22.3	98 18	166.6	24 52.8	98 18	166.7	24 23.3	98 18	166.8	23 53.8	98 17	166.9	23 24.3	98 17	167.0	3
4	26 39.7	98 20	165.3	26 10.3	98 19	165.4	25 40.9	98 19	165.5	25 11.5	98 19	165.6	24 42.1	98 19	165.7	24 12.7	98 19	165.8	23 43.3	98 19	165.9	23 13.9	98 19	166.0	4
15	26 28.0	98 21	164.2	25 58.7	98 21	164.4	25 29.4	98 21	164.5	25 00.1	98 20	164.6	24 30.8	98 20	164.7	24 01.4	98 20	164.8	23 32.1	98 20	164.9	23 02.8	98 20	165.1	15
6	26 15.5	97 22	163.2	25 46.3	97 22	163.3	25 17.1	97 22	163.5	24 47.9	97 22	163.6	24 18.6	97 21	163.7	23 49.4	97 21	163.8	23 20.1	97 21	164.0	22 50.9	97 21	164.1	6
7	26 02.2	97 23	162.2	25 33.1	97 23	162.3	25 04.0	97 23	162.5	24 34.9	97 23	162.6	24 05.7	97 23	162.7	23 36.6	97 22	162.9	23 07.5	97 22	163.0	22 38.3	97 22	163.1	7
8	25 48.2	97 25	161.2	25 19.2	97 24	161.3	24 50.2	97 24	161.5	24 21.2	97 24	161.6	23 52.1	97 24	161.7	23 23.1	97 24	161.9	22 54.1	97 24	162.0	22 25.0	97 23	162.1	8
9	25 33.5	96 26	160.2	25 04.6	96 26	160.3	24 35.7	96 25	160.5	24 06.7	96 25	160.6	23 37.8	96 25	160.8	23 08.9	96 25	160.9	22 39.9	97 25	161.0	22 11.0	97 25	161.2	9
20	25 18.0	96 27	159.2	24 49.2	96 27	159.3	24 20.4	96 27	159.5	23 51.6	96 26	159.6	23 22.8	96 26	159.8	22 53.9	96 26	159.9	22 25.1	96 26	160.1	21 56.2	96 26	160.2	20
1	25 01.8	96 28	158.2	24 33.1	96 28	158.3	24 04.4	96 28	158.5	23 35.7	96 28	158.7	23 07.0	96 27	158.8	22 38.3	96 27	159.0	22 09.6	96 27	159.1	21 40.8	96 27	159.3	1
2	24 44.9	96 29	157.2	24 16.3	95 29	157.4	23 47.7	95 29	157.5	23 19.1	95 29	157.7	22 50.5	95 29	157.9	22 21.9	95 28	158.0	21 53.3	95 28	158.2	21 24.7	95 28	158.3	2
3	24 27.2	95 31	156.2	23 58.8	95 30	156.4	23 30.3	95 30	156.6	23 01.9	95 30	156.7	22 33.4	95 30	156.9	22 04.9	95 30	157.1	21 36.4	95 29	157.2	21 07.9	95 29	157.4	3
4	24 08.9	94 32	155.2	23 40.6	94 32	155.4	23 12.3	94 31	155.6	22 43.9	94 31	155.8	22 15.6	95 31	156.0	21 47.2	95 31	156.1	21 18.8	95 30	156.3	20 50.5	95 30	156.5	4
25	23 49.9	94 33	154.3	23 21.7	94 33	154.5	22 53.5	94 32	154.6	22 25.3	94 32	154.8	21 57.1	94 32	155.0	21 28.8	94 32	155.2	21 00.6	94 32	155.4	20 32.3	94 31	155.6	25
6	23 30.2	93 34	153.3	23 02.1	94 34	153.5	22 34.1	94 34	153.7	22 06.0	94 33	153.9	21 37.9	94 33	154.1	21 09.8	94 33	154.3	20 41.7	94 33	154.4	20 13.5	94 32	154.6	6
7	23 09.8	93 35	152.4	22 41.9	93 35	152.6	22 14.0	93 35	152.8	21 46.0	93 34	152.9	21 18.1	93 34	153.1	20 50.1	93 34	153.3	20 22.1	93 34	153.5	19 54.1	93 33	153.7	7
8	22 48.8	93 36	151.4	22 21.0	93 36	151.6	21 53.2	93 36	151.8	21 25.4	93 35	152.0	20 57.6	93 35	152.2	20 29.8	93 35	152.4	20 01.9	93 35	152.6	19 34.1	93 34	152.8	8
9	22 27.1	92 37	150.5	21 59.5	92 37	150.7	21 31.9	92 37	150.9	21 04.2	92 36	151.1	20 36.5	92 36	151.3	20 08.8	92 36	151.5	19 41.1	92 36	151.7	19 13.4	92 36	151.9	9
30	22 04.8	92 38	149.5	21 37.4	92 38	149.7	21 09.8	92 38	150.0	20 42.3	92 37	150.2	20 14.8	92 37	150.4	19 47.2	92 37	150.6	19 19.7	92 37	150.8	18 52.1	92 37	151.0	30
1	21 41.9	91 39	148.6	21 14.6	91 39	148.8	20 47.2	91 39	149.0	20 19.8	91 38	149.3	19 52.4	91 38	149.5	19 25.0	91 38	149.7	18 57.6	91 38	149.9	18 30.2	91 38	150.1	1
2	21 18.4	91 40	147.7	20 51.2	91 40	147.9	20 24.0	91 40	148.1	19 56.8	91 39	148.4	19 29.5	91 39	148.6	19 02.2	91 39	148.8	18 35.0	91 39	149.0	18 07.7	91 38	149.2	2
3	20 54.3	90 41	146.8	20 27.2	90 41	147.0	20 00.2	90 41	147.2	19 33.1	90 40	147.5	19 06.0	90 40	147.7	18 38.9	90 40	147.9	18 11.7	90 40	148.1	17 44.6	91 39	148.4	3
4	20 29.5	90 42	145.9	20 02.7	90 42	146.1	19 35.7	90 42	146.3	19 08.8	90 41	146.6	18 41.9	90 41	146.8	18 14.9	90 41	147.0	17 47.9	90 41	147.3	17 20.9	90 40	147.5	4
35	20 04.2	89 43	145.0	19 37.5	89 43	145.2	19 10.7	89 43	145.5	18 44.0	89 42	145.7	18 17.2	89 42	145.9	17 50.3	89 42	146.2	17 23.5	89 42	146.4	16 56.7	90 41	146.6	35
6	19 38.4	89 44	144.1	19 11.8	89 44	144.3	18 45.2	89 44	144.6	18 18.6	89 43	144.8	17 51.9	89 43	145.1	17 25.2	89 43	145.3	16 58.6	89 42	145.5	16 31.9	89 42	145.8	6
7	19 12.0	88 45	143.2	18 45.5	88 45	143.5	18 19.1	88 44	143.7	17 52.6	88 44	144.0	17 26.1	88 44	144.2	16 59.6	88 44	144.5	16 33.1	88 43	144.7	16 06.5	88 43	144.9	7
8	18 45.0	88 46	142.3	18 18.7	88 46	142.6	17 52.4	88 45	142.8	17 26.1	88 45	143.1	16 59.8	88 45	143.4	16 33.4	88 45	143.6	16 07.0	88 44	143.9	15 40.6	88 44	144.1	8
9	18 17.5	87 47	141.5	17 51.4	87 46	141.7	17 25.2	87 46	142.0	16 59.1	87 46	142.2	16 32.9	87 46	142.5	16 06.7	87 45	142.8	15 40.5	87 45	143.0	15 14.2	87 45	143.3	9
40	17 49.4	87 48	140.6	17 23.5	87 47	140.9	16 57.5	87 47	141.1	16 31.5	87 47	141.4	16 05.5	87 47	141.7	15 39.4	87 46	141.9	15 13.4	87 46	142.2	14 47.3	87 46	142.4	40
1	17 20.9	86 48	139.8	16 55.1	86 48	140.0	16 29.3	86 48	140.3	16 03.4	86 48	140.6	15 37.6	86 47	140.8	15 11.7	86 47	141.1	14 45.8	86 47	141.4	14 19.9	86 47	141.6	1
2	16 51.8	85 49	138.9	16 26.2	86 49	139.2	16 00.5	86 49	139.5	15 34.9	86 48	139.7	15 09.2	86 48	140.0	14 43.4	86 48	140.3	14 17.7	86 48	140.5	13 51.9	86 47	140.8	2
3	16 22.3	85 50	138.1	15 56.8	85 50	138.4	15 31.3	85 50	138.6	15 05.8	85 49	138.9	14 40.2	85 49	139.2	14 14.7	85 49	139.5	13 49.1	85 48	139.7	13 23.5	85 48	140.0	3
4	15 52.3	84 51	137.3	15 27.0	84 51	137.5	15 01.6	85 50	137.8	14 36.2	85 50	138.1	14 10.9	85 50	138.4	13 45.5	85 50	138.6	13 20.0	85 49	138.9	12 54.6	85 49	139.2	4
45	15 21.8	84 52	136.4	14 56.6	84 51	136.7	14 31.4	84 51	137.0	14 06.2	84 51	137.3	13 41.0	84 51	137.6	13 15.8	84 50	137.8	12 50.5	84 50	138.1	12 25.2	84 50	138.4	45
6	14 50.8	83 52	135.6	14 25.8	83 52	135.9	14 00.8	83 52	136.2	13 35.8	84 52	136.5	13 10.7	84 51	136.8	12 45.6	84 51	137.0	12 20.5	84 51	137.3	11 55.4	84 50	137.6	6
7	14 19.4	83 53	134.8	13 54.6	83 53	135.1	13 29.7	83 53	135.4	13 04.8	83 52	135.7	12 39.9	83 52	136.0	12 15.0	83 52	136.3	11 50.1	83 52	136.5	11 25.1	83 51	136.8	7
8	13 47.6	82 54	134.0	13 22.9	82 54	134.3	12 58.2	82 53	134.6	12 33.5	82 53	134.9	12 08.7	83 53	135.2	11 44.0	83 52	135.5	11 19.2	83 52	135.8	10 54.4	83 52	136.0	8
9	13 15.3	82 54	133.2	12 50.8	82 54	133.5	12 26.2	82 54	133.8	12 01.7	82 54	134.1	11 37.1	82 53	134.4	11 12.5	82 53	134.7	10 47.9	82 53	135.0	10 23.2	82 53	135.3	9
50	12 42.6	81 55	132.4	12 18.2	81 55	132.7	11 53.9	81 55	133.0	11 29.4	81 54	133.3	11 05.0	81 54	133.6	10 40.6	82 54	133.9	10 16.1	82 54	134.2	9 51.6	82 53	134.5	50
1	12 09.5	81 56	131.7	11 45.3	81 56	132.0	11 21.1	81 55	132.3	10 56.8	81 55	132.6	10 32.5	81 55	132.9	10 08.3	81 55	133.2	9 43.9	81 54	133.5	9 19.6	81 54	133.8	1
2	11 36.0	80 57	130.9	11 11.9	80 56	131.2	10 47.9	80 56	131.5	10 23.8	80 56	131.8	9 59.7	80 55	132.1	9 35.5	80 55	132.4	9 11.4	81 55	132.7	8 47.2	81 55	133.0	2
3	11 02.1	80 57	130.1	10 38.2	80 57	130.4	10 14.3	80 57	130.7	9 50.3	80 56	131.0	9 26.4	80 56	131.4	9 02.4	80 56	131.7	8 38.4	80 56	132.0	8 14.4	80 55	132.3	3
4	10 27.8	79 58	129.4	10 04.1	79 58	129.7	9 40.3	79 57	130.0	9 16.5	79 57	130.3	8 52.7	79 57	130.6	8 28.9	79 56	130.9	8 05.1	79 56	131.2	7 41.2	79 56	131.5	4
55	9 53.2	79 58	128.6	9 29.6	79 58	128.9	9 06.0	79 58	129.2	8 42.3	79 58	129.6	8 18.7	79 57	129.9	7 55.0	79 57	130.2	7 31.3	79 57	130.5	7 07.7	79 57	130.8	55
6	9 18.1	78 59	127.9	8 54.7	78 59	128.2	8 31.2	78 58	128.5	8 07.8	78 58	128.8	7 44.3	78 58	129.1	7 20.8	78 58	129.4	6 57.3	78 57	129.8	6 33.7	78 57	130.1	6
7	8 42.8	78 60	127.1	8 19.5	78 59	127.4	7 56.2	78 59	127.8	7 32.8	78 59	128.1	7 09.5	78 59	128.4	6 46.2	78 58	128.7	6 22.8	78 58	129.0	5 59.4	78 58	129.3	7
8	8 07.0	77 60	126.4	7 43.9	77 60	126.7	7 20.7	77 60	127.0	6 57.6	77 59	127.4	6 34.4	77 59	127.7	6 11.2	77 59	128.0	5 48.0	77 59	128.3	5 24.8	77 58	128.6	8
9	7 31.0	77 61	125.7	7 06.0	77 60	126.0	6 45.0	77 60	126.3	6 22.0	77 60	126.6	5 58.9	77 60	127.0	5 35.9	77 59	127.3	5 12.8	77 59	127.6				9
60	6 54.6	76 61	124.9	6 31.7	76 61	125.3	6 08.9	76 61	125.6	5 46.0	76 60	125.9	5 23.1	76 60	126.2	5 00.2	76 60	126.6							60
1	6 17.9	76 62	124.2	5 55.2	76 61	124.6	5 32.5	76 61	124.9	5 09.7	76 61	125.2													1
2	5 40.9	75 62	123.5	5 18.3	75 62	123.8																			2
3	5 03.5	75 63	122.8																						3

Lat. 43°

Lat. 44°

Lat. 45°

Lat. 46°

Lat. 47°

Lat. 48°

DECLINATION SAME NAME AS LATITUDE

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	
91	12 30.8	65 71	74.2	12 50.2	65 71	73.9	13 09.7	65 71	73.5	13 29.0	65 71	73.1	13 48.4	64 71	72.7	14 07.7	64 71	72.3	14 26.9	64 70	71.9	14 46.1	64 70	71.5	91
2	11 48.0	65 71	73.6	12 07.5	65 71	73.2	12 27.0	65 71	72.8	12 46.4	65 71	72.4	13 05.9	65 71	72.1	13 25.3	65 70	71.7	13 44.6	64 70	71.3	14 03.9	64 70	70.9	2
3	11 05.3	65 71	73.0	11 24.9	65 71	72.6	11 44.4	65 71	72.2	12 04.0	65 70	71.8	12 23.5	65 70	71.4	12 43.0	65 70	71.1	13 02.5	65 70	70.7	13 21.9	65 70	70.3	3
4	10 22.7	66 71	72.4	10 42.4	66 71	72.0	11 02.1	66 70	71.6	11 21.7	65 70	71.2	11 41.3	65 70	70.8	12 00.9	65 70	70.4	12 20.5	65 70	70.0	12 40.0	65 70	69.7	4
95	9 40.3	66 70	71.7	10 00.1	66 70	71.4	10 19.8	66 70	71.0	10 39.6	66 70	70.6	10 59.3	66 70	70.2	11 19.0	66 70	69.8	11 38.6	65 69	69.4	11 58.3	65 69	69.0	95
6	8 58.0	66 70	71.1	9 17.9	66 70	70.7	9 37.8	66 70	70.3	9 57.6	66 70	70.0	10 17.4	66 70	69.6	10 37.2	66 69	69.2	10 57.0	66 69	68.8	11 16.7	66 69	68.4	6
7	8 15.9	67 70	70.5	8 35.9	67 70	70.1	8 55.9	67 70	69.7	9 15.8	66 69	69.3	9 35.7	66 69	69.0	9 55.6	66 69	68.6	10 15.5	66 69	68.2	10 35.3	66 69	67.8	7
8	7 34.0	67 70	69.8	7 54.0	67 69	69.5	8 14.1	67 69	69.1	8 34.2	67 69	68.7	8 54.2	67 69	68.3	9 14.2	67 69	68.0	9 34.2	67 69	67.6	9 54.1	66 68	67.2	8
9	6 52.2	67 69	69.2	7 12.4	67 69	68.8	7 32.6	67 69	68.5	7 52.7	67 69	68.1	8 12.8	67 69	67.7	8 33.0	67 68	67.3	8 53.1	67 68	67.0	9 13.1	67 68	66.6	9
100	6 10.6	68 69	68.6	6 30.9	68 69	68.2	6 51.2	68 69	67.8	7 11.4	68 68	67.4	7 31.7	67 68	67.1	7 51.9	67 68	66.7	8 12.1	67 68	66.3	8 32.3	67 68	66.0	100
1	5 29.2	68 69	67.9	5 49.6	68 69	67.6	6 10.0	68 68	67.2	6 30.4	68 68	66.8	6 50.7	68 68	66.4	7 11.1	68 68	66.1	7 31.4	68 68	65.7	7 51.7	68 67	65.3	1
2				5 08.5	68 68	66.9	5 29.0	68 68	66.5	5 49.5	68 68	66.2	6 09.9	68 68	65.8	6 30.4	68 67	65.4	6 50.8	68 67	65.1	7 11.3	68 67	64.7	2
3										5 08.8	69 68	65.5	5 29.4	69 67	65.2	5 49.9	69 67	64.8	6 10.5	69 67	64.4	6 31.1	68 67	64.1	3
4																5 09.7	69 67	64.2	5 30.4	69 67	63.8	5 51.1	69 66	63.4	4
105																						5 11.3	69 66	62.8	105

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Lat. 42°

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	72 00.0	1.0 02	180.0	72 30.0	1.0 02	180.0	73 00.0	1.0 02	180.0	73 30.0	1.0 02	180.0	74 00.0	1.0 02	180.0	74 30.0	1.0 02	180.0	75 00.0	1.0 02	180.0	75 30.0	1.0 02	180.0	00
1	71 58.9	1.0 06	177.0	72 28.8	1.0 06	177.0	72 58.8	1.0 06	176.9	73 28.8	1.0 06	176.8	73 58.7	1.0 06	176.7	74 28.7	1.0 06	176.7	74 58.7	1.0 07	176.6	75 28.6	1.0 07	176.5	1
2	71 55.4	1.0 10	174.1	72 25.3	1.0 10	174.0	72 55.2	1.0 10	173.8	73 25.1	1.0 10	173.7	73 54.9	1.0 10	173.5	74 24.8	1.0 11	173.3	74 54.7	1.0 11	173.1	75 24.5	99 11	172.9	2
3	71 49.7	99 13	171.2	72 19.5	99 14	171.0	72 49.2	99 14	170.8	73 18.9	99 14	170.5	73 48.6	99 15	170.3	74 18.3	99 15	170.0	74 48.0	99 15	169.8	75 17.7	99 16	169.5	3
4	71 41.8	99 17	168.3	72 11.3	99 17	168.0	72 40.9	98 18	167.7	73 10.4	98 18	167.4	73 39.9	98 19	167.1	74 09.4	98 19	166.8	74 38.8	98 20	166.4	75 08.2	98 20	166.0	4
05	71 31.6	98 20	165.4	72 01.0	98 21	165.1	72 30.3	98 21	164.8	72 59.6	98 22	164.4	73 28.8	97 22	164.0	73 58.0	97 23	163.6	74 27.1	97 24	163.2	74 56.2	97 24	162.7	05
6	71 19.4	97 24	162.7	71 48.4	97 24	162.3	72 17.5	97 25	161.9	72 46.5	97 25	161.4	73 15.4	96 26	161.0	73 44.2	96 27	160.5	74 13.0	96 27	160.0	74 41.7	96 28	159.4	6
7	71 05.1	96 27	159.9	71 33.8	96 28	159.5	72 02.5	96 28	159.0	72 31.2	96 29	158.5	72 59.7	95 30	158.0	73 28.2	95 30	157.5	73 56.6	94 31	156.9	74 24.9	94 32	156.3	7
8	70 48.8	95 30	157.2	71 17.2	96 31	156.8	71 45.6	94 32	156.2	72 13.8	94 32	155.7	72 42.0	94 33	155.1	73 10.1	93 34	154.5	73 38.0	93 34	153.9	74 05.9	93 35	153.2	8
9	70 30.6	94 33	154.6	70 58.7	93 34	154.1	71 26.6	93 35	153.5	71 54.5	93 35	153.0	72 22.3	92 36	152.3	72 49.9	92 37	151.7	73 17.4	91 38	151.0	73 44.8	91 38	150.3	9
10	70 10.6	92 36	152.1	70 38.3	92 37	151.5	71 05.9	92 38	150.9	71 33.3	91 38	150.3	72 00.6	91 39	149.6	72 27.8	90 40	149.0	72 54.9	90 41	148.2	73 21.7	89 41	147.5	10
1	69 48.9	91 39	149.7	70 16.2	91 40	149.0	70 43.3	90 40	148.4	71 10.4	90 41	147.7	71 37.2	89 42	147.0	72 04.0	89 43	146.3	72 30.5	88 43	145.6	72 56.9	88 44	144.7	1
2	69 25.6	90 41	147.3	69 52.5	89 42	146.6	70 19.2	89 43	146.0	70 45.8	88 44	145.3	71 12.2	88 44	144.6	71 38.4	87 45	143.8	72 04.5	86 46	143.0	72 30.3	86 47	142.2	2
3	69 00.7	88 44	145.0	69 27.2	88 45	144.3	69 53.5	87 45	143.6	70 19.6	87 46	142.9	70 45.6	86 47	142.2	71 11.3	86 48	141.4	71 36.9	85 48	140.5	72 02.2	84 49	139.7	3
4	68 34.4	87 46	142.8	69 00.5	87 47	142.1	69 26.3	86 48	141.4	69 52.0	85 48	140.6	70 17.5	85 49	139.9	70 42.8	84 50	139.0	71 07.8	83 51	138.2	71 32.6	82 51	137.3	4
15	68 06.8	86 48	140.6	68 32.4	85 49	139.9	68 57.8	84 50	139.2	69 23.1	84 50	138.4	69 48.1	83 51	137.6	70 12.9	82 52	136.8	70 37.5	81 53	136.0	71 01.8	81 53	135.1	15
6	67 37.9	84 50	138.6	68 03.1	84 51	137.9	68 28.1	83 52	137.1	68 52.9	82 52	136.3	69 17.4	82 53	135.5	69 41.8	81 54	134.7	70 05.9	80 55	133.8	70 29.7	79 55	132.9	6
7	67 07.8	83 52	136.6	67 32.6	82 53	135.9	67 57.2	82 53	135.1	68 21.5	81 54	134.3	68 45.6	80 55	133.5	69 09.5	79 56	132.7	69 33.2	78 56	131.8	69 56.5	77 57	130.9	7
8	66 36.6	82 54	134.7	67 01.0	81 54	133.9	67 25.2	80 55	133.2	67 49.1	79 56	132.4	68 12.8	79 56	131.6	68 36.2	78 57	130.7	68 59.4	77 58	129.8	69 22.3	76 59	128.9	8
9	66 04.4	80 55	132.8	66 28.4	80 56	132.1	66 52.2	79 57	131.3	67 15.7	78 57	130.5	67 38.9	77 58	129.7	68 02.0	76 59	128.8	68 24.7	75 59	128.0	68 47.2	74 60	127.1	9
20	65 31.3	79 57	131.1	65 54.9	78 57	130.3	66 18.2	77 58	129.5	66 41.3	77 59	128.7	67 04.2	76 59	127.9	67 26.8	75 60	127.1	67 49.1	74 61	126.2	68 11.2	73 61	125.3	20
1	64 57.2	78 58	129.3	65 20.4	77 59	128.6	65 43.4	76 59	127.8	66 06.1	75 60	127.0	66 28.6	74 61	126.2	66 50.8	74 61	125.3	67 12.7	73 62	124.5	67 34.4	72 62	123.6	1
2	64 22.3	77 59	127.7	64 45.2	76 60	126.9	65 07.8	75 61	126.2	65 30.1	74 61	125.4	65 52.2	73 62	124.6	66 14.1	72 62	123.7	66 35.6	71 63	122.8	66 56.9	70 64	121.9	2
3	63 46.7	75 61	126.1	64 09.2	75 61	125.4	64 31.4	74 62	124.6	64 53.4	73 62	123.8	65 15.2	72 63	123.0	65 36.6	71 63	122.1	65 57.8	70 64	121.3	66 18.7	69 65	120.4	3
4	63 10.3	74 62	124.6	63 32.5	73 62	123.8	63 54.4	73 63	123.1	64 16.0	72 63	122.3	64 37.4	71 64	121.5	64 58.6	70 64	120.6	65 19.4	69 65	119.8	65 40.0	68 66	118.9	4
25	62 33.3	73 63	123.1	62 55.1	72 63	122.4	63 16.7	72 64	121.6	63 38.0	71 64	120.8	63 59.1	70 65	120.0	64 19.9	69 65	119.2	64 40.4	68 66	118.3	65 00.6	67 66	117.5	25
6	61 55.6	72 64	121.7	62 17.1	71 64	120.9	62 38.4	71 65	120.2	62 59.5	70 65	119.4	63 20.2	69 66	118.6	63 40.7	68 66	117.8	64 00.9	67 67	116.9	64 20.8	66 67	116.1	6
7	61 17.4	71 65	120.3	61 38.6	70 65	119.6	61 59.6	70 66	118.8	62 20.4	69 66	118.0	62 40.8	68 66	117.2	63 01.0	67 67	116.4	63 20.9	66 67	115.6	63 40.6	65 68	114.8	7
8	60 38.6	70 65	119.0	60 59.6	69 66	118.2	61 20.3	69 66	117.5	61 40.8	68 67	116.7	62 01.0	67 67	115.9	62 20.9	66 68	115.1	62 40.5	65 68	114.3	62 59.9	64 68	113.5	8
9	59 59.4	69 66	117.7	60 20.1	69 67	117.0	60 40.5	68 67	116.2	61 00.7	67 67	115.5	61 20.6	66 68	114.7	61 40.3	65 68	113.9	61 59.7	64 69	113.1	62 18.8	63 69	112.3	9
30	59 19.7	69 67	116.4	59 40.1	68 67	115.7	60 00.3	67 68	115.0	60 20.3	66 68	114.2	60 39.9	65 68	113.5	60 59.4	64 69	112.7	61 18.5	63 69	111.9	61 37.3	62 70	111.1	30
1	58 39.5	68 68	115.2	58 59.7	67 68	114.5	59 19.7	66 68	113.8	59 39.4	65 69	113.0	59 58.9	64 69	112.3	60 18.0	63 69	111.5	60 37.0	63 70	110.7	60 55.6	62 70	109.9	1
2	57 59.0	67 68	114.1	58 19.0	66 68	113.4	58 38.7	65 69	112.6	58 58.2	65 69	111.9	59 17.4	64 70	111.1	59 36.4	63 70	110.4	59 55.1	62 70	109.6	60 13.5	61 71	108.8	2
3	57 18.1	66 69	112.9	57 37.9	65 69	112.2	57 57.4	65 69	111.5	58 16.7	64 70	110.8	58 35.7	63 70	110.0	58 54.5	62 70	109.3	59 13.0	61 71	108.5	59 31.2	60 71	107.7	3
4	56 36.9	66 69	111.8	56 56.4	65 70	111.1	57 15.8	64 70	110.4	57 34.8	63 70	109.7	57 53.7	62 70	109.0	58 12.2	61 71	108.2	58 30.5	61 71	107.5	58 48.6	60 71	106.7	4
35	55 55.3	65 70	110.7	56 14.7	64 70	110.1	56 33.8	63 70	109.4	56 52.7	63 71	108.7	57 11.4	62 71	107.9	57 29.8	61 71	107.2	57 47.9	60 71	106.5	58 05.8	59 72	105.7	35
6	55 13.5	64 70	109.7	55 32.7	64 70	109.0	55 51.6	63 71	108.3	56 10.4	62 71	107.6	56 28.8	61 71	106.9	56 47.1	60 72	106.2	57 05.0	59 72	105.5	57 22.7	59 72	104.7	6
7	54 31.4	64 71	108.7	54 50.4	63 71	108.0	55 09.2	62 71	107.3	55 27.7	61 71	106.6	55 46.1	61 72	105.9	56 04.1	60 72	105.2	56 22.0	59 72	104.5	56 39.5	58 72	103.8	7
8	53 49.0	63 71	107.7	54 07.9	62 71	107.0	54 26.5	62 71	106.4	54 44.9	61 72	105.7	55 03.1	60 72	105.0	55 21.0	59 72	104.3	55 38.7	59 72	103.6	55 56.1	58 73	102.8	8
9	53 06.4	63 71	106.7	53 25.1	62 72	106.1	53 43.6	61 72	105.4	54 01.9	61 72	104.7	54 19.9	60 72	104.1	54 37.7	59 72	103.4	54 55.3	58 73	102.7	55 12.6	57 73	101.9	9
40	52 23.6	62 72	105.8	52 42.2	62 72	105.1	53 00.5	61 72	104.5	53 18.7	60 72	103.8	53 36.6	59 72	103.1	53 54.3	59 73	102.5	54 11.7	58 73	101.8	54 28.9	57 73	101.1	40
1	51 40.6	62 72	104.9	51 59.1	61 72	104.2	52 17.3	60 72	103.6	52 35.3	60 73	102.9	52 53.1	59 73	102.3	53 10.7	58 73	101.6	53 28.0	57 73	100.9	53 45.1	57 73	100.2	1
2	50 57.4	61 72	104.0	51 15.8	61 72	103.3	51 33.9	60 73	102.7	51 51.8	59 73	102.0	52 09.4	59 73	101.4	52 26.9	58 73	100.7	52 44.1	57 73	100.1	53 01.1	56 73	99.4	2
3	50 14.1	61 73	103.1	50 32.3	60 73	102.5	50 50.3	60 73	101.8	51 08.1	59 73	101.2	51 25.7	58 73	100.5	51 43.0	58 73	99.9	52 00.2	57 73	99.2	52 17.1	56 74	98.5	3
4	49 30.6	61 73	102.2	49 48.7	60 73	101.6	50 06.6	59 73	101.0	50 24.3	59 73	100.4	50 41.8	58 73	99.7	50 59.1	57 73	99.1	51 16.1	56 74	98.4	51 33.0	56 74	97.7	4
45	48 46.9	60 73	101.4	49 04.9	60 73	100.8	49 22.8	59 73	100.2	49 40.4	58 73	99.5	49 57.8	58 74	98.9	50 15.0	57 74	98.3	50 32.0	56 74	97.6	50 48.7	56 74	97.0	45
6	48 03.2	60 73	100.5	48 21.1	59 73	99.9	48 38.8	59 73	99.3	48 56.3	58 74	98.7	49 13.7	57 74	98.1	49 30.8	57 74	97.5	49 47.7	56 74	96.8	50 04.4	55 74	96.2	6
7	47 19.3	60 73	99.7	47 37.1	59 73	99.1	47 54.8	59 74	98.5	48 12.2	58 74	97.9	48 29.5	57 74	97.3	48 46.6	57 74	96.7	49 03.4	56 74	96.1	49 20.1	55 74	95.4	7
8	46 35.3	60 74	98.9	46 53.0	59 74	98.4	47 10.6	58 74	97.8	47 28.0	58 74	97.2	47 45.2	57 74	96.5	48 02.2	56 74	95.9	48 19.1	56 74	95.3	48 35.7	55 74	94.7	8
9	45 51.2	59 74	98.2	46 08.9	59 74	97.6	46 26.4	58 74	97.0	46 43.7	57 74	96.4	47 00.9	57 74	95.8	47 17.9	56 74	95.2	47 34.6	56 74	94.6	47 51.2	55 74	94.0	9
50	45 07.0	59 74	97.4	45 24.6	59 74	96.8	45 42.1	58 74	96.2	45 59.4	57 74	95.6	46 16.5	57 74	95.0	46 33.4	56 74	94.4	46 50.2	55 74	93.8	47 06.7	55 74	93.2	50
1	44 22.7	59 74	96.6	44 40.3	58 74	96.1	44 57.8	58 74	95.5	45 15.0	57 74	94.9	45 32.1	57 74	94.3	45 49.0	56 74	93.7	46 05.7	55 74	93.1	46 22.2	55 74	92.5	1
2	43 38.4	59 74	95.9	43 56.0	58 74	95.3	44 13.3	58 74	94.7	44 30.6	57 74	94.2	44 47.6	56 74	93.6	45 04.4	56 74	93.0	45 21.1	55 74	92.4	45 37.6	55 74	91.8	2
3	42 54.0	59 74	95.1	43 11.5	58 74	94.6	43 28.9	58 74	94.0	43 46.1	57 74	93.5	44 03.1	56 74	92.9	44 19.9	56 74	92.3	44 36.6	55 74	91.7	44 53.0	55 74	91.1	3
4	42 09.6	58 74	94.4	42 27.1	58 74	93.9	42 44.4	57 74	93.3	43 01.5	57 74	92.7	43 18.5	56 74	92.2	43 35.3	56 74	91.6	43 52.0	55 74	91.0	44 08.5	55 74	90.5	4
55	41 25.1	58 74	93.7	41 42.6	58 74	93.2	41 59.9	57 74	92.6	42 17.0	57 74	92.1	42 34.0	56 74	91.5	42 50.8	56 74	90.9	43 07.4	55 74	90.4	43 23.9	55 74	89.8	55
6	40 40.6	58 74	93.0	40 58.0	58 74	92.5	41 15.3	57 74	91.9	41 32.4	57 74	91.4	41 49.4	56 74	90.8	42 06.2	56 74	90.3	42 22.8	55 74	89.7	42 39.3	55 74	89.1	6
7	39 56.1	58 74	92.3	40 13.5	58 74	91.8	40 30.7	57 74	91.2	40 47.8	57 74	90.7	41 04.8	56 74	90.1	41 21.6	56 74	89.6	41 38.2	55 74	89.0	41 54.7	55 74	88.5	7
8	39 11.5	58 74	91.6	39 28.9	58 74	91.1	39 46.2	57 74	90.5	40 03.3	57 74	90.0	40 20.2	56 74	89.5	40 37.0	56 74	88.9	40 53.6	55 74	88.4	41 10.1	55 74	87.8	8
9	38 26.9	58 74	90.9	38 44.3	58 74	90.4	39 01.6	57 74	89.9	39 18.7	57 74	89.3	39 35.6	56 74	88.8	39 52.4	56 74	88.3	40 09.1	55 74	87.7	40 25.6	55 74	87.2	9
60	37 42.4	58 74	90.2	37 59.7	58 74	89.7	38 17.0	57 74	89.2	38 34.1	57 74	88.7	38 51.0	56 74	88.2	39 07.9	56 74	87.6	39 24.5	55 74	87.1	39 41.1	55 74	86.5	60
1	36 57.8	58 74	89.6	37 15.1	58 74	89.1	37 32.4	57 74	88.5	37 49.5	57 74	88.0	38 06.5	56 74	87.5	38 23.3	56 74	87.0	38 40.0	55 74	86.5	38 56.6	55 74	85.9	1
2	36 13.2	58 74	88.9	36 30.6	58 74	88.4	36 47.8	57 74	87.9	37 05.0	57 74	87.4	37 22.0	56 74	86.9	37 38.8	56 74	86.3	37 55.5	56 74	85.8	38 12.1	55 74	85.3	2
3	35 28.6	58 74	88.3	35 46.0	58 74	87.8	36 03.3	57 74	87.3	36 20.4	57 74	86.7	36 37.4	56 74	86.2	36 54.3	56 74	85.7	37 11.1	56 74	85.2	37 27.7	55 74	84.7	3
4	34 44.0	58 74	87.6	35 01.5	58 74	87.1	35 18.8	57 74	86.6	35 35.9	57 74	86.1	35 53.0	57 74	85.6	36 09.9	56 74	85.1	36 26.7	56 74	84.6	36 43.3	55 74	84.1	4
65	33 59.5	58 74	87.0	34 16.9	58 74	86.5	34 34.3	58 74	86.0	34 51.5	57 74	85.5	35 08.5	57 74	85.0	35 25.5	56 74	84.5	35 42.3	56 74	84.0	35 59.0	55 74	83.4	65
6	33 15.0	58 74	86.3	33 32.5	58 74	85.8	33 49.8	58 74	85.3	34 07.0	57 74	84.9	34 24.1	57 74	84.4	34 41.1	57 74	83.9	34 58.0	56 74	83.4	35 14.7	56 74	82.8	6
7	32 30.5	58 74	85.7	32 48.0	58 74	85.2	33 05.4	58 74	84.7	33 22.6	57 74	84.2	33 39.8	57 74	83.7	33 56.8	57 74	83.2	34 13.7	56 74	82.7	34 30.5	56 74	82.2	7
8	31 46.1	59 74	85.1	32 03.6	58 74	84.6	32 21.0	58 74	84.1	32 38.3	57 74	83.6	32 55.5	57 74	83.1	33 12.6	57 74	82.6	33 29.5	56 74	82.1	33 46.4	56 73	81.6	8
9	31 01.7	59 74	84.4	31 19.2	58 74	84.0	31 36.7	58 74	83.5	31 54.0	58 74	83.0	32 11.3	57 74	82.5	32 28.4	57 74	82.0	32 45.4	57 73	81.5	33 02.3	56 73	81.0	9
70	30 17.3	59 74	83.8	30 34.9	58 74	83.3	30 52.4	58 74	82.9	31 09.8	58 74	82.4	31 27.1	57 74	81.9	31 44.3	57 73	81.4	32 01.3	57 73	80.9	32 18.3	56 73	80.5	70
1	29 33.0	59 74	83.2	29 50.7	59 74	82.7	30 08.2	58 74	82.2	30 25.6	58 74	81.8	30 43.0	58 73	81.3	31 00.2	57 73	80.8	31 17.3	57 73	80.3	31 34.4	57 73	79.9	1
2	28 48.8	59 74	82.6	29 06.5	59 74	82.1	29 24.0	58 73	81.6	29 41.5	58 73	81.2	29 58.9	58 73	80.7	30 16.2	57 73	80.2	30 33.4	57 73	79.8	30 50.5	57 73	79.3	2
3	28 04.6	59 74	82.0	28 22.3	59 73	81.5	28 40.0	59 73	81.0	28 57.5	58 73	80.6	29 15.0	58 73	80.1	29 32.3	58 73	79.6	29 49.6	57 73	79.2	30 06.7	57 73	78.7	3
4	27 20.5	59 73	81.3	27 38.3	59 73	80.9	27 56.0	59 73	80.4	28 13.6	59 73	80.0	28 31.1	58 73	79.5	28 48.5	58 73	79.0	29 05.8	58 73	78.6	29 23.1	57 73	78.1	4
75	26 36.4	60 73	80.7	26 54.3	59 73	80.3	27 12.0	59 73	79.8	27 29.7	59 73	79.4	27 47.3	58 73	78.9	28 04.8	58 73	78.5	28 22.2	58 73	78.0	28 39.5	58 72	77.5	75
6	25 52.5	60 73	80.1	26 10.4	60 73	79.7	26 28.2	59 73	79.2	26 45.9	59 73	78.8	27 03.6	59 73	78.3	27 21.1	58 73	77.9	27 38.6	58 72	77.4	27 56.0	58 72	76.9	6
7	25 08.6	60 73	79.5	25 26.5	60 73	79.1	25 44.4	59 73	78.6	26 02.2	59 73	78.2	26 20.0	59 73	77.7	26 37.6	59 72	77.3	26 55.1	58 72	76.8	27 12.6	58 72	76.4	7
8	24 24.8	60 73	78.9	24 42.8	60 73	78.5	25 00.8	60 73	78.0	25 18.6	59 72	77.6	25 36.4	59 72	77.1	25 54.1	59 72	76.7	26 11.8	59 72	76.2	26 29.3	58 72	75.8	8
9	23 41.1	60 73	78.3	23 59.2	60 73	77.9	24 17.2	60 72	77.4	24 35.1	60 72	77.0	24 53.0	59 72	76.5	25 10.8	59 72	76.1	25 28.5	59 72	75.7	25 46.2	59 72	75.2	9
80	22 57.5	61 73	77.7	23 15.6	60 72	77.3	23 33.7	60 72	76.8	23 51.7	60 72	76.4	24 09.7	60 72	76.0	24 27.6	59 72	75.5	24 45.4	59 72	75.1	25 03.1	59 72	74.6	80
1	22 13.9	61 72	77.1	22 32.2	61 72	76.7	22 50.4	60 72	76.2	23 08.5	60 72	75.8	23 26.5	60 72	75.4	23 44.5	60 72	74.9	24 02.4	60 72	74.5	24 20.2	59 71	74.1	1
2	21 30.5	61 72	76.5	21 48.8	61 72	76.1	22 07.1	61 72	75.6	22 25.3	61 72	75.2	22 43.4	60 72	74.8	23 01.5	60 71	74.4	23 19.4	60 71	73.9	23 37.4	60 71	73.5	2
3	20 47.2	61 72	75.9	21 05.6	61 72	75.5	21 24.0	61 72	75.1	21 42.2	61 72	74.6	22 00.5	61 71	74.2	22 18.6	60 71	73.8	22 36.7	60 71	73.3	22 54.7	60 71	72.9	3
4	20 04.0	62 72	75.3	20 22.5	62 72	74.9	20 40.9	61 72	74.5	20 59.3	61 71	74.0	21 17.6	61 71	73.6	21 35.8	61 71	73.2	21 54.0	60 71	72.8	22 12.1	60 71	72.3	4
85	19 21.0	62 72	74.7	19 39.5	62 71	74.3	19 58.1	62 71	73.9	20 16.5	61 71	73.4	20 34.9	61 71	73.0	20 53.2	61 71	72.6	21 11.5	61 71	72.2	21 29.7	61 70	71.7	85
6	18 38.0	62 71	74.1	18 56.7	62 71	73.7	19 15.3	62 71	73.3	19 33.8	62 71	72.9	19 52.3	62 71	72.4	20 10.8	61 71	72.0	20 29.1	61 70	71.6	20 47.4	61 70	71.2	6
7	17 55.2	63 71	73.5	18 14.0	62 71	73.1	18 32.7	62 71	72.7	18 51.3	62 71	72.3	19 09.9	62 70	71.8	19 28.4	62 70	71.4	19 46.9	61 70	71.0	20 05.3	61 70	70.6	7
8	17 12.5	63 71	72.9	17 31.4	63 71	72.5	17 50.2	63 71	72.1	18 08.9	62 70	71.7	18 27.6	62 70	71.3	18 46.2	62 70	70.8	19 04.8	62 70	70.4	19 23.3	62 70	70.0	8
9	16 30.0	63 71	72.3	16 48.9	63 71	71.9	17 07.8	63 70	71.5	17 26.6	63 70	71.1	17 45.4	63 70	70.7	18 04.2	62 70	70.3	18 22.9	62 70	69.8	18 41.5	62 69	69.4	9
90	15 47.6	64 70	71.7	16 06.6	63 70	71.3	16 25.6	63 70	70.9	16 44.5	63 70	70.5	17 03.4	63 70	70.1	17 22.3	63 70	69.7	17 41.1	63 69	69.3	17 59.8	62 69	68.8	90

DECLINATION CONTRARY NAME TO LATITUDE

Lat. 42°

H.A.	24° 00′ Alt.	Δd	Δt	Az.	24° 30′ Alt.	Δd	Δt	Az.	25° 00′ Alt.	Δd	Δt	Az.	25° 30′ Alt.	Δd	Δt	Az.	26° 00′ Alt.	Δd	Δt	Az.	26° 30′ Alt.	Δd	Δt	Az.	27° 00′ Alt.	Δd	Δt	Az.	27° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
00	24 60.0	1.0	01	180.0	23 30.0	1.0	01	180.0	23 00.0	1.0	01	180.0	22 30.0	1.0	01	180.0	22 00.0	1.0	01	180.0	21 30.0	1.0	01	180.0	21 00.0	1.0	01	180.0	20 30.0	1.0	01	180.0	00
1	23 59.6	1.0	02	179.0	23 29.6	1.0	02	179.0	22 59.6	1.0	02	179.0	22 29.6	1.0	02	179.0	21 59.6	1.0	02	179.0	21 29.6	1.0	02	179.0	20 59.6	1.0	02	179.0	20 29.6	1.0	02	179.1	1
2	23 58.4	1.0	03	178.0	23 28.5	1.0	03	178.0	22 58.5	1.0	03	178.0	22 28.5	1.0	03	178.0	21 58.5	1.0	03	178.1	21 28.5	1.0	03	178.1	20 58.5	1.0	03	178.1	20 28.5	1.0	03	178.1	2
3	23 56.5	1.0	05	177.0	23 26.5	1.0	04	177.0	22 56.6	1.0	04	177.0	22 26.6	1.0	04	177.1	21 56.6	1.0	04	177.1	21 26.6	1.0	04	177.1	20 56.7	1.0	04	177.1	20 26.7	1.0	04	177.2	3
4	23 53.8	1.0	06	176.0	23 23.8	1.0	06	176.0	22 53.9	1.0	06	176.1	22 23.9	1.0	06	176.1	21 54.0	1.0	06	176.1	21 24.0	1.0	06	176.2	20 54.1	1.0	06	176.2	20 24.1	1.0	06	176.2	4
05	23 50.3	1.0	07	175.0	23 20.4	1.0	07	175.0	22 50.4	1.0	07	175.1	22 20.5	1.0	07	175.1	21 50.6	1.0	07	175.2	21 20.7	1.0	07	175.2	20 50.7	1.0	07	175.2	20 20.8	1.0	07	175.3	05
6	23 46.0	1.0	08	174.0	23 16.1	1.0	08	174.1	22 46.2	1.0	08	174.1	22 16.3	1.0	08	174.1	21 46.4	1.0	08	174.2	21 16.5	1.0	08	174.2	20 46.7	1.0	08	174.3	20 16.8	1.0	08	174.3	6
7	23 41.0	1.0	10	173.0	23 11.1	1.0	10	173.1	22 41.3	1.0	10	173.1	22 11.4	1.0	09	173.2	21 41.6	1.0	09	173.2	21 11.7	1.0	09	173.3	20 41.8	1.0	09	173.3	20 12.0	1.0	09	173.4	7
8	23 35.2	99	11	172.0	23 05.4	99	11	172.1	22 35.6	99	11	172.1	22 05.7	99	11	172.2	21 35.9	99	11	172.3	21 06.1	99	11	172.3	20 36.3	99	10	172.4	20 06.5	99	10	172.4	8
9	23 28.6	99	12	171.0	22 58.9	99	12	171.1	22 29.1	99	12	171.2	21 59.3	99	12	171.2	21 29.6	99	12	171.3	20 59.8	99	12	171.4	20 30.0	99	12	171.4	20 00.3	99	12	171.5	9
10	23 21.3	99	13	170.0	22 51.6	99	13	170.1	22 21.9	99	13	170.2	21 52.2	99	13	170.3	21 22.5	99	13	170.4	20 52.7	99	13	170.4	20 23.0	99	13	170.5	19 53.3	99	13	170.6	10
1	23 13.2	99	15	169.1	22 43.6	99	15	169.1	22 13.9	99	14	169.2	21 44.3	99	14	169.3	21 14.6	99	14	169.4	20 45.0	99	14	169.5	20 15.3	99	14	169.6	19 45.7	99	14	169.6	1
2	23 04.4	99	16	168.1	22 34.8	99	16	168.2	22 05.2	99	16	168.3	21 35.6	99	16	168.4	21 06.1	99	16	168.4	20 36.5	99	15	168.5	20 06.9	99	15	168.6	19 37.3	99	15	168.7	2
3	22 54.8	98	17	167.1	22 25.3	98	17	167.2	21 55.8	98	17	167.3	21 26.3	98	17	167.4	20 56.8	98	17	167.5	20 27.2	98	17	167.6	19 57.7	98	16	167.7	19 28.2	98	16	167.8	3
4	22 44.5	98	18	166.1	22 15.0	98	18	166.2	21 45.6	98	18	166.3	21 16.2	98	18	166.4	20 46.7	98	18	166.6	20 17.3	98	18	166.7	19 47.9	98	18	166.8	19 18.4	98	18	166.9	4
15	22 33.4	98	20	165.2	22 04.1	98	20	165.3	21 34.7	98	19	165.4	21 05.4	98	19	165.5	20 36.0	98	19	165.6	20 06.7	98	19	165.7	19 37.3	98	19	165.8	19 07.9	98	19	165.9	15
6	22 21.6	98	21	164.2	21 52.4	98	21	164.3	21 23.1	98	21	164.4	20 53.9	98	20	164.6	20 24.6	98	20	164.7	19 55.3	98	20	164.8	19 26.0	98	20	164.9	18 56.7	98	20	165.0	6
7	22 09.1	97	22	163.2	21 40.0	97	22	163.4	21 10.8	97	22	163.5	20 41.6	97	22	163.6	20 12.4	97	21	163.7	19 43.3	97	21	163.9	19 14.1	97	21	164.0	18 44.9	97	21	164.1	7
8	21 55.9	97	23	162.3	21 26.9	97	23	162.4	20 57.8	97	23	162.5	20 28.7	97	23	162.7	19 59.6	97	23	162.8	19 30.5	97	22	162.9	19 01.4	97	22	163.1	18 32.3	97	22	163.2	8
9	21 42.0	97	24	161.3	21 13.0	97	24	161.5	20 44.1	97	24	161.6	20 15.1	97	24	161.7	19 46.1	97	24	161.9	19 17.1	97	24	162.0	18 48.1	97	23	162.2	18 19.1	97	23	162.3	9
20	21 27.4	96	26	160.4	20 58.5	96	25	160.5	20 29.7	96	25	160.7	20 00.8	96	25	160.8	19 31.9	96	25	161.0	19 03.0	96	25	161.1	18 34.1	96	24	161.2	18 05.2	96	24	161.4	20
1	21 12.1	96	27	159.4	20 43.3	96	26	159.6	20 14.6	96	26	159.7	19 45.8	96	26	159.9	19 17.0	96	26	160.0	18 48.2	96	26	160.2	18 19.4	96	26	160.3	17 50.6	96	25	160.5	1
2	20 56.1	95	28	158.5	20 27.4	95	28	158.7	19 58.8	96	27	158.8	19 30.1	96	27	159.0	19 01.5	96	27	159.1	18 32.8	96	27	159.3	18 04.1	96	27	159.4	17 35.4	96	26	159.6	2
3	20 39.4	95	29	157.6	20 10.9	95	29	157.7	19 42.3	95	28	157.9	19 13.8	95	28	158.1	18 45.3	95	28	158.2	18 16.7	95	28	158.4	17 48.1	95	28	158.6	17 19.6	95	28	158.7	3
4	20 22.1	95	30	156.6	19 53.7	95	30	156.8	19 25.2	95	30	157.0	18 56.8	95	29	157.2	18 28.4	95	29	157.3	18 00.0	95	29	157.5	17 31.5	95	29	157.7	17 03.0	95	29	157.8	4
25	20 04.1	94	31	155.7	19 35.8	94	31	155.9	19 07.5	94	31	156.1	18 39.2	94	30	156.3	18 10.9	94	30	156.4	17 42.6	94	30	156.6	17 14.2	94	30	156.8	16 45.9	94	30	157.0	25
6	19 45.4	94	32	154.8	19 17.3	94	32	155.0	18 49.1	94	32	155.2	18 20.9	94	32	155.4	17 52.7	94	31	155.5	17 24.5	94	31	155.7	16 56.3	94	31	155.9	16 28.1	94	31	156.1	6
7	19 26.1	93	33	153.9	18 58.1	93	33	154.1	18 30.1	93	33	154.3	18 02.0	93	33	154.5	17 34.0	94	32	154.7	17 05.9	94	32	154.8	16 37.8	94	32	155.0	16 09.7	94	32	155.2	7
8	19 06.2	93	34	153.0	18 38.3	93	34	153.2	18 10.4	93	34	153.4	17 42.5	93	34	153.6	17 14.6	93	33	153.8	16 46.6	93	33	154.0	16 18.7	93	33	154.2	15 50.7	93	33	154.3	8
9	18 45.6	92	35	152.1	18 17.9	93	35	152.3	17 50.1	93	35	152.5	17 22.4	93	35	152.7	16 54.6	93	34	152.9	16 26.8	93	34	153.1	15 59.0	93	34	153.3	15 31.1	93	34	153.5	9
30	18 24.5	92	36	151.2	17 56.9	92	36	151.4	17 29.2	92	36	151.6	17 01.6	92	36	151.8	16 34.0	92	35	152.0	16 06.3	92	35	152.2	15 38.6	92	35	152.4	15 10.9	92	35	152.6	30
1	18 02.7	92	37	150.3	17 35.2	92	37	150.6	17 07.8	92	37	150.8	16 40.3	92	37	151.0	16 12.8	92	36	151.2	15 45.2	92	36	151.4	15 17.7	92	36	151.6	14 50.2	92	36	151.8	1
2	17 40.4	91	38	149.5	17 13.0	91	38	149.7	16 45.7	91	38	149.9	16 18.3	91	38	150.1	15 51.0	91	37	150.3	15 23.6	91	37	150.5	14 56.2	91	37	150.7	14 28.8	91	37	151.0	2
3	17 17.4	91	39	148.6	16 50.2	91	39	148.8	16 23.0	91	39	149.0	15 55.8	91	38	149.3	15 28.6	91	38	149.5	15 01.4	91	38	149.7	14 34.1	91	38	149.9	14 06.9	91	38	150.1	3
4	16 53.9	90	40	147.7	16 26.9	90	40	148.0	15 59.8	90	40	148.2	15 32.8	90	39	148.4	15 05.7	90	39	148.6	14 38.6	90	39	148.9	14 11.5	90	39	149.1	13 44.4	90	38	149.3	4
35	16 29.8	90	41	146.9	16 02.9	90	41	147.1	15 36.0	90	41	147.3	15 09.1	90	40	147.6	14 42.2	90	40	147.8	14 15.3	90	40	148.0	13 48.3	90	40	148.2	13 21.3	90	39	148.5	35
6	16 05.2	89	42	146.0	15 38.4	89	42	146.3	15 11.7	89	41	146.5	14 44.9	89	41	146.7	14 18.2	89	41	147.0	13 51.4	89	41	147.2	13 24.6	89	40	147.4	12 57.8	89	40	147.7	6
7	15 40.0	89	43	145.2	15 13.4	89	43	145.4	14 46.8	89	42	145.7	14 20.2	89	42	145.9	13 53.6	89	42	146.1	13 26.9	89	42	146.4	13 00.3	89	41	146.6	12 33.6	89	41	146.8	7
8	15 14.2	88	44	144.3	14 47.8	88	44	144.6	14 21.4	88	43	144.8	13 54.9	88	43	145.1	13 28.5	88	43	145.3	13 02.0	88	42	145.6	12 35.5	88	42	145.8	12 09.0	88	42	146.0	8
9	14 48.0	88	45	143.5	14 21.7	88	44	143.8	13 55.4	88	44	144.0	13 29.1	88	44	144.3	13 02.8	88	44	144.5	12 36.5	88	43	144.8	12 10.2	88	43	145.0	11 43.8	88	43	145.2	9
40	14 21.2	87	45	142.7	13 55.1	87	45	142.9	13 29.0	87	45	143.2	13 02.8	87	45	143.4	12 36.7	87	44	143.7	12 10.5	87	44	144.0	11 44.3	87	44	144.2	11 18.2	87	44	144.4	40
1	13 53.9	86	46	141.9	13 28.0	87	46	142.1	13 02.0	87	46	142.4	12 36.0	87	46	142.6	12 10.0	87	45	142.9	11 44.0	87	45	143.2	11 18.0	87	45	143.4	10 52.0	87	44	143.7	1
2	13 26.2	86	47	141.1	13 00.4	86	47	141.3	12 34.6	86	47	141.6	12 08.7	86	46	141.8	11 42.9	86	46	142.1	11 17.1	86	46	142.4	10 51.2	86	46	142.6	10 25.3	86	45	142.9	2
3	12 57.9	85	48	140.3	12 32.3	85	48	140.5	12 06.6	86	47	140.8	11 41.0	86	47	141.1	11 15.3	86	47	141.3	10 49.6	86	47	141.6	10 23.9	86	46	141.8	9 58.2	86	46	142.1	3
4	12 29.1	85	49	139.5	12 03.7	85	48	139.7	11 38.2	85	48	140.0	11 12.7	85	48	140.3	10 47.2	85	48	140.5	10 21.6	85	47	140.8	9 56.1	85	47	141.1	9 30.5	85	47	141.3	4
45	11 59.9	84	49	138.7	11 34.6	84	49	138.9	11 09.3	84	49	139.2	10 44.0	84	49	139.5	10 18.6	85	48	139.8	9 53.2	85	48	140.0	9 27.8	85	48	140.3	9 02.5	85	48	140.6	45
6	11 30.3	84	50	137.9	11 05.1	84	50	138.2	10 39.9	84	50	138.4	10 14.8	84	49	138.7	9 49.6	84	49	139.0	9 24.4	84	49	139.3	8 59.1	84	49	139.5	8 33.9	84	48	139.8	6
7	11 00.1	83	51	137.1	10 35.1	83	51	137.4	10 10.1	83	50	137.7	9 45.1	83	50	137.9	9 20.1	83	50	138.2	8 55.0	84	50	138.5	8 30.0	84	49	138.8	8 04.9	84	49	139.1	7
8	10 29.6	83	52	136.3	10 04.7	83	51	136.6	9 39.9	83	51	136.9	9 15.0	83	51	137.2	8 50.2	83	51	137.5	8 25.3	83	50	137.8	8 00.4	83	50	138.0	7 35.5	83	50	138.3	8
9	9 58.6	82	52	135.6	9 33.9	82	52	135.9	9 09.2	82	52	136.1	8 44.5	82	52	136.4	8 19.8	82	51	136.7	7 55.1	82	51	137.0	7 30.4	82	51	137.3	7 05.6	82	50	137.6	9
50	9 27.1	82	53	134.8	9 02.6	82	53	135.1	8 38.1	82	53	135.4	8 13.6	82	52	135.7	7 49.0	82	52	136.0	7 24.5	82	52	136.3	6 59.9	82	51	136.6	6 35.3	82	51	136.8	50
1	8 55.3	81	54	134.1	8 31.0	81	53	134.4	8 06.6	81	53	134.6	7 42.2	81	53	134.9	7 17.8	81	53	135.2	6 53.4	81	52	135.5	6 29.0	81	52	135.8	6 04.6	81	52	136.1	1
2	8 23.1	81	54	133.3	7 58.9	81	54	133.6	7 34.7	81	54	133.9	7 10.5	81	54	134.2	6 46.2	81	53	134.5	6 22.0	81	53	134.8	5 57.8	81	53	135.1	5 33.5	81	53	135.4	2
3	7 50.4	80	55	132.6	7 26.4	80	55	132.9	7 02.3	80	55	133.2	6 38.3	80	54	133.5	6 14.2	80	54	133.8	5 50.2	80	54	134.1	5 26.1	80	54	134.4	5 02.0	80	53	134.7	3
4	7 17.4	80	56	131.8	6 53.5	80	55	132.1	6 29.6	80	55	132.4	6 05.7	80	55	132.7	5 41.8	80	55	133.1	5 17.9	80	54	133.4									4
55	6 44.0	79	56	131.1	6 20.3	79	56	131.4	5 56.5	79	56	131.7	5 32.8	79	56	132.0	5 09.1	79	55	132.3													55
6	6 10.2	78	57	130.4	5 46.6	79	57	130.7	5 23.1	79	56	131.0																					6
7	5 36.0	78	58	129.7	5 12.6	78	57	130.0																									7
8	5 01.5	77	58	128.9																													8

Lat. 43°

Lat. 44°

Lat. 45°

Lat. 46°

DECLINATION SAME NAME AS LATITUDE

H.A.	24° 00′ Alt.	Δd	Δt	Az.	24° 30′ Alt.	Δd	Δt	Az.	25° 00′ Alt.	Δd	Δt	Az.	25° 30′ Alt.	Δd	Δt	Az.	26° 00′ Alt.	Δd	Δt	Az.	26° 30′ Alt.	Δd	Δt	Az.	27° 00′ Alt.	Δd	Δt	Az.	27° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
91	15 05.3	64	70	71.1	15 24.4	64	70	70.7	15 43.5	64	70	70.3	16 02.6	63	70	69.9	16 21.6	63	69	69.5	16 40.6	63	69	69.1	16 59.5	63	69	68.7	17 18.3	63	69	68.3	91
2	14 23.2	64	70	70.5	14 42.4	64	70	70.1	15 01.6	64	70	69.7	15 20.8	64	69	69.3	15 39.9	64	69	68.9	15 59.0	63	69	68.5	16 18.0	63	69	68.1	16 37.0	63	69	67.7	2
3	13 41.3	65	70	69.9	14 00.6	64	69	69.5	14 19.9	64	69	69.1	14 39.2	64	69	68.7	14 58.4	64	69	68.3	15 17.6	64	69	67.9	15 36.7	64	68	67.5	15 55.8	64	68	67.1	3
4	12 59.5	65	69	69.3	13 18.9	65	69	68.9	13 38.3	65	69	68.5	13 57.7	65	69	68.1	14 17.1	64	69	67.7	14 36.4	64	68	67.3	14 55.6	64	68	66.9	15 14.8	64	68	66.5	4
95	12 17.9	65	69	68.6	12 37.4	65	69	68.3	12 56.9	65	69	67.9	13 16.4	65	68	67.5	13 35.9	65	68	67.1	13 55.3	65	68	66.7	14 14.7	65	68	66.3	14 34.0	64	68	65.9	95
6	11 36.4	66	69	68.0	11 56.1	66	69	67.7	12 15.7	65	68	67.3	12 35.3	65	68	66.9	12 54.9	65	68	66.5	13 14.5	65	68	66.1	13 34.0	65	68	65.7	13 53.4	65	67	65.3	6
7	10 55.1	66	68	67.4	11 14.9	66	68	67.1	11 34.7	66	68	66.7	11 54.4	66	68	66.3	12 14.1	66	68	65.9	12 33.8	65	67	65.5	12 53.4	65	67	65.1	13 13.0	65	67	64.7	7
8	10 14.1	66	68	66.8	10 34.0	66	68	66.4	10 53.8	66	68	66.1	11 13.7	66	68	65.7	11 33.5	66	67	65.3	11 53.3	66	67	64.9	12 13.1	66	67	64.5	12 32.8	66	67	64.1	8
9	9 33.2	67	68	66.2	9 53.2	67	68	65.8	10 13.2	67	67	65.4	10 33.2	67	67	65.1	10 53.1	66	67	64.7	11 13.0	66	67	64.3	11 32.9	66	67	63.9	11 52.8	66	66	63.5	9
100	8 52.5	67	67	65.6	9 12.6	67	67	65.2	9 32.7	67	67	64.8	9 52.8	67	67	64.5	10 12.9	67	67	64.1	10 32.9	67	66	63.7	10 53.0	67	66	63.3	11 12.9	67	66	62.9	100
1	8 12.0	68	67	65.0	8 32.2	68	67	64.6	8 52.5	67	67	64.2	9 12.7	67	67	63.8	9 32.9	67	66	63.5	9 53.1	67	66	63.1	10 13.2	67	66	62.7	10 33.3	67	66	62.3	1
2	7 31.7	68	67	64.3	7 52.1	68	67	64.0	8 12.4	68	66	63.6	8 32.8	68	66	63.2	8 53.1	68	66	62.9	9 13.4	68	66	62.5	9 33.7	68	65	62.1	9 54.0	67	65	61.7	2
3	6 51.6	68	66	63.7	7 12.1	68	66	63.3	7 32.6	68	66	63.0	7 53.1	68	66	62.6	8 13.6	68	66	62.2	8 34.0	68	65	61.9	8 54.4	68	65	61.5	9 14.8	68	65	61.1	3
4	6 11.7	69	66	63.1	6 32.4	69	66	62.7	6 53.0	69	66	62.3	7 13.6	69	65	62.0	7 34.2	69	65	61.6	7 54.8	69	65	61.2	8 15.3	68	65	60.9	8 35.9	68	64	60.5	4
105	5 32.1	69	66	62.4	5 52.9	69	65	62.1	6 13.6	69	65	61.7	6 34.4	69	65	61.4	6 55.1	69	65	61.0	7 15.8	69	65	60.6	7 36.5	69	64	60.3	7 57.2	69	64	59.9	105
6	[illegible]				5 13.6	70	65	61.4	5 34.5	70	65	61.1	5 55.4	70	65	60.7	6 16.2	70	64	60.4	6 37.1	69	64	60.0	6 57.9	69	64	59.6	7 18.7	69	64	59.3	6
7	[illegible]												5 16.6	70	64	60.1	5 37.6	70	64	59.7	5 58.6	70	64	59.4	6 19.6	70	64	59.0	6 40.5	70	63	58.7	7
8	[illegible]																4 59.2	70	64	59.1	5 20.3	70	64	58.7	5 41.5	70	63	58.4	6 02.6	70	63	58.0	8
9	[illegible]																								5 03.6	71	63	57.8	5 24.9	71	63	57.4	9

Lat. 47°

Digitized by Google

Lat. 42°

H.A.	28° 00′			28° 30′			29° 00′			30° 00′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	76 00.0	1.0 02	180.0	76 30.0	1.0 02	180.0	77 00.0	1.0 03	180.0	78 00.0	1.0 03	180.0
1	75 58.6	1.0 07	176.4	76 28.5	1.0 07	176.2	76 58.5	1.0 08	176.1	77 58.4	1.0 08	175.8
2	75 54.3	99 12	172.7	76 24.2	99 12	172.5	76 54.0	99 12	172.3	77 53.5	99 13	171.7
3	75 47.3	99 16	169.2	76 16.9	99 17	168.8	76 46.5	99 17	168.5	77 45.6	98 18	167.7
4	75 37.6	98 21	165.6	76 06.9	98 21	165.2	76 36.2	97 22	164.7	77 34.5	97 23	163.7
05	75 25.2	97 26	162.2	75 54.2	96 26	161.7	76 23.1	96 26	161.1	77 20.6	96 28	159.9
6	75 10.4	95 29	158.9	75 38.9	95 30	158.2	76 07.3	95 30	157.6	77 03.9	94 32	156.1
7	74 53.1	94 32	155.6	75 21.2	93 33	154.9	75 49.1	93 34	154.2	76 44.6	92 36	152.6
8	74 33.6	92 36	152.5	75 01.2	92 37	151.8	75 28.6	91 38	151.0	76 22.9	90 40	149.2
9	74 12.0	90 39	149.5	74 39.0	90 40	148.7	75 05.9	89 41	147.9	75 59.0	88 43	146.0
10	73 48.4	89 42	146.6	74 14.9	88 43	145.8	74 41.2	87 44	144.9	75 33.1	86 46	142.9
1	73 23.0	87 45	143.9	73 49.0	86 46	143.0	74 14.7	85 47	142.1	75 05.3	83 49	140.0
2	72 55.9	85 48	141.3	73 21.3	84 49	140.4	73 46.4	83 50	139.4	74 35.8	81 52	137.3
3	72 27.3	83 50	138.8	72 52.1	82 51	137.8	73 16.7	81 52	136.9	74 04.9	79 54	134.7
4	71 57.2	81 52	136.4	72 21.5	81 53	135.5	72 45.5	80 54	134.4	73 32.6	77 56	132.3
15	71 25.8	80 54	134.1	71 49.6	79 55	133.2	72 13.1	78 56	132.2	72 59.0	75 58	130.0
6	70 53.2	78 56	132.0	71 16.5	77 57	131.0	71 39.4	76 58	130.0	72 24.3	74 60	127.8
7	70 19.6	76 58	129.9	70 42.3	75 59	129.0	71 04.8	74 59	127.9	71 48.6	72 61	125.8
8	69 44.9	75 59	128.0	70 07.2	74 60	127.0	70 29.1	73 61	126.0	71 12.0	70 62	123.9
9	69 09.3	73 61	126.1	69 31.1	72 61	125.1	69 52.6	71 62	124.1	70 34.6	69 64	122.0
20	68 32.9	72 62	124.3	68 54.3	71 63	123.4	69 15.4	70 63	122.4	69 56.4	67 65	120.3
1	67 55.7	71 63	122.6	68 16.7	69 64	121.7	68 37.4	68 64	120.7	69 17.6	66 66	118.6
2	67 17.8	69 64	121.0	67 38.4	68 65	120.1	67 58.7	67 65	119.1	68 38.2	65 67	117.1
3	66 39.3	68 65	119.5	66 59.5	67 66	118.5	67 19.4	66 66	117.6	67 58.2	63 67	115.6
4	66 00.2	67 66	118.0	66 20.1	66 67	117.1	66 39.7	65 67	116.1	67 17.7	62 68	114.1
25	65 20.6	66 67	116.6	65 40.1	65 67	115.7	65 59.4	64 68	114.7	66 36.8	61 69	112.8
6	64 40.4	65 68	115.2	64 59.7	64 68	114.3	65 18.7	63 69	113.4	65 55.5	60 69	111.5
7	63 59.9	64 68	113.9	64 18.9	63 69	113.0	64 37.5	62 69	112.1	65 13.8	59 70	110.2
8	63 18.9	63 69	112.6	63 37.6	62 69	111.8	63 56.0	61 70	110.9	64 31.8	58 70	109.0
9	62 37.6	62 69	111.4	62 56.1	61 70	110.5	63 14.2	60 70	109.7	63 49.5	58 71	107.9
30	61 55.9	61 70	110.2	62 14.2	60 70	109.4	62 32.1	59 71	108.5	63 07.0	57 71	106.7
1	61 13.9	61 70	109.1	61 31.9	60 71	108.3	61 49.7	59 71	107.4	62 24.1	56 72	105.7
2	60 31.6	60 71	108.0	60 49.5	59 71	107.2	61 07.0	58 71	106.4	61 41.1	56 72	104.6
3	59 49.1	59 71	107.0	60 06.8	58 72	106.1	60 24.1	57 72	105.3	60 57.9	55 72	103.6
4	59 06.4	59 72	105.9	59 23.8	58 72	105.1	59 41.0	57 72	104.3	60 14.4	55 73	102.7
35	58 23.4	58 72	104.9	58 40.7	57 72	104.2	58 57.7	56 72	103.4	59 30.9	54 73	101.7
6	57 40.2	58 72	104.0	57 57.4	57 72	103.2	58 14.2	56 73	102.4	58 47.1	54 73	100.8
7	56 56.8	57 73	103.0	57 13.9	56 73	102.3	57 30.6	55 73	101.5	58 03.3	53 73	99.9
8	56 13.3	57 73	102.1	56 30.2	56 73	101.4	56 46.9	55 73	100.6	57 19.3	53 73	99.1
9	55 29.6	56 73	101.2	55 46.4	56 73	100.5	56 03.0	55 73	99.7	56 35.2	53 74	98.2
40	54 45.8	56 73	100.4	55 02.5	55 73	99.6	55 19.0	54 74	98.9	55 51.0	53 74	97.4
1	54 01.9	56 73	99.5	54 18.5	55 74	98.8	54 34.9	54 74	98.1	55 06.8	52 74	96.6
2	53 17.9	55 74	98.7	53 34.4	55 74	98.0	53 50.7	54 74	97.3	54 22.5	52 74	95.8
3	52 33.8	55 74	97.9	52 50.2	54 74	97.2	53 06.4	54 74	96.5	53 38.1	52 74	95.1
4	51 49.6	55 74	97.1	52 05.9	54 74	96.4	52 22.1	53 74	95.7	52 53.6	52 74	94.3
45	51 05.3	55 74	96.3	51 21.6	54 74	95.6	51 37.7	53 74	94.9	52 09.2	52 74	93.6
6	50 20.9	55 74	95.5	50 37.2	54 74	94.9	50 53.2	53 74	94.2	51 24.6	52 74	92.8
7	49 36.5	54 74	94.8	49 52.7	54 74	94.1	50 08.8	53 74	93.5	50 40.1	51 74	92.1
8	48 52.1	54 74	94.0	49 08.3	54 74	93.4	49 24.2	53 74	92.8	49 55.5	51 74	91.4
9	48 07.6	54 74	93.3	48 23.7	54 74	92.7	48 39.7	53 74	92.1	49 10.9	51 74	90.8
50	47 23.0	54 74	92.6	47 39.2	53 74	92.0	47 55.1	53 74	91.4	48 26.4	51 74	90.1
1	46 38.5	54 74	91.9	46 54.6	53 74	91.3	47 10.5	53 74	90.7	47 41.8	51 74	89.4
2	45 53.9	54 74	91.2	46 10.0	53 74	90.6	46 25.9	53 74	90.0	46 57.2	51 74	88.8
3	45 09.3	54 74	90.5	45 25.4	53 74	89.9	45 41.4	53 74	89.3	46 12.6	51 74	88.1
4	44 24.7	54 74	89.9	44 40.9	53 74	89.3	44 56.8	53 74	88.7	45 28.1	51 74	87.5
55	43 40.2	54 74	89.2	43 56.3	53 74	88.6	44 12.2	53 74	88.0	44 43.5	52 74	86.8
6	42 55.6	54 74	88.6	43 11.7	53 74	88.0	43 27.7	53 74	87.4	43 59.0	52 74	86.2
7	42 11.0	54 74	87.9	42 27.2	54 74	87.3	42 43.1	53 74	86.8	43 14.5	52 74	85.6
8	41 26.5	54 74	87.3	41 42.6	54 74	86.7	41 58.6	53 74	86.1	42 30.1	52 74	85.0
9	40 41.9	54 74	86.6	40 58.1	54 74	86.1	41 14.1	53 74	85.5	41 45.7	52 74	84.4
60	39 57.4	54 74	86.0	40 13.7	54 74	85.4	40 29.7	53 74	84.9	41 01.4	52 74	83.8
1	39 13.0	54 74	85.4	39 29.2	54 74	84.8	39 45.3	53 74	84.3	40 17.1	52 74	83.2
2	38 28.6	55 74	84.8	38 44.8	54 74	84.2	39 01.0	54 74	83.7	39 32.8	53 74	82.6
3	37 44.2	55 74	84.1	38 00.5	54 74	83.6	38 16.7	54 74	83.1	38 48.6	53 74	82.0
4	36 59.8	55 74	83.5	37 16.2	54 74	83.0	37 32.5	54 74	82.5	38 04.5	53 73	81.4
65	36 15.6	55 74	82.9	36 32.0	55 74	82.4	36 48.3	54 74	81.9	37 20.4	53 73	80.8
6	35 31.3	55 74	82.3	35 47.8	55 74	81.8	36 04.2	54 73	81.3	36 36.5	53 73	80.3
7	34 47.2	55 73	81.7	35 03.7	55 73	81.2	35 20.1	54 73	80.7	35 52.6	54 73	79.7
8	34 03.1	56 73	81.1	34 19.7	55 73	80.6	34 36.2	55 73	80.1	35 08.7	54 73	79.1
9	33 19.1	56 73	80.6	33 35.7	55 73	80.1	33 52.3	55 73	79.6	34 25.0	54 73	78.5
70	32 35.1	56 73	80.0	32 51.9	56 73	79.5	33 08.5	55 73	79.0	33 41.3	54 73	78.0
1	31 51.3	56 73	79.4	32 08.1	56 73	78.9	32 24.7	55 73	78.4	32 57.8	55 72	77.4
2	31 07.5	56 73	78.8	31 24.4	56 73	78.3	31 41.1	56 73	77.8	32 14.3	55 72	76.8
3	30 23.8	57 73	78.2	30 40.7	56 73	77.7	30 57.6	56 72	77.3	31 30.9	55 72	76.3
4	29 40.2	57 72	77.6	29 57.2	57 72	77.2	30 14.1	56 72	76.7	30 47.7	56 72	75.7
75	28 56.7	57 72	77.1	29 13.8	57 72	76.6	29 30.8	57 72	76.1	30 04.5	56 72	75.2
6	28 13.3	57 72	76.5	28 30.5	57 72	76.0	28 47.6	57 72	75.5	29 21.5	56 72	74.6
7	27 30.0	58 72	75.9	27 47.3	57 72	75.4	28 04.4	57 72	75.0	28 38.5	56 71	74.0
8	26 46.8	58 72	75.3	27 04.2	58 72	74.9	27 21.4	57 71	74.4	27 55.7	57 71	73.5
9	26 03.7	58 72	74.8	26 21.2	58 71	74.3	26 38.5	58 71	73.9	27 13.0	57 71	72.9
80	25 20.7	59 71	74.2	25 38.3	58 71	73.7	25 55.8	58 71	73.3	26 30.5	58 71	72.4
1	24 37.9	59 71	73.6	24 55.6	59 71	73.2	25 13.1	58 71	72.7	25 48.0	58 70	71.8
2	23 55.2	59 71	73.0	24 12.9	59 71	72.6	24 30.6	59 71	72.2	25 05.8	58 70	71.3
3	23 12.6	60 71	72.5	23 30.5	59 71	72.0	23 48.3	59 70	71.6	24 23.6	59 70	70.7
4	22 30.2	60 70	71.9	22 48.1	60 70	71.5	23 06.0	60 70	71.0	23 41.6	59 70	70.1
85	21 47.8	60 70	71.3	22 05.9	60 70	70.9	22 23.9	60 70	70.5	22 59.7	59 70	69.6
6	21 05.7	61 70	70.7	21 23.9	61 70	70.3	21 42.0	60 70	69.9	22 18.0	60 69	69.0
7	20 23.7	61 70	70.2	20 42.0	61 70	69.7	21 00.2	61 69	69.3	21 36.5	60 69	68.5
8	19 41.8	61 69	69.6	20 00.2	61 69	69.2	20 18.5	61 69	68.8	20 55.1	61 69	67.9
9	19 00.1	62 69	69.0	19 18.6	62 69	68.6	19 37.1	61 69	68.2	20 13.8	61 68	67.3
90	18 18.5	62 69	68.4	18 37.2	62 69	68.0	18 55.8	62 69	67.6	19 32.8	61 68	66.8

32° 00′			34° 00′			34° 30′			35° 30′			H.A.
Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
80 00.0	1.0 03	180.0	82 00.0	1.0 04	180.0	82 30.0	1.0 04	180.0	83 30.0	1.0 05	180.0	00
79 58.1	1.0 09	175.1	81 57.7	1.0 11	174.1	82 27.6	1.0 12	173.7	83 27.2	99 14	172.8	1
79 52.4	99 16	170.3	81 50.8	98 19	168.2	82 20.3	98 20	167.5	83 19.0	97 22	165.9	2
79 43.1	98 21	165.6	81 39.6	96 26	162.6	82 08.4	96 27	161.6	83 05.6	95 30	159.2	3
79 30.3	96 27	161.0	81 24.2	94 32	157.2	81 52.3	93 33	156.0	82 47.5	91 37	153.1	4
79 14.2	94 32	156.7	81 05.2	91 37	152.2	81 32.3	90 39	150.8	82 25.4	87 43	147.4	05
78 55.1	91 37	152.5	80 42.8	88 42	147.5	81 08.9	86 44	146.0	81 59.7	83 48	142.3	6
78 33.2	89 41	148.6	80 17.4	84 47	143.2	80 42.5	83 48	141.5	81 31.1	79 52	137.7	7
78 08.8	86 45	144.9	79 49.5	81 50	139.2	80 13.6	79 52	137.5	80 59.9	75 55	133.6	8
77 42.0	84 48	141.5	79 19.3	78 54	135.6	79 42.4	76 55	133.8	80 26.6	71 58	129.9	9
77 13.3	81 51	138.3	78 47.2	75 56	132.2	79 09.3	73 58	130.5	79 51.6	68 61	126.6	10
76 42.7	79 54	135.2	78 13.4	72 59	129.2	78 34.6	70 60	127.4	79 15.1	65 63	123.6	1
76 10.6	76 56	132.4	77 38.1	69 61	126.4	77 58.6	67 62	124.7	78 37.4	62 65	120.9	2
75 37.0	74 58	129.8	77 01.6	67 63	123.8	77 21.3	65 64	122.1	77 58.6	60 66	118.5	3
75 02.1	72 60	127.4	76 24.1	64 64	121.5	76 43.1	62 65	119.8	77 19.0	57 67	116.2	4
74 26.2	70 62	125.1	75 45.6	62 65	119.3	76 04.0	60 66	117.6	76 38.7	55 68	114.2	15
73 49.2	68 63	123.0	75 06.3	60 67	117.2	75 24.1	58 67	115.7	75 57.7	54 69	112.3	6
73 11.4	66 64	121.0	74 26.4	59 68	115.4	74 43.6	57 68	113.8	75 16.2	52 70	110.6	7
72 32.8	64 65	119.1	73 45.8	57 69	113.6	74 02.6	55 69	112.1	74 34.3	51 71	109.0	8
71 53.5	63 66	117.3	73 04.7	56 69	112.0	73 21.1	54 70	110.5	73 51.9	49 71	107.5	9
71 13.6	61 67	115.7	72 23.1	54 70	110.4	72 39.1	52 71	109.0	73 09.2	48 72	106.1	20
70 33.2	60 68	114.1	71 41.1	53 71	109.0	71 56.8	51 71	107.6	72 26.2	47 72	104.8	1
69 52.2	59 69	112.6	70 58.8	52 71	107.6	71 14.1	50 72	106.3	71 43.0	46 72	103.6	2
69 10.9	58 70	111.2	70 16.2	51 72	106.4	70 31.2	49 72	105.1	70 59.6	45 73	102.4	3
68 29.1	57 70	109.9	69 33.3	50 72	105.1	69 48.0	48 72	103.9	70 15.9	45 73	101.3	4
67 47.0	56 71	108.6	68 50.1	49 72	104.0	69 04.6	48 73	102.8	69 32.1	44 73	100.2	25
67 04.6	55 71	107.4	68 06.7	49 73	102.9	68 21.1	47 73	101.7	68 48.2	43 73	99.2	6
66 21.9	54 72	106.2	67 23.2	48 73	101.8	67 37.3	46 73	100.7	68 04.1	43 74	98.3	7
65 39.0	53 72	105.1	66 39.4	47 73	100.8	66 53.4	46 73	99.7	67 19.9	42 74	97.4	8
64 55.8	53 72	104.0	65 55.6	47 73	99.8	66 09.4	45 74	98.7	66 35.7	42 74	96.5	9
64 12.4	52 73	103.0	65 11.6	46 73	98.9	65 25.3	45 74	97.8	65 51.3	42 74	95.6	30
63 28.9	51 73	102.0	64 27.5	46 74	98.0	64 41.1	45 74	97.0	65 06.9	42 74	94.8	1
62 45.2	51 73	101.0	63 43.3	46 74	97.1	63 56.8	44 74	96.1	64 22.5	41 74	94.0	2
62 01.4	51 73	100.1	62 59.0	45 74	96.3	63 12.4	44 74	95.3	63 38.0	41 74	93.3	3
61 17.4	50 73	99.2	62 14.6	45 74	95.5	62 28.0	44 74	94.5	62 53.4	41 74	92.5	4
60 33.3	50 74	98.3	61 30.2	45 74	94.7	61 43.5	44 74	93.7	62 08.9	41 74	91.8	35
59 49.2	49 74	97.5	60 45.8	45 74	93.9	60 59.0	43 74	93.0	61 24.3	41 74	91.1	6
59 04.9	49 74	96.6	60 01.3	45 74	93.2	60 14.5	43 74	92.2	60 39.7	41 74	90.4	7
58 20.6	49 74	95.8	59 16.7	44 74	92.4	59 29.9	43 74	91.5	59 55.1	41 74	89.7	8
57 36.2	49 74	95.1	58 32.2	44 74	91.7	58 45.3	43 74	90.8	59 10.6	41 74	89.1	9
56 51.8	49 74	94.3	57 47.6	44 74	91.0	58 00.7	43 74	90.2	58 26.0	41 74	88.4	40
56 07.3	48 74	93.5	57 03.0	44 74	90.3	57 16.1	43 74	89.5	57 41.4	41 74	87.8	1
55 22.8	48 74	92.8	56 18.4	44 74	89.7	56 31.6	43 74	88.8	56 56.9	41 74	87.2	2
54 38.2	48 74	92.1	55 33.8	44 74	89.0	55 47.0	43 74	88.2	56 12.3	41 74	86.6	3
53 53.6	48 74	91.4	54 49.3	44 74	88.4	55 02.4	43 74	87.6	55 27.8	41 74	86.0	4
53 09.1	48 74	90.7	54 04.7	44 74	87.7	54 17.9	43 74	87.0	54 43.4	41 74	85.4	45
52 24.5	48 74	90.0	53 20.1	45 74	87.1	53 33.4	44 74	86.3	53 59.0	42 74	84.8	6
51 39.9	48 74	89.4	52 35.6	45 74	86.5	52 48.9	44 74	85.7	53 14.6	42 74	84.2	7
50 55.3	48 74	88.7	51 51.1	45 74	85.9	52 04.4	44 74	85.2	52 30.2	42 74	83.7	8
50 10.7	48 74	88.1	51 06.7	45 74	85.3	51 20.0	44 74	84.6	51 45.9	42 74	83.1	9
49 26.2	48 74	87.4	50 22.3	45 74	84.7	50 35.7	44 74	84.0	51 01.7	42 74	82.6	50
48 41.7	48 74	86.8	49 37.9	45 74	84.1	49 51.3	44 74	83.4	50 17.5	43 74	82.0	1
47 57.1	49 74	86.2	48 53.6	45 74	83.5	49 07.1	45 74	82.9	49 33.4	43 73	81.5	2
47 12.7	49 74	85.6	48 09.3	46 74	83.0	48 22.9	45 74	82.3	48 49.3	43 73	80.9	3
46 28.2	49 74	85.0	47 25.1	46 74	82.4	47 38.7	45 73	81.7	48 05.3	44 73	80.4	4
45 43.8	49 74	84.4	46 40.9	46 74	81.8	46 54.6	45 73	81.2	47 21.4	44 73	79.9	55
44 59.5	49 74	83.8	45 56.8	46 73	81.3	46 10.6	46 73	80.6	46 37.5	44 73	79.3	6
44 15.2	49 74	83.2	45 12.7	47 73	80.7	45 26.6	46 73	80.1	45 53.8	44 73	78.8	7
43 30.9	49 74	82.6	44 28.8	47 73	80.2	44 42.7	46 73	79.6	45 10.0	45 73	78.3	8
42 46.7	50 74	82.0	43 44.9	47 73	79.6	43 58.9	47 73	79.0	44 26.4	45 73	77.8	9
42 02.6	50 73	81.5	43 01.0	47 73	79.1	43 15.2	47 73	78.5	43 42.9	46 72	77.3	60
41 18.6	50 73	80.9	42 17.3	48 73	78.6	42 31.5	47 73	78.0	42 59.4	46 72	76.8	1
40 34.6	50 73	80.3	41 33.6	48 73	78.0	41 48.0	47 72	77.4	42 16.1	46 72	76.3	2
39 50.6	51 73	79.8	40 50.1	48 72	77.5	41 04.5	48 72	76.9	41 32.8	47 72	75.7	3
39 06.8	51 73	79.2	40 06.6	49 72	77.0	40 21.1	48 72	76.4	40 49.6	47 72	75.2	4
38 23.0	51 73	78.7	39 23.2	49 72	76.4	39 37.8	49 72	75.9	40 06.6	47 72	74.7	65
37 39.4	51 73	78.1	38 39.9	49 72	75.9	38 54.6	49 72	75.4	39 23.6	48 71	74.2	6
36 55.8	52 72	77.6	37 56.7	50 72	75.4	38 11.5	49 72	74.8	38 40.3	48 71	73.7	7
36 12.3	52 72	77.0	37 13.6	50 72	74.9	37 28.5	50 71	74.3	37 58.0	49 71	73.2	8
35 28.9	52 72	76.5	36 30.6	50 71	74.4	36 45.7	50 71	73.8	37 15.4	49 71	72.7	9
34 45.6	53 72	75.9	35 47.7	51 71	73.8	36 02.9	50 71	73.3	36 32.9	49 71	72.2	70
34 02.4	53 72	75.4	35 04.9	51 71	73.3	35 20.3	51 71	72.8	35 50.5	50 70	71.7	1
33 19.3	53 72	74.8	34 22.3	52 71	72.8	34 37.7	51 71	72.3	35 08.2	50 70	71.2	2
32 36.3	54 71	74.3	33 39.8	52 71	72.3	33 55.3	52 70	71.8	34 26.0	51 70	70.7	3
31 53.4	54 71	73.8	32 57.3	52 70	71.8	33 13.0	52 70	71.3	33 44.0	51 70	70.2	4
31 10.7	54 71	73.2	32 15.1	53 70	71.2	32 30.9	52 70	70.7	33 02.1	52 70	69.7	75
30 28.1	55 71	72.7	31 32.9	53 70	70.7	31 48.8	53 70	70.2	32 20.4	52 69	69.2	6
29 45.5	55 71	72.1	30 50.9	54 70	70.2	31 07.0	53 70	69.7	31 38.7	53 69	68.7	7
29 03.2	56 70	71.6	30 09.0	54 70	69.7	30 25.2	54 69	69.2	30 57.3	53 69	68.2	8
28 20.9	56 70	71.1	29 27.3	55 69	69.2	29 43.6	54 69	68.7	30 15.9	54 69	67.7	9
27 38.8	56 70	70.5	28 45.7	55 69	68.6	29 02.1	55 69	68.2	29 34.7	54 68	67.2	80
26 56.8	57 70	70.0	28 04.2	56 69	68.1	28 20.8	55 69	67.6	28 53.7	55 68	66.7	1
26 15.0	57 69	69.4	27 22.9	56 69	67.6	27 39.6	56 68	67.1	28 12.8	55 68	66.2	2
25 33.3	58 69	68.9	26 41.8	56 68	67.1	26 58.6	56 68	66.6	27 32.1	56 68	65.7	3
24 51.8	58 69	68.4	26 00.8	57 68	66.6	26 17.8	57 68	66.1	26 51.6	56 67	65.2	4
24 10.5	58 69	67.8	25 19.9	57 68	66.0	25 37.1	57 68	65.6	26 11.2	57 67	64.7	85
23 29.2	59 68	67.3	24 39.3	58 67	65.5	24 56.6	58 67	65.1	25 31.0	57 67	64.1	6
22 48.2	59 68	66.7	23 58.8	58 67	65.0	24 16.3	58 67	64.5	24 50.9	58 66	63.6	7
22 07.3	60 68	66.2	23 18.5	59 67	64.4	23 36.1	59 67	64.0	24 11.1	58 66	63.1	8
21 26.6	60 68	65.6	22 38.3	59 67	63.9	22 56.1	59 66	63.5	23 31.4	59 66	62.6	9
20 46.1	61 67	65.1	21 58.4	60 66	63.4	22 16.3	60 66	62.9	22 51.9	59 66	62.1	90

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DECLINATION CONTRARY NAME TO LATITUDE

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	20 00.0	1.0 01	180.0	19 30.0	1.0 01	180.0	19 00.0	1.0 01	180.0	18 00.0	1.0 01	180.0	16 00.0	1.0 01	180.0	14 00.0	1.0 01	180.0	13 30.0	1.0 01	180.0	12 30.0	1.0 01	180.0	00
1	19 59.6	1.0 02	179.1	19 29.6	1.0 02	179.1	18 59.6	1.0 02	179.1	17 59.6	1.0 02	179.1	15 59.7	1.0 02	179.1	13 59.7	1.0 02	179.2	13 29.7	1.0 02	179.2	12 29.7	1.0 02	179.2	1
2	19 58.5	1.0 03	178.1	19 28.5	1.0 03	178.1	18 58.6	1.0 03	178.2	17 58.6	1.0 03	178.2	15 58.6	1.0 03	178.2	13 58.7	1.0 03	178.3	13 28.7	1.0 03	178.3	12 28.7	1.0 03	178.3	2
3	19 56.7	1.0 04	177.2	19 26.7	1.0 04	177.2	18 56.8	1.0 04	177.2	17 56.8	1.0 04	177.3	15 56.9	1.0 04	177.4	13 57.0	1.0 04	177.4	13 27.0	1.0 04	177.5	12 27.1	1.0 04	177.5	3
4	19 54.2	1.0 05	176.2	19 24.2	1.0 05	176.3	18 54.2	1.0 05	176.3	17 54.3	1.0 05	176.4	15 54.5	1.0 05	176.5	13 54.7	1.0 05	176.6	13 24.7	1.0 05	176.6	12 24.8	1.0 05	176.7	4
05	19 50.9	1.0 07	175.3	19 20.9	1.0 07	175.3	18 51.0	1.0 07	175.4	17 51.2	1.0 06	175.5	15 51.4	1.0 06	175.6	13 51.7	1.0 06	175.7	13 21.8	1.0 06	175.8	12 21.9	1.0 06	175.8	05
6	19 46.9	1.0 08	174.4	19 17.0	1.0 08	174.4	18 47.1	1.0 08	174.5	17 47.3	1.0 08	174.5	15 47.7	1.0 07	174.7	13 48.0	1.0 07	174.9	13 18.1	1.0 07	174.9	12 18.3	1.0 07	175.0	6
7	19 42.1	1.0 09	173.4	19 12.3	1.0 09	173.5	18 42.4	1.0 09	173.5	17 42.7	1.0 09	173.6	15 43.2	1.0 09	173.8	13 43.7	1.0 08	174.0	13 13.9	1.0 08	174.1	12 14.1	1.0 08	174.2	7
8	19 36.7	99 10	172.5	19 06.8	99 10	172.6	18 37.0	99 10	172.6	17 37.4	99 10	172.7	15 38.1	99 10	173.0	13 38.8	99 09	173.2	13 08.9	99 09	173.2	12 09.3	99 09	173.3	8
9	19 30.5	99 11	171.6	19 00.7	99 11	171.6	18 30.9	99 11	171.7	17 31.4	99 11	171.8	15 32.3	99 11	172.1	13 33.2	99 10	172.3	13 03.4	99 10	172.4	12 03.8	99 10	172.5	9
10	19 23.6	99 13	170.6	18 53.9	99 13	170.7	18 24.2	99 12	170.8	17 24.7	99 12	170.9	15 25.8	99 12	171.2	13 26.9	99 12	171.5	12 57.1	99 11	171.6	11 57.7	99 11	171.7	10
1	19 16.0	99 14	169.7	18 46.3	99 14	169.8	18 16.7	99 14	169.9	17 17.3	99 13	170.0	15 18.7	99 13	170.3	13 20.0	99 13	170.6	12 50.3	99 12	170.7	11 50.9	99 12	170.9	1
2	19 07.7	99 15	168.8	18 38.1	99 15	168.9	18 08.5	99 15	169.0	17 09.3	99 15	169.1	15 10.8	99 14	169.5	13 12.4	99 14	169.8	12 42.8	99 14	169.9	11 43.5	99 13	170.0	2
3	18 58.7	98 16	167.9	18 29.1	98 16	168.0	17 59.6	98 16	168.1	17 00.5	98 16	168.2	15 02.4	98 15	168.6	13 04.2	99 15	169.0	12 34.6	99 15	169.1	11 35.5	99 14	169.2	3
4	18 49.0	98 17	167.0	18 19.5	98 17	167.1	17 50.0	98 17	167.2	16 51.1	98 17	167.4	14 53.2	98 16	167.7	12 55.3	98 16	168.1	12 25.8	98 16	168.2	11 26.8	98 15	168.4	4
15	18 38.5	98 18	166.0	18 09.2	98 18	166.2	17 39.8	98 18	166.3	16 41.0	98 18	166.5	14 43.4	98 17	166.9	12 45.8	98 17	167.3	12 16.4	98 17	167.4	11 17.6	98 16	167.6	15
6	18 27.5	98 20	165.1	17 58.2	98 20	165.2	17 28.9	98 19	165.4	16 30.3	98 19	165.6	14 33.0	98 18	166.0	12 35.7	98 18	166.5	12 06.4	98 18	166.6	11 07.7	98 18	166.8	6
7	18 15.7	97 21	164.2	17 46.5	97 21	164.3	17 17.3	97 20	164.5	16 18.8	97 20	164.7	14 21.9	97 20	165.2	12 24.9	97 19	165.6	11 55.7	98 19	165.7	10 57.2	98 19	166.0	7
8	18 03.2	97 22	163.3	17 34.1	97 22	163.5	17 05.0	97 22	163.6	16 06.7	97 21	163.8	14 10.2	97 21	164.3	12 13.6	97 20	164.8	11 44.4	97 20	164.9	10 46.1	97 20	165.2	8
9	17 50.1	97 23	162.4	17 21.1	97 23	162.6	16 52.0	97 23	162.7	15 54.0	97 22	163.0	13 57.8	97 22	163.5	12 01.6	97 21	164.0	11 32.5	97 21	164.1	10 34.3	97 21	164.4	9
20	17 36.3	96 24	161.5	17 07.4	96 24	161.7	16 38.4	96 24	161.8	15 40.6	96 23	162.1	13 44.8	97 23	162.6	11 49.0	97 22	163.2	11 20.0	97 22	163.3	10 22.0	97 22	163.6	20
1	17 21.8	96 25	160.6	16 53.0	96 25	160.8	16 24.2	96 25	160.9	15 26.5	96 24	161.2	13 31.2	96 24	161.8	11 35.7	96 23	162.3	11 06.9	96 23	162.5	10 09.1	96 23	162.8	1
2	17 06.7	96 26	159.8	16 38.0	96 26	159.9	16 09.3	96 26	160.1	15 11.9	96 26	160.4	13 16.9	96 25	160.9	11 21.9	96 24	161.5	10 53.1	96 24	161.7	9 55.6	96 24	162.0	2
3	16 51.8	95 27	158.9	16 22.4	95 27	159.0	15 53.8	95 27	159.2	14 56.6	95 27	159.5	13 02.1	95 26	160.1	11 07.5	96 25	160.7	10 38.8	96 25	160.9	9 41.5	96 24	161.2	3
4	16 34.6	95 28	158.0	16 06.1	95 28	158.2	15 37.6	95 28	158.3	14 40.6	95 28	158.6	12 46.6	95 27	159.3	10 52.5	95 26	159.9	10 23.9	95 26	160.1	9 26.8	95 25	160.4	4
25	16 17.6	94 29	157.1	15 49.2	95 29	157.3	15 20.8	95 29	157.5	14 24.1	95 29	157.8	12 30.5	95 28	158.5	10 36.9	95 27	159.1	10 08.4	95 27	159.3	9 11.6	95 26	159.6	25
6	15 59.9	94 30	156.3	15 31.7	94 30	156.4	15 03.4	94 30	156.6	14 06.9	94 30	157.0	12 13.9	94 29	157.6	10 20.7	94 28	158.3	9 52.4	94 28	158.5	8 55.7	94 27	158.8	6
7	15 41.7	94 31	155.4	15 13.6	94 31	155.6	14 45.4	94 31	155.8	13 49.2	94 31	156.1	11 56.6	94 30	156.8	10 03.9	94 29	157.5	9 35.7	94 29	157.7	8 39.3	94 28	158.0	7
8	15 22.8	93 32	154.5	14 54.8	93 32	154.7	14 26.8	93 32	154.9	13 30.8	93 32	155.3	11 38.8	93 31	156.0	9 46.6	94 30	156.7	9 18.5	94 30	156.9	8 22.4	94 29	157.3	8
9	15 03.3	93 33	153.7	14 35.5	93 33	153.9	14 07.6	93 33	154.1	13 11.9	93 33	154.5	11 20.4	93 32	155.2	9 28.7	93 31	156.0	9 00.8	93 31	156.1	8 04.9	93 30	156.5	9
30	14 43.3	92 34	152.8	14 15.6	92 34	153.0	13 47.8	92 34	153.2	12 52.4	92 33	153.6	11 01.4	93 33	154.4	9 10.3	93 32	155.2	8 42.5	93 31	155.4	7 46.8	93 31	155.7	30
1	14 22.6	92 35	152.0	13 55.1	92 35	152.2	13 27.5	92 35	152.4	12 32.3	92 34	152.8	10 41.8	92 33	153.6	8 51.3	92 33	154.4	8 23.6	92 32	154.6	7 28.3	92 32	155.0	1
2	14 01.4	91 36	151.2	13 34.0	91 36	151.4	13 06.5	91 36	151.6	12 11.6	92 35	152.0	10 21.7	92 34	152.8	8 31.7	92 33	153.6	8 04.2	92 33	153.8	7 09.1	92 33	154.2	2
3	13 39.6	91 37	150.3	13 12.3	91 37	150.6	12 45.0	91 37	150.8	11 50.4	91 36	151.2	10 01.1	91 35	152.0	8 11.6	91 34	152.9	7 44.3	91 34	153.1	6 49.5	91 34	153.5	3
4	13 17.3	90 38	149.5	12 50.1	90 38	149.7	12 23.0	90 38	150.0	11 28.7	91 37	150.4	9 39.9	91 36	151.2	7 51.0	91 35	152.1	7 23.8	91 35	152.3	6 29.3	91 34	152.7	4
35	12 54.4	90 39	148.7	12 27.4	90 39	148.9	12 00.4	90 39	149.1	11 06.4	90 38	149.6	9 18.2	90 37	150.5	7 29.9	90 36	151.3	7 02.8	90 36	151.6	6 08.6	90 35	152.0	35
6	12 30.9	89 40	147.9	12 04.1	89 40	148.1	11 37.3	90 39	148.3	10 43.5	90 39	148.8	8 56.0	90 38	149.7	7 08.3	90 37	150.6	6 41.3	90 37	150.8	5 47.4	90 36	151.3	6
7	12 07.0	89 41	147.1	11 40.3	89 41	147.3	11 13.6	89 40	147.5	10 20.2	89 40	148.0	8 33.2	89 39	148.9	6 46.1	89 38	149.8	6 19.3	89 38	150.1	5 25.7	89 37	150.5	7
8	11 42.5	88 42	146.3	11 15.9	88 41	146.5	10 49.4	88 41	146.8	9 56.3	89 41	147.2	8 09.9	89 40	148.2	6 23.5	89 39	149.1	5 56.8	89 38	149.3	5 03.6	89 38	149.8	8
9	11 17.5	88 43	145.5	10 51.1	88 42	145.7	10 24.7	88 42	146.0	9 31.9	88 42	146.5	7 46.2	88 40	147.4	6 00.3	88 39	148.4	5 33.8	88 39	148.6				9
40	10 51.9	87 43	144.7	10 25.7	87 43	144.9	9 59.5	87 43	145.2	9 07.0	88 42	145.7	7 21.9	88 41	146.7	5 36.7	88 40	147.6	5 10.4	88 40	147.9				40
1	10 25.9	87 44	143.9	9 59.9	87 44	144.2	9 33.8	87 44	144.4	8 41.6	87 43	144.9	6 57.2	87 42	145.9	5 12.6	87 41	146.9							1
2	9 59.4	86 45	143.1	9 33.5	86 45	143.4	9 07.6	86 44	143.6	8 15.8	86 44	144.2	6 31.9	87 43	145.2										2
3	9 32.4	86 46	142.4	9 06.7	86 46	142.6	8 40.9	86 45	142.9	7 49.4	86 45	143.4	6 06.2	86 44	144.4										3
4	9 05.9	85 47	141.6	8 39.4	85 46	141.9	8 13.8	85 46	142.1	7 22.6	85 45	142.7	5 40.1	85 44	143.7										4
45	8 37.0	85 47	140.8	8 11.6	85 47	141.1	7 46.2	85 47	141.4	6 55.3	85 46	141.9	5 13.4	85 45	143.0										45
6	8 08.7	84 48	140.1	7 43.4	84 48	140.4	7 18.1	84 48	140.6	6 27.6	84 47	141.2													6
7	7 39.8	84 49	139.3	7 14.7	84 48	139.6	6 49.6	84 48	139.9	5 59.4	84 48	140.4													7
8	7 10.6	83 50	138.6	6 45.6	83 49	138.9	6 20.7	83 49	139.2	5 30.8	83 48	139.7													8
9	6 40.9	83 50	137.9	6 16.1	83 50	138.1	5 51.3	83 50	138.4	5 01.7	83 49	139.0													9
50	6 10.7	82 51	137.1	5 46.1	82 51	137.4	5 21.5	82 50	137.7																50
1	5 40.2	81 52	136.4	5 15.8	81 51	136.7																			1
2	5 09.2	81 52	135.7																						2

DECLINATION SAME NAME AS LATITUDE

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	17 37.1	63 69	67.9	17 55.9	62 68	67.5	18 14.6	62 68	67.0	18 51.9	62 68	66.2	20 05.7	61 67	64.5	21 18.6	60 66	62.8	21 36.7	60 66	62.4	22 12.6	60 65	61.5	91
2	16 55.9	63 68	67.3	17 14.8	63 68	66.9	17 33.6	63 68	66.5	18 11.2	62 68	65.6	19 25.6	62 67	64.0	20 39.0	61 66	62.3	20 57.3	61 65	61.9	21 33.5	60 65	61.0	2
3	16 14.9	63 68	66.7	16 33.9	63 68	66.3	16 52.9	63 68	65.9	17 30.6	63 67	65.1	18 45.6	62 66	63.4	19 59.7	61 65	61.8	20 18.0	61 65	61.3	20 54.6	61 64	60.5	3
4	15 34.0	64 68	66.1	15 53.2	64 68	65.7	16 12.3	64 67	65.3	16 50.3	63 67	64.5	18 05.8	63 66	62.9	19 20.5	62 65	61.2	19 39.0	62 65	60.8	20 15.9	61 64	60.0	4
95	14 53.3	64 67	65.5	15 12.6	64 67	65.1	15 31.8	64 67	64.7	16 10.1	64 67	63.9	17 26.2	63 66	62.3	18 41.5	62 65	60.7	19 00.2	62 64	60.3	19 37.4	62 64	59.4	95
6	14 12.9	65 67	64.9	14 32.3	65 67	64.5	14 51.6	64 67	64.1	15 30.2	64 66	63.4	16 46.8	64 65	61.8	18 02.7	63 64	60.1	18 21.6	63 64	59.7	18 59.1	62 63	58.9	6
7	13 32.6	65 67	64.3	13 52.1	65 67	64.0	14 11.6	65 66	63.6	14 50.4	65 66	62.8	16 07.7	64 65	61.2	17 24.2	63 64	59.6	17 43.2	63 64	59.2	18 21.0	63 63	58.4	7
8	12 52.5	66 66	63.8	13 12.1	65 66	63.4	13 31.8	65 66	63.0	14 10.9	65 66	62.2	15 28.7	65 65	60.6	16 45.8	64 64	59.0	17 05.0	64 63	58.6	17 43.2	63 63	57.8	8
9	12 12.6	66 66	63.2	12 32.4	66 66	62.8	12 52.1	66 66	62.4	13 31.6	66 65	61.6	14 50.0	65 64	60.1	16 07.7	65 63	58.5	16 27.0	64 63	58.1	17 05.6	64 62	57.3	9
100	11 32.9	66 66	62.6	11 52.8	66 66	62.2	12 12.7	66 65	61.8	12 52.4	66 65	61.0	14 11.4	66 64	59.5	15 29.8	65 63	57.9	15 49.3	65 62	57.5	16 28.2	65 62	56.7	100
1	10 53.4	67 65	62.0	11 13.5	67 65	61.6	11 33.6	67 65	61.2	12 13.5	67 64	60.4	13 33.1	66 63	58.9	14 52.2	66 62	57.4	15 11.8	65 62	57.0	15 51.0	65 62	56.2	1
2	10 14.2	67 65	61.4	10 34.4	67 65	61.0	10 54.6	67 65	60.6	11 34.9	67 64	59.8	12 55.1	67 63	58.3	14 14.7	66 62	56.8	14 34.6	66 62	56.4	15 14.1	66 61	55.6	2
3	9 35.2	68 65	60.8	9 55.5	68 64	60.4	10 15.9	68 64	60.0	10 56.4	68 64	59.3	12 17.2	67 63	57.7	13 37.6	67 62	56.2	13 57.5	67 61	55.8	14 37.4	66 61	55.1	3
4	8 56.4	68 64	60.1	9 16.9	68 64	59.8	9 37.4	68 64	59.4	10 18.2	68 63	58.7	11 39.7	68 62	57.2	13 00.6	67 61	55.6	13 20.8	67 61	55.3	14 01.0	67 60	54.5	4
105	8 17.8	69 64	59.5	8 38.5	69 64	59.2	8 59.1	69 63	58.8	9 40.3	69 63	58.1	11 02.3	68 62	56.6	12 23.9	68 61	55.1	12 44.3	68 60	54.7	13 24.8	67 60	53.9	105
6	7 39.5	69 63	58.9	8 00.3	69 63	58.5	8 21.1	69 63	58.2	9 02.6	69 62	57.5	10 25.2	69 61	56.0	11 47.5	68 60	54.5	12 08.0	68 60	54.1	12 48.9	68 59	53.4	6
7	7 01.5	70 63	58.3	7 22.4	70 63	57.9	7 43.3	70 63	57.6	8 25.1	70 62	56.8	9 48.4	69 61	55.4	11 11.3	69 60	53.9	11 32.0	69 60	53.5	12 13.2	69 59	52.8	7
8	6 23.7	70 63	57.7	6 44.8	70 62	57.3	7 05.8	70 62	57.0	7 47.9	70 62	56.2	9 11.8	70 60	54.8	10 35.4	70 59	53.3	10 56.3	69 59	53.0	11 37.9	69 59	52.2	8
9	5 46.1	71 62	57.0	6 07.4	71 62	56.7	6 28.6	71 62	56.3	7 11.0	71 61	55.6	8 35.5	70 60	54.2	9 59.8	70 59	52.7	10 20.8	70 59	52.4	11 02.8	70 58	51.7	9
110	5 08.8	71 62	56.4	5 30.2	71 62	56.1	5 51.6	71 61	55.7	6 34.3	71 61	55.0	7 59.5	71 60	53.6	9 24.5	71 58	52.2	9 45.6	71 58	51.8	10 27.9	70 58	51.1	110
1							5 14.9	72 61	55.1	5 57.9	72 60	54.4	7 23.8	71 59	53.0	8 49.4	71 58	51.6	9 10.7	71 58	51.2	9 53.4	71 57	50.5	1
2										5 21.8	72 60	53.8	6 48.3	72 59	52.4	8 14.6	72 57	51.0	8 36.1	72 57	50.6	9 19.1	72 57	49.9	2
3													6 13.2	73 58	51.7	7 40.1	72 57	50.4	8 01.8	72 57	50.0	8 45.2	72 56	49.3	3
4													5 38.3	73 58	51.1	7 05.9	73 56	49.7	7 27.8	73 56	49.4	8 11.5	73 56	48.7	4
115													5 03.7	74 57	50.5	6 32.1	74 56	49.1	6 54.1	73 56	48.8	7 38.2	73 55	48.1	115
6																5 58.5	74 55	48.5	6 20.7	74 55	48.2	7 05.1	74 55	47.5	6
7																5 25.3	75 55	47.9	5 47.7	75 55	47.6	6 32.4	75 54	46.9	7
8																			5 14.9	75 54	46.9	6 00.0	75 53	46.3	8
9																						5 28.0	76 53	45.7	9
120																									120

Lat. 42°

Lat. 43°

Lat. 44°

Lat. 45°

Lat. 46°

Lat 47°

La 48°

Digitized by Google

Lat. 42°

H.A.	36° 00′				37° 00′				38° 30′				40° 00′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	84 00.0	1.0	05	180.0	85 00.0	1.0	06	180.0	86 30.0	1.0	08	180.0	88 00.0	1.0	14	180.0
1	83 57.0	99	15	172.3	84 56.5	99	17	170.9	86 25.1	98	24	167.4	87 51.8	94	37	159.0
2	83 48.2	97	24	164.8	84 46.1	96	28	162.2	86 10.9	92	36	155.8	87 29.7	81	51	142.3
3	83 33.8	94	32	157.8	84 29.5	91	37	154.2	85 49.1	85	46	145.8	86 58.8	67	60	130.5
4	83 14.7	90	39	151.3	84 07.6	86	44	147.0	85 21.4	77	53	137.6	86 22.8	57	65	122.2
05	82 51.3	85	45	145.5	83 41.2	81	50	140.7	84 49.4	70	58	130.9	85 43.8	49	68	116.3
6	82 24.3	81	50	140.2	83 11.4	76	54	135.3	84 14.3	63	62	125.4	85 03.1	43	70	111.8
7	81 54.4	77	54	135.5	82 38.7	71	58	130.5	83 37.0	58	65	120.9	84 21.2	39	71	108.4
8	81 22.0	72	57	131.4	82 03.7	66	61	126.4	82 58.0	54	67	117.2	83 38.6	36	72	105.7
9	80 47.6	69	60	127.7	81 27.0	62	64	122.8	82 17.8	50	69	114.0	82 55.4	33	73	103.4
10	80 11.6	65	62	124.4	80 48.9	59	65	119.7	81 36.6	47	70	111.3	82 11.9	31	73	101.5
1	79 34.2	62	64	121.5	80 09.6	56	67	116.9	80 54.8	44	71	109.0	81 28.0	29	73	99.9
2	78 55.6	59	66	118.9	79 29.4	53	68	114.4	80 12.4	42	71	107.0	80 44.0	28	74	98.5
3	78 16.1	57	67	116.5	78 48.5	51	69	112.2	79 29.5	40	72	105.1	79 59.8	27	74	97.2
4	77 35.8	55	68	114.3	78 06.9	49	70	110.3	78 46.3	38	72	103.5	79 15.6	26	74	96.1
15	76 54.9	53	69	112.3	77 24.9	47	71	108.4	78 02.8	37	73	102.0	78 31.2	26	74	95.0
6	76 13.4	51	70	110.5	76 42.4	45	71	106.8	77 19.1	36	73	100.7	77 46.7	25	74	94.1
7	75 31.4	49	71	108.9	75 59.5	44	72	105.3	76 35.2	35	73	99.5	77 02.2	25	74	93.2
8	74 49.0	48	71	107.3	75 16.4	43	72	103.9	75 51.2	34	74	98.3	76 17.7	25	74	92.4
9	74 06.3	47	72	105.9	74 33.0	42	73	102.6	75 07.0	34	74	97.3	75 33.1	24	74	91.6
20	73 23.3	46	72	104.6	73 49.3	41	73	101.4	74 22.7	33	74	96.3	74 48.6	24	74	90.9
1	72 40.0	45	72	103.3	73 05.5	40	73	100.2	73 38.3	33	74	95.4	74 04.0	24	74	90.2
2	71 56.5	44	73	102.1	72 21.6	40	73	99.2	72 53.9	32	74	94.5	73 19.4	24	74	89.5
3	71 12.8	43	73	101.0	71 37.5	39	74	98.1	72 09.4	32	74	93.6	72 34.8	24	74	88.9
4	70 29.0	43	73	100.0	70 53.3	38	74	97.2	71 24.9	32	74	92.8	71 50.2	24	74	88.3
25	69 45.0	42	74	98.9	70 09.0	38	74	96.3	70 40.4	32	74	92.1	71 05.7	25	74	87.7
6	69 00.9	42	74	98.0	69 24.7	38	74	95.4	69 55.8	31	74	91.3	70 21.1	25	74	87.1
7	68 16.7	41	74	97.1	68 40.3	37	74	94.6	69 11.2	31	74	90.6	69 36.6	25	74	86.5
8	67 32.4	41	74	96.2	67 55.8	37	74	93.8	68 26.6	31	74	90.0	68 52.1	25	74	86.0
9	66 48.1	40	74	95.3	67 11.3	37	74	93.0	67 42.0	31	74	89.3	68 07.6	25	74	85.5
30	66 03.6	40	74	94.5	66 26.7	37	74	92.2	66 57.5	31	74	88.7	67 23.2	26	74	85.0
1	65 19.2	40	74	93.7	65 42.2	37	74	91.5	66 12.9	32	74	88.0	66 38.8	26	74	84.5
2	64 34.6	40	74	93.0	64 57.6	37	74	90.8	65 28.3	32	74	87.4	65 54.4	26	74	84.0
3	63 50.1	40	74	92.2	64 13.0	37	74	90.1	64 43.8	32	74	86.9	65 10.1	27	74	83.5
4	63 05.5	40	74	91.5	63 28.4	37	74	89.5	63 59.3	32	74	86.3	64 25.8	27	74	83.0
35	62 21.0	40	74	90.8	62 43.8	37	74	88.8	63 14.8	32	74	85.7	63 41.6	27	74	82.5
6	61 36.4	40	74	90.1	61 59.3	37	74	88.2	62 30.4	32	74	85.2	62 57.4	28	74	82.0
7	60 51.8	40	74	89.5	61 14.7	37	74	87.6	61 46.0	33	74	84.6	62 13.3	28	73	81.6
8	60 07.2	40	74	88.8	60 30.2	37	74	87.0	61 01.6	33	74	84.1	61 29.2	29	73	81.1
9	59 22.6	40	74	88.2	59 45.6	37	74	86.4	60 17.3	33	74	83.6	60 45.2	29	73	80.7
40	58 38.1	40	74	87.6	59 01.2	37	74	85.8	59 33.0	33	74	83.0	60 01.2	29	73	80.2
1	57 53.5	40	74	87.0	58 16.7	37	74	85.2	58 48.7	34	74	82.5	59 17.3	30	73	79.8
2	57 09.0	40	74	86.4	57 32.3	38	74	84.6	58 04.6	34	74	82.0	58 33.5	30	73	79.3
3	56 24.5	40	74	85.8	56 47.9	38	74	84.1	57 20.4	34	73	81.5	57 49.7	31	73	78.9
4	55 40.1	40	74	85.2	56 03.6	38	74	83.5	56 36.4	35	73	81.0	57 06.0	31	73	78.4
45	54 55.7	40	74	84.6	55 19.3	38	74	83.0	55 52.3	35	73	80.5	56 22.3	32	73	78.0
6	54 11.3	41	74	84.0	54 35.1	39	74	82.5	55 08.4	35	73	80.0	55 38.8	32	72	77.6
7	53 27.0	41	74	83.5	53 50.9	39	74	81.9	54 24.5	36	73	79.6	54 55.2	33	72	77.1
8	52 42.7	41	74	82.9	53 06.8	39	73	81.4	53 40.7	36	73	79.1	54 11.8	33	72	76.7
9	51 58.5	41	74	82.4	52 22.7	39	73	80.9	52 57.0	37	73	78.6	53 28.5	33	72	76.3
50	51 14.3	42	74	81.8	51 38.7	40	73	80.4	52 13.3	37	73	78.1	52 45.2	34	72	75.8
1	50 30.2	42	73	81.3	50 54.8	40	73	79.9	51 29.7	37	73	77.7	52 02.0	34	72	75.4
2	49 46.2	42	73	80.8	50 11.0	40	73	79.4	50 46.2	38	72	77.2	51 18.9	35	72	75.0
3	49 02.2	42	73	80.2	49 27.2	41	73	78.9	50 02.7	38	72	76.7	50 35.9	35	72	74.5
4	48 18.3	43	73	79.7	48 43.5	41	73	78.4	49 19.4	39	72	76.3	49 53.0	36	71	74.1
55	47 34.4	43	73	79.2	47 59.8	42	73	77.9	48 36.1	39	72	75.8	49 10.1	36	71	73.7
6	46 50.7	43	73	78.7	47 16.3	42	72	77.4	47 52.9	40	72	75.3	48 27.4	37	71	73.3
7	46 07.0	44	73	78.2	46 32.8	42	72	76.9	47 09.8	40	72	74.9	47 44.7	38	71	72.8
8	45 23.4	44	73	77.7	45 49.4	43	72	76.4	46 26.8	40	72	74.4	47 02.2	38	71	72.4
9	44 39.9	44	72	77.2	45 06.1	43	72	75.9	45 43.9	41	71	74.0	46 19.7	39	71	72.0
60	43 56.4	45	72	76.7	44 22.9	43	72	75.4	45 01.1	41	71	73.5	45 37.4	39	70	71.5
1	43 13.1	45	72	76.2	43 39.8	44	72	74.9	44 18.4	42	71	73.0	44 55.1	40	70	71.1
2	42 29.9	46	72	75.7	42 56.8	44	71	74.4	43 35.8	42	71	72.6	44 13.0	40	70	70.7
3	41 46.7	46	72	75.2	42 13.9	45	71	74.0	42 53.3	43	71	72.1	43 31.0	41	70	70.3
4	41 03.7	46	72	74.7	41 31.1	45	71	73.5	42 11.0	43	70	71.7	42 49.1	41	70	69.8
65	40 20.7	47	71	74.2	40 48.4	46	71	73.0	41 28.7	44	70	71.2	42 07.3	42	69	69.4
6	39 37.9	47	71	73.7	40 05.9	46	71	72.5	40 46.5	44	70	70.8	41 25.6	42	69	69.0
7	38 55.1	48	71	73.2	39 23.4	47	71	72.0	40 04.5	45	70	70.3	40 44.0	43	69	68.5
8	38 12.5	48	71	72.7	38 41.0	47	70	71.5	39 22.6	45	70	69.8	40 02.6	44	69	68.1
9	37 30.0	49	71	72.2	37 58.8	47	70	71.1	38 40.8	46	69	69.4	39 21.3	44	69	67.7
70	36 47.6	49	70	71.7	37 16.7	48	70	70.6	37 59.1	46	69	68.9	38 40.1	45	68	67.2
1	36 05.3	49	70	71.2	36 34.7	48	70	70.1	37 17.6	47	69	68.5	37 59.1	45	68	66.8
2	35 23.2	50	70	70.7	35 52.8	49	70	69.6	36 36.2	47	69	68.0	37 18.2	46	68	66.3
3	34 41.2	50	70	70.2	35 11.1	49	69	69.1	35 54.9	48	69	67.5	36 37.4	46	68	65.9
4	33 59.3	51	70	69.7	34 29.5	50	69	68.7	35 13.8	49	68	67.1	35 56.8	47	67	65.4
75	33 17.5	51	69	69.2	33 48.0	50	69	68.2	34 32.8	49	68	66.6	35 16.3	48	67	65.0
6	32 35.9	52	69	68.7	33 06.7	51	69	67.7	33 51.9	50	68	66.1	34 35.9	48	67	64.6
7	31 54.4	52	69	68.2	32 25.5	51	68	67.2	33 11.2	50	68	65.7	33 55.8	49	67	64.1
8	31 13.1	53	69	67.7	31 44.5	52	68	66.7	32 30.7	51	67	65.2	33 15.7	49	66	63.7
9	30 31.9	53	68	67.2	31 03.6	52	68	66.2	31 50.3	51	67	64.7	32 35.8	50	66	63.2
80	29 50.9	54	68	66.7	30 22.9	53	68	65.7	31 10.0	52	67	64.3	31 56.1	51	66	62.7
1	29 10.0	54	68	66.2	29 42.3	53	67	65.3	30 29.9	52	67	63.8	31 16.6	51	66	62.3
2	28 29.3	55	68	65.7	29 01.9	54	67	64.8	29 50.0	53	66	63.3	30 37.2	52	65	61.8
3	27 48.7	55	67	65.2	28 21.6	55	67	64.3	29 10.3	54	66	62.8	29 58.0	52	65	61.4
4	27 08.3	56	67	64.7	27 41.6	55	67	63.8	28 30.7	54	66	62.3	29 18.9	53	65	60.9
85	26 28.1	56	67	64.2	27 01.7	56	66	63.3	27 51.3	55	65	61.9	28 40.0	54	64	60.4
6	25 48.0	57	66	63.7	26 21.9	56	66	62.8	27 12.1	55	65	61.4	28 01.4	54	64	60.0
7	25 08.2	57	66	63.2	25 42.4	57	66	62.3	26 33.0	56	65	60.9	27 22.9	55	64	59.5
8	24 28.5	58	66	62.7	25 03.0	57	65	61.8	25 54.1	56	64	60.4	26 44.5	56	64	59.0
9	23 48.9	58	66	62.2	24 23.8	58	65	61.3	25 15.5	57	64	59.9	26 06.4	56	63	58.5
90	23 09.6	59	65	61.6	23 44.8	58	65	60.8	24 37.0	58	64	59.4	25 28.5	57	63	58.1

42° 00′				42° 30′				43° 00′				45° 00′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
90 00.0	..	74	....	89 30.0	1.0	39	00.0	89 00.0	1.0	24	00.0	87 09.0	1.0	09	00.0	00
89 15.4	01	74	89.7	89 06.4	55	67	55.6	88 45.5	80	54	36.1	86 54.8	97	25	13.3	1
88 30.8	01	74	89.3	88 26.3	81	71	70.7	88 13.1	55	65	55.2	86 40.1	89	37	25.1	2
87 46.2	02	74	89.0	87 43.4	20	73	76.3	87 34.4	40	69	64.7	86 17.7	80	47	34.9	3
87 01.7	02	74	88.7	86 59.8	14	73	79.1	86 53.2	30	71	69.9	85 49.6	70	53	42.7	4
86 17.1	03	74	88.3	86 16.0	10	73	80.6	86 10.8	23	71	73.1	85 17.7	61	58	48.7	05
85 32.5	03	74	88.0	85 31.9	08	74	81.6	85 28.0	19	72	75.2	84 43.0	54	61	53.4	6
84 48.0	04	74	87.7	84 47.8	05	74	82.1	84 44.7	15	72	76.7	84 06.3	47	63	57.0	7
84 03.4	05	74	87.3	84 03.6	04	74	82.5	84 01.2	12	73	77.7	83 28.3	42	65	59.9	8
83 18.9	05	74	87.0	83 19.4	02	74	82.7	83 17.6	10	73	78.4	82 49.2	37	66	62.3	9
82 34.4	06	74	86.6	82 35.1	01	74	82.8	82 33.9	08	73	78.9	82 09.4	33	67	64.1	10
81 49.9	06	74	86.3	81 50.9	00	74	82.8	81 50.1	06	73	79.3	81 29.1	29	68	65.7	1
81 05.4	07	74	86.0	81 06.6	01	74	82.7	81 06.2	04	73	79.5	80 48.2	26	69	66.9	2
80 20.9	08	74	85.6	80 22.4	02	74	82.7	80 22.4	03	73	79.7	80 07.0	23	69	67.9	3
79 36.4	08	74	85.3	79 38.2	03	74	82.5	79 38.5	01	73	79.8	79 25.6	20	69	68.8	4
78 52.0	09	74	85.0	78 54.0	04	74	82.4	78 54.6	00	73	79.8	78 43.9	18	70	69.5	15
78 07.6	09	74	84.6	78 09.8	05	74	82.2	78 10.8	01	73	79.8	78 02.1	15	70	70.1	6
77 23.2	10	74	84.3	77 25.6	06	74	82.0	77 26.9	02	73	79.7	77 20.1	13	70	70.5	7
76 38.9	11	74	84.0	76 41.5	07	74	81.8	76 43.0	03	73	79.6	76 38.0	12	70	70.9	8
75 54.6	11	74	83.6	75 57.4	08	73	81.6	75 59.2	04	73	79.5	75 55.8	10	70	71.3	9
75 10.3	12	74	83.3	75 13.3	08	73	81.3	75 15.3	05	73	79.4	75 13.6	08	71	71.5	20
74 26.0	12	74	82.9	74 29.2	09	73	81.1	74 31.5	06	73	79.2	74 31.2	07	71	71.7	1
73 41.8	13	74	82.6	73 45.2	10	73	80.8	73 47.7	07	73	79.0	73 48.9	05	71	71.9	2
72 57.6	13	74	82.2	73 01.2	11	73	80.6	73 04.0	08	73	78.8	73 06.5	04	71	72.0	3
72 13.4	14	74	81.9	72 17.2	11	73	80.3	72 20.2	09	73	78.6	72 24.1	02	71	72.0	4
71 29.3	15	73	81.6	71 33.3	12	73	80.0	71 36.5	10	73	78.4	71 41.7	01	71	72.1	25
70 45.2	15	73	81.2	70 49.4	13	73	79.7	70 52.9	10	73	78.2	70 59.2	00	71	72.1	6
70 01.1	16	73	80.9	70 05.6	14	73	79.4	70 09.2	11	73	78.0	70 16.8	01	71	72.1	7
69 17.1	16	73	80.5	69 21.7	14	73	79.1	69 25.7	12	73	77.7	69 34.4	03	71	72.0	8
68 33.2	17	73	80.2	68 38.0	15	73	78.8	68 42.1	13	73	77.5	68 52.0	04	71	72.0	9
67 49.3	18	73	79.8	67 54.3	16	73	78.5	67 58.6	13	72	77.2	68 09.6	06	71	71.9	30
67 05.4	18	73	79.5	67 10.6	16	73	78.2	67 15.2	14	72	76.9	67 27.3	06	71	71.8	1
66 21.6	19	73	79.1	66 27.0	17	73	77.9	66 31.7	15	72	76.7	66 44.9	07	71	71.7	2
65 37.8	19	73	78.8	65 43.4	18	73	77.6	65 48.4	16	72	76.4	66 02.6	08	70	71.5	3
64 54.1	20	73	78.4	64 59.9	18	72	77.3	65 05.1	16	72	76.1	65 20.3	09	70	71.4	4
64 10.5	21	73	78.1	64 16.4	19	72	77.0	64 21.8	17	72	75.8	64 38.1	10	70	71.2	35
63 26.9	21	73	77.7	63 33.0	20	72	76.6	63 38.6	18	72	75.5	63 55.9	11	70	71.1	6
62 43.3	22	72	77.4	62 49.6	20	72	76.3	62 55.5	19	72	75.2	63 13.8	12	70	70.9	7
61 59.8	22	72	77.0	62 06.3	21	72	76.0	62 12.4	19	72	74.9	62 31.7	13	70	70.7	8
61 16.4	23	72	76.7	61 23.1	22	72	75.7	61 29.3	20	72	74.6	61 49.6	14	70	70.5	9
60 33.1	24	72	76.3	60 39.9	22	72	75.3	60 46.4	21	72	74.3	61 07.6	15	70	70.3	40
59 49.8	24	72	76.0	59 56.8	23	72	75.0	60 03.5	21	71	74.0	60 25.7	16	70	70.0	1
59 06.6	25	72	75.6	59 13.8	24	72	74.6	59 20.7	22	71	73.7	59 43.8	16	70	69.8	2
58 23.4	25	72	75.2	58 30.9	24	71	74.3	58 37.9	23	71	73.4	59 02.0	17	70	69.6	3
57 40.3	26	72	74.9	57 48.0	25	71	74.0	57 55.2	23	71	73.1	58 20.2	18	69	69.3	4
56 57.3	27	72	74.5	57 05.1	25	71	73.6	57 12.6	24	71	72.7	57 38.5	19	69	69.1	45
56 14.4	27	71	74.1	56 22.4	26	71	73.3	56 30.1	25	71	72.4	56 56.9	20	69	68.8	6
55 31.5	28	71	73.8	55 39.7	27	71	72.9	55 47.6	26	71	72.1	56 15.3	21	69	68.6	7
54 48.8	29	71	73.4	54 57.2	27	71	72.6	55 05.2	26	70	71.7	55 33.9	22	69	68.3	8
54 06.1	29	71	73.0	54 14.7	28	71	72.2	54 22.9	27	70	71.4	54 52.5	22	69	68.1	9
53 23.5	30	71	72.7	53 32.2	29	71	71.9	53 40.7	28	70	71.1	54 11.2	23	69	67.8	50
52 40.9	30	71	72.3	52 49.9	29	70	71.5	52 58.6	28	70	70.7	53 29.9	24	69	67.5	1
51 58.5	31	71	71.9	52 07.7	30	70	71.2	52 16.5	29	70	70.4	52 48.8	25	68	67.2	2
51 16.2	32	70	71.6	51 25.5	31	70	70.8	51 34.6	30	70	70.0	52 07.7	26	68	66.9	3
50 33.9	32	70	71.2	50 43.5	31	70	70.4	50 52.7	30	70	69.7	51 26.7	26	68	66.6	4
49 51.8	33	70	70.8	50 01.5	32	70	70.1	50 10.9	31	69	69.3	50 45.9	27	68	66.3	55
49 09.7	34	70	70.4	49 19.6	33	70	69.7	49 29.3	32	69	69.0	50 05.1	28	68	66.0	6
48 27.7	34	70	70.0	48 37.9	33	69	69.3	48 47.7	32	69	68.6	49 24.4	29	68	65.7	7
47 45.9	35	70	69.6	47 56.2	34	69	69.0	48 06.2	33	69	68.2	48 43.8	30	67	65.4	8
47 04.1	35	69	69.3	47 14.6	35	69	68.6	47 24.9	34	69	67.9	48 03.3	30	67	65.1	9
46 22.5	36	69	68.9	46 33.2	35	69	68.2	46 43.6	34	69	67.5	47 22.9	31	67	64.7	60
45 40.9	37	69	68.5	45 51.8	36	69	67.8	46 02.5	35	68	67.1	46 42.7	32	67	64.4	1
44 59.5	37	69	68.1	45 10.6	37	69	67.4	45 21.4	36	68	66.8	46 02.5	33	67	64.1	2
44 18.2	38	69	67.7	44 29.5	37	68	67.1	44 40.5	36	68	66.4	45 22.5	33	67	63.8	3
43 37.0	39	68	67.3	43 48.5	38	68	66.7	43 59.7	37	68	66.0	44 42.5	34	66	63.4	4
42 55.9	39	68	66.9	43 07.6	39	68	66.3	43 19.0	38	68	65.6	44 02.7	35	66	63.1	65
42 15.0	40	68	66.5	42 26.8	39	68	65.9	42 38.5	39	67	65.3	43 23.0	36	66	62.7	6
41 34.1	40	68	66.1	41 46.2	40	68	65.5	41 58.1	39	67	64.9	42 43.4	36	66	62.4	7
40 53.4	41	68	65.7	41 05.7	41	67	65.1	41 17.7	40	67	64.5	42 04.0	37	66	62.0	8
40 12.9	42	67	65.3	40 25.3	41	67	64.7	40 37.6	41	67	64.1	41 24.7	38	65	61.7	9
39 32.4	42	67	64.9	39 45.1	42	67	64.3	39 57.5	41	67	63.7	40 45.5	39	65	61.3	70
38 52.1	43	67	64.5	39 04.9	42	67	63.9	39 17.6	42	66	63.3	40 06.5	40	65	60.9	1
38 11.9	44	67	64.1	38 25.0	43	66	63.5	38 37.8	43	66	62.9	39 27.6	40	65	60.6	2
37 31.9	44	66	63.7	37 45.1	44	66	63.1	37 58.2	43	66	62.5	38 48.8	41	64	60.2	3
36 52.0	45	66	63.2	37 05.5	44	66	62.7	37 18.7	44	66	62.1	38 10.2	42	64	59.8	4
36 12.3	46	66	62.8	36 25.9	45	66	62.3	36 39.4	45	65	61.7	37 31.7	43	64	59.5	75
35 32.7	46	66	62.4	35 46.5	46	65	61.9	36 00.2	45	65	61.3	36 53.4	43	64	59.1	6
34 53.3	47	65	62.0	35 07.3	47	65	61.4	35 21.2	46	65	60.9	36 15.2	44	63	58.7	7
34 14.0	48	65	61.5	34 28.2	47	65	61.0	34 42.3	47	65	60.5	35 37.2	45	63	58.3	8
33 34.8	48	65	61.1	33 49.3	48	65	60.6	34 03.6	47	64	60.1	34 59.3	46	63	57.9	9
32 55.9	49	65	60.7	33 10.5	49	64	60.2	33 25.0	48	64	59.6	34 21.6	46	63	57.5	80
32 17.1	50	64	60.3	32 31.9	49	64	59.7	32 46.6	49	64	59.2	33 44.1	47	62	57.1	1
31 38.5	50	64	59.8	31 53.5	50	64	59.3	32 08.4	49	63	58.8	33 06.7	48	62	56.7	2
31 00.0	51	64	59.4	31 15.2	51	63	58.9	31 30.3	50	63	58.4	32 29.5	49	62	56.3	3
30 21.7	52	64	58.9	30 37.2	51	63	58.4	30 52.5	51	63	57.9	31 52.5	49	61	55.9	4
29 43.6	52	63	58.5	29 59.2	52	63	58.0	30 14.8	52	63	57.5	31 15.7	50	61	55.5	85
29 05.7	53	63	58.0	29 21.5	53	63	57.5	29 37.3	52	62	57.1	30 39.0	51	61	55.1	6
28 28.0	54	63	57.6	28 44.0	53	62	57.1	28 59.9	53	62	56.6	30 02.6	51	60	54.7	7
27 50.4	54	62	57.1	28 06.7	54	62	56.7	28 22.8	54	62	56.2	29 26.3	52	60	54.2	8
27 13.1	55	62	56.7	27 29.5	55	62	56.2	27 45.8	54	61	55.7	28 50.2	53	60	53.8	9
26 35.9	56	62	56.2	26 52.5	55	61	55.7	27 09.1	55	61	55.3	28 14.3	54	60	53.4	90

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DECLINATION CONTRARY NAME TO LATITUDE

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	°
00	12 00.0	1.0 01	180.0	11 00.0	1.0 01	180.0	9 30.0	1.0 01	180.0	8 00.0	1.0 01	180.0	6 00.0	1.0 00	180.0	5 30.0	1.0 00	180.0	5 00.0	1.0 00	180.0				00
1	11 59.7	1.0 02	179.2	10 59.7	1.0 02	179.2	9 29.7	1.0 02	179.2	7 59.7	1.0 02	179.2	5 59.7	1.0 01	179.3	5 29.7	1.0 01	179.3							1
2	11 58.7	1.0 03	178.3	10 58.7	1.0 03	178.4	9 28.8	1.0 03	178.4	7 58.8	1.0 03	178.5	5 58.8	1.0 02	178.5	5 28.8	1.0 02	178.5							2
3	11 57.1	1.0 04	177.5	10 57.2	1.0 04	177.6	9 27.2	1.0 04	177.6	7 57.3	1.0 04	177.7	5 57.4	1.0 03	177.8	5 27.4	1.0 03	177.8							3
4	11 54.9	1.0 05	176.7	10 54.9	1.0 05	176.7	9 25.1	1.0 05	176.8	7 55.2	1.0 05	176.9	5 55.3	1.0 04	177.0	5 25.4	1.0 04	177.0							4
05	11 52.0	1.0 06	175.9	10 52.1	1.0 06	175.9	9 22.3	1.0 06	176.0	7 52.5	1.0 06	176.1	5 52.7	1.0 05	176.3	5 22.8	1.0 05	176.3							05
6	11 48.4	1.0 07	175.0	10 48.6	1.0 07	175.1	9 18.9	1.0 07	175.2	7 49.2	1.0 07	175.4	5 49.5	1.0 06	175.5	5 19.6	1.0 06	175.6							6
7	11 44.3	1.0 08	174.2	10 44.5	1.0 08	174.3	9 14.9	1.0 08	174.5	7 45.3	1.0 07	174.6	5 45.8	1.0 07	174.8	5 15.9	1.0 07	174.8							7
8	11 39.5	99 09	173.4	10 39.8	99 09	173.5	9 10.3	99 09	173.7	7 40.8	99 08	173.8	5 41.4	99 08	174.0	5 11.6	99 08	174.1							8
9	11 34.0	99 10	172.6	10 34.4	99 10	172.7	9 05.1	99 10	172.9	7 35.7	99 09	173.1	5 36.5	99 09	173.3	5 06.7	99 09	173.4							9
10	11 27.9	99 11	171.8	10 28.5	99 11	171.9	8 59.2	99 11	172.1	7 30.0	99 10	172.3	5 31.0	99 10	172.6	5 01.3	99 10	172.6							10
1	11 21.2	99 12	170.9	10 21.9	99 12	171.1	8 52.8	99 12	171.3	7 23.7	99 11	171.5	5 24.9	99 11	171.8											1
2	11 13.9	99 13	170.1	10 14.6	99 13	170.3	8 45.7	99 13	170.5	7 16.9	99 12	170.8	5 18.3	99 12	171.1											2
3	11 05.9	99 14	169.3	10 06.8	99 14	169.5	8 38.1	99 14	169.7	7 09.4	99 13	170.0	5 11.1	99 13	170.3											3
4	10 57.4	98 15	168.5	9 58.4	98 15	168.7	8 29.9	98 15	169.0	7 01.4	98 14	169.2	5 03.3	98 14	169.6											4
15	10 48.2	98 16	167.7	9 49.3	98 16	167.9	8 21.0	98 16	168.2	6 52.7	98 15	168.5														15
6	10 38.3	98 17	166.9	9 39.7	98 17	167.1	8 11.6	98 17	167.4	6 43.6	98 16	167.7														6
7	10 27.9	98 18	166.1	9 29.4	98 18	166.3	8 01.6	98 18	166.6	6 33.8	98 17	167.0														7
8	10 16.9	97 19	165.3	9 18.5	97 19	165.5	7 51.0	97 19	165.9	6 23.5	97 18	166.2														8
9	10 05.3	97 20	164.5	9 07.1	97 20	164.7	7 39.8	97 20	165.1	6 12.5	97 19	165.5														9
20	9 53.0	97 21	163.7	8 55.1	97 21	163.9	7 28.1	97 21	164.3	6 01.1	97 20	164.7														20
1	9 40.2	96 22	162.9	8 42.4	96 22	163.2	7 15.8	96 22	163.6	5 49.1	96 21	164.0														1
2	9 26.8	96 23	162.1	8 29.2	96 23	162.4	7 02.9	96 22	162.8	5 36.5	96 22	163.2														2
3	9 12.8	96 24	161.3	8 15.5	96 24	161.6	6 49.4	96 23	162.1	5 23.3	96 23	162.5														3
4	8 58.3	95 25	160.5	8 01.1	95 25	160.8	6 35.4	95 24	161.3	5 09.7	95 24	161.8														4
25	8 43.1	95 26	159.8	7 46.2	95 26	160.1	6 20.8	95 25	160.6																	25
6	8 27.4	94 27	159.0	7 30.8	94 27	159.3	6 05.7	94 26	159.8																	6
7	8 11.1	94 28	158.2	7 14.7	94 28	158.6	5 50.1	94 27	159.1																	7
8	7 54.3	94 29	157.5	6 58.2	94 29	157.8	5 33.9	94 28	158.3																	8
9	7 37.0	93 30	156.7	6 41.0	93 29	157.1	5 17.2	93 29	157.6																	9
30	7 19.0	93 31	155.9	6 23.4	93 30	156.3																				30
1	7 00.6	92 32	155.2	6 05.2	92 31	155.6																				1
2	6 41.6	92 33	154.4	5 46.5	92 33	154.8																				2
3	6 22.1	91 33	153.7	5 27.3	91 33	154.1																				3
4	6 02.1	91 34	152.9	5 07.5	91 34	153.4																				4
35	5 41.5	90 35	152.2																							35
6	5 20.5	90 36	151.5																							6

DECLINATION SAME NAME AS LATITUDE

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	°
91	22 30.5	59 65	61.1	23 06.0	59 64	60.2	23 58.7	58 64	58.9	24 50.7	57 63	57.6	25 59.0	56 61	55.7	26 15.8	56 61	55.3	26 32.5	56 61	54.8	27 38.6	54 59	52.9	91
2	21 51.5	60 65	60.6	22 27.4	60 64	59.7	23 20.6	59 63	58.4	24 13.2	58 62	57.1	25 22.2	57 61	55.3	25 39.2	57 61	54.8	25 56.2	56 60	54.4	27 03.2	55 59	52.5	2
3	21 12.8	61 64	60.1	21 49.0	60 64	59.2	22 42.7	59 63	57.9	23 35.9	59 62	56.6	24 45.7	58 61	54.8	25 02.9	57 60	54.4	25 20.1	57 60	53.9	26 27.9	56 58	52.1	3
4	20 34.3	61 64	59.5	21 10.8	61 63	58.7	22 05.1	60 62	57.4	22 58.8	59 62	56.1	24 09.3	58 60	54.3	24 26.8	58 60	53.9	24 44.1	58 60	53.4	25 52.8	57 58	51.6	4
95	19 55.9	62 64	59.0	20 32.8	61 63	58.2	21 27.6	61 62	56.9	22 21.9	60 61	55.6	23 33.2	59 60	53.9	23 50.9	59 59	53.4	24 08.4	58 59	53.0	25 18.0	57 58	51.2	95
6	19 17.8	62 63	58.5	19 55.0	62 63	57.6	20 50.4	61 62	56.4	21 45.2	61 61	55.1	22 57.3	60 59	53.4	23 15.2	59 59	52.9	23 32.9	59 59	52.5	24 43.3	58 57	50.7	6
7	18 39.9	63 63	57.9	19 17.4	62 62	57.1	20 13.3	62 61	55.9	21 08.7	61 60	54.6	22 21.6	60 59	52.9	22 39.7	60 59	52.5	22 57.7	60 58	52.0	24 08.9	59 57	50.3	7
8	18 02.2	63 62	57.4	18 40.1	63 62	56.6	19 36.5	62 61	55.4	20 32.5	62 60	54.1	21 46.2	61 59	52.4	22 04.4	61 58	52.0	22 22.6	61 58	51.6	23 34.7	60 57	49.8	8
9	17 24.8	64 62	56.9	18 03.0	64 61	56.1	19 00.0	63 61	54.8	19 56.5	62 60	53.6	21 11.0	62 58	51.9	21 29.4	61 58	51.5	21 47.8	61 58	51.1	23 00.8	60 56	49.4	9
100	16 47.5	64 62	56.3	17 26.1	64 61	55.5	18 23.6	64 60	54.3	19 20.7	63 59	53.1	20 36.0	62 58	51.4	20 54.7	62 58	51.0	21 13.3	62 57	50.6	22 27.1	61 56	48.9	100
1	16 10.6	65 61	55.8	16 49.5	65 61	55.0	17 47.6	64 60	53.8	18 45.2	64 59	52.6	20 01.2	63 57	50.9	20 20.1	63 57	50.5	20 38.9	63 57	50.1	21 53.6	62 55	48.4	1
2	15 33.8	66 61	55.2	16 13.1	65 60	54.4	17 11.7	65 59	53.3	18 09.9	64 58	52.1	19 26.7	64 57	50.4	19 45.8	64 57	50.0	20 04.8	63 56	49.6	21 20.4	63 55	48.0	2
3	14 57.3	66 60	54.7	15 36.9	66 60	53.9	16 36.1	65 59	52.7	17 34.8	65 58	51.5	18 52.5	64 57	49.9	19 11.8	64 56	49.5	19 31.0	64 56	49.1	20 47.4	63 55	47.5	3
4	14 21.0	67 60	54.1	15 01.0	67 59	53.4	16 00.7	66 58	52.2	17 00.1	66 58	51.0	18 18.5	65 56	49.4	18 38.0	65 56	49.0	18 57.4	65 56	48.6	20 14.6	64 54	47.0	4
105	13 45.0	67 60	53.6	14 25.4	67 59	52.8	15 25.6	67 58	51.6	16 25.5	66 57	50.5	17 44.8	66 56	48.9	18 04.5	66 55	48.5	18 24.1	65 55	48.1	19 42.2	65 54	46.5	105
6	13 09.3	68 59	53.0	13 50.0	68 59	52.2	14 50.8	67 58	51.1	15 51.3	67 57	50.0	17 11.3	66 55	48.4	17 31.2	66 55	48.0	17 51.0	66 55	47.6	19 10.0	65 53	46.0	6
7	12 33.8	69 59	52.4	13 14.9	68 58	51.7	14 16.2	68 57	50.6	15 17.3	68 56	49.4	16 38.1	67 55	47.9	16 58.2	67 55	47.5	17 18.2	67 54	47.1	18 38.0	66 53	45.5	7
8	11 58.6	69 58	51.9	12 40.0	69 58	51.1	13 41.9	69 57	50.0	14 43.5	68 56	48.9	16 05.1	68 54	47.4	16 25.5	68 54	47.0	16 45.7	67 54	46.6	18 06.3	67 52	45.0	8
9	11 23.7	70 58	51.3	12 05.5	70 57	50.6	13 07.9	69 56	49.4	14 10.1	69 55	48.3	15 32.5	68 54	46.8	15 53.0	68 54	46.5	16 13.5	68 53	46.1	17 34.9	68 52	44.5	9
110	10 49.0	70 57	50.7	11 31.2	70 57	50.0	12 34.2	70 56	48.9	13 36.9	70 55	47.8	15 00.1	69 53	46.3	15 20.8	69 53	45.9	15 41.5	69 53	45.5	17 03.8	68 51	44.0	110
1	10 14.7	71 57	50.1	10 57.2	71 56	49.4	12 00.7	70 55	48.3	13 04.0	70 54	47.2	14 28.0	70 53	45.8	14 48.9	70 53	45.4	15 09.8	70 52	45.0	16 32.9	69 51	43.5	1
2	9 40.6	72 56	49.5	10 23.5	71 56	48.8	11 27.6	71 55	47.8	12 31.5	71 54	46.7	13 56.2	70 52	45.2	14 17.3	70 52	44.9	14 38.4	70 52	44.5	16 02.4	70 50	43.0	2
3	9 06.8	72 56	49.0	9 50.0	72 55	48.3	10 54.7	72 54	47.2	11 59.2	71 53	46.1	13 24.7	71 52	44.7	13 46.0	71 52	44.3	14 07.3	71 51	44.0	15 32.1	70 50	42.5	3
4	8 33.3	73 55	48.4	9 16.9	73 55	47.7	10 22.1	72 54	46.6	11 27.2	72 53	45.6	12 53.5	72 51	44.1	13 15.0	72 51	43.8	13 36.5	72 51	43.4	15 02.1	71 49	42.0	4
115	8 00.2	73 55	47.8	8 44.1	73 54	47.1	9 49.9	73 53	46.0	10 55.5	73 52	45.0	12 22.6	72 51	43.6	12 44.3	72 51	43.2	13 06.0	72 50	42.9	14 32.4	72 49	41.5	115
6	7 27.3	74 54	47.2	8 11.6	74 54	46.5	9 18.0	74 53	45.5	10 24.1	73 52	44.4	11 52.0	73 50	43.0	12 13.9	73 50	42.7	12 35.8	73 50	42.3	14 03.1	73 48	40.9	6
7	6 54.8	75 54	46.6	7 39.4	74 53	45.9	8 46.3	74 52	44.9	9 53.1	74 51	43.9	11 21.7	74 50	42.5	11 43.9	74 50	42.1	12 05.9	74 49	41.8	13 34.0	73 48	40.4	7
8	6 22.6	75 53	46.0	7 07.6	75 53	45.3	8 15.0	75 52	44.3	9 22.3	75 51	43.3	10 51.8	74 49	41.9	11 14.1	74 49	41.6	11 36.4	74 49	41.2	13 05.3	74 47	39.9	8
9	5 50.7	76 53	45.3	6 36.1	76 52	44.7	7 44.1	75 51	43.7	8 51.9	75 50	42.7	10 22.2	75 49	41.4	10 44.7	75 49	41.0	11 07.2	75 48	40.7	12 36.9	75 47	39.3	9
120	5 19.1	76 52	44.7	6 04.9	76 51	44.1	7 13.4	76 50	43.1	8 21.9	76 50	42.1	9 52.9	76 48	40.8	10 15.6	76 48	40.5	10 38.3	76 48	40.1	12 08.8	75 46	38.8	120
1				5 34.0	77 51	43.5	6 43.1	77 50	42.5	7 52.1	77 49	41.5	9 23.9	76 48	40.2	9 46.8	76 47	39.9	10 09.7	76 47	39.6	11 41.0	76 46	38.2	1
2				5 03.6	77 50	42.8	6 13.2	77 49	41.9	7 22.8	77 48	40.9	8 55.3	77 47	39.6	9 18.4	77 47	39.3	9 41.5	77 46	39.0	11 13.6	77 45	37.7	2
3							5 43.6	78 49	41.3	6 53.7	78 48	40.3	8 27.0	78 47	39.1	8 50.3	78 46	38.7	9 13.6	78 46	38.4	10 46.5	77 45	37.1	3
4							5 14.4	79 48	40.7	6 25.0	78 47	39.7	7 59.1	78 46	38.5	8 22.6	78 46	38.2	8 46.0	78 45	37.8	10 19.7	78 44	36.6	4
125										5 56.7	79 47	39.1	7 31.5	79 45	37.9	7 55.2	79 45	37.6	8 18.9	79 45	37.3	9 53.3	79 43	36.0	125
6										5 28.8	80 46	38.5	7 04.3	80 45	37.3	7 28.2	80 44	37.0	7 52.1	79 44	36.7	9 27.3	79 43	35.4	6
7										5 01.2	80 46	37.9	6 37.5	80 44	36.7	7 01.6	80 44	36.4	7 25.6	80 43	36.1	9 01.6	80 42	34.9	7
8													6 11.1	81 43	36.1	6 35.3	81 43	35.8	6 59.5	81 43	35.5	8 36.3	81 42	34.3	8
9													5 45.0	81 43	35.5	6 09.4	81 42	35.2	6 33.8	81 42	34.9	8 11.4	81 41	33.7	9
130													5 19.3	82 42	34.9	5 43.9	82 42	34.6	6 08.5	82 42	34.3	7 46.8	82 40	33.1	130
1																5 18.8	83 41	34.0	5 43.6	83 41	33.7	7 22.6	82 40	32.6	1
2																			5 19.0	83 40	33.1	6 58.8	83 39	32.0	2
3																						6 35.4	84 38	31.4	3
4																						6 12.4	84 38	30.8	4
135																						5 49.8	85 37	30.2	135
6																						5 27.6	86 36	29.6	6
7																						5 05.8	86 36	29.0	7

Lat. 42°

Lat. 43°

Lat. 44°

Lat. 45°

Lat. 46°

Lat 47°

La 48

Digitized by Google

Lat. 42°

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	°
00	86 00.0	1.0 00	00.0	85 00.0	1.0 00	00.0	83 30.0	1.0 01	00.0	82 30.0	1.0 03	00.0	81 30.0	1.0 03	00.0	80 30.0	1.0 02	00.0	79 30.0	1.0 02	00.0	78 00.0	1.0 02	00.0	00
1	85 56.2	98 19	09.8	84 57.0	99 15	07.8	83 27.7	99 11	05.8	82 28.1	1.0 10	05.0	81 28.3	1.0 08	04.3	80 28.5	1.0 07	03.8	79 28.7	1.0 06	03.3	77 58.9	1.0 05	02.8	1
2	85 45.0	94 20	19.1	84 48.1	96 24	15.2	83 21.0	97 18	11.5	82 22.3	98 16	09.8	81 23.3	98 14	08.5	80 24.2	99 12	07.5	79 24.8	99 11	06.6	77 55.6	99 09	05.6	2
3	85 27.4	87 38	27.3	84 33.8	91 32	22.1	83 10.0	95 25	16.9	82 12.9	96 21	14.5	81 15.2	97 19	12.6	80 16.9	97 17	11.1	79 18.4	98 15	09.9	77 50.2	98 13	08.4	3
4	85 04.4	80 45	34.4	84 14.7	86 38	28.3	82 55.1	91 31	22.0	82 00.0	93 27	19.0	81 03.9	94 24	16.6	80 07.0	95 21	14.7	79 09.5	96 19	13.0	77 42.6	97 16	11.1	4
05	84 37.4	72 50	40.2	83 51.7	80 44	33.8	82 36.7	86 36	26.7	81 44.0	89 32	23.2	80 49.7	91 28	20.4	79 54.4	93 25	18.0	78 58.3	94 22	16.1	77 33.0	95 19	13.7	05
6	84 07.1	65 55	45.1	83 25.4	73 48	38.5	82 15.2	82 40	30.9	81 25.0	85 36	27.1	80 32.9	88 32	23.9	79 39.4	90 29	21.3	78 44.8	92 26	19.0	77 21.4	93 22	16.3	6
7	83 34.4	59 58	49.1	82 56.4	68 52	42.5	81 51.0	77 44	34.7	81 03.5	81 40	30.6	80 13.7	85 36	27.2	79 22.2	87 32	24.3	78 29.3	89 29	21.8	77 08.0	91 25	18.8	7
8	82 59.8	53 60	52.5	82 25.2	62 55	46.0	81 24.5	72 47	38.1	80 39.7	77 43	33.9	79 52.3	81 39	30.2	79 02.8	84 35	27.1	78 11.7	86 32	24.5	76 52.8	89 28	21.1	8
9	82 23.8	48 62	55.2	81 52.3	57 57	49.0	80 56.1	67 50	41.1	80 13.9	73 46	36.8	79 28.9	77 42	33.0	78 41.6	81 38	29.8	77 52.4	83 35	27.0	76 35.9	87 31	23.4	9
10	81 46.7	43 63	57.5	81 18.0	52 59	51.5	80 26.0	63 53	43.8	79 46.4	69 48	39.4	79 03.7	73 44	35.6	78 18.6	77 41	32.2	77 31.4	80 38	29.3	76 17.5	84 33	25.5	10
1	81 08.7	39 65	59.4	80 42.6	48 61	53.7	79 54.4	59 55	46.2	79 17.3	65 51	41.8	78 37.0	70 47	37.9	77 54.0	74 43	34.5	77 08.8	77 40	31.5	75 57.5	81 35	27.5	1
2	80 29.9	35 65	61.0	80 06.2	44 62	55.6	79 21.7	55 56	48.3	78 47.0	61 52	44.0	78 09.0	66 49	40.1	77 28.1	70 45	36.6	76 44.8	74 42	33.5	75 36.3	78 38	29.4	2
3	79 50.7	32 66	62.4	79 29.1	40 63	57.2	78 47.9	51 58	50.1	78 15.5	57 54	45.9	77 39.7	62 51	42.0	77 00.9	67 47	38.6	76 19.6	71 44	35.4	75 13.7	76 39	31.2	3
4	79 10.9	29 67	63.6	78 51.3	37 64	58.6	78 13.3	47 59	51.7	77 43.0	53 56	47.6	77 09.3	59 52	43.8	76 32.6	63 49	40.3	75 53.2	68 46	37.2	74 50.0	73 41	32.9	4
15	78 30.8	26 67	64.5	78 13.0	34 65	59.8	77 37.9	44 60	53.2	77 09.7	50 57	49.2	76 38.0	55 54	45.4	76 03.2	60 50	42.0	75 25.8	64 47	38.8	74 25.3	70 43	34.5	15
6	77 50.4	23 68	65.4	77 34.2	31 65	60.9	77 01.9	41 61	54.5	76 35.6	47 58	50.5	76 05.8	52 55	46.9	75 33.0	57 52	43.4	74 57.4	61 49	40.3	73 59.6	67 44	36.0	6
7	77 09.8	21 68	66.1	76 55.1	28 66	61.8	76 25.4	38 62	55.6	76 00.9	44 59	51.8	75 32.9	49 56	48.2	75 01.9	54 53	44.8	74 28.2	58 50	41.7	73 32.9	64 46	37.4	7
8	76 28.9	19 68	66.7	76 15.7	25 66	62.5	75 48.4	35 62	56.6	75 25.6	41 60	52.9	74 59.4	46 57	49.4	74 30.2	51 54	46.1	73 58.2	56 51	42.9	73 05.5	61 47	38.6	8
9	75 47.9	17 69	67.2	75 36.0	23 67	63.2	75 10.9	32 63	57.5	74 49.8	38 60	53.9	74 25.3	43 58	50.5	73 57.8	48 55	47.2	73 27.4	53 52	44.1	72 37.3	59 48	39.8	9
20	75 06.7	15 69	67.6	74 56.1	21 67	63.8	74 33.2	30 63	58.3	74 13.5	35 61	54.8	73 50.7	41 58	51.4	73 24.8	46 56	48.2	72 56.1	50 53	45.2	72 08.4	56 49	41.0	20
1	74 25.4	13 69	68.0	74 16.0	19 67	64.3	73 55.1	28 64	59.0	73 36.9	33 62	55.6	73 15.6	38 59	52.3	72 51.3	43 57	49.2	72 24.2	47 54	46.2	71 38.8	53 50	42.0	1
2	73 44.1	11 69	68.3	73 35.7	17 67	64.8	73 16.7	25 64	59.6	73 00.0	31 62	56.3	72 40.1	36 60	53.1	72 17.3	40 57	50.0	71 51.8	45 55	47.1	71 08.7	51 51	42.9	2
3	73 02.6	09 69	68.5	72 55.3	15 68	65.1	72 38.1	23 65	60.2	72 22.7	28 63	57.0	72 04.3	33 60	53.8	71 42.9	38 58	50.8	71 18.9	42 56	47.9	70 38.1	48 52	43.8	3
4	72 21.1	08 69	68.7	72 14.8	13 68	65.5	71 59.4	21 65	60.7	71 45.2	26 63	57.5	71 28.1	31 61	54.5	71 08.2	35 58	51.5	70 45.6	40 56	48.7	70 07.0	46 53	44.7	4
25	71 39.5	06 69	68.9	71 34.2	11 68	65.7	71 20.4	19 65	61.1	71 07.5	24 63	58.0	70 51.7	29 61	55.1	70 33.1	33 59	52.2	70 11.9	37 57	49.4	69 35.4	43 53	45.4	25
6	70 57.9	05 69	69.0	70 53.5	10 68	66.0	70 41.3	17 65	61.4	70 29.6	22 64	58.5	70 15.0	27 62	55.6	69 57.7	31 59	52.8	69 37.9	35 57	50.1	69 03.5	41 54	46.1	6
7	70 16.2	03 69	69.1	70 12.7	08 68	66.1	70 02.1	15 66	61.8	69 51.5	20 64	58.9	69 38.1	25 62	56.1	69 22.1	29 60	53.3	69 03.5	33 58	50.6	68 31.1	39 54	46.8	7
8	69 34.6	02 69	69.2	69 31.9	07 68	66.3	69 22.8	14 66	62.0	69 13.2	18 64	59.2	69 01.0	23 62	56.5	68 46.2	27 60	53.8	68 28.9	31 58	51.2	67 58.5	37 55	47.4	8
9	68 52.9	01 69	69.2	68 51.1	05 68	66.4	68 43.3	12 66	62.3	68 34.8	16 64	59.6	68 23.7	21 62	56.9	68 10.1	25 60	54.2	67 54.0	29 58	51.7	67 25.5	35 55	47.9	9
30	68 11.2	00 69	69.2	68 10.2	04 68	66.5	68 03.8	10 66	62.5	67 56.3	15 64	59.8	67 46.3	19 63	57.2	67 33.8	23 61	54.6	67 19.0	27 59	52.1	66 52.3	32 56	48.4	30
1	67 29.5	02 69	69.2	67 29.3	03 68	66.6	67 24.2	09 66	62.6	67 17.7	13 64	60.1	67 08.8	17 63	57.5	66 57.4	21 61	55.0	66 43.7	25 59	52.5	66 18.8	30 56	48.9	1
2	66 47.9	03 69	69.1	66 48.4	01 68	66.6	66 44.6	07 66	62.8	66 39.1	11 65	60.3	66 31.1	15 63	57.8	66 20.8	19 61	55.3	66 08.2	23 59	52.9	65 45.1	28 57	49.3	2
3	66 06.2	04 69	69.1	66 07.5	00 68	66.6	66 04.9	06 66	62.9	66 00.3	10 65	60.4	65 53.3	14 63	58.0	65 44.1	17 61	55.6	65 32.6	21 60	53.2	65 11.2	26 57	49.7	3
4	65 24.6	05 69	69.0	65 26.6	01 68	66.6	65 25.2	04 66	63.0	65 21.5	08 65	60.6	65 15.5	12 63	58.2	65 07.2	16 62	55.8	64 56.8	19 60	53.5	64 37.1	25 57	50.1	4
35	64 43.0	06 69	68.9	64 45.7	03 68	66.6	64 45.5	03 66	63.0	64 42.6	07 65	60.7	64 37.6	10 63	58.4	64 30.3	14 62	56.1	64 20.9	17 60	53.8	64 02.8	23 57	50.4	35
6	64 01.4	07 69	68.8	64 04.8	04 68	66.5	64 05.8	02 66	63.1	64 03.7	05 65	60.8	63 59.6	09 63	58.5	63 53.3	12 62	56.2	63 44.9	16 60	54.0	63 28.4	21 58	50.7	6
7	63 19.9	08 69	68.7	63 23.9	05 68	66.4	63 26.0	00 66	63.1	63 24.8	04 65	60.8	63 21.5	07 63	58.6	63 16.2	11 62	56.4	63 08.7	14 60	54.2	62 53.8	19 58	50.9	7
8	62 38.3	09 69	68.5	62 43.0	06 68	66.3	62 46.2	01 66	63.1	62 45.9	02 65	60.9	62 43.4	06 64	58.7	62 39.0	09 62	56.5	62 32.5	12 60	54.4	62 19.1	17 58	51.2	8
9	61 56.9	11 69	68.4	62 02.2	07 68	66.2	62 06.5	02 66	63.1	62 06.9	01 65	60.9	62 05.3	04 64	58.8	62 01.8	08 62	56.6	61 56.3	11 61	54.5	61 44.4	16 58	51.4	9
40	61 15.4	11 69	68.2	61 21.4	08 68	66.1	61 26.8	04 66	63.0	61 27.9	00 65	60.9	61 27.2	03 64	58.8	61 24.5	06 62	56.7	61 19.9	09 61	54.7	61 09.5	14 58	51.6	40
1	60 34.1	12 69	68.0	60 40.6	09 68	66.0	60 47.0	05 66	63.0	60 49.0	02 65	60.9	60 49.0	01 64	58.9	60 47.2	05 62	56.8	60 43.5	08 61	54.8	60 34.5	12 58	51.7	1
2	59 52.7	13 69	67.9	59 59.9	10 68	65.9	60 07.3	06 66	62.9	60 10.0	03 65	60.9	60 10.9	00 64	58.9	60 09.9	03 62	56.9	60 07.1	06 61	54.8	59 59.5	11 58	51.9	2
3	59 11.5	14 69	67.7	59 19.3	12 68	65.7	59 27.7	07 66	62.8	59 31.1	04 65	60.8	59 32.7	01 64	58.9	59 32.5	02 62	56.9	59 30.6	05 61	54.9	59 24.4	09 59	52.0	3
4	58 30.3	15 69	67.5	58 38.6	13 68	65.6	58 48.0	08 66	62.7	58 52.1	05 65	60.8	58 54.5	03 64	58.8	58 55.2	00 62	56.9	58 54.1	03 61	55.0	58 49.2	08 59	52.1	4
45	57 49.1	16 68	67.3	57 58.1	14 68	65.4	58 08.4	09 66	62.6	58 13.3	07 65	60.7	58 16.4	04 64	58.8	58 17.8	01 62	56.9	58 17.6	02 61	55.0	58 14.1	06 59	52.1	45
6	57 08.0	17 68	67.0	57 17.6	15 67	65.2	57 28.9	11 66	62.5	57 34.4	08 65	60.6	57 38.3	05 64	58.7	57 40.5	02 62	56.9	57 41.1	00 61	55.0	57 38.8	05 59	52.2	6
7	56 27.0	18 68	66.8	56 37.1	16 67	65.0	56 49.4	12 66	62.3	56 55.6	09 65	60.5	57 00.2	06 63	58.7	57 03.2	04 62	56.8	57 04.6	01 61	55.0	57 03.6	03 59	52.2	7
8	55 46.0	19 68	66.6	55 56.7	17 67	64.8	56 09.9	13 66	62.2	56 16.8	10 65	60.4	56 22.1	08 63	58.6	56 25.9	05 62	56.8	56 28.0	02 61	55.0	56 28.3	02 59	52.3	8
9	55 05.2	20 68	66.3	55 16.4	18 67	64.6	55 30.5	14 66	62.0	55 38.0	11 64	60.3	55 44.1	09 63	58.5	55 48.6	06 62	56.7	55 51.5	04 61	54.9	55 53.1	00 59	52.3	9
50	54 24.3	21 68	66.1	54 36.1	18 67	64.4	54 51.1	15 65	61.9	54 59.3	12 64	60.1	55 06.1	10 63	58.4	55 11.3	07 62	56.7	55 15.0	05 61	54.9	55 17.8	01 59	52.3	50
1	53 43.6	22 68	65.9	53 56.0	19 67	64.2	54 11.9	16 65	61.7	54 20.7	14 64	60.0	54 28.1	11 63	58.3	54 34.1	09 62	56.6	54 38.6	06 61	54.8	54 42.6	03 59	52.2	1
2	53 03.0	23 68	65.6	53 15.9	20 67	64.0	53 32.6	17 65	61.5	53 42.1	15 64	59.8	53 50.2	12 63	58.1	53 56.9	10 62	56.5	54 02.1	08 61	54.8	54 07.3	04 59	52.2	2
3	52 22.4	23 67	65.3	52 35.8	21 67	63.7	52 53.5	18 65	61.3	53 03.6	16 64	59.7	53 12.4	13 63	58.0	53 19.7	11 62	56.4	53 25.7	09 61	54.7	53 32.1	05 59	52.2	3
4	51 41.9	24 67	65.1	51 55.9	22 66	63.5	52 14.4	19 65	61.1	52 25.2	17 64	59.5	52 34.6	15 63	57.9	52 42.6	12 62	56.2	52 49.4	10 61	54.6	52 56.9	07 59	52.1	4
55	51 01.6	25 67	64.8	51 16.0	23 66	63.2	51 35.4	20 65	60.9	51 46.8	18 64	59.3	51 56.8	16 63	57.7	52 05.6	14 62	56.1	52 13.0	11 60	54.5	52 21.7	08 59	52.0	55
6	50 21.3	26 67	64.5	50 36.3	24 66	63.0	50 56.5	21 65	60.7	51 08.5	19 64	59.1	51 19.2	17 63	57.5	51 28.6	15 62	56.0	51 36.8	13 60	54.4	51 46.6	09 58	52.0	6
7	49 41.1	27 67	64.2	49 56.6	25 66	62.7	50 17.7	22 65	60.4	50 30.3	20 64	58.9	50 41.6	18 62	57.4	50 51.7	16 61	55.8	51 00.6	14 60	54.2	51 11.5	11 58	51.9	7
8	49 01.0	28 67	63.9	49 17.0	26 66	62.5	49 38.9	23 64	60.2	49 52.1	21 63	58.7	50 04.1	19 62	57.2	50 14.9	17 61	55.6	50 24.4	15 60	54.1	50 36.4	12 58	51.8	8
9	48 21.0	29 66	63.6	48 37.5	27 66	62.2	49 00.3	24 64	60.0	49 14.1	22 63	58.5	49 26.7	20 62	57.0	49 38.1	18 61	55.5	49 48.3	16 60	54.0	50 01.4	13 58	51.6	9
60	47 41.1	29 66	63.3	47 58.1	28 65	61.9	48 21.7	25 64	59.7	48 36.1	23 63	58.3	48 49.3	21 62	56.8	49 01.4	19 61	55.3	49 12.3	17 60	53.8	49 26.5	14 58	51.5	60
1	47 01.3	30 66	63.0	47 18.9	28 65	61.6	47 43.3	26 64	59.5	47 58.2	24 63	58.0	48 12.1	22 62	56.6	48 24.8	20 61	55.1	48 36.4	18 60	53.6	48 51.6	15 58	51.4	1
2	46 21.6	31 66	62.7	46 39.7	29 65	61.3	47 04.9	27 64	59.2	47 20.4	25 63	57.8	47 34.9	23 62	56.4	47 48.2	21 61	54.9	48 00.5	20 60	53.5	48 16.8	17 58	51.2	2
3	45 42.0	32 66	62.4	46 00.6	30 65	61.0	46 26.7	28 64	59.0	46 42.7	26 63	57.6	46 57.8	24 62	56.1	47 11.8	22 61	54.7	47 24.7	21 60	53.3	47 42.1	18 58	51.1	3
4	45 02.6	33 66	62.1	45 21.7	31 65	60.7	45 48.5	29 63	58.7	46 05.2	27 62	57.3	46 20.8	25 61	55.9	46 35.5	24 60	54.5	46 49.0	22 59	53.1	47 07.4	19 58	50.9	4
65	44 23.2	33 65	61.8	44 42.8	32 65	60.4	45 10.5	30 63	58.4	45 27.7	28 62	57.1	45 43.9	26 61	55.7	45 59.2	25 60	54.3	46 13.4	23 59	52.9	46 32.8	20 58	50.8	65
6	43 44.0	34 65	61.4	44 04.1	33 64	60.1	44 32.5	30 63	58.1	44 50.3	29 62	56.8	45 07.2	27 61	55.4	45 23.0	26 60	54.1	45 37.9	24 59	52.7	45 58.3	21 57	50.6	6
7	43 04.9	35 65	61.1	43 25.5	34 64	59.8	43 54.7	31 63	57.9	44 13.1	30 62	56.5	44 30.5	28 61	55.2	44 47.0	27 60	53.8	45 02.5	25 59	52.5	45 23.9	23 57	50.4	7
8	42 25.9	36 65	60.8	42 47.0	34 64	59.5	43 17.0	32 63	57.6	43 35.9	31 62	56.3	43 54.0	29 61	54.9	44 11.0	28 60	53.6	44 27.2	26 59	52.3	44 49.6	24 57	50.2	8
9	41 47.1	37 65	60.4	42 08.7	35 64	59.2	42 39.5	33 62	57.3	42 58.9	32 62	56.0	43 17.5	30 61	54.7	43 35.2	29 60	53.4	43 52.0	27 58	52.0	44 15.4	25 57	50.0	9
70	41 08.4	37 64	60.1	41 30.4	36 63	58.8	42 02.0	34 62	57.0	42 22.0	33 61	55.7	42 41.2	31 60	54.4	42 59.5	30 59	53.1	43 16.9	28 58	51.8	43 41.3	26 57	49.8	70
1	40 29.8	38 64	59.7	40 52.3	37 63	58.5	41 24.7	35 62	56.7	41 45.3	34 61	55.4	42 05.0	32 60	54.1	42 23.9	31 59	52.8	42 41.9	29 58	51.6	43 07.3	27 56	49.6	1
2	39 51.3	39 64	59.4	40 14.4	38 63	58.2	40 47.5	36 62	56.3	41 08.6	35 61	55.1	41 28.9	33 60	53.9	41 48.4	32 59	52.6	42 07.1	30 58	51.3	42 33.4	28 56	49.4	2
3	39 13.0	40 64	59.0	39 36.6	39 63	57.8	40 10.5	37 62	56.0	40 32.1	35 61	54.8	40 53.0	34 60	53.6	41 13.1	33 59	52.3	41 32.3	31 58	51.1	41 59.6	29 56	49.1	3
4	38 34.9	41 63	58.7	38 58.9	39 63	57.5	39 33.6	38 61	55.7	39 55.8	36 60	54.5	40 17.2	35 59	53.3	40 37.8	34 58	52.0	40 57.7	32 57	50.8	41 26.0	30 56	48.9	4
75	37 56.9	41 63	58.3	38 21.4	40 62	57.1	38 56.8	38 61	55.4	39 19.5	37 60	54.2	39 41.5	36 59	53.0	40 02.8	35 58	51.8	40 23.2	33 57	50.5	40 52.4	31 56	48.7	75
6	37 19.0	42 63	57.9	37 44.0	41 62	56.8	38 20.2	39 61	55.1	38 43.4	38 60	53.9	39 06.0	37 59	52.7	39 27.8	36 58	51.5	39 48.9	34 57	50.3	40 19.0	33 55	48.4	6
7	36 41.3	43 63	57.6	37 06.7	42 62	56.4	37 43.7	40 61	54.7	38 07.5	39 60	53.6	38 30.6	38 59	52.4	38 53.0	37 58	51.2	39 14.6	35 57	50.0	39 45.7	34 55	48.2	7
8	36 03.7	44 62	57.2	36 29.7	43 62	56.1	37 07.4	41 60	54.4	37 31.7	40 59	53.2	37 55.4	39 58	52.1	38 18.3	38 58	50.9	38 40.6	36 57	49.7	39 12.6	35 55	47.9	8
9	35 26.3	45 62	56.8	35 52.7	44 61	55.7	36 31.2	42 60	54.0	36 56.1	41 59	52.9	37 20.3	40 58	51.8	37 43.8	39 57	50.6	38 06.6	37 56	49.4	38 39.5	36 55	47.6	9
80	34 49.1	45 62	56.4	35 16.0	44 61	55.3	35 55.2	43 60	53.7	36 20.6	42 59	52.6	36 45.3	41 58	51.4	37 09.4	40 57	50.3	37 32.8	38 56	49.1	38 06.7	37 55	47.4	80
1	34 12.0	46 62	56.1	34 39.4	45 61	55.0	35 19.4	44 59	53.3	35 45.3	43 59	52.2	36 10.5	42 58	51.1	36 35.2	41 57	50.0	36 59.2	39 56	48.8	37 33.9	38 54	47.1	1
2	33 35.1	47 61	55.7	34 03.0	46 60	54.6	34 43.7	45 59	53.0	35 10.1	44 58	51.9	35 35.9	43 57	50.8	36 01.1	41 56	49.7	36 25.7	40 56	48.5	37 01.4	39 54	46.8	2
3	32 58.4	48 61	55.3	33 26.7	47 60	54.2	34 08.2	45 59	52.6	34 35.1	44 58	51.5	35 01.5	43 57	50.4	35 27.2	42 56	49.3	35 52.4	41 55	48.2	36 28.9	40 54	46.5	3
4	32 21.8	48 61	54.9	32 50.6	48 60	53.8	33 32.8	46 59	52.2	34 00.3	45 58	51.2	34 27.2	44 57	50.1	34 53.5	43 56	49.0	35 19.2	42 55	47.9	35 56.7	41 54	46.2	4
85	31 45.4	49 60	54.5	32 14.7	48 60	53.4	32 57.7	47 58	51.9	33 25.6	46 57	50.8	33 53.1	45 57	49.8	34 19.9	44 56	48.7	34 46.2	43 55	47.6	35 24.5	42 53	45.9	85
6	31 09.3	50 60	54.1	31 39.0	49 59	53.1	32 22.7	48 58	51.5	32 51.1	47 57	50.5	33 19.1	46 56	49.4	33 46.5	45 55	48.3	34 13.4	44 54	47.3	34 52.6	43 53	45.6	6
7	30 33.2	51 60	53.7	31 03.4	50 59	52.7	31 47.9	49 58	51.1	32 16.9	48 57	50.1	32 45.3	47 56	49.1	33 13.3	46 55	48.0	33 40.7	45 54	46.9	34 20.8	44 53	45.3	7
8	29 57.4	52 59	53.3	30 28.1	51 59	52.3	31 13.2	50 57	50.7	31 42.7	49 57	49.7	32 11.7	48 56	48.7	32 40.3	47 55	47.7	33 08.2	46 54	46.6	33 49.2	45 52	45.0	8
9	29 21.8	52 59	52.8	29 52.9	52 58	51.9	30 38.8	50 57	50.4	31 08.8	50 56	49.4	31 38.3	49 55	48.3	32 07.4	48 54	47.3	32 35.9	47 54	46.3	33 17.7	46 52	44.7	9
90	28 46.3	53 59	52.4	29 18.0	52 58	51.4	30 04.6	51 57	50.0	30 35.1	50 56	49.0	31 05.1	50 55	48.0	31 34.7	49 54	46.9	32 03.8	48 53	45.9	32 46.5	47 52	44.4	90

16—11490

Lat. 42°

H.A.	46° 00′ Alt.	Δd	Δt	Az.	47° 00′ Alt.	Δd	Δt	Az.	48° 30′ Alt.	Δd	Δt	Az.	49° 30′ Alt.	Δd	Δt	Az.	50° 30′ Alt.	Δd	Δt	Az.	51° 30′ Alt.	Δd	Δt	Az.	52° 30′ Alt.	Δd	Δt	Az.	54° 00′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
91	28 11.1	54	58	52.0	28 43.2	53	58	51.0	29 30.5	52	56	49.6	30 01.5	51	56	48.6	30 32.1	51	55	47.6	31 02.2	50	54	46.6	31 31.9	49	53	45.6	32 15.4	48	51	44.0	91
2	27 36.1	55	58	51.6	28 08.6	54	57	50.6	28 56.7	53	56	49.2	29 28.2	52	55	48.2	29 59.3	51	54	47.2	30 29.9	51	54	46.2	31 00.1	50	53	45.2	31 44.5	49	51	43.7	2
3	27 01.3	55	58	51.1	27 34.3	55	57	50.2	28 23.0	54	56	48.8	28 55.1	53	55	47.8	29 26.7	52	54	46.8	29 57.8	52	53	45.9	30 28.6	51	52	44.9	31 13.8	50	51	43.4	3
4	26 26.6	56	57	50.7	27 00.1	55	57	49.8	27 49.6	55	55	48.4	28 22.1	54	55	47.4	28 54.2	53	54	46.5	29 25.9	52	53	45.5	29 57.2	52	52	44.5	30 43.3	51	51	43.0	4
95	25 52.2	57	57	50.3	26 26.2	56	56	49.4	27 16.4	55	55	48.0	27 49.4	55	54	47.0	28 22.0	54	53	46.1	28 54.3	53	52	45.1	29 26.1	53	52	44.1	30 13.0	52	50	42.7	95
6	25 18.1	58	57	49.8	25 52.4	57	56	48.9	26 43.4	56	55	47.5	27 16.9	56	54	46.6	27 50.0	55	53	45.7	28 22.8	54	52	44.7	28 55.1	54	51	43.8	29 42.9	53	50	42.3	6
7	24 44.1	58	56	49.4	25 18.9	58	55	48.5	26 10.6	57	54	47.1	26 44.6	56	53	46.2	27 18.2	56	53	45.3	27 51.5	55	52	44.3	28 24.4	54	51	43.4	29 13.0	53	50	41.9	7
8	24 10.4	59	56	48.9	24 45.7	59	55	48.1	25 38.0	58	54	46.7	26 12.5	57	53	45.8	26 46.7	57	52	44.9	27 20.5	56	51	43.9	27 53.9	55	50	43.0	28 43.3	54	49	41.6	8
9	23 36.9	60	55	48.5	24 12.6	59	55	47.6	25 05.7	59	54	46.3	25 40.7	58	53	45.4	26 15.3	57	52	44.5	26 49.6	57	51	43.6	27 23.6	56	50	42.6	28 13.8	55	49	41.2	9
100	23 03.6	61	55	48.0	23 39.8	60	54	47.2	24 33.6	59	53	45.9	25 09.0	59	52	45.0	25 44.2	58	52	44.1	26 19.0	58	51	43.2	26 53.5	57	50	42.2	27 44.5	56	48	40.8	100
1	22 30.5	61	55	47.6	23 07.2	61	54	46.7	24 01.7	60	53	45.4	24 37.7	60	52	44.5	25 13.3	59	51	43.7	25 48.6	59	50	42.8	26 23.6	58	49	41.8	27 15.5	57	48	40.5	1
2	21 57.8	62	54	47.1	22 34.9	62	53	46.3	23 30.1	61	52	45.0	24 06.5	60	52	44.1	24 42.6	60	51	43.2	25 18.5	59	50	42.3	25 54.0	59	49	41.4	26 46.6	58	48	40.1	2
3	21 25.2	63	54	46.6	22 02.8	62	53	45.8	22 58.7	62	52	44.5	23 35.6	61	51	43.7	24 12.2	61	50	42.8	24 48.6	60	49	41.9	25 24.6	60	49	41.0	26 18.0	59	47	39.7	3
4	20 52.9	64	53	46.2	21 31.0	63	53	45.3	22 27.5	63	51	44.1	23 04.9	62	51	43.2	23 42.1	62	50	42.4	24 18.9	61	49	41.5	24 55.4	61	48	40.6	25 49.7	60	47	39.3	4
105	20 20.9	64	53	45.7	20 59.4	64	52	44.9	21 56.6	63	51	43.6	22 34.5	63	50	42.8	23 12.1	62	49	41.9	23 49.5	62	49	41.1	24 26.5	61	48	40.2	25 21.5	61	46	38.9	105
6	19 49.1	65	53	45.2	20 28.0	65	52	44.4	21 26.0	64	51	43.2	22 04.3	64	50	42.4	22 42.4	63	49	41.5	23 20.3	63	48	40.7	23 57.8	62	47	39.8	24 53.6	62	46	38.5	6
7	19 17.6	66	52	44.7	19 57.0	65	51	43.9	20 55.6	65	50	42.7	21 34.4	65	49	41.9	22 13.0	64	49	41.1	22 51.3	64	48	40.2	23 29.4	63	47	39.4	24 26.0	63	46	38.1	7
8	18 46.3	67	52	44.2	19 26.2	66	51	43.5	20 25.5	66	50	42.3	21 04.8	65	49	41.4	21 43.8	65	48	40.6	22 22.7	64	47	39.8	23 01.2	64	47	39.0	23 58.6	63	45	37.7	8
9	18 15.4	67	51	43.8	18 55.6	67	50	43.0	19 55.7	66	49	41.8	20 35.4	66	49	41.0	21 14.9	66	48	40.2	21 54.2	65	47	39.4	22 33.3	65	46	38.6	23 31.4	64	45	37.3	9
110	17 44.7	68	51	43.3	18 25.4	68	50	42.5	19 26.1	67	49	41.3	20 06.3	67	48	40.5	20 46.3	67	47	39.7	21 26.1	66	46	38.9	22 05.6	66	46	38.1	23 04.5	65	44	36.9	110
1	17 14.2	69	50	42.8	17 55.4	68	49	42.0	18 56.8	68	48	40.8	19 37.5	68	48	40.1	20 17.9	67	47	39.3	20 58.2	67	46	38.5	21 38.2	67	45	37.7	22 37.9	66	44	36.5	1
2	16 44.1	69	50	42.3	17 25.7	69	49	41.5	18 27.8	69	48	40.4	19 08.9	68	47	39.6	19 49.8	68	46	38.8	20 30.6	68	46	38.0	21 11.1	67	45	37.3	22 11.5	67	44	36.1	2
3	16 14.3	70	49	41.8	16 56.3	70	48	41.0	17 59.0	69	47	39.9	18 40.6	69	47	39.1	19 22.0	69	46	38.4	20 03.2	69	45	37.6	20 44.3	68	44	36.8	21 45.4	68	43	35.6	3
4	15 44.7	71	49	41.2	16 27.2	71	48	40.5	17 30.6	70	47	39.4	18 12.6	70	46	38.7	18 54.5	70	45	37.9	19 36.2	69	45	37.1	20 17.7	69	44	36.4	21 19.6	68	43	35.2	4
115	15 15.5	72	48	40.7	15 58.4	71	48	40.0	17 02.4	71	46	38.9	17 44.9	71	46	38.2	18 27.3	70	45	37.4	19 09.4	70	44	36.7	19 51.4	70	43	35.9	20 54.0	69	42	34.8	115
6	14 46.5	72	48	40.2	15 29.8	72	47	39.5	16 34.6	72	46	38.4	17 17.5	71	45	37.7	18 00.3	71	44	37.0	18 42.9	71	44	36.2	19 25.4	71	43	35.5	20 28.7	70	42	34.3	6
7	14 17.9	73	47	39.7	15 01.6	73	46	39.0	16 07.0	72	45	37.9	16 50.4	72	45	37.2	17 33.6	72	44	36.5	18 16.7	72	43	35.7	18 59.7	71	42	35.0	20 03.7	71	41	33.9	7
8	13 49.6	74	47	39.2	14 33.7	74	46	38.5	15 39.8	73	45	37.4	16 23.6	73	44	36.7	17 07.3	73	43	36.0	17 50.8	72	43	35.3	18 34.2	72	42	34.5	19 39.0	72	41	33.4	8
9	13 21.6	74	46	38.6	14 06.2	74	45	38.0	15 12.8	74	44	36.9	15 57.1	74	44	36.2	16 41.2	73	43	35.5	17 25.2	73	42	34.8	18 09.1	73	41	34.1	19 14.6	73	40	33.0	9
120	12 53.9	75	46	38.1	13 38.9	75	45	37.4	14 46.2	75	44	36.4	15 30.9	74	43	35.7	16 15.5	74	42	35.0	16 59.9	74	42	34.3	17 44.3	74	41	33.6	18 50.4	73	40	32.5	120
1	12 26.5	76	45	37.6	13 12.0	76	44	36.9	14 19.9	75	43	35.9	15 05.0	75	43	35.2	15 50.1	75	42	34.5	16 35.0	75	41	33.8	17 19.7	74	40	33.1	18 26.6	74	39	32.1	1
2	11 59.5	76	44	37.0	12 45.3	76	44	36.4	13 53.9	76	43	35.4	14 39.5	76	42	34.7	15 25.0	76	41	34.0	16 10.3	75	41	33.3	16 55.5	75	40	32.7	18 03.1	75	39	31.6	2
3	11 32.8	77	44	36.5	12 19.1	77	43	35.8	13 28.3	77	42	34.9	14 14.3	77	42	34.2	15 00.2	76	41	33.5	15 46.0	76	40	32.9	16 31.6	76	39	32.2	17 39.8	76	38	31.2	3
4	11 06.5	78	43	35.9	11 53.1	78	43	35.3	13 03.0	77	42	34.3	13 49.4	77	41	33.7	14 35.7	77	40	33.0	15 21.9	77	40	32.4	16 08.0	77	39	31.7	17 16.9	76	38	30.7	4
125	10 40.5	78	43	35.4	11 27.5	78	42	34.8	12 38.0	78	41	33.8	13 24.8	78	40	33.2	14 11.6	78	40	32.5	14 58.2	78	39	31.9	15 44.8	77	38	31.2	16 54.3	77	37	30.2	125
6	10 14.8	79	42	34.8	11 02.3	79	41	34.2	12 13.4	79	40	33.3	13 00.6	79	40	32.6	13 47.8	79	39	32.0	14 34.9	78	38	31.4	15 21.8	78	38	30.7	16 32.1	78	37	29.7	6
7	9 49.6	80	42	34.3	10 37.4	80	41	33.7	11 49.1	80	40	32.7	12 36.7	79	39	32.1	13 24.3	79	39	31.5	14 11.8	79	38	30.9	14 59.2	79	37	30.2	16 10.1	79	36	29.3	7
8	9 24.6	80	41	33.7	10 12.9	80	40	33.1	11 25.1	80	39	32.2	12 13.2	80	39	31.6	13 01.2	80	38	31.0	13 49.1	80	37	30.3	14 36.9	80	37	29.7	15 48.5	79	36	28.8	8
9	9 00.1	81	40	33.1	9 48.7	81	40	32.5	11 01.6	81	39	31.6	11 50.0	81	38	31.0	12 38.5	81	37	30.4	13 26.8	80	37	29.8	14 15.0	80	36	29.2	15 27.2	80	35	28.3	9
130	8 35.9	82	40	32.6	9 24.9	82	39	32.0	10 38.4	82	38	31.1	11 27.2	81	37	30.5	12 16.0	81	37	29.9	13 04.8	81	36	29.3	13 53.4	81	35	28.7	15 06.2	81	34	27.8	130
1	8 12.1	82	39	32.0	9 01.5	82	38	31.4	10 15.5	82	37	30.5	11 04.8	82	37	30.0	11 54.0	82	36	29.4	12 43.1	82	36	28.8	13 32.2	82	35	28.2	14 45.6	81	34	27.3	1
2	7 48.7	83	38	31.4	8 38.4	83	38	30.8	9 53.0	83	37	30.0	10 42.7	83	36	29.4	11 32.3	83	36	28.8	12 21.8	82	35	28.3	13 11.3	82	34	27.7	14 25.3	82	33	26.8	2
3	7 25.6	84	38	30.8	8 15.8	84	37	30.3	9 30.9	83	36	29.4	10 21.0	83	36	28.9	11 11.0	83	35	28.3	12 00.9	83	34	27.7	12 50.7	83	34	27.2	14 05.4	83	33	26.3	3
4	7 03.0	84	37	30.2	7 53.5	84	36	29.7	9 09.2	84	36	28.9	9 59.6	84	35	28.3	10 50.0	84	34	27.8	11 40.3	84	34	27.2	12 30.5	84	33	26.6	13 45.8	83	32	25.8	4
135	6 40.7	85	36	29.6	7 31.6	85	36	29.1	8 47.9	85	35	28.3	9 38.7	85	34	27.8	10 29.4	85	34	27.2	11 20.1	84	33	26.7	12 10.7	84	32	26.1	13 26.5	84	31	25.3	135
6	6 18.9	85	36	29.0	7 10.1	85	35	28.5	8 26.9	85	34	27.7	9 18.1	85	34	27.2	10 09.2	85	33	26.7	11 00.3	85	32	26.1	11 51.3	85	32	25.6	13 07.7	85	31	24.8	6
7	5 57.4	86	35	28.4	6 49.0	86	34	27.9	8 06.4	86	34	27.2	8 57.9	86	33	26.6	9 49.4	86	32	26.1	10 40.8	86	32	25.6	11 32.2	86	31	25.1	12 49.2	85	30	24.3	7
8	5 36.4	87	34	27.8	6 28.4	87	34	27.3	7 46.2	87	33	26.6	8 38.1	86	32	26.1	9 30.0	86	32	25.6	10 21.7	86	31	25.1	11 13.5	86	31	24.5	12 31.0	86	30	23.8	8
9	5 15.8	87	34	27.2	6 08.1	87	33	26.7	7 26.5	87	32	26.0	8 18.7	87	32	25.5	9 10.9	87	31	25.0	10 03.1	87	30	24.5	10 55.2	87	30	24.0	12 13.2	87	29	23.2	9
140					5 48.2	88	32	26.1	7 07.1	88	32	25.4	7 59.7	88	31	24.9	8 52.3	88	30	24.4	9 44.8	87	30	24.0	10 37.2	87	29	23.5	11 55.8	87	28	22.7	140
1					5 28.8	88	32	25.5	6 48.2	88	31	24.8	7 41.1	88	30	24.4	8 34.0	88	30	23.9	9 26.9	88	29	23.4	10 19.7	88	29	22.9	11 38.8	88	28	22.2	1
2					5 09.8	89	31	24.9	6 29.7	89	30	24.2	7 22.9	89	30	23.8	8 16.2	89	29	23.3	9 09.3	89	29	22.8	10 02.5	89	28	22.4	11 22.1	88	27	21.7	2
3									6 11.6	89	29	23.6	7 05.2	89	29	23.2	7 58.7	89	28	22.7	8 52.2	89	28	22.3	9 45.7	89	27	21.8	11 05.9	89	26	21.1	3
4									5 53.9	90	29	23.1	6 47.8	90	28	22.6	7 41.7	90	28	22.2	8 35.5	90	27	21.7	9 29.3	90	27	21.3	10 50.0	90	26	20.6	4
145									5 36.7	90	28	22.5	6 30.9	90	28	22.0	7 25.1	90	27	21.6	8 19.2	90	26	21.2	9 13.4	90	26	20.7	10 34.5	90	25	20.1	145
6									5 19.9	91	27	21.8	6 14.4	91	27	21.4	7 08.9	91	26	21.0	8 03.4	91	26	20.6	8 57.8	91	25	20.2	10 19.4	91	24	19.5	6
7									5 03.5	91	27	21.2	5 58.3	91	26	20.8	6 53.1	91	26	20.4	7 47.9	91	25	20.0	8 42.6	91	25	19.6	10 04.7	91	24	19.0	7
8													5 42.7	92	25	20.2	6 37.8	92	25	19.8	7 32.8	92	24	19.4	8 27.9	92	24	19.0	9 50.4	92	23	18.4	8
9													5 27.5	92	25	19.6	6 22.8	92	24	19.2	7 18.2	92	24	18.9	8 13.6	92	23	18.5	9 36.5	92	22	17.9	9
150													5 12.7	93	24	19.0	6 08.4	93	23	18.7	7 04.0	93	23	18.3	7 59.6	93	22	17.9	9 23.0	93	22	17.3	150
1																	5 54.3	93	23	18.1	6 50.2	93	22	17.7	7 46.1	93	22	17.3	9 10.0	93	21	16.8	1
2																	5 40.7	94	22	17.5	6 36.9	94	22	17.1	7 33.1	94	21	16.8	8 57.3	94	20	16.2	2
3																	5 27.6	94	21	16.9	6 24.0	94	21	16.5	7 20.4	94	20	16.2	8 45.0	94	20	15.7	3
4																	5 14.9	94	20	16.3	6 11.5	94	20	15.9	7 08.2	94	20	15.6	8 33.2	94	19	15.1	4
155																	5 02.6	95	20	15.7	5 59.5	95	19	15.3	6 56.5	95	19	15.0	8 21.8	95	18	14.5	155
6																					5 48.0	95	19	14.7	6 45.1	95	18	14.4	8 10.8	95	18	14.0	6
7																					5 36.8	96	18	14.1	6 34.2	96	17	13.9	8 00.3	96	17	13.4	7
8																					5 26.2	96	17	13.5	6 23.8	96	17	13.3	7 50.2	96	16	12.8	8
9																					5 15.9	96	16	12.9	6 13.8	96	16	12.7	7 40.5	96	15	12.3	9
160																					5 06.2	97	16	12.3	6 04.2	97	15	12.1	7 31.2	97	15	11.7	160
1																									5 55.1	97	14	11.5	7 22.4	97	14	11.1	1
2																									5 46.4	97	14	10.9	7 14.0	97	13	10.6	2
3																									5 38.2	98	13	10.3	7 06.0	98	12	10.0	3
4																									5 30.5	98	12	09.7	6 58.5	98	12	09.4	4
165																									5 23.2	98	11	09.1	6 51.5	98	11	08.8	165
6																									5 16.4	98	11	08.5	6 44.9	98	10	08.2	6
7																									5 10.0	99	10	07.9	6 38.7	99	10	07.6	7
8																									5 04.1	99	09	07.3	6 33.0	99	09	07.1	8
9																													6 27.8	99	08	06.5	9
170																													6 22.9	99	07	05.9	170
1																													6 18.6	99	06	05.3	1
2																													6 14.7	99	06	04.7	2
3																													6 11.3	1.0	05	04.1	3
4																													6 08.3	1.0	04	03.5	4
175																													6 05.7	1.0	03	03.0	175
6																													6 03.7	1.0	03	02.4	6
7																													6 02.1	1.0	02	01.8	7
8																													6 00.9	1.0	01	01.2	8
9																													6 00.2	1.0	00	00.6	9
180																													6 00.0	1.0	00	00.0	180

Lat. 43°

Lat. 44°

Lat. 45°

Lat. 46°

Lat. 47°

Lat. 48°

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Lat. 42°

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	
00	77 30.0	1.0 02	00.0	77 00.0	1.0 02	00.0	76 00.0	1.0 02	00.0	75 30.0	1.0 01	00.0	75 00.0	1.0 01	00.0	74 30.0	1.0 01	00.0	73 00.0	1.0 01	00.0	72 30.0	1.0 01	00.0	00
1	77 29.0	1.0 05	02.7	76 59.0	1.0 05	02.5	75 59.1	1.0 04	02.3	75 29.1	1.0 04	02.2	74 59.2	1.0 04	02.1	74 29.2	1.0 04	02.0	72 59.3	1.0 03	01.8	72 29.3	1.0 03	01.7	1
2	77 25.8	99 09	05.3	76 56.0	99 08	05.1	75 56.4	99 07	04.6	75 26.6	99 07	04.4	74 56.7	1.0 07	04.2	74 26.9	1.0 06	04.0	72 57.3	1.0 06	03.5	72 27.4	1.0 05	03.4	2
3	77 20.7	98 12	08.0	76 51.1	99 11	07.6	75 51.9	99 10	06.9	75 22.3	99 10	06.6	74 52.7	99 09	06.3	74 23.0	99 09	06.0	72 53.9	99 08	05.3	72 24.1	99 08	05.0	3
4	77 13.5	97 15	10.6	76 44.3	97 14	10.0	75 45.7	98 13	09.1	75 16.4	98 13	08.7	74 47.0	98 12	08.3	74 17.6	98 12	08.0	72 49.1	98 10	07.0	72 19.5	99 10	06.7	4
05	77 04.3	96 18	13.1	76 35.6	96 18	12.5	75 37.8	97 16	11.3	75 08.8	97 15	10.8	74 39.8	97 15	10.3	74 10.6	97 14	09.9	72 43.0	98 12	08.7	72 13.7	98 12	08.3	05
6	76 53.3	94 21	15.5	76 25.1	94 20	14.8	75 28.2	96 19	13.5	74 59.7	96 18	12.9	74 31.0	96 17	12.3	74 02.3	96 16	11.8	72 35.6	97 14	10.4	72 06.6	97 14	09.9	6
7	76 40.5	92 24	17.9	76 12.8	92 23	17.1	75 17.1	96 21	15.6	74 49.0	94 20	14.9	74 20.8	94 19	14.2	73 52.4	96 19	13.6	72 27.0	96 16	12.0	71 58.3	96 16	11.5	7
8	76 26.0	90 27	20.2	75 59.0	90 26	19.2	75 04.3	92 24	17.6	74 36.8	92 23	16.8	74 09.1	93 22	16.1	73 41.3	93 21	15.4	72 17.1	94 18	13.6	71 48.8	94 18	13.1	8
9	76 09.8	87 30	22.3	75 43.5	88 28	21.3	74 50.1	90 26	19.5	74 23.2	90 25	18.7	73 56.0	91 24	17.9	73 28.7	91 23	17.2	72 06.0	93 20	15.2	71 38.2	93 20	14.6	9
10	75 52.1	85 32	24.4	75 26.5	86 31	23.3	74 34.5	87 28	21.4	74 08.2	88 27	20.5	73 41.7	89 26	19.7	73 14.9	89 25	18.9	71 53.7	91 22	16.7	71 26.4	91 22	16.1	10
1	75 33.0	82 34	26.4	75 08.2	83 33	25.3	74 17.6	85 30	23.2	73 51.9	86 29	22.3	73 26.0	87 28	21.4	72 59.9	87 27	20.5	71 40.3	89 24	18.2	71 13.5	90 23	17.5	1
2	75 12.6	80 36	28.2	74 48.5	81 35	27.1	73 59.4	83 32	24.9	73 34.4	84 31	23.9	73 09.2	85 30	23.0	72 43.7	85 29	22.1	71 25.9	87 26	19.6	70 59.5	88 25	18.9	2
3	74 50.9	77 38	30.0	74 27.6	78 37	28.8	73 40.0	80 34	26.6	73 15.8	81 33	25.5	72 51.2	82 32	24.6	72 26.3	83 31	23.6	71 10.4	86 27	21.0	70 44.6	86 26	20.3	3
4	74 28.0	74 40	31.6	74 05.6	75 38	30.4	73 19.5	78 36	28.1	72 56.0	79 35	27.1	72 32.1	80 33	26.0	72 08.0	81 32	25.1	70 53.9	84 29	22.4	70 28.7	84 28	21.6	4
15	74 04.1	71 41	33.2	73 42.5	73 40	31.9	72 58.0	75 38	29.6	72 35.2	77 36	28.5	72 12.1	78 35	27.5	71 48.6	79 34	26.5	70 36.4	82 31	23.7	70 11.8	82 30	22.8	15
6	73 39.2	69 43	34.7	73 18.4	70 42	33.4	72 35.5	73 39	31.0	72 13.5	74 38	29.9	71 51.0	75 37	28.8	71 28.3	76 35	27.8	70 18.1	79 32	24.9	69 54.1	80 31	24.0	6
7	73 13.4	66 44	36.0	72 53.4	67 43	34.8	72 12.1	70 40	32.3	71 50.8	72 39	31.2	71 29.1	73 38	30.1	71 07.0	74 37	29.0	69 58.9	77 33	26.1	69 35.6	78 32	25.2	7
8	72 46.8	63 46	37.3	72 27.6	65 44	36.0	71 47.8	68 42	33.6	71 27.3	69 40	32.4	71 06.3	71 39	31.3	70 45.0	72 38	30.2	69 38.9	75 35	27.2	69 16.2	76 34	26.3	8
9	72 19.4	60 47	38.5	72 01.0	62 46	37.2	71 22.8	65 43	34.8	71 03.0	67 42	33.6	70 42.8	68 40	32.5	70 22.1	69 39	31.4	69 18.1	73 36	28.3	68 56.0	74 35	27.4	9
20	71 51.3	58 48	39.6	71 33.7	60 47	38.3	70 57.0	63 44	35.9	70 38.0	64 43	34.7	70 18.5	66 42	33.6	69 58.6	67 40	32.5	68 56.6	71 37	29.4	68 35.2	72 36	28.4	20
1	71 22.5	55 49	40.7	71 05.7	57 48	39.4	70 30.5	60 45	36.9	70 12.2	62 44	35.7	69 53.5	63 43	34.6	69 34.3	65 42	33.5	68 34.4	68 38	30.3	68 13.7	70 37	29.4	1
2	70 53.2	53 50	41.6	70 37.1	54 49	40.4	70 03.5	58 46	37.9	69 45.9	59 45	36.7	69 27.9	61 44	35.6	69 09.4	62 43	34.4	68 11.5	66 39	31.3	67 51.5	67 38	30.3	2
3	70 23.3	50 51	42.5	70 08.0	52 49	41.3	69 35.8	55 47	38.8	69 18.9	57 46	37.6	69 01.6	58 45	36.5	68 43.9	60 43	35.4	67 48.1	64 40	32.2	67 28.7	65 39	31.2	3
4	69 52.9	48 51	43.4	69 38.3	50 50	42.1	69 07.6	53 48	39.7	68 51.5	55 47	38.5	68 34.8	56 46	37.3	68 17.8	58 44	36.2	67 24.0	62 41	33.0	67 05.3	63 40	32.0	4
25	69 22.1	45 52	44.1	69 08.2	47 51	42.9	68 38.9	51 49	40.5	68 23.5	52 47	39.3	68 07.5	54 46	38.2	67 51.2	55 45	37.0	66 59.5	60 42	33.8	66 41.4	61 41	32.8	25
6	68 50.8	43 53	44.9	68 37.7	45 52	43.6	68 09.7	48 49	41.2	67 55.0	50 48	40.1	67 39.8	52 47	38.9	67 24.1	53 46	37.8	66 34.4	57 43	34.6	66 17.0	59 41	33.6	6
7	68 19.2	41 53	45.5	68 06.7	43 52	44.3	67 40.1	46 50	41.9	67 26.1	48 49	40.8	67 11.5	49 48	39.6	66 56.5	51 47	38.5	66 08.8	55 43	35.3	65 52.1	56 42	34.3	7
8	67 47.2	39 54	46.1	67 35.4	40 53	44.9	67 10.1	44 51	42.6	66 56.8	45 49	41.4	66 42.9	47 48	40.3	66 28.6	49 47	39.2	65 42.8	53 44	36.0	65 26.7	54 43	35.0	8
9	67 14.9	36 54	46.7	67 03.7	38 53	45.5	66 39.8	42 51	43.2	66 27.1	43 50	42.0	66 13.9	45 49	40.9	66 00.2	46 48	39.8	65 16.4	51 45	36.7	65 01.0	52 44	35.6	9
30	66 42.3	34 55	47.2	66 31.8	36 54	46.1	66 09.1	39 52	43.8	65 57.0	41 51	42.6	65 44.5	43 50	41.5	65 31.4	44 48	40.4	64 49.6	49 45	37.3	64 34.8	50 44	36.2	30
1	66 09.4	32 55	47.7	65 59.5	34 54	46.6	65 38.1	37 52	44.3	65 26.7	39 51	43.2	65 14.8	41 50	42.1	65 02.4	42 49	41.0	64 22.4	47 46	37.8	64 08.3	48 45	36.8	1
2	65 36.3	30 56	48.2	65 27.0	32 55	47.0	65 06.9	35 53	44.8	64 56.0	37 52	43.7	64 44.7	38 51	42.6	64 33.0	40 49	41.5	63 54.9	44 46	38.4	63 41.4	46 45	37.4	2
3	65 03.0	28 56	48.6	64 54.3	30 55	47.4	64 35.3	33 53	45.2	64 25.1	35 52	44.1	64 14.4	36 51	43.0	64 03.3	38 50	42.0	63 27.1	42 47	38.9	63 14.2	44 46	37.9	3
4	64 29.5	26 56	48.9	64 21.3	28 55	47.8	64 03.6	31 53	45.6	63 54.0	33 52	44.6	63 43.9	34 51	43.5	63 33.3	36 50	42.4	62 59.0	40 47	39.3	62 46.6	42 46	38.3	4
35	63 55.8	24 56	49.3	63 48.2	26 56	48.2	63 31.6	29 54	46.0	63 22.6	31 53	44.9	63 13.1	32 52	43.9	63 03.1	34 51	42.8	62 30.6	38 48	39.8	62 18.8	40 47	38.8	35
6	63 21.9	22 57	49.6	63 14.9	24 56	48.5	62 59.4	27 54	46.4	62 51.0	29 53	45.3	62 42.1	30 52	44.3	62 32.7	32 51	43.2	62 01.9	36 48	40.2	61 50.8	38 47	39.2	6
7	62 47.9	21 57	49.9	62 41.4	22 56	48.8	62 27.1	25 54	46.7	62 19.2	27 53	45.6	62 10.8	29 52	44.6	62 02.0	30 51	43.6	61 33.0	34 49	40.6	61 22.5	36 48	39.6	7
8	62 13.7	19 57	50.1	62 07.8	21 56	49.1	61 54.5	24 54	47.0	61 47.2	25 54	46.0	61 39.4	27 53	44.9	61 31.2	28 52	43.9	61 03.9	33 49	40.9	60 53.9	34 48	40.0	8
9	61 39.4	17 57	50.3	61 34.0	19 56	49.3	61 21.9	22 55	47.2	61 15.1	23 54	46.2	61 07.9	25 53	45.2	61 00.2	26 52	44.2	60 34.6	31 49	41.3	60 25.2	32 48	40.3	9
40	61 05.1	16 57	50.5	61 00.2	17 57	49.5	60 49.1	20 55	47.5	60 42.8	22 54	46.5	60 36.1	23 53	45.5	60 29.0	24 52	44.5	60 05.0	29 49	41.6	59 56.2	30 49	40.6	40
1	60 30.6	14 58	50.7	60 26.2	15 57	49.7	60 16.1	18 55	47.7	60 10.4	20 54	46.7	60 04.3	21 53	45.7	59 57.7	23 52	44.8	59 35.4	27 50	41.9	59 27.1	28 49	40.9	1
2	59 56.1	12 58	50.9	59 52.2	14 57	49.9	59 43.1	17 55	47.9	59 37.9	18 54	46.9	59 32.3	19 54	46.0	59 26.2	21 53	45.0	59 05.5	25 50	42.1	58 57.8	26 49	41.2	2
3	59 21.4	11 58	51.0	59 18.0	12 57	50.0	59 10.0	15 55	48.1	59 05.3	16 55	47.1	59 00.2	18 54	46.2	58 54.6	19 53	45.2	58 35.5	23 50	42.4	58 28.4	25 49	41.4	3
4	58 46.8	09 58	51.1	58 43.8	10 57	50.1	58 36.7	13 55	48.2	58 32.6	15 55	47.3	58 28.0	16 54	46.3	58 22.9	17 53	45.4	58 05.4	22 50	42.6	57 58.8	23 50	41.7	4
45	58 12.0	07 58	51.2	58 09.6	09 57	50.2	58 03.5	12 56	48.4	57 59.8	13 55	47.4	57 55.7	14 54	46.5	57 51.1	16 53	45.6	57 35.2	20 51	42.8	57 29.1	21 50	41.9	45
6	57 37.3	06 58	51.3	57 35.3	07 57	50.3	57 30.1	10 56	48.5	57 26.9	11 55	47.6	57 23.3	13 54	46.6	57 19.3	14 53	45.7	57 04.8	18 51	43.0	56 59.2	19 50	42.1	6
7	57 02.5	04 58	51.3	57 01.0	06 57	50.4	56 56.7	08 56	48.6	56 54.0	10 55	47.7	56 50.8	11 54	46.7	56 47.3	12 53	45.8	56 34.4	16 51	43.1	56 29.3	18 50	42.2	7
8	56 27.7	03 58	51.4	56 26.6	04 57	50.5	56 23.2	07 56	48.6	56 21.0	08 55	47.7	56 18.3	09 54	46.9	56 15.3	11 53	46.0	56 03.9	15 51	43.3	55 59.3	16 50	42.4	8
9	55 52.8	01 58	51.4	55 52.2	03 57	50.5	55 49.8	05 56	48.7	55 48.0	07 55	47.8	55 45.8	08 54	46.9	55 43.2	09 54	46.1	55 33.3	13 51	43.4	55 29.2	14 50	42.5	9
50	55 18.0	00 58	51.4	55 17.8	01 57	50.5	55 16.2	04 56	48.8	55 14.9	05 55	47.9	55 13.2	06 54	47.0	55 11.1	08 54	46.1	55 02.6	11 51	43.5	54 59.0	13 50	42.7	50
1	54 43.1	01 58	51.4	54 43.4	00 57	50.5	54 42.7	02 56	48.8	54 41.8	04 55	47.9	54 40.6	06 54	47.1	54 38.9	06 54	46.2	54 31.9	10 51	43.6	54 28.8	11 50	42.8	1
2	54 08.3	03 58	51.4	54 09.0	02 57	50.5	54 09.2	01 56	48.8	54 08.7	02 55	47.9	54 07.9	03 54	47.1	54 06.7	05 54	46.2	54 01.1	08 51	43.7	53 58.5	09 51	42.8	2
3	53 33.5	04 58	51.3	53 34.6	03 57	50.5	53 35.6	01 56	48.8	53 35.6	01 55	48.0	53 35.2	02 54	47.1	53 34.5	03 54	46.3	53 30.2	07 51	43.8	53 28.1	08 51	42.9	3
4	52 58.7	05 58	51.3	53 00.2	04 57	50.5	53 02.1	02 56	48.8	53 02.5	01 55	48.0	53 02.6	00 54	47.1	53 02.3	01 54	46.3	52 59.4	05 51	43.8	52 57.7	06 51	43.0	4
55	52 23.9	07 58	51.2	52 25.8	06 57	50.4	52 28.5	03 56	48.8	52 29.4	02 55	47.9	52 29.9	01 54	47.1	52 30.1	00 54	46.3	52 28.5	03 51	43.8	52 27.3	05 51	43.0	55
6	51 49.2	08 58	51.2	51 51.4	07 57	50.3	51 55.0	05 56	48.7	51 56.3	04 55	47.9	51 57.2	03 54	47.1	51 57.8	01 54	46.3	51 57.6	02 51	43.9	51 56.9	03 51	43.1	6
7	51 14.5	09 58	51.1	51 17.1	08 57	50.3	51 21.5	06 56	48.7	51 23.2	05 55	47.9	51 24.6	04 54	47.1	51 25.6	03 54	46.3	51 26.7	00 51	43.9	51 26.5	01 51	43.1	7
8	50 39.8	11 58	51.0	50 42.9	10 57	50.2	50 48.0	08 56	48.6	50 50.1	06 55	47.8	50 51.9	05 54	47.0	50 53.4	04 54	46.2	50 55.8	01 51	43.9	50 56.0	00 51	43.1	8
9	50 05.2	12 58	50.9	50 08.6	11 57	50.1	50 14.6	09 56	48.5	50 17.1	08 55	47.8	50 19.3	07 54	47.0	50 21.2	06 54	46.2	50 24.9	03 51	43.9	50 25.6	02 51	43.1	9
60	49 30.6	13 58	50.8	49 34.4	12 57	50.0	49 41.2	10 56	48.5	49 44.1	09 55	47.7	49 46.7	08 54	46.9	49 49.0	07 54	46.1	49 54.0	04 51	43.8	49 55.1	03 51	43.1	60
1	48 56.1	14 57	50.6	49 00.3	14 57	49.9	49 07.8	12 56	48.4	49 11.1	11 55	47.6	49 14.2	10 54	46.8	49 16.9	09 54	46.1	49 23.2	05 51	43.8	49 24.7	04 51	43.0	1
2	48 21.7	16 57	50.5	48 26.2	15 57	49.8	48 34.5	13 55	48.3	48 38.2	12 55	47.5	48 41.6	11 54	46.8	48 44.8	10 53	46.0	48 52.3	07 51	43.7	48 54.3	06 51	43.0	2
3	47 47.3	17 57	50.4	47 52.2	16 57	49.6	48 01.3	14 55	48.2	48 05.4	13 55	47.4	48 09.2	12 54	46.7	48 12.7	11 53	45.9	48 21.5	08 51	43.7	48 23.9	07 51	42.9	3
4	47 13.0	18 57	50.2	47 18.3	17 56	49.5	47 28.1	15 55	48.0	47 32.6	14 55	47.3	47 36.8	14 54	46.6	47 40.7	13 53	45.8	47 50.8	10 51	43.6	47 53.5	09 51	42.9	4
65	46 38.8	19 57	50.1	46 44.4	18 56	49.3	46 55.0	17 55	47.9	46 59.8	16 54	47.2	47 04.4	15 54	46.4	47 08.7	14 53	45.7	47 20.0	11 51	43.5	47 23.2	10 50	42.8	65
6	46 04.6	21 57	49.9	46 10.7	20 56	49.2	46 21.9	18 55	47.8	46 27.2	17 54	47.0	46 32.2	16 54	46.3	46 36.9	15 53	45.6	46 49.3	13 51	43.4	46 52.9	12 50	42.7	6
7	45 30.6	22 57	49.7	45 37.0	21 56	49.0	45 49.0	19 55	47.6	45 54.6	18 54	46.9	45 59.9	17 54	46.2	46 05.0	17 53	45.5	46 18.7	14 51	43.3	46 22.7	13 50	42.6	7
8	44 56.6	23 56	49.5	45 03.4	22 56	48.8	45 16.1	20 55	47.4	45 22.1	20 54	46.8	45 27.8	19 53	46.1	45 33.3	18 53	45.4	45 48.1	15 51	43.2	45 52.6	14 50	42.5	8
9	44 22.7	24 56	49.3	44 29.8	23 56	48.7	44 43.3	22 55	47.3	44 49.6	21 54	46.6	44 55.7	20 53	45.9	45 01.6	19 53	45.2	45 17.6	17 51	43.1	45 22.5	16 50	42.4	9
70	43 49.0	25 56	49.1	43 56.4	24 56	48.5	44 10.6	23 54	47.1	44 17.3	22 54	46.4	44 23.7	21 53	45.7	44 30.0	20 53	45.1	44 47.2	18 51	43.0	44 52.4	17 50	42.3	70
1	43 15.3	26 56	48.9	43 23.1	26 55	48.3	43 37.9	24 54	46.9	43 45.0	23 54	46.3	43 51.9	22 53	45.6	43 58.5	22 52	44.9	44 16.8	19 50	42.9	44 22.4	18 50	42.2	1
2	42 41.7	27 56	48.7	42 49.9	27 55	48.1	43 05.4	25 54	46.7	43 12.9	24 53	46.1	43 20.1	24 53	45.4	43 27.0	23 52	44.7	43 46.5	20 50	42.7	43 52.5	20 50	42.0	2
3	42 08.3	29 56	48.5	42 16.7	28 55	47.8	42 33.0	26 54	46.5	42 40.8	26 53	45.9	42 48.4	25 53	45.2	42 55.7	24 52	44.6	43 16.3	22 50	42.6	43 22.7	21 50	41.9	3
4	41 35.0	30 55	48.3	41 43.7	29 55	47.6	42 00.7	28 54	46.3	42 08.8	27 53	45.7	42 16.7	26 52	45.0	42 24.4	25 52	44.4	42 46.2	23 50	42.4	42 53.0	22 49	41.7	4
75	41 01.7	31 55	48.0	41 10.9	30 55	47.4	41 28.5	29 53	46.1	41 37.0	28 53	45.5	41 45.3	27 52	44.8	41 53.3	26 52	44.2	42 16.2	24 50	42.2	42 23.3	24 49	41.6	75
6	40 28.7	32 55	47.8	40 38.1	31 54	47.2	40 56.4	30 53	45.9	41 05.2	29 53	45.3	41 13.9	28 52	44.6	41 22.3	28 52	44.0	41 46.2	26 50	42.1	41 53.8	25 49	41.4	6
7	39 55.7	33 55	47.5	40 05.5	32 54	46.9	40 24.4	31 53	45.7	40 33.6	30 52	45.1	40 42.6	30 52	44.4	40 51.4	29 51	43.8	41 16.4	27 50	41.9	41 24.4	26 49	41.2	7
8	39 22.9	34 54	47.3	39 33.0	33 54	46.7	39 52.6	32 53	45.5	40 02.1	31 52	44.8	40 11.4	31 52	44.2	40 20.6	30 51	43.6	40 46.7	28 49	41.7	40 55.0	27 49	41.1	8
9	38 50.2	35 54	47.0	39 00.6	34 54	46.4	39 20.9	33 53	45.2	39 30.7	33 52	44.6	39 40.4	32 52	44.0	39 49.9	31 51	43.4	40 17.1	29 49	41.5	40 25.8	29 49	40.9	9
80	38 17.6	36 54	46.8	38 28.3	36 54	46.2	38 49.3	34 52	45.0	38 59.5	34 52	44.4	39 09.5	33 51	43.8	39 19.3	32 51	43.2	39 47.6	30 49	41.3	39 56.6	30 48	40.7	80
1	37 45.2	37 54	46.5	37 56.2	37 53	45.9	38 17.8	35 52	44.7	38 28.4	35 52	44.1	38 38.7	34 51	43.5	38 48.9	34 50	42.9	39 18.2	32 49	41.1	39 27.6	31 48	40.5	1
2	37 12.9	38 54	46.2	37 24.3	38 53	45.6	37 46.5	36 52	44.5	37 57.4	36 51	43.9	38 08.1	35 51	43.3	38 18.6	35 50	42.7	38 49.0	33 49	40.9	38 58.7	32 48	40.3	2
3	36 40.8	39 53	45.9	36 52.5	39 53	45.4	37 15.4	38 52	44.2	37 26.6	37 51	43.6	37 37.6	36 51	43.0	37 48.4	36 50	42.5	38 19.9	34 48	40.7	38 30.0	33 48	40.1	3
4	36 08.8	40 53	45.7	36 20.8	40 52	45.1	36 44.3	39 51	43.9	36 55.9	38 51	43.4	37 07.2	38 50	42.8	37 18.4	37 50	42.2	37 50.9	35 48	40.4	38 01.3	35 48	39.8	4
85	35 37.0	41 53	45.4	35 49.3	41 52	44.8	36 13.5	40 51	43.7	36 25.3	39 51	43.1	36 37.0	39 50	42.5	36 48.5	38 50	42.0	37 22.0	36 48	40.2	37 32.8	36 47	39.6	85
6	35 05.4	42 52	45.1	35 18.0	42 52	44.5	35 42.8	41 51	43.4	35 54.9	40 50	42.8	36 06.9	40 50	42.3	36 18.8	39 49	41.7	36 53.3	38 48	40.0	37 04.5	37 47	39.4	6
7	34 33.9	43 52	44.8	34 46.8	43 52	44.2	35 12.2	42 51	43.1	35 24.7	41 50	42.6	35 37.0	41 50	42.0	35 49.2	40 49	41.4	36 24.7	39 47	39.7	36 36.2	38 47	39.2	7
8	34 02.6	44 52	44.5	34 15.8	44 51	43.9	34 41.8	43 50	42.8	34 54.6	42 50	42.3	35 07.3	42 49	41.7	35 19.8	41 49	41.2	35 56.3	40 47	39.5	36 08.2	39 47	38.9	8
9	33 31.4	45 52	44.1	33 45.0	45 51	43.6	34 11.6	44 50	42.5	34 24.7	43 50	42.0	34 37.7	43 49	41.4	34 50.5	42 48	40.9	35 28.0	41 47	39.2	35 40.2	40 46	38.7	9
90	33 00.5	46 51	43.8	33 14.3	46 51	43.3	33 41.5	45 50	42.2	33 55.0	45 49	41.7	34 08.2	44 49	41.1	34 21.4	44 48	40.6	34 59.9	42 47	39.0	35 12.5	42 46	38.4	90

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
91	32 29.7	47 51	43.5	32 43.8	47 51	43.0	33 11.7	46 50	41.9	33 25.4	46 49	41.4	33 39.0	45 48	40.9	33 52.4	45 48	40.3	34 32.0	43 46	38.7	34 44.8	43 46	38.1	91
2	31 59.1	48 51	43.2	32 13.5	48 50	42.7	32 42.0	47 49	41.6	32 56.0	47 49	41.1	33 09.9	46 48	40.6	33 23.7	46 48	40.0	34 04.2	44 46	38.4	34 17.4	44 45	37.9	2
3	31 28.7	49 50	42.8	31 43.4	49 50	42.3	32 12.4	48 49	41.3	32 26.8	48 48	40.8	32 41.0	47 48	40.3	32 55.1	47 47	39.7	33 36.6	45 46	38.1	33 50.1	45 45	37.6	3
4	30 58.4	50 50	42.5	31 13.4	50 50	42.0	31 43.1	49 49	41.0	31 57.8	49 48	40.5	32 12.3	48 48	39.9	32 26.7	48 47	39.4	33 09.1	46 45	37.9	33 23.0	46 45	37.3	4
95	30 28.4	51 50	42.2	30 43.7	51 49	41.7	31 14.0	50 48	40.7	31 28.9	50 48	40.1	31 43.7	49 47	39.6	31 58.5	49 47	39.1	32 41.8	48 45	37.6	32 56.0	47 45	37.0	95
6	29 58.6	52 49	41.8	30 14.2	52 49	41.3	30 45.0	51 48	40.3	31 00.3	51 47	39.8	31 15.4	50 47	39.3	31 30.4	50 46	38.8	32 14.7	49 45	37.3	32 29.3	48 44	36.8	6
7	29 28.9	53 49	41.5	29 44.8	53 49	41.0	30 16.3	52 48	40.0	30 31.8	52 47	39.5	30 47.2	51 47	39.0	31 02.6	51 46	38.5	31 47.8	50 45	37.0	32 02.7	49 44	36.5	7
8	28 59.5	54 49	41.1	29 15.7	54 48	40.6	29 47.7	53 47	39.7	30 03.5	53 47	39.2	30 19.3	52 46	38.7	30 34.9	52 46	38.2	31 21.1	51 44	36.7	31 36.3	50 44	36.2	8
9	28 30.3	55 48	40.7	28 46.8	55 48	40.3	29 19.4	54 47	39.3	29 35.5	54 46	38.8	29 51.5	53 46	38.3	30 07.5	53 45	37.8	30 54.6	52 44	36.4	31 10.9	51 43	35.9	9
100	28 01.3	56 48	40.4	28 18.1	56 48	39.9	28 51.2	55 47	39.0	29 07.6	55 46	38.5	29 24.0	54 46	38.0	29 40.2	54 45	37.5	30 28.2	53 44	36.0	30 44.0	52 43	35.6	100
1	27 32.6	57 48	40.0	27 49.6	57 47	39.5	28 23.3	56 46	38.6	28 40.0	56 46	38.1	28 56.6	55 45	37.7	29 13.1	55 45	37.2	30 02.1	54 43	35.7	30 18.2	53 43	35.2	1
2	27 04.0	58 47	39.6	27 21.3	57 47	39.2	27 55.6	57 46	38.2	28 12.6	57 45	37.8	28 29.5	56 45	37.3	28 46.3	56 44	36.8	29 36.1	55 43	35.4	29 52.6	55 42	34.9	2
3	26 35.7	59 47	39.3	26 53.2	58 46	38.8	27 28.1	58 45	37.9	27 45.4	57 45	37.4	28 02.6	57 44	37.0	28 19.7	57 44	36.5	29 10.4	56 43	35.1	29 27.1	56 42	34.6	3
4	26 07.6	60 46	38.9	26 25.4	59 46	38.4	27 00.8	59 45	37.5	27 18.4	58 45	37.1	27 35.9	58 44	36.6	27 53.3	58 44	36.1	28 44.9	57 42	34.7	29 01.9	57 42	34.3	4
105	25 39.7	60 46	38.5	25 57.8	60 46	38.0	26 33.8	60 45	37.1	26 51.6	59 44	36.7	27 09.4	59 44	36.2	27 27.1	59 43	35.8	28 19.6	58 42	34.4	28 36.9	58 41	33.9	105
6	25 12.1	61 46	38.1	25 30.4	61 45	37.7	26 07.0	61 44	36.8	26 25.1	60 44	36.3	26 43.1	60 43	35.9	27 01.1	60 43	35.4	27 54.5	59 41	34.1	28 12.1	59 41	33.6	6
7	24 44.7	62 45	37.7	25 03.3	62 45	37.3	25 40.4	61 44	36.4	25 58.8	61 43	36.0	26 17.1	61 43	35.5	26 35.4	61 43	35.1	27 29.6	60 41	33.7	27 47.5	60 41	33.3	7
8	24 17.5	63 45	37.3	24 36.5	63 44	36.9	25 14.0	62 44	36.0	25 32.7	62 43	35.6	25 51.3	62 43	35.1	26 09.9	62 42	34.7	27 05.0	61 41	33.4	27 23.2	61 40	32.9	8
9	23 50.7	64 44	36.9	24 09.8	64 44	36.5	24 48.0	63 43	35.6	25 06.9	63 43	35.2	25 25.8	63 42	34.8	25 44.6	63 42	34.3	26 40.6	62 40	33.0	26 59.1	61 40	32.6	9
110	23 24.0	65 44	36.5	23 43.4	65 44	36.1	24 22.1	64 43	35.2	24 41.3	64 42	34.8	25 00.5	64 42	34.4	25 19.6	63 41	34.0	26 16.4	63 40	32.7	26 35.2	62 39	32.2	110
1	22 57.6	66 44	36.1	23 17.3	66 43	35.7	23 56.5	65 42	34.8	24 16.0	65 42	34.4	24 35.4	65 41	34.0	24 54.8	64 41	33.6	25 52.4	64 40	32.3	26 11.5	63 39	31.9	1
2	22 31.5	67 43	35.7	22 51.5	66 43	35.2	23 31.2	66 42	34.4	23 50.9	66 41	34.0	24 10.6	66 41	33.6	24 30.3	65 40	33.2	25 28.7	65 39	31.9	25 48.1	64 39	31.5	2
3	22 05.7	67 43	35.2	22 25.9	67 42	34.8	23 06.1	67 41	34.0	23 26.1	67 41	33.6	23 46.1	66 40	33.2	24 06.0	66 40	32.8	25 05.3	66 39	31.6	25 24.9	65 38	31.1	3
4	21 40.1	68 42	34.8	22 00.5	68 42	34.4	22 41.3	68 41	33.6	23 01.6	68 40	33.2	23 21.8	67 40	32.8	23 41.9	67 40	32.4	24 42.0	66 38	31.2	25 01.9	66 38	30.8	4
115	21 14.8	69 42	34.4	21 35.5	69 41	34.0	22 16.7	69 40	33.2	22 37.3	68 40	32.8	22 57.7	68 40	32.4	23 18.2	68 39	32.0	24 19.1	67 38	30.8	24 39.3	67 37	30.4	115
6	20 49.7	70 41	33.9	21 10.7	70 41	33.6	21 52.4	69 40	32.8	22 13.2	69 40	32.4	22 34.0	69 39	32.0	22 54.7	69 39	31.6	23 56.4	68 37	30.4	24 16.8	68 37	30.0	6
7	20 25.0	71 41	33.5	20 46.2	71 40	33.1	21 28.4	70 40	32.4	21 49.5	70 39	32.0	22 10.5	70 39	31.6	22 31.4	70 38	31.2	23 33.9	69 37	30.0	23 54.6	69 37	29.6	7
8	20 00.5	72 40	33.1	20 21.9	71 40	32.7	21 04.7	71 39	31.9	21 26.0	71 39	31.6	21 47.2	71 38	31.2	22 08.4	71 38	30.8	23 11.7	70 37	29.7	23 32.7	70 36	29.3	8
9	19 36.3	72 40	32.6	19 58.0	72 39	32.3	20 41.2	72 39	31.5	21 02.8	72 38	31.1	21 24.3	72 38	30.8	21 45.7	71 37	30.4	22 49.8	71 36	29.3	23 11.0	71 36	28.9	9
120	19 12.4	73 39	32.2	19 34.3	73 39	31.8	20 18.1	73 38	31.1	20 39.9	73 38	30.7	21 01.6	72 37	30.4	21 23.3	72 37	30.0	22 28.1	72 36	28.9	22 49.6	72 35	28.5	120
1	18 48.8	74 39	31.7	19 11.0	74 38	31.4	19 55.2	74 38	30.7	20 17.2	73 37	30.3	20 39.2	73 37	29.9	21 01.2	73 36	29.6	22 06.8	73 35	28.5	22 28.5	72 35	28.1	1
2	18 25.5	75 38	31.3	18 47.9	75 38	30.9	19 32.6	74 37	30.2	19 54.9	74 37	29.9	20 17.1	74 36	29.5	20 39.3	74 36	29.1	21 45.6	73 35	28.1	22 07.7	73 34	27.7	2
3	18 02.5	76 38	30.8	18 25.2	75 37	30.5	19 10.3	75 37	29.8	19 32.8	75 36	29.4	19 55.3	75 36	29.1	20 17.7	75 35	28.7	21 24.8	74 34	27.6	21 47.1	74 34	27.3	3
4	17 39.8	76 37	30.3	18 02.7	76 37	30.0	18 48.3	76 36	29.3	19 11.1	76 36	29.0	19 33.8	76 35	28.6	19 56.5	76 35	28.3	21 04.3	75 34	27.2	21 26.8	75 33	26.9	4
125	17 17.5	77 37	29.9	17 40.6	77 36	29.5	18 26.6	77 36	28.9	18 49.6	77 35	28.5	19 12.6	76 35	28.2	19 35.5	76 34	27.9	20 44.0	76 33	26.8	21 06.8	76 33	26.5	125
6	16 55.4	78 36	29.4	17 18.7	78 36	29.1	18 05.3	77 35	28.4	18 28.5	77 35	28.1	18 51.7	77 34	27.8	19 14.8	77 34	27.4	20 24.0	77 33	26.4	20 47.0	77 32	26.1	6
7	16 33.7	79 36	28.9	16 57.2	78 35	28.6	17 44.2	78 35	28.0	18 07.6	78 34	27.6	18 31.1	78 34	27.3	18 54.4	78 33	27.0	20 04.4	78 32	26.0	20 27.6	77 32	25.6	7
8	16 12.3	79 35	28.5	16 36.0	79 35	28.1	17 23.5	79 34	27.5	17 47.1	79 34	27.2	18 10.8	79 33	26.9	18 34.4	79 33	26.5	19 45.0	78 32	25.5	20 08.5	78 31	25.2	8
9	15 51.2	80 35	28.0	16 15.2	80 34	27.7	17 03.0	80 34	27.0	17 26.9	80 33	26.7	17 50.8	79 33	26.4	18 14.6	79 32	26.1	19 25.9	79 31	25.1	19 49.6	79 31	24.8	9
130	15 30.4	81 34	27.5	15 54.6	81 34	27.2	16 42.9	80 33	26.6	17 07.0	80 33	26.3	17 31.1	80 32	25.9	17 55.2	80 32	25.6	19 07.1	80 31	24.7	19 31.1	80 30	24.4	130
1	15 10.0	81 33	27.0	15 34.4	81 33	26.7	16 23.1	81 32	26.1	16 47.5	81 32	25.8	17 11.8	81 32	25.5	17 36.0	81 31	25.2	18 48.7	81 30	24.2	19 12.8	80 30	23.9	1
2	14 49.9	82 33	26.5	15 14.5	82 33	26.2	16 03.7	82 32	25.6	16 28.2	82 32	25.3	16 52.7	82 31	25.0	17 17.2	82 31	24.7	18 30.5	81 30	23.8	18 54.9	81 29	23.5	2
3	14 30.2	83 32	26.0	14 55.0	83 32	25.7	15 44.6	83 31	25.1	16 09.3	82 31	24.9	16 34.0	82 31	24.6	16 58.7	82 30	24.3	18 12.7	82 29	23.4	18 37.3	82 29	23.1	3
4	14 10.8	83 32	25.5	14 35.8	83 31	25.2	15 25.8	83 31	24.7	15 50.8	83 30	24.4	16 15.7	83 30	24.1	16 40.6	83 30	23.8	17 55.2	83 29	22.9	18 20.0	83 28	22.6	4
135	13 51.8	84 31	25.0	14 17.0	84 31	24.7	15 07.4	84 30	24.2	15 32.5	84 30	23.9	15 57.7	84 29	23.6	16 22.8	84 29	23.3	17 38.0	83 28	22.5	18 03.0	83 28	22.2	135
6	13 33.1	85 31	24.5	13 58.5	85 30	24.2	14 49.3	85 30	23.7	15 14.6	84 29	23.4	15 40.0	84 29	23.1	16 05.3	84 29	22.9	17 21.1	84 28	22.0	17 46.3	84 27	21.7	6
7	13 14.8	85 30	24.0	13 40.4	85 30	23.7	14 31.5	85 29	23.2	14 57.1	85 29	22.9	15 22.6	85 28	22.7	15 48.1	85 28	22.4	17 04.5	85 27	21.6	17 30.0	85 27	21.3	7
8	12 56.8	86 29	23.5	13 22.6	86 29	23.2	14 14.1	86 28	22.7	14 39.9	86 28	22.4	15 05.6	86 28	22.2	15 31.3	86 27	21.9	16 48.3	85 26	21.1	17 13.9	85 26	20.8	8
9	12 39.2	87 29	23.0	13 05.2	87 28	22.7	13 57.1	86 28	22.2	14 23.0	86 27	22.0	14 49.0	86 27	21.7	15 14.9	86 27	21.4	16 32.4	86 26	20.6	16 58.3	86 26	20.4	9
140	12 22.0	87 28	22.5	12 48.2	87 28	22.2	13 40.4	87 27	21.7	14 06.6	87 27	21.5	14 32.7	87 27	21.2	14 58.7	87 26	20.9	16 16.9	87 25	20.2	16 42.9	87 25	19.9	140
1	12 05.1	88 27	21.9	12 31.5	88 27	21.7	13 24.1	88 27	21.2	13 50.4	88 26	21.0	14 16.7	88 26	20.7	14 43.0	88 26	20.5	16 01.7	87 25	19.7	16 27.9	87 24	19.5	1
2	11 48.7	88 27	21.4	12 15.2	88 27	21.2	13 08.2	88 26	20.7	13 34.7	88 26	20.5	14 01.1	88 25	20.2	14 27.6	88 25	20.0	15 46.8	88 24	19.2	16 13.2	88 24	19.0	2
3	11 32.6	89 26	20.9	11 59.3	89 26	20.7	12 52.6	89 25	20.2	13 19.2	89 25	20.0	13 45.9	89 25	19.7	14 12.5	89 24	19.5	15 32.3	89 24	18.8	15 58.9	89 23	18.5	3
4	11 16.9	90 26	20.4	11 43.7	89 25	20.1	12 37.4	89 25	19.7	13 04.2	89 24	19.5	13 31.0	89 24	19.2	13 57.8	89 24	19.0	15 18.1	89 23	18.3	15 44.9	89 23	18.1	4
145	11 01.5	90 25	19.8	11 28.6	90 25	19.6	12 22.6	90 24	19.2	12 49.5	90 24	18.9	13 16.5	90 24	18.7	13 43.5	90 23	18.5	15 04.3	90 22	17.8	15 31.2	90 22	17.6	145
6	10 46.6	91 24	19.3	11 13.8	91 24	19.1	12 08.1	91 23	18.7	12 35.3	90 23	18.4	13 02.4	90 23	18.2	13 29.5	90 23	18.0	14 50.8	90 22	17.3	15 17.9	90 22	17.1	6
7	10 32.1	91 24	18.8	10 59.4	91 23	18.6	11 54.0	91 23	18.1	12 21.3	91 23	17.9	12 48.6	91 22	17.7	13 15.9	91 22	17.5	14 37.7	91 21	16.9	15 05.0	91 21	16.6	7
8	10 17.9	92 23	18.2	10 45.4	92 23	18.0	11 40.4	92 22	17.6	12 07.8	92 22	17.4	12 35.3	91 22	17.2	13 02.7	91 21	17.0	14 25.0	91 21	16.4	14 52.4	91 20	16.2	8
9	10 04.2	92 22	17.7	10 31.8	92 22	17.5	11 27.1	92 22	17.1	11 54.7	92 21	16.9	12 22.3	92 21	16.7	12 49.9	92 21	16.5	14 12.6	92 20	15.9	14 40.2	92 20	15.7	9
150	9 50.8	93 22	17.1	10 18.6	93 21	16.9	11 14.2	93 21	16.6	11 41.9	93 21	16.4	12 09.7	92 20	16.2	12 37.4	92 20	16.0	14 00.6	92 19	15.4	14 28.3	92 19	15.2	150
1	9 37.9	93 21	16.6	10 05.8	93 21	16.4	11 01.6	93 20	16.0	11 29.5	93 20	15.8	11 57.4	93 20	15.7	12 25.3	93 20	15.5	13 48.9	93 19	14.9	14 16.8	93 19	14.7	1
2	9 25.4	94 20	16.0	9 53.4	94 20	15.9	10 49.5	93 20	15.5	11 17.6	93 19	15.3	11 45.6	93 19	15.1	12 13.6	93 19	15.0	13 37.7	93 18	14.4	14 05.7	93 18	14.2	2
3	9 13.2	94 20	15.5	9 41.4	94 19	15.3	10 37.8	94 19	15.0	11 06.0	94 19	14.8	11 34.1	94 18	14.6	12 02.3	94 18	14.4	13 26.7	94 18	13.9	13 54.9	94 17	13.7	3
4	9 01.5	94 19	14.9	9 29.9	94 19	14.8	10 26.5	94 18	14.4	10 54.8	94 18	14.3	11 23.1	94 18	14.1	11 51.4	94 18	13.9	13 16.2	94 17	13.4	13 44.5	94 17	13.2	4
155	8 50.3	95 18	14.4	9 18.7	95 18	14.2	10 15.6	95 18	13.9	10 44.0	95 17	13.7	11 12.4	95 17	13.6	11 40.8	95 17	13.4	13 06.1	95 16	12.9	13 34.5	95 16	12.7	155
6	8 39.4	95 17	13.8	9 08.0	95 17	13.7	10 05.1	95 17	13.4	10 33.6	95 17	13.2	11 02.2	95 16	13.0	11 30.7	95 16	12.9	12 56.3	95 16	12.4	13 24.8	95 15	12.3	6
7	8 29.0	96 17	13.3	8 57.6	96 16	13.1	9 55.0	96 16	12.8	10 23.6	96 16	12.7	10 52.3	96 16	12.5	11 21.0	96 16	12.4	12 46.9	95 15	11.9	13 15.5	95 15	11.8	7
8	8 18.9	96 16	12.7	8 47.7	96 16	12.6	9 45.3	96 15	12.3	10 14.1	96 15	12.1	10 42.8	96 15	12.0	11 11.6	96 15	11.8	12 37.9	96 14	11.4	13 06.6	96 14	11.3	8
9	8 09.4	96 15	12.1	8 38.2	96 15	12.0	9 36.0	96 15	11.7	10 04.9	96 15	11.6	10 33.8	96 14	11.5	11 02.7	96 14	11.3	12 29.3	96 14	10.9	12 58.1	96 14	10.8	9
160	8 00.2	97 15	11.6	8 29.2	97 14	11.4	9 27.2	97 14	11.2	9 56.2	97 14	11.0	10 25.1	97 14	10.9	10 54.1	97 14	10.8	12 21.0	97 13	10.4	12 50.0	97 13	10.3	160
1	7 51.5	97 14	11.0	8 20.6	97 14	10.9	9 18.7	97 13	10.6	9 47.8	97 13	10.5	10 16.9	97 13	10.4	10 46.0	97 13	10.3	12 13.2	97 12	09.9	12 42.2	97 12	09.8	1
2	7 43.2	97 13	10.4	8 12.4	97 13	10.3	9 10.7	97 13	10.1	9 39.9	97 12	10.0	10 09.1	97 12	09.8	10 38.2	97 12	09.7	12 05.7	97 12	09.4	12 34.9	97 12	09.2	2
3	7 35.3	98 12	09.9	8 04.6	98 12	09.8	9 03.1	98 12	09.5	9 32.4	98 12	09.4	10 01.6	98 12	09.3	10 30.9	98 12	09.2	11 58.7	98 11	08.9	12 27.9	97 11	08.7	3
4	7 27.9	98 12	09.3	7 57.3	98 12	09.2	8 56.0	98 11	09.0	9 25.3	98 11	08.9	9 54.6	98 11	08.8	10 24.0	98 11	08.7	11 52.0	98 10	08.3	12 21.3	98 10	08.2	4
165	7 20.9	98 11	08.7	7 50.4	98 11	08.6	8 49.2	98 11	08.4	9 18.6	98 10	08.3	9 48.1	98 10	08.2	10 17.5	98 10	08.1	11 45.7	98 10	07.8	12 15.1	98 10	07.7	165
6	7 14.4	98 10	08.1	7 43.9	98 10	08.0	8 42.9	98 10	07.9	9 12.4	98 10	07.8	9 41.9	98 10	07.7	10 11.4	98 09	07.6	11 39.9	98 09	07.3	12 09.4	98 09	07.2	6
7	7 08.3	99 09	07.6	7 37.9	99 09	07.5	8 37.0	99 09	07.3	9 06.6	99 09	07.2	9 36.1	99 09	07.1	10 05.7	99 09	07.1	11 34.4	99 08	06.8	12 03.9	99 08	06.7	7
8	7 02.6	99 09	07.0	7 32.3	99 09	06.9	8 31.5	99 08	06.8	9 01.2	99 08	06.7	9 30.8	99 08	06.6	10 00.4	99 08	06.5	11 29.3	99 08	06.3	11 58.9	99 08	06.2	8
9	6 57.4	99 08	06.4	7 27.1	99 08	06.3	8 26.5	99 08	06.2	8 56.2	99 08	06.1	9 25.9	99 07	06.0	9 55.6	99 07	06.0	11 24.6	99 07	05.8	11 54.3	99 07	05.7	9
170	6 52.7	99 07	05.8	7 22.4	99 07	05.8	8 21.9	99 07	05.6	8 51.7	99 07	05.6	9 21.4	99 07	05.5	9 51.2	99 07	05.4	11 20.4	99 06	05.2	11 50.1	99 06	05.2	170
1	6 48.4	99 06	05.2	7 18.2	99 06	05.2	8 17.8	99 06	05.1	8 47.6	99 06	05.0	9 17.4	99 06	05.0	9 47.1	99 06	04.9	11 16.5	99 06	04.7	11 46.3	99 06	04.7	1
2	6 44.5	99 06	04.7	7 14.4	99 06	04.6	8 14.0	99 06	04.5	8 43.9	99 05	04.5	9 13.7	99 05	04.4	9 43.5	99 05	04.4	11 13.0	99 05	04.2	11 42.9	99 05	04.1	2
3	6 41.1	1.0 05	04.1	7 11.0	1.0 06	04.0	8 10.8	1.0 05	03.9	8 40.6	1.0 05	03.9	9 10.5	1.0 05	03.9	9 40.4	1.0 05	03.8	11 10.0	1.0 04	03.7	11 39.9	1.0 04	03.6	3
4	6 38.2	1.0 04	03.5	7 08.1	1.0 04	03.5	8 07.9	1.0 04	03.4	8 37.8	1.0 04	03.3	9 07.7	1.0 04	03.3	9 37.6	1.0 04	03.3	11 07.3	1.0 04	03.1	11 37.3	1.0 04	03.1	4
175	6 35.7	1.0 03	02.9	7 05.6	1.0 03	02.9	8 05.5	1.0 03	02.8	8 35.4	1.0 03	02.8	9 05.4	1.0 03	02.8	9 35.3	1.0 03	02.7	11 05.1	1.0 03	02.6	11 35.0	1.0 03	02.6	175
6	6 33.6	1.0 03	02.3	7 03.6	1.0 03	02.3	8 03.5	1.0 03	02.3	8 33.5	1.0 03	02.2	9 03.4	1.0 02	02.2	9 33.4	1.0 02	02.2	11 03.3	1.0 02	02.1	11 33.2	1.0 02	02.1	6
7	6 32.0	1.0 02	01.8	7 02.0	1.0 02	01.7	8 02.0	1.0 02	01.7	8 32.0	1.0 02	01.7	9 01.9	1.0 02	01.7	9 31.9	1.0 02	01.6	11 01.8	1.0 02	01.6	11 31.8	1.0 02	01.6	7
8	6 30.9	1.0 01	01.2	7 00.9	1.0 01	01.2	8 00.9	1.0 01	01.1	8 30.9	1.0 01	01.1	9 00.9	1.0 01	01.1	9 30.8	1.0 01	01.1	11 00.8	1.0 01	01.0	11 30.8	1.0 01	01.0	8
9	6 30.2	1.0 00	00.6	7 00.2	1.0 00	00.6	8 00.2	1.0 00	00.6	8 30.2	1.0 00	00.6	9 00.2	1.0 00	00.6	9 30.2	1.0 00	00.5	11 00.2	1.0 00	00.5	11 30.2	1.0 00	00.5	9
180	6 30.0	1.0 00	00.0	7 00.0	1.0 00	00.0	8 00.0	1.0 00	00.0	8 30.0	1.0 00	00.0	9 00.0	1.0 00	00.0	9 30.0	1.0 00	00.0	11 00.0	1.0 00	00.0	11 30.0	1.0 00	00.0	180

Lat. 42°

Lat. 43°

Lat. 44°

Lat. 45°

Lat 46°

La 47

L 48

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Lat. 42°

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	72 00.0	1.0 01	00.0	71 30.0	1.0 01	00.0	70 00.0	1.0 01	00.0	69 30.0	1.0 01	00.0	69 00.0	1.0 01	00.0	63 00.0	1.0 01	00.0	62 30.0	1.0 00	00.0	57 30.0	1.0 00	00.0	00
1	71 59.4	1.0 03	01.6	71 29.4	1.0 03	01.6	69 59.5	1.0 03	01.4	69 29.5	1.0 03	01.3	68 59.5	1.0 02	01.3	62 59.7	1.0 02	00.8	62 29.7	1.0 01	00.8	57 29.8	1.0 01	00.5	1
2	71 57.5	1.0 05	03.2	71 27.6	1.0 05	03.1	69 57.9	1.0 04	02.7	69 28.0	1.0 04	02.6	68 58.9	1.0 04	02.5	62 58.8	1.0 03	01.6	62 28.8	1.0 02	01.5	57 29.2	1.0 02	01.0	2
3	71 54.4	99 07	04.8	71 24.6	99 07	04.6	69 55.2	99 06	04.1	69 25.4	99 06	03.9	68 55.6	99 06	03.8	62 57.2	1.0 04	02.4	62 27.3	1.0 03	02.3	57 28.3	1.0 02	01.5	3
4	71 50.0	99 09	06.4	71 20.4	99 09	06.2	69 51.5	99 08	05.5	69 21.8	99 08	05.2	68 52.1	99 07	05.0	62 55.1	99 05	03.1	62 25.3	99 04	03.0	57 26.9	1.0 03	02.0	4
05	71 44.4	98 11	08.0	71 15.0	98 11	07.7	69 46.7	98 10	06.8	69 17.2	98 09	06.5	68 47.7	98 09	06.3	62 52.3	99 06	03.9	62 22.6	99 05	03.8	57 25.2	99 04	02.5	05
6	71 37.6	97 13	09.5	71 08.5	97 13	09.2	69 40.9	97 11	08.1	69 11.7	98 11	07.8	68 42.4	98 10	07.5	62 49.0	99 07	04.7	62 19.4	99 06	04.5	57 23.0	99 04	03.0	6
7	71 29.6	96 15	11.1	71 00.8	96 15	10.6	69 34.1	97 13	09.4	69 05.1	97 13	09.1	68 36.1	97 12	08.7	62 45.0	98 08	05.5	62 15.6	98 07	05.3	57 20.5	99 05	03.5	7
8	71 20.5	95 17	12.6	70 52.0	95 16	12.1	69 26.3	95 15	10.7	68 57.6	96 14	10.3	68 28.9	96 14	09.9	62 40.5	97 09	06.2	62 11.2	98 08	06.0	57 17.7	98 05	03.9	8
9	71 10.2	93 19	14.0	70 42.2	94 18	13.5	69 17.5	94 16	12.0	68 49.2	95 16	11.5	68 20.7	95 15	11.1	62 35.3	97 10	07.0	62 06.3	97 09	06.7	57 14.4	98 06	04.4	9
10	70 58.9	92 21	15.5	70 31.3	92 20	14.9	69 07.8	93 18	13.2	68 39.8	94 17	12.7	68 11.7	94 16	12.3	62 29.6	96 10	07.7	62 00.8	96 10	07.4	57 10.8	97 07	04.9	10
1	70 46.5	90 22	16.8	70 19.3	91 22	16.2	68 57.1	92 19	14.4	68 29.5	92 19	13.9	68 01.8	93 18	13.4	62 23.3	95 11	08.5	61 54.7	95 11	08.2	57 06.8	97 07	05.4	1
2	70 33.0	89 24	18.2	70 06.4	89 23	17.5	68 45.6	90 21	15.6	68 18.4	91 20	15.1	67 51.1	91 19	14.5	62 16.5	94 12	09.2	61 48.1	95 12	08.9	57 02.4	96 08	05.9	2
3	70 18.6	87 26	19.5	69 52.5	87 25	18.8	68 33.1	89 22	16.8	68 06.4	89 21	16.2	67 39.5	90 21	15.6	62 09.1	93 13	09.9	61 41.0	94 13	09.6	56 57.7	96 08	06.3	3
4	70 03.3	85 27	20.8	69 37.7	86 26	20.0	68 19.8	87 24	17.9	67 53.5	88 23	17.3	67 27.1	88 22	16.6	62 01.1	92 14	10.6	61 33.3	93 14	10.2	56 52.6	94 09	06.8	4
15	69 47.0	83 29	22.0	69 22.0	84 28	21.2	68 05.7	86 25	19.0	67 39.9	86 24	18.3	67 14.0	87 23	17.7	61 52.6	91 15	11.3	61 25.1	92 14	10.9	56 47.1	94 10	07.3	15
6	69 29.9	81 30	23.2	69 05.5	82 29	22.4	67 50.8	84 26	20.1	67 25.5	85 25	19.4	67 00.1	85 24	18.7	61 43.5	90 16	12.0	61 16.4	90 15	11.6	56 41.3	93 10	07.7	6
7	69 12.0	79 31	24.3	68 48.1	80 30	23.5	67 35.1	82 27	21.1	67 10.4	83 26	20.4	66 45.4	83 26	19.7	61 34.0	89 17	12.7	61 07.2	89 16	12.2	56 35.2	92 11	08.2	7
8	68 53.2	77 32	25.4	68 30.0	78 31	24.5	67 18.7	80 29	22.1	66 54.5	81 28	21.3	66 30.1	82 27	20.6	61 23.9	88 18	13.4	60 57.5	88 17	12.9	56 28.7	91 11	08.6	8
9	68 33.7	75 34	26.4	68 11.1	76 33	25.6	67 01.6	78 30	23.1	66 37.9	79 29	22.3	66 14.0	80 28	21.5	61 13.4	86 18	14.0	60 47.4	87 18	13.5	56 21.8	90 12	09.0	9
20	68 13.5	73 35	27.5	67 51.5	74 34	26.5	66 43.8	77 31	24.0	66 20.7	77 30	23.2	65 57.4	78 29	22.4	61 02.3	85 19	14.7	60 36.7	86 19	14.1	56 14.7	89 12	09.5	20
1	67 52.6	71 36	28.4	67 31.2	72 35	27.5	66 25.3	75 32	24.9	66 02.8	75 31	24.1	65 40.1	76 30	23.3	60 50.8	84 20	15.3	60 25.6	84 19	14.7	56 07.2	88 13	09.9	1
2	67 31.1	69 37	29.3	67 10.4	70 36	28.4	66 06.3	73 33	25.7	65 44.4	74 32	24.9	65 22.2	74 31	24.1	60 38.8	82 21	15.9	60 14.0	83 20	15.3	55 59.3	87 14	10.3	2
3	67 08.9	66 38	30.2	66 48.9	68 37	29.3	65 46.6	71 34	26.6	65 25.3	72 33	25.7	65 03.7	73 32	24.9	60 26.4	81 21	16.5	60 02.0	81 21	15.9	55 51.2	86 14	10.7	3
4	66 46.2	64 39	31.0	66 26.8	65 38	30.1	65 26.4	69 35	27.3	65 05.7	70 34	26.5	64 44.7	71 33	25.6	60 13.5	79 22	17.1	59 49.6	80 21	16.5	55 42.8	84 15	11.1	4
25	66 23.0	62 40	31.8	66 04.2	63 39	30.9	65 05.7	67 35	28.1	64 45.5	68 34	27.2	64 25.1	69 33	26.4	60 00.2	78 23	17.6	59 36.8	78 22	17.0	55 34.0	83 15	11.5	25
6	65 59.2	60 40	32.6	65 41.0	61 39	31.6	64 44.4	65 36	28.8	64 24.9	66 35	28.0	64 05.0	67 34	27.1	59 46.5	76 24	18.2	59 23.5	77 23	17.5	55 24.9	82 16	11.9	6
7	65 35.0	58 41	33.3	65 17.4	59 40	32.3	64 22.7	63 37	29.5	64 03.7	64 36	28.6	63 44.5	65 35	27.8	59 32.4	75 24	18.7	59 09.9	75 23	18.1	55 15.6	81 16	12.3	7
8	65 10.2	56 42	34.0	64 53.4	57 41	33.0	64 00.5	61 38	30.2	63 42.2	62 37	29.3	63 23.5	63 36	28.4	59 17.9	73 25	19.2	58 55.9	74 24	18.6	55 06.0	79 17	12.7	8
9	64 45.1	54 43	34.6	64 28.9	55 42	33.7	63 37.8	58 38	30.8	63 20.1	60 37	29.9	63 02.1	61 36	29.0	59 03.0	71 25	19.7	58 41.5	72 25	19.1	54 56.0	78 17	13.0	9
30	64 19.6	51 43	35.2	64 03.9	53 42	34.3	63 14.8	56 39	31.4	62 57.7	58 38	30.5	62 40.2	59 37	29.6	58 47.8	70 26	20.2	58 26.7	70 25	19.5	54 45.9	76 17	13.4	30
1	63 53.7	49 44	35.8	63 38.7	51 43	34.8	62 51.3	54 40	32.0	62 34.8	56 39	31.1	62 18.0	57 38	30.2	58 32.2	68 27	20.7	58 11.6	69 26	20.0	54 35.4	75 18	13.7	1
2	63 27.4	47 44	36.4	63 13.0	49 43	35.4	62 27.5	52 40	32.5	62 11.6	54 39	31.6	61 55.4	55 38	30.7	58 16.2	66 27	21.2	57 56.2	67 26	20.5	54 24.7	74 18	14.1	2
3	63 00.8	45 45	36.9	62 47.0	47 44	35.9	62 03.4	50 41	33.1	61 48.1	52 40	32.2	61 32.4	53 39	31.3	58 00.0	65 28	21.6	57 40.5	65 27	20.9	54 13.7	72 19	14.4	3
4	62 33.9	43 45	37.4	62 20.7	45 44	36.4	61 38.9	48 41	33.6	61 24.2	50 40	32.6	61 09.1	51 39	31.7	57 43.4	63 28	22.0	57 24.4	64 27	21.3	54 02.5	71 19	14.7	4
35	62 06.7	41 46	37.8	61 54.1	43 45	36.8	61 14.1	46 42	34.0	61 00.0	48 41	33.1	60 45.5	49 40	32.2	57 26.5	61 29	22.5	57 08.1	62 28	21.7	53 51.0	69 20	15.1	35
6	61 39.2	39 46	38.2	61 27.2	41 45	37.3	60 49.0	44 42	34.5	60 35.5	46 41	33.6	60 21.6	47 40	32.7	57 09.3	59 29	22.9	56 51.4	60 28	22.1	53 39.3	68 20	15.4	6
7	61 11.5	37 47	38.6	61 00.1	39 46	37.7	60 23.6	42 43	34.9	60 10.7	44 42	34.0	59 57.4	45 41	33.1	56 51.9	58 30	23.2	56 34.5	58 29	22.5	53 27.4	66 20	15.7	7
8	60 43.5	35 47	39.0	60 32.7	37 46	38.1	59 58.0	41 43	35.3	59 45.6	42 42	34.4	59 32.9	43 41	33.5	56 34.1	56 30	23.6	56 17.3	57 29	22.9	53 15.2	64 21	16.0	8
9	60 15.4	33 47	39.4	60 05.1	35 46	38.4	59 32.1	39 43	35.6	59 20.3	40 43	34.7	59 08.2	41 42	33.8	56 16.2	54 30	24.0	55 59.8	55 30	23.2	53 02.8	63 21	16.2	9
40	59 47.0	31 48	39.7	59 37.3	33 47	38.7	59 06.0	37 44	36.0	58 54.8	38 43	35.1	58 43.3	39 42	34.2	55 57.9	52 31	24.3	55 42.1	53 30	23.5	52 50.3	61 21	16.5	40
1	59 18.4	30 48	40.0	59 09.3	31 47	39.1	58 39.7	35 44	36.3	58 29.1	36 43	35.4	58 18.1	37 42	34.5	55 39.5	50 31	24.6	55 24.2	51 30	23.9	52 37.5	60 22	16.8	1
2	58 49.7	28 48	40.3	58 41.1	29 47	39.3	58 13.2	33 44	36.6	58 03.1	34 44	35.7	57 52.7	35 43	34.8	55 20.8	49 32	24.9	55 06.1	49 31	24.2	52 24.5	58 22	17.0	2
3	58 20.8	26 48	40.5	58 12.8	27 48	39.6	57 46.5	31 45	36.9	57 37.0	32 44	36.0	57 27.1	34 43	35.1	55 01.9	47 32	25.2	54 47.7	48 31	24.5	52 11.4	56 22	17.3	3
4	57 51.7	24 49	40.8	57 44.3	25 48	39.9	57 19.7	29 45	37.2	57 10.7	30 44	36.3	57 01.4	32 43	35.4	54 42.7	45 32	25.5	54 29.1	46 31	24.8	51 58.0	55 23	17.5	4
45	57 22.6	22 49	41.0	57 15.7	24 48	40.1	56 52.7	27 45	37.4	56 44.3	29 44	36.5	56 35.5	30 43	35.7	54 23.4	43 32	25.8	54 10.4	44 32	25.0	51 44.5	53 23	17.8	45
6	56 53.3	21 49	41.2	56 46.9	22 48	40.3	56 25.5	26 45	37.6	56 17.6	27 45	36.8	56 09.4	28 44	35.9	54 03.9	41 33	26.1	53 51.4	42 32	25.3	51 30.8	51 23	18.0	6
7	56 23.8	19 49	41.4	56 18.0	20 48	40.5	55 58.2	24 46	37.8	55 50.9	25 45	37.0	55 43.2	26 44	36.1	53 44.3	39 33	26.3	53 32.3	40 32	25.5	51 16.9	49 23	18.2	7
8	55 54.3	17 49	41.5	55 49.0	18 48	40.6	55 30.8	22 46	38.0	55 24.0	23 45	37.2	55 16.8	24 44	36.3	53 24.4	38 33	26.5	53 13.0	39 32	25.8	51 02.9	48 24	18.4	8
9	55 24.7	15 49	41.7	55 19.9	17 49	40.8	55 03.3	20 46	38.2	54 57.0	22 45	37.4	54 50.4	23 44	36.5	53 04.4	36 34	26.8	52 53.5	37 33	26.0	50 48.8	46 24	18.6	9
50	54 55.1	14 50	41.8	54 50.7	15 49	40.9	54 35.6	19 46	38.4	54 29.9	20 45	37.5	54 23.8	21 44	36.7	52 44.3	34 34	27.0	52 33.9	35 33	26.2	50 34.5	44 24	18.8	50
1	54 25.3	12 50	41.9	54 21.5	13 49	41.1	54 07.9	17 46	38.5	54 02.7	18 46	37.7	53 57.1	19 45	36.8	52 24.0	32 34	27.2	52 14.2	33 33	26.4	50 20.0	43 24	19.0	1
2	53 55.5	10 50	42.0	53 52.2	12 49	41.2	53 40.1	15 46	38.6	53 35.4	16 46	37.8	53 30.3	17 45	37.0	52 03.6	30 34	27.3	51 54.3	31 33	26.6	50 05.5	41 24	19.2	2
3	53 25.6	09 50	42.1	53 22.8	10 49	41.2	53 12.2	13 47	38.8	53 08.0	15 46	37.9	53 03.5	16 45	37.1	51 43.0	29 34	27.5	51 34.3	30 34	26.7	49 50.8	39 25	19.3	3
4	52 55.7	07 50	42.1	52 53.4	08 49	41.3	52 44.3	12 47	38.9	52 40.6	13 46	38.0	52 36.5	14 45	37.2	51 22.4	27 35	27.7	51 14.2	28 34	26.9	49 35.9	37 25	19.5	4
55	52 25.8	06 50	42.2	52 23.9	07 49	41.4	52 16.3	10 47	38.9	52 13.1	11 46	38.1	52 09.5	12 45	37.3	51 01.6	25 35	27.8	50 53.9	26 34	27.1	49 21.0	36 25	19.6	55
6	51 55.8	04 50	42.2	51 54.4	05 49	41.4	51 48.2	09 47	39.0	51 45.5	10 46	38.2	51 42.5	11 45	37.4	50 40.8	23 35	28.0	50 33.6	24 34	27.2	49 06.0	34 25	19.8	6
7	51 25.9	03 50	42.3	51 24.9	04 49	41.5	51 20.2	07 47	39.1	51 17.9	08 46	38.3	51 15.4	09 45	37.5	50 19.8	22 35	28.1	50 13.2	23 34	27.3	48 50.8	32 25	19.9	7
8	50 55.9	01 50	42.3	50 55.4	02 49	41.5	50 52.0	05 47	39.1	50 50.3	06 46	38.3	50 48.2	07 45	37.5	49 58.8	20 35	28.2	49 52.7	21 34	27.4	48 35.6	30 26	20.0	8
9	50 25.9	00 50	42.3	50 25.8	01 49	41.5	50 23.9	04 47	39.1	50 22.6	05 46	38.4	50 21.0	06 45	37.6	49 37.7	18 35	28.3	49 32.1	19 34	27.6	48 20.3	29 26	20.2	9
60	49 55.9	02 50	42.3	49 56.3	01 49	41.5	49 55.8	02 47	39.2	49 54.9	03 46	38.4	49 53.8	04 45	37.6	49 16.5	16 35	28.4	49 11.4	17 35	27.6	48 04.9	27 26	20.3	60
1	49 25.9	03 50	42.3	49 26.8	02 49	41.5	49 27.6	01 47	39.2	49 27.3	02 46	38.4	49 26.6	03 45	37.6	48 55.2	15 36	28.5	48 50.7	16 35	27.7	47 49.4	26 26	20.4	1
2	48 55.9	05 50	42.2	48 57.2	04 49	41.5	48 59.4	01 47	39.2	48 59.5	00 46	38.4	48 59.4	01 45	37.7	48 34.9	13 36	28.6	48 29.9	14 35	27.8	47 33.8	25 26	20.5	2
3	48 26.0	06 50	42.2	48 27.7	05 49	41.4	48 31.3	02 47	39.2	48 31.8	01 46	38.4	48 32.1	00 45	37.7	48 12.6	11 36	28.6	48 09.1	12 35	27.9	47 18.2	22 26	20.6	3
4	47 56.0	08 50	42.1	47 58.2	07 49	41.4	48 03.1	04 47	39.1	48 04.1	03 46	38.4	48 04.9	02 45	37.6	47 51.2	10 36	28.7	47 48.2	11 35	27.9	47 02.5	20 26	20.6	4
65	47 26.1	09 50	42.1	47 28.8	08 49	41.3	47 35.0	05 47	39.1	47 36.5	05 46	38.4	47 37.7	04 45	37.6	47 29.8	08 36	28.7	47 27.3	09 35	28.0	46 46.8	18 26	20.7	65
6	46 56.3	11 50	42.0	46 59.3	10 49	41.3	47 06.9	07 47	39.1	47 08.8	06 46	38.3	47 10.5	05 45	37.6	47 08.4	06 36	28.8	47 06.3	07 35	28.0	46 31.0	16 26	20.8	6
7	46 26.5	12 50	41.9	46 30.0	11 49	41.2	46 38.8	08 47	39.0	46 41.2	07 46	38.3	46 43.3	07 45	37.6	46 46.9	05 36	28.8	46 45.4	05 35	28.1	46 15.1	15 26	20.8	7
8	45 56.7	13 49	41.8	46 00.6	13 49	41.1	46 10.7	10 47	39.0	46 13.5	09 46	38.2	46 16.1	08 45	37.5	46 25.4	03 36	28.8	46 24.4	04 35	28.1	45 59.3	13 27	20.9	8
9	45 27.0	15 49	41.7	45 31.3	14 49	41.0	45 42.7	11 47	38.9	45 46.0	10 46	38.2	45 49.0	10 45	37.5	46 03.9	01 36	28.8	46 03.4	02 35	28.1	45 43.3	11 27	20.9	9
70	44 57.4	16 49	41.6	45 02.1	15 49	40.9	45 14.7	13 47	38.8	45 18.4	12 46	38.1	45 21.9	11 45	37.4	45 42.4	00 36	28.8	45 42.4	01 35	28.1	45 27.4	09 27	21.0	70
1	44 27.8	18 49	41.5	44 32.9	17 48	40.8	44 46.8	14 46	38.7	44 51.0	13 46	38.0	44 54.8	12 45	37.3	45 29.9	02 36	28.8	45 21.4	01 35	28.1	45 11.4	08 27	21.0	1
2	43 58.3	19 49	41.4	44 03.9	18 48	40.7	44 19.0	16 46	38.6	44 23.5	15 46	37.9	44 27.8	14 45	37.2	44 59.4	04 36	28.8	45 00.4	03 35	28.1	44 55.4	06 27	21.0	2
3	43 28.9	20 49	41.2	43 34.8	19 48	40.5	43 51.2	17 46	38.5	43 56.1	16 46	37.8	44 00.9	15 45	37.1	44 37.9	05 36	28.8	44 39.4	04 35	28.1	44 39.4	04 27	21.1	3
4	42 59.6	21 49	41.1	43 05.9	21 48	40.4	43 23.5	18 46	38.4	43 28.8	18 45	37.7	43 34.0	17 45	37.0	44 16.5	07 36	28.8	44 18.4	06 35	28.1	44 23.4	03 27	21.1	4
75	42 30.3	23 49	40.9	42 37.0	22 48	40.3	42 55.8	20 46	38.3	43 01.6	19 45	37.6	43 07.2	18 45	36.9	43 55.0	08 36	28.7	43 57.4	08 35	28.0	44 07.4	01 27	21.1	75
6	42 01.1	24 48	40.8	42 08.2	23 48	40.1	42 28.2	21 46	38.1	42 34.4	20 45	37.5	42 40.4	20 44	36.8	43 33.6	10 36	28.7	43 36.5	09 35	28.0	43 51.3	01 27	21.1	6
7	41 32.1	25 48	40.6	41 39.6	25 48	40.0	42 00.7	22 46	38.0	42 07.3	22 45	37.3	42 13.7	21 44	36.7	43 12.2	11 36	28.6	43 15.6	11 35	27.9	43 35.3	03 27	21.1	7
8	41 03.1	27 48	40.4	41 11.0	26 48	39.8	41 33.3	24 46	37.9	41 40.3	23 45	37.2	41 47.1	22 44	36.6	42 50.9	13 35	28.6	42 54.7	12 35	27.9	43 19.3	04 27	21.1	8
9	40 34.2	28 48	40.3	40 42.5	27 47	39.6	41 06.0	25 45	37.7	41 13.4	24 45	37.1	41 20.6	24 44	36.4	42 29.6	15 35	28.5	42 33.8	14 35	27.8	43 03.2	06 27	21.0	9
80	40 05.5	29 48	40.1	40 14.1	28 47	39.4	40 38.8	26 45	37.5	40 46.6	26 45	36.9	40 54.2	25 44	36.3	42 08.3	16 35	28.4	42 13.1	15 35	27.8	42 47.2	07 27	21.0	80
1	39 36.8	30 48	39.9	39 45.8	30 47	39.3	40 11.7	28 45	37.4	40 19.9	27 44	36.7	40 27.9	26 44	36.1	41 47.2	18 35	28.3	41 52.3	17 34	27.7	42 31.3	09 27	21.0	1
2	39 08.3	32 47	39.7	39 17.7	31 47	39.1	39 44.7	29 45	37.2	39 53.3	28 44	36.6	40 01.6	28 44	36.0	41 26.0	19 35	28.3	41 31.6	18 34	27.6	42 15.3	11 27	20.9	2
3	38 39.9	33 47	39.5	38 49.7	32 46	38.9	39 17.8	30 45	37.0	39 26.7	30 44	36.4	39 35.5	29 43	35.8	41 04.9	21 35	28.2	41 11.0	20 34	27.5	41 59.4	12 26	20.9	3
4	38 11.6	34 47	39.3	38 21.7	33 46	38.7	38 51.0	32 44	36.8	39 00.3	31 44	36.2	39 09.5	30 43	35.6	40 43.9	22 35	28.1	40 50.5	21 34	27.4	41 43.5	14 26	20.9	4
85	37 43.5	35 47	39.0	37 54.0	35 46	38.4	38 24.3	33 44	36.6	38 34.0	32 44	36.0	38 43.6	32 43	35.4	40 23.0	24 35	27.9	40 30.0	23 34	27.3	41 27.6	16 26	20.8	85
6	37 15.5	36 46	38.8	37 26.3	36 46	38.2	37 57.7	34 44	36.4	38 07.9	33 43	35.8	38 17.8	33 43	35.2	40 02.1	25 35	27.8	40 09.5	24 34	27.2	41 11.8	17 26	20.8	6
7	36 47.6	38 46	38.6	36 58.8	37 46	38.0	37 31.3	35 44	36.2	37 41.8	35 43	35.6	37 52.1	34 43	35.1	39 41.4	26 34	27.7	39 49.2	26 34	27.1	40 56.0	19 26	20.7	7
8	36 19.9	39 46	38.3	36 31.4	38 45	37.8	37 05.0	37 44	36.0	37 15.9	36 43	35.4	37 26.6	35 42	34.9	39 20.7	28 34	27.6	39 28.9	27 34	27.0	40 40.3	20 26	20.6	8
9	35 52.3	40 46	38.1	36 04.2	39 45	37.5	36 38.9	38 43	35.8	36 50.1	37 43	35.2	37 01.2	37 43	34.6	39 00.1	29 34	27.5	39 08.8	29 33	26.8	40 24.6	22 26	20.5	9
90	35 24.9	41 45	37.8	35 37.1	41 45	37.3	36 12.9	39 43	35.6	36 24.5	38 42	35.0	36 35.9	38 42	34.4	38 39.6	31 34	27.3	38 48.7	30 33	26.7	40 09.0	23 26	20.5	90

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	34 57.6	42 45	37.6	35 10.2	42 45	37.0	35 47.0	40 43	35.4	35 58.9	40 42	34.8	36 10.7	39 42	34.2	38 19.1	32 34	27.2	38 28.7	31 33	26.6	39 53.5	25 26	20.4	91
2	34 30.5	43 45	37.3	34 43.4	43 44	36.8	35 21.3	41 43	35.1	35 33.6	41 42	34.6	35 45.7	40 41	34.0	37 58.8	33 34	27.0	38 08.8	33 33	26.4	39 38.9	26 26	20.3	2
3	34 03.5	44 45	37.1	34 16.8	44 44	36.5	34 55.7	42 42	34.9	35 08.4	42 42	34.3	35 20.9	41 41	33.8	37 38.6	35 34	26.9	37 49.9	34 33	26.3	39 22.5	28 26	20.2	3
4	33 36.7	46 44	36.8	33 50.3	45 44	36.3	34 30.3	44 42	34.6	34 43.3	43 42	34.1	34 56.2	43 41	33.5	37 18.5	36 33	26.7	37 29.3	36 33	26.1	39 07.2	29 26	20.1	4
95	33 10.1	47 44	36.5	33 24.0	46 44	36.0	34 05.0	45 42	34.4	34 18.4	44 41	33.8	34 31.6	44 41	33.3	36 58.5	38 33	26.5	37 09.7	37 32	26.0	38 51.9	31 26	20.0	95
6	32 43.6	48 44	36.2	32 57.9	47 43	35.7	33 39.9	46 42	34.1	33 53.6	46 41	33.6	34 07.2	45 40	33.1	36 38.7	39 33	26.4	36 50.3	38 32	25.8	38 36.7	32 26	19.9	6
7	32 17.4	49 43	35.9	32 32.0	48 43	35.4	33 15.0	47 41	33.9	33 29.1	47 41	33.3	33 43.0	46 40	32.8	36 18.9	40 33	26.2	36 30.9	40 32	25.6	38 21.6	34 25	19.8	7
8	31 51.3	50 43	35.7	32 06.2	50 43	35.1	32 50.2	48 41	33.6	33 04.6	48 40	33.1	33 18.9	47 40	32.5	35 59.3	42 32	26.0	36 11.7	41 32	25.5	38 06.5	35 25	19.7	8
9	31 25.4	51 43	35.4	31 40.6	51 42	34.9	32 25.6	49 41	33.3	32 40.4	49 40	32.8	32 55.0	49 40	32.3	35 39.8	43 32	25.8	35 52.6	42 32	25.3	37 51.6	37 25	19.5	9
100	30 59.7	52 43	35.1	31 15.3	52 42	34.6	32 01.2	50 40	33.0	32 16.3	50 40	32.5	32 31.3	50 39	32.0	35 20.5	44 32	25.6	35 33.6	44 31	25.1	37 36.7	38 25	19.4	100
1	30 34.2	53 42	34.8	30 50.1	53 42	34.3	31 37.0	52 40	32.8	31 52.4	51 40	32.3	32 07.7	51 39	31.8	35 01.2	45 32	25.4	35 14.8	45 31	24.9	37 21.9	40 24	19.3	1
2	30 08.9	54 42	34.4	30 25.1	54 41	34.0	31 13.0	53 40	32.5	31 28.7	52 39	32.0	31 44.4	52 39	31.5	34 42.2	47 32	25.2	34 56.1	46 31	24.7	37 07.3	41 24	19.1	2
3	29 43.7	55 42	34.1	30 00.2	55 41	33.6	30 49.1	54 39	32.2	31 05.2	53 39	31.7	31 21.2	53 38	31.2	34 23.2	48 31	25.0	34 37.5	48 31	24.5	36 52.7	42 24	19.0	3
4	29 18.8	56 41	33.8	29 35.6	56 41	33.3	30 25.5	55 39	31.9	30 41.9	54 39	31.4	30 58.2	54 38	30.9	34 04.4	49 31	24.8	34 19.1	49 30	24.3	36 38.2	44 24	18.9	4
105	28 54.1	57 41	33.5	29 11.2	57 40	33.0	30 02.0	56 39	31.6	30 18.7	56 38	31.1	30 35.4	55 38	30.6	33 45.8	50 31	24.6	34 00.8	50 30	24.1	36 23.9	45 24	18.7	105
6	28 29.6	58 40	33.2	28 47.1	58 40	32.7	29 38.8	57 38	31.3	29 55.8	57 38	30.8	30 12.7	56 37	30.3	33 27.3	52 31	24.4	33 42.7	51 30	23.9	36 09.6	47 24	18.6	6
7	28 05.4	59 40	32.8	28 23.1	59 40	32.4	29 15.7	58 38	31.0	29 33.1	58 38	30.5	29 50.3	57 37	30.0	33 09.0	53 30	24.2	33 24.8	52 30	23.7	35 55.5	48 23	18.4	7
8	27 41.3	60 40	32.5	27 59.3	60 39	32.0	28 52.9	59 38	30.7	29 10.5	59 37	30.2	29 28.1	58 37	29.7	32 50.8	54 30	23.9	33 06.9	54 29	23.4	35 41.5	49 23	18.2	8
9	27 17.5	61 39	32.1	27 35.8	61 39	31.7	28 30.2	60 37	30.3	28 48.2	60 37	29.9	29 06.1	59 36	29.4	32 32.8	55 30	23.7	32 49.3	55 29	23.2	35 27.6	51 23	18.1	9
110	26 53.9	62 39	31.8	27 12.5	62 38	31.4	28 07.8	61 37	30.0	28 26.1	61 36	29.6	28 44.3	60 36	29.1	32 14.9	56 29	23.5	32 31.8	56 29	23.0	35 13.8	52 23	17.9	110
1	26 30.5	63 39	31.4	26 49.4	63 38	31.0	27 45.6	62 37	29.7	28 04.2	62 36	29.2	28 22.7	61 36	28.8	31 57.3	58 29	23.2	32 14.5	57 29	22.7	35 00.2	53 23	17.7	1
2	26 07.3	64 38	31.1	26 26.5	64 38	30.7	27 23.7	63 36	29.4	27 42.5	63 36	28.9	28 01.3	63 35	28.5	31 39.8	59 29	23.0	31 57.3	58 28	22.5	34 46.7	54 22	17.6	2
3	25 44.4	65 38	30.7	26 03.9	65 37	30.3	27 01.9	64 36	29.0	27 21.1	64 35	28.6	27 40.2	64 35	28.2	31 22.5	60 29	22.7	31 40.4	59 28	22.3	34 33.3	56 22	17.4	3
4	25 21.8	66 37	30.4	25 41.5	66 37	29.9	26 40.4	65 35	28.7	26 59.9	65 35	28.3	27 19.3	65 34	27.8	31 05.3	61 28	22.5	31 23.6	61 28	22.0	34 20.0	57 22	17.2	4
115	24 59.4	67 37	30.0	25 19.4	67 36	29.6	26 19.1	66 35	28.3	26 38.9	66 35	27.9	26 58.6	65 34	27.5	30 48.4	62 28	22.2	31 06.9	62 27	21.8	34 06.9	58 22	17.0	115
6	24 37.2	68 37	29.6	24 57.5	68 36	29.2	25 58.1	67 35	28.0	26 18.1	67 34	27.6	26 38.1	66 34	27.2	30 31.6	63 28	22.0	30 50.5	63 27	21.5	33 54.0	59 21	16.8	6
7	24 15.3	69 36	29.3	24 35.9	69 36	28.9	25 37.3	68 34	27.6	25 57.6	68 34	27.2	26 17.9	67 33	26.8	30 15.0	64 27	21.7	30 34.2	64 27	21.2	33 41.1	61 21	16.6	7
8	23 53.6	70 36	28.9	24 14.5	69 35	28.5	25 16.7	69 34	27.3	25 37.3	69 33	26.9	25 57.9	68 33	26.5	29 58.6	65 27	21.4	30 18.2	65 26	21.0	33 28.4	62 21	16.4	8
9	23 32.2	71 35	28.5	23 53.4	70 35	28.1	24 56.4	70 33	26.9	25 17.3	70 33	26.5	25 38.1	69 32	26.1	29 42.5	66 27	21.2	30 02.3	66 26	20.7	33 15.9	63 21	16.2	9
120	23 11.1	71 35	28.1	23 32.5	71 34	27.7	24 36.3	71 33	26.6	24 57.5	70 33	26.2	25 18.6	70 32	25.8	29 26.5	67 26	20.9	29 46.6	67 26	20.5	33 03.5	64 20	16.0	120
1	22 50.2	72 34	27.7	23 11.9	72 34	27.3	24 16.5	72 33	26.2	24 37.9	71 32	25.8	24 59.3	71 32	25.4	29 10.7	68 26	20.6	29 31.2	68 25	20.2	32 51.3	65 20	15.8	1
2	22 29.6	73 34	27.3	22 51.5	73 33	26.9	23 57.0	72 32	25.8	24 18.6	72 32	25.4	24 40.3	72 31	25.1	28 55.1	69 26	20.3	29 15.9	69 25	19.9	32 39.2	66 20	15.6	2
3	22 09.3	74 33	26.9	22 31.5	74 33	26.6	23 37.7	73 32	25.5	23 59.6	73 31	25.1	24 21.5	73 31	24.7	28 39.7	70 25	20.0	29 00.8	70 25	19.6	32 27.3	67 20	15.4	3
4	21 49.2	75 33	26.5	22 11.7	75 33	26.2	23 18.6	74 31	25.1	23 40.8	74 31	24.7	24 03.0	74 30	24.3	28 24.5	71 25	19.7	28 45.9	71 24	19.3	32 15.5	68 19	15.2	4
125	21 29.5	76 32	26.1	21 52.1	75 32	25.8	22 59.9	75 31	24.7	23 22.3	75 30	24.3	23 44.8	75 30	24.0	28 09.6	72 25	19.4	28 31.3	72 24	19.1	32 03.9	70 19	15.0	125
6	21 10.0	76 32	25.7	21 32.9	76 32	25.4	22 41.4	76 30	24.3	23 04.1	76 30	24.0	23 26.8	76 30	23.6	27 54.9	73 24	19.2	28 16.8	73 24	18.8	31 52.5	71 19	14.7	6
7	20 50.8	77 32	25.3	21 13.9	77 31	25.0	22 23.2	77 30	23.9	22 46.1	77 30	23.6	23 09.1	76 29	23.2	27 40.3	74 24	18.9	28 02.6	74 23	18.5	31 41.2	72 18	14.5	7
8	20 31.9	78 31	24.9	20 55.3	78 31	24.5	22 05.2	77 29	23.5	22 28.4	77 29	23.2	22 51.6	77 29	22.8	27 26.0	75 23	18.6	27 48.5	75 23	18.2	31 30.1	73 18	14.3	8
9	20 13.3	79 31	24.5	20 36.9	79 30	24.1	21 47.6	78 29	23.1	22 11.0	78 29	22.8	22 34.5	78 28	22.5	27 12.0	76 23	18.2	27 34.7	76 23	17.9	31 19.2	74 18	14.1	9
130	19 55.0	80 30	24.0	20 18.8	79 30	23.7	21 30.2	79 28	22.7	21 53.9	79 28	22.4	22 17.6	79 28	22.1	26 58.1	77 23	17.9	27 21.2	77 22	17.6	31 08.4	75 18	13.8	130
1	19 36.9	80 30	23.6	20 01.0	80 29	23.3	21 13.1	80 28	22.3	21 37.0	80 28	22.0	22 00.9	80 27	21.7	26 44.5	78 22	17.6	27 07.8	78 22	17.3	30 57.9	76 17	13.6	1
2	19 19.2	81 29	23.2	19 43.5	81 29	22.9	20 56.3	81 28	21.9	21 20.5	81 27	21.6	21 44.6	80 27	21.3	26 31.1	79 22	17.3	26 54.7	79 22	17.0	30 47.5	77 17	13.4	2
3	19 01.8	82 28	22.8	19 26.4	82 28	22.5	20 39.8	81 27	21.5	21 04.2	81 27	21.2	21 28.5	81 26	20.9	26 17.9	80 22	17.0	26 41.8	79 21	16.7	30 37.2	78 17	13.1	3
4	18 44.7	83 28	22.3	19 09.5	82 28	22.0	20 23.6	82 27	21.1	20 48.2	82 26	20.8	21 12.8	82 26	20.5	26 05.0	80 21	16.7	26 29.1	80 21	16.3	30 27.2	78 16	12.9	4
135	18 28.0	83 27	21.9	18 52.9	83 27	21.6	20 07.6	83 26	20.7	20 32.5	83 26	20.4	20 57.3	83 25	20.1	25 52.4	81 21	16.4	26 16.7	81 20	16.0	30 17.4	79 16	12.6	135
6	18 11.5	84 27	21.4	18 36.7	84 27	21.2	19 52.0	84 26	20.3	20 17.1	84 25	20.0	20 42.1	83 25	19.7	25 39.9	82 20	16.0	26 04.5	82 20	15.7	30 07.7	80 16	12.4	6
7	17 55.4	85 26	21.0	18 20.7	85 26	20.7	19 36.7	84 25	19.9	20 02.0	84 25	19.6	20 27.2	84 24	19.3	25 27.7	83 20	15.7	25 52.5	83 20	15.4	29 58.2	81 15	12.1	7
8	17 39.5	85 26	20.6	18 05.1	85 25	20.3	19 21.7	85 24	19.4	19 47.2	85 24	19.2	20 12.7	85 24	18.9	25 15.8	84 20	15.4	25 40.8	83 19	15.1	29 48.9	82 15	11.9	8
9	17 24.0	86 25	20.1	17 49.8	86 25	19.8	19 07.0	86 24	19.0	19 32.7	86 24	18.8	19 58.4	85 23	18.5	25 04.1	84 19	15.0	25 29.3	84 19	14.7	29 39.8	83 15	11.6	9
140	17 08.9	87 25	19.7	17 34.9	87 24	19.4	18 52.6	86 23	18.6	19 18.5	86 23	18.3	19 44.4	86 23	18.1	24 52.6	85 19	14.7	25 18.1	85 18	14.4	29 30.9	84 14	11.4	140
1	16 54.1	87 24	19.2	17 20.2	87 24	18.9	18 38.6	87 23	18.2	19 04.7	87 23	17.9	19 30.7	87 22	17.6	24 41.4	86 18	14.4	25 07.1	86 18	14.1	29 22.2	84 14	11.1	1
2	16 39.6	88 24	18.7	17 05.9	88 23	18.5	18 24.8	88 22	17.7	18 51.1	88 22	17.5	19 17.4	87 22	17.2	24 30.5	86 18	14.0	24 56.4	86 17	13.8	29 13.7	85 14	10.9	2
3	16 25.4	88 23	18.3	16 51.9	88 23	18.0	18 11.4	88 22	17.3	18 37.9	88 22	17.1	19 04.3	88 21	16.8	24 19.8	87 17	13.7	24 45.9	87 17	13.4	29 05.4	86 14	10.6	3
4	16 11.6	89 22	17.8	16 38.3	89 22	17.6	17 58.3	89 21	16.9	18 25.0	89 21	16.6	18 51.6	89 21	16.4	24 09.4	88 17	13.3	24 35.7	88 17	13.1	28 57.3	87 13	10.3	4
145	15 58.1	90 22	17.4	16 25.0	90 22	17.1	17 45.6	89 21	16.4	18 12.4	89 20	16.2	18 39.2	89 20	16.0	23 59.2	88 16	13.0	24 25.7	88 16	12.7	28 49.4	87 13	10.1	145
6	15 45.0	90 21	16.9	16 12.0	90 21	16.7	17 33.1	90 20	16.0	18 00.1	90 20	15.8	18 27.1	90 20	15.5	23 49.3	89 16	12.7	24 16.0	89 16	12.4	28 41.7	88 12	09.8	6
7	15 32.2	91 21	16.4	15 59.4	91 20	16.2	17 21.0	91 20	15.5	17 48.2	91 19	15.3	18 15.3	90 19	15.1	23 39.7	90 16	12.3	24 06.6	90 15	12.1	28 34.2	89 12	09.5	7
8	15 19.8	91 20	15.9	15 47.2	91 20	15.7	17 09.2	91 19	15.1	17 36.5	91 19	14.9	18 03.9	91 19	14.7	23 30.3	90 15	12.0	23 57.4	90 15	11.7	28 26.9	89 12	09.3	8
9	15 07.7	92 20	15.5	15 35.2	92 19	15.3	16 57.8	92 18	14.6	17 25.3	92 18	14.4	17 52.7	92 18	14.2	23 21.2	91 15	11.6	23 48.5	91 14	11.4	28 19.9	90 11	09.0	9
150	14 56.0	92 19	15.0	15 23.7	92 19	14.8	16 46.7	92 18	14.2	17 14.3	92 18	14.0	17 42.0	92 17	13.8	23 12.4	91 14	11.2	23 39.8	91 14	11.0	28 13.0	91 11	08.7	150
1	14 44.6	93 18	14.5	15 12.5	93 18	14.3	16 35.9	93 17	13.7	17 03.7	93 17	13.5	17 31.5	93 17	13.3	23 03.8	92 14	10.9	23 31.4	92 14	10.7	28 06.3	91 11	08.4	1
2	14 33.6	93 18	14.0	15 01.6	93 17	13.8	16 25.5	93 17	13.3	16 53.4	93 17	13.1	17 21.4	93 16	12.9	22 55.6	93 13	10.5	23 23.3	92 13	10.3	27 59.9	92 10	08.2	2
3	14 23.0	94 17	13.6	14 51.1	94 17	13.4	16 15.4	94 16	12.8	16 43.5	94 16	12.6	17 11.6	94 16	12.5	22 47.6	93 13	10.2	23 15.5	93 13	10.0	27 53.7	92 10	07.9	3
4	14 12.7	94 16	13.1	14 41.0	94 16	12.9	16 05.7	94 16	12.4	16 33.9	94 15	12.2	17 02.1	94 15	12.0	22 39.8	94 12	09.8	23 07.9	94 12	09.6	27 47.7	93 10	07.6	4
155	14 02.8	95 16	12.6	14 31.2	95 16	12.4	15 56.3	95 15	11.9	16 24.7	94 15	11.7	16 53.0	94 15	11.6	22 32.4	94 12	09.4	23 00.6	94 12	09.3	27 41.9	93 09	07.3	155
6	13 53.3	95 15	12.1	14 21.8	95 15	11.9	15 47.3	95 14	11.4	16 15.8	95 14	11.3	16 44.2	95 14	11.1	22 25.2	95 12	09.1	22 53.5	94 11	08.9	27 36.3	94 09	07.0	6
7	13 44.2	95 15	11.6	14 12.8	95 14	11.4	15 38.6	95 14	11.0	16 07.2	95 14	10.8	16 35.8	95 13	10.7	22 18.3	95 11	08.7	22 46.8	95 11	08.5	27 30.9	94 09	06.8	7
8	13 35.4	96 14	11.1	14 04.1	96 14	11.0	15 30.3	96 13	10.5	15 59.0	96 13	10.4	16 27.7	96 13	10.2	22 11.7	95 11	08.3	22 40.3	95 10	08.2	27 25.8	95 08	06.5	8
9	13 27.0	96 13	10.6	13 55.8	96 13	10.5	15 22.4	96 13	10.0	15 51.2	96 12	09.9	16 20.0	96 12	09.8	22 05.4	96 10	08.0	22 34.1	96 10	07.8	27 20.9	95 08	06.2	9
160	13 19.0	97 13	10.1	13 47.9	97 13	10.0	15 14.8	96 12	09.6	15 43.7	96 12	09.4	16 12.6	96 12	09.3	21 59.3	96 10	07.6	22 28.2	96 09	07.4	27 16.2	96 07	05.9	160
1	13 11.3	97 12	09.6	13 40.4	97 12	09.5	15 07.5	97 11	09.1	15 36.6	97 11	09.0	16 05.6	97 11	08.8	21 53.6	97 09	07.2	22 22.6	97 09	07.1	27 11.7	96 07	05.6	1
2	13 04.0	97 11	09.1	13 33.2	97 11	09.0	15 00.6	97 11	08.6	15 29.8	97 11	08.5	15 58.9	97 11	08.4	21 48.1	97 09	06.8	22 17.2	97 08	06.7	27 07.4	97 07	05.3	2
3	12 57.2	97 11	08.6	13 26.4	97 11	08.5	14 54.1	97 10	08.2	15 23.4	97 10	08.0	15 52.6	97 10	07.9	21 43.0	97 08	06.5	22 12.1	97 08	06.3	27 03.4	97 06	05.0	3
4	12 50.7	98 10	08.1	13 20.0	98 10	08.0	14 48.0	98 10	07.7	15 17.3	98 10	07.6	15 46.6	98 09	07.5	21 38.1	98 08	06.1	22 07.3	98 08	06.0	26 59.6	97 06	04.7	4
165	12 44.6	98 10	07.6	13 14.0	98 09	07.5	14 42.2	98 09	07.2	15 11.6	98 09	07.1	15 41.0	98 09	07.0	21 33.5	98 07	05.7	22 02.8	98 07	05.6	26 56.0	98 06	04.4	165
6	12 38.8	98 09	07.1	13 08.3	98 09	07.0	14 36.8	98 08	06.7	15 06.2	98 08	06.6	15 35.7	98 08	06.5	21 29.2	98 07	05.3	21 58.6	98 07	05.2	26 52.7	98 05	04.2	6
7	12 33.5	99 08	06.6	13 03.1	99 08	06.5	14 31.7	98 08	06.3	15 01.3	98 08	06.2	15 30.8	98 08	06.1	21 25.2	98 06	05.0	21 54.7	98 06	04.9	26 49.6	98 05	03.9	7
8	12 28.6	99 08	06.1	12 58.2	99 07	06.0	14 27.0	99 07	05.8	14 56.7	99 07	05.7	15 26.3	99 07	05.6	21 21.5	99 06	04.6	21 51.0	99 06	04.5	26 46.7	98 04	03.6	8
9	12 24.0	99 07	05.6	12 53.7	99 07	05.5	14 22.7	99 07	05.3	14 52.4	99 06	05.2	15 22.1	99 06	05.2	21 18.0	99 05	04.2	21 47.7	99 05	04.1	26 44.0	99 04	03.3	9
170	12 19.9	99 06	05.1	12 49.6	99 06	05.0	14 18.8	99 06	04.8	14 48.5	99 06	04.8	15 18.3	99 06	04.7	21 14.9	99 05	03.8	21 44.6	99 05	03.8	26 41.6	99 04	03.0	170
1	12 16.1	99 06	04.6	12 45.9	99 06	04.5	14 15.2	99 05	04.3	14 45.0	99 05	04.3	15 14.8	99 05	04.2	21 12.1	99 04	03.4	21 41.8	99 04	03.4	26 39.4	99 03	02.7	1
2	12 12.7	99 05	04.1	12 42.5	99 05	04.0	14 12.0	99 05	03.9	14 41.9	99 05	03.8	15 11.7	99 05	03.8	21 09.5	99 04	03.1	21 39.4	99 04	03.0	26 37.4	99 03	02.4	2
3	12 09.7	1 00 04	03.6	12 39.6	1 00 04	03.5	14 09.2	1 00 04	03.4	14 39.1	1 00 04	03.3	15 09.0	1 00 04	03.3	21 07.3	1 00 03	02.7	21 37.2	1 00 03	02.6	26 35.7	99 02	02.1	3
4	12 07.2	1 00 04	03.1	12 37.1	1 00 04	03.0	14 06.8	1 00 03	02.9	14 36.7	1 00 03	02.9	15 06.6	1 00 03	02.8	21 05.4	1 00 03	02.3	21 35.3	1 00 03	02.3	26 34.2	1 00 02	01.8	4
175	12 05.0	1 00 03	02.6	12 34.9	1 00 03	02.5	14 04.7	1 00 03	02.4	14 34.6	1 00 03	02.4	15 04.6	1 00 03	02.3	21 03.7	1 00 02	01.9	21 33.7	1 00 02	01.9	26 32.9	1 00 02	01.5	175
6	12 03.2	1 00 02	02.0	12 33.1	1 00 02	02.0	14 03.0	1 00 02	01.9	14 33.0	1 00 02	01.9	15 02.9	1 00 02	01.9	21 02.4	1 00 02	01.5	21 32.3	1 00 02	01.5	26 31.9	1 00 01	01.2	6
7	12 01.8	1 00 02	01.5	12 31.8	1 00 02	01.5	14 01.7	1 00 02	01.5	14 31.7	1 00 02	01.4	15 01.6	1 00 02	01.4	21 01.3	1 00 01	01.2	21 31.3	1 00 01	01.1	26 31.0	1 00 01	00.9	7
8	12 00.8	1 00 01	01.0	12 30.8	1 00 01	01.0	14 00.8	1 00 01	01.0	14 30.7	1 00 01	01.0	15 00.7	1 00 01	00.9	21 00.6	1 00 01	00.8	21 30.6	1 00 01	00.8	26 30.5	1 00 01	00.6	8
9	12 00.2	1 00 00	00.5	12 30.2	1 00 00	00.5	14 00.2	1 00 00	00.5	14 30.2	1 00 00	00.5	15 00.2	1 00 00	00.5	21 00.1	1 00 00	00.4	21 30.1	1 00 00	00.4	26 30.1	1 00 00	00.3	9
180	12 00.0	1 00 00	00.0	12 30.0	1 00 00	00.0	14 00.0	1 00 00	00.0	14 30.0	1 00 00	00.0	15 00.0	1 00 00	00.0	21 00.0	1 00 00	00.0	21 30.0	1 00 00	00.0	26 30.0	1 00 00	00.0	180

STAR IDENTIFICATION TABLE

ALTITUDE

Lat. 42°

AZ.	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	52	180	56	180	60	180	64	180	68	180	72	180	76	180	80	180	84	180	88	180	88	00	00
4	52	174	56	173	60	172	64	171	68	170	72	168	76	166	80	161	83	151	86	122	86	54	4
8	51	167	55	166	59	165	63	163	67	160	71	157	75	153	78	145	81	131	84	106	84	68	8
12	51	161	54	159	58	157	62	155	66	152	69	147	73	141	76	132	79	119	81	98	81	73	12
16	49	155	53	153	57	150	61	147	64	144	68	139	71	132	74	123	76	111	78	94	78	75	16
20	48	149	52	147	55	144	59	141	62	136	66	131	69	124	71	116	73	105	75	91	75	75	20
24	46	144	50	141	53	138	57	134	60	130	63	125	66	118	68	110	70	100	72	88	72	75	24
28	45	139	48	136	51	133	55	129	58	124	61	119	63	115	66	105	68	96	69	86	70	75	28
32	42	134	46	131	49	128	52	124	55	119	58	114	61	108	63	101	65	93	66	84	67	74	32
36	40	130	44	127	47	123	50	119	53	115	55	110	58	104	60	97	62	90	63	82	64	73	36
40	38	126	41	122	44	119	47	115	50	111	52	106	55	100	57	94	59	88	60	80	61	72	40
44	35	122	38	118	41	115	44	111	47	107	50	102	52	97	54	91	56	85	57	78	58	71	44
48	33	118	36	115	39	111	41	108	44	103	47	99	49	94	51	89	53	83	54	77	55	70	48
52	30	115	33	111	36	108	39	104	41	100	44	96	46	91	48	86	50	81	51	75	53	69	52
56	27	111	30	108	33	105	36	101	38	97	41	93	43	89	45	84	47	79	48	73	50	67	56
60	25	108	27	105	30	102	33	98	35	94	38	90	40	86	42	81	44	77	46	72	47	66	60
64	22	105	25	102	27	99	30	95	32	91	35	88	37	84	39	79	41	75	43	70	44	65	64
68	19	102	22	99	24	96	27	92	29	89	32	85	34	81	36	77	38	73	40	68	42	63	68
72	16	99	19	96	21	93	24	90	26	86	29	83	31	79	33	75	35	71	37	66	39	62	72
76	13	96	16	93	18	90	21	87	23	84	26	80	28	76	30	73	33	69	35	65	36	60	76
80	10	94	13	91	15	88	18	84	20	81	23	78	25	74	28	71	30	67	32	63	34	59	80
84	07	91	10	88	12	85	15	82	18	79	20	75	23	72	25	68	27	65	29	61	31	57	84
88	04	88	07	85	09	82	12	79	15	76	17	73	20	70	22	66	24	63	27	59	29	55	88
92	01	86	04	83	07	80	09	77	12	74	14	70	17	67	19	64	22	61	24	57	26	53	92
96	*02*	83	01	80	04	77	06	74	09	71	12	68	14	65	17	62	19	58	22	55	24	52	96
100	*05*	80	*02*	77	01	74	03	72	06	69	09	66	12	63	14	59	17	56	19	53	22	50	100
104	*08*	78	*05*	75	*02*	72	01	69	03	66	06	63	09	60	12	57	14	54	17	51	20	48	104
108	*11*	75	*08*	72	*05*	69	*02*	66	01	63	04	61	06	58	09	55	12	52	15	49	17	46	108
112	*13*	72	*11*	69	*08*	66	*05*	63	*02*	61	01	58	04	55	07	52	10	50	13	47	15	44	112
116	*16*	69	*13*	66	*10*	63	*07*	61	*04*	58	*01*	55	02	53	04	50	07	47	10	44	13	42	116
120	*19*	66	*16*	63	*13*	60	*10*	58	*07*	55	*04*	52	*01*	50	02	47	05	45	08	42	11	39	120
124	*22*	63	*19*	60	*16*	57	*12*	55	*09*	52	*06*	50	*03*	47	00	45	03	42	06	40	10	37	124
128	*24*	60	*21*	57	*18*	54	*15*	52	*12*	49	*08*	47	*05*	44	*02*	42	01	40	05	37	08	35	128
132	*27*	56	*24*	53	*20*	51	*17*	48	*14*	46	*10*	44	*07*	41	*04*	39	*01*	37	03	35	06	33	132
136	*29*	52	*26*	50	*23*	47	*19*	45	*16*	43	*12*	41	*09*	38	*06*	36	*02*	34	01	32	05	30	136
140	*31*	49	*28*	46	*25*	44	*21*	42	*18*	39	*14*	37	*11*	35	*07*	33	*04*	31	*00*	30	03	28	140
144	*34*	45	*30*	42	*27*	40	*23*	38	*20*	36	*16*	34	*13*	32	*09*	30	*05*	29	*02*	27	02	25	144
148	*36*	41	*32*	38	*29*	36	*25*	34	*21*	32	*18*	31	*14*	29	*10*	27	*07*	26	*03*	24	01	22	148
152	*37*	36	*34*	34	*30*	32	*27*	30	*23*	29	*19*	27	*15*	25	*12*	24	*08*	23	*04*	21	*00*	20	152
156	*39*	32	*35*	30	*32*	28	*28*	26	*24*	25	*20*	23	*17*	22	*13*	21	*09*	19	*05*	18	*01*	17	156
160	*41*	27	*37*	25	*33*	23	*29*	22	*25*	21	*21*	20	*18*	18	*14*	17	*10*	16	*06*	15	*02*	14	160
164	*42*	22	*38*	20	*34*	19	*30*	18	*26*	17	*22*	16	*18*	15	*15*	14	*11*	13	*07*	12	*03*	11	164
168	*43*	16	*39*	15	*35*	14	*31*	13	*27*	13	*23*	12	*19*	11	*15*	11	*11*	10	*07*	09	*03*	09	168
172	*43*	11	*39*	10	*36*	10	*32*	09	*28*	08	*24*	08	*20*	07	*16*	07	*12*	07	*08*	06	*04*	06	172
176	*44*	06	*40*	05	*36*	05	*32*	05	*28*	04	*24*	04	*20*	04	*16*	04	*12*	03	*08*	03	*04*	03	176
180	*44*	00	*40*	00	*36*	00	*32*	00	*28*	00	*24*	00	*20*	00	*16*	00	*12*	00	*08*	00	*04*	00	180
	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		

16—11439

FIGURES IN ITALICS INDICATE THAT DECLINATION IS OF CONTRARY NAME TO LATITUDE

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STAR IDENTIFICATION TABLE

ALTITUDE

AZ.	48°		52°		56°		60°		64°		68°		72°		76°		80°		84°		88°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	84	00	80	00	76	00	72	00	68	00	64	00	60	00	56	00	52	00	48	00	44	00	00
4	83	24	80	14	76	09	72	06	68	05	64	03	60	02	56	02	52	01	48	01	44	00	4
8	82	41	79	26	75	18	71	13	68	09	64	07	60	05	56	03	52	02	48	01	44	00	8
12	80	51	77	35	74	25	71	18	67	13	63	10	59	07	56	05	52	03	48	02	44	01	12
16	77	57	75	42	73	31	69	23	66	17	63	13	59	10	55	07	52	04	48	02	44	01	16
20	75	60	73	47	71	36	68	27	65	21	62	16	58	12	55	08	51	05	48	03	44	01	20
24	72	62	71	50	69	40	67	31	64	24	61	18	58	14	54	10	51	06	47	04	44	01	24
28	69	63	69	52	67	43	65	34	63	27	60	21	57	15	54	11	51	07	47	04	44	01	28
32	67	64	66	54	65	45	63	36	61	29	59	23	56	17	53	12	50	08	47	05	44	01	32
36	64	64	64	55	63	46	62	38	60	31	58	24	55	19	53	14	50	09	47	05	44	02	36
40	61	64	61	56	61	47	60	40	58	32	56	26	54	20	52	15	49	10	46	06	44	02	40
44	59	64	59	56	59	48	58	41	57	34	55	27	53	21	51	16	49	11	46	06	43	02	44
48	56	63	56	56	56	49	56	42	55	35	54	28	52	22	50	16	48	11	46	06	43	02	48
52	53	62	54	56	54	49	54	42	53	35	52	29	51	23	49	17	48	12	46	07	43	02	52
56	51	61	52	55	52	49	52	42	52	36	51	30	50	23	49	18	47	12	45	07	43	02	56
60	48	60	49	55	50	48	50	42	50	36	49	30	49	24	48	18	46	13	45	07	43	02	60
64	46	59	47	54	47	48	48	42	48	36	48	30	47	24	47	18	46	13	44	08	43	02	64
68	43	58	44	53	45	47	46	42	46	36	46	30	46	24	46	19	45	13	44	08	43	03	68
72	41	57	42	52	43	47	44	41	45	36	45	30	45	25	45	19	44	13	44	08	43	03	72
76	38	56	40	51	41	46	42	41	43	35	43	30	44	25	44	19	44	13	43	08	42	03	76
80	36	54	37	50	39	45	40	40	41	35	42	30	43	24	43	19	43	14	43	08	42	03	80
84	33	53	35	48	37	44	38	39	39	34	41	29	41	24	42	19	42	13	42	08	42	03	84
88	31	51	33	47	35	43	36	38	38	34	39	29	40	24	41	19	42	13	42	08	42	03	88
92	29	50	31	46	33	42	35	37	36	33	38	28	39	23	40	18	41	13	42	08	42	03	92
96	26	48	29	44	31	40	33	36	35	32	36	28	38	23	39	18	40	13	41	08	42	03	96
100	24	46	27	43	29	39	31	35	33	31	35	27	37	22	38	18	40	13	41	08	42	03	100
104	22	45	25	41	27	38	29	34	32	30	34	26	36	22	37	17	39	13	40	08	41	03	104
108	20	43	23	39	25	36	28	32	30	29	32	25	34	21	36	17	38	12	40	07	41	03	108
112	18	41	21	38	24	34	26	31	29	28	31	24	33	20	36	16	38	12	40	07	41	02	112
116	16	39	19	36	22	33	25	30	27	26	30	23	32	19	35	15	37	11	39	07	41	02	116
120	14	37	17	34	20	31	23	28	26	25	29	22	31	18	34	15	36	11	39	07	41	02	120
124	13	35	16	32	19	29	22	27	25	24	28	21	31	17	33	14	36	10	38	06	41	02	124
128	11	32	14	30	17	27	21	25	24	22	27	19	30	16	33	13	35	10	38	06	41	02	128
132	09	30	13	28	16	26	19	23	23	21	26	18	29	15	32	12	35	09	38	06	41	02	132
136	08	28	11	26	15	24	18	21	22	19	25	17	28	14	31	11	34	08	38	05	41	02	136
140	07	26	10	24	14	22	17	20	21	18	24	15	27	13	31	10	34	08	37	05	40	02	140
144	05	23	09	21	13	20	16	18	20	16	23	14	27	12	30	09	34	07	37	04	40	02	144
148	04	21	08	19	12	18	15	16	19	14	23	12	26	11	30	08	33	06	37	04	40	01	148
152	03	18	07	17	11	16	15	14	18	13	22	11	26	09	29	07	33	06	37	04	40	01	152
156	02	16	06	15	10	13	14	12	18	11	21	09	25	08	29	06	33	05	36	03	40	01	156
160	02	13	06	12	09	11	13	10	17	09	21	08	25	07	29	05	33	04	36	03	40	01	160
164	01	11	05	10	09	09	13	08	17	07	21	06	25	05	28	04	32	03	36	02	40	01	164
168	01	08	05	07	09	07	12	06	16	05	20	05	24	04	28	03	32	02	36	02	40	01	168
172	00	05	04	05	08	05	12	04	16	04	20	03	24	03	28	02	32	02	36	01	40	00	172
176	00	03	04	02	08	02	12	02	16	02	20	02	24	01	28	01	32	01	36	01	40	00	176
180	00	00	04	00	08	00	12	00	16	00	20	00	24	00	28	00	32	00	36	00	40	00	180
	48°		52°		56°		60°		64°		68°		72°		76°		80°		84°		88°		

16—11439

FIGURES IN ITALICS INDICATE THAT DECLINATION IS OF CONTRARY NAME TO LATITUDE

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Lat. 43°

H.A.	0° 00′		0° 30′		1° 00′		1° 30′		2° 00′		2° 30′		3° 00′		3° 30′		H.A.
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	°
00	47 00.0 1.0 01	180.0	47 30.0 1.0 01	180.0	48 00.0 1.0 01	180.0	48 30.0 1.0 01	180.0	49 00.0 1.0 01	180.0	49 30.0 1.0 01	180.0	50 00.0 1.0 01	180.0	50 30.0 1.0 01	180.0	00
1	46 59.4 1.0 03	178.5	47 29.4 1.0 03	178.5	47 59.4 1.0 03	178.5	48 29.4 1.0 03	178.5	48 59.4 1.0 03	178.5	49 29.4 1.0 03	178.5	49 59.4 1.0 03	178.4	50 29.4 1.0 03	178.4	1
2	46 57.8 1.0 05	177.1	47 27.7 1.0 05	177.0	47 57.7 1.0 05	177.0	48 27.7 1.0 05	177.0	48 57.7 1.0 05	177.0	49 27.6 1.0 05	176.9	49 57.6 1.0 05	176.9	50 27.6 1.0 05	176.9	2
3	46 55.0 1.0 07	175.6	47 24.9 1.0 07	175.6	47 54.9 1.0 07	175.5	48 24.8 1.0 07	175.5	48 54.8 1.0 07	175.4	49 24.7 1.0 07	175.4	49 54.7 1.0 07	175.3	50 24.6 1.0 07	175.3	3
4	46 51.0 1.0 08	174.1	47 20.9 1.0 08	174.1	47 50.9 1.0 09	174.0	48 20.8 1.0 09	174.0	48 50.7 1.0 09	173.9	49 20.6 1.0 09	173.9	49 50.5 1.0 09	173.8	50 20.4 1.0 09	173.7	4
05	46 46.0 1.0 10	172.7	47 15.9 1.0 10	172.6	47 45.7 1.0 10	172.6	48 15.6 1.0 11	172.5	48 45.5 1.0 11	172.4	49 15.3 1.0 11	172.3	49 45.2 1.0 11	172.3	50 15.0 1.0 11	172.2	05
6	46 39.9 99 12	171.2	47 09.7 99 12	171.2	47 39.5 99 12	171.1	48 09.3 99 12	171.0	48 39.1 99 12	170.9	49 08.9 99 13	170.8	49 38.7 99 13	170.7	50 08.5 99 13	170.6	6
7	46 32.6 99 14	169.8	47 02.4 99 14	169.7	47 32.1 99 14	169.6	48 01.9 99 14	169.5	48 31.6 99 14	169.4	49 01.3 99 15	169.3	49 31.0 99 15	169.2	50 00.7 99 15	169.1	7
8	46 24.3 99 16	168.4	46 54.0 99 16	168.2	47 23.7 99 16	168.1	47 53.3 99 16	168.0	48 23.0 99 16	167.9	48 52.6 99 16	167.8	49 22.2 99 17	167.7	49 51.9 99 17	167.6	8
9	46 14.9 99 17	166.9	46 44.5 99 18	166.8	47 14.1 99 18	166.7	47 43.7 99 18	166.6	48 13.2 99 18	166.4	48 42.8 98 18	166.3	49 12.3 98 18	166.2	49 41.8 98 19	166.0	9
10	46 04.5 98 19	165.5	46 34.0 98 19	165.4	47 03.4 98 20	165.2	47 32.9 98 20	165.1	48 02.4 98 20	165.0	48 31.8 98 20	164.8	49 01.3 98 20	164.7	49 30.7 98 20	164.5	10
1	45 53.0 98 21	164.1	46 22.4 98 21	163.9	46 51.7 98 21	163.8	47 21.1 98 21	163.6	47 50.4 98 22	163.5	48 19.8 98 22	163.3	48 49.1 98 22	163.2	49 18.4 98 22	163.0	1
2	45 40.4 98 23	162.7	46 09.7 98 23	162.5	46 39.0 98 23	162.4	47 08.2 97 23	162.2	47 37.4 97 23	162.0	48 06.7 97 24	161.9	48 35.9 97 24	161.7	49 05.0 97 24	161.5	2
3	45 26.9 97 24	161.3	45 56.0 97 24	161.1	46 25.2 97 25	161.0	46 54.3 97 25	160.8	47 23.4 97 25	160.6	47 52.5 97 25	160.4	48 21.6 97 26	160.2	48 50.6 97 26	160.1	3
4	45 12.3 97 26	159.9	45 41.3 97 26	159.7	46 10.3 97 26	159.6	46 39.3 97 27	159.4	47 08.3 97 27	159.2	47 37.3 96 27	159.0	48 06.2 96 27	158.8	48 35.1 96 28	158.6	4
15	44 56.7 96 28	158.6	45 25.6 96 28	158.4	45 54.5 96 28	158.2	46 23.4 96 28	158.0	46 52.2 96 28	157.8	47 21.0 96 29	157.6	47 49.8 96 29	157.4	48 18.6 96 29	157.1	15
6	44 40.2 96 29	157.2	45 09.0 96 29	157.0	45 37.7 96 30	156.8	46 06.4 96 30	156.6	46 35.1 96 30	156.4	47 03.8 96 30	156.2	47 32.4 95 31	155.9	48 01.0 95 31	155.7	6
7	44 22.7 95 31	155.9	44 51.3 95 31	155.6	45 19.9 95 31	155.4	45 48.5 95 31	155.2	46 17.0 95 32	155.0	46 45.5 95 32	154.8	47 14.0 95 32	154.5	47 42.5 95 33	154.3	7
8	44 04.3 95 32	154.5	44 32.8 95 32	154.3	45 01.2 95 33	154.1	45 29.6 95 33	153.9	45 58.0 95 33	153.6	46 26.4 94 34	153.4	46 54.7 94 34	153.1	47 23.0 94 34	152.9	8
9	43 45.0 94 34	153.2	44 13.3 94 34	153.0	44 41.6 94 34	152.7	45 09.8 94 34	152.5	45 38.0 94 35	152.3	46 06.2 94 35	152.0	46 34.4 94 35	151.8	47 02.5 94 36	151.5	9
20	43 24.8 94 35	151.9	43 52.9 94 35	151.7	44 21.0 94 36	151.4	44 49.1 94 36	151.2	45 17.2 93 36	150.9	45 45.2 93 37	150.7	46 13.2 93 37	150.4	46 41.1 93 37	150.2	20
1	43 03.7 93 37	150.6	43 31.7 93 37	150.4	43 59.6 93 37	150.1	44 27.5 93 37	149.9	44 55.4 93 38	149.6	45 23.3 93 38	149.3	45 51.1 93 38	149.1	46 18.9 93 39	148.8	1
2	42 41.7 93 38	149.4	43 09.5 93 38	149.1	43 37.3 93 39	148.8	44 05.1 92 39	148.6	44 32.8 92 39	148.3	45 00.5 92 39	148.0	45 28.1 92 40	147.8	45 55.7 92 40	147.5	2
3	42 18.9 92 39	148.1	42 46.6 92 40	147.8	43 14.2 92 40	147.6	43 41.8 92 40	147.3	44 09.3 92 40	147.0	44 36.8 92 41	146.7	45 04.3 91 41	146.5	45 31.7 91 41	146.2	3
4	41 55.4 92 41	146.9	42 22.8 92 41	146.6	42 50.3 91 41	146.3	43 17.7 91 42	146.0	43 45.0 91 42	145.8	44 12.3 91 42	145.5	44 39.6 91 42	145.2	45 06.8 91 43	144.9	4
25	41 31.0 91 42	145.6	41 58.3 91 42	145.4	42 25.5 91 42	145.1	42 52.8 91 43	144.8	43 19.9 91 43	144.5	43 47.1 90 43	144.2	44 14.2 90 44	143.9	44 41.2 90 44	143.6	25
6	41 05.8 90 43	144.4	41 33.0 90 43	144.1	42 00.0 90 44	143.9	42 27.1 90 44	143.6	42 54.1 90 44	143.3	43 21.0 90 45	143.0	43 47.9 90 45	142.7	44 14.8 89 45	142.4	6
7	40 39.9 90 44	143.2	41 06.9 90 45	142.9	41 33.8 90 45	142.7	42 00.6 89 45	142.4	42 27.5 89 46	142.0	42 54.2 89 46	141.7	43 20.9 89 46	141.4	43 47.6 89 46	141.1	7
8	40 13.3 89 46	142.1	40 40.1 89 46	141.8	41 06.8 89 46	141.5	41 33.5 89 46	141.2	42 00.1 89 47	140.8	42 26.7 89 47	140.5	42 53.2 88 47	140.2	43 19.7 88 48	139.9	8
9	39 46.0 89 47	140.9	40 12.6 89 47	140.6	40 39.1 88 47	140.3	41 05.6 88 48	140.0	41 32.1 88 48	139.7	41 58.5 88 48	139.3	42 24.8 88 49	139.0	42 51.1 88 49	138.7	9
30	39 18.0 88 48	139.8	39 44.4 88 48	139.4	40 10.7 88 48	139.1	40 37.1 88 49	138.8	41 03.3 87 49	138.5	41 29.5 87 49	138.2	41 55.7 87 50	137.8	42 21.8 87 50	137.5	30
1	38 49.3 88 49	138.6	39 15.5 87 49	138.3	39 41.7 87 49	138.0	40 07.8 87 50	137.7	40 33.9 87 50	137.3	40 59.9 87 50	137.0	41 25.9 86 51	136.7	41 51.8 86 51	136.3	1
2	38 19.9 87 50	137.5	38 46.0 87 50	137.2	39 12.0 87 51	136.9	39 38.0 86 51	136.5	40 03.9 86 51	136.2	40 29.7 86 51	135.9	40 55.5 86 52	135.5	41 21.2 86 52	135.2	2
3	37 50.0 86 51	136.4	38 15.9 86 51	136.1	38 41.7 86 52	135.8	39 07.5 86 52	135.4	39 33.2 86 52	135.1	39 58.8 85 52	134.8	40 24.4 85 53	134.4	40 50.0 85 53	134.1	3
4	37 19.4 86 52	135.3	37 45.1 86 52	135.0	38 10.8 85 52	134.7	38 36.4 85 53	134.3	39 01.9 85 53	134.0	39 27.4 85 53	133.7	39 52.8 85 54	133.3	40 18.2 84 54	133.0	4
35	36 48.3 85 53	134.2	37 13.8 85 53	133.9	37 39.3 85 53	133.6	38 04.7 85 54	133.2	38 30.1 84 54	132.9	38 55.3 84 54	132.6	39 20.6 84 55	132.2	39 45.8 84 55	131.9	35
6	36 16.6 85 54	133.2	36 41.9 84 54	132.9	37 07.2 84 54	132.5	37 32.5 84 55	132.2	37 57.6 84 55	131.8	38 22.8 84 55	131.5	38 47.8 83 56	131.1	39 12.8 83 56	130.8	6
7	35 44.3 84 55	132.1	36 09.5 84 55	131.8	36 34.6 84 55	131.5	36 59.7 83 56	131.1	37 24.7 83 56	130.8	37 49.6 83 56	130.4	38 14.5 83 56	130.1	38 39.3 83 57	129.7	7
8	35 11.5 83 56	131.1	35 36.5 83 56	130.8	36 01.5 83 56	130.4	36 26.4 83 56	130.1	36 51.2 83 57	129.7	37 16.0 82 57	129.4	37 40.7 82 57	129.0	38 05.3 82 58	128.7	8
9	34 38.2 83 56	130.1	35 03.0 83 57	129.8	35 27.8 83 57	129.4	35 52.5 82 57	129.1	36 17.2 82 57	128.7	36 41.8 82 58	128.4	37 06.3 82 58	128.0	37 30.8 81 58	127.6	9
40	34 04.4 82 57	129.1	34 29.1 82 57	128.8	34 53.7 82 58	128.4	35 18.2 82 58	128.1	35 42.7 82 58	127.7	36 07.1 81 59	127.3	36 31.5 81 59	127.0	36 55.8 81 59	126.6	40
1	33 30.1 82 58	128.1	33 54.6 82 58	127.8	34 19.0 81 58	127.4	34 43.4 81 59	127.1	35 07.8 81 59	126.7	35 32.0 81 59	126.3	35 56.2 81 60	126.0	36 20.4 80 60	125.6	1
2	32 55.3 81 59	127.1	33 19.7 81 59	126.8	33 44.0 81 59	126.4	34 08.2 81 59	126.1	34 32.4 80 60	125.7	34 56.5 80 60	125.4	35 20.5 80 60	125.0	35 44.5 80 61	124.6	2
3	32 20.1 81 59	126.2	32 44.3 81 60	125.8	33 08.5 80 60	125.5	33 32.5 80 60	125.1	33 56.5 80 60	124.8	34 20.5 80 61	124.4	34 44.3 79 61	124.0	35 08.1 79 61	123.7	3
4	31 44.5 80 60	125.2	32 08.5 80 60	124.9	32 32.5 80 61	124.5	32 56.4 80 61	124.2	33 20.3 79 61	123.8	33 44.0 79 61	123.4	34 07.8 79 62	123.1	34 31.4 79 62	122.7	4
45	31 08.5 80 61	124.3	31 32.3 79 61	123.9	31 56.1 79 61	123.6	32 19.9 79 62	123.2	32 43.6 79 62	122.9	33 07.2 79 62	122.5	33 30.8 78 62	122.1	33 54.3 78 62	121.7	45
6	30 32.0 79 61	123.4	30 55.7 79 62	123.0	31 19.4 79 62	122.7	31 43.0 79 62	122.3	32 06.5 78 62	121.9	32 30.0 78 63	121.6	32 53.4 78 63	121.2	33 16.8 78 63	120.8	6
7	29 55.2 79 62	122.5	30 18.7 78 62	122.1	30 42.3 78 62	121.7	31 05.7 78 63	121.4	31 29.1 78 63	121.0	31 52.4 78 63	120.6	32 15.7 77 63	120.3	32 38.9 77 64	119.9	7
8	29 18.0 78 63	121.6	29 41.4 78 63	121.2	30 04.8 78 63	120.8	30 28.1 78 63	120.5	30 51.3 77 64	120.1	31 14.5 77 64	119.7	31 37.6 77 64	119.4	32 00.7 77 64	119.0	8
9	28 40.4 78 63	120.7	29 03.7 78 63	120.3	29 26.9 77 64	119.9	29 50.1 77 64	119.6	30 13.2 77 64	119.2	30 36.2 77 64	118.8	30 59.2 77 65	118.5	31 22.2 76 65	118.1	9
50	28 02.5 77 64	119.8	28 25.6 77 64	119.4	28 48.7 77 64	119.1	29 11.8 77 64	118.7	29 34.7 76 65	118.3	29 57.6 76 65	117.9	30 20.5 76 65	117.6	30 43.3 76 65	117.2	50
1	27 24.2 77 64	118.9	27 47.2 77 64	118.5	28 10.2 76 65	118.2	28 33.1 76 65	117.8	28 55.9 76 65	117.4	29 18.7 76 65	117.1	29 41.4 76 66	116.7	30 04.1 75 66	116.3	1
2	26 45.6 76 65	118.0	27 08.5 76 65	117.7	27 31.4 76 65	117.3	27 54.1 76 65	117.0	28 16.8 76 66	116.6	28 39.5 75 66	116.2	29 02.1 75 66	115.8	29 24.6 75 66	115.5	2
3	26 06.8 76 65	117.2	26 29.5 76 66	116.8	26 52.2 76 66	116.5	27 14.9 75 66	116.1	27 37.5 75 66	115.7	28 00.0 75 66	115.4	28 22.5 75 66	115.0	28 44.9 75 67	114.6	3
4	25 27.6 76 66	116.4	25 50.2 75 66	116.0	26 12.8 75 66	115.7	26 35.3 75 66	115.3	26 57.8 75 67	114.9	27 20.2 75 67	114.5	27 42.5 74 67	114.1	28 04.8 74 67	113.8	4
55	24 48.1 75 66	115.5	25 10.6 75 66	115.2	25 33.1 75 67	114.8	25 55.5 75 67	114.4	26 17.9 74 67	114.1	26 40.1 74 67	113.7	27 02.4 74 67	113.3	27 24.5 74 68	112.9	55
6	24 08.4 75 67	114.7	24 30.8 75 67	114.3	24 53.1 74 67	114.0	25 15.4 74 67	113.6	25 37.7 74 67	113.2	25 59.8 74 68	112.9	26 21.9 74 68	112.5	26 44.0 73 68	112.1	6
7	23 28.4 74 67	113.9	23 50.7 74 67	113.5	24 12.9 74 67	113.2	24 35.1 74 68	112.8	24 57.2 74 68	112.4	25 19.3 73 68	112.0	25 41.3 73 68	111.7	26 03.2 73 68	111.3	7
8	22 48.2 74 67	113.1	23 10.3 74 68	112.7	23 32.4 74 68	112.3	23 54.5 73 68	112.0	24 16.5 73 68	111.6	24 38.5 73 68	111.2	25 00.4 73 69	110.9	25 22.2 73 69	110.5	8
9	22 07.7 74 68	112.3	22 29.7 73 68	111.9	22 51.7 73 68	111.5	23 13.7 73 68	111.2	23 35.6 73 69	110.8	23 57.5 73 69	110.4	24 19.3 73 69	110.1	24 41.0 72 69	109.7	9
60	21 27.0 73 68	111.5	21 48.9 73 68	111.1	22 10.8 73 69	110.8	22 32.7 73 69	110.4	22 54.5 73 69	110.0	23 16.2 72 69	109.6	23 37.9 72 69	109.3	23 59.6 72 69	108.9	60
1	20 46.0 73 69	110.7	21 07.9 73 69	110.3	21 29.7 73 69	110.0	21 51.4 72 69	109.6	22 13.2 72 69	109.2	22 34.8 72 69	108.9	22 56.4 72 70	108.5	23 18.0 72 70	108.1	1
2	20 04.9 73 69	109.9	20 26.6 72 69	109.6	20 48.3 72 69	109.2	21 10.0 72 69	108.8	21 31.6 72 70	108.5	21 53.2 72 70	108.1	22 14.7 72 70	107.7	22 36.2 71 70	107.3	2
3	19 23.5 72 69	109.2	19 45.2 72 69	108.8	20 06.8 72 70	108.4	20 28.4 72 70	108.1	20 49.9 72 70	107.7	21 11.4 72 70	107.3	21 32.8 71 70	106.9	21 54.2 71 70	106.6	3
4	18 42.0 72 70	108.4	19 03.5 72 70	108.0	19 25.1 72 70	107.7	19 46.6 72 70	107.3	20 08.0 71 70	106.9	20 29.4 71 70	106.5	20 50.8 71 70	106.2	21 12.1 71 70	105.8	4
65	18 00.2 72 70	107.6	18 21.7 72 70	107.3	18 43.2 71 70	106.9	19 04.6 71 70	106.5	19 26.0 71 70	106.2	19 47.3 71 70	105.8	20 08.5 71 71	105.4	20 29.8 71 71	105.0	65
6	17 18.3 71 70	106.9	17 39.7 71 70	106.5	18 01.1 71 70	106.2	18 22.4 71 71	105.8	18 43.7 71 71	105.4	19 05.0 71 71	105.0	19 26.2 71 71	104.7	19 47.3 70 71	104.3	6
7	16 36.3 71 70	106.1	16 57.6 71 70	105.8	17 18.9 71 71	105.4	17 40.1 71 71	105.0	18 01.3 71 71	104.7	18 22.5 70 71	104.3	18 43.6 70 71	103.9	19 04.7 70 71	103.5	7
8	15 54.0 71 71	105.4	16 15.3 71 71	105.0	16 36.5 71 71	104.7	16 57.7 71 71	104.3	17 18.8 70 71	103.9	17 39.9 70 71	103.6	18 01.0 70 71	103.2	18 22.0 70 71	102.8	8
9	15 11.7 71 71	104.7	15 32.8 71 71	104.3	15 54.0 70 71	103.9	16 15.1 70 71	103.6	16 36.2 70 71	103.2	16 57.2 70 71	102.8	17 18.2 70 72	102.4	17 39.1 70 72	102.1	9
70	14 29.1 70 71	103.9	14 50.3 70 71	103.6	15 11.3 70 71	103.2	15 32.4 70 71	102.8	15 53.4 70 72	102.5	16 14.4 70 72	102.1	16 35.3 70 72	101.7	16 56.2 70 72	101.3	70
1	13 46.5 70 71	103.2	14 07.5 70 71	102.8	14 28.6 70 72	102.5	14 49.5 70 72	102.1	15 10.5 70 72	101.7	15 31.4 70 72	101.4	15 52.3 70 72	101.0	16 13.1 69 72	100.6	1
2	13 03.7 70 72	102.5	13 24.7 70 72	102.1	13 45.6 70 72	101.8	14 06.6 70 72	101.4	14 27.5 70 72	101.0	14 48.3 69 72	100.6	15 09.1 69 72	100.3	15 29.9 69 73	99.9	2
3	12 20.8 70 72	101.8	12 41.7 70 72	101.4	13 02.6 70 72	101.0	13 23.5 70 72	100.7	13 44.3 69 72	100.3	14 05.1 69 72	99.9	14 25.9 69 72	99.6	14 46.6 69 72	99.2	3
4	11 37.8 70 72	101.1	11 58.7 70 72	100.7	12 19.5 69 72	100.3	12 40.3 69 72	100.0	13 01.1 69 72	99.6	13 21.9 69 72	99.2	13 42.6 69 72	98.8	14 03.3 69 72	98.5	4
75	10 54.7 69 72	100.4	11 15.5 69 72	100.0	11 36.3 69 72	99.6	11 57.1 69 72	99.3	12 17.8 69 72	98.9	12 38.5 69 72	98.5	12 59.2 69 72	98.1	13 19.8 69 73	97.8	75
6	10 11.5 69 72	99.6	10 32.2 69 72	99.3	10 53.0 69 72	98.9	11 13.7 69 72	98.5	11 34.4 69 72	98.2	11 55.1 69 73	97.8	12 15.7 69 73	97.4	12 36.3 69 73	97.1	6
7	9 28.2 69 72	98.9	9 48.9 69 72	98.6	10 09.6 69 72	98.2	10 30.3 69 73	97.8	10 50.9 69 73	97.5	11 11.6 69 73	97.1	11 32.2 69 73	96.7	11 52.7 69 73	96.4	7
8	8 44.8 69 72	98.2	9 05.5 69 73	97.9	9 26.1 69 73	97.5	9 46.8 69 73	97.1	10 07.4 69 73	96.8	10 28.0 69 73	96.4	10 48.6 69 73	96.0	11 09.1 68 73	95.7	8
9	8 01.3 69 73	97.6	8 22.0 69 73	97.2	8 42.6 69 73	96.8	9 03.2 69 73	96.4	9 23.8 69 73	96.1	9 44.4 69 73	95.7	10 04.9 68 73	95.3	10 25.4 68 73	95.0	9
80	7 17.8 69 73	96.9	7 38.4 69 73	96.5	7 59.0 69 73	96.1	8 19.6 69 73	95.8	8 40.1 68 73	95.4	9 00.7 68 73	95.0	9 21.2 68 73	94.6	9 41.7 68 73	94.3	80
1	6 34.2 69 73	96.2	6 54.8 69 73	95.8	7 15.3 69 73	95.4	7 35.9 68 73	95.1	7 56.4 68 73	94.7	8 16.9 68 73	94.3	8 37.4 68 73	94.0	8 57.9 68 73	93.6	1
2	5 50.5 69 73	95.5	6 11.1 68 73	95.1	6 31.6 68 73	94.7	6 52.1 68 73	94.4	7 12.7 68 73	94.0	7 33.2 68 73	93.6	7 53.6 68 73	93.3	8 14.1 68 73	92.9	2
3	5 06.8 68 73	94.8	5 27.3 68 73	94.4	5 47.9 68 73	94.1	6 08.4 68 73	93.7	6 28.9 68 73	93.3	6 49.3 68 73	93.0	7 09.8 68 73	92.6	7 30.3 68 73	92.2	3
4					5 04.1 68 73	93.4	5 24.6 68 73	93.0	5 45.0 68 73	92.6	6 05.5 68 73	92.3	6 26.0 68 73	91.9	6 46.4 68 73	91.5	4
85									5 01.2 68 73	91.9	5 21.7 68 73	91.6	5 42.1 68 73	91.2	6 02.5 68 73	90.8	85
6															5 18.6 68 73	90.2	6

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H.A.	0° 00′			0° 30′			1° 00′			1° 30′			2° 00′			2° 30′			3° 00′			3° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	47 00.0	1.0 01	180.0	46 30.0	1.0 01	180.0	46 00.0	1.0 01	180.0	45 30.0	1.0 01	180.0	45 00.0	1.0 01	180.0	44 30.0	1.0 01	180.0	44 00.0	1.0 01	180.0	43 30.0	1.0 01	180.0	00
1	46 59.4	1.0 03	178.5	46 29.4	1.0 03	178.5	45 59.4	1.0 03	178.6	45 29.5	1.0 03	178.6	44 59.5	1.0 03	178.6	44 29.5	1.0 03	178.6	43 59.5	1.0 03	178.6	43 29.5	1.0 03	178.6	1
2	46 57.8	1.0 05	177.1	46 27.8	1.0 05	177.1	45 57.8	1.0 05	177.1	45 27.8	1.0 05	177.1	44 57.8	1.0 04	177.2	44 27.9	1.0 04	177.2	43 57.9	1.0 04	177.2	43 27.9	1.0 04	177.2	2
3	46 55.0	1.0 07	175.6	46 25.0	1.0 06	175.6	45 55.0	1.0 06	175.7	45 25.1	1.0 06	175.7	44 55.1	1.0 06	175.8	44 25.2	1.0 06	175.8	43 55.2	1.0 06	175.8	43 25.3	1.0 06	175.9	3
4	46 51.0	1.0 08	174.1	46 21.1	1.0 08	174.2	45 51.2	1.0 08	174.3	45 21.3	1.0 08	174.3	44 51.4	1.0 08	174.4	44 21.4	1.0 08	174.4	43 51.5	1.0 08	174.5	43 21.6	1.0 08	174.5	4
05	46 46.0	1.0 10	172.7	46 16.1	1.0 10	172.8	45 46.3	1.0 10	172.8	45 16.4	1.0 10	172.9	44 46.5	1.0 10	173.0	44 16.6	1.0 10	173.0	43 46.7	1.0 10	173.1	43 16.9	1.0 10	173.1	05
6	46 39.9	99 12	171.2	46 10.1	99 12	171.3	45 40.2	99 12	171.4	45 10.4	99 12	171.5	44 40.6	99 12	171.6	44 10.8	99 12	171.6	43 40.9	99 11	171.7	43 11.1	99 11	171.8	6
7	46 32.6	99 14	169.8	46 02.9	99 14	169.9	45 33 1	99 14	170.0	45 03.4	99 14	170.1	44 33.6	99 13	170.2	44 03.8	99 13	170.2	43 34.1	99 13	170.3	43 04.3	99 13	170.4	7
8	46 24.3	99 16	168.4	45 54.6	99 16	168.5	45 25.0	99 15	168.6	44 55.3	99 15	168.7	44 25.6	99 15	168.8	43 55.9	99 15	168.9	43 26.2	99 15	169.0	42 56.5	99 15	169.1	8
9	46 14.9	99 17	166.9	45 45.3	99 17	167.0	45 15.7	99 17	167.2	44 46.1	99 17	167.3	44 16.5	99 17	167.4	43 46.9	99 17	167.5	43 17.3	99 17	167.6	42 47.7	99 16	167.7	9
10	46 04.5	98 19	165.5	45 35.0	98 19	165.6	45 05.5	98 19	165.8	44 36.0	98 19	165.9	44 06.4	98 19	166.0	43 36.9	98 18	166.1	43 07.4	98 18	166.3	42 37.8	99 18	166.4	10
1	45 53.0	98 21	164.1	45 23.6	98 21	164.2	44 54.2	98 21	164.4	44 24.7	98 20	164.5	43 55.3	98 20	164.6	43 25.9	98 20	164.8	42 56.4	98 20	164.9	42 27.0	98 20	165.0	1
2	45 40.4	98 23	162.7	45 11.1	98 22	162.8	44 41.8	98 22	163.0	44 12.5	98 22	163.1	43 43.2	98 22	163.3	43 13.9	98 22	163.4	42 44.5	98 21	163.6	42 15.2	98 21	163.7	2
3	45 26.9	97 24	161.3	44 57.7	97 24	161.5	44 28.5	97 24	161.6	43 59.3	97 24	161.8	43 30.1	97 23	161.9	43 00.9	97 23	162.1	42 31.6	97 23	162.3	42 02.4	98 23	162.4	3
4	45 12.3	97 26	159.9	44 43.2	97 26	160.1	44 14.2	97 26	160.3	43 45.1	97 25	160.4	43 16.0	97 25	160.6	42 46.9	97 25	160.8	42 17.8	97 25	160.9	41 48.6	97 24	161.1	4
15	44 56.7	96 28	158.6	44 27.8	96 27	158.7	43 58.9	96 27	158.9	43 29.9	97 27	159.1	43 01.0	97 27	159.3	42 32.0	97 26	159.5	42 03.0	97 26	159.6	41 34.0	97 26	159.8	15
6	44 40.2	96 29	157.2	44 11.4	96 29	157.4	43 42.6	96 29	157.6	43 13.8	96 28	157.8	42 45.0	96 28	158.0	42 16.1	96 28	158.2	41 47.2	96 28	158.3	41 18.3	96 28	158.5	6
7	44 22.7	96 31	155.9	43 54.1	96 30	156.1	43 25.4	96 30	156.3	42 56.7	96 30	156.5	42 28.0	96 30	156.7	41 59.3	96 30	156.9	41 30.6	96 29	157.1	41 01.8	96 29	157.2	7
8	44 04.3	95 32	154.5	43 35.8	95 32	154.7	43 07.3	95 32	155.0	42 38.8	95 31	155.2	42 10.2	95 31	155.4	41 41.6	95 31	155.6	41 13.0	95 31	155.8	40 44.4	95 30	156.0	8
9	43 45.0	94 34	153.2	43 16.6	95 33	153.4	42 48.3	95 33	153.7	42 19.9	95 33	153.9	41 51.5	95 33	154.1	41 23.0	95 32	154.3	40 54.6	95 32	154.5	40 26.1	95 32	154.7	9
20	43 24.8	94 35	151.9	42 56.6	94 35	152.1	42 28.4	94 35	152.4	42 00.1	94 34	152.6	41 31.9	94 34	152.8	41 03.6	94 34	153.1	40 35.3	94 34	153.3	40 06.9	94 33	153.5	20
1	43 03.7	93 37	150.6	42 35.6	93 36	150.9	42 07.6	94 36	151.1	41 39.5	94 36	151.3	41 11.4	94 35	151.6	40 43.3	94 35	151.8	40 15.1	94 35	152.0	39 46.9	94 35	152.3	1
2	42 41.7	93 38	149.4	42 13.9	93 38	149.6	41 46.0	93 37	149.9	41 18.1	93 37	150.1	40 50.1	93 37	150.3	40 22.1	93 37	150.6	39 54.1	93 36	150.8	39 26.1	93 36	151.0	2
3	42 18.9	92 39	148.1	41 51.3	92 39	148.4	41 23.5	92 39	148.6	40 55.8	93 38	148.9	40 28.0	93 38	149.1	40 00.2	93 38	149.4	39 32.3	93 38	149.6	39 04.4	93 37	149.8	3
4	41 55.4	92 41	146.9	41 27.8	92 40	147.1	41 00.3	92 40	147.4	40 32.7	92 40	147.7	40 05.1	92 40	147.9	39 37.4	92 39	148.2	39 09.7	92 39	148.4	38 42.0	92 39	148.7	4
25	41 31.0	91 42	145.6	41 03.6	91 42	145.9	40 36.2	91 41	146.2	40 08.8	91 41	146.4	39 41.4	92 41	146.7	39 13.9	92 40	147.0	38 46.4	92 40	147.2	38 18.8	92 40	147.5	25
6	41 05.8	90 43	144.4	40 38.7	91 43	144.7	40 11.4	91 43	145.0	39 44.2	91 42	145.3	39 16.9	91 42	145.5	38 49.6	91 42	145.8	38 22.2	91 41	146.1	37 54.8	91 41	146.3	6
7	40 39.9	90 44	143.2	40 12.9	90 44	143.5	39 45.9	90 44	143.8	39 18.8	90 44	144.1	38 51.7	90 43	144.4	38 24.5	91 43	144.6	37 57.4	91 43	144.9	37 30.1	91 42	145.2	7
8	40 13.3	89 46	142.1	39 46.5	89 45	142.4	39 19.6	90 45	142.6	38 52.7	90 45	142.9	38 25.8	90 44	143.2	37 58.8	90 44	143.5	37 31.8	90 44	143.8	37 04.7	90 44	144.0	8
9	39 46.0	89 47	140.9	39 19.3	89 46	141.2	38 52.6	89 46	141.5	38 25.9	89 46	141.8	37 59.1	89 46	142.1	37 32.3	89 45	142.4	37 05.5	90 45	142.6	36 38.6	90 45	142.9	9
30	39 18.0	88 48	139.8	38 51.5	88 48	140.1	38 25.0	88 47	140.4	37 58.4	89 47	140.6	37 31.8	89 47	140.9	37 05.2	89 46	141.2	36 38.5	89 46	141.5	36 11.8	89 46	141.8	30
1	38 49.3	88 49	138.6	38 23.0	88 49	138.9	37 56.7	88 48	139.2	37 30.3	88 48	139.5	37 03.9	88 48	139.8	36 37.4	88 47	140.1	36 10.9	88 47	140.4	35 44.3	89 47	140.7	1
2	38 19.9	87 50	137.5	37 53.8	87 50	137.8	37 27.7	87 49	138.1	37 01.5	87 49	138.4	36 35.2	88 49	138.7	36 08.9	88 48	139.0	35 42.6	88 48	139.3	35 16.2	88 48	139.6	2
3	37 50.0	86 51	136.4	37 24.1	87 51	136.7	36 58.1	87 50	137.0	36 32.0	87 50	137.3	36 06.0	87 50	137.7	35 39.8	87 50	138.0	35 13.7	87 49	138.3	34 47.5	87 49	138.6	3
4	37 19.4	86 52	135.3	36 53.7	86 52	135.6	36 27.9	86 51	136.0	36 02.0	86 51	136.3	35 36.1	86 51	136.6	35 10.2	87 50	136.9	34 44.2	87 50	137.2	34 18.1	87 50	137.5	4
35	36 48.3	85 53	134.2	36 22.7	85 53	134.6	35 57.1	86 52	134.9	35 31.4	86 52	135.2	35 05.7	86 52	135.5	34 39.9	86 51	135.8	34 14.0	86 51	136.1	33 48.2	86 51	136.5	35
6	36 16.6	85 54	133.2	35 51.2	85 54	133.5	35 25.7	85 53	133.8	35 00.2	85 53	134.2	34 34.6	85 53	134.5	34 09.0	85 52	134.8	33 43.4	86 52	135.1	33 17.7	86 52	135.4	6
7	35 44.3	84 55	132.1	35 19.1	84 54	132.5	34 53.8	84 54	132.8	34 28.4	85 54	133.1	34 03.0	85 54	133.5	33 37.6	85 53	133.8	33 12.1	85 53	134.1	32 46.6	85 53	134.4	7
8	35 11.5	83 56	131.1	34 46.4	84 55	131.5	34 21.3	84 55	131.8	33 56.2	84 55	132.1	33 30.9	84 54	132.4	33 05.7	84 54	132.8	32 40.3	84 54	133.1	32 15.0	85 54	133.4	8
9	34 38.2	83 56	130.1	34 13.3	83 56	130.4	33 48.3	83 56	130.8	33 23.3	83 56	131.1	32 58.3	84 55	131.4	32 33.2	84 55	131.8	32 08.0	84 55	132.1	31 42.8	84 54	132.4	9
40	34 04.4	82 57	129.1	33 39.7	83 57	129.4	33 14.9	83 57	129.8	32 50.0	83 56	130.1	32 25.1	83 56	130.4	32 00.2	83 56	130.8	31 35.2	83 56	131.1	31 10.2	84 55	131.4	40
1	33 30.1	82 58	128.1	33 05.5	82 58	128.5	32 40.9	82 57	128.8	32 16.2	82 57	129.1	31 51.5	83 57	129.5	31 26.7	83 57	129.8	31 01.9	83 56	130.1	30 37.0	83 56	130.5	1
2	32 55.3	81 59	127.1	32 30.9	81 58	127.5	32 06.5	82 58	127.8	31 42.0	82 58	128.2	31 17.4	82 58	128.5	30 52.8	82 57	128.8	30 28.1	82 57	129.2	30 03.4	82 57	129.5	2
3	32 20.1	81 59	126.2	31 55.9	81 59	126.5	31 31.6	81 59	126.9	31 07.2	81 59	127.2	30 42.8	81 58	127.6	30 18.4	82 58	127.9	29 53.9	82 58	128.2	29 29.3	82 58	128.6	3
4	31 44.5	80 60	125.2	31 20.4	80 60	125.6	30 56.3	81 60	125.9	30 32.1	81 59	126.3	30 07.8	81 59	126.6	29 43.5	81 59	127.0	29 19.2	81 59	127.3	28 54.8	81 58	127.6	4
45	31 08.5	80 61	124.3	30 44.5	80 60	124.6	30 20.5	80 60	125.0	29 56.5	80 60	125.3	29 32.4	80 60	125.7	29 08.2	81 59	126.0	28 44.0	81 59	126.4	28 19.8	81 59	126.7	45
6	30 32.0	79 61	123.4	30 08.2	79 61	123.7	29 44.4	80 61	124.1	29 20.5	80 61	124.4	28 56.5	80 60	124.8	28 32.5	80 60	125.1	28 08.5	80 60	125.4	27 44.4	80 60	125.8	6
7	29 55.2	79 62	122.5	29 31.5	79 62	122.8	29 07.8	79 62	123.2	28 44.1	79 61	123.5	28 20.3	79 61	123.9	27 56.4	80 61	124.2	27 32.5	80 61	124.5	27 08.6	80 60	124.9	7
8	29 18.0	78 63	121.6	28 54.5	78 62	121.9	28 30.9	79 62	122.3	28 07.3	79 62	122.6	27 43.7	79 62	123.0	27 20.0	79 61	123.3	26 56.2	79 61	123.7	26 32.4	79 61	124.0	8
9	28 40.4	78 63	120.7	28 17.0	78 63	121.0	27 53.6	78 63	121.4	27 30.2	78 62	121.7	27 06.7	78 62	122.1	26 43.1	79 62	122.4	26 19.5	79 62	122.8	25 55.8	79 62	123.1	9
50	28 02.5	77 64	119.8	27 39.3	77 64	120.1	27 16.0	78 63	120.5	26 52.7	78 63	120.8	26 29.3	78 63	121.2	26 05.9	78 63	121.5	25 42.4	78 62	121.9	25 18.9	78 62	122.2	50
1	27 24.2	77 64	118.9	27 01.1	77 64	119.3	26 38.0	77 64	119.6	26 14.8	77 64	120.0	25 51.6	78 63	120.3	25 28.3	78 63	120.7	25 05.0	78 63	121.0	24 41.6	78 63	121.4	1
2	26 45.6	76 65	118.0	26 22.7	77 65	118.4	25 59.7	77 64	118.8	25 36.7	77 64	119.1	25 13.6	77 64	119.5	24 50.4	77 64	119.8	24 27.2	77 64	120.2	24 04.0	78 63	120.5	2
3	26 06.8	76 65	117.2	25 44.0	76 65	117.6	25 21.1	76 65	117.9	24 58.2	76 65	118.3	24 35.2	77 64	118.6	24 12.2	77 64	119.0	23 49.1	77 64	119.3	23 26.0	77 64	119.7	3
4	25 27.6	76 66	116.4	25 04.9	76 66	116.7	24 42.2	76 65	117.1	24 19.4	76 65	117.4	23 56.5	76 65	117.8	23 33.6	76 65	118.1	23 10.7	77 65	118.5	22 47.7	77 64	118.8	4
55	24 48.1	75 66	115.5	24 25.6	75 66	115.9	24 03.0	75 66	116.2	23 40.3	76 66	116.6	23 17.6	76 65	117.0	22 54.8	76 65	117.3	22 32.0	76 65	117.7	22 09.1	76 65	118.0	55
6	24 08.4	75 67	114.7	23 46.0	75 66	115.1	23 23.5	75 66	115.4	23 00.9	75 66	115.8	22 38.3	75 66	116.1	22 15.7	76 66	116.5	21 53.0	76 65	116.9	21 30.3	76 65	117.2	6
7	23 28.4	74 67	113.9	23 06.1	75 67	114.3	22 43.7	75 67	114.6	22 21.3	75 67	115.0	21 58.8	75 66	115.3	21 36.3	75 66	115.7	21 13.7	75 66	116.0	20 51.1	75 66	116.4	7
8	22 48.2	74 67	113.1	22 25.9	74 67	113.4	22 03.7	74 67	113.8	21 41.4	74 67	114.2	21 19.0	75 67	114.5	20 56.6	75 67	114.9	20 34.1	75 66	115.2	20 11.6	75 66	115.6	8
9	22 07.7	74 68	112.3	21 45.6	74 68	112.6	21 23.4	74 68	113.0	21 01.2	74 67	113.4	20 38.9	74 67	113.7	20 16.7	74 67	114.1	19 54.3	75 67	114.4	19 31.9	75 67	114.8	9
60	21 27.0	73 68	111.5	21 04.9	73 68	111.9	20 42.9	74 68	112.2	20 20.8	74 68	112.6	19 58.7	74 68	112.9	19 36.5	74 67	113.3	19 14.2	74 67	113.7	18 52.0	74 67	114.0	60
1	20 46.0	73 69	110.7	20 24.1	73 68	111.1	20 02.2	73 68	111.4	19 40.2	73 68	111.8	19 18.1	74 68	112.2	18 56.0	74 68	112.5	18 33.9	74 68	112.9	18 11.8	74 67	113.2	1
2	20 04.9	73 69	109.9	19 43.1	73 69	110.3	19 21.2	73 69	110.7	18 59.3	73 68	111.0	18 37.4	73 68	111.4	18 15.4	73 68	111.7	17 53.4	73 68	112.1	17 31.3	74 68	112.5	2
3	19 23.5	72 69	109.2	19 01.8	72 69	109.5	18 40.0	73 69	109.9	18 18.2	73 69	110.3	17 56.4	73 69	110.6	17 34.5	73 68	111.0	17 12.6	73 68	111.3	16 50.7	73 68	111.7	3
4	18 42.0	72 70	108.4	18 20.3	72 69	108.8	17 58.7	72 69	109.1	17 37.0	72 69	109.5	17 15.2	73 69	109.9	16 53.5	73 69	110.2	16 31.6	73 69	110.6	16 09.8	73 68	110.9	4
65	18 00.2	72 70	107.6	17 38.7	72 70	108.0	17 17.1	72 70	108.4	16 55.5	72 69	108.7	16 33.9	72 69	109.1	16 12.2	72 69	109.5	15 50.5	72 69	109.8	15 28.7	73 69	110.2	65
6	17 18.3	71 70	106.9	16 56.9	72 70	107.3	16 35.4	72 70	107.6	16 13.9	72 70	108.0	15 52.3	72 70	108.3	15 30.7	72 69	108.7	15 09.1	72 69	109.1	14 47.4	72 69	109.4	6
7	16 36.3	71 70	106.1	16 14.9	71 70	106.5	15 53.5	71 70	106.9	15 32.0	72 70	107.2	15 10.6	72 70	107.6	14 49.1	72 70	108.0	14 27.5	72 70	108.3	14 05.9	72 69	108.7	7
8	15 54.0	71 71	105.4	15 32.7	71 71	105.8	15 11.4	71 70	106.1	14 50.1	71 70	106.5	14 28.7	71 70	106.9	14 07.2	71 70	107.2	13 45.8	72 70	107.6	13 24.3	72 70	107.9	8
9	15 11.7	71 71	104.7	14 50.4	71 71	105.0	14 29.2	71 71	105.4	14 07.9	71 70	105.8	13 46.6	71 70	106.1	13 25.2	71 70	106.5	13 03.8	71 70	106.8	12 42.4	71 70	107.2	9
70	14 29.1	70 71	103.9	14 08.0	71 71	104.3	13 46.8	71 71	104.7	13 25.6	71 71	105.0	13 04.4	71 71	105.4	12 43.1	71 71	105.8	12 21.8	71 70	106.1	12 00.4	71 70	106.5	70
1	13 46.5	70 71	103.2	13 25.4	70 71	103.6	13 04.3	70 71	103.9	12 43.1	71 71	104.3	12 22.0	71 71	104.7	12 00.8	71 71	105.0	11 39.5	71 71	105.4	11 18.3	71 71	105.8	1
2	13 03.7	70 72	102.5	12 42.7	70 71	102.9	12 21.6	70 71	103.2	12 00.6	70 71	103.6	11 39.5	70 71	104.0	11 18.3	70 71	104.3	10 57.2	71 71	104.7	10 36.0	71 71	105.0	2
3	12 20.8	70 72	101.8	11 59.8	70 72	102.1	11 38.9	70 71	102.5	11 17.8	70 71	102.9	10 56.8	70 71	103.2	10 35.7	70 71	103.6	10 14.6	70 71	104.0	9 53.5	70 71	104.3	3
4	11 37.8	70 72	101.1	11 16.9	70 72	101.4	10 56.0	70 72	101.8	10 35.0	70 72	102.2	10 14.0	70 71	102.5	9 53.0	70 71	102.9	9 32.0	70 71	103.2	9 10.9	70 71	103.6	4
75	10 54.7	69 72	100.4	10 33.8	70 72	100.7	10 13.0	70 72	101.1	9 52.1	70 72	101.5	9 31.1	70 72	101.8	9 10.2	70 72	102.2	8 49.2	70 71	102.5	8 28.2	70 71	102.9	75
6	10 11.5	69 72	99.6	9 50.7	69 72	100.0	9 29.8	69 72	100.4	9 09.0	70 72	100.7	8 48.1	70 72	101.1	8 27.2	70 72	101.5	8 06.3	70 72	101.8	7 45.4	70 72	102.2	6
7	9 28.2	69 72	98.9	9 07.4	69 72	99.3	8 46.6	69 72	99.7	8 25.8	69 72	100.0	8 05.0	69 72	100.4	7 44.2	69 72	100.8	7 23.3	70 72	101.1	7 02.5	70 72	101.5	7
8	8 44.8	69 72	98.2	8 24.1	69 72	98.6	8 03.3	69 72	99.0	7 42.6	69 72	99.3	7 21.8	69 72	99.7	7 01.0	69 72	100.1	6 40.2	69 72	100.4	6 19.4	69 72	100.8	8
9	8 01.3	69 73	97.6	7 40.6	69 72	97.9	7 20.0	69 72	98.3	6 59.2	69 72	98.6	6 38.5	69 72	99.0	6 17.8	69 72	99.4	5 57.0	69 72	99.7	5 36.2	69 72	100.1	9
80	7 17.8	69 73	96.9	6 57.1	69 73	97.2	6 36.5	69 73	97.6	6 15.8	69 72	98.0	5 55.1	69 72	98.3	5 34.4	69 72	98.7	5 13.7	69 72	99.0				80
1	6 34.2	69 73	96.2	6 13.6	69 73	96.5	5 53.0	69 73	96.9	5 32.3	69 73	97.3	5 11.7	69 73	97.6										1
2	5 50.5	69 73	95.5	5 29.9	69 73	95.8	5 09.4	69 73	96.2																2
3	5 06.8	68 73	94.8																						3

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Lat. 43°

H.A.	4° 00′ Alt.	Δd	Δt	Az.	4° 30′ Alt.	Δd	Δt	Az.	5° 00′ Alt.	Δd	Δt	Az.	5° 30′ Alt.	Δd	Δt	Az.
°	° ′			°	° ′			°	° ′			°	° ′			°
00	51 00.0	1.0	01	180.0	51 30.0	1.0	01	180.0	52 00.0	1.0	01	180.0	52 30.0	1.0	01	180.0
1	50 59.4	1.0	03	178.4	51 29.4	1.0	03	178.4	51 59.4	1.0	03	178.4	52 29.4	1.0	03	178.4
2	50 57.6	1.0	05	176.8	51 27.5	1.0	05	176.8	51 57.5	1.0	05	176.8	52 27.5	1.0	05	176.7
3	50 54.5	1.0	07	175.3	51 24.5	1.0	07	175.2	51 54.4	1.0	07	175.2	52 24.4	1.0	07	175.1
4	50 50.3	1.0	09	173.7	51 20.2	1.0	09	173.6	51 50.1	1.0	09	173.5	52 20.0	1.0	09	173.5
05	50 44.9	99	11	172.1	51 14.7	99	11	172.0	51 44.6	99	11	171.9	52 14.4	99	11	171.9
6	50 38.3	99	13	170.5	51 08.0	99	13	170.4	51 37.8	99	13	170.3	52 07.6	99	13	170.2
7	50 30.4	99	15	169.0	51 00.2	99	15	168.9	51 29.8	99	15	168.8	51 59.5	99	15	168.6
8	50 21.5	99	17	167.4	50 51.1	99	17	167.3	51 20.7	99	17	167.2	51 50.3	99	17	167.0
9	50 11.4	98	19	165.9	50 40.9	98	19	165.8	51 10.4	98	19	165.6	51 39.9	98	19	165.5
10	50 00.1	98	21	164.4	50 29.5	98	21	164.2	50 58.9	98	21	164.1	51 28.3	98	21	163.9
1	49 47.7	98	22	162.8	50 17.0	98	23	162.7	50 46.3	98	23	162.5	51 15.5	97	23	162.3
2	49 34.2	97	24	161.3	50 03.4	97	25	161.2	50 32.5	97	25	161.0	51 01.6	97	25	160.8
3	49 19.6	97	26	159.9	49 48.7	97	26	159.7	50 17.7	97	27	159.5	50 46.6	97	27	159.3
4	49 04.0	96	28	158.4	49 32.9	96	28	158.2	50 01.7	96	28	158.0	50 30.6	96	29	157.8
15	48 47.3	96	30	156.9	49 16.1	96	30	156.7	49 44.7	96	30	156.5	50 13.4	96	30	156.3
6	48 29.6	95	31	155.5	48 58.2	95	31	155.3	49 26.7	95	32	155.0	49 55.2	95	32	154.8
7	48 10.9	95	33	154.0	48 39.3	95	33	153.8	49 07.7	95	33	153.6	49 36.0	94	34	153.3
8	47 51.2	94	34	152.7	48 19.5	94	35	152.4	48 47.7	94	35	152.1	49 15.8	94	35	151.9
9	47 30.6	94	36	151.3	47 58.7	93	36	151.0	48 26.7	93	37	150.7	48 54.7	93	37	150.5
20	47 09.1	93	37	149.9	47 36.9	93	38	149.6	48 04.8	93	38	149.3	48 32.6	93	38	149.1
1	46 46.6	92	39	148.5	47 14.3	92	39	148.3	47 41.9	92	40	148.0	48 09.5	92	40	147.7
2	46 23.2	92	40	147.2	46 50.8	92	41	146.9	47 18.2	91	41	146.6	47 45.6	91	41	146.3
3	45 59.1	91	42	145.9	46 26.4	91	42	145.6	46 53.7	91	42	145.3	47 20.9	91	43	145.0
4	45 34.0	91	43	144.6	46 01.2	90	43	144.3	46 28.2	90	44	144.0	46 55.3	90	44	143.6
25	45 08.2	90	44	143.3	45 35.1	90	45	143.0	46 02.0	90	45	142.7	46 28.9	89	45	142.3
6	44 41.6	89	46	142.0	45 08.3	89	46	141.7	45 35.0	89	46	141.4	46 01.7	89	47	141.1
7	44 14.2	89	47	140.8	44 40.8	88	47	140.5	45 07.3	88	47	140.1	45 33.7	88	48	139.8
8	43 46.1	88	48	139.6	44 12.5	88	48	139.2	44 38.8	88	49	138.9	45 05.0	87	49	138.6
9	43 17.3	87	49	138.4	43 43.5	87	49	138.0	44 09.6	87	50	137.7	44 35.6	87	50	137.3
30	42 47.8	87	50	137.2	43 13.8	87	51	136.8	43 39.7	86	51	136.5	44 05.6	86	51	136.1
1	42 17.7	86	51	136.0	42 43.4	86	52	135.7	43 09.2	86	52	135.3	43 34.8	85	52	135.0
2	41 46.9	85	52	134.9	42 12.5	85	53	134.5	42 38.0	85	53	134.1	43 03.5	85	53	133.8
3	41 15.5	85	53	133.7	41 40.9	85	54	133.4	42 06.2	84	54	133.0	42 31.5	84	54	132.6
4	40 43.4	84	54	132.6	41 08.7	84	55	132.2	41 33.8	84	55	131.9	41 58.9	84	55	131.5
35	40 10.9	84	55	131.5	40 35.9	83	56	131.1	41 00.9	83	56	130.8	41 25.8	83	56	130.4
6	39 37.7	83	56	130.4	40 02.6	83	56	130.1	40 27.4	83	57	129.7	40 52.1	82	57	129.3
7	39 04.1	82	57	129.4	39 28.7	82	57	129.0	39 53.3	82	58	128.6	40 17.9	82	58	128.2
8	38 29.9	82	58	128.3	38 54.4	82	58	127.9	39 18.8	81	58	127.6	39 43.2	81	59	127.2
9	37 55.2	81	59	127.3	38 19.5	81	59	126.9	38 43.8	81	59	126.5	39 08.0	80	59	126.1
40	37 20.0	81	59	126.2	37 44.2	80	60	125.9	38 08.3	80	60	125.5	38 32.3	80	60	125.1
1	36 44.4	80	60	125.2	37 08.4	80	60	124.9	37 32.3	80	61	124.5	37 56.2	79	61	124.1
2	36 08.4	80	61	124.3	36 32.2	79	61	123.9	36 55.9	79	61	123.5	37 19.6	79	62	123.1
3	35 31.9	79	61	123.3	35 55.6	79	62	122.9	36 19.2	79	62	122.5	36 42.7	78	62	122.1
4	34 55.0	78	62	122.3	35 18.5	78	62	121.9	35 42.0	78	63	121.6	36 05.3	78	63	121.2
45	34 17.7	78	63	121.4	34 41.1	78	63	121.0	35 04.4	78	63	120.6	35 27.6	77	64	120.2
6	33 40.1	77	63	120.4	34 03.3	77	64	120.1	34 26.4	77	64	119.7	34 49.5	77	64	119.3
7	33 02.1	77	64	119.5	33 25.1	77	64	119.1	33 48.1	77	64	118.7	34 11.0	76	65	118.4
8	32 23.7	77	64	118.6	32 46.6	76	65	118.2	33 09.5	76	65	117.8	33 32.3	76	65	117.4
9	31 45.0	76	65	117.7	32 07.8	76	65	117.3	32 30.5	76	65	116.9	32 53.2	75	66	116.5
50	31 06.0	76	66	116.8	31 28.7	75	66	116.4	31 51.2	75	66	116.0	32 13.8	75	66	115.7
1	30 26.7	75	66	115.9	30 49.2	75	66	115.6	31 11.7	75	66	115.2	31 34.1	74	67	114.8
2	29 47.1	75	66	115.1	30 09.5	75	67	114.7	30 31.8	74	67	114.3	30 54.1	74	67	113.9
3	29 07.2	74	67	114.2	29 29.5	74	67	113.8	29 51.7	74	67	113.5	30 13.8	74	68	113.1
4	28 27.1	74	67	113.4	28 49.2	74	68	113.0	29 11.3	74	68	112.6	29 33.3	73	68	112.2
55	27 46.6	74	68	112.5	28 08.7	73	68	112.2	28 30.7	73	68	111.8	28 52.6	73	68	111.4
6	27 06.0	73	68	111.7	27 27.9	73	68	111.3	27 49.8	73	68	110.9	28 11.6	73	69	110.6
7	26 25.1	73	68	110.9	26 46.9	73	69	110.5	27 08.7	72	69	110.1	27 30.4	72	69	109.7
8	25 44.0	73	69	110.1	26 05.7	72	69	109.7	26 27.4	72	69	109.3	26 49.0	72	69	108.9
9	25 02.7	72	69	109.3	25 24.3	72	69	108.9	25 45.9	72	70	108.5	26 07.4	72	70	108.1
60	24 21.2	72	69	108.5	24 42.7	72	70	108.1	25 04.2	71	70	107.7	25 25.6	71	70	107.4
1	23 39.5	72	70	107.7	24 00.9	71	70	107.3	24 22.3	71	70	107.0	24 43.6	71	70	106.6
2	22 57.6	71	70	106.9	23 19.0	71	70	106.6	23 40.3	71	70	106.2	24 01.5	71	70	105.8
3	22 15.5	71	70	106.2	22 36.8	71	71	105.8	22 58.0	71	71	105.4	23 19.2	70	71	105.0
4	21 33.3	71	71	105.4	21 54.5	71	71	105.0	22 15.7	70	71	104.7	22 36.7	70	71	104.3
65	20 50.9	70	71	104.7	21 12.1	70	71	104.3	21 33.1	70	71	103.9	21 54.1	70	71	103.5
6	20 08.4	70	71	103.9	20 29.5	70	71	103.5	20 50.5	70	71	103.1	21 11.4	70	71	102.8
7	19 25.7	70	71	103.2	19 46.7	70	71	102.8	20 07.7	70	72	102.4	20 28.6	70	72	102.0
8	18 43.0	70	72	102.4	19 03.9	70	72	102.0	19 24.8	70	72	101.7	19 45.6	69	72	101.3
9	18 00.0	70	72	101.7	18 20.9	69	72	101.3	18 41.7	69	72	100.9	19 02.5	69	72	100.6
70	17 17.0	69	72	101.0	17 37.8	69	72	100.6	17 58.6	69	72	100.2	18 19.3	69	72	99.8
1	16 33.9	69	72	100.2	16 54.6	69	72	99.9	17 15.4	69	72	99.5	17 36.0	69	72	99.1
2	15 50.7	69	72	99.5	16 11.4	69	72	99.2	16 32.0	69	72	98.8	16 52.7	69	72	98.4
3	15 07.3	69	72	98.8	15 28.0	69	72	98.4	15 48.6	69	72	98.1	16 09.2	69	73	97.7
4	14 23.9	69	72	98.1	14 44.6	69	73	97.7	15 05.1	69	73	97.4	15 25.7	68	73	97.0
75	13 40.5	69	73	97.4	14 01.0	69	73	97.0	14 21.6	68	73	96.6	14 42.1	68	73	96.3
6	12 56.9	69	73	96.7	13 17.4	68	73	96.3	13 38.0	68	73	95.9	13 58.4	68	73	95.6
7	12 13.3	68	73	96.0	12 33.8	68	73	95.6	12 54.3	68	73	95.2	13 14.7	68	73	94.9
8	11 29.6	68	73	95.3	11 50.1	68	73	94.9	12 10.6	68	73	94.5	12 31.0	68	73	94.2
9	10 45.9	68	73	94.6	11 06.4	68	73	94.2	11 26.8	68	73	93.9	11 47.2	68	73	93.5
80	10 02.1	68	73	93.9	10 22.6	68	73	93.5	10 43.0	68	73	93.2	11 03.4	68	73	92.8
1	9 18.3	68	73	93.2	9 38.8	68	73	92.8	9 59.2	68	73	92.5	10 19.6	68	73	92.1
2	8 34.5	68	73	92.5	8 54.9	68	73	92.2	9 15.3	68	73	91.8	9 35.7	68	73	91.4
3	7 50.7	68	73	91.8	8 11.1	68	73	91.5	8 31.5	68	73	91.1	8 51.8	68	73	90.7
4	7 06.8	68	73	91.2	7 27.2	68	73	90.8	7 47.6	68	73	90.4	8 07.9	68	73	90.0
85	6 22.9	68	73	90.5	6 43.3	68	73	90.1	7 03.7	68	73	89.7	7 24.1	68	73	89.4
6	5 39.1	68	73	89.8	5 59.4	68	73	89.4	6 19.8	68	73	89.1	6 40.2	68	73	88.7
7					5 15.6	68	73	88.7	5 36.0	68	73	88.4	5 56.3	68	73	88.0
8													5 12.5	68	73	87.3
9																
90																

H.A.	6° 00′ Alt.	Δd	Δt	Az.	6° 30′ Alt.	Δd	Δt	Az.	7° 00′ Alt.	Δd	Δt	Az.	7° 30′ Alt.	Δd	Δt	Az.
°	° ′			°	° ′			°	° ′			°	° ′			°
00	53 00.0	1.0	01	180.0	53 30.0	1.0	01	180.0	54 00.0	1.0	01	180.0	54 30.0	1.0	01	180.0
1	52 59.4	1.0	03	178.3	53 29.4	1.0	03	178.3	53 59.4	1.0	03	178.3	54 29.3	1.0	03	178.3
2	52 57.5	1.0	05	176.7	53 27.4	1.0	05	176.7	53 57.4	1.0	05	176.6	54 27.4	1.0	05	176.6
3	52 54.3	1.0	07	175.0	53 24.2	1.0	07	175.0	53 54.2	1.0	08	174.9	54 24.1	1.0	08	174.9
4	52 49.9	1.0	09	173.4	53 19.8	1.0	10	173.3	53 49.7	1.0	10	173.3	54 19.6	1.0	10	173.2
05	52 44.2	99	12	171.8	53 14.1	99	12	171.7	53 43.9	99	12	171.6	54 13.7	99	12	171.5
6	52 37.3	99	14	170.1	53 07.1	99	14	170.0	53 36.8	99	14	169.9	54 06.6	99	14	169.8
7	52 29.2	99	16	168.5	52 58.9	99	16	168.4	53 28.6	99	16	168.3	53 58.2	99	16	168.1
8	52 19.9	99	18	166.9	52 49.5	99	18	166.8	53 19.0	99	18	166.6	53 48.6	99	18	166.5
9	52 09.3	98	20	165.3	52 38.8	98	20	165.2	53 08.3	98	20	165.0	53 37.7	98	20	164.8
10	51 57.6	98	21	163.7	52 27.0	98	22	163.6	52 56.3	98	22	163.4	53 25.6	98	22	163.2
1	51 44.8	97	23	162.2	52 14.0	97	24	162.0	52 43.2	97	24	161.8	53 12.4	97	24	161.6
2	51 30.7	97	25	160.6	51 59.8	97	25	160.4	52 28.9	97	26	160.2	52 57.9	97	26	160.0
3	51 15.6	96	27	159.1	51 44.5	96	27	158.8	52 13.4	96	28	158.6	52 42.3	96	28	158.4
4	50 59.4	96	29	157.5	51 28.1	96	29	157.3	51 56.9	96	29	157.1	52 25.6	96	30	156.8
15	50 42.1	95	31	156.0	51 10.7	95	31	155.8	51 39.3	95	31	155.5	52 07.8	95	31	155.3
6	50 23.7	95	32	154.5	50 52.2	95	33	154.3	51 20.6	95	33	154.0	51 48.9	95	33	153.8
7	50 04.3	94	34	153.1	50 32.6	94	34	152.8	51 00.8	94	35	152.5	51 29.0	94	35	152.3
8	49 44.0	94	36	151.6	50 12.0	94	36	151.3	50 40.1	93	36	151.1	51 08.1	93	37	150.8
9	49 22.6	93	37	150.2	49 50.5	93	37	149.9	50 18.4	93	38	149.6	50 46.2	93	38	149.3
20	49 00.3	92	39	148.8	49 28.0	92	39	148.5	49 55.7	92	39	148.2	50 23.3	92	40	147.9
1	48 37.1	92	40	147.4	49 04.6	92	40	147.1	49 32.1	91	41	146.8	49 59.5	91	41	146.4
2	48 13.0	91	42	146.0	48 40.3	91	42	145.7	49 07.6	91	42	145.4	49 34.8	91	43	145.1
3	47 48.1	90	43	144.7	48 15.2	90	43	144.3	48 42.2	90	44	144.0	49 09.3	90	44	143.7
4	47 22.3	90	44	143.3	47 49.2	90	45	143.0	48 16.0	89	45	142.7	48 42.9	89	45	142.3
25	46 55.6	89	46	142.0	47 22.4	89	46	141.7	47 49.0	89	46	141.3	48 15.6	89	47	141.0
6	46 28.2	88	47	140.7	46 54.8	88	47	140.4	47 21.2	88	48	140.0	47 47.6	88	48	139.7
7	46 00.1	88	48	139.5	46 26.4	88	48	139.1	46 52.7	87	49	138.8	47 18.9	87	49	138.4
8	45 31.2	87	49	138.2	45 57.3	87	50	137.9	46 23.4	87	50	137.5	46 49.4	87	50	137.1
9	45 01.6	87	50	137.0	45 27.5	86	51	136.6	45 53.4	86	51	136.3	46 19.2	86	51	135.9
30	44 31.4	86	52	135.8	44 57.1	86	52	135.4	45 22.7	85	52	135.0	45 48.3	85	53	134.7
1	44 00.4	85	53	134.6	44 25.9	85	53	134.2	44 51.4	85	53	133.9	45 16.8	84	54	133.5
2	43 28.9	85	54	133.4	43 54.2	84	54	133.1	44 19.4	84	54	132.7	44 44.6	84	55	132.3
3	42 56.7	84	55	132.3	43 21.8	84	55	131.9	43 46.9	83	55	131.5	44 11.9	83	56	131.1
4	42 23.9	83	56	131.1	42 48.9	83	56	130.8	43 13.7	83	56	130.4	43 38.5	82	56	130.0
35	41 50.6	83	56	130.0	42 15.4	82	57	129.6	42 40.0	82	57	129.3	43 04.6	82	57	128.9
6	41 16.7	82	57	128.9	41 41.3	82	58	128.6	42 05.8	82	58	128.2	42 30.2	81	58	127.8
7	40 42.3	81	58	127.9	41 06.7	81	58	127.5	41 31.0	81	59	127.1	41 55.3	81	59	126.7
8	40 07.4	81	59	126.8	40 31.7	81	59	126.4	40 55.8	80	60	126.0	41 19.8	80	60	125.6
9	39 32.1	80	60	125.8	39 56.1	80	60	125.4	40 20.1	80	60	125.0	40 43.9	79	61	124.6
40	38 56.2	80	60	124.7	39 20.1	79	61	124.3	39 43.9	79	61	123.9	40 07.6	79	61	123.5
1	38 20.0	79	61	123.7	38 43.6	79	61	123.3	39 07.3	79	62	122.9	39 30.8	78	62	122.5
2	37 43.2	79	62	122.7	38 06.8	78	62	122.3	38 30.2	78	62	121.9	38 53.6	78	63	121.5
3	37 06.1	78	62	121.7	37 29.5	78	63	121.3	37 52.8	77	63	120.9	38 16.0	77	63	120.5
4	36 28.6	78	63	120.8	36 51.8	77	63	120.4	37 15.0	77	64	120.0	37 38.0	77	64	119.6
45	35 50.7	77	64	119.8	36 13.8	77	64	119.4	36 36.8	76	64	119.0	36 59.7	76	64	118.6
6	35 12.5	77	64	118.9	35 35.4	76	65	118.5	35 58.2	76	65	118.1	36 21.0	76	65	117.7
7	34 33.9	76	65	118.0	34 56.7	76	65	117.6	35 19.4	76	65	117.2	35 42.0	75	66	116.8
8	33 55.0	76	65	117.1	34 17.6	75	66	116.7	34 40.2	75	66	116.3	35 02.6	75	66	115.9
9	33 15.7	75	66	116.2	33 38.2	75	66	115.8	34 00.6	75	66	115.4	34 23.0	74	67	115.0
50	32 36.2	75	66	115.3	32 58.6	74	67	114.9	33 20.8	74	67	114.5	33 43.1	74	67	114.1
1	31 56.4	74	67	114.4	32 18.6	74	67	114.0	32 40.8	74	67	113.6	33 02.9	73	67	113.2
2	31 16.3	74	67	113.5	31 38.4	74	67	113.1	32 00.4	73	68	112.7	32 22.4	73	68	112.3
3	30 35.9	73	68	112.7	30 57.9	73	68	112.3	31 19.8	73	68	111.9	31 41.7	73	68	111.5
4	29 55.3	73	68	111.8	30 17.2	73	68	111.4	30 39.0	73	68	111.0	31 00.7	72	69	110.6
55	29 14.4	73	68	111.0	29 36.2	72	69	110.6	29 57.9	72	69	110.2	30 19.6	72	69	109.8
6	28 33.4	72	69	110.2	28 55.0	72	69	109.8	29 16.6	72	69	109.4	29 38.2	72	69	109.0
7	27 52.1	72	69	109.4	28 13.6	72	69	109.0	28 35.1	72	69	108.6	28 56.6	71	70	108.2
8	27 10.6	72	69	108.5	27 32.0	71	70	108.2	27 53.4	71	70	107.8	28 14.8	71	70	107.4
9	26 28.9	71	70	107.8	26 50.2	71	70	107.4	27 11.6	71	70	107.0	27 32.8	71	70	106.6
60	25 47.0	71	70	107.0	26 08.3	71	70	106.6	26 29.5	71	70	106.2	26 50.7	70	70	105.8
1	25 04.9	71	70	106.2	25 26.1	71	70	105.8	25 47.3	70	71	105.4	26 08.3	70	71	105.0
2	24 22.7	71	71	105.4	24 43.8	70	71	105.0	25 04.9	70	71	104.6	25 25.9	70	71	104.2
3	23 40.3	70	71	104.6	24 01.4	70	71	104.3	24 22.4	70	71	103.9	24 43.3	70	71	103.5
4	22 57.8	70	71	103.9	23 18.8	70	71	103.5	23 39.7	70	71	103.1	24 00.5	69	71	102.7
65	22 15.1	70	71	103.1	22 36.0	70	71	102.7	22 56.9	69	72	102.3	23 17.7	69	72	102.0
6	21 32.3	70	72	102.4	21 53.2	69	72	102.0	22 13.9	69	72	101.6	22 34.7	69	72	101.2
7	20 49.4	69	72	101.6	21 10.2	69	72	101.3	21 30.9	69	72	100.9	21 51.6	69	72	100.5
8	20 06.4	69	72	100.9	20 27.1	69	72	100.5	20 47.8	69	72	100.1	21 08.4	69	72	99.7
9	19 23.2	69	72	100.2	19 43.9	69	72	99.8	20 04.5	69	72	99.4	20 25.1	68	72	99.0
70	18 40.0	69	72	99.4	19 00.6	69	72	99.1	19 21.2	69	72	98.7	19 41.7	68	72	98.3
1	17 56.6	69	72	98.7	18 17.2	69	72	98.3	18 37.8	68	72	98.0	18 58.3	68	73	97.6
2	17 13.2	69	72	98.0	17 33.8	68	73	97.6	17 54.3	68	73	97.2	18 14.7	68	73	96.9
3	16 29.7	68	73	97.3	16 50.2	68	73	96.9	17 10.7	68	73	96.5	17 31.1	68	73	96.2
4	15 46.2	68	73	96.6	16 06.7	68	73	96.2	16 27.1	68	73	95.8	16 47.5	68	73	95.4
75	15 02.6	68	73	95.9	15 23.0	68	73	95.5	15 43.4	68	73	95.1	16 03.8	68	73	94.7
6	14 18.9	68	73	95.2	14 39.3	68	73	94.8	14 59.7	68	73	94.4	15 20.0	68	73	94.1
7	13 35.2	68	73	94.5	13 55.5	68	73	94.1	14 15.9	68	73	93.7	14 36.2	68	73	93.4
8	12 51.4	68	73	93.8	13 11.8	68	73	93.4	13 32.1	68	73	93.0	13 52.4	68	73	92.7
9	12 07.6	68	73	93.1	12 27.9	68	73	92.7	12 48.3	68	73	92.4	13 08.5	68	73	92.0
80	11 23.8	68	73	92.4	11 44.1	68	73	92.0	12 04.4	68	73	91.7	12 24.7	68	73	91.3
1	10 39.9	68	73	91.7	11 00.2	68	73	91.4	11 20.5	68	73	91.0	11 40.8	68	73	90.6
2	9 56.0	68	73	91.0	10 16.4	68	73	90.7	10 36.7	68	73	90.3	10 56.9	68	73	89.9
3	9 12.2	68	73	90.4	9 32.5	68	73	90.0	9 52.8	68	73	89.6	10 13.1	68	73	89.2
4	8 28.3	68	73	89.7	8 48.6	68	73	89.3	9 08.9	68	73	88.9	9 29.2	68	73	88.6
85	7 44.4	68	73	89.0	8 04.7	68	73	88.6	8 25.0	68	73	88.3	8 45.3	68	73	87.9
6	7 00.5	68	73	88.3	7 20.9	68	73	87.9	7 41.2	68	73	87.6	8 01.5	68	73	87.2
7	6 16.7	68	73	87.6	6 37.0	68	73	87.3	6 57.4	68	73	86.9	7 17.7	68	73	86.5
8	5 32.9	68	73	87.0	5 53.2	68	73	86.6	6 13.6	68	73	86.2	6 33.9	68	73	95.9
9					5 09.4	68	73	85.9	5 29.8	68	73	85.5	5 50.1	68	73	85.2
90													5 06.4	68	73	84.5

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Lat 43°

H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	43 00.0	1.0 01	180.0	42 30.0	1.0 01	180.0	42 00.0	1.0 01	180.0	41 30.0	1.0 01	180.0	41 00.0	1.0 01	180.0	40 30.0	1.0 01	180.0	40 00.0	1.0 01	180.0	39 30.0	1.0 01	180.0	00
1	42 59.5	1.0 03	178.6	42 29.5	1.0 03	178.6	41 59.5	1.0 03	178.7	41 29.5	1.0 03	178.7	40 59.5	1.0 03	178.7	40 29.5	1.0 02	178.7	39 59.5	1.0 02	178.7	39 29.5	1.0 02	178.7	1
2	42 57.9	1.0 04	177.3	42 27.9	1.0 04	177.3	41 57.9	1.0 04	177.3	41 28.0	1.0 04	177.3	40 58.0	1.0 04	177.4	40 28.0	1.0 04	177.4	39 58.0	1.0 04	177.4	39 28.0	1.0 04	177.4	2
3	42 55.3	1.0 06	175.9	42 25.3	1.0 06	175.9	41 55.4	1.0 06	176.0	41 25.4	1.0 06	176.0	40 55.5	1.0 06	176.0	40 25.5	1.0 06	176.1	39 55.5	1.0 06	176.1	39 25.6	1.0 06	176.1	3
4	42 51.7	1.0 08	174.6	42 21.7	1.0 08	174.6	41 51.8	1.0 08	174.6	41 21.9	1.0 08	174.7	40 51.9	1.0 08	174.7	40 22.0	1.0 07	174.8	39 52.1	1.0 07	174.8	39 22.1	1.0 07	174.9	4
05	42 47.0	1.0 10	173.2	42 17.1	1.0 09	173.3	41 47.2	1.0 09	173.3	41 17.3	1.0 09	173.4	40 47.4	1.0 09	173.4	40 17.5	1.0 09	173.5	39 47.6	1.0 09	173.5	39 17.7	1.0 09	173.6	05
6	42 41.3	99 11	171.8	42 11.4	99 11	171.9	41 41.6	99 11	172.0	41 11.7	99 11	172.1	40 41.9	99 11	172.1	40 12.0	99 11	172.2	39 42.2	1.0 11	172.2	39 12.3	1.0 11	172.3	6
7	42 34.5	99 13	170.5	42 04.7	99 13	170.6	41 35.0	99 13	170.7	41 05.2	99 13	170.7	40 35.4	99 12	170.8	40 05.6	99 12	170.9	39 35.8	99 12	171.0	39 06.0	99 12	171.0	7
8	42 26.8	99 15	169.2	41 57.1	99 14	169.2	41 27.3	99 14	169.3	40 57.6	99 14	169.4	40 27.9	99 14	169.5	39 58.2	99 14	169.6	39 28.4	99 14	169.7	38 58.7	99 14	169.8	8
9	42 18.0	99 16	167.8	41 48.4	99 16	167.9	41 18.7	99 16	168.0	40 49.1	99 16	168.1	40 19.4	99 16	168.2	39 49.8	99 16	168.3	39 20.1	99 15	168.4	38 50.4	99 15	168.5	9
10	42 08.3	99 18	166.5	41 38.7	99 18	166.6	41 09.1	99 18	166.7	40 39.6	99 17	166.8	40 10.0	99 17	166.9	39 40.4	99 17	167.0	39 10.8	99 17	167.2	38 41.2	99 17	167.3	10
1	41 57.5	98 20	165.2	41 28.0	98 19	165.3	40 58.6	98 19	165.4	40 29.1	98 19	165.5	39 59.6	98 19	165.7	39 30.1	98 19	165.8	39 00.6	98 19	165.9	38 31.1	98 18	166.0	1
2	41 45.8	98 21	163.9	41 16.4	98 21	164.0	40 47.0	98 21	164.1	40 17.6	98 21	164.3	39 48.2	98 20	164.4	39 18.8	98 20	164.5	38 49.4	98 20	164.6	38 20.0	98 20	164.8	2
3	41 33.1	98 23	162.6	41 03.8	98 23	162.7	40 34.6	98 22	162.8	40 05.3	98 22	163.0	39 36.0	98 22	163.1	39 06.7	98 22	163.3	38 37.3	98 22	163.4	38 08.0	98 21	163.5	3
4	41 19.5	97 24	161.3	40 50.3	97 24	161.4	40 21.2	97 24	161.6	39 52.0	97 24	161.7	39 22.8	97 24	161.9	38 53.6	97 23	162.0	38 24.3	97 23	162.2	37 55.1	97 23	162.3	4
15	41 04.9	97 26	160.0	40 35.9	97 26	160.1	40 06.8	97 25	160.3	39 37.7	97 25	160.5	39 08.7	97 25	160.6	38 39.6	97 25	160.8	38 10.4	97 25	160.9	37 41.3	97 24	161.1	15
6	40 49.4	96 27	158.7	40 20.5	96 27	158.9	39 51.6	96 27	159.0	39 22.6	97 27	159.2	38 53.6	97 26	159.4	38 24.7	97 26	159.5	37 55.7	97 26	159.7	37 26.7	97 26	159.9	6
7	40 33.0	96 29	157.4	40 04.2	96 29	157.6	39 35.4	96 28	157.8	39 06.6	96 28	158.0	38 37.8	96 28	158.1	38 08.9	96 28	158.3	37 40.0	96 28	158.5	37 11.1	96 27	158.7	7
8	40 15.7	96 30	156.2	39 47.1	96 30	156.4	39 18.4	96 30	156.6	38 49.7	96 30	156.7	38 21.0	96 29	156.9	37 52.2	96 29	157.1	37 23.5	96 29	157.3	36 54.7	96 29	157.5	8
9	39 57.6	95 32	154.9	39 29.1	95 31	155.1	39 00.5	95 31	155.3	38 31.9	95 31	155.5	38 03.4	95 31	155.7	37 34.8	95 31	155.9	37 06.1	95 30	156.1	36 37.5	95 30	156.3	9
20	39 38.6	95 33	153.7	39 10.2	95 33	153.9	38 41.8	95 33	154.1	38 13.4	95 32	154.3	37 44.9	95 32	154.5	37 16.4	95 32	154.7	36 47.9	95 32	154.9	36 19.4	95 31	155.1	20
1	39 18.7	94 34	152.5	38 50.5	94 34	152.7	38 22.2	94 34	152.9	37 53.9	94 34	153.1	37 25.6	94 34	153.3	36 57.3	94 33	153.5	36 28.9	95 33	153.7	36 00.6	95 33	153.9	1
2	38 58.0	94 36	151.3	38 29.9	94 36	151.5	38 01.8	94 35	151.7	37 33.7	94 35	151.9	37 05.5	94 35	152.2	36 37.3	94 35	152.4	36 09.1	94 34	152.6	35 40.9	94 34	152.8	2
3	38 36.5	93 37	150.1	38 08.6	93 37	150.3	37 40.6	93 35	150.5	37 12.6	93 36	150.8	36 44.6	93 36	151.0	36 16.6	94 36	151.2	35 48.5	94 36	151.4	35 20.4	94 35	151.6	3
4	38 14.3	93 38	148.9	37 46.5	93 38	149.1	37 18.7	93 38	149.4	36 50.8	93 38	149.6	36 23.0	93 37	149.8	35 55.1	93 37	150.1	35 27.2	93 37	150.3	34 59.2	93 37	150.5	4
25	37 51.2	92 40	147.7	37 23.6	92 39	148.0	36 55.9	92 39	148.2	36 28.2	92 39	148.5	36 00.5	92 39	148.7	35 32.8	92 38	148.9	35 05.0	93 38	149.2	34 37.2	93 38	149.4	25
6	37 27.4	91 41	146.6	36 59.9	92 41	146.8	36 32.4	92 40	147.1	36 04.9	92 40	147.3	35 37.4	92 40	147.6	35 09.8	92 40	147.8	34 42.2	92 39	148.0	34 14.5	92 39	148.3	6
7	37 02.9	91 42	145.4	36 35.6	91 42	145.7	36 08.2	91 42	145.9	35 40.9	91 41	146.2	35 13.5	91 41	146.4	34 46.0	91 41	146.7	34 18.6	92 40	146.9	33 51.1	92 40	147.2	7
8	36 37.6	90 43	144.3	36 10.5	91 43	144.6	35 43.3	91 43	144.8	35 16.1	91 42	145.1	34 48.9	91 42	145.3	34 21.6	91 42	145.6	33 54.3	91 42	145.8	33 27.0	91 41	146.1	8
9	36 11.7	90 44	143.2	35 44.7	90 44	143.5	35 17.7	90 44	143.7	34 50.6	90 44	144.0	34 23.6	90 43	144.2	33 56.5	90 43	144.5	33 29.3	91 43	144.8	33 02.2	91 42	145.0	9
30	35 45.0	89 46	142.1	35 18.2	89 45	142.4	34 51.4	90 45	142.6	34 24.5	90 45	142.9	33 57.6	90 44	143.2	33 30.7	90 44	143.4	33 03.7	90 44	143.7	32 36.7	90 44	144.0	30
1	35 17.7	89 47	141.0	34 51.1	89 46	141.3	34 24.4	89 46	141.5	33 57.7	89 46	141.8	33 31.0	89 45	142.1	33 04.2	89 45	142.4	32 37.4	89 45	142.6	32 10.5	90 45	142.9	1
2	34 49.8	88 48	139.9	34 23.3	88 47	140.2	33 56.8	88 47	140.5	33 30.3	89 47	140.8	33 03.7	89 46	141.0	32 37.1	89 46	141.3	32 10.4	89 46	141.6	31 43.7	89 46	141.9	2
3	34 21.2	88 49	138.8	33 54.9	88 48	139.1	33 28.6	88 48	139.4	33 02.2	88 48	139.7	32 35.8	88 48	140.0	32 09.3	88 47	140.3	31 42.8	88 47	140.5	31 16.3	88 47	140.8	3
4	33 52.0	87 50	137.8	33 25.9	87 49	138.1	32 59.7	87 49	138.4	32 33.5	87 49	138.7	32 07.3	88 49	139.0	31 41.0	88 48	139.2	31 14.6	88 48	139.5	30 48.3	88 48	139.8	4
35	33 22.3	86 51	136.8	32 56.3	87 50	137.1	32 30.3	87 50	137.3	32 04.2	87 50	137.6	31 38.2	87 49	137.9	31 12.0	87 49	138.2	30 45.9	87 49	138.5	30 19.7	87 49	138.8	35
6	32 51.9	86 52	135.7	32 26.1	86 51	136.0	32 00.3	86 51	136.3	31 34.4	86 51	136.6	31 08.5	86 50	136.9	30 42.5	87 50	137.2	30 16.5	87 50	137.5	29 50.5	87 50	137.8	6
7	32 21.0	85 52	134.7	31 55.4	86 52	135.0	31 29.7	86 52	135.3	31 04.0	86 52	135.6	30 38.2	86 51	135.9	30 12.4	86 51	136.2	29 46.6	86 51	136.5	29 20.7	86 51	136.8	7
8	31 49.5	85 53	133.7	31 24.1	85 53	134.0	30 58.6	85 53	134.3	30 33.0	85 52	134.6	30 07.4	85 52	134.9	29 41.8	86 52	135.2	29 16.1	86 52	135.5	28 50.4	86 51	135.8	8
9	31 17.6	84 54	132.7	30 52.3	84 54	133.0	30 26.9	85 54	133.3	30 01.5	85 53	133.7	29 36.1	85 53	134.0	29 10.6	85 53	134.3	28 45.1	85 53	134.6	28 19.6	85 52	134.9	9
40	30 45.1	84 55	131.7	30 19.9	84 55	132.1	29 54.8	84 54	132.4	29 29.5	84 54	132.7	29 04.3	84 54	133.0	28 38.9	84 54	133.3	28 13.6	85 53	133.6	27 48.2	85 53	133.9	40
1	30 12.1	83 56	130.8	29 47.1	83 56	131.1	29 22.1	83 55	131.4	28 57.0	84 55	131.7	28 31.9	84 55	132.0	28 06.8	84 54	132.4	27 41.6	84 54	132.7	27 16.3	84 54	133.0	1
2	29 38.6	83 57	129.8	29 13.8	83 56	130.1	28 48.9	83 56	130.5	28 24.0	83 56	130.8	27 59.1	83 56	131.1	27 34.1	83 55	131.4	27 09.1	84 55	131.7	26 44.0	84 55	132.0	2
3	29 04.7	82 57	128.9	28 40.0	82 57	129.2	28 15.3	82 57	129.5	27 50.6	83 57	129.8	27 25.8	83 56	130.2	27 00.9	83 56	130.5	26 36.1	83 56	130.8	26 11.1	83 56	131.1	3
4	28 30.3	82 58	127.9	28 05.8	82 58	128.3	27 41.3	82 58	128.6	27 16.7	82 57	128.9	26 52.0	82 57	129.2	26 27.3	82 57	129.6	26 02.6	82 56	129.9	25 37.9	83 56	130.2	4
45	27 55.5	81 59	127.0	27 31.1	81 58	127.4	27 06.7	81 58	127.7	26 42.3	82 58	128.0	26 17.8	82 58	128.3	25 53.3	82 57	128.7	25 28.7	82 57	129.0	25 04.1	82 57	129.3	45
6	27 20.2	81 59	126.1	26 56.0	81 59	126.5	26 31.8	81 59	126.8	26 07.5	81 59	127.1	25 43.2	81 58	127.4	25 18.8	81 58	127.8	24 54.4	81 58	128.1	24 29.9	82 58	128.4	6
7	26 44.6	80 60	125.2	26 20.5	80 60	125.6	25 56.5	80 60	125.9	25 32.3	81 59	126.2	25 08.1	81 59	126.5	24 43.9	81 59	126.9	24 19.6	81 59	127.2	23 55.3	81 58	127.5	7
8	26 08.6	80 61	124.3	25 44.6	80 60	124.7	25 20.7	80 60	125.0	24 56.7	80 60	125.3	24 32.7	80 60	125.7	24 08.6	80 60	126.0	23 44.5	80 59	126.3	23 20.3	81 59	126.6	8
9	25 32.1	79 61	123.4	25 08.4	79 61	123.8	24 44.6	79 61	124.1	24 20.7	80 61	124.5	23 56.8	80 60	124.8	23 32.9	80 60	125.1	23 08.9	80 60	125.4	22 44.9	80 60	125.8	9
50	24 55.3	79 62	122.6	24 31.7	79 62	122.9	24 08.1	79 61	123.3	23 44.4	79 61	123.6	23 20.6	79 61	123.9	22 56.8	79 61	124.3	22 33.0	79 60	124.6	22 09.1	80 60	124.9	50
1	24 18.2	78 62	121.7	23 54.7	78 62	122.1	23 31.2	78 62	122.4	23 07.6	79 62	122.7	22 44.0	79 62	123.1	22 20.4	79 61	123.4	21 56.7	79 61	123.7	21 33.0	79 61	124.1	1
2	23 40.7	78 63	120.9	23 17.3	78 63	121.2	22 54.0	78 63	121.6	22 30.5	78 62	121.9	22 07.1	78 62	122.2	21 43.6	78 62	122.6	21 20.0	79 62	122.9	20 56.4	79 61	123.2	2
3	23 02.8	77 64	120.0	22 39.6	77 63	120.4	22 16.4	78 63	120.7	21 53.1	78 63	121.1	21 29.8	78 63	121.4	21 06.4	78 62	121.7	20 43.0	78 62	122.1	20 19.5	78 62	122.4	3
4	22 24.7	77 64	119.2	22 01.6	77 64	119.5	21 38.5	77 64	119.9	21 15.4	77 63	120.2	20 52.2	77 63	120.6	20 28.9	78 63	120.9	20 05.6	78 63	121.2	19 42.3	78 63	121.6	4
55	21 46.2	76 65	118.4	21 23.3	77 64	118.7	21 00.3	77 64	119.1	20 37.3	77 64	119.4	20 14.2	77 64	119.7	19 51.1	77 64	120.1	19 28.0	77 63	120.4	19 04.8	77 63	120.8	55
6	21 07.5	76 65	117.6	20 44.7	76 65	117.9	20 21.8	76 65	118.2	19 58.9	76 64	118.6	19 36.0	77 64	118.9	19 13.0	77 64	119.3	18 50.0	77 64	119.6	18 26.9	77 64	119.9	6
7	20 28.4	76 66	116.7	20 05.7	76 65	117.1	19 43.0	76 65	117.4	19 20.2	76 65	117.8	18 57.4	76 65	118.1	18 34.5	76 65	118.5	18 11.7	76 64	118.8	17 48.7	76 64	119.1	7
8	19 49.1	75 66	115.9	19 26.5	75 66	116.3	19 03.9	75 66	116.6	18 41.3	76 65	117.0	18 18.6	76 65	117.3	17 55.8	76 65	117.7	17 33.1	76 65	118.0	17 10.3	76 65	118.4	8
9	19 09.5	75 66	115.1	18 47.1	75 66	115.5	18 24.6	75 66	115.8	18 02.0	75 66	116.2	17 39.4	75 66	116.5	17 16.8	75 65	116.9	16 54.2	76 65	117.2	16 31.5	76 65	117.6	9
60	18 29.7	74 67	114.4	18 07.3	75 67	114.7	17 44.9	75 66	115.1	17 22.5	75 66	115.4	17 00.0	75 66	115.8	16 37.6	75 66	116.1	16 15.0	75 66	116.4	15 52.5	75 66	116.8	60
1	17 49.6	74 67	113.6	17 27.3	74 67	113.9	17 05.1	74 67	114.3	16 42.7	74 67	114.6	16 20.4	75 66	115.0	15 58.0	75 66	115.3	15 35.6	75 66	115.7	15 13.2	75 66	116.0	1
2	17 09.2	74 68	112.8	16 47.1	74 67	113.2	16 24.9	74 67	113.5	16 02.7	74 67	113.9	15 40.5	74 67	114.2	15 18.2	74 67	114.6	14 55.9	74 67	114.9	14 33.6	74 66	115.3	2
3	16 28.7	73 68	112.0	16 06.6	73 68	112.4	15 44.6	74 68	112.7	15 22.5	74 67	113.1	15 00.4	74 67	113.4	14 38.2	74 67	113.8	14 16.0	74 67	114.1	13 53.8	74 67	114.5	3
4	15 47.9	73 68	111.3	15 26.0	73 68	111.6	15 04.0	73 68	112.0	14 42.0	73 68	112.3	14 20.0	73 68	112.7	13 57.9	74 67	113.0	13 35.9	74 67	113.4	13 13.7	74 67	113.7	4
65	15 06.9	73 69	110.5	14 45.1	73 68	110.9	14 23.2	73 68	111.2	14 01.3	73 68	111.6	13 39.4	73 68	111.9	13 17.4	73 68	112.3	12 55.5	73 68	112.6	12 33.5	73 68	113.0	65
6	14 25.7	72 69	109.8	14 04.0	72 69	110.1	13 42.2	73 69	110.5	13 20.4	73 69	110.8	12 58.6	73 68	111.2	12 36.7	73 68	111.5	12 14.9	73 68	111.9	11 52.9	73 68	112.2	6
7	13 44.3	72 69	109.0	13 22.7	72 69	109.4	13 01.0	72 69	109.7	12 39.3	72 69	110.1	12 17.6	72 69	110.5	11 55.8	73 69	110.8	11 34.0	73 68	111.2	11 12.2	73 68	111.5	7
8	13 02.7	72 70	108.3	12 41.2	72 69	108.7	12 19.6	72 69	109.0	11 58.0	72 69	109.4	11 36.4	72 69	109.7	11 14.7	72 69	110.1	10 53.0	72 69	110.4	10 31.3	72 69	110.8	8
9	12 21.0	72 70	107.6	11 59.5	72 70	107.9	11 38.0	72 70	108.3	11 16.5	72 69	108.6	10 55.0	72 69	109.0	10 33.4	72 69	109.3	10 11.8	72 69	109.7	9 50.2	72 69	110.0	9
70	11 39.1	71 70	106.8	11 17.7	71 70	107.2	10 56.3	71 70	107.6	10 34.8	71 70	107.9	10 13.4	72 70	108.3	9 51.9	72 69	108.6	9 30.4	72 69	109.0	9 08.9	72 69	109.3	70
1	10 57.0	71 70	106.1	10 35.7	71 70	106.5	10 14.4	71 70	106.8	9 53.0	71 70	107.2	9 31.6	71 70	107.5	9 10.2	71 70	107.9	8 48.8	71 70	108.3	8 27.4	72 69	108.6	1
2	10 14.8	71 71	105.4	9 53.5	71 70	105.8	9 32.3	71 70	106.1	9 11.0	71 70	106.5	8 49.7	71 70	106.8	8 28.4	71 70	107.2	8 07.0	71 70	107.5	7 45.7	71 70	107.9	2
3	9 32.4	71 71	104.7	9 11.2	71 71	105.0	8 50.0	71 71	105.4	8 28.8	71 70	105.8	8 07.6	71 70	106.1	7 46.4	71 70	106.5	7 25.1	71 70	106.8	7 03.8	71 70	107.2	3
4	8 49.9	70 71	104.0	8 28.8	70 71	104.3	8 07.7	70 71	104.7	7 46.5	70 71	105.0	7 25.4	71 71	105.4	7 04.2	71 70	105.8	6 43.0	71 70	106.1	6 21.8	71 70	106.5	4
75	8 07.2	70 71	103.3	7 46.2	70 71	103.6	7 25.2	70 71	104.0	7 04.1	70 71	104.3	6 43.0	70 71	104.7	6 21.9	70 71	105.1	6 00.8	70 71	105.4	5 39.7	70 70	105.8	75
6	7 24.5	70 71	102.6	7 03.5	70 71	102.9	6 42.5	70 71	103.3	6 21.5	70 71	103.6	6 00.5	70 71	104.0	5 39.5	70 71	104.4	5 18.4	70 71	104.7				6
7	6 41.6	70 72	101.9	6 20.7	70 72	102.2	5 59.7	70 71	102.6	5 38.8	70 71	102.9	5 17.9	70 71	103.3										7
8	5 58.6	69 72	101.2	5 37.7	70 72	101.5	5 16.9	70 72	101.9																8
9	5 15.5	69 72	100.5																						9

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Lat. 43°

H.A.	8° 00′ Alt.	Δd	Δt	Az.	8° 30′ Alt.	Δd	Δt	Az.	9° 00′ Alt.	Δd	Δt	Az.	9° 30′ Alt.	Δd	Δt	Az.
°	° ′			°	° ′			°	° ′			°	° ′			°
00	55 00.0	1.0	01	180.0	55 30.0	1.0	01	180.0	56 00.0	1.0	01	180.0	56 30.0	1.0	01	180.0
1	54 59.3	1.0	03	178.3	55 29.3	1.0	03	178.3	55 59.3	1.0	03	178.2	56 29.3	1.0	03	178.2
2	54 57.4	1.0	05	176.5	55 27.3	1.0	06	176.5	55 57.3	1.0	06	176.5	56 27.3	1.0	06	176.4
3	54 54.1	1.0	08	174.8	55 24.0	1.0	08	174.8	55 53.9	1.0	08	174.7	56 23.9	1.0	08	174.6
4	54 49.4	1.0	10	173.1	55 19.3	1.0	10	173.0	55 49.2	1.0	10	173.0	56 19.1	1.0	10	172.9
05	54 43.5	99	12	171.4	55 13.4	99	12	171.3	55 43.2	99	12	171.2	56 13.0	99	12	171.1
6	54 36.3	99	14	169.7	55 06.1	99	14	169.6	55 35.8	99	14	169.5	56 05.5	99	15	169.4
7	54 27.9	99	16	168.0	54 57.5	99	16	167.9	55 27.1	99	17	167.7	55 56.8	99	17	167.6
8	54 18.1	98	18	166.3	54 47.7	98	18	166.2	55 17.2	98	19	166.0	55 46.7	98	19	165.9
9	54 07.1	98	20	164.7	54 36.6	98	21	164.5	55 06.0	98	21	164.3	55 35.3	98	21	164.2
10	53 54.9	98	22	163.0	54 24.2	98	23	162.8	54 53.5	98	23	162.7	55 22.7	97	23	162.5
1	53 41.5	97	24	161.4	54 10.7	97	25	161.2	54 39.8	97	26	161.0	55 08.9	97	25	160.8
2	53 26.9	97	26	159.8	53 55.9	97	27	159.6	54 24.9	97	27	159.3	54 53.8	96	27	159.1
3	53 11.2	96	28	158.2	53 40.0	96	28	157.9	54 08.8	96	29	157.7	54 37.6	96	29	157.5
4	52 54.3	96	30	156.6	53 23.0	96	30	156.4	53 51.6	95	31	156.1	54 20.2	95	31	155.8
15	52 36.3	95	32	155.0	53 04.8	95	32	154.8	53 33.3	95	32	154.5	54 01.7	95	33	154.2
6	52 17.3	94	34	153.5	52 45.6	94	34	153.2	53 13.9	94	34	152.9	53 42.1	94	34	152.7
7	51 57.2	94	35	152.0	52 25.3	94	36	151.7	52 53.4	94	36	151.4	53 21.4	93	36	151.1
8	51 36.1	93	37	150.5	52 04.0	93	37	150.2	52 31.9	93	38	149.9	52 59.7	93	38	149.6
9	51 14.0	92	38	149.0	51 41.7	92	39	148.7	52 09.4	92	39	148.4	52 37.0	92	39	148.1
20	50 50.9	92	40	147.6	51 18.4	92	40	147.2	51 45.9	91	41	146.9	52 13.3	91	41	146.6
1	50 26.9	91	42	146.1	50 54.2	91	42	145.8	51 21.5	91	42	145.5	51 48.7	91	43	145.1
2	50 02.0	90	43	144.7	50 29.1	90	43	144.4	50 56.1	90	44	144.0	51 23.1	90	44	143.7
3	49 36.2	90	44	143.3	50 03.1	90	45	143.0	50 29.9	89	45	142.6	50 56.7	89	45	142.3
4	49 09.6	89	46	142.0	49 36.3	89	46	141.6	50 02.9	89	46	141.3	50 29.5	88	47	140.9
25	48 42.2	88	47	140.6	49 08.6	88	47	140.3	49 35.0	88	48	139.9	50 01.4	88	48	139.6
6	48 14.0	88	48	139.3	48 40.2	87	49	139.0	49 06.4	87	49	138.6	49 32.5	87	49	138.2
7	47 45.0	87	50	138.0	48 11.0	87	50	137.7	48 37.0	86	50	137.3	49 02.9	86	51	136.9
8	47 15.3	86	51	136.8	47 41.1	86	51	136.4	48 06.9	86	51	136.0	48 32.6	86	52	135.6
9	46 44.9	86	52	135.5	47 10.5	85	52	135.1	47 36.1	85	52	134.8	48 01.5	85	53	134.4
30	46 13.8	85	53	134.3	46 39.2	85	53	133.9	47 04.6	84	54	133.5	47 29.8	84	54	133.1
1	45 42.1	84	54	133.1	46 07.3	84	54	132.7	46 32.4	84	55	132.3	46 57.5	83	55	131.9
2	45 09.7	84	55	131.9	45 34.7	83	55	131.5	45 59.7	83	56	131.1	46 24.5	83	56	130.7
3	44 36.8	83	56	130.7	45 01.6	83	56	130.3	45 26.3	82	57	129.9	45 51.0	82	57	129.5
4	44 03.2	82	57	129.6	44 27.9	82	57	129.2	44 52.4	82	57	128.8	45 16.9	81	58	128.4
35	43 29.2	82	58	128.5	43 53.6	81	58	128.1	44 17.9	81	58	127.7	44 42.2	81	59	127.3
6	42 54.5	81	59	127.4	43 18.8	81	59	127.0	43 42.9	80	59	126.6	44 07.0	80	59	126.1
7	42 19.4	80	59	126.3	42 43.5	80	60	125.9	43 07.5	80	60	125.5	43 31.3	79	60	125.1
8	41 43.8	80	60	125.2	42 07.7	79	60	124.8	42 31.5	79	61	124.4	42 55.2	79	61	124.0
9	41 07.7	79	61	124.2	41 31.4	79	61	123.8	41 55.0	79	61	123.4	42 18.6	78	62	122.9
40	40 31.2	79	62	123.1	40 54.7	78	62	122.7	41 18.2	78	62	122.3	41 41.5	78	62	121.9
1	39 54.2	78	62	122.1	40 17.6	78	63	121.7	40 40.9	77	63	121.3	41 04.1	77	63	120.9
2	39 16.9	77	63	121.1	39 40.1	77	63	120.7	40 03.2	77	63	120.3	40 26.2	77	64	119.9
3	38 39.1	77	64	120.1	39 02.2	77	64	119.7	39 25.1	76	64	119.3	39 48.0	76	64	118.9
4	38 01.0	76	64	119.2	38 23.9	76	64	118.8	38 46.7	76	65	118.3	39 09.4	76	65	117.9
45	37 22.5	76	65	118.2	37 45.2	76	65	117.8	38 07.9	75	65	117.4	38 30.4	75	65	117.0
6	36 43.7	75	65	117.3	37 06.3	75	65	116.9	37 28.8	75	66	116.5	37 51.2	75	66	116.0
7	36 04.5	75	66	116.4	36 26.9	75	66	115.9	36 49.3	74	66	115.5	37 11.6	74	66	115.1
8	35 25.0	75	66	115.4	35 47.3	74	66	115.0	36 09.6	74	67	114.6	36 31.7	74	67	114.2
9	34 45.3	74	67	114.5	35 07.4	74	67	114.1	35 29.5	74	67	113.7	35 51.5	73	67	113.3
50	34 05.2	74	67	113.7	34 27.3	73	67	113.2	34 49.2	73	68	112.8	35 11.1	73	68	112.4
1	33 24.9	73	68	112.8	33 46.8	73	68	112.4	34 08.7	73	68	112.0	34 30.4	72	68	111.5
2	32 44.3	73	68	111.9	33 06.1	73	68	111.5	33 27.8	72	68	111.1	33 49.5	72	69	110.7
3	32 03.5	72	68	111.1	32 25.2	72	69	110.7	32 46.8	72	69	110.2	33 08.3	72	69	109.8
4	31 22.4	72	69	110.2	31 44.0	72	69	109.8	32 05.5	72	69	109.4	32 26.9	71	69	109.0
55	30 41.1	72	69	109.4	31 02.6	71	69	109.0	31 24.0	71	69	108.6	31 45.3	71	70	108.2
6	29 59.6	71	69	108.6	30 21.0	71	70	108.2	30 42.3	71	70	107.8	31 03.5	71	70	107.3
7	29 17.9	71	70	107.8	29 39.2	71	70	107.4	30 00.4	71	70	107.0	30 21.6	70	70	106.5
8	28 36.0	71	70	107.0	28 57.2	71	70	106.6	29 18.4	70	70	106.2	29 39.4	70	71	105.7
9	27 54.0	70	70	106.2	28 15.1	70	71	105.8	28 36.1	70	71	105.4	28 57.1	70	71	104.9
60	27 11.8	70	71	105.4	27 32.8	70	71	105.0	27 53.7	70	71	104.6	28 14.6	70	71	104.2
1	26 29.4	70	71	104.6	26 50.3	70	71	104.2	27 11.2	69	71	103.8	27 32.0	69	71	103.4
2	25 46.8	70	71	103.8	26 07.7	69	71	103.4	26 28.5	69	71	103.0	26 49.3	69	71	102.6
3	25 04.2	69	71	103.1	25 25.0	69	71	102.7	25 45.7	69	72	102.3	26 06.4	69	72	101.9
4	24 21.3	69	72	102.3	24 42.1	69	72	101.9	25 02.8	69	72	101.5	25 23.4	69	72	101.1
65	23 38.4	69	72	101.6	23 59.1	69	72	101.2	24 19.7	69	72	100.8	24 40.3	68	72	100.4
6	22 55.4	69	72	100.8	23 16.0	69	72	100.4	23 36.5	68	72	100.0	23 57.0	68	72	99.6
7	22 12.2	69	72	100.1	22 32.8	68	72	99.7	22 53.3	68	72	99.3	23 13.7	68	72	98.9
8	21 29.0	68	72	99.4	21 49.5	68	72	99.0	22 09.9	68	72	98.6	22 30.3	68	72	98.2
9	20 45.6	68	72	98.6	21 06.1	68	72	98.2	21 26.5	68	72	97.8	21 46.9	68	73	97.4
70	20 02.2	68	73	97.9	20 22.6	68	73	97.5	20 43.0	68	73	97.1	21 03.3	68	73	96.7
1	19 18.7	68	73	97.2	19 39.1	68	73	96.8	19 59.4	68	73	96.4	20 19.7	68	73	96.0
2	18 35.1	68	73	96.5	18 55.5	68	73	96.1	19 15.8	68	73	95.7	19 36.0	67	73	95.3
3	17 51.5	68	73	95.8	18 11.8	68	73	95.4	18 32.1	68	73	95.0	18 52.3	67	73	94.6
4	17 07.8	68	73	95.1	17 28.1	68	73	94.7	17 48.4	67	73	94.3	18 08.6	67	73	93.9
75	16 24.1	68	73	94.4	16 44.3	68	73	94.0	17 04.6	67	73	93.6	17 24.8	67	73	93.2
6	15 40.3	68	73	93.7	16 00.6	67	73	93.3	16 20.8	67	73	92.9	16 40.9	67	73	92.5
7	14 56.5	68	73	93.0	15 16.7	67	73	92.6	15 36.9	67	73	92.2	15 57.1	67	73	91.8
8	14 12.7	67	73	92.3	14 32.9	67	73	91.9	14 53.1	67	73	91.5	15 13.2	67	73	91.1
9	13 28.8	67	73	91.6	13 49.0	67	73	91.2	14 09.2	67	73	90.8	14 29.4	67	73	90.5
80	12 44.9	67	73	90.9	13 05.1	67	73	90.5	13 25.3	67	73	90.2	13 45.5	67	73	89.8
1	12 01.1	67	73	90.2	12 21.3	67	73	89.8	12 41.4	67	73	89.5	13 01.6	67	73	89.1
2	11 17.2	67	73	89.5	11 37.4	67	73	89.2	11 57.6	67	73	88.8	12 17.7	67	73	88.4
3	10 33.3	67	73	88.9	10 53.5	67	73	88.5	11 13.7	67	73	88.1	11 33.9	67	73	87.7
4	9 49.4	67	73	88.2	10 09.7	67	73	87.8	10 29.9	67	73	87.4	10 50.0	67	73	87.1
85	9 05.6	67	73	87.5	9 25.8	67	73	87.1	9 46.0	67	73	86.8	10 06.2	67	73	86.4
6	8 21.8	68	73	86.8	8 42.0	67	73	86.5	9 02.2	67	73	86.1	9 22.4	67	73	85.7
7	7 38.0	68	73	86.2	7 58.2	68	73	85.8	8 18.5	67	73	85.4	8 38.7	67	73	85.0
8	6 54.2	68	73	85.5	7 14.5	68	73	85.1	7 34.8	68	73	84.7	7 55.0	67	73	84.4
9	6 10.5	68	73	84.8	6 30.8	68	73	84.4	6 51.1	68	73	84.1	7 11.4	68	73	83.7
90	5 26.8	68	73	84.1	5 47.1	68	73	83.8	6 07.5	68	73	83.4	6 27.8	68	73	83.0

H.A.	10° 00′ Alt.	Δd	Δt	Az.	10° 30′ Alt.	Δd	Δt	Az.	11° 00′ Alt.	Δd	Δt	Az.	11° 30′ Alt.	Δd	Δt	Az.
°	° ′			°	° ′			°	° ′			°	° ′			°
00	57 00.0	1.0	01	180.0	57 30.0	1.0	01	180.0	58 00.0	1.0	01	180.0	58 30.0	1.0	01	180.0
1	56 59.3	1.0	03	178.2	57 29.3	1.0	04	178.2	57 59.3	1.0	04	178.1	58 29.3	1.0	04	178.1
2	56 57.2	1.0	06	176.4	57 27.2	1.0	06	176.3	57 57.2	1.0	06	176.3	58 27.1	1.0	06	176.3
3	56 53.8	1.0	08	174.6	57 23.7	1.0	08	174.5	57 53.6	1.0	08	174.5	58 23.5	1.0	08	174.4
4	56 49.0	1.0	10	172.8	57 18.8	1.0	10	172.7	57 48.7	1.0	11	172.6	58 18.5	1.0	11	172.5
05	56 42.8	99	13	171.0	57 12.6	99	13	170.9	57 42.3	99	13	170.8	58 12.1	99	13	170.7
6	56 35.2	99	15	169.2	57 04.9	99	15	169.1	57 34.6	99	15	169.0	58 04.3	99	15	168.8
7	56 26.4	99	17	167.5	56 56.0	99	17	167.3	57 25.6	99	17	167.2	57 55.1	99	18	167.0
8	56 16.2	98	19	165.7	56 45.7	98	19	165.5	57 15.1	98	20	165.4	57 44.6	98	20	165.2
9	56 04.7	98	21	164.0	56 34.1	98	21	163.8	57 03.4	98	22	163.6	57 32.7	98	22	163.4
10	55 52.0	97	23	162.3	56 21.2	97	24	162.1	56 50.4	97	24	161.8	57 19.5	97	24	161.6
1	55 38.0	97	25	160.6	56 07.0	97	26	160.3	56 36.1	97	26	160.1	57 05.1	97	26	159.9
2	55 22.8	96	27	158.9	55 51.7	96	28	158.6	56 20.5	96	28	158.4	56 49.3	96	28	158.1
3	55 06.4	96	29	157.2	55 35.1	96	30	157.0	56 03.8	96	30	156.7	56 32.4	95	30	156.4
4	54 48.8	95	31	155.6	55 17.3	95	32	155.3	55 45.8	95	32	155.0	56 14.3	95	32	154.7
15	54 30.1	95	33	154.0	54 58.4	94	33	153.7	55 26.7	94	34	153.4	55 55.0	94	34	153.1
6	54 10.3	94	35	152.4	54 38.4	94	35	152.1	55 06.5	94	36	151.8	55 34.6	93	36	151.5
7	53 49.4	93	37	150.8	54 17.3	93	37	150.5	54 45.2	93	37	150.2	55 13.1	93	38	149.9
8	53 27.5	93	38	149.3	53 55.2	92	39	148.9	54 22.9	92	39	148.6	54 50.5	92	39	148.3
9	53 04.5	92	40	147.7	53 32.1	92	40	147.4	53 59.5	91	41	147.1	54 26.9	91	41	146.7
20	52 40.6	91	41	146.3	53 07.9	91	42	145.9	53 35.2	91	42	145.6	54 02.4	90	43	145.2
1	52 15.8	90	43	144.8	52 42.9	90	43	144.4	53 09.9	90	44	144.1	53 36.8	90	44	143.7
2	51 50.0	90	44	143.3	52 16.9	89	45	143.0	52 43.7	89	45	142.6	53 10.4	89	46	142.2
3	51 23.4	89	46	141.9	51 50.1	89	46	141.6	52 16.6	88	47	141.2	52 43.1	88	47	140.8
4	50 55.9	88	47	140.5	51 22.4	88	48	140.2	51 48.7	88	48	139.8	52 15.0	87	48	139.4
25	50 27.6	87	48	139.2	50 53.8	87	49	138.8	51 20.0	87	49	138.4	51 46.0	87	50	138.0
6	49 58.6	87	50	137.8	50 24.5	86	50	137.4	50 50.4	86	50	137.0	51 16.2	86	51	136.6
7	49 28.7	86	51	136.5	49 54.5	86	51	136.1	50 20.2	85	52	135.7	50 45.7	85	52	135.3
8	48 58.2	85	52	135.2	49 23.7	85	52	134.8	49 49.2	85	53	134.4	50 14.5	84	53	134.0
9	48 26.9	85	53	134.0	48 52.3	84	54	133.6	49 17.5	84	54	133.1	49 42.6	84	54	132.7
30	47 55.0	84	54	132.7	48 20.1	84	55	132.3	48 45.1	83	55	131.9	49 10.1	83	55	131.5
1	47 22.5	83	55	131.5	47 47.4	83	56	131.1	48 12.2	82	56	130.7	48 36.9	82	56	130.2
2	46 49.3	82	56	130.3	47 14.0	82	57	129.9	47 38.6	82	57	129.5	48 03.1	81	57	129.0
3	46 15.5	82	57	129.1	46 40.0	81	58	128.7	47 04.4	81	58	128.3	47 28.7	81	58	127.8
4	45 41.2	81	58	128.0	46 05.5	81	58	127.6	46 29.7	80	59	127.1	46 53.8	80	59	126.7
35	45 06.4	80	59	126.8	45 30.5	80	59	126.4	45 54.4	80	60	126.0	46 18.3	79	60	125.5
6	44 31.0	80	60	125.7	44 54.9	79	60	125.3	45 18.7	79	60	124.9	45 42.4	79	61	124.4
7	43 55.1	79	61	124.6	44 18.8	79	61	124.2	44 42.4	79	61	123.8	45 05.9	78	62	123.3
8	43 18.8	79	61	123.6	43 42.3	78	62	123.1	44 05.7	78	62	122.7	44 29.1	78	62	122.3
9	42 42.0	78	62	122.5	43 05.3	78	62	122.1	43 28.6	77	63	121.6	43 51.7	77	63	121.2
40	42 04.8	77	63	121.5	42 28.0	77	63	121.0	42 51.0	77	63	120.6	43 14.0	76	64	120.2
1	41 27.2	77	63	120.5	41 50.2	77	64	120.0	42 13.1	76	64	119.6	42 35.9	76	64	119.2
2	40 49.1	76	64	119.5	41 12.0	76	64	119.0	41 34.7	76	64	118.6	41 57.4	75	65	118.1
3	40 10.8	76	65	118.5	40 33.4	75	65	118.0	40 56.0	75	65	117.6	41 18.5	75	65	117.2
4	39 32.0	75	65	117.5	39 54.5	75	65	117.1	40 17.0	75	66	116.6	40 39.3	74	66	116.2
45	38 52.9	75	66	116.5	39 15.3	74	66	116.1	39 37.6	74	66	115.7	39 59.7	74	66	115.2
6	38 13.5	74	66	115.6	38 35.7	74	66	115.2	38 57.9	74	67	114.7	39 19.9	73	67	114.3
7	37 33.8	74	67	114.7	37 55.9	73	67	114.3	38 17.9	73	67	113.8	38 39.8	73	67	113.4
8	36 53.8	73	67	113.8	37 15.7	73	67	113.3	37 37.6	73	68	112.9	37 59.4	72	68	112.5
9	36 13.5	73	68	112.9	36 35.3	73	68	112.5	36 57.0	72	68	112.0	37 18.7	72	68	111.6
50	35 32.9	73	68	112.0	35 54.6	72	68	111.6	36 16.2	72	68	111.1	36 37.8	72	69	110.7
1	34 52.1	72	68	111.1	35 13.7	72	69	110.7	35 35.2	72	69	110.3	35 56.6	71	69	109.8
2	34 11.0	72	69	110.3	34 32.5	71	69	109.8	34 53.9	71	69	109.4	35 15.2	71	69	109.0
3	33 29.8	71	69	109.4	33 51.1	71	69	109.0	34 12.4	71	69	108.6	34 33.6	71	70	108.1
4	32 48.3	71	70	108.6	33 09.5	71	70	108.2	33 30.7	70	70	107.7	33 51.8	70	70	107.3
55	32 06.6	71	70	107.8	32 27.7	70	70	107.3	32 48.8	70	70	106.9	33 09.8	70	70	106.5
6	31 24.7	70	70	106.9	31 45.8	70	70	106.5	32 06.8	70	70	106.1	32 27.7	70	71	105.7
7	30 42.6	70	70	106.1	31 03.6	70	71	105.7	31 24.5	70	71	105.3	31 45.3	69	71	104.9
8	30 00.4	70	71	105.3	30 21.3	70	71	104.9	30 42.1	69	71	104.5	31 02.8	69	71	104.1
9	29 18.0	70	71	104.5	29 38.8	69	71	104.1	29 59.5	69	71	103.7	30 20.2	69	71	103.3
60	28 35.4	69	71	103.8	28 56.2	69	71	103.3	29 16.8	69	71	102.9	29 37.4	68	72	102.5
1	27 52.7	69	71	103.0	28 13.4	69	71	102.6	28 34.0	69	72	102.2	28 54.5	68	72	101.7
2	27 09.9	69	72	102.2	27 30.5	69	72	101.8	27 51.1	68	72	101.4	28 11.5	68	72	101.0
3	26 27.0	69	72	101.5	26 47.5	68	72	101.1	27 08.0	68	72	100.6	27 28.4	68	72	100.2
4	25 43.9	68	72	100.7	26 04.4	68	72	100.3	26 24.8	68	72	99.9	26 45.1	68	72	99.5
65	25 00.7	68	72	100.0	25 21.2	68	72	99.6	25 41.5	68	72	99.2	26 01.8	68	72	98.7
6	24 17.5	68	72	99.2	24 37.9	68	72	98.8	24 58.2	68	72	98.4	25 18.4	67	72	98.0
7	23 34.1	68	72	98.5	23 54.5	68	72	98.1	24 14.7	67	73	97.7	24 34.9	67	73	97.3
8	22 50.7	68	73	97.8	23 11.0	68	73	97.4	23 31.2	67	73	97.0	23 51.4	67	73	96.6
9	22 07.2	68	73	97.0	22 27.4	67	73	96.7	22 47.6	67	73	96.3	23 07.7	67	73	95.8
70	21 23.6	67	73	96.3	21 43.8	67	73	95.9	22 04.0	67	73	95.5	22 24.1	67	73	95.1
1	20 39.9	67	73	95.6	21 00.1	67	73	95.2	21 20.3	67	73	94.8	21 40.3	67	73	94.4
2	19 56.3	67	73	94.9	20 16.4	67	73	94.5	20 36.5	67	73	94.1	20 56.6	67	73	93.7
3	19 12.5	67	73	94.2	19 32.6	67	73	93.8	19 52.7	67	73	93.4	20 12.8	67	73	93.0
4	18 28.7	67	73	93.5	18 48.8	67	73	93.1	19 08.9	67	73	92.7	19 28.9	67	73	92.3
75	17 44.9	67	73	92.8	18 05.0	67	73	92.4	18 25.1	67	73	92.0	18 45.1	67	73	91.6
6	17 01.1	67	73	92.1	17 21.2	67	73	91.7	17 41.2	67	73	91.3	18 01.2	67	73	91.0
7	16 17.2	67	73	91.4	16 37.3	67	73	91.0	16 57.3	67	73	90.7	17 17.3	67	73	90.3
8	15 33.3	67	73	90.8	15 53.4	67	73	90.4	16 13.4	67	73	90.0	16 33.4	67	73	89.6
9	14 49.5	67	73	90.1	15 09.5	67	73	89.7	15 29.6	67	73	89.3	15 49.6	67	73	88.9
80	14 05.6	67	73	89.4	14 25.7	67	73	89.0	14 45.7	67	73	88.6	15 05.7	67	73	88.2
1	13 21.7	67	73	88.7	13 41.8	67	73	88.3	14 01.8	67	73	87.9	14 21.8	67	73	87.6
2	12 37.8	67	73	88.0	12 57.9	67	73	87.7	13 18.0	67	73	87.3	13 38.0	67	73	86.9
3	11 54.0	67	73	87.4	12 14.1	67	73	87.0	12 34.2	67	73	86.6	12 54.2	67	73	86.2
4	11 10.2	67	73	86.7	11 30.3	67	73	86.3	11 50.4	67	73	85.9	12 10.4	67	73	85.5
85	10 26.4	67	73	86.0	10 46.5	67	73	85.6	11 06.6	67	73	85.3	11 26.7	67	73	84.9
6	9 42.6	67	73	85.3	10 02.8	67	73	85.0	10 22.9	67	73	84.6	10 43.0	67	73	84.2
7	8 58.9	67	73	84.7	9 19.1	67	73	84.3	9 39.3	67	73	83.9	9 59.4	67	73	83.5
8	8 15.2	67	73	84.0	8 35.5	67	73	83.6	8 55.7	67	73	83.2	9 15.8	67	73	82.9
9	7 31.6	68	73	83.3	7 51.9	67	73	82.9	8 12.1	67	72	82.6	8 32.3	67	72	82.2
90	6 48.1	68	72	82.7	7 08.4	68	72	82.3	7 28.6	68	72	81.9	7 48.9	67	72	81.5

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H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	39 00.0	1.0 01	180.0	38 30.0	1.0 01	180.0	38 00.0	1.0 01	180.0	37 30.0	1.0 01	180.0	37 00.0	1.0 01	180.0	36 30.0	1.0 01	180.0	36 00.0	1.0 01	180.0	35 30.0	1.0 01	180.0	00
1	38 59.5	1.0 02	178.7	38 29.5	1.0 02	178.7	37 59.5	1.0 02	178.7	37 29.5	1.0 02	178.8	36 59.5	1.0 02	178.8	36 29.5	1.0 02	178.8	35 59.5	1.0 02	178.8	35 29.5	1.0 02	178.8	1
2	38 58.0	1.0 04	177.5	38 28.1	1.0 04	177.5	37 58.1	1.0 04	177.5	37 28.1	1.0 04	177.5	36 58.1	1.0 04	177.5	36 28.1	1.0 04	177.6	35 58.1	1.0 04	177.6	35 28.2	1.0 04	177.6	2
3	38 55.6	1.0 06	176.2	38 25.6	1.0 06	176.2	37 55.7	1.0 06	176.2	37 25.7	1.0 06	176.3	36 55.8	1.0 06	176.3	36 25.8	1.0 05	176.3	35 55.8	1.0 05	176.4	35 25.9	1.0 06	176.4	3
4	38 52.2	1.0 07	174.9	38 22.3	1.0 07	175.0	37 52.3	1.0 07	175.0	37 22.4	1.0 07	175.0	36 52.5	1.0 07	175.1	36 22.5	1.0 07	175.1	35 52.6	1.0 07	175.2	35 22.6	1.0 07	175.2	4
05	38 47.8	1.0 09	173.6	38 17.9	1.0 09	173.7	37 48.0	1.0 09	173.7	37 18.1	1.0 09	173.8	36 48.2	1.0 09	173.8	36 18.3	1.0 09	173.9	35 48.4	1.0 08	173.9	35 18.5	1.0 08	174.0	05
6	38 42.5	1.0 10	172.4	38 12.6	1.0 10	172.4	37 42.8	1.0 10	172.5	37 12.9	1.0 10	172.6	36 43.0	1.0 10	172.6	36 13.2	1.0 10	172.7	35 43.3	1.0 10	172.7	35 13.4	1.0 10	172.8	6
7	38 36.2	99 12	171.1	38 06.4	99 12	171.2	37 36.6	99 12	171.3	37 06.8	99 12	171.3	36 36.9	99 12	171.4	36 07.1	99 12	171.5	35 37.3	99 12	171.5	35 07.5	99 11	171.6	7
8	38 28.9	99 14	169.9	37 59.2	99 14	169.9	37 29.4	99 13	170.0	36 59.7	99 13	170.1	36 29.9	99 13	170.2	36 00.2	99 13	170.3	35 30.4	99 13	170.3	35 00.6	99 13	170.4	8
9	38 20.7	99 15	168.6	37 51.1	99 15	168.7	37 21.4	99 15	168.8	36 51.7	99 15	168.9	36 22.0	99 15	169.0	35 52.3	99 15	169.1	35 22.6	99 14	169.1	34 52.9	99 14	169.2	9
10	38 11.6	99 17	167.4	37 42.0	99 17	167.5	37 12.4	99 16	167.6	36 42.8	99 16	167.7	36 13.1	99 16	167.8	35 43.5	99 16	167.9	35 13.9	99 16	168.0	34 44.2	99 16	168.0	10
1	38 01.5	98 18	166.1	37 32.0	98 18	166.2	37 02.5	98 18	166.3	36 32.9	98 18	166.5	36 03.4	99 18	166.6	35 33.8	99 18	166.7	35 04.3	99 17	166.8	34 34.7	99 17	166.9	1
2	37 50.6	98 20	164.9	37 21.1	98 20	165.0	36 51.7	98 20	165.1	36 22.2	98 19	165.2	35 52.7	98 19	165.4	35 23.3	98 19	165.5	34 53.8	98 19	165.6	34 24.3	98 19	165.7	2
3	37 38.7	98 21	163.7	37 00.3	98 21	163.8	36 40.9	98 21	163.9	36 10.6	98 21	164.0	35 41.2	98 21	164.2	35 11.8	98 21	164.3	34 42.4	98 20	164.4	34 13.0	98 20	164.5	3
4	37 25.9	97 23	162.4	36 56.6	98 23	162.6	36 27.4	98 22	162.7	35 58.1	98 22	162.9	35 28.8	98 22	163.0	34 59.5	98 22	163.1	34 30.2	98 22	163.3	34 00.9	98 22	163.4	4
15	37 12.2	97 24	161.2	36 43.0	97 24	161.4	36 13.9	97 24	161.5	35 44.7	97 24	161.7	35 15.5	97 24	161.8	34 46.4	97 23	162.0	34 17.2	97 23	162.1	33 47.9	97 23	162.2	15
6	36 57.6	97 26	160.0	36 28.6	97 26	160.2	35 59.5	97 25	160.3	35 30.5	97 25	160.5	35 01.4	97 25	160.6	34 32.3	97 25	160.8	34 03.2	97 25	160.9	33 34.1	97 24	161.1	6
7	36 42.2	96 27	158.8	36 13.3	96 27	159.0	35 44.4	96 27	159.2	35 15.4	97 27	159.3	34 46.5	97 26	159.5	34 17.5	97 26	159.6	33 48.5	97 26	159.8	33 19.5	97 26	159.9	7
8	36 25.9	96 29	157.6	35 57.1	96 28	157.8	35 28.3	96 28	158.0	34 59.5	96 28	158.2	34 30.7	96 28	158.3	34 01.8	96 28	158.5	33 32.9	96 27	158.7	33 04.0	96 27	158.8	8
9	36 08.8	96 30	156.5	35 40.2	96 30	156.6	35 11.5	96 29	156.8	34 42.8	96 29	157.0	34 14.0	96 29	157.2	33 45.3	96 29	157.4	33 16.6	96 29	157.5	32 47.8	96 28	157.7	9
20	35 50.9	95 31	155.3	35 22.4	95 31	155.5	34 53.8	95 31	155.7	34 25.2	95 31	155.9	33 56.6	95 30	156.0	33 28.0	95 30	156.2	32 59.4	95 30	156.4	32 30.7	96 30	156.6	20
1	35 32.2	95 33	154.1	35 03.8	95 32	154.3	34 35.3	95 32	154.5	34 06.9	95 32	154.7	33 38.4	95 32	154.9	33 09.9	95 31	155.1	32 41.4	95 31	155.3	32 12.9	95 31	155.5	1
2	35 12.6	94 34	153.0	34 44.4	94 34	153.2	34 16.1	94 33	153.4	33 47.8	94 33	153.6	33 19.4	94 33	153.8	32 51.1	95 33	154.0	32 22.7	95 32	154.2	31 54.3	95 32	154.4	2
3	34 52.3	94 35	151.9	34 24.2	94 35	152.1	33 56.0	94 35	152.3	33 27.9	94 34	152.5	32 59.7	94 34	152.7	32 31.5	94 34	152.9	32 03.2	94 34	153.1	31 35.0	94 33	153.3	3
4	34 31.3	93 36	150.7	34 03.3	93 36	151.0	33 35.3	93 36	151.2	33 07.2	93 36	151.4	32 39.2	94 35	151.6	32 11.1	94 35	151.8	31 43.0	94 35	152.0	31 14.9	94 35	152.2	4
25	34 09.4	93 38	149.6	33 41.6	93 37	149.8	33 13.7	93 37	150.1	32 45.8	93 37	150.3	32 17.9	93 37	150.5	31 50.0	93 36	150.7	31 22.0	93 36	150.9	30 54.1	93 36	151.1	25
6	33 46.9	92 39	148.5	33 19.2	92 39	148.7	32 51.5	92 38	149.0	32 23.7	93 38	149.2	31 56.0	93 38	149.4	31 28.2	93 38	149.6	31 00.4	93 37	149.9	30 32.5	93 37	150.1	6
7	33 23.6	92 40	147.4	32 56.1	92 40	147.7	32 28.5	92 39	147.9	32 00.9	92 39	148.1	31 33.3	92 39	148.4	31 05.6	92 39	148.6	30 38.0	92 38	148.8	30 10.3	92 38	149.0	7
8	32 59.6	91 41	146.3	32 32.2	91 41	146.6	32 04.8	91 41	146.8	31 37.4	92 40	147.1	31 09.9	92 40	147.3	30 42.4	92 40	147.5	30 14.9	92 40	147.8	29 47.4	92 39	148.0	8
9	32 35.0	91 42	145.3	32 07.7	91 42	145.5	31 40.5	91 42	145.8	31 13.2	91 41	146.0	30 45.9	91 41	146.2	30 18.5	91 41	146.5	29 51.2	91 41	146.7	29 23.8	91 40	147.0	9
30	32 09.6	90 43	144.2	31 42.6	90 43	144.5	31 15.4	90 43	144.7	30 48.3	90 43	145.0	30 21.2	91 42	145.2	29 54.0	91 42	145.5	29 26.8	91 42	145.7	28 59.5	91 42	145.9	30
1	31 43.6	90 44	143.2	31 16.7	90 44	143.4	30 49.8	90 44	143.7	30 22.8	90 44	143.9	29 55.8	90 43	144.2	29 28.8	90 43	144.4	29 01.7	90 43	144.7	28 34.6	90 43	144.9	1
2	31 17.0	89 45	142.1	30 50.2	89 45	142.4	30 23.5	89 45	142.6	29 56.6	89 45	142.9	29 29.8	90 44	143.2	29 02.9	90 44	143.4	28 36.0	90 44	143.7	28 09.1	90 44	143.9	2
3	30 49.7	89 46	141.1	30 23.2	89 46	141.4	29 56.5	89 46	141.6	29 29.9	89 46	141.9	29 03.2	89 45	142.2	28 36.5	89 45	142.4	28 09.7	89 45	142.7	27 42.9	89 45	142.9	3
4	30 21.9	88 47	140.1	29 55.5	88 47	140.3	29 29.0	88 47	140.6	29 02.5	88 47	140.9	28 36.0	88 46	141.2	28 09.4	89 46	141.4	27 42.8	89 46	141.7	27 16.2	89 46	141.9	4
35	29 53.4	88 48	139.1	29 27.2	88 48	139.3	29 00.9	88 48	139.6	28 34.5	88 48	139.9	28 08.1	88 47	140.2	27 41.7	88 47	140.4	27 15.3	88 47	140.7	26 48.8	88 47	141.0	35
6	29 24.4	87 49	138.1	28 58.3	87 49	138.4	28 32.1	87 49	138.6	28 06.0	87 49	138.9	27 39.7	87 48	139.2	27 13.5	88 48	139.5	26 47.2	88 48	139.7	26 20.9	88 47	140.0	6
7	28 54.8	86 50	137.1	28 28.8	87 50	137.4	28 02.9	87 50	137.7	27 36.8	87 49	137.9	27 10.8	87 49	138.2	26 44.7	87 49	138.5	26 18.6	87 49	138.8	25 52.4	87 48	139.0	7
8	28 24.6	86 51	136.1	27 58.9	86 51	136.4	27 33.0	86 51	136.7	27 07.2	86 50	137.0	26 41.3	86 50	137.3	26 15.3	86 50	137.5	25 49.4	87 50	137.8	25 23.4	87 49	138.1	8
9	27 54.0	85 52	135.2	27 28.3	85 52	135.5	27 02.7	86 51	135.7	26 37.0	86 51	136.0	26 11.2	86 51	136.3	25 45.5	86 51	136.6	25 19.7	86 50	136.9	24 53.8	86 50	137.2	9
40	27 22.8	85 53	134.2	26 57.3	85 53	134.5	26 31.8	85 52	134.8	26 06.2	85 52	135.1	25 40.7	85 52	135.4	25 15.1	85 52	135.7	24 49.4	86 51	136.0	24 23.7	86 51	136.2	40
1	26 51.1	84 54	133.3	26 25.7	84 53	133.6	26 00.4	85 53	133.9	25 35.0	85 53	134.2	25 09.6	85 53	134.5	24 44.1	85 52	134.7	24 18.7	85 52	135.0	23 53.1	85 52	135.3	1
2	26 18.9	84 54	132.3	25 53.7	84 54	132.6	25 28.5	84 54	132.9	25 03.3	84 54	133.2	24 38.0	84 53	133.5	24 12.7	84 53	133.8	23 47.4	84 53	134.1	23 22.0	85 53	134.4	2
3	25 46.2	83 55	131.4	25 21.2	83 55	131.7	24 56.2	84 55	132.0	24 31.1	84 54	132.3	24 06.0	84 54	132.6	23 40.8	84 54	132.9	23 15.7	84 54	133.2	22 50.4	84 53	133.5	3
4	25 13.1	83 56	130.5	24 48.2	83 56	130.8	24 23.3	83 55	131.1	23 58.4	83 55	131.4	23 33.5	83 55	131.7	23 08.5	83 55	132.0	22 43.4	83 54	132.3	22 18.4	84 54	132.6	4
45	24 39.5	82 57	129.6	24 14.8	82 56	129.9	23 50.0	82 56	130.2	23 25.3	83 56	130.5	23 00.5	83 56	130.8	22 35.6	83 55	131.1	22 10.8	83 55	131.4	21 45.9	83 55	131.7	45
6	24 05.4	82 57	128.7	23 40.9	82 57	129.0	23 16.3	82 57	129.3	22 51.7	82 57	129.6	22 27.1	82 56	130.0	22 02.4	82 56	130.3	21 37.7	82 56	130.6	21 12.9	83 56	130.9	6
7	23 31.0	81 58	127.8	23 06.6	81 58	128.1	22 42.2	81 58	128.5	22 17.7	82 57	128.8	21 53.2	82 57	129.1	21 28.7	82 57	129.4	21 04.1	82 57	129.7	20 39.5	82 56	130.0	7
8	22 56.1	81 59	127.0	22 31.9	81 59	127.3	22 07.6	81 58	127.6	21 43.3	81 58	127.9	21 18.9	81 58	128.2	20 54.6	81 58	128.5	20 30.2	81 57	128.8	20 05.7	82 57	129.2	8
9	22 20.9	80 59	126.1	21 56.8	80 59	126.4	21 32.6	80 59	126.7	21 08.5	81 59	127.1	20 44.3	81 58	127.4	20 20.0	81 58	127.7	19 55.8	81 58	128.0	19 31.5	81 58	128.3	9
50	21 45.2	80 60	125.2	21 21.3	80 60	125.6	20 57.3	80 60	125.9	20 33.3	80 59	126.2	20 09.2	80 59	126.5	19 45.1	80 59	126.8	19 21.0	80 59	127.2	18 56.8	81 58	127.5	50
1	21 09.2	79 61	124.4	20 45.4	79 60	124.7	20 21.5	80 60	125.0	19 57.7	80 60	125.4	19 33.8	80 60	125.7	19 09.8	80 59	126.0	18 45.8	80 59	126.3	18 21.8	80 59	126.6	1
2	20 32.8	79 61	123.6	20 09.1	79 61	123.9	19 45.4	79 61	124.2	19 21.7	79 61	124.5	18 57.9	79 60	124.9	18 34.1	79 60	125.2	18 10.3	80 60	125.5	17 46.4	80 60	125.8	2
3	19 56.1	78 62	122.7	19 32.5	78 62	123.1	19 09.0	79 61	123.4	18 45.4	79 61	123.7	18 21.7	79 61	124.0	17 58.1	79 61	124.4	17 34.4	79 60	124.7	17 10.7	79 60	125.0	3
4	19 19.0	78 62	121.9	18 55.6	78 62	122.2	18 32.2	78 62	122.6	18 08.7	78 62	122.9	17 45.2	78 61	123.2	17 21.7	78 61	123.5	16 58.1	79 61	123.9	16 34.5	79 61	124.2	4
55	18 41.5	77 63	121.1	18 18.3	78 63	121.4	17 55.0	78 62	121.8	17 31.7	78 62	122.1	17 08.3	78 62	122.4	16 44.9	78 62	122.7	16 21.5	78 62	123.1	15 58.1	78 61	123.4	55
6	18 03.8	77 63	120.3	17 40.7	77 63	120.6	17 17.5	77 63	121.0	16 54.3	77 63	121.3	16 31.1	77 63	121.6	16 07.9	78 62	121.9	15 44.6	78 62	122.3	15 21.3	78 62	122.6	6
7	17 25.8	77 64	119.5	17 02.8	77 64	119.8	16 39.7	77 64	120.2	16 16.7	77 63	120.5	15 53.6	77 63	120.8	15 30.5	77 63	121.2	15 07.3	77 63	121.5	14 44.1	77 62	121.8	7
8	16 47.4	76 64	118.7	16 24.6	76 64	119.0	16 01.7	76 64	119.4	15 38.7	76 64	119.7	15 15.8	77 64	120.0	14 52.8	77 63	120.4	14 29.7	77 63	120.7	14 06.7	77 63	121.0	8
9	16 08.8	76 65	117.9	15 46.0	76 65	118.2	15 23.3	76 64	118.6	15 00.5	76 64	118.9	14 37.6	76 64	119.3	14 14.8	76 64	119.6	13 51.9	76 64	119.9	13 28.9	76 63	120.3	9
60	15 29.9	75 65	117.1	15 07.2	75 65	117.5	14 44.6	76 65	117.8	14 21.9	76 65	118.2	13 59.2	76 64	118.5	13 36.4	76 64	118.8	13 13.7	76 64	119.2	12 50.9	76 64	119.5	60
1	14 50.7	75 66	116.4	14 28.2	75 66	116.7	14 05.6	75 65	117.0	13 43.1	75 65	117.4	13 20.5	75 65	117.7	12 57.9	75 65	118.1	12 35.2	76 65	118.4	12 12.5	76 64	118.7	1
2	14 11.2	75 66	115.6	13 48.8	75 66	115.9	13 26.4	75 66	116.3	13 04.0	75 66	116.6	12 41.5	75 65	117.0	12 19.0	75 65	117.3	11 56.5	75 65	117.6	11 33.9	75 65	118.0	2
3	13 31.5	74 67	114.8	13 09.3	74 66	115.2	12 47.0	74 66	115.5	12 24.6	74 66	115.9	12 02.3	75 66	116.2	11 39.9	75 66	116.5	11 17.5	75 65	116.9	10 55.0	75 65	117.2	3
4	12 51.6	74 67	114.1	12 29.4	74 67	114.4	12 07.2	74 67	114.8	11 45.0	74 66	115.1	11 22.8	74 66	115.5	11 00.5	74 66	115.8	10 38.2	74 66	116.1	10 15.9	74 66	116.5	4
65	12 11.4	73 67	113.3	11 49.4	74 67	113.7	11 27.3	74 67	114.0	11 05.2	74 67	114.4	10 43.0	74 67	114.7	10 20.9	74 66	115.1	9 58.7	74 66	115.4	9 36.5	74 66	115.7	65
6	11 31.0	73 68	112.6	11 09.1	73 68	112.9	10 47.1	73 67	113.3	10 25.1	73 67	113.6	10 03.0	73 67	114.0	9 41.0	74 67	114.3	9 18.9	74 67	114.7	8 56.8	74 66	115.0	6
7	10 50.4	73 68	111.9	10 28.5	73 68	112.2	10 06.7	73 68	112.6	9 44.8	73 68	112.9	9 22.8	73 67	113.2	9 00.9	73 67	113.6	8 38.9	73 67	113.9	8 17.0	73 67	114.3	7
8	10 09.6	72 68	111.1	9 47.8	73 68	111.5	9 26.0	73 68	111.8	9 04.2	73 68	112.2	8 42.4	73 68	112.5	8 20.6	73 68	112.9	7 58.7	73 67	113.2	7 36.8	73 67	113.6	8
9	9 28.5	72 69	110.4	9 06.9	72 69	110.8	8 45.2	72 68	111.1	8 23.5	72 68	111.5	8 01.8	72 68	111.8	7 40.0	72 68	112.1	7 18.3	73 68	112.5	6 56.5	73 68	112.8	9
70	8 47.3	72 69	109.7	8 25.7	72 69	110.0	8 04.2	72 69	110.4	7 42.6	72 69	110.7	7 20.9	72 68	111.1	6 59.3	72 68	111.4	6 37.6	72 68	111.8	6 16.0	72 68	112.1	70
1	8 05.9	72 69	109.0	7 44.4	72 69	109.3	7 22.9	72 69	109.7	7 01.4	72 69	110.0	6 39.9	72 69	110.4	6 18.3	72 69	110.7	5 56.8	72 68	111.1	5 35.2	72 68	111.4	1
2	7 24.3	71 70	108.2	7 02.9	71 69	108.6	6 41.5	71 69	109.0	6 20.1	71 69	109.3	5 58.7	71 69	109.7	5 37.2	72 69	110.0	5 15.7	72 69	110.4				2
3	6 42.6	71 70	107.5	6 21.2	71 70	107.9	5 59.9	71 70	108.2	5 38.6	71 70	108.6	5 17.2	71 69	109.0										3
4	6 00.6	71 70	106.8	5 39.4	71 70	107.2	5 18.2	71 70	107.5																4
75	5 18.6	70 70	106.1																						75

DECLINATION SAME NAME AS LATITUDE

H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91																									91
2				5 03.5	68 73	83.1	5 23.9	68 72	82.7	5 44.3	68 72	82.4	6 04.6	68 72	82.0	6 24.9	68 72	81.6	6 45.2	68 72	81.2	7 05.5	68 72	80.9	2
3										5 00.8	68 72	81.7	5 21.2	68 72	81.3	5 41.5	68 72	80.9	6 01.9	68 72	80.6	6 22.2	68 72	80.2	3
																			5 18.6	68 72	79.9	5 39.0	68 72	79.5	

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Lat. 43°

H.A.	12° 00′ Alt.	Δd Δt	Az.	12° 30′ Alt.	Δd Δt	Az.	13° 00′ Alt.	Δd Δt	Az.	13° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	59 00.0	1.0 01	180.0	59 30.0	1.0 01	180.0	60 00.0	1.0 01	180.0	60 30.0	1.0 01	180.0
1	58 59.3	1.0 04	178.1	59 29.3	1.0 04	178.1	59 59.3	1.0 04	178.1	60 29.2	1.0 04	178.0
2	58 57.1	1.0 06	176.2	59 27.1	1.0 06	176.2	59 57.0	1.0 06	176.1	60 27.0	1.0 06	176.1
3	58 53.5	1.0 08	174.3	59 23.4	1.0 09	174.2	59 53.3	1.0 09	174.2	60 23.2	1.0 09	174.1
4	58 48.4	1.0 11	172.4	59 18.3	1.0 11	172.3	59 48.1	99 11	172.2	60 17.9	99 11	172.1
05	58 41.9	99 13	170.6	59 11.7	99 13	170.4	59 41.4	99 13	170.3	60 11.2	99 14	170.2
6	58 34.0	99 15	168.7	59 03.7	99 16	168.6	59 33.3	99 16	168.4	60 03.0	99 16	168.3
7	58 24.7	99 18	166.8	58 54.3	99 18	166.7	59 23.8	98 18	166.5	59 53.3	98 18	166.3
8	58 14.0	98 20	165.0	58 43.5	98 20	164.8	59 12.9	98 21	164.6	59 42.3	98 21	164.4
9	58 02.0	98 22	163.2	58 31.3	98 22	163.0	59 00.6	98 23	162.8	59 29.8	97 23	162.6
10	57 48.7	97 24	161.4	58 17.8	97 25	161.2	58 46.9	97 25	160.9	59 16.0	97 25	160.7
1	57 34.1	97 26	159.6	58 03.0	96 27	159.4	58 31.9	96 27	159.1	59 00.8	96 27	158.9
2	57 18.2	96 29	157.9	57 46.9	96 29	157.6	58 15.7	96 29	157.4	58 44.4	96 30	157.1
3	57 01.0	96 31	156.2	57 29.6	96 31	155.9	57 58.1	95 31	155.6	58 26.6	95 32	155.3
4	56 42.7	95 32	154.5	57 11.1	95 33	154.2	57 39.4	94 33	153.9	58 07.7	94 34	153.5
15	56 23.2	94 34	152.8	56 51.4	94 35	152.5	57 19.5	94 35	152.2	57 47.6	93 35	151.8
6	56 02.6	93 36	151.1	56 30.5	93 37	150.8	56 58.4	93 37	150.5	57 26.3	93 37	150.1
7	55 40.8	93 38	149.5	56 08.6	92 38	149.2	56 36.2	92 39	148.8	57 03.9	92 39	148.5
8	55 18.1	92 40	147.9	55 45.6	92 40	147.6	56 13.0	91 40	147.2	56 40.4	91 41	146.8
9	54 54.3	91 41	146.4	55 21.5	91 42	146.0	55 48.7	91 42	145.6	56 15.9	90 43	145.2
20	54 29.5	90 43	144.8	54 56.5	90 43	144.5	55 23.5	90 44	144.1	55 50.4	90 44	143.7
1	54 03.7	89 44	143.3	54 30.5	89 45	142.9	54 57.3	89 45	142.5	55 23.9	89 46	142.1
2	53 37.1	89 46	141.8	54 03.6	88 46	141.5	54 30.1	88 47	141.1	54 56.5	88 47	140.6
3	53 09.5	88 47	140.4	53 35.9	88 48	140.0	54 02.1	87 48	139.6	54 28.3	87 48	139.2
4	52 41.1	87 49	139.0	53 07.2	87 49	138.6	53 33.2	87 49	138.2	53 59.2	86 50	137.7
25	52 11.9	86 50	137.6	52 37.8	86 50	137.2	53 03.6	86 51	136.8	53 29.2	85 51	136.3
6	51 41.9	86 51	136.2	52 07.6	85 52	135.8	52 33.1	85 52	135.4	52 58.6	85 52	134.9
7	51 11.2	85 52	134.9	51 36.6	85 53	134.5	52 01.9	84 53	134.0	52 27.1	84 54	133.6
8	50 39.8	84 54	133.6	51 05.0	84 54	133.1	51 30.0	83 54	132.7	51 55.0	83 55	132.3
9	50 07.7	83 55	132.3	50 32.6	83 55	131.9	50 57.4	83 55	131.4	51 22.2	82 56	131.0
30	49 34.9	83 56	131.0	49 59.6	82 56	130.6	50 24.2	82 56	130.2	50 48.7	82 57	129.7
1	49 01.5	82 57	129.8	49 26.0	82 57	129.4	49 50.4	81 57	128.9	50 14.7	81 58	128.5
2	48 27.5	81 58	128.6	48 51.8	81 58	128.1	49 15.9	80 58	127.7	49 40.0	80 59	127.2
3	47 52.9	80 59	127.4	48 17.0	80 59	127.0	48 40.9	80 59	126.5	49 04.8	79 60	126.0
4	47 17.8	80 59	126.2	47 41.6	79 60	125.8	48 05.4	79 60	125.3	48 29.1	79 60	124.9
35	46 42.1	79 60	125.1	47 05.8	79 61	124.7	47 29.4	78 61	124.2	47 52.8	78 61	123.7
6	46 06.0	78 61	124.0	46 29.4	78 61	123.5	46 52.8	78 62	123.1	47 16.1	77 62	122.6
7	45 29.3	78 62	122.9	45 52.6	77 62	122.4	46 15.8	77 62	122.0	46 38.9	77 63	121.5
8	44 52.3	77 62	121.8	45 15.4	77 63	121.4	45 38.4	77 63	120.9	46 01.3	76 63	120.4
9	44 14.8	77 63	120.8	44 37.7	76 63	120.3	45 00.5	76 64	119.9	45 23.3	76 64	119.4
40	43 36.9	76 64	119.7	43 59.6	76 64	119.3	44 22.3	75 64	118.8	44 44.8	75 65	118.4
1	42 58.6	75 64	118.7	43 21.2	75 65	118.3	43 43.6	75 65	117.8	44 06.0	74 65	117.3
2	42 19.9	75 65	117.7	42 42.3	75 65	117.3	43 04.7	74 66	116.8	43 26.9	74 66	116.3
3	41 40.9	74 66	116.7	42 03.2	74 66	116.3	42 25.3	74 66	115.8	42 47.4	73 66	115.4
4	41 01.5	74 66	115.8	41 23.6	74 66	115.3	41 45.7	73 67	114.9	42 07.6	73 67	114.4
45	40 21.8	73 67	114.8	40 43.8	73 67	114.4	41 05.7	73 67	113.9	41 27.5	72 67	113.4
6	39 41.9	73 67	113.9	40 03.7	73 67	113.4	40 25.4	72 68	113.0	40 47.1	72 68	112.5
7	39 01.6	73 68	112.9	39 23.3	72 68	112.5	39 44.9	72 68	112.1	40 06.4	71 68	111.6
8	38 21.0	72 68	112.0	38 42.6	72 68	111.6	39 04.1	71 68	111.2	39 25.5	71 69	110.7
9	37 40.2	72 68	111.2	38 01.7	71 69	110.7	38 23.0	71 69	110.3	38 44.3	71 69	109.8
50	36 59.2	71 69	110.3	37 20.5	71 69	109.8	37 41.8	71 69	109.4	38 02.9	70 69	108.9
1	36 17.9	71 69	109.4	36 39.1	71 69	109.0	37 00.3	70 70	108.5	37 21.3	70 70	108.1
2	35 36.4	71 69	108.5	35 57.5	70 70	108.1	36 18.6	70 70	107.7	36 39.5	70 70	107.2
3	34 54.7	70 70	107.7	35 15.7	70 70	107.3	35 36.6	70 70	106.8	35 57.5	69 70	106.4
4	34 12.8	70 70	106.9	34 33.7	70 70	106.4	34 54.6	69 70	106.0	35 15.3	69 71	105.6
55	33 30.7	70 70	106.1	33 51.6	69 71	105.6	34 12.3	69 71	105.2	34 32.9	69 71	104.7
6	32 48.5	69 71	105.2	33 09.2	69 71	104.8	33 29.9	69 71	104.4	33 50.4	68 71	103.9
7	32 06.1	69 71	104.4	32 26.7	69 71	104.0	32 47.3	68 71	103.6	33 07.7	68 71	103.1
8	31 23.5	69 71	103.6	31 44.1	68 71	103.2	32 04.6	68 71	102.8	32 24.9	68 72	102.4
9	30 40.8	68 71	102.9	31 01.3	68 72	102.4	31 21.7	68 72	102.0	31 42.0	68 72	101.6
60	29 57.9	68 72	102.1	30 18.4	68 72	101.7	30 38.7	68 72	101.2	30 59.0	67 72	100.8
1	29 15.0	68 72	101.3	29 35.3	68 72	100.9	29 55.6	67 72	100.5	30 15.8	67 72	100.1
2	28 31.9	68 72	100.6	28 52.2	68 72	100.2	29 12.4	67 72	99.7	29 32.6	67 72	99.3
3	27 48.7	68 72	99.8	28 09.0	67 72	99.4	28 29.1	67 72	99.0	28 49.2	67 72	98.6
4	27 05.4	67 72	99.1	27 25.6	67 72	98.7	27 45.7	67 72	98.2	28 05.8	67 73	97.8
65	26 22.0	67 72	98.3	26 42.2	67 73	97.9	27 02.3	67 73	97.5	27 22.3	67 73	97.1
6	25 38.6	67 73	97.6	25 58.7	67 73	97.2	26 18.7	67 73	96.8	26 38.7	66 73	96.4
7	24 55.1	67 73	96.9	25 15.1	67 73	96.5	25 35.1	67 73	96.1	25 55.0	66 73	95.6
8	24 11.5	67 73	96.2	24 31.5	67 73	95.7	24 51.5	66 73	95.3	25 11.4	66 73	94.9
9	23 27.8	67 73	95.4	23 47.8	67 73	95.0	24 07.7	66 73	94.6	24 27.6	66 73	94.2
70	22 44.1	67 73	94.7	23 04.1	66 73	94.3	23 24.0	66 73	93.9	23 43.8	66 73	93.5
1	22 00.3	67 73	94.0	22 20.3	66 73	93.6	22 40.2	66 73	93.2	23 00.0	66 73	92.8
2	21 16.5	67 73	93.3	21 36.5	66 73	92.9	21 56.4	66 73	92.5	22 16.2	66 73	92.1
3	20 32.7	67 73	92.6	20 52.6	66 73	92.2	21 12.5	66 73	91.8	21 32.3	66 73	91.4
4	19 48.9	66 73	91.9	20 08.8	66 73	91.5	20 28.6	66 73	91.1	20 48.4	66 73	90.7
75	19 05.0	66 73	91.2	19 24.9	66 73	90.9	19 44.8	66 73	90.5	20 04.6	66 73	90.1
6	18 21.1	66 73	90.6	18 41.0	66 73	90.2	19 00.9	66 73	89.8	19 20.7	66 73	89.4
7	17 37.3	66 73	89.9	17 57.2	66 73	89.5	18 17.0	66 73	89.1	18 36.8	66 73	88.7
8	16 53.4	66 73	89.2	17 13.3	66 73	88.8	17 33.1	66 73	88.4	17 52.9	66 73	88.0
9	16 09.5	66 73	88.5	16 29.4	66 73	88.1	16 49.3	66 73	87.7	17 09.1	66 73	87.4
80	15 25.6	66 73	87.8	15 45.6	66 73	87.5	16 05.4	66 73	87.1	16 25.3	66 73	86.7
1	14 41.8	67 73	87.2	15 01.7	66 73	86.8	15 21.6	66 73	86.4	15 41.5	66 73	86.0
2	13 58.0	67 73	86.5	14 17.9	66 73	86.1	14 37.9	66 73	85.7	14 57.7	66 73	85.3
3	13 14.2	67 73	85.8	13 34.2	67 73	85.4	13 54.1	66 73	85.1	14 14.0	66 73	84.7
4	12 30.5	67 73	85.2	12 50.5	67 73	84.8	13 10.4	66 73	84.4	13 30.3	66 73	84.0
85	11 46.8	67 73	84.5	12 06.8	67 73	84.1	12 26.8	67 73	83.7	12 46.7	66 73	83.4
6	11 03.1	67 73	83.8	11 23.2	67 73	83.4	11 43.2	67 73	83.1	12 03.2	67 72	82.7
7	10 19.5	67 73	83.2	10 39.6	67 72	82.8	10 59.7	67 72	82.4	11 19.7	67 72	82.0
8	9 36.0	67 72	82.5	9 56.1	67 72	82.1	10 16.2	67 72	81.7	10 36.3	67 72	81.4
9	8 52.5	67 72	81.8	9 12.7	67 72	81.5	9 32.8	67 72	81.1	9 52.9	67 72	80.7
90	8 09.1	67 72	81.2	8 29.3	67 72	80.8	8 49.5	67 72	80.4	9 09.7	67 72	80.0

H.A.	14° 00′ Alt.	Δd Δt	Az.	14° 30′ Alt.	Δd Δt	Az.	15° 00′ Alt.	Δd Δt	Az.	15° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	61 00.0	1.0 01	180.0	61 30.0	1.0 01	180.0	62 00.0	1.0 01	180.0	62 30.0	1.0 01	180.0
1	60 59.2	1.0 04	178.0	61 29.2	1.0 04	178.0	61 59.2	1.0 04	177.9	62 29.2	1.0 04	177.9
2	60 56.9	1.0 06	176.0	61 26.9	1.0 06	175.9	61 56.9	1.0 07	175.9	62 26.8	1.0 07	175.8
3	60 53.1	1.0 09	174.0	61 23.0	1.0 09	173.9	61 52.9	1.0 09	173.8	62 22.8	1.0 09	173.8
4	60 47.8	99 11	172.0	61 17.6	99 12	171.9	61 47.4	99 12	171.8	62 17.3	99 12	171.7
05	60 40.9	99 14	170.1	61 10.7	99 14	169.9	61 40.4	99 14	169.8	62 10.1	99 14	169.6
6	60 32.6	99 16	168.1	61 02.3	99 17	167.9	61 31.9	99 17	167.8	62 01.5	99 17	167.6
7	60 22.9	98 19	166.2	60 52.4	98 19	166.0	61 21.8	98 19	165.8	61 51.3	98 19	165.6
8	60 11.6	98 21	164.2	60 41.0	98 21	164.0	61 10.3	98 22	163.8	61 39.6	98 22	163.6
9	59 59.0	97 23	162.3	60 28.2	97 24	162.1	60 57.4	97 24	161.9	61 26.5	97 24	161.6
10	59 45.0	97 26	160.5	60 14.0	97 26	160.2	60 43.0	97 26	159.9	61 12.0	96 27	159.7
1	59 29.7	96 28	158.6	59 58.5	96 28	158.3	60 27.3	96 28	158.1	60 56.1	96 29	157.8
2	59 13.0	95 30	156.8	59 41.6	95 30	156.5	60 10.2	95 31	156.2	60 38.8	95 31	155.9
3	58 55.1	95 32	155.0	59 23.5	95 32	154.7	59 51.9	94 33	154.4	60 20.2	94 33	154.0
4	58 35.9	94 34	153.2	59 04.1	94 34	152.9	59 32.3	94 35	152.6	60 00.4	94 35	152.2
15	58 15.6	93 36	151.5	58 43.5	93 36	151.1	59 11.4	93 37	150.8	59 39.3	93 37	150.4
6	57 54.0	93 38	149.8	58 21.8	92 38	149.4	58 49.4	92 39	149.0	59 17.0	92 39	148.7
7	57 31.4	92 40	148.1	57 58.9	92 40	147.7	58 26.3	91 40	147.3	58 53.7	91 41	147.0
8	57 07.7	91 41	146.5	57 34.9	91 42	146.1	58 02.1	90 42	145.7	58 29.2	90 43	145.3
9	56 42.9	90 43	144.9	57 09.9	90 43	144.5	57 36.8	90 44	144.0	58 03.7	89 44	143.6
20	56 17.2	89 45	143.3	56 43.9	89 45	142.9	57 10.6	89 45	142.5	57 37.2	88 46	142.0
1	55 50.5	88 46	141.7	56 17.0	88 46	141.3	56 43.4	88 47	140.9	57 09.7	88 47	140.4
2	55 22.9	88 48	140.2	55 49.1	87 48	139.8	56 15.2	87 48	139.4	56 41.3	87 49	138.9
3	54 54.3	87 49	138.7	55 20.3	86 49	138.3	55 46.2	86 50	137.9	56 12.0	86 50	137.4
4	54 25.0	86 50	137.3	54 50.7	86 51	136.9	55 16.4	85 51	136.4	55 41.9	85 52	135.9
25	53 54.8	85 52	135.9	54 20.3	85 52	135.4	54 45.7	84 52	135.0	55 11.0	84 53	134.5
6	53 23.9	84 53	134.5	53 49.1	84 53	134.0	54 14.3	84 54	133.6	54 39.3	83 54	133.1
7	52 52.2	84 54	133.1	53 17.2	83 54	132.7	53 42.1	83 55	132.2	54 06.9	82 55	131.7
8	52 19.9	83 55	131.8	52 44.6	82 55	131.3	53 09.3	82 56	130.9	53 33.8	82 56	130.4
9	51 46.8	82 56	130.5	52 11.4	82 56	130.0	52 35.8	81 57	129.6	53 00.1	81 57	129.1
30	51 13.1	81 57	129.2	51 37.4	81 58	128.8	52 01.6	80 58	128.3	52 25.7	80 58	127.8
1	50 38.9	80 58	128.0	51 02.9	80 58	127.5	51 26.9	80 59	127.0	51 50.7	79 59	126.5
2	50 04.0	80 59	126.8	50 27.8	79 59	126.3	50 51.6	79 60	125.8	51 15.2	79 60	125.3
3	49 28.6	79 60	125.6	49 52.2	79 60	125.1	50 15.7	78 61	124.6	50 39.1	78 61	124.1
4	48 52.6	78 61	124.4	49 16.1	78 61	123.9	49 39.4	78 61	123.5	50 02.6	77 62	123.0
35	48 16.2	78 62	123.3	48 39.4	77 62	122.8	49 02.5	77 62	122.3	49 25.5	76 63	121.8
6	47 39.2	77 62	122.1	48 02.3	77 63	121.7	48 25.2	76 63	121.2	48 48.0	76 63	120.7
7	47 01.9	76 63	121.1	47 24.7	76 63	120.6	47 47.4	76 64	120.1	48 10.1	75 64	119.6
8	46 24.1	76 64	120.0	46 46.7	75 64	119.5	47 09.3	75 64	119.0	47 31.7	75 65	118.5
9	45 45.9	75 64	118.9	46 08.3	75 65	118.4	46 30.7	74 65	118.0	46 53.0	74 65	117.5
40	45 07.3	75 65	117.9	45 29.6	74 65	117.4	45 51.8	74 66	116.9	46 13.8	73 66	116.4
1	44 28.3	74 66	116.9	44 50.4	74 66	116.4	45 12.5	73 66	115.9	45 34.4	73 66	115.4
2	43 49.0	73 66	115.9	44 11.0	73 66	115.4	44 32.8	73 67	114.9	44 54.6	72 67	114.4
3	43 09.3	73 67	114.9	43 31.2	73 67	114.4	43 52.9	72 67	113.9	44 14.5	72 67	113.5
4	42 29.4	72 67	113.9	42 51.1	72 67	113.5	43 12.6	72 68	113.0	43 34.1	71 68	112.5
45	41 49.1	72 68	113.0	42 10.7	72 68	112.5	42 32.1	71 68	112.0	42 53.4	71 68	111.6
6	41 08.6	72 68	112.1	41 30.0	71 68	111.6	41 51.3	71 68	111.1	42 12.5	70 69	110.6
7	40 27.8	71 68	111.1	40 49.1	71 69	110.7	41 10.2	70 69	110.2	41 31.3	70 69	109.7
8	39 46.7	71 69	110.2	40 07.9	70 69	109.8	40 28.9	70 69	109.3	40 49.9	70 69	108.8
9	39 05.4	70 69	109.4	39 26.5	70 69	108.9	39 47.4	70 70	108.4	40 08.2	69 70	108.0
50	38 23.9	70 70	108.5	38 44.9	70 70	108.0	39 05.7	69 70	107.6	39 26.4	69 70	107.1
1	37 42.2	70 70	107.6	38 03.0	69 70	107.2	38 23.7	69 70	106.7	38 44.3	68 70	106.2
2	37 00.3	69 70	106.8	37 21.0	69 70	106.3	37 41.6	69 70	105.9	38 02.1	68 71	105.4
3	36 18.2	69 70	105.9	36 38.8	69 71	105.5	36 59.3	68 71	105.0	37 19.7	68 71	104.6
4	35 35.9	69 71	105.1	35 56.4	68 71	104.7	36 16.9	68 71	104.2	36 37.2	68 71	103.8
55	34 53.5	68 71	104.3	35 13.9	68 71	103.9	35 34.2	68 71	103.4	35 54.5	67 71	102.9
6	34 10.9	68 71	103.5	34 31.2	68 71	103.1	34 51.5	67 71	102.6	35 11.7	67 72	102.2
7	33 28.1	68 71	102.7	33 48.4	67 72	102.3	34 08.6	67 72	101.8	34 28.7	67 72	101.4
8	32 45.3	68 72	101.9	33 05.5	67 72	101.5	33 25.6	67 72	101.0	33 45.6	67 72	100.6
9	32 02.3	67 72	101.1	32 22.4	67 72	100.7	32 42.5	67 72	100.3	33 02.4	66 72	99.8
60	31 19.2	67 72	100.4	31 39.2	67 72	99.9	31 59.2	67 72	99.5	32 19.1	66 72	99.1
1	30 35.9	67 72	99.6	30 56.0	67 72	99.2	31 15.9	66 72	98.8	31 35.8	66 72	98.3
2	29 52.6	67 72	98.9	30 12.6	66 72	98.4	30 32.5	66 72	98.0	30 52.3	66 73	97.6
3	29 09.2	67 72	98.1	29 29.2	66 73	97.7	29 49.0	66 73	97.3	30 08.8	66 73	96.8
4	28 25.7	66 73	97.4	28 45.6	66 73	97.0	29 05.4	66 73	96.5	29 25.2	66 73	96.1
65	27 42.2	66 73	96.7	28 02.0	66 73	96.2	28 21.8	66 73	95.8	28 41.5	65 73	95.4
6	26 58.6	66 73	95.9	27 18.4	66 73	95.5	27 38.1	66 73	95.1	27 57.8	65 73	94.7
7	26 14.9	66 73	95.2	26 34.7	66 73	94.8	26 54.4	66 73	94.4	27 14.0	65 73	94.0
8	25 31.2	66 73	94.5	25 50.9	66 73	94.1	26 10.6	65 73	93.7	26 30.2	65 73	93.2
9	24 47.4	66 73	93.8	25 07.2	66 73	93.4	25 26.8	65 73	93.0	25 46.4	65 73	92.6
70	24 03.6	66 73	93.1	24 23.3	66 73	92.7	24 43.0	65 73	92.3	25 02.6	65 73	91.9
1	23 19.8	66 73	92.4	23 39.5	66 73	92.0	23 59.1	65 73	91.6	24 18.7	65 73	91.2
2	22 35.9	66 73	91.7	22 55.6	66 73	91.3	23 15.3	65 73	90.9	23 34.8	65 73	90.5
3	21 52.1	66 73	91.0	22 11.8	66 73	90.6	22 31.4	65 73	90.2	22 50.9	65 73	89.8
4	21 08.2	66 73	90.3	21 27.9	66 73	89.9	21 47.5	65 73	89.5	22 07.1	65 73	89.1
75	20 24.3	66 73	89.7	20 44.0	66 73	89.3	21 03.6	65 73	88.8	21 23.2	65 73	88.4
6	19 40.4	66 73	89.0	20 00.1	66 73	88.6	20 19.8	65 73	88.2	20 39.3	65 73	87.8
7	18 56.6	66 73	88.3	19 16.3	66 73	87.9	19 35.9	65 73	87.5	19 55.5	65 73	87.1
8	18 12.7	66 73	87.6	18 32.4	66 73	87.2	18 52.1	65 73	86.8	19 11.7	65 73	86.4
9	17 28.9	66 73	87.0	17 48.6	66 73	86.6	18 08.3	66 73	86.2	18 27.9	65 73	85.8
80	16 45.1	66 73	86.3	17 04.8	66 73	85.9	17 24.5	66 73	85.5	17 44.2	65 73	85.1
1	16 01.3	66 73	85.6	16 21.1	66 73	85.2	16 40.8	66 73	84.8	17 00.5	66 73	84.4
2	15 17.6	66 73	85.0	15 37.4	66 73	84.6	15 57.1	66 73	84.2	16 16.8	66 73	83.8
3	14 33.9	66 73	84.3	14 53.7	66 73	83.9	15 13.5	66 73	83.5	15 33.2	66 73	83.1
4	13 50.2	66 73	83.6	14 10.1	66 73	83.2	14 29.9	66 72	82.9	14 49.7	66 72	82.5
85	13 06.7	66 73	83.0	13 26.6	66 72	82.6	13 46.4	66 72	82.2	14 06.2	66 72	81.8
6	12 23.1	66 72	82.3	12 43.1	66 72	81.9	13 03.0	66 72	81.5	13 22.8	66 72	81.2
7	11 39.7	67 72	81.6	11 59.7	67 72	81.3	12 19.6	66 72	80.9	12 39.5	66 72	80.5
8	10 56.3	67 72	81.0	11 16.3	67 72	80.6	11 36.3	67 72	80.2	11 56.3	66 72	79.8
9	10 13.0	67 72	80.3	10 33.1	67 72	79.9	10 53.1	67 72	79.6	11 13.1	67 72	79.2
90	9 29.8	67 72	79.7	9 49.9	67 72	79.3	10 10.0	67 72	78.9	10 30.1	67 72	78.5

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10—11439

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	12° 00′			12° 30′			13° 00′			13° 30′			14° 00′			14° 30′			15° 00′			15° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	°
00	35 00.0	1.0 01	180.0	34 30.0	1.0 01	180.0	34 00.0	1.0 01	180.0	33 30.0	1.0 01	180.0	33 00.0	1.0 01	180.0	32 30.0	1.0 01	180.0	32 00.0	1.0 01	180.0	31 30.0	1.0 01	180.0	00
1	34 59.5	1.0 02	178.8	34 29.5	1.0 02	178.8	33 59.5	1.0 02	178.8	33 29.6	1.0 02	178.8	32 59.6	1.0 02	178.8	32 29.6	1.0 02	178.9	31 59.6	1.0 02	178.9	31 29.6	1.0 02	178.9	1
2	34 58.2	1.0 04	177.6	34 28.2	1.0 04	177.6	33 58.2	1.0 04	177.6	33 28.2	1.0 04	177.7	32 58.2	1.0 04	177.7	32 28.2	1.0 04	177.7	31 58.3	1.0 04	177.7	31 28.3	1.0 04	177.7	2
3	34 55.9	1.0 05	176.4	34 25.9	1.0 05	176.4	33 56.0	1.0 05	176.5	33 26.0	1.0 05	176.5	32 56.0	1.0 05	176.5	32 26.0	1.0 05	176.6	31 56.1	1.0 05	176.6	31 26.1	1.0 05	176.6	3
4	34 52.7	1.0 07	175.2	34 22.7	1.0 07	175.3	33 52.8	1.0 07	175.3	33 22.9	1.0 07	175.3	32 52.9	1.0 07	175.4	32 23.0	1.0 07	175.4	31 53.0	1.0 07	175.4	31 23.1	1.0 06	175.5	4
05	34 48.6	1.0 08	174.0	34 18.7	1.0 08	174.1	33 48.8	1.0 08	174.1	33 18.9	1.0 08	174.2	32 48.9	1.0 08	174.2	32 19.0	1.0 08	174.3	31 49.1	1.0 08	174.3	31 19.2	1.0 08	174.4	05
6	34 43.6	1.0 10	172.9	34 13.7	1.0 10	172.9	33 43.8	1.0 10	173.0	33 14.0	1.0 10	173.0	32 44.1	1.0 10	173.1	32 14.2	1.0 09	173.1	31 44.3	1.0 09	173.2	31 14.5	1.0 09	173.2	6
7	34 37.7	99 11	171.7	34 07.8	99 11	171.7	33 38.0	99 11	171.8	33 08.2	99 11	171.9	32 38.4	99 11	171.9	32 08.5	99 11	172.0	31 38.7	99 11	172.1	31 08.9	99 11	172.1	7
8	34 30.9	99 13	170.5	34 01.1	99 13	170.6	33 31.3	99 13	170.6	33 01.5	99 13	170.7	32 31.8	99 12	170.8	32 02.0	99 12	170.9	31 32.2	99 12	170.9	31 02.4	99 12	171.0	8
9	34 23.2	99 14	169.3	33 53.5	99 14	169.4	33 23.7	99 14	169.5	32 54.0	99 14	169.6	32 24.3	99 14	169.6	31 54.6	99 14	169.7	31 24.9	99 14	169.8	30 55.1	99 14	169.9	9
10	34 14.6	99 16	168.1	33 45.0	99 16	168.2	33 15.3	99 16	168.3	32 45.6	99 15	168.4	32 16.0	99 15	168.5	31 46.3	99 15	168.6	31 16.7	99 15	168.7	30 47.0	99 15	168.8	10
1	34 05.1	99 17	167.0	33 35.6	99 17	167.1	33 06.0	99 17	167.2	32 36.4	99 17	167.3	32 06.8	99 17	167.4	31 37.2	99 17	167.5	31 07.6	99 16	167.6	30 38.0	99 16	167.7	1
2	33 54.8	98 19	165.8	33 25.3	98 18	165.9	32 55.8	98 18	166.0	32 26.3	98 18	166.1	31 56.8	98 18	166.2	31 27.3	98 18	166.4	30 57.8	98 18	166.5	30 28.2	98 18	166.6	2
3	33 43.6	98 20	164.7	33 14.2	98 20	164.8	32 44.8	98 20	164.9	32 15.4	98 20	165.0	31 46.0	98 19	165.1	31 16.5	98 19	165.2	30 47.1	98 19	165.3	30 17.6	98 19	165.5	3
4	33 31.6	98 21	163.5	33 02.3	98 21	163.6	32 33.0	98 21	163.8	32 03.6	98 21	163.9	31 34.3	98 21	164.0	31 04.9	98 21	164.1	30 35.6	98 21	164.2	30 06.2	98 20	164.4	4
15	33 18.7	97 23	162.4	32 49.5	97 23	162.5	32 20.3	97 22	162.6	31 51.0	97 22	162.8	31 21.8	98 22	162.9	30 52.5	98 22	163.0	30 23.3	98 22	163.2	29 54.0	98 22	163.3	15
6	33 05.0	97 24	161.2	32 35.9	97 24	161.4	32 06.8	97 24	161.5	31 37.6	97 24	161.7	31 08.5	97 24	161.8	30 39.3	97 23	161.9	30 10.1	97 23	162.1	29 41.0	97 23	162.2	6
7	32 50.5	97 26	160.1	32 21.5	97 25	160.3	31 52.4	97 25	160.4	31 23.4	97 25	160.5	30 54.4	97 25	160.7	30 25.3	97 25	160.8	29 56.2	97 24	161.0	29 27.2	97 24	161.1	7
8	32 35.2	96 27	159.0	32 06.2	96 27	159.1	31 37.3	96 27	159.3	31 08.4	96 26	159.4	30 39.5	96 26	159.6	30 10.5	97 26	159.8	29 41.5	97 26	159.9	29 12.6	97 26	160.1	8
9	32 19.0	96 28	157.9	31 50.2	96 28	158.0	31 21.4	96 28	158.2	30 52.6	96 28	158.4	30 23.8	96 27	158.5	29 54.9	96 27	158.7	29 26.1	96 27	158.8	28 57.2	96 27	159.0	9
20	32 02.1	96 30	156.8	31 33.4	96 29	156.9	31 04.7	96 29	157.1	30 36.0	96 29	157.3	30 07.3	96 29	157.4	29 38.6	96 28	157.6	29 09.9	96 28	157.8	28 41.1	96 28	157.9	20
1	31 44.4	95 31	155.7	31 15.8	95 31	155.8	30 47.3	95 30	156.0	30 18.7	96 30	156.2	29 50.1	95 30	156.4	29 21.5	95 30	156.5	28 52.9	95 30	156.7	28 24.3	96 29	156.9	1
2	31 25.9	95 32	154.6	30 57.5	95 32	154.8	30 29.1	95 32	154.9	30 00.6	95 31	155.1	29 32.1	95 31	155.3	29 03.7	95 31	155.5	28 35.2	95 31	155.7	28 06.7	95 31	155.8	2
3	31 06.7	94 33	153.5	30 38.4	94 33	153.7	30 10.1	94 33	153.9	29 41.8	94 33	154.1	29 13.4	94 32	154.3	28 45.1	95 32	154.4	28 16.7	95 32	154.6	27 48.3	95 32	154.8	3
4	30 46.7	94 34	152.4	30 18.6	94 34	152.6	29 50.4	94 34	152.8	29 22.2	94 34	153.0	28 54.0	94 34	153.2	28 25.8	94 33	153.4	27 57.6	94 33	153.6	27 29.3	94 33	153.8	4
25	30 26.1	93 36	151.4	29 58.0	93 35	151.6	29 30.0	93 35	151.8	29 02.0	94 35	152.0	28 33.9	94 35	152.2	28 05.8	94 34	152.4	27 37.7	94 34	152.6	27 09.6	94 34	152.8	25
6	30 04.7	93 37	150.3	29 36.8	93 37	150.5	29 08.9	93 36	150.7	28 41.0	93 36	150.9	28 13.1	93 36	151.1	27 45.1	93 36	151.3	27 17.1	93 35	151.5	26 49.1	93 35	151.7	6
7	29 42.6	92 38	149.3	29 14.8	92 38	149.5	28 47.1	93 37	149.7	28 19.3	93 37	149.9	27 51.5	93 37	150.1	27 23.7	93 37	150.3	26 55.9	93 37	150.5	26 28.0	93 36	150.7	7
8	29 19.8	92 39	148.2	28 52.2	92 39	148.4	28 24.6	92 39	148.7	27 57.0	92 38	148.9	27 29.3	92 38	149.1	27 01.7	92 38	149.3	26 34.0	92 38	149.5	26 06.3	92 37	149.7	8
9	28 56.4	91 40	147.2	28 28.9	92 40	147.4	28 01.5	92 40	147.6	27 34.0	92 39	147.9	27 06.5	92 39	148.1	26 38.9	92 39	148.3	26 11.4	92 39	148.5	25 43.8	92 38	148.8	9
30	28 32.3	91 41	146.2	28 05.0	91 41	146.4	27 37.6	91 41	146.6	27 10.3	91 40	146.9	26 43.0	91 40	147.1	26 15.6	91 40	147.3	25 48.2	91 40	147.6	25 20.7	91 40	147.8	30
1	28 07.5	90 42	145.2	27 40.4	91 42	145.4	27 13.2	91 42	145.6	26 46.0	91 42	145.9	26 18.8	91 41	146.1	25 51.6	91 41	146.3	25 24.3	91 41	146.6	24 57.0	91 41	146.8	1
2	27 42.1	90 43	144.2	27 15.1	90 43	144.4	26 48.1	90 43	144.7	26 21.1	90 43	144.9	25 54.0	90 42	145.1	25 26.9	90 42	145.4	24 59.8	90 42	145.6	24 32.7	90 42	145.8	2
3	27 16.1	89 44	143.2	26 49.3	89 44	143.4	26 22.4	90 44	143.7	25 55.6	90 44	143.9	25 28.6	90 43	144.2	25 01.7	90 43	144.4	24 34.8	90 43	144.7	24 07.8	90 43	144.9	3
4	26 49.5	89 45	142.2	26 22.9	89 45	142.5	25 56.1	89 45	142.7	25 29.4	89 45	143.0	25 02.7	89 44	143.2	24 35.9	89 44	143.5	24 09.1	89 44	143.7	23 42.2	89 44	143.9	4
35	26 22.3	88 46	141.2	25 55.8	88 46	141.5	25 29.3	89 46	141.7	25 02.7	89 45	142.0	24 36.1	89 45	142.3	24 09.5	89 45	142.5	23 42.8	89 45	142.8	23 16.1	89 44	143.0	35
6	25 54.6	88 47	140.3	25 28.2	88 47	140.5	25 01.8	88 47	140.8	24 35.4	88 46	141.1	24 08.9	88 46	141.3	23 42.5	88 46	141.6	23 16.0	88 46	141.8	22 49.4	88 45	142.1	6
7	25 26.2	87 48	139.3	25 00.0	87 48	139.6	24 33.8	88 48	139.9	24 07.5	88 47	140.1	23 41.2	88 47	140.4	23 14.9	88 47	140.6	22 48.6	88 47	140.9	22 22.2	88 46	141.2	7
8	24 57.4	87 49	138.4	24 31.3	87 49	138.7	24 05.2	87 48	138.9	23 39.1	87 48	139.2	23 13.0	87 48	139.5	22 46.8	87 48	139.7	22 20.6	87 47	140.0	21 54.4	87 47	140.2	8
9	24 28.0	86 50	137.4	24 02.1	86 50	137.7	23 36.1	86 49	138.0	23 10.2	87 49	138.3	22 44.2	87 49	138.5	22 18.2	87 49	138.8	21 52.1	87 48	139.1	21 26.1	87 48	139.3	9
40	23 58.0	86 51	136.5	23 32.3	86 50	136.8	23 06.5	86 50	137.1	22 40.7	86 50	137.4	22 14.9	86 50	137.6	21 49.0	86 49	137.9	21 23.1	86 49	138.2	20 57.2	86 49	138.4	40
1	23 27.6	85 52	135.6	23 02.0	85 51	135.9	22 36.4	85 51	136.2	22 10.7	86 51	136.5	21 45.1	86 51	136.7	21 19.4	86 50	137.0	20 53.6	86 50	137.3	20 27.9	86 50	137.6	1
2	22 56.6	85 52	134.7	22 31.2	85 52	135.0	22 05.7	85 52	135.3	21 40.3	85 52	135.6	21 14.7	85 51	135.8	20 49.2	85 51	136.1	20 23.6	85 51	136.4	19 58.0	85 51	136.7	2
3	22 25.2	84 53	133.8	21 59.9	84 53	134.1	21 34.6	84 53	134.4	21 09.3	84 52	134.7	20 43.9	85 52	135.0	20 18.5	85 52	135.2	19 53.1	85 52	135.5	19 27.7	85 51	135.8	3
4	21 53.3	84 54	132.9	21 28.2	84 54	133.2	21 03.0	84 53	133.5	20 37.9	84 53	133.8	20 12.6	84 53	134.1	19 47.4	84 53	134.4	19 22.1	84 52	134.7	18 56.9	84 52	134.9	4
45	21 20.9	83 55	132.0	20 56.0	83 54	132.3	20 31.0	83 54	132.6	20 06.0	83 54	132.9	19 40.9	84 54	133.2	19 15.8	84 53	133.5	18 50.7	84 53	133.8	18 25.6	84 53	134.1	45
6	20 48.1	83 55	131.2	20 23.3	83 55	131.5	19 58.5	83 55	131.8	19 33.6	83 55	132.1	19 08.7	83 54	132.4	18 43.8	83 54	132.7	18 18.8	83 54	133.0	17 53.8	83 54	133.2	6
7	20 14.9	82 56	130.3	19 50.2	82 56	130.6	19 25.5	82 56	130.9	19 00.8	82 55	131.2	18 36.1	83 55	131.5	18 11.3	83 55	131.8	17 46.5	83 55	132.1	17 21.6	83 54	132.4	7
8	19 41.2	82 57	129.5	19 16.7	82 57	129.8	18 52.2	82 56	130.1	18 27.6	82 56	130.4	18 03.0	82 56	130.7	17 38.4	82 56	131.0	17 13.7	82 55	131.3	16 49.0	82 55	131.6	8
9	19 07.1	81 57	128.6	18 42.8	81 57	128.9	18 18.4	81 57	129.2	17 54.0	81 57	129.5	17 29.5	82 56	129.8	17 05.0	82 56	130.1	16 40.5	82 56	130.4	16 16.0	82 56	130.7	9
50	18 32.7	81 58	127.8	18 08.4	81 58	128.1	17 44.2	81 58	128.4	17 19.9	81 57	128.7	16 55.6	81 57	129.0	16 31.3	81 57	129.3	16 06.9	81 57	129.6	15 42.5	81 56	129.9	50
1	17 57.8	80 59	127.0	17 33.7	80 58	127.3	17 09.6	80 58	127.6	16 45.5	80 58	127.9	16 21.3	81 58	128.2	15 57.1	81 58	128.5	15 32.9	81 57	128.8	15 08.7	81 57	129.1	1
2	17 22.5	80 59	126.1	16 58.6	80 59	126.4	16 34.6	80 59	126.8	16 10.7	80 59	127.1	15 46.6	80 58	127.4	15 22.6	80 58	127.7	14 58.5	80 58	128.0	14 34.5	80 58	128.3	2
3	16 46.9	79 60	125.3	16 23.1	79 60	125.6	15 59.3	79 60	126.0	15 35.5	80 59	126.3	15 11.6	80 59	126.6	14 47.7	80 59	126.9	14 23.8	80 59	127.2	13 59.8	80 58	127.5	3
4	16 10.9	79 61	124.5	15 47.3	79 60	124.8	15 23.6	79 60	125.2	14 59.9	79 60	125.5	14 36.2	79 60	125.8	14 12.4	79 59	126.1	13 48.7	79 59	126.4	13 24.9	79 59	126.7	4
55	15 34.6	78 61	123.7	15 11.1	78 61	124.0	14 47.6	78 61	124.4	14 24.0	79 60	124.7	14 00.4	79 60	125.0	13 36.8	79 60	125.3	13 13.2	79 60	125.6	12 49.5	79 60	125.9	55
6	14 57.9	78 62	122.9	14 34.6	78 61	123.2	14 11.2	78 61	123.6	13 47.7	78 61	123.9	13 24.3	78 61	124.2	13 00.8	78 61	124.5	12 37.3	78 60	124.9	12 13.8	78 60	125.2	6
7	14 20.9	77 62	122.1	13 57.7	77 62	122.5	13 34.4	78 62	122.8	13 11.1	78 62	123.1	12 47.8	78 61	123.4	12 24.5	78 61	123.8	12 01.1	78 61	124.1	11 37.8	78 61	124.4	7
8	13 43.6	77 63	121.4	13 20.5	77 62	121.7	12 57.4	77 62	122.0	12 34.2	77 62	122.3	12 11.1	77 62	122.7	11 47.9	77 62	123.0	11 24.6	77 61	123.3	11 01.4	78 61	123.6	8
9	13 06.0	77 63	120.6	12 43.0	77 63	120.9	12 20.0	77 63	121.2	11 57.0	77 63	121.6	11 34.0	77 62	121.9	11 10.9	77 62	122.2	10 47.8	77 62	122.6	10 24.7	77 62	122.9	9
60	12 28.1	76 64	119.8	12 05.2	76 63	120.2	11 42.4	76 63	120.5	11 19.5	76 63	120.8	10 56.6	76 63	121.1	10 33.6	76 63	121.5	10 10.7	77 62	121.8	9 47.7	77 62	122.1	60
1	11 49.9	76 64	119.1	11 27.1	76 64	119.4	11 04.4	76 64	119.7	10 41.6	76 64	120.1	10 18.8	76 63	120.4	9 56.0	76 63	120.7	9 33.2	76 63	121.1	9 10.4	76 63	121.4	1
2	11 11.4	75 65	118.3	10 48.8	75 64	118.6	10 26.1	75 64	119.0	10 03.5	75 64	119.3	9 40.9	76 64	119.6	9 18.2	76 64	120.0	8 55.5	76 63	120.3	8 32.8	76 63	120.6	2
3	10 32.6	75 65	117.6	10 10.1	75 65	117.9	9 47.6	75 65	118.2	9 25.1	75 64	118.6	9 02.6	75 64	118.9	8 40.0	75 64	119.2	8 17.5	75 64	119.6	7 54.9	75 64	119.9	3
4	9 53.6	74 66	116.8	9 31.2	75 65	117.2	9 08.8	75 65	117.5	8 46.4	75 65	117.8	8 24.0	75 65	118.2	8 01.6	75 64	118.5	7 39.2	75 64	118.8	7 16.7	75 64	119.2	4
65	9 14.3	74 66	116.1	8 52.0	74 66	116.4	8 29.8	74 66	116.8	8 07.5	74 65	117.1	7 45.2	74 65	117.4	7 22.9	74 65	117.8	7 00.6	74 65	118.1	6 38.2	74 65	118.4	65
6	8 34.7	74 66	115.4	8 12.6	74 66	115.7	7 50.5	74 66	116.0	7 28.3	74 66	116.4	7 06.1	74 66	116.7	6 44.0	74 65	117.1	6 21.7	74 65	117.4	5 59.5	74 65	117.7	6
7	7 55.0	73 67	114.6	7 33.0	73 66	115.0	7 10.9	73 66	115.3	6 48.9	74 66	115.7	6 26.8	74 66	116.0	6 04.7	74 66	116.3	5 42.7	74 66	116.7	5 20.6	74 65	117.0	7
8	7 15.0	73 67	113.9	6 53.1	73 67	114.2	6 31.1	73 67	114.6	6 09.2	73 66	114.9	5 47.3	73 66	115.3	5 25.3	73 66	115.6	5 03.3	73 66	116.0				8
9	6 34.7	73 67	113.2	6 12.9	73 67	113.5	5 51.1	73 67	113.9	5 29.3	73 67	114.2	5 07.5	73 67	114.6										9
70	5 54.3	72 68	112.5	5 32.6	72 67	112.8	5 10.9	72 67	113.2																70
1	5 13.6	72 68	111.8																						1

DECLINATION SAME NAME AS LATITUDE

H.A.	12° 00′			12° 30′			13° 00′			13° 30′			14° 00′			14° 30′			15° 00′			15° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	°
91	7 25.8	68 72	80.5	7 46.0	67 72	80.1	8 06.3	67 72	79.8	8 26.5	67 72	79.4	8 46.7	67 72	79.0	9 06.8	67 72	78.6	9 27.0	67 72	78.3	9 47.1	67 71	77.9	91
2	6 42.5	68 72	79.8	7 02.9	68 72	79.5	7 23.1	68 72	79.1	7 43.4	68 72	78.7	8 03.7	67 72	78.3	8 23.9	67 71	78.0	8 44.1	67 71	77.6	9 04.3	67 71	77.2	2
3	5 59.4	68 72	79.2	6 19.8	68 72	78.8	6 40.1	68 72	78.4	7 00.4	68 71	78.1	7 20.7	68 71	77.7	7 41.0	68 71	77.3	8 01.3	68 71	76.9	8 21.5	67 71	76.6	3
4	5 16.4	68 72	78.5	5 36.8	68 72	78.1	5 57.2	68 71	77.8	6 17.5	68 71	77.4	6 37.9	68 71	77.0	6 58.3	68 71	76.7	7 18.6	68 71	76.3	7 38.9	68 71	75.9	4
95							5 14.3	68 71	77.1	5 34.8	68 71	76.7	5 55.2	68 71	76.4	6 15.6	68 71	76.0	6 36.0	68 71	75.6	6 56.4	68 71	75.3	95
6													5 12.6	68 71	75.7	5 33.1	68 71	75.3	5 53.6	68 71	75.0	6 14.0	68 70	74.6	6
7																			5 11.3	68 70	74.3	5 31.8	68 70	73.9	7

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Lat. 43°

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	63 00.0	1.0 01	180.0	63 30.0	1.0 01	180.0	64 00.0	1.0 01	180.0	64 30.0	1.0 01	180.0	65 00.0	1.0 01	180.0	65 30.0	1.0 01	180.0	66 00.0	1.0 01	180.0	66 30.0	1.0 02	180.0	00
1	62 59.2	1.0 04	177.9	63 29.2	1.0 04	177.9	63 59.2	1.0 04	177.8	64 29.2	1.0 04	177.8	64 59.1	1.0 04	177.8	65 29.1	1.0 04	177.7	65 59.1	1.0 04	177.7	66 29.1	1.0 05	177.6	1
2	62 56.8	1.0 07	175.8	63 26.7	1.0 07	175.7	63 56.7	1.0 07	175.6	64 26.6	1.0 07	175.6	64 56.6	1.0 07	175.5	65 26.5	1.0 07	175.4	65 56.4	1.0 07	175.4	66 26.4	1.0 08	175.3	2
3	62 52.7	1.0 09	173.7	63 22.6	1.0 10	173.6	63 52.5	1.0 10	173.5	64 22.4	1.0 10	173.4	64 52.3	1.0 10	173.3	65 22.1	1.0 10	173.2	65 52.0	1.0 10	173.0	66 21.9	1.0 10	172.9	3
4	62 47.1	99 12	171.6	63 16.9	99 12	171.4	63 46.7	99 12	171.3	64 16.5	99 13	171.2	64 46.3	99 13	171.0	65 16.1	99 13	170.9	65 45.8	99 13	170.8	66 15.6	99 13	170.6	4
05	62 39.9	99 15	169.5	63 09.6	99 15	169.3	63 39.3	99 15	169.2	64 08.9	99 15	169.0	64 38.6	99 16	168.8	65 08.3	99 16	168.7	65 37.9	99 16	168.5	66 07.6	99 16	168.3	05
6	62 31.1	99 17	167.4	63 00.7	99 17	167.2	63 30.2	99 18	167.1	63 59.8	98 18	166.9	64 29.3	98 18	166.7	64 58.8	98 18	166.4	65 28.3	98 19	166.2	65 57.8	98 19	166.0	6
7	62 20.8	98 20	165.4	62 50.2	98 20	165.2	63 19.6	98 20	165.0	63 49.0	98 21	164.7	64 18.4	98 21	164.5	64 47.7	98 21	164.3	65 17.0	98 22	164.0	65 46.3	98 22	163.7	7
8	62 08.9	98 22	163.4	62 38.2	98 22	163.1	63 07.4	97 23	162.9	63 36.7	97 23	162.6	64 05.8	97 23	162.4	64 35.0	97 24	162.1	65 04.1	97 24	161.8	65 33.2	97 24	161.5	8
9	61 55.6	97 25	161.4	62 24.7	97 25	161.1	62 53.8	97 25	160.8	63 22.8	97 26	160.6	63 51.8	97 26	160.3	64 20.7	96 26	160.0	64 49.7	96 27	159.7	65 18.5	96 27	159.3	9
10	61 40.9	96 27	159.4	62 09.8	96 27	159.1	62 38.6	96 28	158.8	63 07.5	96 28	158.5	63 36.2	96 28	158.2	64 00.5	96 29	157.9	64 33.6	96 29	157.5	65 02.3	95 30	157.2	10
1	61 24.8	96 29	157.5	61 53.4	96 30	157.2	62 22.1	95 30	156.8	62 50.7	95 30	156.5	63 19.2	95 31	156.2	63 47.7	95 31	155.8	64 16.1	95 32	155.4	64 44.5	95 32	155.1	1
2	61 07.3	95 31	155.6	61 35.7	95 32	155.2	62 04.1	95 32	154.9	62 32.5	94 33	154.5	63 00.8	94 33	154.2	63 29.0	94 33	153.8	63 57.2	94 34	153.4	64 25.3	94 34	153.0	2
3	60 48.5	94 33	153.7	61 16.7	94 34	153.3	61 44.8	94 34	153.0	62 12.9	94 35	152.6	62 41.0	93 35	152.2	63 08.9	93 36	151.8	63 36.9	93 36	151.4	64 04.7	93 37	151.0	3
4	60 28.4	93 36	151.8	60 56.4	93 36	151.5	61 24.3	93 36	151.1	61 52.1	93 37	150.7	62 19.9	92 37	150.3	62 47.6	92 38	149.9	63 15.2	92 38	149.5	63 42.7	92 39	149.0	4
15	60 07.1	92 37	150.0	60 34.8	92 38	149.7	61 02.4	92 38	149.3	61 30.0	92 39	148.8	61 57.5	92 39	148.4	62 24.9	91 40	148.0	62 52.3	91 40	147.5	63 19.5	91 41	147.1	15
6	59 44.6	92 39	148.3	60 12.0	91 40	147.9	60 39.4	91 40	147.5	61 06.7	91 41	147.0	61 33.9	91 41	146.6	62 01.1	90 42	146.1	62 28.1	90 42	145.7	62 55.1	90 43	145.2	6
7	59 20.9	91 41	146.5	59 48.1	91 42	146.1	60 15.2	90 42	145.7	60 42.3	90 43	145.3	61 09.2	90 43	144.8	61 36.1	89 44	144.3	62 02.8	89 44	143.9	62 29.4	89 45	143.4	7
8	58 56.2	90 43	144.9	59 23.1	90 43	144.4	59 50.0	89 44	144.0	60 16.7	89 44	143.5	60 43.4	89 45	143.1	61 09.9	88 45	142.6	61 36.4	88 46	142.1	62 02.7	88 46	141.6	8
9	58 30.4	89 45	143.2	58 57.1	89 45	142.8	59 23.6	88 46	142.3	59 50.1	88 46	141.8	60 16.5	88 46	141.4	60 42.7	87 47	140.9	61 08.9	87 48	140.4	61 34.9	87 48	139.8	9
20	58 03.6	88 46	141.6	58 30.0	88 47	141.1	58 56.3	87 47	140.7	59 22.5	87 48	140.2	59 48.6	87 48	139.7	60 14.6	86 49	139.2	60 40.4	86 49	138.7	61 06.1	86 50	138.2	20
1	57 35.9	87 48	140.0	58 02.0	87 48	139.5	58 28.0	87 49	139.1	58 53.9	86 49	138.6	59 19.7	86 50	138.1	59 45.4	85 50	137.6	60 11.0	85 51	137.0	60 36.4	85 51	136.5	1
2	57 07.2	86 49	138.4	57 33.1	86 50	138.0	57 58.8	86 50	137.5	58 24.5	85 51	137.0	58 50.0	85 51	136.5	59 15.4	84 52	136.0	59 40.6	84 52	135.4	60 05.7	84 52	134.9	2
3	56 37.7	85 51	136.9	57 03.3	85 51	136.5	57 28.7	85 52	136.0	57 54.1	84 52	135.5	58 19.3	84 52	135.0	58 44.4	83 53	134.4	59 09.4	83 53	133.9	59 34.2	83 54	133.3	3
4	56 07.3	85 52	135.5	56 32.6	84 52	135.0	56 57.8	84 53	134.5	57 22.9	83 53	134.0	57 47.9	83 54	133.5	58 12.7	83 54	132.9	58 37.4	82 55	132.4	59 01.9	82 55	131.8	4
25	55 36.2	84 53	134.0	56 01.2	83 54	133.5	56 26.1	83 54	133.0	56 51.0	82 54	132.5	57 15.6	82 55	132.0	57 40.2	82 55	131.5	58 04.6	81 56	130.9	58 28.9	81 56	130.4	25
6	55 04.2	83 54	132.6	55 29.0	82 55	132.1	55 53.7	82 55	131.6	56 18.2	82 56	131.1	56 42.7	81 56	130.6	57 06.9	81 57	130.0	57 31.1	80 57	129.5	57 55.1	80 57	128.9	6
7	54 31.6	82 56	131.2	54 56.1	82 56	130.7	55 20.5	81 56	130.2	55 44.8	81 57	129.7	56 09.0	80 57	129.2	56 33.0	80 58	128.6	56 56.9	79 58	128.1	57 20.6	79 59	127.5	7
8	53 58.2	81 57	129.9	54 22.5	81 57	129.4	54 46.7	80 57	128.9	55 10.7	80 58	128.4	55 34.6	79 58	127.8	55 58.4	79 59	127.3	56 22.0	78 59	126.7	56 45.5	78 60	126.2	8
9	53 24.3	80 58	128.6	53 48.3	80 58	128.1	54 12.2	80 58	127.6	54 36.0	79 59	127.0	54 59.7	79 59	126.5	55 23.2	78 60	126.0	55 46.6	78 60	125.4	56 09.8	77 60	124.8	9
30	52 49.6	80 59	127.3	53 13.5	79 59	126.8	53 37.2	79 59	126.3	54 00.7	78 60	125.8	54 24.1	78 60	125.2	54 47.4	77 61	124.7	55 10.5	77 61	124.1	55 33.5	76 61	123.6	30
1	52 14.5	79 60	126.0	52 38.0	78 60	125.5	53 01.5	78 60	125.0	53 24.8	77 61	124.5	53 48.0	77 61	124.0	54 11.0	77 61	123.4	54 33.9	76 62	122.9	54 56.6	75 62	122.3	1
2	51 38.7	78 60	124.8	52 02.1	78 61	124.3	52 25.3	77 61	123.8	52 48.4	77 62	123.3	53 11.3	76 62	122.7	53 34.1	76 62	122.2	53 56.8	75 63	121.6	54 19.3	75 63	121.1	2
3	51 02.4	77 61	123.6	51 25.6	77 62	123.1	51 48.6	76 62	122.6	52 11.5	76 62	122.1	52 34.2	76 63	121.5	52 56.8	75 63	121.0	53 19.2	75 63	120.4	53 41.5	74 64	119.9	3
4	50 25.6	77 62	122.5	50 48.6	76 62	122.0	51 11.4	76 63	121.4	51 34.0	75 63	120.9	51 56.6	75 63	120.4	52 18.9	74 64	119.8	52 41.1	74 64	119.3	53 03.2	73 64	118.7	4
35	49 48.4	76 63	121.3	50 11.1	76 63	120.8	50 33.7	75 64	120.3	50 56.2	75 64	119.8	51 18.5	74 64	119.2	51 40.6	74 64	118.7	52 02.7	73 65	118.1	52 24.5	73 65	117.6	35
6	49 10.7	75 64	120.2	49 33.2	75 64	119.7	49 55.6	74 64	119.2	50 17.9	74 65	118.7	50 40.0	73 65	118.1	51 02.0	73 65	117.6	51 23.8	72 65	117.0	51 45.4	72 66	116.5	6
7	48 32.5	75 64	119.1	48 54.9	74 65	118.6	49 17.1	74 65	118.1	49 39.2	73 65	117.6	50 01.1	73 65	117.0	50 22.9	72 66	116.5	50 44.5	72 66	115.9	51 06.0	71 66	115.4	7
8	47 54.0	74 65	118.0	48 16.1	74 65	117.5	48 38.2	73 65	117.0	49 00.1	73 66	116.5	49 21.8	72 66	116.0	49 43.4	72 66	115.4	50 04.9	71 67	114.9	50 26.2	71 67	114.3	8
9	47 15.1	73 65	117.0	47 37.0	73 66	116.5	47 58.9	73 66	116.0	48 20.6	72 66	115.4	48 42.2	72 67	114.9	49 03.6	71 67	114.4	49 24.9	71 67	113.8	49 46.0	70 67	113.3	9
40	46 35.8	73 66	115.9	46 57.6	72 66	115.4	47 19.3	72 67	114.9	47 40.8	72 67	114.4	48 02.2	71 67	113.9	48 23.5	71 67	113.4	48 44.6	70 68	112.8	49 05.6	70 68	112.3	40
1	45 56.2	72 67	114.9	46 17.8	72 67	114.4	46 39.3	72 67	113.9	47 00.7	71 67	113.4	47 22.0	71 68	112.9	47 43.1	70 68	112.4	48 04.0	70 68	111.8	48 24.8	69 68	111.3	1
2	45 16.2	72 67	113.9	45 37.7	71 67	113.4	45 59.1	71 68	112.9	46 20.3	71 68	112.4	46 41.4	70 68	111.9	47 02.3	70 68	111.4	47 23.1	69 69	110.9	47 43.8	69 69	110.3	2
3	44 35.9	71 68	113.0	44 57.3	71 68	112.5	45 18.5	71 68	112.0	45 39.6	70 68	111.5	46 00.5	70 69	111.0	46 21.3	69 69	110.4	46 42.0	69 69	109.9	47 02.5	68 69	109.4	3
4	43 55.4	71 68	112.0	44 16.6	70 68	111.5	44 37.7	70 68	111.0	44 58.6	70 69	110.5	45 19.4	69 69	110.0	45 40.1	69 69	109.5	46 00.6	68 69	109.0	46 21.0	68 70	108.4	4
45	43 14.6	70 68	111.1	43 35.7	70 69	110.6	43 56.6	70 69	110.1	44 17.4	69 69	109.6	44 38.1	69 69	109.1	44 58.6	68 70	108.6	45 19.0	68 70	108.0	45 39.3	67 70	107.5	45
6	42 33.5	70 69	110.2	42 54.5	70 69	109.7	43 15.3	69 69	109.2	43 35.9	69 69	108.7	43 56.5	68 70	108.2	44 16.9	68 70	107.7	44 37.2	67 70	107.1	44 57.3	67 70	106.6	6
7	41 52.2	70 69	109.3	42 13.0	69 69	108.8	42 33.7	69 70	108.3	42 54.3	68 70	107.8	43 14.7	68 70	107.3	43 35.0	67 70	106.8	43 55.2	67 70	106.3	44 15.2	67 71	105.7	7
8	41 10.7	69 70	108.4	41 31.4	69 70	107.9	41 51.9	68 70	107.4	42 12.4	68 70	106.9	42 32.7	68 70	106.4	42 52.9	67 70	105.9	43 12.9	67 71	105.4	43 32.9	66 71	104.9	8
9	40 28.9	69 70	107.5	40 49.5	68 70	107.0	41 10.0	68 70	106.5	41 30.3	68 70	106.0	41 50.5	67 71	105.5	42 10.6	67 71	105.0	42 30.5	66 71	104.5	42 50.4	66 71	104.0	9
50	39 47.0	68 70	106.6	40 07.4	68 70	106.1	40 27.8	68 71	105.7	40 48.0	67 71	105.2	41 08.1	67 71	104.7	41 28.1	66 71	104.2	41 48.0	66 71	103.7	42 07.7	66 71	103.2	50
1	39 04.8	68 70	105.8	39 25.2	68 71	105.3	39 45.5	67 71	104.8	40 05.6	67 71	104.3	40 25.6	67 71	103.8	40 45.5	66 71	103.4	41 05.3	66 71	102.9	41 24.9	65 72	102.4	1
2	38 22.5	68 71	104.9	38 42.8	67 71	104.5	39 03.0	67 71	104.0	39 23.0	67 71	103.5	39 42.9	66 71	103.0	40 02.7	66 72	102.5	40 22.4	65 72	102.0	40 42.0	65 72	101.5	2
3	37 40.0	67 71	104.1	38 00.2	67 71	103.6	38 20.3	67 71	103.2	38 40.3	66 71	102.7	39 00.1	66 72	102.2	39 19.8	66 72	101.7	39 39.5	65 72	101.2	39 58.9	65 72	100.7	3
4	36 57.4	67 71	103.3	37 17.5	67 71	102.8	37 37.5	66 72	102.4	37 57.4	66 72	101.9	38 17.2	66 72	101.4	38 36.8	65 72	100.9	38 56.4	65 72	100.4	39 15.8	65 72	99.9	4
55	36 14.6	67 71	102.5	36 34.7	67 72	102.0	36 54.6	66 72	101.6	37 14.4	66 72	101.1	37 34.1	65 72	100.6	37 53.7	65 72	100.1	38 13.1	65 72	99.7	38 32.5	64 72	99.2	55
6	35 31.7	67 72	101.7	35 51.7	66 72	101.2	36 11.5	66 72	100.8	36 31.3	66 72	100.3	36 50.9	65 72	99.8	37 10.4	65 72	99.4	37 29.8	65 72	98.9	37 49.1	64 72	98.4	6
7	34 48.7	66 72	100.9	35 08.6	66 72	100.5	35 28.4	66 72	100.0	35 48.0	65 72	99.5	36 07.6	65 72	99.1	36 27.1	65 72	98.6	36 46.4	64 72	98.1	37 05.7	64 73	97.6	7
8	34 05.5	66 72	100.1	34 25.4	66 72	99.7	34 45.1	66 72	99.2	35 04.7	65 72	98.8	35 24.2	65 72	98.3	35 43.7	65 72	97.8	36 03.0	64 73	97.4	36 22.1	64 73	96.9	8
9	33 22.3	66 72	99.4	33 42.1	66 72	98.9	34 01.7	65 72	98.5	34 21.3	65 72	98.0	34 40.8	65 73	97.6	35 00.1	64 73	97.1	35 19.4	64 73	96.6	35 38.5	64 73	96.1	9
60	32 39.0	66 72	98.6	32 58.7	66 72	98.2	33 18.3	65 73	97.7	33 37.8	65 73	97.3	33 57.2	65 73	96.8	34 16.6	64 73	96.3	34 35.8	64 73	95.9	34 54.9	64 73	95.4	60
1	31 55.5	66 73	97.9	32 15.2	65 73	97.4	32 34.8	65 73	97.0	32 54.3	65 73	96.5	33 13.6	64 73	96.1	33 32.9	64 73	95.6	33 52.1	64 73	95.1	34 11.2	63 73	94.7	1
2	31 12.0	66 73	97.1	31 31.7	65 73	96.7	31 51.2	65 73	96.2	32 10.6	65 73	95.8	32 30.0	64 73	95.3	32 49.2	64 73	94.9	33 08.4	64 73	94.4	33 27.4	63 73	94.0	2
3	30 28.4	65 73	96.4	30 48.0	65 73	96.0	31 07.5	65 73	95.5	31 26.9	65 73	95.1	31 46.3	64 73	94.6	32 05.5	64 73	94.2	32 24.6	64 73	93.7	32 43.6	63 73	93.3	3
4	29 44.8	65 73	95.7	30 04.4	65 73	95.2	30 23.8	65 73	94.8	30 43.2	64 73	94.4	31 02.5	64 73	93.9	31 21.7	64 73	93.5	31 40.8	64 73	93.0	31 59.8	63 73	92.5	4
65	29 01.1	65 73	95.0	29 20.6	65 73	94.5	29 40.1	65 73	94.1	29 59.4	64 73	93.6	30 18.7	64 73	93.2	30 37.9	64 73	92.7	30 57.0	63 73	92.3	31 16.0	63 73	91.8	65
6	28 17.4	65 73	94.2	28 36.9	65 73	93.8	28 56.3	65 73	93.4	29 15.6	64 73	92.9	29 34.9	64 73	92.5	29 54.0	64 73	92.0	30 13.1	63 73	91.6	30 32.1	63 73	91.2	6
7	27 33.6	65 73	93.5	27 53.1	65 73	93.1	28 12.5	65 73	92.7	28 31.8	64 73	92.2	28 51.0	64 73	91.8	29 10.2	64 73	91.4	29 29.2	63 73	90.9	29 48.2	63 73	90.5	7
8	26 49.8	65 73	92.8	27 09.2	65 73	92.4	27 28.6	64 73	92.0	27 47.9	64 73	91.5	28 07.2	64 73	91.1	28 26.3	64 73	90.7	28 45.4	63 73	90.2	29 04.3	63 73	89.8	8
9	26 05.9	65 73	92.1	26 25.4	65 73	91.7	26 44.8	64 73	91.3	27 04.1	64 73	90.8	27 23.3	64 73	90.4	27 42.4	64 73	90.0	28 01.5	63 73	89.5	28 20.5	63 73	89.1	9
70	25 22.1	65 73	91.4	25 41.5	65 73	91.0	26 00.9	64 73	90.6	26 20.2	64 73	90.2	26 39.4	64 73	89.7	26 58.5	64 73	89.3	27 17.6	63 73	88.9	27 36.6	63 73	88.4	70
1	24 38.2	65 73	90.7	24 57.6	65 73	90.3	25 17.0	64 73	89.9	25 36.3	64 73	89.5	25 55.5	64 73	89.1	26 14.7	64 73	88.6	26 33.7	63 73	88.2	26 52.7	63 73	87.8	1
2	23 54.3	65 73	90.1	24 13.8	65 73	89.6	24 33.1	64 73	89.2	24 52.4	64 73	88.8	25 11.7	64 73	88.4	25 30.8	64 73	88.0	25 49.9	63 73	87.5	26 08.9	63 73	87.1	2
3	23 10.5	65 73	89.4	23 29.9	65 73	89.0	23 49.3	64 73	88.6	24 08.6	64 73	88.1	24 27.8	64 73	87.7	24 47.0	64 73	87.3	25 06.1	64 73	86.9	25 25.1	63 73	86.4	3
4	22 26.6	65 73	88.7	22 46.0	65 73	88.3	23 05.4	65 73	87.9	23 24.7	64 73	87.5	23 44.0	64 73	87.0	24 03.1	64 73	86.6	24 22.3	64 73	86.2	24 41.3	63 73	85.8	4
75	21 42.7	65 73	88.0	22 02.2	65 73	87.6	22 21.6	65 73	87.2	22 40.9	64 73	86.8	23 00.2	64 73	86.4	23 19.4	64 73	86.0	23 38.5	64 73	85.5	23 57.6	63 73	85.1	75
6	20 58.9	65 73	87.4	21 18.3	65 73	87.0	21 37.7	65 73	86.5	21 57.1	64 73	86.1	22 16.4	64 73	85.7	22 35.6	64 73	85.3	22 54.8	64 73	84.9	23 13.9	64 73	84.5	6
7	20 15.0	65 73	86.7	20 34.5	65 73	86.3	20 54.0	65 73	85.9	21 13.3	64 73	85.5	21 32.6	64 73	85.1	21 51.9	64 73	84.6	22 11.1	64 73	84.2	22 30.2	64 73	83.8	7
8	19 31.3	65 73	86.0	19 50.8	65 73	85.6	20 10.2	65 73	85.2	20 29.6	65 73	84.8	20 48.9	64 73	84.4	21 08.2	64 73	84.0	21 27.4	64 73	83.6	21 46.6	64 73	83.2	8
9	18 47.5	65 73	85.4	19 07.0	65 73	85.0	19 26.5	65 73	84.6	19 45.9	65 73	84.2	20 05.3	64 73	83.8	20 24.6	64 73	83.3	20 43.9	64 73	82.9	21 03.1	64 72	82.5	9
80	18 03.8	65 73	84.7	18 23.3	65 73	84.3	18 42.8	65 73	83.9	19 02.3	65 73	83.5	19 21.7	65 73	83.1	19 41.1	64 72	82.7	20 00.4	64 72	82.3	20 19.6	64 72	81.9	80
1	17 20.1	65 73	84.0	17 39.7	65 73	83.6	17 59.2	65 73	83.2	18 18.7	65 73	82.8	18 38.2	65 72	82.4	18 57.6	65 72	82.0	19 16.9	64 72	81.6	19 36.2	64 72	81.2	1
2	16 36.5	65 73	83.4	16 56.1	65 73	83.0	17 15.7	65 72	82.6	17 35.2	65 72	82.2	17 54.7	65 72	81.8	18 14.1	65 72	81.4	18 33.5	65 72	81.0	18 52.9	64 72	80.6	2
3	15 52.9	66 72	82.7	16 12.6	65 72	82.3	16 32.2	65 72	81.9	16 51.8	65 72	81.5	17 11.3	65 72	81.2	17 30.8	65 72	80.8	17 50.2	65 72	80.4	18 09.6	65 72	80.0	3
4	15 09.4	66 72	82.1	15 29.1	66 72	81.7	15 48.8	65 72	81.3	16 08.4	65 72	80.9	16 28.0	65 72	80.5	16 47.5	65 72	80.1	17 07.0	65 72	79.7	17 26.4	65 72	79.3	4
85	14 26.0	66 72	81.4	14 45.8	66 72	81.0	15 05.5	66 72	80.6	15 25.1	65 72	80.3	15 44.8	65 72	79.9	16 04.3	65 72	79.5	16 23.9	65 72	79.1	16 43.4	65 72	78.7	85
6	13 42.7	66 72	80.8	14 02.5	66 72	80.4	14 22.2	66 72	80.0	14 41.9	66 72	79.6	15 01.6	66 72	79.2	15 21.2	65 72	78.8	15 40.8	65 72	78.4	16 00.4	65 71	78.0	6
7	12 59.4	66 72	80.1	13 19.2	66 72	79.7	13 39.0	66 72	79.3	13 58.8	66 72	79.0	14 18.5	66 72	78.6	14 38.2	66 72	78.2	14 57.9	65 71	77.8	15 17.5	65 71	77.4	7
8	12 16.2	66 72	79.5	12 36.1	66 72	79.1	12 56.0	66 72	78.7	13 15.8	66 72	78.3	13 35.6	66 71	77.9	13 55.3	66 71	77.5	14 15.1	66 71	77.1	14 34.7	66 71	76.8	8
9	11 33.1	67 72	78.8	11 53.1	66 72	78.4	12 13.0	66 71	78.0	12 32.9	66 71	77.7	12 52.7	66 71	77.3	13 12.5	66 71	76.9	13 32.3	66 71	76.5	13 52.1	66 71	76.1	9
90	10 50.1	67 71	78.2	11 10.1	67 71	77.8	11 30.1	67 71	77.4	11 50.1	66 71	77.0	12 10.0	66 71	76.6	12 29.9	66 71	76.2	12 49.7	66 71	75.9	13 09.5	66 71	75.5	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	16° 00′ Alt.	Δd	Δt	Az.	16° 30′ Alt.	Δd	Δt	Az.	17° 00′ Alt.	Δd	Δt	Az.	17° 30′ Alt.	Δd	Δt	Az.	18° 00′ Alt.	Δd	Δt	Az.	18° 30′ Alt.	Δd	Δt	Az.	19° 00′ Alt.	Δd	Δt	Az.	19° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
00	31 00.0	1.0	01	180.0	30 30.0	1.0	01	180.0	30 00.0	1.0	01	180.0	29 30.0	1.0	01	180.0	29 00.0	1.0	01	180.0	28 30.0	1.0	01	180.0	28 00.0	1.0	01	180.0	27 30.0	1.0	01	180.0	00
1	30 59.6	1.0	02	178.9	30 29.6	1.0	02	178.9	29 59.6	1.0	02	178.9	29 29.6	1.0	02	178.9	28 59.6	1.0	02	178.9	28 29.6	1.0	02	178.9	27 59.6	1.0	02	178.9	27 29.6	1.0	02	178.9	1
2	30 58.3	1.0	04	177.8	30 28.3	1.0	04	177.8	29 58.3	1.0	04	177.8	29 28.3	1.0	03	177.8	28 58.3	1.0	03	177.8	28 28.3	1.0	03	177.8	27 58.4	1.0	03	177.9	27 28.4	1.0	03	177.9	2
3	30 56.1	1.0	05	176.6	30 26.2	1.0	05	176.7	29 56.2	1.0	05	176.7	29 26.2	1.0	05	176.7	28 56.3	1.0	05	176.7	28 26.3	1.0	05	176.8	27 56.3	1.0	05	176.8	27 26.3	1.0	05	176.8	3
4	30 53.1	1.0	06	175.5	30 23.2	1.0	06	175.6	29 53.2	1.0	06	175.6	29 23.3	1.0	06	175.6	28 53.3	1.0	06	175.7	28 23.4	1.0	06	175.7	27 53.4	1.0	06	175.7	27 23.5	1.0	06	175.8	4
05	30 49.3	1.0	08	174.4	30 19.4	1.0	08	174.4	29 49.4	1.0	08	174.5	29 19.5	1.0	08	174.5	28 49.6	1.0	08	174.6	28 19.7	1.0	08	174.6	27 49.8	1.0	08	174.7	27 19.8	1.0	07	174.7	05
6	30 44.6	1.0	09	173.3	30 14.7	1.0	09	173.3	29 44.8	1.0	09	173.4	29 14.9	1.0	09	173.4	28 45.0	1.0	09	173.5	28 15.2	1.0	09	173.5	27 45.3	1.0	09	173.6	27 15.4	1.0	09	173.6	6
7	30 39.0	99	11	172.2	30 09.2	99	11	172.2	29 39.3	99	11	172.3	29 09.5	99	10	172.4	28 39.7	99	10	172.4	28 09.8	99	10	172.5	27 40.0	99	10	172.5	27 10.1	99	10	172.6	7
8	30 32.6	99	12	171.1	30 02.8	99	12	171.1	29 33.0	99	12	171.2	29 03.2	99	12	171.3	28 33.4	99	12	171.3	28 03.7	99	12	171.4	27 33.8	99	12	171.5	27 04.0	99	11	171.5	8
9	30 25.4	99	13	170.0	29 55.7	99	13	170.0	29 25.9	99	13	170.1	28 56.2	99	13	170.2	28 26.4	99	13	170.3	27 56.7	99	13	170.3	27 26.9	99	13	170.4	26 57.2	99	13	170.5	9
10	30 17.3	99	15	168.9	29 47.6	99	15	168.9	29 18.0	99	15	169.0	28 48.3	99	14	169.1	28 18.6	99	14	169.2	27 48.9	99	14	169.3	27 19.2	99	14	169.4	26 49.5	99	14	169.4	10
1	30 08.4	99	16	167.8	29 38.8	99	16	167.8	29 09.2	99	16	167.9	28 39.6	99	16	168.0	28 10.0	99	16	168.1	27 40.3	99	16	168.2	27 10.7	99	15	168.3	26 41.1	99	15	168.4	1
2	29 58.7	98	18	166.7	29 29.2	98	17	166.8	28 59.6	98	17	166.9	28 30.1	98	17	167.0	28 00.5	99	17	167.1	27 31.0	99	17	167.2	27 01.4	99	17	167.3	26 31.9	99	17	167.3	2
3	29 48.2	98	19	165.6	29 18.7	98	19	165.7	28 49.3	98	19	165.8	28 19.8	98	18	165.9	27 50.3	98	18	166.0	27 20.8	98	18	166.1	26 51.4	98	18	166.2	26 21.9	98	18	166.3	3
4	29 36.8	98	20	164.5	29 07.5	98	20	164.6	28 38.1	98	20	164.7	28 08.7	98	20	164.8	27 39.3	98	20	164.9	27 09.9	98	20	165.1	26 40.5	98	19	165.2	26 11.1	98	19	165.3	4
15	29 24.7	98	22	163.4	28 55.4	98	21	163.5	28 26.1	98	21	163.7	27 56.8	98	21	163.8	27 27.5	98	21	163.9	26 58.2	98	21	164.0	26 28.9	98	21	164.1	25 59.6	98	20	164.2	15
6	29 11.8	97	23	162.3	28 42.6	97	23	162.5	28 13.4	97	22	162.6	27 44.2	97	22	162.7	27 15.0	97	22	162.9	26 45.7	97	22	163.0	26 16.5	97	22	163.1	25 47.3	97	22	163.2	6
7	28 58.1	97	24	161.3	28 29.0	97	24	161.4	27 59.9	97	24	161.5	27 30.8	97	24	161.7	27 01.6	97	23	161.8	26 32.5	97	23	161.9	26 03.4	97	23	162.1	25 34.2	97	23	162.2	7
8	28 43.6	97	25	160.2	28 14.6	97	25	160.3	27 45.6	97	25	160.5	27 16.6	97	25	160.6	26 47.6	97	25	160.8	26 18.5	97	25	160.9	25 49.5	97	24	161.1	25 20.5	97	24	161.2	8
9	28 28.3	96	27	159.1	27 59.5	96	26	159.3	27 30.6	96	26	159.4	27 01.7	96	26	159.6	26 32.8	96	26	159.7	26 03.8	96	26	159.9	25 34.9	96	26	160.0	25 06.0	96	25	160.2	9
20	28 12.4	96	28	158.1	27 43.6	96	28	158.3	27 14.8	96	28	158.4	26 46.0	96	27	158.6	26 17.2	96	27	158.7	25 48.4	96	27	158.9	25 19.6	96	27	159.0	24 50.7	96	27	159.2	20
1	27 55.6	96	29	157.1	27 27.0	96	29	157.2	26 58.3	96	29	157.4	26 29.6	96	29	157.5	26 00.9	96	28	157.7	25 32.2	96	28	157.9	25 03.5	96	28	158.0	24 34.8	96	28	158.2	1
2	27 38.1	95	30	156.0	27 09.6	95	30	156.2	26 41.1	95	30	156.4	26 12.5	95	30	156.5	25 43.9	95	30	156.7	25 15.3	95	29	156.9	24 46.7	95	29	157.0	24 18.1	95	29	157.2	2
3	27 19.9	95	32	155.0	26 51.5	95	31	155.2	26 23.1	95	31	155.3	25 54.7	95	31	155.5	25 26.2	95	31	155.7	24 57.7	95	30	155.9	24 29.3	95	30	156.0	24 00.8	95	30	156.2	3
4	27 01.0	94	33	154.0	26 32.7	94	32	154.2	26 04.4	94	32	154.3	25 36.1	94	32	154.5	25 07.8	94	32	154.7	24 39.5	94	32	154.9	24 11.1	95	31	155.1	23 42.7	95	31	155.2	4
25	26 41.4	94	34	153.0	26 13.3	94	34	153.1	25 45.1	94	33	153.3	25 16.9	94	33	153.5	24 48.7	94	33	153.7	24 20.5	94	33	153.9	23 52.3	94	32	154.1	23 24.0	94	32	154.3	25
6	26 21.1	93	35	151.9	25 53.1	93	35	152.1	25 25.1	93	34	152.3	24 57.0	94	34	152.5	24 28.9	94	34	152.7	24 00.9	94	34	152.9	23 32.8	94	34	153.1	23 04.7	94	33	153.3	6
7	26 00.2	93	36	151.0	25 32.3	93	36	151.2	25 04.4	93	36	151.4	24 36.5	93	35	151.6	24 08.5	93	35	151.8	23 40.6	93	35	152.0	23 12.6	93	35	152.2	22 44.6	93	34	152.4	7
8	25 38.5	92	37	150.0	25 10.8	93	37	150.2	24 43.0	93	37	150.4	24 15.2	93	36	150.6	23 47.4	93	36	150.8	23 19.6	93	36	151.0	22 51.8	93	36	151.2	22 23.9	93	36	151.4	8
9	25 16.2	92	38	149.0	24 48.6	92	38	149.2	24 21.0	92	38	149.4	23 53.4	92	37	149.6	23 25.7	92	37	149.8	22 58.0	92	37	150.0	22 30.3	92	37	150.3	22 02.6	92	37	150.5	9
30	24 53.3	92	39	148.0	24 25.8	92	39	148.2	23 58.4	92	39	148.4	23 30.8	92	39	148.7	23 03.3	92	38	148.9	22 35.8	92	38	149.1	22 08.2	92	38	149.3	21 40.7	92	38	149.5	30
1	24 29.7	91	40	147.0	24 02.4	91	40	147.3	23 35.1	91	40	147.5	23 07.7	91	40	147.7	22 40.3	91	39	147.9	22 12.9	91	39	148.2	21 45.5	91	39	148.4	21 18.1	91	39	148.6	1
2	24 05.6	91	41	146.1	23 38.4	91	41	146.3	23 11.2	91	41	146.5	22 44.0	91	41	146.8	22 16.7	91	40	147.0	21 49.5	91	40	147.2	21 22.2	91	40	147.4	20 54.9	91	40	147.7	2
3	23 40.8	90	42	145.1	23 13.7	90	42	145.4	22 46.7	90	42	145.6	22 19.6	90	42	145.8	21 52.5	90	41	146.1	21 25.4	90	41	146.3	20 58.3	90	41	146.5	20 31.2	91	41	146.8	3
4	23 15.4	90	43	144.2	22 48.5	90	43	144.4	22 21.6	90	43	144.7	21 54.7	90	43	144.9	21 27.8	90	42	145.1	21 00.8	90	42	145.4	20 33.8	90	42	145.6	20 06.8	90	42	145.9	4
35	22 49.4	89	44	143.3	22 22.7	89	44	143.5	21 56.0	89	44	143.8	21 29.2	89	43	144.0	21 02.4	89	43	144.2	20 35.6	89	43	144.5	20 08.8	89	43	144.7	19 41.9	90	42	145.0	35
6	22 22.9	89	45	142.3	21 56.3	89	45	142.6	21 29.7	89	45	142.8	21 03.1	89	44	143.1	20 36.5	89	44	143.3	20 09.8	89	44	143.6	19 43.1	89	44	143.8	19 16.4	89	43	144.1	6
7	21 55.8	88	46	141.4	21 29.4	88	46	141.7	21 02.9	88	46	141.9	20 36.5	88	45	142.2	20 10.0	88	45	142.4	19 43.5	88	45	142.7	19 17.0	88	45	142.9	18 50.4	89	44	143.2	7
8	21 28.2	88	47	140.5	21 01.9	88	47	140.8	20 35.6	88	46	141.0	20 09.3	88	46	141.3	19 43.0	88	46	141.5	19 16.6	88	46	141.8	18 50.2	88	45	142.0	18 23.8	88	45	142.3	8
9	21 00.9	87	48	139.6	20 33.9	87	48	139.9	20 07.7	87	47	140.1	19 41.6	87	47	140.4	19 15.4	87	47	140.7	18 49.2	87	47	140.9	18 23.0	87	46	141.2	17 56.7	88	46	141.4	9
40	20 31.3	86	49	138.7	20 05.3	87	48	139.0	19 39.4	87	48	139.3	19 13.4	87	48	139.5	18 47.3	87	48	139.8	18 21.3	87	47	140.0	17 55.2	87	47	140.3	17 29.1	87	47	140.6	40
1	20 02.1	86	50	137.8	19 36.3	86	49	138.1	19 10.5	86	49	138.4	18 44.6	86	49	138.6	18 18.7	86	48	138.9	17 52.8	86	48	139.2	17 26.9	86	48	139.4	17 01.0	87	48	139.7	1
2	19 32.4	85	50	137.0	19 06.7	86	50	137.2	18 41.1	86	50	137.5	18 15.4	86	50	137.8	17 49.6	86	49	138.1	17 23.9	86	49	138.3	16 58.1	86	49	138.6	16 32.4	86	49	138.9	2
3	19 02.2	85	51	136.1	18 36.7	85	51	136.4	18 11.2	85	51	136.6	17 45.6	85	50	136.9	17 20.1	85	50	137.2	16 54.5	85	50	137.5	16 28.9	85	50	137.7	16 03.2	85	49	138.0	3
4	18 31.5	84	52	135.2	18 06.2	85	52	135.5	17 40.8	85	51	135.8	17 15.4	85	51	136.1	16 50.0	85	51	136.4	16 24.6	85	51	136.6	15 59.1	85	50	136.9	15 33.6	85	50	137.2	4
45	18 00.4	84	53	134.4	17 35.2	84	52	134.7	17 10.0	84	52	135.0	16 44.8	84	52	135.2	16 19.5	84	52	135.5	15 54.2	84	51	135.8	15 28.9	84	51	136.1	15 03.6	84	51	136.4	45
6	17 28.8	83	53	133.5	17 03.8	84	53	133.8	16 38.7	84	53	134.1	16 13.6	84	53	134.4	15 48.5	84	52	134.7	15 23.4	84	52	135.0	14 58.2	84	52	135.2	14 33.1	84	52	135.5	6
7	16 56.8	83	54	132.7	16 31.9	83	54	133.0	16 07.0	83	54	133.3	15 42.1	83	53	133.6	15 17.1	83	53	133.9	14 52.1	83	53	134.1	14 27.1	83	53	134.4	14 02.1	83	52	134.7	7
8	16 24.3	82	55	131.9	15 59.6	82	55	132.2	15 34.8	83	54	132.5	15 10.0	83	54	132.7	14 45.2	83	54	133.0	14 20.4	83	54	133.3	13 55.6	83	53	133.6	13 30.7	83	53	133.9	8
9	15 51.4	82	56	131.0	15 26.8	82	55	131.3	15 02.2	82	55	131.6	14 37.6	82	55	131.9	14 13.0	82	54	132.2	13 48.3	82	54	132.5	13 23.6	82	54	132.8	12 58.9	82	54	133.1	9
50	15 18.1	81	56	130.2	14 53.7	81	56	130.5	14 29.2	82	56	130.8	14 04.8	82	55	131.1	13 40.3	82	55	131.4	13 15.7	82	55	131.7	12 51.2	82	55	132.0	12 26.6	82	54	132.3	50
1	14 44.4	81	57	129.4	14 20.1	81	57	129.7	13 55.8	81	56	130.0	13 31.5	81	56	130.3	13 07.2	81	56	130.6	12 42.8	81	56	130.9	12 18.4	81	55	131.2	11 54.0	81	55	131.5	1
2	14 10.3	80	57	128.6	13 46.2	80	57	128.9	13 22.0	81	57	129.2	12 57.9	81	57	129.5	12 33.7	81	56	129.8	12 09.4	81	56	130.1	11 45.2	81	56	130.4	11 20.9	81	56	130.7	2
3	13 35.9	80	58	127.8	13 11.9	80	58	128.1	12 47.9	80	58	128.4	12 23.8	80	57	128.8	11 59.8	80	57	129.1	11 35.7	80	57	129.4	11 11.6	80	57	129.7	10 47.5	80	56	130.0	3
4	13 01.0	79	59	127.0	12 37.2	80	58	127.4	12 13.3	80	58	127.7	11 49.4	80	58	128.0	11 25.5	80	58	128.3	11 01.6	80	57	128.6	10 37.6	80	57	128.9	10 13.7	80	57	129.2	4
55	12 25.8	79	59	126.3	12 02.1	79	59	126.6	11 38.4	79	59	126.9	11 14.7	79	59	127.2	10 50.9	79	58	127.5	10 27.1	79	58	127.8	10 03.3	79	58	128.1	9 39.5	79	58	128.4	55
6	11 50.3	78	60	125.5	11 26.7	79	60	125.8	11 03.1	79	59	126.1	10 39.5	79	59	126.4	10 15.9	79	59	126.7	9 52.3	79	59	127.1	9 28.6	79	58	127.4	9 04.9	79	58	127.7	6
7	11 14.4	78	60	124.7	10 50.9	78	60	125.0	10 27.5	78	60	125.4	10 04.0	78	60	125.7	9 40.6	78	59	126.0	9 17.1	78	59	126.3	8 53.6	78	59	126.6	8 30.0	78	59	126.9	7
8	10 38.1	78	61	124.0	10 14.9	78	61	124.3	9 51.6	78	60	124.6	9 28.2	78	60	124.9	9 04.9	78	60	125.2	8 41.5	78	60	125.6	8 18.2	78	60	125.9	7 54.8	78	59	126.2	8
9	10 01.6	77	61	123.2	9 38.4	77	61	123.5	9 15.3	77	61	123.8	8 52.1	77	61	124.2	8 28.9	77	61	124.5	8 05.7	77	60	124.8	7 42.5	77	60	125.1	7 19.2	77	60	125.4	9
60	9 24.7	77	62	122.5	9 01.7	77	62	122.8	8 38.7	77	62	123.1	8 15.6	77	61	123.4	7 52.6	77	61	123.7	7 29.5	77	61	124.1	7 06.4	77	61	124.4	6 43.3	77	60	124.7	60
1	8 47.5	76	62	121.7	8 24.6	76	62	122.0	8 01.7	76	62	122.4	7 38.8	76	62	122.7	7 15.9	76	62	123.0	6 53.0	76	61	123.3	6 30.0	77	61	123.7	6 07.1	77	61	124.0	1
2	8 10.0	76	63	121.0	7 47.3	76	63	121.3	7 24.5	76	62	121.6	7 01.8	76	62	122.0	6 39.0	76	62	122.3	6 16.2	76	62	122.6	5 53.4	76	62	122.9	5 30.5	76	61	123.3	2
3	7 32.3	75	63	120.2	7 09.7	75	63	120.6	6 47.0	75	63	120.9	6 24.4	75	63	121.2	6 01.7	76	63	121.6	5 39.1	76	62	121.9	5 16.4	76	62	122.2					3
4	6 54.2	75	64	119.5	6 31.7	75	64	119.8	6 09.2	75	63	120.2	5 46.7	75	63	120.5	5 24.2	75	63	120.8	5 01.7	75	63	121.2									4
65	6 15.9	75	64	118.8	5 53.5	75	64	119.1	5 31.2	75	64	119.5	5 08.8	75	64	119.8																	65
6	5 37.3	74	65	118.1	5 15.1	74	65	118.4																									6

DECLINATION SAME NAME AS LATITUDE

H.A.	16° 00′ Alt.	Δd	Δt	Az.	16° 30′ Alt.	Δd	Δt	Az.	17° 00′ Alt.	Δd	Δt	Az.	17° 30′ Alt.	Δd	Δt	Az.	18° 00′ Alt.	Δd	Δt	Az.	18° 30′ Alt.	Δd	Δt	Az.	19° 00′ Alt.	Δd	Δt	Az.	19° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
91	10 07.2	67	71	77.5	10 27.3	67	71	77.1	10 47.3	67	71	76.7	11 07.4	67	71	76.4	11 27.3	67	71	76.0	11 47.3	66	71	75.6	12 07.2	66	71	75.2	12 27.1	66	71	74.8	91
2	9 24.4	67	71	76.8	9 44.6	67	71	76.5	10 04.7	67	71	76.1	10 24.8	67	71	75.7	10 44.8	67	71	75.3	11 04.9	67	71	75.0	11 24.9	67	70	74.6	11 44.8	67	70	74.2	2
3	8 41.8	67	71	76.2	9 02.0	67	71	75.8	9 22.1	67	71	75.4	9 42.3	67	71	75.1	10 02.4	67	70	74.7	10 22.5	67	70	74.3	10 42.6	67	70	73.9	11 02.7	67	70	73.6	3
4	7 59.2	68	71	75.5	8 19.5	68	71	75.2	8 39.7	67	70	74.8	9 00.0	67	70	74.4	9 20.2	67	70	74.0	9 40.4	67	70	73.7	10 00.5	67	70	73.3	10 20.7	67	70	72.9	4
95	7 16.8	68	70	74.9	7 37.1	68	70	74.5	7 57.5	68	70	74.1	8 17.8	68	70	73.8	8 38.1	68	70	73.4	8 58.3	68	70	73.0	9 18.6	67	70	72.6	9 38.8	67	70	72.3	95
6	6 34.5	68	70	74.2	6 54.9	68	70	73.9	7 15.3	68	70	73.5	7 35.7	68	70	73.1	7 56.1	68	70	72.7	8 16.4	68	70	72.4	8 36.8	68	69	72.0	8 57.1	68	69	71.6	6
7	5 52.3	68	70	73.6	6 12.8	68	70	73.2	6 33.3	68	70	72.8	6 53.8	68	70	72.5	7 14.2	68	69	72.1	7 34.7	68	69	71.7	7 55.1	68	69	71.4	8 15.5	68	69	71.0	7
8	5 10.3	69	70	72.9	5 30.9	69	70	72.5	5 51.5	69	70	72.2	6 12.0	68	69	71.8	6 32.6	68	69	71.4	6 53.1	68	69	71.1	7 13.6	68	69	70.7	7 34.1	68	69	70.3	8
9									5 09.8	69	69	71.5	5 30.4	69	69	71.1	5 51.1	69	69	70.8	6 11.7	69	69	70.4	6 32.3	69	69	70.0	6 52.9	69	68	69.7	9
100																	5 09.7	69	69	70.1	5 30.4	69	68	69.8	5 51.1	69	68	69.4	6 11.8	69	68	69.0	100
1																									5 10.1	69	68	68.7	5 30.9	69	68	68.4	1

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Lat. 43°

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	67 00.0	1.0 02	180.0	67 30.0	1.0 02	180.0	68 00.0	1.0 02	180.0	68 30.0	1.0 02	180.0	69 00.0	1.0 02	180.0	69 30.0	1.0 02	180.0	70 00.0	1.0 02	180.0	70 30.0	1.0 02	180.0	00
1	66 59.1	1.0 05	177.6	67 29.1	1.0 05	177.6	67 59.0	1.0 05	177.5	68 29.0	1.0 05	177.5	68 59.0	1.0 05	177.4	69 29.0	1.0 05	177.4	69 59.0	1.0 05	177.3	70 28.9	1.0 05	177.3	1
2	66 56.3	1.0 08	175.2	67 26.3	1.0 08	175.1	67 56.2	1.0 08	175.0	68 26.1	1.0 08	174.9	68 56.0	1.0 08	174.8	69 26.0	1.0 08	174.7	69 55.9	1.0 09	174.6	70 25.8	1.0 09	174.5	2
3	66 51.7	1.0 11	172.8	67 21.6	1.0 11	172.7	67 51.4	99 11	172.6	68 21.3	99 11	172.4	68 51.1	99 11	172.3	69 20.9	99 12	172.1	69 50.8	99 12	172.0	70 20.6	99 12	171.8	3
4	66 45.3	99 14	170.4	67 15.1	99 14	170.3	67 44.8	99 14	170.1	68 14.5	99 14	169.9	68 44.2	99 15	169.7	69 13.9	99 15	169.5	69 43.6	99 15	169.3	70 13.3	99 15	169.1	4
05	66 37.2	99 17	168.1	67 06.8	99 17	167.9	67 36.4	99 17	167.7	68 05.9	99 17	167.4	68 35.5	98 18	167.2	69 05.0	98 18	167.0	69 34.5	98 18	166.7	70 04.0	98 19	166.4	05
6	66 27.2	98 19	165.8	66 56.7	98 20	165.5	67 26.1	98 20	165.3	67 55.5	98 20	165.0	68 24.8	98 21	164.7	68 54.2	98 21	164.4	69 23.5	98 22	164.1	69 52.7	98 23	163.8	6
7	66 15.6	98 22	163.5	66 44.8	97 23	163.2	67 14.1	97 23	162.9	67 43.2	97 23	162.6	68 12.4	97 24	162.3	68 41.5	97 24	162.0	69 10.5	97 25	161.6	69 39.6	97 25	161.2	7
8	66 02.3	97 25	161.2	66 31.3	97 25	160.9	67 00.3	97 26	160.6	67 29.2	96 26	160.2	67 58.1	96 27	159.9	68 27.0	96 27	159.5	68 55.8	96 28	159.1	69 24.5	96 28	158.7	8
9	65 47.4	96 28	159.0	66 16.1	96 28	158.6	66 44.9	96 28	158.3	67 13.6	96 29	157.9	67 42.2	96 29	157.5	68 10.8	96 30	157.1	68 39.3	96 30	156.7	69 07.7	96 31	156.3	9
10	65 30.9	95 30	156.8	65 59.4	95 30	156.4	66 27.9	95 31	156.0	66 56.3	95 31	155.6	67 24.6	94 32	155.2	67 52.9	94 32	154.8	68 21.1	94 33	154.3	68 49.2	94 34	153.8	10
1	65 12.8	94 32	154.7	65 41.1	94 33	154.3	66 09.3	94 33	153.9	66 37.4	94 34	153.4	67 05.4	93 34	153.0	67 33.4	93 35	152.5	68 01.3	93 36	152.0	68 29.1	92 36	151.5	1
2	64 53.3	93 35	152.6	65 21.3	93 35	152.2	65 49.2	93 36	151.7	66 17.0	93 36	151.3	66 44.7	92 37	150.8	67 12.4	92 37	150.3	67 39.9	92 38	149.8	68 07.4	91 39	149.2	2
3	64 32.4	92 37	150.5	65 00.1	92 38	150.1	65 27.7	92 38	149.6	65 55.2	92 39	149.1	66 22.6	91 39	148.6	66 49.9	91 40	148.1	67 17.1	90 40	147.6	67 44.2	90 41	147.0	3
4	64 10.2	91 39	148.5	64 37.6	91 40	148.1	65 04.8	91 40	147.6	65 32.0	90 41	147.1	65 59.1	90 41	146.6	66 26.0	90 42	146.0	66 52.9	89 43	145.4	67 19.6	89 43	144.9	4
15	63 46.7	90 41	146.6	64 13.7	90 42	146.1	64 40.7	90 42	145.6	65 07.5	89 43	145.1	65 34.3	89 43	144.5	66 00.9	88 44	144.0	66 27.4	88 45	143.4	66 53.7	88 45	142.8	15
6	63 21.9	89 43	144.7	63 48.7	89 44	144.2	64 15.3	89 44	143.7	64 41.8	88 45	143.1	65 08.2	88 45	142.6	65 34.4	87 46	142.0	66 00.6	87 47	141.4	66 26.6	86 47	140.8	6
7	62 56.0	88 45	142.9	63 22.4	88 46	142.3	63 48.7	87 46	141.8	64 14.9	87 47	141.2	64 40.9	87 47	140.7	65 06.8	86 48	140.1	65 32.6	86 48	139.5	65 58.2	85 49	138.8	7
8	62 28.9	87 47	141.1	62 55.0	87 47	140.5	63 21.0	86 48	140.0	63 46.9	86 48	139.4	64 12.6	85 49	138.8	64 38.1	85 50	138.2	65 03.5	84 50	137.6	65 28.8	84 51	136.9	8
9	62 00.8	86 48	139.3	62 26.6	86 49	138.8	62 52.3	85 50	138.2	63 17.8	85 50	137.6	63 43.2	84 51	137.0	64 08.4	84 51	136.4	64 33.4	83 52	135.8	64 58.3	83 52	135.1	9
20	61 31.7	85 50	137.6	61 57.2	85 51	137.1	62 22.5	84 51	136.5	62 47.7	84 52	135.9	63 12.8	83 52	135.3	63 37.6	83 53	134.7	64 02.3	82 53	134.0	64 26.9	81 54	133.4	20
1	61 01.7	84 52	136.0	61 26.8	84 52	135.4	61 51.9	83 53	134.8	62 16.7	83 53	134.2	62 41.4	82 54	133.6	63 06.0	82 54	133.0	63 30.3	81 55	132.3	63 54.5	80 55	131.6	1
2	60 30.7	83 53	134.3	60 55.6	83 54	133.8	61 20.3	82 54	133.2	61 44.8	82 55	132.6	62 09.2	81 55	132.0	62 33.4	80 56	131.3	62 57.5	80 56	130.7	63 21.3	79 57	130.0	2
3	59 58.9	82 54	132.8	60 23.5	82 55	132.2	60 47.9	81 55	131.6	61 12.1	81 56	131.0	61 36.2	80 56	130.4	62 00.1	79 57	129.7	62 23.8	79 57	129.1	62 47.3	78 58	128.4	3
4	59 26.3	81 56	131.3	59 50.6	81 56	130.7	60 14.7	80 57	130.1	60 38.6	79 57	129.5	61 02.4	79 58	128.8	61 26.0	78 58	128.2	61 49.4	78 59	127.5	62 12.6	77 59	126.9	4
25	58 53.0	80 57	129.8	59 17.0	80 57	129.2	59 40.8	79 58	128.6	60 04.4	78 58	128.0	60 27.9	78 59	127.4	60 51.1	77 59	126.7	61 14.2	77 60	126.1	61 37.1	76 60	125.4	25
6	58 18.9	79 58	128.3	58 42.6	79 58	127.8	59 06.1	78 59	127.2	59 29.5	78 59	126.5	59 52.6	77 60	125.9	60 15.6	76 60	125.3	60 38.4	76 61	124.6	61 01.0	75 61	123.9	6
7	57 44.2	78 59	126.9	58 07.6	78 59	126.4	58 30.8	77 60	125.8	58 53.9	77 60	125.1	59 16.8	76 61	124.5	59 39.5	75 61	123.9	60 02.0	75 62	123.2	60 24.3	74 62	122.5	7
8	57 08.8	77 60	125.6	57 31.9	77 60	125.0	57 54.9	76 61	124.4	58 17.7	76 61	123.8	58 40.3	75 62	123.2	59 02.8	74 62	122.5	59 25.0	74 63	121.9	59 47.0	73 63	121.2	8
9	56 32.8	77 61	124.3	56 55.7	76 61	123.7	57 18.4	75 62	123.1	57 41.0	75 62	122.5	58 03.3	74 63	121.8	58 25.5	74 63	121.2	58 47.5	73 63	120.5	59 09.2	72 64	119.9	9
30	55 56.3	76 62	123.0	56 18.9	75 62	122.4	56 41.4	75 63	121.8	57 03.7	74 63	121.2	57 25.8	73 63	120.6	57 47.7	73 64	119.9	58 09.4	72 64	119.3	58 31.0	71 65	118.6	30
1	55 19.2	75 63	121.7	55 41.6	74 63	121.1	56 03.8	74 63	120.5	56 25.9	73 64	119.9	56 47.8	73 64	119.3	57 09.4	72 65	118.7	57 30.9	71 65	118.0	57 52.2	71 65	117.4	1
2	54 41.6	74 63	120.5	55 03.8	74 64	119.9	55 25.8	73 64	119.3	55 47.6	72 64	118.7	56 09.3	72 65	118.1	56 30.7	71 65	117.5	56 52.0	71 66	116.8	57 13.0	70 66	116.2	2
3	54 03.6	73 64	119.3	54 25.5	73 64	118.7	54 47.3	72 65	118.1	55 08.9	72 65	117.5	55 30.3	71 66	116.9	55 51.6	70 66	116.3	56 12.6	70 66	115.7	56 33.4	69 67	115.0	3
4	53 25.1	73 65	118.2	53 46.9	72 65	117.6	54 08.4	72 66	117.0	54 29.8	71 66	116.4	54 51.0	70 66	115.8	55 12.0	70 66	115.1	55 32.9	69 67	114.5	55 53.5	68 67	113.9	4
35	52 46.2	72 65	117.0	53 07.8	72 66	116.4	53 29.1	71 66	115.9	53 50.3	70 66	115.3	54 11.3	70 67	114.6	54 32.1	69 67	114.0	54 52.8	68 67	113.4	55 13.2	68 68	112.8	35
6	52 06.9	71 66	115.9	52 28.3	71 66	115.3	52 49.4	70 67	114.8	53 10.4	70 67	114.2	53 31.3	69 67	113.6	53 51.9	68 68	112.9	54 12.3	68 68	112.3	54 32.6	67 68	111.7	6
7	51 27.3	71 67	114.8	51 48.4	70 67	114.3	52 09.4	70 67	113.7	52 30.2	69 68	113.1	52 50.9	68 68	112.5	53 11.3	68 68	111.9	53 31.6	67 68	111.3	53 51.7	67 69	110.6	7
8	50 47.3	70 67	113.8	51 08.3	70 67	113.2	51 29.1	69 68	112.6	51 49.7	68 68	112.0	52 10.2	68 68	111.5	52 30.5	67 69	110.8	52 50.6	67 69	110.2	53 10.5	66 69	109.6	8
9	50 07.0	70 68	112.7	50 27.8	69 68	112.2	50 48.4	69 68	111.6	51 08.9	68 68	111.0	51 29.2	67 69	110.4	51 49.3	67 69	109.8	52 09.2	66 69	109.2	52 29.0	65 70	108.6	9
40	49 26.4	69 68	111.7	49 47.0	69 68	111.2	50 07.5	68 69	110.6	50 27.8	67 69	110.0	50 48.0	67 69	109.4	51 07.9	66 69	108.9	51 27.7	66 70	108.3	51 47.3	65 70	107.6	40
1	48 45.5	69 69	110.7	49 06.0	68 69	110.2	49 26.3	67 69	109.6	49 46.5	67 69	109.1	50 06.4	66 70	108.5	50 26.3	66 70	107.9	50 45.9	65 70	107.3	51 05.4	65 70	106.7	1
2	48 04.3	68 69	109.8	48 24.7	68 69	109.2	48 44.8	67 69	108.7	49 04.9	66 70	108.1	49 24.7	66 70	107.5	49 44.4	65 70	106.9	50 03.9	65 70	106.4	50 23.2	64 71	105.8	2
3	47 22.9	68 69	108.8	47 43.1	67 70	108.3	48 03.2	67 70	107.7	48 23.0	66 70	107.2	48 42.8	65 70	106.6	49 02.3	65 70	106.0	49 21.7	64 71	105.4	49 40.9	64 71	104.8	3
4	46 41.2	67 70	107.9	47 01.3	67 70	107.4	47 21.2	66 70	106.8	47 41.0	66 70	106.3	48 00.6	65 71	105.7	48 20.1	65 71	105.1	48 39.3	64 71	104.5	48 58.4	63 71	104.0	4
45	45 59.4	67 70	107.0	46 19.3	66 70	106.5	46 39.1	66 70	105.9	46 58.8	65 71	105.4	47 18.3	65 71	104.8	47 37.6	64 71	104.2	47 56.8	64 71	103.7	48 15.7	63 71	103.1	45
6	45 17.3	66 70	106.1	45 37.2	66 71	105.6	45 56.9	65 71	105.0	46 16.4	65 71	104.5	46 35.8	64 71	103.9	46 55.0	64 71	103.4	47 14.0	63 71	102.8	47 32.9	63 72	102.2	6
7	44 35.1	66 71	105.2	44 54.8	66 71	104.7	45 14.4	65 71	104.2	45 33.8	65 71	103.6	45 53.1	64 71	103.1	46 12.2	63 72	102.5	46 31.2	63 72	101.9	46 50.0	62 72	101.4	7
8	43 52.6	66 71	104.4	44 12.3	65 71	103.8	44 31.8	65 71	103.3	44 51.1	64 71	102.8	45 10.3	64 72	102.2	45 29.3	63 72	101.7	45 48.2	63 72	101.1	46 06.9	62 72	100.5	8
9	43 10.0	65 71	103.5	43 29.6	65 71	103.0	43 49.0	64 72	102.5	44 08.2	64 72	101.9	44 27.3	63 72	101.4	44 46.3	63 72	100.8	45 05.1	62 72	100.3	45 23.7	62 72	99.7	9
50	42 27.3	65 71	102.7	42 46.8	65 72	102.2	43 06.1	64 72	101.6	43 25.2	64 72	101.1	43 44.2	63 72	100.6	44 03.1	63 72	100.0	44 21.8	62 72	99.5	44 40.4	62 72	98.9	50
1	41 44.4	65 72	101.8	42 03.8	64 72	101.3	42 23.0	64 72	100.8	42 42.1	63 72	100.3	43 01.1	63 72	99.8	43 19.9	62 72	99.2	43 38.5	62 72	98.7	43 57.0	61 72	98.1	1
2	41 01.4	65 72	101.0	41 20.7	64 72	100.5	41 39.9	64 72	100.0	41 58.9	63 72	99.5	42 17.8	63 72	99.0	42 36.5	62 72	98.4	42 55.1	62 73	97.9	43 13.5	61 73	97.4	2
3	40 18.3	64 72	100.2	40 37.5	64 72	99.7	40 56.6	63 72	99.2	41 15.6	63 72	98.7	41 34.4	62 72	98.2	41 53.0	62 73	97.7	42 11.6	62 73	97.1	42 30.0	61 73	96.6	3
4	39 35.1	64 72	99.5	39 54.2	64 72	99.0	40 13.2	63 72	98.4	40 32.1	63 72	97.9	40 50.9	62 73	97.4	41 09.5	62 73	96.9	41 28.0	61 73	96.4	41 46.3	61 73	95.8	4
55	38 51.7	64 72	98.7	39 10.8	63 72	98.2	39 29.8	63 73	97.7	39 48.6	63 73	97.2	40 07.3	62 73	96.7	40 25.9	62 73	96.1	40 44.4	61 73	95.6	41 02.7	61 73	95.1	55
6	38 08.3	64 72	97.9	38 27.3	63 73	97.4	38 46.3	63 73	96.9	39 05.1	62 73	96.4	39 23.7	62 73	95.9	39 42.3	62 73	95.4	40 00.7	61 73	94.9	40 18.9	61 73	94.4	6
7	37 24.8	64 73	97.2	37 43.8	63 73	96.7	38 02.7	63 73	96.2	38 21.4	62 73	95.7	38 40.1	62 73	95.2	38 58.6	61 73	94.7	39 16.9	61 73	94.2	39 35.1	61 73	93.6	7
8	36 41.2	63 73	96.4	37 00.2	63 73	95.9	37 19.0	63 73	95.4	37 37.7	62 73	94.9	37 56.3	62 73	94.4	38 14.8	61 73	93.9	38 33.1	61 73	93.4	38 51.3	60 73	92.9	8
9	35 57.6	63 73	95.7	36 16.5	63 73	95.2	36 35.3	62 73	94.7	36 54.0	62 73	94.2	37 12.6	62 73	93.7	37 31.0	61 73	93.2	37 49.3	61 73	92.7	38 07.5	60 73	92.2	9
60	35 13.9	63 73	94.9	35 32.8	63 73	94.5	35 51.6	62 73	94.0	36 10.2	62 73	93.5	36 28.8	62 73	93.0	36 47.2	61 73	92.5	37 05.5	61 73	92.0	37 23.6	60 73	91.5	60
1	34 30.1	63 73	94.2	34 49.0	63 73	93.7	35 07.8	62 73	93.3	35 26.4	62 73	92.8	35 44.9	62 73	92.3	36 03.3	61 73	91.8	36 21.6	61 73	91.3	36 39.8	60 73	90.8	1
2	33 46.4	63 73	93.5	34 05.2	63 73	93.0	34 23.9	62 73	92.6	34 42.6	62 73	92.1	35 01.1	61 73	91.6	35 19.5	61 73	91.1	35 37.7	61 73	90.6	35 55.9	60 73	90.1	2
3	33 02.6	63 73	92.8	33 21.4	63 73	92.3	33 40.1	62 73	91.9	33 58.7	62 73	91.4	34 17.2	61 73	90.9	34 35.6	61 73	90.4	34 53.9	61 73	89.9	35 12.0	60 73	89.5	3
4	32 18.7	63 73	92.1	32 37.5	63 73	91.6	32 56.2	62 73	91.2	33 14.8	62 73	90.7	33 33.3	61 73	90.2	33 51.7	61 73	89.7	34 10.0	61 73	89.3	34 28.1	60 73	88.8	4
65	31 34.8	63 73	91.4	31 53.6	63 73	90.9	32 12.3	62 73	90.5	32 30.9	62 73	90.0	32 49.4	61 73	89.5	33 07.8	61 73	89.1	33 26.1	61 73	88.6	33 44.3	60 73	88.1	65
6	30 51.0	63 73	90.7	31 09.8	62 73	90.2	31 28.5	62 73	89.8	31 47.1	62 73	89.3	32 05.6	61 73	88.9	32 23.9	61 73	88.4	32 42.2	61 73	87.9	33 00.4	60 73	87.5	6
7	30 07.1	63 73	90.0	30 25.9	62 73	89.6	30 44.6	62 73	89.1	31 03.2	62 73	88.7	31 21.7	62 73	88.2	31 40.1	61 73	87.7	31 58.4	61 73	87.3	32 16.6	61 73	86.8	7
8	29 23.2	63 73	89.3	29 42.0	63 73	88.9	30 00.7	62 73	88.4	30 19.3	62 73	88.0	30 37.8	62 73	87.5	30 56.3	61 73	87.1	31 14.6	61 73	86.6	31 32.8	61 73	86.1	8
9	28 39.3	63 73	88.7	28 58.1	63 73	88.2	29 16.9	62 73	87.8	29 35.5	62 73	87.3	29 54.0	62 73	86.9	30 12.4	61 73	86.4	30 30.8	61 73	86.0	30 49.0	61 73	85.5	9
70	27 55.5	63 73	88.0	28 14.3	63 73	87.6	28 33.0	62 73	87.1	28 51.7	62 73	86.7	29 10.2	62 73	86.2	29 28.7	61 73	85.8	29 47.0	61 73	85.3	30 05.3	61 73	84.8	70
1	27 11.6	63 73	87.3	27 30.5	63 73	86.9	27 49.2	62 73	86.4	28 07.9	62 73	86.0	28 26.4	62 73	85.6	28 44.9	61 73	85.1	29 03.3	61 73	84.7	29 21.6	61 73	84.2	1
2	26 27.8	63 73	86.7	26 46.7	63 73	86.2	27 05.4	62 73	85.8	27 24.1	62 73	85.4	27 42.7	62 73	84.9	28 01.2	62 73	84.5	28 19.7	61 73	84.0	28 38.0	61 73	83.6	2
3	25 44.0	63 73	86.0	26 02.9	63 73	85.6	26 21.7	63 73	85.1	26 40.4	62 73	84.7	26 59.0	62 73	84.3	27 17.6	62 73	83.8	27 36.0	61 73	83.4	27 54.4	61 73	82.9	3
4	25 00.3	63 73	85.3	25 19.2	63 73	84.9	25 38.0	63 73	84.5	25 56.7	62 73	84.1	26 15.4	62 73	83.6	26 34.0	62 73	83.2	26 52.5	62 72	82.7	27 10.9	61 72	82.3	4
75	24 16.6	63 73	84.7	24 35.5	63 73	84.3	24 54.3	63 73	83.8	25 13.1	62 73	83.4	25 31.8	62 73	83.0	25 50.4	62 72	82.5	26 09.0	62 72	82.1	26 27.5	61 72	81.7	75
6	23 32.9	63 73	84.0	23 51.8	63 73	83.6	24 10.7	63 73	83.2	24 29.5	62 73	82.8	24 48.3	62 72	82.3	25 07.0	62 72	81.9	25 25.6	62 72	81.5	25 44.1	62 72	81.0	6
7	22 49.3	63 73	83.4	23 08.3	63 73	83.0	23 27.2	63 72	82.6	23 46.0	63 72	82.1	24 04.8	63 72	81.7	24 23.5	62 72	81.3	24 42.2	62 72	80.8	25 00.8	62 72	80.4	7
8	22 05.7	64 72	82.8	22 24.7	63 72	82.3	22 43.7	63 72	81.9	23 02.6	63 72	81.5	23 21.4	63 72	81.1	23 40.2	62 72	80.6	23 58.9	62 72	80.2	24 17.5	62 72	79.8	8
9	21 22.2	64 72	82.1	21 41.3	63 72	81.7	22 00.3	63 72	81.3	22 19.2	63 72	80.9	22 38.1	63 72	80.4	22 57.0	63 72	80.0	23 15.7	62 72	79.6	23 34.4	62 72	79.2	9
80	20 38.8	64 72	81.5	20 57.9	64 72	81.1	21 17.0	63 72	80.6	21 36.0	63 72	80.2	21 54.9	63 72	79.8	22 13.8	63 72	79.4	22 32.6	63 72	79.0	22 51.3	62 72	78.5	80
1	19 55.4	64 72	80.8	20 14.6	64 72	80.4	20 33.7	64 72	80.0	20 52.8	63 72	79.6	21 11.8	63 72	79.2	21 30.7	63 72	78.8	21 49.6	63 72	78.3	22 08.4	63 71	77.9	1
2	19 12.1	64 72	80.2	19 31.4	64 72	79.8	19 50.5	64 72	79.4	20 09.6	64 72	79.0	20 28.7	63 72	78.6	20 47.7	63 71	78.1	21 06.6	63 71	77.7	21 25.5	63 71	77.3	2
3	18 28.9	64 72	79.5	18 48.2	64 72	79.1	19 07.4	64 72	78.7	19 26.6	64 72	78.3	19 45.7	64 71	77.9	20 04.8	63 71	77.5	20 23.8	63 71	77.1	20 42.8	63 71	76.7	3
4	17 45.8	65 72	78.9	18 05.2	64 72	78.5	18 24.5	64 72	78.1	18 43.7	64 71	77.7	19 02.9	64 71	77.3	19 22.0	64 71	76.9	19 41.1	63 71	76.5	20 00.1	63 71	76.1	4
85	17 02.8	65 72	78.3	17 22.2	65 71	77.9	17 41.6	64 71	77.5	18 00.9	64 71	77.1	18 20.1	64 71	76.7	18 39.3	64 71	76.3	18 58.5	64 71	75.9	19 17.6	64 71	75.5	85
6	16 19.9	65 71	77.6	16 39.4	65 71	77.2	16 58.8	65 71	76.8	17 18.2	65 71	76.4	17 37.5	64 71	76.0	17 56.8	64 71	75.6	18 16.0	64 71	75.2	18 35.2	64 70	74.8	6
7	15 37.1	65 71	77.0	15 56.6	65 71	76.6	16 16.1	65 71	76.2	16 35.6	65 71	75.8	16 55.0	65 71	75.4	17 14.3	64 71	75.0	17 33.6	64 70	74.6	17 52.9	64 70	74.2	7
8	14 54.4	65 71	76.4	15 14.0	65 71	76.0	15 33.6	65 71	75.6	15 53.1	65 71	75.2	16 12.6	65 70	74.8	16 32.0	65 70	74.4	16 51.4	65 70	74.0	17 10.7	64 70	73.6	8
9	14 11.8	65 71	75.7	14 31.5	65 71	75.3	14 51.1	65 71	75.0	15 10.7	65 70	74.6	15 30.3	65 70	74.2	15 49.8	65 70	73.8	16 09.3	65 70	73.4	16 28.7	65 70	73.0	9
90	13 29.3	65 71	75.1	13 49.1	65 70	74.7	14 08.8	65 70	74.3	14 28.5	65 70	73.9	14 48.1	65 70	73.5	15 07.7	65 70	73.1	15 27.3	65 70	72.8	15 46.8	65 70	72.4	90

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	27 00.0	1.0 01	180.0	26 30.0	1.0 01	180.0	26 00.0	1.0 01	180.0	25 30.0	1.0 01	180.0	25 00.0	1.0 01	180.0	24 30.0	1.0 01	180.0	24 00.0	1.0 01	180.0	23 30.0	1.0 01	180.0	00
1	26 59.6	1.0 02	178.9	26 29.6	1.0 02	179.0	25 59.6	1.0 02	179.0	25 29.6	1.0 02	179.0	24 59.6	1.0 02	179.0	24 29.6	1.0 02	179.0	23 59.6	1.0 02	179.0	23 29.6	1.0 02	179.0	1
2	26 58.4	1.0 03	177.9	26 28.4	1.0 03	177.9	25 58.4	1.0 03	177.9	25 28.4	1.0 03	177.9	24 58.4	1.0 03	178.0	24 28.4	1.0 03	178.0	23 58.5	1.0 03	178.0	23 28.5	1.0 03	178.0	2
3	26 56.4	1.0 05	176.8	26 26.4	1.0 05	176.9	25 56.4	1.0 05	176.9	25 26.4	1.0 05	176.9	24 56.5	1.0 05	176.9	24 26.5	1.0 05	177.0	23 56.5	1.0 04	177.0	23 26.6	1.0 04	177.0	3
4	26 53.5	1.0 06	175.8	26 23.6	1.0 06	175.8	25 53.6	1.0 06	175.8	25 23.7	1.0 06	175.9	24 53.7	1.0 06	175.9	24 23.8	1.0 06	175.9	23 53.8	1.0 06	176.0	23 23.9	1.0 06	176.0	4
05	26 49.9	1.0 07	174.7	26 20.0	1.0 07	174.8	25 50.1	1.0 07	174.8	25 20.1	1.0 07	174.9	24 50.2	1.0 07	174.9	24 20.3	1.0 07	174.9	23 50.4	1.0 07	175.0	23 20.4	1.0 07	175.0	05
6	26 45.5	1.0 09	173.7	26 15.6	1.0 09	173.7	25 45.7	1.0 09	173.8	25 15.8	1.0 09	173.8	24 45.9	1.0 08	173.9	24 16.0	1.0 08	173.9	23 46.1	1.0 08	174.0	23 16.2	1.0 08	174.0	6
7	26 40.3	1.0 10	172.6	26 10.4	1.0 10	172.7	25 40.6	1.0 10	172.7	25 10.7	1.0 10	172.8	24 40.9	1.0 10	172.9	24 11.0	1.0 10	172.9	23 41.1	1.0 10	173.0	23 11.3	1.0 10	173.0	7
8	26 34.2	99 11	171.6	26 04.4	99 11	171.7	25 34.6	99 11	171.7	25 04.8	99 11	171.8	24 35.0	99 11	171.8	24 05.2	99 11	171.9	23 35.4	99 11	172.0	23 05.6	99 11	172.0	8
9	26 27.4	99 13	170.5	25 57.7	99 13	170.6	25 27.9	99 12	170.7	24 58.2	99 12	170.8	24 28.4	99 12	170.8	23 58.6	99 12	170.9	23 28.9	99 12	171.0	22 59.1	99 12	171.0	9
10	26 19.8	99 14	169.5	25 50.1	99 14	169.6	25 20.4	99 14	169.7	24 50.7	99 14	169.7	24 21.0	99 14	169.8	23 51.3	99 13	169.9	23 21.6	99 13	170.0	22 51.9	99 13	170.0	10
1	26 11.5	99 15	168.5	25 41.8	99 15	168.6	25 12.2	99 15	168.6	24 42.5	99 15	168.7	24 12.9	99 15	168.8	23 43.2	99 15	168.9	23 13.6	99 15	169.0	22 43.9	99 14	169.1	1
2	26 02.3	99 17	167.4	25 32.7	99 16	167.5	25 03.2	99 16	167.6	24 33.6	99 16	167.7	24 04.0	99 16	167.8	23 34.4	99 16	167.9	23 04.8	99 16	168.0	22 35.2	99 16	168.1	2
3	25 52.4	98 18	166.4	25 22.9	98 18	166.5	24 53.4	98 18	166.6	24 23.9	98 17	166.7	23 54.4	98 17	166.8	23 24.9	98 17	166.9	22 55.3	98 17	167.0	22 25.8	98 17	167.1	3
4	25 41.7	98 19	165.4	25 12.3	98 19	165.5	24 42.8	98 19	165.6	24 13.4	98 19	165.7	23 44.0	98 19	165.8	23 14.5	98 18	165.9	22 45.1	98 18	166.0	22 15.7	98 18	166.1	4
15	25 30.2	98 20	164.4	25 00.9	98 20	164.5	24 31.6	98 20	164.6	24 02.2	98 20	164.7	23 32.9	98 20	164.8	23 03.5	98 20	164.9	22 34.1	98 19	165.0	22 04.8	98 19	165.2	15
6	25 18.0	97 22	163.4	24 48.8	98 21	163.5	24 19.5	98 21	163.6	23 50.3	98 21	163.7	23 21.0	98 21	163.8	22 51.7	98 21	164.0	22 22.5	98 21	164.1	21 53.2	98 20	164.2	6
7	25 05.1	97 23	162.3	24 35.9	97 23	162.5	24 06.8	97 22	162.6	23 37.6	97 22	162.7	23 08.4	97 22	162.9	22 39.3	97 22	163.0	22 10.1	97 22	163.1	21 40.9	97 22	163.2	7
8	24 51.4	97 24	161.3	24 22.4	97 24	161.5	23 53.3	97 24	161.6	23 24.2	97 24	161.7	22 55.1	97 23	161.9	22 26.1	97 23	162.0	21 57.0	97 23	162.1	21 27.9	97 23	162.3	8
9	24 37.0	97 25	160.3	24 08.1	97 25	160.5	23 39.1	97 25	160.6	23 10.1	97 25	160.8	22 41.1	97 24	160.9	22 12.1	97 24	161.0	21 43.2	97 24	161.2	21 14.2	97 24	161.3	9
20	24 21.9	96 26	159.3	23 53.0	96 26	159.5	23 24.2	96 26	159.6	22 55.3	96 26	159.8	22 26.4	96 26	159.9	21 57.5	96 26	160.1	21 28.7	96 25	160.2	20 59.8	96 25	160.4	20
1	24 06.0	96 28	158.4	23 37.3	96 27	158.5	23 08.6	96 27	158.7	22 39.8	96 27	158.8	22 11.0	96 27	159.0	21 42.3	96 27	159.1	21 13.5	96 26	159.3	20 44.7	96 26	159.4	1
2	23 49.5	95 29	157.4	23 20.9	95 29	157.5	22 52.2	95 28	157.7	22 23.6	96 28	157.9	21 54.9	96 28	158.0	21 26.3	96 28	158.2	20 57.6	96 28	158.3	20 28.9	96 27	158.5	2
3	23 32.3	95 30	156.4	23 03.8	95 30	156.6	22 35.2	95 29	156.7	22 06.7	95 29	156.9	21 38.2	95 29	157.1	21 09.6	95 29	157.2	20 41.1	95 29	157.4	20 12.5	95 28	157.6	3
4	23 14.4	95 31	155.4	22 46.0	95 31	155.6	22 17.6	95 31	155.8	21 49.2	95 30	155.9	21 20.7	95 30	156.1	20 52.3	95 30	156.3	20 23.9	95 30	156.5	19 55.4	95 30	156.6	4
25	22 55.8	94 32	154.5	22 27.5	94 32	154.6	21 59.2	94 32	154.8	21 30.9	94 31	155.0	21 02.6	94 31	155.2	20 34.3	94 31	155.4	20 06.0	94 31	155.5	19 37.7	94 31	155.7	25
6	22 36.5	94 33	153.5	22 08.4	94 33	153.7	21 40.2	94 33	153.9	21 12.1	94 33	154.1	20 43.9	94 32	154.2	20 15.7	94 32	154.4	19 47.5	94 32	154.6	19 19.3	94 32	154.8	6
7	22 16.6	93 34	152.5	21 48.6	93 34	152.7	21 20.6	93 34	152.9	20 52.6	93 34	153.1	20 24.5	94 33	153.3	19 56.4	94 33	153.5	19 28.4	94 33	153.7	19 00.3	94 33	153.9	7
8	21 56.1	93 35	151.6	21 28.2	93 35	151.8	21 00.3	93 35	152.0	20 32.4	93 35	152.2	20 04.5	93 34	152.4	19 36.6	93 34	152.6	19 08.6	93 34	152.8	18 40.7	93 34	153.0	8
9	21 34.9	92 36	150.7	21 07.1	92 36	150.9	20 39.4	93 36	151.1	20 11.6	93 36	151.3	19 43.8	93 35	151.5	19 16.0	93 35	151.7	18 48.2	93 35	151.9	18 20.4	93 35	152.1	9
30	21 13.1	92 37	149.7	20 45.5	92 37	149.9	20 17.9	92 37	150.2	19 50.2	92 37	150.4	19 22.6	92 36	150.6	18 54.9	92 36	150.8	18 27.2	92 36	151.0	17 59.6	92 36	151.2	30
1	20 50.7	92 38	148.8	20 23.2	92 38	149.0	19 55.7	92 38	149.2	19 28.2	92 38	149.5	19 00.7	92 37	149.7	18 33.2	92 37	149.9	18 05.6	92 37	150.1	17 38.1	92 37	150.3	1
2	20 27.6	91 39	147.9	20 00.3	91 39	148.1	19 33.0	91 39	148.3	19 05.6	91 39	148.6	18 38.3	91 38	148.8	18 10.9	91 38	149.0	17 43.5	91 38	149.2	17 16.1	91 38	149.4	2
3	20 04.0	91 40	147.0	19 36.8	91 40	147.2	19 09.6	91 40	147.4	18 42.4	91 40	147.7	18 15.2	91 39	147.9	17 48.0	91 39	148.1	17 20.7	91 39	148.3	16 53.4	91 39	148.5	3
4	19 39.8	90 41	146.1	19 12.8	90 41	146.3	18 45.7	90 41	146.5	18 18.7	90 41	146.8	17 51.6	90 40	147.0	17 24.5	90 40	147.2	16 57.4	90 40	147.4	16 30.3	90 40	147.7	4
35	19 15.0	90 42	145.2	18 48.2	90 42	145.4	18 21.3	90 42	145.7	17 54.3	90 41	145.9	17 27.4	90 41	146.1	17 00.5	90 41	146.3	16 33.5	90 41	146.6	16 06.5	90 40	146.8	35
6	18 49.7	89 43	144.3	18 23.0	89 43	144.5	17 56.2	89 43	144.8	17 29.5	89 42	145.0	17 02.7	89 42	145.2	16 35.9	89 42	145.5	16 09.0	89 42	145.7	15 42.2	89 41	145.9	6
7	18 23.8	89 44	143.4	17 57.2	89 44	143.7	17 30.6	89 44	143.9	17 04.0	89 43	144.1	16 37.4	89 43	144.4	16 10.7	89 43	144.6	15 44.1	89 43	144.9	15 17.4	89 42	145.1	7
8	17 57.4	88 45	142.5	17 31.0	88 45	142.8	17 04.5	88 44	143.0	16 38.1	88 44	143.3	16 11.6	88 44	143.5	15 45.1	88 44	143.8	15 18.5	88 43	144.0	14 52.0	88 43	144.3	8
9	17 30.5	88 46	141.7	17 04.2	88 46	141.9	16 37.9	88 45	142.2	16 11.6	88 45	142.4	15 45.2	88 45	142.7	15 18.9	88 45	142.9	14 52.5	88 44	143.2	14 26.1	88 44	143.4	9
40	17 03.0	87 47	140.8	16 36.9	87 46	141.1	16 10.7	87 46	141.3	15 44.5	87 46	141.6	15 18.4	87 46	141.8	14 52.2	87 45	142.1	14 25.9	87 45	142.3	13 59.7	87 45	142.6	40
1	16 35.0	87 47	140.0	16 09.0	87 47	140.2	15 43.0	87 47	140.5	15 17.0	87 47	140.7	14 51.0	87 46	141.0	14 24.9	87 46	141.3	13 58.9	87 46	141.5	13 32.8	87 46	141.8	1
2	16 06.5	86 48	139.1	15 40.7	86 48	139.4	15 14.9	86 48	139.6	14 49.0	86 48	139.9	14 23.1	86 47	140.2	13 57.2	86 47	140.4	13 31.3	86 47	140.7	13 05.4	86 46	140.9	2
3	15 37.6	86 49	138.3	15 11.9	86 49	138.6	14 46.2	86 49	138.8	14 20.5	86 48	139.1	13 54.8	86 48	139.3	13 29.0	86 48	139.6	13 03.3	86 48	139.9	12 37.5	86 47	140.1	3
4	15 06.1	85 50	137.5	14 42.6	85 50	137.7	14 17.1	85 49	138.0	13 51.5	85 49	138.3	13 26.0	85 49	138.5	13 00.4	85 49	138.8	12 34.8	85 48	139.1	12 09.1	85 48	139.3	4
45	14 38.2	85 51	136.6	14 12.9	85 50	136.9	13 47.5	85 50	137.2	13 22.1	85 50	137.5	12 56.7	85 50	137.7	12 31.2	85 49	138.0	12 05.8	85 49	138.3	11 40.3	85 49	138.5	45
6	14 07.9	84 51	135.8	13 42.7	84 51	136.1	13 17.4	84 51	136.4	12 52.2	84 51	136.6	12 26.9	84 50	136.9	12 01.6	84 50	137.2	11 36.3	84 50	137.5	11 11.0	84 50	137.7	6
7	13 37.1	84 52	135.0	13 12.0	84 52	135.3	12 46.9	84 52	135.6	12 21.8	84 51	135.8	11 56.7	84 51	136.1	11 31.6	84 51	136.4	11 06.5	84 51	136.7	10 41.3	84 50	137.0	7
8	13 05.8	83 53	134.2	12 40.9	83 53	134.5	12 16.0	83 52	134.8	11 51.1	83 52	135.1	11 26.1	83 52	135.3	11 01.1	83 52	135.6	10 36.1	83 51	135.9	10 11.1	83 51	136.2	8
9	12 34.1	82 54	133.4	12 09.4	83 53	133.7	11 44.6	83 53	134.0	11 19.8	83 53	134.3	10 55.0	83 52	134.5	10 30.2	83 52	134.8	10 05.4	83 52	135.1	9 40.5	83 52	135.4	9
50	12 02.1	82 54	132.6	11 37.5	82 54	132.9	11 12.8	82 54	133.2	10 48.2	82 53	133.5	10 23.6	82 53	133.8	9 58.9	82 53	134.1	9 34.2	82 53	134.3	9 09.5	82 52	134.6	50
1	11 29.6	81 55	131.8	11 05.1	82 55	132.1	10 40.6	82 54	132.4	10 16.2	82 54	132.7	9 51.7	82 54	133.0	9 27.2	82 54	133.3	9 02.6	82 53	133.6	8 38.1	82 53	133.9	1
2	10 56.7	81 56	131.0	10 32.4	81 55	131.3	10 08.0	81 55	131.6	9 43.7	81 55	131.9	9 19.4	81 54	132.2	8 55.0	81 54	132.5	8 30.6	81 54	132.8	8 06.3	81 54	133.1	2
3	10 23.4	80 56	130.3	9 59.2	81 56	130.6	9 35.1	81 56	130.9	9 10.9	81 55	131.2	8 46.7	81 55	131.5	8 22.5	81 55	131.8	7 58.3	81 55	132.1	7 34.0	81 54	132.4	3
4	9 49.7	80 57	129.5	9 25.7	80 56	129.8	9 01.7	80 56	130.1	8 37.7	80 56	130.4	8 13.6	80 56	130.7	7 49.6	80 56	131.0	7 25.5	80 55	131.3	7 01.4	80 55	131.6	4
55	9 15.7	79 57	128.7	8 51.8	80 57	129.1	8 27.9	80 57	129.4	8 04.1	80 57	129.7	7 40.2	80 56	130.0	7 16.3	80 56	130.3	6 52.4	80 56	130.6	6 28.4	80 56	130.9	55
6	8 41.3	79 58	128.0	8 17.6	79 58	128.3	7 53.8	79 57	128.6	7 30.1	79 57	128.9	7 06.4	79 57	129.2	6 42.6	79 57	129.5	6 18.8	79 56	129.8	5 55.1	79 56	130.2	6
7	8 06.5	78 58	127.2	7 42.9	79 58	127.6	7 19.4	79 58	127.9	6 55.8	79 58	128.2	6 32.2	79 58	128.5	6 08.6	79 57	128.8	5 45.0	79 57	129.1	5 21.3	79 57	129.4	7
8	7 31.4	78 59	126.5	7 08.0	78 59	126.8	6 44.6	78 59	127.1	6 21.1	78 58	127.4	5 57.7	78 58	127.8	5 34.2	78 58	128.1	5 10.8	78 57	128.4				8
9	6 56.0	78 60	125.8	6 32.7	78 59	126.1	6 09.4	78 59	126.4	5 46.1	78 59	126.7	5 22.8	78 59	127.0										9
60	6 20.2	77 60	125.0	5 57.1	77 60	125.4	5 33.9	77 60	125.7	5 10.8	77 59	126.0													60
1	5 44.1	77 61	124.3	5 21.1	77 60	124.6																			1
2	5 07.7	76 61	123.6																						2

DECLINATION SAME NAME AS LATITUDE

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
91	12 47.0	66 70	74.5	13 06.8	66 70	74.1	13 26.6	66 70	73.7	13 46.4	66 70	73.3	14 06.1	66 70	72.9	14 25.8	66 70	72.5	14 45.5	65 69	72.1	15 05.1	65 69	71.7	91
2	12 04.8	66 70	73.8	12 24.7	66 70	73.4	12 44.6	66 70	73.1	13 04.4	66 70	72.7	13 24.2	66 70	72.3	13 44.0	66 69	71.9	14 03.8	66 69	71.5	14 23.5	66 69	71.1	2
3	11 22.7	67 70	73.2	11 42.7	67 70	72.8	12 02.7	67 70	72.4	12 22.6	66 69	72.0	12 42.5	66 69	71.7	13 02.4	66 69	71.3	13 22.2	66 69	70.9	13 42.0	66 69	70.5	3
4	10 40.8	67 70	72.5	11 00.9	67 70	72.2	11 20.9	67 69	71.8	11 40.9	67 69	71.4	12 00.9	67 69	71.0	12 20.9	67 69	70.6	12 40.8	66 69	70.3	13 00.7	66 69	69.9	4
95	9 59.0	67 69	71.9	10 19.2	67 69	71.5	10 39.3	67 69	71.1	10 59.4	67 69	70.8	11 19.5	67 69	70.4	11 39.6	67 69	70.0	11 59.6	67 68	69.6	12 19.6	67 68	69.2	95
6	9 17.4	68 69	71.3	9 37.6	68 69	70.9	9 57.9	67 69	70.5	10 18.1	67 69	70.1	10 38.3	67 68	69.8	10 58.4	67 68	69.4	11 18.6	67 68	69.0	11 38.7	67 68	68.6	6
7	8 35.9	68 69	70.6	8 56.2	68 69	70.2	9 16.6	68 69	69.9	9 36.9	68 68	69.5	9 57.2	68 68	69.1	10 17.4	67 68	68.7	10 37.7	67 68	68.4	10 57.9	67 68	68.0	7
8	7 54.6	68 69	70.0	8 15.0	68 68	69.6	8 35.5	68 68	69.2	8 55.9	68 68	68.9	9 16.3	68 68	68.5	9 36.6	68 68	68.1	9 57.0	68 68	67.7	10 17.3	68 67	67.4	8
9	7 13.4	69 68	69.3	7 34.0	68 68	69.0	7 54.5	68 68	68.6	8 15.0	68 68	68.2	8 35.5	68 68	67.8	8 56.0	68 67	67.5	9 16.5	68 67	67.1	9 36.9	68 67	66.7	9
100	6 32.5	69 68	68.7	6 53.1	69 68	68.3	7 13.8	69 68	67.9	7 34.4	69 67	67.6	7 55.0	69 67	67.2	8 15.6	69 67	66.8	8 36.1	69 67	66.5	8 56.7	68 67	66.1	100
1	5 51.7	69 68	68.0	6 12.5	69 67	67.7	6 33.2	69 67	67.3	6 53.9	69 67	66.9	7 14.6	69 67	66.6	7 35.3	69 67	66.2	7 56.0	69 67	65.8	8 16.7	69 66	65.5	1
2	5 11.1	70 67	67.4	5 32.0	70 67	67.0	5 52.8	69 67	66.6	6 13.7	69 67	66.3	6 34.5	69 67	65.9	6 55.3	69 66	65.5	7 16.1	69 66	65.2	7 36.8	69 66	64.8	2
3	[illegible]						5 12.6	70 67	66.0	5 33.6	70 66	65.6	5 54.5	70 66	65.3	6 15.4	70 66	64.9	6 36.3	70 66	64.5	6 57.2	70 66	64.2	3
4	[illegible]												5 14.8	70 66	64.6	5 35.8	70 66	64.3	5 56.8	70 66	63.9	6 17.8	70 65	63.5	4
[illegible]																			5 17.5	70 65	63.2	5 38.7	70 65	62.9	

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Lat. 43°

H.A.	24° 00′ Alt.	Δd	Δt	Az.	24° 30′ Alt.	Δd	Δt	Az.	25° 00′ Alt.	Δd	Δt	Az.	25° 30′ Alt.	Δd	Δt	Az.
°	° ′			°	° ′			°	° ′			°	° ′			°
00	71 00.0	1.0	02	180.0	71 30.0	1.0	02	180.0	72 00.0	1.0	02	180.0	72 30.0	1.0	02	180.0
1	70 58.9	1.0	05	177.2	71 28.9	1.0	05	177.1	71 58.9	1.0	06	177.1	72 28.8	1.0	06	177.0
2	70 55.7	1.0	09	174.4	71 25.6	1.0	09	174.3	71 55.5	1.0	09	174.1	72 25.4	1.0	10	174.0
3	70 50.4	99	12	171.6	71 20.2	99	13	171.4	71 49.9	99	13	171.2	72 19.7	99	13	171.0
4	70 42.9	99	16	168.9	71 12.6	99	16	168.6	71 42.2	99	16	168.4	72 11.8	99	17	168.1
05	70 33.5	98	19	166.2	71 02.9	98	20	165.9	71 32.3	98	20	165.6	72 01.7	98	20	165.2
6	70 22.0	97	22	163.5	70 51.2	97	23	163.1	71 20.3	97	23	162.8	71 49.4	97	24	162.4
7	70 08.5	96	26	160.9	70 37.5	96	26	160.5	71 06.3	96	27	160.1	71 35.1	96	27	159.6
8	69 53.2	96	29	158.3	70 21.8	95	29	157.9	70 50.4	95	30	157.4	71 18.9	95	30	156.9
9	69 36.1	94	31	155.8	70 04.4	94	32	155.3	70 32.6	94	33	154.8	71 00.8	94	33	154.3
10	69 17.3	93	34	153.4	69 45.2	93	35	152.8	70 13.1	93	35	152.3	70 40.8	92	36	151.7
1	68 56.8	92	37	151.0	69 24.4	92	37	150.4	69 51.8	91	38	149.8	70 19.2	91	39	149.2
2	68 34.7	91	39	148.7	69 01.9	91	40	148.1	69 29.0	90	41	147.5	69 56.0	90	41	146.8
3	68 11.2	90	42	146.4	68 38.0	89	42	145.8	69 04.7	89	43	145.2	69 31.2	88	44	144.5
4	67 46.2	88	44	144.3	68 12.6	88	44	143.6	68 38.9	87	45	143.0	69 05.1	87	46	142.3
15	67 19.9	87	46	142.2	67 46.0	87	47	141.5	68 11.9	86	47	140.8	68 37.6	85	48	140.1
6	66 52.4	86	48	140.1	67 18.0	85	48	139.5	67 43.5	85	49	138.8	68 08.9	84	50	138.1
7	66 23.7	85	50	138.2	66 49.0	84	50	137.5	67 14.0	83	51	136.8	67 39.0	83	52	136.1
8	65 53.9	83	51	136.3	66 18.8	83	52	135.6	66 43.5	82	53	134.9	67 08.0	81	53	134.1
9	65 23.0	82	53	134.4	65 47.5	81	54	133.7	66 11.9	81	54	133.0	66 36.0	80	55	132.3
20	64 51.2	81	54	132.7	65 15.4	80	55	132.0	65 39.3	79	56	131.2	66 03.1	79	56	130.5
1	64 18.5	80	56	131.0	64 42.3	79	56	130.3	65 05.9	78	57	129.5	65 29.3	78	58	128.8
2	63 45.0	79	57	129.3	64 08.4	78	58	128.6	64 31.6	77	58	127.9	64 54.7	76	59	127.1
3	63 10.6	77	58	127.7	63 33.7	77	59	127.0	63 56.6	76	60	126.3	64 19.3	75	60	125.5
4	62 35.6	76	60	126.2	62 58.3	76	60	125.5	63 20.9	75	61	124.7	63 43.3	74	61	124.0
25	61 59.8	75	61	124.7	62 22.3	75	61	124.0	62 44.5	74	62	123.2	63 06.6	73	62	122.5
6	61 23.4	74	62	123.2	61 45.6	74	62	122.5	62 07.5	73	63	121.8	62 29.2	72	63	121.1
7	60 46.4	73	63	121.9	61 08.3	73	63	121.1	61 30.0	72	64	120.4	61 51.4	71	64	119.7
8	60 08.9	72	63	120.5	60 30.5	72	64	119.8	60 51.9	71	64	119.1	61 13.0	70	65	118.4
9	59 30.8	72	64	119.2	59 52.2	71	65	118.5	60 13.3	70	65	117.8	60 34.2	69	65	117.1
30	58 52.3	71	65	117.9	59 13.4	70	65	117.2	59 34.2	69	66	116.5	59 54.9	68	66	115.8
1	58 13.3	70	66	116.7	58 34.1	69	66	116.0	58 54.8	68	66	115.3	59 15.2	68	67	114.6
2	57 33.9	69	66	115.5	57 54.5	68	67	114.8	58 14.9	68	67	114.1	58 35.1	67	67	113.4
3	56 54.1	68	67	114.3	57 14.5	68	67	113.7	57 34.7	67	68	113.0	57 54.6	66	68	112.3
4	56 13.9	68	68	113.2	56 34.1	67	68	112.5	56 54.1	66	68	111.9	57 13.9	65	68	111.2
35	55 33.4	67	68	112.1	55 53.4	66	68	111.4	56 13.2	66	69	110.8	56 32.8	65	69	110.1
6	54 52.6	66	68	111.0	55 12.4	66	69	110.4	55 32.1	65	69	109.7	55 51.5	64	69	109.0
7	54 11.5	66	69	110.0	54 31.2	65	69	109.4	54 50.6	64	69	108.7	55 09.9	64	70	108.0
8	53 30.2	65	69	109.0	53 49.7	65	70	108.3	54 08.9	64	70	107.7	54 28.0	63	70	107.0
9	52 48.5	65	70	108.0	53 07.9	64	70	107.4	53 27.0	63	70	106.7	53 46.0	63	70	106.1
40	52 06.7	64	70	107.0	52 25.9	64	70	106.4	52 44.9	63	71	105.8	53 03.7	62	71	105.1
1	51 24.6	64	70	106.1	51 43.7	63	71	105.5	52 02.6	63	71	104.8	52 21.2	62	71	104.2
2	50 42.4	63	71	105.2	51 01.3	63	71	104.5	51 20.1	62	71	103.9	51 38.6	61	71	103.3
3	49 59.9	63	71	104.2	50 18.7	62	71	103.6	50 37.4	62	71	103.0	50 55.8	61	72	102.4
4	49 17.3	63	71	103.4	49 36.0	62	71	102.8	49 54.6	61	72	102.1	50 12.9	61	72	101.5
45	48 34.5	62	72	102.5	48 53.2	62	72	101.9	49 11.6	61	72	101.3	49 29.8	61	72	100.7
6	47 51.6	62	72	101.6	48 10.2	61	72	101.0	48 28.5	61	72	100.5	48 46.7	60	72	99.9
7	47 08.6	62	72	100.8	47 27.0	61	72	100.2	47 45.3	61	72	99.6	48 03.4	60	72	99.0
8	46 25.4	62	72	100.0	46 43.8	61	72	99.4	47 02.0	60	72	98.8	47 20.0	60	72	98.2
9	45 42.1	61	72	99.2	46 00.4	61	72	98.6	46 18.6	60	72	98.0	46 36.5	60	73	97.4
50	44 58.8	61	72	98.4	45 17.0	61	73	97.8	45 35.1	60	73	97.2	45 53.0	59	73	96.7
1	44 15.3	61	73	97.6	44 33.5	60	73	97.0	44 51.5	60	73	96.5	45 09.4	59	73	95.9
2	43 31.8	61	73	96.8	43 49.9	60	73	96.3	44 07.9	60	73	95.7	44 25.7	59	73	95.2
3	42 48.2	61	73	96.1	43 06.3	60	73	95.5	43 24.2	59	73	95.0	43 41.9	59	73	94.4
4	42 04.5	60	73	95.3	42 22.6	60	73	94.8	42 40.4	59	73	94.2	42 58.2	59	73	93.7
55	41 20.8	60	73	94.6	41 38.8	60	73	94.0	41 56.7	59	73	93.5	42 14.4	59	73	93.0
6	40 37.0	60	73	93.8	40 55.0	60	73	93.3	41 12.9	59	73	92.8	41 30.5	59	73	92.2
7	39 53.2	60	73	93.1	40 11.2	60	73	92.6	40 29.0	59	73	92.1	40 46.7	59	73	91.5
8	39 09.4	60	73	92.4	39 27.4	60	73	91.9	39 45.1	59	73	91.4	40 02.8	59	73	90.8
9	38 25.6	60	73	91.7	38 43.5	60	73	91.2	39 01.3	59	73	90.7	39 18.9	59	73	90.2
60	37 41.7	60	73	91.0	37 59.6	60	73	90.5	38 17.4	59	73	90.0	38 35.0	59	73	89.5
1	36 57.8	60	73	90.3	37 15.7	60	73	89.8	37 33.5	59	73	89.3	37 51.2	59	73	88.8
2	36 13.9	60	73	89.6	36 31.8	60	73	89.1	36 49.6	59	73	88.6	37 07.3	59	73	88.1
3	35 30.1	60	73	89.0	35 48.0	60	73	88.5	36 05.8	59	73	88.0	36 23.5	59	73	87.5
4	34 46.2	60	73	88.3	35 04.1	60	73	87.8	35 21.9	59	73	87.3	35 39.6	59	73	86.8
65	34 02.3	60	73	87.6	34 20.3	60	73	87.2	34 38.1	59	73	86.7	34 55.8	59	73	86.2
6	33 18.5	60	73	87.0	33 36.5	60	73	86.5	33 54.3	59	73	86.0	34 12.1	59	73	85.5
7	32 34.7	60	73	86.3	32 52.7	60	73	85.8	33 10.6	59	73	85.4	33 28.3	59	73	84.9
8	31 50.9	60	73	85.7	32 08.9	60	73	85.2	32 26.8	60	73	84.7	32 44.7	59	73	84.3
9	31 07.2	60	73	85.0	31 25.2	60	73	84.6	31 43.2	60	73	84.1	32 01.0	59	73	83.6
70	30 23.5	60	73	84.4	30 41.6	60	73	83.9	30 59.6	60	73	83.5	31 17.4	59	73	83.0
1	29 39.8	61	73	83.7	29 58.0	60	73	83.3	30 16.0	60	72	82.8	30 33.9	60	72	82.4
2	28 56.3	61	73	83.1	29 14.4	60	72	82.7	29 32.5	60	72	82.2	29 50.5	60	72	81.7
3	28 12.7	61	72	82.5	28 30.9	61	72	82.0	28 49.0	60	72	81.6	29 07.1	60	72	81.1
4	27 29.2	61	72	81.9	27 47.5	61	72	81.4	28 05.7	60	72	81.0	28 23.7	60	72	80.5
75	26 45.8	61	72	81.2	27 04.1	61	72	80.8	27 22.4	61	72	80.3	27 40.5	60	72	79.9
6	26 02.5	61	72	80.6	26 20.9	61	72	80.2	26 39.2	61	72	79.7	26 57.3	61	72	79.3
7	25 19.3	62	72	80.0	25 37.7	61	72	79.5	25 56.0	61	72	79.1	26 14.3	61	72	78.7
8	24 36.1	62	72	79.4	24 54.6	61	72	78.9	25 13.0	61	72	78.5	25 31.3	61	71	78.0
9	23 53.0	62	72	78.7	24 11.6	62	72	78.3	24 30.0	61	71	77.9	24 48.4	61	71	77.4
80	23 10.0	62	71	78.1	23 28.6	62	71	77.7	23 47.2	62	71	77.3	24 05.6	61	71	76.8
1	22 27.1	62	71	77.5	22 45.8	62	71	77.1	23 04.4	62	71	76.7	23 23.0	62	71	76.2
2	21 44.3	63	71	76.9	22 03.1	62	71	76.5	22 21.8	62	71	76.0	22 40.4	62	71	75.6
3	21 01.7	63	71	76.3	21 20.5	63	71	75.9	21 39.3	62	71	75.4	21 58.0	62	71	75.0
4	20 19.1	63	71	75.7	20 38.0	63	71	75.2	20 56.8	63	70	74.8	21 15.6	63	70	74.4
85	19 36.6	63	71	75.0	19 55.6	63	70	74.6	20 14.6	63	70	74.2	20 33.4	63	70	73.8
6	18 54.3	64	70	74.4	19 13.4	63	70	74.0	19 32.4	63	70	73.6	19 51.4	63	70	73.2
7	18 12.1	64	70	73.8	18 31.3	64	70	73.4	18 50.4	64	70	73.0	19 09.4	63	70	72.6
8	17 30.0	64	70	73.2	17 49.3	64	70	72.8	18 08.5	64	70	72.4	18 27.6	64	69	72.0
9	16 48.1	65	70	72.6	17 07.4	64	70	72.2	17 26.7	64	69	71.8	17 46.0	64	69	71.4
90	16 06.3	65	69	72.0	16 25.7	65	69	71.6	16 45.1	65	69	71.2	17 04.4	64	69	70.8

26° 00′ Alt.	Δd	Δt	Az.	26° 30′ Alt.	Δd	Δt	Az.	27° 00′ Alt.	Δd	Δt	Az.	27° 30′ Alt.	Δd	Δt	Az.	H.A.
° ′			°	° ′			°	° ′			°	° ′			°	°
73 00.0	1.0	02	180.0	73 30.0	1.0	02	180.0	74 00.0	1.0	02	180.0	74 30.0	1.0	02	180.0	00
72 58.8	1.0	06	176.9	73 28.8	1.0	06	176.9	73 58.8	1.0	06	176.8	74 28.7	1.0	06	176.7	1
72 55.3	1.0	10	173.9	73 25.2	1.0	10	173.7	73 55.1	1.0	10	173.6	74 24.9	1.0	10	173.4	2
72 49.5	99	14	170.8	73 19.2	99	14	170.6	73 48.9	99	14	170.4	74 18.6	99	15	170.1	3
72 41.3	99	17	167.8	73 10.9	98	18	167.5	73 40.4	98	18	167.2	74 09.9	98	19	166.9	4
72 31.0	98	21	164.9	73 00.3	98	21	164.5	73 29.5	97	22	164.1	73 58.8	97	22	163.7	05
72 18.5	97	24	162.0	72 47.5	97	25	161.6	73 16.4	96	25	161.1	73 45.3	96	26	160.6	6
72 03.9	96	28	159.2	72 32.6	95	28	158.7	73 01.2	95	29	158.2	73 29.7	95	30	157.6	7
71 47.3	95	31	156.4	72 15.6	94	32	155.9	72 43.8	94	32	155.3	73 12.0	94	33	154.7	8
71 28.8	93	34	153.7	71 56.7	93	35	153.1	72 24.6	93	35	152.5	72 52.3	92	36	151.9	9
71 08.5	92	37	151.1	71 36.0	92	37	150.5	72 03.4	91	38	149.9	72 30.7	91	39	149.2	10
70 46.4	91	39	148.6	71 13.6	90	40	148.0	71 40.5	90	41	147.3	72 07.3	89	42	146.5	1
70 22.8	89	42	146.2	70 49.5	89	43	145.5	71 16.0	88	43	144.8	71 42.3	87	44	144.0	2
69 57.6	88	44	143.8	70 23.9	87	45	143.1	70 49.9	87	46	142.4	71 15.8	86	47	141.6	3
69 31.0	86	47	141.6	69 56.8	86	47	140.8	70 22.4	85	48	140.1	70 47.8	84	49	139.3	4
69 03.1	85	49	139.4	69 28.5	84	49	138.7	69 53.6	83	50	137.9	70 18.6	83	51	137.0	15
68 34.0	83	50	137.3	68 58.9	83	51	136.5	69 23.6	82	52	135.7	69 48.1	81	53	134.9	6
68 03.7	82	52	135.3	68 28.2	81	53	134.5	68 52.4	81	54	133.7	69 16.4	80	54	132.9	7
67 32.3	81	54	133.4	67 56.4	80	55	132.6	68 20.2	79	55	131.8	68 43.8	78	56	130.9	8
66 59.9	79	56	131.5	67 23.6	79	56	130.7	67 47.0	78	57	129.9	68 10.2	77	58	129.1	9
66 26.6	78	57	129.7	66 49.9	77	58	128.9	67 12.9	76	58	128.1	67 35.7	75	59	127.3	20
65 52.4	77	58	128.0	66 15.3	76	59	127.2	66 38.0	75	60	126.4	67 00.3	74	60	125.5	1
65 17.4	76	60	126.3	65 40.0	75	60	125.6	66 02.3	74	61	124.7	66 24.3	73	61	123.9	2
64 41.7	74	61	124.8	65 03.9	74	61	124.0	65 25.8	73	62	123.1	65 47.5	72	62	122.3	3
64 05.4	73	62	123.2	64 27.2	72	62	122.4	64 48.8	72	63	121.6	65 10.1	71	63	120.8	4
63 28.3	72	63	121.7	63 49.9	71	63	121.0	64 11.1	70	64	120.1	64 32.1	70	64	119.3	25
62 50.7	71	64	120.3	63 11.9	70	64	119.5	63 32.9	69	65	118.7	63 53.6	68	65	117.9	6
62 12.6	70	64	118.9	62 33.5	69	65	118.2	62 54.2	68	65	117.4	63 14.6	68	66	116.6	7
61 33.9	69	65	117.6	61 54.6	68	66	116.8	62 15.0	68	66	116.1	62 35.1	67	66	115.3	8
60 54.8	68	66	116.3	61 15.2	68	66	115.6	61 35.4	67	67	114.8	61 55.2	66	67	114.0	9
60 15.3	68	67	115.1	60 35.4	67	67	114.3	60 55.3	66	67	113.6	61 14.9	65	68	112.8	30
59 35.3	67	67	113.9	59 55.3	66	68	113.1	60 14.9	65	68	112.4	60 34.3	64	68	111.6	1
58 55.0	66	68	112.7	59 14.7	65	68	112.0	59 34.2	64	68	111.2	59 53.4	63	69	110.5	2
58 14.4	65	68	111.6	58 33.9	65	69	110.8	58 53.1	64	69	110.1	59 12.1	63	69	109.3	3
57 33.4	65	69	110.5	57 52.7	64	69	109.7	58 11.8	63	69	109.0	58 30.6	62	70	108.3	4
56 52.2	64	69	109.4	57 11.3	63	69	108.7	57 30.1	62	70	108.0	57 48.8	62	70	107.2	35
56 10.6	64	70	108.4	56 29.6	63	70	107.7	56 48.3	62	70	106.9	57 06.7	61	70	106.2	6
55 28.9	63	70	107.3	55 47.7	62	70	106.7	56 06.2	61	70	106.0	56 24.5	61	71	105.2	7
54 46.9	62	70	106.4	55 05.5	62	71	105.7	55 23.9	61	71	105.0	55 42.1	60	71	104.3	8
54 04.7	62	71	105.4	54 23.2	61	71	104.7	54 41.4	60	71	104.0	54 59.5	60	71	103.3	9
53 22.3	62	71	104.5	53 40.6	61	71	103.8	53 58.8	60	71	103.1	54 16.7	59	72	102.4	40
52 39.7	61	71	103.5	52 57.9	60	71	102.9	53 16.0	60	72	102.2	53 33.8	59	72	101.5	1
51 57.0	61	71	102.6	52 15.1	60	72	102.0	52 33.0	59	72	101.3	52 50.7	59	72	100.7	2
51 14.1	60	72	101.8	51 32.1	60	72	101.1	51 49.9	59	72	100.5	52 07.5	58	72	99.8	3
50 31.0	60	72	100.9	50 49.0	59	72	100.3	51 06.7	59	72	99.6	51 24.2	58	72	99.0	4
49 47.9	60	72	100.1	50 05.7	59	72	99.4	50 23.4	58	72	98.8	50 40.8	58	72	98.2	45
49 04.6	60	72	99.2	49 22.4	59	72	98.6	49 40.0	58	72	98.0	49 57.4	58	73	97.4	6
48 21.3	59	72	98.4	48 39.0	59	73	97.8	48 56.5	58	73	97.2	49 13.8	57	73	96.6	7
47 37.8	59	73	97.6	47 55.5	58	73	97.0	48 12.9	58	73	96.4	48 30.2	57	73	95.8	8
46 54.3	59	73	96.9	47 11.9	58	73	96.3	47 29.3	58	73	95.7	47 46.5	57	73	95.1	9
46 10.7	59	73	96.1	46 28.2	58	73	95.5	46 45.6	58	73	94.9	47 02.8	57	73	94.3	50
45 27.0	59	73	95.3	45 44.5	58	73	94.7	46 01.8	57	73	94.2	46 19.0	57	73	93.6	1
44 43.3	58	73	94.6	45 00.8	58	73	94.0	45 18.1	57	73	93.4	45 35.2	57	73	92.8	2
43 59.5	58	73	93.8	44 17.0	58	73	93.3	44 34.2	57	73	92.7	44 51.3	57	73	92.1	3
43 15.7	58	73	93.1	43 33.2	58	73	92.6	43 50.4	57	73	92.0	44 07.5	57	73	91.4	4
42 31.9	58	73	92.4	42 49.3	58	73	91.9	43 06.5	57	73	91.3	43 23.6	57	73	90.7	55
41 48.1	58	73	91.7	42 05.4	58	73	91.2	42 22.7	57	73	90.6	42 39.7	57	73	90.0	6
41 04.2	58	73	91.0	41 21.6	58	73	90.5	41 38.8	57	73	89.9	41 55.8	57	73	89.4	7
40 20.3	58	73	90.3	40 37.7	58	73	89.8	40 54.9	57	73	89.2	41 12.0	57	73	88.7	8
39 36.4	58	73	89.6	39 53.8	58	73	89.1	40 11.0	57	73	88.6	40 28.1	57	73	88.0	9
38 52.6	58	73	89.0	39 09.9	58	73	88.4	39 27.2	57	73	87.9	39 44.2	57	73	87.4	60
38 08.7	58	73	88.3	38 26.1	58	73	87.8	38 43.3	57	73	87.3	39 00.4	57	73	86.7	1
37 24.8	58	73	87.6	37 42.2	58	73	87.1	37 59.5	57	73	86.6	38 16.6	57	73	86.1	2
36 41.0	58	73	87.0	36 58.4	58	73	86.5	37 15.7	57	73	86.0	37 32.9	57	73	85.4	3
35 57.2	58	73	86.3	36 14.6	58	73	85.8	36 32.0	58	73	85.3	36 49.1	57	73	84.8	4
35 13.4	58	73	85.7	35 30.9	58	73	85.2	35 48.2	58	73	84.7	36 05.5	57	73	84.2	65
34 29.7	59	73	85.0	34 47.2	58	73	84.5	35 04.6	58	73	84.0	35 21.8	57	73	83.5	6
33 46.0	59	73	84.4	34 03.5	58	73	83.9	34 21.0	58	73	83.4	34 38.3	58	73	82.9	7
33 02.3	59	73	83.8	33 19.9	58	73	83.3	33 37.4	58	73	82.8	33 54.7	58	72	82.3	8
32 18.7	59	73	83.1	32 36.4	59	72	82.7	32 53.9	58	72	82.2	33 11.3	58	72	81.7	9
31 35.2	59	72	82.5	31 52.9	59	72	82.0	32 10.5	58	72	81.6	32 27.9	58	72	81.1	70
30 51.7	59	72	81.9	31 09.5	59	72	81.4	31 27.1	59	72	80.9	31 44.6	58	72	80.5	1
30 08.3	59	72	81.3	30 26.1	59	72	80.8	30 43.8	59	72	80.3	31 01.4	58	72	79.9	2
29 25.0	60	72	80.7	29 42.8	59	72	80.2	30 00.6	59	72	79.7	30 18.2	59	72	79.3	3
28 41.7	60	72	80.0	28 59.6	60	72	79.6	29 17.4	59	72	79.1	29 35.1	59	72	78.7	4
27 58.6	60	72	79.4	28 16.5	60	72	79.0	28 34.4	59	72	78.5	28 52.2	59	71	78.1	75
27 15.5	60	72	78.8	27 33.5	60	72	78.4	27 51.4	60	71	77.9	28 09.3	59	71	77.5	6
26 32.5	60	72	78.2	26 50.6	60	71	77.8	27 08.6	60	71	77.3	27 26.5	60	71	76.9	7
25 49.5	61	71	77.6	26 07.7	60	71	77.2	26 25.8	60	71	76.7	26 43.8	60	71	76.3	8
25 06.7	61	71	77.0	25 25.0	61	71	76.6	25 43.1	60	71	76.1	26 01.2	60	71	75.7	9
24 24.0	61	71	76.4	24 42.4	61	71	76.0	25 00.6	61	71	75.5	25 18.8	60	71	75.1	80
23 41.4	61	71	75.8	23 59.8	61	71	75.4	24 18.2	61	70	74.9	24 36.4	61	70	74.5	1
22 59.0	62	71	75.2	23 17.4	61	70	74.8	23 35.9	61	70	74.3	23 54.2	61	70	73.9	2
22 16.6	62	70	74.6	22 35.2	62	70	74.2	22 53.7	62	70	73.7	23 12.1	61	70	73.3	3
21 34.4	62	70	74.0	21 53.0	62	70	73.6	22 11.6	62	70	73.1	22 30.1	62	70	72.7	4
20 52.2	63	70	73.4	21 11.0	62	70	73.0	21 29.7	62	70	72.5	21 48.3	62	70	72.1	85
20 10.3	63	70	72.8	20 29.1	63	70	72.4	20 47.9	63	69	72.0	21 06.6	62	69	71.5	6
19 28.4	63	70	72.2	19 47.4	63	69	71.8	20 06.2	63	69	71.4	20 25.1	63	69	70.9	7
18 46.7	64	69	71.6	19 05.7	63	69	71.2	19 24.7	63	69	70.8	19 43.7	63	69	70.3	8
18 05.1	64	69	71.0	18 24.3	64	69	70.6	18 43.4	64	69	70.2	19 02.4	63	68	69.8	9
17 23.7	64	69	70.4	17 43.0	64	69	70.0	18 02.2	64	68	69.6	18 21.3	64	68	69.2	90

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DECLINATION CONTRARY NAME TO LATITUDE

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	23 00.0	1.0 01	180.0	22 30.0	1.0 01	180.0	22 00.0	1.0 01	180.0	21 30.0	1.0 01	180.0	21 00.0	1.0 01	180.0	20 30.0	1.0 01	180.0	20 00.0	1.0 01	180.0	19 30.0	1.0 01	180.0	00
1	22 59.6	1.0 02	179.0	22 29.6	1.0 02	179.0	21 59.6	1.0 02	179.0	21 29.6	1.0 02	179.0	20 59.6	1.0 02	179.0	20 29.6	1.0 02	179.0	19 59.6	1.0 02	179.1	19 29.6	1.0 02	179.1	1
2	22 58.5	1.0 03	178.0	22 28.5	1.0 03	178.0	21 58.5	1.0 03	178.0	21 28.5	1.0 03	178.1	20 58.5	1.0 03	178.1	20 28.5	1.0 03	178.1	19 58.5	1.0 03	178.1	19 28.6	1.0 03	178.1	2
3	22 56.6	1.0 04	177.0	22 26.6	1.0 04	177.0	21 56.6	1.0 04	177.1	21 26.7	1.0 04	177.1	20 56.7	1.0 04	177.1	20 26.7	1.0 04	177.1	19 56.7	1.0 04	177.2	19 26.8	1.0 04	177.2	3
4	22 53.9	1.0 06	176.0	22 24.0	1.0 06	176.1	21 54.0	1.0 06	176.1	21 24.1	1.0 06	176.1	20 54.1	1.0 06	176.2	20 24.1	1.0 05	176.2	19 54.2	1.0 05	176.2	19 24.2	1.0 05	176.2	4
05	22 50.5	1.0 07	175.0	22 20.6	1.0 07	175.1	21 50.7	1.0 07	175.1	21 20.7	1.0 07	175.2	20 50.8	1.0 07	175.2	20 20.9	1.0 07	175.2	19 50.9	1.0 07	175.3	19 21.0	1.0 07	175.3	05
6	22 46.3	1.0 08	174.1	22 16.4	1.0 08	174.1	21 46.5	1.0 08	174.1	21 16.6	1.0 08	174.2	20 46.7	1.0 08	174.2	20 16.8	1.0 08	174.3	19 46.9	1.0 08	174.3	19 17.0	1.0 08	174.4	6
7	22 41.4	1.0 09	173.1	22 11.6	1.0 09	173.1	21 41.7	1.0 09	173.2	21 11.8	1.0 09	173.2	20 42.0	1.0 09	173.3	20 12.1	1.0 09	173.3	19 42.2	1.0 09	173.4	19 12.4	1.0 09	173.4	7
8	22 35.8	99 11	172.1	22 05.9	99 11	172.1	21 36.1	99 11	172.2	21 06.3	99 10	172.3	20 36.5	99 10	172.3	20 06.7	99 10	172.4	19 36.8	99 10	172.4	19 07.0	99 10	172.5	8
9	22 29.3	99 12	171.1	21 59.6	99 12	171.2	21 29.8	99 12	171.2	21 00.0	99 12	171.3	20 30.2	99 12	171.4	20 00.5	99 11	171.4	19 30.7	99 11	171.5	19 00.9	99 11	171.6	9
10	22 22.2	99 13	170.1	21 52.5	99 13	170.2	21 22.7	99 13	170.3	20 53.0	99 13	170.3	20 23.3	99 13	170.4	19 53.6	99 13	170.5	19 23.9	99 13	170.6	18 54.1	99 12	170.6	10
1	22 14.3	99 14	169.1	21 44.6	99 14	169.2	21 15.0	99 14	169.3	20 45.3	99 14	169.4	20 15.6	99 14	169.5	19 46.0	99 14	169.5	19 16.3	99 14	169.6	18 46.6	99 14	169.7	1
2	22 05.7	99 16	168.2	21 36.1	99 16	168.3	21 06.5	99 15	168.3	20 36.9	99 15	168.4	20 07.3	99 15	168.5	19 37.7	99 15	168.6	19 08.0	99 15	168.7	18 38.4	99 15	168.8	2
3	21 56.3	98 17	167.2	21 26.8	98 17	167.3	20 57.2	98 17	167.4	20 27.7	98 16	167.5	19 58.2	98 16	167.6	19 28.6	98 16	167.7	18 59.1	98 16	167.8	18 29.5	98 16	167.9	3
4	21 46.2	98 18	166.2	21 16.8	98 18	166.3	20 47.3	98 18	166.4	20 17.8	98 18	166.5	19 48.4	98 18	166.6	19 18.9	98 17	166.7	18 49.4	98 17	166.8	18 20.0	98 17	166.9	4
15	21 35.4	98 19	165.3	21 06.0	98 19	165.4	20 36.7	98 19	165.5	20 07.3	98 19	165.6	19 37.9	98 19	165.7	19 08.5	98 18	165.8	18 39.1	98 18	165.9	18 09.7	98 18	166.0	15
6	21 23.9	98 20	164.3	20 54.6	98 20	164.4	20 25.3	98 20	164.5	19 56.0	98 20	164.7	19 26.7	98 20	164.8	18 57.4	98 20	164.9	18 28.1	98 20	165.0	17 58.8	98 19	165.1	6
7	21 11.7	97 22	163.4	20 42.5	97 21	163.5	20 13.3	97 21	163.6	19 44.1	97 21	163.7	19 14.8	97 21	163.8	18 45.6	97 21	164.0	18 16.4	97 21	164.1	17 47.2	97 20	164.2	7
8	20 58.8	97 23	162.4	20 29.6	97 23	162.5	20 00.5	97 22	162.7	19 31.4	97 22	162.8	19 02.3	97 22	162.9	18 33.1	97 22	163.0	18 04.0	97 22	163.2	17 34.9	97 22	163.3	8
9	20 45.1	97 24	161.5	20 16.1	97 24	161.6	19 47.1	97 24	161.7	19 18.1	97 23	161.9	18 49.1	97 23	162.0	18 20.0	97 23	162.1	17 51.0	97 23	162.3	17 21.9	97 23	162.4	9
20	20 30.8	96 25	160.5	20 01.9	96 25	160.7	19 33.0	96 25	160.8	19 04.1	96 24	160.9	18 35.2	96 24	161.1	18 06.2	96 24	161.2	17 37.3	96 24	161.4	17 08.3	97 24	161.5	20
1	20 15.9	96 26	159.6	19 47.1	96 26	159.7	19 18.2	96 26	159.9	18 49.4	96 26	160.0	18 20.6	96 25	160.2	17 51.8	96 25	160.3	17 22.9	96 25	160.5	16 54.1	96 25	160.6	1
2	20 00.2	96 27	158.6	19 31.5	96 27	158.8	19 02.8	96 27	159.0	18 34.1	96 27	159.1	18 05.4	96 26	159.3	17 36.6	96 26	159.4	17 07.9	96 26	159.6	16 39.2	96 26	159.7	2
3	19 43.9	95 28	157.7	19 15.3	95 28	157.9	18 46.7	95 28	158.0	18 18.1	95 28	158.2	17 49.5	95 28	158.4	17 20.9	95 27	158.5	16 52.3	95 27	158.7	16 23.6	95 27	158.8	3
4	19 26.9	95 29	156.8	18 58.5	95 29	157.0	18 30.0	95 29	157.1	18 01.5	95 29	157.3	17 33.0	95 29	157.5	17 04.5	95 28	157.6	16 36.0	95 28	157.8	16 07.5	95 28	157.9	4
25	19 09.3	94 30	155.9	18 41.0	95 30	156.0	18 12.6	95 30	156.2	17 44.2	95 30	156.4	17 15.9	95 30	156.6	16 47.5	95 29	156.7	16 19.1	95 29	156.9	15 50.7	95 29	157.1	25
6	18 51.1	94 31	155.0	18 22.8	94 31	155.1	17 54.6	94 31	155.3	17 26.4	94 31	155.5	16 58.1	94 31	155.7	16 29.8	94 30	155.8	16 01.5	94 30	156.0	15 33.3	94 30	156.2	6
7	18 32.2	94 33	154.1	18 04.1	94 32	154.2	17 36.0	94 32	154.4	17 07.8	94 32	154.6	16 39.7	94 32	154.8	16 11.6	94 31	155.0	15 43.4	94 31	155.2	15 15.2	94 31	155.3	7
8	18 12.7	93 34	153.2	17 44.7	93 33	153.3	17 16.7	93 33	153.5	16 48.7	93 33	153.7	16 20.7	93 33	153.9	15 52.7	93 32	154.1	15 24.7	93 32	154.3	14 56.6	93 32	154.5	8
9	17 52.6	93 35	152.3	17 24.7	93 34	152.5	16 56.9	93 34	152.7	16 29.0	93 34	152.8	16 01.1	93 34	153.0	15 33.2	93 33	153.2	15 05.3	93 33	153.4	14 37.4	93 33	153.6	9
30	17 31.9	92 36	151.4	17 04.1	92 35	151.6	16 36.4	92 35	151.8	16 08.7	92 35	152.0	15 40.9	93 35	152.2	15 13.2	93 34	152.4	14 45.4	93 34	152.6	14 17.6	93 34	152.8	30
1	17 10.5	92 36	150.5	16 43.0	92 36	150.7	16 15.4	92 36	150.9	15 47.8	92 36	151.1	15 20.2	92 36	151.3	14 52.5	92 35	151.5	14 24.9	92 35	151.7	13 57.3	92 35	151.9	1
2	16 48.6	91 37	149.6	16 21.2	91 37	149.8	15 53.7	92 37	150.0	15 26.3	92 37	150.3	14 58.8	92 37	150.5	14 31.3	92 36	150.7	14 03.8	92 36	150.9	13 36.3	92 36	151.1	2
3	16 26.2	91 38	148.8	15 58.9	91 38	149.0	15 31.5	91 38	149.2	15 04.2	91 38	149.4	14 36.9	91 37	149.6	14 09.5	91 37	149.8	13 42.2	91 37	150.0	13 14.8	91 37	150.2	3
4	16 03.1	90 39	147.9	15 36.0	91 39	148.1	15 08.8	91 39	148.3	14 41.6	91 39	148.5	14 14.4	91 38	148.8	13 47.2	91 38	149.0	13 20.0	91 38	149.2	12 52.8	91 38	149.4	4
35	15 39.5	90 40	147.0	15 12.5	90 40	147.3	14 45.5	90 40	147.5	14 18.4	90 40	147.7	13 51.4	90 39	147.9	13 24.3	90 39	148.2	12 57.3	90 39	148.4	12 30.2	90 39	148.6	35
6	15 15.4	90 41	146.2	14 48.5	90 41	146.4	14 21.6	90 41	146.6	13 54.7	90 40	146.9	13 27.8	90 40	147.1	13 00.9	90 40	147.3	12 34.0	90 40	147.5	12 07.0	90 39	147.8	6
7	14 50.7	89 42	145.3	14 23.9	89 42	145.6	13 57.2	89 42	145.8	13 30.5	89 41	146.0	13 03.7	89 41	146.3	12 36.9	89 41	146.5	12 10.2	89 41	146.7	11 43.4	89 40	147.0	7
8	14 25.4	89 43	144.5	13 58.9	89 43	144.7	13 32.3	89 42	145.0	13 05.7	89 42	145.2	12 39.1	89 42	145.5	12 12.5	89 42	145.7	11 45.8	89 41	145.9	11 19.2	89 41	146.2	8
9	13 59.7	88 44	143.7	13 33.3	88 44	143.9	13 06.8	88 43	144.2	12 40.4	88 43	144.4	12 13.9	88 43	144.6	11 47.5	88 42	144.9	11 21.0	88 42	145.1	10 54.5	88 42	145.4	9
40	13 33.4	88 45	142.8	13 07.2	88 44	143.1	12 40.9	88 44	143.3	12 14.6	88 44	143.6	11 48.3	88 44	143.8	11 22.0	88 43	144.1	10 55.6	88 43	144.3	10 29.3	88 43	144.6	40
1	13 06.7	87 45	142.0	12 40.6	87 45	142.3	12 14.4	87 45	142.5	11 48.3	87 45	142.8	11 22.1	87 44	143.0	10 56.0	87 44	143.3	10 29.8	87 44	143.5	10 03.6	87 44	143.8	1
2	12 39.4	87 46	141.2	12 13.5	87 46	141.5	11 47.5	87 46	141.7	11 21.5	87 45	142.0	10 55.5	87 45	142.2	10 29.5	87 45	142.5	10 03.5	87 45	142.7	9 37.4	87 44	143.0	2
3	12 11.7	86 47	140.4	11 45.9	86 47	140.7	11 20.1	86 46	140.9	10 54.2	86 46	141.2	10 28.4	86 46	141.4	10 02.5	86 46	141.7	9 36.7	86 45	142.0	9 10.8	86 45	142.2	3
4	11 43.5	85 48	139.6	11 17.8	86 48	139.9	10 52.2	86 47	140.1	10 26.5	86 47	140.4	10 00.8	86 47	140.7	9 35.1	86 46	140.9	9 09.4	86 46	141.2	8 43.7	86 46	141.4	4
45	11 14.8	85 49	138.8	10 49.3	85 48	139.1	10 23.8	85 48	139.3	9 58.3	85 48	139.6	9 32.8	85 48	139.9	9 07.2	85 47	140.1	8 41.6	85 47	140.4	8 16.1	85 47	140.7	45
6	10 45.7	84 49	138.0	10 20.4	84 49	138.3	9 55.0	85 49	138.6	9 29.6	85 48	138.8	9 04.3	85 48	139.1	8 38.9	85 48	139.4	8 13.5	85 48	139.6	7 48.0	85 47	139.9	6
7	10 16.1	84 50	137.2	9 50.9	84 50	137.5	9 25.7	84 50	137.8	9 00.5	84 49	138.1	8 35.3	84 49	138.3	8 10.1	84 49	138.6	7 44.8	84 48	138.9	7 19.6	84 48	139.2	7
8	9 46.1	83 51	136.5	9 21.1	83 50	136.7	8 56.0	84 50	137.0	8 31.0	84 50	137.3	8 05.9	84 50	137.6	7 40.8	84 49	137.8	7 15.7	84 49	138.1	6 50.6	84 49	138.4	8
9	9 15.7	83 51	135.7	8 50.8	83 51	136.0	8 25.9	83 51	136.3	8 01.0	83 51	136.5	7 36.1	83 50	136.8	7 11.2	83 50	137.1	6 46.2	83 50	137.4	6 21.3	83 50	137.7	9
50	8 44.8	82 52	134.9	8 20.1	82 52	135.2	7 55.4	82 52	135.5	7 30.6	82 51	135.8	7 05.9	83 51	136.1	6 41.1	83 51	136.4	6 16.3	83 51	136.6	5 51.5	83 50	136.9	50
1	8 13.5	82 53	134.2	7 49.0	82 53	134.5	7 24.4	82 52	134.7	6 59.8	82 52	135.0	6 35.2	82 52	135.3	6 10.6	82 52	135.6	5 46.0	82 51	135.9	5 21.3	82 51	136.2	1
2	7 41.9	81 53	133.4	7 17.4	81 53	133.7	6 53.0	81 53	134.0	6 28.6	81 53	134.3	6 04.1	81 52	134.6	5 39.7	82 52	134.9	5 15.2	82 52	135.2				2
3	7 09.8	81 54	132.7	6 45.5	81 54	133.0	6 21.3	81 54	133.3	5 57.0	81 53	133.6	5 32.7	81 53	133.8	5 08.4	81 53	134.1							3
4	6 37.3	80 55	131.9	6 13.2	80 54	132.2	5 49.1	80 54	132.5	5 25.0	80 54	132.8	5 00.9	80 54	133.1										4
55	6 04.5	80 55	131.2	5 40.5	80 55	131.5	5 16.6	80 55	131.8																55
6	5 31.3	79 56	130.5	5 07.5	79 56	130.8																			6

DECLINATION SAME NAME AS LATITUDE

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
91	15 24.6	65 69	71.3	15 44.2	65 69	71.0	16 03.6	65 69	70.6	16 23.1	65 69	70.2	16 42.5	65 68	69.8	17 01.8	64 68	69.4	17 21.1	64 68	69.0	17 40.4	64 68	68.6	91
2	14 43.1	65 69	70.7	15 02.8	65 69	70.3	15 22.3	65 69	69.9	15 41.9	65 68	69.6	16 01.4	65 68	69.2	16 20.9	65 68	68.8	16 40.3	65 68	68.4	16 59.6	64 68	68.0	2
3	14 01.8	65 69	70.1	14 21.5	66 68	69.7	14 41.2	66 68	69.3	15 00.9	65 68	68.9	15 20.5	65 68	68.5	15 40.0	65 68	68.2	15 59.6	65 68	67.8	16 19.1	65 67	67.4	3
4	13 20.6	66 68	69.5	13 40.4	66 68	69.1	14 00.2	66 68	68.7	14 20.0	66 68	68.3	14 39.7	66 68	67.9	14 59.4	66 67	67.5	15 19.0	65 67	67.2	15 38.6	65 67	66.8	4
95	12 39.6	67 68	68.9	12 59.5	66 68	68.5	13 19.4	66 68	68.1	13 39.3	66 68	67.7	13 59.1	66 67	67.3	14 18.9	66 67	66.9	14 38.7	66 67	66.6	14 58.4	66 67	66.2	95
6	11 58.7	67 68	68.2	12 18.8	67 68	67.9	12 38.8	67 67	67.5	12 58.8	67 67	67.1	13 18.7	66 67	66.7	13 38.6	66 67	66.3	13 58.5	66 67	65.9	14 18.4	66 66	65.6	6
7	11 18.1	67 67	67.6	11 38.2	67 67	67.2	11 58.4	67 67	66.9	12 18.5	67 67	66.5	12 38.5	67 67	66.1	12 58.6	67 66	65.7	13 18.6	67 66	65.3	13 38.5	66 66	65.0	7
8	10 37.6	68 67	67.0	10 57.9	68 67	66.6	11 18.1	67 67	66.2	11 38.3	67 67	65.9	11 58.5	67 66	65.5	12 18.7	67 66	65.1	12 38.8	67 66	64.7	12 58.9	67 66	64.3	8
9	9 57.3	68 67	66.4	10 17.7	68 67	66.0	10 38.0	68 66	65.6	10 58.4	68 66	65.2	11 18.7	68 66	64.9	11 38.9	68 66	64.5	11 59.2	67 66	64.1	12 19.4	67 65	63.7	9
100	9 17.2	68 66	65.7	9 37.7	68 66	65.4	9 58.2	68 66	65.0	10 18.6	68 66	64.6	10 39.0	68 66	64.2	10 59.4	68 66	63.9	11 19.8	68 65	63.5	11 40.2	68 65	63.1	100
1	8 37.3	69 66	65.1	8 57.9	69 66	64.7	9 18.5	69 66	64.4	9 39.1	69 66	64.0	9 59.6	68 65	63.6	10 20.2	68 65	63.2	10 40.7	68 65	62.9	11 01.1	68 65	62.5	1
2	7 57.6	69 66	64.5	8 18.3	69 66	64.1	8 39.1	69 65	63.7	8 59.8	69 65	63.4	9 20.4	69 65	63.0	9 41.1	69 65	62.6	10 01.7	69 65	62.3	10 22.3	69 64	61.9	2
3	7 18.1	70 65	63.8	7 39.0	70 65	63.5	7 59.8	69 65	63.1	8 20.6	69 65	62.7	8 41.4	69 65	62.4	9 02.2	69 64	62.0	9 23.0	69 64	61.6	9 43.7	69 64	61.3	3
4	6 38.8	70 65	63.2	6 59.8	70 65	62.8	7 20.8	70 65	62.5	7 41.7	70 64	62.1	8 02.7	70 64	61.7	8 23.6	70 64	61.4	8 44.5	70 64	61.0	9 05.4	70 64	60.6	4
105	5 59.8	70 65	62.5	6 20.9	70 64	62.2	6 42.0	70 64	61.8	7 03.1	70 64	61.5	7 24.1	70 64	61.1	7 45.2	70 64	60.7	8 06.2	70 63	60.4	8 27.2	70 63	60.0	105
6	5 21.0	71 64	61.9	5 42.2	71 64	61.5	6 03.4	71 64	61.2	6 24.7	71 64	60.8	6 45.8	71 63	60.5	7 07.0	71 63	60.1	7 28.2	71 63	59.7	7 49.3	70 63	59.4	6
7				5 03.8	71 64	60.9	5 25.1	71 64	60.5	5 46.5	71 63	60.2	6 07.8	71 63	59.8	6 29.1	71 63	59.5	6 50.4	71 63	59.1	7 11.7	71 62	58.8	7
8										5 08.5	72 63	59.5	5 30.0	72 62	59.2	5 51.4	71 62	58.8	6 12.9	71 62	58.5	6 34.3	71 62	58.1	8
9																5 14.0	72 62	58.2	5 35.6	72 62	57.8	5 57.2	72 61	57.5	9
110																						5 20.3	72 61	56.8	110

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Lat. 43°

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	75 00.0	1.0 02	180.0	75 30.0	1.0 02	180.0	76 00.0	1.0 02	180.0	77 00.0	1.0 02	180.0	79 00.0	1.0 03	180.0	81 00.0	1.0 03	180.0	81 30.0	1.0 04	180.0	82 30.0	1.0 04	180.0	00
1	74 58.7	1.0 07	176.6	75 28.7	1.0 07	176.5	75 58.6	1.0 07	176.4	76 58.5	1.0 07	176.2	78 58.3	1.0 08	175.6	80 58.0	1.0 10	174.7	81 27.9	1.0 11	174.4	82 27.6	1.0 12	173.8	1
2	74 54.8	1.0 11	173.2	75 24.6	99 11	173.0	75 54.5	99 11	172.8	76 54.1	99 12	172.3	78 53.2	99 14	171.2	80 51.9	99 17	169.5	81 21.5	99 17	169.0	82 20.6	98 19	167.7	2
3	74 48.3	99 15	169.8	75 18.0	99 15	169.6	75 47.6	99 16	169.2	76 46.8	99 17	168.6	78 44.9	98 19	166.9	80 42.0	97 23	164.4	81 11.1	97 24	163.7	82 09.0	96 26	161.8	3
4	74 39.3	98 19	166.5	75 08.8	98 20	166.2	75 38.1	98 20	165.8	76 36.8	98 21	164.9	78 33.3	97 24	162.7	80 28.4	95 28	159.5	80 56.9	95 30	158.6	81 53.3	93 32	156.3	4
05	74 27.9	97 23	163.3	74 57.0	97 24	162.8	75 26.1	97 24	162.4	76 24.0	96 26	161.3	78 18.8	95 29	158.6	80 11.5	93 34	154.9	80 39.2	92 35	153.8	81 33.8	90 38	151.1	05
6	74 14.2	96 27	160.1	74 42.9	96 27	159.6	75 11.6	95 28	159.0	76 08.6	95 30	157.8	78 01.4	93 33	154.7	79 51.3	90 38	150.5	80 18.2	89 40	149.2	81 11.0	87 43	146.3	6
7	73 58.1	95 30	157.1	74 26.5	94 31	156.5	74 54.7	94 32	155.8	75 50.9	93 33	154.4	77 41.3	91 37	151.0	79 28.4	87 42	146.4	79 54.4	86 44	145.0	80 45.2	83 47	141.9	7
8	73 40.0	93 34	154.1	74 07.9	93 34	153.4	74 35.7	92 35	152.7	75 30.8	91 37	151.2	77 18.9	89 41	147.5	79 02.9	84 46	142.6	79 28.0	83 48	141.1	80 16.9	80 51	137.8	8
9	73 19.8	92 37	151.2	73 47.3	91 38	150.5	74 14.6	91 38	149.7	75 08.6	89 40	148.1	76 54.2	86 44	144.2	78 35.2	82 49	139.1	78 59.4	80 51	137.5	79 46.4	76 54	134.2	9
10	72 57.8	90 40	148.4	73 24.7	90 41	147.7	73 51.5	89 41	146.9	74 44.5	88 43	145.2	76 27.6	84 47	141.0	78 05.5	79 52	135.8	78 28.9	77 54	134.2	79 14.1	73 57	130.8	10
1	72 34.0	88 42	145.8	73 00.4	88 43	145.0	73 26.7	87 44	144.1	74 18.5	86 46	142.3	75 59.1	82 50	138.1	77 34.0	76 55	132.7	77 56.6	74 56	131.2	78 40.1	70 59	127.8	1
2	72 08.5	87 45	143.2	72 34.4	86 46	142.4	73 00.2	85 47	141.5	73 50.9	84 49	139.7	75 29.0	79 53	135.3	77 01.0	74 57	129.9	77 22.9	72 58	128.3	78 04.7	68 61	125.0	2
3	71 41.5	85 47	140.8	72 06.9	84 48	139.9	72 32.1	84 49	139.0	73 21.8	82 51	137.1	74 57.4	77 55	132.7	76 26.7	71 59	127.3	76 47.8	69 60	125.7	77 28.2	65 63	122.4	3
4	71 13.0	84 50	138.4	71 38.0	83 50	137.6	72 02.7	82 51	136.7	72 51.2	80 53	134.7	74 24.5	75 57	130.2	75 51.3	69 61	124.8	76 11.7	67 62	123.3	76 50.7	63 64	120.1	4
15	70 43.3	82 52	136.2	71 07.7	81 52	135.3	71 31.9	80 53	134.4	72 19.4	78 55	132.4	73 50.5	73 59	127.9	75 14.8	67 62	122.6	75 34.6	65 63	121.1	76 12.3	61 65	117.9	15
6	70 12.3	80 53	134.1	70 36.3	79 54	133.2	71 00.0	79 55	132.2	71 46.5	76 57	130.2	73 15.4	71 60	125.8	74 37.4	65 64	120.5	74 56.6	63 65	119.0	75 33.2	59 66	115.9	6
7	69 40.2	79 55	132.0	70 03.7	78 56	131.1	70 27.0	77 57	130.2	71 12.5	75 58	128.2	72 39.3	70 62	123.7	73 59.2	63 65	118.5	74 17.8	61 66	117.1	74 53.4	57 67	114.1	7
8	69 07.1	77 57	130.0	69 30.2	76 57	129.1	69 52.9	75 58	128.2	70 37.5	73 60	126.2	72 02.4	68 63	121.8	73 20.3	62 66	116.7	73 38.5	60 67	115.3	74 13.1	56 68	112.3	8
9	68 33.1	76 58	128.2	68 55.7	75 59	127.3	69 18.0	74 60	126.3	70 01.7	72 61	124.4	71 24.7	66 64	120.0	72 40.8	60 67	115.0	72 58.5	58 67	113.6	73 32.3	54 69	110.7	9
20	67 58.2	75 60	126.4	68 20.4	74 60	125.5	68 42.3	72 61	124.5	69 25.1	70 62	122.6	70 46.4	65 65	118.3	72 00.7	59 68	113.3	72 18.1	57 68	112.0	72 51.0	53 69	109.2	20
1	67 22.4	73 61	124.7	67 44.2	72 61	123.8	68 05.8	71 62	122.8	68 47.8	69 63	120.9	70 07.5	64 66	116.6	71 20.2	57 68	111.8	71 37.2	56 69	110.5	72 09.4	52 70	107.8	1
2	66 46.0	72 62	123.0	67 07.4	71 62	122.1	67 28.6	70 63	121.2	68 09.8	68 64	119.3	69 28.0	62 67	115.1	70 39.3	56 69	110.4	70 55.9	54 69	109.1	71 27.5	51 70	106.5	2
3	66 08.9	71 63	121.4	66 30.0	70 63	120.6	66 50.7	69 64	119.6	67 31.3	66 65	117.7	68 48.0	61 67	113.6	69 58.0	55 69	109.0	70 14.2	53 70	107.8	70 45.2	50 71	105.2	3
4	65 31.1	70 64	119.9	65 51.9	69 64	119.1	66 12.3	68 65	118.2	66 52.2	65 66	116.3	68 07.6	60 68	112.2	69 16.3	54 70	107.7	69 32.3	53 70	106.5	70 02.8	49 71	104.0	4
25	64 52.8	69 65	118.5	65 13.2	68 65	117.6	65 33.4	66 66	116.7	66 12.6	64 67	114.9	67 26.7	59 69	110.9	68 34.4	53 70	106.5	68 50.1	52 71	105.3	69 20.1	48 71	102.9	25
6	64 14.0	68 66	117.1	64 34.1	67 66	116.2	64 53.9	65 66	115.3	65 32.6	63 67	113.5	66 45.6	58 69	109.6	67 52.1	53 71	105.3	68 07.7	51 71	104.1	68 37.2	48 72	101.8	6
7	63 34.7	67 66	115.7	63 54.5	66 67	114.9	64 14.0	65 67	114.0	64 52.1	62 68	112.2	66 04.1	57 70	108.4	67 09.7	52 71	104.1	67 25.0	50 71	103.0	67 54.2	47 72	100.7	7
8	62 55.0	66 67	114.4	63 14.5	65 67	113.6	63 33.8	64 68	112.7	64 11.3	61 69	111.0	65 22.3	57 70	107.2	66 27.0	51 71	103.1	66 42.2	50 72	102.0	67 11.0	46 72	99.7	8
9	62 14.8	65 68	113.2	62 34.1	64 68	112.4	62 53.1	63 68	111.5	63 30.2	61 69	109.8	64 40.2	56 70	106.1	65 44.2	51 72	102.0	65 59.2	49 72	101.0	66 27.7	46 73	98.8	9
30	61 34.3	64 68	112.0	61 53.4	63 68	111.2	62 12.1	62 69	110.3	62 48.7	60 70	108.6	63 58.0	55 71	105.0	65 01.2	50 72	101.0	65 16.0	49 72	100.0	65 44.3	46 73	97.9	30
1	60 53.4	63 69	110.8	61 12.3	62 69	110.0	61 30.8	61 69	109.2	62 07.0	59 70	107.5	63 15.5	55 71	103.9	64 18.1	50 72	100.0	64 32.7	48 72	99.0	65 00.8	45 73	97.0	1
2	60 12.3	63 69	109.7	60 30.9	62 69	108.9	60 49.2	61 70	108.1	61 25.0	59 70	106.4	62 32.8	54 71	102.9	63 34.8	49 72	99.1	63 49.3	48 72	98.1	64 17.2	45 73	96.1	2
3	59 30.8	62 70	108.6	59 49.2	61 70	107.8	60 07.4	60 70	107.0	60 42.8	58 71	105.4	61 49.9	54 72	101.9	62 51.4	49 72	98.2	63 05.9	47 73	97.3	63 33.5	45 73	95.3	3
4	58 49.1	61 70	107.5	59 07.3	60 70	106.8	59 25.3	59 70	106.0	60 00.4	58 71	104.4	61 06.9	53 72	101.0	62 07.9	48 73	97.3	62 22.3	47 73	96.4	62 49.8	44 73	94.5	4
35	58 07.1	61 70	106.5	58 25.2	60 71	105.7	58 43.0	59 71	105.0	59 17.8	57 71	103.4	60 23.8	53 72	100.1	61 24.4	48 73	96.5	61 38.6	47 73	95.6	62 06.0	44 73	93.7	35
6	57 24.9	60 71	105.5	57 42.9	59 71	104.7	58 00.5	58 71	104.0	58 35.1	57 72	102.4	59 40.5	52 72	99.2	60 40.8	48 73	95.7	60 54.9	47 73	94.8	61 22.2	44 73	92.9	6
7	56 42.6	60 71	104.5	57 00.3	59 71	103.8	57 17.9	58 71	103.0	57 52.1	56 72	101.5	58 57.1	52 73	98.3	59 57.1	48 73	94.9	60 11.2	47 73	94.0	60 38.4	44 73	92.2	7
8	56 00.0	59 71	103.6	56 17.6	58 71	102.8	56 35.0	58 72	102.1	57 09.1	56 72	100.6	58 13.7	52 73	97.4	59 13.3	48 73	94.1	59 27.4	46 73	93.2	59 54.5	44 73	91.5	8
9	55 17.2	60 72	102.6	55 34.8	58 72	101.9	55 52.1	57 72	101.2	56 25.9	55 72	99.7	57 30.1	52 73	96.6	58 29.5	47 73	93.3	58 43.6	46 73	92.5	59 10.6	44 73	90.8	9
40	54 34.4	58 72	101.7	54 51.8	58 72	101.0	55 09.0	57 72	100.3	55 42.6	55 72	98.9	56 46.5	51 73	95.8	57 45.7	47 73	92.6	57 59.7	46 73	91.8	58 26.8	44 73	90.1	40
1	53 51.3	58 72	100.9	54 08.6	57 72	100.2	54 25.7	57 72	99.5	54 59.1	55 72	98.0	56 02.8	51 73	95.0	57 01.9	47 73	91.9	57 15.8	46 73	91.1	57 42.9	44 73	89.4	1
2	53 08.2	58 72	100.0	53 25.4	57 72	99.3	53 42.4	56 72	98.6	54 15.7	55 73	97.2	55 19.1	51 73	94.3	56 18.0	47 73	91.2	56 32.0	46 73	90.4	56 59.0	44 73	88.7	2
3	52 24.9	58 72	99.2	52 42.0	57 72	98.5	52 59.0	56 73	97.8	53 32.1	54 73	96.4	54 35.3	51 73	93.5	55 34.1	47 73	90.5	55 48.1	46 73	89.7	56 15.1	44 73	88.1	3
4	51 41.5	57 72	98.3	51 58.6	57 73	97.7	52 15.4	56 73	97.0	52 48.4	54 73	95.6	53 51.5	51 73	92.8	54 50.2	47 73	89.8	55 04.2	46 73	89.0	55 31.3	44 73	87.4	4
45	50 58.1	57 73	97.5	51 15.1	56 73	96.9	51 31.9	56 73	96.2	52 04.7	54 73	94.8	53 07.6	51 73	92.0	54 06.4	47 73	89.1	54 20.3	46 73	88.3	54 47.5	44 73	86.8	45
6	50 14.5	57 73	96.7	50 31.5	56 73	96.1	50 48.2	55 73	95.4	51 21.0	54 73	94.1	52 23.8	51 73	91.3	53 22.5	47 73	88.4	53 36.5	46 73	87.7	54 03.7	44 73	86.2	6
7	49 30.9	57 73	96.0	49 47.8	56 73	95.3	50 04.5	55 73	94.7	50 37.2	54 73	93.4	51 39.9	51 73	90.6	52 38.6	47 73	87.8	52 52.7	46 73	87.1	53 19.9	44 73	85.6	7
8	48 47.2	57 73	95.2	49 04.1	56 73	94.6	49 20.7	55 73	93.9	49 53.4	54 73	92.6	50 56.0	51 73	90.0	51 54.8	47 73	87.2	52 08.8	46 73	86.4	52 36.2	45 73	85.0	8
9	48 03.5	56 73	94.4	48 20.3	56 73	93.8	48 36.9	55 73	93.2	49 09.5	54 73	91.9	50 12.1	51 73	89.3	51 11.0	47 73	86.5	51 25.1	47 73	85.8	51 52.5	45 73	84.4	9
50	47 19.7	56 73	93.7	47 36.5	56 73	93.1	47 53.1	55 73	92.5	48 25.7	54 73	91.2	49 28.3	51 73	88.6	50 27.2	48 73	85.9	50 41.3	47 73	85.2	51 08.8	45 73	83.8	50
1	46 35.9	56 73	93.0	46 52.7	56 73	92.4	47 09.3	55 73	91.8	47 41.8	54 73	90.5	48 44.4	51 73	88.0	49 43.4	48 73	85.3	49 57.6	47 73	84.6	50 25.2	45 73	83.2	1
2	45 52.1	56 73	92.3	46 08.8	56 73	91.7	46 25.4	55 73	91.1	46 57.9	54 73	89.8	48 00.5	51 73	87.3	48 59.7	48 73	84.7	49 13.9	47 73	84.0	49 41.7	45 72	82.6	2
3	45 08.2	56 73	91.5	45 25.0	55 73	91.0	45 41.5	55 73	90.4	46 14.0	54 73	89.2	47 16.7	51 73	86.7	48 16.1	48 73	84.1	48 30.3	47 73	83.4	48 58.2	46 72	82.1	3
4	44 24.4	56 73	90.8	44 41.1	55 73	90.3	44 57.6	55 73	89.7	45 30.2	54 73	88.5	46 32.9	51 73	86.0	47 32.4	48 73	83.5	47 46.8	47 73	82.8	48 14.8	46 72	81.5	4
55	43 40.5	56 73	90.2	43 57.2	55 73	89.6	44 13.8	55 73	89.0	44 46.3	54 73	87.8	45 49.2	51 73	85.4	46 48.9	48 73	82.9	47 03.3	48 72	82.3	47 31.4	46 72	80.9	55
6	42 56.6	56 73	89.5	43 13.3	55 73	88.9	43 29.9	55 73	88.3	44 02.5	54 73	87.2	45 05.5	51 73	84.8	46 05.3	49 72	82.3	46 19.8	48 72	81.7	46 48.1	46 72	80.4	6
7	42 12.7	56 73	88.8	42 29.5	56 73	88.2	42 46.0	55 73	87.7	43 18.7	54 73	86.5	44 21.8	51 73	84.2	45 21.9	49 72	81.7	45 36.4	48 72	81.1	46 04.9	47 72	79.8	7
8	41 28.9	56 73	88.1	41 45.6	56 73	87.6	42 02.2	55 73	87.0	42 34.9	54 73	85.9	43 38.2	52 73	83.6	44 38.5	49 72	81.2	44 53.1	48 72	80.5	45 21.7	47 72	79.3	8
9	40 45.0	56 73	87.5	41 01.8	56 73	86.9	41 18.4	55 73	86.4	41 51.1	54 73	85.3	42 54.6	52 73	83.0	43 55.2	49 72	80.6	44 09.8	49 72	80.0	44 38.6	47 72	78.8	9
60	40 01.2	56 73	86.8	40 18.0	56 73	86.3	40 34.6	55 73	85.7	41 07.4	54 73	84.6	42 11.0	52 72	82.4	43 11.9	50 72	80.0	43 26.7	49 72	79.4	43 55.6	48 72	78.2	60
1	39 17.4	56 73	86.2	39 34.2	56 73	85.7	39 50.9	55 73	85.1	40 23.7	54 73	84.0	41 27.6	52 72	81.8	42 28.7	50 72	79.5	42 43.6	49 72	78.9	43 12.7	48 71	77.7	1
2	38 33.6	56 73	85.6	38 50.5	56 73	85.0	39 07.2	55 73	84.5	39 40.1	54 73	83.4	40 44.2	52 72	81.2	41 45.6	50 72	78.9	42 00.6	49 72	78.3	42 29.9	48 71	77.1	2
3	37 49.9	56 73	84.9	38 06.8	56 73	84.4	38 23.5	56 73	83.9	38 56.6	55 72	82.8	40 00.9	53 72	80.6	41 02.6	50 72	78.4	41 17.6	50 71	77.8	41 47.1	49 71	76.6	3
4	37 06.2	57 73	84.3	37 23.1	56 73	83.8	37 39.9	56 73	83.2	38 13.1	55 72	82.2	39 17.6	53 72	80.0	40 19.7	51 71	77.8	40 34.8	50 71	77.2	41 04.5	49 71	76.1	4
65	36 22.6	57 73	83.7	36 39.5	56 73	83.2	36 56.4	56 72	82.6	37 29.6	55 72	81.6	38 34.4	53 72	79.5	39 36.8	51 71	77.2	39 52.0	50 71	76.7	40 22.0	49 71	75.6	65
6	35 39.0	57 73	83.0	35 56.0	56 72	82.5	36 12.9	56 72	82.0	36 46.2	55 72	81.0	37 51.3	53 72	78.9	38 54.1	51 71	76.7	39 09.4	51 71	76.1	39 39.5	50 71	75.0	6
7	34 55.5	57 72	82.4	35 12.5	57 72	81.9	35 29.5	56 72	81.4	36 02.9	55 72	80.4	37 08.3	54 72	78.3	38 11.4	52 71	76.2	38 26.8	51 71	75.6	38 57.2	50 70	74.5	7
8	34 12.0	57 72	81.8	34 29.1	57 72	81.3	34 46.1	56 72	80.8	35 19.7	56 72	79.8	36 25.4	54 71	77.7	37 28.9	52 71	75.6	37 44.4	51 71	75.1	38 14.9	50 70	74.0	8
9	33 28.6	57 72	81.2	33 45.8	57 72	80.7	34 02.8	57 72	80.2	34 36.6	56 72	79.2	35 42.6	54 71	77.2	36 46.4	52 71	75.1	37 02.0	52 70	74.5	37 32.8	51 70	73.5	9
70	32 45.3	58 72	80.6	33 02.5	57 72	80.1	33 19.6	57 72	79.6	33 53.5	56 72	78.6	34 59.8	54 71	76.6	36 04.1	53 70	74.5	36 19.8	52 70	74.0	36 50.8	51 70	72.9	70
1	32 02.0	58 72	80.0	32 19.3	57 72	79.5	32 36.5	57 72	79.0	33 10.5	56 71	78.0	34 17.2	55 71	76.0	35 21.8	53 70	74.0	35 37.7	53 70	73.5	36 08.9	52 70	72.4	1
2	31 18.8	58 72	79.4	31 36.2	58 72	78.9	31 53.5	57 72	78.4	32 27.6	57 71	77.5	33 34.6	55 71	75.5	34 39.7	53 70	73.5	34 55.7	53 70	72.9	35 27.2	52 69	71.9	2
3	30 35.7	58 72	78.8	30 53.2	58 72	78.3	31 10.5	58 71	77.8	31 44.9	57 71	76.9	32 52.2	55 71	74.9	33 57.7	54 70	72.9	34 13.8	53 70	72.4	34 45.5	52 69	71.4	3
4	29 52.7	59 72	78.2	30 10.3	58 71	77.7	30 27.7	58 71	77.3	31 02.2	57 71	76.3	32 09.9	56 70	74 4	33 15.8	54 70	72.4	33 32.0	54 69	71.9	34 04.0	53 69	70.9	4
75	29 09.8	59 71	77.6	29 27.4	58 71	77.1	29 44.9	58 71	76.7	30 19.6	57 71	75.7	31 27.7	56 70	73.8	32 34.1	55 69	71.8	32 50.4	54 69	71.3	33 22.6	53 69	70.3	75
6	28 27.0	59 71	77.0	28 44.7	59 71	76.5	29 02.3	58 71	76.1	29 37.1	58 71	75.2	30 45.6	56 70	73.3	31 52.4	55 69	71.3	32 08.9	55 69	70.8	32 41.3	54 69	69.8	6
7	27 44.3	59 71	76.4	28 02.1	59 71	76.0	28 19.7	59 71	75.5	28 54.8	58 70	74.6	30 03.7	57 70	72.7	31 10.9	55 69	70.8	31 27.5	55 69	70.3	32 00.2	54 68	69.3	7
8	27 01.7	60 71	75.8	27 19.6	59 71	75.4	27 37.3	59 71	74.9	28 12.5	58 70	74.0	29 21.8	57 70	72.1	30 29.6	56 69	70.2	30 46.2	55 68	69.8	31 19.3	55 68	68.8	8
9	26 19.2	60 71	75.2	26 37.2	60 70	74.8	26 55.0	59 70	74.3	27 30.4	59 70	73.4	28 40.1	58 69	71.6	29 48.3	56 68	69.7	30 05.1	56 68	69.2	30 38.4	55 68	68.3	9
80	25 36.9	60 70	74.6	25 54.9	60 70	74.2	26 12.8	60 70	73.8	26 48.4	59 70	72.9	27 58.6	58 69	71.0	29 07.3	57 68	69.2	29 24.2	56 68	68.7	29 57.7	56 68	67.7	80
1	24 54.6	60 70	74.1	25 12.7	60 70	73.6	25 30.7	60 70	73.2	26 06.5	59 70	72.3	27 17.1	58 69	70.5	28 26.3	57 68	68.6	28 43.4	57 68	68.2	29 17.2	56 67	67.2	1
2	24 12.5	61 70	73.5	24 30.7	61 70	73.0	24 48.8	60 70	72.6	25 24.8	60 69	71.7	26 35.9	59 69	69.9	27 45.5	57 68	68.1	28 02.7	57 67	67.6	28 36.8	55 67	66.7	2
3	23 30.5	61 70	72.9	23 48.8	61 70	72.4	24 07.0	61 69	72.0	24 43.2	60 69	71.1	25 54.7	59 68	69.4	27 04.9	58 67	67.5	27 22.2	58 67	67.1	27 56.6	57 67	66.2	3
4	22 48.6	61 70	72.3	23 07.0	61 69	71.9	23 25.3	61 69	71.4	24 01.8	60 69	70.6	25 13.7	59 68	68.8	26 24.4	58 67	67.0	26 41.9	58 67	66.6	27 16.6	57 66	65.6	4
85	22 06.9	62 69	71.7	22 25.4	62 69	71.3	22 43.8	61 69	70.8	23 20.5	61 69	70.0	24 32.9	60 68	68.2	25 44.1	59 67	66.5	26 01.7	59 67	66.0	26 36.7	58 66	65.1	85
6	21 25.3	62 69	71.1	21 43.9	62 69	70.7	22 02.4	62 69	70.3	22 39.3	61 68	69.4	23 52.2	60 68	67.7	25 04.0	59 67	65.9	25 21.7	59 66	65.5	25 56.9	58 66	64.6	6
7	20 43.8	62 69	70 5	21 02.5	62 69	70.1	21 21.2	62 68	69.7	21 58.3	62 68	68.8	23 11.7	61 67	67.1	24 24.0	60 66	65.4	24 41.9	59 66	64.9	25 17.4	59 66	64.1	7
8	20 02.5	63 69	69.9	20 21.4	63 68	69.5	20 40.1	62 68	69.1	21 17.5	62 68	68.3	22 31.4	61 67	66.6	23 44.2	60 66	64.8	24 02.2	60 66	64.4	24 38.0	59 65	63.5	8
9	19 21.4	63 68	69.3	19 40.3	63 68	68.9	19 59.2	63 68	68.5	20 36.8	62 68	67.7	21 51.2	62 67	66.0	23 04.6	61 66	64.3	23 22.7	60 66	63.9	23 58.8	60 65	63.0	9
90	18 40.4	64 68	68.8	18 59.5	63 68	68.3	19 18.5	63 68	67.9	19 56.3	63 67	67.1	21 11.2	62 66	65.4	22 25.1	61 65	63.7	22 43.4	61 65	63.3	23 19.8	60 65	62.5	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	19 00.0	1.0 01	180.0	18 30.0	1.0 01	180.0	18 00.0	1.0 01	180.0	17 00.0	1.0 01	180.0	15 00.0	1.0 01	180.0	13 00.0	1.0 01	180.0	12 30.0	1.0 01	180.0	11 30.0	1.0 01	180.0	00
1	18 59.6	1.0 02	179.1	18 29.6	1.0 02	179.1	17 59.6	1.0 02	179.1	16 59.7	1.0 02	179.1	14 59.7	1.0 02	179.1	12 59.7	1.0 02	179.1	12 29.7	1.0 02	179.2	11 29.7	1.0 02	179.2	1
2	18 58.6	1.0 03	178.1	18 28.6	1.0 03	178.1	17 58.6	1.0 03	178.2	16 58.6	1.0 03	178.2	14 58.7	1.0 03	178.2	12 58.7	1.0 03	178.3	12 28.7	1.0 03	178.3	11 28.7	1.0 03	178.3	2
3	18 56.8	1.0 04	177.2	18 26.8	1.0 04	177.2	17 56.8	1.0 04	177.2	16 56.9	1.0 04	177.3	14 57.0	1.0 04	177.4	12 57.1	1.0 04	177.4	12 27.1	1.0 04	177.5	11 27.1	1.0 04	177.5	3
4	18 54.3	1.0 05	176.3	18 24.3	1.0 05	176.3	17 54.4	1.0 05	176.3	16 54.5	1.0 05	176.4	14 54.6	1.0 05	176.5	12 54.8	1.0 05	176.6	12 24.8	1.0 05	176.6	11 24.9	1.0 05	176.7	4
05	18 51.1	1.0 07	175.3	18 21.1	1.0 06	175.4	17 51.2	1.0 06	175.4	16 51.3	1.0 06	175.5	14 51.6	1.0 06	175.6	12 51.9	1.0 06	175.7	12 21.9	1.0 06	175.8	11 22.1	1.0 06	175.8	05
6	18 47.1	1.0 08	174.4	18 17.2	1.0 08	174.4	17 47.3	1.0 08	174.5	16 47.5	1.0 08	174.6	14 47.9	1.0 07	174.7	12 48.3	1.0 07	174.9	12 18.4	1.0 07	174.9	11 18.6	1.0 07	175.0	6
7	18 42.5	1.0 09	173.5	18 12.6	1.0 09	173.5	17 42.8	1.0 09	173.6	16 43.0	1.0 09	173.7	14 43.6	1.0 08	173.9	12 44.1	1.0 08	174.1	12 14.2	1.0 08	174.1	11 14.4	1.0 08	174.2	7
8	18 37.2	99 10	172.5	18 07.3	99 10	172.6	17 37.5	99 10	172.7	16 37.9	99 10	172.8	14 38.5	99 09	173.0	12 39.2	99 09	173.2	12 09.4	99 09	173.3	11 09.7	99 09	173.4	8
9	18 31.1	99 11	171.6	18 01.4	99 11	171.7	17 31.6	99 11	171.8	16 32.0	99 11	171.9	14 32.9	99 11	172.1	12 33.7	99 10	172.4	12 03.9	99 10	172.4	11 04.3	99 10	172.5	9
10	18 24.4	99 12	170.7	17 54.7	99 12	170.8	17 24.9	99 12	170.8	16 25.5	99 12	171.0	14 26.5	99 12	171.3	12 27.5	99 11	171.5	11 57.8	99 11	171.6	10 58.3	99 11	171.7	10
1	18 17.0	99 14	169.8	17 47.3	99 13	169.9	17 17.6	99 13	169.9	16 18.2	99 13	170.1	14 19.5	99 13	170.4	12 20.7	99 12	170.7	11 51.1	99 12	170.8	10 51.7	99 12	170.9	1
2	18 06.8	99 15	168.9	17 39.2	99 15	168.9	17 09.6	99 14	169.0	16 10.4	99 14	169.2	14 11.9	99 14	169.5	12 13.3	99 13	169.8	11 43.7	99 13	169.9	10 44.4	99 13	170.1	2
3	18 00.0	98 16	167.9	17 30.5	99 16	168.0	17 00.9	99 16	168.1	16 01.8	99 15	168.3	14 03.5	99 15	168.7	12 05.3	99 14	169.0	11 35.7	99 14	169.1	10 36.5	99 14	169.3	3
4	17 50.5	98 17	167.0	17 21.0	98 17	167.1	16 51.5	98 17	167.2	15 52.6	98 16	167.4	13 54.6	98 16	167.8	11 56.6	98 15	168.2	11 27.1	98 15	168.3	10 28.1	98 15	168.4	4
15	17 40.3	98 18	166.1	17 10.9	98 18	166.2	16 41.5	98 18	166.3	15 42.7	98 18	166.5	13 45.0	98 17	166.9	11 47.3	98 17	167.3	11 17.8	98 16	167.4	10 19.0	98 16	167.6	15
6	17 29.4	98 19	165.2	17 00.1	98 19	165.3	16 30.8	98 19	165.4	15 32.1	98 19	165.7	13 34.8	98 18	166.1	11 37.4	98 18	166.5	11 08.0	98 17	166.6	10 09.3	98 17	166.8	6
7	17 17.9	97 20	164.3	16 48.7	97 20	164.4	16 19.4	97 20	164.5	15 20.9	98 20	164.8	13 23.9	98 19	165.2	11 26.8	98 19	165.7	10 57.5	98 18	165.8	9 59.0	98 18	166.0	7
8	17 05.7	97 21	163.4	16 36.6	97 21	163.5	16 07.4	97 21	163.7	15 09.1	97 21	163.9	13 12.4	97 20	164.4	11 15.6	97 20	164.9	10 46.5	97 19	165.0	9 48.1	97 19	165.2	8
9	16 52.9	97 22	162.5	16 23.8	97 22	162.6	15 54.7	97 22	162.8	14 56.6	97 22	163.0	13 00.3	97 21	163.5	11 03.9	97 21	164.0	10 34.8	97 20	164.2	9 36.6	97 20	164.4	9
20	16 39.4	97 24	161.6	16 10.4	97 23	161.8	15 41.4	97 23	161.9	14 43.5	97 23	162.2	12 47.5	97 22	162.7	10 51.5	97 22	163.2	10 22.5	97 21	163.3	9 24.5	97 21	163.6	20
1	16 25.2	96 25	160.7	15 56.3	96 24	160.9	15 27.5	96 24	161.0	14 29.7	96 24	161.3	12 34.2	96 23	161.9	10 38.5	96 23	162.4	10 09.6	96 22	162.5	9 11.8	96 22	162.8	1
2	16 10.4	96 26	159.9	15 41.7	96 26	160.0	15 12.9	96 25	160.2	14 15.4	96 25	160.4	12 20.2	96 24	161.0	10 25.0	96 24	161.6	9 56.2	96 23	161.7	8 58.5	96 23	162.0	2
3	15 55.0	96 27	159.0	15 26.3	96 27	159.1	14 57.7	96 26	159.3	14 00.4	96 26	159.6	12 05.6	96 25	160.2	10 10.8	96 25	160.8	9 42.1	96 24	160.9	8 44.7	96 24	161.2	3
4	15 38.9	96 28	158.1	15 10.4	96 28	158.3	14 41.8	96 27	158.4	13 44.7	96 27	158.7	11 50.5	96 26	159.4	9 56.1	96 26	160.0	9 27.5	96 25	160.1	8 30.3	96 25	160.4	4
25	15 22.3	96 29	157.2	14 53.8	96 29	157.4	14 25.4	96 28	157.6	13 28.5	96 28	157.9	11 34.7	96 27	158.5	9 40.8	96 26	159.2	9 12.3	96 26	159.3	8 15.3	96 26	159.7	25
6	15 05.0	94 30	156.4	14 36.7	94 30	156.5	14 08.4	94 29	156.7	13 11.7	94 29	157.0	11 18.4	96 28	157.7	9 24.9	96 27	158.4	8 56.5	96 27	158.5	7 59.8	96 27	158.9	6
7	14 47.1	94 31	155.5	14 18.9	94 31	155.7	13 50.7	94 30	155.9	12 54.3	94 30	156.2	11 01.4	94 29	156.9	9 08.5	94 28	157.6	8 40.2	94 28	157.8	7 43.7	94 28	158.1	7
8	14 28.6	94 32	154.7	14 00.5	94 32	154.8	13 32.5	94 31	155.0	12 36.3	94 31	155.4	10 43.9	94 30	156.1	8 51.5	94 29	156.8	8 23.3	94 29	157.0	7 27.0	94 29	157.3	8
9	14 09.5	93 33	153.8	13 41.6	93 33	154.0	13 13.6	93 32	154.2	12 17.8	93 32	154.6	10 25.9	93 31	155.3	8 33.9	93 30	156.0	8 05.9	93 30	156.2	7 09.9	93 30	156.6	9
30	13 49.8	93 34	153.0	13 22.0	93 34	153.2	12 54.2	93 33	153.3	11 58.6	93 33	153.7	10 07.3	93 32	154.5	8 15.8	93 31	155.2	7 47.9	93 31	155.4	6 52.1	93 30	155.8	30
1	13 29.6	92 35	152.1	13 01.9	92 34	152.3	12 34.3	92 34	152.5	11 38.9	92 34	152.9	9 48.1	92 33	153.7	7 57.1	92 32	154.5	7 29.4	92 32	154.7	6 33.9	93 31	155.0	1
2	13 08.8	92 36	151.3	12 41.3	92 35	151.5	12 13.7	92 35	151.7	11 18.6	92 35	152.1	9 28.4	92 34	152.9	7 38.0	92 33	153.7	7 10.3	92 33	153.9	6 15.1	92 32	154.3	2
3	12 47.4	91 37	150.5	12 20.1	91 36	150.7	11 52.7	91 36	150.9	10 57.8	91 36	151.3	9 08.1	91 35	152.1	7 18.2	92 34	152.9	6 50.8	92 34	153.1	5 55.8	92 33	153.5	3
4	12 25.5	91 37	149.6	11 58.3	91 37	149.8	11 31.0	91 37	150.1	10 36.5	91 36	150.5	8 47.3	91 36	151.3	6 58.0	91 35	152.2	6 30.7	91 34	152.4	5 36.0	91 34	152.8	4
35	12 03.1	90 38	148.8	11 36.0	90 38	149.0	11 08.9	90 38	149.2	10 14.6	90 37	149.7	8 26.0	91 36	150.5	6 37.3	91 35	151.4	6 10.1	91 35	151.6	5 15.6	91 35	152.0	35
6	11 40.1	90 39	148.0	11 13.1	90 39	148.2	10 46.2	90 39	148.4	9 52.2	90 38	148.9	8 04.1	90 37	149.8	6 16.0	90 36	150.6	5 48.9	90 36	150.9				6
7	11 16.6	89 40	147.2	10 49.8	89 40	147.4	10 22.9	89 40	147.6	9 29.3	89 39	148.1	7 41.8	90 38	149.0	5 54.2	90 37	149.9	5 27.3	90 37	150.1				7
8	10 52.5	89 41	146.4	10 25.9	89 41	146.6	9 59.2	89 40	146.9	9 05.8	89 40	147.3	7 18.9	89 39	148.2	5 32.0	89 38	149.1	5 05.2	89 38	149.4				8
9	10 28.0	88 42	145.6	10 01.5	88 41	145.8	9 34.9	88 41	146.1	8 41.9	88 41	146.5	6 55.6	89 40	147.5	5 09.2	89 39	148.4							9
40	10 02.9	88 43	144.8	9 36.6	88 42	145.0	9 10.2	88 42	145.3	8 17.4	88 42	145.8	6 31.8	88 41	146.7										40
1	9 37.4	87 43	144.0	9 11.2	87 43	144.3	8 45.0	87 43	144.5	7 52.5	87 42	145.0	6 07.5	88 41	146.0										1
2	9 11.4	87 44	143.2	8 45.3	87 44	143.5	8 19.3	87 44	143.7	7 27.1	87 43	144.2	5 42.7	87 42	145.2										2
3	8 44.9	86 45	142.5	8 19.0	86 45	142.7	7 53.1	86 44	143.0	7 01.2	86 44	143.5	5 17.4	87 43	144.5										3
4	8 17.9	86 46	141.7	7 52.2	86 45	142.0	7 26.4	86 45	142.2	6 34.9	86 45	142.7													4
45	7 50.5	85 46	140.9	7 24.9	85 46	141.2	6 59.3	85 46	141.5	6 08.1	85 45	142.0													45
6	7 22.6	85 47	140.2	6 57.2	85 47	140.4	6 31.7	85 47	140.7	5 40.8	85 46	141.2													6
7	6 54.3	84 48	139.4	6 29.0	84 48	139.7	6 03.7	84 47	140.0	5 13.1	84 47	140.5													7
8	6 25.5	84 49	138.7	6 00.4	84 48	139.0	5 35.3	84 48	139.2																8
9	5 56.3	83 49	137.9	5 31.4	83 49	138.2	5 06.4	83 49	138.5																9
50	5 26.7	83 50	137.2	5 01.9	83 50	137.5																			50

DECLINATION SAME NAME AS LATITUDE

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	17 59.6	64 68	68.2	18 18.8	64 68	67.8	18 37.9	64 67	67.3	19 15.9	63 67	66.5	20 31.4	62 66	64.9	21 45.8	62 65	63.2	22 04.3	61 65	62.8	22 41.0	61 64	61.9	91
2	17 19.0	64 67	67.6	17 38.2	64 67	67.2	17 57.5	64 67	66.8	18 35.8	64 67	65.9	19 51.7	63 66	64.3	21 06.8	62 65	62.6	21 25.4	62 65	62.2	22 02.4	61 64	61.4	2
3	16 38.5	65 67	67.0	16 57.9	65 67	66.6	17 17.2	64 67	66.2	17 55.8	64 66	65.4	19 12.3	63 65	63.7	20 27.9	63 64	62.1	20 46.7	62 64	61.7	21 24.0	62 64	60.8	3
4	15 58.2	65 67	66.4	16 17.7	65 67	66.0	16 37.2	65 66	65.6	17 16.0	65 66	64.8	18 33.0	64 65	63.2	19 49.2	63 64	61.5	20 08.1	63 64	61.1	20 45.8	63 63	60.3	4
95	15 18.1	66 67	65.8	15 37.7	65 66	65.4	15 57.3	65 66	65.0	16 36.4	65 66	64.2	17 54.0	64 65	62.6	19 10.8	64 64	61.0	19 29.8	63 64	60.6	20 07.8	63 63	59.7	95
6	14 38.2	66 66	65.2	14 57.9	66 66	64.8	15 17.7	66 66	64.4	15 57.0	65 65	63.6	17 15.1	65 64	62.0	18 32.5	64 63	60.4	18 51.7	64 63	60.0	19 30.0	64 63	59.2	6
7	13 58.4	66 66	64.6	14 18.3	66 66	64.2	14 38.2	66 65	63.8	15 17.8	66 65	63.0	16 36.5	65 64	61.4	17 54.4	65 63	59.9	18 13.8	64 63	59.5	18 52.4	64 62	58.6	7
8	13 18.9	67 66	64.0	13 38.9	67 65	63.6	13 58.9	67 65	63.2	14 38.8	66 65	62.4	15 58.0	66 64	60.9	17 16.6	65 63	59.3	17 36.1	65 62	58.9	18 15.0	65 62	58.1	8
9	12 39.6	67 65	63.4	12 59.7	67 65	63.0	13 19.9	67 65	62.6	14 00.0	67 64	61.8	15 19.8	66 63	60.3	16 39.0	66 62	58.7	16 58.7	66 62	58.3	17 37.9	65 62	57.5	9
100	12 00.5	68 65	62.7	12 20.8	68 65	62.4	12 41.0	67 64	62.0	13 21.4	67 64	61.2	14 41.8	67 63	59.7	16 01.6	66 62	58.2	16 21.4	66 62	57.8	17 01.0	66 61	57.0	100
1	11 21.6	68 64	62.1	11 42.0	68 64	61.8	12 02.4	68 64	61.4	12 43.1	68 64	60.6	14 04.0	67 63	59.1	15 24.4	67 62	57.6	15 44.4	67 61	57.2	16 24.3	66 61	56.4	1
2	10 42.9	69 64	61.5	11 03.4	68 64	61.1	11 24.0	68 64	60.8	12 04.9	68 63	60.0	13 26.5	68 62	58.5	14 47.5	67 61	57.0	15 07.7	67 61	56.6	15 47.9	67 60	55.9	2
3	10 04.4	69 64	60.9	10 25.1	69 63	60.5	10 45.8	69 63	60.2	11 27.0	69 63	59.4	12 49.2	68 62	57.9	14 10.8	68 61	56.4	14 31.2	68 60	56.0	15 11.7	67 60	55.3	3
4	9 26.2	69 63	60.3	9 47.0	69 63	59.9	10 07.8	69 63	59.6	10 49.4	69 62	58.8	12 12.1	69 61	57.3	13 34.4	68 60	55.8	13 54.9	68 60	55.5	14 35.7	68 60	54.7	4
105	8 48.2	70 63	59.7	9 09.2	70 63	59.3	9 30.1	70 62	58.9	10 12.0	70 62	58.2	11 35.3	69 61	56.7	12 58.2	69 60	55.3	13 18.9	69 60	54.9	14 00.0	69 59	54.1	105
6	8 10.5	70 63	59.0	8 31.6	70 62	58.7	8 52.7	70 62	58.3	9 34.8	70 62	57.6	10 58.7	70 61	56.1	12 22.3	69 59	54.7	12 43.1	69 59	54.3	13 24.6	69 59	53.6	6
7	7 33.0	71 62	58.4	7 54.2	71 62	58.0	8 15.4	71 62	57.7	8 57.9	71 61	57.0	10 22.4	70 60	55.5	11 46.6	70 59	54.1	12 07.6	70 59	53.7	12 49.4	70 58	53.0	7
8	6 55.7	71 62	57.8	7 17.1	71 61	57.4	7 38.5	71 61	57.1	8 21.2	71 61	56.4	9 46.4	71 60	54.9	11 11.2	71 59	53.5	11 32.3	70 58	53.1	12 14.5	70 58	52.4	8
9	6 18.7	72 61	57.1	6 40.3	72 61	56.8	7 01.8	72 61	56.4	7 44.8	72 60	55.7	9 10.6	71 59	54.3	10 36.1	71 58	52.9	10 57.4	71 58	52.5	11 39.9	71 57	51.8	9
110	5 42.0	72 61	56.5	6 03.7	72 60	56.1	6 25.4	72 60	55.8	7 08.7	72 60	55.1	8 35.1	72 59	53.7	10 01.2	72 58	52.3	10 22.7	72 57	51.9	11 05.6	71 57	51.2	110
1	5 05.5	73 60	55.8	5 27.4	73 60	55.5	5 49.2	73 60	55.2	6 32.8	73 59	54.5	7 59.9	72 58	53.1	9 26.6	72 57	51.7	9 48.3	72 57	51.3	10 31.5	72 56	50.6	1
2							5 13.3	73 59	54.5	5 57.3	73 59	53.8	7 24.9	73 58	52.5	8 52.4	73 57	51.1	9 14.2	73 56	50.7	9 57.7	73 56	50.0	2
3										5 22.0	74 58	53.2	6 50.3	74 57	51.8	8 18.4	73 56	50.5	8 40.3	73 56	50.1	9 24.2	73 55	49.4	3
4													6 15.9	74 57	51.2	7 44.7	74 56	49.8	8 06.8	74 55	49.5	8 51.1	74 55	48.8	4
115													5 41.9	75 56	50.6	7 11.3	74 55	49.2	7 33.6	74 55	48.9	8 18.2	74 54	48.2	115
6													5 08.1	75 56	49.9	6 38.2	75 55	48.6	7 00.7	75 54	48.3	7 45.6	75 54	47.6	6
7																6 05.5	76 54	48.0	6 28.1	75 54	47.6	7 13.4	75 53	47.0	7
8																5 33.0	76 53	47.3	5 55.8	76 53	47.0	6 41.5	76 53	46.4	8
9																5 00.9	77 53	46.7	5 23.9	77 53	46.4	6 09.9	77 52	45.7	9
120																						5 38.6	77 52	45.1	120
1																						5 07.7	78 51	44.5	1

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Lat. 43°

H.A.	12° 00′ Alt.	Δd	Δt	Az.	12° 30′ Alt.	Δd	Δt	Az.	13° 00′ Alt.	Δd	Δt	Az.	13° 30′ Alt.	Δd	Δt	Az.
°	° ′			°	° ′			°	° ′			°	° ′			°
00	59 00.0	1.0	01	180.0	59 30.0	1.0	01	180.0	60 00.0	1.0	01	180.0	60 30.0	1.0	01	180.0
1	58 59.3	1.0	04	178.1	59 29.3	1.0	04	178.1	59 59.3	1.0	04	178.1	60 29.2	1.0	04	178.0
2	58 57.1	1.0	06	176.2	59 27.1	1.0	06	176.2	59 57.0	1.0	06	176.1	60 27.0	1.0	06	176.1
3	58 53.5	1.0	08	174.3	59 23.4	1.0	09	174.2	59 53.3	1.0	09	174.2	60 23.2	1.0	09	174.1
4	58 48.4	1.0	11	172.4	59 18.3	1.0	11	172.3	59 48.1	99	11	172.2	60 17.9	99	11	172.1
05	58 41.9	99	13	170.6	59 11.7	99	13	170.4	59 41.4	99	13	170.3	60 11.2	99	14	170.2
6	58 34.0	99	15	168.7	59 03.7	99	16	168.6	59 33.3	99	16	168.4	60 03.0	99	16	168.3
7	58 24.7	99	18	166.8	58 54.3	99	18	166.7	59 23.8	98	18	166.5	59 53.3	98	18	166.3
8	58 14.0	98	20	165.0	58 43.5	98	20	164.8	59 12.9	98	21	164.6	59 42.3	98	21	164.4
9	58 02.0	98	22	163.2	58 31.3	98	22	163.0	59 00.6	98	23	162.8	59 29.8	97	23	162.6
10	57 48.7	97	24	161.4	58 17.8	97	25	161.2	58 46.9	97	25	160.9	59 16.0	97	25	160.7
1	57 34.1	97	26	159.6	58 03.0	96	27	159.4	58 31.9	96	27	159.1	59 00.8	96	27	158.9
2	57 18.2	96	29	157.9	57 46.9	96	29	157.6	58 15.7	96	29	157.4	58 44.4	96	30	157.1
3	57 01.0	95	31	156.2	57 29.6	96	31	155.9	57 58.1	95	31	155.6	58 26.6	95	32	155.3
4	56 42.7	95	32	154.5	57 11.1	95	33	154.2	57 39.4	94	33	153.9	58 07.7	94	34	153.5
15	56 23.2	94	34	152.8	56 51.4	94	35	152.5	57 19.5	94	35	152.2	57 47.6	93	35	151.8
6	56 02.6	93	36	151.1	56 30.5	93	37	150.8	56 58.4	93	37	150.5	57 26.3	93	37	150.1
7	55 40.8	93	38	149.5	56 08.6	92	38	149.2	56 36.2	92	39	148.8	57 03.9	92	39	148.5
8	55 18.1	92	40	147.9	55 45.6	92	40	147.6	56 13.0	91	40	147.2	56 40.4	91	41	146.8
9	54 54.3	91	41	146.4	55 21.5	91	42	146.0	55 48.7	91	42	145.6	56 15.9	90	43	145.2
20	54 29.5	90	43	144.8	54 56.5	90	43	144.5	55 23.5	90	44	144.1	55 50.4	90	44	143.7
1	54 03.7	89	44	143.3	54 30.5	89	45	142.9	54 57.3	89	45	142.5	55 23.9	89	46	142.1
2	53 37.1	89	46	141.8	54 03.6	88	46	141.5	54 30.1	88	47	141.1	54 56.5	88	47	140.6
3	53 09.5	88	47	140.4	53 35.9	88	48	140.0	54 02.1	87	48	139.6	54 28.3	87	48	139.2
4	52 41.1	87	49	139.0	53 07.2	87	49	138.6	53 33.2	87	49	138.2	53 59.2	86	50	137.7
25	52 11.9	86	50	137.6	52 37.8	86	50	137.2	53 03.6	86	51	136.8	53 29.2	85	51	136.3
6	51 41.9	86	51	136.2	52 07.6	85	52	135.8	52 33.1	85	52	135.4	52 58.6	85	52	134.9
7	51 11.2	85	52	134.9	51 36.6	85	53	134.5	52 01.9	84	53	134.0	52 27.1	84	54	133.6
8	50 39.8	84	54	133.6	51 05.0	84	54	133.1	51 30.0	83	54	132.7	51 55.0	83	55	132.3
9	50 07.7	83	55	132.3	50 32.6	83	55	131.9	50 57.4	83	55	131.4	51 22.2	82	56	131.0
30	49 34.9	83	56	131.0	49 59.6	82	56	130.6	50 24.2	82	56	130.2	50 48.7	82	57	129.7
1	49 01.5	82	57	129.8	49 26.0	82	57	129.4	49 50.4	81	57	128.9	50 14.7	81	58	128.5
2	48 27.5	81	58	128.6	48 51.8	81	58	128.1	49 15.9	80	58	127.7	49 40.0	80	59	127.2
3	47 52.9	80	59	127.4	48 17.0	80	59	127.0	48 40.9	80	59	126.5	49 04.8	79	60	126.0
4	47 17.8	80	59	126.2	47 41.6	79	60	125.8	48 05.4	79	60	125.3	48 29.1	79	60	124.9
35	46 42.1	79	60	125.1	47 05.8	79	61	124.7	47 29.4	78	61	124.2	47 52.8	78	61	123.7
6	46 06.0	78	61	124.0	46 29.4	78	61	123.5	46 52.8	78	62	123.1	47 16.1	77	62	122.6
7	45 29.3	78	62	122.9	45 52.6	77	62	122.4	46 15.8	77	62	122.0	46 38.9	77	63	121.5
8	44 52.3	77	62	121.8	45 15.4	77	63	121.4	45 38.4	77	63	120.9	46 01.3	76	63	120.4
9	44 14.8	77	63	120.8	44 37.7	76	63	120.3	45 00.5	76	64	119.9	45 23.3	76	64	119.4
40	43 36.9	76	64	119.7	43 59.6	76	64	119.3	44 22.3	75	64	118.8	44 44.8	75	65	118.4
1	42 58.6	75	64	118.7	43 21.2	75	65	118.3	43 43.6	75	65	117.8	44 06.0	74	65	117.3
2	42 19.9	75	65	117.7	42 42.3	75	65	117.3	43 04.7	74	66	116.8	43 26.9	74	66	116.3
3	41 40.9	74	66	116.7	42 03.2	74	66	116.3	42 25.3	74	66	115.8	42 47.4	73	66	115.4
4	41 01.5	74	66	115.8	41 23.6	74	66	115.3	41 45.7	73	67	114.9	42 07.6	73	67	114.4
45	40 21.8	73	67	114.8	40 43.8	73	67	114.4	41 05.7	73	67	113.9	41 27.5	72	67	113.4
6	39 41.9	73	67	113.9	40 03.7	73	67	113.4	40 25.4	72	68	113.0	40 47.1	72	68	112.5
7	39 01.6	73	68	112.9	39 23.3	72	68	112.5	39 44.9	72	68	112.1	40 06.4	71	68	111.6
8	38 21.0	72	68	112.0	38 42.6	72	68	111.6	39 04.1	71	68	111.2	39 25.5	71	69	110.7
9	37 40.2	72	68	111.2	38 01.7	71	69	110.7	38 23.0	71	69	110.3	38 44.3	71	69	109.8
50	36 59.2	71	69	110.3	37 20.5	71	69	109.8	37 41.8	71	69	109.4	38 02.9	70	69	108.9
1	36 17.9	71	69	109.4	36 39.1	71	69	109.0	37 00.3	70	70	108.5	37 21.3	70	70	108.1
2	35 36.4	71	69	108.5	35 57.5	70	70	108.1	36 18.6	70	70	107.7	36 39.5	70	70	107.2
3	34 54.7	70	70	107.7	35 15.7	70	70	107.3	35 36.6	70	70	106.8	35 57.5	69	70	106.4
4	34 12.8	70	70	106.9	34 33.7	70	70	106.4	34 54.6	69	70	106.0	35 15.3	69	71	105.6
55	33 30.7	70	70	106.1	33 51.6	69	71	105.6	34 12.3	69	71	105.2	34 32.9	69	71	104.7
6	32 48.5	69	71	105.2	33 09.2	69	71	104.8	33 29.9	69	71	104.4	33 50.4	68	71	103.9
7	32 06.1	69	71	104.4	32 26.7	69	71	104.0	32 47.3	68	71	103.6	33 07.7	68	71	103.1
8	31 23.5	69	71	103.6	31 44.1	68	71	103.2	32 04.6	68	71	102.8	32 24.9	68	72	102.4
9	30 40.8	68	71	102.9	31 01.3	68	72	102.4	31 21.7	68	72	102.0	31 42.0	68	72	101.6
60	29 57.9	68	72	102.1	30 18.4	68	72	101.7	30 38.7	68	72	101.2	30 59.0	67	72	100.8
1	29 15.0	68	72	101.3	29 35.3	68	72	100.9	29 55.6	67	72	100.5	30 15.8	67	72	100.1
2	28 31.9	68	72	100.6	28 52.2	68	72	100.2	29 12.4	67	72	99.7	29 32.6	67	72	99.3
3	27 48.7	68	72	99.8	28 09.0	67	72	99.4	28 29.1	67	72	99.0	28 49.2	67	72	98.6
4	27 05.4	67	72	99.1	27 25.6	67	72	98.7	27 45.7	67	72	98.2	28 05.8	67	73	97.8
65	26 22.0	67	72	98.3	26 42.2	67	73	97.9	27 02.3	67	73	97.5	27 22.3	67	73	97.1
6	25 38.6	67	73	97.6	25 58.7	67	73	97.2	26 18.7	67	73	96.8	26 38.7	66	73	96.4
7	24 55.1	67	73	96.9	25 15.1	67	73	96.5	25 35.1	67	73	96.1	25 55.0	66	73	95.6
8	24 11.5	67	73	96.2	24 31.5	67	73	95.7	24 51.5	66	73	95.3	25 11.4	66	73	94.9
9	23 27.8	67	73	95.4	23 47.8	67	73	95.0	24 07.7	66	73	94.6	24 27.6	66	73	94.2
70	22 44.1	67	73	94.7	23 04.1	66	73	94.3	23 24.0	66	73	93.9	23 43.8	66	73	93.5
1	22 00.3	67	73	94.0	22 20.3	66	73	93.6	22 40.2	66	73	93.2	23 00.0	66	73	92.8
2	21 16.5	67	73	93.3	21 36.5	66	73	92.9	21 56.4	66	73	92.5	22 16.2	66	73	92.1
3	20 32.7	67	73	92.6	20 52.6	66	73	92.2	21 12.5	66	73	91.8	21 32.3	66	73	91.4
4	19 48.9	66	73	91.9	20 08.8	66	73	91.5	20 28.6	66	73	91.1	20 48.4	66	73	90.7
75	19 05.0	66	73	91.2	19 24.9	66	73	90.9	19 44.8	66	73	90.5	20 04.6	66	73	90.1
6	18 21.1	66	73	90.6	18 41.0	66	73	90.2	19 00.9	66	73	89.8	19 20.7	66	73	89.4
7	17 37.3	66	73	89.9	17 57.2	66	73	89.5	18 17.0	66	73	89.1	18 36.8	66	73	88.7
8	16 53.4	66	73	89.2	17 13.3	66	73	88.8	17 33.1	66	73	88.4	17 52.9	66	73	88.0
9	16 09.5	66	73	88.5	16 29.4	66	73	88.1	16 49.3	66	73	87.7	17 09.1	66	73	87.4
80	15 25.6	66	73	87.8	15 45.6	66	73	87.5	16 05.4	66	73	87.1	16 25.3	66	73	86.7
1	14 41.8	67	73	87.2	15 01.7	66	73	86.8	15 21.6	66	73	86.4	15 41.5	66	73	86.0
2	13 58.0	67	73	86.5	14 17.9	66	73	86.1	14 37.9	66	73	85.7	14 57.7	66	73	85.3
3	13 14.2	67	73	85.8	13 34.2	67	73	85.4	13 54.1	66	73	85.1	14 14.0	66	73	84.7
4	12 30.5	67	73	85.2	12 50.5	67	73	84.8	13 10.4	66	73	84.4	13 30.3	66	73	84.0
85	11 46.8	67	73	84.5	12 06.8	67	73	84.1	12 26.8	67	73	83.7	12 46.7	66	73	83.4
6	11 03.1	67	73	83.8	11 23.2	67	73	83.4	11 43.2	67	73	83.1	12 03.2	67	72	82.7
7	10 19.5	67	73	83.2	10 39.6	67	72	82.8	10 59.7	67	72	82.4	11 19.7	67	72	82.0
8	9 36.0	67	72	82.5	9 56.1	67	72	82.1	10 16.2	67	72	81.7	10 36.3	67	72	81.4
9	8 52.5	67	72	81.8	9 12.7	67	72	81.5	9 32.8	67	72	81.1	9 52.9	67	72	80.7
90	8 09.1	67	72	81.2	8 29.3	67	72	80.8	8 49.5	67	72	80.4	9 09.7	67	72	80.0

H.A.	14° 00′ Alt.	Δd	Δt	Az.	14° 30′ Alt.	Δd	Δt	Az.	15° 00′ Alt.	Δd	Δt	Az.	15° 30′ Alt.	Δd	Δt	Az.
°	° ′			°	° ′			°	° ′			°	° ′			°
00	61 00.0	1.0	01	180.0	61 30.0	1.0	01	180.0	62 00.0	1.0	01	180.0	62 30.0	1.0	01	180.0
1	60 59.2	1.0	04	178.0	61 29.2	1.0	04	178.0	61 59.2	1.0	04	177.9	62 29.2	1.0	04	177.9
2	60 56.9	1.0	06	176.0	61 26.9	1.0	06	175.9	61 56.9	1.0	07	175.9	62 26.8	1.0	07	175.8
3	60 53.1	1.0	09	174.0	61 23.0	1.0	09	173.9	61 52.9	1.0	09	173.8	62 22.8	1.0	09	173.8
4	60 47.8	99	11	172.0	61 17.6	99	12	171.9	61 47.4	99	12	171.8	62 17.3	99	12	171.7
05	60 40.9	99	14	170.1	61 10.7	99	14	169.9	61 40.4	99	14	169.8	62 10.1	99	14	169.6
6	60 32.6	99	16	168.1	61 02.3	99	17	167.9	61 31.9	99	17	167.8	62 01.5	99	17	167.6
7	60 22.9	98	19	166.2	60 52.4	98	19	166.0	61 21.8	98	19	165.8	61 51.3	98	19	165.6
8	60 11.6	98	21	164.2	60 41.0	98	21	164.0	61 10.3	98	22	163.8	61 39.6	98	22	163.6
9	59 59.0	97	23	162.3	60 28.2	97	24	162.1	60 57.4	97	24	161.9	61 26.5	97	24	161.6
10	59 45.0	97	26	160.5	60 14.0	97	26	160.2	60 43.0	97	26	159.9	61 12.0	96	27	159.7
1	59 29.7	96	28	158.6	59 58.5	96	28	158.3	60 27.3	96	28	158.1	60 56.1	96	29	157.8
2	59 13.0	95	30	156.8	59 41.6	95	30	156.5	60 10.2	95	31	156.2	60 38.8	95	31	155.9
3	58 55.1	95	32	155.0	59 23.5	95	32	154.7	59 51.9	94	33	154.4	60 20.2	94	33	154.0
4	58 35.9	94	34	153.2	59 04.1	94	34	152.9	59 32.3	94	35	152.6	60 00.4	94	35	152.2
15	58 15.6	93	36	151.5	58 43.5	93	36	151.1	59 11.4	93	37	150.8	59 39.3	93	37	150.4
6	57 54.0	93	38	149.8	58 21.8	92	38	149.4	58 49.4	92	39	149.0	59 17.0	92	39	148.7
7	57 31.4	92	40	148.1	57 58.9	92	40	147.7	58 26.3	91	40	147.3	58 53.7	91	41	147.0
8	57 07.7	91	41	146.5	57 34.9	91	42	146.1	58 02.1	90	42	145.7	58 29.2	90	43	145.3
9	56 42.9	90	43	144.9	57 09.9	90	43	144.5	57 36.8	90	44	144.0	58 03.7	89	44	143.6
20	56 17.2	89	45	143.3	56 43.9	89	45	142.9	57 10.6	89	45	142.5	57 37.2	88	46	142.0
1	55 50.5	88	46	141.7	56 17.0	88	46	141.3	56 43.4	88	47	140.9	57 09.7	88	47	140.4
2	55 22.9	88	48	140.2	55 49.1	87	48	139.8	56 15.2	87	48	139.4	56 41.3	87	49	138.9
3	54 54.3	87	49	138.7	55 20.3	86	49	138.3	55 46.2	86	50	137.9	56 12.0	86	50	137.4
4	54 25.0	86	50	137.3	54 50.7	86	51	136.9	55 16.4	85	51	136.4	55 41.9	85	52	135.9
25	53 54.8	85	52	135.9	54 20.3	85	52	135.4	54 45.7	84	52	135.0	55 11.0	84	53	134.5
6	53 23.9	84	53	134.5	53 49.1	84	53	134.0	54 14.3	84	54	133.6	54 39.3	83	54	133.1
7	52 52.2	84	54	133.1	53 17.2	83	54	132.7	53 42.1	83	55	132.2	54 06.9	82	55	131.7
8	52 19.9	83	55	131.8	52 44.6	82	55	131.3	53 09.3	82	56	130.9	53 33.8	82	56	130.4
9	51 46.8	82	56	130.5	52 11.4	82	56	130.0	52 35.8	81	57	129.6	53 00.1	81	57	129.1
30	51 13.1	81	57	129.2	51 37.4	81	58	128.8	52 01.6	80	58	128.3	52 25.7	80	58	127.8
1	50 38.9	80	58	128.0	51 02.9	80	58	127.5	51 26.9	80	59	127.0	51 50.7	79	59	126.5
2	50 04.0	80	59	126.8	50 27.8	79	59	126.3	50 51.6	79	60	125.8	51 15.2	79	60	125.3
3	49 28.6	79	60	125.6	49 52.2	79	60	125.1	50 15.7	78	61	124.6	50 39.1	78	61	124.1
4	48 52.6	78	61	124.4	49 16.1	78	61	123.9	49 39.4	78	61	123.5	50 02.6	77	62	123.0
35	48 16.2	78	62	123.3	48 39.4	77	62	122.8	49 02.5	77	62	122.3	49 25.5	76	63	121.8
6	47 39.2	77	62	122.1	48 02.3	77	63	121.7	48 25.2	76	63	121.2	48 48.0	76	63	120.7
7	47 01.9	76	63	121.1	47 24.7	76	63	120.6	47 47.4	76	64	120.1	48 10.1	75	64	119.6
8	46 24.1	76	64	120.0	46 46.7	75	64	119.5	47 09.3	75	64	119.0	47 31.7	75	65	118.5
9	45 45.9	75	64	118.9	46 08.3	75	65	118.4	46 30.7	74	65	118.0	46 53.0	74	65	117.5
40	45 07.3	75	65	117.9	45 29.6	74	65	117.4	45 51.8	74	66	116.9	46 13.8	73	66	116.4
1	44 28.3	74	66	116.9	44 50.4	74	66	116.4	45 12.5	73	66	115.9	45 34.4	73	66	115.4
2	43 49.0	73	66	115.9	44 11.0	73	66	115.4	44 32.8	73	67	114.9	44 54.6	72	67	114.4
3	43 09.3	73	67	114.9	43 31.2	73	67	114.4	43 52.9	72	67	113.9	44 14.5	72	67	113.5
4	42 29.4	72	67	113.9	42 51.1	72	67	113.5	43 12.6	72	68	113.0	43 34.1	71	68	112.5
45	41 49.1	72	68	113.0	42 10.7	72	68	112.5	42 32.1	71	68	112.0	42 53.4	71	68	111.6
6	41 08.6	72	68	112.1	41 30.0	71	68	111.6	41 51.3	71	68	111.1	42 12.5	70	69	110.6
7	40 27.8	71	68	111.1	40 49.1	71	69	110.7	41 10.2	70	69	110.2	41 31.3	70	69	109.7
8	39 46.7	71	69	110.2	40 07.9	70	69	109.8	40 28.9	70	69	109.3	40 49.9	70	69	108.8
9	39 05.4	70	69	109.4	39 26.5	70	69	108.9	39 47.4	70	70	108.4	40 08.2	69	70	108.0
50	38 23.9	70	70	108.5	38 44.9	70	70	108.0	39 05.7	69	70	107.6	39 26.4	69	70	107.1
1	37 42.2	70	70	107.6	38 03.0	69	70	107.2	38 23.7	69	70	106.7	38 44.3	68	70	106.2
2	37 00.3	69	70	106.8	37 21.0	69	70	106.3	37 41.6	69	70	105.9	38 02.1	68	71	105.4
3	36 18.2	69	70	105.9	36 38.8	69	71	105.5	36 59.3	68	71	105.0	37 19.7	68	71	104.6
4	35 35.9	69	71	105.1	35 56.4	68	71	104.7	36 16.9	68	71	104.2	36 37.2	68	71	103.8
55	34 53.5	68	71	104.3	35 13.9	68	71	103.9	35 34.2	68	71	103.4	35 54.5	67	71	102.9
6	34 10.9	68	71	103.5	34 31.2	68	71	103.1	34 51.5	67	71	102.6	35 11.7	67	72	102.2
7	33 28.1	68	71	102.7	33 48.4	67	72	102.3	34 08.6	67	72	101.8	34 28.7	67	72	101.4
8	32 45.3	68	72	101.9	33 05.5	67	72	101.5	33 25.6	67	72	101.0	33 45.6	67	72	100.6
9	32 02.3	67	72	101.1	32 22.4	67	72	100.7	32 42.5	67	72	100.3	33 02.4	66	72	99.8
60	31 19.2	67	72	100.4	31 39.2	67	72	99.9	31 59.2	67	72	99.5	32 19.1	66	72	99.1
1	30 35.9	67	72	99.6	30 56.0	67	72	99.2	31 15.9	66	72	98.8	31 35.8	66	72	98.3
2	29 52.6	67	72	98.9	30 12.6	66	72	98.4	30 32.5	66	72	98.0	30 52.3	66	73	97.6
3	29 09.2	67	72	98.1	29 29.2	66	73	97.7	29 49.0	66	73	97.3	30 08.8	66	73	96.8
4	28 25.7	66	73	97.4	28 45.6	66	73	97.0	29 05.4	66	73	96.5	29 25.2	66	73	96.1
65	27 42.2	66	73	96.7	28 02.0	66	73	96.2	28 21.8	66	73	95.8	28 41.5	65	73	95.4
6	26 58.6	66	73	95.9	27 18.4	66	73	95.5	27 38.1	66	73	95.1	27 57.8	65	73	94.7
7	26 14.9	66	73	95.2	26 34.7	66	73	94.8	26 54.4	66	73	94.4	27 14.0	65	73	94.0
8	25 31.2	66	73	94.5	25 50.9	66	73	94.1	26 10.6	65	73	93.7	26 30.2	65	73	93.2
9	24 47.4	66	73	93.8	25 07.2	66	73	93.4	25 26.8	65	73	93.0	25 46.4	65	73	92.6
70	24 03.6	66	73	93.1	24 23.3	66	73	92.7	24 43.0	65	73	92.3	25 02.6	65	73	91.9
1	23 19.8	66	73	92.4	23 39.5	66	73	92.0	23 59.1	65	73	91.6	24 18.7	65	73	91.2
2	22 35.9	66	73	91.7	22 55.6	66	73	91.3	23 15.3	65	73	90.9	23 34.8	65	73	90.5
3	21 52.1	66	73	91.0	22 11.8	66	73	90.6	22 31.4	65	73	90.2	22 50.9	65	73	89.8
4	21 08.2	66	73	90.3	21 27.9	66	73	89.9	21 47.5	65	73	89.5	22 07.1	65	73	89.1
75	20 24.3	66	73	89.7	20 44.0	66	73	89.3	21 03.6	65	73	88.8	21 23.2	65	73	88.4
6	19 40.4	66	73	89.0	20 00.1	66	73	88.6	20 19.8	65	73	88.2	20 39.3	65	73	87.8
7	18 56.6	66	73	88.3	19 16.3	66	73	87.9	19 35.9	65	73	87.5	19 55.5	65	73	87.1
8	18 12.7	66	73	87.6	18 32.4	66	73	87.2	18 52.1	65	73	86.8	19 11.7	65	73	86.4
9	17 28.9	66	73	87.0	17 48.6	66	73	86.6	18 08.3	66	73	86.2	18 27.9	65	73	85.8
80	16 45.1	66	73	86.3	17 04.8	66	73	85.9	17 24.5	66	73	85.5	17 44.2	65	73	85.1
1	16 01.3	66	73	85.6	16 21.1	66	73	85.2	16 40.8	66	73	84.8	17 00.5	66	73	84.4
2	15 17.6	66	73	85.0	15 37.4	66	73	84.6	15 57.1	66	73	84.2	16 16.8	66	73	83.8
3	14 33.9	66	73	84.3	14 53.7	66	73	83.9	15 13.5	66	73	83.5	15 33.2	66	73	83.1
4	13 50.2	66	73	83.6	14 10.1	66	73	83.2	14 29.9	66	72	82.9	14 49.7	66	72	82.5
85	13 06.7	66	73	83.0	13 26.6	66	72	82.6	13 46.4	66	72	82.2	14 06.2	66	72	81.8
6	12 23.1	66	72	82.3	12 43.1	66	72	81.9	13 03.0	66	72	81.5	13 22.8	66	72	81.2
7	11 39.7	67	72	81.6	11 59.7	67	72	81.3	12 19.6	66	72	80.9	12 39.5	66	72	80.5
8	10 56.3	67	72	81.0	11 16.3	67	72	80.6	11 36.3	67	72	80.2	11 56.3	66	72	79.8
9	10 13.0	67	72	80.3	10 33.1	67	72	79.9	10 53.1	67	72	79.6	11 13.1	67	72	79.2
90	9 29.8	67	72	79.7	9 49.9	67	72	79.3	10 10.0	67	72	78.9	10 30.1	67	72	78.5

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DECLINATION CONTRARY NAME TO LATITUDE

H.A.	12° 00′ Alt.	Az.	12° 30′ Alt.	Az.	13° 00′ Alt.	Az.	13° 30′ Alt.	Az.	14° 00′ Alt.	Az.	14° 30′ Alt.	Az.	15° 00′ Alt.	Az.	15° 30′ Alt.	Az.	H.A.
°	° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		°
00	35 00.0 1.0 01	180.0	34 30.0 1.0 01	180.0	34 00.0 1.0 01	180.0	33 30.0 1.0 01	180.0	33 00.0 1.0 01	180.0	32 30.0 1.0 01	180.0	32 00.0 1.0 01	180.0	31 30.0 1.0 01	180.0	00
1	34 59.5 1.0 02	178.8	34 29.5 1.0 02	178.8	33 59.5 1.0 02	178.8	33 29.6 1.0 02	178.8	32 59.6 1.0 02	178.8	32 29.6 1.0 02	178.9	31 59.6 1.0 02	178.9	31 29.6 1.0 02	178.9	1
2	34 58.2 1.0 04	177.6	34 28.2 1.0 04	177.6	33 58.2 1.0 04	177.6	33 28.2 1.0 04	177.7	32 58.2 1.0 04	177.7	32 28.2 1.0 04	177.7	31 58.3 1.0 04	177.7	31 28.3 1.0 04	177.7	2
3	34 55.9 1.0 05	176.4	34 25.9 1.0 05	176.4	33 56.0 1.0 05	176.5	33 26.0 1.0 05	176.5	32 56.0 1.0 05	176.5	32 26.0 1.0 05	176.6	31 56.1 1.0 05	176.6	31 26.1 1.0 05	176.6	3
4	34 52.7 1.0 07	175.2	34 22.7 1.0 07	175.3	33 52.8 1.0 07	175.3	33 22.9 1.0 07	175.3	32 52.9 1.0 07	175.4	32 23.0 1.0 07	175.4	31 53.0 1.0 07	175.4	31 23.1 1.0 06	175.5	4
05	34 48.6 1.0 08	174.0	34 18.7 1.0 08	174.1	33 48.8 1.0 08	174.1	33 18.9 1.0 08	174.2	32 48.9 1.0 08	174.2	32 19.0 1.0 08	174.3	31 49.1 1.0 08	174.3	31 19.2 1.0 08	174.4	05
6	34 43.6 1.0 10	172.9	34 13.7 1.0 10	172.9	33 43.8 1.0 10	173.0	33 14.0 1.0 10	173.0	32 44.1 1.0 10	173.1	32 14.2 1.0 09	173.1	31 44.3 1.0 09	173.2	31 14.5 1.0 09	173.2	6
7	34 37.7 99 11	171.7	34 07.8 99 11	171.7	33 38.0 99 11	171.8	33 08.2 99 11	171.9	32 38.4 99 11	171.9	32 08.5 99 11	172.0	31 38.7 99 11	172.1	31 08.9 99 11	172.1	7
8	34 30.9 99 13	170.5	34 01.1 99 13	170.6	33 31.3 99 13	170.6	33 01.5 99 13	170.7	32 31.8 99 12	170.8	32 02.0 99 12	170.9	31 32.2 99 12	170.9	31 02.4 99 12	171.0	8
9	34 23.2 99 14	169.3	33 53.5 99 14	169.4	33 23.7 99 14	169.5	32 54.0 99 14	169.6	32 24.3 99 14	169.6	31 54.6 99 14	169.7	31 24.9 99 14	169.8	30 55.1 99 14	169.9	9
10	34 14.6 99 16	168.1	33 45.0 99 16	168.2	33 15.3 99 16	168.3	32 45.6 99 15	168.4	32 16.0 99 15	168.5	31 46.3 99 15	168.6	31 16.7 99 15	168.7	30 47.0 99 15	168.8	10
1	34 05.1 99 17	167.0	33 35.6 99 17	167.1	33 06.0 99 17	167.2	32 36.4 99 17	167.3	32 06.8 99 17	167.4	31 37.2 99 17	167.5	31 07.6 99 16	167.6	30 38.0 99 16	167.7	1
2	33 54.8 98 19	165.8	33 25.3 98 18	165.9	32 55.8 98 18	166.0	32 26.3 98 18	166.1	31 56.8 98 18	166.2	31 27.3 98 18	166.4	30 57.8 98 18	166.5	30 28.2 98 18	166.6	2
3	33 43.6 98 20	164.7	33 14.2 98 20	164.8	32 44.8 98 20	164.9	32 15.4 98 20	165.0	31 46.0 98 19	165.1	31 16.5 98 19	165.2	30 47.1 98 19	165.3	30 17.6 98 19	165.5	3
4	33 31.6 98 21	163.5	33 02.3 98 21	163.6	32 33.0 98 21	163.8	32 03.6 98 21	163.9	31 34.3 98 21	164.0	31 04.9 98 21	164.1	30 35.6 98 21	164.2	30 06.2 98 20	164.4	4
15	33 18.7 97 23	162.4	32 49.5 97 23	162.5	32 20.3 97 22	162.6	31 51.0 97 22	162.8	31 21.8 98 22	162.9	30 52.5 98 22	163.0	30 23.3 98 22	163.2	29 54.0 98 22	163.3	15
6	33 05.0 97 24	161.2	32 35.9 97 24	161.4	32 06.8 97 24	161.5	31 37.6 97 24	161.7	31 08.5 97 24	161.8	30 39.3 97 23	161.9	30 10.1 97 23	162.1	29 41.0 97 23	162.2	6
7	32 50.5 97 26	160.1	32 21.5 97 25	160.3	31 52.4 97 25	160.4	31 23.4 97 25	160.5	30 54.4 97 25	160.7	30 25.3 97 25	160.8	29 56.2 97 24	161.0	29 27.2 97 24	161.1	7
8	32 35.2 96 27	159.0	32 06.2 96 27	159.1	31 37.3 96 27	159.3	31 08.4 96 26	159.4	30 39.5 96 26	159.6	30 10.5 97 26	159.8	29 41.5 97 26	159.9	29 12.6 97 26	160.1	8
9	32 19.0 96 28	157.9	31 50.2 96 28	158.0	31 21.4 96 28	158.2	30 52.6 96 28	158.4	30 23.8 96 27	158.5	29 54.9 96 27	158.7	29 26.1 96 27	158.8	28 57.2 96 27	159.0	9
20	32 02.1 96 30	156.8	31 33.4 96 29	156.9	31 04.7 96 29	157.1	30 36.0 96 29	157.3	30 07.3 96 29	157.4	29 38.6 96 28	157.6	29 09.9 96 28	157.8	28 41.1 96 28	157.9	20
1	31 44.4 95 31	155.7	31 15.8 95 31	155.8	30 47.3 95 30	156.0	30 18.7 95 30	156.2	29 50.1 95 30	156.4	29 21.5 95 30	156.5	28 52.9 95 30	156.7	28 24.3 95 29	156.9	1
2	31 25.9 95 32	154.6	30 57.5 95 32	154.8	30 29.1 95 32	154.9	30 00.6 95 31	155.1	29 32.1 95 31	155.3	29 03.7 95 31	155.5	28 35.2 95 31	155.7	28 06.7 95 31	155.8	2
3	31 06.7 94 33	153.5	30 38.4 94 33	153.7	30 10.1 94 33	153.9	29 41.8 94 33	154.1	29 13.4 94 32	154.3	28 45.1 95 32	154.4	28 16.7 95 32	154.6	27 48.3 95 32	154.8	3
4	30 46.7 94 34	152.4	30 18.6 94 34	152.6	29 50.4 94 34	152.8	29 22.2 94 34	153.0	28 54.0 94 34	153.2	28 25.8 94 33	153.4	27 57.6 94 33	153.6	27 29.3 94 33	153.8	4
25	30 26.1 93 36	151.4	29 58.0 93 35	151.6	29 30.0 93 35	151.8	29 02.0 94 35	152.0	28 33.9 94 35	152.2	28 05.8 94 34	152.4	27 37.7 94 34	152.6	27 09.6 94 34	152.8	25
6	30 04.7 93 37	150.3	29 36.8 93 37	150.5	29 08.9 93 36	150.7	28 41.0 93 36	150.9	28 13.1 93 36	151.1	27 45.1 93 36	151.3	27 17.1 93 35	151.5	26 49.1 93 35	151.7	6
7	29 42.6 92 38	149.3	29 14.8 92 38	149.5	28 47.1 93 37	149.7	28 19.3 93 37	149.9	27 51.5 93 37	150.1	27 23.7 93 37	150.3	26 55.9 93 37	150.5	26 28.0 93 36	150.7	7
8	29 19.8 92 39	148.2	28 52.2 92 39	148.4	28 24.6 92 39	148.7	27 57.0 92 38	148.9	27 29.3 92 38	149.1	27 01.7 92 38	149.3	26 34.0 92 38	149.5	26 06.3 92 37	149.7	8
9	28 56.4 91 40	147.2	28 28.9 92 40	147.4	28 01.5 92 40	147.6	27 34.0 92 39	147.9	27 06.5 92 39	148.1	26 38.9 92 39	148.3	26 11.4 92 39	148.5	25 43.8 92 38	148.8	9
30	28 32.3 91 41	146.2	28 05.0 91 41	146.4	27 37.6 91 41	146.6	27 10.3 91 40	146.9	26 43.0 91 40	147.1	26 15.6 91 40	147.3	25 48.2 91 40	147.6	25 20.7 91 40	147.8	30
1	28 07.5 90 42	145.2	27 40.4 91 42	145.4	27 13.2 91 42	145.6	26 46.0 91 42	145.9	26 18.8 91 41	146.1	25 51.6 91 41	146.3	25 24.3 91 41	146.6	24 57.0 91 41	146.8	1
2	27 42.1 90 43	144.2	27 15.1 90 43	144.4	26 48.1 90 43	144.7	26 21.1 90 43	144.9	25 54.0 90 42	145.1	25 26.9 90 42	145.4	24 59.8 90 42	145.6	24 32.7 90 42	145.8	2
3	27 16.1 89 44	143.2	26 49.3 89 44	143.4	26 22.4 90 44	143.7	25 55.6 90 44	143.9	25 28.6 90 43	144.2	25 01.7 90 43	144.4	24 34.8 90 43	144.7	24 07.8 90 43	144.9	3
4	26 49.5 89 45	142.2	26 22.9 89 45	142.5	25 56.1 89 45	142.7	25 29.4 89 45	143.0	25 02.7 89 44	143.2	24 35.9 89 44	143.5	24 09.1 89 44	143.7	23 42.2 89 44	143.9	4
35	26 22.3 88 46	141.2	25 55.8 88 46	141.5	25 29.3 89 46	141.7	25 02.7 89 45	142.0	24 36.1 89 45	142.3	24 09.5 89 45	142.5	23 42.8 89 45	142.8	23 16.1 89 44	143.0	35
6	25 54.6 88 47	140.3	25 28.2 88 47	140.5	25 01.8 88 47	140.8	24 35.4 88 46	141.1	24 08.9 88 46	141.3	23 42.5 88 46	141.6	23 16.0 88 46	141.8	22 49.4 88 45	142.1	6
7	25 26.2 87 48	139.3	25 00.0 87 48	139.6	24 33.8 88 48	139.9	24 07.5 88 47	140.1	23 41.2 88 47	140.4	23 14.9 88 47	140.6	22 48.6 88 47	140.9	22 22.2 88 46	141.2	7
8	24 57.4 87 49	138.4	24 31.3 87 49	138.7	24 05.2 87 48	138.9	23 39.1 87 48	139.2	23 13.0 87 48	139.5	22 46.8 87 48	139.7	22 20.6 87 47	140.0	21 54.4 87 47	140.2	8
9	24 28.0 86 50	137.4	24 02.1 86 50	137.7	23 36.1 86 49	138.0	23 10.2 87 49	138.3	22 44.2 87 49	138.5	22 18.2 87 49	138.8	21 52.1 87 48	139.1	21 26.1 87 48	139.3	9
40	23 58.0 86 51	136.5	23 32.3 86 50	136.8	23 06.5 86 50	137.1	22 40.7 86 50	137.4	22 14.9 86 50	137.6	21 49.0 86 49	137.9	21 23.1 86 49	138.2	20 57.2 86 49	138.4	40
1	23 27.6 85 52	135.6	23 02.0 85 51	135.9	22 36.4 85 51	136.2	22 10.7 86 51	136.5	21 45.1 86 51	136.7	21 19.4 86 50	137.0	20 53.6 86 50	137.3	20 27.9 86 50	137.6	1
2	22 56.6 85 52	134.7	22 31.2 85 52	135.0	22 05.7 85 52	135.3	21 40.3 85 52	135.6	21 14.7 85 51	135.8	20 49.2 85 51	136.1	20 23.6 85 51	136.4	19 58.0 85 51	136.7	2
3	22 25.2 84 53	133.8	21 59.9 84 53	134.1	21 34.6 84 53	134.4	21 09.3 84 52	134.7	20 43.9 85 52	135.0	20 18.5 85 52	135.2	19 53.1 85 52	135.5	19 27.7 85 51	135.8	3
4	21 53.3 84 54	132.9	21 28.2 84 54	133.2	21 03.0 84 53	133.5	20 37.9 84 53	133.8	20 12.6 84 53	134.1	19 47.4 84 53	134.4	19 22.1 84 52	134.7	18 56.9 84 52	134.9	4
45	21 20.9 83 55	132.0	20 56.0 83 54	132.3	20 31.0 83 54	132.6	20 06.0 83 54	132.9	19 40.9 84 54	133.2	19 15.8 84 53	133.5	18 50.7 84 53	133.8	18 25.6 84 53	134.1	45
6	20 48.1 83 55	131.2	20 23.3 83 55	131.5	19 58.5 83 55	131.8	19 33.6 83 55	132.1	19 08.7 83 54	132.4	18 43.8 83 54	132.7	18 18.8 83 54	133.0	17 53.8 83 54	133.2	6
7	20 14.9 82 56	130.3	19 50.2 82 56	130.6	19 25.5 82 56	130.9	19 00.8 82 55	131.2	18 36.1 83 55	131.5	18 11.3 83 55	131.8	17 46.5 83 55	132.1	17 21.6 83 54	132.4	7
8	19 41.2 82 57	129.5	19 16.7 82 57	129.8	18 52.2 82 56	130.1	18 27.6 82 56	130.4	18 03.0 82 56	130.7	17 38.4 82 56	131.0	17 13.7 82 55	131.3	16 49.0 82 55	131.6	8
9	19 07.1 81 57	128.6	18 42.8 81 57	128.9	18 18.4 81 57	129.2	17 54.0 81 57	129.5	17 29.5 82 56	129.8	17 05.0 82 56	130.1	16 40.5 82 56	130.4	16 16.0 82 56	130.7	9
50	18 32.7 81 58	127.8	18 08.4 81 58	128.1	17 44.2 81 58	128.4	17 19.9 81 57	128.7	16 55.6 81 57	129.0	16 31.3 81 57	129.3	16 06.9 81 57	129.6	15 42.5 81 56	129.9	50
1	17 57.8 80 59	127.0	17 33.7 80 58	127.3	17 09.6 80 58	127.6	16 45.5 80 58	127.9	16 21.3 81 58	128.2	15 57.1 81 58	128.5	15 32.9 81 57	128.8	15 08.7 81 57	129.1	1
2	17 22.5 80 59	126.1	16 58.6 80 59	126.4	16 34.6 80 59	126.8	16 10.7 80 59	127.1	15 46.6 80 58	127.4	15 22.6 80 58	127.7	14 58.5 80 58	128.0	14 34.5 80 58	128.3	2
3	16 46.9 79 60	125.3	16 23.1 79 60	125.6	15 59.3 79 60	126.0	15 35.5 80 59	126.3	15 11.6 80 59	126.6	14 47.7 80 59	126.9	14 23.8 80 59	127.2	13 59.8 80 58	127.5	3
4	16 10.9 79 61	124.5	15 47.3 79 60	124.8	15 23.6 79 60	125.2	14 59.9 79 60	125.5	14 36.2 79 60	125.8	14 12.4 79 59	126.1	13 48.7 79 59	126.4	13 24.9 79 59	126.7	4
55	15 34.6 78 61	123.7	15 11.1 78 61	124.0	14 47.6 78 61	124.4	14 24.0 79 60	124.7	14 00.4 79 60	125.0	13 36.8 79 60	125.3	13 13.2 79 60	125.6	12 49.5 79 60	125.9	55
6	14 57.9 78 62	122.9	14 34.6 78 61	123.2	14 11.2 78 61	123.6	13 47.7 78 61	123.9	13 24.3 78 61	124.2	13 00.8 78 61	124.5	12 37.3 78 60	124.9	12 13.8 78 60	125.2	6
7	14 20.9 77 62	122.1	13 57.7 77 62	122.5	13 34.4 78 62	122.8	13 11.1 78 62	123.1	12 47.8 78 61	123.4	12 24.5 78 61	123.8	12 01.1 78 61	124.1	11 37.8 78 61	124.4	7
8	13 43.6 77 63	121.4	13 20.5 77 62	121.7	12 57.4 77 62	122.0	12 34.2 77 62	122.3	12 11.1 77 62	122.7	11 47.9 77 62	123.0	11 24.6 77 61	123.3	11 01.4 78 61	123.6	8
9	13 06.0 77 63	120.6	12 43.0 77 63	120.9	12 20.0 77 63	121.2	11 57.0 77 63	121.6	11 34.0 77 62	121.9	11 10.9 77 62	122.2	10 47.8 77 62	122.6	10 24.7 77 62	122.9	9
60	12 28.1 76 64	119.8	12 05.2 76 63	120.2	11 42.4 76 63	120.5	11 19.5 76 63	120.8	10 56.6 76 63	121.1	10 33.6 76 63	121.5	10 10.7 77 62	121.8	9 47.7 77 62	122.1	60
1	11 49.9 76 64	119.1	11 27.1 76 64	119.4	11 04.4 76 64	119.7	10 41.6 76 64	120.1	10 18.8 76 63	120.4	9 56.0 76 63	120.7	9 33.2 76 63	121.1	9 10.4 76 63	121.4	1
2	11 11.4 75 65	118.3	10 48.8 75 64	118.6	10 26.1 75 64	119.0	10 03.5 75 64	119.3	9 40.9 76 64	119.6	9 18.2 76 64	120.0	8 55.5 76 63	120.3	8 32.8 76 63	120.6	2
3	10 32.6 75 65	117.6	10 10.1 75 65	117.9	9 47.6 75 65	118.2	9 25.1 75 64	118.6	9 02.6 75 64	118.9	8 40.0 75 64	119.2	8 17.5 75 64	119.6	7 54.9 75 64	119.9	3
4	9 53.6 74 66	116.8	9 31.2 75 65	117.2	9 08.8 75 65	117.5	8 46.4 75 65	117.8	8 24.0 75 65	118.2	8 01.6 75 64	118.5	7 39.2 75 64	118.8	7 16.7 75 64	119.2	4
65	9 14.3 74 66	116.1	8 52.0 74 66	116.4	8 29.8 74 66	116.8	8 07.5 74 65	117.1	7 45.2 74 65	117.4	7 22.9 74 65	117.8	7 00.6 74 65	118.1	6 38.2 74 65	118.4	65
6	8 34.7 74 66	115.4	8 12.6 74 66	115.7	7 50.5 74 66	116.0	7 28.3 74 66	116.4	7 06.1 74 66	116.7	6 44.0 74 65	117.1	6 21.7 74 65	117.4	5 59.5 74 65	117.7	6
7	7 55.0 73 67	114.6	7 33.0 73 66	115.0	7 10.9 73 66	115.3	6 48.9 74 66	115.7	6 26.8 74 66	116.0	6 04.7 74 66	116.3	5 42.7 74 66	116.7	5 20.6 74 65	117.0	7
8	7 15.0 73 67	113.9	6 53.1 73 67	114.2	6 31.1 73 67	114.6	6 09.2 73 66	114.9	5 47.3 73 66	115.3	5 25.3 73 66	115.6	5 03.3 73 66	116.0			8
9	6 34.7 73 67	113.2	6 12.9 73 67	113.5	5 51.1 73 67	113.9	5 29.3 73 67	114.2	5 07.5 73 67	114.6							9
70	5 54.3 72 68	112.5	5 32.6 72 67	112.8	5 10.9 72 67	113.2											70
1	5 13.6 72 68	111.8															1

DECLINATION SAME NAME AS LATITUDE

H.A.	12° 00′ Alt.	Az.	12° 30′ Alt.	Az.	13° 00′ Alt.	Az.	13° 30′ Alt.	Az.	14° 00′ Alt.	Az.	14° 30′ Alt.	Az.	15° 00′ Alt.	Az.	15° 30′ Alt.	Az.	H.A.
°	° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		°
91	7 25.8 68 72	80.5	7 46.0 67 72	80.1	8 06.3 67 72	79.8	8 26.5 67 72	79.4	8 46.7 67 72	79.0	9 06.8 67 72	78.6	9 27.0 67 72	78.3	9 47.1 67 71	77.9	91
2	6 42.5 68 72	79.8	7 02.9 68 72	79.5	7 23.1 68 72	79.1	7 43.4 68 72	78.7	8 03.7 67 72	78.3	8 23.9 67 71	78.0	8 44.1 67 71	77.6	9 04.3 67 71	77.2	2
3	5 59.4 68 72	79.2	6 19.8 68 72	78.8	6 40.1 68 72	78.4	7 00.4 68 71	78.1	7 20.7 68 71	77.7	7 41.0 68 71	77.3	8 01.3 68 71	76.9	8 21.5 67 71	76.6	3
4	5 16.4 68 72	78.5	5 36.8 68 72	78.1	5 57.2 68 71	77.8	6 17.5 68 71	77.4	6 37.9 68 71	77.0	6 58.3 68 71	76.7	7 18.6 68 71	76.3	7 38.9 68 71	75.9	4
95					5 14.3 68 71	77.1	5 34.8 68 71	76.7	5 55.2 68 71	76.4	6 15.6 68 71	76.0	6 36.0 68 71	75.6	6 56.4 68 71	75.3	95
6									5 12.6 68 71	75.7	5 33.1 68 71	75.3	5 53.6 68 71	75.0	6 14.0 68 70	74.6	6
7													5 11.3 68 70	74.3	5 31.8 68 70	73.9	7

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Lat. 43°

H.A.	16° 00′ Alt.		Az.	16° 30′ Alt.		Az.	17° 00′ Alt.		Az.	17° 30′ Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	63 00.0	1.0 01	180.0	63 30.0	1.0 01	180.0	64 00.0	1.0 01	180.0	64 30.0	1.0 01	180.0
1	62 59.2	1.0 04	177.9	63 29.2	1.0 04	177.9	63 59.2	1.0 04	177.8	64 29.2	1.0 04	177.8
2	62 56.8	1.0 07	175.8	63 26.7	1.0 07	175.7	63 56.7	1.0 07	175.6	64 26.6	1.0 07	175.6
3	62 52.7	1.0 09	173.7	63 22.6	1.0 10	173.6	63 52.5	1.0 10	173.5	64 22.4	1.0 10	173.4
4	62 47.1	99 12	171.6	63 16.9	99 12	171.4	63 46.7	99 12	171.3	64 16.5	99 13	171.2
05	62 39.9	99 15	169.5	63 09.6	99 15	169.3	63 39.3	99 15	169.2	64 08.9	99 15	169.0
6	62 31.1	99 17	167.4	63 00.7	99 17	167.2	63 30.2	99 18	167.1	63 59.8	98 18	166.9
7	62 20.8	98 20	165.4	62 50.2	98 20	165.2	63 19.6	98 20	165.0	63 49.0	98 21	164.7
8	62 08.9	98 22	163.4	62 38.2	98 22	163.1	63 07.4	97 23	162.9	63 36.7	97 23	162.6
9	61 55.6	97 25	161.4	62 24.7	97 25	161.1	62 53.8	97 25	160.8	63 22.8	97 26	160.6
10	61 40.9	96 27	159.4	62 09.8	96 27	159.1	62 38.6	96 28	158.8	63 07.5	96 28	158.5
1	61 24.8	96 29	157.5	61 53.4	96 30	157.2	62 22.1	95 30	156.8	62 50.7	95 30	156.5
2	61 07.3	95 31	155.6	61 35.7	95 32	155.2	62 04.1	95 32	154.9	62 32.5	94 33	154.5
3	60 48.5	94 33	153.7	61 16.7	94 34	153.3	61 44.8	94 34	153.0	62 12.9	94 35	152.6
4	60 28.4	93 36	151.8	60 56.4	93 36	151.5	61 24.3	93 36	151.1	61 52.1	93 37	150.7
15	60 07.1	92 37	150.0	60 34.8	92 38	149.7	61 02.4	92 38	149.3	61 30.0	92 39	148.8
6	59 44.6	92 39	148.3	60 12.0	91 40	147.9	60 39.4	91 40	147.5	61 06.7	91 41	147.0
7	59 20.9	91 41	146.5	59 48.1	91 42	146.1	60 15.2	90 42	145.7	60 42.3	90 43	145.3
8	58 56.2	90 43	144.9	59 23.1	90 43	144.4	59 50.0	89 44	144.0	60 16.7	89 44	143.5
9	58 30.4	89 45	143.2	58 57.1	89 45	142.8	59 23.6	88 46	142.3	59 50.1	88 46	141.8
20	58 03.6	88 46	141.6	58 30.0	88 47	141.1	58 56.3	87 47	140.7	59 22.5	87 48	140.2
1	57 35.9	87 48	140.0	58 02.0	87 48	139.5	58 28.0	87 49	139.1	58 53.9	86 49	138.6
2	57 07.2	86 49	138.4	57 33.1	86 50	138.0	57 58.8	86 50	137.5	58 24.5	85 51	137.0
3	56 37.7	85 51	136.9	57 03.3	85 51	136.5	57 28.7	85 52	136.0	57 54.1	84 52	135.5
4	56 07.3	85 52	135.5	56 32.6	84 52	135.0	56 57.8	84 53	134.5	57 22.9	83 53	134.0
25	55 36.2	84 53	134.0	56 01.2	83 54	133.5	56 26.1	83 54	133.0	56 51.0	82 54	132.5
6	55 04.2	83 54	132.6	55 29.0	82 55	132.1	55 53.7	82 55	131.6	56 18.2	82 56	131.1
7	54 31.6	82 56	131.2	54 56.1	82 56	130.7	55 20.5	81 56	130.2	55 44.8	81 57	129.7
8	53 58.2	81 57	129.9	54 22.5	81 57	129.4	54 46.7	80 57	128.9	55 10.7	80 58	128.4
9	53 24.3	80 58	128.6	53 48.3	80 58	128.1	54 12.2	80 58	127.6	54 36.0	79 59	127.0
30	52 49.6	80 59	127.3	53 13.5	79 59	126.8	53 37.2	79 59	126.3	54 00.7	78 60	125.8
1	52 14.5	79 60	126.0	52 38.0	78 60	125.5	53 01.5	78 60	125.0	53 24.8	77 61	124.5
2	51 38.7	78 60	124.8	52 02.1	78 61	124.3	52 25.3	77 61	123.8	52 48.4	77 62	123.3
3	51 02.4	77 61	123.6	51 25.6	77 62	123.1	51 48.6	76 62	122.6	52 11.5	76 62	122.1
4	50 25.6	77 62	122.5	50 48.6	76 62	122.0	51 11.4	76 63	121.4	51 34.0	75 63	120.9
35	49 48.4	76 63	121.3	50 11.1	76 63	120.8	50 33.7	75 64	120.3	50 56.2	75 64	119.8
6	49 10.7	75 64	120.2	49 33.2	75 64	119.7	49 55.6	74 64	119.2	50 17.9	74 65	118.7
7	48 32.5	75 64	119.1	48 54.9	74 65	118.6	49 17.1	74 65	118.1	49 39.2	73 65	117.6
8	47 54.0	74 65	118.0	48 16.1	74 65	117.5	48 38.2	73 65	117.0	49 00.1	73 66	116.5
9	47 15.1	73 65	117.0	47 37.0	73 66	116.5	47 58.9	73 66	116.0	48 20.6	72 66	115.4
40	46 35.8	73 66	115.9	46 57.6	72 66	115.4	47 19.3	72 67	114.9	47 40.8	72 67	114.4
1	45 56.2	72 67	114.9	46 17.8	72 67	114.4	46 39.3	72 67	113.9	47 00.7	71 67	113.4
2	45 16.2	72 67	113.9	45 37.7	71 67	113.4	45 59.1	71 68	112.9	46 20.3	71 68	112.4
3	44 35.9	71 68	113.0	44 57.3	71 68	112.5	45 18.5	71 68	112.0	45 39.6	70 68	111.5
4	43 55.4	71 68	112.0	44 16.6	70 68	111.5	44 37.7	70 68	111.0	44 58.6	70 69	110.5
45	43 14.6	70 68	111.1	43 35.7	70 69	110.6	43 56.6	70 69	110.1	44 17.4	69 69	109.6
6	42 33.5	70 69	110.2	42 54.5	70 69	109.7	43 15.3	69 69	109.2	43 35.9	69 69	108.7
7	41 52.2	70 69	109.3	42 13.0	69 69	108.8	42 33.7	69 70	108.3	42 54.3	68 70	107.8
8	41 10.7	69 70	108.4	41 31.4	69 70	107.9	41 51.9	68 70	107.4	42 12.4	68 70	106.9
9	40 28.9	69 70	107.5	40 49.5	68 70	107.0	41 10.0	68 70	106.5	41 30.3	68 70	106.0
50	39 47.0	68 70	106.6	40 07.4	68 70	106.1	40 27.8	68 71	105.7	40 48.0	67 71	105.2
1	39 04.8	68 70	105.8	39 25.2	68 71	105.3	39 45.5	67 71	104.8	40 05.6	67 71	104.3
2	38 22.5	68 71	104.9	38 42.8	67 71	104.5	39 03.0	67 71	104.0	39 23.0	67 71	103.5
3	37 40.0	67 71	104.1	38 00.2	67 71	103.6	38 20.3	67 71	103.2	38 40.3	66 71	102.7
4	36 57.4	67 71	103.3	37 17.5	67 71	102.8	37 37.5	66 72	102.4	37 57.4	66 72	101.9
55	36 14.6	67 71	102.5	36 34.7	67 72	102.0	36 54.6	66 72	101.6	37 14.4	66 72	101.1
6	35 31.7	67 72	101.7	35 51.7	66 72	101.2	36 11.5	66 72	100.8	36 31.3	66 72	100.3
7	34 48.7	66 72	100.9	35 08.6	66 72	100.5	35 28.4	66 72	100.0	35 48.0	65 72	99.5
8	34 05.5	66 72	100.1	34 25.4	66 72	99.7	34 45.1	66 72	99.2	35 04.7	65 72	98.8
9	33 22.3	66 72	99.4	33 42.1	66 72	98.9	34 01.7	65 72	98.5	34 21.3	65 72	98.0
60	32 39.0	66 72	98.6	32 58.7	66 72	98.2	33 18.3	65 73	97.7	33 37.8	65 73	97.3
1	31 55.5	66 73	97.9	32 15.2	65 73	97.4	32 34.8	65 73	97.0	32 54.3	65 73	96.5
2	31 12.0	66 73	97.1	31 31.7	65 73	96.7	31 51.2	65 73	96.2	32 10.6	65 73	95.8
3	30 28.4	65 73	96.4	30 48.0	65 73	96.0	31 07.5	65 73	95.5	31 26.9	65 73	95.1
4	29 44.8	65 73	95.7	30 04.4	65 73	95.2	30 23.8	65 73	94.8	30 43.2	64 73	94.4
65	29 01.1	65 73	95.0	29 20.6	65 73	94.5	29 40.1	65 73	94.1	29 59.4	64 73	93.6
6	28 17.4	65 73	94.2	28 36.9	65 73	93.8	28 56.3	65 73	93.4	29 15.6	64 73	92.9
7	27 33.6	65 73	93.5	27 53.1	65 73	93.1	28 12.5	65 73	92.7	28 31.8	64 73	92.2
8	26 49.8	65 73	92.8	27 09.2	65 73	92.4	27 28.6	64 73	92.0	27 47.9	64 73	91.5
9	26 05.9	65 73	92.1	26 25.4	65 73	91.7	26 44.8	64 73	91.3	27 04.1	64 73	90.8
70	25 22.1	65 73	91.4	25 41.5	65 73	91.0	26 00.9	64 73	90.6	26 20.2	64 73	90.2
1	24 38.2	65 73	90.7	24 57.6	65 73	90.3	25 17.0	64 73	89.9	25 36.3	64 73	89.5
2	23 54.3	65 73	90.1	24 13.8	65 73	89.6	24 33.1	64 73	89.2	24 52.4	64 73	88.8
3	23 10.5	65 73	89.4	23 29.9	65 73	89.0	23 49.3	64 73	88.6	24 08.6	64 73	88.1
4	22 26.6	65 73	88.7	22 46.0	65 73	88.3	23 05.4	65 73	87.9	23 24.7	64 73	87.5
75	21 42.7	65 73	88.0	22 02.2	65 73	87.6	22 21.6	65 73	87.2	22 40.9	64 73	86.8
6	20 58.9	65 73	87.4	21 18.3	65 73	87.0	21 37.7	65 73	86.5	21 57.1	64 73	86.1
7	20 15.0	65 73	86.7	20 34.5	65 73	86.3	20 54.0	65 73	85.9	21 13.3	64 73	85.5
8	19 31.3	65 73	86.0	19 50.8	65 73	85.6	20 10.2	65 73	85.2	20 29.6	65 73	84.8
9	18 47.5	65 73	85.4	19 07.0	65 73	85.0	19 26.5	65 73	84.6	19 45.9	65 73	84.2
80	18 03.8	65 73	84.7	18 23.3	65 73	84.3	18 42.8	65 73	83.9	19 02.3	65 73	83.5
1	17 20.1	65 73	84.0	17 39.7	65 73	83.6	17 59.2	65 73	83.2	18 18.7	65 73	82.8
2	16 36.5	65 73	83.4	16 56.1	65 73	83.0	17 15.7	65 72	82.6	17 35.2	65 72	82.2
3	15 52.9	66 72	82.7	16 12.6	65 72	82.3	16 32.2	65 72	81.9	16 51.8	65 72	81.5
4	15 09.4	66 72	82.1	15 29.1	66 72	81.7	15 48.8	65 72	81.3	16 08.4	65 72	80.9
85	14 26.0	66 72	81.4	14 45.8	66 72	81.0	15 05.5	66 72	80.6	15 25.1	65 72	80.3
6	13 42.7	66 72	80.8	14 02.5	66 72	80.4	14 22.2	66 72	80.0	14 41.9	66 72	79.6
7	12 59.4	66 72	80.1	13 19.2	66 72	79.7	13 39.0	66 72	79.3	13 58.8	66 72	79.0
8	12 16.2	66 72	79.5	12 36.1	66 72	79.1	12 56.0	66 72	78.7	13 15.8	66 72	78.3
9	11 33.1	67 72	78.8	11 53.1	66 72	78.4	12 13.0	66 71	78.0	12 32.9	66 71	77.7
90	10 50.1	67 71	78.2	11 10.1	67 71	77.8	11 30.1	67 71	77.4	11 50.1	66 71	77.0

18° 00′ Alt.		Az.	18° 30′ Alt.		Az.	19° 00′ Alt.		Az.	19° 30′ Alt.		Az.	H.A.
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
65 00.0	1.0 01	180.0	65 30.0	1.0 01	180.0	66 00.0	1.0 01	180.0	66 30.0	1.0 02	180.0	00
64 59.1	1.0 04	177.8	65 29.1	1.0 04	177.7	65 59.1	1.0 04	177.7	66 29.1	1.0 05	177.6	1
64 56.6	1.0 07	175.5	65 26.5	1.0 07	175.4	65 56.4	1.0 07	175.4	66 26.4	1.0 08	175.3	2
64 52.3	1.0 10	173.3	65 22.1	1.0 10	173.2	65 52.0	1.0 10	173.0	66 21.9	1.0 10	172.9	3
64 46.3	99 13	171.0	65 16.1	99 13	170.9	65 45.8	99 13	170.8	66 15.6	99 13	170.6	4
64 38.6	99 16	168.8	65 08.3	99 16	168.7	65 37.9	99 16	168.5	66 07.6	99 16	168.3	05
64 29.3	98 18	166.7	64 58.8	98 18	166.4	65 28.3	98 19	166.2	65 57.8	98 19	166.0	6
64 18.4	98 21	164.5	64 47.7	98 21	164.3	65 17.0	98 22	164.0	65 46.3	98 22	163.7	7
64 05.8	97 23	162.4	64 35.0	97 24	162.1	65 04.1	97 24	161.8	65 33.2	97 24	161.5	8
63 51.8	97 26	160.3	64 20.7	96 26	160.0	64 49.7	96 27	159.7	65 18.5	96 27	159.3	9
63 36.2	96 28	158.2	64 00.5	96 29	157.9	64 33.6	96 29	157.5	65 02.3	95 30	157.2	10
63 19.2	95 31	156.2	63 47.7	95 31	155.8	64 16.1	95 32	155.4	64 44.5	95 32	155.1	1
63 00.8	94 33	154.2	63 29.0	94 33	153.8	63 57.2	94 34	153.4	64 25.3	94 34	153.0	2
62 41.0	93 35	152.2	63 08.9	93 36	151.8	63 36.9	93 36	151.4	64 04.7	93 37	151.0	3
62 19.9	92 37	150.3	62 47.6	92 38	149.9	63 15.2	92 38	149.5	63 42.7	92 39	149.0	4
61 57.5	92 39	148.4	62 24.9	91 40	148.0	62 52.3	91 40	147.5	63 19.5	91 41	147.1	15
61 33.9	91 41	146.6	62 01.1	90 42	146.1	62 28.1	90 42	145.7	62 55.1	90 43	145.2	6
61 09.2	90 43	144.8	61 36.1	89 44	144.3	62 02.8	89 44	143.9	62 29.4	89 45	143.4	7
60 43.4	89 45	143.1	61 09.9	88 45	142.6	61 36.4	88 46	142.1	62 02.7	88 46	141.6	8
60 16.5	88 46	141.4	60 42.7	87 47	140.9	61 08.9	87 48	140.4	61 34.9	87 48	139.8	9
59 48.6	87 48	139.7	60 14.6	86 49	139.2	60 40.4	86 49	138.7	61 06.1	86 50	138.2	20
59 19.7	86 50	138.1	59 45.4	85 50	137.6	60 11.0	85 51	137.0	60 36.4	85 51	136.5	1
58 50.0	85 51	136.5	59 15.4	84 52	136.0	59 40.6	84 52	135.4	60 05.7	84 52	134.9	2
58 19.3	84 52	135.0	58 44.4	83 53	134.4	59 09.4	83 53	133.9	59 34.2	83 54	133.3	3
57 47.9	83 54	133.5	58 12.7	83 54	132.9	58 37.4	82 55	132.4	59 01.9	82 55	131.8	4
57 15.6	82 55	132.0	57 40.2	82 55	131.5	58 04.6	81 56	130.9	58 28.9	81 56	130.4	25
56 42.7	81 56	130.6	57 06.9	81 57	130.0	57 31.1	80 57	129.5	57 55.1	80 57	128.9	6
56 09.0	80 57	129.2	56 33.0	80 58	128.6	56 56.9	79 58	128.1	57 20.6	79 59	127.5	7
55 34.6	79 58	127.8	55 58.4	79 59	127.3	56 22.0	78 59	126.7	56 45.5	78 60	126.2	8
54 59.7	79 59	126.5	55 23.2	78 60	126.0	55 46.6	78 60	125.4	56 09.8	77 60	124.8	9
54 24.1	78 60	125.2	54 47.4	77 61	124.7	55 10.5	77 61	124.1	55 33.5	76 61	123.6	30
53 48.0	77 61	124.0	54 11.0	77 61	123.4	54 33.9	76 62	122.9	54 56.6	75 62	122.3	1
53 11.3	76 62	122.7	53 34.1	76 62	122.2	53 56.8	75 63	121.6	54 19.3	75 63	121.1	2
52 34.2	76 63	121.5	52 56.8	75 63	121.0	53 19.2	75 63	120.4	53 41.5	74 64	119.9	3
51 56.6	75 63	120.4	52 18.9	74 64	119.8	52 41.1	74 64	119.3	53 03.2	73 64	118.7	4
51 18.5	74 64	119.2	51 40.6	74 64	118.7	52 02.7	73 65	118.1	52 24.5	73 65	117.6	35
50 40.0	73 65	118.1	51 02.0	73 65	117.6	51 23.8	72 65	117.0	51 45.4	72 66	116.5	6
50 01.1	73 65	117.0	50 22.9	72 66	116.5	50 44.5	72 66	115.9	51 06.0	71 66	115.4	7
49 21.8	72 66	116.0	49 43.4	72 66	115.4	50 04.9	71 67	114.9	50 26.2	71 67	114.3	8
48 42.2	72 67	114.9	49 03.6	71 67	114.4	49 24.9	71 67	113.8	49 46.0	70 67	113.3	9
48 02.2	71 67	113.9	48 23.5	71 67	113.4	48 44.6	70 68	112.8	49 05.6	70 68	112.3	40
47 22.0	71 68	112.9	47 43.1	70 68	112.4	48 04.0	70 68	111.8	48 24.8	69 68	111.3	1
46 41.4	70 68	111.9	47 02.3	70 68	111.4	47 23.1	69 69	110.9	47 43.8	69 69	110.3	2
46 00.5	70 69	111.0	46 21.3	69 69	110.4	46 42.0	69 69	109.9	47 02.5	68 69	109.4	3
45 19.4	69 69	110.0	45 40.1	69 69	109.5	46 00.6	68 69	109.0	46 21.0	68 70	108.4	4
44 38.1	69 69	109.1	44 58.6	68 70	108.6	45 19.0	68 70	108.0	45 39.3	67 70	107.5	45
43 56.5	68 70	108.2	44 16.9	68 70	107.7	44 37.2	67 70	107.1	44 57.3	67 70	106.6	6
43 14.7	68 70	107.3	43 35.0	67 70	106.8	43 55.2	67 70	106.3	44 15.2	67 71	105.7	7
42 32.7	68 70	106.4	42 52.9	67 70	105.9	43 12.9	67 71	105.4	43 32.9	66 71	104.9	8
41 50.5	67 71	105.5	42 10.6	67 71	105.0	42 30.5	66 71	104.5	42 50.4	66 71	104.0	9
41 08.1	67 71	104.7	41 28.1	66 71	104.2	41 48.0	66 71	103.7	42 07.7	66 71	103.2	50
40 25.6	67 71	103.8	40 45.5	66 71	103.4	41 05.3	66 71	102.9	41 24.9	65 72	102.4	1
39 42.9	66 71	103.0	40 02.7	66 72	102.5	40 22.4	65 72	102.0	40 42.0	65 72	101.5	2
39 00.1	66 72	102.2	39 19.8	66 72	101.7	39 39.5	65 72	101.2	39 58.9	65 72	100.7	3
38 17.2	66 72	101.4	38 36.8	65 72	100.9	38 56.4	65 72	100.4	39 15.8	65 72	99.9	4
37 34.1	65 72	100.6	37 53.7	65 72	100.1	38 13.1	65 72	99.7	38 32.5	64 72	99.2	55
36 50.9	65 72	99.8	37 10.4	65 72	99.4	37 29.8	65 72	98.9	37 49.1	64 72	98.4	6
36 07.6	65 72	99.1	36 27.1	65 72	98.6	36 46.4	64 72	98.1	37 05.7	64 73	97.6	7
35 24.2	65 72	98.3	35 43.7	65 72	97.8	36 03.0	64 73	97.4	36 22.1	64 73	96.9	8
34 40.8	65 73	97.6	35 00.1	64 73	97.1	35 19.4	64 73	96.6	35 38.5	64 73	96.1	9
33 57.2	65 73	96.8	34 16.6	64 73	96.3	34 35.8	64 73	95.9	34 54.9	64 73	95.4	60
33 13.6	64 73	96.1	33 32.9	64 73	95.6	33 52.1	64 73	95.1	34 11.2	63 73	94.7	1
32 30.0	64 73	95.3	32 49.2	64 73	94.9	33 08.4	64 73	94.4	33 27.4	63 73	94.0	2
31 46.3	64 73	94.6	32 05.5	64 73	94.2	32 24.6	64 73	93.7	32 43.6	63 73	93.3	3
31 02.5	64 73	93.9	31 21.7	64 73	93.5	31 40.8	64 73	93.0	31 59.8	63 73	92.5	4
30 18.7	64 73	93.2	30 37.9	64 73	92.7	30 57.0	63 73	92.3	31 16.0	63 73	91.8	65
29 34.9	64 73	92.5	29 54.0	64 73	92.0	30 13.1	63 73	91.6	30 32.1	63 73	91.2	6
28 51.0	64 73	91.8	29 10.2	64 73	91.4	29 29.2	63 73	90.9	29 48.2	63 73	90.5	7
28 07.2	64 73	91.1	28 26.3	64 73	90.7	28 45.4	63 73	90.2	29 04.3	63 73	89.8	8
27 23.3	64 73	90.4	27 42.4	64 73	90.0	28 01.5	63 73	89.5	28 20.5	63 73	89.1	9
26 39.4	64 73	89.7	26 58.5	64 73	89.3	27 17.6	63 73	88.9	27 36.6	63 73	88.4	70
25 55.5	64 73	89.1	26 14.7	64 73	88.6	26 33.7	63 73	88.2	26 52.7	63 73	87.8	1
25 11.7	64 73	88.4	25 30.8	64 73	88.0	25 49.9	63 73	87.5	26 08.9	63 73	87.1	2
24 27.8	64 73	87.7	24 47.0	64 73	87.3	25 06.1	64 73	86.9	25 25.1	63 73	86.4	3
23 44.0	64 73	87.0	24 03.1	64 73	86.6	24 22.3	64 73	86.2	24 41.3	63 73	85.8	4
23 00.2	64 73	86.4	23 19.4	64 73	86.0	23 38.5	64 73	85.5	23 57.6	63 73	85.1	75
22 16.4	64 73	85.7	22 35.6	64 73	85.3	22 54.8	64 73	84.9	23 13.9	64 73	84.5	6
21 32.6	64 73	85.1	21 51.9	64 73	84.6	22 11.1	64 73	84.2	22 30.2	64 73	83.8	7
20 48.9	64 73	84.4	21 08.2	64 73	84.0	21 27.4	64 73	83.6	21 46.6	64 73	83.2	8
20 05.3	64 73	83.8	20 24.6	64 73	83.3	20 43.9	64 73	82.9	21 03.1	64 72	82.5	9
19 21.7	65 73	83.1	19 41.1	64 72	82.7	20 00.4	64 72	82.3	20 19.6	64 72	81.9	80
18 38.2	65 72	82.4	18 57.6	65 72	82.0	19 16.9	64 72	81.6	19 36.2	64 72	81.2	1
17 54.7	65 72	81.8	18 14.1	65 72	81.4	18 33.5	65 72	81.0	18 52.9	64 72	80.6	2
17 11.3	65 72	81.2	17 30.8	65 72	80.8	17 50.2	65 72	80.4	18 09.6	65 72	80.0	3
16 28.0	65 72	80.5	16 47.5	65 72	80.1	17 07.0	65 72	79.7	17 26.4	65 72	79.3	4
15 44.8	65 72	79.9	16 04.3	65 72	79.5	16 23.9	65 72	79.1	16 43.4	65 72	78.7	85
15 01.6	66 72	79.2	15 21.2	65 72	78.8	15 40.8	65 72	78.4	16 09.4	65 71	78.0	6
14 18.5	66 72	78.6	14 38.2	66 72	78.2	14 57.9	65 71	77.8	15 17.5	65 71	77.4	7
13 35.6	66 71	77.9	13 55.3	66 71	77.5	14 15.1	66 71	77.1	14 34.7	66 71	76.8	8
12 52.7	66 71	77.3	13 12.5	66 71	76.9	13 32.3	66 71	76.5	13 52.1	66 71	76.1	9
12 10.0	66 71	76.6	12 29.9	66 71	76.2	12 49.7	66 71	75.9	13 09.5	66 71	75.5	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	31 00.0	1.0 01	180.0	30 30.0	1.0 01	180.0	30 00.0	1.0 01	180.0	29 30.0	1.0 01	180.0	29 00.0	1.0 01	180.0	28 30.0	1.0 01	180.0	28 00.0	1.0 01	180.0	27 30.0	1.0 01	180.0	00
1	30 59.6	1.0 02	178.9	30 29.6	1.0 02	178.9	29 59.6	1.0 02	178.9	29 29.6	1.0 02	178.9	28 59.6	1.0 02	178.9	28 29.6	1.0 02	178.9	27 59.6	1.0 02	178.9	27 29.6	1.0 02	178.9	1
2	30 58.3	1.0 04	177.8	30 28.3	1.0 04	177.8	29 58.3	1.0 04	177.8	29 28.3	1.0 03	177.8	28 58.3	1.0 03	177.8	28 28.3	1.0 03	177.8	27 58.4	1.0 03	177.9	27 28.4	1.0 03	177.9	2
3	30 56.1	1.0 05	176.6	30 26.2	1.0 05	176.7	29 56.2	1.0 05	176.7	29 26.2	1.0 05	176.7	28 56.3	1.0 05	176.7	28 26.3	1.0 05	176.8	27 56.3	1.0 05	176.8	27 26.3	1.0 05	176.8	3
4	30 53.1	1.0 06	175.5	30 23.2	1.0 06	175.6	29 53.2	1.0 06	175.6	29 23.3	1.0 06	175.6	28 53.3	1.0 06	175.7	28 23.4	1.0 06	175.7	27 53.4	1.0 06	175.7	27 23.5	1.0 06	175.8	4
05	30 49.3	1.0 08	174.4	30 19.4	1.0 08	174.4	29 49.4	1.0 08	174.5	29 19.5	1.0 08	174.5	28 49.6	1.0 08	174.6	28 19.7	1.0 08	174.6	27 49.8	1.0 08	174.7	27 19.8	1.0 07	174.7	05
6	30 44.6	1.0 09	173.3	30 14.7	1.0 09	173.3	29 44.8	1.0 09	173.4	29 14.9	1.0 09	173.4	28 45.0	1.0 09	173.5	28 15.2	1.0 09	173.5	27 45.3	1.0 09	173.6	27 15.4	1.0 09	173.6	6
7	30 39.0	99 11	172.2	30 09.2	99 11	172.2	29 39.3	99 11	172.3	29 09.5	99 10	172.4	28 39.7	99 10	172.4	28 09.8	99 10	172.5	27 40.0	99 10	172.5	27 10.1	99 10	172.6	7
8	30 32.6	99 12	171.1	30 02.8	99 12	171.1	29 33.0	99 12	171.2	29 03.2	99 12	171.3	28 33.4	99 12	171.3	28 03.7	99 12	171.4	27 33.8	99 12	171.5	27 04.0	99 11	171.5	8
9	30 25.4	99 13	170.0	29 55.7	99 13	170.0	29 25.9	99 13	170.1	28 56.2	99 13	170.2	28 26.4	99 13	170.3	27 56.7	99 13	170.3	27 26.9	99 13	170.4	26 57.2	99 13	170.5	9
10	30 17.3	99 15	168.9	29 47.6	99 15	168.9	29 18.0	99 15	169.0	28 48.3	99 14	169.1	28 18.6	99 14	169.2	27 48.9	99 14	169.3	27 19.2	99 14	169.4	26 49.5	99 14	169.4	10
1	30 06.4	99 16	167.8	29 36.8	99 16	167.8	29 09.2	99 16	167.9	28 39.6	99 16	168.0	28 10.0	99 16	168.1	27 40.3	99 16	168.2	27 10.7	99 15	168.3	26 41.1	99 15	168.4	1
2	29 58.7	98 18	166.7	29 29.2	98 17	166.8	28 59.6	98 17	166.9	28 30.1	98 17	167.0	28 00.5	99 17	167.1	27 31.0	99 17	167.2	27 01.4	99 17	167.3	26 31.9	99 17	167.3	2
3	29 48.2	98 19	165.6	29 18.7	98 19	165.7	28 49.3	98 19	165.8	28 19.8	98 18	165.9	27 50.3	98 18	166.0	27 20.8	98 18	166.1	26 51.4	98 18	166.2	26 21.9	98 18	166.3	3
4	29 36.8	98 20	164.5	29 07.5	98 20	164.6	28 38.1	98 20	164.7	28 08.7	98 20	164.8	27 39.3	98 20	164.9	27 09.9	98 20	165.1	26 40.5	98 19	165.2	26 11.1	98 19	165.3	4
15	29 24.7	98 22	163.4	28 55.4	98 21	163.5	28 26.1	98 21	163.7	27 56.8	98 21	163.8	27 27.5	98 21	163.9	26 58.2	98 21	164.0	26 28.9	98 21	164.1	25 59.6	98 20	164.2	15
6	29 11.8	97 23	162.3	28 42.6	97 23	162.5	28 13.4	97 22	162.6	27 44.2	97 22	162.7	27 15.0	97 22	162.9	26 45.7	97 22	163.0	26 16.5	97 22	163.1	25 47.3	97 22	163.2	6
7	28 58.1	97 24	161.3	28 29.0	97 24	161.4	27 59.9	97 24	161.5	27 30.8	97 24	161.7	27 01.6	97 23	161.8	26 32.5	97 23	161.9	26 03.4	97 23	162.1	25 34.2	97 23	162.2	7
8	28 43.6	97 25	160.2	28 14.6	97 25	160.3	27 45.6	97 25	160.5	27 16.6	97 25	160.6	26 47.6	97 25	160.8	26 18.5	97 25	160.9	25 49.5	97 24	161.1	25 20.5	97 24	161.2	8
9	28 28.3	96 27	159.1	27 59.5	96 26	159.3	27 30.6	96 26	159.4	27 01.7	96 26	159.6	26 32.8	96 26	159.7	26 03.8	96 26	159.9	25 34.9	96 26	160.0	25 06.0	96 25	160.2	9
20	28 12.4	96 28	158.1	27 43.6	96 28	158.3	27 14.8	96 28	158.4	26 46.0	96 27	158.6	26 17.2	96 27	158.7	25 48.4	96 27	158.9	25 19.6	96 27	159.0	24 50.7	96 27	159.2	20
1	27 55.6	96 29	157.1	27 27.0	96 29	157.2	26 58.3	96 29	157.4	26 29.6	96 29	157.5	26 00.9	96 28	157.7	25 32.2	96 28	157.9	25 03.5	96 28	158.0	24 34.8	96 28	158.2	1
2	27 38.1	95 30	156.0	27 09.6	95 30	156.2	26 41.1	95 30	156.4	26 12.5	95 30	156.5	25 43.9	95 30	156.7	25 15.3	95 29	156.9	24 46.7	95 29	157.0	24 18.1	95 29	157.2	2
3	27 19.9	95 32	155.0	26 51.5	95 31	155.2	26 23.1	95 31	155.3	25 54.7	95 31	155.5	25 26.2	95 31	155.7	24 57.7	95 30	155.9	24 29.3	95 30	156.0	24 00.8	95 30	156.2	3
4	27 01.0	94 33	154.0	26 32.7	94 32	154.2	26 04.4	94 32	154.3	25 36.1	94 32	154.5	25 07.8	94 32	154.7	24 39.5	94 32	154.9	24 11.1	95 31	155.1	23 42.7	95 31	155.2	4
25	26 41.4	94 34	153.0	26 13.3	94 34	153.1	25 45.1	94 33	153.3	25 16.9	94 33	153.5	24 48.7	94 33	153.7	24 20.5	94 33	153.9	23 52.3	94 32	154.1	23 24.0	94 32	154.3	25
6	26 21.1	93 35	151.9	25 53.1	93 35	152.1	25 25.1	93 34	152.3	24 57.0	94 34	152.5	24 28.9	94 34	152.7	24 00.9	94 34	152.9	23 32.8	94 34	153.1	23 04.7	94 33	153.3	6
7	26 00.2	93 36	151.0	25 32.3	93 36	151.2	25 04.4	93 36	151.4	24 36.5	93 35	151.6	24 08.5	93 35	151.8	23 40.6	93 35	152.0	23 12.6	93 35	152.2	22 44.6	93 34	152.4	7
8	25 38.5	92 37	150.0	25 10.8	93 37	150.2	24 43.0	93 37	150.4	24 15.2	93 36	150.6	23 47.4	93 36	150.8	23 19.6	93 36	151.0	22 51.8	93 36	151.2	22 23.9	93 36	151.4	8
9	25 16.2	92 38	149.0	24 48.6	92 38	149.2	24 21.0	92 38	149.4	23 53.4	92 37	149.6	23 25.7	92 37	149.8	22 58.0	92 37	150.0	22 30.3	92 37	150.3	22 02.6	92 37	150.5	9
30	24 53.3	92 39	148.0	24 25.8	92 39	148.2	23 58.4	92 39	148.4	23 30.8	92 39	148.7	23 03.3	92 38	148.9	22 35.8	92 38	149.1	22 08.2	92 38	149.3	21 40.7	92 38	149.5	30
1	24 29.7	91 40	147.0	24 02.4	91 40	147.3	23 35.1	91 40	147.5	23 07.7	91 40	147.7	22 40.3	91 39	147.9	22 12.9	91 39	148.2	21 45.5	91 39	148.4	21 18.1	91 39	148.6	1
2	24 05.6	91 41	146.1	23 38.4	91 41	146.3	23 11.2	91 41	146.5	22 44.0	91 41	146.8	22 16.7	91 40	147.0	21 49.5	91 40	147.2	21 22.2	91 40	147.4	20 54.9	91 40	147.7	2
3	23 40.8	90 42	145.1	23 13.7	90 42	145.4	22 46.7	90 42	145.6	22 19.6	90 42	145.8	21 52.5	90 41	146.1	21 25.4	90 41	146.3	20 58.3	90 41	146.5	20 31.2	91 41	146.8	3
4	23 15.4	90 43	144.2	22 48.5	90 43	144.4	22 21.6	90 43	144.7	21 54.7	90 43	144.9	21 27.8	90 42	145.1	21 00.8	90 42	145.4	20 33.8	90 42	145.6	20 06.8	90 42	145.9	4
35	22 49.4	89 44	143.3	22 22.7	89 44	143.5	21 56.0	89 44	143.8	21 29.2	89 43	144.0	21 02.4	89 43	144.2	20 35.6	89 43	144.5	20 08.8	89 43	144.7	19 41.9	90 42	145.0	35
6	22 22.9	89 45	142.3	21 56.3	89 45	142.6	21 29.7	89 45	142.8	21 03.1	89 44	143.1	20 36.5	89 44	143.3	20 09.8	89 44	143.6	19 43.1	89 44	143.8	19 16.4	89 43	144.1	6
7	21 55.8	88 46	141.4	21 29.4	88 46	141.7	21 02.9	88 46	141.9	20 36.5	88 45	142.2	20 10.0	88 45	142.4	19 43.5	88 45	142.7	19 17.0	88 45	142.9	18 50.4	89 44	143.2	7
8	21 28.2	88 47	140.5	21 01.9	88 47	140.8	20 35.6	88 46	141.0	20 09.3	88 46	141.3	19 43.0	88 46	141.5	19 16.6	88 46	141.8	18 50.2	88 45	142.0	18 23.8	88 45	142.3	8
9	21 00.0	87 48	139.6	20 33.9	87 48	139.9	20 07.7	87 47	140.1	19 41.6	87 47	140.4	19 15.4	87 47	140.7	18 49.2	87 47	140.9	18 23.0	87 46	141.2	17 56.7	88 46	141.4	9
40	20 31.3	86 49	138.7	20 05.3	87 48	139.0	19 39.4	87 48	139.3	19 13.4	87 48	139.5	18 47.3	87 48	139.8	18 21.3	87 47	140.0	17 55.2	87 47	140.3	17 29.1	87 47	140.6	40
1	20 02.1	86 50	137.8	19 36.3	86 49	138.1	19 10.5	86 49	138.4	18 44.6	86 49	138.6	18 18.7	86 48	138.9	17 52.8	86 48	139.2	17 26.9	86 48	139.4	17 01.0	87 48	139.7	1
2	19 32.4	85 50	137.0	19 06.7	86 50	137.2	18 41.1	86 50	137.5	18 15.4	86 50	137.8	17 49.6	86 49	138.1	17 23.9	86 49	138.3	16 58.1	86 49	138.6	16 32.4	86 49	138.9	2
3	19 02.2	85 51	136.1	18 36.7	85 51	136.4	18 11.2	85 51	136.6	17 45.6	85 50	136.9	17 20.1	85 50	137.2	16 54.5	85 50	137.5	16 28.9	85 50	137.7	16 03.2	85 49	138.0	3
4	18 31.5	84 52	135.2	18 06.2	85 52	135.5	17 40.8	85 51	135.8	17 15.4	85 51	136.1	16 50.0	85 51	136.4	16 24.6	85 51	136.6	15 59.1	85 50	136.9	15 33.6	85 50	137.2	4
45	18 00.4	84 53	134.4	17 35.2	84 52	134.7	17 10.0	84 52	135.0	16 44.8	84 52	135.2	16 19.5	84 52	135.5	15 54.2	84 51	135.8	15 28.9	84 51	136.1	15 03.6	84 51	136.4	45
6	17 28.8	83 53	133.5	17 03.8	84 53	133.8	16 38.7	84 53	134.1	16 13.6	84 53	134.4	15 48.5	84 52	134.7	15 23.4	84 52	135.0	14 58.2	84 52	135.2	14 33.1	84 52	135.5	6
7	16 56.8	83 54	132.7	16 31.9	83 54	133.0	16 07.0	83 54	133.3	15 42.1	83 53	133.6	15 17.1	83 53	133.9	14 52.1	83 53	134.1	14 27.1	83 53	134.4	14 02.1	83 52	134.7	7
8	16 24.3	82 55	131.9	15 59.6	82 55	132.2	15 34.8	83 54	132.5	15 10.0	83 54	132.7	14 45.2	83 54	133.0	14 20.4	83 54	133.3	13 55.6	83 53	133.6	13 30.7	83 53	133.9	8
9	15 51.4	82 56	131.0	15 26.8	82 55	131.3	15 02.2	82 55	131.6	14 37.6	82 55	131.9	14 13.0	82 54	132.2	13 48.3	82 54	132.5	13 23.6	82 54	132.8	12 58.9	82 54	133.1	9
50	15 18.1	81 56	130.2	14 53.7	81 56	130.5	14 29.2	82 56	130.8	14 04.8	82 55	131.1	13 40.3	82 55	131.4	13 15.7	82 55	131.7	12 51.2	82 55	132.0	12 26.6	82 54	132.3	50
1	14 44.4	81 57	129.4	14 20.1	81 57	129.7	13 55.8	81 56	130.0	13 31.5	81 56	130.3	13 07.2	81 56	130.6	12 42.8	81 56	130.9	12 18.4	81 55	131.2	11 54.0	81 55	131.5	1
2	14 10.3	80 57	128.6	13 46.2	80 57	128.9	13 22.0	81 57	129.2	12 57.9	81 57	129.5	12 33.7	81 56	129.8	12 09.4	81 56	130.1	11 45.2	81 56	130.4	11 20.9	81 56	130.7	2
3	13 35.9	80 58	127.8	13 11.9	80 58	128.1	12 47.9	80 58	128.4	12 23.8	80 57	128.8	11 59.8	80 57	129.1	11 35.7	80 57	129.4	11 11.6	80 57	129.7	10 47.5	80 56	130.0	3
4	13 01.0	79 59	127.0	12 37.2	80 58	127.4	12 13.3	80 58	127.7	11 49.4	80 58	128.0	11 25.5	80 58	128.3	11 01.6	80 57	128.6	10 37.6	80 57	128.9	10 13.7	80 57	129.2	4
55	12 25.8	79 59	126.3	12 02.1	79 59	126.6	11 38.4	79 59	126.9	11 14.7	79 59	127.2	10 50.9	79 58	127.5	10 27.1	79 58	127.8	10 03.3	79 58	128.1	9 39.5	79 58	128.4	55
6	11 50.3	78 60	125.5	11 26.7	79 60	125.8	11 03.1	79 59	126.1	10 39.5	79 59	126.4	10 15.9	79 59	126.7	9 52.3	79 59	127.1	9 28.6	79 58	127.4	9 04.9	79 58	127.7	6
7	11 14.4	78 60	124.7	10 50.9	78 60	125.0	10 27.5	78 60	125.4	10 04.0	78 60	125.7	9 40.6	78 59	126.0	9 17.1	78 59	126.3	8 53.6	78 59	126.6	8 30.0	78 59	126.9	7
8	10 38.1	78 61	124.0	10 14.9	78 61	124.3	9 51.6	78 60	124.6	9 28.2	78 60	124.9	9 04.9	78 60	125.2	8 41.5	78 60	125.6	8 18.2	78 60	125.9	7 54.8	78 59	126.2	8
9	10 01.6	77 61	123.2	9 38.4	77 61	123.5	9 15.3	77 61	123.8	8 52.1	77 61	124.2	8 28.9	77 61	124.5	8 05.7	77 60	124.8	7 42.5	77 60	125.1	7 19.2	77 60	125.4	9
60	9 24.7	77 62	122.5	9 01.7	77 62	122.8	8 38.7	77 62	123.1	8 15.6	77 61	123.4	7 52.6	77 61	123.7	7 29.5	77 61	124.1	7 06.4	77 61	124.4	6 43.3	77 60	124.7	60
1	8 47.5	76 62	121.7	8 24.6	76 62	122.0	8 01.7	76 62	122.4	7 38.8	76 62	122.7	7 15.9	76 62	123.0	6 53.0	76 61	123.3	6 30.0	77 61	123.7	6 07.1	77 61	124.0	1
2	8 10.0	76 63	121.0	7 47.3	76 63	121.3	7 24.5	76 62	121.6	7 01.8	76 62	122.0	6 39.0	76 62	122.3	6 16.2	76 62	122.6	5 53.4	76 62	122.9	5 30.5	76 61	123.3	2
3	7 32.3	75 63	120.2	7 09.7	75 63	120.6	6 47.0	75 63	120.9	6 24.4	75 63	121.2	6 01.7	76 63	121.6	5 39.1	76 62	121.9	5 16.4	76 62	122.2				3
4	6 54.2	75 64	119.5	6 31.7	75 64	119.8	6 09.2	75 63	120.2	5 46.7	75 63	120.5	5 24.2	75 63	120.8	5 01.7	75 63	121.2							4
65	6 15.9	75 64	118.8	5 53.5	75 64	119.1	5 31.2	75 64	119.5	5 08.8	75 64	119.8													65
6	5 37.3	74 65	118.1	5 15.1	74 65	118.4																			6

DECLINATION SAME NAME AS LATITUDE

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
91	10 07.2	67 71	77.5	10 27.3	67 71	77.1	10 47.3	67 71	76.7	11 07.4	67 71	76.4	11 27.3	67 71	76.0	11 47.3	66 71	75.6	12 07.2	66 71	75.2	12 27.1	66 71	74.8	91
2	9 24.4	67 71	76.8	9 44.6	67 71	76.5	10 04.7	67 71	76.1	10 24.8	67 71	75.7	10 44.8	67 71	75.3	11 04.9	67 71	75.0	11 24.9	67 70	74.6	11 44.8	67 70	74.2	2
3	8 41.8	67 71	76.2	9 02.0	67 71	75.8	9 22.1	67 71	75.4	9 42.3	67 71	75.1	10 02.4	67 70	74.7	10 22.5	67 70	74.3	10 42.6	67 70	73.9	11 02.7	67 70	73.6	3
4	7 59.2	68 71	75.5	8 19.5	68 71	75.2	8 39.7	67 70	74.8	9 00.0	67 70	74.4	9 20.2	67 70	74.0	9 40.4	67 70	73.7	10 00.5	67 70	73.3	10 20.7	67 70	72.9	4
95	7 16.8	68 70	74.9	7 37.1	68 70	74.5	7 57.5	68 70	74.1	8 17.8	68 70	73.8	8 38.1	68 70	73.4	8 58.3	68 70	73.0	9 18.6	67 70	72.6	9 38.8	67 70	72.3	95
6	6 34.5	68 70	74.2	6 54.9	68 70	73.9	7 15.3	68 70	73.5	7 35.7	68 70	73.1	7 56.1	68 70	72.7	8 16.4	68 70	72.4	8 36.8	68 69	72.0	8 57.1	68 69	71.6	6
7	5 52.3	68 70	73.6	6 12.8	68 70	73.2	6 33.3	68 70	72.8	6 53.8	68 70	72.5	7 14.2	68 69	72.1	7 34.7	68 69	71.7	7 55.1	68 69	71.4	8 15.5	68 69	71.0	7
8	5 10.3	69 70	72.9	5 30.9	69 70	72.5	5 51.5	69 70	72.2	6 12.0	68 69	71.8	6 32.6	68 69	71.4	6 53.1	68 69	71.1	7 13.6	68 69	70.7	7 34.1	68 69	70.3	8
9							5 09.8	69 69	71.5	5 30.4	69 69	71.1	5 51.1	69 69	70.8	6 11.7	69 69	70.4	6 32.3	69 69	70.0	6 52.9	69 68	69.7	9
100													5 09.7	69 69	70.1	5 30.4	69 68	69.8	5 51.1	69 68	69.4	6 11.8	69 68	69.0	100
1																			5 10.1	69 68	68.7	5 30.9	69 68	68.4	1

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Lat. 43°

H.A.	20° 00′ Alt.	Az.	20° 30′ Alt.	Az.	21° 00′ Alt.	Az.	21° 30′ Alt.	Az.	22° 00′ Alt.	Az.	22° 30′ Alt.	Az.	23° 00′ Alt.	Az.	23° 30′ Alt.	Az.	H.A.
°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	°
00	67 00.0 1.0 02	180.0	67 30.0 1.0 02	180.0	68 00.0 1.0 02	180.0	68 30.0 1.0 02	180.0	69 00.0 1.0 02	180.0	69 30.0 1.0 02	180.0	70 00.0 1.0 02	180.0	70 30.0 1.0 02	180.0	00
1	66 59.1 1.0 05	177.6	67 29.1 1.0 05	177.6	67 59.0 1.0 05	177.5	68 29.0 1.0 05	177.5	68 59.0 1.0 05	177.4	69 29.0 1.0 05	177.4	69 59.0 1.0 05	177.3	70 28.9 1.0 05	177.3	1
2	66 56.3 1.0 08	175.2	67 26.3 1.0 08	175.1	67 56.2 1.0 08	175.0	68 26.1 1.0 08	174.9	68 56.0 1.0 08	174.8	69 26.0 1.0 08	174.7	69 55.9 1.0 09	174.6	70 25.8 1.0 09	174.5	2
3	66 51.7 1.0 11	172.8	67 21.6 1.0 11	172.7	67 51.4 99 11	172.6	68 21.3 99 11	172.4	68 51.1 99 11	172.3	69 20.9 99 12	172.1	69 50.8 99 12	172.0	70 20.6 99 12	171.8	3
4	66 45.3 99 14	170.4	67 15.1 99 14	170.3	67 44.8 99 14	170.1	68 14.5 99 14	169.9	68 44.2 99 15	169.7	69 13.9 99 15	169.5	69 43.6 99 15	169.3	70 13.3 99 15	169.1	4
05	66 37.2 99 17	168.1	67 06.8 99 17	167.9	67 36.4 99 17	167.7	68 05.9 99 17	167.4	68 35.5 98 18	167.2	69 05.0 98 18	167.0	69 34.5 98 18	166.7	70 04.0 98 19	166.4	05
6	66 27.2 98 19	165.8	66 56.7 98 20	165.5	67 26.1 98 20	165.3	67 55.5 98 20	165.0	68 24.8 98 21	164.7	68 54.2 98 21	164.4	69 23.5 98 22	164.1	69 52.7 98 22	163.8	6
7	66 15.6 98 22	163.5	66 44.8 97 23	163.2	67 14.1 97 23	162.9	67 43.2 97 23	162.6	68 12.4 97 24	162.3	68 41.5 97 24	162.0	69 10.5 97 25	161.6	69 39.6 97 25	161.2	7
8	66 02.3 97 25	161.2	66 31.3 97 25	160.9	67 00.3 97 26	160.6	67 29.2 96 26	160.2	67 58.1 96 27	159.9	68 27.0 96 27	159.5	68 55.8 96 28	159.1	69 24.5 96 28	158.7	8
9	65 47.4 96 28	159.0	66 16.1 96 28	158.6	66 44.9 96 28	158.3	67 13.6 96 29	157.9	67 42.2 95 29	157.5	68 10.8 95 30	157.1	68 39.3 95 30	156.7	69 07.7 95 31	156.3	9
10	65 30.9 95 30	156.8	65 59.4 95 30	156.4	66 27.9 95 31	156.0	66 56.3 95 31	155.6	67 24.6 94 32	155.2	67 52.9 94 32	154.8	68 21.1 94 33	154.3	68 49.2 94 34	153.8	10
1	65 12.8 94 32	154.7	65 41.1 94 33	154.3	66 09.3 94 33	153.9	66 37.4 94 34	153.4	67 05.4 93 34	153.0	67 33.4 93 35	152.5	68 01.3 93 36	152.0	68 29.1 92 36	151.5	1
2	64 53.3 93 35	152.6	65 21.3 93 35	152.2	65 49.2 93 36	151.7	66 17.0 93 36	151.3	66 44.7 92 37	150.8	67 12.4 92 37	150.3	67 39.9 92 38	149.8	68 07.4 91 39	149.2	2
3	64 32.4 92 37	150.5	65 00.1 92 38	150.1	65 27.7 92 38	149.6	65 55.2 92 39	149.1	66 22.6 91 39	148.6	66 49.9 91 40	148.1	67 17.1 90 40	147.6	67 44.2 90 41	147.0	3
4	64 10.2 91 39	148.5	64 37.6 91 40	148.1	65 04.8 91 40	147.6	65 32.0 90 41	147.1	65 59.1 90 41	146.6	66 26.0 90 42	146.0	66 52.9 89 43	145.4	67 19.6 89 43	144.9	4
15	63 46.7 90 41	146.6	64 13.7 90 42	146.1	64 40.7 90 42	145.6	65 07.5 89 43	145.1	65 34.3 89 43	144.5	66 00.9 88 44	144.0	66 27.4 88 45	143.4	66 53.7 88 45	142.8	15
6	63 21.9 89 43	144.7	63 48.7 89 44	144.2	64 15.3 89 44	143.7	64 41.8 88 45	143.1	65 08.2 88 45	142.6	65 34.4 87 46	142.0	66 00.6 87 47	141.4	66 26.6 86 47	140.8	6
7	62 56.0 88 45	142.9	63 22.4 88 46	142.3	63 48.7 87 46	141.8	64 14.9 87 47	141.2	64 40.9 87 47	140.7	65 06.8 86 48	140.1	65 32.6 86 48	139.5	65 58.2 85 49	138.8	7
8	62 28.9 87 47	141.1	62 55.0 87 47	140.5	63 21.0 86 48	140.0	63 46.9 86 48	139.4	64 12.6 85 49	138.8	64 38.1 85 50	138.2	65 03.5 84 50	137.6	65 28.8 84 51	136.9	8
9	62 00.8 86 48	139.3	62 26.6 86 49	138.8	62 52.3 85 50	138.2	63 17.8 85 50	137.6	63 43.2 84 51	137.0	64 08.4 84 51	136.4	64 33.4 83 52	135.8	64 58.3 83 52	135.1	9
20	61 31.7 85 50	137.6	61 57.2 85 51	137.1	62 22.5 84 51	136.5	62 47.7 84 52	135.9	63 12.8 83 52	135.3	63 37.6 83 53	134.7	64 02.3 82 53	134.0	64 26.9 81 54	133.4	20
1	61 01.7 84 52	136.0	61 26.8 84 52	135.4	61 51.9 83 53	134.8	62 16.7 83 53	134.2	62 41.4 82 54	133.6	63 06.0 82 54	133.0	63 30.3 81 55	132.3	63 54.5 80 55	131.6	1
2	60 30.7 83 53	134.3	60 55.6 83 54	133.8	61 20.3 82 54	133.2	61 44.8 82 55	132.6	62 09.2 81 55	132.0	62 33.4 80 56	131.3	62 57.5 80 56	130.7	63 21.3 79 57	130.0	2
3	59 58.9 82 54	132.8	60 23.5 82 55	132.2	60 47.9 81 55	131.6	61 12.1 81 56	131.0	61 36.2 80 56	130.4	62 00.1 79 57	129.7	62 23.8 79 57	129.1	62 47.3 78 58	128.4	3
4	59 26.3 81 56	131.3	59 50.6 81 56	130.7	60 14.7 80 57	130.1	60 38.6 79 57	129.5	61 02.4 79 58	128.8	61 26.0 78 58	128.2	61 49.4 78 59	127.5	62 12.6 77 59	126.9	4
25	58 53.0 80 57	129.8	59 17.0 80 57	129.2	59 40.8 79 58	128.6	60 04.4 78 58	128.0	60 27.9 78 59	127.4	60 51.1 77 59	126.7	61 14.2 77 60	126.1	61 37.1 76 60	125.4	25
6	58 18.9 79 58	128.3	58 42.6 79 58	127.8	59 06.1 78 59	127.2	59 29.5 78 59	126.5	59 52.6 77 60	125.9	60 15.6 76 60	125.3	60 38.4 76 61	124.6	61 01.0 75 61	123.9	6
7	57 44.2 78 59	126.9	58 07.6 78 59	126.4	58 30.8 77 60	125.8	58 53.9 77 60	125.1	59 16.8 76 61	124.5	59 39.5 75 61	123.9	60 02.0 75 62	123.2	60 24.3 74 62	122.5	7
8	57 08.8 77 60	125.6	57 31.9 77 60	125.0	57 54.9 76 61	124.4	58 17.7 76 61	123.8	58 40.3 75 62	123.2	59 02.8 74 62	122.5	59 25.0 74 63	121.9	59 47.0 73 63	121.2	8
9	56 32.8 77 61	124.3	56 55.7 76 61	123.7	57 18.4 75 62	123.1	57 41.0 75 62	122.5	58 03.3 74 63	121.8	58 25.5 74 63	121.2	58 47.5 73 63	120.5	59 09.2 72 64	119.9	9
30	55 56.3 76 62	123.0	56 18.9 75 62	122.4	56 41.4 75 63	121.8	57 03.7 74 63	121.2	57 25.8 73 63	120.6	57 47.7 73 64	119.9	58 09.4 72 64	119.3	58 31.0 71 65	118.6	30
1	55 19.2 75 63	121.7	55 41.6 74 63	121.1	56 03.8 74 63	120.5	56 25.9 73 64	119.9	56 47.8 73 64	119.3	57 09.4 72 65	118.7	57 30.9 71 65	118.0	57 52.2 71 65	117.4	1
2	54 41.6 74 63	120.5	55 03.8 74 64	119.9	55 25.8 73 64	119.3	55 47.6 72 64	118.7	56 09.3 72 65	118.1	56 30.7 71 65	117.5	56 52.0 71 66	116.8	57 13.0 70 66	116.2	2
3	54 03.6 73 64	119.3	54 25.5 73 64	118.7	54 47.3 72 65	118.1	55 08.9 72 65	117.5	55 30.3 71 66	116.9	55 51.6 70 66	116.3	56 12.6 70 66	115.7	56 33.4 69 67	115.0	3
4	53 25.1 73 65	118.2	53 46.9 72 65	117.6	54 08.4 72 66	117.0	54 29.8 71 66	116.4	54 51.0 70 66	115.8	55 12.0 70 66	115.1	55 32.9 69 67	114.5	55 53.5 68 67	113.9	4
35	52 46.2 72 65	117.0	53 07.8 72 66	116.4	53 29.1 71 66	115.9	53 50.3 70 66	115.3	54 11.3 70 67	114.6	54 32.1 69 67	114.0	54 52.8 68 67	113.4	55 13.2 68 68	112.8	35
6	52 06.9 71 66	115.9	52 28.3 71 66	115.3	52 49.4 70 67	114.8	53 10.4 70 67	114.2	53 31.3 69 67	113.6	53 51.9 68 68	112.9	54 12.3 68 68	112.3	54 32.6 67 68	111.7	6
7	51 27.3 71 67	114.8	51 48.4 70 67	114.3	52 09.4 70 67	113.7	52 30.2 69 68	113.1	52 50.9 68 68	112.5	53 11.3 68 68	111.9	53 31.6 67 68	111.3	53 51.7 67 69	110.6	7
8	50 47.3 70 67	113.8	51 08.3 70 67	113.2	51 29.1 69 68	112.6	51 49.7 68 68	112.0	52 10.2 68 68	111.5	52 30.5 67 69	110.8	52 50.6 67 69	110.2	53 10.5 66 69	109.6	8
9	50 07.0 70 68	112.7	50 27.8 69 68	112.2	50 48.4 69 68	111.6	51 08.9 68 68	111.0	51 29.2 67 69	110.4	51 49.3 67 69	109.8	52 09.2 66 69	109.2	52 29.0 65 70	108.6	9
40	49 26.4 69 68	111.7	49 47.0 69 68	111.2	50 07.5 68 69	110.6	50 27.8 67 69	110.0	50 48.0 67 69	109.4	51 07.9 66 69	108.9	51 27.7 66 70	108.3	51 47.3 65 70	107.6	40
1	48 45.5 69 69	110.7	49 06.0 68 69	110.2	49 26.3 67 69	109.6	49 46.5 67 69	109.1	50 06.4 66 70	108.5	50 26.3 66 70	107.9	50 45.9 65 70	107.3	51 05.4 65 70	106.7	1
2	48 04.3 68 69	109.8	48 24.7 68 69	109.2	48 44.8 67 69	108.7	49 04.9 66 70	108.1	49 24.7 66 70	107.5	49 44.4 65 70	106.9	50 03.9 65 70	106.4	50 23.2 64 71	105.8	2
3	47 22.9 68 69	108.8	47 43.1 67 70	108.3	48 03.2 67 70	107.7	48 23.0 66 70	107.2	48 42.8 65 70	106.6	49 02.3 65 70	106.0	49 21.7 64 71	105.4	49 40.9 64 71	104.8	3
4	46 41.2 67 70	107.9	47 01.3 67 70	107.4	47 21.2 66 70	106.8	47 41.0 66 70	106.3	48 00.6 65 71	105.7	48 20.1 65 71	105.1	48 39.3 64 71	104.5	48 58.4 63 71	104.0	4
45	45 59.4 67 70	107.0	46 19.3 66 70	106.5	46 39.1 66 70	105.9	46 58.8 65 71	105.4	47 18.3 65 71	104.8	47 37.6 64 71	104.2	47 56.8 64 71	103.7	48 15.7 63 71	103.1	45
6	45 17.3 66 70	106.1	45 37.2 66 71	105.6	45 56.9 65 71	105.0	46 16.4 65 71	104.5	46 35.8 64 71	103.9	46 55.0 64 71	103.4	47 14.0 63 71	102.8	47 32.9 63 72	102.2	6
7	44 35.1 66 71	105.2	44 54.8 66 71	104.7	45 14.4 65 71	104.2	45 33.8 65 71	103.6	45 53.1 64 71	103.1	46 12.2 63 72	102.5	46 31.2 63 72	101.9	46 50.0 62 72	101.4	7
8	43 52.6 66 71	104.4	44 12.3 65 71	103.8	44 31.8 65 71	103.3	44 51.1 64 71	102.8	45 10.3 64 72	102.2	45 29.3 63 72	101.7	45 48.2 63 72	101.1	46 06.9 62 73	100.5	8
9	43 10.0 65 71	103.5	43 29.6 65 71	103.0	43 49.0 64 72	102.5	44 08.2 64 72	101.9	44 27.3 63 72	101.4	44 46.3 63 72	100.8	45 05.1 62 72	100.3	45 23.7 62 72	99.7	9
50	42 27.3 65 71	102.7	42 46.8 65 72	102.2	43 06.1 64 72	101.6	43 25.2 64 72	101.1	43 44.2 63 72	100.6	44 03.1 63 72	100.0	44 21.8 62 72	99.5	44 40.4 62 72	98.9	50
1	41 44.4 65 72	101.8	42 03.8 64 72	101.3	42 23.0 64 72	100.8	42 42.1 63 72	100.3	43 01.1 63 72	99.8	43 19.9 62 72	99.2	43 38.5 62 72	98.7	43 57.0 61 72	98.1	1
2	41 01.4 65 72	101.0	41 20.7 64 72	100.5	41 39.9 64 72	100.0	41 58.9 63 72	99.5	42 17.8 63 72	99.0	42 36.5 62 72	98.4	42 55.1 62 73	97.9	43 13.5 61 73	97.4	2
3	40 18.3 64 72	100.2	40 37.5 64 72	99.7	40 56.6 63 72	99.2	41 15.6 63 72	98.7	41 34.4 62 72	98.2	41 53.0 62 73	97.7	42 11.6 62 73	97.1	42 30.0 61 73	96.6	3
4	39 35.1 64 72	99.5	39 54.2 64 72	99.0	40 13.2 63 72	98.4	40 32.1 63 72	97.9	40 50.9 62 73	97.4	41 09.5 62 73	96.9	41 28.0 61 73	96.4	41 46.3 61 73	95.8	4
55	38 51.7 64 72	98.7	39 10.8 63 72	98.2	39 29.8 63 73	97.7	39 48.6 63 73	97.2	40 07.3 62 73	96.7	40 25.9 62 73	96.1	40 44.4 61 73	95.6	41 02.7 61 73	95.1	55
6	38 08.3 64 72	97.9	38 27.3 63 73	97.4	38 46.3 63 73	96.9	39 05.1 62 73	96.4	39 23.7 62 73	95.9	39 42.3 62 73	95.4	40 00.7 61 73	94.9	40 18.9 61 73	94.4	6
7	37 24.8 64 73	97.2	37 43.8 63 73	96.7	38 02.7 63 73	96.2	38 21.4 62 73	95.7	38 40.1 62 73	95.2	38 58.6 61 73	94.7	39 16.9 61 73	94.2	39 35.1 61 73	93.6	7
8	36 41.2 63 73	96.4	37 00.2 63 73	95.9	37 19.0 63 73	95.4	37 37.7 62 73	94.9	37 56.3 62 73	94.4	38 14.8 61 73	93.9	38 33.1 61 73	93.4	38 51.3 60 73	92.9	8
9	35 57.6 63 73	95.7	36 16.5 63 73	95.2	36 35.3 62 73	94.7	36 54.0 62 73	94.2	37 12.6 62 73	93.7	37 31.0 61 73	93.2	37 49.3 61 73	92.7	38 07.5 60 73	92.2	9
60	35 13.9 63 73	94.9	35 32.8 63 73	94.5	35 51.6 62 73	94.0	36 10.2 62 73	93.5	36 28.8 62 73	93.0	36 47.2 61 73	92.5	37 05.5 61 73	92.0	37 23.6 60 73	91.5	60
1	34 30.1 63 73	94.2	34 49.0 63 73	93.7	35 07.8 62 73	93.3	35 26.4 62 73	92.8	35 44.9 62 73	92.3	36 03.3 61 73	91.8	36 21.6 61 73	91.3	36 39.8 60 73	90.8	1
2	33 46.4 63 73	93.5	34 05.2 63 73	93.0	34 23.9 62 73	92.6	34 42.6 62 73	92.1	35 01.1 61 73	91.6	35 19.5 61 73	91.1	35 37.7 61 73	90.6	35 55.9 60 73	90.1	2
3	33 02.6 63 73	92.8	33 21.4 63 73	92.3	33 40.1 62 73	91.9	33 58.7 62 73	91.4	34 17.2 61 73	90.9	34 35.6 61 73	90.4	34 53.9 61 73	89.9	35 12.0 60 73	89.5	3
4	32 18.7 63 73	92.1	32 37.5 63 73	91.6	32 56.2 62 73	91.2	33 14.8 62 73	90.7	33 33.3 61 73	90.2	33 51.7 61 73	89.7	34 10.0 61 73	89.3	34 28.1 60 73	88.8	4
65	31 34.8 63 73	91.4	31 53.6 63 73	90.9	32 12.3 62 73	90.5	32 30.9 62 73	90.0	32 49.4 61 73	89.5	33 07.8 61 73	89.1	33 26.1 61 73	88.6	33 44.3 60 73	88.1	65
6	30 51.0 63 73	90.7	31 09.8 62 73	90.2	31 28.5 62 73	89.8	31 47.1 62 73	89.3	32 05.6 61 73	88.9	32 23.9 61 73	88.4	32 42.2 61 73	87.9	33 00.4 60 73	87.5	6
7	30 07.1 63 73	90.0	30 25.9 62 73	89.6	30 44.6 62 73	89.1	31 03.2 62 73	88.7	31 21.7 62 73	88.2	31 40.1 61 73	87.7	31 58.4 61 73	87.3	32 16.6 61 73	86.8	7
8	29 23.2 63 73	89.3	29 42.0 63 73	88.9	30 00.7 62 73	88.4	30 19.3 62 73	88.0	30 37.8 62 73	87.5	30 56.3 61 73	87.1	31 14.6 61 73	86.6	31 32.8 61 73	86.1	8
9	28 39.3 63 73	88.7	28 58.1 63 73	88.2	29 16.9 62 73	87.8	29 35.5 62 73	87.3	29 54.0 62 73	86.9	30 12.4 61 73	86.4	30 30.8 61 73	86.0	30 49.0 61 73	85.5	9
70	27 55.5 63 73	88.0	28 14.3 63 73	87.6	28 33.0 62 73	87.1	28 51.7 62 73	86.7	29 10.2 62 73	86.2	29 28.7 61 73	85.8	29 47.0 61 73	85.3	30 05.3 61 73	84.8	70
1	27 11.6 63 73	87.3	27 30.5 63 73	86.9	27 49.2 62 73	86.4	28 07.9 62 73	86.0	28 26.4 62 73	85.6	28 44.9 61 73	85.1	29 03.3 61 73	84.7	29 21.6 61 73	84.2	1
2	26 27.8 63 73	86.7	26 46.7 63 73	86.2	27 05.4 62 73	85.8	27 24.1 62 73	85.4	27 42.7 62 73	84.9	28 01.2 62 73	84.5	28 19.7 61 73	84.0	28 38.0 61 73	83.6	2
3	25 44.0 63 73	86.0	26 02.9 63 73	85.6	26 21.7 63 73	85.1	26 40.4 62 73	84.7	26 59.0 62 73	84.3	27 17.6 62 73	83.8	27 36.0 61 73	83.4	27 54.4 61 73	82.9	3
4	25 00.3 63 73	85.3	25 19.2 63 73	84.9	25 38.0 63 73	84.5	25 56.7 62 73	84.1	26 15.4 62 73	83.6	26 34.0 62 73	83.2	26 52.5 62 72	82.7	27 10.9 61 72	82.3	4
75	24 16.6 63 73	84.7	24 35.5 63 73	84.3	24 54.3 63 73	83.8	25 13.1 62 73	83.4	25 31.8 62 73	83.0	25 50.4 62 72	82.5	26 09.0 62 72	82.1	26 27.5 61 72	81.7	75
6	23 32.9 63 73	84.0	23 51.8 63 73	83.6	24 10.7 63 73	83.2	24 29.5 63 72	82.8	24 48.3 62 72	82.3	25 07.0 62 72	81.9	25 25.6 62 72	81.5	25 44.1 62 72	81.0	6
7	22 49.3 63 73	83.4	23 08.3 63 73	83.0	23 27.2 63 72	82.6	23 46.0 63 72	82.1	24 04.8 63 72	81.7	24 23.5 62 72	81.3	24 42.2 62 72	80.8	25 00.8 62 72	80.4	7
8	22 05.7 64 72	82.8	22 24.7 63 72	82.3	22 43.7 63 72	81.9	23 02.6 63 72	81.5	23 21.4 63 72	81.1	23 40.2 62 72	80.6	23 58.9 62 72	80.2	24 17.5 62 72	79.8	8
9	21 22.2 64 72	82.1	21 41.3 63 72	81.7	22 00.3 63 72	81.3	22 19.2 63 72	80.9	22 38.1 63 72	80.4	22 57.0 63 72	80.0	23 15.7 62 72	79.6	23 34.4 62 72	79.2	9
80	20 38.8 64 72	81.5	20 57.9 64 72	81.1	21 17.0 63 72	80.6	21 36.0 63 72	80.2	21 54.9 63 72	79.8	22 13.8 63 72	79.4	22 32.6 63 72	79.0	22 51.3 62 72	78.5	80
1	19 55.4 64 72	80.8	20 14.6 64 72	80.4	20 33.7 64 72	80.0	20 52.8 63 72	79.6	21 11.8 63 72	79.2	21 30.7 63 72	78.8	21 49.6 63 72	78.3	22 08.4 63 71	77.9	1
2	19 12.1 64 72	80.2	19 31.4 64 72	79.8	19 50.5 64 72	79.4	20 09.6 64 72	79.0	20 28.7 63 72	78.6	20 47.7 63 71	78.1	21 06.6 63 71	77.7	21 25.5 63 71	77.3	2
3	18 28.9 64 72	79.5	18 48.2 64 72	79.1	19 07.4 64 72	78.7	19 26.6 64 72	78.3	19 45.7 64 71	77.9	20 04.8 63 71	77.5	20 23.8 63 71	77.1	20 42.8 63 71	76.7	3
4	17 45.8 65 72	78.9	18 05.2 64 72	78.5	18 24.5 64 72	78.1	18 43.7 64 71	77.7	19 02.9 64 71	77.3	19 22.0 64 71	76.9	19 41.1 63 71	76.5	20 00.1 63 71	76.1	4
85	17 02.8 65 72	78.3	17 22.2 65 71	77.9	17 41.6 64 71	77.5	18 00.9 64 71	77.1	18 20.1 64 71	76.7	18 39.3 64 71	76.3	18 58.5 64 71	75.9	19 17.6 64 71	75.5	85
6	16 19.9 65 71	77.6	16 39.4 65 71	77.2	16 58.8 65 71	76.8	17 18.2 65 71	76.4	17 37.5 64 71	76.0	17 56.8 64 71	75.6	18 16.0 64 71	75.2	18 35.2 64 70	74.8	6
7	15 37.1 65 71	77.0	15 56.6 65 71	76.6	16 16.1 65 71	76.2	16 35.6 65 71	75.8	16 55.0 65 71	75.4	17 14.3 64 71	75.0	17 33.6 64 70	74.6	17 52.9 64 70	74.2	7
8	14 54.4 65 71	76.4	15 14.0 65 71	76.0	15 33.6 65 71	75.6	15 53.1 65 71	75.2	16 12.6 65 70	74.8	16 32.0 65 70	74.4	16 51.4 65 70	74.0	17 10.7 64 70	73.6	8
9	14 11.8 66 71	75.7	14 31.5 66 71	75.3	14 51.1 65 71	75.0	15 10.7 65 70	74.6	15 30.3 65 70	74.2	15 49.8 65 70	73.8	16 09.3 65 70	73.4	16 28.7 65 70	73.0	9
90	13 29.3 66 71	75.1	13 49.1 66 70	74.7	14 08.8 66 70	74.3	14 28.5 66 70	73.9	14 48.1 65 70	73.5	15 07.7 65 70	73.1	15 27.3 65 70	72.8	15 46.8 65 70	72.4	90

H.A.	20° 00′ Alt.	Δd Δt	Az.	20° 30′ Alt.	Δd Δt	Az.	21° 00′ Alt.	Δd Δt	Az.	21° 30′ Alt.	Δd Δt	Az.	22° 00′ Alt.	Δd Δt	Az.	22° 30′ Alt.	Δd Δt	Az.	23° 00′ Alt.	Δd Δt	Az.	23° 30′ Alt.	Δd Δt	Az.	H.A.
°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	°
00	27 00.0	1.0 01	180.0	26 30.0	1.0 01	180.0	26 00.0	1.0 01	180.0	25 30.0	1.0 01	180.0	25 00.0	1.0 01	180.0	24 30.0	1.0 01	180.0	24 00.0	1.0 01	180.0	23 30.0	1.0 01	180.0	00
1	26 59.6	1.0 02	178.9	26 29.6	1.0 02	179.0	25 59.6	1.0 02	179.0	25 29.6	1.0 02	179.0	24 59.6	1.0 02	179.0	24 29.6	1.0 02	179.0	23 59.6	1.0 02	179.0	23 29.6	1.0 02	179.0	1
2	26 58.4	1.0 03	177.9	26 28.4	1.0 03	177.9	25 58.4	1.0 03	177.9	25 28.4	1.0 03	177.9	24 58.4	1.0 03	178.0	24 28.4	1.0 03	178.0	23 58.5	1.0 03	178.0	23 28.5	1.0 03	178.0	2
3	26 56.4	1.0 05	176.8	26 26.4	1.0 05	176.9	25 56.4	1.0 05	176.9	25 26.4	1.0 05	176.9	24 56.5	1.0 06	176.9	24 26.5	1.0 05	177.0	23 56.5	1.0 04	177.0	23 26.6	1.0 04	177.0	3
4	26 53.5	1.0 06	175.8	26 23.6	1.0 06	175.8	25 53.6	1.0 06	175.8	25 23.7	1.0 06	175.9	24 53.7	1.0 06	175.9	24 23.8	1.0 06	175.9	23 53.8	1.0 06	176.0	23 23.9	1.0 06	176.0	4
05	26 49.9	1.0 07	174.7	26 20.0	1.0 07	174.8	25 50.1	1.0 07	174.8	25 20.1	1.0 07	174.9	24 50.2	1.0 07	174.9	24 20.3	1.0 07	174.9	23 50.4	1.0 07	175.0	23 20.4	1.0 07	175.0	05
6	26 45.5	1.0 09	173.7	26 15.6	1.0 09	173.7	25 45.7	1.0 09	173.8	25 15.8	1.0 09	173.8	24 45.9	1.0 08	173.9	24 16.0	1.0 08	173.9	23 46.1	1.0 08	174.0	23 16.2	1.0 08	174.0	6
7	26 40.3	1.0 10	172.6	26 10.4	1.0 10	172.7	25 40.6	1.0 10	172.7	25 10.7	1.0 10	172.8	24 40.9	1.0 10	172.9	24 11.0	1.0 10	172.9	23 41.1	1.0 10	173.0	23 11.3	1.0 10	173.0	7
8	26 34.2	99 11	171.6	26 04.4	99 11	171.7	25 34.6	99 11	171.7	25 04.8	99 11	171.8	24 35.0	99 11	171.8	24 05.2	99 11	171.9	23 35.4	99 11	172.0	23 05.6	99 11	172.0	8
9	26 27.4	99 13	170.5	25 57.7	99 13	170.6	25 27.9	99 12	170.7	24 58.2	99 12	170.8	24 28.4	99 12	170.8	23 58.6	99 12	170.9	23 28.9	99 12	171.0	22 59.1	99 12	171.0	9
10	26 19.8	99 14	169.5	25 50.1	99 14	169.6	25 20.4	99 14	169.7	24 50.7	99 14	169.7	24 21.0	99 14	169.8	23 51.3	99 13	169.9	23 21.6	99 13	170.0	22 51.9	99 13	170.0	10
1	26 11.5	99 15	168.5	25 41.8	99 15	168.6	25 12.2	99 15	168.6	24 42.5	99 15	168.7	24 12.9	99 15	168.8	23 43.2	99 15	168.9	23 13.6	99 15	169.0	22 43.9	99 14	169.1	1
2	26 02.3	99 17	167.4	25 32.7	99 16	167.5	25 03.2	99 16	167.6	24 33.6	99 16	167.7	24 04.0	99 16	167.8	23 34.4	99 16	167.9	23 04.8	99 16	168.0	22 35.2	99 16	168.1	2
3	25 52.4	98 18	166.4	25 22.9	98 18	166.5	24 53.4	98 18	166.6	24 23.9	98 17	166.7	23 54.4	98 17	166.8	23 24.9	98 17	166.9	22 55.3	98 17	167.0	22 25.8	98 17	167.1	3
4	25 41.7	98 19	165.4	25 12.3	98 19	165.5	24 42.8	98 19	165.6	24 13.4	98 19	165.7	23 44.0	98 19	165.8	23 14.5	98 18	165.9	22 45.1	98 18	166.0	22 15.7	98 18	166.1	4
15	25 30.2	98 20	164.4	25 00.9	98 20	164.5	24 31.6	98 20	164.6	24 02.2	98 20	164.7	23 32.9	98 20	164.8	23 03.5	98 20	164.9	22 34.1	98 19	165.0	22 04.8	98 19	165.2	15
6	25 18.0	97 22	163.4	24 48.8	98 21	163.5	24 19.5	98 21	163.6	23 50.3	98 21	163.7	23 21.0	98 21	163.8	22 51.7	98 21	164.0	22 22.5	98 21	164.1	21 53.2	98 20	164.2	6
7	25 05.1	97 23	162.3	24 35.9	97 23	162.5	24 06.8	97 22	162.6	23 37.6	97 22	162.7	23 08.4	97 22	162.9	22 39.3	97 22	163.0	22 10.1	97 22	163.1	21 40.9	97 22	163.2	7
8	24 51.4	97 24	161.3	24 22.4	97 24	161.5	23 53.3	97 24	161.6	23 24.2	97 24	161.7	22 55.1	97 23	161.9	22 26.1	97 23	162.0	21 57.0	97 23	162.1	21 27.9	97 23	162.3	8
9	24 37.0	97 25	160.3	24 08.1	97 25	160.5	23 39.1	97 25	160.6	23 10.1	97 25	160.8	22 41.1	97 24	160.9	22 12.1	97 24	161.0	21 43.2	97 24	161.2	21 14.2	97 24	161.3	9
20	24 21.9	96 26	159.3	23 53.0	96 26	159.5	23 24.2	96 26	159.6	22 55.3	96 26	159.8	22 26.4	96 26	159.9	21 57.5	96 26	160.1	21 28.7	96 25	160.2	20 59.8	96 25	160.4	20
1	24 06.0	96 28	158.4	23 37.3	96 27	158.5	23 08.6	96 27	158.7	22 39.8	96 27	158.8	22 11.0	96 27	159.0	21 42.3	96 27	159.1	21 13.5	96 26	159.3	20 44.7	96 26	159.4	1
2	23 49.5	95 29	157.4	23 20.9	96 29	157.5	22 52.2	95 28	157.7	22 23.6	96 28	157.9	21 54.9	96 28	158.0	21 26.3	96 28	158.2	20 57.6	96 28	158.3	20 28.9	96 27	158.5	2
3	23 32.3	95 30	156.4	23 03.8	95 30	156.6	22 35.2	95 29	156.7	22 06.7	95 29	156.9	21 38.2	95 29	157.1	21 09.6	95 29	157.2	20 41.1	95 29	157.4	20 12.5	95 28	157.6	3
4	23 14.4	95 31	155.4	22 46.0	95 31	155.6	22 17.6	95 31	155.8	21 49.2	95 30	155.9	21 20.7	95 30	156.1	20 52.3	95 30	156.3	20 23.9	95 30	156.5	19 55.4	95 30	156.6	4
25	22 55.8	94 32	154.5	22 27.5	94 32	154.6	21 59.2	94 32	154.8	21 30.9	94 31	155.0	21 02.6	94 31	155.2	20 34.3	94 31	155.4	20 06.0	94 31	155.5	19 37.7	94 31	155.7	25
6	22 36.5	94 33	153.5	22 08.4	94 33	153.7	21 40.2	94 33	153.9	21 12.1	94 33	154.1	20 43.9	94 32	154.2	20 15.7	94 32	154.4	19 47.5	94 32	154.6	19 19.3	94 32	154.8	6
7	22 16.6	93 34	152.5	21 48.6	93 34	152.7	21 20.6	93 34	152.9	20 52.6	93 34	153.1	20 24.5	94 33	153.3	19 56.4	94 33	153.5	19 28.4	94 33	153.7	19 00.3	94 33	153.9	7
8	21 56.1	93 35	151.6	21 28.2	93 35	151.8	21 00.3	93 35	152.0	20 32.4	93 35	152.2	20 04.5	93 34	152.4	19 36.6	93 34	152.6	19 08.6	93 34	152.8	18 40.7	93 34	153.0	8
9	21 34.9	92 36	150.7	21 07.1	92 36	150.9	20 39.4	93 36	151.1	20 11.6	93 36	151.3	19 43.8	93 35	151.5	19 16.0	93 35	151.7	18 48.2	93 35	151.9	18 20.4	93 35	152.1	9
30	21 13.1	92 37	149.7	20 45.5	92 37	149.9	20 17.9	92 37	150.2	19 50.2	92 37	150.4	19 22.6	92 36	150.6	18 54.9	92 36	150.8	18 27.2	92 36	151.0	17 59.6	92 36	151.2	30
1	20 50.7	92 38	148.8	20 23.2	92 38	149.0	19 55.7	92 38	149.2	19 28.2	92 38	149.5	19 00.7	92 37	149.7	18 33.2	92 37	149.9	18 05.6	92 37	150.1	17 38.1	92 37	150.3	1
2	20 27.6	91 39	147.9	20 00.3	91 39	148.1	19 33.0	91 39	148.3	19 05.6	91 39	148.6	18 38.3	91 38	148.8	18 10.9	91 38	149.0	17 43.5	91 38	149.2	17 16.1	91 38	149.4	2
3	20 04.0	91 40	147.0	19 36.8	91 40	147.2	19 09.6	91 40	147.4	18 42.4	91 40	147.7	18 15.2	91 39	147.9	17 48.0	91 39	148.1	17 20.7	91 39	148.3	16 53.4	91 39	148.5	3
4	19 39.8	90 41	146.1	19 12.8	90 41	146.3	18 45.7	90 41	146.5	18 18.7	90 41	146.8	17 51.6	90 40	147.0	17 24.5	90 40	147.2	16 57.4	90 40	147.4	16 30.3	90 40	147.7	4
35	19 15.0	90 42	145.2	18 48.2	90 42	145.4	18 21.3	90 42	145.7	17 54.3	90 41	145.9	17 27.4	90 41	146.1	17 00.5	90 41	146.3	16 33.5	90 41	146.6	16 06.5	90 40	146.8	35
6	18 49.7	89 43	144.3	18 23.0	89 43	144.5	17 56.2	89 43	144.8	17 29.5	89 42	145.0	17 02.7	89 42	145.2	16 35.9	89 42	145.5	16 09.0	89 42	145.7	15 42.2	89 41	145.9	6
7	18 23.8	89 44	143.4	17 57.2	89 44	143.7	17 30.6	89 44	143.9	17 04.0	89 43	144.1	16 37.4	89 43	144.4	16 10.7	89 43	144.6	15 44.1	89 43	144.9	15 17.4	89 42	145.1	7
8	17 57.4	88 45	142.5	17 31.0	88 45	142.8	17 04.5	88 44	143.0	16 38.1	88 44	143.3	16 11.6	88 44	143.5	15 45.1	88 44	143.8	15 18.5	88 43	144.0	14 52.0	88 43	144.3	8
9	17 30.5	88 46	141.7	17 04.2	88 46	141.9	16 37.9	88 45	142.2	16 11.6	88 45	142.4	15 45.2	88 45	142.7	15 18.9	88 45	142.9	14 52.5	88 44	143.2	14 26.1	88 44	143.4	9
40	17 03.0	87 47	140.8	16 36.9	87 46	141.1	16 10.7	87 46	141.3	15 44.5	87 46	141.6	15 18.4	87 46	141.8	14 52.2	87 45	142.1	14 25.9	87 45	142.3	13 59.7	87 45	142.6	40
1	16 35.0	87 47	140.0	16 09.0	87 47	140.2	15 43.0	87 47	140.5	15 17.0	87 47	140.7	14 51.0	87 46	141.0	14 24.9	87 46	141.3	13 58.9	87 46	141.5	13 32.8	87 46	141.8	1
2	16 06.5	86 48	139.1	15 40.7	86 48	139.4	15 14.9	86 48	139.6	14 49.0	86 48	139.9	14 23.1	86 47	140.2	13 57.2	86 47	140.4	13 31.3	86 47	140.7	13 05.4	86 46	140.9	2
3	15 37.6	86 49	138.3	15 11.9	86 49	138.6	14 46.2	86 49	138.8	14 20.5	86 48	139.1	13 54.8	86 48	139.3	13 29.0	86 48	139.6	13 03.3	86 48	139.9	12 37.5	86 47	140.1	3
4	15 08.1	85 50	137.5	14 42.6	85 50	137.7	14 17.1	85 49	138.0	13 51.5	85 49	138.3	13 26.0	85 49	138.5	13 00.4	85 49	138.8	12 34.8	85 48	139.1	12 09.1	85 48	139.3	4
45	14 38.2	85 51	136.6	14 12.9	85 50	136.9	13 47.5	85 50	137.2	13 22.1	85 50	137.5	12 56.7	85 50	137.7	12 31.2	85 49	138.0	12 05.8	85 49	138.3	11 40.3	85 49	138.5	45
6	14 07.9	84 51	135.8	13 42.7	84 51	136.1	13 17.4	84 51	136.4	12 52.2	84 51	136.6	12 26.9	84 50	136.9	12 01.6	84 50	137.2	11 36.3	84 50	137.5	11 11.0	84 50	137.7	6
7	13 37.1	84 52	135.0	13 12.0	84 52	135.3	12 46.9	84 52	135.6	12 21.8	84 51	135.8	11 56.7	84 51	136.1	11 31.6	84 51	136.4	11 06.5	84 51	136.7	10 41.3	84 50	137.0	7
8	13 05.8	83 53	134.2	12 40.9	83 53	134.5	12 16.0	83 52	134.8	11 51.1	83 52	135.1	11 26.1	83 52	135.3	11 01.1	83 52	135.6	10 36.1	83 51	135.9	10 11.1	83 51	136.2	8
9	12 34.1	82 54	133.4	12 09.4	83 53	133.7	11 44.6	83 53	134.0	11 19.8	83 53	134.3	10 55.0	83 52	134.5	10 30.2	83 52	134.8	10 05.4	83 52	135.1	9 40.5	83 52	135.4	9
50	12 02.1	82 54	132.6	11 37.5	82 54	132.9	11 12.8	82 54	133.2	10 48.2	82 53	133.5	10 23.6	82 53	133.8	9 58.9	82 53	134.1	9 34.2	82 53	134.3	9 09.5	82 52	134.6	50
1	11 29.6	81 55	131.8	11 05.1	82 55	132.1	10 40.6	82 54	132.4	10 16.2	82 54	132.7	9 51.7	82 54	133.0	9 27.2	82 54	133.3	9 02.6	82 53	133.6	8 38.1	82 53	133.9	1
2	10 56.7	81 56	131.0	10 32.4	81 55	131.3	10 08.0	81 55	131.6	9 43.7	81 55	131.9	9 19.4	81 54	132.2	8 55.0	81 54	132.5	8 30.6	81 54	132.8	8 06.3	81 54	133.1	2
3	10 23.4	80 56	130.3	9 59.2	81 56	130.6	9 35.1	81 56	130.9	9 10.9	81 55	131.2	8 46.7	81 55	131.5	8 22.5	81 55	131.8	7 58.3	81 55	132.1	7 34.0	81 54	132.4	3
4	9 49.7	80 57	129.5	9 25.7	80 56	129.8	9 01.7	80 56	130.1	8 37.7	80 56	130.4	8 13.6	80 56	130.7	7 49.6	80 56	131.0	7 25.5	80 55	131.3	7 01.4	80 55	131.6	4
55	9 15.7	79 57	128.7	8 51.8	80 57	129.1	8 27.9	80 57	129.4	8 04.1	80 57	129.7	7 40.2	80 56	130.0	7 16.3	80 56	130.3	6 52.4	80 56	130.6	6 28.4	80 56	130.9	55
6	8 41.3	79 58	128.0	8 17.6	79 58	128.3	7 53.8	79 57	128.6	7 30.1	79 57	128.9	7 06.4	79 57	129.2	6 42.6	79 57	129.5	6 18.8	79 56	129.8	5 55.1	79 56	130.2	6
7	8 06.5	78 58	127.2	7 42.9	79 58	127.6	7 19.4	79 58	127.9	6 55.8	79 58	128.2	6 32.2	79 58	128.5	6 08.6	79 57	128.8	5 45.0	79 57	129.1	5 21.3	79 57	129.4	7
8	7 31.4	78 59	126.5	7 08.0	78 59	126.8	6 44.6	78 59	127.1	6 21.1	78 58	127.4	5 57.7	78 58	127.8	5 34.2	78 58	128.1	5 10.8	78 57	128.4				8
9	6 56.0	78 60	125.8	6 32.7	78 59	126.1	6 09.4	78 59	126.4	5 46.1	78 59	126.7	5 22.8	78 59	127.0										9
60	6 20.2	77 60	125.0	5 57.1	77 60	125.4	5 33.9	77 60	125.7	5 10.8	77 59	126.0													60
1	5 44.1	77 61	124.3	5 21.1	77 60	124.6																			1
2	5 07.7	76 61	123.6																						2

DECLINATION SAME NAME AS LATITUDE

H.A.	20° 00′ Alt.	Δd Δt	Az.	20° 30′ Alt.	Δd Δt	Az.	21° 00′ Alt.	Δd Δt	Az.	21° 30′ Alt.	Δd Δt	Az.	22° 00′ Alt.	Δd Δt	Az.	22° 30′ Alt.	Δd Δt	Az.	23° 00′ Alt.	Δd Δt	Az.	23° 30′ Alt.	Δd Δt	Az.	H.A.
°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	°
91	12 47.0	66 70	74.5	13 06.8	66 70	74.1	13 26.6	66 70	73.7	13 46.4	66 70	73.3	14 06.1	66 70	72.9	14 25.8	66 70	72.5	14 45.5	65 69	72.1	15 05.1	65 69	71.7	91
2	12 04.8	66 70	73.8	12 24.7	66 70	73.4	12 44.6	66 70	73.1	13 04.4	66 70	72.7	13 24.2	66 70	72.3	13 44.0	66 69	71.9	14 03.8	66 69	71.5	14 23.5	66 69	71.1	2
3	11 22.7	67 70	73.2	11 42.7	67 70	72.8	12 02.7	67 70	72.4	12 22.6	66 69	72.0	12 42.5	66 69	71.7	13 02.4	66 69	71.3	13 22.2	66 69	70.9	13 42.0	66 69	70.5	3
4	10 40.8	67 70	72.5	11 00.9	67 70	72.2	11 20.9	67 69	71.8	11 40.9	67 69	71.4	12 00.9	67 69	71.0	12 20.9	67 69	70.6	12 40.8	66 69	70.3	13 00.7	66 69	69.9	4
95	9 59.0	67 69	71.9	10 19.2	67 69	71.5	10 39.3	67 69	71.1	10 59.4	67 69	70.8	11 19.5	67 69	70.4	11 39.6	67 69	70.0	11 59.6	67 68	69.6	12 19.6	67 68	69.2	95
6	9 17.4	68 69	71.3	9 37.6	68 69	70.9	9 57.9	67 69	70.5	10 18.1	67 69	70.1	10 38.3	67 68	69.8	10 58.4	67 68	69.4	11 18.6	67 68	69.0	11 38.7	67 68	68.6	6
7	8 35.9	68 69	70.6	8 56.2	68 69	70.2	9 16.6	68 69	69.9	9 36.9	68 68	69.5	9 57.2	68 68	69.1	10 17.4	67 68	68.7	10 37.7	67 68	68.4	10 57.9	67 68	68.0	7
8	7 54.6	68 69	70.0	8 15.0	68 68	69.6	8 35.5	68 68	69.2	8 55.9	68 68	68.9	9 16.3	68 68	68.5	9 36.6	68 68	68.1	9 57.0	68 68	67.7	10 17.3	68 67	67.4	8
9	7 13.4	69 68	69.3	7 34.0	68 68	69.0	7 54.5	68 68	68.6	8 15.0	68 68	68.2	8 35.5	68 68	67.8	8 56.0	68 67	67.5	9 16.5	68 67	67.1	9 36.9	68 67	66.7	9
100	6 32.5	69 68	68.7	6 53.1	69 68	68.3	7 13.8	69 68	67.9	7 34.4	69 67	67.6	7 55.0	69 67	67.2	8 15.6	69 67	66.8	8 36.1	69 67	66.5	8 56.7	68 67	66.1	100
1	5 51.7	69 68	68.0	6 12.5	69 67	67.7	6 33.2	69 67	67.3	6 53.9	69 67	66.9	7 14.6	69 67	66.6	7 35.3	69 67	66.2	7 56.0	69 67	65.8	8 16.7	69 66	65.5	1
2	5 11.1	70 67	67.4	5 32.0	70 67	67.0	5 52.8	69 67	66.6	6 13.7	69 67	66.3	6 34.5	69 67	65.9	6 55.3	69 66	65.5	7 16.1	69 66	65.2	7 36.8	69 66	64.8	2
3							5 12.6	70 67	66.0	5 33.6	70 66	65.6	6 54.5	70 66	65.3	6 15.4	70 66	64.9	6 36.3	70 66	64.5	6 57.2	70 66	64.2	3
4													5 14.8	70 66	64.6	5 35.8	70 66	64.3	5 56.8	70 66	63.9	6 17.8	70 65	63.5	4
105																			5 17.5	70 65	63.2	5 38.7	70 65	62.9	105

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Lat. 43°

H.A.	24° 00′ Alt.	Δd Δt	Az.	24° 30′ Alt.	Δd Δt	Az.	25° 00′ Alt.	Δd Δt	Az.	25° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	71 00.0	1.0 02	180.0	71 30.0	1.0 02	180.0	72 00.0	1.0 02	180.0	72 30.0	1.0 02	180.0
1	70 58.9	1.0 06	177.2	71 28.9	1.0 05	177.1	71 58.9	1.0 06	177.1	72 28.8	1.0 06	177.0
2	70 55.7	1.0 09	174.4	71 25.6	1.0 09	174.3	71 55.5	1.0 09	174.1	72 25.4	1.0 10	174.0
3	70 50.4	99 12	171.6	71 20.2	99 13	171.4	71 49.9	99 13	171.2	72 19.7	99 13	171.0
4	70 42.9	99 16	168.9	71 12.6	99 16	168.6	71 42.2	99 16	168.4	72 11.8	99 17	168.1
05	70 33.5	98 19	166.2	71 02.9	98 20	165.9	71 32.3	98 20	165.6	72 01.7	98 20	165.2
6	70 22.0	97 22	163.5	70 51.2	97 23	163.1	71 20.3	97 23	162.8	71 49.4	97 24	162.4
7	70 08.5	96 26	160.9	70 37.5	96 26	160.5	71 06.3	96 27	160.1	71 35.1	96 27	159.6
8	69 53.2	96 29	158.3	70 21.8	95 29	157.9	70 50.4	95 30	157.4	71 18.9	95 30	156.9
9	69 36.1	94 31	155.8	70 04.4	94 32	155.3	70 32.6	94 33	154.8	71 00.8	94 33	154.3
10	69 17.3	93 34	153.4	69 45.2	93 35	152.8	70 13.1	93 35	152.3	70 40.8	92 36	151.7
1	68 56.8	92 37	151.0	69 24.4	92 37	150.4	69 51.8	91 38	149.8	70 19.2	91 39	149.2
2	68 34.7	91 39	148.7	69 01.9	91 40	148.1	69 29.0	90 41	147.5	69 56.0	90 41	146.8
3	68 11.2	90 42	146.4	68 38.0	89 42	145.8	69 04.7	89 43	145.2	69 31.2	88 44	144.5
4	67 46.2	88 44	144.3	68 12.6	88 44	143.6	68 38.9	87 45	143.0	69 05.1	87 46	142.3
15	67 19.9	87 46	142.2	67 46.0	87 47	141.5	68 11.9	86 47	140.8	68 37.6	85 48	140.1
6	66 52.4	86 48	140.1	67 18.0	85 48	139.5	67 43.5	85 49	138.8	68 08.9	84 50	138.1
7	66 23.7	85 50	138.2	66 49.0	84 50	137.5	67 14.0	83 51	136.8	67 39.0	83 52	136.1
8	65 53.9	83 51	136.3	66 18.8	83 52	135.6	66 43.5	82 53	134.9	67 08.0	81 53	134.1
9	65 23.0	82 53	134.4	65 47.5	81 54	133.7	66 11.9	81 54	133.0	66 36.0	80 55	132.3
20	64 51.2	81 54	132.7	65 15.4	80 55	132.0	65 39.3	79 56	131.2	66 03.1	79 56	130.5
1	64 18.5	80 56	131.0	64 42.3	79 56	130.3	65 05.9	78 57	129.5	65 29.3	78 58	128.8
2	63 45.0	79 57	129.3	64 08.4	78 58	128.6	64 31.6	77 58	127.9	64 54.7	76 59	127.1
3	63 10.6	77 58	127.7	63 33.7	77 59	127.0	63 56.6	76 60	126.3	64 19.3	75 60	125.5
4	62 35.6	76 60	126.2	62 58.3	76 60	125.5	63 20.9	75 61	124.7	63 43.3	74 61	124.0
25	61 59.8	75 61	124.7	62 22.3	75 61	124.0	62 44.5	74 62	123.2	63 06.6	73 62	122.5
6	61 23.4	74 62	123.2	61 45.6	74 62	122.5	62 07.5	73 63	121.8	62 29.2	72 63	121.1
7	60 46.4	73 63	121.9	61 08.3	73 63	121.1	61 30.0	72 64	120.4	61 51.4	71 64	119.7
8	60 08.9	72 63	120.5	60 30.5	72 64	119.8	60 51.9	71 64	119.1	61 13.0	70 65	118.4
9	59 30.8	72 64	119.2	59 52.2	71 65	118.5	60 13.3	70 65	117.8	60 34.2	69 65	117.1
30	58 52.3	71 65	117.9	59 13.4	70 65	117.2	59 34.2	69 66	116.5	59 54.9	68 66	115.8
1	58 13.3	70 66	116.7	58 34.1	69 66	116.0	58 54.8	68 66	115.3	59 15.2	68 67	114.6
2	57 33.9	69 66	115.5	57 54.5	68 67	114.8	58 14.9	68 67	114.1	58 35.1	67 67	113.4
3	56 54.1	68 67	114.3	57 14.5	68 67	113.7	57 34.7	67 68	113.0	57 54.6	66 68	112.3
4	56 13.9	68 68	113.2	56 34.1	67 68	112.5	56 54.1	66 68	111.9	57 13.9	65 68	111.2
35	55 33.4	67 68	112.1	55 53.4	66 68	111.4	56 13.2	66 69	110.8	56 32.8	65 69	110.1
6	54 52.6	66 68	111.0	55 12.4	66 69	110.4	55 32.1	65 69	109.7	55 51.5	64 69	109.0
7	54 11.5	66 69	110.0	54 31.2	65 69	109.4	54 50.6	64 69	108.7	55 09.9	64 70	108.0
8	53 30.2	65 69	109.0	53 49.7	65 70	108.3	54 08.9	64 70	107.7	54 28.0	63 70	107.0
9	52 48.5	65 70	108.0	53 07.9	64 70	107.4	53 27.0	63 70	106.7	53 46.0	63 70	106.1
40	52 06.7	64 70	107.0	52 25.9	64 70	106.4	52 44.9	63 71	105.8	53 03.7	62 71	105.1
1	51 24.6	64 70	106.1	51 43.7	63 71	105.5	52 02.6	63 71	104.8	52 21.2	62 71	104.2
2	50 42.4	63 71	105.2	51 01.3	63 71	104.5	51 20.1	62 71	103.9	51 38.6	61 71	103.3
3	49 59.9	63 71	104.2	50 18.7	62 71	103.6	50 37.4	62 71	103.0	50 55.8	61 72	102.4
4	49 17.3	63 71	103.4	49 36.0	62 71	102.8	49 54.6	61 72	102.1	50 12.9	61 72	101.5
45	48 34.5	62 72	102.5	48 53.2	62 72	101.9	49 11.6	61 72	101.3	49 29.8	61 72	100.7
6	47 51.6	62 72	101.6	48 10.2	61 72	101.0	48 28.5	61 72	100.5	48 46.7	60 72	99.9
7	47 08.6	62 72	100.8	47 27.0	61 72	100.2	47 45.3	61 72	99.6	48 03.4	60 72	99.0
8	46 25.4	62 72	100.0	46 43.8	61 72	99.4	47 02.0	60 72	98.8	47 20.0	60 72	98.2
9	45 42.1	61 72	99.2	46 00.4	61 72	98.6	46 18.6	60 72	98.0	46 36.5	60 73	97.4
50	44 58.8	61 72	98.4	45 17.0	61 73	97.8	45 35.1	60 73	97.2	45 53.0	59 73	96.7
1	44 15.3	61 73	97.6	44 33.5	60 73	97.0	44 51.5	60 73	96.5	45 09.4	59 73	95.9
2	43 31.8	61 73	96.8	43 49.9	60 73	96.3	44 07.9	60 73	95.7	44 25.7	59 73	95.2
3	42 48.2	61 73	96.1	43 06.3	60 73	95.5	43 24.2	59 73	95.0	43 41.9	59 73	94.4
4	42 04.5	60 73	95.3	42 22.6	60 73	94.8	42 40.4	59 73	94.2	42 58.2	59 73	93.7
55	41 20.8	60 73	94.6	41 38.8	60 73	94.0	41 56.7	59 73	93.5	42 14.4	59 73	93.0
6	40 37.0	60 73	93.8	40 55.0	60 73	93.3	41 12.9	59 73	92.8	41 30.5	59 73	92.2
7	39 53.2	60 73	93.1	40 11.2	60 73	92.6	40 29.0	59 73	92.1	40 46.7	59 73	91.5
8	39 09.4	60 73	92.4	39 27.4	60 73	91.9	39 45.1	59 73	91.4	40 02.8	59 73	90.8
9	38 25.6	60 73	91.7	38 43.5	60 73	91.2	39 01.3	59 73	90.7	39 18.9	59 73	90.2
60	37 41.7	60 73	91.0	37 59.6	60 73	90.5	38 17.4	59 73	90.0	38 35.0	59 73	89.5
1	36 57.8	60 73	90.3	37 15.7	60 73	89.8	37 33.5	59 73	89.3	37 51.2	59 73	88.8
2	36 13.9	60 73	89.6	36 31.8	60 73	89.1	36 49.6	59 73	88.6	37 07.3	59 73	88.1
3	35 30.1	60 73	89.0	35 48.0	60 73	88.5	36 05.8	59 73	88.0	36 23.5	59 73	87.5
4	34 46.2	60 73	88.3	35 04.1	60 73	87.8	35 21.9	59 73	87.3	35 39.6	59 73	86.8
65	34 02.3	60 73	87.6	34 20.3	60 73	87.2	34 38.1	59 73	86.7	34 55.8	59 73	86.2
6	33 18.5	60 73	87.0	33 36.5	60 73	86.5	33 54.3	59 73	86.0	34 12.1	59 73	85.5
7	32 34.7	60 73	86.3	32 52.7	60 73	85.8	33 10.6	59 73	85.4	33 28.3	59 73	84.9
8	31 50.9	60 73	85.7	32 08.9	60 73	85.2	32 26.8	60 73	84.7	32 44.7	59 73	84.3
9	31 07.2	60 73	85.0	31 25.2	60 73	84.6	31 43.2	60 73	84.1	32 01.0	59 73	83.6
70	30 23.5	60 73	84.4	30 41.6	60 73	83.9	30 59.6	60 73	83.5	31 17.4	59 73	83.0
1	29 39.8	61 73	83.7	29 58.0	60 73	83.3	30 16.0	60 72	82.8	30 33.9	60 72	82.4
2	28 56.3	61 73	83.1	29 14.4	60 72	82.7	29 32.5	60 72	82.2	29 50.5	60 72	81.7
3	28 12.7	61 72	82.5	28 30.9	61 72	82.0	28 49.0	60 72	81.6	29 07.1	60 72	81.1
4	27 29.2	61 72	81.9	27 47.5	61 72	81.4	28 05.7	60 72	81.0	28 23.7	60 72	80.5
75	26 45.8	61 72	81.2	27 04.1	61 72	80.8	27 22.4	61 72	80.3	27 40.5	60 72	79.9
6	26 02.5	61 72	80.6	26 20.9	61 72	80.2	26 39.2	61 72	79.7	26 57.3	61 72	79.3
7	25 19.3	62 72	80.0	25 37.7	61 72	79.5	25 56.0	61 72	79.1	26 14.3	61 72	78.7
8	24 36.1	62 72	79.4	24 54.6	61 72	78.9	25 13.0	61 72	78.5	25 31.3	61 71	78.0
9	23 53.0	62 72	78.7	24 11.6	62 72	78.3	24 30.0	61 71	77.9	24 48.4	61 71	77.4
80	23 10.0	62 71	78.1	23 28.6	62 71	77.7	23 47.2	62 71	77.3	24 05.6	61 71	76.8
1	22 27.1	62 71	77.5	22 45.8	62 71	77.1	23 04.4	62 71	76.7	23 23.0	62 71	76.2
2	21 44.3	63 71	76.9	22 03.1	62 71	76.5	22 21.8	62 71	76.0	22 40.4	62 71	75.6
3	21 01.7	63 71	76.3	21 20.5	63 71	75.9	21 39.3	62 71	75.4	21 58.0	62 71	75.0
4	20 19.1	63 71	75.7	20 38.0	63 71	75.2	20 56.8	63 70	74.8	21 15.6	63 70	74.4
85	19 36.6	63 71	75.0	19 55.6	63 70	74.6	20 14.6	63 70	74.2	20 33.4	63 70	73.8
6	18 54.3	64 70	74.4	19 13.4	63 70	74.0	19 32.4	63 70	73.6	19 51.4	63 70	73.2
7	18 12.1	64 70	73.8	18 31.3	64 70	73.4	18 50.4	64 70	73.0	19 09.4	63 70	72.6
8	17 30.0	64 70	73.2	17 49.3	64 70	72.8	18 08.5	64 70	72.4	18 27.6	64 69	72.0
9	16 48.1	65 70	72.6	17 07.4	64 70	72.2	17 26.7	64 69	71.8	17 46.0	64 69	71.4
90	16 06.3	65 69	72.0	16 25.7	65 69	71.6	16 45.1	65 69	71.2	17 04.4	64 69	70.8

H.A.	26° 00′ Alt.	Δd Δt	Az.	26° 30′ Alt.	Δd Δt	Az.	27° 00′ Alt.	Δd Δt	Az.	27° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	73 00.0	1.0 02	180.0	73 30.0	1.0 02	180.0	74 00.0	1.0 02	180.0	74 30.0	1.0 02	180.0
1	72 58.8	1.0 06	176.9	73 28.8	1.0 06	176.9	73 58.8	1.0 06	176.8	74 28.7	1.0 06	176.7
2	72 55.3	1.0 10	173.9	73 25.2	1.0 10	173.7	73 55.1	1.0 10	173.6	74 24.9	1.0 10	173.4
3	72 49.5	99 14	170.8	73 19.2	99 14	170.6	73 48.9	99 14	170.4	74 18.6	99 15	170.1
4	72 41.3	99 17	167.8	73 10.9	98 18	167.5	73 40.4	98 18	167.2	74 09.9	98 19	166.9
05	72 31.0	98 21	164.9	73 00.3	98 21	164.5	73 29.5	97 22	164.1	73 58.8	97 22	163.7
6	72 18.5	97 24	162.0	72 47.5	97 25	161.6	73 16.4	96 25	161.1	73 45.3	96 26	160.6
7	72 03.9	96 28	159.2	72 32.6	95 28	158.7	73 01.2	95 29	158.2	73 29.7	95 30	157.6
8	71 47.3	95 31	156.4	72 15.6	94 32	155.9	72 43.8	94 32	155.3	73 12.0	94 33	154.7
9	71 28.8	93 34	153.7	71 56.7	93 35	153.1	72 24.6	93 35	152.5	72 52.3	92 36	151.9
10	71 08.5	92 37	151.1	71 36.0	92 37	150.5	72 03.4	91 38	149.9	72 30.7	91 39	149.2
1	70 46.4	91 39	148.6	71 13.6	90 40	148.0	71 40.5	90 41	147.3	72 07.3	89 42	146.5
2	70 22.8	89 42	146.2	70 49.5	89 43	145.5	71 16.0	88 43	144.8	71 42.3	87 44	144.0
3	69 57.6	88 44	143.8	70 23.9	87 45	143.1	70 49.9	87 46	142.4	71 15.8	86 47	141.6
4	69 31.0	86 47	141.6	69 56.8	86 47	140.8	70 22.4	85 48	140.1	70 47.8	84 49	139.3
15	69 03.1	85 49	139.4	69 28.5	84 49	138.7	69 53.6	83 50	137.9	70 18.6	83 51	137.0
6	68 34.0	83 50	137.3	68 58.9	83 51	136.5	69 23.6	82 52	135.7	69 48.1	81 53	134.9
7	68 03.7	82 52	135.3	68 28.2	81 53	134.5	68 52.4	81 54	133.7	69 16.4	80 54	132.9
8	67 32.3	81 54	133.4	67 56.4	80 55	132.6	68 20.2	79 55	131.8	68 43.8	78 56	130.9
9	66 59.9	79 56	131.5	67 23.6	79 56	130.7	67 47.0	78 57	129.9	68 10.2	77 58	129.1
20	66 26.6	78 57	129.7	66 49.9	77 58	128.9	67 12.9	76 58	128.1	67 35.7	75 59	127.3
1	65 52.4	77 58	128.0	66 15.3	76 59	127.2	66 38.0	75 60	126.4	67 00.3	74 60	125.5
2	65 17.4	76 60	126.3	65 40.0	75 60	125.6	66 02.3	74 61	124.7	66 24.3	73 61	123.9
3	64 41.7	74 61	124.8	65 03.9	74 61	124.0	65 25.8	73 62	123.1	65 47.5	72 62	122.3
4	64 05.4	73 62	123.2	64 27.2	72 62	122.4	64 48.8	72 63	121.6	65 10.1	71 63	120.8
25	63 28.3	72 63	121.7	63 49.9	71 63	121.0	64 11.1	70 64	120.1	64 32.1	70 64	119.3
6	62 50.7	71 64	120.3	63 11.9	70 64	119.5	63 32.9	69 65	118.7	63 53.6	68 65	117.9
7	62 12.6	70 64	118.9	62 33.5	69 65	118.2	62 54.2	68 65	117.4	63 14.6	68 66	116.6
8	61 33.9	69 65	117.6	61 54.6	68 66	116.8	62 15.0	68 66	116.1	62 35.1	67 66	115.3
9	60 54.8	68 66	116.3	61 15.2	68 66	115.6	61 35.4	67 67	114.8	61 55.2	66 67	114.0
30	60 15.3	68 67	115.1	60 35.4	67 67	114.3	60 55.3	66 67	113.6	61 14.9	65 68	112.8
1	59 35.3	67 67	113.9	59 55.3	66 68	113.1	60 14.9	65 68	112.4	60 34.3	64 68	111.6
2	58 55.0	66 68	112.7	59 14.7	65 68	112.0	59 34.2	64 68	111.2	59 53.4	63 69	110.5
3	58 14.4	65 68	111.6	58 33.9	65 69	110.8	58 53.1	64 69	110.1	59 12.1	63 69	109.3
4	57 33.4	65 69	110.5	57 52.7	64 69	109.7	58 11.8	63 69	109.0	58 30.6	62 70	108.3
35	56 52.2	64 69	109.4	57 11.3	63 69	108.7	57 30.1	62 70	108.0	57 48.8	62 70	107.2
6	56 10.6	64 70	108.4	56 29.6	63 70	107.7	56 48.3	62 70	106.9	57 06.7	61 70	106.2
7	55 28.9	63 70	107.3	55 47.7	62 70	106.7	56 06.2	61 70	106.0	56 24.5	61 71	105.2
8	54 46.9	62 70	106.4	55 05.5	62 71	105.7	55 23.9	61 71	105.0	55 42.1	60 71	104.3
9	54 04.7	62 71	105.4	54 23.2	61 71	104.7	54 41.4	60 71	104.0	54 59.5	60 71	103.3
40	53 22.3	62 71	104.5	53 40.6	61 71	103.8	53 58.8	60 71	103.1	54 16.7	59 72	102.4
1	52 39.7	61 71	103.5	52 57.9	60 71	102.9	53 16.0	60 72	102.2	53 33.8	59 72	101.5
2	51 57.0	61 71	102.6	52 15.1	60 72	102.0	52 33.0	59 72	101.3	52 50.7	59 72	100.7
3	51 14.1	60 72	101.8	51 32.1	60 72	101.1	51 49.9	59 72	100.5	52 07.5	58 72	99.8
4	50 31.0	60 72	100.9	50 49.0	59 72	100.3	51 06.7	59 72	99.6	51 24.2	58 72	99.0
45	49 47.9	60 72	100.1	50 05.7	59 72	99.4	50 23.4	58 72	98.8	50 40.8	58 72	98.2
6	49 04.6	60 72	99.2	49 22.4	59 72	98.6	49 40.0	58 72	98.0	49 57.4	58 73	97.4
7	48 21.3	59 72	98.4	48 39.0	59 73	97.8	48 56.5	58 73	97.2	49 13.8	57 73	96.6
8	47 37.8	59 73	97.6	47 55.5	58 73	97.0	48 12.9	58 73	96.4	48 30.2	57 73	95.8
9	46 54.3	59 73	96.9	47 11.9	58 73	96.3	47 29.3	58 73	95.7	47 46.5	57 73	95.1
50	46 10.7	59 73	96.1	46 28.2	58 73	95.5	46 45.6	58 73	94.9	47 02.8	57 73	94.3
1	45 27.0	59 73	95.3	45 44.5	58 73	94.7	46 01.8	57 73	94.2	46 19.0	57 73	93.6
2	44 43.3	58 73	94.6	45 00.8	58 73	94.0	45 18.1	57 73	93.4	45 35.2	57 73	92.8
3	43 59.5	58 73	93.8	44 17.0	58 73	93.3	44 34.2	57 73	92.7	44 51.3	57 73	92.1
4	43 15.7	58 73	93.1	43 33.2	58 73	92.6	43 50.4	57 73	92.0	44 07.5	57 73	91.4
55	42 31.9	58 73	92.4	42 49.3	58 73	91.9	43 06.5	57 73	91.3	43 23.6	57 73	90.7
6	41 48.1	58 73	91.7	42 05.4	58 73	91.2	42 22.7	57 73	90.6	42 39.7	57 73	90.0
7	41 04.2	58 73	91.0	41 21.6	58 73	90.5	41 38.8	57 73	89.9	41 55.8	57 73	89.4
8	40 20.3	58 73	90.3	40 37.7	58 73	89.8	40 54.9	57 73	89.2	41 12.0	57 73	88.7
9	39 36.4	58 73	89.6	39 53.8	58 73	89.1	40 11.0	57 73	88.6	40 28.1	57 73	88.0
60	38 52.6	58 73	89.0	39 09.9	58 73	88.4	39 27.2	57 73	87.9	39 44.2	57 73	87.4
1	38 08.7	58 73	88.3	38 26.1	58 73	87.8	38 43.3	57 73	87.3	39 00.4	57 73	86.7
2	37 24.8	58 73	87.6	37 42.2	58 73	87.1	37 59.5	57 73	86.6	38 16.6	57 73	86.1
3	36 41.0	58 73	87.0	36 58.4	58 73	86.5	37 15.7	57 73	86.0	37 32.9	57 73	85.4
4	35 57.2	58 73	86.3	36 14.6	58 73	85.8	36 32.0	58 73	85.3	36 49.1	57 73	84.8
65	35 13.4	58 73	85.7	35 30.9	58 73	85.2	35 48.2	58 73	84.7	36 05.5	57 73	84.2
6	34 29.7	59 73	85.0	34 47.2	58 73	84.5	35 04.6	58 73	84.0	35 21.8	57 73	83.5
7	33 46.0	59 73	84.4	34 03.5	58 73	83.9	34 21.0	58 73	83.4	34 38.3	58 73	82.9
8	33 02.3	59 73	83.8	33 19.9	58 73	83.3	33 37.4	58 73	82.8	33 54.7	58 72	82.3
9	32 18.7	59 73	83.1	32 36.4	59 72	82.7	32 53.9	58 72	82.2	33 11.3	58 72	81.7
70	31 35.2	59 72	82.5	31 52.9	59 72	82.0	32 10.5	58 72	81.6	32 27.9	58 72	81.1
1	30 51.7	59 72	81.9	31 09.5	59 72	81.4	31 27.1	59 72	80.9	31 44.6	58 72	80.5
2	30 08.3	59 72	81.3	30 26.1	59 72	80.8	30 43.8	59 72	80.3	31 01.4	58 72	79.9
3	29 25.0	60 72	80.7	29 42.8	59 72	80.2	30 00.6	59 72	79.7	30 18.2	59 72	79.3
4	28 41.7	60 72	80.0	28 59.6	60 72	79.6	29 17.4	59 72	79.1	29 35.1	59 72	78.7
75	27 58.6	60 72	79.4	28 16.5	60 72	79.0	28 34.4	59 72	78.5	28 52.2	59 71	78.1
6	27 15.5	60 72	78.8	27 33.5	60 72	78.4	27 51.4	60 71	77.9	28 09.3	59 71	77.5
7	26 32.5	60 72	78.2	26 50.6	60 71	77.8	27 08.6	60 71	77.3	27 26.5	60 71	76.9
8	25 49.5	61 71	77.6	26 07.7	60 71	77.2	26 25.8	60 71	76.7	26 43.8	60 71	76.3
9	25 06.7	61 71	77.0	25 25.0	61 71	76.6	25 43.1	60 71	76.1	26 01.2	60 71	75.7
80	24 24.0	61 71	76.4	24 42.4	61 71	76.0	25 00.6	61 71	75.5	25 18.8	60 71	75.1
1	23 41.4	61 71	75.8	23 59.8	61 71	75.4	24 18.2	61 70	74.9	24 36.4	61 70	74.5
2	22 59.0	62 71	75.2	23 17.4	61 70	74.8	23 35.9	61 70	74.3	23 54.2	61 70	73.9
3	22 16.6	62 70	74.6	22 35.2	62 70	74.2	22 53.7	62 70	73.7	23 12.1	61 70	73.3
4	21 34.4	62 70	74.0	21 53.0	62 70	73.6	22 11.6	62 70	73.1	22 30.1	62 70	72.7
85	20 52.2	63 70	73.4	21 11.0	62 70	73.0	21 29.7	62 70	72.5	21 48.3	62 70	72.1
6	20 10.3	63 70	72.8	20 29.1	63 70	72.4	20 47.9	63 69	72.0	21 06.6	62 69	71.5
7	19 28.4	63 70	72.2	19 47.4	63 69	71.8	20 06.2	63 69	71.4	20 25.1	63 69	70.9
8	18 46.7	64 69	71.6	19 05.7	63 69	71.2	19 24.7	63 69	70.8	19 43.7	63 69	70.3
9	18 05.1	64 69	71.0	18 24.3	64 69	70.6	18 43.4	64 69	70.2	19 02.4	63 68	69.8
90	17 23.7	64 69	70.4	17 43.0	64 69	70.0	18 02.2	64 68	69.6	18 21.3	64 68	69.2

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DECLINATION CONTRARY NAME TO LATITUDE

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	23 00.0	1.0 01	180.0	22 30.0	1.0 01	180.0	22 00.0	1.0 01	180.0	21 30.0	1.0 01	180.0	21 00.0	1.0 01	180.0	20 30.0	1.0 01	180.0	20 00.0	1.0 01	180.0	19 30.0	1.0 01	180.0	00
1	22 59.6	1.0 02	179.0	22 29.6	1.0 02	179.0	21 59.6	1.0 02	179.0	21 29.6	1.0 02	179.0	20 59.6	1.0 02	179.0	20 29.6	1.0 02	179.0	19 59.6	1.0 02	179.1	19 29.6	1.0 02	179.1	1
2	22 58.5	1.0 03	178.0	22 28.5	1.0 03	178.0	21 58.5	1.0 03	178.0	21 28.5	1.0 03	178.1	20 58.5	1.0 03	178.1	20 28.5	1.0 03	178.1	19 58.5	1.0 03	178.1	19 28.6	1.0 03	178.1	2
3	22 56.6	1.0 04	177.0	22 26.6	1.0 04	177.0	21 56.6	1.0 04	177.1	21 26.7	1.0 04	177.1	20 56.7	1.0 04	177.1	20 26.7	1.0 04	177.1	19 56.7	1.0 04	177.2	19 26.8	1.0 04	177.2	3
4	22 53.9	1.0 06	176.0	22 24.0	1.0 06	176.1	21 54.0	1.0 06	176.1	21 24.1	1.0 06	176.1	20 54.1	1.0 06	176.2	20 24.1	1.0 05	176.2	19 54.2	1.0 05	176.2	19 24.2	1.0 05	176.2	4
05	22 50.5	1.0 07	175.0	22 20.6	1.0 07	175.1	21 50.7	1.0 07	175.1	21 20.7	1.0 07	175.2	20 50.8	1.0 07	175.2	20 20.9	1.0 07	175.2	19 50.9	1.0 07	175.3	19 21.0	1.0 07	175.3	05
6	22 46.3	1.0 08	174.1	22 16.4	1.0 08	174.1	21 46.5	1.0 08	174.1	21 16.6	1.0 08	174.2	20 46.7	1.0 08	174.2	20 16.8	1.0 08	174.3	19 46.9	1.0 08	174.3	19 17.0	1.0 08	174.4	6
7	22 41.4	1.0 09	173.1	22 11.6	1.0 09	173.1	21 41.7	1.0 09	173.2	21 11.8	1.0 09	173.2	20 42.0	1.0 09	173.3	20 12.1	1.0 09	173.3	19 42.2	1.0 09	173.4	19 12.4	1.0 09	173.4	7
8	22 35.8	99 11	172.1	22 05.9	99 11	172.1	21 36.1	99 11	172.2	21 06.3	99 10	172.3	20 36.5	99 10	172.3	20 06.7	99 10	172.4	19 36.8	99 10	172.4	19 07.0	99 10	172.5	8
9	22 29.3	99 12	171.1	21 59.6	99 12	171.2	21 29.8	99 12	171.2	21 00.0	99 12	171.3	20 30.2	99 12	171.4	20 00.5	99 11	171.4	19 30.7	99 11	171.5	19 00.9	99 11	171.6	9
10	22 22.2	99 13	170.1	21 52.5	99 13	170.2	21 22.7	99 13	170.3	20 53.0	99 13	170.3	20 23.3	99 13	170.4	19 53.6	99 13	170.5	19 23.9	99 13	170.6	18 54.1	99 12	170.6	10
1	22 14.3	99 14	169.1	21 44.6	99 14	169.2	21 15.0	99 14	169.3	20 45.3	99 14	169.4	20 15.6	99 14	169.5	19 46.0	99 14	169.5	19 16.3	99 14	169.6	18 46.6	99 14	169.7	1
2	22 05.7	99 16	168.2	21 36.1	99 16	168.3	21 06.5	99 15	168.3	20 36.9	99 15	168.4	20 07.3	99 15	168.5	19 37.7	99 15	168.6	19 08.0	99 15	168.7	18 38.4	99 15	168.8	2
3	21 56.3	98 17	167.2	21 26.8	98 17	167.3	20 57.2	98 17	167.4	20 27.7	98 16	167.5	19 58.2	98 16	167.6	19 28.6	98 16	167.7	18 59.1	98 16	167.8	18 29.5	98 16	167.9	3
4	21 46.2	98 18	166.2	21 16.8	98 18	166.3	20 47.3	98 18	166.4	20 17.8	98 18	166.5	19 48.4	98 18	166.6	19 18.9	98 17	166.7	18 49.4	98 17	166.8	18 20.0	98 17	166.9	4
15	21 35.4	98 19	165.3	21 06.0	98 19	165.4	20 36.7	98 19	165.5	20 07.3	98 19	165.6	19 37.9	98 19	165.7	19 08.5	98 18	165.8	18 39.1	98 18	165.9	18 09.7	98 18	166.0	15
6	21 23.9	98 20	164.3	20 54.6	98 20	164.4	20 25.3	98 20	164.5	19 56.0	98 20	164.7	19 26.7	98 20	164.8	18 57.4	98 20	164.9	18 28.1	98 20	165.0	17 58.8	98 19	165.1	6
7	21 11.7	97 22	163.4	20 42.5	97 21	163.5	20 13.3	97 21	163.6	19 44.1	97 21	163.7	19 14.8	97 21	163.8	18 45.6	97 21	164.0	18 16.4	97 21	164.1	17 47.2	97 20	164.2	7
8	20 58.8	97 23	162.4	20 29.6	97 23	162.5	20 00.5	97 22	162.7	19 31.4	97 22	162.8	19 02.3	97 22	162.9	18 33.1	97 22	163.0	18 04.0	97 22	163.2	17 34.9	97 22	163.3	8
9	20 45.1	97 24	161.5	20 16.1	97 24	161.6	19 47.1	97 24	161.7	19 18.1	97 23	161.9	18 49.1	97 23	162.0	18 20.0	97 23	162.1	17 51.0	97 23	162.3	17 21.9	97 23	162.4	9
20	20 30.8	96 25	160.5	20 01.9	96 25	160.7	19 33.0	96 25	160.8	19 04.1	96 24	160.9	18 35.2	96 24	161.1	18 06.2	96 24	161.2	17 37.3	96 24	161.4	17 08.3	97 24	161.5	20
1	20 15.9	96 26	159.6	19 47.1	96 26	159.7	19 18.2	96 26	159.9	18 49.4	96 26	160.0	18 20.6	96 25	160.2	17 51.8	96 25	160.3	17 22.9	96 25	160.5	16 54.1	96 25	160.6	1
2	20 00.2	96 27	158.6	19 31.5	96 27	158.8	19 02.8	96 27	159.0	18 34.1	96 27	159.1	18 05.4	96 26	159.3	17 36.6	96 26	159.4	17 07.9	96 26	159.6	16 39.2	96 26	159.7	2
3	19 43.9	95 28	157.7	19 15.3	95 28	157.9	18 46.7	95 28	158.0	18 18.1	96 28	158.2	17 49.5	96 28	158.4	17 20.9	95 27	158.5	16 52.3	95 27	158.7	16 23.6	96 27	158.8	3
4	19 26.9	95 29	156.8	18 58.5	95 29	157.0	18 30.0	95 29	157.1	18 01.5	95 29	157.3	17 33.0	95 29	157.5	17 04.5	95 28	157.6	16 36.0	95 28	157.8	16 07.5	95 28	157.9	4
25	19 09.3	94 30	155.9	18 41.0	95 30	156.0	18 12.6	95 30	156.2	17 44.2	95 30	156.4	17 15.9	95 30	156.6	16 47.5	95 29	156.7	16 19.1	95 29	156.9	15 50.7	95 29	157.1	25
6	18 51.1	94 31	155.0	18 22.8	94 31	155.1	17 54.6	94 31	155.3	17 26.4	94 31	155.5	16 58.1	94 31	155.7	16 29.8	94 30	155.8	16 01.5	94 30	156.0	15 33.3	94 30	156.2	6
7	18 32.2	94 33	154.1	18 04.1	94 32	154.2	17 36.0	94 32	154.4	17 07.8	94 32	154.6	16 39.7	94 32	154.8	16 11.6	94 31	155.0	15 43.4	94 31	155.2	15 15.2	94 31	155.3	7
8	18 12.7	93 34	153.2	17 44.7	93 33	153.3	17 16.7	93 33	153.5	16 48.7	93 33	153.7	16 20.7	93 33	153.9	15 52.7	93 32	154.1	15 24.7	93 32	154.3	14 56.6	93 32	154.5	8
9	17 52.6	93 35	152.3	17 24.7	93 34	152.5	16 56.9	93 34	152.7	16 29.0	93 34	152.8	16 01.1	93 34	153.0	15 33.2	93 33	153.2	15 05.3	93 33	153.4	14 37.4	93 33	153.6	9
30	17 31.9	92 36	151.4	17 04.1	92 35	151.6	16 36.4	92 35	151.8	16 08.7	92 35	152.0	15 40.9	93 35	152.2	15 13.2	93 34	152.4	14 45.4	93 34	152.6	14 17.6	93 34	152.8	30
1	17 10.5	92 36	150.5	16 43.0	92 36	150.7	16 15.4	92 36	150.9	15 47.8	92 36	151.1	15 20.2	92 36	151.3	14 52.5	92 35	151.5	14 24.9	92 35	151.7	13 57.3	92 35	151.9	1
2	16 48.6	91 37	149.6	16 21.2	91 37	149.8	15 53.7	92 37	150.0	15 26.3	92 37	150.3	14 58.8	92 37	150.5	14 31.3	92 36	150.7	14 03.8	92 36	150.9	13 36.3	92 36	151.1	2
3	16 26.2	91 38	148.8	15 58.9	91 38	149.0	15 31.5	91 38	149.2	15 04.2	91 38	149.4	14 36.9	91 37	149.6	14 09.5	91 37	149.8	13 42.2	91 37	150.0	13 14.8	91 37	150.2	3
4	16 03.1	90 39	147.9	15 36.0	91 39	148.1	15 08.8	91 39	148.3	14 41.6	91 39	148.5	14 14.4	91 38	148.8	13 47.2	91 38	149.0	13 20.0	91 38	149.2	12 52.8	91 38	149.4	4
35	15 39.5	90 40	147.0	15 12.5	90 40	147.3	14 45.5	90 40	147.5	14 18.4	90 40	147.7	13 51.4	90 39	147.9	13 24.3	90 39	148.2	12 57.3	90 39	148.4	12 30.2	90 39	148.6	35
6	15 15.4	90 41	146.2	14 48.5	90 41	146.4	14 21.6	90 41	146.6	13 54.7	90 40	146.9	13 27.8	90 40	147.1	13 00.9	90 40	147.3	12 34.0	90 40	147.5	12 07.0	90 39	147.8	6
7	14 50.7	89 42	145.3	14 23.9	89 42	145.6	13 57.2	89 42	145.8	13 30.5	89 41	146.0	13 03.7	89 41	146.3	12 36.9	89 41	146.5	12 10.2	89 41	146.7	11 43.4	89 40	147.0	7
8	14 25.4	89 43	144.5	13 58.9	89 43	144.7	13 32.3	89 42	145.0	13 05.7	89 42	145.2	12 39.1	89 42	145.5	12 12.5	89 42	145.7	11 45.8	89 41	145.9	11 19.2	89 41	146.2	8
9	13 59.7	88 44	143.7	13 33.3	88 44	143.9	13 06.8	88 43	144.2	12 40.4	88 43	144.4	12 13.9	88 43	144.6	11 47.5	88 42	144.9	11 21.0	88 42	145.1	10 54.5	88 42	145.4	9
40	13 33.4	88 45	142.8	13 07.2	88 44	143.1	12 40.9	88 44	143.3	12 14.6	88 44	143.6	11 48.3	88 44	143.8	11 22.0	88 43	144.1	10 55.6	88 43	144.3	10 29.3	88 43	144.6	40
1	13 06.7	87 45	142.0	12 40.6	87 45	142.3	12 14.4	87 45	142.5	11 48.3	87 45	142.8	11 22.1	87 44	143.0	10 56.0	87 44	143.3	10 29.8	87 44	143.5	10 03.6	87 44	143.8	1
2	12 39.4	87 46	141.2	12 13.5	87 46	141.5	11 47.5	87 46	141.7	11 21.5	87 45	142.0	10 55.5	87 45	142.2	10 29.5	87 45	142.5	10 03.5	87 45	142.7	9 37.4	87 44	143.0	2
3	12 11.7	86 47	140.4	11 45.9	86 47	140.7	11 20.1	86 46	140.9	10 54.2	86 46	141.2	10 28.4	86 46	141.4	10 02.5	86 46	141.7	9 36.7	86 45	142.0	9 10.8	86 45	142.2	3
4	11 43.5	85 48	139.6	11 17.8	86 48	139.9	10 52.2	86 47	140.1	10 26.5	86 47	140.4	10 00.8	86 47	140.7	9 35.1	86 46	140.9	9 09.4	86 46	141.2	8 43.7	86 46	141.4	4
45	11 14.8	85 49	138.8	10 49.3	85 48	139.1	10 23.8	85 48	139.3	9 58.3	85 48	139.6	9 32.8	85 48	139.9	9 07.2	85 47	140.1	8 41.6	85 47	140.4	8 16.1	85 47	140.7	45
6	10 45.7	84 49	138.0	10 20.4	84 49	138.3	9 55.0	85 49	138.6	9 29.6	85 48	138.8	9 04.3	85 48	139.1	8 38.9	85 48	139.4	8 13.5	85 48	139.6	7 48.0	85 47	139.9	6
7	10 16.1	84 50	137.2	9 50.9	84 50	137.5	9 25.7	84 50	137.8	9 00.5	84 49	138.1	8 35.3	84 49	138.3	8 10.1	84 49	138.6	7 44.8	84 48	138.9	7 19.6	84 48	139.2	7
8	9 46.1	83 51	136.5	9 21.1	83 50	136.7	8 56.0	84 50	137.0	8 31.0	84 50	137.3	8 05.9	84 50	137.6	7 40.8	84 49	137.8	7 15.7	84 49	138.1	6 50.6	84 49	138.4	8
9	9 15.7	83 51	135.7	8 50.8	83 51	136.0	8 25.9	83 51	136.3	8 01.0	83 51	136.5	7 36.1	83 50	136.8	7 11.2	83 50	137.1	6 46.2	83 50	137.4	6 21.3	83 50	137.7	9
50	8 44.8	82 52	134.9	8 20.1	82 52	135.2	7 55.4	82 52	135.5	7 30.6	82 51	135.8	7 05.9	83 51	136.1	6 41.1	83 51	136.4	6 16.3	83 51	136.6	5 51.5	83 50	136.9	50
1	8 13.5	82 53	134.2	7 49.0	82 53	134.5	7 24.4	82 52	134.7	6 59.8	82 52	135.0	6 35.2	82 52	135.3	6 10.6	82 52	135.6	5 46.0	82 51	135.9	5 21.3	82 51	136.2	1
2	7 41.9	81 53	133.4	7 17.4	81 53	133.7	6 53.0	81 53	134.0	6 28.6	81 53	134.3	6 04.1	81 52	134.6	5 39.7	82 52	134.9	5 15.2	82 52	135.2				2
3	7 09.8	81 54	132.7	6 45.5	81 54	133.0	6 21.3	81 54	133.3	5 57.0	81 53	133.6	5 32.7	81 53	133.8	5 08.4	81 53	134.1							3
4	6 37.3	80 55	131.9	6 13.2	80 54	132.2	5 49.1	80 54	132.5	5 25.0	80 54	132.8	5 00.9	80 54	133.1										4
55	6 04.5	80 55	131.2	5 40.5	80 55	131.5	5 16.6	80 55	131.8																55
6	5 31.3	79 56	130.5	5 07.5	79 56	130.8																			6

DECLINATION SAME NAME AS LATITUDE

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
91	15 24.6	65 69	71.3	15 44.2	65 69	71.0	16 03.6	65 69	70.6	16 23.1	65 69	70.2	16 42.5	65 68	69.8	17 01.8	64 68	69.4	17 21.1	64 68	69.0	17 40.4	64 68	68.6	91
2	14 43.1	65 69	70.7	15 02.8	65 69	70.3	15 22.3	65 69	69.9	15 41.9	65 68	69.6	16 01.4	65 68	69.2	16 20.9	65 68	68.8	16 40.3	65 68	68.4	16 59.6	64 68	68.0	2
3	14 01.8	66 69	70.1	14 21.5	66 68	69.7	14 41.2	66 68	69.3	15 00.9	65 68	68.9	15 20.5	65 68	68.5	15 40.0	65 68	68.2	15 59.6	65 68	67.8	16 19.1	65 67	67.4	3
4	13 20.6	66 68	69.5	13 40.4	66 68	69.1	14 00.2	66 68	68.7	14 20.0	66 68	68.3	14 39.7	66 68	67.9	14 59.4	66 67	67.5	15 19.0	65 67	67.2	15 38.6	65 67	66.8	4
95	12 39.6	67 68	68.9	12 59.5	66 68	68.5	13 19.4	66 68	68.1	13 39.3	66 68	67.7	13 59.1	66 67	67.3	14 18.9	66 67	66.9	14 38.7	66 67	66.6	14 58.4	66 67	66.2	95
6	11 58.7	67 68	68.2	12 18.8	67 68	67.9	12 38.8	67 67	67.5	12 58.8	67 67	67.1	13 18.7	66 67	66.7	13 38.6	66 67	66.3	13 58.5	66 67	65.9	14 18.4	66 66	65.6	6
7	11 18.1	67 67	67.6	11 38.2	67 67	67.2	11 58.4	67 67	66.9	12 18.5	67 67	66.5	12 38.5	67 67	66.1	12 58.6	67 66	65.7	13 18.6	67 66	65.3	13 38.5	66 66	65.0	7
8	10 37.6	68 67	67.0	10 57.9	68 67	66.6	11 18.1	67 67	66.2	11 38.3	67 67	65.9	11 58.5	67 66	65.5	12 18.7	67 66	65.1	12 38.8	67 66	64.7	12 58.9	67 66	64.3	8
9	9 57.3	68 67	66.4	10 17.7	68 67	66.0	10 38.0	68 66	65.6	10 58.4	68 66	65.2	11 18.7	68 66	64.9	11 38.9	68 66	64.5	11 59.2	67 66	64.1	12 19.4	67 65	63.7	9
100	9 17.2	68 66	65.7	9 37.7	68 66	65.4	9 58.2	68 66	65.0	10 18.6	68 66	64.6	10 39.0	68 66	64.2	10 59.4	68 66	63.9	11 19.8	68 65	63.5	11 40.2	68 65	63.1	100
1	8 37.3	69 66	65.1	8 57.9	69 66	64.7	9 18.5	69 66	64.4	9 39.1	69 66	64.0	9 59.6	68 65	63.6	10 20.2	68 65	63.2	10 40.7	68 65	62.9	11 01.1	68 65	62.5	1
2	7 57.6	69 66	64.5	8 18.3	69 66	64.1	8 39.1	69 65	63.7	8 59.8	69 65	63.4	9 20.4	69 65	63.0	9 41.1	69 65	62.6	10 01.7	69 65	62.3	10 22.3	69 64	61.9	2
3	7 18.1	70 65	63.8	7 39.0	70 65	63.5	7 59.8	69 65	63.1	8 20.6	69 65	62.7	8 41.4	69 65	62.4	9 02.2	69 64	62.0	9 23.0	69 64	61.6	9 43.7	69 64	61.3	3
4	6 38.8	70 65	63.2	6 59.8	70 65	62.8	7 20.8	70 65	62.5	7 41.7	70 64	62.1	8 02.7	70 64	61.7	8 23.6	70 64	61.4	8 44.5	70 64	61.0	9 05.4	70 64	60.6	4
105	5 59.8	70 65	62.5	6 20.9	70 64	62.2	6 42.0	70 64	61.8	7 03.1	70 64	61.5	7 24.1	70 64	61.1	7 45.2	70 64	60.7	8 06.2	70 63	60.4	8 27.2	70 63	60.0	105
6	5 21.0	71 64	61.9	5 42.2	71 64	61.5	6 03.4	71 64	61.2	6 24.7	71 64	60.8	6 45.8	71 63	60.5	7 07.0	71 63	60.1	7 28.2	71 63	59.7	7 49.3	70 63	59.4	6
7				5 03.8	71 64	60.9	5 25.1	71 64	60.5	5 46.5	71 63	60.2	6 07.8	71 63	59.8	6 29.1	71 63	59.5	6 50.4	71 63	59.1	7 11.7	71 62	58.8	7
8										5 08.5	72 63	59.5	5 30.0	72 62	59.2	5 51.4	71 62	58.8	6 12.9	71 62	58.5	6 34.3	71 62	58.1	8
9																5 14.0	72 62	58.2	5 35.6	72 62	57.8	5 57.2	72 61	57.5	9
110																						5 20.3	72 61	56.8	110

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Lat. 43°

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	°
00	75 00.0	1.0 02	180.0	75 30.0	1.0 02	180.0	76 00.0	1.0 02	180.0	77 00.0	1.0 02	180.0	79 00.0	1.0 03	180.0	81 00.0	1.0 03	180.0	81 30.0	1.0 04	180.0	82 30.0	1.0 04	180.0	00
1	74 58.7	1.0 07	176.6	75 28.7	1.0 07	176.5	75 58.6	1.0 07	176.4	76 58.5	1.0 07	176.2	78 58.3	1.0 08	175.6	80 58.0	1.0 10	174.7	81 27.9	1.0 11	174.4	82 27.6	1.0 12	173.8	1
2	74 54.8	1.0 11	173.2	75 24.6	99 11	173.0	75 54.5	99 11	172.8	76 54.1	99 12	172.3	78 53.2	99 14	171.2	80 51.9	99 17	169.5	81 21.5	99 17	169.0	82 20.6	98 19	167.7	2
3	74 48.3	99 15	169.8	75 18.0	99 15	169.6	75 47.6	99 16	169.2	76 46.8	99 17	168.6	78 44.9	98 19	166.9	80 42.0	97 23	164.4	81 11.1	97 24	163.7	82 09.0	96 26	161.8	3
4	74 39.3	98 19	166.5	75 08.8	98 20	166.2	75 38.1	98 20	165.8	76 36.8	98 21	164.9	78 33.3	97 24	162.7	80 28.4	95 28	159.5	80 56.9	96 30	158.6	81 53.3	93 32	156.3	4
05	74 27.9	97 23	163.3	74 57.0	97 24	162.8	75 26.1	97 24	162.4	76 24.0	96 26	161.3	78 18.8	95 29	158.6	80 11.5	93 34	154.9	80 39.2	92 35	153.8	81 33.8	90 38	151.1	05
6	74 14.2	96 27	160.1	74 42.9	96 27	159.6	75 11.6	95 28	159.0	76 08.6	95 30	157.8	78 01.4	93 33	154.7	79 51.3	90 38	150.5	80 18.2	89 40	149.2	81 11.0	87 43	146.3	6
7	73 58.1	95 30	157.1	74 26.5	94 31	156.5	74 54.7	94 32	155.8	75 50.9	93 33	154.4	77 41.3	91 37	151.0	79 28.4	87 42	146.4	79 54.4	86 44	145.0	80 45.2	83 47	141.9	7
8	73 40.0	93 34	154.1	74 07.9	93 34	153.4	74 35.7	92 35	152.7	75 30.8	91 37	151.2	77 18.9	89 41	147.5	79 02.9	84 46	142.6	79 28.0	83 48	141.1	80 16.9	80 51	137.8	8
9	73 19.8	92 37	151.2	73 47.3	91 38	150.5	74 14.6	91 38	149.7	75 08.6	89 40	148.1	76 54.2	86 44	144.2	78 35.2	82 49	139.1	78 59.4	80 51	137.5	79 46.4	76 54	134.2	9
10	72 57.8	90 40	148.4	73 24.7	90 41	147.7	73 51.5	89 41	146.9	74 44.5	88 43	145.2	76 27.6	84 47	141.0	78 05.5	79 52	135.8	78 28.9	77 54	134.2	79 14.1	73 57	130.8	10
1	72 34.0	88 42	145.8	73 00.4	88 43	145.0	73 26.7	87 44	144.1	74 18.5	86 46	142.3	75 59.1	82 50	138.1	77 34.0	76 55	132.7	77 56.6	74 56	131.2	78 40.1	70 59	127.8	1
2	72 08.5	87 45	143.2	72 34.4	86 46	142.4	73 00.2	85 47	141.5	73 50.9	84 49	139.7	75 29.0	79 53	135.3	77 01.0	74 57	129.9	77 22.9	72 58	128.3	78 04.7	66 61	125.0	2
3	71 41.5	85 47	140.8	72 06.9	84 48	139.9	72 32.1	84 49	139.0	73 21.8	82 51	137.1	74 57.4	77 55	132.7	76 26.7	71 59	127.3	76 47.8	69 60	125.7	77 28.2	65 63	122.4	3
4	71 13.0	84 50	138.4	71 38.0	83 50	137.6	72 02.7	82 51	136.7	72 51.2	80 53	134.7	74 24.5	75 57	130.2	75 51.3	69 61	124.8	76 11.7	67 62	123.3	76 50.7	63 64	120.1	4
15	70 43.3	82 52	136.2	71 07.7	81 52	135.3	71 31.9	80 53	134.4	72 19.4	78 55	132.4	73 50.5	73 59	127.9	75 14.8	67 62	122.6	75 34.6	65 63	121.1	76 12.3	61 65	117.9	15
6	70 12.3	80 53	134.1	70 36.3	79 54	133.2	71 00.0	79 55	132.2	71 46.5	76 57	130.2	73 15.4	71 60	125.8	74 37.4	65 64	120.5	74 56.6	63 65	119.0	75 33.2	59 66	115.9	6
7	69 40.2	79 55	132.0	70 03.7	78 56	131.1	70 27.0	77 57	130.2	71 12.5	75 58	128.2	72 39.3	70 62	123.7	73 59.2	63 65	118.5	74 17.8	61 66	117.1	74 53.4	57 67	114.1	7
8	69 07.1	77 57	130.0	69 30.2	76 57	129.1	69 52.9	75 58	128.2	70 37.5	73 60	126.2	72 02.4	68 63	121.8	73 20.3	62 66	116.7	73 38.5	60 67	115.3	74 13.1	56 68	112.3	8
9	68 33.1	76 58	128.2	68 55.7	75 59	127.3	69 18.0	74 60	126.3	70 01.7	72 61	124.4	71 24.7	66 64	120.0	72 40.8	60 67	115.0	72 58.5	58 67	113.6	73 32.3	54 69	110.7	9
20	67 58.2	75 60	126.4	68 20.4	74 60	125.5	68 42.3	72 61	124.5	69 25.1	70 62	122.6	70 46.4	65 65	118.3	72 00.7	59 68	113.3	72 18.1	57 68	112.0	72 51.0	53 69	109.2	20
1	67 22.4	73 61	124.7	67 44.2	72 61	123.8	68 05.8	71 62	122.8	68 47.8	69 63	120.9	70 07.5	64 66	116.6	71 20.2	57 68	111.8	71 37.2	56 69	110.5	72 09.4	52 70	107.8	1
2	66 46.0	72 62	123.0	67 07.4	71 62	122.1	67 28.6	70 63	121.2	68 09.8	68 64	119.3	69 28.0	62 67	115.1	70 39.3	56 69	110.4	70 55.9	54 69	109.1	71 27.5	51 70	106.5	2
3	66 08.9	71 63	121.4	66 30.0	70 63	120.6	66 50.7	69 64	119.6	67 31.3	66 65	117.7	68 48.0	61 67	113.6	69 58.0	55 69	109.0	70 14.2	53 70	107.8	70 45.2	50 71	105.2	3
4	65 31.1	70 64	119.9	65 51.9	69 64	119.1	66 12.3	68 65	118.2	66 52.2	65 66	116.3	68 07.6	60 68	112.2	69 16.3	54 70	107.7	69 32.3	53 70	106.5	70 02.8	49 71	104.0	4
25	64 52.8	69 65	118.5	65 13.2	68 65	117.6	65 33.4	66 66	116.7	66 12.6	64 67	114.9	67 26.7	59 69	110.9	68 34.4	53 70	106.5	68 50.1	52 71	105.3	69 20.1	48 71	102.9	25
6	64 14.0	68 66	117.1	64 34.1	67 66	116.2	64 53.9	65 66	115.3	65 32.6	63 67	113.5	66 45.6	58 69	109.6	67 52.1	53 71	105.3	68 07.7	51 71	104.1	68 37.2	48 72	101.8	6
7	63 34.7	67 66	115.7	63 54.5	66 67	114.9	64 14.0	65 67	114.0	64 52.1	62 68	112.2	66 04.1	57 70	108.4	67 09.7	52 71	104.1	67 25.0	50 71	103.0	67 54.2	47 72	100.7	7
8	62 55.0	66 67	114.4	63 14.5	65 67	113.6	63 33.8	64 68	112.7	64 11.3	61 69	111.0	65 22.3	57 70	107.2	66 27.0	51 71	103.1	66 42.2	50 72	102.0	67 11.0	46 72	99.7	8
9	62 14.8	65 68	113.2	62 34.1	64 68	112.4	62 53.1	63 68	111.5	63 30.2	61 69	109.8	64 40.2	56 70	106.1	65 44.2	51 72	102.0	65 59.2	49 72	101.0	66 27.7	46 72	98.8	9
30	61 34.3	64 68	112.0	61 53.4	63 68	111.2	62 12.1	62 69	110.3	62 48.7	60 70	108.6	63 58.0	55 71	105.0	65 01.2	50 72	101.0	65 16.0	49 72	100.0	65 44.3	46 73	97.9	30
1	60 53.4	63 69	110.8	61 12.3	62 69	110.0	61 30.8	61 69	109.2	62 07.0	59 70	107.5	63 15.5	55 71	103.9	64 18.1	50 72	100.0	64 32.7	48 72	99.0	65 00.8	45 73	97.0	1
2	60 12.3	63 69	109.7	60 30.9	62 69	108.9	60 49.2	61 70	108.1	61 25.0	59 70	106.4	62 32.8	54 71	102.9	63 34.8	49 72	99.1	63 49.3	48 72	98.1	64 17.2	45 73	96.1	2
3	59 30.8	62 70	108.6	59 49.2	61 70	107.8	60 07.4	60 70	107.0	60 42.8	58 71	105.4	61 49.9	54 72	101.9	62 51.4	49 72	98.2	63 05.9	47 73	97.3	63 33.5	45 73	95.3	3
4	58 49.1	61 70	107.5	59 07.3	60 70	106.8	59 25.3	59 70	106.0	60 00.4	58 71	104.4	61 06.9	53 72	101.0	62 07.9	48 73	97.3	62 22.3	47 73	96.4	62 49.8	44 73	94.5	4
35	58 07.1	61 70	106.5	58 25.2	60 71	105.7	58 43.0	59 71	105.0	59 17.8	57 71	103.4	60 23.8	53 72	100.1	61 24.4	48 73	96.5	61 38.6	47 73	95.6	62 06.0	44 73	93.7	35
6	57 24.9	60 71	105.5	57 42.9	59 71	104.7	58 00.5	58 71	104.0	58 35.1	57 72	102.4	59 40.5	52 72	99.2	60 40.8	48 73	95.7	60 54.9	47 73	94.8	61 22.2	44 73	92.9	6
7	56 42.6	60 71	104.5	57 00.3	59 71	103.8	57 17.9	58 71	103.0	57 52.1	56 72	101.5	58 57.1	52 72	98.3	59 57.1	48 73	94.9	60 11.2	47 73	94.0	60 38.4	44 73	92.2	7
8	56 00.0	59 71	103.6	56 17.6	58 71	102.8	56 35.0	58 72	102.1	57 09.1	56 72	100.6	58 13.7	52 73	97.4	59 13.3	48 73	94.1	59 27.4	46 73	93.2	59 54.5	44 73	91.5	8
9	55 17.2	59 72	102.6	55 34.8	58 72	101.9	55 52.1	57 72	101.2	56 25.9	55 72	99.7	57 30.1	52 73	96.6	58 29.5	47 73	93.3	58 43.6	46 73	92.5	59 10.6	44 73	90.8	9
40	54 34.4	58 72	101.7	54 51.8	58 72	101.0	55 09.0	57 72	100.3	55 42.6	55 72	98.9	56 46.5	51 73	95.8	57 45.7	47 73	92.6	57 59.7	46 73	91.8	58 26.8	44 73	90.1	40
1	53 51.3	58 72	100.9	54 08.6	57 72	100.2	54 25.7	57 72	99.5	54 59.1	55 72	98.0	56 02.8	51 73	95.0	57 01.9	47 73	91.9	57 15.8	46 73	91.1	57 42.9	44 73	89.4	1
2	53 08.2	58 72	100.0	53 25.4	57 72	99.3	53 42.4	56 72	98.6	54 15.7	55 73	97.2	55 19.1	51 73	94.3	56 18.0	47 73	91.2	56 32.0	46 73	90.4	56 59.0	44 73	88.7	2
3	52 24.9	58 72	99.2	52 42.0	57 72	98.5	52 59.0	56 73	97.8	53 32.1	54 73	96.4	54 35.3	51 73	93.5	55 34.1	47 73	90.5	55 48.1	46 73	89.7	56 15.1	44 73	88.1	3
4	51 41.5	57 72	98.3	51 58.6	57 73	97.7	52 15.4	56 73	97.0	52 48.4	54 73	95.6	53 51.5	51 73	92.8	54 50.2	47 73	89.8	55 04.2	46 73	89.0	55 31.3	44 73	87.4	4
45	50 58.1	57 73	97.5	51 15.1	56 73	96.9	51 31.9	56 73	96.2	52 04.7	54 73	94.8	53 07.6	51 73	92.0	54 06.4	47 73	89.1	54 20.3	46 73	88.3	54 47.5	44 73	86.8	45
6	50 14.5	57 73	96.7	50 31.5	56 73	96.1	50 48.2	55 73	95.4	51 21.0	54 73	94.1	52 23.8	51 73	91.3	53 22.5	47 73	88.4	53 36.5	46 73	87.7	54 03.7	44 73	86.2	6
7	49 30.9	57 73	96.0	49 47.8	56 73	95.3	50 04.5	55 73	94.7	50 37.2	54 73	93.4	51 39.9	51 73	90.6	52 38.6	47 73	87.8	52 52.7	46 73	87.1	53 19.9	44 73	85.6	7
8	48 47.2	57 73	95.2	49 04.1	56 73	94.6	49 20.7	55 73	93.9	49 53.4	54 73	92.6	50 56.0	51 73	90.0	51 54.8	47 73	87.2	52 08.8	46 73	86.4	52 36.2	45 73	85.0	8
9	48 03.5	56 73	94.4	48 20.3	56 73	93.8	48 36.9	55 73	93.2	49 09.5	54 73	91.9	50 12.1	51 73	89.3	51 11.0	47 73	86.5	51 25.1	47 73	85.8	51 52.5	45 73	84.4	9
50	47 19.7	56 73	93.7	47 36.5	56 73	93.1	47 53.1	55 73	92.5	48 25.7	54 73	91.2	49 28.3	51 73	88.6	50 27.2	48 73	85.9	50 41.3	47 73	85.2	51 08.8	45 73	83.8	50
1	46 35.9	56 73	93.0	46 52.7	56 73	92.4	47 09.3	55 73	91.8	47 41.8	54 73	90.5	48 44.4	51 73	88.0	49 43.4	48 73	85.3	49 57.6	47 73	84.6	50 25.2	45 73	83.2	1
2	45 52.1	56 73	92.3	46 08.8	56 73	91.7	46 25.4	55 73	91.1	46 57.9	54 73	89.8	48 00.5	51 73	87.3	48 59.7	48 73	84.7	49 13.9	47 73	84.0	49 41.7	45 72	82.6	2
3	45 08.2	56 73	91.5	45 25.0	55 73	91.0	45 41.5	55 73	90.4	46 14.0	54 73	89.2	47 16.7	51 73	86.7	48 16.1	48 73	84.1	48 30.3	47 73	83.4	48 58.2	46 72	82.1	3
4	44 24.4	56 73	90.8	44 41.1	55 73	90.3	44 57.6	55 73	89.7	45 30.2	54 73	88.5	46 32.9	51 73	86.0	47 32.4	48 73	83.5	47 46.8	47 73	82.8	48 14.8	46 72	81.5	4
55	43 40.5	56 73	90.2	43 57.2	55 73	89.6	44 13.8	55 73	89.0	44 46.3	54 73	87.8	45 49.2	51 73	85.4	46 48.9	48 73	82.9	47 03.3	48 72	82.3	47 31.4	46 72	80.9	55
6	42 56.6	56 73	89.5	43 13.3	55 73	88.9	43 29.9	55 73	88.3	44 02.5	54 73	87.2	45 05.5	51 73	84.8	46 05.3	49 72	82.3	46 19.8	48 72	81.7	46 48.1	46 72	80.4	6
7	42 12.7	56 73	88.8	42 29.5	56 73	88.2	42 46.0	55 73	87.7	43 18.7	54 73	86.5	44 21.8	51 73	84.2	45 21.9	49 72	81.7	45 36.4	48 72	81.1	46 04.9	47 72	79.8	7
8	41 28.9	56 73	88.1	41 45.6	56 73	87.6	42 02.2	55 73	87.0	42 34.9	54 73	85.9	43 38.2	52 73	83.6	44 38.5	49 72	81.2	44 53.1	48 72	80.5	45 21.7	47 72	79.3	8
9	40 45.0	56 73	87.5	41 01.8	56 73	86.9	41 18.4	55 73	86.4	41 51.1	54 73	85.3	42 54.6	52 73	83.0	43 55.2	49 72	80.6	44 09.8	49 72	80.0	44 38.6	47 72	78.8	9
60	40 01.2	56 73	86.8	40 18.0	56 73	86.3	40 34.6	55 73	85.7	41 07.4	54 73	84.6	42 11.0	52 72	82.4	43 11.9	50 72	80.0	43 26.7	49 72	79.4	43 55.6	48 72	78.2	60
1	39 17.4	56 73	86.2	39 34.2	56 73	85.7	39 50.9	55 73	85.1	40 23.7	54 73	84.0	41 27.6	52 72	81.8	42 28.7	50 72	79.5	42 43.6	49 72	78.9	43 12.7	48 71	77.7	1
2	38 33.6	56 73	85.6	38 50.5	56 73	85.0	39 07.2	55 73	84.5	39 40.1	54 73	83.4	40 44.2	52 72	81.2	41 45.6	50 72	78.9	42 00.6	49 72	78.3	42 29.9	48 71	77.1	2
3	37 49.9	56 73	84.9	38 06.8	56 73	84.4	38 23.5	56 73	83.9	38 56.6	55 72	82.8	40 00.9	53 72	80.6	41 02.6	50 72	78.4	41 17.6	50 71	77.8	41 47.1	49 71	76.6	3
4	37 06.2	57 73	84.3	37 23.1	56 73	83.8	37 39.9	56 73	83.2	38 13.1	55 72	82.2	39 17.6	53 72	80.0	40 19.7	51 71	77.8	40 34.8	50 71	77.2	41 04.5	49 71	76.1	4
65	36 22.6	57 73	83.7	36 39.5	56 73	83.2	36 56.4	56 72	82.6	37 29.6	55 72	81.6	38 34.4	53 72	79.5	39 36.8	51 71	77.2	39 52.0	50 71	76.7	40 22.0	49 71	75.6	65
6	35 39.0	57 73	83.0	35 56.0	56 72	82.5	36 12.9	56 72	82.0	36 46.2	55 72	81.0	37 51.3	53 72	78.9	38 54.1	51 71	76.7	39 09.4	51 71	76.1	39 39.5	50 71	75.0	6
7	34 55.5	57 72	82.4	35 12.5	57 72	81.9	35 29.5	56 72	81.4	36 02.9	55 72	80.4	37 08.3	54 72	78.3	38 11.4	52 71	76.2	38 26.8	51 71	75.6	38 57.2	50 70	74.5	7
8	34 12.0	57 72	81.8	34 29.1	57 72	81.3	34 46.1	56 72	80.8	35 19.7	56 72	79.8	36 25.4	54 71	77.7	37 28.9	52 71	75.6	37 44.4	51 71	75.1	38 14.9	50 70	74.0	8
9	33 28.6	57 72	81.2	33 45.8	57 72	80.7	34 02.8	57 72	80.2	34 36.6	56 72	79.2	35 42.6	54 71	77.2	36 46.4	52 71	75.1	37 02.0	52 70	74.5	37 32.8	51 70	73.5	9
70	32 45.3	58 72	80.6	33 02.5	57 72	80.1	33 19.6	57 72	79.6	33 53.5	56 72	78.6	34 59.8	54 71	76.6	36 04.1	53 70	74.5	36 19.8	52 70	74.0	36 50.8	51 70	72.9	70
1	32 02.0	58 72	80.0	32 19.3	57 72	79.5	32 36.5	57 72	79.0	33 10.5	56 71	78.0	34 17.2	55 71	76.0	35 21.8	53 70	74.0	35 37.7	53 70	73.5	36 08.9	52 70	72.4	1
2	31 18.8	58 72	79.4	31 36.2	58 72	78.9	31 53.5	57 72	78.4	32 27.6	57 71	77.5	33 34.6	55 71	75.5	34 39.7	53 70	73.5	34 55.7	53 70	72.9	35 27.2	52 69	71.9	2
3	30 35.7	58 72	78.8	30 53.2	58 72	78.3	31 10.5	58 71	77.8	31 44.9	57 71	76.9	32 52.2	55 71	74.9	33 57.7	54 70	72.9	34 13.8	53 70	72.4	34 45.5	52 69	71.4	3
4	29 52.7	59 72	78.2	30 10.3	58 71	77.7	30 27.7	58 71	77.3	31 02.2	57 71	76.3	32 09.9	56 70	74 4	33 15.8	54 70	72.4	33 32.0	54 69	71.9	34 04.0	53 69	70.9	4
75	29 09.8	59 71	77.6	29 27.4	58 71	77.1	29 44.9	58 71	76.7	30 19.6	57 71	75.7	31 27.7	56 70	73.8	32 34.1	55 69	71.8	32 50.4	54 69	71.3	33 22.6	53 69	70.3	75
6	28 27.0	59 71	77.0	28 44.7	59 71	76.5	29 02.3	58 71	76.1	29 37.1	58 71	75.2	30 45.6	56 70	73.3	31 52.4	55 69	71.3	32 08.9	55 69	70.8	32 41.3	54 69	69.8	6
7	27 44.3	59 71	76.4	28 02.1	59 71	76.0	28 19.7	59 71	75.5	28 54.8	58 70	74.6	30 03.7	57 70	72.7	31 10.9	55 69	70.8	31 27.5	55 69	70.3	32 00.2	54 68	69.3	7
8	27 01.7	60 71	75.8	27 19.6	59 71	75.4	27 37.3	59 71	74.9	28 12.5	58 70	74.0	29 21.8	57 70	72.1	30 29.6	56 69	70.2	30 46.2	55 68	69.8	31 19.3	55 68	68.8	8
9	26 19.2	60 71	75.2	26 37.2	60 70	74.8	26 55.0	59 70	74.3	27 30.4	59 70	73.4	28 40.1	58 69	71.6	29 48.3	56 68	69.7	30 05.1	56 68	69.2	30 38.4	55 68	68.3	9
80	25 36.9	60 70	74.6	25 54.9	60 70	74.2	26 12.8	60 70	73.8	26 48.4	59 70	72.9	27 58.6	58 69	71.0	29 07.3	57 68	69.2	29 24.2	56 68	68.7	29 57.7	56 68	67.7	80
1	24 54.6	60 70	74.1	25 12.7	60 70	73.6	25 30.7	60 70	73.2	26 06.5	59 70	72.3	27 17.1	58 69	70.5	28 26.3	57 68	68.6	28 43.4	57 68	68.2	29 17.2	56 67	67.2	1
2	24 12.5	61 70	73.5	24 30.7	61 70	73.0	24 48.8	60 70	72.6	25 24.8	60 69	71.7	26 35.9	59 69	69.9	27 45.5	57 68	68.1	28 02.7	57 67	67.6	28 36.8	57 67	66.7	2
3	23 30.5	61 70	72.9	23 48.8	61 70	72.4	24 07.0	61 69	72.0	24 43.2	60 69	71.1	25 54.7	59 68	69.4	27 04.9	58 67	67.5	27 22.2	58 67	67.1	27 56.6	57 67	66.2	3
4	22 48.6	61 70	72.3	23 07.0	61 69	71.9	23 25.3	61 69	71.4	24 01.8	60 69	70.6	25 13.7	59 68	68.8	26 24.4	58 67	67.0	26 41.9	58 67	66.6	27 16.6	57 66	65.6	4
85	22 06.9	62 69	71.7	22 25.4	62 69	71.3	22 43.8	61 69	70.8	23 20.5	61 69	70.0	24 32.9	60 68	68.2	25 44.1	59 67	66.5	26 01.7	59 67	66.0	26 36.7	58 66	65.1	85
6	21 25.3	62 69	71.1	21 43.9	62 69	70.7	22 02.4	62 69	70.3	22 39.3	61 68	69.4	23 52.2	60 68	67.7	25 04.0	59 67	65.9	25 21.7	59 66	65.5	25 56.9	58 66	64.6	6
7	20 43.8	62 69	70 5	21 02.5	62 69	70.1	21 21.2	62 68	69.7	21 58.3	62 68	68.8	23 11.7	61 67	67.1	24 24.0	60 66	65.4	24 41.9	59 66	64.9	25 17.4	59 66	64.1	7
8	20 02.5	63 69	69.9	20 21.4	63 68	69.5	20 40.1	62 68	69.1	21 17.5	62 68	68.3	22 31.4	61 67	66.6	23 44.2	60 66	64.8	24 02.2	60 66	64.4	24 38.0	59 65	63.5	8
9	19 21.4	63 68	69.3	19 40.3	63 68	68.9	19 59.2	63 68	68.5	20 36.8	62 68	67.7	21 51.2	62 67	66.0	23 04.6	61 66	64.3	23 22.7	60 66	63.9	23 58.3	60 65	63.0	9
90	18 40.4	64 68	68.8	18 59.5	63 68	68.3	19 18.5	63 68	67.9	19 56.3	63 67	67.1	21 11.2	62 66	65.4	22 25.1	61 65	63.7	22 43.4	61 65	63.3	23 19.8	60 65	62.5	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	19 00.0	1.0 01	180.0	18 30.0	1.0 01	180.0	18 00.0	1.0 01	180.0	17 00.0	1.0 01	180.0	15 00.0	1.0 01	180.0	13 00.0	1.0 01	180.0	12 30.0	1.0 01	180.0	11 30.0	1.0 01	180.0	00
1	18 59.6	1.0 02	179.1	18 29.6	1.0 02	179.1	17 59.6	1.0 02	179.1	16 59.7	1.0 02	179.1	14 59.7	1.0 02	179.1	12 59.7	1.0 02	179.1	12 29.7	1.0 02	179.2	11 29.7	1.0 02	179.2	1
2	18 58.6	1.0 03	178.1	18 28.6	1.0 03	178.1	17 58.6	1.0 03	178.2	16 58.6	1.0 03	178.2	14 58.7	1.0 03	178.2	12 58.7	1.0 03	178.3	12 28.7	1.0 03	178.3	11 28.7	1.0 03	178.3	2
3	18 56.8	1.0 04	177.2	18 26.8	1.0 04	177.2	17 56.8	1.0 04	177.2	16 56.9	1.0 04	177.3	14 57.0	1.0 04	177.4	12 57.1	1.0 04	177.4	12 27.1	1.0 04	177.5	11 27.1	1.0 04	177.5	3
4	18 54.3	1.0 05	176.3	18 24.3	1.0 05	176.3	17 54.4	1.0 05	176.3	16 54.5	1.0 05	176.4	14 54.6	1.0 05	176.5	12 54.8	1.0 05	176.6	12 24.8	1.0 05	176.6	11 24.9	1.0 05	176.7	4
05	18 51.1	1.0 07	175.3	18 21.1	1.0 06	175.4	17 51.2	1.0 06	175.4	16 51.3	1.0 06	175.5	14 51.6	1.0 06	175.6	12 51.9	1.0 06	175.7	12 21.9	1.0 06	175.8	11 22.1	1.0 06	175.8	05
6	18 47.1	1.0 08	174.4	18 17.2	1.0 08	174.4	17 47.3	1.0 08	174.5	16 47.5	1.0 08	174.6	14 47.9	1.0 07	174.7	12 48.3	1.0 07	174.9	12 18.4	1.0 07	174.9	11 18.6	1.0 07	175.0	6
7	18 42.5	1.0 09	173.5	18 12.6	1.0 09	173.5	17 42.8	1.0 09	173.6	16 43.0	1.0 09	173.7	14 43.6	1.0 08	173.9	12 44.1	1.0 08	174.1	12 14.2	1.0 08	174.1	11 14.4	1.0 08	174.2	7
8	18 37.2	99 10	172.5	18 07.3	99 10	172.6	17 37.5	99 10	172.7	16 37.9	99 10	172.8	14 38.5	99 09	173.0	12 39.2	99 09	173.2	12 09.4	99 09	173.3	11 09.7	99 09	173.4	8
9	18 31.1	99 11	171.6	18 01.4	99 11	171.7	17 31.6	99 11	171.8	16 32.0	99 11	171.9	14 32.9	99 11	172.1	12 33.7	99 10	172.4	12 03.9	99 10	172.4	11 04.3	99 10	172.5	9
10	18 24.4	99 12	170.7	17 54.7	99 12	170.8	17 24.9	99 12	170.8	16 25.5	99 12	171.0	14 26.5	99 12	171.3	12 27.5	99 11	171.5	11 57.8	99 11	171.6	10 58.3	99 11	171.7	10
1	18 17.9	99 14	169.8	17 47.3	99 13	169.9	17 17.6	99 13	169.9	16 18.2	99 13	170.1	14 19.5	99 13	170.4	12 20.7	99 12	170.7	11 51.1	99 12	170.8	10 51.7	99 12	170.9	1
2	18 08.8	99 15	168.9	17 39.2	99 16	168.9	17 09.6	99 14	169.0	16 10.4	99 14	169.2	14 11.9	99 14	169.5	12 13.3	99 13	169.8	11 43.7	99 13	169.9	10 44.4	99 13	170.1	2
3	18 00.0	98 16	167.9	17 30.5	99 16	168.0	17 00.9	99 16	168.1	16 01.8	99 15	168.3	14 03.5	99 15	168.7	12 05.3	99 14	169.0	11 35.7	99 14	169.1	10 36.5	99 14	169.3	3
4	17 50.5	98 17	167.0	17 21.0	98 17	167.1	16 51.5	98 17	167.2	15 52.6	98 16	167.4	13 54.6	98 16	167.8	11 56.6	98 15	168.2	11 27.1	98 15	168.3	10 28.1	98 15	168.4	4
15	17 40.3	98 18	166.1	17 10.9	98 18	166.2	16 41.5	98 18	166.3	15 42.7	98 18	166.5	13 45.0	98 17	166.9	11 47.3	98 17	167.3	11 17.8	98 16	167.4	10 19.0	98 16	167.6	15
6	17 29.4	98 19	165.2	17 00.1	98 19	165.3	16 30.8	98 19	165.4	15 32.1	98 19	165.7	13 34.8	98 18	166.1	11 37.4	98 18	166.5	11 08.0	98 17	166.6	10 09.3	98 17	166.8	6
7	17 17.9	97 20	164.3	16 48.7	97 20	164.4	16 19.4	97 20	164.5	15 20.9	98 20	164.8	13 23.9	98 19	165.2	11 26.8	98 19	165.7	10 57.5	98 18	165.8	9 59.0	98 18	166.0	7
8	17 05.7	97 21	163.4	16 36.6	97 21	163.5	16 07.4	97 21	163.7	15 09.1	97 21	163.9	13 12.4	97 20	164.4	11 15.6	97 20	164.9	10 46.5	97 19	165.0	9 48.1	97 19	165.2	8
9	16 52.9	97 22	162.5	16 23.8	97 22	162.6	15 54.7	97 22	162.8	14 56.6	97 22	163.0	13 00.3	97 21	163.5	11 03.9	97 21	164.0	10 34.8	97 20	164.2	9 36.6	97 20	164.4	9
20	16 39.4	97 24	161.6	16 10.4	97 23	161.8	15 41.4	97 23	161.9	14 43.5	97 23	162.2	12 47.5	97 22	162.7	10 51.5	97 22	163.2	10 22.5	97 21	163.3	9 24.5	97 21	163.6	20
1	16 25.2	96 25	160.7	15 56.3	96 24	160.9	15 27.5	96 24	161.0	14 29.7	96 24	161.3	12 34.2	96 23	161.9	10 38.5	96 23	162.4	10 09.6	96 22	162.5	9 11.8	96 22	162.8	1
2	16 10.4	96 26	159.9	15 41.7	96 26	160.0	15 12.9	96 25	160.2	14 15.4	96 25	160.4	12 20.2	96 24	161.0	10 25.0	96 24	161.6	9 56.2	96 23	161.7	8 58.5	96 23	162.0	2
3	15 55.0	96 27	159.0	15 26.3	96 27	159.1	14 57.7	96 26	159.3	14 00.4	96 26	159.6	12 05.6	96 25	160.2	10 10.8	96 25	160.8	9 42.1	96 24	160.9	8 44.7	96 24	161.2	3
4	15 38.9	96 28	158.1	15 10.4	96 28	158.3	14 41.8	96 27	158.4	13 44.7	96 27	158.7	11 50.5	96 26	159.4	9 56.1	96 26	160.0	9 27.5	96 25	160.1	8 30.3	96 25	160.4	4
25	15 22.3	96 29	157.2	14 53.8	96 29	157.4	14 25.4	96 28	157.6	13 28.5	96 28	157.9	11 34.7	96 27	158.5	9 40.8	96 26	159.2	9 12.3	96 26	159.3	8 15.3	96 26	159.7	25
6	15 05.0	94 30	156.4	14 36.7	94 30	156.5	14 08.4	94 29	156.7	13 11.7	94 29	157.0	11 18.4	96 28	157.7	9 24.9	96 27	158.4	8 56.5	96 27	158.5	7 59.8	96 27	158.9	6
7	14 47.1	94 31	155.5	14 18.9	94 31	155.7	13 50.7	94 30	155.9	12 54.3	94 30	156.2	11 01.4	94 29	156.9	9 08.5	94 28	157.6	8 40.2	94 28	157.8	7 43.7	94 28	158.1	7
8	14 28.6	94 32	154.7	14 00.5	94 32	154.8	13 32.5	94 31	155.0	12 36.3	94 31	155.4	10 43.9	94 30	156.1	8 51.5	94 29	156.8	8 23.3	94 29	157.0	7 27.0	94 29	157.3	8
9	14 09.5	93 33	153.8	13 41.6	93 33	154.0	13 13.6	93 32	154.2	12 17.8	93 32	154.6	10 25.9	93 31	155.3	8 33.9	93 30	156.0	8 05.9	93 30	156.2	7 09.9	93 30	156.6	9
30	13 49.8	93 34	153.0	13 22.0	93 34	153.2	12 54.2	93 33	153.3	11 58.6	93 33	153.7	10 07.3	93 32	154.5	8 15.8	93 31	155.2	7 47.9	93 31	155.4	6 52.1	93 30	155.8	30
1	13 29.6	92 35	152.1	13 01.9	92 34	152.3	12 34.3	92 34	152.5	11 38.9	92 34	152.9	9 48.1	92 33	153.7	7 57.1	92 32	154.5	7 29.4	92 32	154.7	6 33.9	93 31	155.0	1
2	13 08.8	92 36	151.3	12 41.3	92 35	151.5	12 13.7	92 35	151.7	11 18.6	92 35	152.1	9 28.4	92 34	152.9	7 38.0	92 33	153.7	7 10.3	92 33	153.9	6 15.1	92 32	154.3	2
3	12 47.4	91 37	150.5	12 20.1	91 36	150.7	11 52.7	91 36	150.9	10 57.8	91 36	151.3	9 08.1	91 35	152.1	7 18.2	92 34	152.9	6 50.8	92 34	153.1	5 55.8	92 33	153.5	3
4	12 25.5	91 37	149.6	11 58.3	91 37	149.8	11 31.0	91 37	150.1	10 36.5	91 36	150.5	8 47.3	91 36	151.3	6 58.0	91 35	152.2	6 30.7	91 34	152.4	5 36.0	91 34	152.8	4
35	12 03.1	90 38	148.8	11 36.0	90 38	149.0	11 08.9	90 38	149.2	10 14.6	90 37	149.7	8 26.0	91 36	150.5	6 37.3	91 35	151.4	6 10.1	91 35	151.6	5 15.6	91 35	152.0	35
6	11 40.1	90 39	148.0	11 13.1	90 39	148.2	10 46.2	90 39	148.4	9 52.2	90 38	148.9	8 04.1	90 37	149.8	6 16.0	90 36	150.6	5 48.9	90 36	150.9				6
7	11 16.6	89 40	147.2	10 49.8	89 40	147.4	10 22.9	89 40	147.6	9 29.3	89 39	148.1	7 41.8	90 38	149.0	5 54.2	90 37	149.9	5 27.3	90 37	150.1				7
8	10 52.5	89 41	146.4	10 25.9	89 41	146.6	9 59.2	89 40	146.9	9 05.8	89 40	147.3	7 18.9	89 39	148.2	5 32.0	89 38	149.1	5 05.2	89 38	149.4				8
9	10 28.8	88 42	145.6	10 01.5	88 41	145.8	9 34.9	88 41	146.1	8 41.9	88 41	146.5	6 55.6	89 40	147.5	5 09.2	89 39	148.4							9
40	10 02.9	88 43	144.8	9 36.6	88 42	145.0	9 10.2	88 42	145.3	8 17.4	88 42	145.8	6 31.8	88 41	146.7										40
1	9 37.4	87 43	144.0	9 11.2	87 43	144.3	8 45.0	87 43	144.5	7 52.5	87 42	145.0	6 07.5	88 41	146.0										1
2	9 11.4	87 44	143.2	8 45.3	87 44	143.5	8 19.3	87 44	143.7	7 27.1	87 43	144.2	5 42.7	87 42	145.2										2
3	8 44.9	86 45	142.5	8 19.0	86 45	142.7	7 53.1	86 44	143.0	7 01.2	86 44	143.5	5 17.4	87 43	144.5										3
4	8 17.9	86 46	141.7	7 52.2	86 45	142.0	7 26.4	86 45	142.2	6 34.9	86 45	142.7													4
45	7 50.5	85 46	140.9	7 24.9	85 46	141.2	6 59.3	85 46	141.5	6 08.1	85 45	142.0													45
6	7 22.6	85 47	140.2	6 57.2	85 47	140.4	6 31.7	85 47	140.7	5 40.8	85 46	141.2													6
7	6 54.3	84 48	139.4	6 29.0	84 48	139.7	6 03.7	84 47	140.0	5 13.1	84 47	140.5													7
8	6 25.5	84 49	138.7	6 00.4	84 48	139.0	5 35.3	84 48	139.2																8
9	5 56.3	83 49	137.9	5 31.4	83 49	138.2	5 06.4	83 49	138.5																9
50	5 26.7	83 50	137.2	5 01.9	83 50	137.5																			50

DECLINATION SAME NAME AS LATITUDE

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	17 59.6	64 68	68.2	18 18.8	64 68	67.8	18 37.9	64 67	67.3	19 15.9	63 67	66.5	20 31.4	62 66	64.9	21 45.8	62 65	63.2	22 04.3	61 65	62.8	22 41.0	61 64	61.9	91
2	17 19.0	64 67	67.6	17 38.2	64 67	67.2	17 57.5	64 67	66.8	18 35.8	64 67	65.9	19 51.7	63 66	64.3	21 06.8	62 65	62.6	21 25.4	62 65	62.2	22 02.4	61 64	61.4	2
3	16 38.5	65 67	67.0	16 57.9	65 67	66.6	17 17.2	64 67	66.2	17 55.8	64 66	65.4	19 12.3	63 65	63.7	20 27.9	63 64	62.1	20 46.7	62 64	61.7	21 24.0	62 64	60.8	3
4	15 58.2	65 67	66.4	16 17.7	65 67	66.0	16 37.2	65 66	65.6	17 16.0	65 66	64.8	18 33.0	64 65	63.2	19 49.2	63 64	61.5	20 08.1	63 64	61.1	20 45.8	63 63	60.3	4
95	15 18.1	66 67	65.8	15 37.7	65 66	65.4	15 57.3	65 66	65.0	16 36.4	65 66	64.2	17 54.0	64 65	62.6	19 10.8	64 64	61.0	19 29.8	63 64	60.6	20 07.8	63 63	59.7	95
6	14 38.2	66 66	65.2	14 57.9	66 66	64.8	15 17.7	66 66	64.4	15 57.0	65 65	63.6	17 15.1	65 64	62.0	18 32.5	64 63	60.4	18 51.7	64 63	60.0	19 30.0	64 63	59.2	6
7	13 58.4	66 66	64.6	14 18.3	66 66	64.2	14 38.2	66 65	63.8	15 17.8	66 65	63.0	16 36.5	65 64	61.4	17 54.4	65 63	59.9	18 13.8	64 63	59.5	18 52.4	64 62	58.6	7
8	13 18.9	67 66	64.0	13 38.9	67 65	63.6	13 58.9	67 65	63.2	14 38.8	66 65	62.4	15 58.0	66 64	60.9	17 16.6	65 63	59.3	17 36.1	65 62	58.9	18 15.0	65 62	58.1	8
9	12 39.6	67 65	63.4	12 59.7	67 65	63.0	13 19.9	67 65	62.6	14 00.0	67 64	61.8	15 19.8	66 63	60.3	16 39.0	66 62	58.7	16 58.7	66 62	58.3	17 37.9	65 62	57.5	9
100	12 00.5	68 65	62.7	12 20.8	68 65	62.4	12 41.0	67 64	62.0	13 21.4	67 64	61.2	14 41.8	67 63	59.7	16 01.6	66 62	58.2	16 21.4	66 62	57.8	17 01.0	66 61	57.0	100
1	11 21.6	68 64	62.1	11 42.0	68 64	61.8	12 02.4	68 64	61.4	12 43.1	68 64	60.6	14 04.0	67 63	59.1	15 24.4	67 62	57.6	15 44.4	67 61	57.2	16 24.3	66 61	56.4	1
2	10 42.9	69 64	61.5	11 03.4	68 64	61.1	11 24.0	68 64	60.8	12 04.9	68 63	60.0	13 26.5	68 62	58.5	14 47.5	67 61	57.0	15 07.7	67 61	56.6	15 47.9	67 60	55.9	2
3	10 04.4	69 64	60.9	10 25.1	69 63	60.5	10 45.8	69 63	60.2	11 27.0	69 63	59.4	12 49.2	68 62	57.9	14 10.8	68 61	56.4	14 31.2	68 60	56.0	15 11.7	67 60	55.3	3
4	9 26.2	69 63	60.3	9 47.0	69 63	59.9	10 07.8	69 63	59.6	10 49.4	69 62	58.8	12 12.1	69 61	57.3	13 34.4	68 60	55.8	13 54.9	68 60	55.5	14 35.7	68 60	54.7	4
105	8 48.2	70 63	59.7	9 09.2	70 63	59.3	9 30.1	70 62	58.9	10 12.0	70 62	58.2	11 35.3	69 61	56.7	12 58.2	69 60	55.3	13 18.9	69 60	54.9	14 00.0	69 59	54.1	105
6	8 10.5	70 63	59.0	8 31.6	70 62	58.7	8 52.7	70 62	58.3	9 34.8	70 62	57.6	10 58.7	70 61	56.1	12 22.3	69 59	54.7	12 43.1	69 59	54.3	13 24.6	69 59	53.6	6
7	7 33.0	71 62	58.4	7 54.2	71 62	58.0	8 15.4	71 62	57.7	8 57.9	71 61	57.0	10 22.4	70 60	55.5	11 46.6	70 59	54.1	12 07.6	70 59	53.7	12 49.4	70 58	53.0	7
8	6 55.7	71 62	57.8	7 17.1	71 61	57.4	7 38.5	71 61	57.1	8 21.2	71 61	56.4	9 46.4	71 60	54.9	11 11.2	71 59	53.5	11 32.3	70 58	53.1	12 14.5	70 58	52.4	8
9	6 18.7	73 61	57.1	6 40.3	72 61	56.8	7 01.8	72 61	56.4	7 44.8	72 60	55.7	9 10.6	71 59	54.3	10 36.1	71 58	52.9	10 57.4	71 58	52.5	11 39.9	71 57	51.8	9
110	5 42.0	72 61	56.5	6 03.7	72 60	56.1	6 25.4	72 60	55.8	7 08.7	72 60	55.1	8 35.1	72 59	53.7	10 01.2	72 58	52.3	10 22.7	72 57	51.9	11 05.6	71 57	51.2	110
1	5 05.5	73 60	55.8	5 27.4	73 60	55.5	5 49.2	73 60	55.2	6 32.8	73 59	54.5	7 59.9	72 58	53.1	9 26.6	72 57	51.7	9 48.3	72 57	51.3	10 31.5	72 56	50.6	1
2							5 13.3	73 59	54.5	5 57.3	73 59	53.8	7 24.9	73 58	52.5	8 52.4	73 57	51.1	9 14.2	73 56	50.7	9 57.7	73 56	50.0	2
3										5 22.0	74 58	53.2	6 50.3	74 57	51.8	8 18.4	73 56	50.5	8 40.3	73 56	50.1	9 24.2	73 55	49.4	3
4													6 15.9	74 57	51.2	7 44.7	74 56	49.8	8 06.8	74 55	49.5	8 51.1	74 55	48.8	4
115													5 41.9	75 56	50.6	7 11.3	74 55	49.2	7 33.6	74 55	48.9	8 18.2	74 54	48.2	115
6													5 08.1	75 56	49.9	6 38.2	75 55	48.6	7 00.7	75 54	48.3	7 45.6	75 54	47.6	6
7																6 05.5	76 54	48.0	6 28.1	75 54	47.6	7 13.4	75 53	47.0	7
8																5 33.0	76 53	47.3	5 55.8	76 53	47.0	6 41.5	76 53	46.4	8
9																5 00.9	77 53	46.7	5 23.9	77 53	46.4	6 09.9	77 52	45.7	9
120																						5 38.6	77 52	45.1	120
1																						5 07.7	78 51	44.5	1

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Lat. 43°

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	83 00.0	1.0 04	180.0	84 00.0	1.0 05	180.0	85 30.0	1.0 06	180.0	87 00.0	1.0 09	180.0	89 00.0	1.0 24	180.0	89 30.0	1.0 39	180.0	90 00.0	.. 73	....	88 00.0	1.0 13	00.0	00
1	82 57.5	99 13	173.4	83 57.1	99 14	172.4	85 26.2	99 18	170.1	86 54.5	97 26	165.6	88 45.5	81 54	143.3	89 06.7	57 66	123.9	89 16.1	01 73	89.7	87 52.5	94 34	19.4	1
2	82 50.0	98 20	166.9	83 48.5	97 23	165.0	85 15.1	95 29	160.7	86 38.8	90 39	152.8	88 13.1	57 65	123.5	88 26.9	33 71	108.1	88 32.2	01 73	89.3	87 32.2	80 48	35.0	2
3	82 37.7	96 28	160.7	83 34.6	94 31	158.1	84 57.6	90 38	152.2	86 15.1	81 49	142.2	87 34.4	43 69	113.3	87 44.5	24 72	101.8	87 48.4	02 73	89.0	87 03.5	67 56	46.1	3
4	82 21.1	92 34	154.9	83 15.9	90 38	151.6	84 34.6	84 46	144.7	85 45.7	72 56	133.7	86 53.2	34 71	107.4	87 01.2	19 73	98.3	87 04.5	02 73	88.6	86 29.8	55 61	53.8	4
05	82 00.7	89 40	149.5	82 53.1	86 44	145.8	84 07.2	78 51	138.3	85 12.2	65 60	127.0	86 10.9	29 72	103.5	86 17.7	16 73	96.1	86 20.6	03 73	88.3	85 53.1	46 64	59.2	05
6	81 36.8	85 45	144.6	82 26.8	81 49	140.6	83 36.4	73 56	132.7	84 35.9	58 64	121.7	85 28.0	26 72	100.7	85 34.0	15 73	94.4	85 36.8	04 73	88.0	85 14.7	30 66	63.1	6
7	81 09.9	81 49	140.1	81 57.5	77 53	135.9	83 03.0	68 59	128.0	83 57.8	53 66	117.4	84 44.7	23 72	98.6	84 50.2	14 73	93.2	84 52.9	04 73	87.6	84 35.0	33 67	65.9	7
8	80 40.6	78 53	136.0	81 25.9	73 56	131.8	82 27.4	63 62	123.9	83 18.2	49 68	113.9	84 01.2	21 73	96.9	84 06.4	13 73	92.1	84 09.1	05 73	87.3	83 54.6	28 68	68.1	8
9	80 09.1	74 56	132.3	80 52.2	69 59	128.1	81 50.3	59 64	120.4	82 37.6	45 69	111.0	83 17.6	20 73	95.5	83 22.5	13 73	91.3	83 25.3	05 73	86.9	83 13.7	24 69	69.7	9
10	79 35.7	71 58	128.9	80 16.9	66 61	124.8	81 11.8	56 66	117.4	81 56.3	42 70	108.5	82 33.9	19 73	94.3	82 38.6	13 73	90.5	82 41.4	06 73	86.6	82 32.4	21 69	71.0	10
1	79 00.9	68 60	125.9	79 40.2	63 63	121.8	80 32.4	53 67	114.7	81 14.4	40 71	106.3	81 50.1	19 73	93.3	81 54.8	13 73	89.8	81 57.7	07 73	86.2	81 50.7	18 70	72.0	1
2	78 24.7	65 62	123.1	79 02.4	60 65	119.2	79 52.2	50 68	112.3	80 32.1	38 71	104.4	81 06.2	18 73	92.4	81 10.9	13 73	89.2	81 13.9	07 73	85.9	81 08.9	15 70	72.8	2
3	77 47.4	63 64	120.6	78 23.6	58 66	116.8	79 11.3	48 69	110.2	79 49.5	36 72	102.7	80 22.4	18 73	91.5	80 27.0	13 73	88.6	80 30.1	08 73	85.6	80 26.9	13 70	73.5	3
4	77 09.2	61 65	118.3	77 44.0	55 67	114.6	78 29.8	46 70	108.3	79 06.5	35 72	101.2	79 38.5	18 73	90.8	79 43.2	13 73	88.0	79 46.4	08 73	85.2	79 44.8	11 70	73.9	4
15	76 30.2	58 66	116.2	77 03.8	53 68	112.6	77 48.0	44 70	106.6	78 23.4	34 72	99.9	78 54.6	18 73	90.1	78 59.3	13 73	87.5	79 02.7	09 73	84.9	79 02.6	09 70	74.3	15
6	75 50.5	57 67	114.3	76 23.0	52 69	110.8	77 05.8	43 71	105.0	77 40.1	33 72	98.6	78 10.8	18 73	89.4	78 15.5	14 73	87.0	78 19.0	10 73	84.5	78 20.3	07 71	74.6	6
7	75 10.2	55 68	112.5	75 41.8	50 69	109.1	76 23.2	42 71	103.5	76 56.6	32 73	97.5	77 26.9	18 73	88.8	77 31.7	14 73	86.5	77 35.3	10 73	84.2	77 37.9	06 71	74.9	7
8	74 29.4	53 69	110.8	75 00.1	49 70	107.5	75 40.4	41 72	102.2	76 13.1	32 73	96.5	76 43.0	18 73	88.2	76 47.9	14 73	86.0	76 51.7	11 73	83.8	76 55.6	04 71	75.0	8
9	73 48.2	52 69	109.2	74 18.1	47 70	106.1	74 57.5	40 72	101.0	75 29.4	31 73	95.5	75 59.2	18 73	87.6	76 04.1	15 73	85.6	76 08.0	11 73	83.5	76 13.2	03 71	75.1	9
20	73 06.6	51 70	107.8	73 35.8	46 71	104.7	74 14.3	39 72	99.8	74 45.7	31 73	94.5	75 15.3	18 73	87.0	75 20.4	15 73	85.1	75 24.5	12 73	83.1	75 30.8	01 71	75.2	20
1	72 24.6	50 70	106.4	72 53.2	45 71	103.4	73 31.0	38 72	98.7	74 02.0	30 73	93.7	74 31.5	19 73	86.5	74 36.7	16 73	84.7	74 40.9	13 73	82.8	74 48.3	00 71	75.2	1
2	71 42.4	49 71	105.1	72 10.4	45 72	102.2	72 47.6	38 73	97.7	73 18.1	30 73	92.9	73 47.7	19 73	86.0	73 53.0	16 73	84.2	73 57.4	13 72	82.4	74 05.9	01 71	75.2	2
3	70 59.9	48 71	103.9	71 27.5	44 72	101.1	72 04.0	37 73	96.7	72 34.3	30 73	92.1	73 04.0	19 73	85.5	73 09.4	17 73	83.8	73 13.9	14 72	82.1	73 23.5	02 71	75.2	3
4	70 17.2	47 72	102.7	70 44.3	43 72	100.0	71 20.4	37 73	95.8	71 50.4	30 73	91.3	72 20.2	20 73	85.0	72 25.8	17 73	83.4	72 30.5	14 72	81.8	72 41.1	03 71	75.1	4
25	69 34.3	46 72	101.6	70 01.1	43 72	99.0	70 36.7	36 73	94.9	71 06.6	30 73	90.6	71 36.5	20 73	84.5	71 42.2	18 73	83.0	71 47.1	15 72	81.4	71 58.7	04 71	75.0	25
6	68 51.2	46 72	100.5	69 17.7	42 72	98.0	69 53.0	36 73	94.1	70 22.7	30 73	89.9	70 52.9	20 73	84.1	70 58.6	18 72	82.6	71 03.7	16 72	81.1	71 16.3	05 71	74.9	6
7	68 08.0	45 72	99.5	68 34.2	42 73	97.1	69 09.2	36 73	93.3	69 38.8	30 73	89.2	70 09.2	21 73	83.6	70 15.2	19 72	82.2	70 20.4	16 72	80.7	70 34.0	06 71	74.8	7
8	67 24.7	45 72	98.6	67 50.6	41 73	96.2	68 25.3	36 73	92.5	68 54.9	30 73	88.6	69 25.7	21 73	83.2	69 31.7	19 72	81.8	69 37.1	17 72	80.3	69 51.6	07 70	74.6	8
9	66 41.3	44 73	97.7	67 06.9	41 73	95.3	67 41.5	36 73	91.7	68 11.1	30 73	88.0	68 42.1	22 73	82.7	68 48.3	20 72	81.4	68 53.8	17 72	80.0	69 09.3	08 70	74.5	9
30	65 57.7	44 73	96.8	66 23.2	41 73	94.5	66 57.6	36 73	91.0	67 27.2	30 73	87.4	67 58.6	22 72	82.3	68 04.9	20 72	81.0	68 10.6	18 72	79.6	68 27.1	09 70	74.3	30
1	65 14.1	44 73	95.9	65 39.4	41 73	93.7	66 13.8	36 73	90.3	66 43.4	30 73	86.8	67 15.2	23 72	81.8	67 21.6	21 72	80.6	67 27.5	19 72	79.3	67 44.9	10 70	74.1	1
2	64 30.4	43 73	95.1	64 55.6	40 73	92.9	65 29.9	36 73	89.6	65 59.6	30 73	86.2	66 31.7	23 72	81.4	66 38.4	21 72	80.2	66 44.4	19 72	78.9	67 02.7	11 70	73.9	2
3	63 46.7	43 73	94.3	64 11.8	40 73	92.2	64 46.0	36 73	89.0	65 15.8	31 73	85.6	65 48.4	24 72	81.0	65 55.2	22 72	79.8	66 01.4	20 72	78.6	66 20.5	12 70	73.7	3
4	63 02.9	43 73	93.5	63 27.9	40 73	91.5	64 02.1	36 73	88.3	64 32.1	31 73	85.1	65 05.1	24 72	80.5	65 12.0	22 72	79.4	65 18.4	20 72	78.2	65 38.5	13 70	73.5	4
35	62 19.1	43 73	92.7	62 44.1	40 73	90.8	63 18.3	36 73	87.7	63 48.4	31 73	84.5	64 21.8	24 72	80.1	64 28.9	23 72	79.0	64 35.5	21 71	77.9	64 56.4	14 70	73.2	35
6	61 35.3	43 73	92.0	62 00.2	40 73	90.1	62 34.4	36 73	87.1	63 04.7	31 73	84.0	63 38.6	25 72	79.7	63 45.8	23 72	78.6	63 52.6	22 71	77.5	64 14.4	15 70	73.0	6
7	60 51.4	43 73	91.3	61 16.3	40 73	89.4	61 50.6	36 73	86.5	62 21.1	32 73	83.5	62 55.5	25 72	79.3	63 02.9	24 72	78.2	63 09.8	22 71	77.1	63 32.5	16 70	72.8	7
8	60 07.5	43 73	90.6	60 32.4	40 73	88.7	61 06.8	36 73	85.9	61 37.5	32 73	82.9	62 12.4	26 72	78.9	62 19.9	24 71	77.8	62 27.0	23 71	76.8	62 50.6	16 70	72.5	8
9	59 23.6	43 73	89.9	59 48.6	40 73	88.1	60 23.1	36 73	85.3	60 54.0	32 72	82.4	61 29.3	26 72	78.5	61 37.1	25 71	77.4	61 44.3	23 71	76.4	62 08.8	17 70	72.3	9
40	58 39.8	43 73	89.2	59 04.7	40 73	87.4	59 39.4	37 73	84.7	60 10.6	33 72	81.9	60 46.4	27 71	78.0	60 54.3	26 71	77.1	61 01.7	24 71	76.1	61 27.0	18 70	72.0	40
1	57 55.9	43 73	88.5	58 20.9	40 73	86.8	58 55.7	37 73	84.2	59 27.1	33 72	81.4	60 03.5	28 71	77.6	60 11.5	26 71	76.7	60 19.2	25 71	75.7	60 45.3	19 69	71.7	1
2	57 12.0	43 73	87.9	57 37.1	41 73	86.2	58 12.1	37 73	83.6	58 43.8	33 72	80.9	59 20.7	28 71	77.2	59 28.9	27 71	76.3	59 36.7	25 71	75.3	60 03.7	20 69	71.5	2
3	56 28.2	43 73	87.3	56 53.3	41 73	85.6	57 28.5	37 73	83.1	58 00.5	34 72	80.4	58 37.9	29 71	76.8	58 46.3	27 71	75.9	58 54.3	26 71	75.0	59 22.1	20 69	71.2	3
4	55 44.4	43 73	86.6	56 09.6	41 73	85.0	56 44.9	38 72	82.5	57 17.2	34 72	80.0	57 55.2	29 71	76.4	58 03.8	28 71	75.5	58 11.9	27 70	74.6	58 40.6	21 69	70.9	4
45	55 00.6	43 73	86.0	55 25.9	41 73	84.4	56 01.5	38 72	82.0	56 34.1	35 72	79.5	57 12.6	30 71	76.0	57 21.3	28 71	75.1	57 29.7	27 70	74.2	57 59.2	22 69	70.6	45
6	54 16.8	43 73	85.4	54 42.2	41 73	83.9	55 18.0	38 72	81.5	55 50.9	35 72	79.0	56 30.0	30 71	75.6	56 38.9	29 70	74.7	56 47.5	28 70	73.9	57 17.8	23 69	70.3	6
7	53 33.1	44 73	84.8	53 58.6	42 73	83.3	54 34.7	39 72	80.9	55 07.9	35 72	78.5	55 47.6	31 71	75.2	55 56.6	30 70	74.3	56 05.4	28 70	73.5	56 36.6	24 69	70.0	7
8	52 49.4	44 73	84.2	53 15.1	42 72	82.7	53 51.4	39 72	80.4	54 24.9	36 71	78.0	55 05.2	31 70	74.8	55 14.4	30 70	73.9	55 23.3	29 70	73.1	55 55.4	24 69	69.7	8
9	52 05.8	44 73	83.7	52 31.6	42 72	82.2	53 08.1	39 72	79.9	53 42.0	36 71	77.6	54 22.9	32 70	74.4	54 32.3	31 70	73.6	54 41.4	30 70	72.7	55 14.3	25 68	69.4	9
50	51 22.2	44 73	83.1	51 48.1	42 72	81.6	52 25.0	40 72	79.4	52 59.2	37 71	77.1	53 40.7	32 70	74.0	53 50.3	31 70	73.2	53 59.5	30 70	72.4	54 33.2	26 68	69.1	50
1	50 38.7	44 72	82.5	51 04.7	43 72	81.1	51 41.9	40 72	78.9	52 16.5	37 71	76.6	52 58.6	33 70	73.6	53 08.3	32 70	72.8	53 17.7	31 69	72.0	53 52.3	27 68	68.8	1
2	49 55.2	45 72	81.9	50 21.4	43 72	80.5	50 58.9	40 72	78.4	51 33.8	37 71	76.2	52 16.5	34 70	73.2	52 26.4	33 70	72.4	52 36.1	32 69	71.6	53 11.4	27 68	68.4	2
3	49 11.8	45 72	81.4	49 38.2	43 72	80.0	50 15.9	41 71	77.9	50 51.3	38 71	75.7	51 34.6	34 70	72.7	51 44.7	33 69	72.0	51 54.5	32 69	71.2	52 30.7	28 68	68.1	3
4	48 28.4	45 72	80.8	48 55.0	44 72	79.5	49 33.0	41 71	77.4	50 08.8	38 71	75.3	50 52.7	35 70	72.3	51 03.0	34 69	71.6	51 13.0	33 69	70.8	51 50.0	29 68	67.8	4
55	47 45.1	45 72	80.3	48 11.9	44 72	79.0	48 50.3	41 71	76.9	49 26.4	39 70	74.8	50 10.9	35 69	71.9	50 21.4	34 69	71.2	50 31.6	33 69	70.5	51 09.4	30 67	67.4	55
6	47 01.9	46 72	79.7	47 28.9	44 72	78.4	48 07.6	42 71	76.4	48 44.1	39 70	74.3	49 29.3	36 69	71.5	49 39.9	35 69	70.8	49 50.3	34 69	70.1	50 28.9	30 67	67.1	6
7	46 18.8	46 72	79.2	46 45.9	45 71	77.9	47 25.0	42 71	75.9	48 01.9	40 70	73.9	48 47.7	36 69	71.1	48 58.5	36 69	70.4	49 09.1	35 68	69.7	49 48.6	31 67	66.8	7
8	45 35.7	46 72	78.7	46 03.0	45 71	77.4	46 42.4	43 71	75.4	47 19.8	40 70	73.4	48 06.2	37 69	70.7	48 17.2	36 69	70.0	48 28.0	35 68	69.3	49 08.3	32 67	66.4	8
9	44 52.7	47 72	78.1	45 20.3	45 71	76.9	46 00.0	43 71	75.0	46 37.8	41 70	73.0	47 24.9	38 69	70.3	47 36.1	37 68	69.6	47 47.0	36 68	68.9	48 28.1	33 67	66.1	9
60	44 09.8	47 71	77.6	44 37.6	46 71	76.4	45 17.7	44 70	74.5	45 55.9	41 70	72.5	46 43.6	38 69	69.9	46 55.0	37 68	69.2	47 06.1	37 68	68.5	47 48.1	33 67	65.7	60
1	43 27.0	47 71	77.1	43 55.0	46 71	75.9	44 35.5	44 70	74.0	45 14.1	42 70	72.1	46 02.5	39 68	69.4	46 14.0	38 68	68.8	46 25.3	37 68	68.1	47 08.1	34 66	65.4	1
2	42 44.3	48 71	76.5	43 12.5	46 71	75.3	43 53.3	44 70	73.5	44 32.4	42 69	71.6	45 21.4	39 68	69.0	45 33.2	39 68	68.4	45 44.7	38 68	67.7	46 28.3	35 66	65.0	2
3	42 01.6	48 71	76.0	42 30.1	47 70	74.8	43 11.3	45 70	73.0	43 50.8	43 69	71.2	44 40.5	40 68	68.6	44 52.4	39 68	68.0	45 04.1	39 67	67.3	45 48.6	36 66	64.7	3
4	41 19.1	48 71	75.5	41 47.8	47 70	74.3	42 29.4	45 70	72.5	43 09.3	43 69	70.7	43 59.7	41 68	68.2	44 11.8	40 67	67.6	44 23.7	39 67	66.9	45 09.0	36 66	64.3	4
65	40 36.7	49 71	75.0	41 05.6	48 70	73.8	41 47.6	46 70	72.1	42 28.0	44 69	70.2	43 19.0	41 68	67.8	43 31.3	41 67	67.1	43 43.4	40 67	66.5	44 29.5	37 66	63.9	65
6	39 54.3	49 70	74.5	40 23.5	48 70	73.3	41 05.9	46 69	71.6	41 46.7	44 69	69.8	42 38.5	42 67	67.4	42 50.9	41 67	66.7	43 03.2	40 67	66.1	43 50.1	38 65	63.6	6
7	39 12.1	50 70	73.9	39 41.5	48 70	72.8	40 24.3	47 69	71.1	41 05.6	45 68	69.3	41 58.0	42 67	66.9	42 10.7	42 67	66.3	42 23.1	41 67	65.7	43 10.9	38 65	63.2	7
8	38 30.0	50 70	73.4	38 59.6	49 70	72.3	39 42.9	47 69	70.6	40 24.6	45 68	68.9	41 17.7	43 67	66.5	41 30.6	42 67	65.9	41 43.2	42 66	65.3	42 31.8	39 65	62.8	8
9	37 48.0	50 70	72.9	38 17.9	49 69	71.8	39 01.5	48 69	70.1	39 43.7	46 68	68.4	40 37.6	44 67	66.1	40 50.6	43 66	65.5	41 03.4	42 66	64.9	41 52.8	40 65	62.5	9
70	37 06.1	51 70	72.4	37 36.3	50 69	71.3	38 20.3	48 68	69.7	39 03.0	47 68	68.0	39 57.5	44 67	65.7	40 10.7	44 66	65.1	40 23.7	43 66	64.5	41 14.0	41 64	62.1	70
1	36 24.3	51 69	71.9	36 54.8	50 69	70.8	37 39.3	49 68	69.2	38 22.4	47 67	67.5	39 17.6	45 66	65.2	39 31.0	44 66	64.6	39 44.2	44 66	64.1	40 35.3	41 64	61.7	1
2	35 42.7	52 69	71.4	36 13.4	51 69	70.3	36 58.3	49 68	68.7	37 41.9	48 67	67.0	38 37.8	46 66	64.8	38 51.4	45 66	64.2	39 04.8	44 65	63.6	39 56.7	42 64	61.3	2
3	35 01.2	52 69	70.9	35 32.1	51 69	69.8	36 17.5	50 68	68.2	37 01.6	48 67	66.6	37 58.2	46 66	64.4	38 12.0	46 65	63.8	38 25.6	45 65	63.2	39 18.3	43 64	60.9	3
4	34 19.8	52 69	70.3	34 51.0	52 68	69.3	35 36.8	50 68	67.7	36 21.4	49 67	66.1	37 18.7	47 66	63.9	37 32.7	46 65	63.4	37 46.5	46 65	62.8	38 40.0	43 64	60.5	4
75	33 38.5	53 69	69.8	34 10.0	52 68	68.8	34 56.3	51 67	67.2	35 41.3	49 66	65.6	36 39.4	47 65	63.5	36 53.5	47 65	62.9	37 07.5	46 65	62.4	38 01.9	44 63	60.1	75
6	32 57.4	53 68	69.3	33 29.2	53 68	68.3	34 15.9	51 67	66.8	35 01.4	50 66	65.2	36 00.2	48 65	63.0	36 14.5	48 65	62.5	36 28.7	47 64	62.0	37 23.9	45 63	59.7	6
7	32 16.4	54 68	68.8	32 48.5	53 68	67.8	33 35.7	52 67	66.3	34 21.7	50 66	64.7	35 21.2	49 65	62.6	35 35.7	48 64	62.1	35 50.1	48 64	61.5	36 46.1	46 63	59.3	7
8	31 35.6	54 68	68.3	32 07.9	54 67	67.3	32 55.6	52 67	65.8	33 42.1	51 66	64.2	34 42.3	49 65	62.2	34 57.0	49 64	61.6	35 11.6	48 64	61.1	36 08.4	46 62	58.9	8
9	30 54.9	55 68	67.8	31 27.5	54 67	66.8	32 15.6	53 66	65.3	33 02.6	52 65	63.8	34 03.6	50 64	61.7	34 18.5	49 64	61.2	34 33.2	49 64	60.7	35 30.9	47 62	58.5	9
80	30 14.4	55 67	67.3	30 47.3	55 67	66.3	31 35.8	53 66	64.8	32 23.3	52 65	63.3	33 25.0	51 64	61.3	33 40.1	50 64	60.7	33 55.1	50 63	60.2	34 53.6	48 62	58.1	80
1	29 34.0	56 67	66.7	30 07.2	55 67	65.8	30 56.2	54 66	64.3	31 44.2	53 65	62.8	32 46.6	51 64	60.8	33 01.9	51 63	60.3	33 17.1	50 63	59.8	34 16.4	49 62	57.7	1
2	28 53.7	56 67	66.2	29 27.2	56 66	65.3	30 16.7	54 65	63.8	31 05.3	53 65	62.4	32 08.4	52 63	60.4	32 23.9	51 63	59.8	32 39.2	51 63	59.3	33 39.4	49 61	57.3	2
3	28 13.7	57 67	65.7	28 47.5	56 66	64.8	29 37.4	55 65	63.3	30 26.5	54 64	61.9	31 30.3	52 63	59.9	31 46.0	52 63	59.4	32 01.6	52 62	58.9	33 02.6	50 61	56.9	3
4	27 33.7	57 66	65.2	28 07.9	57 66	64.2	28 58.3	56 65	62.8	29 47.9	55 64	61.4	30 52.5	53 63	59.4	31 08.3	53 62	58.9	31 24.1	52 62	58.4	32 25.9	51 61	56.4	4
85	26 54.0	58 66	64.7	27 28.4	57 65	63.7	28 19.4	56 65	62.3	29 09.4	55 64	60.9	30 14.8	54 63	59.0	30 30.8	53 62	58.5	30 46.8	53 62	58.0	31 49.5	51 60	56.0	85
6	26 14.4	58 66	64.1	26 49.2	58 65	63.2	27 40.6	57 64	61.8	28 31.2	56 63	60.4	29 37.3	54 62	58.5	29 53.5	54 62	58.0	30 09.7	54 62	57.5	31 13.2	52 60	55.6	6
7	25 35.0	59 65	63.6	26 10.1	58 65	62.7	27 02.0	57 64	61.3	27 53.1	56 63	59.9	28 59.9	55 62	58.0	29 16.4	55 62	57.6	29 32.7	54 61	57.1	30 37.1	53 60	55.1	7
8	24 55.8	59 65	63.1	25 31.2	59 65	62.2	26 23.6	58 64	60.8	27 15.2	57 63	59.4	28 22.8	56 62	57.6	28 39.4	55 61	57.1	28 56.0	55 61	56.6	30 01.2	54 60	54.7	8
9	24 16.8	60 65	62.5	24 52.5	59 64	61.7	25 45.4	58 63	60.3	26 37.5	58 62	59.0	27 45.8	56 61	57.1	28 02.7	56 61	56.6	28 19.4	56 61	56.2	29 25.4	54 59	54.3	9
90	23 37.9	60 64	62.0	24 13.9	60 64	61.1	25 07.3	59 63	59.8	26 00.0	58 62	58.5	27 09.1	57 61	56.6	27 26.1	57 61	56.2	27 43.1	56 60	55.7	28 49.9	55 59	53.8	90

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DECLINATION CONTRARY NAME TO LATITUDE

H.A.	36° 00′ Alt.	Δd	Δt	Az.	37° 00′ Alt.	Δd	Δt	Az.	38° 30′ Alt.	Δd	Δt	Az.	40° 00′ Alt.	Δd	Δt	Az.	42° 00′ Alt.	Δd	Δt	Az.	42° 30′ Alt.	Δd	Δt	Az.	43° 00′ Alt.	Δd	Δt	Az.	45° 00′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
00	11 00.0	1.0	01	180.0	10 00.0	1.0	01	180.0	8 30.0	1.0	01	180.0	7 00.0	1.0	00	180.0	5 00.0	1.0	00	180.0													00
1	10 59.7	1.0	02	179.2	9 59.7	1.0	02	179.2	8 29.7	1.0	02	179.2	6 59.7	1.0	01	179.2																	1
2	10 58.7	1.0	03	178.4	9 58.8	1.0	03	178.4	8 28.8	1.0	03	178.4	6 58.8	1.0	02	178.5																	2
3	10 57.2	1.0	04	177.5	9 57.2	1.0	04	177.6	8 27.3	1.0	04	177.6	6 57.3	1.0	03	177.7																	3
4	10 55.0	1.0	05	176.7	9 55.0	1.0	05	176.8	8 25.2	1.0	05	176.8	6 55.3	1.0	04	176.9																	4
05	10 52.1	1.0	06	175.9	9 52.2	1.0	06	175.9	8 22.4	1.0	06	176.0	6 52.6	1.0	05	176.1																	05
6	10 48.7	1.0	07	175.1	9 48.8	1.0	07	175.1	8 19.1	1.0	07	175.3	6 49.4	1.0	06	175.4																	6
7	10 44.6	1.0	08	174.2	9 44.8	1.0	08	174.3	8 15.2	1.0	08	174.5	6 45.5	1.0	07	174.6																	7
8	10 39.8	99	09	173.4	9 40.2	99	09	173.5	8 10.6	99	09	173.7	6 41.1	99	08	173.8																	8
9	10 34.5	99	10	172.6	9 34.9	99	10	172.7	8 05.5	99	10	172.9	6 36.1	99	09	173.1																	9
10	10 28.5	99	11	171.8	9 29.0	99	11	171.9	7 59.8	99	11	172.1	6 30.5	99	10	172.3																	10
1	10 22.9	99	12	171.0	9 22.6	99	12	171.1	7 53.5	99	12	171.3	6 24.4	99	11	171.5																	1
2	10 14.8	99	13	170.2	9 15.5	99	13	170.3	7 46.6	99	12	170.5	6 17.6	99	12	170.8																	2
3	10 07.0	99	14	169.3	9 07.8	99	14	169.5	7 39.1	99	13	169.8	6 10.3	99	13	170.0																	3
4	9 58.6	98	15	168.5	8 59.5	98	15	168.7	7 31.0	98	14	169.0	6 02.4	98	14	169.3																	4
15	9 49.5	98	16	167.7	8 59.6	98	16	167.9	7 22.3	98	15	168.2	5 54.0	98	15	168.5																	15
6	9 39.9	98	17	166.9	8 41.2	98	17	167.1	7 13.1	98	16	167.4	5 44.9	98	16	167.7																	6
7	9 29.7	98	18	166.1	8 31.1	98	18	166.3	7 03.2	98	17	166.7	5 35.3	98	17	167.0																	7
8	9 18.9	97	19	165.3	8 20.4	97	19	165.6	6 52.8	97	18	165.9	5 25.2	97	18	166.2																	8
9	9 07.4	97	20	164.5	8 09.2	97	20	164.8	6 41.8	97	19	165.1	5 14.5	97	19	165.5																	9
20	8 55.4	97	21	163.7	7 57.4	97	21	164.0	6 30.3	97	20	164.4	5 03.2	97	20	164.8																	20
1	8 42.9	96	22	162.9	7 45.0	96	22	163.2	6 18.2	96	21	163.6																					1
2	8 29.7	96	23	162.2	7 32.0	96	23	162.4	6 05.5	96	22	162.9																					2
3	8 16.0	96	24	161.4	7 18.5	96	24	161.7	5 52.3	96	23	162.1																					3
4	8 01.7	96	25	160.6	7 04.4	96	24	160.9	5 38.6	96	24	161.3																					4
25	7 46.8	96	26	159.8	6 49.8	96	25	160.1	5 24.3	96	25	160.6																					25
6	7 31.4	96	27	159.0	6 34.6	96	26	159.4	5 09.4	96	26	159.9																					6
7	7 15.4	94	28	158.3	6 18.9	94	27	158.6																									7
8	6 58.9	94	28	157.5	6 02.6	94	28	157.9																									8
9	6 41.8	93	29	156.7	5 45.8	93	29	157.1																									9
30	6 24.2	93	30	156.0	5 28.4	93	30	156.4																									30
1	6 06.1	93	31	155.2	5 10.6	93	31	155.6																									1
2	5 47.5	92	32	154.5																													2
3	5 28.3	92	33	153.7																													3
4	5 08.6	91	34	153.0																													4

DECLINATION SAME NAME AS LATITUDE

H.A.	36° 00′ Alt.	Δd	Δt	Az.	37° 00′ Alt.	Δd	Δt	Az.	38° 30′ Alt.	Δd	Δt	Az.	40° 00′ Alt.	Δd	Δt	Az.	42° 00′ Alt.	Δd	Δt	Az.	42° 30′ Alt.	Δd	Δt	Az.	43° 00′ Alt.	Δd	Δt	Az.	45° 00′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
91	22 59.3	61	64	61.5	23 35.6	60	64	60.6	24 29.5	60	63	59.3	25 22.7	59	62	58.0	26 32.5	58	61	56.2	26 49.8	57	60	55.7	27 06.9	57	60	55.2	28 14.6	56	59	53.4	91
2	22 20.8	61	64	60.9	22 57.5	61	63	60.1	23 51.9	60	62	58.8	24 45.6	59	61	57.5	25 56.2	58	60	55.7	26 13.6	58	60	55.2	26 31.0	58	60	54.8	27 39.5	56	58	52.9	2
3	21 42.6	62	63	60.4	22 19.5	61	63	59.6	23 14.5	61	62	58.3	24 08.7	60	61	57.0	25 20.1	59	60	55.2	25 37.7	59	60	54.7	25 55.2	58	59	54.3	27 04.6	57	58	52.5	3
4	21 04.5	62	63	59.9	21 41.8	62	63	59.0	22 37.2	61	62	57.8	23 32.1	61	61	56.5	24 44.1	60	60	54.7	25 02.0	59	59	54.3	25 19.7	59	59	53.8	26 29.9	58	57	52.0	4
95	20 26.7	63	63	59.3	21 04.3	62	62	58.5	22 00.2	62	61	57.2	22 55.6	61	60	56.0	24 08.4	60	59	54.2	24 26.5	60	59	53.8	24 44.4	60	58	53.3	25 55.4	59	57	51.6	95
6	19 49.0	63	62	58.8	20 27.0	63	62	58.0	21 23.4	62	61	56.7	22 19.3	62	60	55.4	23 32.9	61	59	53.7	23 51.2	61	58	53.3	24 09.3	60	58	52.9	25 21.2	59	57	51.1	6
7	19 11.6	64	62	58.2	19 49.9	64	61	57.4	20 46.9	63	61	56.2	21 43.3	62	60	54.9	22 57.7	62	58	53.2	23 16.1	61	58	52.8	23 34.5	61	58	52.4	24 47.1	60	56	50.6	7
8	18 34.4	65	62	57.7	19 13.0	64	61	56.9	20 10.5	64	60	55.7	21 07.5	63	59	54.4	22 22.6	62	58	52.7	22 41.3	62	58	52.3	22 59.8	62	57	51.9	24 13.3	61	56	50.2	8
9	17 57.4	65	61	57.1	18 36.4	65	61	56.3	19 34.4	64	60	55.1	20 31.9	64	59	53.9	21 47.8	63	58	52.2	22 06.7	63	57	51.8	22 25.4	62	57	51.4	23 39.7	61	56	49.7	9
100	17 20.7	66	61	56.6	18 00.0	65	60	55.8	18 58.5	65	59	54.6	19 56.6	64	59	53.4	21 13.3	63	57	51.7	21 32.3	63	57	51.3	21 51.2	63	57	50.9	23 06.4	62	55	49.2	100
1	16 44.2	66	60	56.0	17 23.8	66	60	55.2	18 22.9	65	59	54.1	19 21.5	65	58	52.8	20 38.9	64	57	51.2	20 58.1	64	56	50.8	21 17.3	64	56	50.4	22 33.3	63	55	48.7	1
2	16 07.9	67	60	55.5	16 47.9	66	59	54.7	17 47.5	66	59	53.5	18 46.7	65	58	52.3	20 04.9	65	56	50.7	20 24.3	65	56	50.3	20 43.6	64	56	49.9	22 00.4	64	54	48.2	2
3	15 31.9	67	60	54.9	16 12.2	67	59	54.1	17 12.3	67	58	53.0	18 12.1	66	57	51.8	19 31.0	65	56	50.2	19 50.6	65	56	49.8	20 10.2	65	55	49.4	21 27.8	64	54	47.8	3
4	14 56.1	68	59	54.3	15 36.8	68	59	53.6	16 37.4	67	58	52.4	17 37.7	67	57	51.3	18 57.4	66	56	49.7	19 17.2	66	55	49.3	19 37.0	66	55	48.9	20 55.5	65	54	47.3	4
105	14 20.6	68	59	53.8	15 01.6	68	58	53.0	16 02.8	68	57	51.9	17 03.6	67	56	50.7	18 24.1	67	55	49.2	18 44.1	67	55	48.8	19 04.1	66	54	48.4	20 23.4	66	53	46.8	105
6	13 45.3	69	58	53.2	14 26.7	69	58	52.4	15 28.4	68	57	51.3	16 29.8	68	56	50.2	17 51.0	67	55	48.6	18 11.2	67	54	48.2	18 31.4	67	54	47.9	19 51.5	66	53	46.3	6
7	13 10.3	70	58	52.6	13 52.0	69	57	51.9	14 54.3	69	56	50.8	15 56.2	69	55	49.6	17 18.2	68	54	48.1	17 38.6	68	54	47.7	17 59.0	68	54	47.3	19 19.9	67	52	45.8	7
8	12 35.6	70	57	52.0	13 17.6	70	57	51.3	14 20.4	70	56	50.2	15 22.9	69	55	49.1	16 45.7	69	54	47.6	17 06.3	69	53	47.2	17 26.9	68	53	46.8	18 48.6	68	52	45.3	8
9	12 01.1	71	57	51.5	12 43.5	71	56	50.7	13 46.9	70	55	49.6	14 49.9	70	55	48.5	16 13.5	69	53	47.0	16 34.3	69	53	46.7	16 55.0	69	53	46.3	18 17.6	69	51	44.8	9
110	11 27.0	71	56	50.9	12 09.7	71	56	50.1	13 13.6	71	55	49.1	14 17.2	71	54	48.0	15 41.5	70	53	46.5	16 02.5	70	52	46.1	16 23.4	70	52	45.8	17 46.8	69	51	44.3	110
1	10 53.1	72	56	50.3	11 36.1	72	55	49.6	12 40.6	71	55	48.5	13 44.7	71	54	47.4	15 09.8	71	52	46.0	15 31.0	71	52	45.6	15 52.1	70	52	45.2	17 16.4	70	50	43.7	1
2	10 19.5	72	55	49.7	11 02.9	72	55	49.0	12 07.8	72	54	47.9	13 12.6	72	53	46.9	14 38.4	71	52	45.4	14 59.8	71	51	45.0	15 21.1	71	51	44.7	16 46.2	71	50	43.2	2
3	9 46.2	73	55	49.1	10 29.9	73	54	48.4	11 35.4	73	54	47.3	12 40.7	72	53	46.3	14 07.3	72	51	44.9	14 28.9	72	51	44.5	14 50.4	72	51	44.1	16 16.3	71	49	42.7	3
4	9 13.2	74	54	48.5	9 57.3	73	54	47.8	11 03.3	73	53	46.8	12 09.1	73	52	45.7	13 36.5	73	51	44.3	13 58.3	73	50	44.0	14 20.0	72	50	43.6	15 46.7	72	49	42.2	4
115	8 40.4	74	54	47.9	9 24.9	74	53	47.2	10 31.5	74	52	46.2	11 37.9	74	52	45.1	13 06.0	73	50	43.8	13 28.0	73	50	43.4	13 49.9	73	50	43.0	15 17.3	73	48	41.6	115
6	8 08.1	75	53	47.3	8 52.9	75	53	46.6	10 00.0	74	52	45.6	11 06.9	74	51	44.6	12 35.8	74	50	43.2	12 58.0	74	49	42.8	13 20.1	74	49	42.5	14 48.4	73	48	41.1	6
7	7 36.0	75	53	46.7	8 21.2	75	52	46.0	9 28.8	75	51	45.0	10 36.3	75	51	44.0	12 05.9	75	49	42.6	12 28.3	74	49	42.3	12 50.6	74	49	41.9	14 19.7	74	47	40.6	7
8	7 04.2	76	52	46.0	7 49.8	76	52	45.4	8 58.0	76	51	44.4	10 06.0	75	50	43.4	11 36.4	75	49	42.1	11 58.9	75	48	41.7	12 21.5	75	48	41.4	13 51.3	75	47	40.0	8
9	6 32.8	77	52	45.4	7 18.7	76	51	44.8	8 27.4	76	50	43.8	9 36.0	76	49	42.8	11 07.2	76	48	41.5	11 29.9	76	48	41.2	11 52.6	76	48	40.8	13 23.2	75	46	39.5	9
120	6 01.7	77	51	44.8	6 48.0	77	51	44.1	7 57.2	77	50	43.2	9 06.3	77	49	42.2	10 38.3	76	48	40.9	11 01.2	76	47	40.6	11 24.1	76	47	40.2	12 55.5	76	46	38.9	120
1	5 31.0	78	51	44.2	6 17.6	78	50	43.5	7 27.4	77	49	42.6	8 37.0	77	48	41.6	10 09.7	77	47	40.3	10 32.8	77	47	40.0	10 55.9	77	46	39.7	12 28.1	77	45	38.4	1
2	5 00.6	78	50	43.5	5 47.5	78	50	42.9	6 57.8	78	49	42.0	8 08.1	78	48	41.0	9 41.5	78	46	39.7	10 04.8	78	46	39.4	10 28.1	78	46	39.1	12 01.0	77	45	37.8	2
3					5 17.8	79	49	42.3	6 28.7	79	48	41.3	7 39.4	79	47	40.4	9 13.6	78	46	39.2	9 37.1	78	46	38.8	10 00.6	78	45	38.5	11 34.3	78	44	37.3	3
4									5 59.9	79	47	40.7	7 11.2	79	46	39.8	8 46.0	79	45	38.6	9 09.7	79	45	38.3	9 33.4	79	45	37.9	11 07.9	79	43	36.7	4
125									5 31.4	80	47	40.1	6 43.3	80	46	39.2	8 18.9	80	45	38.0	8 42.7	80	44	37.7	9 06.6	79	44	37.4	10 41.8	79	43	36.1	125
6									5 03.4	80	46	39.5	6 15.7	80	45	38.6	7 52.1	80	44	37.4	8 16.1	80	44	37.1	8 40.1	80	43	36.8	10 16.2	80	42	35.5	6
7													5 48.5	81	45	37.9	7 25.6	81	43	36.8	7 49.8	81	43	36.5	8 14.1	81	43	36.2	9 50.8	81	42	35.0	7
8													5 21.7	82	44	37.3	6 59.5	81	43	36.2	7 23.9	81	43	35.9	7 48.4	81	42	35.6	9 25.9	81	41	34.4	8
9																	6 33.8	82	42	35.5	6 58.4	82	42	35.3	7 23.0	82	42	35.0	9 01.3	82	40	33.8	9
130																	6 08.5	83	42	34.9	6 33.3	83	41	34.6	6 58.1	83	41	34.4	8 37.0	82	40	33.2	130
1																	5 43.6	83	41	34.3	6 08.5	83	41	34.0	6 33.5	83	40	33.8	8 13.2	83	39	32.6	1
2																	5 19.0	84	40	33.7	5 44.2	84	40	33.4	6 09.3	84	40	33.1	7 49.7	84	38	32.0	2
3																					5 20.2	84	39	32.8	5 45.5	84	39	32.5	7 26.6	84	38	31.4	3
4																									5 22.1	85	38	31.9	7 03.9	85	37	30.8	4
135																													6 41.6	85	36	30.2	135
6																													6 19.8	86	36	29.6	6
7																													5 58.3	87	35	29.0	7
8																													5 37.2	87	34	28.4	8
9																													5 16.6	88	34	27.8	9

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Lat. 43°

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
00	87 06.0	1.0 08	00.0	86 00.0	1.0 06	00.0	84 30.0	1.0 04	00.0	83 30.0	1.0 04	00.0	82 30.0	1.0 03	00.0	81 30.0	1.0 03	00.0	80 30.0	1.0 02	00.0	79 00.0	1.0 02	00.0	00
1	86 55.0	97 24	13.0	85 56.3	98 18	09.7	84 27.4	99 13	06.9	83 27.8	99 11	05.7	82 28.1	1.0 09	04.9	81 28.4	1.0 08	04.2	80 28.6	1.0 07	03.7	78 58.8	1.0 06	03.1	1
2	86 40.7	90 36	24.7	85 45.5	94 28	18.8	84 19.6	97 21	13.5	83 21.3	98 18	11.3	82 22.6	98 15	09.6	81 23.6	99 13	08.3	80 24.4	99 12	07.3	78 55.3	99 10	06.1	2
3	86 18.9	80 45	34.5	85 28.4	87 37	26.9	84 07.0	93 28	19.8	83 10.7	95 24	16.6	82 13.5	96 21	14.2	81 15.7	97 18	12.4	80 17.4	97 16	10.9	78 49.5	98 13	09.1	3
4	85 51.7	71 52	42.2	85 06.1	80 44	33.9	83 50.1	88 34	25.5	82 56.3	91 30	21.6	82 01.1	93 26	18.6	81 04.8	94 23	16.3	80 07.8	95 20	14.3	78 41.4	97 17	12.1	4
05	85 20.5	62 56	48.2	84 39.8	73 49	39.7	83 29.4	83 40	30.6	82 38.5	87 35	26.2	81 45.6	90 31	22.8	80 51.2	92 27	20.0	79 55.7	93 24	17.7	78 31.2	95 21	14.9	05
6	84 46.6	54 60	52.9	84 10.3	66 53	44.6	83 05.6	77 44	35.2	82 17.7	82 39	30.4	81 27.2	86 35	26.6	80 34.9	88 31	23.4	79 41.3	90 28	20.8	78 18.8	93 24	17.7	6
7	84 10.7	48 62	56.6	83 38.4	59 56	48.6	82 39.0	72 48	39.1	81 54.2	77 43	34.2	81 06.4	82 38	30.1	80 16.3	85 35	26.7	79 24.6	87 31	23.8	78 04.6	90 27	20.3	7
8	83 33.5	42 64	59.5	83 04.6	54 59	52.0	82 10.3	66 51	42.6	81 28.5	73 46	37.6	80 43.3	78 42	33.3	79 55.6	81 38	29.7	79 05.9	84 34	26.6	77 48.4	88 30	22.8	8
9	82 55.2	37 65	61.8	82 29.4	48 61	54.7	81 39.7	61 53	45.6	81 00.8	68 49	40.6	80 18.3	73 45	36.2	79 32.9	78 41	32.5	78 45.3	81 37	29.2	77 30.6	85 32	25.2	9
10	82 16.2	33 66	63.7	81 53.1	44 62	57.0	81 07.6	57 56	48.2	80 31.5	64 51	43.2	79 51.5	69 47	38.9	79 08.6	74 43	35.0	78 23.1	78 40	31.7	77 11.2	82 35	27.4	10
1	81 36.5	29 67	65.3	81 15.9	39 63	59.0	80 34.3	52 57	50.5	80 00.7	59 53	45.6	79 23.3	65 49	41.2	78 42.6	70 45	37.4	77 59.3	74 42	33.9	76 50.3	79 37	29.5	1
2	80 56.5	26 67	66.5	80 37.9	36 64	60.6	80 00.0	48 59	52.5	79 28.8	55 55	47.7	78 53.8	61 51	43.4	78 15.4	66 47	39.5	77 34.2	71 44	36.0	76 28.0	76 39	31.5	2
3	80 16.1	23 68	67.6	79 59.5	32 65	62.0	79 24.8	45 60	54.2	78 55.9	52 56	49.5	78 23.1	58 53	45.3	77 46.9	63 49	41.4	77 07.8	67 46	37.9	76 04.5	73 41	33.3	3
4	79 35.4	20 68	68.4	79 20.5	29 66	63.1	78 48.8	41 61	55.7	78 22.1	48 58	51.2	77 51.4	54 54	47.0	77 17.3	59 51	43.2	76 40.2	64 48	39.7	75 39.8	70 43	35.0	4
15	78 54.5	18 68	69.1	78 41.2	26 66	64.1	78 12.3	38 62	57.0	77 47.5	45 59	52.6	77 18.9	51 55	48.6	76 46.8	56 52	44.8	76 11.7	61 49	41.3	75 14.1	67 44	36.6	15
6	78 13.4	16 69	69.7	78 01.6	24 66	65.0	77 35.2	35 62	58.2	77 12.4	41 60	53.9	76 45.7	47 56	50.0	76 15.5	53 53	46.2	75 42.3	58 50	42.8	74 47.4	64 45	38.1	6
7	77 32.1	14 69	70.2	77 21.7	21 67	65.7	76 57.7	32 63	59.2	76 36.6	38 60	55.1	76 11.8	44 57	51.2	75 43.5	50 54	47.6	75 12.1	55 52	44.2	74 19.9	61 47	39.5	7
8	76 50.8	12 69	70.6	76 41.6	19 67	66.3	76 19.9	29 64	60.1	76 00.4	36 61	56.1	75 37.3	41 58	52.3	75 10.8	47 55	48.8	74 41.2	52 53	45.4	73 51.6	58 48	40.8	8
9	76 09.4	10 69	70.9	76 01.3	17 67	66.8	75 41.7	27 64	60.8	75 23.8	33 62	57.0	75 02.3	39 59	53.3	74 37.5	44 56	49.9	74 09.6	49 54	46.6	73 22.6	55 49	42.0	9
20	75 27.8	08 69	71.2	75 20.9	15 68	67.3	75 03.3	24 64	61.5	74 46.8	30 62	57.8	74 26.9	36 60	54.2	74 03.7	41 57	50.8	73 37.5	46 54	47.6	72 52.9	53 50	43.1	20
1	74 46.3	07 69	71.4	74 40.4	13 68	67.6	74 24.6	22 65	62.1	74 09.6	28 63	58.5	73 51.1	33 60	55.0	73 29.5	39 58	51.7	73 04.8	43 55	48.6	72 22.7	50 51	44.1	1
2	74 04.7	05 69	71.5	73 59.8	11 68	67.9	73 45.7	20 65	62.6	73 32.0	26 63	59.1	73 15.0	31 61	55.8	72 54.8	36 58	52.5	72 31.7	41 56	49.4	71 51.9	47 52	45.0	2
3	73 23.0	04 69	71.7	73 19.1	09 68	68.2	73 06.7	18 65	63.0	72 54.2	23 63	59.7	72 38.6	29 61	56.4	72 19.8	34 59	53.3	71 58.2	38 56	50.2	71 20.6	45 53	45.9	3
4	72 41.4	02 69	71.7	72 38.3	08 68	68.4	72 27.5	16 65	63.4	72 16.3	21 64	60.2	72 01.9	26 62	57.0	71 44.5	31 59	53.9	71 24.3	36 57	50.9	70 48.9	42 54	46.7	4
25	71 59.7	01 69	71.8	71 57.5	06 68	68.5	71 48.2	14 66	63.7	71 38.1	19 64	60.6	71 25.0	24 62	57.5	71 08.9	29 60	54.5	70 50.0	34 58	51.6	70 16.8	40 54	47.4	25
6	71 18.0	00 69	71.8	71 16.6	05 68	68.7	71 08.8	13 66	64.0	70 59.8	17 64	61.0	70 47.9	22 62	58.0	70 33.1	27 60	55.0	70 15.5	31 58	52.2	69 44.3	38 55	48.1	6
7	70 36.4	02 69	71.8	70 35.8	03 68	68.7	70 29.3	11 66	64.2	70 21.4	16 64	61.3	70 10.6	20 62	58.4	69 57.0	25 60	55.5	69 40.7	29 58	52.7	69 11.5	36 55	48.7	7
8	69 54.7	03 69	71.7	69 54.9	02 68	68.8	69 49.8	09 66	64.4	69 42.8	14 64	61.6	69 33.1	18 63	58.7	69 20.7	23 61	55.9	69 05.7	27 59	53.2	68 38.4	33 56	49.3	8
9	69 13.0	04 69	71.6	69 13.9	01 68	68.8	69 10.2	08 66	64.6	69 04.2	12 65	61.8	68 55.6	17 63	59.1	68 44.3	21 61	56.3	68 30.4	25 59	53.7	68 05.0	31 56	49.8	9
30	68 31.4	05 69	71.6	68 33.0	01 68	68.8	68 30.5	06 66	64.7	68 25.5	11 65	62.0	68 17.9	15 63	59.3	68 07.7	19 61	56.7	67 55.0	23 59	54.1	67 31.4	29 56	50.2	30
1	67 49.8	06 69	71.5	67 52.1	02 68	68.8	67 50.8	05 66	64.8	67 46.7	09 65	62.2	67 40.1	13 63	59.6	67 31.0	17 61	57.0	67 19.4	21 60	54.4	66 57.6	27 57	50.7	1
2	67 08.2	07 69	71.3	67 11.2	03 68	68.8	67 11.1	03 66	64.9	67 07.9	07 65	62.3	67 02.2	11 63	59.8	66 54.1	16 62	57.2	66 43.6	19 60	54.7	66 23.5	25 57	51.1	2
3	66 26.6	08 69	71.2	66 30.3	04 68	68.7	66 31.3	02 66	64.9	66 29.0	06 65	62.4	66 24.3	10 63	59.9	66 17.2	14 62	57.5	66 07.7	18 60	55.0	65 49.3	23 57	51.4	3
4	65 45.1	09 69	71.1	65 49.4	05 68	68.6	65 51.6	01 66	65.0	65 50.1	04 65	62.5	65 46.3	08 63	60.1	65 40.1	12 62	57.7	65 31.7	16 60	55.3	65 14.9	21 58	51.7	4
35	65 03.6	10 69	70.9	65 08.6	06 68	68.5	65 11.8	01 66	65.0	65 11.1	03 65	62.6	65 08.2	07 64	60.2	65 03.0	11 62	57.8	64 55.6	14 60	55.5	64 40.4	20 58	52.0	35
6	64 22.2	11 69	70.7	64 27.8	08 68	68.4	64 32.1	02 66	64.9	64 32.2	02 65	62.6	64 30.1	05 64	60.3	64 25.9	09 62	58.0	64 19.4	13 60	55.7	64 05.8	18 58	52.3	6
7	63 40.8	12 69	70.5	63 47.0	09 68	68.3	63 52.3	03 66	64.9	63 53.2	00 65	62.6	63 52.0	04 64	60.4	63 48.6	07 62	58.1	63 43.1	11 61	55.8	63 31.0	16 58	52.5	7
8	62 59.4	13 69	70.3	63 06.2	10 68	68.2	63 12.6	05 66	64.8	63 14.3	01 65	62.6	63 13.8	02 64	60.4	63 11.4	06 62	58.2	63 06.8	09 61	56.0	62 56.2	14 58	52.7	8
9	62 18.1	14 69	70.1	62 25.5	11 68	68.0	62 32.9	06 66	64.8	62 35.3	02 65	62.6	62 35.7	01 64	60.4	62 34.1	04 62	58.3	62 30.4	08 61	56.1	62 21.2	13 58	52.9	9
40	61 36.9	15 69	69.9	61 44.9	12 68	67.8	61 53.2	07 66	64.7	61 56.4	04 65	62.6	61 57.5	00 64	60.4	61 56.7	03 62	58.3	61 54.0	06 61	56.2	61 46.2	11 58	53.0	40
1	60 55.7	16 69	69.7	61 04.2	13 68	67.7	61 13.6	08 66	64.6	61 17.4	05 65	62.5	61 19.4	02 64	60.4	61 19.4	02 62	58.3	61 17.5	06 61	56.2	61 11.1	09 59	53.1	1
2	60 14.6	17 68	69.5	60 23.7	14 67	67.5	60 34.0	09 66	64.5	60 38.5	06 65	62.4	60 41.2	03 64	60.4	60 42.0	00 62	58.3	60 41.0	03 61	56.3	60 36.0	08 59	53.2	2
3	59 33.5	18 68	69.2	59 43.2	15 67	67.3	59 54.4	10 66	64.3	59 59.6	07 65	62.3	60 03.1	04 64	60.3	60 04.7	01 62	58.3	60 04.5	02 61	56.3	60 00.8	06 59	53.3	3
4	58 52.5	18 68	69.0	59 02.7	16 67	67.1	59 14.9	11 66	64.2	59 20.8	08 65	62.2	59 24.9	05 64	60.3	59 27.3	03 62	58.3	59 28.0	00 61	56.3	59 25.6	05 59	53.4	4
45	58 11.6	19 68	68.7	58 22.3	17 67	66.9	58 35.4	12 66	64.0	58 42.0	10 65	62.1	58 46.9	07 63	60.2	58 50.0	04 62	58.3	58 51.4	01 61	56.3	58 50.4	03 59	53.4	45
6	57 30.7	20 68	68.5	57 42.0	18 67	66.7	57 56.0	13 66	63.9	58 03.2	11 65	62.0	58 08.8	08 63	60.1	58 12.7	05 62	58.2	58 14.9	02 61	56.3	58 15.1	02 59	53.5	6
7	56 49.9	21 68	68.2	57 01.8	18 67	66.4	57 16.6	14 66	63.7	57 24.5	12 64	61.9	57 30.8	09 63	60.0	57 35.4	06 62	58.2	57 38.4	04 61	56.3	57 39.8	00 59	53.5	7
8	56 09.2	22 68	68.0	56 21.6	19 67	66.2	56 37.3	16 65	63.5	56 45.8	13 64	61.7	56 52.8	10 63	59.9	56 58.2	08 62	58.1	57 01.9	05 61	56.2	57 04.6	01 59	53.5	8
9	55 28.6	23 68	67.7	55 41.5	20 67	65.9	55 58.0	17 65	63.3	56 07.2	14 64	61.6	56 14.8	11 63	59.8	56 20.9	09 62	58.0	56 25.5	06 61	56.2	56 29.3	02 59	53.5	9
50	54 48.0	24 67	67.4	55 01.4	21 67	65.7	55 18.9	18 65	63.1	55 28.7	15 64	61.4	55 37.0	13 63	59.6	55 43.7	10 62	57.9	55 49.0	08 61	56.1	55 54.1	04 59	53.4	50
1	54 07.6	24 67	67.1	54 21.5	22 66	65.4	54 39.8	19 65	62.9	54 50.2	16 64	61.2	54 59.1	14 63	59.5	55 06.6	11 62	57.8	55 12.6	09 61	56.0	55 18.8	06 59	53.4	1
2	53 27.2	25 67	66.8	53 41.6	23 66	65.2	54 00.7	20 65	62.7	54 11.7	17 64	61.0	54 21.3	15 63	59.3	54 29.5	12 62	57.6	54 36.3	10 61	55.9	54 43.6	06 59	53.3	2
3	52 46.9	26 67	66.5	53 01.8	24 66	64.9	53 21.8	20 65	62.5	53 33.4	18 64	60.8	53 43.6	16 63	59.2	53 52.5	14 62	57.5	53 59.9	11 60	55.8	54 08.4	08 59	53.3	3
4	52 06.7	27 67	66.2	52 22.1	25 66	64.6	52 42.9	21 65	62.2	52 55.1	19 64	60.6	53 06.0	17 63	59.0	53 15.5	15 62	57.3	53 23.7	12 60	55.7	53 33.3	09 58	53.2	4
55	51 26.6	28 67	65.9	51 42.5	26 66	64.4	52 04.1	22 64	62.0	52 16.9	20 64	60.4	52 28.4	18 62	58.8	52 38.6	16 61	57.2	52 47.5	14 60	55.6	52 58.2	10 58	53.1	55
6	50 46.6	28 67	65.6	51 03.0	26 66	64.1	51 25.4	23 64	61.8	51 38.8	21 63	60.2	51 50.9	19 62	58.6	52 01.8	17 61	57.0	52 11.3	15 60	55.4	52 23.1	11 58	53.0	6
7	50 06.7	29 66	65.3	50 23.6	27 66	63.8	50 46.8	24 64	61.5	51 00.8	22 63	60.0	51 13.5	20 62	58.4	51 25.0	18 61	56.8	51 35.2	16 60	55.3	51 48.1	13 58	52.9	7
8	49 26.8	30 66	65.0	49 44.3	28 65	63.5	50 06.3	26 64	61.3	50 22.8	23 63	59.7	50 36.2	21 62	58.2	50 48.3	19 61	56.7	50 59.2	17 60	55.1	51 13.2	14 58	52.7	8
9	48 47.1	31 66	64.7	49 05.1	29 65	63.2	49 29.9	26 64	61.0	49 45.0	24 63	59.5	49 58.9	22 62	58.0	50 11.7	20 61	56.5	50 23.2	18 60	54.9	50 38.3	15 58	52.6	9
60	48 07.5	32 66	64.3	48 25.9	30 65	62.9	48 51.5	27 64	60.7	49 07.2	25 63	59.2	49 21.8	23 62	57.8	49 35.1	21 61	56.3	49 47.4	19 60	54.7	50 03.4	16 58	52.5	60
1	47 28.0	32 66	64.0	47 46.9	31 65	62.6	48 13.3	28 64	60.4	48 29.5	26 63	59.0	48 44.7	24 62	57.5	48 58.7	22 61	56.1	49 11.6	20 60	54.6	49 28.7	18 58	52.3	1
2	46 48.7	33 65	63.7	47 08.0	31 65	62.3	47 35.2	29 63	60.2	47 52.0	27 62	58.7	48 07.7	25 61	57.3	48 22.3	23 60	55.8	48 35.9	22 59	54.4	48 54.0	19 58	52.1	2
3	46 09.4	34 65	63.3	46 29.3	32 64	62.0	46 57.2	30 63	59.9	47 14.5	28 62	58.5	47 30.8	26 61	57.0	47 46.1	25 60	55.6	48 00.2	23 59	54.2	48 19.4	20 58	52.0	3
4	45 30.2	35 65	63.0	45 50.6	33 64	61.6	46 19.3	31 63	59.6	46 37.2	29 62	58.2	46 54.1	27 61	56.8	47 09.9	26 60	55.4	47 24.7	24 59	54.0	47 44.9	21 57	51.8	4
65	44 51.2	35 65	62.6	45 12.0	34 64	61.3	45 41.5	32 63	59.3	45 59.9	30 62	57.9	46 17.4	28 61	56.5	46 33.9	27 60	55.1	46 49.3	25 59	53.7	47 10.4	22 57	51.6	65
6	44 12.3	36 65	62.3	44 33.6	35 64	61.0	45 03.8	32 63	59.0	45 22.8	31 62	57.6	45 40.9	29 61	56.3	45 57.9	28 60	54.9	46 14.0	26 59	53.5	46 36.1	23 57	51.4	6
7	43 33.5	37 64	61.9	43 55.3	36 64	60.6	44 26.3	33 62	58.7	44 45.8	32 61	57.3	45 04.4	30 61	56.0	45 22.1	29 60	54.6	45 38.7	27 59	53.3	46 01.9	24 57	51.2	7
8	42 54.9	38 64	61.6	43 17.1	36 63	60.3	43 48.9	34 62	58.4	44 08.9	33 61	57.1	44 28.1	31 60	55.7	44 46.3	30 59	54.4	45 03.6	28 58	53.0	45 27.7	26 57	51.0	8
9	42 16.3	39 64	61.2	42 39.1	37 63	60.0	43 11.6	35 62	58.1	43 32.2	34 61	56.8	43 51.9	32 60	55.5	44 10.7	31 59	54.1	44 28.6	29 58	52.8	44 53.7	27 57	50.8	9
70	41 37.9	39 64	60.9	42 01.1	38 63	59.6	42 34.4	36 62	57.7	42 55.5	35 61	56.5	43 15.8	33 60	55.2	43 35.2	32 59	53.9	43 53.7	30 58	52.5	44 19.7	28 56	50.5	70
1	40 59.7	40 64	60.5	41 23.3	39 63	59.3	41 57.4	37 62	57.4	42 19.0	35 61	56.1	42 39.9	34 60	54.9	42 59.8	33 59	53.6	43 18.9	31 58	52.3	43 45.9	29 56	50.3	1
2	40 21.6	41 63	60.1	40 45.7	40 62	58.9	41 20.5	38 61	57.1	41 42.6	36 60	55.8	42 04.0	35 60	54.6	42 24.6	34 59	53.3	42 44.3	32 58	52.0	43 12.2	30 56	50.1	2
3	39 43.6	42 63	59.7	40 08.2	40 62	58.5	40 43.7	39 61	56.7	41 06.4	37 60	55.5	41 28.3	36 59	54.3	41 49.5	35 58	53.0	42 09.7	33 57	51.8	42 38.6	31 56	49.8	3
4	39 05.8	42 63	59.4	39 30.8	41 62	58.2	40 07.1	39 61	56.4	40 30.3	38 60	55.2	40 52.8	37 59	54.0	41 14.5	35 58	52.7	41 35.4	34 57	51.5	42 05.1	32 56	49.6	4
75	38 28.1	43 63	59.0	38 53.6	42 62	57.8	39 30.6	40 61	56.1	39 54.4	39 60	54.9	40 17.4	38 59	53.7	40 39.6	36 58	52.4	41 01.1	35 57	51.2	41 31.8	33 55	49.3	75
6	37 50.6	44 62	58.6	38 16.6	43 62	57.5	38 54.3	41 60	55.7	39 18.5	40 59	54.5	39 42.1	39 59	53.3	40 04.9	37 58	52.1	40 27.0	36 57	50.9	40 58.6	34 55	49.1	6
7	37 13.2	45 62	58.2	37 39.6	44 61	57.1	38 18.1	42 60	55.4	38 42.9	41 59	54.2	39 07.0	40 58	53.0	39 30.3	38 57	51.8	39 53.0	37 56	50.6	40 25.5	35 55	48.8	7
8	36 36.0	45 62	57.8	37 02.9	44 61	56.7	37 42.1	43 60	55.0	38 07.4	42 59	53.9	38 32.0	40 58	52.7	38 55.9	39 57	51.5	39 19.1	38 56	50.3	39 52.5	36 55	48.5	8
9	35 58.9	46 62	57.4	36 26.3	45 61	56.3	37 06.2	44 60	54.6	37 32.0	42 59	53.5	37 57.2	41 58	52.4	38 21.6	40 57	51.2	38 45.4	39 56	50.0	39 19.7	37 54	48.2	9
80	35 22.0	47 61	57.0	35 49.9	46 60	55.9	36 30.5	44 59	54.3	36 56.8	43 58	53.2	37 22.5	42 58	52.0	37 47.5	41 57	50.9	38 11.9	40 56	49.7	38 47.1	38 54	48.0	80
1	34 45.3	48 61	56.6	35 13.6	47 60	55.5	35 55.0	45 59	53.9	36 21.8	44 58	52.8	36 48.0	43 57	51.7	37 13.6	42 56	50.5	37 38.5	41 55	49.4	38 14.6	39 54	47.7	1
2	34 08.7	48 61	56.2	34 37.5	47 60	55.2	35 19.6	46 59	53.5	35 46.9	45 58	52.4	36 13.6	44 57	51.3	36 39.7	43 56	50.2	37 05.2	42 55	49.1	37 42.2	40 54	47.4	2
3	33 32.3	49 60	55.8	34 01.6	48 60	54.8	34 44.4	47 58	53.2	35 12.2	46 58	52.1	35 39.5	45 57	51.0	36 06.1	44 56	49.9	36 32.1	43 55	48.8	37 10.9	41 53	47.1	3
4	32 56.1	50 60	55.4	33 25.8	49 59	54.4	34 09.3	48 58	52.8	34 37.7	47 57	51.7	35 05.4	46 56	50.6	35 32.6	45 56	49.5	35 59.2	44 55	48.4	36 38.0	42 53	46.8	4
85	32 20.1	51 60	55.0	32 50.2	50 59	54.0	33 34.5	49 58	52.4	34 03.3	48 57	51.3	34 31.6	47 56	50.3	34 59.3	46 55	49.2	35 26.5	45 54	48.1	36 06.1	43 53	46.4	85
6	31 44.2	51 59	54.6	32 14.8	51 59	53.6	32 59.8	49 57	52.0	33 29.1	48 57	51.0	33 57.9	48 56	49.9	34 26.2	47 55	48.8	34 53.9	46 54	47.8	35 34.4	44 53	46.1	6
7	31 08.6	52 59	54.1	31 39.6	51 58	53.1	32 25.3	50 57	51.6	32 55.1	49 56	50.6	33 24.5	48 56	49.5	33 53.3	48 55	48.5	34 21.5	47 54	47.4	35 02.8	45 52	45.8	7
8	30 33.1	53 59	53.7	31 04.6	52 58	52.7	31 51.0	51 57	51.2	32 21.3	50 56	50.2	32 51.2	49 55	49.2	33 20.5	48 54	48.1	33 49.3	48 53	47.1	34 31.4	46 52	45.5	8
9	29 57.8	54 58	53.3	30 29.8	53 58	52.3	31 16.9	52 57	50.8	31 47.7	51 56	49.8	32 18.1	50 55	48.8	32 47.9	49 54	47.8	33 17.2	48 53	46.7	34 00.2	47 52	45.1	9
90	29 22.8	54 58	52.9	29 55.2	54 57	51.9	30 43.0	53 56	50.4	31 14.3	52 55	49.4	31 45.1	51 55	48.4	32 15.5	50 54	47.4	32 45.4	49 53	46.4	33 29.2	48 51	44.8	90

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	28 47.9	55 58	52.4	29 20.7	54 57	51.5	30 09.3	53 56	50.0	30 41.1	53 55	49.0	31 12.4	52 54	48.0	31 43.3	51 53	47.0	32 13.7	50 52	46.0	32 58.4	49 51	44.5	91
2	28 13.2	55 57	52.0	28 46.5	55 57	51.0	29 35.7	54 56	49.6	30 08.0	53 55	48.6	30 39.9	53 54	47.6	31 11.3	52 53	46.7	31 42.2	51 52	45.7	32 27.7	50 51	44.1	2
3	27 38.7	57 57	51.5	28 12.5	56 56	50.6	29 02.4	55 55	49.2	29 35.2	54 54	48.2	30 07.5	54 54	47.3	30 39.5	53 53	46.3	31 10.9	52 52	45.3	31 57.3	51 50	43.8	3
4	27 04.5	57 57	51.1	27 38.7	57 56	50.2	28 29.3	56 55	48.8	29 02.6	55 54	47.8	29 35.4	54 53	46.9	30 07.9	54 52	45.9	30 39.9	53 51	44.9	31 27.0	52 50	43.4	4
95	26 30.4	58 56	50.7	27 05.1	57 56	49.7	27 56.4	57 54	48.3	28 30.2	56 54	47.4	29 03.5	55 53	46.5	29 36.5	55 52	45.5	30 09.0	54 51	44.5	30 57.0	53 50	43.1	95
6	25 56.6	59 56	50.2	26 31.7	58 55	49.3	27 23.7	57 54	47.9	27 58.0	57 53	47.0	28 31.8	56 52	46.1	29 05.3	55 52	45.1	29 38.3	55 51	44.2	30 27.1	54 49	42.7	6
7	25 23.0	60 56	49.7	25 58.6	59 55	48.8	26 51.3	58 54	47.5	27 26.0	58 53	46.6	28 00.3	57 52	45.6	28 34.3	56 51	44.7	29 07.9	56 50	43.8	29 57.5	55 49	42.3	7
8	24 49.6	60 55	49.3	25 25.6	60 54	48.4	26 19.0	59 53	47.1	26 54.2	58 53	46.2	27 29.0	58 52	45.2	28 03.5	57 51	44.3	28 37.6	56 50	43.4	29 28.0	56 49	42.0	8
9	24 16.5	61 55	48.8	24 52.9	60 54	47.9	25 47.0	60 53	46.6	26 22.7	59 52	45.7	26 58.0	59 51	44.8	27 33.0	58 51	43.9	28 07.6	57 50	43.0	28 58.8	56 48	41.6	9
100	23 43.6	62 54	48.4	24 20.5	61 54	47.5	25 15.3	60 53	46.2	25 51.4	60 52	45.3	26 27.2	59 51	44.4	27 02.7	59 50	43.5	27 37.8	58 49	42.6	28 29.8	57 48	41.2	100
1	23 10.9	62 54	47.9	23 48.2	62 53	47.0	24 43.7	61 52	45.7	25 20.3	61 51	44.9	25 56.6	60 51	44.0	26 32.6	60 50	43.1	27 08.2	59 49	42.2	28 01.0	58 48	40.8	1
2	22 38.5	63 54	47.4	23 16.3	63 53	46.6	24 12.4	62 52	45.3	24 49.5	62 51	44.4	25 26.3	61 50	43.5	26 02.7	61 49	42.7	26 38.8	60 49	41.8	27 32.4	59 47	40.4	2
3	22 06.3	64 53	46.9	22 44.5	63 52	46.1	23 41.3	63 51	44.8	24 18.9	62 51	44.0	24 56.1	62 50	43.1	25 33.1	61 49	42.2	26 09.7	61 48	41.4	27 04.1	60 47	40.0	3
4	21 34.4	65 53	46.5	22 13.0	64 52	45.6	23 10.5	64 51	44.4	23 48.5	63 50	43.5	24 26.3	63 49	42.7	25 03.7	62 49	41.8	25 40.8	62 48	41.0	26 36.0	61 46	39.6	4
105	21 02.7	65 52	46.0	21 41.8	65 52	45.2	22 40.0	64 50	43.9	23 18.4	64 50	43.1	23 56.6	63 49	42.2	24 34.6	63 48	41.4	25 12.2	62 47	40.5	26 08.1	62 46	39.2	105
6	20 31.3	66 52	45.5	21 10.8	66 51	44.7	22 09.7	65 50	43.5	22 48.6	65 49	42.6	23 27.3	64 49	41.8	24 05.7	64 48	41.0	24 43.8	63 47	40.1	25 40.5	63 46	38.8	6
7	20 00.1	67 51	45.0	20 40.1	66 51	44.2	21 39.6	66 50	43.0	22 19.0	65 49	42.2	22 58.2	65 48	41.4	23 37.0	65 47	40.5	24 15.7	64 46	39.7	25 13.1	63 45	38.4	7
8	19 29.2	67 51	44.5	20 09.6	67 50	43.7	21 09.8	67 49	42.5	21 49.7	66 48	41.7	22 29.3	66 48	40.9	23 08.7	65 47	40.1	23 47.8	65 46	39.3	24 45.9	64 45	38.0	8
9	18 58.6	68 51	44.0	19 39.4	68 50	43.2	20 40.3	67 49	42.0	21 20.6	67 48	41.2	22 00.7	67 47	40.4	22 40.5	66 46	39.6	23 20.1	66 46	38.8	24 19.1	65 44	37.6	9
110	18 28.3	69 50	43.5	19 09.5	69 49	42.7	20 11.1	68 48	41.6	20 51.8	68 48	40.8	21 32.4	67 47	40.0	22 12.7	67 46	39.2	22 52.8	67 45	38.4	23 52.4	66 44	37.2	110
1	17 58.2	70 50	43.0	18 39.9	69 49	42.2	19 42.1	69 48	41.1	20 23.3	69 47	40.3	21 04.3	68 46	39.5	21 45.1	68 46	38.7	22 25.6	67 45	37.9	23 26.0	67 44	36.7	1
2	17 28.4	70 49	42.5	18 10.6	70 48	41.7	19 13.4	70 47	40.6	19 55.0	69 47	39.8	20 36.5	69 46	39.1	21 17.8	69 45	38.3	21 58.8	68 44	37.5	22 59.9	68 43	36.3	2
3	16 59.0	71 49	42.0	17 41.5	71 48	41.2	18 45.0	70 47	40.1	19 27.1	70 46	39.3	20 09.0	70 45	38.6	20 50.7	69 45	37.8	21 32.2	69 44	37.0	22 34.1	68 43	35.9	3
4	16 29.8	72 48	41.4	17 12.7	71 47	40.7	18 16.9	71 46	39.6	18 59.4	71 46	38.9	19 41.8	70 45	38.1	20 24.0	70 44	37.4	21 05.9	70 43	36.6	22 08.5	69 42	35.4	4
115	16 00.9	72 48	40.9	16 44.3	72 47	40.2	17 49.0	72 46	39.1	18 32.0	72 45	38.4	19 14.8	71 44	37.6	19 57.5	71 44	36.9	20 39.9	71 43	36.1	21 43.2	70 42	35.0	115
6	15 32.3	73 47	40.4	16 16.1	73 46	39.7	17 21.5	72 45	38.6	18 04.9	72 45	37.9	18 48.2	72 44	37.2	19 31.3	72 43	36.4	20 14.2	71 42	35.7	21 18.2	71 41	34.5	6
7	15 04.0	74 47	39.9	15 48.2	74 46	39.2	16 54.3	73 45	38.1	17 38.1	73 44	37.4	18 21.8	73 43	36.7	19 05.4	72 43	35.9	19 48.7	72 42	35.2	20 53.4	72 41	34.1	7
8	14 36.0	74 46	39.3	15 20.7	74 45	38.6	16 27.4	74 44	37.6	17 11.6	74 44	36.9	17 55.8	73 43	36.2	18 39.8	73 42	35.5	19 23.6	73 41	34.7	20 29.0	72 40	33.6	8
9	14 08.4	75 46	38.8	14 53.4	75 45	38.1	16 00.7	75 44	37.1	16 45.5	74 43	36.4	17 30.0	74 42	35.7	18 14.5	74 42	35.0	18 58.7	74 41	34.3	20 04.8	73 40	33.2	9
120	13 41.0	76 45	38.3	14 26.5	76 44	37.6	15 34.4	75 43	36.6	16 19.6	75 43	35.9	17 04.6	75 42	35.2	17 49.5	75 41	34.5	18 34.2	74 40	33.8	19 41.0	74 39	32.7	120
1	13 14.0	77 44	37.7	13 59.9	76 44	37.0	15 08.5	76 43	36.0	15 54.0	76 42	35.4	16 39.5	76 41	34.7	17 24.8	75 41	34.0	18 09.9	75 40	33.3	19 17.4	75 39	32.3	1
2	12 47.4	77 44	37.2	13 33.6	77 43	36.5	14 42.8	77 42	35.5	15 28.8	77 42	34.9	16 14.6	76 41	34.2	17 00.4	76 40	33.5	17 46.0	76 39	32.8	18 54.1	76 38	31.8	2
3	12 21.0	78 43	36.6	13 07.7	78 43	36.0	14 17.5	77 42	35.0	15 03.9	77 41	34.3	15 50.1	77 40	33.7	16 36.3	77 40	33.0	17 22.3	77 39	32.3	18 31.1	76 38	31.3	3
4	11 55.0	78 43	36.1	12 42.1	78 42	35.4	13 52.5	78 41	34.5	14 39.3	78 40	33.8	15 26.0	78 40	33.2	16 12.6	78 39	32.5	16 59.0	77 38	31.9	18 08.5	77 37	30.8	4
125	11 29.4	79 42	35.5	12 16.8	79 42	34.9	13 27.8	79 41	33.9	14 15.0	79 40	33.3	15 02.1	78 39	32.7	15 49.1	78 38	32.0	16 36.0	78 38	31.4	17 46.1	78 37	30.4	125
6	11 04.1	80 42	34.9	11 51.9	80 41	34.3	13 03.5	79 40	33.4	13 51.1	79 39	32.8	14 38.6	79 39	32.1	15 26.1	79 38	31.5	16 13.4	79 37	30.9	17 24.1	78 36	29.9	6
7	10 39.1	80 41	34.4	11 27.3	80 40	33.8	12 39.5	80 39	32.8	13 27.5	80 39	32.2	14 15.5	80 38	31.6	15 03.3	80 37	31.0	15 51.0	79 37	30.4	17 02.4	79 36	29.4	7
8	10 14.5	81 40	33.8	11 03.1	81 40	33.2	12 15.9	81 39	32.3	13 04.3	81 38	31.7	13 52.6	80 37	31.1	14 40.9	80 37	30.5	15 29.0	80 36	29.9	16 41.0	80 35	28.9	8
9	9 50.3	82 40	33.2	10 39.3	82 39	32.6	11 52.6	81 38	31.8	12 41.4	81 38	31.2	13 30.2	81 37	30.6	14 18.8	81 36	30.0	15 07.3	81 36	29.3	16 20.9	81 35	28.4	9
130	9 26.4	82 39	32.6	10 15.8	82 39	32.1	11 29.7	82 38	31.2	12 18.9	82 37	30.6	13 08.0	82 36	30.0	13 57.1	82 36	29.4	14 46.0	82 35	28.8	15 59.2	81 34	27.9	130
1	9 03.0	83 38	32.1	9 52.7	83 38	31.5	11 07.2	83 37	30.6	11 56.7	83 36	30.1	12 46.2	82 36	29.5	13 35.7	82 35	28.9	14 25.0	82 34	28.3	15 38.9	82 33	27.4	1
2	8 39.9	84 38	31.5	9 29.9	83 37	30.9	10 45.0	83 36	30.1	11 34.9	83 36	29.5	12 24.8	83 35	28.9	13 14.6	83 34	28.4	14 04.4	83 34	27.8	15 18.8	83 33	26.9	2
3	8 17.1	84 37	30.9	9 07.6	84 37	30.3	10 23.2	84 36	29.5	11 13.5	84 35	29.0	12 03.8	84 34	28.4	12 54.0	84 34	27.8	13 44.1	83 33	27.3	14 59.1	83 32	26.4	3
4	7 54.8	85 37	30.3	8 45.6	85 36	29.8	10 01.7	85 35	28.9	10 52.4	84 34	28.4	11 43.1	84 34	27.9	12 33.6	84 33	27.3	13 24.1	84 33	26.8	14 39.8	84 32	25.9	4
135	7 32.9	85 36	29.7	8 24.0	85 35	29.2	9 40.7	85 34	28.4	10 31.8	85 34	27.8	11 22.8	85 33	27.3	12 13.7	85 33	26.8	13 04.6	85 32	26.2	14 20.8	85 31	25.4	135
6	7 11.3	86 35	29.1	8 02.8	86 35	28.6	9 29.0	86 34	27.8	10 11.4	86 33	27.3	11 02.8	86 33	26.8	11 54.1	85 32	26.2	12 45.4	85 31	25.7	14 02.1	85 30	24.9	6
7	6 50.2	86 35	28.5	7 42.0	86 34	28.0	8 59.8	86 33	27.2	9 51.5	86 33	26.7	10 43.2	86 32	26.2	11 34.9	86 31	25.7	12 26.5	86 31	25.2	13 43.8	86 30	24.4	7
8	6 29.4	87 34	27.9	7 21.6	87 33	27.4	8 39.9	87 32	26.6	9 32.0	87 32	26.1	10 24.1	87 31	25.6	11 16.1	87 31	25.1	12 08.1	87 30	24.6	13 25.9	86 29	23.9	8
9	6 09.1	88 33	27.3	7 01.7	88 33	26.8	8 20.4	87 32	26.1	9 12.9	87 31	25.6	10 05.3	87 31	25.1	10 57.6	87 30	24.6	11 50.0	87 30	24.1	13 08.3	87 29	23.3	9
140	5 49.2	88 32	26.7	6 42.1	88 32	26.2	8 01.3	88 31	25.5	8 54.1	88 31	25.0	9 46.9	88 30	24.5	10 39.6	88 29	24.0	11 32.2	88 29	23.5	12 51.1	88 28	22.8	140
1	5 29.7	89 32	26.1	6 22.9	89 31	25.6	7 42.7	89 30	24.9	8 35.8	88 30	24.4	9 28.9	88 29	23.9	10 21.9	88 29	23.5	11 14.9	88 28	23.0	12 34.3	88 27	22.3	1
2	5 10.7	89 31	25.4	6 04.2	89 31	25.0	7 24.4	89 30	24.3	8 17.8	89 29	23.8	9 11.2	89 29	23.4	10 04.6	89 28	22.9	10 58.0	89 28	22.4	12 17.9	89 27	21.7	2
3				5 45.9	90 30	24.4	7 06.5	90 29	23.7	8 00.3	90 29	23.2	8 54.0	90 28	22.8	9 47.7	89 27	22.3	10 41.4	89 27	21.9	12 01.8	89 26	21.2	3
4				5 28.0	90 29	23.7	6 49.1	90 28	23.1	7 43.2	90 28	22.7	8 37.2	90 27	22.2	9 31.3	90 27	21.8	10 25.2	90 26	21.3	11 46.1	90 26	20.7	4
145				5 10.5	91 28	23.1	6 32.1	91 28	22.5	7 26.5	91 27	22.1	8 20.9	91 27	21.6	9 15.2	91 26	21.2	10 09.5	90 26	20.8	11 30.9	90 25	20.1	145
6							6 15.6	91 27	21.9	7 10.2	91 26	21.5	8 04.9	91 26	21.1	8 59.5	91 25	20.6	9 54.1	91 25	20.2	11 16.0	91 24	19.6	6
7							5 59.4	92 26	21.3	6 54.4	92 26	20.9	7 49.3	92 25	20.5	8 44.3	92 25	20.1	9 39.2	91 24	19.7	11 01.4	91 24	19.0	7
8							5 43.7	92 25	20.7	6 39.0	92 25	20.3	7 34.2	92 25	19.9	8 29.4	92 24	19.5	9 24.6	92 24	19.1	10 47.3	92 23	18.5	8
9							5 28.4	93 25	20.0	6 24.0	93 24	19.7	7 19.5	93 24	19.3	8 15.0	92 23	18.9	9 10.5	92 23	18.5	10 33.6	92 22	17.9	9
150							5 13.6	93 24	19.4	6 09.4	93 24	19.1	7 05.2	93 23	18.7	8 01.0	93 23	18.3	8 56.7	93 22	17.9	10 20.3	93 22	17.4	150
1										5 55.3	93 23	18.5	6 51.4	93 22	18.1	7 47.4	93 22	17.7	8 43.4	93 22	17.4	10 07.4	93 21	16.8	1
2										5 41.6	94 22	17.8	6 38.0	94 22	17.5	7 34.2	94 21	17.1	8 30.5	94 21	16.8	9 54.9	94 20	16.3	2
3										5 28.4	94 21	17.2	6 25.0	94 21	16.9	7 21.5	94 20	16.6	8 18.1	94 20	16.2	9 42.8	94 19	15.7	3
4										5 15.7	95 21	16.6	6 12.5	95 20	16.3	7 09.2	95 20	16.0	8 06.0	95 19	15.6	9 31.1	95 19	15.1	4
155										5 03.3	95 20	16.0	6 00.4	95 19	15.7	6 57.4	95 19	15.4	7 54.4	95 19	15.1	9 19.9	95 18	14.6	155
6													5 48.7	95 19	15.1	6 46.0	95 18	14.8	7 43.2	95 18	14.5	9 09.1	95 17	14.0	6
7													5 37.5	96 18	14.5	6 35.0	96 18	14.2	7 32.5	96 17	13.9	8 58.6	96 17	13.4	7
8													5 26.8	96 17	13.8	6 24.5	96 17	13.6	7 22.2	96 16	13.3	8 48.6	96 16	12.9	8
9													5 16.5	96 16	13.2	6 14.4	96 16	13.0	7 12.3	96 16	12.7	8 39.1	96 15	12.3	9
160													5 06.7	97 16	12.6	6 04.8	97 15	12.4	7 02.9	97 15	12.1	8 29.9	97 14	11.7	160
1																5 55.6	97 15	11.8	6 53.9	97 14	11.5	8 21.2	97 14	11.2	1
2																5 46.9	97 14	11.1	6 45.3	97 14	10.9	8 13.0	97 13	10.6	2
3																5 38.7	98 13	10.5	6 37.3	98 13	10.3	8 05.1	98 12	10.0	3
4																5 30.9	98 12	09.9	6 29.6	98 12	09.7	7 57.7	98 12	09.4	4
165																5 23.5	98 11	09.3	6 22.4	98 11	09.1	7 50.8	98 11	08.8	165
6																5 16.7	98 11	08.7	6 15.7	98 10	08.5	7 44.3	98 10	08.3	6
7																5 10.3	99 10	08.1	6 09.4	99 10	07.9	7 38.2	99 09	07.7	7
8																5 04.3	99 09	07.5	6 03.6	99 09	07.3	7 32.6	99 09	07.1	8
9																			5 58.3	99 08	06.7	7 27.4	99 08	06.5	9
170																			5 53.4	99 07	06.1	7 22.6	99 07	05.9	170
1																			5 48.9	99 07	05.5	7 18.3	99 06	05.3	1
2																			5 45.0	99 06	04.9	7 14.5	99 06	04.7	2
3																			5 41.5	1.0 05	04.3	7 11.1	1.0 05	04.1	3
4																			5 38.4	1.0 04	03.7	7 08.2	1.0 04	03.6	4
175																			5 35.9	1.0 03	03.1	7 05.7	1.0 03	03.0	175
6																			5 33.7	1.0 03	02.4	7 03.6	1.0 03	02.4	6
7																			5 32.1	1.0 02	01.8	7 02.0	1.0 02	01.8	7
8																			5 30.9	1.0 01	01.2	7 00.9	1.0 01	01.2	8
9																			5 30.2	1.0 00	00.6	7 00.2	1.0 00	00.6	9
180																			5 30.0	1.0 00	00.0	7 00.0	1.0 00	00.0	180

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Lat. 43°

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	78 30.0	1.0 02	00.0	78 06.0	1.0 02	00.0	77 00.0	1.0 02	00.0	76 30.0	1.0 02	00.0	76 00.0	1.0 01	00.0	75 30.0	1.0 01	00.0	74 00.0	1.0 01	00.0	73 30.0	1.0 01	00.0	00
1	78 28.9	1.0 06	02.9	77 58.9	1.0 05	02.8	76 59.8	1.0 05	02.5	76 29.1	1.0 05	02.4	75 59.1	1.0 04	02.2	75 29.2	1.0 04	02.1	73 59.3	1.0 04	01.9	73 29.3	1.0 03	01.8	1
2	78 25.6	99 09	05.8	77 55.8	99 09	05.5	76 56.2	99 08	05.0	76 26.4	99 07	04.7	75 56.6	99 07	04.5	75 26.7	99 07	04.3	73 57.1	1.0 06	03.7	73 27.3	1.0 06	03.6	2
3	78 20.0	98 13	08.6	77 50.6	98 12	08.2	76 51.5	99 11	07.4	76 21.9	99 10	07.0	75 52.3	99 10	06.7	75 22.6	99 09	06.4	73 53.6	99 08	05.6	73 23.9	99 08	05.3	3
4	78 12.4	97 16	11.4	77 43.3	97 15	10.8	76 44.9	97 14	09.8	76 15.6	98 13	09.3	75 46.3	98 13	08.9	75 17.0	98 12	08.5	73 48.6	98 11	07.4	73 19.1	98 10	07.1	4
05	78 02.7	96 20	14.1	77 34.1	96 19	13.4	76 36.6	96 17	12.1	76 07.7	96 16	11.6	75 38.7	97 15	11.0	75 09.7	97 15	10.5	73 42.3	97 13	09.2	73 13.0	98 12	08.8	05
6	77 51.0	93 23	16.8	77 22.9	94 22	15.9	76 26.5	95 20	14.4	75 58.1	95 19	13.8	75 29.5	95 18	13.1	75 00.9	96 17	12.5	73 34.6	96 15	11.0	73 05.7	96 14	10.5	6
7	77 37.4	91 26	19.3	77 10.0	92 24	18.3	76 14.7	93 22	16.7	75 46.8	93 21	15.9	75 18.8	94 20	15.2	74 50.6	94 19	14.5	73 25.6	95 17	12.7	72 57.0	95 16	12.2	7
8	77 22.0	89 28	21.7	76 55.4	89 27	20.7	76 01.3	91 25	18.8	75 34.0	91 24	18.0	75 06.6	92 23	17.2	74 39.0	92 22	16.4	73 15.3	94 19	14.4	72 47.2	94 18	13.8	8
9	77 05.0	86 31	24.0	76 39.1	87 30	22.9	75 46.5	88 27	20.9	75 19.8	89 26	19.9	74 52.9	90 25	19.1	74 25.9	90 24	18.2	73 03.8	92 21	16.1	72 36.1	92 20	15.4	9
10	76 46.4	83 33	26.1	76 21.3	84 32	25.0	75 30.1	86 30	22.8	75 04.2	87 28	21.8	74 37.9	88 27	20.9	74 11.5	88 26	20.0	72 51.0	90 23	17.7	72 23.9	91 22	16.9	10
1	76 26.4	80 36	28.2	76 02.1	82 34	27.0	75 12.4	84 32	24.7	74 47.2	85 30	23.7	74 21.6	86 29	22.7	73 55.8	86 28	21.7	72 37.2	88 25	19.2	72 10.5	89 24	18.4	1
2	76 05.0	77 38	30.1	75 41.5	79 36	28.9	74 53.5	81 34	26.5	74 29.0	82 32	25.4	74 04.1	83 31	24.4	73 39.0	84 30	23.4	72 22.2	86 27	20.7	71 56.1	87 26	19.9	2
3	75 42.3	75 40	31.9	75 19.7	76 38	30.6	74 33.3	79 35	28.2	74 09.6	80 34	27.1	73 45.5	81 33	26.0	73 21.0	82 32	25.0	72 06.1	84 28	22.1	71 40.7	85 27	21.3	3
4	75 18.6	72 41	33.6	74 56.8	73 40	32.3	74 12.0	76 37	29.8	73 49.1	77 36	28.6	73 25.7	78 35	27.5	73 02.0	80 33	26.5	71 49.1	82 30	23.5	71 24.3	83 29	22.6	4
15	74 53.7	69 43	35.2	74 32.9	70 42	33.9	73 49.7	73 39	31.3	73 27.5	75 37	30.1	73 04.9	76 36	29.0	72 42.0	77 35	27.9	71 31.1	80 31	24.9	71 06.9	81 30	23.9	15
6	74 28.0	66 44	36.7	74 08.0	68 43	35.3	73 26.5	71 40	32.7	73 05.0	72 39	31.5	72 43.2	73 38	30.4	72 21.0	75 36	29.2	71 12.2	78 33	26.1	70 48.7	79 32	25.2	6
7	74 01.3	63 46	38.1	73 42.2	65 44	36.7	73 02.3	68 42	34.1	72 41.7	70 40	32.9	72 20.6	71 39	31.7	71 59.1	72 38	30.5	70 52.5	76 34	27.4	70 29.6	77 33	26.4	7
8	73 33.9	60 47	39.4	73 15.5	62 46	38.0	72 37.3	65 43	35.3	72 17.5	67 42	34.1	71 57.2	68 40	32.9	71 36.4	70 39	31.7	70 31.9	73 36	28.5	70 09.7	75 34	27.5	8
9	73 05.7	57 48	40.6	72 48.2	59 47	39.2	72 11.5	63 44	36.5	71 52.5	64 43	35.3	71 32.9	66 42	34.1	71 13.0	67 40	32.9	70 10.6	71 37	29.6	69 49.0	72 36	28.6	9
20	72 36.8	55 49	41.7	72 20.1	57 48	40.3	71 45.1	60 45	37.6	71 26.8	62 44	36.4	71 08.0	63 43	35.2	70 48.8	65 41	34.0	69 48.5	69 38	30.7	69 27.7	70 37	29.7	20
1	72 07.4	52 50	42.7	71 51.5	54 49	41.3	71 18.0	58 46	38.7	71 00.4	59 45	37.4	70 42.4	61 44	36.2	70 23.9	62 42	35.0	69 25.8	67 39	31.7	69 05.6	68 38	30.6	1
2	71 37.3	49 51	43.6	71 22.2	51 50	42.3	70 50.2	55 47	39.7	70 33.5	57 46	38.4	70 16.2	58 45	37.2	69 58.4	60 43	36.0	69 02.4	64 40	32.6	68 42.9	66 39	31.6	2
3	71 06.8	47 52	44.5	70 52.4	49 50	43.2	70 22.0	53 48	40.6	70 05.9	54 47	39.3	69 49.4	56 46	38.1	69 32.3	58 44	36.9	68 38.5	62 41	33.5	68 19.7	63 40	32.5	3
4	70 35.8	45 52	45.3	70 22.2	46 51	44.0	69 53.2	50 49	41.4	69 37.9	52 48	40.2	69 22.0	54 46	39.0	69 05.7	55 45	37.8	68 14.0	60 42	34.4	67 55.8	61 41	33.3	4
25	70 04.4	42 53	46.1	69 51.5	44 52	44.7	69 23.9	48 49	42.2	69 09.3	50 48	41.0	68 54.2	51 47	39.8	68 38.6	53 46	38.6	67 48.9	57 43	35.2	67 31.5	59 41	34.1	25
6	69 32.7	40 54	46.8	69 20.4	42 52	45.5	68 54.3	45 50	42.9	68 40.4	47 49	41.7	68 25.9	49 48	40.5	68 11.0	51 47	39.3	67 23.4	55 43	36.0	67 06.6	57 42	34.9	6
7	69 00.5	38 54	47.4	68 49.0	39 53	46.1	68 24.2	43 51	43.6	68 11.0	45 50	42.4	67 57.2	47 48	41.2	67 43.0	48 47	40.0	66 57.4	53 44	36.7	66 41.3	54 43	35.6	7
8	68 28.1	35 55	48.0	68 17.2	37 54	46.7	67 53.7	41 51	44.2	67 41.2	43 50	43.0	67 28.1	44 49	41.9	67 14.6	46 48	40.7	66 31.0	51 45	37.4	66 15.5	52 44	36.3	8
9	67 55.3	33 55	48.5	67 45.1	35 54	47.3	67 23.0	39 52	44.8	67 11.1	40 51	43.6	66 58.7	42 50	42.5	66 45.8	44 49	41.3	66 04.1	49 45	38.0	65 49.3	50 44	36.9	9
30	67 22.4	31 55	49.0	67 12.7	33 54	47.8	66 51.9	37 52	45.4	66 40.6	38 51	44.2	66 28.9	40 50	43.0	66 16.6	42 49	41.9	65 36.9	46 46	38.6	65 22.8	48 45	37.5	30
1	66 49.1	29 56	49.4	66 40.1	31 55	48.2	66 20.5	34 53	45.9	66 09.9	36 52	44.7	65 58.8	38 51	43.6	65 47.2	40 50	42.4	65 09.4	44 46	39.2	64 55.9	46 45	38.1	1
2	66 15.7	27 56	49.9	66 07.3	29 55	48.7	65 48.9	32 53	46.3	65 38.9	34 52	45.2	65 28.4	36 51	44.0	65 17.4	37 50	42.9	64 41.5	42 47	39.7	64 28.7	44 46	38.6	2
3	65 42.0	25 56	50.2	65 34.2	27 55	49.1	65 17.0	30 53	46.8	65 07.7	32 52	45.6	64 57.8	34 51	44.5	64 47.4	35 50	43.4	64 13.4	40 47	40.2	64 01.1	42 46	39.1	3
4	65 08.2	23 57	50.6	65 01.0	25 56	49.4	64 45.0	28 54	47.1	64 36.2	30 53	46.0	64 26.9	32 52	44.9	64 17.1	33 51	43.8	63 44.9	38 48	40.6	63 33.3	40 47	39.6	4
35	64 34.3	21 57	50.9	64 27.6	23 56	49.7	64 12.7	26 54	47.5	64 04.5	28 53	46.4	63 55.8	30 52	45.3	63 46.6	31 51	44.2	63 16.2	36 48	41.1	63 05.2	38 47	40.0	35
6	64 00.2	20 57	51.1	63 54.0	21 56	50.0	63 40.3	25 54	47.8	63 32.6	26 53	46.7	63 24.5	28 52	45.7	63 15.9	29 51	44.6	62 47.3	34 49	41.5	62 36.8	36 48	40.4	6
7	63 25.9	18 57	51.4	63 20.3	19 56	50.3	63 07.7	23 55	48.1	63 00.6	24 54	47.0	62 53.1	26 53	46.0	62 45.0	28 52	44.9	62 18.1	32 49	41.8	62 08.3	34 48	40.8	7
8	62 51.6	16 57	51.6	62 46.5	18 57	50.5	62 34.9	21 55	48.4	62 28.4	23 54	47.3	62 21.4	24 53	46.3	62 13.9	26 52	45.2	61 48.8	30 49	42.2	61 39.5	32 48	41.2	8
9	62 17.2	14 58	51.8	62 12.6	16 57	50.7	62 02.1	19 55	48.6	61 56.1	21 54	47.6	61 49.6	22 53	46.5	61 42.7	24 52	45.5	61 19.2	28 50	42.5	61 10.5	30 49	41.5	9
40	61 42.6	13 58	52.0	61 38.6	14 57	50.9	61 29.1	17 55	48.8	61 23.6	19 54	47.8	61 17.7	20 53	46.8	61 11.3	22 53	45.8	60 49.5	26 50	42.8	60 41.4	28 49	41.8	40
1	61 08.0	11 58	52.1	61 04.5	13 57	51.1	60 56.0	16 55	49.0	60 51.1	17 54	48.0	60 45.7	19 54	47.0	60 39.8	20 53	46.0	60 19.6	25 50	43.0	60 12.0	26 49	42.1	1
2	60 33.4	09 58	52.2	60 30.3	11 57	51.2	60 22.8	14 55	49.2	60 18.4	16 55	48.2	60 13.5	17 54	47.2	60 08.2	18 53	46.2	59 49.6	23 50	43.3	59 42.6	24 49	42.3	2
3	59 58.7	08 58	52.3	59 56.1	09 57	51.3	59 49.6	12 56	49.4	59 45.6	14 55	48.4	59 41.3	15 54	47.4	59 36.5	17 53	46.4	59 19.5	21 50	43.5	59 12.9	22 50	42.6	3
4	59 23.9	06 58	52.4	59 21.8	08 57	51.4	59 16.2	11 56	49.5	59 12.8	12 55	48.5	59 08.9	14 54	47.5	59 04.6	15 53	46.6	58 49.2	19 51	43.7	58 43.2	21 50	42.8	4
45	58 49.1	05 58	52.5	58 47.5	06 57	51.5	58 42.8	09 56	49.6	58 39.9	11 55	48.6	58 36.5	12 54	47.7	58 32.7	13 53	46.7	58 18.8	18 51	43.9	58 13.4	19 50	43.0	45
6	58 14.3	03 58	52.5	58 13.1	05 57	51.6	58 09.4	08 56	49.7	58 06.9	09 55	48.7	58 04.0	10 54	47.8	58 00.7	12 53	46.9	57 48.3	16 51	44.1	57 43.4	17 50	43.1	6
7	57 39.5	02 58	52.5	57 38.7	03 57	51.6	57 35.9	06 56	49.7	57 33.9	07 55	48.8	57 31.5	09 54	47.9	57 28.7	10 53	47.0	57 17.8	14 51	44.2	57 13.4	15 50	43.3	7
8	57 04.6	00 58	52.6	57 04.3	02 57	51.6	57 02.4	04 56	49.8	57 00.9	06 55	48.9	56 58.9	07 54	48.0	56 56.6	08 54	47.1	56 47.2	12 51	44.3	56 43.2	14 50	43.4	8
9	56 29.8	01 58	52.6	56 29.9	00 57	51.7	56 28.9	03 56	49.8	56 27.8	04 55	48.9	56 26.3	06 54	48.0	56 24.5	07 54	47.1	56 16.5	11 51	44.4	56 13.0	12 50	43.5	9
50	55 55.0	02 58	52.5	55 55.5	01 57	51.6	55 55.4	01 56	49.9	55 54.7	03 55	49.0	55 53.7	04 54	48.1	55 52.3	05 54	47.2	55 45.7	09 51	44.5	55 42.8	10 51	43.6	50
1	55 20.1	04 58	52.5	55 21.1	03 57	51.6	55 21.8	00 56	49.9	55 21.6	01 55	49.0	55 21.0	03 54	48.1	55 20.1	04 54	47.2	55 14.9	08 51	44.6	55 12.5	09 51	43.7	1
2	54 45.3	05 58	52.5	54 46.7	04 57	51.6	54 48.3	01 56	49.9	54 48.5	00 55	49.0	54 48.4	01 54	48.1	54 47.8	02 54	47.3	54 44.1	06 51	44.7	54 42.1	07 51	43.8	2
3	54 10.5	06 58	52.4	54 12.3	05 57	51.6	54 14.7	03 56	49.8	54 15.4	02 55	49.0	54 15.7	00 54	48.1	54 15.6	01 54	47.3	54 13.2	04 51	44.7	54 11.7	06 51	43.9	3
4	53 35.8	08 58	52.3	53 37.9	07 57	51.5	53 41.2	04 56	49.8	53 42.3	03 55	49.0	53 43.0	02 54	48.1	53 43.4	01 54	47.3	53 42.4	03 51	44.7	53 41.3	04 51	43.9	4
55	53 01.1	09 58	52.3	53 03.6	08 57	51.4	53 07.7	06 56	49.8	53 09.2	04 55	48.9	53 10.3	03 54	48.1	53 11.1	02 54	47.3	53 11.5	01 51	44.8	53 10.9	03 51	43.9	55
6	52 26.4	10 58	52.2	52 29.3	09 57	51.3	52 34.2	07 56	49.7	52 36.1	06 55	48.9	52 37.7	05 54	48.1	52 38.9	04 54	47.2	52 40.6	00 51	44.8	52 40.4	01 51	43.9	6
7	51 51.8	12 58	52.1	51 55.1	11 57	51.3	52 00.7	08 56	49.6	52 03.1	07 55	48.8	52 05.1	06 54	48.0	52 06.7	05 54	47.2	52 09.7	02 51	44.8	52 10.0	00 51	43.9	7
8	51 17.2	13 58	51.9	51 20.9	12 57	51.1	51 27.3	10 56	49.6	51 30.0	09 55	48.8	51 32.4	07 54	48.0	51 34.5	06 54	47.2	51 38.8	03 51	44.7	51 39.5	02 51	43.9	8
9	50 42.7	14 57	51.8	50 46.7	13 57	51.0	50 53.9	11 56	49.5	50 57.1	10 55	48.7	50 59.9	09 54	47.9	51 02.4	08 54	47.1	51 07.9	05 51	44.7	51 09.1	03 51	43.9	9
60	50 08.2	15 57	51.7	50 12.6	14 57	50.9	50 20.6	12 55	49.4	50 24.1	11 55	48.6	50 27.3	10 54	47.8	50 30.2	09 53	47.0	50 37.0	06 51	44.7	50 38.7	05 51	43.9	60
1	49 33.8	17 57	51.5	49 38.6	16 57	50.8	49 47.3	14 55	49.2	49 51.3	13 55	48.5	49 54.9	11 54	47.7	49 58.2	10 53	46.9	50 06.2	07 51	44.6	50 08.3	06 51	43.8	1
2	48 59.5	18 57	51.4	49 04.7	17 56	50.6	49 14.1	15 55	49.1	49 18.4	14 55	48.4	49 22.4	13 54	47.6	49 26.1	12 53	46.8	49 35.4	09 51	44.5	49 37.9	08 51	43.8	2
3	48 25.2	19 57	51.2	48 30.8	18 56	50.5	48 41.0	16 55	49.0	48 45.7	15 54	48.2	48 50.0	14 54	47.5	48 54.1	13 53	46.7	49 04.6	10 51	44.5	49 07.5	09 50	43.7	3
4	47 51.1	20 57	51.1	47 57.0	19 56	50.3	48 07.9	17 55	48.9	48 13.0	16 54	48.1	48 17.7	15 54	47.4	48 22.2	14 53	46.6	48 33.9	12 51	44.4	48 37.2	11 50	43.6	4
65	47 17.0	21 57	50.9	47 23.2	20 56	50.2	47 34.9	19 55	48.7	47 40.3	18 54	48.0	47 45.5	17 54	47.2	47 50.3	16 53	46.5	48 03.2	13 51	44.3	48 07.0	12 50	43.6	65
6	46 43.0	22 56	50.7	46 49.6	22 56	50.0	47 02.0	20 55	48.5	47 07.8	19 54	47.8	47 13.3	18 54	47.1	47 18.5	17 53	46.4	47 32.6	14 51	44.2	47 36.8	13 50	43.5	6
7	46 09.1	24 56	50.5	46 16.0	23 56	49.8	46 29.1	21 55	48.4	46 35.3	20 54	47.7	46 41.2	19 53	47.0	46 46.8	18 53	46.2	47 02.1	16 51	44.1	47 06.6	15 50	43.3	7
8	45 35.3	25 56	50.3	45 42.5	24 56	49.6	45 56.4	22 54	48.2	46 02.9	21 54	47.5	46 09.2	20 53	46.8	46 15.2	20 53	46.1	46 31.6	17 51	44.0	46 36.5	16 50	43.2	8
9	45 01.5	26 56	50.1	45 09.2	25 55	49.4	45 23.7	23 54	48.0	45 30.6	23 54	47.3	45 37.2	22 53	46.6	45 43.6	21 52	45.9	46 01.2	18 51	43.8	46 06.5	17 50	43.1	9
70	44 27.9	27 56	49.9	44 35.9	26 55	49.2	44 51.1	25 54	47.8	44 58.4	24 54	47.1	45 05.4	23 53	46.5	45 12.1	22 52	45.8	45 30.8	20 50	43.7	45 36.5	19 50	43.0	70
1	43 54.4	28 56	49.6	44 02.7	27 55	49.0	44 18.6	26 54	47.6	44 26.2	25 53	47.0	44 33.6	24 53	46.3	44 40.7	23 52	45.6	45 00.6	21 50	43.5	45 06.7	20 50	42.8	1
2	43 21.1	29 55	49.4	43 29.7	28 55	48.8	43 46.3	27 54	47.4	43 54.2	26 53	46.8	44 01.9	25 53	46.1	44 09.4	25 52	45.4	44 30.4	22 50	43.4	44 36.9	21 50	42.7	2
3	42 47.8	30 55	49.2	42 56.8	30 55	48.5	43 14.0	28 54	47.2	43 22.3	27 53	46.6	43 30.4	26 52	45.9	43 38.2	26 52	45.2	44 00.3	23 50	43.2	44 07.2	23 49	42.5	3
4	42 14.6	31 55	48.9	42 23.9	31 54	48.3	42 41.9	29 53	47.0	42 50.5	28 53	46.4	42 58.9	28 52	45.7	43 07.1	27 52	45.0	43 30.3	25 50	43.0	43 37.5	24 49	42.4	4
75	41 41.6	32 55	48.7	41 51.2	32 54	48.1	42 09.8	30 53	46.8	42 18.8	30 53	46.1	42 27.6	29 52	45.5	42 36.1	28 51	44.8	43 00.4	26 50	42.9	43 08.0	25 49	42.2	75
6	41 08.7	33 55	48.4	41 18.6	33 54	47.8	41 37.9	31 53	46.5	41 47.2	31 52	45.9	41 56.3	30 52	45.3	42 05.2	29 51	44.6	42 30.6	27 49	42.7	42 38.6	26 49	42.0	6
7	40 35.9	35 54	48.2	40 46.2	34 54	47.6	41 06.1	33 53	46.3	41 15.8	32 52	45.7	41 25.2	31 52	45.0	41 34.4	30 51	44.4	42 00.9	28 49	42.5	42 09.3	28 49	41.8	7
8	40 03.3	36 54	47.9	40 13.9	35 54	47.3	40 34.4	34 53	46.1	40 44.4	33 52	45.4	40 54.2	32 51	44.8	41 03.8	32 51	44.2	41 31.3	30 49	42.3	41 40.0	29 48	41.6	8
9	39 30.8	37 54	47.6	39 41.7	36 53	47.0	40 02.9	35 52	45.8	40 13.2	34 52	45.2	40 23.3	33 51	44.6	40 33.3	33 51	44.0	41 01.8	31 49	42.1	41 10.9	30 48	41.5	9
80	38 58.5	38 54	47.4	39 09.7	37 53	46.8	39 31.5	36 52	45.6	39 42.2	35 52	44.9	39 52.6	35 51	44.3	40 02.9	34 50	43.7	40 32.5	32 49	41.9	40 41.9	31 48	41.2	80
1	38 26.3	39 53	47.1	38 37.8	38 53	46.5	39 00.3	37 52	45.3	39 11.2	36 51	44.7	39 22.0	36 51	44.1	39 32.6	35 50	43.5	40 03.3	33 48	41.7	40 13.1	32 48	41.0	1
2	37 54.2	40 53	46.8	38 06.0	39 53	46.2	38 29.1	38 52	45.0	38 40.4	37 51	44.4	38 51.5	37 51	43.8	39 02.5	36 50	43.2	39 34.2	34 48	41.4	39 44.3	34 48	40.8	2
3	37 22.3	41 53	46.5	37 34.4	40 52	45.9	37 58.2	39 51	44.8	38 09.8	38 51	44.2	38 21.2	38 50	43.6	38 32.5	37 50	43.0	39 05.2	35 48	41.2	39 15.7	35 47	40.6	3
4	36 50.6	42 53	46.2	37 03.0	41 52	45.6	37 27.4	40 51	44.5	37 39.3	40 51	43.9	37 51.1	39 50	43.3	38 02.6	38 49	42.7	38 36.4	37 48	41.0	38 47.2	36 47	40.4	4
85	36 19.0	43 52	45.9	36 31.7	42 52	45.3	36 56.7	41 51	44.2	37 08.9	41 50	43.6	37 21.0	40 50	43.0	37 32.9	39 49	42.5	38 07.7	38 48	40.7	38 18.9	37 47	40.1	85
6	35 47.5	44 52	45.6	36 00.6	43 52	45.0	36 26.2	42 51	43.9	36 38.7	42 50	43.3	36 51.2	41 50	42.8	37 03.4	41 49	42.2	37 39.1	39 47	40.5	37 50.7	38 47	39.9	6
7	35 16.3	45 52	45.3	35 29.6	44 51	44.7	35 55.8	43 50	43.6	36 08.7	43 50	43.0	36 21.4	42 49	42.5	36 34.0	42 49	41.9	37 10.7	40 47	40.2	37 22.6	39 47	39.6	7
8	34 45.2	46 52	44.9	34 58.8	45 51	44.4	35 25.7	44 50	43.3	35 38.8	44 50	42.7	35 51.9	43 49	42.2	36 04.8	43 48	41.6	36 42.5	41 47	39.9	36 54.7	41 46	39.4	8
9	34 14.3	47 51	44.6	34 28.2	46 51	44.1	34 55.7	45 50	43.0	35 09.1	45 49	42.5	35 22.5	44 49	41.9	35 35.7	44 48	41.3	36 14.4	42 47	39.7	36 26.9	42 46	39.1	9
90	33 43.6	48 51	44.3	33 57.8	47 50	43.8	34 25.8	46 49	42.7	34 39.6	46 49	42.1	34 53.3	45 48	41.6	35 06.8	45 48	41.1	35 46.4	43 46	39.4	35 59.3	43 46	38.8	90

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	33 13.0	49 51	43.9	33 27.5	48 50	43.4	33 56.2	47 49	42.4	34 10.3	47 49	41.8	34 24.2	46 48	41.3	34 38.0	46 48	40.8	35 18.7	44 46	39.1	35 31.9	44 45	38.6	91
2	32 42.7	50 50	43.6	32 57.5	49 50	43.1	33 26.7	48 49	42.0	33 41.1	48 48	41.5	33 55.3	47 48	41.0	34 09.5	47 47	40.5	34 51.0	45 46	38.8	35 04.6	45 45	38.3	2
3	32 12.5	50 50	43.3	32 27.6	50 50	42.8	32 57.4	49 49	41.7	33 12.1	49 48	41.2	33 26.7	48 48	40.7	33 41.1	48 47	40.2	34 23.6	47 45	38.6	34 37.5	46 45	38.0	3
4	31 42.5	51 50	42.9	31 57.9	51 49	42.4	32 28.3	50 48	41.4	32 43.3	50 48	40.9	32 58.1	49 47	40.4	33 12.9	49 47	39.8	33 56.3	48 45	38.3	34 10.6	47 45	37.7	4
95	31 12.7	52 49	42.6	31 28.4	52 49	42.1	31 59.3	51 48	41.1	32 14.6	51 47	40.5	32 29.8	50 47	40.0	32 44.9	50 46	39.5	33 29.3	49 45	38.0	33 43.8	48 44	37.4	95
6	30 43.2	53 49	42.2	30 59.1	53 48	41.7	31 30.6	52 48	40.7	31 46.2	52 47	40.2	32 01.7	51 47	39.7	32 17.0	51 46	39.2	33 02.4	50 45	37.7	33 17.2	49 44	37.1	6
7	30 13.8	54 49	41.8	30 30.0	54 48	41.4	31 02.1	53 47	40.4	31 18.0	53 47	39.9	31 33.8	52 46	39.4	31 49.4	52 46	38.9	32 35.6	51 44	37.4	32 50.8	50 44	36.8	7
8	29 44.6	55 48	41.5	30 01.1	55 48	41.0	30 33.8	54 47	40.0	30 50.0	54 46	39.5	31 06.0	53 46	39.0	31 22.0	53 45	38.5	32 09.1	52 44	37.0	32 24.6	51 43	36.5	8
9	29 15.7	56 48	41.1	29 32.4	56 47	40.6	30 05.7	55 47	39.7	30 22.1	55 46	39.2	30 38.5	54 46	38.7	30 54.7	54 45	38.2	31 42.8	53 44	36.7	31 58.6	52 43	36.2	9
100	28 46.9	57 48	40.7	29 04.0	57 47	40.3	29 37.8	56 46	39.3	29 54.5	56 46	38.8	30 11.1	55 45	38.4	30 27.7	55 45	37.9	31 16.6	54 43	36.4	31 32.7	53 43	35.9	100
1	28 18.4	58 47	40.3	28 35.7	58 47	39.9	29 10.1	57 46	38.9	29 27.1	57 45	38.5	29 44.0	56 45	38.0	30 00.8	56 44	37.5	30 50.7	55 43	36.1	31 07.1	54 42	35.6	1
2	27 50.1	59 47	40.0	28 07.7	58 46	39.5	28 42.6	58 45	38.6	28 59.9	58 45	38.1	29 17.1	57 44	37.6	29 34.2	57 44	37.2	30 24.9	56 43	35.7	30 41.6	55 42	35.3	2
3	27 22.0	60 46	39.6	27 39.9	59 46	39.1	28 15.3	59 45	38.2	28 32.9	59 45	37.8	28 50.4	58 44	37.3	29 07.8	58 44	36.8	29 59.4	57 42	35.4	30 16.4	56 42	34.9	3
4	26 54.2	61 46	39.2	27 12.3	60 46	38.7	27 48.3	60 45	37.8	28 06.2	59 44	37.4	28 23.9	59 44	36.9	28 41.6	59 43	36.5	29 34.1	58 42	35.1	29 51.4	58 41	34.6	4
105	26 26.6	61 46	38.8	26 45.0	61 45	38.3	27 21.5	61 44	37.5	27 39.6	60 44	37.0	27 57.7	60 43	36.6	28 15.7	60 43	36.1	29 09.0	59 42	34.7	29 26.6	58 41	34.3	105
6	25 59.2	62 45	38.4	26 17.9	62 45	38.0	26 54.9	62 44	37.1	27 13.3	61 43	36.6	27 31.7	61 43	36.2	27 49.9	61 43	35.7	28 44.1	60 41	34.4	29 02.0	59 41	33.9	6
7	25 32.1	63 45	38.0	25 51.0	63 44	37.6	26 28.6	62 44	36.7	26 47.3	62 43	36.2	27 05.9	62 43	35.8	27 24.4	62 42	35.4	28 19.4	61 41	34.0	28 37.6	60 40	33.6	7
8	25 05.2	64 44	37.6	25 24.4	64 44	37.2	26 02.5	63 43	36.3	26 21.4	63 43	35.9	26 40.3	63 42	35.4	26 59.1	63 42	35.0	27 55.0	62 40	33.7	28 13.5	61 40	33.2	8
9	24 38.6	65 44	37.2	24 58.0	65 44	36.7	25 36.6	64 43	35.9	25 55.9	64 42	35.5	26 15.0	64 42	35.0	26 34.1	63 41	34.6	27 30.8	63 40	33.3	27 49.5	62 40	32.9	9
110	24 12.2	66 44	36.7	24 31.9	66 43	36.3	25 11.0	65 42	35.5	25 30.5	65 42	35.1	25 49.9	65 41	34.7	26 09.3	64 41	34.2	27 06.8	64 40	32.9	27 25.8	63 39	32.5	110
1	23 46.1	67 43	36.3	24 06.0	66 43	35.9	24 45.7	66 42	35.1	25 05.4	66 41	34.7	25 25.1	65 41	34.3	25 44.7	65 40	33.8	26 43.1	64 39	32.6	27 02.4	64 39	32.1	1
2	23 20.2	67 43	35.9	23 40.4	67 42	35.5	24 20.6	67 41	34.7	24 40.6	67 41	34.3	25 00.5	66 41	33.9	25 20.4	66 40	33.4	26 19.6	65 39	32.2	26 39.2	65 38	31.8	2
3	22 54.6	68 42	35.5	23 15.0	68 42	35.1	23 55.7	68 41	34.3	24 16.0	67 41	33.9	24 36.2	67 40	33.5	24 56.3	67 40	33.1	25 56.3	66 38	31.8	26 16.2	66 38	31.4	3
4	22 29.3	69 42	35.0	22 50.0	69 41	34.6	23 31.2	68 41	33.9	23 51.7	68 40	33.5	24 12.1	68 40	33.1	24 32.5	68 39	32.7	25 33.3	67 38	31.4	25 53.4	67 38	31.0	4
115	22 04.2	70 41	34.6	22 25.1	70 41	34.2	23 06.9	69 40	33.4	23 27.6	69 40	33.0	23 48.3	69 39	32.7	24 09.0	69 39	32.3	25 10.5	68 38	31.0	25 30.9	68 37	30.6	115
6	21 39.4	71 41	34.2	22 00.6	71 40	33.8	22 42.8	70 40	33.0	23 03.8	70 39	32.6	23 24.8	70 39	32.2	23 45.7	70 38	31.8	24 48.0	69 37	30.7	25 08.7	69 37	30.3	6
7	21 14.9	71 40	33.7	21 36.3	71 40	33.3	22 19.0	71 39	32.6	22 40.3	71 39	32.2	23 01.5	71 38	31.8	23 22.7	70 38	31.4	24 25.8	70 37	30.3	24 46.7	70 36	29.9	7
8	20 50.7	72 40	33.3	21 12.4	72 40	32.9	21 55.5	72 39	32.2	22 17.1	72 38	31.8	22 38.5	71 38	31.4	22 59.9	71 37	31.0	24 03.8	71 36	29.9	24 25.0	71 36	29.5	8
9	20 26.8	73 39	32.8	20 48.7	73 39	32.5	21 32.3	73 38	31.7	21 54.1	72 38	31.4	22 15.8	72 37	31.0	22 37.4	72 37	30.6	23 42.1	72 36	29.5	24 03.5	71 35	29.1	9
120	20 03.1	74 39	32.4	20 25.3	74 39	32.0	21 09.4	73 38	31.3	21 31.4	73 37	30.9	21 53.3	73 37	30.6	22 15.2	73 37	30.2	23 20.6	72 35	29.1	23 42.3	72 35	28.7	120
1	19 39.8	75 38	31.9	20 02.2	74 38	31.6	20 46.8	74 37	30.8	21 09.0	74 37	30.5	21 31.2	74 36	30.1	21 53.3	74 36	29.8	22 59.5	73 35	28.7	23 21.4	73 34	28.3	1
2	19 16.7	75 38	31.4	19 39.3	75 38	31.1	20 24.4	75 37	30.4	20 46.9	75 36	30.0	21 09.3	75 36	29.7	21 31.7	75 36	29.3	22 38.5	74 34	28.2	23 00.7	74 34	27.9	2
3	18 54.0	76 37	31.0	19 16.8	76 37	30.6	20 02.4	76 36	29.9	20 25.1	76 36	29.6	20 47.7	75 35	29.2	21 10.3	75 35	28.9	22 17.9	75 34	27.8	22 40.4	75 34	27.5	3
4	18 31.6	77 37	30.5	18 54.6	77 36	30.2	19 40.6	77 36	29.5	20 03.5	76 35	29.2	20 26.4	76 35	28.8	20 49.3	76 35	28.5	21 57.6	76 33	27.4	22 20.3	76 33	27.1	4
125	18 09.4	78 36	30.0	18 32.7	78 36	29.7	19 19.1	77 35	29.0	19 42.3	77 35	28.7	20 05.4	77 34	28.4	20 28.5	77 34	28.0	21 37.5	76 33	27.0	22 00.4	76 33	26.6	125
6	17 47.6	78 36	29.6	18 11.1	78 35	29.2	18 58.0	78 35	28.6	19 21.4	78 34	28.2	19 44.7	78 34	27.9	20 08.0	78 34	27.6	21 17.7	77 32	26.6	21 40.9	77 32	26.2	6
7	17 26.1	79 35	29.1	17 49.8	79 35	28.8	18 37.2	79 34	28.1	19 00.8	79 34	27.8	19 24.3	79 33	27.5	19 47.9	78 33	27.1	20 58.3	78 32	26.1	21 21.7	78 32	25.8	7
8	17 05.0	80 35	28.6	17 28.9	80 34	28.3	18 16.6	79 34	27.6	18 40.5	79 33	27.3	19 04.3	79 33	27.0	19 28.0	79 33	26.7	20 39.1	79 31	25.7	21 02.7	79 31	25.4	8
9	16 44.1	80 34	28.1	17 08.3	80 34	27.8	17 56.4	80 33	27.2	18 20.5	80 33	26.9	18 44.5	80 32	26.5	19 08.5	80 32	26.2	20 20.2	80 31	25.3	20 44.0	79 31	24.9	9
130	16 23.6	81 34	27.6	16 48.0	81 33	27.3	17 36.6	81 33	26.7	18 00.8	81 32	26.4	18 25.0	81 32	26.1	18 49.2	81 32	25.8	20 01.6	80 30	24.8	20 25.7	80 30	24.5	130
1	16 03.4	82 33	27.1	16 28.0	82 33	26.8	17 17.0	82 32	26.2	17 41.5	82 32	25.9	18 05.9	81 31	25.6	18 30.3	81 31	25.3	19 43.4	81 30	24.4	20 07.6	81 30	24.1	1
2	15 43.6	83 33	26.6	16 08.3	82 32	26.3	16 57.8	82 32	25.8	17 22.4	82 31	25.5	17 47.1	82 31	25.2	18 11.7	82 30	24.9	19 25.4	82 29	23.9	19 49.9	82 29	23.6	2
3	15 24.1	83 32	26.1	15 49.0	83 32	25.8	16 38.9	83 31	25.3	17 03.7	83 31	25.0	17 28.6	83 30	24.7	17 53.4	83 30	24.4	19 07.7	82 29	23.5	19 32.5	82 29	23.2	3
4	15 04.9	84 31	25.6	15 30.1	84 31	25.4	16 20.3	84 30	24.8	16 45.4	84 30	24.5	17 10.4	83 30	24.2	17 35.5	83 29	23.9	18 50.4	83 28	23.0	19 15.3	83 28	22.8	4
135	14 46.1	84 31	25.1	15 11.5	84 30	24.9	16 02.1	84 30	24.3	16 27.4	84 29	24.0	16 52.6	84 29	23.7	17 17.8	84 29	23.4	18 33.4	84 28	22.6	18 58.5	84 28	22.3	135
6	14 27.7	85 30	24.6	14 53.2	85 30	24.3	15 44.2	85 29	23.8	16 09.7	85 29	23.5	16 35.1	85 29	23.3	17 00.5	85 28	23.0	18 16.7	84 27	22.1	18 42.0	84 27	21.9	6
7	14 09.6	86 30	24.1	14 35.3	86 29	23.8	15 26.7	86 29	23.3	15 52.3	86 28	23.0	16 18.0	85 28	22.8	16 43.6	85 28	22.5	18 00.3	85 27	21.7	18 25.8	85 26	21.4	7
8	13 51.8	86 29	23.6	14 17.7	86 29	23.3	15 09.5	86 28	22.8	15 35.3	86 28	22.5	16 01.2	86 27	22.3	16 27.0	86 27	22.0	17 44.3	86 26	21.2	18 10.0	86 26	20.9	8
9	13 34.4	87 28	23.1	14 00.5	87 28	22.8	14 52.6	87 27	22.3	15 18.7	87 27	22.1	15 44.7	87 27	21.8	16 10.7	87 27	21.5	17 28.6	86 26	20.7	17 54.5	86 25	20.5	9
140	13 17.4	88 28	22.6	13 43.7	88 27	22.3	14 36.2	87 27	21.8	15 02.4	87 27	21.6	15 28.6	87 26	21.3	15 54.8	87 26	21.0	17 13.2	87 25	20.3	17 39.3	87 25	20.0	140
1	13 00.8	88 27	22.0	13 27.2	88 27	21.8	14 20.0	88 26	21.3	14 46.4	88 26	21.1	15 12.8	88 26	20.8	15 39.2	88 25	20.6	16 58.1	88 24	19.8	17 24.4	88 24	19.6	1
2	12 44.5	89 26	21.5	13 11.1	89 26	21.3	14 04.3	89 26	20.8	14 30.9	89 25	20.5	14 57.4	88 25	20.3	15 23.9	88 25	20.1	16 43.4	88 24	19.3	17 09.9	88 24	19.1	2
3	12 28.6	89 26	21.0	12 55.4	89 26	20.7	13 48.9	89 25	20.3	14 15.6	89 25	20.0	14 42.3	89 24	19.8	15 09.1	89 24	19.6	16 29.1	89 23	18.9	16 55.7	89 23	18.6	3
4	12 13.1	90 25	20.4	12 40.0	90 25	20.2	13 33.9	90 24	19.8	14 00.8	90 24	19.5	14 27.7	90 24	19.3	14 54.5	90 24	19.1	16 15.1	89 23	18.4	16 41.9	89 22	18.1	4
145	11 58.0	90 25	19.9	12 25.1	90 24	19.7	13 19.2	90 24	19.2	13 46.3	90 24	19.0	14 13.3	90 23	18.8	14 40.4	90 23	18.6	16 01.4	90 22	17.9	16 28.4	90 22	17.7	145
6	11 43.2	91 24	19.4	12 10.5	91 24	19.2	13 04.9	91 23	18.7	13 32.2	91 23	18.5	13 59.4	91 23	18.3	14 26.6	91 22	18.1	15 48.1	91 22	17.4	16 15.3	90 21	17.2	6
7	11 28.9	91 23	18.8	11 56.3	91 23	18.6	12 51.0	91 23	18.2	13 18.4	91 22	18.0	13 45.8	91 22	17.8	14 13.1	91 22	17.6	15 35.1	91 21	16.9	16 02.5	91 21	16.7	7
8	11 14.9	92 23	18.3	11 42.4	92 22	18.1	12 37.5	92 22	17.7	13 05.1	92 22	17.5	13 32.6	92 21	17.3	14 00.1	92 21	17.1	15 22.5	92 20	16.4	15 50.0	92 20	16.2	8
9	11 01.3	92 22	17.7	11 29.0	92 22	17.5	12 24.4	92 21	17.2	12 52.1	92 21	17.0	13 19.7	92 21	16.8	13 47.4	92 21	16.6	15 10.3	92 20	16.0	15 37.9	92 20	15.8	9
150	10 48.2	93 21	17.2	11 16.0	93 21	17.0	12 11.7	93 21	16.6	12 39.5	93 20	16.4	13 07.3	93 20	16.2	13 35.1	93 20	16.0	14 58.4	93 19	15.5	15 26.2	93 19	15.3	150
1	10 35.4	93 21	16.6	11 03.4	93 20	16.5	11 59.3	93 20	16.1	12 27.3	93 20	15.9	12 55.2	93 20	15.7	13 23.1	93 19	15.5	14 46.9	93 19	15.0	15 14.8	93 18	14.8	1
2	10 23.0	94 20	16.1	10 51.1	94 20	15.9	11 47.3	94 19	15.6	12 15.4	94 19	15.4	12 43.5	94 19	15.2	13 11.6	94 19	15.0	14 35.8	93 18	14.5	15 03.8	93 18	14.3	2
3	10 11.1	94 19	15.5	10 39.3	94 19	15.4	11 35.8	94 19	15.0	12 04.0	94 18	14.8	12 32.2	94 18	14.7	13 00.4	94 18	14.5	14 25.0	94 17	14.0	14 53.2	94 17	13.8	3
4	9 59.5	95 19	15.0	10 27.9	95 18	14.8	11 24.6	95 18	14.5	11 52.9	94 18	14.3	12 21.3	94 18	14.1	12 49.6	94 17	14.0	14 14.6	94 17	13.5	14 42.9	94 17	13.3	4
155	9 48.4	95 18	14.4	10 16.9	95 18	14.3	11 13.8	95 17	13.9	11 42.3	95 17	13.8	12 10.7	95 17	13.6	12 39.2	95 17	13.5	14 04.5	95 16	13.0	14 33.0	95 16	12.8	155
6	9 37.7	95 17	13.9	10 06.3	95 17	13.7	11 03.4	95 17	13.4	11 32.0	95 16	13.2	12 00.6	95 16	13.1	12 29.2	95 16	12.9	13 54.9	95 15	12.5	14 23.4	95 15	12.3	6
7	9 27.4	96 16	13.3	9 56.1	96 16	13.2	10 53.5	96 16	12.9	11 22.2	96 16	12.7	11 50.9	96 16	12.6	12 19.6	96 15	12.4	13 45.6	96 15	12.0	14 14.3	96 15	11.8	7
8	9 17.5	96 16	12.7	9 46.3	96 16	12.6	10 43.9	96 15	12.3	11 12.7	96 15	12.2	11 41.5	96 15	12.0	12 10.3	96 15	11.9	13 36.7	96 14	11.4	14 05.5	96 14	11.3	8
9	9 08.0	96 15	12.2	9 36.9	96 15	12.0	10 34.8	96 15	11.8	11 03.7	96 14	11.6	11 32.6	96 14	11.5	12 01.5	96 14	11.4	13 28.2	96 14	10.9	13 57.1	96 13	10.8	9
160	8 59.0	97 14	11.6	9 28.0	97 14	11.5	10 26.0	97 14	11.2	10 55.0	97 14	11.1	11 24.0	97 14	11.0	11 53.1	97 13	10.8	13 20.0	97 13	10.4	13 49.0	97 13	10.3	160
1	8 50.4	97 14	11.0	9 19.5	97 14	10.9	10 17.7	97 13	10.7	10 46.8	97 13	10.5	11 15.9	97 13	10.4	11 45.0	97 13	10.3	13 12.3	97 12	09.9	13 41.4	97 12	09.8	1
2	8 42.2	97 13	10.5	9 11.4	97 13	10.3	10 09.8	97 13	10.1	10 39.0	97 12	10.0	11 08.2	97 12	09.9	11 37.4	97 12	09.8	13 04.9	97 12	09.4	13 34.1	97 11	09.3	2
3	8 34.4	98 12	09.9	9 03.7	98 12	09.8	10 02.3	98 12	09.6	10 31.6	98 12	09.4	11 00.9	98 12	09.3	11 30.1	98 11	09.2	12 58.0	98 11	08.9	13 27.2	98 11	08.8	3
4	8 27.1	98 11	09.3	8 56.5	98 11	09.2	9 55.2	98 11	09.0	10 24.6	98 11	08.9	10 53.9	98 11	08.8	11 23.3	98 11	08.7	12 51.4	98 10	08.4	13 20.7	98 10	08.3	4
165	8 20.2	98 11	08.7	8 49.7	98 11	08.6	9 48.6	98 10	08.4	10 18.0	98 10	08.3	10 47.4	98 10	08.3	11 16.9	98 10	08.2	12 45.2	98 10	07.9	13 14.6	98 10	07.8	165
6	8 13.8	98 10	08.2	8 43.3	98 10	08.1	9 42.3	98 10	07.9	10 11.8	98 10	07.8	10 41.3	98 09	07.7	11 10.9	98 09	07.6	12 39.4	98 09	07.3	13 08.9	98 09	07.2	6
7	8 07.8	99 09	07.6	8 37.4	99 09	07.5	9 36.5	99 09	07.3	10 06.1	99 09	07.2	10 35.7	99 09	07.2	11 05.2	99 09	07.1	12 34.0	99 08	06.8	13 03.5	99 08	06.7	7
8	8 02.2	99 09	07.0	8 31.8	99 08	06.9	9 31.1	99 08	06.8	10 00.8	99 08	06.7	10 30.4	99 08	06.6	11 00.0	99 08	06.5	12 29.0	99 08	06.3	12 58.6	99 08	06.2	8
9	7 57.1	99 08	06.4	8 26.8	99 08	06.4	9 26.2	99 08	06.2	9 55.9	99 07	06.1	10 25.6	99 07	06.1	10 55.3	99 07	06.0	12 24.3	99 07	05.8	12 54.0	99 07	05.7	9
170	7 52.4	99 07	05.8	8 22.1	99 07	05.8	9 21.6	99 07	05.6	9 51.4	99 07	05.6	10 21.1	99 07	05.5	10 50.9	99 07	05.5	12 20.1	99 06	05.3	12 49.9	99 06	05.2	170
1	7 48.1	99 06	05.3	8 17.9	99 06	05.2	9 17.5	99 06	05.1	9 47.3	99 06	05.0	10 17.1	99 06	05.0	10 46.9	99 06	04.9	12 16.3	99 06	04.7	12 46.1	99 06	04.7	1
2	7 44.3	99 06	04.7	8 14.2	99 06	04.6	9 13.9	99 05	04.5	9 43.7	99 05	04.5	10 13.5	99 05	04.4	10 43.4	99 05	04.4	12 12.9	99 05	04.2	12 42.7	99 05	04.2	2
3	7 41.0	1.0 05	04.1	8 10.9	1.0 05	04.0	9 10.6	1.0 05	04.0	9 40.5	1.0 05	03.9	10 10.4	1.0 05	03.9	10 40.2	1.0 05	03.8	12 09.9	1.0 04	03.7	12 39.7	1.0 04	03.6	3
4	7 38.1	1.0 04	03.5	8 08.0	1.0 04	03.5	9 07.8	1.0 04	03.4	9 37.7	1.0 04	03.4	10 07.6	1.0 04	03.3	10 37.5	1.0 04	03.3	12 07.3	1.0 04	03.2	12 37.2	1.0 04	03.1	4
175	7 35.6	1.0 03	02.9	8 05.5	1.0 03	02.9	9 05.4	1.0 03	02.8	9 35.4	1.0 03	02.8	10 05.3	1.0 03	02.8	10 35.2	1.0 03	02.7	12 05.0	1.0 03	02.6	12 35.0	1.0 03	02.6	175
6	7 33.6	1.0 03	02.3	8 03.5	1.0 03	02.3	9 03.5	1.0 03	02.3	9 33.4	1.0 02	02.2	10 03.4	1.0 02	02.2	10 33.3	1.0 02	02.2	12 03.2	1.0 02	02.1	12 33.2	1.0 02	02.1	6
7	7 32.0	1.0 02	01.8	8 02.0	1.0 02	01.7	9 02.0	1.0 02	01.7	9 31.9	1.0 02	01.7	10 01.9	1.0 02	01.7	10 31.9	1.0 02	01.6	12 01.8	1.0 02	01.6	12 31.8	1.0 02	01.6	7
8	7 30.9	1.0 01	01.2	8 00.9	1.0 01	01.2	9 00.9	1.0 01	01.1	9 30.9	1.0 01	01.1	10 00.8	1.0 01	01.1	10 30.8	1.0 01	01.1	12 00.8	1.0 01	01.1	12 30.8	1.0 01	01.0	8
9	7 30.2	1.0 00	00.6	8 00.2	1.0 00	00.6	9 00.2	1.0 00	00.6	9 30.2	1.0 00	00.6	10 00.2	1.0 00	00.6	10 30.2	1.0 00	00.5	12 00.2	1.0 00	00.5	12 30.2	1.0 00	00.5	9
180	7 30.0	1.0 00	00.0	8 00.0	1.0 00	00.0	9 00.0	1.0 00	00.0	9 30.0	1.0 00	00.0	10 00.0	1.0 00	00.0	10 30.0	1.0 00	00.0	12 00.0	1.0 00	00.0	12 30.0	1.0 00	00.0	180

Lat. 43°

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	
00	73 00.0	1.0 01	00.0	72 30.0	1.0 01	00.0	71 00.0	1.0 01	00.0	70 30.0	1.0 01	00.0	70 00.0	1.0 01	00.0	64 00.0	1.0 01	00.0	63 30.0	1.0 00	00.0	58 30.8	1.0 00	00.0	00
1	72 59.3	1.0 03	01.7	72 29.4	1.0 03	01.6	70 59.4	1.0 03	01.4	70 29.5	1.0 03	01.4	69 59.5	1.0 03	01.3	63 59.7	1.0 02	00.8	63 29.7	1.0 02	00.8	58 29.8	1.0 01	00.5	1
2	72 57.4	1.0 05	03.4	72 27.5	1.0 05	03.3	70 57.8	1.0 05	02.9	70 27.9	1.0 04	02.8	69 58.0	1.0 04	02.7	63 58.8	1.0 03	01.6	63 28.8	1.0 03	01.6	58 29.2	1.0 02	01.0	2
3	72 54.1	99 08	05.1	72 24.4	99 07	04.9	70 55.0	99 06	04.3	70 25.2	99 06	04.1	69 55.4	99 06	04.0	63 57.2	1.0 04	02.4	63 27.3	1.0 04	02.4	58 28.2	1.0 02	01.5	3
4	72 49.6	98 10	06.8	72 20.0	99 09	06.5	70 51.2	99 08	05.7	70 21.6	99 08	05.5	69 51.9	99 08	05.3	63 55.0	99 05	03.3	63 25.2	99 05	03.1	58 26.9	1.0 03	02.0	4
05	72 43.8	98 12	08.4	72 14.4	98 11	08.1	70 46.3	98 10	07.1	70 16.8	98 10	06.9	69 47.4	98 09	06.6	63 52.2	99 06	04.1	63 22.5	99 05	03.9	58 25.1	99 04	02.5	05
6	72 36.7	97 14	10.1	72 07.7	97 13	09.7	70 40.3	97 12	08.5	70 11.1	97 11	08.2	69 41.8	98 11	07.9	63 48.8	98 07	04.9	63 19.2	99 06	04.7	58 23.0	99 04	03.1	6
7	72 28.4	96 16	11.7	71 59.7	96 15	11.2	70 33.3	96 13	09.9	70 04.3	97 13	09.5	69 35.4	97 12	09.1	63 44.7	98 08	05.7	63 15.4	98 07	05.4	58 20.4	99 05	03.6	7
8	72 19.0	94 18	13.2	71 50.6	96 17	12.7	70 25.2	96 15	11.2	69 56.6	96 15	10.8	69 27.9	96 14	10.4	63 40.1	97 09	06.5	63 10.9	97 08	06.2	58 17.5	98 05	04.1	8
9	72 08.3	93 20	14.8	71 40.4	93 19	14.2	70 16.2	94 17	12.6	69 47.9	94 16	12.1	69 19.6	95 15	11.6	63 34.9	97 10	07.2	63 05.9	97 09	07.0	58 14.2	98 06	04.6	9
10	71 56.6	91 21	16.3	71 29.2	92 21	15.6	70 06.1	93 18	13.9	69 38.3	93 18	13.3	69 10.3	93 17	12.8	63 29.1	96 11	08.0	63 00.3	96 10	07.7	58 10.6	97 07	05.0	10
1	71 43.8	90 23	17.7	71 16.8	90 22	17.0	69 55.2	91 20	15.1	69 27.7	92 19	14.5	69 00.1	92 18	14.0	63 22.7	95 12	08.8	62 54.1	96 11	08.4	58 06.5	96 07	05.5	1
2	71 29.9	88 25	19.1	71 03.5	88 24	18.4	69 43.3	90 21	16.4	69 16.2	90 21	15.7	68 49.1	91 20	15.1	63 15.7	94 13	09.5	62 47.4	94 12	09.2	58 02.1	96 03	06.0	2
3	71 15.0	86 26	20.5	70 49.2	87 25	19.7	69 30.5	88 23	17.6	69 03.9	89 22	16.9	68 37.2	89 21	16.3	63 08.1	93 14	10.3	62 40.1	93 13	09.9	57 57.3	95 09	06.5	3
4	70 59.2	84 28	21.8	70 33.9	85 27	21.0	69 16.8	87 24	18.7	68 50.7	87 23	18.0	68 24.5	88 22	17.4	63 00.0	92 14	11.0	62 32.4	92 14	10.6	57 52.1	94 09	07.0	4
15	70 42.5	82 29	23.1	70 17.7	83 28	22.2	69 02.3	85 26	19.9	68 36.7	85 25	19.1	68 11.0	86 24	18.4	62 51.4	91 15	11.7	62 24.0	91 15	11.3	57 46.6	93 10	07.5	15
6	70 24.8	80 31	24.3	70 00.7	81 30	23.4	68 47.0	83 27	21.0	68 22.0	84 26	20.2	67 56.8	84 25	19.5	62 42.2	90 16	12.4	62 15.2	90 16	12.0	57 40.8	93 10	07.9	6
7	70 06.4	78 32	25.4	69 42.9	79 31	24.5	68 30.9	81 28	22.0	68 06.5	82 27	21.2	67 41.8	83 26	20.5	62 32.5	89 17	13.1	62 05.8	89 16	12.6	57 34.5	92 11	08.4	7
8	69 47.1	76 33	26.6	69 24.3	77 32	25.6	68 14.1	79 29	23.0	67 50.2	80 28	22.2	67 26.1	81 27	21.4	62 22.2	87 18	13.8	61 56.0	88 17	13.3	57 28.0	91 11	08.8	8
9	69 27.2	73 34	27.6	69 05.0	75 33	26.7	67 56.6	77 30	24.0	67 33.3	78 29	23.2	67 09.7	79 28	22.4	62 11.5	86 19	14.5	61 45.6	86 18	13.9	57 21.1	90 12	09.3	9
20	69 06.5	71 36	28.7	68 44.9	72 35	27.7	67 38.4	75 31	25.0	67 15.7	76 30	24.1	66 52.7	77 29	23.3	62 00.3	85 20	15.1	61 34.8	85 19	14.6	57 13.8	89 13	09.7	20
1	68 45.1	69 37	29.6	68 24.2	70 36	28.6	67 19.6	73 32	25.9	66 57.4	74 31	25.0	66 35.0	75 30	24.2	61 48.6	83 20	15.8	61 23.6	84 20	15.2	57 06.2	88 13	10.2	1
2	68 23.1	67 38	30.6	68 02.8	68 37	29.6	67 00.1	71 33	26.8	66 38.6	72 32	25.9	66 16.7	73 31	25.0	61 36.4	82 21	16.4	61 11.8	82 20	15.8	56 58.3	86 14	10.6	2
3	68 00.5	65 39	31.4	67 40.9	66 38	30.4	66 40.1	69 34	27.6	66 19.1	70 33	26.7	65 57.9	71 32	25.8	61 23.8	80 22	17.0	60 59.7	81 21	16.4	56 50.1	85 14	11.0	3
4	67 37.3	62 40	32.3	67 18.4	64 38	31.3	66 19.5	67 35	28.4	65 59.2	68 34	27.5	65 38.5	69 33	26.6	61 10.8	79 22	17.6	60 47.1	79 22	17.0	56 41.6	84 15	11.4	4
25	67 13.6	60 40	33.1	66 55.3	61 39	32.1	65 58.3	65 36	29.2	65 38.6	66 35	28.2	65 18.6	67 34	27.3	60 57.3	77 23	18.2	60 34.1	78 22	17.5	56 32.8	83 15	11.8	25
6	66 49.4	58 41	33.8	66 31.8	59 40	32.8	65 36.7	63 37	29.9	65 17.6	64 36	29.0	64 58.2	65 35	28.1	60 43.4	76 24	18.7	60 20.6	76 23	18.1	56 23.6	82 16	12.2	6
7	66 24.7	56 42	34.6	66 07.8	57 41	33.5	65 14.6	61 38	30.6	64 56.2	62 37	29.7	64 37.4	63 36	28.7	60 29.1	74 24	19.3	60 06.8	75 24	18.6	56 14.2	80 16	12.6	7
8	65 59.6	54 43	35.2	65 43.3	55 41	34.2	64 52.1	59 38	31.3	64 34.2	60 37	30.3	64 16.0	61 36	29.4	60 14.4	73 25	19.8	59 52.6	73 24	19.1	56 04.5	79 17	13.0	8
9	65 34.1	51 43	35.9	65 18.4	53 42	34.9	64 29.1	57 39	31.9	64 11.9	58 38	31.0	63 54.3	59 37	30.0	59 59.4	71 26	20.3	59 38.1	71 25	19.6	55 54.5	77 17	13.4	9
30	65 08.2	49 44	36.5	64 53.2	51 43	35.5	64 05.7	55 40	32.5	63 49.1	56 39	31.6	63 32.1	57 38	30.6	59 43.9	69 26	20.8	59 23.2	70 25	20.1	55 44.2	76 18	13.7	30
1	64 41.9	47 44	37.1	64 27.5	49 43	36.0	63 41.9	53 40	33.1	63 25.9	54 39	32.1	63 09.6	55 38	31.2	59 28.2	67 27	21.3	59 07.9	68 26	20.6	55 33.6	75 18	14.1	1
2	64 15.3	45 45	37.6	64 01.6	47 44	36.6	63 17.8	51 41	33.6	63 02.4	52 40	32.7	62 46.7	53 39	31.7	59 12.1	65 27	21.8	58 52.3	66 27	21.0	55 22.8	73 18	14.4	2
3	63 48.4	43 45	38.1	63 35.3	45 44	37.1	62 53.3	49 41	34.1	62 38.6	50 40	33.2	62 23.4	51 39	32.2	58 55.6	64 28	22.2	58 36.4	64 27	21.5	55 11.8	72 19	14.8	3
4	63 21.2	41 46	38.6	63 08.7	42 45	37.6	62 28.6	47 42	34.6	62 14.4	48 41	33.7	61 59.9	49 40	32.7	58 38.9	62 28	22.7	58 20.2	63 28	21.9	55 00.4	70 19	15.1	4
35	62 53.7	39 46	39.0	62 41.8	40 45	38.0	62 03.5	45 42	35.1	61 49.9	46 41	34.1	61 36.0	47 40	33.2	58 21.8	60 29	23.1	58 03.7	61 28	22.3	54 48.9	69 20	15.4	35
6	62 26.9	37 47	39.4	62 14.6	38 46	38.4	61 38.1	43 43	35.5	61 25.2	44 42	34.6	61 11.8	45 41	33.6	58 04.5	58 29	23.5	57 46.9	59 28	22.7	54 37.1	67 20	15.7	6
7	61 58.9	35 47	39.8	61 47.2	36 46	38.8	61 12.5	41 43	35.9	61 00.1	42 42	35.0	60 47.4	43 41	34.0	57 46.9	56 30	23.9	57 29.8	57 29	23.1	54 25.1	65 20	16.0	7
8	61 29.8	33 47	40.2	61 19.6	35 46	39.2	60 46.7	39 43	36.3	60 34.9	40 42	35.4	60 22.7	41 42	34.4	57 29.0	55 30	24.2	57 12.5	56 29	23.5	54 12.8	64 21	16.3	8
9	61 01.4	31 48	40.5	60 51.8	33 47	39.5	60 20.6	37 44	36.7	60 09.4	38 43	35.7	59 57.8	39 42	34.8	57 10.8	53 31	24.6	56 54.9	54 30	23.8	54 00.4	62 21	16.6	9
40	60 32.8	29 48	40.8	60 23.8	31 47	39.8	59 54.3	35 44	37.0	59 43.6	36 43	36.1	59 32.6	37 42	35.1	56 52.5	51 31	24.9	56 37.0	52 30	24.1	53 47.7	61 21	16.9	40
1	60 04.0	27 48	41.1	59 55.6	29 47	40.1	59 27.8	33 44	37.3	59 17.7	34 44	36.4	59 07.2	35 43	35.5	56 33.9	49 31	25.3	56 19.0	50 30	24.5	53 34.9	59 22	17.2	1
2	59 35.1	26 48	41.4	59 27.2	27 48	40.4	59 01.1	31 45	37.6	58 51.6	32 44	36.7	58 41.7	34 43	35.8	56 15.0	47 32	25.6	56 00.7	48 31	24.8	53 21.8	57 22	17.4	2
3	59 06.0	24 49	41.6	58 58.7	25 48	40.7	58 34.2	29 45	37.9	58 25.3	30 44	37.0	58 15.9	32 43	36.1	55 56.0	46 32	25.9	55 42.2	47 31	25.1	53 08.6	56 22	17.7	3
4	58 36.8	22 49	41.8	58 30.0	23 48	40.9	58 07.2	27 45	38.1	57 58.8	29 44	37.2	57 50.0	30 43	36.3	55 36.7	44 32	26.2	55 23.5	45 32	25.4	52 55.2	54 23	17.9	4
45	58 07.5	20 49	42.0	58 01.2	22 48	41.1	57 40.0	26 45	38.4	57 32.2	27 45	37.5	57 23.9	28 44	36.6	55 17.3	42 33	26.4	55 04.6	43 32	25.6	52 41.6	52 23	18.2	45
6	57 38.1	18 49	42.2	57 32.3	20 48	41.3	57 12.7	24 46	38.6	57 05.4	26 45	37.7	56 57.7	26 44	36.8	54 57.7	40 33	26.7	54 45.5	41 32	25.9	52 27.8	50 23	18.4	6
7	57 08.5	17 49	42.4	57 03.3	18 48	41.5	56 45.3	22 46	38.8	56 38.5	23 45	37.9	56 31.4	24 44	37.0	54 37.9	38 33	26.9	54 26.3	39 32	26.1	52 13.9	49 23	18.6	7
8	56 38.9	15 49	42.5	56 34.2	16 49	41.6	56 17.8	20 46	39.0	56 11.5	21 45	38.1	56 04.9	23 44	37.2	54 18.0	36 34	27.2	54 06.9	37 33	26.4	51 59.8	47 24	18.8	8
9	56 09.2	13 50	42.6	56 05.0	15 49	41.8	55 50.1	18 46	39.1	55 44.4	20 45	38.2	55 38.3	21 44	37.4	53 57.8	35 34	27.4	53 47.3	36 33	26.6	51 45.6	45 24	19.0	9
50	55 39.5	12 50	42.8	55 35.7	13 49	41.9	55 22.4	17 46	39.3	55 17.2	18 45	38.4	55 11.6	19 45	37.5	53 37.6	33 34	27.6	53 27.6	34 33	26.8	51 31.2	44 24	19.2	50
1	55 09.6	10 50	42.9	55 06.4	11 49	42.0	54 54.6	15 46	39.4	54 49.9	16 46	38.5	54 44.9	17 45	37.7	53 17.2	31 34	27.8	53 07.8	32 33	27.0	51 16.7	42 24	19.4	1
2	54 39.8	08 50	42.9	54 37.0	10 49	42.1	54 26.7	13 47	39.5	54 22.5	14 46	38.7	54 18.0	16 45	37.8	52 56.7	29 34	27.9	52 47.8	30 33	27.2	51 02.1	40 25	19.6	2
3	54 09.8	07 50	43.0	54 07.6	08 49	42.2	53 58.7	12 47	39.6	53 55.1	13 46	38.8	53 51.1	14 45	37.9	52 36.1	27 35	28.1	52 27.7	28 34	27.3	50 47.3	38 25	19.7	3
4	53 39.9	05 50	43.1	53 38.1	06 49	42.2	53 30.7	10 47	39.7	53 27.6	11 46	38.9	53 24.0	12 45	38.0	52 15.4	26 35	28.3	52 07.5	27 34	27.5	50 32.4	37 25	19.9	4
55	53 09.9	04 50	43.1	53 08.6	05 49	42.3	53 02.7	08 47	39.8	53 00.0	09 46	38.9	52 57.0	11 45	38.1	51 54.5	24 35	28.4	51 47.2	25 34	27.6	50 17.5	35 25	20.0	55
6	52 39.9	02 50	43.1	52 39.1	03 49	42.3	52 34.6	07 47	39.8	52 32.4	08 46	39.0	52 29.9	09 45	38.2	51 33.6	22 35	28.5	51 26.8	23 34	27.8	50 02.4	33 25	20.2	6
7	52 10.0	01 50	43.1	52 09.6	02 49	42.3	52 06.5	05 47	39.9	52 04.8	06 46	39.1	52 02.7	07 45	38.2	51 12.6	20 35	28.7	51 06.3	21 34	27.9	49 47.2	31 25	20.3	7
8	51 40.0	01 50	43.1	51 40.0	00 49	42.3	51 38.3	04 47	39.9	51 37.1	05 46	39.1	51 35.6	06 45	38.3	50 51.5	19 35	28.8	50 45.8	20 34	28.0	49 31.9	29 26	20.4	8
9	51 10.0	02 50	43.1	51 10.5	01 49	42.3	51 10.2	02 47	39.9	51 09.4	03 46	39.1	51 08.3	04 45	38.3	50 30.3	17 35	28.9	50 25.1	18 34	28.1	49 16.5	28 26	20.6	9
60	50 40.0	04 50	43.1	50 41.0	03 49	42.3	50 42.0	00 47	39.9	50 41.7	01 46	39.1	50 41.1	03 45	38.4	50 09.1	15 35	29.0	50 04.4	16 35	28.2	49 01.1	26 26	20.7	60
1	50 10.0	05 50	43.1	50 11.4	04 49	42.3	50 13.9	01 47	39.9	50 14.0	00 46	39.2	50 13.9	01 45	38.4	49 47.8	13 36	29.0	49 43.7	14 35	28.3	48 45.6	24 26	20.8	1
2	49 40.1	07 50	43.0	49 41.9	06 49	42.2	49 45.7	03 47	39.9	49 46.3	02 46	39.1	49 46.6	01 45	38.4	49 26.5	12 36	29.1	49 22.8	13 35	28.4	48 39.0	22 26	20.9	2
3	49 10.1	08 50	43.0	49 12.4	07 49	42.2	49 17.5	04 47	39.9	49 18.6	03 46	39.1	49 19.4	02 45	38.4	49 05.1	10 36	29.2	49 02.0	11 35	28.4	48 14.3	21 26	20.9	3
4	48 40.3	10 50	42.9	48 43.0	09 49	42.1	48 49.4	06 47	39.9	48 50.9	05 46	39.1	48 52.2	04 45	38.3	48 43.7	08 36	29.2	48 41.1	09 35	28.5	47 58.6	19 26	21.0	4
65	48 10.4	11 50	42.8	48 13.6	10 49	42.1	48 21.3	07 47	39.8	48 23.3	06 46	39.1	48 25.0	06 45	38.3	48 22.3	07 36	29.3	48 20.1	08 35	28.5	47 42.8	17 26	21.1	65
6	47 40.6	12 50	42.7	47 44.2	11 49	42.0	47 53.2	09 47	39.8	47 55.6	08 46	39.0	47 57.8	07 45	38.3	48 00.8	05 36	29.3	47 59.2	06 35	28.6	47 27.0	15 26	21.2	6
7	47 10.9	14 49	42.6	47 14.9	13 49	41.9	47 25.2	10 47	39.7	47 28.0	09 46	39.0	47 30.6	08 45	38.2	47 39.3	03 36	29.3	47 38.2	04 35	28.6	47 11.1	14 26	21.2	7
8	46 41.2	15 49	42.5	46 45.6	14 49	41.8	46 57.2	11 47	39.6	47 00.5	11 46	38.9	47 03.5	10 45	38.2	47 17.8	02 36	29.3	47 17.2	03 35	28.6	46 55.2	12 27	21.3	8
9	46 11.6	16 49	42.4	46 16.4	16 49	41.7	46 29.2	13 46	39.5	46 32.9	12 46	38.8	46 36.4	11 45	38.1	46 56.3	00 36	29.3	46 56.2	01 35	28.6	46 39.3	10 27	21.3	9
70	45 42.0	18 49	42.3	45 47.2	17 48	41.6	46 01.3	14 46	39.4	46 05.5	13 46	38.7	46 09.3	13 45	38.0	46 34.8	02 36	29.3	46 35.2	01 35	28.6	46 23.3	09 27	21.4	70
1	45 12.5	19 49	42.1	45 18.1	18 48	41.4	45 33.4	16 46	39.3	45 38.0	15 46	38.6	45 42.3	14 45	37.9	46 13.3	03 36	29.3	46 14.2	02 35	28.6	46 07.4	07 27	21.4	1
2	44 43.1	20 49	42.0	44 49.1	20 48	41.3	45 05.7	17 46	39.2	45 10.7	16 45	38.5	45 15.4	16 45	37.8	45 51.9	05 36	29.3	45 53.2	04 35	28.6	45 51.4	05 27	21.4	2
3	44 13.8	22 49	41.9	44 20.2	21 48	41.2	44 37.9	18 46	39.1	44 43.4	18 45	38.4	44 48.5	17 45	37.7	45 30.4	06 36	29.3	45 32.2	06 35	28.6	45 35.3	03 27	21.4	3
4	43 44.6	23 49	41.7	43 51.4	22 48	41.0	44 10.3	20 46	39.0	44 16.1	19 45	38.3	44 21.7	18 45	37.6	45 08.9	08 36	29.2	45 11.2	07 35	28.5	45 19.3	02 27	21.4	4
75	43 15.4	24 48	41.5	43 22.6	24 48	40.9	43 42.7	21 46	38.9	43 49.0	20 45	38.2	43 54.9	20 44	37.5	44 47.5	10 36	29.2	44 50.3	09 35	28.5	45 03.3	00 27	21.4	75
6	42 46.4	26 48	41.4	42 53.9	25 48	40.7	43 15.2	23 46	38.7	43 21.9	22 45	38.0	43 28.3	21 44	37.4	44 26.1	11 36	29.1	44 29.3	10 35	28.4	44 47.2	02 27	21.4	6
7	42 17.4	27 48	41.2	42 25.4	26 47	40.5	42 47.8	24 46	38.6	42 54.9	23 45	37.9	43 01.7	22 44	37.2	44 04.8	13 36	29.1	44 08.5	12 35	28.4	44 31.2	03 27	21.4	7
8	41 48.6	28 48	41.0	41 56.9	27 47	40.4	42 20.5	25 45	38.4	42 28.0	24 45	37.8	42 35.2	24 44	37.1	43 43.5	14 35	29.0	43 47.6	13 35	28.3	44 15.2	05 27	21.4	8
9	41 19.8	29 48	40.8	41 28.5	29 47	40.2	41 53.3	26 45	38.2	42 01.1	26 45	37.6	42 08.7	25 44	36.9	43 22.2	16 35	28.9	43 26.8	15 35	28.3	43 59.2	07 27	21.4	9
80	40 51.2	31 48	40.6	41 00.3	30 47	40.0	41 26.2	28 45	38.1	41 34.4	27 44	37.4	41 42.4	26 44	36.8	43 01.0	17 35	28.9	43 06.1	16 34	28.2	43 43.2	08 27	21.4	80
1	40 22.7	32 47	40.4	40 32.1	31 47	39.8	40 59.2	29 45	37.9	41 07.8	28 44	37.3	41 16.2	28 44	36.6	42 39.9	19 35	28.8	42 45.4	18 34	28.1	43 27.2	10 27	21.3	1
2	39 54.3	33 47	40.2	40 04.1	32 46	39.6	40 32.3	30 45	37.7	40 41.3	30 44	37.1	40 50.1	29 43	36.5	42 18.8	20 35	28.7	42 24.7	19 34	28.0	43 11.3	12 27	21.3	2
3	39 26.1	34 47	40.0	39 36.2	34 46	39.4	40 05.5	32 44	37.5	40 14.9	31 44	36.9	40 24.0	30 43	36.3	41 57.7	22 35	28.6	42 04.1	21 34	27.9	42 55.4	13 26	21.2	3
4	38 57.9	35 47	39.8	39 08.4	35 46	39.2	39 38.8	33 44	37.3	39 48.6	32 44	36.7	39 58.1	32 43	36.1	41 36.8	23 35	28.5	41 43.6	22 34	27.8	42 39.5	15 26	21.2	4
85	38 29.9	37 46	39.5	38 40.8	36 46	38.9	39 12.3	34 44	37.1	39 22.4	33 43	36.5	39 32.3	33 43	35.9	41 15.9	25 35	28.4	41 23.2	24 34	27.7	42 23.7	16 26	21.1	
6	38 02.1	38 46	39.3	38 13.3	37 46	38.7	38 45.9	35 44	36.9	38 56.4	35 43	36.3	39 06.7	34 43	35.7	40 55.1	26 35	28.2	41 02.8	25 34	27.6	42 07.9	18 26	21.1	6
7	37 34.4	39 46	39.0	37 45.9	38 45	38.5	38 19.6	37 44	36.7	38 30.4	36 43	36.1	38 41.1	35 42	35.5	40 34.4	27 34	28.1	40 42.5	27 34	27.5	41 52.1	20 26	21.0	7
8	37 06.8	40 46	38.8	37 18.7	39 45	38.2	37 53.4	38 43	36.5	38 04.6	37 43	35.9	38 15.7	37 42	35.3	40 13.8	29 34	28.0	40 22.3	28 34	27.3	41 36.4	21 26	20.9	8
9	36 39.4	41 45	38.5	36 51.6	41 45	38.0	37 27.4	39 43	36.3	37 39.0	38 43	35.7	37 50.4	38 42	35.1	39 53.2	30 34	27.8	40 02.2	30 33	27.2	41 20.8	23 26	20.8	9
90	36 12.1	43 45	38.3	36 24.7	42 45	37.7	37 01.5	40 43	36.0	37 13.5	40 43	35.4	37 25.3	39 42	34.9	39 32.8	32 34	27.7	39 42.2	31 33	27.1	41 05.2	24 26	20.8	

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
91	35 45.0	43 45	38.0	35 57.9	43 44	37.5	36 35.8	41 43	35.8	36 48.1	41 42	35.2	37 00.2	40 41	34.6	39 12.4	33 34	27.5	39 22.3	32 33	26.9	40 49.6	26 26	20.7	91
2	35 18.0	44 45	37.8	35 31.3	44 44	37.2	36 10.2	42 42	35.5	36 22.9	42 42	35.0	36 35.4	41 41	34.4	38 52.2	34 34	27.4	39 02.4	34 33	26.8	40 34.2	27 26	20.6	2
3	34 51.3	46 44	37.5	35 04.9	45 44	36.9	35 44.8	44 42	35.3	35 57.8	43 42	34.7	36 10.6	43 41	34.2	38 32.1	36 33	27.2	38 42.7	35 33	26.6	40 18.8	29 26	20.5	3
4	34 24.6	47 44	37.2	34 38.6	46 44	36.7	35 19.5	45 42	35.0	35 32.9	44 41	34.5	35 46.1	44 41	33.9	38 12.0	37 33	27.1	38 23.1	37 32	26.5	40 03.5	30 25	20.4	4
95	33 58.2	48 44	36.9	34 12.5	47 43	36.4	34 54.4	46 42	34.8	35 08.1	45 41	34.2	35 21.7	45 40	33.7	37 52.1	39 33	26.9	38 03.6	38 32	26.3	39 48.2	32 25	20.3	95
6	33 31.9	49 44	36.6	33 46.5	48 43	36.1	34 29.5	47 41	34.5	34 43.5	47 41	34.0	34 57.4	46 40	33.4	37 32.4	40 33	26.7	37 44.2	39 32	26.1	39 33.1	33 25	20.2	6
7	33 05.8	50 43	36.3	33 20.8	49 43	35.8	34 04.7	48 41	34.2	34 19.1	48 40	33.7	34 33.3	47 40	33.2	37 12.7	41 33	26.5	37 24.9	41 32	26.0	39 18.0	35 25	20.0	7
8	32 39.9	51 43	36.0	32 55.2	51 42	35.5	33 40.1	49 41	34.0	33 54.8	49 40	33.4	34 09.4	48 40	32.9	36 53.2	42 32	26.3	37 05.8	42 32	25.8	39 03.0	36 25	19.9	8
9	32 14.2	52 43	35.7	32 29.8	52 42	35.2	33 15.7	50 40	33.7	33 30.7	50 40	33.2	33 45.6	49 39	32.6	36 33.8	44 32	26.1	36 46.8	43 32	25.6	38 48.1	38 25	19.8	9
100	31 48.7	53 42	35.4	32 04.6	53 42	34.9	32 51.4	51 40	33.4	33 06.8	51 40	32.9	33 22.1	51 39	32.4	36 14.5	45 32	25.9	36 27.9	44 31	25.4	38 33.3	39 25	19.7	100
1	31 23.4	54 42	35.1	31 39.5	54 41	34.6	32 27.4	53 40	33.1	32 43.1	52 39	32.6	32 58.7	52 39	32.1	35 55.4	46 32	25.7	36 09.2	46 31	25.2	38 18.5	40 24	19.5	1
2	30 58.2	55 42	34.8	31 14.7	55 41	34.3	32 03.5	54 39	32.8	32 19.5	53 39	32.3	32 35.4	53 38	31.8	35 36.4	48 31	25.5	35 50.5	47 31	25.0	38 03.9	42 24	19.4	2
3	30 33.3	56 41	34.5	30 50.1	56 41	34.0	31 39.8	55 39	32.5	31 56.2	54 39	32.0	32 12.4	54 38	31.5	35 17.5	49 31	25.3	35 32.1	48 31	24.8	37 49.4	43 24	19.2	3
4	30 08.6	57 41	34.1	30 25.7	57 40	33.7	31 16.3	56 39	32.2	31 33.0	55 38	31.7	31 49.6	55 38	31.2	34 58.8	50 31	25.1	35 13.7	50 30	24.6	37 35.0	45 24	19.1	4
105	29 44.1	58 40	33.8	30 01.5	58 40	33.3	30 53.0	57 38	31.9	31 10.0	56 38	31.4	31 26.9	56 37	30.9	34 40.3	51 31	24.9	34 55.6	51 30	24.4	37 20.7	46 24	18.9	105
6	29 19.8	59 40	33.5	29 37.5	59 40	33.0	30 30.0	58 38	31.6	30 47.3	57 38	31.1	31 04.4	57 37	30.6	34 21.9	52 30	24.7	34 37.5	52 30	24.1	37 06.5	47 23	18.8	6
7	28 55.7	60 40	33.1	29 13.7	60 39	32.7	30 07.1	59 38	31.3	30 24.7	59 37	30.8	30 42.2	58 37	30.3	34 03.6	54 30	24.4	34 19.7	53 30	23.9	36 52.4	49 23	18.6	7
8	28 31.8	61 39	32.8	28 50.1	61 39	32.3	29 44.4	60 37	30.9	30 02.3	60 37	30.5	30 20.1	59 36	30.0	33 45.6	55 30	24.2	34 01.9	54 29	23.7	36 38.5	50 23	18.5	8
9	28 08.2	62 39	32.4	28 26.8	62 39	32.0	29 22.0	61 37	30.6	29 40.2	61 37	30.2	29 58.3	60 36	29.7	33 27.7	56 30	24.0	33 44.4	56 29	23.5	36 24.6	51 23	18.3	9
110	27 44.8	63 39	32.1	28 03.6	63 38	31.6	28 59.7	62 37	30.3	29 18.2	62 36	29.8	29 36.6	61 36	29.4	33 09.9	57 29	23.7	33 27.0	57 29	23.2	36 10.9	52 23	18.1	110
1	27 21.6	64 38	31.7	27 40.8	64 38	31.3	28 37.7	63 36	30.0	28 56.5	63 36	29.5	29 15.2	62 35	29.1	32 52.4	58 29	23.5	33 09.8	58 28	23.0	35 57.3	54 22	18.0	1
2	26 58.7	65 38	31.3	27 18.1	65 37	30.9	28 15.9	64 36	29.6	28 35.0	64 35	29.2	28 54.0	63 35	28.7	32 35.0	59 29	23.2	32 52.7	59 28	22.7	35 43.9	55 22	17.8	2
3	26 36.0	66 37	31.0	26 55.7	66 37	30.6	27 54.3	65 36	29.3	28 13.7	65 35	28.8	28 33.0	64 35	28.4	32 17.8	60 28	23.0	32 35.8	60 28	22.5	35 30.5	56 22	17.6	3
4	26 13.5	67 37	30.6	26 33.5	66 37	30.2	27 33.0	66 35	28.9	27 52.7	65 35	28.5	28 12.3	65 34	28.1	32 00.7	62 28	22.7	32 19.1	61 28	22.2	35 17.3	57 22	17.4	4
115	25 51.3	68 37	30.2	26 11.5	67 36	29.8	27 11.9	67 35	28.6	27 31.8	66 34	28.2	27 51.7	66 34	27.7	31 43.9	63 28	22.4	32 02.6	62 27	22.0	35 04.3	59 22	17.2	115
6	25 29.3	69 36	29.9	25 49.8	68 36	29.5	26 51.0	68 34	28.2	27 11.2	67 34	27.8	27 31.4	67 33	27.4	31 27.2	64 27	22.2	31 46.3	63 27	21.7	34 51.4	60 21	17.0	6
7	25 07.6	69 36	29.5	25 28.4	69 35	29.1	26 30.4	69 34	27.9	26 50.9	68 34	27.5	27 11.3	68 33	27.0	31 10.7	65 27	21.9	31 30.1	64 27	21.5	34 38.6	61 21	16.8	7
8	24 46.1	70 35	29.1	25 07.2	70 35	28.7	26 10.0	69 34	27.5	26 30.8	69 33	27.1	26 51.5	69 33	26.7	30 54.5	66 27	21.6	31 14.2	66 26	21.2	34 26.0	62 21	16.6	8
9	24 24.9	71 35	28.7	24 46.2	71 34	28.3	25 49.8	70 33	27.1	26 10.9	70 33	26.7	26 31.9	70 32	26.3	30 38.4	67 26	21.4	30 58.4	67 26	20.9	34 13.5	63 21	16.4	9
120	24 04.0	72 34	28.3	24 25.5	72 34	27.9	25 29.9	71 33	26.8	25 51.3	71 32	26.4	26 12.6	71 32	26.0	30 22.5	68 26	21.1	30 42.8	68 26	20.7	34 01.2	65 20	16.2	120
1	23 43.3	73 34	27.9	24 05.1	73 34	27.5	25 10.3	72 32	26.4	25 31.9	72 32	26.0	25 53.5	72 31	25.6	30 06.8	69 26	20.8	30 27.4	69 25	20.4	33 49.0	66 20	16.0	1
2	23 22.9	74 34	27.5	23 45.0	74 33	27.1	24 50.9	73 32	26.0	25 12.8	73 31	25.6	25 34.6	73 31	25.3	29 51.3	70 25	20.5	30 12.3	70 25	20.1	33 37.0	67 20	15.8	2
3	23 02.7	75 33	27.1	23 25.1	74 33	26.7	24 31.8	74 31	25.6	24 53.9	74 31	25.3	25 16.0	73 31	24.9	29 36.0	71 25	20.2	29 57.3	71 25	19.8	33 25.1	68 20	15.6	3
4	22 42.9	75 33	26.7	23 05.5	75 32	26.3	24 12.9	75 31	25.3	24 35.3	75 31	24.9	24 57.6	74 30	24.5	29 21.0	72 25	19.9	29 42.5	72 24	19.5	33 13.4	69 19	15.4	4
125	22 23.3	76 32	26.3	22 46.1	76 32	25.9	23 54.3	76 31	24.9	24 17.0	75 30	24.5	24 39.6	75 30	24.2	29 06.1	73 24	19.6	29 27.9	73 24	19.2	33 01.9	70 19	15.1	125
6	22 04.0	77 32	25.9	22 27.1	77 31	25.5	23 36.0	76 30	24.5	23 58.9	76 30	24.1	24 21.7	76 29	23.8	28 51.5	74 24	19.3	29 13.6	74 24	18.9	32 50.5	71 19	14.9	6
7	21 45.0	78 31	25.5	22 08.3	78 31	25.1	23 18.0	77 30	24.1	23 41.1	77 29	23.7	24 04.2	77 29	23.4	28 37.1	75 24	19.0	28 59.4	74 23	18.6	32 39.3	72 18	14.7	7
8	21 26.3	79 31	25.0	21 49.8	78 30	24.7	23 00.2	78 29	23.7	23 23.6	78 29	23.4	23 46.9	78 28	23.0	28 22.9	76 23	18.7	28 45.5	75 23	18.3	32 28.2	73 18	14.5	8
9	21 07.9	79 30	24.6	21 31.6	79 30	24.3	22 42.7	79 29	23.3	23 06.3	79 28	23.0	23 29.9	78 28	22.6	28 08.9	76 23	18.4	28 31.8	76 22	18.0	32 17.4	74 18	14.2	9
130	20 49.7	80 30	24.2	21 13.7	80 29	23.9	22 25.5	80 28	22.9	22 49.3	79 28	22.6	23 13.1	79 27	22.2	27 55.2	77 23	18.1	28 18.3	77 22	17.7	32 06.7	75 18	14.0	130
1	20 31.9	81 29	23.8	20 56.1	81 29	23.4	22 08.5	80 28	22.5	22 32.6	80 27	22.2	22 56.7	80 27	21.8	27 41.6	78 22	17.8	28 05.1	78 22	17.4	31 56.2	76 17	13.7	1
2	20 14.4	82 29	23.3	20 38.8	81 28	23.0	21 51.9	81 27	22.1	22 16.2	81 27	21.8	22 40.5	81 26	21.4	27 28.4	79 22	17.5	27 52.0	79 21	17.1	31 45.8	77 17	13.5	2
3	19 57.1	82 28	22.9	20 21.8	82 28	22.6	21 35.6	82 27	21.7	22 00.1	82 26	21.4	22 24.6	82 26	21.0	27 15.3	80 21	17.1	27 39.2	80 21	16.8	31 35.7	78 17	13.3	3
4	19 40.2	83 28	22.5	20 05.1	83 27	22.2	21 19.5	83 26	21.3	21 44.2	82 26	21.0	22 09.0	82 26	20.6	27 02.5	81 21	16.8	27 26.7	81 21	16.5	31 25.7	79 16	13.0	4
135	19 23.6	84 27	22.0	19 48.7	84 27	21.7	21 03.7	83 26	20.8	21 28.7	83 25	20.5	21 53.6	83 25	20.2	26 49.9	81 21	16.5	27 14.3	81 20	16.2	31 15.9	80 16	12.8	135
6	19 07.3	84 27	21.6	19 32.6	84 26	21.3	20 48.3	84 25	20.4	21 13.4	84 25	20.1	21 38.6	84 25	19.8	26 37.6	82 20	16.2	27 02.2	82 20	15.8	31 06.3	80 16	12.5	6
7	18 51.4	85 26	21.1	19 16.8	85 26	20.8	20 33.1	85 25	20.0	20 58.5	85 24	19.7	21 23.8	84 24	19.4	26 25.5	83 20	15.8	26 50.4	83 19	15.5	30 56.9	81 15	12.3	7
8	18 35.7	86 26	20.7	19 01.4	86 25	20.4	20 18.3	85 24	19.6	20 43.9	85 24	19.3	21 09.4	85 24	19.0	26 13.6	84 19	15.5	26 38.7	84 19	15.2	30 47.6	82 15	12.0	8
9	18 20.4	86 25	20.2	18 46.2	86 25	20.0	20 03.7	86 24	19.1	20 29.5	86 23	18.9	20 55.3	86 23	18.6	26 02.0	85 19	15.2	26 27.4	84 19	14.9	30 38.6	83 15	11.8	9
140	18 05.4	87 24	19.8	18 31.4	87 24	19.5	19 49.5	87 23	18.7	20 15.5	87 23	18.4	20 41.4	86 23	18.2	25 50.6	85 18	14.8	26 16.2	85 18	14.5	30 29.7	84 14	11.5	140
1	17 50.7	88 24	19.3	18 17.0	87 24	19.0	19 35.6	87 23	18.3	20 01.7	87 22	18.0	20 27.9	87 22	17.8	25 39.5	86 18	14.5	26 05.3	86 18	14.2	30 21.1	85 14	11.2	1
2	17 36.4	88 23	18.8	18 02.8	88 23	18.6	19 22.0	88 22	17.8	19 48.3	88 22	17.6	20 14.7	88 22	17.3	25 28.7	87 18	14.1	25 54.7	87 17	13.9	30 12.6	85 14	11.0	2
3	17 22.4	89 23	18.4	17 49.0	89 22	18.1	19 08.7	88 22	17.4	19 35.3	88 21	17.2	20 01.7	88 21	16.9	25 18.1	87 17	13.8	25 44.3	87 17	13.5	30 04.4	86 13	10.7	3
4	17 08.7	89 22	17.9	17 35.5	89 22	17.7	18 55.7	89 21	17.0	19 22.4	89 21	16.7	19 49.1	89 20	16.5	25 07.8	88 17	13.5	25 34.1	88 16	13.2	29 56.3	87 13	10.4	4
145	16 55.4	90 22	17.4	17 22.3	90 21	17.2	18 43.1	90 20	16.5	19 10.0	90 20	16.3	19 36.8	90 20	16.0	24 57.7	89 16	13.1	25 24.3	89 16	12.8	29 48.5	88 13	10.2	145
6	16 42.4	90 21	17.0	17 09.5	90 21	16.8	18 30.8	90 20	16.1	18 57.8	90 20	15.8	19 24.9	90 19	15.6	24 47.9	89 16	12.8	25 14.6	89 16	12.5	29 40.8	88 12	09.9	6
7	16 29.7	91 20	16.5	16 57.0	91 20	16.3	18 18.8	91 19	15.6	18 46.0	91 19	15.4	19 13.2	91 19	15.2	24 38.3	90 15	12.4	25 05.3	90 15	12.2	29 33.4	89 12	09.6	7
8	16 17.5	91 20	16.0	16 44.9	91 20	15.8	18 07.1	91 19	15.2	18 34.5	91 19	15.0	19 01.9	91 18	14.7	24 29.0	90 15	12.0	24 56.1	90 15	11.8	29 26.1	90 12	09.4	8
9	16 05.5	92 19	15.5	16 33.1	92 19	15.3	17 55.8	92 18	14.7	18 23.4	92 18	14.5	18 50.9	92 18	14.3	24 20.0	91 15	11.7	24 47.3	91 14	11.5	29 19.1	90 11	09.1	9
150	15 53.9	92 19	15.1	16 21.7	92 18	14.9	17 44.8	92 18	14.3	18 12.5	92 18	14.1	18 40.2	92 17	13.9	24 11.2	92 14	11.3	24 38.7	92 14	11.1	29 12.3	91 11	08.8	150
1	15 42.7	93 18	14.6	16 10.6	93 18	14.4	17 34.2	93 17	13.8	18 02.0	93 17	13.6	18 29.9	93 17	13.4	24 02.8	92 14	11.0	24 30.4	92 13	10.8	29 05.7	91 11	08.5	1
2	15 31.8	93 18	14.1	15 59.9	93 17	13.9	17 23.9	93 17	13.4	17 51.9	93 16	13.2	18 19.8	93 16	13.0	23 54.5	93 13	10.6	24 22.3	93 13	10.4	28 59.3	92 10	08.2	2
3	15 21.3	94 17	13.6	15 49.5	94 17	13.4	17 13.9	94 16	12.9	17 42.0	94 16	12.7	18 10.2	94 16	12.5	23 46.6	93 13	10.2	24 14.6	93 13	10.0	28 53.1	93 10	08.0	3
4	15 11.2	94 16	13.1	15 39.5	94 16	13.0	17 04.3	94 15	12.4	17 32.6	94 15	12.3	18 00.8	94 15	12.1	23 38.9	94 12	09.9	24 07.0	94 12	09.7	28 47.1	93 10	07.7	4
155	15 01.4	95 16	12.6	15 29.8	95 16	12.5	16 55.0	95 15	12.0	17 23.4	95 15	11.8	17 51.8	95 14	11.6	23 31.6	94 12	09.5	23 59.8	94 12	09.3	28 41.4	94 09	07.4	155
6	14 52.0	95 15	12.1	15 20.5	95 15	12.0	16 46.1	95 14	11.5	17 14.6	95 14	11.3	17 43.1	95 14	11.2	23 24.4	95 11	09.1	23 52.8	95 11	09.0	28 35.8	94 09	07.1	6
7	14 42.9	96 14	11.7	15 11.6	96 14	11.5	16 37.5	95 14	11.0	17 06.2	95 14	10.9	17 34.8	95 13	10.7	23 17.6	95 11	08.8	23 46.1	95 11	08.6	28 30.5	95 09	06.8	7
8	14 34.3	96 14	11.2	15 03.0	96 14	11.0	16 29.3	96 13	10.6	16 58.0	96 13	10.4	17 26.8	96 13	10.3	23 11.1	95 10	08.4	23 39.7	95 10	08.2	28 25.4	95 08	06.5	8
9	14 26.0	96 13	10.7	14 54.8	96 13	10.5	16 21.4	96 13	10.1	16 50.3	96 12	10.0	17 19.1	96 12	09.8	23 04.8	96 10	08.0	23 33.5	96 10	07.9	28 20.5	95 08	06.2	9
160	14 18.0	97 13	10.2	14 47.0	97 12	10.0	16 13.9	97 12	09.6	16 42.9	97 12	09.5	17 11.8	97 12	09.4	22 58.8	96 10	07.7	23 27.7	96 09	07.5	28 15.8	96 07	06.0	160
1	14 10.5	97 12	09.7	14 39.5	97 12	09.5	16 06.8	97 11	09.2	16 35.8	97 11	09.0	17 04.9	97 11	08.9	22 53.1	97 09	07.3	23 22.1	97 09	07.1	28 11.4	96 07	05.7	1
2	14 03.3	97 11	09.2	14 32.5	97 11	09.0	16 00.0	97 11	08.7	16 29.1	97 11	08.6	16 58.3	97 10	08.4	22 47.7	97 09	06.9	23 16.8	97 08	06.8	28 07.2	97 07	05.4	2
3	13 56.5	98 11	08.7	14 25.7	98 11	08.5	15 53.5	97 10	08.2	16 22.8	97 10	08.1	16 52.0	97 10	08.0	22 42.6	97 08	06.5	23 11.7	97 08	06.4	28 03.2	97 06	05.1	3
4	13 50.1	98 10	08.2	14 19.4	98 10	08.1	15 47.4	98 10	07.7	16 16.8	98 09	07.6	16 46.1	98 09	07.5	22 37.7	98 08	06.1	23 07.0	98 07	06.0	27 59.4	97 06	04.8	4
165	13 44.0	98 09	07.7	14 13.5	98 09	07.6	15 41.7	98 09	07.3	16 11.1	98 09	07.1	16 40.5	98 09	07.0	22 33.2	98 07	05.8	23 02.5	98 07	05.7	27 55.9	98 06	04.5	165
6	13 38.4	98 09	07.2	14 07.9	98 09	07.1	15 36.4	98 08	06.8	16 05.8	98 08	06.7	16 35.3	98 08	06.6	22 28.9	98 07	05.4	22 58.4	98 06	05.3	27 52.5	98 05	04.2	6
7	13 33.1	99 08	06.6	14 02.7	99 08	06.6	15 31.4	99 08	06.3	16 00.9	99 08	06.2	16 30.5	99 07	06.1	22 24.9	98 06	05.0	22 54.5	98 06	04.9	27 49.4	98 05	03.9	7
8	13 28.2	99 08	06.1	13 57.9	99 07	06.1	15 26.7	99 07	05.8	15 56.4	99 07	05.7	16 26.0	99 07	05.6	22 21.3	99 06	04.6	22 50.9	99 06	04.5	27 46.6	99 04	03.6	8
9	13 23.7	99 07	05.6	13 53.4	99 07	05.6	15 22.5	99 06	05.3	15 52.2	99 06	05.3	16 21.8	99 06	05.2	22 17.9	99 05	04.2	22 47.5	99 05	04.2	27 43.9	99 04	03.3	9
170	13 19.6	99 06	05.1	13 49.4	99 06	05.1	15 18.6	99 06	04.8	15 48.3	99 06	04.8	16 18.1	99 06	04.7	22 14.8	99 05	03.9	22 44.5	99 05	03.8	27 41.5	99 04	03.0	170
1	13 15.9	99 06	04.6	13 45.7	99 05	04.5	15 15.1	99 05	04.4	15 44.8	99 05	04.3	16 14.6	99 05	04.2	22 12.0	99 04	03.5	22 41.7	99 04	03.4	27 39.3	99 03	02.7	1
2	13 12.6	99 05	04.1	13 42.4	99 05	04.0	15 11.9	99 05	03.9	15 41.7	99 05	03.8	16 11.6	99 05	03.8	22 09.5	99 04	03.1	22 39.3	99 04	03.0	27 37.4	99 03	02.4	2
3	13 09.6	1.0 04	03.6	13 39.5	1.0 04	03.5	15 09.1	1.0 04	03.4	15 39.0	1.0 04	03.4	16 08.9	1.0 04	03.3	22 07.2	1.0 03	02.7	22 37.1	1.0 03	02.6	27 35.6	99 02	02.1	3
4	13 07.1	1.0 04	03.1	13 37.0	1.0 04	03.0	15 06.7	1.0 03	02.9	15 36.6	1.0 03	02.9	16 06.5	1.0 03	02.8	22 05.3	1.0 03	02.3	22 35.2	1.0 03	02.3	27 34.2	1.0 02	01.8	4
175	13 04.9	1.0 03	02.6	13 34.8	1.0 03	02.5	15 04.7	1.0 03	02.4	15 34.6	1.0 03	02.4	16 04.5	1.0 03	02.4	22 03.7	1.0 02	01.9	22 33.6	1.0 02	01.9	27 32.9	1.0 02	01.5	175
6	13 03.1	1.0 02	02.1	13 33.1	1.0 02	02.0	15 03.0	1.0 02	01.9	15 32.9	1.0 02	01.9	16 02.9	1.0 02	01.9	22 02.4	1.0 02	01.5	22 32.3	1.0 02	01.5	27 31.8	1.0 01	01.2	6
7	13 01.8	1.0 02	01.5	13 31.7	1.0 02	01.5	15 01.7	1.0 02	01.5	15 31.7	1.0 02	01.4	16 01.6	1.0 02	01.4	22 01.3	1.0 01	01.2	22 31.3	1.0 01	01.1	27 31.0	1.0 01	00.9	7
8	13 00.8	1.0 01	01.0	13 30.8	1.0 01	01.0	15 00.7	1.0 01	01.0	15 30.7	1.0 01	01.0	16 00.7	1.0 01	00.9	22 00.6	1.0 01	00.8	22 30.6	1.0 01	00.8	27 30.5	1.0 01	00.6	8
9	13 00.2	1.0 00	00.5	13 30.2	1.0 00	00.5	15 00.2	1.0 00	00.5	15 30.2	1.0 00	00.5	16 00.2	1.0 00	00.5	22 00.1	1.0 00	00.4	22 30.1	1.0 00	00.4	27 30.1	1.0 00	00.3	9
180	13 00.0	1.0 00	00.0	13 30.0	1.0 00	00.0	15 00.0	1.0 00	00.0	15 30.0	1.0 00	00.0	16 00.0	1.0 00	00.0	22 00.0	1.0 00	00.0	22 30.0	1.0 00	00.0	27 30.0	1.0 00	00.0	180

STAR IDENTIFICATION TABLE

Lat. 43°

ALTITUDE

AZ.	4°		8°		12		16°		20°		24°		28°		32°		36°		40°		44°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	51	180	55	180	59	180	63	180	67	180	71	180	75	180	79	180	83	180	87	180	89	00	00
4	51	174	55	173	59	172	63	172	67	170	71	169	75	167	79	163	82	155	86	134	87	70	4
8	50	167	54	166	58	165	62	163	66	161	70	158	74	154	77	147	81	136	83	114	84	77	8
12	50	161	53	160	57	158	61	156	65	153	69	149	72	143	75	135	78	123	81	104	81	79	12
16	48	155	52	153	56	151	60	148	63	145	67	140	70	134	73	126	76	114	78	99	78	80	16
20	47	150	51	148	54	145	58	142	62	138	65	133	68	126	71	118	73	108	75	95	75	79	20
24	46	145	49	142	53	139	56	135	59	131	63	126	66	120	68	112	70	103	72	91	73	78	24
28	44	140	47	137	51	134	54	130	57	126	60	121	63	114	65	107	67	99	69	89	70	77	28
32	42	135	45	132	48	129	52	125	55	121	58	115	60	110	63	103	65	95	66	86	67	76	32
36	40	130	43	127	46	124	49	120	52	116	55	111	57	105	60	99	62	92	63	84	64	75	36
40	37	126	41	123	44	120	47	116	49	112	52	107	55	102	57	96	59	89	60	82	61	74	40
44	35	122	38	119	41	116	44	112	47	108	49	103	52	98	54	93	56	87	57	80	58	73	44
48	32	119	35	115	38	112	41	108	44	104	46	100	49	95	51	90	53	84	54	78	56	71	48
52	30	115	33	112	36	109	38	105	41	101	44	97	46	92	48	87	50	82	52	76	53	70	52
56	27	112	30	109	33	105	36	102	38	98	41	94	43	89	45	85	47	80	49	74	50	69	56
60	24	109	27	105	30	102	33	99	35	95	38	91	40	87	42	82	44	78	46	73	47	67	60
64	22	105	24	102	27	99	30	96	32	92	35	88	37	84	39	80	41	76	43	71	45	66	64
68	19	102	21	99	24	96	27	93	29	89	32	86	34	82	36	78	38	73	40	69	42	64	68
72	16	100	19	96	21	93	24	90	26	87	29	83	31	79	34	75	36	71	38	67	40	62	72
76	13	97	16	94	18	91	21	87	24	84	26	81	28	77	31	73	33	69	35	65	37	61	76
80	10	94	13	91	15	88	18	85	21	81	23	78	26	75	28	71	30	67	32	63	34	59	80
84	07	91	10	88	13	85	15	82	18	79	20	76	23	72	25	69	28	65	30	61	32	57	84
88	04	88	07	85	10	82	12	79	15	76	18	73	20	70	23	67	25	63	27	59	29	56	88
92	01	86	04	83	07	80	09	77	12	74	15	71	17	68	20	64	22	61	25	57	27	54	92
96	*02*	83	01	80	04	77	07	74	09	71	12	68	15	65	17	62	20	59	22	55	25	52	96
100	*05*	80	*02*	77	01	74	04	72	07	69	09	66	12	63	15	60	17	57	20	53	22	50	100
104	*07*	77	*05*	75	*02*	72	01	69	04	66	07	63	09	60	12	57	15	54	18	51	20	48	104
108	*10*	75	*07*	72	*05*	69	*02*	66	01	63	04	61	07	58	10	55	13	52	15	49	18	46	108
112	*13*	72	*10*	69	*07*	66	*04*	63	*01*	61	02	58	04	55	07	52	10	50	13	47	16	44	112
116	*16*	69	*13*	66	*10*	63	*07*	60	*04*	58	*01*	56	02	53	05	50	08	47	11	45	14	42	116
120	*18*	66	*15*	63	*12*	60	*09*	58	*06*	55	*03*	52	*00*	50	03	47	06	45	09	42	12	40	120
124	*21*	62	*18*	60	*15*	57	*12*	55	*09*	52	*06*	50	*02*	47	01	45	04	42	07	40	10	37	124
128	*24*	59	*21*	56	*17*	54	*14*	51	*11*	49	*08*	47	*04*	44	*01*	42	02	40	05	37	09	35	128
132	*26*	56	*23*	53	*20*	51	*16*	48	*13*	46	*10*	44	*06*	41	*03*	39	00	37	04	35	07	33	132
136	*29*	52	*25*	49	*22*	47	*19*	45	*15*	43	*12*	40	*08*	38	*05*	36	*01*	34	02	32	05	30	136
140	*31*	48	*27*	46	*24*	43	*21*	41	*17*	39	*14*	37	*10*	35	*07*	33	*03*	31	01	30	04	28	140
144	*33*	44	*29*	42	*26*	40	*22*	38	*19*	36	*15*	34	*12*	32	*08*	30	*04*	28	*01*	27	03	25	144
148	*35*	40	*31*	38	*28*	36	*24*	34	*20*	32	*17*	30	*13*	29	*09*	27	*06*	26	*02*	24	02	22	148
152	*37*	36	*33*	34	*29*	32	*26*	30	*22*	28	*18*	27	*14*	25	*11*	24	*07*	22	*03*	21	01	20	152
156	*38*	31	*35*	29	*31*	28	*27*	26	*23*	25	*19*	23	*16*	22	*12*	21	*08*	19	*04*	18	*00*	17	156
160	*40*	26	*36*	25	*32*	23	*28*	22	*24*	21	*21*	19	*17*	18	*13*	17	*09*	16	*05*	15	*01*	14	160
164	*41*	21	*37*	20	*33*	19	*29*	18	*25*	17	*21*	16	*17*	15	*14*	14	*10*	13	*06*	12	*02*	11	164
168	*42*	16	*38*	15	*34*	14	*30*	13	*26*	13	*22*	12	*18*	11	*14*	10	*10*	10	*06*	09	*02*	09	168
172	*42*	11	*38*	10	*35*	10	*31*	09	*27*	08	*23*	08	*19*	07	*15*	07	*11*	07	*07*	06	*03*	06	172
176	*43*	05	*39*	05	*35*	05	*31*	04	*27*	04	*23*	04	*19*	04	*15*	04	*11*	03	*07*	03	*03*	03	176
180	*43*	00	*39*	00	*35*	00	*31*	00	*27*	00	*23*	00	*19*	00	*15*	00	*11*	00	*07*	00	*03*	00	180
	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		

16—11439

FIGURES IN ITALICS INDICATE THAT DECLINATION IS OF CONTRARY NAME TO LATITUDE

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STAR IDENTIFICATION TABLE

AZ.	48°		52°		56°		60°		64°		68°		72°		76°		80°		84°		88°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	85	00	81	00	77	00	73	00	69	00	65	00	61	00	57	00	53	00	49	00	45	00	00
4	84	28	81	15	77	10	73	07	69	05	65	04	61	03	57	02	53	01	49	01	45	00	4
8	82	45	80	28	76	19	72	13	69	10	65	07	61	05	57	04	53	02	49	01	45	00	8
12	80	55	78	38	75	26	71	19	68	14	64	10	60	07	57	05	53	03	49	02	45	01	12
16	78	60	76	44	73	33	70	24	67	18	64	13	60	10	56	07	53	05	49	03	45	01	16
20	75	63	74	49	72	38	69	29	66	22	63	16	59	12	56	08	52	06	49	03	45	01	20
24	73	65	72	52	70	41	68	32	65	25	62	19	59	14	55	10	52	07	48	04	45	01	24
28	70	66	69	55	68	44	66	35	64	28	61	21	58	16	55	11	52	08	48	04	45	01	28
32	67	66	67	56	66	46	64	38	62	30	60	23	57	18	54	13	51	08	48	05	45	01	32
36	65	66	64	57	64	48	62	39	61	32	59	25	56	19	54	14	51	09	48	05	45	02	36
40	62	66	62	57	61	49	61	41	59	33	57	27	55	20	53	15	50	10	47	06	45	02	40
44	59	65	59	57	59	49	59	42	58	35	56	28	54	22	52	16	50	11	47	06	44	02	44
48	57	64	57	57	57	50	57	43	56	35	55	29	53	22	51	17	49	11	47	07	44	02	48
52	54	64	55	57	55	50	55	43	54	36	53	30	52	23	50	17	49	12	46	07	44	02	52
56	51	63	52	56	53	50	53	43	52	37	52	30	51	24	50	18	48	12	46	07	44	02	56
60	49	61	50	56	50	49	51	43	51	37	50	31	50	24	49	18	47	13	46	07	44	02	60
64	46	60	47	55	48	49	49	43	49	37	49	31	48	25	48	19	47	13	45	08	44	02	64
68	44	59	45	54	46	48	47	43	47	37	47	31	47	25	47	19	46	13	45	08	44	03	68
72	41	58	43	53	44	47	45	42	45	36	46	31	46	25	46	19	45	14	45	08	44	03	72
76	39	56	40	52	42	47	43	41	44	36	44	31	45	25	45	19	45	14	44	08	43	03	76
80	36	55	38	50	40	46	41	41	42	35	43	30	43	25	44	19	44	14	44	08	43	03	80
84	34	53	36	49	37	44	39	40	40	35	41	30	42	25	43	19	43	14	43	08	43	03	84
88	32	52	34	48	35	43	37	39	39	34	40	29	41	24	42	19	43	14	43	08	43	03	88
92	29	50	31	46	33	42	35	38	37	33	39	29	40	24	41	19	42	13	42	08	43	03	92
96	27	48	29	45	32	41	34	37	35	32	37	28	39	23	40	18	41	13	42	08	43	03	96
100	25	47	27	43	30	39	32	35	34	31	36	27	38	23	39	18	41	13	42	08	43	03	100
104	23	45	25	41	28	38	30	34	32	30	34	26	36	22	38	17	40	13	41	08	42	03	104
108	21	43	23	40	26	36	29	33	31	29	33	25	35	21	37	17	39	12	41	08	42	03	108
112	19	41	22	38	24	35	27	31	30	28	32	24	34	20	37	16	39	12	41	07	42	03	112
116	17	39	20	36	23	33	25	30	28	27	31	23	33	19	36	16	38	11	40	07	42	02	116
120	15	37	18	34	21	31	24	28	27	25	30	22	32	18	35	15	37	11	40	07	42	02	120
124	13	35	17	32	20	29	23	27	26	24	29	21	31	17	34	14	37	10	39	06	42	02	124
128	12	33	15	30	18	28	21	25	25	22	28	19	31	16	34	13	36	10	39	06	42	02	128
132	10	30	14	28	17	26	20	23	23	21	27	18	30	15	33	12	36	09	39	06	42	02	132
136	09	28	12	26	16	24	19	22	22	19	26	17	29	14	32	11	35	09	39	05	42	02	136
140	08	26	11	24	15	22	18	20	22	18	25	15	28	13	32	11	35	08	38	05	41	02	140
144	06	23	10	22	14	20	17	18	21	16	24	14	28	12	31	10	35	07	38	04	41	02	144
148	05	21	09	19	13	18	16	16	20	14	24	13	27	11	31	09	34	06	38	04	41	01	148
152	04	18	08	17	12	16	16	14	19	13	23	11	27	09	30	08	34	06	38	04	41	01	152
156	03	16	07	15	11	13	15	12	19	11	22	09	26	08	30	07	34	05	37	03	41	01	156
160	03	13	07	12	10	11	14	10	18	09	22	08	26	07	30	05	34	04	37	03	41	01	160
164	02	11	06	10	10	09	14	08	18	07	22	06	26	05	29	04	33	03	37	02	41	01	164
168	02	08	06	07	10	07	13	06	17	05	21	05	25	04	29	03	33	02	37	02	41	01	168
172	01	05	05	05	09	05	13	04	17	04	21	03	25	03	29	02	33	02	37	01	41	00	172
176	01	03	05	02	09	02	13	02	17	02	21	02	25	01	29	01	33	01	37	01	41	00	176
180	01	60	05	00	09	00	13	00	17	00	21	00	25	00	29	00	33	00	37	00	41	00	180
	48°		52°		56°		60°		64°		68°		72°		76°		80°		84°		88°		

16—11439

FIGURES IN ITALICS INDICATE THAT DECLINATION IS OF CONTRARY NAME TO LATITUDE

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Lat. 44°

H.A.	0° 00′			0° 30′			1° 00′			1° 30′			2° 00′			2° 30′			3° 00′			3° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	
00	46 00.0	1.0 01	180.0	46 30.0	1.0 01	180.0	47 00.0	1.0 01	180.0	47 30.0	1.0 01	180.0	48 00.0	1.0 01	180.0	48 30.0	1.0 01	180.0	49 00.0	1.0 01	180.0	49 30.0	1.0 01	180.0	00
1	45 59.5	1.0 03	178.6	46 29.5	1.0 03	178.5	46 59.4	1.0 03	178.5	47 29.4	1.0 03	178.5	47 59.4	1.0 03	178.5	48 29.4	1.0 03	178.5	48 59.4	1.0 03	178.5	49 29.4	1.0 03	178.5	1
2	45 57.8	1.0 05	177.1	46 27.8	1.0 05	177.1	46 57.8	1.0 05	177.1	47 27.8	1.0 05	177.0	47 57.8	1.0 05	177.0	48 27.7	1.0 05	177.0	48 57.7	1.0 05	177.0	49 27.7	1.0 05	176.9	2
3	45 55.1	1.0 06	175.7	46 25.1	1.0 06	175.6	46 55.0	1.0 06	175.6	47 25.0	1.0 06	175.6	47 54.9	1.0 07	175.5	48 24.9	1.0 07	175.5	48 54.8	1.0 07	175.4	49 24.8	1.0 07	175.4	3
4	45 51.3	1.0 08	174.3	46 21.3	1.0 08	174.2	46 51.2	1.0 08	174.1	47 21.1	1.0 08	174.1	47 51.0	1.0 08	174.0	48 20.9	1.0 08	174.0	48 50.8	1.0 09	173.9	49 20.8	1.0 09	173.9	4
05	45 46.5	1.0 10	172.8	46 16.4	1.0 10	172.8	46 46.2	1.0 10	172.7	47 16.1	1.0 10	172.6	47 46.0	1.0 10	172.6	48 15.8	1.0 10	172.5	48 45.7	1.0 10	172.4	49 15.6	1.0 11	172.3	05
6	45 40.6	99 12	171.4	46 10.4	99 12	171.3	46 40.2	99 12	171.2	47 10.0	99 12	171.2	47 39.8	99 12	171.1	48 09.6	99 12	171.0	48 39.4	99 12	170.9	49 09.3	99 12	170.8	6
7	45 33.6	99 13	170.0	46 03.3	99 14	169.9	46 33.1	99 14	169.8	47 02.8	99 14	169.7	47 32.6	99 14	169.6	48 02.3	99 14	169.5	48 32.1	99 14	169.4	49 01.8	99 14	169.3	7
8	45 25.5	99 15	168.6	45 55.2	99 15	168.5	46 24.9	99 15	168.4	46 54.6	99 16	168.2	47 24.3	99 16	168.1	47 53.9	99 16	168.0	48 23.6	99 16	167.9	48 53.2	99 16	167.8	8
9	45 16.5	99 17	167.2	45 46.1	99 17	167.0	46 15.7	99 17	166.9	46 45.3	99 17	166.8	47 14.9	99 17	166.7	47 44.4	99 18	166.6	48 14.0	99 18	166.4	48 43.6	99 18	166.3	9
10	45 06.4	98 19	165.8	45 35.9	98 19	165.6	46 05.4	98 19	165.5	46 34.9	98 19	165.4	47 04.4	98 19	165.2	47 33.9	98 19	165.1	48 03.3	98 20	165.0	48 32.8	98 20	164.8	10
1	44 55.2	98 20	164.4	45 24.6	98 20	164.2	45 54.1	98 21	164.1	46 23.5	98 21	163.9	46 52.9	98 21	163.8	47 22.2	98 21	163.7	47 51.6	98 21	163.5	48 21.0	98 22	163.3	1
2	44 43.1	98 22	163.0	45 12.4	98 22	162.8	45 41.7	98 22	162.7	46 11.0	98 22	162.5	46 40.3	98 23	162.4	47 09.6	98 23	162.2	47 38.8	98 23	162.0	48 08.1	97 23	161.9	2
3	44 30.0	97 24	161.6	44 59.2	97 24	161.5	45 28.4	97 24	161.3	45 57.6	97 24	161.1	46 26.7	97 24	161.0	46 55.9	97 24	160.8	47 25.0	97 25	160.6	47 54.1	97 25	160.4	3
4	44 15.9	97 25	160.3	44 45.0	97 25	160.1	45 14.0	97 26	159.9	45 43.1	97 26	159.7	46 12.1	97 26	159.6	46 41.2	97 26	159.4	47 10.2	97 26	159.2	47 39.2	97 27	159.0	4
15	44 00.8	97 27	158.9	44 29.8	97 27	158.7	44 58.7	96 27	158.5	45 27.7	96 27	158.4	45 56.6	96 28	158.2	46 25.5	96 28	158.0	46 54.4	96 28	157.8	47 23.2	96 28	157.6	15
6	43 44.8	96 28	157.6	44 13.7	96 28	157.4	44 42.5	96 29	157.2	45 11.3	96 29	157.0	45 40.0	96 29	156.8	46 08.8	96 29	156.6	46 37.5	96 30	156.4	47 06.2	96 30	156.2	6
7	43 27.9	96 30	156.2	43 56.6	96 30	156.0	44 25.3	96 30	155.8	44 53.9	95 30	155.6	45 22.6	96 31	155.4	45 51.2	96 31	155.2	46 19.8	96 31	155.0	46 48.3	95 31	154.8	7
8	43 10.0	96 31	154.9	43 38.6	95 31	154.7	44 07.1	95 32	154.5	44 35.7	96 32	154.3	45 04.1	95 32	154.1	45 32.6	95 32	153.8	46 01.0	95 33	153.6	46 29.5	95 33	153.4	8
9	42 51.3	95 33	153.6	43 19.7	95 33	153.4	43 48.1	95 33	153.2	44 16.5	94 33	153.0	44 44.8	94 34	152.7	45 13.1	94 34	152.5	45 41.4	94 34	152.3	46 09.7	94 34	152.0	9
20	42 31.7	94 34	152.3	43 00.0	94 34	152.1	43 28.2	94 35	151.9	43 56.4	94 35	151.7	44 24.6	94 35	151.4	44 52.8	94 35	151.2	45 20.9	94 36	150.9	45 49.0	94 36	150.7	20
1	42 11.3	94 36	151.1	42 39.4	94 36	150.8	43 07.5	94 36	150.6	43 35.5	93 36	150.4	44 03.5	93 37	150.1	44 31.5	93 37	149.9	44 59.5	93 37	149.6	45 27.4	93 37	149.3	1
2	41 50.0	93 37	149.8	42 17.9	93 37	149.6	42 45.8	93 37	149.3	43 13.7	93 38	149.1	43 41.6	93 38	148.8	44 09.4	93 38	148.6	44 37.2	93 38	148.3	45 04.9	92 39	148.0	2
3	41 27.9	93 38	148.6	41 55.7	93 38	148.3	42 23.4	92 39	148.1	42 51.1	92 39	147.8	43 18.8	92 39	147.5	43 46.5	92 40	147.3	44 14.1	92 40	147.0	44 41.7	92 40	146.7	3
4	41 05.0	92 39	147.3	41 32.6	92 40	147.1	42 00.2	92 40	146.8	42 27.8	92 40	146.6	42 55.3	92 41	146.3	43 22.8	92 41	146.0	43 50.2	91 41	145.7	44 17.6	91 41	145.4	4
25	40 41.3	92 41	146.1	41 08.8	91 41	145.9	41 36.2	91 41	145.6	42 03.6	91 42	145.3	42 30.9	91 42	145.0	42 58.2	91 42	144.8	43 25.5	91 42	144.5	43 52.7	91 43	144.2	25
6	40 16.9	91 42	144.9	40 44.2	91 42	144.7	41 11.4	91 42	144.4	41 38.6	91 43	144.1	42 05.8	91 43	143.8	42 33.0	90 43	143.5	43 00.0	90 44	143.2	43 27.1	90 44	142.9	6
7	39 51.7	90 43	143.7	40 18.8	90 43	143.5	40 45.9	90 44	143.2	41 13.0	90 44	142.9	41 40.0	90 44	142.6	42 06.9	90 45	142.3	42 33.8	90 45	142.0	43 00.7	89 45	141.7	7
8	39 25.8	90 44	142.6	39 52.8	90 45	142.3	40 19.7	90 45	142.0	40 46.6	90 45	141.7	41 13.4	89 45	141.4	41 40.2	89 46	141.1	42 06.9	89 46	140.8	42 33.6	89 46	140.5	8
9	38 59.2	89 45	141.4	39 26.0	89 46	141.1	39 52.8	89 46	140.8	40 19.5	89 46	140.5	40 46.1	89 47	140.2	41 12.7	89 47	139.9	41 39.3	88 47	139.6	42 05.8	88 47	139.3	9
30	38 32.0	89 47	140.3	38 58.6	89 47	140.0	39 25.2	88 47	139.7	39 51.7	88 47	139.4	40 18.2	88 48	139.1	40 44.6	88 48	138.8	41 11.0	88 48	138.4	41 37.3	88 49	138.1	30
1	38 04.1	88 48	139.1	38 30.5	88 48	138.8	38 56.9	88 48	138.5	39 23.3	88 48	138.2	39 49.6	88 49	137.9	40 15.8	87 49	137.6	40 42.0	87 49	137.3	41 08.2	87 50	137.0	1
2	37 35.5	88 49	138.0	38 01.8	88 49	137.7	38 28.0	87 49	137.4	38 54.2	87 49	137.1	39 20.3	87 50	136.8	39 46.4	87 50	136.5	40 12.4	87 50	136.1	40 38.4	86 51	135.8	2
3	37 06.4	87 50	136.9	37 32.5	87 50	136.6	37 58.5	87 50	136.3	38 24.5	87 50	136.0	38 50.5	86 51	135.7	39 16.4	86 51	135.3	39 42.2	86 51	135.0	40 08.0	86 52	134.7	3
4	36 36.6	87 51	135.8	37 02.5	86 51	135.5	37 28.4	86 51	135.2	37 54.2	86 51	134.9	38 20.0	86 52	134.6	38 45.7	86 52	134.2	39 11.4	85 52	133.9	39 37.0	85 53	133.6	4
35	36 06.2	86 52	134.8	36 32.0	86 52	134.5	36 57.7	86 52	134.1	37 23.4	85 52	133.8	37 49.0	85 53	133.5	38 14.5	85 53	133.1	38 40.0	85 53	132.8	39 05.5	85 54	132 5	35
6	35 35.3	85 52	133.7	36 00.9	85 53	133.4	36 26.5	85 53	133.1	36 51.9	85 53	132.7	37 17.4	85 54	132.4	37 42.8	85 54	132.1	38 08.1	84 54	131.7	38 33.4	84 54	131.4	6
7	35 03.8	85 53	132.7	35 29.3	85 54	132.3	35 54.7	85 54	132.0	36 20.0	84 54	131.7	36 45.3	84 54	131.3	37 10.5	84 55	131.0	37 35.6	84 55	130.7	38 00.7	84 55	130.3	7
8	34 31.8	84 54	131.6	34 57.1	84 54	131.3	35 22.3	84 55	131.0	35 47.5	84 55	130.6	36 12.6	84 55	130.3	36 37.6	83 56	130.0	37 02.6	83 56	129.6	37 27.6	83 56	129.3	8
9	33 59.3	84 55	130.6	34 24.4	84 55	130.3	34 49.5	83 56	130.0	35 14.5	83 56	129.6	35 39.4	83 56	129.3	36 04.3	83 56	128.9	36 29.1	83 57	128.6	36 53.9	82 57	128.2	9
40	33 26.3	83 56	129.6	33 51.3	83 56	129.3	34 16.2	83 56	128.9	34 41.0	83 57	128.6	35 05.8	82 57	128.3	35 30.5	82 57	127.9	35 55.2	82 57	127.6	36 19.8	82 58	127.2	40
1	32 52.8	83 57	128.6	33 17.6	83 57	128.3	33 42.4	82 57	128.0	34 07.0	82 57	127.6	34 31.7	82 58	127.3	34 56.2	82 58	126.9	35 20.7	82 58	126.6	35 45.2	81 58	126.2	1
2	32 18.9	82 57	127.6	32 43.5	82 58	127.3	33 08.1	82 58	127.0	33 32.6	82 58	126.6	33 57.1	81 58	126.3	34 21.5	81 59	125.9	34 45.8	81 59	125.6	35 10.1	81 59	125.2	2
3	31 44.5	82 58	126.7	32 09.0	81 58	126.3	32 33.4	81 59	126.0	32 57.8	81 59	125.7	33 22.1	81 59	125.3	33 46.3	81 59	124.9	34 10.5	81 60	124.6	34 34.6	80 60	124.2	3
4	31 09.7	81 59	125.7	31 34.0	81 59	125.4	31 58.3	81 59	125.0	32 22.5	81 59	124.7	32 46.6	80 60	124.3	33 10.7	80 60	124.0	33 34.8	80 60	123.6	33 58.8	80 60	123.3	4
45	30 34.4	81 59	124.8	30 58.6	81 60	124.4	31 22.7	80 60	124.1	31 46.8	80 60	123.7	32 10.8	80 60	123.4	32 34.8	80 61	123.0	32 58.6	80 61	122.7	33 22.5	79 61	122.3	45
6	29 58.8	80 60	123.9	30 22.8	80 60	123.5	30 46.8	80 61	123.2	31 10.7	80 61	122.8	31 34.6	79 61	122.5	31 58.4	79 61	122.1	32 22.1	79 62	121.7	32 45.8	79 62	121.4	6
7	29 22.8	80 61	122.9	29 46.6	80 61	122.6	30 10.5	79 61	122.2	30 34.3	79 61	121.9	30 58.0	79 62	121.5	31 21.6	79 62	121.2	31 45.2	79 62	120.8	32 08.8	78 62	120.4	7
8	28 46.3	79 61	122.0	29 10.1	79 62	121.7	29 33.8	79 62	121.3	29 57.4	79 62	121.0	30 21.0	78 62	120.6	30 44.5	78 62	120.3	31 08.0	78 63	119.9	31 31.4	78 63	119.5	8
9	28 09.6	79 62	121.1	28 33.2	79 62	120.8	28 56.7	78 62	120.4	29 20.2	78 63	120.1	29 43.7	78 63	119.7	30 07.1	78 63	119.3	30 30.4	78 63	119.0	30 53.7	77 63	118.6	9
50	27 32.5	78 62	120.2	27 55.9	78 63	119.9	28 19.4	78 63	119.5	28 42.7	78 63	119.2	29 06.0	78 63	118.8	29 29.3	77 64	118.5	29 52.5	77 64	118.1	30 15.6	77 64	117.7	50
1	26 55.0	78 63	119.4	27 18.3	78 63	119.0	27 41.6	78 63	118.7	28 04.9	77 64	118.3	28 28.1	77 64	117.9	28 51.2	77 64	117.6	29 14.2	77 64	117.2	29 37.3	77 64	116.8	1
2	26 17.2	77 63	118.5	26 40.4	77 64	118.1	27 03.6	77 64	117.8	27 26.7	77 64	117.4	27 49.8	77 64	117.1	28 12.8	77 64	116.7	28 35.7	76 65	116.3	28 58.6	76 65	116.0	2
3	25 39.1	77 64	117.6	26 02.2	77 64	117.3	26 25.3	77 64	116.9	26 48.3	77 65	116.6	27 11.2	76 65	116.2	27 34.1	76 65	115.8	27 56.9	76 65	115.5	28 19.6	76 65	115.1	3
4	25 00.8	77 64	116.8	25 23.7	76 65	116.4	25 46.6	76 65	116.1	26 09.5	76 65	115.7	26 32.3	76 65	115.3	26 55.1	76 65	115.0	27 17.8	76 66	114.6	27 40.4	75 66	114.2	4
55	24 22.1	76 65	115.9	24 44.9	76 65	115.6	25 07.7	76 65	115.2	25 30.5	76 65	114.9	25 53.2	76 66	114.5	26 15.8	75 66	114.1	26 38.4	75 66	113.8	27 00.9	75 66	113.4	55
6	23 43.1	76 65	115.1	24 05.9	76 66	114.7	24 28.6	76 66	114.4	24 51.2	75 66	114.0	25 13.8	75 66	113.7	25 36.3	75 66	113.3	25 58.8	75 66	112.9	26 21.2	75 67	112.6	6
7	23 03.9	76 66	114.3	23 26.5	75 66	113.9	23 49.1	75 66	113.6	24 11.7	75 66	113.2	24 34.1	75 66	112.8	24 56.5	75 67	112.5	25 18.9	74 67	112.1	25 41.2	74 67	111.7	7
8	22 24.5	75 66	113.5	22 47.0	75 66	113.1	23 09.4	75 67	112.7	23 31.9	75 67	112.4	23 54.2	74 67	112.0	24 16.5	74 67	111.7	24 38.8	74 67	111.3	25 01.0	74 67	110.9	8
9	21 44.7	75 67	112.7	22 07.2	75 67	112.3	22 29.5	74 67	111.9	22 51.8	74 67	111.6	23 14.1	74 67	111.2	23 36.3	74 67	110.8	23 58.5	74 68	110.5	24 20.6	74 68	110.1	9
60	21 04.8	74 67	111.9	21 27.1	74 67	111.5	21 49.4	74 67	111.1	22 11.6	74 67	110.8	22 33.8	74 68	110.4	22 55.9	74 68	110.0	23 18.0	73 68	109.7	23 40.0	73 68	109.3	60
1	20 24.6	74 67	111.1	20 46.8	74 67	110.7	21 09.0	74 68	110.3	21 31.1	74 68	110.0	21 53.2	74 68	109.6	22 15.2	73 68	109.2	22 37.2	73 68	108.9	22 59.1	73 68	108.5	1
2	19 44.2	74 68	110.3	20 06.4	74 68	109.9	20 28.4	74 68	109.6	20 50.5	73 68	109.2	21 12.5	73 68	108.8	21 34.4	73 68	108.5	21 56.3	73 69	108.1	22 18.1	73 69	107.7	2
3	19 03.7	73 68	109.5	19 25.7	73 68	109.1	19 47.7	73 68	108.8	20 09.6	73 68	108.4	20 31.5	73 69	108.0	20 53.4	73 69	107.7	21 15.2	73 69	107.3	21 36.9	72 69	106.9	3
4	18 22.9	73 68	108.7	18 44.8	73 68	108.4	19 06.7	73 69	108.0	19 28.6	73 69	107.6	19 50.4	73 69	107.3	20 12.1	72 69	106.9	20 33.9	72 69	106.5	20 55.5	72 69	106.2	4
65	17 41.9	73 69	107.9	18 03.8	73 69	107.6	18 25.6	73 69	107.2	18 47.3	73 69	106.9	19 09.1	72 69	106.5	19 30.8	72 69	106.1	19 52.4	72 69	105.8	20 14.0	72 70	105.4	65
6	17 00.8	73 69	107.2	17 22.5	73 69	106.8	17 44.3	72 69	106.5	18 06.0	72 69	106.1	18 27.6	72 69	105.7	18 49.2	72 69	105.4	19 10.8	72 70	105.0	19 32.3	72 70	104.6	6
7	16 19.4	72 69	106.4	16 41.1	72 69	106.1	17 02.8	72 69	105.7	17 24.4	72 69	105.3	17 46.0	72 70	105.0	18 07.5	72 70	104.6	18 29.0	72 70	104.2	18 50.5	71 70	103.9	7
8	15 38.0	72 69	105.7	15 59.6	72 70	105.3	16 21.2	72 70	105.0	16 42.7	72 70	104.6	17 04.2	72 70	104.2	17 25.7	72 70	103.9	17 47.1	71 70	103.5	18 08.5	71 70	103.1	8
9	14 56.3	72 70	104.9	15 17.9	72 70	104.6	15 39.4	72 70	104.2	16 00.9	72 70	103.8	16 22.3	71 70	103.5	16 43.7	71 70	103.1	17 05.1	71 70	102.8	17 26.4	71 70	102.4	9
70	14 14.6	72 70	104.2	14 36.0	72 70	103.8	14 57.5	71 70	103.5	15 18.9	71 70	103.1	15 40.3	71 70	102.7	16 01.6	71 70	102.4	16 22.9	71 70	102.0	16 44.2	71 71	101.6	70
1	13 32.6	71 70	103.5	13 54.1	71 70	103.1	14 15.5	71 70	102.7	14 36.8	71 70	102.4	14 58.1	71 70	102.0	15 19.4	71 71	101.6	15 40.7	71 71	101.3	16 01.9	71 71	100.9	1
2	12 50.6	71 70	102.7	13 12.0	71 70	102.4	13 33.3	71 70	102.0	13 54.6	71 71	101.6	14 15.9	71 71	101.3	14 37.1	71 71	100.9	14 58.3	71 71	100.5	15 19.5	70 71	100.2	2
3	12 08.4	71 70	102.0	12 29.7	71 71	101.6	12 51.0	71 71	101.3	13 12.3	71 71	100.9	13 33.5	71 71	100.5	13 54.7	71 71	100.2	14 15.8	70 71	99.8	14 36.9	70 71	99.4	3
4	11 26.2	71 71	101.3	11 47.4	71 71	100.9	12 08.6	71 71	100.5	12 29.8	71 71	100.2	12 51.0	71 71	99.8	13 12.1	70 71	99.5	13 33.2	70 71	99.1	13 54.3	70 71	98.7	4
75	10 43.8	71 71	100.5	11 05.0	71 71	100.2	11 26.2	71 71	99.8	11 47.3	70 71	99.5	12 08.4	70 71	99.1	12 29.5	70 71	98.7	12 50.6	70 71	98.4	13 11.6	70 71	98.0	75
6	10 01.3	71 71	99.8	10 22.5	70 71	99.5	10 43.6	70 71	99.1	11 04.7	70 71	98.7	11 25.8	70 71	98.4	11 46.8	70 71	98.0	12 07.8	70 71	97.7	12 28.8	70 71	97.3	6
7	9 18.7	70 71	99.1	9 39.8	70 71	98.8	10 00.9	70 71	98.4	10 22.0	70 71	98.0	10 43.0	70 71	97.7	11 04.0	70 71	97.3	11 25.0	70 71	96.9	11 46.0	70 72	96.6	7
8	8 36.1	70 71	98.4	8 57.1	70 71	98.0	9 18.2	70 71	97.7	9 39.2	70 71	97.3	10 00.2	70 71	97.0	10 21.2	70 72	96.6	10 42.2	70 72	96.2	11 03.1	70 72	95.9	8
9	7 53.3	70 71	97.7	8 14.4	70 71	97.3	8 35.4	70 71	97.0	8 56.4	70 72	96.6	9 17.3	70 72	96.2	9 38.3	70 72	95.9	9 59.2	70 72	95.5	10 20.1	70 72	95.2	9
80	7 10.5	70 71	97.0	7 31.5	70 72	96.6	7 52.5	70 72	96.3	8 13.5	70 72	95.9	8 34.4	70 72	95.5	8 55.3	70 72	95.2	9 16.2	70 72	94.8	9 37.1	70 72	94.4	80
1	6 27.7	70 72	96.3	6 48.6	70 72	95.9	7 09.6	70 72	95.6	7 30.5	70 72	95.2	7 51.4	70 72	94.8	8 12.3	70 72	94.5	8 33.2	70 73	94.1	8 54.1	69 72	93.7	1
2	5 44.7	70 72	95.6	6 05.7	70 72	95.2	6 26.6	70 72	94.9	6 47.5	70 72	94.5	7 08.4	70 72	94.1	7 29.3	70 72	93.8	7 50.1	69 73	93.4	8 11.0	69 72	93.0	2
3	5 01.8	70 72	94.9	5 22.7	70 72	94.5	5 43.6	70 72	94.2	6 04.5	70 72	93.8	6 25.3	70 72	93.4	6 46.2	70 72	93.1	7 07.0	69 72	92.7	7 27.9	69 72	92.3	3
4							5 00.5	70 72	93.5	5 21.4	70 72	93.1	5 42.2	70 72	92.7	6 03.1	69 72	92.4	6 23.9	69 72	92.0	6 44.7	69 72	91.6	4
85																5 20.0	69 72	91.7	5 40.8	69 72	91.3	6 01.6	69 72	91.0	85
6																						5 18.4	69 72	90.8	6

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H.A.	0° 00′			0° 30′			1° 00′			1° 30′			2° 00′			2° 30′			3° 00′			3° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	46 00.0	1.0 01	180.0	45 30.0	1.0 01	180.0	45 00.0	1.0 01	180.0	44 30.0	1.0 01	180.0	44 00.0	1.0 01	180.0	43 30.0	1.0 01	180.0	43 00.0	1.0 01	180.0	42 30.0	1.0 01	180.0	00
1	45 59.5	1.0 03	178.6	45 29.5	1.0 03	178.6	44 59.5	1.0 03	178.6	44 29.5	1.0 03	178.6	43 59.5	1.0 03	178.6	43 29.5	1.0 03	178.6	42 59.5	1.0 03	178.6	42 29.5	1.0 03	178.6	1
2	45 57.8	1.0 05	177.1	45 27.9	1.0 04	177.1	44 57.9	1.0 04	177.2	44 27.9	1.0 04	177.2	43 57.9	1.0 04	177.2	43 27.9	1.0 04	177.2	42 57.9	1.0 04	177.3	42 28.0	1.0 04	177.3	2
3	45 55.1	1.0 06	175.7	45 25.2	1.0 06	175.7	44 55.2	1.0 06	175.8	44 25.3	1.0 06	175.8	43 55.3	1.0 06	175.8	43 25.3	1.0 06	175.9	42 55.4	1.0 06	175.9	42 25.4	1.0 06	175.9	3
4	45 51.3	1.0 08	174.3	45 21.4	1.0 08	174.3	44 51.5	1.0 08	174.4	44 21.6	1.0 08	174.4	43 51.6	1.0 08	174.5	43 21.7	1.0 08	174.5	42 51.8	1.0 08	174.5	42 21.9	1.0 08	174.6	4
05	45 46.5	1.0 10	172.8	45 16.6	1.0 10	172.9	44 46.7	1.0 10	172.9	44 16.8	1.0 10	173.0	43 47.0	1.0 10	173.1	43 17.1	1.0 09	173.1	42 47.2	1.0 09	173.2	42 17.3	1.0 09	173.2	05
6	45 40.6	99 12	171.4	45 10.7	99 12	171.5	44 40.9	99 11	171.5	44 11.1	99 11	171.6	43 41.2	99 11	171.7	43 11.4	99 11	171.8	42 41.5	99 11	171.8	42 11.7	99 11	171.9	6
7	45 33.6	99 13	170.0	45 03.8	99 13	170.1	44 34.0	99 13	170.2	44 04.3	99 13	170.2	43 34.5	99 13	170.3	43 04.7	99 13	170.4	42 34.9	99 13	170.5	42 05.1	99 13	170.6	7
8	45 25.5	99 15	168.6	44 55.8	99 15	168.7	44 26.1	99 15	168.8	43 56.4	99 15	168.9	43 26.7	99 15	169.0	42 57.0	99 14	169.0	42 27.3	99 14	169.1	41 57.6	99 14	169.2	8
9	45 16.5	99 17	167.2	44 46.8	99 17	167.3	44 17.2	99 17	167.4	43 47.6	99 16	167.5	43 17.9	99 16	167.6	42 48.3	99 16	167.7	42 18.7	99 16	167.8	41 49.0	99 16	167.9	9
10	45 06.4	98 19	165.8	44 36.8	98 18	165.9	44 07.3	98 18	166.0	43 37.7	99 18	166.1	43 08.2	99 18	166.2	42 38.6	99 18	166.4	42 09.1	99 18	166.5	41 39.5	99 18	166.6	10
1	44 55.2	98 20	164.4	44 25.8	98 20	164.5	43 56.3	98 20	164.6	43 26.9	98 20	164.8	42 57.4	98 20	164.9	42 28.0	98 19	165.0	41 58.5	98 19	165.1	41 29.0	98 19	165.3	1
2	44 43.1	98 22	163.0	44 13.8	98 22	163.1	43 44.4	98 22	163.3	43 15.1	98 21	163.4	42 45.7	98 21	163.6	42 16.3	98 21	163.7	41 46.9	98 21	163.8	41 17.5	98 21	164.0	2
3	44 30.0	97 24	161.6	44 00.7	97 23	161.8	43 31.5	97 23	161.9	43 02.3	98 23	162.1	42 33.0	98 23	162.2	42 03.7	98 23	162.4	41 34.4	98 22	162.5	41 05.1	98 22	162.7	3
4	44 15.9	97 25	160.3	43 46.8	97 25	160.4	43 17.6	97 25	160.6	42 48.5	97 24	160.8	42 19.4	97 24	160.9	41 50.2	97 24	161.1	41 21.0	97 24	161.2	40 51.8	97 24	161.4	4
15	44 00.8	97 27	158.9	43 31.8	97 26	159.1	43 02.8	97 26	159.3	42 33.8	97 26	159.4	42 04.8	97 26	159.6	41 35.7	97 26	159.8	41 06.7	97 25	159.9	40 37.6	97 25	160.1	15
6	43 44.8	96 28	157.6	43 16.0	96 28	157.8	42 47.1	96 28	157.9	42 18.2	96 28	158.1	41 49.3	96 27	158.3	41 20.4	96 27	158.5	40 51.4	97 27	158.7	40 22.4	97 27	158.8	6
7	43 27.9	96 30	156.2	42 59.2	96 30	156.4	42 30.4	96 29	156.6	42 01.7	96 29	156.8	41 32.9	96 29	157.0	41 04.1	96 29	157.2	40 35.3	96 28	157.4	40 06.4	96 28	157.6	7
8	43 10.0	96 31	154.9	42 41.5	96 31	155.1	42 12.9	95 31	155.3	41 44.2	96 30	155.5	41 15.6	96 30	155.7	40 46.9	96 30	155.9	40 18.2	96 30	156.1	39 49.5	96 30	156.3	8
9	42 51.3	95 33	153.6	42 22.9	95 32	153.8	41 54.4	95 32	154.1	41 25.9	95 32	154.3	40 57.4	95 32	154.5	40 28.9	95 31	154.7	40 00.3	95 31	154.9	39 31.8	95 31	155.1	9
20	42 31.7	94 34	152.3	42 03.4	94 34	152.6	41 35.1	94 34	152.8	41 06.8	95 33	153.0	40 38.4	95 33	153.2	40 10.0	95 33	153.4	39 41.6	95 33	153.6	39 13.2	95 32	153.9	20
1	42 11.3	94 36	151.1	41 43.1	94 35	151.3	41 15.0	94 35	151.5	40 46.8	94 35	151.8	40 18.5	94 34	152.0	39 50.3	94 34	152.2	39 22.0	94 34	152.4	38 53.7	94 34	152.6	1
2	41 50.0	93 37	149.8	41 22.0	93 37	150.1	40 54.0	93 36	150.3	40 25.9	94 36	150.5	39 57.9	94 36	150.8	39 29.8	94 36	151.0	39 01.6	94 35	151.2	38 33.5	94 35	151.4	2
3	41 27.9	93 38	148.6	41 00.0	93 38	148.8	40 32.2	93 38	149.1	40 04.3	93 37	149.3	39 36.4	93 37	149.5	39 08.4	93 37	149.8	38 40.5	93 37	150.0	38 12.5	93 36	150.2	3
4	41 05.0	92 39	147.3	40 37.3	92 39	147.6	40 09.6	92 39	147.9	39 41.9	92 39	148.1	39 14.1	93 38	148.3	38 46.3	93 38	148.6	38 18.5	93 38	148.8	37 50.6	93 38	149.1	4
25	40 41.3	92 41	146.1	40 13.8	92 40	146.4	39 46.3	92 40	146.6	39 18.7	92 40	146.9	38 51.1	92 40	147.2	38 23.4	92 39	147.4	37 55.8	92 39	147.7	37 28.1	92 39	147.9	25
6	40 16.9	91 42	144.9	39 49.5	91 42	145.2	39 22.2	91 41	145.5	38 54.7	91 41	145.7	38 27.3	92 41	146.0	37 59.8	92 41	146.2	37 32.3	92 40	146.5	37 04.8	92 40	146.7	6
7	39 51.7	90 43	143.7	39 24.5	91 43	144.0	38 57.3	91 43	144.3	38 30.1	91 42	144.6	38 02.8	91 42	144.8	37 35.5	91 42	145.1	37 08.1	91 42	145.3	36 40.7	91 41	145.6	7
8	39 25.8	90 44	142.6	38 58.8	90 44	142.8	38 31.8	90 44	143.1	38 04.7	90 43	143.4	37 37.6	90 43	143.7	37 10.4	91 43	143.9	36 43.2	91 43	144.2	36 16.0	91 42	144.5	8
9	38 59.2	89 45	141.4	38 32.4	90 45	141.7	38 05.5	90 45	142.0	37 38.6	90 45	142.3	37 11.7	90 44	142.5	36 44.7	90 44	142.8	36 17.6	90 44	143.1	35 50.6	90 44	143.3	9
30	38 32.0	89 47	140.3	38 05.3	89 46	140.6	37 38.6	89 46	140.8	37 11.9	89 46	141.1	36 45.1	89 45	141.4	36 18.3	89 45	141.7	35 51.4	90 45	142.0	35 24.5	90 45	142.2	30
1	38 04.1	88 48	139.1	37 37.6	88 47	139.4	37 11.0	89 47	139.7	36 44.5	89 47	140.0	36 17.8	89 46	140.3	35 51.2	89 46	140.6	35 24.5	89 46	140.9	34 57.7	89 46	141.1	1
2	37 35.5	88 49	138.0	37 09.2	88 48	138.3	36 42.8	88 48	138.6	36 16.4	88 48	138.9	35 50.0	88 48	139.2	35 23.5	88 47	139.5	34 56.9	89 47	139.8	34 30.3	89 47	140.1	2
3	37 06.4	87 50	136.9	36 40.2	87 49	137.2	36 14.0	87 49	137.5	35 47.7	88 49	137.8	35 21.5	88 49	138.1	34 55.1	88 48	138.4	34 28.8	88 48	138.7	34 02.3	88 48	139.0	3
4	36 36.6	87 51	135.8	36 10.6	87 50	136.2	35 44.6	87 50	136.5	35 18.5	87 50	136.8	34 52.4	87 49	137.1	34 26.2	87 49	137.4	34 00.0	87 49	137.7	33 33.7	88 49	137.9	4
35	36 06.2	86 52	134.8	35 40.4	86 51	135.1	35 14.5	86 51	135.4	34 48.6	86 51	135.7	34 22.7	87 50	136.0	33 56.7	87 50	136.3	33 30.6	87 50	136.6	33 04.5	87 50	136.9	35
6	35 35.3	85 52	133.7	35 09.7	86 52	134.0	34 44.0	86 52	134.3	34 18.2	86 52	134.7	33 52.4	86 51	135.0	33 26.6	86 51	135.3	33 00.7	86 51	135.6	32 34.8	87 51	135.9	6
7	35 03.8	85 53	132.7	34 38.4	85 53	133.0	34 12.8	85 53	133.3	33 47.2	85 53	133.6	33 21.6	86 52	133.9	32 55.9	86 52	134.2	32 30.2	86 52	134.6	32 04.4	86 51	134.9	7
8	34 31.8	84 54	131.6	34 06.5	84 54	132.0	33 41.1	85 54	132.3	33 15.7	85 53	132.6	32 50.3	85 53	132.9	32 24.7	85 53	133.2	31 59.2	85 53	133.5	31 33.6	85 52	133.8	8
9	33 59.3	84 55	130.6	33 34.2	84 55	131.0	33 09.0	84 54	131.3	32 43.7	84 54	131.6	32 18.4	84 54	131.9	31 53.0	85 54	132.2	31 27.6	85 53	132.5	31 02.2	85 53	132.9	9
40	33 26.3	83 56	129.6	33 01.3	83 56	130.0	32 36.3	84 55	130.3	32 11.2	84 55	130.6	31 46.0	84 55	130.9	31 20.8	84 54	131.2	30 55.6	84 54	131.6	30 30.3	84 54	131.9	40
1	32 52.8	83 57	128.6	32 28.0	83 56	129.0	32 03.1	83 56	129.3	31 38.2	83 56	129.6	31 13.2	83 56	129.9	30 48.1	84 55	130.3	30 23.0	84 55	130.6	29 57.9	84 55	130.9	1
2	32 18.9	82 57	127.6	31 54.2	82 57	128.0	31 29.5	83 57	128.3	31 04.7	83 57	128.6	30 39.8	83 56	129.0	30 15.0	83 56	129.3	29 50.0	83 56	129.6	29 25.0	83 56	129.9	2
3	31 44.5	82 58	126.7	31 20.0	82 58	127.0	30 55.4	82 58	127.4	30 30.8	82 57	127.7	30 06.1	82 57	128.0	29 41.3	83 57	128.3	29 16.6	83 57	128.7	28 51.7	83 56	129.0	3
4	31 09.7	81 59	125.7	30 45.3	81 58	126.1	30 20.9	82 58	126.4	29 56.4	82 58	126.7	29 31.8	82 58	127.1	29 07.3	82 58	127.4	28 42.6	82 57	127.7	28 18.0	82 57	128.0	4
45	30 34.4	81 59	124.8	30 10.2	81 59	125.1	29 45.9	81 59	125.5	29 21.6	81 59	125.8	28 57.2	81 58	126.1	28 32.8	82 58	126.5	28 08.3	82 58	126.8	27 43.8	82 58	127.1	45
6	29 58.8	80 60	123.9	29 34.7	80 60	124.2	29 10.6	81 60	124.5	28 46.4	81 59	124.9	28 22.1	81 59	125.2	27 57.9	81 59	125.5	27 33.5	81 59	125.9	27 09.1	81 58	126.2	6
7	29 22.8	80 61	122.9	28 58.8	80 60	123.3	28 34.8	80 60	123.6	28 10.8	80 60	124.0	27 46.7	80 60	124.3	27 22.5	81 60	124.6	26 58.3	81 59	125.0	26 34.1	81 59	125.3	7
8	28 46.3	79 61	122.0	28 22.5	79 61	122.4	27 58.7	80 61	122.7	27 34.8	80 61	123.1	27 10.8	80 60	123.4	26 46.8	80 60	123.7	26 22.8	80 60	124.1	25 58.7	80 60	124.4	8
9	28 09.6	79 62	121.1	27 45.9	79 62	121.5	27 22.2	79 61	121.8	26 58.4	79 61	122.2	26 34.6	79 61	122.5	26 10.8	80 61	122.8	25 46.8	80 60	123.2	25 22.9	80 60	123.5	9
50	27 32.5	78 62	120.2	27 08.9	79 62	120.6	26 45.3	79 62	120.9	26 21.7	79 62	121.3	25 58.0	79 62	121.6	25 34.3	79 61	122.0	25 10.5	79 61	122.3	24 46.7	79 61	122.6	50
1	26 55.0	78 63	119.4	26 31.6	78 63	119.7	26 08.2	78 63	120.1	25 44.7	78 62	120.4	25 21.1	79 62	120.7	24 57.5	79 62	121.1	24 33.9	79 62	121.4	24 10.2	79 61	121.8	1
2	26 17.2	77 63	118.5	25 54.0	78 63	118.8	25 30.6	78 63	119.2	25 07.3	78 63	119.5	24 43.9	78 63	119.9	24 20.4	78 62	120.2	23 56.9	78 62	120.6	23 33.3	79 62	120.9	2
3	25 39.1	77 64	117.6	25 16.0	77 64	118.0	24 52.8	77 64	118.3	24 29.6	78 63	118.7	24 06.3	78 63	119.0	23 42.9	78 63	119.4	23 19.6	78 63	119.7	22 56.1	78 63	120.1	3
4	25 00.8	77 64	116.8	24 37.7	77 64	117.1	24 14.7	77 64	117.5	23 51.5	77 64	117.8	23 28.4	77 64	118.2	23 05.2	77 63	118.5	22 41.9	78 63	118.9	22 18.6	78 63	119.2	4
55	24 22.1	76 65	115.9	23 59.2	76 65	116.3	23 36.2	77 65	116.6	23 13.2	77 64	117.0	22 50.2	77 64	117.3	22 27.1	77 64	117.7	22 04.0	77 64	118.0	21 40.8	77 64	118.4	55
6	23 43.1	76 65	115.1	23 20.3	76 65	115.5	22 57.5	76 65	115.8	22 34.6	76 65	116.2	22 11.7	76 65	116.5	21 48.7	77 64	116.9	21 25.7	77 64	117.2	21 02.7	77 64	117.5	6
7	23 03.9	76 66	114.3	22 41.2	76 66	114.6	22 18.5	76 65	115.0	21 55.8	76 65	115.3	21 32.9	76 65	115.7	21 10.1	76 65	116.0	20 47.2	76 65	116.4	20 24.3	77 64	116.7	7
8	22 24.5	75 66	113.5	22 01.9	75 66	113.8	21 39.3	75 66	114.2	21 16.6	76 66	114.5	20 53.9	76 65	114.9	20 31.2	76 65	115.2	20 08.4	76 65	115.6	19 45.6	76 65	115.9	8
9	21 44.7	75 67	112.7	21 22.3	75 66	113.0	20 59.8	75 66	113.4	20 37.2	75 66	113.7	20 14.6	75 66	114.1	19 52.0	76 66	114.4	19 29.3	76 66	114.8	19 06.6	76 65	115.1	9
60	21 04.8	74 67	111.9	20 42.4	75 67	112.2	20 20.0	75 67	112.6	19 57.6	75 66	112.9	19 35.1	75 66	113.3	19 12.6	75 66	113.6	18 50.0	75 66	114.0	18 27.4	75 66	114.3	60
1	20 24.6	74 67	111.1	20 02.4	74 67	111.4	19 40.1	74 67	111.8	19 17.7	75 67	112.1	18 55.3	75 67	112.5	18 32.9	75 66	112.8	18 10.5	75 66	113.2	17 48.0	75 66	113.5	1
2	19 44.2	74 68	110.3	19 22.1	74 68	110.6	18 59.9	74 67	111.0	18 37.6	74 67	111.3	18 15.4	74 67	111.7	17 53.0	74 67	112.0	17 30.7	75 67	112.4	17 08.3	75 67	112.7	2
3	19 03.7	73 68	109.5	18 41.6	74 68	109.8	18 19.5	74 68	110.2	17 57.3	74 68	110.6	17 35.1	74 67	110.9	17 12.9	74 67	111.3	16 50.7	74 67	111.6	16 28.4	74 67	112.0	3
4	18 22.9	73 68	108.7	18 00.9	73 68	109.1	17 38.9	73 68	109.4	17 16.8	74 68	109.8	16 54.7	74 68	110.1	16 32.6	74 68	110.5	16 10.4	74 67	110.8	15 48.2	74 67	111.2	4
65	17 41.9	73 69	107.9	17 20.0	73 68	108.3	16 58.1	73 68	108.7	16 36.1	73 68	109.0	16 14.1	73 68	109.4	15 52.1	74 68	109.7	15 30.0	74 68	110.1	15 07.9	74 68	110.4	65
6	17 00.8	73 69	107.2	16 38.9	73 69	107.5	16 17.1	73 69	107.9	15 55.2	73 68	108.3	15 33.3	73 68	108.6	15 11.3	73 68	109.0	14 49.3	73 68	109.3	14 27.3	73 68	109.7	6
7	16 19.4	72 69	106.4	15 57.7	72 69	106.8	15 35.9	73 69	107.1	15 14.1	73 69	107.5	14 52.3	73 69	107.9	14 30.4	73 68	108.2	14 08.5	73 68	108.6	13 46.6	73 68	108.9	7
8	15 38.0	72 69	105.7	15 16.3	72 69	106.0	14 54.6	72 69	106.4	14 32.9	72 69	106.8	14 11.1	73 69	107.1	13 49.3	73 69	107.5	13 27.5	73 69	107.8	13 05.7	73 68	108.2	8
9	14 56.3	72 70	104.9	14 34.7	72 70	105.3	14 13.1	72 69	105.6	13 51.5	72 69	106.0	13 29.8	72 69	106.4	13 08.1	72 69	106.7	12 46.3	73 69	107.1	12 24.6	73 69	107.4	9
70	14 14.6	72 70	104.2	13 53.0	72 70	104.5	13 31.5	72 70	104.9	13 09.9	72 70	105.3	12 48.3	72 69	105.6	12 26.7	72 69	106.0	12 05.0	72 69	106.3	11 43.3	72 69	106.7	70
1	13 32.6	71 70	103.5	13 11.2	72 70	103.8	12 49.7	72 70	104.2	12 28.2	72 70	104.5	12 06.7	72 70	104.9	11 45.1	72 70	105.2	11 23.5	72 69	105.6	11 01.9	72 69	105.9	1
2	12 50.6	71 70	102.7	12 29.2	71 70	103.1	12 07.8	71 70	103.4	11 46.4	72 70	103.8	11 24.9	72 70	104.2	11 03.4	72 70	104.5	10 41.9	72 70	104.9	10 20.3	72 70	105.2	2
3	12 08.4	71 70	102.0	11 47.1	71 70	102.3	11 25.8	71 70	102.7	11 04.4	71 70	103.1	10 43.0	71 70	103.4	10 21.5	71 70	103.8	10 00.1	72 70	104.1	9 38.6	72 70	104.5	3
4	11 26.2	71 71	101.3	11 04.9	71 71	101.6	10 43.6	71 70	102.0	10 22.3	71 70	102.3	10 00.9	71 70	102.7	9 39.6	71 70	103.1	9 18.2	71 70	103.4	8 56.7	71 70	103.8	4
75	10 43.8	71 71	100.5	10 22.6	71 71	100.9	10 01.3	71 71	101.3	9 40.1	71 71	101.6	9 18.8	71 70	102.0	8 57.4	71 70	102.3	8 36.1	71 70	102.7	8 14.8	71 70	103.0	75
6	10 01.3	71 71	99.8	9 40.1	71 71	100.2	9 18.9	71 71	100.5	8 57.7	71 71	100.9	8 36.5	71 71	101.3	8 15.2	71 71	101.6	7 53.9	71 70	102.0	7 32.7	71 70	102.3	6
7	9 18.7	70 71	99.1	8 57.6	70 71	99.5	8 36.5	71 71	99.8	8 15.3	71 71	100.2	7 54.1	71 71	100.5	7 32.9	71 71	100.9	7 11.7	71 71	101.3	6 50.4	71 71	101.6	7
8	8 36.1	70 71	98.4	8 15.0	70 71	98.8	7 53.9	70 71	99.1	7 32.8	70 71	99.5	7 11.6	71 71	99.8	6 50.5	71 71	100.2	6 29.3	71 71	100.5	6 08.1	71 71	100.9	8
9	7 53.3	70 71	97.7	7 32.3	70 71	98.1	7 11.2	70 71	98.4	6 50.2	70 71	98.8	6 29.1	70 71	99.1	6 07.9	70 71	99.5	5 46.8	70 71	99.8	5 25.7	70 71	100.2	9
80	7 10.5	70 71	97.0	6 49.5	70 71	97.3	6 28.5	70 71	97.7	6 07.5	70 71	98.1	5 46.4	70 71	98.4	5 25.3	70 71	98.8	5 04.2	70 71	99.1				80
1	6 27.7	70 72	96.3	6 06.7	70 72	96.6	5 45.7	70 71	97.0	5 24.7	70 71	97.4	5 03.7	70 71	97.7										1
2	5 44.7	70 72	95.6	5 23.8	70 72	95.9	5 02.8	70 71	96.3																2
3	5 01.8	70 72	94.9																						3

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Lat. 44°

H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	50 00.0	1.0 01	180.0	50 30.0	1.0 01	180.0	51 00.0	1.0 01	180.0	51 30.0	1.0 01	180.0	52 00.0	1.0 01	180.0	52 30.0	1.0 01	180.0	53 00.0	1.0 01	180.0	53 30.0	1.0 01	180.0	00
1	49 59.4	1.0 03	178.4	50 29.4	1.0 03	178.4	50 59.4	1.0 03	178.4	51 29.4	1.0 03	178.4	51 59.4	1.0 03	178.4	52 29.4	1.0 03	178.4	52 59.4	1.0 03	178.4	53 29.4	1.0 03	178.3	1
2	49 57.7	1.0 05	176.9	50 27.6	1.0 05	176.9	50 57.6	1.0 05	176.8	51 27.6	1.0 05	176.8	51 57.6	1.0 05	176.8	52 27.5	1.0 05	176.7	52 57.5	1.0 05	176.7	53 27.5	1.0 05	176.7	2
3	49 54.7	1.0 07	175.3	50 24.7	1.0 07	175.3	50 54.6	1.0 07	175.3	51 24.6	1.0 07	175.2	51 54.5	1.0 07	175.2	52 24.5	1.0 07	175.1	52 54.4	1.0 07	175.1	53 24.4	1.0 07	175.0	3
4	49 50.7	1.0 09	173.8	50 20.6	1.0 09	173.7	50 50.5	1.0 09	173.7	51 20.4	1.0 09	173.6	51 50.3	1.0 09	173.6	52 20.2	1.0 09	173.5	52 50.1	1.0 09	173.4	53 20.0	1.0 09	173.3	4
05	49 45.4	1.0 11	172.3	50 15.3	1.0 11	172.2	50 45.1	1.0 11	172.1	51 15.0	99 11	172.0	51 44.8	99 11	172.0	52 14.7	99 11	171.9	52 44.5	99 11	171.8	53 14.4	99 11	171.7	05
6	49 39.1	99 13	170.7	50 08.8	99 13	170.6	50 38.6	99 13	170.5	51 08.4	99 13	170.5	51 38.2	99 13	170.4	52 08.0	99 13	170.3	52 37.8	99 13	170.2	53 07.5	99 13	170.1	6
7	49 31.5	99 14	169.2	50 01.3	99 15	169.1	50 31.0	99 15	169.0	51 00.7	99 15	168.9	51 30.4	99 15	168.8	52 00.1	99 15	168.7	52 29.8	99 15	168.5	52 59.5	99 15	168.4	7
8	49 22.9	99 16	167.7	49 52.5	99 16	167.6	50 22.2	99 17	167.4	50 51.8	99 17	167.3	51 21.4	99 17	167.2	51 51.0	99 17	167.1	52 20.6	99 17	166.9	52 50.2	99 17	166.8	8
9	49 13.1	99 18	166.2	49 42.7	98 18	166.0	50 12.2	98 18	165.9	50 41.7	98 19	165.8	51 11.3	98 19	165.6	51 40.8	98 19	165.5	52 10.3	98 19	165.3	52 39.7	98 19	165.2	9
10	49 02.3	98 20	164.7	49 31.7	98 20	164.5	50 01.2	98 20	164.4	50 30.6	98 20	164.2	51 00.0	98 21	164.1	51 29.4	98 21	163.9	51 58.8	98 21	163.8	52 28.1	98 21	163.6	10
1	48 50.3	98 22	163.2	49 19.7	98 22	163.0	49 49.0	98 22	162.9	50 18.3	98 22	162.7	50 47.6	98 23	162.5	51 16.9	98 23	162.4	51 46.1	98 23	162.2	52 15.4	97 23	162.0	1
2	48 37.3	97 23	161.7	49 06.5	97 24	161.5	49 35.7	97 24	161.4	50 04.9	97 24	161.2	50 34.1	97 24	161.0	51 03.2	97 25	160.8	51 32.3	97 25	160.6	52 01.5	97 25	160.4	2
3	48 23.2	97 25	160.2	48 52.3	97 25	160.1	49 21.4	97 26	159.9	49 50.5	97 26	159.7	50 19.5	97 26	159.5	50 48.5	97 26	159.3	51 17.5	97 27	159.1	51 46.4	97 27	158.9	3
4	48 08.1	97 27	158.8	48 37.1	96 27	158.6	49 06.0	96 27	158.4	49 34.9	96 28	158.2	50 03.8	96 28	158.0	50 32.7	96 28	157.8	51 01.5	96 28	157.6	51 30.4	96 29	157.3	4
15	47 52.0	96 28	157.4	48 20.8	96 29	157.2	48 49.6	96 29	156.9	49 18.4	96 29	156.7	49 47.1	96 30	156.5	50 15.8	96 30	156.3	50 44.5	96 30	156.0	51 13.2	95 30	155.8	15
6	47 34.9	96 30	155.9	48 03.6	96 30	155.7	48 32.2	95 31	155.5	49 00.8	95 31	155.3	49 29.4	95 31	155.0	49 58.0	95 31	154.8	50 26.5	95 32	154.6	50 55.0	95 32	154.3	6
7	47 16.9	95 32	154.5	47 45.4	95 32	154.3	48 13.8	95 32	154.1	48 42.3	95 33	153.8	49 10.7	95 33	153.6	49 39.1	95 33	153.3	50 07.5	94 33	153.1	50 35.8	94 34	152.8	7
8	46 57.8	95 33	153.1	47 26.2	94 34	152.9	47 54.5	94 34	152.7	48 22.8	94 34	152.4	48 51.0	94 34	152.2	49 19.3	94 35	151.9	49 47.4	94 35	151.6	50 15.6	94 35	151.4	8
9	46 37.9	94 35	151.8	47 06.1	94 35	151.5	47 34.2	94 35	151.3	48 02.3	94 36	151.0	48 30.4	94 36	150.7	48 58.5	93 36	150.5	49 26.5	93 37	150.2	49 54.4	93 37	149.9	9
20	46 17.0	93 36	150.4	46 45.0	93 37	150.2	47 13.0	93 37	149.9	47 41.0	93 37	149.6	48 08.9	93 37	149.3	48 36.7	93 38	149.1	49 04.6	93 38	148.8	49 32.3	93 38	148.5	20
1	45 55.3	93 38	149.1	46 23.1	93 38	148.8	46 50.9	93 38	148.5	47 18.7	92 39	148.3	47 46.4	92 39	148.0	48 14.1	92 39	147.7	48 41.7	92 39	147.4	49 09.3	92 40	147.1	1
2	45 32.7	92 39	147.8	46 00.3	92 39	147.5	46 28.0	92 40	147.2	46 55.5	92 40	146.9	47 23.1	92 40	146.6	47 50.6	92 41	146.3	48 18.0	91 41	146.0	48 45.4	91 41	145.7	2
3	45 09.2	92 40	146.4	45 36.7	92 41	146.2	46 04.2	91 41	145.9	46 31.6	91 41	145.6	46 58.9	91 42	145.3	47 26.2	91 42	145.0	47 53.5	91 42	144.7	48 20.7	91 43	144.3	3
4	44 45.0	91 42	145.2	45 12.3	91 42	144.9	45 39.5	91 42	144.6	46 06.8	91 43	144.3	46 33.9	90 43	144.0	47 01.1	90 43	143.6	47 28.1	90 44	143.3	47 55.1	90 44	143.0	4
25	44 19.9	91 43	143.9	44 47.0	90 43	143.6	45 14.1	90 44	143.3	45 41.2	90 44	143.0	46 08.1	90 44	142.7	46 35.1	90 45	142.3	47 02.0	90 45	142.0	47 28.8	89 45	141.7	25
6	43 54.1	90 44	142.6	44 21.0	90 45	142.3	44 47.9	90 45	142.0	45 14.8	89 45	141.7	45 41.6	89 46	141.4	46 08.3	89 46	141.1	46 35.0	89 46	140.7	47 01.6	89 46	140.4	6
7	43 27.5	90 45	141.4	43 54.3	89 46	141.1	44 21.0	89 46	140.8	44 47.7	89 46	140.4	45 14.3	89 47	140.1	45 40.8	88 47	139.8	46 07.3	88 47	139.5	46 33.7	88 48	139.1	7
8	43 00.2	89 47	140.2	43 26.8	89 47	139.9	43 53.4	88 47	139.5	44 19.8	88 48	139.2	44 46.2	88 48	138.9	45 12.6	88 48	138.5	45 38.9	88 49	138.2	46 05.1	87 49	137.8	8
9	42 32.3	88 48	139.0	42 58.7	88 48	138.7	43 25.0	88 48	138.3	43 51.3	88 49	138.0	44 17.5	87 49	137.7	44 43.7	87 49	137.3	45 09.8	87 50	137.0	45 35.8	87 50	136.6	9
30	42 03.6	87 49	137.8	42 29.8	87 49	137.5	42 56.0	87 49	137.1	43 22.1	87 50	136.8	43 48.1	87 50	136.5	44 14.1	86 50	136.1	44 40.0	86 51	135.8	45 05.8	86 51	135.4	30
1	41 34.3	87 50	136.6	42 00.3	87 50	136.3	42 26.3	86 51	136.0	42 52.2	86 51	135.6	43 18.0	86 51	135.3	43 43.8	86 51	134.9	44 09.6	86 52	134.6	44 35.2	85 52	134.2	1
2	41 04.3	86 51	135.5	41 30.2	86 51	135.1	41 56.0	86 52	134.8	42 21.7	86 52	134.4	42 47.4	85 52	134.1	43 13.0	85 52	133.7	43 38.5	85 53	133.4	44 04.0	85 53	133.0	2
3	40 33.7	86 52	134.3	40 59.4	85 52	134.0	41 25.0	85 53	133.7	41 50.6	85 53	133.3	42 16.1	85 53	132.9	42 41.5	85 53	132.6	43 06.8	84 54	132.2	43 32.1	84 54	131.9	3
4	40 02.6	85 53	133.2	40 28.1	85 53	132.9	40 53.5	85 53	132.5	41 18.9	84 54	132.2	41 44.2	84 54	131.8	42 09.4	84 54	131.5	42 34.6	84 55	131.1	42 59.7	84 55	130.7	4
35	39 30.9	84 54	132.1	39 56.2	84 54	131.8	40 21.4	84 54	131.4	40 46.6	84 55	131.1	41 11.7	84 55	130.7	41 36.8	83 55	130.3	42 01.8	83 56	130.0	42 26.7	83 56	129.6	35
6	38 58.6	84 55	131.0	39 23.7	84 55	130.7	39 48.8	83 55	130.3	40 13.8	83 56	130.0	40 38.8	83 56	129.6	41 03.6	83 56	129.2	41 28.4	83 56	128.9	41 53.2	82 57	128.5	6
7	38 25.8	83 56	130.0	38 50.7	83 56	129.6	39 15.6	83 56	129.3	39 40.5	83 56	128.9	40 05.2	82 57	128.5	40 29.9	82 57	128.2	40 54.6	82 57	127.8	41 19.1	82 58	127.4	7
8	37 52.4	83 56	128.9	38 17.2	83 57	128.6	38 42.0	82 57	128.2	39 06.6	82 57	127.8	39 31.2	82 58	127.5	39 55.8	82 58	127.1	40 20.2	81 58	126.7	40 44.6	81 58	126.3	8
9	37 18.6	82 57	127.9	37 43.2	82 57	127.5	38 07.8	82 58	127.2	38 32.3	82 58	126.8	38 56.7	81 58	126.4	39 21.1	81 59	126.0	39 45.4	81 59	125.7	40 09.6	81 59	125.3	9
40	36 44.3	82 58	126.9	37 08.8	81 58	126.5	37 33.2	81 58	126.1	37 57.5	81 59	125.8	38 21.8	81 59	125.4	38 46.0	81 59	125.0	39 10.1	80 60	124.6	39 34.1	80 60	124.2	40
1	36 09.5	81 59	125.8	36 33.8	81 59	125.5	36 58.1	81 59	125.1	37 22.3	80 59	124.7	37 46.4	80 60	124.4	38 10.4	80 60	124.0	38 34.3	80 60	123.6	38 58.2	79 61	123.2	1
2	35 34.3	81 59	124.9	35 58.5	80 60	124.5	36 22.6	80 60	124.1	36 46.6	80 60	123.7	37 10.5	80 60	123.4	37 34.4	79 61	123.0	37 58.2	79 61	122.6	38 21.9	79 61	122.2	2
3	34 58.7	80 60	123.9	35 22.7	80 60	123.5	35 46.6	80 61	123.1	36 10.5	79 61	122.8	36 34.3	79 61	122.4	36 58.0	79 61	122.0	37 21.6	79 62	121.6	37 45.2	78 62	121.2	3
4	34 22.7	80 61	122.9	34 46.5	79 61	122.5	35 10.3	79 61	122.2	35 34.0	79 61	121.8	35 57.6	79 62	121.4	36 21.2	78 62	121.0	36 44.7	78 62	120.6	37 08.1	78 62	120.2	4
45	33 46.2	79 61	121.9	34 09.9	79 62	121.6	34 33.6	79 62	121.2	34 57.1	78 62	120.8	35 20.6	78 62	120.4	35 44.0	78 63	120.1	36 07.4	78 63	119.7	36 30.6	77 63	119.3	45
6	33 09.4	79 62	121.0	33 33.0	78 62	120.6	33 56.5	78 62	120.3	34 19.9	78 63	119.9	34 43.2	78 63	119.5	35 06.5	77 63	119.1	35 29.7	77 63	118.7	35 52.8	77 64	118.3	6
7	32 32.2	78 63	120.1	32 55.7	78 63	119.7	33 19.0	78 63	119.3	33 42.3	77 63	118.9	34 05.5	77 63	118.6	34 28.6	77 64	118.2	34 51.7	77 64	117.8	35 14.7	76 64	117.4	7
8	31 54.7	78 63	119.2	32 18.0	77 63	118.8	32 41.2	77 64	118.4	33 04.3	77 64	118.0	33 27.4	77 64	117.6	33 50.4	77 64	117.3	34 13.3	76 64	116.9	34 36.2	76 65	116.5	8
9	31 16.9	77 64	118.2	31 40.0	77 64	117.9	32 03.1	77 64	117.5	32 26.1	77 64	117.1	32 49.0	76 64	116.7	33 11.9	76 65	116.3	33 34.7	76 65	116.0	33 57.4	76 65	115.6	9
50	30 38.7	77 64	117.3	31 01.7	77 64	117.0	31 24.6	76 65	116.6	31 47.5	76 65	116.2	32 10.3	76 65	115.8	32 33.1	76 65	115.4	32 55.7	75 65	115.1	33 18.3	75 66	114.7	50
1	30 00.2	76 65	116.5	30 23.1	76 65	116.1	30 45.9	76 65	115.7	31 08.6	76 65	115.3	31 31.3	75 65	114.9	31 53.9	75 66	114.6	32 16.5	75 66	114.2	32 39.0	75 66	113.8	1
2	29 21.4	76 65	115.6	29 44.2	76 65	115.2	30 06.9	76 66	114.8	30 29.5	75 66	114.5	30 52.1	75 66	114.1	31 14.5	75 66	113.7	31 37.0	75 66	113.3	31 59.3	74 66	112.9	2
3	28 42.3	76 66	114.7	29 05.0	75 66	114.4	29 27.6	75 66	114.0	29 50.1	75 66	113.6	30 12.5	75 66	113.2	30 34.9	74 67	112.8	30 57.2	74 67	112.4	31 19.4	74 67	112.0	3
4	28 03.0	75 66	113.9	28 25.5	75 66	113.5	28 48.0	75 66	113.1	29 10.4	75 67	112.7	29 32.7	74 67	112.4	29 55.0	74 67	112.0	30 17.2	74 67	111.6	30 39.3	74 67	111.2	4
55	27 23.4	75 66	113.0	27 45.8	75 67	112.7	28 08.2	74 67	112.3	28 30.5	74 67	111.9	28 52.7	74 67	111.5	29 14.8	74 67	111.1	29 36.9	74 67	110.7	29 59.0	73 68	110.3	55
6	26 43.6	74 67	112.2	27 05.9	74 67	111.8	27 28.1	74 67	111.4	27 50.3	74 67	111.1	28 12.4	74 67	110.7	28 34.5	73 68	110.3	28 56.5	73 68	109.9	29 18.4	73 68	109.5	6
7	26 03.5	74 67	111.4	26 25.7	74 67	111.0	26 47.8	74 68	110.6	27 09.9	73 68	110.2	27 31.9	73 68	109.8	27 53.9	73 68	109.5	28 15.8	73 68	109.1	28 37.6	73 68	108.7	7
8	25 23.2	74 68	110.5	25 45.3	74 68	110.2	26 07.3	73 68	109.8	26 29.3	73 68	109.4	26 51.2	73 68	109.0	27 13.1	73 68	108.6	27 34.9	73 68	108.3	27 56.6	72 69	107.9	8
9	24 42.7	73 68	109.7	25 04.7	73 68	109.4	25 26.6	73 68	109.0	25 48.5	73 68	108.6	26 10.3	73 68	108.2	26 32.1	72 69	107.8	26 53.8	72 69	107.5	27 15.4	72 69	107.1	9
60	24 01.9	73 68	108.9	24 23.8	73 68	108.6	24 45.7	73 68	108.2	25 07.5	73 69	107.8	25 29.2	72 69	107.4	25 50.9	72 69	107.0	26 12.5	72 69	106.7	26 34.1	72 69	106.3	60
1	23 21.0	73 69	108.1	23 42.8	73 69	107.8	24 04.6	72 69	107.4	24 26.3	72 69	107.0	24 48.0	72 69	106.6	25 09.6	72 69	106.2	25 31.1	72 69	105.9	25 52.6	71 69	105.5	1
2	22 39.9	73 69	107.3	23 01.6	72 69	107.0	23 23.3	72 69	106.6	23 45.0	72 69	106.2	24 06.5	72 69	105.8	24 28.0	72 69	105.5	24 49.5	71 70	105.1	25 10.9	71 70	104.7	2
3	21 58.6	72 69	106.6	22 20.3	72 69	106.2	22 41.9	72 69	105.8	23 03.4	72 69	105.4	23 24.9	72 70	105.1	23 46.4	71 70	104.7	24 07.8	71 70	104.3	24 29.1	71 70	103.9	3
4	21 17.2	72 69	105.8	21 38.8	72 69	105.4	22 00.3	72 70	105.0	22 21.8	72 70	104.7	22 43.2	71 70	104.3	23 04.5	71 70	103.9	23 25.9	71 70	103.5	23 47.1	71 70	103.1	4
65	20 35.6	72 70	105.0	20 57.1	72 70	104.7	21 18.5	71 70	104.3	21 39.9	71 70	103.9	22 01.3	71 70	103.5	22 22.6	71 70	103.1	22 43.8	71 70	102.8	23 05.0	71 70	102.4	65
6	19 53.8	72 70	104.3	20 15.2	71 70	103.9	20 36.6	71 70	103.5	20 58.0	71 70	103.1	21 19.3	71 70	102.8	21 40.5	71 70	102.4	22 01.7	71 70	102.0	22 22.8	70 71	101.6	6
7	19 11.9	71 70	103.5	19 33.3	71 70	103.1	19 54.6	71 70	102.8	20 15.9	71 70	102.4	20 37.1	71 70	102.0	20 58.3	71 71	101.6	21 19.4	70 71	101.3	21 40.5	70 71	100.9	7
8	18 29.9	71 70	102.8	18 51.2	71 70	102.4	19 12.4	71 70	102.0	19 33.7	71 71	101.6	19 54.8	70 71	101.3	20 15.9	70 71	100.9	20 37.0	70 71	100.5	20 58.0	70 71	100.1	8
9	17 47.7	71 70	102.0	18 09.0	71 71	101.6	18 30.2	71 71	101.3	18 51.3	70 71	100.9	19 12.4	70 71	100.5	19 33.5	70 71	100.1	19 54.5	70 71	99.8	20 15.5	70 71	99.4	9
70	17 05.4	71 71	101.3	17 26.6	71 71	100.9	17 47.8	70 71	100.5	18 08.9	70 71	100.2	18 30.0	70 71	99.8	18 51.0	70 71	99.4	19 11.9	70 71	99.0	19 32.9	70 71	98.6	70
1	16 23.1	71 71	100.5	16 44.2	70 71	100.2	17 05.3	70 71	99.8	17 26.4	70 71	99.4	17 47.4	70 71	99.0	18 08.4	70 71	98.7	18 29.3	70 71	98.3	18 50.2	70 71	97.9	1
2	15 40.6	70 71	99.8	16 01.7	70 71	99.4	16 22.7	70 71	99.1	16 43.7	70 71	98.7	17 04.7	70 71	98.3	17 25.6	70 71	97.9	17 46.5	70 71	97.6	18 07.4	69 71	97.2	2
3	14 58.0	70 71	99.1	15 19.1	70 71	98.7	15 40.1	70 71	98.3	16 01.0	70 71	98.0	16 22.0	70 71	97.6	16 42.9	70 71	97.2	17 03.7	69 71	96.8	17 24.5	69 72	96.5	3
4	14 15.3	70 71	98.4	14 36.4	70 71	98.0	14 57.3	70 71	97.6	15 18.3	70 71	97.2	15 39.2	70 71	96.9	16 00.0	69 72	96.5	16 20.8	69 72	96.1	16 41.6	69 72	95.7	4
75	13 32.6	70 71	97.6	13 53.6	70 71	97.3	14 14.5	70 71	96.9	14 35.4	70 72	96.5	14 56.3	69 72	96.2	15 17.1	69 72	95.8	15 37.9	69 72	95.4	15 58.6	69 72	95.0	75
6	12 49.8	70 71	96.9	13 10.7	70 72	96.6	13 31.6	70 72	96.2	13 52.5	70 72	95.8	14 13.3	69 72	95.4	14 34.1	69 72	95.1	14 54.9	69 72	94.7	15 15.6	69 72	94.3	6
7	12 06.9	70 72	96.2	12 27.8	70 72	95.8	12 48.7	70 72	95.5	13 09.5	69 72	95.1	13 30.3	69 72	94.7	13 51.1	69 72	94.4	14 11.9	69 72	94.0	14 32.6	69 72	93.6	7
8	11 24.0	70 72	95.5	11 44.9	70 72	95.1	12 05.7	69 72	94.8	12 26.5	69 72	94.4	12 47.3	69 72	94.0	13 08.1	69 72	93.7	13 28.8	69 72	93.3	13 49.5	69 72	92.9	8
9	10 41.0	70 72	94.8	11 01.8	69 72	94.4	11 22.7	69 72	94.1	11 43.5	69 72	93.7	12 04.2	69 72	93.3	12 25.0	69 72	93.0	12 45.7	69 72	92.6	13 06.4	69 72	92.2	9
80	9 58.0	69 72	94.1	10 18.8	69 72	93.7	10 39.6	69 72	93.4	11 00.4	69 72	93.0	11 21.1	69 72	92.6	11 41.9	69 72	92.2	12 02.6	69 72	91.9	12 23.2	69 72	91.5	80
1	9 14.9	69 72	93.4	9 35.7	69 72	93.0	9 56.5	69 72	92.7	10 17.3	69 72	92.3	10 38.0	69 72	91.9	10 58.7	69 72	91.5	11 19.4	69 72	91.2	11 40.1	69 72	90.8	1
2	8 31.8	69 72	92.7	8 52.6	69 72	92.3	9 13.4	69 72	92.0	9 34.1	69 72	91.6	9 54.9	69 72	91.2	10 15.6	69 72	90.9	10 36.3	69 72	90.5	10 56.9	69 72	90.1	2
3	7 48.7	69 72	92.0	8 09.5	69 72	91.6	8 30.2	69 72	91.3	8 51.0	69 72	90.9	9 11.7	69 72	90.5	9 32.4	69 72	90.2	9 53.1	69 72	89.8	10 13.8	69 72	89.4	3
4	7 05.5	69 72	91.3	7 26.3	69 72	90.9	7 47.1	69 72	90.6	8 07.8	69 72	90.2	8 28.5	69 72	89.8	8 49.3	69 72	89.5	9 09.9	69 72	89.1	9 30.6	69 72	88.7	4
85	6 22.4	69 72	90.6	6 43.2	69 72	90.2	7 03.9	69 72	89.9	7 24.7	69 72	89.5	7 45.4	69 72	89.1	8 06.1	69 72	88.8	8 26.8	69 72	88.4	8 47.5	69 72	88.0	85
6	5 39.2	69 72	89.9	6 00.0	69 72	89.5	6 20.8	69 72	89.2	6 41.5	69 72	88.8	7 02.2	69 72	88.4	7 23.0	69 72	88.1	7 43.7	69 72	87.7	8 04.3	69 72	87.3	6
7				5 16.8	69 72	88.8	5 37.6	69 72	88.5	5 58.4	69 72	88.1	6 19.1	69 72	87.7	6 39.8	69 72	87.4	7 00.5	69 72	87.0	7 21.2	69 72	86.7	7
8										5 15.2	69 72	87.4	5 36.0	69 72	87.1	5 56.7	69 72	86.7	6 17.4	69 72	86.3	6 38.2	69 72	86.0	8
9																5 13.7	69 72	86.0	5 34.4	69 72	85.6	5 55.1	69 72	85.3	9
90																						5 12.1	69 72	84.6	90

Digitized by GS

H.A.	4° 00′		4° 30′		5° 00′		5° 30′		6° 00′		6° 30′		7° 00′		7° 30′		H.A.
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
°	° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		°
00	42 00.0 1.0 01	180.0	41 30.0 1.0 01	180.0	41 00.0 1.0 01	180.0	40 30.0 1.0 01	180.0	40 00.0 1.0 01	180.0	39 30.0 1.0 01	180.0	39 00.0 1.0 01	180.0	38 30.0 1.0 01	180.0	00
1	41 59.5 1.0 03	178.7	41 29.5 1.0 02	178.7	40 59.5 1.0 02	178.7	40 29.5 1.0 02	178.7	39 59.5 1.0 02	178.7	39 29.5 1.0 02	178.7	38 59.5 1.0 02	178.7	38 29.5 1.0 02	178.7	1
2	41 58.0 1.0 04	177.3	41 28.0 1.0 04	177.3	40 58.0 1.0 04	177.4	40 28.0 1.0 04	177.4	39 58.0 1.0 04	177.4	39 28.1 1.0 04	177.4	38 58.1 1.0 04	177.4	38 28.1 1.0 04	177.5	2
3	41 55.5 1.0 06	176.0	41 25.5 1.0 06	176.0	40 55.5 1.0 06	176.0	40 25.6 1.0 06	176.1	39 55.6 1.0 06	176.1	39 25.6 1.0 06	176.1	38 55.7 1.0 06	176.2	38 25.7 1.0 06	176.2	3
4	41 51.9 1.0 08	174.6	41 22.0 1.0 07	174.7	40 52.1 1.0 07	174.7	40 22.1 1.0 07	174.8	39 52.2 1.0 07	174.8	39 22.3 1.0 07	174.9	38 52.3 1.0 07	174.9	38 22.4 1.0 07	174.9	4
05	41 47.4 1.0 09	173.3	41 17.5 1.0 09	173.4	40 47.6 1.0 09	173.4	40 17.7 1.0 09	173.5	39 47.8 1.0 09	173.5	39 17.9 1.0 09	173.6	38 48.0 1.0 09	173.6	38 18.1 1.0 09	173.7	05
6	41 41.9 99 11	172.0	41 12.0 1.0 11	172.0	40 42.2 1.0 11	172.1	40 12.3 1.0 11	172.2	39 42.5 1.0 11	172.2	39 12.6 1.0 10	172.3	38 42.7 1.0 10	172.4	38 12.9 1.0 10	172.4	6
7	41 35.3 99 12	170.6	41 05.5 99 12	170.7	40 35.7 99 12	170.8	40 05.9 99 12	170.9	39 36.1 99 12	170.9	39 06.3 99 12	171.0	38 36.5 99 12	171.1	38 06.7 99 12	171.2	7
8	41 27.8 99 14	169.3	40 58.1 99 14	169.4	40 28.4 99 14	169.5	39 58.6 99 14	169.6	39 28.9 99 14	169.7	38 59.1 99 14	169.8	38 29.4 99 13	169.8	37 59.6 99 13	169.9	8
9	41 19.3 99 16	168.0	40 49.7 99 16	168.1	40 20.0 99 16	168.2	39 50.3 99 15	168.3	39 20.7 99 15	168.4	38 51.0 99 15	168.5	38 21.3 99 15	168.6	37 51.6 99 15	168.7	9
10	41 09.9 99 17	166.7	40 40.3 99 17	166.8	40 10.7 99 17	166.9	39 41.1 99 17	167.0	39 11.5 99 17	167.1	38 41.9 99 17	167.2	38 12.3 99 17	167.3	37 42.7 99 16	167.4	10
1	40 59.5 98 19	165.4	40 30.0 98 19	165.5	40 00.5 98 19	165.6	39 31.0 98 18	165.7	39 01.4 98 18	165.9	38 31.9 98 18	166.0	38 02.4 98 18	166.1	37 32.8 98 18	166.2	1
2	40 48.1 98 20	164.1	40 18.7 98 20	164.2	39 49.3 98 20	164.4	39 19.9 98 20	164.5	38 50.4 98 20	164.6	38 21.0 98 20	164.7	37 51.5 98 20	164.8	37 22.1 98 19	165.0	2
3	40 35.8 98 22	162.8	40 06.5 98 22	162.9	39 37.2 98 22	163.1	39 07.9 98 22	163.2	38 38.5 98 21	163.4	38 09.2 98 21	163.5	37 39.8 98 21	163.6	37 10.4 98 21	163.7	3
4	40 22.6 97 24	161.5	39 53.4 97 23	161.7	39 24.2 97 23	161.8	38 55.0 97 23	162.0	38 25.7 98 23	162.1	37 56.5 98 23	162.3	37 27.2 98 22	162.4	36 57.9 98 22	162.5	4
15	40 08.5 97 25	160.3	39 39.4 97 25	160.4	39 10.3 97 25	160.6	38 41.2 97 24	160.7	38 12.0 97 24	160.9	37 42.9 97 24	161.0	37 13.7 97 24	161.2	36 44.5 97 24	161.3	15
6	39 53.5 97 27	159.0	39 24.5 97 26	159.2	38 55.5 97 26	159.3	38 26.5 97 26	159.5	37 57.4 97 26	159.7	37 28.4 97 26	159.8	36 59.3 97 25	160.0	36 30.3 97 25	160.1	6
7	39 37.6 96 28	157.7	39 08.7 96 28	157.9	38 39.8 96 28	158.1	38 10.9 96 27	158.3	37 42.0 96 27	158.4	37 13.1 96 27	158.6	36 44.1 96 27	158.8	36 15.2 97 27	158.9	7
8	39 20.8 96 29	156.5	38 52.1 96 29	156.7	38 23.3 96 29	156.9	37 54.5 96 29	157.1	37 25.7 96 29	157.2	36 56.9 96 28	157.4	36 28.1 96 28	157.6	35 59.3 96 28	157.8	8
9	39 03.2 95 31	155.3	38 34.6 95 31	155.5	38 05.9 95 30	155.7	37 37.3 96 30	155.8	37 08.6 96 30	156.0	36 39.9 96 30	156.2	36 11.2 96 29	156.4	35 42.5 96 29	156.6	9
20	38 44.7 95 32	154.1	38 16.2 95 32	154.3	37 47.7 95 32	154.5	37 19.2 95 31	154.7	36 50.7 95 31	154.8	36 22.1 95 31	155.0	35 53.5 95 31	155.2	35 24.9 95 31	155.4	20
1	38 25.4 94 34	152.8	37 57.1 95 33	153.1	37 28.7 95 33	153.3	37 00.3 95 33	153.5	36 31.9 95 33	153.7	36 03.5 95 32	153.9	35 35.0 95 32	154.1	35 06.6 95 32	154.3	1
2	38 05.3 94 35	151.7	37 37.1 94 35	151.9	37 08.9 94 34	152.1	36 40.6 94 34	152.3	36 12.4 94 34	152.5	35 44.1 94 34	152.7	35 15.8 94 33	152.9	34 47.5 94 33	153.1	2
3	37 44.4 93 36	150.5	37 16.4 94 36	150.7	36 48.3 94 36	150.9	36 20.2 94 35	151.1	35 52.1 94 35	151.3	35 23.9 94 35	151.6	34 55.7 94 35	151.8	34 27.6 94 34	152.0	3
4	37 22.8 93 37	149.3	36 54.9 93 37	149.5	36 26.9 93 37	149.8	35 59.0 93 37	150.0	35 31.0 93 36	150.2	35 03.0 93 36	150.4	34 35.0 93 36	150.6	34 06.9 94 36	150.9	4
25	37 00.4 92 39	148.1	36 32.6 93 38	148.4	36 04.8 93 38	148.6	35 37.0 93 38	148.8	35 09.2 93 38	149.1	34 41.3 93 37	149.3	34 13.4 93 37	149.5	33 45.5 93 37	149.7	25
6	36 37.2 92 40	147.0	36 09.6 92 40	147.2	35 42.0 92 39	147.5	35 14.3 92 39	147.7	34 46.6 92 39	147.9	34 18.9 92 39	148.2	33 51.2 93 38	148.4	33 23.4 93 38	148.6	6
7	36 13.3 91 41	145.8	35 45.9 92 41	146.1	35 18.4 92 40	146.3	34 50.9 92 40	146.6	34 23.4 92 40	146.8	33 55.8 92 40	147.1	33 28.2 92 39	147.3	33 00.6 92 39	147.5	7
8	35 48.8 91 42	144.7	35 21.5 91 42	145.0	34 54.1 91 42	145.2	34 26.8 91 41	145.5	33 59.4 91 41	145.7	33 32.0 91 41	146.0	33 04.5 92 41	146.2	32 37.1 92 40	146.5	8
9	35 23.5 90 43	143.6	34 56.4 90 43	143.9	34 29.2 91 43	144.1	34 02.0 91 42	144.4	33 34.8 91 42	144.6	33 07.5 91 42	144.9	32 40.2 91 42	145.1	32 12.9 91 41	145.4	9
30	34 57.5 90 44	142.5	34 30.6 90 44	142.8	34 03.6 90 44	143.0	33 36.5 90 44	143.3	33 09.4 90 43	143.6	32 42.3 90 43	143.8	32 15.2 91 43	144.1	31 48.0 91 42	144.3	30
1	34 31.0 89 45	141.4	34 04.1 89 45	141.7	33 37.3 90 45	142.0	33 10.4 90 45	142.2	32 43.5 90 44	142.5	32 16.5 90 44	142.8	31 49.6 90 44	143.0	31 22.5 90 44	143.3	1
2	34 03.7 89 46	140.3	33 37.1 89 46	140.6	33 10.4 89 46	140.9	32 43.7 89 46	141.2	32 16.9 89 45	141.4	31 50.1 89 45	141.7	31 23.3 89 45	142.0	30 56.4 90 45	142.2	2
3	33 35.9 88 47	139.3	33 09.4 88 47	139.6	32 42.9 88 47	139.8	32 16.3 89 47	140.1	31 49.7 89 46	140.4	31 23.0 89 46	140.7	30 56.4 89 46	140.9	30 29.7 89 46	141.2	3
4	33 07.4 88 48	138.2	32 41.1 88 48	138.5	32 14.7 88 48	138.8	31 48.3 88 48	139.1	31 21.9 88 47	139.4	30 55.4 88 47	139.6	30 28.9 88 47	139.9	30 02.3 89 47	140.2	4
35	32 38.4 87 49	137.2	32 12.2 87 49	137.5	31 46.0 87 49	137.8	31 19.8 88 49	138.1	30 53.5 88 48	138.3	30 27.1 88 48	138.6	30 00.8 88 48	138.9	29 34.4 88 48	139.2	35
6	32 08.8 87 50	136.2	31 42.8 87 50	136.5	31 16.7 87 50	136.8	30 50.6 87 50	137.0	30 24.5 87 49	137.3	29 58.3 87 49	137.6	29 32.1 87 49	137.9	29 05.9 88 48	138.2	6
7	31 38.6 86 51	135.2	31 12.8 86 51	135.5	30 46.9 86 51	135.7	30 20.9 87 50	136.0	29 55.0 87 50	136.3	29 29.0 87 50	136.6	29 02.9 87 50	136.9	28 36.8 87 49	137.2	7
8	31 07.9 86 52	134.2	30 42.2 86 52	134.5	30 16.5 86 52	134.8	29 50.7 86 51	135.0	29 24.9 86 51	135.3	28 59.0 86 51	135.6	28 33.2 86 50	135.9	28 07.2 86 50	136.2	8
9	30 36.7 85 53	133.2	30 11.2 85 53	133.5	29 45.6 85 52	133.8	29 20.0 85 52	134.1	28 54.3 86 52	134.4	28 28.6 86 52	134.7	28 02.9 86 51	134.9	27 37.1 86 51	135.2	9
40	30 05.0 85 54	132.2	29 39.6 85 53	132.5	29 14.2 85 53	132.8	28 48.7 85 53	133.1	28 23.2 85 53	133.4	27 57.6 85 52	133.7	27 32.1 85 52	134.0	27 06.4 85 52	134.3	40
1	29 32.7 84 54	131.2	29 07.5 84 54	131.5	28 42.2 84 54	131.8	28 16.9 84 54	132.1	27 51.6 85 54	132.4	27 26.2 85 53	132.7	27 00.8 85 53	133.0	26 35.3 85 53	133.3	1
2	29 00.0 84 55	130.3	28 34.9 84 55	130.6	28 09.8 84 55	130.9	27 44.7 84 55	131.2	27 19.5 84 54	131.5	26 54.3 84 54	131.8	26 29.0 84 54	132.1	26 03.7 84 54	132.4	2
3	28 26.8 83 56	129.3	28 01.9 83 56	129.6	27 37.0 83 56	129.9	27 12.0 83 55	130.2	26 46.9 84 55	130.6	26 21.8 84 55	130.9	25 56.7 84 55	131.2	25 31.6 84 54	131.5	3
4	27 53.2 82 57	128.4	27 28.5 83 56	128.7	27 03.7 83 56	129.0	26 38.8 83 56	129.3	26 13.9 83 56	129.6	25 49.0 83 56	129.9	25 24.0 83 55	130.2	24 59.0 83 55	130.6	4
45	27 19.2 82 57	127.4	26 54.6 82 57	127.8	26 29.9 82 57	128.1	26 05.2 82 57	128.4	25 40.4 83 56	128.7	25 15.7 83 56	129.0	24 50.8 83 56	129.3	24 26.0 83 56	129.6	45
6	26 44.7 81 58	126.5	26 20.2 82 58	126.9	25 55.7 82 58	127.2	25 31.2 82 57	127.5	25 06.6 82 57	127.8	24 41.9 82 57	128.1	24 17.2 82 57	128.4	23 52.5 82 56	128.7	6
7	26 09.8 81 59	125.6	25 45.5 81 59	125.9	25 21.1 81 58	126.3	24 56.7 81 58	126.6	24 32.3 82 58	126.9	24 07.8 82 58	127.2	23 43.2 82 57	127.5	23 18.7 82 57	127.9	7
8	25 34.5 81 59	124.7	25 10.4 81 59	125.1	24 46.1 81 59	125.4	24 21.9 81 59	125.7	23 57.5 81 58	126.0	23 33.2 81 58	126.3	23 08.8 81 58	126.7	22 44.4 81 58	127.0	8
9	24 58.9 80 60	123.8	24 34.8 80 60	124.2	24 10.7 80 60	124.5	23 46.6 81 59	124.8	23 22.4 81 59	125.1	22 58.2 81 59	125.5	22 34.0 81 59	125.8	22 09.7 81 58	126.1	9
50	24 22.8 80 61	123.0	23 58.9 80 60	123.3	23 35.0 80 60	123.6	23 11.0 80 60	124.0	22 47.0 80 60	124.3	22 22.9 80 60	124.6	21 58.8 80 59	124.9	21 34.6 81 59	125.2	50
1	23 46.5 79 61	122.1	23 22.7 79 61	122.4	22 58.9 79 61	122.8	22 35.0 80 61	123.1	22 11.1 80 60	123.4	21 47.2 80 60	123.7	21 23.2 80 60	124.1	20 59.2 80 60	124.4	1
2	23 09.7 79 62	121.2	22 46.1 79 62	121.6	22 22.4 79 61	121.9	21 58.7 79 61	122.2	21 34.9 79 61	122.6	21 11.1 79 61	122.9	20 47.3 80 60	123.2	20 23.4 80 60	123.5	2
3	22 32.7 78 62	120.4	22 09.1 78 62	120.7	21 45.6 79 62	121.1	21 22.0 79 62	121.4	20 58.4 79 61	121.7	20 34.7 79 61	122.0	20 11.0 79 61	122.4	19 47.3 79 61	122.7	3
4	21 55.3 78 63	119.5	21 31.9 78 63	119.9	21 08.5 78 62	120.2	20 45.0 78 62	120.6	20 21.5 78 62	120.9	19 58.0 79 62	121.2	19 34.4 79 62	121.5	19 10.8 79 61	121.9	4
55	21 17.6 77 63	118.7	20 54.3 78 63	119.1	20 31.0 78 63	119.4	20 07.7 78 63	119.7	19 44.3 78 63	120.1	19 20.9 78 62	120.4	18 57.4 78 62	120.7	18 34.0 78 62	121.0	55
6	20 39.6 77 64	117.9	20 16.4 77 64	118.2	19 53.3 77 63	118.6	19 30.0 77 63	118.9	19 06.8 78 63	119.2	18 43.5 78 63	119.6	18 20.2 78 63	119.9	17 56.8 78 62	120.2	6
7	20 01.3 77 64	117.1	19 38.3 77 64	117.4	19 15.2 77 64	117.8	18 52.1 77 64	118.1	18 29.0 77 64	118.4	18 05.8 77 63	118.8	17 42.6 77 63	119.1	17 19.4 77 63	119.4	7
8	19 22.7 76 65	116.3	18 59.8 76 65	116.6	18 36.9 77 64	116.9	18 13.9 77 64	117.3	17 50.9 77 64	117.6	17 27.8 77 64	118.0	17 04.8 77 64	118.3	16 41.6 77 63	118.6	8
9	18 43.9 76 65	115.5	18 21.1 76 65	115.8	17 58.3 76 65	116.1	17 35.4 76 65	116.5	17 12.5 76 64	116.8	16 49.6 76 64	117.2	16 26.6 77 64	117.5	16 03.6 77 64	117.8	9
60	18 04.8 76 66	114.7	17 42.1 76 65	115.0	17 19.4 76 65	115.3	16 56.6 76 65	115.7	16 33.8 76 65	116.0	16 11.0 76 65	116.4	15 48.2 76 64	116.7	15 25.3 76 64	117.0	60
1	17 25.4 75 66	113.9	17 02.9 75 66	114.2	16 40.2 75 66	114.6	16 17.6 76 65	114.9	15 54.9 76 65	115.2	15 32.2 76 65	115.6	15 09.5 76 65	115.9	14 46.7 76 65	116.3	1
2	16 45.8 75 66	113.1	16 23.4 75 66	113.4	16 00.9 75 66	113.8	15 38.3 75 66	114.1	15 15.8 75 66	114.5	14 53.2 75 66	114.8	14 30.6 75 65	115.1	14 07.9 76 65	115.5	2
3	16 06.0 74 67	112.3	15 43.7 75 67	112.7	15 21.3 75 66	113.0	14 58.8 75 66	113.3	14 36.4 75 66	113.7	14 13.9 75 66	114.0	13 51.4 75 66	114.4	13 28.8 75 66	114.7	3
4	15 26.0 74 67	111.5	15 03.7 74 67	111.9	14 41.4 74 67	112.2	14 19.1 74 67	112.6	13 56.7 75 66	112.9	13 34.3 75 66	113.3	13 11.9 75 66	113.6	12 49.5 75 66	113.9	4
65	14 45.7 74 67	110.8	14 23.6 74 67	111.1	14 01.4 74 67	111.5	13 39.1 74 67	111.8	13 16.9 74 67	112.2	12 54.6 74 67	112.5	12 32.3 74 66	112.8	12 09.9 75 66	113.2	65
6	14 05.3 74 68	110.0	13 43.2 74 68	110.4	13 21.1 74 67	110.7	12 59.0 74 67	111.1	12 36.8 74 67	111.4	12 14.6 74 67	111.8	11 52.4 74 67	112.1	11 30.1 74 67	112.4	6
7	13 24.6 73 68	109.3	13 02.6 73 68	109.6	12 40.6 73 68	110.0	12 18.6 74 68	110.3	11 56.5 74 67	110.7	11 34.4 74 67	111.0	11 12.3 74 67	111.3	10 50.1 74 67	111.7	7
8	12 43.8 73 68	108.5	12 21.9 73 68	108.9	12 00.0 73 68	109.2	11 38.0 73 68	109.6	11 16.0 73 68	109.9	10 54.0 73 68	110.3	10 32.0 73 68	110.6	10 09.9 74 67	110.9	8
9	12 02.8 73 69	107.8	11 41.0 73 69	108.1	11 19.1 73 68	108.5	10 57.2 73 68	108.8	10 35.3 73 68	109.2	10 13.4 73 68	109.5	9 51.5 73 68	109.9	9 29.5 73 68	110.2	9
70	11 21.6 72 69	107.0	10 59.9 73 69	107.4	10 38.1 73 69	107.7	10 16.3 73 69	108.1	9 54.5 73 68	108.4	9 32.7 73 68	108.8	9 10.8 73 68	109.1	8 48.9 73 68	109.5	70
1	10 40.3 72 69	106.3	10 18.6 72 69	106.6	9 56.9 72 69	107.0	9 35.2 72 69	107.4	9 13.5 72 69	107.7	8 51.7 73 69	108.0	8 29.9 73 68	108.4	8 08.1 73 68	108.7	1
2	9 58.7 72 69	105.6	9 37.2 72 69	105.9	9 15.5 72 69	106.3	8 53.9 72 69	106.6	8 32.3 72 69	107.0	8 10.6 72 69	107.3	7 48.9 72 69	107.7	7 27.2 72 69	108.0	2
3	9 17.1 72 70	104.8	8 55.6 72 70	105.2	8 34.0 72 69	105.5	8 12.5 72 69	105.9	7 50.9 72 69	106.2	7 29.3 72 69	106.6	7 07.7 72 69	106.9	6 46.1 72 69	107.3	3
4	8 35.3 71 70	104.1	8 13.9 72 70	104.5	7 52.4 72 70	104.8	7 30.9 72 70	105.2	7 09.4 72 69	105.5	6 47.9 72 69	105.9	6 26.3 72 69	106.2	6 04.8 72 69	106.6	4
75	7 53.4 71 70	103.4	7 32.0 71 70	103.8	7 10.6 71 70	104.1	6 49.2 71 70	104.5	6 27.7 71 70	104.8	6 06.3 72 70	105.2	5 44.8 72 69	105.5	5 23.3 72 69	105.9	75
6	7 11.3 71 70	102.7	6 50.0 71 70	103.0	6 28.7 71 70	103.4	6 07.3 71 70	103.7	5 45.9 71 70	104.1	5 24.6 71 70	104.4	5 03.2 71 70	104.8			6
7	6 29.2 71 70	102.0	6 07.9 71 70	102.3	5 46.6 71 70	102.7	5 25.3 71 70	103.0	5 04.0 71 70	103.4							7
8	5 46.9 71 71	101.3	5 25.7 71 70	101.6	5 04.5 71 70	102.0											8
9	5 04.5 71 71	100.6															9

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Lat. 44°

H.A.	8° 00′			8° 30′			9° 00′			9° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	54 00.0	1.0 01	180.0	54 30.0	1.0 01	180.0	55 00.0	1.0 01	180.0	55 30.0	1.0 01	180.0
1	53 59.4	1.0 03	178.3	54 29.4	1.0 03	178.3	54 59.4	1.0 03	178.3	55 29.3	1.0 03	178.3
2	53 57.5	1.0 05	176.6	54 27.4	1.0 05	176.6	54 57.4	1.0 05	176.6	55 27.4	1.0 06	176.5
3	53 54.3	1.0 07	174.9	54 24.2	1.0 07	174.9	54 54.2	1.0 08	174.8	55 24.1	1.0 08	174.8
4	53 49.9	1.0 09	173.3	54 19.8	1.0 10	173.2	54 49.6	1.0 10	173.1	55 19.5	1.0 10	173.1
05	53 44.2	99 12	171.6	54 14.0	99 12	171.5	54 43.8	99 12	171.4	55 13.7	99 12	171.3
6	53 37.3	99 14	169.9	54 07.0	99 14	169.8	54 36.8	99 14	169.7	55 06.5	99 14	169.6
7	53 29.1	99 16	168.3	53 58.8	99 16	168.2	54 28.5	99 16	168.0	54 58.1	99 16	167.9
8	53 19.8	99 18	166.7	53 49.3	99 18	166.5	54 18.9	99 18	166.4	54 48.5	98 18	166.2
9	53 09.2	98 20	165.0	53 38.7	98 20	164.9	54 08.1	98 20	164.7	54 37.6	98 20	164.5
10	52 57.5	98 22	163.4	53 26.8	98 22	163.2	53 56.2	98 22	163.1	54 25.5	98 22	162.9
1	52 44.6	97 23	161.8	53 13.8	97 24	161.6	53 43.0	97 24	161.4	54 12.2	97 24	161.2
2	52 30.5	97 26	160.2	52 59.6	97 26	160.0	53 28.7	97 26	159.8	53 57.7	97 26	159.6
3	52 15.4	96 27	158.7	52 44.3	96 27	158.4	53 13.2	96 28	158.2	53 42.1	96 28	158.0
4	51 59.1	96 29	157.1	52 27.9	96 29	156.9	52 56.6	96 29	156.6	53 25.4	96 30	156.4
15	51 41.8	95 31	155.6	52 10.4	95 31	155.3	52 39.0	95 31	155.1	53 07.5	95 32	154.8
6	51 23.5	95 32	154.1	51 51.9	95 33	153.8	52 20.3	95 33	153.5	52 48.6	94 33	153.3
7	51 04.1	94 34	152.6	51 32.3	94 34	152.3	52 00.5	94 35	152.0	52 28.7	94 35	151.7
8	50 43.7	94 36	151.1	51 11.8	93 36	150.8	51 39.8	93 36	150.5	52 07.8	93 37	150.2
9	50 22.4	93 37	149.6	50 50.2	93 37	149.3	51 18.1	93 38	149.0	51 45.9	93 38	148.7
20	50 00.1	92 39	148.2	50 27.8	92 39	147.9	50 55.4	92 39	147.6	51 23.0	92 40	147.3
1	49 36.9	92 40	146.8	50 04.4	92 40	146.5	50 31.8	91 41	146.2	50 59.2	91 41	145.8
2	49 12.8	91 42	145.4	49 40.1	91 42	145.1	50 07.4	91 42	144.8	50 34.5	91 43	144.4
3	48 47.9	90 43	144.0	49 15.0	90 43	143.7	49 42.0	90 44	143.4	50 09.0	90 44	143.0
4	48 22.1	90 44	142.7	48 49.0	90 45	142.3	49 15.9	89 45	142.0	49 42.6	89 45	141.7
25	47 55.5	89 46	141.3	48 22.2	89 46	141.0	48 48.9	89 46	140.7	49 15.5	88 47	140.3
6	47 28.2	88 47	140.0	47 54.7	88 47	139.7	48 21.1	88 48	139.3	48 47.5	88 48	139.0
7	47 00.1	88 48	138.8	47 26.4	88 48	138.4	47 52.7	87 49	138.0	48 18.8	87 49	137.7
8	46 31.3	87 49	137.5	46 57.4	87 50	137.1	47 23.4	87 50	136.8	47 49.4	86 50	136.4
9	46 01.8	86 50	136.3	46 27.7	86 51	135.9	46 53.5	86 51	135.5	47 19.3	86 51	135.1
30	45 31.6	86 51	135.0	45 57.3	86 52	134.7	46 23.0	85 52	134.3	46 48.5	85 52	133.9
1	45 00.8	85 52	133.8	45 26.3	85 53	133.5	45 51.8	85 53	133.1	46 17.1	84 53	132.7
2	44 29.4	85 53	132.6	44 54.7	84 54	132.3	45 19.9	84 54	131.9	45 45.1	84 54	131.5
3	43 57.3	84 54	131.5	44 22.4	84 55	131.1	44 47.5	83 55	130.7	45 12.5	83 55	130.3
4	43 24.7	83 55	130.3	43 49.6	83 56	130.0	44 14.5	83 56	129.6	44 39.3	82 56	129.2
35	42 51.5	83 56	129.2	43 16.3	82 56	128.8	43 41.0	82 57	128.4	44 05.6	82 57	128.0
6	42 17.8	82 57	128.1	42 42.4	82 57	127.7	43 06.9	82 58	127.3	43 31.3	81 58	126.9
7	41 43.6	81 58	127.0	42 08.0	81 58	126.6	42 32.3	81 58	126.2	42 56.5	81 59	125.8
8	41 08.9	81 59	125.9	41 33.1	81 59	125.5	41 57.3	80 59	125.1	42 21.3	80 60	124.7
9	40 33.7	80 59	124.9	40 57.8	80 60	124.5	41 21.7	80 60	124.1	41 45.6	79 60	123.7
40	39 58.1	80 60	123.8	40 22.0	79 60	123.4	40 45.8	79 61	123.0	41 09.5	79 61	122.6
1	39 22.0	79 61	122.8	39 45.7	79 61	122.4	40 09.4	79 61	122.0	40 32.9	78 62	121.6
2	38 45.6	79 61	121.8	39 09.1	78 62	121.4	39 32.6	78 62	121.0	39 56.0	78 62	120.6
3	38 08.7	78 62	120.8	38 32.1	78 62	120.4	38 55.4	78 63	120.0	39 18.7	77 63	119.6
4	37 31.4	78 63	119.8	37 54.7	77 63	119.4	38 17.9	77 63	119.0	38 41.0	77 63	118.6
45	36 53.8	77 63	118.9	37 16.9	77 64	118.5	37 40.0	77 64	118.1	38 02.9	76 64	117.7
6	36 15.9	77 64	117.9	36 38.8	76 64	117.5	37 01.7	76 64	117.1	37 24.5	76 65	116.7
7	35 37.6	76 64	117.0	36 00.4	76 65	116.6	36 23.1	76 65	116.2	36 45.8	75 65	115.8
8	34 58.9	76 65	116.1	35 21.6	76 65	115.7	35 44.3	75 65	115.3	36 06.8	75 66	114.9
9	34 20.0	75 65	115.2	34 42.6	75 66	114.8	35 05.1	75 66	114.4	35 27.5	75 66	114.0
50	33 40.8	75 66	114.3	34 03.3	75 66	113.9	34 25.6	74 66	113.5	34 47.9	74 66	113.1
1	33 01.3	75 66	113.4	33 23.7	74 66	113.0	33 45.9	74 67	112.6	34 08.1	74 67	112.2
2	32 21.6	74 67	112.5	32 43.8	74 67	112.1	33 05.9	74 67	111.7	33 28.0	73 67	111.3
3	31 41.6	74 67	111.6	32 03.7	74 67	111.2	32 25.7	73 67	110.8	32 47.7	73 68	110.4
4	31 01.4	73 67	110.8	31 23.4	73 68	110.4	31 45.3	73 68	110.0	32 07.1	73 68	109.6
55	30 20.9	73 68	110.0	30 42.8	73 68	109.6	31 04.6	73 68	109.2	31 26.3	72 68	108.8
6	29 40.2	73 68	109.1	30 02.0	72 68	108.7	30 23.7	72 68	108.3	30 45.4	72 69	107.9
7	28 59.4	72 68	108.3	29 21.0	72 69	107.9	29 42.7	72 69	107.5	30 04.2	72 69	107.1
8	28 18.3	72 69	107.5	28 39.9	72 69	107.1	29 01.4	72 69	106.7	29 22.9	71 69	106.3
9	27 37.0	72 69	106.7	27 58.5	72 69	106.3	28 20.0	71 69	105.9	28 41.4	71 69	105.5
60	26 55.6	72 69	105.9	27 17.0	71 69	105.5	27 38.4	71 70	105.1	27 59.7	71 70	104.7
1	26 14.0	71 70	105.1	26 35.3	71 70	104.7	26 56.6	71 70	104.3	27 17.9	71 70	103.9
2	25 32.2	71 70	104.3	25 53.5	71 70	103.9	26 14.7	71 70	103.5	26 35.9	70 70	103.1
3	24 50.4	71 70	103.5	25 11.6	71 70	103.1	25 32.7	70 70	102.7	25 53.8	70 70	102.3
4	24 08.3	71 70	102.8	24 29.5	70 70	102.4	24 50.5	70 70	102.0	25 11.6	70 71	101.6
65	23 26.2	70 70	102.0	23 47.2	70 71	101.6	24 08.3	70 71	101.2	24 29.2	70 71	100.8
6	22 43.9	70 71	101.2	23 04.9	70 71	100.8	23 25.9	70 71	100.5	23 46.8	70 71	100.1
7	22 01.5	70 71	100.5	22 22.5	70 71	100.1	22 43.4	70 71	99.7	23 04.2	69 71	99.3
8	21 19.0	70 71	99.7	21 39.9	70 71	99.4	22 00.8	69 71	99.0	22 21.6	69 71	98.6
9	20 36.4	70 71	99.0	20 57.3	69 71	98.6	21 18.1	69 71	98.2	21 38.9	69 71	97.8
70	19 53.8	70 71	98.3	20 14.6	69 71	97.9	20 35.4	69 71	97.5	20 56.1	69 71	97.1
1	19 11.0	69 71	97.5	19 31.8	69 71	97.2	19 52.5	69 71	96.8	20 13.2	69 72	96.4
2	18 28.2	69 71	96.8	18 48.9	69 72	96.4	19 09.6	69 72	96.0	19 30.3	69 72	95.7
3	17 45.3	69 72	96.1	18 06.0	69 72	95.7	18 26.7	69 72	95.3	18 47.3	69 72	94.9
4	17 02.3	69 72	95.4	17 23.0	69 72	95.0	17 43.7	69 72	94.6	18 04.3	69 72	94.2
75	16 19.4	69 72	94.7	16 40.0	69 72	94.3	17 00.7	69 72	93.9	17 21.2	69 72	93.5
6	15 36.3	69 72	93.9	15 57.0	69 72	93.6	16 17.6	69 72	93.2	16 38.2	69 72	92.8
7	14 53.2	69 72	93.2	15 13.9	69 72	92.9	15 34.5	69 72	92.5	15 55.0	68 72	92.1
8	14 10.1	69 72	92.5	14 30.8	69 72	92.2	14 51.3	69 72	91.8	15 11.9	68 72	91.4
9	13 27.0	69 72	91.8	13 47.6	69 72	91.5	14 08.2	69 72	91.1	14 28.7	68 72	90.7
80	12 43.9	69 72	91.1	13 04.5	69 72	90.8	13 25.0	69 72	90.4	13 45.6	68 72	90.0
1	12 00.7	69 72	90.4	12 21.3	69 72	90.1	12 41.9	69 72	89.7	13 02.4	68 72	89.3
2	11 17.5	69 72	89.7	11 38.1	69 72	89.4	11 58.7	69 72	89.0	12 19.3	68 72	88.6
3	10 34.4	69 72	89.1	10 55.0	69 72	88.7	11 15.6	69 72	88.3	11 36.1	68 72	87.9
4	9 51.2	69 72	88.4	10 11.9	69 72	88.0	10 32.4	69 72	87.6	10 53.0	68 72	87.3
85	9 08.1	69 72	87.7	9 28.7	69 72	87.3	9 49.3	69 72	86.9	10 09.9	69 72	86.6
6	8 25.0	69 72	87.0	8 45.6	69 72	86.6	9 06.2	69 72	86.2	9 26.8	69 72	85.9
7	7 41.9	69 72	86.3	8 02.6	69 72	85.9	8 23.2	69 72	85.6	8 43.8	69 72	85.2
8	6 58.9	69 72	85.6	7 19.5	69 72	85.2	7 40.2	69 72	84.9	8 00.8	69 72	84.5
9	6 15.8	69 72	84.9	6 36.5	69 72	84.6	6 57.2	69 72	84.2	7 17.9	69 71	83.8
90	5 32.9	69 72	84.2	5 53.6	69 71	83.9	6 14.3	69 71	83.5	6 35.0	69 71	83.1

10° 00′			10° 30′			11° 00′			11° 30′			H.A.
Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
56 00.0	1.0 01	180.0	56 30.0	1.0 01	180.0	57 00.0	1.0 01	180.0	57 30.0	1.0 01	180.0	00
55 59.3	1.0 03	178.2	56 29.3	1.0 03	178.2	56 59.3	1.0 03	178.2	57 29.3	1.0 03	178.2	1
55 57.3	1.0 06	176.5	56 27.3	1.0 06	176.4	56 57.3	1.0 06	176.4	57 27.3	1.0 06	176.4	2
55 54.0	1.0 08	174.7	56 24.0	1.0 08	174.7	56 53.9	1.0 08	174.6	57 23.8	1.0 08	174.5	3
55 49.4	1.0 10	173.0	56 19.3	1.0 10	172.9	56 49.2	1.0 10	172.8	57 19.0	1.0 10	172.7	4
55 43.5	99 12	171.2	56 13.3	99 12	171.1	56 43.1	99 12	171.0	57 12.9	99 12	170.9	05
55 36.3	99 14	169.5	56 06.0	99 14	169.4	56 35.7	99 14	169.3	57 05.4	99 15	169.1	6
55 27.8	99 16	167.8	55 57.4	99 16	167.6	56 27.0	99 17	167.5	56 56.6	99 17	167.4	7
55 18.0	98 18	166.1	55 47.5	98 19	165.9	56 17.0	98 19	165.8	56 46.5	98 19	165.6	8
55 07.0	98 20	164.4	55 36.4	98 21	164.2	56 05.8	98 21	164.0	56 35.2	98 21	163.8	9
54 54.8	98 22	162.7	55 24.0	98 23	162.5	55 53.3	97 23	162.3	56 22.5	97 23	162.1	10
54 41.3	97 24	161.0	55 10.4	97 25	160.8	55 39.6	97 25	160.6	56 08.6	97 25	160.4	1
54 26.7	97 26	159.4	54 55.7	97 27	159.2	55 24.6	96 27	158.9	55 53.6	96 27	158.7	2
54 10.9	96 28	157.8	54 39.7	96 28	157.5	55 08.5	96 29	157.3	55 37.3	96 29	157.0	3
53 54.0	96 30	156.1	54 22.7	95 30	155.9	54 51.3	95 31	155.6	55 19.9	95 31	155.4	4
53 36.0	95 32	154.6	54 04.5	95 32	154.3	54 32.9	95 32	154.0	55 01.3	95 33	153.7	15
53 17.0	94 34	153.0	53 45.2	94 34	152.7	54 13.5	94 34	152.4	54 41.7	94 34	152.1	6
52 56.8	94 35	151.5	53 24.9	94 36	151.2	53 53.0	93 36	150.9	54 21.0	93 36	150.6	7
52 35.7	93 37	149.9	53 03.6	93 37	149.6	53 31.5	93 38	149.3	53 59.3	93 38	149.0	8
52 13.6	92 38	148.4	52 41.3	92 39	148.1	53 09.0	92 39	147.8	53 36.5	92 39	147.5	9
51 50.5	92 40	147.0	52 18.0	92 40	146.6	52 45.5	91 41	146.3	53 12.9	91 41	146.0	20
51 26.6	91 41	145.5	51 53.8	91 42	145.2	52 21.1	91 42	144.8	52 48.2	90 43	144.5	1
51 01.7	90 43	144.1	51 28.8	90 43	143.7	51 55.8	90 44	143.4	52 22.7	90 44	143.0	2
50 35.9	90 44	142.7	51 02.8	89 45	142.3	51 29.6	89 45	142.0	51 56.3	89 45	141.6	3
50 09.4	89 46	141.3	50 36.0	89 46	140.9	51 02.6	89 46	140.6	51 29.1	88 47	140.2	4
49 42.0	88 47	139.9	50 08.4	88 47	139.6	50 34.8	88 48	139.2	51 01.1	88 48	138.8	25
49 13.8	88 48	138.6	49 40.1	87 49	138.2	50 06.2	87 49	137.9	50 32.3	87 49	137.5	6
48 44.9	87 49	137.3	49 10.9	87 50	136.9	49 36.9	86 50	136.5	50 02.8	86 50	136.2	7
48 15.3	86 50	136.0	48 41.1	86 51	135.6	49 06.9	86 51	135.2	49 32.5	85 52	134.8	8
47 45.0	85 52	134.8	48 10.6	85 52	134.4	48 36.1	85 52	134.0	49 01.6	85 53	133.6	9
47 14.0	85 53	133.5	47 39.4	85 53	133.1	48 04.7	84 53	132.7	48 30.0	84 54	132.3	30
46 42.4	84 54	132.3	47 07.6	84 54	131.9	47 32.7	84 54	131.5	47 57.8	83 55	131.1	1
46 10.2	83 55	131.1	46 35.2	83 55	130.7	47 00.1	83 55	130.3	47 24.9	83 56	129.9	2
45 37.4	83 56	129.9	46 02.2	83 56	129.5	46 26.9	82 56	129.1	46 51.5	82 57	128.7	3
45 04.0	82 57	128.8	45 28.6	82 57	128.4	45 53.1	82 57	127.9	46 17.6	81 57	127.5	4
44 30.1	82 57	127.6	44 54.5	81 58	127.2	45 18.8	81 58	126.8	45 43.1	81 58	126.4	35
43 55.6	81 58	126.5	44 19.9	81 59	126.1	44 44.0	80 59	125.7	45 08.1	80 59	125.3	6
43 20.7	80 59	125.4	43 44.8	80 59	125.0	44 08.7	80 60	124.6	44 32.6	79 60	124.2	7
42 45.3	80 60	124.3	43 09.2	79 60	123.9	43 33.0	79 60	123.5	43 56.7	79 61	123.1	8
42 09.4	79 60	123.3	42 33.1	79 61	122.9	42 56.8	79 61	122.4	43 20.3	78 61	122.0	9
41 33.1	79 61	122.2	41 56.7	78 61	121.8	42 20.1	78 62	121.4	42 43.5	78 62	121.0	40
40 56.4	78 62	121.2	41 19.8	78 62	120.8	41 43.1	77 62	120.4	42 06.3	77 63	119.9	1
40 19.3	78 62	120.2	40 42.5	77 63	119.8	41 05.7	77 63	119.4	41 28.7	77 63	118.9	2
39 41.8	77 63	119.2	40 04.9	77 63	118.8	40 27.9	76 64	118.4	40 50.7	76 64	117.9	3
39 04.0	77 64	118.2	39 26.9	76 64	117.8	39 49.7	76 64	117.4	40 12.4	76 64	117.0	4
38 25.8	76 64	117.3	38 48.5	76 64	116.8	39 11.2	75 65	116.4	39 33.8	75 65	116.0	45
37 47.2	76 65	116.3	38 09.9	75 65	115.9	38 32.4	75 65	115.5	38 54.9	75 65	115.0	6
37 08.4	75 65	115.4	37 30.9	75 65	115.0	37 53.3	75 66	114.5	38 15.6	74 66	114.1	7
36 29.2	75 66	114.5	36 51.6	74 66	114.0	37 13.9	74 66	113.6	37 36.1	74 66	113.2	8
35 49.8	74 66	113.5	36 12.1	74 66	113.1	36 34.2	74 67	112.7	36 56.3	73 67	112.3	9
35 10.1	74 67	112.7	35 32.2	74 67	112.2	35 54.3	73 67	111.8	36 16.2	73 67	111.4	50
34 30.2	73 67	111.8	34 52.2	73 67	111.4	35 14.1	73 67	110.9	35 35.9	73 68	110.5	1
33 50.0	73 67	110.9	34 11.8	73 68	110.5	34 33.6	73 68	110.1	34 55.4	72 68	109.6	2
33 09.5	73 68	110.0	33 31.3	72 68	109.6	33 53.0	72 68	109.2	34 14.6	72 68	108.8	3
32 28.9	72 68	109.2	32 50.5	72 68	108.8	33 12.1	72 68	108.4	33 33.6	72 69	107.9	4
31 48.0	72 68	108.3	32 09.6	72 69	107.9	32 31.1	72 69	107.5	32 52.5	71 69	107.1	55
31 06.9	72 69	107.5	31 28.4	71 69	107.1	31 49.8	71 69	106.7	32 11.2	71 69	106.3	6
30 25.7	71 69	106.7	30 47.1	71 69	106.3	31 08.4	71 69	105.9	31 29.6	71 69	105.5	7
29 44.2	71 69	105.9	30 05.6	71 69	105.5	30 26.8	71 70	105.1	30 48.0	70 70	104.7	8
29 02.7	71 70	105.1	29 23.9	71 70	104.7	29 45.0	70 70	104.3	30 06.1	70 70	103.9	9
28 20.9	71 70	104.3	28 42.1	70 70	103.9	29 03.1	70 70	103.5	29 24.2	70 70	103.1	60
27 39.0	70 70	103.5	28 00.1	70 70	103.1	28 21.1	70 70	102.7	28 42.0	70 70	102.3	1
26 57.0	70 70	102.7	27 18.0	70 70	102.3	27 38.9	70 70	101.9	27 59.8	69 71	101.5	2
26 14.8	70 70	101.9	26 35.8	70 71	101.5	26 56.6	70 71	101.1	27 17.5	69 71	100.7	3
25 32.5	70 71	101.2	25 53.4	70 71	100.8	26 14.2	69 71	100.4	26 35.0	69 71	100.0	4
24 50.1	70 71	100.4	25 11.0	69 71	100.0	25 31.7	69 71	99.6	25 52.4	69 71	99.2	65
24 07.6	69 71	99.7	24 28.4	69 71	99.3	24 49.1	69 71	98.9	25 09.8	69 71	98.5	6
23 25.0	69 71	98.9	23 45.8	69 71	98.5	24 06.5	69 71	98.1	24 27.1	69 71	97.7	7
22 42.4	69 71	98.2	23 03.1	69 71	97.8	23 23.7	69 71	97.4	23 44.3	68 71	97.0	8
21 59.6	69 71	97.5	22 20.3	69 71	97.1	22 40.9	69 72	96.7	23 01.4	68 72	96.3	9
21 16.8	69 72	96.7	21 37.4	69 72	96.3	21 58.0	68 72	95.9	22 18.5	68 72	95.5	70
20 33.9	69 72	96.0	20 54.5	69 72	95.6	21 15.0	68 72	95.2	21 35.5	68 72	94.8	1
19 50.9	69 72	95.3	20 11.5	68 72	94.9	20 32.0	68 72	94.5	20 52.5	68 72	94.1	2
19 07.9	69 72	94.6	19 28.5	68 72	94.2	19 48.9	68 72	93.8	20 09.4	68 72	93.4	3
18 24.9	68 72	93.8	18 45.4	68 72	93.5	19 05.9	68 72	93.1	19 26.3	68 72	92.7	4
17 41.8	68 72	93.1	18 02.3	68 72	92.8	18 22.8	68 72	92.4	18 43.2	68 72	92.0	75
16 58.7	68 72	92.4	17 19.2	68 72	92.0	17 39.6	68 72	91.7	18 00.0	68 72	91.3	6
16 15.6	68 72	91.7	16 36.0	68 72	91.3	16 56.5	68 72	91.0	17 16.9	68 72	90.6	7
15 32.4	68 72	91.0	15 52.9	68 72	90.7	16 13.3	68 72	90.3	16 33.7	68 72	89.9	8
14 49.3	68 72	90.3	15 09.7	68 72	90.0	15 30.2	68 72	89.6	15 50.5	68 72	89.2	9
14 06.1	68 72	89.6	14 26.6	68 72	89.3	14 47.0	68 72	88.9	15 07.4	68 72	88.5	80
13 22.9	68 72	88.9	13 43.4	68 72	88.6	14 03.9	68 72	88.2	14 24.3	68 72	87.8	1
12 39.8	68 72	88.3	13 00.3	68 72	87.9	13 20.7	68 72	87.5	13 41.1	68 72	87.1	2
11 56.7	68 72	87.6	12 17.2	68 72	87.2	12 37.6	68 72	86.8	12 58.0	68 72	86.4	3
11 13.5	68 72	86.9	11 34.1	68 72	86.5	11 54.5	68 72	86.1	12 15.0	68 72	85.8	4
10 30.5	68 72	86.2	10 51.0	68 72	85.8	11 11.5	68 72	85.4	11 32.0	68 72	85.1	85
9 47.4	69 72	85.5	10 08.0	68 72	85.1	10 28.5	68 72	84.8	10 49.0	68 72	84.4	6
9 04.4	69 72	84.8	9 25.0	69 72	84.5	9 45.5	68 72	84.1	10 06.1	68 71	83.7	7
8 21.5	69 72	84.1	8 42.1	69 71	83.8	9 02.6	69 71	83.4	9 23.2	68 71	83.0	8
7 38.5	69 71	83.5	7 59.2	69 71	83.1	8 19.8	69 71	82.7	8 40.4	69 71	82.4	9
6 55.7	69 71	82.8	7 16.4	69 71	82.4	7 37.0	69 71	82.0	7 57.6	69 71	81.7	90

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H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
00	38 00.0	1.0 01	180.0	37 30.0	1.0 01	180.0	37 00.0	1.0 01	180.0	36 30.0	1.0 01	180.0	36 00.0	1.0 01	180.0	35 30.0	1.0 01	180.0	35 00.0	1.0 01	180.0	34 30.0	1.0 01	180.0	00
1	37 59.5	1.0 02	178.7	37 29.5	1.0 02	178.7	36 59.5	1.0 02	178.8	36 29.5	1.0 02	178.8	35 59.5	1.0 02	178.8	35 29.5	1.0 02	178.8	34 59.5	1.0 02	178.8	34 29.6	1.0 02	178.8	1
2	37 58.1	1.0 04	177.5	37 28.1	1.0 04	177.5	36 58.1	1.0 04	177.5	36 28.2	1.0 04	177.5	35 58.2	1.0 04	177.6	35 28.2	1.0 04	177.6	34 58.2	1.0 04	177.6	34 28.2	1.0 04	177.6	2
3	37 55.7	1.0 06	176.2	37 25.8	1.0 05	176.3	36 55.8	1.0 05	176.3	36 25.8	1.0 05	176.3	35 55.9	1.0 05	176.4	35 25.9	1.0 05	176.4	34 55.9	1.0 05	176.4	34 26.0	1.0 05	176.4	3
4	37 52.4	1.0 07	175.0	37 22.5	1.0 07	175.0	36 52.6	1.0 07	175.1	36 22.6	1.0 07	175.1	35 52.7	1.0 07	175.1	35 22.7	1.0 07	175.2	34 52.8	1.0 07	175.2	34 22.8	1.0 07	165.2	4
05	37 48.2	1.0 09	173.7	37 18.3	1.0 09	173.8	36 48.4	1.0 08	173.8	36 18.5	1.0 08	173.9	35 48.6	1.0 08	173.9	35 18.6	1.0 08	174.0	34 48.7	1.0 08	174.0	34 18.8	1.0 08	174.1	05
6	37 43.0	1.0 10	172.5	37 13.1	1.0 10	172.5	36 43.3	1.0 10	172.6	36 13.4	1.0 10	172.7	35 43.5	1.0 10	172.7	35 13.7	1.0 10	172.8	34 43.8	1.0 10	172.8	34 13.9	1.0 10	172.9	6
7	37 36.9	99 12	171.2	37 07.1	99 12	171.3	36 37.3	99 12	171.4	36 07.4	99 11	171.4	35 37.6	99 11	171.5	35 07.8	99 11	171.6	34 38.0	99 11	171.6	34 08.1	99 11	171.7	7
8	37 29.9	99 13	170.0	37 00.1	99 13	170.1	36 30.3	99 13	170.2	36 00.6	99 13	170.2	35 30.8	99 13	170.3	35 01.0	99 13	170.4	34 31.2	99 13	170.5	34 01.5	99 13	170.5	8
9	37 21.9	99 15	168.8	36 52.2	99 15	168.8	36 22.5	99 15	168.9	35 52.8	99 14	169.0	35 23.1	99 14	169.1	34 53.4	99 14	169.2	34 23.6	99 14	169.3	33 53.9	99 14	169.4	9
10	37 13.0	99 16	167.5	36 43.4	99 16	167.6	36 13.8	99 16	167.7	35 44.1	99 16	167.8	35 14.5	99 16	167.9	34 44.8	99 16	168.0	34 15.2	99 16	168.1	33 45.5	99 15	168.2	10
1	37 03.3	99 18	166.3	36 33.7	99 18	166.4	36 04.2	99 18	166.5	35 34.6	99 17	166.6	35 05.0	99 17	166.7	34 35.4	99 17	166.8	34 05.9	99 17	166.9	33 36.3	99 17	167.0	1
2	36 52.6	98 19	165.1	36 23.1	98 19	165.2	35 53.6	98 19	165.3	35 24.2	98 19	165.4	34 54.7	98 19	165.5	34 25.2	98 19	165.7	33 55.7	98 18	165.8	33 26.1	98 18	165.9	2
3	36 41.1	98 21	163.9	36 11.7	98 21	164.0	35 42.3	98 20	164.1	35 12.9	98 20	164.2	34 43.5	98 20	164.4	34 14.0	98 20	164.5	33 44.6	98 20	164.6	33 15.2	98 20	164.7	3
4	36 28.6	98 22	162.7	35 59.3	98 22	162.8	35 30.0	98 22	162.9	35 00.7	98 22	163.1	34 31.4	98 22	163.2	34 02.1	98 21	163.3	33 32.7	98 21	163.4	33 03.4	98 21	163.6	4
15	36 15.3	97 24	161.5	35 46.1	97 23	161.6	35 16.9	97 23	161.8	34 47.7	97 23	161.9	34 18.5	97 23	162.0	33 49.3	97 23	162.2	33 20.0	97 23	162.3	32 50.8	98 22	162.4	15
6	36 01.2	97 25	160.3	35 32.1	97 25	160.4	35 03.0	97 25	160.6	34 33.9	97 24	160.7	34 04.8	97 24	160.9	33 35.6	97 24	161.0	33 06.5	97 24	161.2	32 37.3	97 24	161.3	6
7	35 46.2	97 26	159.1	35 17.2	97 26	159.3	34 48.2	97 26	159.4	34 19.2	97 26	159.6	33 50.2	97 26	159.7	33 21.2	97 25	159.9	32 52.1	97 25	160.0	32 23.1	97 25	160.2	7
8	35 30.4	96 28	157.9	35 01.5	96 28	158.1	34 32.7	96 27	158.3	34 03.8	96 27	158.4	33 34.9	96 27	158.6	33 05.9	96 27	158.7	32 37.0	96 27	158.9	32 08.1	96 26	159.0	8
9	35 13.8	96 29	156.8	34 45.0	96 29	156.9	34 16.3	96 29	157.1	33 47.5	96 28	157.3	33 18.7	96 28	157.4	32 49.9	96 28	157.6	32 21.1	96 28	157.8	31 52.2	96 28	157.9	9
20	34 56.3	96 30	155.6	34 27.7	96 30	155.8	33 59.1	95 30	156.0	33 30.4	96 30	156.1	33 01.7	96 30	156.3	32 33.1	96 29	156.5	32 04.4	96 29	156.7	31 35.6	96 29	156.8	20
1	34 38.1	95 32	154.4	34 09.6	95 31	154.6	33 41.1	95 31	154.8	33 12.6	95 31	155.0	32 44.0	95 31	155.2	32 15.4	95 31	155.4	31 46.9	95 30	155 6	31 18.3	95 30	155.7	1
2	34 19.1	95 33	153.3	33 50.7	95 33	153.5	33 22.4	95 32	153.7	32 53.9	95 32	153.9	32 25.5	95 32	154.1	31 57.1	95 32	154.3	31 28.6	95 32	154.5	31 00.2	95 31	154.6	2
3	33 59.3	94 34	152.2	33 31.1	94 34	152.4	33 02.9	94 34	152.6	32 34.6	94 34	152.8	32 06.3	94 33	153.0	31 38.0	94 33	153.2	31 09.7	94 33	153.4	30 41.3	95 33	153.6	3
4	33 38.8	94 35	151.1	33 10.7	94 35	151.3	32 42.6	94 35	151.5	32 14.5	94 35	151.7	31 46.3	94 34	151.9	31 18.1	94 34	152.1	30 49.9	94 34	152.3	30 21.7	94 34	152.5	4
25	33 17.6	93 37	150.0	32 49.6	93 36	150.2	32 21.6	93 36	150.4	31 53.6	93 36	150.6	31 25.6	93 36	150.8	30 57.6	94 35	151.0	30 29.5	94 35	151.2	30 01.4	94 35	151.4	25
6	32 55.6	93 38	148.9	32 27.8	93 38	149.1	32 00.0	93 37	149.3	31 32.1	93 37	149.5	31 04.2	93 37	149.7	30 36.3	93 37	149.9	30 08.4	93 36	150.2	29 40.4	93 36	150.4	6
7	32 32.9	92 39	147.8	32 05.3	92 39	148.0	31 37.6	92 38	148.2	31 09.9	92 38	148.4	30 42.1	93 38	148.7	30 14.4	93 38	148.9	29 46.6	93 37	149.1	29 18.8	93 37	149.3	7
8	32 09.6	92 40	146.7	31 42.1	92 40	146.9	31 14.5	92 40	147.2	30 46.9	92 39	147.4	30 19.3	92 39	147.6	29 51.7	92 39	147.8	29 24.1	92 39	148.1	28 56.4	92 38	148.3	8
9	31 45.5	91 41	145.6	31 18.2	91 41	145.9	30 50.8	91 41	146.1	30 23.3	91 40	146.3	29 55.9	92 40	146.6	29 28.4	92 40	146.8	29 00.9	92 40	147.0	28 33.4	92 39	147.3	9
30	31 20.8	91 42	144.6	30 53.6	91 42	144.8	30 26.4	91 42	145.1	29 59.1	91 42	145.3	29 31.8	91 41	145.5	29 04.5	91 41	145.8	28 37.1	91 41	146.0	28 09.7	91 41	146.2	30
1	30 55.5	90 43	143.5	30 28.4	90 43	143.8	30 01.3	90 43	144.0	29 34.2	90 43	144.3	29 07.0	91 42	144.5	28 39.9	91 42	144.8	28 12.7	91 42	145.0	27 45.4	91 42	145.2	1
2	30 29.5	90 44	142.5	30 02.6	90 44	142.7	29 35.7	90 44	143.0	29 08.7	90 44	143.2	28 41.7	90 43	143.5	28 14.6	90 43	143.7	27 47.6	90 43	144.0	27 20.5	90 43	144.2	2
3	30 02.9	89 45	141.5	29 36.2	89 45	141.7	29 09.4	89 45	142.0	28 42.6	89 45	142.2	28 15.7	90 44	142.5	27 48.8	90 44	142.7	27 21.9	90 44	143.0	26 55.0	90 44	143.2	3
4	29 35.7	89 46	140.4	29 09.1	89 46	140.7	28 42.5	89 46	141.0	28 15.8	89 46	141.2	27 49.1	89 45	141.5	27 22.4	89 45	141.7	26 55.6	89 45	142.0	26 28.8	89 44	142.3	4
35	29 08.0	88 47	139.4	28 41.5	88 47	139.7	28 15.0	88 47	140.0	27 48.5	88 46	140.2	27 22.0	89 46	140.5	26 55.4	89 46	140.8	26 28.8	89 46	141.0	26 02.1	89 45	141.3	35
6	28 39.6	88 48	138.4	28 13.3	88 48	138.7	27 47.0	88 48	139.0	27 20.6	88 47	139.3	26 54.2	88 47	139.5	26 27.8	88 47	139.8	26 01.3	88 47	140.1	25 34.8	88 46	140.3	6
7	28 10.7	87 49	137.5	27 44.6	87 49	137.7	27 18.4	87 49	138.0	26 52.2	87 48	138.3	26 25.9	88 48	138.6	25 59.6	88 48	138.8	25 33.3	88 48	139.1	25 07.0	88 47	139.4	7
8	27 41.3	87 50	136.5	27 15.3	87 50	136.8	26 49.2	87 49	137.0	26 23.2	87 49	137.3	25 57.1	87 49	137.6	25 31.0	87 49	137.9	25 04.8	87 48	138.1	24 38.6	87 48	138.4	8
9	27 11.3	86 51	135.5	26 45.4	86 51	135.8	26 19.6	86 50	136.1	25 53.7	86 50	136.4	25 27.7	87 50	136.7	25 01.8	87 50	136.9	24 35.7	87 49	137.2	24 09.7	87 49	137.5	9
40	26 40.8	86 52	134.6	26 15.1	86 51	134.9	25 49.4	86 51	135.1	25 23.6	86 51	135.4	24 57.8	86 51	135.7	24 32.0	86 50	136.0	24 06.2	86 50	136.3	23 40.3	86 50	136.5	40
1	26 09.8	85 52	133.6	25 44.3	85 52	133.9	25 18.7	85 52	134.2	24 53.1	85 52	134.5	24 27.5	86 51	134.8	24 01.8	86 51	135.1	23 36.1	86 51	135.3	23 10.4	86 51	135.6	1
2	25 38.3	85 53	132.7	25 12.9	85 53	133.0	24 47.5	85 53	133.3	24 22.1	85 53	133.6	23 56.6	85 52	133.9	23 31.1	85 52	134.1	23 05.5	85 52	134.4	22 39.9	85 52	134.7	2
3	25 06.4	84 54	131.8	24 41.1	84 54	132.1	24 15.9	84 54	132.4	23 50.6	84 53	132.7	23 25.2	85 53	133.0	22 59.8	85 53	133.2	22 34.4	85 53	133.5	22 09.0	85 52	133.8	3
4	24 33.9	84 55	130.9	24 08.9	84 55	131.2	23 43.7	84 54	131.5	23 18.6	84 54	131.8	22 53.4	84 54	132.0	22 28.2	84 54	132.3	22 02.9	84 53	132.6	21 37.6	84 53	132.9	4
45	24 01.1	83 56	130.0	23 36.1	83 55	130.3	23 11.2	83 55	130.6	22 46.2	83 55	130.9	22 21.1	84 55	131.2	21 56.1	84 54	131.5	21 30.9	84 54	131.7	21 05.8	84 54	132.0	45
6	23 27.8	83 56	129.1	23 03.0	83 56	129.4	22 38.2	83 56	129.7	22 13.3	83 55	130.0	21 48.4	83 55	130.3	21 23.5	83 55	130.6	20 58.5	83 55	130.9	20 33.5	83 54	131.2	6
7	22 54.0	82 57	128.2	22 29.4	82 57	128.5	22 04.7	82 56	128.8	21 40.0	82 56	129.1	21 15.3	83 56	129.4	20 50.5	83 56	129.7	20 25.7	83 55	130.0	20 00.8	83 55	130.3	7
8	22 19.9	82 58	127.3	21 55.4	82 57	127.6	21 30.9	82 57	127.9	21 06.3	82 57	128.2	20 41.7	82 57	128.5	20 17.1	82 56	128.8	19 52.4	82 56	129.1	19 27.7	82 56	129.4	8
9	21 45.4	81 58	126.4	21 21.0	81 58	126.7	20 56.6	81 58	127.0	20 32.2	81 58	127.4	20 07.7	82 57	127.7	19 43.2	82 57	128.0	19 18.7	82 57	128.3	18 54.2	82 57	128.6	9
50	21 10.5	81 59	125.6	20 46.2	81 59	125.9	20 22.0	81 58	126.2	19 57.7	81 58	126.5	19 33.4	81 58	126.8	19 09.0	81 58	127.1	18 44.6	81 57	127.4	18 20.2	81 57	127.7	50
1	20 35.2	80 59	124.7	20 11.1	80 59	125.0	19 47.0	80 59	125.3	19 22.8	81 59	125.7	18 58.6	81 59	126.0	18 34.4	81 58	126.3	18 10.2	81 58	126.6	17 45.9	81 58	126.9	1
2	19 59.5	80 60	123.9	19 35.5	80 60	124.2	19 11.6	80 60	124.5	18 47.6	80 59	124.8	18 23.5	80 59	125.1	17 59.4	80 59	125.4	17 35.3	80 59	125.8	17 11.2	80 58	126.1	2
3	19 23.5	79 61	123.0	18 59.7	79 60	123.3	18 35.8	80 60	123.7	18 11.9	80 60	124.0	17 48.0	80 60	124.3	17 24.1	80 59	124.6	17 00.1	80 59	124.9	16 36.1	80 59	125.2	3
4	18 47.1	79 61	122.2	18 23.4	79 61	122.5	17 59.7	79 61	122.8	17 36.0	79 60	123.2	17 12.2	79 60	123.5	16 48.4	79 60	123.8	16 24.6	79 60	124.1	16 00.7	80 60	124.4	4
55	18 10.4	78 62	121.4	17 46.9	79 61	121.7	17 23.3	79 61	122.0	16 59.7	79 61	122.3	16 36.0	79 61	122.7	16 12.4	79 61	123.0	15 48.7	79 60	123.3	15 24.9	79 60	123.6	55
6	17 33.4	78 62	120.6	17 10.0	78 62	120.9	16 46.6	78 62	121.2	16 23.1	78 62	121.5	15 59.6	78 61	121.9	15 36.0	79 61	122.2	15 12.4	79 61	122.5	14 48.8	79 61	122.8	6
7	16 56.1	78 63	119.8	16 32.8	78 62	120.1	16 09.5	78 62	120.4	15 46.1	78 62	120.7	15 22.7	78 62	121.1	14 59.3	78 62	121.4	14 35.9	78 61	121.7	14 12.4	78 61	122.0	7
8	16 18.5	77 63	119.0	15 55.3	77 63	119.3	15 32.1	77 63	119.6	15 08.9	77 63	119.9	14 45.6	78 62	120.3	14 22.3	78 62	120.6	13 59.0	78 62	120.9	13 35.7	78 62	121.2	8
9	15 40.6	77 64	118.2	15 17.5	77 63	118.5	14 54.4	77 63	118.8	14 31.3	77 63	119.2	14 08.2	77 63	119.5	13 45.0	77 63	119.8	13 21.8	77 62	120.1	12 58.6	77 62	120.5	9
60	15 02.4	76 64	117.4	14 39.5	77 64	117.7	14 16.5	77 64	118.0	13 53.5	77 64	118.4	13 30.5	77 63	118.7	13 07.4	77 63	119.0	12 44.4	77 63	119.4	12 21.3	77 63	119.7	60
1	14 23.9	76 65	116.6	14 01.1	76 64	116.9	13 38.3	76 64	117.3	13 15.4	76 64	117.6	12 52.5	76 64	117.9	12 29.5	76 64	118.3	12 06.6	77 63	118.6	11 43.6	77 63	118.9	1
2	13 45.2	76 65	115.8	13 22.5	76 65	116.2	12 59.8	76 65	116.5	12 37.0	76 64	116.8	12 14.2	76 64	117.2	11 51.4	76 64	117.5	11 28.6	76 64	117.8	11 05.7	76 64	118.2	2
3	13 06.2	75 65	115.1	12 43.6	75 65	115.4	12 21.0	75 65	115.7	11 58.4	76 65	116.1	11 35.7	76 65	116.4	11 13.0	76 64	116.7	10 50.3	76 64	117.1	10 27.5	76 64	117.4	3
4	12 27.0	75 66	114.3	12 04.5	75 66	114.6	11 42.0	75 65	115.0	11 19.5	75 65	115.3	10 56.9	75 65	115.6	10 34.3	75 65	116.0	10 11.7	75 65	116.3	9 49.1	75 64	116.6	4
65	11 47.6	75 66	113.5	11 25.2	75 66	113.9	11 02.8	75 66	114.2	10 40.3	75 66	114.5	10 17.9	75 65	114.9	9 55.4	75 65	115.2	9 32.9	75 65	115.6	9 10.4	75 65	115.9	65
6	11 07.9	74 66	112.8	10 45.6	74 66	113.1	10 23.3	74 66	113.5	10 00.9	74 66	113.8	9 38.6	75 66	114.1	9 16.2	75 66	114.5	8 53.8	75 65	114.8	8 31.4	75 65	115.1	6
7	10 28.0	74 67	112.0	10 05.8	74 67	112.4	9 43.6	74 67	112.7	9 21.3	74 66	113.1	8 59.1	74 66	113.4	8 36.8	74 66	113.7	8 14.5	74 66	114.1	7 52.2	74 66	114.4	7
8	9 47.9	74 67	111.3	9 25.8	74 67	111.6	9 03.7	74 67	112.0	8 41.5	73 67	112.3	8 19.4	74 67	112.7	7 57.2	74 66	113.0	7 35.0	74 66	113.3	7 12.8	74 66	113.7	8
9	9 07.5	73 68	110.6	8 45.5	73 67	110.9	8 23.5	73 67	111.2	8 01.5	73 67	111.6	7 39.4	74 67	111.9	7 17.4	74 67	112.3	6 55.3	74 67	112.6	6 33.2	74 66	112.9	9
70	8 27.0	73 68	109.8	8 05.1	73 68	110.2	7 43.2	73 68	110.5	7 21.3	73 67	110.9	6 59.3	73 67	111.2	6 37.3	73 67	111.5	6 15.3	73 67	111.9	5 53.3	73 67	112.2	70
1	7 46.3	73 68	109.1	7 24.5	73 68	109.4	7 02.7	73 68	109.8	6 40.8	73 68	110.1	6 19.0	73 68	110.5	5 57.1	73 67	110.8	5 35.2	73 67	111.2	5 13.3	73 67	111.5	1
2	7 05.5	72 68	108.4	6 43.7	72 68	108.7	6 22.0	73 68	109.1	6 00.2	73 68	109.4	5 38.4	73 68	109.8	5 16.6	73 68	110.1							2
3	6 24.4	72 69	107.6	6 02.8	72 69	108.0	5 41.1	72 68	108.3	5 19.4	72 68	108.7													3
4	5 43.2	72 69	106.9	5 21.6	72 69	107.3	5 00.0	72 69	107.6																4
75	5 01.8	72 69	106.2																						75

DECLINATION SAME NAME AS LATITUDE

H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
91				5 10.7	69 71	83.2	5 31.5	69 71	82.8	5 52.2	69 71	82.5	6 12.9	69 71	82.1	6 33.6	69 71	81.7	6 54.3	69 71	81.4	7 15.0	69 71	81.0	9
2										5 09.4	69 71	81.8	5 30.2	69 71	81.4	5 50.9	69 71	81.0	6 11.7	69 71	80.7	6 32.4	69 71	80.3	
3																5 08.3	69 71	80.4	5 29.1	69 71	80.0	5 49.9	69 71	79.6	
4																						5 07.5	69 70	79.0	

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Lat. 44°

H.A.	12° 00′				12° 30′				13° 00′				13° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	58 00.0	1.0	01	180.0	58 30.0	1.0	01	180.0	59 00.0	1.0	01	180.0	59 30.0	1.0	01	180.0
1	57 59.3	1.0	03	178.2	58 29.3	1.0	04	178.1	58 59.3	1.0	04	178.1	59 29.3	1.0	04	178.1
2	57 57.2	1.0	06	176.3	58 27.2	1.0	06	176.3	58 57.2	1.0	06	176.2	59 27.1	1.0	06	176.2
3	57 53.8	1.0	08	174.5	58 23.7	1.0	08	174.4	58 53.6	1.0	08	174.3	59 23.5	1.0	08	174.3
4	57 48.9	1.0	10	172.6	58 18.8	1.0	10	172.6	58 48.6	1.0	11	172.5	59 18.5	1.0	11	172.4
05	57 42.7	99	13	170.8	58 12.5	99	13	170.7	58 42.3	99	13	170.6	59 12.0	99	13	170.5
6	57 35.1	99	15	169.0	58 04.8	99	15	168.9	58 34.5	99	15	168.7	59 04.2	99	15	168.6
7	57 26.2	99	17	167.2	57 55.8	99	17	167.1	58 25.4	99	17	166.9	58 55.0	99	18	166.7
8	57 16.0	98	19	165.4	57 45.5	98	19	165.2	58 15.0	98	20	165.1	58 44.4	98	20	164.9
9	57 04.5	98	21	163.6	57 33.9	98	22	163.5	58 03.2	98	22	163.3	58 32.5	98	22	163.1
10	56 51.7	97	23	161.9	57 20.9	97	24	161.7	57 50.1	97	24	161.5	58 19.3	97	24	161.2
1	56 37.7	97	25	160.2	57 06.7	97	26	159.9	57 35.8	97	26	159.7	58 04.7	97	26	159.5
2	56 22.5	96	27	158.5	56 51.3	96	28	158.2	57 20.2	96	28	158.0	57 49.0	96	28	157.7
3	56 06.0	96	29	156.8	56 34.7	96	30	156.5	57 03.4	95	30	156.2	57 32.0	95	30	156.0
4	55 48.4	95	31	155.1	56 16.9	95	32	154.8	56 45.4	95	32	154.5	57 13.8	95	32	154.2
15	55 29.7	94	33	153.5	55 58.0	94	33	153.2	56 26.3	94	34	152.9	56 54.5	94	34	152.6
6	55 09.8	94	35	151.8	55 38.0	94	35	151.5	56 06.0	93	36	151.2	56 34.0	93	36	150.9
7	54 48.9	93	37	150.2	55 16.8	93	37	149.9	55 44.7	93	37	149.6	56 12.5	93	38	149.3
8	54 27.0	92	38	148.7	54 54.7	92	39	148.3	55 22.3	92	39	148.0	55 49.9	92	39	147.7
9	54 04.1	92	40	147.1	54 31.6	91	40	146.8	54 59.0	91	41	146.4	55 26.3	91	41	146.1
20	53 40.2	91	41	145.6	54 07.4	91	42	145.3	54 34.6	91	42	144.9	55 01.8	90	43	144.5
1	53 15.3	90	43	144.1	53 42.4	90	43	143.8	54 09.4	90	44	143.4	54 36.3	90	44	143.0
2	52 49.6	90	44	142.7	53 16.4	89	45	142.3	53 43.2	89	45	141.9	54 09.8	89	45	141.5
3	52 23.0	89	46	141.2	52 49.6	89	46	140.9	53 16.1	88	46	140.5	53 42.6	88	47	140.1
4	51 55.6	88	47	139.8	52 21.9	88	47	139.4	52 48.2	88	48	139.0	53 14.4	87	48	138.6
25	51 27.3	87	48	138.4	51 53.5	87	49	138.0	52 19.5	87	49	137.6	52 45.5	86	50	137.2
6	50 58.3	87	50	137.1	51 24.2	86	50	136.7	51 50.1	86	50	136.3	52 15.8	86	51	135.9
7	50 28.6	86	51	135.8	50 54.3	86	51	135.3	51 19.9	85	52	134.9	51 45.4	85	52	134.5
8	49 58.1	85	52	134.4	50 23.6	85	52	134.0	50 49.0	85	53	133.6	51 14.3	84	53	133.2
9	49 26.9	84	53	133.2	49 52.2	84	53	132.7	50 17.4	84	54	132.3	50 42.5	83	54	131.9
30	48 55.1	84	54	131.9	49 20.2	83	54	131.5	49 45.2	83	55	131.1	50 10.0	83	55	130.6
1	48 22.7	83	55	130.7	48 47.6	83	55	130.2	49 12.3	82	56	129.8	49 37.0	82	56	129.4
2	47 49.7	82	56	129.5	48 14.3	82	56	129.0	48 38.9	82	57	128.6	49 03.3	81	57	128.2
3	47 16.1	82	57	128.3	47 40.5	81	57	127.8	48 04.9	81	58	127.4	48 29.1	81	58	127.0
4	46 41.9	81	58	127.1	47 06.2	81	58	126.7	47 30.3	80	58	126.2	47 54.4	80	59	125.8
35	46 07.2	80	59	126.0	46 31.3	80	59	125.5	46 55.2	80	59	125.1	47 19.1	79	60	124.6
6	45 32.0	80	59	124.8	45 55.9	79	60	124.4	46 19.7	79	60	124.0	46 43.4	79	60	123.5
7	44 56.4	79	60	123.7	45 20.1	79	60	123.3	45 43.7	78	61	122.9	46 07.1	78	61	122.4
8	44 20.3	79	61	122.7	44 43.8	78	61	122.2	45 07.2	78	62	121.8	45 30.5	77	62	121.3
9	43 43.7	78	62	121.6	44 07.1	78	62	121.1	44 30.3	77	62	120.7	44 53.4	77	62	120.3
40	43 06.7	77	62	120.5	43 29.9	77	63	120.1	43 53.0	77	63	119.7	44 15.9	76	63	119.2
1	42 29.4	77	63	119.5	42 52.4	77	63	119.1	43 15.3	76	63	118.6	43 38.1	76	64	118.2
2	41 51.6	76	64	118.5	42 14.5	76	64	118.1	42 37.2	76	64	117.6	42 59.9	75	64	117.2
3	41 13.5	76	64	117.5	41 36.2	75	64	117.1	41 58.8	75	65	116.6	42 21.3	75	65	116.2
4	40 35.1	75	65	116.5	40 57.6	75	65	116.1	41 20.1	75	65	115.7	41 42.4	74	65	115.2
45	39 56.3	75	65	115.6	40 18.7	75	65	115.1	40 41.0	74	66	114.7	41 03.2	74	66	114.2
6	39 17.2	74	66	114.6	39 39.5	74	66	114.2	40 01.6	74	66	113.7	40 23.7	73	66	113.3
7	38 37.8	74	66	113.7	39 00.0	74	66	113.3	39 22.0	73	67	112.8	39 43.9	73	67	112.4
8	37 58.2	73	67	112.8	38 20.2	73	67	112.3	38 42.1	73	67	111.9	39 03.9	73	67	111.5
9	37 18.2	73	67	111.9	37 40.1	73	67	111.4	38 01.9	72	67	111.0	38 23.6	72	68	110.6
50	36 38.1	73	67	111.0	36 59.8	72	68	110.5	37 21.5	72	68	110.1	37 43.1	72	68	109.7
1	35 57.6	72	68	110.1	36 19.3	72	68	109.7	36 40.8	72	68	109.2	37 02.3	71	68	108.8
2	35 17.0	72	68	109.2	35 38.5	72	68	108.8	36 00.0	71	68	108.4	36 21.3	71	69	107.9
3	34 36.1	72	68	108.4	34 57.6	71	69	107.9	35 18.9	71	69	107.5	35 40.2	71	69	107.1
4	33 55.1	71	69	107.5	34 16.4	71	69	107.1	34 37.7	71	69	106.7	34 58.8	70	69	106.2
55	33 13.8	71	69	106.7	33 35.1	71	69	106.3	33 56.2	70	69	105.8	34 17.3	70	70	105.4
6	32 32.4	71	69	105.9	32 53.6	70	69	105.4	33 14.6	70	70	105.0	33 35.6	70	70	104.6
7	31 50.8	70	70	105.0	32 11.9	70	70	104.6	32 32.9	70	70	104.2	32 53.8	70	70	103.8
8	31 09.0	70	70	104.2	31 30.0	70	70	103.8	31 51.0	70	70	103.4	32 11.8	69	70	103.0
9	30 27.1	70	70	103.4	30 48.1	70	70	103.0	31 08.9	69	70	102.6	31 29.7	69	70	102.2
60	29 45.1	70	70	102.7	30 05.9	69	70	102.2	30 26.7	69	70	101.8	30 47.4	69	71	101.4
1	29 02.9	69	70	101.9	29 23.7	69	71	101.5	29 44.4	69	71	101.0	30 05.1	69	71	100.6
2	28 20.6	69	71	101.1	28 41.3	69	71	100.7	29 02.0	69	71	100.3	29 22.6	68	71	99.9
3	27 38.2	69	71	100.3	27 58.9	69	71	99.9	28 19.5	69	71	99.5	28 40.0	68	71	99.1
4	26 55.7	69	71	99.6	27 16.3	69	71	99.2	27 36.9	68	71	98.8	27 57.3	68	71	98.3
65	26 13.1	69	71	98.8	26 33.7	68	71	98.4	26 54.2	68	71	98.0	27 14.6	68	71	97.6
6	25 30.4	69	71	98.1	25 50.9	68	71	97.7	26 11.4	68	71	97.3	26 31.8	68	71	96.9
7	24 47.6	68	71	97.3	25 08.1	68	71	96.9	25 28.5	68	72	96.5	25 48.9	68	72	96.1
8	24 04.8	68	72	96.6	24 25.2	68	72	96.2	24 45.6	68	72	95.8	25 06.0	68	72	95.4
9	23 21.9	68	72	95.9	23 42.3	68	72	95.5	24 02.7	68	72	95.1	24 23.0	68	72	94.7
70	22 38.9	68	72	95.1	22 59.3	68	72	94.8	23 19.7	68	72	94.4	23 39.9	67	72	94.0
1	21 55.9	68	72	94.4	22 16.3	68	72	94.0	22 36.6	68	72	93.6	22 56.9	67	72	93.2
2	21 12.9	68	72	93.7	21 33.2	68	72	93.3	21 53.5	68	72	92.9	22 13.7	67	72	92.5
3	20 29.8	68	72	93.0	20 50.1	68	72	92.6	21 10.4	68	72	92.2	21 30.6	67	72	91.8
4	19 46.7	68	72	92.3	20 07.0	68	72	91.9	20 27.3	67	72	91.5	20 47.5	67	72	91.1
75	19 03.5	68	72	91.6	19 23.8	68	72	91.2	19 44.1	67	72	90.8	20 04.3	67	72	90.4
6	18 20.4	68	72	90.9	18 40.7	68	72	90.5	19 00.9	67	72	90.1	19 21.2	67	72	89.7
7	17 37.2	68	72	90.2	17 57.5	68	72	89.8	18 17.8	67	72	89.4	18 38.0	67	72	89.0
8	16 54.1	68	72	89.5	17 14.4	68	72	89.1	17 34.6	67	72	88.7	17 54.8	67	72	88.3
9	16 10.9	68	72	88.8	16 31.2	68	72	88.4	16 51.5	67	72	88.0	17 11.7	67	72	87.7
80	15 27.8	68	72	88.1	15 48.1	68	72	87.7	16 08.4	68	72	87.4	16 28.6	67	72	87.0
1	14 44.6	68	72	87.4	15 05.0	68	72	87.1	15 25.3	68	72	86.7	15 45.5	67	72	86.3
2	14 01.5	68	72	86.8	14 21.9	68	72	86.4	14 42.2	68	72	86.0	15 02.5	68	72	85.6
3	13 18.5	68	72	86.1	13 38.8	68	72	85.7	13 59.2	68	72	85.3	14 19.5	68	72	84.9
4	12 35.4	68	72	85.4	12 55.8	68	72	85.0	13 16.2	68	72	84.6	13 36.5	68	72	84.3
85	11 52.4	68	72	84.7	12 12.8	68	72	84.3	12 33.2	68	72	84.0	12 53.6	68	71	83.6
6	11 09.5	68	72	84.0	11 29.9	68	71	83.6	11 50.3	68	71	83.3	12 10.7	68	71	82.9
7	10 26.6	68	71	83.3	10 47.0	68	71	83.0	11 07.5	68	71	82.6	11 27.9	68	71	82.2
8	9 43.7	68	71	82.7	10 04.2	68	71	82.3	10 24.7	68	71	81.9	10 45.2	68	71	81.6
9	9 01.0	69	71	82.0	9 21.5	68	71	81.6	9 42.0	68	71	81.2	10 02.5	68	71	80.9
90	8 18.2	69	71	81.3	8 38.8	69	71	80.9	8 59.4	69	71	80.6	9 20.0	68	71	80.2

H.A.	14° 00′				14° 30′				15° 00′				15° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	60 00.0	1.0	01	180.0	60 30.0	1.0	01	180.0	61 00.0	1.0	01	180.0	61 30.0	1.0	01	180.0
1	59 59.3	1.0	04	178.1	60 29.3	1.0	04	178.0	60 59.3	1.0	04	178.0	61 29.2	1.0	04	178.0
2	59 57.1	1.0	06	176.1	60 27.0	1.0	06	176.1	60 57.0	1.0	06	176.0	61 27.0	1.0	06	176.0
3	59 53.4	1.0	08	174.2	60 23.3	1.0	09	174.1	60 53.3	1.0	09	174.0	61 23.2	1.0	09	174.0
4	59 48.3	1.0	11	172.3	60 18.2	99	11	172.2	60 48.0	99	11	172.1	61 17.9	99	11	172.0
05	59 41.8	99	13	170.4	60 11.6	99	13	170.2	60 41.3	99	14	170.1	61 11.1	99	14	170.0
6	59 33.9	99	16	168.5	60 03.5	99	16	168.3	60 33.2	99	16	168.1	61 02.8	99	16	168.0
7	59 24.5	99	18	166.6	59 54.1	98	18	166.4	60 23.6	98	18	166.2	60 53.1	98	19	166.0
8	59 13.8	98	20	164.7	59 43.2	98	20	164.5	60 12.6	98	21	164.3	60 42.0	98	21	164.1
9	59 01.8	98	22	162.8	59 31.0	98	23	162.6	60 00.3	97	23	162.4	60 29.5	97	23	162.2
10	58 48.4	97	24	161.0	59 17.5	97	25	160.8	59 46.6	97	25	160.5	60 15.6	97	26	160.3
1	58 33.7	96	27	159.2	59 02.6	96	27	159.0	59 31.5	96	27	158.7	60 00.4	96	28	158.4
2	58 17.8	96	29	157.4	58 46.5	96	29	157.2	59 15.2	96	29	156.9	59 43.9	95	30	156.6
3	58 00.6	95	31	155.7	58 29.1	95	31	155.4	58 57.6	95	31	155.1	59 26.1	95	32	154.8
4	57 42.2	95	33	153.9	58 10.5	94	33	153.6	58 38.8	94	33	153.3	59 07.1	94	34	153.0
15	57 22.7	94	34	152.2	57 50.8	94	35	151.9	58 18.9	94	35	151.6	58 46.9	93	36	151.2
6	57 02.0	93	36	150.6	57 29.9	93	37	150.2	57 57.8	93	37	149.9	58 25.6	93	37	149.5
7	56 40.2	92	38	148.9	57 07.9	92	38	148.6	57 35.6	92	39	148.2	58 03.1	92	39	147.8
8	56 17.4	92	40	147.3	56 44.9	91	40	146.9	57 12.3	91	40	146.6	57 39.6	91	41	146.2
9	55 53.6	91	41	145.7	56 20.8	91	42	145.3	56 48.0	90	42	144.9	57 15.1	90	43	144.6
20	55 28.8	90	43	144.2	55 55.8	90	43	143.8	56 22.7	90	44	143.4	56 49.6	89	44	143.0
1	55 03.1	89	44	142.6	55 29.8	89	45	142.2	55 56.5	89	45	141.8	56 23.1	88	46	141.4
2	54 36.4	89	46	141.1	55 03.0	88	46	140.7	55 29.4	88	47	140.3	55 55.7	88	47	139.9
3	54 08.9	88	47	139.7	54 35.2	87	48	139.2	55 01.4	87	48	138.8	55 27.5	87	48	138.4
4	53 40.6	87	49	138.2	54 06.6	87	49	137.8	54 32.6	86	49	137.4	54 58.4	86	50	136.9
25	53 11.4	86	50	136.8	53 37.2	86	50	136.4	54 02.9	86	51	135.9	54 28.6	85	51	135.5
6	52 41.5	85	51	135.4	53 07.1	85	51	135.0	53 32.6	85	52	134.6	53 57.9	84	52	134.1
7	52 10.9	85	52	134.1	52 36.2	84	53	133.6	53 01.4	84	53	133.2	53 26.6	84	53	132.7
8	51 39.5	84	53	132.8	52 04.6	84	54	132.3	52 29.6	83	54	131.9	52 54.5	83	55	131.4
9	51 07.5	83	54	131.5	51 32.4	83	55	131.0	51 57.2	82	55	130.6	52 21.8	82	56	130.1
30	50 34.8	82	55	130.2	50 59.5	82	56	129.7	51 24.1	82	56	129.3	51 48.5	81	57	128.8
1	50 01.5	82	56	128.9	50 26.0	81	57	128.5	50 50.3	81	57	128.0	51 14.6	81	58	127.6
2	49 27.7	81	57	127.7	49 51.9	81	58	127.3	50 16.1	80	58	126.8	50 40.1	80	58	126.3
3	48 53.3	80	58	126.5	49 17.3	80	59	126.1	49 41.2	80	59	125.6	50 05.0	79	59	125.1
4	48 18.3	80	59	125.3	48 42.1	79	59	124.9	49 05.9	79	60	124.4	49 29.5	79	60	123.9
35	47 42.9	79	60	124.2	48 06.5	79	60	123.7	48 30.0	78	61	123.3	48 53.4	78	61	122.8
6	47 06.9	78	61	123.1	47 30.4	78	61	122.6	47 53.7	78	61	122.1	48 16.9	77	62	121.7
7	46 30.5	78	61	122.0	46 53.8	77	62	121.5	47 16.9	77	62	121.0	47 40.0	77	62	120.6
8	45 53.7	77	62	120.9	46 16.8	77	62	120.4	46 39.7	76	63	119.9	47 02.6	76	63	119.5
9	45 16.4	77	63	119.8	45 39.4	76	63	119.3	46 02.2	76	63	118.9	46 24.8	75	64	118.4
40	44 38.8	76	63	118.8	45 01.5	76	64	118.3	45 24.2	75	64	117.8	45 46.7	75	64	117.4
1	44 00.8	75	64	117.7	44 23.4	75	64	117.3	44 45.8	75	64	116.8	45 08.2	74	65	116.3
2	43 22.4	75	65	116.7	43 44.8	75	65	116.3	44 07.1	74	65	115.8	44 29.3	74	65	115.3
3	42 43.7	74	65	115.7	43 05.9	74	65	115.3	43 28.1	74	66	114.8	43 50.2	73	66	114.3
4	42 04.6	74	66	114.8	42 26.8	74	66	114.3	42 48.8	73	66	113.8	43 10.7	73	66	113.4
45	41 25.3	73	66	113.8	41 47.3	73	66	113.3	42 09.2	73	66	112.9	42 30.9	72	67	112.4
6	40 45.7	73	67	112.9	41 07.5	73	67	112.4	41 29.3	72	67	111.9	41 50.9	72	67	111.5
7	40 05.8	73	67	111.9	40 27.5	72	67	111.5	40 49.1	72	67	111.0	41 10.6	72	68	110.6
8	39 25.6	72	67	111.0	39 47.2	72	68	110.6	40 08.7	71	68	110.1	40 30.1	71	68	109.6
9	38 45.2	72	68	110.1	39 06.7	71	68	109.7	39 28.0	71	68	109.2	39 49.3	71	68	108.8
50	38 04.5	71	68	109.2	38 25.9	71	68	108.8	38 47.2	71	68	108.3	39 08.3	70	69	107.9
1	37 23.7	71	68	108.4	37 44.9	71	69	107.9	38 06.1	70	69	107.5	38 27.2	70	69	107.0
2	36 42.6	71	69	107.5	37 03.8	70	69	107.0	37 24.8	70	69	106.6	37 45.8	70	69	106.2
3	36 01.4	70	69	106.6	36 22.4	70	69	106.2	36 43.4	70	69	105.8	37 04.3	69	70	105.3
4	35 19.9	70	69	105.8	35 40.9	70	70	105.4	36 01.8	69	70	104.9	36 22.5	69	70	104.5
55	34 38.3	70	70	105.0	34 59.2	69	70	104.5	35 20.0	69	70	104.1	35 40.7	69	70	103.7
6	33 56.5	70	70	104.2	34 17.3	69	70	103.7	34 38.0	69	70	103.3	34 58.7	69	70	102.8
7	33 14.6	69	70	103.3	33 35.3	69	70	102.9	33 56.0	69	70	102.5	34 16.5	68	70	102.0
8	32 32.5	69	70	102.5	32 53.2	69	70	102.1	33 13.8	68	71	101.7	33 34.3	68	71	101.2
9	31 50.3	69	71	101.8	32 10.9	68	71	101.3	32 31.4	68	71	100.9	32 51.9	68	71	100.5
60	31 08.0	69	71	101.0	31 28.6	68	71	100.6	31 49.0	68	71	100.1	32 09.4	68	71	99.7
1	30 25.6	68	71	100.2	30 46.1	68	71	99.8	31 06.5	68	71	99.4	31 26.8	68	71	98.9
2	29 43.1	68	71	99.4	30 03.5	68	71	99.0	30 23.8	68	71	98.6	30 44.1	67	71	98.2
3	29 00.5	68	71	98.7	29 20.8	68	71	98.3	29 41.1	68	71	97.8	30 01.3	67	71	97.4
4	28 17.8	68	71	97.9	28 38.1	68	71	97.5	28 58.3	67	71	97.1	29 18.5	67	72	96.7
65	27 35.0	68	71	97.2	27 55.3	67	71	96.8	28 15.5	67	72	96.3	28 35.6	67	72	95.9
6	26 52.1	68	72	96.4	27 12.4	67	72	96.0	27 32.5	67	72	95.6	27 52.6	67	72	95.2
7	26 09.2	68	72	95.7	26 29.4	67	72	95.3	26 49.6	67	72	94.9	27 09.6	67	72	94.5
8	25 26.2	67	72	95.0	25 46.4	67	72	94.6	26 06.5	67	72	94.2	26 26.6	67	72	93.7
9	24 43.2	67	72	94.3	25 03.4	67	72	93.9	25 23.5	67	72	93.4	25 43.5	67	72	93.0
70	24 00.1	67	72	93.5	24 20.3	67	72	93.1	24 40.4	67	72	92.7	25 00.4	67	72	92.3
1	23 17.0	67	72	92.8	23 37.2	67	72	92.4	23 57.2	67	72	92.0	24 17.3	67	72	91.6
2	22 33.9	67	72	92.1	22 54.0	67	72	91.7	23 14.1	67	72	91.3	23 34.1	67	72	90.9
3	21 50.8	67	72	91.4	22 10.9	67	72	91.0	22 31.0	67	72	90.6	22 50.9	67	72	90.2
4	21 07.6	67	72	90.7	21 27.7	67	72	90.3	21 47.8	67	72	89.9	22 07.8	67	72	89.5
75	20 24.5	67	72	90.0	20 44.6	67	72	89.6	21 04.6	67	72	89.2	21 24.6	67	72	88.8
6	19 41.3	67	72	89.3	20 01.4	67	72	88.9	20 21.5	67	72	88.5	20 41.5	67	72	88.1
7	18 58.2	67	72	88.6	19 18.3	67	72	88.2	19 38.3	67	72	87.9	19 58.4	67	72	87.5
8	18 15.0	67	72	88.0	18 35.1	67	72	87.6	18 55.2	67	72	87.2	19 15.2	67	72	86.8
9	17 31.9	67	72	87.3	17 52.0	67	72	86.9	18 12.1	67	72	86.5	18 32.2	67	72	86.1
80	16 48.8	67	72	86.6	17 09.0	67	72	86.2	17 29.1	67	72	85.8	17 49.1	67	72	85.4
1	16 05.7	67	72	85.9	16 25.9	67	72	85.5	16 46.0	67	72	85.1	17 06.1	67	72	84.7
2	15 22.7	67	72	85.2	15 42.9	67	72	84.8	16 03.1	67	72	84.5	16 23.2	67	72	84.1
3	14 39.7	67	72	84.5	14 59.9	67	72	84.2	15 20.1	67	71	83.8	15 40.3	67	71	83.4
4	13 56.8	68	71	83.9	14 17.0	67	71	83.5	14 37.2	67	71	83.1	14 57.4	67	71	82.7
85	13 13.9	68	71	83.2	13 34.2	68	71	82.8	13 54.4	67	71	82.4	14 14.6	67	71	82.1
6	12 31.1	68	71	82.5	12 51.4	68	71	82.1	13 11.7	68	71	81.8	13 31.9	67	71	81.4
7	11 48.3	68	71	81.9	12 08.7	68	71	81.5	12 29.0	68	71	81.1	12 49.3	68	71	80.7
8	11 05.6	68	71	81.2	11 26.0	68	71	80.8	11 46.4	68	71	80.4	12 06.7	68	71	80.1
9	10 23.0	68	71	80.5	10 43.5	68	71	80.1	11 03.9	68	71	79.8	11 24.3	68	71	79.4
90	9 40.5	68	71	79.8	10 01.0	68	71	79.5	10 21.5	68	71	79.1	10 41.9	68	70	78.7

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H.A.	12° 00′			12° 30′			13° 00′			13° 30′			14° 00′			14° 30′			15° 00′			15° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
00	34 00.0	1.0 01	180.0	33 30.0	1.0 01	180.0	33 00.0	1.0 01	180.0	32 30.0	1.0 01	180.0	32 00.0	1.0 01	180.0	31 30.0	1.0 01	180.0	31 00.0	1.0 01	180.0	30 30.0	1.0 01	180.0	00
1	33 59.6	1.0 02	178.8	33 29.6	1.0 02	178.8	32 59.6	1.0 02	178.8	32 29.6	1.0 02	178.8	31 59.6	1.0 02	178.9	31 29.6	1.0 02	178.9	30 59.6	1.0 02	178.9	30 29.6	1.0 02	178.9	1
2	33 58.2	1.0 04	177.6	33 28.2	1.0 04	177.7	32 58.3	1.0 04	177.7	32 28.3	1.0 04	177.7	31 58.3	1.0 04	177.7	31 28.3	1.0 04	177.7	30 58.3	1.0 04	177.7	30 28.3	1.0 04	177.8	2
3	33 56.0	1.0 05	176.5	33 26.0	1.0 05	176.5	32 56.1	1.0 05	176.5	32 26.1	1.0 05	176.5	31 56.1	1.0 05	176.6	31 26.2	1.0 05	176.6	30 56.2	1.0 05	176.6	30 26.2	1.0 05	176.6	3
4	33 52.9	1.0 07	175.3	33 23.0	1.0 07	175.3	32 53.0	1.0 07	175.4	32 23.1	1.0 06	175.4	31 53.1	1.0 06	175.4	31 23.2	1.0 06	175.5	30 53.2	1.0 06	175.5	30 23.3	1.0 06	175.5	4
05	33 48.9	1.0 08	174.1	33 19.0	1.0 08	174.2	32 49.1	1.0 08	174.2	32 19.2	1.0 08	174.2	31 49.2	1.0 08	174.3	31 19.3	1.0 08	174.3	30 49.4	1.0 08	174.4	30 19.5	1.0 08	174.4	05
6	33 44.0	1.0 10	172.9	33 14.2	1.0 10	173.0	32 44.3	1.0 09	173.0	32 14.4	1.0 09	173.1	31 44.5	1.0 09	173.2	31 14.6	1.0 09	173.2	30 44.8	1.0 09	173.3	30 14.9	1.0 09	173.3	6
7	33 38.3	99 11	171.8	33 08.5	99 11	171.8	32 38.6	99 11	171.9	32 08.8	99 11	172.0	31 39.0	99 11	172.0	31 09.1	99 11	172.1	30 39.3	99 11	172.1	30 09.4	99 10	172.2	7
8	33 31.7	99 12	170.6	33 01.9	99 12	170.7	32 32.1	99 12	170.7	32 02.3	99 12	170.8	31 32.5	99 12	170.9	31 02.7	99 12	171.0	30 32.9	99 12	171.0	30 03.1	99 12	171.1	8
9	33 24.2	99 14	169.4	32 54.5	99 14	169.5	32 24.7	99 14	169.6	31 55.0	99 14	169.7	31 25.3	99 13	169.8	30 55.5	99 13	169.8	30 25.8	99 13	169.9	29 56.0	99 13	170.0	9
10	33 15.9	99 15	168.3	32 46.2	99 15	168.4	32 16.5	99 15	168.5	31 46.9	99 15	168.5	31 17.2	99 15	168.6	30 47.5	99 15	168.7	30 17.8	99 15	168.8	29 48.1	99 15	168.9	10
1	33 06.7	99 17	167.1	32 37.1	99 17	167.2	32 07.5	99 16	167.3	31 37.9	99 16	167.4	31 08.3	99 16	167.5	30 38.6	99 16	167.6	30 09.0	99 16	167.7	29 39.4	99 16	167.8	1
2	32 56.6	98 18	166.0	32 27.1	98 18	166.1	31 57.6	98 18	166.2	31 28.0	98 18	166.3	30 58.5	98 18	166.4	30 29.0	98 17	166.5	29 59.4	98 17	166.6	29 29.9	99 17	166.7	2
3	32 45.8	98 20	164.8	32 16.3	98 19	164.9	31 46.9	98 19	165.1	31 17.4	98 19	165.2	30 48.0	98 19	165.3	30 18.5	98 19	165.4	29 49.0	98 19	165.5	29 19.5	98 19	165.6	3
4	32 34.0	98 21	163.7	32 04.7	98 21	163.8	31 35.3	98 21	163.9	31 06.0	98 20	164.1	30 36.6	98 20	164.2	30 07.2	98 20	164.3	29 37.8	98 20	164.4	29 08.4	98 20	164.5	4
15	32 21.5	98 22	162.6	31 52.3	98 22	162.7	31 23.0	98 22	162.8	30 53.7	98 22	162.9	30 24.4	98 22	163.1	29 55.1	98 21	163.2	29 25.8	98 21	163.3	28 56.5	98 21	163.4	15
6	32 08.2	97 24	161.4	31 39.0	97 23	161.6	31 09.8	97 23	161.7	30 40.6	97 23	161.8	30 11.4	97 23	162.0	29 42.2	97 23	162.1	29 13.0	97 23	162.2	28 43.8	97 22	162.4	6
7	31 54.0	97 25	160.3	31 25.0	97 25	160.5	30 55.9	97 25	160.6	30 26.8	97 24	160.7	29 57.7	97 24	160.9	29 28.6	97 24	161.0	28 59.5	97 24	161.2	28 30.4	97 24	161.3	7
8	31 39.1	97 26	159.2	31 10.1	97 26	159.4	30 41.2	97 26	159.5	30 12.2	97 26	159.7	29 43.2	97 25	159.8	29 14.2	97 25	159.9	28 45.2	97 25	160.1	28 16.1	97 25	160.2	8
9	31 23.4	96 28	158.1	30 54.5	96 27	158.3	30 25.7	96 27	158.4	29 56.8	96 27	158.6	29 27.9	96 27	158.7	28 59.0	96 27	158.9	28 30.1	96 26	159.0	28 01.2	96 26	159.2	9
20	31 06.9	96 29	157.0	30 38.2	96 29	157.2	30 09.4	96 28	157.3	29 40.6	96 28	157.5	29 11.9	96 28	157.7	28 43.1	96 28	157.8	28 14.3	96 28	158.0	27 45.5	96 27	158.1	20
1	30 49.7	96 30	155.9	30 21.0	96 30	156.1	29 52.4	95 30	156.3	29 23.8	96 29	156.4	28 55.1	96 29	156.6	28 26.4	96 29	156.8	27 57.7	96 29	156.9	27 29.0	96 29	157.1	1
2	30 31.7	95 31	154.8	30 03.2	95 31	155.0	29 34.7	95 31	155.2	29 06.1	95 31	155.4	28 37.6	95 30	155.5	28 09.0	95 30	155.7	27 40.5	95 30	155.9	27 11.9	95 30	156.1	2
3	30 13.0	95 32	153.8	29 44.6	95 32	153.9	29 16.2	95 32	154.1	28 47.8	95 32	154.3	28 19.4	95 32	154.5	27 50.9	95 31	154.7	27 22.5	95 31	154.8	26 54.0	95 31	155.0	3
4	29 53.5	94 34	152.7	29 25.3	94 33	152.9	28 57.0	94 33	153.1	28 28.7	94 33	153.3	28 00.4	94 33	153.4	27 32.1	94 33	153.6	27 03.8	94 32	153.8	26 35.4	94 32	154.0	4
25	29 33.3	94 35	151.6	29 05.2	94 35	151.8	28 37.1	94 34	152.0	28 08.9	94 34	152.2	27 40.8	94 34	152.4	27 12.6	94 34	152.6	26 44.4	94 33	152.8	26 16.2	94 33	153.0	25
6	29 12.5	93 36	150.6	28 44.5	93 36	150.8	28 16.5	93 35	151.0	27 48.5	93 35	151.2	27 20.4	93 35	151.4	26 52.4	94 35	151.6	26 24.3	94 35	151.8	25 56.2	94 34	152.0	6
7	28 50.9	93 37	149.5	28 23.1	93 37	149.7	27 55.2	93 37	150.0	27 27.3	93 36	150.2	26 59.4	93 36	150.4	26 31.5	93 36	150.6	26 03.6	93 36	150.8	25 35.6	93 35	151.0	7
8	28 28.7	92 38	148.5	28 01.0	92 38	148.7	27 33.3	92 38	148.9	27 05.5	93 37	149.2	26 37.8	93 37	149.4	26 10.0	93 37	149.6	25 42.2	93 37	149.8	25 14.4	93 37	150.0	8
9	28 05.8	92 39	147.5	27 38.3	92 39	147.7	27 10.7	92 39	147.9	26 43.1	92 38	148.1	26 15.5	92 38	148.4	25 47.8	92 38	148.6	25 20.1	92 38	148.8	24 52.5	92 38	149.0	9
30	27 42.3	91 40	146.5	27 14.9	91 40	146.7	26 47.5	92 40	146.9	26 20.0	92 40	147.1	25 52.5	92 39	147.4	25 25.0	92 39	147.6	24 57.5	92 39	147.8	24 29.9	92 39	148.0	30
1	27 18.2	91 41	145.5	26 50.9	91 41	145.7	26 23.6	91 41	145.9	25 56.3	91 41	146.2	25 28.9	91 40	146.4	25 01.5	91 40	146.6	24 34.2	91 40	146.8	24 06.8	91 40	147.1	1
2	26 53.4	90 42	144.5	26 26.3	90 42	144.7	25 59.1	91 42	144.9	25 31.9	91 42	145.2	25 04.7	91 41	145.4	24 37.5	91 41	145.6	24 10.2	91 41	145.9	23 43.0	91 41	146.1	2
3	26 28.0	90 43	143.5	26 01.0	90 43	143.7	25 34.0	90 43	144.0	25 07.0	90 43	144.2	24 39.9	90 42	144.4	24 12.8	90 42	144.7	23 45.7	90 42	144.9	23 18.6	90 42	145.1	3
4	26 02.0	89 44	142.5	25 35.2	90 44	142.7	25 08.3	90 44	143.0	24 41.4	90 44	143.2	24 14.5	90 43	143.5	23 47.6	90 43	143.7	23 20.6	90 43	144.0	22 53.7	90 43	144.2	4
35	25 35.5	89 45	141.5	25 08.8	89 45	141.8	24 42.1	89 45	142.0	24 15.3	89 44	142.3	23 48.6	89 44	142.5	23 21.8	89 44	142.8	22 55.0	89 44	143.0	22 28.1	89 43	143.3	35
6	25 08.3	88 46	140.6	24 41.8	89 46	140.8	24 15.2	89 46	141.1	23 48.6	89 45	141.3	23 22.0	89 45	141.6	22 55.4	89 45	141.8	22 28.7	89 45	142.1	22 02.0	89 44	142.3	6
7	24 40.6	88 47	139.6	24 14.3	88 47	139.9	23 47.8	88 47	140.1	23 21.4	88 46	140.4	22 54.9	88 46	140.7	22 28.4	88 46	140.9	22 01.9	88 46	141.2	21 35.4	88 45	141.4	7
8	24 12.4	87 48	138.7	23 46.2	88 48	138.9	23 19.9	88 47	139.2	22 53.6	88 47	139.5	22 27.3	88 47	139.7	22 01.0	88 47	140.0	21 34.6	88 46	140.2	21 08.2	88 46	140.5	8
9	23 43.7	87 49	137.7	23 17.6	87 49	138.0	22 51.4	87 48	138.3	22 25.3	87 48	138.5	21 59.1	87 48	138.8	21 32.9	87 48	139.1	21 06.7	87 47	139.3	20 40.5	88 47	139.6	9
40	23 14.4	86 50	136.8	22 48.4	87 49	137.1	22 22.5	87 49	137.4	21 56.5	87 49	137.6	21 30.5	87 49	137.9	21 04.4	87 48	138.2	20 38.3	87 48	138.4	20 12.2	87 48	138.7	40
1	22 44.6	86 50	135.9	22 18.8	86 50	136.2	21 53.0	86 50	136.5	21 27.1	86 50	136.7	21 01.3	86 49	137.0	20 35.4	86 49	137.3	20 09.5	86 49	137.5	19 43.5	87 49	137.8	1
2	22 14.3	85 51	135.0	21 48.7	86 51	135.3	21 23.0	86 51	135.6	20 57.3	86 51	135.8	20 31.6	86 50	136.1	20 05.8	86 50	136.4	19 40.1	86 50	136.7	19 14.3	86 50	136.9	2
3	21 43.6	85 52	134.1	21 18.1	85 52	134.4	20 52.5	85 52	134.7	20 27.0	85 51	134.9	20 01.4	85 51	135.2	19 35.8	85 51	135.5	19 10.2	85 51	135.8	18 44.6	86 50	136.1	3
4	21 12.3	84 53	133.2	20 47.0	85 53	133.5	20 21.6	85 52	133.8	19 56.2	85 52	134.1	19 30.8	85 52	134.3	19 05.4	85 52	134.6	18 39.9	85 51	134.9	18 14.4	85 51	135.2	4
45	20 40.6	84 54	132.3	20 15.5	84 53	132.6	19 50.2	84 53	132.9	19 25.0	84 53	133.2	18 59.7	84 53	133.5	18 34.4	84 52	133.8	18 09.1	84 52	134.0	17 43.7	85 52	134.3	45
6	20 08.5	83 54	131.5	19 43.5	84 54	131.7	19 18.4	84 54	132.0	18 53.3	84 54	132.3	18 28.2	84 53	132.6	18 03.0	84 53	132.9	17 37.8	84 53	133.2	17 12.6	84 53	133.5	6
7	19 36.0	83 55	130.6	19 11.1	83 55	130.9	18 46.1	83 54	131.2	18 21.2	83 54	131.5	17 56.2	83 54	131.8	17 31.2	83 54	132.1	17 06.1	83 54	132.3	16 41.1	84 53	132.6	7
8	19 03.0	82 56	129.7	18 38.2	83 55	130.0	18 13.4	83 55	130.3	17 48.6	83 55	130.6	17 23.8	83 55	130.9	16 58.9	83 54	131.2	16 34.0	83 54	131.5	16 09.1	83 54	131.8	8
9	18 29.6	82 56	128.9	18 05.0	82 56	129.2	17 40.3	82 56	129.5	17 15.7	82 56	129.8	16 51.0	82 55	130.1	16 26.2	82 55	130.4	16 01.5	83 55	130.7	15 36.7	83 55	131.0	9
50	17 55.8	82 57	128.0	17 31.3	82 57	128.3	17 06.8	82 56	128.6	16 42.3	82 56	128.9	16 17.7	82 56	129.2	15 53.2	82 56	129.5	15 28.6	82 56	129.8	15 03.9	82 55	130.1	50
1	17 21.6	81 58	127.2	16 57.3	81 57	127.5	16 32.9	81 57	127.8	16 08.5	81 57	128.1	15 44.1	81 57	128.4	15 19.7	81 56	128.7	14 55.2	82 56	129.0	14 30.8	82 56	129.3	1
2	16 47.0	81 58	126.4	16 22.8	81 58	126.7	15 58.6	81 58	127.0	15 34.4	81 58	127.3	15 10.1	81 57	127.6	14 45.8	81 57	127.9	14 21.5	81 57	128.2	13 57.2	81 57	128.5	2
3	16 12.1	80 59	125.6	15 48.1	80 59	125.9	15 24.0	80 58	126.2	14 59.9	80 58	126.5	14 35.7	80 58	126.8	14 11.6	81 58	127.1	13 47.4	81 57	127.4	13 23.2	81 57	127.7	3
4	15 36.8	80 59	124.7	15 12.9	80 59	125.1	14 49.0	80 59	125.4	14 25.0	80 59	125.7	14 01.0	80 58	126.0	13 37.0	80 58	126.3	13 12.9	80 58	126.6	12 48.9	80 58	126.9	4
55	15 01.2	79 60	123.9	14 37.4	79 60	124.3	14 13.6	79 60	124.6	13 49.8	79 59	124.9	13 25.9	80 59	125.2	13 02.0	80 59	125.5	12 38.1	80 59	125.8	12 14.2	80 58	126.1	55
6	14 25.2	79 60	123.1	14 01.6	79 60	123.5	13 37.9	79 60	123.8	13 14.2	79 60	124.1	12 50.5	79 60	124.4	12 26.7	79 59	124.7	12 03.0	79 59	125.0	11 39.2	79 59	125.3	6
7	13 48.9	78 61	122.4	13 25.4	78 61	122.7	13 01.8	79 61	123.0	12 38.3	79 60	123.3	12 14.7	79 60	123.6	11 51.1	79 60	123.9	11 27.4	79 60	124.3	11 03.8	79 60	124.6	7
8	13 12.3	78 62	121.6	12 48.9	78 61	121.9	12 25.5	78 61	122.2	12 02.0	78 61	122.5	11 38.6	78 61	122.8	11 15.1	78 60	123.2	10 51.6	78 60	123.5	10 28.1	78 60	123.8	8
9	12 35.4	78 62	120.8	12 12.1	78 62	121.1	11 48.8	78 62	121.4	11 25.5	78 61	121.8	11 02.2	78 61	122.1	10 38.8	78 61	122.4	10 15.5	78 61	122.7	9 52.1	78 61	123.0	9
60	11 58.1	77 63	120.0	11 35.0	77 62	120.3	11 11.8	77 62	120.7	10 48.7	77 62	121.0	10 25.4	77 62	121.3	10 02.2	77 61	121.6	9 39.0	78 61	121.9	9 15.7	78 61	122.3	60
1	11 29.6	77 63	119.2	10 57.6	77 63	119.6	10 34.6	77 63	119.9	10 11.5	77 62	120.2	9 48.4	77 62	120.5	9 25.3	77 62	120.9	9 02.2	77 62	121.2	8 39.1	77 62	121.5	1
2	10 42.8	76 63	118.5	10 19.9	76 63	118.8	9 57.0	76 63	119.1	9 34.1	76 63	119.5	9 11.1	77 63	119.8	8 48.1	77 62	120.1	8 25.1	77 62	120.4	8 02.1	77 62	120.8	2
3	10 04.8	76 64	117.7	9 42.0	76 64	118.1	9 19.2	76 64	118.4	8 56.3	76 63	118.7	8 33.5	76 63	119.0	8 10.7	76 63	119.4	7 47.8	76 63	119.7	7 24.9	76 63	120.0	3
4	9 26.4	76 64	117.0	9 03.7	76 64	117.3	8 41.1	76 64	117.6	8 18.4	76 64	118.0	7 55.6	76 64	118.3	7 32.9	76 63	118.6	7 10.2	76 63	119.0	6 47.4	76 63	119.3	4
65	8 47.8	75 65	116.2	8 25.3	75 65	116.6	8 02.7	75 64	116.9	7 40.1	75 64	117.2	7 17.5	75 64	117.6	6 54.9	75 64	117.9	6 32.3	75 64	118.2	6 09.6	75 63	118.5	65
6	8 09.0	75 65	115.5	7 46.5	75 65	115.8	7 24.1	75 65	116.2	7 01.6	75 65	116.5	6 39.1	75 64	116.8	6 16.6	75 64	117.2	5 54.1	75 64	117.5	5 31.6	75 64	117.8	6
7	7 29.9	74 66	114.7	7 07.6	74 65	115.1	6 45.2	75 65	115.4	6 22.9	75 65	115.8	6 00.5	75 65	116.1	5 38.1	75 65	116.4	5 15.7	75 64	116.8				7
8	6 50.6	74 66	114.0	6 28.4	74 66	114.4	6 06.1	74 66	114.7	5 43.9	74 65	115.0	5 21.6	74 65	115.4										8
9	6 11.1	74 66	113.3	5 48.9	74 66	113.6	5 26.8	74 66	114.0	5 04.6	74 66	114.3													9
70	5 31.3	73 66	112.6	5 09.3	73 66	112.9																			70

DECLINATION SAME NAME AS LATITUDE

H.A.	12° 00′			12° 30′			13° 00′			13° 30′			14° 00′			14° 30′			15° 00′			15° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
91	7 35.6	69 71	80.6	7 56.3	69 71	80.3	8 16.9	69 71	79.9	8 37.5	69 71	79.5	8 58.0	69 71	79.2	9 18.6	68 70	78.8	9 39.1	68 70	78.4	9 59.6	68 70	78.0	91
2	6 53.1	69 71	79.9	7 13.8	69 71	79.6	7 34.4	69 71	79.2	7 55.1	69 70	78.9	8 15.7	69 70	78.5	8 36.3	69 70	78.1	8 56.9	69 70	77.8	9 17.5	69 70	77.4	2
3	6 10.6	69 71	79.3	6 31.4	69 71	78.9	6 52.1	69 70	78.5	7 12.8	69 70	78.2	7 33.5	69 70	77.8	7 54.1	69 70	77.4	8 14.8	69 70	77.1	8 35.4	69 70	76.7	3
4	5 28.3	69 70	78.6	5 49.1	69 70	78.2	6 09.8	69 70	77.9	6 30.6	69 70	77.5	6 51.3	69 70	77.1	7 12.1	69 70	76.8	7 32.8	69 70	76.4	7 53.4	69 70	76.0	4
95				5 06.9	69 70	77.5	5 27.7	69 70	77.2	5 48.5	69 70	76.8	6 09.3	69 70	76.5	6 30.1	69 70	76.1	6 50.9	69 70	75.7	7 11.6	69 69	75.4	95
6										5 06.5	70 70	76.1	5 27.4	70 70	75.8	5 48.3	69 70	75.4	6 09.1	69 69	75.1	6 29.9	69 69	74.7	6
7																5 06.6	70 70	74.7	5 27.5	70 69	74.4	5 48.4	70 69	74.0	7
8																						5 06.9	70 69	73.3	8

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Lat. 44°

H.A.	16° 00′			16° 30′			17° 00′			17° 30′		
°	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °
00	62 00.0	1.0 01	180.0	62 30.0	1.0 01	180.0	63 00.0	1.0 01	180.0	63 30.0	1.0 01	180.0
1	61 59.2	1.0 04	178.0	62 29.2	1.0 04	177.9	62 59.2	1.0 04	177.9	63 29.2	1.0 04	177.9
2	61 56.9	1.0 06	175.9	62 26.9	1.0 06	175.9	62 56.8	1.0 07	175.8	63 26.8	1.0 07	175.7
3	61 53.1	1.0 09	173.9	62 23.0	1.0 09	173.8	62 52.9	1.0 09	173.7	63 22.8	1.0 09	173.6
4	61 47.7	99 11	171.8	62 17.5	99 12	171.7	62 47.4	99 12	171.6	63 17.2	99 12	171.5
05	61 40.8	99 14	169.8	62 10.6	99 14	169.7	62 40.3	99 14	169.5	63 10.0	99 15	169.4
6	61 32.5	99 16	167.8	62 02.1	99 17	167.7	62 31.7	99 17	167.5	63 01.3	99 17	167.3
7	61 22.6	98 19	165.8	61 52.1	98 19	165.7	62 21.6	98 19	165.4	62 51.0	98 20	165.2
8	61 11.4	98 21	163.9	61 40.7	98 21	163.7	62 10.0	98 22	163.4	62 39.3	98 22	163.2
9	60 58.7	97 23	161.9	61 27.9	97 24	161.7	61 57.0	97 24	161.5	62 26.1	97 24	161.2
10	60 44.6	97 26	160.0	61 13.6	97 26	159.8	61 42.6	96 26	159.5	62 11.5	96 27	159.2
1	60 29.2	96 28	158.1	60 58.0	96 28	157.9	61 26.8	96 29	157.6	61 55.5	96 29	157.3
2	60 12.5	95 30	156.3	60 41.1	95 30	156.0	61 09.6	95 31	155.7	61 38.1	95 31	155.3
3	59 54.5	95 32	154.5	60 22.9	94 32	154.1	60 51.2	94 33	153.8	61 19.5	94 33	153.4
4	59 35.3	94 34	152.7	60 03.4	94 34	152.3	60 31.5	94 35	152.0	60 59.5	93 35	151.6
15	59 14.9	93 36	150.9	59 42.8	93 36	150.5	60 10.6	93 37	150.2	60 38.4	93 37	149.8
6	58 53.3	92 38	149.2	59 21.0	92 38	148.8	59 48.6	92 39	148.4	60 16.1	92 39	148.0
7	58 30.6	92 40	147.4	58 58.0	91 40	147.1	59 25.4	91 40	146.7	59 52.7	91 41	146.2
8	58 06.9	91 41	145.8	58 34.0	90 42	145.4	59 01.1	90 42	145.0	59 28.2	90 43	144.5
9	57 42.1	90 43	144.1	58 09.0	90 43	143.7	58 35.9	89 44	143.3	59 02.6	89 44	142.9
20	57 16.3	89 45	142.5	57 43.0	89 45	142.1	58 09.6	88 45	141.7	58 36.1	88 46	141.2
1	56 49.6	88 46	141.0	57 16.0	88 46	140.5	57 42.3	88 47	140.1	58 08.6	87 47	139.6
2	56 22.0	87 47	139.4	56 48.2	87 48	139.0	57 14.2	87 48	138.5	57 40.2	86 49	138.1
3	55 53.5	87 49	137.9	56 19.4	86 49	137.5	56 45.2	86 50	137.0	57 10.9	86 50	136.6
4	55 24.2	86 50	136.5	55 49.8	85 51	136.0	56 15.4	85 51	135.6	56 40.8	85 51	135.1
25	54 54.1	85 51	135.0	55 19.5	85 52	134.6	55 44.8	84 52	134.1	56 10.0	84 53	133.6
6	54 23.2	84 53	133.6	54 48.4	84 53	133.2	55 13.4	83 53	132.7	55 38.4	83 54	132.2
7	53 51.6	83 54	132.3	54 16.5	83 54	131.8	54 41.4	83 55	131.3	55 06.0	82 55	130.8
8	53 19.3	82 55	130.9	53 44.0	82 55	130.5	54 08.6	82 56	130.0	54 33.1	81 56	129.5
9	52 46.4	82 56	129.6	53 10.9	81 56	129.1	53 35.2	81 57	128.6	53 59.4	81 57	128.1
30	52 12.9	81 57	128.3	52 37.1	81 57	127.8	53 01.2	80 58	127.4	53 25.2	80 58	126.9
1	51 38.7	80 58	127.1	52 02.7	80 58	126.6	52 26.6	79 59	126.1	52 50.4	79 59	125.6
2	51 04.0	79 59	125.8	51 27.8	79 59	125.4	51 51.5	79 59	124.9	52 15.0	78 60	124.4
3	50 28.7	79 60	124.6	50 52.3	78 60	124.2	51 15.8	78 60	123.7	51 39.1	78 61	123.2
4	49 53.0	78 60	123.5	50 16.4	78 61	123.0	50 39.6	77 61	122.5	51 02.7	77 61	122.0
35	49 16.7	77 61	122.3	49 39.9	77 62	121.8	50 03.0	77 62	121.3	50 25.9	76 62	120.8
6	48 40.0	77 62	121.2	49 03.0	76 62	120.7	49 25.9	76 63	120.2	49 48.6	76 63	119.7
7	48 02.9	76 63	120.1	48 25.7	76 63	119.6	48 48.4	75 63	119.1	49 10.9	75 64	118.6
8	47 25.3	76 63	119.0	47 48.0	75 64	118.5	48 10.5	75 64	118.0	48 32.8	74 64	117.5
9	46 47.4	75 64	117.9	47 09.8	75 64	117.4	47 32.2	74 64	116.9	47 54.4	74 65	116.4
40	46 09.1	74 64	116.9	46 31.4	74 65	116.4	46 53.5	74 65	115.9	47 15.5	73 65	115.4
1	45 30.4	74 65	115.9	45 52.5	74 65	115.4	46 14.5	73 66	114.9	46 36.4	73 66	114.4
2	44 51.4	73 66	114.9	45 13.4	73 66	114.4	45 35.2	73 66	113.9	45 56.9	72 66	113.4
3	44 12.1	73 66	113.9	44 33.9	73 66	113.4	44 55.6	72 66	112.9	45 17.2	72 67	112.4
4	43 32.5	72 67	112.9	43 54.2	72 67	112.4	44 15.7	72 67	111.9	44 37.1	71 67	111.4
45	42 52.6	72 67	111.9	43 14.1	72 67	111.5	43 35.5	71 67	111.0	43 56.8	71 68	110.5
6	42 12.4	72 67	111.0	42 33.8	71 68	110.5	42 55.1	71 68	110.1	43 16.3	70 68	109.6
7	41 32.0	71 68	110.1	41 53.3	71 68	109.6	42 14.5	70 68	109.1	42 35.5	70 68	108.7
8	40 51.4	71 68	109.2	41 12.5	70 68	108.7	41 33.6	70 68	108.2	41 54.5	70 69	107.8
9	40 10.5	70 68	108.3	40 31.5	70 69	107.8	40 52.5	70 69	107.4	41 13.3	69 69	106.9
50	39 29.4	70 69	107.4	39 50.4	70 69	106.9	40 11.2	69 69	106.5	40 31.9	69 69	106.0
1	38 48.1	70 69	106.5	39 09.0	69 69	106.1	39 29.7	69 69	105.6	39 50.3	69 70	105.1
2	38 06.7	69 69	105.7	38 27.4	69 70	105.2	38 48.1	69 70	104.8	39 08.6	68 70	104.3
3	37 25.0	69 70	104.9	37 45.7	69 70	104.4	38 06.2	68 70	103.9	38 26.7	68 70	103.5
4	36 43.2	69 70	104.0	37 03.8	68 70	103.6	37 24.3	68 70	103.1	37 44.6	68 70	102.6
55	36 01.3	68 70	103.2	36 21.8	68 70	102.8	36 42.2	68 70	102.3	37 02.5	67 70	101.8
6	35 19.2	68 70	102.4	35 39.6	68 70	101.9	35 59.9	68 71	101.5	36 20.2	67 71	101.0
7	34 37.0	68 71	101.6	34 57.3	68 71	101.1	35 17.6	67 71	100.7	35 37.7	67 71	100.2
8	33 54.6	68 71	100.8	34 14.9	67 71	100.4	34 35.1	67 71	99.9	34 55.2	67 71	99.5
9	33 12.2	68 71	100.0	33 32.4	67 71	99.6	33 52.6	67 71	99.1	34 12.6	67 71	98.7
60	32 29.6	67 71	99.3	32 49.8	67 71	98.8	33 09.9	67 71	98.4	33 29.9	66 71	97.9
1	31 47.0	67 71	98.5	32 07.1	67 71	98.0	32 27.2	67 71	97.6	32 47.1	66 71	97.2
2	31 04.3	67 71	97.7	31 24.3	67 71	97.3	31 44.3	67 71	96.9	32 04.2	66 72	96.4
3	30 21.5	67 71	97.0	30 41.5	67 72	96.5	31 01.5	66 72	96.1	31 21.3	66 72	95.7
4	29 38.6	67 72	96.2	29 58.6	67 72	95.8	30 18.5	66 72	95.4	30 38.4	66 72	94.9
65	28 55.7	67 72	95.5	29 15.6	66 72	95.1	29 35.5	66 72	94.6	29 55.3	66 72	94.2
6	28 12.7	67 72	94.8	28 32.6	66 72	94.3	28 52.5	66 72	93.9	29 12.3	66 72	93.5
7	27 29.6	67 72	94.0	27 49.6	66 72	93.6	28 00.4	66 72	93.2	28 29.2	66 72	92.8
8	26 46.6	66 72	93.3	27 06.5	66 72	92.9	27 26.3	66 72	92.5	27 46.1	66 72	92.1
9	26 03.5	66 72	92.6	26 23.4	66 72	92.2	26 43.2	66 72	91.8	27 02.9	66 72	91.4
70	25 20.3	66 72	91.9	25 40.2	66 72	91.5	26 00.0	66 72	91.1	26 19.8	66 72	90.7
1	24 37.2	66 72	91.2	24 57.1	66 72	90.8	25 16.9	66 72	90.4	25 36.6	66 72	90.0
2	23 54.0	66 72	90.5	24 13.9	66 72	90.1	24 33.7	66 72	89.7	24 53.4	66 72	89.3
3	23 10.9	66 72	89.8	23 30.7	66 72	89.4	23 50.5	66 72	89.0	24 10.3	66 72	88.6
4	22 27.7	66 72	89.1	22 47.6	66 72	88.7	23 07.4	66 72	88.3	23 27.1	66 72	87.9
75	21 44.6	66 72	88.4	22 04.4	66 72	88.0	22 24.3	66 72	87.6	22 44.0	66 72	87.2
6	21 01.4	66 72	87.7	21 21.3	66 72	87.3	21 41.2	66 72	86.9	22 00.9	66 72	86.5
7	20 18.3	66 72	87.1	20 38.2	66 72	86.7	20 58.1	66 72	86.3	21 17.9	66 72	85.9
8	19 35.2	67 72	86.4	19 55.1	66 72	86.0	20 15.0	66 72	85.6	20 34.8	66 72	85.2
9	18 52.2	67 72	85.7	19 12.1	66 72	85.3	19 32.0	66 72	84.9	19 51.9	66 72	84.5
80	18 09.1	67 72	85.0	18 29.1	66 72	84.6	18 49.0	66 72	84.2	19 08.9	66 71	83.8
1	17 26.2	67 72	84.4	17 46.2	67 71	84.0	18 06.1	66 71	83.6	18 26.0	66 71	83.2
2	16 43.2	67 71	83.7	17 03.3	67 71	83.3	17 23.3	67 71	82.9	17 43.2	66 71	82.5
3	16 00.4	67 71	83.0	16 20.4	67 71	82.6	16 40.5	67 71	82.2	17 00.4	67 71	81.8
4	15 17.6	67 71	82.3	15 37.7	67 71	82.0	15 57.7	67 71	81.6	16 17.8	67 71	81.2
85	14 34.8	67 71	81.7	14 55.0	67 71	81.3	15 15.1	67 71	80.9	15 35.1	67 71	80.5
6	13 52.2	67 71	81.0	14 12.3	67 71	80.6	14 32.5	67 71	80.2	14 52.6	67 71	79.9
7	13 09.6	68 71	80.3	13 29.8	67 71	80.0	13 50.0	67 71	79.6	14 10.2	67 71	79.2
8	12 27.1	68 71	79.7	12 47.4	68 71	79.3	13 07.6	67 70	78.9	13 27.8	67 70	78.5
9	11 44.6	68 71	79.0	12 05.0	68 70	78.6	12 25.3	68 70	78.3	12 45.6	68 70	77.9
90	11 02.3	68 70	78.3	11 22.7	68 70	78.0	11 43.1	68 70	77.6	12 03.4	68 70	77.2

18° 00′			18° 30′			19° 00′			19° 30′			H.A.
Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	°
64 00.0	1.0 01	180.0	64 30.0	1.0 01	180.0	65 00.0	1.0 01	180.0	65 30.0	1.0 01	180.0	00
63 59.2	1.0 04	177.8	64 29.2	1.0 04	177.8	64 59.2	1.0 04	177.8	65 29.1	1.0 04	177.7	1
63 56.7	1.0 07	175.7	64 26.7	1.0 07	175.6	64 56.6	1.0 07	175.5	65 26.6	1.0 07	175.5	2
63 52.7	1.0 09	173.5	64 22.6	1.0 10	173.4	64 52.4	1.0 10	173.3	65 22.3	1.0 10	173.2	3
63 47.0	99 12	171.4	64 16.8	99 12	171.2	64 46.6	99 12	171.1	65 16.4	99 13	171.0	4
63 39.7	99 15	169.2	64 09.4	90 15	169.1	64 39.1	99 15	168.9	65 08.8	99 15	168.7	05
63 30.9	99 17	167.1	64 00.4	99 18	166.9	64 30.0	98 18	166.7	64 59.5	98 18	166.5	6
63 20.5	98 20	165.0	63 49.9	98 20	164.8	64 19.3	98 20	164.6	64 48.6	98 21	164.3	7
63 08.6	98 22	163.0	63 37.8	97 23	162.7	64 07.0	97 23	162.5	64 36.2	97 23	162.2	8
62 55.2	97 25	160.9	63 24.2	97 25	160.6	63 53.3	97 25	160.4	64 22.3	97 26	160.1	9
62 40.4	96 27	158.9	63 09.2	96 27	158.6	63 38.0	96 28	158.3	64 06.8	96 28	158.0	10
62 24.2	96 29	156.9	62 52.8	95 30	156.6	63 21.4	95 30	156.3	63 49.9	95 30	155.9	1
62 06.6	95 32	155.0	62 35.0	95 32	154.6	63 03.3	94 32	154.3	63 31.6	94 33	153.9	2
61 47.7	94 34	153.1	62 15.8	94 34	152.7	62 43.9	94 34	152.3	63 12.0	93 35	151.9	3
61 27.5	93 36	151.2	61 55.4	93 36	150.8	62 23.3	93 37	150.4	62 51.0	92 37	150.0	4
61 06.1	92 38	149.4	61 33.8	92 38	149.0	62 01.4	92 38	148.6	62 28.8	92 39	148.1	15
60 43.6	91 40	147.6	61 10.9	91 40	147.2	61 38.3	91 40	146.7	62 05.5	91 41	146.3	6
60 19.9	91 41	145.8	60 47.0	90 42	145.4	61 14.0	90 42	144.9	61 41.0	90 43	144.5	7
59 55.1	90 43	144.1	60 21.9	89 44	143.7	60 48.7	89 44	143.2	61 15.3	89 44	142.7	8
59 29.3	89 45	142.4	59 55.8	88 45	142.0	60 22.3	88 46	141.5	60 48.7	88 46	141.0	9
59 02.5	88 46	140.8	59 28.8	87 47	140.3	59 55.0	87 47	139.8	60 21.0	87 48	139.3	20
58 34.7	87 48	139.2	59 00.7	87 48	138.7	59 26.6	86 49	138.2	59 52.4	86 49	137.7	1
58 06.0	86 49	137.6	58 31.8	86 50	137.1	58 57.4	85 50	136.6	59 22.9	85 51	136.1	2
57 36.5	85 51	136.1	58 02.0	85 51	135.6	58 27.4	84 51	135.1	58 52.6	84 52	134.6	3
57 06.2	84 52	134.6	57 31.4	84 52	134.1	57 56.5	83 53	133.6	58 21.5	83 53	133.0	4
56 35.1	83 53	133.1	57 00.0	83 54	132.6	57 24.8	83 54	132.1	57 49.5	82 54	131.6	25
56 03.2	83 54	131.7	56 27.9	82 55	131.2	56 52.5	82 55	130.7	57 16.9	81 56	130.1	6
55 30.6	82 55	130.3	55 55.1	81 56	129.8	56 19.4	81 56	129.3	56 43.6	80 57	128.7	7
54 57.4	81 56	129.0	55 21.6	80 57	128.4	55 45.6	80 57	127.9	56 09.6	80 58	127.4	8
54 23.5	80 57	127.6	54 47.5	80 58	127.1	55 11.3	79 58	126.6	55 35.0	79 59	126.0	9
53 49.0	79 58	126.3	54 12.8	79 59	125.8	54 36.3	78 59	125.3	54 59.8	78 60	124.8	30
53 14.0	79 59	125.1	53 37.5	78 60	124.6	54 00.8	78 60	124.0	54 24.1	77 60	123.5	1
52 38.4	78 60	123.8	53 01.7	77 61	123.3	53 24.8	77 61	122.8	53 47.8	76 61	122.3	2
52 02.3	77 61	122.6	52 25.4	77 61	122.1	52 48.3	76 62	121.6	53 11.1	76 62	121.0	3
51 25.7	76 62	121.5	51 48.6	76 62	120.9	52 11.3	75 62	120.4	52 33.9	75 63	119.9	4
50 48.7	76 62	120.3	51 11.3	75 63	119.8	51 33.8	75 63	119.3	51 56.2	74 63	118.7	35
50 11.2	75 63	119.2	50 33.7	75 63	118.7	50 56.0	74 64	118.1	51 18.2	74 64	117.6	6
49 33.3	74 64	118.1	49 55.6	74 64	117.6	50 17.7	74 64	117.0	50 39.7	73 65	116.5	7
48 55.1	74 64	117.0	49 17.2	73 65	116.5	49 39.1	73 65	116.0	50 00.9	72 65	115.4	8
48 16.4	73 65	115.9	48 38.3	73 65	115.4	49 00.1	72 66	114.9	49 21.8	72 66	114.4	9
47 37.4	73 65	114.9	47 59.2	72 66	114.4	48 20.8	72 66	113.9	48 42.3	71 66	113.3	40
46 58.1	72 66	113.9	47 19.7	72 66	113.4	47 41.2	71 67	112.9	48 02.5	71 67	112.3	1
46 18.5	72 66	112.9	46 40.0	71 67	112.4	47 01.3	71 67	111.9	47 22.5	70 67	111.3	2
45 38.6	71 67	111.9	45 59.9	71 67	111.4	46 21.1	70 67	110.9	46 42.1	70 68	110.4	3
44 58.4	71 67	111.0	45 19.6	70 68	110.4	45 40.6	70 68	109.9	46 01.5	69 68	109.4	4
44 18.0	70 68	110.0	44 39.0	70 68	109.5	45 00.0	69 68	109.0	45 20.7	69 68	108.5	45
43 37.3	70 68	109.1	43 58.2	70 68	108.6	44 19.0	69 69	108.1	44 39.7	69 69	107.6	6
42 56.4	70 69	108.2	43 17.2	69 69	107.7	43 37.9	69 69	107.2	43 58.4	68 69	106.7	7
42 15.3	69 69	107.3	42 36.0	69 69	106.8	42 56.6	68 69	106.3	43 17.0	68 69	105.8	8
41 34.0	69 69	106.4	41 54.6	68 69	105.9	42 15.0	68 70	105.4	42 35.4	68 70	104.9	9
40 52.5	68 69	105.5	41 13.0	68 70	105.0	41 33.4	68 70	104.6	41 53.6	67 70	104.1	50
40 10.8	68 70	104.7	40 31.2	68 70	104.2	40 51.5	67 70	103.7	41 11.6	67 70	103.2	1
39 29.0	68 70	103.8	39 49.3	67 70	103.3	40 09.5	67 70	102.9	40 29.6	67 70	102.4	2
38 47.0	68 70	103.0	39 07.2	67 70	102.5	39 27.3	67 70	102.0	39 47.3	66 71	101.6	3
38 04.9	67 70	102.2	38 25.0	67 71	101.7	38 45.1	67 71	101.2	39 05.0	66 71	100.7	4
37 22.6	67 71	101.4	37 42.7	67 71	100.9	38 02.7	66 71	100.4	38 22.5	66 71	100.0	55
36 40.3	67 71	100.6	37 00.3	67 71	100.1	37 20.2	66 71	99.6	37 40.0	66 71	99.2	6
35 57.8	67 71	99.8	36 17.7	66 71	99.3	36 37.6	66 71	98.9	36 57.3	66 71	98.4	7
35 15.2	66 71	99.0	35 35.1	66 71	98.5	35 54.9	66 71	98.1	36 14.6	65 71	97.6	8
34 32.5	66 71	98.2	34 52.4	66 71	97.8	35 12.1	66 71	97.3	35 31.8	65 71	96.9	9
33 49.8	66 71	97.5	34 09.6	66 71	97.0	34 29.3	65 72	96.6	34 48.9	65 72	96.1	60
33 07.0	66 71	96.7	33 26.7	66 72	96.3	33 46.4	65 72	95.8	34 05.9	65 72	95.4	1
32 24.1	66 72	96.0	32 43.8	66 72	95.5	33 03.4	65 72	95.1	33 22.9	65 72	94.6	2
31 41.1	66 72	95.2	32 00.8	65 72	94.8	32 20.4	65 72	94.3	32 39.9	65 72	93.9	3
30 58.1	66 72	94.5	31 17.8	65 72	94.1	31 37.3	65 72	93.6	31 56.8	65 72	93.2	4
30 15.1	66 72	93.8	30 34.7	65 72	93.3	30 54.2	65 72	92.9	31 13.7	65 72	92.5	65
29 32.0	66 72	93.1	29 51.6	65 72	92.6	30 11.1	65 72	92.2	30 30.6	65 72	91.7	6
28 48.9	65 72	92.3	29 08.5	65 72	91.9	29 28.0	65 72	91.5	29 47.4	65 72	91.0	7
28 05.7	65 72	91.6	28 25.3	65 72	91.2	28 44.8	65 72	90.8	29 04.3	65 72	90.3	8
27 22.6	65 72	90.9	27 42.2	65 72	90.5	28 01.7	65 72	90.1	28 21.1	65 72	89.6	9
26 39.4	65 72	90.2	26 59.0	65 72	89.8	27 18.5	65 72	89.4	27 37.9	65 72	89.0	70
25 56.3	65 72	89.5	26 15.8	65 72	89.1	26 35.4	65 72	88.7	26 54.8	65 72	88.3	1
25 13.1	65 72	88.9	25 32.7	65 72	88.4	25 52.2	66 72	88.0	26 11.7	65 72	87.6	2
24 30.0	65 72	88.2	24 49.6	65 72	87.7	25 09.1	65 72	87.3	25 28.6	65 72	86.9	3
23 46.8	65 72	87.5	24 06.4	65 72	87.1	24 26.0	65 72	86.7	24 45.5	65 72	86.2	4
23 03.7	66 72	86.8	23 23.4	65 72	86.4	23 42.9	65 72	86.0	24 02.4	65 72	85.6	75
22 20.6	66 72	86.1	22 40.3	65 72	85.7	22 59.9	65 72	85.3	23 19.4	65 72	84.9	6
21 37.6	66 72	85.5	21 57.3	65 72	85.0	22 16.9	65 72	84.6	22 36.5	65 72	84.2	7
20 54.6	66 72	84.8	21 14.3	66 72	84.4	21 34.0	65 72	84.0	21 53.5	65 71	83.6	8
20 11.6	66 72	84.1	20 31.4	66 71	83.7	20 51.1	65 71	83.3	21 10.7	65 71	82.9	9
19 28.7	66 71	83.4	19 48.5	66 71	83.0	20 08.2	66 71	82.6	20 27.9	65 71	82.2	80
18 45.9	66 71	82.8	19 05.7	66 71	82.4	19 25.4	66 71	82.0	19 45.1	66 71	81.6	1
18 03.1	66 71	82.1	18 22.9	66 71	81.7	18 42.7	66 71	81.3	19 02.5	66 71	80.9	2
17 20.4	66 71	81.5	17 40.3	66 71	81.1	18 00.1	66 71	80.7	18 19.9	66 71	80.3	3
16 37.7	67 71	80.8	16 57.7	66 71	80.4	17 17.6	66 71	80.0	17 37.4	66 71	79.6	4
15 55.2	67 71	80.1	16 15.2	67 71	79.8	16 35.1	66 71	79.4	16 55.0	66 71	79.0	85
15 12.7	67 71	79.5	15 32.7	67 71	79.1	15 52.7	67 70	78.7	16 12.7	66 70	78.3	6
14 30.3	67 70	78.8	14 50.4	67 70	78.4	15 10.5	67 70	78.1	15 30.5	67 70	77.7	7
13 48.0	67 70	78.2	14 08.2	67 70	77.8	14 28.3	67 70	77.4	14 48.4	67 70	77.0	8
13 05.8	67 70	77.5	13 26.0	67 70	77.1	13 46.2	67 70	76.7	14 06.4	67 70	76.4	9
12 23.7	68 70	76.8	12 44.0	68 70	76.5	13 04.3	67 70	76.1	13 24.5	67 70	75.7	90

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H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
00	30 00.0	1.0 01	180.0	29 30.0	1.0 01	180.0	29 00.0	1.0 01	180.0	28 30.0	1.0 01	180.0	28 00.0	1.0 01	180.0	27 30.0	1.0 01	180.0	27 00.0	1.0 01	180.0	26 30.0	1.0 01	180.0	00
1	29 59.6	1.0 02	178.9	29 29.6	1.0 02	178.9	28 59.6	1.0 02	178.9	28 29.6	1.0 02	178.9	27 59.6	1.0 02	178.9	27 29.6	1.0 02	178.9	26 59.6	1.0 02	178.9	26 29.6	1.0 02	178.9	1
2	29 58.3	1.0 04	177.8	29 28.3	1.0 03	177.8	28 58.4	1.0 03	177.8	28 28.4	1.0 03	177.8	27 58.4	1.0 03	177.8	27 28.4	1.0 03	177.9	26 58.4	1.0 03	177.9	26 28.4	1.0 03	177.9	2
3	29 56.2	1.0 05	176.7	29 26.3	1.0 05	176.7	28 56.3	1.0 05	176.7	28 26.3	1.0 05	176.7	27 56.3	1.0 05	176.8	27 26.4	1.0 05	176.8	26 56.4	1.0 05	176.8	26 26.4	1.0 05	176.8	3
4	29 53.3	1.0 06	175.6	29 23.4	1.0 06	175.6	28 53.4	1.0 06	175.6	28 23.5	1.0 06	175.7	27 53.5	1.0 06	175.7	27 23.6	1.0 06	175.7	26 53.6	1.0 06	175.8	26 23.7	1.0 06	175.8	4
05	29 49.6	1.0 08	174.5	29 19.6	1.0 08	174.5	28 49.7	1.0 08	174.5	28 19.8	1.0 07	174.6	27 49.9	1.0 07	174.6	27 19.9	1.0 07	174.7	26 50.0	1.0 07	174.7	26 20.1	1.0 07	174.7	05
6	29 45.0	1.0 09	173.4	29 15.1	1.0 09	173.4	28 45.2	1.0 09	173.5	28 15.3	1.0 09	173.5	27 45.4	1.0 09	173.6	27 15.5	1.0 09	173.6	26 45.6	1.0 09	173.6	26 15.7	1.0 09	173.7	6
7	29 39.6	99 10	172.3	29 09.7	99 10	172.3	28 39.9	1.0 10	172.4	28 10.0	1.0 10	172.4	27 40.2	1.0 10	172.5	27 10.3	1.0 10	172.5	26 40.5	1.0 10	172.6	26 10.6	1.0 10	172.6	7
8	29 33.3	99 12	171.2	29 03.5	99 12	171.2	28 33.7	99 12	171.3	28 03.9	99 11	171.3	27 34.1	99 11	171.4	27 04.3	99 11	171.5	26 34.5	99 11	171.5	26 04.7	99 11	171.6	8
9	29 26.3	99 13	170.1	28 56.6	99 13	170.1	28 26.8	99 13	170.2	27 57.0	99 13	170.3	27 27.3	99 13	170.3	26 57.5	99 13	170.4	26 27.8	99 13	170.5	25 58.0	99 12	170.6	9
10	29 18.4	99 14	169.0	28 48.8	99 14	169.0	28 19.1	99 14	169.1	27 49.4	99 14	169.2	27 19.7	99 14	169.3	26 50.0	99 14	169.4	26 20.2	99 14	169.4	25 50.5	99 14	169.5	10
1	29 09.8	99 16	167.9	28 40.2	99 16	168.0	28 10.5	99 16	168.1	27 40.9	99 15	168.1	27 11.2	99 15	168.2	26 41.6	99 15	168.3	26 12.0	99 15	168.4	25 42.3	99 15	168.5	1
2	29 00.3	99 17	166.8	28 30.8	99 17	166.9	28 01.2	99 17	167.0	27 31.6	99 17	167.1	27 02.0	99 17	167.2	26 32.5	99 16	167.3	26 02.9	99 16	167.4	25 33.3	99 16	167.5	2
3	28 50.1	98 18	165.7	28 20.6	98 18	165.8	27 51.1	98 18	165.9	27 21.6	98 18	166.0	26 52.1	98 18	166.1	26 22.6	98 18	166.2	25 53.1	98 18	166.3	25 23.6	98 18	166.4	3
4	28 39.0	98 20	164.6	28 09.6	98 20	164.7	27 40.2	98 19	164.9	27 10.8	98 19	165.0	26 41.3	98 19	165.1	26 11.9	98 19	165.2	25 42.5	98 19	165.3	25 13.1	98 19	165.4	4
15	28 27.2	98 21	163.6	27 57.9	98 21	163.7	27 28.5	98 21	163.8	26 59.2	98 21	163.9	26 29.9	98 20	164.0	26 00.5	98 20	164.2	25 31.2	98 20	164.3	25 01.8	98 20	164.4	15
6	28 14.6	97 22	162.5	27 45.4	97 22	162.6	27 16.1	97 22	162.7	26 46.9	98 22	162.9	26 17.6	98 22	163.0	25 48.3	98 22	163.1	25 19.1	98 21	163.2	24 49.8	98 21	163.4	6
7	28 01.2	97 24	161.4	27 32.1	97 23	161.6	27 02.9	97 23	161.7	26 33.8	97 23	161.8	26 04.6	97 23	162.0	25 35.4	97 23	162.1	25 06.3	97 23	162.2	24 37.1	97 22	162.4	7
8	27 47.1	97 25	160.4	27 18.1	97 25	160.5	26 49.0	97 24	160.7	26 20.0	97 24	160.8	25 50.9	97 24	160.9	25 21.8	97 24	161.1	24 52.7	97 24	161.2	24 23.6	97 24	161.3	8
9	27 32.2	96 26	159.3	27 03.3	96 26	159.5	26 34.4	97 26	159.6	26 05.4	97 25	159.8	25 36.4	97 25	159.9	25 07.5	97 25	160.1	24 38.5	97 25	160.2	24 09.5	97 25	160.3	9
20	27 16.6	96 27	158.3	26 47.8	96 27	158.4	26 19.0	96 27	158.6	25 50.1	96 27	158.8	25 21.3	96 26	158.9	24 52.4	96 26	159.1	24 23.5	96 26	159.2	23 54.6	96 26	159.3	20
1	27 00.3	96 28	157.3	26 31.6	96 28	157.4	26 02.9	96 28	157.6	25 34.1	96 28	157.7	25 05.4	96 28	157.9	24 36.6	96 27	158.0	24 07.8	96 27	158.2	23 39.0	96 27	158.4	1
2	26 43.3	95 30	156.2	26 14.7	95 29	156.4	25 46.0	95 29	156.6	25 17.4	95 29	156.7	24 48.8	95 29	156.9	24 20.1	96 29	157.1	23 51.5	96 28	157.2	23 22.8	96 28	157.4	2
3	26 25.5	95 31	155.2	25 57.0	95 31	155.4	25 28.5	95 30	155.6	25 00.0	95 30	155.7	24 31.5	95 30	155.9	24 02.9	95 30	156.1	23 34.4	95 30	156.2	23 05.8	95 29	156.4	3
4	26 07.1	95 32	154.2	25 38.7	95 32	154.4	25 10.3	95 31	154.5	24 41.9	95 31	154.7	24 13.5	95 31	154.9	23 45.1	95 31	155.1	23 16.7	95 31	155.3	22 48.2	95 30	155.4	4
25	25 47.9	94 33	153.2	25 19.7	94 33	153.4	24 51.4	94 33	153.5	24 23.2	94 32	153.7	23 54.9	94 32	153.9	23 26.6	94 32	154.1	22 58.3	94 32	154.3	22 29.9	94 32	154.5	25
6	25 28.1	94 34	152.2	25 00.0	94 34	152.4	24 31.9	94 34	152.6	24 03.7	94 34	152.8	23 35.6	94 33	152.9	23 07.4	94 33	153.1	22 39.2	94 33	153.3	22 11.0	94 33	153.5	6
7	25 07.6	93 35	151.2	24 39.7	93 35	151.4	24 11.7	93 35	151.6	23 43.6	93 35	151.8	23 15.6	93 34	152.0	22 47.6	94 34	152.2	22 19.5	94 34	152.4	21 51.4	94 34	152.5	7
8	24 46.5	93 36	150.2	24 18.7	93 36	150.4	23 50.8	93 36	150.6	23 22.9	93 36	150.8	22 55.0	93 35	151.0	22 27.1	93 35	151.2	21 59.2	93 35	151.4	21 31.2	93 35	151.6	8
9	24 24.7	92 37	149.2	23 57.0	92 37	149.4	23 29.3	92 37	149.6	23 01.5	93 37	149.8	22 33.8	93 36	150.0	22 06.0	93 36	150.2	21 38.2	93 36	150.5	21 10.4	93 36	150.7	9
30	24 02.3	92 38	148.2	23 34.8	92 38	148.5	23 07.2	92 38	148.7	22 39.5	92 38	148.9	22 11.9	92 37	149.1	21 44.3	92 37	149.3	21 16.6	92 37	149.5	20 48.9	92 37	149.7	30
1	23 39.3	91 39	147.3	23 11.9	92 39	147.5	22 44.4	92 39	147.7	22 16.9	92 39	147.9	21 49.4	92 38	148.2	21 21.9	92 38	148.4	20 54.4	92 38	148.6	20 26.8	92 38	148.8	1
2	23 15.7	91 40	146.3	22 48.4	91 40	146.6	22 21.1	91 40	146.8	21 53.7	91 40	147.0	21 26.4	91 39	147.2	20 59.0	91 39	147.4	20 31.6	91 39	147.7	20 04.2	91 39	147.9	2
3	22 51.5	91 41	145.4	22 24.3	91 41	145.6	21 57.1	91 41	145.8	21 29.9	91 41	146.1	21 02.7	91 40	146.3	20 35.5	91 40	146.5	20 08.2	91 40	146.7	19 40.9	91 40	147.0	3
4	22 26.7	90 42	144.4	21 59.6	90 42	144.7	21 32.6	90 42	144.9	21 05.5	90 42	145.1	20 38.5	90 41	145.4	20 11.4	90 41	145.6	19 44.2	90 41	145.8	19 17.1	90 41	146.1	4
35	22 01.3	90 43	143.5	21 34.4	90 43	143.7	21 07.5	90 43	144.0	20 40.6	90 43	144.2	20 13.6	90 42	144.5	19 46.7	90 42	144.7	19 19.7	90 42	144.9	18 52.7	90 42	145.2	35
6	21 35.3	89 44	142.6	21 08.6	89 44	142.8	20 41.8	89 44	143.1	20 15.1	89 43	143.3	19 48.3	89 43	143.5	19 21.5	89 43	143.8	18 54.6	89 43	144.0	18 27.8	90 42	144.3	6
7	21 08.8	89 45	141.7	20 42.2	89 45	141.9	20 15.6	89 45	142.2	19 49.0	89 44	142.4	19 22.4	89 44	142.6	18 55.9	89 44	142.9	18 29.0	89 44	143.1	18 02.3	89 43	143.4	7
8	20 41.8	88 46	140.8	20 15.3	88 46	141.0	19 48.9	88 45	141.3	19 22.4	88 45	141.5	18 55.9	88 45	141.8	18 29.4	88 45	142.0	18 02.9	88 44	142.2	17 36.3	89 44	142.5	8
9	20 14.2	88 47	139.9	19 47.9	88 47	140.1	19 21.6	88 46	140.4	18 55.3	88 46	140.6	18 28.9	88 46	140.9	18 02.6	88 46	141.1	17 36.2	88 45	141.4	17 09.8	88 45	141.6	9
40	19 46.1	87 48	139.0	19 20.0	87 47	139.2	18 53.8	87 47	139.5	18 27.6	87 47	139.7	18 01.4	87 47	140.0	17 35.2	87 46	140.2	17 09.0	88 46	140.5	16 42.7	88 46	140.8	40
1	19 17.5	87 48	138.1	18 51.5	87 48	138.3	18 25.5	87 48	138.6	17 59.5	87 48	138.9	17 33.4	87 47	139.1	17 07.4	87 47	139.4	16 41.3	87 47	139.6	16 15.2	87 47	139.9	1
2	18 48.5	86 49	137.2	18 22.6	86 49	137.5	17 56.7	86 49	137.7	17 30.9	86 49	138.0	17 05.0	86 48	138.3	16 39.0	86 48	138.5	16 13.1	87 48	138.8	15 47.1	87 48	139.0	2
3	18 18.9	86 50	136.3	17 53.2	86 50	136.6	17 27.5	86 50	136.9	17 01.7	86 49	137.1	16 36.0	86 49	137.4	16 10.2	86 49	137.7	15 44.4	86 49	137.9	15 18.6	86 48	138.2	3
4	17 48.9	85 51	135.5	17 23.3	85 51	135.7	16 57.7	85 50	136.0	16 32.1	85 50	136.3	16 06.5	85 50	136.6	15 40.9	85 50	136.8	15 15.2	86 49	137.1	14 49.6	86 49	137.4	4
45	17 18.3	85 52	134.6	16 53.0	85 51	134.9	16 27.5	85 51	135.2	16 02.1	85 51	135.4	15 36.6	85 51	135.7	15 11.1	85 50	136.0	14 45.6	85 50	136.3	14 20.1	85 50	136.5	45
6	16 47.4	84 52	133.8	16 22.1	84 52	134.0	15 56.9	84 52	134.3	15 31.6	84 52	134.6	15 06.3	84 51	134.9	14 40.9	84 51	135.2	14 15.6	85 51	135.4	13 50.2	85 51	135.7	6
7	16 16.0	84 53	132.9	15 50.9	84 53	133.2	15 25.8	84 53	133.5	15 00.6	84 52	133.8	14 35.5	84 52	134.0	14 10.3	84 52	134.3	13 45.1	84 52	134.6	13 19.8	84 51	134.9	7
8	15 44.2	83 54	132.1	15 19.2	83 54	132.4	14 54.2	83 53	132.7	14 29.2	83 53	132.9	14 04.2	83 53	133.2	13 39.2	84 53	133.5	13 14.1	84 52	133.8	12 49.0	84 52	134.1	8
9	15 11.9	83 54	131.3	14 47.1	83 54	131.5	14 22.3	83 54	131.8	13 57.4	83 54	132.1	13 32.6	83 53	132.4	13 07.7	83 53	132.7	12 42.8	83 53	133.0	12 17.8	83 53	133.3	9
50	14 39.3	82 55	130.4	14 14.6	82 55	130.7	13 49.9	82 55	131.0	13 25.2	82 54	131.3	13 00.5	82 54	131.6	12 35.7	83 54	131.9	12 11.0	83 54	132.2	11 46.2	83 53	132.5	50
1	14 06.2	82 56	129.6	13 41.7	82 55	129.9	13 17.2	82 55	130.2	12 52.6	82 55	130.5	12 28.0	82 55	130.8	12 03.4	82 55	131.1	11 38.8	82 54	131.4	11 14.1	82 54	131.7	1
2	13 32.8	81 56	128.8	13 08.4	81 56	129.1	12 44.0	81 56	129.4	12 19.6	81 56	129.7	11 55.2	82 55	130.0	11 30.7	82 55	130.3	11 06.2	82 55	130.6	10 41.7	82 55	130.9	2
3	12 59.0	81 57	128.0	12 34.8	81 57	128.3	12 10.5	81 56	128.6	11 46.2	81 56	128.9	11 21.9	81 56	129.2	10 57.6	81 56	129.5	10 33.3	81 56	129.8	10 08.9	81 55	130.1	3
4	12 24.8	80 58	127.2	12 00.7	80 57	127.5	11 36.6	80 57	127.8	11 12.4	81 57	128.1	10 48.3	81 57	128.4	10 24.1	81 56	128.7	9 59.9	81 56	129.0	9 35.7	81 56	129.3	4
55	11 50.3	80 58	126.4	11 26.3	80 58	126.7	11 02.3	80 58	127.0	10 38.3	80 57	127.4	10 14.3	80 57	127.7	9 50.3	80 57	128.0	9 26.2	80 57	128.3	9 02.1	80 57	128.6	55
6	11 15.4	79 59	125.7	10 51.5	79 58	126.0	10 27.7	80 58	126.3	10 03.8	80 58	126.6	9 39.9	80 58	126.9	9 16.1	80 58	127.2	8 52.1	80 57	127.5	8 28.2	80 57	127.8	6
7	10 40.1	79 59	124.9	10 16.4	79 59	125.2	9 52.7	79 59	125.5	9 29.0	79 59	125.8	9 05.3	79 58	126.1	8 41.5	79 58	126.4	8 17.7	79 58	126.7	7 53.9	79 58	127.0	7
8	10 04.6	78 60	124.1	9 41.0	79 60	124.4	9 17.4	79 59	124.7	8 53.8	79 59	125.1	8 30.2	79 59	125.4	8 06.6	79 59	125.7	7 43.0	79 58	126.0	7 19.3	79 58	126.3	8
9	9 28.7	78 60	123.3	9 05.2	78 60	123.7	8 41.8	78 60	124.0	8 18.3	78 60	124.3	7 54.9	78 59	124.6	7 31.4	78 59	124.9	7 07.9	78 59	125.2	6 44.4	78 59	125.5	9
60	8 52.4	78 61	122.6	8 29.2	78 61	122.9	8 05.8	78 60	123.2	7 42.5	78 60	123.5	7 19.2	78 60	123.9	6 55.8	78 60	124.2	6 32.5	78 60	124.5	6 09.1	78 59	124.8	60
1	8 15.9	77 61	121.8	7 52.8	77 61	122.2	7 29.6	77 61	122.5	7 06.4	77 61	122.8	6 43.2	77 60	123.1	6 20.0	77 60	123.4	5 56.7	77 60	123.8	5 33.5	77 60	124.1	1
2	7 39.1	77 62	121.1	7 16.1	77 62	121.4	6 53.0	77 61	121.7	6 30.0	77 61	122.1	6 06.9	77 61	122.4	5 43.8	77 61	122.7	5 20.7	77 61	123.0				2
3	7 02.0	76 62	120.3	6 39.1	76 62	120.7	6 16.2	76 62	121.0	5 53.2	76 62	121.3	5 30.3	77 61	121.6	5 07.3	77 61	122.0							3
4	6 24.6	76 63	119.6	6 01.8	76 63	119.9	5 39.0	76 62	120.3	5 16.2	76 62	120.6													4
65	5 47.0	76 63	118.9	5 24.3	76 63	119.2	5 01.6	76 63	119.5																65
6	5 09.0	75 64	118.1																						6

DECLINATION SAME NAME AS LATITUDE

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
91	10 29.1	68 70	77.7	10 40.6	68 70	77.3	11 01.0	68 70	76.9	11 21.4	68 70	76.6	11 41.8	68 70	76.2	12 02.1	68 70	75.8	12 22.4	68 70	75.4	12 42.7	68 69	75.1	91
2	9 38.0	68 70	77.0	9 58.5	68 70	76.6	10 19.0	68 70	76.3	10 39.5	68 70	75.9	10 59.9	68 70	75.5	11 20.3	68 69	75.2	11 40.7	68 69	74.8	12 01.1	68 69	74.4	2
3	8 56.0	69 70	76.3	9 16.6	69 70	76.0	9 37.1	68 70	75.6	9 57.7	68 69	75.2	10 18.2	68 69	74.9	10 38.7	68 69	74.5	10 59.1	68 69	74.1	11 19.6	68 69	73.7	3
4	8 14.1	69 70	75.7	8 34.8	69 69	75.3	8 55.4	69 69	74.9	9 16.0	69 69	74.6	9 36.6	69 69	74.2	9 57.2	68 69	73.8	10 17.7	68 69	73.5	10 38.2	68 69	73.1	4
95	7 32.4	69 69	75.0	7 53.1	69 69	74.6	8 13.8	69 69	74.3	8 34.5	69 69	73.9	8 55.1	69 69	73.5	9 15.8	69 69	73.2	9 36.4	69 69	72.8	9 57.0	69 68	72.4	95
6	6 50.7	69 69	74.3	7 11.5	69 69	74.0	7 32.3	69 69	73.6	7 53.1	69 69	73.2	8 13.8	69 69	72.9	8 34.5	69 68	72.5	8 55.2	69 68	72.1	9 15.9	69 68	71.8	6
7	6 09.3	70 69	73.7	6 30.1	70 69	73.3	6 51.0	69 69	72.9	7 11.8	69 68	72.6	7 32.6	69 68	72.2	7 53.4	69 68	71.9	8 14.2	69 68	71.5	8 35.0	69 68	71.1	7
8	5 27.9	70 69	73.0	5 48.9	70 69	72.6	6 09.8	70 68	72.3	6 30.7	70 68	71.9	6 51.6	70 68	71.5	7 12.5	70 68	71.2	7 33.4	70 68	70.8	7 54.2	69 68	70.5	8
9				5 07.7	70 68	72.0	5 28.8	70 68	71.6	5 49.8	70 68	71.2	6 10.8	70 68	70.9	6 31.7	70 68	70.5	6 52.7	70 68	70.2	7 13.6	70 67	69.8	9
100										5 09.0	70 68	70.6	5 30.1	70 68	70.2	5 51.1	70 67	69.9	6 12.2	70 67	69.5	6 33.2	70 67	69.1	100
1																5 10.7	71 67	69.2	5 31.8	70 67	68.8	5 53.0	70 67	68.5	1
2																						5 12.9	71 66	67.8	2

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Lat. 44°

H.A.	20° 00′ Alt.	Δd Δt	Az.	20° 30′ Alt.	Δd Δt	Az.	21° 00′ Alt.	Δd Δt	Az.	21° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	66 00.0	1.0 01	180.0	66 30.0	1.0 01	180.0	67 00.0	1.0 02	180.0	67 30.0	1.0 02	180.0
1	65 59.1	1.0 04	177.7	66 29.1	1.0 04	177.7	66 59.1	1.0 04	177.6	67 29.1	1.0 05	177.6
2	65 56.5	1.0 07	175.4	66 26.5	1.0 07	175.3	66 56.4	1.0 07	175.2	67 26.3	1.0 08	175.1
3	65 52.2	1.0 10	173.1	66 22.1	1.0 10	173.0	66 51.9	1.0 10	172.9	67 21.8	1.0 11	172.7
4	65 46.1	99 13	170.8	66 15.9	99 13	170.7	66 45.7	99 13	170.5	67 15.4	99 14	170.3
05	65 38.4	99 16	168.5	66 08.1	99 16	168.4	66 37.7	99 16	168.2	67 07.3	99 16	168.0
6	65 29.0	98 18	166.3	65 58.5	98 19	166.1	66 28.0	98 19	165.9	66 57.4	98 19	165.6
7	65 18.0	98 21	164.1	65 47.3	98 21	163.8	66 16.6	98 22	163.6	66 45.9	98 22	163.3
8	65 05.4	97 24	161.9	65 34.5	97 24	161.6	66 03.6	97 24	161.3	66 32.6	97 25	161.0
9	64 51.2	96 26	159.8	65 20.1	96 27	159.4	65 49.0	96 27	159.1	66 17.8	96 27	158.8
10	64 35.5	96 29	157.6	65 04.2	96 29	157.3	65 32.8	95 29	156.9	66 01.4	95 30	156.6
1	64 18.4	95 31	155.6	64 46.8	95 31	155.2	65 15.2	94 32	154.8	65 43.5	94 32	154.4
2	63 59.8	94 33	153.5	64 28.0	94 34	153.1	64 56.1	94 34	152.7	65 24.1	93 35	152.3
3	63 39.9	93 35	151.5	64 07.8	93 36	151.1	64 35.7	93 36	150.7	65 03.4	92 37	150.2
4	63 18.7	92 37	149.6	63 46.3	92 38	149.2	64 13.9	92 38	148.7	64 41.3	91 39	148.2
15	62 56.3	91 39	147.7	63 23.6	91 40	147.2	63 50.8	91 40	146.8	64 18.0	90 41	146.3
6	62 32.6	90 41	145.8	62 59.6	90 42	145.3	63 26.6	90 42	144.9	63 53.4	89 43	144.4
7	62 07.8	89 43	144.0	62 34.5	89 44	143.5	63 01.2	89 44	143.0	63 27.7	88 45	142.5
8	61 41.9	88 45	142.2	62 08.3	88 45	141.7	62 34.7	88 46	141.2	63 00.9	87 46	140.7
9	61 14.9	87 47	140.5	61 41.1	87 47	140.0	62 07.1	87 48	139.5	62 33.0	86 48	138.9
20	60 47.0	86 48	138.8	61 12.9	86 49	138.3	61 38.6	86 49	137.8	62 04.2	85 50	137.2
1	60 18.1	85 50	137.2	60 43.7	85 50	136.6	61 09.1	85 51	136.1	61 34.4	84 51	135.5
2	59 48.3	84 51	135.6	60 13.6	84 52	135.0	60 38.7	84 52	134.5	61 03.7	83 52	133.9
3	59 17.7	83 52	134.0	59 42.7	83 53	133.5	60 07.5	83 53	132.9	60 32.2	82 54	132.3
4	58 46.3	83 54	132.5	59 11.0	82 54	132.0	59 35.5	82 55	131.4	59 59.9	81 55	130.8
25	58 14.1	82 55	131.0	58 38.5	81 55	130.5	59 02.8	81 56	129.9	59 26.9	80 56	129.3
6	57 41.2	81 56	129.6	58 05.3	80 56	129.0	58 29.3	80 57	128.5	58 53.2	79 57	127.9
7	57 07.6	80 57	128.2	57 31.5	79 57	127.6	57 55.2	79 58	127.1	58 18.8	78 58	126.5
8	56 33.3	79 58	126.8	56 57.0	79 58	126.3	57 20.5	78 59	125.7	57 43.8	77 59	125.1
9	55 58.5	78 59	125.5	56 21.9	78 59	124.9	56 45.1	77 60	124.4	57 08.2	77 60	123.8
30	55 23.1	77 60	124.2	55 46.2	77 60	123.6	56 09.2	76 61	123.1	56 32.0	76 61	122.5
1	54 47.1	77 61	122.9	55 10.0	76 61	122.4	55 32.8	76 62	121.8	55 55.4	75 62	121.2
2	54 10.6	76 62	121.7	54 33.3	75 62	121.1	54 55.9	75 62	120.6	55 18.2	74 63	120.0
3	53 33.7	75 62	120.5	53 56.2	75 63	119.9	54 18.5	74 63	119.4	54 40.6	74 63	118.8
4	52 56.3	74 63	119.3	53 18.5	74 63	118.8	53 40.6	73 64	118.2	54 02.6	73 64	117.6
35	52 18.4	74 64	118.2	52 40.5	73 64	117.6	53 02.4	73 64	117.1	53 24.1	72 65	116.5
6	51 40.2	73 64	117.1	52 02.1	73 65	116.5	52 23.8	72 65	115.9	52 45.3	72 65	115.4
7	51 01.6	73 65	116.0	51 23.2	72 65	115.4	51 44.8	71 66	114.8	52 06.1	71 66	114.3
8	50 22.6	72 66	114.9	50 44.1	71 66	114.3	51 05.4	71 66	113.8	51 26.6	70 66	113.2
9	49 43.3	71 66	113.8	50 04.6	71 66	113.3	50 25.8	70 67	112.7	50 46.8	70 67	112.2
40	49 03.6	71 67	112.8	49 24.8	70 67	112.3	49 45.8	70 67	111.7	50 06.7	69 67	111.2
1	48 23.7	70 67	111.8	48 44.7	70 67	111.3	49 05.6	69 68	110.7	49 26.3	69 68	110.2
2	47 43.5	70 67	110.8	48 04.4	69 68	110.3	48 25.1	69 68	109.7	48 45.7	68 68	109.2
3	47 03.0	69 68	109.9	47 23.8	69 68	109.3	47 44.4	68 68	108.8	48 04.8	68 68	108.2
4	46 22.3	69 68	108.9	46 42.9	68 68	108.4	47 03.4	68 69	107.8	47 23.7	67 69	107.3
45	45 41.4	69 69	108.0	46 01.8	68 69	107.4	46 22.2	68 69	106.9	46 42.4	67 69	106.4
6	45 00.2	68 69	107.1	45 20.6	68 69	106.5	45 40.8	67 69	106.0	46 00.9	67 69	105.5
7	44 18.8	68 69	106.2	44 39.1	67 69	105.6	44 59.2	67 70	105.1	45 19.2	66 70	104.6
8	43 37.3	67 70	105.3	43 57.5	67 70	104.8	44 17.5	67 70	104.2	44 37.4	66 70	103.7
9	42 55.6	67 70	104.4	43 15.6	67 70	103.9	43 35.6	66 70	103.4	43 55.4	66 70	102.9
50	42 13.7	67 70	103.6	42 33.7	66 70	103.1	42 53.5	66 70	102.5	43 13.2	65 70	102.0
1	41 31.7	67 70	102.7	41 51.5	66 70	102.2	42 11.3	66 71	101.7	42 30.9	65 71	101.2
2	40 49.5	66 70	101.9	41 09.3	66 71	101.4	41 29.0	65 71	100.9	41 48.5	65 71	100.4
3	40 07.2	66 71	101.1	40 26.9	66 71	100.6	40 46.5	65 71	100.1	41 06.0	65 71	99.6
4	39 24.8	66 71	100.3	39 44.4	65 71	99.8	40 04.0	65 71	99.3	40 23.4	65 71	98.8
55	38 42.3	66 71	99.5	39 01.9	65 71	99.0	39 21.4	65 71	98.5	39 40.7	64 71	98.0
6	37 59.6	65 71	98.7	38 19.2	65 71	98.2	38 38.6	65 71	97.7	38 57.9	64 71	97.2
7	37 16.9	65 71	97.9	37 36.4	65 71	97.4	37 55.8	64 71	96.9	38 15.1	64 72	96.5
8	36 34.1	65 71	97.1	36 53.6	65 72	96.7	37 12.9	64 72	96.2	37 32.2	64 72	95.7
9	35 51.3	65 72	96.4	36 10.7	65 72	95.9	36 30.0	64 72	95.4	36 49.2	64 72	95.0
60	35 08.4	65 72	95.6	35 27.7	64 72	95.2	35 47.0	64 72	94.7	36 06.2	64 72	94.2
1	34 25.4	65 72	94.9	34 44.7	64 72	94.4	35 04.0	64 72	94.0	35 23.1	64 72	93.5
2	33 42.4	65 72	94.2	34 01.7	64 72	93.7	34 20.9	64 72	93.2	34 40.0	64 72	92.8
3	32 59.3	65 72	93.4	33 18.6	64 72	93.0	33 37.8	64 72	92.5	33 56.9	63 72	92.1
4	32 16.2	64 72	92.7	32 35.5	64 72	92.3	32 54.7	64 72	91.8	33 13.8	63 72	91.3
65	31 33.1	64 72	92.0	31 52.3	64 72	91.6	32 11.5	64 72	91.1	32 30.6	63 72	90.6
6	30 49.9	64 72	91.3	31 09.2	64 72	90.9	31 28.4	64 72	90.4	31 47.4	63 72	89.9
7	30 06.8	64 72	90.6	30 26.0	64 72	90.2	30 45.2	64 72	89.7	31 04.3	63 72	89.3
8	29 23.6	64 72	89.9	29 42.9	64 72	89.5	30 02.0	64 72	89.0	30 21.1	63 72	88.6
9	28 40.5	64 72	89.2	28 59.7	64 72	88.8	29 18.9	64 72	88.3	29 38.0	63 72	87.9
70	27 57.3	64 72	88.5	28 16.6	64 72	88.1	28 35.8	64 72	87.7	28 54.9	64 72	87.2
1	27 14.2	64 72	87.8	27 33.4	64 72	87.4	27 52.6	64 72	87.0	28 11.8	64 72	86.5
2	26 31.0	64 72	87.2	26 50.3	64 72	86.7	27 09.6	64 72	86.3	27 28.7	64 72	85.9
3	25 48.0	65 72	86.5	26 07.3	64 72	86.1	26 26.5	64 72	85.6	26 45.7	64 72	85.2
4	25 04.9	65 72	85.8	25 24.2	64 72	85.4	25 43.5	64 72	85.0	26 02.7	64 72	84.5
75	24 21.9	65 72	85.1	24 41.2	64 72	84.7	25 00.5	64 72	84.3	25 19.7	64 71	83.9
6	23 38.9	65 72	84.5	23 58.3	65 72	84.1	24 17.6	64 71	83.6	24 36.9	64 71	83.2
7	22 55.9	65 71	83.8	23 15.4	65 71	83.4	23 34.7	64 71	83.0	23 54.0	64 71	82.6
8	22 13.1	65 71	83.2	22 32.5	65 71	82.7	22 51.9	65 71	82.3	23 11.3	64 71	81.9
9	21 30.2	65 71	82.5	21 49.7	65 71	82.1	22 09.2	65 71	81.7	22 28.6	65 71	81.3
80	20 47.5	65 71	81.8	21 07.0	65 71	81.4	21 26.5	65 71	81.0	21 45.9	65 71	80.6
1	20 04.8	65 71	81.2	20 24.4	65 71	80.8	20 43.9	65 71	80.4	21 03.4	65 71	80.0
2	19 22.2	66 71	80.5	19 41.8	65 71	80.1	20 01.4	65 71	79.7	20 20.9	65 71	79.3
3	18 39.7	66 71	79.9	18 59.3	66 71	79.5	19 19.0	65 71	79.1	19 38.6	65 70	78.7
4	17 57.2	66 71	79.2	18 17.0	66 70	78.8	18 36.7	66 70	78.4	18 56.3	65 70	78.0
85	17 14.9	66 70	78.6	17 34.7	66 70	78.2	17 54.4	66 70	77.8	18 14.1	66 70	77.4
6	16 32.6	66 70	77.9	16 52.5	66 70	77.5	17 12.3	66 70	77.1	17 32.1	66 70	76.7
7	15 50.4	67 70	77.3	16 10.4	66 70	76.9	16 30.3	66 70	76.5	16 50.1	66 70	76.1
8	15 08.4	67 70	76.6	15 28.4	67 70	76.2	15 48.4	66 70	75.9	16 08.3	66 70	75.5
9	14 26.5	67 70	76.0	14 46.5	67 70	75.6	15 06.6	67 69	75.2	15 26.6	67 69	74.8
90	13 44.7	67 69	75.3	14 04.8	67 69	74.9	14 24.9	67 69	74.6	14 45.0	67 69	74.2

H.A.	22° 00′ Alt.	Δd Δt	Az.	22° 30′ Alt.	Δd Δt	Az.	23° 00′ Alt.	Δd Δt	Az.	23° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	68 00.0	1.0 02	180.0	68 30.0	1.0 02	180.0	69 00.0	1.0 02	180.0	69 30.0	1.0 02	180.0
1	67 59.1	1.0 05	177.5	68 29.1	1.0 05	177.5	68 59.0	1.0 05	177.4	69 29.0	1.0 05	177.4
2	67 56.3	1.0 08	175.1	68 26.2	1.0 08	175.0	68 56.1	1.0 08	174.9	69 26.1	1.0 08	174.8
3	67 51.6	1.0 11	172.6	68 21.5	99 11	172.5	68 51.3	99 11	172.3	69 21.2	99 11	172.2
4	67 45.2	99 14	170.2	68 14.9	99 14	170.0	68 44.6	99 14	169.8	69 14.3	99 15	169.6
05	67 36.9	99 17	167.7	68 06.5	99 17	167.5	68 36.0	99 17	167.3	69 05.6	98 18	167.1
6	67 26.9	98 20	165.4	67 56.3	98 20	165.1	68 25.6	98 20	164.8	68 55.0	98 21	164.5
7	67 15.1	97 22	163.0	67 44.3	97 23	162.7	68 13.5	97 23	162.4	68 42.6	97 24	162.1
8	67 01.7	97 25	160.7	67 30.6	97 26	160.4	67 59.6	96 26	160.0	68 28.4	96 26	159.6
9	66 46.6	96 28	158.4	67 15.3	96 28	158.0	67 44.0	95 29	157.7	68 12.6	95 29	157.3
10	66 29.9	95 30	156.2	66 58.4	95 31	155.8	67 26.8	95 31	155.4	67 55.1	94 32	154.9
1	66 11.7	94 33	154.0	66 39.9	94 33	153.6	67 08.0	94 34	153.1	67 36.1	93 34	152.7
2	65 52.1	93 35	151.9	66 20.0	93 36	151.4	66 47.8	93 36	150.9	67 15.5	92 37	150.4
3	65 31.1	92 37	149.8	65 58.6	92 38	149.3	66 26.1	91 38	148.8	66 53.5	91 39	148.3
4	65 08.7	91 39	147.7	65 35.9	91 40	147.2	66 03.1	90 41	146.7	66 30.1	90 41	146.2
15	64 45.0	90 41	145.8	65 12.0	90 42	145.2	65 38.8	89 43	144.7	66 05.5	89 43	144.2
6	64 20.1	89 43	143.8	64 46.8	89 44	143.3	65 13.2	88 44	142.7	65 39.6	88 45	142.2
7	63 54.1	88 45	142.0	64 20.4	87 46	141.4	64 46.6	87 46	140.8	65 12.6	87 47	140.2
8	63 27.0	87 47	140.1	63 52.9	86 48	139.6	64 18.8	86 48	139.0	64 44.4	85 49	138.4
9	62 58.8	86 49	138.4	63 24.4	85 49	137.8	63 49.9	85 50	137.2	64 15.3	84 50	136.6
20	62 29.6	85 50	136.6	62 54.9	84 51	136.1	63 20.1	84 51	135.4	63 45.1	83 52	134.8
1	61 59.5	84 52	135.0	62 24.5	83 52	134.4	62 49.4	83 53	133.8	63 14.1	82 53	133.1
2	61 28.6	83 53	133.3	61 53.3	82 54	132.7	62 17.8	81 54	132.1	62 42.1	81 55	131.5
3	60 56.8	82 54	131.8	61 21.2	81 55	131.2	61 45.4	80 55	130.5	62 09.4	80 56	129.9
4	60 24.2	81 56	130.2	60 48.3	80 56	129.6	61 12.2	79 56	129.0	61 35.9	79 57	128.4
25	59 50.9	80 57	128.7	60 14.7	79 57	128.1	60 38.3	78 58	127.5	61 01.7	78 58	126.9
6	59 16.9	79 58	127.3	59 40.4	78 58	126.7	60 03.7	78 59	126.0	60 26.9	77 59	125.4
7	58 42.2	78 59	125.9	59 05.4	77 59	125.3	59 28.5	77 60	124.6	59 51.4	76 60	124.0
8	58 06.9	77 60	124.5	58 29.9	76 60	123.9	58 52.7	76 61	123.3	59 15.3	75 61	122.6
9	57 31.1	76 61	123.2	57 53.8	75 61	122.6	58 16.4	75 61	121.9	58 38.7	74 62	121.3
30	56 54.7	75 62	121.9	57 17.2	75 62	121.3	57 39.5	74 62	120.6	58 01.6	73 63	120.0
1	56 17.8	74 62	120.6	56 40.0	74 63	120.0	57 02.1	73 63	119.4	57 24.0	73 63	118.8
2	55 40.4	74 63	119.4	56 02.4	73 63	118.8	56 24.3	72 64	118.2	56 45.9	72 64	117.5
3	55 02.6	73 64	118.2	55 24.4	72 64	117.6	55 46.0	72 64	117.0	56 07.4	71 65	116.4
4	54 24.3	72 64	117.0	54 45.9	72 65	116.4	55 07.4	71 65	115.8	55 28.6	70 65	115.2
35	53 45.7	72 65	115.9	54 07.1	71 65	115.3	54 28.3	70 66	114.7	54 49.3	70 66	114.1
6	53 06.7	71 66	114.8	53 27.9	70 66	114.2	53 48.9	70 66	113.6	54 09.8	69 66	113.0
7	52 27.3	70 66	113.7	52 48.4	70 66	113.1	53 09.2	69 67	112.5	53 29.9	69 67	111.9
8	51 47.7	70 67	112.6	52 08.5	69 67	112.1	52 29.2	69 67	111.5	52 49.7	68 67	110.9
9	51 07.7	69 67	111.6	51 28.4	69 67	111.0	51 48.9	68 68	110.4	52 09.2	67 68	109.8
40	50 27.4	69 68	110.6	50 47.9	68 68	110.0	51 08.3	68 68	109.4	51 28.5	67 68	108.8
1	49 46.9	68 68	109.6	50 07.3	68 68	109.0	50 27.5	67 68	108.5	50 47.5	67 69	107.9
2	49 06.1	68 68	108.6	49 26.4	67 69	108.1	49 46.4	67 69	107.5	50 06.4	66 69	106.9
3	48 25.1	67 69	107.7	48 45.2	67 69	107.1	49 05.2	66 69	106.6	49 25.0	66 69	106.0
4	47 43.9	67 69	106.7	48 03.9	66 69	106.2	48 23.7	66 69	105.6	48 43.4	65 70	105.1
45	47 02.4	67 69	105.8	47 22.3	66 70	105.3	47 42.0	65 70	104.7	48 01.6	65 70	104.2
6	46 20.8	66 70	104.9	46 40.6	66 70	104.4	47 00.2	65 70	103.8	47 19.7	65 70	103.3
7	45 39.0	66 70	104.1	45 58.7	65 70	103.5	46 18.2	65 70	103.0	46 37.6	64 70	102.4
8	44 57.1	66 70	103.2	45 16.7	65 70	102.7	45 36.1	65 70	102.1	45 55.4	64 71	101.6
9	44 15.0	65 70	102.3	44 34.5	65 70	101.8	44 53.8	64 71	101.3	45 13.0	64 71	100.7
50	43 32.8	65 71	101.5	43 52.2	64 71	101.0	44 11.4	64 71	100.4	44 30.6	63 71	99.9
1	42 50.4	65 71	100.7	43 09.8	64 71	100.2	43 28.9	64 71	99.6	43 48.0	63 71	99.1
2	42 07.9	64 71	99.9	42 27.2	64 71	99.3	42 46.3	64 71	98.8	43 05.3	63 71	98.3
3	41 25.4	64 71	99.1	41 44.6	64 71	98.6	42 03.7	63 71	98.0	42 22.6	63 71	97.5
4	40 42.7	64 71	98.3	41 01.9	64 71	97.8	41 20.9	63 71	97.3	41 39.8	63 72	96.7
55	39 59.9	64 71	97.5	40 19.1	63 71	97.0	40 38.0	63 72	96.5	40 56.9	63 72	96.0
6	39 17.1	64 71	96.7	39 36.2	63 72	96.2	39 55.1	63 72	95.7	40 13.9	62 72	95.2
7	38 34.2	64 72	96.0	38 53.2	63 72	95.5	39 12.1	63 72	95.0	39 30.9	62 72	94.5
8	37 51.3	63 72	95.2	38 10.3	63 72	94.7	38 29.1	63 72	94.2	38 47.9	62 72	93.7
9	37 08.3	63 72	94.5	37 27.2	63 72	94.0	37 46.1	63 72	93.5	38 04.8	62 72	93.0
60	36 25.2	63 72	93.7	36 44.1	63 72	93.3	37 03.0	63 72	92.8	37 21.7	62 72	92.3
1	35 42.1	63 72	93.0	36 01.0	63 72	92.5	36 19.8	62 72	92.1	36 38.5	62 72	91.6
2	34 59.0	63 72	92.3	35 17.9	63 72	91.8	35 36.7	62 72	91.3	35 55.4	62 72	90.9
3	34 15.9	63 72	91.6	34 34.8	63 72	91.1	34 53.5	62 72	90.6	35 12.2	62 72	90.2
4	33 32.7	63 72	90.9	33 51.6	63 72	90.4	34 10.4	62 72	89.9	34 29.0	62 72	89.5
65	32 49.6	63 72	90.2	33 08.5	63 72	89.7	33 27.2	62 72	89.3	33 45.9	62 72	88.8
6	32 06.4	63 72	89.5	32 25.3	63 72	89.0	32 44.1	62 72	88.6	33 02.7	62 72	88.1
7	31 23.3	63 72	88.8	31 42.1	63 72	88.3	32 00.9	62 72	87.9	32 19.6	62 72	87.4
8	30 40.1	63 72	88.1	30 59.0	63 72	87.7	31 17.8	63 72	87.2	31 36.5	62 72	86.8
9	29 57.0	63 72	87.4	30 15.9	63 72	87.0	30 34.7	63 72	86.5	30 53.4	62 72	86.1
70	29 13.9	63 72	86.8	29 32.8	63 72	86.3	29 51.7	63 72	85.9	30 10.4	62 72	85.4
1	28 30.8	63 72	86.1	28 49.8	63 72	85.7	29 08.6	63 72	85.2	29 27.4	62 72	84.8
2	27 47.8	63 72	85.4	28 06.7	63 72	85.0	28 25.6	63 72	84.6	28 44.4	63 72	84.1
3	27 04.8	63 72	84.8	27 23.8	63 72	84.3	27 42.7	63 71	83.9	28 01.5	63 71	83.5
4	26 21.8	64 72	84.1	26 40.8	63 71	83.7	26 59.8	63 71	83.2	27 18.7	63 71	82.8
75	25 38.9	64 71	83.5	25 58.0	63 71	83.0	26 17.0	63 71	82.6	26 35.9	63 71	82.2
6	24 56.0	64 71	82.8	25 15.2	64 71	82.4	25 34.2	63 71	81.9	25 53.2	63 71	81.5
7	24 13.3	64 71	82.1	24 32.4	64 71	81.7	24 51.5	63 71	81.3	25 10.5	63 71	80.9
8	23 30.5	64 71	81.5	23 49.7	64 71	81.1	24 08.9	64 71	80.7	24 27.9	63 71	80.2
9	22 47.9	64 71	80.9	23 07.1	64 71	80.4	23 26.3	64 71	80.0	23 45.5	64 71	79.6
80	22 05.3	64 71	80.2	22 24.6	64 71	79.8	22 43.9	64 71	79.4	23 03.0	64 71	79.0
1	21 22.8	65 71	79.6	21 42.2	64 71	79.2	22 01.5	64 70	78.7	22 20.7	64 70	78.3
2	20 40.4	65 71	78.9	20 59.8	65 70	78.5	21 19.2	64 70	78.1	21 38.5	64 70	77.7
3	19 58.1	65 70	78.3	20 17.6	65 70	77.9	20 37.0	65 70	77.5	20 56.4	64 70	77.1
4	19 15.9	65 70	77.6	19 35.5	65 70	77.2	19 55.0	65 70	76.8	20 14.4	65 70	76.4
85	18 33.8	65 70	77.0	18 53.4	65 70	76.6	19 13.0	65 70	76.2	19 32.5	65 70	75.8
6	17 51.8	66 70	76.4	18 11.5	66 70	76.0	18 31.1	65 70	75.6	18 50.7	65 69	75.2
7	17 09.9	66 70	75.7	17 29.7	66 70	75.3	17 49.4	66 69	74.9	18 09.0	65 69	74.5
8	16 28.2	66 69	75.1	16 48.0	66 69	74.7	17 07.8	66 69	74.3	17 27.5	66 69	73.9
9	15 46.5	66 69	74.4	16 06.4	66 69	74.0	16 26.3	66 69	73.7	16 46.1	66 69	73.3
90	15 05.0	67 69	73.8	15 25.0	67 69	73.4	15 44.9	66 69	73.0	16 04.9	66 69	72.6

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H.A.	20° 00′ Alt.	Δd	Δt	Az.	20° 30′ Alt.	Δd	Δt	Az.	21° 00′ Alt.	Δd	Δt	Az.	21° 30′ Alt.	Δd	Δt	Az.	22° 00′ Alt.	Δd	Δt	Az.	22° 30′ Alt.	Δd	Δt	Az.	23° 00′ Alt.	Δd	Δt	Az.	23° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
00	26 00.0	1.0	01	180.0	25 30.0	1.0	01	180.0	25 00.0	1.0	01	180.0	24 30.0	1.0	01	180.0	24 00.0	1.0	01	180.0	23 30.0	1.0	01	180.0	23 00.0	1.0	01	180.0	22 30.0	1.0	01	180.0	00
1	25 59.6	1.0	02	179.0	25 29.6	1.0	02	179.0	24 59.6	1.0	02	179.0	24 29.6	1.0	02	179.0	23 59.6	1.0	02	179.0	23 29.6	1.0	02	179.0	22 59.6	1.0	02	179.0	22 29.6	1.0	02	179.0	1
2	25 58.4	1.0	03	177.9	25 28.4	1.0	03	177.9	24 58.4	1.0	03	177.9	24 28.5	1.0	03	178.0	23 58.5	1.0	03	178.0	23 28.5	1.0	03	178.0	22 58.5	1.0	03	178.0	22 28.5	1.0	03	178.0	2
3	25 56.5	1.0	05	176.9	25 26.5	1.0	05	176.9	24 56.5	1.0	05	176.9	24 26.5	1.0	04	176.9	23 56.6	1.0	04	177.0	23 26.6	1.0	04	177.0	22 56.6	1.0	04	177.0	22 26.6	1.0	04	177.0	3
4	25 53.7	1.0	06	175.8	25 23.8	1.0	06	175.9	24 53.8	1.0	06	175.9	24 23.8	1.0	06	175.9	23 53.9	1.0	06	175.9	23 23.9	1.0	06	176.0	22 54.0	1.0	06	176.0	22 24.0	1.0	06	176.0	4
05	25 50.2	1.0	07	174.8	25 20.2	1.0	07	174.8	24 50.3	1.0	07	174.9	24 20.4	1.0	07	174.9	23 50.5	1.0	07	174.9	23 20.5	1.0	07	175.0	22 50.6	1.0	07	175.0	22 20.7	1.0	07	175.0	05
6	25 45.9	1.0	08	173.7	25 16.0	1.0	08	173.8	24 46.1	1.0	08	173.8	24 16.2	1.0	08	173.9	23 46.3	1.0	08	173.9	23 16.4	1.0	08	174.0	22 46.5	1.0	08	174.0	22 16.6	1.0	08	174.1	6
7	25 40.8	1.0	10	172.7	25 10.9	1.0	10	172.8	24 41.0	1.0	10	172.8	24 11.2	1.0	10	172.9	23 41.3	1.0	10	172.9	23 11.5	1.0	09	173.0	22 41.6	1.0	09	173.0	22 11.7	1.0	09	173.1	7
8	25 34.9	99	11	171.7	25 05.1	99	11	171.7	24 35.3	99	11	171.8	24 05.4	99	11	171.8	23 35.6	99	11	171.9	23 05.8	99	11	172.0	22 36.0	99	11	172.0	22 06.1	99	11	172.1	8
9	25 28.2	99	12	170.6	24 58.5	99	12	170.7	24 28.7	99	12	170.8	23 58.9	99	12	170.8	23 29.2	99	12	170.9	22 59.4	99	12	171.0	22 29.6	99	12	171.0	21 59.8	99	12	171.1	9
10	25 20.8	99	14	169.6	24 51.1	99	14	169.7	24 21.4	99	13	169.7	23 51.7	99	13	169.8	23 22.0	99	13	169.9	22 52.2	99	13	170.0	22 22.5	99	13	170.0	21 52.8	99	13	170.1	10
1	25 12.7	99	15	168.6	24 43.0	99	15	168.7	24 13.3	99	15	168.7	23 43.7	99	15	168.8	23 14.0	99	14	168.9	22 44.4	99	14	169.0	22 14.7	99	14	169.1	21 45.0	99	14	169.1	1
2	25 03.7	99	16	167.5	24 34.1	99	16	167.6	24 04.5	99	16	167.7	23 34.9	99	16	167.8	23 05.3	99	16	167.9	22 35.7	99	16	168.0	22 06.1	99	15	168.1	21 36.5	99	15	168.2	2
3	24 54.0	98	17	166.5	24 24.5	98	17	166.6	23 55.0	98	17	166.7	23 25.5	98	17	166.8	22 55.9	98	17	166.9	22 26.4	98	17	167.0	21 56.9	98	17	167.1	21 27.3	98	17	167.2	3
4	24 43.6	98	19	165.5	24 14.2	98	18	165.6	23 44.7	98	18	165.7	23 15.3	98	18	165.8	22 45.8	98	18	165.9	22 16.3	98	18	166.0	21 46.9	98	18	166.1	21 17.4	98	18	166.2	4
15	24 32.4	98	20	164.5	24 03.1	98	20	164.6	23 33.7	98	20	164.7	23 04.3	98	19	164.8	22 34.9	98	19	164.9	22 05.6	98	19	165.0	21 36.2	98	19	165.2	21 06.8	98	19	165.3	15
6	24 20.5	98	21	163.5	23 51.2	98	21	163.6	23 22.0	98	21	163.7	22 52.7	98	21	163.8	22 23.4	98	20	164.0	21 54.1	98	20	164.1	21 24.8	98	20	164.2	20 55.4	98	20	164.3	6
7	24 07.9	97	22	162.5	23 38.7	97	22	162.6	23 09.5	97	22	162.7	22 40.3	97	22	162.9	22 11.1	97	22	163.0	21 41.9	97	22	163.1	21 12.6	97	21	163.2	20 43.4	97	21	163.3	7
8	23 54.5	97	23	161.5	23 25.4	97	23	161.6	22 56.3	97	23	161.7	22 27.2	97	23	161.9	21 58.1	97	23	162.0	21 29.0	97	23	162.1	20 59.8	97	22	162.3	20 30.7	97	22	162.4	8
9	23 40.5	97	25	160.5	23 11.5	97	24	160.6	22 42.5	97	24	160.8	22 13.4	97	24	160.9	21 44.4	97	24	161.0	21 15.4	97	24	161.2	20 46.3	97	24	161.3	20 17.3	97	23	161.4	9
20	23 25.7	96	26	159.5	22 56.8	96	26	159.6	22 27.9	96	25	159.8	21 59.0	96	25	159.9	21 30.0	96	25	160.1	21 01.1	96	25	160.2	20 32.2	96	25	160.4	20 03.2	97	25	160.5	20
1	23 10.3	96	27	158.5	22 41.5	96	27	158.7	22 12.6	96	27	158.8	21 43.8	96	26	159.0	21 15.0	96	26	159.1	20 46.2	96	26	159.3	20 17.3	96	26	159.4	19 48.5	96	26	159.6	1
2	22 54.1	96	28	157.5	22 25.4	96	28	157.7	21 56.7	96	28	157.8	21 28.0	96	28	158.0	20 59.3	96	27	158.2	20 30.5	96	27	158.3	20 01.8	96	27	158.5	19 33.1	96	27	158.6	2
3	22 37.3	95	29	156.6	22 08.7	95	29	156.7	21 40.1	95	29	156.9	21 11.5	95	29	157.1	20 42.9	95	28	157.2	20 14.3	95	28	157.4	19 45.6	95	28	157.5	19 17.0	95	28	157.7	3
4	22 19.8	95	30	155.6	21 51.3	95	30	155.8	21 22.8	95	30	155.9	20 54.3	95	30	156.1	20 25.8	95	30	156.3	19 57.3	95	29	156.4	19 28.8	95	29	156.6	19 00.3	95	29	156.8	4
25	22 01.6	94	31	154.6	21 33.3	95	31	154.8	21 04.9	95	31	155.0	20 36.5	95	31	155.2	20 08.2	95	31	155.3	19 39.8	95	30	155.5	19 11.4	95	30	155.7	18 43.0	95	30	155.8	25
6	21 42.8	94	32	153.7	21 14.6	94	32	153.9	20 46.3	94	32	154.0	20 18.1	94	32	154.2	19 49.8	94	32	154.4	19 21.6	94	31	154.6	18 53.3	94	31	154.8	18 25.0	94	31	154.9	6
7	21 23.3	94	33	152.7	20 55.2	94	33	152.9	20 27.1	94	33	153.1	19 59.0	94	33	153.3	19 30.9	94	33	153.5	19 02.7	94	32	153.7	18 34.6	94	32	153.8	18 06.4	94	32	154.0	7
8	21 03.2	93	35	151.8	20 35.3	93	34	152.0	20 07.3	93	34	152.2	19 39.3	93	34	152.4	19 11.3	93	34	152.6	18 43.3	93	33	152.7	18 15.2	93	33	152.9	17 47.2	94	33	153.1	8
9	20 42.5	93	36	150.9	20 14.7	93	35	151.1	19 46.8	93	35	151.3	19 19.0	93	35	151.4	18 51.1	93	35	151.6	18 23.2	93	34	151.8	17 55.3	93	34	152.0	17 27.4	93	34	152.2	9
30	20 21.2	92	37	149.9	19 53.5	92	36	150.1	19 25.8	92	36	150.3	18 58.0	92	36	150.5	18 30.3	93	36	150.7	18 02.5	93	35	150.9	17 34.7	93	35	151.1	17 06.9	93	35	151.3	30
1	19 59.3	92	38	149.0	19 31.7	92	37	149.2	19 04.1	92	37	149.4	18 36.5	92	37	149.6	18 08.9	92	37	149.8	17 41.2	92	36	150.0	17 13.6	92	36	150.2	16 45.9	92	36	150.4	1
2	19 36.8	91	38	148.1	19 09.3	91	38	148.3	18 41.9	92	38	148.5	18 14.4	92	38	148.7	17 46.9	92	38	148.9	17 19.4	92	37	149.1	16 51.9	92	37	149.4	16 24.4	92	37	149.6	2
3	19 13.6	91	39	147.2	18 46.3	91	39	147.4	18 19.0	91	39	147.6	17 51.7	91	39	147.8	17 24.3	91	39	148.0	16 57.0	91	38	148.3	16 29.6	91	38	148.5	16 02.2	91	38	148.7	3
4	18 50.0	91	40	146.3	18 22.8	91	40	146.5	17 55.6	91	40	146.7	17 28.4	91	40	146.9	17 01.2	91	39	147.2	16 34.0	91	39	147.4	16 06.8	91	39	147.6	15 39.5	91	39	147.8	4
35	18 25.7	90	41	145.4	17 58.7	90	41	145.6	17 31.7	90	41	145.8	17 04.6	90	41	146.1	16 37.5	90	40	146.3	16 10.5	90	40	146.5	15 43.4	90	40	146.7	15 16.3	90	40	147.0	35
6	18 00.9	90	42	144.5	17 34.1	90	42	144.7	17 07.2	90	42	145.0	16 40.2	90	42	145.2	16 13.3	90	41	145.4	15 46.4	90	41	145.6	15 19.4	90	41	145.9	14 52.4	90	41	146.1	6
7	17 35.6	89	43	143.6	17 08.9	89	43	143.8	16 42.1	89	43	144.1	16 15.3	89	42	144.3	15 48.6	89	42	144.6	15 21.8	89	42	144.8	14 54.9	89	42	145.0	14 28.1	89	41	145.3	7
8	17 09.7	89	44	142.7	16 43.1	89	44	143.0	16 16.5	89	44	143.2	15 49.9	89	43	143.5	15 23.3	89	43	143.7	14 56.6	89	43	143.9	14 29.9	89	43	144.2	14 03.2	89	42	144.4	8
9	16 43.3	88	45	141.9	16 16.9	88	45	142.1	15 50.4	88	44	142.4	15 23.9	88	44	142.6	14 57.4	88	44	142.8	14 30.9	88	44	143.1	14 04.4	88	43	143.3	13 37.9	88	43	143.6	9
40	16 16.4	88	46	141.0	15 50.1	88	45	141.3	15 23.8	88	45	141.5	14 57.5	88	45	141.8	14 31.1	88	45	142.0	14 04.8	88	44	142.2	13 38.4	88	44	142.5	13 12.0	88	44	142.7	40
1	15 49.0	87	46	140.2	15 22.9	87	46	140.4	14 56.7	87	46	140.7	14 30.5	87	46	140.9	14 04.3	87	46	141.2	13 38.1	87	45	141.4	13 11.9	87	45	141.7	12 45.6	88	45	141.9	1
2	15 21.1	87	47	139.3	14 55.1	87	47	139.6	14 29.1	87	47	139.8	14 03.1	87	47	140.1	13 37.0	87	46	140.3	13 10.9	87	46	140.6	12 44.8	87	46	140.8	12 18.7	87	46	141.1	2
3	14 52.7	86	48	138.5	14 26.9	86	48	138.7	14 01.0	86	48	139.0	13 35.1	86	47	139.2	13 09.2	86	47	139.5	12 43.3	86	47	139.8	12 17.3	86	47	140.0	11 51.4	87	46	140.3	3
4	14 23.9	86	49	137.6	13 58.2	86	49	137.9	13 32.4	86	48	138.2	13 06.7	86	48	138.4	12 40.9	86	48	138.7	12 15.2	86	48	138.9	11 49.4	86	47	139.2	11 23.6	86	47	139.5	4
45	13 54.6	85	50	136.8	13 29.0	85	49	137.1	13 03.4	85	49	137.3	12 37.8	85	49	137.6	12 12.2	85	49	137.9	11 46.6	85	48	138.1	11 21.0	85	48	138.4	10 55.3	86	48	138.7	45
6	13 24.8	85	50	136.0	12 59.4	85	50	136.3	12 34.0	85	50	136.5	12 08.5	85	50	136.8	11 43.0	85	49	137.1	11 17.6	85	49	137.3	10 52.1	85	49	137.6	10 26.6	85	49	137.9	6
7	12 54.6	84	51	135.2	12 29.3	84	51	135.4	12 04.0	84	51	135.7	11 38.7	84	50	136.0	11 13.4	84	50	136.3	10 48.1	84	50	136.5	10 22.8	84	50	136.8	9 57.4	85	49	137.1	7
8	12 23.9	84	52	134.4	11 58.8	84	52	134.6	11 33.7	84	51	134.9	11 08.5	84	51	135.2	10 43.4	84	51	135.5	10 18.2	84	51	135.7	9 53.0	84	50	136.0	9 27.8	84	50	136.3	8
9	11 52.9	83	52	133.6	11 27.9	83	52	133.8	11 02.9	83	52	134.1	10 37.9	83	52	134.4	10 12.9	83	52	134.7	9 47.9	83	51	135.0	9 22.8	84	51	135.2	8 57.8	84	51	135.5	9
50	11 21.4	83	53	132.8	10 56.6	83	53	133.0	10 31.7	83	53	133.3	10 06.9	83	52	133.6	9 42.0	83	52	133.9	9 17.1	83	52	134.2	8 52.2	83	52	134.5	8 27.3	83	51	134.7	50
1	10 49.5	82	54	132.0	10 24.8	82	54	132.3	10 00.1	82	53	132.5	9 35.4	82	53	132.8	9 10.7	82	53	133.1	8 46.0	82	53	133.4	8 21.2	83	52	133.7	7 56.5	83	52	134.0	1
2	10 17.2	82	54	131.2	9 52.7	82	54	131.5	9 28.1	82	54	131.8	9 03.6	82	54	132.1	8 39.0	82	53	132.4	8 14.4	82	53	132.6	7 49.8	82	53	132.9	7 25.2	82	53	133.2	2
3	9 44.5	81	55	130.4	9 20.1	81	55	130.7	8 55.7	81	55	131.0	8 31.3	81	54	131.3	8 06.9	81	54	131.6	7 42.5	81	54	131.9	7 18.0	82	54	132.2	6 53.6	82	53	132.5	3
4	9 11.5	81	56	129.6	8 47.2	81	55	129.9	8 23.0	81	55	130.2	7 58.7	81	55	130.5	7 34.4	81	55	130.8	7 10.1	81	54	131.1	6 45.8	81	54	131.4	6 21.5	81	54	131.7	4
55	8 38.1	80	56	128.9	8 14.0	80	56	129.2	7 49.8	80	56	129.5	7 25.7	80	56	129.8	7 01.6	80	55	130.1	6 37.4	81	55	130.4	6 13.3	81	55	130.7	5 49.1	81	55	131.0	55
6	8 04.3	80	57	128.1	7 40.3	80	57	128.4	7 16.4	80	56	128.7	6 52.4	80	56	129.0	6 28.4	80	56	129.3	6 04.4	80	56	129.6	5 40.4	80	55	129.9	5 16.4	80	55	130.2	6
7	7 30.1	79	57	127.4	7 06.3	79	57	127.7	6 42.5	79	57	128.0	6 18.7	79	57	128.3	5 54.8	80	57	128.6	5 31.0	80	56	128.9	5 07.1	80	56	129.2					7
8	6 55.7	79	58	126.6	6 32.0	79	58	126.9	6 08.3	79	58	127.2	5 44.6	79	57	127.5	5 20.9	79	57	127.8													8
9	6 20.8	78	59	125.9	5 57.3	78	58	126.2	5 33.8	78	58	126.5	5 10.2	79	58	126.8																	9
60	5 45.7	78	59	125.1	5 22.3	78	59	125.4																									60
1	5 10.2	78	60	124.4																													1

DECLINATION SAME NAME AS LATITUDE

H.A.	20° 00′ Alt.	Δd	Δt	Az.	20° 30′ Alt.	Δd	Δt	Az.	21° 00′ Alt.	Δd	Δt	Az.	21° 30′ Alt.	Δd	Δt	Az.	22° 00′ Alt.	Δd	Δt	Az.	22° 30′ Alt.	Δd	Δt	Az.	23° 00′ Alt.	Δd	Δt	Az.	23° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
91	13 03.0	67	69	74.7	13 23.2	67	69	74.3	13 43.4	67	69	73.9	14 03.5	67	69	73.5	14 23.6	67	69	73.2	14 43.7	67	69	72.8	15 03.7	67	68	72.4	15 23.7	67	68	72.0	91
2	12 21.4	68	69	74.0	12 41.7	68	69	73.6	13 02.0	67	69	73.3	13 22.2	67	69	72.9	13 42.4	67	68	72.5	14 02.5	67	68	72.1	14 22.7	67	68	71.7	14 42.8	67	68	71.4	2
3	11 40.0	68	69	73.4	12 00.3	68	69	73.0	12 20.7	68	69	72.6	12 41.0	68	68	72.2	13 01.3	68	68	71.9	13 21.5	67	68	71.5	13 41.8	67	68	71.1	14 01.9	67	68	70.7	3
4	10 58.7	68	69	72.7	11 19.1	68	68	72.4	11 39.6	68	68	72.0	12 00.0	68	68	71.6	12 20.4	68	68	71.2	12 40.7	68	68	70.9	13 01.0	68	68	70.5	13 21.3	68	68	70.1	4
95	10 17.6	69	68	72.1	10 38.1	68	68	71.7	10 58.6	68	68	71.3	11 19.1	68	68	71.0	11 39.6	68	68	70.6	12 00.0	68	68	70.2	12 20.4	68	67	69.8	12 40.8	68	67	69.5	95
6	9 36.6	69	68	71.4	9 57.2	69	68	71.0	10 17.8	69	68	70.7	10 38.4	69	68	70.3	10 58.9	68	67	69.9	11 19.5	68	67	69.6	11 40.0	68	67	69.2	12 00.4	68	67	68.8	6
7	8 55.7	69	68	70.8	9 16.5	69	68	70.4	9 37.2	69	67	70.0	9 57.8	69	67	69.7	10 18.5	69	67	69.3	10 39.1	69	67	68.9	10 59.7	69	67	68.5	11 20.3	69	67	68.2	7
8	8 15.1	69	68	70.1	8 35.9	69	67	69.7	8 56.7	69	67	69.4	9 17.5	69	67	69.0	9 38.2	69	67	68.6	9 58.9	69	67	68.3	10 19.6	69	67	67.9	10 40.3	69	66	67.5	8
9	7 34.6	70	67	69.4	7 55.5	70	67	69.1	8 16.4	70	67	68.7	8 37.2	70	67	68.4	8 58.1	69	67	68.0	9 18.9	69	66	67.6	9 39.7	69	66	67.3	10 00.5	69	66	66.9	9
100	6 54.2	70	67	68.8	7 15.3	70	67	68.4	7 36.2	70	67	68.1	7 57.2	70	66	67.7	8 18.2	70	66	67.3	8 39.1	70	66	67.0	9 00.0	70	66	66.6	9 20.9	70	66	66.2	100
1	6 14.1	70	67	68.1	6 35.2	70	66	67.8	6 56.3	70	66	67.4	7 17.4	70	66	67.0	7 38.4	70	66	66.7	7 59.5	70	66	66.3	8 20.5	70	66	66.0	8 41.5	70	65	65.6	1
2	5 34.2	71	66	67.4	5 55.4	71	66	67.1	6 16.6	71	66	66.7	6 37.7	71	66	66.4	6 58.9	71	66	66.0	7 20.1	70	65	65.7	7 41.2	70	65	65.3	8 02.3	70	65	64.9	2
3					5 15.7	71	66	66.4	5 37.0	71	66	66.1	5 58.3	71	65	65.7	6 19.6	71	65	65.4	6 40.8	71	65	65.0	7 02.1	71	65	64.7	7 23.3	71	65	64.3	3
4													5 19.1	71	65	65.1	5 40.5	71	65	64.7	6 01.8	71	65	64.3	6 23.2	71	64	64.0	6 44.5	71	64	63.6	4
105																	5 01.5	72	64	64.0	5 23.0	72	64	63.7	5 44.5	72	64	63.3	6 06.0	72	64	63.0	105
6																									5 06.1	72	64	62.7	5 27.6	72	64	62.3	6

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Lat. 44°

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
00	70 00.0	1.0 02	180.0	70 30.0	1.0 02	180.0	71 00.0	1.0 02	180.0	71 30.0	1.0 02	180.0	72 00.0	1.0 02	180.0	72 30.0	1.0 02	180.0	73 00.0	1.0 02	180.0	73 30.0	1.0 02	180.0	00
1	69 59.0	1.0 05	177.3	70 29.0	1.0 05	177.3	70 59.0	1.0 05	177.2	71 28.9	1.0 05	177.2	71 58.9	1.0 05	177.1	72 28.9	1.0 06	177.0	72 58.9	1.0 06	177.0	73 28.8	1.0 0€	176.9	1
2	69 56.0	1.0 08	174.7	70 25.9	1.0 08	174.6	70 55.8	1.0 09	174.4	71 25.7	1.0 09	174.3	71 55.6	1.0 09	174.2	72 25.5	1.0 09	174.1	72 55.4	1.0 10	173.9	73 25.3	1.0 10	173.8	2
3	69 51.0	99 12	172.0	70 20.8	99 12	171.9	70 50.6	99 12	171.7	71 20.4	99 12	171.5	71 50.2	99 13	171.3	72 20.0	99 13	171.1	72 49.7	99 13	170.9	73 19.5	99 14	170.7	3
4	69 44.0	99 15	169.4	70 13.7	99 15	169.2	70 43.3	99 15	169.0	71 13.0	99 16	168.7	71 42.6	99 16	168.5	72 12.2	99 16	168.2	72 41.8	99 17	167.9	73 11.4	98 17	167.6	4
05	69 35.1	98 18	166.8	70 04.6	98 18	166.5	70 34.1	98 19	166.3	71 03.5	98 19	166.0	71 33.0	98 19	165.7	72 02.3	98 20	165.3	72 31.7	98 20	165.0	73 01.0	98 21	164.7	05
6	69 24.3	98 21	164.2	69 53.6	98 21	163.9	70 22.9	97 22	163.6	70 52.1	97 22	163.3	71 21.3	97 23	162.9	71 50.4	97 23	162.5	72 19.5	97 24	162.1	72 48.5	97 24	161.7	6
7	69 11.7	97 24	161.7	69 40.7	97 24	161.4	70 09.8	97 25	161.0	70 38.7	96 25	160.6	71 07.6	96 26	160.2	71 36.5	96 26	159.8	72 05.2	96 27	159.3	72 34.0	96 28	158.8	7
8	68 57.3	96 27	159.3	69 26.1	96 27	158.9	69 54.8	96 28	158.5	70 23.5	95 28	158.0	70 52.1	95 29	157.6	71 20.6	95 30	157.1	71 49.0	95 30	156.6	72 17.4	94 31	156.1	8
9	68 41.2	95 30	156.8	69 09.6	95 30	156.4	69 38.1	95 31	156.0	70 06.4	94 31	155.5	70 34.7	94 32	155.0	71 02.9	94 32	154.5	71 31.0	93 33	153.9	71 59.0	93 34	153.3	9
10	68 23.4	94 32	154.5	68 51.6	94 33	154.0	69 19.7	94 33	153.5	69 47.7	93 34	153.0	70 15.6	93 35	152.5	70 43.4	93 35	151.9	71 11.1	92 36	151.3	71 38.7	92 37	150.7	10
1	68 04.0	93 35	152.2	68 31.9	93 35	151.7	68 59.6	92 36	151.2	69 27.3	92 37	150.6	69 54.8	92 37	150.0	70 22.3	91 38	149.4	70 49.6	91 39	148.8	71 16.8	90 39	148.2	1
2	67 43.1	92 37	149.9	68 10.6	92 38	149.4	68 38.0	91 38	148.9	69 05.3	91 39	148.3	69 32.5	90 40	147.7	69 59.6	90 40	147.1	70 26.5	89 41	146.4	70 53.2	89 42	145.7	2
3	67 20.8	91 40	147.8	67 47.9	90 40	147.2	68 15.0	90 41	146.6	68 41.9	90 41	146.0	69 08.7	89 42	145.4	69 35.4	89 43	144.7	70 01.9	88 43	144.1	70 28.2	88 44	143.4	3
4	66 57.1	90 42	145.6	67 23.9	89 42	145.1	67 50.6	89 43	144.5	68 17.1	88 44	143.8	68 43.5	88 44	143.2	69 09.8	87 45	142.5	69 35.8	87 46	141.8	70 01.8	86 46	141.1	4
15	66 32.1	88 44	143.6	66 58.5	88 44	143.0	67 24.8	87 45	142.4	67 51.0	87 46	141.7	68 17.0	86 46	141.0	68 42.9	86 47	140.4	69 08.5	85 48	139.6	69 34.0	85 48	138.9	15
6	66 05.8	87 46	141.6	66 31.9	87 46	141.0	66 57.9	86 47	140.3	67 23.7	86 48	139.7	67 49.3	85 48	139.0	68 14.7	84 49	138.3	68 40.0	84 50	137.5	69 05.0	83 50	136.8	6
7	65 38.5	86 47	139.6	66 04.2	86 48	139.0	66 29.8	85 49	138.4	66 55.2	84 49	137.7	67 20.4	84 50	137.0	67 45.4	83 51	136.3	68 10.3	82 51	135.5	68 34.9	82 52	134.8	7
8	65 10.0	85 49	137.8	65 35.3	84 50	137.1	66 00.5	84 50	136.5	66 25.6	83 51	135.8	66 50.4	82 52	135.1	67 15.1	82 52	134.3	67 39.5	81 53	133.6	68 03.7	80 54	132.8	8
9	64 40.5	84 51	136.0	65 05.5	83 51	135.3	65 30.3	83 52	134.6	65 55.0	82 53	133.9	66 19.5	81 53	133.2	66 43.7	81 54	132.5	67 07.8	80 54	131.7	67 31.6	79 55	130.9	9
20	64 10.0	83 52	134.2	64 34.6	82 53	133.5	64 59.1	81 53	132.9	65 23.4	81 54	132.2	65 47.5	80 55	131.4	66 11.4	79 55	130.7	66 35.1	79 56	129.9	66 58.6	78 56	129.1	20
1	63 38.6	81 54	132.5	64 02.9	81 54	131.8	64 27.1	80 55	131.1	64 51.0	79 55	130.4	65 14.8	79 56	129.7	65 38.3	78 57	129.0	66 01.6	77 57	128.2	66 24.7	76 58	127.4	1
2	63 06.3	80 55	130.8	63 30.3	80 56	130.2	63 54.1	79 56	129.5	64 17.8	78 57	128.8	64 41.2	78 57	128.1	65 04.3	77 58	127.3	65 27.3	76 58	126.5	65 50.0	75 59	125.7	2
3	62 33.3	79 56	129.2	62 57.0	79 57	128.6	63 20.5	78 57	127.9	63 43.7	77 58	127.2	64 06.8	77 58	126.4	64 29.6	76 59	125.7	64 52.3	75 60	124.9	65 14.6	74 60	124.1	3
4	61 59.5	78 58	127.7	62 22.9	78 58	127.0	62 46.0	77 58	126.3	63 09.0	76 59	125.6	63 31.7	75 60	124.9	63 54.3	75 60	124.2	64 16.5	74 61	123.4	64 38.6	73 61	122.6	4
25	61 25.0	77 59	126.2	61 48.1	77 59	125.5	62 10.9	76 60	124.8	62 33.6	75 60	124.1	62 56.0	74 61	123.4	63 18.2	74 61	122.7	63 40.2	73 62	121.9	64 01.9	72 62	121.1	25
6	60 49.9	76 60	124.7	61 12.6	76 60	124.1	61 35.2	75 61	123.4	61 57.6	74 61	122.7	62 19.7	73 62	122.0	62 41.6	73 62	121.2	63 03.3	72 62	120.5	63 24.7	71 63	119.7	6
7	60 14.1	75 61	123.3	60 36.6	75 61	122.7	60 58.9	74 61	122.0	61 21.0	73 62	121.3	61 42.8	72 62	120.6	62 04.4	72 63	119.8	62 25.8	71 63	119.1	62 46.9	70 64	118.3	7
8	59 37.8	74 61	122.0	60 00.0	74 62	121.3	60 22.0	73 62	120.6	60 43.8	72 63	119.9	61 05.4	72 63	119.2	61 26.7	71 64	118.5	61 47.8	70 64	117.7	62 08.7	69 64	117.0	8
9	59 00.9	74 62	120.7	59 22.8	73 63	120.0	59 44.6	72 63	119.3	60 06.2	71 64	118.6	60 27.5	71 64	117.9	60 48.6	70 64	117.2	61 09.4	69 65	116.4	61 30.0	68 65	115.7	9
30	58 23.5	73 63	119.4	58 45.2	72 63	118.7	59 06.7	71 64	118.0	59 28.0	71 64	117.3	59 49.1	70 65	116.6	60 10.0	69 65	115.9	60 30.6	68 65	115.2	60 50.9	67 66	114.4	30
1	57 45.7	72 64	118.1	58 07.1	71 64	117.5	58 28.4	71 65	116.8	58 49.5	70 65	116.1	59 10.3	69 65	115.4	59 30.9	68 66	114.7	59 51.3	68 66	114.0	60 11.4	67 66	113.2	1
2	57 07.4	71 64	116.9	57 28.6	71 65	116.2	57 49.7	70 65	115.6	58 10.5	69 66	114.9	58 31.1	68 66	114.2	58 51.5	68 66	113.5	59 11.7	67 67	112.8	59 31.6	66 67	112.0	2
3	56 28.7	70 65	115.7	56 49.7	70 65	115.1	57 10.6	69 66	114.4	57 31.2	68 66	113.7	57 51.6	68 66	113.0	58 11.8	67 67	112.4	58 31.7	66 67	111.6	58 51.4	65 67	110.9	3
4	55 49.6	70 66	114.6	56 10.5	69 66	113.9	56 31.1	68 66	113.3	56 51.5	68 67	112.6	57 11.7	67 67	111.9	57 31.7	66 67	111.2	57 51.5	65 68	110.5	58 11.9	65 68	109.8	4
35	55 10.2	69 66	113.4	55 30.8	68 67	112.8	55 51.3	68 67	112.2	56 11.5	67 67	111.5	56 31.5	66 67	110.8	56 51.3	66 68	110.1	57 10.9	65 68	109.4	57 30.2	64 68	108.7	35
6	54 30.4	69 67	112.4	54 50.9	68 67	111.7	55 11.2	67 67	111.1	55 31.2	67 68	110.4	55 51.0	66 68	109.8	56 10.7	65 68	109.1	56 30.1	64 68	108.4	56 49.2	63 69	107.7	6
7	53 50.4	68 67	111.3	54 10.6	67 68	110.7	54 30.7	67 68	110.0	54 50.6	66 68	109.4	55 10.3	65 68	108.7	55 29.8	65 69	108.1	55 49.0	64 69	107.4	56 08.0	63 69	106.7	7
8	53 10.0	67 68	110.3	53 30.1	67 68	109.6	53 50.1	66 68	109.0	54 09.8	65 68	108.4	54 29.3	65 69	107.7	54 48.6	64 69	107.0	55 07.7	63 69	106.4	55 26.6	62 69	105.7	8
9	52 29.4	67 68	109.2	52 49.4	66 68	108.6	53 09.1	66 69	108.0	53 28.7	65 69	107.4	53 48.1	64 69	106.7	54 07.2	64 69	106.1	54 26.2	63 70	105.4	54 44.9	62 70	104.7	9
40	51 48.5	66 69	108.2	52 08.3	66 69	107.6	52 28.0	65 69	107.0	52 47.4	64 69	106.4	53 06.6	64 69	105.8	53 25.7	63 70	105.1	53 44.5	62 70	104.4	54 03.1	62 70	103.8	40
1	51 07.4	66 69	107.3	51 27.1	65 69	106.7	51 46.6	65 69	106.1	52 05.9	64 70	105.4	52 25.0	63 70	104.8	52 43.9	63 70	104.2	53 02.6	62 70	103.5	53 21.1	61 70	102.9	1
2	50 26.1	65 69	106.3	50 45.6	65 69	105.7	51 05.0	64 70	105.1	51 24.2	64 70	104.5	51 43.2	63 70	103.9	52 02.0	62 70	103.3	52 20.6	62 70	102.6	52 38.9	61 70	102.0	2
3	49 44.6	65 70	105.4	50 04.0	64 70	104.8	50 23.3	64 70	104.2	50 42.3	63 70	103.6	51 01.2	63 70	103.0	51 19.9	62 70	102.4	51 38.4	61 71	101.7	51 56.6	61 71	101.1	3
4	49 02.9	65 70	104.5	49 22.2	64 70	103.9	49 41.3	64 70	103.3	50 00.3	63 70	102.7	50 19.1	62 70	102.1	50 37.7	62 71	101.5	50 56.0	61 71	100.9	51 14.2	60 71	100.2	4
45	48 21.0	64 70	103.6	48 40.2	64 70	103.0	48 59.3	63 70	102.4	49 18.1	63 71	101.8	49 36.8	62 71	101.2	49 55.3	61 71	100.6	50 13.6	61 71	100.0	50 31.7	60 71	99.4	45
6	47 39.0	64 70	102.7	47 58.1	63 70	102.1	48 17.0	63 71	101.6	48 35.8	62 71	101.0	48 54.4	62 71	100.4	49 12.8	61 71	99.8	49 31.0	60 71	99.2	49 49.0	60 71	98.5	6
7	46 56.8	64 70	101.9	47 15.8	63 71	101.3	47 34.7	63 71	100.7	47 53.4	62 71	100.1	48 11.9	61 71	99.5	48 30.2	61 71	98.9	48 48.4	60 71	98.3	49 06.3	60 71	97.7	7
8	46 14.5	63 71	101.0	46 33.4	63 71	100.4	46 52.2	62 71	99.9	47 10.8	62 71	99.3	47 29.3	61 71	98.7	47 47.5	61 71	98.1	48 05.6	60 71	97.5	48 23.5	59 71	96.9	8
9	45 32.1	63 71	100.2	45 50.9	63 71	99.6	46 09.7	62 71	99.1	46 28.2	62 71	98.5	46 46.6	61 71	97.9	47 04.8	60 71	97.3	47 22.8	60 72	96.7	47 40.6	59 72	96.1	9
50	44 49.5	63 71	99.4	45 08.3	62 71	98.8	45 27.0	62 71	98.3	45 45.5	61 71	97.7	46 03.8	61 71	97.1	46 21.9	60 72	96.5	46 39.9	60 72	96.0	46 57.7	59 72	95.4	50
1	44 06.9	63 71	98.6	44 25.6	62 71	98.0	44 44.2	62 71	97.5	45 02.7	61 71	96.9	45 20.9	61 72	96.3	45 39.0	60 72	95.8	45 56.9	59 72	95.2	46 14.7	59 72	94.6	1
2	43 24.2	63 71	97.8	43 42.9	62 71	97.2	44 01.4	62 72	96.7	44 19.8	61 72	96.1	44 38.0	60 72	95.6	44 56.1	60 72	95.0	45 13.9	59 72	94.4	45 31.7	59 72	93.9	2
3	42 41.4	62 71	97.0	43 00.0	62 72	96.4	43 18.5	61 72	95.9	43 36.8	61 72	95.4	43 55.0	60 72	94.8	44 13.0	60 72	94.3	44 30.9	59 72	93.7	44 48.6	59 72	93.1	3
4	41 58.5	62 72	96.2	42 17.1	62 72	95.7	42 35.5	61 72	95.1	42 53.8	61 72	94.6	43 12.0	60 72	94.1	43 30.0	60 72	93.5	43 47.8	59 72	93.0	44 05.5	59 72	92.4	4
55	41 15.6	62 72	95.5	41 34.1	62 72	94.9	41 52.5	61 72	94.4	42 10.8	61 72	93.9	42 28.9	60 72	93.3	42 46.9	60 72	92.8	43 04.7	59 72	92.2	43 22.3	59 72	91.7	55
6	40 32.6	62 72	94.7	40 51.1	62 72	94.2	41 09.5	61 72	93.7	41 27.7	61 72	93.1	41 45.8	60 72	92.6	42 03.8	60 72	92.1	42 21.5	59 72	91.5	42 39.2	59 72	91.0	6
7	39 49.5	62 72	94.0	40 08.0	61 72	93.4	40 26.4	61 72	92.9	40 44.6	60 72	92.4	41 02.7	60 72	91.9	41 20.6	60 72	91.3	41 38.4	59 72	90.8	41 56.0	59 72	90.3	7
8	39 06.5	62 72	93.2	39 24.9	61 72	92.7	39 43.3	61 72	92.2	40 01.5	60 72	91.7	40 19.5	60 72	91.2	40 37.5	60 72	90.6	40 55.2	59 72	90.1	41 12.9	59 72	89.6	8
9	38 23.4	62 72	92.5	38 41.8	61 72	92.0	39 00.1	61 72	91.5	39 18.3	60 72	91.0	39 36.4	60 72	90.5	39 54.3	59 72	89.9	40 12.1	59 72	89.4	40 29.7	59 72	88.9	9
60	37 40.2	62 72	91.8	37 58.7	61 72	91.3	38 17.0	61 72	90.8	38 35.2	60 72	90.3	38 53.2	60 72	89.8	39 11.1	60 72	89.3	39 28.9	59 72	88.7	39 46.6	59 72	88.2	60
1	36 57.1	62 72	91.1	37 15.5	61 72	90.6	37 33.8	61 72	90.1	37 52.0	60 72	89.6	38 10.1	60 72	89.1	38 28.0	60 72	88.6	38 45.8	59 72	88.1	39 03.4	59 72	87.5	1
2	36 13.9	62 72	90.4	36 32.4	61 72	89.9	36 50.7	61 72	89.4	37 08.9	60 72	88.9	37 26.9	60 72	88.4	37 44.9	60 72	87.9	38 02.7	59 72	87.4	38 20.3	59 72	86.9	2
3	35 30.8	62 72	89.7	35 49.2	61 72	89.2	36 07.5	61 72	88.7	36 25.7	60 72	88.2	36 43.8	60 72	87.7	37 01.7	60 72	87.2	37 19.6	59 72	86.7	37 37.2	59 72	86.2	3
4	34 47.6	62 72	89.0	35 06.0	61 72	88.5	35 24.4	61 72	88.0	35 42.6	61 72	87.5	36 00.7	60 72	87.0	36 18.6	60 72	86.6	36 36.5	59 72	86.1	36 54.2	59 72	85.5	4
65	34 04.5	62 72	88.3	34 22.9	61 72	87.8	34 41.2	61 72	87.4	34 59.5	61 72	86.9	35 17.6	60 72	86.4	35 35.6	60 72	85.9	35 53.4	59 72	85.4	36 11.2	59 72	84.9	65
6	33 21.3	62 72	87.6	33 39.8	61 72	87.2	33 58.1	61 72	86.7	34 16.4	61 72	86.2	34 34.5	60 72	85.7	34 52.5	60 72	85.2	35 10.4	59 72	84.7	35 28.2	59 72	84.3	6
7	32 38.2	62 72	87.0	32 56.7	61 72	86.5	33 15.1	61 72	86.0	33 33.3	61 72	85.5	33 51.5	60 72	85.1	34 09.5	60 72	84.6	34 27.5	60 72	84.1	34 45.3	59 71	83.6	7
8	31 55.1	62 72	86.3	32 13.6	62 72	85.8	32 32.0	61 72	85.4	32 50.3	61 72	84.9	33 08.5	60 72	84.4	33 26.6	60 71	83.9	33 44.6	60 71	83.5	34 02.4	59 71	83.0	8
9	31 12.1	62 72	85.6	31 30.6	62 72	85.2	31 49.0	61 72	84.7	32 07.4	61 72	84.2	32 25.6	61 71	83.8	32 43.7	60 71	83.3	33 01.7	60 71	82.8	33 19.6	60 71	82.3	9
70	30 29.1	62 72	85.0	30 47.6	62 72	84.5	31 06.1	61 72	84.1	31 24.4	61 71	83.6	31 42.7	61 71	83.1	32 00.9	60 71	82.7	32 18.9	60 71	82.2	32 36.9	60 71	81.7	70
1	29 46.1	62 72	84.3	30 04.7	62 72	83.9	30 23.2	62 71	83.4	30 41.6	61 71	82.9	30 59.9	61 71	82.5	31 18.1	61 71	82.0	31 36.2	60 71	81.6	31 54.2	60 71	81.1	1
2	29 03.2	62 71	83.7	29 21.8	62 71	83.2	29 40.3	62 71	82.8	29 58.8	61 71	82.3	30 17.1	61 71	81.9	30 35.4	61 71	81.4	30 53.5	60 71	80.9	31 11.6	60 71	80.5	2
3	28 20.3	62 71	83.0	28 39.0	62 71	82.6	28 57.5	62 71	82.1	29 16.0	61 71	81.7	29 34.4	61 71	81.2	29 52.8	61 71	80.8	30 11.0	61 71	80.3	30 29.1	60 71	79.8	3
4	27 37.5	63 71	82.4	27 56.2	62 71	81.9	28 14.8	62 71	81.5	28 33.4	62 71	81.0	28 51.8	61 71	80.6	29 10.2	61 71	80.1	29 28.5	61 71	79.7	29 46.6	60 71	79.2	4
75	26 54.7	63 71	81.7	27 13.5	62 71	81.3	27 32.2	62 71	80.8	27 50.8	62 71	80.4	28 09.3	62 71	80.0	28 27.7	61 71	79.5	28 46.0	61 71	79.1	29 04.3	61 70	78.6	75
6	26 12.1	63 71	81.1	26 30.9	63 71	80.6	26 49.6	62 71	80.2	27 08.3	62 71	79.8	27 26.8	62 71	79.3	27 45.3	61 71	78.9	28 03.7	61 70	78.4	28 22.0	61 70	78.0	6
7	25 29.5	63 71	80.4	25 48.3	63 71	80.0	26 07.1	63 71	79.6	26 25.8	62 71	79.1	26 44.5	62 70	78.7	27 03.0	62 70	78.3	27 21.5	61 70	77.8	27 39.9	61 70	77.4	7
8	24 46.9	63 71	79.8	25 05.9	63 71	79.4	25 24.7	63 71	79.0	25 43.5	62 70	78.5	26 02.2	62 70	78.1	26 20.8	62 70	77.6	26 39.3	62 70	77.2	26 57.8	61 70	76.8	8
9	24 04.5	63 71	79.2	24 23.5	63 70	78.7	24 42.4	63 70	78.3	25 01.2	63 70	77.9	25 20.0	62 70	77.5	25 38.7	62 70	77.0	25 57.3	62 70	76.6	26 15.8	62 70	76.2	9
80	23 22.2	64 70	78.5	23 41.2	63 70	78.1	24 00.2	63 70	77.7	24 19.1	63 70	77.3	24 37.9	63 70	76.8	24 56.7	62 70	76.4	25 15.4	62 70	76.0	25 34.0	62 70	75.5	80
1	22 39.9	64 70	77.9	22 59.0	64 70	77.5	23 18.1	63 70	77.1	23 37.0	63 70	76.6	23 55.9	63 70	76.2	24 14.8	63 70	75.8	24 33.6	62 70	75.4	24 52.2	62 69	74.9	1
2	21 57.8	64 70	77.3	22 16.9	64 70	76.9	22 36.0	64 70	76.4	22 55.1	63 70	76.0	23 14.1	63 70	75.6	23 33.0	63 69	75.2	23 51.8	63 69	74.8	24 10.6	62 69	74.3	2
3	21 15.7	64 70	76.6	21 35.0	64 70	76.2	21 54.1	64 70	75.8	22 13.3	64 70	75.4	22 32.3	63 69	75.0	22 51.3	63 69	74.6	23 10.3	63 69	74.1	23 29.1	63 69	73.7	3
4	20 33.8	65 70	76.0	20 53.1	64 70	75.6	21 12.4	64 69	75.2	21 31.6	64 69	74.8	21 50.7	64 69	74.4	22 09.8	63 69	74.0	22 28.8	63 69	73.5	22 47.8	63 69	73.1	4
85	19 51 9	65 70	75.4	20 11.3	65 69	75.0	20 30.7	64 69	74.6	20 50.0	64 69	74.2	21 09.2	64 69	73.8	21 28.4	64 69	73.3	21 47.5	64 69	72.9	22 06.5	63 68	72.5	85
6	19 10.2	65 69	74.8	19 29.7	65 69	74.4	19 49.2	65 69	74.0	20 08.5	64 69	73.5	20 27.8	64 69	73.1	20 47.1	64 69	72.7	21 06.3	64 68	72.3	21 25.4	64 68	71.9	6
7	18 28.7	65 69	74.1	18 48.2	65 69	73.7	19 07.7	65 69	73.3	19 27.2	65 69	72.9	19 46.6	65 68	72.5	20 06.0	64 68	72.1	20 25.2	64 68	71.7	20 44.5	64 68	71.3	7
8	17 47.2	66 69	73.5	18 06.9	65 69	73.1	18 26.5	65 69	72.7	18 46.0	65 68	72.3	19 05.5	65 68	71.9	19 25.0	65 68	71.5	19 44.3	65 68	71.1	20 03.7	64 68	70.7	8
9	17 05.9	66 69	72.9	17 25.6	66 68	72.5	17 45.3	66 68	72.1	18 05.0	65 68	71.7	18 24.6	65 68	71.3	18 44.1	65 68	70.9	19 03.6	65 68	70.5	19 23.0	65 68	70.1	9
90	16 24 7	66 68	72.2	16 44.5	66 68	71.8	17 04.3	66 68	71.5	17 24.1	66 68	71.1	17 43.8	66 68	70.7	18 03.4	65 68	70.3	18 23.0	65 67	69.9	18 42.5	65 67	69.5	90

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	22 00.0	1.0 01	180.0	21 30.0	1.0 01	180.0	21 00.0	1.0 01	180.0	20 30.0	1.0 01	180.0	20 00.0	1.0 01	180.0	19 30.0	1.0 01	180.0	19 00.0	1.0 01	180.0	18 30.0	1.0 01	180.0	00
1	21 59.6	1.0 02	179.0	21 29.6	1.0 02	179.0	20 59.6	1.0 02	179.0	20 29.6	1.0 02	179.0	19 59.6	1.0 02	179.0	19 29.6	1.0 02	179.1	18 59.6	1.0 02	179.1	18 29.6	1.0 02	179.1	1
2	21 58.5	1.0 03	178.0	21 28.5	1.0 03	178.0	20 58.5	1.0 03	178.1	20 28.5	1.0 03	178.1	19 58.6	1.0 03	178.1	19 28.6	1.0 03	178.1	18 58.6	1.0 03	178.1	18 28.6	1.0 03	178.1	2
3	21 56.7	1.0 04	177.0	21 26.7	1.0 04	177.1	20 56.7	1.0 04	177.1	20 26.7	1.0 04	177.1	19 56.8	1.0 04	177.1	19 26.8	1.0 04	177.2	18 56.8	1.0 04	177.2	18 26.8	1.0 04	177.2	3
4	21 54.1	1.0 06	176.1	21 24.1	1.0 06	176.1	20 54.2	1.0 05	176.1	20 24.2	1.0 05	176.1	19 54.2	1.0 05	176.2	19 24.3	1.0 05	176.2	18 54.3	1.0 05	176.2	18 24.4	1.0 05	176.3	4
05	21 50.7	1.0 07	175.1	21 20.8	1.0 07	175.1	20 50.9	1.0 07	175.2	20 20.9	1.0 07	175.2	19 51.0	1.0 07	175.2	19 21.1	1.0 07	175.3	18 51.1	1.0 06	175.3	18 21.2	1.0 06	175.3	05
6	21 46.7	1.0 08	174.1	21 16.8	1.0 08	174.1	20 46.9	1.0 08	174.2	20 17.0	1.0 08	174.2	19 47.1	1.0 08	174.3	19 17.1	1.0 08	174.3	18 47.2	1.0 08	174.4	18 17.3	1.0 08	174.4	6
7	21 41.9	1.0 09	173.1	21 12.0	1.0 09	173.2	20 42.1	1.0 09	173.2	20 12.3	1.0 09	173.3	19 42.4	1.0 09	173.3	19 12.5	1.0 09	173.4	18 42.6	1.0 09	173.4	18 12.8	1.0 09	173.5	7
8	21 36.3	99 10	172.1	21 06.5	99 10	172.2	20 36.7	99 10	172.3	20 06.8	99 10	172.3	19 37.0	99 10	172.4	19 07.2	99 10	172.4	18 37.3	99 10	172.5	18 07.5	99 10	172.5	8
9	21 30.1	99 12	171.2	21 00.3	99 12	171.2	20 30.5	99 12	171.3	20 00.7	99 11	171.4	19 30.9	99 11	171.4	19 01.1	99 11	171.5	18 31.4	99 11	171.5	18 01.6	99 11	171.6	9
10	21 23.1	99 13	170.3	20 53.3	99 13	170.3	20 23.6	99 13	170.3	19 53.9	99 13	170.4	19 24.1	99 12	170.5	18 54.4	99 12	170.5	18 24.7	99 12	170.6	17 54.9	99 12	170.7	10
1	21 15.4	99 14	169.2	20 45.7	99 14	169.3	20 16.0	99 14	169.4	19 46.3	99 14	169.5	19 16.6	99 14	169.5	18 47.0	99 14	169.6	18 17.3	99 13	169.7	17 47.6	99 13	169.8	1
2	21 06.9	99 15	168.3	20 37.3	99 15	168.3	20 07.7	99 15	168.4	19 38.1	99 15	168.5	19 08.5	99 15	168.6	18 38.8	99 15	168.7	18 09.2	99 15	168.8	17 39.6	99 14	168.8	2
3	20 57.8	98 16	167.3	20 28.2	98 16	167.4	19 58.7	99 16	167.5	19 29.1	99 16	167.6	18 59.6	99 16	167.7	18 30.0	99 16	167.7	18 00.4	99 16	167.8	17 30.9	99 16	167.9	3
4	20 47.9	98 18	166.3	20 18.4	98 17	166.4	19 49.0	98 17	166.5	19 19.5	98 17	166.6	18 50.0	98 17	166.7	18 20.5	98 17	166.8	17 51.0	98 17	166.9	17 21.5	98 17	167.0	4
15	20 37.4	98 19	165.4	20 08.0	98 19	165.5	19 38.6	98 18	165.6	19 09.2	98 18	165.7	18 39.7	98 18	165.8	18 10.3	98 18	165.9	17 40.9	98 18	166.0	17 11.5	98 18	166.1	15
6	20 26.1	98 20	164.4	19 56.8	98 20	164.5	19 27.5	98 20	164.6	18 58.1	98 19	164.7	18 28.8	98 19	164.9	17 59.5	98 19	165.0	17 30.1	98 19	165.1	17 00.8	98 19	165.2	6
7	20 14.2	97 21	163.5	19 44.9	97 21	163.6	19 15.7	97 21	163.7	18 46.4	98 21	163.8	18 17.2	98 20	163.9	17 47.9	98 20	164.0	17 18.7	98 20	164.2	16 49.4	98 20	164.3	7
8	20 01.5	97 22	162.5	19 32.4	97 22	162.6	19 03.2	97 22	162.8	18 34.1	97 22	162.9	18 04.9	97 22	163.0	17 35.7	97 21	163.1	17 06.6	97 21	163.3	16 37.4	97 21	163.4	8
9	19 48.2	97 23	161.6	19 19.2	97 23	161.7	18 50.1	97 23	161.8	18 21.0	97 23	162.0	17 52.0	97 23	162.1	17 22.9	97 22	162.2	16 53.8	97 22	162.4	16 24.7	97 22	162.5	9
20	19 34.3	97 24	160.6	19 05.3	97 24	160.8	18 36.3	97 24	160.9	18 07.4	97 24	161.0	17 38.4	97 24	161.2	17 09.4	97 24	161.3	16 40.4	97 23	161.5	16 11.4	97 23	161.6	20
1	19 19.6	96 26	159.7	18 50.8	96 25	159.8	18 21.9	96 25	160.0	17 53.0	96 25	160.1	17 24.1	96 25	160.3	16 55.2	96 25	160.4	16 26.4	96 24	160.6	15 57.5	96 24	160.7	1
2	19 04.3	96 27	158.8	18 35.6	96 26	158.9	18 06.8	96 26	159.1	17 38.0	96 26	159.2	17 09.2	96 26	159.4	16 40.5	96 26	159.5	16 11.7	96 26	159.7	15 42.9	96 25	159.8	2
3	18 48.4	95 28	157.8	18 19.7	96 27	158.0	17 51.1	96 27	158.2	17 22.4	96 27	158.3	16 53.7	96 27	158.5	16 25.0	96 27	158.6	15 56.4	96 27	158.8	15 27.7	96 26	158.9	3
4	18 31.8	95 29	156.9	18 03.2	95 29	157.1	17 34.7	95 28	157.3	17 06.1	95 28	157.4	16 37.6	95 28	157.6	16 09.0	95 28	157.7	15 40.4	95 28	157.9	15 11.8	95 27	158.0	4
25	18 14.5	95 30	156.0	17 46.1	95 30	156.2	17 17.7	95 29	156.3	16 49.2	95 29	156.5	16 20.8	95 29	156.7	15 52.3	95 29	156.8	15 23.9	95 29	157.0	14 55.4	95 28	157.2	25
6	17 56.7	94 31	155.1	17 28.4	94 31	155.3	17 00.1	94 30	155.5	16 31.7	94 30	155.6	16 03.4	94 30	155.8	15 35.1	94 30	156.0	15 06.7	95 30	156.1	14 38.3	95 29	156.3	6
7	17 38.2	94 32	154.2	17 10.0	94 32	154.4	16 41.8	94 31	154.6	16 13.6	94 31	154.7	15 45.4	94 31	154.9	15 17.2	94 31	155.1	14 48.9	94 31	155.3	14 20.7	94 30	155.4	7
8	17 19.1	94 33	153.3	16 51.1	94 33	153.5	16 23.0	94 32	153.7	15 54.9	94 32	153.9	15 26.8	94 32	154.0	14 58.7	94 32	154.2	14 30.6	94 32	154.4	14 02.5	94 31	154.6	8
9	16 59.4	93 34	152.4	16 31.5	93 34	152.6	16 03.5	93 33	152.8	15 35.6	93 33	153.0	15 07.6	93 33	153.2	14 39.6	93 33	153.4	14 11.6	93 33	153.5	13 43.7	93 32	153.7	9
30	16 39.1	93 35	151.5	16 11.3	93 35	151.7	15 43.5	93 34	151.9	15 15.7	93 34	152.1	14 47.8	93 34	152.3	14 20.0	93 34	152.5	13 52.1	93 34	152.7	13 24.3	93 33	152.9	30
1	16 18.3	92 36	150.6	15 50.6	92 36	150.8	15 22.9	92 35	151.0	14 55.2	92 35	151.2	14 27.5	92 35	151.4	13 59.8	92 35	151.6	13 32.0	92 34	151.8	13 04.3	92 34	152.0	1
2	15 56.8	92 37	149.8	15 29.3	92 36	150.0	15 01.7	92 36	150.2	14 34.2	92 36	150.4	14 06.6	92 36	150.6	13 39.0	92 36	150.8	13 11.4	92 35	151.0	12 43.8	92 35	151.2	2
3	15 34.8	91 38	148.9	15 07.4	91 37	149.1	14 40.0	91 37	149.3	14 12.5	91 37	149.5	13 45.1	92 37	149.7	13 17.6	92 36	149.9	12 50.2	92 36	150.2	12 22.7	92 36	150.4	3
4	15 12.2	91 39	148.0	14 45.0	91 38	148.3	14 17.7	91 38	148.5	13 50.4	91 38	148.7	13 23.1	91 38	148.9	12 55.8	91 37	149.1	12 28.4	91 37	149.3	12 01.1	91 37	149.5	4
35	14 49.1	90 39	147.2	14 22.0	90 39	147.4	13 54.8	91 39	147.6	13 27.7	91 39	147.8	13 00.5	91 39	148.1	12 33.3	91 38	148.3	12 06.1	91 38	148.5	11 38.9	91 38	148.7	35
6	14 25.5	90 40	146.3	13 58.5	90 40	146.6	13 31.5	90 40	146.8	13 04.4	90 40	147.0	12 37.4	90 39	147.2	12 10.4	90 39	147.4	11 43.3	90 39	147.7	11 16.2	90 39	147.9	6
7	14 01.3	89 41	145.5	13 34.4	90 41	145.7	13 07.5	90 41	145.9	12 40.7	90 40	146.2	12 13.8	90 40	146.4	11 46.9	90 40	146.6	11 20.0	90 40	146.8	10 53.0	90 40	147.1	7
8	13 36.6	89 42	144.6	13 09.8	89 42	144.9	12 43.1	89 42	145.1	12 16.4	89 41	145.3	11 49.6	89 41	145.6	11 22.9	89 41	145.8	10 56.1	89 41	146.0	10 29.3	89 40	146.3	8
9	13 11.3	89 43	143.8	12 44.8	89 43	144.0	12 18.2	89 42	144.3	11 51.6	89 42	144.5	11 25.0	89 42	144.8	10 58.4	89 42	145.0	10 31.7	89 41	145.2	10 05.1	89 41	145.5	9
40	12 45.6	88 44	143.0	12 19.2	88 43	143.2	11 52.7	88 43	143.5	11 26.3	88 43	143.7	10 59.8	88 43	143.9	10 33.4	88 42	144.2	10 06.9	88 42	144.4	9 40.4	88 42	144.7	40
1	12 19.4	88 45	142.2	11 53.1	88 44	142.4	11 26.8	88 44	142.7	11 00.5	88 44	142.9	10 34.2	88 44	143.1	10 07.9	88 43	143.4	9 41.5	88 43	143.6	9 15.2	88 43	143.9	1
2	11 52.6	87 45	141.3	11 26.5	87 45	141.6	11 00.4	87 45	141.8	10 34.2	87 45	142.1	10 08.0	87 44	142.3	9 41.9	87 44	142.6	9 15.7	87 44	142.8	8 49.5	87 44	143.1	2
3	11 25.4	87 46	140.5	10 59.5	87 46	140.8	10 33.5	87 46	141.0	10 07.5	87 45	141.3	9 41.4	87 45	141.5	9 15.4	87 45	141.8	8 49.4	87 45	142.1	8 23.3	87 44	142.3	3
4	10 57.8	86 47	139.7	10 31.9	86 47	140.0	10 06.1	86 46	140.2	9 40.2	86 46	140.5	9 14.4	86 46	140.8	8 48.5	86 46	141.0	8 22.6	86 45	141.3	7 56.7	86 45	141.5	4
45	10 29.6	86 48	138.9	10 04.0	86 47	139.2	9 38.3	86 47	139.5	9 12.6	86 47	139.7	8 46.8	86 47	140.0	8 21.1	86 46	140.2	7 55.4	86 46	140.5	7 29.6	86 46	140.8	45
6	10 01.1	85 48	138.1	9 35.5	85 48	138.4	9 10.0	85 48	138.7	8 44.4	85 48	138.9	8 18.9	85 47	139.2	7 53.3	85 47	139.5	7 27.7	85 47	139.7	7 02.1	85 47	140.0	6
7	9 32.0	85 49	137.4	9 06.7	85 49	137.6	8 41.3	85 49	137.9	8 15.9	85 48	138.2	7 50.4	85 48	138.4	7 25.0	85 48	138.7	6 59.6	85 48	139.0	6 34.1	85 47	139.2	7
8	9 02.6	84 50	136.6	8 37.3	84 50	136.8	8 12.1	84 49	137.1	7 46.9	84 49	137.4	7 21.6	84 49	137.7	6 56.3	84 49	137.9	6 31.0	84 48	138.2	6 05.7	84 48	138.5	8
9	8 32.7	84 50	135.8	8 07.6	84 50	136.1	7 42.5	84 50	136.4	7 17.4	84 50	136.6	6 52.3	84 50	136.9	6 27.2	84 49	137.2	6 02.1	84 49	137.5	5 36.9	84 49	137.7	9
50	8 02.4	83 51	135.0	7 37.5	83 51	135.3	7 12.5	83 51	135.6	6 47.6	83 50	135.9	6 22.6	83 50	136.1	5 57.6	83 50	136.4	5 32.7	83 50	136.7	5 07.7	83 49	137.0	50
1	7 31.7	83 52	134.3	7 06.9	83 52	134.5	6 42.1	83 51	134.8	6 17.3	83 51	135.1	5 52.5	83 51	135.4	5 27.7	83 50	135.7	5 02.9	83 50	136.0				1
2	7 00.6	82 52	133.5	6 36.0	82 52	133.8	6 11.3	82 52	134.1	5 46.7	82 52	134.4	5 22.0	82 52	134.7										2
3	6 29.1	82 53	132.8	6 04.6	82 53	133.0	5 40.1	82 53	133.3	5 15.6	82 52	133.6													3
4	5 57.2	81 54	132.0	5 32.9	81 54	132.3	5 08.5	81 53	132.6																4
55	5 24.9	81 54	131.3	5 00.8	81 54	131.6																			55

DECLINATION SAME NAME AS LATITUDE

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
91	15 43.7	66 68	71.6	16 03.6	66 68	71.2	16 23.5	66 68	70.8	16 43.3	66 68	70.4	17 03.1	66 67	70.0	17 22.8	66 67	69.7	17 42.5	66 67	69.3	18 02.2	65 67	68.9	91
2	15 02.8	67 68	71.0	15 22.8	67 68	70.6	15 42.8	67 68	70.2	16 02.7	66 67	69.8	16 22.6	66 67	69.4	16 42.5	66 67	69.0	17 02.3	66 67	68.6	17 22.0	66 67	68.3	2
3	14 22.1	67 68	70.3	14 42.2	67 67	70.0	15 02.3	67 67	69.6	15 22.3	67 67	69.2	15 42.3	67 67	68.8	16 02.2	66 67	68.4	16 22.1	66 67	68.0	16 42.0	66 66	67.6	3
4	13 41.5	67 67	69.7	14 01.7	67 67	69.3	14 21.9	67 67	69.0	14 42.0	67 67	68.6	15 02.1	67 67	68.2	15 22.2	67 66	67.8	15 42.2	67 66	67.4	16 02.2	67 66	67.0	4
95	13 01.1	68 67	69.1	13 21.4	68 67	68.7	13 41.7	68 67	68.3	14 01.9	67 67	67.9	14 22.2	67 66	67.6	14 42.3	67 66	67.2	15 02.4	67 66	66.8	15 22.5	67 66	66.4	95
6	12 20.9	68 67	68.4	12 41.3	68 67	68.1	13 01.7	68 66	67.7	13 22.0	68 66	67.3	13 42.3	68 66	66.9	14 02.6	68 66	66.6	14 22.9	67 66	66.2	14 43.1	67 65	65.8	6
7	11 40.8	68 66	67.8	12 01.4	68 66	67.4	12 21.8	68 66	67.1	12 42.3	68 66	66.7	13 02.7	68 66	66.3	13 23.1	68 66	65.9	13 43.5	68 65	65.6	14 03.8	68 65	65.2	7
8	11 01.0	69 66	67.2	11 21.6	69 66	66.8	11 42.2	69 66	66.4	12 02.8	69 66	66.1	12 23.3	68 65	65.7	12 43.8	68 65	65.3	13 04.3	68 65	64.9	13 24.7	68 65	64.6	8
9	10 21.3	69 66	66.5	10 42.0	69 66	66.2	11 02.7	69 65	65.8	11 23.4	69 65	65.4	11 44.1	69 65	65.1	12 04.7	69 65	64.7	12 25.3	69 65	64.3	12 45.9	68 64	63.9	9
100	9 41.8	70 66	65.9	10 02.6	69 65	65.5	10 23.5	69 65	65.2	10 44.3	69 65	64.8	11 05.0	69 65	64.4	11 25.8	69 64	64.0	11 46.5	69 64	63.7	12 07.2	69 64	63.3	100
1	9 02.5	70 65	65.2	9 23.5	70 65	64.9	9 44.4	70 65	64.5	10 05.3	70 65	64.1	10 26.2	70 64	63.8	10 47.1	70 64	63.4	11 07.9	69 64	63.0	11 28.7	69 64	62.7	1
2	8 23.4	70 65	64.6	8 44.5	70 65	64.2	9 05.5	70 64	63.9	9 26.6	70 64	63.5	9 47.6	70 64	63.1	10 08.6	70 64	62.8	10 29.6	70 64	62.4	10 50.5	70 63	62.1	2
3	7 44.5	71 64	63.9	8 05.7	71 64	63.6	8 26.9	71 64	63.2	8 48.1	70 64	62.9	9 09.2	70 64	62.5	9 30.3	70 63	62.1	9 51.4	70 63	61.8	10 12.5	70 63	61.4	3
4	7 05.9	71 64	63.3	7 27.2	71 64	62.9	7 48.5	71 64	62.6	8 09.8	71 63	62.2	8 31.0	71 63	61.9	8 52.3	71 63	61.5	9 13.5	71 63	61.1	9 34.7	71 63	60.8	4
105	6 27.4	71 64	62.6	6 48.9	71 63	62.3	7 10.3	71 63	61.9	7 31.7	71 63	61.6	7 53.1	71 63	61.2	8 14.5	71 63	60.9	8 35.8	71 62	60.5	8 57.1	71 62	60.2	105
6	5 49.2	72 63	62.0	6 10.8	72 63	61.6	6 32.3	72 63	61.3	6 53.9	72 63	60.9	7 15.4	72 62	60.6	7 36.9	72 62	60.2	7 58.4	72 62	59.9	8 19.8	72 62	59.5	6
7	5 11.2	72 63	61.3	5 32.9	72 63	61.0	5 54.6	72 62	60.6	6 16.3	72 62	60.3	6 37.9	72 62	59.9	6 59.5	72 62	59.6	7 21.2	72 62	59.2	7 42.8	72 61	58.9	7
8							5 17.1	73 62	60.0	5 38.9	73 62	59.6	6 00.7	73 62	59.3	6 22.5	73 61	58.9	6 44.2	72 61	58.6	7 05.9	72 61	58.2	8
9										5 01.8	73 61	58.9	5 23.7	73 61	58.6	5 45.6	73 61	58.3	6 07.5	73 61	57.9	6 29.4	73 60	57.6	9
110																5 09.0	73 60	57.6	5 31.1	73 60	57.3	5 53.1	73 60	56.9	110
1																						5 17.1	74 60	56.3	1

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Lat. 44°

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	74 00.0	1.0 02	180.0	74 30.0	1.0 02	180.0	75 00.0	1.0 02	180.0	76 00.0	1.0 02	180.0	78 00.0	1.0 03	180.0	80 00.0	1.0 03	180.0	80 30.0	1.0 03	180.0	81 30.0	1.0 03	180.0	00
1	73 58.8	1.0 06	176.8	74 28.8	1.0 06	176.7	74 58.7	1.0 06	176.6	75 58.7	1.0 07	176.4	77 58.5	1.0 08	175.9	79 58.2	1.0 09	175.2	80 28.1	1.0 09	175.0	81 27.9	1.0 10	174.5	1
2	73 55.2	1.0 10	173.6	74 25.1	1.0 10	173.4	74 54.9	1.0 10	173.3	75 54.6	99 11	172.9	77 53.9	99 13	171.9	79 52.8	99 15	170.5	80 22.5	99 15	170.1	81 21.8	99 17	169.1	2
3	73 49.2	99 14	170.5	74 18.9	99 14	170.2	74 48.6	99 15	169.9	75 48.0	99 15	169.4	77 46.3	98 17	167.9	79 44.0	98 20	165.9	80 13.3	98 21	165.3	81 11.7	97 23	163.8	3
4	73 40.9	98 18	167.3	74 10.4	98 18	167.0	74 39.9	98 19	166.7	75 38.7	98 20	165.9	77 35.8	97 22	164.0	79 31.9	96 25	161.4	80 00.7	96 26	160.6	80 57.8	95 29	158.8	4
05	73 30.3	98 21	164.3	73 59.5	97 22	163.9	74 28.7	97 22	163.4	75 27.0	97 24	162.5	77 22.6	96 26	160.2	79 16.6	94 30	157.1	79 44.8	94 31	156.2	80 40.6	92 34	154.0	05
6	73 17.5	97 25	161.3	73 46.4	96 25	160.8	74 15.3	96 26	160.3	75 12.8	96 27	159.2	77 06.7	94 31	156.6	78 58.4	92 35	153.1	79 25.9	91 36	152.0	80 20.1	89 39	149.5	6
7	73 02.6	96 28	158.3	73 31.2	95 29	157.8	73 59.7	95 30	157.3	74 56.4	94 31	156.0	76 48.3	92 34	153.1	78 37.6	90 39	149.2	79 04.3	89 40	148.0	79 56.9	86 43	145.4	7
8	72 45.7	94 31	155.5	73 13.9	94 32	154.9	73 42.0	93 33	154.3	74 37.8	93 34	153.0	76 27.7	90 38	149.7	78 14.3	87 42	145.5	78 40.3	86 44	144.3	79 31.2	83 47	141.5	8
9	72 26.9	93 34	152.7	72 54.6	92 35	152.1	73 22.3	92 36	151.4	74 17.2	91 38	150.0	76 04.9	88 41	146.5	77 48.8	85 46	142.1	78 14.0	83 47	140.8	79 03.2	81 50	137.9	9
10	72 06.2	91 37	150.1	72 33.5	91 38	149.4	73 00.7	90 39	148.7	73 54.6	89 40	147.1	75 40.1	86 44	143.5	77 21.3	82 49	138.9	77 45.8	81 50	137.5	78 33.4	78 53	134.6	10
1	71 43.8	90 40	147.5	72 10.7	89 41	146.8	72 37.5	89 42	146.0	73 30.4	88 43	144.4	75 13.6	84 47	140.6	76 52.1	80 51	135.9	77 15.8	78 53	134.5	78 01.8	75 55	131.5	1
3	71 19.8	88 42	145.0	71 46.3	88 43	144.3	72 12.5	87 44	143.5	73 04.4	86 46	141.8	74 45.4	82 49	137.9	76 21.3	77 54	133.1	76 44.3	76 55	131.7	77 28.8	72 57	128.7	2
3	70 54.4	87 45	142.6	71 20.3	86 46	141.8	71 46.1	86 46	141.0	72 37.0	84 48	139.3	74 15.7	80 52	135.3	75 49.1	75 56	130.4	76 11.4	74 57	129.0	76 54.5	70 59	126.1	3
4	70 27.5	85 47	140.3	70 53.0	85 48	139.5	71 18.3	84 49	138.7	72 08.2	82 50	136.9	73 44.7	78 54	132.9	75 15.6	73 58	128.0	75 37.3	71 59	126.6	76 19.0	68 61	123.6	4
15	69 59.3	84 49	138.1	70 24.3	83 50	137.3	70 49.2	82 51	136.4	71 38.1	81 52	134.6	73 12.5	76 56	130.6	74 41.1	71 59	125.7	75 02.1	69 60	124.3	75 42.6	66 62	121.4	15
6	69 29.9	82 51	136.0	69 54.5	82 52	135.2	70 18.8	81 52	134.3	71 06.8	79 54	132.5	72 39.2	75 57	128.4	74 05.6	69 61	123.5	74 26.0	67 62	122.2	75 05.4	64 63	119.3	6
7	68 59.3	81 53	133.9	69 23.5	80 53	133.1	69 47.4	79 54	132.2	70 34.5	77 56	130.4	72 04.9	73 59	126.3	73 29.2	67 62	121.5	73 49.1	66 63	120.2	74 27.4	62 64	117.3	7
8	68 27.7	80 54	132.0	68 51.5	79 55	131.2	69 15.0	78 56	130.3	70 01.1	76 57	128.4	71 29.6	71 60	124.3	72 52.0	66 63	119.6	73 11.4	64 64	118.3	73 48.7	60 65	115.5	8
9	67 55.2	78 56	130.1	68 18.5	77 56	129.3	68 41.6	76 57	128.4	69 26.9	74 58	126.6	70 53.6	70 61	122.5	72 14.1	64 64	117.8	72 33.1	62 65	116.5	73 09.5	59 66	113.8	9
20	67 21.7	77 57	128.3	67 44.7	76 58	127.5	68 07.4	75 58	126.6	68 51.8	73 60	124.8	70 16.9	68 62	120.7	71 35.6	63 65	116.1	71 54.2	61 66	114.8	72 29.8	58 67	112.2	20
1	66 47.5	76 58	126.6	67 10.0	75 59	125.7	67 32.3	74 60	124.9	68 16.0	72 61	123.1	69 39.4	67 63	119.0	70 56.6	61 66	114.5	71 14.8	60 66	113.3	71 49.6	56 68	110.7	1
2	66 12.5	74 60	124.9	66 34.6	74 60	124.1	66 56.6	73 61	123.2	67 39.5	71 62	121.4	69 01.4	66 64	117.4	70 17.1	60 67	113.0	70 34.9	59 67	111.8	71 09.1	55 68	109.3	2
3	65 36.7	73 61	123.3	65 58.6	72 61	122.5	66 20.1	71 62	121.6	67 02.4	69 63	119.8	68 22.8	65 65	115.9	69 37.2	59 67	111.5	69 54.6	57 68	110.4	70 28.1	54 69	107.9	3
4	65 00.4	72 62	121.8	65 21.9	71 62	121.0	65 43.1	70 63	120.1	66 24.6	68 64	118.3	67 43.8	64 66	114.5	68 56.8	58 68	110.2	69 14.0	56 68	109.0	69 46.9	53 69	106.6	4
25	64 23.4	71 63	120.3	64 44.6	70 63	119.5	65 05.5	69 64	118.6	65 46.4	67 65	116.9	67 04.3	63 66	113.1	68 16.2	57 68	108.9	68 33.0	56 69	107.7	69 05.4	52 70	105.4	25
6	63 45.8	70 63	118.9	64 06.7	69 64	118.1	64 27.3	68 64	117.2	65 07.7	66 65	115.5	66 24.4	62 67	111.7	67 35.2	56 69	107.6	67 51.8	55 69	106.5	68 23.7	52 70	104.2	6
7	63 07.8	69 64	117.5	63 28.4	68 65	116.7	63 48.7	67 65	115.9	64 28.5	65 66	114.2	65 44.1	61 68	110.5	66 53.9	55 69	106.4	67 10.3	54 70	105.3	67 41.8	51 70	103.1	7
8	62 29.3	68 65	116.2	62 49.6	67 65	115.4	63 09.7	66 66	114.6	63 48.9	64 67	112.9	65 03.5	60 68	109.2	66 12.4	55 70	105.3	66 28.6	53 70	104.2	66 59.7	50 70	102.1	8
9	61 50.4	67 66	114.9	62 10.4	66 66	114.1	62 30.2	66 66	113.3	63 09.0	64 67	111.6	64 22.6	59 69	108.1	65 30.6	54 70	104.2	65 46.6	53 70	103.1	66 17.4	50 71	101.0	9
30	61 11.0	67 66	113.7	61 30.9	66 67	112.9	61 50.4	65 67	112.1	62 28.7	63 68	110.4	63 41.5	58 69	106.9	64 48.7	53 70	103.1	65 04.5	52 70	102.1	65 34.9	49 71	100.0	30
1	60 31.3	66 67	112.5	60 50.9	65 67	111.7	61 10.3	64 67	110.9	61 48.1	62 68	109.3	63 00.1	58 69	105.8	64 06.6	53 70	102.1	64 22.2	52 71	101.1	64 52.4	49 71	99.1	1
2	59 51.3	65 67	111.3	60 10.7	64 68	110.5	60 29.8	63 68	109.8	61 07.2	61 69	108.2	62 18.4	57 70	104.8	63 24.3	52 71	101.1	63 39.8	51 71	100.1	64 09.7	48 71	98.2	2
3	59 10.9	64 68	110.2	59 30.1	64 68	109.4	59 49.0	63 68	108.7	60 26.1	61 69	107.1	61 36.6	57 70	103.7	62 41.9	52 71	100.1	62 57.3	51 71	99.2	63 26.9	48 71	97.3	3
4	58 30.2	64 68	109.1	58 49.3	63 68	108.3	59 08.0	62 69	107.6	59 44.7	60 69	106.0	60 54.6	56 70	102.7	61 59.3	52 71	99.2	62 14.6	50 71	98.3	62 44.1	48 72	96.4	4
35	57 49.3	63 69	108.0	58 08.2	62 69	107.3	58 26.7	62 69	106.5	59 03.1	60 70	105.0	60 12.4	56 71	101.8	61 16.6	51 71	98.3	61 31.9	50 71	97.4	62 01.2	48 72	95.6	35
6	57 08.2	63 69	107.0	57 26.8	62 69	106.3	57 45.3	61 69	105.5	58 21.3	59 70	104.0	59 30.1	55 71	100.8	60 33.9	51 71	97.4	60 49.0	50 72	96.6	61 18.2	47 72	94.8	6
7	56 26.8	62 69	106.0	56 45.3	61 70	105.3	57 03.6	61 70	104.5	57 39.4	59 70	103.0	58 47.6	55 71	99.9	59 51.1	51 72	96.6	60 06.1	50 72	95.7	60 35.1	47 72	94.0	7
8	55 45.2	62 70	105.0	56 03.6	61 70	104.3	56 21.7	60 70	103.6	56 57.2	58 70	102.1	58 05.1	55 71	99.0	59 08.2	50 72	95.8	59 23.1	49 72	94.9	59 52.1	47 72	93.2	8
9	55 03.4	61 70	104.0	55 21.7	60 70	103.3	55 39.7	60 70	102.6	56 15.0	58 71	101.2	57 22.4	54 71	98.2	58 25.2	50 72	95.0	58 40.1	49 72	94.1	59 09.0	47 72	92.4	9
40	54 21.4	61 70	103.1	54 39.6	60 70	102.4	54 57.5	59 71	101.7	55 32.6	58 71	100.3	56 39.6	54 71	97.3	57 42.2	50 72	94.2	57 57.0	49 72	93.4	58 25.8	47 72	91.7	40
1	53 39.3	60 70	102.2	53 57.4	60 71	101.5	54 15.2	59 71	100.8	54 50.0	57 71	99.4	55 56.8	54 72	96.5	56 59.1	50 72	93.4	57 13.9	49 72	92.6	57 42.7	47 72	91.0	1
2	52 57.1	60 71	101.3	53 15.0	59 71	100.6	53 32.7	59 71	100.0	54 07.4	57 71	98.6	55 13.9	54 72	95.7	56 16.0	50 72	92.7	56 30.8	49 72	91.9	56 59.5	47 72	90.3	2
3	52 14.7	60 71	100.4	52 32.5	59 71	99.8	52 50.1	58 71	99.1	53 24.7	57 71	97.7	54 30.9	53 72	94.9	55 32.9	50 72	91.9	55 47.7	49 72	91.1	56 16.4	47 72	89.6	3
4	51 32.2	60 71	99.6	51 49.9	59 71	98.9	52 07.5	58 71	98.3	52 41.9	57 71	96.9	53 47.9	53 72	94.1	54 49.7	50 72	91.2	55 04.5	49 72	90.4	55 33.2	47 72	88.9	4
45	50 49.6	59 71	98.7	51 07.3	59 71	98.1	51 24.7	58 71	97.4	51 59.0	56 72	96.1	53 04.8	53 72	93.4	54 06.6	50 72	90.5	54 21.3	49 72	89.7	54 50.1	47 72	88.2	45
6	50 06.9	59 71	97.9	50 24.5	58 71	97.3	50 41.9	58 72	96.6	51 16.1	56 72	95.3	52 21.7	53 72	92.6	53 23.4	50 72	89.8	53 38.2	49 72	89.1	54 06.9	47 72	87.6	6
7	49 24.1	59 71	97.1	49 41.6	58 72	96.5	49 59.0	58 72	95.9	50 33.1	56 72	94.6	51 38.6	53 72	91.9	52 40.2	50 72	89.1	52 55.0	49 72	88.4	53 23.8	47 72	86.9	7
8	48 41.2	59 72	96.3	48 58.7	58 72	95.7	49 16.0	57 72	95.1	49 50.0	56 72	93.8	50 55.4	53 72	91.2	51 57.1	50 72	88.4	52 11.9	49 72	87.7	52 40.7	47 72	86.3	8
9	47 58.3	59 72	95.5	48 15.7	58 72	94.9	48 33.0	57 72	94.3	49 06.9	56 72	93.1	50 12.3	53 72	90.5	51 14.0	50 72	87.8	51 28.8	49 72	87.1	51 57.7	47 72	85.7	9
50	47 15.3	58 72	94.8	47 32.7	58 72	94.2	47 50.0	57 72	93.6	48 23.8	56 72	92.3	49 29.1	53 72	89.8	50 30.8	50 72	87.1	50 45.7	49 72	86.4	51 14.7	47 72	85.0	50
1	46 32.3	58 72	94.0	46 49.7	58 72	93.4	47 06.9	57 72	92.8	47 40.7	56 72	91.6	48 45.9	53 72	89.1	49 47.8	50 72	86.5	50 02.6	49 72	85.8	50 31.7	48 72	84.4	1
2	45 49.2	58 72	93.3	46 06.6	58 72	92.7	46 23.7	57 72	92.1	46 57.5	56 72	90.9	48 02.8	53 72	88.4	49 04.7	50 72	85.8	49 19.6	49 72	85.2	49 48.8	48 71	83.8	2
3	45 06.1	58 72	92.6	45 23.4	58 72	92.0	45 40.6	57 72	91.4	46 14.4	56 72	90.2	47 19.7	53 72	87.7	48 21.7	50 72	85.2	48 36.6	49 72	84.5	49 05.9	48 71	83.2	3
4	44 23.0	58 72	91.8	44 40.3	57 72	91.3	44 57.4	57 72	90.7	45 31.2	56 72	89.5	46 36.5	53 72	87.1	47 38.7	50 72	84.6	47 53.7	50 72	83.9	48 23.0	48 71	82.6	4
55	43 39.8	58 72	91.1	43 57.1	57 72	90.6	44 14.3	57 72	90.0	44 48.1	56 72	88.8	45 53.4	53 72	86.4	46 55.7	51 72	84.0	47 10.8	50 71	83.3	47 40.3	48 71	82.0	55
6	42 56.7	58 72	90.4	43 14.0	57 72	89.9	43 31.1	57 72	89.3	44 04.9	56 72	88.1	45 10.4	53 72	85.8	46 12.8	51 71	83.3	46 27.9	50 71	82.7	46 57.6	49 71	81.4	6
7	42 13.5	58 72	89.7	42 30.8	57 72	89.2	42 48.0	57 72	88.6	43 21.8	56 72	87.5	44 27.4	53 72	85.2	45 30.0	51 71	82.7	45 45.2	50 71	82.1	46 14.9	49 71	80.9	7
8	41 30.3	58 72	89.0	41 47.7	57 72	88.5	42 04.8	57 72	87.9	42 38.7	56 72	86.8	43 44.4	54 72	84.5	44 47.2	51 71	82.1	45 02.4	50 71	81.5	45 32.3	49 71	80.3	8
9	40 47.2	58 72	88.3	41 04.5	58 72	87.8	41 21.7	57 72	87.3	41 55.6	56 72	86.2	43 01.4	54 71	83.9	44 04.5	51 71	81.5	44 19.8	51 71	80.9	44 49.8	49 71	79.7	9
60	40 04.1	58 72	87.7	40 21.4	58 72	87.1	40 38.6	57 72	86.6	41 12.6	56 72	85.5	42 18.5	54 71	83.3	43 21.8	52 71	81.0	43 37.2	51 71	80.4	44 07.4	50 71	79.2	60
1	39 20.9	58 72	87.0	39 38.3	58 72	86.5	39 55.5	57 72	85.9	40 29.6	56 72	84.9	41 35.7	54 71	82.7	42 39.2	52 71	80.4	42 54.7	51 71	79.8	43 25.0	50 70	78.6	1
2	38 37.9	58 72	86.3	38 55.3	58 72	85.8	39 12.5	57 72	85.3	39 46.6	56 72	84.2	40 52.9	54 71	82.0	41 56.7	52 71	79.8	42 12.2	51 71	79.2	42 42.8	50 70	78.0	2
3	37 54.8	58 72	85.7	38 12.2	58 72	85.2	38 29.5	57 72	84.7	39 03.7	56 71	83.6	40 10.2	54 71	81.4	41 14.3	52 71	79.2	41 29.9	52 70	78.6	42 00.6	51 70	77.5	3
4	37 11.8	58 72	85.0	37 29.2	58 72	84.5	37 46.6	58 72	84.0	38 20.8	57 71	83.0	39 27.6	55 71	80.8	40 31.9	53 70	78.6	40 47.6	52 70	78.1	41 18.5	51 70	76.9	4
65	36 28.8	59 72	84.4	36 46.3	58 71	83.9	37 03.7	58 71	83.4	37 38.0	57 71	82.3	38 45.0	55 71	80.2	39 49.7	53 70	78.1	40 05.4	52 70	77.5	40 36.5	51 70	76.4	65
6	35 45.9	59 71	83.8	36 03.4	58 71	83.3	36 20.8	58 71	82.8	36 55.3	57 71	81.7	38 02.5	55 71	79.6	39 07.5	53 70	77.5	39 23.3	53 70	76.9	39 54.6	52 70	75.8	6
7	35 03.0	59 71	83.1	35 20.6	58 71	82.6	35 38.0	58 71	82.1	36 12.6	57 71	81.1	37 20.1	55 71	79.1	38 25.4	53 70	76.9	38 41.3	53 70	76.4	39 12.8	52 70	75.3	7
8	34 20.2	59 71	82.5	34 37.8	59 71	82.0	34 55.3	58 71	81.5	35 30.0	57 71	80.5	36 37.8	56 70	78.5	37 43.4	54 70	76.4	37 59.5	53 70	75.8	38 31.1	52 69	74.7	8
9	33 37.4	59 71	81.9	33 55.1	59 71	81.4	34 12.7	58 71	80.9	34 47.4	58 71	79.9	35 55.5	56 70	77.9	37 01.5	54 70	75.8	37 17.7	54 69	75.3	37 49.5	53 69	74.2	9
70	32 54.7	59 71	81.2	33 12.5	59 71	80.8	33 30.1	59 71	80.3	34 05.0	58 71	79.3	35 13.4	56 70	77.3	36 19.7	54 69	75.2	36 36.0	54 69	74.7	37 08.1	53 69	73.7	70
1	32 12.1	59 71	80.6	32 29.9	59 71	80.1	32 47.6	59 71	79.7	33 22.6	58 70	78.7	34 31.3	56 70	76.7	35 38.0	55 69	74.7	35 54.4	54 69	74.2	36 26.7	53 69	73.1	1
2	31 29.6	60 71	80.0	31 47.4	59 71	79.5	32 05.2	59 71	79.0	32 40.4	58 70	78.1	33 49.4	57 70	76.1	34 56.5	55 69	74.1	35 12.9	55 69	73.6	35 45.5	54 69	72.6	2
3	30 47.1	60 71	79.4	31 05.0	60 70	78.9	31 22.8	59 70	78.4	31 58.2	59 70	77.5	33 07.5	57 70	75.6	34 15.0	55 69	73.6	34 31.6	55 69	73.1	35 04.3	54 68	72.0	3
4	30 04.7	60 70	78.8	30 22.7	60 70	78.3	30 40.6	59 70	77.8	31 16.1	59 70	76.9	32 25.8	57 69	75.0	33 33.7	56 69	73.0	33 50.4	55 68	72.5	34 23.3	55 68	71.5	4
75	29 22.4	60 70	78.1	29 40.5	60 70	77.7	29 58.5	60 70	77.2	30 34.1	59 70	76.3	31 44.1	58 69	74.4	32 52.5	56 68	72.5	33 09.3	56 68	72.0	33 42.5	55 68	71.0	75
6	28 40.2	61 70	77.5	28 58.4	60 70	77.1	29 16.4	60 70	76.6	29 52.2	59 70	75.7	31 02.6	58 69	73.8	32 11.4	57 68	71.9	32 28.3	56 68	71.4	33 01.7	55 68	70.4	6
7	27 58.2	61 70	76.9	28 16.4	61 70	76.5	28 34.5	60 70	76.0	29 10.4	60 69	75.1	30 21.2	58 69	73.3	31 30.4	57 68	71.3	31 47.4	57 68	70.9	32 21.2	56 67	69.9	7
8	27 16.2	61 70	76.3	27 34.5	61 70	75.9	27 52.7	61 70	75.4	28 28.8	60 69	74.5	29 40.0	59 69	72.7	30 49.6	57 68	70.8	31 06.7	57 68	70.3	31 40.7	56 67	69.3	8
9	26 34.3	61 70	75.7	26 52.7	61 69	75.3	27 10.9	61 69	74.8	27 47.3	60 69	73.9	28 58.8	59 68	72.1	30 08.9	58 68	70.2	30 26.2	57 67	69.8	31 00.4	57 67	68.8	9
80	25 52.5	62 69	75.1	26 11.0	61 69	74.7	26 29.3	61 69	74.2	27 05.8	61 69	73.3	28 17.8	59 68	71.5	29 28.3	58 67	69.7	29 45.7	58 67	69.2	30 20.2	57 67	68.3	80
1	25 10.9	62 69	74.5	25 29.4	62 69	74.1	25 47.9	61 69	73.6	26 24.6	61 69	72.8	27 37.0	60 68	71.0	28 47.9	59 67	69.1	29 05.5	58 67	68.7	29 40.2	58 66	67.7	1
2	24 29.3	62 69	73.9	24 48.0	62 69	73.5	25 06.5	62 69	73.0	25 43.4	61 68	72.2	26 56.2	60 68	70.4	28 07.7	59 67	68.6	28 25.3	59 67	68.1	29 00.3	58 66	67.2	2
3	23 47.9	63 69	73.3	24 06.7	62 69	72.9	24 25.3	62 68	72.4	25 02.4	62 68	71.6	26 15.6	61 67	69.8	27 27.6	59 67	68.0	27 45.4	59 66	67.6	28 20.6	58 66	66.7	3
4	23 06.7	63 69	72.7	23 25.5	63 68	72.3	23 44.2	62 68	71.8	24 21.5	62 68	71.0	25 35.2	61 67	69.2	26 47.6	60 66	67.5	27 05.5	60 66	67.0	27 41.1	59 66	66.1	4
85	22 25.5	63 68	72.1	22 44.4	63 68	71.7	23 03.3	63 68	71.2	23 40.8	62 68	70.4	24 54.9	61 67	68.7	26 07.9	60 66	66.9	26 25.9	60 66	66.5	27 01.7	59 65	65.6	85
6	21 44.5	63 68	71.5	22 03.5	63 68	71.1	22 22.5	63 68	70.7	23 00.2	63 67	69.8	24 14.8	62 67	68.1	25 28.2	61 66	66.4	25 46.4	60 66	65.9	26 22.5	60 65	65.0	6
7	21 03.7	64 68	70.9	21 22.8	64 68	70.5	21 41.8	63 68	70.1	22 19.8	63 67	69.2	23 34.8	62 66	67.5	24 48.8	61 65	65.8	25 07.1	61 65	65.4	25 43.5	60 65	64.5	7
8	20 23.0	64 68	70.3	20 42.2	64 67	69.9	21 01.3	64 67	69.5	21 39.5	63 67	68.6	22 55.0	63 66	66.9	24 09.5	62 65	65.2	24 27.9	61 65	64.8	25 04.6	61 64	63.9	8
9	19 42.4	65 67	69.7	20 01.7	64 67	69.3	20 21.0	64 67	68.9	20 59.4	64 67	68.0	22 15.4	63 66	66.4	23 30.4	62 65	64.7	23 49.0	62 65	64.3	24 25.9	61 64	63.4	9
90	19 02.0	65 67	69.1	19 21.5	65 67	68.7	19 40.8	65 67	68.3	20 19.4	64 66	67.4	21 36.0	63 65	65.8	22 51.5	63 65	64.1	23 10.2	62 64	63.7	23 47.4	62 64	62.8	90

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DECLINATION CONTRARY NAME TO LATITUDE

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
00	18 00.0	1.0 01	180.0	17 30.0	1.0 01	180.0	17 00.0	1.0 01	180.0	16 00.0	1.0 01	180.0	14 00.0	1.0 01	180.0	12 00.0	1.0 01	180.0	11 30.0	1.0 01	180.0	10 30.0	1.0 01	180.0	00
1	17 59.7	1.0 02	179.1	17 29.7	1.0 02	179.1	16 59.7	1.0 02	179.1	15 59.7	1.0 02	179.1	13 59.7	1.0 02	179.1	11 59.7	1.0 02	179.2	11 29.7	1.0 02	179.2	10 29.7	1.0 02	179.2	1
2	17 58.6	1.0 03	178.1	17 28.6	1.0 03	178.2	16 58.6	1.0 03	178.2	15 58.6	1.0 03	178.2	13 58.7	1.0 03	178.3	11 58.7	1.0 03	178.3	11 28.7	1.0 03	178.3	10 28.8	1.0 03	178.3	2
3	17 56.9	1.0 04	177.2	17 26.9	1.0 04	177.2	16 56.9	1.0 04	177.3	15 56.9	1.0 04	177.3	13 57.0	1.0 04	177.4	11 57.1	1.0 04	177.5	11 27.1	1.0 04	177.5	10 27.2	1.0 04	177.5	3
4	17 54.4	1.0 05	176.3	17 24.5	1.0 05	176.3	16 54.5	1.0 05	176.3	15 54.6	1.0 05	176.4	13 54.7	1.0 05	176.5	11 54.9	1.0 05	176.6	11 24.9	1.0 05	176.6	10 25.0	1.0 05	176.7	4
05	17 51.3	1.0 06	175.4	17 21.3	1.0 06	175.4	16 51.4	1.0 06	175.4	15 51.5	1.0 06	175.5	13 51.8	1.0 06	175.6	11 52.0	1.0 06	175.8	11 22.1	1.0 06	175.8	10 22.2	1.0 06	175.9	05
6	17 47.4	1.0 08	174.4	17 17.5	1.0 07	174.5	16 47.6	1.0 07	174.5	15 47.8	1.0 07	174.6	13 48.2	1.0 07	174.8	11 48.5	1.0 07	174.9	11 18.6	1.0 07	175.0	10 18.8	1.0 07	175.0	6
7	17 42.9	1.0 09	173.5	17 13.0	1.0 09	173.6	16 43.2	1.0 09	173.6	15 43.4	1.0 08	173.7	13 43.9	1.0 08	173.9	11 44.4	1.0 08	174.1	11 14.5	1.0 08	174.1	10 14.7	1.0 08	174.2	7
8	17 37.7	99 10	172.6	17 07.8	99 10	172.6	16 38.0	99 10	172.7	15 38.3	99 10	172.8	13 39.0	99 09	173.0	11 39.6	99 09	173.2	11 09.8	99 09	173.3	10 10.1	99 09	173.4	8
9	17 31.8	99 11	171.7	17 02.0	99 11	171.7	16 32.2	99 11	171.8	15 32.6	99 11	171.9	13 33.4	99 10	172.2	11 34.2	99 10	172.4	11 04.4	99 10	172.5	10 04.8	99 10	172.6	9
10	17 25.2	99 12	170.8	16 55.4	99 12	170.8	16 25.7	99 12	170.9	15 26.2	99 12	171.0	13 27.2	99 11	171.3	11 28.2	99 11	171.6	10 58.4	99 11	171.6	9 58.9	99 11	171.7	10
1	17 17.9	99 13	169.8	16 48.2	99 13	169.9	16 18.5	99 13	170.0	15 19.1	99 13	170.1	13 20.3	99 12	170.4	11 21.5	99 12	170.7	10 51.8	99 12	170.8	9 52.4	99 12	170.9	1
2	17 09.9	99 14	168.9	16 40.3	99 14	169.0	16 10.7	99 14	169.1	15 11.4	99 14	169.2	13 12.8	99 14	169.6	11 14.3	99 13	169.9	10 44.6	99 13	170.0	9 45.3	99 13	170.1	2
3	17 01.3	99 16	168.0	16 31.8	99 15	168.1	16 02.2	99 15	168.2	15 03.0	99 15	168.4	13 04.7	99 15	168.7	11 06.4	99 14	169.0	10 36.8	99 14	169.1	9 37.6	99 14	169.3	3
4	16 52.0	98 17	167.1	16 22.5	98 16	167.2	15 53.0	98 16	167.3	14 54.0	98 16	167.5	12 55.9	98 16	167.8	10 57.9	98 15	168.2	10 28.3	98 15	168.3	9 29.3	98 15	168.5	4
15	16 42.1	98 18	166.2	16 12.6	98 18	166.3	15 43.2	98 17	166.4	14 44.3	98 17	166.6	12 46.5	98 17	167.0	10 48.7	98 16	167.4	10 19.3	98 16	167.5	9 20.4	98 16	167.7	15
6	16 31.4	98 19	165.3	16 02.1	98 19	165.4	15 32.7	98 19	165.5	14 34.0	98 18	165.7	12 36.5	98 18	166.1	10 39.0	98 17	166.6	10 09.6	98 17	166.7	9 10.8	98 17	166.9	6
7	16 20.1	98 20	164.4	15 50.9	98 20	164.5	15 21.6	98 20	164.6	14 23.0	98 19	164.8	12 25.9	98 19	165.3	10 28.7	98 18	165.7	9 59.4	98 18	165.8	9 00.7	98 18	166.1	7
8	16 08.2	97 21	163.5	15 39.0	97 21	163.6	15 09.8	97 21	163.7	14 11.4	97 20	164.0	12 14.6	97 20	164.4	10 17.7	97 19	164.9	9 48.5	97 19	165.0	8 50.0	97 19	165.3	8
9	15 55.6	97 22	162.6	15 26.5	97 22	162.7	14 57.4	97 22	162.9	13 59.2	97 21	163.1	12 02.7	97 21	163.6	10 06.2	97 20	164.1	9 37.0	97 20	164.2	8 38.8	97 20	164.4	9
20	15 42.4	97 23	161.7	15 13.4	97 23	161.9	14 44.4	97 23	162.0	13 46.4	97 22	162.2	11 50.2	97 22	162.8	9 54.1	97 21	163.3	9 25.0	97 21	163.4	8 26.9	97 21	163.7	20
1	15 28.5	96 24	160.8	14 59.6	96 24	161.0	14 30.7	96 24	161.1	13 32.9	96 23	161.4	11 37.1	96 23	161.9	9 41.3	97 22	162.5	9 12.4	97 22	162.6	8 14.5	97 22	162.9	1
2	15 14.1	96 25	160.0	14 45.3	96 25	160.1	14 16.4	96 25	160.2	13 18.8	96 24	160.5	11 23.5	96 24	161.1	9 28.0	96 23	161.6	8 59.2	96 23	161.8	8 01.5	96 23	162.1	2
3	14 59.0	96 26	159.1	14 30.3	96 26	159.2	14 01.5	96 26	159.4	13 04.1	96 25	159.7	11 09.2	96 25	160.3	9 14.2	96 24	160.8	8 45.4	96 24	161.0	7 47.9	96 24	161.3	3
4	14 43.2	96 27	158.2	14 14.6	96 27	158.4	13 46.0	96 27	158.5	12 48.8	96 26	158.8	10 54.3	96 26	159.4	8 59.7	96 25	160.0	8 31.1	96 25	160.2	7 33.7	96 24	160.5	4
25	14 26.9	95 28	157.3	13 58.4	95 28	157.5	13 29.9	95 28	157.7	12 32.9	95 27	158.0	10 38.9	95 27	158.6	8 44.7	95 26	159.2	8 16.2	95 26	159.4	7 19.0	95 25	159.7	25
6	14 10.0	95 29	156.5	13 41.6	95 29	156.6	13 13.2	95 29	156.8	12 16.4	95 28	157.1	10 22.8	95 28	157.8	8 29.1	95 27	158.4	8 00.7	95 27	158.6	7 03.8	95 26	158.9	6
7	13 52.5	94 30	155.6	13 24.2	94 30	155.8	12 55.9	94 30	156.0	11 59.4	94 29	156.3	10 06.2	94 29	157.0	8 13.0	94 28	157.6	7 44.7	94 28	157.8	6 48.0	94 27	158.1	7
8	13 34.3	94 31	154.8	13 06.2	94 31	154.9	12 38.1	94 31	155.1	11 41.8	94 30	155.5	9 49.1	94 30	156.2	7 56.3	94 29	156.9	7 28.1	94 29	157.0	6 31.7	94 28	157.4	8
9	13 15.6	93 32	153.9	12 47.6	93 32	154.1	12 19.6	93 32	154.3	11 23.6	93 31	154.6	9 31.4	94 30	155.4	7 39.1	94 30	156.1	7 11.0	94 29	156.2	6 14.8	94 29	156.6	9
30	12 56.4	93 33	153.1	12 28.5	93 33	153.3	12 00.6	93 33	153.4	11 04.8	93 32	153.8	9 13.1	93 31	154.6	7 21.3	93 31	155.3	6 53.3	93 30	155.5	5 57.4	93 30	155.8	30
1	12 36.5	93 34	152.2	12 08.8	93 34	152.4	11 41.0	93 34	152.6	10 45.5	93 33	150.0	8 54.3	93 32	153.8	7 03.0	93 31	154.5	6 35.2	93 31	154.7	5 39.5	93 31	155.1	1
2	12 16.2	92 35	151.4	11 48.5	92 35	151.6	11 20.9	92 34	151.8	10 25.6	92 34	152.2	8 34.9	92 33	153.0	6 44.2	92 32	153.7	6 16.5	92 32	153.9	5 21.0	92 32	154.3	2
3	11 55.2	92 36	150.6	11 27.7	92 36	150.8	11 00.2	92 35	151.0	10 05.2	92 35	151.4	8 15.0	92 34	152.2	6 24.8	92 33	153.0	5 57.2	92 33	153.2	5 02.1	92 32	153.6	3
4	11 33.7	91 37	149.7	11 06.4	91 36	149.9	10 39.0	91 36	150.2	9 44.2	91 36	150.6	7 54.6	91 35	151.4	6 04.9	91 34	152.2	5 37.5	91 34	152.4				4
35	11 11.7	91 38	148.9	10 44.5	91 37	149.1	10 17.3	91 37	149.3	9 22.8	91 37	149.8	7 33.7	91 36	150.6	5 44.6	91 35	151.5	5 17.3	91 34	151.7				35
6	10 49.2	90 38	148.1	10 22.1	90 38	148.3	9 55.0	90 38	148.5	9 00.8	90 38	149.0	7 12.3	90 37	149.8	5 23.7	91 36	150.7							6
7	10 26.1	90 39	147.3	9 59.2	90 39	147.5	9 32.2	90 39	147.7	8 38.3	90 38	148.2	6 50.3	90 37	149.1	5 02.3	90 36	149.9							7
8	10 02.5	89 40	146.5	9 35.7	89 40	146.7	9 08.9	89 40	146.9	8 15.3	89 39	147.4	6 27.9	90 38	148.3										8
9	9 38.5	89 41	145.7	9 11.8	89 41	145.9	8 45.1	89 40	146.2	7 51.8	89 40	146.6	6 05.0	89 39	147.5										9
40	9 13.9	88 42	144.9	8 47.4	88 42	145.1	8 20.9	88 41	145.4	7 27.8	88 41	145.8	5 41.6	89 40	146.8										40
1	8 48.8	88 43	144.1	8 22.5	88 42	144.4	7 56.1	88 42	144.6	7 03.3	88 42	145.1	5 17.7	88 41	146.0										1
2	8 23.3	87 43	143.3	7 57.1	87 43	143.6	7 30.9	87 43	143.8	6 38.4	87 42	144.3													2
3	7 57.3	87 44	142.6	7 31.2	87 44	142.8	7 05.1	87 44	143.1	6 13.0	87 43	143.5													3
4	7 30.8	86 45	141.8	7 04.9	86 45	142.0	6 39.0	86 44	142.3	5 47.1	86 44	142.8													4
45	7 03.9	86 46	141.0	6 38.1	86 45	141.3	6 12.3	86 45	141.5	5 20.8	86 45	142.0													45
6	6 36.5	85 46	140.3	6 10.9	85 46	140.5	5 45.3	85 46	140.8																6
7	6 08.7	85 47	139.5	5 43.2	85 47	139.8	5 17.8	85 47	140.0																7
8	5 40.4	84 48	138.7	5 15.1	84 48	139.0																			8
9	5 11.8	84 48	138.0																						9

DECLINATION SAME NAME AS LATITUDE

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	18 21.8	65 67	68.5	18 41.3	65 67	68.1	19 00.8	65 66	67.7	19 39.7	65 66	66.9	20 56.7	64 65	65.2	22 12.7	63 64	63.6	22 31.6	63 64	63.1	23 09.1	62 64	62.3	91
2	17 41.7	66 66	67.9	18 01.4	65 66	67.5	18 21.0	65 66	67.1	19 00.1	65 66	66.3	20 17.6	64 65	64.6	21 34.2	63 64	63.0	21 53.2	63 64	62.6	22 31.0	63 63	61.7	2
3	17 01.8	66 66	67.2	17 21.6	66 66	66.9	17 41.3	66 66	66.5	18 20.7	65 65	65.7	19 38.7	65 65	64.1	20 55.8	64 64	62.4	21 15.0	64 63	62.0	21 53.1	63 63	61.2	3
4	16 22.1	66 66	66.6	16 42.0	66 66	66.2	17 01.9	66 66	65.9	17 41.4	66 65	65.1	19 00.0	65 64	63.5	20 17.7	64 63	61.9	20 37.0	64 63	61.4	21 15.4	64 62	60.6	4
95	15 42.6	67 66	66.0	16 02.6	67 65	65.6	16 22.6	67 65	65.2	17 02.4	66 65	64.5	18 21.4	66 64	62.9	19 39.7	65 63	61.3	19 59.2	65 63	60.9	20 37.9	64 62	60.1	95
6	15 03.3	67 65	65.4	15 23.4	67 65	65.0	15 43.5	67 65	64.6	16 23.5	67 64	63.9	17 43.1	66 64	62.3	19 02.0	65 63	60.7	19 21.6	65 62	60.3	20 00.6	65 62	59.5	6
7	14 24.1	68 65	64.8	14 44.4	67 65	64.4	15 04.6	67 64	64.0	15 44.9	67 64	63.3	17 05.0	66 63	61.7	18 24.4	66 62	60.1	18 44.2	66 62	59.7	19 23.5	65 61	58.9	7
8	13 45.1	68 65	64.2	14 05.5	68 64	63.8	14 25.9	68 64	63.4	15 06.4	67 64	62.7	16 27.1	67 63	61.1	17 47.1	66 62	59.6	18 07.0	66 62	59.2	18 46.6	66 61	58.4	8
9	13 06.4	68 64	63.6	13 26.9	68 64	63.2	13 47.4	68 64	62.8	14 28.2	68 63	62.1	15 49.4	67 62	60.5	17 10.0	67 61	59.0	17 30.1	67 61	58.6	18 10.0	66 61	57.8	9
100	12 27.9	69 64	62.9	12 48.5	69 64	62.6	13 09.1	69 63	62.2	13 50.2	68 63	61.4	15 12.0	68 62	59.9	16 33.1	67 61	58.4	16 53.3	67 61	58.0	17 33.6	67 60	57.2	100
1	11 49.5	69 64	62.3	12 10.3	69 63	61.9	12 31.0	69 63	61.6	13 12.4	69 63	60.8	14 34.7	68 62	59.3	15 56.5	68 61	57.8	16 16.8	68 60	57.4	16 57.4	67 60	56.7	1
2	11 11.4	70 63	61.7	11 32.3	70 63	61.3	11 53.2	69 63	61.0	12 34.8	69 62	60.2	13 57.7	69 61	58.7	15 20.1	68 60	57.2	15 40.6	68 60	56.9	16 21.5	68 59	56.1	2
3	10 33.5	70 63	61.1	10 54.6	70 63	60.7	11 15.6	70 62	60.3	11 57.5	70 62	59.6	13 21.0	69 61	58.1	14 43.9	69 60	56.6	15 04.6	69 60	56.3	15 45.8	69 59	55.5	3
4	9 55.9	71 62	60.4	10 17.0	70 62	60.1	10 38.2	70 62	59.7	11 20.4	70 61	59.0	12 44.4	70 60	57.5	14 08.0	69 59	56.0	14 28.8	69 59	55.7	15 10.3	69 59	54.9	4
105	9 18.5	71 62	59.8	9 39.8	71 62	59.4	10 01.0	71 62	59.1	10 43.5	71 61	58.4	12 08.1	70 60	56.9	13 32.3	70 59	55.5	13 53.3	70 59	55.1	14 35.1	70 58	54.3	105
6	8 41.3	71 62	59.2	9 02.7	71 61	58.8	9 24.1	71 61	58.4	10 06.9	71 61	57.7	11 32.1	71 60	56.3	12 56.9	70 59	54.9	13 18.0	70 58	54.5	14 00.2	70 58	53.8	6
7	8 04.3	72 61	58.5	8 25.9	72 61	58.2	8 47.5	72 61	57.8	9 30.5	72 60	57.1	10 56.3	71 59	55.7	12 21.7	71 58	54.3	12 43.0	71 58	53.9	13 25.5	71 57	53.2	7
8	7 27.7	72 61	57.9	7 49.4	72 60	57.5	8 11.1	72 60	57.2	8 54.4	72 60	56.5	10 20.8	72 59	55.1	11 46.8	72 58	53.7	12 08.3	71 57	53.3	12 51.1	71 57	52.6	8
9	6 51.2	73 60	57.2	7 13.1	73 60	56.9	7 34.9	73 60	56.5	8 18.5	73 59	55.8	9 45.5	72 58	54.5	11 12.2	72 57	53.0	11 33.8	72 57	52.7	12 16.9	72 56	52.0	9
110	6 15.1	73 60	56.6	6 37.1	73 60	56.2	6 59.1	73 59	55.9	7 43.0	73 59	55.2	9 10.6	73 58	53.8	10 37.9	73 57	52.4	10 59.6	73 56	52.1	11 43.1	72 56	51.4	110
1	5 39.2	74 59	55.9	6 01.3	74 59	55.6	6 23.5	74 59	55.2	7 07.7	74 58	54.6	8 35.9	73 57	53.2	10 03.8	73 56	51.8	10 25.7	73 56	51.5	11 09.5	73 55	50.8	1
2	5 03.6	74 59	55.3	5 25.9	74 59	54.9	5 48.1	74 58	54.6	6 32.6	74 58	53.9	8 01.4	74 57	52.6	9 30.0	74 56	51.2	9 52.1	74 56	50.9	10 36.2	73 55	50.2	2
3							5 13.1	75 58	53.9	5 57.9	75 57	53.3	7 27.3	74 56	51.9	8 56.5	74 55	50.6	9 18.8	74 55	50.2	10 03.2	74 54	49.6	3
4										5 23.4	75 57	52.6	6 53.5	75 56	51.3	8 23.3	75 55	50.0	8 45.7	75 55	49.6	9 30.5	75 54	48.9	4
115													6 20.0	75 55	50.7	7 50.4	75 54	49.3	8 13.0	75 54	49.0	8 58.1	75 53	48.3	115
6													5 46.7	76 55	50.0	7 17.8	76 54	48.7	7 40.6	76 54	48.4	8 26.0	76 53	47.7	6
7													5 13.8	77 54	49.4	6 45.6	76 53	48.1	7 08.5	76 53	47.7	7 54.3	76 52	47.1	7
8																6 13.6	77 53	47.4	6 36.7	77 52	47.1	7 22.8	77 52	46.5	8
9																5 42.0	77 52	46.8	6 05.3	77 52	46.5	6 51.7	77 51	45.8	9
120																5 10.7	78 52	46.1	5 34.1	78 51	45.8	6 20.9	78 51	45.2	120
1																			5 03.4	79 51	45.2	5 50.5	78 50	44.5	1
2																						5 20.4	79 50	43.9	2

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Lat. 44°

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	°
00	82 00.0	1.0 04	180.0	83 00.0	1.0 04	180.0	84 30.0	1.0 05	180.0	86 00.0	1.0 07	180.0	88 00.0	1.0 13	180.0	88 30.0	1.0 17	180.0	89 00.0	1.0 24	180.0	89 00.0	1.0 23	00.0	00
1	81 57.8	1.0 11	174.2	82 57.5	99 12	173.5	84 26.9	99 15	171.9	85 55.9	98 20	169.1	87 52.2	94 35	159.6	88 20.0	90 42	153.8	88 45.9	81 53	143.7	88 46.3	81 51	35.1	1
2	81 51.3	98 18	168.5	82 50.2	98 20	167.1	84 17.9	97 24	164.0	85 44.0	94 31	158.9	87 31.3	81 49	143.1	87 54.6	73 56	135.1	88 14.3	58 63	123.9	88 15.5	56 62	54.3	2
3	81 40.7	97 24	163.0	82 38.4	96 27	161.0	84 03.4	93 32	156.7	85 25.3	88 40	149.9	87 01.9	69 57	131.3	87 21.0	58 63	123.4	87 36.3	43 67	113.6	87 38.3	41 66	63.9	3
4	81 26.2	94 30	157.7	82 22.2	93 33	155.2	83 44.0	89 39	150.0	85 01.1	82 48	142.0	86 27.4	58 62	123.0	86 43.4	48 66	115.9	86 55.9	35 69	107.6	86 58.6	31 68	69.3	4
05	81 08.1	91 36	152.8	82 02.3	89 39	149.8	83 20.5	84 45	144.0	84 32.6	75 53	135.4	85 50.0	51 65	117.0	86 03.7	41 68	110.7	86 14.3	29 70	103.7	86 17.8	24 69	72.6	05
6	80 46.8	88 40	148.1	81 39.0	86 44	144.9	82 53.5	70 50	138.6	84 00.8	69 57	129.9	85 10.8	45 67	112.4	85 22.8	36 69	106.9	85 32.1	26 71	100.9	85 36.4	19 70	74.8	6
7	80 22.6	85 44	143.9	81 12.8	82 48	140.4	82 23.6	75 54	133.9	83 26.5	64 60	125.2	84 30.4	40 69	108.9	84 41.2	32 70	104.0	84 49.6	23 71	98.7	84 54.6	15 70	76.2	7
8	79 56.0	82 48	139.9	80 44.1	78 51	136.3	81 51.4	71 57	129.7	82 50.4	60 63	121.2	83 49.2	37 70	106.1	83 59.2	29 71	101.7	84 06.8	22 72	97.0	84 12.6	12 70	77.3	8
9	79 27.2	79 51	136.3	80 13.3	75 54	132.6	81 17.4	67 59	126.1	82 12.8	56 64	117.8	83 07.5	34 70	103.8	83 16.7	27 71	99.8	83 23.9	20 72	95.6	83 30.4	10 70	78.0	9
10	78 56.4	76 54	132.9	79 40.7	72 57	129.3	80 41.7	63 61	122.8	81 34.1	52 66	114.9	82 25.4	32 71	101.8	82 34.1	26 71	98.2	82 40.9	20 72	94.4	82 48.2	08 71	78.5	10
1	78 24.0	73 56	129.9	79 06.6	69 59	126.2	80 04.9	60 63	119.9	80 54.6	50 67	112.3	81 43.0	30 71	100.2	81 51.3	25 72	96.8	81 57.9	19 72	93.3	82 05.8	06 71	78.9	1
2	77 50.2	70 58	127.0	78 31.2	66 61	123.5	79 27.0	58 65	117.3	80 14.3	47 68	110.1	81 00.5	29 71	98.7	81 08.4	24 72	95.6	81 14.8	19 72	92.4	81 23.4	04 71	79.1	2
3	77 15.2	68 60	124.4	77 54.6	63 62	120.9	78 48.2	55 66	115.0	79 33.5	45 69	108.0	80 17.7	28 71	97.4	80 25.4	23 72	94.5	80 31.6	18 72	91.5	80 41.0	03 71	79.3	3
4	76 39.1	66 62	122.0	77 17.2	61 64	118.6	78 08.8	53 67	112.8	78 52.3	43 69	106.2	79 34.9	27 72	96.2	79 42.4	23 72	93.5	79 48.5	18 72	90.8	79 58.6	01 71	79.4	4
15	76 02.0	64 63	119.8	76 38.9	59 65	116.5	77 28.7	51 68	110.9	78 10.7	42 70	104.6	78 51.9	27 72	95.1	78 59.3	22 72	92.6	79 05.3	18 72	90.0	79 16.2	00 71	79.4	15
6	75 24.2	62 64	117.8	75 59.9	57 66	114.5	76 48.1	50 68	109.1	77 28.8	40 70	103.1	78 08.9	26 72	94.2	78 16.1	22 72	91.8	78 22.2	18 72	89.4	78 33.8	01 71	79.4	6
7	74 45.7	60 65	115.9	75 20.4	56 67	112.7	76 07.2	48 69	107.5	76 46.6	39 71	101.7	77 25.8	26 72	93.3	77 33.0	22 72	91.0	77 39.0	18 72	88.7	77 51.4	02 71	79.3	7
8	74 06.6	58 66	114.1	74 40.3	54 68	111.0	75 25.8	47 69	106.0	76 04.2	38 71	100.5	76 42.7	25 72	92.4	76 49.8	22 72	90.3	76 55.9	18 72	88.1	77 09.0	03 71	79.2	8
9	73 26.9	57 67	112.4	73 59.8	53 68	109.4	74 44.2	46 70	104.6	75 21.7	38 71	99.3	75 59.6	25 72	91.6	76 06.7	22 72	89.6	76 12.7	19 72	87.5	76 26.6	04 71	79.1	9
20	72 46.8	56 68	110.8	73 18.9	52 69	107.9	74 02.3	45 70	103.3	74 39.1	37 71	98.2	75 16.4	25 72	90.8	75 23.5	22 72	88.9	75 29.6	19 72	87.0	75 44.2	05 71	79.0	20
1	72 06.2	54 68	109.4	72 37.7	50 69	106.5	73 20.2	44 70	102.0	73 56.3	36 71	97.1	74 33.3	25 72	90.1	74 40.4	22 72	88.3	74 46.5	19 72	86.4	75 01.8	06 71	78.8	1
2	71 25.3	53 69	108.0	71 56.2	49 70	105.2	72 37.9	43 71	100.9	73 13.4	36 72	96.2	73 50.1	25 72	89.4	73 57.2	22 72	87.7	74 03.5	19 72	85.9	74 19.5	07 70	78.6	2
3	70 44.1	52 69	106.6	71 14.4	49 70	104.0	71 55.4	42 71	99.8	72 30.5	35 72	95.2	73 07.0	25 72	88.8	73 14.1	22 72	87.1	73 20.4	20 72	85.4	73 37.2	08 70	78.4	3
4	70 02.6	51 70	105.4	70 32.4	48 70	102.8	71 12.8	42 71	98.7	71 47.5	35 72	94.4	72 23.8	25 72	88.2	72 31.0	23 72	86.5	72 37.4	20 72	84.9	72 54.9	09 70	78.2	4
25	69 20.9	51 70	104.2	69 50.3	47 71	101.7	70 30.1	41 71	97.7	71 04.4	35 72	93.5	71 40.7	25 72	87.5	71 47.9	23 72	86.0	71 54.5	20 72	84.4	72 12.7	10 70	78.0	25
6	68 39.0	50 70	103.1	69 07.9	47 71	100.6	69 47.3	41 72	96.8	70 21.3	35 72	92.7	70 57.6	26 72	87.0	71 04.9	23 72	85.5	71 11.5	21 72	84.0	71 30.5	11 70	77.8	6
7	67 56.8	49 70	102.0	68 25.4	46 71	99.6	69 04.4	40 72	95.9	69 38.2	35 72	91.9	70 14.5	26 72	86.4	70 21.9	24 72	84.9	70 28.6	21 71	83.5	70 48.3	12 70	77.5	7
8	67 14.5	49 71	100.9	67 42.8	46 71	98.6	68 21.4	40 72	95.0	68 55.0	34 72	91.2	69 31.4	26 72	85.8	69 38.9	24 72	84.4	69 45.8	22 71	83.0	70 06.2	12 70	77.3	8
9	66 32.1	48 71	99.9	67 00.1	45 71	97.7	67 38.4	40 72	94.2	68 11.9	34 72	90.5	68 48.4	26 72	85.3	68 56.0	24 72	83.9	69 02.9	22 71	82.6	69 24.1	13 70	77.0	9
30	65 49.5	48 71	99.0	66 17.3	45 72	96.8	66 55.3	40 72	93.4	67 28.7	34 72	89.8	68 05.4	27 72	84.7	68 13.1	25 71	83.4	68 20.2	23 71	82.1	68 42.1	14 70	76.7	30
1	65 06.8	47 71	98.0	65 34.4	44 72	95.9	66 12.2	40 72	92.6	66 45.6	34 72	89.1	67 22.4	27 72	84.2	67 30.2	25 71	82.9	67 37.4	23 71	81.7	68 00.1	15 70	76.5	1
2	64 24.0	47 71	97.1	64 51.4	44 72	95.1	65 29.1	40 72	91.8	66 02.4	34 72	88.4	66 39.5	27 71	83.7	66 47.4	25 71	82.5	66 54.7	23 71	81.2	67 18.2	16 70	76.2	2
3	63 41.2	47 72	96.3	64 08.4	44 72	94.3	64 46.0	39 72	91.1	65 19.3	35 72	87.8	65 56.6	28 71	83.2	66 04.7	26 71	82.0	66 12.1	24 71	80.8	66 36.3	16 70	75.9	3
4	62 58.2	47 72	95.4	63 25.3	44 72	93.5	64 02.8	39 72	90.4	64 36.2	35 72	87.2	65 13.8	28 71	82.7	65 21.9	26 71	81.5	65 29.5	24 71	80.4	65 54.4	17 70	75.6	4
35	62 15.3	46 72	94.6	62 42.3	44 72	92.7	63 19.6	39 72	89.7	63 53.1	35 72	86.6	64 31.0	28 71	82.2	64 39.3	27 71	81.1	64 47.0	25 71	79.9	65 12.7	18 70	75.3	35
6	61 32.2	46 72	93.8	61 59.1	44 72	91.9	62 36.5	39 72	89.0	63 10.0	35 72	86.0	63 48.3	29 71	81.7	63 56.7	27 71	80.6	64 04.5	25 71	79.5	64 30.9	19 69	75.0	6
7	60 49.1	46 72	93.1	61 16.0	43 72	91.2	61 53.3	39 72	88.3	62 27.0	35 72	85.4	63 05.6	29 71	81.2	63 14.1	28 71	80.2	63 22.1	26 71	79.1	63 49.3	19 69	74.7	7
8	60 06.0	46 72	92.3	60 32.8	43 72	90.5	61 10.2	40 72	87.7	61 44.0	35 72	84.8	62 23.0	30 71	80.7	62 31.6	28 71	79.7	62 39.8	26 70	78.7	63 07.7	20 69	74.4	8
9	59 22.9	46 72	91.6	59 49.7	43 72	89.8	60 27.1	40 72	87.1	61 01.0	36 72	84.2	61 40.4	30 71	80.3	61 49.2	28 71	79.3	61 57.5	27 70	78.2	62 26.1	21 69	74.1	9
40	58 39.7	46 72	90.8	59 06.5	43 72	89.1	59 44.0	40 72	86.4	60 18.1	36 71	83.7	60 57.9	30 71	79.8	61 06.8	29 71	78.8	61 15.3	28 70	77.8	61 44.7	21 69	73.8	40
1	57 56.6	46 72	90.1	58 23.4	44 72	88.4	59 00.9	40 72	85.8	59 35.2	36 71	83.1	60 15.5	31 71	79.3	60 24.5	29 70	78.4	60 33.1	28 70	77.4	61 03.3	22 69	73.4	1
2	57 13.4	46 72	89.5	57 40.2	44 72	87.8	58 17.9	40 72	85.2	58 52.4	36 71	82.6	59 33.1	31 71	78.9	59 42.3	30 70	77.9	59 51.0	29 70	77.0	60 21.9	23 69	73.1	2
3	56 30.3	46 72	88.8	56 57.1	44 72	87.1	57 34.9	40 72	84.6	58 09.6	37 71	82.0	58 50.8	32 70	78.4	59 00.1	30 70	77.5	59 09.0	29 70	76.6	59 40.7	24 69	72.8	3
4	55 47.1	46 72	88.1	56 14.0	44 72	86.5	56 52.0	41 72	84.0	57 26.9	37 71	81.5	58 08.5	32 70	78.0	58 18.0	31 70	77.1	58 27.1	30 70	76.2	58 59.5	24 69	72.5	4
45	55 04.0	46 72	87.5	55 30.9	44 72	85.9	56 09.1	41 71	83.5	56 44.2	37 71	81.0	57 26.3	33 70	77.5	57 36.0	31 70	76.6	57 45.2	30 70	75.7	58 18.4	25 68	72.1	45
6	54 20.9	46 72	86.8	54 47.9	44 72	85.3	55 26.2	41 71	82.9	56 01.7	38 71	80.4	56 44.2	33 70	77.1	56 54.0	32 70	76.2	57 03.4	31 70	75.3	57 37.3	26 68	71.8	6
7	53 37.8	46 72	86.2	54 04.9	44 72	84.7	54 43.4	41 71	82.3	55 19.1	38 71	79.9	56 02.2	34 70	76.6	56 12.1	32 70	75.8	56 21.7	31 69	74.9	56 56.4	26 68	71.4	7
8	52 54.8	46 72	85.6	53 22.0	44 72	84.1	54 00.7	42 71	81.8	54 36.7	38 71	79.4	55 20.3	34 70	76.2	55 30.3	33 70	75.3	55 40.1	32 69	74.5	56 15.5	27 68	71.1	8
9	52 11.7	46 72	84.9	52 39.1	45 71	83.5	53 18.0	42 71	81.2	53 54.3	39 71	78.9	54 38.4	35 70	75.7	54 48.6	34 69	74.9	54 58.5	32 69	74.1	55 34.7	28 68	70.7	9
50	51 28.8	47 72	84.3	51 56.2	45 71	82.9	52 35.3	42 71	80.7	53 12.0	39 70	78.4	53 56.6	35 70	75.3	54 07.0	34 69	74.5	54 17.0	33 69	73.7	54 54.0	29 68	70.4	50
1	50 45.8	47 71	83.7	51 13.4	45 71	82.3	51 52.8	42 71	80.1	52 29.7	40 70	77.9	53 14.9	36 69	74.8	53 25.4	35 69	74.1	53 35.7	34 69	73.3	54 13.4	29 68	70.0	1
2	50 03.0	47 71	83.1	50 30.7	45 71	81.7	51 10.3	43 71	79.6	51 47.5	40 70	77.4	52 33.3	36 69	74.4	52 44.0	35 69	73.6	52 54.4	34 69	72.9	53 32.9	30 67	69.7	2
3	49 20.1	47 71	82.5	49 48.0	46 71	81.2	50 27.9	43 71	79.1	51 05.5	40 70	76.9	51 51.8	37 69	74.0	52 02.6	36 69	73.2	52 13.2	35 68	72.4	52 52.4	31 67	69.3	3
4	48 37.4	47 71	82.0	49 05.4	46 71	80.6	49 45.5	43 70	78.5	50 23.5	41 70	76.4	51 10.3	37 69	73.5	51 21.3	36 69	72.8	51 32.1	35 68	72.0	52 12.1	31 67	69.0	4
55	47 54.7	48 71	81.4	48 22.8	46 71	80.1	49 03.3	44 70	78.0	49 41.6	41 70	75.9	50 29.0	38 69	73.1	50 40.2	37 68	72.3	50 51.1	36 68	71.6	51 31.9	32 67	68.6	55
6	47 12.0	48 71	80.8	47 40.3	46 71	79.5	48 21.1	44 70	77.5	48 59.7	42 70	75.5	49 47.7	38 69	72.6	49 59.1	37 68	71.9	50 10.2	36 68	71.2	50 51.7	33 67	68.2	6
7	46 29.5	48 71	80.2	46 57.9	47 71	79.0	47 39.0	44 70	77.0	48 18.0	42 69	75.0	49 06.6	39 68	72.2	49 18.1	38 68	71.5	49 29.4	37 68	70.8	50 11.7	33 67	67.9	7
8	45 47.0	48 71	79.7	46 15.6	47 70	78.4	46 57.0	45 70	76.5	47 36.4	43 69	74.5	48 25.6	39 68	71.8	48 37.2	39 68	71.1	48 48.7	38 68	70.4	49 31.8	34 66	67.5	8
9	45 04.5	49 71	79.1	45 33.4	47 70	77.9	46 15.1	45 70	76.0	46 54.8	43 69	74.0	47 44.6	40 68	71.3	47 56.5	39 68	70.6	48 08.1	38 67	69.9	48 52.0	35 66	67.1	9
60	44 22.2	49 70	78.6	44 51.2	48 70	77.3	45 33.3	46 70	75.4	46 13.4	43 69	73.5	47 03.8	40 68	70.9	47 15.8	40 68	70.2	47 27.6	39 67	69.5	48 12.2	36 66	66.8	60
1	43 39.9	49 70	78.0	44 09.2	48 70	76.8	44 51.5	46 69	74.9	45 32.1	44 69	73.0	46 23.1	41 68	70.4	46 35.2	40 67	69.8	46 47.2	39 67	69.1	47 32.6	36 66	66.4	1
2	42 57.8	50 70	77.5	43 27.2	48 70	76.3	44 09.9	46 69	74.4	44 50.8	44 69	72.6	45 42.5	42 68	70.0	45 54.8	41 67	69.3	46 06.9	40 67	68.7	46 53.2	37 66	66.0	2
3	42 15.7	50 70	76.9	42 45.3	49 70	75.7	43 28.4	47 69	73.9	44 09.7	45 68	72.1	45 02.0	42 67	69.5	45 14.5	41 67	68.9	45 26.8	41 67	68.3	46 13.8	38 65	65.6	3
4	41 33.7	50 70	76.4	42 03.5	49 69	75.2	42 47.0	47 69	73.4	43 28.7	45 68	71.6	44 21.6	43 67	69.1	44 34.3	42 67	68.5	44 46.8	41 67	67.8	45 34.5	38 65	65.2	4
65	40 51.8	51 70	75.8	41 21.9	50 69	74.7	42 05.7	48 69	72.9	42 47.8	46 68	71.1	43 41.3	43 67	68.7	43 54.2	43 67	68.0	44 06.9	42 66	67.4	44 55.4	39 65	64.8	65
6	40 10.9	51 69	75.3	40 40.3	50 69	74.1	41 24.5	48 68	72.4	42 07.0	46 68	70.6	43 01.2	44 67	68.2	43 14.2	43 66	67.6	43 27.1	42 66	67.0	44 16.4	40 65	64.4	6
7	39 28.3	51 69	74.7	39 58.8	50 69	73.6	40 43.4	49 68	71.9	41 26.4	47 68	70.2	42 21.2	44 66	67.8	42 34.4	44 66	67.2	42 47.4	43 66	66.5	43 37.5	40 65	64.1	7
8	38 46.7	52 69	74.2	39 17.5	51 69	73.1	40 02.4	49 68	71.4	40 45.8	47 67	69.7	41 41.3	45 66	67.3	41 54.7	44 66	66.7	42 07.9	44 66	66.1	42 58.8	41 64	63.7	8
9	38 05.3	52 69	73.7	38 36.2	51 69	72.6	39 21.6	50 68	70.9	40 05.4	48 67	69.2	41 01.5	46 66	66.9	41 15.1	45 66	66.3	41 28.5	44 65	65.7	42 20.2	42 64	63.3	9
70	37 23.9	53 69	73.1	37 55.1	52 68	72.0	38 40.8	50 68	70.4	39 25.1	48 67	68.7	40 21.9	46 66	66.4	40 35.6	46 66	65.8	40 49.2	45 65	65.2	41 41.7	42 64	62.9	70
1	36 42.7	53 69	72.6	37 14.1	52 68	71.5	38 00.2	50 67	69.9	38 45.0	49 67	68.2	39 42.4	47 66	66.0	39 56.3	46 65	65.4	40 10.1	46 65	64.8	41 03.4	43 64	62.5	1
2	36 01.5	53 68	72.1	36 33.3	52 68	71.0	37 19.8	51 67	69.4	38 05.0	49 66	67.8	39 03.0	47 65	65.5	39 17.2	47 65	65.0	39 31.1	46 65	64.4	40 25.2	44 63	62.0	2
3	35 20.5	54 68	71.5	35 52.5	53 68	70.5	36 39.4	51 67	68.9	37 25.1	50 66	67.3	38 23.8	48 65	65.1	38 38.1	47 65	64.5	38 52.3	47 64	63.9	39 47.1	45 63	61.6	3
4	34 39.7	54 68	71.0	35 11.9	53 67	70.0	35 59.2	52 67	68.4	36 45.4	51 66	66.8	37 44.8	49 65	64.6	37 59.2	48 65	64.1	38 13.6	47 64	63.5	39 09.2	45 63	61.2	4
75	33 58.9	55 68	70.5	34 31.4	54 67	69.4	35 19.2	52 67	67.9	36 05.8	51 66	66.3	37 05.9	49 65	64.2	37 20.5	49 64	63.6	37 35.0	48 64	63.1	38 31.5	46 63	60.8	75
6	33 18.3	55 67	69.9	33 51.1	54 67	68.9	34 39.3	53 66	67.4	35 26.3	52 66	65.8	36 27.1	50 64	63.7	36 41.9	49 64	63.2	36 56.6	49 64	62.6	37 53.9	47 62	60.4	6
7	32 37.8	55 67	69.4	33 10.9	55 67	68.4	33 59.5	53 66	66.9	34 47.0	52 65	65.3	35 48.5	50 64	63.2	36 03.5	50 64	62.7	36 18.4	49 63	62.2	37 16.4	47 62	60.0	7
8	31 57.5	56 67	68.9	32 30.8	55 67	67.9	33 19.9	54 66	66.4	34 07.9	53 65	64.9	35 10.0	51 64	62.8	35 25.2	50 64	62.2	35 40.3	50 63	61.7	36 39.1	48 62	59.6	8
9	31 17.3	56 67	68.3	31 50.9	56 66	67.4	32 40.4	54 66	65.9	33 28.9	53 65	64.4	34 31.7	52 64	62.3	34 47.1	51 63	61.8	35 02.4	51 63	61.3	36 02.0	49 62	59.1	9
80	30 37.3	57 66	67.8	31 11.1	56 66	66.8	32 01.1	55 65	65.4	32 50.0	54 64	63.9	33 53.6	52 63	61.8	34 09.2	52 63	61.3	34 24.6	51 63	60.8	35 25.0	49 61	58.7	80
1	29 57.4	57 66	67.3	30 31.5	57 66	66.3	31 22.0	55 65	64.9	32 11.4	54 64	63.4	33 15.6	53 63	61.4	33 31.4	52 63	60.9	33 47.0	52 62	60.4	34 48.2	50 61	58.3	1
2	29 17.7	58 66	66.7	29 52.1	57 65	65.8	30 43.0	56 65	64.4	31 32.9	55 64	62.9	32 37.8	53 63	60.9	32 53.8	53 62	60.4	33 09.6	53 62	59.9	34 11.6	51 61	57.8	2
3	28 38.1	58 66	66.2	29 12.8	58 65	65.3	30 04.1	57 64	63.8	30 54.5	55 64	62.4	32 00.2	54 62	60.4	32 16.3	54 62	59.9	32 32.3	53 62	59.4	33 35.2	52 60	57.4	3
4	27 58.7	59 65	65.7	28 33.7	58 65	64.7	29 25.5	57 64	63.3	30 16.4	56 63	61.9	31 22.7	55 62	60.0	31 39.0	54 62	59.5	31 55.3	54 62	59.0	32 58.9	52 60	57.0	4
85	27 19.5	59 65	65.1	27 54.8	59 65	64.2	28 47.0	58 64	62.8	29 38.4	57 63	61.4	30 45.5	55 62	59.5	31 02.0	55 62	59.0	31 18.4	54 61	58.5	32 22.8	53 60	56.5	85
6	26 40.4	60 65	64.6	27 16.0	59 64	63.7	28 08.7	58 64	62.3	29 00.6	57 63	60.9	30 08.4	56 62	59.0	30 25.1	55 61	58.5	30 41.6	55 61	58.0	31 46.9	54 60	56.1	6
7	26 01.5	60 65	64.0	26 37.4	60 64	63.1	27 30.6	59 63	61.8	28 23.0	58 62	60.4	29 31.5	56 61	58.5	29 48.3	56 61	58.0	30 05.1	56 61	57.6	31 11.2	54 59	55.6	7
8	25 22.8	61 64	63.5	25 59.0	60 64	62.6	26 52.6	59 63	61.3	27 45.5	58 62	59.9	28 54.8	57 61	58.0	29 11.8	57 61	57.6	29 28.8	56 60	57.1	30 35.6	55 59	55.2	8
9	24 44.3	61 64	63.0	25 20.8	61 63	62.1	26 14.9	60 63	60.7	27 08.3	59 62	59.4	28 18.2	58 61	57.6	28 35.5	57 60	57.1	28 52.6	57 60	56.6	30 00.3	56 59	54.7	9
90	24 05.9	62 64	62.4	24 42.7	61 63	61.5	25 37.3	60 62	60.2	26 31.2	59 61	58.9	27 41.9	58 60	57.1	27 59.3	58 60	56.6	28 16.7	58 60	56.1	29 25.2	56 58	54.3	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	36° 00′		37° 00′		38° 30′		40° 00′		42° 00′		42° 30′		43° 00′		45° 00′		H.A.
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	°
00	10 00.0 1.0 01	180.0	9 00.0 1.0 01	180.0	7 30.0 1.0 00	180.0	6 00.0 1.0 00	180.0									00
1	9 59.7 1.0 02	179.2	8 59.7 1.0 02	179.2	7 29.7 1.0 01	179.2	5 59.7 1.0 01	179.2									1
2	9 58.8 1.0 03	178.4	8 58.8 1.0 03	178.4	7 28.8 1.0 02	178.4	5 58.8 1.0 02	178.5									2
3	9 57.2 1.0 04	177.5	8 57.3 1.0 04	177.6	7 27.3 1.0 03	177.6	5 57.4 1.0 03	177.7									3
4	9 55.1 1.0 05	176.7	8 55.1 1.0 05	176.8	7 25.2 1.0 04	176.8	5 55.4 1.0 04	176.9									4
05	9 52.3 1.0 06	175.9	8 52.4 1.0 06	176.0	7 22.6 1.0 05	176.1	5 52.8 1.0 05	176.2									05
6	9 48.9 1.0 07	175.1	8 49.0 1.0 07	175.2	7 19.3 1.0 06	175.3	5 49.6 1.0 06	175.4									6
7	9 44.9 1.0 08	174.3	8 45.1 1.0 08	174.3	7 15.5 1.0 07	174.5	5 45.8 1.0 07	174.6									7
8	9 40.2 99 09	173.4	8 40.5 99 09	173.5	7 11.0 99 08	173.7	5 41.5 99 08	173.8									8
9	9 35.0 99 10	172.6	8 35.4 99 10	172.7	7 06.0 99 09	172.9	5 36.6 99 09	173.1									9
10	9 29.2 99 11	171.8	8 29.6 99 11	171.9	7 00.4 99 10	172.1	5 31.1 99 10	172.3									10
1	9 22.7 99 12	171.0	8 23.3 99 12	171.1	6 54.2 99 11	171.3	5 25.0 99 11	171.6									1
2	9 15.7 99 13	170.2	8 16.3 99 13	170.3	6 47.4 99 12	170.6	5 18.4 99 12	170.8									2
3	9 08.0 99 14	169.4	8 08.8 99 14	169.5	6 40.0 99 13	169.8	5 11.2 99 13	170.0									3
4	8 59.7 98 15	168.6	8 00.7 98 15	168.7	6 32.1 98 14	169.0	5 03.5 98 14	169.3									4
15	8 50.9 98 16	167.8	7 52.0 98 16	168.0	6 23.6 98 15	168.2											15
6	8 41.5 98 17	167.0	7 42.7 98 16	167.2	6 14.5 98 16	167.5											6
7	8 31.4 98 18	166.2	7 32.8 98 17	166.4	6 04.8 98 17	166.7											7
8	8 20.8 97 19	165.4	7 22.3 97 18	165.6	5 54.6 97 18	165.9											8
9	8 09.6 97 20	164.6	7 11.3 97 19	164.8	5 43.8 97 19	165.2											9
20	7 57.8 97 21	163.8	6 59.7 97 20	164.0	5 32.5 97 20	164.4											20
1	7 45.5 97 22	163.0	6 47.6 97 21	163.2	5 20.6 97 21	163.6											1
2	7 32.6 96 22	162.2	6 34.8 96 22	162.5	5 08.2 96 22	162.9											2
3	7 19.1 96 23	161.4	6 21.6 96 23	161.7													3
4	7 05.1 96 24	160.6	6 07.7 96 24	160.9													4
25	6 50.5 95 25	159.9	5 53.4 95 25	160.2													25
6	6 35.4 95 26	159.1	5 38.5 95 26	159.4													6
7	6 19.7 94 27	158.3	5 23.0 94 27	158.6													7
8	6 03.5 94 28	157.5	5 07.0 94 28	157.9													8
9	5 46.7 94 29	156.8															9
30	5 29.4 93 30	156.0															30
1	5 11.6 93 31	155.3															1

DECLINATION SAME NAME AS LATITUDE

H.A.	36° 00′		37° 00′		38° 30′		40° 00′		42° 00′		42° 30′		43° 00′		45° 00′		H.A.
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	°
91	23 27.8 62 63	61.9	24 04.9 62 63	61.0	25 00.0 61 62	59.7	25 54.4 60 61	58.4	27 05.8 59 60	56.6	27 23.4 59 60	56.1	27 41.0 58 59	55.7	28 50.2 57 58	53.8	91
2	22 49.8 63 63	61.3	23 27.2 62 62	60.5	24 22.8 61 62	59.2	25 17.7 61 61	57.9	26 29.9 60 60	56.1	26 47.7 59 59	55.6	27 05.4 59 59	55.2	28 15.5 58 58	53.3	2
3	22 12.0 63 63	60.8	22 49.8 63 62	59.9	23 45.8 62 61	58.6	24 41.3 61 60	57.3	25 54.1 60 59	55.6	26 12.2 60 59	55.1	26 30.1 60 59	54.7	27 41.0 58 57	52.9	3
4	21 34.5 64 62	60.2	22 12.5 63 62	59.4	23 09.1 63 61	58.1	24 05.1 62 60	56.8	25 18.6 61 59	55.1	25 36.9 61 58	54.7	25 55.0 60 58	54.2	27 06.7 59 57	52.4	4
95	20 57.1 64 62	59.7	21 35.5 64 61	58.8	22 32.6 63 61	57.6	23 29.0 62 60	56.3	24 43.4 61 58	54.6	25 01.8 61 58	54.2	25 20.1 61 58	53.7	26 32.6 60 56	51.9	95
6	20 20.0 65 62	59.1	20 58.7 64 61	58.3	21 56.2 64 60	57.0	22 53.2 63 59	55.8	24 08.3 62 58	54.1	24 26.9 62 58	53.7	24 45.4 62 57	53.2	25 58.7 61 56	51.5	6
7	19 43.1 65 61	58.5	20 22.1 65 61	57.7	21 20.1 64 60	56.5	22 17.7 64 59	55.3	23 33.4 63 58	53.6	23 52.2 62 57	53.2	24 10.9 62 57	52.7	25 25.0 61 56	51.0	7
8	19 06.4 66 61	58.0	19 45.7 65 60	57.2	20 44.2 65 59	56.0	21 42.3 64 59	54.7	22 58.8 63 57	53.1	23 17.8 63 57	52.6	23 36.7 63 57	52.2	24 51.6 62 55	50.5	8
9	18 29.9 66 60	57.4	19 09.5 66 60	56.6	20 08.6 65 59	55.4	21 07.2 65 58	54.2	22 24.5 64 57	52.6	22 43.6 64 57	52.1	23 02.7 64 56	51.7	24 18.4 63 55	50.0	9
100	17 53.6 67 60	56.8	18 33.6 66 60	56.1	19 33.2 66 59	54.9	20 32.3 65 58	53.7	21 50.3 65 56	52.0	22 09.7 64 56	51.6	22 28.9 64 56	51.2	23 45.5 63 55	49.5	100
1	17 17.6 67 60	56.3	17 57.9 67 59	55.5	18 58.0 67 58	54.3	19 57.6 66 57	53.1	21 16.4 65 56	51.5	21 35.9 65 56	51.1	21 55.4 65 55	50.7	23 12.8 64 54	49.0	1
2	16 41.8 68 59	55.7	17 22.5 68 59	54.9	18 23.1 67 58	53.8	19 23.2 67 57	52.6	20 42.7 66 56	51.0	21 02.5 66 55	50.6	21 22.1 66 55	50.2	22 40.3 65 54	48.6	2
3	16 06.3 68 59	55.1	16 47.3 68 58	54.4	17 48.4 68 57	53.2	18 49.1 67 56	52.1	20 09.3 67 55	50.5	20 29.2 66 55	50.1	20 49.1 66 55	49.7	22 08.0 65 53	48.1	3
4	15 31.0 69 58	54.6	16 12.3 69 58	53.8	17 13.9 68 57	52.7	18 15.2 68 56	51.5	19 36.1 67 55	49.9	19 56.3 67 55	49.6	20 16.3 67 54	49.2	21 36.1 66 53	47.6	4
105	14 56.0 69 58	54.0	15 37.6 69 57	53.2	16 39.7 69 57	52.1	17 41.5 68 56	51.0	19 03.2 68 54	49.4	19 23.6 68 54	49.0	19 43.8 67 54	48.6	21 04.4 67 52	47.1	105
6	14 21.2 70 58	53.4	15 03.2 70 57	52.7	16 05.8 69 56	51.5	17 08.1 69 55	50.4	18 30.6 68 54	48.9	18 51.1 68 54	48.5	19 11.6 68 53	48.1	20 32.9 67 52	46.5	6
7	13 46.7 71 57	52.8	14 29.0 70 56	52.1	15 32.2 70 56	51.0	16 35.0 70 55	49.9	17 58.2 69 54	48.3	18 18.9 69 53	48.0	18 39.6 69 53	47.6	20 01.7 68 52	46.0	7
8	13 12.4 71 57	52.2	13 55.1 71 56	51.5	14 58.8 71 55	50.4	16 02.1 70 54	49.3	17 26.1 70 53	47.8	17 47.0 70 53	47.4	18 07.8 69 52	47.0	19 30.8 69 51	45.5	8
9	12 38.5 72 56	51.6	13 21.4 72 56	50.9	14 25.6 71 55	49.8	15 29.6 71 54	48.7	16 54.3 70 53	47.3	17 15.3 70 52	46.9	17 36.4 70 52	46.5	19 00.1 69 51	45.0	9
110	12 04.8 72 56	51.0	12 48.1 72 55	50.3	13 52.8 72 54	49.2	14 57.3 71 53	48.2	16 22.7 71 52	46.7	16 44.0 71 52	46.3	17 05.2 71 51	46.0	18 29.7 70 50	44.5	110
1	11 31.4 73 55	50.4	12 15.0 73 55	49.7	13 20.3 72 54	48.7	14 25.2 72 53	47.6	15 51.4 72 52	46.2	16 12.9 71 51	45.8	16 34.3 71 51	45.4	17 59.6 71 50	44.0	1
2	10 58.2 73 55	49.8	11 42.2 73 54	49.1	12 48.0 73 53	48.1	13 53.5 73 52	47.0	15 20.5 72 51	45.6	15 42.1 72 51	45.2	16 03.7 72 50	44.9	17 29.8 71 49	43.4	2
3	10 25.4 74 54	49.2	11 09.7 74 54	48.5	12 16.0 74 53	47.5	13 22.1 73 52	46.5	14 49.8 73 51	45.0	15 11.6 73 50	44.7	15 33.4 73 50	44.3	17 00.3 72 49	42.9	3
4	9 52.9 75 54	48.6	10 37.5 74 53	47.9	11 44.4 74 52	46.9	12 51.0 74 51	45.9	14 19.4 73 50	44.5	14 41.4 73 50	44.1	15 03.4 73 50	43.8	16 31.1 73 48	42.4	4
115	9 20.6 75 53	48.0	10 05.6 75 53	47.3	11 13.0 75 52	46.3	12 20.1 74 51	45.3	13 49.3 74 50	43.9	14 11.5 74 49	43.6	14 33.7 74 49	43.2	16 02.1 73 48	41.8	115
6	8 48.7 76 53	47.4	9 34.1 76 52	46.7	10 41.9 75 51	45.7	11 49.6 75 50	44.7	13 19.5 75 49	43.3	13 41.9 75 49	43.0	14 04.3 75 48	42.7	15 33.5 74 47	41.3	6
7	8 17.1 76 52	46.8	9 02.8 76 52	46.1	10 11.2 76 51	45.1	11 19.4 76 50	44.1	12 50.0 75 49	42.8	13 12.6 75 48	42.4	13 35.2 75 48	42.1	15 05.2 75 47	40.7	7
8	7 45.9 77 52	46.1	8 31.9 77 51	45.5	9 40.8 76 50	44.5	10 49.5 76 49	43.5	12 20.9 76 48	42.2	12 43.7 76 48	41.9	13 06.4 76 47	41.5	14 37.2 75 46	40.2	8
9	7 14.9 77 51	45.5	8 01.3 77 50	44.9	9 10.7 77 50	43.9	10 20.0 77 49	42.9	11 52.1 77 48	41.6	12 15.0 77 47	41.3	12 38.0 76 47	41.0	14 09.5 76 46	39.6	9
120	6 44.3 78 50	44.9	7 31.0 78 50	44.2	8 40.9 78 49	43.3	9 50.7 77 48	42.3	11 23.6 77 47	41.0	11 46.7 77 47	40.7	12 09.8 77 46	40.4	13 42.1 77 45	39.1	120
1	6 14.0 78 50	44.2	7 01.0 78 49	43.6	8 11.5 78 48	42.7	9 21.8 78 48	41.7	10 55.4 78 46	40.4	11 18.7 78 46	40.1	11 42.0 78 46	39.8	13 15.1 77 45	38.5	1
2	5 44.1 79 49	43.6	6 31.5 79 49	43.0	7 42.4 79 48	42.0	8 53.3 79 47	41.1	10 27.6 78 46	39.9	10 51.1 78 46	39.5	11 14.6 78 45	39.2	12 48.4 78 44	37.9	2
3	5 14.5 80 49	42.9	6 02.2 79 48	42.3	7 13.7 79 47	41.4	8 25.1 79 46	40.5	10 00.1 79 45	39.3	10 23.8 79 45	39.0	10 47.5 79 45	38.6	12 22.0 79 43	37.4	3
4			5 33.3 80 48	41.7	6 45.3 80 47	40.8	7 57.2 80 46	39.9	9 32.9 80 45	38.7	9 56.8 80 44	38.4	10 20.7 80 44	38.0	11 56.0 79 43	36.8	4
125			5 04.8 81 47	41.1	6 17.3 81 46	40.2	7 29.7 80 45	39.3	9 06.1 80 44	38.1	9 30.2 80 44	37.8	9 54.3 80 43	37.5	11 30.3 80 42	36.2	125
6					5 49.7 81 45	39.5	7 02.6 81 45	38.6	8 39.7 81 43	37.5	9 04.0 81 43	37.2	9 28.2 81 43	36.9	11 04.9 81 42	35.7	6
7					5 22.4 82 45	38.9	6 35.8 82 44	38.0	8 13.6 81 43	36.8	8 38.1 81 43	36.6	9 02.5 81 42	36.3	10 40.0 81 41	35.1	7
8							6 09.4 82 43	37.4	7 47.9 82 42	36.2	8 12.5 82 42	35.9	8 37.1 82 42	35.7	10 15.3 82 40	34.5	8
9							5 43.4 83 43	36.8	7 22.6 83 42	35.6	7 47.4 83 41	35.3	8 12.2 83 41	35.0	9 51.1 82 40	33.9	9
130							5 17.8 83 42	36.1	6 57.7 83 41	35.0	7 22.6 83 41	34.7	7 47.6 83 40	34.4	9 27.2 83 39	33.3	130
1									6 33.1 84 40	34.4	6 58.2 84 40	34.1	7 23.4 84 40	33.8	9 03.7 84 39	32.7	1
2									6 09.0 84 40	33.7	6 34.2 84 39	33.5	6 59.5 84 39	33.2	8 40.6 84 38	32.1	2
3									5 45.2 85 39	33.1	6 10.6 85 39	32.8	6 36.1 85 38	32.6	8 17.8 85 37	31.5	3
4									5 21.8 85 39	32.5	5 47.4 85 38	32.2	6 13.0 85 38	32.0	7 55.4 85 37	30.9	4
135											5 24.6 86 37	31.6	5 50.4 86 37	31.3	7 33.5 86 36	30.3	135
6											5 02.2 87 37	30.9	5 28.2 86 36	30.7	7 11.9 86 35	29.7	6
7													5 06.4 87 36	30.1	6 50.7 87 35	29.1	7
8															6 30.0 87 34	28.4	8
9															6 09.6 88 33	27.8	9
140															5 49.7 89 33	27.2	140
1															5 30.2 89 32	26.6	1
2															5 11.1 90 31	25.9	2

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Lat. 44°

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	
00	88 00.0	1.0 12	00.0	87 00.0	1.0 08	00.0	85 30.0	1.0 05	00.0	84 30.0	1.0 04	00.0	83 30.0	1.0 04	00.0	82 30.0	1.0 03	00.0	81 30.0	1.0 03	00.0	80 00.0	1.0 02	00.0	00
1	87 52.7	94 33	19.1	86 55.2	97 23	12.8	85 26.8	99 15	08.4	84 27.5	99 13	06.7	83 27.9	99 10	05.6	82 28.2	1.0 09	04.8	81 28.5	1.0 08	04.1	79 58.7	1.0 06	03.4	1
2	87 33.0	81 47	34.6	86 41.3	90 35	24.3	85 17.6	95 25	16.4	84 19.9	97 20	13.3	83 21.6	98 17	11.1	82 22.9	98 15	09.4	81 23.8	99 13	08.2	79 54.9	99 10	06.7	2
3	87 05.1	67 55	45.6	86 20.2	81 44	34.0	85 02.8	90 33	23.7	84 07.8	93 27	19.4	83 11.4	95 23	16.3	82 14.1	96 20	14.0	81 16.2	97 17	12.1	79 48.6	98 14	10.0	3
4	86 32.2	56 60	53.3	85 53.7	71 51	41.6	84 43.2	84 39	30.1	83 51.4	88 33	25.0	82 57.5	91 29	21.2	82 02.1	93 25	18.3	81 05.8	96 22	15.9	79 39.9	96 18	13.2	4
05	85 56.4	47 63	58.8	85 23.3	63 55	47.7	84 19.7	77 44	35.8	83 31.4	83 39	30.1	82 40.3	87 34	25.8	81 47.2	90 30	22.3	80 52.6	92 26	19.5	79 28.9	94 22	16.3	05
6	85 18.7	39 65	62.7	84 50.2	55 58	52.4	83 53.0	71 49	40.5	83 08.3	78 43	34.6	82 20.1	83 38	29.9	81 29.4	86 34	26.1	80 36.9	89 30	23.0	79 15.8	91 26	19.3	6
7	84 39.8	33 66	65.5	84 15.1	48 61	56.1	83 23.8	65 52	44.6	82 42.5	72 47	38.6	81 57.4	78 42	33.6	81 09.3	82 37	29.6	80 19.0	85 33	26.2	79 00.5	89 29	22.1	7
8	84 00.2	29 67	67.7	83 38.7	43 62	59.0	82 52.5	59 55	48.0	82 14.6	67 50	42.0	81 32.4	73 45	37.0	80 46.9	78 40	32.7	79 58.9	82 37	29.1	78 43.4	86 32	24.7	8
9	83 20.0	25 68	69.4	83 01.2	38 64	61.4	82 19.7	54 57	50.9	81 44.8	62 52	45.1	81 05.5	69 48	40.0	80 22.7	74 43	35.6	79 37.0	78 39	31.9	78 24.5	83 34	27.2	9
10	82 39.4	21 68	70.7	82 23.0	33 65	63.3	81 45.6	49 59	53.4	81 13.6	57 54	47.7	80 37.0	64 50	42.6	79 56.7	70 46	38.3	79 13.4	74 42	34.4	78 03.9	80 37	29.6	10
1	81 58.6	18 68	71.7	81 44.2	30 65	64.9	81 10.5	45 60	55.5	80 41.1	53 56	50.0	80 07.1	60 52	45.0	79 29.3	66 48	40.6	78 48.3	71 44	36.7	77 41.9	76 39	31.8	1
2	81 17.5	16 69	72.5	81 04.9	26 66	66.1	80 34.5	41 61	57.3	80 07.6	49 57	51.9	79 36.0	56 54	47.1	79 00.6	62 50	42.8	78 21.8	67 46	38.9	77 18.5	73 41	33.8	2
3	80 36.2	13 69	73.2	80 25.2	23 67	67.2	79 57.9	37 62	58.8	79 33.2	45 59	53.7	79 03.9	52 55	49.0	78 30.7	58 51	44.7	77 54.2	64 48	40.8	76 53.9	70 43	35.7	3
4	79 54.9	11 69	73.7	79 45.3	21 67	68.1	79 20.7	34 63	60.1	78 58.1	42 60	55.2	78 31.0	49 56	50.6	77 59.9	55 53	46.4	77 25.4	60 49	42.6	76 28.2	67 45	37.4	4
15	79 13.4	09 69	74.1	79 05.2	18 67	68.8	78 43.1	31 63	61.2	78 22.3	38 60	56.5	77 57.2	45 57	52.1	77 28.3	51 54	48.0	76 55.8	57 51	44.2	76 01.5	64 46	39.0	15
6	78 31.9	07 69	74.4	78 24.9	16 67	69.4	78 05.1	28 64	62.2	77 46.1	35 61	57.7	77 22.9	42 58	53.4	76 55.8	48 55	49.4	76 25.3	54 52	45.6	75 33.9	61 47	40.5	6
7	77 50.3	06 69	74.6	77 44.4	14 68	69.9	77 26.7	25 64	63.0	77 09.4	32 62	58.7	76 48.0	39 59	54.5	76 22.8	45 56	50.6	75 54.1	50 53	46.9	75 05.4	58 49	41.9	7
8	77 08.7	04 69	74.8	77 03.8	12 68	70.3	76 48.1	23 65	63.7	76 32.4	30 62	59.6	76 12.6	36 60	55.6	75 49.2	42 57	51.7	75 22.3	47 54	48.1	74 36.2	55 50	43.2	8
9	76 27.0	03 69	74.9	76 23.1	10 68	70.6	76 09.3	21 65	64.4	75 55.0	27 63	60.3	75 36.8	33 60	56.5	75 15.0	39 58	52.8	74 49.9	45 55	49.2	74 06.4	52 51	44.3	9
20	75 45.3	02 69	74.9	75 42.4	08 68	70.9	75 30.3	18 65	64.9	75 17.4	25 63	61.0	75 00.7	31 61	57.3	74 40.5	37 58	53.7	74 16.9	42 56	50.2	73 35.9	49 52	45.4	20
1	75 03.7	00 69	74.9	75 01.6	07 68	71.1	74 51.2	16 65	65.3	74 39.5	22 63	61.6	74 24.2	28 61	58.0	74 05.5	34 59	54.5	73 43.5	39 56	51.1	73 04.9	46 52	46.4	1
2	74 22.0	01 69	74.9	74 20.7	05 68	71.2	74 11.9	14 66	65.7	74 01.5	20 64	62.1	73 47.5	26 62	58.6	73 30.2	32 59	55.2	73 09.7	37 57	51.9	72 33.5	44 53	47.3	2
3	73 40.3	02 69	74.9	73 39.9	04 68	71.3	73 32.5	13 66	66.0	73 23.2	18 64	62.6	73 10.6	24 62	59.2	72 54.6	29 60	55.9	72 35.6	34 57	52.7	72 01.6	41 54	48.1	3
4	72 58.6	03 69	74.8	72 59.0	02 68	71.4	72 53.0	11 66	66.3	72 44.8	16 64	63.0	72 33.4	22 62	59.7	72 18.8	27 60	56.4	72 01.1	32 58	53.3	71 29.2	39 54	48.8	4
25	72 17.0	04 69	74.7	72 18.0	01 68	71.4	72 13.5	09 66	66.5	72 06.3	15 64	63.3	71 56.1	20 62	60.1	71 42.7	25 60	57.0	71 26.4	30 58	53.9	70 56.6	36 55	49.5	25
6	71 35.4	06 69	74.6	71 37.1	00 68	71.5	71 33.8	08 66	66.7	71 27.7	13 64	63.6	71 18.6	18 63	60.5	71 06.4	28 61	57.4	70 51.4	27 59	54.5	70 23.6	34 55	50.2	6
7	70 53.8	07 69	74.5	70 56.2	02 68	71.4	70 54.2	06 66	66.8	70 49.1	11 65	63.8	70 41.0	16 63	60.8	70 30.0	21 61	57.8	70 16.1	25 59	54.9	69 50.3	32 56	50.7	7
8	70 12.2	08 69	74.3	70 15.3	03 68	71.4	70 14.5	05 66	67.0	70 10.3	09 65	64.0	70 03.2	14 63	61.1	69 53.3	19 61	58.2	69 40.7	23 59	55.4	69 16.8	30 56	51.3	8
9	69 30.7	09 69	74.2	69 34.4	04 68	71.3	69 34.7	03 66	67.0	69 31.5	08 65	64.2	69 25.4	12 63	61.3	69 16.6	17 61	58.5	69 05.1	21 60	55.8	68 43.0	28 57	51.7	9
30	68 49.1	10 69	74.0	68 53.5	05 68	71.2	68 55.0	02 66	67.1	68 52.6	06 65	64.3	68 47.5	11 63	61.5	68 39.7	15 62	58.8	68 29.3	19 60	56.1	68 09.0	26 57	52.2	30
1	68 07.7	10 69	73.8	68 12.7	06 68	71.1	68 15.2	00 66	67.1	68 13.7	05 65	64.4	68 09.5	09 63	61.7	68 02.8	13 62	59.0	67 53.4	18 60	56.4	67 34.8	24 57	52.5	1
2	67 26.2	11 69	73.6	67 31.8	07 68	71.0	67 35.5	01 66	67.1	67 34.8	03 65	64.5	67 31.5	08 63	61.9	67 25.7	12 62	59.3	67 17.4	16 60	56.7	67 00.5	22 57	52.9	2
3	66 44.9	12 69	73.4	66 51.0	08 68	70.9	66 55.7	02 66	67.1	66 55.8	02 65	64.5	66 53.4	06 64	62.0	66 48.6	10 62	59.4	66 41.3	14 60	56.9	66 26.0	20 58	53.2	3
4	66 03.5	13 69	73.2	66 10.3	09 68	70.7	66 16.0	03 66	67.0	66 16.8	01 65	64.5	66 15.3	05 64	62.0	66 11.4	08 62	59.6	66 05.1	12 60	57.1	65 51.4	18 58	53.5	4
35	65 22.2	14 69	73.0	65 29.6	10 68	70.6	65 36.3	05 66	67.0	65 37.9	01 65	64.5	65 37.2	03 64	62.1	65 34.2	07 62	59.7	65 28.8	11 61	57.3	65 16.6	16 58	53.7	35
6	64 41.0	15 69	72.7	64 48.9	11 68	70.4	64 56.6	06 66	66.9	64 58.9	02 65	64.5	64 59.0	02 64	62.1	64 56.9	05 62	59.8	64 52.5	09 61	57.4	64 41.8	15 58	53.9	6
7	63 59.8	16 69	72.5	64 08.2	12 68	70.2	64 16.9	07 66	66.8	64 20.0	03 65	64.5	64 20.9	00 64	62.2	64 19.6	04 62	59.9	64 16.1	08 61	57.5	64 06.9	13 58	54.1	7
8	63 18.7	17 68	72.2	63 27.7	13 68	70.0	63 37.2	08 66	66.7	63 41.0	05 65	64.4	63 42.7	01 64	62.2	63 42.2	03 62	59.9	63 39.7	06 61	57.6	63 31.9	11 58	54.3	8
9	62 37.6	17 68	72.0	62 47.1	14 67	69.8	62 57.6	09 66	66.5	63 02.1	06 65	64.3	63 04.5	02 64	62.1	63 04.9	01 62	59.9	63 03.2	05 61	57.7	62 56.8	10 59	54.4	9
40	61 56.6	18 68	71.7	62 06.6	15 67	69.6	62 18.1	10 66	66.4	62 23.2	07 65	64.2	62 26.4	04 64	62.1	62 27.5	00 62	59.9	62 26.7	03 61	57.8	62 21.7	08 59	54.5	40
1	61 15.7	19 68	71.4	61 26.2	16 67	69.4	61 38.5	11 66	66.2	61 44.4	08 65	64.1	61 48.2	05 64	62.0	61 50.2	02 62	59.9	61 50.2	02 61	57.8	61 46.5	07 59	54.6	1
2	60 34.8	20 68	71.1	60 45.9	17 67	69.1	60 59.1	12 66	66.1	61 05.5	09 65	64.0	61 10.1	06 63	62.0	61 12.8	03 62	59.9	61 13.6	00 61	57.8	61 11.3	05 59	54.7	2
3	59 54.0	21 68	70.8	60 05.6	18 67	68.9	60 19.6	13 66	65.9	60 26.8	10 65	63.9	60 32.1	07 63	61.9	60 35.5	04 62	59.8	60 37.1	01 61	57.8	60 36.0	04 59	54.7	3
4	59 13.2	22 68	70.6	59 25.3	19 67	68.6	59 40.3	14 66	65.7	59 48.0	11 64	63.8	59 54.0	08 63	61.8	59 58.2	05 62	59.8	60 00.6	02 61	57.8	60 00.8	02 59	54.8	4
45	58 32.6	22 68	70.3	58 45.2	20 67	68.4	59 01.0	15 65	65.5	59 09.3	13 64	63.6	59 16.0	10 63	61.7	59 20.9	07 62	59.7	59 24.1	04 61	57.7	59 25.5	01 59	54.8	45
6	57 52.0	23 68	70.0	58 05.1	20 67	68.1	58 21.7	16 65	65.3	58 30.7	14 64	63.4	58 38.0	11 63	61.5	58 43.7	08 62	59.6	58 47.6	05 61	57.7	58 50.3	01 59	54.8	6
7	57 11.5	24 67	69.7	57 25.1	21 67	67.9	57 42.5	17 65	65.1	57 52.1	15 64	63.3	58 00.1	12 63	61.4	58 06.5	09 62	59.5	58 11.1	06 61	57.6	58 15.0	02 59	54.8	7
8	56 31.1	25 67	69.3	56 45.1	22 66	67.6	57 03.4	18 65	64.9	57 13.6	16 64	63.1	57 22.3	13 63	61.2	57 29.3	10 62	59.4	57 34.7	08 61	57.5	57 39.7	04 59	54.7	8
9	55 50.7	25 67	69.0	56 05.3	23 66	67.3	56 24.4	19 65	64.7	56 35.2	17 64	62.9	56 44.5	14 63	61.1	56 52.2	12 62	59.3	56 58.3	09 61	57.5	57 04.5	05 59	54.7	9
50	55 10.5	26 67	68.7	55 25.5	24 66	67.0	55 45.4	20 65	64.4	55 56.8	18 64	62.7	56 06.7	15 63	60.9	56 15.1	13 62	59.1	56 21.9	10 61	57.3	56 29.3	06 59	54.6	50
1	54 30.3	27 67	68.4	54 45.8	25 66	66.7	55 06.5	21 65	64.2	55 18.5	19 64	62.5	55 29.0	16 63	60.7	55 38.1	14 62	59.0	55 45.6	11 60	57.2	55 54.1	07 59	54.6	1
2	53 50.2	28 67	68.1	54 06.2	26 66	66.4	54 27.7	22 65	63.9	54 40.2	20 64	62.3	54 51.4	17 63	60.5	55 01.1	15 62	58.8	55 09.4	13 60	57.1	55 19.0	09 59	54.5	2
3	53 10.2	29 67	67.7	53 26.7	26 66	66.1	53 48.9	23 64	63.7	54 02.1	21 63	62.0	54 13.9	18 62	60.4	54 24.2	16 61	58.7	54 33.2	14 60	57.0	54 43.8	10 58	54.4	3
4	52 30.3	29 66	67.4	52 47.3	27 66	65.8	53 10.3	24 64	63.4	53 24.0	22 63	61.8	53 36.4	19 62	60.1	53 47.4	17 61	58.5	53 57.0	15 60	56.8	54 08.8	11 58	54.3	4
55	51 50.5	30 66	67.1	52 07.9	28 65	65.5	52 31.8	25 64	63.2	52 46.0	23 63	61.6	52 59.0	21 62	59.9	53 10.6	18 61	58.3	53 20.9	16 60	56.7	53 33.8	13 58	54.2	55
6	51 10.8	31 66	66.7	51 28.7	29 65	65.2	51 53.3	26 64	62.9	52 08.1	24 63	61.3	52 21.7	22 62	59.7	52 33.9	19 61	58.1	52 44.9	17 60	56.5	52 58.8	14 58	54.0	6
7	50 31.2	32 66	66.4	50 49.6	30 65	64.9	51 14.9	27 64	62.6	51 30.3	25 63	61.1	51 44.5	23 62	59.5	51 57.3	20 61	57.9	52 08.9	18 60	56.3	52 23.9	15 58	53.9	7
8	49 51.7	32 66	66.0	50 10.5	30 65	64.6	50 36.7	28 64	62.3	50 52.6	26 63	60.8	51 07.3	24 62	59.3	51 20.8	21 61	57.7	51 33.1	19 60	56.1	51 49.1	16 58	53.7	8
9	49 12.3	33 65	65.7	49 31.6	31 65	64.2	49 58.5	28 63	62.0	50 15.0	26 63	60.5	50 30.3	25 62	59.0	50 44.4	23 61	57.5	50 57.3	20 60	55.9	51 14.3	17 58	53.6	9
60	48 33.0	34 65	65.3	48 52.8	32 65	63.9	49 20.4	29 63	61.7	49 37.4	27 62	60.3	49 53.3	26 61	58.8	50 08.0	24 60	57.3	50 21.6	22 59	55.7	50 39.6	19 58	53.4	60
1	47 53.9	35 65	65.0	48 14.1	33 64	63.6	48 42.5	30 63	61.4	49 00.0	28 62	60.0	49 16.5	26 61	58.5	49 31.8	25 60	57.0	49 45.9	23 59	55.5	50 05.0	20 58	53.2	1
2	47 14.8	35 65	64.6	47 35.5	34 64	63.2	48 04.6	31 63	61.1	48 22.7	29 62	59.7	48 39.7	27 61	58.2	48 55.6	26 60	56.8	49 10.4	24 59	55.3	49 30.5	21 57	53.1	2
3	46 35.9	36 65	64.3	46 57.0	34 64	62.9	47 26.9	32 63	60.8	47 45.5	30 62	59.4	48 03.1	28 61	58.0	48 19.6	27 60	56.5	48 35.0	25 59	55.1	48 56.0	22 57	52.9	3
4	45 57.1	37 64	63.9	46 18.7	35 64	62.6	46 49.2	33 62	60.5	47 08.4	31 62	59.1	47 26.5	29 61	57.7	47 43.6	28 60	56.3	47 59.6	26 59	54.8	48 21.6	23 57	52.7	4
65	45 18.4	38 64	63.5	45 40.4	36 64	62.2	46 11.7	34 62	60.2	46 31.4	32 61	58.8	46 50.1	30 61	57.4	47 07.8	29 60	56.0	47 24.4	27 59	54.6	47 47.4	24 57	52.5	65
6	44 39.8	38 64	63.2	45 02.3	37 63	61.8	45 34.4	34 62	59.9	45 54.6	33 61	58.5	46 13.8	31 60	57.1	46 32.0	30 59	55.8	46 49.3	28 58	54.4	47 13.2	25 57	52.2	6
7	44 01.4	39 64	62.8	44 24.3	38 63	61.5	44 57.1	35 62	59.5	45 17.8	34 61	58.2	45 37.6	32 60	56.8	45 56.4	31 59	55.5	46 14.3	29 58	54.1	46 39.1	26 57	52.0	7
8	43 23.0	40 64	62.4	43 46.5	38 63	61.1	44 20.0	36 62	59.2	44 41.2	35 61	57.9	45 01.5	33 60	56.6	45 20.9	32 59	55.2	45 39.3	30 58	53.9	46 05.2	27 56	51.8	8
9	42 44.9	40 63	62.0	43 08.7	39 63	60.8	43 43.0	37 61	58.9	44 04.7	36 61	57.6	44 25.6	34 60	56.3	44 45.5	32 59	54.9	45 04.5	31 58	53.6	45 31.3	29 56	51.6	9
70	42 06.8	41 63	61.6	42 31.1	40 62	60.4	43 06.1	38 61	58.5	43 28.3	36 60	57.2	43 49.7	35 60	55.9	44 10.3	33 59	54.6	44 29.9	32 58	53.3	44 57.5	30 56	51.3	70
1	41 28.9	42 63	61.2	41 53.7	41 62	60.0	42 29.3	39 61	58.2	42 52.1	37 60	56.9	43 14.0	36 59	55.6	43 35.1	34 58	54.4	43 55.3	33 57	53.0	44 23.9	31 56	51.1	1
2	40 51.1	43 63	60.9	41 16.4	41 62	59.7	41 52.7	39 61	57.8	42 16.0	38 60	56.6	42 38.5	37 59	55.3	43 00.1	35 58	54.1	43 20.9	34 57	52.8	43 50.4	32 56	50.8	2
3	40 13.5	43 62	60.5	40 39.2	42 62	59.3	41 16.3	40 61	57.5	41 40.1	39 60	56.2	42 03.1	38 59	55.0	42 25.2	36 58	53.7	42 46.6	35 57	52.5	43 17.0	33 55	50.5	3
4	39 36.0	44 62	60.1	40 02.1	43 61	58.9	40 40.0	41 60	57.1	41 04.3	40 59	55.9	41 27.8	39 59	54.7	41 50.5	37 58	53.4	42 12.4	36 57	52.2	42 43.8	34 55	50.3	4
75	38 58.7	45 62	59.7	39 25.3	44 61	58.5	40 03.8	42 60	56.8	40 28.6	41 59	55.6	40 52.6	39 58	54.3	41 15.9	38 57	53.1	41 38.4	37 56	51.9	42 10.6	35 55	50.0	75
6	38 21.5	46 62	59.3	38 48.5	44 61	58.1	39 27.8	43 60	56.4	39 53.1	42 59	55.2	40 17.6	40 58	54.0	40 41.5	39 57	52.8	41 04.5	38 56	51.6	41 37.6	36 55	49.7	6
7	37 44.5	46 61	58.9	38 12.0	45 61	57.7	38 51.9	44 60	56.0	39 17.7	42 59	54.9	39 42.8	41 58	53.7	40 07.1	40 57	52.5	40 30.8	39 56	51.3	41 04.8	37 55	49.4	7
8	37 07.6	47 61	58.5	37 35.5	46 60	57.3	38 16.2	44 59	55.6	38 42.5	43 58	54.5	39 08.1	42 58	53.3	39 33.0	41 57	52.2	39 57.2	40 56	51.0	40 32.0	38 54	49.2	8
9	36 30.9	48 61	58.0	36 59.3	47 60	56.9	37 40.7	45 59	55.3	38 07.4	44 58	54.1	38 33.5	43 57	53.0	38 59.0	42 56	51.8	39 23.7	41 56	50.6	39 59.5	39 54	48.9	9
80	35 54.4	48 61	57.6	36 23.2	48 60	56.5	37 05.3	46 59	54.9	37 32.5	45 58	53.8	37 59.2	44 57	52.6	38 25.1	43 56	51.5	38 50.4	42 55	50.3	39 27.0	40 54	48.6	80
1	35 18.0	49 60	57.2	35 47.3	48 60	56.1	36 30.0	47 58	54.5	36 57.8	46 58	53.4	37 24.9	45 57	52.3	37 51.4	44 56	51.1	38 17.3	42 55	50.0	38 54.8	41 54	48.3	1
2	34 41.8	50 60	56.8	35 11.5	49 59	55.7	35 55.0	48 58	54.1	36 23.2	47 57	53.0	36 50.9	46 56	51.9	37 17.9	45 56	50.8	37 44.3	43 55	49.7	38 22.6	42 53	47.9	2
3	34 05.8	51 60	56.4	34 35.9	50 59	55.3	35 20.1	48 58	53.7	35 48.8	47 57	52.6	36 17.0	46 56	51.6	36 44.5	45 55	50.4	37 11.5	44 54	49.3	37 50.7	43 53	47.6	3
4	33 30.0	51 59	55.9	34 00.5	51 59	54.9	34 45.4	49 58	53.3	35 14.6	48 57	52.3	35 43.3	47 56	51.2	36 11.4	46 55	50.1	36 38.8	45 54	49.0	37 18.9	44 53	47.3	4
85	32 54.3	52 59	55.5	33 25.3	51 58	54.5	34 10.9	50 57	52.9	34 40.6	49 56	51.9	35 09.7	48 56	50.8	35 38.3	47 55	49.7	36 06.3	46 54	48.6	36 47.2	45 52	47.0	85
6	32 18.8	53 59	55.1	32 50.3	52 58	54.1	33 36.5	51 57	52.5	34 06.7	50 56	51.5	34 36.4	49 55	50.4	35 05.5	48 54	49.4	35 34.0	47 54	48.3	36 15.7	46 52	46.7	6
7	31 43.5	54 58	54.6	32 15.4	53 58	53.6	33 02.4	52 57	52.1	33 33.0	51 56	51.1	34 03.2	50 55	50.1	34 32.8	49 54	49.0	35 01.9	48 53	47.9	35 44.4	47 52	46.3	7
8	31 08.4	54 58	54.2	31 40.8	54 57	53.2	32 28.4	52 56	51.7	32 59.5	52 56	50.7	33 30.2	51 55	49.7	34 00.3	50 54	48.6	34 29.9	49 53	47.6	35 13.3	47 52	46.0	8
9	30 33.5	55 58	53.8	31 06.3	54 57	52.8	31 54.6	53 56	51.3	32 26.2	52 55	50.3	32 57.4	52 54	49.3	33 28.0	51 54	48.3	33 58.2	50 53	47.2	34 42.4	48 51	45.6	9
90	29 58.8	56 58	53.3	30 32.0	55 57	52.4	31 21.0	54 56	50.9	31 53.1	53 55	49.9	32 24.8	52 54	48.9	32 55.9	52 53	47.9	33 26.6	51 52	46.8	34 11.6	49 51	45.3	90

Navigation Digest

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	29 24.3	56 57	52.9	29 57.9	56 56	51.9	30 47.6	55 55	50.5	31 20.2	54 55	49.5	31 52.3	53 54	48.5	32 24.0	52 53	47.5	32 55.2	52 52	46.5	33 41.0	50 51	44.9	91
2	28 50.0	57 57	52.4	29 24.1	56 56	51.5	30 14.4	55 55	50.0	30 47.5	55 54	49.1	31 20.1	54 53	48.1	31 52.3	53 53	47.1	32 24.0	52 52	46.1	33 10.6	51 50	44.6	2
3	28 15.9	58 56	52.0	28 50.4	57 56	51.0	29 41.5	56 55	49.6	30 15.0	56 54	48.7	30 48.1	55 53	47.7	31 20.8	54 52	46.7	31 53.0	53 51	45.7	32 40.5	52 50	44.2	3
4	27 42.0	59 56	51.5	28 17.0	58 55	50.6	29 08.7	57 54	49.2	29 42.7	56 54	48.2	30 16.3	56 53	47.3	30 49.5	55 52	46.3	31 22.2	54 51	45.3	32 10.5	53 50	43.8	4
95	27 08.3	59 56	51.0	27 43.7	59 55	50.1	28 36.1	58 54	48.8	29 10.6	57 53	47.8	29 44.7	56 52	46.9	30 18.4	56 51	45.9	30 51.6	55 51	44.9	31 40.7	54 49	43.5	95
6	26 34.9	60 55	50.6	27 10.7	59 55	49.7	28 03.8	59 54	48.3	28 38.7	58 53	47.4	29 13.3	57 52	46.5	29 47.5	57 51	45.5	30 21.2	56 50	44.6	31 11.1	55 49	43.1	6
7	26 01.6	61 55	50.1	26 37.9	60 54	49.2	27 31.7	59 53	47.9	28 07.1	59 52	47.0	28 42.1	58 52	46.0	29 16.8	57 51	45.1	29 51.0	57 50	44.2	30 41.7	56 49	42.7	7
8	25 28.6	61 55	49.6	26 05.3	61 54	48.8	26 59.8	60 53	47.4	27 35.6	60 52	46.5	28 11.2	59 51	45.6	28 46.3	58 50	44.7	29 21.1	58 50	43.8	30 12.5	57 48	42.3	8
9	24 55.9	62 54	49.2	25 33.0	62 54	48.3	26 28.1	61 52	47.0	27 04.4	60 52	46.1	27 40.4	60 51	45.2	28 16.1	59 50	44.3	28 51.3	58 49	43.4	29 43.5	58 48	42.0	9
100	24 23.3	63 54	48.7	25 00.9	62 53	47.8	25 56.7	62 52	46.5	26 33.5	61 51	45.6	27 09.9	61 50	44.8	27 46.1	60 50	43.9	28 21.8	59 49	42.9	29 14.8	58 48	41.6	100
1	23 51.0	64 53	48.2	24 29.0	63 53	47.4	25 25.5	62 52	46.1	26 02.7	62 51	45.2	26 39.7	61 50	44.3	27 16.3	61 49	43.4	27 52.5	60 48	42.5	28 46.3	59 47	41.2	1
2	23 19.0	64 53	47.7	23 57.4	64 52	46.9	24 54.5	63 51	45.6	25 32.2	63 50	44.8	26 09.6	62 50	43.9	26 46.7	62 49	43.0	27 23.5	61 48	42.1	28 18.0	60 47	40.8	2
3	22 47.2	65 53	47.2	23 26.0	65 52	46.4	24 23.8	64 51	45.1	25 01.9	63 50	44.3	25 39.8	63 49	43.4	26 17.4	62 48	42.6	26 54.6	62 48	41.7	27 49.9	61 46	40.4	3
4	22 15.6	66 52	46.7	22 54.9	65 51	45.9	23 53.3	65 50	44.7	24 31.9	64 50	43.8	25 10.3	64 49	43.0	25 48.3	63 48	42.1	26 26.1	63 47	41.3	27 22.1	62 46	40.0	4
105	21 44.3	66 52	46.2	22 24.0	66 51	45.4	23 23.1	65 50	44.2	24 02.2	65 49	43.4	24 41.0	64 48	42.5	25 19.5	64 48	41.7	25 57.7	63 47	40.8	26 54.5	63 46	39.5	105
6	21 13.2	67 51	45.8	21 53.4	67 51	45.0	22 53.1	66 50	43.7	23 32.6	66 49	42.9	24 11.9	65 48	42.1	24 50.9	65 47	41.3	25 29.6	64 46	40.4	26 27.1	64 45	39.1	6
7	20 42.5	68 51	45.2	21 23.0	67 50	44.5	22 23.4	67 49	43.3	23 03.4	66 48	42.5	23 43.1	66 48	41.6	24 22.6	66 47	40.8	25 01.7	65 46	40.0	26 00.0	64 45	38.7	7
8	20 11.9	68 50	44.7	20 52.9	68 50	44.0	21 54.0	68 49	42.8	22 34.4	67 48	42.0	23 14.5	67 47	41.2	23 54.5	66 46	40.4	24 34.1	66 46	39.5	25 33.1	65 44	38.3	8
9	19 41.7	69 50	44.2	20 23.1	69 49	43.5	21 24.8	68 48	42.3	22 05.6	68 47	41.5	22 46.3	68 47	40.7	23 26.7	67 46	39.9	24 06.8	67 45	39.1	25 06.5	66 44	37.9	9
110	19 11.7	70 49	43.7	19 53.5	70 49	43.0	20 55.9	69 48	41.8	21 37.2	69 47	41.0	22 18.2	68 46	40.2	22 59.1	68 46	39.5	23 39.7	67 45	38.6	24 40.2	67 44	37.4	110
1	18 42.0	71 49	43.2	19 24.2	70 48	42.5	20 27.2	70 47	41.3	21 09.0	69 47	40.5	21 50.5	69 46	39.8	22 31.8	69 45	39.0	23 12.9	68 44	38.2	24 14.0	68 43	37.0	1
2	18 12.6	71 49	42.7	18 55.3	71 48	41.9	19 58.9	70 47	40.8	20 41.0	70 46	40.1	21 23.0	70 45	39.3	22 04.8	69 45	38.5	22 46.3	69 44	37.7	23 48.2	68 43	36.6	2
3	17 43.5	72 48	42.2	18 26.5	72 47	41.4	19 30.8	71 46	40.3	20 13.4	71 46	39.6	20 55.8	71 45	38.8	21 38.0	70 44	38.1	22 20.0	70 43	37.3	23 22.6	69 42	36.1	3
4	17 14.7	73 48	41.6	17 58.1	72 47	40.9	19 03.0	72 46	39.8	19 46.1	72 45	39.1	20 28.9	71 44	38.3	21 11.6	71 44	37.6	21 54.0	71 43	36.8	22 57.3	70 42	35.7	4
115	16 46.1	73 47	41.1	17 30.0	73 46	40.4	18 35.5	73 45	39.3	19 19.0	72 45	38.6	20 02.3	72 44	37.9	20 45.4	72 43	37.1	21 28.3	71 42	36.4	22 32.3	71 41	35.2	115
6	16 17.9	74 47	40.6	17 02.2	74 46	39.9	18 08.3	73 45	38.8	18 52.2	73 44	38.1	19 35.9	73 43	37.4	20 19.5	72 43	36.6	21 02.9	72 42	35.9	22 07.5	72 41	34.8	6
7	15 50.0	75 46	40.0	16 34.7	74 45	39.3	17 41.4	74 44	38.3	18 25.7	74 44	37.6	19 09.9	73 43	36.9	19 53.9	73 42	36.1	20 37.7	73 41	35.4	21 43.1	72 40	34.3	7
8	15 22.4	75 45	39.5	16 07.5	75 45	38.8	17 14.8	75 44	37.8	17 59.6	74 43	37.1	18 44.2	74 42	36.4	19 28.6	74 42	35.7	20 12.8	74 41	34.9	21 18.9	73 40	33.9	8
9	14 55.1	76 45	39.0	15 40.6	76 44	38.3	16 48.5	75 43	37.3	17 33.7	75 43	36.6	18 18.7	75 42	35.9	19 03.6	75 41	35.2	19 48.3	74 40	34.5	20 55.0	74 39	33.4	9
120	14 28.1	77 44	38.4	15 14.0	76 44	37.7	16 22.6	76 43	36.7	17 08.1	76 42	36.1	17 53.6	76 41	35.4	18 38.9	75 41	34.7	19 24.0	75 40	34.0	20 31.4	75 39	32.9	120
1	14 01.5	77 44	37.9	14 47.7	77 43	37.2	15 56.9	77 42	36.2	16 42.9	77 42	35.5	17 28.7	76 41	34.9	18 14.4	76 40	34.2	19 00.0	76 39	33.5	20 08.1	75 38	32.5	1
2	13 35.1	78 43	37.3	14 21.8	78 43	36.7	15 31.6	77 42	35.7	16 18.0	77 41	35.0	17 04.2	77 40	34.4	17 50.4	77 40	33.7	18 36.3	77 39	33.0	19 45.1	76 38	32.0	2
3	13 09.1	78 43	36.7	13 56.2	78 42	36.1	15 06.6	78 41	35.1	15 53.4	78 40	34.5	16 40.0	78 40	33.8	17 26.6	77 39	33.2	18 13.0	77 38	32.5	19 22.3	77 37	31.5	3
4	12 43.5	79 42	36.2	13 30.9	79 42	35.6	14 41.9	79 41	34.6	15 29.1	79 40	34.0	16 16.2	78 39	33.3	17 03.1	78 39	32.7	17 50.0	78 38	32.0	18 59.9	78 37	31.0	4
125	12 18.2	80 42	35.6	13 06.0	80 41	35.0	14 17.6	79 40	34.1	15 05.1	79 39	33.4	15 52.6	79 39	32.8	16 40.0	79 38	32.2	17 27.2	79 37	31.5	18 37.9	78 36	30.5	125
6	11 53.2	80 41	35.1	12 41.4	80 40	34.4	13 53.6	80 39	33.5	14 41.5	80 39	32.9	15 29.4	80 38	32.3	16 17.2	80 37	31.6	17 04.8	79 37	31.0	18 16.1	79 36	30.1	6
7	11 28.6	81 40	34.5	12 17.2	81 40	33.9	13 29.9	81 39	33.0	14 18.3	81 38	32.4	15 06.5	80 38	31.7	15 54.7	80 37	31.1	16 42.8	80 36	30.5	17 54.6	80 35	29.6	7
8	11 04.4	82 40	33.9	11 53.3	82 39	33.3	13 06.6	81 38	32.4	13 55.3	81 38	31.8	14 44.0	81 37	31.2	15 32.5	81 36	30.6	16 21.0	81 36	30.0	17 33.5	80 35	29.1	8
9	10 40.5	82 39	33.3	11 29.8	82 39	32.7	12 43.6	82 38	31.9	13 32.7	82 37	31.3	14 21.8	82 36	30.7	15 10.7	82 36	30.1	15 59.6	81 35	29.5	17 12.7	81 34	28.6	9
130	10 16.9	83 39	32.7	11 06.6	83 38	32.2	12 21.0	83 37	31.3	13 10.5	82 36	30.7	13 59.9	82 36	30.1	14 49.3	82 35	29.6	15 38.5	82 35	29.0	16 52.2	82 34	28.1	130
1	9 53.8	83 38	32.2	10 43.8	83 37	31.6	11 58.8	83 36	30.7	12 48.6	83 36	30.2	13 38.4	83 35	29.6	14 28.2	83 35	29.0	15 17.8	83 34	28.4	16 32.1	82 33	27.6	1
2	9 31.0	84 37	31.6	10 21.4	84 37	31.0	11 36.9	84 36	30.2	12 27.1	84 35	29.6	13 17.3	84 35	29.1	14 07.4	83 34	28.5	14 57.4	83 33	27.9	16 12.3	83 32	27.1	2
3	9 08.6	85 37	31.0	9 59.3	85 36	30.4	11 15.4	84 35	29.6	12 06.0	84 35	29.1	12 56.5	84 34	28.5	13 47.0	84 33	28.0	14 37.4	84 33	27.4	15 52.8	84 32	26.5	3
4	8 46.6	85 36	30.4	9 37.7	85 35	29.8	10 54.2	85 35	29.0	11 45.2	85 34	28.5	12 36.1	85 33	28.0	13 26.9	85 33	27.4	14 17.7	85 32	26.9	15 33.7	84 31	26.0	4
135	8 25.0	86 35	29.8	9 16.4	86 35	29.3	10 33.5	86 34	28.5	11 24.8	85 33	27.9	12 16.0	85 33	27.4	13 07.2	85 32	26.9	13 58.4	85 32	26.3	15 14.9	85 31	25.5	135
6	8 03.7	86 35	29.2	8 55.5	86 34	28.7	10 13.1	86 33	27.9	11 04.8	86 33	27.4	11 56.4	86 32	26.8	12 47.9	86 32	26.3	13 39.4	86 31	25.8	14 56.5	86 30	25.0	6
7	7 42.9	87 34	28.6	8 35.0	87 34	28.1	9 53.1	87 33	27.3	10 45.1	87 32	26.8	11 37.1	87 32	26.3	12 29.0	86 31	25.8	13 20.8	86 30	25.3	14 38.5	86 30	24.5	7
8	7 22.5	87 33	27.9	8 14.9	87 33	27.5	9 33.5	87 32	26.7	10 25.8	87 31	26.2	11 18.1	87 31	25.7	12 10.4	87 30	25.2	13 02.6	87 30	24.7	14 20.8	87 29	24.0	8
9	7 02.4	88 33	27.3	7 55.2	88 32	26.9	9 14.3	88 31	26.1	10 07.0	88 31	25.6	10 59.6	88 30	25.2	11 52.2	88 30	24.7	12 44.7	88 29	24.2	14 03.4	87 28	23.4	9
140	6 42.8	88 32	26.7	7 35.9	88 31	26.2	8 55.5	88 31	25.5	9 48.5	88 30	25.1	10 41.4	88 30	24.6	11 34.4	88 29	24.1	12 27.2	88 28	23.6	13 46.4	88 28	22.9	140
1	6 23.6	89 31	26.1	7 17.0	89 31	25.6	8 37.1	89 30	24.9	9 30.4	89 29	24.5	10 23.7	89 29	24.0	11 16.9	89 28	23.5	12 10.1	89 28	23.1	13 29.8	88 27	22.4	1
2	6 04.8	90 31	25.5	6 58.6	89 30	25.0	8 19.1	89 29	24.3	9 12.7	89 29	23.9	10 06.3	89 28	23.4	10 59.9	89 28	23.0	11 53.4	89 27	22.5	13 13.6	89 26	21.8	2
3	5 46.5	90 30	24.8	6 40.5	90 29	24.4	8 01.5	90 29	23.7	8 55.4	90 28	23.3	9 49.3	90 28	22.9	10 43.2	90 27	22.4	11 37.1	90 27	22.0	12 57.8	90 26	21.3	3
4	5 28.6	91 29	24.2	6 22.9	90 29	23.8	7 44.3	90 28	23.1	8 38.6	90 27	22.7	9 32.8	90 27	22.3	10 27.0	90 26	21.8	11 21.1	90 26	21.4	12 42.3	90 25	20.7	4
145	5 11.1	91 29	23.6	6 05.7	91 28	23.2	7 27.6	91 27	22.5	8 22.1	91 27	22.1	9 16.6	91 26	21.7	10 11.1	91 26	21.3	11 05.6	91 25	20.8	12 27.2	91 25	20.2	145
6				5 48.9	91 27	22.5	7 11.2	91 26	21.9	8 06.1	91 26	21.5	9 00.9	91 26	21.1	9 55.7	91 25	20.7	10 50.4	91 25	20.3	12 12.5	91 24	19.7	6
7				5 32.6	92 26	21.9	6 55.3	92 26	21.3	7 50.4	92 25	20.9	8 45.5	92 25	20.5	9 40.6	92 24	20.1	10 35.6	92 24	19.7	11 58.2	92 23	19.1	7
8				5 16.7	92 26	21.3	6 39.8	92 25	20.7	7 35.2	92 25	20.3	8 30.6	92 24	19.9	9 26.0	92 24	19.5	10 21.3	92 23	19.1	11 44.2	92 23	18.5	8
9				5 01.3	93 25	20.6	6 24.8	93 24	20.1	7 20.5	93 24	19.7	8 16.1	93 23	19.3	9 11.7	93 23	19.0	10 07.3	93 23	18.6	11 30.7	93 22	18.0	9
150							6 10.2	93 24	19.5	7 06.1	93 23	19.1	8 02.0	93 23	18.7	8 57.9	93 22	18.4	9 53.8	93 22	18.0	11 17.6	93 21	17.4	150
1							5 56.0	94 23	18.8	6 52.2	94 22	18.5	7 48.4	94 22	18.1	8 44.5	94 22	17.8	9 40.7	94 21	17.4	11 04.8	93 21	16.9	1
2							5 42.3	94 22	18.2	6 38.8	94 22	17.9	7 35.2	94 21	17.5	8 31.6	94 21	17.2	9 28.0	94 20	16.8	10 52.5	94 20	16.3	2
3							5 29.1	94 21	17.6	6 25.7	94 21	17.3	7 22.4	94 21	16.9	8 19.0	94 20	16.6	9 15.7	94 20	16.3	10 40.6	94 19	15.8	3
4							5 16.2	95 21	17.0	6 13.1	95 20	16.6	7 10.0	95 20	16.3	8 06.9	95 19	16.0	9 03.8	95 19	15.7	10 29.1	95 18	15.2	4
155							5 03.9	95 20	16.3	6 01.0	95 19	16.0	6 58.1	95 19	15.7	7 55.2	95 19	15.4	8 52.3	95 18	15.1	10 18.0	95 18	14.6	155
6										5 49.3	96 19	15.4	6 46.7	96 18	15.1	7 44.0	96 18	14.8	8 41.3	96 18	14.5	10 07.3	95 17	14.1	6
7										5 38.1	96 18	14.8	6 35.6	96 18	14.5	7 33.2	96 17	14.2	8 30.7	96 17	13.9	9 57.0	96 16	13.5	7
8										5 27.3	96 17	14.1	6 25.1	96 17	13.9	7 22.8	96 17	13.6	8 20.5	96 16	13.3	9 47.1	96 16	12.9	8
9										5 17.0	97 16	13.5	6 14.9	97 16	13.3	7 12.9	97 16	13.0	8 10.8	97 16	12.7	9 37.7	97 15	12.3	9
160										5 07.1	97 16	12.9	6 05.3	97 15	12.6	7 03.4	97 15	12.4	8 01.5	97 15	12.1	9 28.7	97 14	11.8	160
1													5 56.1	97 15	12.0	6 54.4	97 14	11.8	7 52.7	97 14	11.5	9 20.1	97 14	11.2	1
2													5 47.3	97 14	11.4	6 45.8	97 14	11.2	7 44.3	97 13	10.9	9 12.0	97 13	10.6	2
3													5 39.0	98 13	10.8	6 37.6	98 13	10.6	7 36.3	98 13	10.3	9 04.2	98 12	10.0	3
4													5 31.2	98 12	10.1	6 30.0	98 12	09.9	7 28.8	98 12	09.7	8 56.9	98 11	09.4	4
165													5 23.8	98 12	09.5	6 22.7	98 11	09.3	7 21.7	98 11	09.1	8 50.1	98 11	08.9	165
6													5 16.9	98 11	08.9	6 16.0	98 10	08.7	7 15.0	98 10	08.5	8 43.6	98 10	08.3	6
7													5 10.5	99 10	08.3	6 09.7	99 10	08.1	7 08.9	99 10	07.9	8 37.6	99 09	07.7	7
8													5 04.5	99 09	07.6	6 03.8	99 09	07.5	7 03.1	99 09	07.3	8 32.1	99 09	07.1	8
9																5 58.4	99 08	06.9	6 57.9	99 08	06.7	8 27.0	99 08	06.5	9
170																5 53.5	99 07	06.2	6 53.0	99 07	06.1	8 22.3	99 07	05.9	170
1																5 49.0	99 07	05.6	6 48.7	99 07	05.5	8 18.1	99 06	05.3	1
2																5 45.1	99 06	05.0	6 44.7	99 06	04.9	8 14.3	99 06	04.7	2
3																5 41.5	1.0 05	04.4	6 41.3	1.0 05	04.3	8 10.9	1.0 05	04.2	3
4																5 38.5	1.0 04	03.7	6 38.3	1.0 04	03.7	8 08.0	1.0 04	03.6	4
175																5 35.9	1.0 04	03.1	6 35.8	1.0 03	03.1	8 05.6	1.0 03	03.0	175
6																5 33.8	1.0 03	02.5	6 33.7	1.0 03	02.4	8 03.6	1.0 03	02.4	6
7																5 32.1	1.0 02	01.9	6 32.1	1.0 02	01.8	8 02.0	1.0 02	01.8	7
8																5 30.9	1.0 01	01.2	6 30.9	1.0 01	01.2	8 00.9	1.0 01	01.2	8
9																5 30.2	1.0 00	00.6	6 30.2	1.0 00	00.6	8 00.2	1.0 00	00.6	9
180																5 30.0	1.0 00	00.0	6 30.0	1.0 00	00.0	8 00.0	1.0 00	00.0	180

Lat. 44°

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	
00	79 30.0	1.0 02	00.0	79 00.0	1.0 02	00.0	78 00.0	1.0 02	00.0	77 30.0	1.0 02	00.0	77 00.0	1.0 02	00.0	76 30.0	1.0 01	00.0	75 00.0	1.0 01	00.0	74 30.0	1.0 01	00.0	00
1	79 28.8	1.0 06	03.2	78 58.9	1.0 06	03.0	77 59.0	1.0 05	02.7	77 29.0	1.0 05	02.5	76 59.1	1.0 05	02.4	76 29.1	1.0 04	02.3	74 59.2	1.0 04	02.0	74 29.3	1.0 04	01.9	1
2	79 25.2	99 10	06.3	78 55.5	99 09	06.0	77 56.0	99 08	05.4	77 26.2	99 08	05.1	76 56.4	99 08	04.8	76 26.5	99 07	04.6	74 57.0	1.0 06	04.0	74 27.1	1.0 06	03.8	2
3	79 19.3	98 14	09.4	78 49.9	98 13	08.9	77 50.9	98 12	08.0	77 21.4	99 11	07.6	76 51.8	99 10	07.2	76 22.2	99 10	06.9	74 53.3	99 09	05.9	74 23.6	99 08	05.7	3
4	79 11.1	96 17	12.5	78 42.1	97 16	11.8	77 44.0	97 15	10.6	77 14.8	97 14	10.0	76 45.6	98 13	09.5	76 16.3	98 13	09.1	74 48.1	98 11	07.9	74 18.6	98 11	07.5	4
05	79 00.7	94 21	15.4	78 32.3	95 20	14.6	77 35.1	96 18	13.1	77 06.4	96 17	12.4	76 37.5	96 16	11.8	76 08.6	97 15	11.3	74 41.5	97 13	09.8	74 12.3	97 13	09.4	05
6	78 48.2	92 24	18.2	78 20.4	93 23	17.3	77 24.4	94 21	15.6	76 56.2	94 20	14.8	76 27.8	95 19	14.1	75 59.4	95 18	13.4	74 33.4	96 16	11.7	74 04.6	96 15	11.2	6
7	78 33.7	90 27	20.9	78 06.7	90 26	19.8	77 12.0	92 24	17.9	76 44.4	92 22	17.1	76 16.6	93 21	16.2	75 48.6	93 20	15.5	74 24.0	95 18	13.5	73 55.6	95 17	12.9	7
8	78 17.4	87 30	23.5	77 51.2	88 29	22.3	76 57.9	90 26	20.2	76 30.9	90 25	19.2	76 03.7	91 24	18.3	75 36.4	92 23	17.5	74 13.3	93 20	15.3	73 45.3	93 19	14.6	8
9	77 59.4	84 33	25.9	77 34.0	85 31	24.6	76 42.2	87 29	22.4	76 16.0	88 27	21.3	75 49.4	89 26	20.4	75 22.7	90 25	19.4	74 01.3	91 22	17.0	73 33.8	92 21	16.3	9
10	77 39.8	81 35	28.2	77 15.3	82 34	26.8	76 25.1	85 31	24.4	75 59.6	86 30	23.3	75 33.7	87 28	22.3	75 07.6	87 27	21.3	73 48.0	89 24	18.7	73 21.1	90 23	17.9	10
1	77 18.7	78 37	30.3	76 55.1	80 36	28.9	76 06.6	82 33	26.4	75 41.8	83 32	25.2	75 16.7	84 30	24.1	74 51.3	85 29	23.1	73 33.6	87 26	20.3	73 07.3	88 25	19.5	1
2	76 56.3	75 39	32.3	76 33.6	77 38	30.9	75 46.8	79 35	28.2	75 22.8	81 34	27.0	74 58.4	82 32	25.9	74 33.8	83 31	24.8	73 18.1	85 28	21.9	72 52.4	86 27	21.0	2
3	76 32.6	72 41	34.2	76 10.8	74 40	32.7	75 25.8	77 37	30.0	75 02.6	78 36	28.8	74 39.0	79 34	27.6	74 15.1	80 33	26.4	73 01.5	83 29	23.4	72 36.4	84 28	22.5	3
4	76 07.9	69 43	35.9	75 47.0	71 41	34.4	75 03.6	74 39	31.7	74 41.3	75 37	30.4	74 18.5	77 36	29.2	73 55.4	78 35	28.0	72 43.9	81 31	24.8	72 19.4	82 30	23.9	4
15	75 42.1	66 45	37.5	75 22.1	68 43	36.0	74 40.5	71 40	33.2	74 19.0	72 39	31.9	73 57.0	74 37	30.7	73 34.6	75 36	29.5	72 25.3	79 32	26.2	72 01.5	80 31	25.2	15
6	75 15.4	63 46	39.0	74 56.3	65 44	37.5	74 16.4	68 42	34.7	73 55.7	70 40	33.3	73 34.5	71 39	32.1	73 12.9	73 38	30.9	72 05.8	76 34	27.5	71 42.7	78 33	26.5	6
7	74 47.8	60 47	40.3	74 29.6	62 46	38.8	73 51.4	65 43	36.0	73 31.6	67 42	34.7	73 11.2	69 40	33.4	72 50.4	70 39	32.2	71 45.4	74 35	28.8	71 23.0	75 34	27.7	7
8	74 19.5	57 48	41.6	74 02.1	59 47	40.1	73 25.7	63 44	37.3	73 06.6	64 43	35.9	72 47.0	66 42	34.7	72 27.0	68 40	33.4	71 24.3	72 37	29.9	71 02.6	73 35	28.9	8
9	73 50.5	54 49	42.8	73 34.0	56 48	41.3	72 59.2	60 45	38.5	72 40.9	62 44	37.1	72 22.1	63 43	35.8	72 02.9	65 41	34.6	71 02.4	69 38	31.1	70 41.4	71 37	30.0	9
20	73 20.9	51 50	43.9	73 05.2	53 49	42.4	72 32.0	57 46	39.6	72 14.5	59 45	38.2	71 56.5	61 44	36.9	71 38.0	62 42	35.7	70 39.7	67 39	32.1	70 19.5	68 38	31.0	20
1	72 50.7	49 51	44.9	72 35.8	51 50	43.4	72 04.2	55 47	40.6	71 47.5	57 46	39.3	71 30.3	58 45	38.0	71 12.5	60 44	36.7	70 16.4	65 40	33.2	69 56.9	66 39	32.0	1
2	72 20.0	46 52	45.8	72 05.9	48 51	44.3	71 35.8	52 48	41.6	71 19.9	54 47	40.2	71 03.4	56 46	38.9	70 46.4	57 44	37.7	69 52.5	62 41	34.1	69 33.7	64 40	33.0	2
3	71 48.8	43 53	46.6	71 35.5	46 51	45.2	71 06.9	50 49	42.5	70 51.7	51 48	41.1	70 36.0	53 46	39.8	70 19.8	55 45	38.6	69 28.1	60 42	35.0	69 09.9	61 41	33.9	3
4	71 17.3	41 53	47.4	71 04.6	43 52	46.0	70 37.5	47 50	43.3	70 23.1	49 48	42.0	70 08.1	51 47	40.7	69 52.6	53 46	39.4	69 03.0	57 43	35.9	68 45.6	59 41	34.7	4
25	70 45.3	39 54	48.1	70 33.4	41 53	46.7	70 07.7	45 50	44.0	69 54.0	47 49	42.7	69 39.8	48 48	41.5	69 25.0	50 47	40.2	68 37.5	55 43	36.7	68 20.7	57 42	35.5	25
6	70 13.0	36 54	48.8	70 01.8	38 53	47.4	69 37.5	42 51	44.8	69 24.5	44 50	43.5	69 11.0	46 49	42.2	68 56.9	48 48	41.0	68 11.5	53 44	37.4	67 55.4	54 43	36.3	6
7	69 40.4	34 55	49.4	69 29.9	36 54	48.0	69 07.0	40 52	45.4	68 54.7	42 50	44.1	68 41.8	44 49	42.9	68 28.4	46 48	41.7	67 45.0	51 45	38.1	67 29.6	52 44	37.0	7
8	69 07.5	32 55	49.9	68 57.6	34 54	48.6	68 36.1	38 52	46.0	68 24.4	40 51	44.8	68 12.2	42 50	43.5	67 59.5	43 49	42.3	67 18.2	48 45	38.8	67 03.4	50 44	37.7	8
9	68 34.4	30 56	50.4	68 25.1	32 55	49.1	68 04.9	36 52	46.6	67 53.9	38 51	45.3	67 42.4	39 50	44.1	67 30.3	41 49	42.9	66 51.0	46 46	39.4	66 36.9	48 45	38.3	9
30	68 01.0	28 56	50.9	67 52.4	30 55	49.6	67 33.4	34 53	47.1	67 23.0	35 52	45.9	67 12.2	37 51	44.7	67 00.7	39 50	43.5	66 23.4	44 46	40.0	66 09.9	46 45	38.9	30
1	67 27.4	26 56	51.3	67 19.4	28 55	50.0	67 01.7	31 53	47.6	66 51.9	33 52	46.3	66 41.7	35 51	45.2	66 30.9	37 50	44.0	65 55.5	42 47	40.6	65 42.7	43 46	39.5	1
2	66 53.6	24 57	51.6	66 46.2	26 56	50.4	66 29.7	29 54	48.0	66 20.6	31 53	46.8	66 11.0	33 52	45.6	66 00.8	35 51	44.5	65 27.3	40 47	41.1	65 15.1	41 46	40.0	2
3	66 19.7	22 57	52.0	66 12.9	24 56	50.8	65 57.5	27 54	48.4	65 49.0	29 53	47.2	65 40.0	31 52	46.0	65 30.5	33 51	44.9	64 58.8	38 48	41.5	64 47.2	39 47	40.5	3
4	65 45.7	20 57	52.3	65 39.4	22 56	51.1	65 25.2	25 54	48.7	65 17.3	27 53	47.6	65 08.8	29 52	46.4	64 59.9	31 51	45.3	64 30.0	36 48	42.0	64 19.1	37 47	40.9	4
35	65 11.5	18 57	52.5	65 05.7	20 56	51.4	64 52.6	24 54	49.1	64 45.3	25 54	47.9	64 37.5	27 53	46.8	64 29.1	29 52	45.7	64 01.0	34 49	42.4	63 50.7	35 48	41.3	35
6	64 37.1	16 57	52.8	64 31.9	18 56	51.6	64 20.0	22 55	49.4	64 13.2	23 54	48.2	64 05.9	25 53	47.1	63 58.1	27 52	46.0	63 31.8	32 49	42.8	63 22.1	33 48	41.7	6
7	64 02.7	15 58	53.0	63 58.0	16 57	51.9	63 47.1	20 55	49.6	63 40.9	22 54	48.5	63 34.2	23 53	47.4	63 27.0	25 52	46.3	63 02.4	30 49	43.1	62 53.3	31 48	42.1	7
8	63 28.2	13 58	53.2	63 24.1	15 57	52.1	63 14.2	18 55	49.9	63 08.5	20 54	48.8	63 02.4	21 53	47.7	62 55.7	23 52	46.6	62 32.8	28 50	43.5	62 24.2	29 49	42.4	8
9	62 53.6	11 58	53.3	62 50.0	13 57	52.2	62 41.2	16 55	50.1	62 36.0	18 54	49.0	62 30.4	20 54	47.9	62 24.2	21 53	46.9	62 03.0	26 50	43.8	61 55.0	27 49	42.7	9
40	62 19.0	10 58	53.5	62 15.8	11 57	52.4	62 08.0	15 55	50.3	62 03.4	16 55	49.2	61 58.3	18 54	48.2	61 52.7	19 53	47.1	61 33.1	24 50	44.0	61 25.7	26 49	43.0	40
1	61 44.3	08 58	53.6	61 41.6	10 57	52.5	61 34.8	13 56	50.4	61 30.7	15 55	49.4	61 26.1	16 54	48.4	61 21.0	18 53	47.3	61 03.0	22 50	44.3	60 56.2	24 49	43.3	1
2	61 09.5	07 58	53.7	61 07.3	08 57	52.6	61 01.5	11 56	50.6	60 57.9	13 55	49.5	60 53.8	14 54	48.5	60 49.2	16 53	47.5	60 32.9	20 50	44.5	60 26.5	22 50	43.5	2
3	60 34.8	05 58	53.7	60 33.0	07 57	52.7	60 28.1	10 56	50.7	60 25.0	11 55	49.7	60 21.4	13 54	48.7	60 17.4	14 53	47.7	60 02.5	19 51	44.7	59 56.7	20 50	43.7	3
4	59 59.9	04 58	53.8	59 58.6	05 57	52.8	59 54.7	08 56	50.8	59 52.0	10 55	49.8	59 48.9	11 54	48.8	59 45.4	13 53	47.8	59 32.1	17 51	44.9	59 26.8	18 50	43.9	4
45	59 25.1	02 58	53.8	59 24.3	04 57	52.8	59 21.2	07 56	50.9	59 19.1	08 55	49.9	59 16.4	09 54	48.9	59 13.4	11 53	47.9	59 01.6	15 51	45.0	58 56.9	17 50	44.1	45
6	58 50.3	01 58	53.8	58 49.9	02 57	52.9	58 47.7	05 56	50.9	58 46.0	06 55	50.0	58 43.9	08 54	49.0	58 41.3	09 54	48.0	58 31.1	14 51	45.2	58 26.8	15 50	44.2	6
7	58 15.4	01 58	53.8	58 15.4	01 57	52.9	58 14.2	03 56	51.0	58 13.0	05 55	50.0	58 11.3	06 54	49.1	58 09.2	08 54	48.1	58 00.4	12 51	45.3	57 56.6	13 50	44.4	7
8	57 40.6	02 58	53.8	57 41.0	01 57	52.9	57 40.7	02 56	51.0	57 39.9	03 55	50.1	57 38.7	05 54	49.1	57 37.0	06 54	48.2	57 29.7	10 51	45.4	57 26.4	12 50	44.5	8
9	57 05.8	04 58	53.8	57 06.6	02 57	52.9	57 07.1	01 56	51.0	57 06.8	02 55	50.1	57 06.0	03 54	49.2	57 04.8	05 54	48.3	56 58.9	09 51	45.5	56 56.2	10 51	44.6	9
50	56 31.0	05 58	53.7	56 32.2	04 57	52.8	56 33.6	01 56	51.0	56 33.7	00 55	50.1	56 33.3	02 54	49.2	56 32.6	03 54	48.3	56 28.1	07 51	45.6	56 25.8	08 51	44.7	50
1	55 56.2	06 58	53.7	55 57.8	05 57	52.8	56 00.0	02 56	51.0	56 00.5	01 55	50.1	56 00.7	00 54	49.2	56 00.4	02 54	48.3	55 57.3	05 51	45.6	55 55.5	07 51	44.7	1
2	55 21.4	08 58	53.6	55 23.5	06 57	52.7	55 26.5	04 56	51.0	55 27.4	03 55	50.1	55 28.0	01 54	49.2	55 28.2	00 54	48.3	55 26.4	04 51	45.7	55 25.1	05 51	44.8	2
3	54 46.7	09 58	53.5	54 49.1	08 57	52.7	54 53.0	05 56	50.9	54 54.3	04 55	50.1	54 55.3	03 54	49.2	54 55.9	01 54	48.3	54 55.5	02 52	45.7	54 54.6	04 51	44.8	3
4	54 12.0	10 58	53.4	54 14.9	09 57	52.6	54 19.5	07 56	50.9	54 21.2	05 55	50.0	54 22.7	04 54	49.2	54 23.7	03 54	48.3	54 24.6	01 52	45.7	54 24.2	02 51	44.9	4
55	53 37.4	11 58	53.3	53 40.6	10 57	52.5	53 46.0	08 56	50.8	53 48.2	07 55	50.0	53 50.0	05 54	49.1	53 51.5	04 54	48.3	53 53.7	01 52	45.7	53 53.7	00 51	44.9	55
6	53 02.8	13 58	53.2	53 06.4	11 57	52.4	53 12.6	09 56	50.7	53 15.2	08 55	49.9	53 17.4	07 54	49.1	53 19.3	06 54	48.2	53 22.8	02 51	45.7	53 23.3	01 51	44.9	6
7	52 28.2	14 57	53.1	52 32.2	13 57	52.3	52 39.2	10 56	50.6	52 42.2	09 55	49.8	52 44.8	08 54	49.0	52 47.1	07 54	48.2	52 51.9	04 51	45.7	52 52.8	02 51	44.9	7
8	51 53.8	15 57	52.9	51 58.1	14 57	52.1	52 05.9	12 55	50.5	52 09.2	11 55	49.7	52 12.3	10 54	48.9	52 15.0	08 54	48.1	52 21.1	05 51	45.6	52 22.4	04 51	44.8	8
9	51 19.3	16 57	52.8	51 24.1	15 57	52.0	51 32.6	13 55	50.4	51 36.3	12 55	49.6	51 39.8	11 54	48.8	51 42.9	10 53	48.0	51 50.2	07 51	45.6	51 52.0	05 51	44.8	9
60	50 45.0	17 57	52.6	50 50.1	16 57	51.9	50 59.3	14 55	50.3	51 03.5	13 55	49.5	51 07.3	12 54	48.7	51 10.8	11 53	47.9	51 19.4	08 51	45.5	51 21.6	07 51	44.7	60
1	50 10.7	19 57	52.5	50 16.2	18 56	51.7	50 26.2	16 55	50.2	50 30.7	15 55	49.4	50 34.9	14 54	48.6	50 38.8	12 53	47.8	50 48.6	09 51	45.5	50 51.2	08 51	44.7	1
2	49 36.5	20 57	52.3	49 42.3	19 56	51.5	49 53.0	17 55	50.0	49 57.9	16 54	49.3	50 02.5	15 54	48.5	50 06.8	14 53	47.7	50 17.8	11 51	45.4	50 20.9	10 50	44.6	2
3	49 02.4	21 57	52.1	49 08.6	20 56	51.4	49 20.0	18 55	49.9	49 25.3	17 54	49.1	49 30.3	16 54	48.4	49 34.9	15 53	47.6	49 47.1	12 51	45.3	49 50.6	11 50	44.5	3
4	48 28.4	22 57	51.9	48 34.9	21 56	51.2	48 47.0	19 55	49.7	48 52.7	18 54	49.0	48 58.0	17 54	48.2	49 03.1	16 53	47.5	49 16.5	13 51	45.2	49 20.4	12 50	44.4	4
65	47 54.5	23 56	51.7	48 01.3	22 56	51.0	48 14.2	20 55	49.5	48 20.2	20 54	48.8	48 25.9	19 53	48.1	48 31.3	18 53	47.3	48 45.9	15 51	45.1	48 50.2	14 50	44.3	65
6	47 20.6	24 56	51.5	47 27.8	23 56	50.8	47 41.4	22 54	49.4	47 47.7	21 54	48.6	47 53.8	20 53	47.9	47 59.6	19 53	47.2	48 15.4	16 51	45.0	48 20.0	15 50	44.2	6
7	46 46.9	25 56	51.3	46 54.4	25 56	50.6	47 08.7	23 54	49.2	47 15.4	22 54	48.5	47 21.8	21 53	47.7	47 28.0	20 53	47.0	47 44.9	17 51	44.8	47 50.0	16 50	44.1	7
8	46 13.3	27 56	51.1	46 21.1	26 55	50.4	46 36.0	24 54	49.0	46 43.1	23 54	48.3	46 49.9	22 53	47.6	46 56.5	21 52	46.9	47 14.5	19 51	44.7	47 20.0	18 50	44.0	8
9	45 39.7	28 56	50.9	45 47.9	27 55	50.2	46 03.5	25 54	48.8	46 11.0	24 53	48.1	46 18.1	23 53	47.4	46 25.0	23 52	46.7	46 44.2	20 50	44.6	46 50.0	19 50	43.8	9
70	45 06.3	29 56	50.6	45 14.8	28 55	50.0	45 31.1	26 54	48.6	45 38.9	25 53	47.9	45 46.4	25 53	47.2	45 53.7	24 52	46.5	46 14.0	21 50	44.4	46 20.2	20 50	43.7	70
1	44 33.0	30 55	50.4	44 41.8	29 55	49.7	44 58.8	27 54	48.4	45 06.9	27 53	47.7	45 14.8	26 53	47.0	45 22.4	25 52	46.3	45 43.8	22 50	44.2	45 50.4	22 49	43.5	1
2	43 59.8	31 55	50.1	44 09.0	30 55	49.5	44 26.6	29 54	48.2	44 35.0	28 53	47.5	44 43.3	27 52	46.8	44 51.2	26 52	46.1	45 13.7	24 50	44.1	45 20.7	23 49	43.4	2
3	43 26.7	32 55	49.9	43 36.2	31 54	49.2	43 54.5	30 53	47.9	44 03.3	29 53	47.3	44 11.9	28 52	46.6	44 20.2	27 52	45.9	44 43.8	25 50	43.9	44 51.1	24 49	43.2	3
4	42 53.8	33 55	49.6	43 03.6	32 54	49.0	43 22.5	31 53	47.7	43 31.6	30 53	47.0	43 40.6	29 52	46.4	43 49.2	29 51	45.7	44 13.9	26 50	43.7	44 21.6	25 49	43.0	4
75	42 20.9	34 54	49.4	42 31.1	33 54	48.7	42 50.7	32 53	47.5	43 00.1	31 52	46.8	43 09.4	30 52	46.2	43 18.4	30 51	45.5	43 44.1	27 49	43.5	43 52.2	27 49	42.8	75
6	41 48.3	35 54	49.1	41 58.7	34 54	48.5	42 18.9	33 53	47.2	42 28.7	32 52	46.6	42 38.3	32 52	45.9	42 47.7	31 51	45.3	43 14.5	29 49	43.3	43 22.9	28 49	42.7	6
7	41 15.7	36 54	48.8	41 26.4	35 54	48.2	41 47.3	34 52	47.0	41 57.4	33 52	46.3	42 07.4	33 51	45.7	42 17.1	32 51	45.0	42 44.9	30 49	43.1	42 53.7	29 48	42.5	7
8	40 43.3	37 54	48.5	40 54.3	37 53	47.9	41 15.8	35 52	46.7	41 26.3	35 52	46.1	41 36.5	34 51	45.4	41 46.6	33 51	44.8	42 15.5	31 49	42.9	42 24.7	30 48	42.3	8
9	40 11.0	38 54	48.3	40 22.4	38 53	47.7	40 44.5	36 52	46.4	40 55.3	36 51	45.8	41 05.9	35 51	45.2	41 16.2	34 50	44.6	41 46.1	32 49	42.7	41 55.7	31 48	42.0	9
80	39 38.9	39 53	48.0	39 50.5	39 53	47.4	40 13.3	37 52	46.2	40 24.4	37 51	45.5	40 35.3	36 51	44.9	40 46.0	35 50	44.3	41 17.0	33 48	42.5	41 26.9	33 48	41.8	80
1	39 06.9	40 53	47.7	39 18.9	40 53	47.1	39 42.2	38 52	45.9	39 53.7	38 51	45.3	40 04.9	37 50	44.7	40 15.9	36 50	44.1	40 47.9	35 48	42.2	40 58.1	34 48	41.6	1
2	38 35.1	41 53	47.4	38 47.3	41 52	46.8	39 11.3	39 51	45.6	39 23.1	39 51	45.0	39 34.6	38 50	44.4	39 46.0	38 50	43.8	40 18.9	36 48	42.0	40 29.6	35 47	41.4	2
3	38 03.4	42 53	47.1	38 16.0	42 52	46.5	38 40.6	40 51	45.3	38 52.6	40 50	44.7	39 04.5	39 50	44.1	39 16.2	39 49	43.5	39 50.1	37 48	41.7	40 01.1	36 47	41.1	3
4	37 31.9	43 52	46.7	37 44.7	43 52	46.2	38 10.0	41 51	45.0	38 22.3	41 50	44.4	38 34.5	40 50	43.9	38 46.5	40 49	43.3	39 21.5	38 48	41.5	39 32.8	37 47	40.9	4
85	37 00.5	44 52	46.4	37 13.7	44 52	45.9	37 39.5	42 50	44.7	37 52.2	42 50	44.1	38 04.7	41 49	43.6	38 17.0	41 49	43.0	38 53.0	39 47	41.2	39 04.6	38 47	40.6	85
6	36 29.4	45 52	46.1	36 42.8	45 51	45.5	37 09.2	44 50	44.4	37 22.2	43 50	43.9	37 35.0	42 49	43.3	37 47.7	42 49	42.7	38 24.6	40 47	41.0	38 36.0	40 46	40.4	6
7	35 58.3	46 51	45.8	36 12.1	46 51	45.2	36 39.1	45 50	44.1	36 52.4	44 49	43.6	37 05.5	43 49	43.0	37 18.5	43 48	42.4	37 56.4	41 47	40.7	38 08.7	41 46	40.1	7
8	35 27.5	47 51	45.4	35 41.5	47 51	44.9	36 09.1	46 50	43.8	36 22.7	45 49	43.2	36 36.2	45 49	42.7	36 49.4	44 48	42.1	37 28.3	42 47	40.4	37 40.9	42 46	39.9	8
9	34 56.8	48 51	45.1	35 11.2	47 50	44.6	35 39.4	47 49	43.5	35 53.2	46 49	42.9	36 07.0	46 48	42.4	36 20.6	45 48	41.8	37 00.4	43 46	40.2	37 13.3	43 46	39.6	9
90	34 26.4	49 50	44.8	34 41.0	48 50	44.2	35 09.8	48 49	43.2	35 23.9	47 49	42.6	35 38.0	47 48	42.1	35 51.9	46 48	41.5	36 32.6	45 46	39.9	36 45.9	44 45	39.3	90

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	33 56.1	50 50	44.4	34 10.9	49 50	43.9	34 40.3	49 49	42.8	34 54.8	48 48	42.3	35 09.1	48 48	41.8	35 23.3	47 47	41.2	36 05.0	46 46	39.6	36 18.7	45 45	39.0	91
2	33 25.9	51 50	44.1	33 41.1	50 49	43.5	34 11.1	49 48	42.5	34 25.8	49 48	42.0	34 40.5	49 47	41.4	34 55.0	48 47	40.9	35 37.6	47 45	39.3	35 51.6	46 45	38.7	2
3	32 56.0	52 50	43.7	33 11.5	51 49	43.2	33 42.0	50 48	42.2	33 57.1	50 48	41.6	34 12.0	50 47	41.1	34 26.8	49 47	40.6	35 10.4	48 45	39.0	35 24.6	47 45	38.5	3
4	32 26.3	53 49	43.3	32 42.0	52 49	42.8	33 13.1	51 48	41.8	33 28.5	51 47	41.3	33 43.7	51 47	40.8	33 58.8	50 46	40.3	34 43.3	49 45	38.7	34 57.9	48 44	38.2	4
95	31 56.8	54 49	43.0	32 12.8	53 48	42.5	32 44.4	52 47	41.5	33 00.1	52 47	41.0	33 15.6	52 46	40.5	33 31.0	51 46	39.9	34 16.4	50 44	38.4	34 31.3	49 44	37.9	95
6	31 27.5	54 49	42.6	31 43.7	54 48	42.1	32 16.0	53 47	41.1	32 31.9	53 47	40.6	32 47.7	52 46	40.1	33 03.4	52 46	39.6	33 49.7	51 44	38.1	34 04.9	50 44	37.5	6
7	30 58.3	55 48	42.2	31 14.9	55 48	41.8	31 47.7	54 47	40.8	32 03.9	54 46	40.3	32 20.0	53 46	39.8	32 36.0	53 45	39.3	33 23.2	52 44	37.8	33 38.7	51 43	37.2	7
8	30 29.4	56 48	41.9	30 46.3	56 47	41.4	31 19.6	55 46	40.4	31 36.1	55 46	39.9	31 52.5	54 46	39.4	32 08.8	54 45	38.9	32 56.9	53 44	37.4	33 12.7	52 43	36.9	8
9	30 00.7	57 47	41.5	30 17.8	57 47	41.0	30 51.7	56 46	40.0	31 08.5	56 46	39.6	31 25.2	55 45	39.1	31 41.7	55 45	38.6	32 30.7	54 43	37.1	32 46.8	53 43	36.6	9
100	29 32.3	58 47	41.1	29 49.6	58 47	40.6	30 24.1	57 46	39.7	30 41.1	57 45	39.2	30 58.1	56 45	38.7	31 14.9	56 44	38.2	32 04.8	55 43	36.8	32 21.2	54 42	36.3	100
1	29 04.0	59 47	40.7	29 21.6	59 46	40.2	29 56.6	58 45	39.3	30 13.9	58 45	38.8	30 31.2	57 44	38.4	30 48.3	57 44	37.9	31 39.1	56 43	36.4	31 55.8	55 42	35.9	1
2	28 36.0	60 46	40.3	28 53.9	60 46	39.9	29 29.4	59 45	38.9	29 47.0	59 45	38.5	30 04.5	58 44	38.0	30 21.9	58 44	37.5	31 13.5	57 42	36.1	31 30.5	56 42	35.6	2
3	28 08.2	61 46	39.9	28 26.3	60 46	39.5	29 02.4	60 45	38.6	29 20.3	59 44	38.1	29 38.0	59 44	37.6	29 55.7	59 43	37.2	30 48.2	58 42	35.8	31 05.5	57 41	35.3	3
4	27 40.6	62 46	39.5	27 59.0	61 45	39.1	28 35.6	61 44	38.2	28 53.7	60 44	37.7	29 11.8	60 43	37.3	29 29.8	60 43	36.8	30 23.1	59 41	35.4	30 40.7	58 41	34.9	4
105	27 13.2	62 45	39.1	27 31.9	62 45	38.7	28 09.0	62 44	37.8	28 27.4	61 43	37.3	28 45.8	61 43	36.9	29 04.0	61 43	36.4	29 58.2	60 41	35.0	30 16.1	59 41	34.6	105
6	26 46.1	63 45	38.7	27 05.1	63 44	38.3	27 42.7	62 43	37.4	28 01.4	62 43	36.9	28 20.0	62 43	36.5	28 38.5	62 42	36.1	29 33.5	61 41	34.7	29 51.7	60 40	34.2	6
7	26 19.3	64 44	38.3	26 38.5	64 44	37.9	27 16.6	63 43	37.0	27 35.6	63 43	36.6	27 54.4	63 42	36.1	28 13.2	62 42	35.7	29 09.1	62 40	34.3	29 27.5	61 40	33.9	7
8	25 52.6	65 44	37.9	26 12.1	65 44	37.4	26 50.8	64 43	36.6	27 10.0	64 42	36.2	27 29.1	64 42	35.7	27 48.2	63 41	35.3	28 44.9	63 40	34.0	29 03.6	62 40	33.5	8
9	25 26.3	66 44	37.4	25 46.0	66 43	37.0	26 25.2	65 42	36.2	26 44.6	65 42	35.8	27 04.0	65 41	35.3	27 23.4	64 41	34.9	28 20.9	63 40	33.6	28 39.9	63 39	33.2	9
110	25 00.2	67 43	37.0	25 20.1	66 43	36.6	25 59.8	66 42	35.8	26 19.5	66 41	35.4	26 39.2	65 41	34.9	26 58.8	65 41	34.5	27 57.1	64 39	33.2	28 16.4	64 39	32.8	110
1	24 34.3	67 43	36.6	24 54.5	67 42	36.2	25 34.7	67 41	35.4	25 54.7	67 41	35.0	26 14.6	66 41	34.5	26 34.5	66 40	34.1	27 33.6	65 39	32.8	27 53.1	65 38	32.4	1
2	24 08.7	68 42	36.2	24 29.2	68 42	35.8	25 09.8	68 41	34.9	25 30.1	67 41	34.5	25 50.3	67 40	34.1	26 10.4	67 40	33.7	27 10.3	66 38	32.5	27 30.1	66 38	32.0	2
3	23 43.4	69 42	35.7	24 04.1	69 41	35.3	24 45.3	68 41	34.5	25 05.8	68 40	34.1	25 26.2	68 40	33.7	25 46.5	68 39	33.3	26 47.2	67 38	32.1	27 07.3	67 38	31.7	3
4	23 18.3	70 41	35.3	23 39.2	70 41	34.9	24 20.9	69 40	34.1	24 41.7	69 40	33.7	25 02.4	69 39	33.3	25 23.0	69 39	32.9	26 24.4	68 38	31.7	26 44.8	68 37	31.3	4
115	22 53.5	71 41	34.8	23 14.7	70 40	34.5	23 56.9	70 40	33.7	24 17.8	70 39	33.3	24 38.8	70 39	32.9	24 59.7	69 38	32.5	26 01.9	69 37	31.3	26 22.5	69 37	30.9	115
6	22 29.0	71 40	34.4	22 50.4	71 40	34.0	23 33.1	71 39	33.2	23 54.3	71 39	32.9	24 15.5	71 38	32.5	24 36.6	70 38	32.1	25 39.6	70 37	30.9	26 00.5	69 36	30.5	6
7	22 04.8	72 40	33.9	22 26.4	72 40	33.6	23 09.5	72 39	32.8	23 31.0	72 38	32.4	23 52.4	71 38	32.1	24 13.8	71 38	31.7	25 17.6	71 36	30.5	25 38.7	70 36	30.1	7
8	21 40.8	73 39	33.5	22 02.7	73 39	33.1	22 46.3	72 38	32.4	23 06.0	72 38	32.0	23 29.7	72 38	31.6	23 51.3	72 37	31.2	24 55.8	71 36	30.1	25 17.2	71 35	29.7	8
9	21 17.1	74 39	33.0	21 39.2	74 39	32.7	22 23.3	73 38	31.9	22 45.3	73 37	31.6	23 07.2	73 37	31.2	23 29.0	73 37	30.8	24 34.3	72 35	29.7	24 55.9	72 35	29.3	9
120	20 53.8	75 38	32.6	21 16.1	74 38	32.2	22 00.6	74 37	31.5	22 22.8	74 37	31.1	22 45.0	74 37	30.8	23 07.1	74 36	30.4	24 13.0	73 35	29.3	24 34.9	73 35	28.9	120
1	20 30.7	75 38	32.1	20 53.2	75 38	31.8	21 38.2	75 37	31.0	22 00.6	75 36	30.7	22 23.0	75 36	30.3	22 45.4	74 36	30.0	23 52.1	74 34	28.9	24 14.2	74 34	28.5	1
2	20 07.9	76 38	31.6	20 30.7	76 37	31.3	21 16.1	76 36	30.6	21 38.8	75 36	30.2	22 01.4	75 36	29.9	22 23.9	75 35	29.5	23 31.4	75 34	28.4	23 53.7	74 34	28.1	2
3	19 45.4	77 37	31.2	20 08.4	77 37	30.8	20 54.3	76 36	30.1	21 17.2	76 35	29.8	21 40.0	76 35	29.4	22 02.8	76 35	29.1	23 10.9	75 34	28.0	23 33.5	75 33	27.7	3
4	19 23.2	77 36	30.7	19 46.4	77 36	30.4	20 32.8	77 35	29.7	20 55.9	77 35	29.3	21 19.0	77 35	29.0	21 42.0	77 34	28.6	22 50.8	76 33	27.6	23 13.6	76 33	27.3	4
125	19 01.3	78 36	30.2	19 24.8	78 36	29.9	20 11.6	78 35	29.2	20 34.9	78 34	28.9	20 58.2	78 34	28.5	21 21.4	77 34	28.2	22 30.9	77 33	27.2	22 54.0	77 32	26.8	125
6	18 39.8	79 35	29.7	19 03.4	79 35	29.4	19 50.6	79 34	28.7	20 14.2	78 34	28.4	20 37.7	78 34	28.1	21 01.2	78 33	27.8	22 11.4	78 32	26.7	22 34.7	78 32	26.4	6
7	18 18.5	80 35	29.2	18 42.4	80 35	28.9	19 30.0	79 34	28.3	19 53.8	79 33	28.0	20 17.5	79 33	27.6	20 41.2	79 33	27.3	21 52.1	79 32	26.3	22 15.6	78 31	26.0	7
8	17 57.6	80 34	28.8	18 21.7	80 34	28.4	19 09.7	80 33	27.8	19 33.7	80 33	27.5	19 57.7	80 33	27.2	20 21.6	80 32	26.8	21 33.1	79 31	25.9	21 56.9	79 31	25.5	8
9	17 37.0	81 34	28.3	18 01.3	81 33	28.0	18 49.8	81 33	27.3	19 14.0	81 32	27.0	19 38.1	80 32	26.7	20 02.3	80 32	26.4	21 14.4	80 31	25.4	21 38.4	80 30	25.1	9
130	17 16.7	82 33	27.8	17 41.2	82 33	27.5	18 30.1	81 32	26.9	18 54.5	81 32	26.5	19 18.9	81 32	26.2	19 43.2	81 31	25.9	20 56.0	81 30	25.0	21 20.2	81 30	24.7	130
1	16 56.8	82 33	27.3	17 21.5	82 32	27.0	18 10.8	82 32	26.4	18 35.4	82 31	26.1	19 00.0	82 31	25.8	19 24.5	82 31	25.5	20 38.0	81 30	24.5	21 02.4	81 29	24.2	1
2	16 37.2	83 32	26.8	17 02.1	83 32	26.5	17 51.8	83 31	25.9	18 16.6	83 31	25.6	18 41.4	83 30	25.3	19 06.1	82 30	25.0	20 20.2	82 29	24.1	20 44.8	82 29	23.8	2
3	16 17.9	84 32	26.3	16 43.0	84 31	26.0	17 33.1	83 31	25.4	17 58.1	83 30	25.1	18 23.1	83 30	24.8	18 48.0	83 30	24.5	20 02.7	83 29	23.6	20 27.6	83 28	23.3	3
4	15 59.0	84 31	25.8	16 24.3	84 31	25.5	17 14.7	84 30	24.9	17 40.0	84 30	24.6	18 05.1	84 29	24.3	18 30.3	84 29	24.1	19 45.6	84 28	23.2	20 10.6	83 28	22.9	4
135	15 40.4	85 30	25.2	16 05.9	85 30	25.0	16 56.7	85 29	24.4	17 22.1	85 29	24.1	17 47.5	85 29	23.9	18 12.9	84 29	23.6	19 28.8	84 28	22.7	19 54.0	84 27	22.4	135
6	15 22.2	86 30	24.7	15 47.8	85 30	24.5	16 39.1	85 29	23.9	17 04.7	85 29	23.6	17 30.2	85 28	23.4	17 55.8	85 28	23.1	19 12.2	85 27	22.3	19 37.7	85 27	22.0	6
7	15 04.3	86 29	24.2	15 30.1	86 29	24.0	16 21.7	86 28	23.4	16 47.5	86 28	23.1	17 13.3	86 28	22.9	17 39.0	86 27	22.6	18 56.0	85 26	21.8	19 21.7	85 26	21.5	7
8	14 46.8	87 29	23.7	15 12.8	87 28	23.4	16 04.8	87 28	22.9	16 30.7	86 27	22.7	16 56.7	86 27	22.4	17 22.6	86 27	22.1	18 40.2	86 26	21.3	19 06.0	86 26	21.1	8
9	14 29.6	87 28	23.2	14 55.8	87 28	22.9	15 48.1	87 27	22.4	16 14.3	87 27	22.2	16 40.4	87 27	21.9	17 06.5	87 26	21.6	18 24.6	87 25	20.9	18 50.7	87 25	20.6	9
140	14 12.8	88 27	22.6	14 39.2	88 27	22.4	15 31.8	88 27	21.9	15 58.2	88 26	21.7	16 24.5	88 26	21.4	16 50.7	88 26	21.2	18 09.4	87 25	20.4	18 35.6	87 24	20.1	140
1	13 56.4	88 27	22.1	14 22.9	88 26	21.9	15 15.9	88 26	21.4	15 42.4	88 26	21.2	16 08.9	88 25	20.9	16 35.3	88 25	20.7	17 54.6	88 24	19.9	18 21.0	88 24	19.7	1
2	13 40.3	89 26	21.6	14 07.0	89 26	21.4	15 00.4	89 25	20.9	15 27.0	89 25	20.6	15 53.7	89 25	20.4	16 20.3	89 25	20.2	17 40.0	89 24	19.4	18 06.6	88 23	19.2	2
3	13 24.6	90 26	21.1	13 51.5	90 25	20.8	14 45.2	89 25	20.4	15 12.0	89 24	20.1	15 38.8	89 24	19.9	16 05.6	89 24	19.7	17 25.8	89 23	19.0	17 52.6	89 23	18.7	3
4	13 09.3	90 25	20.5	13 36.3	90 25	20.3	14 30.3	90 24	19.8	14 57.3	90 24	19.6	15 24.3	90 24	19.4	15 51.2	90 23	19.2	17 12.0	90 22	18.5	17 38.9	90 22	18.2	4
145	12 54.4	91 24	20.0	13 21.5	91 24	19.8	14 15.9	90 24	19.3	14 43.0	90 23	19.1	15 10.1	90 23	18.9	15 37.2	90 23	18.7	16 58.5	90 22	18.0	17 25.6	90 22	17.8	145
6	12 39.8	91 24	19.4	13 07.1	91 23	19.2	14 01.8	91 23	18.8	14 29.1	91 23	18.6	14 56.3	91 22	18.4	15 23.6	91 22	18.2	16 45.3	91 21	17.5	17 12.6	91 21	17.3	6
7	12 25.6	92 23	18.9	12 53.1	92 23	18.7	13 48.0	91 22	18.3	14 15.5	91 22	18.1	14 42.9	91 22	17.9	15 10.3	91 21	17.6	16 32.5	91 21	17.0	16 59.9	91 20	16.8	7
8	12 11.9	92 22	18.4	12 39.5	92 22	18.2	13 34.7	92 22	17.7	14 02.3	92 21	17.5	14 29.9	92 21	17.3	14 57.4	92 21	17.1	16 20.1	92 20	16.5	16 47.6	92 20	16.3	8
9	11 58.5	93 22	17.8	12 26.2	93 21	17.6	13 21.7	92 21	17.2	13 49.5	92 21	17.0	14 17.2	92 20	16.8	14 44.9	92 20	16.6	16 08.0	92 20	16.0	16 35.7	92 19	15.8	9
150	11 45.5	93 21	17.3	12 13.4	93 21	17.1	13 09.1	93 20	16.7	13 37.0	93 20	16.5	14 04.9	93 20	16.3	14 32.7	93 20	16.1	15 56.2	93 19	15.5	16 24.1	93 19	15.3	150
1	11 32.9	93 20	16.7	12 00.9	93 20	16.5	12 56.9	93 20	16.2	13 24.9	93 19	16.0	13 52.9	93 19	15.8	14 20.9	93 19	15.6	15 44.9	93 18	15.0	16 12.8	93 18	14.8	1
2	11 20.7	94 20	16.1	11 48.8	94 19	16.0	12 45.1	94 19	15.6	13 13.3	94 19	15.4	13 41.4	94 19	15.3	14 09.5	94 18	15.1	15 33.8	94 18	14.5	16 01.9	94 18	14.4	2
3	11 08.9	94 19	15.6	11 37.1	94 19	15.4	12 33.7	94 18	15.1	13 02.0	94 18	14.9	13 30.2	94 18	14.7	13 58.5	94 18	14.6	15 23.2	94 17	14.0	15 51.4	94 17	13.9	3
4	10 57.5	95 18	15.0	11 25.9	95 18	14.9	12 22.7	95 18	14.5	12 51.1	95 18	14.4	13 19.4	95 17	14.2	13 47.8	95 17	14.0	15 12.9	95 17	13.5	15 41.3	94 16	13.4	4
155	10 46.5	95 18	14.5	11 15.0	95 17	14.3	12 12.0	95 17	14.0	12 40.5	95 17	13.8	13 09.1	95 17	13.7	13 37.5	95 16	13.5	15 03.0	95 16	13.0	15 31.5	95 16	12.9	155
6	10 35.9	95 17	13.9	11 04.5	95 17	13.8	12 01.8	95 16	13.4	12 30.4	95 16	13.3	12 59.0	95 16	13.1	13 27.7	95 16	13.0	14 53.5	95 15	12.5	15 22.1	95 15	12.4	6
7	10 25.7	96 16	13.3	10 54.5	96 16	13.2	11 52.0	96 16	12.9	12 20.7	96 16	12.8	12 49.4	96 15	12.6	13 18.2	96 15	12.5	14 44.3	96 15	12.0	15 13.0	96 14	11.9	7
8	10 16.0	96 16	12.8	10 44.8	96 15	12.6	11 42.5	96 15	12.4	12 11.4	96 15	12.2	12 40.2	96 15	12.1	13 09.0	96 15	11.9	14 35.5	96 14	11.5	15 04.3	96 14	11.4	8
9	10 06.7	97 15	12.2	10 35.6	97 15	12.1	11 33.5	96 14	11.8	12 02.4	96 14	11.7	12 31.4	96 14	11.5	13 00.3	96 14	11.4	14 27.1	96 13	11.0	14 56.0	96 13	10.9	9
160	9 57.7	97 14	11.6	10 26.8	97 14	11.5	11 24.9	97 14	11.3	11 53.9	97 14	11.1	12 22.9	97 13	11.0	12 52.0	97 13	10.9	14 19.0	97 13	10.5	14 48.1	97 13	10.3	160
1	9 49.2	97 13	11.1	10 18.4	97 13	10.9	11 16.7	97 13	10.7	11 45.8	97 13	10.6	12 14.9	97 13	10.5	12 44.0	97 13	10.3	14 11.4	97 12	10.0	14 40.5	97 12	09.8	1
2	9 41.2	97 13	10.5	10 10.4	97 13	10.4	11 08.9	97 12	10.1	11 38.1	97 12	10.0	12 07.3	97 12	09.9	12 36.5	97 12	09.8	14 04.1	97 11	09.4	14 33.3	97 11	09.3	2
3	9 33.5	98 12	09.9	10 02.8	98 12	09.8	11 01.5	98 12	09.6	11 30.8	98 12	09.5	12 00.1	98 11	09.4	12 29.4	98 11	09.3	13 57.2	98 11	08.9	14 26.5	98 11	08.8	3
4	9 26.3	98 11	09.3	9 55.7	98 11	09.2	10 54.5	98 11	09.0	11 23.9	98 11	08.9	11 53.2	98 11	08.8	12 22.6	98 11	08.7	13 50.7	98 10	08.4	14 20.1	98 10	08.3	4
165	9 19.5	98 11	08.8	9 49.0	98 10	08.7	10 47.9	98 10	08.5	11 17.4	98 10	08.4	11 46.8	98 10	08.3	12 16.3	98 10	08.2	13 44.6	98 10	07.9	14 14.1	98 09	07.8	165
6	9 13.2	98 10	08.2	9 42.7	98 10	08.1	10 41.8	98 10	07.9	11 11.3	98 09	07.8	11 40.8	98 09	07.7	12 10.3	98 09	07.6	13 38.9	98 09	07.4	14 08.4	98 09	07.3	6
7	9 07.2	99 09	07.6	9 36.8	99 09	07.5	10 36.0	99 09	07.4	11 05.6	99 09	07.3	11 35.2	99 09	07.2	12 04.8	99 09	07.1	13 33.5	99 08	06.8	14 03.1	99 08	06.8	7
8	9 01.8	99 08	07.0	9 31.4	99 08	06.9	10 30.7	99 08	06.8	11 00.4	99 08	06.7	11 30.0	99 08	06.6	11 59.7	99 08	06.6	13 28.6	99 08	06.3	13 58.2	99 08	06.2	8
9	8 56.7	99 08	06.4	9 26.4	99 08	06.4	10 25.8	99 07	06.2	10 55.5	99 07	06.2	11 25.2	99 07	06.1	11 54.9	99 07	06.0	13 24.0	99 07	05.8	13 53.7	99 07	05.7	9
170	8 52.1	99 07	05.9	9 21.8	99 07	05.8	10 21.3	99 07	05.7	10 51.1	99 07	05.6	11 20.9	99 07	05.5	11 50.6	99 07	05.5	13 19.9	99 06	05.3	13 49.6	99 06	05.2	170
1	8 47.9	99 06	05.3	9 17.7	99 06	05.2	10 17.3	99 06	05.1	10 47.1	99 06	05.0	11 16.9	99 06	05.0	11 46.7	99 06	04.9	13 16.1	99 06	04.7	13 45.9	99 06	04.7	1
2	8 44.1	99 06	04.7	9 14.0	99 06	04.6	10 13.7	99 05	04.5	10 43.5	99 05	04.5	11 13.4	99 06	04.4	11 43.2	99 06	04.4	13 12.7	99 05	04.2	13 42.6	99 05	04.2	2
3	8 40.8	1.0 05	04.1	9 10.7	1.0 05	04.1	10 10.5	1.0 05	04.0	10 40.3	1.0 05	03.9	11 10.2	1.0 05	03.9	11 40.1	1.0 04	03.8	13 09.7	1.0 04	03.7	13 39.6	1.0 04	03.6	3
4	8 38.0	1.0 04	03.5	9 07.9	1.0 04	03.5	10 07.7	1.0 04	03.4	10 37.6	1.0 04	03.4	11 07.5	1.0 04	03.3	11 37.4	1.0 04	03.3	13 07.2	1.0 04	03.2	13 37.1	1.0 04	03.1	4
175	8 35.5	1.0 03	02.9	9 05.5	1.0 03	02.9	10 05.3	1.0 03	02.8	10 35.3	1.0 03	02.8	11 05.2	1.0 03	02.8	11 35.2	1.0 03	02.7	13 05.0	1.0 03	02.6	13 34.9	1.0 03	02.6	175
6	8 33.5	1.0 03	02.3	9 03.5	1.0 03	02.3	10 03.4	1.0 02	02.3	10 33.4	1.0 02	02.2	11 03.3	1.0 02	02.2	11 33.3	1.0 02	02.2	13 03.2	1.0 02	02.1	13 33.1	1.0 02	02.1	6
7	8 32.0	1.0 02	01.8	9 02.0	1.0 02	01.7	10 01.9	1.0 02	01.7	10 31.9	1.0 02	01.7	11 01.9	1.0 02	01.7	11 31.9	1.0 02	01.6	13 01.8	1.0 02	01.6	13 31.8	1.0 02	01.6	7
8	8 30.9	1.0 01	01.2	9 00.9	1.0 01	01.2	10 00.9	1.0 01	01.1	10 30.8	1.0 01	01.1	11 00.8	1.0 01	01.1	11 30.8	1.0 01	01.1	13 00.8	1.0 01	01.1	13 30.8	1.0 01	01.0	8
9	8 30.2	1.0 00	00.6	9 00.2	1.0 00	00.6	10 00.2	1.0 00	00.6	10 30.2	1.0 00	00.6	11 00.2	1.0 00	00.6	11 30.2	1.0 00	00.5	13 00.2	1.0 00	00.5	13 30.2	1.0 00	00.5	9
180	8 30.0	1.0 00	00.0	9 00.0	1.0 00	00.0	10 00.0	1.0 00	00.0	10 30.0	1.0 00	00.0	11 00.0	1.0 00	00.0	11 30.0	1.0 00	00.0	13 00.0	1.0 00	00.0	13 30.0	1.0 00	00.0	180

Lat. 44°

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	
00	74 00.0	1.0 01	00.0	73 30.0	1.0 01	00.0	72 00.0	1.0 01	00.0	71 30.0	1.0 01	00.0	71 00.0	1.0 01	00.0	65 00.0	1.0 01	00.0	64 30.0	1.0 00	00.0	59 30.0	1.0 00	00.0	00
1	73 59.3	1.0 03	01.8	73 29.3	1.0 03	01.7	71 59.4	1.0 03	01.5	71 29.5	1.0 03	01.5	70 59.5	1.0 03	01.4	64 59.7	1.0 02	00.8	64 29.7	1.0 02	00.8	59 29.8	1.0 01	00.5	1
2	73 57.3	1.0 06	03.6	73 27.4	1.0 05	03.5	71 57.7	1.0 05	03.0	71 27.8	1.0 05	02.9	70 57.9	1.0 04	02.8	64 58.7	1.0 03	01.7	64 28.8	1.0 03	01.6	59 29.2	1.0 02	01.1	2
3	73 53.9	99 06	05.4	73 24.1	99 06	05.2	71 54.9	99 07	04.5	71 25.1	99 06	04.3	70 55.3	99 06	04.2	64 57.1	1.0 04	02.5	64 27.2	1.0 04	02.4	59 28.2	1.0 02	01.6	3
4	73 49.1	98 10	07.2	73 19.6	98 10	06.9	71 50.9	99 08	06.0	71 21.3	99 08	05.8	70 51.6	99 08	05.5	64 54.9	99 05	03.4	64 25.1	99 05	03.2	59 26.8	1.0 03	02.1	4
05	73 43.1	97 12	08.9	73 13.8	98 12	08.6	71 45.8	98 10	07.5	71 16.4	98 10	07.2	70 47.0	98 10	06.9	64 52.0	99 06	04.2	64 22.4	99 06	04.0	59 25.1	99 04	02.6	05
6	73 35.7	96 14	10.7	73 06.8	97 14	10.2	71 39.6	97 12	09.0	71 10.4	97 12	08.6	70 41.3	97 11	08.3	64 48.6	98 07	05.0	64 19.0	98 07	04.8	59 22.9	99 04	03.1	6
7	73 27.1	95 16	12.4	72 58.5	95 16	11.8	71 32.3	96 14	10.4	71 03.5	96 13	10.0	70 34.6	96 13	09.6	64 44.4	98 08	05.9	64 15.1	98 08	05.6	59 20.3	99 05	03.7	7
8	73 17.3	94 18	14.0	72 49.1	94 18	13.4	71 24.0	95 16	11.8	70 55.5	95 15	11.3	70 26.9	95 14	10.9	64 39.7	97 09	06.7	64 10.5	97 09	06.4	59 17.4	98 06	04.2	8
9	73 06.2	92 20	15.6	72 38.5	93 20	15.0	71 14.7	94 17	13.2	70 46.5	94 17	12.7	70 18.3	94 16	12.2	64 34.4	97 10	07.5	64 05.4	97 10	07.2	59 14.0	98 06	04.7	9
10	72 54.1	91 22	17.2	72 26.8	91 21	16.5	71 04.3	92 19	14.6	70 36.6	93 18	14.0	70 08.7	93 17	13.4	64 28.5	96 11	08.3	63 59.7	96 10	08.0	59 10.3	97 07	05.2	10
1	72 40.8	89 24	18.7	72 14.1	89 23	17.9	70 53.0	91 20	15.9	70 25.7	91 20	15.2	69 58.3	92 19	14.7	64 21.9	95 12	09.1	63 53.4	96 11	08.7	59 06.2	96 07	05.7	1
2	72 26.4	87 26	20.2	72 00.3	88 25	19.4	70 40.7	89 22	17.2	70 13.9	90 21	16.5	69 46.9	90 20	15.8	64 14.8	94 13	09.9	63 46.6	94 12	09.5	59 01.7	96 08	06.2	2
3	72 11.0	85 27	21.6	71 45.5	86 26	20.7	70 27.5	88 23	18.4	70 01.2	88 23	17.7	69 34.7	89 22	17.0	64 07.1	93 14	10.6	63 39.2	93 13	10.2	58 56.9	95 09	06.7	3
4	71 54.7	83 29	22.9	71 29.7	84 28	22.0	70 13.5	86 25	19.6	69 47.6	86 24	18.9	69 21.6	87 23	18.2	63 58.9	92 15	11.4	63 31.3	92 14	11.0	58 51.7	94 09	07.2	4
15	71 37.4	81 30	24.2	71 13.1	82 29	23.3	69 58.6	84 26	20.8	69 33.3	85 25	20.0	69 07.8	85 24	19.3	63 50.1	91 16	12.1	63 22.8	91 15	11.7	58 46.1	93 10	07.7	15
6	71 19.3	79 32	25.5	70 55.6	79 31	24.5	69 42.8	82 28	21.9	69 18.1	83 27	21.1	68 53.2	83 26	20.3	63 40.7	89 16	12.9	63 13.8	90 16	12.4	58 40.2	92 10	08.1	6
7	71 00.3	76 33	26.7	70 37.2	77 32	25.7	69 26.4	80 29	23.0	69 02.2	81 28	22.2	68 37.8	82 27	21.4	63 30.8	88 17	13.6	63 04.3	89 17	13.1	58 33.9	92 11	08.6	7
8	70 40.5	74 34	27.8	70 18.1	75 33	26.8	69 09.1	78 30	24.1	68 45.6	79 29	23.2	68 21.7	80 28	22.4	63 20.4	87 18	14.3	62 54.3	87 18	13.7	58 27.2	91 12	09.1	8
9	70 20.0	72 35	28.9	69 58.3	73 34	27.9	68 51.2	76 31	25.1	68 28.2	77 30	24.2	68 05.0	78 29	23.3	63 09.5	85 19	15.0	62 43.8	86 18	14.4	58 20.3	89 12	09.5	9
20	69 58.8	70 36	30.0	69 37.7	71 35	28.9	68 32.6	74 32	26.0	68 10.2	75 31	25.1	67 47.6	76 30	24.3	62 58.1	84 20	15.6	62 32.8	85 19	15.1	58 12.9	88 13	10.0	20
1	69 36.9	67 38	31.0	69 16.5	68 36	29.9	68 13.3	72 33	27.0	67 51.6	73 32	26.0	67 29.5	74 31	25.2	62 46.3	83 21	16.3	62 21.4	83 20	15.7	58 05.3	87 13	10.4	1
2	69 14.4	65 38	31.9	68 54.7	66 37	30.8	67 53.4	70 34	27.9	67 32.3	71 33	26.9	67 10.9	72 32	26.0	62 33.9	81 21	16.9	62 09.5	82 21	16.3	57 57.3	86 14	10.9	2
3	68 51.3	63 39	32.8	68 32.3	64 38	31.7	67 33.0	68 35	28.7	67 12.5	69 34	27.8	66 51.7	70 33	26.8	62 21.1	80 22	17.6	61 57.2	80 21	16.9	57 49.0	85 14	11.3	3
4	68 27.6	60 40	33.6	68 09.3	62 39	32.6	67 12.0	66 36	29.5	66 52.1	67 35	28.6	66 31.9	68 34	27.6	62 07.9	78 23	18.2	61 44.4	79 22	17.5	57 40.4	84 15	11.7	4
25	68 03.5	58 41	34.4	67 45.8	60 40	33.4	66 50.4	63 37	30.3	66 31.2	65 36	29.3	66 11.7	66 35	28.4	61 54.2	76 23	18.8	61 31.2	77 23	18.1	57 31.5	82 15	12.1	25
6	67 38.8	56 42	35.2	67 21.9	57 41	34.1	66 28.4	61 37	31.0	66 09.9	63 36	30.1	65 50.9	64 35	29.1	61 40.1	75 24	19.3	61 17.6	75 23	18.6	57 22.2	81 16	12.5	6
7	67 13.7	54 43	35.9	66 57.4	55 41	34.8	66 06.0	59 38	31.7	65 48.0	60 37	30.8	65 29.7	62 36	29.8	61 25.6	73 25	19.9	61 03.6	74 24	19.2	57 12.7	80 16	12.9	7
8	66 48.2	51 43	36.6	66 32.6	53 42	35.5	65 43.0	57 39	32.4	65 25.7	58 38	31.4	65 08.0	60 37	30.5	61 10.8	71 25	20.4	60 49.2	72 25	19.7	57 02.9	78 17	13.3	8
9	66 22.3	49 44	37.2	66 07.3	51 43	36.1	65 19.7	55 40	33.0	65 03.0	56 38	32.1	64 45.9	58 37	31.1	60 55.5	70 26	20.9	60 34.5	70 25	20.2	56 52.8	77 17	13.7	9
30	65 56.0	47 44	37.8	65 41.7	49 43	36.7	64 56.0	53 40	33.6	64 39.9	54 39	32.7	64 23.5	55 38	31.7	60 39.9	68 27	21.5	60 19.4	69 26	20.7	56 42.4	76 18	14.1	30
1	65 29.4	45 45	38.4	65 15.7	47 44	37.3	64 31.9	51 41	34.2	64 16.4	52 40	33.2	64 00.6	53 39	32.2	60 23.9	66 27	21.9	60 04.0	67 26	21.2	56 31.8	74 18	14.5	1
2	65 02.5	43 45	38.9	64 49.4	44 44	37.8	64 07.4	49 41	34.8	63 52.6	50 40	33.8	63 37.4	51 39	32.8	60 07.7	64 28	22.4	59 48.2	65 27	21.7	56 20.9	73 19	14.8	2
3	64 35.2	41 46	39.4	64 22.7	42 45	38.3	63 42.7	47 42	35.3	63 28.5	48 41	34.3	63 13.9	49 40	33.3	59 51.0	63 28	22.9	59 32.1	63 27	22.1	56 09.7	71 19	15.2	3
4	64 07.7	39 46	39.8	63 55.8	40 45	38.8	63 17.6	45 42	35.7	63 04.0	46 41	34.8	62 50.0	47 40	33.8	59 34.1	61 29	23.3	59 15.7	62 28	22.5	55 58.3	70 19	15.5	4
35	63 39.9	37 47	40.3	63 28.7	38 46	39.2	62 52.3	43 43	36.2	62 39.3	44 42	35.2	62 25.9	45 41	34.2	59 16.9	59 29	23.7	58 59.1	60 28	22.9	55 46.7	68 20	15.8	35
6	63 11.9	35 47	40.7	63 01.2	36 46	39.6	62 26.6	41 43	36.6	62 14.3	42 42	35.6	62 01.5	43 41	34.7	58 59.4	57 30	24.1	58 42.1	58 29	23.3	55 34.8	66 20	16.1	6
7	62 43.6	33 47	41.0	62 33.6	34 46	40.0	62 00.8	39 44	37.0	61 49.0	40 42	36.0	61 36.8	41 42	35.1	58 41.6	55 30	24.5	58 24.9	56 29	23.7	55 22.7	65 21	16.4	7
8	62 15.2	31 48	41.4	62 05.7	32 47	40.4	61 34.7	37 44	37.4	61 23.5	38 43	36.4	61 11.9	39 42	35.5	58 23.6	53 30	24.9	58 07.4	54 30	24.1	55 10.4	63 21	16.7	8
9	61 46.6	29 48	41.7	61 37.7	30 47	40.7	61 08.4	35 44	37.7	60 57.7	36 43	36.8	60 46.7	37 42	35.8	58 05.3	52 31	25.3	57 49.6	53 30	24.4	54 57.8	61 21	17.0	9
40	61 17.8	27 48	42.0	61 09.4	29 47	41.0	60 41.8	33 44	38.1	60 31.8	34 44	37.1	60 21.4	36 43	36.2	57 46.7	50 31	25.6	57 31.6	51 30	24.8	54 45.1	60 22	17.3	40
1	60 48.8	25 48	42.3	60 41.0	27 48	41.3	60 15.1	31 45	38.4	60 05.7	32 44	37.4	59 55.8	34 43	36.5	57 28.0	48 32	25.9	57 13.4	49 31	25.1	54 32.1	58 22	17.6	1
2	60 19.7	23 49	42.5	60 12.5	25 48	41.5	59 48.3	29 45	38.7	59 39.4	30 44	37.7	59 30.0	32 43	36.8	57 09.0	46 32	26.2	56 55.0	47 31	25.4	54 19.0	56 22	17.9	2
3	59 50.5	22 49	42.7	59 43.8	23 48	41.8	59 21.2	27 45	38.9	59 12.9	29 44	38.0	59 04.1	30 43	37.0	56 49.8	44 32	26.5	56 36.4	45 31	25.7	54 05.7	55 22	18.1	3
4	59 21.1	20 49	42.9	59 15.0	21 48	42.0	58 54.0	25 46	39.2	58 46.3	27 45	38.2	58 38.1	28 44	37.3	56 30.4	42 33	26.8	56 17.6	43 32	26.0	53 52.2	53 23	18.4	4
45	58 51.7	18 49	43.1	58 46.1	19 48	42.2	58 26.7	24 46	39.4	58 19.5	25 45	38.4	58 11.8	26 44	37.5	56 10.9	41 33	27.1	55 58.5	42 32	26.3	53 38.5	51 23	18.6	45
6	58 22.1	16 49	43.3	58 17.0	18 49	42.4	57 59.3	22 46	39.6	57 52.6	23 45	38.7	57 45.5	24 44	37.7	55 51.1	39 33	27.3	55 39.4	40 32	26.5	53 24.7	50 23	18.8	6
7	57 52.5	15 50	43.4	57 47.9	16 49	42.5	57 31.7	20 46	39.8	57 25.6	21 45	38.8	57 19.0	23 44	37.9	55 31.2	37 33	27.6	55 20.0	38 33	26.8	53 10.7	48 24	19.0	7
8	57 22.8	13 50	43.6	57 18.7	14 49	42.7	57 04.1	18 46	39.9	56 58.4	19 45	39.0	56 52.4	21 44	38.1	55 11.2	35 34	27.8	55 00.5	36 33	27.0	52 56.5	46 24	19.2	8
9	56 53.0	11 50	43.7	56 49.4	13 49	42.8	56 36.4	16 46	40.1	56 31.2	18 46	39.2	56 25.7	19 45	38.3	54 51.0	33 34	28.0	54 40.8	34 33	27.2	52 42.2	44 24	19.4	9
50	56 23.1	10 50	43.8	56 20.1	11 49	42.9	56 08.5	15 46	40.2	56 03.9	16 46	39.3	55 58.9	17 45	38.4	54 30.6	31 34	28.2	54 21.0	33 33	27.4	52 27.8	43 24	19.6	50
1	55 53.3	08 50	43.9	55 50.7	09 49	43.0	55 40.6	13 47	40.3	55 36.5	14 46	39.4	55 32.1	16 45	38.6	54 10.2	30 34	28.4	54 01.1	31 33	27.6	52 13.2	41 24	19.8	1
2	55 23.3	06 50	43.9	55 21.2	08 49	43.0	55 12.7	11 47	40.4	55 09.1	13 46	39.6	55 05.1	14 45	38.7	53 49.6	28 34	28.6	53 41.0	29 34	27.8	51 58.5	39 25	20.0	2
3	54 53.4	05 50	44.0	54 51.8	06 49	43.1	54 44.7	10 47	40.5	54 41.6	11 46	39.6	54 38.1	12 45	38.8	53 28.9	26 35	28.7	53 20.9	27 34	27.9	51 43.7	37 25	20.2	3
4	54 23.4	03 50	44.0	54 22.3	04 49	43.1	54 16.6	08 47	40.6	54 14.0	09 46	39.7	54 11.0	10 45	38.9	53 08.1	24 35	28.9	53 00.6	25 34	28.1	51 28.8	36 25	20.3	4
55	53 53.4	02 50	44.0	53 52.7	03 49	43.2	53 48.5	06 47	40.6	53 46.4	08 46	39.8	53 43.9	09 45	39.0	52 47.2	23 35	29.0	52 40.2	24 34	28.2	51 13.7	34 25	20.5	55
6	53 23.4	00 50	44.0	53 23.2	01 49	43.2	53 20.4	05 47	40.7	53 18.8	06 46	39.8	53 16.8	07 45	39.0	52 26.2	21 35	29.2	52 19.8	22 34	28.4	50 58.6	32 25	20.6	6
7	52 53.4	01 50	44.0	52 53.6	00 49	43.2	52 52.2	03 47	40.7	52 51.1	04 46	39.9	52 49.6	06 45	39.1	52 05.1	19 35	29.3	51 59.2	20 34	28.5	50 43.4	30 26	20.7	7
8	52 23.4	03 50	44.0	52 24.1	02 49	43.2	52 24.1	02 47	40.7	52 23.4	03 46	39.9	52 22.4	04 45	39.1	51 43.9	17 35	29.4	51 38.6	18 34	28.6	50 28.0	29 26	20.9	8
9	51 53.4	04 50	44.0	51 54.6	03 49	43.2	51 55.9	00 47	40.7	51 55.7	01 46	39.9	51 55.2	02 45	39.1	51 22.7	16 35	29.5	51 17.9	17 35	28.7	50 12.6	27 26	21.0	9
60	51 23.5	06 50	43.9	51 25.0	05 49	43.1	51 27.8	01 47	40.7	51 28.0	00 46	39.9	51 27.9	01 45	39.1	51 01.5	14 36	29.6	50 57.2	15 35	28.8	49 57.2	25 26	21.1	60
1	50 53.5	07 50	43.9	50 55.5	06 49	43.1	50 59.6	03 47	40.7	51 00.3	02 46	39.9	51 00.7	01 45	39.1	50 40.1	12 36	29.6	50 36.4	13 35	28.9	49 41.6	23 26	21.2	1
2	50 23.6	09 50	43.8	50 26.1	08 49	43.0	50 31.4	04 47	40.7	50 32.6	03 46	39.9	50 33.4	02 45	39.1	50 18.8	10 36	29.7	50 15.5	11 35	28.9	49 26.0	22 26	21.3	2
3	49 53.8	10 50	43.8	49 56.6	09 49	43.0	50 03.3	06 47	40.7	50 04.9	05 46	39.9	50 06.2	04 45	39.1	49 57.4	09 36	29.8	49 54.6	10 35	29.0	49 10.3	20 26	21.4	3
4	49 23.9	11 50	43.7	49 27.2	10 49	42.9	49 35.2	07 47	40.6	49 37.3	06 46	39.8	49 39.0	05 45	39.1	49 35.9	07 36	29.8	49 33.7	08 35	29.0	48 54.5	18 26	21.4	4
65	48 54.2	13 50	43.6	48 57.9	12 49	42.8	49 07.1	09 47	40.5	49 09.6	08 46	39.8	49 11.8	07 45	39.0	49 14.5	05 36	29.8	49 12.7	06 35	29.1	48 38.7	16 26	21.5	65
6	48 24.4	14 49	43.5	48 28.5	13 49	42.7	48 39.1	10 47	40.5	48 42.0	09 46	39.7	48 44.7	08 45	39.0	48 53.0	04 36	29.9	48 51.7	05 35	29.1	48 22.9	14 26	21.6	6
7	47 54.8	16 49	43.4	47 59.3	15 49	42.6	48 11.1	12 47	40.4	48 14.5	11 46	39.7	48 17.5	10 45	38.9	48 31.5	02 36	29.9	48 30.7	03 35	29.1	48 07.0	13 27	21.6	7
8	47 25.2	17 49	43.2	47 30.1	16 49	42.5	47 43.1	13 46	40.3	47 46.9	12 46	39.6	47 50.4	11 45	38.8	48 10.0	00 36	29.9	48 09.7	01 35	29.1	47 51.1	11 27	21.7	8
9	46 55.6	18 49	43.1	47 00.9	17 48	42.4	47 15.2	15 46	40.2	47 19.5	14 46	39.5	47 23.4	13 45	38.8	47 48.5	01 36	29.9	47 48.7	00 35	29.1	47 35.1	09 27	21.7	9
70	46 26.2	19 49	43.0	46 31.9	19 48	42.3	46 47.4	16 46	40.1	46 52.0	15 46	39.4	46 56.4	14 45	38.7	47 27.0	03 36	29.9	47 27.7	02 35	29.1	47 19.2	08 27	21.7	70
1	45 56.8	21 49	42.8	46 02.9	20 48	42.1	46 19.6	17 46	40.0	46 24.7	16 46	39.3	46 29.5	16 45	38.6	47 05.5	04 36	29.8	47 06.7	04 35	29.1	47 03.2	06 27	21.8	1
2	45 27.5	22 49	42.7	45 34.0	21 48	42.0	45 51.9	19 46	39.9	45 57.4	18 45	39.2	46 02.6	17 45	38.5	46 44.0	06 36	29.8	46 45.7	05 35	29.1	46 47.1	04 27	21.8	2
3	44 58.3	23 49	42.5	45 05.1	23 48	41.8	45 24.3	20 46	39.8	45 30.2	19 45	39.1	45 35.8	18 45	38.4	46 22.6	08 36	29.8	46 24.7	07 35	29.1	46 31.1	02 27	21.8	3
4	44 29.1	25 48	42.4	44 36.4	24 48	41.7	44 56.7	21 46	39.6	45 03.0	21 45	38.9	45 09.0	20 44	38.2	46 01.2	09 36	29.7	46 03.8	08 35	29.0	46 15.1	01 27	21.8	4
75	44 00.1	26 48	42.2	44 07.8	25 48	41.5	44 29.2	23 46	39.5	44 35.9	22 45	38.8	44 42.4	21 44	38.1	45 39.8	11 36	29.7	45 42.9	10 35	29.0	45 59.1	01 27	21.8	75
6	43 31.2	27 48	42.0	43 39.2	26 47	41.3	44 01.9	24 46	39.3	44 08.9	23 45	38.6	44 15.8	22 44	38.0	45 18.4	12 36	29.6	45 22.0	11 35	28.9	45 43.0	03 27	21.8	6
7	43 02.4	28 48	41.8	43 10.8	28 47	41.1	43 34.6	25 45	39.2	43 42.0	25 45	38.5	43 49.3	24 44	37.8	44 57 1	14 35	29.6	45 01.1	13 35	28.9	45 27.0	04 27	21.8	7
8	42 33.6	30 48	41.6	42 42.4	29 47	41.0	43 07.4	27 45	39.0	43 15.2	26 45	38.3	43 22.8	25 44	37.7	44 35.8	15 35	29.5	44 40.3	14 35	28.8	45 11.0	06 27	21.8	8
9	42 05.0	31 48	41.4	42 14.2	30 47	40.8	42 40.2	28 45	38.8	42 48.5	27 44	38.2	42 56.5	26 44	37.5	44 14.6	17 35	29.4	44 19.5	16 35	28.7	44 55.0	08 27	21.7	9
80	41 36.6	32 47	41.2	41 46.0	31 47	40.6	42 13.2	29 45	38.6	42 21.9	28 44	38.0	42 30.3	28 44	37.3	43 53.4	18 35	29.3	43 58.8	18 34	28.6	44 39.0	09 27	21.7	80
1	41 08.2	33 47	41.0	41 18.0	33 46	40.3	41 46.4	30 45	38.4	41 55.4	30 44	37.8	42 04.2	29 43	37.2	43 32.3	20 35	29.2	43 38.2	19 34	28.6	44 23.1	11 27	21.7	1
2	40 40.0	34 47	40.8	40 50.2	34 46	40.1	41 19.6	32 44	38.2	41 29.0	31 44	37.6	41 38.2	30 43	37.0	43 11.3	21 35	29.1	43 17.6	21 34	28.5	44 07.1	12 26	21.6	2
3	40 11.9	36 47	40.5	40 22.4	35 46	39.9	40 52.9	33 44	38.0	41 02.7	32 44	37.4	41 12.3	32 43	36.8	42 50.3	23 35	29.0	42 57.0	22 34	28.4	43 51.2	14 26	21.6	3
4	39 43.9	37 46	40.3	39 54.8	36 46	39.7	40 26.4	34 44	37.8	40 36.5	33 43	37.2	40 46.5	33 43	36.6	42 29.4	24 35	28.9	42 36.6	23 34	28.2	43 35.4	16 26	21.5	4
85	39 16.0	38 46	40.0	39 27.3	37 46	39.4	40 00.0	35 44	37.6	40 10.5	35 43	37.0	40 20.8	34 43	36.4	42 08.6	26 35	28.8	42 16.2	25 34	28.1	43 19.6	17 26	21.5	85
6	38 48.3	39 46	39.8	39 00.0	38 45	39.2	39 33.7	37 44	37.4	39 44.6	36 43	36.8	39 55.2	35 42	36.2	41 47.9	27 34	28.7	41 55.9	26 34	28.0	43 03.8	19 26	21.4	6
7	38 20.8	40 46	39.5	38 32.7	40 45	39.0	39 07.5	38 43	37.2	39 18.8	37 43	36.6	39 29.8	37 42	36.0	41 27.2	29 34	28.5	41 35.7	28 34	27.9	42 48.1	20 26	21.3	7
8	37 53.4	41 45	39.3	38 05.7	41 45	38.7	38 41.5	39 43	37.0	38 53.1	38 43	36.4	39 04.5	38 42	35.8	41 06.6	30 34	28.4	41 15.5	29 33	27.7	42 32.4	22 26	21.3	8
9	37 26.1	42 45	39.0	37 38.8	42 45	38.4	38 15.6	40 43	36.7	38 27.6	40 42	36.1	38 39.4	39 42	35.5	40 46.2	31 34	28.2	40 55.5	31 33	27.6	42 16.8	23 26	21.2	9
90	36 59.0	43 45	38.8	37 12.0	43 44	38.2	37 49.9	41 43	36.5	38 02.2	41 42	35.9	38 14.3	40 41	35.3	40 25.8	33 34	28.1	40 35.5	32 33	27.5	42 01.2	25 26	21.1	90

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	36 32.1	45 45	38.5	36 45.4	44 44	37.9	37 24.3	42 42	36.2	37 37.0	42 42	35.7	37 49.5	41 41	35.1	40 05.5	34 34	27.9	40 15.7	33 33	27.3	41 45.7	26 26	21.0	91
2	36 05.3	46 44	38.2	36 19.0	45 44	37.6	36 58.9	44 42	36.0	37 11.9	43 42	35.4	37 24.7	43 41	34.8	39 45.4	35 33	27.8	39 55.9	35 33	27.2	41 30.3	28 26	20.9	2
3	35 38.7	47 44	37.9	35 52.7	46 44	37.4	36 33.6	45 42	35.7	36 47.0	44 41	35.2	37 00.2	44 41	34.6	39 25.3	37 33	27.6	39 36.3	36 33	27.0	41 14.9	30 25	20.8	3
4	35 12.3	48 44	37.6	35 26.6	47 43	37.1	36 08.5	46 42	35.4	36 22.2	45 41	34.9	36 35.7	45 40	34.3	39 05.4	38 33	27.4	39 16.7	37 32	26.8	40 59.7	31 25	20.7	4
95	34 46.0	49 43	37.3	35 00.6	48 43	36.8	35 43.6	47 41	35.2	35 57.6	47 41	34.6	36 11.5	46 40	34.1	38 45.6	39 33	27.2	38 57.3	39 32	26.7	40 44.5	32 25	20.6	95
6	34 20.0	50 43	37.0	34 34.9	49 43	36.5	35 18.8	48 41	34.9	35 33.2	48 40	34.4	35 47.4	47 40	33.8	38 25.9	41 33	27.1	38 38.0	40 32	26.5	40 29.3	34 25	20.5	6
7	33 54.1	51 43	36.7	34 09.3	51 42	36.2	34 54.2	49 41	34.6	35 08.9	49 40	34.1	35 23.4	48 40	33.6	38 06.3	42 32	26.9	38 18.8	41 32	26.3	40 14.3	35 25	20.3	7
8	33 28.3	52 43	36.4	33 43.9	52 42	35.9	34 29.8	50 40	34.3	34 44.8	50 40	33.8	34 59.7	49 39	33.3	37 46.8	43 32	26.7	37 59.8	43 32	26.1	39 59.3	37 25	20.2	8
9	33 02.8	53 42	36.1	33 18.7	53 42	35.6	34 05.5	51 40	34.0	34 20.8	51 40	33.5	34 36.1	51 39	33.0	37 27.5	45 32	26.5	37 40.8	44 31	25.9	39 44.5	38 25	20.1	9
100	32 37.5	54 42	35.8	32 53.7	54 41	35.3	33 41.4	52 40	33.8	33 57.1	52 39	33.2	34 12.6	52 39	32.7	37 08.4	46 32	26.3	37 22.0	45 31	25.7	39 29.7	40 24	19.9	100
1	32 12.4	55 42	35.5	32 28.8	55 41	35.0	33 17.5	54 40	33.5	33 33.5	53 39	33.0	33 49.4	53 38	32.4	36 49.3	47 32	26.1	37 03.4	47 31	25.5	39 15.0	41 24	19.8	1
2	31 47.4	56 41	35.1	32 04.2	56 41	34.6	32 53.8	55 39	33.2	33 10.1	54 39	32.7	33 26.3	54 38	32.2	36 30.4	48 31	25.9	36 44.9	48 31	25.3	39 00.5	42 24	19.7	2
3	31 22.7	57 41	34.8	31 39.8	57 40	34.3	32 30.3	56 39	32.8	32 46.9	55 38	32.4	33 03.5	55 38	31.9	36 11.7	50 31	25.6	36 26.5	49 30	25.1	38 46.0	44 24	19.5	3
4	30 58.2	58 41	34.5	31 15.5	58 40	34.0	32 07.0	57 39	32.5	32 23.9	56 38	32.0	32 40.8	56 37	31.6	35 53.1	51 31	25.4	36 08.2	50 30	24.9	38 31.6	45 24	19.4	4
105	30 33.8	59 40	34.1	30 51.5	59 40	33.6	31 43.9	58 38	32.2	32 01.1	57 38	31.7	32 18.3	57 37	31.3	35 34.6	52 30	25.2	35 50.2	52 30	24.7	38 17.4	47 24	19.2	105
6	30 09.7	60 40	33.8	30 27.7	60 39	33.3	31 21.0	59 38	31.9	31 38.5	58 37	31.4	31 56.0	58 37	30.9	35 16.3	53 30	25.0	35 32.2	53 30	24.4	38 03.3	48 23	19.0	6
7	29 45.9	61 39	33.4	30 04.1	61 39	33.0	30 58.3	60 38	31.6	31 16.1	59 37	31.1	31 33.9	59 36	30.6	34 58.2	54 30	24.7	35 14.4	54 29	24.2	37 49.2	49 23	18.9	7
8	29 22.2	62 39	33.1	29 40.7	62 39	32.6	30 35.8	61 37	31.2	30 53.9	60 37	30.8	31 12.0	60 36	30.3	34 40.2	56 30	24.5	34 56.8	55 29	24.0	37 35.3	50 23	18.7	8
9	28 58.8	63 39	32.7	29 17.6	63 38	32.3	30 13.5	62 37	30.9	30 32.0	61 36	30.5	30 50.3	61 36	30.0	34 22.4	57 29	24.2	34 39.4	56 29	23.7	37 21.5	52 23	18.5	9
110	28 35.6	64 38	32.4	28 54.7	64 38	31.9	29 51.4	63 36	30.6	30 10.2	62 36	30.1	30 28.9	62 35	29.7	34 04.8	58 29	24.0	34 22.1	57 29	23.5	37 07.9	53 23	18.4	110
1	28 12.6	65 38	32.0	28 32.0	64 37	31.6	29 29.6	64 36	30.2	29 48.6	63 36	29.8	30 07.6	63 35	29.3	33 47.3	59 29	23.7	34 05.0	59 28	23.3	36 54.4	54 22	18.2	1
2	27 49.8	66 38	31.6	28 09.5	65 37	31.2	29 08.0	65 36	29.9	29 27.3	64 35	29.5	29 46.6	64 35	29.0	33 30.1	60 28	23.5	33 48.0	60 28	23.0	36 41.0	56 22	18.0	2
3	27 27.3	67 37	31.2	27 47.3	66 37	30.8	28 46.6	66 35	29.5	29 06.2	65 35	29.1	29 25.7	65 34	28.7	33 12.9	61 28	23.2	33 31.2	61 28	22.7	36 27.7	57 22	17.8	3
4	27 05.1	67 37	30.9	27 25.3	67 36	30.4	28 25.4	66 35	29.2	28 45.3	66 34	28.8	29 05.1	66 34	28.3	32 56.0	62 28	23.0	33 14.6	62 27	22.5	36 14.6	58 22	17.6	4
115	26 43.0	68 36	30.5	27 03.5	68 36	30.1	28 04.5	67 34	28.8	28 24.7	67 34	28.4	28 44.8	67 34	28.0	32 39.3	63 28	22.7	32 58.2	63 27	22.2	36 01.6	59 21	17.4	115
6	26 21.3	69 36	30.1	26 42.0	69 35	29.7	27 43.8	68 34	28.5	28 04.2	68 34	28.1	28 24.6	68 33	27.6	32 22.7	64 27	22.4	32 42.0	64 27	22.0	35 48.7	60 21	17.2	6
7	25 59.7	70 35	29.7	26 20.7	70 35	29.3	27 23.3	69 34	28.1	27 44.1	69 33	27.7	28 04.7	69 33	27.3	32 06.4	65 27	22.1	32 25.9	65 26	21.7	35 36.0	62 21	17.0	7
8	25 38.5	71 35	29.3	25 59.7	71 35	28.9	27 03.1	70 33	27.7	27 24.1	70 33	27.3	27 45.1	70 32	26.9	31 50.2	66 27	21.9	32 10.1	66 26	21.4	35 23.4	63 21	16.8	8
9	25 17.5	72 35	28.9	25 39.0	72 34	28.5	26 43.2	71 33	27.4	27 04.4	71 32	27.0	27 25.6	71 32	26.6	31 34.2	67 26	21.6	31 54.4	67 26	21.2	35 11.0	64 20	16.6	9
120	24 56.7	73 34	28.5	25 18.5	72 34	28.1	26 23.5	72 32	27.0	26 45.0	72 32	26.6	27 06.4	71 32	26.2	31 18.4	68 26	21.3	31 38.9	68 25	20.9	34 58.7	65 20	16.4	120
1	24 36.3	73 34	28.1	24 58.3	73 33	27.7	26 04.0	73 32	26.6	26 25.8	73 32	26.2	26 47.5	72 31	25.8	31 02.9	69 26	21.0	31 23.6	69 25	20.6	34 46.6	66 20	16.2	1
2	24 16.0	74 33	27.7	24 38.3	74 33	27.3	25 44.8	74 32	26.2	26 06.8	73 31	25.9	26 28.8	73 31	25.5	30 47.5	70 25	20.7	31 08.6	70 25	20.3	34 34.7	67 20	16.0	2
3	23 56.1	75 33	27.3	24 18.6	75 32	26.9	25 25.8	74 31	25.8	25 48.1	74 31	25.5	26 10.4	74 30	25.1	30 32.3	71 25	20.4	30 53.7	71 24	20.0	34 22.9	68 19	15.8	3
4	23 36.4	76 32	26.9	23 59.2	76 32	26.5	25 07.1	75 31	25.5	25 29.7	75 30	25.1	25 52.2	75 30	24.7	30 17.4	72 25	20.1	30 39.0	72 24	19.7	34 11.2	69 19	15.5	4
125	23 17.1	77 32	26.5	23 40.0	77 31	26.1	24 48.7	76 30	25.1	25 11.5	76 30	24.7	25 34.3	76 29	24.3	30 02.6	73 24	19.8	30 24.6	73 24	19.4	33 59.7	70 19	15.3	125
6	22 58.0	77 31	26.1	23 21.2	77 31	25.7	24 30.6	77 30	24.7	24 53.6	77 29	24.3	25 16.6	77 29	24.0	29 48.1	74 24	19.5	30 10.3	74 23	19.1	33 48.4	71 19	15.1	6
7	22 39.1	78 31	25.6	23 02.6	78 31	25.3	24 12.7	78 29	24.3	24 36.0	78 29	23.9	24 59.2	77 29	23.6	29 33.8	75 23	19.2	29 56.3	75 23	18.8	33 37.3	72 18	14.9	7
8	22 20.6	79 30	25.2	22 44.3	79 30	24.9	23 55.1	78 29	23.9	24 18.6	78 28	23.5	24 42.1	78 28	23.2	29 19.7	76 23	18.9	29 42.4	76 23	18.5	33 26.3	73 18	14.6	8
9	22 02.4	80 30	24.8	22 26.3	80 30	24.5	23 37.8	79 28	23.5	24 01.5	79 28	23.1	24 25.2	79 28	22.8	29 05.8	77 23	18.6	29 28.8	77 22	18.2	33 15.5	74 18	14.4	9
130	21 44.4	81 29	24.4	22 08.6	80 29	24.0	23 20.7	80 28	23.1	23 44.7	80 28	22.7	24 08.6	80 27	22.4	28 52.2	78 22	18.3	29 15.5	78 22	17.9	33 04.9	75 17	14.1	130
1	21 26.8	81 29	23.9	21 51.1	81 29	23.6	23 04.0	81 27	22.6	23 28.2	81 27	22.3	23 52.3	80 27	22.0	28 38.8	79 22	17.9	29 02.3	78 22	17.6	32 54.4	76 17	13.9	1
2	21 09.4	82 28	23.5	21 34.0	82 28	23.2	22 47.5	81 27	22.2	23 11.9	81 27	21.9	23 36.3	81 26	21.6	28 25.6	79 22	17.6	28 49.4	79 21	17.3	32 44.1	77 17	13.7	2
3	20 52.4	83 28	23.0	21 17.2	83 28	22.7	22 31.3	82 26	21.8	22 55.9	82 26	21.5	23 20.5	82 26	21.2	28 12.6	80 21	17.3	28 36.7	80 21	17.0	32 34.0	78 17	13.4	3
4	20 35.6	83 27	22.6	21 00.6	83 27	22.3	22 15.4	83 26	21.4	22 40.2	83 26	21.1	23 05.1	83 25	20.8	27 59.9	81 21	17.0	28 24.2	81 20	16.6	32 24.1	79 16	13.2	4
135	20 19.2	84 27	22.1	20 44.4	84 27	21.9	21 59.8	84 26	21.0	22 24.9	84 25	20.7	22 49.9	83 25	20.4	27 47.4	82 20	16.6	28 11.9	82 20	16.3	32 14.4	80 16	12.9	135
6	20 03.1	85 26	21.7	20 28.5	85 26	21.4	21 44.5	84 25	20.6	22 09.8	84 25	20.3	22 35.0	84 24	20.0	27 35.2	83 20	16.3	27 59.9	82 20	16.0	32 04.8	81 16	12.7	6
7	19 47.3	85 26	21.2	20 12.9	85 25	21.0	21 29.5	85 24	20.1	21 55.0	85 24	19.8	22 20.4	85 24	19.6	27 23.2	83 20	16.0	27 48.2	83 19	15.7	31 55.5	82 15	12.4	7
8	19 31.8	86 25	20.8	19 57.6	86 25	20.5	21 14.8	86 24	19.7	21 40.5	86 24	19.4	22 06.1	85 23	19.1	27 11.4	84 19	15.6	27 36.6	84 19	15.3	31 46.3	82 15	12.1	8
9	19 16.7	87 25	20.3	19 42.6	87 24	20.1	21 00.4	86 24	19.3	21 26.3	86 23	19.0	21 52.1	86 23	18.7	26 59.9	85 19	15.3	27 25.3	85 18	15.0	31 37.3	83 15	11.9	9
140	19 01.8	87 24	19.9	19 28.0	87 24	19.6	20 46.3	87 23	18.8	21 12.4	87 23	18.6	21 38.4	87 22	18.3	26 48.6	86 18	15.0	27 14.3	85 18	14.7	31 28.5	84 14	11.6	140
1	18 47.3	88 24	19.4	19 13.6	88 23	19.2	20 32.5	88 22	18.4	20 58.8	87 22	18.1	21 25.0	87 22	17.9	26 37.6	86 18	14.6	27 03.5	86 18	14.3	31 19.9	85 14	11.4	1
2	18 33.1	88 23	18.9	18 59.6	88 23	18.7	20 19.1	88 22	18.0	20 45.5	88 22	17.7	21 11.9	88 21	17.4	26 26.9	87 18	14.3	26 52.9	87 17	14.0	31 11.5	86 14	11.1	2
3	18 19.3	89 23	18.5	18 46.0	89 22	18.2	20 05.9	89 21	17.5	20 32.5	89 21	17.3	20 59.1	89 21	17.0	26 16.3	88 17	13.9	26 42.6	87 17	13.6	31 03.3	86 13	10.8	3
4	18 05.8	90 22	18.0	18 32.6	90 22	17.8	19 53.1	89 21	17.1	20 19.9	89 21	16.8	20 46.7	89 20	16.6	26 06.1	88 17	13.6	26 32.5	88 16	13.3	30 55.3	87 13	10.6	4
145	17 52.6	90 21	17.5	18 19.6	90 21	17.3	19 40.6	90 20	16.6	20 07.6	90 20	16.4	20 34.5	90 20	16.1	25 56.1	89 16	13.2	26 22.7	89 16	13.0	30 47.5	88 13	10.3	145
6	17 39.8	91 21	17.1	18 06.9	91 21	16.8	19 28.4	90 20	16.2	19 55.5	90 20	15.9	20 22.6	90 19	15.7	25 46.4	89 16	12.9	26 13.2	89 16	12.6	30 39.9	88 12	10.0	6
7	17 27.3	91 20	16.6	17 54.6	91 20	16.4	19 16.6	91 19	15.7	19 43.8	91 19	15.5	20 11.1	91 19	15.3	25 36.9	90 15	12.5	26 03.9	90 15	12.3	30 32.5	89 12	09.7	7
8	17 15.1	92 20	16.1	17 42.6	92 19	15.9	19 05.0	92 19	15.3	19 32.5	91 18	15.0	19 59.9	91 18	14.8	25 27.7	91 15	12.1	25 54.9	91 15	11.9	30 25.3	90 12	09.5	8
9	17 03.3	92 19	15.6	17 31.0	92 19	15.4	18 53.8	92 18	14.8	19 21.4	92 18	14.6	19 49.0	92 18	14.4	25 18.7	91 14	11.8	25 46.1	91 14	11.6	30 18.4	90 11	09.2	9
150	16 51.9	93 18	15.1	17 19.7	93 18	14.9	18 43.0	93 18	14.3	19 10.7	92 17	14.1	19 38.5	92 17	13.9	25 10.1	92 14	11.4	25 37.6	92 14	11.2	30 11.6	91 11	08.9	150
1	16 40.8	93 18	14.7	17 08.7	93 18	14.5	18 32.4	93 17	13.9	19 00.3	93 17	13.7	19 28.2	93 17	13.5	25 01.6	92 14	11.1	25 29.3	92 13	10.8	30 05.0	92 11	08.6	1
2	16 30.0	94 17	14.2	16 58.1	94 17	14.0	18 22.3	93 16	13.4	18 50.3	93 16	13.2	19 18.3	93 16	13.1	24 53.5	93 13	10.7	25 21.3	93 13	10.5	29 58.7	92 10	08.3	2
3	16 19.6	94 17	13.7	16 47.8	94 17	13.5	18 12.4	94 16	13.0	18 40.6	94 16	12.8	19 08.7	94 15	12.6	24 45.6	93 13	10.3	25 13.6	93 12	10.1	29 52.5	93 10	08.0	3
4	16 09.6	94 16	13.2	16 37.9	94 16	13.0	18 02.9	94 15	12.5	18 31.2	94 15	12.3	18 59.5	94 15	12.1	24 38.0	94 12	10.0	25 06.2	94 12	09.8	29 46.6	93 10	07.8	4
155	15 59.9	95 16	12.7	16 28.4	95 15	12.5	17 53.7	95 15	12.0	18 22.1	95 14	11.9	18 50.6	95 14	11.7	24 30.7	94 12	09.6	24 59.0	94 12	09.4	29 40.9	94 09	07.5	155
6	15 50.6	95 15	12.2	16 19.2	95 15	12.0	17 44.9	95 14	11.6	18 13.4	95 14	11.4	18 42.0	95 14	11.2	24 23.7	95 11	09.2	24 52.1	95 11	09.0	29 35.4	94 09	07.2	6
7	15 41.7	96 14	11.7	16 10.4	96 14	11.6	17 36.4	96 14	11.1	18 05.1	96 13	10.9	18 33.7	96 13	10.8	24 16.9	95 11	08.8	24 45.4	95 11	08.7	29 30.1	95 08	06.9	7
8	15 33.1	96 14	11.2	16 01.9	96 14	11.1	17 28.3	96 13	10.6	17 57.1	96 13	10.5	18 25.8	96 13	10.3	24 10.4	96 10	08.5	24 39.1	96 10	08.3	29 25.0	95 08	06.6	8
9	15 24.9	96 13	10.7	15 53.8	96 13	10.6	17 20.5	96 12	10.2	17 49.4	96 12	10.0	18 18.3	96 12	09.9	24 04.2	96 10	08.1	24 33.0	96 10	07.9	29 20.1	96 08	06.3	9
160	15 17.1	97 12	10.2	15 46.1	97 12	10.1	17 13.1	97 12	09.7	17 42.0	97 12	09.5	18 11.0	97 11	09.4	23 58.3	96 09	07.7	24 27.2	96 09	07.6	29 15.5	96 07	06.0	160
1	15 09.6	97 12	09.7	15 38.7	97 12	09.6	17 06.0	97 11	09.2	17 35.1	97 11	09.1	18 04.1	97 11	08.9	23 52.6	97 09	07.3	24 21.6	97 09	07.2	29 11.1	96 07	05.7	1
2	15 02.5	97 11	09.2	15 31.7	97 11	09.1	16 59.3	97 11	08.7	17 28.4	97 10	08.6	17 57.6	97 10	08.5	23 47.3	97 08	07.0	24 16.4	97 08	06.8	29 06.9	97 07	05.4	2
3	14 55.8	98 11	08.7	15 25.1	98 10	08.6	16 52.9	98 10	08.2	17 22.2	98 10	08.1	17 51.4	98 10	08.0	23 42.2	97 08	06.6	24 11.4	97 08	06.4	29 02.9	97 06	05.1	3
4	14 49.5	98 10	08.2	15 18.8	98 10	08.1	16 46.9	98 09	07.8	17 16.2	98 09	07.7	17 45.6	98 09	07.6	23 37.4	98 08	06.2	24 06.7	98 07	06.1	28 59.2	97 06	04.8	4
165	14 43.5	98 09	07.7	15 12.9	98 09	07.6	16 41.2	98 09	07.3	17 10.7	98 09	07.2	17 40.1	98 09	07.1	23 32.9	98 07	05.8	24 02.2	98 07	05.7	28 55.7	98 06	04.5	165
6	14 37.9	98 09	07.2	15 07.4	98 09	07.1	16 35.9	98 08	06.8	17 05.4	98 08	06.7	17 34.9	98 08	06.6	23 28.6	98 07	05.4	23 58.1	98 06	05.3	28 52.4	98 05	04.2	6
7	14 32.7	99 08	06.7	15 02.3	99 08	06.6	16 31.0	99 08	06.3	17 00.6	99 08	06.2	17 30.1	99 07	06.1	23 24.7	98 06	05.0	23 54.2	98 06	04.9	28 49.3	98 05	03.9	7
8	14 27.9	99 07	06.2	14 57.5	99 07	06.1	16 26.4	99 07	05.8	16 56.1	99 07	05.8	17 25.7	99 07	05.7	23 21.1	99 06	04.7	23 50.7	99 06	04.6	28 46.5	99 04	03.6	8
9	14 23.4	99 07	05.7	14 53.1	99 07	05.6	16 22.2	99 06	05.4	16 51.9	99 06	05.3	17 21.6	99 06	05.2	23 17.7	99 05	04.3	23 47.4	99 05	04.2	28 43.8	99 04	03.3	9
170	14 19.4	99 06	05.1	14 49.1	99 06	05.1	16 18.4	99 06	04.9	16 48.1	99 06	04.8	17 17.8	99 06	04.7	23 14.6	99 05	03.9	23 44.4	99 05	03.8	28 41.4	99 04	03.0	170
1	14 15.7	99 06	04.6	14 45.5	99 05	04.6	16 14.9	99 05	04.4	16 44.7	99 05	04.3	17 14.5	99 05	04.3	23 11.9	99 04	03.5	23 41.6	99 04	03.4	28 39.3	99 03	02.7	1
2	14 12.4	99 05	04.1	14 42.2	99 05	04.1	16 11.8	99 05	03.9	16 41.6	99 05	03.8	17 11.4	99 04	03.8	23 09.4	99 04	03.1	23 39.2	99 04	03.1	28 37.3	99 03	02.4	2
3	14 09.5	1.0 04	03.6	14 39.4	1.0 04	03.6	16 09.0	1.0 04	03.4	16 38.9	1.0 04	03.4	17 08.8	1.0 04	03.3	23 07.2	1.0 03	02.7	23 37.0	1.0 03	02.7	28 35.6	1.0 02	02.1	3
4	14 07.0	1.0 04	03.1	14 36.9	1.0 04	03.0	16 06.6	1.0 03	02.9	16 36.5	1.0 03	02.9	17 06.4	1.0 03	02.8	23 05.3	1.0 03	02.3	23 35.2	1.0 03	02.3	28 34.1	1.0 02	01.8	4
175	14 04.9	1.0 03	02.6	14 34.8	1.0 03	02.5	16 04.6	1.0 03	02.4	16 34.5	1.0 03	02.4	17 04.5	1.0 03	02.4	23 03.7	1.0 02	01.9	23 33.6	1.0 02	01.9	28 32.9	1.0 02	01.5	175
6	14 03.1	1.0 02	02.1	14 33.1	1.0 02	02.0	16 02.9	1.0 02	02.0	16 32.9	1.0 02	01.9	17 02.9	1.0 02	01.9	23 02.3	1.0 02	01.6	23 32.3	1.0 02	01.5	28 31.8	1.0 01	01.2	6
7	14 01.7	1.0 02	01.5	14 31.7	1.0 02	01.5	16 01.7	1.0 02	01.5	16 31.6	1.0 02	01.4	17 01.6	1.0 02	01.4	23 01.3	1.0 01	01.2	23 31.3	1.0 01	01.1	28 31.0	1.0 01	00.9	7
8	14 00.8	1.0 01	01.0	14 30.8	1.0 01	01.0	16 00.7	1.0 01	01.0	16 30.7	1.0 01	01.0	17 00.7	1.0 01	00.9	23 00.6	1.0 01	00.8	23 30.6	1.0 01	00.8	28 30.5	1.0 01	00.6	8
9	14 00.2	1.0 00	00.5	14 30.2	1.0 00	00.5	16 00.2	1.0 00	00.5	16 30.2	1.0 00	00.5	17 00.2	1.0 00	00.5	23 00.1	1.0 00	00.4	23 30.1	1.0 00	00.4	28 30.1	1.0 00	00.3	9
180	14 00.0	1.0 00	00.0	14 30.0	1.0 00	00.0	16 00.0	1.0 00	00.0	16 30.0	1.0 00	00.0	17 00.0	1.0 00	00.0	23 00.0	1.0 00	00.0	23 30.0	1.0 00	00.0	28 30.0	1.0 00	00.0	180

STAR IDENTIFICATION TABLE

ALTITUDE

Lat. 44°

AZ.	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	50	180	54	180	58	180	62	180	66	180	70	180	74	180	78	180	82	180	86	180	90	...	00
4	50	174	54	173	58	173	62	172	66	171	70	169	74	167	78	164	81	158	85	142	87	89	4
8	49	168	53	167	57	165	61	164	65	162	69	159	73	156	76	150	80	140	83	121	84	87	8
12	49	162	53	160	56	158	60	156	64	154	68	150	71	145	75	138	78	127	80	110	81	86	12
16	48	156	51	154	55	152	59	149	63	146	66	142	69	136	73	128	75	118	77	103	79	84	16
20	46	150	50	148	54	146	57	143	61	139	64	134	67	128	70	121	73	111	75	98	76	83	20
24	45	145	48	143	52	140	55	136	59	133	62	128	65	122	68	114	70	105	72	94	73	82	24
28	43	140	47	137	50	134	53	131	57	127	60	122	62	116	65	109	67	101	69	91	70	80	28
32	41	135	44	133	48	129	51	126	54	122	57	117	60	111	62	105	64	97	66	88	67	79	32
36	39	131	42	128	46	125	49	121	52	117	55	112	57	107	60	101	62	94	63	86	64	77	36
40	37	127	40	124	43	121	46	117	49	113	52	108	54	103	57	97	59	91	60	84	62	76	40
44	34	123	38	120	41	117	44	113	46	109	49	104	52	100	54	94	56	88	57	81	59	74	44
48	32	119	35	116	38	113	41	109	44	105	46	101	49	96	51	91	53	86	55	79	56	73	48
52	29	116	32	113	35	109	38	106	41	102	43	98	46	93	48	88	50	83	52	77	53	71	52
56	27	112	30	109	33	106	35	102	38	99	41	95	43	90	45	86	47	81	49	75	51	70	56
60	24	109	27	106	30	103	32	99	35	96	38	92	40	88	42	83	44	79	46	74	48	68	60
64	21	106	24	103	27	100	30	96	32	93	35	89	37	85	39	81	42	76	43	72	45	67	64
68	18	103	21	100	24	97	27	93	29	90	32	86	34	82	37	78	39	74	41	70	43	65	68
72	16	100	18	97	21	94	24	91	27	87	29	84	31	80	34	76	36	72	38	68	40	63	72
76	13	97	16	94	18	91	21	88	24	84	26	81	29	78	31	74	33	70	35	66	37	62	76
80	10	94	13	91	15	88	18	85	21	82	23	79	26	75	28	72	31	68	33	64	35	60	80
84	07	91	10	88	13	85	15	82	18	79	21	76	23	73	26	69	28	66	30	62	32	58	84
88	04	89	07	86	10	83	12	80	15	77	18	74	20	70	23	67	25	63	28	60	30	56	88
92	01	86	04	83	07	80	10	77	12	74	15	71	18	68	20	65	23	61	25	58	28	54	92
96	*02*	83	01	80	04	77	07	74	10	71	12	68	15	65	18	62	20	59	23	56	25	52	96
100	*04*	80	*02*	77	01	74	04	72	07	69	10	66	12	63	15	60	18	57	21	54	23	50	100
104	*07*	77	*04*	74	*01*	72	01	69	04	66	07	63	10	60	13	58	16	55	18	52	21	48	104
108	*10*	74	*07*	72	*04*	69	*01*	66	02	63	05	61	07	58	10	55	13	52	16	49	19	46	108
112	*13*	71	*10*	69	*07*	66	*04*	63	*01*	61	02	58	05	55	08	53	11	50	14	47	17	44	112
116	*15*	68	*12*	66	*09*	63	*06*	60	*03*	58	*00*	55	03	53	06	50	09	47	12	45	15	42	116
120	*18*	65	*15*	63	*12*	60	*09*	57	*06*	55	*03*	52	00	50	04	47	07	45	10	42	13	40	120
124	*21*	62	*18*	59	*14*	57	*11*	54	*08*	52	*05*	49	*02*	47	02	45	05	42	08	40	11	37	124
128	*23*	59	*20*	56	*17*	54	*14*	51	*10*	49	*07*	46	*04*	44	*00*	42	03	40	06	37	09	35	128
132	*26*	55	*22*	53	*19*	50	*16*	48	*12*	46	*09*	43	*06*	41	*02*	39	01	37	04	35	08	33	132
136	*28*	52	*25*	49	*21*	47	*18*	45	*14*	42	*11*	40	*08*	38	*04*	36	*01*	34	03	32	06	30	136
140	*30*	48	*27*	45	*23*	43	*20*	41	*16*	39	*13*	37	*09*	35	*06*	33	*02*	31	01	30	05	28	140
144	*32*	44	*29*	42	*25*	39	*22*	37	*18*	36	*14*	34	*11*	32	*07*	30	*04*	28	00	27	04	25	144
148	*34*	40	*30*	38	*27*	36	*23*	34	*20*	32	*16*	30	*12*	29	*09*	27	*05*	25	*01*	24	03	22	148
152	*36*	35	*32*	33	*28*	31	*25*	30	*21*	28	*17*	27	*14*	25	*10*	24	*06*	22	*02*	21	01	20	152
156	*37*	31	*34*	29	*30*	27	*26*	26	*22*	24	*19*	23	*15*	22	*11*	21	*07*	19	*03*	18	01	17	156
160	*39*	26	*35*	24	*31*	23	*27*	22	*23*	21	*20*	19	*16*	18	*12*	17	*08*	16	*04*	15	*00*	14	160
164	*40*	21	*36*	20	*32*	19	*28*	18	*24*	17	*20*	16	*17*	15	*13*	14	*09*	13	*05*	12	*01*	11	164
168	*41*	16	*37*	15	*33*	14	*29*	13	*25*	12	*21*	12	*17*	11	*13*	10	*09*	10	*05*	09	*01*	09	168
172	*41*	11	*37*	10	*34*	09	*30*	09	*26*	08	*22*	08	*18*	07	*14*	07	*10*	07	*06*	06	*02*	06	172
176	*42*	05	*38*	05	*34*	05	*30*	04	*26*	04	*22*	04	*18*	04	*14*	03	*10*	03	*06*	03	*02*	03	176
180	*42*	00	*38*	00	*34*	00	*30*	00	*26*	00	*22*	00	*18*	00	*14*	00	*10*	00	*06*	00	*02*	00	180
	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		

16—11439

FIGURES IN ITALICS INDICATE THAT DECLINATION IS OF CONTRARY NAME TO LATITUDE

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STAR IDENTIFICATION TABLE

AZ.	48°		52°		56°		60°		64°		68°		72°		76°		80°		84°		88°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	86	00	82	00	78	00	74	00	70	00	66	00	62	00	58	00	54	00	50	00	46	00	00
4	85	33	82	17	78	11	74	07	70	05	66	04	62	03	58	02	54	01	50	01	46	00	4
8	83	51	80	31	77	20	73	14	69	10	66	07	62	05	58	04	54	02	50	01	46	00	8
12	81	60	79	41	76	28	72	20	69	15	65	11	61	08	58	05	54	03	50	02	46	01	12
16	78	65	77	47	74	35	71	25	68	19	65	14	61	10	57	07	54	05	50	03	46	01	16
20	76	67	74	52	73	40	70	30	67	23	64	17	60	12	57	09	53	06	50	03	46	01	20
24	73	68	72	55	71	43	68	34	66	26	63	20	60	14	56	10	53	07	49	04	46	01	24
28	70	68	70	57	69	46	67	37	65	29	62	22	59	16	56	12	53	08	49	04	46	01	28
32	68	68	67	58	66	48	65	39	63	31	61	24	58	18	55	13	52	09	49	05	46	02	32
36	65	68	65	59	64	49	63	41	62	33	60	26	57	20	55	14	52	09	49	05	46	02	36
40	62	67	62	59	62	50	61	42	60	34	58	27	56	21	54	15	51	10	48	06	46	02	40
44	60	67	60	59	60	51	59	43	58	35	57	28	55	22	53	16	51	11	48	06	45	02	44
48	57	66	58	58	58	51	57	44	57	36	56	29	54	23	52	17	50	12	48	07	45	02	48
52	54	65	55	58	55	51	55	44	55	37	54	30	53	24	51	18	50	12	47	07	45	02	52
56	52	64	53	57	53	51	53	44	53	37	53	31	52	24	50	18	49	13	47	07	45	02	56
60	49	62	50	56	51	50	51	44	51	38	51	31	51	25	50	19	48	13	47	08	45	02	60
64	47	61	48	56	49	50	49	44	50	38	50	31	49	25	49	19	48	13	46	08	45	03	64
68	44	60	46	55	47	49	47	43	48	37	48	31	48	25	48	19	47	14	46	08	45	03	68
72	42	58	43	53	44	48	45	43	46	37	47	31	47	25	47	20	46	14	46	08	45	03	72
76	39	57	41	52	42	47	44	42	44	37	45	31	46	25	46	20	46	14	45	08	44	03	76
80	37	55	39	51	40	46	42	41	43	36	44	31	44	25	45	20	45	14	45	08	44	03	80
84	35	54	36	50	38	45	40	40	41	35	42	30	43	25	44	19	44	14	44	08	44	03	84
88	32	52	34	48	36	44	38	39	39	35	41	30	42	25	43	19	44	14	44	08	44	03	88
92	30	51	32	47	34	42	36	38	38	34	39	29	41	24	42	19	43	14	43	08	44	03	92
96	28	49	30	45	32	41	34	37	36	33	38	28	40	24	41	19	42	13	43	08	44	03	96
100	26	47	28	43	30	40	33	36	35	32	37	27	38	23	40	18	41	13	43	08	44	03	100
104	24	45	26	42	29	38	31	34	33	31	35	26	37	22	39	18	41	13	42	08	43	03	104
108	22	43	24	40	27	37	29	33	32	29	34	25	36	21	38	17	40	12	42	08	43	03	108
112	20	41	22	38	25	35	28	32	30	28	33	24	35	21	38	16	40	12	42	07	43	03	112
116	18	39	21	36	24	33	26	30	29	27	32	23	34	20	37	16	39	12	41	07	43	02	116
120	16	37	19	34	22	31	25	29	28	25	31	22	33	19	36	15	38	11	41	07	43	02	120
124	14	35	17	32	21	30	24	27	27	24	30	21	32	18	35	14	38	11	40	07	43	02	124
128	13	33	16	30	19	28	22	25	25	22	29	20	32	17	35	13	37	10	40	06	43	02	128
132	11	30	15	28	18	26	21	23	24	21	28	18	31	16	34	13	37	09	40	06	43	02	132
136	10	28	13	26	17	24	20	22	23	19	27	17	30	14	33	12	36	09	40	05	43	02	136
140	08	26	12	24	16	22	19	20	23	18	26	16	29	13	33	11	36	08	39	05	42	02	140
144	07	23	11	22	15	20	18	18	22	16	25	14	29	12	32	10	36	07	39	05	42	02	144
148	06	21	10	19	14	18	17	16	21	14	25	13	28	11	32	09	35	06	39	04	42	01	148
152	05	18	09	17	13	16	17	14	20	13	24	11	28	09	31	08	35	06	39	04	42	01	152
156	04	16	08	15	12	13	16	12	20	11	23	10	27	08	31	07	35	05	38	03	42	01	156
160	04	13	08	12	11	11	15	10	19	09	23	08	27	07	31	06	35	04	38	03	42	01	160
164	03	11	07	10	11	09	15	08	19	07	23	06	27	05	30	04	34	03	38	02	42	01	164
168	03	08	07	07	11	07	14	06	18	06	22	05	26	04	30	03	34	03	38	02	42	01	168
172	02	05	06	05	10	05	14	04	18	04	22	03	26	03	30	02	34	02	38	01	42	00	172
176	02	03	06	02	10	02	14	02	18	02	22	02	26	01	30	01	34	01	38	01	42	00	176
180	02	00	06	00	10	00	14	00	18	00	22	00	26	00	30	00	34	00	38	00	42	00	180
	48°		52°		56°		60°		64°		68°		72°		76°		80°		84°		88°		

16—11439

FIGURES IN ITALICS INDICATE THAT DECLINATION IS OF CONTRARY NAME TO LATITUDE

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Lat. 45°

H.A.	0° 00′			0° 30′			1° 00′			1° 30′			2° 00′			2° 30′			3° 00′			3° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	
00	45 00.0	1.0 01	180.0	45 30.0	1.0 01	180.0	46 00.0	1.0 01	180.0	46 30.0	1.0 01	180.0	47 00.0	1.0 01	180.0	47 30.0	1.0 01	180.0	48 00.0	1.0 01	180.0	48 30.0	1.0 01	180.0	00
1	44 59.5	1.0 03	178.6	45 29.5	1.0 03	178.6	45 59.5	1.0 03	178.6	46 29.5	1.0 03	178.5	46 59.5	1.0 03	178.5	47 29.5	1.0 03	178.5	47 59.4	1.0 03	178.5	48 29.4	1.0 03	178.5	1
2	44 57.9	1.0 04	177.2	45 27.9	1.0 04	177.1	45 57.9	1.0 04	177.1	46 27.9	1.0 04	177.1	46 57.8	1.0 05	177.1	47 27.8	1.0 05	177.0	47 57.8	1.0 05	177.0	48 27.8	1.0 05	177.0	2
3	44 55.3	1.0 06	175.8	45 25.3	1.0 06	175.7	45 55.2	1.0 06	175.7	46 25.2	1.0 06	175.6	46 55.1	1.0 06	175.6	47 25.1	1.0 06	175.6	47 55.0	1.0 06	175.5	48 25.0	1.0 06	175.5	3
4	44 51.6	1.0 08	174.4	45 21.6	1.0 08	174.3	45 51.5	1.0 08	174.3	46 21.4	1.0 08	174.2	46 51.3	1.0 08	174.1	47 21.3	1.0 08	174.1	47 51.2	1.0 08	174.0	48 21.1	1.0 08	174.0	4
05	44 46.9	1.0 10	172.9	45 16.8	1.0 10	172.9	45 46.7	1.0 10	172.8	46 16.6	1.0 10	172.8	46 46.5	1.0 10	172.7	47 16.4	1.0 10	172.6	47 46.2	1.0 10	172.6	48 16.1	1.0 10	172.5	05
6	44 41.2	99 11	171.5	45 11.1	99 11	171.5	45 40.9	99 11	171.4	46 10.7	99 12	171.3	46 40.5	99 12	171.2	47 10.4	99 12	171.2	47 40.2	99 12	171.1	48 10.0	99 12	171.0	6
7	44 34.5	99 13	170.1	45 04.2	99 13	170.1	45 34.0	99 13	170.0	46 03.8	99 13	169.9	46 33.6	99 13	169.8	47 03.3	99 14	169.7	47 33.1	99 14	169.6	48 02.8	99 14	169.5	7
8	44 26.7	99 15	168.8	44 56.4	99 15	168.7	45 26.1	99 15	168.6	45 55.8	99 15	168.5	46 25.5	99 15	168.4	46 55.2	99 15	168.3	47 24.9	99 15	168.1	47 54.6	99 16	168.0	8
9	44 17.9	99 16	167.4	44 47.6	99 16	167.3	45 17.2	99 17	167.2	45 46.8	99 17	167.0	46 16.4	99 17	166.9	46 46.0	99 17	166.8	47 15.7	99 17	166.7	47 45.2	99 17	166.6	9
10	44 08.2	99 18	166.0	44 37.7	99 18	165.9	45 07.3	99 18	165.8	45 36.8	99 18	165.6	46 06.3	98 19	165.5	46 35.9	98 19	165.4	47 05.4	98 19	165.2	47 34.9	98 19	165.1	10
1	43 57.4	98 20	164.6	44 26.9	98 20	164.5	44 56.3	98 20	164.4	45 25.8	98 20	164.2	45 55.2	98 20	164.1	46 24.6	98 20	163.9	46 54.0	98 21	163.8	47 23.4	98 21	163.7	1
2	43 45.7	98 21	163.3	44 15.0	98 21	163.1	44 44.4	98 22	163.0	45 13.7	98 22	162.8	45 43.1	98 22	162.7	46 12.4	98 22	162.5	46 41.7	98 22	162.4	47 11.0	98 22	162.2	2
3	43 33.0	98 23	161.9	44 02.2	98 23	161.8	44 31.5	97 23	161.6	45 00.7	97 23	161.5	45 30.0	97 23	161.3	45 59.2	97 24	161.1	46 28.4	97 24	161.0	46 57.5	97 24	160.8	3
4	43 19.3	97 24	160.6	43 48.5	97 24	160.4	44 17.6	97 25	160.2	44 46.8	97 25	160.1	45 15.9	97 25	159.9	45 45.0	97 25	159.7	46 14.0	97 26	159.6	46 43.1	97 26	159.4	4
15	43 04.8	97 26	159.2	43 33.8	97 26	159.1	44 02.8	97 26	158.9	44 31.8	97 26	158.7	45 00.8	97 27	158.5	45 29.8	97 27	158.4	45 58.7	96 27	158.2	46 27.7	96 27	158.0	15
6	42 49.3	96 27	157.9	43 18.2	96 28	157.7	43 47.1	96 28	157.6	44 16.0	96 28	157.4	44 44.8	96 28	157.2	45 13.7	96 28	157.0	45 42.5	96 29	156.8	46 11.3	96 29	156.6	6
7	42 32.9	96 29	156.6	43 01.7	96 29	156.4	43 30.4	96 29	156.2	43 59.2	96 29	156.0	44 27.9	96 30	155.8	44 56.6	96 30	155.6	45 25.3	96 30	155.4	45 53.9	95 30	155.2	7
8	42 15.6	96 30	155.3	42 44.3	95 30	155.1	43 12.9	95 31	154.9	43 41.5	95 31	154.7	44 10.1	95 31	154.5	44 38.7	95 31	154.3	45 07.2	95 32	154.1	45 35.7	95 32	153.8	8
9	41 57.5	95 32	154.0	42 26.0	95 32	153.8	42 54.5	95 32	153.6	43 22.9	95 32	153.4	43 51.4	95 33	153.2	44 19.8	95 33	153.0	44 48.2	95 33	152.7	45 16.6	94 33	152.5	9
20	41 38.5	95 33	152.8	42 06.8	95 33	152.5	42 35.2	94 34	152.3	43 03.5	94 34	152.1	43 31.8	94 34	151.9	44 00.1	94 34	151.6	44 28.3	94 35	151.4	44 56.5	94 35	151.2	20
1	41 18.6	94 34	151.5	41 46.9	94 35	151.3	42 15.1	94 35	151.0	42 43.2	94 35	150.8	43 11.4	94 35	150.6	43 39.5	94 36	150.3	44 07.6	94 36	150.1	44 35.6	93 36	149.8	1
2	40 58.0	94 36	150.3	41 26.1	94 36	150.0	41 54.1	93 36	149.8	42 22.1	93 37	149.5	42 50.1	93 37	149.3	43 18.1	93 37	149.1	43 46.0	93 37	148.8	44 13.9	93 38	148.5	2
3	40 36.5	93 37	149.0	41 04.5	93 37	148.8	41 32.4	93 38	148.5	42 00.2	93 38	148.3	42 28.1	93 38	148.0	42 55.9	93 38	147.8	43 23.6	92 39	147.5	43 51.4	92 39	147.3	3
4	40 14.3	93 38	147.8	40 42.1	93 39	147.6	41 09.8	92 39	147.3	41 37.5	92 39	147.0	42 05.2	92 39	146.8	42 32.9	92 40	146.5	43 00.5	92 40	146.3	43 28.0	92 40	146.0	4
25	39 51.3	92 40	146.6	40 19.0	92 40	146.3	40 46.5	92 40	146.1	41 14.1	92 40	145.8	41 41.6	92 41	145.6	42 09.1	92 41	145.3	42 36.5	91 41	145.0	43 03.9	91 41	144.7	25
6	39 27.6	92 41	145.4	39 55.1	91 41	145.1	40 22.5	91 41	144.9	40 49.9	91 42	144.6	41 17.2	91 42	144.3	41 44.5	91 42	144.1	42 11.8	91 42	143.8	42 39.0	91 43	143.5	6
7	39 03.2	91 42	144.2	39 30.5	91 42	144.0	39 57.7	91 42	143.7	40 25.0	91 43	143.4	40 52.1	91 43	143.1	41 19.3	90 43	142.8	41 46.4	90 44	142.6	42 13.4	90 44	142.3	7
8	38 38.0	91 43	143.1	39 05.2	90 43	142.8	39 32.3	90 44	142.5	39 59.3	90 44	142.2	40 26.3	90 44	141.9	40 53.3	90 44	141.7	41 20.2	90 45	141.4	41 47.1	90 45	141.1	8
9	38 12.2	90 44	141.9	38 39.2	90 44	141.6	39 06.1	90 45	141.3	39 33.0	90 45	141.1	39 59.8	89 45	140.8	40 26.6	89 46	140.5	40 53.4	89 46	140.2	41 20.1	89 46	139.9	9
30	37 45.7	89 45	140.8	38 12.5	89 46	140.5	38 39.3	89 46	140.2	39 06.0	89 46	139.9	39 32.7	89 46	139.6	39 59.3	89 47	139.3	40 25.9	89 47	139.0	40 52.4	88 47	138.7	30
1	37 18.5	89 46	139.6	37 45.2	89 47	139.4	38 11.8	89 47	139.1	38 38.3	88 47	138.8	39 04.9	88 47	138.5	39 31.3	88 48	138.2	39 57.7	88 48	137.9	40 24.1	88 48	137.5	1
2	36 50.7	88 47	138.5	37 17.2	88 48	138.2	37 43.7	88 48	137.9	38 10.1	88 48	137.6	38 36.4	88 48	137.3	39 02.7	88 49	137.0	39 29.0	87 49	136.7	39 55.2	87 49	136.4	2
3	36 22.3	88 48	137.4	36 48.7	88 49	137.1	37 14.9	88 49	136.8	37 41.2	87 49	136.5	38 07.4	87 49	136.2	38 33.5	87 50	135.9	38 59.6	87 50	135.6	39 25.6	87 50	135.3	3
4	35 53.3	87 49	136.4	36 19.5	87 50	136.0	36 45.6	87 50	135.7	37 11.7	87 50	135.4	37 37.7	87 50	135.1	38 03.7	86 51	134.8	38 29.6	86 51	134.5	38 55.5	86 51	134.2	4
35	35 23.8	87 50	135.3	35 49.8	87 50	135.0	36 15.7	86 51	134.7	36 41.6	86 51	134.4	37 07.5	86 51	134.0	37 33.3	86 52	133.7	37 59.0	86 52	133.4	38 24.7	86 52	133.1	35
6	34 53.6	86 51	134.2	35 19.5	86 51	133.9	35 45.3	86 52	133.6	36 11.0	86 52	133.3	36 36.7	86 52	133.0	37 02.3	85 52	132.6	37 27.9	85 53	132.3	37 53.5	85 53	132.0	6
7	34 23.0	86 52	133.2	34 48.7	86 52	132.9	35 14.3	85 53	132.5	35 39.9	85 53	132.2	36 05.4	85 53	131.9	36 30.9	85 53	131.6	36 56.3	85 54	131.2	37 21.7	84 54	130.9	7
8	33 51.8	85 53	132.1	34 17.3	85 53	131.8	34 42.8	85 53	131.5	35 08.2	85 54	131.2	35 33.6	84 54	130.9	35 58.9	84 54	130.5	36 24.1	84 54	130.2	36 49.3	84 55	129.9	8
9	33 20.1	85 54	131.1	33 45.4	84 54	130.8	34 10.7	84 54	130.5	34 36.0	84 54	130.2	35 01.2	84 55	129.8	35 26.4	84 55	129.5	35 51.5	84 55	129.2	36 16.5	83 56	128.8	9
40	32 47.9	84 54	130.1	33 13.1	84 55	129.8	33 38.2	84 55	129.5	34 03.3	84 55	129.1	34 28.4	83 55	128.8	34 53.4	83 56	128.5	35 18.3	83 56	128.1	35 43.2	83 56	127.8	40
1	32 15.2	84 55	129.1	32 40.2	83 56	128.8	33 05.3	83 56	128.5	33 30.2	83 56	128.1	33 55.1	83 56	127.8	34 20.0	83 56	127.5	34 44.7	83 57	127.1	35 09.5	82 57	126.8	1
2	31 42.0	83 56	128.1	32 07.0	83 56	127.8	32 31.8	83 56	127.5	32 56.6	83 57	127.1	33 21.4	82 57	126.8	33 46.1	82 57	126.5	34 10.7	82 57	126.1	34 35.3	82 58	125.8	2
3	31 08.5	83 57	127.2	31 33.2	82 57	126.8	31 57.9	82 57	126.5	32 22.6	82 57	126.2	32 47.2	82 58	125.8	33 11.7	82 58	125.5	33 36.2	82 58	125.1	34 00.6	81 58	124.8	3
4	30 34.4	82 57	126.2	30 59.1	82 58	125.9	31 23.6	82 58	125.5	31 48.1	82 58	125.2	32 12.6	81 58	124.9	32 37.0	81 59	124.5	33 01.3	81 59	124.2	33 25.6	81 59	123.8	4
45	30 00.0	82 58	125.3	30 24.5	81 58	124.9	30 48.9	81 59	124.6	31 13.3	81 59	124.3	31 37.6	81 59	123.9	32 01.8	81 59	123.6	32 26.0	81 59	123.2	32 50.2	80 60	122.9	45
6	29 25.2	81 59	124.3	29 49.5	81 59	124.0	30 13.8	81 59	123.7	30 38.0	81 59	123.3	31 02.2	80 60	123.0	31 26.3	80 60	122.6	31 50.3	80 60	122.3	32 14.3	80 60	121.9	6
7	28 49.9	81 59	123.4	29 14.1	81 60	123.1	29 38.3	80 60	122.7	30 02.3	80 60	122.4	30 26.4	80 60	122.0	30 50.4	80 60	121.7	31 14.3	80 61	121.3	31 38.1	79 61	121.0	7
8	28 14.3	80 60	122.5	28 38.4	80 60	122.1	29 02.4	80 60	121.8	29 26.3	80 61	121.5	29 50.2	80 61	121.1	30 14.1	79 61	120.8	30 37.9	79 61	120.4	31 01.6	79 62	120.0	8
9	27 38.4	80 61	121.6	28 02.3	80 61	121.2	28 26.1	79 61	120.9	28 50.0	79 61	120.5	29 13.7	79 61	120.2	29 37.4	79 62	119.8	30 01.1	79 62	119.5	30 24.7	79 62	119.1	9
50	27 02.0	79 61	120.7	27 25.8	79 61	120.3	27 49.6	79 62	120.0	28 13.3	79 62	119.6	28 36.9	79 62	119.3	29 00.5	79 62	118.9	29 24.0	78 62	118.6	29 47.5	78 63	118.2	50
1	26 25.4	79 62	119.8	26 49.1	79 62	119.5	27 12.7	79 62	119.1	27 36.2	78 62	118.8	27 59.7	78 62	118.4	28 23.2	78 63	118.1	28 46.6	78 63	117.7	29 09.9	78 63	117.3	1
2	25 48.4	79 62	118.9	26 11.9	78 62	118.6	26 35.4	78 63	118.2	26 58.9	78 63	117.9	27 22.3	78 63	117.5	27 45.6	78 63	117.2	28 08.9	77 63	116.8	28 32.1	77 64	116.5	2
3	25 11.1	78 63	118.0	25 34.5	78 63	117.7	25 57.9	78 63	117.4	26 21.2	78 63	117.0	26 44.5	77 63	116.7	27 07.7	77 64	116.3	27 30.9	77 64	115.9	27 54.0	77 64	115.6	3
4	24 33.5	78 63	117.2	24 56.8	78 63	116.8	25 20.1	77 64	116.5	25 43.3	77 64	116.1	26 06.4	77 64	115.8	26 29.5	77 64	115.4	26 52.6	77 64	115.1	27 15.6	77 64	114.7	4
55	23 55.6	77 64	116.3	24 18.8	77 64	116.0	24 42.0	77 64	115.6	25 05.1	77 64	115.3	25 28.1	77 64	114.9	25 51.1	77 65	114.6	26 14.0	76 65	114.2	26 36.9	76 65	113.9	55
6	23 17.5	77 64	115.5	23 40.6	77 64	115.2	24 03.6	77 64	114.8	24 26.6	77 65	114.4	24 49.5	76 65	114.1	25 12.4	76 65	113.7	25 35.2	76 65	113.4	25 58.0	76 65	113.0	6
7	22 39.1	77 64	114.7	23 02.0	76 65	114.3	23 24.9	76 65	114.0	23 47.8	76 65	113.6	24 10.6	76 65	113.3	24 33.4	76 65	112.9	24 56.1	76 66	112.5	25 18.8	75 66	112.2	7
8	22 00.4	76 65	113.8	22 23.2	76 65	113.5	22 46.1	76 65	113.1	23 08.8	76 65	112.8	23 31.5	76 66	112.4	23 54.2	75 66	112.1	24 16.8	75 66	111.7	24 39.4	75 66	111.3	8
9	21 21.5	76 65	113.0	21 44.2	76 65	112.7	22 06.9	76 66	112.3	22 29.6	75 66	112.0	22 52.2	75 66	111.6	23 14.8	75 66	111.2	23 37.3	75 66	110.9	23 59.8	75 66	110.5	9
60	20 42.3	76 66	112.2	21 04.9	75 66	111.9	21 27.6	75 66	111.5	21 50.1	75 66	111.1	22 12.6	75 66	110.8	22 35.1	75 66	110.4	22 57.6	75 67	110.1	23 19.9	75 67	109.7	60
1	20 02.9	75 66	111.4	20 25.5	75 66	111.1	20 48.0	75 66	110.7	21 10.5	75 66	110.3	21 32.9	75 67	110.0	21 55.3	75 67	109.6	22 17.6	74 67	109.3	22 39.9	74 67	108.9	1
2	19 23.3	75 66	110.6	19 45.8	75 67	110.3	20 08.2	75 67	109.9	20 30.6	75 67	109.5	20 52.9	74 67	109.2	21 15.2	74 67	108.8	21 37.5	74 67	108.5	21 59.7	74 67	108.1	2
3	18 43.5	75 67	109.8	19 05.9	75 67	109.5	19 28.2	74 67	109.1	19 50.5	74 67	108.8	20 12.7	74 67	108.4	20 35.0	74 67	108.0	20 57.1	74 68	107.7	21 19.2	74 68	107.3	3
4	18 03.5	74 67	109.0	18 25.8	74 67	108.7	18 48.0	74 67	108.3	19 10.2	74 67	108.0	19 32.4	74 68	107.6	19 54.5	74 68	107.3	20 16.6	74 68	106.9	20 38.7	73 68	106.5	4
65	17 23.3	74 67	108.2	17 45.5	74 67	107.9	18 07.6	74 68	107.5	18 29.8	74 68	107.2	18 51.9	74 68	106.8	19 13.9	73 68	106.5	19 35.9	73 68	106.1	19 57.9	73 68	105.7	65
6	16 42.9	74 68	107.5	17 05.0	74 68	107.1	17 27.1	74 68	106.8	17 49.2	73 68	106.4	18 11.2	73 68	106.1	18 33.2	73 68	105.7	18 55.1	73 68	105.3	19 17.0	73 68	105.0	6
7	16 02.3	74 68	106.7	16 24.4	73 68	106.4	16 46.4	73 68	106.0	17 08.4	73 68	105.6	17 30.3	73 68	105.3	17 52.2	73 68	104.9	18 14.1	73 69	104.6	18 35.9	73 69	104.2	7
8	15 21.6	73 68	105.9	15 43.6	73 68	105.6	16 05.5	73 68	105.2	16 27.5	73 68	104.9	16 49.3	73 69	104.5	17 11.2	73 69	104.2	17 33.0	73 69	103.8	17 54.7	72 69	103.4	8
9	14 40.7	73 68	105.2	15 02.7	73 68	104.8	15 24.5	73 69	104.5	15 46.4	73 69	104.1	16 08.2	73 69	103.8	16 30.0	73 69	103.4	16 51.7	72 69	103.0	17 13.4	72 69	102.7	9
70	13 59.7	73 69	104.4	14 21.6	73 69	104.1	14 43.4	73 69	103.7	15 05.2	73 69	103.4	15 26.9	72 69	103.0	15 48.6	72 69	102.7	16 10.3	72 69	102.3	16 32.0	72 69	101.9	70
1	13 18.6	73 69	103.7	13 40.4	73 69	103.3	14 02.1	72 69	103.0	14 23.8	72 69	102.6	14 45.5	72 69	102.3	15 07.2	72 69	101.9	15 28.8	72 69	101.5	15 50.4	72 69	101.2	1
2	12 37.3	72 69	102.9	12 59.0	72 69	102.6	13 20.7	72 69	102.2	13 42.4	72 69	101.9	14 04.0	72 69	101.5	14 25.6	72 69	101.2	14 47.2	72 70	100.8	15 08.7	72 70	100.4	2
3	11 55.9	72 69	102.2	12 17.5	72 69	101.8	12 39.2	72 69	101.5	13 00.8	72 69	101.1	13 22.4	72 70	100.8	13 43.9	72 70	100.4	14 05.5	72 70	100.1	14 26.9	72 70	99.7	3
4	11 14.4	72 69	101.5	11 36.0	72 69	101.1	11 57.6	72 70	100.8	12 19.1	72 70	100.4	12 40.7	72 70	100.0	13 02.2	72 70	99.7	13 23.6	72 70	99.3	13 45.1	71 70	99.0	4
75	10 32.7	72 70	100.7	10 54.3	72 70	100.4	11 15.8	72 70	100.0	11 37.3	72 70	99.7	11 58.8	72 70	99.3	12 20.3	71 70	99.0	12 41.7	71 70	98.6	13 03.1	71 70	98.2	75
6	9 51.0	72 70	100.0	10 12.5	72 70	99.6	10 34.0	72 70	99.3	10 55.5	72 70	98.9	11 16.9	71 70	98.6	11 38.3	71 70	98.2	11 59.7	71 70	97.9	12 21.1	71 70	97.5	6
7	9 09.2	72 70	99.3	9 30.6	72 70	98.9	9 52.1	71 70	98.6	10 13.5	71 70	98.2	10 34.9	71 70	97.9	10 56.3	71 70	97.5	11 17.7	71 70	97.1	11 39.0	71 70	96.8	7
8	8 27.2	71 70	98.5	8 48.7	71 70	98.2	9 10.1	71 70	97.8	9 31.5	71 70	97.5	9 52.9	71 70	97.1	10 14.2	71 70	96.8	10 35.5	71 70	96.4	10 56.8	71 70	96.1	8
9	7 45.2	71 70	97.8	8 06.6	71 70	97.5	8 28.0	71 70	97.1	8 49.4	71 70	96.8	9 10.7	71 70	96.4	9 32.1	71 70	96.1	9 53.4	71 70	95.7	10 14.6	71 70	95.3	9
80	7 03.2	71 70	97.1	7 24.5	71 70	96.8	7 45.9	71 70	96.4	8 07.2	71 70	96.0	8 28.5	71 70	95.7	8 49.8	71 70	95.3	9 11.1	71 70	95.0	9 32.4	71 70	94.6	80
1	6 21.0	71 70	96.4	6 42.4	71 70	96.0	7 03.7	71 70	95.7	7 25.0	71 70	95.3	7 46.3	71 70	95.0	8 07.6	71 70	94.6	8 28.8	71 71	94.3	8 50.1	71 71	93.9	1
2	5 38.9	71 70	95.7	6 00.2	71 70	95.3	6 21.5	71 70	95.0	6 42.7	71 71	94.6	7 04.0	71 71	94.3	7 25.3	71 71	93.9	7 46.5	71 71	93.5	8 07.7	71 71	93.2	2
3				5 17.9	71 71	94.6	5 39.2	71 71	94.3	6 00.4	71 71	93.9	6 21.7	71 71	93.5	6 42.9	71 71	93.2	7 04.1	71 71	92.8	7 25.3	71 71	92.5	3
4										5 18.1	71 71	93.2	5 39.3	71 71	92.8	6 00.5	71 71	92.5	6 21.8	71 71	92.1	6 42.9	71 71	91.8	4
85																5 18.1	71 71	91.8	5 39.3	71 71	91.4	6 00.5	71 71	91.1	85
6																						5 18.1	71 71	90.3	6

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H.A.	0° 00′		0° 30′		1° 00′		1° 30′		2° 00′		2° 30′		3° 00′		3° 30′		H.A.
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
°	° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		°
00	45 00.0 1.0 01	180.0	44 30.0 1.0 01	180.0	44 00.0 1.0 01	180.0	43 30.0 1.0 01	180.0	43 00.0 1.0 01	180.0	42 30.0 1.0 01	180.0	42 00.0 1.0 01	180.0	41 30.0 1.0 01	180.0	00
1	44 59.5 1.0 03	178.6	44 29.5 1.0 03	178.6	43 59.5 1.0 03	178.6	43 29.5 1.0 03	178.6	42 59.5 1.0 03	178.6	42 29.5 1.0 02	178.6	41 59.5 1.0 02	178.7	41 29.5 1.0 02	178.7	1
2	44 57.9 1.0 04	177.2	44 27.9 1.0 04	177.2	43 57.9 1.0 04	177.2	43 28.0 1.0 04	177.2	42 58.0 1.0 04	177.3	42 28.0 1.0 04	177.3	41 58.0 1.0 04	177.3	41 28.0 1.0 04	177.3	2
3	44 55.3 1.0 06	175.8	44 25.3 1.0 06	175.8	43 55.4 1.0 06	175.8	43 25.4 1.0 06	175.9	42 55.5 1.0 06	175.9	42 25.5 1.0 06	175.9	41 55.5 1.0 06	176.0	41 25.6 1.0 06	176.0	3
4	44 51.6 1.0 08	174.4	44 21.7 1.0 08	174.4	43 51.8 1.0 08	174.4	43 21.8 1.0 08	174.5	42 51.9 1.0 08	174.5	42 22.0 1.0 08	174.6	41 52.1 1.0 07	174.6	41 22.1 1.0 07	174.7	4
05	44 46.9 1.0 10	172.9	44 17.1 1.0 09	173.0	43 47.2 1.0 09	173.1	43 17.3 1.0 09	173.1	42 47.4 1.0 09	173.2	42 17.5 1.0 09	173.2	41 47.6 1.0 09	173.3	41 17.7 1.0 09	173.4	05
6	44 41.2 99 11	171.5	44 11.4 99 11	171.6	43 41.5 99 11	171.7	43 11.7 99 11	171.8	42 41.8 99 11	171.8	42 12.0 1.0 11	171.9	41 42.1 1.0 11	172.0	41 12.3 1.0 11	172.0	6
7	44 34.5 99 13	170.1	44 04.7 99 13	170.2	43 34.9 99 13	170.3	43 05.1 99 13	170.4	42 35.3 99 12	170.5	42 05.5 99 12	170.6	41 35.7 99 12	170.6	41 05.9 99 12	170.7	7
8	44 26.7 99 15	168.8	43 57.0 99 14	168.9	43 27.3 99 14	168.9	42 57.5 99 14	169.0	42 27.8 99 14	169.1	41 58.1 99 14	169.2	41 28.3 99 14	169.3	40 58.6 99 14	169.4	8
9	44 17.9 99 16	167.4	43 48.3 99 16	167.5	43 18.6 99 16	167.6	42 49.0 99 16	167.7	42 19.3 99 16	167.8	41 49.7 99 16	167.9	41 20.0 99 16	168.0	40 50.3 99 15	168.1	9
10	44 08.2 99 18	166.0	43 38.6 99 18	166.1	43 09.0 99 18	166.2	42 39.5 99 17	166.3	42 09.9 99 17	166.5	41 40.3 99 17	166.6	41 10.7 99 17	166.7	40 41.1 99 17	166.8	10
1	43 57.4 98 20	164.6	43 27.9 98 19	164.8	42 58.5 98 19	164.9	42 29.0 98 19	165.0	41 59.5 98 19	165.1	41 30.0 98 19	165.3	41 00.4 98 19	165.4	40 30.9 98 19	165.5	1
2	43 45.7 98 21	163.3	43 16.3 98 21	163.4	42 46.9 98 21	163.5	42 17.5 98 21	163.7	41 48.1 98 20	163.8	41 18.7 98 20	163.9	40 49.3 98 20	164.1	40 19.8 98 20	164.2	2
3	43 33.0 98 23	161.9	43 03.7 98 23	162.1	42 34.4 98 22	162.2	42 05.1 98 22	162.4	41 35.8 98 22	162.5	41 06.5 98 22	162.6	40 37.2 98 22	162.8	40 07.8 98 22	162.9	3
4	43 19.3 97 24	160.6	42 50.2 97 24	160.7	42 21.0 97 24	160.9	41 51.8 97 24	161.1	41 22.6 97 24	161.2	40 53.4 97 23	161.4	40 24.2 97 23	161.5	39 54.9 97 23	161.6	4
15	43 04.8 97 26	159.2	42 35.7 97 26	159.4	42 06.7 97 25	159.6	41 37.6 97 25	159.7	41 08.5 97 25	159.9	40 39.4 97 25	160.1	40 10.3 97 25	160.2	39 41.1 97 24	160.4	15
6	42 49.3 96 27	157.9	42 20.4 96 27	158.1	41 51.4 97 27	158.3	41 22.4 97 27	158.5	40 53.5 97 26	158.6	40 24.5 97 26	158.8	39 55.5 97 26	159.0	39 26.4 97 26	159.1	6
7	42 32.9 96 29	156.6	42 04.1 96 29	156.8	41 35.3 96 28	157.0	41 06.4 96 28	157.2	40 37.6 96 28	157.4	40 08.7 96 28	157.5	39 39.8 96 28	157.7	39 10.9 96 27	157.9	7
8	42 15.6 96 30	155.3	41 46.9 96 30	155.5	41 18.2 96 30	155.7	40 49.5 96 30	155.9	40 20.8 96 29	156.1	39 52.1 96 29	156.3	39 23.3 96 29	156.5	38 54.5 96 29	156.6	8
9	41 57.5 95 32	154.0	41 28.9 95 31	154.2	41 00.4 95 31	154.4	40 31.8 95 31	154.6	40 03.2 95 31	154.8	39 34.6 95 31	155.0	39 05.9 96 30	155.2	38 37.3 96 30	155.4	9
20	41 38.5 95 33	152.8	41 10.1 95 33	153.0	40 41.6 95 33	153.2	40 13.2 95 32	153.4	39 44.7 95 32	153.6	39 16.2 95 32	153.8	38 47.7 95 32	154.0	38 19.2 95 31	154.2	20
1	41 18.6 94 34	151.5	40 50.4 94 34	151.7	40 22.1 94 34	151.9	39 53.8 94 34	152.2	39 25.5 94 33	152.4	38 57.1 95 33	152.6	38 28.7 95 33	152.8	38 00.4 95 33	153.0	1
2	40 58.0 94 36	150.3	40 29.9 94 36	150.5	40 01.8 94 35	150.7	39 33.6 94 35	150.9	39 05.4 94 35	151.2	38 37.2 94 35	151.4	38 09.0 94 34	151.6	37 40.7 94 34	151.8	2
3	40 36.5 93 37	149.0	40 08.6 93 37	149.3	39 40.6 93 37	149.5	39 12.6 93 36	149.7	38 44.5 94 36	150.0	38 16.5 94 36	150.2	37 48.4 94 36	150.4	37 20.3 94 35	150.6	3
4	40 14.3 93 38	147.8	39 46.5 93 38	148.0	39 18.7 93 38	148.3	38 50.8 93 38	148.5	38 22.9 93 37	148.8	37 55.0 93 37	149.0	37 27.1 93 37	149.2	36 59.1 93 37	149.5	4
25	39 51.3 92 40	146.6	39 23.7 92 39	146.8	38 56.0 92 39	147.1	38 28.3 92 39	147.3	38 00.6 93 38	147.6	37 32.8 93 38	147.8	37 05.0 93 38	148.1	36 37.1 93 38	148.3	25
6	39 27.6 92 41	145.4	39 00.1 92 40	145.7	38 32.6 92 40	145.9	38 05.0 92 40	146.2	37 37.4 92 40	146.4	37 09.8 92 39	146.7	36 42.2 92 39	146.9	36 14.5 92 39	147.1	6
7	39 03.2 91 42	144.2	38 35.8 91 42	144.5	38 08.5 91 41	144.7	37 41.1 91 41	145.0	37 13.6 92 41	145.3	36 46.2 92 41	145.5	36 18.7 92 40	145.8	35 51.1 92 40	146.0	7
8	38 38.0 91 43	143.1	38 10.8 91 43	143.3	37 43.6 91 43	143.6	37 16.4 91 42	143.9	36 49.1 91 42	144.1	36 21.8 91 42	144.4	35 54.4 91 41	144.6	35 27.1 91 41	144.9	8
9	38 12.2 90 44	141.9	37 45.2 90 44	142.2	37 18.1 90 44	142.5	36 51.0 90 43	142.7	36 23.9 90 43	143.0	35 56.7 91 43	143.3	35 29.5 91 43	143.5	35 02.3 91 42	143.8	9
30	37 45.7 89 45	140.8	37 18.8 90 45	141.0	36 51.9 90 45	141.3	36 25.0 90 44	141.6	35 58.0 90 44	141.9	35 31.0 90 44	142.1	35 04.0 90 44	142.4	34 36.9 90 43	142.7	30
1	37 18.5 89 46	139.6	36 51.8 89 46	139.9	36 25.1 89 46	140.2	35 58.3 89 46	140.5	35 31.5 89 45	140.8	35 04.7 90 45	141.0	34 37.8 90 45	141.3	34 10.9 90 44	141.6	1
2	36 50.7 88 47	138.5	36 24.2 88 47	138.8	35 57.6 89 47	139.1	35 31.0 89 47	139.4	35 04.4 89 46	139.7	34 37.7 89 46	140.0	34 11.0 89 46	140.2	33 44.2 89 45	140.5	2
3	36 22.3 88 48	137.4	35 56.0 88 48	137.7	35 29.6 88 48	138.0	35 03.1 88 48	138.3	34 36.6 88 47	138.6	34 10.1 89 47	138.9	33 43.5 89 47	139.2	33 16.9 89 46	139.4	3
4	35 53.3 87 49	136.4	35 27.1 87 49	136.7	35 00.9 88 49	136.9	34 34.6 88 48	137.2	34 08.3 88 48	137.5	33 41.9 88 48	137.8	33 15.5 88 48	138.1	32 49.0 88 47	138.4	4
35	35 23.8 87 50	135.3	34 57.7 87 50	135.6	34 31.6 87 50	135.9	34 05.5 87 49	136.2	33 39.3 87 49	136.5	33 13.1 87 49	136.8	32 46.9 88 49	137.1	32 20.6 88 48	137.3	35
6	34 53.6 86 51	134.2	34 27.8 86 51	134.5	34 01.8 87 51	134.8	33 35.9 87 50	135.1	33 09.8 87 50	135.4	32 43.8 87 50	135.7	32 17.7 87 50	136.0	31 51.5 87 49	136.3	6
7	34 23.0 86 52	133.2	33 57.2 86 52	133.5	33 31.5 86 51	133.8	33 05.7 86 51	134.1	32 39.8 86 51	134.4	32 13.9 86 51	134.7	31 47.9 87 50	135.0	31 21.9 87 50	135.3	7
8	33 51.8 85 53	132.1	33 26.2 85 53	132.5	33 00.6 85 52	132.8	32 34.9 86 52	133.1	32 09.2 86 52	133.4	31 43.5 86 52	133.7	31 17.7 86 51	134.0	30 51.8 86 51	134.3	8
9	33 20.1 85 54	131.1	32 54.7 85 53	131.4	32 29.2 85 53	131.8	32 03.7 85 53	132.1	31 38.1 85 53	132.4	31 12.5 85 52	132.7	30 46.9 86 52	133.0	30 21.2 86 52	133.3	9
40	32 47.9 84 54	130.1	32 22.6 84 54	130.4	31 57.3 84 54	130.8	31 31.9 85 54	131.1	31 06.5 85 53	131.4	30 41.1 85 53	131.7	30 15.6 85 53	132.0	29 50.1 85 53	132.3	40
1	32 15.2 84 55	129.1	31 50.1 84 55	129.4	31 24.9 84 55	129.8	30 59.7 84 54	130.1	30 34.5 84 54	130.4	30 09.2 84 54	130.7	29 43.8 85 54	131.0	29 18.5 85 54	131.3	1
2	31 42.0 83 56	128.1	31 17.1 83 56	128.5	30 52.1 83 56	128.8	30 27.0 84 55	129.1	30 01.9 84 55	129.4	29 36.8 84 55	129.7	29 11.6 84 54	130.1	28 46.4 84 54	130.4	2
3	31 08.5 83 57	127.2	30 43.6 83 56	127.5	30 18.8 83 56	127.8	29 53.9 83 56	128.1	29 28.9 83 56	128.5	29 03.9 83 56	128.8	28 38.9 84 55	129.1	28 13.8 84 55	129.4	3
4	30 34.4 82 57	126.2	30 09.8 82 57	126.5	29 45.1 82 57	126.9	29 20.3 83 57	127.2	28 55.5 83 56	127.5	28 30.6 83 56	127.8	28 05.7 83 56	128.2	27 40.8 83 56	128.5	4
45	30 00.0 82 58	125.3	29 35.5 82 58	125.6	29 10.9 82 58	125.9	28 46.3 82 57	126.3	28 21.6 82 57	126.6	27 56.9 82 57	126.9	27 32.2 83 57	127.2	27 07.4 83 56	127.5	45
6	29 25.2 81 59	124.3	29 00.8 81 58	124.7	28 36.4 82 58	125.0	28 11.9 82 58	125.3	27 47.4 82 58	125.6	27 22.8 82 58	126.0	26 58.2 82 57	126.3	26 33.5 82 57	126.6	6
7	28 49.9 81 59	123.4	28 25.7 81 59	123.7	28 01.4 81 59	124.1	27 37.1 81 59	124.4	27 12.7 81 58	124.7	26 48.3 82 58	125.1	26 23.8 82 58	125.4	25 59.3 82 58	125.7	7
8	28 14.3 80 60	122.5	27 50.2 80 60	122.8	27 26.1 81 60	123.2	27 01.9 81 59	123.5	26 37.6 81 59	123.8	26 13.3 81 59	124.1	25 49.0 81 59	124.5	25 24.6 81 58	124.8	8
9	27 38.4 80 61	121.6	27 14.4 80 60	121.9	26 50.4 80 60	122.3	26 26.3 80 60	122.6	26 02.2 80 60	122.9	25 38.0 81 59	123.2	25 13.8 81 59	123.6	24 49.6 81 59	123.9	9
50	27 02.0 79 61	120.7	26 38.2 80 61	121.0	26 14.3 80 61	121.4	25 50.4 80 60	121.7	25 26.4 80 60	122.0	25 02.4 80 60	122.4	24 38.3 80 60	122.7	24 14.2 80 60	123.0	50
1	26 25.4 79 62	119.8	26 01.7 79 61	120.1	25 37.9 79 61	120.5	25 14.1 79 61	120.8	24 50.3 80 61	121.1	24 26.4 80 61	121.5	24 02.4 80 60	121.8	23 38.4 80 60	122.1	1
2	25 48.4 79 62	118.9	25 24.8 79 62	119.3	25 01.2 79 62	119.6	24 37.5 79 62	119.9	24 13.8 79 61	120.3	23 50.0 79 61	120.6	23 26.2 79 61	120.9	23 02.3 80 61	121.3	2
3	25 11.1 78 63	118.0	24 47.7 78 62	118.4	24 24.1 78 62	118.7	24 00.6 79 62	119.1	23 37.0 79 62	119.4	23 13.3 79 62	119.7	22 49.6 79 61	120.1	22 25.9 79 61	120.4	3
4	24 33.5 78 63	117.2	24 10.2 78 63	117.5	23 46.8 78 63	117.9	23 23.4 78 63	118.2	22 59.9 78 62	118.6	22 36.3 78 62	118.9	22 12.8 79 62	119.2	21 49.2 79 62	119.6	4
55	23 55.6 77 64	116.3	23 32.4 78 63	116.7	23 09.1 78 63	117.0	22 45.8 78 63	117.4	22 22.5 78 63	117.7	21 59.0 78 63	118.0	21 35.6 78 62	118.4	21 12.1 78 62	118.7	55
6	23 17.5 77 64	115.5	22 54.4 77 64	115.8	22 31.2 77 64	116.2	22 08.0 77 64	116.5	21 44.8 78 63	116.9	21 21.5 78 63	117.2	20 58.1 78 63	117.5	20 34.8 78 63	117.9	6
7	22 39.1 77 64	114.7	22 16.1 77 64	115.0	21 53.0 77 64	115.4	21 29.9 77 64	115.7	21 06.8 77 64	116.0	20 43.6 77 64	116.4	20 20.4 77 63	116.7	19 57.1 78 63	117.1	7
8	22 00.4 76 65	113.8	21 37.5 76 65	114.2	21 14.5 77 65	114.5	20 51.5 77 64	114.9	20 28.5 77 64	115.2	20 05.4 77 64	115.6	19 42.3 77 64	115.9	19 19.2 77 64	116.2	8
9	21 21.5 76 65	113.0	20 58.7 76 65	113.4	20 35.8 76 65	113.7	20 12.9 76 65	114.1	19 50.0 76 65	114.4	19 27.0 77 64	114.7	19 04.0 77 64	115.1	18 41.0 77 64	115.4	9
60	20 42.3 76 66	112.2	20 19.6 76 65	112.6	19 56.8 76 65	112.9	19 34.1 76 65	113.2	19 11.2 76 65	113.6	18 48.4 76 65	113.9	18 25.5 76 65	114.3	18 02.6 76 64	114.6	60
1	20 02.9 75 66	111.4	19 40.3 75 66	111.8	19 17.7 76 66	112.1	18 55.0 76 66	112.4	18 32.3 76 65	112.8	18 09.5 76 65	113.1	17 46.7 76 65	113.5	17 23.9 76 65	113.8	1
2	19 23.3 75 66	110.6	19 00.8 75 66	111.0	18 38.2 75 66	111.3	18 15.6 75 66	111.7	17 53.0 75 66	112.0	17 30.4 76 66	112.3	17 07.7 76 65	112.7	16 44.9 76 65	113.0	2
3	18 43.5 75 67	109.8	18 21.1 75 67	110.2	17 58.6 75 66	110.5	17 36.1 75 66	110.9	17 13.6 75 66	111.2	16 51.0 75 66	111.6	16 28.4 75 66	111.9	16 05.8 75 66	112.2	3
4	18 03.5 74 67	109.0	17 41.1 74 67	109.4	17 18.8 75 67	109.7	16 56.4 75 67	110.1	16 33.9 75 66	110.4	16 11.4 75 66	110.8	15 48.9 75 66	111.1	15 26.4 75 66	111.5	4
65	17 23.3 74 67	108.2	17 01.0 74 67	108.6	16 38.7 74 67	108.9	16 16.4 74 67	109.3	15 54.1 75 67	109.6	15 31.7 75 67	110.0	15 09.3 75 66	110.3	14 46.8 75 66	110.7	65
6	16 42.9 74 68	107.5	16 20.7 74 67	107.8	15 58.5 74 67	108.2	15 36.3 74 67	108.5	15 14.0 74 67	108.9	14 51.7 74 67	109.2	14 29.4 74 67	109.6	14 07.0 75 67	109.9	6
7	16 02.3 74 68	106.7	15 40.2 74 68	107.1	15 18.1 74 68	107.4	14 56.0 74 68	107.8	14 33.8 74 67	108.1	14 11.6 74 67	108.5	13 49.3 74 67	108.8	13 27.0 74 67	109.1	7
8	15 21.6 73 68	105.9	14 59.6 73 68	106.3	14 37.6 74 68	106.6	14 15.5 74 68	107.0	13 53.4 74 68	107.3	13 31.2 74 68	107.7	13 09.1 74 67	108.0	12 46.9 74 67	108.4	8
9	14 40.7 73 68	105.2	14 18.8 73 68	105.5	13 56.8 73 68	105.9	13 34.8 73 68	106.2	13 12.8 73 68	106.6	12 50.7 74 68	106.9	12 28.6 74 68	107.3	12 06.5 74 68	107.6	9
70	13 59.7 73 69	104.4	13 37.8 73 68	104.8	13 15.9 73 68	105.1	12 54.0 73 68	105.5	12 32.0 73 68	105.8	12 10.1 73 68	106.2	11 48.0 73 68	106.5	11 26.0 74 68	106.9	70
1	13 18.6 73 69	103.7	12 56.8 73 69	104.0	12 34.9 73 69	104.4	12 13.0 73 68	104.7	11 51.2 73 68	105.1	11 29.2 73 68	105.4	11 07.3 73 68	105.8	10 45.3 73 68	106.1	1
2	12 37.3 72 69	102.9	12 15.5 73 69	103.3	11 53.8 73 69	103.6	11 31.9 73 69	104.0	11 10.1 73 69	104.3	10 48.3 73 69	104.7	10 26.4 73 68	105.0	10 04.5 73 68	105.4	2
3	11 55.9 72 69	102.2	11 34.2 72 69	102.6	11 12.5 72 69	102.9	10 50.7 73 69	103.3	10 28.9 73 69	103.6	10 07.2 73 69	104.0	9 45.3 73 69	104.3	9 23.5 73 68	104.6	3
4	11 14.4 72 69	101.5	10 52.7 72 69	101.8	10 31.0 72 69	102.2	10 09.4 72 69	102.5	9 47.6 72 69	102.9	9 25.9 72 69	103.2	9 04.2 73 69	103.6	8 42.4 73 69	103.9	4
75	10 32.7 72 70	100.7	10 11.1 72 69	101.1	9 49.5 72 69	101.4	9 27.9 72 69	101.8	9 06.2 72 69	102.1	8 44.6 72 69	102.5	8 22.9 72 69	102.8	8 01.1 72 69	103.2	75
6	9 51.0 72 70	100.0	9 29.4 72 70	100.4	9 07.9 72 70	100.7	8 46.3 72 70	101.1	8 24.7 72 69	101.4	8 03.1 72 69	101.8	7 41.4 72 69	102.1	7 19.8 72 69	102.5	6
7	9 09.2 73 70	99.3	8 47.7 73 70	99.6	8 26.1 72 70	100.0	8 04.6 72 70	100.3	7 43.1 72 70	100.7	7 21.5 72 70	101.0	6 59.9 72 69	101.4	6 38.3 72 69	101.7	7
8	8 27.2 71 70	98.5	8 05.8 73 70	98.9	7 44.3 72 70	99.3	7 22.8 72 70	99.6	7 01.3 72 70	100.0	6 39.8 72 70	100.3	6 18.3 72 70	100.7	5 56.7 72 70	101.0	8
9	7 45.2 71 70	97.8	7 23.8 71 70	98.2	7 02.4 71 70	98.5	6 40.9 72 70	98.9	6 19.5 72 70	99.2	5 58.0 72 70	99.6	5 36.5 72 70	99.9	5 15.0 72 70	100.3	9
80	7 03.2 71 70	97.1	6 41.8 71 70	97.5	6 20.4 71 70	97.8	5 59.0 71 70	98.2	5 37.6 71 70	98.5	5 16.1 71 70	98.9					80
1	6 21.0 71 70	96.4	5 59.7 71 70	96.7	5 38.3 71 70	97.1	5 17.0 71 70	97.4									1
2	5 38.9 71 70	95.7	5 17.5 71 70	96.0													2

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Lat. 45°

H.A.	4° 00′ Alt.	Δd	Δt	Az.	4° 30′ Alt.	Δd	Δt	Az.	5° 00′ Alt.	Δd	Δt	Az.	5° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	°
00	49 00.0	1.0	01	180.0	49 30.0	1.0	01	180.0	50 00.0	1.0	01	180.0	50 30.0	1.0	01	180.0	00
1	48 59.4	1.0	03	178.5	49 29.4	1.0	03	178.5	49 59.4	1.0	03	178.5	50 29.4	1.0	03	178.4	1
2	48 57.8	1.0	05	177.0	49 27.7	1.0	05	176.9	49 57.7	1.0	05	176.9	50 27.7	1.0	05	176.9	2
3	48 54.9	1.0	07	175.4	49 24.9	1.0	07	175.4	49 54.8	1.0	07	175.4	50 24.8	1.0	07	175.3	3
4	48 51.0	1.0	08	173.9	49 20.9	1.0	08	173.9	49 50.8	1.0	09	173.8	50 20.8	1.0	09	173.8	4
05	48 46.0	1.0	10	172.4	49 15.8	1.0	10	172.3	49 45.7	1.0	10	172.3	50 15.6	1.0	11	172.2	05
6	48 39.8	99	12	170.9	49 09.6	99	12	170.8	49 39.4	99	12	170.7	50 09.2	99	12	170.7	6
7	48 32.6	99	14	169.4	49 02.3	99	14	169.3	49 32.1	99	14	169.2	50 01.8	99	14	169.1	7
8	48 24.2	99	16	167.9	48 53.9	99	16	167.8	49 23.6	99	16	167.7	49 53.2	99	16	167.6	8
9	48 14.8	99	17	166.4	48 44.4	99	18	166.3	49 14.0	99	18	166.2	49 43.5	99	18	166.1	9
10	48 04.4	98	19	165.0	48 33.8	98	19	164.8	49 03.3	98	20	164.7	49 32.8	98	20	164.6	10
1	47 52.8	98	21	163.5	48 22.2	98	21	163.4	48 51.6	98	21	163.2	49 20.9	98	22	163.0	1
2	47 40.3	98	23	162.1	48 09.6	98	23	161.9	48 38.8	97	23	161.7	49 08.0	97	23	161.6	2
3	47 26.7	97	24	160.6	47 55.9	97	24	160.4	48 25.0	97	25	160.3	48 54.1	97	25	160.1	3
4	47 12.1	97	26	159.2	47 41.2	97	26	159.0	48 10.2	97	26	158.8	48 39.2	97	27	158.6	4
15	46 56.6	96	28	157.8	47 25.5	96	28	157.6	47 54.3	96	28	157.4	48 23.2	96	28	157.2	15
6	46 40.1	96	29	156.4	47 08.8	96	29	156.2	47 37.5	96	30	156.0	48 06.2	96	30	155.7	6
7	46 22.6	95	31	155.0	46 51.2	95	31	154.8	47 19.8	95	31	154.5	47 48.3	95	31	154.3	7
8	46 04.2	95	32	153.6	46 32.6	96	32	153.4	47 01.1	95	33	153.2	47 29.5	95	33	152.9	8
9	45 44.9	94	34	152.3	46 13.2	94	34	152.0	46 41.5	94	34	151.8	47 09.7	94	34	151.5	9
20	45 24.7	94	35	150.9	45 52.8	94	35	150.7	46 21.0	94	36	150.4	46 49.0	94	36	150.2	20
1	45 03.7	93	36	149.6	45 31.6	93	37	149.3	45 59.6	93	37	149.1	46 27.5	93	37	148.8	1
2	44 41.8	93	38	148.3	45 09.6	93	38	148.0	45 37.4	93	38	147.8	46 05.1	92	39	147.5	2
3	44 19.1	92	39	147.0	44 46.7	92	39	146.7	45 14.3	92	40	146.4	45 41.9	92	40	146.2	3
4	43 55.5	92	40	145.7	44 23.0	92	41	145.4	44 50.5	91	41	145.1	45 17.9	91	41	144.9	4
25	43 31.3	91	42	144.5	43 58.6	91	42	144.2	44 25.8	91	42	143.9	44 53.1	91	43	143.6	25
6	43 06.2	91	43	143.2	43 33.4	90	43	142.9	44 00.5	90	44	142.6	44 27.5	90	44	142.3	6
7	42 40.4	90	44	142.0	43 07.4	90	44	141.7	43 34.3	90	45	141.4	44 01.2	89	45	141.1	7
8	42 14.0	89	45	140.8	42 40.8	89	46	140.5	43 07.5	89	46	140.1	43 34.2	89	46	139.8	8
9	41 46.8	89	46	139.6	42 13.4	89	47	139.3	42 40.0	88	47	138.9	43 06.5	88	47	138.6	9
30	41 18.9	88	48	138.4	41 45.4	88	48	138.1	42 11.8	88	48	137.8	42 38.1	88	48	137.4	30
1	40 50.4	88	49	137.2	41 16.7	87	49	136.9	41 42.9	87	49	136.6	42 09.1	87	49	136.2	1
2	40 21.3	87	50	136.1	40 47.4	87	50	135.8	41 13.5	87	50	135.4	41 39.4	87	50	135.1	2
3	39 51.6	87	51	134.9	40 17.5	86	51	134.6	40 43.4	86	51	134.3	41 09.2	86	51	133.9	3
4	39 21.3	86	51	133.8	39 47.0	86	52	133.5	40 12.7	86	52	133.2	40 38.3	85	52	132.8	4
35	38 50.4	85	52	132.7	39 16.0	85	53	132.4	39 41.5	85	53	132.1	40 06.9	85	53	131.7	35
6	38 18.9	85	53	131.6	38 44.4	85	54	131.3	39 09.7	84	54	131.0	39 35.0	84	54	130.6	6
7	37 47.0	84	54	130.6	38 12.2	84	54	130.2	38 37.4	84	55	129.9	39 02.5	84	55	129.5	7
8	37 14.5	84	55	129.5	37 39.6	84	55	129.2	38 04.6	83	56	128.8	38 29.6	83	56	128.5	8
9	36 41.5	83	56	128.5	37 06.4	83	56	128.1	37 31.3	83	56	127.8	37 56.1	83	57	127.4	9
40	36 08.1	83	57	127.4	36 32.8	82	57	127.1	36 57.5	82	57	126.7	37 22.2	82	57	126.4	40
1	35 34.2	82	57	126.4	35 58.8	82	58	126.1	36 23.3	82	58	125.7	36 47.8	82	58	125.4	1
2	34 59.8	82	58	125.4	35 24.3	81	58	125.1	35 48.7	81	58	124.7	36 13.0	81	59	124.4	2
3	34 25.0	81	59	124.4	34 49.3	81	59	124.1	35 13.6	81	59	123.7	35 37.8	80	59	123.4	3
4	33 49.8	81	59	123.5	34 14.0	80	60	123.1	34 38.1	80	60	122.7	35 02.1	80	60	122.4	4
45	33 14.2	80	60	122.5	33 38.3	80	60	122.1	34 02.2	80	60	121.8	34 26.1	80	61	121.4	45
6	32 38.3	80	61	121.6	33 02.1	79	61	121.2	33 26.0	79	61	120.8	33 49.7	79	61	120.5	6
7	32 01.9	79	61	120.6	32 25.7	79	61	120.3	32 49.4	79	62	119.9	33 13.0	79	62	119.5	7
8	31 25.2	79	62	119.7	31 48.9	79	62	119.3	32 12.4	78	62	119.0	32 35.9	78	62	118.6	8
9	30 48.2	78	62	118.8	31 11.7	78	62	118.4	31 35.1	78	63	118.0	31 58.5	78	63	117.7	9
50	30 10.9	78	63	117.9	30 34.2	78	63	117.5	30 57.5	78	63	117.1	31 20.7	77	63	116.8	50
1	29 33.2	78	63	117.0	29 56.4	77	63	116.6	30 19.6	77	64	116.2	30 42.7	77	64	115.9	1
2	28 55.3	77	64	116.1	29 18.4	77	64	115.7	29 41.4	77	64	115.4	30 04.4	77	64	115.0	2
3	28 17.0	77	64	115.2	28 40.0	77	64	114.9	29 02.9	76	65	114.5	29 25.8	76	65	114.1	3
4	27 38.5	76	65	114.4	28 01.4	76	65	114.0	28 24.2	76	65	113.6	28 47.0	76	65	113.2	4
55	26 59.7	76	65	113.5	27 22.5	76	65	113.1	27 45.2	76	65	112.8	28 07.8	75	66	112.4	55
6	26 20.7	76	65	112.7	26 43.3	75	66	112.3	27 06.0	75	66	111.9	27 28.5	75	66	111.5	6
7	25 41.4	75	66	111.8	26 04.0	75	66	111.4	26 26.5	75	66	111.1	26 48.9	75	66	110.7	7
8	25 01.9	75	66	111.0	25 24.4	75	66	110.6	25 46.8	75	67	110.2	26 09.1	74	67	109.9	8
9	24 22.2	75	67	110.2	24 44.6	74	67	109.8	25 06.9	74	67	109.4	25 29.1	74	67	109.1	9
60	23 42.3	74	67	109.3	24 04.5	74	67	109.0	24 26.8	74	67	108.6	24 48.9	74	67	108.2	60
1	23 02.1	74	67	108.5	23 24.3	74	67	108.2	23 46.5	74	67	107.8	24 08.5	74	68	107.4	1
2	22 21.8	74	68	107.7	22 43.9	74	68	107.4	23 06.0	73	68	107.0	23 28.0	73	68	106.6	2
3	21 41.3	74	68	107.0	22 03.3	73	68	106.6	22 25.3	73	68	106.2	22 47.3	73	68	105.8	3
4	21 00.7	73	68	106.2	21 22.6	73	68	105.8	21 44.5	73	68	105.4	22 06.4	73	68	105.1	4
65	20 19.8	73	68	105.4	20 41.7	73	68	105.0	21 03.5	73	69	104.7	21 25.3	73	69	104.3	65
6	19 38.8	73	69	104.6	20 00.7	73	69	104.2	20 22.4	72	69	103.9	20 44.1	72	69	103.5	6
7	18 57.7	73	69	103.8	19 19.5	72	69	103.5	19 41.2	72	69	103.1	20 02.8	72	69	102.7	7
8	18 16.5	72	69	103.1	18 38.1	72	69	102.7	18 59.8	72	69	102.4	19 21.4	72	69	102.0	8
9	17 35.1	72	69	102.3	17 56.7	72	69	102.0	18 18.3	72	69	101.6	18 39.8	72	69	101.2	9
70	16 53.6	72	69	101.6	17 15.1	72	69	101.2	17 36.7	72	70	100.8	17 58.1	72	70	100.5	70
1	16 11.9	72	70	100.8	16 33.5	72	70	100.5	16 54.9	72	70	100.1	17 16.4	71	70	99.7	1
2	15 30.2	72	70	100.1	15 51.7	72	70	99.7	16 13.1	71	70	99.4	16 34.5	71	70	99.0	2
3	14 48.4	71	70	99.3	15 09.8	71	70	99.0	15 31.2	71	70	98.6	15 52.6	71	70	98.2	3
4	14 06.5	71	70	98.6	14 27.9	71	70	98.2	14 49.2	71	70	97.9	15 10.5	71	70	97.5	4
75	13 24.5	71	70	97.9	13 45.9	71	70	97.5	14 07.2	71	70	97.1	14 28.4	71	70	96.8	75
6	12 42.4	71	70	97.1	13 03.8	71	70	96.8	13 25.0	71	70	96.4	13 46.3	71	70	96.1	6
7	12 00.3	71	70	96.4	12 21.6	71	70	96.1	12 42.9	71	70	95.7	13 04.1	71	70	95.3	7
8	11 18.1	71	70	95.7	11 39.4	71	70	95.3	12 00.6	71	70	95.0	12 21.8	71	70	94.6	8
9	10 35.9	71	70	95.0	10 57.1	71	71	94.6	11 18.3	71	71	94.3	11 39.5	71	71	93.9	9
80	9 53.6	71	71	94.3	10 14.8	71	71	93.9	10 36.0	71	71	93.5	10 57.2	70	71	93.2	80
1	9 11.3	71	71	93.5	9 32.5	71	71	93.2	9 53.6	71	71	92.8	10 14.8	70	71	92.5	1
2	8 28.9	71	71	92.8	8 50.1	71	71	92.5	9 11.2	70	71	92.1	9 32.4	70	71	91.8	2
3	7 46.5	71	71	92.1	8 07.7	71	71	91.8	8 28.8	70	71	91.4	8 50.0	70	71	91.0	3
4	7 04.1	71	71	91.4	7 25.3	71	71	91.1	7 46.4	70	71	90.7	8 07.5	70	71	90.3	4
85	6 21.7	71	71	90.7	6 42.9	70	71	90.3	7 04.0	70	71	90.0	7 25.1	70	71	89.6	85
6	5 39.3	71	71	90.0	6 00.4	70	71	89.6	6 21.6	70	71	89.3	6 42.7	70	71	88.9	6
7					5 18.0	71	71	88.9	5 39.1	70	71	88.6	6 00.3	70	71	88.2	7
8													5 17.9	70	71	87.5	8
9																	9
90																	90

H.A.	6° 00′ Alt.	Δd	Δt	Az.	6° 30′ Alt.	Δd	Δt	Az.	7° 00′ Alt.	Δd	Δt	Az.	7° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	°
00	51 00.0	1.0	01	180.0	51 30.0	1.0	01	180.0	52 00.0	1.0	01	180.0	52 30.0	1.0	01	180.0	00
1	50 59.4	1.0	03	178.4	51 29.4	1.0	03	178.4	51 59.4	1.0	03	178.4	52 29.4	1.0	03	178.4	1
2	50 57.7	1.0	05	176.8	51 27.6	1.0	05	176.8	51 57.6	1.0	05	176.8	52 27.6	1.0	05	176.7	2
3	50 54.7	1.0	07	175.3	51 24.7	1.0	07	175.2	51 54.6	1.0	07	175.2	52 24.6	1.0	07	175.1	3
4	50 50.7	1.0	09	173.7	51 20.6	1.0	09	173.6	51 50.5	1.0	09	173.6	52 20.4	1.0	09	173.5	4
05	50 45.4	1.0	11	172.1	51 15.3	1.0	11	172.0	51 45.1	1.0	11	172.0	52 15.0	99	11	171.9	05
6	50 39.0	99	13	170.6	51 08.8	99	13	170.5	51 38.6	99	13	170.4	52 08.4	99	13	170.3	6
7	50 31.5	99	14	169.0	51 01.2	99	15	168.9	51 30.9	99	15	168.8	52 00.7	99	15	168.7	7
8	50 22.9	99	16	167.5	50 52.5	99	16	167.3	51 22.1	99	17	167.2	51 51.7	99	17	167.1	8
9	50 13.1	98	18	165.9	50 42.6	98	18	165.8	51 12.2	98	18	165.7	51 41.7	98	19	165.5	9
10	50 02.2	98	20	164.4	50 31.7	98	20	164.3	51 01.1	98	20	164.1	51 30.5	98	20	163.9	10
1	49 50.3	98	22	162.9	50 19.6	98	22	162.7	50 48.9	98	22	162.6	51 18.2	98	22	162.4	1
2	49 37.3	97	23	161.4	50 06.5	97	24	161.2	50 35.7	97	24	161.0	51 04.9	97	24	160.8	2
3	49 23.2	97	25	159.9	49 52.3	97	25	159.7	50 21.4	97	26	159.5	50 50.4	97	26	159.3	3
4	49 08.1	97	27	158.4	49 37.1	96	27	158.2	50 06.0	96	27	158.0	50 34.9	96	28	157.8	4
15	48 52.0	96	28	157.0	49 20.8	96	29	156.8	49 49.6	96	29	156.5	50 18.4	96	29	156.3	15
6	48 34.9	96	30	155.5	49 03.6	95	30	155.3	49 32.2	95	31	155.1	50 00.8	95	31	154.8	6
7	48 16.9	95	32	154.1	48 45.4	95	32	153.9	49 13.8	95	32	153.6	49 42.3	95	32	153.4	7
8	47 57.9	95	33	152.7	48 26.2	94	33	152.4	48 54.5	94	34	152.2	49 22.8	94	34	151.9	8
9	47 37.9	94	35	151.3	48 06.1	94	35	151.0	48 34.2	94	35	150.8	49 02.4	94	36	150.5	9
20	47 17.1	93	36	149.9	47 45.1	93	36	149.6	48 13.1	93	37	149.4	48 41.0	93	37	149.1	20
1	46 55.4	93	38	148.5	47 23.2	93	38	148.3	47 51.0	93	38	148.0	48 18.8	92	38	147.7	1
2	46 32.8	92	39	147.2	47 00.5	92	39	146.9	47 28.1	92	40	146.6	47 55.7	92	40	146.3	2
3	46 09.4	92	40	145.9	46 36.9	92	41	145.6	47 04.4	91	41	145.3	47 31.8	91	41	145.0	3
4	45 45.2	91	42	144.6	46 12.5	91	42	144.3	46 39.8	91	42	144.0	47 07.0	91	43	143.7	4
25	45 20.2	91	43	143.3	45 47.4	90	43	143.0	46 14.5	90	44	142.7	46 41.5	90	44	142.3	25
6	44 54.5	90	44	142.0	45 21.4	90	44	141.7	45 48.3	90	45	141.4	46 15.2	89	45	141.1	6
7	44 28.0	89	45	140.8	44 54.8	89	46	140.4	45 21.5	89	46	140.1	45 48.2	89	46	139.8	7
8	44 00.8	89	46	139.5	44 27.4	89	47	139.2	44 53.9	88	47	138.9	45 20.4	88	47	138.5	8
9	43 32.9	88	48	138.3	43 59.3	88	48	138.0	44 25.7	88	48	137.6	44 52.0	88	49	137.3	9
30	43 04.4	88	49	137.1	43 30.6	87	49	136.8	43 56.8	87	49	136.4	44 22.9	87	50	136.1	30
1	42 35.2	87	50	135.9	43 01.2	87	50	135.6	43 27.2	87	50	135.2	43 53.1	86	51	134.9	1
2	42 05.4	86	51	134.8	42 31.2	86	51	134.4	42 57.0	86	51	134.1	43 22.8	86	52	133.7	2
3	41 34.9	86	52	133.6	42 00.6	86	52	133.3	42 26.2	85	52	132.9	42 51.8	85	53	132.6	3
4	41 03.9	85	53	132.5	41 29.4	85	53	132.1	41 54.9	85	53	131.8	42 20.3	84	54	131.4	4
35	40 32.4	85	54	131.4	40 57.7	84	54	131.0	41 23.0	84	54	130.6	41 48.2	84	54	130.3	35
6	40 00.2	84	54	130.3	40 25.4	84	55	129.9	40 50.5	84	55	129.5	41 15.5	83	55	129.2	6
7	39 27.6	83	55	129.2	39 52.6	83	56	128.8	40 17.5	83	56	128.5	40 42.4	83	56	128.1	7
8	38 54.5	83	56	128.1	39 19.3	83	56	127.7	39 44.1	82	57	127.4	40 08.8	82	57	127.0	8
9	38 20.8	82	57	127.1	38 45.5	82	57	126.7	39 10.1	82	57	126.3	39 34.6	82	58	126.0	9
40	37 46.8	82	58	126.0	38 11.3	82	58	125.7	38 35.7	81	58	125.3	39 00.1	81	58	124.9	40
1	37 12.2	81	58	125.0	37 36.6	81	59	124.6	38 00.9	81	59	124.3	38 25.1	81	59	123.9	1
2	36 37.3	81	59	124.0	37 01.4	81	59	123.6	37 25.6	80	59	123.2	37 49.6	80	60	122.9	2
3	36 01.9	80	60	123.0	36 25.9	80	60	122.6	36 49.9	80	60	122.3	37 13.8	80	60	121.9	3
4	35 26.1	80	60	122.0	35 50.0	80	60	121.6	36 13.8	79	61	121.3	36 37.6	79	61	120.9	4
45	34 49.9	79	61	121.0	35 13.7	79	61	120.7	35 37.4	79	61	120.3	36 01.0	79	62	119.9	45
6	34 13.4	79	61	120.1	34 37.0	79	62	119.7	35 00.6	78	62	119.3	35 24.0	78	62	119.0	6
7	33 36.5	78	62	119.2	34 00.0	78	62	118.8	34 23.4	78	62	118.4	34 46.8	78	63	118.0	7
8	32 59.3	78	63	118.2	33 22.6	78	63	117.8	33 45.9	77	63	117.5	34 09.1	77	63	117.1	8
9	32 21.8	78	63	117.3	32 45.0	77	63	116.9	33 08.1	77	64	116.5	33 31.2	77	64	116.2	9
50	31 43.9	77	64	116.4	32 07.0	77	64	116.0	32 30.0	77	64	115.6	32 53.0	76	64	115.3	50
1	31 05.8	77	64	115.5	31 28.7	76	64	115.1	31 51.6	76	64	114.7	32 14.5	76	65	114.4	1
2	30 27.3	76	64	114.6	30 50.2	76	65	114.2	31 13.0	76	65	113.9	31 35.7	76	65	113.5	2
3	29 48.6	76	65	113.7	30 11.4	76	65	113.4	30 34.0	75	65	113.0	30 56.7	75	65	112.6	3
4	29 09.7	76	65	112.9	29 32.3	75	66	112.5	29 54.9	75	66	112.1	30 17.4	75	66	111.7	4
55	28 30.4	75	66	112.0	28 53.0	75	66	111.6	29 15.4	75	66	111.3	29 37.8	75	66	110.9	55
6	27 51.0	75	66	111.2	28 13.4	75	66	110.8	28 35.8	74	66	110.4	28 58.1	74	67	110.0	6
7	27 11.3	75	66	110.3	27 33.6	74	67	110.0	27 55.9	74	67	109.6	28 18.1	74	67	109.2	7
8	26 31.4	74	67	109.5	26 53.7	74	67	109.1	27 15.8	74	67	108.8	27 38.0	74	67	108.4	8
9	25 51.3	74	67	108.7	26 13.5	74	67	108.3	26 35.6	74	67	107.9	26 57.6	73	68	107.6	9
60	25 11.1	74	67	107.9	25 33.1	73	68	107.5	25 55.1	73	68	107.1	26 17.1	73	68	106.7	60
1	24 30.6	73	68	107.1	24 52.6	73	68	106.7	25 14.5	73	68	106.3	25 36.3	73	68	105.9	1
2	23 49.9	73	68	106.3	24 11.8	73	68	105.9	24 33.7	73	68	105.5	24 55.5	73	68	105.1	2
3	23 09.1	73	68	105.5	23 31.0	73	68	105.1	23 52.7	72	68	104.7	24 14.4	72	69	104.3	3
4	22 28.2	73	69	104.7	22 49.9	72	69	104.3	23 11.6	72	69	103.9	23 33.3	72	69	103.6	4
65	21 47.1	72	69	103.9	22 08.7	72	69	103.5	22 30.4	72	69	103.2	22 52.0	72	69	102.8	65
6	21 05.8	72	69	103.1	21 27.4	72	69	102.8	21 49.0	72	69	102.4	22 10.5	72	69	102.0	6
7	20 24.4	72	69	102.4	20 46.0	72	69	102.0	21 07.5	72	69	101.6	21 29.0	71	69	101.3	7
8	19 42.9	72	69	101.6	20 04.4	72	69	101.2	20 25.9	71	70	100.9	20 47.3	71	70	100.5	8
9	19 01.3	72	70	100.9	19 22.8	71	70	100.5	19 44.2	71	70	100.1	20 05.5	71	70	99.7	9
70	18 19.6	71	70	100.1	18 41.0	71	70	99.7	19 02.4	71	70	99.4	19 23.7	71	70	99.0	70
1	17 37.8	71	70	99.4	17 59.1	71	70	99.0	18 20.5	71	70	98.6	18 41.7	71	70	98.3	1
2	16 55.9	71	70	98.6	17 17.2	71	70	98.3	17 38.5	71	70	97.9	17 59.7	71	70	97.5	2
3	16 13.9	71	70	97.9	16 35.2	71	70	97.5	16 56.4	71	70	97.1	17 17.6	71	70	96.8	3
4	15 31.8	71	70	97.2	15 53.1	71	70	96.8	16 14.3	71	70	96.4	16 35.4	71	70	96.0	4
75	14 49.7	71	70	96.4	15 10.9	71	70	96.1	15 32.1	71	70	95.7	15 53.2	70	70	95.3	75
6	14 07.5	71	70	95.7	14 28.7	71	70	95.3	14 49.8	70	70	95.0	15 11.0	70	71	94.6	6
7	13 25.3	71	70	95.0	13 46.4	70	71	94.6	14 07.6	70	71	94.2	14 28.6	70	71	93.9	7
8	12 43.0	71	71	94.3	13 04.1	70	71	93.9	13 25.2	70	71	93.5	13 46.3	70	71	93.2	8
9	12 00.6	70	71	93.5	12 21.8	70	71	93.2	12 42.9	70	71	92.8	13 03.9	70	71	92.4	9
80	11 18.3	70	71	92.8	11 39.4	70	71	92.5	12 00.5	70	71	92.1	12 21.5	70	71	91.7	80
1	10 35.9	70	71	92.1	10 57.0	70	71	91.7	11 18.1	70	71	91.4	11 39.1	70	71	91.0	1
2	9 53.5	70	71	91.4	10 14.6	70	71	91.0	10 35.7	70	71	90.7	10 56.7	70	71	90.3	2
3	9 11.1	70	71	90.7	9 32.2	70	71	90.3	9 53.2	70	71	90.0	10 14.3	70	71	89.6	3
4	8 28.6	70	71	90.0	8 49.7	70	71	89.6	9 10.8	70	71	89.3	9 31.8	70	71	88.9	4
85	7 46.2	70	71	89.3	8 07.3	70	71	88.9	8 28.4	70	71	88.6	8 49.4	70	71	88.2	85
6	7 03.8	70	71	88.6	7 24.9	70	71	88.2	7 46.0	70	71	87.8	8 07.0	70	71	87.5	6
7	6 21.4	70	71	87.9	6 42.5	70	71	87.5	7 03.6	70	71	87.1	7 24.7	70	71	86.8	7
8	5 39.0	70	71	87.2	6 00.1	70	71	86.8	6 21.2	70	71	86.4	6 42.3	70	70	86.1	8
9					5 17.8	70	71	86.1	5 38.9	70	70	85.7	6 00.0	70	70	85.4	9
90													5 17.7	70	70	84.7	90

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Lat. 45°

H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
00	41 00.0	1.0 01	180.0	40 30.0	1.0 01	180.0	40 00.0	1.0 01	180.0	39 30.0	1.0 01	180.0	39 00.0	1.0 01	180.0	38 30.0	1.0 01	180.0	38 00.0	1.0 01	180.0	37 30.0	1.0 01	180.0	00
1	40 59.5	1.0 02	178.7	40 29.5	1.0 02	178.7	39 59.5	1.0 02	178.7	39 29.5	1.0 02	178.7	38 59.5	1.0 02	178.7	38 29.5	1.0 02	178.7	37 59.5	1.0 02	178.7	37 29.5	1.0 02	178.8	1
2	40 58.0	1.0 04	177.4	40 28.1	1.0 04	177.4	39 58.1	1.0 04	177.4	39 28.1	1.0 04	177.4	38 58.1	1.0 04	177.4	38 28.1	1.0 04	177.5	37 58.1	1.0 04	177.5	37 28.2	1.0 04	177.5	2
3	40 55.6	1.0 06	176.0	40 25.6	1.0 05	176.1	39 55.7	1.0 06	176.1	39 25.7	1.0 06	176.1	38 55.7	1.0 05	176.2	38 25.8	1.0 05	176.2	37 55.8	1.0 05	176.2	37 25.8	1.0 05	176.3	3
4	40 52.2	1.0 07	174.7	40 22.2	1.0 07	174.8	39 52.3	1.0 07	174.8	39 22.4	1.0 07	174.8	38 52.4	1.0 07	174.9	38 22.5	1.0 07	174.9	37 52.5	1.0 07	175.0	37 22.6	1.0 07	175.0	4
05	40 47.8	1.0 09	173.4	40 17.9	1.0 09	173.5	39 48.0	1.0 09	173.5	39 18.1	1.0 09	173.6	38 48.2	1.0 09	173.6	38 18.3	1.0 09	173.7	37 48.4	1.0 08	173.7	37 18.5	1.0 08	173.8	05
6	40 42.4	1.0 11	172.1	40 12.6	1.0 10	172.2	39 42.7	1.0 10	172.2	39 12.9	1.0 10	172.3	38 43.0	1.0 10	172.3	38 13.1	1.0 10	172.4	37 43.3	1.0 10	172.5	37 13.4	1.0 10	172.5	6
7	40 36.1	99 12	170.8	40 06.3	99 12	170.9	39 36.5	99 12	170.9	39 06.7	99 12	171.0	38 36.9	99 12	171.1	38 07.1	99 12	171.1	37 37.2	99 12	171.2	37 07.4	99 11	171.3	7
8	40 28.9	99 14	169.5	39 59.1	99 14	169.6	39 29.3	99 13	169.6	38 59.6	99 13	169.7	38 29.8	99 13	169.8	38 00.1	99 13	169.9	37 30.3	99 13	170.0	37 00.5	99 13	170.0	8
9	40 20.6	99 15	168.2	39 51.0	99 15	168.3	39 21.3	99 15	168.4	38 51.6	99 15	168.5	38 21.9	99 15	168.6	37 52.2	99 15	168.6	37 22.5	99 15	168.7	36 52.8	99 14	168.8	9
10	40 11.5	99 17	166.9	39 41.9	99 17	167.0	39 12.3	99 17	167.1	38 42.6	99 16	167.2	38 13.0	99 16	167.3	37 43.4	99 16	167.4	37 13.7	99 16	167.5	36 44.1	99 16	167.6	10
1	40 01.4	98 18	165.6	39 31.9	98 18	165.7	39 02.3	98 18	165.8	38 32.8	99 18	165.9	38 03.2	99 18	166.1	37 33.7	99 18	166.2	37 04.1	99 18	166.3	36 34.5	99 17	166.4	1
2	39 50.4	98 20	164.3	39 20.9	98 20	164.5	38 51.5	98 20	164.6	38 22.0	98 19	164.7	37 52.6	98 19	164.8	37 23.1	98 19	164.9	36 53.6	98 19	165.0	36 24.1	98 19	165.2	2
3	39 38.5	98 21	163.1	39 09.1	98 21	163.2	38 39.8	98 21	163.3	38 10.4	98 21	163.5	37 41.0	98 21	163.6	37 11.6	98 21	163.7	36 42.2	98 20	163.8	36 12.8	98 20	164.0	3
4	39 25.7	98 23	161.8	38 56.4	98 23	161.9	38 27.1	98 22	162.1	37 57.9	98 22	162.2	37 28.6	98 22	162.4	36 59.3	98 22	162.5	36 30.0	98 22	162.6	36 00.6	98 22	162.8	4
15	39 12.0	97 24	160.5	38 42.8	97 24	160.7	38 13.6	97 24	160.8	37 44.5	97 24	161.0	37 15.3	97 24	161.1	36 46.1	97 23	161.3	36 16.9	97 23	161.4	35 47.6	97 23	161.6	15
6	38 57.4	97 26	159.3	38 28.4	97 26	159.5	37 59.3	97 25	159.6	37 30.2	97 25	159.8	37 01.1	97 25	159.9	36 32.0	97 25	160.1	36 02.9	97 25	160.2	35 33.8	97 24	160.4	6
7	38 42.0	96 27	158.1	38 13.0	96 27	158.2	37 44.1	97 27	158.4	37 15.1	97 27	158.6	36 46.1	97 26	158.7	36 17.2	97 26	158.9	35 48.2	97 26	159.0	35 19.1	97 26	159.2	7
8	38 25.7	96 29	156.8	37 56.9	96 28	157.0	37 28.0	96 28	157.2	36 59.2	96 28	157.4	36 30.3	96 28	157.5	36 01.5	96 28	157.7	35 32.6	96 27	157.9	35 03.7	96 27	158.0	8
9	38 08.6	96 30	155.6	37 39.9	96 30	155.8	37 11.2	96 29	156.0	36 42.5	96 29	156.2	36 13.7	96 29	156.3	35 45.0	96 29	156.5	35 16.2	96 29	156.7	34 47.4	96 28	156.9	9
20	37 50.7	96 31	154.4	37 22.1	96 31	154.6	36 53.5	95 31	154.8	36 24.9	95 31	155.0	35 56.3	95 30	155.2	35 27.6	95 30	155.3	34 59.0	96 30	155.5	34 30.3	96 30	155.7	20
1	37 31.9	95 33	153.2	37 03.5	95 32	153.4	36 35.0	95 32	153.6	36 06.6	95 32	153.8	35 38.1	95 32	154.0	35 09.6	95 31	154.2	34 41.0	95 31	154.4	34 12.5	95 31	154.6	1
2	37 12.4	94 34	152.0	36 44.1	94 34	152.2	36 15.8	94 33	152.4	35 47.4	95 33	152.6	35 19.1	95 33	152.8	34 50.7	95 33	153.0	34 22.3	95 32	153.2	33 53.9	95 32	153.4	2
3	36 52.1	94 35	150.8	36 24.0	94 35	151.1	35 55.8	94 35	151.3	35 27.6	94 34	151.5	34 59.3	94 34	151.7	34 31.1	94 34	151.9	34 02.8	94 34	152.1	33 34.5	94 34	152.3	3
4	36 31.1	93 36	149.7	36 03.1	93 36	149.9	35 35.0	94 36	150.1	35 06.9	94 36	150.3	34 38.8	94 35	150.5	34 10.7	94 35	150.8	33 42.6	94 35	151.0	33 14.4	94 35	151.2	4
25	36 09.3	93 38	148.5	35 41.4	93 37	148.8	35 13.5	93 37	149.0	34 45.6	93 37	149.2	34 17.6	93 37	149.4	33 49.6	93 36	149.6	33 21.6	93 36	149.9	32 53.6	93 36	150.1	25
6	35 46.8	92 39	147.4	35 19.0	92 38	147.6	34 51.3	93 38	147.8	34 23.5	93 38	148.1	33 55.7	93 38	148.3	33 27.8	93 37	148.5	33 00.0	93 37	148.7	32 32.1	93 37	149.0	6
7	35 23.6	92 40	146.3	34 56.0	92 40	146.5	34 28.4	92 39	146.7	34 00.7	92 39	147.0	33 33.0	92 39	147.2	33 05.3	92 39	147.4	32 37.6	92 38	147.7	32 09.9	93 38	147.9	7
8	34 59.6	91 41	145.1	34 32.2	92 41	145.4	34 04.7	92 40	145.6	33 37.2	92 40	145.9	33 09.7	92 40	146.1	32 42.2	92 40	146.3	32 14.6	92 40	146.6	31 47.0	92 39	146.8	8
9	34 35.1	91 43	144.0	34 07.8	91 42	144.3	33 40.4	91 42	144.5	33 13.1	91 41	144.8	32 45.7	91 41	145.0	32 18.3	91 41	145.3	31 50.9	91 41	145.5	31 23.4	92 40	145.7	9
30	34 09.8	90 43	142.9	33 42.7	91 43	143.2	33 15.5	91 43	143.4	32 48.3	91 42	143.7	32 21.1	91 42	143.9	31 53.8	91 42	144.2	31 26.5	91 42	144.4	30 59.2	91 41	144.7	30
1	33 43.9	90 44	141.8	33 16.9	90 44	142.1	32 49.9	90 44	142.4	32 22.9	90 43	142.6	31 55.8	90 43	142.9	31 28.7	90 43	143.1	31 01.5	91 43	143.4	30 34.3	91 42	143.6	1
2	33 17.4	89 45	140.8	32 50.6	90 45	141.0	32 23.7	90 45	141.3	31 56.8	90 44	141.6	31 29.9	90 44	141.8	31 02.9	90 44	142.1	30 35.9	90 44	142.3	30 08.9	90 43	142.6	2
3	32 50.3	89 46	139.7	32 23.6	89 46	140.0	31 56.9	89 46	140.3	31 30.1	89 45	140.5	31 03.3	89 45	140.8	30 36.5	89 45	141.0	30 09.7	90 45	141.3	29 42.8	90 44	141.6	3
4	32 22.5	88 47	138.7	31 56.0	88 47	138.9	31 29.4	89 47	139.2	31 02.8	89 46	139.5	30 36.2	89 46	139.7	30 09.5	89 46	140.0	29 42.9	89 46	140.3	29 16.1	89 45	140.5	4
35	31 54.2	88 48	137.6	31 27.8	88 48	137.9	31 01.4	88 48	138.2	30 35.0	88 47	138.5	30 08.5	88 47	138.7	29 42.0	88 47	139.0	29 15.5	89 47	139.3	28 48.9	89 46	139.5	35
6	31 25.3	87 49	136.6	30 59.1	87 49	136.9	30 32.9	88 49	137.2	30 06.6	88 48	137.4	29 40.2	88 48	137.7	29 13.9	88 48	138.0	28 47.5	88 48	138.3	28 21.1	88 47	138.5	6
7	30 55.9	87 50	135.6	30 29.9	87 50	135.9	30 03.7	87 49	136.2	29 37.6	87 49	136.4	29 11.4	87 49	136.7	28 45.2	87 49	137.0	28 19.0	88 48	137.3	27 52.7	88 48	137.5	7
8	30 26.0	86 51	134.6	30 00.0	86 51	134.9	29 34.1	87 50	135.2	29 08.1	87 50	135.4	28 42.1	87 50	135.7	28 16.0	87 50	136.0	27 49.9	87 49	136.3	27 23.8	87 49	136.6	8
9	29 55.5	86 52	133.6	29 29.7	86 51	133.9	29 03.9	86 51	134.2	28 38.1	86 51	134.5	28 12.2	86 51	134.7	27 46.3	86 50	135.0	27 20.3	87 50	135.3	26 54.4	87 50	135.6	9
40	29 24.5	85 52	132.6	28 58.9	85 52	132.9	28 33.2	86 52	133.2	28 07.5	86 52	133.5	27 41.8	86 51	133.8	27 16.1	86 51	134.1	26 50.3	86 51	134.4	26 24.4	86 51	134.6	40
1	28 53.0	85 53	131.6	28 27.6	85 53	131.9	28 02.1	85 53	132.2	27 36.5	85 52	132.5	27 10.9	85 52	132.8	26 45.3	85 52	133.1	26 19.7	86 52	133.4	25 54.0	86 52	133.7	1
2	28 21.1	84 54	130.7	27 55.8	84 54	131.0	27 30.4	85 54	131.3	27 05.0	85 53	131.6	26 39.6	85 53	131.9	26 14.1	85 53	132.2	25 48.6	85 53	132.5	25 23.1	85 52	132.8	2
3	27 48.7	84 55	129.7	27 23.5	84 54	130.0	26 58.3	84 54	130.3	26 33.0	84 54	130.6	26 07.8	84 54	130.9	25 42.4	84 54	131.2	25 17.1	85 53	131.5	24 51.7	85 53	131.8	3
4	27 15.8	83 55	128.8	26 50.8	83 55	129.1	26 25.7	84 55	129.4	26 00.6	84 55	129.7	25 35.5	84 55	130.0	25 10.3	84 54	130.3	24 45.1	84 54	130.6	24 19.8	84 54	130.9	4
45	26 42.5	83 56	127.8	26 17.6	83 56	128.2	25 52.7	83 56	128.5	25 27.8	83 55	128.8	25 02.8	83 55	129.1	24 37.7	84 55	129.4	24 12.7	84 55	129.7	23 47.6	84 55	130.0	45
6	26 08.8	82 57	126.9	25 44.1	83 57	127.2	25 19.3	83 56	127.6	24 54.5	83 56	127.9	24 29.6	83 56	128.2	24 04.7	83 56	128.5	23 39.8	83 55	128.8	23 14.8	83 55	129.1	6
7	25 34.7	82 58	126.0	25 10.1	82 57	126.3	24 45.5	82 57	126.6	24 20.8	82 57	127.0	23 56.1	82 57	127.3	23 31.3	83 56	127.6	23 06.5	83 56	127.9	22 41.7	83 56	128.2	7
8	25 00.2	81 58	125.1	24 35.7	82 58	125.4	24 11.2	82 58	125.8	23 46.7	82 57	126.1	23 22.1	82 57	126.4	22 57.5	82 57	126.7	22 32.8	82 57	127.0	22 08.1	82 57	127.3	8
9	24 25.3	81 59	124.2	24 01.0	81 59	124.5	23 36.6	81 58	124.9	23 12.2	81 58	125.2	22 47.8	82 58	125.5	22 23.3	82 58	125.8	21 58.8	82 57	126.1	21 34.2	82 57	126.4	9
50	23 50.0	81 59	123.3	23 25.8	81 59	123.7	23 01.6	81 59	124.0	22 37.3	81 59	124.3	22 13.0	81 58	124.6	21 48.7	81 58	124.9	21 24.3	81 58	125.2	20 59.9	81 58	125.6	50
1	23 14.4	80 60	122.5	22 50.4	80 60	122.8	22 26.2	80 60	123.1	22 02.1	81 59	123.4	21 37.9	81 59	123.8	21 13.7	81 59	124.1	20 49.5	81 59	124.4	20 25.2	81 58	124.7	1
2	22 38.4	80 60	121.6	22 14.5	80 60	121.9	21 50.5	80 60	122.3	21 26.5	80 60	122.6	21 02.5	80 60	122.9	20 38.4	80 59	123.2	20 14.3	80 59	123.5	19 50.1	81 59	123.8	2
3	22 02.1	79 61	120.7	21 38.3	79 61	121.1	21 14.5	80 61	121.4	20 50.6	80 60	121.7	20 26.7	80 60	122.0	20 02.7	80 60	122.4	19 38.7	80 60	122.7	19 14.7	80 60	123.0	3
4	21 25.5	79 62	119.9	21 01.8	79 61	120.2	20 38.1	79 61	120.5	20 14.4	79 61	120.9	19 50.6	79 61	121.2	19 26.7	79 61	121.5	19 02.9	80 60	121.8	18 39.0	80 60	122.2	4
55	20 48.6	78 62	119.1	20 25.0	79 62	119.4	20 01.4	79 62	119.7	19 37.8	79 61	120.0	19 14.1	79 61	120.4	18 50.4	79 61	120.7	18 26.7	79 61	121.0	18 02.9	79 61	121.3	55
6	20 11.3	78 63	118.2	19 47.9	78 62	118.6	19 24.4	78 62	118.9	19 00.9	78 62	119.2	18 37.3	79 62	119.5	18 13.8	79 62	119.9	17 50.1	79 61	120.2	17 26.5	79 61	120.5	6
7	19 33.8	78 63	117.4	19 10.5	78 63	117.7	18 47.1	78 63	118.1	18 23.7	78 62	118.4	18 00.3	78 62	118.7	17 36.8	78 62	119.0	17 13.3	78 62	119.4	16 49.8	78 62	119.7	7
8	18 56.0	77 63	116.6	18 32.8	77 63	116.9	18 09.5	78 63	117.2	17 46.3	78 63	117.6	17 22.9	78 63	117.9	16 59.6	78 63	118.2	16 36.2	78 62	118.6	16 12.8	78 62	118.9	8
9	18 17.9	77 64	115.8	17 54.8	77 64	116.1	17 31.7	77 64	116.4	17 08.5	77 63	116.8	16 45.3	77 63	117.1	16 22.1	78 63	117.4	15 58.8	78 63	117.8	15 35.5	78 63	118.1	9
60	17 39.6	77 64	115.0	17 16.6	77 64	115.3	16 53.6	77 64	115.6	16 30.5	77 64	116.0	16 07.4	77 64	116.3	15 44.3	77 63	116.6	15 21.1	77 63	117.0	14 57.9	77 63	117.3	60
1	17 01.0	76 65	114.2	16 38.1	76 65	114.5	16 15.2	76 64	114.8	15 52.2	77 64	115.2	15 29.2	77 64	115.5	15 06.2	77 64	115.8	14 43.2	77 64	116.2	14 20.1	77 64	116.5	1
2	16 22.2	76 65	113.4	15 59.4	76 65	113.7	15 36.6	76 65	114.0	15 13.7	76 65	114.4	14 50.8	76 64	114.7	14 27.9	76 64	115.0	14 04.9	77 64	115.4	13 42.0	77 64	115.7	2
3	15 43.1	76 65	112.6	15 20.4	76 65	112.9	14 57.7	76 65	113.3	14 34.9	76 65	113.6	14 12.1	76 65	113.9	13 49.3	76 65	114.3	13 26.5	76 64	114.6	13 03.6	76 64	114.9	3
4	15 03.8	75 66	111.8	14 41.2	75 66	112.1	14 18.6	75 66	112.5	13 55.9	76 65	112.8	13 33.2	76 65	113.1	13 10.5	76 65	113.5	12 47.8	76 65	113.8	12 25.0	76 65	114.2	4
65	14 24.3	75 66	111.0	14 01.8	75 66	111.4	13 39.3	75 66	111.7	13 16.7	75 66	112.0	12 54.1	75 66	112.4	12 31.5	75 65	112.7	12 08.9	76 65	113.1	11 46.2	76 65	113.4	65
6	13 44.6	75 66	110.3	13 22.2	75 66	110.6	12 59.8	75 66	110.9	12 37.3	75 66	111.3	12 14.8	75 66	111.6	11 52.3	75 66	112.0	11 29.7	75 66	112.3	11 07.1	75 65	112.6	6
7	13 04.7	74 67	109.5	12 42.4	74 67	109.8	12 20.0	75 67	110.2	11 57.7	75 66	110.5	11 35.2	75 66	110.9	11 12.8	75 66	111.2	10 50.4	75 66	111.5	10 27.9	75 66	111.9	7
8	12 24.6	74 67	108.7	12 02.4	74 67	109.1	11 40.1	74 67	109.4	11 17.8	74 67	109.8	10 55.5	74 67	110.1	10 33.2	75 66	110.4	10 10.8	75 66	110.8	9 48.4	75 66	111.1	8
9	11 44.4	74 67	108.0	11 22.2	74 67	108.3	11 00.0	74 67	108.7	10 37.8	74 67	109.0	10 15.6	74 67	109.3	9 53.3	74 67	109.7	9 31.0	74 67	110.0	9 08.7	74 66	110.4	9
70	11 03.9	74 68	107.2	10 41.8	74 68	107.6	10 19.7	74 67	107.9	9 57.6	74 67	108.3	9 35.4	74 67	108.6	9 13.3	74 67	108.9	8 51.1	74 67	109.3	8 28.9	74 67	109.6	70
1	10 23.3	73 68	106.5	10 01.3	73 68	106.8	9 39.3	73 68	107.2	9 17.2	74 68	107.5	8 55.1	74 67	107.9	8 33.0	74 67	108.2	8 10.9	74 67	108.5	7 48.8	74 67	108.9	1
2	9 42.6	73 68	105.7	9 20.6	73 68	106.1	8 58.7	73 68	106.4	8 36.7	73 68	106.8	8 14.7	73 68	107.1	7 52.7	73 68	107.5	7 30.6	73 67	107.8	7 08.6	74 67	108.1	2
3	9 01.7	73 68	105.0	8 39.8	73 68	105.3	8 17.9	73 68	105.7	7 56.0	73 68	106.0	7 34.0	73 68	106.4	7 12.1	73 68	106.7	6 50.1	73 68	107.1	6 28.2	73 68	107.4	3
4	8 20.6	73 69	104.3	7 58.8	73 69	104.6	7 37.0	73 68	105.0	7 15.1	73 68	105.3	6 53.3	73 68	105.6	6 31.4	73 68	106.0	6 09.5	73 68	106.3	5 47.6	73 68	106.7	4
75	7 39.4	72 69	103.5	7 17.7	73 69	103.9	6 55.9	73 69	104.2	6 34.1	73 69	104.6	6 12.3	73 68	104.9	5 50.5	73 68	105.3	5 28.7	73 68	105.6	5 06.9	73 68	106.0	75
6	6 58.1	72 69	102.8	6 36.4	72 69	103.2	6 14.7	72 69	103.5	5 53.0	72 69	103.8	5 31.3	72 68	104.2	5 09.5	72 68	104.5							6
7	6 16.7	72 69	102.1	5 55.0	72 69	102.4	5 33.4	72 69	102.8	5 11.7	72 69	103.1													7
8	5 35.1	72 69	101.4	5 13.6	72 69	101.7																			8

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Lat. 45°

H.A.	8° 00′ Alt.	Δd Δt	Az.	8° 30′ Alt.	Δd Δt	Az.	9° 00′ Alt.	Δd Δt	Az.	9° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	53 00.0	1.0 01	180.0	53 30.0	1.0 01	180.0	54 00.0	1.0 01	180.0	54 30.0	1.0 01	180.0
1	52 59.4	1.0 03	178.4	53 29.4	1.0 03	178.3	53 59.4	1.0 03	178.3	54 29.4	1.0 03	178.3
2	52 57.6	1.0 05	176.7	53 27.5	1.0 05	176.7	53 57.5	1.0 05	176.6	54 27.5	1.0 05	176.6
3	52 54.5	1.0 07	175.1	53 24.5	1.0 07	175.0	53 54.4	1.0 07	175.0	54 24.3	1.0 07	174.9
4	52 50.3	1.0 09	173.4	53 20.2	1.0 09	173.4	53 50.1	1.0 09	173.3	54 20.0	1.0 09	173.2
05	52 44.8	99 11	171.8	53 14.7	99 11	171.7	53 44.5	99 11	171.6	54 14.3	99 11	171.5
6	52 38.2	99 13	170.2	53 08.0	99 13	170.1	53 37.7	99 13	170.0	54 07.5	99 13	169.9
7	52 30.4	99 15	168.6	53 00.0	99 15	168.4	53 29.7	99 15	168.3	53 59.4	99 15	168.2
8	52 21.4	99 17	167.0	52 51.0	99 17	166.8	53 20.6	99 17	166.7	53 50.1	99 17	166.5
9	52 11.2	98 19	165.4	52 40.7	98 19	165.2	53 10.2	98 19	165.1	53 39.7	98 19	164.9
10	51 59.9	98 21	163.8	52 29.3	98 21	163.6	52 58.7	98 21	163.5	53 28.1	98 21	163.3
1	51 47.5	98 22	162.2	52 16.8	98 23	162.0	52 46.0	97 23	161.9	53 15.3	97 23	161.7
2	51 34.0	97 24	160.7	52 03.2	97 25	160.5	52 32.3	97 25	160.3	53 01.4	97 25	160.1
3	51 19.4	97 26	159.1	51 48.4	97 26	158.9	52 17.4	97 27	158.7	52 46.4	96 27	158.5
4	51 03.8	96 28	157.6	51 32.6	96 28	157.4	52 01.5	96 28	157.2	52 30.3	96 29	156.9
15	50 47.1	96 30	156.1	51 15.8	96 30	155.9	51 44.5	96 30	155.6	52 13.1	95 30	155.4
6	50 29.4	96 31	154.6	50 57.9	95 31	154.4	51 26.4	95 32	154.1	51 54.9	95 32	153.8
7	50 10.7	95 33	153.1	50 39.1	95 33	152.9	51 07.4	94 33	152.6	51 35.7	94 34	152.3
8	49 51.0	94 34	151.7	50 19.2	94 35	151.4	50 47.4	94 35	151.1	51 15.5	94 35	150.9
9	49 30.4	94 36	150.2	49 58.5	93 36	150.0	50 26.4	93 36	149.7	50 54.4	93 37	149.4
20	49 08.9	93 37	148.8	49 36.8	93 38	148.5	50 04.6	93 38	148.2	50 32.3	92 38	147.9
1	48 46.5	92 39	147.4	49 14.2	92 39	147.1	49 41.8	92 39	146.8	50 09.4	92 40	146.5
2	48 23.2	92 40	146.0	48 50.7	92 40	145.7	49 18.1	91 41	145.4	49 45.5	91 41	145.1
3	47 59.1	91 42	144.7	48 26.4	91 42	144.4	48 53.7	91 42	144.1	49 20.9	91 42	143.7
4	47 34.2	90 43	143.3	48 01.3	90 43	143.0	48 28.3	90 44	142.7	48 55.3	90 44	142.4
25	47 08.5	90 44	142.0	47 35 4	90 44	141.7	48 02.2	89 45	141.4	48 29.1	89 45	141.0
6	46 42.0	89 45	140.7	47 08.7	89 46	140.4	47 35.4	89 46	140.1	48 02.0	89 46	139.7
7	46 14.8	89 47	139.5	46 41.3	88 47	139.1	47 07.8	88 47	138.8	47 34.2	88 48	138.4
8	45 46.8	88 48	138.2	46 13.2	88 48	137.8	46 39.5	88 48	137.5	47 05.7	87 49	137.1
9	45 18.2	87 49	137.0	45 44.4	87 49	136.6	46 10.5	87 49	136.3	46 36.5	87 50	135.9
30	44 48.9	87 50	135.7	45 14.9	86 50	135.4	45 40.8	86 50	135.0	46 06.6	86 51	134.7
1	44 19.0	86 51	134.5	44 44.8	86 51	134.2	45 10.5	86 52	133.8	45 36.1	85 52	133.4
2	43 48.4	85 52	133.4	44 14.0	85 52	133.0	44 39.6	85 53	132.6	45 05.0	85 53	132.2
3	43 17.3	85 53	132.2	43 42.7	85 53	131.8	44 08.1	84 53	131.5	44 33.3	84 54	131.1
4	42 45.6	84 54	131.0	43 10.8	84 54	130.7	43 36.0	84 54	130.3	44 01.1	84 55	129.9
35	42 13.3	84 55	129.9	42 38.4	83 55	129.5	43 03.4	83 55	129.2	43 28.3	83 56	128.8
6	41 40.5	83 56	128.8	42 05.4	83 56	128.4	42 30.2	83 56	128.1	42 54.9	82 56	127.7
7	41 07.2	83 56	127.7	41 31.9	82 57	127.3	41 56.5	82 57	127.0	42 21.1	82 57	126.6
8	40 33.4	82 57	126.6	40 57.9	82 57	126.3	41 22.4	81 58	125.9	41 46.8	81 58	125.5
9	39 59.1	81 58	125.6	40 23.5	81 58	125.2	40 47.8	81 58	124.8	41 12.0	81 59	124.4
40	39 24.4	81 59	124.5	39 48.6	81 59	124.1	40 12.7	80 59	123.8	40 36.8	80 59	123.4
1	38 49.2	80 59	123.5	39 13.3	80 60	123.1	39 37.3	80 60	122.7	40 01.2	80 60	122.3
2	38 13.6	80 60	122.5	38 37.5	80 60	122.1	39 01.4	79 60	121.7	39 25.1	79 61	121.3
3	37 37.6	79 61	121.5	38 01.4	79 61	121.1	38 25.1	79 61	120.7	38 48.7	79 61	120.3
4	37 01.3	79 61	120.5	37 24.9	79 61	120.1	37 48.4	78 62	119.7	38 11.9	78 62	119.3
45	36 24.5	78 62	119.5	36 48.0	78 62	119.1	37 11.4	78 62	118.8	37 34.7	78 62	118.4
6	35 47.4	78 62	118.6	36 10.8	78 63	118.2	36 34.0	77 63	117.8	36 57.2	77 63	117.4
7	35 10.0	77 63	117.6	35 33.2	77 63	117.2	35 56.3	77 63	116.9	36 19.4	77 64	116.5
8	34 32.3	77 63	116.7	34 55.3	77 64	116.3	35 18.3	77 64	115.9	35 41.3	76 64	115.5
9	33 54.2	77 64	115.8	34 17.2	76 64	115.4	34 40.0	76 64	115.0	35 02.8	76 65	114.6
50	33 15.9	76 64	114.9	33 38.7	76 65	114.5	34 01.4	76 65	114.1	34 24.1	75 65	113.7
1	32 37.2	76 65	114.0	32 59.9	76 65	113.6	33 22.6	75 65	113.2	33 45.1	75 65	112.8
2	31 58.3	75 65	113.1	32 20.9	75 65	112.7	32 43.4	75 66	112.3	33 05.9	75 66	111.9
3	31 19.2	75 66	112.2	31 41.7	75 66	111.8	32 04.1	75 66	111.4	32 26.4	74 66	111.0
4	30 39.8	75 66	111.4	31 02.2	74 66	111.0	31 24.5	74 66	110.6	31 46.7	74 67	110.2
55	30 00.2	74 66	110.5	30 22.4	74 67	110.1	30 44.6	74 67	109.7	31 06.8	74 67	109.3
6	29 20.3	74 67	109.7	29 42.5	74 67	109.3	30 04.6	74 67	108.9	30 26.6	73 67	108.5
7	28 40.3	74 67	108.8	29 02.3	73 67	108.4	29 24.4	73 67	108.0	29 46.3	73 68	107.6
8	28 00.0	73 67	108.0	28 22.0	73 68	107.6	28 43.9	73 68	107.2	29 05.8	73 68	106.8
9	27 19.6	73 68	107.2	27 41.5	73 68	106.8	28 03.3	73 68	106.4	28 25.1	72 68	106.0
60	26 38.9	73 68	106.4	27 00.8	73 68	106.0	27 22.5	72 68	105.6	27 44.2	72 68	105.2
1	25 58.1	73 68	105.6	26 19.9	72 68	105.2	26 41.6	72 68	104.8	27 03.2	72 69	104.4
2	25 17.2	72 68	104.8	25 38.9	72 69	104.4	26 00.5	72 69	104.0	26 22.0	72 69	103.6
3	24 36.1	72 69	104.0	24 57.7	72 69	103.6	25 19.2	72 69	103.2	25 40.7	72 69	102.8
4	23 54.9	72 69	103.2	24 16.4	72 69	102.8	24 37.9	71 69	102.4	24 59.3	71 69	102.0
65	23 13.5	72 69	102.4	23 35.0	71 69	102.0	23 56.4	71 69	101.6	24 17.7	71 69	101.3
6	22 32.0	71 69	101.6	22 53.4	71 69	101.3	23 14.8	71 70	100.9	23 36.1	71 70	100.5
7	21 50.4	71 70	100.9	22 11.7	71 70	100.5	22 33.0	71 70	100.1	22 54.3	71 70	99.7
8	21 08.7	71 70	100.1	21 30.0	71 70	99.7	21 51.2	71 70	99.4	22 12.4	71 70	99.0
9	20 26.8	71 70	99.4	20 48.1	71 70	99.0	21 09.3	71 70	98.6	21 30.5	70 70	98.2
70	19 44.9	71 70	98.6	20 06.2	71 70	98.2	20 27.3	71 70	97.9	20 48.5	70 70	97.5
1	19 03.0	71 70	97.9	19 24.1	71 70	97.5	19 45.3	70 70	97.1	20 06.4	70 70	96.7
2	18 20.9	71 70	97.1	18 42.0	70 70	96.8	19 03.1	70 70	96.4	19 24.2	70 70	96.0
3	17 38.8	70 70	96.4	17 59.9	70 70	96.0	18 21.0	70 70	95.7	18 42.0	70 70	95.3
4	16 56.6	70 70	95.7	17 17.7	70 70	95.3	17 38.7	70 70	94.9	17 59.7	70 71	94.6
75	16 14.3	70 70	94.9	16 35.4	70 71	94.6	16 56.4	70 71	94.2	17 17.4	70 71	93.8
6	15 32.0	70 71	94.2	15 53.1	70 71	93.9	16 14.1	70 71	93.5	16 35.1	70 71	93.1
7	14 49.7	70 71	93.5	15 10.7	70 71	93.1	15 31.7	70 71	92.8	15 52.7	70 71	92.4
8	14 07.3	70 71	92.8	14 28.4	70 71	92.4	14 49.3	70 71	92.1	15 10.3	70 71	91.7
9	13 25.0	70 71	92.1	13 46.0	70 71	91.7	14 06.9	70 71	91.3	14 27.9	70 71	91.0
80	12 42.6	70 71	91.4	13 03.5	70 71	91.0	13 24.5	70 71	90.6	13 45.4	70 71	90.3
1	12 00.1	70 71	90.7	12 21.1	70 71	90.3	12 42.1	70 71	89.9	13 03.0	70 71	89.6
2	11 17.7	70 71	89.9	11 38.7	70 71	89.6	11 59.7	70 71	89.2	12 20.6	70 71	88.8
3	10 35.3	70 71	89.2	10 56.3	70 71	88.9	11 17.2	70 71	88.5	11 38.2	70 71	88.1
4	9 52.9	70 71	88.5	10 13.9	70 71	88.2	10 34.8	70 71	87.8	10 55.8	70 71	87.4
85	9 10.5	70 71	87.8	9 31.5	70 71	87.5	9 52.5	70 71	87.1	10 13.4	70 71	86.7
6	8 28.1	70 71	87.1	8 49.1	70 71	86.8	9 10.1	70 71	86.4	9 31.1	70 70	86.0
7	7 45.7	70 71	86.4	8 06.8	70 70	86.1	8 27.8	70 70	85.7	8 48.8	70 70	85.3
8	7 03.4	70 70	85.7	7 24.4	70 70	85.4	7 45.5	70 70	85.0	8 06.5	70 70	84.6
9	6 21.1	70 70	85.0	6 42.2	70 70	84.7	7 03.2	70 70	84.3	7 24.3	70 70	83.9
90	5 38.9	70 70	84.3	6 00.0	70 70	84.0	6 21.0	70 70	83.6	6 42.1	70 70	83.3

H.A.	10° 00′ Alt.	Δd Δt	Az.	10° 30′ Alt.	Δd Δt	Az.	11° 00′ Alt.	Δd Δt	Az.	11° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	55 00.0	1.0 01	180.0	55 30.0	1.0 01	180.0	56 00.0	1.0 01	180.0	56 30.0	1.0 01	180.0
1	54 59.4	1.0 03	178.3	55 29.4	1.0 03	178.3	55 59.4	1.0 03	178.2	56 29.3	1.0 03	178.2
2	54 57.5	1.0 05	176.6	55 27.4	1.0 05	176.5	55 57.4	1.0 05	176.5	56 27.4	1.0 05	176.5
3	54 54.3	1.0 07	174.9	55 24.2	1.0 07	174.8	55 54.2	1.0 08	174.7	56 24.1	1.0 08	174.7
4	54 49.9	1.0 09	173.2	55 19.7	1.0 10	173.1	55 49.6	1.0 10	173.0	56 19.5	1.0 10	172.9
05	54 44.2	99 12	171.5	55 14.0	99 12	171.4	55 43.8	99 12	171.3	56 13.6	99 12	171.2
6	54 37.2	99 14	169.8	55 07.0	99 14	169.6	55 36.7	99 14	169.5	56 06.5	99 14	169.4
7	54 29.1	99 16	168.1	54 58.8	99 16	167.9	55 28.4	99 16	167.8	55 58.1	99 16	167.7
8	54 19.7	99 18	166.4	54 49.3	99 18	166.3	55 18.8	98 18	166.1	55 48.4	98 18	166.0
9	54 09.2	98 20	164.7	54 38.6	98 20	164.6	55 08.0	98 20	164.4	55 37.5	98 20	164.2
10	53 57.4	98 22	163.1	54 26.7	98 22	162.9	54 56.0	98 22	162.7	55 25.3	98 22	162.6
1	53 44.5	97 23	161.5	54 13.7	97 24	161.3	54 42.9	97 24	161.1	55 12.0	97 24	160.9
2	53 30.5	97 25	159.9	53 59.5	97 26	159.7	54 28.5	97 26	159.4	54 57.6	97 26	159.2
3	53 15.3	96 27	158.3	53 44.2	96 27	158.0	54 13.1	96 28	157.8	54 41.9	96 28	157.6
4	52 59.0	96 29	156.7	53 27.8	96 29	156.4	53 56.5	96 29	156.2	54 25.2	96 30	156.0
15	52 41.7	95 31	155.1	53 10.3	95 31	154.9	53 38.9	95 31	154.6	54 07.4	95 31	154.4
6	52 23.4	95 32	153.6	52 51.8	95 33	153.3	53 20.1	95 33	153.1	53 48.5	94 33	152.8
7	52 04.0	94 34	152.1	52 32.2	94 34	151.8	53 00.4	94 35	151.5	53 28.6	94 35	151.2
8	51 43.6	94 36	150.6	52 11.7	93 36	150.3	52 39.7	93 36	150.0	53 07.6	93 36	149.7
9	51 22.3	93 37	149.1	51 50.2	93 37	148.8	52 18.0	93 38	148.5	52 45.8	92 38	148.2
20	51 00.1	92 39	147.6	51 27.7	92 39	147.3	51 55.4	92 39	147.0	52 22.9	92 40	146.7
1	50 36.9	92 40	146.2	51 04.4	92 40	145.9	51 31.8	91 41	145.6	51 59.2	91 41	145.2
2	50 12.9	91 41	144.8	50 40.2	91 42	144.5	51 07.4	91 42	144.1	51 34.5	90 42	143.8
3	49 48.0	90 43	143.4	50 15.1	90 43	143.1	50 42.1	90 43	142.7	51 09.1	90 44	142.4
4	49 22.3	90 44	142.0	49 49.2	90 44	141.7	50 16.0	89 45	141.3	50 42.8	89 45	141.0
25	48 55.8	89 45	140.7	49 22.5	89 46	140.3	49 49.1	89 46	140.0	50 15.7	88 46	139.6
6	48 28.5	88 47	139.4	48 55.0	88 47	139.0	49 21.5	88 47	138.6	49 47.8	88 48	138.3
7	48 00.6	88 48	138.1	48 26.8	88 48	137.7	48 53.1	87 49	137.3	49 19.2	87 49	137.0
8	47 31.9	87 49	136.8	47 57.9	87 49	136.4	48 24.0	87 50	136.0	48 49.9	86 50	135.7
9	47 02.5	86 50	135.5	47 28.4	86 50	135.2	47 54.2	86 51	134.8	48 19.9	86 51	134.4
30	46 32.4	86 51	134.3	46 58.1	86 51	133.9	47 23.7	85 52	133.5	47 49.3	85 52	133.1
1	46 01.7	85 52	133.1	46 27.2	85 52	132.7	46 52.7	85 53	132.3	47 18.0	84 53	131.9
2	45 30.4	85 53	131.9	45 55.7	84 53	131.5	46 21.0	84 54	131.1	46 46.1	84 54	130.7
3	44 58.5	84 54	130.7	45 23.7	84 54	130.3	45 48.7	83 55	129.9	46 13.7	83 55	129.5
4	44 26.1	83 55	129.5	44 51.0	83 55	129.1	45 15.9	83 56	128.7	45 40.7	82 56	128.3
35	43 53.1	83 56	128.4	44 17.9	82 56	128.0	44 42.5	82 56	127.6	45 07.1	82 57	127.2
6	43 19.6	82 57	127.3	43 44.2	82 57	126.9	44 08.7	82 57	126.5	44 33.1	81 58	126.1
7	42 45.6	81 57	126.2	43 10.0	81 58	125.8	43 34.3	81 58	125.4	43 58.6	81 58	125.0
8	42 11.1	81 58	125.1	42 35.4	81 58	124.7	42 59.5	80 59	124.3	43 23.6	80 59	123.9
9	41 36.2	80 59	124.0	42 00.2	80 59	123.6	42 24.2	80 60	123.2	42 48.1	80 60	122.8
40	41 00.8	80 60	123.0	41 24.7	80 60	122.6	41 48.5	79 60	122.2	42 12.3	79 60	121.8
1	40 25.0	79 60	121.9	40 48.7	79 61	121.5	41 12.4	79 61	121.1	41 36.0	78 61	120.7
2	39 48.8	79 61	120.9	40 12.4	78 61	120.5	40 35.9	78 62	120.1	40 59.3	78 62	119.7
3	39 12.2	78 62	119.9	39 35.6	78 62	119.5	39 59.0	78 62	119.1	40 22.3	77 62	118.7
4	38 35.3	78 62	118.9	38 58.6	78 62	118.5	39 21.8	77 63	118.1	39 44.9	77 63	117.7
45	37 58.0	77 63	118.0	38 21.1	77 63	117.6	38 44.2	77 63	117.1	39 07.2	76 63	116.7
6	37 20.3	77 63	117.0	37 43.3	77 64	116.6	38 06.3	76 64	116.2	38 29.1	76 64	115.8
7	36 42.4	76 64	116.1	37 05.2	76 64	115.6	37 28.0	76 64	115.2	37 50.7	76 64	114.8
8	36 04.1	76 64	115.1	36 26.8	76 64	114.7	36 49.5	75 65	114.3	37 12.1	75 65	113.9
9	35 25.5	76 65	114.2	35 48.2	75 65	113.8	36 10.7	75 65	113.4	36 33.2	75 65	113.0
50	34 46.7	75 65	113.3	35 09.2	75 65	112.9	35 31.6	75 66	112.5	35 54.0	74 66	112.1
1	34 07.6	75 66	112.4	34 30.0	75 66	112.0	34 52.3	74 66	111.6	35 14.5	74 66	111.2
2	33 28.2	74 66	111.5	33 50.5	74 66	111.1	34 12.7	74 66	110.7	34 34.9	74 66	110.3
3	32 48.7	74 66	110.6	33 10.8	74 67	110.2	33 32.9	74 67	109.8	33 55.0	73 67	109.4
4	32 08.8	74 67	109.8	32 30.9	73 67	109.4	32 52.9	73 67	109.0	33 14.9	73 67	108.6
55	31 28.8	73 67	108.9	31 50.8	73 67	108.5	32 12.7	73 67	108.1	32 34.5	73 68	107.7
6	30 48.6	73 67	108.1	31 10.5	73 68	107.7	31 32.3	73 68	107.3	31 54.0	72 68	106.9
7	30 08.2	73 68	107.3	30 30.0	73 68	106.9	30 51.7	72 68	106.5	31 13.3	72 68	106.0
8	29 27.6	72 68	106.4	29 49.3	72 68	106.0	30 10.9	72 68	105.6	30 32.5	72 68	105.2
9	28 46.8	72 68	105.6	29 08.4	72 68	105.2	29 30.0	72 68	104.8	29 51.5	72 69	104.4
60	28 05.8	72 68	104.8	28 27.4	72 69	104.4	28 48.9	72 69	104.0	29 10.3	71 69	103.6
1	27 24.7	72 69	104.0	27 46.2	72 69	103.6	28 07.7	71 69	103.2	28 29.0	71 69	102.8
2	26 43.5	72 69	103.2	27 04.9	71 69	102.8	27 26.3	71 69	102.4	27 47.6	71 69	102.0
3	26 02.1	71 69	102.4	26 23.5	71 69	102.0	26 44.8	71 69	101.6	27 06.0	71 69	101.2
4	25 20.6	71 69	101.6	25 41.9	71 69	101.3	26 03.2	71 70	100.9	26 24.4	70 70	100.5
65	24 39.0	71 70	100.9	25 00.3	71 70	100.5	25 21.5	71 70	100.1	25 42.6	70 70	99.7
6	23 57.3	71 70	100.1	24 18.5	71 70	99.7	24 39.6	70 70	99.3	25 00.7	70 70	98.9
7	23 15.5	71 70	99.4	23 36.6	70 70	99.0	23 57.7	70 70	98.6	24 18.8	70 70	98.2
8	22 33.6	70 70	98.6	22 54.7	70 70	98.2	23 15.7	70 70	97.8	23 36.7	70 70	97.4
9	21 51.6	70 70	97.9	22 12.7	70 70	97.5	22 33.7	70 70	97.1	22 54.6	70 70	96.7
70	21 09.5	70 70	97.1	21 30.6	70 70	96.7	21 51.5	70 70	96.3	22 12.5	70 70	96.0
1	20 27.4	70 70	96.4	20 48.4	70 70	96.0	21 09.3	70 70	95.6	21 30.2	70 70	95.2
2	19 45.2	70 70	95.6	20 06.2	70 70	95.3	20 27.1	70 70	94.9	20 48.0	69 71	94.5
3	19 03.0	70 70	94.9	19 23.9	70 70	94.5	19 44.8	70 71	94.1	20 05.6	69 71	93.8
4	18 20.7	70 71	94.2	18 41.6	70 71	93.8	19 02.5	69 71	93.4	19 23.3	69 71	93.0
75	17 38.3	70 71	93.5	17 59.2	70 71	93.1	18 20.1	69 71	92.7	18 40.9	69 71	92.3
6	16 56.0	70 71	92.7	17 16.9	70 71	92.4	17 37.7	69 71	92.0	17 58.5	69 71	91.6
7	16 13.6	70 71	92.0	16 34.5	70 71	91.6	16 55.3	69 71	91.3	17 16.1	69 71	90.9
8	15 31.2	70 71	91.3	15 52.1	69 71	90.9	16 12.9	69 71	90.6	16 33.7	69 71	90.2
9	14 48.8	70 71	90.6	15 09.6	69 71	90.2	15 30.5	69 71	89.9	15 51.2	69 71	89.5
80	14 06.3	70 71	89.9	14 27.2	69 71	89.5	14 48.0	69 71	89.1	15 08.8	69 71	88.8
1	13 23.9	70 71	89.2	13 44.8	70 71	88.8	14 05.6	69 71	88.4	14 26.4	69 71	88.1
2	12 41.5	70 71	88.5	13 02.4	70 71	88.1	13 23.2	69 71	87.7	13 44.0	69 71	87.4
3	11 59.1	70 71	87.8	12 20.0	70 71	87.4	12 40.8	69 71	87.0	13 01.7	69 71	86.7
4	11 16.7	70 71	87.1	11 37.6	70 71	86.7	11 58.5	70 71	86.3	12 19.3	69 70	86.0
85	10 34.4	70 71	86.4	10 55.3	70 71	86.0	11 16.1	70 70	85.6	11 37.0	69 70	85.3
6	9 52.0	70 70	85.7	10 13.0	70 70	85.3	10 33.9	70 70	85.0	10 54.7	70 70	84.6
7	9 09.7	70 70	85.0	9 30.7	70 70	84.6	9 51.6	70 70	84.3	10 12.5	70 70	83.9
8	8 27.5	70 70	84.3	8 48.5	70 70	83.9	9 09.4	70 70	83.6	9 30.4	70 70	83.2
9	7 45.3	70 70	83.6	8 06.3	70 70	83.2	8 27.3	70 70	82.9	8 48.3	70 70	82.5
90	7 03.2	70 70	82.9	7 24.2	70 70	82.5	7 45.2	70 70	82.2	8 06.3	70 70	81.8

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H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	d	Δt °	′	d	Δt °	′	d	Δt °	′	d	Δt °	′	d	Δt °	′	d	Δt °	′	d	Δt °	′	d	Δt °	°
00	37 00.0	1.0	01 180.0	36 30.0	1.0	01 180.0	36 00.0	1.0	01 180.0	35 30.0	1.0	01 180.0	35 00.0	1.0	01 180.0	34 30.0	1.0	01 180.0	34 00.0	1.0	01 180.0	33 30.0	1.0	01 180.0	00
1	36 59.5	1.0	02 178.8	36 29.5	1.0	02 178.8	35 59.5	1.0	02 178.8	35 29.6	1.0	02 178.8	34 59.6	1.0	02 178.8	34 29.6	1.0	02 178.8	33 59.6	1.0	02 178.8	33 29.6	1.0	02 178.8	1
2	36 58.2	1.0	04 177.5	36 28.2	1.0	04 177.5	35 58.2	1.0	04 177.6	35 28.2	1.0	04 177.6	34 58.2	1.0	04 177.6	34 28.2	1.0	04 177.6	33 58.2	1.0	04 177.6	33 28.3	1.0	04 177.7	2
3	36 55.9	1.0	05 176.3	36 25.9	1.0	05 176.3	35 55.9	1.0	05 176.3	35 26.0	1.0	05 176.4	34 56.0	1.0	05 176.4	34 26.0	1.0	05 176.4	33 56.1	1.0	05 176.4	33 26.1	1.0	05 176.5	3
4	36 52.7	1.0	07 175.0	36 22.7	1.0	07 175.1	35 52.8	1.0	07 175.1	35 22.8	1.0	07 175.2	34 52.9	1.0	07 175.2	34 22.9	1.0	07 175.2	33 53.0	1.0	07 175.3	33 23.0	1.0	07 175.3	4
05	36 48.5	1.0	08 173.8	36 18.6	1.0	08 173.9	35 48.7	1.0	08 173.9	35 18.8	1.0	08 174.0	34 48.9	1.0	08 174.0	34 19.0	1.0	08 174.0	33 49.1	1.0	08 174.1	33 19.1	1.0	08 174.1	05
6	36 43.5	1.0	10 172.6	36 13.6	1.0	10 172.6	35 43.8	1.0	10 172.7	35 13.9	1.0	10 172.7	34 44.0	1.0	10 172.8	34 14.1	1.0	10 172.9	33 44.3	1.0	09 172.9	33 14.4	1.0	09 173.0	6
7	36 37.6	99	11 171.4	36 07.8	99	11 171.4	35 37.9	99	11 171.5	35 08.1	99	11 171.5	34 38.3	99	11 171.6	34 08.4	99	11 171.7	33 38.6	99	11 171.7	33 08.8	99	11 171.8	7
8	36 30.8	99	13 170.1	36 01.0	99	13 170.2	35 31.2	99	13 170.3	35 01.4	99	13 170.4	34 31.6	99	12 170.4	34 01.9	99	12 170.5	33 32.1	99	12 170.6	33 02.3	99	12 170.6	8
9	36 23.0	99	14 168.9	35 53.3	99	14 169.0	35 23.6	99	14 169.1	34 53.9	99	14 169.2	34 24.1	99	14 169.2	33 54.4	99	14 169.3	33 24.7	99	14 169.4	32 54.9	99	14 169.5	9
10	36 14.4	99	16 167.7	35 44.8	99	16 167.8	35 15.1	99	16 167.9	34 45.5	99	15 168.0	34 15.8	99	15 168.1	33 46.1	99	15 168.1	33 16.5	99	15 168.2	32 46.8	99	15 168.3	10
1	36 05.0	99	17 166.5	35 35.4	99	17 166.6	35 05.8	99	17 166.7	34 36.2	99	17 166.8	34 06.6	99	17 166.9	33 37.0	99	17 167.0	33 07.4	99	17 167.1	32 37.8	99	16 167.2	1
2	35 54.6	98	19 165.3	35 25.1	98	19 165.4	34 55.6	98	18 165.5	34 26.1	98	18 165.6	33 56.5	98	18 165.7	33 27.0	98	18 165.8	32 57.5	98	18 165.9	32 27.9	98	18 166.0	2
3	35 43.4	98	20 164.1	35 14.0	98	20 164.2	34 44.5	98	20 164.3	34 15.1	98	20 164.4	33 45.7	98	20 164.5	33 16.2	98	19 164.7	32 46.8	98	19 164.8	32 17.3	98	19 164.9	3
4	35 31.3	98	22 162.9	35 02.0	98	21 163.0	34 32.6	98	21 163.1	34 03.3	98	21 163.3	33 33.9	98	21 163.4	33 04.6	98	21 163.5	32 35.2	98	21 163.6	32 05.8	98	20 163.7	4
15	35 18.4	97	23 161.7	34 49.2	97	23 161.8	34 19.9	98	23 162.0	33 50.7	98	22 162.1	33 21.4	98	22 162.2	32 52.1	98	22 162.4	32 22.8	98	22 162.5	31 53.5	98	22 162.6	15
6	35 04.7	97	24 160.5	34 35.5	97	24 160.7	34 06.4	97	24 160.8	33 37.2	97	24 160.9	33 08.0	97	24 161.1	32 38.9	97	23 161.2	32 09.7	97	23 161.4	31 40.5	97	23 161.5	6
7	34 50.1	97	26 159.3	34 21.1	97	25 159.5	33 52.0	97	25 159.6	33 23.0	97	25 159.8	32 53.9	97	25 159.9	32 24.8	97	25 160.1	31 55.7	97	25 160.2	31 26.6	97	24 160.4	7
8	34 34.7	96	27 158.2	34 05.8	96	27 158.3	33 36.9	96	27 158.5	33 07.9	97	26 158.7	32 39.0	97	26 158.8	32 10.0	97	26 159.0	31 41.0	97	26 159.1	31 12.0	97	26 159.3	8
9	34 18.6	96	28 157.0	33 49.8	96	28 157.2	33 20.9	96	28 157.4	32 52.1	96	28 157.5	32 23.2	96	28 157.7	31 54.4	96	27 157.8	31 25.5	96	27 158.0	30 56.6	96	27 158.2	9
20	34 01.6	96	30 155.9	33 32.9	96	29 156.1	33 04.2	96	29 156.2	32 35.5	96	29 156.4	32 06.7	96	29 156.6	31 38.0	96	29 156.7	31 09.2	96	28 156.9	30 40.4	96	28 157.1	20
1	33 43.9	95	31 154.7	33 15.3	95	31 154.9	32 46.7	95	30 155.1	32 18.1	95	30 155.3	31 49.5	95	30 155.5	31 20.8	95	30 155.6	30 52.2	96	30 155.8	30 23.5	96	29 156.0	1
2	33 25.4	95	32 153.6	32 57.9	95	32 153.8	32 28.5	95	32 154.0	32 00.0	95	31 154.2	31 31.5	95	31 154.4	31 03.0	95	31 154.5	30 34.4	95	31 154.7	30 05.9	95	31 154.9	2
3	33 06.2	94	33 152.5	32 37.9	94	33 152.7	32 09.5	95	33 152.9	31 41.2	95	33 153.1	31 12.8	95	32 153.3	30 44.4	95	32 153.4	30 16.0	95	32 153.6	29 47.5	95	32 153.8	3
4	32 46.2	94	34 151.4	32 18.0	94	34 151.6	31 49.8	94	34 151.8	31 21.6	94	34 152.0	30 53.3	94	34 152.2	30 25.1	94	33 152.4	29 56.8	94	33 152.6	29 28.5	94	33 152.8	4
25	32 25.6	94	36 150.3	31 57.5	94	35 150.5	31 29.4	94	35 150.7	31 01.3	94	35 150.9	30 33.2	94	35 151.1	30 05.0	94	35 151.3	29 36.9	94	34 151.5	29 08.7	94	34 151.7	25
6	32 04.2	93	37 149.2	31 36.2	93	37 149.4	31 08.3	93	36 149.6	30 40.3	93	36 149.8	30 12.3	93	36 150.0	29 44.3	93	36 150.2	29 16.3	93	35 150.4	28 48.2	94	35 150.6	6
7	31 42.1	93	38 148.1	31 14.3	93	38 148.3	30 46.5	93	37 148.5	30 18.6	93	37 148.8	29 50.8	93	37 149.0	29 22.9	93	37 149.2	28 55.0	93	37 149.4	28 27.1	93	36 149.6	7
8	31 19.3	92	39 147.0	30 51.7	92	39 147.3	30 24.0	92	39 147.5	29 56.3	92	38 147.7	29 28.6	92	38 147.9	29 00.8	93	38 148.1	28 33.1	93	38 148.4	28 05.3	93	37 148.6	8
9	30 55.9	92	40 146.0	30 28.4	92	40 146.2	30 00.9	92	40 146.4	29 33.3	92	39 146.7	29 05.7	92	39 146.9	28 38.1	92	39 147.1	28 10.5	92	39 147.3	27 42.8	92	38 147.5	9
30	30 31.9	91	41 144.9	30 04.5	91	41 145.1	29 37.1	91	41 145.4	29 09.7	91	40 145.6	28 42.2	92	40 145.8	28 14.8	92	40 146.1	27 47.3	92	40 146.3	27 19.8	92	40 146.5	30
1	30 07.2	91	42 143.9	29 39.9	91	42 144.1	29 12.7	91	42 144.4	28 45.4	91	42 144.6	28 18.1	91	41 144.8	27 50.8	91	41 145.1	27 23.4	91	41 145.3	26 56.1	91	41 145.5	1
2	29 41.8	90	43 142.8	29 14.7	90	43 143.1	28 47.6	90	43 143.3	28 20.5	90	42 143.6	27 53.3	91	42 143.8	27 26.2	91	42 144.1	26 59.0	91	42 144.3	26 31.7	91	42 144.5	2
3	29 15.9	90	44 141.8	28 49.0	90	44 142.1	28 22.0	90	44 142.3	27 55.0	90	43 142.6	27 28.0	90	43 142.8	27 01.0	90	43 143.1	26 33.9	90	43 143.3	26 06.8	90	42 143.5	3
4	28 49.4	89	45 140.8	28 22.6	89	45 141.1	27 55.8	89	45 141.3	27 28.9	90	44 141.6	27 02.1	90	44 141.8	26 35.2	90	44 142.1	26 08.2	90	44 142.3	25 41.3	90	43 142.5	4
35	28 22.3	89	46 139.8	27 55.6	89	46 140.1	27 29.0	89	46 140.3	27 02.3	89	45 140.6	26 35.5	89	45 140.8	26 08.8	89	45 141.1	25 42.0	89	45 141.3	25 15.2	89	44 141.6	35
6	27 54.6	88	47 138.8	27 28.1	88	47 139.1	27 01.6	88	47 139.3	26 35.0	89	46 139.6	26 08.5	89	46 139.8	25 41.9	89	46 140.1	25 15.2	89	46 140.4	24 48.6	89	45 140.6	6
7	27 26.4	88	48 137.8	27 00.0	88	48 138.1	26 33.7	88	47 138.4	26 07.3	88	47 138.6	25 40.8	88	47 138.9	25 14.4	88	47 139.1	24 47.9	88	46 139.4	24 21.4	88	46 139.7	7
8	26 57.6	87	49 136.8	26 31.4	87	49 137.1	26 05.2	87	48 137.4	25 39.0	88	48 137.7	25 12.7	88	48 137.9	24 46.4	88	48 138.2	24 20.0	88	47 138.4	23 53.6	88	47 138.7	8
9	26 28.3	87	50 135.9	26 02.3	87	49 136.2	25 36.2	87	49 136.4	25 10.1	87	49 136.7	24 44.0	87	49 137.0	24 17.8	87	48 137.2	23 51.6	87	48 137.5	23 25.4	87	48 137.8	9
40	25 58.6	86	50 134.9	25 32.7	86	50 135.2	25 06.7	86	50 135.5	24 40.8	87	50 135.8	24 14.8	87	50 136.0	23 48.8	87	49 136.3	23 22.7	87	49 136.6	22 56.6	87	49 136.8	40
1	25 28.3	86	51 134.0	25 02.5	86	51 134.3	24 36.7	86	51 134.5	24 10.9	86	51 134.8	23 45.1	86	50 135.1	23 19.2	86	50 135.4	22 53.3	86	50 135.6	22 27.4	86	50 135.9	1
2	24 57.5	85	52 133.0	24 31.9	85	52 133.3	24 06.3	86	52 133.6	23 40.6	86	51 133.9	23 14.9	86	51 134.2	22 49.1	86	51 134.5	22 23.4	86	51 134.7	21 57.6	86	50 135.0	2
3	24 26.3	85	53 132.1	24 00.8	85	53 132.4	23 35.3	85	52 132.7	23 09.8	85	52 133.0	22 44.2	85	52 133.3	22 18.6	85	52 133.5	21 53.0	85	51 133.8	21 27.4	86	51 134.1	3
4	23 54.6	84	54 131.2	23 29.2	84	53 131.5	23 03.9	85	53 131.8	22 38.5	85	53 132.1	22 13.1	85	53 132.4	21 47.6	85	52 132.6	21 22.2	85	52 132.9	20 56.7	85	52 133.2	4
45	23 22.4	84	54 130.3	22 57.2	84	54 130.6	22 32.0	84	54 130.9	22 06.8	84	54 131.2	21 41.5	84	53 131.5	21 16.2	84	53 131.7	20 50.9	84	53 132.0	20 25.5	85	53 132.3	45
6	22 49.8	83	55 129.4	22 24.8	84	55 129.7	21 59.7	84	55 130.0	21 34.6	84	54 130.3	21 09.5	84	54 130.6	20 44.3	84	54 130.9	20 19.2	84	54 131.2	19 53.9	84	53 131.4	6
7	22 16.8	83	56 128.5	21 51.9	83	55 128.8	21 27.0	83	55 129.1	21 02.1	83	55 129.4	20 37.1	83	55 129.7	20 12.0	83	55 130.0	19 47.0	84	54 130.3	19 21.9	84	54 130.6	7
8	21 43.4	82	56 127.6	21 18.7	83	56 127.9	20 53.9	83	56 128.2	20 29.1	83	56 128.5	20 04.2	83	55 128.8	19 39.3	83	55 129.1	19 14.4	83	55 129.4	18 49.5	83	55 129.7	8
9	21 09.6	82	57 126.7	20 45.0	82	57 127.0	20 20.3	82	57 127.3	19 55.7	82	56 127.6	19 31.0	82	56 128.0	19 06.2	83	56 128.3	18 41.4	83	56 128.5	18 16.6	83	55 128.8	9
50	20 35.4	82	58 125.9	20 10.9	82	57 126.2	19 46.4	82	57 126.5	19 21.9	82	57 126.8	18 57.3	82	57 127.1	18 32.7	82	56 127.4	18 08.1	82	56 127.7	17 43.4	82	56 128.0	50
1	20 00.9	81	58 125.0	19 36.5	81	58 125.3	19 12.1	81	58 125.6	18 47.7	81	58 125.9	18 23.3	82	57 126.2	17 58.8	82	57 126.5	17 34.3	82	57 126.8	17 09.8	82	57 127.2	1
2	19 25.9	81	59 124.2	19 01.7	81	59 124.5	18 37.5	81	58 124.8	18 13.2	81	58 125.1	17 48.9	81	58 125.4	17 24.5	81	58 125.7	17 00.2	81	58 126.0	16 35.8	81	57 126.3	2
3	18 50.7	80	59 123.3	18 26.6	80	59 123.6	18 02.4	80	59 123.9	17 38.3	81	59 124.3	17 14.1	81	59 124.6	16 49.9	81	58 124.9	16 25.7	81	58 125.2	16 01.4	81	58 125.5	3
4	18 15.0	80	60 122.5	17 51.1	80	60 122.8	17 27.1	80	60 123.1	17 03.1	80	59 123.4	16 39.0	80	59 123.7	16 14.9	80	59 124.0	15 50.8	80	59 124.4	15 26.7	80	58 124.7	4
55	17 39.1	79	60 121.7	17 15.2	80	60 122.0	16 51.4	80	60 122.3	16 27.5	80	60 122.6	16 03.6	80	60 122.9	15 39.6	80	59 123.2	15 15.6	80	59 123.5	14 51.6	80	59 123.9	55
6	17 02.8	79	61 120.8	16 39.1	79	61 121.1	16 15.3	79	61 121.5	15 51.6	79	60 121.8	15 27.8	79	60 122.1	15 03.9	79	60 122.4	14 40.1	80	60 122.7	14 16.2	80	60 123.0	6
7	16 26.2	79	61 120.0	16 02.6	79	61 120.3	15 39.0	79	61 120.7	15 15.4	79	61 121.0	14 51.7	79	61 121.3	14 28.0	79	60 121.6	14 04.2	79	60 121.9	13 40.5	79	60 122.2	7
8	15 49.3	78	62 119.2	15 25.9	78	62 119.5	15 02.4	78	62 119.9	14 38.8	78	61 120.2	14 15.3	79	61 120.5	13 51.7	79	61 120.8	13 28.1	79	61 121.1	13 04.5	79	61 121.4	8
9	15 12.2	78	62 118.4	14 48.8	78	62 118.7	14 25.4	78	62 119.1	14 02.0	78	62 119.4	13 38.6	78	62 119.7	13 15.1	78	61 120.0	12 51.6	78	61 120.3	12 28.1	78	61 120.7	9
60	14 34.7	77	63 117.6	14 11.5	78	63 117.9	13 48.2	78	62 118.3	13 24.9	78	62 118.6	13 01.6	78	62 118.9	12 38.2	78	62 119.2	12 14.9	78	62 119.6	11 51.5	78	62 119.9	60
1	13 57.0	77	63 116.8	13 33.8	77	63 117.1	13 10.7	77	63 117.5	12 47.5	77	63 117.8	12 24.3	77	63 118.1	12 01.1	77	62 118.4	11 37.8	78	62 118.8	11 14.5	78	62 119.1	1
2	13 19.0	77	64 116.0	12 56.0	77	64 116.4	12 32.9	77	63 116.7	12 09.8	77	63 117.0	11 46.7	77	63 117.3	11 23.6	77	63 117.7	11 00.5	77	63 118.0	10 37.3	77	62 118.3	2
3	12 40.7	76	64 115.3	12 17.8	76	64 115.6	11 54.9	77	64 115.9	11 31.9	77	64 116.2	11 08.9	77	63 116.6	10 45.9	77	63 116.9	10 22.9	77	63 117.2	9 59.8	77	63 117.6	3
4	12 02.2	76	65 114.5	11 39.4	76	64 114.8	11 16.6	76	64 115.1	10 53.7	76	64 115.5	10 30.8	76	64 115.8	10 07.9	76	64 116.1	9 45.0	76	64 116.5	9 22.1	76	63 116.8	4
65	11 23.5	76	65 113.7	11 00.8	76	65 114.1	10 38.1	76	65 114.4	10 15.3	76	64 114.7	9 52.5	76	64 115.0	9 29.7	76	64 115.4	9 06.9	76	64 115.7	8 44.1	76	64 116.0	65
6	10 44.6	75	65 113.0	10 21.9	75	65 113.3	9 59.3	75	65 113.6	9 36.7	76	65 114.0	9 14.0	76	65 114.3	8 51.3	76	64 114.6	8 28.6	76	64 115.0	8 05.9	76	64 115.3	6
7	10 05.4	75	66 112.2	9 42.9	75	66 112.5	9 20.3	75	65 112.9	8 57.8	75	65 113.2	8 35.2	75	65 113.5	8 12.6	75	65 113.9	7 50.0	75	65 114.2	7 27.4	75	64 114.5	7
8	9 26.0	75	66 111.4	9 03.6	75	66 111.8	8 41.1	75	66 112.1	8 18.7	75	66 112.5	7 56.2	75	65 112.8	7 33.7	75	65 113.1	7 11.2	75	65 113.5	6 48.7	75	65 113.8	8
9	8 46.4	74	66 110.7	8 24.1	74	66 111.0	8 01.7	75	66 111.4	7 39.4	75	66 111.7	7 17.0	75	66 112.0	6 54.6	75	66 112.4	6 32.2	75	65 112.7	6 09.7	75	65 113.1	9
70	8 06.6	74	67 110.0	7 44.4	74	66 110.3	7 22.1	74	66 110.6	6 59.8	74	66 111.0	6 37.5	74	66 111.3	6 15.2	74	66 111.6	5 52.9	74	66 112.0	5 30.6	74	66 112.3	70
1	7 26.7	74	67 109.2	7 04.5	74	67 109.6	6 42.3	74	67 109.9	6 20.1	74	66 110.2	5 57.9	74	66 110.6	5 35.7	74	66 110.9	5 13.5	74	66 111.2				1
2	6 46.5	74	67 108.5	6 24.4	74	67 108.8	6 02.3	74	67 109.2	5 40.2	74	67 109.5	5 18.1	74	67 109.8										2
3	6 06.2	73	68 107.7	5 44.2	73	67 108.1	5 22.2	73	67 108.4	5 00.1	73	67 108.8													3
4	5 25.7	73	68 107.0	5 03.8	73	68 107.4																			4

DECLINATION SAME NAME AS LATITUDE

H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	d	Δt °	′	d	Δt °	′	d	Δt °	′	d	Δt °	′	d	Δt °	′	d	Δt °	′	d	Δt °	′	d	Δt °	°
91				5 17.8	70	70 83.3	5 38.9	70	70 82.9	6 00.0	70	70 82.6	6 21.1	70	70 82.2	6 42.2	70	70 81.8	7 03.3	70	70 81.5	7 24.3	70	70 81.1	91
2										5 18.0	70	70 81.9	5 39.1	70	70 81.5	6 00.2	70	70 81.1	6 21.3	70	70 80.8	6 42.4	70	70 80.4	2
3																5 18.4	71	70 80.4	5 39.5	70	70 80.1	6 00.6	70	70 79.7	3
4																						5 18.9	71	70 79.0	4

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Lat. 45°

H.A.	12° 00′ Alt.	Δd Δt	Az.	12° 30′ Alt.	Δd Δt	Az.	13° 00′ Alt.	Δd Δt	Az.	13° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	57 00.0	1.0 01	180.0	57 30.0	1.0 01	180.0	58 00.0	1.0 01	180.0	58 30.0	1.0 01	180.0
1	56 59.3	1.0 03	178.2	57 29.3	1.0 03	178.2	57 59.3	1.0 03	178.2	58 29.3	1.0 03	178.1
2	56 57.3	1.0 06	176.4	57 27.3	1.0 06	176.4	57 57.3	1.0 06	176.3	58 27.2	1.0 06	176.3
3	56 54.0	1.0 08	174.6	57 24.0	1.0 08	174.6	57 53.9	1.0 08	174.5	58 23.8	1.0 08	174.4
4	56 49.4	1.0 10	172.8	57 19.3	1.0 10	172.8	57 49.1	1.0 10	172.7	58 19.0	1.0 10	172.6
05	56 43.4	99 12	171.1	57 13.3	99 12	171.0	57 43.1	99 12	170.9	58 12.9	99 12	170.7
6	56 36.2	99 14	169.3	57 05.9	99 14	169.2	57 35.7	99 15	169.0	58 05.4	99 15	168.9
7	56 27.7	99 16	167.5	56 57.3	99 16	167.4	57 26.9	99 17	167.2	57 56.5	99 17	167.1
8	56 17.9	98 18	165.8	56 47.4	98 19	165.6	57 16.9	98 19	165.5	57 46.4	98 19	165.3
9	56 06.9	98 20	164.1	56 36.3	98 21	163.9	57 05.7	98 21	163.7	57 35.0	98 21	163.5
10	55 54.6	98 22	162.4	56 23.9	98 23	162.2	56 53.1	97 23	162.0	57 22.4	97 23	161.8
1	55 41.2	97 24	160.7	56 10.3	97 25	160.5	56 39.4	97 25	160.2	57 08.5	97 25	160.0
2	55 26.5	97 26	159.0	55 55.5	96 27	158.8	56 24.4	96 27	158.5	56 53.3	96 27	158.3
3	55 10.8	96 28	157.3	55 39.6	96 28	157.1	56 08.3	96 29	156.8	56 37.1	96 29	156.6
4	54 53.9	95 30	155.7	55 22.5	96 30	155.4	55 51.1	95 31	155.2	56 19.6	95 31	154.9
15	54 35.9	95 32	154.1	55 04.3	95 32	153.8	55 32.7	95 32	153.5	56 01.1	94 33	153.2
6	54 16.8	94 34	152.5	54 45.0	94 34	152.2	55 13.3	94 34	151.9	55 41.4	94 34	151.6
7	53 56.7	94 35	150.9	54 24.7	93 36	150.6	54 52.8	93 36	150.3	55 20.7	93 36	150.0
8	53 35.6	93 37	149.4	54 03.4	93 37	149.1	54 31.3	93 37	148.8	54 59.0	92 38	148.4
9	53 13.5	92 38	147.9	53 41.1	92 39	147.5	54 08.8	92 39	147.2	54 36.3	92 39	146.9
20	52 50.4	92 40	146.4	53 17.9	91 40	146.0	53 45.3	91 41	145.7	54 12.7	91 41	145.3
1	52 26.5	91 41	144.9	52 53.7	91 42	144.6	53 20.9	91 42	144.2	53 48.1	90 42	143.8
2	52 01.7	90 43	143.4	52 28.7	90 43	143.1	52 55.7	90 44	142.7	53 22.6	90 44	142.4
3	51 36.0	90 44	142.0	52 02.8	89 45	141.7	52 29.6	89 45	141.3	52 56.3	89 45	140.9
4	51 09.5	89 46	140.6	51 36.1	89 46	140.3	52 02.6	88 46	139.9	52 29.1	88 47	139.5
25	50 42.2	88 47	139.3	51 08.6	88 47	138.9	51 34.9	88 47	138.5	52 01.2	87 48	138.1
6	50 14.1	87 48	137.9	50 40.3	87 48	137.5	51 06.4	87 49	137.1	51 32.5	87 49	136.7
7	49 45.3	87 49	136.6	50 11.3	87 50	136.2	50 37.2	86 50	135.8	51 03.0	86 50	135.4
8	49 15.8	86 50	135.3	49 41.6	86 51	134.9	50 07.3	86 51	134.5	50 32.9	85 51	134.1
9	48 45.6	85 51	134.0	49 11.2	85 52	133.6	49 36.7	85 52	133.2	50 02.1	85 52	132.8
30	48 14.7	85 52	132.7	48 40.1	84 53	132.3	49 05.4	84 53	131.9	49 30.6	84 53	131.5
1	47 43.3	84 53	131.5	48 08.5	84 54	131.1	48 33.5	84 54	130.7	48 58.6	83 54	130.3
2	47 11.2	83 54	130.3	47 36.2	83 55	129.9	48 01.1	83 55	129.5	48 25.9	83 55	129.1
3	46 38.6	83 55	129.1	47 03.4	82 56	128.7	47 28.1	82 56	128.3	47 52.7	82 56	127.9
4	46 05.4	82 56	127.9	46 30.0	82 56	127.5	46 54.5	82 57	127.1	47 18.9	81 57	126.7
35	45 31.6	82 57	126.8	45 56.1	81 57	126.4	46 20.4	81 58	126.0	46 44.6	81 58	125.5
6	44 57.4	81 58	125.7	45 21.7	81 58	125.2	45 45.8	80 58	124.8	46 09.8	80 59	124.4
7	44 22.7	80 59	124.6	44 46.8	80 59	124.1	45 10.7	80 59	123.7	45 34.6	79 59	123.3
8	43 47.5	80 59	123.5	44 11.4	79 60	123.0	44 35.2	79 60	122.6	44 58.9	79 60	122.2
9	43 11.9	79 60	122.4	43 35.6	79 60	122.0	43 59.3	79 61	121.5	44 22.8	78 61	121.1
40	42 35.9	79 61	121.3	42 59.4	78 61	120.9	43 22.9	78 61	120.5	43 46.3	78 62	120.1
1	41 59.5	78 61	120.3	42 22.9	78 62	119.9	42 46.2	77 62	119.4	43 09.4	77 62	119.0
2	41 22.6	78 62	119.3	41 45.9	77 62	118.9	42 09.0	77 62	118.4	42 32.1	77 63	118.0
3	40 45.5	77 63	118.3	41 08.5	77 63	117.9	41 31.5	76 63	117.4	41 54.4	76 63	117.0
4	40 07.9	77 63	117.3	40 30.9	76 63	116.9	40 53.7	76 64	116.4	41 16.5	76 64	116.0
45	39 30.0	76 64	116.3	39 52.9	76 64	115.9	40 15.6	76 64	115.5	40 38.2	75 64	115.0
6	38 51.9	76 64	115.4	39 14.5	75 64	114.9	39 37.1	75 65	114.5	39 59.6	75 65	114.1
7	38 13.4	75 65	114.4	38 35.9	75 65	114.0	38 58.4	75 65	113.6	39 20.7	74 65	113.1
8	37 34.6	75 65	113.5	37 57.0	75 65	113.1	38 19.3	74 65	112.6	38 41.6	74 66	112.2
9	36 55.6	74 66	112.6	37 17.8	74 66	112.1	37 40.1	74 66	111.7	38 02.2	74 66	111.3
50	36 16.3	74 66	111.7	36 38.4	74 66	111.2	37 00.5	73 66	110.8	37 22.5	73 66	110.4
1	35 36.7	74 66	110.8	35 58.8	73 66	110.3	36 20.7	73 67	109.9	36 42.6	73 67	109.5
2	34 56.9	73 67	109.9	35 18.9	73 67	109.5	35 40.7	73 67	109.0	36 02.5	72 67	108.6
3	34 16.9	73 67	109.0	34 38.8	73 67	108.6	35 00.5	72 67	108.2	35 22.2	72 67	107.8
4	33 36.7	73 67	108.2	33 58.5	72 68	107.7	34 20.1	72 68	107.3	34 41.7	72 68	106.9
55	32 56.3	72 68	107.3	33 18.0	72 68	106.9	33 39.5	72 68	106.5	34 01.0	72 68	106.1
6	32 15.7	72 08	106.5	32 37.3	72 68	106.1	32 58.8	72 68	105.6	33 20.2	71 68	105.2
7	31 34.9	72 68	105.6	31 56.4	72 68	105.2	32 17.8	71 68	104.8	32 39.2	71 69	104.4
8	30 54.0	72 68	104.8	31 15.4	71 69	104.4	31 36.7	71 69	104.0	31 58.0	71 69	103.6
9	30 12.9	71 69	104.0	30 34.2	71 69	103.6	30 55.5	71 69	103.2	31 16.7	71 69	102.8
60	29 31.7	71 69	103.2	29 52.9	71 69	102.8	30 14.1	71 69	102.4	30 35.3	70 69	102.0
1	28 50.3	71 69	102.4	29 11.5	71 69	102.0	29 32.6	70 69	101.6	29 53.7	70 69	101.2
2	28 08.8	71 69	101.6	28 29.9	70 69	101.2	28 51.0	70 70	100.8	29 12.0	70 70	100.4
3	27 27.2	70 70	100.8	27 48.3	70 70	100.4	28 09.3	70 70	100.0	28 30.2	70 70	99.6
4	26 45.5	70 70	100.1	27 06.5	70 70	99.7	27 27.5	70 70	99.3	27 48.4	70 70	98.9
65	26 03.6	70 70	99.3	26 24.6	70 70	98.9	26 45.6	70 70	98.5	27 06.4	69 70	98.1
6	25 21.7	70 70	98.5	25 42.7	70 70	98.2	26 03.6	69 70	97.8	26 24.4	69 70	97.4
7	24 39.7	70 70	97.8	25 00.6	70 70	97.4	25 21.5	69 70	97.0	25 42.3	69 70	96.6
8	23 57.7	70 70	97.0	24 18.5	69 70	96.7	24 39.3	69 70	96.3	25 00.1	69 70	95.9
9	23 15.5	70 70	96.3	23 36.4	69 70	95.9	23 57.1	69 70	95.5	24 17.8	69 70	95.1
70	22 33.3	69 70	95.6	22 54.1	69 70	95.2	23 14.9	69 70	94.8	23 35.6	69 71	94.4
1	21 51.1	69 70	94.8	22 11.9	69 71	94.4	22 32.6	69 71	94.1	22 53.2	69 71	93.7
2	21 08.8	69 71	94.1	21 29.5	69 71	93.7	21 50.2	69 71	93.3	22 10.9	69 71	92.9
3	20 26.4	69 71	93.4	20 47.2	69 71	93.0	21 07.9	69 71	92.6	21 28.5	69 71	92.2
4	19 44.1	69 71	92.7	20 04.8	69 71	92.3	20 25.5	69 71	91.9	20 46.1	69 71	91.5
75	19 01.7	69 71	91.9	19 22.4	69 71	91.6	19 43.1	69 71	91.2	20 03.7	69 71	90.8
6	18 19.3	69 71	91.2	18 40.0	69 71	90.8	19 00.6	69 71	90.5	19 21.3	69 71	90.1
7	17 36.8	69 71	90.5	17 57.6	69 71	90.1	18 18.2	69 71	89.8	18 38.8	69 71	89.4
8	16 54.4	69 71	89.8	17 15.1	69 71	89.4	17 35.8	69 71	89.0	17 56.4	69 71	88.7
9	16 12.0	69 71	89.1	16 32.7	69 71	88.7	16 53.4	69 71	88.3	17 14.0	69 71	88.0
80	15 29.6	69 71	88.4	15 50.3	69 71	88.0	16 11.0	69 71	87.6	16 31.6	69 71	87.3
1	14 47.2	69 71	87.7	15 07.9	69 71	87.3	15 28.6	69 71	87.0	15 49.3	69 71	86.6
2	14 04.8	69 71	87.0	14 25.5	69 71	86.6	14 46.2	69 71	86.3	15 06.9	69 70	85.9
3	13 22.4	69 71	86.3	13 43.2	69 70	85.9	14 03.9	69 70	85.6	14 24.6	69 70	85.2
4	12 40.1	69 70	85.6	13 00.9	69 70	85.2	13 21.6	69 70	84.9	13 42.4	69 70	84.5
85	11 57.8	69 70	84.9	12 18.6	69 70	84.5	12 39.4	69 70	84.2	13 00.2	69 70	83.8
6	11 15.6	69 70	84.2	11 36.4	69 70	83.9	11 57.2	69 70	83.5	12 18.0	69 70	83.1
7	10 33.4	70 70	83.5	10 54.3	69 70	83.2	11 15.1	69 70	82.8	11 35.9	69 70	82.4
8	9 51.3	70 70	82.8	10 12.2	70 70	82.5	10 33.1	70 70	82.1	10 53.9	69 70	81.7
9	9 09.2	70 70	82.1	9 30.2	70 70	81.8	9 51.1	70 70	81.4	10 12.0	70 70	81.1
90	8 27.2	70 70	81.5	8 48.2	70 70	81.1	9 09.2	70 70	80.7	9 30.1	70 70	80.4

H.A.	14° 00′ Alt.	Δd Δt	Az.	14° 30′ Alt.	Δd Δt	Az.	15° 00′ Alt.	Δd Δt	Az.	15° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	59 00.0	1.0 01	180.0	59 30.0	1.0 01	180.0	60 00.0	1.0 01	180.0	60 30.0	1.0 01	180.0
1	58 59.3	1.0 03	178.1	59 29.3	1.0 04	178.1	59 59.3	1.0 04	178.1	60 29.3	1.0 04	178.0
2	58 57.2	1.0 06	176.2	59 27.2	1.0 06	176.2	59 57.1	1.0 06	176.1	60 27.1	1.0 06	176.1
3	58 53.7	1.0 08	174.4	59 23.7	1.0 08	174.3	59 53.6	1.0 08	174.2	60 23.5	1.0 08	174.1
4	58 48.9	1.0 10	172.5	59 18.7	1.0 10	172.4	59 48.6	1.0 11	172.3	60 18.4	1.0 11	172.2
05	58 42.6	99 13	170.6	59 12.4	99 13	170.5	59 42.2	99 13	170.4	60 12.0	99 13	170.3
6	58 35.1	99 15	168.8	59 04.8	99 15	168.6	59 34.4	99 15	168.5	60 04.1	99 15	168.4
7	58 26.1	99 17	166.9	58 55.7	99 17	166.8	59 25.3	99 17	166.6	59 54.9	99 18	166.5
8	58 15.9	98 19	165.1	58 45.4	98 19	164.9	59 14.8	98 20	164.8	59 44.2	98 20	164.6
9	58 04.4	98 21	163.3	58 33.7	98 22	163.1	59 03.0	98 22	162.9	59 32.3	98 22	162.7
10	57 51.6	97 23	161.5	58 20.7	97 24	161.3	58 49.9	97 24	161.1	59 19.0	97 24	160.9
1	57 37.5	97 25	159.8	58 06.5	97 26	159.5	58 35.5	97 26	159.3	59 04.5	96 26	159.0
2	57 22.2	96 27	158.0	57 51.1	96 28	157.8	58 19.9	96 28	157.5	58 48.7	96 28	157.2
3	57 05.8	96 29	156.3	57 34.4	96 30	156.0	58 03.1	95 30	155.8	58 31.7	95 30	155.5
4	56 48.1	95 31	154.6	57 16.6	95 32	154.3	57 45.1	95 32	154.0	58 13.5	95 32	153.7
15	56 29.4	94 33	152.9	56 57.7	94 33	152.6	57 25.9	94 34	152.3	57 54.1	94 34	152.0
6	56 09.6	94 35	151.3	56 37.6	94 35	151.0	57 05.7	93 36	150.7	57 33.6	93 36	150.3
7	55 48.7	93 37	149.7	56 16.5	93 37	149.3	56 44.3	93 37	149.0	57 12.1	92 38	148.7
8	55 26.7	92 38	148.1	55 54.4	92 39	147.7	56 22.0	92 39	147.4	56 49.5	92 39	147.0
9	55 03.8	92 40	146.5	55 31.2	91 40	146.2	55 58.6	91 41	145.8	56 25.9	91 41	145.4
20	54 39.9	91 41	145.0	55 07.2	91 42	144.6	55 34.3	90 42	144.2	56 01.4	90 42	143.9
1	54 15.1	90 43	143.5	54 42.1	90 43	143.1	55 09.1	90 44	142.7	55 35.9	89 44	142.3
2	53 49.4	89 44	142.0	54 16.2	89 45	141.6	54 42.9	89 45	141.2	55 09.5	89 45	140.8
3	53 22.9	89 46	140.5	53 49.4	88 46	140.1	54 15.9	88 46	139.7	54 42.3	88 47	139.3
4	52 55.5	88 47	139.1	53 21.8	88 47	138.7	53 48.1	87 48	138.3	54 14.2	87 48	137.9
25	52 27.4	87 48	137.7	52 53.5	87 49	137.3	53 19.5	87 49	136.9	53 45.4	86 49	136.5
6	51 58.4	86 49	136.3	52 24.3	86 50	135.9	52 50.1	86 50	135.5	53 15.8	86 51	135.1
7	51 28.8	86 51	135.0	51 54.4	85 51	134.6	52 20.0	85 51	134.1	52 45.5	85 52	133.7
8	50 58.4	85 52	133.7	51 23.9	85 52	133.2	51 49.2	84 52	132.8	52 14.5	84 53	132.4
9	50 27.4	84 53	132.4	50 52.6	84 53	131.9	51 17.8	84 53	131.5	51 42.8	83 54	131.1
30	49 55.7	84 54	131.1	50 20.8	83 54	130.7	50 45.7	83 54	130.2	51 10.5	83 55	129.8
1	49 23.5	83 55	129.8	49 48.3	83 55	129.4	50 13.0	82 55	129.0	50 37.6	82 56	128.5
2	48 50.6	82 56	128.6	49 15.2	82 56	128.2	49 39.7	82 56	127.7	50 04.1	81 57	127.3
3	48 17.2	82 57	127.4	48 41.6	81 57	127.0	49 05.9	81 57	126.5	49 30.1	81 58	126.1
4	47 43.2	81 57	126.2	48 07.4	81 58	125.8	48 31.6	80 58	125.4	48 55.6	80 58	124.9
35	47 08.7	80 58	125.1	47 32.8	80 59	124.6	47 56.7	80 59	124.2	48 20.5	79 59	123.7
6	46 33.8	80 59	124.0	46 57.6	79 59	123.5	47 21.4	79 60	123.1	47 45.0	79 60	122.6
7	45 58.4	79 60	122.8	46 22.0	79 60	122.4	46 45.6	78 60	121.9	47 09.1	78 61	121.5
8	45 22.5	78 60	121.7	45 46.0	78 61	121.3	46 09.4	78 61	120.9	46 32.7	77 61	120.4
9	44 46.2	78 61	120.7	45 09.5	78 61	120.2	45 32.8	77 62	119.8	45 55.9	77 62	119.3
40	44 09.5	77 62	119.6	44 32.7	77 62	119.2	44 55.7	77 62	118.7	45 18.7	76 63	118.3
1	43 32.5	77 62	118.6	43 55.5	76 63	118.1	44 18.4	76 63	117.7	44 41.1	76 63	117.2
2	42 55.0	76 63	117.6	43 17.9	76 63	117.1	43 40.6	76 63	116.7	44 03.2	75 64	116.2
3	42 17.2	76 64	116.6	42 39.9	75 64	116.1	43 02.5	75 64	115.7	43 25.0	75 64	115.2
4	41 39.1	75 64	115.6	42 01.7	75 64	115.1	42 24.1	75 64	114.7	42 46.5	74 65	114.2
45	41 00.7	75 65	114.6	41 23.1	75 65	114.2	41 45.4	74 65	113.7	42 07.6	74 65	113.3
6	40 22.0	74 65	113.6	40 44.3	74 65	113.2	41 06.4	74 65	112.8	41 28.5	73 66	112.3
7	39 43.0	74 65	112.7	40 05.1	74 66	112.3	40 27.2	73 66	111.8	40 49.1	73 66	111.4
8	39 03.7	74 66	111.8	39 25.7	73 66	111.3	39 47.7	73 66	110.9	40 09.5	73 66	110.4
9	38 24.2	73 66	110.9	38 46.1	73 66	110.4	39 07.9	73 67	110.0	39 29.6	72 67	109.5
50	37 44.4	73 67	110.0	38 06.2	73 67	109.5	38 27.9	72 67	109.1	38 49.5	72 67	108.6
1	37 04.4	72 67	109.1	37 26.1	72 67	108.6	37 47.7	72 67	108.2	38 09.2	72 67	107.8
2	36 24.2	72 67	108.2	36 45.8	72 68	107.8	37 07.3	72 68	107.3	37 28.7	71 68	106.9
3	35 43.8	72 68	107.3	36 05.3	72 68	106.9	36 26.7	71 68	106.5	36 48.1	71 68	106.0
4	35 03.2	72 68	106.5	35 24.6	71 68	106.1	35 46.0	71 68	105.6	36 07.2	71 68	105.2
55	34 22.5	71 68	105.6	34 43.8	71 68	105.2	35 05.0	71 68	104.8	35 26.2	70 69	104.3
6	33 41.5	71 68	104.8	34 02.8	71 69	104.4	34 23.9	70 69	104.0	34 45.0	70 69	103.5
7	33 00.4	71 69	104.0	33 21.6	70 69	103.6	33 42.7	70 69	103.1	34 03.7	70 69	102.7
8	32 19.2	70 69	103.2	32 40.3	70 69	102.7	33 01.3	70 69	102.3	33 22.2	70 69	101.9
9	31 37.8	70 69	102.4	31 58.8	70 69	101.9	32 19.8	70 69	101.5	32 40.6	69 69	101.1
60	30 56.3	70 69	101.6	31 17.3	70 69	101.1	31 38.2	69 70	100.7	31 59.0	69 70	100.3
1	30 14.7	70 70	100.8	30 35.6	70 70	100.4	30 56.4	69 70	99.9	31 17.2	69 70	99.5
2	29 33.0	70 70	100.0	29 53.8	69 70	99.6	30 14.6	69 70	99.2	30 35.3	69 70	98.7
3	28 51.1	69 70	99.2	29 11.9	69 70	98.8	29 32.6	69 70	98.4	29 53.3	69 70	98.0
4	28 09.2	69 70	98.5	28 30.0	69 70	98.0	28 50.6	69 70	97.6	29 11.2	69 70	97.2
65	27 27.2	69 70	97.7	27 47.9	69 70	97.3	28 08.6	69 70	96.9	78 29.1	68 70	96.5
6	26 45.1	69 70	96.9	27 05.8	69 70	96.5	27 26.4	69 70	96.1	27 46.9	68 70	95.7
7	26 03.0	69 70	96.2	26 23.6	69 70	95.8	26 44.2	68 70	95.4	27 04.7	68 70	95.0
8	25 20.8	69 70	95.5	25 41.4	69 70	95.1	26 01.9	68 70	94.6	26 22.4	68 71	94.2
9	24 38.5	69 70	94.7	24 59.1	69 71	94.3	25 19.6	68 71	93.9	25 40.1	68 71	93.5
70	23 56.2	69 71	94.0	24 16.8	68 71	93.6	24 37.3	68 71	93.2	24 57.7	68 71	92.8
1	23 13.9	69 71	93.3	23 34.4	68 71	92.9	23 54.9	68 71	92.5	24 15.3	68 71	92.1
2	22 31.5	69 71	92.5	22 52.0	68 71	92.1	23 12.5	68 71	91.7	23 32.9	68 71	91.4
3	21 49.1	69 71	91.8	22 09.6	68 71	91.4	22 30.1	68 71	91.0	22 50.5	68 71	90.6
4	21 06.7	68 71	91.1	21 27.2	68 71	90.7	21 47.7	68 71	90.3	22 08.1	68 71	89.9
75	20 24.3	68 71	90.4	20 44.8	68 71	90.0	21 05.2	68 71	89.6	21 25.6	68 71	89.2
6	19 41.8	68 71	89.7	20 02.3	68 71	89.3	20 22.8	68 71	88.9	20 43.2	68 71	88.5
7	18 59.4	68 71	89.0	19 19.9	68 71	88.6	19 40.4	68 71	88.2	20 00.8	68 71	87.8
8	18 17.0	69 71	88.3	18 37.5	68 71	87.9	18 58.0	68 71	87.5	19 18.4	68 71	87.1
9	17 34.6	69 71	87.6	17 55.1	68 71	87.2	18 15.6	68 71	86.8	18 36.1	68 71	86.4
80	16 52.2	69 71	86.9	17 12.8	68 71	86.5	17 33.3	68 71	86.1	17 53.8	68 70	85.7
1	16 09.9	69 71	86.2	16 30.4	69 70	85.8	16 51.0	68 70	85.4	17 11.5	68 70	85.1
2	15 27.6	69 70	85.5	15 48.1	69 70	85.1	16 08.7	68 70	84.7	16 29.2	68 70	84.4
3	14 45.3	69 70	84.8	15 05.9	69 70	84.4	15 26.5	69 70	84.1	15 47.0	68 70	83.7
4	14 03.0	69 70	84.1	14 23.7	69 70	83.7	14 44.3	69 70	83.4	15 04.9	69 70	83.0
85	13 20.9	69 70	83.4	13 41.5	69 70	83.1	14 02.2	69 70	82.7	14 22.8	69 70	82.3
6	12 38.8	69 70	82.7	12 59.5	69 70	82.4	13 20.1	69 70	82.0	13 40.8	69 70	81.6
7	11 56.7	69 70	82.1	12 17.4	69 70	81.7	12 38.2	69 70	81.3	12 58.9	69 70	80.9
8	11 14.7	69 70	81.4	11 35.5	69 70	81.0	11 56.3	69 70	80.6	12 17.0	69 70	80.3
9	10 32.8	69 70	80.7	10 53.6	69 70	80.3	11 14.4	69 70	80.0	11 35.2	69 69	79.6
90	9 51.0	70 70	80.0	10 11.9	70 70	79.6	10 32.7	69 69	79.3	10 53.6	69 69	78.9

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H.A.	12° 00′ Alt.	Az.	Δd	Δt	12° 30′ Alt.	Az.	Δd	Δt	13° 00′ Alt.	Az.	Δd	Δt	13° 30′ Alt.	Az.	Δd	Δt	14° 00′ Alt.	Az.	Δd	Δt	14° 30′ Alt.	Az.	Δd	Δt	15° 00′ Alt.	Az.	Δd	Δt	15° 30′ Alt.	Az.	Δd	Δt	H.A.
°	° ′	°			° ′	°			° ′	°			° ′	°			° ′	°			° ′	°			° ′	°			° ′	°			°
00	33 00.0	180.0	1.0	01	32 30.0	180.0	1.0	01	32 00.0	180.0	1.0	01	31 30.0	180.0	1.0	01	31 00.0	180.0	1.0	01	30 30.0	180.0	1.0	01	30 00.0	180.0	1.0	01	29 30.0	180.0	1.0	01	00
1	32 59.6	178.8	1.0	02	32 29.6	178.8	1.0	02	31 59.6	178.9	1.0	02	31 29.6	178.9	1.0	02	30 59.6	178.9	1.0	02	30 29.6	178.9	1.0	02	29 59.6	178.9	1.0	02	29 29.6	178.9	1.0	02	1
2	32 58.3	177.7	1.0	04	32 28.3	177.7	1.0	04	31 58.3	177.7	1.0	04	31 28.3	177.7	1.0	04	30 58.3	177.7	1.0	03	30 28.3	177.8	1.0	03	29 58.3	177.8	1.0	03	29 28.4	177.8	1.0	03	2
3	32 56.1	176.5	1.0	05	32 26.1	176.5	1.0	05	31 56.2	176.6	1.0	05	31 26.2	176.6	1.0	05	30 56.2	176.6	1.0	05	30 26.3	176.6	1.0	05	29 56.3	176.7	1.0	05	29 26.3	176.7	1.0	05	3
4	32 53.1	175.3	1.0	06	32 23.2	175.4	1.0	06	31 53.2	175.4	1.0	06	31 23.3	175.4	1.0	06	30 53.3	175.5	1.0	06	30 23.4	175.5	1.0	06	29 53.4	175.5	1.0	06	29 23.4	175.6	1.0	06	4
05	32 49.2	174.2	1.0	08	32 19.3	174.2	1.0	08	31 49.4	174.3	1.0	08	31 19.5	174.3	1.0	08	30 49.5	174.3	1.0	08	30 19.6	174.4	1.0	08	29 49.7	174.4	1.0	08	29 19.8	174.5	1.0	08	05
6	32 44.5	173.0	1.0	09	32 14.6	173.1	1.0	09	31 44.7	173.1	1.0	09	31 14.8	173.2	1.0	09	30 44.9	173.2	1.0	09	30 15.1	173.3	1.0	09	29 45.2	173.3	1.0	09	29 15.3	173.4	1.0	09	6
7	32 38.9	171.9	99	11	32 09.1	171.9	99	11	31 39.2	172.0	99	11	31 09.4	172.0	99	10	30 39.5	172.1	99	10	30 09.7	172.2	1.0	10	29 39.8	172.2	1.0	10	29 10.0	172.3	1.0	10	7
8	32 32.5	170.7	99	12	32 02.7	170.8	99	12	31 32.9	170.8	99	12	31 03.1	170.9	99	12	30 33.3	171.0	99	12	30 03.5	171.0	99	12	29 33.7	171.1	99	12	29 03.9	171.2	99	12	8
9	32 25.2	169.6	99	14	31 55.5	169.6	99	13	31 25.7	169.7	99	13	30 56.0	169.8	99	13	30 26.2	169.9	99	13	29 56.5	169.9	99	13	29 26.7	170.0	99	13	28 57.0	170.1	99	13	9
10	32 17.1	168.4	99	15	31 47.4	168.5	99	15	31 17.7	168.6	99	15	30 48.0	168.7	99	15	30 18.3	168.7	99	14	29 48.6	168.8	99	14	29 18.9	168.9	99	14	28 49.2	169.0	99	14	10
1	32 08.2	167.3	99	16	31 38.5	167.4	99	16	31 08.9	167.5	99	16	30 39.3	167.5	99	16	30 09.7	167.6	99	16	29 40.0	167.7	99	16	29 10.4	167.8	99	15	28 40.8	167.9	99	15	1
2	31 58.4	166.1	98	18	31 28.9	166.2	99	17	30 59.3	166.3	99	17	30 29.7	166.4	99	17	30 00.2	166.5	99	17	29 30.6	166.6	99	17	29 01.0	166.7	99	17	28 31.5	166.8	99	17	2
3	31 47.8	165.0	98	19	31 18.3	165.1	98	19	30 48.9	165.2	98	19	30 19.4	165.3	98	19	29 49.9	165.4	98	18	29 20.4	165.5	98	18	28 50.9	165.6	98	18	28 21.4	165.7	98	18	3
4	31 36.4	163.9	98	20	31 07.0	164.0	98	20	30 37.6	164.1	98	20	30 08.2	164.2	98	20	29 38.8	164.3	98	20	29 09.4	164.4	98	20	28 40.0	164.6	98	19	28 10.6	164.7	98	19	4
15	31 24.2	162.7	98	22	30 54.9	162.9	98	21	30 25.6	163.0	98	21	29 56.3	163.1	98	21	29 27.0	163.2	98	21	28 57.7	163.4	98	21	28 28.3	163.5	98	21	27 59.0	163.6	98	21	15
6	31 11.3	161.6	97	23	30 42.1	161.8	98	22	30 12.8	161.9	97	23	29 43.6	162.0	97	22	29 14.4	162.2	97	22	28 45.1	162.3	97	22	28 15.9	162.4	98	22	27 46.6	162.5	98	22	6
7	30 57.5	160.5	97	24	30 28.4	160.7	97	24	29 59.3	160.8	97	24	29 30.1	160.9	97	24	29 01.0	161.1	97	24	28 31.8	161.2	97	23	28 02.7	161.3	97	23	27 33.5	161.5	97	23	7
8	30 43.0	159.4	97	26	30 14.0	159.6	97	25	29 44.9	159.7	97	25	29 15.9	159.9	97	25	28 46.8	160.0	97	25	28 17.8	160.1	97	25	27 48.7	160.3	97	24	27 19.6	160.4	97	24	8
9	30 27.7	158.3	96	27	29 58.8	158.5	96	27	29 29.8	158.6	96	26	29 00.9	158.8	96	26	28 32.0	158.9	97	26	28 03.0	159.1	97	26	27 34.0	159.2	97	26	27 05.1	159.4	97	26	9
20	30 11.6	157.2	96	28	29 42.8	157.4	96	28	29 14.0	157.5	96	28	28 45.2	157.7	96	27	28 16.3	157.9	96	27	27 47.5	158.0	96	27	27 18.6	158.2	96	27	26 49.7	158.3	96	27	20
1	29 54.8	156.1	96	29	29 26.1	156.3	96	29	28 57.4	156.5	96	29	28 28.7	156.6	96	29	28 00.0	156.8	96	28	27 31.2	157.0	96	28	27 02.5	157.1	96	28	26 33.7	157.3	96	28	1
2	29 37.3	155.1	96	30	29 08.7	155.2	96	30	28 40.1	155.4	96	30	28 11.5	155.6	96	30	27 42.9	155.8	95	30	27 14.3	155.9	96	29	26 45.6	156.1	96	29	26 17.0	156.3	96	29	2
3	29 19.1	154.0	95	32	28 50.6	154.2	95	31	28 22.1	154.4	95	31	27 53.7	154.5	95	31	27 25.1	154.7	95	31	26 56.6	154.9	95	31	26 28.1	155.1	95	30	25 59.6	155.2	95	30	3
4	29 00.1	152.9	94	33	28 31.8	153.1	94	33	28 03.4	153.3	95	32	27 35.1	153.5	95	32	27 06.7	153.7	95	32	26 38.3	153.9	95	32	26 09.9	154.0	95	32	25 41.4	154.2	95	31	4
25	28 40.5	151.9	94	34	28 12.3	152.1	94	34	27 44.0	152.3	94	33	27 15.8	152.5	94	33	26 47.5	152.7	94	33	26 19.3	152.8	94	33	25 51.0	153.0	94	33	25 22.7	153.2	94	32	25
6	28 20.2	150.8	94	35	27 52.1	151.0	94	35	27 24.0	151.2	94	35	26 55.8	151.4	94	34	26 27.7	151.6	94	34	25 59.6	151.8	94	34	25 31.4	152.0	94	34	25 03.2	152.2	94	34	6
7	27 59.2	149.6	93	36	27 31.2	149.8	93	36	27 03.2	150.0	93	36	26 35.2	150.2	93	35	26 07.2	150.6	93	35	25 39.2	150.8	93	35	25 11.2	151.0	93	35	24 43.1	151.2	94	35	7
8	27 37.5	148.8	93	37	27 09.7	149.0	93	37	26 41.8	149.2	93	37	26 14.0	149.4	93	37	25 46.1	149.6	93	36	25 18.2	149.8	93	36	24 50.3	150.0	93	36	24 22.3	150.2	93	36	8
9	27 15.2	147.8	92	38	26 47.5	148.0	92	38	26 19.8	148.2	92	38	25 52.0	148.4	92	38	25 24.3	148.6	93	37	24 56.5	148.8	93	37	24 28.8	149.0	93	37	24 01.0	149.2	93	37	9
30	26 52.2	146.8	92	39	26 24.7	147.0	92	39	25 57.1	147.2	92	39	25 29.5	147.4	92	39	25 01.9	147.6	92	38	24 34.3	147.8	92	38	24 06.6	148.1	92	38	23 38.9	148.3	92	38	30
1	26 28.7	145.7	91	40	26 01.2	146.0	91	40	25 33.8	146.2	91	40	25 06.3	146.4	92	40	24 38.9	146.6	92	39	24 11.4	146.9	92	39	23 43.9	147.1	92	39	23 16.3	147.3	92	39	1
2	26 04.5	144.4	91	41	25 37.2	145.0	91	41	25 09.9	145.2	91	41	24 42.6	145.4	91	41	24 15.2	145.7	91	40	23 47.9	145.9	91	40	23 20.5	146.1	91	40	22 53.1	146.3	92	40	2
3	25 39.7	143.8	90	42	25 12.6	144.0	90	42	24 45.4	144.2	91	42	24 18.2	144.5	91	42	23 51.0	144.7	91	41	23 23.8	144.9	91	41	22 56.6	145.2	91	41	22 29.3	145.4	91	41	3
4	25 14.3	142.8	90	43	24 47.3	143.0	90	43	24 20.3	143.3	90	43	23 53.3	143.5	90	43	23 26.2	143.7	90	42	22 59.1	144.0	90	42	22 32.0	144.2	90	42	22 04.9	144.4	90	42	4
35	24 48.4	141.8	89	44	24 21.5	142.1	90	44	23 54.7	142.3	90	44	23 27.8	142.6	90	43	23 00.8	142.8	90	43	22 33.9	143.0	90	43	22 06.9	143.3	90	43	21 40.0	143.5	90	43	35
6	24 21.9	140.9	89	45	23 55.2	141.1	89	45	23 28.4	141.4	89	45	23 01.7	141.6	89	44	22 34.9	141.9	89	44	22 08.1	142.1	89	44	21 41.3	142.3	89	44	21 14.5	142.6	90	43	6
7	23 54.8	139.9	88	46	23 28.3	140.2	89	46	23 01.7	140.4	89	46	22 35.1	140.7	89	45	22 08.4	140.9	89	45	21 41.8	141.2	89	45	21 15.1	141.4	89	44	20 48.4	141.7	89	44	7
8	23 27.3	139.0	88	47	23 00.8	139.2	88	46	22 34.4	139.5	88	46	22 07.9	139.7	88	46	21 41.4	140.0	88	46	21 14.9	140.2	88	46	20 48.4	140.5	88	45	20 21.8	140.7	89	45	8
9	22 59.1	138.0	88	48	22 32.9	138.3	88	47	22 06.6	138.6	88	47	21 40.2	138.8	88	47	21 13.9	139.1	88	47	20 47.5	139.3	88	46	20 21.1	139.6	88	46	19 54.7	139.8	88	46	9
40	22 30.5	137.1	87	49	22 04.4	137.4	87	48	21 38.2	137.6	87	48	21 12.0	137.9	87	48	20 45.8	138.2	87	48	20 19.6	138.4	87	47	19 53.4	138.7	88	47	19 27.1	138.9	88	47	40
1	22 01.4	136.2	87	49	21 35.4	136.5	87	49	21 09.4	136.7	87	49	20 43.4	137.0	87	49	20 17.3	137.3	87	48	19 51.2	137.5	87	48	19 25.1	137.8	87	48	18 59.0	138.0	87	48	1
2	21 31.8	135.3	86	50	21 05.9	135.6	86	50	20 40.1	135.8	86	50	20 14.2	136.1	86	49	19 48.3	136.4	86	49	19 22.3	136.6	87	49	18 56.4	136.9	87	49	18 30.4	137.2	87	48	2
3	21 01.7	134.4	86	51	20 36.0	134.7	86	51	20 10.3	134.9	86	50	19 44.5	135.2	86	50	19 18.7	135.5	86	50	18 52.9	135.7	86	50	18 27.1	136.0	86	49	18 01.3	136.3	86	49	3
4	20 31.1	133.5	85	52	20 05.6	133.8	85	51	19 40.0	134.0	85	51	19 14.4	134.3	85	51	18 48.8	134.6	85	51	18 23.1	134.9	86	50	17 57.4	135.1	86	50	17 31.7	135.4	86	50	4
45	20 00.1	132.6	85	52	19 34.7	132.9	85	52	19 09.3	133.2	85	52	18 43.8	133.4	85	52	18 18.3	133.7	85	51	17 52.8	134.0	85	51	17 27.3	134.3	85	51	17 01.7	134.6	85	51	45
6	19 28.7	131.7	84	53	19 03.4	132.0	84	53	18 38.1	132.3	84	53	18 12.8	132.6	84	52	17 47.4	132.9	85	52	17 22.1	133.1	85	52	16 56.7	133.4	85	52	16 31.3	133.7	85	52	6
7	18 56.8	130.9	84	54	18 31.7	131.1	84	53	18 06.5	131.4	84	53	17 41.3	131.7	84	53	17 16.1	132.0	84	53	16 50.9	132.3	84	53	16 25.6	132.6	84	52	16 00.4	132.8	84	52	7
8	18 24.5	130.0	83	54	17 59.5	130.3	83	54	17 34.5	130.6	83	54	17 09.5	130.9	84	54	16 44.4	131.2	84	54	16 19.3	131.4	84	53	15 54.2	131.7	84	53	15 29.1	132.0	84	53	8
9	17 51.8	129.1	83	55	17 27.0	129.4	83	55	17 02.1	129.7	83	55	16 37.2	130.0	83	54	16 12.2	130.3	83	54	15 47.3	130.6	83	54	15 22.3	130.9	83	54	14 57.3	131.2	83	54	9
50	17 18.7	128.3	82	56	16 54.0	128.6	82	56	16 29.2	128.9	83	55	16 04.5	129.2	83	55	15 39.7	129.5	83	55	15 14.9	129.8	83	55	14 50.0	130.1	83	54	14 25.2	130.3	83	54	50
1	16 45.2	127.5	82	56	16 20.6	127.8	82	56	15 56.0	128.0	82	56	15 31.4	128.3	82	56	15 06.7	128.6	82	56	14 42.1	128.9	82	55	14 17.4	129.2	82	55	13 52.6	129.5	82	55	1
2	16 11.3	126.6	81	57	15 46.9	126.9	82	57	15 22.4	127.2	82	57	14 57.9	127.5	82	56	14 33.4	127.8	82	56	14 08.9	128.1	82	56	13 44.3	128.4	82	56	13 19.7	128.7	82	56	2
3	15 37.1	125.8	81	58	15 12.8	126.1	81	57	14 48.5	126.4	81	57	14 24.1	126.7	81	57	13 59.7	127.0	81	57	13 35.3	127.3	81	57	13 10.9	127.6	81	56	12 46.4	127.9	82	56	3
4	15 02.5	125.0	81	58	14 38.3	125.3	81	58	14 14.1	125.6	81	58	13 49.9	125.9	81	58	13 25.7	126.2	81	57	13 01.4	126.5	81	57	12 37.1	126.8	81	57	12 12.8	127.1	81	57	4
55	14 27.6	124.2	80	59	14 03.5	124.5	80	59	13 39.5	124.8	80	58	13 15.4	125.1	80	58	12 51.2	125.4	80	58	12 27.1	125.7	81	58	12 02.9	126.0	81	58	11 38.8	126.3	81	57	55
6	13 52.3	123.4	80	59	13 28.4	123.7	80	59	13 04.4	124.0	80	59	12 40.5	124.3	80	59	12 16.5	124.6	80	58	11 52.5	124.9	80	58	11 28.4	125.2	80	58	11 04.4	125.5	80	58	6
7	13 16.7	122.6	79	60	12 52.9	122.9	79	59	12 29.1	123.2	79	59	12 05.3	123.5	80	59	11 41.4	123.8	80	59	11 17.5	124.1	80	59	10 53.6	124.4	80	58	10 29.7	124.7	80	58	7
8	12 40.8	121.8	79	60	12 17.1	122.1	79	60	11 53.4	122.4	79	60	11 29.7	122.7	79	60	11 06.0	123.0	79	60	10 42.2	123.3	79	59	10 18.4	123.6	79	59	9 54.6	123.9	79	59	8
9	12 04.6	121.0	78	61	11 41.0	121.3	79	61	11 17.4	121.6	79	60	10 53.9	121.9	79	60	10 30.2	122.2	79	60	10 06.6	122.5	79	60	9 43.0	122.9	79	59	9 19.3	123.2	79	59	9
60	11 28.0	120.2	78	61	11 04.6	120.5	78	61	10 41.2	120.8	78	61	10 17.7	121.1	78	61	9 54.2	121.5	78	61	9 30.7	121.8	78	60	9 07.2	122.1	78	60	8 43.6	122.4	78	60	60
1	10 51.2	119.4	78	62	10 27.9	119.7	78	62	10 04.6	120.1	78	61	9 41.2	120.4	78	61	9 17.9	120.7	78	61	8 54.5	121.0	78	61	8 31.1	121.3	78	61	8 07.7	121.6	78	60	1
2	10 14.1	118.6	77	62	9 50.9	119.0	77	62	9 27.7	119.3	77	62	9 04.5	119.6	77	62	8 41.2	119.9	78	62	8 18.0	120.2	78	61	7 54.7	120.6	78	61	7 31.4	120.9	78	61	2
3	9 36.8	117.9	77	63	9 13.7	118.2	77	63	8 50.6	118.5	77	62	8 27.5	118.8	77	62	8 04.3	119.2	77	62	7 41.2	119.5	77	62	7 18.0	119.8	77	62	6 54.8	120.1	77	61	3
4	8 59.1	117.1	77	63	8 36.2	117.4	77	63	8 13.2	117.8	77	63	7 50.2	118.1	77	63	7 27.1	118.4	77	62	7 04.1	118.7	77	62	6 41.1	119.1	77	62	6 18.0	119.4	77	62	4
65	8 21.2	116.4	76	64	7 58.4	116.7	76	63	7 35.5	117.0	76	63	7 12.6	117.3	76	63	6 49.7	117.7	76	63	6 26.8	118.0	76	63	6 03.8	118.3	76	62	5 40.9	118.6	76	62	65
6	7 43.1	115.6	76	64	7 20.4	115.9	76	64	6 57.6	116.3	76	64	6 34.8	116.6	76	63	6 12.0	116.9	76	63	5 49.2	117.2	76	63	5 26.4	117.6	76	63	5 03.5	117.9	76	63	6
7	7 04.7	114.9	75	64	6 42.1	115.2	76	64	6 19.4	115.5	76	64	5 56.7	115.9	76	64	5 34.0	116.2	76	64	5 11.3	116.5	76	64									7
8	6 26.1	114.1	75	65	6 03.6	114.5	75	65	5 41.0	114.8	75	64	5 18.4	115.1	75	64																	8
9	5 47.3	113.4	75	65	5 24.8	113.7	75	65	5 02.4	114.1	75	65																					9
70	5 08.2	112.7	74	65																													70

DECLINATION SAME NAME AS LATITUDE

H.A.	12° 00′ Alt.	Az.	Δd	Δt	12° 30′ Alt.	Az.	Δd	Δt	13° 00′ Alt.	Az.	Δd	Δt	13° 30′ Alt.	Az.	Δd	Δt	14° 00′ Alt.	Az.	Δd	Δt	14° 30′ Alt.	Az.	Δd	Δt	15° 00′ Alt.	Az.	Δd	Δt	15° 30′ Alt.	Az.	Δd	Δt	H.A.
°	° ′	°			° ′	°			° ′	°			° ′	°			° ′	°			° ′	°			° ′	°			° ′	°			°
91	7 45.3	80.8	70	70	8 06.3	80.4	70	70	8 27.3	80.0	70	70	8 48.3	79.7	70	70	9 09.2	79.3	70	69	9 30.2	79.0	70	69	9 51.1	78.6	70	69	10 12.0	78.2	70	69	91
2	7 03.5	80.1	70	70	7 24.5	79.7	70	70	7 45.6	79.4	70	69	8 06.6	79.0	70	69	8 27.6	78.6	70	69	8 48.6	78.3	70	69	9 09.5	77.9	70	69	9 30.5	77.5	70	69	2
3	6 21.7	79.4	70	69	6 42.8	79.0	70	69	7 03.9	78.7	70	69	7 25.0	78.3	70	69	7 46.1	77.9	70	69	8 07.1	77.6	70	69	8 28.1	77.2	70	69	8 49.1	76.9	70	69	3
4	5 40.1	78.7	71	69	6 01.2	78.3	70	69	6 22.4	78.0	70	69	6 43.5	77.6	70	69	7 04.6	77.3	70	69	7 25.7	76.9	70	69	7 46.8	76.5	70	69	8 07.9	76.2	70	69	4
95					5 19.8	77.6	71	69	5 40.9	77.3	71	69	6 02.1	76.9	71	69	6 23.3	76.6	71	69	6 44.5	76.2	70	69	7 05.6	75.9	70	68	7 26.7	75.5	70	68	95
6													5 20.9	76.2	71	69	5 42.1	75.9	71	68	6 03.3	75.5	71	68	6 24.5	75.2	71	68	6 45.7	74.8	71	68	6
7																	5 01.0	75.2	71	68	5 22.3	74.8	71	68	5 43.6	74.5	71	68	6 04.8	74.1	71	68	7
8																									5 02.8	73.8	71	68	5 24.1	73.4	71	68	8

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Lat. 45°

H.A.	16° 00′			16° 30′			17° 00′			17° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	61 00.0	1.0 01	180.0	61 30.0	1.0 01	180.0	62 00.0	1.0 01	180.0	62 30.0	1.0 01	180.0
1	60 59.3	1.0 04	178.0	61 29.3	1.0 04	178.0	61 59.2	1.0 04	178.0	62 29.2	1.0 04	177.9
2	60 57.1	1.0 06	176.0	61 27.0	1.0 06	176.0	61 57.0	1.0 06	175.9	62 26.9	1.0 06	175.9
3	60 53.4	1.0 08	174.1	61 23.3	1.0 09	174.0	61 53.2	1.0 09	173.9	62 23.1	1.0 09	173.8
4	60 48.3	99 11	172.1	61 18.1	99 11	172.0	61 48.0	99 11	171.9	62 17.8	99 11	171.8
05	60 41.7	99 13	170.1	61 11.5	99 13	170.0	61 41.3	99 14	169.9	62 11.0	99 14	169.7
6	60 33.8	99 16	168.2	61 03.4	99 16	168.0	61 33.1	99 16	167.9	62 02.7	99 16	167.7
7	60 24.4	98 18	166.3	60 53.9	98 18	166.1	61 23.5	98 18	165.9	61 53.0	98 19	165.7
8	60 13.7	98 20	164.4	60 43.1	98 20	164.2	61 12.4	98 21	164.0	61 41.8	98 21	163.7
9	60 01.6	98 22	162.5	60 30.8	97 23	162.3	61 00.0	97 23	162.0	61 29.2	97 23	161.8
10	59 48.1	97 25	160.6	60 17.2	97 25	160.4	60 46.3	97 25	160.1	61 15.3	97 25	159.9
1	59 33.4	96 27	158.8	60 02.3	96 27	158.5	60 31.2	96 27	158.2	61 00.0	96 28	158.0
2	59 17.4	96 29	157.0	59 46.1	96 29	156.7	60 14.8	96 29	156.4	60 43.4	95 30	156.1
3	59 00.2	95 31	155.2	59 28.7	95 31	154.9	59 57.2	95 31	154.6	60 25.6	95 32	154.2
4	58 41.8	94 33	153.4	59 10.1	94 33	153.1	59 38.4	94 33	152.8	60 06.6	94 34	152.4
15	58 22.2	94 34	151.7	58 50.3	94 35	151.3	59 18.4	93 35	151.0	59 46.3	93 36	150.6
6	58 01.6	93 36	150.0	58 29.4	93 37	149.6	58 57.2	93 37	149.3	59 25.0	92 37	148.9
7	57 39.8	92 38	148.3	58 07.4	92 38	147.9	58 35.0	92 39	147.6	59 02.5	92 39	147.2
8	57 17.0	91 40	146.7	57 44.4	91 40	146.3	58 11.7	91 40	145.9	58 39.0	91 41	145.5
9	56 53.2	91 41	145.0	57 20.3	90 42	144.7	57 47.4	90 42	144.3	58 14.5	90 43	143.8
20	56 28.4	90 43	143.5	56 55.3	90 43	143.1	57 22.2	89 44	142.7	57 49.0	89 44	142.2
1	56 02.7	89 44	141.9	56 29.4	89 45	141.5	56 56.0	89 45	141.1	57 22.5	88 46	140.7
2	55 36.1	88 46	140.4	56 02.5	88 46	140.0	56 28.9	88 47	139.6	56 55.2	87 47	139.1
3	55 08.6	88 47	138.9	55 34.8	87 48	138.5	56 01.0	87 48	138.1	56 27.0	87 48	137.6
4	54 40.3	87 48	137.5	55 06.3	86 49	137.0	55 32.2	86 49	136.6	55 58.0	86 50	136.1
25	54 11.2	86 50	136.0	54 37.0	86 50	135.6	55 02.6	85 50	135.1	55 28.2	85 51	134.7
6	53 41.4	85 51	134.6	54 06.9	85 51	134.2	54 32.3	85 52	133.7	54 57.6	84 52	133.3
7	53 10.9	84 52	133.3	53 36.2	84 52	132.8	54 01.3	84 53	132.4	54 26.4	83 53	131.9
8	52 39.6	84 53	131.9	53 04.7	83 54	131.5	53 29.6	83 54	131.0	53 54.5	83 54	130.5
9	52 07.8	83 54	130.6	52 32.6	83 55	130.2	52 57.3	82 55	129.7	53 21.9	82 55	129.2
30	51 35.2	82 55	129.3	51 59.8	82 56	128.9	52 24.4	81 56	128.4	52 48.7	81 56	127.9
1	51 02.1	82 56	128.1	51 26.5	81 56	127.6	51 50.8	81 57	127.1	52 15.0	80 57	126.6
2	50 28.4	81 57	126.8	50 52.6	80 57	126.4	51 16.7	80 58	125.9	51 40.7	80 58	125.4
3	49 54.2	80 58	125.6	50 18.2	80 58	125.2	50 42.1	79 59	124.7	51 05.8	79 59	124.2
4	49 19.5	79 59	124.4	49 43.3	79 59	124.0	50 06.9	79 59	123.5	50 30.5	78 60	123.0
35	48 44.2	79 60	123.3	49 07.8	78 60	122.8	49 31.3	78 60	122.3	49 54.7	78 60	121.8
6	48 08.5	78 60	122.1	48 32.0	78 61	121.7	48 55.3	77 61	121.2	49 18.4	77 61	120.7
7	47 32.4	78 61	121.0	47 55.6	77 61	120.6	48 18.7	77 62	120.1	48 41.7	76 62	119.6
8	46 55.8	77 62	119.9	47 18.9	77 62	119.5	47 41.8	76 62	119.0	48 04.7	76 62	118.5
9	46 18.9	76 62	118.9	46 41.8	76 63	118.4	47 04.5	76 63	117.9	47 27.2	75 63	117.4
40	45 41.5	76 63	117.8	46 04.3	76 63	117.3	46 26.9	75 63	116.9	46 49.3	75 64	116.4
1	45 03.8	75 63	116.8	45 26.4	75 64	116.3	45 48.8	75 64	115.8	46 11.2	74 64	115.3
2	44 25.8	75 64	115.7	44 48.2	75 64	115.3	45 10.5	74 64	114.8	45 32.7	74 65	114.3
3	43 47.4	74 64	114.7	44 09.7	74 65	114.3	44 31.8	74 65	113.8	44 53.9	73 65	113.3
4	43 08.7	74 65	113.8	43 30.8	74 65	113.3	43 52.9	73 65	112.8	44 14.8	73 66	112.4
45	42 29.7	73 65	112.8	42 51.7	73 66	112.3	43 13.6	73 66	111.9	43 35.4	72 66	111.4
6	41 50.5	73 66	111.8	42 12.4	73 66	111.4	42 34.1	72 66	110.9	42 55.8	72 66	110.5
7	41 11.0	73 66	110.9	41 32.7	72 66	110.5	41 54.4	72 67	110.0	42 15.9	72 67	109.5
8	40 31.2	72 67	110.0	40 52.9	72 67	109.5	41 14.4	72 67	109.1	41 35.8	71 67	108.6
9	39 51.3	72 67	109.1	40 12.8	72 67	108.6	40 34.2	71 67	108.2	40 55.5	71 68	107.7
50	39 11.1	72 67	108.2	39 32.5	71 68	107.7	39 53.8	71 68	107.3	40 15.0	70 68	106.8
1	38 30.7	71 68	107.3	38 52.0	71 68	106.9	39 13.2	70 68	106.4	39 34.3	70 68	105.9
2	37 50.1	71 68	106.4	38 11.3	71 68	106.0	38 32.4	70 68	105.5	38 53.4	70 68	105.1
3	37 09.3	71 68	105.6	37 30.4	70 68	105.1	37 51.4	70 69	104.7	38 12.3	70 69	104.2
4	36 28.3	70 69	104.7	36 49.4	70 69	104.3	37 10.3	70 69	103.8	37 31.1	69 69	103.4
55	35 47.2	70 69	103.9	36 08.2	70 69	103.5	36 29.0	69 69	103.0	36 49.8	69 69	102.6
6	35 06.0	70 69	103.1	35 26.8	69 69	102.6	35 47.6	69 69	102.2	36 08.3	69 69	101.8
7	34 24.6	70 69	102.3	34 45.4	69 69	101.8	35 06.1	69 69	101.4	35 26.7	69 70	100.9
8	33 43.1	69 69	101.5	34 03.8	69 70	101.0	34 24.4	69 70	100.6	34 45.0	68 70	100.1
9	33 01.4	69 70	100.7	33 22.1	69 70	100.2	33 42.7	68 70	99.8	34 03.2	68 70	99.4
60	32 19.7	69 70	99.9	32 40.3	69 70	99.4	33 00.8	68 70	99.0	33 21.3	68 70	98.6
1	31 37.8	69 70	99.1	31 58.4	68 70	98.7	32 18.9	68 70	98.2	32 39.3	68 70	97.8
2	30 55.9	69 70	98.3	31 16.4	68 70	97.9	31 36.9	68 70	97.5	31 57.2	68 70	97.0
3	30 13.9	68 70	97.6	30 34.4	68 70	97.1	30 54.8	68 70	96.7	31 15.1	68 70	96.3
4	29 31.8	68 70	96.8	29 52.2	68 70	96.4	30 12.6	68 70	96.0	30 32.9	67 70	95.5
65	28 49.6	68 70	96.1	29 10.0	68 70	95.6	29 30.4	68 70	95.2	29 50.6	67 70	94.8
6	28 07.4	68 70	95.3	28 27.8	68 70	94.9	28 48.1	68 71	94.5	29 08.3	67 71	94.0
7	27 25.1	68 71	94.6	27 45.5	68 71	94.2	28 05.8	67 71	93.7	28 26.0	67 71	93.3
8	26 42.8	68 71	93.8	27 03.2	68 71	93.4	27 23.4	67 71	93.0	27 43.6	67 71	92.6
9	26 00.5	68 71	93.1	26 20.8	68 71	92.7	26 41.0	67 71	92.3	27 01.2	67 71	91.9
70	25 18.1	68 71	92.4	25 38.4	68 71	92.0	25 58.6	67 71	91.6	26 18.8	67 71	91.2
1	24 35.7	68 71	91.7	24 56.0	68 71	91.3	25 16.2	67 71	90.8	25 36.4	67 71	90.4
2	23 53.3	68 71	90.9	24 13.6	68 71	90.5	24 33.8	67 71	90.1	24 54.0	67 71	89.7
3	23 10.8	68 71	90.2	23 31.1	68 71	89.8	23 51.4	67 71	89.4	24 11.5	67 71	89.0
4	22 28.4	68 71	89.5	22 48.7	68 71	89.1	23 09.0	67 71	88.7	23 29.1	67 71	88.3
75	21 46.0	68 71	88.8	22 06.3	68 71	88.4	22 26.5	67 71	88.0	22 46.7	67 71	87.6
6	21 03.6	68 71	88.1	21 23.9	68 71	87.7	21 44.2	67 71	87.3	22 04.3	67 71	86.9
7	20 21.2	68 71	87.4	20 41.5	68 71	87.0	21 01.8	67 71	86.6	21 22.0	67 71	86.2
8	19 38.8	68 71	86.7	19 59.2	68 71	86.3	20 19.4	68 70	86.0	20 39.7	67 70	85.6
9	18 56.5	68 70	86.0	19 16.8	68 70	85.7	19 37.1	68 70	85.3	19 57.4	67 70	84.9
80	18 14.2	68 70	85.4	18 34.6	68 70	85.0	18 54.9	68 70	84.6	19 15.2	68 70	84.2
1	17 31.9	68 70	84.7	17 52.3	68 70	84.3	18 12.7	68 70	83.9	18 33.0	68 70	83.5
2	16 49.7	68 70	84.0	17 10.1	68 70	83.6	17 30.5	68 70	83.2	17 50.9	68 70	82.8
3	16 07.5	68 70	83.3	16 28.0	68 70	82.9	16 48.4	68 70	82.5	17 08.8	68 70	82.2
4	15 25.4	68 70	82.6	15 45.9	68 70	82.2	16 06.4	68 70	81.9	16 26.8	68 70	81.5
85	14 43.4	69 70	81.9	15 03.9	68 70	81.6	15 24.4	68 70	81.2	15 44.9	68 70	80.8
6	14 01.4	69 70	81.3	14 22.0	69 70	80.9	14 42.5	68 70	80.5	15 03.0	68 70	80.1
7	13 19.5	69 70	80.6	13 40.1	69 70	80.2	14 00.7	69 70	79.8	14 21.3	68 69	79.5
8	12 37.7	69 70	79.9	12 58.4	69 69	79.5	13 19.0	69 69	79.2	13 39.6	69 69	78.8
9	11 56.0	69 69	79.2	12 16.7	69 69	78.8	12 37.4	69 69	78.5	12 58.1	69 69	78.1
90	11 14.4	69 69	78.5	11 35.1	69 69	78.2	11 55.9	69 69	77.8	12 16.6	69 69	77.4

H.A.	18° 00′			18° 30′			19° 00′			19° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	63 00.0	1.0 01	180.0	63 30.0	1.0 01	180.0	64 00.0	1.0 01	180.0	64 30.0	1.0 01	180.0
1	62 59.2	1.0 04	177.9	63 29.2	1.0 04	177.9	63 59.2	1.0 04	177.8	64 29.2	1.0 04	177.8
2	62 56.9	1.0 06	175.8	63 26.9	1.0 07	175.8	63 56.8	1.0 07	175.7	64 26.8	1.0 07	175.6
3	62 53.0	1.0 09	173.7	63 22.9	1.0 09	173.6	63 52.8	1.0 09	173.5	64 22.7	1.0 09	173.4
4	62 47.6	99 12	171.7	63 17.5	99 12	171.5	63 47.3	99 12	171.4	64 17.1	99 12	171.3
05	62 40.7	99 14	169.6	63 10.5	99 14	169.4	63 40.2	99 14	169.3	64 09.9	99 15	169.1
6	62 32.3	99 16	167.6	63 01.9	99 17	167.4	63 31.5	99 17	167.2	64 01.1	99 17	167.0
7	62 22.4	98 19	165.5	62 51.9	98 19	165.3	63 21.4	98 19	165.1	63 50.8	98 20	164.9
8	62 11.1	98 21	163.5	62 40.4	98 22	163.3	63 09.7	98 22	163.1	63 39.0	98 22	162.8
9	61 58.4	97 24	161.5	62 27.5	97 24	161.3	62 56.6	97 24	161.0	63 25.7	97 24	160.8
10	61 44.3	97 26	159.6	62 13.2	96 26	159.3	62 42.1	96 26	159.0	63 11.0	96 27	158.7
1	61 28.8	96 28	157.7	61 57.6	96 28	157.4	62 26.3	96 29	157.1	62 55.0	96 29	156.7
2	61 12.0	96 30	155.8	61 40.6	95 30	155.4	62 09.1	95 31	155.1	62 37.5	95 31	154.8
3	60 54.0	95 32	153.9	61 22.3	94 32	153.6	61 50.6	94 33	153.2	62 18.8	94 33	152.8
4	60 34.7	94 34	152.1	61 02.8	94 34	151.7	61 30.8	93 35	151.3	61 58.8	93 35	151.0
15	60 14.3	93 36	150.3	60 42.1	93 36	149.9	61 09.9	93 37	149.5	61 37.6	92 37	149.1
6	59 52.7	92 38	148.5	60 20.3	92 38	148.1	60 47.8	92 39	147.7	61 15.3	91 39	147.3
7	59 29.9	91 40	146.8	59 57.3	91 40	146.4	60 24.6	91 40	146.0	60 51.8	91 41	145.5
8	59 06.2	90 41	145.1	59 33.3	90 42	144.7	60 00.3	90 42	144.2	60 27.3	90 43	143.8
9	58 41.4	90 43	143.4	59 08.3	89 43	143.0	59 35.0	89 44	142.6	60 01.7	89 44	142.1
20	58 15.6	89 44	141.8	58 42.2	88 45	141.4	59 08.7	88 45	140.9	59 35.1	88 46	140.4
1	57 48.9	88 46	140.2	58 15.3	88 46	139.8	58 41.5	87 47	139.3	59 07.7	87 47	138.8
2	57 21.4	87 47	138.7	57 47.4	87 48	138.2	58 13.4	86 48	137.7	58 39.3	86 49	137.2
3	56 52.9	86 49	137.1	57 18.7	86 49	136.7	57 44.5	86 50	136.2	58 10.1	85 50	135.7
4	56 23.7	85 50	135.7	56 49.2	85 50	135.2	57 14.7	85 51	134.7	57 40.1	84 51	134.2
25	55 53.6	85 51	134.2	56 19.0	84 52	133.7	56 44.2	84 52	133.2	57 09.3	83 53	132.7
6	55 22.8	84 52	132.8	55 47.9	83 53	132.3	56 12.9	83 53	131.8	56 37.7	83 54	131.3
7	54 51.4	83 54	131.4	55 16.2	83 54	130.9	55 40.9	82 54	130.4	56 05.5	82 55	129.9
8	54 19.2	82 55	130.0	54 43.8	82 55	129.6	55 08.3	81 55	129.1	55 32.7	81 56	128.5
9	53 46.4	81 56	128.7	54 10.8	81 56	128.2	54 35.0	81 56	127.7	54 59.2	80 57	127.2
30	53 13.0	81 57	127.4	53 37.2	80 57	126.9	54 01.2	80 57	126.4	54 25.1	79 58	125.9
1	52 39.0	80 58	126.2	53 03.0	80 58	125.7	53 26.8	79 58	125.1	53 50.4	79 59	124.6
2	52 04.5	79 58	124.9	52 28.2	79 59	124.4	52 51.8	78 59	123.9	53 15.3	78 59	123.4
3	51 29.5	79 59	123.7	51 53.0	78 60	123.2	52 16.4	78 60	122.7	52 39.6	77 60	122.2
4	50 53.9	78 60	122.5	51 17.2	77 60	122.0	51 40.4	77 61	121.5	52 03.5	77 61	121.0
35	50 17.9	77 61	121.4	50 41.0	77 61	120.9	51 04.0	76 61	120.3	51 26.9	76 62	119.8
6	49 41.5	77 61	120.2	50 04.4	76 62	119.7	50 27.2	76 62	119.2	50 49.9	75 62	118.7
7	49 04.6	76 62	119.1	49 27.4	76 62	118.6	49 50.0	75 63	118.1	50 12.4	75 63	117.6
8	48 27.3	75 63	118.0	48 49.9	75 63	117.5	49 12.4	75 63	117.0	49 34.7	74 64	116.5
9	47 49.7	75 63	116.9	48 12.1	74 64	116.4	48 34.4	74 64	115.9	48 56.5	74 64	115.4
40	47 11.7	74 64	115.9	47 33.9	74 64	115.4	47 56.0	73 64	114.9	48 18.0	73 65	114.4
1	46 33.4	74 64	114.9	46 55.5	73 65	114.4	47 17.4	73 65	113.9	47 39.2	73 65	113.4
2	45 54.7	73 65	113.8	46 16.7	73 65	113.4	46 38.5	72 65	112.9	47 00.1	72 66	112.3
3	45 15.8	73 65	112.8	45 37.6	72 66	112.4	45 59.2	72 66	111.9	46 20.8	72 66	111.4
4	44 36.5	72 66	111.9	44 58.2	72 66	111.4	45 19.7	72 66	110.9	45 41.1	71 66	110.4
45	43 57.0	72 66	110.9	44 18.6	72 66	110.4	44 40.0	71 67	109.9	45 01.2	71 67	109.4
6	43 17.3	72 67	110.0	43 38.7	71 67	109.5	44 00.0	71 67	109.0	44 21.1	70 67	108.5
7	42 37.3	71 67	109.0	42 58.6	71 67	108.6	43 19.7	70 67	108.1	43 40.8	70 68	107.6
8	41 57.1	71 67	108.1	42 18.2	70 68	107.7	42 39.3	70 68	107.2	43 00.2	70 68	106.7
9	41 16.7	70 68	107.2	41 37.7	70 68	106.8	41 58.7	70 68	106.3	42 19.5	69 68	105.8
50	40 36.0	70 68	106.4	40 57.0	70 68	105.9	41 17.8	69 68	105.4	41 38.6	69 68	104.9
1	39 55.2	70 68	105.5	40 16.1	69 68	105.0	40 36.9	69 69	104.5	40 57.5	69 69	104.1
2	39 14.3	69 69	104.6	39 35.0	69 69	104.2	39 55.7	69 69	103.7	40 16.3	68 69	103.2
3	38 33.1	69 69	103.8	38 53.8	69 69	103.3	39 14.4	68 69	102.8	39 34.9	68 69	102.4
4	37 51.9	69 69	102.9	38 12.5	69 69	102.5	38 33.0	68 69	102.0	38 53.4	68 69	101.5
55	37 10.4	69 69	102.1	37 31.0	68 69	101.7	37 51.4	68 69	101.2	38 11.8	68 70	100.7
6	36 28.9	68 69	101.3	36 49.4	68 70	100.8	37 09.8	68 70	100.4	37 30.0	67 70	99.9
7	35 47.2	68 70	100.5	36 07.7	68 70	100.0	36 28.0	68 70	99.6	36 48.2	67 70	99.1
8	35 05.5	68 70	99.7	35 25.8	68 70	99.2	35 46.1	67 70	98.8	36 06.2	67 70	98.3
9	34 23.6	68 70	98.9	34 43.9	68 70	98.5	35 04.1	67 70	98.0	35 24.2	67 70	97.6
60	33 41.6	68 70	98.1	34 01.9	67 70	97.7	34 22.1	67 70	97.2	34 42.1	67 70	96.8
1	32 59.6	68 70	97.4	33 19.8	67 70	96.9	33 39.9	67 70	96.5	34 00.0	67 70	96.0
2	32 17.5	67 70	96.6	32 37.7	67 70	96.2	32 57.8	67 70	95.7	33 17.8	66 70	95.3
3	31 35.3	67 70	95.8	31 55.5	67 70	95.4	32 15.5	67 70	95.0	32 35.5	66 71	94.5
4	30 53.1	67 70	95.1	31 13.2	67 71	94.7	31 33.2	67 71	94.2	31 53.2	66 71	93.8
65	30 10.8	67 71	94.4	30 30.9	67 71	93.9	30 50.9	67 71	93.5	31 10.8	66 71	93.1
6	29 28.5	67 71	93.6	29 48.5	67 71	93.2	30 08.5	66 71	92.8	30 28.4	66 71	92.3
7	28 46.1	67 71	92.9	29 06.2	67 71	92.5	29 26.1	66 71	92.0	29 46.0	66 71	91.6
8	28 03.7	67 71	92.2	28 23.8	67 71	91.7	28 43.7	66 71	91.3	29 03.6	66 71	90.9
9	27 21.3	67 71	91.5	27 41.4	67 71	91.0	28 01.3	66 71	90.6	28 21.2	66 71	90.2
70	26 38.9	67 71	90.7	26 58.9	67 71	90.3	27 18.9	66 71	89.9	27 38.8	66 71	89.5
1	25 56.5	67 71	90.0	26 16.5	67 71	89.6	26 36.5	66 71	89.2	26 56.3	66 71	88.8
2	25 14.1	67 71	89.3	25 34.1	67 71	88.9	25 54.0	66 71	88.5	26 13.9	66 71	88.1
3	24 31.6	67 71	88.6	24 51.7	67 71	88.2	25 11.6	66 71	87.8	25 31.5	66 71	87.4
4	23 49.2	67 71	87.9	24 09.3	67 71	87.5	24 29.3	67 71	87.1	24 49.2	66 71	86.7
75	23 06.8	67 71	87.2	23 26.9	67 71	86.8	23 46.9	67 71	86.4	24 06.8	66 70	86.0
6	22 24.5	67 71	86.5	22 44.6	67 71	86.1	23 04.6	67 70	85.7	23 24.5	66 70	85.3
7	21 42.2	67 70	85.8	22 02.2	67 70	85.4	22 22.3	67 70	85.0	22 42.3	67 70	84.6
8	20 59.9	67 70	85.2	21 20.0	67 70	84.8	21 40.0	67 70	84.4	22 00.1	67 70	84.0
9	20 17.6	67 70	84.5	20 37.8	67 70	84.1	20 57.8	67 70	83.7	21 17.9	67 70	83.3
80	19 35.4	67 70	83.8	19 55.6	67 70	83.4	20 15.7	67 70	83.0	20 35.8	67 70	82.6
1	18 53.2	67 70	83.1	19 13.5	67 70	82.7	19 33.6	67 70	82.3	19 53.7	67 70	81.9
2	18 11.2	68 70	82.4	18 31.4	67 70	82.1	18 51.6	67 70	81.7	19 11.8	67 70	81.3
3	17 29.1	68 70	81.8	17 49.4	68 70	81.4	18 09.7	67 70	81.0	18 29.9	67 70	80.6
4	16 47.2	68 70	81.1	17 07.5	68 70	80.7	17 27.8	68 70	80.3	17 48.1	67 70	79.9
85	16 05.3	68 70	80.4	16 25.7	68 70	80.0	16 46.0	68 70	79.7	17 06.3	68 69	79.3
6	15 23.5	68 70	79.7	15 43.9	68 69	79.4	16 04.3	68 69	79.0	16 24.7	68 69	78.6
7	14 41.8	68 69	79.1	15 02.3	68 69	78.7	15 22.7	68 69	78.3	15 43.1	68 69	77.9
8	14 00.2	69 69	78.4	14 20.7	68 69	78.0	14 41.2	68 69	77.7	15 01.7	68 69	77.3
9	13 18.7	69 69	77.7	13 39.3	69 69	77.4	13 59.9	68 69	77.0	14 20.4	68 69	76.6
90	12 37.3	69 69	77.1	12 57.9	69 69	76.7	13 18.6	69 69	76.3	13 39.2	69 68	75.9

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	29 00.0	1.0 01	180.0	28 30.0	1.0 01	180.0	28 00.0	1.0 01	180.0	27 30.0	1.0 01	180.0	27 00.0	1.0 01	180.0	26 30.0	1.0 01	180.0	26 00.0	1.0 01	180.0	25 30.0	1.0 01	180.0	00
1	28 59.6	1.0 02	178.9	28 29.6	1.0 02	178.9	27 59.6	1.0 02	178.9	27 29.6	1.0 02	178.9	26 59.6	1.0 02	178.9	26 29.6	1.0 02	178.9	25 59.6	1.0 02	178.9	25 29.6	1.0 02	179.0	1
2	28 58.4	1.0 03	177.8	28 28.4	1.0 03	177.8	27 58.4	1.0 03	177.8	27 28.4	1.0 03	177.8	26 58.4	1.0 03	177.9	26 28.4	1.0 03	177.9	25 58.4	1.0 03	177.9	25 28.5	1.0 03	177.9	2
3	28 56.3	1.0 05	176.7	28 26.4	1.0 05	176.7	27 56.4	1.0 05	176.8	27 26.4	1.0 05	176.8	26 56.4	1.0 05	176.8	26 26.5	1.0 05	176.8	25 56.5	1.0 05	176.8	25 26.5	1.0 04	176.9	3
4	28 53.5	1.0 06	175.6	28 23.5	1.0 06	175.6	27 53.6	1.0 06	175.7	27 23.6	1.0 06	175.7	26 53.7	1.0 06	175.7	26 23.7	1.0 06	175.8	25 53.8	1.0 06	175.8	25 23.8	1.0 06	175.8	4
05	28 49.8	1.0 07	174.5	28 19.9	1.0 07	174.6	27 50.0	1.0 07	174.6	27 20.1	1.0 07	174.6	26 50.1	1.0 07	174.7	26 20.2	1.0 07	174.7	25 50.3	1.0 07	174.7	25 20.3	1.0 07	174.8	05
6	28 45.4	1.0 09	173.4	28 15.5	1.0 09	173.5	27 45.6	1.0 09	173.5	27 15.7	1.0 09	173.6	26 45.8	1.0 09	173.6	26 15.9	1.0 08	173.7	25 46.0	1.0 08	173.7	25 16.1	1.0 08	173.7	6
7	28 40.1	1.0 10	172.3	28 10.3	1.0 10	172.4	27 40.4	1.0 10	172.4	27 10.5	1.0 10	172.5	26 40.7	1.0 10	172.5	26 10.8	1.0 10	172.6	25 41.0	1.0 10	172.7	25 11.1	1.0 10	172.7	7
8	28 34.1	99 11	171.2	28 04.2	99 11	171.3	27 34.4	99 11	171.4	27 04.6	99 11	171.4	26 34.8	99 11	171.5	26 05.0	99 11	171.6	25 35.2	99 11	171.6	25 05.3	99 11	171.7	8
9	28 27.2	99 13	170.2	27 57.4	99 13	170.2	27 27.7	99 13	170.3	26 57.9	99 12	170.4	26 28.1	99 12	170.4	25 58.4	99 12	170.5	25 28.6	99 12	170.6	24 58.8	99 12	170.6	9
10	28 19.5	99 14	169.1	27 49.8	99 14	169.1	27 20.1	99 14	169.2	26 50.4	99 14	169.3	26 20.7	99 14	169.4	25 51.0	99 14	169.5	25 21.3	99 13	169.5	24 51.5	99 13	169.6	10
1	28 11.1	99 15	168.0	27 41.5	99 15	168.1	27 11.8	99 15	168.2	26 42.2	99 15	168.2	26 12.5	99 15	168.3	25 42.8	99 15	168.4	25 13.2	99 15	168.5	24 43.5	99 15	168.6	1
2	28 01.9	99 17	166.9	27 32.3	99 17	167.0	27 02.7	99 16	167.1	26 33.1	99 16	167.2	26 03.5	99 16	167.3	25 33.9	99 16	167.4	25 04.3	99 16	167.5	24 34.7	99 16	167.6	2
3	27 51.9	98 18	165.8	27 22.4	98 18	165.9	26 52.9	98 18	166.0	26 23.3	98 18	166.1	25 53.8	98 17	166.2	25 24.3	98 17	166.3	24 54.8	98 17	166.4	24 25.2	98 17	166.5	3
4	27 41.1	98 19	164.8	27 11.7	98 19	164.9	26 43.2	98 19	165.0	26 12.8	98 19	165.1	25 43.4	98 19	165.2	25 13.9	98 19	165.3	24 44.4	98 18	165.4	24 15.0	98 18	165.5	4
15	27 29.6	98 20	163.7	27 00.3	98 20	163.8	26 30.9	98 20	163.9	26 01.5	98 20	164.1	25 32.2	98 20	164.2	25 02.8	98 20	164.3	24 33.4	98 20	164.4	24 04.0	98 20	164.5	15
6	27 17.3	98 22	162.7	26 48.1	98 22	162.8	26 18.8	98 21	162.9	25 49.5	98 21	163.0	25 20.2	98 21	163.1	24 50.9	98 21	163.3	24 21.6	98 21	163.4	23 52.3	98 21	163.5	6
7	27 04.3	97 23	161.6	26 35.1	97 23	161.7	26 05.9	97 23	161.9	25 36.7	97 22	162.0	25 07.5	97 22	162.1	24 38.3	97 22	162.2	24 09.1	97 22	162.4	23 39.9	97 22	162.5	7
8	26 50.6	97 24	160.6	26 21.5	97 24	160.7	25 52.4	97 24	160.8	25 23.3	97 24	161.0	24 54.2	97 24	161.1	24 25.0	97 23	161.2	23 55.9	97 23	161.4	23 26.8	97 23	161.5	8
9	26 36.1	97 25	159.5	26 07.1	97 25	159.7	25 38.1	97 25	159.8	25 09.1	97 25	159.9	24 40.1	97 25	160.1	24 11.0	97 25	160.2	23 42.0	97 24	160.4	23 13.0	97 24	160.5	9
20	26 20.9	96 27	158.5	25 52.0	96 26	158.6	25 23.1	96 26	158.8	24 54.2	96 26	158.9	24 25.2	96 26	159.1	23 56.3	96 26	159.2	23 27.4	96 26	159.4	22 58.4	96 25	159.5	20
1	26 04.9	96 28	157.4	25 36.2	96 28	157.6	25 07.4	96 27	157.8	24 38.6	96 27	157.9	24 09.7	96 27	158.1	23 40.9	96 27	158.2	23 12.1	96 27	158.4	22 43.2	96 26	158.5	1
2	25 48.3	96 29	156.4	25 19.6	96 29	156.6	24 51.0	96 28	156.7	24 22.3	96 28	156.9	23 53.6	96 28	157.1	23 24.8	96 28	157.2	22 56.1	96 28	157.4	22 27.4	96 28	157.5	2
3	25 31.0	96 30	155.4	25 02.4	96 30	155.6	24 33.9	96 30	155.7	24 05.3	96 29	155.9	23 36.7	96 29	156.1	23 08.1	96 29	156.2	22 39.5	96 29	156.4	22 10.8	96 29	156.6	3
4	25 13.0	95 31	154.4	24 44.6	95 31	154.6	24 16.1	95 31	154.7	23 47.6	95 31	154.9	23 19.1	95 30	155.1	22 50.6	95 30	155.3	22 22.1	95 30	155.4	21 53.6	95 30	155.6	4
25	24 54.3	94 32	153.4	24 26.0	94 32	153.6	23 57.7	95 32	153.8	23 29.3	95 32	153.9	23 00.9	95 31	154.1	22 32.6	95 31	154.3	22 04.2	95 31	154.5	21 35.8	95 31	154.6	25
6	24 35.0	94 33	152.4	24 06.8	94 33	152.6	23 38.6	94 33	152.8	23 10.3	94 33	153.0	22 42.1	94 32	153.1	22 13.8	94 32	153.3	21 45.6	94 32	153.5	21 17.3	94 32	153.7	6
7	24 15.0	94 34	151.4	23 46.9	94 34	151.6	23 18.8	94 34	151.8	22 50.7	94 34	152.0	22 22.6	94 34	152.2	21 54.5	94 33	152.4	21 26.3	94 33	152.5	20 58.1	94 33	152.7	7
8	23 54.4	93 35	150.4	23 26.4	93 35	150.6	22 58.5	93 35	150.8	22 30.5	93 35	151.0	22 02.5	93 35	151.2	21 34.5	93 34	151.4	21 06.4	93 34	151.6	20 38.4	93 34	151.8	8
9	23 33.1	93 36	149.4	23 05.3	93 36	149.6	22 37.5	93 36	149.8	22 09.6	93 36	150.0	21 41.7	93 36	150.2	21 13.8	93 35	150.4	20 45.9	93 35	150.6	20 18.0	93 35	150.8	9
30	23 11.3	92 37	148.5	22 43.6	92 37	148.7	22 15.8	92 37	148.9	21 48.1	92 37	149.1	21 20.4	93 37	149.3	20 52.6	93 36	149.5	20 24.8	93 36	149.7	19 57.0	93 36	149.9	30
1	22 48.8	92 38	147.5	22 21.2	92 38	147.7	21 53.6	92 38	147.9	21 26.0	92 38	148.2	20 58.4	92 38	148.4	20 30.8	92 37	148.6	20 03.1	92 37	148.8	19 35.5	92 37	149.0	1
2	22 25.7	91 39	146.6	21 58.3	91 39	146.8	21 30.8	92 39	147.0	21 03.3	92 39	147.2	20 35.9	92 39	147.4	20 08.4	92 38	147.6	19 40.8	92 38	147.9	19 13.3	92 38	148.1	2
3	22 02.0	91 40	145.6	21 34.7	91 40	145.8	21 07.4	91 40	146.1	20 40.1	91 40	146.3	20 12.7	91 40	146.5	19 45.4	91 39	146.7	19 18.0	91 39	146.9	18 50.6	91 39	147.1	3
4	21 37.8	91 41	144.7	21 10.6	91 41	144.9	20 43.4	91 41	145.1	20 16.2	91 41	145.4	19 49.0	91 40	145.6	19 21.8	91 40	145.8	18 54.5	91 40	146.0	18 27.3	91 40	146.2	4
35	21 13.0	90 42	143.7	20 45.9	90 42	144.0	20 18.9	90 42	144.2	19 51.8	90 42	144.4	19 24.8	90 41	144.7	18 57.7	90 41	144.9	18 30.6	90 41	145.1	18 03.4	90 41	145.3	35
6	20 47.6	90 43	142.8	20 20.7	90 43	143.1	19 53.8	90 43	143.3	19 26.9	90 42	143.5	19 00.0	90 42	143.8	18 33.0	90 42	144.0	18 06.0	90 42	144.2	17 39.0	90 42	144.4	6
7	20 21.7	89 44	141.9	19 54.9	89 44	142.1	19 28.2	89 44	142.4	19 01.4	89 43	142.6	18 34.6	89 43	142.9	18 07.8	89 43	143.1	17 41.0	89 43	143.3	17 14.1	90 42	143.6	7
8	19 55.2	89 45	141.0	19 28.6	89 45	141.2	19 02.0	89 44	141.5	18 35.4	89 44	141.7	18 08.7	89 44	142.0	17 42.0	89 44	142.2	17 15.4	89 44	142.4	16 48.6	89 43	142.7	8
9	19 28.3	88 46	140.1	19 01.8	88 46	140.3	18 35.3	88 45	140.6	18 08.8	88 45	140.8	17 42.3	88 45	141.1	17 15.8	88 45	141.3	16 49.2	89 44	141.6	16 22.7	89 44	141.8	9
40	19 00.8	88 47	139.2	18 34.5	88 46	139.4	18 08.1	88 46	139.7	17 41.8	88 46	139.9	17 15.4	88 46	140.2	16 49.0	88 45	140.4	16 22.6	88 45	140.7	15 56.2	88 45	140.9	40
1	18 32.8	87 47	138.3	18 06.6	87 47	138.6	17 40.5	87 47	138.8	17 14.2	87 47	139.1	16 48.0	87 46	139.3	16 21.8	88 46	139.6	15 55.5	88 46	139.8	15 29.2	88 46	140.1	1
2	18 04.4	87 48	137.4	17 38.3	87 48	137.7	17 12.3	87 48	137.9	16 46.2	87 48	138.2	16 20.1	87 47	138.5	15 54.0	87 47	138.7	15 27.9	87 47	139.0	15 01.7	87 47	139.2	2
3	17 35.4	86 49	136.5	17 09.5	86 49	136.8	16 43.6	86 49	137.1	16 17.7	86 48	137.3	15 51.7	87 48	137.6	15 25.8	87 48	137.9	14 59.8	87 48	138.1	14 33.8	87 47	138.4	3
4	17 06.0	86 50	135.7	16 40.3	86 50	136.0	16 14.5	86 49	136.2	15 48.7	86 49	136.5	15 22.9	86 49	136.7	14 57.1	86 49	137.0	14 31.2	86 48	137.3	14 05.4	86 48	137.5	4
45	16 36.1	85 51	134.8	16 10.5	85 50	135.1	15 44.9	85 50	135.4	15 19.3	86 50	135.6	14 53.6	86 50	135.9	14 27.9	86 49	136.2	14 02.2	86 49	136.4	13 36.5	86 49	136.7	45
6	16 05.8	85 51	134.0	15 40.4	85 51	134.2	15 14.9	85 51	134.5	14 49.4	85 51	134.8	14 23.9	85 50	135.1	13 58.3	85 50	135.3	13 32.8	85 50	135.6	13 07.2	85 50	135.9	6
7	15 35.1	84 52	133.1	15 09.7	84 52	133.4	14 44.4	84 52	133.7	14 19.0	85 51	134.0	13 53.7	85 51	134.2	13 28.3	85 51	134.5	13 02.9	85 51	134.8	12 37.4	85 50	135.1	7
8	15 03.9	84 53	132.3	14 38.7	84 52	132.6	14 13.5	84 52	132.8	13 48.3	84 52	133.1	13 23.1	84 52	133.4	12 57.8	84 51	133.7	12 32.5	84 51	134.0	12 07.2	84 51	134.2	8
9	14 32.3	83 53	131.5	14 07.3	84 53	131.7	13 42.2	84 53	132.0	13 17.1	84 53	132.3	12 52.0	84 52	132.6	12 26.9	84 52	132.9	12 01.8	84 52	133.1	11 36.6	84 52	133.4	9
50	14 00.3	83 54	130.6	13 35.4	83 54	130.9	13 10.5	83 54	131.2	12 45.5	83 53	131.5	12 20.6	83 53	131.8	11 55.6	83 53	132.1	11 30.6	83 53	132.3	11 05.6	83 52	132.6	50
1	13 27.9	83 55	129.8	13 03.1	83 54	130.1	12 38.4	83 54	130.4	12 13.6	83 54	130.7	11 48.7	83 54	131.0	11 23.9	83 53	131.3	10 59.1	83 53	131.5	10 34.2	83 53	131.8	1
2	12 55.1	82 55	129.0	12 30.5	82 55	129.3	12 05.9	82 55	129.6	11 41.2	82 55	129.9	11 16.5	82 54	130.2	10 51.8	82 54	130.5	10 27.1	82 54	130.7	10 02.4	82 54	131.0	2
3	12 22.0	82 56	128.2	11 57.5	82 56	128.5	11 33.0	82 55	128.8	11 08.4	82 55	129.1	10 43.9	82 55	129.4	10 19.3	82 55	129.7	9 54.8	82 55	130.0	9 30.2	82 54	130.2	3
4	11 48.4	81 56	127.4	11 24.1	81 56	127.7	10 59.7	81 56	128.0	10 35.3	81 56	128.3	10 10.9	81 56	128.6	9 46.5	81 55	128.9	9 22.1	81 55	129.2	8 57.6	82 55	129.5	4
55	11 14.6	81 57	126.6	10 50.3	81 57	126.9	10 26.1	81 57	127.2	10 01.8	81 56	127.5	9 37.6	81 56	127.8	9 13.3	81 56	128.1	8 49.0	81 56	128.4	8 24.7	81 56	128.7	55
6	10 40.3	80 58	125.8	10 16.2	80 57	126.1	9 52.1	80 57	126.4	9 28.0	80 57	126.7	9 03.9	80 57	127.0	8 39.7	81 57	127.3	8 15.6	81 56	127.6	7 51.4	81 56	127.9	6
7	10 05.7	80 58	125.0	9 41.8	80 58	125.3	9 17.8	80 58	125.6	8 53.8	80 58	125.9	8 29.8	80 57	126.2	8 05.8	80 57	126.6	7 41.8	80 57	126.9	7 17.7	80 57	127.2	7
8	9 30.8	79 59	124.3	9 07.0	79 58	124.6	8 43.2	79 58	124.9	8 19.3	80 58	125.2	7 55.4	80 58	125.5	7 31.6	80 58	125.8	7 07.7	80 57	126.1	6 43.8	80 57	126.4	8
9	8 55.6	79 59	123.5	8 31.9	79 59	123.8	8 08.2	79 59	124.1	7 44.5	79 59	124.4	7 20.7	79 58	124.7	6 57.0	79 58	125.0	6 33.2	79 58	125.3	6 09.4	79 58	125.6	9
60	8 20.1	79 60	122.7	7 56.5	79 60	123.0	7 32.9	79 59	123.3	7 09.3	79 59	123.7	6 45.7	79 59	124.0	6 22.1	79 59	124.3	5 58.4	79 58	124.6	5 34.8	79 58	124.9	60
1	7 44.2	78 60	122.0	7 20.8	78 60	122.3	6 57.3	78 60	122.6	6 33.8	78 60	122.9	6 10.4	78 59	123.2	5 46.9	78 59	123.5	5 23.4	78 59	123.8				1
2	7 08.1	78 61	121.2	6 44.8	78 61	121.5	6 21.4	78 60	121.8	5 58.1	78 60	122.1	5 34.7	78 60	122.5	5 11.3	78 60	122.8							2
3	6 31.6	77 61	120.4	6 08.4	77 61	120.8	5 45.2	77 61	121.1	5 22.0	77 61	121.4													3
4	5 54.9	77 62	119.7	5 31.8	77 62	120.0	5 08.8	77 61	120.3																4
65	5 17.9	77 62	119.0																						65

DECLINATION SAME NAME AS LATITUDE

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
91	10 32.8	69 69	77.9	10 53.7	69 69	77.5	11 14.5	69 69	77.1	11 35.2	69 69	76.8	11 56.0	69 69	76.4	12 16.7	69 69	76.0	12 37.4	69 68	75.7	12 58.1	69 68	75.3	91
2	9 51.4	70 69	77.2	10 12.3	70 69	76.8	10 33.2	70 69	76.4	10 54.0	69 69	76.1	11 14.8	69 68	75.7	11 35.6	69 68	75.3	11 56.4	69 68	75.0	12 17.1	69 68	74.6	2
3	9 10.1	70 69	76.5	9 31.0	70 69	76.1	9 52.0	70 68	75.8	10 12.9	70 68	75.4	10 33.8	70 68	75.0	10 54.6	69 68	74.7	11 15.5	69 68	74.3	11 36.3	69 68	73.9	3
4	8 28.9	70 68	75.8	8 49.9	70 68	75.5	9 10.9	70 68	75.1	9 31.9	70 68	74.7	9 52.8	70 68	74.4	10 13.8	70 68	74.0	10 34.7	70 68	73.6	10 55.6	70 68	73.3	4
95	7 47.8	70 68	75.1	8 08.9	70 68	74.8	8 30.0	70 68	74.4	8 51.0	70 68	74.1	9 12.1	70 68	73.7	9 33.1	70 68	73.3	9 54.0	70 67	73.0	10 15.0	70 67	72.6	95
6	7 06.9	71 68	74.5	7 28.0	71 68	74.1	7 49.2	70 68	73.7	8 10.3	70 68	73.4	8 31.4	70 68	73.0	8 52.5	70 67	72.7	9 13.5	70 67	72.3	9 34.6	70 67	71.9	6
7	6 26.1	71 68	73.8	6 47.3	71 68	73.4	7 08.5	71 68	73.1	7 29.7	71 67	72.7	7 50.9	71 67	72.3	8 12.1	71 67	72.0	8 33.2	70 67	71.6	8 54.3	70 67	71.3	7
8	5 45.4	71 68	73.1	6 06.7	71 67	72.7	6 28.0	71 67	72.4	6 49.3	71 67	72.0	7 10.5	71 67	71.7	7 31.8	71 67	71.3	7 53.0	71 67	71.0	8 14.2	71 67	70.6	8
9	5 04.9	71 67	72.4	5 26.3	71 67	72.0	5 47.7	71 67	71.7	6 09.0	71 67	71.3	6 30.4	71 67	71.0	6 51.7	71 67	70.6	7 13.0	71 66	70.3	7 34.3	71 66	69.9	9
100							5 07.5	71 67	71.0	5 28.9	71 67	70.7	5 50.3	71 66	70.3	6 11.7	71 66	70.0	6 33.1	71 66	69.6	6 54.5	71 66	69.2	100
1													5 10.5	72 66	69.6	5 32.0	72 66	69.3	5 53.5	72 66	68.9	6 15.0	72 66	68.6	1
2																			5 14.0	72 66	68.2	5 35.5	72 65	67.9	2

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Lat. 45°

H.A.	20° 00′ Alt.	Δd Δt	Az.	20° 30′ Alt.	Δd Δt	Az.	21° 00′ Alt.	Δd Δt	Az.	21° 30′ Alt.	Δd Δt	Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	65 00.0	1.0 01	180.0	65 30.0	1.0 01	180.0	66 00.0	1.0 01	180.0	66 30.0	1.0 01	180.0
1	64 59.2	1.0 04	177.8	65 29.2	1.0 04	177.7	65 59.2	1.0 04	177.7	66 29.1	1.0 04	177.7
2	64 56.7	1.0 07	175.6	65 26.7	1.0 07	175.5	65 56.6	1.0 07	175.4	66 26.6	1.0 07	175.3
3	64 52.6	1.0 10	173.3	65 22.5	1.0 10	173.2	65 52.4	1.0 10	173.1	66 22.2	1.0 10	173.0
4	64 46.9	99 12	171.2	65 16.7	99 12	171.0	65 46.5	99 13	170.9	66 16.2	99 13	170.7
05	64 39.6	99 15	169.0	65 09.2	99 15	168.8	65 38.9	99 15	168.6	66 08.6	99 16	168.4
6	64 30.7	99 17	166.8	65 00.2	98 18	166.6	65 29.7	98 18	166.4	65 59.2	98 18	166.2
7	64 20.2	98 20	164.7	64 49.6	98 20	164.4	65 19.0	98 21	164.2	65 48.3	98 21	163.9
8	64 08.2	97 22	162.6	64 37.4	97 23	162.3	65 06.6	97 23	162.0	65 35.8	97 23	161.7
9	63 54.8	97 25	160.5	64 23.8	97 25	160.2	64 52.8	97 26	159.9	65 21.7	96 26	159.6
10	63 39.9	96 27	158.4	64 08.7	96 28	158.1	64 37.5	96 28	157.8	65 06.2	96 28	157.4
1	63 23.6	95 29	156.4	63 52.2	95 30	156.1	64 20.7	95 30	155.7	64 49.2	95 31	155.3
2	63 05.9	95 32	154.4	63 34.3	94 32	154.1	64 02.6	94 32	153.7	64 30.8	94 33	153.3
3	62 47.0	94 34	152.5	63 15.1	94 34	152.1	63 43.1	93 35	151.7	64 11.0	93 35	151.3
4	62 26.7	93 36	150.6	62 54.6	93 36	150.2	63 22.3	92 37	149.7	63 50.0	92 37	149.3
15	62 05.3	92 38	148.7	62 32.8	92 38	148.3	63 00.3	92 38	147.8	63 27.8	91 39	147.4
6	61 42.7	91 40	146.9	62 10.0	91 40	146.4	62 37.2	91 40	146.0	63 04.3	90 41	145.5
7	61 18.9	90 41	145.1	61 45.9	90 42	144.6	62 12.9	90 42	144.2	62 39.7	89 43	143.7
8	60 54.1	89 43	143.3	61 20.9	89 44	142.9	61 47.5	89 44	142.4	62 14.1	88 44	141.9
9	60 28.3	88 45	141.6	60 54.7	88 45	141.1	61 21.1	88 46	140.7	61 47.4	87 46	140.1
20	60 01.4	88 46	140.0	60 27.6	87 47	139.5	60 53.7	87 47	139.0	61 19.7	86 48	138.5
1	59 33.7	87 48	138.3	59 59.6	86 48	137.8	60 25.4	86 49	137.3	60 51.1	85 49	136.8
2	59 05.1	86 49	136.8	59 30.7	85 50	136.2	59 56.2	85 50	135.7	60 21.6	84 51	135.2
3	58 35.6	85 50	135.2	59 00.9	84 51	134.7	59 26.2	84 51	134.2	59 51.3	84 52	133.6
4	58 05.3	84 52	133.7	58 30.4	83 52	133.2	58 55.4	83 53	132.6	59 20.2	83 53	132.1
25	57 34.2	83 53	132.2	57 59.1	83 53	131.7	58 23.8	82 54	131.2	58 48.4	82 54	130.6
6	57 02.5	82 54	130.8	57 27.0	82 55	130.3	57 51.5	81 55	129.7	58 15.8	81 55	129.2
7	56 30.0	81 55	129.4	56 54.3	81 56	128.8	57 18.5	80 56	128.3	57 42.6	80 56	127.7
8	55 56.9	81 56	128.0	56 21.0	80 57	127.5	56 44.9	80 57	126.9	57 08.7	79 57	126.4
9	55 23.2	80 57	126.7	55 47.0	79 58	126.1	56 10.7	79 58	125.6	56 34.3	78 58	125.0
30	54 48.8	79 58	125.4	55 12.5	78 58	124.8	55 35.9	78 59	124.3	55 59.3	77 59	123.7
1	54 14.0	78 59	124.1	54 37.4	78 59	123.6	55 00.6	77 60	123.0	55 23.7	77 60	122.5
2	53 38.6	77 60	122.9	54 01.8	77 60	122.3	54 24.8	77 60	121.8	54 47.7	76 61	121.2
3	53 02.7	77 61	121.6	53 25.7	76 61	121.1	53 48.5	76 61	120.6	54 11.2	75 62	120.0
4	52 26.4	76 61	120.5	52 49.1	76 62	119.9	53 11.7	75 62	119.4	53 34.2	75 62	118.8
35	51 49.6	75 62	119.3	52 12.1	75 62	118.8	52 34.6	74 63	118.2	52 56.8	74 63	117.7
6	51 12.4	75 63	118.2	51 34.8	74 63	117.6	51 57.0	74 63	117.1	52 19.1	73 64	116.5
7	50 34.8	74 63	117.1	50 57.0	74 64	116.5	51 19.0	73 64	116.0	51 40.9	73 64	115.4
8	49 56.8	74 64	116.0	50 18.8	73 64	115.4	50 40.7	73 64	114.9	51 02.4	72 65	114.4
9	49 18.5	73 64	114.9	49 40.4	73 65	114.4	50 02.1	72 65	113.8	50 23.6	72 65	113.3
40	48 39.9	73 65	113.9	49 01.6	72 65	113.3	49 23.1	72 66	112.8	49 44.5	71 66	112.3
1	48 00.9	72 65	112.8	48 22.5	72 66	112.3	48 43.8	71 66	111.8	49 05.1	71 66	111.2
2	47 21.7	72 66	111.8	47 43.1	71 66	111.3	48 04.3	71 66	110.8	48 25.4	70 67	110.3
3	46 42.1	71 66	110.9	47 03.4	71 66	110.3	47 24.5	70 67	109.8	47 45.5	70 67	109.3
4	46 02.4	71 67	109.9	46 23.5	70 67	109.4	46 44.5	70 67	108.9	47 05.3	69 67	108.3
45	45 22.4	70 67	108.9	45 43.4	70 67	108.4	46 04.2	69 67	107.9	46 25.0	69 68	107.4
6	44 42.1	70 67	108.0	45 03.0	69 68	107.5	45 23.8	69 68	107.0	45 44.4	68 68	106.5
7	44 01.7	69 68	107.1	44 22.4	69 68	106.6	44 43.1	69 68	106.1	45 03.6	68 68	105.6
8	43 21.0	69 68	106.2	43 41.7	69 68	105.7	44 02.2	68 68	105.2	44 22.6	68 69	104.7
9	42 40.2	69 68	105.3	43 00.8	68 68	104.8	43 21.2	68 69	104.3	43 41.5	67 69	103.8
50	41 59.2	68 69	104.4	42 19.7	68 69	103.9	42 40.0	68 69	103.4	43 00.2	67 69	102.9
1	41 18.0	68 69	103.6	41 38.4	68 69	103.1	41 58.7	67 69	102.6	42 18.8	67 69	102.1
2	40 36.7	68 69	102.7	40 57.0	68 69	102.2	41 17.2	67 69	101.7	41 37.3	67 69	101.3
3	39 55.2	68 69	101.9	40 15.5	67 69	101.4	40 35.6	67 70	100.9	40 55.6	66 70	100.4
4	39 13.7	67 69	101.1	39 33.8	67 70	100.6	39 53.9	67 70	100.1	40 13.8	66 70	99.6
55	38 32.0	67 70	100.3	38 52.1	67 70	99.8	39 12.1	66 70	99.3	39 31.9	66 70	98.8
6	37 50.2	67 70	99.5	38 10.2	67 70	99.0	38 30.2	66 70	98.5	38 50.0	66 70	98.0
7	37 08.3	67 70	98.7	37 28.3	66 70	98.2	37 48.2	66 70	97.7	38 07.9	66 70	97.2
8	36 26.3	67 70	97.9	36 46.2	66 70	97.4	37 06.1	66 70	96.9	37 25.8	66 70	96.5
9	35 44.2	67 70	97.1	36 04.1	66 70	96.6	36 23.9	66 70	96.2	36 43.6	65 70	95.7
60	35 02.1	66 70	96.3	35 22.0	66 70	95.9	35 41.7	66 70	95.4	36 01.4	65 70	95.0
1	34 19.9	66 70	95.6	34 39.7	66 70	95.1	34 59.5	66 70	94.7	35 19.1	65 71	94.2
2	33 37.6	66 70	94.8	33 57.4	66 71	94.4	34 17.2	65 71	93.9	34 36.7	65 71	93.5
3	32 55.4	66 71	94.1	33 15.1	66 71	93.6	33 34.8	65 71	93.2	33 54.4	65 71	92.7
4	32 13.0	66 71	93.3	32 32.8	66 71	92.9	32 52.4	65 71	92.5	33 12.0	65 71	92.0
65	31 30.6	66 71	92.6	31 50.4	66 71	92.2	32 10.0	65 71	91.7	32 29.6	65 71	91.3
6	30 48.3	66 71	91.9	31 08.0	66 71	91.5	31 27.6	65 71	91.0	31 47.2	65 71	90.6
7	30 05.8	66 71	91.2	30 25.6	66 71	90.7	30 45.2	65 71	90.3	31 04.7	65 71	89.9
8	29 23.4	66 71	90.5	29 43.1	66 71	90.0	30 02.8	65 71	89.6	30 22.3	65 71	89.2
9	28 41.0	66 71	89.8	29 00.7	66 71	89.3	29 20.3	65 71	88.9	29 39.9	65 71	88.5
70	27 58.6	66 71	89.1	28 18.3	66 71	88.6	28 37.9	65 71	88.2	28 57.5	65 71	87.8
1	27 16.2	66 71	88.4	27 35.9	66 71	87.9	27 55.5	65 71	87.5	28 15.1	65 71	87.1
2	26 33.8	66 71	87.7	26 53.5	66 71	87.2	27 13.2	65 71	86.8	27 32.8	65 71	86.4
3	25 51.4	66 71	87.0	26 11.1	66 71	86.6	26 30.8	65 70	86.1	26 50.4	65 70	85.7
4	25 09.0	66 71	86.3	25 28.8	66 70	85.9	25 48.5	66 70	85.4	26 08.1	65 70	85.0
75	24 26.7	66 70	85.6	24 46.5	66 70	85.2	25 06.2	66 70	84.8	25 25.9	65 70	84.4
6	23 44.4	66 70	84.9	24 04.2	66 70	84.5	24 24.0	66 70	84.1	24 43.7	66 70	83.7
7	23 02.2	66 70	84.2	23 22.0	66 70	83.8	23 41.8	66 70	83.4	24 01.6	66 70	83.0
8	22 20.0	66 70	83.6	22 39.9	66 70	83.2	22 59.7	66 70	82.8	23 19.5	66 70	82.3
9	21 37.9	67 70	82.9	21 57.8	66 70	82.5	22 17.7	66 70	82.1	22 37.5	66 70	81.7
80	20 55.8	67 70	82.2	21 15.8	66 70	81.8	21 35.7	66 70	81.4	21 55.5	66 70	81.0
1	20 13.8	67 70	81.5	20 33.8	67 70	81.2	20 53.8	66 70	80.8	21 13.7	66 70	80.4
2	19 31.9	67 70	80.9	19 51.9	67 70	80.5	20 11.9	67 70	80.1	20 31.9	66 69	79.7
3	18 50.0	67 70	80.2	19 10.1	67 70	79.8	19 30.2	67 70	79.4	19 50.2	67 69	79.0
4	18 08.3	67 69	79.5	18 28.4	67 69	79.2	18 48.5	67 69	78.8	19 08.6	67 69	78.4
85	17 26.6	67 69	78.9	17 46.8	67 69	78.5	18 07.0	67 69	78.1	18 27.1	67 69	77.7
6	16 45.0	68 69	78.2	17 05.3	67 69	77.8	17 25.5	67 69	77.4	17 45.7	67 69	77.1
7	16 03.5	68 69	77.6	16 23.8	68 69	77.2	16 44.1	68 69	76.8	17 04.4	67 69	76.4
8	15 22.1	68 69	76.9	15 42.5	68 69	76.5	16 02.9	68 68	76.1	16 23.2	68 68	75.7
9	14 40.9	68 69	76.2	15 01.3	68 68	75.9	15 21.8	68 68	75.5	15 42.1	68 68	75.1
90	13 59.7	68 68	75.6	14 20.3	68 68	75.2	14 40.7	68 68	74.8	15 01.2	68 68	74.4

22° 00′ Alt.	Δd Δt	Az.	22° 30′ Alt.	Δd Δt	Az.	23° 00′ Alt.	Δd Δt	Az.	23° 30′ Alt.	Δd Δt	Az.	H.A.
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
67 00.0	1.0 02	180.0	67 30.0	1.0 02	180.0	68 00.0	1.0 02	180.0	68 30.0	1.0 02	180.0	00
66 59.1	1.0 04	177.6	67 29.1	1.0 04	177.6	67 59.1	1.0 04	177.5	68 29.1	1.0 05	177.5	1
66 56.5	1.0 07	175.3	67 26.4	1.0 07	175.2	67 56.4	1.0 08	175.1	68 26.3	1.0 08	175.0	2
66 52.1	1.0 10	172.9	67 22.0	1.0 10	172.8	67 51.8	1.0 10	172.7	68 21.7	99 11	172.5	3
66 46.0	99 13	170.6	67 15.8	99 13	170.4	67 45.5	99 14	170.2	68 15.3	99 14	170.1	4
66 38.2	99 16	168.2	67 07.8	99 16	168.0	67 37.5	99 16	167.8	68 07.0	99 17	167.6	05
66 28.7	98 18	165.9	66 58.2	98 19	165.7	67 27.7	98 19	165.5	67 57.1	98 19	165.2	6
66 17.6	98 21	163.7	66 46.9	98 22	163.4	67 16.2	97 22	163.1	67 45.4	97 22	162.8	7
66 04.9	97 24	161.4	66 34.0	97 24	161.1	67 03.0	97 24	160.8	67 32.0	97 25	160.5	8
65 50.6	96 26	159.2	66 19.5	96 27	158.9	66 48.3	96 27	158.6	67 17.1	96 28	158.2	9
65 34.8	95 29	157.1	66 03.5	95 29	156.7	66 32.0	95 30	156.3	67 00.5	95 30	155.9	10
65 17.6	95 31	155.0	65 46.0	94 32	154.6	66 14.3	94 32	154.2	66 42.5	94 33	153.7	1
64 58.9	94 33	152.9	65 27.0	94 34	152.5	65 55.1	93 34	152.0	66 23.0	93 35	151.6	2
64 38.9	93 36	150.8	65 06.8	93 36	150.4	65 34.5	92 36	149.9	66 02.1	92 37	149.5	3
64 17.6	92 38	148.9	64 45.2	92 38	148.4	65 12.6	91 39	147.9	65 39.9	91 39	147.4	4
63 55.1	91 40	146.9	64 22.3	91 40	146.4	64 49.4	90 41	145.9	65 16.5	90 41	145.4	15
63 31.3	90 42	145.0	63 58.3	90 42	144.5	64 25.1	89 42	144.0	64 51.8	89 43	143.5	6
63 06.5	89 43	143.2	63 33.1	89 44	142.7	63 59.6	88 44	142.1	64 26.0	88 45	141.6	7
62 40.5	88 45	141.4	63 06.8	88 45	140.9	63 33.0	87 46	140.3	63 59.1	87 47	139.8	8
62 13.5	87 47	139.6	62 39.5	87 47	139.1	63 05.4	86 48	138.5	63 31.2	86 48	138.0	9
61 45.5	86 48	137.9	62 11.3	86 49	137.4	62 36.9	85 49	136.8	63 02.3	85 50	136.2	20
61 16.7	85 50	136.3	61 42.1	85 50	135.7	62 07.4	84 51	135.1	62 32.5	84 51	134.5	1
60 46.9	84 51	134.6	61 12.0	84 51	134.1	61 37.0	83 52	133.5	62 01.8	83 52	132.9	2
60 16.3	83 52	133.1	60 41.1	83 53	132.5	61 05.8	82 53	131.9	61 30.4	82 54	131.3	3
59 44.9	82 54	131.5	60 09.5	82 54	131.0	60 33.9	81 54	130.4	60 58.1	81 55	129.8	4
59 12.8	81 55	130.0	59 37.1	81 55	129.5	60 01.2	80 56	128.9	60 25.2	80 56	128.3	25
58 40.0	80 56	128.6	59 04.0	80 56	128.0	59 27.8	79 57	127.4	59 51.5	79 57	126.8	6
58 06.5	79 57	127.2	58 30.2	79 57	126.6	58 53.8	78 58	126.0	59 17.2	78 58	125.4	7
57 32.4	79 58	125.8	57 55.9	78 58	125.2	58 19.2	77 59	124.6	58 42.4	77 59	124.0	8
56 57.7	78 59	124.5	57 20.9	77 59	123.9	57 44.0	77 60	123.3	58 06.9	76 60	122.7	9
56 22.4	77 60	123.2	56 45.4	76 60	122.6	57 08.3	76 60	122.0	57 31.0	75 61	121.4	30
55 46.7	76 60	121.9	56 09.4	76 61	121.3	56 32.0	75 61	120.7	56 54.5	75 62	120.1	1
55 10.4	75 61	120.6	55 33.0	75 62	120.1	55 55.3	74 62	119.5	56 17.6	74 62	118.9	2
54 33.7	75 62	119.4	54 56.0	74 62	118.9	55 18.2	74 63	118.3	55 40.2	73 63	117.7	3
53 56.5	74 63	118.3	54 18.6	74 63	117.7	54 40.6	73 63	117.1	55 02.4	72 64	116.5	4
53 18.9	73 63	117.1	53 40.9	73 64	116.5	54 02.7	72 64	115.9	54 24.3	72 64	115.4	35
52 41.0	73 64	116.0	53 02.7	72 64	115.4	53 24.3	72 64	114.8	53 45.7	71 65	114.2	6
52 02.7	72 64	114.9	52 24.2	72 65	114.3	52 45.6	71 65	113.7	53 06.9	71 65	113.1	7
51 24.0	72 65	113.8	51 45.4	71 65	113.2	52 06.7	71 66	112.7	52 27.7	70 66	112.1	8
50 45.0	71 66	112.7	51 06.3	71 66	112.2	51 27.4	70 66	111.6	51 48.3	69 66	111.0	9
50 05.8	71 66	111.7	50 26.8	70 66	111.2	50 47.8	69 66	110.6	51 08.5	69 67	110.0	40
49 26.2	70 66	110.7	49 47.1	70 67	110.2	50 07.9	69 67	109.6	50 28.6	68 67	109.0	1
48 46.4	70 67	109.7	49 07.2	69 67	109.2	49 27.8	69 67	108.6	49 48.3	68 67	108.0	2
48 06.3	69 67	108.7	48 27.0	69 67	108.2	48 47.5	68 68	107.6	49 07.9	68 68	107.1	3
47 26.0	69 68	107.8	47 46.6	68 68	107.3	48 07.0	68 68	106.7	48 27.2	67 68	106.2	4
46 45.5	68 68	106.9	47 06.0	68 68	106.3	47 26.3	67 68	105.8	47 46.4	67 68	105.2	45
46 04.8	68 68	105.9	46 25.2	67 68	105.4	46 45.3	67 68	104.9	47 05.4	66 69	104.3	6
45 24.0	68 68	105.0	45 44.2	67 69	104.5	46 04.3	67 69	104.0	46 24.2	66 69	103.4	7
44 42.9	67 69	104.2	45 03.0	67 69	103.6	45 23.0	66 69	103.1	45 42.8	66 69	102.6	8
44 01.7	67 69	103.3	44 21.7	67 69	102.8	44 41.6	66 69	102.2	45 01.4	66 69	101.7	9
43 20.3	67 69	102.4	43 40.3	66 69	101.9	44 00.1	66 69	101.4	44 19.8	65 70	100.9	50
42 38.8	66 69	101.6	42 58.7	66 70	101.1	43 18.4	66 70	100.6	43 38.0	65 70	100.0	1
41 57.2	66 70	100.8	42 17.0	66 70	100.2	42 36.7	65 70	99.7	42 56.2	65 70	99.2	2
41 15.5	66 70	99.9	41 35.2	66 70	99.4	41 54.8	65 70	98.9	42 14.3	65 70	98.4	3
40 33.6	66 70	99.1	40 53.3	65 70	98.6	41 12.8	65 70	98.1	41 32.3	64 70	97.6	4
39 51.7	66 70	98.3	40 11.3	65 70	97.8	40 30.8	65 70	97.3	40 50.2	64 70	96.8	55
39 09.7	65 70	97.5	39 29.2	65 70	97.0	39 48.7	65 70	96.6	40 08.0	64 70	96.1	6
38 27.6	65 70	96.8	38 47.1	65 70	96.3	39 06.5	65 70	95.8	39 25.8	64 70	95.3	7
37 45.4	65 70	96.0	38 04.9	65 70	95.5	38 24.3	64 70	95.0	38 43.5	64 71	94.5	8
37 03.2	65 70	95.2	37 22.6	65 70	94.8	37 42.0	64 70	94.3	38 01.2	64 71	93.8	9
36 20.9	65 70	94.5	36 40.3	65 71	94.0	36 59.7	64 71	93.5	37 18.9	64 71	93.0	60
35 38.6	65 71	93.7	35 58.0	65 71	93.3	36 17.3	64 71	92.8	36 36.5	64 71	92.3	1
34 56.2	65 71	93.0	35 15.6	64 71	92.5	35 34.9	64 71	92.1	35 54.1	64 71	91.6	2
34 13.9	65 71	92.3	34 33.2	64 71	91.8	34 52.5	64 71	91.3	35 11.7	64 71	90.9	3
33 31.5	65 71	91.5	33 50.8	64 71	91.1	34 10.1	64 71	90.6	34 29.2	64 71	90.2	4
32 49.0	65 71	90.8	33 08.4	64 71	90.4	33 27.7	64 71	89.9	33 46.8	64 71	89.5	65
32 06.6	65 71	90.1	32 26.0	64 71	89.7	32 45.2	64 71	89.2	33 04.4	64 71	88.8	6
31 24.2	65 71	89.4	31 43.6	64 71	89.0	32 02.8	64 71	88.5	32 22.0	64 71	88.1	7
30 41.8	65 71	88.7	31 01.1	64 71	88.3	31 20.4	64 71	87.8	31 39.6	64 71	87.4	8
29 59.4	65 71	88.0	30 18.7	64 71	87.6	30 38.0	64 71	87.1	30 57.2	64 71	86.7	9
29 17.0	65 71	87.3	29 36.4	65 71	86.9	29 55.7	64 70	86.5	30 14.9	64 70	86.0	70
28 34.6	65 71	86.6	28 54.0	65 71	86.2	29 13.3	64 70	85.8	29 32.6	64 70	85.3	1
27 52.3	65 70	86.0	28 11.7	65 70	85.5	28 31.0	64 70	85.1	28 50.3	64 70	84.7	2
27 10.0	65 70	85.3	27 29.4	65 70	84.9	27 48.8	64 70	84.4	28 08.1	64 70	84.0	3
26 27.7	65 70	84.6	26 47.2	65 70	84.2	27 06.6	65 70	83.8	27 25.9	64 70	83.3	4
25 45.5	65 70	83.9	26 05.0	65 70	83.5	26 24.5	65 70	83.1	26 43.8	64 70	82.7	75
25 03.3	65 70	83.3	25 22.9	65 70	82.8	25 42.4	65 70	82.4	26 01.8	65 70	82.0	6
24 21.2	65 70	82.6	24 40.8	65 70	82.2	25 00.3	65 70	81.8	25 19.8	65 70	81.3	7
23 39.2	66 70	81.9	23 58.8	65 70	81.5	24 18.4	65 70	81.1	24 37.9	65 70	80.7	8
22 57.2	66 70	81.3	23 16.9	65 70	80.9	23 36.5	65 70	80.4	23 56.1	65 70	80.0	9
22 15.3	66 70	80.6	22 35.0	66 70	80.2	22 54.7	65 70	79.8	23 14.3	65 69	79.4	80
21 33.5	66 70	79.9	21 53.3	66 69	79.5	22 13.0	66 69	79.1	22 32.7	65 69	78.7	1
20 51.8	66 69	79.3	21 11.6	66 69	78.9	21 31.4	66 69	78.5	21 51.1	66 69	78.1	2
20 10.1	66 69	78.6	20 30.0	66 69	78.2	20 49.9	66 69	77.8	21 09.6	66 69	77.4	3
19 28.6	67 69	78.0	19 48.5	66 69	77.6	20 08.4	66 69	77.2	20 28.3	66 69	76.8	4
18 47.1	67 69	77.3	19 07.2	67 69	76.9	19 27.1	66 69	76.5	19 47.0	66 69	76.1	85
18 05.8	67 69	76.7	18 25.9	67 69	76.3	18 45.9	67 68	75.9	19 05.9	67 68	75.5	6
17 24.6	67 68	76.0	17 44.7	67 68	75.6	18 04.8	67 68	75.2	18 24.9	67 68	74.8	7
16 43.5	67 68	75.4	17 03.7	67 68	75.0	17 23.9	67 68	74.6	17 44.0	67 68	74.2	8
16 02.5	68 68	74.7	16 22.8	68 68	74.3	16 43.0	67 68	73.9	17 03.2	67 68	73.6	9
15 21.6	68 68	74.1	15 42.0	68 68	73.7	16 02.3	68 68	73.3	16 22.6	68 67	72.9	90

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H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
00	25 00.0	1.0 01	180.0	24 30.0	1.0 01	180.0	24 00.0	1.0 01	180.0	23 30.0	1.0 01	180.0	23 00.0	1.0 01	180.0	22 30.0	1.0 01	180.0	22 00.0	1.0 01	180.0	21 30.0	1.0 01	180.0	00
1	24 59.6	1.0 02	179.0	24 29.6	1.0 02	179.0	23 59.6	1.0 02	179.0	23 29.6	1.0 02	179.0	22 59.6	1.0 02	179.0	22 29.6	1.0 02	179.0	21 59.6	1.0 02	179.0	21 29.6	1.0 02	179.0	1
2	24 58.5	1.0 03	177.9	24 28.5	1.0 03	177.9	23 58.5	1.0 03	178.0	23 28.5	1.0 03	178.0	22 58.5	1.0 03	178.0	22 28.5	1.0 03	178.0	21 58.5	1.0 03	178.0	21 28.5	1.0 03	178.0	2
3	24 56.5	1.0 04	176.9	24 26.6	1.0 04	176.9	23 56.6	1.0 04	176.9	23 26.6	1.0 04	177.0	22 56.6	1.0 04	177.0	22 26.7	1.0 04	177.0	21 56.7	1.0 04	177.0	21 26.7	1.0 04	177.0	3
4	24 53.9	1.0 06	175.9	24 23.9	1.0 06	175.9	23 54.0	1.0 06	175.9	23 24.0	1.0 06	175.9	22 54.0	1.0 06	176.0	22 24.1	1.0 06	176.0	21 54.1	1.0 06	176.0	21 24.2	1.0 06	176.1	4
05	24 50.4	1.0 07	174.8	24 20.5	1.0 07	174.9	23 50.6	1.0 07	174.9	23 20.6	1.0 07	174.9	22 50.7	1.0 07	175.0	22 20.8	1.0 07	175.0	21 50.8	1.0 07	175.0	21 20.9	1.0 07	175.1	05
6	24 46.2	1.0 08	173.8	24 16.3	1.0 08	173.8	23 46.4	1.0 08	173.9	23 16.5	1.0 08	173.9	22 46.6	1.0 08	174.0	22 16.7	1.0 08	174.0	21 46.8	1.0 08	174.1	21 16.9	1.0 08	174.1	6
7	24 41.2	1.0 10	172.8	24 11.4	1.0 09	172.8	23 41.5	1.0 09	172.9	23 11.6	1.0 09	172.9	22 41.8	1.0 09	173.0	22 11.9	1.0 09	173.0	21 42.0	1.0 09	173.1	21 12.2	1.0 09	173.1	7
8	24 35.5	99 11	171.7	24 05.7	99 11	171.8	23 35.9	99 11	171.8	23 06.0	99 11	171.9	22 36.2	99 10	172.0	22 06.4	99 10	172.0	21 36.5	99 10	172.1	21 06.7	99 10	172.1	8
9	24 29.0	99 12	170.7	23 59.3	99 12	170.8	23 29.5	99 12	170.8	22 59.7	99 12	170.9	22 29.9	99 12	171.0	22 00.1	99 12	171.0	21 30.3	99 12	171.1	21 00.6	99 11	171.2	9
10	24 21.8	99 13	169.7	23 52.1	99 13	169.8	23 22.4	99 13	169.8	22 52.6	99 13	169.9	22 22.9	99 13	170.0	21 53.2	99 13	170.0	21 23.4	99 13	170.1	20 53.7	99 13	170.2	10
1	24 13.8	99 14	168.7	23 44.2	99 14	168.7	23 14.5	99 14	168.8	22 44.8	99 14	168.9	22 15.1	99 14	169.0	21 45.5	99 14	169.1	21 15.8	99 14	169.1	20 46.1	99 14	169.2	1
2	24 05.1	99 16	167.6	23 35.5	99 16	167.7	23 05.9	99 16	167.8	22 36.3	99 15	167.9	22 06.7	99 15	168.0	21 37.0	99 15	168.1	21 07.4	99 15	168.2	20 37.8	99 15	168.2	2
3	23 55.7	98 17	166.6	23 26.1	98 17	166.7	22 56.6	98 17	166.8	22 27.0	98 17	166.9	21 57.5	99 16	167.0	21 27.9	99 16	167.1	20 58.4	99 16	167.2	20 28.8	99 16	167.3	3
4	23 45.5	98 18	165.6	23 16.0	98 18	165.7	22 46.6	98 18	165.8	22 17.1	98 18	165.9	21 47.6	98 18	166.0	21 18.1	98 18	166.1	20 48.6	98 18	166.2	20 19.1	98 17	166.3	4
15	23 34.6	98 19	164.6	23 05.2	98 19	164.7	22 35.8	98 19	164.8	22 06.4	98 19	164.9	21 37.0	98 19	165.0	21 07.6	98 19	165.1	20 38.2	98 19	165.3	20 08.7	98 18	165.4	15
6	23 23.0	98 21	163.6	22 53.7	98 20	163.7	22 24.3	98 20	163.8	21 55.0	98 20	164.0	21 25.7	98 20	164.1	20 56.3	98 20	164.2	20 27.0	98 20	164.3	19 57.7	98 20	164.4	6
7	23 10.7	97 22	162.6	22 41.4	97 22	162.7	22 12.2	97 22	162.9	21 42.9	97 21	163.0	21 13.7	98 21	163.1	20 44.4	98 21	163.2	20 15.2	98 21	163.3	19 45.9	98 21	163.4	7
8	22 57.6	97 23	161.6	22 28.5	97 23	161.7	21 59.3	97 22	161.9	21 30.2	97 22	162.0	21 01.0	97 22	162.1	20 31.8	97 22	162.3	20 02.7	97 22	162.4	19 33.5	97 22	162.5	8
9	22 43.9	97 24	160.6	22 14.9	97 24	160.8	21 45.8	97 24	160.9	21 16.7	97 24	161.0	20 47.7	97 23	161.2	20 18.6	97 23	161.3	19 49.5	97 23	161.4	19 20.4	97 23	161.6	9
20	22 29.5	97 25	159.6	22 00.5	97 25	159.8	21 31.6	97 25	159.9	21 02.6	97 25	160.1	20 33.6	97 24	160.2	20 04.6	97 24	160.3	19 35.6	97 24	160.5	19 06.6	97 24	160.6	20
1	22 14.4	96 26	158.7	21 45.5	96 26	158.8	21 16.7	96 26	159.0	20 47.8	96 26	159.1	20 18.9	96 26	159.2	19 50.0	96 25	159.4	19 21.1	96 25	159.5	18 52.2	96 25	159.7	1
2	21 58.6	96 27	157.7	21 29.9	96 27	157.8	21 01.1	96 27	158.0	20 32.3	96 27	158.1	20 03.6	96 27	158.3	19 34.8	96 26	158.4	19 06.0	96 26	158.6	18 37.2	96 26	158.7	2
3	21 42.2	96 28	156.7	21 13.5	96 28	156.9	20 44.9	96 28	157.0	20 16.2	96 28	157.2	19 47.5	96 28	157.4	19 18.9	96 28	157.5	18 50.2	96 27	157.7	18 21.5	96 27	157.8	3
4	21 25.1	95 30	155.8	20 56.6	95 29	155.9	20 28.0	95 29	156.1	19 59.5	95 29	156.3	19 30.9	95 29	156.4	19 02.3	95 29	156.6	18 33.7	95 28	156.7	18 05.1	95 28	156.9	4
25	21 07.3	95 31	154.8	20 38.9	95 30	155.0	20 10.5	95 30	155.1	19 42.0	95 30	155.3	19 13.6	95 30	155.5	18 45.1	95 30	155.6	18 16.7	95 30	155.8	17 48.2	95 29	156.0	25
6	20 49.0	94 32	153.9	20 20.7	94 32	154.0	19 52.3	94 31	154.2	19 24.0	94 31	154.4	18 55.7	94 31	154.6	18 27.3	95 31	154.7	17 59.0	95 30	154.9	17 30.6	95 30	155.1	6
7	20 30.0	94 33	152.9	20 01.8	94 32	153.1	19 33.6	94 32	153.3	19 05.4	94 32	153.5	18 37.1	94 32	153.6	18 08.9	94 32	153.8	17 40.7	94 32	154.0	17 12.4	94 31	154.2	7
8	20 10.3	94 34	152.0	19 42.3	94 34	152.2	19 14.2	94 33	152.3	18 46.1	94 33	152.5	18 18.0	94 33	152.7	17 49.9	94 33	152.9	17 21.8	94 32	153.1	16 53.6	94 32	153.3	8
9	19 50.1	93 35	151.0	19 22.1	93 35	151.2	18 54.2	93 34	151.4	18 26.2	93 34	151.6	17 58.2	93 34	151.8	17 30.2	93 34	152.0	17 02.2	93 34	152.2	16 34.2	93 33	152.4	9
30	19 29.2	93 36	150.1	19 01.4	93 36	150.3	18 33.6	93 35	150.5	18 05.7	93 35	150.7	17 37.9	93 35	150.9	17 10.0	93 35	151.1	16 42.2	93 34	151.3	16 14.3	93 34	151.5	30
1	19 07.8	92 37	149.2	18 40.1	92 36	149.4	18 12.4	92 36	149.6	17 44.7	92 36	149.8	17 17.0	92 36	150.0	16 49.2	92 36	150.2	16 21.5	93 36	150.4	15 53.7	98 35	150.6	1
2	18 45.8	92 38	148.3	18 18.2	92 37	148.5	17 50.6	92 37	148.7	17 23.1	92 37	148.9	16 55.5	92 37	149.1	16 27.9	92 37	149.3	16 00.2	92 36	149.5	15 32.6	92 36	149.7	2
3	18 23.2	91 39	147.4	17 55.7	91 38	147.6	17 28.3	91 38	147.8	17 00.9	92 38	148.0	16 33.4	92 38	148.2	16 05.9	92 38	148.4	15 38.4	92 37	148.6	15 10.9	92 37	148.8	3
4	18 00.0	91 40	146.5	17 32.7	91 39	146.7	17 05.4	91 39	146.9	16 38.1	91 39	147.1	16 10.8	91 39	147.3	15 43.4	91 38	147.5	15 16.1	91 38	147.8	14 48.7	91 38	148.0	4
35	17 36.3	90 40	145.6	17 09.1	91 40	145.8	16 42.0	91 40	146.0	16 14.8	91 40	146.2	15 47.6	91 40	146.4	15 20.4	91 39	146.7	14 53.1	91 39	146.9	14 25.9	91 39	147.1	35
6	17 12.0	90 41	144.7	16 45.0	90 41	144.9	16 18.0	90 41	145.1	15 50.9	90 41	145.4	15 23.9	90 40	145.6	14 56.8	90 40	145.8	14 29.7	90 40	146.0	14 02.6	90 40	146.2	6
7	16 47.2	90 42	143.8	16 20.4	90 42	144.0	15 53.5	90 42	144.3	15 26.5	90 42	144.5	14 59.6	90 41	144.7	14 32.7	90 41	144.9	14 05.7	90 41	145.2	13 38.8	90 41	145.4	7
8	16 21.9	89 43	142.9	15 55.2	89 43	143.2	15 28.4	89 42	143.4	15 01.6	89 42	143.6	14 34.9	89 42	143.9	14 08.1	89 42	144.1	13 41.2	89 42	144.3	13 14.4	89 41	144.5	8
9	15 56.1	89 44	142.0	15 29.5	89 44	142.3	15 02.9	89 44	142.5	14 36.2	89 43	142.8	14 09.6	89 43	143.0	13 42.9	89 43	143.2	13 16.2	89 42	143.5	12 49.6	89 42	143.7	9
40	15 29.7	88 45	141.2	15 03.3	88 44	141.4	14 36.8	88 44	141.7	14 10.3	88 44	141.9	13 43.8	88 44	142.2	13 17.3	88 44	142.4	12 50.7	88 43	142.6	12 24.2	89 43	142.9	40
1	15 02.9	88 46	140.3	14 36.6	88 45	140.6	14 10.2	88 45	140.8	13 43.9	88 45	141.1	13 17.5	88 45	141.3	12 51.1	88 44	141.6	12 24.7	88 44	141.8	11 58.3	88 44	142.0	1
2	14 35.6	87 46	139.5	14 09.4	87 46	139.7	13 43.2	87 46	140.0	13 17.0	87 46	140.2	12 50.8	87 45	140.5	12 24.5	87 45	140.7	11 58.3	88 45	141.0	11 32.0	88 45	141.2	2
3	14 07.8	87 47	138.6	13 41.7	87 47	138.9	13 15.7	87 47	139.1	12 49.6	87 46	139.4	12 23.5	87 46	139.7	11 57.4	87 46	139.9	11 31.3	87 46	140.2	11 05.2	87 45	140.4	3
4	13 39.5	86 48	137.8	13 13.6	86 48	138.1	12 47.7	86 47	138.3	12 21.8	86 47	138.6	11 55.8	86 47	138.8	11 29.9	87 47	139.1	11 03.9	87 46	139.3	10 37.9	87 46	139.6	4
45	13 10.8	86 49	137.0	12 45.0	86 48	137.2	12 19.3	86 48	137.5	11 53.5	86 48	137.8	11 27.7	86 48	138.0	11 01.9	86 47	138.3	10 36.0	86 47	138.5	10 10.2	86 47	138.8	45
6	12 41.6	85 49	136.1	12 16.0	85 49	136.4	11 50.4	85 49	136.7	11 24.7	85 49	136.9	10 59.1	86 48	137.2	10 33.4	86 48	137.5	10 07.7	86 48	137.7	9 42.0	86 48	138.0	6
7	12 12.0	85 50	135.3	11 46.5	85 50	135.6	11 21.0	85 50	135.9	10 55.5	85 49	136.1	10 30.0	85 49	136.4	10 04.5	85 49	136.7	9 39.0	85 49	136.9	9 13.4	85 48	137.2	7
8	11 41.9	84 51	134.5	11 16.6	84 51	134.8	10 51.3	84 50	135.1	10 25.9	85 50	135.3	10 00.6	85 50	135.6	9 35.2	85 50	135.9	9 09.8	85 49	136.1	8 44.4	85 49	136.4	8
9	11 11.5	84 51	133.7	10 46.3	84 51	134.0	10 21.1	84 51	134.3	9 55.9	84 51	134.5	9 30.7	84 50	134.8	9 05.4	84 50	135.1	8 40.2	84 50	135.4	8 14.9	84 50	135.6	9
50	10 40.6	83 52	132.9	10 15.6	83 52	133.2	9 50.5	84 52	133.5	9 25.4	84 51	133.7	9 00.4	84 51	134.0	8 35.3	84 51	134.3	8 10.2	84 51	134.6	7 45.0	84 50	134.8	50
1	10 09.3	83 53	132.1	9 44.4	83 53	132.4	9 19.5	83 52	132.7	8 54.6	83 52	133.0	8 29.6	83 52	133.2	8 04.7	83 52	133.5	7 39.7	83 51	133.8	7 14.8	83 51	134.1	1
2	9 37.6	82 53	131.3	9 12.9	83 53	131.6	8 48.1	83 53	131.9	8 23.3	83 53	132.2	7 58.5	83 52	132.5	7 33.7	83 52	132.7	7 08.9	83 52	133.0	6 44.1	83 52	133.3	2
3	9 05.6	82 54	130.5	8 41.0	82 54	130.8	8 16.3	82 54	131.1	7 51.7	82 53	131.4	7 27.0	82 53	131.7	7 02.4	82 53	132.0	6 37.7	82 53	132.3	6 13.0	82 52	132.5	3
4	8 33.2	82 55	129.8	8 08.7	82 54	130.0	7 44.2	82 54	130.3	7 19.7	82 54	130.6	6 55.2	82 54	130.9	6 30.7	82 54	131.2	6 06.1	82 53	131.5	5 41.6	82 53	131.8	4
55	8 00.4	81 55	129.0	7 36.0	81 55	129.3	7 11.7	81 55	129.6	6 47.3	81 55	129.9	6 22.9	81 54	130.2	5 58.5	81 54	130.5	5 34.2	81 54	130.7	5 09.8	81 54	131.0	55
6	7 27.2	81 56	128.2	7 03.0	81 56	128.5	6 38.8	81 55	128.8	6 14.6	81 55	129.1	5 50.3	81 55	129.4	5 26.1	81 55	129.7	5 01.8	81 54	130.0				6
7	6 53.7	80 56	127.5	6 29.6	80 56	127.8	6 05.6	80 56	128.1	5 41.5	80 56	128.4	5 17.4	80 56	128.7										7
8	6 19.8	80 57	126.7	5 55.9	80 57	127.0	5 32.0	80 56	127.3																8
9	5 45.7	79 58	125.9	5 21.9	79 57	126.3																			9
60	5 11.2	79 58	125.2																						60

DECLINATION SAME NAME AS LATITUDE

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
91	13 18.7	69 68	74.9	13 39.3	69 68	74.5	13 59.9	68 68	74.2	14 20.4	68 68	73.8	14 40.9	68 68	73.4	15 01.3	68 68	73.0	15 21.8	68 67	72.6	15 42.1	68 67	72.3	91
2	12 37.8	69 68	74.2	12 58.5	69 68	73.9	13 19.1	69 68	73.5	13 39.7	69 68	73.1	14 00.3	69 67	72.7	14 20.8	68 67	72.4	14 41.3	68 67	72.0	15 01.8	68 67	71.6	2
3	11 57.0	69 68	73.6	12 17.8	69 68	73.2	12 38.5	69 68	72.8	12 59.2	69 67	72.5	13 19.9	69 67	72.1	13 40.5	69 67	71.7	14 01.1	69 67	71.3	14 21.6	68 67	71.0	3
4	11 16.4	69 67	72.9	11 37.2	69 67	72.5	11 58.0	69 67	72.2	12 18.8	69 67	71.8	12 39.6	69 67	71.4	13 00.3	69 67	71.1	13 20.9	69 67	70.7	13 41.6	69 66	70.3	4
95	10 35.9	70 67	72.2	10 56.8	70 67	71.9	11 17.7	70 67	71.5	11 38.6	69 67	71.1	11 59.4	69 67	70.8	12 20.2	69 66	70.4	12 41.0	69 66	70.0	13 01.7	69 66	69.7	95
6	9 55.6	70 67	71.6	10 16.6	70 67	71.2	10 37.6	70 67	70.9	10 58.5	70 66	70.5	11 19.4	70 66	70.1	11 40.3	70 66	69.8	12 01.2	70 66	69.4	12 22.0	69 66	69.0	6
7	9 15.4	70 67	70.9	9 36.5	70 67	70.5	9 57.6	70 66	70.2	10 18.6	70 66	69.8	10 39.6	70 66	69.5	11 00.6	70 66	69.1	11 21.6	70 66	68.7	11 42.5	70 66	68.4	7
8	8 35.4	71 66	70.2	8 56.6	71 66	69.9	9 17.7	70 66	69.5	9 38.9	70 66	69.2	10 00.0	70 66	68.8	10 21.1	70 66	68.4	10 42.1	70 66	68.1	11 03.2	70 65	67.7	8
9	7 55.6	71 66	69.6	8 16.8	71 66	69.2	8 38.1	71 66	68.9	8 59.3	71 66	68.5	9 20.5	71 66	68.1	9 41.7	71 65	67.8	10 02.9	70 65	67.4	10 24.0	70 65	67.1	9
100	7 15.9	71 66	68.9	7 37.3	71 66	68.5	7 58.6	71 66	68.2	8 19.9	71 65	67.8	8 41.2	71 65	67.5	9 02.5	71 65	67.1	9 23.8	71 65	66.8	9 45.0	71 65	66.4	10
1	6 36.4	72 66	68.2	6 57.9	71 65	67.9	7 19.3	71 65	67.5	7 40.7	71 65	67.2	8 02.1	71 65	66.8	8 23.5	71 65	66.4	8 44.9	71 64	66.1	9 06.2	71 64	65.7	
2	5 57.1	72 65	67.5	6 18.7	72 65	67.2	6 40.2	72 65	66.8	7 01.7	72 65	66.5	7 23.2	72 64	66.1	7 44.7	72 64	65.8	8 06.2	72 64	65.4	8 27.7	71 64	65.1	
3	5 18.0	72 65	66.9	5 39.7	72 65	66.5	6 01.3	72 64	66.2	6 22.9	72 64	65.8	6 44.5	72 64	65.5	7 06.1	72 64	65.1	7 27.7	72 64	64.8	7 49.3	72 64	64.4	
4				5 00.9	72 64	75.8	5 22.6	72 64	65.5	5 44.3	72 64	65.1	6 06.1	72 64	64.8	6 27.8	72 64	64.4	6 49.4	72 64	64.1	7 11.1	72 63	63.7	
105										5 05.9	73 64	64.5	5 27.8	73 64	64.1	5 49.6	73 63	63.8	6 11.4	73 63	63.4	6 33.2	73 63	63.1	10
6																5 11.6	73 63	63.1	5 33.6	73 63	62.8	5 55.5	73 62	62.4	
7																						5 18.0	73 62	61.7	

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Lat. 45°

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	69 00.0	1.0 02	180.0	69 30.0	1.0 02	180.0	70 00.0	1.0 02	180.0	70 30.0	1.0 02	180.0	71 00.0	1.0 02	180.0	71 30.0	1.0 02	180.0	72 00.0	1.0 02	180.0	72 30.0	1.0 02	180.0	00
1	68 59.1	1.0 05	177.5	69 29.0	1.0 05	177.4	69 59.0	1.0 05	177.4	70 29.0	1.0 05	177.3	70 59.0	1.0 05	177.2	71 29.0	1.0 05	177.2	71 58.9	1.0 05	177.1	72 28.9	1.0 05	177.1	1
2	68 56.2	1.0 08	174.9	69 26.2	1.0 08	174.8	69 56.1	1.0 08	174.7	70 26.0	1.0 08	174.6	70 55.9	1.0 08	174.5	71 25.8	1.0 09	174.4	71 55.7	1.0 09	174.2	72 25.6	1.0 09	174.1	2
3	68 51.5	99 11	172.4	69 21.4	99 11	172.2	69 51.2	99 11	172.1	70 21.0	99 12	171.9	70 50.8	99 12	171.8	71 20.6	99 12	171.6	71 50.4	99 12	171.4	72 20.2	99 13	171.2	3
4	68 45.0	99 14	169.9	69 14.7	99 14	169.7	69 44.4	99 14	169.5	70 14.1	99 15	169.3	70 43.8	99 15	169.0	71 13.4	99 15	168.8	71 43.1	99 16	168.6	72 12.7	99 16	168.3	4
05	68 36.6	99 17	167.4	69 06.2	98 17	167.2	69 35.7	98 18	166.9	70 05.2	98 18	166.6	70 34.7	98 18	166.4	71 04.2	98 19	166.1	71 33.6	98 19	165.8	72 03.0	98 19	165.5	05
6	68 26.5	98 20	164.9	68 55.9	98 20	164.7	69 25.2	98 20	164.4	69 54.5	98 21	164.1	70 23.8	98 21	163.7	70 53.0	97 22	163.4	71 22.2	97 22	163.0	71 51.4	97 23	162.7	6
7	68 14.6	97 23	162.5	68 43.8	97 23	162.2	69 12.9	97 24	161.9	69 42.0	97 24	161.5	70 11.0	97 24	161.1	70 40.0	97 25	160.8	71 08.9	96 25	160.4	71 37.8	96 26	159.9	7
8	68 01.0	96 25	160.1	68 29.9	96 26	159.8	68 58.8	96 26	159.4	69 27.6	96 27	159.0	69 56.4	96 27	158.6	70 25.1	96 28	158.2	70 53.8	95 28	157.7	71 22.3	95 29	157.3	8
9	67 45.8	96 28	157.8	68 14.4	95 28	157.4	68 43.1	95 29	157.0	69 11.6	95 29	156.6	69 40.1	95 30	156.1	70 08.5	95 31	155.7	70 36.8	94 31	155.2	71 05 0	94 32	154.7	9
10	67 29.0	95 30	155.5	67 57.4	94 31	155.1	68 25.7	94 32	154.7	68 53.9	94 32	154.2	69 22.1	94 33	153.7	69 50.2	93 33	153.2	70 18.1	93 34	152.7	70 46.0	93 34	152.1	10
1	67 10.7	94 33	153.3	67 38.7	93 34	152.8	68 06.8	93 34	152.4	68 34.7	93 35	151.9	69 02.5	93 35	151.3	69 30.2	92 36	150.8	69 57.9	92 36	150.2	70 25.4	92 37	149.7	1
2	66 50.9	93 35	151.1	67 18.7	92 36	150.6	67 46.3	92 36	150.1	68 13.9	92 37	149.6	68 41.4	91 38	149.1	69 08.8	91 38	148.5	69 36.1	91 39	147.9	70 03.2	90 39	147.3	2
3	66 29.7	92 38	149.0	66 57.2	91 38	148.5	67 24.5	91 39	147.9	67 51.8	91 39	147.4	68 18.9	90 40	146.8	68 45.9	90 40	146.2	69 12.8	89 41	145.6	69 39.6	89 42	145.0	3
4	66 07.2	91 40	146.9	66 34.3	90 40	146.4	67 01.3	90 41	145.8	67 28.2	89 41	145.3	67 55.0	89 42	144.7	68 21.7	89 43	144.0	68 48.2	88 43	143.4	69 14.5	88 44	142.7	4
15	65 43.4	90 42	144.9	66 10.2	89 42	144.3	66 36.9	89 43	143.8	67 03.4	88 43	143.2	67 29.9	88 44	142.6	67 56.1	87 45	141.9	68 22.2	87 45	141.3	68 48.2	86 46	140.6	15
6	65 18.4	88 44	142.9	65 44.9	88 44	142.4	66 11.2	88 45	141.8	66 37.4	87 45	141.2	67 03.5	87 46	140.5	67 29.4	86 46	139.9	67 55.1	86 47	139.2	68 20.7	85 48	138.5	6
7	64 52.3	87 45	141.0	65 18.4	87 46	140.4	65 44.4	86 46	139.8	66 10.2	86 47	139.2	66 35.9	85 48	138.6	67 01.5	85 48	137.9	67 26.8	84 49	137.2	67 52.0	84 50	136.5	7
8	64 25.0	86 47	139.2	64 50.9	86 48	138.6	65 16.5	85 48	138.0	65 42.0	85 49	137.3	66 07.4	84 50	136.7	66 32.5	84 50	136.0	66 57.5	83 50	135.3	67 22.3	82 51	134.6	8
9	63 56.8	85 49	137.4	64 22.3	85 49	136.8	64 47.6	84 50	136.1	65 12.8	84 50	135.5	65 37.7	83 51	134.8	66 02.6	82 52	134.1	66 27.2	82 52	133.4	66 51.6	81 53	132.7	9
20	63 27.6	84 50	135.6	63 52.8	84 51	135.0	64 17.7	83 51	134.4	64 42.6	82 52	133.7	65 07.2	82 52	133.1	65 31.6	81 53	132.4	65 55.9	81 54	131.6	66 20.0	80 54	130.9	20
1	62 57.5	83 52	133.9	63 22.3	82 53	133.3	63 47.0	82 53	132.7	64 11.5	81 53	132.0	64 35.8	81 54	131.3	64 59.9	80 54	130.6	65 23.8	79 55	129.9	65 47.5	79 55	129.2	1
2	62 26.5	82 53	132.3	62 51.0	81 53	131.7	63 15.4	81 54	131.0	63 39.5	80 55	130.4	64 03.5	80 55	129.7	64 27.3	79 56	129.0	64 50.8	78 56	128.3	65 14.2	77 57	127.5	2
3	61 54.7	81 54	130.7	62 18.9	80 55	130.1	62 43.0	80 55	129.4	63 06.8	79 56	128.8	63 30.5	79 56	128.1	63 53.9	78 57	127.4	64 17.2	77 57	126.6	64 40.2	76 58	125.9	3
4	61 22.2	80 55	129.2	61 46.1	79 56	128.5	62 09.8	79 56	127.9	62 33.4	78 57	127.2	62 56.7	77 57	126.5	63 19.9	77 58	125.8	63 42.8	76 58	125.1	64 05.5	75 59	124.3	4
25	60 49.0	79 56	127.6	61 12.6	78 57	127.0	61 36.0	78 58	126.4	61 59.2	77 58	125.7	62 22.3	76 58	125.0	62 45.1	76 59	124.3	63 07.7	75 59	123.6	63 30.1	74 60	122.8	25
6	60 15.0	78 58	126.2	60 38.4	77 58	125.6	61 01.5	77 58	124.9	61 24.5	76 59	124.2	61 47.2	76 59	123.5	62 09.8	75 60	122.8	62 32.1	74 60	122.1	62 54.2	73 61	121.4	6
7	59 40.5	77 58	124.8	60 03.6	77 59	124.1	60 26.4	76 60	123.5	60 49.1	75 60	122.8	61 11.6	75 60	122.1	61 33.9	74 61	121.4	61 55.9	73 61	120.7	62 17.7	72 62	120.0	7
8	59 05.3	76 60	123.4	59 28.2	76 60	122.8	59 50.8	75 60	122.1	60 13.2	74 61	121.4	60 35.4	74 61	120.8	60 57.4	73 62	120.1	61 19.2	72 62	119.4	61 40.7	71 62	118.6	8
9	58 29.7	75 60	122.1	58 52.2	75 61	121.4	59 14.6	74 61	120.8	59 36.7	74 62	120.1	59 58.7	73 62	119.4	60 20.4	72 62	118.7	60 42.0	71 63	118.0	61 03.2	71 63	117.3	9
30	57 53.4	75 61	120.8	58 15.8	74 62	120.1	58 37.9	73 62	119.5	58 59.8	73 62	118.8	59 21.5	72 63	118.1	59 43.0	71 63	117.5	60 04.3	71 64	116.8	60 25.3	70 64	116.0	30
1	57 16.7	74 62	119.5	57 38.8	73 62	118.9	58 00.7	73 63	118.2	58 22.4	72 63	117.6	58 43.9	71 64	116.9	59 05.1	71 64	116.2	59 26.2	70 64	115.5	59 47.0	69 64	114.8	1
2	56 39.6	73 63	118.3	57 01.5	73 63	117.6	57 23.1	72 63	117.0	57 44.6	71 64	116.3	58 05.8	71 64	115.7	58 26.9	70 64	115.0	58 47.7	69 65	114.3	59 08.3	68 65	113.6	2
3	56 02.0	72 63	117.1	56 23.7	72 64	116.4	56 45.1	71 64	115.8	57 06.4	71 64	115.2	57 27.4	70 65	114.5	57 48.2	69 65	113.8	58 08.9	68 65	113.1	58 29.3	68 66	112.4	3
4	55 24.0	72 64	115.9	55 45.5	71 64	115.3	56 06.7	71 65	114.6	56 27.8	70 65	114.0	56 48.6	69 65	113.3	57 09.3	68 66	112.7	57 29.7	68 66	112.0	57 49.9	67 66	111.3	4
35	54 45.7	71 64	114.7	55 06.9	71 65	114.1	55 28.0	70 65	113.5	55 48.9	69 65	112.9	56 09.5	69 66	112.2	56 30.0	68 66	111.6	56 50.2	67 66	110.9	57 10.2	66 67	110.2	35
6	54 07.0	71 65	113.6	54 28.0	70 65	113.0	54 48.9	69 66	112.4	55 09.6	69 66	111.8	55 30.1	68 66	111.1	55 50.4	67 66	110.5	56 10.4	67 67	109.8	56 30.3	66 67	109.1	6
7	53 28.0	70 66	112.6	53 48.9	69 66	111.9	54 09.6	69 66	111.3	54 30.1	68 66	110.7	54 50.4	67 67	110.1	55 10.5	67 67	109.4	55 30.4	66 67	108.8	55 50.1	65 67	108.1	7
8	52 48.6	69 66	111.5	53 09.4	69 66	110.9	53 29.9	68 66	110.3	53 50.2	68 67	109.7	54 10.4	67 67	109.0	54 30.3	66 67	108.4	54 50.1	65 68	107.7	55 09.6	65 68	107.1	8
9	52 09.0	69 66	110.5	52 29.6	68 67	109.9	52 50.0	68 67	109.3	53 10.2	67 67	108.6	53 30.2	66 68	108.0	53 50.0	66 68	107.4	54 09.6	65 68	106.7	54 29.0	64 68	106.1	9
40	51 29.1	68 67	109.4	51 49.6	68 67	108.8	52 09.8	67 67	108.2	52 29.8	67 68	107.6	52 49.7	66 68	107.0	53 09.4	65 68	106.4	53 28.8	65 68	105.8	53 48.1	64 68	105.1	40
1	50 49.0	68 67	108.4	51 09.3	67 67	107.9	51 29.4	67 68	107.3	51 49.3	66 68	106.7	52 09.0	65 68	106.1	52 28.6	65 68	105.4	52 47.9	64 68	104.8	53 07.1	63 69	104.2	1
2	50 08.6	67 68	107.5	50 28.8	67 68	106.9	50 48.8	66 68	106.3	51 08.6	66 68	105.7	51 28.2	65 68	105.1	51 47.6	64 69	104.5	52 06.8	64 69	103.9	52 25.8	63 69	103.2	2
3	49 28.1	67 68	106.5	49 48.1	66 68	105.9	50 08.0	66 68	105.4	50 27.6	65 68	104.8	50 47.1	65 69	104.2	51 06.4	64 69	103.6	51 25.5	63 69	103.0	51 44.5	62 69	102.3	3
4	48 47.3	67 68	105.6	49 07.2	66 68	105.0	49 27.0	66 69	104.4	49 46.5	65 69	103.9	50 05.9	64 69	103.3	50 25.1	64 69	102.7	50 44.1	63 69	102.1	51 02.9	62 69	101.4	4
45	48 06.3	66 68	104.7	48 26.2	66 69	104.1	48 45.8	65 69	103.5	49 05.2	65 69	103.0	49 24.5	64 69	102.4	49 43.6	63 69	101.8	50 02.6	63 70	101.2	50 21.3	62 70	100.6	45
6	47 25.2	66 69	103.8	47 44.9	65 69	103.2	48 04.5	65 69	102.7	48 23.8	64 69	102.1	48 43.0	64 69	101.5	49 02.0	63 70	100.9	49 20.9	62 70	100.3	49 39.5	62 70	99.7	6
7	46 43.9	66 69	102.9	47 03.5	65 69	102.3	47 23.0	65 69	101.8	47 42.3	64 69	101.2	48 01.4	63 70	100.6	48 20.3	63 70	100.1	48 39.1	62 70	99.5	48 57.7	62 70	98.9	7
8	46 02.5	65 69	102.0	46 22.0	65 69	101.5	46 41.4	64 70	100.9	47 00.6	64 70	100.4	47 19.6	63 70	99.8	47 38.5	63 70	99.2	47 57.2	62 70	98.6	48 15.7	61 70	98.0	8
9	45 21.0	65 70	101.2	45 40.4	65 70	100.6	45 59.7	64 70	100.1	46 18.8	63 70	99.5	46 37.8	63 70	99.0	46 56.6	62 70	98.4	47 15.2	62 70	97.8	47 33.6	61 70	97.2	9
50	44 39.3	65 70	100.3	44 58.6	64 70	99.8	45 17.9	64 70	99.3	45 36.9	63 70	98.7	45 55.8	63 70	98.1	46 14.6	62 70	97.6	46 33.1	62 70	97.0	46 51.5	61 70	96.4	50
1	43 57.5	65 70	99.5	44 16.8	64 70	99.0	44 35.9	64 70	98.4	44 54.9	63 70	97.9	45 13.8	63 70	97.3	45 32.5	62 70	96.8	45 51.0	61 70	96.2	46 09.3	61 70	95.7	1
2	43 15.6	64 70	98.7	43 34.8	64 70	98.2	43 53.9	63 70	97.6	44 12.9	63 70	97.1	44 31.7	62 70	96.5	44 50.3	62 70	96.0	45 08.8	61 70	95.4	45 27.1	61 70	94.9	2
3	42 33.6	64 70	97.9	42 52.8	64 70	97.4	43 11.8	63 70	96.8	43 30.7	63 70	96.3	43 49.5	62 70	95.8	44 08.1	62 70	95.2	44 26.5	61 70	94.7	44 44.8	61 71	94.1	3
4	41 51.5	64 70	97.1	42 10.7	64 70	96.6	42 29.7	63 70	96.1	42 48.5	63 70	95.5	43 07.2	62 70	95.0	43 25.8	62 71	94.5	43 44.2	61 70	93.9	44 02.5	61 71	93.4	4
55	41 09.4	64 70	96.3	41 28.5	63 70	95.8	41 47.5	63 70	95.3	42 06.3	62 70	94.8	42 25.0	62 71	94.2	42 43.5	61 71	93.7	43 01.9	61 71	93.2	43 20.1	60 71	92.6	55
6	40 27.2	64 70	95.6	40 46.3	63 70	95.0	41 05.2	63 70	94.5	41 24.0	62 71	94.0	41 42.6	62 71	93.5	42 01.1	61 71	93.0	42 19.5	61 71	92.4	42 37.7	60 71	91.9	6
7	39 45.0	64 70	94.8	40 04.0	63 71	94.3	40 22.9	63 71	93.8	40 41.6	62 71	93.3	41 00.3	62 71	92.7	41 18.7	61 71	92.2	41 37.1	61 71	91.7	41 55.3	60 71	91.2	7
8	39 02.7	64 70	94.0	39 21.7	63 71	93.5	39 40.5	63 71	93.0	39 59.3	62 71	92.5	40 17.9	62 71	92.0	40 36.3	61 71	91.5	40 54.7	61 71	91.0	41 12.9	60 71	90.4	8
9	38 20.3	63 71	93.3	38 39.3	63 71	92.8	38 58.1	63 71	92.3	39 16.9	62 71	91.8	39 35.5	62 71	91.3	39 53.9	61 71	90.8	40 12.2	61 71	90.3	40 30.4	60 71	89.7	9
60	37 37.9	63 71	92.6	37 56.9	63 71	92.1	38 15.7	63 71	91.6	38 34.5	62 71	91.1	38 53.0	62 71	90.6	39 11.5	61 71	90.1	39 29.8	61 71	89.6	39 48.0	60 71	89.0	60
1	36 55.5	63 71	91.8	37 14.5	63 71	91.3	37 33.3	63 71	90.9	37 52.0	62 71	90.4	38 10.6	62 71	89.9	38 29.1	61 71	89.4	38 47.4	61 71	88.9	39 05.6	60 71	88.3	1
2	36 13.1	63 71	91.1	36 32.1	63 71	90.6	36 50.9	63 71	90.1	37 09.6	62 71	89.7	37 28.2	62 71	89.2	37 46.7	61 71	88.7	38 05.0	61 71	88.2	38 23.2	60 71	87.7	2
3	35 30.7	63 71	90.4	35 49.7	63 71	89.9	36 08.5	63 71	89.4	36 27.2	62 71	89.0	36 45.8	62 71	88.5	37 04.2	61 71	88.0	37 22.6	61 71	87.5	37 40.8	61 71	87.0	3
4	34 48.3	63 71	89.7	35 07.2	63 71	89.2	35 26.1	63 71	88.7	35 44.8	62 71	88.3	36 03.4	62 71	87.8	36 21.9	61 71	87.3	36 40.2	61 71	86.8	36 58.5	61 71	86.3	4
65	34 05.9	63 71	89.0	34 24.8	63 71	88.5	34 43.6	63 71	88.0	35 02.4	62 71	87.6	35 21.0	62 71	87.1	35 39.5	61 71	86.6	35 57.9	61 70	86.1	36 16.1	61 70	85.6	65
6	33 23.5	63 71	88.3	33 42.4	63 71	87.8	34 01.3	63 71	87.4	34 20.0	62 71	86.9	34 38.6	62 70	86.4	34 57.2	62 70	85.9	35 15.6	61 70	85.5	35 33.9	61 70	85.0	6
7	32 41.1	63 71	87.6	33 00.0	63 71	87.1	33 18.9	63 70	86.7	33 37.7	62 71	86.2	33 56.3	62 70	85.7	34 14.9	62 70	85.3	34 33.3	61 70	84.8	34 51.6	61 70	84.3	7
8	31 58.7	63 70	86.9	32 17.7	63 71	86.5	32 36.5	63 70	86.0	32 55.3	62 70	85.5	33 14.0	62 70	85.1	33 32.6	62 70	84.6	33 51.1	61 70	84.1	34 09.4	61 70	83.6	8
9	31 16.3	64 70	86.2	31 35.3	63 70	85.8	31 54.2	63 70	85.3	32 13.1	63 70	84.9	32 31.8	62 70	84.4	32 50.4	62 70	83.9	33 08.9	62 70	83.5	33 27.3	61 70	83.0	9
70	30 34.0	64 70	85.6	30 53.0	63 70	85.1	31 12.0	63 70	84.7	31 30.8	63 70	84.2	31 49.6	62 70	83.7	32 08.2	62 70	83.3	32 26.8	62 70	82.8	32 45.2	61 70	82.3	70
1	29 51.7	64 70	84.9	30 10.8	63 70	84.4	30 29.8	63 70	84.0	30 48.6	63 70	83.5	31 07.4	62 70	83.1	31 26.1	62 70	82.6	31 44.7	62 70	82.2	32 03.2	61 70	81.7	1
2	29 09.5	64 70	84.2	29 28.6	63 70	83.8	29 47.6	63 70	83.3	30 06.5	63 70	82.9	30 25.3	63 70	82.4	30 44.1	62 70	82.0	31 02.7	62 70	81.5	31 21.2	62 70	81.1	2
3	28 27.3	64 70	83.6	28 46.4	64 70	83.1	29 05.5	63 70	82.7	29 24.4	63 70	82.2	29 43.3	63 70	81.8	30 02.1	62 70	81.3	30 20.8	62 70	80.9	30 39.4	62 70	80.4	3
4	27 45.2	64 70	82.9	28 04.4	64 70	82.5	28 23.4	63 70	82.0	28 42.4	63 70	81.6	29 01.4	63 70	81.1	29 20.2	63 70	80.7	29 38.9	62 70	80.2	29 57.6	62 70	79.8	4
75	27 03.1	64 70	82.2	27 22.3	64 70	81.8	27 41.5	64 70	81.4	28 00.5	63 70	80.9	28 19.5	63 70	80.5	28 38.4	63 70	80.0	28 57.2	63 70	79.6	29 15.9	62 69	79.2	75
6	26 21.1	64 70	81.6	26 40.4	64 70	81.1	26 59.5	64 70	80.7	27 18.7	64 70	80.3	27 37.7	63 70	79.8	27 56.6	63 69	79.4	28 15.5	63 69	79.0	28 34.2	62 69	78.5	6
7	25 39.2	64 70	80.9	25 58.5	64 70	80.5	26 17.7	64 70	80.1	26 36.9	64 69	79.6	26 56.0	63 70	79.2	27 15.0	63 69	78.8	27 33.9	63 69	78.3	27 52.7	63 69	77.9	7
8	24 57.3	65 70	80.3	25 16.7	64 70	79.8	25 36.0	64 69	79.4	25 55.2	64 69	79.0	26 14.3	64 69	78.6	26 33.4	63 69	78.1	26 52.4	63 69	77.7	27 11.3	63 69	77.3	8
9	24 15.5	65 70	79.6	24 35.0	65 69	79.2	24 54.3	64 69	78.8	25 13.6	64 69	78.4	25 32.8	64 69	77.9	25 51.9	64 69	77.5	26 11.0	63 69	77.1	26 29.9	63 69	76.6	9
80	23 33.9	65 69	79.0	23 53.3	65 69	78.6	24 12.7	65 69	78.1	24 32.1	64 69	77.7	24 51.3	64 69	77.3	25 10.5	64 69	76.9	25 29.7	64 69	76.4	25 48.7	63 68	76.0	80
1	22 52.3	65 69	78.3	23 11.8	65 69	77.9	23 31.3	65 69	77.5	23 50.7	65 69	77.1	24 10.0	64 69	76.7	24 29.3	64 69	76.2	24 48.5	64 68	75.8	25 07.6	64 68	75.4	1
2	22 10.8	65 69	77.7	22 30.4	65 69	77.3	22 49.9	65 69	76.9	23 09.4	65 69	76.4	23 28.8	65 68	76.0	23 48.1	64 68	75.6	24 07.4	64 68	75.2	24 26.6	64 68	74.8	2
3	21 29.4	66 69	77.0	21 49.0	65 69	76.6	22 08.6	65 69	76.2	22 28.2	65 68	75.8	22 47.7	65 68	75.4	23 07.1	65 68	75.0	23 26.5	64 68	74.6	23 45.7	64 68	74.1	3
4	20 48.1	66 69	76.4	21 07.8	66 68	76.0	21 27.5	65 68	75.6	21 47.1	65 68	75.2	22 06.7	65 68	74.8	22 26.2	65 68	74.3	22 45.6	65 68	73.9	23 05.0	64 68	73.5	4
85	20 06.9	66 68	75.7	20 26.7	66 68	75.3	20 46.5	66 68	74.9	21 06.2	66 68	74.5	21 25.8	65 68	74.1	21 45.4	65 68	73.7	22 04.9	65 68	73.3	22 24.4	65 67	72.9	85
6	19 25.8	66 68	75.1	19 45.7	66 68	74.7	20 05.6	66 68	74.3	20 25.3	66 68	73.9	20 45.1	66 68	73.5	21 04.7	65 68	73.1	21 24.3	65 67	72.7	21 43.9	65 67	72.3	6
7	18 44.9	67 68	74.5	19 04.9	66 68	74.1	19 24.8	66 68	73.7	19 44.6	66 68	73.3	20 04.5	66 68	72.9	20 24.2	66 67	72.5	20 43.9	66 67	72.1	21 03.5	65 67	71.7	7
8	18 04.1	67 68	73.8	18 24.1	67 68	73.4	18 44.1	67 68	73.0	19 04.1	66 67	72.6	19 24.0	66 67	72.2	19 43.8	66 67	71.8	20 03.6	66 67	71.4	20 23.4	66 67	71.0	8
9	17 23.4	67 68	73.2	17 43.5	67 67	72.8	18 03.6	67 67	72.4	18 23.7	67 67	72.0	18 43.6	67 67	71.6	19 03.6	66 67	71.2	19 23.5	66 67	70.8	19 43.3	66 66	70.4	9
90	16 42.9	67 67	72.5	17 03.1	67 67	72.1	17 23.3	67 67	71.8	17 43.4	67 67	71.4	18 03.5	67 67	71.0	18 23.5	67 67	70.6	18 43.5	67 66	70.2	19 03.4	66 66	69.8	90

H.A	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	21 00.0	1.0 01	180.0	20 30.0	1.0 01	180.0	20 00.0	1.0 01	180.0	19 30.0	1.0 01	180.0	19 00.0	1.0 01	180.0	18 30.0	1.0 01	180.0	18 00.0	1.0 01	180.0	17 30.0	1.0 01	180.0	00
1	20 59.6	1.0 02	179.0	20 29.6	1.0 02	179.0	19 59.6	1.0 02	179.0	19 29.6	1.0 02	179.0	18 59.6	1.0 02	179.0	18 29.7	1.0 02	179.1	17 59.7	1.0 02	179.1	17 29.7	1.0 02	179.1	1
2	20 58.6	1.0 03	178.0	20 28.6	1.0 03	178.1	19 58.6	1.0 03	178.1	19 28.6	1.0 03	178.1	18 58.6	1.0 03	178.1	18 28.6	1.0 03	178.1	17 58.6	1.0 03	178.1	17 28.6	1.0 03	178.1	2
3	20 56.7	1.0 04	177.1	20 26.8	1.0 04	177.1	19 56.8	1.0 04	177.1	19 26.8	1.0 04	177.1	18 56.8	1.0 04	177.1	18 26.9	1.0 04	177.2	17 56.9	1.0 04	177.2	17 26.9	1.0 04	177.2	3
4	20 54.2	1.0 05	176.1	20 24.2	1.0 05	176.1	19 54.3	1.0 05	176.1	19 24.3	1.0 05	176.2	18 54.4	1.0 05	176.2	18 24.4	1.0 05	176.2	17 54.5	1.0 05	176.3	17 24.5	1.0 05	176.3	4
05	20 51.0	1.0 07	175.1	20 21.0	1.0 07	175.1	19 51.1	1.0 06	175.2	19 21.1	1.0 06	175.2	18 51.2	1.0 06	175.3	18 21.3	1.0 06	175.3	17 51.3	1.0 06	175.3	17 21.4	1.0 06	175.4	05
6	20 47.0	1.0 08	174.1	20 17.1	1.0 08	174.2	19 47.2	1.0 08	174.2	19 17.3	1.0 08	174.3	18 47.3	1.0 08	174.3	18 17.4	1.0 08	174.3	17 47.5	1.0 08	174.4	17 17.6	1.0 07	174.4	6
7	20 42.3	1.0 09	173.2	20 12.4	1.0 09	173.2	19 42.5	1.0 09	173.3	19 12.7	1.0 09	173.3	18 42.8	1.0 09	173.4	18 12.9	1.0 09	173.4	17 43.0	1.0 09	173.5	17 13.2	1.0 09	173.5	7
8	20 36.9	99 10	172.2	20 07.0	99 10	172.2	19 37.2	99 10	172.3	19 07.4	99 10	172.4	18 37.5	99 10	172.4	18 07.7	99 10	172.5	17 37.9	99 10	172.5	17 08.0	99 10	172.6	8
9	20 30.8	99 11	171.2	20 01.0	99 11	171.3	19 31.2	99 11	171.3	19 01.4	99 11	171.4	18 31.6	99 11	171.5	18 01.8	99 11	171.5	17 32.0	99 11	171.6	17 02.2	99 11	171.7	9
10	20 23.9	99 12	170.3	19 54.2	99 12	170.3	19 24.4	99 12	170.4	18 54.7	99 12	170.5	18 25.0	99 12	170.5	17 55.2	99 12	170.6	17 25.5	99 12	170.7	16 55.7	99 12	170.7	10
1	20 16.4	99 14	169.3	19 46.7	99 14	169.4	19 17.0	99 14	169.4	18 47.3	99 13	169.5	18 17.6	99 13	169.6	17 47.9	99 13	169.7	17 18.2	99 13	169.7	16 48.5	99 13	169.8	1
2	20 08.2	99 15	168.3	19 38.5	99 15	168.4	19 08.9	99 15	168.5	18 39.3	99 15	168.6	18 09.6	99 14	168.7	17 40.0	99 14	168.7	17 10.3	99 14	168.8	16 40.7	99 14	168.9	2
3	19 59.2	99 16	167.4	19 29.7	99 16	167.5	19 00.1	99 16	167.5	18 30.5	99 16	167.6	18 00.9	99 16	167.7	17 31.4	99 15	167.8	17 01.8	99 15	167.9	16 32.2	99 15	168.0	3
4	19 49.6	98 17	166.4	19 20.1	98 17	166.5	18 50.6	98 17	166.6	18 21.1	98 17	166.7	17 51.6	98 17	166.8	17 22.1	98 17	166.9	16 52.6	98 16	167.0	16 23.0	98 16	167.1	4
15	19 39.3	98 18	165.5	19 09.9	98 18	165.6	18 40.4	98 18	165.7	18 11.0	98 18	165.8	17 41.6	98 18	165.9	17 12.1	98 18	166.0	16 42.7	98 18	166.1	16 13.2	98 17	166.2	15
6	19 28.3	98 20	164.5	18 59.0	98 19	164.6	18 29.6	98 19	164.7	18 00.2	98 19	164.8	17 30.9	98 19	164.9	17 01.5	98 19	165.0	16 32.1	98 19	165.2	16 02.8	98 19	165.3	6
7	19 16.6	98 21	163.6	18 47.4	98 20	163.7	18 18.1	98 20	163.8	17 48.8	98 20	163.9	17 19.5	98 20	164.0	16 50.2	98 20	164.1	16 20.9	98 20	164.2	15 51.6	98 20	164.4	7
8	19 04.3	97 22	162.6	18 35.1	97 22	162.7	18 05.9	97 21	162.9	17 36.7	97 21	163.0	17 07.5	97 21	163.1	16 38.3	97 21	163.2	16 09.1	97 21	163.3	15 39.9	97 21	163.5	8
9	18 51.3	97 23	161.7	18 22.2	97 23	161.8	17 53.1	97 22	161.9	17 24.0	97 22	162.1	16 54.9	97 22	162.2	16 25.7	97 22	162.3	15 56.6	97 22	162.4	15 27.5	97 22	162.6	9
20	18 37.6	97 24	160.7	18 08.6	97 24	160.9	17 39.6	97 24	161.0	17 10.6	97 23	161.1	16 41.6	97 23	161.3	16 12.5	97 23	161.4	15 43.5	97 23	161.5	15 14.5	97 23	161.7	20
1	18 23.3	96 25	159.8	17 54.4	96 25	160.0	17 25.5	96 25	160.1	16 56.6	96 24	160.2	16 27.6	96 24	160.4	15 58.7	96 24	160.5	15 29.8	96 24	160.6	15 00.8	96 24	160.8	1
2	18 08.4	96 26	158.9	17 39.6	96 26	159.0	17 10.7	96 26	159.2	16 41.9	96 25	159.3	16 13.1	96 25	159.5	15 44.2	96 25	159.6	15 15.4	96 25	159.8	14 46.5	96 25	159.9	2
3	17 52.8	96 27	158.0	17 24.1	96 27	158.1	16 55.3	96 27	158.3	16 26.6	96 27	158.4	15 57.9	96 26	158.6	15 29.1	96 26	158.7	15 00.4	96 26	158.9	14 31.7	96 26	159.0	3
4	17 36.5	95 28	157.1	17 07.9	95 28	157.2	16 39.3	95 28	157.4	16 10.7	95 28	157.5	15 42.1	95 27	157.7	15 13.4	95 27	157.8	14 44.8	95 27	158.0	14 16.2	95 27	158.1	4
25	17 19.7	95 29	156.1	16 51.2	95 29	156.3	16 22.7	95 29	156.5	15 54.2	95 29	156.6	15 25.7	95 28	156.8	14 57.1	95 28	157.0	14 28.6	95 28	157.1	14 00.1	95 28	157.3	25
6	17 02.2	95 30	155.2	16 33.8	95 30	155.4	16 05.5	95 30	155.6	15 37.1	95 30	155.7	15 08.6	95 29	155.9	14 40.2	95 29	156.1	14 11.8	95 29	156.2	13 43.4	95 29	156.4	6
7	16 44.2	94 31	154.3	16 15.9	94 31	154.5	15 47.6	94 31	154.7	15 19.3	94 31	154.9	14 51.0	94 30	155.0	14 22.7	94 30	155.2	13 54.4	94 30	155.4	13 26.1	94 30	155.5	7
8	16 25.5	94 33	153.4	15 57.3	94 32	153.6	15 29.2	94 33	153.8	15 01.0	94 32	154.0	14 32.8	94 31	154.2	14 04.6	94 31	154.3	13 36.5	94 31	154.5	13 08.3	94 31	154.7	8
9	16 06.2	93 33	152.5	15 38.2	93 33	152.7	15 10.1	93 33	152.9	14 42.1	94 32	153.1	14 14.0	94 32	153.3	13 46.0	94 32	153.5	13 17.9	94 32	153.6	12 49.8	94 32	153.8	9
30	15 46.4	93 34	151.7	15 18.5	93 34	151.9	14 50.5	93 34	152.0	14 22.6	93 33	152.2	13 54.7	93 33	152.4	13 26.7	93 33	152.6	12 58.8	93 33	152.8	12 30.8	93 33	153.0	30
1	15 25.9	93 35	150.8	14 58.2	93 35	151.0	14 30.4	93 35	151.2	14 02.6	93 34	151.4	13 34.8	93 34	151.6	13 06.9	93 34	151.8	12 39.1	93 34	151.9	12 11.3	93 34	152.1	1
2	15 05.0	92 36	149.9	14 37.3	92 36	150.1	14 09.6	92 36	150.3	13 42.0	92 35	150.5	13 14.3	92 35	150.7	12 46.6	92 35	150.9	12 18.9	92 35	151.1	11 51.2	92 34	151.3	2
3	14 43.4	92 37	149.0	14 15.9	92 37	149.2	13 48.3	92 36	149.4	13 20.8	92 36	149.7	12 53.2	92 36	149.9	12 25.7	92 36	150.1	11 58.1	92 36	150.3	11 30.5	92 35	150.5	3
4	14 21.3	91 38	148.2	13 53.9	91 38	148.4	13 26.5	91 37	148.6	12 59.1	91 37	148.8	12 31.7	91 37	149.0	12 04.2	91 37	149.2	11 36.8	91 36	149.4	11 09.3	92 36	149.6	4
35	13 58.7	91 39	147.3	13 31.4	91 38	147.5	13 04.1	91 38	147.7	12 36.9	91 38	148.0	12 09.6	91 38	148.2	11 42.3	91 38	148.4	11 15.0	91 37	148.6	10 47.6	91 37	148.8	35
6	13 35.5	90 40	146.5	13 08.4	90 39	146.7	12 41.2	90 39	146.9	12 14.1	91 39	147.1	11 46.9	91 39	147.3	11 19.8	91 38	147.6	10 52.6	91 38	147.8	10 25.4	91 38	148.0	6
7	13 11.8	90 40	145.6	12 44.8	90 40	145.8	12 17.8	90 40	146.1	11 50.8	90 40	146.3	11 23.8	90 40	146.5	10 56.7	90 39	146.7	10 29.7	90 39	147.0	10 02.7	90 39	147.2	7
8	12 47.6	89 41	144.8	12 20.7	90 41	145.0	11 53.9	90 41	145.2	11 27.0	90 41	145.5	11 00.1	90 40	145.7	10 33.2	90 40	145.9	10 06.3	90 40	146.1	9 39.4	90 40	146.4	8
9	12 22.9	89 42	143.9	11 56.1	89 42	144.2	11 29.4	89 42	144.4	11 02.7	89 41	144.6	10 35.9	89 41	144.9	10 09.2	89 41	145.1	9 42.4	89 41	145.3	9 15.6	89 40	145.6	9
40	11 57.6	89 43	143.1	11 31.1	89 43	143.3	11 04.5	89 42	143.6	10 37.9	89 42	143.8	10 11.3	89 42	144.1	9 44.7	89 42	144.3	9 18.0	89 42	144.5	8 51.4	89 41	144.8	40
1	11 31.9	88 44	142.3	11 05.5	88 43	142.5	10 39.1	88 43	142.8	10 12.6	88 43	143.0	9 46.1	88 43	143.2	9 19.7	88 42	143.5	8 53.2	88 42	143.7	8 26.7	88 42	144.0	1
2	11 05.7	88 44	141.5	10 39.4	88 44	141.7	10 13.1	88 44	142.0	9 46.8	88 44	142.2	9 20.5	88 44	142.4	8 54.2	88 43	142.7	8 27.8	88 43	142.9	8 01.5	88 43	143.2	2
3	10 39.1	87 45	140.7	10 12.9	87 45	140.9	9 46.8	87 45	141.2	9 20.6	87 44	141.4	8 54.4	87 44	141.6	8 28.2	87 44	141.9	8 02.0	87 44	142.1	7 35.8	87 44	142.4	3
4	10 11.9	87 46	139.8	9 45.9	87 46	140.1	9 19.9	87 46	140.4	8 53.9	87 45	140.6	8 27.9	87 45	140.9	8 01.8	87 45	141.1	7 35.8	87 44	141.4	7 09.7	87 44	141.6	4
45	9 44.4	86 47	139.0	9 18.5	86 46	139.3	8 52.6	86 46	139.6	8 26.8	86 46	139.8	8 00.9	86 46	140.1	7 35.0	86 46	140.3	7 09.1	86 45	140.6	6 43.1	86 45	140.8	45
6	9 16.3	86 48	138.3	8 50.6	86 47	138.5	8 24.9	86 47	138.8	7 59.2	86 47	139.0	7 33.4	86 46	139.3	7 07.7	86 46	139.6	6 41.9	86 46	139.8	6 16.1	86 46	140.1	6
7	8 47.9	85 48	137.5	8 22.3	85 48	137.7	7 56.7	85 48	138.0	7 31.1	85 47	138.3	7 05.5	85 47	138.5	6 39.9	85 47	138.8	6 14.3	85 47	139.0	5 48.7	85 46	139.3	7
8	8 19.0	85 49	136.7	7 53.5	85 49	136.9	7 28.1	85 48	137.2	7 02.7	85 48	137.5	6 37.2	85 48	137.7	6 11.7	85 48	138.0	5 46.3	85 47	138.3	5 20.8	85 47	138.5	8
9	7 49.6	84 50	135.9	7 24.4	84 49	136.2	6 59.1	84 49	136.4	6 33.8	84 49	136.7	6 08.5	84 49	137.0	5 43.2	84 48	137.3	5 17.8	84 48	137.5				9
50	7 19.9	84 50	135.1	6 54.8	84 50	135.4	6 29.6	84 50	135.7	6 04.5	84 50	135.9	5 39.3	84 49	136.2	5 14.2	84 49	136.5							50
1	6 49.8	83 51	134.4	6 24.8	83 51	134.6	5 59.8	83 50	134.9	5 34.8	83 50	135.2	5 09.8	83 50	135.5										1
2	6 19.2	83 52	133.6	5 54.4	83 51	133.9	5 29.5	83 51	134.2	5 04.7	83 51	134.4													2
3	5 48.3	82 52	132.8	5 23.6	82 52	133.1																			3
4	5 17.0	82 53	132.1																						4

DECLINATION SAME NAME AS LATITUDE

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
91	16 02.5	68 67	71.9	16 22.8	68 67	71.5	16 43.0	67 67	71.1	17 03.3	67 67	70.7	17 23.4	67 66	70.3	17 43.6	67 66	70.0	18 03.6	67 66	69.6	18 23.7	67 66	69.2	91
2	15 22.2	68 67	71.2	15 42.6	68 67	70.9	16 03.0	68 66	70.5	16 23.3	68 66	70.1	16 43.6	67 66	69.7	17 03.8	67 66	69.3	17 24.0	67 66	68.9	17 44.1	67 66	68.5	2
3	14 42.1	68 67	70.6	15 02.6	68 66	70.2	15 23.1	68 66	69.8	15 43.5	68 66	69.5	16 03.8	68 66	69.1	16 24.2	68 66	68.7	16 44.5	68 66	68.3	17 04.7	67 66	67.9	3
4	14 02.2	69 66	69.9	14 22.8	69 66	69.6	14 43.3	68 66	69.2	15 03.8	68 66	68.8	15 24.3	68 66	68.4	15 44.7	68 65	68.1	16 05.1	68 65	67.7	16 25.5	68 65	67.3	4
95	13 22.4	69 66	69.3	13 43.1	69 66	68.9	14 03.8	69 66	68.6	14 24.4	69 66	68.2	14 44.9	69 65	67.8	15 05.5	68 65	67.4	15 26.0	68 65	67.0	15 46.4	68 65	66.7	95
6	12 42.8	69 66	68.7	13 03.6	69 66	68.3	13 24.4	69 65	67.9	13 45.1	69 65	67.5	14 05.7	69 65	67.2	14 26.4	69 65	66.8	14 47.0	69 65	66.4	15 07.6	68 64	66.0	6
7	12 03.4	70 65	68.0	12 24.3	70 65	67.6	12 45.1	69 65	67.3	13 06.0	69 65	66.9	13 26.7	69 65	66.5	13 47.5	69 64	66.2	14 08.2	69 64	65.8	14 28.9	69 64	65.4	7
8	11 24.2	70 65	67.3	11 45.1	70 65	67.0	12 06.1	70 65	66.6	12 27.0	70 65	66.3	12 47.9	70 64	65.9	13 08.8	69 64	65.5	13 29.6	69 64	65.1	13 50.4	69 64	64.8	8
9	10 45.1	70 65	66.7	11 06.2	70 65	66.3	11 27.3	70 64	66.0	11 48.3	70 64	65.6	12 09.3	70 64	65.2	12 30.3	70 64	64.9	12 51.2	70 64	64.5	13 12.1	70 63	64.1	9
100	10 06.2	71 64	66.0	10 27.4	71 64	65.7	10 48.6	71 64	65.3	11 09.7	70 64	65.0	11 30.9	70 64	64.6	11 52.0	70 64	64.2	12 13.0	70 63	63.9	12 34.1	70 63	63.5	100
1	9 27.6	71 64	65.4	9 48.9	71 64	65.0	10 10.2	71 64	64.7	10 31.4	71 64	64.3	10 52.6	71 63	64.0	11 13.9	71 63	63.6	11 35.0	71 63	63.2	11 56.2	70 63	62.9	1
2	8 49.1	71 64	64.7	9 10.5	71 64	64.4	9 31.9	71 63	64.0	9 53.3	71 63	63.7	10 14.6	71 63	63.3	10 36.0	71 63	62.9	10 57.3	71 63	62.6	11 18.5	71 62	62.2	2
3	8 10.8	72 63	64.1	8 32.4	72 63	63.7	8 53.9	72 63	63.4	9 15.4	72 63	63.0	9 36.8	72 62	62.7	9 58.3	71 62	62.3	10 19.7	71 62	61.9	10 41.1	71 62	61.6	3
4	7 32.8	72 63	63.4	7 54.4	72 63	63.1	8 16.1	72 63	62.7	8 37.7	72 62	62.3	8 59.3	72 62	62.0	9 20.8	72 62	61.6	9 42.4	72 62	61.3	10 03.9	72 62	60.9	4
105	6 55.0	73 63	62.7	7 16.7	73 62	62.4	7 38.5	72 62	62.0	8 00.2	72 62	61.7	8 21.9	72 62	61.3	8 43.6	72 62	61.0	9 05.3	72 62	60.6	9 26.9	72 61	60.3	105
6	6 17.4	73 62	62.1	6 39.3	73 62	61.7	7 01.1	73 62	61.4	7 23.0	73 62	61.0	7 44.8	73 62	60.7	8 06.6	73 61	60.3	8 28.4	73 61	60.0	8 50.2	73 61	59.6	6
7	5 40.0	73 62	61.4	6 02.0	73 62	61.1	6 24.0	73 62	60.7	6 46.0	73 61	60.4	7 07.9	73 61	60.0	7 29.9	73 61	59.7	7 51.8	73 61	59.3	8 13.7	73 60	59.0	7
8	5 02.9	74 62	60.7	5 25.0	74 61	60.4	5 47.1	74 61	60.0	6 09.2	74 61	59.7	6 31.3	74 61	59.4	6 53.4	74 60	59.0	7 15.4	74 60	58.7	7 37.5	73 60	58.3	8
9							5 10.5	74 61	59.4	5 32.7	74 60	59.0	5 54.9	74 61	58.7	6 17.1	74 60	58.4	6 39.3	74 60	58.0	7 01.5	74 60	57.7	9
110													5 18.8	74 60	58.0	5 41.2	74 60	57.7	6 03.5	74 59	57.3	6 25.8	74 59	57.0	110
1																5 05.4	75 59	57.0	5 27.9	75 59	56.7	5 50.3	75 59	56.3	1
2																						5 15.2	75 58	55.7	2

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Lat. 45°

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	73 00.0	1.0 02	180.0	73 30.0	1.0 02	180.0	74 00.0	1.0 02	180.0	75 00.0	1.0 02	180.0	77 00.0	1.0 02	180.0	79 00.0	1.0 03	180.0	79 30.0	1.0 03	180.0	80 30.0	1.0 03	180.0	00
1	72 58.9	1.0 06	177.0	73 28.9	1.0 06	176.9	73 58.8	1.0 06	176.8	74 58.8	1.0 06	176.7	76 58.6	1.0 07	176.2	78 58.4	1.0 08	175.7	79 28.3	1.0 08	175.5	80 28.2	1.0 09	175.1	1
2	72 55.5	1.0 09	174.0	73 25.4	1.0 09	173.8	73 55.3	1.0 10	173.7	74 55.1	1.0 10	173.3	76 54.4	99 12	172.5	78 53.6	99 13	171.4	79 23.3	99 14	171.0	80 22.7	99 15	170.2	2
3	72 50.8	99 13	171.0	73 19.7	99 13	170.8	73 49.5	99 14	170.5	74 48.9	99 14	170.0	76 47.5	99 16	168.8	78 45.7	98 18	167.1	79 15.1	98 19	166.6	80 13.8	98 20	165.5	3
4	72 42.3	99 16	168.0	73 11.8	99 17	167.8	73 41.4	98 17	167.5	74 40.4	98 18	166.8	76 38.0	98 20	165.2	78 34.8	97 23	163.0	79 03.8	97 24	162.4	80 01.5	96 26	160.9	4
05	72 32.4	98 20	165.1	73 01.8	98 20	164.8	73 31.1	98 21	164.4	74 29.6	97 22	163.6	76 25.9	96 24	161.6	78 21.0	95 28	159.0	78 49.5	95 28	158.2	79 46.0	94 31	156.5	05
6	72 20.5	97 23	162.3	72 49.6	97 24	161.9	73 18.6	97 24	161.4	74 16.5	96 25	160.5	76 11.3	95 28	158.2	78 04.4	93 32	155.2	78 32.4	93 33	154.3	79 27.7	91 35	152.3	6
7	72 06.6	96 26	159.5	72 35.4	96 27	159.0	73 04.1	96 28	158.5	74 01.2	95 29	157.5	75 54.4	94 32	154.9	77 45.4	91 36	151.5	78 12.7	91 37	150.6	79 06.7	89 39	148.3	7
8	71 50.8	95 29	156.8	72 19.2	95 30	156.3	72 47.6	94 31	155.7	73 44.0	94 32	154.5	75 35.3	92 35	151.7	77 24.1	89 39	148.1	77 50.7	88 40	147.0	78 43.2	86 43	144.6	8
9	71 33.2	94 32	154.1	72 01.3	93 33	153.6	72 29.2	93 34	153.0	73 24.8	92 35	151.7	75 14.2	90 38	148.6	77 00.6	87 42	144.8	77 26.6	86 44	143.6	78 17.6	84 46	141.1	9
10	71 13.8	92 35	151.5	71 41.5	92 36	150.9	72 09.0	92 36	150.3	73 03.7	91 38	148.9	74 51.2	88 41	145.7	76 35.2	85 45	141.6	77 00.5	84 46	140.5	77 50.0	81 49	137.9	10
1	70 52.8	91 38	149.0	71 20.1	91 38	148.4	71 47.2	90 39	147.7	72 41.0	89 41	146.3	74 26.4	86 44	142.9	76 08.0	83 48	138.7	76 32.6	81 49	137.5	77 20.7	79 51	134.8	1
2	70 30.2	90 40	146.6	70 57.1	89 41	146.0	71 23.8	89 42	145.2	72 16.7	88 43	143.7	74 00.1	85 46	140.2	75 39.2	80 50	135.9	76 03.2	79 51	134.7	76 49.9	76 54	132.0	2
3	70 06.2	88 42	144.3	70 32.6	88 43	143.6	70 58.9	87 44	142.9	71 50.9	86 45	141.3	73 32.2	83 49	137.7	75 09.0	78 52	133.3	75 32.4	77 54	132.1	76 17.7	74 56	129.4	3
4	69 40.7	87 44	142.0	70 06.7	86 45	141.3	70 32.6	86 46	140.6	71 23.6	84 47	139.0	73 03.0	81 51	135.3	74 37.5	76 54	130.8	75 00.3	75 55	129.6	75 44.4	72 57	126.9	4
15	69 14.0	86 46	139.9	69 39.6	85 47	139.1	70 05.0	84 48	138.4	70 55.2	83 49	136.7	72 32.5	79 53	133.0	74 04.9	74 56	128.5	74 27.0	73 57	127.3	75 09.9	70 59	124.6	15
6	68 46.1	84 48	137.8	69 11.2	84 49	137.0	69 36.2	83 50	136.2	70 25.5	81 51	134.6	72 00.9	78 54	130.8	73 31.2	73 58	126.3	73 52.8	71 59	125.1	74 34.6	68 60	122.5	6
7	68 17.0	83 50	135.8	68 41.8	82 51	135.0	69 06.3	81 52	134.2	69 54.7	80 53	132.5	71 28.3	76 56	128.7	72 56.6	71 59	124.3	73 17.6	69 60	123.0	73 58.4	66 62	120.4	7
8	67 46.9	82 52	133.8	68 11.3	81 52	133.0	68 35.4	80 53	132.2	69 23.0	78 54	130.5	70 54.8	74 57	126.7	72 21.1	69 60	122.3	72 41.7	68 61	121.1	73 21.4	65 63	118.5	8
9	67 15.8	80 53	131.9	67 39.8	80 54	131.2	68 03.5	79 55	130.4	68 50.3	77 56	128.6	70 20.3	73 59	124.9	71 44.9	68 61	120.5	72 05.0	66 62	119.3	72 43.9	63 64	116.8	9
20	66 43.8	79 55	130.1	67 07.4	78 55	129.4	67 30.8	77 56	128.5	68 16.7	76 57	126.8	69 45.1	72 60	123.1	71 08.0	66 62	118.7	71 27.7	65 63	117.6	72 05.7	62 64	115.1	20
1	66 11.0	78 56	128.4	66 34.2	77 57	127.6	66 57.2	76 57	126.8	67 42.4	74 58	125.1	69 09.2	70 61	121.3	70 30.5	65 63	117.1	70 49.8	64 64	115.9	71 27.0	60 65	113.5	1
2	65 37.3	77 57	126.7	66 00.2	76 58	126.0	66 22.8	75 58	125.1	67 07.3	73 60	123.4	68 32.7	69 62	119.7	69 52.5	64 64	115.5	70 11.4	62 65	114.4	70 47.9	59 66	112.0	2
3	65 03.0	76 58	125.1	65 25.5	75 59	124.3	65 47.8	74 59	123.5	66 31.6	72 61	121.8	67 55.6	68 63	118.1	69 13.9	63 65	114.0	69 32.5	61 66	112.9	70 08.4	58 66	110.6	3
4	64 27.9	74 59	123.6	64 50.2	74 60	122.8	65 12.1	73 60	122.0	65 55.3	71 61	120.3	67 17.9	67 64	116.7	68 35.0	62 66	112.6	68 53.2	60 66	111.5	69 28.5	57 67	109.2	4
25	63 52.3	73 60	122.1	64 14.2	73 61	121.3	64 35.9	72 61	120.5	65 18.4	70 62	118.8	66 39.7	66 64	115.2	67 55.6	61 66	111.2	68 13.6	59 67	110.1	68 48.2	56 68	107.9	25
6	63 16.1	72 61	120.6	63 37.7	72 62	119.9	63 59.0	71 62	119.1	64 40.9	69 63	117.4	66 01.1	65 65	113.8	67 15.9	60 67	109.9	67 33.6	58 67	108.8	68 07.7	55 68	106.7	6
7	62 39.3	72 62	119.2	63 00.6	71 63	118.5	63 21.7	70 63	117.7	64 03.0	68 64	116.0	65 22.1	64 66	112.5	66 35.8	59 67	108.6	66 53.3	58 68	107.6	67 27.0	55 68	105.5	7
8	62 02.0	71 63	117.9	62 23.1	70 63	117.1	62 43.9	69 64	116.3	63 24.7	67 65	114.7	64 42.8	63 66	111.2	65 55.5	58 68	107.4	66 12.7	57 68	106.4	66 46.0	54 69	104.3	8
9	61 24.3	70 64	116.6	61 45.1	69 64	115.8	62 05.7	68 64	115.0	62 46.0	66 65	113.4	64 03.1	62 67	110.0	65 14.9	57 68	106.3	65 31.9	56 68	105.3	66 04.8	53 69	103.2	9
30	60 46.2	69 64	115.3	61 06.7	68 65	114.6	61 27.0	67 65	113.8	62 06.9	65 66	112.2	63 23.1	61 67	108.8	64 34.0	57 68	105.2	64 50.9	56 69	104.2	65 23.4	53 69	102.2	30
1	60 07.6	68 65	114.1	60 27.9	67 65	113.3	60 48.0	67 66	112.6	61 27.4	65 66	111.0	62 42.8	61 68	107.7	63 53.0	56 69	104.1	64 09.6	55 69	103.1	64 41.8	52 70	101.2	1
2	59 28.7	67 66	112.9	59 48.8	67 66	112.2	60 08.7	66 66	111.4	60 47.7	64 67	109.9	62 02.2	60 68	106.6	63 11.7	56 69	103.0	63 28.2	54 69	102.1	64 00.1	52 70	100.2	2
3	58 49.4	67 66	111.7	59 09.4	66 66	111.0	59 29.0	65 66	110.3	60 07.6	63 67	108.7	61 21.4	60 68	105.5	62 30.3	55 69	102.0	62 46.7	54 70	101.1	63 18.3	51 70	99.2	3
4	58 09.9	66 66	110.6	58 29.6	65 67	109.9	58 49.1	65 67	109.2	59 27.3	63 68	107.7	60 40.5	59 69	104.5	61 48.7	55 70	101.1	62 05.0	54 70	100.2	62 36.4	51 70	98.3	4
35	57 30.0	66 67	109.5	57 49.6	65 67	108.8	58 08.9	64 67	108.1	58 46.8	62 68	106.6	59 59.3	59 69	103.5	61 07.0	54 70	100.1	61 23.2	53 70	99.2	61 54.4	51 70	97.4	35
6	56 49.9	65 67	108.4	57 09.3	64 68	107.7	57 28.4	63 68	107.0	58 06.0	62 68	105.6	59 18.0	58 69	102.5	60 25.2	54 70	99.2	60 41.2	53 70	98.3	61 12.3	51 70	96.6	6
7	56 09.5	65 68	107.4	56 28.8	64 68	106.7	56 47.8	63 68	106.0	57 25.0	61 69	104.6	58 36.5	58 69	101.5	59 43.3	54 70	98.3	59 59.2	53 70	97.5	60 30.1	50 70	95.7	7
8	55 28.9	64 68	106.4	55 48.0	63 68	105.7	56 06.9	62 68	105.0	56 43.9	61 69	103.6	57 54.8	57 70	100.6	59 01.3	53 70	97.4	59 17.1	52 70	96.6	59 47.8	50 70	94.9	8
9	54 48.1	64 68	105.4	55 07.1	63 69	104.7	55 25.8	62 69	104.1	56 02.6	60 69	102.7	57 13.1	57 70	99.7	58 19.1	53 70	96.6	58 34.9	52 70	95.8	59 05.5	50 71	94.1	9
40	54 07.1	63 69	104.5	54 26.0	62 69	103.8	54 44.6	62 69	103.1	55 21.1	60 69	101.7	56 31.2	57 70	98.8	57 37.0	53 70	95.7	57 52.7	52 70	95.0	58 23.2	50 71	93.3	40
1	53 26.0	63 69	103.5	53 44.7	62 69	102.9	54 03.2	61 69	102.2	54 39.5	60 70	100.8	55 49.2	56 70	98.0	56 54.7	53 70	94.9	57 10.4	52 71	94.2	57 40.8	50 71	92.6	1
2	52 44.6	62 69	102.6	53 03.3	62 69	101.9	53 21.6	61 70	101.3	53 57.8	59 70	99.9	55 07.2	56 70	97.1	56 12.4	53 71	94.1	56 28.1	52 71	93.4	56 58.4	50 71	91.8	2
3	52 03.2	62 69	101.7	52 21.7	61 70	101.1	52 40.0	61 70	100.4	53 15.9	59 70	99.1	54 25.0	56 70	96.3	55 30.1	52 71	93.4	55 45.7	52 71	92.6	56 16.0	50 71	91.1	3
4	51 21.6	62 70	100.8	51 40.0	61 70	100.2	51 58.2	60 70	99.5	52 34.0	59 70	98.2	53 42.8	56 70	95.5	54 47.7	52 71	92.6	55 03.3	51 71	91.9	55 33.6	50 71	90.4	4
45	50 39.8	61 70	99.9	50 58.2	61 70	99.3	51 16.3	60 70	98.7	51 51.9	59 70	97.4	53 00.6	56 71	94.7	54 05.3	52 71	91.9	54 20.9	51 71	91.1	54 51.2	50 71	89.6	45
6	49 58.0	61 70	99.1	50 16.3	61 70	98.5	50 34.3	60 70	97.9	51 09.8	58 70	96.6	52 18.3	56 71	93.9	53 22.9	52 71	91.1	53 38.5	51 71	90.4	54 08.8	50 71	89.0	6
7	49 16.0	61 70	98.3	49 34.2	60 70	97.7	49 52.3	60 70	97.0	50 27.7	58 70	95.8	51 35.9	55 71	93.2	52 40.5	52 71	90.4	52 56.0	51 71	89.7	53 26.3	50 71	88.3	7
8	48 34.0	61 70	97.4	48 52.2	60 70	96.8	49 10.1	60 70	96.2	49 45.4	58 70	95.0	50 53.5	55 71	92.4	51 58.1	52 71	89.7	52 13.6	51 71	89.0	52 43.9	50 71	87.6	8
9	47 51.9	61 70	96.6	48 10.0	60 70	96.0	48 27.9	59 70	95.4	49 03.1	58 71	94.2	50 11.1	55 71	91.7	51 15.6	52 71	89.0	51 31.2	51 71	88.3	52 01.6	50 71	86.9	9
50	47 09.7	60 70	95.9	47 27.8	60 70	95.3	47 45.6	59 70	94.7	48 20.8	58 71	93.5	49 28.7	55 71	90.9	50 33.2	52 71	88.3	50 48.8	51 71	87.6	51 19.2	50 71	86.3	50
1	46 27.5	60 70	95.1	46 45.5	60 71	94.5	47 03.3	59 70	93.9	47 38.4	58 71	92.7	48 46.3	55 71	90.2	49 50.8	52 71	87.6	50 06.4	52 71	87.0	50 36.9	50 70	85.6	1
2	45 45.2	60 70	94.3	46 03.2	60 71	93.7	46 21.0	59 71	93.2	46 56.0	58 71	92.0	48 03.9	55 71	89.5	49 08.5	52 71	87.0	49 24.1	52 71	86.3	49 54.6	50 70	85.0	2
3	45 02.9	60 71	93.6	45 20.8	60 71	93.0	45 38.6	59 71	92.4	46 13.6	58 71	91.2	47 21.4	55 71	88.8	48 26.1	52 71	86.3	48 41.7	52 70	85.7	49 12.4	50 70	84.4	3
4	44 20.5	60 71	92.8	44 38.5	59 71	92.2	44 56.2	59 71	91.7	45 31.2	58 71	90.5	46 39.0	55 71	88.1	47 43.8	53 70	85.7	47 59.5	52 70	85.0	48 30.2	50 70	83.7	4
55	43 38.2	60 71	92.1	43 56.1	59 71	91.5	44 13.8	59 71	91.0	44 48.8	58 71	89.8	45 56.6	55 71	87.5	47 01.5	53 70	85.0	47 17.2	52 70	84.4	47 48.0	51 70	83.1	55
6	42 55.7	60 71	91.3	43 13.6	59 71	90.8	43 31.4	59 71	90.2	44 06.4	58 71	89.1	45 14.3	55 71	86.8	46 19.2	53 70	84.4	46 35.0	52 70	83.8	47 05.9	51 70	82.5	6
7	42 13.3	60 71	90.6	42 31.2	59 71	90.1	42 49.0	59 71	89.5	43 23.9	58 71	88.4	44 31.9	55 70	86.1	45 37.0	53 70	83.8	45 52.9	52 70	83.1	46 23.9	51 70	81.9	7
8	41 30.9	60 71	89.9	41 48.8	59 71	89.4	42 06.5	59 71	88.8	42 41.5	58 71	87.7	43 49.6	55 70	85.5	44 54.9	53 70	83.1	45 10.8	53 70	82.5	45 41.9	51 70	81.3	8
9	40 48.5	60 71	89.2	41 06.4	59 71	88.7	41 24.1	59 71	88.1	41 59.2	58 71	87.1	43 07.3	55 70	84.8	44 12.8	53 70	82.5	44 28.7	53 70	81.9	45 00.0	52 70	80.7	9
60	40 06.1	60 71	88.5	40 24.0	59 71	88.0	40 41.7	59 71	87.5	41 16.8	58 71	86.4	42 25.1	55 70	84.2	43 30.8	54 70	81.9	43 46.8	53 70	81.3	44 18.2	52 70	80.1	60
1	39 23.6	60 71	87.8	39 41.6	60 71	87.3	39 59.3	59 70	86.8	40 34.5	58 70	85.7	41 42.9	55 70	83.5	42 48.8	54 70	81.3	43 04.9	53 70	80.7	43 36.4	52 69	79.5	1
2	38 41.3	60 71	87.1	38 59.2	60 71	86.6	39 17.0	59 70	86.1	39 52.2	58 70	85.1	41 00.8	55 70	82.9	42 06.9	54 70	80.7	42 23.0	53 70	80.1	42 54.7	52 69	79.0	2
3	37 58.9	60 70	86.5	38 16.9	60 70	86.0	38 34.7	59 70	85.4	39 09.9	58 70	84.4	40 18.7	55 70	82.3	41 25.1	54 70	80.1	41 41.3	54 69	79.5	42 13.1	53 69	78.4	3
4	37 16.6	60 70	85.8	37 34.6	60 70	85.3	37 52.4	59 70	84.8	38 27.7	58 70	83.8	39 36.7	57 70	81.7	40 43.3	54 69	79.5	40 59.6	54 69	78.9	41 31.6	53 69	77.8	4
65	36 34.3	60 70	85.1	36 52.3	60 70	84.6	37 10.2	59 70	84.1	37 45.6	59 70	83.1	38 54.8	57 70	81.0	40 01.7	55 69	78.9	40 18.0	54 69	78.3	40 50.2	53 69	77.2	65
6	35 52.0	60 70	84.5	36 10.1	60 70	84.0	36 28.0	60 70	83.5	37 03.5	59 70	82.5	38 12.9	57 70	80.4	39 20.1	55 69	78.3	39 36.5	54 69	77.7	40 08.9	53 69	76.7	6
7	35 09.8	61 70	83.8	35 27.9	60 70	83.3	35 45.9	60 70	82.8	36 21.5	59 70	81.8	37 31.1	57 70	79.8	38 38.6	55 69	77.7	38 55.1	55 69	77.2	39 27.6	54 69	76.1	7
8	34 27.7	61 70	83.2	34 45.8	60 70	82.7	35 03.8	60 70	82.2	35 39.5	59 70	81.2	36 49.4	57 69	79.2	37 57.2	56 69	77.1	38 13.8	55 69	76.6	38 46.5	54 68	75.5	8
9	33 45.6	61 70	82.5	34 03.8	60 70	82.0	34 21.8	60 70	81.6	34 57.6	59 70	80.6	36 07.8	58 69	78.6	37 15.9	56 69	76.5	37 32.5	55 69	76.0	38 05.5	54 68	75.0	9
70	33 03.5	61 70	81.9	33 21.8	61 70	81.4	33 39.9	60 70	80.9	34 15.8	59 70	80.0	35 26.2	58 69	78.0	36 34.6	56 68	76.0	36 51.4	56 68	75.4	37 24.6	55 68	74.4	70
1	32 21.6	61 70	81.2	32 39.9	61 70	80.8	32 58.0	60 70	80.3	33 34.1	60 69	79.3	34 44.8	58 69	77.4	35 53.5	56 68	75.4	36 10.4	56 68	74.9	36 43.8	55 68	73.8	1
2	31 39.7	61 70	80.6	31 58.0	61 70	80.1	32 16.3	61 70	79.7	32 52.4	60 69	78.7	34 03.4	58 69	76.8	35 12.5	57 68	74.8	35 29.5	56 68	74.3	36 03.1	55 68	73.3	2
3	30 57.9	61 70	80.0	31 16.3	61 69	79.5	31 34.6	61 69	79.0	32 10.9	60 69	78.1	33 22.2	59 69	76.2	34 31.7	57 68	74.2	34 48.7	57 68	73.7	35 22.5	56 67	72.7	3
4	30 16.1	62 69	79.3	30 34.6	61 69	78.9	30 53.0	61 69	78.4	31 29.4	60 69	77.5	32 41.0	59 68	75.6	33 50.9	57 68	73.6	34 08.1	57 68	73.2	34 42.1	56 67	72.2	4
75	29 34.5	62 69	78.7	29 53.0	62 69	78.2	30 11.4	61 69	77.8	30 48.0	61 69	76.9	32 00.0	59 68	75.0	33 10.2	58 68	73.1	33 27.5	57 67	72.6	34 01.7	57 67	71.6	75
6	28 52.9	62 69	78.1	29 11.5	62 69	77.6	29 30.0	62 69	77.2	30 06.8	61 69	76.3	31 19.1	60 68	74.4	32 29.7	58 67	72.5	32 47.1	58 67	72.0	33 21.5	57 67	71.0	6
7	28 11.5	62 69	77.4	28 30.1	62 69	77.0	28 48.7	62 69	76.6	29 25.6	61 68	75.7	30 38.2	60 68	73.8	31 49.3	59 67	71.9	32 06.8	58 67	71.5	32 41.5	57 67	70.5	7
8	27 30.1	63 69	76.8	27 48.8	62 69	76.4	28 07.5	62 68	75.9	28 44.5	61 68	75.0	29 57.6	60 68	73.2	31 09.0	59 67	71.4	31 26.7	59 67	70.9	32 01.6	58 66	69.9	8
9	26 48.8	63 68	76.2	27 07.7	63 68	75.8	27 26.4	62 68	75.3	28 03.6	62 68	74.4	29 17.0	61 67	72.6	30 28.9	59 67	70.8	30 46.6	59 66	70.3	31 21.8	58 66	69.4	9
80	26 07.7	63 68	75.6	26 26.6	63 68	75.1	26 45.4	63 68	74.7	27 22.8	62 68	73.8	28 36.6	61 67	72.0	29 48.9	60 66	70.2	30 06.8	59 66	69.8	30 42.2	59 66	68.8	80
1	25 26.7	63 68	75.0	25 45.6	63 68	74.5	26 04.5	63 68	74.1	26 42.1	62 68	73.2	27 56.3	61 67	71.5	29 09.1	60 66	69.7	29 27.0	60 66	69.2	30 02.7	59 66	68.3	1
2	24 45.7	64 68	74.3	25 04.8	63 68	73.9	25 23.8	63 68	73.5	26 01.6	63 67	72.6	27 16.1	62 67	70.9	28 29.4	60 66	69.1	28 47.4	60 66	68.6	29 23.3	60 65	67.7	2
3	24 05.0	64 68	73.7	24 24.1	64 68	73.3	24 43.2	63 68	72.9	25 21.1	63 67	72.0	26 36.1	62 66	70.3	27 49.8	61 66	68.5	28 08.0	61 65	68.1	28 44.2	60 65	67.2	3
4	23 24.3	64 68	73.1	23 43.5	64 67	72.7	24 02.7	64 67	72.3	24 40.9	63 67	71.4	25 56.3	62 66	69.7	27 10.4	61 65	67.9	27 28.7	61 65	67.5	28 05.1	60 65	66.6	4
85	22 43.8	65 67	72.5	23 03.1	64 67	72.1	23 22.4	64 67	71.7	24 00.7	64 67	70.8	25 16.5	63 66	69.1	26 31.2	62 65	67.4	26 49.6	61 65	66.9	27 26.3	61 64	66.0	85
6	22 03.4	65 67	71.9	22 22.8	65 67	71.5	22 42.2	64 67	71.0	23 20.7	64 66	70.2	24 37.0	63 66	68.5	25 52.1	62 65	66.8	26 10.7	62 65	66.4	26 47.6	61 64	65.5	6
7	21 23.1	65 67	71.3	21 42.7	65 67	70.8	22 02.1	65 66	70.4	22 40.9	64 66	69.6	23 57.6	63 65	67.9	25 13.2	63 65	66.2	25 31.9	62 64	65.8	26 09.1	62 64	64.9	7
8	20 43.0	66 67	70.6	21 02.7	65 66	70.2	21 22.2	65 66	69.8	22 01.2	65 66	69.0	23 18.3	64 65	67.3	24 34.4	63 64	65.7	24 53.3	63 64	65.2	25 30.8	62 64	64.4	8
9	20 03.1	66 66	70.0	20 22.8	66 66	69.6	20 42.5	65 66	69.2	21 21.7	65 66	68.4	22 39.3	64 65	66.8	23 55.9	63 64	65.1	24 14.9	63 64	64.7	24 52.6	62 63	63.8	9
90	19 23.3	66 66	69.4	19 43.1	66 66	69.0	20 02.9	66 66	68.6	20 42.3	65 65	67.8	22 00.4	65 65	66.2	23 17.5	64 64	64.5	23 36.6	64 63	64.1	24 14.6	63 63	63.2	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	28° 00′ Alt.	Δd	Δt	Az.	28° 30′ Alt.	Δd	Δt	Az.	29° 00′ Alt.	Δd	Δt	Az.	30° 00′ Alt.	Δd	Δt	Az.	32° 00′ Alt.	Δd	Δt	Az.	34° 00′ Alt.	Δd	Δt	Az.	34° 30′ Alt.	Δd	Δt	Az.	35° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
00	17 00.0	1.0	01	180.0	16 30.0	1.0	01	180.0	16 00.0	1.0	01	180.0	15 00.0	1.0	01	180.0	13 00.0	1.0	01	180.0	11 00.0	1.0	01	180.0	10 30.0	1.0	01	180.0	9 30.0	1.0	01	180.0	00
1	16 59.7	1.0	02	179.1	16 29.7	1.0	02	179.1	15 59.7	1.0	02	179.1	14 59.7	1.0	02	179.1	12 59.7	1.0	02	179.1	10 59.7	1.0	02	179.2	10 29.7	1.0	02	179.2	9 29.7	1.0	02	179.2	1
2	16 58.6	1.0	03	178.2	16 28.6	1.0	03	178.2	15 58.7	1.0	03	178.2	14 58.7	1.0	03	178.2	12 58.7	1.0	03	178.3	10 58.8	1.0	03	178.3	10 28.8	1.0	03	178.3	9 28.8	1.0	03	178.3	2
3	16 56.9	1.0	04	177.2	16 26.9	1.0	04	177.3	15 57.0	1.0	04	177.3	14 57.0	1.0	04	177.3	12 57.1	1.0	04	177.4	10 57.2	1.0	04	177.5	10 27.2	1.0	04	177.5	9 27.3	1.0	04	177.5	3
4	16 54.5	1.0	05	176.3	16 24.6	1.0	05	176.3	15 54.6	1.0	05	176.4	14 54.7	1.0	05	176.4	12 54.8	1.0	05	176.5	10 55.0	1.0	05	176.6	10 25.0	1.0	05	176.6	9 25.1	1.0	05	176.7	4
05	16 51.5	1.0	06	175.4	16 21.5	1.0	06	175.4	15 51.6	1.0	06	175.5	14 51.7	1.0	06	175.5	12 52.0	1.0	06	175.7	10 52.2	1.0	06	175.8	10 22.2	1.0	06	175.8	9 22.4	1.0	06	175.9	05
6	16 47.7	1.0	07	174.5	16 17.8	1.0	07	174.5	15 47.9	1.0	07	174.5	14 48.1	1.0	07	174.6	12 48.4	1.0	07	174.8	10 48.8	1.0	07	174.9	10 18.8	1.0	07	175.0	9 19.0	1.0	07	175.1	6
7	16 43.3	1.0	08	173.5	16 13.4	1.0	08	173.6	15 43.5	1.0	08	173.6	14 43.8	1.0	08	173.7	12 44.2	1.0	08	173.9	10 44.7	1.0	08	174.1	10 14.8	1.0	08	174.1	9 15.0	1.0	08	174.2	7
8	16 38.2	99	10	172.6	16 08.3	99	10	172.7	15 38.5	99	10	172.7	14 38.8	99	09	172.8	12 39.4	99	09	173.1	10 40.0	99	09	173.3	10 10.2	1.0	09	173.3	9 10.5	1.0	09	173.4	8
9	16 32.4	99	11	171.7	16 02.6	99	11	171.8	15 32.8	99	11	171.8	14 33.2	99	10	172.0	12 34.0	99	10	172.2	10 34.7	99	10	172.4	10 04.9	99	10	172.5	9 05.3	99	10	172.6	9
10	16 26.0	99	12	170.8	15 56.2	99	12	170.9	15 26.4	99	12	170.9	14 26.9	99	12	171.1	12 27.9	99	11	171.3	10 28.8	99	11	171.6	9 59.1	99	11	171.6	8 59.5	99	11	171.8	10
1	16 18.8	99	13	169.9	15 49.1	99	13	170.0	15 19.4	99	13	170.0	14 20.0	99	13	170.2	12 21.2	99	12	170.5	10 22.3	99	12	170.7	9 52.6	99	12	170.8	8 53.2	99	12	171.0	1
2	16 11.1	99	14	169.0	15 41.4	99	14	169.1	15 11.8	99	14	169.1	14 12.5	99	14	169.3	12 13.8	99	13	169.6	10 15.2	99	13	169.9	9 45.5	99	13	170.0	8 46.2	99	13	170.1	2
3	16 02.6	99	15	168.1	15 33.0	99	15	168.2	15 03.4	99	15	168.2	14 04.3	99	15	168.4	12 05.9	99	14	168.7	10 07.5	99	14	169.1	9 37.9	99	14	169.2	8 38.6	99	14	169.3	3
4	15 53.5	98	16	167.2	15 24.0	98	16	167.3	14 54.5	98	16	167.4	13 55.4	98	16	167.5	11 57.3	98	15	167.9	9 59.1	98	15	168.2	9 29.6	98	15	168.3	8 30.5	98	15	168.5	4
15	15 43.8	98	17	166.3	15 14.3	98	17	166.4	14 44.9	98	17	166.5	13 45.9	98	17	166.7	11 48.1	98	16	167.0	9 50.2	98	16	167.4	9 20.7	98	16	167.5	8 21.7	98	16	167.7	15
6	15 33.4	98	18	165.4	15 04.0	98	18	165.5	14 34.6	98	18	165.6	13 35.8	98	18	165.8	11 38.3	98	17	166.2	9 40.6	98	17	166.6	9 11.2	98	17	166.7	8 12.4	98	17	166.9	6
7	15 22.3	98	20	164.5	14 53.0	98	19	164.6	14 23.7	98	19	164.7	13 25.1	98	19	164.9	11 27.8	98	18	165.3	9 30.5	98	18	165.8	9 01.2	98	18	165.9	8 02.5	98	17	166.1	7
8	15 10.7	97	20	163.6	14 41.4	97	20	163.7	14 12.2	97	20	163.8	13 13.8	97	20	164.0	11 16.8	97	19	164.5	9 19.8	98	19	165.0	8 50.5	98	19	165.1	7 52.0	98	18	165.3	8
9	14 58.4	97	22	162.7	14 29.2	97	21	162.8	14 00.1	97	21	162.9	13 01.8	97	21	163.2	11 05.2	97	20	163.7	9 08.5	97	20	164.1	8 39.3	97	20	164.3	7 41.0	97	19	164.5	9
20	14 45.4	97	23	161.8	14 16.4	97	22	161.9	13 47.3	97	22	162.1	12 49.2	97	22	162.3	10 52.9	97	21	162.8	8 56.6	97	21	163.3	8 27.5	97	21	163.4	7 29.3	97	20	163.7	20
1	14 31.9	97	24	160.9	14 02.9	97	23	161.1	13 33.9	97	23	161.2	12 36.0	97	23	161.5	10 40.1	97	22	162.0	8 44.1	97	22	162.5	8 15.1	97	22	162.6	7 17.1	97	21	162.9	1
2	14 17.7	96	25	160.0	13 48.8	96	24	160.2	13 20.0	96	24	160.3	12 22.2	96	24	160.6	10 26.7	96	23	161.2	8 31.1	96	23	161.7	8 02.2	96	22	161.8	7 04.4	96	22	162.1	2
3	14 02.9	96	26	159.2	13 34.1	96	25	159.3	13 05.4	96	25	159.5	12 07.8	96	25	159.8	10 12.7	96	24	160.3	8 17.5	96	24	160.9	7 48.7	96	23	161.0	6 51.1	96	23	161.3	3
4	13 47.5	96	27	158.3	13 18.9	96	26	158.4	12 50.2	96	26	158.6	11 52.8	96	26	158.9	9 58.1	96	25	159.5	8 03.3	96	25	160.1	7 34.6	96	24	160.2	6 37.2	96	24	160.5	4
25	13 31.5	96	28	157.4	13 03.0	96	27	157.6	12 34.4	96	27	157.7	11 37.3	96	27	158.1	9 43.0	96	26	158.7	7 48.6	96	25	159.3	7 20.0	96	26	159.4	6 22.8	96	25	159.7	25
6	13 14.9	96	29	156.6	12 46.5	96	28	156.7	12 18.1	96	28	156.9	11 21.1	96	28	157.2	9 27.3	96	27	157.9	7 33.3	96	26	158.5	7 04.8	96	26	158.7	6 07.8	96	26	159.0	6
7	12 57.8	94	30	155.7	12 29.5	94	29	155.9	12 01.1	94	29	156.0	11 04.4	94	29	156.4	9 11.0	96	28	157.0	7 17.5	96	27	157.7	6 49.1	96	27	157.9	5 52.3	96	27	158.2	7
8	12 40.9	94	30	154.9	12 11.8	94	30	155.0	11 43.6	94	30	155.2	10 47.2	94	30	155.6	8 54.2	94	29	156.2	7 01.1	94	28	156.9	6 32.8	94	28	157.1	5 36.3	94	28	157.4	8
9	12 21.7	94	32	154.0	11 53.6	94	31	154.2	11 25.5	94	31	154.4	10 29.3	94	31	154.7	8 36.8	94	30	155.4	6 44.2	94	29	156.1	6 16.1	94	29	156.3	5 19.7	94	28	156.6	9
30	12 02.9	93	32	153.2	11 34.9	93	32	153.4	11 06.9	93	32	153.5	10 10.9	93	32	153.9	8 18.9	93	31	154.6	6 26.8	93	30	155.3	5 58.7	93	30	155.5	5 02.6	93	29	155.9	30
1	11 43.4	93	33	152.3	11 15.6	93	33	152.5	10 47.7	93	33	152.7	9 52.0	93	32	153.1	8 00.4	93	32	153.8	6 08.8	93	31	154.6	5 40.9	93	31	154.8					1
2	11 23.5	92	34	151.5	10 55.7	92	34	151.7	10 28.0	92	34	151.9	9 32.5	92	33	152.3	7 41.5	93	32	153.0	5 50.3	93	32	153.8	5 22.5	93	31	154.0					2
3	11 02.9	92	35	150.7	10 35.3	92	35	150.9	10 07.7	92	35	151.1	9 12.5	92	34	151.5	7 22.0	92	33	152.2	5 31.3	92	32	153.0	5 03.7	92	32	153.2					3
4	10 41.9	92	36	149.8	10 14.4	92	36	150.0	9 46.9	92	36	150.2	8 52.0	92	35	150.7	7 01.9	92	34	151.5	5 11.8	92	33	152.3									4
35	10 20.3	91	37	149.0	9 53.0	91	37	149.2	9 25.6	91	36	149.4	8 30.9	91	36	149.8	6 41.4	91	35	150.7													35
6	9 58.2	91	38	148.2	9 31.0	91	37	148.4	9 03.8	91	37	148.6	8 09.4	91	37	149.1	6 20.4	91	36	149.9													6
7	9 35.6	90	38	147.4	9 08.5	90	38	147.6	8 41.5	90	38	147.8	7 47.3	90	38	148.3	5 58.9	90	37	149.1													7
8	9 12.5	90	39	146.6	8 45.6	90	39	146.8	8 18.6	90	39	147.0	7 24.7	90	38	147.5	5 36.9	90	38	148.4													8
9	8 48.9	89	40	145.8	8 22.1	89	40	146.0	7 55.3	89	40	146.2	7 01.7	89	39	146.7	5 14.4	89	38	147.6													9
40	8 24.8	89	41	145.0	7 58.1	89	41	145.2	7 31.5	89	40	145.5	6 38.1	89	40	145.9																	40
1	8 00.2	88	42	144.2	7 33.7	88	42	144.4	7 07.2	88	41	144.7	6 14.1	88	41	145.1																	1
2	7 35.1	88	42	143.4	7 08.8	88	42	143.7	6 42.4	88	42	143.9	5 49.6	88	42	144.4																	2
3	7 09.6	87	43	142.6	6 43.4	87	43	142.9	6 17.2	87	43	143.1	5 24.7	87	42	143.6																	3
4	6 43.6	87	44	141.9	6 17.6	87	44	142.1	5 51.5	87	44	142.4																					4
45	6 17.2	86	45	141.1	5 51.3	86	45	141.3	5 25.3	86	44	141.6																					45
6	5 50.3	86	46	140.3	5 24.6	86	45	140.6																									6
7	5 23.0	85	46	139.6																													7

DECLINATION SAME NAME AS LATITUDE

H.A.	28° 00′ Alt.	Δd	Δt	Az.	28° 30′ Alt.	Δd	Δt	Az.	29° 00′ Alt.	Δd	Δt	Az.	30° 00′ Alt.	Δd	Δt	Az.	32° 00′ Alt.	Δd	Δt	Az.	34° 00′ Alt.	Δd	Δt	Az.	34° 30′ Alt.	Δd	Δt	Az.	35° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
91	18 43.7	67	66	68.8	19 03.6	66	66	68.4	19 23.5	66	65	68.0	20 03.1	66	65	67.2	21 21.7	65	64	65.6	22 39.3	64	63	63.9	22 58.5	64	63	63.5	23 36.8	64	63	62.7	91
2	18 04.2	67	66	68.2	18 24.2	67	65	67.8	18 44.2	67	65	67.4	19 24.1	66	65	66.6	20 43.1	66	64	65.0	22 01.3	65	63	63.3	22 20.7	65	63	62.9	22 59.2	64	62	62.1	2
3	17 24.9	67	65	67.5	17 45.1	67	65	67.1	18 05.2	67	65	66.8	18 45.2	67	64	66.0	20 04.8	66	64	64.4	21 23.5	65	63	62.8	21 43.0	65	62	62.4	22 21.8	65	62	61.5	3
4	16 45.8	68	65	66.9	17 06.1	67	65	66.5	17 26.3	67	64	66.1	18 06.6	67	64	65.4	19 26.6	66	63	63.8	20 45.8	66	62	62.2	21 05.5	65	62	61.8	21 44.6	65	62	61.0	4
95	16 06.8	68	64	66.3	16 27.2	68	64	65.9	16 47.6	68	64	65.5	17 28.1	67	64	64.7	18 48.7	67	63	63.2	20 08.4	66	62	61.6	20 28.2	66	62	61.2	21 07.7	66	61	60.4	95
6	15 28.1	68	64	65.7	15 48.6	68	64	65.3	16 09.0	68	64	64.9	16 49.8	68	63	64.1	18 10.9	67	63	62.6	19 31.2	67	62	61.0	19 51.1	66	61	60.6	20 30.9	66	61	59.8	6
7	14 49.5	69	64	65.0	15 10.2	69	64	64.7	15 30.7	69	64	64.3	16 11.8	68	63	63.5	17 33.3	68	62	62.0	18 54.2	67	61	60.4	19 14.3	67	61	60.0	19 54.3	67	61	59.2	7
8	14 11.2	69	64	64.4	14 31.9	69	63	64.0	14 52.6	69	63	63.7	15 33.9	69	63	62.9	16 56.0	68	62	61.4	18 17.4	68	61	59.8	18 37.6	67	61	59.5	19 18.0	67	60	58.7	8
9	13 33.0	70	63	63.8	13 53.9	69	63	63.4	14 14.7	69	63	63.0	14 56.2	69	62	62.3	16 18.8	69	62	60.8	17 40.8	68	61	59.3	18 01.2	68	60	58.9	18 41.8	68	60	58.1	9
100	12 55.1	70	63	63.1	13 16.0	70	63	62.8	13 37.0	70	62	62.4	14 18.8	70	62	61.7	15 41.9	69	61	60.2	17 04.5	68	60	58.7	17 25.0	68	60	58.3	18 05.9	68	59	57.5	100
1	12 17.3	70	62	62.5	12 38.4	70	62	62.1	12 59.5	70	62	61.8	13 41.5	70	62	61.0	15 05.2	70	61	59.6	16 28.3	69	60	58.1	16 49.0	69	60	57.7	17 30.3	69	59	56.9	1
2	11 39.8	71	62	61.9	12 01.0	71	62	61.5	12 22.2	71	62	61.1	13 04.5	70	61	60.4	14 28.8	70	60	59.0	15 52.5	69	59	57.5	16 13.3	69	59	57.1	16 54.8	69	59	56.3	2
3	11 02.5	71	62	61.2	11 23.8	71	62	60.9	11 45.2	71	61	60.5	12 27.7	71	61	59.8	13 52.5	70	60	58.3	15 16.8	70	59	56.9	15 37.8	70	59	56.5	16 19.6	70	58	55.7	3
4	10 25.4	72	61	60.6	10 46.9	72	61	60.2	11 08.4	71	61	59.9	11 51.2	71	60	59.2	13 16.5	71	60	57.7	14 41.4	70	59	56.3	15 02.5	70	58	55.9	15 44.7	70	58	55.2	4
105	9 48.6	72	61	59.9	10 10.2	72	61	59.6	10 31.8	72	60	59.2	11 14.9	72	60	58.5	12 40.8	71	59	57.1	14 06.2	71	58	55.7	14 27.5	71	58	55.3	15 10.0	71	57	54.6	105
6	9 12.0	73	61	59.3	9 33.7	72	60	58.9	9 55.4	72	60	58.6	10 38.8	72	60	57.9	12 05.3	72	59	56.5	13 31.3	72	58	55.0	13 52.8	71	58	54.7	14 35.6	71	57	54.0	6
7	8 35.6	73	60	58.6	8 57.5	73	60	58.3	9 19.4	73	60	58.0	10 03.0	73	59	57.3	11 30.0	72	58	55.9	12 56.7	72	57	54.4	13 18.3	72	57	54.1	14 01.4	72	57	53.4	7
8	7 59.5	73	60	58.0	8 21.5	73	60	57.6	8 43.5	73	59	57.3	9 27.5	73	59	56.6	10 55.1	73	58	55.2	12 22.3	73	57	53.8	12 44.1	72	57	53.5	13 27.5	72	56	52.8	8
9	7 23.7	74	59	57.3	7 45.8	74	59	57.0	8 08.0	74	59	56.7	8 52.2	74	58	56.0	10 20.4	73	57	54.6	11 48.2	73	56	53.2	12 10.1	73	56	52.9	12 53.8	73	56	52.2	9
110	6 48.1	74	59	56.7	7 10.4	74	59	56.3	7 32.6	74	58	56.0	8 17.1	74	58	55.3	9 45.9	74	57	54.0	11 14.4	74	56	52.6	11 36.4	73	56	52.2	12 20.5	73	55	51.5	110
1	6 12.8	75	58	56.0	6 35.2	75	58	55.7	6 57.6	75	58	55.3	7 42.4	75	57	54.7	9 11.8	74	56	53.3	10 40.8	74	55	52.0	11 03.0	74	55	51.6	11 47.4	74	55	50.9	1
2	5 37.7	75	58	55.3	6 00.3	75	58	55.0	6 22.9	75	58	54.7	7 07.9	75	57	54.0	8 37.9	75	56	52.7	10 07.5	75	55	51.3	10 29.9	75	55	51.0	11 14.6	74	54	50.3	2
3	5 03.0	76	57	54.7	5 25.7	76	57	54.3	5 48.4	76	57	54.0	6 33.7	76	56	53.4	8 04.3	75	56	52.0	9 34.6	75	54	50.7	9 57.1	75	54	50.4	10 42.1	75	54	49.7	3
4									5 14.2	76	57	53.4	5 59.8	76	56	52.7	7 31.0	76	55	51.4	9 01.9	76	54	50.1	9 24.6	76	54	49.7	10 09.9	75	53	49.1	4
115													5 26.2	77	56	52.0	6 58.0	76	54	50.7	8 29.5	76	53	49.4	8 52.3	76	53	49.1	9 38.0	76	53	48.5	115
6																	6 25.3	77	54	50.1	7 57.4	77	53	48.8	8 20.4	77	53	48.5	9 06.4	77	52	47.8	6
7																	5 52.9	77	53	49.4	7 25.6	77	52	48.2	7 48.8	77	52	47.8	8 35.1	77	52	47.2	7
8																	5 20.8	78	53	48.8	6 54.2	78	52	47.5	7 17.5	78	52	47.2	8 04.1	78	51	46.6	8
9																					6 23.1	78	51	46.9	6 46.6	78	51	46.5	7 33.5	78	51	45.9	9
120																					5 52.3	79	51	46.2	6 15.9	79	50	45.9	7 03.2	79	50	45.3	120
1																					5 21.8	79	50	45.5	5 45.6	79	50	45.2	6 33.2	79	49	44.6	1
2																									5 15.7	80	49	44.6	6 03.6	80	49	44.0	2
3																													5 34.3	80	48	43.3	3
4																													5 05.4	81	48	42.7	4

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Lat. 45°

H.A.	36° 00′ Alt.	Δd Δt	Az.	37° 00′ Alt.	Δd Δt	Az.	38° 30′ Alt.	Δd Δt	Az.	40° 00′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	81 00.0	1.0 03	180.0	82 00.0	1.0 04	180.0	83 30.0	1.0 04	180.0	85 00.0	1.0 05	180.0
1	80 58.1	1.0 09	174.8	81 57.9	1.0 10	174.3	83 27.4	99 13	173.1	84 56.8	99 16	171.3
2	80 52.4	99 16	169.7	81 51.6	98 17	168.6	83 19.9	98 20	166.4	84 47.2	96 26	162.9
3	80 43.0	97 21	164.8	81 41.2	97 24	163.2	83 07.6	95 28	160.0	84 32.0	92 34	155.1
4	80 30.2	96 27	160.0	81 27.1	94 29	158.0	82 51.0	92 34	154.0	84 11.8	87 41	148.1
05	80 14.1	93 32	155.4	81 09.6	92 35	153.1	82 30.6	88 40	148.5	83 47.4	82 46	141.9
6	79 55.0	91 36	151.1	80 48.8	89 39	148.5	82 06.8	84 44	143.4	83 19.7	77 51	136.4
7	79 33.2	88 40	147.1	80 25.3	86 43	144.2	81 40.1	80 48	138.8	82 49.2	72 55	131.7
8	79 09.0	85 44	143.3	79 59.3	82 47	140.3	81 11.1	77 52	134.7	82 16.5	68 57	127.5
9	78 42.5	83 47	139.7	79 31.1	79 50	136.6	80 39.9	73 55	131.0	81 42.0	64 60	123.9
10	78 14.2	80 50	136.4	79 01.1	76 53	133.3	80 07.1	70 57	127.6	81 06.1	61 62	120.7
1	77 44.1	77 53	133.4	78 29.4	74 55	130.2	79 32.8	67 59	124.6	80 29.1	58 63	117.8
2	77 12.6	75 55	130.6	77 56.4	71 57	127.4	78 57.3	64 61	121.9	79 51.2	55 65	115.3
3	76 39.7	72 57	127.9	77 22.1	69 59	124.8	78 20.8	62 62	119.4	79 12.4	53 66	113.0
4	76 05.7	70 58	125.5	76 46.7	66 60	122.4	77 43.4	59 64	117.1	78 33.1	51 66	111.0
15	75 30.7	68 60	123.2	76 10.4	64 62	120.1	77 05.3	57 65	115.0	77 53.2	49 67	109.1
6	74 54.7	66 61	121.1	75 33.4	62 63	118.1	76 26.5	56 66	113.0	77 13.0	47 68	107.4
7	74 18.0	65 62	119.1	74 55.6	61 64	116.1	75 47.2	54 66	111.3	76 32.3	46 68	105.8
8	73 40.6	63 63	117.2	74 17.2	59 65	114.3	75 07.5	52 67	109.6	75 51.3	45 69	104.4
9	73 02.6	61 64	115.4	73 38.3	58 66	112.6	74 27.3	51 68	108.1	75 10.1	44 69	103.0
20	72 24.0	60 65	113.8	72 58.9	56 66	111.0	73 46.8	50 68	106.6	74 28.7	43 69	101.7
1	71 44.9	59 66	112.2	72 19.1	55 67	109.6	73 06.0	49 68	105.2	73 47.1	42 70	100.6
2	71 05.4	58 66	110.7	71 39.0	54 67	108.1	72 25.0	48 69	104.0	73 05.3	41 70	99.4
3	70 25.6	57 67	109.3	70 58.5	53 68	106.8	71 43.7	47 69	102.8	72 23.4	41 70	98.4
4	69 45.4	56 68	108.0	70 17.7	52 68	105.5	71 02.2	47 69	101.6	71 41.3	40 70	97.4
25	69 04.9	55 68	106.7	69 36.8	51 69	104.3	70 20.6	46 70	100.5	70 59.2	40 70	96.4
6	68 24.1	54 68	105.5	68 55.5	51 69	103.2	69 38.8	45 70	99.5	70 17.0	39 70	95.5
7	67 43.2	53 69	104.4	68 14.1	50 69	102.1	68 56.9	45 70	98.5	69 34.8	39 70	94.6
8	67 02.0	53 69	103.3	67 32.6	49 70	101.0	68 14.9	44 70	97.5	68 52.4	39 71	93.8
9	66 20.6	52 69	102.2	66 50.9	49 70	100.0	67 32.8	44 70	96.6	68 10.1	39 71	93.0
30	65 39.0	51 69	101.2	66 09.0	49 70	99.0	66 50.6	44 70	95.7	67 27.7	39 71	92.2
1	64 57.3	51 70	100.2	65 27.1	48 70	98.1	66 08.3	44 70	94.8	66 45.3	39 71	91.4
2	64 15.5	51 70	99.2	64 45.0	48 70	97.2	65 26.0	43 71	94.0	66 02.9	38 71	90.7
3	63 33.6	50 70	98.3	64 02.9	47 70	96.3	64 43.7	43 71	93.2	65 20.5	38 71	90.0
4	62 51.5	50 70	97.4	63 20.7	47 70	95.5	64 01.3	43 71	92.4	64 38.0	38 71	89.3
35	62 09.4	50 70	96.5	62 38.4	47 70	94.6	63 18.9	43 71	91.7	63 55.6	39 71	88.6
6	61 27.2	49 70	95.7	61 56.1	47 71	93.8	62 36.5	43 71	90.9	63 13.2	39 71	87.9
7	60 45.0	49 70	94.8	61 13.8	47 71	93.0	61 54.1	43 71	90.2	62 30.8	39 71	87.3
8	60 02.7	49 71	94.0	60 31.4	47 71	92.3	61 11.7	43 71	89.5	61 48.4	39 71	86.6
9	59 20.4	49 71	93.3	59 49.0	47 71	91.5	60 29.2	43 71	88.8	61 06.1	39 71	86.0
40	58 38.0	49 71	92.5	59 06.6	47 71	90.8	59 46.8	43 71	88.1	60 23.8	39 70	85.4
1	57 55.6	49 71	91.7	58 24.1	46 71	90.1	59 04.4	43 71	87.5	59 41.5	39 70	84.8
2	57 13.2	49 71	91.0	57 41.7	46 71	89.4	58 22.1	43 71	86.8	58 59.3	40 70	84.2
3	56 30.8	49 71	90.3	56 59.3	47 71	88.7	57 39.7	43 71	86.2	58 17.1	40 70	83.6
4	55 48.3	49 71	89.6	56 16.9	47 71	88.0	56 57.4	43 70	85.6	57 35.0	40 70	83.0
45	55 05.9	49 71	88.9	55 34.5	47 71	87.3	56 15.1	44 70	85.0	56 52.9	40 70	82.5
6	54 23.5	49 71	88.2	54 52.1	47 71	86.7	55 32.9	44 70	84.3	56 10.9	41 70	81.9
7	53 41.1	49 71	87.5	54 09.8	47 71	86.0	54 50.7	44 70	83.7	55 28.9	41 70	81.4
8	52 58.7	49 71	86.9	53 27.5	47 70	85.4	54 08.5	44 70	83.1	54 47.0	41 70	80.8
9	52 16.4	49 71	86.2	52 45.2	47 70	84.8	53 26.4	44 70	82.6	54 05.1	41 70	80.3
50	51 34.0	49 70	85.6	52 03.0	47 70	84.2	52 44.4	45 70	82.0	53 23.3	42 70	79.7
1	50 51.8	49 70	84.9	51 20.8	48 70	83.6	52 02.4	45 70	81.4	52 41.6	42 69	79.2
2	50 09.5	49 70	84.3	50 38.7	48 70	82.9	51 20.5	45 70	80.8	52 00.0	43 69	78.7
3	49 27.3	50 70	83.7	49 56.6	48 70	82.3	50 38.6	46 70	80.3	51 18.4	43 69	78.1
4	48 45.2	50 70	83.1	49 14.6	48 70	81.8	49 56.9	46 70	79.7	50 36.9	43 69	77.6
55	48 03.1	50 70	82.5	48 32.6	48 70	81.2	49 15.2	46 69	79.2	49 55.6	44 69	77.1
6	47 21.1	50 70	81.9	47 50.7	49 70	80.6	48 33.5	46 69	78.6	49 14.2	44 69	76.6
7	46 39.1	50 70	81.3	47 08.9	49 70	80.0	47 52.0	47 69	78.1	48 33.0	44 69	76.1
8	45 57.2	51 70	80.7	46 27.2	49 69	79.4	47 10.5	47 69	77.5	47 51.9	45 68	75.5
9	45 15.4	51 70	80.1	45 45.5	50 69	78.9	46 29.1	47 69	77.0	47 10.9	45 68	75.0
60	44 33.6	51 69	79.5	45 03.9	50 69	78.3	45 47.8	48 69	76.4	46 29.9	46 68	74.5
1	43 51.9	51 69	78.9	44 22.4	50 69	77.7	45 06.6	48 68	75.9	45 49.1	46 68	74.0
2	43 10.3	52 69	78.4	43 41.0	50 69	77.2	44 25.5	49 68	75.4	45 08.3	47 68	73.5
3	42 28.8	52 69	77.8	42 59.7	51 69	76.6	43 44.5	49 68	74.8	44 27.7	47 68	73.0
4	41 47.4	52 69	77.2	42 18.4	51 69	76.1	43 03.6	49 68	74.3	43 47.2	47 67	72.5
65	41 06.1	53 69	76.7	41 37.3	51 68	75.5	42 22.9	50 68	73.8	43 06.8	48 67	72.0
6	40 24.8	53 69	76.1	40 56.3	52 68	75.0	41 42.2	50 68	73.3	42 26.5	48 67	71.5
7	39 43.7	53 68	75.5	40 15.3	52 68	74.4	41 01.6	51 67	72.7	41 46.3	49 67	71.0
8	39 02.7	54 68	75.0	39 34.5	53 68	73.9	40 21.1	51 67	72.2	41 06.3	49 67	70.5
9	38 21.8	54 68	74.4	38 53.8	53 68	73.3	39 40.8	51 67	71.7	40 26.3	50 66	70.0
70	37 40.9	54 68	73.9	38 13.2	53 67	72.8	39 00.6	52 67	71.2	39 46.5	50 66	69.5
1	37 00.2	55 68	73.3	37 32.8	54 67	72.3	38 20.5	52 67	70.6	39 06.9	51 66	69.0
2	36 19.7	55 67	72.8	36 52.4	54 67	71.7	37 40.5	53 66	70.1	38 27.3	51 66	68.5
3	35 39.2	55 67	72.2	36 12.2	55 67	71.2	37 00.7	53 66	69.6	37 47.9	52 65	68.0
4	34 58.9	56 67	71.6	35 32.1	55 67	70.6	36 21.0	54 66	69.1	37 08.7	52 65	67.5
75	34 18.7	56 67	71.1	34 52.2	55 66	70.1	35 41.5	54 66	68.6	36 29.5	53 65	67.0
6	33 38.6	57 67	70.5	34 12.3	56 66	69.6	35 02.0	55 65	68.0	35 50.6	53 65	66.5
7	32 58.7	57 66	70.0	33 32.7	56 66	69.0	34 22.8	55 65	67.5	35 11.7	54 64	66.0
8	32 18.9	57 66	69.4	32 53.1	57 66	68.5	33 43.6	56 65	67.0	34 33.1	54 64	65.5
9	31 39.2	58 66	68.9	32 13.7	57 65	67.9	33 04.7	56 65	66.5	33 54.5	55 64	65.0
80	30 59.7	58 66	68.3	31 34.5	58 65	67.4	32 25.8	56 64	65.9	33 16.2	55 64	64.5
1	30 20.3	59 65	67.8	30 55.4	58 65	66.9	31 47.2	57 64	65.4	32 38.0	56 63	64.0
2	29 41.1	59 65	67.2	30 16.5	59 65	66.3	31 08.7	58 64	64.9	31 59.9	56 63	63.4
3	29 02.1	60 65	66.7	29 37.7	59 64	65.8	30 30.3	58 64	64.4	31 22.1	57 63	62.9
4	28 23.2	60 65	66.1	28 59.1	59 64	65.2	29 52.2	59 63	63.8	30 44.4	58 63	62.4
85	27 44.5	61 64	65.6	28 20.6	60 64	64.7	29 14.2	59 63	63.3	30 06.9	58 62	61.9
6	27 05.9	61 64	65.0	27 42.4	60 63	64.1	28 36.4	60 63	62.8	29 29.5	59 62	61.4
7	26 27.6	61 64	64.5	27 04.3	61 63	63.6	27 58.7	60 62	62.2	28 52.4	59 62	60.9
8	25 49.4	62 63	63.9	26 26.4	61 63	63.0	27 21.3	61 62	61.7	28 15.4	60 61	60.4
9	25 11.4	62 63	63.4	25 48.7	62 63	62.5	26 44.0	61 62	61.2	27 38.6	60 61	59.8
90	24 33.5	63 63	62.8	25 11.1	62 62	61.9	26 06.9	62 61	60.6	27 02.0	61 61	59.3

42° 00′ Alt.	Δd Δt	Az.	42° 30′ Alt.	Δd Δt	Az.	43° 00′ Alt.	Δd Δt	Az.	45° 00′ Alt.	Δd Δt	Az.	H.A.
° ′		°	° ′		°	° ′		°	° ′		°	°
87 00.0	1.0 09	180.0	87 30.0	1.0 10	180.0	88 00.0	1.0 13	180.0	90 00.0	.. 71	....	00
86 54.8	97 25	166.1	87 23.9	96 29	163.5	87 52.5	94 34	159.9	89 17.6	01 71	89.6	1
86 40.1	91 37	153.5	87 06.8	87 42	149.3	87 32.2	82 48	143.6	88 35.2	01 71	89.3	2
86 17.7	82 47	143.0	86 41.5	77 51	138.0	87 03.5	69 56	131.8	87 52.7	02 71	88.9	3
85 49.6	74 53	134.6	86 10.8	67 57	129.5	86 29.8	59 61	123.4	87 10.3	02 71	88.6	4
85 17.7	66 58	127.9	85 36.5	59 61	122.9	85 53.1	51 64	117.3	86 27.9	03 71	88.2	05
84 43.0	60 61	122.5	84 59.9	53 64	117.9	85 14.7	45 66	112.8	85 45.5	04 71	87.9	6
84 06.3	54 63	118.1	84 21.7	48 65	113.9	84 35.0	41 67	109.2	85 03.1	04 71	87.5	7
83 28.3	50 65	114.5	83 42.4	44 67	110.6	83 54.6	37 68	106.4	84 20.7	05 71	87.2	8
82 49.2	47 66	111.5	83 02.4	41 68	107.9	83 13.7	35 69	104.0	83 38.4	06 71	86.8	9
82 09.4	44 67	109.0	82 21.7	38 68	105.6	82 32.4	33 69	102.0	82 56.0	06 71	86.5	10
81 29.1	41 68	106.8	81 40.7	36 69	103.6	81 50.7	31 70	100.3	82 13.7	07 71	86.1	1
80 48.2	39 69	104.8	80 59.3	35 69	101.9	81 08.9	30 70	98.8	81 31.4	07 70	85.7	2
80 07.0	38 69	103.1	80 17.7	33 70	100.3	80 26.9	28 70	97.5	80 49.0	08 70	85.4	3
79 25.6	36 69	101.5	79 35.8	32 70	99.0	79 44.8	28 70	96.3	80 06.8	09 70	85.0	4
78 43.9	35 70	100.1	78 53.8	31 70	97.7	79 02.6	27 70	95.2	79 24.5	09 70	84.7	15
78 02.1	34 70	98.9	78 11.8	30 70	96.6	78 20.3	26 71	94.2	78 42.3	10 70	84.3	6
77 20.1	33 70	97.7	77 29.6	30 70	95.5	77 37.9	26 71	93.3	78 00.1	11 70	84.0	7
76 38.0	33 70	96.6	76 47.3	29 71	94.5	76 55.6	26 71	92.4	77 17.9	11 70	83.6	8
75 55.8	32 70	95.6	76 05.0	29 71	93.6	76 13.2	26 71	91.6	76 35.8	12 70	83.3	9
75 13.6	32 71	94.6	75 22.6	29 71	92.8	75 30.8	26 71	90.8	75 53.6	12 70	82.9	20
74 31.2	31 71	93.7	74 40.2	29 71	91.9	74 48.3	26 71	90.1	75 11.6	13 70	82.5	1
73 48.9	31 71	92.9	73 57.8	28 71	91.2	74 05.9	26 71	89.4	74 29.5	14 70	82.2	2
73 06.5	31 71	92.1	73 15.4	28 71	90.4	73 23.5	26 71	88.8	73 47.5	14 70	81.8	3
72 24.1	31 71	91.3	72 33.0	28 71	89.7	72 41.1	26 71	88.1	73 05.5	15 70	81.5	4
71 41.7	31 71	90.6	71 50.5	28 71	89.0	71 58.7	26 71	87.5	72 23.6	16 70	81.1	25
70 59.2	31 71	89.9	71 08.1	28 71	88.4	71 16.3	26 71	86.9	71 41.7	16 70	80.7	6
70 16.8	31 71	89.2	70 25.7	29 71	87.7	70 34.0	26 71	86.3	70 59.8	17 70	80.4	7
69 34.4	31 71	88.5	69 43.3	29 71	87.1	69 51.6	27 70	85.7	70 18.0	17 70	80.0	8
68 52.0	31 71	87.8	69 01.0	29 71	86.5	69 09.3	27 70	85.2	69 36.3	18 70	79.6	9
68 09.6	31 71	87.2	68 18.6	29 70	85.9	68 27.1	27 70	84.6	68 54.6	19 69	79.3	30
67 27.3	31 71	86.6	67 36.3	29 70	85.4	67 44.9	27 70	84.1	68 12.9	19 69	78.9	1
66 44.9	31 71	86.0	66 54.1	30 70	84.8	67 02.7	28 70	83.6	67 31.3	20 69	78.5	2
66 02.6	32 70	85.4	66 11.8	30 70	84.2	66 20.5	28 70	83.1	66 49.7	21 69	78.2	3
65 20.3	32 70	84.8	65 29.7	30 70	83.7	65 38.5	28 70	82.5	66 08.2	21 69	77.8	4
64 38.1	32 70	84.3	64 47.5	31 70	83.2	64 56.4	29 70	82.0	65 26.8	22 69	77.4	35
63 55.9	32 70	83.7	64 05.4	31 70	82.6	64 14.4	29 70	81.5	64 45.4	22 69	77.1	6
63 13.8	33 70	83.2	63 23.4	31 70	82.1	63 32.5	30 70	81.1	64 04.1	23 69	76.7	7
62 31.7	33 70	82.6	62 41.4	32 70	81.6	62 50.6	30 70	80.6	63 22.9	24 69	76.3	8
61 49.6	33 70	82.1	61 59.4	32 70	81.1	62 08.8	30 70	80.1	62 41.7	24 69	75.9	9
61 07.6	34 70	81.6	61 17.5	32 70	80.6	61 27.0	31 70	79.6	62 00.5	25 68	75.6	40
60 25.7	34 70	81.1	60 35.7	33 70	80.1	60 45.3	31 69	79.2	61 19.5	26 68	75.2	1
59 43.8	35 70	80.6	59 53.9	33 70	79.6	60 03.7	32 69	78.7	60 38.5	26 68	74.8	2
59 02.0	35 70	80.1	59 12.2	34 69	79.1	59 22.1	32 69	78.2	59 57.6	27 68	74.4	3
58 20.2	35 69	79.6	58 30.6	34 69	78.7	58 40.6	33 69	77.8	59 16.8	27 68	74.1	4
57 38.5	36 69	79.1	57 49.0	34 69	78.2	57 59.2	33 69	77.3	58 36.0	28 68	73.7	45
56 56.9	36 69	78.6	57 07.5	35 69	77.7	57 17.8	34 69	76.8	57 55.3	29 68	73.3	6
56 15.3	37 69	78.1	56 26.1	35 69	77.2	56 36.6	34 69	76.4	57 14.7	29 68	72.9	7
55 33.9	37 69	77.6	55 44.8	36 69	76.8	55 55.4	35 69	75.9	56 34.2	30 67	72.5	8
54 52.5	37 69	77.1	55 03.5	36 69	76.3	55 14.3	35 68	75.5	55 53.8	31 67	72.1	9
54 11.2	38 69	76.6	54 22.4	37 68	75.8	54 33.2	36 68	75.0	55 13.5	31 67	71.8	50
53 29.9	38 69	76.1	53 41.3	37 68	75.4	53 52.3	36 68	74.6	54 33.2	32 67	71.4	1
52 48.8	39 68	75.7	53 00.3	38 68	74.9	53 11.4	37 68	74.1	53 53.1	33 67	71.0	2
52 07.7	39 68	75.2	52 19.3	38 68	74.4	52 30.7	37 68	73.7	53 13.0	33 67	70.6	3
51 26.7	40 68	74.7	51 38.5	39 68	74.0	51 50.0	38 68	73.2	52 33.0	34 66	70.2	4
50 45.9	40 68	74.2	50 57.8	39 68	73.5	51 09.4	38 67	72.8	51 53.2	35 66	69.8	55
50 05.1	41 68	73.8	50 17.1	40 68	73.1	50 28.9	39 67	72.3	51 13.4	35 66	69.4	6
49 24.4	41 68	73.3	49 36.6	40 67	72.6	49 48.6	39 67	71.9	50 33.8	36 66	69.0	7
48 43.8	42 67	72.8	48 56.2	41 67	72.1	49 08.3	40 67	71.4	49 54.2	36 66	68.6	8
48 03.3	42 67	72.4	48 15.8	41 67	71.7	48 28.1	41 67	71.0	49 14.8	37 66	68.2	9
47 22.9	43 67	71.9	47 35.6	42 67	71.2	47 48.1	41 67	70.5	48 35.4	38 65	67.8	60
46 42.7	43 67	71.4	46 55.5	42 67	70.8	47 08.1	42 66	70.1	47 56.2	38 65	67.4	1
46 02.5	44 67	71.0	46 15.5	43 66	70.3	46 28.3	42 66	69.7	47 17.1	39 65	67.0	2
45 22.5	44 67	70.5	45 35.6	43 66	69.9	45 48.6	43 66	69.2	46 38.1	40 65	66.6	3
44 42.5	45 66	70.0	44 55.8	44 66	69.4	45 09.0	43 66	68.8	45 59.2	40 65	66.2	4
44 02.7	45 66	69.6	44 16.2	45 66	68.9	44 29.5	44 66	68.3	45 20.5	41 64	65.7	65
43 23.0	46 66	69.1	43 36.7	45 66	68.5	43 50.1	44 65	67.9	44 41.9	42 64	65.3	6
42 43.4	46 66	68.6	42 57.3	46 65	68.0	43 10.9	45 65	67.4	44 03.4	42 64	64.9	7
42 04.0	47 66	68.1	42 18.0	46 65	67.6	42 31.8	46 65	67.0	43 25.0	43 64	64.5	8
41 24.7	47 65	67.7	41 38.8	47 65	67.1	41 52.8	46 65	66.5	42 46.8	44 64	64.1	9
40 45.5	48 65	67.2	40 59.8	47 65	66.6	41 14.0	47 64	66.0	42 08.7	44 63	63.7	70
40 06.5	49 65	66.7	40 21.0	48 65	66.2	40 35.3	47 64	65.6	41 30.8	45 63	63.2	1
39 27.6	49 65	66.3	39 42.2	49 64	65.7	39 56.7	48 64	65.1	40 52.9	46 63	62.8	2
38 48.8	50 64	65.8	39 03.6	49 64	65.2	39 18.3	49 64	64.7	40 15.3	46 63	62.4	3
38 10.2	50 64	65.3	38 25.2	50 64	64.8	38 40.0	49 64	64.2	39 37.8	47 62	61.9	4
37 31.7	51 64	64.8	37 46.9	50 64	64.3	38 01.9	50 63	63.7	39 00.4	48 62	61.5	75
36 53.4	51 64	64.4	37 08.7	51 63	63.8	37 23.9	50 63	63.3	38 23.2	48 62	61.1	6
36 15.2	52 63	63.9	36 30.7	52 63	63.4	36 46.1	51 63	62.8	37 46.1	49 62	60.6	7
35 37.2	53 63	63.4	35 52.9	52 63	62.9	36 08.4	52 62	62.4	37 09.2	50 61	60.2	8
34 59.3	53 63	62.9	35 15.2	53 63	62.4	35 30.9	52 62	61.9	36 32.5	50 61	59.8	9
34 21.6	54 63	62.4	34 37.7	53 62	61.9	34 53.6	53 62	61.4	35 55.9	51 61	59.3	80
33 44.1	54 62	62.0	34 00.3	54 62	61.5	34 16.4	53 62	60.9	35 19.5	52 60	58.9	1
33 06.7	55 62	61.5	33 23.1	54 62	61.0	33 39.4	54 61	60.5	34 43.3	52 60	58.4	2
32 29.5	55 62	61.0	32 46.1	55 61	60.5	33 02.6	55 61	60.0	34 07.2	53 60	58.0	3
31 52.5	56 61	60.5	32 09.3	56 61	60.0	32 25.9	55 61	59.5	33 31.3	54 60	57.5	4
31 15.7	57 61	60.0	31 32.6	56 61	59.5	31 49.5	56 60	59.0	32 55.7	54 59	57.1	85
30 39.0	57 61	59.5	30 56.2	57 60	59.0	31 13.2	57 60	58.6	32 20.1	55 59	56.6	6
30 02.6	58 60	59.0	30 19.9	58 60	58.5	30 37.1	57 60	58.1	31 44.8	56 59	56.1	7
29 26.3	58 60	58.5	29 43.8	58 60	58.0	30 01.2	58 60	57.6	31 09.7	56 58	55.7	8
28 50.2	59 60	58.0	29 07.9	59 60	57.6	29 25.4	58 59	57.1	30 34.7	57 58	55.2	9
28 14.3	60 60	57.5	28 32.2	59 59	57.1	28 49.9	59 59	56.6	30 00.0	58 58	54.7	90

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DECLINATION CONTRARY NAME TO LATITUDE

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	°
00	9 00.0	1.0 01	180.0	8 00.0	1.0 00	180.0	6 30.0	1.0 00	180.0	5 00.0	1.0 00	180.0													00
1	8 59.7	1.0 02	179.2	7 59.7	1.0 01	179.2	6 29.7	1.0 01	179.2																1
2	8 58.8	1.0 03	178.4	7 58.8	1.0 02	178.4	6 28.8	1.0 02	178.4																2
3	8 57.3	1.0 04	177.5	7 57.3	1.0 03	177.6	6 27.4	1.0 03	177.6																3
4	8 55.2	1.0 05	176.7	7 55.2	1.0 04	176.8	6 25.3	1.0 04	176.9																4
05	8 52.4	1.0 06	175.9	7 52.5	1.0 05	176.0	6 22.7	1.0 05	176.1																05
6	8 49.1	1.0 07	175.1	7 49.3	1.0 06	175.2	6 19.5	1.0 06	175.3																6
7	8 45.2	1.0 08	174.3	7 45.4	1.0 07	174.4	6 15.7	1.0 07	174.5																7
8	8 40.6	1.0 09	173.5	7 40.9	1.0 08	173.6	6 11.4	1.0 08	173.7																8
9	8 35.5	99 10	172.6	7 35.9	99 09	172.8	6 06.4	99 09	172.9																9
10	8 29.8	99 11	171.8	7 30.2	99 10	172.0	6 00.9	99 10	172.1																10
1	8 23.4	99 12	171.0	7 24.0	99 11	171.2	5 54.8	99 11	171.4																1
2	8 16.5	99 13	170.2	7 17.2	99 12	170.4	5 48.2	99 12	170.6																2
3	8 09.0	99 13	169.4	7 09.8	99 13	169.6	5 41.0	99 13	169.8																3
4	8 00.9	98 14	168.6	7 01.8	99 14	168.8	5 33.2	99 14	169.0																4
15	7 52.3	98 15	167.8	6 53.3	98 15	168.0	5 24.8	98 15	168.3																15
6	7 43.0	98 16	167.0	6 44.2	98 16	167.2	5 15.9	98 16	167.5																6
7	7 33.2	98 17	166.2	6 34.5	98 17	166.4	5 06.4	98 17	166.7																7
8	7 22.8	98 18	165.4	6 24.2	98 18	165.6																			8
9	7 11.8	97 19	164.6	6 13.4	97 19	164.8																			9
20	7 00.2	97 20	163.8	6 02.0	97 20	164.1																			20
1	6 48.1	97 21	163.0	5 50.1	97 21	163.3																			1
2	6 35.5	96 22	162.2	5 37.6	96 22	162.5																			2
3	6 22.2	96 23	161.5	5 24.6	96 23	161.7																			3
4	6 08.5	96 24	160.7	5 11.0	96 24	161.0																			4
25	5 54.2	96 25	159.9																						25
6	5 39.3	96 26	159.1																						6
7	5 23.9	96 27	158.4																						7
8	5 08.0	94 28	157.6																						8

DECLINATION SAME NAME AS LATITUDE

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	°
91	23 55.9	63 62	62.2	24 33.8	63 62	61.4	25 30.1	62 61	60.1	26 25.7	61 60	58.8	27 38.6	60 59	57.0	27 56.7	60 59	56.6	28 14.6	60 59	56.1	29 25.5	58 57	54.3	91
2	23 18.4	64 62	61.7	23 56.6	63 62	60.8	24 53.4	63 61	59.6	25 49.5	62 60	58.3	27 03.2	61 59	56.5	27 21.4	61 58	56.1	27 39.5	60 58	55.6	28 51.1	59 57	53.8	2
3	22 41.2	64 62	61.1	23 19.7	64 61	60.3	24 16.9	63 60	59.0	25 13.5	63 60	57.7	26 27.9	61 58	56.0	26 46.3	61 58	55.6	27 04.6	61 58	55.1	28 17.0	60 57	53.3	3
4	22 04.1	65 61	60.6	22 42.9	64 61	59.7	23 40.6	64 60	58.5	24 37.7	63 59	57.2	25 52.8	62 58	55.5	26 11.4	62 58	55.0	26 29.9	62 57	54.6	27 43.1	60 56	52.8	4
95	21 27.3	65 61	60.0	22 06.4	65 61	59.2	23 04.6	64 60	57.9	24 02.2	64 59	56.7	25 18.0	63 58	55.0	25 36.7	62 57	54.5	25 55.4	62 57	54.1	27 09.4	61 56	52.3	95
6	20 50.7	66 61	59.4	21 30.1	65 60	58.6	22 28.7	65 59	57.4	23 26.8	64 59	56.1	24 43.3	63 57	54.5	25 02.3	63 57	54.0	25 21.2	63 57	53.6	26 35.9	62 55	51.9	6
7	20 14.2	66 60	58.9	20 54.0	66 60	58.0	21 53.1	65 59	56.8	22 51.7	65 58	55.6	24 08.9	64 57	53.9	24 28.1	64 57	53.5	24 47.1	63 56	53.1	26 02.7	62 55	51.4	7
8	19 38.0	67 60	58.3	20 18.1	67 59	57.5	21 17.7	66 59	56.3	22 16.8	65 58	55.1	23 34.7	65 57	53.4	23 54.1	64 56	53.0	24 13.3	64 56	52.6	25 29.6	63 55	50.9	8
9	19 02.1	67 60	57.7	19 42.4	67 59	56.9	20 42.5	67 58	55.7	21 42.1	66 57	54.5	23 00.8	65 56	52.9	23 20.3	65 56	52.5	23 39.7	65 56	52.1	24 56.8	64 54	50.4	9
100	18 26.3	68 59	57.1	19 07.0	68 59	56.3	20 07.6	67 58	55.2	21 07.7	67 57	54.0	22 27.1	66 56	52.4	22 46.8	66 55	52.0	23 06.4	65 55	51.5	24 24.3	64 54	49.9	100
1	17 50.8	68 59	56.5	18 31.8	68 58	55.8	19 32.9	68 57	54.6	20 33.5	67 57	53.4	21 53.6	66 55	51.8	22 13.5	66 55	51.4	22 33.3	66 55	51.0	23 51.9	65 53	49.4	1
2	17 15.5	69 58	56.0	17 56.8	69 58	55.2	18 58.4	68 57	54.0	19 59.6	68 56	52.9	21 20.4	67 55	51.3	21 40.4	67 55	50.9	22 00.4	67 54	50.5	23 19.9	66 53	48.9	2
3	16 40.5	69 58	55.4	17 22.1	69 57	54.6	18 24.2	69 57	53.5	19 25.9	68 56	52.3	20 47.4	68 55	50.8	21 07.6	67 54	50.4	21 27.8	67 54	50.0	22 48.0	66 53	48.4	3
4	16 05.7	70 58	54.8	16 47.6	70 57	54.0	17 50.2	69 56	52.9	18 52.4	69 55	51.8	20 14.6	68 54	50.2	20 35.1	68 54	49.8	20 55.5	68 54	49.4	22 16.5	67 52	47.9	4
105	15 31.2	71 57	54.2	16 13.4	70 57	53.5	17 16.5	70 56	52.3	18 19.2	69 55	51.2	19 42.2	69 54	49.7	20 02.8	69 53	49.3	20 23.4	68 53	48.9	21 45.1	68 52	47.3	105
6	14 56.9	71 57	53.6	15 39.5	71 56	52.9	16 43.0	70 55	51.8	17 46.3	70 54	50.6	19 10.0	69 53	49.1	19 30.8	69 53	48.8	19 51.5	69 53	48.4	21 14.1	68 51	46.8	6
7	14 22.9	72 56	53.0	15 05.8	71 56	52.3	16 09.8	71 55	51.2	17 13.6	71 54	50.1	18 38.0	70 53	48.6	18 59.0	70 52	48.2	19 19.9	70 52	47.8	20 43.2	69 51	46.3	7
8	13 49.1	72 56	52.4	14 32.3	72 55	51.7	15 36.9	72 54	50.6	16 41.2	71 54	49.5	18 06.3	71 52	48.0	18 27.5	71 52	47.7	18 48.6	70 52	47.3	20 12.7	70 50	45.8	8
9	13 15.6	73 55	51.8	13 59.2	72 55	51.1	15 04.3	72 54	50.0	16 09.1	72 53	48.9	17 34.9	71 52	47.5	17 56.3	71 52	47.1	18 17.6	71 51	46.7	19 42.4	70 50	45.2	9
110	12 42.4	73 55	51.2	13 26.3	73 54	50.5	14 31.9	73 53	49.4	15 37.2	72 53	48.4	17 03.8	72 51	46.9	17 25.3	72 51	46.6	17 46.8	72 51	46.2	19 12.4	71 50	44.7	110
1	12 09.5	74 54	50.6	12 53.7	74 54	49.9	13 59.8	73 53	48.8	15 05.6	73 52	47.8	16 32.9	73 51	46.4	16 54.7	72 51	46.0	17 16.4	72 50	45.6	18 42.7	72 49	44.2	1
2	11 36.9	74 54	50.0	12 21.4	74 53	49.3	13 28.0	74 52	48.3	14 34.3	74 52	47.2	16 02.4	73 50	45.8	16 24.3	73 50	45.4	16 46.2	73 50	45.1	18 13.3	72 49	43.6	2
3	11 04.5	75 53	49.4	11 49.4	75 53	48.7	12 56.5	74 52	47.7	14 03.4	74 51	46.6	15 32.1	74 50	45.2	15 54.2	74 50	44.9	16 16.3	74 49	44.5	17 44.2	73 48	43.1	3
4	10 32.5	75 53	48.7	11 17.7	75 52	48.1	12 25.3	75 52	47.1	13 32.7	75 51	46.0	15 02.1	74 49	44.7	15 24.4	74 49	44.3	15 46.7	74 49	44.0	17 15.3	74 48	42.6	4
115	10 00.8	76 52	48.1	10 46.3	76 52	47.5	11 54.4	76 51	46.5	13 02.3	75 50	45.5	14 32.4	75 49	44.1	14 54.9	75 49	43.7	15 17.3	75 48	43.4	16 46.8	74 47	42.0	115
6	9 29.3	76 52	47.5	10 15.2	76 51	46.8	11 23.8	76 50	45.9	12 32.2	76 50	44.9	14 03.1	76 48	43.5	14 25.7	75 48	43.2	14 48.4	75 48	42.8	16 18.5	75 47	41.5	6
7	8 58.2	77 51	46.9	9 44.4	77 51	46.2	10 53.5	77 50	45.2	12 02.4	76 49	44.3	13 34.0	76 48	42.9	13 56.9	76 48	42.6	14 19.7	76 47	42.3	15 50.6	76 46	40.9	7
8	8 27.4	78 51	46.2	9 13.9	77 50	45.6	10 23.5	77 49	44.6	11 33.0	77 49	43.7	13 05.3	77 47	42.4	13 28.3	77 47	42.0	13 51.3	77 47	41.7	15 23.0	76 46	40.4	8
9	7 56.9	78 50	45.6	8 43.8	78 50	45.0	9 53.9	78 49	44.0	11 03.9	78 48	43.1	12 36.9	77 47	41.8	13 00.1	77 47	41.4	13 23.2	77 46	41.1	14 55.6	77 45	39.8	9
120	7 26.8	79 50	45.0	8 13.9	79 49	44.3	9 24.6	78 48	43.4	10 35.1	78 47	42.4	12 08.8	78 46	41.2	12 32.1	78 46	40.9	12 55.5	78 46	40.5	14 28.7	77 44	39.2	120
1	6 57.0	79 49	44.3	7 44.5	79 49	43.7	8 55.6	79 48	42.8	10 06.6	79 47	41.8	11 41.0	79 46	40.6	12 04.6	78 45	40.3	12 28.1	78 45	39.9	14 02.0	78 44	38.7	1
2	6 27.5	80 49	43.7	7 15.3	80 48	43.1	8 27.0	80 47	42.1	9 38.5	79 46	41.2	11 13.6	79 45	40.0	11 37.3	79 45	39.7	12 01.0	79 45	39.4	13 35.6	79 43	38.1	2
3	5 58.4	80 48	43.0	6 46.5	80 47	42.4	7 58.7	80 47	41.5	9 10.7	80 46	40.6	10 46.5	80 45	39.4	11 10.4	80 44	39.1	11 34.3	80 44	38.8	13 09.6	79 43	37.5	3
4	5 29.6	81 47	42.4	6 18.1	81 47	41.8	7 30.7	81 46	40.9	8 43.2	81 45	40.0	10 19.7	80 44	38.8	10 43.8	80 44	38.5	11 07.9	80 43	38.2	12 44.0	80 42	36.9	4
125	5 01.2	81 47	41.7	5 50.0	81 46	41.1	7 03.1	81 45	40.2	8 16.2	81 45	39.4	9 53.3	81 43	38.2	10 17.6	81 43	37.9	10 41.8	81 43	37.6	12 18.6	81 42	36.4	125
6				5 22.3	82 46	40.5	6 35.9	82 45	39.6	7 49.4	82 44	38.7	9 27.3	81 43	37.6	9 51.7	81 43	37.3	10 16.2	81 42	37.0	11 53.7	81 41	35.8	6
7							6 09.1	82 44	38.9	7 23.1	82 43	38.1	9 01.6	82 42	36.9	9 26.2	82 42	36.6	9 50.8	82 42	36.4	11 29.0	82 40	35.2	7
8							5 42.6	83 44	38.3	6 57.1	83 43	37.5	8 36.3	83 42	36.3	9 01.1	83 41	36.0	9 25.9	83 41	35.7	11 04.8	82 40	34.6	8
9							5 16.5	83 43	37.6	6 31.5	83 42	36.8	8 11.4	83 41	35.7	8 36.3	83 41	35.4	9 01.3	83 40	35.1	10 40.9	83 39	34.0	9
130										6 06.3	84 41	36.2	7 46.8	84 40	35.1	8 11.9	84 40	34.8	8 37.0	84 40	34.5	10 17.3	83 39	33.4	130
1										5 41.4	84 41	35.5	7 22.6	84 40	34.4	7 47.9	84 39	34.2	8 13.2	84 39	33.9	9 54.1	84 38	32.8	1
2										5 17.0	85 40	34.9	6 58.8	85 39	33.8	7 24.3	85 39	33.5	7 49.7	85 38	33.3	9 31.3	85 37	32.2	2
3													6 35.4	85 38	33.2	7 01.0	85 38	32.9	7 26.6	85 38	32.6	9 08.9	85 37	31.6	3
4													6 12.4	86 38	32.5	6 38.2	86 37	32.3	7 03.9	86 37	32.0	8 46.9	86 36	31.0	4
135													5 49.8	86 37	31.9	6 15.7	86 37	31.6	6 41.6	86 36	31.4	8 25.3	86 35	30.4	135
6													5 27.6	87 36	31.2	5 53.7	87 36	31.0	6 19.8	87 36	30.7	8 04.0	87 35	29.7	6
7													5 05.8	88 36	30.6	5 32.0	87 35	30.3	5 58.3	87 35	30.1	7 43.2	87 34	29.1	7
8																5 10.8	88 35	29.7	5 37.2	88 34	29.5	7 22.7	88 33	28.5	8
9																			5 16.6	88 34	28.8	7 02.7	88 33	27.9	9
140																						6 43.1	89 32	27.2	140
1																						6 23.9	89 31	26.6	1
2																						6 05.1	90 31	26.0	2
3																						5 46.7	90 30	25.3	3
4																						5 28.8	91 29	24.7	4
145																						5 11.3	91 28	24.0	145

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Lat. 45°

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	
00	89 00.0	1.0 22	00.0	88 00.0	1.0 12	00.0	86 30.0	1.0 07	00.0	85 30.0	1.0 05	00.0	84 30.0	1.0 04	00.0	83 30.0	1.0 03	00.0	82 30.0	1.0 03	00.0	81 00.0	1.0 02	00.0	00
1	88 46.7	82 50	34.7	87 53.0	94 32	18.8	86 26.0	98 19	10.7	85 26.9	99 15	08.2	84 27.5	99 12	06.6	83 28.0	99 10	05.5	82 28.3	1.0 09	04.7	80 58.6	1.0 07	03.8	1
2	88 16.7	57 61	53.8	87 33.9	81 45	34.1	86 14.5	93 30	20.7	85 18.0	95 24	16.1	84 20.3	97 20	13.0	83 21.9	98 16	10.8	82 23.1	98 14	09.2	80 54.5	99 11	07.5	2
3	87 40.3	41 65	63.5	87 06.7	68 53	45.1	85 56.5	85 39	29.3	85 03.7	90 32	23.3	84 08.6	93 26	19.0	83 12.1	95 22	16.0	82 14.7	96 19	13.7	80 47.6	97 16	11.1	3
4	87 01.4	31 67	69.0	86 34.6	56 58	52.8	85 33.4	77 45	36.6	84 44.8	84 38	29.7	83 52.8	89 32	24.6	82 58.7	91 28	20.8	82 03.2	93 24	17.9	80 38.2	95 20	14.6	4
05	86 21.4	24 68	72.3	85 59.6	47 61	58.3	85 06.3	69 50	42.6	84 22.0	78 43	35.2	83 33.4	84 37	29.6	82 42.1	87 32	25.3	81 48.7	90 28	21.9	80 26.3	93 24	18.0	05
6	85 40.7	19 68	74.5	85 22.7	40 63	62.2	84 36.2	62 54	47.4	83 56.1	71 47	40.0	83 11.0	78 42	34.1	82 22.6	83 37	29.4	81 31.6	87 32	25.6	80 12.1	90 27	21.2	6
7	84 59.7	16 69	76.0	84 44.7	34 65	65.1	84 04.0	55 56	51.4	83 27.6	65 51	44.0	82 46.0	73 45	38.0	82 00.6	78 40	33.1	81 12.2	83 36	29.0	79 55.7	87 31	24.2	7
8	84 18.4	13 69	77.0	84 05.8	29 66	67.4	83 30.1	49 59	54.6	82 57.2	60 53	47.5	82 18.9	68 48	41.5	81 36.4	74 43	36.4	80 50.6	79 39	32.2	79 37.4	84 34	27.0	8
9	83 37.0	10 69	77.8	83 26.4	25 66	69.1	82 55.0	44 60	57.2	82 25.2	54 55	50.4	81 50.0	63 51	44.5	81 10.3	69 46	39.4	80 27.1	75 42	35.0	79 17.2	80 36	29.6	9
10	82 55.5	08 69	78.3	82 46.6	22 67	70.4	82 18.9	40 61	59.4	81 52.0	50 57	52.9	81 19.6	58 53	47.1	80 42.6	65 48	42.0	80 01.9	70 44	37.6	78 55.4	77 39	32.1	10
1	82 13.9	06 69	78.7	82 06.5	19 67	71.4	81 42.0	36 62	61.1	81 17.7	45 59	55.0	80 47.9	54 54	49.4	80 13.6	61 50	44.4	79 35.3	67 46	40.0	78 32.2	73 41	34.4	1
2	81 32.3	04 69	79.0	81 26.2	16 67	72.2	81 04.6	32 63	62.6	80 42.6	41 60	56.8	80 15.2	50 56	51.4	79 43.3	57 52	46.5	79 07.4	63 48	42.1	78 07.6	70 43	36.4	2
3	80 50.6	03 69	79.1	80 45.7	13 68	72.9	80 26.7	29 64	63.9	80 06.8	38 61	58.3	79 41.7	46 57	53.1	79 12.1	53 54	48.4	78 38.5	59 50	44.0	77 41.8	67 45	38.4	3
4	80 09.0	01 69	79.2	80 05.1	11 68	73.4	79 48.4	26 64	64.9	79 30.4	34 61	59.6	79 07.4	42 58	54.6	78 39.9	49 55	50.0	78 08.5	55 51	45.8	77 15.0	63 46	40.1	4
15	79 27.3	00 69	79.2	79 24.4	09 68	73.8	79 09.8	23 65	65.8	78 53.6	31 62	60.8	78 32.5	39 59	56.0	78 07.1	46 56	51.5	77 37.7	52 53	47.3	76 47.2	60 48	41.7	15
6	78 45.6	01 69	79.2	78 43.7	08 68	74.1	78 31.0	20 65	66.6	78 16.4	28 63	61.7	77 57.1	36 60	57.1	77 33.6	43 57	52.8	77 06.1	49 54	48.7	76 18.6	57 49	43.2	6
7	78 03.9	02 69	79.2	78 02.8	06 68	74.3	77 52.0	18 65	67.2	77 38.9	26 63	62.6	77 21.3	33 60	58.2	76 59.5	40 58	54.0	76 33.9	46 55	50.0	75 49.2	54 50	44.5	7
8	77 22.3	03 69	79.1	77 22.0	04 68	74.5	77 12.8	16 66	67.7	77 01.1	23 63	63.3	76 45.0	30 61	59.1	76 25.0	37 58	55.0	76 01.2	43 55	51.1	75 19.1	51 51	45.8	8
9	76 40.6	04 69	78.9	76 41.1	03 68	74.6	76 33.5	14 66	68.1	76 23.1	21 64	63.9	76 08.5	28 61	59.8	75 50.0	34 59	55.9	75 27.9	40 56	52.2	74 48.4	48 52	46.9	9
20	75 59.0	05 69	78.8	76 00.2	02 68	74.7	75 54.1	12 66	68.5	75 44.9	19 64	64.5	75 31.7	25 62	60.5	75 14.7	31 59	56.7	74 54.2	37 57	53.1	74 17.1	45 53	47.9	20
1	75 17.4	06 69	78.6	75 19.3	00 68	74.7	75 14.6	10 66	68.8	75 06.5	17 64	64.9	74 54.7	23 62	61.1	74 39.1	29 60	57.4	74 20.1	35 57	53.9	73 45.4	42 54	48.9	1
2	74 35.8	07 69	78.4	74 38.3	01 68	74.7	74 35.0	08 66	69.0	74 28.0	15 64	65.3	74 17.4	21 62	61.6	74 03.2	27 60	58.1	73 45.6	32 58	54.6	73 13.2	40 54	49.7	2
3	73 54.3	08 69	78.2	73 57.4	02 68	74.6	73 55.3	07 66	69.2	73 49.4	13 64	65.6	73 40.0	19 63	62.1	73 27.1	24 61	58.6	73 10.9	30 58	55.3	72 40.7	37 55	50.5	3
4	73 12.7	09 69	78.0	73 16.5	03 68	74.6	73 15.7	05 66	69.4	73 10.8	11 65	65.9	73 02.4	17 63	62.5	72 50.8	22 61	59.1	72 35.9	27 59	55.9	72 07.8	35 55	51.2	4
25	72 31.2	10 69	77.8	72 35.6	05 68	74.5	72 36.0	04 66	69.5	72 32.0	09 65	66.1	72 24.7	15 63	62.8	72 14.3	20 61	59.6	72 00.6	25 59	56.4	71 34.6	33 56	51.8	25
6	71 49.8	11 69	77.6	71 54.8	06 68	74.4	71 56.2	02 66	69.5	71 53.2	08 65	66.3	71 46.9	13 63	63.1	71 37.6	18 61	60.0	71 25.2	23 59	56.9	71 01.1	30 56	52.4	6
7	71 06.4	12 69	77.3	71 13.9	07 68	74.2	71 16.5	01 66	69.6	71 14.3	06 65	66.4	71 09.1	11 63	63.4	71 00.8	16 62	60.3	70 49.6	21 60	57.3	70 27.4	28 57	52.9	7
8	70 27.0	13 69	77.1	70 33.1	08 68	74.1	70 36.7	00 66	69.6	70 35.4	05 65	66.6	70 31.1	10 63	63.6	70 23.9	14 62	60.6	70 13.8	19 60	57.7	69 53.4	26 57	53.4	8
9	69 45.7	13 69	76.8	69 52.3	09 68	73.9	69 57.0	02 66	69.5	69 56.5	03 65	66.6	69 53.1	08 63	63.7	69 46.9	13 62	60.8	69 37.9	17 60	58.0	69 19.3	24 57	53.8	9
30	69 04.4	14 69	76.5	69 11.6	10 68	73.7	69 17.2	03 66	69.5	69 17.5	02 65	66.7	69 15.0	06 64	63.9	69 09.8	11 62	61.1	69 01.9	15 60	58.3	68 45.0	22 57	54.2	30
1	68 23.2	15 69	76.2	68 30.9	11 68	73.5	68 37.5	04 66	69.4	68 38.5	00 65	66.7	68 36.9	05 64	64.0	68 32.6	09 62	61.2	68 25.7	14 60	58.5	68 10.5	20 58	54.5	1
2	67 42.0	16 69	76.0	67 50.2	12 68	73.3	67 57.8	05 66	69.4	67 59.6	01 65	66.7	67 58.8	03 64	64.0	67 55.4	08 62	61.4	67 49.5	12 60	58.7	67 35.9	18 58	54.8	2
3	67 00.9	17 68	75.7	67 09.6	13 68	73.1	67 18.1	06 66	69.3	67 20.6	02 65	66.7	67 20.6	02 64	64.1	67 18.2	06 62	61.5	67 13.2	10 61	58.9	67 01.1	16 58	55.1	3
4	66 19.8	17 68	75.4	66 29.0	13 68	72.9	66 38.4	07 66	69.1	66 41.7	03 65	66.6	66 42.5	01 64	64.1	66 40.9	05 62	61.6	66 36.8	09 61	59.1	66 26.3	15 58	55.3	4
35	65 38.8	18 68	75.1	65 48.5	14 67	72.7	65 58.8	09 66	69.0	66 02.7	05 65	66.6	66 04.3	01 64	64.1	66 03.6	03 62	61.6	66 00.4	07 61	59.2	65 51.4	13 58	55.5	35
6	64 57.8	19 68	74.8	65 08.0	15 67	72.4	65 19.2	10 66	68.9	65 23.8	06 65	66.5	65 26.2	02 64	64.1	65 26.2	02 62	61.7	65 24.0	06 61	59.3	65 16.4	11 58	55.7	6
7	64 16.9	20 68	74.4	64 27.6	16 67	72.2	64 39.6	11 66	68.7	64 44.9	07 65	66.4	64 48.0	03 64	64.0	64 48.9	00 62	61.7	64 47.5	04 61	59.3	64 41.3	10 59	55.8	7
8	63 36.1	20 68	74.1	63 47.2	17 67	71.9	64 00.1	12 66	68.5	64 06.1	08 65	66.3	64 09.9	05 64	64.0	64 11.5	01 62	61.7	64 11.0	03 61	59.4	64 06.2	08 59	56.0	8
9	62 55.3	21 68	73.8	63 06.9	18 67	71.6	63 20.7	13 66	68.4	63 27.2	09 65	66.1	63 31.8	06 63	63.9	63 34.2	02 62	61.7	63 34.5	01 61	59.4	63 31.0	06 59	56.0	9
40	62 14.6	22 68	73.5	62 26.7	19 67	71.4	62 41.2	14 66	68.2	62 48.5	10 65	66.0	62 53.7	07 63	63.8	62 56.8	04 62	61.6	62 58.0	00 61	59.4	62 55.8	05 59	56.1	40
1	61 33.9	23 68	73.2	61 46.5	19 67	71.1	62 01.9	15 66	68.0	62 09.7	11 64	65.8	62 15.6	08 63	63.7	62 19.5	05 62	61.6	62 21.4	02 61	59.4	62 20.6	03 59	56.2	1
2	60 53.4	23 68	72.8	61 08.4	20 67	70.8	61 22.6	16 65	67.7	61 31.0	13 64	65.7	61 37.6	09 63	63.6	61 42.2	06 62	61.5	61 44.9	03 61	59.4	61 45.3	02 59	56.2	2
3	60 12.9	24 67	72.5	60 26.4	21 67	70.5	60 43.4	17 65	67.5	60 52.4	14 64	65.5	60 59.6	10 63	63.5	61 05.0	07 62	61.4	61 08.4	04 61	59.3	61 10.0	01 59	56.2	3
4	59 32.4	25 67	72.2	59 46.4	22 66	70.2	60 04.2	18 65	67.3	60 13.8	15 64	65.3	60 21.7	12 63	63.3	60 27.7	09 62	61.3	60 31.9	05 61	59.3	60 34.8	01 59	56.2	4
45	58 52.1	25 67	71.8	59 06.5	23 66	69.9	59 25.1	18 65	67.1	59 35.3	16 64	65.1	59 43.8	13 63	63.2	59 50.5	10 62	61.2	59 55.5	07 61	59.2	59 59.5	02 59	56.2	45
6	58 11.8	26 67	71.5	58 26.7	24 66	69.6	58 46.0	19 65	66.8	58 56.9	17 64	64.9	59 06.0	14 63	63.0	59 13.4	11 62	61.1	59 19.0	08 61	59.1	59 24.3	04 59	56.2	6
7	57 31.6	27 67	71.1	57 47.0	24 66	69.3	58 07.1	20 65	66.6	58 18.5	18 64	64.7	58 28.2	15 63	62.8	58 36.3	12 62	60.9	58 42.7	09 61	59.0	58 49.0	06 59	56.1	7
8	56 51.5	28 67	70.8	57 07.3	25 66	69.0	57 28.2	21 65	66.3	57 40.1	19 64	64.5	57 50.5	16 63	62.6	57 59.2	13 62	60.8	58 06.3	10 61	58.9	58 13.8	08 59	56.1	8
9	56 11.5	28 67	70.4	56 27.8	26 66	68.7	56 49.4	22 65	66.0	57 01.9	20 64	64.3	57 12.8	17 63	62.4	57 22.2	14 62	60.6	57 30.0	12 60	58.8	57 38.6	08 59	56.0	9
50	55 31.6	29 66	70.1	55 48.3	27 66	68.4	56 10.6	23 64	65.8	56 23.7	21 64	64.0	56 35.3	18 62	62.2	56 45.3	15 61	60.4	56 53.8	13 60	58.6	57 03.5	09 59	55.9	50
1	54 51.7	30 66	69.7	55 08.9	27 66	68.0	55 32.0	24 64	65.5	55 45.6	21 63	63.8	55 57.8	19 62	62.0	56 08.4	17 61	60.3	56 17.6	14 60	58.5	56 28.4	10 58	55.8	1
2	54 12.0	30 66	69.4	54 29.6	28 65	67.7	54 53.4	25 64	65.2	55 07.6	22 63	63.5	55 20.3	20 62	61.8	55 31.6	18 61	60.1	55 41.4	15 60	58.3	55 53.3	11 58	55.7	2
3	53 32.3	31 66	69.0	53 50.4	29 65	67.4	54 15.0	26 64	64.9	54 29.7	23 63	63.3	54 43.0	21 62	61.6	54 54.9	19 61	59.9	55 05.3	16 60	58.2	55 18.3	13 58	55.6	3
4	52 52.8	32 66	68.6	53 11.3	30 65	67.0	53 36.6	26 64	64.6	53 51.8	24 63	63.0	54 05.7	22 62	61.3	54 18.2	20 61	59.7	54 29.3	17 60	58.0	54 43.3	14 58	55.4	4
55	52 13.3	33 66	68.3	52 32.2	31 65	66.7	52 58.3	27 64	64.3	53 14.1	25 63	62.7	53 28.5	23 62	61.1	53 41.6	21 61	59.5	53 53.4	18 60	57.8	54 08.4	15 58	55.3	55
6	51 34.0	33 65	67.9	51 53.3	31 65	66.4	52 20.1	28 63	64.0	52 36.4	26 63	62.4	52 51.4	24 62	60.9	53 05.1	22 61	59.2	53 17.5	20 60	57.6	53 33.6	16 58	55.1	6
7	50 54.7	34 65	67.5	51 14.5	32 64	66.0	51 42.0	29 63	63.7	51 58.8	27 62	62.2	52 14.4	25 62	60.6	52 28.7	23 61	59.0	52 41.8	21 60	57.4	52 58.8	17 58	55.0	7
8	50 15.6	35 65	67.1	50 35.8	33 64	65.7	51 04.0	30 63	63.4	51 21.4	28 62	61.9	51 37.5	26 61	60.3	51 52.4	24 60	58.8	52 06.1	22 59	57.2	52 24.1	18 58	54.8	8
9	49 36.5	35 65	66.8	49 57.2	34 64	65.3	50 26.1	31 63	63.1	50 44.0	29 62	61.6	51 00.7	27 61	60.1	51 16.2	25 60	58.5	51 30.4	23 59	57.0	51 49.5	20 58	54.6	9
60	48 57.6	36 65	66.4	49 18.7	34 64	65.0	49 48.4	32 63	62.8	50 06.7	30 62	61.3	50 24.0	28 61	59.8	50 40.0	26 60	58.3	50 54.9	24 59	56.7	51 14.9	21 57	54.4	60
1	48 18.8	37 64	66.0	48 40.3	35 64	64.6	49 10.7	32 63	62.4	49 29.6	31 62	61.0	49 47.4	29 61	59.5	50 04.0	27 60	58.0	50 19.5	25 59	56.5	50 40.5	22 57	54.2	1
2	47 40.1	37 64	65.6	48 02.1	36 64	64.2	48 33.1	33 62	62.1	48 52.5	31 62	60.7	49 10.9	30 61	59.2	49 28.1	28 60	57.8	49 44.2	26 59	56.3	50 06.1	23 57	54.0	2
3	47 01.5	38 64	65.2	47 23.9	37 63	63.9	47 55.7	34 62	61.8	48 15.6	32 61	60.4	48 34.5	31 60	58.9	48 52.2	29 60	57.5	49 08.9	27 59	56.0	49 31.8	24 57	53.8	3
4	46 23.0	39 64	64.8	46 45.9	37 63	63.5	47 18.4	35 62	61.4	47 38.8	33 61	60.0	47 58.2	31 60	58.6	48 16.5	30 59	57.2	48 33.8	28 58	55.8	48 57.6	25 57	53.6	4
65	45 44.7	40 64	64.4	46 08.0	38 63	63.1	46 41.2	36 62	61.1	47 02.1	34 61	59.7	47 22.0	32 60	58.3	47 40.9	31 59	56.9	47 58.8	29 58	55.5	48 23.6	26 57	53.3	65
6	45 06.5	40 63	64.0	45 30.2	39 63	62.7	46 04.1	36 62	60.7	46 25.5	35 61	59.4	46 46.0	33 60	58.0	47 05.4	32 59	56.6	47 23.9	30 58	55.2	47 49.6	27 56	53.1	6
7	44 28.4	41 63	63.6	44 52.6	40 63	62.4	45 27.1	37 61	60.4	45 49.0	36 61	59.1	46 10.8	34 60	57.7	46 30.0	33 59	56.4	46 49.1	31 58	55.0	47 15.7	28 56	52.9	7
8	43 50.4	42 63	63.2	44 15.0	40 62	62.0	44 50.3	38 61	60.0	45 12.7	37 60	58.7	45 34.2	35 59	57.4	45 54.8	33 59	56.1	46 14.4	32 58	54.7	46 41.9	29 56	52.6	8
9	43 12.6	42 63	62.8	43 37.6	41 62	61.6	44 13.6	39 61	59.7	44 36.5	37 60	58.4	44 58.5	36 59	57.1	45 19.6	34 58	55.8	45 39.8	33 57	54.4	46 08.3	30 56	52.4	9
70	42 34.9	43 63	62.4	43 00.4	42 62	61.2	43 37.1	40 61	59.3	44 00.5	38 60	58.0	44 23.0	37 59	56.8	44 44.6	35 58	55.4	45 05.4	34 57	54.1	45 34.7	31 56	52.1	70
1	41 57.4	44 62	62.0	42 23.3	42 62	60.8	43 00.6	40 60	59.0	43 24.5	39 60	57.7	43 47.6	38 59	56.4	44 09.8	36 58	55.1	44 31.1	35 57	53.8	45 01.3	32 56	51.8	1
2	41 20.0	44 62	61.6	41 46.3	43 61	60.4	42 24.4	41 60	58.6	42 48.7	40 59	57.3	43 12.3	39 59	56.1	43 35.0	37 58	54.8	43 56.9	36 57	53.5	44 28.0	33 55	51.6	2
3	40 42.7	45 62	61.2	41 09.5	44 61	60.0	41 48.2	42 60	58.2	42 13.1	41 59	57.0	42 37.2	39 58	55.8	43 00.4	38 57	54.5	43 22.8	37 57	53.2	43 54.8	34 55	51.3	3
4	40 05.6	46 62	60.8	40 32.8	45 61	59.6	41 12.2	43 60	57.8	41 37.6	42 59	56.6	42 02.2	40 58	55.4	42 25.9	39 57	54.2	42 48.9	38 56	52.9	43 21.8	35 55	51.0	4
75	39 28.7	47 61	60.4	39 56.3	45 61	59.2	40 36.4	44 59	57.5	41 02.2	42 59	56.3	41 27.3	41 58	55.1	41 51.6	40 57	53.8	42 15.1	39 56	52.6	42 48.9	36 55	50.7	75
6	38 51.9	47 61	60.0	39 19.9	46 60	58.8	40 00.7	44 59	57.1	40 27.0	43 58	55.9	40 52.6	42 58	54.7	41 17.4	41 57	53.5	41 41.5	39 56	52.3	42 16.1	37 54	50.4	6
7	38 15.2	48 61	59.5	38 43.7	47 60	58.4	39 25.2	45 59	56.7	39 52.0	44 58	55.5	40 18.0	43 57	54.4	40 43.4	42 56	53.2	41 08.0	40 56	52.0	41 43.5	38 54	50.1	7
8	37 38.7	49 61	59.1	38 07.6	48 60	58.0	38 49.8	46 59	56.3	39 17.1	45 58	55.2	39 43.6	44 57	54.0	40 09.5	43 56	52.8	40 34.7	41 55	51.6	41 11.0	39 54	49.8	8
9	37 02.4	49 60	58.7	37 31.7	48 60	57.6	38 14.6	47 58	55.9	38 42.3	46 58	54.8	39 09.4	45 57	53.6	39 35.8	43 56	52.5	40 01.5	42 55	51.3	40 38.7	40 54	49.5	9
80	36 26.3	50 60	58.2	36 56.0	49 59	57.2	37 39.5	48 58	55.5	38 07.7	47 57	54.4	38 35.3	45 57	53.3	39 02.2	44 56	52.1	39 28.5	43 55	51.0	40 06.5	41 53	49.2	80
1	35 50.3	51 60	57.8	36 20.4	50 59	56.7	37 04.6	48 58	55.1	37 33.3	47 57	54.0	38 01.4	46 56	52.9	38 28.8	45 55	51.8	38 55.6	44 55	50.6	39 34.5	42 53	48.9	1
2	35 14.4	51 59	57.4	35 45.0	51 59	56.3	36 29.9	49 58	54.7	36 59.1	48 57	53.6	37 27.6	47 56	52.5	37 55.6	46 55	51.4	38 22.9	45 54	50.3	39 02.6	43 53	48.5	2
3	34 38.8	52 59	56.9	35 09.8	51 58	55.9	35 55.4	50 57	54.3	36 25.0	49 56	53.2	36 54.1	48 56	52.1	37 22.5	47 55	51.0	37 50.3	46 54	49.9	38 30.9	44 53	48.2	3
4	34 03.3	53 59	56.5	34 34.8	52 58	55.5	35 21.0	51 57	53.9	35 51.1	50 56	52.8	36 20.7	49 55	51.8	36 49.6	48 55	50.7	37 18.0	47 54	49.6	37 59.3	45 52	47.9	4
85	33 28.0	54 58	56.1	33 59.9	53 58	55.0	34 46.8	51 57	53.5	35 17.4	51 56	52.4	35 47.4	50 55	51.4	36 16.9	49 54	50.3	36 45.8	48 53	49.2	37 27.9	46 52	47.5	85
6	32 52.9	54 58	55.6	33 25.3	53 57	54.6	34 12.8	52 56	53.1	34 43.9	51 56	52.0	35 14.4	50 55	51.0	35 44.3	49 54	49.9	36 13.7	49 53	48.8	36 56.7	47 52	47.2	6
7	32 18.0	55 58	55.2	32 50.8	54 57	54.2	33 39.0	53 56	52.6	34 10.5	52 55	51.6	34 41.5	51 54	50.6	35 12.0	50 54	49.5	35 41.9	49 53	48.5	36 25.7	48 51	46.8	7
8	31 43.3	56 58	54.7	32 16.5	55 57	53.7	33 05.4	54 56	52.2	33 37.3	53 55	51.2	34 08.8	52 54	50.2	34 39.8	51 53	49.1	35 10.2	50 52	48.1	35 54.8	49 51	46.5	8
9	31 06.8	56 57	54.2	31 42.4	56 57	53.3	32 31.9	54 55	51.8	33 04.4	54 55	50.8	33 36.3	53 54	49.8	34 07.8	52 53	48.8	34 38.7	51 52	47.7	35 24.1	50 51	46.1	9
90	30 34.4	57 57	53.8	31 08.5	56 56	52.8	31 58.7	55 55	51.4	32 31.6	54 54	50.4	33 04.0	54 54	49.4	33 36.0	53 53	48.4	34 07.4	52 52	47.3	34 53.6	51 51	45.8	90

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		°
91	39 00.3	58 57	53.3	39 34.8	57 56	52.4	31 25.6	56 55	50.9	31 59.0	55 54	50.0	32 31.9	54 53	49.0	33 04.4	54 52	48.0	33 36.3	53 52	47.0	34 23.3	52 50	45.4	91
2	29 26.4	58 56	52.9	30 01.3	58 56	51.9	30 52.8	57 54	50.5	31 26.6	56 54	49.5	32 00.0	55 53	48.6	32 33.0	55 52	47.6	33 05.4	54 51	46.6	33 53.2	52 50	45.0	2
3	28 52.7	59 56	52.4	29 28.0	58 55	51.5	30 20.2	58 54	50.1	30 54.5	57 53	49.1	31 28.3	56 52	48.1	32 01.7	55 52	47.2	32 34.7	55 51	46.2	33 23.3	53 50	44.7	3
4	28 19.2	60 56	51.9	28 54.9	59 55	51.0	29 47.7	58 54	49.6	30 22.5	58 53	48.7	30 56.8	57 52	47.7	31 30.7	56 51	46.8	32 04.2	55 50	45.8	32 53.6	54 49	44.3	4
95	27 45.9	61 55	51.4	28 22.0	60 54	50.5	29 15.5	59 53	49.2	29 50.7	58 53	48.2	30 25.5	58 52	47.3	30 59.9	57 51	46.3	31 33.9	56 50	45.4	32 24.0	55 49	43.9	95
6	27 12.8	61 55	51.0	27 49.4	61 54	50.1	28 43.5	60 53	48.7	29 19.2	59 52	47.8	29 54.5	58 51	46.9	30 29.4	58 51	45.9	31 03.8	57 50	45.0	31 54.7	56 48	43.5	6
7	26 40.0	62 54	50.5	27 16.9	61 54	49.6	28 11.8	60 53	48.3	28 47.9	60 52	47.4	29 23.6	59 51	46.4	29 59.0	59 50	45.5	30 33.9	58 49	44.6	31 25.6	57 48	43.1	7
8	26 07.3	63 54	50.0	26 44.7	62 53	49.1	27 40.2	61 52	47.8	28 16.8	61 51	46.9	28 53.0	60 51	46.0	29 28.8	59 50	45.1	30 04.3	59 49	44.2	30 56.7	58 48	42.7	8
9	25 34.9	63 54	49.5	26 12.8	63 53	48.7	27 08.9	62 52	47.3	27 45.9	61 51	46.5	28 22.6	61 50	45.6	28 58.9	60 50	44.7	29 34.8	60 49	43.7	30 28.0	59 47	42.3	9
100	25 02.8	64 53	49.0	25 41.0	63 52	48.2	26 37.8	63 51	46.9	27 15.3	62 51	46.0	27 52.4	62 50	45.1	28 29.2	61 49	44.2	29 05.6	60 48	43.3	29 59.6	59 47	41.9	100
1	24 30.9	65 53	48.5	25 09.5	64 52	47.7	26 07.0	63 51	46.4	26 44.9	63 50	45.6	27 22.5	62 50	44.7	27 59.7	62 49	43.8	28 36.6	61 48	42.9	29 31.3	60 47	41.5	1
2	23 59.2	65 52	48.0	24 38.3	65 52	47.2	25 36.3	64 51	45.9	26 14.7	64 50	45.1	26 52.7	63 49	44.2	27 30.5	63 48	43.4	28 07.9	62 48	42.5	29 03.3	61 46	41.1	2
3	23 27.8	66 52	47.5	24 07.3	66 51	46.7	25 06.0	65 50	45.5	25 44.8	64 49	44.6	26 23.3	64 49	43.8	27 01.5	63 48	42.9	27 39.3	63 47	42.0	28 35.5	62 46	40.7	3
4	22 56.6	67 52	47.0	23 36.5	66 51	46.2	24 35.8	66 50	45.0	25 15.1	65 49	44.2	25 54.0	65 48	43.3	26 32.7	64 48	42.5	27 11.0	64 47	41.6	28 08.0	63 46	40.3	4
105	22 25.7	67 51	46.5	23 06.0	67 50	45.7	24 06.0	66 49	44.5	24 45.6	66 49	43.7	25 25.0	65 48	42.9	26 04.2	65 47	42.0	26 43.0	64 46	41.2	27 40.6	64 45	39.9	105
6	21 55.0	68 51	46.0	22 35.7	68 50	45.2	23 36.4	67 49	44.0	24 16.5	67 48	43.2	24 56.3	66 47	42.4	25 35.9	66 47	41.6	26 15.2	65 46	40.7	27 13.6	64 45	39.5	6
7	21 24.6	69 50	45.5	22 05.7	68 50	44.7	23 07.0	68 48	43.6	23 47.5	67 48	42.7	24 27.8	67 47	41.9	25 07.9	67 46	41.1	25 47.6	66 46	40.3	26 46.7	65 44	39.0	7
8	20 54.5	69 50	45.0	21 36.0	69 49	44.2	22 37.9	68 48	43.1	23 18.9	68 47	42.3	23 59.6	68 47	41.5	24 40.1	67 46	40.7	25 20.3	67 45	39.8	26 20.1	66 44	38.6	8
9	20 24.6	70 49	44.5	21 06.5	70 49	43.7	22 09.1	69 48	42.6	22 50.5	69 47	41.8	23 31.6	68 46	41.0	24 12.6	68 45	40.2	24 53.3	68 45	39.4	25 53.8	67 43	38.2	9
110	19 55.0	71 49	44.0	20 37.3	70 48	43.2	21 40.5	70 47	42.1	22 22.3	70 46	41.3	23 04.0	69 46	40.5	23 45.3	69 45	39.7	24 26.5	68 44	38.9	25 27.7	68 43	37.7	110
1	19 25.7	71 48	43.4	20 08.4	71 48	42.7	21 12.2	71 47	41.6	21 54.5	70 46	40.8	22 36.5	70 45	40.0	23 18.4	70 45	39.3	23 59.9	69 44	38.5	25 01.9	68 43	37.3	1
2	18 56.6	72 48	42.9	19 39.8	72 47	42.2	20 44.2	71 46	41.1	21 26.9	71 46	40.3	22 09.4	71 45	39.6	22 51.6	70 44	38.8	23 33.7	70 43	38.0	24 36.3	69 42	36.8	2
3	18 27.9	73 47	42.4	19 11.5	72 47	41.7	20 16.5	72 46	40.6	20 59.6	72 45	39.8	21 42.5	71 44	39.1	22 25.2	71 44	38.3	23 07.7	71 43	37.5	24 11.0	70 42	36.4	3
4	17 59.4	73 47	41.9	18 43.4	73 46	41.1	19 49.0	73 45	40.0	20 32.6	72 45	39.3	21 15.9	72 44	38.6	21 59.0	72 43	37.8	22 42.0	71 42	37.1	23 46.0	71 41	35.9	4
115	17 31.3	74 46	41.3	18 15.6	74 46	40.6	19 21.9	73 45	39.5	20 05.8	73 44	38.8	20 49.6	73 43	38.1	21 33.2	72 43	37.3	22 16.5	72 42	36.6	23 21.2	72 41	35.5	115
6	17 03.4	75 46	40.8	17 48.2	74 45	40.1	18 55.0	74 44	39.0	19 39.4	74 44	38.3	20 23.6	74 43	37.6	21 07.6	73 42	36.9	21 51.4	73 41	36.1	22 56.8	72 40	35.0	6
7	16 35.9	75 45	40.2	17 21.0	75 45	39.5	18 28.5	75 44	38.5	19 13.2	74 43	37.8	19 57.8	74 42	37.1	20 42.3	74 42	36.4	21 26.5	74 41	35.6	22 32.6	73 40	34.5	7
8	16 08.6	76 45	39.7	16 54.2	76 44	39.0	18 02.2	75 43	38.0	18 47.4	75 43	37.3	19 32.4	75 42	36.6	20 17.3	75 41	35.9	21 01.9	74 40	35.2	22 08.6	74 39	34.1	8
9	15 41.7	77 44	39.1	16 27.6	76 44	38.5	17 36.2	76 43	37.4	18 21.8	76 42	36.8	19 07.3	76 41	36.1	19 52.5	75 41	35.4	20 37.7	75 40	34.7	21 45.0	75 39	33.6	9
120	15 15.1	77 44	38.6	16 01.4	77 43	37.9	17 10.6	77 42	36.9	17 56.6	77 42	36.2	18 42.4	76 41	35.6	19 28.1	76 40	34.9	20 13.7	76 40	34.2	21 21.7	75 38	33.1	120
1	14 48.8	78 43	38.0	15 35.5	78 43	37.4	16 45.3	77 42	36.4	17 31.7	77 41	35.7	18 17.9	77 40	35.0	19 04.0	77 40	34.4	19 50.0	76 39	33.7	20 58.6	76 38	32.7	1
2	14 22.8	79 43	37.5	15 09.9	78 42	36.8	16 20.3	78 41	35.8	17 07.1	78 40	35.2	17 53.7	78 40	34.5	18 40.2	77 39	33.9	19 26.6	77 38	33.2	20 35.9	77 37	32.2	2
3	13 57.2	79 42	36.9	14 44.6	79 42	36.3	15 55.6	79 41	35.3	16 42.8	79 40	34.7	17 29.8	78 39	34.0	18 16.7	78 39	33.4	19 03.5	78 38	32.7	20 13.5	77 37	31.7	3
4	13 31.9	80 42	36.3	14 19.7	80 41	35.7	15 31.2	79 40	34.8	16 18.8	79 39	34.1	17 06.3	79 39	33.5	17 53.6	79 38	32.8	18 40.8	79 37	32.2	19 51.3	78 36	31.2	4
125	13 06.9	80 41	35.8	13 55.1	80 40	35.1	15 07.2	80 39	34.2	15 55.2	80 39	33.6	16 43.0	80 38	33.0	17 30.7	79 38	32.3	18 18.3	79 37	31.7	19 29.5	79 36	30.7	125
6	12 42.3	81 40	35.2	13 30.9	81 40	34.6	14 43.5	81 39	33.7	15 31.9	80 38	33.0	16 20.1	80 38	32.4	17 08.2	80 37	31.8	17 56.2	80 36	31.2	19 08.0	80 35	30.2	6
7	12 18.0	82 40	34.6	13 07.0	81 39	34.0	14 20.2	81 38	33.1	15 08.9	81 38	32.5	15 57.5	81 37	31.9	16 46.0	81 36	31.3	17 34.4	81 36	30.7	18 46.8	80 35	29.7	7
8	11 54.1	82 39	34.0	12 43.4	82 39	33.4	13 57.2	82 38	32.5	14 46.3	82 37	32.0	15 35.3	82 36	31.4	16 24.1	81 36	30.8	17 12.9	81 35	30.1	18 25.9	81 34	29.2	8
9	11 30.6	83 39	33.4	12 20.2	83 38	32.9	13 34.5	82 37	32.0	14 24.0	82 37	31.4	15 13.4	82 36	30.8	16 02.6	82 35	30.2	16 51.8	82 35	29.6	18 05.4	82 34	28.7	9
130	11 07.4	83 38	32.8	11 57.4	83 37	32.3	13 12.2	83 37	31.4	14 02.1	83 36	30.9	14 51.8	83 35	30.3	15 41.4	83 35	29.7	16 31.0	83 34	29.1	17 45.1	82 33	28.2	130
1	10 44.5	84 37	32.2	11 34.9	84 37	31.7	12 50.3	84 36	30.9	13 40.5	84 35	30.3	14 30.6	83 35	29.7	15 20.6	83 34	29.2	16 10.5	83 34	28.6	17 25.2	83 33	27.7	1
2	10 22.1	85 37	31.7	11 12.8	84 36	31.1	12 28.7	84 35	30.3	13 19.3	84 35	29.7	14 09.7	84 34	29.2	15 00.1	84 34	28.6	15 50.4	84 33	28.1	17 05.7	84 32	27.2	2
3	10 00.0	85 36	31.1	10 51.1	85 36	30.5	12 07.5	85 35	29.7	12 58.4	85 34	29.2	13 49.2	85 34	28.6	14 40.0	85 33	28.1	15 30.6	84 32	27.5	16 46.5	84 31	26.7	3
4	9 38.3	86 36	30.5	10 29.7	86 35	29.9	11 46.7	85 34	29.1	12 37.9	85 34	28.6	13 29.1	85 33	28.1	14 20.2	85 32	27.5	15 11.2	85 32	27.0	16 27.6	85 31	26.2	4
135	9 17.0	86 35	29.8	10 08.7	86 34	29.3	11 26.2	86 33	28.6	12 17.8	86 33	28.0	13 09.3	86 32	27.5	14 00.7	86 32	27.0	14 52.1	86 31	26.4	16 09.1	85 30	25.6	135
6	8 56.1	87 34	29.2	9 48.1	87 34	28.7	11 06.1	87 33	28.0	11 58.0	86 32	27.5	12 49.9	86 32	26.9	13 41.7	86 31	26.4	14 33.4	86 31	25.9	15 50.9	86 30	25.1	6
7	8 35.6	87 34	28.6	9 27.9	87 33	28.1	10 46.4	87 32	27.4	11 38.6	87 32	26.9	12 30.8	87 31	26.4	13 23.0	87 31	25.9	14 15.1	87 30	25.4	15 33.0	87 29	24.6	7
8	8 15.4	88 33	28.0	9 06.1	88 32	27.5	10 27.1	88 32	26.8	11 19.6	88 31	26.3	12 12.2	88 30	25.8	13 04.6	87 30	25.3	13 57.1	87 29	24.8	15 15.6	87 29	24.1	8
9	7 55.7	88 32	27.4	8 48.7	88 32	26.9	10 08.1	88 31	26.2	11 01.0	88 30	25.7	11 53.9	88 30	25.2	12 46.7	88 29	24.8	13 39.4	88 29	24.3	14 58.5	88 28	23.5	9
140	7 36.4	89 32	26.8	8 29.7	89 31	26.3	9 49.6	89 30	25.6	10 42.8	89 30	25.1	11 36.0	89 29	24.7	12 29.1	88 29	24.2	13 22.2	88 28	23.7	14 41.7	88 27	23.0	140
1	7 17.5	89 31	26.2	8 11.1	89 30	25.7	9 31.5	89 30	25.0	10 25.0	89 29	24.6	11 18.5	89 29	24.1	12 11.9	89 28	23.6	13 05.3	89 28	23.2	14 25.3	89 27	22.5	1
2	6 59.0	90 30	25.5	7 52.9	90 30	25.1	9 13.7	90 29	24.4	10 07.5	90 28	24.0	11 01.3	90 28	23.5	11 55.1	90 27	23.1	12 48.8	89 27	22.6	14 09.3	89 26	21.9	2
3	6 40.9	90 29	24.9	7 35.1	90 29	24.5	8 56.4	90 28	23.8	9 50.5	90 28	23.4	10 44.6	90 27	22.9	11 38.7	90 27	22.5	12 32.7	90 26	22.0	13 53.6	90 25	21.4	3
4	6 23.3	91 29	24.3	7 17.8	91 28	23.8	8 39.5	91 28	23.2	9 33.9	91 27	22.8	10 28.3	91 27	22.3	11 22.6	91 26	21.9	12 17.0	91 26	21.5	13 38.4	90 25	20.8	4
145	6 06.1	91 28	23.6	7 00.8	91 28	23.2	8 23.0	91 27	22.6	9 17.7	91 26	22.2	10 12.4	91 26	21.8	11 07.0	91 25	21.3	12 01.6	91 25	20.9	13 23.5	91 24	20.3	145
6	5 49.3	92 27	23.0	6 44.3	92 27	22.6	8 06.9	92 26	22.0	9 01.9	92 26	21.6	9 56.8	92 25	21.2	10 51.8	92 25	20.8	11 46.7	91 24	20.3	13 09.0	91 24	19.7	6
7	5 32.9	92 26	22.3	6 28.3	92 26	22.0	7 51.2	92 25	21.4	8 46.5	92 25	21.0	9 41.7	92 24	20.6	10 36.9	92 24	20.2	11 32.1	92 24	19.8	12 54.8	92 23	19.2	7
8	5 17.0	93 26	21.7	6 12.6	93 25	21.3	7 36.0	93 25	20.7	8 31.5	93 24	20.4	9 27.0	93 24	20.0	10 22.5	92 23	19.6	11 18.0	92 23	19.2	12 41.1	92 22	18.6	8
9	5 01.6	93 25	21.0	5 57.4	93 25	20.7	7 21.1	93 24	20.1	8 16.9	93 24	19.8	9 12.7	93 23	19.4	10 08.5	93 23	19.0	11 04.2	93 22	18.6	12 27.7	93 22	18.1	9
150				5 42.7	93 24	20.0	7 06.8	93 23	19.5	8 02.8	93 23	19.1	8 58.9	93 22	18.8	9 54.9	93 22	18.4	10 50.9	93 22	18.1	12 14.8	93 21	17.5	150
1				5 28.3	94 23	19.4	6 52.8	94 23	18.9	7 49.1	94 22	18.5	8 45.4	94 22	18.2	9 41.7	94 21	17.8	10 37.9	94 21	17.5	12 02.2	94 20	16.9	1
2				5 14.5	94 22	18.8	6 39.3	94 22	18.3	7 35.9	94 21	17.9	8 32.4	94 21	17.6	9 28.9	94 21	17.2	10 25.4	94 20	16.9	11 50.1	94 20	16.4	2
3				5 01.1	95 22	18.1	6 26.2	95 21	17.6	7 23.0	95 21	17.3	8 19.8	95 20	17.0	9 16.5	95 20	16.6	10 13.3	95 20	16.3	11 38.3	94 19	15.8	3
4							6 13.6	95 20	17.0	7 10.6	95 20	16.7	8 07.6	95 20	16.4	9 04.6	95 19	16.0	10 01.5	95 19	15.7	11 26.9	95 18	15.2	4
155							6 01.4	95 20	16.4	6 58.7	95 19	16.1	7 55.9	95 19	15.7	8 53.1	95 18	15.4	9 50.3	95 18	15.1	11 16.0	95 18	14.7	155
6							5 49.7	96 19	15.7	6 47.2	96 18	15.4	7 44.6	96 18	15.1	8 42.0	96 18	14.8	9 39.4	96 17	14.5	11 05.5	96 17	14.1	6
7							5 38.5	96 18	15.1	6 36.1	96 18	14.8	7 33.7	96 17	14.5	8 31.3	96 17	14.2	9 28.9	96 17	14.0	10 55.3	96 16	13.5	7
8							5 27.7	96 17	14.4	6 25.5	96 17	14.2	7 23.3	96 17	13.9	8 21.1	96 16	13.6	9 18.9	96 16	13.4	10 45.6	96 16	13.0	8
9							5 17.3	97 16	13.8	6 15.3	97 16	13.5	7 13.3	97 16	13.3	8 11.3	97 16	13.0	9 09.3	97 15	12.8	10 36.3	97 15	12.4	9
160							5 07.4	97 16	13.2	6 05.6	97 15	12.9	7 03.8	97 15	12.7	8 02.0	97 15	12.4	9 00.2	97 15	12.2	10 27.4	97 14	11.8	160
1										5 56.4	97 15	12.3	6 54.7	97 14	12.0	7 53.1	97 14	11.8	8 51.5	97 14	11.6	10 19.0	97 13	11.2	1
2										5 47.6	98 14	11.6	6 46.1	98 14	11.4	7 44.6	98 13	11.2	8 43.2	98 13	11.0	10 10.9	98 13	10.6	2
3										5 39.3	98 13	11.0	6 37.9	98 13	10.8	7 36.6	98 13	10.6	8 35.3	98 12	10.4	10 03.3	98 12	10.1	3
4										5 31.4	98 12	10.4	6 30.2	98 12	10.2	7 29.1	98 12	10.0	8 27.9	98 12	09.8	9 56.1	98 11	09.5	4
165										5 24.0	98 12	09.7	6 23.0	98 11	09.5	7 21.9	98 11	09.3	8 20.9	98 11	09.2	9 49.4	98 11	08.9	165
6										5 17.1	99 11	09.1	6 16.2	99 11	08.9	7 15.3	99 10	08.7	8 14.4	98 10	08.6	9 43.0	98 10	08.3	6
7										5 10.6	99 10	08.4	6 09.8	99 10	08.3	7 09.1	99 10	08.1	8 08.3	99 09	08.0	9 37.1	99 09	07.7	7
8										5 04.6	99 09	07.8	6 04.0	99 09	07.6	7 03.3	99 09	07.5	8 02.6	99 09	07.3	9 31.6	99 08	07.1	8
9													5 58.6	99 08	07.0	6 58.0	99 08	06.9	7 57.4	99 08	06.7	9 26.6	99 08	06.5	9
170													5 53.6	99 07	06.4	6 53.1	99 07	06.3	7 52.7	99 07	06.1	9 22.0	99 07	05.9	170
1													5 49.1	99 07	05.7	6 48.8	99 07	05.6	7 48.4	99 06	05.5	9 17.8	99 06	05.3	1
2													5 45.1	1.0 06	05.1	6 44.8	1.0 06	05.0	7 44.5	1.0 06	04.9	9 14.1	1.0 06	04.8	2
3													5 41.6	1.0 05	04.5	6 41.4	1.0 05	04.4	7 41.1	1.0 05	04.3	9 10.8	1.0 05	04.2	3
4													5 38.5	1.0 04	03.8	6 38.3	1.0 04	03.8	7 38.2	1.0 04	03.7	9 07.9	1.0 04	03.6	4
175													5 35.9	1.0 04	03.2	6 35.8	1.0 03	03.1	7 35.7	1.0 03	03.1	9 05.5	1.0 03	03.0	175
6													5 33.8	1.0 03	02.6	6 33.7	1.0 03	02.5	7 33.6	1.0 03	02.5	9 03.5	1.0 03	02.4	6
7													5 32.1	1.0 02	01.9	6 32.1	1.0 02	01.9	7 32.0	1.0 02	01.8	9 02.0	1.0 02	01.8	7
8													5 30.9	1.0 01	01.3	6 30.9	1.0 01	01.3	7 30.9	1.0 01	01.2	9 00.9	1.0 01	01.2	8
9													5 30.2	1.0 00	00.6	6 30.2	1.0 00	00.6	7 30.2	1.0 00	00.6	9 00.2	1.0 00	00.6	9
180													5 30.0	1.0 00	00.0	6 30.0	1.0 00	00.0	7 30.0	1.0 00	00.0	9 00.0	1.0 00	00.0	180

Lat. 45°

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	80 30.0	1.0 02	00.0	80 00.0	1.0 02	00.0	79 00.0	1.0 02	00.0	78 30.0	1.0 02	00.0	78 00.0	1.0 02	00.0	77 30.0	1.0 02	00.0	76 00.0	1.0 01	00.0	75 30.0	1.0 01	00.0	00
1	80 28.7	1.0 06	03.5	79 58.8	1.0 06	03.3	78 58.9	1.0 05	02.9	78 29.0	1.0 05	02.8	77 59.0	1.0 05	02.6	77 29.1	1.0 05	02.5	75 59.2	1.0 04	02.1	75 29.2	1.0 04	02.0	1
2	80 24.8	99 11	07.0	79 55.1	99 10	06.6	78 55.7	99 09	05.8	78 25.9	99 08	05.5	77 56.1	99 08	05.2	77 26.3	99 08	04.9	75 56.9	99 07	04.2	75 27.0	1.0 06	04.0	2
3	80 18.4	98 15	10.4	79 49.1	98 14	09.8	78 50.3	98 12	08.7	78 20.8	98 12	08.2	77 51.3	98 11	07.8	77 21.8	99 11	07.4	75 52.9	99 09	06.3	75 23.3	99 09	06.0	3
4	80 09.5	96 19	13.7	79 40.8	96 18	12.9	78 42.9	97 16	11.5	78 13.8	97 15	10.9	77 44.6	97 14	10.3	77 15.4	97 13	09.8	75 47.5	98 12	08.4	75 18.1	98 11	08.0	4
05	79 58.3	94 22	16.9	79 30.2	94 21	15.9	78 33.4	95 19	14.2	78 04.8	95 18	13.5	77 36.2	96 17	12.8	77 07.4	96 16	12.1	75 40.5	97 14	10.5	75 11.4	97 13	10.0	05
6	79 44.9	91 26	19.9	79 17.5	92 24	18.8	78 22.0	93 22	16.9	77 54.1	94 21	16.0	77 25.9	94 20	15.2	76 57.6	94 19	14.4	75 32.1	96 16	12.4	75 03.4	96 16	11.9	6
7	79 29.4	88 29	22.8	79 02.8	89 28	21.6	78 08.9	91 25	19.4	77 41.5	91 24	18.4	77 14.0	92 23	17.5	76 46.3	93 22	16.6	75 22.3	94 19	14.4	74 54.0	94 18	13.7	7
8	79 12.0	85 32	25.6	78 46.3	86 30	24.2	77 53.9	88 28	21.8	77 27.3	89 26	20.7	77 00.4	90 25	19.7	76 33.4	91 24	18.8	75 11.0	92 21	16.3	74 43.3	93 20	15.5	8
9	78 52.9	82 35	28.1	78 28.1	83 33	26.7	77 37.4	86 30	24.1	77 11.5	87 29	22.9	76 45.4	88 27	21.8	76 19.0	88 26	20.8	74 58.5	90 23	18.1	74 31.3	91 22	17.3	9
10	78 32.1	79 37	30.5	78 08.3	80 35	29.0	77 19.3	83 32	26.3	76 54.3	84 31	25.0	76 28.9	85 30	23.9	76 03.2	86 28	22.8	74 44.7	88 25	19.9	74 18.0	89 24	19.0	10
1	78 09.9	75 39	32.7	77 47.0	77 38	31.1	76 59.9	80 35	28.3	76 35.7	81 33	27.0	76 11.1	83 32	25.8	75 46.2	84 30	24.6	74 29.7	86 27	21.6	74 03.6	87 26	20.6	1
2	77 46.3	72 41	34.8	77 24.4	74 40	33.2	76 39.1	77 37	30.2	76 15.8	79 35	28.9	75 52.0	80 34	27.6	75 27.9	81 32	26.4	74 13.5	84 29	23.2	73 48.1	85 28	22.2	2
3	77 21.6	69 43	36.7	77 00.7	71 41	35.0	76 17.2	74 38	32.0	75 54.7	76 37	30.7	75 31.8	77 36	29.4	75 08.4	78 34	28.1	73 56.3	82 30	24.8	73 31.6	83 29	23.7	3
4	76 55.7	65 45	38.4	76 35.8	67 43	36.8	75 54.1	71 40	33.7	75 32.5	73 39	32.3	75 10.4	74 37	31.0	74 47.9	76 36	29.7	73 38.0	79 32	26.2	73 14.0	81 31	25.2	4
15	76 28.9	62 46	40.0	76 09.9	64 45	38.4	75 30.1	68 42	35.3	75 09.4	70 40	33.9	74 48.1	72 39	32.5	74 26.4	73 37	31.2	73 18.8	77 34	27.7	72 55.5	78 32	26.6	15
6	76 01.2	59 47	41.5	75 43.1	61 46	39.9	75 05.1	65 43	36.8	74 45.2	67 42	35.3	74 24.8	69 40	34.0	74 04.0	70 39	32.6	72 58.6	75 35	29.0	72 36.1	76 34	27.9	6
7	75 32.7	56 49	42.9	75 15.5	58 47	41.2	74 39.3	62 44	38.2	74 20.3	64 43	36.7	74 00.7	66 42	35.3	73 40.6	68 40	34.0	72 37.6	72 36	30.3	72 15.8	73 35	29.1	7
8	75 03.5	53 50	44.1	74 47.2	55 48	42.5	74 12.7	60 45	39.4	73 54.5	62 44	38.0	73 35.8	63 43	36.6	73 16.5	65 41	35.2	72 15.8	70 38	31.5	71 54.7	71 36	30.3	8
9	74 33.7	50 51	45.3	74 18.2	53 49	43.7	73 45.4	57 47	40.6	73 28.1	59 45	39.2	73 10.2	61 44	37.8	72 51.7	62 43	36.4	71 53.3	67 39	32.6	71 32.9	69 38	31.5	9
20	74 03.3	47 52	46.3	73 48.7	50 50	44.7	73 17.5	54 47	41.7	73 01.0	56 46	40.3	72 43.9	58 45	38.9	72 26.2	60 44	37.5	71 30.1	65 40	33.7	71 10.5	66 39	32.5	20
1	73 32.3	45 52	47.3	73 18.6	47 51	45.7	72 49.0	51 48	42.7	72 33.3	53 47	41.3	72 16.9	55 46	39.9	72 00.1	57 45	38.5	71 06.2	62 41	34.7	70 47.3	64 40	33.6	1
2	73 01.0	42 53	48.1	72 48.0	44 52	46.6	72 20.0	49 49	43.6	72 05.0	51 48	42.2	71 49.5	53 47	40.8	71 33.3	55 45	39.5	70 41.8	60 42	35.7	70 23.6	61 41	34.5	2
3	72 29.2	40 54	48.9	72 16.9	42 52	47.4	71 50.4	46 50	44.5	71 36.3	48 49	43.1	71 21.5	50 47	41.7	71 06.1	52 46	40.4	70 16.7	57 43	36.6	69 59.2	59 41	35.4	3
4	71 57.0	37 54	49.7	71 45.5	39 53	48.2	71 20.5	44 51	45.3	71 07.0	46 49	43.9	70 53.0	48 48	42.6	70 38.3	50 47	41.2	69 51.2	55 43	37.5	69 34.4	57 42	36.3	4
25	71 24.5	35 55	50.3	71 13.7	37 54	48.9	70 50.1	41 51	46.0	70 37.4	43 50	44.7	70 24.1	45 49	43.3	70 10.2	47 48	42.0	69 25.1	53 44	38.3	69 09.1	54 43	37.1	25
6	70 51.7	33 55	50.9	70 41.6	35 54	49.5	70 19.4	39 52	46.7	70 07.4	41 51	45.4	69 54.8	43 49	44.0	69 41.6	45 48	42.7	68 58.6	50 45	39.0	68 43.3	52 44	37.8	6
7	70 18.6	30 56	51.5	70 09.2	33 54	50.1	69 48.4	37 52	47.3	69 37.0	39 51	46.0	69 25.1	41 50	44.7	69 12.6	43 49	43.4	68 31.7	48 46	39.7	68 17.1	50 44	38.5	7
8	69 45.3	28 56	52.0	69 36.5	30 55	50.6	69 17.0	35 53	47.9	69 06.4	37 52	46.6	68 55.1	39 50	45.3	68 43.3	40 49	44.0	68 04.4	46 46	40.4	67 50.4	47 45	39.2	8
9	69 11.8	26 56	52.4	69 03.6	28 55	51.1	68 45.4	32 53	48.4	68 35.4	34 52	47.1	68 24.8	36 51	45.9	68 13.6	38 50	44.6	67 36.8	44 47	41.0	67 23.5	45 46	39.8	9
30	68 38.0	24 56	52.8	68 30.5	26 56	51.5	68 13.5	30 53	48.9	68 04.2	32 52	47.6	67 54.2	34 51	46.4	67 43.7	36 50	45.1	67 08.8	41 47	41.5	66 56.1	43 46	40.4	30
1	68 04.2	22 57	53.2	67 57.2	24 56	51.9	67 41.5	28 54	49.4	67 32.7	30 53	48.1	67 23.4	32 52	46.9	67 13.5	34 51	45.6	66 40.5	39 48	42.1	66 28.5	41 47	40.9	1
2	67 30.1	20 57	53.5	67 23.7	22 56	52.3	67 09.2	26 54	49.7	67 01.0	28 53	48.5	66 52.3	30 52	47.3	66 43.0	32 51	46.1	66 12.0	37 48	42.6	66 00.6	39 47	41.4	2
3	66 55.9	18 57	53.8	66 50.1	20 56	52.6	66 36.7	24 54	50.1	66 29.1	26 53	48.9	66 21.0	28 52	47.7	66 12.4	30 51	46.5	65 43.2	35 48	43.0	65 32.4	37 47	41.9	3
4	66 21.6	17 57	54.1	66 16.3	19 56	52.9	66 04.1	22 55	50.4	65 57.1	24 54	49.2	65 49.6	26 53	48.0	65 41.5	28 52	46.9	65 14.1	33 49	43.4	65 03.9	35 48	42.3	4
35	65 47.2	15 58	54.3	65 42.5	17 57	53.1	65 31.3	20 55	50.7	65 24.9	22 54	49.5	65 17.9	24 53	48.4	65 10.4	26 52	47.2	64 44.8	31 49	43.8	64 35.3	33 48	42.7	35
6	65 12.7	13 58	54.5	65 08.5	15 57	53.3	64 58.4	19 55	51.0	64 52.5	20 54	49.8	64 46.1	22 53	48.7	64 39.2	24 52	47.5	64 15.3	29 49	44.2	64 06.4	31 48	43.1	6
7	64 38.1	11 58	54.7	64 34.4	13 57	53.5	64 25.4	17 55	51.2	64 20.1	19 54	50.1	64 14.2	20 53	48.9	64 07.8	22 53	47.8	63 45.7	27 50	44.5	63 37.3	29 49	43.4	7
8	64 03.5	10 58	54.8	64 00.3	12 57	53.7	63 52.3	15 55	51.4	63 47.5	17 54	50.3	63 42.2	19 54	49.2	63 36.3	20 53	48.1	63 15.9	25 50	44.8	63 08.1	27 49	43.7	8
9	63 28.8	08 58	54.9	63 26.1	10 57	53.8	63 19.1	13 55	51.6	63 14.8	15 55	50.5	63 10.0	17 54	49.4	63 04.7	18 53	48.3	62 45.9	23 50	45.1	62 38.6	25 49	44.0	9
40	62 54.0	07 58	55.0	62 51.8	08 57	53.9	62 45.8	12 56	51.8	62 42.0	13 55	50.7	62 37.7	15 54	49.6	62 33.0	17 53	48.5	62 15.8	22 50	45.3	62 09.1	23 50	44.3	40
1	62 19.3	05 58	55.1	62 17.5	07 57	54.0	62 12.4	10 56	51.9	62 09.1	12 55	50.8	62 05.4	13 54	49.8	62 01.1	15 53	48.7	61 45.5	20 51	45.6	61 39.4	21 50	44.5	1
2	61 44.5	04 58	55.2	61 43.1	05 57	54.1	61 39.0	08 56	52.0	61 36.2	10 55	50.9	61 33.0	12 54	49.9	61 29.2	13 53	48.9	61 15.2	18 51	45.8	61 09.6	19 50	44.8	2
3	61 09.6	02 58	55.2	61 06.7	04 57	54.2	61 05.6	07 56	52.1	61 03.3	08 55	51.1	61 00.5	10 54	50.0	60 57.2	12 53	49.0	60 44.7	16 51	46.0	60 39.7	18 50	44.9	3
4	60 34.8	01 58	55.2	60 34.3	02 57	54.2	60 32.1	05 56	52.2	60 30.2	07 55	51.1	60 27.9	08 54	50.1	60 25.2	10 54	49.1	60 14.2	14 51	46.1	60 09.6	16 50	45.1	4
45	59 59.9	01 58	55.2	59 59.9	01 57	54.2	59 58.6	04 56	52.2	59 57.2	05 55	51.2	59 55.4	07 54	50.2	59 53.1	08 54	49.2	59 43.6	13 51	46.3	59 39.5	14 50	45.3	45
6	59 25.1	02 58	55.2	59 25.5	01 57	54.2	59 25.0	02 56	52.2	59 24.1	04 55	51.3	59 22.7	05 54	50.3	59 20.9	07 54	49.3	59 12.9	11 51	46.4	59 09.4	13 50	45.4	6
7	58 50.3	03 58	55.2	58 51.1	02 57	54.2	58 51.5	01 56	52.3	58 51.0	02 55	51.3	58 50.1	04 54	50.3	58 48.8	05 54	49.4	58 42.2	09 51	46.5	58 39.1	11 50	45.5	7
8	58 15.5	05 58	55.1	58 16.7	03 57	54.2	58 17.9	01 56	52.3	58 17.9	01 55	51.3	58 17.4	02 54	50.4	58 16.6	04 54	49.4	58 11.4	08 51	46.6	58 08.8	09 51	45.6	8
9	57 40.7	06 58	55.1	57 42.3	05 57	54.1	57 44.4	02 56	52.2	57 44.8	01 55	51.3	57 44.8	01 54	50.4	57 44.3	02 54	49.4	57 40.6	06 51	46.6	57 38.5	08 51	45.7	9
50	57 05.9	07 58	55.0	57 08.0	06 57	54.1	57 10.8	03 56	52.2	57 11.7	02 55	51.3	57 12.1	01 54	50.4	57 12.1	01 54	49.4	57 09.7	05 51	46.7	57 08.1	06 51	45.8	50
1	56 31.2	09 58	54.9	56 33.6	07 57	54.0	56 37.3	05 56	52.2	56 38.6	03 55	51.3	56 39.4	02 54	50.4	56 39.9	01 54	49.4	56 38.8	03 51	46.7	56 37.7	04 51	45.8	1
2	55 56.5	10 58	54.8	55 59.3	09 57	53.9	56 03.8	06 56	52.1	56 05.5	05 55	51.2	56 06.7	04 54	50.3	56 07.6	02 54	49.4	56 07.9	02 52	46.7	56 07.2	03 51	45.8	2
3	55 21.9	11 58	54.7	55 25.1	10 57	53.8	55 30.3	08 56	52.1	55 32.4	06 55	51.2	55 34.1	05 54	50.3	55 35.4	04 54	49.4	55 37.0	00 52	46.8	55 36.8	01 51	45.9	3
4	54 47.3	13 58	54.6	54 50.8	11 57	53.7	54 56.9	09 56	52.0	54 59.4	08 55	51.1	55 01.5	06 54	50.2	55 03.2	05 54	49.4	55 06.1	01 51	46.7	55 06.4	00 51	45.9	4
55	54 12.7	14 57	54.4	54 16.7	13 57	53.6	54 23.5	10 56	51.9	54 26.4	09 55	51.0	54 28.9	08 54	50.2	54 31.0	07 54	49.3	54 35.2	03 51	46.7	54 35.9	02 51	45.9	55
6	53 38.2	15 57	54.3	53 42.6	14 57	53.5	53 50.1	11 56	51.8	53 53.4	10 55	50.9	53 56.3	09 54	50.1	53 58.9	08 54	49.2	54 04.3	04 51	46.7	54 05.5	03 51	45.8	6
7	53 03.8	16 57	54.1	53 08.5	15 57	53.3	53 16.8	13 55	51.7	53 20.5	12 55	50.8	53 23.8	10 54	50.0	53 26.7	09 53	49.2	53 33.5	06 51	46.6	53 35.0	06 51	45.8	7
8	52 29.5	17 57	54.0	52 34.5	16 57	53.2	52 43.6	14 55	51.5	52 47.6	13 55	50.7	52 51.3	12 54	49.9	52 54.7	11 53	49.1	53 02.6	07 51	46.6	53 04.6	06 51	45.8	8
9	51 55.2	19 57	53.8	52 00.6	17 56	53.0	52 10.4	15 55	51.4	52 14.8	14 55	50.6	52 18.9	13 54	49.8	52 22.6	12 53	49.0	52 31.8	09 51	46.5	52 34.2	07 51	45.7	9
60	51 21.0	20 57	53.6	51 26.7	19 56	52.8	51 37.3	16 55	51.3	51 42.1	15 54	50.5	51 46.5	14 54	49.7	51 50.6	13 53	48.9	52 01.1	10 51	46.5	52 03.9	09 51	45.6	60
1	50 46.9	21 57	53.4	50 53.0	20 56	52.7	51 04.2	18 55	51.1	51 09.4	17 54	50.3	51 14.2	16 54	49.5	51 18.7	15 53	48.7	51 30.3	11 51	46.4	51 33.6	10 50	45.6	1
2	50 12.8	22 57	53.2	50 19.3	21 56	52.5	50 31.2	19 55	50.9	50 36.7	18 54	50.2	50 42.0	17 54	49.4	50 46.9	16 53	48.6	50 59.7	13 51	46.3	51 03.3	12 50	45.5	2
3	49 38.9	23 56	53.0	49 45.7	22 56	52.3	49 58.3	20 55	50.8	50 04.2	19 54	50.0	50 09.8	18 54	49.2	50 15.1	17 53	48.5	50 29.0	14 51	46.2	50 33.1	13 50	45.4	3
4	49 05.0	24 56	52.8	49 12.1	23 56	52.1	49 25.5	21 55	50.6	49 31.7	20 54	49.8	49 37.7	19 53	49.1	49 43.3	18 53	48.3	49 58.5	15 51	46.0	50 02.9	14 50	45.3	4
65	48 31.3	25 56	52.6	48 38.7	24 56	51.9	48 52.8	22 54	50.4	48 59.3	22 54	49.7	49 05.7	21 53	48.9	49 11.7	20 53	48.2	49 28.0	17 51	45.9	49 32.8	16 50	45.1	65
6	47 57.6	26 56	52.4	48 05.4	25 55	51.7	48 20.1	24 54	50.2	48 27.1	23 54	49.5	48 33.7	22 53	48.7	48 40.1	21 52	48.0	48 57.5	18 51	45.8	49 02.8	17 50	45.0	6
7	47 24.1	27 56	52.2	47 32.2	27 55	51.4	47 47.6	25 54	50.0	47 54.8	24 54	49.3	48 01.9	23 53	48.6	48 08.6	22 52	47.8	48 27.2	19 50	45.6	48 32.8	18 50	44.9	7
8	46 50.6	29 56	51.9	46 59.0	28 55	51.2	47 15.1	26 54	49.8	47 22.7	25 53	49.1	47 30.1	24 53	48.4	47 37.2	23 52	47.7	47 56.9	20 50	45.5	48 02.9	20 50	44.7	8
9	46 17.3	30 55	51.7	46 26.0	29 55	51.0	46 42.7	27 54	49.6	46 50.7	26 53	48.9	46 58.4	25 53	48.2	47 05.9	24 52	47.5	47 26.7	22 50	45.3	47 33.0	21 50	44.6	9
70	45 44.0	31 55	51.4	45 53.1	30 55	50.7	46 10.5	28 54	49.4	46 18.8	27 53	48.7	46 26.9	26 52	48.0	46 34.7	26 52	47.3	46 56.5	23 50	45.1	47 03.3	22 49	44.4	70
1	45 10.9	32 55	51.2	45 20.3	31 54	50.5	45 38.3	29 53	49.1	45 47.0	28 53	48.4	45 55.4	28 52	47.8	46 03.6	27 52	47.1	46 26.5	24 50	45.0	46 33.7	23 49	44.3	1
2	44 37.9	33 55	50.9	44 47.6	32 54	50.2	45 06.3	30 53	48.9	45 15.3	30 53	48.2	45 24.1	29 52	47.5	45 32.6	28 52	46.9	45 56.6	25 50	44.8	46 04.1	25 49	44.1	2
3	44 05.1	34 55	50.6	44 15.1	33 54	50.0	44 34.4	31 53	48.7	44 43.7	31 52	48.0	44 52.8	30 52	47.3	45 01.7	29 51	46.6	45 26.7	27 50	44.6	45 34.6	26 49	43.9	3
4	43 32.3	35 54	50.4	43 42.7	34 54	49.7	44 02.6	33 53	48.4	44 12.3	32 52	47.7	44 21.7	31 52	47.1	44 30.9	30 51	46.4	44 57.0	28 49	44.4	45 05.2	27 49	43.7	4
75	42 59.7	36 54	50.1	43 10.4	35 54	49.4	43 31.0	34 53	48.1	43 40.9	33 52	47.5	43 50.7	32 51	46.8	44 00.2	31 51	46.2	44 27.4	29 49	44.2	44 36.0	28 49	43.5	75
6	42 27.3	37 54	49.8	42 38.2	36 53	49.2	42 59.4	35 52	47.9	43 09.7	34 52	47.2	43 19.8	33 51	46.6	43 29.6	32 51	45.9	43 57.9	30 49	44.0	44 06.8	29 48	43.3	6
7	41 54.9	38 54	49.5	42 06.2	37 53	48.9	42 28.0	36 52	47.6	42 38.6	35 52	47.0	42 49.0	34 51	46.3	42 59.2	34 50	45.7	43 28.5	31 49	43.8	43 37.8	31 48	43.1	7
8	41 22.8	39 53	49.2	41 34.3	38 53	48.6	41 56.8	37 52	47.3	42 07.7	36 51	46.7	42 18.4	35 51	46.1	42 28.9	35 50	45.4	42 59.2	33 49	43.5	43 08.9	32 48	42.9	8
9	40 50.7	40 53	48.9	41 02.5	39 53	48.3	41 25.6	38 52	47.1	41 36.9	37 51	46.4	41 47.9	36 51	45.8	41 58.8	36 50	45.2	42 30.0	34 48	43.3	42 40.0	33 48	42.7	9
80	40 18.8	41 53	48.6	40 30.9	40 52	48.0	40 54.6	39 51	46.8	41 06.2	38 51	46.2	41 17.6	38 50	45.6	41 28.7	37 50	44.9	42 01.0	35 48	43.1	42 11.4	34 48	42.4	80
1	39 47.1	42 53	48.3	39 59.5	41 52	47.7	40 23.8	40 51	46.5	40 35.7	39 51	45.9	40 47.3	39 50	45.3	40 58.8	38 50	44.7	41 32.1	36 48	42.8	41 42.8	35 47	42.2	1
2	39 15.5	43 52	48.0	39 28.2	42 52	47.4	39 53.1	41 51	46.2	40 05.3	40 50	45.6	40 17.3	40 50	45.0	40 29.1	39 49	44.4	41 03.3	37 48	42.6	41 14.4	36 47	41.9	2
3	38 44.1	44 52	47.6	38 57.1	43 52	47.1	39 22.6	42 51	45.9	39 35.0	41 50	45.3	39 47.3	41 50	44.7	39 59.5	40 49	44.1	40 34.7	38 47	42.3	40 46.1	38 47	41.7	3
4	38 12.8	45 52	47.3	38 26.1	44 51	46.7	38 52.2	43 50	45.6	39 05.0	42 50	45.0	39 17.6	42 49	44.4	39 30.0	41 49	43.8	40 06.2	39 47	42.0	40 17.9	39 47	41.4	4
85	37 41.7	46 52	47.0	37 55.3	45 51	46.4	38 21.9	44 50	45.3	38 35.0	43 50	44.7	38 48.0	43 49	44.1	39 00.7	42 49	43.5	39 37.9	40 47	41.8	39 49.9	40 46	41.2	85
6	37 10.8	47 51	46.6	37 24.6	46 51	46.1	37 51.9	45 50	45.0	38 05.3	44 49	44.4	38 18.5	44 49	43.8	38 31.6	43 48	43.2	39 09.7	42 47	41.5	39 22.1	41 46	40.9	6
7	36 40.0	47 51	46.3	36 54.1	47 50	45.7	37 22.0	46 50	44.6	37 35.7	45 49	44.1	37 49.2	45 49	43.5	38 02.6	44 48	42.9	38 41.7	43 46	41.2	38 54.4	42 46	40.6	7
8	36 09.4	48 51	46.0	36 23.8	48 50	45.4	36 52.3	47 49	44.3	37 06.3	46 49	43.8	37 20.1	46 48	43.2	37 33.8	45 48	42.6	38 13.8	44 46	40.9	38 26.8	43 46	40.4	8
9	35 39.0	49 50	45.6	35 53.7	49 50	45.1	36 22.7	48 49	44.0	36 37.0	47 48	43.4	36 51.1	47 48	42.9	37 05.1	46 47	42.3	37 46.1	45 46	40.6	37 59.4	44 45	40.1	9
90	35 08.8	50 50	45.2	35 23.8	50 50	44.7	35 53.3	49 49	43.6	36 07.9	48 48	43.1	36 22.3	48 48	42.6	36 36.6	47 47	42.0	37 18.5	46 46	40.4	37 32.2	45 45	39.8	90

Lat 45°

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	34 38.7	51 50	44.9	34 54.0	51 49	44.4	35 24.2	50 48	43.3	35 39.0	49 48	42.8	35 53.7	49 47	42.2	36 08.3	48 47	41.7	36 51.1	47 45	40.1	37 05.1	46 45	39.5	91
2	34 08.9	52 49	44.5	34 24.4	52 49	44.0	34 55.1	51 48	43.0	35 10.3	50 48	42.4	35 25.3	50 47	41.9	35 40.2	49 47	41.4	36 23.9	48 45	39.8	36 38.2	47 45	39.2	2
3	33 39.2	53 49	44.2	33 55.1	53 49	43.6	34 26.3	52 48	42.6	34 41.8	51 47	42.1	34 57.1	51 47	41.6	35 12.2	50 46	41.0	35 56.9	49 45	39.4	36 11.5	48 44	38.9	3
4	33 09.8	54 49	43.8	33 25.9	53 48	43.3	33 57.7	53 47	42.3	34 13.4	52 47	41.8	34 29.0	52 46	41.2	34 44.5	51 46	40.7	35 30.0	50 44	39.1	35 44.9	49 44	38.6	4
95	32 40.5	55 48	43.4	32 56.9	54 48	42.9	33 29.3	54 47	41.9	33 45.3	53 47	41.4	34 01.1	53 46	40.9	34 16.9	52 46	40.4	35 03.3	51 44	38.8	35 18.5	50 44	38.3	95
6	32 11.5	56 48	43.0	32 28.1	55 48	42.5	33 01.9	54 47	41.5	33 17.3	54 46	41.0	33 33.5	54 46	40.5	33 49.5	53 45	40.0	34 36.8	52 44	38.5	34 52.3	52 43	38.0	6
7	31 42.6	57 48	42.7	31 59.5	56 47	42.2	32 33.0	55 46	41.2	32 49.5	55 46	40.7	33 06.0	55 45	40.2	33 22.3	54 45	39.7	34 10.5	53 44	38.2	34 26.3	53 43	37.6	7
8	31 14.0	57 47	42.3	31 31.1	57 47	41.8	32 05.1	56 46	40.8	32 22.0	56 46	40.3	32 38.7	56 45	39.8	32 55.3	55 45	39.3	33 44.4	54 43	37.8	34 00.5	54 43	37.3	8
9	30 45.6	58 47	41.9	31 03.0	58 47	41.4	31 37.5	57 46	40.4	31 54.6	57 45	40.0	32 11.6	56 45	39.5	32 28.5	56 44	39.0	33 18.5	55 43	37.5	33 34.9	55 42	37.0	9
100	30 17.3	59 47	41.5	30 35.0	59 46	41.0	31 10.1	58 45	40.1	31 27.5	58 45	39.6	31 44.8	57 44	39.1	32 01.9	57 44	38.6	32 52.7	56 43	37.2	33 09.5	56 42	36.7	100
1	29 49.4	60 46	41.1	30 07.3	60 46	40.6	30 42.9	59 45	39.7	31 00.6	59 45	39.2	31 18.1	58 44	38.7	31 35.5	58 44	38.3	32 27.2	57 42	36.8	32 44.2	56 42	36.3	1
2	29 21.6	61 46	40.7	29 39.8	61 45	40.2	30 15.9	60 45	39.3	30 33.8	60 44	38.8	30 51.7	59 44	38.4	31 09.4	59 43	37.9	32 01.9	58 42	36.5	32 19.2	57 41	36.0	2
3	28 54.1	62 46	40.3	29 12.5	61 45	39.8	29 49.2	61 44	38.9	30 07.4	60 44	38.4	30 25.4	60 43	38.0	30 43.4	60 43	37.5	31 36.8	59 42	36.1	31 54.4	58 41	35.6	3
4	28 26.8	63 45	39.9	28 45.5	62 45	39.4	29 22.6	62 44	38.5	29 41.1	61 43	38.1	29 59.4	61 43	37.6	30 17.7	61 43	37.1	31 11.9	60 41	35.7	31 29.8	59 41	35.3	4
105	27 59.7	63 45	39.4	28 18.7	63 44	39.0	28 56.3	63 43	38.1	29 15.1	62 43	37.7	29 33.7	62 43	37.2	29 52.2	62 42	36.8	30 47.2	61 41	35.4	31 05.4	60 40	34.9	105
6	27 32.9	64 44	39.0	27 52.1	64 44	38.6	28 30.3	63 43	37.7	28 49.2	63 43	37.3	29 08.1	63 42	36.8	29 26.9	63 42	36.4	30 22.8	62 40	35.0	30 41.2	61 40	34.6	6
7	27 06.3	65 44	38.6	27 25.7	65 44	38.2	28 04.4	64 43	37.3	28 23.7	64 42	36.9	28 42.8	64 42	36.4	29 01.9	63 41	36.0	29 58.5	63 40	34.7	30 17.2	62 40	34.2	7
8	26 39.9	66 44	38.2	26 59.6	66 43	37.7	27 38.8	65 42	36.9	27 58.3	65 42	36.5	28 17.7	65 41	36.0	28 37.1	64 41	35.6	29 34.5	63 40	34.3	29 53.5	63 39	33.8	8
9	26 13.8	67 43	37.7	26 33.8	66 43	37.3	27 13.5	66 42	36.5	27 33.2	66 41	36.1	27 52.9	65 41	35.6	28 12.5	65 41	35.2	29 10.7	64 39	33.9	29 30.0	64 39	33.5	9
110	25 48.0	67 43	37.3	26 08.2	67 42	36.9	26 48.4	67 41	36.1	27 08.4	67 41	35.6	27 28.3	66 41	35.2	27 48.1	66 40	34.8	28 47.2	65 39	33.5	29 06.7	65 38	33.1	110
1	25 22.4	68 42	36.9	25 42.8	68 42	36.5	26 23.5	68 41	35.6	26 43.8	67 41	35.2	27 04.0	67 40	34.8	27 24.1	67 40	34.4	28 23.9	66 38	33.1	28 43.7	66 38	32.7	1
2	24 57.1	69 42	36.4	25 17.8	69 41	36.0	25 58.9	68 41	35.2	26 19.4	68 40	34.8	26 39.9	68 40	34.4	27 00.2	68 39	34.0	28 00.8	67 38	32.7	28 20.9	67 38	32.3	2
3	24 32.0	70 41	36.0	24 52.9	70 41	35.6	25 34.6	69 40	34.8	25 55.3	69 40	34.4	26 16.0	69 39	34.0	26 36.6	69 39	33.6	27 38.0	68 38	32.4	27 58.3	68 37	31.9	3
4	24 07.2	71 41	35.5	24 28.4	70 40	35.1	25 10.5	70 40	34.4	25 31.5	70 39	34.0	25 52.4	70 39	33.6	26 13.3	69 38	33.2	27 15.4	69 37	32.0	27 36.0	68 37	31.5	4
115	23 42.7	71 40	35.1	24 04.1	71 40	34.7	24 46.7	71 39	33.9	25 07.9	71 39	33.5	25 29.1	70 38	33.1	25 50.2	70 38	32.8	26 53.1	70 37	31.6	27 13.9	69 36	31.2	115
6	23 18.4	72 40	34.6	23 40.1	72 40	34.3	24 23.2	72 39	33.5	24 44.6	71 38	33.1	25 06.0	71 38	32.7	25 27.4	71 38	32.3	26 31.0	70 36	31.2	26 52.1	70 36	30.8	6
7	22 54.5	73 39	34.2	23 16.3	73 39	33.8	23 59.9	72 38	33.1	24 21.6	72 38	32.7	24 43.2	72 38	32.3	25 04.8	72 37	31.9	26 09.2	71 36	30.7	26 30.5	71 36	30.4	7
8	22 30.8	74 39	33.7	22 52.9	74 39	33.3	23 36.9	73 38	32.6	23 58.8	73 38	32.2	24 20.7	73 37	31.9	24 42.5	73 37	31.5	25 47.6	72 36	30.3	26 09.2	72 35	29.9	8
9	22 07.4	74 38	33.2	22 29.7	74 38	32.9	23 14.2	74 37	32.2	23 36.3	74 37	31.8	23 58.4	74 37	31.4	24 20.5	73 36	31.1	25 26.3	73 35	29.9	25 48.2	73 35	29.5	9
120	21 44.3	75 38	32.8	22 06.8	75 38	32.4	22 51.7	75 37	31.7	23 14.1	75 37	31.3	23 36.5	74 36	31.0	23 58.7	74 36	30.6	25 05.3	74 35	29.5	25 27.4	73 34	29.1	120
1	21 21.4	76 38	32.3	21 44.2	76 37	32.0	22 29.6	75 36	31.3	22 52.2	75 36	30.9	23 14.8	75 36	30.5	23 37.3	75 35	30.2	24 44.5	74 34	29.1	25 06.9	74 34	28.7	1
2	20 58.9	77 37	31.8	21 21.9	77 37	31.5	22 07.7	76 36	30.8	22 30.5	76 36	30.4	22 53.3	76 35	30.1	23 16.1	76 35	29.7	24 24.1	75 34	28.7	24 46.6	75 33	28.3	2
3	20 36.7	77 37	31.4	20 59.9	77 36	31.0	21 46.1	77 35	30.3	22 09.2	77 35	30.0	22 32.2	77 35	29.6	22 55.2	77 34	29.3	24 03.8	76 33	28.2	24 26.6	76 33	27.9	3
4	20 14.8	78 36	30.9	20 38.2	78 36	30.5	21 24.9	78 35	29.9	21 48.1	78 35	29.5	22 11.4	77 34	29.2	22 34.6	77 34	28.8	23 43.9	77 33	27.8	24 06.9	77 32	27.5	4
125	19 53.1	79 36	30.4	20 16.8	79 35	30.1	21 03.9	78 34	29.4	21 27.4	78 34	29.1	21 50.8	78 34	28.7	22 14.3	78 33	28.4	23 24.3	78 32	27.4	23 47.5	77 32	27.0	125
6	19 31.8	79 35	29.9	19 55.7	79 35	29.6	20 43.2	79 34	28.9	21 06.9	79 34	28.6	21 30.6	79 33	28.3	21 54.2	79 33	27.9	23 04.9	78 32	26.9	23 28.4	78 31	26.6	6
7	19 10.8	80 34	29.4	19 34.9	80 34	29.1	20 22.8	80 33	28.5	20 46.8	80 33	28.1	21 10.7	80 33	27.8	21 34.5	79 32	27.5	22 45.8	79 31	26.5	23 09.5	79 31	26.2	7
8	18 50.2	81 34	28.9	19 14.4	81 34	28.6	20 02.8	81 33	28.0	20 26.9	80 33	27.7	20 51.0	80 32	27.3	21 15.1	80 32	27.0	22 27.1	80 31	26.0	22 51.0	80 30	25.7	8
9	18 29.8	81 33	28.4	18 54.3	81 33	28.1	19 43.0	81 32	27.5	20 07.4	81 32	27.2	20 31.7	81 32	26.9	20 56.0	81 31	26.6	22 08.6	81 30	25.6	22 32.7	80 30	25.3	9
130	18 09.8	82 33	27.9	18 34.4	82 32	27.6	19 23.6	82 32	27.0	19 48.2	82 32	26.7	20 12.7	82 31	26.4	20 37.1	82 31	26.1	21 50.4	81 30	25.2	22 14.7	81 29	24.8	130
1	17 50.1	83 32	27.4	18 14.9	83 32	27.1	19 04.5	83 31	26.5	19 29.2	82 31	26.2	19 54.0	82 31	25.9	20 18.6	82 30	25.6	21 32.5	82 29	24.7	21 57.1	82 29	24.4	1
2	17 30.7	83 32	26.9	17 55.8	83 31	26.6	18 45.7	83 31	26.0	19 10.7	83 30	25.7	19 35.6	83 30	25.4	20 00.5	83 30	25.1	21 14.9	83 29	24.2	21 39.7	82 28	23.9	2
3	17 11.7	84 31	26.4	17 36.9	84 31	26.1	18 27.3	84 30	25.5	18 52.4	84 30	25.3	19 17.5	84 30	25.0	19 42.6	84 29	24.7	20 57.7	83 28	23.8	21 22.6	83 28	23.5	3
4	16 53.0	85 31	25.9	17 18.4	85 30	25.6	18 09.1	84 30	25.0	18 34.5	84 29	24.8	18 59.8	84 29	24.5	19 25.0	84 29	24.2	20 40.7	84 28	23.3	21 05.9	84 27	23.0	4
135	16 34.7	85 30	25.4	17 00.2	85 30	25.1	17 51.3	85 29	24.5	18 16.9	85 29	24.3	18 42.4	85 28	24.0	19 07.8	85 28	23.7	20 24.1	85 27	22.9	20 49.4	84 27	22.6	135
6	16 16.7	86 29	24.8	16 42.4	86 29	24.6	17 33.9	86 29	24.0	17 59.6	86 28	23.8	18 25.3	86 28	23.5	18 50.9	85 28	23.2	20 07.7	85 27	22.4	20 33.3	85 26	22.1	6
7	15 59.0	87 29	24.3	16 24.9	86 29	24.1	17 16.8	86 28	23.5	17 42.7	86 28	23.3	18 08.5	86 27	23.0	18 34.4	86 27	22.7	19 51.7	86 26	21.9	20 17.5	86 26	21.7	7
8	15 41.7	87 28	23.8	16 07.8	87 28	23.5	17 00.0	87 27	23.0	17 26.1	87 27	22.8	17 52.1	87 27	22.5	18 18.1	87 26	22.3	19 36.0	86 26	21.5	20 02.0	86 25	21.2	8
9	15 24.8	88 28	23.3	15 51.0	88 27	23.0	16 43.6	87 27	22.5	17 09.8	87 27	22.3	17 36.0	87 26	22.0	18 02.2	87 26	21.8	19 20.7	87 25	21.0	19 46.8	87 25	20.7	9
140	15 08.2	88 27	22.7	15 34.6	88 27	22.5	16 27.5	88 26	22.0	16 53.9	88 26	21.8	17 20.3	88 26	21.5	17 46.7	88 25	21.3	19 05.7	88 24	20.5	19 32.0	88 24	20.3	140
1	14 51.9	89 26	22.2	15 18.6	89 26	22.0	16 11.8	89 26	21.5	16 38.3	89 25	21.3	17 04.9	88 25	21.0	17 31.5	88 25	20.8	18 51.0	88 24	20.0	19 17.4	88 24	19.8	1
2	14 36.1	89 26	21.7	15 02.9	89 26	21.4	15 56.4	89 25	21.0	16 23.1	89 25	20.7	16 49.9	89 24	20.5	17 16.6	89 24	20.3	18 36.6	89 23	19.5	19 03.2	89 23	19.3	2
3	14 20.6	90 25	21.1	14 47.5	90 25	20.9	15 41.4	90 24	20.5	16 08.3	90 24	20.2	16 35.2	90 24	20.0	17 02.1	90 24	19.8	18 22.6	89 23	19.1	18 49.4	89 23	18.8	3
4	14 05.5	90 25	20.6	14 32.6	90 24	20.4	15 26.7	90 24	19.9	15 53.8	90 24	19.7	16 20.9	90 23	19.5	16 47.9	90 23	19.3	18 08.9	90 22	18.6	18 35.9	90 22	18.3	4
145	13 50.7	91 24	20.1	14 18.0	91 24	19.8	15 12.5	91 23	19.4	15 39.7	91 23	19.2	16 06.9	91 23	19.0	16 34.1	91 22	18.8	17 55.5	90 22	18.1	18 22.7	90 21	17.9	145
6	13 36.4	91 23	19.5	14 03.8	91 23	19.3	14 58.5	91 23	18.9	15 25.9	91 22	18.7	15 53.3	91 22	18.5	16 20.6	91 22	18.2	17 42.5	91 21	17.6	18 09.8	91 21	17.4	6
7	13 22.4	92 23	19.0	13 49.9	92 22	18.8	14 45.0	92 22	18.4	15 12.5	92 22	18.2	15 40.0	92 21	17.9	16 07.5	92 21	17.7	17 29.9	91 21	17.1	17 57.3	91 20	16.9	7
8	13 08.8	92 22	18.4	13 36.5	92 22	18.2	14 31.8	92 21	17.8	14 59.5	92 21	17.6	15 27.1	92 21	17.4	15 54.8	92 21	17.2	17 17.6	92 20	16.6	17 45.2	92 20	16.4	8
9	12 55.6	93 21	17.9	13 23.4	93 21	17.7	14 19.0	93 21	17.3	14 46.8	93 20	17.1	15 14.6	93 20	16.9	15 42.4	93 20	16.7	17 05.6	92 19	16.1	17 33.4	92 19	15.9	9
150	12 42.8	93 21	17.3	13 10.7	93 21	17.1	14 06.6	93 20	16.8	14 34.5	93 20	16.6	15 02.5	93 20	16.4	15 30.4	93 19	16.2	16 54.0	93 19	15.6	17 21.9	93 18	15.4	150
1	12 30.3	94 20	16.8	12 58.4	94 20	16.6	13 54.6	94 19	16.2	14 22.6	94 19	16.0	14 50.7	94 19	15.9	15 18.7	93 19	15.7	16 42.8	93 18	15.1	17 10.8	93 18	14.9	1
2	12 18.3	94 19	16.2	12 46.5	94 19	16.0	13 42.9	94 19	15.7	14 11.1	94 19	15.5	14 39.3	94 18	15.3	15 07.4	94 18	15.1	16 31.9	94 18	14.6	17 00.1	94 17	14.4	2
3	12 06.6	94 19	15.6	12 35.0	94 19	15.5	13 31.6	94 18	15.1	13 59.9	94 18	15.0	14 28.2	94 18	14.8	14 56.5	94 18	14.6	16 21.4	94 17	14.1	16 49.7	94 17	13.9	3
4	11 55.4	95 18	15.1	12 23.9	95 18	14.9	13 20.7	95 18	14.6	13 49.2	95 17	14.4	14 17.6	95 17	14.3	14 46.0	95 17	14.1	16 11.2	95 16	13.6	16 39.6	95 16	13.4	4
155	11 44.6	95 17	14.5	12 13.1	95 17	14.4	13 10.3	95 17	14.0	13 38.8	95 17	13.9	14 07.3	95 16	13.7	14 35.9	95 16	13.6	16 01.5	95 16	13.1	16 30.0	95 16	12.9	155
6	11 34.1	96 17	14.0	12 02.8	96 17	13.8	13 00.2	96 16	13.5	13 28.8	96 16	13.3	13 57.5	96 16	13.2	14 26.1	95 16	13.0	15 52.0	95 15	12.6	16 20.7	95 15	12.4	6
7	11 24.1	96 16	13.4	11 52.9	96 16	13.2	12 50.4	96 16	13.0	13 19.2	96 15	12.8	13 48.0	96 15	12.7	14 16.7	96 15	12.5	15 43.0	96 14	12.1	16 11.7	96 14	11.9	7
8	11 14.5	96 15	12.8	11 43.4	96 15	12.7	12 41.1	96 15	12.4	13 10.0	96 15	12.3	13 38.9	96 14	12.1	14 07.7	96 14	12.0	15 34.3	96 14	11.6	16 03.1	96 14	11.4	8
9	11 05.3	97 15	12.2	11 34.3	97 14	12.1	12 32.2	97 14	11.8	13 01.2	97 14	11.7	13 30.2	97 14	11.6	13 59.1	97 14	11.4	15 26.0	96 13	11.0	15 54.9	96 13	10.9	9
160	10 56.5	97 14	11.7	11 25.6	97 14	11.5	12 23.7	97 14	11.3	12 52.8	97 13	11.2	13 21.8	97 13	11.0	13 50.9	97 13	10.9	15 18.0	97 13	10.5	15 47.1	97 12	10.4	160
1	10 48.1	97 13	11.1	11 17.3	97 13	11.0	12 15.6	97 13	10.7	12 44.8	97 13	10.6	13 13.9	97 13	10.5	13 43.1	97 12	10.4	15 10.5	97 12	10.0	15 39.6	97 12	09.9	1
2	10 40.2	97 13	10.5	11 09.4	97 12	10.4	12 07.9	97 12	10.2	12 37.1	97 12	10.1	13 06.4	97 12	10.0	13 35.6	97 12	09.8	15 03.3	97 11	09.5	15 32.5	97 11	09.4	2
3	10 32.6	98 12	09.9	11 02.0	98 12	09.8	12 00.6	98 11	09.6	12 29.9	98 11	09.5	12 59.3	98 11	09.4	13 28.6	98 11	09.3	14 56.5	98 11	09.0	15 25.8	98 11	08.9	3
4	10 25.5	98 11	09.4	10 54.9	98 11	09.3	11 53.7	98 11	09.1	12 23.1	98 11	09.0	12 52.5	98 11	08.9	13 21.9	98 10	08.8	14 50.1	98 10	08.4	15 19.5	98 10	08.3	4
165	10 18.8	98 10	08.8	10 48.3	98 10	08.7	11 47.2	98 10	08.5	12 16.7	98 10	08.4	12 46.2	98 10	08.3	13 15.7	98 10	08.2	14 44.0	98 09	07.9	15 13.5	98 09	07.8	165
6	10 12.6	98 10	08.2	10 42.1	98 10	08.1	11 41.2	98 09	07.9	12 10.7	98 09	07.9	12 40.3	98 09	07.8	13 09.8	98 09	07.7	14 38.4	98 09	07.4	15 07.9	98 09	07.3	6
7	10 06.7	99 09	07.6	10 36.3	99 09	07.5	11 35.5	99 09	07.4	12 05.1	99 09	07.3	12 34.7	99 09	07.2	13 04.3	99 08	07.1	14 33.1	99 08	06.9	15 02.7	99 08	06.8	7
8	10 01.3	99 08	07.0	10 31.0	99 08	07.0	11 30.3	99 08	06.8	11 59.9	99 08	06.7	12 29.6	99 08	06.7	12 59.3	99 08	06.6	14 28.2	99 08	06.3	14 57.9	99 07	06.3	8
9	9 56.3	99 08	06.5	10 26.0	99 08	06.4	11 25.5	99 07	06.3	11 55.2	99 07	06.2	12 24.9	99 07	06.1	12 54.6	99 07	06.0	14 23.7	99 07	05.8	14 53.4	99 07	05.8	9
170	9 51.8	99 07	05.9	10 21.5	99 07	05.8	11 21.1	99 07	05.7	11 50.8	99 07	05.6	12 20.6	99 07	05.6	12 50.3	99 06	05.5	14 19.6	99 06	05.3	14 49.4	99 06	05.2	170
1	9 47.6	99 06	05.3	10 17.4	99 06	05.2	11 17.1	99 06	05.1	11 46.9	99 06	05.1	12 16.7	99 06	05.0	12 46.5	99 06	04.9	14 15.9	99 06	04.8	14 45.7	99 06	04.7	1
2	9 43.9	1.0 05	04.7	10 13.8	1.0 05	04.7	11 13.5	99 05	04.6	11 43.3	99 05	04.5	12 13.2	99 05	04.4	12 43.0	99 05	04.4	14 12.6	99 05	04.2	14 42.4	99 05	04.2	2
3	9 40.7	1.0 05	04.1	10 10.6	1.0 05	04.1	11 10.3	1.0 05	04.0	11 40.2	1.0 05	03.9	12 10.1	1.0 04	03.9	12 40.0	1.0 04	03.8	14 09.6	1.0 04	03.7	14 39.5	1.0 04	03.7	3
4	9 37.8	1.0 04	03.5	10 07.8	1.0 04	03.5	11 07.6	1.0 04	03.4	11 37.5	1.0 04	03.4	12 07.4	1.0 04	03.3	12 37.3	1.0 04	03.3	14 07.1	1.0 04	03.2	14 37.0	1.0 04	03.1	4
175	9 35.4	1.0 03	02.9	10 05.4	1.0 03	02.9	11 05.3	1.0 03	02.8	11 35.2	1.0 03	02.8	12 05.2	1.0 03	02.8	12 35.1	1.0 03	02.8	14 04.9	1.0 03	02.7	14 34.9	1.0 03	02.6	175
6	9 33.5	1.0 03	02.4	10 03.4	1.0 03	02.3	11 03.4	1.0 02	02.3	11 33.3	1.0 02	02.3	12 03.3	1.0 02	02.2	12 33.3	1.0 02	02.2	14 03.1	1.0 02	02.1	14 33.1	1.0 02	02.1	6
7	9 32.0	1.0 02	01.8	10 01.9	1.0 02	01.7	11 01.9	1.0 02	01.7	11 31.9	1.0 02	01.7	12 01.9	1.0 02	01.7	12 31.8	1.0 02	01.7	14 01.8	1.0 02	01.6	14 31.7	1.0 02	01.6	7
8	9 30.9	1.0 01	01.2	10 00.9	1.0 01	01.2	11 00.8	1.0 01	01.1	11 30.8	1.0 01	01.1	12 00.8	1.0 01	01.1	12 30.8	1.0 01	01.1	14 00.8	1.0 01	01.1	14 30.8	1.0 01	01.0	8
9	9 30.2	1.0 00	00.6	10 00.2	1.0 00	00.6	11 00.2	1.0 00	00.6	11 30.2	1.0 00	00.6	12 00.2	1.0 00	00.6	12 30.2	1.0 00	00.5	14 00.2	1.0 00	00.5	14 30.2	1.0 00	00.5	9
180	9 30.0	1.0 00	00.0	10 00.0	1.0 00	00.0	11 00.0	1.0 00	00.0	11 30.0	1.0 00	00.0	12 00.0	1.0 00	00.0	12 30.0	1.0 00	00.0	14 00.0	1.0 00	00.0	14 30.0	1.0 00	00.0	180

Lat. 45°

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	
°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	°
00	75 00.0	1.0 01	00.0	74 30.0	1.0 01	00.0	73 00.0	1.0 01	00.0	72 30.0	1.0 01	00.0	72 00.0	1.0 01	00.0	66 00.0	1.0 01	00.0	65 30.0	1.0 01	00.0	60 30.0	1.0 00	00.0	00
1	74 59.3	1.0 04	01.9	74 29.3	1.0 03	01.8	72 59.4	1.0 03	01.6	72 29.4	1.0 03	01.5	71 59.5	1.0 03	01.5	65 59.7	1.0 02	00.9	65 29.7	1.0 02	00.8	60 29.8	1.0 01	00.5	1
2	74 57.1	1.0 06	03.9	74 27.3	1.0 06	03.7	72 57.6	1.0 05	03.2	72 27.7	1.0 05	03.1	71 57.8	1.0 05	02.9	65 58.7	1.0 03	01.8	65 28.7	1.0 03	01.7	60 29.2	1.0 02	01.1	2
3	74 53.6	99 06	05.8	74 23.9	99 06	05.5	72 54.7	99 07	04.8	72 24.9	99 07	04.6	71 55.1	99 06	04.4	65 57.1	1.0 04	02.6	65 27.2	1.0 04	02.5	60 28.2	1.0 02	01.6	3
4	74 48.6	98 11	07.6	74 19.2	98 10	07.3	72 50.5	99 09	06.4	72 20.9	99 08	06.1	71 51.3	99 08	05.8	65 54.8	99 05	03.5	65 25.0	99 05	03.4	60 26.8	1.0 03	02.2	4
05	74 42.3	97 13	09.5	74 13.1	97 12	09.1	72 45.2	98 11	07.9	72 15.9	98 10	07.6	71 46.5	98 10	07.3	65 51.9	99 06	04.4	65 22.2	99 06	04.2	60 25.0	99 04	02.7	05
6	74 34.6	96 15	11.3	74 05.8	96 14	10.8	72 38.8	97 13	09.5	72 09.7	97 12	09.1	71 40.6	97 12	08.7	65 48.3	98 07	05.2	65 18.8	98 07	05.0	60 22.8	99 04	03.2	6
7	74 25.6	95 17	13.1	73 57.2	95 16	12.5	72 31.3	96 14	11.0	72 02.5	96 14	10.5	71 33.7	96 13	10.1	65 44.1	98 08	06.1	65 14.8	98 08	05.9	60 20.2	98 05	03.8	7
8	74 15.4	93 19	14.9	73 47.4	94 18	14.2	72 22.7	95 16	12.5	71 54.3	95 15	11.9	71 25.8	95 15	11.4	65 39.3	97 09	06.9	65 10.1	97 09	06.7	60 17.2	98 06	04.3	8
9	74 03.9	92 21	16.6	73 36.4	92 20	15.8	72 13.0	93 18	13.9	71 45.0	94 17	13.3	71 16.9	94 16	12.8	65 33.9	96 10	07.8	65 04.9	96 10	07.5	60 13.8	97 06	04.8	9
10	73 51.2	90 23	18.2	73 24.2	90 22	17.4	72 02.3	92 20	15.3	71 34.7	92 19	14.7	71 07.0	93 18	14.1	65 27.8	96 11	08.6	64 59.1	96 11	08.3	60 10.1	97 07	05.4	10
1	73 37.4	88 25	19.8	73 11.0	88 24	19.0	71 50.6	90 21	16.7	71 23.5	91 20	16.0	70 56.2	91 20	15.4	65 21.1	95 12	09.4	64 52.7	95 12	09.1	60 05.9	96 08	05.9	1
2	73 22.5	86 27	21.3	72 56.7	87 26	20.4	71 37.9	88 23	18.0	71 11.3	89 22	17.3	70 44.5	90 21	16.6	65 13.9	94 13	10.2	64 45.8	94 13	09.8	60 01.4	96 08	06.4	2
3	73 06.6	84 28	22.8	72 41.4	85 27	21.9	71 24.3	87 24	19.3	70 58.2	87 23	18.6	70 31.9	88 22	17.8	65 06.1	93 14	11.0	64 38.2	93 13	10.6	59 56.5	95 09	06.9	3
4	72 49.7	81 30	24.2	72 25.1	82 29	23.2	71 09.8	85 26	20.6	70 44.3	86 25	19.8	70 18.5	86 24	19.0	64 57.6	91 15	11.8	64 30.2	92 14	11.4	59 51.2	94 09	07.4	4
15	72 31.9	79 31	25.5	72 07.9	80 30	24.5	70 54.5	83 27	21.8	70 29.5	84 26	21.0	70 04.3	84 25	20.2	64 48.7	90 16	12.6	64 21.5	91 15	12.1	59 45.6	93 10	07.9	15
6	72 13.1	77 33	26.8	71 49.9	78 31	25.8	70 38.3	81 28	23.0	70 13.9	82 27	22.1	69 49.3	83 26	21.3	64 39.2	89 17	13.3	64 12.4	89 16	12.8	59 39.6	92 11	08.4	6
7	71 53.6	75 34	28.1	71 31.0	76 33	27.0	70 21.4	79 30	24.1	69 57.6	80 28	23.2	69 33.5	81 27	22.3	64 29.1	88 18	14.1	64 02.7	88 17	13.5	59 33.2	91 11	08.9	7
8	71 33.2	72 35	29.2	71 11.4	74 34	28.2	70 03.7	77 31	25.2	69 40.5	78 30	24.3	69 17.0	79 29	23.4	64 18.5	86 18	14.8	63 52.5	87 18	14.2	59 26.5	90 12	09.3	8
9	71 12.2	70 36	30.3	70 51.0	71 35	29.3	69 45.3	75 32	26.2	69 22.7	76 31	25.3	68 59.9	77 30	24.4	64 07.4	85 19	15.5	63 41.9	85 19	14.9	59 19.4	89 12	09.8	9
20	70 50.4	68 37	31.4	70 29.9	69 36	30.3	69 26.2	73 33	27.2	69 04.3	74 32	26.2	68 42.0	75 31	25.3	63 55.8	84 20	16.2	63 30.7	84 19	15.6	59 12.0	88 13	10.3	20
1	70 28.0	66 38	32.4	70 08.2	67 37	31.3	69 06.5	70 34	28.2	68 45.2	71 33	27.2	68 23.6	73 32	26.2	63 43.8	82 21	16.9	63 19.1	83 20	16.2	59 04.3	87 13	10.7	1
2	70 04.9	63 39	33.4	69 45.8	64 38	32.2	68 46.2	68 35	29.1	68 25.5	69 34	28.1	68 04.6	70 33	27.1	63 31.2	80 22	17.5	63 07.0	81 21	16.9	58 56.2	86 14	11.2	2
3	69 41.3	61 40	34.3	69 22.9	62 39	33.1	68 25.3	66 36	29.9	68 05.3	67 35	28.9	67 45.0	68 34	27.9	63 18.2	79 22	18.2	62 54.5	79 22	17.5	58 47.8	85 15	11.6	3
4	69 17.2	58 41	35.1	68 59.5	60 40	34.0	68 03.9	64 37	30.7	67 44.5	65 35	29.7	67 24.8	66 34	28.7	63 04.8	77 23	18.8	62 41.5	78 22	18.1	58 39.1	83 15	12.1	4
25	68 52.5	56 42	35.9	68 35.5	57 41	34.8	67 41.9	62 37	31.5	67 23.2	63 36	30.5	67 04.2	64 35	29.5	62 50.9	76 24	19.4	62 28.1	76 23	18.7	58 30.1	82 16	12.5	25
6	68 27.4	54 43	36.6	68 11.1	55 41	35.5	67 19.5	59 38	32.3	67 01.5	61 37	31.2	66 43.1	62 36	30.2	62 36.6	74 24	20.0	62 14.3	75 24	19.2	58 20.8	81 16	12.9	6
7	68 01.9	51 43	37.4	67 46.3	53 42	36.2	66 56.6	57 39	33.0	66 39.3	59 38	31.9	66 21.5	60 37	30.9	62 21.9	72 25	20.5	62 00.2	73 24	19.8	58 11.1	79 16	13.3	7
8	67 36.0	49 44	38.0	67 21.0	51 43	36.9	66 33.3	55 40	33.6	66 16.6	56 38	32.6	65 59.4	58 37	31.6	62 06.9	70 26	21.1	61 45.6	71 25	20.3	58 01.2	78 17	13.7	8
9	67 09.6	47 44	38.6	66 55.3	48 43	37.5	66 09.6	53 40	34.3	65 53.5	54 39	33.2	65 37.0	56 38	32.2	61 51.4	69 26	21.6	61 30.7	70 25	20.9	57 51.0	76 17	14.1	9
30	66 43.0	45 45	39.2	66 29.3	46 44	38.1	65 45.6	51 41	34.9	65 30.1	52 40	33.8	65 14.2	54 39	32.8	61 35.6	67 27	22.1	61 15.4	68 26	21.4	57 40.6	75 18	14.5	30
1	66 16.0	43 45	39.8	66 03.0	44 44	38.7	65 21.1	49 41	35.4	65 06.3	50 40	34.4	64 51.0	52 39	33.4	61 19.5	65 27	22.6	60 59.8	66 27	21.8	57 29.8	74 18	14.8	1
2	65 48.7	40 46	40.3	65 36.3	42 45	39.2	64 56.4	47 42	36.0	64 42.2	48 41	34.9	64 27.5	49 40	33.9	61 03.0	63 28	23.1	60 43.9	64 27	22.3	57 18.8	72 19	15.2	2
3	65 21.1	38 46	40.8	65 09.4	40 45	39.7	64 31.3	45 42	36.5	64 17.7	46 41	35.4	64 03.7	47 40	34.4	60 46.2	61 29	23.6	60 27.6	62 28	22.8	57 07.6	70 19	15.6	3
4	64 53.3	36 47	41.2	64 42.2	38 46	40.1	64 05.9	42 43	36.9	63 53.0	44 42	35.9	63 39.6	45 41	34.9	60 29.1	60 29	24.0	60 11.0	61 28	23.2	56 56.1	69 20	15.9	4
35	64 25.2	34 47	41.6	64 14.7	36 46	40.5	63 40.3	40 43	37.4	63 28.0	42 42	36.4	63 15.2	43 41	35.4	60 11.7	58 29	24.4	59 54.2	59 29	23.6	56 44.3	67 20	16.2	35
6	63 56.9	32 47	42.0	63 47.0	34 46	40.9	63 14.4	38 44	37.8	63 02.7	40 43	36.8	62 50.5	41 42	35.8	59 54.9	56 30	24.8	59 37.0	57 29	24.0	56 32.4	66 20	16.6	6
7	63 28.4	30 48	42.4	63 19.1	32 47	41.3	62 48.3	36 44	38.2	62 37.2	38 43	37.2	62 25.6	39 42	36.2	59 36.0	54 30	25.2	59 19.6	55 29	24.4	56 20.2	64 21	16.9	7
8	62 59.8	28 48	42.7	62 51.0	30 47	41.6	62 22.0	35 44	38.5	62 11.4	36 43	37.5	62 00.4	37 42	36.5	59 17.8	52 31	25.6	59 02.0	53 30	24.8	56 07.8	62 21	17.2	8
9	62 30.9	26 48	43.0	62 22.7	28 47	41.9	61 55.4	33 45	38.9	61 45.5	34 44	37.9	61 35.0	35 43	36.9	58 59.4	50 31	26.0	58 44.1	51 30	25.1	55 55.1	61 21	17.5	9
40	62 01.9	25 49	43.3	61 54.3	26 48	42.2	61 28.7	31 45	39.2	61 19.3	32 44	38.2	61 09.5	33 43	37.2	58 40.7	49 32	26.3	58 26.0	50 31	25.5	55 42.3	59 22	17.8	40
1	61 32.8	23 49	43.5	61 25.7	24 48	42.5	61 01.8	29 45	39.5	60 53.0	30 44	38.5	60 43.7	32 43	37.5	58 21.8	47 32	26.6	58 07.6	48 31	25.8	55 29.3	57 22	18.0	1
2	61 03.5	21 49	43.7	60 57.0	22 48	42.7	60 34.8	27 45	39.8	60 26.5	28 44	38.8	60 17.8	30 43	37.8	58 02.7	45 32	26.9	57 49.0	46 31	26.1	55 16.0	56 22	18.3	2
3	60 34.1	19 49	43.9	60 28.1	21 48	42.9	60 07.6	25 46	40.0	59 59.8	26 45	39.0	59 51.7	28 44	38.1	57 43.3	43 33	27.2	57 30.3	44 32	26.4	55 02.6	54 23	18.5	3
4	60 04.6	17 49	44.1	59 59.2	19 48	43.1	59 40.2	23 46	40.2	59 33.1	25 45	39.3	59 25.5	26 44	38.3	57 23.8	41 33	27.5	57 11.3	42 32	26.7	54 49.0	52 23	18.8	4
45	59 35.0	16 49	44.3	59 30.1	17 49	43.3	59 12.8	21 46	40.4	59 06.1	23 45	39.5	58 59.1	24 44	38.5	57 04.1	39 33	27.8	56 52.2	40 32	26.9	54 35.3	51 23	19.0	45
6	59 05.4	14 50	44.4	59 01.0	15 49	43.5	58 45.2	20 46	40.6	58 39.1	21 45	39.7	58 32.6	22 44	38.7	56 44.3	37 33	28.0	56 32.9	39 32	27.2	54 21.4	49 23	19.3	6
7	58 35.6	12 50	44.6	58 31.7	14 49	43.6	58 17.5	18 46	40.8	58 12.0	19 45	39.9	58 06.0	21 44	38.9	56 24.3	36 34	28.3	56 13.4	37 33	27.4	54 07.3	47 24	19.5	7
8	58 05.8	11 50	44.7	58 02.4	12 49	43.7	57 49.8	16 46	40.9	57 44.7	17 46	40.0	57 39.3	19 45	39.1	56 04.1	34 34	28.5	55 53.8	35 33	27.7	53 53.1	45 24	19.7	8
9	57 36.0	09 50	44.8	57 33.1	10 49	43.8	57 21.9	14 47	41.1	57 17.4	16 46	40.2	57 12.5	17 45	39.2	55 43.8	32 34	28.7	55 34.0	33 33	27.9	53 38.7	44 24	19.9	9
50	57 06.1	07 50	44.8	57 03.7	09 49	43.9	56 54.0	13 47	41.2	56 50.0	14 46	40.3	56 45.6	15 45	39.4	55 23.3	30 34	28.9	55 14.1	31 33	28.1	53 24.2	42 24	20.1	50
1	56 36.1	06 50	44.9	56 34.2	07 49	44.0	56 26.1	11 47	41.3	56 22.6	12 46	40.4	56 18.7	14 45	39.5	55 02.8	28 34	29.1	54 54.1	29 34	28.3	53 00.6	40 25	20.3	1
2	56 06.2	04 50	44.9	56 04.7	06 49	44.1	55 58.0	09 47	41.4	55 55.0	11 46	40.5	55 51.6	12 45	39.6	54 42.1	26 35	29.3	54 34.0	28 34	28.4	52 54.8	38 25	20.4	2
3	55 36.2	03 50	45.0	55 35.2	04 49	44.1	55 30.0	08 47	41.4	55 27.5	09 46	40.6	55 24.6	10 45	39.7	54 21.3	25 35	29.4	54 13.7	26 34	28.6	52 48.0	36 25	20.6	3
4	55 06.2	01 50	45.0	55 05.7	02 49	44.1	55 01.9	06 47	41.5	54 59.8	07 46	40.6	54 57.5	09 45	39.8	54 00.4	23 35	29.6	53 53.4	24 34	28.7	52 25.0	35 25	20.8	4
55	54 36.2	00 50	45.0	54 36.1	01 49	44.1	54 33.7	05 47	41.5	54 32.2	06 46	40.7	54 30.3	07 45	39.8	53 39.4	21 35	29.7	53 32.9	22 34	28.9	52 09.9	33 25	20.9	55
6	54 06.2	02 50	45.0	54 06.6	01 49	44.1	54 05.6	03 47	41.6	54 04.5	04 46	40.7	54 03.1	05 45	39.9	53 18.4	19 35	29.8	53 12.4	21 34	29.0	51 54.7	31 26	21.0	6
7	53 36.2	03 50	45.0	53 37.1	02 49	44.1	53 37.4	01 47	41.6	53 36.8	03 46	40.8	53 35.9	04 45	39.9	52 57.3	18 35	29.9	52 51.8	19 34	29.1	51 39.4	29 26	21.2	7
8	53 06.2	05 50	44.9	53 07.5	04 49	44.1	53 09.3	00 47	41.6	53 09.1	01 46	40.8	53 08.7	02 45	39.9	52 36.1	16 35	30.0	52 31.1	17 35	29.2	51 24.0	28 26	21.3	8
9	52 36.3	06 50	44.9	52 38.0	05 49	44.1	52 41.1	02 47	41.6	52 41.4	01 46	40.8	52 41.4	01 45	39.9	52 14.8	14 36	30.1	52 10.4	15 35	29.3	51 08.6	26 26	21.4	9
60	52 06.4	08 50	44.8	52 08.5	07 49	44.0	52 12.9	03 47	41.6	52 13.7	02 46	40.8	52 14.2	01 45	39.9	51 53.5	12 36	30.2	51 49.6	14 35	29.4	50 53.1	24 26	21.5	60
1	51 36.5	09 50	44.8	51 39.0	08 49	44.0	51 44.8	05 47	41.5	51 46.0	04 46	40.7	51 47.0	03 45	39.9	51 32.1	11 36	30.3	51 28.8	12 35	29.5	50 37.5	22 26	21.6	1
2	51 06.6	11 50	44.7	51 09.6	09 49	43.9	51 16.7	06 47	41.5	51 18.4	06 46	40.7	51 19.7	04 45	39.9	51 10.7	09 36	30.3	51 07.9	10 35	29.5	50 21.8	21 26	21.7	2
3	50 36.8	12 50	44.6	50 40.2	11 49	43.8	50 48.6	08 47	41.4	50 50.7	07 46	40.7	50 52.5	06 45	39.9	50 49.3	07 36	30.4	50 46.9	08 35	29.6	50 06.1	19 26	21.8	3
4	50 07.0	13 50	44.5	50 10.9	12 49	43.7	50 20.5	09 47	41.4	50 23.1	08 46	40.6	50 25.3	07 45	39.8	50 27.8	06 36	30.4	50 26.0	07 35	29.6	49 50.3	17 26	21.9	4
65	49 37.3	15 49	44.4	49 41.6	14 49	43.6	49 52.5	11 47	41.3	49 55.5	10 46	40.5	49 58.2	09 45	39.8	50 06.4	04 36	30.4	50 05.0	05 35	29.6	49 34.5	15 26	21.9	65
6	49 07.7	16 49	44.3	49 12.3	15 49	43.5	49 24.5	12 47	41.2	49 27.9	11 46	40.5	49 31.1	10 45	39.7	49 44.9	02 36	30.4	49 44.0	03 35	29.7	49 18.6	14 26	22.0	6
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8	48 08.6	19 49	44.0	48 14.0	18 48	43.3	48 28.6	15 46	41.0	48 32.9	14 46	40.3	48 36.9	13 45	39.5	49 01.9	01 36	30.4	49 02.0	00 35	29.7	48 46.8	10 27	22.1	8
9	47 39.2	20 49	43.9	47 45.0	19 48	43.1	48 00.8	16 46	40.9	48 05.5	15 46	40.2	48 10.0	14 45	39.5	48 40.4	03 36	30.4	48 41.0	02 35	29.7	48 30.8	08 27	22.1	9
70	47 09.8	21 49	43.7	47 16.0	20 48	43.0	47 33.1	18 46	40.8	47 38.2	17 45	40.1	47 43.0	16 45	39.4	48 18.9	04 36	30.4	48 20.0	03 35	29.7	48 14.8	07 27	22.2	70
1	46 40.5	22 49	43.6	46 47.1	22 48	42.8	47 05.4	19 46	40.7	47 10.9	18 45	40.0	47 16.2	17 45	39.2	47 57.4	06 36	30.4	47 59.0	06 35	29.6	47 58.8	05 27	22.2	1
2	46 11.3	24 48	43.4	46 18.3	23 48	42.7	46 37.7	20 46	40.6	46 43.7	19 45	39.8	46 49.4	18 45	39.1	47 36.0	07 36	30.4	47 38.0	06 35	29.6	47 42.8	03 27	22.2	2
3	45 42.2	26 48	43.2	45 49.6	24 48	42.5	46 10.2	22 46	40.4	46 16.5	21 45	39.7	46 22.6	20 44	39.0	47 14.5	09 36	30.3	47 17.1	08 35	29.6	47 26.7	02 27	22.2	3
4	45 13.2	28 48	43.0	45 21.0	25 48	42.3	45 42.7	23 46	40.3	45 49.5	22 45	39.6	45 56.0	21 44	38.9	46 53.1	10 36	30.3	46 56.1	10 35	29.5	47 10.7	00 27	22.2	4
75	44 44.3	27 48	42.8	44 52.5	27 47	42.2	45 15.4	24 45	40.1	45 22.5	23 45	39.4	45 29.4	23 44	38.7	46 31.8	12 36	30.2	46 35.2	11 35	29.5	46 54.7	02 27	22.2	75
6	44 15.5	29 48	42.6	44 24.0	28 47	42.0	44 48.1	25 45	39.9	44 55.6	25 45	39.3	45 02.9	24 44	38.6	46 10.4	14 35	30.1	46 14.4	13 35	29.4	46 38.7	04 27	22.2	6
7	43 46.9	30 48	42.4	43 55.7	29 47	41.8	44 20.9	27 45	39.8	44 28.8	26 45	39.1	44 36.5	25 44	38.4	45 49.2	15 35	30.1	45 53.5	14 35	29.4	46 22.6	05 27	22.2	7
8	43 18.3	31 47	42.2	43 27.5	30 47	41.6	43 53.8	28 45	39.6	44 02.1	27 44	38.9	44 10.2	26 44	38.3	45 27.9	17 35	30.0	45 32.8	16 35	29.3	46 06.6	07 27	22.2	8
9	42 49.8	32 47	42.0	42 59.4	32 47	41.4	43 26.8	29 45	39.4	43 35.5	29 44	38.7	43 43.9	28 44	38.1	45 06.7	18 35	29.9	45 12.0	17 34	29.2	45 50.6	08 27	22.1	9
80	42 21.5	33 47	41.8	42 31.4	33 46	41.1	42 59.9	31 45	39.2	43 09.0	30 44	38.6	43 17.8	29 43	37.9	44 45.6	20 35	29.8	44 51.4	19 34	29.1	45 34.7	10 27	22.1	80
1	41 53.3	35 47	41.6	42 03.6	34 46	40.9	42 33.2	32 44	39.0	42 42.6	31 44	38.4	42 51.8	30 43	37.7	44 24.6	21 35	29.7	44 30.8	20 34	29.0	45 18.7	12 26	22.0	1
2	41 25.2	36 47	41.3	41 35.9	35 46	40.7	42 06.5	33 44	38.8	42 16.3	32 44	38.2	42 25.9	32 43	37.5	44 03.6	22 35	29.6	44 10.2	22 34	28.9	45 02.8	13 26	22.0	2
3	40 57.3	37 46	41.1	41 08.3	36 46	40.5	41 40.0	34 44	38.6	41 50.2	34 43	38.0	42 00.1	33 43	37.3	43 42.7	24 35	29.5	43 49.7	23 34	28.8	44 47.0	15 26	21.9	3
4	40 29.5	38 46	40.8	40 40.8	37 46	40.2	41 13.6	35 44	38.4	41 24.1	35 43	37.8	41 34.5	34 43	37.1	43 21.8	25 35	29.4	43 29.3	25 34	28.7	44 31.1	17 26	21.9	4
85	40 01.8	39 46	40.6	40 13.5	39 45	40.0	40 47.3	37 44	38.1	40 58.2	36 43	37.5	41 08.9	35 42	36.9	43 01.1	27 34	29.2	43 09.0	26 34	28.6	44 15.3	18 26	21.8	85
6	39 34.3	40 46	40.3	39 46.3	40 45	39.7	40 21.2	38 43	37.9	40 32.4	37 43	37.3	40 43.5	37 42	36.7	42 40.4	28 34	29.1	42 48.8	27 34	28.4	43 59.6	20 26	21.8	6
7	39 06.9	41 45	40.1	39 19.2	41 45	39.5	39 55.2	39 43	37.7	40 06.8	38 42	37.1	40 18.2	38 42	36.5	42 19.8	30 34	29.0	42 28.6	29 33	28.3	43 43.9	21 26	21.7	7
8	38 39.7	43 45	39.8	38 52.3	42 45	39.2	39 29.3	40 43	37.4	39 41.3	40 42	36.8	39 53.1	39 42	36.2	41 59.3	31 34	28.8	42 08.5	30 33	28.2	43 28.2	22 26	21.6	8
9	38 12.6	44 45	39.5	38 25.6	43 44	38.9	39 03.6	41 43	37.2	39 15.9	41 42	36.6	39 28.0	40 41	36.0	41 38.9	32 34	28.7	41 48.5	32 33	28.0	43 12.7	24 26	21.5	9
90	37 45.7	45 45	39.2	37 59.0	44 44	38.7	38 38.0	42 42	36.9	38 50.7	42 42	36.4	39 03.2	41 41	35.8	41 18.6	34 34	28.5	41 28.7	33 33	27.9	42 57.1	26 26	21.4	90

16— 11430

H.A.	60° 00′			60° 30′			62° 00′			62° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
91	37 18.9	46 44	38.9	37 32.6	45 44	38.4	38 12.6	44 42	36.7	38 25.6	43 42	36.1
2	36 52.3	47 44	38.7	37 06.3	46 44	38.1	37 47.3	45 42	36.4	38 00.7	44 41	35.9
3	36 25.9	48 44	38.4	36 40.2	47 43	37.8	37 22.2	46 42	36.2	37 35.9	45 41	35.6
4	35 59.7	49 43	38.1	36 14.3	48 43	37.5	36 57.3	47 41	35.9	37 11.3	46 41	35.3
95	35 33.6	50 43	37.8	35 48.5	50 43	37.2	36 32.5	48 41	35.6	36 46.8	48 40	35.1
6	35 07.7	51 43	37.4	35 23.0	51 42	36.9	36 07.9	49 41	35.3	36 22.6	49 40	34.8
7	34 42.0	52 43	37.1	34 57.6	52 42	36.6	35 43.4	50 40	35.0	35 58.4	50 40	34.5
8	34 16.5	53 42	36.8	34 32.4	53 42	36.3	35 19.2	51 40	34.7	35 34.5	51 40	34.2
9	33 51.2	54 42	36.5	34 07.4	54 41	36.0	34 55.1	52 40	34.4	35 10.7	52 39	33.9
100	33 26.0	55 42	36.2	33 42.5	55 41	35.7	34 31.2	53 40	34.1	34 47.2	53 39	33.6
1	33 01.1	56 41	35.8	33 17.9	56 41	35.3	34 07.5	54 39	33.8	34 23.8	54 39	33.3
2	32 36.4	57 41	35.5	32 53.5	57 40	35.0	33 44.0	56 39	33.5	34 00.6	55 38	33.0
3	32 11.9	58 41	35.2	32 29.2	58 40	34.7	33 20.6	57 39	33.2	33 37.5	56 38	32.7
4	31 47.5	59 40	34.8	32 05.2	59 40	34.3	32 57.5	58 38	32.9	33 14.7	57 38	32.4
105	31 23.4	60 40	34.5	31 41.4	60 39	34.0	32 34.6	59 38	32.6	32 52.1	58 37	32.1
6	30 59.5	61 39	34.1	31 17.8	61 39	33.6	32 11.8	60 38	32.2	32 29.7	59 37	31.8
7	30 35.8	62 39	33.7	30 54.4	62 39	33.3	31 49.3	61 37	31.9	32 07.4	60 37	31.4
8	30 12.4	63 39	33.4	30 31.2	63 38	32.9	31 27.0	62 37	31.6	31 45.4	61 36	31.1
9	29 49.2	64 38	33.0	30 08.2	63 38	32.6	31 04.9	63 36	31.2	31 23.6	62 36	30.8
110	29 26.2	65 38	32.6	29 45.5	64 38	32.2	30 43.0	63 36	30.9	31 02.0	63 36	30.4
1	29 03.4	66 38	32.3	29 23.0	65 37	31.8	30 21.4	64 36	30.5	30 40.6	64 35	30.1
2	28 40.8	66 37	31.9	29 00.7	66 37	31.5	29 59.9	65 35	30.2	30 19.5	65 35	29.7
3	28 18.5	67 37	31.5	28 38.7	67 36	31.1	29 38.7	66 35	29.8	29 58.6	66 34	29.4
4	27 56.5	68 36	31.1	28 16.9	68 36	30.7	29 17.7	67 35	29.5	29 37.8	67 34	29.0
115	27 34.7	69 36	30.7	27 55.4	69 36	30.3	28 57.0	68 34	29.1	29 17.4	68 34	28.7
6	27 13.1	70 36	30.4	27 34.1	70 35	30.0	28 36.5	69 34	28.7	28 57.1	69 33	28.3
7	26 51.8	71 35	30.0	27 13.0	71 35	29.6	28 16.2	70 33	28.4	28 37.1	70 33	27.9
8	26 30.7	72 35	29.6	26 52.2	71 34	29.2	27 56.2	71 33	28.0	28 17.4	71 33	27.6
9	26 09.9	72 34	29.2	26 31.6	72 34	28.8	27 36.4	72 33	27.6	27 57.8	71 32	27.2
120	25 49.4	73 34	28.8	26 11.4	73 33	28.4	27 16.9	72 32	27.2	27 38.6	72 32	26.8
1	25 29.1	74 33	28.3	25 51.3	74 33	28.0	26 57.6	73 32	26.8	27 19.5	73 31	26.5
2	25 09.1	75 33	27.9	25 31.6	75 32	27.6	26 38.6	74 31	26.5	27 00.8	74 31	26.1
3	24 49.4	76 32	27.5	25 12.1	76 32	27.2	26 19.8	75 31	26.1	26 42.2	75 30	25.7
4	24 29.9	76 32	27.1	24 52.8	76 32	26.7	26 01.3	76 30	25.7	26 24.0	76 30	25.3
125	24 10.7	77 32	26.7	24 33.9	77 31	26.3	25 43.0	77 30	25.3	26 06.0	76 30	24.9
6	23 51.8	78 31	26.3	24 15.2	78 31	25.9	25 25.1	77 30	24.9	25 48.2	77 29	24.5
7	23 33.2	79 31	25.8	23 56.8	79 30	25.5	25 07.4	78 29	24.5	25 30.8	78 29	24.1
8	23 14.8	80 30	25.4	23 38.7	79 30	25.1	24 49.9	79 29	24.1	25 13.6	79 28	23.7
9	22 56.8	80 30	25.0	23 20.9	80 29	24.6	24 32.8	80 28	23.6	24 56.6	80 28	23.3
130	22 39.0	81 29	24.5	23 03.3	81 29	24.2	24 15.9	80 28	23.2	24 40.0	80 27	22.9
1	22 21.6	82 29	24.1	22 46.1	82 28	23.8	23 59.3	81 27	22.8	24 23.6	81 27	22.5
2	22 04.4	82 28	23.6	22 29.1	82 28	23.3	23 43.0	82 27	22.4	24 07.5	82 26	22.1
3	21 47.6	83 28	23.2	22 12.5	83 27	22.9	23 27.0	83 26	22.0	23 51.7	82 26	21.7
4	21 31.0	84 27	22.7	21 56.1	84 27	22.4	23 11.2	83 26	21.6	23 36.2	83 25	21.3
135	21 14.8	84 27	22.3	21 40.1	84 26	22.0	22 55.8	84 25	21.1	23 21.0	84 25	20.8
6	20 58.8	85 26	21.8	21 24.3	85 26	21.6	22 40.6	85 25	20.7	23 06.0	85 24	20.4
7	20 43.2	86 26	21.4	21 08.9	86 25	21.1	22 25.8	85 24	20.3	22 51.4	85 24	20.0
8	20 27.9	86 25	20.9	20 53.8	86 25	20.7	22 11.3	86 24	19.8	22 37.0	86 23	19.6
9	20 12.9	87 24	20.5	20 39.0	87 24	20.2	21 57.0	87 23	19.4	22 23.0	87 23	19.1
140	19 58.2	88 24	20.0	20 24.5	87 24	19.7	21 43.1	87 23	19.0	22 09.2	87 22	18.7
1	19 43.9	88 23	19.5	20 10.3	88 23	19.3	21 29.4	88 22	18.5	21 55.8	88 22	18.3
2	19 29.9	89 23	19.1	19 56.5	89 23	18.8	21 16.1	88 22	18.1	21 42.6	88 21	17.8
3	19 16.2	89 22	18.6	19 42.9	89 22	18.3	21 03.1	89 21	17.6	21 29.8	89 21	17.4
4	19 02.8	90 22	18.1	19 29.7	90 21	17.9	20 50.4	90 21	17.2	21 17.3	89 20	16.9
145	18 49.8	90 21	17.6	19 16.9	90 21	17.4	20 38.1	90 20	16.7	21 05.1	90 20	16.5
6	18 37.1	91 21	17.2	19 04.4	91 20	16.9	20 26.0	91 20	16.3	20 53.2	91 19	16.0
7	18 24.8	91 20	16.7	18 52.2	91 20	16.5	20 14.3	91 19	15.8	20 41.7	91 19	15.6
8	18 12.7	92 19	16.2	18 40.3	92 19	16.0	20 02.9	92 18	15.4	20 30.4	92 18	15.1
9	18 01.1	92 19	15.7	18 28.8	92 19	15.5	19 51.8	92 18	14.9	20 19.5	92 18	14.7
150	17 49.8	93 18	15.2	18 17.6	93 18	15.0	19 41.1	93 17	14.4	20 08.9	93 17	14.2
1	17 38.8	93 18	14.7	18 06.8	93 17	14.5	19 30.7	93 17	14.0	19 58.6	93 17	13.8
2	17 28.2	94 17	14.2	17 56.3	94 17	14.1	19 20.6	94 16	13.5	19 48.7	94 16	13.3
3	17 17.9	94 16	13.8	17 46.2	94 16	13.6	19 10.9	94 16	13.0	19 39.1	94 15	12.9
4	17 08.0	95 16	13.3	17 36.4	95 16	13.1	19 01.5	94 15	12.6	19 29.8	94 15	12.4
155	16 58.5	95 15	12.8	17 27.0	95 15	12.6	18 52.4	95 15	12.1	19 20.9	95 14	11.9
6	16 49.3	95 15	12.3	17 17.9	95 15	12.1	18 43.7	95 14	11.6	19 12.2	95 14	11.5
7	16 40.4	95 14	11.8	17 09.2	96 14	11.6	18 35.3	96 13	11.2	19 04.0	96 13	11.0
8	16 32.0	96 14	11.3	17 00.8	96 13	11.1	18 27.2	96 13	10.7	18 56.0	96 13	10.5
9	16 23.9	96 13	10.8	16 52.8	96 13	10.6	18 19.6	96 12	10.2	18 48.5	96 12	10.1
160	16 16.1	97 12	10.3	16 45.1	97 12	10.1	18 12.2	97 12	09.7	18 41.2	97 11	09.6
1	16 08.7	97 12	09.8	16 37.9	97 12	09.6	18 05.2	97 11	09.3	18 34.3	97 11	09.1
2	16 01.7	97 11	09.3	16 30.9	97 11	09.1	17 58.6	97 10	08.8	18 27.8	97 10	08.7
3	15 55.1	98 10	08.7	16 24.4	98 10	08.6	17 52.3	98 10	08.3	18 21.5	98 10	08.2
4	15 48.8	98 10	08.2	16 18.2	98 10	08.1	17 46.3	98 09	07.8	18 15.7	98 09	07.7
165	15 42.9	98 09	07.7	16 12.4	98 09	07.6	17 40.7	98 09	07.3	18 10.2	98 09	07.2
6	15 37.4	98 09	07.2	16 07.0	98 08	07.1	17 35.5	98 08	06.8	18 05.0	98 08	06.7
7	15 32.3	99 08	06.7	16 01.9	99 08	06.6	17 30.6	99 08	06.4	18 00.2	99 07	06.3
8	15 27.5	99 07	06.2	15 57.2	99 07	06.1	17 26.1	99 07	05.9	17 55.7	99 07	05.8
9	15 23.1	99 07	05.7	15 52.8	99 07	05.6	17 21.9	99 06	05.4	17 51.6	99 06	05.3
170	15 19.1	99 06	05.2	15 48.9	99 06	05.1	17 18.1	99 06	04.9	17 47.9	99 06	04.8
1	15 15.5	99 05	04.7	15 45.3	99 05	04.6	17 14.7	99 05	04.4	17 44.5	99 05	04.3
2	15 12.3	99 05	04.1	15 42.1	99 05	04.1	17 11.6	99 05	03.9	17 41.5	99 04	03.9
3	15 09.4	1.0 04	03.6	15 39.3	1.0 04	03.6	17 08.9	1.0 04	03.4	17 38.8	1.0 04	03.4
4	15 06.9	1.0 04	03.1	15 36.8	1.0 03	03.1	17 06.5	1.0 03	02.9	17 36.4	1.0 03	02.9
175	15 04.8	1.0 03	02.6	15 34.7	1.0 03	02.6	17 04.5	1.0 03	02.5	17 34.5	1.0 03	02.4
6	15 03.1	1.0 02	02.1	15 33.0	1.0 02	02.0	17 02.9	1.0 02	02.0	17 32.9	1.0 02	01.9
7	15 01.7	1.0 02	01.6	15 31.7	1.0 02	01.5	17 01.6	1.0 02	01.5	17 31.6	1.0 02	01.5
8	15 00.8	1.0 01	01.0	15 30.8	1.0 01	01.0	17 00.7	1.0 01	01.0	17 30.7	1.0 01	01.0
9	15 00.2	1.0 00	00.5	15 30.2	1.0 00	00.5	17 00.2	1.0 00	00.5	17 30.2	1.0 00	00.5
180	15 00.0	1.0 00	00.0	15 30.0	1.0 00	00.0	17 00.0	1.0 00	00.0	17 30.0	1.0 00	00.0

63° 00′			69° 00′			69° 30′			74° 30′			H.A.
Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
38 38.4	42 41	35.5	40 58.4	35 33	28.3	41 08.9	34 33	27.7	42 41.7	27 26	21.3	91
38 13.9	44 41	35.3	40 38.4	36 33	28.2	40 49.2	36 33	27.5	42 26.3	29 26	21.2	2
37 49.4	45 40	35.0	40 18.4	38 33	28.0	40 29.6	37 32	27.4	42 11.0	30 25	21.1	3
37 25.2	46 40	34.8	39 58.6	39 33	27.8	40 10.2	38 32	27.2	41 55.7	32 26	21.0	4
37 01.0	47 40	34.5	39 38.8	40 33	27.6	39 50.8	40 32	27.0	41 40.6	33 25	20.9	95
36 37.1	48 40	34.2	39 19.2	42 32	27.4	39 31.6	41 32	26.8	41 25.5	35 25	20.8	6
36 13.3	49 39	34.0	38 59.7	43 32	27.2	39 12.5	42 32	26.7	41 10.5	36 25	20.6	7
35 49.7	50 39	33.7	38 40.4	44 32	27.0	38 53.6	44 31	26.5	40 55.6	38 25	20.5	8
35 26.3	52 39	33.4	38 21.2	45 32	26.8	38 34.7	45 31	26.3	40 40.8	39 25	20.4	9
35 03.0	53 38	33.1	38 02.1	47 32	26.6	38 16.0	46 31	26.1	40 26.1	40 24	20.2	100
34 39.9	54 38	32.8	37 43.1	48 31	26.4	37 57.4	47 31	25.8	40 11.4	42 24	20.1	1
34 17.0	55 38	32.5	37 24.3	49 31	26.2	37 39.0	49 30	25.6	39 56.9	43 24	19.9	2
33 54.3	56 38	32.2	37 05.7	50 31	26.0	37 20.7	50 30	25.4	39 42.5	44 24	19.8	3
33 31.8	57 37	31.9	36 47.2	52 31	25.7	37 02.6	51 30	25.2	39 28.2	46 24	19.6	4
33 09.5	58 37	31.6	36 28.9	53 30	25.5	36 44.6	52 30	25.0	39 14.0	47 23	19.5	105
32 47.4	59 37	31.3	36 10.7	54 30	25.3	36 26.8	53 29	24.7	38 59.9	48 23	19.3	6
32 25.4	60 36	31.0	35 52.6	55 30	25.0	36 09.1	55 29	24.5	38 46.0	50 23	19.1	7
32 03.7	61 36	30.6	35 34.8	56 30	24.8	35 51.6	56 29	24.3	38 32.1	51 23	19.0	8
31 42.2	62 36	30.3	35 17.1	57 29	24.5	35 34.2	57 29	24.0	38 18.4	52 23	18.8	9
31 20.9	63 35	30.0	34 59.6	58 29	24.3	35 17.0	58 28	23.8	38 04.8	54 22	18.6	110
30 59.8	64 35	29.6	34 42.2	60 29	24.0	35 00.0	59 28	23.5	37 51.3	55 22	18.4	1
30 39.0	65 34	29.3	34 25.0	61 28	23.8	34 43.2	60 28	23.3	37 38.0	56 22	18.2	2
30 18.3	66 34	28.9	34 08.0	62 28	23.5	34 26.5	61 27	23.0	37 24.8	57 22	18.0	3
29 57.9	67 34	28.6	33 51.2	63 28	23.2	34 10.0	62 27	22.7	37 11.7	59 22	17.8	4
29 37.7	68 33	28.3	33 34.6	64 27	22.9	33 53.7	64 27	22.5	36 58.8	60 21	17.6	115
29 17.7	68 33	27.9	33 18.1	65 27	22.7	33 37.6	65 27	22.2	36 46.0	61 21	17.4	6
28 58.0	69 32	27.5	33 01.9	66 27	22.4	33 21.6	66 26	21.9	36 33.3	62 21	17.2	7
28 38.5	70 32	27.2	32 45.8	67 26	22.1	33 05.9	67 26	21.7	36 20.8	63 21	17.0	8
28 19.2	71 32	26.8	32 30.0	68 26	21.8	32 50.3	68 26	21.4	36 08.5	64 20	16.8	9
28 00.2	72 31	26.4	32 14.3	69 26	21.5	32 34.9	69 25	21.1	35 56.3	65 20	16.6	120
27 41.4	73 31	26.1	31 58.8	70 25	21.2	32 19.8	70 25	20.8	35 44.2	67 20	16.4	1
27 22.9	74 30	25.7	31 43.6	71 25	20.9	32 04.8	71 25	20.5	35 32.3	68 20	16.2	2
27 04.7	75 30	25.3	31 28.5	72 25	20.6	31 50.0	72 24	20.2	35 20.6	69 19	15.9	3
26 46.6	75 30	24.9	31 13.7	73 24	20.3	31 35.5	73 24	19.9	35 09.0	70 19	15.7	4
26 28.9	76 29	24.5	30 59.0	74 24	20.0	31 21.1	73 24	19.6	34 57.6	71 19	15.5	125
26 11.4	77 29	24.2	30 44.6	75 24	19.7	31 07.0	74 23	19.3	34 46.3	72 18	15.3	6
25 54.2	78 28	23.8	30 30.4	76 23	19.4	30 53.0	75 23	19.0	34 35.3	73 18	15.0	7
25 37.2	79 28	23.4	30 16.4	76 23	19.1	30 39.3	76 22	18.7	34 24.3	74 18	14.8	8
25 20.5	79 27	23.0	30 02.7	77 23	18.8	30 25.8	77 22	18.4	34 13.6	75 18	14.5	9
25 04.1	80 27	22.6	29 49.1	78 22	18.4	30 12.5	78 22	18.1	34 03.0	76 17	14.3	130
24 47.9	81 26	22.2	29 35.8	79 22	18.1	29 59.5	79 21	17.8	33 52.6	77 17	14.1	1
24 32.0	82 26	21.8	29 22.7	80 21	17.8	29 46.6	80 21	17.4	33 42.4	78 17	13.8	2
24 16.4	82 26	21.4	29 09.9	81 21	17.5	29 34.0	80 21	17.1	33 32.4	78 16	13.6	3
24 01.1	83 25	20.9	28 57.3	81 21	17.1	29 21.6	81 20	16.8	33 22.5	79 16	13.3	4
23 46.1	84 25	20.5	28 44.9	82 20	16.8	29 09.5	82 20	16.5	33 12.9	80 16	13.1	135
23 31.4	84 24	20.1	28 32.7	83 20	16.5	28 57.6	83 19	16.1	33 03.4	81 16	12.8	6
23 16.9	85 24	19.7	28 20.8	84 19	16.1	28 45.9	84 19	15.8	32 54.1	82 15	12.5	7
23 02.8	86 23	19.3	28 09.2	84 19	15.8	28 34.5	84 19	15.5	32 44.9	83 15	12.3	8
22 48.9	86 23	18.9	27 57.8	85 19	15.4	28 23.3	85 18	15.1	32 36.0	83 15	12.0	9
22 35.4	87 22	18.4	27 46.6	86 18	15.1	28 12.3	86 18	14.8	32 27.3	84 14	11.7	140
22 22.1	88 22	18.0	27 35.7	86 18	14.7	28 01.6	86 17	14.5	32 18.7	85 14	11.5	1
22 09.1	88 21	17.6	27 25.0	87 17	14.4	27 51.1	87 17	14.1	32 10.4	86 14	11.2	2
21 56.5	89 21	17.1	27 14.6	88 17	14.0	27 40.9	88 17	13.8	32 02.3	86 13	10.9	3
21 44.1	89 20	16.7	27 04.4	88 16	13.7	27 30.9	88 16	13.4	31 54.3	87 13	10.7	4
21 32.1	90 20	16.3	26 54.5	89 16	13.3	27 21.2	89 16	13.1	31 46.6	88 13	10.4	145
21 20.4	91 19	15.8	26 44.8	90 16	13.0	27 11.7	90 15	12.7	31 39.0	89 12	10.1	6
21 09.0	91 18	15.4	26 35.5	90 15	12.6	27 02.5	90 15	12.4	31 31.7	89 12	09.8	7
20 57.9	92 18	14.9	26 26.3	91 15	12.2	26 53.6	91 14	12.0	31 24.5	90 12	09.6	8
20 47.1	92 17	14.5	26 17.5	91 14	11.9	26 44.9	91 14	11.7	31 17.6	90 11	09.3	9
20 36.7	93 17	14.0	26 08.9	92 14	11.5	26 36.4	92 14	11.3	31 10.8	91 11	09.0	150
20 26.5	93 16	13.6	26 00.5	92 13	11.1	26 28.2	92 13	10.9	31 04.3	92 11	08.7	1
20 16.7	94 16	13.1	25 52.5	93 13	10.8	26 20.3	93 13	10.6	30 58.0	92 10	08.4	2
20 07.3	94 15	12.7	25 44.7	93 13	10.4	26 12.7	93 12	10.2	30 51.9	93 10	08.1	3
19 58.1	94 15	12.2	25 37.1	94 12	10.0	26 05.3	94 12	09.8	30 46.0	93 09	07.8	4
19 49.3	95 14	11.8	25 29.9	94 12	09.7	25 58.2	94 11	09.5	30 40.3	94 09	07.5	155
19 40.8	95 14	11.3	25 22.9	95 11	09.3	25 51.3	95 11	09.1	30 34.9	94 09	07.3	6
19 32.7	96 13	10.8	25 16.2	95 11	08.9	25 44.7	95 11	08.7	30 29.6	95 08	07.0	7
19 24.8	96 12	10.4	25 09.8	96 10	08.5	25 38.4	96 10	08.4	30 24.6	95 08	06.7	8
19 17.4	96 12	09.9	25 03.6	96 10	08.2	25 32.4	96 10	08.0	30 19.8	96 08	06.4	9
19 10.2	97 11	09.5	24 57.7	96 09	07.8	25 26.6	96 09	07.6	30 15.2	96 07	06.1	160
19 03.4	97 11	09.0	24 52.1	97 09	07.4	25 21.1	97 09	07.2	30 10.8	96 07	05.8	1
18 56.9	97 10	08.5	24 46.8	97 08	07.0	25 15.9	97 08	06.9	30 06.6	97 07	05.5	2
18 50.8	98 10	08.1	24 41.8	97 08	06.6	25 11.0	97 08	06.5	30 02.7	97 06	05.2	3
18 45.0	98 09	07.6	24 37.0	98 07	06.2	25 06.3	98 07	06.1	29 59.0	97 06	04.9	4
18 39.6	98 08	07.1	24 32.6	98 07	05.9	25 01.9	98 07	05.7	29 55.5	98 05	04.6	165
18 34.5	98 08	06.7	24 28.4	98 06	05.5	24 57.8	98 06	05.4	29 52.2	98 05	04.3	6
18 29.8	99 07	06.2	24 24.5	98 06	05.1	24 54.0	98 06	05.0	29 49.2	98 05	04.0	7
18 25.4	99 07	05.7	24 20.9	99 06	04.7	24 50.5	99 05	04.6	29 46.3	99 04	03.7	8
18 21.3	99 06	05.2	24 17.5	99 05	04.3	24 47.2	99 05	04.2	29 43.7	99 04	03.4	9
18 17.6	99 06	04.8	24 14.5	99 05	03.9	24 44.2	99 04	03.8	29 41.4	99 04	03.1	170
18 14.3	99 05	04.3	24 11.7	99 04	03.5	24 41.5	99 04	03.5	29 39.2	99 03	02.8	1
18 11.3	99 04	03.8	24 09.3	99 04	03.1	24 39.1	99 04	03.1	29 37.3	99 03	02.5	2
18 08.7	1.0 04	03.3	24 07.1	1.0 03	02.7	24 37.0	1.0 03	02.7	29 35.6	1.0 02	02.1	3
18 06.4	1.0 03	02.9	24 05.2	1.0 03	02.4	24 35.1	1.0 03	02.3	29 34.1	1.0 02	01.8	4
18 04.4	1.0 03	02.4	24 03.6	1.0 02	02.0	24 33.6	1.0 02	01.9	29 32.8	1.0 02	01.5	175
18 02.8	1.0 02	01.9	24 02.3	1.0 02	01.6	24 32.3	1.0 02	01.5	29 31.8	1.0 01	01.2	6
18 01.6	1.0 01	01.4	24 01.3	1.0 01	01.2	24 31.3	1.0 01	01.2	29 31.0	1.0 01	00.9	7
18 00.7	1.0 01	01.0	24 00.6	1.0 01	00.8	24 30.6	1.0 01	00.8	29 30.5	1.0 01	00.6	8
18 00.2	1.0 00	00.5	24 00.1	1.0 00	00.4	24 30.1	1.0 00	00.4	29 30.1	1.0 00	00.3	9
18 00.0	1.0 00	00.0	24 00.0	1.0 00	00.0	24 30.0	1.0 00	00.0	29 30.0	1.0 00	00.0	180

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STAR IDENTIFICATION TABLE

ALTITUDE

Lat. 45°

AZ.	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	49	180	53	180	57	180	61	180	65	180	69	180	73	180	77	180	81	180	85	180	89	180	00
4	49	174	53	173	57	173	61	172	65	171	69	170	73	168	77	165	81	160	84	148	87	108	4
8	48	168	52	167	56	166	60	164	64	163	68	160	72	157	76	152	79	143	82	128	84	97	8
12	48	162	52	161	55	159	59	157	63	154	67	151	71	147	74	140	77	131	80	115	81	92	12
16	47	156	50	155	54	152	58	150	62	147	65	143	69	138	72	131	75	121	77	107	79	89	16
20	45	151	49	149	53	146	56	143	60	140	63	136	67	130	70	123	72	114	74	102	76	87	20
24	44	146	48	143	51	141	55	137	58	134	61	129	64	124	67	117	70	108	72	97	73	85	24
28	42	141	46	138	49	135	53	132	56	128	59	123	62	118	65	111	67	103	69	94	70	83	28
32	40	136	44	133	47	130	50	127	54	123	57	118	59	113	62	107	64	99	66	91	67	81	32
36	38	132	42	129	45	126	48	122	51	118	54	114	57	108	59	102	61	96	63	88	65	79	36
40	36	127	39	125	43	121	46	118	49	114	51	109	54	104	57	99	59	92	60	85	62	78	40
44	34	123	37	121	40	117	43	114	46	110	49	106	51	101	54	95	56	90	58	83	59	76	44
48	31	120	35	117	38	113	41	110	43	106	46	102	49	97	51	92	53	87	55	81	56	74	48
52	29	116	32	113	35	110	38	106	41	103	43	99	46	94	48	90	50	84	52	79	54	73	52
56	26	113	29	110	32	106	35	103	38	99	40	96	43	91	45	87	47	82	49	77	51	71	56
60	24	109	27	106	30	103	32	100	35	96	38	93	40	89	42	84	45	80	46	75	48	69	60
64	21	106	24	103	27	100	30	97	32	93	35	90	37	86	40	82	42	77	44	73	46	67	64
68	18	103	21	100	24	97	27	94	29	90	32	87	34	83	37	79	39	75	41	70	43	66	68
72	16	100	18	97	21	94	24	91	27	88	29	84	32	81	34	77	36	73	38	68	40	64	72
76	13	97	16	94	18	91	21	88	24	85	26	82	29	78	31	74	34	71	36	66	38	62	76
80	10	94	13	91	15	88	18	85	21	82	24	79	26	76	29	72	31	68	33	64	35	60	80
84	07	91	10	89	13	86	15	83	18	80	21	76	23	73	26	70	28	66	31	62	33	59	84
88	04	89	07	86	10	83	13	80	15	77	18	74	21	71	23	67	26	64	28	60	31	57	88
92	01	86	04	83	07	80	10	77	13	74	15	71	18	68	21	65	23	62	26	58	28	55	92
96	*01*	83	01	80	04	77	07	74	10	72	13	69	15	66	18	63	21	59	23	56	26	53	96
100	*04*	80	*01*	77	02	75	04	72	07	69	10	66	13	63	16	60	18	57	21	54	24	51	100
104	*07*	77	*04*	74	*01*	72	02	69	05	66	08	63	10	61	13	58	16	55	19	52	22	49	104
108	*10*	74	*07*	72	*04*	69	*01*	66	02	63	05	61	08	58	11	55	14	52	17	50	20	47	108
112	*12*	71	*09*	69	*06*	66	*03*	63	*00*	61	03	58	06	55	09	53	12	50	15	47	17	44	112
116	*15*	68	*12*	66	*09*	63	*06*	60	*03*	58	00	55	03	53	06	50	09	47	13	45	16	42	116
120	*18*	65	*15*	62	*11*	60	*08*	57	*05*	55	*02*	52	01	50	04	47	07	45	11	42	14	40	120
124	*20*	62	*17*	59	*14*	57	*11*	54	*07*	52	*04*	49	*01*	47	02	45	05	42	09	40	12	38	124
128	*23*	58	*19*	56	*16*	53	*13*	51	*10*	49	*06*	46	*03*	44	00	42	04	40	07	37	10	35	128
132	*25*	55	*22*	52	*18*	50	*15*	48	*12*	45	*08*	43	*05*	41	*02*	39	02	37	05	35	09	33	132
136	*27*	51	*24*	49	*21*	46	*17*	44	*14*	42	*10*	40	*07*	38	*03*	36	00	34	04	32	07	30	136
140	*29*	47	*26*	45	*23*	43	*19*	41	*15*	39	*12*	37	*08*	35	*05*	33	*01*	31	02	29	06	28	140
144	*31*	43	*28*	41	*24*	39	*21*	37	*17*	35	*14*	34	*10*	32	*06*	30	*03*	28	01	27	05	25	144
148	*33*	39	*30*	37	*26*	35	*22*	33	*19*	32	*15*	30	*11*	29	*08*	27	*04*	25	*00*	24	03	22	148
152	*35*	35	*31*	33	*28*	31	*24*	30	*20*	28	*16*	27	*13*	25	*09*	24	*05*	22	*01*	21	02	20	152
156	*37*	30	*33*	29	*29*	27	*25*	26	*21*	24	*18*	23	*14*	22	*10*	21	*06*	19	*02*	18	02	17	156
160	*38*	26	*34*	24	*30*	23	*26*	22	*22*	20	*19*	19	*15*	18	*11*	17	*07*	16	*03*	15	01	14	160
164	*39*	21	*35*	19	*31*	18	*27*	17	*23*	16	*19*	15	*16*	15	*12*	14	*08*	13	*04*	12	00	11	164
168	*40*	16	*36*	15	*32*	14	*28*	13	*24*	12	*20*	12	*16*	11	*12*	10	*08*	10	*04*	09	*00*	09	168
172	*40*	11	*37*	10	*33*	09	*29*	09	*25*	08	*21*	08	*17*	07	*13*	07	*09*	07	*05*	06	*01*	06	172
176	*41*	05	*37*	05	*33*	05	*29*	04	*25*	04	*21*	04	*17*	04	*13*	03	*09*	03	*05*	03	*01*	03	176
180	*41*	00	*37*	00	*33*	00	*29*	00	*25*	00	*21*	00	*17*	00	*13*	00	*09*	00	*05*	00	*01*	00	180
	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		

16—11430

FIGURES IN ITALICS INDICATE THAT DECLINATION IS OF CONTRARY NAME TO LATITUDE

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STAR IDENTIFICATION TABLE

ALTITUDE

AZ.	48°		52°		56°		60°		64°		68°		72°		76°		80°		84°		88°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	87	00	83	00	79	00	75	00	71	00	67	00	63	00	59	00	55	00	51	00	47	00	00
4	86	41	83	19	79	11	75	08	71	05	67	04	63	03	59	02	55	01	51	01	47	00	4
8	84	59	81	34	78	22	74	15	70	11	67	08	63	05	59	04	55	02	51	01	47	00	8
12	81	66	79	44	77	30	73	21	70	15	66	11	62	08	59	06	55	04	51	02	47	01	12
16	79	69	77	51	75	37	72	27	69	20	66	14	62	10	58	07	55	05	51	03	47	01	16
20	76	71	75	55	73	42	71	31	68	24	65	17	61	13	58	09	54	06	51	03	47	01	20
24	73	71	73	58	71	45	69	35	67	27	64	20	61	15	57	11	54	07	50	04	47	01	24
28	71	71	70	59	69	48	68	38	65	30	63	23	60	17	57	12	54	08	50	04	47	01	28
32	68	71	68	60	67	50	66	40	64	32	62	25	59	19	56	13	53	09	50	05	47	02	32
36	65	70	65	60	65	51	64	42	62	34	60	27	58	20	56	15	53	10	50	05	47	02	36
40	63	69	63	61	63	52	62	43	61	35	59	28	57	21	55	16	52	10	49	06	47	02	40
44	60	68	60	60	61	52	60	44	59	36	58	29	56	23	54	17	52	11	49	06	46	02	44
48	57	67	58	60	58	52	58	45	57	37	56	30	55	24	53	17	51	12	49	07	46	02	48
52	55	66	56	59	56	52	56	45	56	38	55	31	54	24	52	18	51	12	48	07	46	02	52
56	52	65	53	58	54	52	54	45	54	38	53	31	53	25	51	19	50	13	48	07	46	02	56
60	50	64	51	58	52	51	52	45	52	38	52	32	51	25	51	19	49	13	48	08	46	02	60
64	47	62	48	56	49	51	50	44	50	38	51	32	50	26	50	20	49	14	47	08	46	03	64
68	45	61	46	55	47	50	48	44	49	38	49	32	49	26	49	20	48	14	47	08	46	03	68
72	42	59	44	54	45	49	46	43	47	38	48	32	48	26	48	20	47	14	47	08	46	03	72
76	40	58	41	53	43	48	44	43	45	37	46	32	46	26	47	20	47	14	46	08	45	03	76
80	37	56	39	52	41	47	42	42	44	37	45	31	45	26	46	20	46	14	46	08	45	03	80
84	35	54	37	50	39	46	40	41	42	36	43	31	44	25	45	20	45	14	45	09	45	03	84
88	33	53	35	49	37	44	39	40	40	35	42	30	43	25	44	20	44	14	45	08	45	03	88
92	31	51	33	47	35	43	37	39	39	34	40	29	42	24	43	19	44	14	44	08	45	03	92
96	28	49	31	45	33	42	35	37	37	33	39	29	41	24	42	19	43	14	44	08	45	03	96
100	26	47	29	44	31	40	33	36	36	32	38	28	39	23	41	18	42	13	44	08	45	03	100
104	24	45	27	42	29	39	32	35	34	31	36	27	38	22	40	18	42	13	43	08	44	03	104
108	22	43	25	40	28	37	30	33	33	30	35	26	37	22	39	17	41	13	43	08	44	03	108
112	20	41	23	38	26	35	29	32	31	28	34	25	36	21	38	17	41	12	42	08	44	03	112
116	19	39	21	36	24	33	27	30	30	27	33	24	35	20	38	16	40	12	42	07	44	03	116
120	17	37	20	35	23	32	26	29	29	26	32	22	34	19	37	15	39	11	42	07	44	02	120
124	15	35	18	33	21	30	24	27	28	24	30	21	33	18	36	14	39	11	41	07	44	02	124
128	14	33	17	30	20	28	23	25	26	23	30	20	33	17	36	14	38	10	41	06	44	02	128
132	12	31	15	28	19	26	22	24	25	21	29	18	32	16	35	13	38	09	41	06	44	02	132
136	11	28	14	26	18	24	21	22	24	20	28	17	31	15	34	12	37	09	41	05	44	02	136
140	09	26	13	24	16	22	20	20	23	18	27	16	30	13	34	11	37	08	40	05	43	02	140
144	08	23	12	22	15	20	19	18	23	16	26	14	30	12	33	10	37	07	40	05	43	02	144
148	07	21	11	19	15	18	18	16	22	14	26	13	29	11	33	09	36	07	40	04	43	01	148
152	06	18	10	17	14	16	17	14	21	13	25	11	29	10	32	08	36	06	40	04	43	01	152
156	05	16	09	15	13	13	17	12	21	11	24	10	28	08	32	07	36	05	39	03	43	01	156
160	05	13	09	12	12	11	16	10	20	09	24	08	28	07	32	06	36	04	39	03	43	01	160
164	04	11	08	10	12	09	16	08	20	07	24	06	28	06	31	04	35	03	39	02	43	01	164
168	04	08	08	07	12	07	15	06	19	06	23	05	27	04	31	03	35	03	39	02	43	01	168
172	03	05	07	05	11	05	15	04	19	04	23	03	27	03	31	02	35	02	39	01	43	00	172
176	03	03	07	02	11	02	15	02	19	02	23	02	27	01	31	01	35	01	39	01	43	00	176
180	03	00	07	00	11	00	15	00	19	00	23	00	27	00	31	00	35	00	39	00	43	00	180
	48°		52°		56°		60°		64°		68°		72°		76°		80°		84°		88°		

16—11439

FIGURES IN ITALICS INDICATE THAT DECLINATION IS OF CONTRARY NAME TO LATITUDE

Digitized by Google

Lat. 46°

H.A.	0° 00′ Alt.	Δd Δt	Az.	0° 30′ Alt.	Δd Δt	Az.	1° 00′ Alt.	Δd Δt	Az.	1° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	44 00.0	1.0 01	180.0	44 30.0	1.0 01	180.0	45 00.0	1.0 01	180.0	45 30.0	1.0 01	180.0
1	43 59.5	1.0 03	178.6	44 29.5	1.0 03	178.6	44 59.5	1.0 03	178.6	45 29.5	1.0 03	178.6
2	43 58.0	1.0 04	177.2	44 28.0	1.0 04	177.2	44 57.9	1.0 04	177.2	45 27.9	1.0 04	177.1
3	43 55.5	1.0 06	175.8	44 25.4	1.0 06	175.8	44 55.4	1.0 06	175.8	45 25.3	1.0 06	175.7
4	43 51.9	1.0 08	174.4	44 21.9	1.0 08	174.4	44 51.8	1.0 08	174.4	45 21.7	1.0 08	174.3
05	43 47.4	1.0 09	173.1	44 17.3	1.0 09	173.0	44 47.2	1.0 09	172.9	45 17.1	1.0 09	172.9
6	43 41.9	99 11	171.7	44 11.7	99 11	171.6	44 41.6	99 11	171.5	45 11.4	99 11	171.5
7	43 35.3	99 12	170.3	44 05.1	99 13	170.2	44 34.9	99 13	170.1	45 04.7	99 13	170.1
8	43 27.8	99 14	168.9	43 57.6	99 14	168.9	44 27.3	99 14	168.8	44 57.0	99 14	168.7
9	43 19.4	99 16	167.6	43 49.0	99 16	167.5	44 18.7	99 16	167.4	44 48.3	99 16	167.3
10	43 09.9	99 17	166.2	43 39.5	99 17	166.1	44 09.1	99 18	166.0	44 38.6	99 18	165.9
1	42 59.5	98 19	164.9	43 29.0	98 19	164.8	43 58.5	98 19	164.6	44 28.0	98 19	164.5
2	42 48.2	98 20	163.5	43 17.6	98 21	163.4	43 47.0	98 21	163.3	44 16.4	98 21	163.1
3	42 35.9	98 22	162.2	43 05.2	98 22	162.1	43 34.5	98 22	161.9	44 03.8	98 23	161.8
4	42 22.7	97 24	160.9	42 51.9	97 24	160.7	43 21.1	97 24	160.6	43 50.3	97 24	160.4
15	42 08.6	97 25	159.6	42 37.7	97 26	159.4	43 06.8	97 25	159.2	43 35.9	97 26	159.1
6	41 53.6	97 26	158.3	42 22.6	97 27	158.1	42 51.6	97 27	157.9	43 20.5	96 27	157.7
7	41 37.7	96 28	157.0	42 06.6	96 28	156.8	42 35.4	96 28	156.6	43 04.3	96 29	156.4
8	41 21.0	96 29	155.7	41 49.7	96 30	155.5	42 18.5	96 30	155.3	42 47.2	96 30	155.1
9	41 03.4	96 31	154.4	41 32.0	95 31	154.2	42 00.6	95 31	154.0	42 29.2	95 31	153.8
20	40 45.0	95 32	153.2	41 13.5	95 32	153.0	41 42.0	95 32	152.7	42 10.4	95 33	152.5
1	40 25.8	95 33	151.9	40 54.1	94 34	151.7	41 22.5	94 34	151.5	41 50.7	94 34	151.3
2	40 05.8	94 35	150.7	40 34.0	94 35	150.5	41 02.2	94 35	150.2	41 30.3	94 35	150.0
3	39 45.0	94 36	149.5	40 13.0	93 36	149.2	40 41.1	93 36	149.0	41 09.1	93 37	148.8
4	39 23.4	93 37	148.2	39 51.3	93 37	148.0	40 19.2	93 38	147.8	40 47.1	93 38	147.5
25	39 01.1	93 38	147.0	39 28.9	92 39	146.8	39 56.6	92 39	146.6	40 24.3	92 39	146.3
6	38 38.1	92 40	145.9	39 05.7	92 40	145.6	39 33.3	92 40	145.4	40 00.8	92 40	145.1
7	38 14.3	92 41	144.7	38 41.8	91 41	144.4	39 09.2	91 41	144.2	39 36.6	91 42	143.9
8	37 49.9	91 42	143.5	38 17.2	91 42	143.3	38 44.5	91 42	143.0	39 11.7	91 43	142.7
9	37 24.8	91 43	142.4	37 52.0	90 43	142.1	38 19.1	90 43	141.8	38 46.1	90 44	141.6
30	36 59.0	90 44	141.2	37 26.0	90 44	141.0	37 53.0	90 45	140.7	38 19.9	90 45	140.4
1	36 32.6	90 45	140.1	36 59.5	89 45	139.8	37 26.3	89 46	139.6	37 53.0	89 46	139.3
2	36 05.6	89 46	139.0	36 32.3	89 46	138.7	36 58.9	89 47	138.4	37 25.5	89 47	138.2
3	35 38.0	88 47	137.9	36 04.5	88 47	137.6	36 31.0	88 48	137.3	36 57.4	88 48	137.1
4	35 09.8	88 48	136.8	35 36.1	88 48	136.5	36 02.5	88 48	136.3	36 28.8	88 49	136.0
35	34 41.0	87 49	135.8	35 07.2	87 49	135.5	35 33.4	87 49	135.2	35 59.5	87 50	134.9
6	34 11.6	87 50	134.7	34 37.7	87 50	134.4	35 03.7	87 50	134.1	35 29.7	87 51	133.8
7	33 41.7	86 51	133.7	34 07.6	86 51	133.4	34 33.5	86 51	133.1	34 59.3	86 51	132.7
8	33 11.3	86 52	132.6	33 37.1	86 52	132.3	34 02.8	86 52	132.0	34 28.5	85 52	131.7
9	32 40.4	85 52	131.6	33 06.0	85 53	131.3	33 31.6	85 53	131.0	33 57.1	85 53	130.7
40	32 09.0	85 53	130.6	32 34.5	85 53	130.3	32 59.9	85 54	130.0	33 25.3	84 54	129.7
1	31 37.1	84 54	129.6	32 02.4	84 54	129.3	32 27.7	84 54	129.0	32 52.9	84 55	128.7
2	31 04.8	84 55	128.6	31 30.0	84 55	128.3	31 55.1	84 55	128.0	32 20.2	84 55	127.7
3	30 32.0	84 55	127.6	30 57.0	83 56	127.3	31 22.0	83 56	127.0	31 47.0	83 56	126.7
4	29 58.8	83 56	126.7	30 23.7	83 56	126.4	30 48.5	83 56	126.0	31 13.3	83 57	125.7
45	29 25.2	83 57	125.7	29 49.9	82 57	125.4	30 14.6	82 57	125.1	30 39.3	82 57	124.7
6	28 51.1	82 57	124.8	29 15.7	82 58	124.5	29 40.3	82 58	124.1	30 04.8	82 58	123.8
7	28 16.7	82 58	123.9	28 41.2	82 58	123.5	29 05.6	81 58	123.2	29 30.0	81 59	122.9
8	27 41.9	81 59	122.9	28 06.3	81 59	122.6	28 30.6	81 59	122.3	28 54.8	81 59	121.9
9	27 06.7	81 59	122.0	27 31.0	81 59	121.7	27 55.1	80 60	121.4	28 19.3	80 60	121.0
50	26 31.2	80 60	121.1	26 55.3	80 60	120.8	27 19.4	80 60	120.4	27 43.4	80 60	120.1
1	25 55.4	80 60	120.2	26 19.4	80 60	119.9	26 43.3	80 61	119.5	27 07.2	80 61	119.2
2	25 19.2	80 61	119.3	25 43.1	79 61	119.0	26 06.9	79 61	118.7	26 30.6	79 61	118.3
3	24 42.7	79 61	118.5	25 06.4	79 62	118.1	25 30.1	79 62	117.8	25 53.8	79 62	117.4
4	24 05.9	79 62	117.6	24 29.5	79 62	117.3	24 53.1	78 62	116.9	25 16.6	78 62	116.6
55	23 28.8	78 62	116.7	23 52.3	78 62	116.4	24 15.8	78 63	116.1	24 39.2	78 63	115.7
6	22 51.5	78 63	115.9	23 14.9	78 63	115.5	23 38.2	78 63	115.2	24 01.5	78 63	114.9
7	22 13.8	78 63	115.0	22 37.1	78 63	114.7	23 00.4	77 63	114.4	23 23.6	77 64	114.0
8	21 36.0	77 64	114.2	21 59.1	77 64	113.9	22 22.3	77 64	113.5	22 45.4	77 64	113.2
9	20 57.8	77 64	113.4	21 20.9	77 64	113.0	21 44.0	77 64	112.7	22 07.0	77 64	112.3
60	20 19.4	77 64	112.6	20 42.4	77 64	112.2	21 05.4	76 65	111.9	21 28.3	76 65	111.5
1	19 40.8	76 65	111.7	20 03.7	76 65	111.4	20 26.6	76 65	111.1	20 49.4	76 65	110.7
2	19 02.0	76 65	110.9	19 24.8	76 65	110.6	19 47.6	76 65	110.2	20 10.3	76 65	109.9
3	18 23.0	76 65	110.1	18 45.7	76 66	109.8	19 08.4	76 66	109.4	19 31.0	75 66	109.1
4	17 43.8	76 66	109.3	18 06.4	75 66	109.0	18 29.0	75 66	108.6	18 51.6	75 66	108.3
65	17 04.3	75 66	108.5	17 26.9	75 66	108.2	17 49.4	75 66	107.9	18 11.9	75 66	107.5
6	16 24.7	75 66	107.8	16 47.2	75 66	107.4	17 09.6	75 67	107.1	17 32.1	75 67	106.7
7	15 44.9	75 67	107.0	16 07.3	75 67	106.6	16 29.7	75 67	106.3	16 52.1	74 67	105.9
8	15 05.0	75 67	106.2	15 27.3	74 67	105.9	15 49.6	74 67	105.5	16 11.9	74 67	105.2
9	14 24.9	74 67	105.4	14 47.2	74 67	105.1	15 09.4	74 67	104.7	15 31.6	74 67	104.4
70	13 44.7	74 67	104.7	14 06.9	74 67	104.3	14 29.0	74 68	104.0	14 51.2	74 68	103.6
1	13 04.3	74 68	103.9	13 26.4	74 68	103.6	13 48.5	74 68	103.2	14 10.6	74 68	102.9
2	12 23.7	74 68	103.2	12 45.8	74 68	102.8	13 07.9	73 68	102.5	13 29.9	73 68	102.1
3	11 43.1	73 68	102.4	12 05.1	73 68	102.1	12 27.1	73 68	101.7	12 49.1	73 68	101.4
4	11 02.3	73 68	101.7	11 24.3	73 68	101.3	11 46.3	73 68	101.0	12 08.2	73 68	100.6
75	10 21.5	73 68	100.9	10 43.4	73 68	100.6	11 05.3	73 68	100.2	11 27.2	73 69	99.9
6	9 40.5	73 68	100.2	10 02.4	73 69	99.8	10 24.2	73 69	99.5	10 46.1	73 69	99.1
7	8 59.4	73 69	99.4	9 21.2	73 69	99.1	9 43.1	73 69	98.7	10 04.9	73 69	98.4
8	8 18.2	73 69	98.7	8 40.0	73 69	98.3	9 01.8	73 69	98.0	9 23.6	72 69	97.6
9	7 37.0	73 69	98.0	7 58.8	73 69	97.6	8 20.5	72 69	97.3	8 42.2	72 69	96.9
80	6 55.7	72 69	97.2	7 17.4	72 69	96.9	7 39.1	72 69	96.5	8 00.8	72 69	96.2
1	6 14.3	72 69	96.5	6 36.0	72 69	96.2	6 57.7	72 69	95.8	7 19.4	72 69	95.5
2	5 32.9	72 69	95.8	5 54.5	72 69	95.4	6 16.2	72 69	95.1	6 37.9	72 69	94.7
3				5 13.0	72 69	94.7	5 34.7	72 69	94.4	5 56.3	72 69	94.0
4										5 14.7	72 69	93.3
85												
6												

H.A.	2° 00′ Alt.	Δd Δt	Az.	2° 30′ Alt.	Δd Δt	Az.	3° 00′ Alt.	Δd Δt	Az.	3° 30′ Alt.	Δd Δt	Az.	H.A.
°	° ′		°	° ′		°	° ′		°	° ′		°	°
00	46 00.0	1.0 01	180.0	46 30.0	1.0 01	180.0	47 00.0	1.0 01	180.0	47 30.0	1.0 01	180.0	00
1	45 59.5	1.0 03	178.6	46 29.5	1.0 03	178.5	46 59.5	1.0 03	178.5	47 29.5	1.0 03	178.5	1
2	45 57.9	1.0 04	177.1	46 27.9	1.0 04	177.1	46 57.9	1.0 04	177.1	47 27.9	1.0 04	177.0	2
3	45 55.3	1.0 06	175.7	46 25.3	1.0 06	175.7	46 55.2	1.0 06	175.6	47 25.2	1.0 06	175.6	3
4	45 51.6	1.0 08	174.3	46 21.6	1.0 08	174.2	46 51.5	1.0 08	174.2	47 21.4	1.0 08	174.1	4
05	45 47.0	1.0 10	172.8	46 16.8	1.0 10	172.8	46 46.7	1.0 10	172.7	47 16.6	1.0 10	172.6	05
6	45 41.2	99 11	171.4	46 11.1	99 11	171.3	46 40.9	99 11	171.2	47 10.7	99 12	171.2	6
7	45 34.5	99 13	170.0	46 04.3	99 13	169.9	46 34.0	99 13	169.8	47 03.8	99 13	169.7	7
8	45 26.7	99 15	168.6	45 56.4	99 15	168.5	46 26.1	99 15	168.4	46 55.8	99 15	168.3	8
9	45 18.0	99 16	167.2	45 47.6	99 16	167.0	46 17.2	99 17	166.9	46 46.9	99 17	166.8	9
10	45 08.2	99 18	165.8	45 37.8	99 18	165.6	46 07.3	98 18	165.5	46 36.8	98 18	165.4	10
1	44 57.5	98 20	164.4	45 26.9	98 20	164.2	45 56.4	98 20	164.1	46 25.8	98 20	164.0	1
2	44 45.7	98 21	163.0	45 15.1	98 21	162.8	45 44.5	98 21	162.7	46 13.8	98 22	162.5	2
3	44 33.1	98 23	161.6	45 02.3	98 23	161.5	45 31.6	97 23	161.3	46 00.8	97 23	161.1	3
4	44 19.5	97 24	160.2	44 48.6	97 24	160.1	45 17.7	97 25	159.9	45 46.9	97 25	159.7	4
15	44 04.9	97 26	158.9	44 33.9	97 26	158.7	45 03.0	97 26	158.5	45 32.0	97 26	158.4	15
6	43 49.4	96 27	157.6	44 18.4	96 28	157.4	44 47.3	96 28	157.2	45 16.1	96 28	157.0	6
7	43 33.1	96 29	156.2	44 01.9	96 29	156.0	44 30.6	96 29	155.8	44 59.4	96 29	155.6	7
8	43 15.8	96 30	154.9	43 44.5	95 30	154.7	44 13.1	95 31	154.5	44 41.7	95 31	154.3	8
9	42 57.7	95 32	153.6	43 26.3	95 32	153.4	43 54.8	95 32	153.2	44 23.2	95 32	153.0	9
20	42 38.8	95 33	152.3	43 07.2	95 33	152.1	43 35.5	94 33	151.9	44 03.8	94 34	151.6	20
1	42 19.0	94 34	151.0	42 47.2	94 35	150.8	43 15.4	94 35	150.6	43 43.6	94 35	150.3	1
2	41 58.4	94 36	149.8	42 26.5	94 36	149.5	42 54.6	93 36	149.3	43 22.6	93 36	149.0	2
3	41 37.0	93 37	148.5	42 05.0	93 37	148.3	42 32.9	93 37	148.0	43 00.8	93 38	147.8	3
4	41 14.9	93 38	147.3	41 42.7	93 38	147.0	42 10.4	92 39	146.8	42 38.1	92 39	146.5	4
25	40 52.0	92 39	146.0	41 19.6	92 40	145.8	41 47.2	92 40	145.5	42 14.8	92 40	145.3	25
6	40 28.3	92 41	144.8	40 55.8	92 41	144.6	41 23.2	91 41	144.3	41 50.6	91 41	144.0	6
7	40 04.0	91 42	143.6	40 31.3	91 42	143.4	40 58.6	91 42	143.1	41 25.8	91 43	142.8	7
8	39 38.9	91 43	142.5	40 06.1	90 43	142.2	40 33.2	90 43	141.9	41 00.3	90 44	141.6	8
9	39 13.2	90 44	141.3	39 40.2	90 44	141.0	40 07.1	90 45	140.7	40 34.0	90 45	140.4	9
30	38 46.8	90 45	140.1	39 13.6	89 45	139.8	39 40.4	89 46	139.6	40 07.2	89 46	139.3	30
1	38 19.8	89 46	139.0	38 46.4	89 46	138.7	39 13.1	89 47	138.4	39 39.7	89 47	138.1	1
2	37 52.1	88 47	137.9	38 18.6	88 47	137.6	38 45.1	88 48	137.3	39 11.5	88 48	137.0	2
3	37 23.8	88 48	136.8	37 50.2	88 48	136.5	38 16.5	88 49	136.1	38 42.8	87 49	135.8	3
4	36 55.0	87 49	135.7	37 21.2	87 49	135.3	37 47.3	87 50	135.0	38 13.4	87 50	134.7	4
35	36 25.6	87 50	134.6	36 51.6	87 50	134.3	37 17.6	87 50	133.9	37 43.6	86 51	133.6	35
6	35 55.6	86 51	133.5	36 21.5	86 51	133.2	36 47.3	86 51	132.9	37 13.1	86 52	132.5	6
7	35 25.1	86 52	132.4	35 50.8	86 52	132.1	36 16.5	86 52	131.8	36 42.1	85 52	131.5	7
8	34 54.1	85 53	131.4	35 19.7	85 53	131.1	35 45.2	85 53	130.7	36 10.7	85 53	130.4	8
9	34 22.6	85 53	130.4	34 48.0	85 54	130.0	35 13.4	84 54	129.7	35 38.7	84 54	129.4	9
40	33 50.6	84 54	129.3	34 15.9	84 54	129.0	34 41.1	84 55	128.7	35 06.2	84 55	128.4	40
1	33 18.1	84 55	128.3	33 43.2	84 55	128.0	34 08.3	83 55	127.7	34 33.3	83 56	127.3	1
2	32 45.2	83 56	127.3	33 10.2	83 56	127.0	33 35.1	83 56	126.7	34 00.0	83 56	126.3	2
3	32 11.8	83 56	126.3	32 36.7	83 57	126.0	33 01.4	83 57	125.7	33 26.2	82 57	125.3	3
4	31 38.1	82 57	125.4	32 02.7	82 57	125.0	32 27.4	82 57	124.7	32 52.0	82 58	124.4	4
45	31 03.9	82 58	124.4	31 28.4	82 58	124.1	31 52.9	82 58	123.7	32 17.4	81 58	123.4	45
6	30 29.3	81 58	123.5	30 53.7	81 58	123.1	31 18.1	81 59	122.8	31 42.4	81 59	122.4	6
7	29 54.3	81 59	122.5	30 18.6	81 59	122.2	30 42.8	81 59	121.8	31 07.0	80 60	121.5	7
8	29 19.0	81 59	121.6	29 43.2	80 60	121.3	30 07.3	80 60	120.9	30 31.3	80 60	120.6	8
9	28 43.3	80 60	120.7	29 07.4	80 60	120.3	29 31.3	80 60	120.0	29 55.2	80 61	119.6	9
50	28 07.3	80 61	119.8	28 31.2	80 61	119.4	28 55.1	79 61	119.1	29 18.9	79 61	118.7	50
1	27 31.0	79 61	118.9	27 54.8	79 61	118.5	28 18.5	79 62	118.2	28 42.2	79 62	117.8	1
2	26 54.3	79 62	118.0	27 18.0	79 62	117.6	27 41.6	79 62	117.3	28 05.1	78 62	116.9	2
3	26 17.4	79 62	117.1	26 40.9	78 62	116.8	27 04.4	78 62	116.4	27 27.8	78 63	116.1	3
4	25 40.1	78 63	116.2	26 03.5	78 63	115.9	26 26.9	78 63	115.5	26 50.3	78 63	115.2	4
55	25 02.6	78 63	115.4	25 25.9	78 63	115.0	25 49.2	77 63	114.7	26 12.4	77 64	114.3	55
6	24 24.8	77 63	114.5	24 48.0	77 64	114.2	25 11.2	77 64	113.8	25 34.3	77 64	113.5	6
7	23 46.7	77 64	113.7	24 09.9	77 64	113.3	24 32.9	77 64	113.0	24 55.9	77 64	112.6	7
8	23 08.5	77 64	112.8	23 31.5	77 64	112.5	23 54.4	76 65	112.1	24 17.3	76 65	111.8	8
9	22 29.9	76 65	112.0	22 52.8	76 65	111.6	23 15.7	76 65	111.3	23 38.5	76 65	110.9	9
60	21 51.2	76 65	111.2	22 14.0	76 65	110.8	22 36.8	76 65	110.5	22 59.5	76 65	110.1	60
1	21 12.2	76 65	110.4	21 34.9	76 65	110.0	21 57.6	76 66	109.7	22 20.3	75 66	109.3	1
2	20 33.0	76 66	109.5	20 55.7	75 66	109.2	21 18.3	75 66	108.8	21 40.8	75 66	108.5	2
3	19 53.6	75 66	108.7	20 16.2	75 66	108.4	20 38.7	75 66	108.0	21 01.2	75 66	107.7	3
4	19 14.1	75 66	107.9	19 36.6	75 66	107.6	19 59.0	75 66	107.2	20 21.4	75 67	106.9	4
65	18 34.3	75 66	107.2	18 56.7	75 67	106.8	19 19.1	74 67	106.4	19 41.4	74 67	106.1	65
6	17 54.4	75 67	106.4	18 16.8	74 67	106.0	18 39.1	74 67	105.7	19 01.3	74 67	105.3	6
7	17 14.4	74 67	105.6	17 36.6	74 67	105.2	17 58.9	74 67	104.9	18 21.0	74 67	104.5	7
8	16 34.1	74 67	104.8	16 56.3	74 67	104.5	17 18.5	74 67	104.1	17 40.6	74 68	103.8	8
9	15 53.8	74 68	104.0	16 15.9	74 68	103.7	16 38.0	74 68	103.3	17 00.1	73 68	103.0	9
70	15 13.3	74 68	103.3	15 35.4	74 68	102.9	15 57.4	73 68	102.6	16 19.4	73 68	102.2	70
1	14 32.6	73 68	102.5	14 54.7	73 68	102.2	15 16.7	73 68	101.8	15 38.6	73 68	101.5	1
2	13 51.9	73 68	101.8	14 13.9	73 68	101.4	14 35.8	73 68	101.1	14 57.7	73 68	100.7	2
3	13 11.0	73 68	101.0	13 33.0	73 68	100.7	13 54.8	73 68	100.3	14 16.7	73 68	100.0	3
4	12 30.1	73 68	100.3	12 52.0	73 68	99.9	13 13.8	73 69	99.6	13 35.6	73 69	99.2	4
75	11 49.0	73 69	99.5	12 10.8	73 69	99.2	12 32.6	73 69	98.8	12 54.4	73 69	98.5	75
6	11 07.9	73 69	98.8	11 29.7	73 69	98.4	11 51.4	72 69	98.1	12 13.2	72 69	97.7	6
7	10 26.6	73 69	98.0	10 48.4	72 69	97.7	11 10.1	72 69	97.3	11 31.8	72 69	97.0	7
8	9 45.3	72 69	97.3	10 07.0	72 69	97.0	10 28.7	72 69	96.6	10 50.4	72 69	96.2	8
9	9 04.0	72 69	96.6	9 25.6	72 69	96.2	9 47.3	72 69	95.9	10 09.0	72 69	95.5	9
80	8 22.5	72 69	95.8	8 44.2	72 69	95.5	9 05.8	72 69	95.1	9 27.4	72 69	94.8	80
1	7 41.0	72 69	95.1	8 02.7	72 69	94.8	8 24.3	72 69	94.4	8 45.9	72 69	94.1	1
2	6 59.5	72 69	94.4	7 21.1	72 69	94.0	7 42.7	72 69	93.7	8 04.3	72 69	93.3	2
3	6 17.9	72 69	93.7	6 39.5	72 69	93.3	7 01.1	72 69	93.0	7 22.7	72 69	92.6	3
4	5 36.3	72 69	92.9	5 57.9	72 69	92.6	6 19.5	72 69	92.2	6 41.0	72 69	91.9	4
85				5 16.2	72 69	91.9	5 37.8	72 69	91.5	5 59.4	72 69	91.2	85
6										5 17.7	72 69	90.4	6

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H.A.	0° 00′			0° 30′			1° 00′			1° 30′			2° 00′			2° 30′			3° 00′			3° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	44 00.0	1.0 01	180.0	43 30.0	1.0 01	180.0	43 00.0	1.0 01	180.0	42 30.0	1.0 01	180.0	42 00.0	1.0 01	180.0	41 30.0	1.0 01	180.0	41 00.0	1.0 01	180.0	40 30.0	1.0 01	180.0	00
1	43 59.5	1.0 03	178.6	43 29.5	1.0 02	178.6	42 59.5	1.0 02	178.6	42 29.5	1.0 02	178.6	41 59.5	1.0 02	178.7	41 29.5	1.0 02	178.7	40 59.5	1.0 02	178.7	40 29.5	1.0 02	178.7	1
2	43 58.0	1.0 04	177.2	43 28.0	1.0 04	177.2	42 58.0	1.0 04	177.3	42 28.0	1.0 04	177.3	41 58.0	1.0 04	177.3	41 28.1	1.0 04	177.3	40 58.1	1.0 04	177.4	40 28.1	1.0 04	177.4	2
3	43 55.5	1.0 06	175.8	43 25.5	1.0 06	175.9	42 55.5	1.0 06	175.9	42 25.6	1.0 06	175.9	41 55.6	1.0 06	176.0	41 25.6	1.0 06	176.0	40 55.7	1.0 06	176.0	40 25.7	1.0 06	176.1	3
4	43 51.9	1.0 08	174.4	43 22.0	1.0 07	174.5	42 52.1	1.0 07	174.5	42 22.1	1.0 07	174.6	41 52.2	1.0 07	174.6	41 22.2	1.0 07	174.7	40 52.3	1.0 07	174.7	40 22.4	1.0 07	174.8	4
05	43 47.4	1.0 09	173.1	43 17.5	1.0 09	173.1	42 47.6	1.0 09	173.2	42 17.7	1.0 09	173.2	41 47.8	1.0 09	173.3	41 17.9	1.0 09	173.3	40 48.0	1.0 09	173.4	40 18.1	1.0 09	173.5	05
6	43 41.9	99 11	171.7	43 12.0	1.0 11	171.8	42 42.2	1.0 11	171.8	42 12.3	1.0 11	171.9	41 42.4	1.0 11	172.0	41 12.6	1.0 10	172.0	40 42.7	1.0 10	172.1	40 12.9	1.0 10	172.1	6
7	43 35.3	99 12	170.3	43 05.5	99 12	170.4	42 35.7	99 12	170.5	42 05.9	99 12	170.6	41 36.1	99 12	170.6	41 06.3	99 12	170.7	40 36.5	99 12	170.8	40 06.7	99 12	170.8	7
8	43 27.8	99 14	168.9	42 58.1	99 14	169.0	42 28.4	99 14	169.1	41 58.6	99 14	169.2	41 28.9	99 14	169.3	40 59.1	99 14	169.4	40 29.4	99 13	169.5	39 59.6	99 13	169.6	8
9	43 19.4	99 16	167.6	42 49.7	99 16	167.7	42 20.0	99 15	167.8	41 50.3	99 15	167.9	41 20.7	99 15	168.0	40 51.0	99 15	168.1	40 21.3	99 15	168.2	39 51.6	99 15	168.3	9
10	43 09.9	99 17	166.2	42 40.3	99 17	166.3	42 10.7	99 17	166.5	41 41.1	99 17	166.6	41 11.5	99 17	166.7	40 41.9	99 17	166.8	40 12.3	99 17	166.9	39 42.7	99 16	167.0	10
1	42 59.5	98 19	164.9	42 30.0	98 19	165.0	42 00.5	98 19	165.1	41 31.0	98 18	165.2	41 01.4	98 18	165.4	40 31.9	98 18	165.5	40 02.4	98 18	165.6	39 32.8	99 18	165.7	1
2	42 48.2	98 20	163.5	42 18.8	98 20	163.7	41 49.3	98 20	163.8	41 19.9	98 20	163.9	40 50.4	98 20	164.1	40 21.0	98 20	164.2	39 51.5	98 20	164.3	39 22.1	98 19	164.4	2
3	42 35.9	98 22	162.2	42 06.6	98 22	162.3	41 37.2	98 22	162.5	41 07.9	98 21	162.6	40 38.6	98 21	162.8	40 09.2	98 21	162.9	39 39.8	98 21	163.0	39 10.4	98 21	163.2	3
4	42 22.7	97 24	160.9	41 53.5	97 23	161.0	41 24.3	97 23	161.2	40 55.0	97 23	161.3	40 25.8	98 23	161.5	39 56.5	98 23	161.6	39 27.2	98 22	161.8	38 57.9	98 22	161.9	4
15	42 08.6	97 25	159.6	41 39.5	97 25	159.7	41 10.4	97 25	159.9	40 41.2	97 24	160.0	40 12.1	97 24	160.2	39 42.9	97 24	160.4	39 13.7	97 24	160.5	38 44.6	97 24	160.7	15
6	41 53.6	97 26	158.3	41 24.6	97 26	158.4	40 55.6	97 26	158.6	40 26.6	97 26	158.8	39 57.5	97 26	158.9	39 28.5	97 25	159.1	38 59.4	97 25	159.3	38 30.3	97 25	159.4	6
7	41 37.7	96 28	157.0	41 08.9	96 28	157.2	40 40.0	96 27	157.3	40 11.1	96 27	157.5	39 42.1	96 27	157.7	39 13.2	97 27	157.8	38 44.2	97 27	158.0	38 15.3	97 26	158.2	7
8	41 21.0	96 29	155.7	40 52.3	96 29	155.9	40 23.5	96 29	156.1	39 54.7	96 29	156.3	39 25.9	96 28	156.4	38 57.1	96 28	156.6	38 28.2	96 28	156.8	37 59.4	96 28	157.0	8
9	41 03.4	96 31	154.4	40 34.8	96 30	154.6	40 06.2	96 30	154.8	39 37.5	96 30	155.0	39 08.8	96 30	155.2	38 40.1	96 30	155.4	38 11.4	96 29	155.6	37 42.6	96 29	155.7	9
20	40 45.0	95 32	153.2	40 16.5	95 32	153.4	39 48.0	95 32	153.6	39 19.5	95 31	153.8	38 50.9	95 31	154.0	38 22.3	95 31	154.2	37 53.7	95 31	154.4	37 25.1	95 31	154.5	20
1	40 25.8	95 33	151.9	39 57.4	95 33	152.1	39 29.1	95 33	152.3	39 00.6	95 33	152.5	38 32.2	95 32	152.7	38 03.8	95 32	153.0	37 35.3	95 32	153.2	37 06.8	95 32	153.3	1
2	40 05.8	94 35	150.7	39 37.6	94 34	150.9	39 09.3	94 34	151.1	38 41.0	94 34	151.3	38 12.7	94 34	151.5	37 44.4	94 34	151.8	37 16.1	95 33	152.0	36 47.7	95 33	152.2	2
3	39 45.0	94 36	149.5	39 16.9	94 36	149.7	38 48.8	94 35	149.9	38 20.7	94 35	150.1	37 52.5	94 35	150.4	37 24.3	94 35	150.6	36 56.1	94 35	150.8	36 27.9	94 34	151.0	3
4	39 23.4	93 37	148.2	38 55.5	93 37	148.5	38 27.5	93 37	148.7	37 59.5	93 36	148.9	37 31.5	93 36	149.2	37 03.5	94 36	149.4	36 35.4	94 36	149.6	36 07.3	94 36	149.8	4
25	39 01.1	93 38	147.0	38 33.3	93 38	147.3	38 05.5	93 38	147.5	37 37.7	93 38	147.8	37 09.8	93 37	148.0	36 41.9	93 37	148.2	36 14.0	93 37	148.5	35 46.0	93 37	148.7	25
6	38 38.1	92 40	145.9	38 10.4	92 39	146.1	37 42.8	92 39	146.4	37 15.1	92 39	146.6	36 47.3	92 39	146.8	36 19.6	93 38	147.1	35 51.8	93 38	147.3	35 24.0	93 38	147.5	6
7	38 14.3	92 41	144.7	37 46.9	92 40	144.9	37 19.3	92 40	145.2	36 51.8	92 40	145.4	36 24.2	92 40	145.7	35 56.6	92 40	145.9	35 28.9	92 39	146.2	35 01.3	92 39	146.4	7
8	37 49.9	91 42	143.5	37 22.6	91 42	143.8	36 55.2	91 41	144.0	36 27.8	91 41	144.3	36 00.4	92 41	144.5	35 32.9	92 41	144.8	35 05.4	92 40	145.0	34 37.9	92 40	145.3	8
9	37 24.8	91 43	142.4	36 57.6	91 43	142.6	36 30.4	91 42	142.9	36 03.1	91 42	143.2	35 35.8	91 42	143.4	35 08.5	91 42	143.7	34 41.2	91 41	143.9	34 13.8	91 41	144.2	9
30	36 59.0	90 44	141.2	36 32.0	90 44	141.5	36 04.9	90 44	141.8	35 37.8	90 43	142.1	35 10.7	91 43	142.3	34 43.5	91 43	142.6	34 16.3	91 42	142.8	33 49.1	91 42	143.1	30
1	36 32.6	90 45	140.1	36 05.8	90 45	140.4	35 38.8	90 45	140.7	35 11.9	90 44	140.9	34 44.9	90 44	141.2	34 17.9	90 44	141.5	33 50.8	90 44	141.7	33 23.7	90 43	142.0	1
2	36 05.6	89 46	139.0	35 38.9	89 46	139.3	35 12.1	89 46	139.6	34 45.3	89 45	139.9	34 18.5	90 45	140.1	33 51.6	90 45	140.4	33 24.7	90 45	140.7	32 57.8	90 44	140.9	2
3	35 38.0	89 47	137.9	35 11.4	89 47	138.2	34 44.8	89 46	138.5	34 18.1	89 46	138.8	33 51.5	89 46	139.0	33 24.7	89 46	139.3	32 58.0	89 46	139.6	32 31.2	89 45	139.9	3
4	35 09.8	88 48	136.8	34 43.3	88 48	137.1	34 16.9	88 48	137.4	33 50.4	88 47	137.7	33 23.8	89 47	138.0	32 57.3	89 47	138.3	32 30.7	89 46	138.5	32 04.0	89 46	138.8	4
35	34 41.0	87 49	135.8	34 14.7	88 49	136.1	33 48.4	88 48	136.4	33 22.0	88 48	136.6	32 55.7	88 48	136.9	32 29.2	88 48	137.2	32 02.8	88 47	137.5	31 36.3	88 47	137.8	35
6	34 11.6	87 50	134.7	33 45.5	87 50	135.0	33 19.3	87 49	135.3	32 53.2	87 49	135.6	32 26.9	88 49	135.9	32 00.6	88 49	136.2	31 34.3	88 48	136.5	31 08.0	88 48	136.7	6
7	33 41.7	86 51	133.7	33 15.8	87 50	134.0	32 49.8	87 50	134.3	32 23.7	87 50	134.6	31 57.6	87 50	134.9	31 31.5	87 49	135.1	31 05.3	87 49	135.4	30 39.1	87 49	135.7	7
8	33 11.3	86 52	132.6	32 45.5	86 51	132.9	32 19.7	86 51	133.2	31 53.8	86 51	133.5	31 27.8	87 51	133.8	31 01.9	87 50	134.1	30 35.8	87 50	134.4	30 09.8	87 50	134.7	8
9	32 40.4	85 52	131.6	32 14.7	86 52	131.9	31 49.0	86 52	132.2	31 23.3	86 52	132.5	30 57.5	86 51	132.8	30 31.7	86 51	133.1	30 05.8	86 51	133.4	29 39.9	86 51	133.7	9
40	32 09.0	85 53	130.6	31 43.5	85 53	130.9	31 17.9	85 53	131.2	30 52.3	85 52	131.5	30 26.7	86 52	131.8	30 01.0	86 52	132.1	29 35.3	86 52	132.4	29 09.5	86 51	132.7	40
1	31 37.1	84 54	129.6	31 11.8	85 54	129.9	30 46.4	85 53	130.2	30 20.9	85 53	130.5	29 55.4	85 53	130.8	29 29.9	85 53	131.1	29 04.3	85 52	131.4	28 38.7	85 52	131.7	1
2	31 04.8	84 55	128.6	30 39.6	84 54	128.9	30 14.3	84 54	129.2	29 49.0	84 54	129.6	29 23.6	85 54	129.9	28 58.2	85 53	130.2	28 32.8	85 53	130.5	28 07.3	85 53	130.8	2
3	30 32.0	84 55	127.6	30 06.9	84 55	128.0	29 41.8	84 55	128.3	29 16.6	84 55	128.6	28 51.4	84 54	128.9	28 26.2	84 54	129.2	28 00.9	84 54	129.5	27 35.5	85 54	129.8	3
4	29 58.8	83 56	126.7	29 33.9	83 56	127.0	29 08.9	83 56	127.3	28 43.8	84 55	127.6	28 18.8	84 55	127.9	27 53.7	84 55	128.3	27 28.5	84 55	128.6	27 03.3	84 54	128.9	4
45	29 25.2	83 57	125.7	29 00.4	83 56	126.1	28 35.5	83 56	126.4	28 10.6	83 56	126.7	27 45.7	83 56	127.0	27 20.7	83 56	127.3	26 55.7	83 55	127.6	26 30.6	84 55	127.9	45
6	28 51.1	82 57	124.8	28 26.5	82 57	125.1	28 01.8	82 57	125.4	27 37.0	83 57	125.8	27 12.2	83 56	126.1	26 47.4	83 56	126.4	26 22.5	83 56	126.7	25 57.6	83 56	127.0	6
7	28 16.7	82 58	123.9	27 52.2	82 58	124.2	27 27.6	82 58	124.5	27 03.0	82 57	124.8	26 38.3	82 57	125.1	26 13.6	82 57	125.5	25 48.9	83 57	125.8	25 24.1	83 56	126.1	7
8	27 41.9	81 59	122.9	27 17.5	81 58	123.3	26 53.1	82 58	123.6	26 28.6	82 58	123.9	26 04.0	82 58	124.2	25 39.5	82 58	124.5	25 14.9	82 57	124.9	24 50.2	82 57	125.2	8
9	27 06.7	81 59	122.0	26 42.5	81 59	122.3	26 18.2	81 59	122.7	25 53.8	81 59	123.0	25 29.4	81 58	123.3	25 05.0	82 58	123.6	24 40.5	82 58	124.0	24 16.0	82 58	124.3	9
50	26 31.2	80 60	121.1	26 07.1	81 60	121.4	25 42.9	81 59	121.8	25 18.7	81 59	122.1	24 54.4	81 59	122.4	24 30.1	81 59	122.7	24 05.7	81 58	123.1	23 41.3	81 58	123.4	50
1	25 55.4	80 60	120.2	25 31.4	80 60	120.6	25 07.3	80 60	120.9	24 43.2	80 60	121.2	24 19.0	81 60	121.5	23 54.9	81 59	121.9	23 30.6	81 59	122.2	23 06.4	81 59	122.5	1
2	25 19.2	80 61	119.3	24 55.3	80 61	119.7	24 31.4	80 60	120.0	24 07.4	80 60	120.3	23 43.4	80 60	120.7	23 19.3	80 60	121.0	22 55.2	80 60	121.3	22 31.0	81 59	121.6	2
3	24 42.7	79 61	118.5	24 18.9	79 61	118.8	23 55.1	79 61	119.1	23 31.2	80 61	119.5	23 07.3	80 61	119.8	22 43.4	80 60	120.1	22 19.4	80 60	120.4	21 55.4	80 60	120.8	3
4	24 05.9	79 62	117.6	23 42.3	79 62	117.9	23 18.6	79 61	118.3	22 54.8	79 61	118.6	22 31.0	79 61	118.9	22 07.2	79 61	119.3	21 43.3	80 61	119.6	21 19.4	80 60	119.9	4
55	23 28.8	78 62	116.7	23 05.3	79 62	117.1	22 41.7	79 62	117.4	22 18.1	79 62	117.7	21 54.4	79 62	118.1	21 30.7	79 61	118.4	21 06.9	79 61	118.7	20 43.1	79 61	119.1	55
6	22 51.5	78 63	115.9	22 28.0	78 63	116.2	22 04.6	78 62	116.6	21 41.0	78 62	116.9	21 17.5	79 62	117.2	20 53.9	79 62	117.6	20 30.2	79 62	117.9	20 06.5	79 61	118.2	6
7	22 13.8	78 63	115.0	21 50.5	78 63	115.4	21 27.1	78 63	115.7	21 03.7	78 63	116.1	20 40.3	78 62	116.4	20 16.8	78 62	116.7	19 53.2	78 62	117.0	19 29.7	79 62	117.4	7
8	21 36.0	77 64	114.2	21 12.7	78 63	114.5	20 49.5	78 63	114.9	20 26.1	78 63	115.2	20 02.8	78 63	115.6	19 39.4	78 63	115.9	19 16.0	78 63	116.2	18 52.5	78 62	116.5	8
9	20 57.8	77 64	113.4	20 34.7	77 64	113.7	20 11.5	77 64	114.1	19 48.3	77 63	114.4	19 25.1	78 63	114.7	19 01.8	78 63	115.1	18 38.5	78 63	115.4	18 15.1	78 63	115.7	9
60	20 19.4	77 64	112.6	19 56.4	77 64	112.9	19 33.3	77 64	113.2	19 10.2	77 64	113.6	18 47.1	77 64	113.9	18 23.9	77 64	114.2	18 00.7	77 63	114.6	17 37.4	78 63	114.9	60
1	19 40.8	76 65	111.7	19 17.9	77 65	112.1	18 54.9	77 64	112.4	18 31.9	77 64	112.8	18 08.9	77 64	113.1	17 45.8	77 64	113.4	17 22.7	77 64	113.8	16 59.5	77 64	114.1	1
2	19 02.0	76 65	110.9	18 39.2	76 65	111.3	18 16.3	76 65	111.6	17 53.4	76 65	112.0	17 30.4	77 64	112.3	17 07.4	77 64	112.6	16 44.4	77 64	113.0	16 21.3	77 64	113.3	2
3	18 23.0	76 66	110.1	18 00.2	76 65	110.5	17 37.4	76 65	110.8	17 14.6	76 65	111.2	16 51.7	76 65	111.5	16 28.8	76 65	111.8	16 05.9	76 64	112.2	15 42.9	77 64	112.5	3
4	17 43.8	76 66	109.3	17 21.1	76 66	109.7	16 58.4	76 65	110.0	16 35.6	76 65	110.4	16 12.8	76 65	110.7	15 50.0	76 65	111.0	15 27.2	76 65	111.4	15 04.3	76 65	111.7	4
65	17 04.3	75 66	108.5	16 41.7	75 66	108.9	16 19.1	75 66	109.2	15 56.5	76 66	109.6	15 33.8	76 66	109.9	15 11.0	76 65	110.2	14 48.3	76 65	110.6	14 25.5	76 65	110.9	65
6	16 24.7	75 66	107.8	16 02.2	75 66	108.1	15 39.7	75 66	108.4	15 17.1	75 66	108.8	14 54.5	75 66	109.1	14 31.8	76 66	109.5	14 09.2	76 66	109.8	13 46.5	76 65	110.1	6
7	15 44.9	75 67	107.0	15 22.5	75 66	107.3	15 00.0	75 66	107.7	14 37.5	75 66	108.0	14 15.0	75 66	108.4	13 52.4	75 66	108.7	13 29.9	75 66	109.0	13 07.2	75 66	109.4	7
8	15 05.0	75 67	106.2	14 42.6	75 67	106.6	14 20.2	75 67	106.9	13 57.8	75 66	107.2	13 35.4	75 66	107.6	13 12.9	75 66	107.9	12 50.4	75 66	108.3	12 27.8	75 66	108.6	8
9	14 24.9	74 67	105.4	14 02.6	74 67	105.8	13 40.3	74 67	106.1	13 17.9	75 67	106.5	12 55.5	75 67	106.8	12 33.1	75 66	107.2	12 10.7	75 66	107.5	11 48.2	75 66	107.8	9
70	13 44.7	74 67	104.7	13 22.4	74 67	105.0	13 00.2	74 67	105.4	12 37.9	74 67	105.7	12 15.6	74 67	106.0	11 53.2	75 67	106.4	11 30.9	75 67	106.7	11 08.5	75 67	107.1	70
1	13 04.3	74 68	103.9	12 42.1	74 67	104.3	12 19.9	74 67	104.6	11 57.7	74 67	104.9	11 35.4	74 67	105.3	11 13.2	74 67	105.6	10 50.9	74 67	106.0	10 28.6	74 67	106.3	1
2	12 23.7	74 68	103.2	12 01.6	74 68	103.5	11 39.5	74 68	103.8	11 17.3	74 67	104.2	10 55.2	74 67	104.5	10 33.0	74 67	104.9	10 10.7	74 67	105.2	9 48.5	74 67	105.6	2
3	11 43.1	73 68	102.4	11 21.0	74 68	102.7	10 59.0	74 68	103.1	10 36.9	74 68	103.4	10 14.7	74 68	103.8	9 52.6	74 67	104.1	9 30.4	74 67	104.5	9 08.3	74 67	104.8	3
4	11 02.3	73 68	101.7	10 40.3	73 68	102.0	10 18.3	73 68	102.3	9 56.3	74 68	102.7	9 34.2	74 68	103.0	9 12.1	74 68	103.4	8 50.0	74 68	103.7	8 27.9	74 67	104.1	4
75	10 21.5	73 68	100.9	9 59.5	73 68	101.3	9 37.5	73 68	101.6	9 15.5	73 68	101.9	8 53.5	73 68	102.3	8 31.5	73 68	102.6	8 09.5	74 68	103.0	7 47.4	74 68	103.3	75
6	9 40.5	73 68	100.2	9 18.6	73 68	100.5	8 56.7	73 68	100.9	8 34.7	73 68	101.2	8 12.8	73 68	101.5	7 50.8	73 68	101.9	7 28.8	73 68	102.2	7 06.8	73 68	102.6	6
7	8 59.4	73 69	99.4	8 37.5	73 69	99.8	8 15.7	73 68	100.1	7 53.8	73 68	100.5	7 31.9	73 68	100.8	7 09.9	73 68	101.2	6 48.0	73 68	101.5	6 26.0	73 68	101.8	7
8	8 18.2	73 69	98.7	7 56.4	73 69	99.0	7 34.6	73 69	99.4	7 12.7	73 69	99.7	6 50.9	73 68	100.1	6 29.0	73 68	100.4	6 07.1	73 68	100.8	5 45.2	73 68	101.1	8
9	7 37.0	73 69	98.0	7 15.2	73 69	98.3	6 53.4	73 69	98.7	6 31.6	73 69	99.0	6 09.8	73 69	99.3	5 48.0	73 69	99.7	5 26.1	73 68	100.0	5 04.2	73 68	100.4	9
80	6 55.7	72 69	97.2	6 33.9	73 69	97.6	6 12.2	73 69	97.9	5 50.4	73 69	98.3	5 28.6	73 69	98.6	5 06.8	73 69	99.0							80
1	6 14.3	72 69	96.5	5 52.6	72 69	96.8	5 30.9	72 69	97.2	5 09.1	72 69	97.5													1
2	5 32.9	72 69	95.8	5 11.2	72 69	96.1																			2

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Lat. 46°

H.A.	4° 00′				4° 30′				5° 00′				5° 30′			
°	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °
00	48 00.0	1.0	01	180.0	48 30.0	1.0	01	180.0	49 00.0	1.0	01	180.0	49 30.0	1.0	01	180.0
1	47 59.5	1.0	03	178.5	48 29.5	1.0	03	178.5	48 59.4	1.0	03	178.5	49 29.4	1.0	03	178.5
2	47 57.8	1.0	04	177.0	48 27.8	1.0	05	177.0	48 57.8	1.0	05	177.0	49 27.8	1.0	05	176.9
3	47 55.1	1.0	06	175.5	48 25.1	1.0	06	175.5	48 55.0	1.0	06	175.4	49 25.0	1.0	06	175.4
4	47 51.3	1.0	08	174.0	48 21.3	1.0	08	174.0	48 51.2	1.0	08	173.9	49 21.1	1.0	08	173.9
05	47 46.5	1.0	10	172.6	48 16.4	1.0	10	172.5	48 46.2	1.0	10	172.4	49 16.1	1.0	10	172.4
6	47 40.6	99	12	171.1	48 10.4	99	12	171.0	48 40.2	99	12	170.9	49 10.0	99	12	170.8
7	47 33.6	99	13	169.6	48 03.3	99	14	169.5	48 33.1	99	14	169.4	49 02.8	99	14	169.3
8	47 25.5	99	15	168.2	47 55.2	99	15	168.1	48 24.9	99	15	167.9	48 54.6	99	16	167.8
9	47 16.5	99	17	166.7	47 46.1	99	17	166.6	48 15.7	99	17	166.5	48 45.3	99	17	166.3
10	47 06.4	98	18	165.3	47 35.9	98	19	165.1	48 05.4	98	19	165.0	48 34.9	98	19	164.9
1	46 55.3	98	20	163.8	47 24.7	98	20	163.7	47 54.1	98	21	163.5	48 23.5	98	21	163.4
2	46 43.1	98	22	162.4	47 12.5	98	22	162.2	47 41.8	98	22	162.1	48 11.1	98	22	161.9
3	46 30.0	97	23	161.0	46 59.3	97	24	160.8	47 28.5	97	24	160.6	47 57.6	97	24	160.5
4	46 16.0	97	25	159.6	46 45.1	97	25	159.4	47 14.1	97	25	159.2	47 43.2	97	26	159.0
15	46 01.0	97	27	158.2	46 29.9	97	27	158.0	46 58.9	96	27	157.8	47 27.8	96	27	157.6
6	45 45.0	96	28	156.8	46 13.8	96	28	156.6	46 42.6	96	29	156.4	47 11.4	96	29	156.2
7	45 28.1	96	30	155.4	45 56.8	96	30	155.2	46 25.5	96	30	155.0	46 54.2	95	30	154.8
8	45 10.3	95	31	154.1	45 38.9	95	31	153.9	46 07.4	95	32	153.6	46 35.9	95	32	153.4
9	44 51.7	95	33	152.7	45 20.1	95	33	152.5	45 48.5	95	33	152.3	46 16.8	94	33	152.0
20	44 32.1	94	34	151.4	45 00.4	94	34	151.2	45 28.7	94	34	150.9	45 56.9	94	35	150.7
1	44 11.8	94	35	150.1	44 39.9	94	36	149.8	45 08.0	94	36	149.6	45 36.0	93	36	149.3
2	43 50.6	93	37	148.8	44 18.5	93	37	148.5	44 46.5	93	37	148.3	45 14.4	93	37	148.0
3	43 28.6	93	38	147.5	43 56.4	93	38	147.3	44 24.2	92	38	147.0	44 51.9	92	39	146.7
4	43 05.8	92	39	146.2	43 33.5	92	40	146.0	44 01.1	92	40	145.7	44 28.6	92	40	145.4
25	42 42.3	92	40	145.0	43 09.8	92	41	144.7	43 37.2	91	41	144.4	44 04.6	91	41	144.2
6	42 18.0	91	42	143.8	42 45.3	91	42	143.5	43 12.6	91	42	143.2	43 39.8	91	42	142.9
7	41 53.0	91	43	142.5	42 20.2	90	43	142.2	42 47.3	90	43	142.0	43 14.3	90	44	141.7
8	41 27.3	90	44	141.3	41 54.3	90	44	141.0	42 21.2	90	45	140.7	42 48.1	90	45	140.4
9	41 00.9	89	45	140.1	41 27.7	89	45	139.8	41 54.5	89	46	139.5	42 21.2	89	46	139.2
30	40 33.9	89	46	139.0	41 00.5	89	46	138.7	41 27.1	89	47	138.4	41 53.7	88	47	138.0
1	40 06.2	88	47	137.8	40 32.7	88	47	137.5	40 59.1	88	48	137.2	41 25.5	88	48	136.9
2	39 37.9	88	48	136.7	40 04.2	88	48	136.3	40 30.5	88	49	136.0	40 56.7	87	49	135.7
3	39 09.0	87	49	135.5	39 35.1	87	49	135.2	40 01.3	87	50	134.9	40 27.3	87	50	134.6
4	38 39.5	87	50	134.4	39 05.5	87	50	134.1	39 31.4	86	51	133.8	39 57.3	86	51	133.4
35	38 09.4	86	51	133.3	38 35.3	86	51	133.0	39 01.1	86	52	132.7	39 26.8	86	52	132.3
6	37 38.8	86	52	132.2	38 04.5	85	52	131.9	38 30.1	85	52	131.6	38 55.7	85	53	131.2
7	37 07.7	85	53	131.1	37 33.2	85	53	130.8	37 58.7	85	53	130.5	38 24.1	85	54	130.1
8	36 36.1	85	54	130.1	37 01.4	84	54	129.8	37 26.7	84	54	129.4	37 52.0	84	54	129.1
9	36 03.9	84	54	129.0	36 29.2	84	55	128.7	36 54.3	84	55	128.4	37 19.4	84	55	128.0
40	35 31.3	84	55	128.0	35 56.4	83	55	127.7	36 21.4	83	56	127.3	36 46.3	83	56	127.0
1	34 58.3	83	56	127.0	35 23.2	83	56	126.7	35 48.0	83	56	126.3	36 12.8	83	57	126.0
2	34 24.8	83	57	126.0	34 49.5	82	57	125.6	35 14.2	82	57	125.3	35 38.9	82	57	125.0
3	33 50.8	82	57	125.0	34 15.5	82	57	124.7	34 40.0	82	58	124.3	35 04.5	82	58	124.0
4	33 16.5	82	58	124.0	33 41.0	81	58	123.7	34 05.4	81	58	123.3	34 29.7	81	59	123.0
45	32 41.8	81	59	123.0	33 06.1	81	59	122.7	33 30.4	81	59	122.4	33 54.6	81	59	122.0
6	32 06.6	81	59	122.1	32 30.8	81	59	121.7	32 55.0	80	60	121.4	33 19.0	80	60	121.0
7	31 31.1	80	60	121.1	31 55.2	80	60	120.8	32 19.2	80	60	120.4	32 43.1	80	60	120.1
8	30 55.3	80	60	120.2	31 19.2	80	60	119.9	31 43.1	79	61	119.5	32 06.9	79	61	119.1
9	30 19.1	79	61	119.3	30 42.9	79	61	118.9	31 06.7	79	61	118.6	31 30.3	79	61	118.2
50	29 42.6	79	61	118.4	30 06.3	79	62	118.0	30 29.9	79	62	117.7	30 53.5	78	62	117.3
1	29 05.8	79	62	117.5	29 29.3	78	62	117.1	29 52.8	78	62	116.8	30 16.3	78	62	116.4
2	28 28.6	78	62	116.6	28 52.1	78	63	116.2	29 15.5	78	63	115.9	29 38.8	78	63	115.5
3	27 51.2	78	63	115.7	28 14.6	78	63	115.3	28 37.8	77	63	115.0	29 01.1	77	63	114.6
4	27 13.5	77	63	114.8	27 36.8	77	63	114.5	27 59.9	77	64	114.1	28 23.0	77	64	113.7
55	26 35.6	77	64	114.0	26 58.7	77	64	113.6	27 21.7	77	64	113.2	27 44.8	77	64	112.9
6	25 57.4	77	64	113.1	26 20.4	77	64	112.7	26 43.3	76	64	112.4	27 06.2	76	65	112.0
7	25 18.9	76	64	112.3	25 41.8	76	65	111.9	26 04.7	76	65	111.5	26 27.5	76	65	111.2
8	24 40.2	76	65	111.4	25 03.0	76	65	111.1	25 25.8	76	65	110.7	25 48.5	76	65	110.3
9	24 01.3	76	65	110.6	24 24.0	76	65	110.2	24 46.7	75	66	109.9	25 09.3	75	66	109.5
60	23 22.2	76	66	109.8	23 44.8	75	66	109.4	24 07.4	75	66	109.0	24 29.9	75	66	108.7
1	22 42.9	75	66	108.9	23 05.4	75	66	108.6	23 27.9	75	66	108.2	23 50.4	75	66	107.9
2	22 03.3	75	66	108.1	22 25.8	75	66	107.8	22 48.2	75	66	107.4	23 10.6	74	67	107.1
3	21 23.6	75	66	107.3	21 46.0	75	67	107.0	22 08.4	74	67	106.6	22 30.7	74	67	106.2
4	20 43.8	74	67	106.5	21 06.1	74	67	106.2	21 28.3	74	67	105.8	21 50.6	74	67	105.5
65	20 03.7	74	67	105.7	20 26.0	74	67	105.4	20 48.2	74	67	105.0	21 10.3	74	67	104.7
6	19 23.5	74	67	105.0	19 45.7	74	67	104.6	20 07.8	74	67	104.2	20 29.9	74	68	103.9
7	18 43.2	74	67	104.2	19 05.3	74	68	103.8	19 27.4	73	68	103.5	19 49.4	73	68	103.1
8	18 02.7	74	68	103.4	18 24.8	73	68	103.0	18 46.8	73	68	102.7	19 08.7	73	68	102.3
9	17 22.1	73	68	102.6	17 44.1	73	68	102.3	18 06.1	73	68	101.9	18 28.0	73	68	101.6
70	16 41.4	73	68	101.9	17 03.3	73	68	101.5	17 25.2	73	68	101.2	17 47.1	73	68	100.8
1	16 00.5	73	68	101.1	16 22.4	73	68	100.8	16 44.3	73	68	100.4	17 06.1	73	68	100.0
2	15 19.6	73	68	100.4	15 41.4	73	68	100.0	16 03.2	73	69	99.6	16 25.0	72	69	99.3
3	14 38.5	73	69	99.6	15 00.3	73	69	99.2	15 22.1	72	69	98.9	15 43.8	72	69	98.5
4	13 57.4	73	69	98.9	14 19.1	72	69	98.5	14 40.9	72	69	98.1	15 02.6	72	69	97.8
75	13 16.2	72	69	98.1	13 37.9	72	69	97.8	13 59.6	72	69	97.4	14 21.2	72	69	97.0
6	12 34.9	72	69	97.4	12 56.6	72	69	97.0	13 18.2	72	69	96.7	13 39.8	72	69	96.3
7	11 53.5	72	69	96.6	12 15.2	72	69	96.3	12 36.8	72	69	95.9	12 58.4	72	69	95.6
8	11 12.1	72	69	95.9	11 33.7	72	69	95.5	11 55.3	72	69	95.2	12 16.9	72	69	94.8
9	10 30.6	72	69	95.2	10 52.2	72	69	94.8	11 13.8	72	69	94.5	11 35.3	72	69	94.1
80	9 49.1	72	69	94.4	10 10.6	72	69	94.1	10 32.2	72	69	93.7	10 53.7	72	69	93.4
1	9 07.5	72	69	93.7	9 29.0	72	69	93.4	9 50.6	72	69	93.0	10 12.1	72	69	92.6
2	8 25.9	72	69	93.0	8 47.4	72	69	92.6	9 08.9	72	69	92.3	9 30.5	72	69	91.9
3	7 44.2	72	69	92.3	8 05.8	72	69	91.9	8 27.3	72	69	91.6	8 48.8	72	69	91.2
4	7 02.6	72	69	91.5	7 24.1	72	69	91.2	7 45.6	72	69	90.8	8 07.1	72	69	90.5
85	6 20.9	72	69	90.8	6 42.4	72	69	90.5	7 03.9	72	69	90.1	7 25.4	72	69	89.8
6	5 39.2	72	69	90.1	6 00.8	72	69	89.7	6 22.3	72	69	89.4	6 43.8	72	69	89.0
7					5 19.1	72	69	89.0	5 40.6	72	69	88.7	6 02.1	72	69	88.3
8													5 20.4	72	69	87.6
9																
90																

6° 00′				6° 30′				7° 00′				7° 30′				H.A.
Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	°
50 00.0	1.0	01	180.0	50 30.0	1.0	01	180.0	51 00.0	1.0	01	180.0	51 30.0	1.0	01	180.0	00
49 59.4	1.0	03	178.5	50 29.4	1.0	03	178.4	50 59.4	1.0	03	178.4	51 29.4	1.0	03	178.4	1
49 57.8	1.0	05	176.9	50 27.7	1.0	05	176.9	50 57.7	1.0	05	176.8	51 27.7	1.0	05	176.8	2
49 54.9	1.0	07	175.4	50 24.9	1.0	07	175.3	50 54.8	1.0	07	175.3	51 24.8	1.0	07	175.2	3
49 51.0	1.0	08	173.8	50 20.9	1.0	08	173.8	50 50.8	1.0	09	173.7	51 20.8	1.0	09	173.6	4
49 46.0	1.0	10	172.3	50 15.8	1.0	10	172.2	50 45.7	1.0	10	172.1	51 15.6	1.0	11	172.1	05
49 39.8	99	12	170.8	50 09.6	99	12	170.7	50 39.4	99	12	170.6	51 09.2	99	12	170.5	6
49 32.6	99	14	169.2	50 02.3	99	14	169.1	50 32.1	99	14	169.0	51 01.8	99	14	168.9	7
49 24.3	99	16	167.7	49 53.9	99	16	167.6	50 23.6	99	16	167.5	50 53.2	99	16	167.4	8
49 14.9	99	17	166.2	49 44.4	99	18	166.1	50 14.0	99	18	166.0	50 43.6	99	18	165.8	9
49 04.4	98	19	164.7	49 33.9	98	19	164.6	50 03.4	98	20	164.4	50 32.8	98	20	164.3	10
48 52.9	98	21	163.2	49 22.3	98	21	163.1	49 51.6	98	21	162.9	50 21.0	98	21	162.8	1
48 40.4	98	23	161.8	49 09.6	98	23	161.6	49 38.9	97	23	161.4	50 08.1	97	23	161.2	2
48 26.8	97	24	160.3	48 55.9	97	24	160.1	49 25.1	97	25	159.9	49 54.2	97	25	159.7	3
48 12.2	97	26	158.8	48 41.3	97	26	158.6	49 10.3	97	26	158.5	49 39.2	97	27	158.3	4
47 56.7	96	28	157.4	48 25.6	96	28	157.2	48 54.5	96	28	157.0	49 23.3	96	28	156.8	15
47 40.2	96	29	156.0	48 09.0	96	29	155.8	48 37.7	96	30	155.5	49 06.4	96	30	155.3	6
47 22.8	95	31	154.6	47 51.4	95	31	154.3	48 20.0	95	31	154.1	48 48.5	95	31	153.9	7
47 04.4	95	32	153.2	47 32.9	95	32	152.9	48 01.3	95	33	152.7	48 29.7	95	33	152.5	8
46 45.2	94	34	151.8	47 13.5	94	34	151.6	47 41.8	94	34	151.3	48 10.0	94	34	151.1	9
46 25.0	94	35	150.4	46 53.2	94	35	150.2	47 21.3	94	36	149.9	47 49.4	94	36	149.7	20
46 04.1	93	36	149.1	46 32.0	93	37	148.8	47 00.0	93	37	148.6	47 27.9	93	37	148.3	1
45 42.2	93	38	147.8	46 10.0	93	38	147.5	46 37.8	93	38	147.2	47 05.6	92	39	146.9	2
45 19.6	92	39	146.4	45 47.2	92	39	146.2	46 14.9	92	40	145.9	46 42.4	92	40	145.6	3
44 56.2	92	40	145.2	45 23.6	92	41	144.9	45 51.1	91	41	144.6	46 18.5	91	41	144.3	4
44 32.0	91	42	143.9	44 59.3	91	42	143.6	45 26.6	91	42	143.3	45 53.8	91	42	143.0	25
44 07.0	91	43	142.6	44 34.2	90	43	142.3	45 01.3	90	43	142.0	45 28.3	90	44	141.7	6
43 41.4	90	44	141.4	44 08.3	90	44	141.1	44 35.2	90	45	140.8	45 02.1	89	45	140.4	7
43 15.0	89	45	140.1	43 41.8	89	45	139.8	44 08.5	89	46	139.5	44 35.2	89	46	139.2	8
42 47.9	89	46	138.9	43 14.6	89	46	138.6	43 41.1	88	47	138.3	44 07.6	88	47	138.0	9
42 20.2	88	47	137.7	42 46.7	88	48	137.4	43 13.1	88	48	137.1	43 39.4	88	48	136.8	30
41 51.9	88	48	136.5	42 18.1	88	49	136.2	42 44.4	87	49	135.9	43 10.5	87	49	135.6	1
41 22.9	87	49	135.4	41 49.0	87	50	135.1	42 15.1	87	50	134.7	42 41.0	87	50	134.4	2
40 53.3	87	50	134.2	41 19.3	86	51	133.9	41 45.1	86	51	133.6	42 11.0	86	51	133.2	3
40 23.2	86	51	133.1	40 48.9	86	51	132.8	41 14.7	86	52	132.4	41 40.3	85	52	132.1	4
39 52.5	85	52	132.0	40 18.1	85	52	131.6	40 43.6	85	53	131.3	41 09.1	85	53	131.0	35
39 21.2	85	53	130.9	39 46.7	85	53	130.5	40 12.0	85	53	130.2	40 37.4	84	54	129.8	6
38 49.4	84	54	129.8	39 14.7	84	54	129.5	39 40.0	84	54	129.1	40 05.1	84	55	128.8	7
38 17.2	84	55	128.7	38 42.3	84	55	128.4	39 07.4	83	55	128.0	39 32.4	83	55	127.7	8
37 44.4	83	55	127.7	38 09.4	83	56	127.3	38 34.3	83	56	127.0	38 59.1	83	56	126.6	9
37 11.2	83	56	126.6	37 36.0	83	56	126.3	38 00.8	82	57	125.9	38 25.5	82	57	125.6	40
36 37.5	82	57	125.6	37 02.2	82	57	125.3	37 26.8	82	57	124.9	37 51.3	82	58	124.5	1
36 03.4	82	58	124.6	36 28.0	82	58	124.2	36 52.4	81	58	123.9	37 16.8	81	58	123.5	2
35 28.9	81	58	123.6	35 53.3	81	58	123.2	36 17.6	81	59	122.9	36 41.8	81	59	122.5	3
34 54.0	81	59	122.6	35 18.2	81	59	122.2	35 42.4	80	59	121.9	36 06.5	80	60	121.5	4
34 18.7	80	59	121.6	34 42.8	80	60	121.3	35 06.8	80	60	120.9	35 30.8	80	60	120.5	45
33 43.0	80	60	120.7	34 07.0	80	60	120.3	34 30.9	80	60	119.9	34 54.7	79	61	119.6	6
33 07.0	79	61	119.7	33 30.8	79	61	119.4	33 54.6	79	61	119.0	34 18.3	79	61	118.6	7
32 30.7	79	61	118.8	32 54.4	79	61	118.4	33 18.0	79	62	118.1	33 41.5	78	62	117.7	8
31 54.0	79	62	117.9	32 17.5	78	62	117.5	32 41.0	78	62	117.1	33 04.5	78	62	116.8	9
31 17.0	78	62	116.9	31 40.4	78	62	116.6	32 03.8	78	63	116.2	32 27.1	78	63	115.8	50
30 39.7	78	63	116.0	31 03.0	78	63	115.7	31 26.3	77	63	115.3	31 49.5	77	63	114.9	1
30 02.1	77	63	115.1	30 25.3	77	63	114.8	30 48.4	77	63	114.4	31 11.5	77	64	114.0	2
29 24.2	77	64	114.3	29 47.3	77	64	113.9	30 10.4	77	64	113.5	30 33.3	76	64	113.1	3
28 46.1	77	64	113.4	29 09.1	77	64	113.0	29 32.0	76	64	112.6	29 54.9	76	64	112.3	4
28 07.7	76	64	112.5	28 30.6	76	65	112.1	28 53.4	76	65	111.8	29 16.2	76	65	111.4	55
27 29.1	76	65	111.7	27 51.9	76	65	111.3	28 14.6	76	65	110.9	28 37.3	75	65	110.6	6
26 50.2	76	65	110.8	27 12.9	76	65	110.4	27 35.6	75	65	110.1	27 58.1	75	66	109.7	7
26 11.2	75	65	110.0	26 33.8	75	66	109.6	26 56.3	75	66	109.2	27 18.8	75	66	108.9	8
25 31.9	75	66	109.1	25 54.4	75	66	108.8	26 16.9	75	66	108.4	26 39.3	75	66	108.0	9
24 52.4	75	66	108.3	25 14.8	75	66	107.9	25 37.2	74	66	107.6	25 59.5	74	66	107.2	60
24 12.8	75	66	107.5	24 35.1	74	67	107.1	24 57.4	74	67	106.8	25 19.6	74	67	106.4	1
23 32.9	74	67	106.7	23 55.2	74	67	106.3	24 17.4	74	67	106.0	24 39.6	74	67	105.6	2
22 52.9	74	67	105.9	23 15.1	74	67	105.5	23 37.3	74	67	105.2	23 59.3	74	67	104.8	3
22 12.7	74	67	105.1	22 34.9	74	67	104.7	22 56.9	74	67	104.4	23 19.0	73	68	104.0	4
21 32.4	74	67	104.3	21 54.5	73	68	103.9	22 16.5	73	68	103.6	22 38.5	73	68	103.2	65
20 52.0	73	68	103.5	21 14.0	73	68	103.2	21 35.9	73	68	102.8	21 57.8	73	68	102.4	6
20 11.4	73	68	102.7	20 33.3	73	68	102.4	20 55.2	73	68	102.0	21 17.1	73	68	101.6	7
19 30.7	73	68	102.0	19 52.5	73	68	101.6	20 14.4	73	68	101.2	20 36.2	73	68	100.9	8
18 49.8	73	68	101.2	19 11.7	73	68	100.8	19 33.5	73	68	100.5	19 55.2	72	68	100.1	9
18 08.9	73	68	100.4	18 30.7	73	68	100.1	18 52.4	72	69	99.7	19 14.1	72	69	99.3	70
17 27.9	73	69	99.7	17 49.6	72	69	99.3	18 11.3	72	69	98.9	18 32.9	72	69	98.6	1
16 46.7	72	69	98.9	17 08.4	72	69	98.6	17 30.1	72	69	98.2	17 51.7	72	69	97.8	2
16 05.5	72	69	98.2	16 27.2	72	69	97.8	16 48.8	72	69	97.4	17 10.4	72	69	97.1	3
15 24.2	72	69	97.4	15 45.8	72	69	97.1	16 07.4	72	69	96.7	16 29.0	72	69	96.3	4
14 42.9	72	69	96.7	15 04.4	72	69	96.3	15 26.0	72	69	96.0	15 47.5	72	69	95.6	75
14 01.4	72	69	95.9	14 23.0	72	69	95.6	14 44.5	72	69	95.2	15 06.0	72	69	94.9	6
13 19.9	72	69	95.2	13 41.5	72	69	94.8	14 03.0	72	69	94.5	14 24.5	72	69	94.1	7
12 38.4	72	69	94.5	12 59.9	72	69	94.1	13 21.4	72	69	93.8	13 42.9	71	69	93.4	8
11 56.8	72	69	93.7	12 18.3	72	69	93.4	12 39.8	72	69	93.0	13 01.3	71	69	92.7	9
11 15.2	72	69	93.0	11 36.7	72	69	92.7	11 58.2	71	69	92.3	12 19.6	71	69	91.9	80
10 33.6	72	69	92.3	10 55.1	72	69	91.9	11 16.5	71	69	91.6	11 37.9	71	69	91.2	1
9 51.9	72	69	91.6	10 13.4	72	69	91.2	10 34.8	71	69	90.9	10 56.3	71	69	90.5	2
9 10.3	72	69	90.8	9 31.7	72	69	90.5	9 53.2	71	69	90.1	10 14.6	71	69	89.8	3
8 28.6	72	69	90.1	8 50.1	72	69	89.8	9 11.5	71	69	89.4	9 32.9	71	69	89.1	4
7 46.9	72	69	89.4	8 08.4	72	69	89.1	8 29.8	71	69	88.7	8 51.2	71	69	88.3	85
7 05.2	72	69	88.7	7 26.7	72	69	88.3	7 48.2	71	69	88.0	8 09.6	71	69	87.6	6
6 23.6	72	69	88.0	6 45.1	72	69	87.6	7 06.5	72	69	87.3	7 28.0	71	69	86.9	7
5 41.9	72	69	87.3	6 03.4	72	69	86.9	6 24.9	72	69	86.6	6 46.4	72	69	86.2	8
5 00.3	72	69	86.5	5 21.8	72	69	86.2	5 43.3	72	69	85.8	6 04.8	72	69	85.5	9
								5 01.8	72	69	85.1	5 23.3	72	69	84.8	90

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H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	40 00.0	1.0 01	180.0	39 30.0	1.0 01	180.0	39 00.0	1.0 01	180.0	38 30.0	1.0 01	180.0	38 00.0	1.0 01	180.0	37 30.0	1.0 01	180.0	37 00.0	1.0 01	180.0	36 30.0	1.0 01	180.0	00
1	39 59.5	1.0 02	178.7	39 29.5	1.0 02	178.7	38 59.5	1.0 02	178.7	38 29.5	1.0 02	178.7	37 59.5	1.0 02	178.7	37 29.5	1.0 02	178.7	36 59.5	1.0 02	178.8	36 29.6	1.0 02	178.8	1
2	39 58.1	1.0 04	177.4	39 28.1	1.0 04	177.4	38 58.1	1.0 04	177.4	38 28.2	1.0 04	177.5	37 58.2	1.0 04	177.5	37 28.2	1.0 04	177.5	36 58.2	1.0 04	177.5	36 28.2	1.0 04	177.5	2
3	39 55.7	1.0 05	176.1	39 25.8	1.0 05	176.1	38 55.8	1.0 05	176.2	38 25.8	1.0 05	176.2	37 55.9	1.0 05	176.2	37 25.9	1.0 05	176.2	36 55.9	1.0 06	176.3	36 26.0	1.0 06	176.3	3
4	39 52.4	1.0 07	174.8	39 22.5	1.0 07	174.8	38 52.5	1.0 07	174.9	38 22.6	1.0 07	174.9	37 52.7	1.0 07	175.0	37 22.7	1.0 07	175.0	36 52.8	1.0 07	175.0	36 22.8	1.0 07	175.1	4
05	39 48.2	1.0 09	173.5	39 18.3	1.0 09	173.6	38 48.4	1.0 08	173.6	38 18.5	1.0 08	173.7	37 48.5	1.0 08	173.7	37 18.6	1.0 08	173.8	36 48.7	1.0 08	173.8	36 18.8	1.0 08	173.8	05
6	39 43.0	1.0 10	172.2	39 13.1	1.0 10	172.3	38 43.3	1.0 10	172.3	38 13.4	1.0 10	172.4	37 43.5	1.0 10	172.4	37 13.6	1.0 10	172.5	36 43.8	1.0 10	172.6	36 13.9	1.0 10	172.6	6
7	39 36.9	99 12	170.9	39 07.1	99 12	171.0	38 37.2	99 12	171.1	38 07.4	99 11	171.1	37 37.6	99 11	171.2	37 07.8	99 11	171.3	36 37.9	99 11	171.3	36 08.1	99 11	171.4	7
8	39 29.8	99 13	169.6	39 00.1	99 13	169.7	38 30.3	99 13	169.8	38 00.5	99 13	169.9	37 30.8	99 13	170.0	37 01.0	99 13	170.0	36 31.2	99 13	170.1	36 01.4	99 13	170.2	8
9	39 21.9	99 15	168.4	38 52.2	99 15	168.4	38 22.5	99 15	168.5	37 52.8	99 14	168.6	37 23.0	99 14	168.7	36 53.3	99 14	168.8	36 23.6	99 14	168.9	35 53.9	99 14	169.0	9
10	39 13.0	99 16	167.1	38 43.4	99 16	167.2	38 13.7	99 16	167.3	37 44.1	99 16	167.4	37 14.4	99 16	167.5	36 44.8	99 16	167.6	36 15.1	99 16	167.7	35 45.5	99 15	167.8	10
1	39 03.3	99 18	165.8	38 33.7	99 18	165.9	38 04.1	99 17	166.0	37 34.6	99 17	166.1	37 05.0	99 17	166.2	36 35.4	99 17	166.3	36 05.8	99 17	166.4	35 36.2	99 17	166.5	1
2	38 52.6	98 19	164.5	38 23.1	98 19	164.7	37 53.6	98 19	164.8	37 24.1	98 19	164.9	36 54.6	98 19	165.0	36 25.1	98 19	165.1	35 55.6	98 18	165.2	35 26.1	98 18	165.3	2
3	38 41.0	98 21	163.3	38 11.7	98 21	163.4	37 42.2	98 20	163.5	37 12.8	98 20	163.7	36 43.4	98 20	163.8	36 14.0	98 20	163.9	35 44.6	98 20	164.0	35 15.1	98 20	164.2	3
4	38 28.6	98 22	162.0	37 59.3	98 22	162.2	37 30.0	98 22	162.3	37 00.7	98 22	162.4	36 31.4	98 21	162.6	36 02.0	98 21	162.7	35 32.7	98 21	162.8	35 03.3	98 21	163.0	4
15	38 15.4	97 24	160.8	37 46.1	97 23	160.9	37 16.9	97 23	161.1	36 47.7	97 23	161.2	36 18.5	97 23	161.4	35 49.2	98 23	161.5	35 20.0	98 23	161.6	34 50.7	98 22	161.8	15
6	38 01.2	97 25	159.6	37 32.1	97 25	159.7	37 03.0	97 25	159.9	36 33.9	97 24	160.0	36 04.7	97 24	160.2	35 35.6	97 24	160.3	35 06.4	97 24	160.5	34 37.2	97 24	160.6	6
7	37 46.3	97 26	158.3	37 17.3	97 26	158.5	36 48.3	97 26	158.7	36 19.2	97 26	158.8	35 50.2	97 26	159.0	35 21.1	97 25	159.1	34 52.1	97 25	159.3	34 23.0	97 25	159.4	7
8	37 30.5	96 28	157.1	37 01.6	96 27	157.3	36 32.7	96 27	157.5	36 03.8	96 27	157.6	35 34.8	96 27	157.8	35 05.9	96 27	158.0	34 36.9	97 27	158.1	34 08.0	97 26	158.3	8
9	37 13.9	96 29	155.9	36 45.1	96 29	156.1	36 16.3	96 29	156.3	35 47.5	96 28	156.5	35 18.7	96 28	156.6	34 49.9	96 28	156.8	34 21.0	96 28	157.0	33 52.2	96 28	157.1	9
20	36 56.5	96 30	154.7	36 27.8	96 30	154.9	35 59.2	96 30	155.1	35 30.5	96 30	155.3	35 01.8	96 30	155.5	34 33.1	96 29	155.6	34 04.3	96 29	155.8	33 35.6	96 29	156.0	20
1	36 38.3	96 32	153.5	36 09.8	95 31	153.7	35 41.2	95 31	153.9	35 12.7	96 31	154.1	34 44.1	95 31	154.3	34 15.5	95 31	154.5	33 46.9	95 30	154.7	33 18.2	96 30	154.8	1
2	36 19.3	95 33	152.4	35 50.9	95 33	152.6	35 22.5	95 32	152.8	34 54.1	95 32	153.0	34 25.6	95 32	153.1	33 57.1	95 32	153.3	33 28.7	95 32	153.5	33 00.1	96 31	153.7	2
3	35 59.6	94 34	151.2	35 31.4	94 34	151.4	35 03.1	94 34	151.6	34 34.8	94 33	151.8	34 06.4	94 33	152.0	33 38.1	95 33	152.2	33 09.7	95 33	152.4	32 41.3	95 33	152.6	3
4	35 39.2	94 35	150.0	35 11.1	94 35	150.3	34 42.9	94 35	150.5	34 14.7	94 35	150.7	33 46.5	94 34	150.9	33 18.3	94 34	151.1	32 50.0	94 34	151.3	32 21.8	94 34	151.5	4
25	35 18.0	93 36	148.9	34 50.0	93 36	149.1	34 22.0	93 36	149.3	33 53.9	94 36	149.5	33 25.9	94 36	149.8	32 57.8	94 35	150.0	32 29.7	94 35	150.2	32 01.5	94 35	150.4	25
6	34 56.1	93 38	147.8	34 28.3	93 37	148.0	34 00.4	93 37	148.2	33 32.5	93 37	148.4	33 04.5	93 37	148.6	32 36.6	93 36	148.9	32 08.6	93 36	149.1	31 40.6	93 36	149.3	6
7	34 33.6	92 39	146.6	34 05.8	92 39	146.9	33 38.1	93 38	147.1	33 10.3	93 38	147.3	32 42.5	93 38	147.5	32 14.7	93 38	147.8	31 46.8	93 37	148.0	31 19.0	93 37	148.2	7
8	34 10.3	92 40	145.5	33 42.7	92 40	145.8	33 15.1	92 39	146.0	32 47.5	92 39	146.2	32 19.8	92 39	146.5	31 52.1	92 39	146.7	31 24.4	92 38	146.9	30 56.7	92 38	147.1	8
9	33 46.4	91 41	144.4	33 18.9	92 41	144.7	32 51.5	92 40	144.9	32 24.0	92 40	145.1	31 56.4	92 40	145.4	31 28.9	92 40	145.6	31 01.3	92 40	145.8	30 33.7	92 39	146.1	9
30	33 21.8	91 42	143.3	32 54.5	91 42	143.6	32 27.2	91 42	143.8	31 59.8	91 41	144.1	31 32.4	91 41	144.3	31 05.0	91 41	144.5	30 37.6	91 41	144.8	30 10.1	92 40	145.0	30
1	32 56.6	90 43	142.3	32 29.4	91 43	142.5	32 02.3	91 43	142.8	31 35.1	91 42	143.0	31 07.8	91 42	143.2	30 40.5	91 42	143.5	30 13.3	91 42	143.7	29 45.9	91 41	144.0	1
2	32 30.8	90 44	141.2	32 03.8	90 44	141.4	31 36.7	90 44	141.7	31 09.7	90 43	141.9	30 42.6	90 43	142.2	30 15.4	90 43	142.4	29 48.3	91 43	142.7	29 21.1	91 42	142.9	2
3	32 04.3	89 45	140.1	31 37.5	90 45	140.4	31 10.6	90 45	140.6	30 43.7	90 44	140.9	30 16.7	90 44	141.2	29 49.7	90 44	141.4	29 22.7	90 44	141.7	28 55.7	90 43	141.9	3
4	31 37.3	89 46	139.1	31 10.6	89 46	139.3	30 43.9	89 46	139.6	30 17.1	89 45	139.9	29 50.3	89 45	140.1	29 23.5	90 45	140.4	28 56.6	90 45	140.6	28 29.7	90 44	140.9	4
35	31 09.7	88 47	138.0	30 43.2	89 47	138.3	30 16.6	89 46	138.6	29 49.9	89 46	138.8	29 23.3	89 46	139.1	28 56.6	89 46	139.4	28 29.9	89 45	139.6	28 03.1	89 45	139.9	35
6	30 41.6	88 48	137.0	30 15.2	88 48	137.3	29 48.7	88 47	137.6	29 22.2	88 47	137.8	28 55.7	88 47	138.1	28 29.2	89 47	138.4	28 02.6	89 46	138.6	27 36.0	89 46	138.9	6
7	30 12.9	88 49	136.0	29 46.6	88 48	136.3	29 20.3	88 48	136.5	28 54.0	88 48	136.8	28 27.6	88 48	137.1	28 01.2	88 47	137.4	27 34.8	88 47	137.6	27 08.3	88 47	137.9	7
8	29 43.7	87 50	135.0	29 17.6	87 49	135.3	28 51.4	87 49	135.6	28 25.2	87 49	135.8	27 59.0	87 49	136.1	27 32.7	88 48	136.4	27 06.4	88 48	136.6	26 40.1	88 48	136.9	8
9	29 14.9	87 50	134.0	28 48.9	87 50	134.3	28 22.0	87 50	134.6	27 55.9	87 50	134.8	27 29.8	87 49	135.1	27 03.7	87 49	135.4	26 37.5	87 49	135.7	26 11.4	87 49	135.9	9
40	28 43.7	86 51	133.0	28 17.9	86 51	133.3	27 52.0	86 51	133.6	27 26.1	86 50	133.9	27 00.2	87 50	134.2	26 34.2	87 50	134.4	26 08.2	87 50	134.7	25 42.1	87 50	135.0	40
1	28 13.0	86 52	132.0	27 47.3	86 52	132.3	27 21.6	86 52	132.6	26 55.8	86 51	132.9	26 30.0	86 51	133.2	26 04.2	86 51	133.5	25 38.3	86 51	133.8	25 12.4	86 50	134.0	1
2	27 41.8	85 53	131.1	27 16.3	85 52	131.4	26 50.7	85 52	131.7	26 25.1	85 52	132.0	25 59.4	86 52	132.2	25 33.7	86 52	132.5	25 08.0	86 51	132.8	24 42.2	86 51	133.1	2
3	27 10.2	85 53	130.1	26 44.8	85 53	130.4	26 19.3	85 53	130.7	25 53.8	85 53	131.0	25 28.3	85 53	131.3	25 02.8	85 52	131.6	24 37.2	85 52	131.9	24 11.5	85 52	132.2	3
4	26 38.1	84 54	129.2	26 12.8	84 54	129.5	25 47.5	84 54	129.8	25 22.2	85 54	130.1	24 56.8	85 53	130.4	24 31.4	85 53	130.7	24 05.9	85 53	130.9	23 40.4	85 53	131.2	4
45	26 05.6	84 55	128.2	25 40.4	84 55	128.5	25 15.2	84 54	128.8	24 50.0	84 54	129.1	24 24.8	84 54	129.4	23 59.5	84 54	129.7	23 34.2	84 54	130.0	23 08.9	85 53	130.3	45
6	25 32.6	83 56	127.3	25 07.6	83 55	127.6	24 42.6	84 55	127.9	24 17.5	84 55	128.2	23 52.4	84 55	128.5	23 27.3	84 54	128.8	23 02.1	84 54	129.1	22 36.9	84 54	129.4	6
7	24 59.3	83 56	126.4	24 34.4	83 56	126.7	24 09.5	83 56	127.0	23 44.6	83 56	127.3	23 19.6	83 55	127.6	22 54.6	83 55	127.9	22 29.5	84 55	128.2	22 04.5	84 55	128.5	7
8	24 25.5	82 57	125.5	24 00.8	82 57	125.8	23 36.0	83 56	126.1	23 11.2	83 56	126.4	22 46.4	83 56	126.7	22 21.5	83 56	127.0	21 56.6	83 56	127.3	21 31.7	83 55	127.6	8
9	23 51.4	82 58	124.6	23 26.8	82 57	124.9	23 02.2	82 57	125.2	22 37.5	82 57	125.5	22 12.8	82 57	125.8	21 48.0	83 56	126.1	21 23.3	83 56	126.4	20 58.4	83 56	126.7	9
50	23 16.9	82 58	123.7	22 52.4	82 58	124.0	22 27.9	82 58	124.3	22 03.4	82 57	124.6	21 38.8	82 57	125.0	21 14.2	82 57	125.3	20 49.5	82 57	125.6	20 24.9	82 57	125.9	50
1	22 42.0	81 59	122.8	22 17.7	81 58	123.1	21 53.3	81 58	123.5	21 28.9	81 58	123.8	21 04.5	82 58	124.1	20 40.0	82 58	124.4	20 15.4	82 57	124.7	19 50.9	82 57	125.0	1
2	22 06.9	81 59	121.9	21 42.6	81 59	122.3	21 18.4	81 59	122.6	20 54.1	81 59	122.9	20 29.8	81 58	123.2	20 05.4	81 58	123.5	19 41.0	81 58	123.8	19 16.6	81 58	124.1	2
3	21 31.3	80 60	121.1	21 07.2	80 60	121.4	20 43.1	81 59	121.7	20 18.9	81 59	122.0	19 54.7	81 59	122.4	19 30.5	81 59	122.7	19 06.2	81 59	123.0	18 41.9	81 58	123.3	3
4	20 55.5	80 60	120.2	20 31.5	80 60	120.5	20 07.5	80 60	120.9	19 43.4	80 60	121.2	19 19.3	80 59	121.5	18 55.2	80 59	121.8	18 31.1	81 59	122.1	18 06.9	81 59	122.4	4
55	20 19.3	79 61	119.4	19 55.4	80 61	119.7	19 31.5	80 60	120.0	19 07.6	80 60	120.3	18 43.6	80 60	120.7	18 19.6	80 60	121.0	17 55.6	80 60	121.3	17 31.6	80 59	121.6	55
6	19 42.8	79 61	118.5	19 19.1	79 61	118.9	18 55.3	79 61	119.2	18 31.5	79 61	119.5	18 07.6	80 60	119.8	17 43.8	80 60	120.1	17 19.8	80 60	120.5	16 55.9	80 60	120.8	6
7	19 06.1	79 62	117.7	18 42.4	79 62	118.0	18 18.8	79 61	118.4	17 55.1	79 61	118.7	17 31.3	79 61	119.0	17 07.6	79 61	119.3	16 43.8	79 61	119.6	16 19.9	79 60	120.0	7
8	18 29.0	78 62	116.9	18 05.5	78 62	117.2	17 41.9	79 62	117.5	17 18.4	79 62	117.9	16 54.7	79 61	118.2	16 31.1	79 61	118.5	16 07.4	79 61	118.8	15 43.7	79 61	119.1	8
9	17 51.7	78 63	116.1	17 28.3	78 62	116.4	17 04.8	78 62	116.7	16 41.4	78 62	117.0	16 17.8	78 62	117.4	15 54.3	79 62	117.7	15 30.7	79 62	118.0	15 07.1	79 61	118.3	9
60	17 14.1	78 63	115.2	16 50.8	78 63	115.6	16 27.5	78 63	115.9	16 04.1	78 63	116.2	15 40.7	78 62	116.5	15 17.3	78 62	116.9	14 53.8	78 62	117.2	14 30.3	78 62	117.5	60
1	16 36.3	77 63	114.4	16 13.1	77 63	114.8	15 49.9	78 63	115.1	15 26.6	78 63	115.4	15 03.3	78 63	115.7	14 39.9	78 63	116.1	14 16.6	78 62	116.4	13 53.2	78 62	116.7	1
2	15 58.3	77 64	113.6	15 35.1	77 64	114.0	15 12.0	77 64	114.3	14 48.8	77 63	114.6	14 25.6	77 63	114.9	14 02.4	77 63	115.3	13 39.1	78 63	115.6	13 15.8	78 63	115.9	2
3	15 20.0	77 64	112.8	14 56.9	77 64	113.2	14 33.9	77 64	113.5	14 10.8	77 64	113.8	13 47.7	77 64	114.2	13 24.6	77 63	114.5	13 01.4	77 63	114.8	12 38.2	77 63	115.1	3
4	14 41.4	76 65	112.0	14 18.5	76 64	112.4	13 55.5	77 64	112.7	13 32.6	77 64	113.0	13 09.6	77 64	113.4	12 46.5	77 64	113.7	12 23.5	77 64	114.0	12 00.4	77 63	114.4	4
65	14 02.7	76 65	111.3	13 39.9	76 65	111.6	13 17.0	76 65	111.9	12 54.1	76 64	112.3	12 31.2	76 64	112.6	12 08.2	77 64	112.9	11 45.3	77 64	113.2	11 22.3	77 64	113.6	65
6	13 23.7	76 65	110.5	13 01.0	76 65	110.8	12 38.2	76 65	111.1	12 15.4	76 65	111.5	11 52.6	76 65	111.8	11 29.7	76 65	112.1	11 06.9	76 64	112.5	10 44.0	76 64	112.8	6
7	12 44.6	76 66	109.7	12 21.9	76 65	110.0	11 59.2	76 65	110.4	11 36.5	76 65	110.7	11 13.8	76 65	111.0	10 51.0	76 65	111.4	10 28.3	76 65	111.7	10 05.5	76 65	112.0	7
8	12 05.3	75 66	108.9	11 42.7	75 66	109.3	11 20.1	75 66	109.6	10 57.4	75 65	109.9	10 34.8	76 65	110.3	10 12.1	76 65	110.6	9 49.4	76 65	110.9	9 26.7	76 65	111.3	8
9	11 25.8	75 66	108.2	11 03.3	75 66	108.5	10 40.7	75 66	108.8	10 18.2	75 66	109.2	9 55.6	75 66	109.5	9 33.0	75 66	109.8	9 10.4	75 65	110.2	8 47.8	75 65	110.5	9
70	10 46.1	75 66	107.4	10 23.6	75 66	107.7	10 01.2	75 66	108.1	9 38.7	75 66	108.4	9 16.2	75 66	108.8	8 53.7	75 66	109.1	8 31.2	75 66	109.4	8 08.6	75 66	109.8	70
1	10 06.2	74 67	106.6	9 43.9	75 67	107.0	9 21.5	75 66	107.3	8 59.1	75 66	107.7	8 36.7	75 66	108.0	8 14.2	75 66	108.3	7 51.8	75 66	108.7	7 29.3	75 66	109.0	1
2	9 26.2	74 67	105.9	9 03.9	74 67	106.2	8 41.6	74 67	106.6	8 19.3	74 67	106.9	7 56.9	74 66	107.2	7 34.6	75 66	107.6	7 12.2	75 66	107.9	6 49.8	75 66	108.3	2
3	8 46.0	74 67	105.1	8 23.8	74 67	105.5	8 01.6	74 67	105.8	7 39.3	74 67	106.2	7 17.1	74 67	106.5	6 54.8	74 67	106.8	6 32.5	74 67	107.2	6 10.2	74 66	107.5	3
4	8 05.7	74 67	104.4	7 43.6	74 67	104.7	7 21.4	74 67	105.1	6 59.2	74 67	105.4	6 37.0	74 67	105.8	6 14.8	74 67	106.1	5 52.6	74 67	106.4	5 30.3	74 67	106.8	4
75	7 25.3	74 68	103.7	7 03.2	74 68	104.0	6 41.1	74 67	104.3	6 19.0	74 67	104.7	5 56.8	74 67	105.0	5 34.7	74 67	105.4	5 12.5	74 67	105.7				75
6	6 44.7	73 68	102.9	6 22.7	73 68	103.3	6 00.7	74 68	103.6	5 38.6	74 68	103.9	5 16.5	74 67	104.3										6
7	6 04.1	73 68	102.2	5 42.1	73 68	102.5	5 20.1	73 68	102.9																7
8	5 23.3	73 68	101.5	5 01.3	73 68	101.8																			8

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Lat. 46°

H.A.	8° 00′ Alt.	Δd Δt	Az.	8° 30′ Alt.	Δd Δt	Az.	9° 00′ Alt.	Δd Δt	Az.	9° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	52 00.0	1.0 01	180.0	52 30.0	1.0 01	180.0	53 00.0	1.0 01	180.0	53 30.0	1.0 01	180.0
1	51 59.4	1.0 03	178.4	52 29.4	1.0 03	178.4	52 59.4	1.0 03	178.4	53 29.4	1.0 03	178.3
2	51 57.7	1.0 05	176.8	52 27.6	1.0 05	176.8	52 57.6	1.0 05	176.7	53 27.6	1.0 05	176.7
3	51 54.7	1.0 07	175.2	52 24.7	1.0 07	175.1	52 54.6	1.0 07	175.1	53 24.6	1.0 07	175.0
4	51 50.7	1.0 09	173.6	52 20.6	1.0 09	173.5	52 50.5	1.0 09	173.5	53 20.4	1.0 09	173.4
05	51 45.4	1.0 11	172.0	52 15.3	1.0 11	171.9	52 45.1	1.0 11	171.8	53 15.0	99 11	171.7
6	51 39.0	99 13	170.4	52 08.8	99 13	170.3	52 38.6	99 13	170.2	53 08.4	99 13	170.1
7	51 31.5	99 14	168.8	52 01.2	99 15	168.7	52 31.0	99 15	168.6	53 00.7	99 15	168.5
8	51 22.9	99 16	167.2	51 52.5	99 16	167.1	52 22.1	99 17	167.0	52 51.8	99 17	166.9
9	51 13.1	98 18	165.7	51 42.7	98 18	165.5	52 12.2	98 18	165.4	52 41.7	98 19	165.3
10	51 02.3	98 20	164.1	51 31.7	98 20	164.0	52 01.1	98 20	163.8	52 30.5	98 20	163.7
1	50 50.3	98 22	162.6	51 19.7	98 22	162.4	51 49.0	98 22	162.3	52 18.3	98 22	162.1
2	50 37.3	97 23	161.1	51 06.5	97 24	160.9	51 35.7	97 24	160.7	52 04.9	97 24	160.5
3	50 23.3	97 25	159.6	50 52.4	97 25	159.4	51 21.4	97 26	159.2	51 50.4	97 26	159.0
4	50 08.2	97 27	158.1	50 37.1	96 27	157.8	51 06.1	96 27	157.6	51 35.0	96 28	157.4
15	49 52.1	96 28	156.6	50 20.9	96 29	156.4	50 49.7	96 29	156.1	51 18.4	96 29	155.9
6	49 35.1	96 30	155.1	50 03.7	95 30	154.9	50 32.3	95 31	154.6	51 00.9	95 31	154.4
7	49 17.0	95 32	153.6	49 45.5	95 32	153.4	50 14.0	95 32	153.2	50 42.4	95 32	152.9
8	48 58.1	95 33	152.2	49 26.4	94 33	152.0	49 54.7	94 34	151.7	50 23.0	94 34	151.4
9	48 38.2	94 35	150.8	49 06.4	94 35	150.5	49 34.5	94 35	150.3	50 02.6	94 35	150.0
20	48 17.4	93 36	149.4	48 45.4	93 36	149.1	49 13.4	93 37	148.9	49 41.3	93 37	148.6
1	47 55.8	93 37	148.0	48 23.6	93 38	147.7	48 51.4	93 38	147.5	49 19.1	92 38	147.2
2	47 33.3	92 39	146.7	48 00.9	92 39	146.4	48 28.5	92 39	146.1	48 56.1	92 40	145.8
3	47 10.0	92 40	145.3	47 37.4	92 40	145.0	48 04.9	91 41	144.7	48 32.3	91 41	144.4
4	46 45.8	91 42	144.0	47 13.1	91 42	143.7	47 40.4	91 42	143.4	48 07.6	91 42	143.1
25	46 21.0	91 43	142.7	46 48.1	90 43	142.4	47 15.2	90 43	142.1	47 42.2	90 44	141.7
6	45 55.3	90 44	141.4	46 22.3	90 44	141.1	46 49.2	90 45	140.7	47 16.0	89 45	140.4
7	45 28.9	89 45	140.1	45 55.7	89 45	139.8	46 22.4	89 46	139.5	46 49.1	89 46	139.1
8	45 01.9	89 46	138.9	45 28.5	89 47	138.5	45 55.0	88 47	138.2	46 21.5	88 47	137.9
9	44 34.1	88 47	137.6	45 00.5	88 48	137.3	45 26.9	88 48	137.0	45 53.2	88 48	136.6
30	44 05.7	88 48	136.4	44 31.9	87 49	136.1	44 58.1	87 49	135.7	45 24.2	87 49	135.4
1	43 36.6	87 49	135.2	44 02.7	87 50	134.9	44 28.7	87 50	134.5	44 54.6	86 50	134.2
2	43 07.0	86 50	134.0	43 32.9	86 51	133.7	43 58.7	86 51	133.3	44 24.4	86 51	133.0
3	42 36.7	86 51	132.9	43 02.4	86 52	132.5	43 28.1	85 52	132.2	43 53.6	85 52	131.8
4	42 05.9	85 52	131.7	42 31.4	85 53	131.4	42 56.9	85 53	131.0	43 22.3	85 53	130.6
35	41 34.5	85 53	130.6	41 59.9	84 53	130.2	42 25.2	84 54	129.9	42 50.4	84 54	129.5
6	41 02.6	84 54	129.5	41 27.8	84 54	129.1	41 52.9	84 55	128.8	42 18.0	83 55	128.4
7	40 30.2	84 55	128.4	40 55.2	83 55	128.0	41 20.2	83 55	127.7	41 45.1	83 56	127.3
8	39 57.3	83 56	127.3	40 22.2	83 56	126.9	40 46.9	83 56	126.6	41 11.7	82 56	126.2
9	39 23.9	82 56	126.2	39 48.6	82 57	125.9	40 13.2	82 57	125.5	40 37.8	82 57	125.1
40	38 50.1	82 57	125.2	39 14.6	82 57	124.8	39 39.1	81 58	124.5	40 03.5	81 58	124.1
1	38 15.8	81 58	124.2	38 40.2	81 58	123.8	39 04.5	81 58	123.4	39 28.8	81 59	123.0
2	37 41.1	81 58	123.1	38 05.3	81 59	122.8	38 29.5	80 59	122.4	38 53.6	80 59	122.0
3	37 06.0	80 59	122.1	37 30.1	80 59	121.8	37 54.1	80 60	121.4	38 18.1	80 60	121.0
4	36 30.5	80 60	121.1	36 54.5	80 60	120.8	37 18.4	79 60	120.4	37 42.2	79 60	120.0
45	35 54.7	80 60	120.2	36 18.5	79 61	119.8	36 42.2	79 61	119.4	37 05.9	79 61	119.0
6	35 18.5	79 61	119.2	35 42.1	79 61	118.8	36 05.8	79 61	118.4	36 29.3	78 62	118.1
7	34 41.9	79 61	118.2	35 05.5	78 62	117.9	35 28.9	78 62	117.5	35 52.4	78 62	117.1
8	34 05.0	78 62	117.3	34 28.5	78 62	116.9	34 51.8	78 62	116.5	35 15.1	77 63	116.2
9	33 27.8	78 62	116.4	33 51.1	78 63	116.0	34 14.4	77 63	115.6	34 37.5	77 63	115.2
50	32 50.4	77 63	115.5	33 13.5	77 63	115.1	33 36.7	77 63	114.7	33 59.7	77 64	114.3
1	32 12.6	77 63	114.6	32 35.7	77 64	114.2	32 58.7	77 64	113.8	33 21.6	76 64	113.4
2	31 34.5	77 64	113.7	31 57.5	76 64	113.3	32 20.4	76 64	112.9	32 43.2	76 64	112.5
3	30 56.2	76 64	112.8	31 19.1	76 64	112.4	31 41.9	76 65	112.0	32 04.6	76 65	111.6
4	30 17.7	76 65	111.9	30 40.4	76 65	111.5	31 03.1	75 65	111.1	31 25.7	75 65	110.8
55	29 38.9	76 65	111.0	30 01.5	75 65	110.7	30 24.1	75 65	110.3	30 46.6	75 66	109.9
6	28 59.9	75 65	110.2	29 22.4	75 66	109.8	29 44.9	75 66	109.4	30 07.3	75 66	109.0
7	28 20.7	75 66	109.3	28 43.1	75 66	109.0	29 05.5	75 66	108.6	29 27.8	74 66	108.2
8	27 41.2	75 66	108.5	28 03.6	74 66	108.1	28 25.9	74 66	107.7	28 48.1	74 66	107.4
9	27 01.6	74 66	107.7	27 23.9	74 66	107.3	27 46.1	74 67	106.9	28 08.3	74 67	106.5
60	26 21.8	74 67	106.8	26 44.0	74 67	106.5	27 06.1	74 67	106.1	27 28.2	74 67	105.7
1	25 41.8	74 67	106.0	26 03.9	74 67	105.6	26 26.0	73 67	105.3	26 48.0	73 67	104.9
2	25 01.7	74 67	105.2	25 23.7	73 67	104.8	25 45.7	73 67	104.5	26 07.7	73 68	104.1
3	24 21.4	73 67	104.4	24 43.4	73 68	104.0	25 05.3	73 68	103.7	25 27.2	73 68	103.3
4	23 40.9	73 68	103.6	24 02.9	73 68	103.2	24 24.7	73 68	102.9	24 46.5	73 68	102.5
65	23 00.4	73 68	102.8	23 22.2	73 68	102.5	23 44.0	73 68	102.1	24 05.8	72 68	101.7
6	22 19.7	73 68	102.0	22 41.5	73 68	101.7	23 03.2	72 68	101.3	23 24.9	72 68	100.9
7	21 38.9	73 68	101.3	22 00.6	72 68	100.9	22 22.3	72 68	100.5	22 43.9	72 68	100.2
8	20 57.9	72 68	100.5	21 19.6	72 68	100.1	21 41.3	72 69	99.8	22 02.9	72 69	99.4
9	20 16.9	72 69	99.7	20 38.5	72 69	99.4	21 00.1	72 69	99.0	21 21.7	72 69	98.6
70	19 35.8	72 69	99.0	19 57.4	72 69	98.6	20 18.9	72 69	98.2	20 40.5	72 69	97.9
1	18 54.6	72 69	98.2	19 16.1	72 69	97.9	19 37.7	72 69	97.5	19 59.1	72 69	97.1
2	18 13.3	72 69	97.5	18 34.8	72 69	97.1	18 56.3	72 69	96.7	19 17.7	71 69	96.4
3	17 31.9	72 69	96.7	17 53.4	72 69	96.4	18 14.9	71 69	96.0	18 36.3	71 69	95.6
4	16 50.5	72 69	96.0	17 12.0	72 69	95.6	17 33.4	71 69	95.2	17 54.8	71 69	94.9
75	16 09.0	72 69	95.2	16 30.5	71 69	94.9	16 51.9	71 69	94.5	17 13.2	71 69	94.1
6	15 27.5	71 69	94.5	15 48.9	71 69	94.1	16 10.3	71 69	93.8	16 31.6	71 69	93.4
7	14 45.9	71 69	93.8	15 07.3	71 69	93.4	15 28.7	71 69	93.0	15 50.0	71 69	92.7
8	14 04.3	71 69	93.0	14 25.7	71 69	92.7	14 47.1	71 69	92.3	15 08.4	71 69	92.0
9	13 22.7	71 69	92.3	13 44.0	71 69	92.0	14 05.4	71 69	91.6	14 26.7	71 69	91.2
80	12 41.0	71 69	91.6	13 02.4	71 69	91.2	13 23.7	71 69	90.9	13 45.0	71 69	90.5
1	11 59.3	71 69	90.9	12 20.7	71 69	90.5	12 42.0	71 69	90.1	13 03.4	71 69	89.8
2	11 17.7	71 69	90.1	11 39.0	71 69	89.8	12 00.4	71 69	89.4	12 21.7	71 69	89.1
3	10 36.0	71 69	89.4	10 57.4	71 69	89.1	11 18.7	71 69	88.7	11 40.0	71 69	88.4
4	9 54.3	71 69	88.7	10 15.7	71 69	88.4	10 37.0	71 69	88.0	10 58.4	71 69	87.6
85	9 12.6	71 69	88.0	9 34.0	71 69	87.6	9 55.4	71 69	87.3	10 16.7	71 69	86.9
6	8 31.0	71 69	87.3	8 52.4	71 69	86.9	9 13.8	71 69	86.6	9 35.1	71 69	86.2
7	7 49.4	71 69	86.6	8 10.8	71 69	86.2	8 32.2	71 69	85.9	8 53.6	71 69	85.5
8	7 07.8	71 69	85.8	7 29.2	71 69	85.5	7 50.6	71 69	85.1	8 12.0	71 69	84.8
9	6 26.2	72 69	85.1	6 47.7	71 69	84.8	7 09.1	71 69	84.4	7 30.5	71 69	84.1
90	5 44.7	72 69	84.4	6 06.2	72 69	84.1	6 27.7	72 69	83.7	6 49.1	71 69	83.4

H.A.	10° 00′ Alt.	Δd Δt	Az.	10° 30′ Alt.	Δd Δt	Az.	11° 00′ Alt.	Δd Δt	Az.	11° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	54 00.0	1.0 01	180.0	54 30.0	1.0 01	180.0	55 00.0	1.0 01	180.0	55 30.0	1.0 01	180.0
1	53 59.4	1.0 03	178.3	54 29.4	1.0 03	178.3	54 59.4	1.0 03	178.3	55 29.4	1.0 03	178.3
2	53 57.6	1.0 05	176.7	54 27.5	1.0 05	176.6	54 57.5	1.0 05	176.6	55 27.5	1.0 05	176.5
3	53 54.5	1.0 07	175.0	54 24.5	1.0 07	174.9	54 54.4	1.0 07	174.9	55 24.3	1.0 07	174.8
4	53 50.3	1.0 09	173.3	54 20.2	1.0 09	173.2	54 50.1	1.0 09	173.2	55 20.0	1.0 09	173.1
05	53 44.8	99 11	171.7	54 14.7	99 11	171.6	54 44.5	99 11	171.5	55 14.3	99 11	171.4
6	53 38.2	99 13	170.0	54 07.9	99 13	169.9	54 37.7	99 13	169.8	55 07.5	99 13	169.7
7	53 30.4	99 15	168.4	54 00.0	99 15	168.2	54 29.7	99 15	168.1	54 59.4	99 15	168.0
8	53 21.4	99 17	166.7	53 51.0	99 17	166.6	54 20.5	99 17	166.4	54 50.1	99 17	166.3
9	53 11.2	98 19	165.1	53 40.7	98 19	164.9	54 10.2	98 19	164.8	54 39.7	98 19	164.6
10	52 59.9	98 21	163.5	53 29.3	98 21	163.3	53 58.7	98 21	163.2	54 28.0	98 21	163.0
1	52 47.5	98 22	161.9	53 16.8	98 23	161.7	53 46.0	97 23	161.5	54 15.3	97 23	161.3
2	52 34.0	97 24	160.3	53 03.2	97 25	160.1	53 32.3	97 25	159.9	54 01.4	97 25	159.7
3	52 19.5	97 26	158.7	52 48.5	97 26	158.5	53 17.4	97 27	158.3	53 46.4	96 27	158.1
4	52 03.8	96 28	157.2	52 32.7	96 28	157.0	53 01.5	96 28	156.7	53 30.3	96 29	156.5
15	51 47.2	96 29	155.7	52 15.9	96 30	155.4	52 44.5	95 30	155.2	53 13.1	95 30	154.9
6	51 29.5	95 31	154.2	51 58.0	95 31	153.9	52 26.5	95 32	153.6	52 55.0	95 32	153.4
7	51 10.8	95 33	152.7	51 39.2	94 33	152.4	52 07.5	94 33	152.1	52 35.8	94 34	151.9
8	50 51.2	94 34	151.2	51 19.4	94 35	150.9	51 47.6	94 35	150.6	52 15.7	94 35	150.3
9	50 30.7	93 36	149.7	50 58.7	93 36	149.4	51 26.7	93 36	149.2	51 54.6	93 37	148.9
20	50 09.2	93 37	148.3	50 37.0	93 38	148.0	51 04.8	93 38	147.7	51 32.6	92 38	147.4
1	49 46.8	92 39	146.9	50 14.5	92 39	146.6	50 42.1	92 39	146.3	51 09.7	92 40	145.9
2	49 23.6	92 40	145.5	49 51.1	91 40	145.2	50 18.5	91 41	144.8	50 45.9	91 41	144.5
3	48 59.6	91 41	144.1	49 26.9	91 42	143.8	49 54.1	91 42	143.5	50 21.3	90 42	143.1
4	48 34.8	90 43	142.7	49 01.9	90 43	142.4	49 28.9	90 43	142.1	49 55.9	90 44	141.7
25	48 09.1	90 44	141.4	48 36.1	90 44	141.1	49 02.9	89 45	140.7	49 29.7	89 45	140.4
6	47 42.8	89 45	140.1	48 09.5	89 45	139.7	48 36.2	89 46	139.4	49 02.8	89 46	139.1
7	47 15.7	89 46	138.8	47 42.2	88 47	138.4	48 08.7	88 47	138.1	48 35.1	88 47	137.7
8	46 47.9	88 47	137.5	47 14.2	88 48	137.2	47 40.5	87 48	136.8	48 06.7	87 48	136.4
9	46 19.4	87 49	136.3	46 45.5	87 49	135.9	47 11.6	87 49	135.5	47 37.6	87 50	135.2
30	45 50.2	87 50	135.0	46 16.2	86 50	134.7	46 42.1	86 50	134.3	47 07.9	86 51	133.9
1	45 20.5	86 51	133.8	45 46.3	86 51	133.4	46 12.0	86 51	133.1	46 37.6	85 52	132.7
2	44 50.1	85 52	132.6	45 15.7	85 52	132.2	45 41.2	85 52	131.9	46 06.7	85 52	131.5
3	44 19.1	85 53	131.4	44 44.6	85 53	131.1	45 09.9	84 53	130.7	45 35.2	84 53	130.3
4	43 47.6	84 53	130.3	44 12.9	84 54	129.9	44 38.0	84 54	129.5	45 03.1	84 54	129.1
35	43 15.5	84 54	129.1	43 40.6	83 55	128.8	44 05.6	83 55	128.4	44 30.5	83 55	128.0
6	42 43.0	83 55	128.0	43 07.9	83 55	127.6	43 32.7	83 56	127.2	43 57.4	82 56	126.9
7	42 09.9	83 56	126.9	42 34.6	82 56	126.5	42 59.3	82 56	126.1	43 23.8	82 57	125.7
8	41 36.3	82 57	125.8	42 00.9	82 57	125.4	42 25.4	82 57	125.0	42 49.8	81 58	124.7
9	41 02.3	81 57	124.7	41 26.7	81 58	124.4	41 51.0	81 58	124.0	42 15.3	81 58	123.6
40	40 27.8	81 58	123.7	40 52.1	81 58	123.3	41 16.2	80 59	122.9	41 40.3	80 59	122.5
1	39 52.9	80 59	122.7	40 17.0	80 59	122.3	40 41.1	80 59	121.9	41 05.0	80 60	121.5
2	39 17.6	80 59	121.6	39 41.6	80 60	121.2	40 05.5	79 60	120.8	40 29.2	79 60	120.4
3	38 42.0	79 60	120.6	39 05.8	79 60	120.2	39 29.5	79 61	119.8	39 53.1	79 61	119.4
4	38 05.9	79 61	119.6	38 29.6	79 61	119.2	38 53.2	78 61	118.8	39 16.7	78 61	118.4
45	37 29.5	79 61	118.6	37 53.0	78 61	118.2	38 16.5	78 62	117.9	38 39.8	78 62	117.5
6	36 52.8	78 62	117.7	37 16.1	78 62	117.3	37 39.5	78 62	116.9	38 02.7	77 62	116.5
7	36 15.7	78 62	116.7	36 38.9	77 63	116.3	37 02.1	77 63	115.9	37 25.2	77 63	115.5
8	35 38.3	77 63	115.8	36 01.4	77 63	115.4	36 24.5	77 63	115.0	36 47.5	76 63	114.6
9	35 00.6	77 63	114.8	35 23.6	77 63	114.5	35 46.6	76 64	114.1	36 09.4	76 64	113.7
50	34 22.7	76 64	113.9	34 45.6	76 64	113.5	35 08.4	76 64	113.1	35 31.1	76 64	112.7
1	33 44.4	76 64	113.0	34 07.2	76 64	112.6	34 29.9	76 64	112.2	34 52.5	75 65	111.8
2	33 05.9	76 65	112.1	33 28.6	75 65	111.7	33 51.2	75 65	111.3	34 13.7	75 65	110.9
3	32 27.2	75 65	111.2	32 49.8	75 65	110.8	33 12.3	75 65	110.5	33 34.7	75 65	110.1
4	31 48.3	75 65	110.4	32 10.7	75 65	110.0	32 33.1	75 66	109.6	32 55.4	74 66	109.2
55	31 09.1	75 66	109.5	31 31.4	74 66	109.1	31 53.7	74 66	108.7	32 16.0	74 66	108.3
6	30 29.7	74 66	108.6	30 52.0	74 66	108.3	31 14.2	74 66	107.9	31 36.3	74 66	107.5
7	29 50.1	74 66	107.8	30 12.3	74 66	107.4	30 34.4	74 67	107.0	30 56.5	73 67	106.6
8	29 10.3	74 67	107.0	29 32.4	74 67	106.6	29 54.5	73 67	106.2	30 16.4	73 67	105.8
9	28 30.4	74 67	106.1	28 52.4	73 67	105.8	29 14.4	73 67	105.4	29 36.3	73 67	105.0
60	27 50.2	73 67	105.3	28 12.2	73 67	104.9	28 34.1	73 67	104.5	28 55.9	73 67	104.2
1	27 10.0	73 67	104.5	27 31.9	73 67	104.1	27 53.7	73 68	103.7	28 15.4	72 68	103.3
2	26 29.5	73 68	103.7	26 51.4	73 68	103.3	27 13.1	72 68	102.9	27 34.8	72 68	102.5
3	25 49.0	73 68	102.9	26 10.7	72 68	102.5	26 32.4	72 68	102.1	26 54.1	72 68	101.7
4	25 08.3	72 68	102.1	25 30.0	72 68	101.7	25 51.6	72 68	101.3	26 13.2	72 68	101.0
65	24 27.5	72 68	101.3	24 49.1	72 68	100.9	25 10.7	72 68	100.6	25 32.2	72 68	100.2
6	23 46.6	72 68	100.5	24 08.1	72 68	100.2	24 29.7	72 69	99.8	24 51.2	71 69	99.4
7	23 05.5	72 69	99.8	23 27.1	72 69	99.4	23 48.6	72 69	99.0	24 10.0	71 69	98.6
8	22 24.4	72 69	99.0	22 45.9	72 69	98.6	23 07.4	71 69	98.2	23 28.7	71 69	97.9
9	21 43.2	72 69	98.2	22 04.7	71 69	97.9	22 26.1	71 69	97.5	22 47.4	71 69	97.1
70	21 01.9	71 69	97.5	21 23.3	71 69	97.1	21 44.7	71 69	96.7	22 06.0	71 69	96.4
1	20 20.6	71 69	96.7	20 41.9	71 69	96.4	21 03.3	71 69	96.0	21 24.6	71 69	95.6
2	19 39.1	71 69	96.0	20 00.5	71 69	95.6	20 21.8	71 69	95.2	20 43.1	71 69	94.9
3	18 57.7	71 69	95.2	19 19.0	71 69	94.9	19 40.3	71 69	94.5	20 01.5	71 69	94.1
4	18 16.1	71 69	94.5	18 37.4	71 69	94.1	18 58.7	71 69	93.8	19 19.9	71 69	93.4
75	17 34.6	71 69	93.8	17 55.9	71 69	93.4	18 17.1	71 69	93.0	18 38.3	71 69	92.7
6	16 53.0	71 69	93.0	17 14.2	71 69	92.7	17 35.5	71 69	92.3	17 56.7	71 69	91.9
7	16 11.3	71 69	92.3	16 32.6	71 69	91.9	16 53.8	71 69	91.6	17 15.0	71 69	91.2
8	15 29.7	71 69	91.6	15 50.9	71 69	91.2	16 12.1	71 69	90.9	16 33.3	71 69	90.5
9	14 48.0	71 69	90.9	15 09.2	71 69	90.5	15 30.5	71 69	90.1	15 51.6	71 69	89.8
80	14 06.3	71 69	90.1	14 27.6	71 69	89.8	14 48.8	71 69	89.4	15 10.0	71 69	89.0
1	13 24.6	71 69	89.4	13 45.9	71 69	89.1	14 07.1	71 69	88.7	14 28.3	71 69	88.3
2	12 43.0	71 69	88.7	13 04.2	71 69	88.3	13 25.4	71 69	88.0	13 46.6	71 69	87.6
3	12 01.3	71 69	88.0	12 22.6	71 69	87.6	12 43.8	71 69	87.3	13 05.0	71 69	86.9
4	11 19.7	71 69	87.3	11 40.9	71 69	86.9	12 02.2	71 69	86.6	12 23.4	71 69	86.2
85	10 38.0	71 69	86.6	10 59.3	71 69	86.2	11 20.6	71 69	85.8	11 41.8	71 69	85.5
6	9 56.5	71 69	85.9	10 17.8	71 69	85.5	10 39.0	71 69	85.1	11 00.3	71 69	84.8
7	9 14.9	71 69	85.1	9 36.2	71 69	84.8	9 57.5	71 69	84.4	10 18.8	71 69	84.1
8	8 33.4	71 69	84.4	8 54.8	71 69	84.1	9 16.1	71 69	83.7	9 37.4	71 69	83.4
9	7 51.9	71 69	83.7	8 13.3	71 69	83.4	8 34.7	71 69	83.0	8 56.0	71 69	82.7
90	7 10.5	71 69	83.0	7 32.0	71 69	82.7	7 53.3	71 69	82.3	8 14.7	71 69	82.0

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H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	36 00.0	1.0 01	180.0	35 30.0	1.0 01	180.0	35 00.0	1.0 01	180.0	34 30.0	1.0 01	180.0	34 00.0	1.0 01	180.0	33 30.0	1.0 01	180.0	33 00.0	1.0 01	180.0	32 30.0	1.0 01	180.0	00
1	35 59.6	1.0 02	178.8	35 29.6	1.0 02	178.8	34 59.6	1.0 02	178.8	34 29.6	1.0 02	178.8	33 59.6	1.0 02	178.8	33 29.6	1.0 02	178.8	32 59.6	1.0 02	178.8	32 29.6	1.0 02	178.8	1
2	35 58.2	1.0 04	177.6	35 28.2	1.0 04	177.6	34 58.2	1.0 04	177.6	34 28.3	1.0 04	177.6	33 58.3	1.0 04	177.6	33 28.3	1.0 04	177.6	32 58.3	1.0 04	177.7	32 28.3	1.0 04	177.7	2
3	35 56.0	1.0 05	176.3	35 26.0	1.0 05	176.4	34 56.1	1.0 05	176.4	34 26.1	1.0 05	176.4	33 56.1	1.0 05	176.4	33 26.1	1.0 05	176.5	32 56.2	1.0 05	176.5	32 26.2	1.0 05	176.5	3
4	35 52.9	1.0 07	175.1	35 22.9	1.0 07	175.1	34 53.0	1.0 07	175.2	34 23.0	1.0 07	175.2	33 53.1	1.0 06	175.3	33 23.1	1.0 06	175.3	32 53.2	1.0 06	175.3	32 23.2	1.0 06	175.4	4
05	35 48.9	1.0 08	173.9	35 19.0	1.0 08	173.9	34 49.1	1.0 08	174.0	34 19.1	1.0 08	174.0	33 49.2	1.0 08	174.1	33 19.3	1.0 08	174.1	32 49.4	1.0 08	174.2	32 19.5	1.0 08	174.2	05
6	35 44.0	1.0 10	172.7	35 14.1	1.0 10	172.7	34 44.3	1.0 09	172.8	34 14.4	1.0 09	172.8	33 44.5	1.0 09	172.9	33 14.6	1.0 09	172.9	32 44.7	1.0 09	173.0	32 14.8	1.0 09	173.0	6
7	35 38.3	99 11	171.5	35 08.4	99 11	171.5	34 38.6	99 11	171.6	34 08.7	99 11	171.6	33 38.9	99 11	171.7	33 09.1	99 11	171.8	32 39.2	99 11	171.8	32 09.4	1.0 10	171.9	7
8	35 31.6	99 12	170.3	35 01.8	99 12	170.3	34 32.1	99 12	170.4	34 02.3	99 12	170.5	33 32.5	99 12	170.5	33 02.7	99 12	170.6	32 32.9	99 12	170.7	32 03.1	99 12	170.7	8
9	35 24.1	99 14	169.0	34 54.4	99 14	169.1	34 24.7	99 14	169.2	33 54.9	99 14	169.3	33 25.2	99 14	169.4	32 55.4	99 13	169.4	32 25.7	99 13	169.5	31 55.9	99 13	169.6	9
10	35 15.8	99 15	167.8	34 46.1	99 15	167.9	34 16.4	99 15	168.0	33 46.8	99 15	168.1	33 17.1	99 15	168.2	32 47.4	99 15	168.3	32 17.7	99 15	168.4	31 48.0	99 15	168.4	10
1	35 06.6	99 17	166.6	34 37.0	99 17	166.7	34 07.4	99 17	166.8	33 37.8	99 16	166.9	33 08.1	99 16	167.0	32 38.5	99 16	167.1	32 08.9	99 16	167.2	31 39.3	99 16	167.3	1
2	34 56.5	98 18	165.5	34 27.0	98 18	165.6	33 57.5	98 18	165.7	33 27.9	98 18	165.8	32 58.4	99 18	165.9	32 28.8	99 18	166.0	31 59.3	99 17	166.1	31 29.7	99 17	166.2	2
3	34 45.7	98 20	164.3	34 16.2	98 19	164.4	33 46.7	98 19	164.5	33 17.3	98 19	164.6	32 47.8	98 19	164.7	32 18.3	98 19	164.8	31 48.8	98 19	164.9	31 19.3	98 19	165.0	3
4	34 33.9	98 21	163.1	34 04.6	98 21	163.2	33 35.2	98 21	163.3	33 05.8	98 20	163.5	32 36.4	98 20	163.6	32 07.0	98 20	163.7	31 37.6	98 20	163.8	31 08.2	98 20	163.9	4
15	34 21.4	98 22	161.9	33 52.1	98 22	162.0	33 22.8	98 22	162.2	32 53.5	98 22	162.3	32 24.2	98 22	162.4	31 54.9	98 22	162.6	31 25.6	98 21	162.7	30 56.3	98 21	162.8	15
6	34 08.1	97 24	160.7	33 38.9	97 23	160.9	33 09.7	97 23	161.0	32 40.5	97 23	161.2	32 11.2	97 23	161.3	31 42.0	97 23	161.4	31 12.8	97 23	161.6	30 43.5	97 22	161.7	6
7	33 53.9	97 25	159.6	33 24.8	97 25	159.7	32 55.7	97 25	159.9	32 26.6	97 24	160.0	31 57.5	97 24	160.2	31 28.4	97 24	160.3	30 59.2	97 24	160.4	30 30.1	97 24	160.6	7
8	33 39.0	97 26	158.4	33 10.0	97 26	158.6	32 41.0	97 26	158.7	32 12.0	97 26	158.9	31 43.0	97 25	159.0	31 13.9	97 25	159.2	30 44.9	97 25	159.3	30 15.8	97 25	159.5	8
9	33 23.3	96 27	157.3	32 54.4	96 27	157.4	32 25.5	96 27	157.6	31 56.6	96 27	157.8	31 27.7	96 27	157.9	30 58.7	96 27	158.1	30 29.8	96 26	158.2	30 00.8	97 26	158.4	9
20	33 06.8	96 29	156.1	32 38.0	96 29	156.3	32 09.3	96 28	156.5	31 40.4	96 28	156.6	31 11.6	96 28	156.8	30 42.8	96 28	157.0	30 14.0	96 28	157.1	29 45.1	96 27	157.3	20
1	32 49.6	96 30	155.0	32 20.9	96 30	155.2	31 52.2	96 30	155.4	31 23.6	96 29	155.5	30 54.9	96 29	155.7	30 26.1	96 29	155.9	29 57.4	96 29	156.0	29 28.7	96 29	156.2	1
2	32 31.6	95 31	153.9	32 03.1	95 31	154.1	31 34.5	95 31	154.3	31 05.9	95 31	154.4	30 37.3	95 30	154.6	30 08.7	95 30	154.8	29 40.1	95 30	155.0	29 11.5	95 30	155.1	2
3	32 12.9	95 32	152.8	31 44.5	95 32	153.0	31 16.1	95 32	153.2	30 47.6	95 32	153.3	30 19.1	95 32	153.5	29 50.6	95 31	153.7	29 22.1	95 31	153.9	28 53.6	95 31	154.1	3
4	31 53.5	94 34	151.7	31 25.2	94 33	151.9	30 56.9	94 33	152.1	30 28.5	94 33	152.3	30 00.2	95 33	152.4	29 31.8	95 32	152.6	29 03.4	95 32	152.8	28 35.0	95 32	153.0	4
25	31 33.4	94 35	150.6	31 05.2	94 34	150.8	30 37.0	94 34	151.0	30 08.8	94 34	151.2	29 40.6	94 34	151.4	29 12.3	94 34	151.6	28 44.1	94 33	151.8	28 15.8	94 33	152.0	25
6	31 12.6	93 36	149.5	30 44.5	94 36	149.7	30 16.5	94 35	149.9	29 48.4	94 35	150.1	29 20.3	94 35	150.3	28 52.1	94 35	150.5	28 24.0	94 35	150.7	27 55.9	94 34	150.9	6
7	30 51.1	93 37	148.4	30 23.2	93 37	148.6	29 55.2	93 36	148.8	29 27.3	93 36	149.1	28 59.3	93 36	149.3	28 31.3	93 36	149.5	28 03.3	93 36	149.7	27 35.3	93 35	149.9	7
8	30 28.9	93 38	147.4	30 01.1	93 38	147.6	29 33.3	93 38	147.8	29 05.5	93 37	148.0	28 37.7	93 37	148.2	28 09.8	93 37	148.4	27 41.9	93 37	148.6	27 14.0	93 36	148.8	8
9	30 06.1	92 39	146.3	29 38.5	92 39	146.5	29 10.8	92 39	146.7	28 43.1	92 38	147.0	28 15.4	92 38	147.2	27 47.7	92 38	147.4	27 19.9	93 38	147.6	26 52.1	93 38	147.8	9
30	29 42.7	92 40	145.2	29 15.1	92 40	145.5	28 47.6	92 40	145.7	28 20.1	92 39	145.9	27 52.5	92 39	146.1	27 24.9	92 39	146.4	26 57.3	92 39	146.6	26 29.6	92 39	146.8	30
1	29 18.6	91 41	144.2	28 51.2	91 41	144.4	28 23.8	91 41	144.7	27 56.4	91 40	144.9	27 29.0	92 40	145.1	27 01.5	92 40	145.4	26 34.0	92 40	145.6	26 06.5	92 40	145.8	1
2	28 53.9	91 42	143.2	28 26.7	91 42	143.4	27 59.4	91 42	143.6	27 32.1	91 41	143.9	27 04.8	91 41	144.1	26 37.5	91 41	144.3	26 10.2	91 41	144.6	25 42.8	91 41	144.8	2
3	28 28.6	90 43	142.2	28 01.5	90 43	142.4	27 34.4	90 43	142.6	27 07.3	91 42	142.9	26 40.1	91 42	143.1	26 12.9	91 42	143.3	25 45.7	91 42	143.6	25 18.5	91 42	143.8	3
4	28 02.8	90 44	141.1	27 35.8	90 44	141.4	27 08.8	90 44	141.6	26 41.8	90 43	141.9	26 14.8	90 43	142.1	25 47.7	90 43	142.4	25 20.7	90 43	142.6	24 53.6	90 42	142.8	4
35	27 36.3	89 45	140.1	27 09.5	89 45	140.4	26 42.7	90 45	140.6	26 15.8	90 44	140.9	25 48.9	90 44	141.1	25 22.0	90 44	141.4	24 55.1	90 44	141.6	24 28.1	90 43	141.9	35
6	27 09.3	89 46	139.1	26 42.7	89 46	139.4	26 16.0	89 45	139.7	25 49.2	89 45	139.9	25 22.5	89 45	140.2	24 55.7	89 45	140.4	24 28.9	89 44	140.7	24 02.1	89 44	140.9	6
7	26 41.8	88 47	138.2	26 15.3	88 47	138.4	25 48.7	89 46	138.7	25 22.1	89 46	138.9	24 55.5	89 46	139.2	24 28.9	89 46	139.4	24 02.2	89 45	139.7	23 35.5	89 45	139.9	7
8	26 13.7	88 48	137.2	25 47.3	88 47	137.4	25 20.9	88 47	137.7	24 54.5	88 47	138.0	24 28.0	88 47	138.2	24 01.5	88 46	138.5	23 35.0	88 46	138.7	23 08.5	89 46	139.0	8
9	25 45.1	87 48	136.2	25 18.9	88 48	136.5	24 52.6	88 48	136.8	24 26.3	88 48	137.0	24 00.0	88 48	137.3	23 33.6	88 47	137.5	23 07.3	88 47	137.8	22 40.9	88 47	138.1	9
40	25 16.1	87 49	135.3	24 50.0	87 49	135.5	24 23.8	87 49	135.8	23 57.7	87 49	136.1	23 31.5	87 48	136.3	23 05.3	87 48	136.6	22 39.0	88 48	136.9	22 12.8	88 48	137.1	40
1	24 46.5	86 50	134.3	24 20.5	87 50	134.6	23 54.5	87 50	134.9	23 28.5	87 49	135.1	23 02.5	87 49	135.4	22 36.4	87 49	135.7	22 10.3	87 49	135.9	21 44.1	87 48	136.2	1
2	24 16.4	86 51	133.4	23 50.6	86 51	133.7	23 24.7	86 50	133.9	22 58.9	86 50	134.2	22 33.0	86 50	134.5	22 07.0	87 50	134.7	21 41.1	87 50	135.0	21 15.1	87 49	135.3	2
3	23 45.9	86 52	132.4	23 20.2	86 51	132.7	22 54.5	86 51	133.0	22 28.8	86 51	133.3	22 03.0	86 51	133.6	21 37.2	86 50	133.8	21 11.4	86 50	134.1	20 45.5	86 50	134.4	3
4	23 14.9	85 52	131.5	22 49.4	85 52	131.8	22 23.8	85 52	132.1	21 58.2	85 52	132.4	21 32.6	85 51	132.7	21 06.9	86 51	132.9	20 41.2	86 51	133.2	20 15.5	86 51	133.5	4
45	22 43.5	85 53	130.6	22 18.1	85 53	130.9	21 52.6	85 53	131.2	21 27.2	85 52	131.5	21 01.7	85 52	131.8	20 36.2	85 52	132.0	20 10.6	85 52	132.3	19 45.0	85 52	132.6	45
6	22 11.6	84 54	129.7	21 46.4	84 54	130.0	21 21.1	84 53	130.3	20 55.7	84 53	130.6	20 30.4	85 53	130.9	20 05.0	85 53	131.1	19 39.6	85 52	131.4	19 14.1	85 52	131.7	6
7	21 39.4	84 54	128.8	21 14.2	84 54	129.1	20 49.1	84 54	129.4	20 23.9	84 54	129.7	19 58.6	84 54	130.0	19 33.4	84 53	130.3	19 08.1	84 53	130.5	18 42.8	84 53	130.8	7
8	21 06.7	83 55	127.9	20 41.7	83 55	128.2	20 16.6	84 55	128.5	19 51.6	84 54	128.8	19 26.5	84 54	129.1	19 01.4	84 54	129.4	18 36.2	84 54	129.7	18 11.1	84 54	130.0	8
9	20 33.6	83 56	127.0	20 08.7	83 56	127.3	19 43.8	83 55	127.6	19 18.9	83 55	127.9	18 53.9	83 55	128.2	18 29.0	83 55	128.5	18 03.9	83 54	128.8	17 38.9	84 54	129.1	9
50	20 00.1	82 56	126.2	19 35.4	83 56	126.5	19 10.6	83 56	126.8	18 45.8	83 56	127.1	18 21.0	83 56	127.4	17 56.1	83 55	127.7	17 31.3	83 55	127.9	17 06.4	83 55	128.2	50
1	19 26.3	82 57	125.3	19 01.7	82 57	125.6	18 37.1	82 57	125.9	18 12.4	82 56	126.2	17 47.7	82 56	126.5	17 23.0	82 56	126.8	16 58.2	83 56	127.1	16 33.4	83 56	127.4	1
2	18 52.1	82 58	124.4	18 27.6	82 57	124.8	18 03.1	82 57	125.1	17 38.6	82 57	125.4	17 14.0	82 57	125.7	16 49.4	82 57	126.0	16 24.8	82 56	126.3	16 00.1	82 56	126.6	2
3	18 17.6	81 58	123.6	17 53.2	81 58	123.9	17 28.8	81 58	124.2	17 04.4	81 58	124.5	16 40.0	82 57	124.8	16 15.5	82 57	125.1	15 51.0	82 57	125.4	15 26.5	82 57	125.7	3
4	17 42.7	81 59	122.8	17 18.4	81 58	123.1	16 54.2	81 58	123.4	16 29.9	81 58	123.7	16 05.6	81 58	124.0	15 41.2	81 58	124.3	15 16.9	81 57	124.6	14 52.5	81 57	124.9	4
55	17 07.5	80 59	121.9	16 43.4	80 59	122.2	16 19.2	81 59	122.5	15 55.0	81 59	122.8	15 30.8	81 58	123.2	15 06.6	81 58	123.5	14 42.4	81 58	123.8	14 18.1	81 58	124.1	55
6	16 31.9	80 60	121.1	16 07.9	80 60	121.4	15 43.9	80 59	121.7	15 19.9	80 59	122.0	14 55.8	80 59	122.3	14 31.7	80 59	122.6	14 07.6	80 59	122.9	13 43.4	81 58	123.3	6
7	15 56.1	80 60	120.3	15 32.2	80 60	120.6	15 08.3	80 60	120.9	14 44.4	80 60	121.2	14 20.4	80 59	121.5	13 56.4	80 59	121.8	13 32.4	80 59	122.1	13 08.4	80 59	122.4	7
8	15 19.9	79 61	119.5	14 56.2	79 61	119.8	14 32.4	79 60	120.1	14 08.6	79 60	120.4	13 44.7	80 60	120.7	13 20.9	80 60	121.0	12 57.0	80 60	121.3	12 33.1	80 59	121.6	8
9	14 43.5	79 61	118.6	14 19.9	79 61	119.0	13 56.2	79 61	119.3	13 32.5	79 61	119.6	13 08.7	79 60	119.9	12 45.0	79 60	120.2	12 21.2	79 60	120.5	11 57.4	79 60	120.8	9
60	14 06.8	78 62	117.8	13 43.2	79 61	118.2	13 19.7	79 61	118.5	12 56.1	79 61	118.8	12 32.5	79 61	119.1	12 08.8	79 61	119.4	11 45.2	79 61	119.7	11 21.5	79 60	120.0	60
1	13 29.8	78 62	117.0	13 06.4	78 62	117.4	12 42.9	78 62	117.7	12 19.4	78 62	118.0	11 55.9	78 61	118.3	11 32.4	78 61	118.6	11 08.8	79 61	118.9	10 45.3	79 61	119.3	1
2	12 52.5	78 62	116.2	12 29.2	78 62	116.6	12 05.9	78 62	116.9	11 42.5	78 62	117.2	11 19.1	78 62	117.5	10 55.7	78 62	117.8	10 32.2	78 61	118.2	10 08.8	78 61	118.5	2
3	12 15.0	77 63	115.5	11 51.8	77 63	115.8	11 28.6	78 63	116.1	11 05.3	78 62	116.4	10 42.0	78 62	116.7	10 18.7	78 62	117.1	9 55.4	78 62	117.4	9 32.0	78 62	117.7	3
4	11 37.3	77 63	114.7	11 14.2	77 63	115.0	10 51.0	77 63	115.3	10 27.8	77 63	115.6	10 04.6	77 63	116.0	9 41.4	77 62	116.3	9 18.2	77 62	116.6	8 55.0	77 62	116.9	4
65	10 59.3	77 64	113.9	10 36.3	77 64	114.2	10 13.2	77 63	114.6	9 50.1	77 63	114.9	9 27.1	77 63	115.2	9 04.0	77 63	115.5	8 40.8	77 63	115.8	8 17.7	77 63	116.2	65
6	10 21.1	76 64	113.1	9 58.1	76 64	113.5	9 35.2	77 64	113.8	9 12.2	77 64	114.1	8 49.2	77 63	114.4	8 26.2	77 63	114.8	8 03.2	77 63	115.1	7 40.2	77 63	115.4	6
7	9 42.6	76 64	112.4	9 19.8	76 64	112.7	8 56.9	76 64	113.0	8 34.1	76 64	113.3	8 11.2	76 64	113.7	7 48.3	76 64	114.0	7 25.3	76 64	114.3	7 02.4	76 63	114.6	7
8	9 04.0	76 65	111.6	8 41.2	76 65	111.9	8 18.5	76 64	112.3	7 55.7	76 64	112.6	7 32.9	76 64	112.9	7 10.1	76 64	113.2	6 47.2	76 64	113.6	6 24.4	76 64	113.9	8
9	8 25.1	76 65	110.8	8 02.5	76 65	111.2	7 39.8	76 65	111.5	7 17.1	76 65	111.8	6 54.4	76 64	112.2	6 31.7	76 64	112.5	6 08.9	76 64	112.8	5 46.2	76 64	113.1	9
70	7 46.1	75 65	110.1	7 23.5	75 65	110.4	7 00.9	75 65	110.8	6 38.3	75 65	111.1	6 15.7	75 65	111.4	5 53.1	75 65	111.7	5 30.4	75 64	112.1	5 07.8	76 64	112.4	70
1	7 06.8	75 66	109.3	6 44.3	75 66	109.7	6 21.8	75 65	110.0	5 59.3	75 65	110.3	5 36.8	75 65	110.7	5 14.2	75 65	111.0							1
2	6 27.4	75 66	108.6	6 05.0	75 66	108.9	5 42.6	75 66	109.3	5 20.1	75 66	109.6													2
3	5 47.8	74 66	107.8	5 25.5	74 66	108.2	5 03.1	75 66	108.5																3
4	5 08.1	74 66	107.1																						4

DECLINATION SAME NAME AS LATITUDE

H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	5 03.3	72 69	83.7	5 24.8	72 69	83.4	5 46.3	72 69	83.0	6 07.7	72 69	82.7	6 29.2	72 69	82.3	6 50.6	71 69	82.0	7 12.1	71 69	81.6	7 33.5	71 69	81.3	91
2							5 04.9	72 69	82.3	5 26.4	72 69	81.9	5 47.9	72 69	81.6	6 09.4	72 69	81.2	6 30.9	72 69	80.9	6 52.3	71 68	80.5	2
3													5 06.7	72 69	80.9	5 28.3	72 68	80.5	5 49.8	72 68	80.2	6 11.3	72 68	79.8	3
4																			5 08.7	72 68	79.5	5 30.3	72 68	79.1	4

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Lat. 46°

H.A.	12° 00′ Alt.	Δd	Δt	Az.	12° 30′ Alt.	Δd	Δt	Az.	13° 00′ Alt.	Δd	Δt	Az.	13° 30′ Alt.	Δd	Δt	Az.
°	° ′			°	° ′			°	° ′			°	° ′			°
00	56 00.0	1.0	01	180.0	56 30.0	1.0	01	180.0	57 00.0	1.0	01	180.0	57 00.0	1.0	01	180.0
1	55 59.4	1.0	03	178.3	56 29.4	1.0	03	178.2	56 59.3	1.0	03	178.2	57 29.3	1.0	03	178.2
2	55 57.5	1.0	05	176.5	56 27.4	1.0	05	176.5	56 57.4	1.0	05	176.4	57 27.4	1.0	05	176.4
3	55 54.3	1.0	07	174.8	56 24.2	1.0	07	174.7	56 54.2	1.0	08	174.6	57 24.1	1.0	08	174.6
4	55 49.8	1.0	09	173.0	56 19.7	1.0	10	172.9	56 49.6	1.0	10	172.9	57 19.5	1.0	10	172.8
05	55 44.2	99	12	171.3	56 14.0	99	12	171.2	56 43.8	99	12	171.1	57 13.6	99	12	171.0
6	55 37.2	99	14	169.6	56 07.0	99	14	169.5	56 36.7	99	14	169.3	57 06.5	99	14	169.2
7	55 29.1	99	16	167.9	55 58.7	99	16	167.7	56 28.4	99	16	167.6	56 58.0	99	16	167.4
8	55 19.7	99	18	166.2	55 49.3	99	18	166.0	56 18.8	98	18	165.8	56 48.3	98	18	165.7
9	55 09.1	98	20	164.5	55 38.6	98	20	164.3	56 08.0	98	20	164.1	56 37.4	98	20	163.9
10	54 57.4	98	22	162.8	55 26.7	98	22	162.6	55 56.0	98	22	162.4	56 25.3	98	22	162.2
1	54 44.5	97	23	161.1	55 13.7	97	24	160.9	55 42.8	97	24	160.7	56 12.0	97	24	160.5
2	54 30.4	97	25	159.5	54 59.5	97	26	159.3	55 28.5	97	26	159.1	55 57.5	97	26	158.8
3	54 15.3	96	27	157.9	54 44.2	96	27	157.6	55 13.0	96	28	157.4	55 41.9	96	28	157.2
4	53 59.0	96	29	156.3	54 27.8	96	29	156.0	54 56.5	96	29	155.8	55 25.2	96	30	155.5
15	53 41.7	95	31	154.7	54 10.3	95	31	154.4	54 38.8	95	31	154.2	55 07.3	95	31	153.9
6	53 23.4	95	32	153.1	53 51.8	95	33	152.8	54 20.2	94	33	152.6	54 48.5	94	33	152.3
7	53 04.1	94	34	151.6	53 32.3	94	34	151.3	54 00.5	94	34	151.0	54 28.6	94	35	150.7
8	52 43.7	94	35	150.1	53 11.8	93	36	149.8	53 39.8	93	36	149.5	54 07.7	93	36	149.2
9	52 22.5	93	37	148.6	52 50.3	93	37	148.3	53 18.1	93	38	147.9	53 45.9	92	38	147.6
20	52 00.3	92	38	147.1	52 27.9	92	39	146.8	52 55.5	92	39	146.4	53 23.1	92	39	146.1
1	51 37.2	92	40	145.6	52 04.6	91	40	145.3	52 32.0	91	41	145.0	52 59.4	91	41	144.6
2	51 13.2	91	41	144.2	51 40.5	91	42	143.9	52 07.7	91	42	143.5	52 34.8	90	42	143.2
3	50 48.4	90	43	142.8	51 15.5	90	43	142.4	51 42.5	90	43	142.1	52 09.4	90	44	141.7
4	50 22.8	90	44	141.4	50 49.7	89	44	141.0	51 16.5	89	45	140.7	51 43.2	89	45	140.3
25	49 56.4	89	45	140.0	50 23.1	89	46	139.7	50 49.7	89	46	139.3	51 16.2	88	46	138.9
6	49 29.3	88	46	138.7	49 55.7	88	47	138.3	50 22.1	88	47	138.0	50 48.5	88	47	137.6
7	49 01.4	88	48	137.4	49 27.7	87	48	137.0	49 53.9	87	48	136.6	50 20.0	87	49	136.2
8	48 32.8	87	49	136.1	48 58.9	87	49	135.7	49 24.9	87	49	135.3	49 50.8	86	50	134.9
9	48 03.6	86	50	134.8	48 29.5	86	50	134.4	48 55.3	86	50	134.0	49 21.0	86	51	133.6
30	47 33.7	86	51	133.6	47 59.4	85	51	133.2	48 25.0	85	51	132.8	48 50.5	85	52	132.4
1	47 03.2	85	52	132.3	47 28.7	85	52	131.9	47 54.1	85	52	131.5	48 19.4	84	53	131.1
2	46 32.1	84	53	131.1	46 57.4	84	53	130.7	47 22.6	84	53	130.3	47 47.7	84	54	129.9
3	46 00.4	84	54	129.9	46 25.5	84	54	129.5	46 50.5	83	54	129.1	47 15.5	83	55	128.7
4	45 28.1	83	55	128.7	45 53.1	83	55	128.3	46 17.9	83	55	127.9	46 42.7	82	56	127.5
35	44 55.4	83	55	127.6	45 20.1	82	56	127.2	45 44.8	82	56	126.8	46 09.4	82	56	126.4
6	44 22.1	82	56	126.5	44 46.7	82	57	126.1	45 11.2	82	57	125.6	45 35.6	81	57	125.2
7	43 48.3	82	57	125.3	44 12.8	81	57	124.9	44 37.1	81	58	124.5	45 01.3	81	58	124.1
8	43 14.1	81	58	124.3	43 38.4	81	58	123.8	44 02.5	80	58	123.4	44 26.6	80	59	123.0
9	42 39.4	80	58	123.2	43 03.5	80	59	122.8	43 27.5	80	59	122.4	43 51.4	80	59	121.9
40	42 04.3	80	59	122.1	42 28.3	80	59	121.7	42 52.1	79	60	121.3	43 15.8	79	60	120.9
1	41 28.8	79	60	121.1	41 52.6	79	60	120.7	42 16.3	79	60	120.2	42 39.9	78	61	119.8
2	40 53.0	79	60	120.0	41 16.6	79	61	119.6	41 40.1	78	61	119.2	42 03.5	78	61	118.8
3	40 16.7	78	61	119.0	40 40.2	78	61	118.6	41 03.5	78	62	118.2	41 26.8	77	62	117.8
4	39 40.1	78	62	118.0	40 03.4	78	62	117.6	40 26.6	77	62	117.2	40 49.8	77	62	116.8
45	39 03.1	77	62	117.0	39 26.3	77	62	116.6	39 49.4	77	63	116.2	40 12.4	77	63	115.8
6	38 25.8	77	63	116.1	38 48.9	77	63	115.7	39 11.9	76	63	115.3	39 34.8	76	63	114.8
7	37 48.2	77	63	115.1	38 11.2	76	63	114.7	38 34.0	76	64	114.3	38 56.8	76	64	113.9
8	37 10.4	76	64	114.2	37 33.2	76	64	113.8	37 55.9	76	64	113.4	38 18.5	75	64	112.9
9	36 32.2	76	64	113.3	36 54.9	76	64	112.8	37 17.5	75	64	112.4	37 40.0	75	65	112.0
50	35 53.8	75	64	112.3	36 16.4	75	65	111.9	36 38.8	75	65	111.5	37 01.3	75	65	111.1
1	35 15.1	75	65	111.4	35 37.6	75	65	111.0	36 00.0	74	65	110.6	36 22.3	74	65	110.2
2	34 36.2	75	65	110.5	34 58.5	74	65	110.1	35 20.8	74	66	109.7	35 43.0	74	66	109.3
3	33 57.0	74	66	109.7	34 19.3	74	66	109.3	34 41.5	74	66	108.8	35 03.6	74	66	108.4
4	33 17.7	74	66	108.8	33 39.9	74	66	108.4	34 01.9	73	66	108.0	34 23.9	73	66	107.6
55	32 38.1	74	66	107.9	33 00.2	73	66	107.5	33 22.2	73	67	107.1	33 44.1	73	67	106.7
6	31 58.4	73	67	107.1	32 20.4	73	67	106.7	32 42.3	73	67	106.3	33 04.1	73	67	105.9
7	31 18.4	73	67	106.2	31 40.4	73	67	105.8	32 02.2	73	67	105.4	32 23.9	72	67	105.0
8	30 38.3	73	67	105.4	31 00.2	73	67	105.0	31 21.9	72	67	104.6	31 43.6	72	67	104.2
9	29 58.1	73	67	104.6	30 19.8	72	67	104.2	30 41.5	72	68	103.8	31 03.1	72	68	103.4
60	29 17.7	72	68	103.8	29 39.4	72	68	103.4	30 01.0	72	68	103.0	30 22.5	72	68	102.6
1	28 37.1	72	68	102.9	28 58.7	72	68	102.6	29 20.3	72	68	102.2	29 41.8	71	68	101.8
2	27 56.4	72	68	102.1	28 18.0	72	68	101.8	28 39.5	72	68	101.4	29 00.9	71	68	101.0
3	27 15.6	72	68	101.4	27 37.1	72	68	101.0	27 58.6	71	68	100.6	28 19.9	71	68	100.2
4	26 34.7	72	68	100.6	26 56.2	71	68	100.2	27 17.5	71	69	99.8	27 38.9	71	69	99.4
65	25 53.7	71	69	99.8	26 15.1	71	69	99.4	26 36.4	71	69	99.0	26 57.7	71	69	98.6
6	25 12.6	71	69	99.0	25 33.9	71	69	98.6	25 55.2	71	69	98.2	26 16.4	71	69	97.8
7	24 31.4	71	69	98.2	24 52.7	71	69	97.9	25 13.9	71	69	97.5	25 35.1	71	69	97.1
8	23 50.1	71	69	97.5	24 11.3	71	69	97.1	24 32.6	71	69	96.7	24 53.7	70	69	96.3
9	23 08.7	71	69	96.7	23 30.0	71	69	96.3	23 51.1	71	69	96.0	24 12.3	70	69	95.6
70	22 27.3	71	69	96.0	22 48.5	71	69	95.6	23 00.7	70	69	95.2	23 30.8	70	69	94.8
1	21 45.8	71	69	95.2	22 07.0	71	69	94.8	22 28.1	70	69	94.5	22 49.2	70	69	94.1
2	21 04.3	71	69	94.5	21 25.4	70	69	94.1	21 46.5	70	69	93.7	22 07.6	70	69	93.3
3	20 22.7	71	69	93.7	20 43.8	70	69	93.4	21 04.9	70	69	93.0	21 26.0	70	69	92.6
4	19 41.1	71	69	93.0	20 02.2	70	69	92.6	20 23.3	70	69	92.3	20 44.3	70	69	91.9
75	18 59.5	70	69	92.3	19 20.6	70	69	91.9	19 41.6	70	69	91.5	20 02.7	70	69	91.2
6	18 17.8	70	69	91.6	18 38.9	70	69	91.2	19 00.0	70	69	90.8	19 21.0	70	69	90.4
7	17 36.1	70	69	90.8	17 57.2	70	69	90.5	18 18.3	70	69	90.1	18 39.3	70	69	89.7
8	16 54.5	70	69	90.1	17 15.6	70	69	89.7	17 36.6	70	69	89.4	17 57.6	70	69	89.0
9	16 12.8	70	69	89.4	16 33.9	70	69	89.0	16 54.9	70	69	88.7	17 16.0	70	69	88.3
80	15 31.1	70	69	88.7	15 52.2	70	69	88.3	16 13.3	70	69	87.9	16 34.3	70	69	87.6
1	14 49.4	70	69	88.0	15 10.6	70	69	87.6	15 31.6	70	69	87.2	15 52.7	70	69	86.9
2	14 07.8	70	69	87.3	14 28.9	70	69	86.9	14 50.0	70	69	86.5	15 11.1	70	69	86.1
3	13 26.2	71	69	86.5	13 47.3	70	69	86.2	14 08.4	70	69	85.8	14 29.5	70	69	85.4
4	12 44.6	71	69	85.8	13 05.8	70	69	85.5	13 26.9	70	69	85.1	13 48.0	70	69	84.7
85	12 03.1	71	69	85.1	12 24.2	71	69	84.8	12 45.4	70	69	84.4	13 06.5	70	69	84.0
6	11 21.5	71	69	84.4	11 42.8	71	69	84.1	12 03.9	71	69	83.7	12 25.1	70	69	83.3
7	10 40.1	71	69	83.7	11 01.3	71	69	83.4	11 22.5	71	69	83.0	11 43.7	71	69	82.6
8	9 58.7	71	69	83.0	10 20.0	71	69	82.7	10 41.2	71	69	82.3	11 02.4	71	69	81.9
9	9 17.4	71	69	82.3	9 38.7	71	69	81.9	9 59.9	71	69	81.6	10 21.2	71	69	81.2
90	8 36.1	71	69	81.6	8 57.4	71	69	81.2	9 18.7	71	68	80.9	9 40.0	71	68	80.5

H.A.	14° 00′ Alt.	Δd	Δt	Az.	14° 30′ Alt.	Δd	Δt	Az.	15° 00′ Alt.	Δd	Δt	Az.	15° 30′ Alt.	Δd	Δt	Az.
°	° ′			°	° ′			°	° ′			°	° ′			°
00	58 00.0	1.0	01	180.0	58 30.0	1.0	01	180.0	59 00.0	1.0	01	180.0	59 30.0	1.0	01	180.0
1	57 59.3	1.0	03	178.2	58 29.3	1.0	03	178.1	58 59.3	1.0	03	178.1	59 29.3	1.0	03	178.1
2	57 57.3	1.0	06	176.3	58 27.3	1.0	06	176.3	58 57.3	1.0	06	176.3	59 27.2	1.0	06	176.2
3	57 54.0	1.0	08	174.5	58 23.9	1.0	08	174.5	58 53.9	1.0	08	174.4	59 23.8	1.0	08	174.3
4	57 49.4	1.0	10	172.7	58 19.2	1.0	10	172.6	58 49.1	1.0	10	172.5	59 19.0	1.0	10	172.4
05	57 43.4	99	12	170.9	58 13.2	99	12	170.8	58 43.0	99	12	170.7	59 12.8	99	12	170.6
6	57 36.2	99	14	169.1	58 05.9	99	14	169.0	58 35.6	99	15	168.8	59 05.3	99	15	168.7
7	57 27.7	99	16	167.3	57 57.3	99	16	167.2	58 26.9	99	17	167.0	58 56.5	99	17	166.8
8	57 17.9	98	18	165.5	57 47.4	98	19	165.4	58 16.9	98	19	165.2	58 46.3	98	19	165.0
9	57 06.8	98	20	163.8	57 36.2	98	21	163.6	58 05.6	98	21	163.4	58 34.9	98	21	163.2
10	56 54.6	98	22	162.0	57 23.8	97	23	161.8	57 53.0	97	23	161.6	58 22.2	97	23	161.4
1	56 41.1	97	24	160.3	57 10.2	97	25	160.1	57 39.3	97	25	159.8	58 08.3	97	25	159.6
2	56 26.5	97	26	158.6	56 55.4	96	27	158.4	57 24.3	96	27	158.1	57 53.2	96	27	157.9
3	56 10.7	96	28	156.9	56 39.5	96	28	156.7	57 08.2	96	29	156.4	57 36.9	96	29	156.1
4	55 53.8	95	30	155.3	56 22.4	95	30	155.0	56 51.0	95	31	154.7	57 19.5	95	31	154.4
15	55 35.8	95	32	153.6	56 04.2	95	32	153.3	56 32.6	95	32	153.0	57 00.9	94	33	152.7
6	55 16.8	94	33	152.0	55 45.0	94	34	151.7	56 13.2	94	34	151.4	56 41.3	94	34	151.1
7	54 56.7	94	35	150.4	55 24.7	93	35	150.1	55 52.7	93	36	149.8	56 20.6	93	36	149.4
8	54 35.6	93	37	148.8	55 03.4	93	37	148.5	55 31.2	93	37	148.2	55 59.0	92	38	147.8
9	54 13.5	92	38	147.3	54 41.2	92	39	147.0	55 08.8	92	39	146.6	55 36.3	92	39	146.3
20	53 50.6	92	40	145.8	54 18.0	91	40	145.4	54 45.4	91	41	145.1	55 12.7	91	41	144.7
1	53 26.7	91	41	144.3	53 53.9	91	42	143.9	54 21.0	90	42	143.6	54 48.1	90	42	143.2
2	53 01.9	90	43	142.8	53 28.9	90	43	142.4	53 55.9	90	43	142.1	54 22.7	89	44	141.7
3	52 36.3	89	44	141.4	53 03.1	89	44	141.0	53 29.8	89	45	140.6	53 56.5	89	45	140.2
4	52 09.9	89	45	140.0	52 36.5	89	46	139.6	53 03.0	88	46	139.2	53 29.4	88	46	138.8
25	51 42.7	88	47	138.6	52 09.1	88	47	138.2	52 35.4	88	47	137.8	53 01.6	87	48	137.4
6	51 14.7	87	48	137.2	51 40.9	87	48	136.8	52 07.0	87	48	136.4	52 33.0	87	49	136.0
7	50 46.0	87	49	135.9	51 12.0	86	49	135.5	51 37.9	86	50	135.1	52 03.7	86	50	134.6
8	50 16.7	86	50	134.5	50 42.4	86	50	134.1	51 08.1	85	51	133.7	51 33.7	85	51	133.3
9	49 46.6	85	51	133.2	50 12.2	85	51	132.8	50 37.7	85	52	132.4	51 03.0	84	52	132.0
30	49 16.0	85	52	132.0	49 41.3	84	52	131.6	50 06.6	84	53	131.1	50 31.7	84	53	130.7
1	48 44.7	84	53	130.7	49 09.8	84	53	130.3	49 34.9	83	54	129.9	49 59.9	83	54	129.5
2	48 12.8	83	54	129.5	48 37.8	83	54	129.1	49 02.6	83	55	128.7	49 27.4	82	55	128.2
3	47 40.4	83	55	128.3	48 05.1	82	55	127.9	48 29.8	82	56	127.4	48 54.4	82	56	127.0
4	47 07.4	82	56	127.1	47 32.0	82	56	126.7	47 56.5	81	56	126.3	48 20.8	81	57	125.8
35	46 33.9	81	57	126.0	46 58.3	81	57	125.5	47 22.6	81	57	125.1	47 46.8	81	58	124.7
6	45 59.9	81	57	124.8	46 24.1	81	58	124.4	46 48.3	80	58	124.0	47 12.3	80	58	123.5
7	45 25.5	80	58	123.7	45 49.5	80	58	123.3	46 13.5	80	59	122.8	46 37.3	79	59	122.4
8	44 50.6	80	59	122.6	45 14.4	79	59	122.2	45 38.2	79	59	121.7	46 01.9	79	60	121.3
9	44 15.2	79	60	121.5	44 38.9	79	60	121.1	45 02.6	79	60	120.6	45 26.1	78	60	120.2
40	43 39.5	79	60	120.4	44 03.1	78	60	120.0	44 26.5	78	61	119.6	44 49.9	78	61	119.1
1	43 03.4	78	61	119.4	43 26.8	78	61	119.0	43 50.1	78	61	118.5	44 13.3	77	62	118.1
2	42 26.9	78	61	118.4	42 50.1	77	62	117.9	43 13.3	77	62	117.5	43 36.3	77	62	117.1
3	41 50.0	77	62	117.4	42 13.1	77	62	116.9	42 36.2	77	62	116.5	42 59.1	76	63	116.1
4	41 12.9	77	62	116.4	41 35.8	76	63	115.9	41 58.7	76	63	115.5	42 21.5	76	63	115.1
45	40 35.4	76	63	115.4	40 58.2	76	63	115.0	41 20.9	76	63	114.5	41 43.6	75	64	114.1
6	39 57.5	76	64	114.4	40 20.2	76	64	114.0	40 42.9	75	64	113.6	41 05.4	75	64	113.1
7	39 19.4	75	64	113.5	39 42.0	75	64	113.0	40 04.5	75	64	112.6	40 26.9	74	65	112.2
8	38 41.1	75	64	112.5	39 03.5	75	65	112.1	39 25.9	74	65	111.7	39 48.2	74	65	111.2
9	38 02.5	75	65	111.6	38 24.8	74	65	111.2	38 47.0	74	65	110.7	39 09.2	74	65	110.3
50	37 23.6	74	65	110.7	37 45.8	74	65	110.3	38 07.9	74	66	109.8	38 30.0	73	66	109.4
1	36 44.5	74	66	109.8	37 06.6	74	66	109.4	37 28.6	73	66	108.9	37 50.6	73	66	108.5
2	36 05.1	74	66	108.9	36 27.2	73	66	108.5	36 49.1	73	66	108.0	37 10.9	73	66	107.6
3	35 25.6	73	66	108.0	35 47.5	73	66	107.6	36 09.4	73	67	107.2	36 31.1	72	67	106.7
4	34 45.9	73	67	107.1	35 07.7	73	67	106.7	35 29.5	72	67	106.3	35 51.1	72	67	105.9
55	34 06.0	73	67	106.3	34 27.7	72	67	105.9	34 49.4	72	67	105.5	35 11.0	72	67	105.0
6	33 25.9	72	67	105.4	33 47.5	72	67	105.0	34 09.1	72	67	104.6	34 30.6	72	67	104.2
7	32 45.6	72	67	104.6	33 07.2	72	67	104.2	33 28.7	72	68	103.8	33 50.1	71	68	103.4
8	32 05.2	72	68	103.8	32 26.7	72	68	103.4	32 48.2	71	68	103.0	33 09.5	71	68	102.5
9	31 24.7	72	68	103.0	31 46.1	71	68	102.6	32 07.5	71	68	102.1	32 28.8	71	68	101.7
60	30 44.0	71	68	102.2	31 05.4	71	68	101.7	31 26.7	71	68	101.3	31 47.9	71	68	100.9
1	30 03.2	71	68	101.3	30 24.5	71	68	100.9	30 45.8	71	68	100.5	31 06.9	70	68	100.1
2	29 22.2	71	68	100.6	29 43.5	71	68	100.1	30 04.7	71	69	99.7	30 25.8	70	69	99.3
3	28 41.2	71	69	99.8	29 02.4	71	69	99.4	29 23.6	70	69	99.0	29 44.7	70	69	98.5
4	28 00.1	71	69	99.0	28 21.3	70	69	98.6	28 42.4	70	69	98.2	29 03.4	70	69	97.8
65	27 18.9	71	69	98.2	27 40.0	70	69	97.8	28 01.1	70	69	97.4	28 22.1	70	69	97.0
6	26 37.6	70	69	97.4	26 58.7	70	69	97.0	27 19.7	70	69	96.6	27 40.7	70	69	96.2
7	25 56.2	70	69	96.7	26 17.3	70	69	96.3	26 38.3	70	69	95.9	26 59.2	70	69	95.5
8	25 14.8	70	69	95.9	25 35.8	70	69	95.5	25 56.8	70	69	95.1	26 17.7	70	69	94.7
9	24 33.3	70	69	95.2	24 54.3	70	69	94.8	25 15.3	70	69	94.4	25 36.1	69	69	94.0
70	23 51.8	70	69	94.4	24 12.8	70	69	94.0	24 33.7	70	69	93.6	24 54.6	69	69	93.3
1	23 10.2	70	69	93.7	23 31.2	70	69	93.3	23 52.1	70	69	92.9	24 12.9	69	69	92.5
2	22 28.6	70	69	93.0	22 49.6	70	69	92.6	23 10.4	70	69	92.2	23 31.3	69	69	91.8
3	21 47.0	70	69	92.2	22 07.9	70	69	91.8	22 28.8	70	69	91.4	22 49.6	69	69	91.1
4	21 05.3	70	69	91.5	21 26.2	70	69	91.1	21 47.1	69	69	90.7	22 07.9	69	69	90.3
75	20 23.6	70	69	90.8	20 44.6	70	69	90.4	21 05.4	69	69	90.0	21 26.3	69	69	89.6
6	19 42.0	70	69	90.0	20 02.9	70	69	89.7	20 23.8	69	69	89.3	20 44.6	69	69	88.9
7	19 00.3	70	69	89.3	19 21.2	70	69	89.0	19 42.1	70	69	88.6	20 02.9	69	69	88.2
8	18 18.6	70	69	88.6	18 39.5	70	69	88.2	19 00.4	70	69	87.9	19 21.3	69	69	87.5
9	17 37.0	70	69	87.9	17 57.9	70	69	87.5	18 18.8	70	69	87.2	18 39.6	69	69	86.8
80	16 55.3	70	69	87.2	17 16.3	70	69	86.8	17 37.2	70	69	86.4	17 58.0	69	69	86.1
1	16 13.7	70	69	86.5	16 34.7	70	69	86.1	16 55.6	70	69	85.7	17 16.5	70	69	85.4
2	15 32.1	70	69	85.8	15 53.1	70	69	85.4	16 14.0	70	69	85.0	16 35.0	70	69	84.7
3	14 50.6	70	69	85.1	15 11.6	70	69	84.7	15 32.5	70	69	84.3	15 53.5	70	69	84.0
4	14 09.1	70	69	84.4	14 30.1	70	69	84.0	14 51.1	70	69	83.6	15 12.1	70	69	83.3
85	13 27.6	70	69	83.7	13 48.7	70	69	83.3	14 09.7	70	69	82.9	14 30.7	70	69	82.6
6	12 46.2	70	69	83.0	13 07.3	70	69	82.6	13 28.4	70	69	82.2	13 49.4	70	69	81.9
7	12 04.9	70	69	82.3	12 26.0	70	69	81.9	12 47.1	70	69	81.5	13 08.2	70	69	81.2
8	11 23.6	71	69	81.6	11 44.8	71	69	81.2	12 05.9	70	68	80.8	12 27.0	70	68	80.5
9	10 42.4	71	68	80.9	11 03.6	71	68	80.5	11 24.8	71	68	80.2	11 46.0	70	68	79.8
90	10 01.3	71	68	80.2	10 22.6	71	68	79.8	10 43.8	71	68	79.5	11 05.0	71	68	79.1

H.A.	12° 00′			12° 30′			13° 00′			13° 30′			14° 00′			14° 30′			15° 00′			15° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	°
00	32 00.0	1.0 01	180.0	31 30.0	1.0 01	180.0	31 00.0	1.0 01	180.0	30 30.0	1.0 01	180.0	30 00.0	1.0 01	180.0	29 30.0	1.0 01	180.0	29 00.0	1.0 01	180.0	28 30.0	1.0 01	180.0	00
1	31 59.6	1.0 02	178.8	31 29.6	1.0 02	178.9	30 59.6	1.0 02	178.9	30 29.6	1.0 02	178.9	29 59.6	1.0 02	178.9	29 29.6	1.0 02	178.9	28 59.6	1.0 02	178.9	28 29.6	1.0 02	178.9	1
2	31 58.3	1.0 03	177.7	31 28.3	1.0 03	177.7	30 58.3	1.0 03	177.7	30 28.4	1.0 03	177.7	29 58.4	1.0 03	177.8	29 28.4	1.0 03	177.8	28 58.4	1.0 03	177.8	28 28.4	1.0 03	177.8	2
3	31 56.2	1.0 05	176.5	31 26.3	1.0 05	176.6	30 56.3	1.0 05	176.6	30 26.3	1.0 05	176.6	29 56.3	1.0 05	176.6	29 26.4	1.0 05	176.7	28 56.4	1.0 05	176.7	28 26.4	1.0 05	176.7	3
4	31 53.3	1.0 06	175.4	31 23.3	1.0 06	175.4	30 53.4	1.0 06	175.5	30 23.4	1.0 06	175.5	29 53.5	1.0 06	175.5	29 23.5	1.0 06	175.6	28 53.6	1.0 06	175.6	28 23.6	1.0 06	175.6	4
05	31 49.5	1.0 08	174.2	31 19.6	1.0 08	174.3	30 49.7	1.0 08	174.3	30 19.8	1.0 08	174.4	29 49.8	1.0 07	174.4	29 19.9	1.0 07	174.4	28 50.0	1.0 07	174.5	28 20.0	1.0 07	174.5	05
6	31 44.9	1.0 09	173.1	31 15.8	1.0 09	173.1	30 45.1	1.0 09	173.2	30 15.3	1.0 09	173.2	29 45.4	1.0 09	173.3	29 15.5	1.0 09	173.3	28 45.6	1.0 09	173.4	28 15.7	1.0 09	173.4	6
7	31 39.5	1.0 10	171.9	31 09.7	1.0 10	172.0	30 39.8	1.0 10	172.1	30 09.9	1.0 10	172.1	29 40.1	1.0 10	172.2	29 10.2	1.0 10	172.2	28 40.4	1.0 10	172.3	28 10.5	1.0 10	172.3	7
8	31 33.3	99 12	170.8	31 03.5	99 12	170.9	30 33.6	99 12	170.9	30 03.8	99 12	171.0	29 34.0	99 11	171.1	29 04.2	99 11	171.2	28 34.4	99 11	171.2	28 04.6	99 11	171.3	8
9	31 26.2	99 13	169.7	30 56.4	99 13	169.7	30 26.7	99 13	169.8	29 56.9	99 13	169.9	29 27.1	99 13	170.0	28 57.4	99 13	170.0	28 27.6	99 13	170.1	27 57.8	99 12	170.2	9
10	31 18.3	99 14	168.5	30 48.6	99 14	168.6	30 18.9	99 14	168.7	29 49.2	99 14	168.8	29 19.5	99 14	168.9	28 49.8	99 14	168.9	28 20.1	99 14	169.0	27 50.3	99 14	169.1	10
1	31 09.6	99 16	167.4	30 40.0	99 16	167.5	30 10.3	99 16	167.6	29 40.7	99 16	167.7	29 11.0	99 15	167.8	28 41.4	99 15	167.8	28 11.7	99 15	167.9	27 42.1	99 15	168.0	1
2	31 00.1	99 17	166.3	30 30.6	99 17	166.4	30 01.0	99 17	166.5	29 31.4	99 17	166.6	29 01.8	99 17	166.7	28 32.2	99 17	166.8	28 02.6	99 16	166.8	27 33.0	99 16	166.9	2
3	30 49.8	98 18	165.2	30 20.3	98 18	165.3	29 50.8	98 18	165.4	29 21.3	98 18	165.5	28 51.8	98 18	165.6	28 22.3	98 18	165.7	27 52.8	98 18	165.8	27 23.2	98 18	165.9	3
4	30 38.8	98 20	164.0	30 09.3	98 20	164.1	29 39.9	98 19	164.3	29 10.5	98 19	164.4	28 41.0	98 19	164.5	28 11.6	98 19	164.6	27 42.1	98 19	164.7	27 12.7	98 19	164.8	4
15	30 26.9	98 21	162.9	29 57.6	98 21	163.0	29 28.2	98 21	163.2	28 58.9	98 21	163.3	28 29.5	98 20	163.4	28 00.1	98 20	163.5	27 30.8	98 20	163.6	27 01.4	98 20	163.7	15
6	30 14.3	98 22	161.8	29 45.0	98 22	161.9	29 15.8	98 22	162.1	28 46.5	98 22	162.2	28 17.2	98 22	162.3	27 47.9	98 22	162.4	27 18.6	98 21	162.6	26 49.3	98 21	162.7	6
7	30 00.9	97 24	160.7	29 31.7	97 23	160.8	29 02.6	97 23	161.0	28 33.4	97 23	161.1	28 04.2	97 23	161.2	27 35.0	97 23	161.4	27 05.8	97 23	161.5	26 36.6	97 22	161.6	7
8	29 46.8	97 25	159.6	29 17.7	97 25	159.8	28 48.6	97 24	159.9	28 19.5	97 24	160.0	27 50.4	97 24	160.2	27 21.3	97 24	160.3	26 52.2	97 24	160.5	26 23.1	97 24	160.6	8
9	29 31.9	97 26	158.5	29 02.9	97 26	158.7	28 33.9	97 26	158.8	28 04.9	97 26	159.0	27 35.9	97 25	159.1	27 06.9	97 25	159.3	26 37.9	97 25	159.4	26 08.9	97 25	159.5	9
20	29 16.3	96 27	157.4	28 47.4	96 27	157.6	28 18.5	96 27	157.8	27 49.6	96 27	157.9	27 20.7	96 27	158.1	26 51.8	96 26	158.2	26 22.9	96 26	158.4	25 54.0	96 26	158.5	20
1	28 59.9	96 28	156.4	28 31.2	96 28	156.5	28 02.4	96 28	156.7	27 33.6	96 28	156.9	27 04.8	96 28	157.0	26 36.0	96 28	157.2	26 07.2	96 27	157.3	25 38.3	96 27	157.5	1
2	28 42.9	95 30	155.3	28 14.2	96 29	155.5	27 45.5	96 29	155.6	27 16.9	96 29	155.8	26 48.2	96 29	156.0	26 19.5	96 29	156.1	25 50.7	96 28	156.3	25 22.0	96 28	156.5	2
3	28 25.1	95 31	154.2	27 56.6	95 31	154.4	27 28.0	95 30	154.6	26 59.4	95 30	154.8	26 30.8	95 30	154.9	26 02.3	95 30	155.1	25 33.7	95 30	155.3	25 05.0	95 29	155.4	3
4	28 06.6	95 32	153.2	27 38.2	95 32	153.4	27 09.8	95 32	153.5	26 41.3	95 31	153.7	26 12.8	95 31	153.9	25 44.4	95 31	154.1	25 15.9	95 31	154.3	24 47.4	95 31	154.4	4
25	27 47.5	94 33	152.1	27 19.2	94 33	152.3	26 50.9	94 33	152.5	26 22.5	94 32	152.7	25 54.2	95 32	152.9	25 25.8	95 32	153.1	24 57.4	95 32	153.2	24 29.0	95 32	153.4	25
6	27 27.7	94 34	151.1	26 59.5	94 34	151.3	26 31.3	94 34	151.5	26 03.1	94 34	151.7	25 34.9	94 33	151.9	25 06.6	94 33	152.1	24 38.3	94 33	152.2	24 10.1	94 33	152.4	6
7	27 07.2	94 35	150.1	26 39.2	94 35	150.3	26 11.1	94 35	150.5	25 43.0	94 35	150.7	25 14.9	94 34	150.9	24 46.8	94 34	151.0	24 18.6	94 34	151.2	23 50.5	94 34	151.4	7
8	26 46.1	93 36	149.0	26 18.2	93 36	149.3	25 50.2	93 36	149.5	25 22.2	93 36	149.7	24 54.3	93 35	149.9	24 26.3	93 35	150.1	23 58.2	93 35	150.2	23 30.2	93 35	150.4	8
9	26 24.3	93 37	148.0	25 56.5	93 37	148.2	25 28.7	93 37	148.4	25 00.9	93 37	148.7	24 33.0	93 36	148.9	24 05.1	93 36	149.1	23 37.2	93 36	149.3	23 09.3	93 36	149.5	9
30	26 02.0	92 38	147.0	25 34.3	92 38	147.2	25 06.6	92 38	147.5	24 38.9	92 38	147.7	24 11.2	92 37	147.9	23 43.4	93 37	148.1	23 15.6	93 37	148.3	22 47.9	93 37	148.5	30
1	25 39.0	92 39	146.0	25 11.4	92 39	146.2	24 43.9	92 39	146.5	24 16.3	92 39	146.7	23 48.7	92 38	146.9	23 21.1	92 38	147.1	22 53.4	92 38	147.3	22 25.8	92 38	147.5	1
2	25 15.4	91 40	145.0	24 48.0	91 40	145.3	24 20.5	91 40	145.5	23 53.1	92 40	145.7	23 25.6	92 39	145.9	22 58.1	92 39	146.1	22 30.6	92 39	146.4	22 03.1	92 39	146.6	2
3	24 51.2	91 41	144.0	24 23.9	91 41	144.3	23 56.6	91 41	144.5	23 29.3	91 41	144.7	23 02.0	91 40	145.0	22 34.6	91 40	145.2	22 07.2	91 40	145.4	21 39.9	91 40	145.6	3
4	24 26.5	90 42	143.1	23 59.3	91 42	143.3	23 32.1	91 42	143.5	23 05.0	91 42	143.8	22 37.8	91 41	144.0	22 10.5	91 41	144.2	21 43.3	91 41	144.4	21 16.0	91 41	144.7	4
35	24 01.1	90 43	142.1	23 34.1	90 43	142.3	23 07.1	90 43	142.6	22 40.0	90 42	142.8	22 13.0	90 42	143.0	21 45.9	90 42	143.3	21 18.8	90 42	143.5	20 51.7	90 42	143.7	35
6	23 35.3	90 44	141.1	23 08.4	90 44	141.4	22 41.5	90 44	141.6	22 14.6	90 43	141.9	21 47.6	90 43	142.1	21 20.7	90 43	142.3	20 53.7	90 43	142.6	20 26.7	90 42	142.8	6
7	23 08.8	89 45	140.2	22 42.1	89 45	140.4	22 15.4	89 44	140.7	21 48.6	89 44	140.9	21 21.8	89 44	141.2	20 55.0	89 44	141.4	20 28.1	89 44	141.6	20 01.3	90 43	141.9	7
8	22 41.9	89 46	139.2	22 15.3	89 46	139.5	21 48.7	89 45	139.7	21 22.0	89 45	140.0	20 55.4	89 45	140.2	20 28.7	89 45	140.5	20 02.0	89 44	140.7	19 35.3	89 44	141.0	8
9	22 14.4	88 47	138.3	21 48.0	88 46	138.6	21 21.5	88 46	138.8	20 55.0	88 46	139.1	20 28.5	88 46	139.3	20 01.9	89 45	139.6	19 35.4	89 45	139.8	19 08.8	89 45	140.1	9
40	21 46.5	88 47	137.4	21 20.1	88 47	137.6	20 53.8	88 47	137.9	20 27.4	88 47	138.2	20 01.1	88 46	138.4	19 34.6	88 46	138.7	19 08.2	88 46	138.9	18 41.8	88 46	139.2	40
1	21 18.0	87 48	136.5	20 51.8	87 48	136.7	20 25.6	87 48	137.0	19 59.4	87 48	137.2	19 33.1	88 47	137.5	19 06.9	88 47	137.8	18 40.6	88 47	138.0	18 14.3	88 47	138.3	1
2	20 49.0	87 49	135.6	20 23.0	87 49	135.8	19 56.9	87 49	136.1	19 30.9	87 48	136.3	19 04.7	87 48	136.6	18 38.6	87 48	136.9	18 12.5	87 48	137.1	17 46.3	87 47	137.4	2
3	20 19.6	86 50	134.7	19 53.7	86 50	134.9	19 27.8	86 49	135.2	19 01.9	87 49	135.5	18 35.9	87 49	135.7	18 09.9	87 49	136.0	17 43.9	87 48	136.2	17 17.8	87 48	136.5	3
4	19 49.8	86 51	133.8	19 24.0	86 50	134.0	18 58.2	86 50	134.3	18 32.4	86 50	134.6	18 06.5	86 50	134.8	17 40.7	86 49	135.1	17 14.8	86 49	135.4	16 48.9	86 49	135.6	4
45	19 19.4	85 51	132.9	18 53.8	85 51	133.1	18 28.1	86 51	133.4	18 02.5	86 51	133.7	17 36.8	86 50	134.0	17 11.0	86 50	134.2	16 45.3	86 50	134.5	16 19.5	86 50	134.8	45
6	18 48.7	85 52	132.0	18 23.2	85 52	132.3	17 57.6	85 52	132.5	17 32.1	85 51	132.8	17 06.5	85 51	133.1	16 41.0	85 51	133.4	16 15.4	85 51	133.6	15 49.7	85 50	133.9	6
7	18 17.5	84 53	131.1	17 52.1	85 52	131.4	17 26.7	85 52	131.7	17 01.3	85 52	132.0	16 35.9	85 52	132.2	16 10.4	85 52	132.5	15 45.0	85 51	132.8	15 19.5	85 51	133.1	7
8	17 45.9	84 53	130.2	17 20.6	84 53	130.5	16 55.4	84 53	130.8	16 30.1	84 53	131.1	16 04.8	84 52	131.4	15 39.5	84 52	131.7	15 14.2	84 52	131.9	14 48.8	85 52	132.2	8
9	17 13.8	84 54	129.4	16 48.7	84 54	129.7	16 23.6	84 54	130.0	15 58.5	84 53	130.2	15 33.3	84 53	130.5	15 08.2	84 53	130.8	14 43.0	84 53	131.1	14 17.7	84 52	131.4	9
50	16 41.4	83 55	128.5	16 16.5	83 54	128.8	15 51.5	83 54	129.1	15 26.5	83 54	129.4	15 01.5	83 54	129.7	14 36.4	84 54	130.0	14 11.4	84 53	130.3	13 46.3	84 53	130.5	50
1	16 08.6	83 55	127.7	15 43.8	83 55	128.0	15 19.0	83 55	128.3	14 54.1	83 55	128.6	14 29.2	83 54	128.8	14 04.3	83 54	129.1	13 39.3	83 54	129.4	13 14.4	83 54	129.7	1
2	15 35.5	82 56	126.8	15 10.8	82 56	127.1	14 46.0	82 55	127.4	14 21.3	83 55	127.7	13 56.5	83 55	128.0	13 31.8	83 55	128.3	13 07.0	83 55	128.6	12 42.1	83 54	128.9	2
3	15 01.9	82 56	126.0	14 37.4	82 56	126.3	14 12.8	82 56	126.6	13 48.2	82 56	126.9	13 23.5	82 56	127.2	12 58.9	82 55	127.5	12 34.2	82 55	127.8	12 09.5	82 55	128.1	3
4	14 28.0	81 57	125.2	14 03.6	82 57	125.5	13 39.1	82 57	125.8	13 14.7	82 56	126.1	12 50.1	82 56	126.4	12 25.6	82 56	126.7	12 01.1	82 56	127.0	11 36.5	82 56	127.3	4
55	13 53.8	81 58	124.4	13 29.5	81 57	124.7	13 05.2	81 57	125.0	12 40.8	81 57	125.3	12 16.4	81 57	125.6	11 52.0	81 57	125.9	11 27.6	81 56	126.2	11 03.2	81 56	126.5	55
6	13 19.2	81 58	123.6	12 55.0	81 58	123.9	12 30.8	81 58	124.2	12 06.6	81 58	124.5	11 42.3	81 57	124.8	11 18.1	81 57	125.1	10 53.8	81 57	125.4	10 29.5	81 57	125.7	6
7	12 44.3	80 59	122.7	12 20.3	80 58	123.1	11 56.2	80 58	123.4	11 32.1	80 58	123.7	11 07.9	80 58	124.0	10 43.8	81 58	124.3	10 19.6	81 57	124.6	9 55.4	81 57	124.9	7
8	12 09.1	80 59	121.9	11 45.2	80 59	122.3	11 21.2	80 59	122.6	10 57.2	80 59	122.9	10 33.2	80 58	123.2	10 09.2	80 58	123.5	9 45.1	80 58	123.8	9 21.1	80 58	124.1	8
9	11 33.6	79 60	121.2	11 09.8	79 60	121.5	10 45.9	80 59	121.8	10 22.1	80 59	122.1	9 58.2	80 59	122.4	9 34.3	80 59	122.7	9 10.3	80 59	123.0	8 46.4	80 58	123.3	9
60	10 57.8	79 60	120.4	10 34.1	79 60	120.7	10 10.3	79 60	121.0	9 46.6	79 60	121.3	9 22.8	79 59	121.6	8 59.0	79 59	121.9	8 35.2	79 59	122.2	8 11.4	79 59	122.5	60
1	10 21.7	79 61	119.6	9 58.1	79 60	119.9	9 34.5	79 60	120.2	9 10.8	79 60	120.5	8 47.2	79 60	120.8	8 23.5	79 60	121.1	7 59.8	79 60	121.4	7 36.1	79 59	121.8	1
2	9 45.3	78 61	118.8	9 21.8	78 61	119.1	8 58.3	78 61	119.4	8 34.8	78 61	119.7	8 11.2	78 60	120.1	7 47.7	79 60	120.4	7 24.1	79 60	120.7	7 00.5	79 60	121.0	2
3	9 08.6	78 62	118.0	8 45.3	78 61	118.3	8 21.9	78 61	118.7	7 58.5	78 61	119.0	7 35.0	78 61	119.3	7 11.6	78 61	119.6	6 48.1	78 60	119.9	6 24.7	78 60	120.2	3
4	8 31.7	78 62	117.3	8 08.4	78 62	117.6	7 45.2	78 62	117.9	7 21.9	78 61	118.2	6 58.5	78 61	118.5	6 35.2	78 61	118.8	6 11.9	78 61	119.2	5 48.5	78 61	119.5	4
65	7 54.5	77 62	116.5	7 31.4	77 62	116.8	7 08.2	77 62	117.1	6 45.0	77 62	117.4	6 21.8	77 62	117.8	5 58.6	77 62	118.1	5 35.3	77 61	118.4	5 12.1	77 61	118.7	65
6	7 17.1	77 63	115.7	6 54.1	77 63	116.1	6 31.0	77 62	116.4	6 07.9	77 62	116.7	5 44.8	77 62	117.0	5 21.7	77 62	117.3							6
7	6 39.5	77 63	115.0	6 16.5	77 63	115.3	5 53.5	77 63	115.6	5 30.5	77 62	115.9	5 07.5	77 63	116.3										7
8	6 01.6	76 64	114.2	5 38.7	76 63	114.5	5 15.8	76 63	114.9																8
9	5 23.4	76 64	113.5	5 00.7	76 64	113.8																			9

DECLINATION SAME NAME AS LATITUDE

H.A.	12° 00′			12° 30′			13° 00′			13° 30′			14° 00′			14° 30′			15° 00′			15° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	°
91	7 54.9	71 68	80.9	8 16.3	71 68	80.5	8 37.6	71 68	80.2	8 59.0	71 68	79.8	9 20.3	71 68	79.5	9 41.6	71 68	79.1	10 02.9	71 68	78.8	10 24.1	71 68	78.4	91
2	7 13.8	71 68	80.2	7 35.2	71 68	79.8	7 56.6	71 68	79.5	8 18.0	71 68	79.1	8 39.4	71 68	78.8	9 00.7	71 68	78.4	9 22.0	71 68	78.1	9 43.3	71 68	77.7	2
3	6 32.8	72 68	79.5	6 54.2	72 68	79.1	7 15.7	71 68	78.8	7 37.1	71 68	78.4	7 58.5	71 68	78.1	8 19.9	71 68	77.7	8 41.3	71 68	77.4	9 02.7	71 68	77.0	3
4	5 51.8	72 68	78.8	6 13.3	72 68	78.4	6 34.8	72 68	78.1	6 56.3	72 68	77.7	7 17.8	72 68	77.4	7 39.3	71 68	77.0	8 00.7	71 68	76.7	8 22.1	71 67	76.3	4
95	5 11.0	72 68	78.1	5 32.6	72 68	77.7	5 54.1	72 68	77.4	6 15.7	72 68	77.0	6 37.2	72 68	76.7	6 58.7	72 67	76.3	7 20.2	72 67	76.0	7 41.7	72 67	75.6	95
6							5 13.5	72 68	76.7	5 35.1	72 67	76.3	5 56.7	72 67	76.0	6 18.3	72 67	75.6	6 39.8	72 67	75.3	7 01.4	72 67	74.9	6
7													5 16.3	72 67	75.3	5 37.9	72 67	74.9	5 59.6	72 67	74.6	6 21.2	72 67	74.2	7
8																			5 19.5	72 67	73.9	5 41.1	72 66	73.5	8
9																						5 01.3	72 66	72.8	9

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Lat. 46°

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	60 00.0	1.0 01	180.0	60 30.0	1.0 01	180.0	61 00.0	1.0 01	180.0	61 30.0	1.0 01	180.0	62 00.0	1.0 01	180.0	62 30.0	1.0 01	180.0	63 00.0	1.0 01	180.0	63 30.0	1.0 01	180.0	00
1	59 59.3	1.0 04	178.1	60 29.3	1.0 04	178.1	60 59.3	1.0 04	178.0	61 29.3	1.0 04	178.0	61 59.3	1.0 04	178.0	62 29.3	1.0 04	177.9	62 59.2	1.0 04	177.9	63 29.2	1.0 04	177.9	1
2	59 57.2	1.0 06	176.2	60 27.2	1.0 06	176.1	60 57.1	1.0 06	176.1	61 27.1	1.0 06	176.0	61 57.1	1.0 06	176.0	62 27.0	1.0 06	175.9	62 57.0	1.0 06	175.8	63 26.9	1.0 06	175.8	2
3	59 53.7	1.0 08	174.2	60 23.6	1.0 08	174.2	60 53.6	1.0 08	174.1	61 23.5	1.0 08	174.0	61 53.4	1.0 09	173.9	62 23.3	1.0 09	173.9	62 53.2	1.0 09	173.8	63 23.1	1.0 09	173.7	3
4	59 48.8	1.0 10	172.3	60 18.7	1.0 11	172.2	60 48.6	1.0 11	172.1	61 18.4	99 11	172.0	61 48.3	99 11	171.9	62 18.1	99 11	171.8	62 47.9	99 11	171.7	63 17.8	99 11	171.6	4
05	59 42.6	99 13	170.4	60 12.4	99 13	170.3	60 42.2	99 13	170.2	61 11.9	99 13	170.1	61 41.7	99 13	169.9	62 11.4	99 14	169.8	62 41.2	99 14	169.7	63 10.9	99 14	169.5	05
6	59 35.0	99 15	168.6	60 04.7	99 15	168.4	60 34.4	99 15	168.3	61 04.0	99 15	168.1	61 33.7	99 16	168.0	62 03.3	99 16	167.8	62 33.0	99 16	167.6	63 02.6	99 16	167.4	6
7	59 26.1	99 17	166.7	59 55.6	99 17	166.5	60 25.2	99 18	166.3	60 54.8	98 18	166.2	61 24.3	98 18	166.0	61 53.8	98 18	165.8	62 23.3	98 18	165.6	62 52.8	98 19	165.4	7
8	59 15.8	98 19	164.8	59 45.3	98 20	164.6	60 14.7	98 20	164.4	60 44.1	98 20	164.2	61 13.5	98 20	164.0	61 42.9	98 20	163.8	62 12.2	98 21	163.6	62 41.6	98 21	163.4	8
9	59 04.3	98 21	163.0	59 33.6	98 22	162.8	60 02.9	98 22	162.6	60 32.1	98 22	162.3	61 01.4	97 22	162.1	61 30.6	97 23	161.9	61 59.8	97 23	161.6	62 29.0	97 23	161.4	9
10	58 51.4	97 23	161.2	59 20.6	97 24	160.9	59 49.7	97 24	160.7	60 18.8	97 24	160.5	60 47.9	97 25	160.2	61 17.0	97 25	160.0	61 46.0	97 25	159.7	62 15.0	97 26	159.4	10
1	58 37.4	97 25	159.4	59 06.4	97 26	159.1	59 35.3	97 26	158.9	60 04.3	96 26	158.6	60 33.2	96 27	158.3	61 02.0	96 27	158.1	61 30.9	96 27	157.8	61 59.7	96 28	157.5	1
2	58 22.1	96 27	157.6	58 50.9	96 28	157.3	59 19.7	96 28	157.1	59 48.4	96 28	156.8	60 17.2	96 29	156.5	60 45.8	96 29	156.2	61 14.5	95 29	155.9	61 43.1	95 30	155.6	2
3	58 05.6	96 29	155.8	58 34.2	95 30	155.6	59 02.8	95 30	155.3	59 31.4	95 30	155.0	59 59.9	95 31	154.7	60 28.4	95 31	154.4	60 56.8	95 31	154.0	61 25.2	95 32	153.7	3
4	57 48.0	95 31	154.1	58 16.4	95 32	153.8	58 44.8	95 32	153.5	59 13.2	94 32	153.2	59 41.5	94 33	152.9	60 09.8	94 33	152.5	60 38.0	94 33	152.2	61 06.1	94 34	151.8	4
15	57 29.2	94 33	152.4	57 57.5	94 33	152.1	58 25.7	94 34	151.8	58 53.8	94 34	151.5	59 21.9	94 34	151.1	59 50.0	93 35	150.8	60 18.0	93 35	150.4	60 45.9	93 36	150.0	15
6	57 09.4	94 35	150.8	57 37.4	93 35	150.4	58 05.4	93 36	150.1	58 33.4	93 36	149.7	59 01.3	93 36	149.4	59 29.1	93 37	149.0	59 56.8	92 37	148.6	60 24.5	92 37	148.3	6
7	56 48.5	93 36	149.1	57 16.4	93 37	148.8	57 44.1	92 37	148.4	58 11.8	92 38	148.1	58 39.5	92 38	147.7	59 07.1	92 38	147.3	59 34.6	92 39	146.9	60 02.0	91 39	146.5	7
8	56 26.6	92 38	147.5	56 54.2	92 38	147.1	57 21.8	92 39	146.8	57 49.3	92 39	146.4	58 16.7	91 40	146.0	58 44.1	91 40	145.6	59 11.3	91 40	145.2	59 38.5	91 41	144.8	8
9	56 03.7	91 40	145.9	56 31.1	91 40	145.5	56 58.5	91 40	145.2	57 25.7	91 41	144.8	57 52.9	90 41	144.4	58 20.0	90 42	144.0	58 47.1	90 42	143.6	59 14.0	90 42	143.1	9
20	55 39.9	91 41	144.3	56 07.1	90 42	144.0	56 34.2	90 42	143.6	57 01.2	90 42	143.2	57 28.2	90 43	142.8	57 55.0	89 43	142.4	58 21.8	89 44	141.9	58 48.5	89 44	141.5	20
1	55 15.2	90 43	142.8	55 42.1	90 43	142.4	56 09.0	89 43	142.0	56 35.8	89 44	141.6	57 02.5	89 44	141.2	57 29.1	89 45	140.8	57 55.7	88 45	140.3	58 22.1	88 45	139.9	1
2	54 49.5	89 44	141.3	55 16.3	89 44	140.9	55 42.9	89 45	140.5	56 09.5	88 45	140.1	56 36.0	88 46	139.7	57 02.3	88 46	139.2	57 28.6	88 46	138.8	57 54.8	87 47	138.3	2
3	54 23.1	88 45	139.8	54 49.6	88 46	139.4	55 16.0	88 46	139.0	55 42.3	88 47	138.6	56 08.6	87 47	138.2	56 34.7	87 47	137.7	57 00.8	87 48	137.3	57 26.7	86 48	136.8	3
4	53 55.8	88 47	138.4	54 22.1	87 47	138.0	54 48.3	87 48	137.6	55 14.4	87 48	137.1	55 40.4	87 48	136.7	56 06.3	86 49	136.2	56 32.1	86 49	135.8	56 57.8	86 49	135.3	4
25	53 27.7	87 48	137.0	53 53.8	87 48	136.6	54 19.7	86 49	136.1	54 45.6	86 49	135.7	55 11.4	86 50	135.2	55 37.1	85 50	134.8	56 02.6	85 50	134.3	56 28.1	85 51	133.8	25
6	52 58.9	86 49	135.6	53 24.7	86 50	135.2	53 50.5	86 50	134.7	54 16.1	85 50	134.3	54 41.7	85 51	133.8	55 07.1	85 51	133.4	55 32.5	84 51	132.9	55 57.7	84 52	132.4	6
7	52 29.4	86 50	134.2	52 55.0	85 51	133.8	53 20.5	85 51	133.3	53 46.0	85 51	132.9	54 11.3	84 52	132.4	54 36.5	84 52	132.0	55 01.6	84 53	131.5	55 26.6	83 53	131.0	7
8	51 59.2	85 51	132.9	52 24.6	85 52	132.4	52 49.9	84 52	132.0	53 15.1	84 52	131.6	53 40.2	83 53	131.1	54 05.2	83 53	130.6	54 30.1	83 54	130.1	54 54.8	82 54	129.7	8
9	51 28.3	84 52	131.6	51 53.5	84 53	131.1	52 18.6	83 53	130.7	52 43.6	83 54	130.2	53 08.5	83 54	129.8	53 33.2	82 54	129.3	53 57.9	82 55	128.8	54 22.4	82 55	128.3	9
30	50 56.8	83 53	130.3	51 21.8	83 54	129.8	51 46.7	83 54	129.4	52 11.5	82 54	128.9	52 36.1	82 55	128.5	53 00.7	82 55	128.0	53 25.1	81 56	127.5	53 49.4	81 56	127.0	30
1	50 24.7	83 54	129.0	50 49.5	82 55	128.6	51 14.2	82 55	128.1	51 38.7	82 55	127.7	52 03.2	81 56	127.2	52 27.5	81 56	126.7	52 51.8	81 56	126.2	53 15.9	80 57	125.7	1
2	49 52.1	82 55	127.8	50 16.6	82 56	127.3	50 41.1	81 56	126.9	51 05.5	81 56	126.4	51 29.7	81 57	126.0	51 53.9	80 57	125.5	52 17.9	80 57	125.0	52 41.8	79 58	124.5	2
3	49 18.9	81 56	126.6	49 43.2	81 57	126.1	50 07.5	81 57	125.7	50 31.7	80 57	125.2	50 55.7	80 58	124.7	51 19.7	80 58	124.3	51 43.5	79 58	123.8	52 07.2	79 58	123.3	3
4	48 45.1	81 57	125.4	49 09.3	80 57	124.9	49 33.4	80 58	124.5	49 57.4	80 58	124.0	50 21.2	79 58	123.5	50 45.0	79 59	123.1	51 08.6	79 59	122.6	51 32.1	78 59	122.1	4
35	48 10.9	80 58	124.2	48 34.9	80 58	123.8	48 58.8	79 58	123.3	49 22.6	79 59	122.8	49 46.3	79 59	122.4	50 09.8	78 59	121.9	50 33.2	78 60	121.4	50 56.5	77 60	120.9	35
6	47 36.2	80 59	123.1	48 00.0	79 59	122.6	48 23.7	79 59	122.2	48 47.3	78 59	121.7	49 10.8	78 60	121.2	49 34.2	78 60	120.7	49 57.4	77 60	120.2	50 20.6	77 61	119.8	6
7	47 01.1	79 59	121.9	47 24.7	79 60	121.5	47 48.2	78 60	121.0	48 11.7	78 60	120.6	48 35.0	77 60	120.1	48 58.2	77 61	119.6	49 21.2	77 61	119.1	49 44.2	76 61	118.6	7
8	46 25.5	78 60	120.8	46 49.0	78 60	120.4	47 12.3	78 61	119.9	47 35.6	77 61	119.5	47 58.7	77 61	119.0	48 21.7	77 61	118.5	48 44.6	76 62	118.0	49 07.4	76 62	117.5	8
9	45 49.5	78 61	119.8	46 12.8	78 61	119.3	46 36.0	77 61	118.8	46 59.1	77 61	118.4	47 22.1	76 62	117.9	47 44.9	76 62	117.4	48 07.7	76 62	116.9	48 30.3	76 62	116.4	9
40	45 13.1	77 61	118.7	45 36.3	77 62	118.2	45 59.3	77 62	117.8	46 22.2	76 62	117.3	46 45.1	76 62	116.8	47 07.8	75 62	116.4	47 30.3	75 63	115.9	47 52.8	75 63	115.4	40
1	44 36.4	77 62	117.6	44 59.4	76 62	117.2	45 22.3	76 62	116.7	45 45.0	76 63	116.3	46 07.7	75 63	115.8	46 30.2	75 63	115.3	46 52.7	75 63	114.8	47 15.0	74 64	114.3	1
2	43 59.3	76 62	116.6	44 22.1	76 63	116.2	44 44.9	76 63	115.7	45 07.5	75 63	115.2	45 30.0	75 63	114.8	45 52.4	74 64	114.3	46 14.7	74 64	113.8	46 36.8	74 64	113.3	2
3	43 21.9	76 63	115.6	43 44.6	75 63	115.2	44 07.2	75 63	114.7	44 29.7	75 64	114.2	44 52.0	74 64	113.8	45 14.3	74 64	113.3	45 36.4	74 64	112.8	45 58.4	73 64	112.3	3
4	42 44.1	75 63	114.6	43 06.7	75 64	114.2	43 29.2	75 64	113.7	43 51.5	74 64	113.2	44 13.7	74 64	112.8	44 35.9	74 64	112.3	44 57.9	73 65	111.8	45 19.7	73 65	111.3	4
45	42 06.1	75 64	113.6	42 28.5	75 64	113.2	42 50.8	74 64	112.7	43 13.1	74 64	112.3	43 35.2	73 65	111.8	43 57.2	73 65	111.3	44 19.0	73 65	110.9	44 40.8	72 65	110.4	45
6	41 27.8	75 64	112.7	41 50.1	74 64	112.2	42 12.3	74 65	111.8	42 34.4	73 65	111.3	42 56.3	73 65	110.9	43 18.2	73 65	110.4	43 40.0	72 66	109.9	44 01.6	72 66	109.4	6
7	40 49.2	74 65	111.7	41 11.4	74 65	111.3	41 33.4	73 65	110.8	41 55.4	73 65	110.4	42 17.3	73 66	109.9	42 39.0	72 66	109.4	43 00.7	72 66	109.0	43 22.2	72 66	108.5	7
8	40 10.3	74 65	110.8	40 32.4	73 65	110.3	40 54.4	73 66	109.9	41 16.2	73 66	109.4	41 38.0	72 66	109.0	41 59.6	72 66	108.5	42 21.1	72 66	108.0	42 42.5	71 66	107.6	8
9	39 31.3	73 66	109.9	39 53.2	73 66	109.4	40 15.1	73 66	109.0	40 36.8	72 66	108.5	40 58.5	72 66	108.1	41 20.0	72 66	107.6	41 41.4	71 67	107.1	42 02.7	71 67	106.7	9
50	38 51.9	73 66	109.0	39 13.8	73 66	108.5	39 35.5	72 66	108.1	39 57.2	72 66	107.6	40 18.7	72 67	107.2	40 40.2	71 67	106.7	41 01.5	71 67	106.2	41 22.7	71 67	105.8	50
1	38 12.4	73 66	108.1	38 34.2	72 66	107.6	38 55.8	72 66	107.2	39 17.4	72 67	106.7	39 38.8	71 67	106.3	40 00.2	71 67	105.8	40 21.4	71 67	105.4	40 42.5	70 67	104.9	1
2	37 32.7	72 67	107.2	37 54.4	72 67	106.7	38 15.9	72 67	106.3	38 37.4	71 67	105.9	38 58.7	71 67	105.4	39 20.0	71 67	105.0	39 41.1	70 67	104.5	40 02.1	70 68	104.0	2
3	36 52.8	72 67	106.3	37 14.4	72 67	105.9	37 35.8	71 67	105.4	37 57.2	71 67	105.0	38 18.5	71 67	104.5	38 39.6	70 68	104.1	39 00.7	70 68	103.6	39 21.6	70 68	103.2	3
4	36 12.7	72 67	105.5	36 34.2	71 67	105.0	36 55.6	71 67	104.6	37 16.8	71 68	104.1	37 38.0	70 68	103.7	37 59.1	70 68	103.2	38 20.1	70 68	102.8	38 41.0	69 68	102.3	4
55	35 32.4	71 67	104.6	35 53.8	71 67	104.2	36 15.1	71 68	103.7	36 36.4	71 68	103.3	36 57.5	70 68	102.9	37 18.5	70 68	102.4	37 39.4	70 68	102.0	38 00.2	69 68	101.5	55
6	34 52.0	71 68	103.8	35 13.4	71 68	103.3	35 34.6	71 68	102.9	35 55.7	70 68	102.5	36 16.8	70 68	102.0	36 37.7	70 68	101.6	36 58.6	69 68	101.1	37 19.3	69 68	100.7	6
7	34 11.5	71 68	102.9	34 32.7	71 68	102.5	34 53.9	70 68	102.1	35 15.0	70 68	101.6	35 35.9	70 68	101.2	35 56.8	69 68	100.8	36 17.6	69 68	100.3	36 38.3	69 69	99.9	7
8	33 30.8	71 68	102.1	33 52.0	70 68	101.7	34 13.1	70 68	101.3	34 34.1	70 68	100.8	34 55.0	70 68	100.4	35 15.8	69 68	99.9	35 36.5	69 69	99.5	35 57.2	69 69	99.1	8
9	32 50.0	71 68	101.3	33 11.1	70 68	100.9	33 32.1	70 68	100.5	33 53.1	70 68	100.0	34 14.0	69 69	99.6	34 34.7	69 69	99.1	34 55.4	69 69	98.7	35 16.0	68 69	98.3	9
60	32 09.1	70 68	100.5	32 30.1	70 68	100.1	32 51.1	70 69	99.7	33 12.0	70 69	99.2	33 32.8	69 69	98.8	33 53.5	69 69	98.4	34 14.1	69 69	97.9	34 34.7	68 69	97.5	60
1	31 28.0	70 69	99.7	31 49.0	70 69	99.3	32 10.0	70 69	98.9	32 30.8	69 69	98.4	32 51.6	69 69	98.0	33 12.2	69 69	97.6	33 32.8	68 69	97.1	33 53.3	68 69	96.7	1
2	30 46.9	70 69	98.9	31 07.9	70 69	98.5	31 28.7	69 69	98.1	31 49.5	69 69	97.7	32 10.3	69 69	97.2	32 30.9	69 69	96.8	32 51.4	68 69	96.4	33 11.9	68 69	95.9	2
3	30 05.7	70 69	98.1	30 26.6	70 69	97.7	30 47.4	69 69	97.3	31 08.2	69 69	96.9	31 28.9	69 69	96.5	31 49.5	69 69	96.0	32 10.0	68 69	95.6	32 30.4	68 69	95.2	3
4	29 24.4	70 69	97.4	29 45.3	69 69	97.0	30 06.1	69 69	96.5	30 26.8	69 69	96.1	30 47.4	69 69	95.7	31 08.0	68 69	95.3	31 28.5	68 69	94.8	31 48.9	68 69	94.4	4
65	28 43.0	70 69	96.6	29 03.9	69 69	96.2	29 24.6	69 69	95.8	29 45.3	69 69	95.4	30 05.9	69 69	94.9	30 26.5	68 69	94.5	30 46.9	68 69	94.1	31 07.3	68 69	93.7	65
6	28 01.6	70 69	95.8	28 22.4	69 69	95.4	28 43.1	69 69	95.0	29 03.8	69 69	94.6	29 24.4	69 69	94.2	29 44.9	68 69	93.8	30 05.3	68 69	93.3	30 25.7	68 69	92.9	6
7	27 20.1	69 69	95.1	27 40.9	69 69	94.7	28 01.6	69 69	94.3	28 22.2	69 69	93.9	28 42.8	68 69	93.4	29 03.3	68 69	93.0	29 23.7	68 69	92.6	29 44.0	68 69	92.2	7
8	26 38.5	69 69	94.3	26 59.3	69 69	93.9	27 20.0	69 69	93.5	27 40.6	69 69	93.1	28 01.2	68 69	92.7	28 21.7	68 69	92.3	28 42.1	68 69	91.9	29 02.4	68 69	91.4	8
9	25 57.0	69 69	93.6	26 17.7	69 69	93.2	26 38.4	69 69	92.8	26 59.0	69 69	92.4	27 19.5	68 69	92.0	27 40.0	68 69	91.6	28 00.4	68 69	91.1	28 20.7	68 69	90.7	9
70	25 15.3	69 69	92.9	25 36.1	69 69	92.5	25 56.7	69 69	92.0	26 17.3	69 69	91.6	26 37.9	68 69	91.2	26 58.3	68 69	90.8	27 18.7	68 69	90.4	27 39.0	68 69	90.0	70
1	24 33.7	69 69	92.1	24 54.4	69 69	91.7	25 15.1	69 69	91.3	25 35.7	69 69	90.9	25 56.2	68 69	90.5	26 16.7	68 69	90.1	26 37.0	68 69	89.7	26 57.4	68 69	89.3	1
2	23 52.0	69 69	91.4	24 12.8	69 69	91.0	24 33.4	69 69	90.6	24 54.0	69 69	90.2	25 14.5	68 69	89.8	25 35.0	68 69	89.4	25 55.4	68 69	89.0	26 15.7	68 69	88.6	2
3	23 10.4	69 69	90.7	23 31.1	69 69	90.3	23 51.7	69 69	89.9	24 12.3	69 69	89.5	24 32.8	68 69	89.1	24 53.3	68 69	88.7	25 13.7	68 69	88.3	25 34.0	68 69	87.9	3
4	22 28.7	69 69	89.9	22 49.4	69 69	89.6	23 10.1	69 69	89.2	23 30.6	69 69	88.8	23 51.2	68 69	88.4	24 11.6	68 69	88.0	24 32.1	68 69	87.6	24 52.4	68 69	87.2	4
75	21 47.0	69 69	89.2	22 07.7	69 69	88.8	22 28.4	69 69	88.4	22 49.0	69 69	88.1	23 09.5	68 69	87.7	23 30.0	68 69	87.3	23 50.4	68 69	86.9	24 10.8	68 69	86.5	75
6	21 05.3	69 69	88.5	21 26.1	69 69	88.1	21 46.7	69 69	87.7	22 07.3	69 69	87.3	22 27.9	68 69	87.0	22 48.4	68 69	86.6	23 08.8	68 69	86.2	23 29.2	68 69	85.8	6
7	20 23.7	69 69	87.8	20 44.4	69 69	87.4	21 05.1	69 69	87.0	21 25.7	69 69	86.6	21 46.3	68 69	86.2	22 06.8	68 69	85.9	22 27.3	68 69	85.5	22 47.7	68 69	85.1	7
8	19 42.1	69 69	87.1	20 02.8	69 69	86.7	20 23.5	69 69	86.3	20 44.1	69 69	85.9	21 04.7	69 69	85.5	21 25.2	68 69	85.2	21 45.7	68 69	84.8	22 06.1	68 69	84.4	8
9	19 00.4	69 69	86.4	19 21.2	69 69	86.0	19 41.9	69 69	85.6	20 02.6	69 69	85.2	20 23.2	69 69	84.9	20 43.7	68 69	84.5	21 04.2	68 69	84.1	21 24.7	68 69	83.7	9
80	18 18.9	69 69	85.7	18 39.6	69 69	85.3	19 00.4	69 69	84.9	19 21.1	69 69	84.5	19 41.7	69 69	84.2	20 02.3	69 69	83.8	20 22.8	68 69	83.4	20 43.3	68 69	83.0	80
1	17 37.3	69 69	85.0	17 58.1	69 69	84.6	18 18.9	69 69	84.2	18 39.6	69 69	83.8	19 00.3	69 69	83.5	19 20.9	69 69	83.1	19 41.4	68 69	82.7	20 02.0	68 69	82.3	1
2	16 55.8	69 69	84.3	17 16.7	69 69	83.9	17 37.4	69 69	83.5	17 58.2	69 69	83.2	18 18.9	69 69	82.8	18 39.5	69 69	82.4	19 00.1	69 69	82.0	19 20.7	68 69	81.6	2
3	16 14.4	70 69	83.6	16 35.2	69 69	83.2	16 56.1	69 69	82.8	17 16.8	69 69	82.5	17 37.6	69 69	82.1	17 58.2	69 69	81.7	18 18.9	69 69	81.3	18 39.5	69 69	80.9	3
4	15 33.0	70 69	82.9	15 53.9	70 69	82.5	16 14.7	69 69	82.1	16 35.5	69 69	81.8	16 56.3	69 69	81.4	17 17.0	69 69	81.0	17 37.7	69 68	80.6	17 58.4	69 68	80.3	4
85	14 51.7	70 69	82.2	15 12.6	70 69	81.8	15 33.5	70 69	81.5	15 54.3	69 69	81.1	16 15.1	69 68	80.7	16 35.9	69 68	80.3	16 56.6	69 68	80.0	17 17.3	69 68	79.6	85
6	14 10.4	70 69	81.5	14 31.4	70 69	81.1	14 52.3	70 68	80.8	15 13.2	70 68	80.4	15 34.1	69 68	80.0	15 54.9	69 68	79.6	16 15.7	69 68	79.3	16 36.4	69 68	78.9	6
7	13 29.2	70 68	80.8	13 50.2	70 68	80.4	14 11.2	70 68	80.1	14 32.1	70 68	79.7	14 53.0	70 68	79.3	15 13.9	70 68	79.0	15 34.7	69 68	78.6	15 55.5	69 68	78.2	7
8	12 48.1	70 68	80.1	13 09.2	70 68	79.8	13 30.2	70 68	79.4	13 51.2	70 68	79.0	14 12.1	70 68	78.6	14 33.1	70 68	78.3	14 53.9	70 68	77.9	15 14.8	69 68	77.5	8
9	12 07.1	70 68	79.4	12 28.2	70 68	79.1	12 49.3	70 68	78.7	13 10.3	70 68	78.3	13 31.3	70 68	78.0	13 52.3	70 68	77.6	14 13.2	70 68	77.2	14 34.2	70 68	76.9	9
90	11 26.2	71 68	78.7	11 47.3	70 68	78.4	12 08.4	70 68	78.0	12 29.5	70 68	77.6	12 50.6	70 68	77.3	13 11.6	70 68	76.9	13 32.6	70 67	76.5	13 53.6	70 67	76.2	90

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H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	28 00.0	1.0 01	180.0	27 30.0	1.0 01	180.0	27 00.0	1.0 01	180.0	26 30.0	1.0 01	180.0	26 00.0	1.0 01	180.0	25 30.0	1.0 01	180.0	25 00.0	1.0 01	180.0	24 30.0	1.0 01	180.0	00
1	27 59.6	1.0 02	178.9	27 29.6	1.0 02	178.9	26 59.6	1.0 02	178.9	26 29.6	1.0 02	178.9	25 59.6	1.0 02	178.9	25 29.6	1.0 02	178.9	24 59.6	1.0 02	179.0	24 29.6	1.0 02	179.0	1
2	27 58.4	1.0 03	177.8	27 28.4	1.0 03	177.8	26 58.4	1.0 03	177.9	26 28.4	1.0 03	177.9	25 58.5	1.0 03	177.9	25 28.5	1.0 03	177.9	24 58.5	1.0 03	177.9	24 28.5	1.0 03	177.9	2
3	27 56.4	1.0 05	176.7	27 26.5	1.0 05	176.8	26 56.5	1.0 05	176.8	26 26.5	1.0 05	176.8	25 56.5	1.0 04	176.8	25 26.6	1.0 04	176.8	24 56.6	1.0 04	176.9	24 26.6	1.0 04	176.9	3
4	27 53.7	1.0 06	175.6	27 23.7	1.0 06	175.7	26 53.8	1.0 06	175.7	26 23.8	1.0 06	175.7	25 53.8	1.0 06	175.8	25 23.9	1.0 06	175.8	24 53.9	1.0 06	175.8	24 24.0	1.0 06	175.9	4
05	27 50.1	1.0 07	174.6	27 20.2	1.0 07	174.6	26 50.3	1.0 07	174.6	26 20.3	1.0 07	174.7	25 50.4	1.0 07	174.7	25 20.5	1.0 07	174.8	24 50.5	1.0 07	174.8	24 20.6	1.0 07	174.8	05
6	27 45.8	1.0 09	173.5	27 15.9	1.0 08	173.5	26 46.0	1.0 08	173.6	26 16.1	1.0 08	173.6	25 46.2	1.0 08	173.7	25 16.3	1.0 08	173.7	24 46.4	1.0 08	173.8	24 16.5	1.0 08	173.8	6
7	27 40.7	1.0 10	172.4	27 10.8	1.0 10	172.5	26 40.9	1.0 10	172.5	26 11.1	1.0 10	172.6	25 41.2	1.0 10	172.6	25 11.3	1.0 10	172.7	24 41.5	1.0 09	172.7	24 11.6	1.0 09	172.8	7
8	27 34.7	99 11	171.3	27 04.9	99 11	171.4	26 35.1	99 11	171.4	26 05.3	99 11	171.5	25 35.5	99 11	171.6	25 05.6	99 11	171.6	24 35.8	99 11	171.7	24 06.0	99 11	171.7	8
9	27 28.1	99 12	170.2	26 58.3	99 12	170.3	26 28.5	99 12	170.4	25 58.7	99 12	170.4	25 29.0	99 12	170.5	24 59.2	99 12	170.6	24 29.4	99 12	170.6	23 59.6	99 12	170.7	9
10	27 20.6	99 14	169.2	26 50.9	99 14	169.2	26 21.2	99 14	169.3	25 51.4	99 13	169.4	25 21.7	99 13	169.5	24 52.0	99 13	169.5	24 22.2	99 13	169.6	23 52.5	99 13	169.7	10
1	27 12.4	99 15	168.1	26 42.7	99 15	168.2	26 13.1	99 15	168.3	25 43.4	99 15	168.3	25 13.7	99 15	168.4	24 44.0	99 14	168.5	24 14.4	99 14	168.6	23 44.7	99 14	168.7	1
2	27 03.4	99 16	167.0	26 33.8	99 16	167.1	26 04.2	99 16	167.2	25 34.6	99 16	167.3	25 05.0	99 16	167.4	24 35.4	99 16	167.5	24 05.8	99 16	167.6	23 36.1	99 15	167.7	2
3	26 53.7	98 17	166.0	26 24.2	98 17	166.1	25 54.6	98 17	166.2	25 25.1	98 17	166.3	24 55.5	99 17	166.4	24 26.0	99 17	166.4	23 56.4	99 17	166.5	23 26.9	99 17	166.6	3
4	26 43.2	98 19	164.9	26 13.8	98 19	165.0	25 44.3	98 18	165.1	25 14.8	98 18	165.2	24 45.3	98 18	165.3	24 15.8	98 18	165.4	23 46.4	98 18	165.5	23 16.9	98 18	165.6	4
15	26 32.0	98 20	163.9	26 02.6	98 20	164.0	25 33.2	98 20	164.1	25 03.8	98 20	164.2	24 34.4	98 19	164.3	24 05.0	98 19	164.4	23 35.6	98 19	164.5	23 06.2	98 19	164.6	15
6	26 20.0	98 21	162.8	25 50.7	98 21	162.9	25 21.4	98 21	163.0	24 52.1	98 21	163.2	24 22.8	98 21	163.3	23 53.4	98 20	163.4	23 24.1	98 20	163.5	22 54.8	98 20	163.6	6
7	26 07.4	97 22	161.8	25 38.1	97 22	161.9	25 08.9	97 22	162.0	24 39.7	97 22	162.1	24 10.4	97 22	162.3	23 41.2	98 22	162.4	23 11.9	98 21	162.5	22 42.7	98 21	162.6	7
8	25 54.0	97 24	160.7	25 24.8	97 23	160.9	24 55.7	97 23	161.0	24 26.5	97 23	161.1	23 57.4	97 23	161.2	23 28.2	97 23	161.4	22 59.0	97 23	161.5	22 29.9	97 22	161.6	8
9	25 39.8	97 25	159.7	25 10.8	97 25	159.8	24 41.7	97 24	160.0	24 12.7	97 24	160.1	23 43.6	97 24	160.2	23 14.5	97 24	160.4	22 45.5	97 24	160.5	22 16.4	97 24	160.6	9
20	25 25.0	96 26	158.7	24 56.1	97 26	158.8	24 27.1	97 26	158.9	23 58.1	97 25	159.1	23 29.2	97 25	159.2	23 00.2	97 25	159.4	22 31.2	97 25	159.5	22 02.2	97 25	159.6	20
1	25 09.5	96 27	157.6	24 40.6	96 27	157.8	24 11.8	96 27	157.9	23 42.9	96 26	158.1	23 14.1	96 26	158.2	22 45.2	96 26	158.4	22 16.3	96 26	158.5	21 47.4	96 26	158.7	1
2	24 53.3	96 28	156.6	24 24.5	96 28	156.8	23 55.8	96 28	156.9	23 27.0	96 28	157.1	22 58.3	96 27	157.2	22 29.5	96 27	157.4	22 00.7	96 27	157.5	21 31.9	96 27	157.7	2
3	24 36.4	96 29	155.6	24 07.8	96 29	155.8	23 39.1	96 29	155.9	23 10.5	96 29	156.1	22 41.8	96 29	156.2	22 13.1	96 28	156.4	21 44.4	96 28	156.6	21 15.7	96 28	156.7	3
4	24 18.9	95 30	154.6	23 50.3	95 30	154.8	23 21.8	95 30	154.9	22 53.2	95 30	155.1	22 24.7	95 30	155.3	21 56.1	95 29	155.4	21 27.5	95 29	155.6	20 58.9	95 29	155.8	4
25	24 00.6	95 31	153.6	23 32.2	95 31	153.8	23 03.8	95 31	153.9	22 35.4	95 31	154.1	22 06.9	95 31	154.3	21 38.5	95 30	154.5	21 10.0	95 30	154.6	20 41.5	95 30	154.8	25
6	23 41.8	94 32	152.6	23 13.5	94 32	152.8	22 45.2	94 32	153.0	22 16.9	94 32	153.1	21 48.5	94 32	153.3	21 20.2	95 32	153.5	20 51.8	95 31	153.7	20 23.5	95 31	153.8	6
7	23 22.3	94 34	151.6	22 54.1	94 33	151.8	22 25.9	94 33	152.0	21 57.7	94 33	152.2	21 29.5	94 33	152.4	21 01.3	94 33	152.5	20 33.0	94 32	152.7	20 04.8	94 32	152.9	7
8	23 02.2	94 35	150.6	22 34.1	94 34	150.8	22 06.0	94 34	151.0	21 37.9	94 34	151.2	21 09.8	94 34	151.4	20 41.7	94 34	151.6	20 13.6	94 33	151.8	19 45.5	94 33	152.0	8
9	22 41.4	93 36	149.7	22 13.5	93 35	149.9	21 45.5	93 35	150.1	21 17.6	93 35	150.2	20 49.6	93 35	150.4	20 21.6	93 35	150.6	19 53.6	93 34	150.8	19 25.6	93 34	151.0	9
30	22 20.1	93 37	148.7	21 52.2	93 36	148.9	21 24.4	93 36	149.1	20 56.6	93 36	149.3	20 28.7	93 36	149.5	20 00.9	93 36	149.7	19 33.0	93 35	149.9	19 05.1	93 35	150.1	30
1	21 58.1	92 38	147.7	21 30.4	92 37	147.9	21 02.7	92 37	148.1	20 35.0	92 37	148.4	20 07.3	92 37	148.6	19 39.5	92 37	148.8	19 11.8	93 36	149.0	18 44.0	93 36	149.2	1
2	21 35.6	92 39	146.8	21 08.0	92 38	147.0	20 40.4	92 38	147.2	20 12.8	92 38	147.4	19 45.2	92 38	147.6	19 17.6	92 37	147.8	18 50.0	92 37	148.0	18 22.3	92 37	148.2	2
3	21 12.4	91 39	145.8	20 45.0	91 39	146.1	20 17.6	92 39	146.3	19 50.1	92 39	146.5	19 22.6	92 39	146.7	18 55.1	92 38	146.9	18 27.6	92 38	147.1	18 00.1	92 38	147.3	3
4	20 48.8	91 40	144.9	20 21.5	91 40	145.1	19 54.1	91 40	145.3	19 26.8	91 40	145.6	18 59.5	91 40	145.8	18 32.1	91 39	146.0	18 04.7	91 39	146.2	17 37.4	91 39	146.4	4
35	20 24.5	91 41	144.0	19 57.3	91 41	144.2	19 30.2	91 41	144.4	19 03.0	91 41	144.6	18 35.8	91 40	144.9	18 08.5	91 40	145.1	17 41.3	91 40	145.3	17 14.0	91 40	145.5	35
6	19 59.7	90 42	143.0	19 32.7	90 42	143.3	19 05.6	90 42	143.5	18 38.6	90 42	143.7	18 11.5	90 41	144.0	17 44.4	90 41	144.2	17 17.3	90 41	144.4	16 50.2	90 41	144.6	6
7	19 34.4	90 43	142.1	19 07.5	90 43	142.4	18 40.6	90 43	142.6	18 13.7	90 42	142.8	17 46.7	90 42	143.1	17 19.7	90 42	143.3	16 52.8	90 42	143.5	16 25.8	90 42	143.7	7
8	19 08.5	89 44	141.2	18 41.8	89 44	141.4	18 15.0	89 43	141.7	17 48.2	89 43	141.9	17 21.4	89 43	142.2	16 54.6	89 43	142.4	16 27.7	90 43	142.6	16 00.9	90 42	142.9	8
9	18 42.2	89 45	140.3	18 15.6	89 45	140.6	17 48.9	89 44	140.8	17 22.3	89 44	141.0	16 55.6	89 44	141.3	16 28.9	89 44	141.5	16 02.2	89 43	141.7	15 35.4	89 43	142.0	9
40	18 15.3	88 46	139.4	17 48.8	88 45	139.7	17 22.3	88 45	139.9	16 55.8	88 45	140.1	16 29.3	88 45	140.4	16 02.7	89 44	140.6	15 36.1	89 44	140.9	15 09.5	89 44	141.1	40
1	17 47.9	88 46	138.5	17 21.6	88 46	138.8	16 55.2	88 46	139.0	16 28.8	88 46	139.3	16 02.4	88 46	139.5	15 36.0	88 45	139.8	15 09.6	88 45	140.0	14 43.1	88 45	140.3	1
2	17 20.1	87 47	137.6	16 53.9	87 47	137.9	16 27.7	87 47	138.1	16 01.4	88 46	138.4	15 35.1	88 46	138.6	15 08.9	88 46	138.9	14 42.6	88 46	139.1	14 16.2	88 46	139.4	2
3	16 51.8	87 48	136.8	16 25.7	87 48	137.0	15 59.6	87 48	137.3	15 33.5	87 47	137.5	15 07.4	87 47	137.8	14 41.2	87 47	138.0	14 15.1	87 47	138.3	13 48.9	87 46	138.5	3
4	16 23.0	86 49	135.9	15 57.1	87 48	136.2	15 31.1	87 48	136.4	15 05.1	87 48	136.7	14 39.1	87 48	136.9	14 13.1	87 48	137.2	13 47.1	87 47	137.4	13 21.1	87 47	137.7	4
45	15 53.8	86 49	135.0	15 28.0	86 49	135.3	15 02.1	86 49	135.6	14 36.3	86 49	135.8	14 10.4	86 49	136.1	13 44.6	86 48	136.3	13 18.7	86 48	136.6	12 52.8	86 48	136.9	45
6	15 24.1	86 50	134.2	14 58.4	86 50	134.4	14 32.7	86 50	134.7	14 07.0	86 50	135.0	13 41.3	86 49	135.2	13 15.6	86 49	135.5	12 49.8	86 49	135.8	12 24.1	86 49	136.0	6
7	14 54.0	85 51	133.3	14 28.4	85 51	133.6	14 02.9	85 50	133.9	13 37.3	85 50	134.1	13 11.8	85 50	134.4	12 46.2	85 50	134.7	12 20.5	85 50	134.9	11 54.9	85 49	135.2	7
8	14 23.4	85 52	132.5	13 58.1	85 51	132.8	13 32.6	85 51	133.0	13 07.2	85 51	133.3	12 41.8	85 51	133.6	12 16.3	85 50	133.8	11 50.8	85 50	134.1	11 25.3	85 50	134.4	8
9	13 52.5	84 52	131.6	13 27.2	84 52	131.9	13 02.0	84 52	132.2	12 36.7	84 52	132.5	12 11.4	84 51	132.8	11 46.0	84 51	133.0	11 20.7	85 51	133.3	10 55.3	85 51	133.6	9
50	13 21.2	84 53	130.8	12 56.0	84 53	131.1	12 30.9	84 52	131.4	12 05.7	84 52	131.7	11 40.6	84 52	131.9	11 15.4	84 52	132.2	10 50.2	84 52	132.5	10 24.9	84 51	132.8	50
1	12 49.4	83 54	130.0	12 24.4	83 53	130.3	11 59.4	83 53	130.6	11 34.4	83 53	130.8	11 09.3	84 53	131.1	10 44.3	84 52	131.4	10 19.2	84 52	131.7	9 54.1	84 52	132.0	1
2	12 17.3	83 54	129.2	11 52.4	83 54	129.5	11 27.6	83 54	129.7	11 02.7	83 54	130.0	10 37.8	83 53	130.3	10 12.8	83 53	130.6	9 47.9	83 53	130.9	9 22.9	83 53	131.2	2
3	11 44.8	82 55	128.4	11 20.1	82 55	128.6	10 55.3	83 54	128.9	10 30.6	83 54	129.2	10 05.8	83 54	129.5	9 41.0	83 54	129.8	9 16.2	83 53	130.1	8 51.4	83 53	130.4	3
4	11 11.9	82 55	127.6	10 47.3	82 55	127.8	10 22.7	82 55	128.1	9 58.1	82 55	128.4	9 33.5	82 54	128.7	9 08.8	82 54	129.0	8 44.1	82 54	129.3	8 19.4	82 54	129.6	4
55	10 38.7	82 56	126.8	10 14.2	82 56	127.0	9 49.8	82 56	127.3	9 25.3	82 55	127.6	9 00.8	82 55	127.9	8 36.2	82 55	128.2	8 11.7	82 55	128.5	7 47.1	82 54	128.8	55
6	10 05.2	81 56	126.0	9 40.8	81 56	126.3	9 16.5	81 56	126.6	8 52.1	81 56	126.8	8 27.7	81 56	127.1	8 03.3	81 55	127.4	7 38.9	81 55	127.7	7 14.5	81 55	128.0	6
7	9 31.2	81 57	125.2	9 07.0	81 57	125.5	8 42.8	81 57	125.8	8 18.6	81 56	126.1	7 54.3	81 56	126.4	7 30.0	81 56	126.7	7 05.8	81 56	127.0	6 41.5	81 56	127.3	7
8	8 57.0	80 58	124.4	8 32.9	80 57	124.7	8 08.8	80 57	125.0	7 44.7	80 57	125.3	7 20.6	80 57	125.6	6 56.4	80 57	125.9	6 32.3	81 56	126.2	6 08.1	81 56	126.5	8
9	8 22.5	80 58	123.6	7 58.5	80 58	123.9	7 34.5	80 58	124.2	7 10.5	80 58	124.5	6 46.5	80 57	124.8	6 22.5	80 57	125.1	5 58.5	80 57	125.4	5 34.4	80 57	125.7	9
60	7 47.6	79 59	122.8	7 23.7	79 58	123.1	6 59.9	80 58	123.4	6 36.0	80 58	123.8	6 12.1	80 58	124.1	5 48.3	80 58	124.4	5 24.4	80 57	124.7	5 00.5	80 57	125.0	60
1	7 12.4	79 59	122.1	6 48.7	79 59	122.4	6 25.0	79 59	122.7	6 01.2	79 59	123.0	5 37.5	79 58	123.3	5 13.7	79 58	123.6							1
2	6 37.0	79 60	121.3	6 13.3	79 59	121.6	5 49.7	79 59	121.9	5 26.1	79 59	122.2	5 02.5	79 59	122.5										2
3	6 01.2	78 60	120.5	5 37.7	78 60	120.9	5 14.2	78 60	121.2																3
4	5 25.2	78 61	119.8	5 01.8	78 60	120.1																			4

DECLINATION SAME NAME AS LATITUDE

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	10 45.3	71 68	78.0	11 06.6	71 68	77.7	11 27.7	71 68	77.3	11 48.9	70 68	77.0	12 10.0	70 67	76.6	12 31.1	70 67	76.2	12 52.2	70 67	75.9	13 13.2	70 67	75.5	91
2	10 04.6	71 68	77.4	10 25.9	71 68	77.0	10 47.1	71 67	76.6	11 08.3	71 67	76.3	11 29.5	71 67	75.9	11 50.7	70 67	75.5	12 11.8	70 67	75.2	12 32.9	70 67	74.8	2
3	9 24.0	71 68	76.7	9 45.3	71 67	76.3	10 06.6	71 67	75.9	10 27.9	71 67	75.6	10 49.2	71 67	75.2	11 10.4	71 67	74.9	11 31.6	71 67	74.5	11 52.8	71 67	74.1	3
4	8 43.5	71 67	76.0	9 04.9	71 67	75.6	9 26.3	71 67	75.3	9 47.6	71 67	74.9	10 08.9	71 67	74.5	10 30.2	71 67	74.2	10 51.5	71 67	73.8	11 12.7	71 66	73.5	4
95	8 03.1	72 67	75.3	8 24.6	71 67	74.9	8 46.0	71 67	74.6	9 07.4	71 67	74.2	9 28.8	71 67	73.9	9 50.2	71 66	73.5	10 11.5	71 66	73.1	10 32.8	71 66	72.8	95
6	7 22.9	72 67	74.6	7 44.4	72 67	74.2	8 05.9	72 67	73.9	8 27.4	72 66	73.5	8 48.9	72 66	73.2	9 10.3	71 66	72.8	9 31.7	71 66	72.5	9 53.1	71 66	72.1	6
7	6 42.8	72 67	73.9	7 04.4	72 66	73.5	7 25.9	72 66	73.2	7 47.5	72 66	72.8	8 09.0	72 66	72.5	8 30.5	72 66	72.1	8 52.0	72 66	71.8	9 13.5	72 66	71.4	7
8	6 02.8	72 66	73.2	6 24.5	72 66	72.8	6 46.1	72 66	72.5	7 07.7	72 66	72.1	7 29.4	72 66	71.8	7 51.0	72 66	71.4	8 12.5	72 66	71.1	8 34.1	72 65	70.7	8
9	5 23.0	72 66	72.5	5 44.7	72 66	72.1	6 06.5	72 66	71.8	6 28.2	72 66	71.4	6 49.8	72 66	71.1	7 11.5	72 65	70.7	7 33.2	72 65	70.4	7 54.8	72 65	70.0	9
100				5 05.1	73 66	71.4	5 26.9	73 66	71.1	5 48.7	73 65	70.7	6 10.5	73 65	70.4	6 32.3	73 65	70.1	6 54.0	72 65	69.7	7 15.7	72 65	69.4	100
1										5 09.5	73 65	70.1	5 31.3	73 65	69.7	5 53.2	73 65	69.4	6 15.0	73 65	69.0	6 36.8	73 65	68.7	1
2																5 14.3	73 65	68.7	5 36.2	73 64	68.3	5 58.1	73 64	68.0	2
3																						5 19.5	73 64	67.3	3

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Lat. 46°

H.A.	20° 00′ Alt.	Δd Δt	Az.	20° 30′ Alt.	Δd Δt	Az.	21° 00′ Alt.	Δd Δt	Az.	21° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	64 00.0	1.0 01	180.0	64 30.0	1.0 01	180.0	65 00.0	1.0 01	180.0	65 30.0	1.0 01	180.0
1	63 59.2	1.0 04	177.9	64 29.2	1.0 04	177.8	64 59.2	1.0 04	177.8	65 29.2	1.0 04	177.8
2	63 56.9	1.0 06	175.7	64 26.8	1.0 07	175.7	64 56.8	1.0 07	175.6	65 26.7	1.0 07	175.5
3	63 53.0	1.0 09	173.6	64 22.9	1.0 09	173.5	64 52.8	1.0 09	173.4	65 22.7	1.0 09	173.3
4	63 47.6	99 12	171.5	64 17.4	99 12	171.3	64 47.2	99 12	171.2	65 17.0	99 12	171.1
05	63 40.6	99 14	169.4	64 10.3	99 14	169.2	64 40.1	99 14	169.0	65 09.7	99 15	168.9
6	63 32.2	99 17	167.3	64 01.8	99 17	167.1	64 31.4	99 17	166.9	65 00.9	99 17	166.7
7	63 22.3	98 19	165.2	63 51.7	98 19	165.0	64 21.1	98 19	164.8	64 50.6	98 20	164.5
8	63 10.9	98 21	163.1	63 40.2	98 22	162.9	64 09.5	98 22	162.7	64 38.7	97 22	162.4
9	62 58.1	97 24	161.1	63 27.2	97 24	160.9	63 56.3	97 24	160.6	64 25.4	97 25	160.3
10	62 44.0	96 26	159.1	63 12.9	96 26	158.8	63 41.8	96 27	158.5	64 10.6	96 27	158.2
1	62 28.4	96 28	157.2	62 57.2	96 28	156.9	63 25.8	96 29	156.5	63 54.5	95 29	156.2
2	62 11.6	96 30	155.2	62 40.1	95 31	154.9	63 08.6	96 31	154.6	63 37.0	95 31	154.2
3	61 53.5	94 32	153.3	62 21.8	94 33	153.0	62 50.0	94 33	152.6	63 18.2	94 33	152.2
4	61 34.2	94 34	151.5	62 02.3	93 35	151.1	62 30.2	93 35	150.7	62 58.2	93 35	150.3
15	61 13.7	93 36	149.6	61 41.5	93 36	149.3	62 09.3	92 37	148.8	62 36.9	92 37	148.4
6	60 52.1	92 38	147.9	61 19.7	92 38	147.4	61 47.1	91 39	147.0	62 14.5	91 39	146.6
7	60 29.4	91 40	146.1	60 56.7	91 40	145.7	61 23.9	91 40	145.2	61 51.0	90 41	144.8
8	60 05.6	90 41	144.4	60 32.7	90 42	143.9	60 59.6	90 42	143.5	61 26.5	89 43	143.0
9	59 40.9	89 43	142.7	60 07.6	89 43	142.2	60 34.3	89 44	141.8	61 00.9	88 44	141.3
20	59 15.1	89 44	141.1	59 41.7	88 45	140.6	60 08.1	88 45	140.1	60 34.4	88 46	139.6
1	58 48.5	88 46	139.4	59 14.7	87 46	139.0	59 40.9	87 47	138.5	60 06.9	87 47	138.0
2	58 21.0	87 47	137.9	58 47.0	86 48	137.4	59 12.8	86 48	136.9	59 38.6	86 49	136.4
3	57 52.6	86 49	136.3	58 18.3	86 49	135.8	58 44.0	85 50	135.3	59 09.5	85 50	134.8
4	57 23.4	85 50	134.8	57 48.9	85 50	134.3	58 14.3	84 51	133.8	58 39.5	84 51	133.3
25	56 53.5	84 51	133.4	57 18.7	84 52	132.9	57 43.8	84 52	132.4	58 08.8	83 52	131.8
6	56 22.8	84 52	131.9	56 47.8	83 53	131.4	57 12.7	83 53	130.9	57 37.4	82 53	130.4
7	55 51.5	83 53	130.5	56 16.2	82 54	130.0	56 40.8	82 54	129.5	57 05.3	81 55	129.0
8	55 19.5	82 54	129.2	55 44.0	82 55	128.6	56 08.4	81 55	128.1	56 32.6	81 56	127.6
9	54 46.8	81 55	127.8	55 11.1	81 56	127.3	55 35.3	80 56	126.8	55 59.3	80 56	126.3
30	54 13.6	80 56	126.5	54 37.7	80 57	126.0	55 01.6	80 57	125.5	55 25.4	79 57	124.9
1	53 39.8	80 57	125.2	54 03.7	79 58	124.7	54 27.4	79 58	124.2	54 51.0	78 58	123.7
2	53 05.5	79 58	124.0	53 29.2	79 58	123.5	53 52.7	78 59	122.9	54 16.0	78 59	122.4
3	52 30.7	78 59	122.8	52 54.2	78 59	122.2	53 17.5	77 60	121.7	53 40.6	77 60	121.2
4	51 55.5	78 60	121.6	52 18.7	77 60	121.0	52 41.8	77 60	120.5	53 04.7	76 60	120.0
35	51 19.7	77 60	120.4	51 42.8	77 61	119.9	52 05.7	76 61	119.4	52 28.4	76 61	118.8
6	50 43.6	76 61	119.2	51 06.4	76 61	118.7	51 29.1	76 62	118.2	51 51.7	75 62	117.7
7	50 07.0	76 62	118.1	50 29.7	75 62	117.6	50 52.2	75 62	117.1	51 14.6	74 62	116.6
8	49 30.0	75 62	117.0	49 52.6	75 62	116.5	50 14.9	74 63	116.0	50 37.2	74 63	115.5
9	48 52.7	75 63	115.9	49 15.1	74 63	115.4	49 37.3	74 63	114.9	49 59.4	73 64	114.4
40	48 15.1	74 63	114.9	48 37.3	74 64	114.4	48 59.3	73 64	113.9	49 21.3	73 64	113.3
1	47 37.1	74 64	113.9	47 59.2	73 64	113.3	48 21.1	73 64	112.8	48 42.8	72 64	112.3
2	46 58.9	73 64	112.8	47 20.8	73 64	112.3	47 42.5	72 65	111.8	48 04.1	72 65	111.3
3	46 20.3	73 65	111.8	46 42.1	72 65	111.3	47 03.7	72 65	110.8	47 25.2	71 65	110.3
4	45 41.5	72 65	110.9	46 03.1	72 65	110.4	46 24.6	71 66	109.9	46 46.0	71 66	109.3
45	45 02.4	72 66	109.9	45 23.9	71 66	109.4	45 45.3	71 66	108.9	46 06.5	71 66	108.4
6	44 23.1	71 66	108.9	44 44.5	71 66	108.4	45 05.7	71 66	108.0	45 26.9	70 66	107.4
7	43 43.6	71 66	108.0	44 04.8	71 66	107.5	44 26.0	70 67	107.0	44 47.0	70 67	106.5
8	43 03.8	71 67	107.1	43 25.0	70 67	106.6	43 46.0	70 67	106.1	44 07.0	69 67	105.6
9	42 23.9	70 67	106.2	42 45.0	70 67	105.7	43 05.9	70 67	105.2	43 26.7	69 67	104.7
50	41 43.8	70 67	105.3	42 04.8	70 67	104.8	42 25.6	69 67	104.3	42 46.3	69 68	103.8
1	41 03.5	70 67	104.4	41 24.4	69 68	103.9	41 45.2	69 68	103.5	42 05.8	69 68	103.0
2	40 23.1	70 68	103.6	40 43.9	69 68	103.1	41 04.5	69 68	102.6	41 25.1	68 68	102.1
3	39 42.5	69 68	102.7	40 03.2	69 68	102.2	40 23.8	69 68	101.8	40 44.3	68 68	101.3
4	39 01.7	69 68	101.9	39 22.4	69 68	101.4	39 42.9	68 68	100.9	40 03.4	68 68	100.4
55	38 20.9	69 68	101.0	38 41.5	68 68	100.6	39 02.0	68 68	100.1	39 22.3	68 69	99.6
6	37 39.9	69 68	100.2	38 00.5	68 69	99.8	38 20.9	68 69	99.3	38 41.2	67 69	98.8
7	36 58.9	68 69	99.4	37 19.3	68 69	98.9	37 39.7	68 69	98.5	38 00.0	67 69	98.0
8	36 17.7	68 69	98.6	36 38.1	68 69	98.2	36 58.4	68 69	97.7	37 18.6	67 69	97.2
9	35 36.4	68 69	97.8	35 56.8	68 69	97.4	36 17.1	67 69	96.9	36 37.3	67 69	96.4
60	34 55.1	68 69	97.0	35 15.4	68 69	96.6	35 35.7	67 69	96.1	35 55.8	67 69	95.7
1	34 13.7	68 69	96.3	34 34.0	67 69	95.8	34 54.2	67 69	95.4	35 14.3	67 69	94.9
2	33 32.3	68 69	95.5	33 52.5	67 69	95.0	34 12.7	67 69	94.6	34 32.8	67 69	94.2
3	32 50.7	68 69	94.7	33 11.0	67 69	94.3	33 31.1	67 69	93.8	33 51.2	67 69	93.4
4	32 09.2	68 69	94.0	32 29.4	67 69	93.5	32 49.5	67 69	93.1	33 09.6	67 69	92.7
65	31 27.6	67 69	93.2	31 47.8	67 69	92.8	32 07.9	67 69	92.4	32 27.9	67 69	91.9
6	30 46.0	67 69	92.5	31 06.1	67 69	92.1	31 26.2	67 69	91.6	31 46.2	67 69	91.2
7	30 04.3	67 69	91.8	30 24.5	67 69	91.3	30 44.6	67 69	90.9	31 04.6	67 69	90.5
8	29 22.6	67 69	91.0	29 42.8	67 69	90.6	30 02.9	67 69	90.2	30 22.9	67 69	89.7
9	28 41.0	67 69	90.3	29 01.1	67 69	89.9	29 21.2	67 69	89.5	29 41.2	67 69	89.0
70	27 59.3	67 69	89.6	28 19.4	67 69	89.2	28 39.5	67 69	88.7	28 59.5	67 69	88.3
1	27 17.6	67 69	88.9	27 37.8	67 69	88.5	27 57.9	67 69	88.0	28 17.9	67 69	87.6
2	26 35.9	67 69	88.2	26 56.1	67 69	87.7	27 16.2	67 69	87.3	27 36.3	67 69	86.9
3	25 54.3	67 69	87.5	26 14.5	67 69	87.0	26 34.6	67 69	86.6	26 54.7	67 69	86.2
4	25 12.7	67 69	86.8	25 32.9	67 69	86.3	25 53.0	67 69	85.9	26 13.1	67 69	85.5
75	24 31.1	68 69	86.1	24 51.3	67 69	85.6	25 11.5	67 69	85.2	25 31.6	67 69	84.8
6	23 49.5	68 69	85.4	24 09.8	67 69	85.0	24 29.9	67 69	84.5	24 50.1	67 69	84.1
7	23 08.0	68 69	84.7	23 28.3	67 69	84.3	23 48.5	67 69	83.9	24 08.6	67 69	83.5
8	22 26.5	68 69	84.0	22 46.8	68 69	83.6	23 07.1	67 69	83.2	23 27.3	67 69	82.8
9	21 45.1	68 69	83.3	22 05.4	68 69	82.9	22 25.7	68 69	82.5	22 45.9	67 69	82.1
80	21 03.7	68 69	82.6	21 24.1	68 69	82.2	21 44.4	68 69	81.8	22 04.7	67 69	81.4
1	20 22.4	68 69	81.9	20 42.8	68 69	81.5	21 03.2	68 68	81.1	21 23.5	68 68	80.7
2	19 41.2	68 69	81.2	20 01.7	68 68	80.8	20 22.1	68 68	80.5	20 42.4	68 68	80.1
3	19 00.0	68 68	80.6	19 20.6	68 68	80.2	19 41.0	68 68	79.8	20 01.4	68 68	79.4
4	18 19.0	69 68	79.9	18 39.5	68 68	79.5	19 00.0	68 68	79.1	19 20.5	68 68	78.7
85	17 38.0	69 68	79.2	17 58.6	69 68	78.8	18 19.2	68 68	78.4	18 39.7	68 68	78.0
6	16 57.1	69 68	78.5	17 17.8	69 68	78.1	17 38.4	69 68	77.8	17 58.9	68 68	77.4
7	16 16.3	69 68	77.8	16 37.0	69 68	77.5	16 57.7	69 68	77.1	17 18.3	69 68	76.7
8	15 35.6	69 68	77.2	15 56.4	69 68	76.8	16 17.1	69 67	76.4	16 37.8	69 67	76.0
9	14 55.0	70 67	76.5	15 15.9	69 67	76.1	15 36.7	69 67	75.7	15 57.4	69 67	75.4
90	14 14.6	70 67	75.8	14 35.5	70 67	75.4	14 56.3	70 67	75.1	15 17.2	69 67	74.7

H.A.	22° 00′ Alt.	Δd Δt	Az.	22° 30′ Alt.	Δd Δt	Az.	23° 00′ Alt.	Δd Δt	Az.	23° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	66 00.0	1.0 01	180.0	66 30.0	1.0 01	180.0	67 00.0	1.0 01	180.0	67 30.0	1.0 01	180.0
1	65 59.2	1.0 04	177.7	66 29.2	1.0 04	177.7	66 59.1	1.0 04	177.6	67 29.1	1.0 04	177.6
2	65 56.7	1.0 07	175.4	66 26.6	1.0 07	175.4	66 56.6	1.0 07	175.3	67 26.5	1.0 07	175.2
3	65 52.6	1.0 10	173.2	66 22.4	1.0 10	173.1	66 52.3	1.0 10	173.0	67 22.2	1.0 10	172.8
4	65 46.8	99 12	170.9	66 16.6	99 12	170.8	66 46.4	99 13	170.6	67 16.1	99 13	170.5
05	65 39.4	99 15	168.7	66 09.1	99 15	168.5	66 38.7	99 16	168.3	67 08.4	99 16	168.1
6	65 30.5	98 18	166.5	66 00.0	98 18	166.3	66 29.5	98 18	166.0	66 59.0	98 18	165.8
7	65 19.9	98 20	164.3	65 49.3	98 20	164.0	66 18.6	98 21	163.8	66 48.0	98 21	163.5
8	65 07.9	97 22	162.1	65 37.1	97 23	161.9	66 06.2	97 23	161.6	66 35.4	97 24	161.3
9	64 54.4	97 26	160.0	65 23.4	97 25	159.7	65 52.3	96 26	159.4	66 21.2	96 26	159.0
10	64 39.4	96 27	157.9	65 08.2	96 28	157.6	65 36.9	96 28	157.2	66 05.6	96 28	156.9
1	64 23.0	95 30	155.8	64 51.6	95 30	155.5	65 20.0	96 30	155.1	65 48.5	95 31	154.7
2	64 05.3	94 32	153.8	64 33.6	94 32	153.4	65 01.8	94 33	153.0	65 30.0	94 33	152.6
3	63 46.3	94 34	151.8	64 14.3	93 34	151.4	64 42.3	93 35	151.0	65 10.2	93 35	150.6
4	63 26.0	93 36	149.9	63 53.8	92 36	149.5	64 21.4	92 37	149.0	64 49.0	92 37	148.6
15	63 04.5	92 38	148.0	63 32.0	92 38	147.6	63 59.4	91 39	147.1	64 26.7	91 39	146.6
6	62 41.8	91 40	146.1	63 09.0	91 40	145.7	63 36.2	90 40	145.2	64 03.2	90 41	144.7
7	62 18.1	90 42	144.3	62 45.0	90 42	143.8	63 11.8	89 42	143.4	63 38.6	89 43	142.8
8	61 53.2	89 43	142.6	62 19.9	89 44	142.1	62 46.4	88 44	141.6	63 12.9	88 44	141.0
9	61 27.4	88 45	140.8	61 53.8	88 45	140.3	62 20.0	87 46	139.8	62 46.2	87 46	139.3
20	61 00.6	87 46	139.1	61 26.7	87 47	138.6	61 52.7	86 47	138.1	62 18.5	86 48	137.6
1	60 32.9	86 48	137.5	60 58.7	86 48	137.0	61 24.4	85 49	136.4	61 49.9	85 49	135.9
2	60 04.3	85 49	135.9	60 29.8	85 49	135.4	60 55.2	84 50	134.8	61 20.5	84 50	134.2
3	59 34.8	84 50	134.3	60 00.1	84 51	133.8	60 25.2	84 51	133.2	60 50.2	83 52	132.7
4	59 04.7	84 52	132.8	59 29.6	83 52	132.2	59 54.5	83 52	131.7	60 19.2	82 53	131.1
25	58 33.7	83 53	131.3	58 58.4	82 53	130.8	59 23.0	82 54	130.2	59 47.4	81 54	129.6
6	58 02.0	82 54	129.9	58 26.5	81 54	129.3	58 50.8	81 55	128.7	59 15.0	80 55	128.2
7	57 29.7	81 55	128.4	57 53.9	80 55	127.9	58 18.0	80 56	127.3	58 41.9	79 56	126.7
8	56 56.7	80 56	127.1	57 20.7	80 56	126.5	57 44.5	79 57	125.9	58 08.2	79 57	125.4
9	56 23.2	79 57	125.7	56 46.9	79 57	125.2	57 10.5	78 58	124.6	57 33.9	78 58	124.0
30	55 49.1	79 58	124.4	56 12.6	78 58	123.8	56 35.9	78 58	123.3	56 59.1	77 59	122.7
1	55 14.4	78 58	123.1	55 37.7	77 59	122.6	56 00.8	77 59	122.0	56 23.8	76 60	121.4
2	54 39.3	77 59	121.9	55 02.3	77 60	121.3	55 25.2	76 60	120.7	55 48.0	76 60	120.2
3	54 03.6	76 60	120.6	54 26.5	76 60	120.1	54 49.2	75 61	119.5	55 11.7	75 61	118.9
4	53 27.5	76 61	119.4	53 50.2	75 61	118.9	54 12.7	75 62	118.3	54 35.1	74 62	117.8
35	52 51.0	75 62	118.3	53 13.5	75 62	117.7	53 35.8	74 62	117.2	53 58.0	74 62	116.6
6	52 14.1	75 62	117.1	52 36.4	74 62	116.6	52 58.6	73 63	116.0	53 20.5	73 63	115.5
7	51 36.9	74 63	116.0	51 59.0	73 63	115.5	52 20.9	73 63	114.9	52 42.7	73 64	114.4
8	50 59.2	73 63	114.9	51 21.2	73 64	114.4	51 43.0	72 64	113.8	52 04.6	72 64	113.3
9	50 21.3	73 64	113.9	50 43.1	72 64	113.3	51 04.7	72 64	112.8	51 26.2	71 65	112.2
40	49 43.0	72 64	112.8	50 04.6	72 65	112.3	50 26.1	71 65	111.7	50 47.4	71 65	111.2
1	49 04.5	72 65	111.8	49 25.9	71 65	111.3	49 47.3	71 65	110.7	50 08.4	70 65	110.2
2	48 25.6	71 65	110.8	48 47.0	71 65	110.2	49 08.1	70 66	109.7	49 29.2	70 66	109.2
3	47 46.5	71 66	109.8	48 07.7	70 66	109.3	48 28.8	70 66	108.7	48 49.7	69 66	108.2
4	47 07.2	71 66	108.8	47 28.3	70 66	108.3	47 49.2	70 66	107.8	48 10.0	69 67	107.2
45	46 27.6	70 66	107.9	46 48.6	70 66	107.4	47 09.4	69 67	106.8	47 30.1	69 67	106.3
6	45 47.9	70 67	106.9	46 08.7	69 67	106.4	46 29.4	69 67	105.9	46 50.0	68 67	105.4
7	45 07.9	69 67	106.0	45 28.6	69 67	105.5	45 49.2	68 67	105.0	46 09.7	68 67	104.5
8	44 27.7	69 67	105.1	44 48.4	69 67	104.6	45 08.9	68 68	104.1	45 29.3	68 68	103.6
9	43 47.4	69 68	104.2	44 08.0	68 68	103.7	44 28.4	68 68	103.2	44 48.7	67 68	102.7
50	43 06.9	68 68	103.3	43 27.4	68 68	102.8	43 47.7	68 68	102.3	44 07.9	67 68	101.8
1	42 26.3	68 68	102.5	42 46.7	68 68	102.0	43 07.0	67 68	101.5	43 27.1	67 68	101.0
2	41 45.6	68 68	101.6	42 05.9	68 68	101.1	42 26.1	67 68	100.6	42 46.1	67 68	100.1
3	41 04.7	68 68	100.8	41 24.9	67 68	100.3	41 45.0	67 68	99.8	42 05.0	66 69	99.3
4	40 23.7	67 68	100.0	40 43.9	67 69	99.5	41 03.9	67 69	99.0	41 23.9	66 69	98.5
55	39 42.6	67 69	99.1	40 02.7	67 69	98.7	40 22.7	66 69	98.2	40 42.6	66 69	97.7
6	39 01.4	67 69	98.3	39 21.5	67 69	97.9	39 41.4	66 69	97.4	40 01.3	66 69	96.9
7	38 20.1	67 69	97.5	38 40.1	67 69	97.1	39 00.0	66 69	96.6	39 19.8	66 69	96.1
8	37 38.7	67 69	96.8	37 58.7	66 69	96.3	38 18.6	66 69	95.8	38 38.4	66 69	95.3
9	36 57.3	67 69	96.0	37 17.3	66 69	95.5	37 37.1	66 69	95.0	37 56.8	66 69	94.6
60	36 15.8	67 69	95.2	36 35.8	66 69	94.7	36 55.6	66 69	94.3	37 15.3	65 69	93.8
1	35 34.3	66 69	94.5	35 54.2	66 69	94.0	36 14.0	66 69	93.5	36 33.7	65 69	93.1
2	34 52.7	66 69	93.7	35 12.6	66 69	93.2	35 32.4	66 69	92.8	35 52.0	65 69	92.3
3	34 11.1	66 69	93.0	34 31.0	66 69	92.5	34 50.7	66 69	92.0	35 10.4	65 69	91.6
4	33 29.5	66 69	92.2	33 49.3	66 69	91.8	34 09.1	66 69	91.3	34 28.7	65 69	90.8
65	32 47.8	66 69	91.5	33 07.7	66 69	91.0	33 27.4	66 69	90.6	33 47.0	65 69	90.1
6	32 06.2	66 69	90.7	32 26.0	66 69	90.3	32 45.7	66 69	89.9	33 05.4	65 69	89.4
7	31 24.5	66 69	90.0	31 44.3	66 69	89.6	32 04.0	66 69	89.1	32 23.7	65 69	88.7
8	30 42.8	66 69	89.3	31 02.6	66 69	88.9	31 22.4	66 69	88.4	31 42.0	65 69	88.0
9	30 01.1	66 69	88.6	30 21.0	66 69	88.2	30 40.7	66 69	87.7	31 00.4	65 69	87.3
70	29 19.5	66 69	87.9	29 39.3	66 69	87.5	29 59.1	66 69	87.0	30 18.8	65 69	86.6
1	28 37.8	66 69	87.2	28 57.7	66 69	86.8	29 17.5	66 69	86.3	29 37.2	66 69	85.9
2	27 56.2	66 69	86.5	28 16.1	66 69	86.1	28 35.9	66 69	85.6	28 55.6	66 69	85.2
3	27 14.6	66 69	85.8	27 34.5	66 69	85.4	27 54.4	66 69	84.9	28 14.1	66 69	84.5
4	26 33.1	67 69	85.1	26 53.0	66 69	84.7	27 12.9	66 69	84.3	27 32.6	66 69	83.8
75	25 51.6	67 69	84.4	26 11.5	66 69	84.0	26 31.4	66 69	83.6	26 51.2	66 69	83.2
6	25 10.1	67 69	83.7	25 30.1	67 69	83.3	25 50.0	66 69	82.9	26 09.9	66 69	82.5
7	24 28.7	67 69	83.0	24 48.7	67 69	82.6	25 08.7	66 69	82.2	25 28.6	66 69	81.8
8	23 47.4	67 69	82.4	24 07.4	67 69	82.0	24 27.4	67 69	81.6	24 47.4	66 69	81.1
9	23 06.1	67 69	81.7	23 26.2	67 69	81.3	23 46.2	67 68	80.9	24 06.2	66 68	80.5
80	22 24.9	67 68	81.0	22 45.0	67 68	80.6	23 05.1	67 68	80.2	23 25.2	67 68	79.8
1	21 43.8	67 68	80.3	22 04.0	67 68	79.9	22 24.1	67 68	79.5	22 44.2	67 68	79.1
2	21 02.7	68 68	79.7	21 23.0	67 68	79.3	21 43.2	67 68	78.9	22 03.3	67 68	78.5
3	20 21.8	68 68	79.0	20 42.1	68 68	78.6	21 02.3	67 68	78.2	21 22.5	67 68	77.8
4	19 40.9	68 68	78.3	20 01.3	68 68	77.9	20 21.6	68 68	77.5	20 41.8	67 68	77.2
85	19 00.1	68 68	77.7	19 20.5	68 68	77.3	19 40.9	68 68	76.9	20 01.2	68 67	76.5
6	18 19.5	68 68	77.0	18 39.9	68 67	76.6	19 00.4	68 67	76.2	19 20.8	68 67	75.8
7	17 38.9	69 67	76.3	17 59.5	68 67	75.9	18 20.0	68 67	75.6	18 40.4	68 67	75.2
8	16 58.5	69 67	75.7	17 19.1	69 67	75.3	17 39.7	68 67	74.9	18 00.2	68 67	74.5
9	16 18.2	69 67	75.0	16 38.8	69 67	74.6	16 59.5	69 67	74.2	17 20.1	69 67	73.9
90	15 38.0	69 67	74.3	15 58.7	69 67	73.9	16 19.4	69 66	73.6	16 40.1	69 66	73.2

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H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	24 00.0	1.0 01	180.0	23 30.0	1.0 01	180.0	23 00.0	1.0 01	180.0	22 30.0	1.0 01	180.0	22 00.0	1.0 01	180.0	21 30.0	1.0 01	180.0	21 00.0	1.0 01	180.0	20 30.0	1.0 01	180.0	00
1	23 59.6	1.0 02	179.0	23 29.6	1.0 02	179.0	22 59.6	1.0 02	179.0	22 29.6	1.0 02	179.0	21 59.6	1.0 02	179.0	21 29.6	1.0 02	179.0	20 59.6	1.0 02	179.0	20 29.6	1.0 02	179.0	1
2	23 58.5	1.0 08	177.9	23 28.5	1.0 08	178.0	22 58.5	1.0 08	178.0	22 28.5	1.0 08	178.0	21 58.5	1.0 08	178.0	21 28.6	1.0 08	178.0	20 58.6	1.0 08	178.0	20 28.6	1.0 08	178.0	2
3	23 56.6	1.0 04	176.9	23 26.7	1.0 04	176.9	22 56.7	1.0 04	177.0	22 26.7	1.0 04	177.0	21 56.7	1.0 04	177.0	21 26.8	1.0 04	177.0	20 56.8	1.0 04	177.0	20 26.8	1.0 04	177.1	3
4	23 54.0	1.0 06	175.9	23 24.1	1.0 06	175.9	22 54.1	1.0 06	175.9	22 24.1	1.0 06	176.0	21 54.2	1.0 06	176.0	21 24.2	1.0 05	176.0	20 54.3	1.0 05	176.1	20 24.3	1.0 05	176.1	4
05	23 50.7	1.0 07	174.9	23 20.7	1.0 07	174.9	22 50.8	1.0 07	174.9	22 20.9	1.0 07	175.0	21 50.9	1.0 07	175.0	21 21.0	1.0 07	175.0	20 51.0	1.0 06	175.1	20 21.1	1.0 06	175.1	05
6	23 46.6	1.0 08	173.8	23 16.6	1.0 08	173.9	22 46.7	1.0 08	173.9	22 16.8	1.0 08	174.0	21 46.9	1.0 08	174.0	21 17.0	1.0 08	174.1	20 47.1	1.0 08	174.1	20 17.2	1.0 08	174.1	6
7	23 41.7	1.0 09	172.8	23 11.8	1.0 09	172.9	22 42.0	1.0 09	172.9	22 12.1	1.0 09	173.0	21 42.2	1.0 09	173.0	21 12.3	1.0 09	173.1	20 42.5	1.0 09	173.1	20 12.6	1.0 09	173.2	7
8	23 36.1	99 11	171.8	23 06.3	99 10	171.9	22 36.5	99 10	171.9	22 06.6	99 10	172.0	21 36.8	99 10	172.0	21 07.0	99 10	172.1	20 37.1	99 10	172.1	20 07.3	99 10	172.2	8
9	23 29.8	99 12	170.8	23 00.0	99 12	170.8	22 30.2	99 12	170.9	22 00.4	99 12	171.0	21 30.6	99 11	171.0	21 00.9	99 11	171.1	20 31.1	99 11	171.2	20 01.3	99 11	171.2	9
10	23 22.8	99 13	169.8	22 53.0	99 13	169.8	22 23.3	99 13	169.9	21 53.5	99 13	170.0	21 23.8	99 13	170.0	20 54.0	99 13	170.1	20 24.3	99 12	170.2	19 54.5	99 12	170.2	10
1	23 15.0	99 14	168.7	22 45.3	99 14	168.8	22 15.6	99 14	168.9	21 45.9	99 14	169.0	21 16.2	99 14	169.1	20 46.5	99 14	169.1	20 16.8	99 14	169.2	19 47.1	99 14	169.3	1
2	23 06.5	99 15	167.7	22 36.9	99 15	167.8	22 07.2	99 15	167.9	21 37.6	99 15	168.0	21 08.0	99 15	168.1	20 38.3	99 15	168.2	20 08.7	99 15	168.2	19 39.0	99 15	168.3	2
3	22 57.3	99 17	166.7	22 27.7	99 16	166.8	21 58.2	99 16	166.9	21 28.6	99 16	167.0	20 59.0	99 16	167.1	20 29.4	99 16	167.2	19 59.8	99 16	167.3	19 30.3	99 16	167.4	3
4	22 47.4	98 18	165.7	22 17.9	98 18	165.8	21 48.4	98 18	165.9	21 18.9	98 17	166.0	20 49.4	98 17	166.1	20 19.8	98 17	166.2	19 50.3	98 17	166.3	19 20.8	98 17	166.4	4
15	22 36.7	98 19	164.7	22 07.3	98 19	164.8	21 37.9	98 19	164.9	21 08.4	98 19	165.0	20 39.0	98 18	165.1	20 09.6	98 18	165.2	19 40.1	98 18	165.3	19 10.7	98 18	165.4	15
6	22 25.4	98 20	163.7	21 56.1	98 20	163.8	21 26.7	98 20	164.0	20 57.3	98 20	164.1	20 28.0	98 20	164.2	19 58.6	98 19	164.3	19 29.2	98 19	164.4	18 59.9	98 19	164.5	6
7	22 13.4	98 21	162.7	21 44.1	98 21	162.9	21 14.8	98 21	163.0	20 45.6	98 21	163.1	20 16.3	98 21	163.2	19 47.0	98 20	163.3	19 17.7	98 20	163.4	18 48.4	98 20	163.5	7
8	22 00.7	97 22	161.7	21 31.5	97 22	161.9	21 02.3	97 22	162.0	20 33.1	97 22	162.1	20 03.9	97 22	162.2	19 34.7	97 22	162.4	19 05.5	97 22	162.5	18 36.3	97 21	162.6	8
9	21 47.3	97 23	160.8	21 18.2	97 23	160.9	20 49.1	97 23	161.0	20 20.0	97 23	161.2	19 50.8	97 23	161.3	19 21.7	97 23	161.4	18 52.6	97 22	161.5	18 23.5	97 22	161.7	9
20	21 33.2	97 25	159.8	21 04.2	97 24	159.9	20 35.2	97 24	160.1	20 06.2	97 24	160.2	19 37.1	97 24	160.3	19 08.1	97 24	160.5	18 39.1	97 24	160.6	18 10.0	97 23	160.7	20
1	21 18.5	96 26	158.8	20 49.6	96 26	159.0	20 20.6	96 25	159.1	19 51.7	96 25	159.2	19 22.8	96 25	159.4	18 53.8	96 25	159.5	18 24.9	96 25	159.7	17 55.9	97 25	159.8	1
2	21 03.1	96 27	157.8	20 34.3	96 27	158.0	20 05.4	96 26	158.1	19 36.6	96 26	158.3	19 07.8	96 26	158.4	18 38.9	96 26	158.6	18 10.1	96 26	158.7	17 41.2	96 26	158.9	2
3	20 47.0	96 28	156.9	20 18.3	96 28	157.0	19 49.6	96 28	157.2	19 20.9	96 27	157.3	18 52.1	96 27	157.5	18 23.4	96 27	157.6	17 54.6	96 27	157.8	17 25.9	96 27	157.9	3
4	20 30.3	95 29	155.9	20 01.7	95 29	156.1	19 33.1	95 28	156.2	19 04.5	95 28	156.4	18 35.9	95 28	156.6	18 07.2	95 28	156.7	17 38.6	96 28	156.9	17 09.9	96 28	157.0	4
25	20 13.0	95 30	155.0	19 44.5	95 30	155.1	19 16.0	95 30	155.3	18 47.5	95 29	155.5	18 19.0	95 29	155.6	17 50.4	95 29	155.8	17 21.9	95 29	155.9	16 53.4	95 29	156.1	25
6	19 55.1	95 31	154.0	19 26.7	95 31	154.2	18 58.3	95 31	154.4	18 29.9	95 30	154.5	18 01.5	95 30	154.7	17 33.0	95 30	154.9	17 04.6	95 30	155.0	16 36.2	95 30	155.2	6
7	19 36.5	94 32	153.1	19 08.2	94 32	153.2	18 39.9	94 32	153.4	18 11.7	94 31	153.6	17 43.3	94 31	153.8	17 15.0	94 31	153.9	16 46.7	94 31	154.1	16 18.4	94 31	154.3	7
8	19 17.3	94 33	152.1	18 49.2	94 33	152.3	18 21.0	94 32	152.5	17 52.8	94 32	152.7	17 24.6	94 32	152.9	16 56.4	94 32	153.0	16 28.2	94 32	153.2	16 00.0	94 32	153.4	8
9	18 57.5	93 34	151.2	18 29.5	93 34	151.4	18 01.5	94 34	151.6	17 33.4	94 33	151.8	17 05.3	94 33	151.9	16 37.2	94 33	152.1	16 09.2	94 33	152.3	15 41.1	94 33	152.5	9
30	18 37.2	93 35	150.3	18 09.3	93 35	150.5	17 41.3	93 34	150.7	17 13.4	93 34	150.9	16 45.4	93 34	151.0	16 17.5	93 34	151.2	15 49.5	93 34	151.4	15 21.5	93 34	151.6	30
1	18 16.2	93 36	149.4	17 48.4	93 36	149.6	17 20.6	93 36	149.8	16 52.8	93 35	149.9	16 25.0	93 35	150.1	15 57.1	93 35	150.3	15 29.3	93 35	150.5	15 01.4	93 34	150.7	1
2	17 54.7	92 37	148.4	17 27.0	92 37	148.6	16 59.3	92 36	148.8	16 31.6	92 36	149.0	16 03.9	92 36	149.2	15 36.2	92 36	149.4	15 08.5	92 36	149.6	14 40.8	92 35	149.8	2
3	17 32.6	92 38	147.5	17 05.1	92 38	147.7	16 37.5	92 37	148.0	16 09.9	92 37	148.2	15 42.3	92 37	148.4	15 14.8	92 37	148.6	14 47.2	92 36	148.8	14 19.5	92 36	149.0	3
4	17 10.0	91 39	146.6	16 42.5	91 38	146.8	16 15.1	91 38	147.1	15 47.7	91 38	147.3	15 20.2	92 38	147.5	14 52.7	92 38	147.7	14 25.3	92 37	147.9	13 57.8	92 37	148.1	4
35	16 46.8	91 40	145.7	16 19.5	91 39	146.0	15 52.2	91 39	146.2	15 24.9	91 39	146.4	14 57.5	91 39	146.6	14 30.2	91 38	146.8	14 02.9	91 38	147.0	13 35.5	91 38	147.2	35
6	16 23.0	90 40	144.9	15 55.9	91 40	145.1	15 28.7	91 40	145.3	15 01.5	91 40	145.5	14 34.3	91 40	145.7	14 07.1	91 39	145.9	13 39.9	91 39	146.2	13 12.7	91 39	146.4	6
7	15 58.8	90 41	144.0	15 31.7	90 41	144.2	15 04.7	90 41	144.4	14 37.7	90 41	144.6	14 10.6	90 40	144.9	13 43.5	90 40	145.1	13 16.4	90 40	145.3	12 49.3	90 40	145.5	7
8	15 34.0	90 42	143.1	15 07.1	90 42	143.3	14 40.2	90 42	143.5	14 13.3	90 41	143.8	13 46.4	90 41	144.0	13 19.4	90 41	144.2	12 52.5	90 41	144.5	12 25.5	90 41	144.7	8
9	15 08.7	89 43	142.2	14 42.0	89 43	142.5	14 15.2	89 42	142.7	13 48.4	89 42	142.9	13 21.6	89 42	143.2	12 54.8	89 42	143.4	12 28.0	89 42	143.6	12 01.2	89 41	143.8	9
40	14 42.9	89 44	141.4	14 16.3	89 44	141.6	13 49.7	89 43	141.8	13 23.0	89 43	142.1	12 56.4	89 43	142.3	12 29.7	89 43	142.5	12 03.0	89 42	142.8	11 36.3	89 42	143.0	40
1	14 16.7	88 45	140.5	13 50.2	88 44	140.7	13 23.7	88 44	141.0	12 57.2	88 44	141.2	12 30.6	88 44	141.5	12 04.1	88 43	141.7	11 37.6	89 43	141.9	11 11.0	89 43	142.2	1
2	13 49.9	88 45	139.6	13 23.6	88 45	139.9	12 57.2	88 45	140.1	12 30.8	88 45	140.4	12 04.4	88 44	140.6	11 38.0	88 44	140.9	11 11.6	88 44	141.1	10 45.2	88 44	141.3	2
3	13 22.7	87 46	138.8	12 56.5	87 46	139.0	12 30.2	87 46	139.3	12 04.0	87 45	139.5	11 37.8	88 45	139.8	11 11.5	88 45	140.0	10 45.2	88 45	140.3	10 18.9	88 45	140.5	3
4	12 55.0	87 47	138.0	12 28.9	87 47	138.2	12 02.8	87 46	138.5	11 36.7	87 46	138.7	11 10.6	87 46	139.0	10 44.5	87 46	139.2	10 18.4	87 46	139.5	9 52.2	87 45	139.7	4
45	12 26.9	86 48	137.1	12 00.9	86 47	137.4	11 35.0	87 47	137.6	11 09.0	87 47	137.9	10 43.0	87 47	138.1	10 17.0	87 46	138.4	9 51.0	87 46	138.7	9 25.0	87 46	138.9	45
6	11 58.3	86 48	136.3	11 32.5	86 48	136.6	11 06.7	86 48	136.8	10 40.8	86 48	137.1	10 15.0	86 48	137.3	9 49.1	86 47	137.6	9 23.3	86 47	137.8	8 57.4	86 47	138.1	6
7	11 29.3	86 49	135.5	11 03.6	86 49	135.7	10 37.9	86 48	136.0	10 12.2	86 48	136.3	9 46.5	86 48	136.5	9 20.8	86 48	136.8	8 55.1	86 48	137.0	8 29.4	86 47	137.3	7
8	10 59.8	85 50	134.7	10 34.3	85 50	134.9	10 08.8	85 49	135.2	9 43.2	85 49	135.5	9 17.6	85 49	135.7	8 52.1	85 49	136.0	8 26.5	85 48	136.2	8 00.9	85 48	136.5	8
9	10 30.0	85 50	133.8	10 04.6	85 50	134.1	9 39.2	85 50	134.4	9 13.8	85 50	134.7	8 48.3	85 50	134.9	8 22.9	85 49	135.2	7 57.5	85 49	135.5	7 32.0	85 49	135.7	9
50	9 59.7	84 51	133.0	9 34.4	84 51	133.3	9 09.2	84 51	133.6	8 43.9	84 50	133.9	8 18.6	84 50	134.1	7 53.3	84 50	134.4	7 28.0	84 50	134.7	7 02.7	84 49	134.9	50
1	9 29.0	84 52	132.2	9 03.9	84 52	132.5	8 38.8	84 51	132.8	8 13.7	84 51	133.1	7 48.5	84 51	133.3	7 23.3	84 51	133.6	6 58.2	84 50	133.9	6 33.0	84 50	134.2	1
2	8 58.0	83 52	131.4	8 33.0	83 52	131.7	8 08.0	83 52	132.0	7 43.0	83 52	132.3	7 18.0	83 52	132.6	6 53.0	83 51	132.8	6 27.9	83 51	133.1	6 02.9	83 51	133.4	2
3	8 26.5	83 53	130.7	8 01.7	83 53	130.9	7 36.8	83 52	131.2	7 12.0	83 52	131.5	6 47.1	83 52	131.8	6 22.2	83 52	132.1	5 57.3	83 52	132.3	5 32.4	83 51	132.6	3
4	7 54.7	82 54	129.9	7 30.0	82 53	130.2	7 05.3	82 53	130.4	6 40.6	82 53	130.7	6 15.8	82 53	131.0	5 51.1	83 52	131.3	5 26.3	83 52	131.6	5 01.6	83 52	131.9	4
55	7 22.6	82 54	129.1	6 58.0	82 54	129.4	6 33.4	82 54	129.7	6 08.8	82 54	130.0	5 44.2	82 53	130.2	5 19.6	82 53	130.5							55
6	6 50.0	81 55	128.3	6 25.6	81 55	128.6	6 01.1	82 54	128.9	5 36.7	82 54	129.2	5 12.2	82 54	129.5										6
7	6 17.2	81 55	127.5	5 52.9	81 55	127.8	5 28.5	81 55	128.1	5 04.2	81 55	128.4													7
8	5 43.9	81 56	126.8	5 19.8	81 56	127.1																			8
9	5 10.4	80 56	126.0																						9

DECLINATION SAME NAME AS LATITUDE

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	13 34.2	70 67	75.1	13 55.2	70 67	74.8	14 16.1	70 67	74.4	14 37.0	70 67	74.0	14 57.9	70 66	73.7	15 18.7	69 66	73.3	15 39.5	69 66	72.9	16 00.3	69 66	72.5	91
2	12 54.9	70 67	74.5	13 15.0	70 67	74.1	13 36.0	70 66	73.7	13 57.0	70 66	73.4	14 18.0	70 66	73.0	14 38.9	70 66	72.6	14 59.8	70 66	72.2	15 20.6	69 66	71.9	2
3	12 13.9	70 67	73.8	12 35.0	70 66	73.4	12 56.1	70 66	73.1	13 17.2	70 66	72.7	13 38.2	70 66	72.3	13 59.2	70 66	72.0	14 20.1	70 66	71.6	14 41.1	70 66	71.2	3
4	11 34.0	71 66	73.1	11 55.1	71 66	72.7	12 16.3	71 66	72.4	12 37.4	70 66	72.0	12 58.6	70 66	71.7	13 19.6	70 66	71.3	13 40.7	70 66	70.9	14 01.7	70 65	70.6	4
95	10 54.1	71 66	72.4	11 15.4	71 66	72.1	11 36.7	71 66	71.7	11 57.9	71 66	71.3	12 19.1	71 66	71.0	12 40.2	70 65	70.6	13 01.4	70 65	70.3	13 22.5	70 65	69.9	95
6	10 14.5	71 66	71.7	10 35.8	71 66	71.4	10 57.2	71 66	71.0	11 18.5	71 65	70.7	11 39.7	71 65	70.3	12 01.0	71 65	70.0	12 22.2	71 65	69.6	12 43.4	71 65	69.2	6
7	9 35.0	71 66	71.1	9 56.4	71 65	70.7	10 17.8	71 65	70.4	10 39.2	71 65	70.0	11 00.6	71 65	69.6	11 21.9	71 65	69.3	11 43.2	71 65	68.9	12 04.5	71 65	68.6	7
8	8 55.6	72 65	70.4	9 17.2	72 65	70.0	9 38.7	72 65	69.7	10 00.1	72 65	69.3	10 21.6	71 65	69.0	10 43.0	71 65	68.6	11 04.4	71 64	68.3	11 25.8	71 64	67.9	8
9	8 16.5	72 65	69.7	8 38.1	72 65	69.3	8 59.7	72 65	69.0	9 21.2	72 65	68.6	9 42.8	72 64	68.3	10 04.3	72 64	67.9	10 25.8	72 64	67.6	10 47.3	72 64	67.2	9
100	7 37.5	72 65	69.0	7 59.2	72 65	68.7	8 20.8	72 64	68.3	8 42.5	72 64	68.0	9 04.2	72 64	67.6	9 25.8	72 64	67.3	9 47.4	72 64	66.9	10 09.0	72 64	66.6	100
1	6 58.6	73 64	68.3	7 20.4	73 64	68.0	7 42.2	73 64	67.6	8 04.0	72 64	67.3	8 25.7	72 64	66.9	8 47.4	72 64	66.6	9 09.1	72 63	66.2	9 30.8	72 63	65.9	1
2	6 20.0	73 64	67.6	6 41.9	73 64	67.3	7 03.8	73 64	66.9	7 25.6	73 64	66.6	7 47.5	73 64	66.3	8 09.3	73 63	65.9	8 31.1	73 63	65.6	8 52.9	73 63	65.2	2
3	5 41.5	73 64	66.9	6 03.5	73 64	66.6	6 25.5	73 63	66.3	6 47.5	73 63	65.9	7 09.4	73 63	65.6	7 31.3	73 63	65.2	7 53.2	73 63	64.9	8 15.1	73 63	64.5	3
4	5 03.3	74 63	66.3	5 25.4	74 63	65.9	5 47.5	74 63	65.6	6 09.5	74 63	65.2	6 31.6	73 63	64.9	6 53.6	73 63	64.6	7 15.6	73 62	64.2	7 37.6	73 62	63.9	4
105							5 09.6	74 63	64.9	5 31.8	74 63	64.5	5 53.9	74 62	64.2	6 16.1	74 62	63.9	6 38.2	74 62	63.5	7 00.3	74 62	63.2	105
6													5 16.5	74 62	63.5	5 38.8	74 62	63.2	6 01.0	74 62	62.8	6 23.2	74 61	62.5	6
7																5 01.7	75 62	62.5	5 24.0	74 61	62.2	5 46.4	74 61	61.8	7
8																						5 09.7	75 61	61.1	8

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Lat. 46°

H.A.	24° 00′			24° 30′			25° 00′			25° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	68 00.0	1.0 02	180.0	68 30.0	1.0 02	180.0	69 00.0	1.0 02	180.0	69 30.0	1.0 02	180.0
1	67 59.1	1.0 04	177.6	68 29.1	1.0 04	177.5	68 59.1	1.0 05	177.5	69 29.1	1.0 05	177.4
2	67 56.5	1.0 07	175.1	68 26.4	1.0 08	175.0	68 56.3	1.0 08	175.0	69 26.3	1.0 08	174.9
3	67 52.0	1.0 10	172.7	68 21.9	1.0 10	172.6	68 51.8	99 11	172.4	69 21.6	99 11	172.3
4	67 45.9	99 13	170.3	68 15.6	99 13	170.1	68 45.4	99 14	170.0	69 15.1	99 14	169.8
05	67 38.0	99 16	167.9	68 07.6	99 16	167.7	68 37.2	99 16	167.5	69 06.8	99 17	167.3
6	67 28.5	98 19	165.6	67 57.9	98 19	165.3	68 27.3	98 19	165.0	68 56.7	98 20	164.8
7	67 17.2	98 21	163.2	67 46.5	97 22	163.0	68 15.7	97 22	162.6	68 44.9	97 22	162.3
8	67 04.4	97 24	161.0	67 33.5	97 24	160.6	68 02.5	97 25	160.3	68 31.4	96 25	159.9
9	66 50.1	96 26	158.7	67 18.9	96 27	158.3	67 47.6	96 27	158.0	68 16.3	96 28	157.6
10	66 34.2	95 29	156.5	67 02.7	95 29	156.1	67 31.2	95 30	155.7	67 59.7	95 30	155.3
1	66 16.8	94 31	154.3	66 45.1	94 32	153.9	67 13.3	94 32	153.5	67 41.5	94 33	153.0
2	65 58.1	94 34	152.2	66 26.1	93 34	151.8	66 54.0	93 34	151.3	67 21.9	93 35	150.8
3	65 38.0	93 36	150.1	66 05.7	92 36	149.7	66 33.3	92 37	149.2	67 00.9	92 37	148.7
4	65 16.6	92 38	148.1	65 44.0	91 38	147.6	66 11.3	91 39	147.1	66 38.5	91 39	146.6
15	64 53.9	91 40	146.1	65 21.0	90 40	145.6	65 48.1	90 41	145.1	66 15.0	89 41	144.5
6	64 30.1	90 42	144.2	64 56.9	89 42	143.7	65 23.6	89 42	143.1	65 50.2	88 43	142.6
7	64 05.2	89 43	142.3	64 31.7	88 44	141.8	64 58.1	88 44	141.2	65 24.3	87 45	140.7
8	63 39.2	88 45	140.5	64 05.4	87 46	139.9	64 31.4	87 46	139.4	64 57.4	86 47	138.8
9	63 12.2	87 47	138.7	63 38.1	86 47	138.2	64 03.8	86 48	137.6	64 29.4	85 48	137.0
20	62 44.2	85 48	137.0	63 09.8	85 49	136.4	63 35.2	85 49	135.8	64 00.5	84 50	135.2
1	62 15.3	84 50	135.3	62 40.6	84 50	134.7	63 05.7	84 50	134.1	63 30.7	83 51	133.5
2	61 45.6	84 51	133.7	62 10.6	83 51	133.1	62 35.4	82 52	132.5	63 00.1	82 52	131.9
3	61 15.1	83 52	132.1	61 39.8	82 53	131.5	62 04.3	81 53	130.9	62 28.7	81 54	130.3
4	60 43.8	82 53	130.5	61 08.2	81 54	129.9	61 32.4	81 54	129.3	61 56.5	80 55	128.7
25	60 11.7	81 54	129.0	60 35.9	80 55	128.4	60 59.8	80 56	127.8	61 23.6	79 56	127.2
6	59 39.0	80 56	127.6	60 02.9	79 56	127.0	60 26.6	79 56	126.4	60 50.1	78 57	125.7
7	59 05.7	79 56	126.1	59 29.3	78 57	125.5	59 52.7	78 58	124.9	60 15.9	77 58	124.3
8	58 31.7	78 58	124.8	58 55.1	78 58	124.2	59 18.2	77 58	123.5	59 41.2	76 59	122.9
9	57 57.2	77 58	123.4	58 20.3	77 59	122.8	58 43.2	76 59	122.2	59 06.0	75 60	121.6
30	57 22.2	76 59	122.1	57 45.0	76 60	121.5	58 07.7	75 60	120.9	58 30.2	75 60	120.3
1	56 46.6	76 60	120.8	57 09.2	75 60	120.2	57 31.7	75 61	119.6	57 54.0	74 61	119.0
2	56 10.6	75 61	119.6	56 33.0	74 61	119.0	56 55.2	74 62	118.4	57 17.3	73 62	117.7
3	55 34.1	74 62	118.4	55 56.3	74 62	117.8	56 18.4	73 62	117.2	56 40.2	73 62	116.5
4	54 57.2	74 62	117.2	55 19.2	73 62	116.6	55 41.1	72 63	116.0	56 02.7	72 63	115.4
35	54 20.0	73 63	116.0	54 41.8	72 63	115.4	55 03.4	72 63	114.8	55 24.9	71 64	114.2
6	53 42.3	72 63	114.9	54 04.0	72 64	114.3	54 25.4	71 64	113.7	54 46.7	71 64	113.1
7	53 04.4	72 64	113.8	53 25.8	71 64	113.2	53 47.1	71 64	112.6	54 08.2	70 65	112.0
8	52 26.1	71 64	112.7	52 47.4	71 65	112.1	53 08.5	70 65	111.5	53 29.4	70 65	110.9
9	51 47.5	71 65	111.6	52 08.6	70 65	111.1	52 29.6	70 65	110.5	52 50.4	69 66	109.9
40	51 08.6	70 65	110.6	51 29.6	70 65	110.0	51 50.4	69 66	109.5	52 11.0	69 66	108.9
1	50 29.4	70 66	109.6	50 50.3	69 66	109.0	51 11.0	69 66	108.5	51 31.5	68 66	107.9
2	49 50.1	69 66	108.6	50 10.8	69 66	108.0	50 31.3	68 66	107.5	50 51.7	68 67	106.9
3	49 10.5	69 66	107.6	49 31.0	68 67	107.1	49 51.5	68 67	106.5	50 11.7	67 67	105.9
4	48 30.6	69 67	106.7	48 51.1	68 67	106.1	49 11.4	67 67	105.6	49 31.6	67 67	105.0
45	47 50.6	68 67	105.7	48 11.0	68 67	105.2	48 31.2	67 67	104.6	48 51.2	67 68	104.1
6	47 10.4	68 67	104.8	47 30.7	67 67	104.3	47 50.8	67 68	103.7	48 10.7	66 68	103.2
7	46 30.0	67 68	103.9	46 50.2	67 68	103.4	47 10.2	66 68	102.8	47 30.1	66 68	102.3
8	45 49.5	67 68	103.0	46 09.6	67 68	102.5	46 29.5	66 68	102.0	46 49.3	66 68	101.4
9	45 08.8	67 68	102.2	45 28.8	66 68	101.6	45 48.7	66 68	101.1	46 08.4	65 68	100.6
50	44 28.0	67 68	101.3	44 47.9	66 68	100.8	45 07.7	66 68	100.2	45 27.3	65 69	99.7
1	43 47.1	66 68	100.5	44 06.9	66 69	99.9	44 26.6	65 69	99.4	44 46.2	65 69	98.9
2	43 06.0	66 68	99.6	43 25.8	66 69	99.1	43 45.5	65 69	98.6	44 05.0	65 69	98.1
3	42 24.9	66 69	98.8	42 44.6	66 69	98.3	43 04.2	65 69	97.8	43 23.7	65 69	97.2
4	41 43.7	66 69	98.0	42 03.3	65 69	97.5	42 22.9	65 69	97.0	42 42.3	64 69	96.5
55	41 02.3	66 69	97.2	41 22.0	65 69	96.7	41 41.5	65 69	96.2	42 00.8	64 69	95.7
6	40 21.0	65 69	96.4	40 40.5	65 69	95.9	41 00.0	65 69	95.4	41 19.3	64 69	94.9
7	39 39.5	65 69	95.6	39 59.1	65 69	95.1	40 18.5	65 69	94.6	40 37.8	64 69	94.1
8	38 58.0	65 69	94.8	39 17.5	65 69	94.4	39 36.9	64 69	93.9	39 56.2	64 69	93.4
9	38 16.5	65 69	94.1	38 35.9	65 69	93.6	38 55.3	64 69	93.1	39 14.6	64 69	92.6
60	37 34.9	65 69	93.3	37 54.3	65 69	92.8	38 13.7	64 69	92.4	38 32.9	64 69	91.9
1	36 53.2	65 69	92.6	37 12.7	65 69	92.1	37 32.0	64 69	91.6	37 51.2	64 69	91.1
2	36 11.6	65 69	91.8	36 31.0	65 69	91.4	36 50.4	64 69	90.9	37 09.6	64 69	90.4
3	35 29.9	65 69	91.1	35 49.4	65 69	90.6	36 08.7	64 69	90.2	36 27.9	64 69	89.7
4	34 48.2	65 69	90.4	35 07.7	65 69	89.9	35 27.0	64 69	89.5	35 46.2	64 69	89.0
65	34 06.6	65 69	89.7	34 26.0	65 69	89.2	34 45.3	64 69	88.7	35 04.6	64 69	88.3
6	33 24.9	65 69	89.0	33 44.3	65 69	88.5	34 03.7	64 69	88.0	34 22.9	64 69	87.6
7	32 43.2	65 69	88.2	33 02.7	65 69	87.8	33 22.0	64 69	87.3	33 41.3	64 69	86.9
8	32 01.6	65 69	87.5	32 21.0	65 69	87.1	32 40.4	64 69	86.6	32 59.7	64 69	86.2
9	31 19.9	65 69	86.8	31 39.4	65 69	86.4	31 58.8	64 69	85.9	32 18.1	64 69	85.5
70	30 38.3	65 69	86.1	30 57.8	65 69	85.7	31 17.3	65 69	85.3	31 36.6	64 69	84.8
1	29 56.8	65 69	85.5	30 16.3	65 69	85.0	30 35.7	65 69	84.6	30 55.1	64 69	84.1
2	29 15.3	65 69	84.8	29 34.8	65 69	84.3	29 54.3	65 69	83.9	30 13.6	64 69	83.5
3	28 33.8	65 69	84.1	28 53.4	65 69	83.7	29 12.9	65 69	83.2	29 32.3	65 69	82.8
4	27 52.3	66 69	83.4	28 12.0	65 69	83.0	28 31.5	65 69	82.6	28 51.0	65 69	82.1
75	27 11.0	66 69	82.7	27 30.6	65 69	82.3	27 50.2	65 69	81.9	28 09.7	65 69	81.5
6	26 29.6	66 69	82.1	26 49.3	66 69	81.6	27 09.0	65 69	81.2	27 28.5	65 68	80.8
7	25 48.4	66 69	81.4	26 08.1	66 69	81.0	26 27.8	65 68	80.6	26 47.4	65 68	80.1
8	25 07.2	66 68	80.7	25 27.0	66 68	80.3	25 46.7	66 68	79.9	26 06.4	65 68	79.5
9	24 26.1	66 68	80.1	24 46.0	66 68	79.6	25 05.8	66 68	79.2	25 25.5	66 68	78.8
80	23 45.1	66 68	79.4	24 05.0	66 68	79.0	24 24.9	66 68	78.6	24 44.6	66 68	78.2
1	23 04.2	67 68	78.7	23 24.2	66 68	78.3	23 44.0	66 68	77.9	24 03.9	66 68	77.5
2	22 23.4	67 68	78.1	22 43.4	67 68	77.7	23 03.3	66 68	77.3	23 23.2	66 68	76.9
3	21 42.6	67 68	77.4	22 02.7	67 68	77.0	22 22.7	67 68	76.6	22 42.7	66 67	76.2
4	21 02.0	67 68	76.8	21 22.2	67 67	76.4	21 42.3	67 67	76.0	22 02.3	67 67	75.6
85	20 21.5	67 67	76.1	20 41.7	67 67	75.7	21 01.9	67 67	75.3	21 22.0	67 67	74.9
6	19 41.1	68 67	75.4	20 01.4	68 67	75.0	20 21.6	67 67	74.7	20 41.8	67 67	74.3
7	19 00.8	68 67	74.8	19 21.2	68 67	74.4	19 41.5	68 67	74.0	20 01.7	67 67	73.6
8	18 20.7	68 67	74.1	18 41.1	68 67	73.7	19 01.5	68 66	73.4	19 21.8	68 66	73.0
9	17 40.6	68 66	73.5	18 01.2	68 66	73.1	18 21.6	68 66	72.7	18 42.0	68 66	72.3
90	17 00.8	69 66	72.8	17 21.4	69 66	72.4	17 41.9	68 66	72.1	18 02.4	68 66	71.7

H.A.	26° 00′			26° 30′			27° 00′			27° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	70 00.0	1.0 02	180.0	70 30.0	1.0 02	180.0	71 00.0	1.0 02	180.0	71 30.0	1.0 02	180.0
1	69 59.0	1.0 05	177.4	70 29.0	1.0 05	177.3	70 59.0	1.0 05	177.3	71 29.0	1.0 05	177.2
2	69 56.2	1.0 08	174.8	70 26.1	1.0 08	174.6	70 56.0	1.0 08	174.5	71 25.9	1.0 08	174.4
3	69 51.4	99 11	172.1	70 21.3	99 11	172.0	70 51.1	99 12	171.8	71 20.9	99 12	171.7
4	69 44.8	99 14	169.6	70 14.5	99 14	169.4	70 44.2	99 15	169.1	71 13.8	99 15	168.9
05	69 36.3	98 17	167.0	70 05.9	98 17	166.8	70 35.4	98 18	166.5	71 04.9	98 18	166.2
6	69 26.1	98 20	164.5	69 55.4	98 20	164.2	70 24.7	98 21	163.9	70 54.0	98 21	163.5
7	69 14.1	97 23	162.0	69 43.2	97 23	161.7	70 12.2	97 24	161.3	70 41.3	97 24	160.9
8	69 00.3	96 26	159.6	69 29.2	96 26	159.2	69 58.0	96 26	158.8	70 26.8	96 27	158.4
9	68 45.0	96 28	157.2	69 13.6	95 29	156.8	69 42.1	95 29	156.3	70 10.5	95 30	155.8
10	68 28.0	94 31	154.8	68 56.3	94 31	154.4	69 24.5	94 32	153.9	69 52.7	94 32	153.4
1	68 09.6	93 33	152.5	68 37.5	93 34	152.1	69 05.4	93 34	151.6	69 33.3	93 35	151.0
2	67 49.6	92 36	150.3	68 17.3	92 36	149.8	68 44.9	92 37	149.3	69 12.3	91 37	148.7
3	67 28.3	91 38	148.1	67 55.6	91 38	147.6	68 22.9	91 39	147.0	68 50.0	90 39	146.5
4	67 05.7	90 40	146.0	67 32.7	90 40	145.5	67 59.5	89 41	144.9	68 26.3	89 42	144.3
15	66 41.8	89 42	144.0	67 08.4	89 42	143.4	67 34.9	88 43	142.8	68 01.3	88 44	142.2
6	66 16.7	88 44	142.0	66 43.0	87 44	141.4	67 09.2	87 45	140.8	67 35.2	86 45	140.1
7	65 50.4	87 45	140.1	66 16.4	86 46	139.4	66 42.2	86 47	138.8	67 07.9	85 47	138.1
8	65 23.2	86 47	138.2	65 48.8	85 48	137.5	66 14.3	85 48	136.9	66 39.6	84 49	136.2
9	64 54.9	85 49	136.4	65 20.2	84 49	135.7	65 45.3	83 50	135.1	66 10.2	83 50	134.4
20	64 25.7	83 50	134.6	64 50.6	83 51	133.9	65 15.4	82 51	133.3	65 40.0	82 52	132.6
1	63 55.5	82 52	132.9	64 20.2	82 52	132.2	64 44.6	81 53	131.6	65 08.9	81 53	130.9
2	63 24.6	81 53	131.2	63 48.9	81 53	130.6	64 13.0	80 54	129.9	64 37.0	79 54	129.2
3	62 52.8	80 54	129.6	63 16.9	80 55	128.9	63 40.7	79 55	128.3	64 04.3	78 56	127.6
4	62 20.4	79 55	128.0	62 44.1	79 56	127.4	63 07.6	78 56	126.7	63 30.9	77 57	126.0
25	61 47.2	78 56	126.5	62 10.6	78 57	125.9	62 33.9	77 57	125.2	62 56.9	76 58	124.5
6	61 13.4	77 57	125.1	61 36.5	77 58	124.4	61 59.5	76 58	123.7	62 22.2	75 59	123.0
7	60 39.0	77 58	123.6	61 01.9	76 59	123.0	61 24.5	75 59	122.3	61 47.0	75 60	121.6
8	60 04.0	76 59	122.3	60 26.6	75 60	121.6	60 49.0	74 60	120.9	61 11.2	74 60	120.2
9	59 28.5	75 60	120.9	59 50.9	74 60	120.3	60 13.0	74 61	119.6	60 35.0	73 61	118.9
30	58 52.5	74 61	119.6	59 14.6	73 61	119.0	59 36.6	73 62	118.3	59 58.3	72 62	117.6
1	58 16.1	73 62	118.3	58 38.0	73 62	117.7	58 59.6	72 62	117.0	59 21.1	71 63	116.3
2	57 39.2	73 62	117.1	58 00.8	72 62	116.5	58 22.3	71 63	115.8	58 43.6	71 63	115.1
3	57 01.9	72 63	115.9	57 23.3	71 63	115.3	57 44.6	71 64	114.6	58 05.6	70 64	113.9
4	56 24.2	71 63	114.7	56 45.5	71 64	114.1	57 06.5	70 64	113.4	57 27.4	69 64	112.8
35	55 46.2	71 64	113.6	56 07.2	70 64	113.0	56 28.1	69 64	112.3	56 48.8	69 65	111.6
6	55 07.8	70 64	112.5	55 28.7	69 65	111.8	55 49.4	69 65	111.2	56 09.9	68 65	110.5
7	54 29.1	69 65	111.4	54 49.9	69 65	110.8	55 10.4	68 66	110.1	55 30.7	67 66	109.5
8	53 50.2	69 65	110.3	54 10.8	68 66	109.7	54 31.1	68 66	109.1	54 51.3	67 66	108.4
9	53 11.0	68 66	109.3	53 31.4	68 66	108.7	53 51.6	67 66	108.0	54 11.7	66 66	107.4
40	52 31.5	68 66	108.3	52 51.8	67 66	107.7	53 11.9	67 66	107.0	53 31.8	66 67	106.4
1	51 51.8	67 66	107.3	52 12.0	67 67	106.7	52 31.9	66 67	106.1	52 51.7	66 67	105.4
2	51 11.9	67 67	106.3	51 32.0	66 67	105.7	51 51.8	66 67	105.1	52 11.5	65 67	104.5
3	50 31.8	67 67	105.4	50 51.7	66 67	104.8	51 11.5	65 68	104.2	51 31.0	65 68	103.6
4	49 51.5	66 67	104.4	50 11.4	66 68	103.8	50 31.0	65 68	103.2	50 50.4	65 68	102.6
45	49 11.1	66 68	103.5	49 30.8	65 68	102.9	49 50.3	65 68	102.3	50 09.7	64 68	101.7
6	48 30.5	66 68	102.6	48 50.1	65 68	102.0	49 09.5	65 68	101.5	49 28.8	64 68	100.9
7	47 49.8	65 68	101.7	48 09.3	65 68	101.2	48 28.6	64 68	100.6	48 47.8	64 68	100.0
8	47 08.9	65 68	100.9	47 28.3	65 68	100.3	47 47.6	64 68	99.7	48 06.7	63 69	99.2
9	46 27.9	65 68	100.0	46 47.3	64 69	99.4	47 06.5	64 69	98.9	47 25.5	63 69	98.3
50	45 46.8	65 69	99.2	46 06.1	64 69	98.6	46 25.3	64 69	98.1	46 44.2	63 69	97.5
1	45 05.6	64 69	98.3	45 24.9	64 69	97.8	45 43.9	63 69	97.2	46 02.9	63 69	96.7
2	44 24.3	64 69	97.5	44 43.5	64 69	97.0	45 02.6	63 69	96.4	45 21.5	63 69	95.9
3	43 43.0	64 69	96.7	44 02.1	64 69	96.2	44 21.1	63 69	95.6	44 40.0	63 69	95.1
4	43 01.5	64 69	95.9	43 20.6	63 69	95.4	43 39.6	63 69	94.9	43 58.4	62 69	94.3
55	42 20.0	64 69	95.1	42 39.1	63 69	94.6	42 58.1	63 69	94.1	43 16.8	62 69	93.6
6	41 38.5	64 69	94.4	41 57.6	63 69	93.9	42 16.5	63 69	93.3	42 35.2	62 69	92.8
7	40 56.9	64 69	93.6	41 16.0	63 69	93.1	41 34.8	63 69	92.6	41 53.6	62 69	92.1
8	40 15.3	64 69	92.9	40 34.3	63 69	92.4	40 53.2	63 69	91.8	41 11.9	62 69	91.3
9	39 33.7	64 69	92.1	39 52.7	63 69	91.6	40 11.5	63 69	91.1	40 30.3	62 69	90.6
60	38 52.0	63 69	91.4	39 11.0	63 69	90.9	39 29.9	63 69	90.4	39 48.6	62 69	89.9
1	38 10.3	63 69	90.7	38 29.3	63 69	90.2	38 48.2	63 69	89.7	39 06.9	62 69	89.2
2	37 28.7	63 69	89.9	37 47.6	63 69	89.4	38 06.5	63 69	88.9	38 25.2	62 69	88.4
3	36 47.0	63 69	89.2	37 06.0	63 69	88.7	37 24.8	63 69	88.2	37 43.6	62 69	87.7
4	36 05.3	63 69	88.5	36 24.3	63 69	88.0	36 43.2	63 69	87.5	37 01.9	62 69	87.1
65	35 23.7	64 69	87.8	35 42.7	63 69	87.3	36 01.6	63 69	86.8	36 20.3	62 69	86.4
6	34 42.0	64 69	87.1	35 01.0	63 69	86.6	35 20.0	63 69	86.2	35 38.7	62 69	85.7
7	34 00.4	64 69	86.4	34 19.5	63 69	85.9	34 38.4	63 69	85.5	34 57.2	63 69	85.0
8	33 18.8	64 69	85.7	33 37.9	63 69	85.3	33 56.9	63 69	84.8	34 15.7	63 69	84.3
9	32 37.3	64 69	85.0	32 56.4	63 69	84.6	33 15.4	63 69	84.1	33 34.3	63 69	83.7
70	31 55.8	64 69	84.4	32 14.9	64 69	83.9	32 33.9	63 69	83.4	32 52.9	63 69	83.0
1	31 14.3	64 69	83.7	31 33.5	64 69	83.2	31 52.6	63 69	82.8	32 11.5	63 69	82.3
2	30 32.9	64 69	83.0	30 52.1	64 69	82.6	31 11.2	64 69	82.1	31 30.3	63 69	81.7
3	29 51.6	64 69	82.3	30 10.8	64 69	81.9	30 30.0	64 69	81.5	30 49.0	63 69	81.0
4	29 10.3	64 69	81.7	29 29.6	64 69	81.2	29 48.8	64 68	80.8	30 07.9	64 68	80.4
75	28 29.1	65 68	81.0	28 48.5	64 68	80.6	29 07.7	64 68	80.1	29 26.9	64 68	79.7
6	27 48.0	65 68	80.4	28 07.4	65 68	79.9	28 26.7	64 68	79.5	28 45.9	64 68	79.1
7	27 06.9	65 68	79.7	27 26.4	65 68	79.3	27 45.7	64 68	78.8	28 05.0	64 68	78.4
8	26 26.0	65 68	79.0	26 45.5	65 68	78.6	27 04.9	65 68	78.2	27 24.2	64 68	77.8
9	25 45.1	65 68	78.4	26 04.7	65 68	78.0	26 24.1	65 68	77.6	26 43.6	65 68	77.1
80	25 04.3	66 68	77.7	25 23.9	65 68	77.3	25 43.5	65 68	76.9	26 03.0	65 67	76.5
1	24 23.6	66 68	77.1	24 43.3	66 68	76.7	25 03.0	65 67	76.3	25 22.5	65 67	75.8
2	23 43.1	66 68	76.4	24 02.8	66 67	76.0	24 22.5	66 67	75.6	24 42.2	65 67	75.2
3	23 02.6	66 67	75.8	23 22.4	66 67	75.4	23 42.2	66 67	75.0	24 01.9	66 67	74.6
4	22 22.3	66 67	75.2	22 42.2	66 67	74.7	23 02.0	66 67	74.3	23 21.8	66 67	73.9
85	21 42.0	67 67	74.5	22 02.0	67 67	74.1	22 21.9	66 67	73.7	22 41.8	66 66	73.3
6	21 01.9	67 66	73.9	21 22.0	67 66	73.5	21 42.0	67 66	73.1	22 02.0	66 66	72.7
7	20 22.0	67 66	73.2	20 42.1	67 66	72.8	21 02.2	67 66	72.4	21 22.2	67 66	72.0
8	19 42.1	68 66	72.6	20 02.4	67 66	72.2	20 22.5	67 66	71.8	20 42.7	67 66	71.4
9	19 02.4	68 66	71.9	19 22.7	68 66	71.5	19 43.0	67 66	71.1	20 03.2	67 65	70.8
90	18 22.9	68 66	71.3	18 43.3	68 66	70.9	19 03.7	68 65	70.5	19 24.0	68 65	70.1

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DECLINATION CONTRARY NAME TO LATITUDE

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	
00	20 00.0	1.0 01	180.0	19 30.0	1.0 01	180.0	19 00.0	1.0 01	180.0	18 30.0	1.0 01	180.0	18 00.0	1.0 00	180.0	17 30.0	1.0 01	180.0	17 00.0	1.0 00	180.0	16 30.0	1.0 01	180.0	00
1	19 59.6	1.0 02	179.0	19 29.6	1.0 02	179.0	18 59.7	1.0 02	179.0	18 29.7	1.0 02	179.0	17 59.7	1.0 02	179.1	17 29.7	1.0 02	179.1	16 59.7	1.0 02	179.1	16 29.7	1.0 02	179.1	1
2	19 58.6	1.0 03	178.1	19 28.6	1.0 03	178.1	18 58.6	1.0 03	178.1	18 28.6	1.0 03	178.1	17 58.6	1.0 03	178.1	17 28.6	1.0 03	178.1	16 58.6	1.0 03	178.1	16 28.7	1.0 03	178.2	2
3	19 56.8	1.0 04	177.1	19 26.8	1.0 04	177.1	18 56.9	1.0 04	177.1	18 26.9	1.0 04	177.1	17 56.9	1.0 04	177.2	17 26.9	1.0 04	177.2	16 57.0	1.0 04	177.2	16 27.0	1.0 04	177.2	3
4	19 54.3	1.0 05	176.1	19 24.4	1.0 05	176.1	18 54.4	1.0 05	176.2	18 24.5	1.0 05	176.2	17 54.5	1.0 05	176.2	17 24.5	1.0 05	176.2	16 54.6	1.0 05	176.3	16 24.6	1.0 05	176.3	4
05	19 51.2	1.0 06	175.1	19 21.2	1.0 06	175.2	18 51.3	1.0 06	175.2	18 21.4	1.0 06	175.2	17 51.4	1.0 06	175.3	17 21.5	1.0 06	175.3	16 51.5	1.0 06	175.3	16 21.6	1.0 06	175.4	05
6	19 47.3	1.0 08	174.2	19 17.4	1.0 08	174.2	18 47.5	1.0 08	174.3	18 17.6	1.0 07	174.3	17 47.6	1.0 07	174.3	17 17.7	1.0 07	174.4	16 47.8	1.0 07	174.4	16 17.9	1.0 07	174.5	6
7	19 42.7	1.0 09	173.2	19 12.8	1.0 09	173.3	18 43.0	1.0 09	173.3	18 13.1	1.0 09	173.4	17 43.2	1.0 08	173.4	17 13.3	1.0 08	173.4	16 43.4	1.0 08	173.5	16 13.5	1.0 08	173.5	7
8	19 37.4	99 10	172.2	19 07.6	99 10	172.3	18 37.7	99 10	172.4	18 07.9	99 10	172.4	17 38.1	99 10	172.5	17 08.2	99 10	172.5	16 38.4	99 10	172.6	16 08.5	99 09	172.6	8
9	19 31.5	99 11	171.3	19 01.7	99 11	171.3	18 31.9	99 11	171.4	18 02.1	99 11	171.5	17 32.3	99 11	171.5	17 02.4	99 11	171.6	16 32.6	99 11	171.6	16 02.8	99 11	171.7	9
10	19 24.8	99 12	170.3	18 55.0	99 12	170.4	18 25.3	99 12	170.5	17 55.5	99 12	170.5	17 25.8	99 12	170.6	16 56.0	99 12	170.7	16 26.2	99 12	170.7	15 56.5	99 12	170.8	10
1	19 17.4	99 13	169.4	18 47.7	99 13	169.4	18 18.0	99 13	169.5	17 48.3	99 13	169.6	17 18.6	99 13	169.7	16 48.9	99 13	169.7	16 19.2	99 13	169.8	15 49.5	99 13	169.9	1
2	19 09.4	99 14	168.4	18 39.8	99 14	168.5	18 10.1	99 14	168.6	17 40.5	99 14	168.6	17 10.8	99 14	168.7	16 41.1	99 14	168.8	16 11.5	99 14	168.9	15 41.8	99 14	169.0	2
3	19 00.7	99 16	167.4	18 31.1	99 16	167.5	18 01.5	99 16	167.6	17 31.9	99 15	167.7	17 02.3	99 15	167.8	16 32.7	99 15	167.9	16 03.1	99 15	168.0	15 33.5	99 15	168.0	3
4	18 51.3	98 17	166.5	18 21.8	98 17	166.6	17 52.2	98 16	166.7	17 22.7	98 16	166.8	16 53.2	98 16	166.9	16 23.6	98 16	167.0	15 54.1	98 16	167.0	15 24.6	98 16	167.1	4
15	18 41.2	98 18	165.5	18 11.8	98 18	165.6	17 42.3	98 18	165.7	17 12.8	98 18	165.8	16 43.4	98 17	165.9	16 13.9	98 17	166.0	15 44.4	98 17	166.1	15 15.0	98 17	166.2	15
6	18 30.5	98 19	164.6	18 01.1	98 19	164.7	17 31.7	98 19	164.8	17 02.3	98 19	164.9	16 32.9	98 18	165.0	16 03.5	98 18	165.1	15 34.1	98 18	165.2	15 04.7	98 18	165.3	6
7	18 19.1	98 20	163.7	17 49.8	98 20	163.8	17 20.5	98 20	163.9	16 51.1	98 20	164.0	16 21.8	98 20	164.1	15 52.5	98 19	164.2	15 23.2	98 19	164.3	14 53.9	98 19	164.4	7
8	18 07.0	97 21	162.7	17 37.8	97 21	162.8	17 08.6	97 21	163.0	16 39.3	97 21	163.1	16 10.1	97 21	163.2	15 40.9	97 20	163.3	15 11.6	97 20	163.4	14 42.4	98 20	163.5	8
9	17 54.3	97 22	161.8	17 25.2	97 22	161.9	16 56.0	97 22	162.0	16 26.9	97 22	162.2	15 57.7	97 22	162.3	15 28.6	97 22	162.4	14 59.4	97 21	162.5	14 30.2	97 21	162.6	9
20	17 41.0	97 23	160.9	17 11.9	97 23	161.0	16 42.9	97 23	161.1	16 13.8	97 23	161.2	15 44.7	97 23	161.4	15 15.7	97 23	161.5	14 46.6	97 22	161.6	14 17.5	97 22	161.8	20
1	17 27.0	97 24	159.9	16 58.0	97 24	160.1	16 29.1	97 24	160.2	16 00.1	97 24	160.3	15 31.1	97 24	160.5	15 02.1	97 24	160.6	14 33.1	97 23	160.7	14 04.1	97 23	160.9	1
2	17 12.4	96 25	159.0	16 43.5	96 25	159.1	16 14.6	96 25	159.3	15 45.7	96 25	159.4	15 16.9	96 25	159.6	14 48.0	96 25	159.7	14 19.1	96 24	159.9	13 50.2	96 24	160.0	2
3	16 57.1	96 26	158.1	16 28.4	96 26	158.2	15 59.6	96 26	158.4	15 30.8	96 26	158.5	15 02.0	96 26	158.7	14 33.2	96 26	158.8	14 04.4	96 26	159.0	13 35.6	96 25	159.1	3
4	16 41.3	96 28	157.2	16 12.6	96 27	157.3	15 43.9	96 27	157.5	15 15.2	96 27	157.6	14 46.6	96 27	157.8	14 17.9	96 27	157.9	13 49.2	96 26	158.1	13 20.5	96 26	158.2	4
25	16 24.8	95 28	156.3	15 56.2	95 28	156.4	15 27.7	95 28	156.6	14 59.1	95 28	156.7	14 30.5	95 28	156.9	14 01.9	95 28	157.1	13 33.3	95 27	157.2	13 04.7	95 27	157.4	25
6	16 07.7	95 30	155.4	15 39.3	95 29	155.5	15 10.8	95 29	155.7	14 42.3	95 29	155.9	14 13.8	95 29	156.0	13 45.4	95 29	156.2	13 16.9	95 28	156.3	12 48.4	95 28	156.5	6
7	15 50.0	94 30	154.5	15 21.7	95 30	154.6	14 53.3	95 30	154.8	14 25.0	95 30	155.0	13 56.6	95 30	155.1	13 28.2	95 29	155.3	12 59.9	95 29	155.5	12 31.5	95 29	155.6	7
8	15 31.8	94 31	153.6	15 03.6	94 31	153.7	14 35.3	94 31	153.9	14 07.1	94 31	154.1	13 38.8	94 31	154.3	13 10.5	94 30	154.4	12 42.3	94 30	154.6	12 14.0	94 30	154.8	8
9	15 12.9	94 32	152.7	14 44.8	94 32	152.9	14 16.7	94 32	153.0	13 48.6	94 32	153.2	13 20.4	94 32	153.4	12 52.3	94 31	153.6	12 24.1	94 31	153.8	11 56.0	94 31	153.9	9
30	14 53.5	93 33	151.8	14 25.5	93 33	152.0	13 57.5	93 33	152.2	13 29.5	93 33	152.3	13 01.5	93 33	152.5	12 33.4	93 32	152.7	12 05.4	93 32	152.9	11 37.4	94 32	153.1	30
1	14 33.5	93 34	150.9	14 05.7	93 34	151.1	13 37.8	93 34	151.3	13 09.9	93 34	151.5	12 42.0	93 34	151.7	12 14.1	93 33	151.9	11 46.1	93 33	152.0	11 18.2	93 33	152.2	1
2	14 13.0	93 35	150.0	13 45.2	93 35	150.2	13 17.5	93 35	150.4	12 49.7	93 35	150.6	12 21.9	93 34	150.8	11 54.1	93 34	151.0	11 26.3	93 34	151.2	10 58.5	93 34	151.4	2
3	13 51.9	92 36	149.2	13 24.3	92 36	149.4	12 56.6	92 36	149.6	12 29.0	92 35	149.8	12 01.3	92 35	150.0	11 33.7	92 35	150.2	11 06.0	92 35	150.4	10 38.3	92 35	150.6	3
4	13 30.3	92 37	148.3	13 02.8	92 37	148.5	12 35.3	92 36	148.7	12 07.7	92 36	148.9	11 40.2	92 36	149.1	11 12.7	92 36	149.3	10 45.1	92 36	149.5	10 17.6	92 35	149.7	4
35	13 08.1	91 38	147.4	12 40.7	91 38	147.7	12 13.4	91 37	147.9	11 46.0	91 37	148.1	11 18.6	91 37	148.3	10 51.1	91 37	148.5	10 23.7	91 36	148.7	9 56.3	91 36	148.9	35
6	12 45.4	91 39	146.6	12 18.2	91 38	146.8	11 50.9	91 38	147.0	11 23.7	91 38	147.2	10 56.4	91 38	147.4	10 29.1	91 38	147.7	10 01.8	91 37	147.9	9 34.5	91 37	148.1	6
7	12 22.2	90 40	145.7	11 55.1	90 39	146.0	11 28.0	90 39	146.2	11 00.8	90 39	146.4	10 33.7	91 39	146.6	10 06.5	91 38	146.8	9 39.4	91 38	147.0	9 12.2	91 38	147.3	7
8	11 58.5	90 40	144.9	11 31.5	90 40	145.1	11 04.5	90 40	145.3	10 37.5	90 40	145.6	10 10.5	90 40	145.8	9 43.5	90 39	146.0	9 16.5	90 39	146.2	8 49.4	90 39	146.5	8
9	11 34.3	89 41	144.1	11 07.5	90 41	144.3	10 40.6	90 41	144.5	10 13.7	90 40	144.7	9 46.8	90 40	145.0	9 19.9	90 40	145.2	8 53.0	90 40	145.4	8 26.1	90 40	145.6	9
40	11 09.6	89 42	143.2	10 42.9	89 42	143.5	10 16.2	89 42	143.7	9 49.4	89 41	143.9	9 22.7	89 41	144.2	8 55.9	89 41	144.4	8 29.2	89 41	144.6	8 02.4	89 40	144.8	40
1	10 44.4	89 43	142.4	10 17.8	89 43	142.6	9 51.2	89 42	142.9	9 24.6	89 42	143.1	8 58.0	89 42	143.3	8 31.4	89 42	143.6	8 04.8	89 42	143.8	7 38.1	89 41	144.0	1
2	10 18.8	88 44	141.6	9 52.3	88 43	141.8	9 25.9	88 43	142.1	8 59.4	88 43	142.3	8 32.9	88 43	142.5	8 06.4	88 42	142.8	7 39.9	88 42	143.0	7 13.4	88 42	143.3	2
3	9 52.6	88 44	140.8	9 26.3	88 44	141.0	9 00.0	88 44	141.3	8 33.7	88 44	141.5	8 07.3	88 43	141.7	7 41.0	88 43	142.0	7 14.6	88 43	142.2	6 48.3	88 43	142.5	3
4	9 26.0	87 45	140.0	8 59.9	87 45	140.2	8 33.7	87 45	140.5	8 07.5	87 44	140.7	7 41.3	87 44	140.9	7 15.1	87 44	141.2	6 48.9	87 44	141.4	6 22.7	87 43	141.7	4
45	8 59.0	87 46	139.2	8 33.0	87 46	139.4	8 06.9	87 45	139.7	7 40.9	87 45	139.9	7 14.8	87 45	140.2	6 48.8	87 45	140.4	6 22.7	87 44	140.7	5 56.6	87 44	140.9	45
6	8 31.5	86 46	138.4	8 05.6	86 46	138.6	7 39.7	86 46	138.9	7 13.8	86 46	139.1	6 47.9	86 46	139.4	6 22.0	86 45	139.6	5 56.0	86 45	139.9	5 30.1	86 45	140.1	6
7	8 03.6	86 47	137.6	7 37.9	86 47	137.8	7 12.1	86 47	138.1	6 46.3	86 47	138.3	6 20.5	86 46	138.6	5 54.8	86 46	138.9	5 29.0	86 46	139.1	5 03.2	86 46	139.4	7
8	7 35.3	85 48	136.8	7 09.7	85 48	137.0	6 44.0	85 48	137.3	6 18.4	85 47	137.6	5 52.8	85 47	137.8	5 27.1	86 47	138.1	5 01.5	86 47	138.3				8
9	7 06.5	85 49	136.0	6 41.1	85 48	136.3	6 15.6	85 48	136.5	5 50.1	85 48	136.8	5 24.6	85 48	137.1										9
50	6 37.4	84 49	135.2	6 12.0	84 49	135.5	5 46.7	84 49	135.7	5 21.3	85 48	136.0													50
1	6 07.8	84 50	134.4	5 42.6	84 50	134.7	5 17.4	84 50	135.0																1
2	5 37.8	84 51	133.7	5 12.8	84 50	133.9																			2
3	5 07.5	83 51	132.9																						3

DECLINATION SAME NAME AS LATITUDE

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	
91	16 21.0	69 66	72.2	16 41.7	69 66	71.8	17 02.3	69 66	71.4	17 22.9	69 66	71.0	17 43.5	68 66	70.6	18 04.0	68 65	70.3	18 24.4	68 65	69.9	18 44.9	68 65	69.5	91
2	15 41.4	69 66	71.5	16 02.2	69 66	71.1	16 22.9	69 66	70.7	16 43.6	69 65	70.4	17 04.2	69 65	70.0	17 24.8	69 65	69.6	17 45.4	68 65	69.2	18 05.9	68 65	68.8	2
3	15 02.0	70 66	70.8	15 22.8	69 65	70.5	15 43.6	69 65	70.1	16 04.4	69 65	69.7	16 25.1	69 65	69.3	16 45.8	69 65	69.0	17 06.5	69 64	68.6	17 27.1	69 64	68.2	3
4	14 22.7	70 65	70.2	14 43.6	70 65	69.8	15 04.5	70 65	69.4	15 25.4	70 65	69.1	15 46.2	69 64	68.7	16 07.0	69 64	68.3	16 27.8	69 64	67.9	16 48.5	69 64	67.6	4
95	13 43.5	70 65	69.5	14 04.6	70 65	69.2	14 25.6	70 65	68.8	14 46.6	70 64	68.4	15 07.5	70 64	68.0	15 28.4	70 64	67.7	15 49.2	69 64	67.3	16 10.1	69 64	66.9	95
6	13 04.6	71 65	68.9	13 25.7	70 64	68.5	13 46.8	70 64	68.1	14 07.9	70 64	67.8	14 28.9	70 64	67.4	14 49.9	70 64	67.0	15 10.9	70 64	66.7	15 31.8	70 63	66.3	6
7	12 25.8	71 64	68.2	12 47.0	71 64	67.8	13 08.2	71 64	67.5	13 29.4	71 64	67.1	13 50.5	70 64	66.7	14 11.6	70 63	66.4	14 32.7	70 63	66.0	14 53.7	70 63	65.6	7
8	11 47.2	71 64	67.5	12 08.5	71 64	67.2	12 29.8	71 64	66.8	12 51.1	71 64	66.5	13 12.3	71 63	66.1	13 33.5	71 63	65.7	13 54.7	71 63	65.4	14 15.9	70 63	65.0	8
9	11 08.8	71 64	66.9	11 30.2	71 64	66.5	11 51.6	71 63	66.2	12 13.0	71 63	65.8	12 34.3	71 63	65.4	12 55.6	71 63	65.1	13 16.9	71 63	64.7	13 38.2	71 62	64.4	9
100	10 30.5	72 63	66.2	10 52.1	72 63	65.9	11 13.6	72 63	65.5	11 35.1	72 63	65.1	11 56.5	71 63	64.8	12 17.9	71 62	64.4	12 39.4	71 62	64.1	13 00.7	71 62	63.7	100
1	9 52.5	72 63	65.5	10 14.1	72 63	65.2	10 35.7	72 63	64.8	10 57.3	72 62	64.5	11 18.9	72 62	64.1	11 40.5	72 62	63.8	12 02.0	72 62	63.4	12 23.5	72 62	63.1	1
2	9 14.6	73 63	64.9	9 36.4	72 63	64.5	9 58.1	72 62	64.2	10 19.8	72 62	63.8	10 41.5	72 62	63.5	11 03.2	72 62	63.1	11 24.8	72 62	62.8	11 46.4	72 61	62.4	2
3	8 37.0	73 62	64.2	8 58.9	73 62	63.9	9 20.7	73 62	63.5	9 42.5	73 62	63.2	10 04.3	73 62	62.8	10 26.1	73 61	62.5	10 47.9	72 61	62.1	11 09.6	72 61	61.8	3
4	7 59.6	73 62	63.5	8 21.6	73 62	63.2	8 43.5	73 62	62.8	9 05.5	73 61	62.5	9 27.4	73 61	62.1	9 49.3	73 61	61.8	10 11.1	73 61	61.4	10 33.0	73 61	61.1	4
105	7 22.4	74 62	62.8	7 44.5	74 61	62.5	8 06.6	74 61	62.2	8 28.6	73 61	61.8	8 50.6	73 61	61.5	9 12.6	73 61	61.1	9 34.6	73 60	60.8	9 56.6	73 60	60.4	105
6	6 45.4	74 61	62.2	7 07.6	74 61	61.8	7 29.8	74 61	61.5	7 52.0	74 61	61.1	8 14.1	74 60	60.8	8 36.3	74 60	60.5	8 58.4	74 60	60.1	9 20.5	74 60	59.8	6
7	6 08.7	74 61	61.5	6 31.0	74 61	61.1	6 53.3	74 60	60.8	7 15.6	74 60	60.5	7 37.9	74 60	60.1	8 00.1	74 60	59.8	8 22.4	74 60	59.5	8 44.6	74 59	59.1	7
8	5 32.2	75 61	60.8	5 54.6	75 60	60.5	6 17.0	75 60	60.1	6 39.4	75 60	59.8	7 01.8	75 60	59.5	7 24.2	75 59	59.1	7 46.6	75 59	58.8	8 08.9	74 59	58.5	8
9				5 18.5	75 60	59.8	5 41.0	75 60	59.4	6 03.6	75 59	59.1	6 26.1	75 59	58.8	6 48.6	75 59	58.5	7 11.1	75 59	58.1	7 33.5	75 59	57.8	9
110							5 05.3	76 59	58.8	5 27.9	75 59	58.4	5 50.6	75 59	58.1	6 13.2	75 59	57.8	6 35.8	75 58	57.4	6 58.4	75 58	57.1	110
1													5 15.3	76 58	57.4	5 38.1	76 58	57.1	6 00.8	76 58	56.8	6 23.5	76 58	56.4	1
2																5 03.2	76 58	56.4	5 26.1	76 58	56.1	5 49.0	76 57	55.8	2
3																						5 14.6	77 57	55.1	3

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Lat. 46°

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt °	°	′	Δd Δt °	°	′	Δd Δt °	°	′	Δd Δt °	°	′	Δd Δt °	°	′	Δd Δt °	°	′	Δd Δt °	°	′	Δd Δt °	°	
00	72 00.0	1.0 02	180.0	72 30.0	1.0 02	180.0	73 00.0	1.0 02	180.0	74 00.0	1.0 02	180.0	76 00.0	1.0 02	180.0	78 00.0	1.0 02	180.0	78 30.0	1.0 02	180.0	79 30.0	1.0 03	180.0	00
1	71 59.0	1.0 05	177.1	72 28.9	1.0 05	177.1	72 58.9	1.0 06	177.0	73 58.9	1.0 06	176.9	75 58.7	1.0 06	176.5	77 58.6	1.0 07	176.0	78 28.5	1.0 07	175.9	79 28.4	1.0 08	175.5	1
2	71 55.9	1.0 09	174.3	72 25.8	1.0 09	174.2	72 55.7	1.0 09	174.0	73 55.4	1.0 09	173.7	75 54.9	1.0 11	173.0	77 54.2	99 12	172.1	78 24.0	99 12	171.8	79 23.5	99 13	171.1	2
3	71 50.7	99 12	171.5	72 20.5	99 12	171.3	72 50.3	99 12	171.1	73 49.8	99 13	170.6	75 48.6	99 15	169.6	77 47.1	99 16	168.2	78 16.6	98 17	167.7	79 15.5	98 18	166.8	3
4	71 43.5	99 15	168.7	72 13.1	99 16	168.4	72 42.7	99 16	168.2	73 41.9	99 17	167.6	75 39.8	98 19	166.2	77 37.2	97 21	164.4	78 06.4	97 22	163.8	79 04.5	97 23	162.6	4
05	71 34.3	98 18	165.9	72 03.8	98 19	165.6	72 33.2	98 19	165.3	73 31.9	98 20	164.6	75 28.7	97 22	162.9	77 24.6	96 25	160.6	77 53.4	96 26	160.0	78 50.6	95 26	158.5	05
6	71 23.2	97 22	163.2	71 52.4	97 22	162.8	72 21.6	97 22	162.4	73 19.7	97 24	161.6	75 15.3	96 26	159.6	77 09.6	95 29	157.0	77 37.9	94 30	156.3	78 34.0	93 32	154.6	6
7	71 10.2	97 25	160.5	71 39.2	96 25	160.1	72 08.0	96 26	159.7	73 05.6	96 27	158.7	74 59.7	95 29	156.5	76 52.2	93 33	153.6	77 19.9	92 34	152.7	78 14.9	91 36	150.8	7
8	70 55.5	96 28	157.9	71 24.1	95 28	157.5	71 52.6	95 29	157.0	72 49.5	94 30	155.9	74 42.1	93 33	153.4	76 32.6	91 36	150.3	76 59.7	90 37	149.4	77 53.5	89 39	147.3	8
9	70 38.9	94 30	155.4	71 07.2	94 31	154.9	71 35.4	94 32	154.3	72 31.6	93 33	153.2	74 22.5	91 36	150.5	76 10.9	89 39	147.1	76 37.5	88 40	146.1	77 29.9	86 42	144.0	9
10	70 20.7	93 33	152.9	70 48.7	93 34	152.3	71 16.5	93 34	151.8	72 11.9	92 36	150.5	74 01.0	90 39	147.7	75 47.3	87 42	144.1	76 13.3	86 43	143.1	77 04.5	84 45	140.8	10
1	70 01.0	92 36	150.5	70 28.6	92 36	149.9	70 56.0	91 37	149.3	71 50.6	91 38	148.0	73 37.9	88 41	145.0	75 22.1	85 45	141.2	75 47.5	84 46	140.2	76 37.3	82 48	137.8	1
2	69 39.7	91 38	148.1	70 06.9	91 38	147.5	70 34.0	90 39	146.9	71 27.7	89 41	145.5	73 13.2	87 44	142.4	74 55.2	83 47	138.5	75 20.0	82 48	137.4	76 08.6	80 50	135.0	2
3	69 17.0	90 40	145.8	69 43.8	90 41	145.2	70 10.5	89 41	144.5	71 03.4	88 43	143.1	72 47.1	85 46	139.9	74 26.9	81 49	135.9	74 51.1	80 50	134.8	75 38.5	78 52	132.4	3
4	68 52.9	88 42	143.6	69 19.4	88 43	143.0	69 45.7	87 44	142.3	70 37.8	86 45	140.8	72 19.5	83 48	137.5	73 57.2	79 51	133.5	74 20.9	78 52	132.4	75 07.1	76 54	129.9	4
15	68 27.6	87 44	141.5	68 53.6	87 45	140.8	69 19.5	86 46	140.1	70 10.8	85 47	138.6	71 50.8	82 50	135.2	73 26.4	78 53	131.2	73 49.5	76 54	130.0	74 34.6	74 56	127.6	15
6	68 01.0	86 46	139.4	68 26.7	85 47	138.8	68 52.2	85 47	138.0	69 42.7	83 49	136.5	71 20.8	80 52	133.0	72 54.5	76 55	129.0	73 17.1	75 56	127.8	74 01.1	72 57	125.4	6
7	67 33.4	85 48	137.5	67 58.7	84 48	136.7	68 23.8	83 49	136.0	69 13.4	82 50	134.5	70 49.9	79 53	131.0	72 21.6	74 56	126.9	72 43.7	73 57	125.8	73 26.7	70 59	123.3	7
8	67 04.7	83 50	135.5	67 29.6	83 50	134.8	67 54.4	82 51	134.1	68 43.2	81 52	132.5	70 17.9	77 55	129.0	71 47.9	73 58	124.9	72 09.5	71 58	123.8	72 51.5	69 60	121.4	8
9	66 35.0	82 51	133.7	66 59.6	82 52	132.9	67 23.9	81 52	132.2	68 12.0	79 53	130.6	69 45.1	76 56	127.1	71 13.3	71 59	123.0	71 34.5	70 60	121.9	72 15.5	67 61	119.6	9
20	66 04.4	81 52	131.9	66 28.6	80 53	131.1	66 52.6	80 54	130.4	67 39.9	78 55	128.8	69 11.4	74 57	125.3	70 38.0	70 60	121.2	70 58.7	68 61	120.1	71 39.0	66 62	117.8	20
1	65 33.0	80 54	130.1	65 56.8	79 54	129.4	66 20.5	78 55	128.6	67 07.0	77 56	127.0	68 37.1	73 58	123.5	70 02.1	68 61	119.5	70 22.4	67 62	118.4	71 01.8	64 63	116.2	1
2	65 00.7	79 55	128.5	65 24.2	78 56	127.7	65 47.5	77 56	127.0	66 33.4	76 57	125.4	68 02.0	72 60	121.9	69 25.5	67 62	117.9	69 45.5	66 62	116.8	70 24.2	63 64	114.6	2
3	64 27.7	78 56	126.8	64 50.9	77 57	126.1	65 13.9	76 57	125.3	65 59.1	75 58	123.8	67 26.3	71 60	120.3	68 48.4	66 63	116.4	69 08.0	65 63	115.3	69 46.1	62 64	113.1	3
4	63 54.0	77 57	125.3	64 16.9	76 58	124.5	64 39.6	75 58	123.8	65 24.1	73 59	122.2	66 50.0	70 61	118.7	68 10.8	65 63	114.9	68 30.1	64 64	113.8	69 07.5	61 65	111.7	4
25	63 19.7	76 58	123.8	63 42.3	75 59	123.0	64 04.6	74 59	122.3	64 48.6	72 60	120.7	66 13.2	69 62	117.3	67 32.8	64 64	113.5	67 51.8	63 65	112.4	68 28.6	60 65	110.3	25
6	62 44.7	75 59	122.3	63 07.0	74 60	121.6	63 29.1	73 60	120.8	64 12.5	71 61	119.2	65 35.9	68 63	115.9	66 54.4	63 65	112.1	67 13.1	62 65	111.1	67 49.4	59 66	109.0	6
7	62 09.2	74 60	120.9	62 31.3	73 60	120.2	62 53.0	72 61	119.4	63 35.8	71 62	117.9	64 58.2	67 64	114.5	66 15.6	62 65	110.8	66 34.0	61 66	109.8	67 09.8	58 66	107.8	7
8	61 33.2	73 61	119.5	61 55.0	72 61	118.8	62 16.5	71 62	118.0	62 58.8	70 62	116.5	64 20.1	66 64	113.2	65 36.4	61 66	109.5	65 54.7	60 66	108.6	66 30.8	58 67	106.6	8
9	60 56.7	72 62	118.2	61 18.2	71 62	117.5	61 39.5	70 62	116.7	62 21.3	69 63	115.2	63 41.6	65 65	111.9	64 57.0	61 66	108.3	65 15.0	59 66	107.4	65 49.9	57 67	105.4	9
30	60 19.8	71 62	116.9	60 41.0	70 63	116.2	61 02.0	70 63	115.4	61 43.4	68 64	113.9	63 02.8	64 65	110.7	64 17.3	60 67	107.2	64 35.1	59 67	106.2	65 09.6	56 67	104.3	30
1	59 42.4	70 63	115.6	60 03.4	70 63	114.9	60 24.2	69 64	114.2	61 05.1	67 64	112.7	62 23.6	64 66	109.5	63 37.4	59 67	106.0	63 55.0	58 67	105.1	64 29.1	56 68	103.2	1
2	59 04.6	70 64	114.4	59 25.4	69 64	113.7	59 46.0	68 64	113.0	60 26.5	67 65	111.5	61 44.2	63 66	108.4	62 57.2	59 67	104.9	63 14.7	58 68	104.0	63 48.5	55 68	102.2	2
3	58 26.5	69 64	113.2	58 47.1	68 64	112.5	59 07.5	68 65	111.8	59 47.5	66 65	110.4	61 04.5	62 67	107.3	62 16.9	58 68	103.9	62 34.1	57 68	103.0	63 07.7	55 68	101.2	3
4	57 48.0	68 65	112.1	58 08.5	68 65	111.4	58 28.6	67 65	110.7	59 08.3	65 66	109.3	60 24.6	62 67	106.2	61 36.3	58 68	102.9	61 53.4	57 68	102.0	62 26.7	54 68	100.2	4
35	57 09.3	68 65	111.0	57 29.5	67 65	110.3	57 49.5	66 66	109.6	58 28.8	65 66	108.2	59 44.5	61 67	105.1	60 55.6	57 68	101.9	61 12.6	56 68	101.0	61 45.6	54 69	99.3	35
6	56 30.2	67 66	109.9	56 50.3	67 66	109.2	57 10.1	66 66	108.5	57 49.1	64 67	107.1	59 04.1	61 68	104.1	60 14.7	57 68	100.9	60 31.6	56 68	100.1	61 04.5	54 69	98.4	6
7	55 50.9	67 66	108.8	56 10.8	66 66	108.2	56 30.5	65 66	107.5	57 09.2	64 67	106.1	58 23.6	60 68	103.1	59 33.7	56 68	100.0	59 50.5	55 69	99.2	60 23.2	53 69	97.5	7
8	55 11.3	66 66	107.8	55 31.1	66 67	107.1	55 50.6	65 67	106.5	56 29.0	63 67	105.1	57 43.0	60 68	102.2	58 52.6	56 69	99.1	59 09.3	55 69	98.3	59 41.8	53 69	96.6	8
9	54 31.5	66 67	106.8	54 51.1	65 67	106.1	55 10.5	64 67	105.5	55 48.7	63 68	104.1	57 02.2	60 68	101.2	58 11.4	56 69	98.2	58 28.1	55 69	97.4	59 00.4	53 69	95.8	9
40	53 51.5	65 67	105.8	54 11.0	65 67	105.1	54 30.3	64 67	104.5	55 08.2	62 68	103.1	56 21.2	59 68	100.3	57 30.1	56 69	97.3	57 46.7	55 69	96.5	58 18.9	53 69	94.9	40
1	53 11.3	65 67	104.8	53 30.7	64 67	104.2	53 49.8	64 68	103.5	54 27.5	62 68	102.2	55 40.1	59 69	99.4	56 48.8	55 69	96.5	57 05.2	54 69	95.7	57 37.3	52 69	94.1	1
2	52 30.9	65 68	103.9	52 50.2	64 68	103.2	53 09.2	63 68	102.6	53 46.7	62 68	101.3	54 59.0	59 69	98.5	56 07.3	55 69	95.6	56 23.7	54 69	94.9	56 55.7	52 69	93.3	2
3	51 50.4	64 68	102.9	52 00.5	64 68	102.3	52 28.5	63 68	101.7	53 05.8	61 68	100.4	54 17.7	58 69	97.7	55 25.8	55 69	94.8	55 42.2	54 69	94.1	56 14.1	52 69	92.6	3
4	51 00.7	64 68	102.0	51 28.7	63 68	101.4	51 47.6	63 68	100.8	52 24.7	61 69	99.5	53 36.4	58 69	96.8	54 44.3	55 69	94.0	55 00.6	54 69	93.3	55 32.5	52 69	91.8	4
45	50 28.8	64 68	101.1	50 47.8	63 68	100.5	51 06.6	62 68	99.9	51 43.6	61 69	98.7	52 55.0	58 69	96.0	54 02.7	55 69	93.2	54 19.0	54 69	92.5	54 50.8	52 69	91.1	45
6	49 47.9	63 68	100.3	50 06.8	63 69	99.7	50 25.5	62 69	99.1	51 02.3	61 69	97.8	52 13.5	58 69	95.2	53 21.0	55 69	92.5	53 37.3	54 69	91.8	54 09.1	52 69	90.3	6
7	49 06.8	63 69	99.4	49 25.7	62 69	98.8	49 44.3	62 69	98.2	50 21.0	61 69	97.0	51 31.9	58 69	94.4	52 39.4	55 69	91.7	52 55.6	54 69	91.0	53 27.4	52 69	89.6	7
8	48 25.7	63 69	98.6	48 44.4	62 69	98.0	49 03.0	62 69	97.4	49 39.6	60 69	96.2	50 50.4	58 69	93.6	51 57.7	55 69	91.0	52 14.0	54 69	90.3	52 45.8	52 69	88.9	8
9	47 44.4	63 69	97.7	48 03.1	62 69	97.2	48 21.6	61 69	96.6	48 58.1	60 69	95.4	50 08.8	58 69	92.9	51 16.0	55 69	90.3	51 32.3	54 69	89.6	52 04.1	52 69	88.2	9
50	47 03.1	62 69	96.9	47 21.7	62 69	96.3	47 40.2	61 69	95.8	48 16.6	60 69	94.6	49 27.1	57 69	92.1	50 34.4	55 69	89.5	50 50.6	54 69	88.9	51 22.5	52 69	87.5	50
1	46 21.7	62 69	96.1	46 40.3	62 69	95.6	46 58.7	61 69	95.0	47 35.0	60 69	93.8	48 45.5	57 69	91.4	49 52.7	55 69	88.8	50 09.0	54 69	88.2	50 40.8	52 69	86.8	1
2	45 40.2	62 69	95.3	45 58.7	62 69	94.8	46 17.1	61 69	94.2	46 53.4	60 69	93.0	48 03.8	57 69	90.6	49 11.0	55 69	88.1	49 27.3	54 69	87.5	49 59.2	52 69	86.2	2
3	44 58.7	62 69	94.5	45 17.2	61 69	94.0	45 35.6	61 69	93.4	46 11.8	60 69	92.3	47 22.1	57 69	89.9	48 29.4	55 69	87.4	48 45.7	54 69	86.8	49 17.7	53 69	85.5	3
4	44 17.1	62 69	93.8	44 35.6	61 69	93.2	44 53.9	61 69	92.7	45 30.1	60 69	91.5	46 40.4	57 69	89.2	47 47.7	55 69	86.8	48 04.1	54 69	86.1	48 36.1	53 69	84.9	4
55	43 35.5	62 69	93.0	43 54.0	61 69	92.5	44 12.3	61 69	91.9	44 48.5	60 69	90.8	45 58.8	57 69	88.5	47 06.1	55 69	86.1	47 22.5	54 69	85.5	47 54.6	53 69	84.2	55
6	42 53.8	62 69	92.3	43 12.3	61 69	91.7	43 30.6	61 69	91.2	44 06.8	60 69	90.1	45 17.1	57 69	87.8	46 24.6	55 69	85.4	46 41.0	54 69	84.8	47 13.2	53 69	83.6	6
7	42 12.2	62 69	91.5	42 30.6	61 69	91.0	42 49.0	61 69	90.5	43 25.1	60 69	89.4	44 35.5	58 69	87.1	45 43.1	55 69	84.8	45 59.5	54 69	84.2	46 31.8	53 69	83.0	7
8	41 30.5	62 69	90.8	41 49.0	61 69	90.3	42 07.3	61 69	89.7	42 43.4	60 69	88.7	43 53.8	58 69	86.4	45 01.6	55 69	84.1	45 18.1	55 69	83.5	45 50.5	53 69	82.3	8
9	40 48.8	62 69	90.1	41 07.3	61 69	89.6	41 25.6	61 69	89.0	42 01.8	60 69	88.0	43 12.3	58 69	85.8	44 20.1	55 69	83.5	44 36.7	55 69	82.9	45 09.2	54 69	81.7	9
60	40 07.2	62 69	89.4	40 25.6	61 69	88.8	40 43.9	61 69	88.3	41 20.1	60 69	87.3	42 30.7	58 69	85.1	43 38.7	56 69	82.8	43 55.3	55 69	82.3	44 28.0	54 69	81.1	60
1	39 25.5	62 69	88.6	39 44.0	61 69	88.1	40 02.3	61 69	87.6	40 38.5	60 69	86.6	41 49.2	58 69	84.4	42 57.4	56 69	82.2	43 14.1	55 69	81.6	43 46.8	54 68	80.5	1
2	38 43.8	62 69	87.9	39 02.3	61 69	87.4	39 20.6	61 69	86.9	39 56.9	60 69	85.9	41 07.8	58 69	83.8	42 16.2	56 69	81.6	42 32.9	55 69	81.0	43 05.8	54 68	79.9	2
3	38 02.2	62 69	87.3	38 20.7	61 69	86.8	38 39.0	61 69	86.2	39 15.4	60 69	85.2	40 26.3	58 69	83.1	41 35.0	56 69	80.9	41 51.7	55 68	80.4	42 24.8	55 68	79.3	3
4	37 20.6	62 69	86.6	37 39.1	61 69	86.1	37 57.5	61 69	85.6	38 33.8	60 69	84.6	39 45.0	58 69	82.5	40 53.8	56 68	80.3	41 10.7	56 68	79.8	41 43.9	55 68	78.7	4
65	36 39.0	62 69	85.9	36 57.5	62 69	85.4	37 15.9	61 69	84.9	37 52.4	60 69	83.9	39 03.7	59 69	81.8	40 12.8	57 68	79.7	40 29.7	56 68	79.2	41 03.0	55 68	78.1	65
6	35 57.4	62 69	85.2	36 16.0	62 69	84.7	36 34.4	61 69	84.2	37 11.0	60 69	83.2	38 22.5	59 69	81.2	39 31.8	57 68	79.1	39 48.8	56 68	78.6	40 22.3	55 68	77.5	6
7	35 15.9	62 69	84.5	35 34.5	62 69	84.0	35 53.0	61 69	83.6	36 29.6	61 69	82.6	37 41.3	59 68	80.6	38 50.9	57 68	78.5	39 08.0	57 68	78.0	39 41.7	55 68	76.9	7
8	34 34.5	62 69	83.9	34 53.1	62 69	83.4	35 11.6	62 69	82.9	35 48.3	61 69	81.9	37 00.3	59 68	79.9	38 10.1	57 68	77.9	38 27.3	57 68	77.4	39 01.1	56 67	76.3	8
9	33 53.0	62 69	83.2	34 11.7	62 69	82.7	34 30.3	62 69	82.2	35 07.1	61 69	81.3	36 19.3	59 68	79.3	37 29.4	58 68	77.3	37 46.7	57 68	76.8	38 20.7	56 67	75.7	9
70	33 11.7	63 69	82.5	33 30.4	62 69	82.1	33 49.0	62 69	81.6	34 25.9	61 68	80.6	35 38.3	60 68	78.7	36 48.8	58 68	76.7	37 06.1	57 67	76.2	37 40.3	57 67	75.1	70
1	32 30.4	63 69	81.9	32 49.2	62 69	81.4	33 07.8	62 68	80.9	33 44.8	61 68	80.0	34 57.5	60 68	78.1	36 08.3	58 67	76.1	36 25.7	58 67	75.6	37 00.1	57 67	74.6	1
2	31 49.2	63 68	81.2	32 08.0	63 68	80.8	32 26.7	62 68	80.3	33 03.8	62 68	79.4	34 16.8	60 68	77.4	35 27.9	58 67	75.5	35 45.4	58 67	75.0	36 20.0	57 67	74.0	2
3	31 08.0	63 68	80.6	31 26.9	63 68	80.1	31 45.7	62 68	79.6	32 22.9	62 68	78.7	33 36.2	60 68	76.8	34 47.6	59 67	74.9	35 05.2	58 67	74.4	35 40.0	58 66	73.4	3
4	30 26.9	63 68	79.9	30 45.9	63 68	79.5	31 04.7	63 68	79.0	31 42.1	62 68	78.1	32 55.6	61 67	76.2	34 07.5	59 67	74.3	34 25.1	59 67	73.8	35 00.1	58 66	72.8	4
75	29 45.9	63 68	79.3	30 04.9	63 68	78.8	30 23.8	63 68	78.4	31 01.3	62 68	77.5	32 15.2	61 67	75.6	33 27.4	59 67	73.7	33 45.2	59 66	73.2	34 20.4	58 66	72.2	75
6	29 05.0	64 68	78.6	29 24.1	63 68	78.2	29 43.1	63 68	77.7	30 20.7	62 68	76.8	31 34.9	61 67	75.0	32 47.4	60 66	73.1	33 05.3	59 66	72.6	33 40.7	58 66	71.7	6
7	28 24.2	64 68	78.0	28 43.3	64 68	77.5	29 02.4	63 68	77.1	29 40.2	63 67	76.2	30 54.7	61 67	74.4	32 07.6	60 66	72.5	32 25.6	60 66	72.1	33 01.2	59 66	71.1	7
8	27 43.5	64 68	77.3	28 02.7	64 68	76.9	28 21.8	64 68	76.5	28 59.8	63 67	75.6	30 14.6	62 67	73.8	31 27.9	60 66	71.9	31 46.0	60 66	71.5	32 21.9	59 65	70.5	8
9	27 02.9	64 68	76.7	27 22.2	64 67	76.3	27 41.3	64 67	75.8	28 19.4	63 67	75.0	29 34.6	62 66	73.2	30 48.4	61 66	71.4	31 06.6	60 66	70.9	31 42.6	60 65	70.0	9
80	26 22.4	65 67	76.1	26 41.7	64 67	75.6	27 01.0	64 67	75.2	27 39.3	64 67	74.3	28 54.8	62 66	72.6	30 09.0	61 65	70.8	30 27.3	61 65	70.3	31 03.6	60 65	69.4	80
1	25 42.0	65 67	75.4	26 01.4	65 67	75.0	26 20.7	64 67	74.6	26 59.2	64 67	73.7	28 15.1	63 66	72.0	29 29.7	62 65	70.2	29 48.1	61 65	69.7	30 24.6	61 65	68.8	1
2	25 01.7	65 67	74.8	25 21.2	65 67	74.4	25 40.6	65 67	73.9	26 19.2	64 66	73.1	27 35.5	63 66	71.4	28 50.5	62 65	69.6	29 09.1	62 65	69.1	29 45.8	61 64	68.2	2
3	24 21.6	65 67	74.2	24 41.1	65 67	73.7	25 00.6	65 66	73.3	25 39.4	64 66	72.5	26 56.1	63 65	70.8	28 11.5	62 65	69.0	28 30.2	62 65	68.6	29 07.2	61 64	67.7	3
4	23 41.5	66 66	73.5	24 01.2	65 66	73.1	24 20.8	65 66	72.7	24 59.8	65 66	71.9	26 16.8	64 65	70.2	27 32.7	63 64	68.4	27 51.5	62 64	68.0	28 28.7	62 64	67.1	4
85	23 01.6	66 66	72.9	23 21.4	66 66	72.5	23 41.1	65 66	72.1	24 20.2	65 66	71.2	25 37.7	64 65	69.6	26 54.0	63 64	67.8	27 12.9	63 64	67.4	27 50.4	62 64	66.5	85
6	22 21.9	66 66	72.3	22 41.7	66 66	71.9	23 01.5	66 66	71.4	23 40.8	65 65	70.6	24 58.7	64 65	69.0	26 15.5	63 64	67.2	26 34.5	63 64	66.8	27 12.3	63 64	65.9	6
7	21 42.2	67 66	71.6	22 02.2	66 66	71.2	22 22.0	66 66	70.8	23 01.6	66 65	70.0	24 19.9	65 64	68.3	25 37.2	64 64	66.7	25 56.3	64 63	66.2	26 34.3	63 63	65.4	7
8	21 02.8	67 66	71.0	21 22.8	67 65	70.6	21 42.7	66 65	70.2	22 22.5	66 65	69.4	23 41.3	65 64	67.7	24 59.0	64 63	66.1	25 18.2	64 63	65.6	25 56.5	64 63	64.8	8
9	20 23.4	67 65	70.4	20 43.5	67 65	70.0	21 03.6	67 65	69.6	21 43.6	66 65	68.8	23 02.8	66 64	67.1	24 21.9	65 63	65.5	24 40.3	64 63	65.1	25 18.9	64 62	64.2	9
90	19 44.2	67 65	69.7	20 04.5	67 65	69.3	20 24.6	67 65	68.9	21 04.8	67 64	68.1	22 24.5	66 64	66.5	23 43.1	65 63	64.9	24 02.6	65 63	64.5	24 41.5	64 62	63.6	90

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H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	16 00.0	1.0 00	180.0	15 30.0	1.0 01	180.0	15 00.0	1.0 00	180.0	14 00.0	1.0 01	180.0	12 00.0	1.0 01	180.0	10 00.0	1.0 01	180.0	9 30.0	1.0 01	180.0	8 30.0	1.0 00	180.0	00
1	15 59.7	1.0 02	179.1	15 29.7	1.0 02	179.1	14 59.7	1.0 02	179.1	13 59.7	1.0 02	179.1	11 59.7	1.0 02	179.1	9 59.7	1.0 02	179.2	9 29.7	1.0 02	179.2	8 29.7	1.0 01	179.2	1
2	15 58.7	1.0 03	178.2	15 28.7	1.0 03	178.2	14 58.7	1.0 03	178.2	13 58.7	1.0 03	178.2	11 58.7	1.0 03	178.3	9 58.8	1.0 03	178.3	9 28.8	1.0 03	178.3	8 28.8	1.0 02	178.4	2
3	15 57.0	1.0 04	177.2	15 27.0	1.0 04	177.3	14 57.0	1.0 04	177.3	13 57.1	1.0 04	177.3	11 57.2	1.0 04	177.4	9 57.2	1.0 04	177.5	9 27.3	1.0 04	177.5	8 27.3	1.0 03	177.5	3
4	15 54.7	1.0 05	176.3	15 24.7	1.0 05	176.4	14 54.7	1.0 05	176.4	13 54.8	1.0 05	176.4	11 55.0	1.0 05	176.5	9 55.1	1.0 05	176.6	9 25.1	1.0 05	176.7	8 25.2	1.0 04	176.7	4
05	15 51.7	1.0 06	175.4	15 21.7	1.0 06	175.4	14 51.8	1.0 06	175.5	13 51.9	1.0 06	175.5	11 52.1	1.0 06	175.7	9 52.4	1.0 06	175.8	9 22.4	1.0 06	175.8	8 22.5	1.0 05	175.9	05
6	15 48.0	1.0 07	174.5	15 18.1	1.0 07	174.5	14 48.2	1.0 07	174.6	13 48.3	1.0 07	174.7	11 48.7	1.0 07	174.8	9 49.0	1.0 07	175.0	9 19.1	1.0 07	175.0	8 19.2	1.0 06	175.1	6
7	15 43.7	1.0 08	173.6	15 13.8	1.0 08	173.6	14 43.9	1.0 08	173.7	13 44.1	1.0 08	173.8	11 44.6	1.0 08	173.9	9 45.0	1.0 08	174.1	9 15.1	1.0 08	174.2	8 15.4	1.0 07	174.2	7
8	15 38.7	99 10	172.7	15 08.8	99 09	172.7	14 39.0	1.0 09	172.8	13 39.3	1.0 09	172.9	11 39.9	1.0 09	173.1	9 40.4	1.0 09	173.3	9 10.6	1.0 09	173.3	8 10.9	1.0 08	173.4	8
9	15 33.0	99 10	171.8	15 03.2	99 10	171.8	14 33.4	99 10	171.9	13 33.8	99 10	172.0	11 34.5	99 10	172.2	9 35.3	99 10	172.4	9 05.4	99 10	172.5	8 05.8	99 09	172.6	9
10	15 26.7	99 12	170.8	14 57.0	99 12	170.9	14 27.2	99 11	171.0	13 27.7	99 11	171.1	11 28.6	99 11	171.4	9 29.5	99 11	171.6	8 59.7	99 11	171.7	8 00.2	99 10	171.8	10
1	15 19.8	99 13	169.9	14 50.1	99 13	170.0	14 20.3	99 12	170.1	13 20.9	99 12	170.2	11 22.0	99 12	170.5	9 23.1	99 12	170.8	8 53.4	99 12	170.8	7 53.9	99 11	171.0	1
2	15 12.2	99 14	169.0	14 42.5	99 14	169.1	14 12.8	99 14	169.2	13 13.5	99 13	169.3	11 14.8	99 13	169.6	9 16.1	99 13	169.9	8 46.4	99 13	170.0	7 47.1	99 12	170.2	2
3	15 03.9	99 15	168.1	14 34.3	99 15	168.2	14 04.7	99 15	168.3	13 05.5	99 14	168.5	11 07.0	99 14	168.8	9 08.5	99 14	169.1	8 38.9	99 14	169.2	7 39.7	99 13	169.4	3
4	14 55.0	98 16	167.2	14 25.5	98 16	167.3	13 55.9	98 16	167.4	12 56.8	99 15	167.6	10 58.6	99 15	167.9	9 00.4	99 15	168.3	8 30.8	99 14	168.4	7 31.7	99 14	168.5	4
15	14 45.5	98 17	166.3	14 16.0	98 17	166.4	13 46.5	98 17	166.5	12 47.6	98 16	166.7	10 49.6	98 16	167.1	8 51.6	98 16	167.5	8 22.1	98 15	167.5	7 23.1	98 15	167.7	15
6	14 35.3	98 18	165.4	14 05.9	98 18	165.5	13 36.5	98 18	165.6	12 37.7	98 18	165.8	10 40.0	98 17	166.2	8 42.3	98 17	166.6	8 12.8	98 16	166.7	7 14.0	98 16	166.9	6
7	14 24.5	98 19	164.5	13 55.2	98 19	164.6	13 25.9	98 19	164.8	12 27.2	98 19	165.0	10 29.8	98 18	165.4	8 32.3	98 18	165.8	8 03.0	98 17	165.9	7 04.3	98 17	166.1	7
8	14 13.1	98 20	163.7	13 43.8	98 20	163.8	13 14.6	98 20	163.9	12 16.1	98 20	164.1	10 19.0	98 19	164.6	8 21.8	98 18	165.0	7 52.6	98 18	165.1	6 54.9	98 18	165.3	8
9	14 01.1	97 21	162.8	13 31.9	97 21	162.9	13 02.7	97 21	163.0	12 04.3	97 21	163.2	10 07.6	97 20	163.7	8 10.8	97 19	164.2	7 41.6	97 19	164.3	6 43.1	97 19	164.5	9
20	13 48.4	97 22	161.9	13 19.3	97 22	162.0	12 50.2	97 22	162.1	11 52.0	97 22	162.4	9 55.6	97 21	162.9	7 59.1	97 20	163.4	7 30.0	97 20	163.5	6 31.7	97 20	163.7	20
1	13 35.1	97 23	161.0	13 06.1	97 23	161.1	12 37.1	97 23	161.3	11 39.1	97 22	161.5	9 43.0	97 22	162.0	7 46.9	97 21	162.6	7 17.9	97 21	162.7	6 19.8	97 21	162.9	1
2	13 21.3	96 24	160.1	12 52.4	96 24	160.3	12 23.4	96 24	160.4	11 25.6	96 24	160.7	9 29.9	96 23	161.2	7 34.1	96 22	161.7	7 05.2	97 22	161.9	6 07.3	97 22	162.1	2
3	13 06.8	96 25	159.3	12 38.0	96 25	159.4	12 09.2	96 25	159.5	11 11.5	96 24	159.8	9 16.2	96 24	160.4	7 20.8	96 23	160.9	6 51.9	96 23	161.1	5 54.2	96 23	161.3	3
4	12 51.7	96 26	158.4	12 23.0	96 26	158.5	11 54.3	96 26	158.7	10 56.9	96 25	159.0	9 01.9	96 25	159.6	7 06.9	96 24	160.1	6 38.1	96 24	160.3	5 40.6	96 24	160.6	4
25	12 36.1	96 27	157.5	12 07.5	96 27	157.7	11 38.9	96 27	157.8	10 41.6	96 26	158.1	8 47.1	96 26	158.7	6 52.5	96 25	159.3	6 23.8	96 25	159.5	5 26.5	96 24	159.8	25
6	12 19.9	96 28	156.7	11 51.4	96 28	156.8	11 22.9	96 28	157.0	10 25.8	96 27	157.3	8 31.7	96 27	157.9	6 37.5	96 26	158.5	6 08.9	96 26	158.7	5 11.8	96 25	159.0	6
7	12 03.1	96 29	155.8	11 34.7	96 29	156.0	11 06.3	96 29	156.1	10 09.4	96 28	156.5	8 15.7	96 27	157.1	6 22.0	96 27	157.7	5 53.5	96 27	157.9				7
8	11 45.7	94 30	155.0	11 17.4	94 30	155.1	10 49.1	94 30	155.3	9 52.5	94 29	155.6	7 59.2	94 28	156.3	6 05.9	94 28	157.0	5 37.6	94 27	157.1				8
9	11 27.8	94 31	154.1	10 59.6	94 31	154.3	10 31.4	94 30	154.5	9 35.0	94 30	154.8	7 42.2	94 29	155.5	5 49.3	94 28	156.2	5 21.1	94 28	156.3				9
30	11 09.3	94 32	153.3	10 41.2	94 32	153.4	10 13.2	94 31	153.6	9 17.0	94 31	154.0	7 24.7	94 30	154.7	5 32.2	94 29	155.4	5 04.1	94 29	155.6				30
1	10 50.3	93 33	152.4	10 22.3	93 32	152.6	9 54.4	93 32	152.8	8 58.5	93 32	153.2	7 06.6	93 31	153.9	5 14.6	93 30	154.6							1
2	10 39.7	93 34	151.6	10 02.9	93 33	151.8	9 35.1	93 33	152.0	8 39.4	93 33	152.3	6 48.0	93 32	153.1										2
3	10 10.6	92 34	150.8	9 42.9	92 34	150.9	9 15.2	92 34	151.1	8 19.8	92 34	151.5	6 28.9	92 33	152.3										3
4	9 50.0	92 35	149.9	9 22.4	92 35	150.1	8 54.8	92 35	150.3	7 59.7	92 34	150.7	6 09.2	92 34	151.5										4
35	9 28.8	91 36	149.1	9 01.4	91 36	149.3	8 33.9	92 36	149.5	7 39.0	92 35	149.9	5 49.1	92 34	150.7										35
6	9 07.2	91 37	148.3	8 39.9	91 37	148.5	8 12.5	91 36	148.7	7 17.9	91 36	149.1	5 28.5	91 35	149.9										6
7	8 45.9	91 38	147.5	8 17.8	91 38	147.7	7 50.6	91 37	147.9	6 56.2	91 37	148.3	5 07.4	91 36	149.2										7
8	8 22.4	90 38	146.7	7 55.3	90 38	146.9	7 28.3	90 38	147.1	6 34.1	90 38	147.5													8
9	7 59.2	90 39	145.9	7 32.3	90 39	146.1	7 05.4	90 39	146.3	6 11.5	90 38	146.8													9
40	7 35.6	89 40	145.1	7 08.8	89 40	145.3	6 42.0	89 40	145.5	5 48.4	89 39	146.0													40
1	7 11.5	89 41	144.3	6 44.8	89 41	144.5	6 18.2	89 40	144.7	5 24.9	89 40	145.2													1
2	6 46.9	88 42	143.5	6 20.4	88 41	143.7	5 53.9	88 41	144.0	5 00.8	88 41	144.4													2
3	6 21.9	88 42	142.7	5 55.5	88 42	142.9	5 29.2	88 42	143.2																3
4	5 56.4	87 43	141.9	5 30.2	87 43	142.2	5 04.0	87 43	142.4																4
45	5 30.5	87 44	141.2	5 04.4	87 44	141.4																			45
6	5 04.1	87 45	140.4																						6

DECLINATION SAME NAME AS LATITUDE

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
91	19 05.2	68 65	69.1	19 25.5	68 65	68.7	19 45.8	67 64	68.3	20 26.2	67 64	67.5	21 46.3	66 63	65.9	23 05.5	66 62	64.3	23 25.1	65 62	63.9	24 04.2	65 62	63.1	91
2	18 26.4	68 64	68.5	18 46.8	68 64	68.1	19 07.2	68 64	67.7	19 47.8	67 64	66.9	21 08.3	67 63	65.3	22 28.0	66 62	63.7	22 47.8	66 62	63.3	23 27.1	65 61	62.5	2
3	17 47.7	68 64	67.8	18 08.2	68 64	67.4	18 28.7	68 64	67.1	19 09.5	68 63	66.3	20 30.6	67 63	64.7	21 50.7	66 62	63.1	22 10.6	66 62	62.7	22 50.3	66 61	61.9	3
4	17 00.2	69 64	67.2	17 29.8	69 64	66.8	17 50.4	69 64	66.4	18 31.5	68 63	65.7	19 53.0	68 62	64.1	21 13.7	67 61	62.5	21 33.7	67 61	62.1	22 13.6	66 61	61.3	4
95	16 30.9	69 64	66.6	16 51.6	69 63	66.2	17 12.3	69 63	65.8	17 53.6	69 63	65.0	19 15.6	68 62	63.5	20 36.8	67 61	61.9	20 57.0	67 61	61.5	21 37.1	67 60	60.7	95
6	15 52.7	70 63	65.9	16 13.6	69 63	65.5	16 34.4	69 63	65.2	17 15.9	69 62	64.4	18 38.4	68 62	62.9	20 00.1	68 61	61.3	20 20.4	68 61	60.9	21 00.9	67 60	60.2	6
7	15 14.8	70 63	65.3	15 35.7	70 63	64.9	15 56.6	70 62	64.5	16 38.4	69 62	63.8	18 01.4	69 61	62.3	19 23.7	68 60	60.7	19 44.1	68 60	60.3	20 24.8	68 60	59.6	7
8	14 37.0	70 63	64.6	14 58.1	70 62	64.3	15 19.1	70 62	63.9	16 01.1	70 62	63.2	17 24.6	69 61	61.7	18 47.4	69 60	60.1	19 08.0	69 60	59.7	19 49.0	68 59	59.0	8
9	13 59.4	71 62	64.0	14 20.6	71 62	63.6	14 41.8	70 62	63.3	15 24.0	70 61	62.5	16 48.0	70 61	61.0	18 11.4	69 60	59.5	18 32.1	69 59	59.1	19 13.4	69 59	58.4	9
100	13 22.1	71 62	63.3	13 43.4	71 62	63.0	14 04.7	71 62	62.6	14 47.1	71 61	61.9	16 11.7	70 60	60.4	17 35.6	70 59	58.9	17 56.4	69 59	58.5	18 38.0	69 59	57.8	100
1	12 44.9	72 62	62.7	13 06.4	71 61	62.3	13 27.8	71 61	62.0	14 10.5	71 61	61.3	15 35.5	71 60	59.8	17 00.0	70 59	58.3	17 21.0	70 59	57.9	18 02.9	70 58	57.2	1
2	12 08.0	72 61	62.1	12 29.6	72 61	61.7	12 51.1	72 61	61.3	13 34.1	72 60	60.6	14 59.6	71 59	59.2	16 24.6	71 59	57.7	16 45.8	70 58	57.3	17 28.0	70 58	56.6	2
3	11 31.3	72 61	61.4	11 53.0	72 61	61.1	12 14.6	72 60	60.7	12 57.8	72 60	60.0	14 23.9	72 59	58.6	15 49.5	71 58	57.1	16 10.8	71 58	56.7	16 53.3	71 57	56.0	3
4	10 54.8	73 60	60.8	11 16.6	73 60	60.4	11 38.4	73 60	60.0	12 21.9	72 60	59.3	13 48.5	72 59	57.9	15 14.6	72 58	56.5	15 36.1	71 57	56.1	16 18.9	71 57	55.4	4
105	10 18.6	73 60	60.1	10 40.5	73 60	59.7	11 02.4	73 60	59.4	11 46.1	73 59	58.7	13 13.3	72 58	57.3	14 40.0	72 57	55.9	15 01.6	72 57	55.5	15 44.7	72 57	54.8	105
6	9 42.6	74 60	59.4	10 04.6	73 59	59.1	10 26.6	73 59	58.7	11 10.6	73 59	58.1	12 38.4	73 58	56.7	14 05.6	73 57	55.2	14 27.4	72 57	54.9	15 10.8	72 56	54.2	6
7	9 06.8	74 59	58.8	9 29.0	74 59	58.4	9 51.1	74 59	58.1	10 35.4	74 58	57.4	12 03.7	73 57	56.0	13 31.5	73 56	54.6	13 53.4	73 56	54.3	14 37.1	73 56	53.6	7
8	8 31.3	74 59	58.1	8 53.6	74 59	57.8	9 15.9	74 58	57.4	10 00.4	74 58	56.8	11 29.2	74 57	55.4	12 57.7	74 56	54.0	13 19.7	73 56	53.7	14 03.7	73 55	53.0	8
9	7 56.0	75 58	57.4	8 18.5	75 58	57.1	8 40.9	75 58	56.8	9 25.7	75 57	56.1	10 55.1	74 56	54.7	12 24.1	74 56	53.4	12 46.3	74 55	53.0	13 30.6	74 55	52.3	9
110	7 21.0	75 58	56.8	7 43.6	75 58	56.4	8 06.2	75 58	56.1	8 51.2	75 57	55.4	10 21.2	75 56	54.1	11 50.8	75 55	52.7	12 13.1	74 55	52.4	12 57.7	74 54	51.7	110
1	6 46.3	76 58	56.1	7 09.0	76 57	55.8	7 31.7	76 57	55.4	8 17.0	76 57	54.8	9 47.5	75 56	53.5	11 17.7	75 55	52.1	11 40.2	75 54	51.8	12 25.1	75 54	51.1	1
2	6 11.8	76 57	55.4	6 34.7	76 57	55.1	6 57.5	76 56	54.8	7 43.1	76 56	54.1	9 14.2	76 55	52.8	10 45.0	76 54	51.5	11 07.6	75 54	51.1	11 52.8	75 53	50.5	2
3	5 37.6	77 56	54.8	6 00.6	77 56	54.4	6 23.6	77 56	54.1	7 09.5	76 56	53.5	8 41.1	76 55	52.2	10 12.5	76 54	50.8	10 35.3	76 53	50.5	11 20.8	76 53	49.8	3
4	5 03.7	77 56	54.1	5 26.9	77 56	53.8	5 50.0	77 56	53.4	6 36.2	77 55	52.8	8 08.4	77 54	51.5	9 40.3	77 53	50.2	10 03.3	76 53	49.9	10 49.1	76 52	49.2	4
115							5 16.6	77 55	52.8	6 03.1	77 55	52.1	7 35.9	77 54	50.8	9 08.5	77 53	49.6	9 31.6	77 52	49.2	10 17.7	77 52	48.6	115
6										5 30.4	78 54	51.4	7 03.7	78 53	50.2	8 36.9	78 52	48.9	9 00.1	77 52	48.6	9 46.6	77 51	47.9	6
7													6 31.9	78 53	49.5	8 05.6	78 52	48.3	8 29.0	78 51	47.9	9 15.8	78 51	47.3	7
8													6 00.3	79 52	48.8	7 34.7	79 51	47.6	7 58.3	79 51	47.3	8 45.3	78 50	46.7	8
9													5 29.1	79 52	48.2	7 04.1	79 50	46.9	7 27.8	79 50	46.6	8 15.2	79 50	46.0	9
120																6 33.8	80 50	46.3	6 57.7	80 50	46.0	7 45.4	79 49	45.4	120
1																6 03.8	80 49	45.6	6 27.9	80 49	45.3	7 15.9	80 49	44.7	1
2																5 34.2	81 49	44.9	5 58.4	81 49	44.6	6 46.7	81 48	44.0	2
3																5 05.0	81 48	44.3	5 29.3	81 48	44.0	6 17.9	81 47	43.4	3
4																			5 00.5	82 48	43.3	5 49.5	82 47	42.7	4
125																						5 21.4	82 46	42.1	125

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Lat. 46°

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	80 00.0	1.0 03	180.0	81 00.0	1.0 03	180.0	82 30.0	1.0 04	180.0	84 00.0	1.0 04	180.0	86 00.0	1.0 06	180.0	86 30.0	1.0 07	180.0	87 00.0	1.0 08	180.0	89 00.0	1.0 22	180.0	00
1	79 58.3	1.0 08	175.3	80 58.2	1.0 09	174.9	82 27.8	1.0 11	174.0	83 57.4	99 13	172.7	85 56.2	99 19	169.5	86 25.7	98 21	168.1	86 55.0	97 24	166.3	88 46.7	82 50	144.6	1
2	79 53.3	99 14	170.7	80 52.6	99 15	169.9	82 21.4	98 18	168.2	83 49.5	97 21	165.6	85 45.0	94 29	159.5	86 13.1	93 32	157.0	86 40.7	91 36	153.9	88 16.7	59 61	124.8	2
3	79 44.9	98 19	166.2	80 43.5	97 21	165.0	82 10.8	96 24	162.5	83 36.8	95 29	158.9	85 27.4	89 38	150.6	85 53.6	86 42	147.4	86 18.9	82 45	143.4	87 40.3	45 65	114.4	3
4	79 33.5	96 24	161.9	80 31.1	96 26	160.2	81 56.4	94 30	157.1	83 19.6	91 35	152.6	85 04.4	83 45	142.9	85 28.7	79 48	139.3	85 51.7	74 52	135.0	87 01.4	36 67	108.2	4
05	79 19.0	95 29	157.6	80 15.4	93 31	155.7	81 38.4	91 35	152.0	82 58.6	87 41	146.9	84 37.4	76 50	136.3	84 59.6	72 53	132.6	85 20.5	67 56	128.3	86 21.4	30 68	104.1	05
6	79 01.8	92 33	153.6	79 56.9	91 35	151.4	81 17.4	88 40	147.3	82 34.3	83 45	141.7	84 07.1	71 55	130.7	84 27.6	66 57	127.0	84 46.6	60 60	122.9	85 40.7	27 68	101.2	6
7	78 42.1	90 37	149.8	79 35.6	88 39	147.4	80 53.5	84 44	142.9	82 07.2	79 49	137.1	83 34.4	65 58	126.0	83 53.3	61 60	122.4	84 10.7	55 62	118.5	84 59.7	24 69	99.0	7
8	78 20.0	88 40	146.2	79 12.0	86 43	143.6	80 27.3	81 47	138.9	81 37.7	75 52	132.9	82 59.8	61 60	122.0	83 17.4	56 62	118.6	83 33.5	51 64	114.9	84 18.4	22 69	97.2	8
9	77 55.7	85 44	142.8	78 46.3	83 46	140.1	79 58.9	78 50	135.3	81 06.2	71 55	129.2	82 23.8	57 62	118.5	82 40.2	52 64	115.3	82 55.2	47 65	111.8	83 37.0	21 69	95.8	9
10	77 29.6	83 46	139.6	78 18.6	80 49	136.8	79 28.7	75 53	131.9	80 33.2	68 57	125.9	81 46.7	54 63	115.5	82 02.1	49 65	112.5	82 16.2	44 66	109.2	82 55.5	20 69	94.5	10
1	77 01.7	81 49	136.6	77 49.3	78 51	133.7	78 56.9	72 55	128.8	79 58.8	65 59	122.9	81 06.7	51 65	112.9	81 23.3	47 66	110.0	81 36.5	42 67	107.0	82 13.9	20 69	93.4	1
2	76 32.3	78 51	133.7	77 18.5	75 54	130.9	78 23.8	70 57	126.0	79 23.2	62 61	120.1	80 29.9	48 65	110.6	80 43.9	44 66	107.9	80 56.5	40 67	105.0	81 32.3	19 69	92.5	2
3	76 01.5	76 53	131.1	76 46.4	73 55	128.3	77 49.6	67 59	123.4	78 46.7	60 62	117.7	79 50.7	46 66	108.5	80 04.0	42 67	106.0	80 16.1	38 68	103.3	80 50.6	19 69	91.6	3
4	75 29.5	74 55	128.6	76 13.1	71 57	125.8	77 14.3	65 60	121.0	78 09.4	57 63	115.4	79 10.9	45 67	106.7	79 23.7	41 68	104.2	79 35.4	37 68	101.7	80 09.0	19 69	90.8	4
15	74 56.4	72 57	126.3	75 38.8	69 59	123.5	76 38.2	63 61	118.8	77 31.5	55 64	113.4	78 30.8	43 67	105.0	78 43.2	39 68	102.7	78 54.5	36 68	100.3	79 27.3	19 69	90.0	15
6	74 22.4	70 58	124.1	75 03.6	67 60	121.4	76 01.3	61 63	116.7	76 53.0	54 65	111.5	77 50.4	42 68	103.5	78 02.4	38 68	101.3	78 13.4	35 69	99.0	78 45.6	19 69	89.3	6
7	73 47.5	69 59	122.1	74 27.6	66 61	119.4	75 23.7	59 63	114.8	76 14.0	52 66	109.8	77 09.8	41 68	102.1	77 21.5	37 69	100.0	77 32.1	34 69	97.8	78 03.9	19 69	88.7	7
8	73 11.8	67 61	120.1	73 51.0	64 62	117.5	74 45.6	58 64	113.1	75 34.5	51 66	108.1	76 28.9	40 68	100.7	76 40.3	36 69	98.8	76 50.8	33 69	96.7	77 22.3	19 69	88.0	8
9	72 35.4	65 62	118.3	73 13.7	62 63	115.7	74 07.1	56 65	111.4	74 54.8	49 67	106.6	75 47.9	39 69	99.5	75 59.1	36 69	97.6	76 09.4	33 69	95.7	76 40.6	19 69	87.4	9
20	71 58.4	64 63	116.6	72 35.9	61 64	114.0	73 28.1	55 66	109.8	74 14.7	48 67	105.2	75 06.7	38 69	98.4	75 17.7	35 69	96.6	75 27.8	32 69	94.7	75 59.0	19 69	86.9	20
1	71 20.9	63 63	115.0	71 57.6	59 65	112.5	72 48.7	54 66	108.4	73 34.3	47 68	103.9	74 25.4	37 69	97.3	74 36.3	35 69	95.6	74 46.3	32 69	93.8	75 17.4	20 69	86.3	1
2	70 42.9	62 64	113.4	71 18.9	58 65	111.0	72 09.0	53 67	107.0	72 53.8	47 68	102.6	73 44.1	37 69	96.3	73 54.8	34 69	94.6	74 04.7	32 69	92.9	74 35.8	20 69	85.8	2
3	70 04.4	60 65	111.9	70 39.8	57 66	109.5	71 29.0	52 67	105.7	72 13.0	46 68	101.5	73 02.6	37 69	95.4	73 13.2	34 69	93.8	73 23.0	31 69	92.1	73 54.3	20 69	85.2	3
4	69 25.6	59 65	110.5	70 00.3	56 66	108.2	70 48.7	51 67	104.4	71 32.1	45 68	100.3	72 21.1	36 69	94.5	72 31.6	34 69	92.9	72 41.4	31 69	91.3	73 12.7	21 69	84.7	4
25	68 46.4	59 66	109.2	69 20.6	55 67	106.9	70 08.2	50 68	103.2	70 51.0	45 69	99.3	71 39.5	36 69	93.6	71 50.0	34 69	92.1	71 59.7	31 69	90.6	72 31.2	21 69	84.2	25
6	68 06.9	58 66	107.9	68 40.6	55 67	105.7	69 27.6	50 68	102.1	70 09.8	44 69	98.3	70 57.9	36 69	92.8	71 08.3	34 69	91.3	71 18.0	31 69	89.8	71 49.8	22 69	83.7	6
7	67 27.1	57 67	106.7	68 00.3	54 67	104.5	68 46.7	49 68	101.0	69 28.5	44 69	97.3	70 16.2	36 69	92.0	70 26.6	34 69	90.6	70 36.4	31 69	89.1	71 08.4	22 69	83.3	7
8	66 47.0	56 67	105.5	67 19.9	53 68	103.4	68 05.8	49 68	100.0	68 47.1	43 69	96.4	69 34.6	36 69	91.2	69 44.9	34 69	89.8	69 54.7	31 69	88.5	70 27.0	22 69	82.8	8
9	66 06.8	56 67	104.4	66 39.3	53 68	102.3	67 24.6	48 69	99.0	68 05.7	43 69	95.5	68 52.9	36 69	90.4	69 03.3	34 69	89.1	69 13.0	31 69	87.8	69 45.7	23 69	82.3	9
30	65 26.3	55 68	103.3	65 58.5	52 68	101.3	66 43.4	48 69	98.0	67 24.2	43 69	94.6	68 11.2	36 69	89.7	68 21.6	34 69	88.4	68 31.4	32 69	87.2	69 04.4	23 69	81.8	30
1	64 45.7	54 68	102.3	65 17.5	52 68	100.2	66 02.1	47 69	97.1	66 42.6	43 69	93.7	67 29.5	36 69	89.0	67 39.9	34 69	87.8	67 49.8	32 69	86.5	68 23.2	24 69	81.4	1
2	64 04.9	54 68	101.2	64 36.4	51 69	99.3	65 20.7	47 69	96.2	66 01.0	42 69	92.9	66 47.9	36 69	88.3	66 58.3	34 69	87.1	67 08.2	32 69	85.9	67 42.0	24 69	80.9	2
3	63 23.9	53 68	100.3	63 55.2	51 69	98.3	64 39.2	47 69	95.3	65 19.4	42 69	92.1	66 06.2	36 69	87.7	66 16.7	34 69	86.5	66 26.6	32 69	85.3	67 00.9	25 68	80.5	3
4	62 42.8	53 69	99.3	63 14.0	51 69	97.4	63 57.7	47 69	94.5	64 37.7	42 69	91.4	65 24.6	36 69	87.0	65 35.1	34 69	85.9	65 45.1	32 69	84.7	66 19.8	25 68	80.0	4
35	62 01.6	53 69	98.4	62 32.6	50 69	96.5	63 16.1	46 69	93.7	63 56.0	42 69	90.6	64 43.0	36 69	86.4	64 53.5	34 69	85.3	65 03.6	33 69	84.2	65 38.8	26 68	79.6	35
6	61 20.4	52 69	97.5	61 51.1	50 69	95.7	62 34.5	46 69	92.9	63 14.3	42 69	89.9	64 01.4	36 69	85.8	64 12.0	35 69	84.7	64 22.2	33 69	83.6	64 57.8	26 68	79.1	6
7	60 39.0	52 69	96.6	61 09.6	50 69	94.8	61 52.9	46 69	92.1	62 32.7	42 69	89.2	63 19.9	36 69	85.2	63 30.5	35 69	84.1	63 40.8	33 69	83.1	64 16.9	27 68	78.7	7
8	59 57.6	52 69	95.8	60 28.1	50 69	94.0	61 11.2	46 69	91.3	61 51.0	42 69	88.5	62 38.3	37 69	84.6	62 49.1	35 69	83.5	62 59.4	34 69	82.5	63 36.1	27 68	78.3	8
9	59 16.1	52 69	94.9	59 46.5	50 69	93.2	60 29.6	46 69	90.6	61 09.3	42 69	87.8	61 56.9	37 69	84.0	62 07.7	35 69	83.0	62 18.1	34 69	82.0	62 55.3	28 68	77.8	9
40	58 34.5	52 69	94.1	59 04.9	49 69	92.5	59 47.9	46 69	89.9	60 27.7	42 69	87.2	61 15.4	37 69	83.4	61 26.4	36 69	82.4	61 36.9	34 69	81.4	62 14.6	28 68	77.4	40
1	57 52.9	52 69	93.3	58 23.2	49 69	91.7	59 06.2	46 69	89.2	59 46.1	43 69	86.5	60 34.1	37 69	82.8	60 45.1	36 69	81.9	60 55.7	35 69	80.9	61 33.9	29 68	77.0	1
2	57 11.3	51 69	92.6	57 41.5	49 69	91.0	58 24.5	46 69	88.5	59 04.5	43 69	85.9	59 52.7	38 69	82.3	60 03.9	36 69	81.3	60 14.6	35 68	80.4	60 53.4	30 68	76.5	2
3	56 29.7	51 69	91.8	56 59.9	49 69	90.2	57 42.9	46 69	87.8	58 22.9	43 69	85.2	59 11.5	38 69	81.7	59 22.7	37 69	80.8	59 33.5	35 68	79.9	60 12.9	30 67	76.1	3
4	55 48.0	51 69	91.1	56 18.2	49 69	89.5	57 01.2	46 69	87.1	57 41.4	43 69	84.6	58 30.3	38 69	81.2	58 41.6	37 68	80.3	58 52.5	36 68	79.4	59 32.4	31 67	75.7	4
45	55 06.3	51 69	90.3	55 36.5	49 69	88.8	56 19.6	46 69	86.4	56 59.9	43 69	84.0	57 49.1	39 68	80.6	58 00.5	37 68	79.7	58 11.6	36 68	78.9	58 52.1	31 67	75.3	45
6	54 24.6	51 69	89.6	54 54.8	49 69	88.1	55 38.0	47 69	85.8	56 18.5	43 69	83.4	57 08.0	39 68	80.1	57 19.5	38 68	79.2	57 30.7	37 68	78.4	58 11.8	32 67	74.8	6
7	53 43.0	51 69	88.9	54 13.2	49 69	87.4	54 56.5	47 69	85.2	55 37.1	44 69	82.8	56 27.0	39 68	79.6	56 38.6	38 68	78.7	56 49.9	37 68	77.9	57 31.6	32 67	74.4	7
8	53 01.3	51 69	88.2	53 31.6	50 69	86.8	54 15.0	47 69	84.5	54 55.8	44 69	82.2	55 46.0	40 68	79.0	55 57.8	39 68	78.2	56 09.2	38 68	77.4	56 51.5	33 67	74.0	8
9	52 19.6	51 69	87.5	52 50.0	50 69	86.1	53 33.5	47 69	83.9	54 14.5	44 69	81.6	55 05.2	40 68	78.5	55 17.0	39 68	77.7	55 28.6	38 68	76.9	56 11.5	33 67	73.6	9
50	51 38.0	51 69	86.8	52 08.4	50 69	85.4	52 52.1	47 69	83.3	53 33.3	44 69	81.1	54 24.3	41 68	78.0	54 36.3	39 68	77.2	54 48.0	38 67	76.4	55 31.6	34 66	73.1	50
1	50 56.4	52 69	86.2	51 26.9	50 69	84.8	52 10.7	47 69	82.7	52 52.2	45 68	80.5	53 43.6	41 68	77.5	53 55.7	40 68	76.7	54 07.6	39 67	75.9	54 51.7	35 66	72.7	1
2	50 14.8	52 69	85.5	50 45.4	50 69	84.2	51 29.4	48 69	82.1	52 11.1	45 68	79.9	53 03.0	41 68	77.0	53 15.2	40 67	76.2	53 27.2	39 67	75.4	54 12.0	35 66	72.3	2
3	49 33.3	52 69	84.9	50 04.0	50 69	83.5	50 48.2	48 69	81.5	51 30.1	45 68	79.4	52 22.4	42 67	76.4	52 34.8	41 67	75.7	52 46.9	40 67	74.9	53 32.3	36 66	71.9	3
4	48 51.8	52 69	84.2	49 22.6	51 69	82.9	50 07.0	48 69	80.9	50 49.2	46 68	78.8	51 41.9	42 67	75.9	51 54.5	41 67	75.2	52 06.7	40 67	74.5	52 52.8	36 66	71.4	4
55	48 10.4	52 69	83.6	48 41.2	51 69	82.3	49 25.9	48 68	80.3	50 08.4	46 68	78.3	51 01.6	43 67	75.4	51 14.2	42 67	74.7	51 26.6	41 67	74.0	52 13.3	37 66	71.0	55
6	47 29.0	52 69	83.0	48 00.0	51 69	81.7	48 44.8	49 68	79.7	49 27.6	46 68	77.7	50 21.3	43 67	74.9	50 34.0	42 67	74.2	50 46.6	41 67	73.5	51 34.0	38 66	70.6	6
7	46 47.7	53 69	82.3	47 18.8	51 69	81.1	48 03.8	49 68	79.1	48 46.9	47 68	77.2	49 41.1	43 67	74.4	49 54.0	43 67	73.7	50 06.7	42 66	73.0	50 54.7	38 65	70.1	7
8	46 06.4	53 69	81.7	46 37.6	51 68	80.5	47 22.9	49 68	78.6	48 06.3	47 68	76.6	49 01.0	44 67	73.9	49 14.0	43 66	73.2	49 26.8	42 66	72.5	50 15.6	39 65	69.7	8
9	45 25.2	53 69	81.1	45 56.5	52 68	79.9	46 42.1	50 68	78.0	47 25.8	47 67	76.1	48 21.0	44 66	73.4	48 34.2	44 66	72.8	48 47.1	43 66	72.1	49 36.5	39 65	69.3	9
60	44 44.0	53 68	80.5	45 15.6	52 68	79.3	46 01.4	50 68	77.4	46 45.4	48 67	75.5	47 41.1	45 66	72.9	47 54.4	44 66	72.3	48 07.5	43 66	71.6	48 57.6	40 65	68.9	60
1	44 03.0	53 68	79.9	44 34.6	52 68	78.7	45 20.8	50 68	76.9	46 05.1	48 67	75.0	47 01.3	45 66	72.4	47 14.8	45 66	71.8	47 28.0	44 66	71.1	48 18.8	41 64	68.4	1
2	43 22.0	54 68	79.3	43 53.8	52 68	78.1	44 40.2	51 67	76.3	45 24.9	49 67	74.5	46 21.6	46 66	71.9	46 35.2	45 66	71.3	46 48.7	44 65	70.6	47 40.1	41 64	68.0	2
3	42 41.0	54 68	78.7	43 13.1	53 68	77.5	43 59.8	51 67	75.8	44 44.8	49 67	74.0	45 42.0	46 66	71.5	45 55.8	46 66	70.8	46 09.4	45 65	70.2	47 01.5	42 64	67.6	3
4	42 00.2	54 68	78.1	42 32.4	53 68	77.0	43 19.4	51 67	75.2	44 04.8	49 66	73.4	45 02.6	47 66	71.0	45 16.5	46 65	70.3	45 30.2	45 65	69.7	46 23.0	43 64	67.1	4
65	41 19.5	55 68	77.5	41 51.9	53 67	76.4	42 39.2	52 67	74.7	43 24.9	50 66	72.9	44 23.2	47 65	70.5	44 37.3	47 65	69.9	44 51.2	46 65	69.2	45 44.7	43 64	66.7	65
6	40 38.8	55 68	76.9	41 11.4	54 67	75.8	41 59.0	52 67	74.1	42 45.1	50 66	72.4	43 44.0	48 65	70.0	43 58.2	47 65	69.4	44 12.3	47 65	68.8	45 06.5	44 63	66.2	6
7	39 58.3	55 67	76.3	40 31.0	54 67	75.2	41 19.0	52 67	73.6	42 05.4	51 66	71.8	43 04.9	48 65	69.5	43 19.3	48 65	68.9	43 33.5	47 64	68.3	44 28.4	44 63	65.8	7
8	39 17.8	55 67	75.8	39 50.8	54 67	74.7	40 39.1	53 66	73.0	41 25.9	51 66	71.3	42 25.9	49 65	69.0	42 40.5	48 64	68.4	42 54.9	48 64	67.8	43 50.4	45 63	65.4	8
9	38 37.5	56 67	75.2	39 10.6	55 67	74.1	39 59.3	53 66	72.5	40 46.5	52 65	70.8	41 47.1	49 65	68.5	42 01.8	49 64	67.9	42 16.3	48 64	67.3	43 12.6	46 63	64.9	9
70	37 57.2	56 67	74.6	38 30.6	55 67	73.6	39 19.6	54 66	71.9	40 07.2	52 65	70.3	41 08.4	50 64	68.0	41 23.2	49 64	67.4	41 37.9	49 64	66.9	42 34.9	46 63	64.5	70
1	37 17.1	56 67	74.0	37 50.7	56 66	73.0	38 40.0	54 66	71.4	39 28.0	53 65	69.8	40 29.8	50 64	67.5	40 44.8	50 64	66.9	40 59.7	49 64	66.4	41 57.4	47 62	64.0	1
2	36 37.1	57 66	73.5	37 10.9	56 66	72.4	38 00.6	54 66	70.8	38 49.0	53 65	69.2	39 51.3	51 64	67.0	40 06.5	50 64	66.5	40 21.6	50 63	65.9	41 20.0	48 62	63.6	2
3	35 57.2	57 66	72.9	36 31.2	56 66	71.9	37 21.3	55 65	70.3	38 10.1	53 65	68.7	39 13.0	51 64	66.5	39 28.4	51 63	66.0	39 43.6	50 63	65.4	40 42.7	48 62	63.1	3
4	35 17.4	58 66	72.3	35 51.7	57 66	71.3	36 42.1	55 65	69.8	37 31.3	54 64	68.2	38 34.9	52 63	66.0	38 50.4	51 63	65.5	39 05.8	51 63	64.9	40 05.6	49 62	62.7	4
75	34 37.8	58 66	71.7	35 12.3	57 65	70.8	36 03.1	56 65	69.2	36 52.7	54 64	67.7	37 56.9	53 63	65.5	38 12.6	52 63	65.0	38 28.1	52 63	64.5	39 28.7	49 61	62.2	75
6	33 58.3	58 66	71.2	34 33.0	57 65	70.2	35 24.2	56 65	68.7	36 14.2	55 64	67.2	37 19.0	53 63	65.0	37 34.9	53 63	64.5	37 50.6	52 62	64.0	38 51.9	50 61	61.8	6
7	33 18.9	59 65	70.6	33 53.8	58 65	69.6	34 45.4	57 64	68.1	35 35.9	55 64	66.6	36 41.3	54 63	64.6	36 57.3	53 62	64.0	37 13.2	53 62	63.5	38 15.2	51 61	61.3	7
8	32 39.6	59 65	70.0	33 14.8	58 65	69.1	34 06.8	57 64	67.6	34 57.7	56 63	66.1	36 03.7	54 62	64.1	36 19.9	54 62	63.5	36 36.0	53 62	63.0	37 38.7	51 61	60.9	8
9	32 00.5	59 65	69.5	32 36.0	59 65	68.5	33 28.3	58 64	67.1	34 19.6	56 63	65.6	35 26.3	55 62	63.6	35 42.7	54 62	63.0	35 58.9	54 62	62.5	37 02.4	52 60	60.4	9
80	31 21.6	60 65	68.9	31 57.3	59 64	68.0	32 50.0	58 64	66.5	33 41.8	57 63	65.1	34 49.1	55 62	63.1	35 05.6	55 62	62.5	35 22.0	54 61	62.0	36 26.3	53 60	59.9	80
1	30 42.8	60 64	68.3	31 18.7	60 64	67.4	32 11.9	59 63	66.0	33 04.1	57 63	64.5	34 12.0	56 62	62.6	34 28.7	55 61	62.1	34 45.3	55 61	61.5	35 50.3	53 60	59.5	1
2	30 04.1	61 64	67.8	30 40.3	60 64	66.9	31 33.9	59 63	65.4	32 26.5	58 62	64.0	33 35.1	56 61	62.1	33 52.0	56 61	61.6	34 08.7	56 61	61.1	35 14.4	54 59	59.0	2
3	29 25.6	61 64	67.2	30 02.1	60 63	66.3	30 56.1	59 63	64.9	31 49.1	58 62	63.5	32 58.4	57 61	61.5	33 15.4	57 61	61.1	33 32.3	56 60	60.6	34 38.8	55 59	58.6	3
4	28 47.2	62 64	66.6	29 24.0	61 63	65.7	30 18.4	60 62	64.4	31 11.9	59 62	63.0	32 21.8	58 61	61.0	32 39.0	57 60	60.6	32 56.1	57 60	60.1	34 03.3	55 59	58.1	4
85	28 09.1	62 63	66.1	28 46.1	61 63	65.2	29 40.9	60 62	63.8	30 34.9	59 61	62.4	31 45.4	58 60	60.5	32 02.8	58 60	60.1	32 20.1	57 60	59.6	33 28.0	56 58	57.6	85
6	27 31.1	62 63	65.5	28 08.3	62 63	64.6	29 03.6	61 62	63.3	29 58.0	60 61	61.9	31 09.3	59 60	60.0	31 26.8	58 60	59.6	31 44.2	58 59	59.1	32 52.9	56 58	57.1	6
7	26 53.2	63 63	64.9	27 30.8	62 62	64.1	28 26.5	61 62	62.7	29 21.4	61 61	61.4	30 33.2	59 60	59.5	30 51.0	59 59	59.0	31 08.6	59 59	58.6	32 18.0	57 58	56.7	7
8	26 15.5	63 62	64.4	26 53.4	63 62	63.5	27 49.5	62 61	62.2	28 44.9	61 60	60.8	29 57.4	60 59	59.0	30 15.3	60 59	58.5	30 33.1	59 59	58.1	31 43.3	58 58	56.2	8
9	25 38.1	64 62	63.8	26 16.2	63 62	62.9	27 12.7	62 61	61.6	28 08.6	62 60	60.3	29 21.8	60 59	58.5	29 39.9	60 59	58.0	29 57.8	60 58	57.6	31 08.8	58 57	55.7	9
90	25 00.8	64 62	63.2	25 39.1	64 61	62.4	26 36.2	63 61	61.1	27 32.5	62 60	59.8	28 46.3	61 59	58.0	29 04.6	61 58	57.5	29 22.8	60 58	57.1	30 34.4	59 57	55.2	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	°
00	8 00.0	1.0 00	180.0	7 00.0	1.0 00	180.0	5 30.0	1.0 00	180.0																00
1	7 59.7	1.0 01	179.2	6 59.7	1.0 01	179.2	5 29.7	1.0 01	179.2																1
2	7 58.8	1.0 02	178.4	6 58.8	1.0 02	178.4	5 28.9	1.0 02	178.4																2
3	7 57.3	1.0 03	177.5	6 57.4	1.0 03	177.6	5 27.4	1.0 03	177.6																3
4	7 55.2	1.0 04	176.7	6 55.3	1.0 04	176.8	5 25.4	1.0 04	176.9																4
05	7 52.6	1.0 05	175.9	6 52.7	1.0 05	176.0	5 22.9	1.0 05	176.1																05
6	7 49.3	1.0 06	175.1	6 49.5	1.0 06	175.2	5 19.7	1.0 06	175.3																6
7	7 45.5	1.0 07	174.3	6 45.7	1.0 07	174.4	5 16.0	1.0 07	174.5																7
8	7 41.0	1.0 08	173.5	6 41.3	1.0 08	173.6	5 11.7	1.0 08	173.7																8
9	7 36.0	99 09	172.7	6 36.4	99 09	172.8	5 06.9	99 09	172.9																9
10	7 30.4	99 10	171.9	6 30.8	99 10	172.0	5 01.5	99 10	172.2																10
1	7 24.2	99 11	171.0	6 24.7	99 11	171.2																			1
2	7 17.4	99 12	170.2	6 18.0	99 12	170.4																			2
3	7 10.0	99 13	169.4	6 10.8	99 13	169.6																			3
4	7 02.1	99 14	168.6	6 03.0	99 14	168.8																			4
15	6 53.6	98 15	167.8	5 54.6	98 15	168.0																			15
6	6 44.5	98 16	167.0	5 45.7	98 16	167.2																			6
7	6 34.9	98 17	166.2	5 36.2	98 17	166.4																			7
8	6 24.7	98 18	165.4	5 26.1	98 18	165.6																			8
9	6 13.9	97 19	164.6	5 15.5	97 19	164.9																			9
20	6 02.6	97 20	163.8	5 04.3	97 20	164.1																			20
1	5 50.7	97 21	163.1																						1
2	5 38.3	97 22	162.3																						2
3	5 25.3	96 23	161.5																						3
4	5 11.8	96 24	160.7																						4

DECLINATION SAME NAME AS LATITUDE

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	°
91	24 23.6	65 62	62.6	25 02.3	64 61	61.8	25 59.8	63 60	60.5	26 56.5	63 60	59.2	28 11.1	62 58	57.5	28 29.5	61 58	57.0	28 47.9	61 58	56.6	30 00.3	60 57	54.7	91
2	23 46.7	65 61	62.1	24 25.7	65 61	61.2	25 23.6	64 60	60.0	26 20.8	63 59	58.7	27 36.1	62 58	56.9	27 54.7	62 58	56.5	28 13.2	62 57	56.0	29 26.4	60 56	54.2	2
3	23 10.0	66 61	61.5	23 49.2	65 60	60.7	24 47.6	65 60	59.4	25 45.3	64 59	58.1	27 01.3	63 58	56.4	27 20.0	62 57	56.0	27 38.7	62 57	55.5	28 52.7	61 56	53.7	3
4	22 33.5	66 61	60.9	23 13.0	66 60	60.1	24 11.8	65 59	58.9	25 10.0	64 58	57.6	26 26.6	63 57	55.9	26 45.6	63 57	55.5	27 04.5	63 57	55.0	28 19.2	62 56	53.3	4
95	21 57.1	67 60	60.3	22 37.0	66 60	59.5	23 36.3	66 59	58.3	24 35.0	65 58	57.1	25 52.2	64 57	55.4	26 11.4	64 57	54.9	26 30.4	63 56	54.5	27 45.9	62 55	52.8	95
6	21 21.0	67 60	59.8	22 01.2	67 59	59.0	23 00.9	66 59	57.7	24 00.1	65 58	56.5	25 18.1	65 57	54.8	25 37.4	64 56	54.4	25 56.6	64 56	54.0	27 12.8	63 55	52.3	6
7	20 45.1	68 59	59.2	21 25.6	67 59	58.4	22 25.8	67 58	57.2	23 25.4	66 57	56.0	24 44.1	65 56	54.3	25 03.6	65 56	53.9	25 23.0	65 56	53.5	26 40.0	64 54	51.8	7
8	20 09.5	68 59	58.6	20 50.2	68 59	57.8	21 50.9	67 58	56.6	22 51.0	67 57	55.4	24 10.4	66 56	53.8	24 30.0	65 56	53.4	24 49.6	65 55	52.9	26 07.3	64 54	51.2	8
9	19 34.0	69 59	58.0	20 15.0	68 58	57.2	21 16.2	68 57	56.0	22 16.8	67 57	54.9	23 36.9	66 55	53.2	23 56.7	66 55	52.8	24 16.5	66 55	52.4	25 34.9	65 54	50.7	9
100	18 58.8	69 58	57.4	19 40.1	69 58	56.6	20 41.7	68 57	55.5	21 42.9	68 56	54.3	23 03.6	67 55	52.7	23 23.6	67 55	52.3	23 43.6	66 54	51.9	25 02.8	66 53	50.2	100
1	18 23.8	70 58	56.8	19 05.4	69 57	56.1	20 07.5	69 57	54.9	21 09.1	68 56	53.7	22 30.5	67 55	52.2	22 50.8	67 54	51.8	23 10.9	67 54	51.3	24 30.9	66 53	49.7	1
2	17 49.0	70 58	56.2	18 30.9	70 57	55.5	19 33.5	69 56	54.3	20 35.6	69 55	53.2	21 57.8	68 54	51.6	22 18.1	68 54	51.2	22 38.5	68 54	50.8	23 59.2	67 52	49.2	2
3	17 14.5	71 57	55.6	17 56.7	70 57	54.9	18 59.8	70 56	53.8	20 02.4	69 55	52.6	21 25.2	69 54	51.1	21 45.8	68 54	50.7	22 06.3	68 53	50.3	23 27.8	67 52	48.7	3
4	16 40.2	71 57	55.0	17 22.8	71 56	54.3	18 26.3	70 55	53.2	19 29.4	70 55	52.0	20 52.9	69 53	50.5	21 13.7	69 53	50.1	21 34.4	69 53	49.7	22 56.6	68 52	48.2	4
105	16 06.2	72 56	54.4	16 49.0	71 56	53.7	17 53.1	71 55	52.6	18 56.7	70 54	51.5	20 20.9	70 53	50.0	20 41.8	70 53	49.6	21 02.7	70 52	49.2	22 25.7	69 51	47.6	105
6	15 32.4	72 56	53.8	16 15.6	72 55	53.1	17 20.1	71 55	52.0	18 24.2	71 54	50.9	19 49.1	70 53	49.4	20 10.2	70 52	49.0	20 31.3	70 52	48.6	21 55.0	69 51	47.1	6
7	14 58.9	73 55	53.2	15 42.4	72 55	52.5	16 47.4	72 54	51.4	17 52.0	72 53	50.3	19 17.6	71 52	48.8	19 38.9	71 52	48.5	20 00.1	71 51	48.1	21 24.6	70 50	46.6	7
8	14 25.6	73 55	52.6	15 09.4	73 54	51.9	16 14.9	73 54	50.8	17 20.0	72 53	49.7	18 46.3	72 52	48.3	19 07.8	71 51	47.9	19 29.2	71 51	47.5	20 54.5	71 50	46.1	8
9	13 52.7	74 54	52.0	14 36.8	73 54	51.3	15 42.7	73 53	50.2	16 48.4	73 52	49.2	18 15.4	72 51	47.7	18 37.0	72 51	47.4	18 58.6	72 51	47.0	20 24.6	71 49	45.5	9
110	13 20.0	74 54	51.4	14 04.4	74 54	50.7	15 10.8	74 53	49.6	16 17.0	73 52	48.6	17 44.7	73 51	47.2	18 06.5	73 50	46.8	18 28.3	73 50	46.4	19 55.0	72 49	45.0	110
1	12 47.5	75 54	50.8	13 32.3	75 53	50.1	14 39.2	74 52	49.0	15 45.9	74 51	48.0	17 14.2	73 50	46.6	17 36.2	73 50	46.2	17 58.2	73 50	45.9	19 25.7	73 48	44.4	1
2	12 15.4	75 53	50.1	13 00.5	75 53	49.5	14 07.9	75 52	48.4	15 15.0	74 51	47.4	16 44.1	74 50	46.0	17 06.3	74 49	45.7	17 28.4	74 49	45.3	18 56.6	73 48	43.9	2
3	11 43.6	76 53	49.5	12 28.9	76 52	48.8	13 36.8	75 51	47.8	14 44.5	75 50	46.8	16 14.3	75 49	45.4	16 36.6	74 49	45.1	16 59.0	74 49	44.7	18 27.9	74 47	43.3	3
4	11 12.0	76 52	48.9	11 57.7	76 52	48.2	13 06.1	76 51	47.2	14 14.3	76 50	46.2	15 44.7	75 49	44.9	16 07.3	75 48	44.5	16 29.8	75 48	44.2	17 59.4	74 47	42.8	4
115	10 40.8	77 52	48.3	11 26.8	77 51	47.6	12 35.7	76 50	46.6	13 44.3	76 49	45.6	15 15.5	76 48	44.3	15 38.2	76 48	43.9	16 00.9	76 48	43.6	17 31.3	75 46	42.2	115
6	10 09.8	77 51	47.6	10 56.2	77 51	47.0	12 05.5	77 50	46.0	13 14.7	77 49	45.0	14 46.5	76 48	43.7	15 09.4	76 47	43.4	15 32.3	76 47	43.0	17 03.4	76 46	41.7	6
7	9 39.2	78 51	47.0	10 25.8	78 50	46.3	11 35.7	78 49	45.4	12 45.3	77 48	44.4	14 17.9	77 47	43.1	14 41.0	77 47	42.8	15 04.0	77 47	42.4	16 35.9	76 45	41.1	7
8	9 08.9	78 50	46.3	9 55.8	78 49	45.7	11 06.2	78 49	44.8	12 16.3	78 48	43.8	13 49.6	78 47	42.5	14 12.8	77 46	42.2	14 36.0	77 46	41.9	16 08.6	77 45	40.5	8
9	8 38.9	79 49	45.7	9 26.2	79 49	45.1	10 37.0	79 48	44.1	11 47.7	78 47	43.2	13 21.6	78 46	41.9	13 45.0	78 46	41.6	14 08.4	78 46	41.3	15 41.7	78 44	40.0	9
120	8 09.2	79 49	45.1	8 56.8	79 48	44.4	10 08.1	79 48	43.5	11 19.3	79 47	42.6	12 53.9	79 46	41.3	13 17.5	79 45	41.0	13 41.0	79 45	40.7	15 15.1	78 44	39.4	120
1	7 39.9	80 48	44.4	8 27.8	80 48	43.8	9 39.6	80 47	42.9	10 51.3	80 46	42.0	12 26.5	79 45	40.7	12 50.3	79 45	40.4	13 14.0	79 44	40.1	14 48.8	79 43	38.8	1
2	7 10.9	80 48	43.7	7 59.1	80 47	43.2	9 11.4	80 46	42.2	10 23.6	80 46	41.3	11 59.5	80 44	40.1	12 23.4	80 44	39.8	12 47.4	80 44	39.5	14 22.8	79 43	38.2	2
3	6 42.2	81 47	43.1	7 30.8	81 47	42.5	8 43.6	81 46	41.6	9 56.2	81 45	40.7	11 32.8	80 44	39.5	11 56.9	80 44	39.2	12 21.0	80 43	38.9	13 57.2	80 42	37.7	3
4	6 13.9	82 47	42.4	7 02.8	81 46	41.8	8 16.1	81 45	41.0	9 29.2	81 44	40.1	11 06.5	81 43	38.9	11 30.8	81 43	38.6	11 55.0	81 43	38.3	13 31.9	81 42	37.1	4
125	5 46.0	82 46	41.8	6 35.2	82 45	41.2	7 48.9	82 45	40.3	9 02.5	82 44	39.4	10 40.5	82 43	38.3	11 04.9	81 42	38.0	11 29.4	81 42	37.7	13 06.9	81 41	36.5	125
6	5 18.4	83 46	41.1	6 07.9	82 45	40.5	7 22.1	82 44	39.7	8 36.2	82 43	38.8	10 14.8	82 42	37.7	10 39.5	82 42	37.4	11 04.1	82 42	37.1	12 42.3	82 40	35.9	6
7				5 41.0	83 44	39.9	6 55.7	83 43	39.0	8 10.3	83 43	38.2	9 49.6	83 42	37.0	10 14.3	83 41	36.8	10 39.1	83 41	36.5	12 18.0	82 40	35.3	7
8				5 14.5	84 44	39.2	6 29.6	83 43	38.4	7 44.7	83 42	37.5	9 24.6	83 41	36.4	9 49.6	83 41	36.1	10 14.5	83 40	35.8	11 54.1	83 39	34.7	8
9							6 04.0	84 42	37.7	7 19.5	84 41	36.9	9 00.1	84 40	35.8	9 25.2	84 40	35.5	9 50.3	84 40	35.2	11 30.6	83 39	34.1	9
130							5 38.7	84 42	37.0	6 54.7	84 41	36.2	8 35.9	84 40	35.2	9 01.2	84 39	34.9	9 26.4	84 39	34.6	11 07.4	84 38	33.5	130
1							5 13.7	85 41	36.4	6 30.2	85 40	35.6	8 12.1	85 39	34.5	8 37.5	85 39	34.2	9 03.0	85 38	34.0	10 44.5	85 37	32.9	1
2										6 06.2	85 39	34.9	7 48.7	85 38	33.9	8 14.3	85 38	33.6	8 39.9	85 38	33.4	10 22.1	85 37	32.3	2
3										5 42.5	86 39	34.3	7 25.6	86 38	33.2	7 51.4	86 38	33.0	8 17.1	86 37	32.7	10 00.0	86 36	31.7	3
4										5 19.2	87 38	33.6	7 03.0	86 37	32.6	7 28.9	86 37	32.3	7 54.8	86 37	32.1	9 38.3	86 36	31.1	4
135													6 40.7	87 36	31.9	7 06.8	87 36	31.7	7 32.9	87 36	31.4	9 17.0	87 35	30.4	135
6													6 18.9	87 36	31.3	6 45.1	87 36	31.0	7 11.3	87 35	30.8	8 56.1	87 34	29.8	6
7													5 57.4	88 35	30.6	6 23.8	88 35	30.4	6 50.2	88 35	30.2	8 35.6	88 34	29.2	7
8													5 36.4	88 34	30.0	6 02.9	88 34	29.7	6 29.4	88 34	29.5	8 15.4	88 33	28.6	8
9													5 15.8	89 34	29.3	5 42.4	89 33	29.1	6 09.1	89 33	28.9	7 55.7	89 32	27.9	9
140																5 22.4	89 33	28.4	5 49.2	89 32	28.2	7 36.4	89 32	27.3	140
1																5 02.8	90 32	27.8	5 29.7	90 32	27.5	7 17.5	90 31	26.7	1
2																			5 10.7	90 31	26.9	6 59.0	90 30	26.0	2
3																						6 40.9	91 29	25.4	3
4																						6 23.3	91 29	24.7	4
145																						6 06.1	92 28	24.1	145
6																						5 49.3	92 27	23.4	6
7																						5 32.9	92 26	22.8	7
8																						5 17.0	93 26	22.1	8
9																						5 01.6	93 25	21.4	9

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Lat. 46°

H.A.	46° 00′ Alt.		Az.	47° 00′ Alt.		Az.	48° 30′ Alt.		Az.	49° 30′ Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	90 00.0	.. 69	....	89 00.0	1.0 21	00.0	87 30.0	1.0 09	00.0	86 30.0	1.0 06	00.0
1	89 18.3	01 69	89.6	88 47.2	82 49	34.2	87 24.6	96 25	14.8	86 26.2	98 19	10.5
2	88 36.6	01 69	89.3	88 17.9	58 59	53.3	87 09.3	87 38	27.8	86 15.0	93 29	20.3
3	87 55.0	02 69	88.9	87 42.3	42 63	63.1	86 46.6	76 47	38.1	85 57.7	86 37	28.9
4	87 13.3	03 69	88.6	87 04.3	32 65	68.6	86 18.6	66 52	45.9	85 35.2	78 44	36.1
05	86 31.6	03 69	88.2	86 25.0	26 66	72.0	85 47.2	57 56	51.8	85 08.9	70 49	42.0
6	85 50.0	04 69	87.8	85 45.1	20 67	74.2	85 13.4	49 59	56.3	84 39.7	63 52	46.9
7	85 08.3	04 69	87.5	85 04.8	16 68	75.7	84 38.0	42 61	59.7	84 08.3	56 55	50.8
8	84 26.7	05 69	87.1	84 24.3	13 68	76.8	84 01.5	37 62	62.4	83 35.3	50 57	54.0
9	83 45.1	06 69	86.8	83 43.7	10 68	77.6	83 24.2	32 63	64.5	83 01.0	45 59	56.7
10	83 03.5	06 69	86.4	83 03.0	08 68	78.1	82 46.4	28 64	66.2	82 25.7	40 60	58.9
1	82 21.9	07 69	86.0	82 22.1	06 68	78.5	82 08.1	25 64	67.5	81 49.7	36 61	60.7
2	81 40.3	08 69	85.7	81 41.3	04 68	78.8	81 29.4	22 65	68.6	81 13.1	32 62	62.2
3	80 58.8	08 69	85.3	81 00.4	03 68	78.9	80 50.5	19 65	69.5	80 36.0	29 62	63.4
4	80 17.2	09 69	85.0	80 19.5	01 68	79.0	80 11.4	17 65	70.2	79 58.5	26 63	64.5
15	79 35.7	09 69	84.6	79 38.5	00 68	79.0	79 32.1	14 66	70.8	79 20.8	23 63	65.4
6	78 54.3	10 69	84.2	78 57.6	01 68	79.0	78 52.6	12 66	71.2	78 42.8	21 64	66.1
7	78 12.8	11 69	83.9	78 16.7	02 68	79.0	78 13.1	10 66	71.6	78 04.6	18 64	66.8
8	77 31.4	11 69	83.5	77 35.8	03 68	78.9	77 33.6	08 66	71.9	77 26.2	16 64	67.3
9	76 50.0	12 69	83.1	76 54.9	05 68	78.7	76 53.9	07 66	72.1	76 47.7	14 64	67.8
20	76 08.6	13 69	82.8	76 14.1	06 68	78.6	76 14.2	05 66	72.3	76 09.0	12 65	68.1
1	75 27.3	13 69	82.4	75 33.2	07 68	78.4	75 34.5	04 66	72.4	75 30.3	10 65	68.4
2	74 46.0	14 69	82.0	74 52.4	07 68	78.2	74 54.8	02 66	72.5	74 51.5	09 65	68.7
3	74 04.7	14 69	81.7	74 11.6	08 68	78.0	74 15.0	01 66	72.5	74 12.7	07 65	68.8
4	73 23.5	15 69	81.3	73 30.8	09 68	77.8	73 35.3	00 66	72.5	73 33.8	05 65	69.0
25	72 42.3	16 69	80.9	72 50.1	10 68	77.6	72 55.5	02 66	72.5	72 54.9	04 65	69.1
6	72 01.2	16 68	80.6	72 09.4	11 68	77.3	72 15.8	03 66	72.5	72 15.9	03 65	69.2
7	71 20.1	17 68	80.2	71 28.8	12 68	77.1	71 36.0	04 66	72.4	71 36.9	01 65	69.2
8	70 39.0	18 68	79.8	70 48.2	13 68	76.8	70 56.3	05 66	72.3	70 58.0	00 65	69.2
9	69 58.0	18 68	79.5	70 07.6	14 68	76.6	70 16.6	06 66	72.2	70 19.0	02 65	69.2
30	69 17.1	19 68	79.1	69 27.1	14 67	76.3	69 37.0	07 66	72.0	69 40.1	03 65	69.2
1	68 30.2	20 68	78.7	68 46.6	15 67	76.0	68 57.3	09 66	71.9	69 01.1	04 65	69.1
2	67 55.3	20 68	78.3	68 06.2	16 67	75.7	68 17.8	10 66	71.7	68 22.2	05 65	69.0
3	67 14.6	21 68	78.0	67 25.9	17 67	75.4	67 38.2	11 66	71.5	67 43.3	06 65	68.9
4	66 33.8	21 68	77.6	66 45.5	18 67	75.1	66 58.7	12 66	71.3	67 04.4	07 65	68.8
35	65 53.1	22 68	77.2	66 05.3	18 67	74.8	66 19.2	13 66	71.1	66 25.6	09 65	68.7
6	65 12.5	23 68	76.8	65 25.1	19 67	74.5	65 39.8	14 66	70.9	65 46.8	10 65	68.5
7	64 32.0	23 67	76.5	64 45.0	20 67	74.2	65 00.4	14 66	70.7	65 08.0	11 65	68.4
8	63 51.5	24 67	76.1	64 04.9	21 67	73.9	64 21.1	15 65	70.5	64 29.3	12 64	68.2
9	63 11.1	25 67	75.7	63 24.9	21 67	73.5	63 41.9	16 65	70.2	63 50.6	13 64	68.0
40	62 30.7	25 67	75.3	62 44.9	22 66	73.2	63 02.7	17 65	70.0	63 12.0	14 64	67.8
1	61 50.4	26 67	74.9	62 05.1	23 66	72.9	62 23.5	18 65	69.7	62 33.4	15 64	67.6
2	61 10.2	27 67	74.6	61 25.3	24 66	72.5	61 44.5	19 65	69.5	61 54.9	16 64	67.4
3	60 30.1	27 67	74.2	60 45.6	24 66	72.2	61 05.5	20 65	69.2	61 16.5	17 64	67.2
4	59 50.0	28 67	73.8	60 05.9	25 66	71.9	60 26.6	21 65	68.9	60 38.1	18 64	66.9
45	59 10.0	29 66	73.4	59 26.3	26 66	71.5	59 47.7	22 65	68.6	59 59.8	19 64	66.7
6	58 30.1	29 66	73.0	58 46.8	27 66	71.2	59 08.9	22 64	68.4	59 21.6	20 64	66.4
7	57 50.3	30 66	72.6	58 07.4	27 66	70.8	58 30.2	23 64	68.1	58 43.4	21 64	66.2
8	57 10.6	31 66	72.2	57 28.1	28 65	70.5	57 51.6	24 64	67.8	58 05.3	22 63	65.9
9	56 30.9	31 66	71.8	56 48.9	29 65	70.1	57 13.1	25 64	67.5	57 27.3	22 63	65.7
50	55 51.3	32 66	71.5	56 09.7	29 65	69.8	56 34.6	26 64	67.2	56 49.4	23 63	65.4
1	55 11.9	32 66	71.1	55 30.7	30 65	69.4	55 56.2	27 64	66.8	56 11.5	24 63	65.1
2	54 32.5	33 65	70.7	54 51.7	31 65	69.0	55 18.0	27 64	66.5	55 33.7	25 63	64.8
3	53 53.2	34 65	70.3	54 12.8	32 65	68.7	54 39.8	28 63	66.2	54 56.1	26 63	64.5
4	53 14.0	34 65	69.9	53 34.1	32 64	68.3	54 01.7	29 63	65.9	54 18.5	27 62	64.2
55	52 35.0	35 65	69.5	52 55.4	33 64	67.9	53 23.7	30 63	65.5	53 41.0	28 62	63.9
6	51 56.0	36 65	69.1	52 16.8	34 64	67.5	52 45.8	31 63	65.2	53 03.6	29 62	63.6
7	51 17.1	36 65	68.7	51 38.3	34 64	67.2	52 08.0	31 63	64.9	52 26.3	29 62	63.3
8	50 38.3	37 64	68.3	51 00.0	35 64	66.8	51 30.4	32 63	64.5	51 49.1	30 62	63.0
9	49 59.7	38 64	67.9	50 21.7	36 64	66.4	50 52.8	33 62	64.2	51 12.0	31 62	62.7
60	49 21.1	38 64	67.4	49 43.6	37 63	66.0	50 15.3	34 62	63.8	50 35.1	32 61	62.4
1	48 42.7	39 64	67.0	49 05.6	37 63	65.6	49 38.0	35 62	63.5	49 58.2	33 61	62.0
2	48 04.4	40 64	66.6	48 27.7	38 63	65.2	49 00.7	35 62	63.1	49 21.5	34 61	61.7
3	47 26.2	40 63	66.2	47 49.9	39 63	64.8	48 23.6	36 62	62.8	48 44.8	34 61	61.4
4	46 48.1	41 63	65.8	47 12.2	39 63	64.5	47 46.6	37 61	62.4	48 08.3	35 61	61.0
65	46 10.1	42 63	65.4	46 34.7	40 62	64.1	47 09.7	38 61	62.0	47 31.9	36 60	60.7
6	45 32.3	42 63	65.0	45 57.3	41 62	63.7	46 33.0	39 61	61.7	46 55.6	37 60	60.3
7	44 54.6	43 63	64.5	45 20.0	42 62	63.3	45 56.4	39 61	61.3	46 19.5	38 60	60.0
8	44 17.0	44 62	64.1	44 42.8	42 62	62.9	45 19.9	40 61	60.9	45 43.5	39 60	59.6
9	43 39.6	44 62	63.7	44 05.8	43 61	62.4	44 43.5	41 60	60.5	45 07.6	39 60	59.2
70	43 02.3	45 62	63.3	43 28.9	44 61	62.0	44 07.3	42 60	60.2	44 31.8	40 59	58.9
1	42 25.2	46 62	62.8	42 52.2	44 61	61.6	43 31.2	42 60	59.8	43 56.2	41 59	58.5
2	41 48.2	46 61	62.4	42 15.6	45 61	61.2	42 55.3	43 60	59.4	43 20.8	42 59	58.1
3	41 11.3	47 61	62.0	41 39.1	46 60	60.8	42 19.5	44 59	59.0	42 45.4	43 59	57.8
4	40 34.6	48 61	61.5	41 02.8	46 60	60.4	41 43.8	45 59	58.6	42 10.2	43 58	57.4
75	39 58.0	48 61	61.1	40 26.7	47 60	60.0	41 08.3	45 59	58.2	41 35.2	44 58	57.0
6	39 21.6	49 60	60.7	39 50.7	48 60	59.5	40 33.0	46 59	57.8	41 00.3	45 58	56.6
7	38 45.3	50 60	60.2	39 14.8	49 59	59.1	39 57.8	47 58	57.4	40 25.6	46 58	56.2
8	38 09.2	50 60	59.8	38 39.1	49 59	58.7	39 22.8	48 58	57.0	39 51.0	47 57	55.8
9	37 33.3	51 60	59.3	38 03.6	50 59	58.2	38 47.9	48 58	56.6	39 16.6	47 57	55.4
80	36 57.5	52 59	58.9	37 28.3	51 59	57.8	38 13.2	49 58	56.2	38 42.4	48 57	55.0
1	36 21.9	52 59	58.4	36 53.1	51 58	57.4	37 38.7	50 57	55.7	38 08.3	49 57	54.6
2	35 46.5	53 59	58.0	36 18.1	52 58	56.9	37 04.3	51 57	55.3	37 34.4	50 56	54.2
3	35 11.3	54 58	57.5	35 43.2	53 58	56.5	36 30.1	51 57	54.9	37 00.7	50 56	53.8
4	34 36.2	54 58	57.1	35 08.6	54 57	56.0	35 56.1	52 56	54.5	36 27.1	51 56	53.4
85	34 01.3	55 58	56.6	34 34.1	54 57	55.6	35 22.3	53 56	54.0	35 53.7	52 55	53.0
6	33 26.6	56 58	56.1	33 59.8	55 57	55.1	34 48.6	54 56	53.6	35 20.5	53 55	52.6
7	32 52.1	56 57	55.7	33 25.7	56 57	54.7	34 15.2	54 55	53.2	34 47.5	54 55	52.2
8	32 17.7	57 57	55.2	32 51.8	56 56	54.2	33 41.9	55 55	52.7	34 14.7	54 54	51.7
9	31 43.6	58 57	54.7	32 18.0	57 56	53.8	33 08.8	56 55	52.3	33 42.1	55 54	51.3
90	31 09.7	58 56	54.3	31 44.5	58 56	53.3	32 35.9	57 54	51.9	33 09.6	56 54	50.9

50° 30′ Alt.		Az.	51° 30′ Alt.		Az.	52° 30′ Alt.		Az.	54° 00′ Alt.		Az.	H.A.
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
85 30.0	1.0 05	00.0	84 30.0	1.0 04	00.0	83 30.0	1.0 03	00.0	82 00.0	1.0 03	00.0	00
85 27.1	99 14	08.0	84 27.6	99 12	06.5	83 28.0	99 10	05.4	81 58.5	1.0 08	04.2	1
85 18.5	96 23	15.7	84 20.7	97 19	12.7	83 22.2	98 16	10.6	81 53.9	99 13	08.4	2
85 04.7	91 30	22.8	84 09.4	93 26	18.7	83 12.8	96 22	15.6	81 46.4	97 17	12.4	3
84 46.4	85 37	29.1	83 54.2	89 31	24.1	82 59.9	92 27	20.4	81 36.0	94 22	16.3	4
84 24.3	78 42	34.7	83 35.5	84 36	29.1	82 43.9	88 31	24.8	81 23.0	91 26	20.0	05
83 59.2	72 46	39.4	83 13.8	79 40	33.5	82 25.0	84 35	28.8	81 07.6	88 29	23.5	6
83 31.6	66 49	43.4	82 49.6	74 44	37.4	82 03.8	79 39	32.5	80 49.9	85 33	26.7	7
83 02.0	60 52	46.9	82 23.3	68 47	40.8	81 40.4	74 42	35.8	80 30.2	81 36	29.7	8
82 30.8	55 54	49.8	81 55.2	63 49	43.9	81 15.1	70 45	38.8	80 08.6	77 39	32.5	9
81 58.4	50 56	52.3	81 25.6	59 51	46.5	80 48.2	66 47	41.4	79 45.5	73 41	35.0	10
81 25.0	46 57	54.4	80 54.8	54 53	48.8	80 20.0	61 49	43.8	79 20.8	70 43	37.4	1
80 50.7	42 58	56.2	80 23.0	50 54	50.8	79 50.6	57 51	45.9	78 54.9	66 45	39.5	2
80 15.7	38 59	57.8	79 50.3	46 56	52.5	79 20.2	54 52	47.7	78 27.9	62 47	41.4	3
79 40.2	35 60	59.1	79 16.9	43 57	54.1	78 49.0	50 53	49.4	77 59.9	59 48	43.1	4
79 04.2	32 61	60.3	78 42.8	40 58	55.4	78 17.0	47 54	50.9	77 30.9	56 49	44.7	15
78 27.9	29 61	61.3	78 08.3	36 58	56.6	77 44.3	43 55	52.2	77 01.2	52 51	46.2	6
77 51.2	26 62	62.1	77 33.3	33 59	57.6	77 11.1	40 56	53.4	76 30.8	49 52	47.5	7
77 14.2	24 62	62.8	76 57.9	31 60	58.5	76 37.5	37 57	54.4	75 59.8	46 53	48.6	8
76 37.0	21 62	63.5	76 22.2	28 60	59.3	76 03.4	35 57	55.3	75 28.3	43 53	49.7	9
75 59.6	19 63	64.0	75 46.2	26 60	60.0	75 28.9	32 58	56.2	74 56.3	41 54	50.7	20
75 22.1	17 63	64.5	75 10.0	23 61	60.6	74 54.2	29 58	56.9	74 23.8	38 55	51.6	1
74 44.4	15 63	64.9	74 33.6	21 61	61.2	74 19.1	27 59	57.5	73 51.0	35 55	52.3	2
74 06.6	13 63	65.2	73 57.0	19 61	61.6	73 43.8	25 59	58.1	73 17.8	33 56	53.0	3
73 28.8	11 63	65.5	73 20.2	17 61	62.0	73 08.3	23 59	58.6	72 44.4	31 56	53.7	4
72 50.8	10 63	65.7	72 43.4	15 62	62.4	72 32.7	21 60	59.1	72 10.7	28 57	54.3	25
72 12.8	08 63	65.9	72 06.4	13 62	62.6	71 56.9	19 60	59.4	71 36.7	26 57	54.8	6
71 34.7	06 64	66.0	71 29.4	12 62	62.9	71 20.9	17 60	59.8	71 02.6	24 57	55.2	7
70 56.6	05 64	66.2	70 52.2	10 62	63.1	70 44.8	15 60	60.1	70 28.3	22 57	55.6	8
70 18.5	03 64	66.2	70 15.0	08 62	63.3	70 08.7	13 60	60.3	69 53.8	20 58	56.0	9
69 40.3	02 64	66.3	69 37.8	07 62	63.4	69 32.4	11 61	60.5	69 19.2	18 58	56.3	30
69 02.2	01 64	66.3	69 00.5	05 62	63.5	68 56.1	10 61	60.7	68 44.4	16 58	56.6	1
68 24.0	01 64	66.3	68 23.2	04 62	63.6	68 19.7	08 61	60.9	68 09.6	14 58	56.9	2
67 45.8	02 64	66.3	67 45.8	02 62	63.6	67 43.3	06 61	61.0	67 34.6	13 58	57.1	3
67 07.7	03 64	66.2	67 08.5	01 62	63.7	67 06.8	05 61	61.1	66 59.6	11 58	57.2	4
66 29.6	05 64	66.2	66 31.1	01 62	63.7	66 30.3	03 61	61.1	66 24.5	09 59	57.4	35
65 51.4	06 64	66.1	65 53.8	02 62	63.6	65 53.8	02 61	61.2	65 49.4	08 59	57.5	6
65 13.4	07 63	66.0	65 16.4	03 62	63.6	65 17.3	01 61	61.2	65 14.2	06 59	57.6	7
64 35.3	08 63	65.9	64 39.1	05 62	63.5	64 40.7	01 61	61.2	64 39.0	05 59	57.7	8
63 57.3	09 63	65.7	64 01.8	06 62	63.5	64 04.2	02 61	61.2	64 03.8	03 59	57.7	9
63 19.3	10 63	65.6	63 24.5	07 62	63.4	63 27.7	04 61	61.1	63 28.5	02 59	57.8	40
62 41.4	12 63	65.4	62 47.3	08 62	63.3	62 51.2	05 61	61.1	62 53.3	00 59	57.8	1
62 03.5	13 63	65.3	62 10.1	09 62	63.1	62 14.7	06 61	61.0	62 18.0	01 59	57.8	2
61 25.7	14 63	65.1	61 32.9	11 62	63.0	61 38.3	07 61	60.9	61 42.7	03 59	57.8	3
60 47.9	15 63	64.9	60 55.8	12 62	62.9	61 01.9	09 61	60.8	61 07.5	04 59	57.7	4
60 10.2	16 63	64.7	60 18.7	13 62	62.7	60 25.5	10 61	60.7	60 32.2	05 59	57.7	45
59 32.5	17 63	64.5	59 41.7	14 62	62.6	59 49.2	11 60	60.6	59 57.0	06 59	57.6	6
58 54.9	18 63	64.3	59 04.8	15 62	62.4	59 12.9	12 60	60.4	59 21.9	08 59	57.5	7
58 17.4	19 62	64.1	58 27.9	16 61	62.2	58 36.7	13 60	60.3	58 46.7	09 58	57.4	8
57 40.0	20 62	63.8	57 51.0	17 61	62.0	58 00.5	14 60	60.1	58 11.6	10 58	57.3	9
57 02.6	21 62	63.6	57 14.3	18 61	61.8	57 24.4	16 60	60.0	57 36.6	11 58	57.2	50
56 25.3	22 62	63.4	56 37.6	19 61	61.6	56 48.3	17 60	59.8	57 01.5	13 58	57.1	1
55 48.1	23 62	63.1	56 01.0	20 61	61.4	56 12.4	18 60	59.6	56 26.6	14 58	56.9	2
55 11.0	24 62	62.8	55 24.4	21 61	61.1	55 36.4	19 60	59.4	55 51.7	15 58	56.8	3
54 33.9	25 62	62.6	54 48.0	22 61	60.9	55 00.6	20 60	59.2	55 16.9	16 58	56.6	4
53 57.0	26 61	62.3	54 11.6	23 60	60.6	54 24.9	21 59	59.0	54 42.1	17 58	56.4	55
53 20.1	26 61	62.0	53 35.3	24 60	60.4	53 49.2	22 59	58.8	54 07.4	19 58	56.3	6
52 43.4	27 61	61.7	52 59.1	25 60	60.1	53 13.6	23 59	58.5	53 32.8	20 58	56.1	7
52 06.7	28 61	61.4	52 23.0	26 60	59.9	52 38.1	24 59	58.3	52 58.3	21 57	55.9	8
51 30.1	29 61	61.2	51 47.0	27 60	59.6	52 02.7	25 59	58.0	52 23.8	22 57	55.7	9
50 53.7	30 61	60.9	51 11.1	28 60	59.3	51 27.4	26 59	57.8	51 49.4	23 57	55.4	60
50 17.3	31 60	60.5	50 35.3	29 60	59.0	50 52.2	27 59	57.5	51 15.1	24 57	55.2	1
49 41.1	32 60	60.2	49 59.6	30 59	58.8	50 17.0	28 58	57.3	50 41.0	25 57	55.0	2
49 05.0	33 60	59.9	49 24.1	31 59	58.5	49 42.0	29 58	57.0	50 06.9	26 57	54.8	3
48 29.0	34 60	59.6	48 48.6	32 59	58.2	49 07.1	30 58	56.7	49 32.9	27 56	54.5	4
47 53.1	34 60	59.3	48 13.2	33 59	57.9	48 32.3	31 58	56.4	48 59.0	28 56	54.3	65
47 17.3	35 59	58.9	47 38.0	34 59	57.6	47 57.7	32 58	56.2	48 25.2	29 56	54.0	6
46 41.7	36 59	58.6	47 02.9	35 58	57.2	47 23.1	33 57	55.9	47 51.5	30 56	53.7	7
46 06.2	37 59	58.3	46 27.9	35 58	56.9	46 48.7	34 57	55.6	47 18.0	31 56	53.5	8
45 30.8	38 59	57.9	45 53.0	36 58	56.6	46 14.4	35 57	55.3	46 44.6	32 56	53.2	9
44 55.5	39 59	57.6	45 18.3	37 58	56.3	45 40.2	36 57	54.9	46 11.2	33 55	52.9	70
44 20.4	40 58	57.2	44 43.7	38 57	55.9	45 06.1	37 57	54.6	45 38.1	34 55	52.6	1
43 45.4	40 58	56.9	44 09.2	39 57	55.6	44 32.2	38 56	54.3	45 05.0	35 55	52.3	2
43 10.6	41 58	56.5	43 34.9	40 57	55.3	43 58.4	38 56	54.0	44 32.1	36 55	52.0	3
42 35.9	42 58	56.2	43 00.7	41 57	54.9	43 24.8	39 56	53.7	43 59.3	37 54	51.7	4
42 01.3	43 57	55.8	42 26.7	42 56	54.6	42 51.3	40 56	53.3	43 26.6	38 54	51.4	75
41 26.9	44 57	55.4	41 52.8	42 56	54.2	42 17.9	41 55	53.0	42 54.1	39 54	51.1	6
40 52.7	45 57	55.1	41 19.1	43 56	53.9	41 44.7	42 55	52.7	42 21.7	40 54	50.8	7
40 18.6	45 57	54.7	40 45.5	44 56	53.5	41 11.6	43 55	52.3	41 49.5	41 53	50.5	8
39 44.7	46 56	54.3	40 12.1	45 55	53.1	40 38.7	44 55	52.0	41 17.4	42 53	50.2	9
39 10.9	47 56	53.9	39 38.8	46 55	52.8	40 06.0	45 54	51.6	40 45.5	43 53	49.8	80
38 37.3	48 56	53.5	39 05.7	47 55	52.4	39 33.4	46 54	51.2	40 13.7	44 53	49.5	1
38 03.9	49 55	53.1	38 32.8	48 55	52.0	39 01.0	46 54	50.9	39 42.1	45 52	49.2	2
37 30.6	49 55	52.7	38 00.0	48 54	51.6	38 28.7	47 53	50.5	39 10.6	46 52	48.8	3
36 57.6	50 55	52.3	37 27.4	49 54	51.3	37 56.7	48 53	50.1	38 39.3	47 52	48.5	4
36 24.6	51 55	51.9	36 55.0	50 54	50.9	37 24.7	49 53	49.8	38 08.2	48 52	48.1	85
35 51.9	52 54	51.5	36 22.8	51 53	50.5	36 53.0	50 53	49.4	37 37.3	48 51	47.8	6
35 19.4	53 54	51.1	35 50.7	52 53	50.1	36 21.5	51 52	49.0	37 06.5	49 51	47.4	7
34 47.0	53 54	50.7	35 18.8	53 53	49.7	35 50.1	52 52	48.6	36 35.9	50 51	47.0	8
34 14.9	54 53	50.3	34 47.1	53 52	49.3	35 18.9	52 52	48.2	36 05.5	51 50	46.7	9
33 42.9	55 53	49.9	34 15.6	54 52	48.9	34 47.9	53 51	47.8	35 35.3	52 50	46.3	90

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H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	d Alt	°	° ′	d Alt	°	° ′	d Alt	°	° ′	d Alt	°	° ′	d Alt	°	° ′	d Alt	°	° ′	d Alt	°	° ′	d Alt	°	°
91	30 35.9	59 56	53.8	31 11.2	58 55	52.9	32 03.2	57 54	51.4	32 37.4	57 53	50.4	33 11.1	56 53	49.5	33 44.4	55 52	48.5	34 17.1	54 51	47.4	35 05.3	53 50	45.9	91
2	30 02.4	60 56	53.3	30 38.1	59 55	52.4	31 30.8	58 54	51.0	32 05.4	57 53	50.0	32 39.5	57 52	49.0	33 13.3	56 51	48.0	33 46.5	55 51	47.0	34 35.4	54 49	45.5	2
3	29 29.1	60 55	52.8	30 05.2	60 54	51.9	30 58.5	59 53	50.5	31 33.6	58 53	49.6	32 08.2	57 52	48.6	32 42.4	57 51	47.6	33 16.1	56 50	46.6	34 05.8	55 49	45.1	3
4	28 56.0	61 55	52.4	29 32.5	60 54	51.4	30 26.4	60 53	50.1	31 01.9	59 52	49.1	31 37.0	58 52	48.2	32 11.7	57 51	47.2	32 45.9	57 50	46.2	33 36.3	55 49	44.8	4
95	28 23.1	62 54	51.9	29 00.0	61 54	51.0	29 54.6	60 53	49.6	30 30.5	60 52	48.7	31 06.1	59 51	47.7	31 41.2	58 50	46.8	32 15.9	57 50	45.8	33 07.1	56 48	44.4	95
6	27 50.4	62 54	51.4	28 27.7	62 53	50.5	29 23.0	61 52	49.1	29 59.3	60 52	48.2	30 35.3	60 51	47.3	31 10.9	59 50	46.4	31 46.1	58 49	45.4	32 38.1	57 48	44.0	6
7	27 18.0	63 54	50.9	27 55.7	63 53	50.0	28 51.5	62 52	48.7	29 28.4	61 51	47.8	30 04.8	60 50	46.9	30 40.9	60 50	45.9	31 16.5	59 49	45.0	32 09.2	58 48	43.6	7
8	26 45.7	64 53	50.4	27 23.8	63 53	49.5	28 20.4	62 52	48.2	28 57.6	62 51	47.3	29 34.5	61 50	46.4	30 11.0	61 49	45.5	30 47.2	60 49	44.6	31 40.6	59 47	43.2	8
9	26 13.7	64 53	49.9	26 52.2	64 52	49.0	27 49.4	63 51	47.7	28 27.1	63 50	46.9	29 04.4	62 50	46.0	29 41.4	61 49	45.1	30 18.0	61 48	44.1	31 12.2	60 47	42.7	9
100	25 42.0	65 53	49.4	26 20.9	65 52	48.5	27 18.7	64 51	47.3	27 56.8	63 50	46.4	28 34.6	63 49	45.5	29 12.0	62 49	44.6	29 49.1	61 48	43.7	30 44.1	61 47	42.3	100
1	25 10.5	66 52	48.9	25 49.8	65 51	48.1	26 48.2	65 50	46.8	27 26.7	64 50	45.9	28 05.0	63 49	45.0	28 42.9	63 48	44.2	29 20.4	62 47	43.3	30 16.1	61 46	41.9	1
2	24 39.2	66 52	48.4	25 18.9	66 51	47.6	26 17.9	65 50	46.3	26 56.9	65 49	45.5	27 35.6	64 49	44.6	28 14.0	64 48	43.7	28 52.0	63 47	42.8	29 48.4	62 46	41.5	2
3	24 08.1	67 51	47.9	24 48.3	67 51	47.1	25 47.9	66 50	45.8	26 27.3	65 49	45.0	27 06.5	65 48	44.1	27 45.3	64 47	43.3	28 23.8	64 47	42.4	29 20.9	63 45	41.1	3
4	23 37.4	68 51	47.4	24 17.9	67 50	46.6	25 18.2	67 49	45.3	25 58.0	66 48	44.5	26 37.6	66 48	43.7	27 16.8	65 47	42.8	27 55.8	65 46	42.0	28 53.6	64 45	40.6	4
105	23 06.8	68 50	46.8	23 47.7	68 50	46.1	24 48.6	67 49	44.8	25 28.9	67 48	44.0	26 08.9	66 47	43.2	26 48.6	66 47	42.4	27 28.0	65 46	41.5	28 26.6	65 45	40.2	105
6	22 36.5	69 50	46.3	23 17.9	69 49	45.5	24 19.4	68 48	44.3	25 00.1	68 48	43.5	25 40.5	67 47	42.7	26 20.7	67 46	41.9	27 00.5	66 45	41.1	27 59.8	65 44	39.8	6
7	22 06.5	70 50	45.8	22 48.2	69 49	45.0	23 50.4	69 48	43.9	24 31.5	68 47	43.1	25 12.4	68 46	42.2	25 53.0	67 46	41.4	26 33.3	67 45	40.6	27 33.2	66 44	39.3	7
8	21 36.8	70 49	45.3	22 18.9	70 48	44.5	23 21.6	69 47	43.4	24 03.2	69 47	42.6	24 44.5	69 46	41.8	25 25.5	68 45	41.0	26 06.3	68 45	40.1	27 06.9	67 43	38.9	8
9	21 07.3	71 49	44.8	21 49.8	71 48	44.0	22 53.2	70 47	42.8	23 35.1	70 46	42.1	24 16.8	69 46	41.3	24 58.3	69 45	40.5	25 39.5	68 44	39.7	26 40.9	68 43	38.5	9
110	20 38.1	72 48	44.2	21 21.0	71 48	43.5	22 24.9	71 47	42.3	23 07.3	70 46	41.6	23 49.5	70 45	40.8	24 31.4	70 44	40.0	25 13.1	69 44	39.2	26 15.1	69 43	38.0	110
1	20 09.1	72 48	43.7	20 52.4	72 47	43.0	21 57.0	71 46	41.8	22 39.8	71 45	41.1	23 22.4	71 45	40.3	24 04.7	70 44	39.5	24 46.8	70 43	38.8	25 49.5	69 42	37.6	1
2	19 40.5	73 47	43.2	20 24.2	73 47	42.4	21 29.3	72 46	41.3	22 12.5	72 45	40.6	22 55.5	71 44	39.8	23 38.3	71 44	39.1	24 20.9	71 43	38.3	25 24.3	70 42	37.1	2
3	19 12.1	74 47	42.6	19 56.2	73 46	41.9	21 02.0	73 45	40.8	21 45.6	73 44	40.1	22 29.0	72 44	39.3	23 12.2	72 43	38.6	23 55.2	71 42	37.8	24 59.2	71 41	36.7	3
4	18 44.1	74 46	42.1	19 28.5	74 46	41.4	20 34.9	74 45	40.3	21 18.9	73 44	39.6	22 02.7	73 43	38.8	22 46.4	73 43	38.1	23 29.8	72 42	37.3	24 34.5	72 41	36.2	4
115	18 16.3	75 46	41.5	19 01.1	75 45	40.8	20 08.1	74 44	39.8	20 52.5	74 44	39.0	21 36.7	74 43	38.3	22 20.8	73 42	37.6	23 04.6	73 41	36.8	24 10.0	72 40	35.7	115
6	17 48.8	75 45	41.0	18 34.0	75 45	40.3	19 41.6	75 44	39.2	20 26.4	75 43	38.5	21 11.0	74 42	37.8	21 55.5	74 42	37.1	22 39.8	74 41	36.4	23 45.8	73 40	35.3	6
7	17 21.6	76 45	40.4	18 07.2	76 44	39.7	19 15.3	76 43	38.7	20 00.6	75 43	38.0	20 45.6	75 42	37.3	21 30.5	75 41	36.6	22 15.2	74 40	35.9	23 21.9	74 39	34.8	7
8	16 54.7	77 44	39.9	17 40.7	77 44	39.2	18 49.4	76 43	38.2	19 35.0	76 42	37.5	20 20.5	76 41	36.8	21 05.8	75 41	36.1	21 50.9	75 40	35.4	22 58.3	75 39	34.3	8
9	16 28.2	77 44	39.3	17 14.5	77 43	38.6	18 23.8	77 42	37.6	19 09.8	77 42	37.0	19 55.7	76 41	36.3	20 41.4	76 40	35.6	21 26.9	76 40	34.9	22 34.9	75 38	33.8	9
120	16 01.9	78 43	38.8	16 48.7	78 43	38.1	17 58.5	77 42	37.1	18 44.9	77 41	36.4	19 31.2	77 40	35.8	20 17.3	77 40	35.1	21 03.2	76 39	34.4	22 11.9	76 38	33.4	120
1	15 36.0	79 43	38.2	16 23.1	78 42	37.5	17 33.5	78 41	36.6	18 20.3	78 40	35.9	19 07.0	78 40	35.2	19 53.5	77 39	34.6	20 39.9	77 38	33.9	21 49.1	77 37	32.9	1
2	15 10.4	79 42	37.6	15 57.9	79 42	37.0	17 08.9	79 41	36.0	17 56.0	79 40	35.4	18 43.1	78 39	34.7	19 30.0	78 39	34.1	20 16.8	78 38	33.4	21 26.6	77 37	32.4	2
3	14 45.1	80 42	37.0	15 33.0	80 41	36.4	16 44.5	79 40	35.5	17 32.1	79 39	34.8	18 19.5	79 39	34.2	19 06.8	79 38	33.5	19 54.0	78 37	32.9	21 04.5	78 36	31.9	3
4	14 20.2	80 41	36.5	15 08.4	80 40	35.9	16 20.5	80 40	34.9	17 08.4	80 39	34.3	17 56.2	80 38	33.7	18 43.9	79 38	33.0	19 31.5	79 37	32.4	20 42.6	79 36	31.4	4
125	13 55.6	81 40	35.9	14 44.1	81 40	35.3	15 56.8	81 39	34.4	16 45.1	80 38	33.8	17 33.3	80 38	33.1	18 21.4	80 37	32.5	19 09.3	80 36	31.9	20 21.0	79 35	30.9	125
6	13 31.3	82 40	35.3	14 20.2	81 39	34.7	15 33.4	81 38	33.8	16 22.1	81 38	33.2	17 10.7	81 37	32.6	17 59.2	81 36	32.0	18 47.5	80 36	31.3	19 59.8	80 35	30.4	6
7	13 07.4	82 39	34.7	13 56.7	82 39	34.1	15 10.4	82 38	33.3	15 59.5	82 37	32.7	16 48.4	81 37	32.1	17 37.2	81 36	31.4	18 26.0	81 35	30.8	19 38.8	81 34	29.9	7
8	12 43.8	83 39	34.1	13 33.4	83 38	33.6	14 47.7	82 37	32.7	15 37.1	82 37	32.1	16 26.5	82 36	31.5	17 15.7	82 35	30.9	18 04.8	82 35	30.3	19 18.2	81 34	29.4	8
9	12 20.6	83 38	33.5	13 10.6	83 38	33.0	14 25.4	83 37	32.1	15 15.2	83 36	31.5	16 04.8	83 35	31.0	16 54.4	83 35	30.4	17 43.9	82 34	29.8	18 57.9	82 33	28.9	9
130	11 57.8	84 37	33.0	12 48.1	84 37	32.4	14 03.4	84 36	31.6	14 53.5	83 35	31.0	15 43.6	83 35	30.4	16 33.5	83 34	29.8	17 23.4	83 34	29.3	18 38.0	83 33	28.4	130
1	11 35.3	84 37	32.4	12 25.9	84 36	31.8	13 41.8	84 35	31.0	14 32.2	84 35	30.4	15 22.6	84 34	29.9	16 13.0	84 34	29.3	17 03.2	84 33	28.7	18 18.3	83 32	27.9	1
2	11 13.1	85 36	31.8	12 04.1	85 36	31.2	13 20.5	85 35	30.4	14 11.3	85 34	29.9	15 02.1	85 34	29.3	15 52.7	84 33	28.7	16 43.3	84 33	28.2	17 59.0	84 32	27.3	2
3	10 51.4	86 36	31.2	11 42.7	85 35	30.6	12 59.6	85 34	29.8	13 50.8	85 34	29.3	14 41.8	85 33	28.7	15 32.9	85 33	28.2	16 23.8	85 32	27.7	17 40.0	85 31	26.8	3
4	10 30.0	86 35	30.5	11 21.7	86 34	30.0	12 39.0	86 34	29.2	13 30.5	86 33	28.7	14 22.0	86 33	28.2	15 13.3	86 32	27.7	16 04.6	85 31	27.1	17 21.4	85 30	26.3	4
135	10 09.0	87 34	29.9	11 01.0	87 34	29.4	12 18.9	86 33	28.7	13 10.7	86 32	28.1	14 02.5	86 32	27.6	14 54.2	86 31	27.1	15 45.8	86 31	26.6	17 03.1	86 30	25.8	135
6	9 48.4	87 34	29.3	10 40.7	87 33	28.8	11 59.1	87 32	28.1	12 51.2	87 32	27.6	13 43.3	87 31	27.1	14 35.4	87 31	26.5	15 27.3	87 30	26.0	16 45.2	86 29	25.2	6
7	9 28.2	88 33	28.7	10 20.8	88 33	28.2	11 39.6	88 32	27.5	12 32.1	87 31	27.0	13 24.6	87 31	26.5	14 16.9	87 30	26.0	15 09.2	87 30	25.5	16 27.6	87 29	24.7	7
8	9 08.4	88 32	28.1	10 01.3	88 32	27.6	11 20.6	88 31	26.9	12 13.4	88 31	26.4	13 06.2	88 30	25.9	13 58.9	88 30	25.4	14 51.5	88 29	24.9	16 10.3	88 28	24.2	8
9	8 49.0	89 32	27.5	9 42.2	89 31	27.0	11 01.9	89 30	26.3	11 55.1	88 30	25.8	12 48.1	88 29	25.3	13 41.2	88 29	24.9	14 34.1	88 28	24.4	15 53.4	88 28	23.6	9
140	8 29.9	89 31	26.8	9 23.5	89 31	26.4	10 43.7	89 30	25.7	11 37.1	89 29	25.2	12 30.5	89 29	24.8	13 23.8	89 28	24.3	14 17.1	89 28	23.8	15 36.9	89 27	23.1	140
1	8 11.3	90 30	26.2	9 05.2	90 30	25.8	10 25.8	90 29	25.1	11 19.5	90 29	24.6	12 13.2	89 28	24.2	13 06.9	89 28	23.7	14 00.5	89 27	23.3	15 20.7	89 26	22.6	1
2	7 53.1	90 30	25.6	8 47.2	90 29	25.1	10 08.3	90 28	24.5	11 02.4	90 28	24.0	11 56.3	90 27	23.6	12 50.3	90 27	23.1	13 44.2	90 26	22.7	15 04.9	90 26	22.0	2
3	7 35.3	91 29	24.9	8 29.7	91 28	24.5	9 51.3	91 28	23.9	10 45.6	90 27	23.4	11 39.9	90 27	23.0	12 34.1	90 26	22.6	13 28.3	90 26	22.1	14 49.5	90 25	21.5	3
4	7 18.0	91 28	24.3	8 12.6	91 28	23.9	9 34.6	91 27	23.3	10 29.2	91 27	22.8	11 23.8	91 26	22.4	12 18.3	91 26	22.0	13 12.8	91 25	21.6	14 34.4	91 24	20.9	4
145	7 01.0	92 28	23.7	7 56.0	92 27	23.3	9 18.3	91 26	22.7	10 13.2	91 26	22.2	11 08.1	91 26	21.8	12 02.9	91 25	21.4	12 57.7	91 25	21.0	14 19.7	91 24	20.4	145
6	6 44.5	92 27	23.0	7 39.7	92 26	22.6	9 02.5	92 26	22.0	9 57.6	92 25	21.6	10 52.8	92 25	21.2	11 47.9	92 24	20.8	12 42.9	92 24	20.4	14 05.4	92 23	19.8	6
7	6 28.4	92 26	22.4	7 23.9	92 26	22.0	8 47.1	92 25	21.4	9 42.5	92 25	21.0	10 37.9	92 24	20.6	11 33.2	92 24	20.2	12 28.6	92 23	19.9	13 51.5	92 23	19.3	7
8	6 12.8	93 26	21.7	7 08.5	93 25	21.4	8 32.1	93 24	20.8	9 27.7	93 24	20.4	10 23.4	93 23	20.0	11 19.0	93 23	19.7	12 14.6	93 23	19.3	13 37.9	93 22	18.7	8
9	5 57.6	93 25	21.1	6 53.5	93 24	20.7	8 17.5	93 24	20.2	9 13.4	93 23	19.8	10 09.3	93 23	19.4	11 05.2	93 22	19.1	12 01.1	93 22	18.7	13 24.8	93 21	18.1	9
150	5 42.8	94 24	20.4	6 39.0	94 24	20.1	8 03.3	94 23	19.5	8 59.5	94 22	19.2	9 55.6	94 22	18.8	10 51.8	94 22	18.5	11 47.9	93 21	18.1	13 12.0	93 21	17.6	150
1	5 28.5	94 23	19.8	6 24.9	94 23	19.4	7 49.6	94 22	18.9	8 46.0	94 22	18.6	9 42.4	94 21	18.2	10 38.8	94 21	17.9	11 35.1	94 21	17.5	12 59.6	94 20	17.0	1
2	5 14.6	94 22	19.1	6 11.3	94 22	18.8	7 36.3	94 21	18.3	8 32.9	94 21	18.0	9 29.6	94 21	17.6	10 26.2	94 20	17.3	11 22.8	94 20	16.9	12 47.6	94 19	16.4	2
3	5 01.2	95 22	18.5	5 58.1	95 21	18.1	7 23.4	95 21	17.7	8 20.3	95 20	17.3	9 17.2	95 20	17.0	10 14.0	95 20	16.7	11 10.8	95 19	16.4	12 36.0	95 19	15.9	3
4				5 45.3	95 20	17.5	7 11.0	95 20	17.0	8 08.1	95 20	16.7	9 05.2	95 19	16.4	10 02.2	95 19	16.1	10 59.3	95 19	15.8	12 24.8	95 18	15.3	4
155				5 33.0	96 20	16.8	6 59.0	96 19	16.4	7 56.3	96 19	16.1	8 53.6	95 19	15.8	9 50.9	95 18	15.5	10 48.2	95 18	15.2	12 14.0	95 17	14.7	155
6				5 21.2	96 19	16.2	6 47.5	96 18	15.7	7 45.0	96 18	15.5	8 42.5	96 18	15.2	9 40.0	96 17	14.9	10 37.5	96 17	14.6	12 03.6	96 17	14.2	6
7				5 09.8	96 18	15.5	6 36.4	96 18	15.1	7 34.1	96 17	14.8	8 31.8	96 17	14.6	9 29.5	96 17	14.3	10 27.2	96 16	14.0	11 53.7	96 16	13.6	7
8							6 25.8	97 17	14.5	7 23.7	96 17	14.2	8 21.5	96 16	13.9	9 19.4	96 16	13.7	10 17.3	96 16	13.4	11 44.1	96 15	13.0	8
9							6 15.6	97 16	13.8	7 13.7	97 16	13.6	8 11.7	97 16	13.3	9 09.8	97 15	13.1	10 07.9	97 15	12.8	11 34.9	97 15	12.4	9
160							6 05.8	97 15	13.2	7 04.1	97 15	12.9	8 02.4	97 15	12.7	9 00.6	97 15	12.4	9 58.8	97 14	12.2	11 26.2	97 14	11.8	160
1							5 56.6	97 15	12.5	6 55.0	97 14	12.3	7 53.4	97 14	12.1	8 51.8	97 14	11.8	9 50.2	97 14	11.6	11 17.8	97 13	11.3	1
2							5 47.8	98 14	11.9	6 46.3	98 14	11.7	7 44.9	98 13	11.4	8 43.5	98 13	11.2	9 42.1	98 13	11.0	11 09.9	98 12	10.7	2
3							5 39.4	98 13	11.2	6 38.2	98 13	11.0	7 36.9	98 13	10.8	8 35.6	98 12	10.6	9 34.3	98 12	10.4	11 02.4	98 12	10.1	3
4							5 31.5	98 12	10.6	6 30.4	98 12	10.4	7 29.3	98 12	10.2	8 28.2	98 12	10.0	9 27.0	98 11	09.8	10 55.3	98 11	09.5	4
165							5 24.1	98 12	09.9	6 23.1	98 11	09.7	7 22.1	98 11	09.6	8 21.1	98 11	09.4	9 20.1	98 11	09.2	10 48.6	98 10	08.9	165
6							5 17.2	99 11	09.3	6 16.3	99 11	09.1	7 15.4	99 10	08.9	8 14.6	99 10	08.8	9 13.7	99 10	08.6	10 42.4	99 10	08.3	6
7							5 10.7	99 10	08.6	6 10.0	99 10	08.4	7 09.2	99 10	08.3	8 08.5	99 09	08.1	9 07.7	99 09	08.0	10 36.6	99 09	07.7	7
8							5 04.7	99 09	08.0	6 04.1	99 09	07.8	7 03.4	99 09	07.7	8 02.8	99 09	07.5	9 02.1	99 09	07.4	10 31.2	99 08	07.1	8
9										5 58.6	99 08	07.2	6 58.1	99 08	07.0	7 57.6	99 08	06.9	8 57.0	99 08	06.8	10 26.2	99 08	06.5	9
170										5 53.7	99 08	06.5	6 53.2	99 07	06.4	7 52.8	99 07	06.3	8 52.3	99 07	06.1	10 21.7	99 07	06.0	170
1										5 49.2	99 07	05.9	6 48.8	99 07	05.8	7 48.5	99 06	05.6	8 48.1	99 06	05.5	10 17.6	99 06	05.4	1
2										5 45.2	1.0 06	05.2	6 44.9	1.0 06	05.1	7 44.6	1.0 06	05.0	8 44.3	1.0 06	04.9	10 13.9	1.0 05	04.8	2
3										5 41.6	1.0 05	04.6	6 41.4	1.0 05	04.5	7 41.2	1.0 05	04.4	8 41.0	1.0 05	04.3	10 10.6	1.0 05	04.2	3
4										5 38.5	1.0 04	03.9	6 38.4	1.0 04	03.8	7 38.2	1.0 04	03.8	8 38.1	1.0 04	03.7	10 07.8	1.0 04	03.6	4
175										5 35.9	1.0 04	03.3	6 35.8	1.0 04	03.2	7 35.7	1.0 03	03.1	8 35.6	1.0 03	03.1	10 05.4	1.0 03	03.0	175
6										5 33.8	1.0 03	02.6	6 33.7	1.0 03	02.6	7 33.7	1.0 03	02.5	8 33.6	1.0 03	02.5	10 03.5	1.0 03	02.4	6
7										5 32.1	1.0 02	02.0	6 32.1	1.0 02	01.9	7 32.1	1.0 02	01.9	8 32.0	1.0 02	01.8	10 02.0	1.0 02	01.8	7
8										5 30.9	1.0 01	01.3	6 30.9	1.0 01	01.3	7 30.9	1.0 01	01.3	8 30.9	1.0 01	01.2	10 00.9	1.0 01	01.2	8
9										5 30.2	1.0 00	00.7	6 30.2	1.0 00	00.6	7 30.2	1.0 00	00.6	8 30.2	1.0 00	00.6	10 00.2	1.0 00	00.6	9
180										5 30.0	1.0 00	00.0	6 30.0	1.0 00	00.0	7 30.0	1.0 00	00.0	8 30.0	1.0 00	00.0	10 00.0	1.0 00	00.0	180

Lat. 46°

H.A.	54° 30′ Alt.	Δd Δt	Az.	55° 00′ Alt.	Δd Δt	Az.	56° 00′ Alt.	Δd Δt	Az.	56° 30′ Alt.	Δd Δt	Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	81 30.0	1.0 02	00.0	81 00.0	1.0 02	00.0	80 00.0	1.0 02	00.0	79 30.0	1.0 02	00.0
1	81 28.6	1.0 07	03.9	80 58.7	1.0 07	03.7	79 58.8	1.0 06	03.2	79 28.9	1.0 06	03.0
2	81 24.3	99 12	07.8	80 54.7	99 11	07.3	79 55.3	99 10	06.4	79 25.6	99 09	06.0
3	81 17.3	97 16	11.6	80 48.1	97 15	10.8	79 49.6	98 13	09.5	79 20.2	98 13	09.0
4	81 07.6	95 20	15.2	80 39.1	95 19	14.3	79 41.6	96 17	12.6	79 12.6	97 16	11.9
05	80 55.5	92 24	18.7	80 27.6	93 23	17.6	79 31.4	94 20	15.5	79 03.0	95 19	14.7
6	80 40.9	89 28	22.0	80 14.0	90 26	20.7	79 19.2	92 23	18.4	78 51.5	93 22	17.4
7	80 24.3	86 31	25.1	79 58.2	87 29	23.7	79 05.2	89 26	21.1	78 38.2	90 25	20.0
8	80 05.6	83 34	28.0	79 40.6	84 32	26.5	78 49.3	87 29	23.7	78 23.1	88 28	22.4
9	79 45.2	79 37	30.7	79 21.2	81 35	29.1	78 31.7	84 32	26.1	78 06.4	85 30	24.8
10	79 23.1	76 39	33.2	79 00.1	77 37	31.5	78 12.7	81 34	28.4	77 48.2	82 33	27.0
1	78 59.6	72 41	35.5	78 37.7	74 40	33.7	77 52.2	78 36	30.5	77 28.6	79 35	29.1
2	78 34.8	68 43	37.6	78 13.9	71 42	35.8	77 30.4	74 38	32.5	77 07.8	76 37	31.0
3	78 08.8	65 45	39.5	77 49.0	67 43	37.7	77 07.4	71 40	34.4	76 45.7	73 39	32.8
4	77 41.8	61 47	41.2	77 23.0	64 45	39.4	76 43.4	68 42	36.1	76 22.6	70 40	34.5
15	77 13.9	58 48	42.8	76 56.1	61 46	41.0	76 18.3	65 43	37.7	75 58.5	67 42	36.1
6	76 45.2	55 49	44.3	76 28.3	57 48	42.5	75 52.4	62 44	39.2	75 33.5	64 43	37.6
7	76 15.7	52 50	45.6	75 59.8	54 49	43.9	75 25.7	59 46	40.5	75 07.7	61 44	39.0
8	75 45.6	49 51	46.8	75 30.5	51 50	45.1	74 58.3	56 47	41.8	74 41.1	58 45	40.2
9	75 14.9	46 52	47.9	75 00.7	49 51	46.2	74 30.2	53 48	43.0	74 13.9	55 46	41.4
20	74 43.7	43 53	48.9	74 30.4	46 51	47.3	74 01.5	50 49	44.0	73 46.0	53 47	42.5
1	74 12.1	40 53	49.8	73 59.5	43 52	48.2	73 32.3	48 50	45.0	73 17.6	50 48	43.5
2	73 40.0	38 54	50.7	73 28.3	40 53	49.0	73 02.6	45 50	45.9	72 48.7	47 49	44.4
3	73 07.6	35 55	51.4	72 56.6	38 53	49.8	72 32.4	43 51	46.7	72 19.3	45 50	45.2
4	72 34.9	33 55	52.1	72 24.6	35 54	50.5	72 01.9	40 52	47.5	71 49.5	42 50	46.0
25	72 01.8	31 55	52.7	71 52.3	33 54	51.2	71 31.0	38 52	48.2	71 19.3	40 51	46.7
6	71 28.6	29 56	53.3	71 19.6	31 55	51.8	70 59.7	35 53	48.8	70 48.8	38 51	47.4
7	70 55.1	26 56	53.7	70 46.8	29 55	52.3	70 28.2	33 53	49.4	70 18.0	35 52	48.0
8	70 21.3	24 56	54.2	70 13.7	27 55	52.8	69 56.5	31 53	49.9	69 46.8	33 52	48.6
9	69 47.5	22 57	54.6	69 40.4	25 56	53.2	69 24.4	29 54	50.4	69 15.5	31 53	49.1
30	69 13.4	20 57	54.9	69 07.0	22 56	53.6	68 52.2	27 54	50.9	68 43.9	29 53	49.5
1	68 39.2	18 57	55.3	68 33.4	21 56	53.9	68 19.8	25 54	51.3	68 12.1	27 53	50.0
2	68 04.9	17 57	55.5	67 59.6	19 56	54.2	67 47.2	23 55	51.6	67 40.1	25 54	50.3
3	67 30.5	15 58	55.8	67 25.8	17 57	54.5	67 14.5	21 55	51.9	67 07.9	23 54	50.7
4	66 56.0	13 58	56.0	66 51.8	15 57	54.7	66 41.6	19 55	52.2	66 35.6	21 54	51.0
35	66 21.4	11 58	56.2	66 17.7	13 57	54.9	66 08.6	17 55	52.5	66 03.1	19 54	51.3
6	65 46.8	10 58	56.3	65 43.6	12 57	55.1	65 35.5	15 55	52.7	65 30.6	17 54	51.5
7	65 12.1	08 58	56.4	65 09.4	10 57	55.2	65 02.3	14 55	52.9	64 57.9	16 55	51.7
8	64 37.3	07 58	56.5	64 35.1	08 57	55.4	64 29.0	12 56	53.1	64 25.1	14 55	51.9
9	64 02.5	05 58	56.6	64 00.8	07 57	55.5	63 55.7	10 56	53.2	63 52.3	12 55	52.1
40	63 27.7	03 58	56.7	63 26.4	05 57	55.5	63 22.3	09 56	53.3	63 19.4	10 55	52.2
1	62 52.9	02 58	56.7	62 52.1	04 57	55.6	62 48.8	07 56	53.4	62 46.4	09 55	52.3
2	62 18.1	01 58	56.7	62 17.7	02 57	55.6	62 15.3	06 56	53.5	62 13.4	07 55	52.4
3	61 43.2	01 58	56.7	61 43.2	01 57	55.7	61 41.8	04 56	53.5	61 40.4	06 55	52.5
4	61 08.4	02 58	56.7	61 08.8	01 57	55.7	61 08.3	03 56	53.6	61 07.3	04 55	52.6
45	60 33.6	04 58	56.7	60 34.4	02 57	55.6	60 34.7	01 56	53.6	60 34.2	03 55	52.6
6	59 58.8	05 58	56.6	60 00.0	03 57	55.6	60 01.2	00 56	53.6	60 01.1	01 55	52.6
7	59 24.0	06 58	56.5	59 25.6	05 57	55.6	59 27.6	02 56	53.6	59 28.0	00 55	52.6
8	58 49.2	08 58	56.5	58 51.3	06 57	55.5	58 54.1	03 56	53.6	58 54.9	02 55	52.6
9	58 14.5	09 58	56.4	58 16.9	07 57	55.4	58 20.6	05 56	53.5	58 21.8	03 55	52.6
50	57 39.8	10 58	56.3	57 42.6	09 57	55.3	57 47.1	06 56	53.5	57 48.7	05 55	52.5
1	57 05.2	11 58	56.2	57 08.4	10 57	55.2	57 13.6	07 56	53.4	57 15.6	06 55	52.5
2	56 30.6	13 58	56.0	56 34.2	11 57	55.1	56 40.2	09 56	53.3	56 42.6	07 55	52.4
3	55 56.0	14 57	55.9	56 00.0	13 57	55.0	56 06.7	10 56	53.2	56 09.6	09 55	52.3
4	55 21.6	15 57	55.7	55 25.9	14 57	54.9	55 33.4	11 56	53.1	55 36.6	10 55	52.2
55	54 47.1	16 57	55.6	54 51.8	15 57	54.7	55 00.1	13 55	53.0	55 03.7	11 55	52.1
6	54 12.8	17 57	55.4	54 17.8	16 57	54.6	54 26.8	14 55	52.9	54 30.8	13 55	52.0
7	53 38.5	19 57	55.2	53 43.9	17 56	54.4	53 53.6	15 55	52.7	53 57.9	14 55	51.9
8	53 04.3	20 57	55.1	53 10.0	19 56	54.2	53 20.5	16 55	52.6	53 25.2	15 54	51.8
9	52 30.2	21 57	54.9	52 36.3	20 56	54.1	52 47.4	17 55	52.4	52 52.5	16 54	51.6
60	51 56.2	22 57	54.7	52 02.6	21 56	53.9	52 14.4	19 55	52.3	52 19.8	18 54	51.5
1	51 22.2	23 56	54.4	51 28.9	22 56	53.7	51 41.5	20 55	52.1	51 47.3	19 54	51.3
2	50 48.3	24 56	54.2	50 55.4	23 56	53.5	51 08.6	21 55	51.9	51 14.8	20 54	51.1
3	50 14.6	25 56	54.0	50 22.0	24 56	53.2	50 35.9	22 54	51.7	50 42.4	21 54	50.9
4	49 40.9	26 56	53.8	49 48.6	25 55	53.0	50 03.2	23 54	51.5	50 10.1	22 54	50.8
65	49 07.3	27 56	53.5	49 15.4	26 55	52.8	49 30.6	24 54	51.3	49 37.8	24 54	50.6
6	48 33.9	28 56	53.3	48 42.2	27 55	52.6	48 58.1	26 54	51.1	49 05.7	25 53	50.4
7	48 00.5	29 55	53.0	48 09.2	29 55	52.3	48 25.8	27 54	50.9	48 33.6	26 53	50.1
8	47 27.3	30 55	52.8	47 36.3	30 55	52.1	47 53.5	28 54	50.6	48 01.7	27 53	49.9
9	46 54.1	31 55	52.5	47 03.4	31 54	51.8	47 21.3	29 53	50.4	47 29.9	28 53	49.7
70	46 21.1	33 55	52.2	46 30.7	32 54	51.6	46 49.2	30 53	50.2	46 58.1	29 53	49.5
1	45 48.2	34 55	52.0	45 58.2	33 54	51.3	46 17.3	31 53	49.9	46 26.5	30 53	49.2
2	45 15.5	35 54	51.7	45 25.7	34 54	51.0	45 45.5	32 53	49.7	45 55.0	31 52	49.0
3	44 42.8	36 54	51.4	44 53.4	35 54	50.7	45 13.8	33 53	49.4	45 23.6	32 52	48.7
4	44 10.3	37 54	51.1	44 21.2	36 53	50.5	44 42.2	34 52	49.1	44 52.3	33 52	48.5
75	43 38.0	37 54	50.8	43 49.1	37 53	50.2	44 10.7	35 52	48.9	44 21.2	35 52	48.2
6	43 05.7	38 53	50.5	43 17.2	38 53	49.9	43 39.4	36 52	48.6	43 50.2	36 51	47.9
7	42 33.6	39 53	50.2	42 45.4	39 53	49.6	43 08.2	37 52	48.3	43 19.3	37 51	47.7
8	42 01.7	40 53	49.9	42 13.7	40 53	49.3	42 37.2	38 52	48.0	42 48.6	38 51	47.4
9	41 29.9	41 53	49.6	41 42.2	41 52	48.9	42 06.2	39 51	47.7	42 18.0	39 51	47.1
80	40 58.2	42 52	49.2	41 10.8	42 52	48.6	41 35.5	40 51	47.4	41 47.5	40 50	46.8
1	40 26.8	43 52	48.9	40 39.6	43 52	48.3	41 04.9	41 51	47.1	41 17.2	41 50	46.5
2	39 55.4	44 52	48.6	40 08.6	44 52	48.0	40 34.4	42 50	46.8	40 47.0	42 50	46.2
3	39 24.2	45 52	48.2	39 37.7	45 51	47.7	40 04.1	43 50	46.5	40 17.0	43 50	45.9
4	38 53.2	46 51	47.9	39 07.0	46 51	47.3	39 33.9	44 50	46.2	39 47.2	44 49	45.6
85	38 22.4	47 51	47.6	38 36.4	46 51	47.0	39 04.0	45 50	45.8	39 17.5	45 49	45.3
6	37 51.7	48 51	47.2	38 06.0	47 50	46.6	38 34.1	46 49	45.5	38 47.9	46 49	44.9
7	37 21.2	49 51	46.8	37 35.8	48 50	46.3	38 04.5	47 49	45.2	38 18.6	47 49	44.6
8	36 50.9	50 50	46.5	37 05.8	49 50	45.9	37 35.0	48 49	44.8	37 49.4	48 48	44.3
9	36 20.8	51 50	46.1	36 35.9	50 49	45.6	37 05.7	49 49	44.5	37 20.4	49 48	44.0
90	35 50.8	52 50	45.8	36 06.2	51 49	45.2	36 36.6	50 48	44.2	36 51.5	50 48	43.6

H.A.	57° 00′ Alt.	Δd Δt	Az.	57° 30′ Alt.	Δd Δt	Az.	59° 00′ Alt.	Δd Δt	Az.	59° 30′ Alt.	Δd Δt	Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	79 00.0	1.0 02	00.0	78 30.0	1.0 02	00.0	77 00.0	1.0 01	00.0	76 30.0	1.0 01	00.0
1	78 59.0	1.0 05	02.9	78 29.0	1.0 05	02.7	76 59.2	1.0 04	02.3	76 29.2	1.0 04	02.2
2	78 55.9	99 09	05.7	78 26.1	99 08	05.4	76 56.7	99 07	04.6	76 26.8	99 07	04.3
3	78 50.7	98 12	08.5	78 21.2	98 11	08.0	76 52.5	99 10	06.8	76 22.9	99 09	06.5
4	78 43.6	97 15	11.2	78 14.5	97 14	10.6	76 46.8	98 12	09.0	76 17.4	98 12	08.6
05	78 34.5	95 18	13.9	78 05.9	96 17	13.1	76 39.5	96 15	11.2	76 10.5	97 14	10.7
6	78 23.6	93 21	16.4	77 55.6	94 20	15.6	76 30.6	95 17	13.3	76 02.0	95 16	12.7
7	78 11.0	91 24	18.9	77 43.6	92 23	17.9	76 20.2	93 20	15.4	75 52.2	94 19	14.7
8	77 56.7	89 26	21.3	77 29.9	89 25	20.2	76 08.5	91 22	17.4	75 40.9	92 21	16.6
9	77 40.8	86 29	23.5	77 14.8	87 28	22.4	75 55.3	89 24	19.3	75 28.4	90 23	18.5
10	77 23.4	83 31	25.7	76 58.2	84 30	24.4	75 40.9	87 26	21.2	75 14.6	88 25	20.2
1	77 04.7	81 33	27.7	76 40.3	82 32	26.4	75 25.2	85 28	23.0	74 59.6	86 27	22.0
2	76 44.7	78 35	29.6	76 21.2	79 34	28.3	75 08.4	83 30	24.7	74 43.4	84 29	23.6
3	76 23.6	75 37	31.4	76 00.9	76 36	30.0	74 50.4	80 32	26.3	74 26.2	81 30	25.2
4	76 01.3	72 39	33.1	75 39.5	73 37	31.7	74 31.4	78 33	27.8	74 08.0	79 32	26.7
15	75 38.1	69 40	34.6	75 17.2	71 39	33.2	74 11.5	75 35	29.3	73 48.8	76 33	28.1
6	75 14.0	66 42	36.1	74 53.9	68 40	34.6	73 50.7	73 36	30.7	73 28.7	74 35	29.5
7	74 49.0	63 43	37.4	74 29.8	65 41	36.0	73 29.0	70 37	32.0	73 07.8	71 36	30.8
8	74 23.3	60 44	38.7	74 04.9	62 43	37.3	73 06.5	67 39	33.2	72 46.1	69 37	32.0
9	73 56.9	58 45	39.9	73 39.4	60 44	38.4	72 43.4	65 40	34.4	72 23.7	66 38	33.1
20	73 29.9	55 46	41.0	73 13.1	57 45	39.5	72 19.5	62 41	35.5	72 00.6	64 40	34.2
1	73 02.3	52 47	42.0	72 46.3	54 46	40.6	71 55.0	60 42	36.5	71 36.8	61 41	35.2
2	72 34.1	50 48	42.9	72 19.0	52 46	41.5	71 29.9	57 43	37.4	71 12.5	59 41	36.2
3	72 05.5	47 48	43.8	71 51.1	49 47	42.4	71 04.3	55 44	38.3	70 47.6	56 42	37.1
4	71 36.5	45 49	44.6	71 22.8	47 48	43.2	70 38.2	52 44	39.2	70 22.3	54 43	37.9
25	71 07.0	42 50	45.3	70 54.1	44 49	43.9	70 11.7	50 45	40.0	69 56.4	52 44	38.7
6	70 37.2	40 50	46.0	70 25.0	42 49	44.6	69 44.7	48 46	40.7	69 30.2	49 44	39.4
7	70 07.0	37 51	46.6	69 55.5	39 50	45.3	69 17.3	45 46	41.4	69 03.5	47 45	40.1
8	69 36.6	35 51	47.2	69 25.7	37 50	45.9	68 49.6	43 47	42.0	68 36.4	45 46	40.8
9	69 05.9	33 52	47.7	68 55.7	35 51	46.4	68 21.5	41 47	42.6	68 09.0	43 46	41.4
30	68 34.9	31 52	48.2	68 25.3	33 51	46.9	67 53.2	39 48	43.2	67 41.3	40 47	41.9
1	68 03.7	29 52	48.7	67 54.8	31 51	47.4	67 24.5	36 48	43.7	67 13.3	38 47	42.5
2	67 32.3	27 53	49.1	67 24.0	29 52	47.8	66 55.6	34 49	44.1	66 45.0	36 48	43.0
3	67 00.8	25 53	49.4	66 53.0	27 52	48.2	66 26.5	32 49	44.6	66 16.5	34 48	43.4
4	66 29.0	23 53	49.8	66 21.9	25 52	48.5	65 57.1	30 49	45.0	65 47.8	32 48	43.8
35	65 57.1	21 53	50.0	65 50.6	23 52	48.9	65 27.6	28 50	45.3	65 18.8	30 49	44.2
6	65 25.1	19 54	50.3	65 19.1	21 53	49.1	64 57.8	26 50	45.7	64 49.7	28 49	44.5
7	64 53.0	17 54	50.6	64 47.5	19 53	49.4	64 27.9	24 50	46.0	64 20.4	26 49	44.9
8	64 20.8	16 54	50.8	64 15.8	17 53	49.6	63 57.9	22 50	46.3	63 50.9	24 49	45.2
9	63 48.4	14 54	50.9	63 44.0	16 53	49.8	63 27.7	21 50	46.5	63 21.3	22 50	45.4
40	63 16.0	12 54	51.1	63 12.1	14 53	50.0	62 57.4	19 51	46.7	62 51.5	20 50	45.7
1	62 43.6	10 54	51.2	62 40.2	12 53	50.2	62 27.0	17 51	46.9	62 21.7	19 50	45.9
2	62 11.0	09 54	51.4	62 08.1	10 53	50.3	61 56.5	15 51	47.1	61 51.7	17 50	46.1
3	61 38.5	07 54	51.4	61 36.0	09 54	50.4	61 26.0	14 51	47.3	61 21.6	15 50	46.2
4	61 05.8	06 54	51.5	61 03.9	07 54	50.5	60 55.3	12 51	47.4	60 51.5	13 50	46.4
45	60 33.2	04 54	51.6	60 31.7	06 54	50.6	60 24.6	10 51	47.5	60 21.3	12 50	46.5
6	60 00.5	03 54	51.6	59 59.5	04 54	50.6	59 53.8	09 51	47.6	59 51.0	10 51	46.6
7	59 27.9	01 54	51.6	59 27.3	03 54	50.6	59 23.0	07 51	47.7	59 20.7	08 51	46.7
8	58 55.2	00 54	51.6	58 55.1	01 54	50.7	58 52.2	05 51	47.8	58 50.3	07 51	46.8
9	58 22.5	02 54	51.6	58 22.9	00 54	50.7	58 21.3	04 51	47.8	58 19.9	05 51	46.9
50	57 49.9	03 54	51.6	57 50.6	02 54	50.7	57 50.4	02 52	47.8	57 49.5	04 51	46.9
1	57 17.2	05 54	51.6	57 18.4	03 54	50.6	57 19.5	01 52	47.9	57 19.1	02 51	46.9
2	56 44.6	06 54	51.5	56 46.2	05 54	50.6	56 48.6	01 52	47.9	56 48.6	01 51	46.9
3	56 12.0	07 54	51.4	56 14.0	06 54	50.5	56 17.7	02 51	47.8	56 18.2	01 51	46.9
4	55 39.4	09 54	51.4	55 41.8	07 54	50.5	55 46.8	04 51	47.8	55 47.7	02 51	46.9
55	55 06.9	10 54	51.3	55 09.7	09 54	50.4	55 16.0	05 51	47.8	55 17.3	04 51	46.9
6	54 34.4	11 54	51.2	54 37.6	10 53	50.3	54 45.1	07 51	47.7	54 46.9	05 51	46.9
7	54 01.9	13 54	51.1	54 05.6	11 53	50.2	54 14.3	08 51	47.7	54 16.5	07 51	46.8
8	53 29.5	14 54	50.9	53 33.6	13 53	50.1	53 43.5	09 51	47.6	53 46.1	08 51	46.7
9	52 57.2	15 54	50.8	53 01.6	14 53	50.0	53 12.8	11 51	47.5	53 15.8	09 50	46.7
60	52 24.9	16 54	50.7	52 29.7	15 53	49.8	52 42.0	12 51	47.4	52 45.5	11 50	46.6
1	51 52.8	18 54	50.5	51 57.9	17 53	49.7	52 11.4	13 51	47.3	52 15.2	12 50	46.5
2	51 20.6	19 53	50.3	51 26.2	18 53	49.6	51 40.8	15 51	47.2	51 45.0	14 50	46.4
3	50 48.6	20 53	50.2	50 54.5	19 53	49.4	51 10.3	16 51	47.0	51 14.9	15 50	46.3
4	50 16.6	21 53	50.0	50 22.9	20 53	49.2	50 39.8	17 51	46.9	50 44.8	16 50	46.1
65	49 44.7	23 53	49.8	49 51.3	22 52	49.1	50 09.4	19 51	46.8	50 14.8	18 50	46.0
6	49 12.9	24 53	49.6	49 19.9	23 52	48.9	49 39.1	20 50	46.6	49 44.9	19 50	45.9
7	48 41.2	25 53	49.4	48 48.6	24 52	48.7	49 08.8	21 50	46.5	49 15.0	20 50	45.7
8	48 09.6	26 52	49.2	48 17.3	25 52	48.5	48 38.6	22 50	46.3	48 45.2	21 50	45.5
9	47 38.1	27 52	49.0	47 46.1	26 52	48.3	48 08.6	24 50	46.1	48 15.5	23 49	45.4
70	47 06.7	28 52	48.8	47 15.1	27 52	48.1	47 38.6	25 50	45.9	47 45.9	24 49	45.2
1	46 35.4	29 52	48.5	46 44.1	29 51	47.8	47 08.7	26 50	45.7	47 16.3	25 49	45.0
2	46 04.3	31 52	48.3	46 13.3	30 51	47.6	46 38.9	27 50	45.5	46 46.9	26 49	44.8
3	45 33.2	32 52	48.1	45 42.6	31 51	47.4	46 09.2	28 49	45.3	46 17.6	28 49	44.6
4	45 02.3	33 51	47.8	45 12.0	32 51	47.1	45 39.6	30 49	45.1	45 48.4	29 49	44.4
75	44 31.5	34 51	47.6	44 41.5	33 51	46.9	45 10.2	31 49	44.9	45 19.2	30 48	44.2
6	44 00.8	35 51	47.3	44 11.1	34 50	46.6	44 40.8	32 49	44.7	44 50.2	31 48	44.0
7	43 30.2	36 51	47.0	43 40.9	35 50	46.4	44 11.6	33 49	44.4	44 21.4	32 48	43.8
8	42 59.8	37 50	46.8	43 10.8	36 50	46.1	43 42.5	34 48	44.2	43 52.6	33 48	43.5
9	42 29.5	38 50	46.5	42 40.8	37 50	45.8	43 13.5	35 48	43.9	43 24.0	35 48	43.3
80	41 59.3	39 50	46.2	42 11.0	38 50	45.6	42 44.6	36 48	43.7	42 55.4	36 47	43.0
1	41 29.3	40 50	45.9	41 41.3	39 49	45.3	42 15.9	37 48	43.4	42 27.1	37 47	42.8
2	40 59.5	41 50	45.6	41 11.7	41 49	45.0	41 47.3	39 47	43.2	41 58.8	38 47	42.5
3	40 29.8	42 49	45.3	40 42.3	42 49	44.7	41 18.9	40 47	42.9	41 30.7	39 47	42.3
4	40 00.2	43 49	45.0	40 13.1	43 48	44.4	40 50.6	41 47	42.6	41 02.7	40 46	42.0
85	39 30.8	44 49	44.7	39 44.0	44 48	44.1	40 22.5	42 47	42.3	40 34.9	41 46	41.7
6	39 01.6	45 48	44.4	39 15.1	45 48	43.8	39 54.5	43 46	42.1	40 07.2	42 46	41.5
7	38 32.5	46 48	44.1	38 46.3	46 48	43.5	39 26.6	44 46	41.8	39 39.7	43 46	41.2
8	38 03.6	47 48	43.7	38 17.7	47 47	43.2	38 58.9	45 46	41.5	39 12.4	44 45	40.9
9	37 34.9	48 48	43.4	37 49.3	48 47	42.9	38 31.4	46 46	41.2	38 45.2	45 45	40.6
90	37 06.4	49 47	43.1	37 21.0	49 47	42.5	38 04.1	47 45	40.9	38 18.1	47 45	40.3

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H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	35 21.1	52 49	45.4	35 36.7	52 49	44.9	36 07.6	51 48	43.8	36 22.9	51 47	43.3	36 38.0	50 47	42.7	36 52.9	50 46	42.2	37 36.9	48 45	40.5	37 51.2	48 44	40.0	91
2	34 51.5	53 49	45.0	35 07.4	53 49	44.5	35 38.9	52 48	43.4	35 54.4	52 47	42.9	36 09.8	51 47	42.4	36 25.0	51 46	41.9	37 09.9	49 45	40.2	37 24.5	49 44	39.7	2
3	34 22.1	54 49	44.6	34 38.3	54 48	44.1	35 10.3	53 47	43.1	35 26.1	52 47	42.6	35 41.8	52 46	42.0	35 57.3	52 46	41.5	36 43.0	50 44	39.9	36 58.0	50 44	39.4	3
4	33 52.9	55 48	44.2	34 09.4	55 48	43.7	34 41.9	54 47	42.7	34 58.0	53 47	42.2	35 14.0	53 46	41.7	35 29.8	52 46	41.2	36 16.4	51 44	39.6	36 31.7	51 44	39.1	4
95	33 23.9	56 48	43.9	33 40.7	56 48	43.4	34 13.8	55 47	42.4	34 30.1	54 46	41.9	34 46.3	54 46	41.3	35 02.4	53 45	40.8	35 49.9	52 44	39.3	36 05.5	52 43	38.7	95
6	32 55.2	57 48	43.5	33 12.2	56 47	43.0	33 45.8	56 46	42.0	34 02.4	55 46	41.5	34 18.9	55 45	41.0	34 35.3	54 45	40.5	35 23.6	53 44	38.9	35 39.5	53 43	38.4	6
7	32 26.6	58 47	43.1	32 43.8	57 47	42.6	33 18.0	57 46	41.6	33 34.9	56 46	41.1	33 51.7	56 45	40.6	34 08.3	55 45	40.1	34 57.6	54 43	38.6	35 13.7	54 43	38.1	7
8	31 58.2	59 47	42.7	32 15.7	58 46	42.2	32 50.4	57 46	41.2	33 07.6	57 45	40.7	33 24.6	57 45	40.2	33 41.6	56 44	39.8	34 31.7	55 43	38.2	34 48.1	55 42	37.7	8
9	31 30.1	59 47	42.3	31 47.9	59 46	41.8	32 23.0	58 45	40.8	32 40.5	58 45	40.4	32 57.8	58 44	39.9	33 15.0	57 44	39.4	34 05.9	56 42	37.9	34 22.7	56 42	37.4	9
100	31 02.2	60 46	41.9	31 20.2	60 46	41.4	31 55.9	59 45	40.5	32 13.6	59 44	40.0	32 31.2	58 44	39.5	32 48.7	58 44	39.0	33 40.4	57 42	37.6	33 57.5	57 42	37.1	100
1	30 34.5	61 46	41.5	30 52.7	61 45	41.0	31 29.0	60 45	40.1	31 46.9	60 44	39.6	32 04.8	59 44	39.1	32 22.5	59 43	38.6	33 15.1	58 42	37.2	33 32.5	58 41	36.7	1
2	30 07.0	62 45	41.0	30 25.5	62 45	40.6	31 02.2	61 44	39.7	31 20.5	61 44	39.2	31 38.6	60 43	38.7	31 56.6	60 43	38.3	32 50.0	59 41	36.8	33 07.6	58 41	36.4	2
3	29 39.7	63 45	40.6	29 58.5	62 45	40.2	30 35.7	62 44	39.3	30 54.2	61 43	38.8	31 12.6	61 43	38.4	31 30.9	61 42	37.9	32 25.2	60 41	36.5	32 43.0	59 41	36.0	3
4	29 12.7	64 45	40.2	29 31.7	63 44	39.8	30 09.5	63 43	38.9	30 28.2	62 43	38.4	30 46.9	62 43	38.0	31 05.4	62 42	37.5	32 00.5	61 41	36.1	32 18.6	60 40	35.6	4
105	28 45.9	64 44	39.8	29 05.2	64 44	39.3	29 43.4	63 43	38.5	30 02.4	63 43	38.0	30 21.3	63 42	37.6	30 40.2	63 42	37.1	31 36.0	62 40	35.7	31 54.5	61 40	35.3	105
6	28 19.4	65 44	39.4	28 38.9	65 43	38.9	29 17.6	64 43	38.0	29 36.9	64 42	37.6	29 56.1	64 42	37.2	30 15.1	63 41	36.7	31 11.8	63 40	35.4	31 30.5	62 40	34.9	6
7	27 53.1	66 43	38.9	28 12.8	66 43	38.5	28 52.1	65 42	37.6	29 11.6	65 42	37.2	29 31.0	65 41	36.8	29 50.3	64 41	36.3	30 47.8	63 40	35.0	31 06.8	63 39	34.5	7
8	27 27.8	67 43	38.5	27 47.0	67 43	38.1	28 26.7	66 42	37.2	28 46.5	66 41	36.8	29 06.2	65 41	36.4	29 25.8	65 41	35.9	30 24.0	64 39	34.6	30 43.2	64 39	34.2	8
9	27 01.2	68 43	38.0	27 21.4	67 42	37.6	28 01.6	67 41	36.8	28 21.6	67 41	36.4	28 41.6	66 41	35.9	29 01.4	66 40	35.5	30 00.5	65 39	34.2	30 20.0	65 38	33.8	9
110	26 35.6	68 42	37.6	26 56.1	68 42	37.2	27 36.8	68 41	36.4	27 57.1	67 41	36.0	28 17.2	67 40	35.5	28 37.3	67 40	35.1	29 37.1	66 38	33.8	29 56.9	66 38	33.4	110
1	26 10.3	69 42	37.2	26 31.0	69 41	36.8	27 12.2	68 41	35.9	27 32.7	68 40	35.5	27 53.1	68 40	35.1	28 13.5	68 39	34.7	29 14.0	67 38	33.4	29 34.1	67 38	33.0	1
2	25 45.3	70 41	36.7	26 06.2	70 41	36.3	26 47.9	69 40	35.5	27 08.6	69 40	35.1	27 29.3	69 39	34.7	27 49.9	69 39	34.3	28 51.2	68 38	33.0	29 11.5	67 37	32.6	2
3	25 20.5	71 41	36.3	25 41.6	70 40	35.9	26 23.8	70 40	35.1	26 44.8	70 39	34.7	27 05.7	70 39	34.3	27 26.5	69 38	33.9	28 28.6	69 37	32.6	28 49.1	68 37	32.2	3
4	24 56.0	71 40	35.8	25 17.4	71 40	35.4	26 00.0	71 39	34.6	26 21.2	71 39	34.2	26 42.3	70 38	33.8	27 03.4	70 38	33.4	28 06.2	69 37	32.2	28 27.0	69 36	31.8	4
115	24 31.7	72 40	35.3	24 53.3	72 40	35.0	25 36.4	72 39	34.2	25 57.9	71 38	33.8	26 19.2	71 38	33.4	26 40.6	71 38	33.0	27 44.1	70 36	31.8	28 05.2	70 36	31.4	115
6	24 07.7	73 40	34.9	24 29.6	73 39	34.5	25 13.1	72 38	33.7	25 34.8	72 38	33.4	25 56.4	72 38	33.0	26 18.0	72 37	32.6	27 22.3	71 36	31.4	27 43.6	71 36	31.0	6
7	23 44.0	74 39	34.4	24 06.1	73 39	34.0	24 50.1	73 38	33.3	25 12.0	73 38	32.9	25 33.9	73 37	32.5	25 55.7	73 37	32.2	27 00.7	72 36	31.0	27 22.2	72 35	30.6	7
8	23 20.6	74 39	33.9	23 42.9	74 38	33.6	24 27.4	74 37	32.8	24 49.5	74 37	32.5	25 11.6	74 37	32.1	25 33.6	73 36	31.7	26 39.3	73 35	30.6	27 01.1	73 35	30.2	8
9	22 57.5	75 38	33.5	23 20.0	75 38	33.1	24 04.9	75 37	32.4	24 27.3	74 37	32.0	24 49.6	74 36	31.7	25 11.8	74 36	31.3	26 18.3	74 35	30.2	26 40.3	73 34	29.8	9
120	22 34.6	76 38	33.0	22 57.4	76 37	32.6	23 42.7	75 36	31.9	24 05.3	75 36	31.6	24 27.8	75 36	31.2	24 50.3	75 35	30.8	25 57.5	74 34	29.7	26 19.7	74 34	29.4	120
1	22 12.1	77 37	32.5	22 35.0	76 37	32.2	23 20.8	76 36	31.5	23 43.6	76 36	31.1	24 06.4	76 35	30.8	24 29.1	76 35	30.4	25 36.9	75 34	29.3	25 59.4	75 33	28.9	1
2	21 49.8	77 37	32.0	22 13.0	77 36	31.7	22 59.2	77 36	31.0	23 22.2	77 35	30.7	23 45.2	77 35	30.3	24 08.1	76 34	30.0	25 16.6	76 33	28.9	25 39.4	76 33	28.5	2
3	21 27.9	78 36	31.6	21 51.2	78 36	31.2	22 37.9	78 35	30.5	23 01.1	77 35	30.2	23 24.3	77 34	29.8	23 47.5	77 34	29.5	24 56.7	77 33	28.4	25 19.6	76 32	28.1	3
4	21 06.2	79 36	31.1	21 29.8	79 35	30.7	22 16.8	78 35	30.1	22 40.3	78 34	29.7	23 03.7	78 34	29.4	23 27.1	78 33	29.0	24 36.9	77 32	28.0	25 00.1	77 32	27.7	4
125	20 44.9	79 35	30.6	21 08.6	79 35	30.2	21 56.1	79 34	29.6	22 19.8	79 34	29.3	22 43.4	79 33	28.9	23 07.0	79 33	28.6	24 17.5	78 32	27.6	24 40.9	78 32	27.2	125
6	20 23.8	80 35	30.1	20 47.8	80 34	29.8	21 35.7	80 34	29.1	21 59.6	80 33	28.8	22 23.4	79 33	28.5	22 47.2	79 32	28.1	23 58.4	79 31	27.1	24 22.0	79 31	26.8	6
7	20 03.1	81 34	29.6	20 27.3	81 34	29.3	21 15.5	80 33	28.6	21 39.6	80 33	28.3	22 03.7	80 32	28.0	22 27.7	80 32	27.7	23 39.5	80 31	26.7	24 03.3	79 31	26.4	7
8	19 42.7	81 34	29.1	20 07.0	81 33	28.8	20 55.7	81 33	28.1	21 20.0	81 32	27.8	21 44.3	81 32	27.5	22 08.5	81 32	27.2	23 20.9	80 30	26.2	23 45.0	80 30	25.9	8
9	19 22.6	82 33	28.6	19 47.1	82 33	28.3	20 36.2	82 32	27.7	21 00.7	82 32	27.4	21 25.2	81 31	27.0	21 49.6	81 31	26.7	23 02.6	81 30	25.8	23 26.9	81 30	25.5	9
130	19 02.8	83 32	28.1	19 27.6	83 32	27.8	20 17.0	82 31	27.2	20 41.7	82 31	26.9	21 06.4	82 31	26.6	21 31.0	82 30	26.3	22 44.7	82 29	25.3	23 09.1	82 29	25.0	130
1	18 43.3	83 32	27.6	19 08.3	83 32	27.3	19 58.2	83 31	26.7	20 23.0	83 31	26.4	20 47.9	83 30	26.1	21 12.7	83 30	25.8	22 27.0	82 29	24.9	22 51.7	82 29	24.6	1
2	18 24.2	84 31	27.1	18 49.4	84 31	26.8	19 39.6	84 30	26.2	20 04.7	84 30	25.9	20 29.7	83 30	25.6	20 54.7	83 29	25.3	22 09.6	83 28	24.4	22 34.5	83 28	24.1	2
3	18 05.4	85 31	26.5	18 30.8	84 30	26.3	19 21.4	84 30	25.7	19 46.6	84 30	25.4	20 11.9	84 29	25.1	20 37.1	84 29	24.8	21 52.5	84 28	23.9	22 17.6	84 28	23.7	3
4	17 47.0	85 30	26.0	18 12.5	85 30	25.7	19 03.5	85 29	25.2	19 28.9	85 29	24.9	19 54.3	85 29	24.6	20 19.7	85 28	24.3	21 35.8	84 27	23.5	22 01.1	84 27	23.2	4
135	17 28.8	86 30	25.5	17 54.6	86 29	25.2	18 45.9	85 29	24.7	19 11.5	85 28	24.4	19 37.1	85 28	24.1	20 02.7	85 28	23.9	21 19.3	85 27	23.0	21 44.8	85 27	22.7	135
6	17 11.1	86 29	25.0	17 37.0	86 29	24.7	18 28.7	86 28	24.2	18 54.5	86 28	23.9	19 20.3	86 28	23.6	19 46.0	86 27	23.4	21 03.2	86 26	22.5	21 28.8	86 26	22.3	6
7	16 53.7	87 28	24.4	17 19.7	87 28	24.2	18 11.8	87 28	23.7	18 37.7	87 27	23.4	19 03.7	87 27	23.1	19 29.7	86 27	22.9	20 47.4	86 26	22.1	21 13.2	86 26	21.8	7
8	16 36.6	87 28	23.9	17 02.8	87 28	23.7	17 55.2	87 27	23.2	18 21.4	87 27	22.9	18 47.5	87 26	22.6	19 13.6	87 26	22.4	20 31.9	87 25	21.6	20 57.9	87 25	21.3	8
9	16 19.9	88 27	23.4	16 46.2	88 27	23.1	17 39.0	88 26	22.6	18 05.3	88 26	22.4	18 31.6	88 26	22.1	18 57.9	88 26	21.9	20 16.7	87 25	21.1	20 42.9	87 24	20.9	9
140	16 03.5	89 27	22.9	16 30.0	88 26	22.6	17 23.1	88 26	22.1	17 49.6	88 26	21.9	18 16.1	88 25	21.6	18 42.6	88 25	21.4	20 01.8	88 24	20.6	20 28.2	88 24	20.4	140
1	15 47.5	89 26	22.3	16 14.2	89 26	22.1	17 07.6	89 25	21.6	17 34.2	89 25	21.4	18 00.9	89 25	21.1	18 27.5	89 24	20.9	19 47.3	89 24	20.1	20 13.9	88 23	19.9	1
2	15 31.8	90 25	21.8	15 58.7	90 25	21.6	16 52.4	89 25	21.1	17 19.2	89 24	20.9	17 46.0	89 24	20.6	18 12.8	89 24	20.4	19 33.1	89 23	19.7	19 59.8	89 23	19.4	2
3	15 16.5	90 25	21.2	15 43.6	90 25	21.0	16 37.6	90 24	20.6	17 04.6	90 24	20.3	17 31.5	90 24	20.1	17 58.5	90 23	19.9	19 19.3	90 23	19.2	19 46.2	90 22	18.9	3
4	15 01.6	91 24	20.7	15 28.8	91 24	20.5	16 23.1	90 24	20.0	16 50.3	90 23	19.8	17 17.4	90 23	19.6	17 44.5	90 23	19.4	19 05.7	90 22	18.7	19 32.8	90 22	18.5	4
145	14 47.1	91 24	20.2	15 14.4	91 23	19.9	16 09.0	91 23	19.5	16 36.3	91 23	19.3	17 03.6	91 22	19.1	17 30.9	91 22	18.9	18 52.6	91 21	18.2	19 19.8	91 21	18.0	145
6	14 32.9	92 23	19.6	15 00.4	92 23	19.4	15 55.3	91 22	19.0	16 22.7	91 22	18.8	16 50.2	91 22	18.6	17 17.6	91 22	18.3	18 39.7	91 21	17.7	19 07.1	91 21	17.5	6
7	14 19.1	92 22	19.1	14 46.7	92 22	18.8	15 41.9	92 22	18.4	16 09.5	92 21	18.2	16 37.1	92 21	18.0	17 04.6	92 21	17.8	18 27.2	92 20	17.2	18 54.7	92 20	17.0	7
8	14 05.7	93 22	18.5	14 33.5	92 22	18.3	15 28.9	92 21	17.9	15 56.6	92 21	17.7	16 24.4	92 21	17.5	16 52.1	92 20	17.3	18 15.1	92 20	16.7	18 42.7	92 19	16.5	8
9	13 52.7	93 21	17.9	14 20.6	93 21	17.8	15 16.3	93 20	17.4	15 44.2	93 20	17.2	16 12.0	93 20	17.0	16 39.8	93 20	16.8	18 03.3	93 19	16.2	18 31.1	93 19	16.0	9
150	13 40.0	93 20	17.4	14 08.0	93 20	17.2	15 04.0	93 20	16.8	15 32.0	93 20	16.6	16 00.0	93 19	16.5	16 28.0	93 19	16.3	17 51.8	93 18	15.7	18 19.7	93 18	15.5	150
1	13 27.8	94 20	16.8	13 55.9	94 20	16.6	14 52.2	94 19	16.3	15 20.3	94 19	16.1	15 48.4	94 19	15.9	16 16.5	94 19	15.7	17 40.7	94 18	15.2	18 08.8	94 18	15.0	1
2	13 15.9	94 19	16.3	13 44.2	94 19	16.1	14 40.7	94 19	15.7	15 08.9	94 18	15.6	15 37.1	94 18	15.4	16 05.4	94 18	15.2	17 30.0	94 17	14.7	17 58.2	94 17	14.5	2
3	13 04.4	95 18	15.7	13 32.8	95 18	15.5	14 29.5	95 18	15.2	14 57.9	95 18	15.0	15 26.3	94 18	14.9	15 54.6	94 17	14.7	17 19.6	94 17	14.2	17 47.9	94 17	14.0	3
4	12 53.3	95 18	15.1	13 21.8	95 18	15.0	14 18.8	95 17	14.7	14 47.3	95 17	14.5	15 15.7	95 17	14.3	15 44.2	95 17	14.2	17 09.6	95 16	13.7	17 38.0	95 16	13.5	4
155	12 42.6	95 17	14.6	13 11.3	95 17	14.4	14 08.5	95 17	14.1	14 37.0	95 16	13.9	15 05.6	95 16	13.8	15 34.2	95 16	13.6	16 59.9	95 16	13.2	17 28.4	95 15	13.0	155
6	12 32.4	96 16	14.0	13 01.1	96 16	13.9	13 58.5	96 16	13.6	14 27.2	96 16	13.4	14 55.9	96 16	13.3	15 24.6	96 15	13.1	16 50.6	96 15	12.6	17 19.2	96 15	12.5	6
7	12 22.5	96 16	13.4	12 51.3	96 16	13.3	13 48.9	96 15	13.0	14 17.7	96 15	12.9	14 46.5	96 15	12.7	15 15.3	96 15	12.6	16 41.6	96 14	12.1	17 10.4	96 14	12.0	7
8	12 13.0	96 15	12.9	12 41.9	96 15	12.7	13 39.7	96 15	12.4	14 08.6	96 14	12.3	14 37.5	96 14	12.2	15 06.4	96 14	12.0	16 33.1	96 14	11.6	17 01.9	96 14	11.5	8
9	12 03.9	97 14	12.3	12 32.9	97 14	12.2	13 30.9	97 14	11.9	13 59.9	97 14	11.8	14 28.9	97 14	11.6	14 57.9	97 14	11.5	16 24.9	97 13	11.1	16 53.8	97 13	11.0	9
160	11 55.3	97 14	11.7	12 24.4	97 14	11.6	13 22.6	97 13	11.3	13 51.6	97 13	11.2	14 20.7	97 13	11.1	14 49.8	97 13	11.0	16 17.0	97 12	10.6	16 46.1	97 12	10.4	160
1	11 47.0	97 13	11.1	12 16.2	97 13	11.0	13 14.6	97 13	10.8	13 43.7	97 13	10.7	14 12.9	97 12	10.5	14 42.1	97 12	10.4	16 09.6	97 12	10.1	16 38.7	97 12	09.9	1
2	11 39.2	98 12	10.6	12 08.4	98 12	10.4	13 07.0	98 12	10.2	13 36.2	98 12	10.1	14 05.5	98 12	10.0	14 34.7	98 12	09.9	16 02.5	97 11	09.5	16 31.7	97 11	09.4	2
3	11 31.7	98 12	10.0	12 01.1	98 12	09.9	12 59.8	98 11	09.7	13 29.1	98 11	09.6	13 58.4	98 11	09.4	14 27.8	98 11	09.3	15 55.8	98 11	09.0	16 25.1	98 10	08.9	3
4	11 24.7	98 11	09.4	11 54.1	98 11	09.3	12 53.0	98 11	09.1	13 22.4	98 11	09.0	13 51.8	98 10	08.9	14 21.2	98 10	08.8	15 49.4	98 10	08.5	16 18.8	98 10	08.4	4
165	11 18.1	98 10	08.8	11 47.6	98 10	08.7	12 46.6	98 10	08.5	13 16.1	98 10	08.4	13 45.6	98 10	08.3	14 15.0	98 10	08.2	15 43.5	98 09	08.0	16 12.9	98 09	07.9	165
6	11 11.9	99 10	08.2	11 41.5	99 10	08.1	12 40.6	99 09	08.0	13 10.2	99 09	07.9	13 39.7	98 09	07.8	14 09.3	98 09	07.7	15 37.9	98 09	07.4	16 07.4	98 09	07.3	6
7	11 06.2	99 09	07.6	11 35.8	99 09	07.6	12 35.0	99 09	07.4	13 04.6	99 08	07.3	13 34.3	99 08	07.2	14 03.9	99 08	07.2	15 32.7	99 08	06.9	16 02.3	99 08	06.8	7
8	11 00.8	99 08	07.1	11 30.5	99 08	07.0	12 29.9	99 08	06.8	12 59.5	99 08	06.8	13 29.2	99 08	06.7	13 58.9	99 08	06.6	15 27.9	99 07	06.4	15 57.5	99 07	06.3	8
9	10 55.9	99 08	06.5	11 25.7	99 07	06.4	12 25.1	99 07	06.3	12 54.8	99 07	06.2	13 24.5	99 07	06.1	13 54.3	99 07	06.1	15 23.4	99 07	05.9	15 53.1	99 07	05.8	9
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1	10 47.4	99 06	05.3	11 17.2	99 06	05.2	12 16.8	99 06	05.1	12 46.6	99 06	05.1	13 16.4	99 06	05.0	13 46.3	99 06	05.0	15 15.7	99 05	04.8	15 45.5	99 05	04.7	1
2	10 43.7	1.0 05	04.7	11 13.6	1.0 05	04.7	12 13.3	1.0 05	04.6	12 43.1	1.0 05	04.5	13 13.0	1.0 05	04.5	13 42.8	1.0 05	04.4	15 12.4	99 05	04.3	15 42.2	99 05	04.2	2
3	10 40.5	1.0 05	04.1	11 10.4	1.0 05	04.1	12 10.2	1.0 04	04.0	12 40.1	1.0 04	04.0	13 10.0	1.0 04	03.9	13 39.8	1.0 04	03.9	15 09.5	1.0 04	03.7	15 39.4	1.0 04	03.7	3
4	10 37.7	1.0 04	03.5	11 07.6	1.0 04	03.5	12 07.5	1.0 04	03.4	12 37.4	1.0 04	03.4	13 07.3	1.0 04	03.4	13 37.2	1.0 04	03.3	15 07.0	1.0 04	03.2	15 36.9	1.0 04	03.2	4
175	10 35.4	1.0 03	03.0	11 05.3	1.0 03	02.9	12 05.2	1.0 03	02.9	12 35.1	1.0 03	02.8	13 05.1	1.0 03	02.8	13 35.0	1.0 03	02.8	15 04.8	1.0 03	02.7	15 34.8	1.0 03	02.6	175
6	10 33.4	1.0 02	02.4	11 03.4	1.0 02	02.3	12 03.3	1.0 02	02.3	12 33.3	1.0 02	02.3	13 03.3	1.0 02	02.2	13 33.2	1.0 02	02.2	15 03.1	1.0 02	02.1	15 33.1	1.0 02	02.1	6
7	10 31.9	1.0 02	01.8	11 01.9	1.0 02	01.8	12 01.9	1.0 02	01.7	12 31.8	1.0 02	01.7	13 01.8	1.0 02	01.7	13 31.8	1.0 02	01.7	15 01.7	1.0 02	01.6	15 31.7	1.0 02	01.6	7
8	10 30.9	1.0 01	01.2	11 00.8	1.0 01	01.2	12 00.8	1.0 01	01.1	12 30.8	1.0 01	01.1	13 00.8	1.0 01	01.1	13 30.8	1.0 01	01.1	15 00.8	1.0 01	01.1	15 30.8	1.0 01	01.1	8
9	10 30.2	1.0 00	00.6	11 00.2	1.0 00	00.6	12 00.2	1.0 00	00.6	12 30.2	1.0 00	00.6	13 00.2	1.0 00	00.6	13 30.2	1.0 00	00.5	15 00.2	1.0 00	00.5	15 30.2	1.0 00	00.5	9
180	10 30.0	1.0 00	00.0	11 00.0	1.0 00	00.0	12 00.0	1.0 00	00.0	12 30.0	1.0 00	00.0	13 00.0	1.0 00	00.0	13 30.0	1.0 00	00.0	15 00.0	1.0 00	00.0	15 30.0	1.0 00	00.0	180

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Lat. 46°

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	76 00.0	1.0 01	00.0	75 30.0	1.0 01	00.0	74 00.0	1.0 01	00.0	73 30.0	1.0 01	00.0	73 00.0	1.0 01	00.0	67 00.0	1.0 01	00.0	66 30.0	1.0 01	00.0	61 30.0	1.0 00	00.0	00
1	75 59.2	1.0 04	02.1	75 29.3	1.0 04	02.0	73 59.4	1.0 03	01.7	73 29.4	1.0 03	01.6	72 59.4	1.0 03	01.6	66 59.7	1.0 02	00.9	66 29.7	1.0 02	00.9	61 29.8	1.0 01	00.6	1
2	75 57.0	1.0 06	04.1	75 27.1	1.0 06	03.9	73 57.5	1.0 05	03.4	73 27.6	1.0 05	03.2	72 57.7	1.0 05	03.1	66 58.7	1.0 03	01.8	66 28.7	1.0 03	01.8	61 29.2	1.0 02	01.1	2
3	75 53.3	99 09	06.2	75 23.6	99 08	05.9	73 54.4	99 07	05.1	73 24.7	99 07	04.9	72 54.9	99 07	04.6	66 57.0	1.0 04	02.7	66 27.1	1.0 04	02.6	61 28.2	1.0 02	01.7	3
4	75 48.1	98 11	08.2	75 18.6	98 11	07.8	73 50.1	98 09	06.8	73 20.6	99 09	06.5	72 51.0	99 08	06.2	66 54.7	99 05	03.7	66 24.9	99 05	03.5	61 26.7	99 03	02.2	4
05	75 41.4	97 13	10.2	75 12.3	97 13	09.7	73 44.6	98 11	08.4	73 15.3	98 11	08.0	72 46.0	98 10	07.7	66 51.7	99 06	04.6	66 22.0	99 06	04.4	61 24.9	99 04	02.8	05
6	75 33.4	96 16	12.1	75 04.6	96 15	11.5	73 38.0	97 13	10.0	73 09.0	97 12	09.6	72 39.9	97 12	09.2	66 48.0	98 07	05.5	66 18.6	98 07	05.2	61 22.7	99 04	03.3	6
7	75 24.0	94 18	14.0	74 55.7	95 17	13.3	73 30.1	96 15	11.6	73 01.5	96 14	11.1	72 32.7	96 14	10.6	66 43.8	98 08	06.3	66 14.4	98 08	06.1	61 20.1	98 05	03.9	7
8	75 13.2	93 20	15.8	74 45.4	93 19	15.1	73 21.2	94 17	13.2	72 52.9	94 16	12.6	72 24.5	95 15	12.1	66 38.8	97 09	07.2	66 09.7	97 09	06.9	61 17.0	98 06	04.4	8
9	75 01.2	91 22	17.6	74 33.9	91 21	16.8	73 11.1	93 18	14.7	72 43.3	93 18	14.1	72 15.3	93 17	13.5	66 33.3	96 10	08.1	66 04.4	96 10	07.8	61 13.6	97 06	05.0	9
10	74 48.0	89 24	19.3	74 21.3	89 23	18.5	73 00.0	91 20	16.2	72 32.6	92 19	15.5	72 05.1	92 19	14.8	66 27.1	96 11	09.0	65 58.5	96 11	08.6	61 09.8	97 07	05.5	10
1	74 33.7	87 26	21.0	74 07.5	87 25	20.1	72 47.9	89 22	17.6	72 21.0	90 21	16.9	71 53.9	90 20	16.2	66 20.3	94 12	09.8	65 51.9	95 12	09.4	61 05.6	96 08	06.1	1
2	74 18.2	85 28	22.6	73 52.7	85 26	21.6	72 34.8	88 23	19.0	72 08.4	88 22	18.2	71 41.9	89 22	17.5	66 12.9	93 13	10.6	65 44.8	94 13	10.2	61 01.0	95 08	06.6	2
3	74 01.6	82 29	24.1	73 36.8	83 28	23.1	72 20.7	86 25	20.4	71 54.9	86 24	19.5	71 28.9	87 23	18.8	66 04.9	92 14	11.5	65 37.2	93 14	11.0	60 56.0	95 09	07.1	3
4	73 44.1	80 31	25.6	73 20.0	81 30	24.5	72 05.8	84 26	21.7	71 40.5	85 25	20.8	71 15.1	85 24	20.0	65 56.3	91 15	12.3	65 28.9	91 15	11.8	60 50.7	94 10	07.6	4
15	73 25.7	78 32	27.0	73 02.2	79 31	25.9	71 50.0	82 28	22.9	71 25.3	83 27	22.0	71 00.4	83 26	21.2	65 47.2	90 16	13.1	65 20.2	90 16	12.5	60 45.0	93 10	08.1	15
6	73 06.3	75 34	28.3	72 43.6	76 32	27.2	71 33.3	80 29	24.1	71 09.3	81 28	23.2	70 45.0	81 27	22.3	65 37.5	89 17	13.8	65 10.8	89 16	13.3	60 38.9	92 11	08.6	6
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8	72 25.2	70 36	30.8	72 03.9	72 35	29.6	70 57.7	75 31	26.4	70 34.9	76 30	25.4	70 11.9	77 29	24.5	65 16.5	86 19	15.4	64 50.6	86 18	14.7	60 25.6	90 12	09.6	8
9	72 03.5	68 37	31.9	71 42.9	69 36	30.7	70 38.8	73 33	27.5	70 16.7	74 32	26.5	69 54.3	75 30	25.5	65 05.2	84 20	16.1	64 39.8	85 19	15.5	60 18.5	89 12	10.1	9
20	71 41.2	65 38	33.0	71 21.3	67 37	31.8	70 19.3	71 34	28.5	69 57.8	72 33	27.4	69 36.0	73 31	26.5	64 53.4	83 20	16.8	64 28.4	83 20	16.1	60 11.0	88 13	10.6	20
1	71 18.2	63 39	34.0	70 59.0	65 38	32.8	69 59.1	69 35	29.4	69 38.3	70 34	28.4	69 17.2	71 32	27.4	64 41.1	81 21	17.5	64 16.6	82 20	16.8	60 03.2	87 14	11.1	1
2	70 54.6	61 40	34.9	70 36.2	62 39	33.7	69 38.3	66 36	30.4	69 18.2	68 34	29.3	68 57.7	69 33	28.3	64 28.3	80 22	18.2	64 04.3	80 21	17.5	59 55.0	85 14	11.5	2
3	70 30.4	58 41	35.8	70 12.8	60 40	34.6	69 17.0	64 36	31.2	68 57.5	65 35	30.2	68 37.7	67 34	29.1	64 15.1	78 23	18.8	63 51.6	79 22	18.1	59 46.5	84 15	12.0	3
4	70 05.8	56 42	36.7	69 48.8	57 41	35.5	68 55.1	62 37	32.1	68 36.3	63 36	31.0	68 17.1	65 35	29.9	64 01.5	76 23	19.4	63 38.4	77 23	18.7	59 37.7	83 15	12.4	4
25	69 40.7	53 43	37.5	69 24.4	55 41	36.3	68 32.7	60 38	32.8	68 14.6	61 37	31.8	67 56.1	62 36	30.7	63 47.4	75 24	20.1	63 24.9	75 23	19.3	59 28.6	82 16	12.8	25
6	69 15.1	51 43	38.2	68 59.5	53 42	37.0	68 09.9	57 39	33.6	67 52.4	59 38	32.5	67 34.6	60 37	31.4	63 32.9	73 25	20.7	63 10.9	74 24	19.9	59 19.2	80 16	13.3	6
7	68 49.1	49 44	38.9	68 34.2	51 43	37.7	67 46.6	55 39	34.3	67 29.8	57 38	33.2	67 12.6	58 37	32.1	63 18.0	71 25	21.2	62 56.5	72 25	20.5	59 09.5	79 17	13.7	7
8	68 22.7	47 45	39.6	68 08.5	48 43	38.4	67 22.9	53 40	35.0	67 06.8	54 39	33.9	66 50.2	56 38	32.8	63 02.7	69 26	21.8	62 41.8	70 25	21.0	58 59.5	77 17	14.1	8
9	67 56.0	44 45	40.2	67 42.4	46 44	39.0	66 58.8	51 41	35.6	66 43.4	52 40	34.5	66 27.4	54 39	33.4	62 47.1	68 27	22.3	62 26.6	69 26	21.5	58 49.2	76 18	14.5	9
30	67 28.9	42 46	40.8	67 16.1	44 44	39.6	66 34.4	49 41	36.2	66 19.6	50 40	35.1	66 04.3	52 39	34.0	62 31.1	66 27	22.8	62 11.2	67 26	22.0	58 38.6	74 18	14.9	30
1	67 01.6	40 46	41.3	66 49.3	42 45	40.1	66 09.6	47 42	36.7	65 55.4	48 41	35.7	65 40.8	50 40	34.6	62 14.7	64 28	23.3	61 55.4	65 27	22.5	58 27.8	73 18	15.3	1
2	66 34.0	38 46	41.8	66 22.3	40 45	40.6	65 44.5	44 42	37.3	65 31.0	46 41	36.2	65 17.0	47 40	35.1	61 58.0	62 28	23.8	61 39.2	63 27	23.0	58 16.7	71 19	15.6	2
3	66 06.1	36 47	42.2	65 55.1	37 46	41.1	65 19.2	42 43	37.8	65 06.2	44 42	36.7	64 52.8	45 41	35.6	61 41.0	60 29	24.3	61 22.8	61 28	23.5	58 05.3	70 19	16.0	3
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6	64 41.0	30 48	43.4	64 31.9	31 47	42.3	64 01.4	36 44	39.1	63 50.4	38 43	38.0	63 38.8	39 42	37.0	60 48.3	55 30	25.6	60 31.7	56 29	24.7	57 29.8	65 20	17.0	6
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8	63 43.4	26 48	44.1	63 35.4	27 48	43.0	63 08.5	32 45	39.8	62 58.6	34 44	38.7	62 48.3	35 43	37.7	60 11.8	51 31	26.4	59 56.3	52 30	25.5	57 05.0	62 21	17.6	8
9	63 14.3	24 49	44.3	63 06.9	26 48	43.3	62 41.8	30 45	40.1	62 32.4	32 44	39.1	62 22.7	33 43	38.0	59 53.1	49 31	26.7	59 38.3	50 30	25.8	56 52.3	60 22	17.9	9
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1	62 15.8	20 49	44.8	62 09.5	22 48	43.8	61 47.7	26 45	40.7	61 39.6	28 44	39.7	61 30.9	29 44	38.6	59 15.2	45 32	27.4	59 01.5	46 31	26.5	56 26.2	57 22	18.5	1
2	61 46.4	18 49	45.0	61 40.6	20 48	44.0	61 20.5	25 46	40.9	61 12.9	26 45	39.9	61 04.8	28 44	38.9	58 56.0	43 32	27.7	58 42.8	45 32	26.8	56 12.9	55 22	18.8	2
3	61 16.9	17 49	45.2	61 11.6	18 48	44.2	60 53.1	23 46	41.2	60 46.1	24 45	40.2	60 38.6	26 44	39.2	58 36.5	42 33	28.0	58 23.9	43 32	27.1	55 59.4	53 23	19.0	3
4	60 47.2	15 50	45.4	60 42.5	17 49	44.4	60 25.7	21 46	41.4	60 19.1	22 45	40.4	60 12.2	24 44	39.4	58 16.9	40 33	28.3	58 04.8	41 32	27.4	55 45.8	51 23	19.3	4
45	60 17.5	13 50	45.5	60 13.3	15 49	44.5	59 58.1	19 46	41.6	59 52.1	21 45	40.6	59 45.7	22 44	39.6	57 57.0	38 33	28.5	57 45.5	39 32	27.7	55 31.9	50 23	19.5	45
6	59 47.8	12 50	45.6	59 44.1	13 49	44.7	59 30.4	17 46	41.7	59 24.9	19 45	40.8	59 19.1	20 45	39.8	57 37.1	36 34	28.8	57 26.1	37 33	27.9	55 17.9	48 24	19.7	6
7	59 17.9	10 50	45.7	59 14.8	11 49	44.8	59 02.6	16 46	41.9	58 57.7	17 46	40.9	58 52.3	18 45	40.0	57 16.9	34 34	29.0	57 06.5	35 33	28.1	55 03.8	46 24	20.0	7
8	58 48.1	08 50	45.8	58 45.4	10 49	44.9	58 34.7	14 47	42.0	58 30.3	15 46	41.1	58 25.5	17 45	40.1	56 56.6	32 34	29.2	56 46.8	33 33	28.4	54 49.5	44 24	20.2	8
9	58 18.2	07 50	45.9	58 15.9	08 49	45.0	58 06.8	12 47	42.1	58 02.9	14 46	41.2	57 58.6	15 45	40.3	56 36.2	30 34	29.4	56 26.9	32 33	28.6	54 35.1	43 24	20.4	9
50	57 48.2	05 50	46.0	57 46.5	06 49	45.0	57 38.8	11 47	42.2	57 35.4	12 46	41.3	57 31.7	13 45	40.4	56 15.7	29 34	29.6	56 06.9	30 34	28.8	54 20.5	41 24	20.6	50
1	57 18.2	03 50	46.0	57 17.0	05 49	45.1	57 10.8	09 47	42.3	57 07.9	10 46	41.4	57 04.6	12 45	40.5	55 55.0	27 35	29.8	55 46.8	28 34	28.9	54 05.8	39 25	20.7	1
2	56 48.2	02 50	46.0	56 47.5	03 49	45.1	56 42.7	07 47	42.4	56 40.3	09 46	41.5	56 37.6	10 45	40.6	55 34.3	25 35	30.0	55 26.6	26 34	29.1	53 51.0	37 25	20.9	2
3	56 18.2	00 50	46.0	56 17.9	02 49	45.1	56 14.6	06 47	42.4	56 12.7	07 46	41.5	56 10.4	08 45	40.6	55 13.4	23 35	30.1	55 06.2	24 34	29.3	53 36.0	35 25	21.1	3
4	55 48.2	01 50	46.0	55 48.4	00 49	45.1	55 46.5	04 47	42.5	55 45.1	05 46	41.6	55 43.3	07 45	40.7	54 52.4	21 35	30.3	54 45.8	23 34	29.4	53 21.0	34 25	21.2	4
55	55 18.3	03 50	46.0	55 18.8	01 49	45.1	55 18.3	02 47	42.5	55 17.4	04 46	41.6	55 16.1	05 45	40.7	54 31.4	20 35	30.4	54 25.3	21 34	29.5	53 05.8	32 25	21.4	55
6	54 48.3	04 50	46.0	54 49.3	03 49	45.1	54 50.1	01 47	42.5	54 49.7	02 46	41.6	54 48.9	03 45	40.8	54 10.3	18 35	30.5	54 04.7	19 34	29.7	52 50.6	30 26	21.5	6
7	54 18.3	05 50	45.9	54 19.8	04 49	45.1	54 22.0	01 47	42.5	54 22.0	01 46	41.7	54 21.6	02 45	40.8	53 49.1	16 35	30.6	53 44.1	17 35	29.8	52 35.3	28 26	21.6	7
8	53 48.4	07 50	45.9	53 50.3	06 49	45.0	53 53.8	02 47	42.5	53 54.3	01 46	41.7	53 54.4	00 45	40.8	53 27.8	14 36	30.7	53 23.3	16 35	29.9	52 19.8	27 26	21.8	8
9	53 18.5	08 50	45.8	53 20.8	07 49	45.0	53 25.7	04 47	42.5	53 26.6	02 46	41.6	53 27.1	01 45	40.8	53 06.5	13 36	20.8	53 02.5	14 35	30.0	52 04.3	25 26	21.9	9
60	52 48.6	10 50	45.8	52 51.3	09 49	44.9	52 57.5	05 47	42.4	52 58.9	04 46	41.6	52 59.9	03 45	40.8	52 45.2	11 36	30.8	52 41.7	12 35	30.0	51 48.8	23 26	22.0	60
1	52 18.7	11 50	45.7	52 21.9	10 49	44.9	52 29.4	07 47	42.4	52 31.2	05 46	41.6	52 32.7	04 45	40.8	52 23.8	09 36	30.9	52 20.8	10 35	30.1	51 33.1	21 26	22.1	1
2	51 48.9	13 50	45.6	51 52.5	11 49	44.8	52 01.3	08 47	42.3	52 03.6	07 46	41.5	52 05.5	06 45	40.7	52 02.4	08 36	31.0	51 59.9	09 35	30.1	51 17.4	20 26	22.2	2
3	51 19.2	14 49	45.5	51 23.2	13 49	44.7	51 33.2	10 47	42.3	51 35.9	08 46	41.5	51 38.3	07 45	40.7	51 40.9	06 36	31.0	51 39.0	07 35	30.2	51 01.7	18 26	22.2	3
4	50 49.5	15 49	45.4	50 53.9	14 49	44.6	51 05.2	11 47	42.2	51 08.4	10 46	41.4	51 11.2	09 45	40.6	51 19.4	04 36	31.0	51 18.0	05 35	30.2	50 45.9	16 26	22.3	4
65	50 19.9	17 49	45.2	50 24.7	16 49	44.5	50 37.3	12 47	42.1	50 40.8	11 46	41.3	50 44.0	10 45	40.5	50 57.9	03 36	31.0	50 57.0	04 35	30.3	50 30.0	14 26	22.4	65
6	49 50.4	18 49	45.1	49 55.6	17 48	44.3	50 09.3	14 46	42.0	50 13.3	13 46	41.2	50 17.0	12 45	40.5	50 36.4	01 36	31.1	50 36.0	02 35	30.3	50 14.2	13 27	22.4	6
7	49 20.9	19 49	44.9	49 26.5	18 48	44.2	49 41.5	15 46	41.9	49 45.8	14 46	41.1	49 49.9	13 45	40.4	50 14.9	01 36	31.1	50 15.0	00 35	30.3	49 58.2	11 27	22.5	7
8	48 51.5	20 49	44.8	48 57.4	19 48	44.1	49 13.6	17 46	41.8	49 18.5	16 46	41.0	49 23.0	15 45	40.3	49 53.4	02 36	31.0	49 54.0	01 35	30.3	49 42.3	09 27	22.5	8
9	48 22.1	22 49	44.6	48 28.5	21 48	43.9	48 45.9	18 46	41.7	48 51.1	17 45	40.9	48 56.0	16 45	40.2	49 32.0	04 36	31.0	49 33.0	03 35	30.3	49 26.3	07 27	22.6	9
70	47 52.9	23 49	44.5	47 59.6	22 48	43.7	48 18.2	19 46	41.5	48 23.8	18 45	40.8	48 29.2	17 45	40.1	49 10.5	05 36	31.0	49 12.0	05 35	30.2	49 10.3	06 27	22.6	70
1	47 23.7	24 48	44.3	47 30.9	23 48	43.6	47 50.6	21 46	41.4	47 56.6	20 45	40.7	48 02.4	19 45	39.9	48 49.0	07 36	31.0	48 51.0	06 35	30.2	48 54.3	04 27	22.6	1
2	46 54.7	25 48	44.1	47 02.2	25 48	43.4	47 23.1	22 46	41.3	47 29.5	21 45	40.5	47 35.7	20 44	39.8	48 27.6	09 36	30.9	48 30.0	08 35	30.2	48 38.2	02 27	22.6	2
3	46 25.7	27 48	43.9	46 33.6	26 47	43.2	46 55.6	23 46	41.1	47 02.5	22 45	40.4	47 09.0	21 44	39.7	48 06.2	10 36	30.9	48 09.1	09 35	30.1	48 22.2	01 27	22.6	3
4	45 56.9	28 48	43.7	46 05.1	27 47	43.0	46 28.3	24 45	40.9	46 35.5	24 45	40.2	46 42.5	23 44	39.5	47 44.8	12 36	30.8	47 48.2	11 35	30.1	48 06.2	01 27	22.6	4
75	45 28.1	29 48	43.5	45 36.7	28 47	42.8	46 01.0	26 45	40.8	46 08.6	25 45	40.1	46 16.0	24 44	39.4	47 23.5	13 35	30.8	47 27.3	12 35	30.0	47 50.2	03 27	22.6	75
6	44 59.4	30 48	43.3	45 08.4	29 47	42.6	45 33.9	27 45	40.6	45 41.8	26 44	39.9	45 49.6	25 44	39.2	47 02.2	15 35	30.7	47 06.5	14 35	30.0	47 34.1	04 27	22.6	6
7	44 30.9	31 47	43.1	44 40.2	31 47	42.4	45 06.8	28 45	40.4	45 15.2	28 44	39.7	45 23.3	27 44	39.0	46 40.9	16 35	30.6	46 45.7	15 35	29.9	47 18.1	06 27	22.6	7
8	44 02.5	33 47	42.9	44 12.2	32 47	42.2	44 39.8	30 45	40.2	44 48.6	29 44	39.5	44 57.1	28 44	38.9	46 19.8	18 35	30.5	46 25.0	17 34	29.8	47 02.1	08 27	22.6	8
9	43 34.2	34 47	42.6	43 44.2	33 46	42.0	44 13.0	31 45	40.0	44 22.1	30 44	39.4	44 31.0	29 43	38.7	45 58.6	19 35	30.4	46 04.3	18 34	29.7	46 46.1	09 27	22.5	9
80	43 06.0	35 47	42.4	43 16.4	34 46	41.8	43 46.2	32 44	39.8	43 55.7	31 44	39.2	44 05.0	31 43	38.5	45 37.6	21 35	30.3	45 43.7	20 34	29.6	46 30.2	11 27	22.5	80
1	42 38.0	36 47	42.2	42 48.7	35 46	41.5	43 19.6	33 44	39.6	43 29.5	33 44	38.9	43 39.1	32 43	38.3	45 16.6	22 35	30.2	45 23.1	21 34	29.5	46 14.3	13 26	22.4	1
2	42 10.1	37 46	41.9	42 21.1	37 46	41.3	42 53.1	34 44	39.4	43 03.3	34 43	38.7	43 13.3	33 43	38.1	44 55.6	24 35	30.1	45 02.6	23 34	29.4	45 58.4	14 26	22.4	2
3	41 42.3	38 46	41.7	41 53.7	38 46	41.0	42 26.7	36 44	39.2	42 37.3	35 43	38.5	42 47.7	34 43	37.9	44 34.8	25 35	30.0	44 42.2	24 34	29.3	45 42.5	16 26	22.3	3
4	41 14.7	39 46	41.4	41 26.4	39 45	40.8	42 00.5	37 44	38.9	42 11.4	36 43	38.3	42 22.1	35 42	37.7	44 14.0	27 34	29.8	44 21.8	26 34	29.2	45 26.7	17 26	22.3	4
85	40 47.2	41 46	41.1	40 59.3	40 45	40.5	41 34.3	38 43	38.7	41 45.6	37 43	38.1	41 56.7	37 42	37.4	43 53.3	28 34	29.7	44 01.6	27 34	29.0	45 11.0	19 26	22.2	85
6	40 19.8	42 45	40.9	40 32.2	41 45	40.3	41 08.3	39 43	38.5	41 20.0	39 42	37.8	41 31.4	38 42	37.2	43 32.7	29 34	29.6	43 41.4	29 34	28.9	44 55.2	21 26	22.1	6
7	39 52.6	43 45	40.6	40 05.4	42 45	40.0	40 42.5	40 43	38.2	40 54.5	40 42	37.6	41 06.3	39 42	37.0	43 12.2	31 34	29.4	43 21.3	30 33	28.7	44 39.6	22 26	22.0	7
8	39 25.6	44 45	40.3	39 38.7	43 44	39.7	40 16.8	41 43	38.0	40 29.1	41 42	37.4	40 41.3	40 41	36.8	42 51.8	32 34	29.2	43 01.3	31 33	28.6	44 24.0	24 26	21.9	8
9	38 58.7	45 45	40.0	39 12.1	44 44	39.4	39 51.2	43 42	37.7	40 03.9	42 42	37.1	40 16.4	41 41	36.5	42 31.5	33 34	29.1	42 41.4	33 33	28.4	44 08.4	25 26	21.9	9
90	38 32.0	46 44	39.7	38 45.7	45 44	39.2	39 25.8	44 42	37.4	39 38.8	43 42	36.8	39 51.7	43 41	36.3	42 11.3	35 34	28.9	42 21.6	34 33	28.3	43 52.9	27 26	21.8	90

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H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	38 05.4	47 44	39.4	38 19.5	47 43	38.9	39 00.6	45 42	37.2	39 13.9	44 41	36.6	39 27.1	44 41	36.0	41 51.2	36 33	28.8	42 01.9	35 33	28.1	43 37.5	28 26	21.7	91
2	37 39.0	48 44	39.1	37 53.4	48 43	38.6	38 35.5	46 42	36.9	38 49.2	45 41	36.3	39 02.7	45 40	35.7	41 31.2	37 33	28.6	41 42.3	37 32	28.0	43 22.2	30 25	21.6	2
3	37 12.8	49 43	38.8	37 27.5	49 43	38.3	38 10.5	47 41	36.6	38 24.6	47 41	36.0	38 38.4	46 40	35.5	41 11.3	39 33	28.4	41 22.8	38 32	27.8	43 06.9	31 25	21.4	3
4	36 46.8	50 43	38.5	37 01.7	50 43	38.0	37 45.8	48 41	36.3	38 00.1	48 40	35.8	38 14.3	47 40	35.2	40 51.5	40 33	28.2	41 03.4	39 32	27.6	42 51.7	33 25	21.3	4
95	36 20.9	51 43	38.2	36 36.2	51 42	37.7	37 21.1	49 41	36.0	37 35.8	49 40	35.5	37 50.4	48 40	34.9	40 31.9	41 33	28.0	40 44.2	41 32	27.4	42 36.6	34 25	21.2	95
6	35 55.2	52 42	37.9	36 10.8	52 42	37.4	36 56.7	50 40	35.7	37 11.7	50 40	35.2	37 26.6	49 39	34.7	40 12.4	43 32	27.8	40 25.1	42 32	27.2	42 21.5	35 25	21.1	6
7	35 29.7	53 42	37.6	35 45.6	53 42	37.0	36 32.4	51 40	35.4	36 47.8	51 40	34.9	37 03.0	50 39	34.4	39 53.0	44 32	27.6	40 06.1	43 31	27.0	42 06.6	37 25	20.9	7
8	35 04.4	54 42	37.2	35 20.6	54 41	36.7	36 08.4	52 40	35.1	36 24.0	52 39	34.6	36 39.5	51 39	34.1	39 33.7	45 32	27.4	39 47.2	45 31	26.8	41 51.7	38 25	20.8	8
9	34 39.3	55 42	36.9	34 55.8	55 41	36.4	35 44.5	53 40	34.8	36 00.4	53 39	34.3	36 16.2	53 38	33.8	39 14.6	46 32	27.2	39 28.4	46 31	26.6	41 37.0	40 24	20.7	9
100	34 14.4	56 41	36.6	34 31.2	56 41	36.1	35 20.7	54 39	34.5	35 37.0	54 39	34.0	35 53.2	54 38	33.5	38 55.6	48 31	27.0	39 09.8	47 31	26.4	41 22.3	41 24	20.5	100
1	33 49.6	57 41	36.2	34 06.7	57 40	35.7	34 57.2	55 39	34.2	35 13.8	55 38	33.7	35 30.2	55 38	33.2	38 36.8	49 31	26.8	38 51.4	48 31	26.2	41 07.7	42 24	20.4	1
2	33 25.1	58 41	35.9	33 42.5	58 40	35.4	34 33.9	56 39	33.9	34 50.8	56 38	33.4	35 07.5	56 38	32.9	38 18.1	50 31	26.5	38 33.0	50 30	26.0	40 53.3	44 24	20.2	2
3	33 00.8	59 40	35.5	33 18.5	59 40	35.0	34 10.7	58 38	33.6	34 27.9	57 38	33.1	34 45.0	57 37	32.6	37 59.6	51 31	26.3	38 14.9	51 30	25.8	40 38.9	45 24	20.1	3
4	32 36.7	60 40	35.2	32 54.6	60 39	34.7	33 47.8	58 38	33.2	34 05.3	58 37	32.8	34 22.6	58 37	32.3	37 41.2	52 30	26.1	37 56.8	52 30	25.5	40 24.7	47 24	19.9	4
105	32 12.8	61 39	34.8	32 31.0	61 39	34.3	33 25.0	59 38	32.9	33 42.8	59 37	32.4	34 00.5	59 37	31.9	37 22.9	54 30	25.8	37 38.9	53 30	25.3	40 10.5	48 23	19.7	105
6	31 49.1	62 39	34.4	32 07.6	61 39	34.0	33 02.5	60 37	32.6	33 20.6	60 37	32.1	33 38.5	60 36	31.6	37 04.9	55 30	25.6	37 21.2	54 29	25.1	39 56.5	49 23	19.6	6
7	31 25.6	63 39	34.1	31 44.4	62 38	33.6	32 40.2	61 37	32.2	32 58.5	61 36	31.8	33 16.8	61 36	31.3	36 46.9	56 30	25.3	37 03.6	55 29	24.8	39 42.6	50 23	19.4	7
8	31 02.4	64 38	33.7	31 21.5	63 38	33.3	32 18.0	62 36	31.9	32 36.7	62 36	31.4	32 55.3	62 36	31.0	36 29.2	57 29	25.1	36 46.2	57 29	24.6	39 28.8	52 23	19.2	8
9	30 39.4	65 38	33.3	30 58.7	64 38	32.9	31 56.1	63 36	31.5	32 15.1	63 36	31.1	32 33.9	63 35	30.6	36 11.6	58 29	24.8	36 29.0	58 28	24.3	39 15.2	53 23	19.0	9
110	30 16.6	65 38	33.0	30 36.2	65 37	32.5	31 34.4	64 36	31.2	31 53.7	64 35	30.7	32 12.8	64 35	30.3	35 54.2	59 29	24.6	36 11.9	59 28	24.1	39 01.6	54 22	18.9	110
1	29 54.0	66 37	32.6	30 13.9	66 37	32.1	31 13.0	65 35	30.8	31 32.5	65 35	30.4	31 51.9	65 34	29.9	35 37.0	60 28	24.3	35 55.0	60 28	23.8	38 48.2	55 22	18.7	1
2	29 31.7	67 37	32.2	29 51.8	67 36	31.8	30 51.7	66 35	30.5	31 11.5	66 35	30.0	31 31.2	66 34	29.6	35 19.9	61 28	24.0	35 38.2	61 28	23.5	38 34.9	57 22	18.5	2
3	29 09.6	68 36	31.8	29 30.0	68 36	31.4	30 30.7	67 35	30.1	30 50.8	67 34	29.7	31 10.7	66 34	29.2	35 03.0	62 28	23.8	35 21.7	62 27	23.3	38 21.8	58 22	18.3	3
4	28 47.8	69 36	31.4	29 08.4	69 36	31.0	30 09.9	68 34	29.7	30 30.2	68 34	29.3	30 50.5	67 33	28.9	34 46.3	63 28	23.5	35 05.3	63 27	23.0	38 08.8	59 21	18.1	4
115	28 26.2	70 36	31.0	28 47.1	70 35	30.6	29 49.3	69 34	29.4	30 09.9	69 33	29.0	30 30.5	68 33	28.5	34 29.8	65 27	23.2	34 49.1	64 27	22.7	37 55.9	60 21	17.9	115
6	28 04.8	71 35	30.6	28 26.0	70 35	30.2	29 29.0	70 33	29.0	29 49.9	69 33	28.6	30 10.7	69 33	28.2	34 13.4	66 27	22.9	34 33.1	65 26	22.5	37 43.2	61 21	17.7	6
7	27 43.7	71 35	30.2	28 05.1	71 34	29.8	29 08.9	71 33	28.6	29 30.1	70 33	28.2	29 51.1	70 32	27.8	33 57.3	67 27	22.6	34 17.2	66 26	22.2	37 30.6	63 21	17.5	7
8	27 22.9	72 34	29.8	27 44.5	72 34	29.4	28 49.1	71 33	28.2	29 10.5	71 32	27.8	29 31.8	71 32	27.4	33 41.4	68 26	22.4	34 01.6	67 26	21.9	37 18.2	64 20	17.3	8
9	27 02.3	73 34	29.4	27 24.2	73 33	29.0	28 29.5	72 32	27.9	28 51.1	72 32	27.5	29 12.7	72 31	27.1	33 25.6	69 26	22.1	33 46.1	68 25	21.6	37 05.9	65 20	17.0	9
120	26 41.9	74 33	29.0	27 04.1	74 33	28.6	28 10.2	73 32	27.5	28 32.1	73 31	27.1	28 53.9	73 31	26.7	33 10.1	70 26	21.8	33 30.9	69 25	21.3	36 53.7	66 20	16.8	120
1	26 21.9	75 33	28.6	26 44.3	75 33	28.2	27 51.1	74 31	27.1	28 13.2	74 31	26.7	28 35.3	73 31	26.3	32 54.7	71 25	21.5	33 15.8	70 25	21.0	36 41.7	67 20	16.6	1
2	26 02.1	76 33	28.2	26 24.7	75 32	27.8	27 32.2	75 31	26.7	27 54.6	75 31	26.3	28 16.9	74 30	25.9	32 39.6	71 25	21.2	33 00.9	71 24	20.7	36 29.9	68 19	16.4	2
3	25 42.5	76 32	27.7	26 05.4	76 32	27.4	27 13.6	76 31	26.3	27 36.3	75 30	25.9	27 58.8	75 30	25.5	32 24.6	72 25	20.9	32 46.3	72 24	20.4	36 18.2	69 19	16.1	3
4	25 23.3	77 32	27.3	25 46.4	77 31	27.0	26 55.3	76 30	25.9	27 18.2	76 30	25.5	27 41.0	76 29	25.2	32 09.9	73 24	20.5	32 31.8	73 24	20.1	36 06.7	70 19	15.9	4
125	25 04.3	78 31	26.9	25 27.6	78 31	26.5	26 37.2	77 30	25.5	27 00.4	77 29	25.1	27 23.4	77 29	24.8	31 55.4	74 24	20.2	32 17.6	74 23	19.8	35 55.4	71 19	15.7	125
6	24 45.6	79 31	26.5	25 09.1	78 30	26.1	26 19.5	78 29	25.1	26 42.8	78 29	24.7	27 06.1	78 28	24.4	31 41.0	75 24	19.9	32 03.5	75 23	19.5	35 44.2	72 18	15.4	6
7	24 27.2	79 30	26.0	24 50.9	79 30	25.7	26 01.9	79 29	24.7	26 25.5	78 28	24.3	26 49.0	78 28	24.0	31 27.0	76 23	19.6	31 49.7	76 23	19.2	35 33.2	73 18	15.2	7
8	24 09.0	80 30	25.6	24 33.0	80 29	25.3	25 44.7	79 28	24.2	26 08.5	79 28	23.9	26 32.2	79 28	23.6	31 13.1	77 23	19.3	31 36.1	77 22	18.9	35 22.3	74 18	15.0	8
9	23 51.2	81 29	25.1	24 15.4	81 29	24.8	25 27.7	80 28	23.8	25 51.7	80 27	23.5	26 15.7	80 27	23.2	30 59.4	78 22	19.0	31 22.7	77 22	18.6	35 11.7	75 18	14.7	9
130	23 33.6	81 29	24.7	23 58.0	81 28	24.4	25 11.0	81 27	23.4	25 35.2	81 27	23.1	25 59.4	81 27	22.8	30 46.0	79 22	18.6	31 09.5	78 22	18.3	35 01.2	76 17	14.5	130
1	23 16.3	82 28	24.3	23 40.9	82 28	23.9	24 54.6	82 27	23.0	25 19.0	81 27	22.7	25 43.4	81 26	22.4	30 32.8	79 22	18.3	30 56.6	79 21	17.9	34 50.8	77 17	14.2	1
2	22 59.4	83 28	23.8	23 24.2	83 27	23.5	24 38.4	82 26	22.6	25 03.1	82 26	22.3	25 27.7	82 26	21.9	30 19.8	80 21	18.0	30 43.8	80 21	17.6	34 40.7	78 17	14.0	2
3	22 42.7	83 27	23.4	23 07.7	83 27	23.1	24 22.6	83 26	22.1	24 47.4	83 26	21.8	25 12.3	83 25	21.5	30 07.1	81 21	17.6	30 31.3	81 20	17.3	34 30.7	79 16	13.7	3
4	22 26.3	84 27	22.9	22 51.5	84 26	22.6	24 07.0	84 25	21.7	24 32.1	84 25	21.4	24 57.1	83 25	21.1	29 54.6	82 20	17.3	30 19.1	82 20	17.0	34 20.9	80 16	13.5	4
135	22 10.2	85 26	22.4	22 35.7	85 26	22.2	23 51.7	84 25	21.3	24 17.0	84 25	21.0	24 42.3	84 24	20.7	29 42.3	82 20	17.0	30 07.0	82 20	16.6	34 11.3	80 16	13.2	135
6	21 54.5	85 26	22.0	22 20.1	85 25	21.7	23 36.7	85 24	20.9	24 02.2	85 24	20.6	24 27.7	85 24	20.3	29 30.2	83 20	16.6	29 55.2	83 19	16.3	34 01.9	81 15	12.9	6
7	21 39.0	86 25	21.5	22 04.8	86 25	21.2	23 22.1	86 24	20.4	23 47.7	86 24	20.1	24 13.4	85 23	19.8	29 18.4	84 19	16.3	29 43.6	84 19	16.0	33 52.6	82 15	12.7	7
8	21 23.9	87 25	21.1	21 49.9	87 24	20.8	23 07.7	86 23	20.0	23 33.5	86 23	19.7	23 59.4	86 23	19.4	29 06.9	85 19	15.9	29 32.3	85 18	15.6	33 43.6	83 15	12.4	8
9	21 09.1	87 24	20.6	21 35.2	87 24	20.3	22 53.6	87 23	19.5	23 19.6	87 23	19.3	23 45.7	87 22	19.0	28 55.6	85 18	15.6	29 21.2	85 18	15.3	33 34.7	84 14	12.1	9
140	20 54.6	88 24	20.1	21 20.9	88 23	19.9	22 39.8	88 22	19.1	23 06.0	87 22	18.8	23 32.3	87 22	18.6	28 44.5	86 18	15.2	29 10.3	86 18	14.9	33 26.0	84 14	11.9	140
1	20 40.4	88 23	19.7	21 06.9	88 23	19.4	22 26.3	88 22	18.6	22 52.7	88 22	18.4	23 19.1	88 21	18.1	28 33.7	87 18	14.9	28 59.7	87 17	14.6	33 17.5	85 14	11.6	1
2	20 26.6	89 23	19.2	20 53.2	89 22	18.9	22 13.2	89 21	18.2	22 39.7	89 21	17.9	23 06.3	89 21	17.7	28 23.1	87 17	14.5	28 49.3	87 17	14.2	33 09.2	86 14	11.3	2
3	20 13.0	90 22	18.7	20 39.9	89 22	18.5	22 00.3	89 21	17.7	22 27.1	89 21	17.5	22 53.8	89 20	17.3	28 12.8	88 17	14.2	28 39.2	88 16	13.9	33 01.1	87 13	11.1	3
4	19 59.8	90 21	18.2	20 26.8	90 21	18.0	21 47.8	90 20	17.3	22 14.7	90 20	17.1	22 41.6	90 20	16.8	28 02.7	89 16	13.8	28 29.3	89 16	13.5	32 53.3	87 13	10.8	4
145	19 47.0	91 21	17.7	20 14.1	91 21	17.5	21 35.5	90 20	16.8	22 02.6	90 20	16.6	22 29.7	90 19	16.4	27 52.9	89 16	13.4	28 19.6	89 16	13.2	32 45.6	88 12	10.5	145
6	19 34.4	91 20	17.3	20 01.7	91 20	17.0	21 23.6	91 19	16.4	21 50.9	91 19	16.2	22 18.1	91 19	15.9	27 43.3	90 16	13.1	28 10.2	90 15	12.8	32 38.1	89 12	10.2	6
7	19 22.2	92 20	16.8	19 49.7	92 20	16.6	21 12.0	91 19	15.9	21 39.4	91 19	15.7	22 06.8	91 18	15.5	27 34.0	90 15	12.7	28 01.1	90 15	12.5	32 30.8	89 12	09.9	7
8	19 10.4	92 19	16.3	19 38.0	92 19	16.1	21 00.8	92 18	15.5	21 28.3	92 18	15.2	21 55.9	92 18	15.0	27 25.0	91 15	12.4	27 52.2	91 14	12.1	32 23.7	90 11	09.7	8
9	18 58.8	93 19	15.8	19 26.6	93 18	15.6	20 49.8	92 18	15.0	21 17.5	92 17	14.8	21 45.2	92 17	14.6	27 16.2	92 14	12.0	27 43.6	91 14	11.8	32 16.8	91 11	09.4	9
150	18 47.7	93 18	15.3	19 15.6	93 18	15.1	20 39.2	93 17	14.5	21 07.0	93 17	14.3	21 34.9	93 17	14.1	27 07.6	92 14	11.6	27 35.3	92 14	11.4	32 10.1	91 11	09.1	150
1	18 36.8	93 17	14.8	19 04.9	93 17	14.6	20 28.9	93 17	14.1	20 56.9	93 16	13.9	21 24.9	93 16	13.7	26 59.4	93 13	11.2	27 27.1	93 13	11.0	32 03.6	92 10	08.8	1
2	18 26.3	94 17	14.3	18 54.5	94 17	14.1	20 18.9	94 16	13.6	20 47.1	94 16	13.4	21 15.2	94 16	13.2	26 51.4	93 13	10.9	27 19.3	93 13	10.7	31 57.4	92 10	08.5	2
3	18 16.2	94 16	13.8	18 44.5	94 16	13.7	20 09.3	94 15	13.1	20 37.6	94 15	12.9	21 05.8	94 15	12.8	26 43.7	94 12	10.5	27 11.7	94 12	10.3	31 51.3	93 10	08.2	3
4	18 06.4	95 16	13.3	18 34.8	95 16	13.2	20 00.0	95 15	12.7	20 28.4	95 15	12.5	20 56.8	95 15	12.3	26 36.2	94 12	10.1	27 04.4	94 12	09.9	31 45.5	93 09	07.9	4
155	17 57.0	95 15	12.8	18 25.5	95 15	12.7	19 51.0	95 14	12.2	20 19.5	95 14	12.0	20 48.0	95 14	11.8	26 29.0	94 12	09.7	26 57.4	94 11	09.6	31 39.8	94 09	07.6	155
6	17 47.9	95 15	12.3	18 16.5	95 14	12.2	19 42.4	95 14	11.7	20 11.0	95 14	11.5	20 39.6	95 13	11.4	26 22.1	95 11	09.4	26 50.6	95 11	09.2	31 34.4	94 09	07.3	6
7	17 39.2	96 14	11.8	18 07.9	96 14	11.7	19 34.1	96 13	11.2	20 02.9	96 13	11.1	20 31.6	96 13	10.9	26 15.5	95 11	09.0	26 44.0	95 10	08.8	31 29.2	95 08	07.0	7
8	17 30.8	96 13	11.3	17 59.7	96 13	11.2	19 26.2	96 13	10.7	19 55.0	96 12	10.6	20 23.9	96 12	10.5	26 09.1	96 10	08.6	26 37.8	96 10	08.4	31 24.2	95 08	06.7	8
9	17 22.8	97 13	10.8	17 51.8	97 13	10.7	19 18.6	96 12	10.3	19 47.5	96 12	10.1	20 16.5	96 12	10.0	26 03.0	96 10	08.2	26 31.8	96 10	08.1	31 19.4	96 08	06.4	9
160	17 15.2	97 12	10.3	17 44.2	97 12	10.2	19 11.3	97 12	09.8	19 40.4	97 11	09.7	20 09.4	97 11	09.5	25 57.2	96 09	07.8	26 26.1	96 09	07.7	31 14.8	96 07	06.1	160
1	17 07.9	97 12	09.8	17 37.0	97 11	09.7	19 04.4	97 11	09.3	19 33.6	97 11	09.2	20 02.7	97 11	09.1	25 51.6	97 09	07.4	26 20.7	97 09	07.3	31 10.5	96 07	05.8	1
2	17 01.0	97 11	09.3	17 30.2	97 11	09.2	18 57.9	97 10	08.8	19 27.1	97 10	08.7	19 56.3	97 10	08.6	25 46.4	97 08	07.1	26 15.5	97 08	06.9	31 06.4	97 07	05.5	2
3	16 54.4	98 10	08.8	17 23.7	98 10	08.7	18 51.6	98 10	08.3	19 20.9	98 10	08.2	19 50.2	98 10	08.1	25 41.4	97 08	06.7	26 10.6	97 08	06.6	31 02.5	97 06	05.2	3
4	16 48.2	98 10	08.3	17 17.6	98 10	08.2	18 45.8	98 09	07.9	19 15.1	98 09	07.7	19 44.5	98 09	07.6	25 36.7	98 07	06.3	26 06.0	98 07	06.2	30 58.8	97 06	04.9	4
165	16 42.4	98 09	07.8	17 11.9	98 09	07.7	18 40.2	98 09	07.4	19 09.7	98 08	07.3	19 39.1	98 08	07.2	25 32.2	98 07	05.9	26 01.6	98 07	05.8	30 55.3	98 05	04.6	165
6	16 37.0	98 08	07.3	17 06.5	98 08	07.2	18 35.1	98 08	06.9	19 04.6	98 08	06.8	19 34.1	98 08	06.7	25 28.1	98 06	05.5	25 57.6	98 06	05.4	30 52.0	98 05	04.3	6
7	16 31.9	99 08	06.7	17 01.5	99 08	06.7	18 30.3	99 07	06.4	18 59.8	99 07	06.3	19 29.4	99 07	06.2	25 24.2	98 06	05.1	25 53.8	98 06	05.0	30 49.0	98 05	04.0	7
8	16 27.2	99 07	06.2	16 56.8	99 07	06.1	18 25.8	99 07	05.9	18 55.4	99 07	05.8	19 25.1	99 07	05.7	25 20.7	99 06	04.7	25 50.3	99 05	04.6	30 46.2	99 04	03.7	8
9	16 22.8	99 07	05.7	16 52.6	99 06	05.6	18 21.7	99 06	05.4	18 51.4	99 06	05.3	19 21.1	99 06	05.3	25 17.4	99 05	04.3	25 47.0	99 05	04.3	30 43.6	99 04	03.4	9
170	16 18.9	99 06	05.2	16 48.6	99 06	05.1	18 17.9	99 06	04.9	18 47.7	99 06	04.9	19 17.4	99 06	04.8	25 14.4	99 05	03.9	25 44.1	99 04	03.9	30 41.3	99 04	03.1	170
1	16 15.3	99 05	04.7	16 45.1	99 05	04.6	18 14.5	99 05	04.4	18 44.3	99 05	04.4	19 14.1	99 05	04.3	25 11.6	99 04	03.6	25 41.4	99 04	03.5	30 39.1	99 03	02.8	1
2	16 12.1	99 05	04.2	16 41.9	99 05	04.1	18 11.5	99 04	03.9	18 41.3	99 04	03.9	19 11.2	99 04	03.8	25 09.2	99 04	03.2	25 39.0	99 04	03.1	30 37.2	99 03	02.5	2
3	16 09.3	1.0 04	03.6	16 39.1	1.0 04	03.6	18 08.8	1.0 04	03.5	18 38.7	1.0 04	03.4	19 08.6	1.0 04	03.4	25 07.0	1.0 03	02.8	25 36.9	1.0 03	02.7	30 35.5	1.0 02	02.2	3
4	16 06.8	1.0 03	03.1	16 36.7	1.0 03	03.1	18 06.5	1.0 03	03.0	18 36.4	1.0 03	02.9	19 06.3	1.0 03	02.9	25 05.2	1.0 03	02.4	25 35.1	1.0 03	02.3	30 34.1	1.0 02	01.9	4
175	16 04.7	1.0 03	02.6	16 34.7	1.0 03	02.6	18 04.5	1.0 03	02.5	18 34.4	1.0 03	02.4	19 04.4	1.0 03	02.4	25 03.6	1.0 02	02.0	25 33.5	1.0 02	01.9	30 32.8	1.0 02	01.5	175
6	16 03.0	1.0 02	02.1	16 33.0	1.0 02	02.1	18 02.9	1.0 02	02.0	18 32.8	1.0 02	01.9	19 02.8	1.0 02	01.9	25 02.3	1.0 02	01.6	25 32.3	1.0 02	01.6	30 31.8	1.0 01	01.2	6
7	16 01.7	1.0 02	01.6	16 31.7	1.0 02	01.5	18 01.6	1.0 02	01.5	18 31.6	1.0 02	01.4	19 01.6	1.0 01	01.4	25 01.3	1.0 01	01.2	25 31.3	1.0 01	01.2	30 31.0	1.0 01	00.9	7
8	16 00.8	1.0 01	01.0	16 30.7	1.0 01	01.0	18 00.7	1.0 01	01.0	18 30.7	1.0 01	01.0	19 00.7	1.0 01	01.0	25 00.6	1.0 01	00.8	25 30.6	1.0 01	00.8	30 30.5	1.0 01	00.6	8
9	16 00.2	1.0 00	00.5	16 30.2	1.0 00	00.5	18 00.2	1.0 00	00.5	18 30.2	1.0 00	00.5	19 00.2	1.0 00	00.5	25 00.1	1.0 00	00.4	25 30.1	1.0 00	00.4	30 30.1	1.0 00	00.3	9
180	16 00.0	1.0 00	00.0	16 30.0	1.0 00	00.0	18 00.0	1.0 00	00.0	18 30.0	1.0 00	00.0	19 00.0	1.0 00	00.0	25 00.0	1.0 00	00.0	25 30.0	1.0 00	00.0	30 30.0	1.0 00	00.0	180

STAR IDENTIFICATION TABLE

ALTITUDE

Lat. 46°

AZ.	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	48	180	52	180	56	180	60	180	64	180	68	180	72	180	76	180	80	180	84	180	88	180	00
4	48	174	52	174	56	173	60	172	64	171	68	170	72	169	76	166	80	162	83	153	87	124	4
8	47	168	51	167	55	166	59	165	63	163	67	161	71	158	75	153	78	146	82	133	84	107	8
12	47	162	51	161	55	159	58	158	62	155	66	152	70	148	73	142	77	134	79	120	81	99	12
16	46	157	50	155	53	153	57	151	61	148	65	144	68	139	71	133	74	124	77	112	79	94	16
20	45	151	48	149	52	147	56	144	59	141	63	137	66	132	69	125	72	117	74	105	76	91	20
24	43	146	47	144	50	141	54	138	57	135	61	131	64	125	67	119	69	111	72	100	73	88	24
28	41	141	45	139	49	136	52	133	55	129	59	125	62	120	64	113	67	106	69	96	70	86	28
32	40	137	43	134	47	131	50	128	53	124	56	120	59	114	62	108	64	101	66	93	67	83	32
36	38	132	41	129	44	126	48	123	51	119	54	115	57	110	59	104	61	97	63	90	65	81	36
40	36	128	39	125	42	122	45	119	48	115	51	111	54	106	56	100	59	94	60	87	62	79	40
44	33	124	37	121	40	118	43	115	46	111	49	107	51	102	54	97	56	91	58	85	59	78	44
48	31	120	34	117	37	114	40	111	43	107	46	103	48	99	51	94	53	88	55	82	57	76	48
52	28	117	32	114	35	111	38	107	40	104	43	100	46	95	48	91	50	86	52	80	54	74	52
56	26	113	29	110	32	107	35	104	38	100	40	96	43	92	45	88	47	83	49	78	51	72	56
60	23	110	26	107	29	104	32	100	35	97	38	93	40	89	43	85	45	80	47	76	49	70	60
64	21	107	24	104	27	101	29	97	32	94	35	90	37	87	40	82	42	78	44	73	46	68	64
68	18	103	21	100	24	97	27	94	29	91	32	88	35	84	37	80	39	76	41	71	43	67	68
72	15	100	18	97	21	94	24	91	27	88	29	85	32	81	34	77	37	73	39	69	41	65	72
76	13	97	15	95	18	92	21	89	24	85	26	82	29	79	32	75	34	71	36	67	38	63	76
80	10	94	13	92	16	89	18	86	21	83	24	79	26	76	29	73	31	69	34	65	36	61	80
84	07	92	10	89	13	86	16	83	18	80	21	77	24	74	26	70	29	67	31	63	33	59	84
88	04	89	07	86	10	83	13	80	16	77	18	74	21	71	24	68	26	64	29	61	31	57	88
92	01	86	04	83	07	80	10	77	13	74	16	72	18	68	21	65	24	62	26	59	29	55	92
96	*01*	83	02	80	05	77	07	75	10	72	13	69	16	66	19	63	21	60	24	57	27	53	96
100	*04*	80	*01*	77	02	75	05	72	08	69	11	66	13	63	16	60	19	57	22	54	24	51	100
104	*07*	77	*04*	74	*01*	72	02	69	05	66	08	64	11	61	14	58	17	55	19	52	22	49	104
108	*09*	74	*06*	71	*03*	69	*00*	66	03	63	06	61	09	58	11	55	14	53	17	50	20	47	108
112	*12*	71	*09*	68	*06*	66	*03*	63	00	61	03	58	06	55	09	53	12	50	15	47	18	45	112
116	*15*	68	*12*	65	*09*	63	*05*	60	*02*	58	01	55	04	53	07	50	10	48	13	45	16	42	116
120	*17*	65	*14*	62	*11*	60	*08*	57	*05*	55	*01*	52	02	50	05	47	08	45	11	43	14	40	120
124	*20*	61	*17*	59	*13*	56	*10*	54	*07*	52	*04*	49	*00*	47	03	45	06	42	09	40	13	38	124
128	*22*	58	*19*	56	*16*	53	*12*	51	*09*	49	*06*	46	*02*	44	01	42	04	40	08	38	11	35	128
132	*24*	55	*21*	52	*18*	50	*14*	48	*11*	45	*08*	43	*04*	41	*01*	39	03	37	06	35	10	33	132
136	*27*	51	*23*	48	*20*	46	*16*	44	*13*	42	*09*	40	*06*	38	*02*	36	01	34	05	32	08	30	136
140	*29*	47	*25*	45	*22*	43	*18*	41	*15*	39	*11*	37	*08*	35	*04*	33	*00*	31	03	30	07	28	140
144	*31*	43	*27*	41	*24*	39	*20*	37	*16*	35	*13*	33	*09*	32	*05*	30	*02*	28	02	27	05	25	144
148	*33*	39	*29*	37	*25*	35	*22*	33	*18*	32	*14*	30	*11*	28	*07*	27	*03*	25	01	24	04	22	148
152	*34*	34	*30*	33	*27*	31	*23*	29	*19*	28	*16*	26	*12*	25	*08*	24	*04*	22	*00*	21	03	20	152
156	*36*	30	*32*	28	*28*	27	*24*	25	*21*	24	*17*	23	*13*	22	*09*	20	*05*	19	*01*	19	02	17	156
160	*37*	25	*33*	24	*29*	23	*25*	21	*22*	20	*18*	19	*14*	18	*10*	17	*06*	16	*02*	15	02	14	160
164	*38*	20	*34*	19	*30*	18	*26*	17	*22*	16	*19*	15	*15*	15	*11*	14	*07*	13	*03*	12	01	11	164
168	*39*	15	*35*	15	*31*	14	*27*	13	*23*	12	*19*	12	*15*	11	*11*	10	*07*	10	*03*	09	01	09	168
172	*39*	10	*36*	10	*32*	09	*28*	09	*24*	08	*20*	08	*16*	07	*12*	07	*08*	07	*04*	06	00	06	172
176	*40*	05	*36*	05	*32*	05	*28*	04	*24*	04	*20*	04	*16*	04	*12*	03	*08*	03	*04*	03	00	03	176
180	*40*	00	*36*	00	*32*	00	*28*	00	*24*	00	*20*	00	*16*	00	*12*	00	*08*	00	*04*	00	00	00	180
	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		

16—11

FIGURES IN ITALICS INDICATE THAT DECLINATION IS OF CONTRARY NAME TO LATITUDE

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STAR IDENTIFICATION TABLE

AZ.	48°		52°		56°		60°		64°		68°		72°		76°		80°		84°		88°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	88	00	84	00	80	00	76	00	72	00	68	00	64	00	60	00	56	00	52	00	48	00	00
4	87	52	83	22	80	13	76	08	72	06	68	04	64	03	60	02	56	01	52	01	48	00	4
8	84	67	82	38	79	24	75	16	71	11	68	08	64	06	60	04	56	02	52	01	48	00	8
12	82	72	80	48	78	33	74	23	71	16	67	12	63	08	60	06	56	04	52	02	48	01	12
16	79	74	78	54	76	39	73	28	70	21	67	15	63	11	59	07	56	05	52	03	48	01	16
20	76	74	76	58	74	44	72	33	69	25	66	18	62	13	59	09	55	06	52	03	48	01	20
24	74	74	73	60	72	47	70	37	68	28	65	21	62	15	58	11	55	07	51	04	48	01	24
28	71	74	71	62	70	50	68	40	66	31	64	23	61	17	58	12	55	08	51	04	48	01	28
32	68	73	68	62	68	52	67	42	65	33	63	26	60	19	57	14	54	09	51	05	48	02	32
36	66	72	66	62	66	53	65	43	63	35	61	27	59	21	57	15	54	10	51	06	48	02	36
40	63	71	63	62	63	53	63	45	62	36	60	29	58	22	56	16	53	11	50	06	48	02	40
44	60	70	61	62	61	54	61	45	60	37	59	30	57	23	55	17	53	11	50	07	47	02	44
48	58	69	59	61	59	54	59	46	58	38	57	31	56	24	54	18	52	12	50	07	47	02	48
52	55	67	56	60	57	53	57	46	57	39	56	32	55	25	53	19	52	13	49	07	47	02	52
56	53	66	54	60	54	53	55	46	55	39	54	32	54	26	52	19	51	13	49	08	47	02	56
60	50	65	51	59	52	52	53	46	53	39	53	32	52	26	51	20	50	14	49	08	47	03	60
64	48	63	49	57	50	52	51	45	51	39	51	33	51	26	51	20	50	14	48	08	47	03	64
68	45	62	47	56	48	51	49	45	50	39	50	33	50	26	50	20	49	14	48	08	47	03	68
72	43	60	44	55	46	50	47	44	48	38	48	32	49	26	49	20	48	14	48	08	47	03	72
76	40	58	42	54	44	49	45	43	46	38	47	32	47	26	48	20	48	14	47	09	46	03	76
80	38	57	40	52	42	47	43	42	44	37	45	32	46	26	47	20	47	14	47	09	46	03	80
84	36	55	38	51	40	46	41	41	43	36	44	31	45	26	46	20	46	14	46	09	46	03	84
88	33	53	36	49	38	45	39	40	41	36	43	31	44	25	45	20	45	14	46	09	46	03	88
92	31	51	33	48	36	43	38	39	39	35	41	30	43	25	44	20	45	14	45	09	46	03	92
96	29	50	31	46	34	42	36	38	38	34	40	29	41	24	43	19	44	14	45	08	46	03	96
100	27	48	30	44	32	40	34	37	36	32	38	28	40	24	42	19	43	14	45	08	46	03	100
104	25	46	28	42	30	39	33	35	35	31	37	27	39	23	41	18	43	13	44	08	45	03	104
108	23	44	26	41	28	37	31	34	34	30	36	26	38	22	40	18	42	13	44	08	45	03	108
112	21	42	24	39	27	36	30	32	32	29	35	25	37	21	39	17	42	12	43	08	45	03	112
116	19	40	22	37	25	34	28	31	31	27	34	24	36	20	39	16	41	12	43	07	45	03	116
120	18	37	21	35	24	32	27	29	30	26	32	23	35	19	38	15	40	11	43	07	45	02	120
124	16	35	19	33	22	30	25	27	28	24	31	21	34	18	37	15	40	11	42	07	45	02	124
128	14	33	18	31	21	28	24	26	27	23	30	20	34	17	36	14	39	10	42	06	45	02	128
132	13	31	16	28	20	26	23	24	26	21	30	19	33	16	36	13	39	10	42	06	45	02	132
136	12	28	15	26	18	24	22	22	25	20	29	17	32	15	35	12	38	09	42	06	45	02	136
140	10	26	14	24	17	22	21	20	24	18	28	16	31	13	35	11	38	08	41	05	44	02	140
144	09	23	13	22	16	20	20	18	24	16	27	14	31	12	34	10	38	07	41	05	44	02	144
148	08	21	12	19	15	18	19	16	23	15	27	13	30	11	34	09	37	07	41	04	44	01	148
152	07	18	11	17	15	16	18	14	22	13	26	11	30	10	33	08	37	06	41	04	44	01	152
156	06	16	10	15	14	14	18	12	22	11	25	10	29	08	33	07	37	05	40	03	44	01	156
160	06	13	09	12	13	11	17	10	21	09	25	08	29	07	33	06	37	04	40	03	44	01	160
164	05	11	09	10	13	09	17	08	21	07	25	07	29	06	32	05	36	03	40	02	44	01	164
168	05	08	09	07	12	07	16	06	20	06	24	05	28	04	32	03	36	03	40	02	44	01	168
172	04	05	08	05	12	05	16	04	20	04	24	03	28	03	32	02	36	02	40	01	44	00	172
176	04	03	08	02	12	02	16	02	20	02	24	02	28	01	32	01	36	01	40	01	44	00	176
180	04	00	08	00	12	00	16	00	20	00	24	00	28	00	32	00	36	00	40	00	44	00	180
	48°		52°		56°		60°		64°		68°		72°		76°		80°		84°		88°		

16—11439

FIGURES IN ITALICS INDICATE THAT DECLINATION IS OF CONTRARY NAME TO LATITUDE

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Lat. 47°

H.A.	0° 00′			0° 30′			1° 00′			1° 30′			2° 00′			2° 30′			3° 00′			3° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	
00	43 00.0	1.0 01	180.0	43 30.0	1.0 01	180.0	44 00.0	1.0 01	180.0	44 30.0	1.0 01	180.0	45 00.0	1.0 01	180.0	45 30.0	1.0 01	180.0	46 00.0	1.0 01	180.0	46 30.0	1.0 01	180.0	00
1	42 59.5	1.0 02	178.6	43 29.5	1.0 02	178.6	43 59.5	1.0 02	178.6	44 29.5	1.0 02	178.6	44 59.5	1.0 03	178.6	45 29.5	1.0 03	178.6	45 59.5	1.0 03	178.6	46 29.5	1.0 03	178.6	1
2	42 58.9	1.0 04	177.3	43 28.9	1.0 04	177.2	43 58.9	1.0 04	177.2	44 28.9	1.0 04	177.2	44 58.9	1.0 04	177.2	45 28.9	1.0 04	177.2	45 57.9	1.0 04	177.1	46 27.9	1.0 04	177.1	2
3	42 55.6	1.0 06	175.9	43 25.6	1.0 06	175.9	43 55.5	1.0 06	175.8	44 25.5	1.0 06	175.8	44 55.5	1.0 06	175.8	45 25.4	1.0 06	175.7	45 55.4	1.0 06	175.7	46 25.3	1.0 06	175.7	3
4	42 52.2	1.0 07	174.5	43 22.1	1.0 07	174.5	43 52.1	1.0 07	174.4	44 22.0	1.0 07	174.4	44 51.9	1.0 08	174.4	45 21.9	1.0 08	174.3	45 51.8	1.0 08	174.3	46 21.7	1.0 08	174.2	4
05	42 47.8	1.0 09	173.2	43 17.7	1.0 09	173.1	43 47.6	1.0 09	173.1	44 17.5	1.0 09	173.0	44 47.4	1.0 09	172.9	45 17.3	1.0 09	172.9	45 47.2	1.0 09	172.8	46 17.1	1.0 09	172.8	05
6	42 42.5	1.0 10	171.8	43 12.3	1.0 11	171.8	43 42.2	1.0 11	171.7	44 12.0	1.0 11	171.6	44 41.9	99 11	171.5	45 11.7	99 11	171.5	45 41.6	99 11	171.4	46 11.4	99 11	171.3	6
7	42 36.2	99 12	170.5	43 06.0	99 12	170.4	43 35.8	99 12	170.3	44 05.6	99 12	170.2	44 35.4	99 12	170.2	45 05.2	99 13	170.1	45 35.0	99 13	170.0	46 04.8	99 13	169.9	7
8	42 28.9	99 14	169.1	42 58.7	99 14	169.0	43 28.4	99 14	168.9	43 58.2	99 14	168.9	44 27.9	99 14	168.8	44 57.6	99 14	168.7	45 27.4	99 14	168.6	45 57.1	99 14	168.5	8
9	42 20.7	99 15	167.8	42 50.4	99 15	167.7	43 20.1	99 15	167.6	43 49.8	99 16	167.5	44 19.4	99 16	167.4	44 49.1	99 16	167.3	45 18.8	99 16	167.2	45 48.4	99 16	167.1	9
10	42 11.6	99 17	166.4	42 41.2	99 17	166.3	43 10.8	99 17	166.2	43 40.4	99 17	166.1	44 10.0	99 17	166.0	44 39.6	99 17	165.9	45 09.2	99 18	165.8	45 38.8	99 18	165.6	10
1	42 01.6	98 18	165.1	42 31.1	98 18	165.0	43 00.6	98 19	164.9	43 30.1	98 19	164.8	43 59.6	98 19	164.6	44 29.1	98 19	164.5	44 58.6	98 19	164.4	45 28.1	98 19	164.2	1
2	41 50.6	98 20	163.8	42 20.0	98 20	163.7	42 49.5	98 20	163.5	43 18.9	98 20	163.4	43 48.3	98 20	163.3	44 17.7	98 21	163.1	44 47.1	98 21	163.0	45 16.5	98 21	162.8	2
3	41 38.7	98 21	162.5	42 08.1	98 21	162.3	42 37.4	98 22	162.2	43 06.8	98 22	162.1	43 36.1	98 22	161.9	44 05.4	98 22	161.8	44 34.7	98 22	161.6	45 04.0	98 22	161.5	3
4	41 26.0	98 23	161.2	41 55.2	98 23	161.0	42 24.5	97 23	160.9	42 53.7	97 23	160.7	43 22.9	97 23	160.6	43 52.1	97 24	160.4	44 21.3	97 24	160.3	44 50.5	97 24	160.1	4
15	41 12.3	97 24	159.9	41 41.5	97 24	159.7	42 10.6	97 25	159.6	42 39.8	97 25	159.4	43 08.9	97 25	159.2	43 38.0	97 25	159.1	44 07.1	97 25	158.9	44 36.1	97 26	158.7	15
6	40 57.8	97 26	158.6	41 26.9	97 26	158.4	41 55.9	97 26	158.3	42 24.9	97 26	158.1	42 53.9	97 26	157.9	43 22.9	97 27	157.7	43 51.9	97 27	157.6	44 20.8	96 27	157.4	6
7	40 42.5	96 27	157.3	41 11.4	96 27	157.1	41 40.3	96 27	157.0	42 09.2	96 28	156.8	42 38.1	96 28	156.6	43 07.0	96 28	156.4	43 35.8	96 28	156.2	44 04.6	96 28	156.0	7
8	40 26.3	96 28	156.0	40 55.1	96 29	155.9	41 23.9	96 29	155.7	41 52.7	96 29	155.5	42 21.4	96 29	155.3	42 50.2	96 29	155.1	43 18.9	96 30	154.9	43 47.6	96 30	154.7	8
9	40 09.2	96 30	154.8	40 37.9	96 30	154.6	41 06.6	96 30	154.4	41 35.3	95 30	154.2	42 03.9	95 31	154.0	42 32.5	95 31	153.8	43 01.1	96 31	153.6	43 29.7	96 31	153.4	9
20	39 51.4	95 31	153.5	40 20.0	95 31	153.3	40 48.5	95 31	153.1	41 17.0	95 32	152.9	41 45.6	95 32	152.7	42 14.0	95 32	152.5	42 42.5	95 32	152.3	43 10.9	95 33	152.1	20
1	39 32.8	95 32	152.3	40 01.2	95 33	152.1	40 29.6	95 33	151.9	40 58.0	95 33	151.7	41 26.4	95 33	151.5	41 54.8	94 33	151.2	42 23.1	94 34	151.0	42 51.4	94 34	150.8	1
2	39 13.4	94 34	151.1	39 41.7	94 34	150.9	40 10.0	94 34	150.7	40 38.2	94 34	150.4	41 06.5	94 35	150.2	41 34.7	94 35	150.0	42 02.9	94 35	149.8	42 31.0	94 35	149.5	2
3	38 53.2	94 35	149.9	39 21.4	94 35	149.6	39 49.5	94 35	149.4	40 17.7	94 36	149.2	40 45.7	94 36	149.0	41 13.8	94 36	148.7	41 41.9	93 36	148.5	42 09.9	93 37	148.3	3
4	38 32.3	94 36	148.7	39 00.3	93 36	148.4	39 28.3	93 37	148.2	39 56.3	93 37	148.0	40 24.3	93 37	147.7	40 52.2	93 37	147.5	41 20.1	93 38	147.3	41 48.0	93 38	147.0	4
25	38 10.7	93 37	147.5	38 38.6	93 38	147.2	39 06.4	93 38	147.0	39 34.3	93 38	146.8	40 02.1	93 38	146.5	40 29.8	93 38	146.3	40 57.6	92 39	146.0	41 25.3	92 39	145.8	25
6	37 48.3	93 38	146.3	38 16.1	92 39	146.1	38 43.8	92 39	145.8	39 11.5	92 39	145.6	39 39.1	92 39	145.3	40 06.8	92 40	145.1	40 34.4	92 40	144.8	41 01.9	92 40	144.5	6
7	37 25.3	92 40	145.1	37 52.9	92 40	144.9	38 20.4	92 40	144.6	38 48.0	92 40	144.4	39 15.5	92 41	144.1	39 43.0	92 41	143.9	40 10.4	91 41	143.6	40 37.8	91 41	143.3	7
8	37 01.5	92 41	144.0	37 29.0	91 41	143.7	37 56.4	91 41	143.5	38 23.8	91 41	143.2	38 51.2	91 42	143.0	39 18.5	91 42	142.7	39 45.8	91 42	142.4	40 13.1	91 42	142.1	8
9	36 37.1	91 42	142.8	37 04.5	91 42	142.6	37 31.7	91 42	142.3	37 59.0	91 42	142.1	38 26.2	91 43	141.8	38 53.4	91 43	141.5	39 20.5	90 43	141.2	39 47.6	90 43	141.0	9
30	36 12.1	91 43	141.7	36 39.3	91 43	141.4	37 06.4	90 43	141.2	37 33.5	90 44	140.9	38 00.6	90 44	140.6	38 27.6	90 44	140.4	38 54.6	90 44	140.1	39 21.5	90 45	139.8	30
1	35 46.4	90 44	140.6	36 13.5	90 44	140.3	36 40.4	90 44	140.1	37 07.4	90 45	139.8	37 34.3	90 45	139.5	38 01.2	90 45	139.2	38 28.0	89 45	138.9	38 54.8	89 46	138.6	1
2	35 20.1	90 45	139.5	35 47.0	90 45	139.2	36 13.9	89 45	138.9	36 40.7	89 46	138.7	37 07.4	89 46	138.4	37 34.1	89 46	138.1	38 00.8	89 46	137.8	38 27.5	89 47	137.5	2
3	34 53.3	89 46	138.4	35 20.0	89 46	138.1	35 46.7	89 46	137.8	36 13.3	89 47	137.6	36 40.0	89 47	137.3	37 06.5	88 47	137.0	37 33.0	88 47	136.7	37 59.5	88 48	136.4	3
4	34 25.8	89 47	137.3	34 52.4	89 47	137.0	35 18.9	88 47	136.7	35 45.4	88 47	136.5	36 11.9	88 48	136.2	36 38.3	88 48	135.9	37 04.7	88 48	135.6	37 31.0	88 48	135.3	4
35	33 57.8	88 48	136.2	34 24.2	88 48	136.0	34 50.6	88 48	135.7	35 17.0	88 48	135.4	35 43.3	88 49	135.1	36 09.5	87 49	134.8	36 35.8	87 49	134.5	37 01.9	87 49	134.2	35
6	33 29.2	88 48	135.2	33 55.5	88 49	134.9	34 21.8	87 49	134.6	34 48.0	87 49	134.3	35 14.1	87 49	134.0	35 40.2	87 50	133.7	36 06.3	87 50	133.4	36 32.3	87 50	133.1	6
7	33 00.1	87 49	134.1	33 26.3	87 50	133.9	33 52.4	87 50	133.6	34 18.4	87 50	133.3	34 44.4	87 50	133.0	35 10.4	86 51	132.6	35 36.3	86 51	132.3	36 02.2	86 51	132.0	7
8	32 30.5	87 50	133.1	32 56.5	87 50	132.8	33 22.4	86 51	132.5	33 48.4	86 51	132.2	34 14.2	86 51	131.9	34 40.0	86 51	131.6	35 05.8	86 52	131.3	35 31.5	86 52	131.0	8
9	32 00.4	86 51	132.1	32 26.2	86 51	131.8	32 52.0	86 51	131.5	33 17.8	86 52	131.2	33 43.5	86 52	130.9	34 09.2	86 52	130.6	34 34.8	85 52	130.2	35 00.4	85 53	129.9	9
40	31 29.8	86 52	131.1	31 55.5	86 52	130.8	32 21.1	85 52	130.5	32 46.8	85 52	130.2	33 12.3	85 53	129.8	33 37.9	85 53	129.5	34 03.4	85 53	129.2	34 28.8	85 53	128.9	40
1	30 58.7	85 53	130.1	31 24.3	85 53	129.8	31 49.8	85 53	129.5	32 15.3	85 53	129.1	32 40.7	85 54	128.8	33 06.1	85 54	128.5	33 31.4	84 54	128.2	33 56.7	84 54	127.9	1
2	30 27.1	85 53	129.1	30 52.6	85 54	128.8	31 18.0	85 54	128.5	31 43.3	84 54	128.2	32 08.6	84 54	127.8	32 33.8	84 54	127.5	32 59.0	84 55	127.2	33 24.2	84 55	126.9	2
3	29 55.2	84 54	128.1	30 20.5	84 54	127.8	30 45.7	84 54	127.5	31 10.9	84 55	127.2	31 36.1	84 55	126.8	32 01.2	84 55	126.5	32 26.2	83 55	126.2	32 51.2	83 56	125.9	3
4	29 22.8	84 55	127.1	29 47.9	84 55	126.8	30 13.0	84 55	126.5	30 38.1	83 55	126.2	31 03.1	83 56	125.9	31 28.1	83 56	125.5	31 53.0	83 56	125.2	32 17.9	83 56	124.9	4
45	28 49.9	83 55	126.2	29 15.0	83 56	125.9	29 39.9	83 56	125.5	30 04.9	83 56	125.2	30 29.8	83 56	124.9	30 54.6	83 56	124.6	31 19.4	83 57	124.2	31 44.1	82 57	123.9	45
6	28 16.7	83 56	125.2	28 41.6	83 56	124.9	29 06.4	83 56	124.6	29 31.2	83 57	124.3	29 56.0	82 57	123.9	30 20.7	82 57	123.6	30 45.4	82 57	123.3	31 10.0	82 58	123.0	6
7	27 43.1	83 57	124.3	28 07.8	82 57	124.0	28 32.6	82 57	123.7	28 57.2	82 57	123.3	29 21.9	82 58	123.0	29 46.4	82 58	122.7	30 11.0	82 58	122.3	30 35.4	81 58	122.0	7
8	27 00.1	82 57	123.4	27 33.7	82 57	123.0	27 58.3	82 58	122.7	28 22.9	82 58	122.4	28 47.4	82 58	122.1	29 11.8	81 58	121.7	29 36.2	81 58	121.4	30 00.6	81 59	121.1	8
9	26 34.7	82 58	122.4	26 59.3	82 58	122.1	27 23.7	81 58	121.8	27 48.1	81 58	121.5	28 12.5	81 59	121.1	28 36.8	81 59	120.8	29 01.1	81 59	120.5	29 25.3	81 59	120.1	9
50	26 00.0	81 58	121.5	26 24.4	81 59	121.2	26 48.8	81 59	120.9	27 13.1	81 59	120.6	27 37.3	81 59	120.2	28 01.5	81 59	119.9	28 25.7	80 60	119.6	28 49.8	80 60	119.2	50
1	25 25.0	81 59	120.6	25 49.3	81 59	120.3	26 13.5	81 59	120.0	26 37.7	81 60	119.7	27 01.8	80 60	119.3	27 25.9	80 60	119.0	27 49.9	80 60	118.6	28 13.9	80 60	118.3	1
2	24 49.6	81 59	119.7	25 13.8	80 60	119.4	25 37.9	80 60	119.1	26 01.9	80 60	118.8	26 26.0	80 60	118.4	26 49.9	80 60	118.1	27 13.9	80 61	117.7	27 37.7	79 61	117.4	2
3	24 13.9	80 60	118.9	24 38.0	80 60	118.5	25 02.0	80 60	118.2	25 25.9	80 61	117.9	25 49.8	80 61	117.5	26 13.7	79 61	117.2	26 37.5	79 61	116.9	27 01.3	79 61	116.5	3
4	23 38.0	80 60	118.0	24 01.9	80 61	117.7	24 25.8	80 61	117.3	24 49.6	79 61	117.0	25 13.4	79 61	116.7	25 37.2	79 61	116.3	26 00.9	79 62	116.0	26 24.5	79 62	115.6	4
55	23 01.7	79 61	117.1	23 25.5	79 61	116.8	23 49.3	79 61	116.5	24 13.0	79 61	116.1	24 36.7	79 62	115.8	25 00.3	79 62	115.4	25 23.9	79 62	115.1	25 47.5	78 62	114.8	55
6	22 25.1	79 61	116.3	22 48.8	79 62	115.9	23 12.5	79 62	115.6	23 36.1	79 62	115.3	23 59.7	79 62	114.9	24 23.3	78 62	114.6	24 46.8	78 62	114.2	25 10.2	78 63	113.9	6
7	21 48.3	79 62	115.4	22 11.9	79 62	115.1	22 35.5	78 62	114.7	22 59.0	78 62	114.4	23 22.5	78 62	114.1	23 45.9	78 63	113.7	24 09.3	78 63	113.4	24 32.7	78 63	113.0	7
8	21 11.2	78 62	114.6	21 34.7	78 62	114.2	21 58.2	78 63	113.9	22 21.6	78 63	113.6	22 45.0	78 63	113.2	23 08.3	78 63	112.9	23 31.6	78 63	112.5	23 54.9	77 63	112.2	8
9	20 33.8	78 63	113.7	20 57.3	78 63	113.4	21 20.6	78 63	113.1	21 44.0	78 63	112.7	22 07.3	78 63	112.4	22 30.5	77 63	112.0	22 53.7	77 64	111.7	23 16.9	77 64	111.3	9
60	19 56.3	78 63	112.9	20 19.6	78 63	112.6	20 42.9	78 63	112.2	21 06.1	77 63	111.9	21 29.3	77 64	111.5	21 52.5	77 64	111.2	22 15.6	77 64	110.9	22 38.7	77 64	110.5	60
1	19 18.5	77 63	112.1	19 41.7	77 64	111.7	20 04.9	77 64	111.4	20 28.0	77 64	111.1	20 51.1	77 64	110.7	21 14.2	77 64	110.4	21 37.2	77 64	110.0	22 00.2	77 64	109.7	1
2	18 40.4	77 64	111.2	19 03.6	77 64	110.9	19 26.7	77 64	110.6	19 49.7	77 64	110.2	20 12.8	77 64	109.9	20 35.8	77 64	109.6	20 58.7	76 65	109.2	21 21.6	76 65	108.9	2
3	18 02.2	77 64	110.4	18 25.2	77 64	110.1	18 48.3	77 64	109.8	19 11.2	77 64	109.4	19 34.2	76 65	109.1	19 57.1	76 65	108.7	20 20.0	76 65	108.4	20 42.8	76 65	108.0	3
4	17 23.7	77 64	109.6	17 46.7	77 65	109.3	18 09.7	76 65	109.0	18 32.6	76 65	108.6	18 55.4	76 65	108.3	19 18.3	76 65	107.9	19 41.0	76 65	107.6	20 03.8	76 65	107.2	4
65	16 45.1	76 65	108 8	17 08.0	76 65	108.5	17 30.9	76 65	108.2	17 53.7	76 65	107.8	18 16.5	76 65	107.5	18 39.2	76 65	107.1	19 02.0	76 65	106.8	19 24.6	76 66	106.4	65
6	16 06.3	76 65	108.0	16 29.1	76 65	107.7	16 51.9	76 65	107.4	17 14.6	76 65	107.0	17 37.4	76 65	106.7	18 00.1	76 66	106.3	18 22.7	75 66	106.0	18 45.3	75 66	105.6	6
7	15 27.3	76 65	107.2	15 50.0	76 65	106.9	16 12.8	76 66	106.6	16 35.4	76 66	106.2	16 58.1	75 66	105.9	17 20.7	75 66	105.5	17 43.3	75 66	105.2	18 05.8	75 66	104.8	7
8	14 48.1	76 66	106.5	15 10.8	76 66	106.1	15 33.5	75 66	105.8	15 56.1	75 66	105.4	16 18.7	75 66	105.1	16 41.2	75 66	104.8	17 03.7	75 66	104.4	17 26.2	75 66	104.1	8
9	14 08.8	75 66	105.7	14 31.4	75 66	105.3	14 54.0	75 66	105.0	15 16.6	75 66	104.7	15 39.1	75 66	104.3	16 01.6	75 66	104.0	16 24.0	75 66	103.6	16 46.4	75 66	103.3	9
70	13 29.3	75 66	104.9	13 51.9	75 66	104.6	14 14.4	75 66	104.2	14 36.9	75 66	103.9	14 59.4	75 66	103.5	15 21.8	75 66	103.2	15 44.2	75 67	102.9	16 06.6	75 67	102.5	70
1	12 49.7	75 66	104.1	13 12.2	75 66	103.8	13 34.7	75 66	103.5	13 57.1	75 66	103.1	14 19.5	75 67	102.8	14 41.9	75 67	102.4	15 04.2	74 67	102.1	15 26.5	74 67	101.7	1
2	12 10.0	75 66	103.4	12 32.4	75 67	103.0	12 54.8	75 67	102.7	13 17.2	75 67	102.3	13 39.5	74 67	102.0	14 01.9	74 67	101.7	14 24.2	74 67	101.3	14 46.4	74 67	101.0	2
3	11 30.1	75 67	102.6	11 52.5	75 67	102.3	12 14.8	74 67	101.9	12 37.2	74 67	101.6	12 59.5	74 67	101.2	13 21.7	74 67	100.9	13 44.0	74 67	100.5	14 06.2	74 67	100.2	3
4	10 50.1	74 67	101.8	11 12.4	74 67	101.5	11 34.7	74 67	101.2	11 57.0	74 67	100.8	12 19.3	74 67	100.5	12 41.5	74 67	100.1	13 03.7	74 67	99.8	13 25.9	74 67	99.4	4
75	10 10.0	74 67	101.1	10 32.3	74 67	100.7	10 54.5	74 67	100.4	11 16.8	74 67	100.1	11 39.0	74 67	99.7	12 01.2	74 67	99.4	12 23.3	74 67	99.0	12 45.5	74 68	98.7	75
6	9 29.8	74 67	100.3	9 52.0	74 67	100.0	10 14.3	74 67	99.7	10 36.4	74 67	99.3	10 58.6	74 67	99.0	11 20.8	74 68	98.6	11 42.9	74 68	98.3	12 05.0	74 68	97.9	6
7	8 49.5	74 67	99.6	9 11.7	74 67	99.2	9 33.9	74 67	98.9	9 56.0	74 68	98.6	10 18.2	74 68	98.2	10 40.3	74 68	97.9	11 02.4	74 68	97.5	11 24.4	74 68	97.2	7
8	8 09.1	74 67	98.8	8 31.3	74 68	98.5	8 53.4	74 68	98.2	9 15.5	74 68	97.8	9 37.6	74 68	97.5	9 59.7	74 68	97.1	10 21.8	73 68	96.8	10 43.8	73 68	96.4	8
9	7 28.6	74 68	98.1	7 50.8	74 68	97.8	8 12.9	74 68	97.4	8 34.9	74 68	97.1	8 57.0	74 68	96.7	9 19.1	73 68	96.4	9 41.1	73 68	96.0	10 03.1	73 68	95.7	9
80	6 48.1	74 68	97.3	7 10.2	74 68	97.0	7 32.2	74 68	96.7	7 54.3	73 68	96.3	8 16.3	73 68	96.0	8 38.4	73 68	95.6	9 00.4	73 68	95.3	9 22.4	73 68	95.0	80
1	6 07.5	74 68	96.6	6 29.5	74 68	96.3	6 51.6	73 68	95.9	7 13.6	73 68	95.6	7 35.6	73 68	95.2	7 57.6	73 68	94.9	8 19.6	73 68	94.6	8 41.6	73 68	94.2	1
2	5 26.8	73 68	95.9	5 48.8	73 68	95.5	6 10.8	73 68	95.2	6 32.9	73 68	94.8	6 54.8	73 68	94.5	7 16.8	73 68	94.2	7 38.8	73 68	93.8	8 00.7	73 68	93.5	2
3				5 08.1	73 68	94.8	5 30.1	73 68	94.4	5 52.1	73 68	94.1	6 14.0	73 68	93.8	6 36.0	73 68	93.4	6 57.9	73 68	93.1	7 19.9	73 68	92.7	3
4										5 11.2	73 68	93.4	5 33.2	73 68	93.0	5 55.1	73 68	92.7	6 17.1	73 68	92.3	6 39.0	73 68	92.0	4
85																5 14.3	73 68	92.0	5 36.2	73 68	91.6	5 58.1	73 68	91.3	85
6																						5 17.2	73 68	90.5	6

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H.A.	0° 00′			0° 30′			1° 00′			1° 30′			2° 00′			2° 30′			3° 00′			3° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		°
00	43 00.0	1.0 01	180.0	42 30.0	1.0 01	180.0	42 00.0	1.0 01	180.0	41 30.0	1.0 01	180.0	41 00.0	1.0 01	180.0	40 30.0	1.0 01	180.0	40 00.0	1.0 01	180.0	39 30.0	1.0 01	180.0	00
1	42 59.5	1.0 02	178.6	42 29.5	1.0 02	178.6	41 59.5	1.0 02	178.7	41 29.5	1.0 02	178.7	40 59.5	1.0 02	178.7	40 29.5	1.0 02	178.7	39 59.5	1.0 02	178.7	39 29.5	1.0 02	178.7	1
2	42 58.0	1.0 04	177.3	42 28.1	1.0 04	177.3	41 58.1	1.0 04	177.3	41 28.1	1.0 04	177.3	40 58.1	1.0 04	177.4	40 28.1	1.0 04	177.4	39 58.1	1.0 04	177.4	39 28.2	1.0 04	177.4	2
3	42 55.6	1.0 06	175.9	42 25.6	1.0 06	175.9	41 55.7	1.0 06	176.0	41 25.7	1.0 06	176.0	40 55.7	1.0 06	176.0	40 25.8	1.0 05	176.1	39 55.8	1.0 05	176.1	39 25.8	1.0 05	176.1	3
4	42 52.2	1.0 07	174.5	42 22.3	1.0 07	174.6	41 52.3	1.0 07	174.6	41 22.4	1.0 07	174.7	40 52.4	1.0 07	174.7	40 22.5	1.0 07	174.8	39 52.6	1.0 07	174.8	39 22.6	1.0 07	174.8	4
05	42 47.8	1.0 09	173.2	42 17.9	1.0 09	173.2	41 48.0	1.0 09	173.3	41 18.1	1.0 09	173.3	40 48.2	1.0 09	173.4	40 18.3	1.0 09	173.4	39 48.4	1.0 08	173.5	39 18.5	1.0 08	173.5	05
6	42 42.5	1.0 10	171.8	42 12.6	1.0 10	171.9	41 42.8	1.0 10	172.0	41 12.9	1.0 10	172.0	40 43.0	1.0 10	172.1	40 13.2	1.0 10	172.1	39 43.3	1.0 10	172.2	39 13.4	1.0 10	172.3	6
7	42 36.2	99 12	170.5	42 06.4	99 12	170.5	41 36.6	99 12	170.6	41 06.7	99 12	170.7	40 36.9	99 12	170.8	40 07.1	99 12	170.8	39 37.3	99 12	170.9	39 07.5	99 11	171.0	7
8	42 28.9	99 14	169.1	41 59.2	99 14	169.2	41 29.4	99 13	169.3	40 59.7	99 13	169.4	40 29.9	99 13	169.5	40 00.1	99 13	169.5	39 30.4	99 13	169.6	39 00.6	99 13	169.7	8
9	42 20.7	99 15	167.8	41 51.1	99 15	167.9	41 21.4	99 15	168.0	40 51.7	99 15	168.1	40 22.0	99 15	168.2	39 52.3	99 15	168.2	39 22.5	99 15	168.3	38 52.8	99 14	168.4	9
10	42 11.6	99 17	166.4	41 42.0	99 17	166.6	41 12.4	99 16	166.7	40 42.7	99 16	166.8	40 13.1	99 16	166.9	39 43.5	99 16	167.0	39 13.8	99 16	167.1	38 44.2	99 16	167.2	10
1	42 01.6	98 18	165.1	41 32.0	98 18	165.2	41 02.5	99 18	165.3	40 32.9	99 18	165.5	40 03.4	99 18	165.6	39 33.8	99 18	165.7	39 04.2	99 17	165.8	38 34.6	99 17	165.9	1
2	41 50.6	98 20	163.8	41 21.1	98 20	163.9	40 51.7	98 20	164.0	40 22.2	98 19	164.2	39 52.7	98 19	164.3	39 23.2	98 19	164.4	38 53.7	98 19	164.5	38 24.2	98 19	164.6	2
3	41 38.7	98 21	162.5	41 09.4	98 21	162.6	40 40.0	98 21	162.8	40 10.6	98 21	162.9	39 41.2	98 21	163.0	39 11.8	98 20	163.1	38 42.4	98 20	163.3	38 13.0	98 20	163.4	3
4	41 26.0	98 23	161.2	40 56.7	98 23	161.3	40 27.4	98 22	161.5	39 58.1	98 22	161.6	39 28.8	98 22	161.7	38 59.5	98 22	161.9	38 30.2	98 22	162.0	38 00.9	98 22	162.2	4
15	41 12.3	97 24	159.9	40 43.2	97 24	160.0	40 14.0	97 24	160.2	39 44.8	97 24	160.3	39 15.6	97 23	160.5	38 46.4	97 23	160.6	38 17.1	97 23	160.8	37 47.9	97 23	160.9	15
6	40 57.8	97 26	158.6	40 28.8	97 25	158.8	39 59.7	97 25	158.9	39 30.6	97 25	159.1	39 01.5	97 25	159.2	38 32.4	97 25	159.4	38 03.2	97 25	159.5	37 34.1	97 24	159.7	6
7	40 42.5	96 27	157.3	40 13.5	97 27	157.5	39 44.5	97 27	157.7	39 15.6	97 26	157.8	38 46.6	97 26	158.0	38 17.6	97 26	158.2	37 48.5	97 26	158.3	37 19.5	97 26	158.5	7
8	40 26.3	96 28	156.0	39 57.4	96 28	156.2	39 28.6	96 28	156.4	38 59.7	96 28	156.6	38 30.8	96 28	156.8	38 01.9	96 27	156.9	37 33.0	96 27	157.1	37 04.1	96 27	157.3	8
9	40 09.2	96 30	154.8	39 40.5	96 30	155.0	39 11.8	96 29	155.2	38 43.0	96 29	155.3	38 14.3	96 29	155.5	37 45.5	96 29	155.7	37 16.7	96 29	155.9	36 47.9	96 28	156.1	9
20	39 51.4	95 31	153.5	39 22.8	95 31	153.7	38 54.2	95 31	153.9	38 25.6	95 30	154.1	37 56.9	96 30	154.3	37 28.3	96 30	154.5	36 59.6	96 30	154.7	36 30.9	96 30	154.9	20
1	39 32.8	95 32	152.3	39 04.3	95 32	152.5	38 35.8	95 32	152.7	38 07.3	95 32	152.9	37 38.8	95 32	153.1	37 10.2	95 31	153.3	36 41.7	95 31	153.5	36 13.1	95 31	153.7	1
2	39 13.4	94 34	151.1	38 45.0	94 33	151.3	38 16.7	95 33	151.5	37 48.3	95 33	151.7	37 19.9	95 33	151.9	36 51.5	95 33	152.1	36 23.0	95 32	152.3	35 54.6	95 32	152.5	2
3	38 53.2	94 35	149.9	38 25.0	94 35	150.1	37 56.8	94 34	150.3	37 28.5	94 34	150.5	37 00.3	94 34	150.7	36 32.0	94 34	150.9	36 03.7	94 34	151.1	35 35.3	94 33	151.3	3
4	38 32.3	94 36	148.7	38 04.2	94 36	148.9	37 36.1	94 36	149.1	37 08.0	94 35	149.3	36 39.9	94 35	149.6	36 11.7	94 35	149.8	35 43.5	94 35	150.0	35 15.3	94 34	150.2	4
25	38 10.7	93 37	147.5	37 42.7	93 37	147.7	37 14.8	93 37	147.9	36 46.8	93 37	148.2	36 18.8	93 36	148.4	35 50.8	93 36	148.6	35 22.7	94 36	148.8	34 54.6	94 36	149.0	25
6	37 48.3	93 38	146.3	37 20.5	93 38	146.5	36 52.7	93 38	146.8	36 24.9	93 38	147.0	35 57.0	93 37	147.2	35 29.1	93 37	147.5	35 01.2	93 37	147.7	34 33.2	93 37	147.9	6
7	37 25.3	92 40	145.1	36 57.6	92 39	145.4	36 29.9	92 39	145.6	36 02.2	92 39	145.9	35 34.5	92 39	146.1	35 06.8	93 38	146.3	34 39.0	93 38	146.6	34 11.2	93 38	146.8	7
8	37 01.5	92 41	144.0	36 34.0	92 40	144.2	36 06.5	92 40	144.5	35 38.9	92 40	144.7	35 11.4	92 40	145.0	34 43.7	92 39	145.2	34 16.1	92 39	145.4	33 48.4	92 39	145.7	8
9	36 37.1	91 42	142.8	36 09.8	91 42	143.1	35 42.4	91 41	143.3	35 15.0	91 41	143.6	34 47.5	92 41	143.8	34 20.1	92 41	144.1	33 52.6	92 40	144.3	33 25.0	92 40	144.6	9
30	36 12.1	91 43	141.7	35 44.9	91 43	142.0	35 17.6	91 42	142.2	34 50.4	91 42	142.5	34 23.1	91 42	142.7	33 55.7	91 42	143.0	33 28.4	91 41	143.2	33 01.0	91 41	143.5	30
1	35 46.4	90 44	140.6	35 19.4	90 44	140.9	34 52.3	90 43	141.1	34 25.1	90 43	141.4	33 58.0	91 43	141.6	33 30.8	91 43	141.9	33 03.6	91 42	142.1	32 36.3	91 42	142.4	1
2	35 20.1	90 45	139.5	34 53.2	90 45	139.8	34 26.3	90 44	140.0	33 59.3	90 44	140.3	33 32.3	90 44	140.6	33 05.2	90 44	140.8	32 38.2	90 43	141.1	32 11.0	90 43	141.3	2
3	34 53.3	89 46	138.4	34 26.5	89 46	138.7	33 59.7	89 45	138.9	33 32.9	90 45	139.2	33 06.0	90 45	139.5	32 39.1	90 45	139.7	32 12.1	90 44	140.0	31 45.2	90 44	140.3	3
4	34 25.8	89 47	137.3	33 59.2	89 46	137.6	33 32.5	89 46	137.9	33 05.8	89 46	138.1	32 39.1	89 46	138.4	32 12.4	89 46	138.7	31 45.6	89 45	138.9	31 18.7	89 45	139.2	4
35	33 57.8	88 48	136.2	33 31.3	88 47	136.5	33 04.8	88 47	136.8	32 38.3	89 47	137.1	32 11.7	89 47	137.4	31 45.1	89 46	137.6	31 18.4	89 46	137.9	30 51.7	89 46	138.2	35
6	33 29.2	88 48	135.2	33 02.9	88 48	135.5	32 36.5	88 48	135.8	32 10.1	88 48	136.0	31 43.7	88 48	136.3	31 17.2	88 47	136.6	30 50.7	88 47	136.9	30 24.1	89 47	137.1	6
7	33 00.1	87 49	134.1	32 33.9	87 49	134.4	32 07.7	87 49	134.7	31 41.5	88 49	135.0	31 15.2	88 48	135.3	30 48.8	88 48	135.6	30 22.5	88 48	135.8	29 56.0	88 48	136.1	7
8	32 30.5	87 50	133.1	32 04.5	87 50	133.4	31 38.4	87 50	133.7	31 12.3	87 50	134.0	30 46.1	87 49	134.3	30 19.9	87 49	134.6	29 53.7	87 49	134.8	29 27.4	88 49	135.1	8
9	32 00.4	86 51	132.1	31 34.5	86 51	132.4	31 08.5	87 51	132.7	30 42.6	87 50	133.0	30 16.6	87 50	133.3	29 50.5	87 50	133.5	29 24.4	87 50	133.8	28 58.3	87 49	134.1	9
40	31 29.8	86 52	131.1	31 04.0	86 52	131.4	30 38.2	86 51	131.7	30 12.4	86 51	132.0	29 46.5	86 51	132.3	29 20.6	86 51	132.5	28 54.7	87 50	132.8	28 28.7	87 50	133.1	40
1	30 58.7	85 53	130.1	30 33.1	85 52	130.4	30 07.4	86 52	130.7	29 41.7	86 52	131.0	29 16.0	86 52	131.3	28 50.2	86 51	131.6	28 24.4	86 51	131.9	27 58.6	86 51	132.1	1
2	30 27.1	85 53	129.1	30 01.7	85 53	129.4	29 36.2	85 53	129.7	29 10.6	85 53	130.0	28 45.0	85 52	130.3	28 19.4	86 52	130.6	27 53.7	86 52	130.9	27 28.0	86 52	131.2	2
3	29 55.2	84 54	128.1	29 29.8	85 54	128.4	29 04.5	85 54	128.7	28 39.0	85 53	129.0	28 13.6	85 53	129.3	27 48.1	85 53	129.6	27 22.5	85 53	129.9	26 57.0	85 52	130.2	3
4	29 22.8	84 55	127.1	28 57.6	84 54	127.4	28 32.3	84 54	127.8	28 07.0	84 54	128.1	27 41.7	84 54	128.4	27 16.3	85 54	128.7	26 50.9	85 53	129.0	26 25.5	85 53	129.3	4
45	28 49.9	83 55	126.2	28 24.9	84 55	126.5	27 59.8	84 55	126.8	27 34.6	84 55	127.1	27 09.4	84 55	127.4	26 44.2	84 54	127.7	26 18.9	84 54	128.0	25 53.6	84 54	128.3	45
6	28 16.7	83 56	125.2	27 51.8	83 56	125.5	27 26.8	83 56	125.9	27 01.8	83 55	126.2	26 36.7	84 55	126.5	26 11.6	84 55	126.8	25 46.5	84 55	127.1	25 21.3	84 55	127.4	6
7	27 43.1	83 57	124.3	27 18.3	83 56	124.6	26 53.4	83 56	124.9	26 28.5	83 56	125.2	26 03.6	83 56	125.5	25 38.6	83 56	125.9	25 13.6	83 55	126.2	24 48.6	84 55	126.5	7
8	27 09.1	82 57	123.4	26 44.4	82 57	123.7	26 19.7	82 57	124.0	25 54.9	83 57	124.3	25 30.1	83 56	124.6	25 05.3	83 56	124.9	24 40.4	83 56	125.2	24 15.5	83 56	125.6	8
9	26 34.7	82 58	122.4	26 10.2	82 58	122.8	25 45.6	82 57	123.1	25 20.9	82 57	123.4	24 56.3	82 57	123.7	24 31.6	82 57	124.0	24 06.8	83 57	124.3	23 42.0	83 56	124.6	9
50	26 00.0	81 58	121.5	25 35.6	82 58	121.9	25 11.1	82 58	122.2	24 46.6	82 58	122.5	24 22.1	82 58	122.8	23 57.5	82 57	123.1	23 32.8	82 57	123.4	23 08.2	82 57	123.7	50
1	25 25.0	81 59	120.6	25 00.7	81 59	121.0	24 36.3	81 59	121.3	24 11.9	81 58	121.6	23 47.5	82 58	121.9	23 23.0	82 58	122.2	22 58.5	82 58	122.5	22 34.0	82 58	122.9	1
2	24 49.6	81 59	119.7	24 25.4	81 59	120.1	24 01.2	81 59	120.4	23 36.9	81 59	120.7	23 12.6	81 59	121.0	22 48.2	81 58	121.3	22 23.8	81 58	121.7	21 59.4	81 58	122.0	2
3	24 13.9	80 60	118.9	23 49.9	80 60	119.2	23 25.7	80 60	119.5	23 01.6	81 59	119.8	22 37.4	81 59	120.2	22 13.1	81 59	120.5	21 48.9	81 59	120.8	21 24.5	81 59	121.1	3
4	23 38.0	80 60	118.0	23 14.0	80 60	118.3	22 50.0	80 60	118.6	22 25.9	80 60	119.0	22 01.8	80 60	119.3	21 37.7	80 60	119.6	21 13.5	81 59	119.9	20 49.3	81 59	120.2	4
55	23 01.7	79 61	117.1	22 37.8	80 61	117.4	22 13.9	80 61	117.8	21 50.0	80 60	118.1	21 26.0	80 60	118.4	21 02.0	80 60	118.7	20 37.9	80 60	119.1	20 13.8	80 60	119.4	55
6	22 25.1	79 61	116.3	22 01.4	79 61	116.6	21 37.6	79 61	116.9	21 13.7	80 61	117.2	20 49.9	80 61	117.6	20 26.0	80 60	117.9	20 02.0	80 60	118.2	19 38.0	80 60	118.5	6
7	21 48.3	79 62	115.4	21 24.6	79 62	115.7	21 00.9	79 61	116.1	20 37.2	79 61	116.4	20 13.4	79 61	116.7	19 49.6	79 61	117.0	19 25.8	80 61	117.4	19 01.9	80 61	117.7	7
8	21 11.2	78 62	114.6	20 47.6	79 62	114.9	20 24.0	79 62	115.2	20 00.4	79 62	115.6	19 36.8	79 62	115.9	19 13.1	79 61	116.2	18 49.3	79 61	116.5	18 25.6	79 61	116.8	8
9	20 33.8	78 63	113.7	20 10.4	78 62	114.1	19 46.9	78 62	114.4	19 23.4	78 62	114.7	18 59.8	79 62	115.0	18 36.2	79 62	115.4	18 12.6	79 62	115.7	17 48.9	79 62	116.0	9
60	19 56.3	78 63	112.9	19 32.9	78 63	113.2	19 09.5	78 63	113.6	18 46.1	78 63	113.9	18 22.6	78 62	114.2	17 59.1	78 62	114.5	17 35.6	78 62	114.9	17 12.0	79 62	115.2	60
1	19 18.5	77 63	112.1	18 55.2	78 63	112.4	18 31.9	78 63	112.7	18 08.6	78 63	113.1	17 45.2	78 63	113.4	17 21.8	78 63	113.7	16 58.3	78 62	114.0	16 34.9	78 62	114.4	1
2	18 40.4	77 64	111.2	18 17.2	77 64	111.6	17 54.0	77 63	111.9	17 30.8	78 63	112.2	17 07.5	78 63	112.6	16 44.2	78 63	112.9	16 20.9	78 63	113.2	15 57.5	78 63	113.6	2
3	18 02.2	77 64	110.4	17 39.1	77 64	110.8	17 16.0	77 64	111.1	16 52.8	77 64	111.4	16 29.6	77 64	111.8	16 06.4	77 63	112.1	15 43.1	78 63	112.4	15 19.9	78 63	112.8	3
4	17 23.7	77 64	109.6	17 00.7	77 64	110.0	16 37.7	77 64	110.3	16 14.6	77 64	110.6	15 51.5	77 64	111.0	15 28.4	77 64	111.3	15 05.2	77 64	111.6	14 42.0	77 63	112.0	4
65	16 45.1	76 65	108.8	16 22.2	76 65	109.2	15 59.2	77 64	109.5	15 36.2	77 64	109.8	15 13.2	77 64	110.2	14 50.1	77 64	110.5	14 27.1	77 64	110.8	14 04.0	77 64	111.2	65
6	16 06.3	76 65	108.0	15 43.4	76 65	108.4	15 20.5	76 65	108.7	14 57.6	76 65	109.0	14 34.7	77 64	109.4	14 11.7	77 64	109.7	13 48.7	77 64	110.0	13 25.7	77 64	110.4	6
7	15 27.3	76 65	107.2	15 04.5	76 65	107.6	14 41.7	76 65	107.9	14 18.9	76 65	108.3	13 56.0	76 65	108.6	13 33.1	76 65	108.9	13 10.2	76 65	109.3	12 47.2	77 64	109.6	7
8	14 48.1	76 66	106.5	14 25.4	76 65	106.8	14 02.7	76 65	107.1	13 39.9	76 65	107.5	13 17.1	76 65	107.8	12 54.3	76 65	108.1	12 31.5	76 65	108.5	12 08.6	76 65	108.8	8
9	14 08.8	75 66	105.7	13 46.2	76 66	106.0	13 23.5	76 66	106.4	13 00.8	76 65	106.7	12 38.1	76 65	107.0	12 15.3	76 65	107.4	11 52.6	76 65	107.7	11 29.8	76 65	108.0	9
70	13 29.3	75 66	104.9	13 06.8	75 66	105.2	12 44.2	75 66	105.6	12 21.5	75 66	105.9	11 58.9	76 66	106.3	11 36.2	76 66	106.6	11 13.5	76 65	106.9	10 50.8	76 65	107.3	70
1	12 49.7	75 66	104.1	12 27.2	75 66	104.5	12 04.7	75 66	104.8	11 42.1	75 66	105.1	11 19.5	75 66	105.5	10 56.9	75 66	105.8	10 34.3	75 66	106.2	10 11.6	76 66	106.5	1
2	12 10.0	75 66	103.4	11 47.5	75 66	103.7	11 25.0	75 66	104.0	11 02.5	75 66	104.4	10 40.0	75 66	104.7	10 17.5	75 66	105.1	9 54.9	75 66	105.4	9 32.3	75 66	105.7	2
3	11 30.1	75 67	102.6	11 07.7	75 67	102.9	10 45.3	75 66	103.3	10 22.8	75 66	103.6	10 00.4	75 66	104.0	9 37.9	75 66	104.3	9 15.4	75 66	104.6	8 52.8	75 66	105.0	3
4	10 50.1	74 67	101.8	10 27.8	75 67	102.2	10 05.4	75 67	102.5	9 43.0	75 67	102.9	9 20.6	75 66	103.2	8 58.2	75 66	103.5	8 35.7	75 66	103.9	8 13.2	75 66	104.2	4
75	10 10.0	74 67	101.1	9 47.7	74 67	101.4	9 25.4	74 67	101.8	9 03.0	74 67	102.1	8 40.7	75 67	102.4	8 18.3	75 67	102.8	7 55.9	75 67	103.1	7 33.5	75 66	103.4	75
6	9 29.8	74 67	100.3	9 07.5	74 67	100.7	8 45.3	74 67	101.0	8 23.0	74 67	101.4	8 00.7	74 67	101.7	7 38.3	74 67	102.0	7 16.0	74 67	102.4	6 53.6	75 67	102.7	6
7	8 49.5	74 67	99.6	8 27.3	74 67	99.9	8 05.1	74 67	100.3	7 42.8	74 67	100.6	7 20.5	74 67	100.9	6 58.3	74 67	101.3	6 36.0	74 67	101.6	6 13.7	74 67	102.0	7
8	8 09.1	74 67	98.8	7 46.9	74 67	99.2	7 24.7	74 67	99.5	7 02.5	74 67	99.9	6 40.3	74 67	100.2	6 18.1	74 67	100.5	5 55.8	74 67	100.9	5 33.6	74 67	101.2	8
9	7 28.6	74 68	98.1	7 06.5	74 68	98.4	6 44.3	74 67	98.8	6 22.2	74 67	99.1	6 00.0	74 67	99.4	5 37.8	74 67	99.8	5 15.6	74 67	100.1				9
80	6 48.1	74 68	97.3	6 26.0	74 68	97.7	6 03.9	74 68	98.0	5 41.7	74 68	98.4	5 19.6	74 68	98.7										80
1	6 07.5	74 68	96.6	5 45.4	74 68	96.9	5 23.3	74 68	97.3	5 01.2	74 68	97.6													1
2	5 26.8	73 68	95.9	5 04.7	74 68	96.2																			2

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Lat. 47°

H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	° ′	Δt °	°	°
00	47 00.0	1.0 01	180.0	47 30.0	1.0 01	180.0	48 00.0	1.0 01	180.0	48 30.0	1.0 01	180.0	49 00.0	1.0 01	180.0	49 30.0	1.0 01	180.0	50 00.0	1.0 01	180.0	50 30.0	1.0 01	180.0	00
1	46 59.5	1.0 03	178.5	47 29.5	1.0 03	178.5	47 59.5	1.0 03	178.5	48 29.5	1.0 03	178.5	48 59.5	1.0 03	178.5	49 29.5	1.0 03	178.5	49 59.4	1.0 03	178.5	50 29.4	1.0 03	178.4	1
2	46 57.9	1.0 04	177.1	47 27.9	1.0 04	177.0	47 57.9	1.0 04	177.0	48 27.9	1.0 04	177.0	48 57.8	1.0 04	177.0	49 27.8	1.0 05	176.9	49 57.8	1.0 05	176.9	50 27.8	1.0 05	176.9	2
3	46 55.3	1.0 06	175.6	47 25.3	1.0 06	175.6	47 55.2	1.0 06	175.5	48 25.2	1.0 06	175.5	48 55.1	1.0 06	175.5	49 25.1	1.0 06	175.4	49 55.0	1.0 06	175.4	50 25.0	1.0 06	175.3	3
4	46 51.7	1.0 08	174.2	47 21.6	1.0 08	174.1	47 51.5	1.0 08	174.1	48 21.4	1.0 08	174.0	48 51.4	1.0 08	173.9	49 21.3	1.0 08	173.9	49 51.2	1.0 08	173.8	50 21.1	1.0 08	173.8	4
05	46 47.0	1.0 10	172.7	47 16.9	1.0 10	172.6	47 46.7	1.0 10	172.6	48 16.6	1.0 10	172.5	48 46.5	1.0 10	172.4	49 16.4	1.0 10	172.4	49 46.3	1.0 10	172.3	50 16.1	1.0 10	172.2	05
6	46 41.3	99 11	171.3	47 11.1	99 11	171.2	47 40.9	99 11	171.1	48 10.8	99 12	171.0	48 40.6	99 12	170.9	49 10.4	99 12	170.9	49 40.2	99 12	170.8	50 10.1	99 12	170.7	6
7	46 34.5	99 13	169.8	47 04.3	99 13	169.7	47 34.1	99 13	169.6	48 03.9	99 13	169.5	48 33.6	99 13	169.4	49 03.4	99 13	169.4	49 33.1	99 14	169.3	50 02.9	99 14	169.2	7
8	46 26.8	99 15	168.4	46 56.5	99 15	168.3	47 26.2	99 15	168.2	47 55.9	99 15	168.1	48 25.6	99 15	168.0	48 55.3	99 15	167.9	49 25.0	99 15	167.7	49 54.7	99 15	167.6	8
9	46 18.1	99 16	166.9	46 47.7	99 16	166.8	47 17.3	99 16	166.7	47 46.9	99 17	166.6	48 16.6	99 17	166.5	48 46.2	99 17	166.4	49 15.8	99 17	166.2	49 45.4	99 17	166.1	9
10	46 08.3	99 18	165.5	46 37.9	99 18	165.4	47 07.4	98 18	165.3	47 37.0	98 18	165.1	48 06.5	98 18	165.0	48 36.0	98 19	164.9	49 05.5	98 19	164.7	49 35.0	98 19	164.6	10
1	45 57.6	98 19	164.1	46 27.1	98 20	164.0	46 56.5	98 20	163.8	47 26.0	98 20	163.7	47 55.4	98 20	163.5	48 24.8	98 20	163.4	48 54.2	98 20	163.3	49 23.6	98 21	163.1	1
2	45 45.9	98 21	162.7	46 15.3	98 21	162.6	46 44.6	98 21	162.4	47 14.0	98 22	162.3	47 43.3	98 22	162.1	48 12.6	98 22	161.9	48 41.9	98 22	161.8	49 11.2	98 22	161.6	2
3	45 33.3	98 23	161.3	46 02.5	98 23	161.2	46 31.8	97 23	161.0	47 01.0	97 23	160.8	47 30.2	97 23	160.7	47 59.5	97 24	160.5	48 28.6	97 24	160.3	48 57.8	97 24	160.1	3
4	45 19.7	97 24	159.9	45 48.8	97 24	159.8	46 18.0	97 25	159.6	46 47.1	97 25	159.4	47 16.2	97 25	159.2	47 45.3	97 25	159.1	48 14.4	97 25	158.9	48 43.4	97 26	158.7	4
15	45 05.2	97 26	158.6	45 34.2	97 26	158.4	46 03.2	97 26	158.2	46 32.2	97 26	158.0	47 01.2	97 27	157.8	47 30.2	97 27	157.6	47 59.1	96 27	157.4	48 28.1	96 27	157.2	15
6	44 49.8	96 27	157.2	45 18.7	96 27	157.0	45 47.6	96 28	156.8	46 16.5	96 28	156.6	46 45.3	96 28	156.4	47 14.2	96 28	156.2	47 43.0	96 28	156.0	48 11.8	96 29	155.8	6
7	44 33.5	96 29	155.8	45 02.2	96 29	155.6	45 31.0	96 29	155.4	45 59.8	96 29	155.2	46 28.5	96 30	155.0	46 57.2	96 30	154.8	47 25.9	96 30	154.6	47 54.5	96 30	154.4	7
8	44 16.3	96 30	154.5	44 44.9	95 30	154.3	45 13.6	95 31	154.1	45 42.2	95 31	153.9	46 10.8	95 31	153.7	46 39.3	95 31	153.4	47 07.9	95 31	153.2	47 36.4	95 32	153.0	8
9	43 58.2	95 31	153.2	44 26.8	95 32	153.0	44 55.3	95 32	152.7	45 23.7	95 32	152.5	45 52.2	95 32	152.3	46 20.6	95 33	152.1	46 49.0	95 33	151.8	47 17.4	94 33	151.6	9
20	43 39.3	95 33	151.9	44 07.7	95 33	151.6	44 36.1	94 33	151.4	45 04.4	94 34	151.2	45 32.7	94 34	150.9	46 01.0	94 34	150.7	46 29.2	94 34	150.5	46 57.4	94 35	150.2	20
1	43 19.6	94 34	150.6	43 47.9	94 34	150.3	44 16.1	94 35	150.1	44 44.3	94 35	149.9	45 12.4	94 35	149.6	45 40.6	94 35	149.4	46 08.6	94 36	149.1	46 36.7	93 36	148.9	1
2	42 59.1	94 35	149.3	43 27.2	94 36	149.0	43 55.3	94 36	148.8	44 23.3	93 36	148.5	44 51.3	93 36	148.3	45 19.3	93 37	148.0	45 47.2	93 37	147.8	46 15.1	93 37	147.5	2
3	42 37.8	93 37	148.0	43 05.8	93 37	147.8	43 33.7	93 37	147.5	44 01.6	93 38	147.3	44 29.4	93 38	147.0	44 57.2	93 38	146.7	45 25.0	93 38	146.5	45 52.7	92 39	146.2	3
4	42 15.8	93 38	146.8	42 43.6	93 38	146.5	43 11.3	92 38	146.2	43 39.1	92 39	146.0	44 06.8	92 39	145.7	44 34.4	92 39	145.4	45 02.0	92 40	145.2	45 29.6	92 40	144.9	4
25	41 53.0	92 39	145.5	42 20.6	92 39	145.2	42 48.2	92 40	145.0	43 15.8	92 40	144.7	43 43.3	92 40	144.4	44 10.8	92 41	144.2	44 38.3	91 41	143.9	45 05.7	91 41	143.6	25
6	41 29.4	92 40	144.3	41 56.9	92 41	144.0	42 24.4	91 41	143.7	42 51.8	91 41	143.5	43 19.2	91 41	143.2	43 46.5	91 42	142.9	44 13.8	91 42	142.6	44 41.0	91 42	142.3	6
7	41 05.2	91 42	143.1	41 32.5	91 42	142.8	41 59.8	91 42	142.5	42 27.1	91 42	142.2	42 54.3	91 43	141.9	43 21.5	90 43	141.7	43 48.6	90 43	141.4	44 15.7	90 43	141.1	7
8	40 40.3	91 43	141.9	41 07.5	91 43	141.6	41 34.6	90 43	141.3	42 01.7	90 43	141.0	42 28.7	90 44	140.7	42 55.7	90 44	140.4	43 22.7	90 44	140.1	43 49.6	90 45	139.8	8
9	40 14.7	90 44	140.7	40 41.7	90 44	140.4	41 08.7	90 44	140.1	41 35.6	90 45	139.8	42 02.5	90 45	139.5	42 29.3	89 45	139.2	42 56.1	89 45	138.9	43 22.9	89 46	138.6	9
30	39 48.4	90 45	139.5	40 15.3	89 45	139.2	40 42.1	89 45	138.9	41 08.9	89 46	138.6	41 35.6	89 46	138.3	42 02.3	89 46	138.0	42 28.9	89 46	137.7	42 55.5	88 47	137.4	30
1	39 21.6	89 46	138.4	39 48.3	89 46	138.1	40 14.9	89 46	137.8	40 41.5	89 47	137.5	41 08.1	88 47	137.2	41 34.6	88 47	136.8	42 01.1	88 47	136.5	42 27.5	88 48	136.2	1
2	38 54.1	89 47	137.2	39 20.6	88 47	136.9	39 47.1	88 47	136.6	40 13.6	88 48	136.3	40 40.0	88 48	136.0	41 06.3	88 48	135.7	41 32.6	88 48	135.4	41 58.8	87 49	135.0	2
3	38 26.0	88 48	136.1	38 52.4	88 48	135.8	39 18.7	88 48	135.5	39 45.0	88 49	135.2	40 11.2	87 49	134.8	40 37.4	87 49	134.5	41 03.6	87 49	134.2	41 29.6	87 50	133.9	3
4	37 57.3	88 49	135.0	38 23.5	87 49	134.7	38 49.7	87 49	134.4	39 15.8	87 50	134.0	39 41.9	87 50	133.7	40 08.0	87 50	133.4	40 33.9	86 50	133.1	40 59.8	86 51	132.7	4
35	37 28.1	87 50	133.9	37 54.2	87 50	133.6	38 20.2	87 50	133.2	38 46.2	87 50	132.9	39 12.1	86 51	132.6	39 38.0	86 51	132.3	40 03.8	86 51	131.9	40 29.5	86 51	131.6	35
6	36 58.3	87 50	132.8	37 24.2	86 51	132.5	37 50.1	86 51	132.1	38 15.9	86 51	131.8	38 41.7	86 52	131.5	39 07.4	86 52	131.2	39 33.1	85 52	130.8	39 58.7	85 52	130.5	6
7	36 28.0	86 51	131.7	36 53.8	86 52	131.4	37 19.5	86 52	131.1	37 45.2	85 52	130.7	38 10.8	85 52	130.4	38 36.3	85 53	130.1	39 01.8	85 53	129.7	39 27.3	85 53	129.4	7
8	35 57.2	85 52	130.7	36 22.8	85 52	130.3	36 48.4	85 53	130.0	37 13.9	85 53	129.7	37 39.4	85 53	129.3	38 04.8	85 53	129.0	38 30.1	84 54	128.7	38 55.4	84 54	128.3	8
9	35 25.9	85 53	129.6	35 51.4	85 53	129.3	36 16.8	85 53	128.9	36 42.2	84 54	128.6	37 07.5	84 54	128.3	37 32.8	84 54	127.9	37 57.9	84 54	127.6	38 23.1	84 55	127.3	9
40	34 54.2	85 54	128.6	35 19.5	84 54	128.2	35 44.8	84 54	127.9	36 10.0	84 54	127.6	36 35.2	84 55	127.2	37 00.3	84 55	126.9	37 25.3	83 55	126.5	37 50.3	83 55	126.2	40
1	34 21.9	84 54	127.5	34 47.1	84 55	127.2	35 12.3	84 55	126.9	35 37.3	83 55	126.5	36 02.4	83 55	126.2	36 27.3	83 56	125.9	36 52.2	83 56	125.5	37 17.0	83 56	125.2	1
2	33 49.3	84 55	126.5	34 14.3	83 55	126.2	34 39.3	83 56	125.9	35 04.2	83 56	125.5	35 29.1	83 56	125.2	35 53.9	83 56	124.8	36 18.7	82 57	124.5	36 43.4	82 57	124.1	2
3	33 16.2	83 56	125.5	33 41.1	83 56	125.2	34 05.9	83 56	124.9	34 30.7	83 56	124.5	34 55.5	82 57	124.2	35 20.1	82 57	123.8	35 44.8	82 57	123.5	36 09.3	82 57	123.1	3
4	32 42.7	83 56	124.6	33 07.5	82 57	124.2	33 32.2	82 57	123.9	33 56.8	82 57	123.5	34 21.4	82 57	123.2	34 46.0	82 58	122.8	35 10.4	81 58	122.5	35 34.9	81 58	122.1	4
45	32 08.8	82 57	123.6	32 33.4	82 57	123.2	32 58.0	82 58	122.9	33 22.5	82 58	122.6	33 47.0	81 58	122.2	34 11.4	81 58	121.9	34 35.7	81 58	121.5	35 00.0	81 59	121.1	45
6	31 34.5	82 58	122.6	31 59.0	82 58	122.3	32 23.5	81 58	121.9	32 47.9	81 58	121.6	33 12.2	81 59	121.2	33 36.5	81 59	120.9	34 00.7	81 59	120.5	34 24.8	80 59	120.2	6
7	30 59.9	81 58	121.7	31 24.2	81 59	121.3	31 48.6	81 59	121.0	32 12.8	81 59	120.6	32 37.0	81 59	120.3	33 01.2	80 59	119.9	33 25.3	80 60	119.6	33 49.3	80 60	119.2	7
8	30 24.9	81 59	120.7	30 49.1	81 59	120.4	31 13.3	81 59	120.0	31 37.4	80 60	119.7	32 01.5	80 60	119.3	32 25.5	80 60	119.0	32 49.5	80 60	118.6	33 13.4	80 60	118.3	8
9	29 49.5	81 59	119.8	30 13.6	80 60	119.5	30 37.7	80 60	119.1	31 01.7	80 60	118.8	31 25.7	80 60	118.4	31 49.6	80 60	118.0	32 13.4	79 61	117.7	32 37.2	79 61	117.3	9
50	29 13.8	80 60	118.9	29 37.9	80 60	118.5	30 01.8	80 60	118.2	30 25.7	80 61	117.8	30 49.5	79 61	117.5	31 13.3	79 61	117.1	31 37.0	79 61	116.8	32 00.7	79 61	116.4	50
1	28 37.9	80 60	118.0	29 01.7	80 61	117.6	29 25.6	79 61	117.3	29 49.4	79 61	116.9	30 13.1	79 61	116.6	30 36.7	79 61	116.2	31 00.4	79 62	115.8	31 23.9	78 62	115.5	1
2	28 01.6	79 61	117.1	28 25.3	79 61	116.7	28 49.1	79 61	116.4	29 12.7	79 62	116.0	29 36.3	79 62	115.7	29 59.9	78 62	115.3	30 23.4	78 62	114.9	30 46.8	78 62	114.6	2
3	27 25.0	79 61	116.2	27 48.6	79 62	115.8	28 12.3	79 62	115.5	28 35.8	78 62	115.1	28 59.3	78 62	114.8	29 22.8	78 62	114.4	29 46.2	78 62	114.0	30 09.5	78 63	113.7	3
4	26 48.1	79 62	115.3	27 11.7	78 62	114.9	27 35.2	78 62	114.6	27 58.6	78 62	114.2	28 22.0	78 63	113.9	28 45.4	78 63	113.5	29 08.7	78 63	113.2	29 31.9	77 63	112.8	4
55	26 11.0	78 62	114.4	26 34.4	78 62	114.1	26 57.8	78 63	113.7	27 21.2	78 63	113.4	27 44.5	78 63	113.0	28 07.7	77 63	112.6	28 30.9	77 63	112.3	28 54.0	77 63	111.9	55
6	25 33.6	78 63	113.5	25 57.0	78 63	113.2	26 20.3	78 63	112.8	26 43.5	77 63	112.5	27 06.7	77 63	112.1	27 29.8	77 64	111.8	27 52.9	77 64	111.4	28 16.0	77 64	111.1	6
7	24 56.0	78 63	112.7	25 19.2	77 63	112.3	25 42.4	77 63	112.0	26 05.6	77 64	111.6	26 28.7	77 64	111.3	26 51.7	77 64	110.9	27 14.7	77 64	110.6	27 37.7	76 64	110.2	7
8	24 18.1	77 64	111.8	24 41.3	77 64	111.5	25 04.4	77 64	111.1	25 27.4	77 64	110.8	25 50.4	77 64	110.4	26 13.4	76 64	110.1	26 36.3	76 64	109.7	26 59.2	76 65	109.3	8
9	23 40.0	77 64	111.0	24 03.1	77 64	110.6	24 26.1	77 64	110.3	24 49.1	76 64	109.9	25 12.0	76 64	109.6	25 34.9	76 65	109.2	25 57.7	76 65	108.9	26 20.5	76 65	108.5	9
60	23 01.7	77 64	110.2	23 24.7	77 64	109.8	23 47.6	76 64	109.5	24 10.5	76 65	109.1	24 33.3	76 65	108.8	24 56.1	76 65	108.4	25 18.9	76 65	108.0	25 41.6	76 65	107.7	60
1	22 23.2	76 65	109.3	22 46.1	76 65	109.0	23 08.9	76 65	108.6	23 31.7	76 65	108.3	23 54.5	76 65	107.9	24 17.2	76 65	107.6	24 39.9	75 65	107.2	25 02.5	75 65	106.8	1
2	21 44.5	76 65	108.5	22 07.3	76 65	108.2	22 30.1	76 65	107.8	22 52.8	76 65	107.5	23 15.5	76 65	107.1	23 38.1	75 65	106.7	24 00.7	75 66	106.4	24 23.2	75 66	106.0	2
3	21 05.6	76 65	107.7	21 28.3	76 65	107.3	21 51.0	76 65	107.0	22 13.7	75 66	106.6	22 36.3	75 66	106.3	22 58.8	75 66	105.9	23 21.4	75 66	105.6	23 43.8	75 66	105.2	3
4	20 26.5	76 65	106.9	20 49.2	75 66	106.5	21 11.8	75 66	106.2	21 34.4	75 66	105.8	21 56.9	75 66	105.5	22 19.4	75 66	105.1	22 41.9	75 66	104.8	23 04.3	75 66	104.4	4
65	19 47.3	75 66	106.1	20 09.9	75 66	105.7	20 32.4	75 66	105.4	20 54.9	75 66	105.0	21 17.4	75 66	104.7	21 39.8	75 66	104.3	22 02.2	75 66	104.0	22 24.6	74 66	103.6	65
6	19 07.9	75 66	105.3	19 30.4	75 66	104.9	19 52.9	75 66	104.6	20 15.4	75 66	104.2	20 37.8	75 66	103.9	21 00.1	74 66	103.5	21 22.4	74 67	103.2	21 44.7	74 67	102.8	6
7	18 28.3	75 66	104.5	18 50.8	75 66	104.2	19 13.2	75 66	103.8	19 35.6	75 66	103.4	19 58.0	74 67	103.1	20 20.3	74 67	102.7	20 42.5	74 67	102.4	21 04.8	74 67	102.0	7
8	17 48.6	75 66	103.7	18 11.1	75 66	103.4	18 33.4	75 67	103.0	18 55.8	74 67	102.7	19 18.1	74 67	102.3	19 40.3	74 67	102.0	20 02.5	74 67	101.6	20 24.7	74 67	101.2	8
9	17 08.8	75 67	102.9	17 31.2	74 67	102.6	17 53.5	74 67	102.2	18 15.8	74 67	101.9	18 38.0	74 67	101.5	19 00.2	74 67	101.2	19 22.4	74 67	100.8	19 44.5	74 67	100.5	9
70	16 28.9	74 67	102.2	16 51.2	74 67	101.8	17 13.5	74 67	101.5	17 35.7	74 67	101.1	17 57.9	74 67	100.8	18 20.0	74 67	100.4	18 42.1	74 67	100.0	19 04.2	73 67	99.7	70
1	15 48.8	74 67	101.4	16 11.1	74 67	101.0	16 33.3	74 67	100.7	16 55.5	74 67	100.3	17 17.6	74 67	100.0	17 39.7	74 67	99.6	18 01.8	73 67	99.3	18 23.8	73 67	98.9	1
2	15 08.7	74 67	100.6	15 30.9	74 67	100.3	15 53.0	74 67	99.9	16 15.2	74 67	99.6	16 37.3	74 67	99.2	16 59.3	73 67	98.9	17 21.4	73 68	98.5	17 43.3	73 68	98.2	2
3	14 28.4	74 67	99.9	14 50.6	74 67	99.5	15 12.7	74 67	99.2	15 34.8	74 67	98.8	15 56.8	73 68	98.5	16 18.9	73 68	98.1	16 40.9	73 68	97.7	17 02.8	73 68	97.4	3
4	13 48.0	74 67	99.1	14 10.2	74 67	98.7	14 32.2	74 68	98.4	14 54.3	73 68	98.0	15 16.3	73 68	97.7	15 38.3	73 68	97.3	16 00.3	73 68	97.0	16 22.2	73 68	96.6	4
75	13 07.6	74 68	98.3	13 29.7	74 68	98.0	13 51.7	73 68	97.6	14 13.7	73 68	97.3	14 35.7	73 68	96.9	14 57.7	73 68	96.6	15 19.6	73 68	96.2	15 41.5	73 68	95.9	75
6	12 27.1	74 68	97.6	12 49.1	73 68	97.2	13 11.1	73 68	96.9	13 33.1	73 68	96.5	13 55.1	73 68	96.2	14 17.0	73 68	95.8	14 38.9	73 68	95.5	15 00.8	73 68	95.1	6
7	11 46.5	73 68	96.8	12 08.5	73 68	96.5	12 30.5	73 68	96.1	12 52.4	73 68	95.8	13 14.4	73 68	95.4	13 36.3	73 68	95.1	13 58.2	73 68	94.7	14 20.0	73 68	94.4	7
8	11 05.8	73 68	96.1	11 27.8	73 68	95.7	11 49.8	73 68	95.4	12 11.7	73 68	95.0	12 33.6	73 68	94.7	12 55.5	73 68	94.3	13 17.4	73 68	94.0	13 39.2	73 68	93.6	8
9	10 25.1	73 68	95.3	10 47.1	73 68	95.0	11 09.0	73 68	94.7	11 30.9	73 68	94.3	11 52.8	73 68	94.0	12 14.7	73 68	93.6	12 36.5	73 68	93.3	12 58.3	73 68	92.9	9
80	9 44.3	73 68	94.6	10 06.3	73 68	94.3	10 28.2	73 68	93.9	10 50.1	73 68	93.6	11 12.0	73 68	93.2	11 33.8	73 68	92.9	11 55.7	73 68	92.5	12 17.5	73 68	92.2	80
1	9 03.5	73 68	93.9	9 25.4	73 68	93.5	9 47.4	73 68	93.2	10 09.2	73 68	92.8	10 31.1	73 68	92.5	10 52.9	73 68	92.1	11 14.8	73 68	91.8	11 36.6	73 68	91.4	1
2	8 22.7	73 68	93.1	8 44.6	73 68	92.8	9 06.5	73 68	92.4	9 28.4	73 68	92.1	9 50.2	73 68	91.7	10 12.0	73 68	91.4	10 33.9	73 68	91.0	10 55.6	73 68	90.7	2
3	7 41.8	73 68	92.4	8 03.7	73 68	92.0	8 25.6	73 68	91.7	8 47.5	73 68	91.4	9 09.3	73 68	91.0	9 31.1	73 68	90.7	9 52.9	73 68	90.3	10 14.7	73 68	90.0	3
4	7 00.9	73 68	91.7	7 22.8	73 68	91.3	7 44.7	73 68	91.0	8 06.5	73 68	90.6	8 28.4	73 68	90.3	8 50.2	73 68	89.9	9 12.0	73 68	89.6	9 33.8	73 68	89.2	4
85	6 20.0	73 68	90.9	6 41.9	73 68	90.6	7 03.8	73 68	90.2	7 25.6	73 68	89.9	7 47.5	73 68	89.5	8 09.3	73 68	89.2	8 31.1	73 68	88.9	8 52.9	73 68	88.5	85
6	5 39.1	73 68	90.2	6 01.0	73 68	89.8	6 22.8	73 68	89.5	6 44.7	73 68	89.2	7 06.6	73 68	88.8	7 28.4	73 68	88.5	7 50.2	73 68	88.1	8 12.0	73 68	87.8	6
7				5 20.1	73 68	89.1	5 41.9	73 68	88.8	6 03.8	73 68	88.4	6 25.6	73 68	88.1	6 47.5	73 68	87.7	7 09.3	73 68	87.4	7 31.1	73 68	87.0	7
8							5 01.0	73 68	88.0	5 22.9	73 68	87.7	5 44.8	73 68	87.4	6 06.6	73 68	87.0	6 28.4	73 68	86.7	6 50.3	73 68	86.3	8
9													5 03.9	73 68	86.6	5 25.8	73 68	86.3	5 47.6	73 68	85.9	6 09.4	73 68	85.6	9
90																			5 06.8	73 68	85.2	5 28.7	73 68	84.9	90

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H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		°
00	39 00.0	1.0 01	180.0	38 30.0	1.0 01	180.0	38 00.0	1.0 01	180.0	37 30.0	1.0 01	180.0	37 00.0	1.0 01	180.0	36 30.0	1.0 01	180.0	36 00.0	1.0 01	180.0	35 30.0	1.0 01	180.0	00
1	38 59.5	1.0 02	178.7	38 29.5	1.0 02	178.7	37 59.5	1.0 02	178.7	37 29.6	1.0 02	178.7	36 59.6	1.0 02	178.8	36 29.6	1.0 02	178.8	35 59.6	1.0 02	178.8	35 29.6	1.0 02	178.8	1
2	38 58.2	1.0 04	177.4	38 28.2	1.0 04	177.5	37 58.2	1.0 04	177.5	37 28.2	1.0 04	177.5	36 58.2	1.0 04	177.5	36 28.2	1.0 04	177.5	35 58.2	1.0 04	177.5	35 28.3	1.0 04	177.6	2
3	38 55.9	1.0 05	176.2	38 25.9	1.0 05	176.2	37 55.9	1.0 05	176.2	37 26.0	1.0 05	176.2	36 56.0	1.0 05	176.3	36 26.0	1.0 05	176.3	35 56.1	1.0 05	176.3	35 26.1	1.0 05	176.3	3
4	38 52.7	1.0 07	174.9	38 22.7	1.0 07	174.9	37 52.8	1.0 07	174.9	37 22.8	1.0 07	175.0	36 52.9	1.0 07	175.0	36 22.9	1.0 07	175.1	35 53.0	1.0 07	175.1	35 23.0	1.0 06	175.1	4
05	38 48.6	1.0 08	173.6	38 18.6	1.0 08	173.6	37 48.7	1.0 08	173.7	37 18.8	1.0 08	173.7	36 48.9	1.0 08	173.8	36 19.0	1.0 08	173.8	35 49.1	1.0 08	173.9	35 19.1	1.0 08	173.9	05
6	38 43.5	1.0 10	172.3	38 13.7	1.0 10	172.4	37 43.8	1.0 10	172.4	37 13.9	1.0 10	172.5	36 44.0	1.0 10	172.5	36 14.2	1.0 10	172.6	35 44.3	1.0 09	172.7	35 14.4	1.0 09	172.7	6
7	38 37.6	99 11	171.0	38 07.8	99 11	171.1	37 38.0	99 11	171.2	37 08.1	99 11	171.2	36 38.3	99 11	171.3	36 08.4	99 11	171.4	35 38.6	99 11	171.4	35 08.8	99 11	171.5	7
8	38 30.8	99 13	169.8	38 01.0	99 13	169.9	37 31.2	99 13	169.9	37 01.5	99 13	170.0	36 31.7	99 12	170.1	36 01.9	99 12	170.2	35 32.1	99 12	170.2	35 02.3	99 12	170.3	8
9	38 23.1	99 14	168.5	37 53.4	99 14	168.6	37 23.7	99 14	168.7	36 53.9	99 14	168.8	36 24.2	99 14	168.9	35 54.5	99 14	168.9	35 24.7	99 14	169.0	34 55.0	99 14	169.1	9
10	38 14.5	99 16	167.3	37 44.9	99 16	167.4	37 15.2	99 16	167.4	36 45.5	99 15	167.5	36 15.9	99 15	167.6	35 46.2	99 15	167.7	35 16.5	99 15	167.8	34 46.8	99 15	167.9	10
1	38 05.1	99 17	166.0	37 35.5	99 17	166.1	37 05.9	99 17	166.2	36 36.3	99 17	166.3	36 06.7	99 17	166.4	35 37.1	99 17	166.5	35 07.4	99 16	166.6	34 37.8	99 16	166.7	1
2	37 54.7	98 19	164.8	37 25.2	98 18	164.9	36 55.7	98 18	165.0	36 26.2	98 18	165.1	35 56.6	98 18	165.2	35 27.1	98 18	165.3	34 57.6	98 18	165.4	34 28.0	99 18	165.5	2
3	37 43.5	98 20	163.5	37 14.1	98 20	163.6	36 44.7	98 20	163.8	36 15.2	98 20	163.9	35 45.8	98 19	164.0	35 16.3	98 19	164.1	34 46.8	98 19	164.2	34 17.4	98 19	164.3	3
4	37 31.5	98 21	162.3	37 02.2	98 21	162.4	36 32.8	98 21	162.5	36 03.4	98 21	162.7	35 34.1	98 21	162.8	35 04.7	98 21	162.9	34 35.3	98 21	163.0	34 05.9	98 20	163.2	4
15	37 18.6	98 23	161.1	36 49.4	98 23	161.2	36 20.1	98 23	161.3	35 50.8	98 22	161.5	35 21.6	98 22	161.6	34 52.3	98 22	161.7	34 23.0	98 22	161.9	33 53.7	98 22	162.0	15
6	37 05.0	97 24	159.8	36 35.8	97 24	160.0	36 06.6	97 24	160.1	35 37.4	97 24	160.3	35 08.2	97 24	160.4	34 39.0	97 23	160.6	34 09.8	97 23	160.7	33 40.6	97 23	160.8	6
7	36 50.4	97 26	158.6	36 21.4	97 25	158.8	35 52.3	97 25	158.9	35 23.2	97 25	159.1	34 54.1	97 25	159.2	34 25.0	97 25	159.4	33 55.9	97 24	159.5	33 26.8	97 24	159.7	7
8	36 35.1	96 27	157.4	36 06.2	97 27	157.6	35 37.2	97 26	157.7	35 08.2	97 26	157.9	34 39.2	97 26	158.1	34 10.2	97 26	158.2	33 41.2	97 26	158.4	33 12.2	97 26	158.5	8
9	36 19.0	96 28	156.2	35 50.2	96 28	156.4	35 21.3	96 28	156.6	34 52.5	96 28	156.7	34 23.6	96 27	156.9	33 54.7	96 27	157.1	33 25.8	96 27	157.2	32 56.8	96 27	157.4	9
20	36 02.2	96 29	155.0	35 33.4	96 29	155.2	35 04.7	96 29	155.4	34 35.9	96 29	155.6	34 07.1	96 29	155.7	33 38.3	96 28	155.9	33 09.5	96 28	156.1	32 40.7	96 28	156.2	20
1	35 44.5	96 31	153.9	35 15.9	96 30	154.1	34 47.3	96 30	154.2	34 18.6	96 30	154.4	33 49.9	96 30	154.6	33 21.3	96 30	154.8	32 52.6	96 30	154.9	32 23.9	96 29	155.1	1
2	35 26.1	96 32	152.7	34 57.6	96 32	152.9	34 29.1	96 32	153.1	34 00.6	96 31	153.3	33 32.0	96 31	153.5	33 03.5	96 31	153.6	32 34.9	96 31	153.8	32 06.3	96 30	154.0	2
3	35 07.0	96 33	151.5	34 38.6	96 33	151.7	34 10.2	96 33	151.9	33 41.8	96 32	152.1	33 13.4	96 32	152.3	32 44.9	96 32	152.5	32 16.5	96 32	152.7	31 48.0	96 32	152.9	3
4	34 47.1	94 34	150.4	34 18.9	94 34	150.6	33 50.6	94 34	150.8	33 22.3	94 34	151.0	32 54.0	94 33	151.2	32 25.7	94 33	151.4	31 57.3	95 33	151.6	31 29.0	95 33	151.8	4
25	34 26.5	94 35	149.3	33 58.4	94 35	149.5	33 30.3	94 35	149.7	33 02.1	94 35	149.9	32 33.9	94 35	150.1	32 05.7	94 34	150.3	31 37.5	94 34	150.5	31 09.3	94 34	150.7	25
6	34 05.3	93 37	148.1	33 37.3	93 36	148.3	33 09.3	93 36	148.6	32 41.3	93 36	148.8	32 13.2	94 36	149.0	31 45.1	94 35	149.2	31 17.0	94 35	149.4	30 48.9	94 35	149.6	6
7	33 43.3	93 38	147.0	33 15.5	93 37	147.2	32 47.6	93 37	147.5	32 19.7	93 37	147.7	31 51.8	93 37	147.9	31 23.8	93 37	148.1	30 55.9	93 36	148.3	30 27.9	93 36	148.5	7
8	33 20.7	92 39	145.9	32 53.0	92 39	146.1	32 25.3	93 38	146.4	31 57.5	93 38	146.6	31 29.7	93 38	146.8	31 01.9	93 38	147.0	30 34.0	93 37	147.2	30 06.2	93 37	147.5	8
9	32 57.5	92 40	144.8	32 29.9	92 40	145.0	32 02.3	92 39	145.3	31 34.6	92 39	145.5	31 07.0	92 39	145.7	30 39.3	92 39	145.9	30 11.6	92 38	146.2	29 43.8	92 38	146.4	9
30	32 33.6	91 41	143.7	32 06.1	92 41	144.0	31 38.6	92 40	144.2	31 11.1	92 40	144.4	30 43.6	92 40	144.7	30 16.1	92 40	144.9	29 48.5	92 40	145.1	29 20.9	92 39	145.3	30
1	32 09.0	91 42	142.6	31 41.7	91 42	142.9	31 14.4	91 41	143.1	30 47.0	91 41	143.4	30 19.6	91 41	143.6	29 52.2	91 41	143.8	29 24.8	92 40	144.1	28 57.3	92 40	144.3	1
2	31 43.9	91 43	141.6	31 16.7	91 43	141.8	30 49.5	91 42	142.1	30 22.3	91 42	142.3	29 55.0	91 42	142.6	29 27.8	91 42	142.8	29 00.5	91 42	143.0	28 33.1	91 41	143.3	2
3	31 18.2	90 44	140.5	30 51.1	90 44	140.8	30 24.1	90 43	141.0	29 57.0	90 43	141.3	29 29.9	90 43	141.5	29 02.7	91 43	141.8	28 35.6	91 42	142.0	28 08.4	91 42	142.2	3
4	30 51.9	90 45	139.5	30 25.0	90 45	139.7	29 58.1	90 44	140.0	29 31.1	90 44	140.2	29 04.1	90 44	140.5	28 37.1	90 44	140.7	28 10.1	90 43	141.0	27 43.0	90 43	141.2	4
35	30 25.0	89 46	138.4	29 58.2	89 45	138.7	29 31.5	89 45	139.0	29 04.6	89 45	139.2	28 37.8	90 45	139.5	28 10.9	90 45	139.7	27 44.0	90 44	140.0	27 17.1	90 44	140.2	35
6	29 57.6	89 47	137.4	29 31.0	89 46	137.7	29 04.3	89 46	137.9	28 37.6	89 46	138.2	28 10.9	89 46	138.5	27 44.2	89 45	138.7	27 17.4	89 45	139.0	26 50.7	89 45	139.2	6
7	29 29.6	88 47	136.4	29 03.1	88 47	136.7	28 36.6	88 47	136.9	28 10.1	88 47	137.2	27 43.5	89 47	137.5	27 16.9	89 46	137.7	26 50.3	89 46	138.0	26 23.7	89 46	138.2	7
8	29 01.1	88 48	135.4	28 34.8	88 48	135.7	28 08.4	88 48	135.9	27 42.0	88 48	136.2	27 15.6	88 47	136.5	26 49.1	88 47	136.7	26 22.7	88 47	137.0	25 56.1	88 47	137.3	8
9	28 32.1	87 49	134.4	28 05.9	87 49	134.7	27 39.7	87 49	134.9	27 13.5	88 48	135.2	26 47.2	88 48	135.5	26 20.8	88 48	135.8	25 54.5	88 48	136.0	25 28.1	88 48	136.3	9
40	28 02.6	87 50	133.4	27 36.6	87 50	133.7	27 10.5	87 49	134.0	26 44.4	87 49	134.2	26 18.2	87 49	134.5	25 52.0	87 49	134.8	25 25.8	87 49	135.1	24 59.6	88 48	135.3	40
1	27 32.7	86 51	132.4	27 06.8	86 50	132.7	26 40.8	87 50	133.0	26 14.8	87 50	133.3	25 48.8	87 50	133.5	25 22.8	87 50	133.8	24 56.7	87 49	134.1	24 30.6	87 49	134.4	1
2	27 02.2	86 52	131.5	26 36.5	86 51	131.7	26 10.6	86 51	132.0	25 44.8	86 51	132.3	25 18.9	86 51	132.6	24 53.0	86 50	132.9	24 27.1	87 50	133.1	24 01.1	87 50	133.4	2
3	26 31.4	85 52	130.5	26 05.7	86 52	130.8	25 40.0	86 52	131.1	25 14.3	86 52	131.4	24 48.6	86 51	131.6	24 22.8	86 51	131.9	23 57.0	86 51	132.2	23 31.1	86 51	132.5	3
4	26 00.0	85 53	129.6	25 34.5	85 53	129.8	25 09.0	85 52	130.1	24 43.4	85 52	130.4	24 17.8	85 52	130.7	23 52.1	86 52	131.0	23 26.5	86 52	131.3	23 00.7	86 51	131.6	4
45	25 28.3	85 54	128.6	25 02.9	85 53	128.9	24 37.5	85 53	129.2	24 12.0	85 53	129.5	23 46.5	85 53	129.8	23 21.0	85 53	130.1	22 55.5	85 52	130.4	22 29.9	85 52	130.6	45
6	24 56.1	84 54	127.7	24 30.8	84 54	128.0	24 05.6	84 54	128.3	23 40.2	84 54	128.6	23 14.9	85 53	128.9	22 49.5	85 53	129.2	22 24.1	85 53	129.4	21 58.6	85 53	129.7	6
7	24 23.5	84 55	126.8	23 58.4	84 55	127.1	23 33.2	84 55	127.4	23 08.0	84 54	127.7	22 42.8	84 54	128.0	22 17.6	84 54	128.2	21 52.3	84 54	128.5	21 27.0	84 53	128.8	7
8	23 50.5	83 56	125.9	23 25.5	83 55	126.2	23 00.5	83 55	126.5	22 35.5	84 55	126.8	22 10.4	84 55	127.1	21 45.2	84 55	127.3	21 20.1	84 54	127.6	20 54.9	84 54	127.9	8
9	23 17.2	83 56	125.0	22 52.3	83 56	125.3	22 27.4	83 56	125.6	22 02.5	83 56	125.9	21 37.5	83 55	126.2	21 12.5	83 55	126.5	20 47.5	83 55	126.7	20 22.4	84 55	127.0	9
50	22 43.5	82 57	124.1	22 18.7	83 57	124.4	21 53.9	83 56	124.7	21 29.1	83 56	125.0	21 04.3	83 56	125.3	20 39.4	83 56	125.6	20 14.5	83 56	125.9	19 49.6	83 55	126.2	50
1	22 09.4	82 57	123.2	21 44.8	82 57	123.5	21 20.1	82 57	123.8	20 55.4	82 57	124.1	20 30.7	82 57	124.4	20 05.9	83 56	124.7	19 41.2	83 56	125.0	19 16.4	83 56	125.3	1
2	21 35.0	82 58	122.3	21 10.5	82 58	122.6	20 45.9	82 58	122.9	20 21.4	82 57	123.2	19 56.8	82 57	123.5	19 32.1	82 57	123.8	19 07.5	82 57	124.1	18 42.8	82 57	124.4	2
3	21 00.2	81 58	121.4	20 35.8	81 58	121.7	20 11.4	81 58	122.0	19 46.9	82 58	122.3	19 22.5	82 58	122.7	18 58.0	82 58	123.0	18 33.4	82 57	123.3	18 08.9	82 57	123.6	3
4	20 25.1	81 59	120.6	20 00.8	81 59	120.9	19 36.5	81 59	121.2	19 12.2	81 58	121.5	18 47.9	81 58	121.8	18 23.5	81 58	122.1	17 59.0	81 58	122.4	17 34.6	82 58	122.7	4
55	19 49.7	80 59	119.7	19 25.6	81 59	120.0	19 01.4	81 59	120.3	18 37.2	81 59	120.6	18 12.9	81 59	120.9	17 48.6	81 59	121.3	17 24.3	81 58	121.6	17 00.0	81 58	121.9	55
6	19 14.0	80 60	118.8	18 50.0	80 60	119.2	18 25.9	80 60	119.5	18 01.8	80 59	119.8	17 37.7	81 59	120.1	17 13.5	81 59	120.4	16 49.3	81 59	120.7	16 25.1	81 59	121.0	6
7	18 38.0	80 60	118.0	18 14.1	80 60	118.3	17 50.1	80 60	118.6	17 26.1	80 60	119.0	17 02.1	80 60	119.3	16 38.1	80 60	119.6	16 14.0	80 59	119.9	15 49.9	80 59	120.2	7
8	18 01.8	79 61	117.2	17 37.9	79 61	117.5	17 14.1	80 61	117.8	16 50.2	80 60	118.1	16 26.3	80 60	118.4	16 02.3	80 60	118.8	15 38.4	80 60	119.1	15 14.4	80 60	119.4	8
9	17 25.2	79 61	116.3	17 01.5	79 61	116.7	16 37.8	79 61	117.0	16 14.0	79 61	117.3	15 50.2	79 61	117.6	15 26.3	80 60	117.9	15 02.4	80 60	118.2	14 38.6	80 60	118.6	9
60	16 48.4	79 62	115.5	16 24.8	79 62	115.8	16 01.2	79 61	116.2	15 37.5	79 61	116.5	15 13.8	79 61	116.8	14 50.0	79 61	117.1	14 26.3	79 61	117.4	14 02.5	79 61	117.7	60
1	16 11.4	78 62	114.7	15 47.9	78 62	115.0	15 24.3	79 62	115.3	15 00.7	79 62	115.7	14 37.1	79 62	116.0	14 13.5	79 61	116.3	13 49.8	79 61	116.6	13 26.1	79 61	116.9	1
2	15 34.1	78 63	113.9	15 10.7	78 62	114.2	14 47.2	78 62	114.5	14 23.7	78 62	114.9	14 00.2	78 62	115.2	13 36.7	78 62	115.5	13 13.1	79 62	115.8	12 49.5	79 61	116.1	2
3	14 56.6	78 63	113.1	14 33.2	78 63	113.4	14 09.9	78 63	113.7	13 46.5	78 62	114.1	13 23.0	78 62	114.4	12 59.6	78 62	114.7	12 36.1	78 62	115.0	12 12.7	78 62	115.3	3
4	14 18.8	77 63	112.3	13 55.5	78 63	112.6	13 32.3	78 63	112.9	13 09.0	78 63	113.3	12 45.7	78 63	113.6	12 22.3	78 63	113.9	11 58.9	78 62	114.2	11 35.6	78 62	114.5	4
65	13 40.8	77 64	111.5	13 17.7	77 64	111.8	12 54.5	77 63	112.1	12 31.3	77 63	112.5	12 08.0	77 63	112.8	11 44.8	78 63	113.1	11 21.5	78 63	113.4	10 58.2	78 63	113.8	65
6	13 02.6	77 64	110.7	12 39.6	77 64	111.0	12 16.5	77 64	111.4	11 53.4	77 64	111.7	11 30.2	77 63	112.0	11 07.0	77 63	112.3	10 43.9	77 63	112.6	10 20.6	77 63	113.0	6
7	12 24.3	77 64	109.9	12 01.3	77 64	110.2	11 38.3	77 64	110.6	11 15.2	77 64	110.9	10 52.2	77 64	111.2	10 29.1	77 64	111.5	10 06.0	77 63	111.9	9 42.9	77 63	112.2	7
8	11 45.7	76 65	109.1	11 22.8	76 64	109.5	10 59.9	76 64	109.8	10 36.9	77 64	110.1	10 13.9	77 64	110.4	9 50.9	77 64	110.8	9 27.9	77 64	111.1	9 04.9	77 64	111.4	8
9	11 07.0	76 65	108.4	10 44.1	76 65	108.7	10 21.3	76 65	109.0	9 58.4	76 64	109.3	9 35.5	76 64	109.7	9 12.6	76 64	110.0	8 49.6	76 64	110.3	8 26.7	77 64	110.7	9
70	10 28.0	76 65	107.6	10 05.3	76 65	107.9	9 42.5	76 65	108.2	9 19.7	76 65	108.6	8 56.9	76 65	108.9	8 34.0	76 65	109.2	8 11.2	76 64	109.6	7 48.3	76 64	109.9	70
1	9 48.9	76 65	106.8	9 26.2	76 65	107.2	9 03.5	76 65	107.5	8 40.8	76 65	107.8	8 18.1	76 65	108.1	7 55.3	76 65	108.5	7 32.5	76 65	108.8	7 09.7	76 65	109.1	1
2	9 09.7	75 66	106.1	8 47.1	75 66	106.4	8 24.4	76 65	106.7	8 01.8	76 65	107.1	7 39.1	76 65	107.4	7 16.4	76 65	107.7	6 53.7	76 65	108.0	6 31.0	76 65	108.4	2
3	8 30.3	75 66	105.3	8 07.7	75 66	105.6	7 45.2	75 66	106.0	7 22.6	75 66	106.3	7 00.0	75 66	106.6	6 37.3	75 65	107.0	6 14.7	75 65	107.3	5 52.1	76 65	107.6	3
4	7 50.8	75 66	104.5	7 28.3	75 66	104.9	7 05.7	75 66	105.2	6 43.2	75 66	105.5	6 20.7	75 66	105.9	5 58.1	75 66	106.2	5 35.6	75 65	106.5	5 13.0	75 66	106.9	4
75	7 11.1	75 66	103.8	6 48.6	75 66	104.1	6 26.2	75 66	104.5	6 03.7	75 66	104.8	5 41.2	75 66	105.1	5 18.8	75 66	105.5							75
6	6 31.3	75 67	103.0	6 08.9	75 66	103.4	5 46.5	75 66	103.7	5 24.1	75 66	104.0	5 01.7	75 66	104.4										6
7	5 51.4	74 67	102.3	5 29.0	74 67	102.6	5 06.7	74 66	103.0																7
8	5 11.3	74 67	101.5																						8

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Lat. 47°

H.A.	8° 00′				8° 30′				9° 00′				9° 30′			
°	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °
00	51 09.0	1.0	01	180.0	51 30.0	1.0	01	180.0	52 00.0	1.0	01	180.0	52 30.0	1.0	01	180.0
1	50 59.4	1.0	03	178.4	51 29.4	1.0	03	178.4	51 59.4	1.0	03	178.4	52 29.4	1.0	03	178.4
2	50 57.8	1.0	05	176.9	51 27.7	1.0	05	176.8	51 57.7	1.0	05	176.8	52 27.7	1.0	05	176.8
3	50 54.9	1.0	07	175.3	51 24.9	1.0	07	175.2	51 54.8	1.0	07	175.2	52 24.8	1.0	07	175.1
4	50 51.0	1.0	08	173.7	51 20.9	1.0	08	173.7	51 50.9	1.0	09	173.6	52 20.8	1.0	09	173.5
05	50 46.0	1.0	10	172.2	51 15.9	1.0	10	172.1	51 45.7	1.0	10	172.0	52 15.6	1.0	11	171.9
6	50 39.9	99	12	170.6	51 09.7	99	12	170.5	51 39.5	99	12	170.4	52 09.3	99	12	170.3
7	50 32.6	99	14	169.1	51 02.4	99	14	168.9	51 32.1	99	14	168.8	52 01.8	99	14	168.7
8	50 24.3	99	16	167.5	50 54.0	99	16	167.4	51 23.6	99	16	167.3	51 53.3	99	16	167.2
9	50 14.9	99	17	166.0	50 44.5	99	18	165.8	51 14.1	99	18	165.7	51 43.6	99	18	165.6
10	50 04.5	98	19	164.5	50 34.0	98	19	164.3	51 03.4	98	19	164.2	51 32.9	98	20	164.0
1	49 53.0	98	21	162.9	50 22.4	98	21	162.8	50 51.8	98	21	162.6	51 21.1	98	21	162.5
2	49 40.5	98	23	161.4	50 09.8	98	23	161.3	50 39.0	97	23	161.1	51 08.3	97	23	160.9
3	49 27.0	97	24	160.0	49 56.1	97	24	159.8	50 25.3	97	25	159.6	50 54.4	97	25	159.4
4	49 12.5	97	26	158.5	49 41.5	97	26	158.3	50 10.5	97	26	158.1	50 39.5	97	26	157.9
15	48 57.0	96	27	157.0	49 25.9	96	28	156.8	49 54.7	96	28	156.6	50 23.6	96	28	156.4
6	48 40.5	96	29	155.6	49 09.3	96	29	155.4	49 38.0	96	29	155.1	50 06.7	96	30	154.9
7	48 23.2	95	30	154.2	48 51.8	95	31	153.9	49 20.3	95	31	153.7	49 48.9	95	31	153.5
8	48 04.9	95	32	152.7	48 33.3	95	32	152.5	49 01.7	95	32	152.3	49 30.1	95	33	152.0
9	47 45.7	94	33	151.3	48 14.0	94	34	151.1	48 42.2	94	34	150.8	49 10.5	94	34	150.6
20	47 25.6	94	35	150.0	47 53.8	94	35	149.7	48 21.9	94	35	149.4	48 49.9	94	36	149.2
1	47 04.7	93	36	148.6	47 32.7	93	36	148.3	48 00.6	93	37	148.1	48 28.6	93	37	147.8
2	46 43.0	93	38	147.2	47 10.8	93	38	147.0	47 38.6	93	38	146.7	48 06.3	92	38	146.4
3	46 20.4	92	39	145.9	46 48.1	92	39	145.6	47 15.7	92	39	145.3	47 43.3	92	40	145.1
4	45 57.1	92	40	144.6	46 24.6	92	40	144.3	46 52.1	91	41	144.0	47 19.4	91	41	143.7
25	45 33.0	91	41	143.3	46 00.4	91	42	143.0	46 27.6	91	42	142.7	46 54.9	91	42	142.4
6	45 08.2	91	43	142.0	45 35.4	90	43	141.7	46 02.5	90	43	141.4	46 29.5	90	43	141.1
7	44 42.7	90	44	140.8	45 09.7	90	44	140.4	45 36.6	90	44	140.1	46 03.5	89	45	139.8
8	44 16.5	89	45	139.5	44 43.3	89	45	139.2	45 10.0	89	45	138.9	45 36.7	89	46	138.6
9	43 49.6	89	46	138.3	44 16.2	89	46	138.0	44 42.8	89	46	137.6	45 09.3	88	47	137.3
30	43 22.0	88	47	137.1	43 48.5	88	47	136.7	44 14.9	88	48	136.4	44 41.2	88	48	136.1
1	42 53.8	88	48	135.9	43 20.1	88	48	135.5	43 46.4	87	49	135.2	44 12.5	87	49	134.9
2	42 25.0	87	49	134.7	42 51.2	87	49	134.4	43 17.2	87	50	134.0	43 43.2	87	50	133.7
3	41 55.7	87	50	133.5	42 21.6	86	50	133.2	42 47.5	86	50	132.9	43 13.4	86	51	132.5
4	41 25.7	86	51	132.4	41 51.5	86	51	132.1	42 17.2	86	51	131.7	42 42.9	85	52	131.4
35	40 55.2	86	52	131.3	41 20.9	85	52	130.9	41 46.4	85	52	130.6	42 11.9	85	52	130.2
6	40 24.2	85	53	130.2	40 49.7	85	53	129.8	41 15.1	85	53	129.4	41 40.4	84	53	129.1
7	39 52.7	84	53	129.1	40 18.0	84	54	128.7	40 43.2	84	54	128.3	41 08.4	84	54	128.0
8	39 20.6	84	54	128.0	39 45.8	84	54	127.6	40 10.9	84	55	127.3	40 35.9	83	55	126.9
9	38 48.2	83	55	126.9	39 13.2	83	55	126.5	39 38.1	83	55	126.2	40 03.0	83	56	125.8
40	38 15.2	83	56	125.8	38 40.1	83	56	125.5	39 04.9	83	56	125.1	39 29.6	82	56	124.8
1	37 41.8	82	56	124.8	38 06.5	82	57	124.4	38 31.2	82	57	124.1	38 55.8	82	57	123.7
2	37 08.0	82	57	123.8	37 32.6	82	57	123.4	37 57.1	82	58	123.1	38 21.5	81	58	122.7
3	36 33.8	82	58	122.8	36 58.2	81	58	122.4	37 22.6	81	58	122.0	37 46.9	81	58	121.7
4	35 59.2	81	58	121.8	36 23.5	81	59	121.4	36 47.7	81	59	121.0	37 11.9	80	59	120.7
45	35 24.2	81	59	120.8	35 48.4	80	59	120.4	36 12.5	80	59	120.1	36 36.5	80	60	119.7
6	34 48.9	80	59	119.8	35 12.9	80	60	119.4	35 36.9	80	60	119.1	36 00.8	80	60	118.7
7	34 13.2	80	60	118.9	34 37.1	80	60	118.5	35 01.0	79	60	118.1	35 24.7	79	61	117.7
8	33 37.2	79	61	117.9	34 01.0	79	61	117.5	34 24.7	79	61	117.2	34 48.3	79	61	116.8
9	33 00.9	79	61	117.0	33 24.6	79	61	116.6	33 48.1	79	61	116.2	34 11.7	78	62	115.9
50	32 24.3	79	62	116.0	32 47.8	78	62	115.7	33 11.3	78	62	115.3	33 34.7	78	62	114.9
1	31 47.4	78	62	115.1	32 10.8	78	62	114.8	32 34.2	78	62	114.4	32 57.5	78	62	114.0
2	31 10.2	78	62	114.2	31 33.5	78	63	113.8	31 56.8	77	63	113.5	32 19.9	77	63	113.1
3	30 32.8	77	63	113.3	30 56.0	77	63	113.0	31 19.1	77	63	112.6	31 42.2	77	63	112.2
4	29 55.0	77	63	112.4	30 18.2	77	63	112.1	30 41.2	77	64	111.7	31 04.2	76	64	111.3
55	29 17.1	77	64	111.6	29 40.1	77	64	111.2	30 03.1	76	64	110.8	30 25.9	76	64	110.4
6	28 38.9	76	64	110.7	29 01.9	76	64	110.3	29 24.7	76	64	110.0	29 47.5	76	64	109.6
7	28 00.6	76	64	109.8	28 23.4	76	64	109.5	28 46.1	76	65	109.1	29 08.8	76	65	108.7
8	27 22.0	76	65	109.0	27 44.7	76	65	108.6	28 07.4	75	65	108.2	28 30.0	75	65	107.9
9	26 43.2	76	65	108.1	27 05.8	75	65	107.8	27 28.4	75	65	107.4	27 51.0	75	65	107.0
60	26 04.2	75	65	107.3	26 26.8	75	65	106.9	26 49.3	75	66	106.6	27 11.7	75	66	106.2
1	25 25.0	75	66	106.5	25 47.5	75	66	106.1	26 10.0	75	66	105.7	26 32.4	75	66	105.4
2	24 45.7	75	66	105.7	25 08.1	75	66	105.3	25 30.5	74	66	104.9	25 52.8	74	66	104.6
3	24 06.2	75	66	104.8	24 28.6	74	66	104.5	24 50.9	74	66	104.1	25 13.2	74	66	103.7
4	23 26.6	74	66	104.0	23 48.9	74	66	103.7	24 11.1	74	66	103.3	24 33.3	74	67	102.9
65	22 46.8	74	66	103.2	23 09.1	74	67	102.9	23 31.3	74	67	102.5	23 53.4	74	67	102.1
6	22 06.9	74	67	102.4	22 29.1	74	67	102.1	22 51.3	74	67	101.7	23 13.3	74	67	101.3
7	21 26.9	74	67	101.7	21 49.1	74	67	101.3	22 11.1	74	67	100.9	22 33.2	73	67	100.6
8	20 46.8	74	67	100.9	21 08.9	73	67	100.5	21 30.9	73	67	100.1	21 52.9	73	67	99.8
9	20 06.6	74	67	100.1	20 28.6	73	67	99.7	20 50.6	73	67	99.4	21 12.5	73	67	99.0
70	19 26.2	73	67	99.3	19 48.2	73	67	99.0	20 10.2	73	68	98.6	20 32.1	73	68	98.2
1	18 45.8	73	68	98.6	19 07.8	73	68	98.2	19 29.7	73	68	97.8	19 51.5	73	68	97.5
2	18 05.3	73	68	97.8	18 27.2	73	68	97.4	18 49.1	73	68	97.1	19 10.9	73	68	96.7
3	17 24.7	73	68	97.0	17 46.6	73	68	96.7	18 08.4	73	68	96.3	18 30.2	73	68	96.0
4	16 44.1	73	68	96.3	17 05.9	73	68	95.9	17 27.7	73	68	95.6	17 49.5	73	68	95.2
75	16 03.4	73	68	95.5	16 25.2	73	68	95.2	16 47.0	73	68	94.8	17 08.7	72	68	94.4
6	15 22.6	73	68	94.8	15 44.4	73	68	94.4	16 06.2	72	68	94.1	16 27.9	72	68	93.7
7	14 41.8	73	68	94.0	15 03.6	73	68	93.7	15 25.4	72	68	93.3	15 47.1	72	68	93.0
8	14 01.0	73	68	93.3	14 22.8	73	68	92.9	14 44.5	72	68	92.6	15 06.2	72	68	92.2
9	13 20.1	73	68	92.5	13 41.9	72	68	92.2	14 03.6	72	68	91.8	14 25.3	72	68	91.5
80	12 39.2	73	68	91.8	13 01.0	72	68	91.5	13 22.7	72	68	91.1	13 44.4	72	68	90.7
1	11 58.3	73	68	91.1	12 20.1	72	68	90.7	12 41.8	72	68	90.4	13 03.5	72	68	90.0
2	11 17.4	72	68	90.3	11 39.1	72	68	90.0	12 00.9	72	68	89.6	12 22.5	72	68	89.3
3	10 36.5	72	68	89.6	10 58.2	72	68	89.3	11 19.9	72	68	88.9	11 41.6	72	68	88.6
4	9 55.6	73	68	88.9	10 17.3	72	68	88.5	10 39.0	72	68	88.2	11 00.7	72	68	87.8
85	9 14.7	73	68	88.2	9 36.4	72	68	87.8	9 58.1	72	68	87.5	10 19.9	72	68	87.1
6	8 33.8	73	68	87.4	8 55.5	72	68	87.1	9 17.3	72	68	86.7	9 39.0	72	68	86.4
7	7 52.9	73	68	86.7	8 14.7	73	68	86.4	8 36.4	72	68	86.0	8 58.2	72	68	85.7
8	7 12.1	73	68	86.0	7 33.9	73	68	85.6	7 55.6	73	68	85.3	8 17.4	72	68	84.9
9	6 31.3	73	68	85.2	6 53.1	73	68	84.9	7 14.9	73	68	84.6	7 36.7	73	68	84.2
90	5 50.5	73	68	84.5	6 12.4	73	68	84.2	6 34.2	73	68	83.8	6 56.0	73	68	83.5

10° 00′				10° 30′				11° 00′				11° 30′				H.A.
Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	°
53 00.0	1.0	01	180.0	53 30.0	1.0	01	180.0	54 00.0	1.0	01	180.0	54 30.0	1.0	01	180.0	00
52 59.4	1.0	03	178.4	53 29.4	1.0	03	178.3	53 59.4	1.0	03	178.3	54 29.4	1.0	03	178.3	1
52 57.7	1.0	05	176.7	53 27.6	1.0	05	176.7	53 57.6	1.0	05	176.7	54 27.6	1.0	05	176.6	2
52 54.7	1.0	07	175.1	53 24.7	1.0	07	175.0	53 54.6	1.0	07	175.0	54 24.6	1.0	07	174.9	3
52 50.7	1.0	09	173.5	53 20.6	1.0	09	173.4	53 50.5	1.0	09	173.3	54 20.4	1.0	09	173.3	4
52 45.4	1.0	11	171.8	53 15.3	1.0	11	171.8	53 45.1	99	11	171.7	54 15.0	99	11	171.6	05
52 39.1	99	12	170.2	53 08.9	99	13	170.1	53 38.6	99	13	170.0	54 08.4	99	13	169.9	6
52 31.6	99	14	168.6	53 01.3	99	15	168.5	53 31.0	99	15	168.4	54 00.7	99	15	168.3	7
52 22.9	99	16	167.0	52 52.6	99	16	166.9	53 22.2	99	17	166.8	53 51.8	99	17	166.6	8
52 13.2	98	18	165.4	52 42.7	98	18	165.3	53 12.2	98	18	165.1	53 41.8	98	19	165.0	9
52 02.4	98	20	163.9	52 31.8	98	20	163.7	53 01.2	98	20	163.5	53 30.6	98	20	163.4	10
51 50.4	98	22	162.3	52 19.8	98	22	162.1	52 49.1	98	22	161.9	53 18.4	98	22	161.8	1
51 37.5	97	23	160.7	52 06.7	97	24	160.6	52 35.8	97	24	160.4	53 05.0	97	24	160.2	2
51 23.5	97	25	159.2	51 52.5	97	25	159.0	52 21.6	97	26	158.8	52 50.6	97	26	158.6	3
51 08.4	96	27	157.7	51 37.4	96	27	157.5	52 06.3	96	27	157.3	52 35.1	96	27	157.0	4
50 52.4	96	28	156.2	51 21.2	96	29	156.0	51 49.9	96	29	155.7	52 18.7	96	29	155.5	15
50 35.4	96	30	154.7	51 04.0	95	30	154.5	51 32.6	95	30	154.2	52 01.2	95	31	154.0	6
50 17.4	95	32	153.2	50 45.9	95	32	153.0	51 14.3	95	32	152.7	51 42.8	95	32	152.5	7
49 58.5	94	33	151.8	50 26.8	94	33	151.5	50 55.1	94	34	151.2	51 23.4	94	34	151.0	8
49 38.7	94	34	150.3	50 06.8	94	35	150.1	50 35.0	94	35	149.8	51 03.1	94	35	149.5	9
49 18.0	93	36	148.9	49 46.0	93	36	148.6	50 13.9	93	37	148.3	50 41.8	93	37	148.1	20
48 56.4	93	37	147.5	49 24.2	93	38	147.2	49 52.0	93	38	146.9	50 19.8	92	38	146.6	1
48 34.0	92	39	146.1	49 01.7	92	39	145.8	49 29.3	92	39	145.5	49 56.8	92	40	145.2	2
48 10.8	92	40	144.8	48 38.3	92	40	144.5	49 05.7	91	41	144.1	49 33.1	91	41	143.8	3
47 46.8	91	41	143.4	48 14.1	91	42	143.1	48 41.3	91	42	142.8	49 08.5	91	42	142.5	4
47 22.0	90	43	142.1	47 49.1	90	43	141.8	48 16.2	90	43	141.4	48 43.2	90	43	141.1	25
46 56.5	90	44	140.8	47 23.5	90	44	140.5	47 50.3	90	44	140.1	48 17.2	89	45	139.8	6
46 30.3	89	45	139.5	46 57.1	89	45	139.2	47 23.8	89	45	138.8	47 50.4	89	46	138.5	7
46 03.4	89	46	138.2	46 29.9	89	46	137.9	46 56.5	88	47	137.5	47 22.9	88	47	137.2	8
45 35.8	88	47	137.0	46 02.2	88	47	136.6	46 28.5	88	48	136.3	46 54.8	88	48	135.9	9
45 07.5	88	48	135.7	45 33.8	87	48	135.4	45 59.9	87	49	135.0	46 26.0	87	49	134.7	30
44 38.7	87	49	134.5	45 04.7	87	49	134.2	45 30.7	87	50	133.8	45 56.6	86	50	133.5	1
44 09.2	86	50	133.3	44 35.1	86	50	133.0	45 00.9	86	51	132.6	45 26.6	86	51	132.3	2
43 39.1	86	51	132.2	44 04.9	86	51	131.8	44 30.5	85	52	131.4	44 56.1	85	52	131.1	3
43 08.5	85	52	131.0	43 34.1	85	52	130.6	43 59.5	85	52	130.3	44 24.9	85	53	129.9	4
42 37.4	85	53	129.9	43 02.8	84	53	129.5	43 28.1	84	53	129.1	43 53.3	84	54	128.8	35
42 05.7	84	54	128.7	42 30.9	84	54	128.4	42 56.1	84	54	128.0	43 21.1	83	54	127.6	6
41 33.5	84	54	127.6	41 58.6	83	55	127.3	42 23.6	83	55	126.9	42 48.5	83	55	126.5	7
41 00.9	83	55	126.5	41 25.8	83	55	126.2	41 50.6	83	56	125.8	42 15.3	82	56	125.4	8
40 27.8	83	56	125.5	40 52.5	82	56	125.1	41 17.2	82	56	124.7	41 41.8	82	57	124.3	9
39 54.2	82	57	124.4	40 18.8	82	57	124.0	40 43.3	82	57	123.6	41 07.8	81	57	123.3	40
39 20.3	82	57	123.3	39 44.7	81	58	123.0	40 09.1	81	58	122.6	40 33.3	81	58	122.2	1
38 45.9	81	58	122.3	39 10.2	81	58	121.9	39 34.4	81	58	121.6	39 58.5	80	59	121.2	2
38 11.1	81	59	121.3	38 35.2	80	59	120.9	38 59.3	80	59	120.5	39 23.3	80	59	120.1	3
37 36.0	80	59	120.3	38 00.0	80	59	119.9	38 23.9	80	60	119.5	38 47.8	79	60	119.1	4
37 00.4	80	60	119.3	37 24.3	79	60	118.9	37 48.1	79	60	118.5	38 11.8	79	60	118.2	45
36 24.6	79	60	118.3	36 48.3	79	60	117.9	37 12.0	79	61	117.6	37 35.6	79	61	117.2	6
35 48.4	79	61	117.4	36 12.0	79	61	117.0	36 35.6	78	61	116.6	36 59.0	78	61	116.2	7
35 11.9	78	61	116.4	35 35.4	78	62	116.0	35 58.8	78	62	115.6	36 22.2	78	62	115.3	8
34 35.1	78	62	115.5	34 58.5	78	62	115.1	35 21.8	78	62	114.7	35 45.0	77	62	114.3	9
33 58.0	78	62	114.5	34 21.3	77	62	114.2	34 44.5	77	63	113.8	35 07.6	77	63	113.4	50
33 20.7	77	63	113.6	33 43.8	77	63	113.2	34 06.9	77	63	112.9	34 29.9	77	63	112.5	1
32 43.1	77	63	112.7	33 06.1	77	63	112.3	33 29.1	76	63	112.0	33 52.0	76	64	111.6	2
32 05.2	77	64	111.8	32 28.1	76	64	111.4	32 51.0	76	64	111.1	33 13.8	76	64	110.7	3
31 27.1	76	64	110.9	31 49.9	76	64	110.6	32 12.7	76	64	110.2	32 35.4	76	64	109.8	4
30 48.8	76	64	110.1	31 11.5	76	64	109.7	31 34.2	76	65	109.3	31 56.8	75	65	108.9	55
30 10.2	76	65	109.2	30 32.9	75	65	108.8	30 55.5	75	65	108.4	31 18.0	75	65	108.1	6
29 31.5	75	65	108.3	29 54.1	75	65	108.0	30 16.6	75	65	107.6	30 39.0	75	65	107.2	7
28 52.5	75	65	107.5	29 15.0	75	65	107.1	29 37.5	75	65	106.7	29 59.8	74	66	106.4	8
28 13.4	75	66	106.7	28 35.8	75	66	106.3	28 58.2	74	66	105.9	29 20.5	74	66	105.5	9
27 34.1	75	66	105.8	27 56.5	74	66	105.4	28 18.8	74	66	105.1	28 41.0	74	65	104.7	60
26 54.7	74	66	105.0	27 17.0	74	66	104.6	27 39.2	74	66	104.2	28 01.3	74	66	103.9	1
26 15.1	74	66	104.2	26 37.3	74	66	103.8	26 59.4	74	66	103.4	27 21.5	74	67	103.0	2
25 35.4	74	66	103.4	25 57.5	74	67	103.0	26 19.6	74	67	102.6	26 41.6	73	67	102.2	3
24 55.5	74	67	102.6	25 17.6	74	67	102.2	25 39.6	73	67	101.8	26 01.5	73	67	101.4	4
24 15.5	74	67	101.8	24 37.5	73	67	101.4	24 59.5	73	67	101.0	25 21.4	73	67	100.6	65
23 35.4	73	67	101.0	23 57.3	73	67	100.6	24 19.3	73	67	100.2	24 41.1	73	67	99.9	6
22 55.1	73	67	100.2	23 17.1	73	67	99.8	23 38.9	73	67	99.4	24 00.8	73	67	99.1	7
22 14.8	73	67	99.4	22 36.7	73	67	99.0	22 58.5	73	67	98.7	23 20.3	72	68	98.3	8
21 34.4	73	68	98.6	21 56.2	73	68	98.3	22 18.0	73	68	97.9	22 39.8	72	68	97.5	9
20 53.9	73	68	97.9	21 15.7	73	68	97.5	21 37.5	72	68	97.1	21 59.2	72	68	96.8	70
20 13.3	73	68	97.1	20 35.1	72	68	96.7	20 56.8	72	68	96.4	21 18.5	72	68	96.0	1
19 32.7	73	68	96.3	19 54.4	72	68	96.0	20 16.1	72	68	95.6	20 37.8	72	68	95.2	2
18 52.0	72	68	95.6	19 13.7	72	68	95.2	19 35.4	72	68	94.9	19 57.0	72	68	94.5	3
18 11.2	72	68	94.8	18 32.9	72	68	94.5	18 54.6	72	68	94.1	19 16.2	72	68	93.7	4
17 30.5	72	68	94.1	17 52.1	72	68	93.7	18 13.8	72	68	93.4	18 35.3	72	68	93.0	75
16 49.6	72	68	93.3	17 11.3	72	68	93.0	17 32.9	72	68	92.6	17 54.5	72	68	92.3	6
16 08.8	72	68	92.6	16 30.4	72	68	92.2	16 52.0	72	68	91.9	17 13.6	72	68	91.5	7
15 27.9	72	68	91.9	15 49.5	72	68	91.5	16 11.1	72	68	91.1	16 32.7	72	68	90.8	8
14 47.0	72	68	91.1	15 08.6	72	68	90.8	15 30.2	72	68	90.4	15 51.7	72	68	90.0	9
14 06.0	72	68	90.4	14 27.7	72	68	90.0	14 49.3	72	68	89.7	15 10.8	72	68	89.3	80
13 25.1	72	68	89.7	13 46.7	72	68	89.3	14 08.3	72	68	88.9	14 29.9	72	68	88.6	1
12 44.2	72	68	88.9	13 05.8	72	68	88.6	13 27.4	72	68	88.2	13 49.0	72	68	87.9	2
12 03.3	72	68	88.2	12 24.9	72	68	87.9	12 46.5	72	68	87.5	13 08.1	72	68	87.1	3
11 22.4	72	68	87.5	11 44.1	72	68	87.1	12 05.7	72	68	86.8	12 27.3	72	68	86.4	4
10 41.5	72	68	86.8	11 03.2	72	68	86.4	11 24.8	72	68	86.0	11 46.5	72	68	85.7	85
10 00.7	72	68	86.0	10 22.4	72	68	85.7	10 44.0	72	68	85.3	11 05.7	72	68	85.0	6
9 19.9	72	68	85.3	9 41.6	72	68	85.0	10 03.3	72	68	84.6	10 24.9	72	68	84.3	7
8 39.1	72	68	84.6	9 00.9	72	68	84.2	9 22.6	72	68	83.9	9 44.2	72	68	83.5	8
7 58.4	73	68	83.9	8 20.2	72	68	83.5	8 41.9	72	68	83.2	9 03.6	72	68	82.8	9
7 17.8	73	68	83.1	7 39.5	73	68	82.8	8 01.3	72	68	82.4	8 23.0	72	68	82.1	90

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H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
00	35 00.0	1.0 01	180.0	34 30.0	1.0 01	180.0	34 00.0	1.0 01	180.0	33 30.0	1.0 01	180.0	33 00.0	1.0 01	180.0	32 30.0	1.0 01	180.0	32 00.0	1.0 01	180.0	31 30.0	1.0 01	180.0	00
1	34 59.6	1.0 02	178.8	34 29.6	1.0 02	178.8	33 59.6	1.0 02	178.8	33 29.6	1.0 02	178.8	32 59.6	1.0 02	178.8	32 29.6	1.0 02	178.8	31 59.6	1.0 02	178.8	31 29.6	1.0 02	178.9	1
2	34 58.3	1.0 04	177.6	34 28.3	1.0 04	177.6	33 58.3	1.0 04	177.6	33 28.3	1.0 04	177.6	32 58.3	1.0 03	177.7	32 28.3	1.0 03	177.7	31 58.3	1.0 03	177.7	31 28.4	1.0 03	177.7	2
3	34 56.1	1.0 05	176.4	34 26.1	1.0 05	176.4	33 56.2	1.0 05	176.4	33 26.2	1.0 05	176.5	32 56.2	1.0 05	176.5	32 26.3	1.0 05	176.5	31 56.3	1.0 05	176.5	31 26.3	1.0 05	176.6	3
4	34 53.1	1.0 06	175.2	34 23.2	1.0 06	175.2	33 53.2	1.0 06	175.2	33 23.2	1.0 06	175.3	32 53.3	1.0 06	175.3	32 23.3	1.0 06	175.3	31 53.4	1.0 06	175.4	31 23.4	1.0 06	175.4	4
05	34 49.2	1.0 08	174.0	34 19.3	1.0 08	174.0	33 49.4	1.0 08	174.1	33 19.5	1.0 08	174.1	32 49.5	1.0 08	174.1	32 19.6	1.0 08	174.2	31 49.7	1.0 08	174.2	31 19.8	1.0 07	174.3	05
6	34 44.5	1.0 09	172.8	34 14.6	1.0 09	172.8	33 44.7	1.0 09	172.9	33 14.8	1.0 09	172.9	32 44.9	1.0 09	173.0	32 15.0	1.0 09	173.0	31 45.2	1.0 09	173.1	31 15.3	1.0 09	173.1	6
7	34 38.9	99 11	171.6	34 09.1	99 11	171.6	33 39.2	1.0 11	171.7	33 09.4	1.0 10	171.7	32 39.5	1.0 10	171.8	32 09.7	1.0 10	171.9	31 39.8	1.0 10	171.9	31 10.0	1.0 10	172.0	7
8	34 32.5	99 12	170.4	34 02.7	99 12	170.4	33 32.9	99 12	170.5	33 03.1	99 12	170.6	32 33.3	99 12	170.6	32 03.5	99 12	170.7	31 33.7	99 12	170.8	31 03.8	99 12	170.8	8
9	34 25.2	99 14	169.2	33 55.5	99 13	169.3	33 25.7	99 13	169.3	32 56.0	99 13	169.4	32 26.2	99 13	169.5	31 56.5	99 13	169.6	31 26.7	99 13	169.6	30 56.9	99 13	169.7	9
10	34 17.1	99 15	168.0	33 47.4	99 15	168.1	33 17.7	99 15	168.2	32 48.0	99 15	168.2	32 18.3	99 14	168.3	31 48.6	99 14	168.4	31 18.9	99 14	168.5	30 49.2	99 14	168.6	10
1	34 08.2	99 16	166.8	33 38.6	99 16	166.9	33 08.9	99 16	167.0	32 39.3	99 16	167.1	32 09.7	99 16	167.2	31 40.0	99 16	167.3	31 10.4	99 16	167.4	30 40.7	99 16	167.4	1
2	33 58.4	99 18	165.6	33 28.9	99 17	165.7	32 59.3	99 17	165.8	32 29.7	99 17	165.9	32 00.2	99 17	166.0	31 30.6	99 17	166.1	31 01.0	99 17	166.2	30 31.4	99 17	166.3	2
3	33 47.9	98 19	164.5	33 18.4	98 19	164.6	32 48.9	98 19	164.7	32 19.4	98 19	164.8	31 49.9	98 18	164.9	31 20.4	98 18	165.0	30 50.9	98 18	165.1	30 21.4	98 18	165.2	3
4	33 36.5	98 20	163.3	33 07.1	98 20	163.4	32 37.7	98 20	163.5	32 08.3	98 20	163.6	31 38.8	98 20	163.7	31 09.4	98 20	163.9	30 40.0	98 19	164.0	30 10.5	98 19	164.1	4
15	33 24.3	98 22	162.1	32 55.0	98 21	162.2	32 25.7	98 21	162.4	31 56.3	98 21	162.5	31 27.0	98 21	162.6	30 57.6	98 21	162.7	30 28.3	98 21	162.9	29 58.9	98 21	163.0	15
6	33 11.4	97 23	161.0	32 42.2	97 23	161.1	32 12.9	98 23	161.2	31 43.7	98 22	161.4	31 14.4	98 22	161.5	30 45.1	98 22	161.6	30 15.8	98 22	161.7	29 46.6	98 22	161.9	6
7	32 57.7	97 24	159.8	32 28.5	97 24	160.0	31 59.4	97 24	160.1	31 30.2	97 24	160.2	31 01.0	97 24	160.4	30 31.8	97 23	160.5	30 02.6	97 23	160.6	29 33.5	97 23	160.8	7
8	32 43.2	97 25	158.7	32 14.1	97 26	158.8	31 45.0	97 25	159.0	31 16.0	97 25	159.1	30 46.9	97 25	159.3	30 17.8	97 25	159.4	29 48.7	97 24	159.5	29 19.6	97 24	159.7	8
9	32 27.9	96 27	157.5	31 58.9	97 26	157.7	31 30.0	97 26	157.8	31 01.0	97 26	158.0	30 32.0	97 26	158.1	30 03.0	97 26	158.3	29 34.0	97 26	158.4	29 05.0	97 26	158.6	9
20	32 11.9	96 28	156.4	31 43.0	96 28	156.6	31 14.2	96 28	156.7	30 45.3	96 27	156.9	30 16.4	96 27	157.0	29 47.5	96 27	157.2	29 18.6	96 27	157.4	28 49.7	96 27	157.5	20
1	31 55.1	96 29	155.3	31 26.4	96 29	155.5	30 57.7	96 29	155.6	30 28.9	96 29	155.8	30 00.1	96 28	155.9	29 31.3	96 28	156.1	29 02.5	96 28	156.3	28 33.7	96 28	156.4	1
2	31 37.7	96 30	154.2	31 09.0	96 30	154.3	30 40.4	96 30	154.5	30 11.8	96 30	154.7	29 43.1	96 30	154.9	29 14.4	96 29	155.0	28 45.7	96 29	155.2	28 17.0	96 29	155.4	2
3	31 19.5	95 31	153.1	30 51.0	96 31	153.2	30 22.4	96 31	153.4	29 53.9	96 31	153.6	29 25.4	95 31	153.8	28 56.8	96 30	154.0	28 28.2	96 30	154.1	27 59.6	96 30	154.3	3
4	31 00.6	96 33	152.0	30 32.2	96 32	152.2	30 03.8	96 32	152.3	29 35.4	96 32	152.5	29 06.9	96 32	152.7	28 38.5	96 32	152.9	28 10.0	96 31	153.1	27 41.5	96 31	153.2	4
25	30 41.0	94 34	150.9	30 12.8	94 34	151.1	29 44.5	94 33	151.3	29 16.2	94 33	151.5	28 47.8	94 33	151.6	28 19.5	94 33	151.8	27 51.1	96 33	152.0	27 22.8	96 32	152.2	25
6	30 20.8	94 35	149.8	29 52.6	94 35	150.0	29 24.5	94 34	150.2	28 56.3	94 34	150.4	28 28.1	94 34	150.6	27 59.9	94 34	150.8	27 31.6	94 34	151.0	27 03.4	94 33	151.2	6
7	29 59.9	93 36	148.7	29 31.8	93 36	148.9	29 03.8	94 36	149.1	28 35.7	94 35	149.3	28 07.6	94 35	149.5	27 39.6	94 35	149.7	27 11.4	94 35	149.9	26 43.3	94 34	150.1	7
8	29 38.3	93 37	147.7	29 10.4	93 37	147.9	28 42.5	93 37	148.1	28 14.5	93 36	148.3	27 46.6	93 36	148.5	27 18.6	93 36	148.7	26 50.6	93 36	148.9	26 22.6	93 36	149.1	8
9	29 16.1	93 38	146.6	28 48.3	93 38	146.8	28 20.5	93 38	147.0	27 52.7	93 37	147.3	27 24.9	93 37	147.5	26 57.0	93 37	147.7	26 29.2	93 37	147.9	26 01.3	93 37	148.1	9
30	28 53.3	92 39	145.6	28 25.6	92 39	145.8	27 58.0	92 39	146.0	27 30.3	92 38	146.2	27 02.6	92 38	146.4	26 34.8	92 38	146.7	26 07.1	93 38	146.9	25 39.3	93 38	147.1	30
1	28 29.8	92 40	144.5	28 02.3	92 40	144.8	27 34.8	92 40	145.0	27 07.2	92 39	145.2	26 39.6	92 39	145.4	26 12.1	92 39	145.6	25 44.4	92 39	145.9	25 16.8	92 39	146.1	1
2	28 05.8	91 41	143.5	27 38.4	91 41	143.7	27 11.0	91 41	144.0	26 43.6	91 40	144.2	26 16.1	92 40	144.4	25 48.7	92 40	144.6	25 21.2	92 40	144.9	24 53.7	92 40	145.1	2
3	27 41.1	91 42	142.5	27 13.9	91 42	142.7	26 46.6	91 42	142.9	26 19.3	91 41	143.2	25 52.0	91 41	143.4	25 24.7	91 41	143.6	24 57.3	91 41	143.9	24 30.0	91 40	144.1	3
4	27 15.9	90 43	141.5	26 48.8	90 43	141.7	26 21.7	90 42	141.9	25 54.5	91 42	142.2	25 27.3	91 42	142.4	25 00.1	91 42	142.6	24 32.9	91 42	142.9	24 05.7	91 41	143.1	4
35	26 50.2	90 44	140.5	26 23.2	90 44	140.7	25 56.2	90 43	141.0	25 29.2	90 43	141.2	25 02.1	90 43	141.4	24 35.0	90 43	141.7	24 07.9	90 43	141.9	23 40.8	90 42	142.1	35
6	26 23.8	89 45	139.5	25 57.0	90 45	139.7	25 30.1	90 44	140.0	25 03.2	90 44	140.2	24 36.3	90 44	140.5	24 09.4	90 44	140.7	23 42.4	90 43	140.9	23 15.4	90 43	141.2	6
7	25 57.0	89 46	138.5	25 30.3	89 45	138.7	25 03.5	89 45	139.0	24 36.8	89 45	139.2	24 10.0	89 45	139.5	23 43.2	89 44	139.7	23 16.4	89 44	140.0	22 49.5	90 44	140.2	7
8	25 29.6	89 46	137.5	25 03.0	89 46	137.8	24 36.4	89 46	138.0	24 09.8	89 46	138.3	23 43.2	89 46	138.5	23 16.5	89 45	138.8	22 49.8	89 45	139.0	22 23.1	89 45	139.3	8
9	25 01.7	88 47	136.5	24 35.3	88 47	136.8	24 08.8	88 47	137.1	23 42.3	88 47	137.3	23 15.8	88 46	137.6	22 49.3	88 46	137.8	22 22.7	89 46	138.1	21 56.1	89 46	138.3	9
40	24 33.3	88 48	135.6	24 07.0	88 48	135.9	23 40.7	88 48	136.1	23 14.3	88 47	136.4	22 48.0	88 47	136.6	22 21.6	88 47	136.9	21 55.1	88 47	137.1	21 28.7	88 47	137.4	40
1	24 04.4	87 49	134.6	23 38.3	87 49	134.9	23 12.1	87 48	135.2	22 45.9	87 48	135.4	22 19.6	88 48	135.7	21 53.4	88 48	136.0	21 27.1	88 48	136.2	21 00.7	88 47	136.5	1
2	23 35.1	87 50	133.7	23 09.1	87 49	134.0	22 43.0	87 49	134.2	22 16.9	87 49	134.5	21 50.8	87 49	134.8	21 24.7	87 49	135.0	20 58.5	87 48	135.3	20 32.3	87 48	135.6	2
3	23 05.3	86 50	132.8	22 39.4	86 50	133.0	22 13.5	86 50	133.3	21 47.5	87 50	133.6	21 21.5	87 50	133.8	20 55.5	87 49	134.1	20 29.5	87 49	134.4	20 03.4	87 49	134.6	3
4	22 35.0	86 51	131.8	22 09.2	86 51	132.1	21 43.5	86 51	132.4	21 17.6	86 50	132.7	20 51.8	86 50	132.9	20 25.9	86 50	133.2	20 00.0	86 50	133.5	19 34.1	86 50	133.7	4
45	22 04.3	85 52	130.9	21 38.7	85 52	131.2	21 13.0	86 51	131.5	20 47.3	86 51	131.8	20 21.6	86 51	132.0	19 55.9	86 51	132.3	19 30.1	86 51	132.6	19 04.3	86 50	132.8	45
6	21 33.2	85 53	130.0	21 07.7	85 52	130.3	20 42.1	85 52	130.6	20 16.6	85 52	130.9	19 51.0	85 52	131.1	19 25.4	85 52	131.4	18 59.8	85 51	131.7	18 34.1	86 51	132.0	6
7	21 01.6	85 53	129.1	20 36.3	85 53	129.4	20 10.9	85 53	129.7	19 45.4	85 53	130.0	19 20.0	85 52	130.2	18 54.5	85 52	130.5	18 29.0	85 52	130.8	18 03.5	85 52	131.1	7
8	20 29.7	84 54	128.2	20 04.4	84 54	128.5	19 39.2	84 53	128.8	19 13.9	84 53	129.1	18 48.5	84 53	129.4	18 23.2	85 53	129.6	17 57.8	85 53	129.9	17 32.4	85 52	130.2	8
9	19 57.3	84 55	127.3	19 32.2	84 54	127.6	19 07.1	84 54	127.9	18 41.9	84 54	128.2	18 16.7	84 54	128.5	17 51.5	84 54	128.8	17 26.2	84 53	129.1	17 01.0	84 53	129.3	9
50	19 24.6	83 55	126.5	18 59.6	83 55	126.8	18 34.6	83 55	127.0	18 09.6	84 55	127.3	17 44.5	84 54	127.6	17 19.4	84 54	127.9	16 54.3	84 54	128.2	16 29.1	84 54	128.5	50
1	18 51.5	83 56	125.6	18 26.6	83 56	125.9	18 01.8	83 55	126.2	17 36.8	83 55	126.5	17 11.9	83 55	126.8	16 46.9	83 55	127.0	16 21.9	83 55	127.3	15 56.9	83 54	127.6	1
2	18 18.1	82 56	124.7	17 53.3	83 56	125.0	17 28.5	83 56	125.3	17 03.7	83 56	125.6	16 38.9	83 56	125.9	16 14.1	83 55	126.2	15 49.2	83 55	126.5	15 24.3	83 55	126.8	2
3	17 44.3	82 57	123.9	17 19.6	82 57	124.2	16 55.0	82 57	124.5	16 30.3	82 56	124.8	16 05.6	82 56	125.1	15 40.9	82 56	125.4	15 16.1	83 56	125.6	14 51.4	83 56	125.9	3
4	17 10.1	82 57	123.0	16 45.6	82 57	123.3	16 21.1	82 57	123.6	15 56.5	82 57	123.9	15 31.9	82 57	124.2	15 07.3	82 56	124.5	14 42.7	82 56	124.8	14 18.0	82 56	125.1	4
55	16 35.6	81 58	122.2	16 11.2	81 58	122.5	15 46.8	81 58	122.8	15 22.4	82 57	123.1	14 57.9	82 57	123.4	14 33.4	82 57	123.7	14 08.9	82 57	124.0	13 44.4	82 57	124.3	55
6	16 00.8	81 58	121.3	15 36.6	81 58	121.6	15 12.3	81 58	121.9	14 47.9	81 58	122.3	14 23.6	81 58	122.6	13 59.2	81 58	122.9	13 34.8	81 57	123.2	13 10.4	81 57	123.5	6
7	15 25.7	80 59	120.5	15 01.6	81 59	120.8	14 37.4	81 59	121.1	14 13.2	81 58	121.4	13 49.0	81 58	121.7	13 24.7	81 58	122.0	13 00.4	81 58	122.3	12 36.1	81 58	122.6	7
8	14 50.3	80 60	119.7	14 26.3	80 59	120.0	14 02.2	80 59	120.3	13 38.1	80 59	120.6	13 14.0	80 59	120.9	12 49.9	81 59	121.2	12 25.7	81 58	121.5	12 01.5	81 58	121.8	8
9	14 14.6	80 60	118.9	13 50.7	80 60	119.2	13 26.7	80 60	119.5	13 02.7	80 59	119.8	12 38.7	80 59	120.1	12 14.7	80 59	120.4	11 50.7	80 59	120.7	11 26.6	80 59	121.0	9
60	13 38.7	79 60	118.1	13 14.8	79 60	118.4	12 51.0	80 60	118.7	12 27.1	80 60	119.0	12 03.2	80 60	119.3	11 39.3	80 60	119.6	11 15.3	80 59	119.9	10 51.4	80 59	120.2	60
1	13 02.4	79 61	117.2	12 38.7	79 61	117.6	12 14.9	79 60	117.9	11 51.2	79 60	118.2	11 27.4	79 60	118.5	11 03.6	79 60	118.8	10 39.7	79 60	119.1	10 15.9	80 60	119.4	1
2	12 25.9	79 61	116.4	12 02.3	79 61	116.8	11 38.6	79 61	117.1	11 15.0	79 61	117.4	10 51.3	79 61	117.7	10 27.6	79 60	118.0	10 03.8	79 60	118.3	9 40.1	79 60	118.6	2
3	11 49.1	78 62	115.7	11 25.6	78 62	116.0	11 02.1	79 61	116.3	10 38.5	79 61	116.6	10 14.9	79 61	116.9	9 51.3	79 61	117.2	9 27.7	79 61	117.5	9 04.0	79 61	117.9	3
4	11 12.1	78 62	114.9	10 48.7	78 62	115.2	10 25.3	78 62	115.5	10 01.8	78 62	115.8	9 38.3	78 61	116.1	9 14.8	78 61	116.4	8 51.3	78 61	116.8	8 27.7	78 61	117.1	4
65	10 34.9	78 62	114.1	10 11.6	78 62	114.4	9 48.2	78 62	114.7	9 24.8	78 62	115.0	9 01.4	78 62	115.3	8 38.0	78 62	115.7	8 14.6	78 62	116.0	7 51.2	78 61	116.3	65
6	9 57.4	77 63	113.3	9 34.2	78 63	113.6	9 10.9	78 63	113.9	8 47.6	78 62	114.3	8 24.3	78 62	114.6	8 01.0	78 62	114.9	7 37.7	78 62	115.2	7 14.4	78 62	115.5	6
7	9 19.7	77 63	112.5	8 56.6	77 63	112.8	8 33.4	77 63	113.2	8 10.2	77 63	113.5	7 47.0	77 63	113.8	7 23.8	77 62	114.1	7 00.6	77 62	114.4	6 37.3	77 62	114.8	7
8	8 41.8	77 64	111.7	8 18.8	77 63	112.1	7 55.7	77 63	112.4	7 32.6	77 63	112.7	7 09.5	77 63	113.0	6 46.3	77 63	113.4	6 23.2	77 63	113.7	6 00.1	77 62	114.0	8
9	8 03.7	77 64	111.0	7 40.7	77 64	111.3	7 17.7	77 64	111.6	6 54.7	77 63	111.9	6 31.7	77 63	112.3	6 08.7	77 63	112.6	5 45.6	77 63	112.9	5 22.6	77 63	113.2	9
70	7 25.4	76 64	110.2	7 02.5	76 64	110.5	6 39.6	76 64	110.9	6 16.7	76 64	111.2	5 53.7	76 64	111.5	5 30.8	77 64	111.8	5 07.8	77 63	112.2				70
1	6 46.9	76 64	109.5	6 24.1	76 64	109.8	6 01.3	76 64	110.1	5 38.4	76 64	110.4	5 15.6	76 64	110.8										1
2	6 08.2	76 65	108.7	5 45.5	76 65	109.0	5 22.7	76 64	109.4	5 00.0	76 64	109.7													2
3	5 29.4	76 65	107.9	5 06.7	76 65	108.3																			3

DECLINATION SAME NAME AS LATITUDE

H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
91	5 00.8	73 68	83.8	5 31.7	73 68	83.5	5 53.5	73 68	83.1	6 15.4	73 68	82.8	6 37.2	73 68	82.4	6 59.0	73 68	82.1	7 20.8	73 67	81.7	7 42.6	73 67	81.4	91
2							5 12.9	73 68	82.4	5 34.8	73 68	82.0	5 56.6	73 67	81.7	6 18.5	73 67	81.4	6 40.3	73 67	81.0	7 02.1	73 67	80.7	2
3													5 16.2	73 67	81.0	5 38.1	73 67	80.6	5 59.9	73 67	80.3	6 21.8	73 67	79.9	3
4																			5 19.7	73 67	79.6	5 41.6	73 67	79.2	4
95																						5 01.4	73 67	78.5	95

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Lat. 47°

H.A.	12° 00′			12° 30′			13° 00′			13° 30′			14° 00′			14° 30′			15° 00′			15° 30′			H.A.
	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	
°	′	Δ	°	′	Δ	°	′	Δ	°	′	Δ	°	′	Δ	°	′	Δ	°	′	Δ	°	′	Δ	°	
00	55 00.0	1.0 01	180.0	55 30.0	1.0 01	180.0	56 00.0	1.0 01	180.0	56 30.0	1.0 01	180.0	57 00.0	1.0 01	180.0	57 30.0	1.0 01	180.0	58 00.0	1.0 01	180.0	58 30.0	1.0 01	180.0	00
1	54 59.4	1.0 03	178.3	55 29.4	1.0 03	178.3	55 59.4	1.0 03	178.3	56 29.4	1.0 03	178.2	56 59.4	1.0 03	178.2	57 29.4	1.0 03	178.2	57 59.3	1.0 03	178.2	58 29.3	1.0 03	178.2	1
2	54 57.6	1.0 05	176.6	55 27.5	1.0 05	176.6	55 57.5	1.0 05	176.5	56 27.5	1.0 05	176.5	56 57.5	1.0 05	176.4	57 27.4	1.0 05	176.4	57 57.4	1.0 05	176.4	58 27.4	1.0 05	176.3	2
3	54 54.5	1.0 07	174.9	55 24.5	1.0 07	174.8	55 54.4	1.0 07	174.8	56 24.3	1.0 07	174.7	56 54.3	1.0 07	174.7	57 24.2	1.0 07	174.6	57 54.2	1.0 08	174.5	58 24.1	1.0 08	174.5	3
4	54 50.3	1.0 09	173.2	55 20.2	1.0 09	173.1	55 50.1	1.0 09	173.0	56 20.0	1.0 09	173.0	56 49.8	1.0 09	172.9	57 19.7	1.0 10	172.8	57 49.6	1.0 10	172.7	58 19.5	1.0 10	172.6	4
05	54 44.8	99 11	171.5	55 14.7	99 11	171.4	55 44.5	99 11	171.3	56 14.3	99 11	171.2	56 44.2	99 12	171.1	57 14.0	99 12	171.0	57 43.8	99 12	170.9	58 13.6	99 12	170.8	05
6	54 38.2	99 13	169.8	55 08.0	99 13	169.7	55 37.7	99 13	169.6	56 07.5	99 13	169.5	56 37.2	99 14	169.4	57 07.0	99 14	169.3	57 36.7	99 14	169.1	58 06.4	99 14	169.0	6
7	54 30.4	99 15	168.2	55 00.1	99 15	168.0	55 29.7	99 15	167.9	55 59.4	99 15	167.8	56 29.1	99 16	167.6	56 58.7	99 16	167.5	57 28.4	99 16	167.4	57 58.0	99 16	167.2	7
8	54 21.4	99 17	166.5	54 51.0	99 17	166.3	55 20.6	99 17	166.2	55 50.2	99 17	166.1	56 19.7	99 18	165.9	56 49.3	99 18	165.7	57 18.8	99 18	165.6	57 48.3	99 18	165.4	8
9	54 11.3	98 19	164.8	54 40.8	98 19	164.7	55 10.2	98 19	164.5	55 39.7	98 19	164.4	56 09.2	98 20	164.2	56 38.6	98 20	164.0	57 08.0	98 20	163.8	57 37.4	98 20	163.6	9
10	54 00.0	98 21	163.2	54 29.4	98 21	163.0	54 58.7	98 21	162.9	55 28.1	98 21	162.7	55 57.4	98 21	162.5	56 26.7	98 22	162.3	56 56.0	98 22	162.1	57 25.3	98 22	161.9	10
1	53 47.6	98 22	161.6	54 16.9	97 23	161.4	54 46.1	97 23	161.2	55 15.3	97 23	161.0	55 44.5	97 23	160.8	56 13.7	97 24	160.6	56 42.9	97 24	160.4	57 12.0	97 24	160.2	1
2	53 34.2	97 24	160.0	54 03.3	97 24	159.8	54 32.4	97 25	159.6	55 01.5	97 25	159.3	55 30.5	97 25	159.1	55 59.5	97 26	158.9	56 28.5	97 26	158.7	56 57.5	97 26	158.4	2
3	53 19.6	97 26	158.4	53 48.6	97 26	158.2	54 17.5	96 26	157.9	54 46.5	96 27	157.7	55 15.4	96 27	157.5	55 44.3	96 27	157.2	56 13.1	96 28	157.0	56 41.9	96 28	156.7	3
4	53 04.0	96 28	156.8	53 32.8	96 28	156.6	54 01.6	96 28	156.3	54 30.4	96 28	156.1	54 59.2	96 29	155.9	55 27.9	96 29	155.6	55 56.6	96 29	155.3	56 25.2	96 30	155.1	4
15	52 47.4	96 29	155.3	53 16.1	96 30	155.0	53 44.7	96 30	154.8	54 13.3	95 30	154.5	54 41.9	95 30	154.2	55 10.5	95 31	154.0	55 39.0	95 31	153.7	56 07.4	95 31	153.4	15
6	52 29.8	95 31	153.7	52 58.3	95 31	153.5	53 26.8	95 32	153.2	53 55.2	95 32	152.9	54 23.6	95 32	152.7	54 52.0	95 32	152.4	55 20.3	94 33	152.1	55 48.6	94 33	151.8	6
7	52 11.1	95 33	152.2	52 39.5	94 33	151.9	53 07.8	94 33	151.7	53 36.1	94 33	151.4	54 04.3	94 34	151.1	54 32.5	94 34	150.8	55 00.7	94 34	150.5	55 28.8	94 35	150.2	7
8	51 51.6	94 34	150.7	52 19.8	94 34	150.4	52 47.9	94 35	150.1	53 16.0	94 35	149.8	53 44.1	93 35	149.5	54 12.1	93 36	149.2	54 40.0	93 36	148.9	55 07.9	93 36	148.6	8
9	51 31.1	93 36	149.2	51 59.1	93 36	148.9	52 27.1	93 36	148.6	52 55.0	93 37	148.3	53 22.8	93 37	148.0	53 50.7	93 37	147.7	54 18.4	92 38	147.4	54 46.2	92 38	147.1	9
20	51 09.7	93 37	147.8	51 37.5	93 37	147.5	52 05.3	93 38	147.2	52 33.0	92 38	146.8	53 00.7	92 38	146.5	53 28.4	92 39	146.2	53 55.9	92 39	145.9	54 23.4	92 39	145.5	20
1	50 47.5	92 38	146.3	51 15.1	92 39	146.0	51 42.7	92 39	145.7	52 10.2	92 39	145.4	52 37.7	92 40	145.0	53 05.2	91 40	144.7	53 32.5	91 40	144.4	53 59.8	91 41	144.0	1
2	50 24.3	92 40	144.9	50 51.8	91 40	144.6	51 19.2	91 40	144.3	51 46.6	91 41	143.9	52 13.9	91 41	143.6	52 41.1	91 41	143.3	53 08.3	90 42	142.9	53 35.4	90 42	142.5	2
3	50 00.4	91 41	143.5	50 27.7	91 42	143.2	50 54.9	91 42	142.9	51 22.1	90 42	142.5	51 49.2	90 42	142.2	52 16.2	90 43	141.8	52 43.2	90 43	141.5	53 10.1	90 44	141.1	3
4	49 35.7	90 42	142.1	50 02.8	90 43	141.8	50 29.8	90 43	141.5	50 56.8	90 43	141.1	51 23.7	90 44	140.8	51 50.5	89 44	140.4	52 17.3	89 44	140.0	52 44.0	89 45	139.7	4
25	49 10.2	90 44	140.8	49 37.1	90 44	140.4	50 03.9	89 44	140.1	50 30.7	89 45	139.7	50 57.4	89 45	139.4	51 24.0	89 45	139.0	51 50.6	88 46	138.6	52 17.1	88 46	138.3	25
6	48 43.9	89 45	139.5	49 10.7	89 45	139.1	49 37.3	89 46	138.8	50 03.9	88 46	138.4	50 30.4	88 46	138.0	50 56.8	88 47	137.7	51 23.2	88 47	137.3	51 49.5	88 47	136.9	6
7	48 17.0	89 46	138.1	48 43.5	88 46	137.8	49 10.0	88 47	137.4	49 36.4	88 47	137.1	50 02.7	88 47	136.7	50 28.9	87 48	136.3	50 55.1	87 48	135.9	51 21.2	87 48	135.5	7
8	47 49.3	88 47	136.8	48 15.7	88 48	136.5	48 41.9	87 48	136.1	49 08.1	87 48	135.8	49 34.3	87 48	135.4	50 00.3	87 49	135.0	50 26.3	86 49	134.6	50 52.2	86 49	134.2	8
9	47 21.0	87 48	135.6	47 47.2	87 49	135.2	48 13.3	87 49	134.8	48 39.3	87 49	134.5	49 05.2	86 50	134.1	49 31.1	86 50	133.7	49 56.8	86 50	133.3	50 22.5	86 50	132.9	9
30	46 52.1	87 49	134.3	47 18.0	86 50	134.0	47 43.9	86 50	133.6	48 09.8	86 50	133.2	48 35.5	86 51	132.8	49 01.2	85 51	132.4	49 26.7	85 51	132.0	49 52.2	85 51	131.6	30
1	46 22.5	86 50	133.1	46 48.3	86 51	132.7	47 14.0	86 51	132.3	47 39.6	85 51	132.0	48 05.2	85 52	131.6	48 30.7	85 52	131,2	48 56.1	85 52	130.8	49 21.4	84 52	130.4	1
2	45 52.3	85 51	131.9	46 17.9	85 52	131.5	46 43.5	85 52	131.1	47 08.9	85 52	130.7	47 34.3	84 52	130.3	47 59.6	84 53	129.9	48 24.8	84 53	129.5	48 49.9	84 53	129.1	2
3	45 21.6	85 52	130.7	45 47.0	85 52	130.3	46 12.4	84 53	129.9	46 37.6	84 53	129.5	47 02.8	84 53	129.1	47 27.9	84 54	128.7	47 52.9	83 54	128.3	48 17.9	83 54	127.9	3
4	44 50.3	84 53	129.5	45 15.5	84 53	129.1	45 40.7	84 54	128.8	46 05.8	84 54	128.4	46 30.8	83 54	128.0	46 55.7	83 54	127.6	47 20.6	83 55	127.1	47 45.3	82 55	126.7	4
35	44 18.5	84 54	128.4	44 43.5	83 54	128.0	45 08.5	83 54	127.6	45 33.5	83 55	127.2	45 58.3	83 55	126.8	46 23.1	82 55	126.4	46 47.7	82 56	126.0	47 12.3	82 56	125.6	35
6	43 46.1	83 55	127.2	44 11.0	83 55	126.8	44 35.9	83 55	126.5	45 00.6	82 56	126.1	45 25.3	82 56	125.7	45 49.9	82 56	125.2	46 14.4	81 56	124.8	46 38.8	81 57	124.4	6
7	43 13.3	83 55	126.1	43 38.0	82 56	125.7	44 02.7	82 56	125.3	44 27.3	82 56	124.9	44 51.8	82 57	124.5	45 16.2	81 57	124.1	45 40.5	81 57	123.7	46 04.8	81 57	123.3	7
8	42 40.0	82 56	125.0	43 04.6	82 56	124.6	43 29.1	82 57	124.2	43 53.5	81 57	123.8	44 17.9	81 57	123.4	44 42.1	81 58	123.0	45 06.3	80 58	122.6	45 30.4	80 58	122.2	8
9	42 06.3	82 57	123.9	42 30.7	81 57	123.5	42 55.1	81 57	123.1	43 19.3	81 58	122.7	43 43.5	80 58	122.3	44 07.6	80 58	121.9	44 31.6	80 58	121.5	44 55.5	80 59	121.1	9
40	41 32.1	81 58	122.9	41 56.4	81 58	122.5	42 20.6	81 58	122.1	42 44.7	80 58	121.7	43 08.7	80 59	121.3	43 32.7	80 59	120.8	43 56.5	79 59	120.4	44 20.3	79 59	120.0	40
1	40 57.5	81 58	121.8	41 21.7	80 58	121.4	41 45.7	80 59	121.0	42 09.7	80 59	120.6	42 33.6	79 59	120.2	42 57.3	79 59	119.8	43 21.0	79 60	119.4	43 44.6	79 60	118.9	1
2	40 22.6	80 59	120.8	40 46.6	80 59	120.4	41 10.5	80 59	120.0	41 34.3	79 60	119.6	41 58.0	79 60	119.2	42 21.6	79 60	118.8	42 45.2	78 60	118.3	43 08.7	78 61	117.9	2
3	39 47.2	80 60	119.8	40 11.1	79 60	119.4	40 34.8	79 60	119.0	40 58.5	79 60	118.6	41 22.1	78 60	118.1	41 45.6	78 61	117.7	42 09.0	78 61	117.3	42 32.3	78 61	116.9	3
4	39 11.5	79 60	118.8	39 35.2	79 60	118.4	39 58.9	79 61	118.0	40 22.4	78 61	117.5	40 45.8	78 61	117.1	41 09.2	78 61	116.7	41 32.5	77 61	116.3	41 55.7	77 62	115.9	4
45	38 35.5	79 61	117.8	38 59.1	78 61	117.4	39 22.6	78 61	117.0	39 46.0	78 61	116.6	40 09.3	78 61	116.1	40 32.5	77 62	115.7	40 55.6	77 62	115.3	41 18.7	77 62	114.9	45
6	37 59.1	78 61	116.8	38 22.6	78 61	116.4	38 45.9	78 62	116.0	39 09.2	77 62	115.6	39 32.4	77 62	115.2	39 55.5	77 62	114.8	40 18.5	77 62	114.3	40 41.4	76 63	113.9	6
7	37 22.4	78 62	115.8	37 45.8	78 62	115.4	38 09.0	77 62	115.0	38 32.1	77 62	114.6	38 55.2	77 62	114.2	39 18.2	76 63	113.8	39 41.1	76 63	113.4	40 03.9	76 63	112.9	7
8	36 45.5	77 62	114.9	37 08.7	77 62	114.5	37 31.8	77 62	114.1	37 54.8	77 63	113.7	38 17.7	76 63	113.3	38 40.6	76 63	112.8	39 03.4	76 63	112.4	39 26.1	75 63	112.0	8
9	36 08.2	77 63	113.9	36 31.3	77 63	113.5	36 54.3	77 63	113.1	37 17.2	76 63	112.7	37 40.0	76 63	112.3	38 02.8	76 63	111.9	38 25.4	75 64	111.5	38 48.0	75 64	111.1	9
50	35 30.7	77 63	113.0	35 53.6	76 63	112.6	36 16.5	76 63	112.2	36 39.3	76 64	111.8	37 02.0	76 64	111.4	37 24.7	75 64	111.0	37 47.2	75 64	110.6	38 09.7	75 64	110.1	50
1	34 52.9	76 63	112.1	35 15.7	76 64	111.7	35 38.5	76 64	111.3	36 01.2	76 64	110.9	36 23.8	75 64	110.5	36 46.4	75 64	110.1	37 08.8	75 64	109.7	37 31.2	74 65	109.2	1
2	34 14.8	76 64	111.2	34 37.6	76 64	110.8	35 00.3	75 64	110.4	35 22.9	75 64	110.0	35 45.4	75 64	109.6	36 07.8	75 65	109.2	36 30.2	74 65	108.8	36 52.4	74 65	108.3	2
3	33 36.6	76 64	110.3	33 59.2	75 64	109.9	34 21.8	75 64	109.5	34 44.3	75 65	109.1	35 06.7	75 65	108.7	35 29.1	74 65	108.3	35 51.3	74 65	107.9	36 13.5	74 65	107.4	3
4	32 58.1	75 64	109.4	33 20.6	75 65	109.0	33 43.1	75 65	108.6	34 05.5	75 65	108.2	34 27.9	74 65	107.8	34 50.1	74 65	107.4	35 12.3	74 65	107.0	35 34.4	73 66	106.6	4
55	32 19.4	75 65	108.5	32 41.8	75 65	108.1	33 04.2	75 65	107.7	33 26.6	74 65	107.3	33 48.8	74 65	106.9	34 11.0	74 66	106.5	34 33.1	73 66	106.1	34 55.1	73 66	105.7	55
6	31 40.5	75 65	107.7	32 02.9	75 65	107.3	32 25.2	74 65	106.9	32 47.4	74 66	106.5	33 09.6	74 66	106.1	33 31.7	73 66	105.7	33 53.7	73 66	105.3	34 15.6	73 66	104.9	6
7	31 01.4	74 65	106.8	31 23.7	74 66	106.4	31 45.9	74 66	106.0	32 08.1	74 66	105.6	32 30.2	73 66	105.2	32 52.2	73 66	104.8	33 14.1	73 66	104.4	33 36.0	73 66	104.0	7
8	30 22.1	74 66	106.0	30 44.4	74 66	105.6	31 06.5	74 66	105.2	31 28.6	73 66	104.8	31 50.6	73 66	104.4	32 12.5	73 66	104.0	32 34.4	73 66	103.6	32 56.2	72 67	103.2	8
9	29 42.7	74 66	105.1	30 04.9	74 66	104.7	30 26.9	73 66	104.3	30 49.0	73 66	104.0	31 10.9	73 66	103.6	31 32.8	73 67	103.2	31 54.6	73 67	102.7	32 16.3	72 67	102.3	9
60	29 03.1	74 66	104.3	29 25.2	73 66	103.9	29 47.2	73 66	103.5	30 09.2	73 67	103.1	30 31.0	73 67	102.7	30 52.8	73 67	102.3	31 14.6	72 67	101.9	31 36.2	72 67	101.5	60
1	28 23.4	74 66	103.5	28 45.4	73 67	103.1	29 07.4	73 67	102.7	29 29.3	73 67	102.3	29 51.1	73 67	101.9	30 12.8	72 67	101.5	30 34.5	72 67	101.1	30 56.1	72 67	100.7	1
2	27 43.5	73 67	102.7	28 05.5	73 67	102.3	28 27.4	73 67	101.9	28 49.2	73 67	101.5	29 11.0	72 67	101.1	29 32.7	72 67	100.7	29 54.3	72 67	100.3	30 15.8	72 67	99.9	2
3	27 03.6	73 67	101.9	27 25.5	73 67	101.5	27 47.3	73 67	101.1	28 09.1	72 67	100.7	28 30.8	72 67	100.3	28 52.4	72 67	99.9	29 14.0	72 67	99.5	29 35.5	72 67	99.1	3
4	26 23.5	73 67	101.1	26 45.3	73 67	100.7	27 07.1	72 67	100.3	27 28.8	72 67	99.9	27 50.5	72 67	99.5	28 12.0	72 67	99.1	28 33.6	72 67	98.7	28 55.0	71 68	98.3	4
65	25 43.2	73 67	100.3	26 05.0	73 67	99.9	26 26.8	72 67	99.5	26 48.4	72 67	99.1	27 10.1	72 67	98.7	27 31.6	72 68	98.3	27 53.1	71 68	97.9	28 14.5	71 68	97.5	65
6	25 02.9	73 67	99.5	25 24.7	72 67	99.1	25 46.4	72 67	98.7	26 08.0	72 68	98.3	26 29.6	72 68	97.9	26 51.1	72 68	97.6	27 12.5	71 68	97.2	27 33.9	71 68	96.8	6
7	24 22.5	72 67	98.7	24 44.2	72 68	98.3	25 05.9	72 68	97.9	25 27.5	72 68	97.6	25 49.0	72 68	97.2	26 10.5	71 68	96.8	26 31.9	71 68	96.4	26 53.2	71 68	96.0	7
8	23 42.0	72 68	97.9	24 03.7	72 68	97.5	24 25.3	72 68	97.2	24 46.9	72 68	96.8	25 08.4	72 68	96.4	25 29.8	71 68	96.0	25 51.2	71 68	95.6	26 12.5	71 68	95.2	8
9	23 01.5	72 68	97.2	23 23.1	72 68	96.8	23 44.7	72 68	96.4	24 06.2	72 68	96.0	24 27.7	71 68	95.6	24 49.1	71 68	95.2	25 10.4	71 68	94.9	25 31.7	71 68	94.5	9
70	22 20.8	72 68	96.4	22 42.4	72 68	96.0	23 04.0	72 68	95.6	23 25.5	72 68	95.3	23 46.9	71 68	94.9	24 08.3	71 68	94.5	24 29.6	71 68	94.1	24 50.9	71 68	93.7	70
1	21 40.1	72 68	95.6	22 01.7	72 68	95.3	22 23.2	72 68	94.9	22 44.7	71 68	94.5	23 06.1	71 68	94.1	23 27.5	71 68	93.7	23 48.8	71 68	93.4	24 10.1	71 68	93.0	1
2	20 59.4	72 68	94.9	21 20.9	72 68	94.5	21 42.4	72 68	94.1	22 03.9	71 68	93.7	22 25.3	71 68	93.4	22 46.6	71 68	93.0	23 07.9	71 68	92.6	23 29.2	71 68	92.2	2
3	20 18.6	72 68	94.1	20 40.1	72 68	93.7	21 01.6	72 68	93.4	21 23.0	71 68	93.0	21 44.4	71 68	92.6	22 05.8	71 68	92.2	22 27.1	71 68	91.9	22 48.3	71 68	91.5	3
4	19 37.8	72 68	93.4	19 59.3	72 68	93.0	20 20.7	71 68	92.6	20 42.2	71 68	92.3	21 03.5	71 68	91.9	21 24.9	71 68	91.5	21 46.1	71 68	91.1	22 07.4	71 68	90.7	4
75	18 56.9	72 68	92.6	19 18.4	72 68	92.3	19 39.9	71 68	91.9	20 01.3	71 68	91.5	20 22.6	71 68	91.1	20 44.0	71 68	90.8	21 05.2	71 68	90.4	21 26.4	71 68	90.0	75
6	18 16.0	72 68	91.9	18 37.5	72 68	91.5	18 59.0	71 68	91.2	19 20.4	71 68	90.8	19 41.7	71 68	90.4	20 03.0	71 68	90.0	20 24.3	71 68	89.7	20 45.5	71 68	89.3	6
7	17 35.1	72 68	91.1	17 56.6	72 68	90.8	18 18.0	71 68	90.4	18 39.4	71 68	90.0	19 00.8	71 68	89.7	19 22.1	71 68	89.3	19 43.4	71 68	88.9	20 04.6	71 68	88.6	7
8	16 54.2	72 68	90.4	17 15.7	72 68	90.1	17 37.1	71 68	89.7	17 58.5	71 68	89.3	18 19.9	71 68	88.9	18 41.2	71 68	88.6	19 02.5	71 68	88.2	19 23.7	71 68	87.8	8
9	16 13.3	72 68	89.7	16 34.8	72 68	89.3	16 56.2	71 68	89.0	17 17.6	71 68	88.6	17 39.0	71 68	88.2	18 00.3	71 68	87.9	18 21.6	71 68	87.5	18 42.8	71 68	87.1	9
80	15 32.3	72 68	89.0	15 53.8	72 68	88.6	16 15.3	71 68	88.2	16 36.7	71 68	87.9	16 58.1	71 68	87.5	17 19.4	71 68	87.1	17 40.7	71 68	86.8	18 02.0	71 68	86.4	80
1	14 51.4	72 68	88.2	15 12.9	72 68	87.9	15 34.4	71 68	87.5	15 55.8	71 68	87.1	16 17.2	71 68	86.8	16 38.6	71 68	86.4	16 59.9	71 68	86.0	17 21.2	71 68	85.7	1
2	14 10.6	72 68	87.5	14 32.1	72 68	87.1	14 53.5	72 68	86.8	15 15.0	71 68	86.4	15 36.4	71 68	86.1	15 57.8	71 68	85.7	16 19.1	71 68	85.3	16 40.4	71 68	85.0	2
3	13 29.7	72 68	86.8	13 51.2	72 68	86.4	14 12.7	72 68	86.1	14 34.2	71 68	85.7	14 55.6	71 68	85.3	15 17.0	71 68	85.0	15 38.3	71 68	84.6	15 59.6	71 68	84.2	3
4	12 48.8	72 68	86.1	13 10.4	72 68	85.7	13 31.9	72 68	85.3	13 53.4	72 68	85.0	14 14.8	71 68	84.6	14 36.2	71 68	84.3	14 57.6	71 68	83.9	15 19.0	71 68	83.5	4
85	12 08.0	72 68	85.3	12 29.6	72 68	85.0	12 51.1	72 68	84.6	13 12.6	72 68	84.3	13 34.1	72 68	83.9	13 55.5	71 68	83.5	14 16.9	71 68	83.2	14 38.3	71 68	82.8	85
6	11 27.3	72 68	84.6	11 48.9	72 68	84.3	12 10.4	72 68	83.9	12 31.9	72 68	83.6	12 53.4	72 68	83.2	13 14.9	72 68	82.8	13 36.3	71 68	82.5	13 57.8	71 68	82.1	6
7	10 46.6	72 68	83.9	11 08.2	72 68	83.5	11 29.8	72 68	83.2	11 51.3	72 68	82.8	12 12.8	72 68	82.5	12 34.3	72 68	82.1	12 55.8	72 67	81.8	13 17.3	71 67	81.4	7
8	10 05.9	72 68	83.2	10 27.5	72 68	82.8	10 49.2	72 68	82.5	11 10.7	72 67	82.1	11 32.3	72 67	81.8	11 53.8	72 67	81.4	12 15.4	72 67	81.1	12 36.8	72 67	80.7	8
9	9 25.3	72 68	82.5	9 47.0	72 68	82.1	10 08.6	72 67	81.8	10 30.2	72 67	81.4	10 51.8	72 67	81.1	11 13.4	72 67	80.7	11 35.0	72 67	80.4	11 56.5	72 67	80.0	9
90	8 44.8	72 67	81.8	9 06.5	72 67	81.4	9 28.2	72 67	81.1	9 49.8	72 67	80.7	10 11.5	72 67	80.3	10 33.1	72 67	80.0	10 54.7	72 67	79.6	11 16.2	72 67	79.3	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	12° 00′ Alt.	Az.	12° 30′ Alt.	Az.	13° 00′ Alt.	Az.	13° 30′ Alt.	Az.	14° 00′ Alt.	Az.	14° 30′ Alt.	Az.	15° 00′ Alt.	Az.	15° 30′ Alt.	Az.	H.A.
°	° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		°
00	31 00.0 1.0 01	180.0	30 30.0 1.0 01	180.0	30 00.0 1.0 01	180.0	29 30.0 1.0 01	180.0	29 00.0 1.0 01	180.0	28 30.0 1.0 01	180.0	28 00.0 1.0 01	180.0	27 30.0 1.0 01	180.0	00
1	30 59.6 1.0 02	178.9	30 29.6 1.0 02	178.9	29 59.6 1.0 02	178.9	29 29.6 1.0 02	178.9	28 59.6 1.0 02	178.9	28 29.6 1.0 02	178.9	27 59.6 1.0 02	178.9	27 29.6 1.0 02	178.9	1
2	30 58.4 1.0 03	177.7	30 28.4 1.0 03	177.7	29 58.4 1.0 03	177.8	29 28.4 1.0 03	177.8	28 58.4 1.0 03	177.8	28 28.4 1.0 03	177.8	27 58.4 1.0 03	177.8	27 28.4 1.0 03	177.8	2
3	30 56.3 1.0 05	176.6	30 26.4 1.0 05	176.6	29 56.4 1.0 05	176.6	29 26.4 1.0 06	176.6	28 56.4 1.0 05	176.7	28 26.5 1.0 05	176.7	27 56.5 1.0 05	176.7	27 26.5 1.0 05	176.7	3
4	30 53.5 1.0 06	175.4	30 23.5 1.0 06	175.5	29 53.6 1.0 06	175.5	29 23.6 1.0 06	175.5	28 53.7 1.0 06	175.6	28 23.7 1.0 06	175.6	27 53.8 1.0 06	175.6	27 23.8 1.0 06	175.7	4
05	30 49.8 1.0 07	174.3	30 19.9 1.0 07	174.3	29 50.0 1.0 07	174.4	29 20.0 1.0 07	174.4	28 50.1 1.0 07	174.5	28 20.2 1.0 07	174.5	27 50.2 1.0 07	174.5	27 20.3 1.0 07	174.6	05
6	30 45.4 1.0 09	173.2	30 15.5 1.0 09	173.2	29 45.6 1.0 09	173.3	29 15.7 1.0 09	173.3	28 45.8 1.0 09	173.4	28 15.9 1.0 08	173.4	27 46.0 1.0 08	173.4	27 16.1 1.0 08	173.5	6
7	30 40.1 1.0 10	172.0	30 10.2 1.0 10	172.1	29 40.4 1.0 10	172.1	29 10.5 1.0 10	172.2	28 40.6 1.0 10	172.3	28 10.8 1.0 10	172.3	27 40.9 1.0 10	172.4	27 11.0 1.0 10	172.4	7
8	30 34.0 99 11	170.9	30 04.2 99 11	171.0	29 34.4 99 11	171.0	29 04.6 99 11	171.1	28 34.7 99 11	171.2	28 04.9 99 11	171.2	27 35.1 99 11	171.3	27 05.3 99 11	171.3	8
9	30 27.2 99 13	169.8	29 57.4 99 13	169.8	29 27.6 99 13	169.9	28 57.8 99 12	170.0	28 28.1 99 12	170.1	27 58.3 99 12	170.1	27 28.5 99 12	170.2	26 58.7 99 12	170.3	9
10	30 19.5 99 14	168.7	29 49.8 99 14	168.7	29 20.1 99 14	168.8	28 50.3 99 14	168.9	28 20.6 99 14	169.0	27 50.9 99 14	169.0	27 21.1 99 14	169.1	26 51.4 99 13	169.2	10
1	30 11.1 99 15	167.5	29 41.4 99 15	167.6	29 11.7 99 15	167.7	28 42.1 99 15	167.8	28 12.4 99 15	167.9	27 42.7 99 15	168.0	27 13.0 99 15	168.0	26 43.4 99 15	168.1	1
2	30 01.8 99 17	166.4	29 32.2 99 17	166.5	29 02.6 99 16	166.6	28 33.0 99 16	166.7	28 03.4 99 16	166.8	27 33.8 99 16	166.9	27 04.2 99 16	167.0	26 34.6 99 16	167.1	2
3	29 51.8 98 18	165.3	29 22.3 98 18	165.4	28 52.8 98 18	165.5	28 23.2 98 18	165.6	27 53.7 98 17	165.7	27 24.1 98 17	165.8	26 54.6 99 17	165.9	26 25.0 99 17	166.0	3
4	29 41.1 98 19	164.2	29 11.6 98 19	164.3	28 42.1 98 19	164.4	28 12.7 98 19	164.5	27 43.2 98 19	164.6	27 13.7 98 19	164.7	26 44.2 98 18	164.8	26 14.8 98 18	164.9	4
15	29 29.5 98 20	163.1	29 00.2 98 20	163.2	28 30.8 98 20	163.3	28 01.4 98 20	163.4	27 32.0 98 20	163.5	27 02.6 98 20	163.7	26 33.2 98 20	163.8	26 03.8 98 20	163.9	15
6	29 17.3 98 22	162.0	28 48.0 98 22	162.1	28 18.7 98 21	162.2	27 49.4 98 21	162.4	27 20.0 98 21	162.5	26 50.7 98 21	162.6	26 21.4 98 21	162.7	25 52.0 98 21	162.8	6
7	29 04.2 97 23	160.9	28 35.0 97 23	161.0	28 05.8 97 23	161.2	27 36.6 97 22	161.3	27 07.4 97 22	161.4	26 38.1 97 22	161.5	26 08.9 98 22	161.7	25 39.6 98 22	161.8	7
8	28 50.5 97 24	159.8	28 21.4 97 24	160.0	27 52.2 97 24	160.1	27 23.1 97 24	160.2	26 53.9 97 24	160.4	26 24.8 97 23	160.5	25 55.6 97 23	160.6	25 26.5 97 23	160.7	8
9	28 36.0 97 25	158.7	28 07.0 97 25	158.9	27 37.9 97 25	159.0	27 08.9 97 25	159.2	26 39.8 97 25	159.3	26 10.8 97 25	159.4	25 41.7 97 24	159.6	25 12.6 97 24	159.7	9
20	28 20.8 96 27	157.7	27 51.9 96 26	157.8	27 22.9 96 26	158.0	26 54.0 97 26	158.1	26 25.0 97 26	158.3	25 56.1 97 26	158.4	25 27.1 97 26	158.5	24 58.1 97 25	158.7	20
1	28 04.9 96 28	156.6	27 36.1 96 28	156.7	27 07.2 96 27	156.9	26 38.4 96 27	157.1	26 09.5 96 27	157.2	25 40.6 96 27	157.4	25 11.8 96 27	157.5	24 42.9 96 26	157.7	1
2	27 48.3 96 29	155.5	27 19.6 96 29	155.7	26 50.8 96 28	155.9	26 22.1 96 28	156.0	25 53.3 96 28	156.2	25 24.6 96 28	156.3	24 55.8 96 28	156.5	24 27.0 96 28	156.6	2
3	27 31.0 95 30	154.5	27 02.4 95 30	154.6	26 33.8 95 30	154.8	26 05.1 95 29	155.0	25 36.5 96 29	155.1	25 07.8 96 29	155.3	24 39.1 96 29	155.5	24 10.4 96 29	155.6	3
4	27 13.0 95 31	153.4	26 44.5 95 31	153.6	26 16.0 95 31	153.8	25 47.5 95 30	153.9	25 18.9 95 30	154.1	24 50.4 95 30	154.3	24 21.8 95 30	154.5	23 53.2 95 30	154.6	4
25	26 54.4 95 32	152.4	26 26.0 95 32	152.6	25 57.6 95 32	152.7	25 29.2 95 32	152.9	25 00.7 95 31	153.1	24 32.3 95 31	153.3	24 03.8 95 31	153.4	23 35.3 95 31	153.6	25
6	26 35.1 94 33	151.3	26 06.8 94 33	151.5	25 38.5 94 33	151.7	25 10.2 94 33	151.9	24 41.9 94 32	152.1	24 13.6 94 32	152.3	23 45.2 95 32	152.4	23 16.8 95 32	152.6	6
7	26 15.2 94 34	150.3	25 47.0 94 34	150.5	25 18.8 94 34	150.7	24 50.6 94 34	150.9	24 22.4 94 34	151.1	23 54.2 94 33	151.3	23 26.0 94 33	151.4	22 57.7 94 33	151.6	7
8	25 54.6 93 35	149.3	25 26.5 94 35	149.5	24 58.5 94 35	149.7	24 30.4 94 35	149.9	24 02.3 94 35	150.1	23 34.2 94 34	150.3	23 06.1 94 34	150.5	22 38.0 94 34	150.7	8
9	25 33.4 93 36	148.3	25 05.5 93 36	148.5	24 37.5 93 36	148.7	24 09.6 93 36	148.9	23 41.6 93 36	149.1	23 13.6 93 35	149.3	22 45.6 93 35	149.5	22 17.6 93 35	149.7	9
30	25 11.6 93 37	147.3	24 43.8 93 37	147.5	24 16.0 93 37	147.7	23 48.1 93 37	147.9	23 20.3 93 36	148.1	22 52.4 93 36	148.3	22 24.5 93 36	148.5	21 56.6 93 36	148.7	30
1	24 49.1 92 38	146.3	24 21.5 92 38	146.5	23 53.8 92 38	146.7	23 26.1 92 38	146.9	22 58.4 92 38	147.1	22 30.6 92 37	147.3	22 02.9 93 37	147.5	21 35.1 93 37	147.7	1
2	24 26.1 92 39	145.3	23 58.6 92 39	145.5	23 31.0 92 39	145.7	23 03.5 92 39	145.9	22 35.9 92 38	146.2	22 08.2 92 38	146.4	21 40.6 92 38	146.6	21 13.0 92 38	146.8	2
3	24 02.6 91 40	144.3	23 35.1 91 40	144.5	23 07.7 91 40	144.8	22 40.3 92 40	145.0	22 12.8 92 39	145.2	21 45.3 92 39	145.4	21 17.8 92 39	145.6	20 50.3 92 39	145.8	3
4	23 38.4 91 41	143.3	23 11.1 91 41	143.6	22 43.8 91 41	143.8	22 16.5 91 41	144.0	21 49.1 91 40	144.2	21 21.8 91 40	144.5	20 54.4 91 40	144.7	20 27.0 91 40	144.9	4
35	23 13.7 90 42	142.4	22 46.5 91 42	142.6	22 19.4 91 42	142.8	21 52.2 91 41	143.1	21 25.0 91 41	143.3	20 57.7 91 41	143.5	20 30.5 91 41	143.7	20 03.2 91 41	144.0	35
6	22 48.4 90 43	141.4	22 21.4 90 43	141.6	21 54.4 90 43	141.9	21 27.3 90 42	142.1	21 00.2 90 42	142.3	20 33.1 90 42	142.6	20 06.0 90 42	142.8	19 38.9 90 41	143.0	6
7	22 22.7 90 44	140.5	21 55.8 90 44	140.7	21 28.8 90 43	140.9	21 01.9 90 43	141.2	20 35.0 90 43	141.4	20 08.0 90 43	141.6	19 41.0 90 43	141.9	19 14.0 90 42	142.1	7
8	21 56.3 89 45	139.5	21 29.6 89 44	139.8	21 02.8 89 44	140.0	20 36.0 89 44	140.2	20 09.2 89 44	140.5	19 42.3 90 44	140.7	19 15.5 90 43	141.0	18 48.6 90 43	141.2	8
9	21 29.5 89 46	138.6	21 02.9 89 45	138.8	20 36.2 89 45	139.1	20 09.6 89 45	139.3	19 42.9 89 45	139.6	19 16.2 89 44	139.8	18 49.4 89 44	140.0	18 22.7 89 44	140.3	9
40	21 02.2 88 46	137.7	20 35.7 88 46	137.9	20 09.2 88 46	138.2	19 42.7 88 46	138.4	19 16.1 89 45	138.6	18 49.5 89 45	138.9	18 22.9 89 45	139.1	17 56.3 89 45	139.4	40
1	20 34.4 88 47	136.7	20 08.0 88 47	137.0	19 41.7 88 47	137.2	19 15.2 88 46	137.5	18 48.8 88 46	137.7	18 22.4 88 46	138.0	17 55.9 88 46	138.2	17 29.4 88 46	138.5	1
2	20 06.1 87 48	135.8	19 39.9 87 48	136.1	19 13.6 88 47	136.3	18 47.4 88 47	136.6	18 21.1 88 47	136.8	17 54.7 88 47	137.1	17 28.4 88 47	137.3	17 02.1 88 46	137.6	2
3	19 37.4 87 49	134.9	19 11.3 87 48	135.2	18 45.1 87 48	135.4	18 19.0 87 48	135.7	17 52.8 87 48	135.9	17 26.7 87 48	136.2	17 00.5 87 47	136.5	16 34.2 87 47	136.7	3
4	19 08.2 87 49	134.0	18 42.2 87 49	134.3	18 16.2 87 49	134.5	17 50.2 87 49	134.8	17 24.2 87 49	135.1	16 58.1 87 48	135.3	16 32.0 87 48	135.6	16 05.9 87 48	135.8	4
45	18 38.5 86 50	133.1	18 12.7 86 50	133.4	17 46.8 86 50	133.7	17 20.9 86 49	133.9	16 55.0 86 49	134.2	16 29.1 86 49	134.4	16 03.2 87 49	134.7	15 37.2 87 49	135.0	45
6	18 08.4 86 51	132.2	17 42.7 86 51	132.5	17 17.0 86 50	132.8	16 51.2 86 50	133.0	16 25.5 86 50	133.3	15 59.7 86 50	133.6	15 33.9 86 50	133.8	15 08.0 86 49	134.1	6
7	17 37.9 85 52	131.4	17 12.3 85 51	131.6	16 46.7 85 51	131.9	16 21.1 85 51	132.2	15 55.5 85 51	132.4	15 29.8 86 50	132.7	15 04.1 86 50	133.0	14 38.5 86 50	133.2	7
8	17 07.0 85 52	130.5	16 41.5 85 52	130.8	16 16.1 85 52	131.0	15 50.6 85 52	131.3	15 25.1 85 51	131.6	14 59.6 85 51	131.9	14 34.0 85 51	132.1	14 08.4 85 51	132.4	8
9	16 35.7 84 53	129.6	16 10.4 84 53	129.9	15 45.0 84 52	130.2	15 19.7 85 52	130.5	14 54.3 85 52	130.7	14 28.9 85 52	131.0	14 03.5 85 52	131.3	13 38.0 85 51	131.6	9
50	16 04.0 84 53	128.8	15 38.8 84 53	129.0	15 13.6 84 53	129.3	14 48.3 84 53	129.6	14 23.1 84 53	129.9	13 57.8 84 52	130.2	13 32.5 84 52	130.4	13 07.2 84 52	130.7	50
1	15 31.9 84 54	127.9	15 06.8 84 54	128.2	14 41.7 84 54	128.5	14 16.6 84 53	128.8	13 51.5 84 53	129.0	13 26.3 84 53	129.3	13 01.2 84 53	129.6	12 36.0 84 53	129.9	1
2	14 59.4 83 55	127.1	14 34.5 83 54	127.4	14 09.5 83 54	127.6	13 44.5 83 54	127.9	13 19.5 83 54	128.2	12 54.5 83 54	128.5	12 29.5 83 53	128.8	12 04.4 84 53	129.1	2
3	14 26.6 83 55	126.2	14 01.7 83 55	126.5	13 36.9 83 55	126.8	13 12.1 83 55	127.1	12 47.2 83 54	127.4	12 22.3 83 54	127.7	11 57.4 83 54	128.0	11 32.4 83 54	128.2	3
4	13 53.4 82 56	125.4	13 28.7 82 56	125.7	13 04.0 82 55	126.0	12 39.2 82 55	126.3	12 14.5 83 55	126.6	11 49.7 83 55	126.8	11 24.9 83 55	127.1	11 00.1 83 54	127.4	4
55	13 19.8 82 56	124.6	12 55.3 82 56	124.9	12 30.7 82 56	125.2	12 06.1 82 56	125.4	11 41.4 82 56	125.7	11 16.8 82 55	126.0	10 52.1 82 55	126.3	10 27.4 82 55	126.6	55
6	12 46.0 81 57	123.8	12 21.5 82 57	124.0	11 57.1 82 57	124.3	11 32.6 82 56	124.6	11 08.1 82 56	124.9	10 43.5 82 56	125.2	10 19.0 82 56	125.5	9 54.4 82 56	125.8	6
7	12 11.8 81 58	122.9	11 47.5 81 57	123.2	11 23.1 81 57	123.5	10 58.7 81 57	123.8	10 34.3 81 57	124.1	10 09.9 81 57	124.4	9 45.5 81 56	124.7	9 21.1 81 56	125.0	7
8	11 37.3 81 58	122.1	11 13.1 81 58	122.4	10 48.8 81 58	122.7	10 24.6 81 57	123.0	10 00.3 81 57	123.3	9 36.0 81 57	123.6	9 11.7 81 57	123.9	8 47.4 81 57	124.2	8
9	11 02.5 80 58	121.3	10 38.4 80 58	121.6	10 14.3 80 58	121.9	9 50.1 81 58	122.2	9 26.0 81 58	122.5	9 01.8 81 58	122.8	8 37.6 81 57	123.1	8 13.4 81 57	123.4	9
60	10 27.4 80 59	120.5	10 03.4 80 59	120.8	9 39.4 80 59	121.1	9 15.4 80 58	121.4	8 51.3 80 58	121.7	8 27.3 80 58	122.0	8 03.2 80 58	122.3	7 39.1 80 58	122.6	60
1	9 52.0 80 59	119.7	9 28.1 80 59	120.0	9 04.2 80 59	120.3	8 40.3 80 59	120.7	8 16.4 80 59	121.0	7 52.4 80 59	121.3	7 28.5 80 58	121.6	7 04.5 80 58	121.9	1
2	9 16.3 79 60	118.9	8 52.6 79 60	119.3	8 28.8 79 60	119.6	8 05.0 79 59	119.9	7 41.1 79 59	120.2	7 17.3 79 59	120.5	6 53.5 80 59	120.8	6 29.6 80 59	121.1	2
3	8 40.4 79 60	118.2	8 16.7 79 60	118.5	7 53.0 79 60	118.8	7 29.3 79 60	119.1	7 05.6 79 60	119.4	6 41.9 79 59	119.7	6 18.2 79 59	120.0	5 54.4 79 59	120.3	3
4	8 04.2 79 61	117.4	7 40.6 79 61	117.7	7 17.0 79 60	118.0	6 53.4 79 60	118.3	6 29.8 79 60	118.6	6 06.2 79 60	118.9	5 42.6 79 60	119.3	5 19.0 79 59	119.6	4
65	7 27.7 78 61	116.6	7 04.3 78 61	116.9	6 40.8 78 61	117.2	6 17.3 78 61	117.6	5 53.8 78 60	117.9	5 30.3 78 60	118.2	5 06.8 78 60	118.5			65
6	6 51.0 78 62	115.8	6 27.7 78 61	116.2	6 04.3 78 61	116.5	5 40.9 78 61	116.8	5 17.5 78 61	117.1							6
7	6 14.1 78 62	115.1	5 50.8 78 62	115.4	5 27.5 78 62	115.7	5 04.2 78 61	116.0									7
8	5 36.9 77 62	114.3	5 13.7 77 62	114.6													8
9																	9

DECLINATION SAME NAME AS LATITUDE

H.A.	12° 00′ Alt.	Az.	12° 30′ Alt.	Az.	13° 00′ Alt.	Az.	13° 30′ Alt.	Az.	14° 00′ Alt.	Az.	14° 30′ Alt.	Az.	15° 00′ Alt.	Az.	15° 30′ Alt.	Az.	H.A.
°	° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		°
91	8 04.3 72 67	81.0	8 26.1 72 67	80.7	8 47.8 72 67	80.3	9 09.5 72 67	80.0	9 31.2 72 67	79.6	9 52.8 72 67	79.3	10 14.5 72 67	78.9	10 36.1 72 67	78.6	91
2	7 23.9 73 67	80.3	7 45.7 73 67	80.0	8 07.5 73 67	79.6	8 29.2 72 67	79.3	8 51.0 72 67	78.9	9 12.7 72 67	78.6	9 34.4 72 67	78.2	9 56.0 72 67	77.9	2
3	6 43.6 73 67	79.6	7 05.5 73 67	79.3	7 27.3 73 67	78.9	7 49.1 73 67	78.6	8 10.8 73 67	78.2	8 32.6 72 67	77.9	8 54.4 72 66	77.5	9 16.1 72 66	77.2	3
4	6 03.4 73 67	78.9	6 25.3 73 67	78.5	6 47.2 73 67	78.2	7 09.0 73 67	77.9	7 30.8 73 66	77.5	7 52.7 73 66	77.2	8 14.5 73 66	76.8	8 36.2 73 66	76.5	4
95	5 23.3 73 67	78.2	5 45.3 73 67	77.8	6 07.2 73 66	77.5	6 29.1 73 66	77.1	6 51.0 73 66	76.8	7 12.8 73 66	76.4	7 34.7 73 66	76.1	7 56.5 73 66	75.8	95
6			5 05.3 73 66	77.1	5 27.3 73 66	76.8	5 49.2 73 66	76.4	6 11.2 73 66	76.1	6 33.1 73 66	75.7	6 55.0 73 66	75.4	7 16.9 73 66	75.0	6
7							5 09.5 73 66	75.7	5 31.5 73 66	75.4	5 53.5 73 66	75.0	6 15.5 73 66	74.7	6 37.4 73 66	74.3	7
8											5 14.0 73 66	74.3	5 36.1 73 66	74.0	5 58.1 73 65	73.6	8
9															5 18.9 74 65	72.9	9

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Lat. 47°

H.A.	16° 00′ Alt.			16° 00′ Az.	16° 30′ Alt.			16° 30′ Az.	17° 00′ Alt.			17° 00′ Az.	17° 30′ Alt.			17° 30′ Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	59 00.0	1.0	01	180.0	59 30.0	1.0	01	180.0	60 00.0	1.0	01	180.0	60 30.0	1.0	01	180.0
1	58 59.3	1.0	03	178.1	59 29.3	1.0	03	178.1	59 59.3	1.0	03	178.1	60 29.3	1.0	03	178.1
2	58 57.3	1.0	06	176.3	59 27.3	1.0	06	176.2	59 57.3	1.0	06	176.2	60 27.2	1.0	06	176.1
3	58 54.0	1.0	08	174.4	59 23.9	1.0	08	174.3	59 53.9	1.0	08	174.3	60 23.8	1.0	08	174.2
4	58 49.4	1.0	10	172.6	59 19.2	1.0	10	172.5	59 49.1	1.0	10	172.4	60 19.0	1.0	10	172.3
05	58 43.4	99	12	170.7	59 13.2	99	12	170.6	59 43.0	99	12	170.5	60 12.8	99	13	170.4
6	58 36.2	99	14	168.9	59 05.9	99	14	168.7	59 35.6	99	15	168.6	60 05.3	99	15	168.5
7	58 27.6	99	16	167.1	58 57.2	99	16	166.9	59 26.9	99	17	166.7	59 56.4	99	17	166.6
8	58 17.8	98	18	165.3	58 47.3	98	19	165.1	59 16.8	98	19	164.9	59 46.3	98	19	164.7
9	58 06.8	98	20	163.5	58 36.2	98	21	163.3	59 05.5	98	21	163.1	59 34.9	98	21	162.9
10	57 54.6	97	22	161.7	58 23.8	97	23	161.5	58 53.0	97	23	161.3	59 22.2	97	23	161.0
1	57 41.1	97	24	159.9	58 10.2	97	25	159.7	58 39.2	97	25	159.5	59 08.3	97	25	159.2
2	57 26.5	96	26	158.2	57 55.4	96	27	158.0	58 24.3	96	27	157.7	58 53.2	96	27	157.4
3	57 10.7	96	28	156.5	57 39.5	96	28	156.2	58 08.2	96	29	156.0	58 36.9	96	29	155.7
4	56 53.8	96	30	154.8	57 22.4	95	30	154.5	57 51.0	95	31	154.2	58 19.5	95	31	153.9
15	56 35.9	96	32	153.1	57 04.3	95	32	152.8	57 32.6	94	32	152.5	58 00.9	94	33	152.2
6	56 16.9	94	33	151.5	56 45.1	94	34	151.2	57 13.2	94	34	150.9	57 41.3	94	34	150.5
7	55 56.8	93	35	149.9	56 24.8	93	35	149.6	56 52.8	93	36	149.2	57 20.7	93	36	148.9
8	55 35.8	93	37	148.3	56 03.6	93	37	147.9	56 31.4	92	37	147.6	56 59.1	92	38	147.3
9	55 13.8	92	38	146.7	55 41.4	92	39	146.4	56 09.0	92	39	146.0	56 36.4	91	39	145.7
20	54 50.9	91	40	145.2	55 18.3	91	40	144.8	55 45.6	91	40	144.5	56 12.9	91	41	144.1
1	54 27.1	91	41	143.7	54 54.3	91	41	143.3	55 21.4	90	42	142.9	55 48.4	90	42	142.5
2	54 02.4	90	42	142.2	54 29.4	90	43	141.8	54 56.3	90	43	141.4	55 23.1	89	44	141.0
3	53 36.9	89	44	140.7	54 03.7	89	44	140.3	54 30.4	89	45	139.9	54 57.0	89	45	139.5
4	53 10.6	89	45	139.3	53 37.2	88	45	138.9	54 03.6	88	46	138.5	54 30.0	88	46	138.1
25	52 43.5	88	46	137.9	53 09.9	88	47	137.5	53 36.1	87	47	137.1	54 02.3	87	47	136.7
6	52 15.7	87	48	136.5	52 41.9	87	48	136.1	53 07.9	87	48	135.7	53 33.9	86	49	135.3
7	51 47.2	87	49	135.1	52 13.1	86	49	134.7	52 39.0	86	49	134.3	53 04.7	86	50	133.9
8	51 18.0	86	50	133.8	51 43.7	86	50	133.4	52 09.4	85	50	133.0	52 34.9	85	51	132.5
9	50 48.1	85	51	132.5	51 13.7	85	51	132.1	51 39.1	85	51	131.6	52 04.4	84	52	131.2
30	50 17.7	85	52	131.2	50 43.0	84	52	130.8	51 08.2	84	52	130.4	51 33.3	84	53	129.9
1	49 46.6	84	53	129.9	50 11.7	84	53	129.5	50 36.7	83	53	129.1	51 01.7	83	54	128.6
2	49 14.9	83	54	128.7	49 39.9	83	54	128.3	50 04.7	83	54	127.8	50 29.4	82	55	127.4
3	48 42.7	83	55	127.5	49 07.5	82	55	127.1	49 32.1	82	55	126.6	49 56.7	82	55	126.2
4	48 10.0	82	55	126.3	48 34.6	82	56	125.9	48 59.0	81	56	125.4	49 23.4	81	56	125.0
35	47 36.8	81	56	125.1	48 01.2	81	56	124.7	48 25.4	81	57	124.3	48 49.6	80	57	123.8
6	47 03.1	81	57	124.0	47 27.3	81	57	123.5	47 51.4	80	57	123.1	48 15.4	80	58	122.7
7	46 28.9	80	58	122.8	46 53.0	80	58	122.4	47 16.9	80	58	122.0	47 40.7	79	58	121.5
8	45 54.3	80	58	121.7	46 18.2	79	59	121.3	46 42.0	79	59	120.9	47 05.6	79	59	120.4
9	45 19.3	79	59	120.6	45 43.0	79	59	120.2	46 06.6	79	60	119.8	46 30.1	78	60	119.3
40	44 43.9	79	60	119.6	45 07.5	78	60	119.1	45 30.9	78	60	118.7	45 54.3	78	60	118.2
1	44 08.1	78	60	118.5	44 31.5	78	60	118.1	44 54.9	78	61	117.6	45 18.1	77	61	117.2
2	43 32.0	78	61	117.5	43 55.3	77	61	117.0	44 18.4	77	61	116.6	44 41.5	77	61	116.1
3	42 55.5	77	61	116.5	43 18.7	77	62	116.0	43 41.7	77	62	115.6	44 04.6	76	62	115.1
4	42 18.7	77	62	115.4	42 41.7	76	62	115.0	43 04.6	76	62	114.6	43 27.4	76	62	114.1
45	41 41.6	76	62	114.5	42 04.5	76	63	114.0	42 27.3	76	63	113.6	42 49.9	75	63	113.1
6	41 04.3	76	63	113.5	41 27.0	76	63	113.0	41 49.6	75	63	112.6	42 12.1	75	63	112.2
7	40 26.6	76	63	112.5	40 49.2	75	63	112.1	41 11.7	75	64	111.6	41 34.1	75	64	111.2
8	39 48.7	75	64	111.6	40 11.2	75	64	111.1	40 33.6	74	64	110.7	40 55.8	74	64	110.3
9	39 10.5	75	64	110.6	39 32.9	74	64	110.2	39 55.2	74	64	109.8	40 17.3	74	65	109.3
50	38 32.1	74	64	109.7	38 54.4	74	65	109.3	39 16.5	74	65	108.9	39 38.6	73	65	108.4
1	37 53.4	74	65	108.8	38 15.6	74	65	108.4	38 37.7	73	65	107.9	38 59.7	73	65	107.5
2	37 14.6	74	65	107.9	37 36.7	73	65	107.5	37 58.7	73	65	107.1	38 20.6	73	66	106.6
3	36 35.6	73	65	107.0	36 57.6	73	66	106.6	37 19.5	73	66	106.2	37 41.3	73	66	105.7
4	35 56.4	73	66	106.2	36 18.3	73	66	105.7	36 40.1	73	66	105.3	37 01.8	72	66	104.9
55	35 17.0	73	66	105.3	35 38.8	73	66	104.9	36 00.5	72	66	104.4	36 22.2	72	66	104.0
6	34 37.4	73	66	104.4	34 59.2	72	66	104.0	35 20.8	72	66	103.6	35 42.4	72	67	103.2
7	33 57.7	72	66	103.6	34 19.4	72	67	103.2	34 41.0	72	67	102.8	35 02.5	72	67	102.3
8	33 17.9	72	67	102.8	33 39.5	72	67	102.3	34 01.0	72	67	101.9	34 22.5	71	67	101.5
9	32 37.9	72	67	101.9	32 59.5	72	67	101.5	33 20.9	71	67	101.1	33 42.3	71	67	100.7
60	31 57.8	72	67	101.1	32 19.3	72	67	100.7	32 40.7	71	67	100.3	33 02.1	71	67	99.9
1	31 17.6	72	67	100.3	31 39.0	71	67	99.9	32 00.4	71	67	99.5	32 21.7	71	67	99.1
2	30 37.3	71	67	99.5	30 58.7	71	67	99.1	31 20.0	71	68	98.7	31 41.2	71	68	98.3
3	29 56.9	71	67	98.7	30 18.2	71	68	98.3	30 39.5	71	68	97.9	31 00.7	71	68	97.5
4	29 16.4	71	68	97.9	29 37.7	71	68	97.5	29 58.9	71	68	97.1	30 20.1	70	68	96.7
65	28 35.8	71	68	97.1	28 57.1	71	68	96.7	29 18.3	71	68	96.3	29 39.4	70	68	95.9
6	27 55.2	71	68	96.4	28 16.4	71	68	96.0	28 37.6	70	68	95.6	28 58.7	70	68	95.2
7	27 14.5	71	68	95.6	27 35.7	71	68	95.2	27 56.8	70	68	94.8	28 17.9	70	68	94.4
8	26 33.7	71	68	94.8	26 54.9	71	68	94.4	27 16.0	70	68	94.0	27 37.1	70	68	93.6
9	25 53.0	71	68	94.1	26 14.1	70	68	93.7	26 35.2	70	68	93.3	26 56.2	70	68	92.9
70	25 12.1	71	68	93.3	25 33.3	70	68	92.9	25 54.3	70	68	92.5	26 15.4	70	68	92.1
1	24 31.2	71	68	92.6	24 52.4	70	68	92.2	25 13.5	70	68	91.8	25 34.5	70	68	91.4
2	23 50.4	71	68	91.8	24 11.5	70	68	91.4	24 32.5	70	68	91.1	24 53.6	70	68	90.7
3	23 09.5	70	68	91.1	23 30.6	70	68	90.7	23 51.6	70	68	90.3	24 12.6	70	68	89.9
4	22 28.5	70	68	90.4	22 49.7	70	68	90.0	23 10.7	70	68	89.6	23 31.7	70	68	89.2
75	21 47.6	70	68	89.6	22 08.7	70	68	89.2	22 29.8	70	68	88.9	22 50.8	70	68	88.5
6	21 06.7	70	68	88.9	21 27.8	70	68	88.5	21 48.9	70	68	88.1	22 09.9	70	68	87.8
7	20 25.8	71	68	88.2	20 46.9	70	68	87.8	21 08.0	70	68	87.4	21 29.0	70	68	87.0
8	19 44.9	71	68	87.5	20 06.0	70	68	87.1	20 27.1	70	68	86.7	20 48.2	70	68	86.3
9	19 04.0	71	68	86.7	19 25.2	70	68	86.4	19 46.3	70	68	86.0	20 07.4	70	68	85.6
80	18 23.2	71	68	86.0	18 44.4	71	68	85.6	19 05.5	70	68	85.3	19 26.6	70	68	84.9
1	17 42.4	71	68	85.3	18 03.6	71	68	84.9	18 24.7	70	68	84.6	18 45.8	70	68	84.2
2	17 01.6	71	68	84.6	17 22.9	71	68	84.2	17 44.0	71	68	83.8	18 05.2	70	68	83.5
3	16 20.9	71	68	83.9	16 42.2	71	68	83.5	17 03.4	71	68	83.1	17 24.5	70	68	82.8
4	15 40.3	71	68	83.2	16 01.5	71	68	82.8	16 22.8	71	68	82.4	16 44.0	71	68	82.1
85	14 59.7	71	68	82.5	15 21.0	71	68	82.1	15 42.2	71	67	81.7	16 03.5	71	67	81.4
6	14 19.1	71	67	81.8	14 40.5	71	67	81.4	15 01.8	71	67	81.0	15 23.1	71	67	80.7
7	13 38.7	71	67	81.0	14 00.1	71	67	80.7	14 21.4	71	67	80.3	14 42.7	71	67	80.0
8	12 58.3	71	67	80.3	13 19.7	71	67	80.0	13 41.1	71	67	79.6	14 02.5	71	67	79.3
9	12 18.0	72	67	79.6	12 39.5	72	67	79.3	13 00.9	71	67	78.9	13 22.3	71	67	78.6
90	11 37.8	72	67	78.9	11 59.3	72	67	78.6	12 20.8	72	67	78.2	12 42.3	72	67	77.9

18° 00′ Alt.			18° 00′ Az.	18° 30′ Alt.			18° 30′ Az.	19° 00′ Alt.			19° 00′ Az.	19° 30′ Alt.			19° 30′ Az.	H.A.
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
61 00.0	1.0	01	180.0	61 30.0	1.0	01	180.0	62 00.0	1.0	01	180.0	62 30.0	1.0	01	180.0	00
60 59.3	1.0	04	178.0	61 29.3	1.0	04	178.0	61 59.3	1.0	04	178.0	62 29.3	1.0	04	178.0	1
60 57.2	1.0	06	176.1	61 27.2	1.0	06	176.0	61 57.1	1.0	06	176.0	62 27.1	1.0	06	175.9	2
60 53.7	1.0	08	174.1	61 23.6	1.0	08	174.1	61 53.5	1.0	08	174.0	62 23.5	1.0	08	173.9	3
60 48.8	1.0	10	172.2	61 18.7	1.0	11	172.1	61 48.5	99	11	172.0	62 18.4	99	11	171.9	4
60 42.6	99	13	170.2	61 12.4	99	13	170.1	61 42.1	99	13	170.0	62 11.9	99	13	169.9	05
60 35.0	99	15	168.3	61 04.6	99	15	168.2	61 34.3	99	15	168.0	62 04.0	99	16	167.9	6
60 26.0	99	17	166.4	60 55.6	99	17	166.2	61 25.1	98	18	166.1	61 54.7	98	18	165.9	7
60 15.8	98	19	164.5	60 45.2	98	20	164.3	61 14.6	98	20	164.1	61 44.0	98	20	163.9	8
60 04.2	98	21	162.7	60 33.5	98	22	162.4	61 02.8	98	22	162.2	61 32.0	97	22	162.0	9
59 51.4	97	23	160.8	60 20.5	97	24	160.6	60 49.6	97	24	160.3	61 18.7	97	24	160.1	10
59 37.3	97	25	159.0	60 06.3	97	26	158.7	60 35.2	96	26	158.4	61 04.1	96	26	158.2	1
59 22.0	96	27	157.2	59 50.8	96	28	156.9	60 19.6	96	28	156.6	60 48.3	96	28	156.3	2
59 05.5	95	29	155.4	59 34.1	95	30	155.1	60 02.7	95	30	154.8	60 31.2	95	30	154.5	3
58 47.9	95	31	153.6	59 16.3	95	32	153.3	59 44.7	94	32	153.0	60 13.0	94	32	152.7	4
58 29.2	94	33	151.9	58 57.4	94	33	151.6	59 25.6	94	34	151.2	59 53.7	94	34	150.9	15
58 09.4	93	35	150.2	58 37.4	93	35	149.9	59 05.3	93	35	149.5	59 33.2	93	36	149.2	6
57 48.5	93	36	148.5	58 16.3	93	37	148.2	58 44.1	92	37	147.8	59 11.7	92	38	147.4	7
57 26.7	92	38	146.9	57 54.3	92	38	146.5	58 21.8	92	39	146.2	58 49.2	91	39	145.8	8
57 03.9	91	40	145.3	57 31.2	91	40	144.9	57 58.5	91	40	144.5	58 25.7	91	41	144.1	9
56 40.1	91	41	143.7	57 07.2	90	41	143.3	57 34.3	90	42	142.9	58 01.2	90	42	142.5	20
56 15.4	90	43	142.2	56 42.3	90	43	141.7	57 09.2	89	43	141.3	57 35.9	89	44	140.9	1
55 49.9	89	44	140.6	56 16.6	89	44	140.2	56 43.2	88	45	139.8	57 09.7	88	45	139.4	2
55 23.5	88	45	139.1	55 50.0	88	46	138.7	56 16.3	88	46	138.3	56 42.6	87	46	137.9	3
54 56.4	88	47	137.7	55 22.6	87	47	137.2	55 48.7	87	47	136.8	56 14.8	87	48	136.4	4
54 28.4	87	48	136.2	54 54.4	87	48	135.8	55 20.3	86	48	135.4	55 46.2	86	49	134.9	25
53 59.8	86	49	134.8	54 25.5	86	49	134.4	54 51.2	85	50	133.9	55 16.8	85	50	133.5	6
53 30.4	85	50	133.4	53 56.0	85	50	133.0	54 21.4	85	51	132.6	54 46.8	84	51	132.1	7
53 00.4	85	51	132.1	53 25.7	84	51	131.7	53 51.0	84	52	131.2	54 16.1	84	52	130.7	8
52 29.7	84	52	130.8	52 54.8	84	52	130.3	53 19.8	83	53	129.9	53 44.8	83	53	129.4	9
51 58.4	83	53	129.5	52 23.3	83	53	129.0	52 48.1	83	54	128.6	53 12.9	82	54	128.1	30
51 26.5	83	54	128.2	51 51.2	82	54	127.7	52 15.9	82	55	127.3	52 40.4	82	55	126.8	1
50 54.1	82	55	127.0	51 18.6	82	55	126.5	51 43.0	81	56	126.0	52 07.3	81	56	125.6	2
50 21.1	81	56	125.7	50 45.5	81	56	125.3	51 09.7	81	56	124.8	51 33.8	80	57	124.3	3
49 47.6	81	57	124.5	50 11.8	80	57	124.1	50 35.8	80	57	123.6	50 59.8	80	58	123.1	4
49 13.7	80	57	123.4	49 37.7	80	58	122.9	50 01.5	79	58	122.4	50 25.3	79	58	121.9	35
48 39.3	79	58	122.2	49 03.1	79	58	121.7	49 26.8	79	59	121.3	49 50.3	78	59	120.8	6
48 04.5	79	59	121.1	48 28.1	79	59	120.6	48 51.6	78	59	120.1	49 15.0	78	60	119.6	7
47 29.2	78	59	119.9	47 52.6	78	60	119.5	48 16.0	78	60	119.0	48 39.2	77	60	118.5	8
46 53.5	78	60	118.9	47 16.8	77	60	118.4	47 40.0	77	61	117.9	48 03.1	77	61	117.4	9
46 17.5	77	61	117.8	46 40.7	77	61	117.3	47 03.7	77	61	116.9	47 26.6	76	61	116.4	40
45 41.1	77	61	116.7	46 04.1	76	61	116.3	46 27.0	76	62	115.8	46 49.8	76	62	115.3	1
45 04.4	76	62	115.7	45 27.3	76	62	115.2	45 50.0	76	62	114.8	46 12.6	75	62	114.3	2
44 27.4	76	62	114.7	44 50.1	75	62	114.2	45 12.7	75	63	113.7	45 35.2	75	63	113.3	3
43 50.1	75	63	113.7	44 12.6	75	63	113.2	44 35.1	75	63	112.7	44 57.4	74	63	112.3	4
43 12.5	75	63	112.7	43 34.9	75	63	112.2	43 57.2	74	64	111.8	44 19.4	74	64	111.3	45
42 34.6	75	64	111.7	42 56.9	74	64	111.3	43 19.1	74	64	110.8	43 41.2	73	64	110.3	6
41 56.4	74	64	110.8	42 18.6	74	64	110.3	42 40.7	73	64	109.8	43 02.7	73	64	109.4	7
41 18.0	74	64	109.8	41 40.1	73	65	109.4	42 02.1	73	65	108.9	42 24.0	73	65	108.4	8
40 39.4	73	65	108.9	41 01.4	73	65	108.4	41 23.3	73	65	108.0	41 45.1	72	65	107.5	9
40 00.6	73	65	108.0	40 22.5	73	65	107.5	40 44.3	72	65	107.1	41 06.0	72	66	106.6	50
39 21.6	73	65	107.1	39 43.4	72	66	106.6	40 05.1	72	66	106.2	40 26.7	72	66	105.7	1
38 42.4	72	66	106.2	39 04.1	72	66	105.7	39 25.7	72	66	105.3	39 47.2	71	66	104.8	2
38 03.0	72	66	105.3	38 24.6	72	66	104.9	38 46.1	72	66	104.4	39 07.6	71	66	104.0	3
37 23.5	72	66	104.4	37 45.0	72	66	104.0	38 06.4	71	66	103.6	38 27.8	71	67	103.1	4
36 43.8	72	66	103.6	37 05.2	71	67	103.1	37 26.6	71	67	102.7	37 47.8	71	67	102.3	55
36 03.9	71	67	102.7	36 25.3	71	67	102.3	36 46.6	71	67	101.9	37 07.8	71	67	101.4	6
35 23.9	71	67	101.9	35 45.3	71	67	101.5	36 06.5	71	67	101.0	36 27.6	70	67	100.6	7
34 43.8	71	67	101.1	35 05.1	71	67	100.6	35 26.3	70	67	100.2	35 47.4	70	67	99.8	8
34 03.6	71	67	100.3	34 24.8	71	67	99.8	34 46.0	70	67	99.4	35 07.0	70	67	99.0	9
33 23.3	71	67	99.4	33 44.5	70	67	99.0	34 05.5	70	68	98.6	34 26.5	70	68	98.2	60
32 42.9	71	68	98.6	33 04.0	70	68	98.2	33 25.0	70	68	97.8	33 46.0	70	68	97.4	1
32 02.4	70	68	97.9	32 23.5	70	68	97.4	32 44.5	70	68	97.0	33 05.4	70	68	96.6	2
31 21.8	70	68	97.1	31 42.9	70	68	96.6	32 03.8	70	68	96.2	32 24.7	69	68	95.8	3
30 41.2	70	68	96.3	31 02.2	70	68	95.9	31 23.1	70	68	95.5	31 43.9	69	68	95.0	4
30 00.5	70	68	95.5	30 21.4	70	68	95.1	30 42.3	70	68	94.7	31 03.2	69	68	94.3	65
29 19.7	70	68	94.7	29 40.7	70	68	94.3	30 01.5	69	68	93.9	30 22.3	69	68	93.5	6
28 38.9	70	68	94.0	28 59.8	70	68	93.6	29 20.7	69	68	93.2	29 41.5	69	68	92.8	7
27 58.1	70	68	93.2	28 19.0	70	68	92.8	28 39.8	69	68	92.4	29 00.6	69	68	92.0	8
27 17.2	70	68	92.5	27 38.1	70	68	92.1	27 58.9	69	68	91.7	28 19.7	69	68	91.3	9
26 36.3	70	68	91.7	26 57.2	70	68	91.3	27 18.0	69	68	90.9	27 38.8	69	68	90.5	70
25 55.4	70	68	91.0	26 16.3	69	68	90.6	26 37.1	69	68	90.2	26 57.8	69	68	89.8	1
25 14.5	70	68	90.3	25 35.4	69	68	89.9	25 56.2	69	68	89.5	26 16.9	69	68	89.1	2
24 33.6	70	68	89.5	24 54.5	69	68	89.1	25 15.3	69	68	88.7	25 36.0	69	68	88.3	3
23 52.7	70	68	88.8	24 13.5	70	68	88.4	24 34.4	69	68	88.0	24 55.1	69	68	87.6	4
23 11.8	70	68	88.1	23 32.6	70	68	87.7	23 53.5	69	68	87.3	24 14.3	69	68	86.9	75
22 30.9	70	68	87.4	22 51.8	70	68	87.0	23 12.6	69	68	86.6	23 33.4	69	68	86.2	6
21 50.0	70	68	86.6	22 10.9	70	68	86.3	22 31.8	69	68	85.9	22 52.6	69	68	85.5	7
21 09.2	70	68	85.9	21 30.1	70	68	85.5	21 51.0	70	68	85.2	22 11.8	69	68	84.8	8
20 28.4	70	68	85.2	20 49.3	70	68	84.8	21 10.2	70	68	84.5	21 31.1	69	68	84.1	9
19 47.6	70	68	84.5	20 08.6	70	68	84.1	20 29.5	70	68	83.8	20 50.4	70	68	83.4	80
19 06.9	70	68	83.8	19 27.9	70	68	83.4	19 48.9	70	68	83.0	20 09.8	70	68	82.7	1
18 26.3	70	68	83.1	18 47.3	70	68	82.7	19 08.3	70	68	82.3	19 29.3	70	67	82.0	2
17 45.7	70	68	82.4	18 06.7	70	68	82.0	18 27.8	70	67	81.6	18 48.8	70	67	81.3	3
17 05.1	70	67	81.7	17 26.3	70	67	81.3	17 47.3	70	67	81.0	18 08.4	70	67	80.6	4
16 24.7	71	67	81.0	16 45.8	70	67	80.6	17 07.0	70	67	80.3	17 28.0	70	67	79.9	85
15 44.3	71	67	80.3	16 05.5	71	67	79.9	16 26.7	70	67	79.6	16 47.8	70	67	79.2	6
15 04.0	71	67	79.6	15 25.3	71	67	79.2	15 46.5	71	67	78.9	16 07.7	71	67	78.5	7
14 23.8	71	67	78.9	14 45.1	71	67	78.5	15 06.4	71	67	78.2	15 27.6	71	67	77.8	8
13 43.7	71	67	78.2	14 05.1	71	67	77.8	14 26.4	71	66	77.5	14 47.7	71	66	77.1	9
13 03.7	71	66	77.5	13 25.1	71	66	77.1	13 46.5	71	66	76.8	14 07.8	71	66	76.4	90

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H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	27 00.0	1.0 01	180.0	26 30.0	1.0 01	180.0	26 00.0	1.0 01	180.0	25 30.0	1.0 01	180.0	25 00.0	1.0 01	180.0	24 30.0	1.0 01	180.0	24 00.0	1.0 01	180.0	23 30.0	1.0 01	180.0	00
1	26 59.6	1.0 02	178.9	26 29.6	1.0 02	178.9	25 59.6	1.0 02	178.9	25 29.6	1.0 02	178.9	24 59.6	1.0 02	179.0	24 29.6	1.0 02	179.0	23 59.6	1.0 02	179.0	23 29.6	1.0 02	179.0	1
2	26 58.5	1.0 03	177.8	26 28.5	1.0 03	177.9	25 58.5	1.0 03	177.9	25 28.5	1.0 03	177.9	24 58.5	1.0 03	177.9	24 28.5	1.0 03	177.9	23 58.5	1.0 03	177.9	23 28.5	1.0 03	177.9	2
3	26 56.5	1.0 04	176.8	26 26.6	1.0 04	176.8	25 56.6	1.0 04	176.8	25 26.6	1.0 04	176.8	24 56.6	1.0 04	176.9	24 26.7	1.0 04	176.9	23 56.7	1.0 04	176.9	23 26.7	1.0 04	176.9	3
4	26 53.8	1.0 06	175.7	26 23.9	1.0 06	175.7	25 53.9	1.0 06	175.7	25 24.0	1.0 06	175.8	24 54.0	1.0 06	175.8	24 24.0	1.0 06	175.8	23 54.1	1.0 06	175.9	23 24.1	1.0 06	175.9	4
05	26 50.4	1.0 07	174.6	26 20.4	1.0 07	174.6	25 50.5	1.0 07	174.7	25 20.6	1.0 07	174.7	24 50.6	1.0 07	174.8	24 20.7	1.0 07	174.8	23 50.8	1.0 07	174.8	23 20.8	1.0 07	174.9	05
6	26 46.2	1.0 08	173.5	26 16.3	1.0 08	173.6	25 46.3	1.0 08	173.6	25 16.4	1.0 08	173.7	24 46.5	1.0 08	173.7	24 16.6	1.0 08	173.8	23 46.7	1.0 08	173.8	23 16.8	1.0 08	173.8	6
7	26 41.2	1.0 10	172.5	26 11.3	1.0 10	172.5	25 41.4	1.0 09	172.6	25 11.6	1.0 09	172.6	24 41.7	1.0 09	172.7	24 11.8	1.0 09	172.7	23 41.9	1.0 09	172.8	23 12.1	1.0 09	172.8	7
8	26 35.4	99 11	171.4	26 05.6	99 11	171.5	25 35.8	99 11	171.5	25 05.9	99 11	171.6	24 36.1	99 11	171.6	24 06.3	99 10	171.7	23 36.4	99 10	171.7	23 06.6	99 10	171.8	8
9	26 28.9	99 12	170.3	25 59.1	99 12	170.4	25 29.4	99 12	170.5	24 59.6	99 12	170.5	24 29.8	99 12	170.6	24 00.0	99 12	170.7	23 30.2	99 12	170.7	23 00.4	99 12	170.8	9
10	26 21.7	99 13	169.3	25 51.9	99 13	169.3	25 22.2	99 13	169.4	24 52.5	99 13	169.5	24 22.7	99 13	169.6	23 53.0	99 13	169.6	23 23.2	99 13	169.7	22 53.5	99 13	169.8	10
1	26 13.7	99 15	168.2	25 44.0	99 14	168.3	25 14.3	99 14	168.4	24 44.6	99 14	168.4	24 14.9	99 14	168.5	23 45.2	99 14	168.6	23 15.5	99 14	168.7	22 45.8	99 14	168.8	1
2	26 04.9	99 16	167.1	25 35.3	99 16	167.2	25 05.7	99 16	167.3	24 36.1	99 15	167.4	24 06.4	99 15	167.5	23 36.8	99 15	167.6	23 07.2	99 15	167.7	22 37.5	99 15	167.7	2
3	25 55.5	99 17	166.1	25 25.9	99 17	166.2	24 56.3	99 17	166.3	24 26.8	99 17	166.4	23 57.2	99 17	166.5	23 27.6	99 16	166.6	22 58.1	99 16	166.6	22 28.5	99 16	166.7	3
4	25 45.3	98 18	165.0	25 15.8	98 18	165.1	24 46.3	98 18	165.2	24 16.8	98 18	165.3	23 47.3	98 18	165.4	23 17.8	98 18	165.5	22 48.2	98 18	165.6	22 18.7	98 17	165.7	4
15	25 34.3	98 19	164.0	25 04.9	98 19	164.1	24 35.5	98 19	164.2	24 06.1	98 19	164.3	23 36.6	98 19	164.4	23 07.2	98 19	164.5	22 37.7	98 19	164.6	22 08.3	98 19	164.7	15
6	25 22.7	98 21	162.9	24 53.4	98 20	163.1	24 24.0	98 20	163.2	23 54.7	98 20	163.3	23 25.3	98 20	163.4	22 55.9	98 20	163.5	22 26.6	98 20	163.6	21 57.2	98 20	163.7	6
7	25 10.3	98 22	161.9	24 41.1	98 22	162.0	24 11.8	98 22	162.2	23 42.5	98 21	162.3	23 13.3	98 21	162.4	22 44.0	98 21	162.5	22 14.7	98 21	162.6	21 45.4	98 21	162.7	7
8	24 57.3	97 23	160.9	24 28.1	97 23	161.0	23 58.9	97 23	161.1	23 29.7	97 22	161.3	23 00.5	97 22	161.4	22 31.3	97 22	161.5	22 02.1	97 22	161.6	21 32.9	97 22	161.7	8
9	24 43.5	97 24	159.8	24 14.4	97 24	160.0	23 45.3	97 24	160.1	23 16.2	97 24	160.2	22 47.1	97 23	160.4	22 18.0	97 23	160.5	21 48.9	97 23	160.6	21 19.7	97 23	160.8	9
20	24 29.1	97 25	158.8	24 00.1	97 25	159.0	23 31.1	97 25	159.1	23 02.1	97 25	159.2	22 33.0	97 25	159.4	22 04.0	97 24	159.5	21 35.0	97 24	159.6	21 05.9	97 24	159.8	20
1	24 14.0	96 26	157.8	23 45.1	96 26	158.0	23 16.2	96 26	158.1	22 47.2	96 26	158.2	22 18.3	96 26	158.4	21 49.4	96 26	158.5	21 20.4	96 25	158.7	20 51.5	97 25	158.8	1
2	23 58.2	96 27	156.8	23 29.4	96 27	156.9	23 00.6	96 27	157.1	22 31.7	96 27	157.2	22 02.9	96 27	157.4	21 34.1	96 27	157.5	21 05.2	96 26	157.7	20 36.4	96 26	157.8	2
3	23 41.7	96 29	155.8	23 13.0	96 28	155.9	22 44.3	96 28	156.1	22 15.6	96 28	156.3	21 46.8	96 28	156.4	21 18.1	96 28	156.6	20 49.4	96 27	156.7	20 20.6	96 27	156.9	3
4	23 24.6	95 30	154.8	22 56.0	95 29	154.9	22 27.4	95 29	155.1	21 58.8	95 29	155.3	21 30.2	95 29	155.4	21 01.5	95 29	155.6	20 32.9	96 29	155.8	20 04.2	96 28	155.9	4
25	23 06.9	95 31	153.8	22 38.4	95 30	154.0	22 09.9	95 30	154.1	21 41.3	95 30	154.3	21 12.8	95 30	154.5	20 44.3	95 30	154.6	20 15.7	95 30	154.8	19 47.2	96 29	155.0	25
6	22 48.5	95 32	152.8	22 20.1	95 32	153.0	21 51.7	95 31	153.1	21 23.3	96 31	153.3	20 54.9	95 31	153.5	20 26.4	95 31	153.7	19 58.0	95 31	153.8	19 29.6	96 30	154.0	6
7	22 29.5	94 33	151.8	22 01.2	94 33	152.0	21 32.9	94 32	152.2	21 04.6	94 32	152.4	20 36.3	94 32	152.5	20 08.0	94 32	152.7	19 39.7	94 32	152.9	19 11.3	94 31	153.1	7
8	22 09.8	94 34	150.8	21 41.7	94 34	151.0	21 13.5	94 33	151.2	20 45.3	94 33	151.4	20 17.1	94 33	151.6	19 48.9	94 33	151.8	19 20.7	94 33	151.9	18 52.5	94 32	152.1	8
9	21 49.6	93 35	149.9	21 21.5	93 35	150.1	20 53.5	94 34	150.2	20 25.4	94 34	150.4	19 57.3	94 34	150.6	19 29.3	94 34	150.8	19 01.2	94 34	151.0	18 33.0	94 33	151.2	9
30	21 28.7	93 36	148.9	21 00.8	93 36	149.1	20 32.9	93 35	149.3	20 04.9	93 35	149.5	19 37.0	93 35	149.7	19 09.0	93 35	149.9	18 41.0	93 34	150.1	18 13.0	93 34	150.3	30
1	21 07.3	93 37	147.9	20 39.5	93 36	148.1	20 11.7	93 36	148.3	19 43.9	93 36	148.5	19 16.0	93 36	148.7	18 48.2	93 36	148.9	18 20.3	93 35	149.1	17 52.4	93 35	149.3	1
2	20 45.3	92 38	147.0	20 17.6	92 37	147.2	19 49.9	92 37	147.4	19 22.2	92 37	147.6	18 54.5	92 37	147.8	18 26.8	92 37	148.0	17 59.0	92 36	148.2	17 31.3	93 36	148.4	2
3	20 22.7	92 39	146.0	19 55.2	92 38	146.3	19 27.6	92 38	146.5	19 00.0	92 38	146.7	18 32.4	92 38	146.9	18 04.8	92 38	147.1	17 37.2	92 37	147.3	17 09.6	92 37	147.5	3
4	19 59.6	91 39	145.1	19 32.2	91 39	145.3	19 04.7	91 39	145.5	18 37.3	92 39	145.8	18 09.8	92 39	146.0	17 42.3	92 38	146.2	17 14.8	92 38	146.4	16 47.3	92 38	146.6	4
35	19 35.9	91 40	144.2	19 08.6	91 40	144.4	18 41.3	91 40	144.6	18 14.0	91 40	144.8	17 46.6	91 40	145.1	17 19.3	91 39	145.3	16 51.9	91 39	145.5	16 24.5	91 39	145.7	35
6	19 11.7	91 41	143.3	18 44.5	91 41	143.5	18 17.3	91 41	143.7	17 50.1	91 41	143.9	17 22.9	91 40	144.1	16 55.7	91 40	144.4	16 28.4	91 40	144.6	16 01.2	91 40	144.8	6
7	18 47.0	90 42	142.3	18 19.9	90 42	142.6	17 52.9	90 42	142.8	17 25.8	90 41	143.0	16 58.7	90 41	143.2	16 31.6	90 41	143.5	16 04.5	90 41	143.7	15 37.3	90 41	143.9	7
8	18 21.7	90 43	141.4	17 54.8	90 43	141.7	17 27.9	90 43	141.9	17 00.9	90 42	142.1	16 34.0	90 42	142.3	16 07.0	90 42	142.6	15 40.0	90 42	142.8	15 13.0	90 41	143.0	8
9	17 55.9	89 44	140.5	17 29.2	89 44	140.8	17 02.4	89 43	141.0	16 35.5	89 43	141.2	16 08.7	89 43	141.5	15 41.9	90 43	141.7	15 15.0	90 42	141.9	14 48.1	90 42	142.2	9
40	17 29.7	89 45	139.6	17 03.0	89 44	139.9	16 36.4	89 44	140.1	16 09.7	89 44	140.3	15 43.0	89 44	140.6	15 16.2	89 44	140.8	14 49.5	89 43	141.0	14 22.8	89 43	141.3	40
1	17 02.9	88 45	138.7	16 36.4	88 45	139.0	16 09.9	88 45	139.2	15 43.3	89 45	139.5	15 16.7	89 44	139.7	14 50.2	89 44	139.9	14 23.6	89 44	140.2	13 56.9	89 44	140.4	1
2	16 35.7	88 46	137.8	16 09.3	88 46	138.1	15 42.9	88 46	138.3	15 16.5	88 46	138.6	14 50.0	88 45	138.8	14 23.6	88 45	139.1	13 57.1	88 45	139.3	13 30.6	88 45	139.6	2
3	16 08.0	87 47	137.0	15 41.7	88 47	137.2	15 15.5	88 46	137.5	14 49.2	88 46	137.7	14 22.9	88 46	138.0	13 56.5	88 46	138.2	13 30.2	88 46	138.5	13 03.8	88 45	138.7	3
4	15 39.8	87 48	136.1	15 13.7	87 47	136.3	14 47.6	87 47	136.6	14 21.4	87 47	136.9	13 55.2	87 47	137.1	13 29.0	87 47	137.4	13 02.8	87 46	137.6	12 36.6	87 46	137.9	4
45	15 11.2	87 48	135.2	14 45.2	87 48	135.5	14 19.2	87 48	135.7	13 53.2	87 48	136.0	13 27.2	87 48	136.3	13 01.1	87 47	136.5	12 35.0	87 47	136.8	12 08.9	87 47	137.0	45
6	14 42.2	86 49	134.4	14 16.3	86 49	134.6	13 50.5	86 49	134.9	13 24.6	86 48	135.1	12 58.6	86 48	135.4	12 32.7	86 48	135.7	12 06.8	87 48	135.9	11 40.8	87 48	136.2	6
7	14 12.7	86 50	133.5	13 47.0	86 50	133.8	13 21.3	86 49	134.0	12 55.5	86 49	134.3	12 29.7	86 49	134.6	12 03.9	86 49	134.8	11 38.1	86 48	135.1	11 12.3	86 48	135.3	7
8	13 42.9	85 50	132.7	13 17.3	85 50	132.9	12 51.6	85 50	133.2	12 26.0	85 50	133.5	12 00.3	86 50	133.7	11 34.7	86 49	134.0	11 09.0	86 49	134.3	10 43.3	86 49	134.5	8
9	13 12.6	85 51	131.8	12 47.1	85 51	132.1	12 21.6	85 51	132.4	11 56.1	85 50	132.6	11 30.6	85 50	132.9	11 05.0	85 50	133.2	10 39.5	85 50	133.4	10 13.9	85 50	133.7	9
50	12 41.9	84 52	131.0	12 16.5	85 52	131.3	11 51.2	85 51	131.5	11 25.8	85 51	131.8	11 00.4	85 51	132.1	10 35.0	85 51	132.4	10 09.6	85 51	132.6	9 44.1	85 50	132.9	50
1	12 10.8	84 52	130.2	11 45.6	84 52	130.4	11 20.3	84 52	130.7	10 55.1	84 52	131.0	10 29.8	84 52	131.3	10 04.6	84 51	131.5	9 39.3	84 51	131.8	9 14.0	84 51	132.1	1
2	11 39.3	84 53	129.3	11 14.2	84 53	129.6	10 49.1	84 53	129.9	10 24.0	84 52	130.2	9 58.9	84 52	130.5	9 33.7	84 52	130.7	9 08.6	84 52	131.0	8 43.4	84 52	131.3	2
3	11 07.5	83 54	128.5	10 42.5	83 53	128.8	10 17.6	83 53	129.1	9 52.6	83 53	129.4	9 27.6	83 53	129.6	9 02.5	83 53	129.9	8 37.5	83 52	130.2	8 12.5	84 52	130.5	3
4	10 35.3	83 54	127.7	10 10.5	83 54	128.0	9 45.6	83 54	128.3	9 20.7	83 54	128.6	8 55.9	83 53	128.8	8 31.0	83 53	129.1	8 06.1	83 53	129.4	7 41.2	83 53	129.7	4
55	10 02.8	82 55	126.9	9 38.0	82 55	127.2	9 13.3	82 54	127.5	8 48.6	82 54	127.8	8 23.8	83 54	128.0	7 59.1	83 54	128.3	7 34.3	83 54	128.6	7 09.5	83 53	128.9	55
6	9 29.9	82 55	126.1	9 05.3	82 55	126.4	8 40.7	82 55	126.7	8 16.1	82 55	127.0	7 51.4	82 55	127.3	7 26.8	82 54	127.5	7 02.1	82 54	127.8	6 37.5	82 54	128.1	6
7	8 56.6	82 56	125.3	8 32.2	82 56	125.6	8 07.7	82 56	125.9	7 43.2	82 55	126.2	7 18.7	82 55	126.5	6 54.2	82 55	126.8	6 29.6	82 55	127.1	6 05.1	82 54	127.3	7
8	8 23.1	81 56	124.5	7 58.7	81 56	124.8	7 34.4	81 56	125.1	7 10.0	81 56	125.4	6 45.6	81 56	125.7	6 21.2	81 55	126.0	5 56.8	81 55	126.3	5 32.4	81 55	126.6	8
9	7 49.2	81 57	123.7	7 25.0	81 57	124.0	7 00.7	81 57	124.3	6 36.5	81 56	124.6	6 12.2	81 56	124.9	5 47.9	81 56	125.2	5 23.7	81 56	125.5				9
60	7 15.0	80 57	122.9	6 50.9	80 57	123.2	6 26.8	80 57	123.5	6 02.6	80 57	123.8	5 38.5	80 57	124.1	5 14.4	81 56	124.4							60
1	6 40.5	80 58	122.2	6 16.5	80 58	122.5	5 52.5	80 58	122.8	5 28.5	80 57	123.1	5 04.5	80 57	123.4										1
2	6 05.7	80 58	121.4	5 41.9	80 58	121.7	5 18.0	80 58	122.0																2
3	5 30.7	79 59	120.6	5 06.9	79 59	120.9																			3

DECLINATION SAME NAME AS LATITUDE

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
91	10 57.7	72 67	78.2	11 19.3	72 67	77.9	11 40.8	72 66	77.5	12 02.3	72 66	77.2	12 23.8	72 66	76.8	12 45.3	71 66	76.5	13 06.7	71 66	76.1	13 28.1	71 66	75.7	91
2	10 17.7	72 66	77.5	10 39.3	72 66	77.2	11 00.9	72 66	76.8	11 22.5	72 66	76.5	11 44.0	72 66	76.1	12 05.5	72 66	75.8	12 27.0	72 66	75.4	12 48.5	72 66	75.0	2
3	9 37.8	72 66	76.8	9 59.5	72 66	76.5	10 21.1	72 66	76.1	10 42.8	72 66	75.8	11 04.4	72 66	75.4	11 26.0	72 66	75.1	11 47.5	72 66	74.7	12 09.0	72 66	74.3	3
4	8 58.0	72 66	76.1	9 19.7	72 66	75.8	9 41.5	72 66	75.4	10 03.2	72 66	75.1	10 24.8	72 66	74.7	10 46.5	72 66	74.4	11 08.1	72 65	74.0	11 29.7	72 65	73.7	4
95	8 18.3	73 66	75.4	8 40.1	73 66	75.1	9 01.9	73 66	74.7	9 23.7	73 66	74.4	9 45.4	72 65	74.0	10 07.1	72 65	73.7	10 28.8	72 65	73.3	10 50.5	72 65	73.0	95
6	7 38.8	73 66	74.7	8 00.7	73 66	74.4	8 22.5	73 65	74.0	8 44.3	73 65	73.7	9 06.2	73 65	73.3	9 27.9	73 65	73.0	9 49.7	73 65	72.6	10 11.5	72 65	72.3	6
7	6 59.4	73 65	74.0	7 21.3	73 65	73.7	7 43.2	73 65	73.3	8 05.1	73 65	73.0	8 27.0	73 65	72.6	8 48.9	73 65	72.3	9 10.7	73 65	71.9	9 32.6	73 65	71.6	7
8	6 20.1	73 65	73.3	6 42.1	73 65	72.9	7 04.1	73 65	72.6	7 26.1	73 65	72.3	7 48.1	73 65	71.9	8 10.0	73 65	71.6	8 31.9	73 64	71.2	8 53.8	73 64	70.9	8
9	5 41.0	74 65	72.6	6 03.1	74 65	72.2	6 25.1	74 65	71.9	6 47.2	73 65	71.6	7 09.2	73 64	71.2	7 31.3	73 64	70.9	7 53.3	73 64	70.5	8 15.2	73 64	70.2	9
100	5 02.0	74 65	71.9	5 24.2	74 65	71.5	5 46.3	74 64	71.2	6 08.5	74 64	70.8	6 30.6	74 64	70.5	6 52.7	74 64	70.2	7 14.8	74 64	69.8	7 36.8	74 64	69.5	100
1							5 07.7	74 64	70.5	5 29.9	74 64	70.1	5 52.1	74 64	69.8	6 14.3	74 64	69.5	6 36.4	74 64	69.1	6 58.6	74 63	68.8	1
2													5 13.8	74 64	69.1	5 36.0	74 63	68.8	5 58.3	74 63	68.4	6 20.5	74 63	68.1	2
3																			5 20.3	74 63	67.7	5 42.7	74 63	67.4	3
4																						5 05.0	75 63	66.7	4

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Lat. 47°

H.A.	20° 00′ Alt.	Az.	20° 30′ Alt.	Az.	21° 00′ Alt.	Az.	21° 30′ Alt.	Az.	22° 00′ Alt.	Az.	22° 30′ Alt.	Az.	23° 00′ Alt.	Az.	23° 30′ Alt.	Az.	H.A.
°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	°
00	63 00.0 1.0 01	180.0	63 30.0 1.0 01	180.0	64 00.0 1.0 01	180.0	64 30.0 1.0 01	180.0	65 00.0 1.0 01	180.0	65 30.0 1.0 01	180.0	66 00.0 1.0 01	180.0	66 30.0 1.0 01	180.0	00
1	62 59.3 1.0 04	177.9	63 29.2 1.0 04	177.9	63 59.2 1.0 04	177.9	64 29.2 1.0 04	177.8	64 59.2 1.0 04	177.8	65 29.2 1.0 04	177.8	65 59.2 1.0 04	177.7	66 29.2 1.0 04	177.7	1
2	62 57.0 1.0 06	175.9	63 27.0 1.0 06	175.8	63 57.0 1.0 06	175.7	64 26.9 1.0 06	175.7	64 56.9 1.0 06	175.6	65 26.8 1.0 07	175.5	65 56.8 1.0 07	175.5	66 26.7 1.0 07	175.4	2
3	62 53.4 1.0 09	173.8	63 23.3 1.0 09	173.7	63 53.2 1.0 09	173.6	64 23.1 1.0 09	173.5	64 53.0 1.0 09	173.4	65 22.9 1.0 09	173.3	65 52.7 1.0 09	173.2	66 22.6 1.0 10	173.1	3
4	62 48.2 99 11	171.8	63 18.1 99 11	171.6	63 47.9 99 11	171.5	64 17.7 99 11	171.4	64 47.5 99 12	171.3	65 17.3 99 12	171.1	65 47.1 99 12	171.0	66 16.9 99 12	170.8	4
05	62 41.6 99 13	169.7	63 11.4 99 14	169.6	63 41.1 99 14	169.4	64 10.8 99 14	169.3	64 40.5 99 14	169.1	65 10.2 99 14	168.9	65 39.9 99 14	168.8	66 09.6 99 15	168.6	05
6	62 33.6 99 16	167.7	63 03.2 99 16	167.5	63 32.9 99 16	167.3	64 02.5 99 16	167.2	64 32.1 99 17	167.0	65 01.6 99 17	166.8	65 31.2 99 17	166.6	66 00.8 98 17	166.4	6
7	62 24.2 98 18	165.7	62 53.7 98 18	165.5	63 23.2 98 18	165.3	63 52.7 98 19	165.1	64 22.1 98 19	164.9	64 51.5 98 19	164.6	65 20.9 98 20	164.4	65 50.3 98 20	164.2	7
8	62 13.4 98 20	163.7	62 42.8 98 21	163.5	63 12.1 98 21	163.3	63 41.4 98 21	163.0	64 10.7 98 21	162.8	64 40.0 98 22	162.5	65 09.2 97 22	162.2	65 38.4 97 22	162.0	8
9	62 01.2 97 22	161.7	62 30.4 97 23	161.5	62 59.6 97 23	161.2	63 28.8 97 23	161.0	63 57.9 97 24	160.7	64 27.0 97 24	160.4	64 56.0 97 24	160.1	65 25.0 97 25	159.8	9
10	61 47.8 97 25	159.8	62 16.8 97 25	159.5	62 45.8 97 25	159.3	63 14.7 96 26	159.0	63 43.7 96 26	158.7	64 12.6 96 26	158.4	64 41.4 96 27	158.0	65 10.2 96 27	157.7	10
1	61 33.0 96 27	157.9	62 01.8 96 27	157.6	62 30.6 96 27	157.3	62 59.4 96 28	157.0	63 28.1 96 28	156.7	63 56.8 96 28	156.3	64 25.4 95 29	156.0	64 54.0 95 29	155.6	1
2	61 17.0 96 29	156.0	61 45.6 95 29	155.7	62 14.2 95 30	155.4	62 42.8 95 30	155.0	63 11.3 95 30	154.7	63 39.7 95 31	154.3	64 08.1 95 31	154.0	64 36.5 94 31	153.6	2
3	60 59.7 95 31	154.2	61 28.2 95 31	153.8	61 56.5 95 31	153.5	62 24.9 94 32	153.1	62 53.2 94 32	152.8	63 21.4 94 33	152.4	63 49.5 94 33	152.0	64 17.6 94 33	151.6	3
4	60 41.3 94 33	152.3	61 09.5 94 33	152.0	61 37.7 94 33	151.6	62 05.8 94 34	151.3	62 33.8 93 34	150.9	63 01.8 93 35	150.5	63 29.7 93 35	150.1	63 57.6 93 35	149.6	4
15	60 21.7 93 34	150.5	60 49.7 93 35	150.2	61 17.7 93 35	149.8	61 45.5 93 36	149.4	62 13.3 93 36	149.0	62 41.1 92 36	148.6	63 08.7 92 37	148.2	63 36.3 92 37	147.7	15
6	60 01.1 93 36	148.8	60 28.8 92 37	148.4	60 56.5 92 37	148.0	61 24.2 92 37	147.6	61 51.7 92 38	147.2	62 19.2 91 38	146.8	62 46.6 91 39	146.3	63 13.9 91 39	145.9	6
7	59 39.3 92 38	147.1	60 06.9 92 38	146.7	60 34.3 91 39	146.3	61 01.7 91 39	145.8	61 29.0 91 40	145.4	61 56.2 91 40	145.0	62 23.3 90 40	144.5	62 50.4 90 41	144.0	7
8	59 16.6 91 40	145.4	59 43.9 91 40	145.0	60 11.1 91 40	144.5	60 38.2 90 41	144.1	61 05.2 90 41	143.7	61 32.2 90 42	143.2	61 59.1 89 42	142.7	62 25.8 89 43	142.2	8
9	58 52.8 90 41	143.7	59 19.9 90 42	143.3	59 46.8 90 42	142.9	60 13.7 89 42	142.4	60 40.5 89 43	142.0	61 07.2 89 43	141.5	61 33.8 88 44	141.0	62 00.3 88 44	140.5	9
20	58 28.1 90 43	142.1	58 54.9 89 43	141.6	59 21.7 89 44	141.2	59 48.3 89 44	140.7	60 14.8 88 44	140.3	60 41.3 88 45	139.8	61 07.6 88 45	139.3	61 33.8 87 46	138.8	20
1	58 02.5 89 44	140.5	58 29.1 88 45	140.0	58 55.6 88 45	139.6	59 22.0 88 45	139.1	59 48.2 87 46	138.7	60 14.4 87 46	138.2	60 40.4 87 47	137.7	61 06.4 86 47	137.1	1
2	57 36.1 88 46	138.9	58 02.4 88 46	138.5	58 28.6 87 46	138.0	58 54.8 87 47	137.5	59 20.8 87 47	137.1	59 46.7 86 48	136.6	60 12.5 86 48	136.1	60 38.1 85 48	135.5	2
3	57 08.8 87 47	137.4	57 34.9 87 47	136.9	58 00.9 86 48	136.5	58 26.7 86 48	136.0	58 52.5 86 48	135.5	59 18.1 85 49	135.0	59 43.7 85 49	134.5	60 09.1 84 50	134.0	3
4	56 40.7 86 48	135.9	57 06.5 86 48	135.4	57 32.3 86 49	135.0	57 57.9 85 49	134.5	58 23.4 85 50	134.0	58 48.8 84 50	133.5	59 14.1 84 50	133.0	59 39.2 84 51	132.4	4
25	56 11.9 86 49	134.5	56 37.5 85 50	134.0	57 03.0 85 50	133.5	57 28.4 84 50	133.0	57 53.6 84 51	132.5	58 18.8 84 51	132.0	58 43.8 83 52	131.5	59 08.7 83 52	130.9	25
6	55 42.3 85 50	133.0	56 07.7 84 51	132.5	56 32.9 84 51	132.1	56 58.1 84 52	131.6	57 23.1 83 52	131.1	57 48.0 83 52	130.5	58 12.8 82 53	130.0	58 37.4 82 53	129.5	6
7	55 12.0 84 52	131.6	55 37.2 84 52	131.1	56 02.2 83 52	130.7	56 27.1 83 53	130.2	56 51.9 82 53	129.6	57 16.6 82 53	129.1	57 41.1 82 54	128.6	58 05.5 81 54	128.0	7
8	54 41.1 83 53	130.3	55 06.1 83 53	129.8	55 30.9 82 53	129.3	55 55.5 82 54	128.8	56 20.1 82 54	128.3	56 44.5 81 54	127.7	57 08.8 81 55	127.2	57 32.9 80 55	126.6	8
9	54 09.6 83 54	128.9	54 34.3 82 54	128.4	54 58.9 82 54	127.9	55 23.3 81 55	127.4	55 47.7 81 55	126.9	56 11.9 80 55	126.4	56 35.9 80 56	125.8	56 59.8 79 56	125.3	9
30	53 37.5 82 54	127.6	54 02.0 81 55	127.1	54 26.3 81 55	126.6	54 50.6 81 56	126.1	55 14.7 80 56	125.6	55 38.6 80 56	125.1	56 02.5 79 57	124.5	56 26.2 79 57	124.0	30
1	53 04.8 81 55	126.3	53 29.0 81 56	125.8	53 53.2 80 56	125.3	54 17.2 80 56	124.8	54 41.1 79 57	124.3	55 04.9 79 57	123.8	55 28.5 78 58	123.2	55 52.0 78 58	122.7	1
2	52 31.5 80 56	125.1	52 55.6 80 57	124.6	53 19.6 80 57	124.1	53 43.4 79 57	123.6	54 07.1 79 58	123.0	54 30.6 78 58	122.5	54 54.0 78 58	122.0	55 17.3 77 59	121.4	2
3	51 57.8 80 57	123.8	52 21.7 79 57	123.3	52 45.4 79 58	122.8	53 09.0 79 58	122.3	53 32.5 78 58	121.8	53 55.9 78 59	121.3	54 19.1 77 59	120.7	54 42.1 77 59	120.2	3
4	51 23.6 79 58	122.6	51 47.2 79 58	122.1	52 10.8 78 58	121.6	52 34.2 78 59	121.1	52 57.5 77 59	120.6	53 20.7 77 59	120.1	53 43.7 76 60	119.5	54 06.5 76 60	119.0	4
35	50 48.9 79 59	121.5	51 12.4 78 59	121.0	51 35.7 78 59	120.5	51 59.0 77 59	119.9	52 22.1 77 60	119.4	52 45.1 76 60	118.9	53 07.9 76 60	118.4	53 30.5 75 61	117.8	35
6	50 13.8 78 59	120.3	50 37.1 78 60	119.8	51 00.3 77 60	119.3	51 23.3 77 60	118.8	51 46.2 76 60	118.3	52 09.0 76 61	117.7	52 31.7 75 61	117.2	52 54.2 75 61	116.7	6
7	49 38.2 77 60	119.2	50 01.4 77 60	118.7	50 24.4 77 60	118.2	50 47.3 76 61	117.7	51 10.0 76 61	117.1	51 32.6 75 61	116.6	51 55.1 75 62	116.1	52 17.4 74 62	115.5	7
8	49 02.3 77 60	118.1	49 25.3 76 61	117.6	49 48.1 76 61	117.1	50 10.8 76 61	116.6	50 33.4 75 62	116.0	50 55.9 75 62	115.5	51 18.2 74 62	115.0	51 40.3 74 62	114.4	8
9	48 26.0 76 61	117.0	48 48.8 76 61	116.5	49 11.5 75 62	116.0	49 34.1 75 62	115.5	49 56.5 75 62	115.0	50 18.8 74 62	114.4	50 40.9 74 63	113.9	51 02.9 73 63	113.4	9
40	47 49.4 76 62	115.9	48 12.0 75 62	115.4	48 34.6 75 62	114.9	48 57.0 74 62	114.4	49 19.2 74 63	113.9	49 41.4 74 63	113.4	50 03.4 73 63	112.8	50 25.2 73 63	112.3	40
1	47 12.4 75 62	114.8	47 34.9 75 62	114.4	47 57.3 74 63	113.9	48 19.5 74 63	113.4	48 41.7 74 63	112.8	49 03.7 73 63	112.3	49 25.5 73 64	111.8	49 47.2 72 64	111.3	1
2	46 35.1 75 63	113.8	46 57.5 74 63	113.3	47 19.7 74 63	112.8	47 41.8 74 63	112.3	48 03.8 73 64	111.8	48 25.7 73 64	111.3	48 47.4 72 64	110.8	49 08.9 72 64	110.3	2
3	45 57.5 74 63	112.8	46 19.8 74 63	112.3	46 41.9 73 64	111.8	47 03.9 73 64	111.3	47 25.7 73 64	110.8	47 47.4 72 64	110.3	48 09.0 72 64	109.8	48 30.4 71 65	109.3	3
4	45 19.7 74 64	111.8	45 41.8 73 64	111.3	46 03.8 73 64	110.8	46 25.6 73 64	110.3	46 47.3 72 64	109.8	47 08.9 72 65	109.3	47 30.4 71 65	108.8	47 51.7 71 65	108.3	4
45	44 41.5 73 64	110.8	45 03.5 73 64	110.3	45 25.4 73 64	109.9	45 47.1 72 65	109.4	46 08.7 72 65	108.9	46 30.2 71 65	108.4	46 51.5 71 65	107.8	47 12.7 70 65	107.3	45
6	44 03.2 73 64	109.9	44 25.0 73 64	109.4	44 46.8 72 65	108.9	45 08.4 72 65	108.4	45 29.9 71 65	107.9	45 51.3 71 65	107.4	46 12.5 71 65	106.9	46 33.6 70 66	106.4	6
7	43 24.6 73 65	108.9	43 46.3 72 65	108.4	44 08.0 72 65	108.0	44 29.5 71 65	107.5	44 50.9 71 65	107.0	45 12.1 71 66	106.5	45 33.2 70 66	106.0	45 54.2 70 66	105.5	7
8	42 45.8 72 65	108.0	43 07.4 72 65	107.5	43 28.9 72 65	107.0	43 50.3 71 66	106.5	44 11.6 71 66	106.1	44 32.8 70 66	105.6	44 53.8 70 66	105.1	45 14.7 69 66	104.5	8
9	42 06.7 72 65	107.1	42 28.3 72 66	106.6	42 49.7 71 66	106.1	43 11.0 71 66	105.6	43 32.2 70 66	105.1	43 53.3 70 66	104.7	44 14.2 70 66	104.2	44 35.0 69 66	103.7	9
50	41 27.5 72 66	106.2	41 49.0 71 66	105.7	42 10.3 71 66	105.2	42 31.5 71 66	104.7	42 52.6 70 66	104.3	43 13.6 70 66	103.8	43 34.5 69 66	103.3	43 55.2 69 67	102.8	50
1	40 48.1 71 66	105.3	41 09.5 71 66	104.8	41 30.7 71 66	104.3	41 51.9 70 66	103.9	42 12.9 70 66	103.4	42 33.8 69 67	102.9	42 54.6 69 67	102.4	43 15.2 69 67	101.9	1
2	40 08.6 71 66	104.4	40 29.9 71 66	103.9	40 51.0 70 66	103.5	41 12.1 70 67	103.0	41 33.0 70 67	102.5	41 53.8 69 67	102.0	42 14.5 69 67	101.5	42 35.1 68 67	101.0	2
3	39 28.9 71 66	103.5	39 50.1 70 67	103.1	40 11.2 70 67	102.6	40 32.1 70 67	102.1	40 53.0 69 67	101.6	41 13.7 69 67	101.2	41 34.4 69 67	100.7	41 54.9 68 67	100.2	3
4	38 49.0 71 67	102.7	39 10.1 70 67	102.2	39 31.2 70 67	101.7	39 52.1 70 67	101.3	40 12.9 69 67	100.8	40 33.5 69 67	100.3	40 54.1 68 67	99.8	41 14.6 68 67	99.4	4
55	38 09.0 70 67	101.8	38 30.1 70 67	101.4	38 51.0 70 67	100.9	39 11.9 69 67	100.4	39 32.6 69 67	100.0	39 53.2 69 67	99.5	40 13.7 68 67	99.0	40 34.1 68 68	98.5	55
6	37 28.9 70 67	101.0	37 49.9 70 67	100.5	38 10.8 69 67	100.1	38 31.6 69 67	99.6	38 52.3 69 67	99.1	39 12.8 68 68	98.7	39 33.3 68 68	98.2	39 53.6 68 68	97.7	6
7	36 48.7 70 67	100.1	37 09.6 70 67	99.7	37 30.5 69 68	99.2	37 51.2 69 67	98.8	38 11.8 69 68	98.3	38 32.3 68 68	97.9	38 52.7 68 68	97.4	39 13.0 67 68	96.9	7
8	36 08.3 70 67	99.3	36 29.2 69 67	98.9	36 50.0 69 68	98.4	37 10.7 69 68	98.0	37 31.3 68 68	97.5	37 51.8 68 68	97.1	38 12.1 68 68	96.6	38 32.4 67 68	96.1	8
9	35 27.9 70 68	98.5	35 48.8 69 68	98.1	36 09.5 69 68	97.6	36 30.1 69 68	97.2	36 50.7 68 68	96.7	37 11.1 68 68	96.3	37 31.4 68 68	95.8	37 51.7 67 68	95.3	9
60	34 47.4 69 68	97.7	35 08.2 69 68	97.3	35 28.9 69 68	96.8	35 49.5 69 68	96.4	36 10.0 68 68	95.9	36 30.4 68 68	95.5	36 50.7 67 68	95.0	37 10.9 67 68	94.6	60
1	34 06.8 69 68	96.9	34 27.6 69 68	96.5	34 48.2 69 68	96.1	35 08.8 68 68	95.6	35 29.3 68 68	95.2	35 49.7 68 68	94.7	36 09.9 67 68	94.3	36 30.1 67 68	93.8	1
2	33 26.2 69 68	96.1	33 46.9 69 68	95.7	34 07.5 69 68	95.3	34 28.1 68 68	94.8	34 48.5 68 68	94.4	35 08.9 68 68	93.9	35 29.1 67 68	93.5	35 49.2 67 68	93.0	2
3	32 45.5 69 68	95.4	33 06.2 69 68	94.9	33 26.8 69 68	94.5	33 47.3 68 68	94.1	34 07.7 68 68	93.6	34 28.0 68 68	93.2	34 48.2 67 68	92.7	35 08.4 67 68	92.3	3
4	32 04.7 69 68	94.6	32 25.4 69 68	94.2	32 45.9 68 68	93.7	33 06.4 68 68	93.3	33 26.8 68 68	92.9	33 47.1 68 68	92.4	34 07.4 67 68	92.0	34 27.5 67 68	91.5	4
65	31 23.9 69 68	93.8	31 44.5 69 68	93.4	32 05.1 68 68	93.0	32 25.6 68 68	92.6	32 46.0 68 68	92.1	33 06.2 67 68	91.7	33 26.4 67 68	91.2	33 46.6 67 68	90.8	65
6	30 43.0 69 68	93.1	31 03.7 69 68	92.7	31 24.2 68 68	92.2	31 44.7 68 68	91.8	32 05.1 68 68	91.4	32 25.3 67 68	90.9	32 45.5 67 68	90.5	33 05.6 67 68	90.1	6
7	30 02.2 69 68	92.3	30 22.8 69 68	91.9	30 43.3 68 68	91.5	31 03.8 68 68	91.1	31 24.1 68 68	90.6	31 44.4 67 68	90.2	32 04.6 67 68	89.8	32 24.7 67 68	89.3	7
8	29 21.3 69 68	91.6	29 41.9 69 68	91.2	30 02.4 68 68	90.8	30 22.9 68 68	90.3	30 43.2 68 68	89.9	31 03.5 67 68	89.5	31 23.7 67 68	89.0	31 43.8 67 68	88.6	8
9	28 40.4 69 68	90.9	29 01.0 69 68	90.4	29 21.5 68 68	90.0	29 41.9 68 68	89.6	30 02.3 68 68	89.2	30 22.6 67 68	88.7	30 42.8 67 68	88.3	31 02.9 67 68	87.9	9
70	27 59.4 69 68	90.1	28 20.0 69 68	89.7	28 40.6 68 68	89.3	29 01.0 68 68	88.9	29 21.4 68 68	88.5	29 41.7 68 68	88.0	30 01.9 67 68	87.6	30 22.0 67 68	87.2	70
1	27 18.5 69 68	89.4	27 39.1 69 68	89.0	27 59.7 68 68	88.6	28 20.1 68 68	88.2	28 40.5 68 68	87.7	29 00.8 68 68	87.3	29 21.0 67 68	86.9	29 41.2 67 68	86.5	1
2	26 37.6 69 68	88.7	26 58.2 69 68	88.3	27 18.8 68 68	87.8	27 39.2 68 68	87.4	27 59.6 68 68	87.0	28 19.9 68 68	86.6	28 40.2 67 68	86.2	29 00.3 67 68	85.8	2
3	25 56.7 69 68	87.9	26 17.3 69 68	87.5	26 37.9 68 68	87.1	26 58.4 68 68	86.7	27 18.8 68 68	86.3	27 39.1 68 68	85.9	27 59.4 67 68	85.5	28 19.6 67 68	85.1	3
4	25 15.8 69 68	87.2	25 36.5 69 68	86.8	25 57.0 68 68	86.4	26 17.5 68 68	86.0	26 37.9 68 68	85.6	26 58.3 68 68	85.2	27 18.6 67 68	84.8	27 38.8 67 68	84.4	4
75	24 35.0 69 68	86.5	24 55.6 69 68	86.1	25 16.2 68 68	85.7	25 36.7 68 68	85.3	25 57.2 68 68	84.9	26 17.6 68 68	84.5	26 37.9 68 68	84.1	26 58.1 67 68	83.7	75
6	23 54.1 69 68	85.8	24 14.8 69 68	85.4	24 35.4 69 68	85.0	24 56.0 68 68	84.6	25 16.4 68 68	84.2	25 36.8 68 68	83.8	25 57.2 68 68	83.4	26 17.5 67 68	83.0	6
7	23 13.3 69 68	85.1	23 34.0 69 68	84.7	23 54.7 69 68	84.3	24 15.2 68 68	83.9	24 35.8 68 68	83.5	24 56.2 68 68	83.1	25 16.6 68 68	82.7	25 36.9 68 68	82.3	7
8	22 32.6 69 68	84.4	22 53.3 69 68	84.0	23 14.0 69 68	83.6	23 34.6 69 68	83.2	23 55.1 68 68	82.8	24 15.6 68 68	82.4	24 36.0 68 68	82.0	24 56.4 68 67	81.6	8
9	21 51.9 69 68	83.7	22 12.6 69 68	83.3	22 33.3 69 68	82.9	22 54.0 69 68	82.5	23 14.6 68 68	82.1	23 35.1 68 67	81.7	23 55.5 68 67	81.3	24 15.9 68 67	80.9	9
80	21 11.3 69 68	83.0	21 32.0 69 68	82.6	21 52.8 69 68	82.2	22 13.4 69 67	81.8	22 34.1 69 67	81.4	22 54.6 68 67	81.0	23 15.1 68 67	80.6	23 35.6 68 67	80.2	80
1	20 30.7 69 68	82.3	20 51.5 69 67	81.9	21 12.3 69 68	81.5	21 33.0 69 67	81.1	21 53.6 69 67	80.7	22 14.2 69 67	80.3	22 34.8 68 67	79.9	22 55.3 68 67	79.6	1
2	19 50.2 70 67	81.6	20 11.0 69 67	81.2	20 31.8 69 67	80.8	20 52.6 69 67	80.4	21 13.3 69 67	80.0	21 33.9 69 67	79.7	21 54.5 69 67	79.3	22 15.1 68 67	78.9	2
3	19 09.7 70 67	80.9	19 30.6 70 67	80.5	19 51.5 69 67	80.1	20 12.3 69 67	79.7	20 33.0 69 67	79.4	20 53.7 69 67	79.0	21 14.4 69 67	78.6	21 35.0 69 67	78.2	3
4	18 29.4 70 67	80.2	18 50.3 70 67	79.8	19 11.2 70 67	79.4	19 32.1 69 67	79.1	19 52.9 69 67	78.7	20 13.6 69 67	78.3	20 34.3 69 67	77.9	20 55.0 69 66	77.5	4
85	17 49.1 70 67	79.5	18 10.1 70 67	79.1	18 31.0 70 67	78.8	18 51.9 70 67	78.4	19 12.8 69 67	78.0	19 33.6 69 67	77.6	19 54.4 69 66	77.2	20 15.1 69 66	76.8	85
6	17 08.9 70 67	78.8	17 29.9 70 67	78.4	17 50.9 70 67	78.1	18 11.9 70 67	77.7	18 32.8 70 66	77.3	18 53.7 69 66	76.9	19 14.5 69 66	76.6	19 35.3 69 66	76.2	6
7	16 28.8 70 67	78.1	16 49.9 70 67	77.8	17 10.9 70 66	77.4	17 32.0 70 66	77.0	17 52.9 70 66	76.6	18 13.9 70 66	76.3	18 34.8 70 66	75.9	18 55.6 69 66	75.5	7
8	15 48.8 71 66	77.4	16 10.0 70 66	77.1	16 31.1 70 66	76.7	16 52.2 70 66	76.3	17 13.2 70 66	76.0	17 34.2 70 66	75.6	17 55.1 70 66	75.2	18 16.1 70 66	74.8	8
9	15 08.9 71 66	76.7	15 30.1 71 66	76.4	15 51.3 71 66	76.0	16 12.4 70 66	75.6	16 33.6 70 66	75.3	16 54.6 70 66	74.9	17 15.6 70 66	74.5	17 36.6 70 66	74.2	9
90	14 29.1 71 66	76.1	14 50.4 71 66	75.7	15 11.7 71 66	75.3	15 32.9 71 66	75.0	15 54.0 71 66	74.6	16 15.2 70 66	74.2	16 36.3 70 66	73.9	16 57.3 70 66	73.5	90

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	
00	23 00.0	1.0 01	180.0	22 30.0	1.0 01	180.0	22 00.0	1.0 01	180.0	21 30.0	1.0 01	180.0	21 00.0	1.0 01	180.0	20 30.0	1.0 01	180.0	20 00.0	1.0 01	180.0	19 30.0	1.0 01	180.0	00
1	22 59.6	1.0 02	179.0	22 29.6	1.0 02	179.0	21 59.6	1.0 02	179.0	21 29.6	1.0 02	179.0	20 59.6	1.0 02	179.0	20 29.6	1.0 02	179.0	19 59.7	1.0 02	179.0	19 29.7	1.0 02	179.0	1
2	22 58.5	1.0 03	178.0	22 28.6	1.0 03	178.0	21 58.6	1.0 03	178.0	21 28.6	1.0 03	178.0	20 58.6	1.0 03	178.0	20 28.6	1.0 03	178.0	19 58.6	1.0 03	178.0	19 28.6	1.0 03	178.1	2
3	22 56.7	1.0 04	176.9	22 26.7	1.0 04	177.0	21 56.8	1.0 04	177.0	21 26.8	1.0 04	177.0	20 56.8	1.0 04	177.0	20 26.8	1.0 04	177.0	19 56.9	1.0 04	177.1	19 26.9	1.0 04	177.1	3
4	22 54.2	1.0 05	175.9	22 24.2	1.0 05	175.9	21 54.3	1.0 05	176.0	21 24.3	1.0 05	176.0	20 54.3	1.0 05	176.0	20 24.4	1.0 05	176.1	19 54.4	1.0 05	176.1	19 24.4	1.0 05	176.1	4
05	22 50.9	1.0 07	174.9	22 21.0	1.0 07	174.9	21 51.0	1.0 07	175.0	21 21.1	1.0 07	175.0	20 51.1	1.0 06	175.0	20 21.2	1.0 06	175.1	19 51.3	1.0 06	175.1	19 21.3	1.0 06	175.1	05
6	22 46.9	1.0 08	173.9	22 17.0	1.0 08	173.9	21 47.1	1.0 08	174.0	21 17.2	1.0 08	174.0	20 47.3	1.0 08	174.0	20 17.3	1.0 08	174.1	19 47.4	1.0 08	174.1	19 17.5	1.0 08	174.2	6
7	22 42.2	1.0 09	172.9	22 12.3	1.0 09	172.9	21 42.4	1.0 09	173.0	21 12.5	1.0 09	173.0	20 42.7	1.0 09	173.1	20 12.8	1.0 09	173.1	19 42.9	1.0 09	173.2	19 13.0	1.0 09	173.2	7
8	22 36.7	99 10	171.9	22 06.9	99 10	171.9	21 37.1	99 10	172.0	21 07.2	99 10	172.0	20 37.4	99 10	172.1	20 07.5	99 10	172.1	19 37.7	99 10	172.2	19 07.8	99 10	172.2	8
9	22 30.6	99 11	170.8	22 00.8	99 11	170.9	21 31.0	99 11	171.0	21 01.2	99 11	171.0	20 31.4	99 11	171.1	20 01.6	99 11	171.2	19 31.8	99 11	171.2	19 02.0	99 11	171.3	9
10	22 23.7	99 13	169.8	21 54.0	99 13	169.9	21 24.2	99 12	170.0	20 54.5	99 12	170.0	20 24.7	99 12	170.1	19 54.9	99 12	170.2	19 25.2	99 12	170.2	18 55.4	99 12	170.3	10
1	22 16.1	99 14	168.8	21 46.4	99 14	168.9	21 16.7	99 14	169.0	20 47.0	99 14	169.1	20 17.3	99 13	169.1	19 47.6	99 13	169.2	19 17.9	99 13	169.3	18 48.2	99 13	169.3	1
2	22 07.9	99 15	167.8	21 38.2	99 15	167.9	21 08.6	99 15	168.0	20 38.9	99 15	168.1	20 09.3	99 15	168.2	19 39.6	99 14	168.2	19 09.9	99 14	168.3	18 40.3	99 14	168.4	2
3	21 58.9	99 16	166.8	21 29.3	99 16	166.9	20 59.7	99 16	167.0	20 30.1	99 16	167.1	20 00.5	99 16	167.2	19 30.9	99 16	167.3	19 01.3	99 16	167.3	18 31.7	99 15	167.4	3
4	21 49.2	98 17	165.8	21 19.7	98 17	165.9	20 50.2	98 17	166.0	20 20.6	98 17	166.1	19 51.1	98 17	166.2	19 21.6	98 17	166.3	18 52.0	98 17	166.4	18 22.5	98 16	166.5	4
15	21 38.8	98 18	164.8	21 09.4	98 18	164.9	20 39.9	98 18	165.0	20 10.5	98 18	165.1	19 41.0	98 18	165.2	19 11.5	98 18	165.3	18 42.1	98 18	165.4	18 12.6	98 18	165.5	15
6	21 27.8	98 20	163.8	20 58.4	98 19	163.9	20 29.0	98 19	164.1	19 59.6	98 19	164.2	19 30.2	98 19	164.3	19 00.8	98 19	164.4	18 31.4	98 19	164.5	18 02.0	98 19	164.6	6
7	21 16.1	98 21	162.9	20 46.8	98 21	163.0	20 17.5	98 20	163.1	19 48.1	98 20	163.2	19 18.8	98 20	163.3	18 49.5	98 20	163.4	18 20.2	98 20	163.5	17 50.8	98 20	163.6	7
8	21 03.7	97 22	161.9	20 34.4	97 22	162.0	20 05.2	97 22	162.1	19 36.0	97 21	162.2	19 06.7	97 21	162.3	18 37.5	97 21	162.5	18 08.2	98 21	162.6	17 39.0	98 21	162.7	8
9	20 50.6	97 23	160.9	20 21.5	97 23	161.0	19 52.3	97 23	161.1	19 23.2	97 22	161.3	18 54.0	97 22	161.4	18 24.8	97 22	161.5	17 55.7	97 22	161.6	17 26.5	97 22	161.8	9
20	20 36.9	97 24	159.9	20 07.8	97 24	160.1	19 38.8	97 24	160.2	19 09.7	97 24	160.3	18 40.6	97 23	160.4	18 11.5	97 23	160.6	17 42.5	97 23	160.7	17 13.4	97 23	160.8	20
1	20 22.5	97 25	158.9	19 53.5	97 25	159.1	19 24.6	97 25	159.2	18 55.6	97 25	159.4	18 26.6	97 24	159.5	17 57.6	97 24	159.6	17 28.6	97 24	159.8	16 59.6	97 24	159.9	1
2	20 07.5	96 26	158.0	19 38.6	96 26	158.1	19 09.7	96 26	158.3	18 40.8	96 26	158.4	18 12.0	96 26	158.6	17 43.1	96 25	158.7	17 14.2	96 25	158.8	16 45.2	96 25	159.0	2
3	19 51.8	96 27	157.0	19 23.1	96 27	157.2	18 54.3	96 27	157.3	18 25.5	96 27	157.5	17 56.7	96 26	157.6	17 27.9	96 26	157.8	16 59.1	96 26	157.9	16 30.3	96 26	158.1	3
4	19 35.5	96 28	156.1	19 06.9	96 28	156.2	18 38.2	96 28	156.4	18 09.5	96 28	156.5	17 40.8	96 28	156.7	17 12.1	96 27	156.8	16 43.4	96 27	157.0	16 14.7	96 27	157.1	4
25	19 18.6	95 29	155.1	18 50.1	95 29	155.3	18 21.5	95 29	155.4	17 52.9	95 29	155.6	17 24.3	95 28	155.8	16 55.7	95 28	155.9	16 27.1	95 28	156.1	15 58.5	95 28	156.2	25
6	19 01.1	95 30	154.2	18 32.6	95 30	154.3	18 04.2	95 30	154.5	17 35.7	95 30	154.7	17 07.2	95 30	154.8	16 38.7	95 29	155.0	16 10.2	95 29	155.2	15 41.7	95 29	155.3	6
7	18 43.0	95 31	153.2	18 14.6	95 31	153.4	17 46.3	95 31	153.6	17 17.9	95 31	153.7	16 49.5	95 30	153.9	16 21.1	95 30	154.1	15 52.7	95 30	154.2	15 24.3	95 30	154.4	7
8	18 24.2	94 32	152.3	17 56.0	94 32	152.5	17 27.7	94 32	152.6	16 59.5	94 32	152.8	16 31.2	94 32	153.0	16 02.9	94 31	153.2	15 34.6	94 31	153.3	15 06.3	94 31	153.5	8
9	18 04.9	94 33	151.4	17 36.8	94 33	151.5	17 08.7	94 33	151.7	16 40.5	94 33	151.9	16 12.3	94 32	152.1	15 44.2	94 32	152.3	15 16.0	94 32	152.4	14 47.8	94 32	152.6	9
30	17 45.0	93 34	150.4	17 17.0	93 34	150.6	16 49.0	93 34	150.8	16 20.9	93 34	151.0	15 52.9	94 33	151.2	15 24.8	94 33	151.4	14 56.8	94 33	151.6	14 28.7	94 33	151.7	30
1	17 24.6	93 35	149.5	16 56.7	93 35	149.7	16 28.7	93 35	149.9	16 00.8	93 34	150.1	15 32.9	93 34	150.3	15 05.0	93 34	150.5	14 37.0	93 34	150.7	14 09.0	93 34	150.8	1
2	17 03.5	93 36	148.6	16 35.7	93 36	148.8	16 07.9	93 36	149.0	15 40.1	93 35	149.2	15 12.3	93 35	149.4	14 44.5	93 35	149.6	14 16.7	93 35	149.8	13 48.8	93 35	150.0	2
3	16 41.9	92 37	147.7	16 14.3	92 37	147.9	15 46.6	92 36	148.1	15 18.9	92 36	148.3	14 51.2	92 36	148.5	14 23.5	92 36	148.7	13 55.8	92 36	148.9	13 28.1	92 35	149.1	3
4	16 19.8	92 38	146.8	15 52.3	92 38	147.0	15 24.7	92 37	147.2	14 57.1	92 37	147.4	14 29.6	92 37	147.6	14 02.0	92 37	147.8	13 34.4	92 36	148.0	13 06.8	92 36	148.2	4
35	15 57.1	91 39	145.9	15 29.7	91 38	146.1	15 02.3	91 38	146.3	14 34.8	91 38	146.5	14 07.4	92 38	146.7	13 39.9	92 38	147.0	13 12.5	92 37	147.2	12 45.0	92 37	147.4	35
6	15 33.9	91 40	145.0	15 06.6	91 39	145.2	14 39.3	91 39	145.4	14 12.0	91 39	145.7	13 44.7	91 39	145.9	13 17.4	91 38	146.1	12 50.0	91 38	146.3	12 22.7	91 38	146.5	6
7	15 10.2	91 40	144.1	14 43.0	91 40	144.4	14 15.9	91 40	144.6	13 48.7	91 40	144.8	13 21.5	91 40	145.0	12 54.3	91 39	145.2	12 27.1	91 39	145.4	11 59.8	91 39	145.7	7
8	14 46.0	90 41	143.3	14 18.9	90 41	143.5	13 51.9	90 41	143.7	13 24.8	90 41	143.9	12 57.8	90 40	144.1	12 30.7	90 40	144.4	12 03.6	90 40	144.6	11 36.5	90 40	144.8	8
9	14 21.2	90 42	142.4	13 54.3	90 42	142.6	13 27.4	90 42	142.8	13 00.5	90 41	143.1	12 33.6	90 41	143.3	12 06.6	90 41	143.5	11 39.6	90 41	143.7	11 12.7	90 41	144.0	9
40	13 56.0	89 43	141.5	13 29.2	89 43	141.7	13 02.5	89 42	142.0	12 35.7	89 42	142.2	12 08.8	89 42	142.4	11 42.0	89 42	142.7	11 15.2	89 42	142.9	10 48.4	89 41	143.1	40
1	13 30.3	89 44	140.7	13 03.7	89 43	140.9	12 37.0	89 43	141.1	12 10.3	89 43	141.4	11 43.7	89 43	141.6	11 17.0	89 43	141.8	10 50.3	89 42	142.1	10 23.6	89 42	142.3	1
2	13 04.1	88 44	139.8	12 37.6	88 44	140.0	12 11.1	88 44	140.3	11 44.6	88 44	140.5	11 18.0	89 44	140.8	10 51.5	89 43	141.0	10 24.9	89 43	141.2	9 58.3	89 43	141.5	2
3	12 37.5	88 45	138.9	12 11.1	88 45	139.2	11 44.7	88 45	139.4	11 18.3	88 44	139.7	10 51.9	88 44	139.9	10 25.5	88 44	140.2	9 59.0	88 44	140.4	9 32.6	88 44	140.6	3
4	12 10.4	87 46	138.1	11 44.1	88 46	138.4	11 17.9	88 46	138.6	10 51.6	88 45	138.8	10 25.3	88 45	139.1	9 59.0	88 45	139.3	9 32.7	88 45	139.6	9 06.4	88 44	139.8	4
45	11 42.8	87 47	137.3	11 16.7	87 46	137.5	10 50.6	87 46	137.8	10 24.4	87 46	138.0	9 58.3	87 46	138.3	9 32.1	87 46	138.5	9 06.0	87 45	138.8	8 39.8	87 45	139.0	45
6	11 14.8	87 47	136.4	10 48.9	87 47	136.7	10 22.9	87 47	136.9	9 56.9	87 47	137.2	9 30.8	87 46	137.4	9 04.8	87 46	137.7	8 38.8	87 46	138.0	8 12.7	87 46	138.2	6
7	10 46.4	86 48	135.6	10 20.6	86 48	135.9	9 54.7	86 48	136.1	9 28.8	86 47	136.4	9 03.0	86 47	136.6	8 37.1	86 47	136.9	8 11.1	86 47	137.1	7 45.2	86 46	137.4	7
8	10 17.6	86 49	134.8	9 51.9	86 49	135.0	9 26.1	86 48	135.3	9 00.4	86 48	135.6	8 34.6	86 48	135.8	8 08.9	86 48	136.1	7 43.1	86 48	136.3	7 17.3	86 47	136.6	8
9	9 48.4	85 49	134.0	9 22.8	85 49	134.2	8 57.2	85 49	134.5	8 31.6	85 49	134.8	8 05.9	85 48	135.0	7 40.3	85 48	135.3	7 14.7	85 48	135.5	6 49.0	86 48	135.8	9
50	9 18.7	85 50	133.2	8 53.2	85 50	133.4	8 27.8	85 50	133.7	8 02.3	85 49	134.0	7 36.8	85 49	134.2	7 11.3	85 49	134.5	6 45.8	85 49	134.8	6 20.3	85 49	135.0	50
1	8 48.7	84 51	132.4	8 23.3	84 50	132.6	7 58.0	84 50	132.9	7 32.6	85 50	133.2	7 07.3	85 50	133.4	6 41.9	85 50	133.7	6 16.5	85 49	134.0	5 51.2	85 49	134.2	1
2	8 18.2	84 51	131.6	7 53.0	84 51	131.8	7 27.8	84 51	132.1	7 02.6	84 51	132.4	6 37.4	84 50	132.6	6 12.1	84 50	132.9	5 46.9	84 50	133.2	5 21.7	84 50	133.5	2
3	7 47.4	84 52	130.8	7 22.3	84 52	131.0	6 57.3	84 52	131.3	6 32.2	84 51	131.6	6 07.1	84 51	131.9	5 42.0	84 51	132.1	5 16.9	84 51	132.4				3
4	7 16.2	83 53	130.0	6 51.3	83 52	130.2	6 26.4	83 52	130.5	6 01.4	83 52	130.8	5 36.4	83 52	131.1	5 11.5	83 51	131.4							4
55	6 44.7	83 53	129.2	6 19.9	83 53	129.5	5 55.1	83 53	129.8	5 30.2	83 53	130.0	5 05.4	83 52	130.3										55
6	6 12.8	82 54	128.4	5 48.1	82 54	128.7	5 23.4	82 53	129.0																6
7	5 40.6	82 54	127.6	5 16.0	82 54	127.9																			7
8	5 08.0	81 55	126.9																						8

DECLINATION SAME NAME AS LATITUDE

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	
91	13 49.5	71 66	75.4	14 10.8	71 66	75.0	14 32.1	71 66	74.6	14 53.4	71 66	74.3	15 14.7	71 65	73.9	15 35.9	71 65	73.5	15 57.0	71 65	73.2	16 18.2	70 65	72.8	91
2	13 10.0	71 66	74.7	13 31.4	71 66	74.3	13 52.7	71 65	74.0	14 14.1	71 65	73.6	14 35.4	71 65	73.2	14 56.7	71 65	72.9	15 17.9	71 65	72.5	15 39.1	71 65	72.1	2
3	12 30.6	72 65	74.0	12 52.0	72 65	73.6	13 13.5	71 65	73.3	13 34.9	71 65	72.9	13 56.3	71 65	72.6	14 17.7	71 65	72.2	14 39.0	71 65	71.8	15 00.3	71 65	71.5	3
4	11 51.3	72 65	73.3	12 12.8	72 65	72.9	12 34.4	72 65	72.6	12 55.9	72 65	72.2	13 17.3	72 65	71.9	13 38.8	71 65	71.5	14 00.2	71 64	71.2	14 21.5	71 64	70.8	4
95	11 12.2	72 65	72.6	11 33.8	72 65	72.3	11 55.4	72 65	71.9	12 17.0	72 65	71.5	12 38.5	72 64	71.2	12 59.9	72 64	70.8	13 21.5	72 64	70.5	13 43.0	71 64	70.1	95
6	10 33.2	72 65	71.9	10 54.9	72 65	71.6	11 16.6	72 64	71.2	11 38.2	72 64	70.9	11 59.9	72 64	70.5	12 21.5	72 64	70.2	12 43.0	72 64	69.8	13 04.6	72 64	69.4	6
7	9 54.4	73 64	71.2	10 16.2	73 64	70.9	10 37.9	72 64	70.5	10 59.7	72 64	70.2	11 21.4	72 64	69.8	11 43.1	72 64	69.5	12 04.7	72 64	69.1	12 26.4	72 63	68.8	7
8	9 15.7	73 64	70.5	9 37.6	73 64	70.2	9 59.4	73 64	69.8	10 21.2	73 64	69.5	10 43.0	73 64	69.1	11 04.8	73 63	68.8	11 26.6	72 63	68.4	11 48.3	72 63	68.1	8
9	8 37.2	73 64	69.8	8 59.2	73 64	69.5	9 21.1	73 64	69.1	9 43.0	73 63	68.8	10 04.9	73 63	68.5	10 26.8	73 63	68.1	10 48.6	73 63	67.8	11 10.4	73 63	67.4	9
100	7 58.9	73 64	69.1	8 20.9	73 63	68.8	8 42.9	73 63	68.5	9 04.9	73 63	68.1	9 26.9	73 63	67.8	9 48.9	73 63	67.4	10 10.8	73 63	67.1	10 32.7	73 62	66.7	100
1	7 20.7	74 63	68.4	7 42.9	74 63	68.1	8 05.0	74 63	67.8	8 27.1	74 63	67.4	8 49.1	74 62	67.1	9 11.2	73 62	66.7	9 33.2	73 62	66.4	9 55.3	73 62	66.0	1
2	6 42.8	74 63	67.7	7 05.0	74 63	67.4	7 27.2	74 63	67.1	7 49.4	74 62	66.7	8 11.6	74 62	66.4	8 33.7	74 62	66.0	8 55.8	74 62	65.7	9 18.0	74 62	65.4	2
3	6 05.0	74 63	67.0	6 27.3	74 62	66.7	6 49.6	74 62	66.4	7 11.9	74 62	66.0	7 34.2	74 62	65.7	7 56.4	74 62	65.4	8 18.6	74 62	65.0	8 40.9	74 62	64.7	3
4	5 27.4	75 62	66.3	5 49.8	75 62	66.0	6 12.2	75 62	65.7	6 34.6	75 62	65.3	6 57.0	75 62	65.0	7 19.3	74 61	64.7	7 41.7	74 61	64.3	8 04.0	74 61	64.0	4
105				5 12.5	75 62	65.3	5 35.0	75 62	65.0	5 57.5	75 61	64.6	6 20.0	75 61	64.3	6 42.4	75 61	64.0	7 04.9	75 61	63.6	7 27.3	75 61	63.3	105
6										5 20.7	75 61	63.9	5 43.2	75 61	63.6	6 05.8	75 61	63.3	6 28.3	75 60	62.9	6 50.9	75 60	62.6	6
7													5 06.7	76 61	62.9	5 29.4	76 60	62.6	5 52.0	76 60	62.2	6 14.7	75 60	61.9	7
8																			5 15.9	76 60	61.5	5 38.7	76 60	61.2	8
9																						5 02.9	76 59	60.5	9

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Lat. 47°

H.A.	24° 00′			24° 30′			25° 00′			25° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	67 00.0	1.0 01	180.0	67 30.0	1.0 01	180.0	68 00.0	1.0 01	180.0	68 30.0	1.0 01	180.0
1	66 59.2	1.0 04	177.7	67 29.2	1.0 04	177.6	67 59.1	1.0 04	177.6	68 29.1	1.0 04	177.5
2	66 56.7	1.0 07	175.3	67 26.6	1.0 07	175.3	67 56.6	1.0 07	175.2	68 26.5	1.0 07	175.1
3	66 52.5	1.0 10	173.0	67 22.4	1.0 10	172.9	67 52.2	1.0 10	172.8	68 22.1	1.0 10	172.6
4	66 46.7	99 12	170.7	67 16.5	99 13	170.5	67 46.2	99 13	170.4	68 16.0	99 13	170.2
05	66 39.3	99 15	168.4	67 08.9	99 15	168.2	67 38.6	99 16	168.0	68 08.2	99 16	167.8
6	66 30.3	98 18	166.1	66 59.8	98 18	165.9	67 29.3	98 18	165.7	67 58.7	98 19	165.4
7	66 19.7	98 20	163.9	66 49.0	98 20	163.6	67 18.3	98 21	163.4	67 47.6	98 21	163.1
8	66 07.6	97 23	161.7	66 36.7	97 23	161.4	67 05.9	97 23	161.1	67 34.9	97 24	160.8
9	65 54.0	97 25	159.5	66 22.9	96 25	159.2	66 51.8	96 26	158.8	67 20.7	96 26	158.5
10	65 39.0	96 27	157.4	66 07.7	96 28	157.0	66 36.3	95 28	156.6	67 04.9	95 29	156.3
1	65 22.5	95 30	155.3	65 51.0	95 30	154.9	66 19.4	95 30	154.5	66 47.8	94 31	154.1
2	65 04.7	94 32	153.2	65 33.0	94 32	152.8	66 01.1	94 33	152.4	66 29.2	93 33	151.9
3	64 45.7	93 34	151.2	65 13.6	93 34	150.8	65 41.5	93 35	150.3	66 09.3	93 35	149.9
4	64 25.3	92 36	149.2	64 53.0	92 36	148.8	65 20.6	92 37	148.3	65 48.1	92 37	147.8
15	64 03.8	91 38	147.3	64 31.2	91 38	146.8	64 58.5	91 39	146.3	65 25.7	91 39	145.8
6	63 41.1	91 40	145.4	64 08.2	90 40	144.9	64 35.2	90 41	144.4	65 02.2	90 41	143.9
7	63 17.3	90 41	143.5	63 44.1	89 42	143.0	64 10.9	89 42	142.5	64 37.5	89 43	142.0
8	62 52.5	89 43	141.7	63 19.0	88 44	141.2	63 45.5	88 44	140.7	64 11.8	88 44	140.2
9	62 26.7	88 45	140.0	62 52.9	87 45	139.5	63 19.1	87 46	138.9	63 45.1	86 46	138.4
20	61 59.9	87 46	138.3	62 25.9	86 47	137.7	62 51.7	86 47	137.2	63 17.4	85 48	136.6
1	61 32.2	86 48	136.6	61 57.9	85 48	136.1	62 23.5	85 48	135.5	62 48.9	84 49	134.9
2	61 03.7	85 49	135.0	61 29.1	84 49	134.4	61 54.4	84 50	133.9	62 19.5	84 50	133.3
3	60 34.3	84 50	133.4	60 59.5	84 51	132.8	61 24.5	83 51	132.3	61 49.3	83 52	131.7
4	60 04.2	83 51	131.9	60 29.1	83 52	131.3	60 53.8	82 52	130.7	61 18.4	82 53	130.1
25	59 33.4	82 52	130.4	59 58.0	82 53	129.8	60 22.5	81 53	129.2	60 46.7	81 54	128.6
6	59 01.9	81 54	128.9	59 26.2	81 54	128.3	59 50.4	80 54	127.7	60 14.4	80 55	127.1
7	58 29.7	81 55	127.5	58 53.8	80 55	126.9	59 17.7	80 55	126.3	59 41.5	79 56	125.7
8	57 56.9	80 56	126.1	58 20.8	79 56	125.5	58 44.5	79 56	124.9	59 08.0	78 57	124.3
9	57 23.6	79 56	124.7	57 47.2	78 57	124.1	58 10.7	78 57	123.6	58 33.9	77 58	123.0
30	56 49.7	78 57	123.4	57 13.1	78 58	122.8	57 36.3	77 58	122.2	57 59.4	77 58	121.6
1	56 15.3	77 58	122.1	56 38.4	77 59	121.5	57 01.4	76 59	121.0	57 24.3	76 59	120.4
2	55 40.4	77 59	120.9	56 03.3	76 59	120.3	56 26.1	76 60	119.7	56 48.7	75 60	119.1
3	55 05.0	76 60	119.6	55 27.8	76 60	119.1	55 50.4	75 60	118.5	56 12.8	74 61	117.9
4	54 29.3	75 60	118.4	54 51.8	75 61	117.9	55 14.2	74 61	117.3	55 36.4	74 61	116.7
35	53 53.1	75 61	117.3	54 15.4	74 61	116.7	54 37.6	74 62	116.1	54 59.7	73 62	115.5
6	53 16.5	74 62	116.1	53 38.7	74 62	115.5	54 00.7	73 62	115.0	54 22.6	73 62	114.4
7	52 39.6	74 62	115.0	53 01.6	73 62	114.4	53 23.4	73 63	113.9	53 45.1	72 63	113.3
8	52 02.3	73 63	113.9	52 24.2	73 63	113.3	52 45.9	72 63	112.8	53 07.4	71 63	112.2
9	51 24.8	73 63	112.8	51 46.4	72 63	112.3	52 08.0	71 64	111.7	52 29.3	71 64	111.1
40	50 46.9	72 64	111.8	51 08.4	72 64	111.2	51 29.8	71 64	110.6	51 51.0	70 64	110.1
1	50 08.8	72 64	110.7	50 30.2	71 64	110.2	50 51.4	71 64	109.6	51 12.5	70 65	109.1
2	49 30.4	71 64	109.7	49 51.6	71 65	109.2	50 12.7	70 65	108.6	50 33.7	70 65	108.1
3	48 51.7	71 65	108.7	49 12.9	70 65	108.2	49 33.9	70 65	107.6	49 54.7	69 65	107.1
4	48 12.9	70 65	107.8	48 33.9	70 65	107.2	48 54.8	69 66	106.7	49 15.5	69 66	106.1
45	47 33.8	70 66	106.8	47 54.7	69 66	106.3	48 15.5	69 66	105.7	48 36.1	68 66	105.2
6	46 54.5	70 66	105.9	47 15.3	69 66	105.3	47 36.0	69 66	104.8	47 56.5	68 66	104.3
7	46 15.1	69 66	104.9	46 35.8	69 66	104.4	46 56.3	68 66	103.9	47 16.8	68 66	103.3
8	45 35.5	69 66	104.0	45 56.1	68 66	103.5	46 16.5	68 66	103.0	46 36.9	67 67	102.5
9	44 55.7	69 66	103.1	45 16.2	68 67	102.6	45 36.6	68 67	102.1	45 56.8	67 67	101.6
50	44 15.8	68 67	102.3	44 36.2	68 67	101.7	44 56.5	67 67	101.2	45 16.7	67 67	100.7
1	43 35.7	68 67	101.4	43 56.1	68 67	100.9	44 16.3	67 67	100.4	44 36.4	67 67	99.9
2	42 55.5	68 67	100.5	43 15.8	67 67	100.0	43 36.0	67 67	99.5	43 56.1	67 67	99.0
3	42 15.3	68 67	99.7	42 35.5	67 67	99.2	42 55.6	67 68	98.7	43 15.6	66 68	98.2
4	41 34.9	68 68	98.9	41 55.1	67 68	98.4	42 15.1	67 68	97.9	42 35.1	66 68	97.4
55	40 54.4	67 68	98.0	41 14.5	67 68	97.6	41 34.6	67 68	97.1	41 54.4	66 68	96.6
6	40 13.8	67 68	97.2	40 33.9	67 68	96.8	40 53.9	66 68	96.3	41 13.8	66 68	95.8
7	39 33.2	67 68	96.4	39 53.3	67 68	96.0	40 13.2	66 68	95.5	40 33.0	66 68	95.0
8	38 52.5	67 68	95.7	39 12.5	67 68	95.2	39 32.4	66 68	94.7	39 52.2	66 68	94.2
9	38 11.8	67 68	94.9	38 31.8	66 68	94.4	38 51.6	66 68	93.9	39 11.4	66 68	93.4
60	37 31.0	67 68	94.1	37 50.9	66 68	93.6	38 10.8	66 68	93.2	38 30.5	66 68	92.7
1	36 50.1	67 68	93.3	37 10.1	66 68	92.9	37 29.9	66 68	92.4	37 49.6	66 68	91.9
2	36 09.3	67 68	92.6	36 29.2	66 68	92.1	36 49.0	66 68	91.6	37 08.7	66 68	91.2
3	35 28.4	67 68	91.8	35 48.3	66 68	91.4	36 08.1	66 68	90.9	36 27.8	65 68	90.4
4	34 47.5	67 68	91.1	35 07.4	66 68	90.6	35 27.2	66 68	90.2	35 46.9	65 68	89.7
65	34 06.6	67 68	90.3	34 26.5	66 68	89.9	34 46.3	66 68	89.4	35 06.0	66 68	89.0
6	33 25.6	67 68	89.6	33 45.6	66 68	89.2	34 05.4	66 68	88.7	34 25.1	66 68	88.3
7	32 44.7	67 68	88.9	33 04.6	66 68	88.4	33 24.5	66 68	88.0	33 44.2	66 68	87.5
8	32 03.8	67 68	88.2	32 23.7	66 68	87.7	32 43.6	66 68	87.3	33 03.3	66 68	86.8
9	31 22.9	67 68	87.5	31 42.9	66 68	87.0	32 02.7	66 68	86.6	32 22.5	66 68	86.1
70	30 42.1	67 68	86.7	31 02.0	66 68	86.3	31 21.9	66 68	85.9	31 41.7	66 68	85.4
1	30 01.2	67 68	86.0	30 21.2	66 68	85.6	30 41.1	66 68	85.2	31 00.9	66 68	84.7
2	29 20.4	67 68	85.3	29 40.4	67 68	84.9	30 00.3	66 68	84.5	30 20.2	66 68	84.0
3	28 39.7	67 68	84.6	28 59.7	67 68	84.2	29 19.6	66 68	83.8	29 39.5	66 68	83.4
4	27 58.9	67 68	83.9	28 19.0	67 68	83.5	28 39.0	66 68	83.1	28 58.9	66 68	82.7
75	27 18.3	67 68	83.2	27 38.4	67 68	82.8	27 58.4	67 68	82.4	28 18.3	66 67	82.0
6	26 37.7	67 68	82.6	26 57.8	67 68	82.1	27 17.9	67 68	81.7	27 37.9	66 67	81.3
7	25 57.1	67 68	81.9	26 17.3	67 67	81.5	26 37.4	67 67	81.0	26 57.4	67 67	80.6
8	25 16.7	68 67	81.2	25 36.9	67 67	80.8	25 57.0	67 67	80.4	26 17.1	67 67	80.0
9	24 36.3	68 67	80.5	24 56.5	67 67	80.1	25 16.7	67 67	79.7	25 36.9	67 67	79.3
80	23 55.9	68 67	79.8	24 16.3	68 67	79.4	24 36.5	67 67	79.0	24 56.7	67 67	78.6
1	23 15.7	68 67	79.2	23 36.1	68 67	78.8	23 56.4	68 67	78.4	24 16.6	67 67	77.9
2	22 35.6	68 67	78.5	22 56.0	68 67	78.1	23 16.4	68 66	77.7	23 36.7	68 66	77.3
3	21 55.5	68 66	77.8	22 16.0	68 66	77.4	22 36.4	68 66	77.0	22 56.8	68 66	76.6
4	21 15.6	69 66	77.1	21 36.1	68 66	76.7	21 56.6	68 66	76.3	22 17.0	68 66	76.0
85	20 35.7	69 66	76.5	20 56.3	69 66	76.1	21 16.9	68 66	75.7	21 37.4	68 66	75.3
6	19 56.0	69 66	75.8	20 16.7	69 66	75.4	20 37.3	69 66	75.0	20 57.9	68 66	74.6
7	19 16.4	69 66	75.1	19 37.2	69 66	74.7	19 57.8	69 66	74.4	20 18.5	69 65	74.0
8	18 36.9	69 66	74.4	18 57.7	69 65	74.1	19 18.5	69 65	73.7	19 39.2	69 65	73.3
9	17 57.6	70 65	73.8	18 18.5	70 65	73.4	18 39.3	69 65	73.0	19 00.1	69 65	72.6
90	17 18.3	70 65	73.1	17 39.3	70 65	72.7	18 00.2	70 65	72.4	18 21.1	70 65	72.0

H.A.	26° 00′			26° 30′			27° 00′			27° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	69 00.0	1.0 02	180.0	69 30.0	1.0 02	180.0	70 00.0	1.0 02	180.0	70 30.0	1.0 02	180.0
1	68 59.1	1.0 04	177.5	69 29.1	1.0 05	177.4	69 59.1	1.0 05	177.4	70 29.0	1.0 05	177.3
2	68 56.4	1.0 07	175.0	69 26.4	1.0 08	174.9	69 56.3	1.0 08	174.8	70 26.2	1.0 08	174.7
3	68 52.0	1.0 10	172.5	69 21.8	99 11	172.4	69 51.7	99 11	172.2	70 21.5	99 11	172.1
4	68 45.8	99 13	170.0	69 15.5	99 13	169.8	69 45.2	99 14	169.7	70 14.9	99 14	169.5
05	68 37.8	99 16	167.6	69 07.4	99 16	167.4	69 37.0	99 17	167.1	70 06.5	98 17	166.9
6	68 28.2	98 19	165.2	68 57.6	98 19	164.9	69 27.0	98 20	164.6	69 56.3	98 20	164.3
7	68 16.9	97 22	162.8	68 46.1	97 22	162.5	69 15.3	97 22	162.1	69 44.4	97 23	161.8
8	68 04.0	97 24	160.4	68 33.0	97 25	160.1	69 01.9	96 25	159.7	69 30.8	96 25	159.3
9	67 49.5	96 27	158.1	68 18.2	96 27	157.7	68 46.9	96 28	157.3	69 15.6	95 28	156.9
10	67 33.5	95 29	155.9	68 02.0	95 30	155.5	68 30.4	95 30	155.0	68 58.8	94 31	154.6
1	67 16.0	94 31	153.7	67 44.3	94 32	153.2	68 12.4	94 32	152.7	68 40.4	93 33	152.3
2	66 57.2	93 34	151.5	67 25.1	93 34	151.0	67 52.9	93 35	150.5	68 20.7	92 35	150.0
3	66 37.0	92 36	149.4	67 04.6	92 36	148.9	67 32.1	92 37	148.4	67 59.6	91 37	147.8
4	66 15.5	91 38	147.3	66 42.8	91 38	146.8	67 10.0	91 39	146.3	67 37.1	90 39	145.7
15	65 52.8	90 40	145.3	66 19.8	90 40	144.8	66 46.7	89 41	144.2	67 13.5	89 41	143.6
6	65 29.0	89 42	143.3	65 55.6	89 42	142.8	66 22.2	88 43	142.2	66 48.6	88 43	141.6
7	65 04.0	88 43	141.4	65 30.3	88 44	140.9	65 56.6	87 44	140.3	66 22.7	87 45	139.7
8	64 38.0	87 45	139.6	65 04.0	87 46	139.0	65 29.9	86 46	138.4	65 55.7	86 47	137.8
9	64 10.9	86 46	137.8	64 36.7	86 47	137.2	65 02.3	85 48	136.6	65 27.7	85 48	135.9
20	63 43.0	85 48	136.0	64 08.4	84 49	135.4	64 33.7	84 49	134.8	64 58.8	83 50	134.2
1	63 14.1	84 49	134.3	63 39.3	83 50	133.7	64 04.2	83 50	133.1	64 29.0	82 51	132.4
2	62 44.5	83 51	132.7	63 09.3	82 51	132.1	63 33.9	82 52	131.4	63 58.4	81 52	130.8
3	62 14.0	82 52	131.1	62 38.5	81 52	130.5	63 02.9	81 53	129.8	63 27.1	80 53	129.2
4	61 42.8	81 53	129.5	62 07.0	81 54	128.9	62 31.1	80 54	128.2	62 55.0	79 55	127.6
25	61 10.9	80 54	128.0	61 34.8	80 55	127.4	61 58.6	79 55	126.7	62 22.2	78 56	126.1
6	60 38.3	79 55	126.5	61 02.0	79 56	125.9	61 25.5	78 56	125.3	61 48.8	77 57	124.6
7	60 05.1	78 56	125.1	60 28.6	78 57	124.5	60 51.8	77 57	123.8	61 14.9	77 58	123.2
8	59 31.4	78 57	123.7	59 54.5	77 58	123.1	60 17.5	76 58	122.4	60 40.3	76 58	121.8
9	58 57.1	77 58	122.3	59 20.0	76 58	121.7	59 42.7	76 59	121.1	60 05.3	75 59	120.4
30	58 22.2	76 59	121.0	58 44.9	75 59	120.4	59 07.4	75 60	119.8	59 29.8	74 60	119.1
1	57 46.9	75 60	119.7	58 09.4	75 60	119.1	58 31.7	74 60	118.5	58 53.8	73 61	117.8
2	57 11.2	75 60	118.5	57 33.4	74 61	117.9	57 55.5	73 61	117.2	58 17.4	73 61	116.6
3	56 35.0	74 61	117.3	56 57.1	73 61	116.7	57 18.9	73 62	116.0	57 40.6	72 62	115.4
4	55 58.4	73 62	116.1	56 20.3	73 62	115.5	56 42.0	72 62	114.8	57 03.5	71 62	114.2
35	55 21.5	73 62	114.9	55 43.2	72 62	114.3	56 04.7	71 63	113.7	56 26.0	71 63	113.1
6	54 44.2	72 63	113.8	55 05.7	71 63	113.2	55 27.0	71 63	112.6	55 48.2	70 64	111.9
7	54 06.6	71 63	112.7	54 28.0	71 63	112.1	54 49.1	70 64	111.5	55 10.1	70 64	110.8
8	53 28.7	71 64	111.6	53 49.9	70 64	111.0	54 10.9	70 64	110.4	54 31.7	69 64	109.8
9	52 50.5	70 64	110.5	53 11.6	70 64	109.9	53 32.4	69 64	109.3	53 53.1	69 65	108.7
40	52 12.1	70 64	109.5	52 33.0	69 65	108.9	52 53.7	69 65	108.3	53 14.2	68 65	107.7
1	51 33.4	69 65	108.5	51 54.1	69 65	107.9	52 14.7	68 65	107.3	52 35.1	68 66	106.7
2	50 54.5	69 65	107.5	51 15.1	68 65	106.9	51 35.5	68 66	106.3	51 55.8	67 66	105.7
3	50 15.3	69 66	106.5	50 35.8	68 66	105.9	50 56.2	67 66	105.4	51 16.3	67 66	104.8
4	49 36.0	68 66	105.6	49 56.4	68 66	105.0	50 16.6	67 66	104.4	50 36.7	67 66	103.8
45	48 56.5	68 66	104.6	49 16.8	67 66	104.1	49 36.9	67 66	103.5	49 56.9	66 67	102.9
6	48 16.8	68 66	103.7	48 37.0	67 67	103.1	48 57.1	66 67	102.6	49 16.9	66 67	102.0
7	47 37.0	67 67	102.8	47 57.1	67 67	102.2	48 17.0	66 67	101.7	48 36.8	66 67	101.1
8	46 57.0	67 67	101.9	47 17.1	66 67	101.4	47 36.9	66 67	100.8	47 56.6	65 67	100.2
9	46 16.9	67 67	101.0	46 36.9	66 67	100.5	46 56.7	66 67	99.9	47 16.3	65 67	99.4
50	45 36.7	67 67	100.2	45 56.6	66 67	99.6	46 16.3	65 68	99.1	46 35.9	65 68	98.5
1	44 56.4	66 67	99.3	45 16.2	66 67	98.8	45 35.9	65 68	98.3	45 55.4	65 68	97.7
2	44 16.0	66 68	98.5	44 35.7	66 68	98.0	44 55.3	65 68	97.4	45 14.8	65 68	96.9
3	43 35.4	66 68	97.7	43 55.1	65 68	97.1	44 14.7	65 68	96.6	44 34.1	64 68	96.1
4	42 54.9	66 68	96.9	43 14.5	65 68	96.3	43 34.0	65 68	95.8	43 53.4	64 68	95.3
55	42 14.2	66 68	96.1	42 33.8	65 68	95.5	42 53.3	65 68	95.0	43 12.6	64 68	94.5
6	41 33.5	65 68	95.3	41 53.1	65 68	94.8	42 12.5	65 68	94.2	42 31.8	64 68	93.7
7	40 52.7	65 68	94.5	41 12.3	65 68	94.0	41 31.7	65 68	93.5	41 51.0	64 68	93.0
8	40 11.9	65 68	93.7	40 31.4	65 68	93.2	40 50.8	64 68	92.7	41 10.1	64 68	92.2
9	39 31.0	65 68	92.9	39 50.5	65 68	92.4	40 09.9	64 68	92.0	40 29.2	64 68	91.4
60	38 50.2	65 68	92.2	39 09.7	65 68	91.7	39 29.0	64 68	91.2	39 48.3	64 68	90.7
1	38 09.3	65 68	91.4	38 28.7	65 68	91.0	38 48.1	64 68	90.5	39 07.4	64 68	90.0
2	37 28.3	65 68	90.7	37 47.8	65 68	90.2	38 07.2	64 68	89.7	38 26.4	64 68	89.2
3	36 47.4	65 68	90.0	37 06.9	65 68	89.5	37 26.3	64 68	89.0	37 45.5	64 68	88.5
4	36 06.5	65 68	89.2	36 26.0	65 68	88.8	36 45.4	64 68	88.3	37 04.6	64 68	87.8
65	35 25.6	65 68	88.5	35 45.1	65 68	88.0	36 04.5	64 68	87.6	36 23.8	64 68	87.1
6	34 44.7	65 68	87.8	35 04.2	65 68	87.3	35 23.6	64 68	86.9	35 42.9	64 68	86.4
7	34 03.8	65 68	87.1	34 23.3	65 68	86.6	34 42.8	65 68	86.2	35 02.1	64 68	85.7
8	33 23.0	65 68	86.4	33 42.5	65 68	85.9	34 01.9	65 68	85.5	34 21.3	64 68	85.0
9	32 42.1	65 68	85.7	33 01.7	65 68	85.2	33 21.2	65 68	84.8	33 40.5	64 68	84.3
70	32 01.4	65 68	85.0	32 21.0	65 68	84.5	32 40.5	65 68	84.1	32 59.9	65 68	83.6
1	31 20.6	66 68	84.3	31 40.2	65 68	83.8	31 59.8	65 68	83.4	32 19.2	65 68	83.0
2	30 39.9	66 68	83.6	30 59.6	65 68	83.2	31 19.2	65 68	82.7	31 38.6	65 68	82.3
3	29 59.3	66 68	82.9	30 19.0	66 68	82.5	30 38.6	65 68	82.0	30 58.1	65 67	81.6
4	29 18.7	66 68	82.2	29 38.5	66 67	81.8	29 58.1	65 67	81.4	30 17.7	65 67	80.9
75	28 38.2	66 67	81.6	28 58.0	66 67	81.1	29 17.7	66 67	80.7	29 37.3	65 67	80.3
6	27 57.8	66 67	80.9	28 17.6	66 67	80.5	28 37.3	66 67	80.0	28 57.0	65 67	79.6
7	27 17.4	66 67	80.2	27 37.3	66 67	79.8	27 57.1	66 67	79.4	28 16.8	66 67	78.9
8	26 37.1	67 67	79.5	26 57.1	66 67	79.1	27 16.9	66 67	78.7	27 36.7	66 67	78.3
9	25 56.9	67 67	78.9	26 16.9	67 67	78.5	26 36.8	66 67	78.0	26 56.7	66 67	77.6
80	25 16.8	67 67	78.2	25 36.9	67 67	77.8	25 56.9	66 66	77.4	26 16.8	66 66	77.0
1	24 36.8	67 66	77.5	24 56.9	67 66	77.1	25 17.0	67 66	76.7	25 36.9	66 66	76.3
2	23 56.9	67 66	76.9	24 17.1	67 66	76.5	24 37.2	67 66	76.1	24 57.2	67 66	75.7
3	23 17.1	68 66	76.2	23 37.4	67 66	75.8	23 57.5	67 66	75.4	24 17.7	67 66	75.0
4	22 37.4	68 66	75.6	22 57.7	68 66	75.2	23 18.0	67 66	74.8	23 38.2	67 66	74.4
85	21 57.9	68 66	74.9	22 18.2	68 66	74.5	22 38.6	68 66	74.1	22 58.9	67 65	73.7
6	21 18.4	68 66	74.2	21 38.9	68 65	73.8	21 59.3	68 65	73.4	22 19.6	68 65	73.1
7	20 39.1	69 65	73.6	20 59.6	68 65	73.2	21 20.1	68 65	72.8	21 40.6	68 65	72.4
8	19 59.9	69 65	72.9	20 20.5	69 65	72.5	20 41.1	68 65	72.1	21 01.6	68 65	71.8
9	19 20.9	69 65	72.3	19 41.6	69 65	71.9	20 02.2	69 64	71.5	20 22.9	69 64	71.1
90	18 42.0	69 65	71.6	19 02.8	69 64	71.2	19 23.5	69 64	70.8	19 44.2	69 64	70.5

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DECLINATION CONTRARY NAME TO LATITUDE

H.A.	24° 00′ Alt.	Δd	Δt	Az.	24° 30′ Alt.	Δd	Δt	Az.	25° 00′ Alt.	Δd	Δt	Az.	25° 30′ Alt.	Δd	Δt	Az.	26° 00′ Alt.	Δd	Δt	Az.	26° 30′ Alt.	Δd	Δt	Az.	27° 00′ Alt.	Δd	Δt	Az.	27° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
00	19 00.0	1.0	01	180.0	18 30.0	1.0	01	180.0	18 00.0	1.0	01	180.0	17 30.0	1.0	01	180.0	17 00.0	1.0	01	180.0	16 30.0	1.0	01	180.0	16 00.0	1.0	01	180.0	15 30.0	1.0	01	180.0	00
1	18 59.7	1.0	02	179.0	18 29.7	1.0	02	179.0	17 59.7	1.0	02	179.0	17 29.7	1.0	02	179.1	16 59.7	1.0	02	179.1	16 29.7	1.0	02	179.1	15 59.7	1.0	02	179.1	15 29.7	1.0	02	179.1	1
2	18 58.6	1.0	03	178.1	18 28.6	1.0	03	178.1	17 58.6	1.0	03	178.1	17 28.6	1.0	03	178.1	16 58.7	1.0	03	178.1	16 28.7	1.0	03	178.1	15 58.7	1.0	03	178.1	15 28.7	1.0	03	178.2	2
3	18 56.9	1.0	04	177.1	18 26.9	1.0	04	177.1	17 56.9	1.0	04	177.1	17 27.0	1.0	04	177.2	16 57.0	1.0	04	177.2	16 27.0	1.0	04	177.2	15 57.0	1.0	04	177.2	15 27.0	1.0	04	177.2	3
4	18 54.5	1.0	05	176.1	18 24.5	1.0	05	176.2	17 54.6	1.0	05	176.2	17 24.6	1.0	05	176.2	16 54.6	1.0	05	176.2	16 24.7	1.0	05	176.3	15 54.7	1.0	05	176.3	15 24.7	1.0	05	176.3	4
05	18 51.4	1.0	06	175.2	18 21.4	1.0	06	175.2	17 51.5	1.0	06	175.2	17 21.6	1.0	06	175.3	16 51.6	1.0	06	175.3	16 21.7	1.0	06	175.3	15 51.7	1.0	06	175.4	15 21.8	1.0	06	175.4	05
6	18 47.6	1.0	08	174.2	18 17.7	1.0	07	174.3	17 47.8	1.0	07	174.3	17 17.9	1.0	07	174.3	16 47.9	1.0	07	174.4	16 18.0	1.0	07	174.4	15 48.1	1.0	07	174.4	15 18.2	1.0	07	174.5	6
7	18 43.1	1.0	09	173.2	18 13.2	1.0	09	173.3	17 43.4	1.0	08	173.3	17 13.5	1.0	08	173.4	16 43.6	1.0	08	173.4	16 13.7	1.0	08	173.5	15 43.8	1.0	08	173.5	15 13.9	1.0	08	173.6	7
8	18 38.0	99	10	172.3	18 08.1	1.0	10	172.3	17 38.3	1.0	10	172.4	17 08.4	1.0	10	172.4	16 38.6	1.0	10	172.5	16 08.7	1.0	09	172.5	15 38.9	1.0	09	172.6	15 09.0	1.0	09	172.7	8
9	18 32.1	99	11	171.3	18 02.3	99	11	171.4	17 32.5	99	11	171.4	17 02.7	99	11	171.5	16 32.9	99	11	171.6	16 03.1	99	10	171.6	15 33.3	99	10	171.7	15 03.5	99	10	171.7	9
10	18 25.6	99	12	170.4	17 55.9	99	12	170.4	17 26.1	99	12	170.5	16 56.3	99	12	170.6	16 26.6	99	12	170.6	15 56.8	99	12	170.7	15 27.0	99	12	170.8	14 57.3	99	11	170.8	10
1	18 18.5	99	13	169.4	17 48.7	99	13	169.5	17 19.0	99	13	169.6	16 49.3	99	13	169.6	16 19.6	99	13	169.7	15 49.9	99	13	169.8	15 20.1	99	12	169.8	14 50.4	99	12	169.9	1
2	18 10.6	99	14	168.5	17 41.0	99	14	168.5	17 11.3	99	14	168.6	16 41.6	99	14	168.7	16 11.9	99	14	168.8	15 42.3	99	14	168.9	15 12.6	99	14	168.9	14 42.9	99	14	169.0	2
3	18 02.1	99	15	167.5	17 32.5	99	15	167.6	17 02.9	99	15	167.7	16 33.3	99	15	167.8	16 03.7	99	15	167.9	15 34.0	99	15	168.0	15 04.4	99	15	168.0	14 34.8	99	15	168.1	3
4	17 52.9	98	16	166.6	17 23.4	98	16	166.7	16 53.8	99	16	166.8	16 24.3	99	16	166.8	15 54.7	99	16	166.9	15 25.2	99	16	167.0	14 55.6	99	16	167.1	14 26.1	99	16	167.2	4
15	17 43.1	98	18	165.6	17 13.6	98	17	165.7	16 44.1	98	17	165.8	16 14.6	98	17	165.9	15 45.2	98	17	166.0	15 15.7	98	17	166.1	14 46.2	98	17	166.2	14 16.7	98	17	166.3	15
6	17 32.6	98	18	164.7	17 03.2	98	18	164.8	16 33.8	98	18	164.9	16 04.4	98	18	165.0	15 35.0	98	18	165.1	15 05.5	98	18	165.2	14 36.1	98	18	165.3	14 06.7	98	18	165.4	6
7	17 21.5	98	20	163.7	16 52.2	98	20	163.9	16 22.8	98	19	164.0	15 53.5	98	19	164.1	15 24.1	98	19	164.2	14 54.8	98	19	164.3	14 25.4	98	19	164.4	13 56.0	98	19	164.5	7
8	17 09.7	98	21	162.8	16 40.5	98	21	162.9	16 11.2	98	20	163.0	15 41.9	98	20	163.2	15 12.6	98	20	163.3	14 43.4	98	20	163.4	14 14.1	98	20	163.5	13 44.8	98	20	163.6	8
9	16 57.3	97	22	161.9	16 28.1	97	22	162.0	15 58.9	97	22	162.1	15 29.8	97	21	162.2	15 00.6	97	21	162.4	14 31.4	97	21	162.5	14 02.2	97	21	162.6	13 33.0	97	21	162.7	9
20	16 44.3	97	22	161.0	16 15.2	97	23	161.1	15 46.1	97	22	161.2	15 17.0	97	22	161.3	14 47.9	97	22	161.5	14 18.7	97	22	161.6	13 49.6	97	22	161.7	13 20.5	97	22	161.8	20
1	16 30.6	97	24	160.0	16 01.6	97	24	160.2	15 32.6	97	24	160.3	15 03.6	97	23	160.4	14 34.5	97	23	160.6	14 05.5	97	23	160.7	13 36.5	97	23	160.8	13 07.4	97	23	160.9	1
2	16 16.3	96	25	159.1	15 47.4	96	25	159.3	15 18.5	96	24	159.4	14 49.6	96	24	159.5	14 20.6	96	24	159.7	13 51.7	96	24	159.8	13 22.7	96	24	159.9	12 53.8	97	24	160.1	2
3	16 01.4	96	26	158.2	15 32.6	96	26	158.3	15 03.8	96	26	158.5	14 34.9	96	25	158.6	14 06.1	96	25	158.8	13 37.3	96	25	158.9	13 08.4	96	25	159.1	12 39.5	96	25	159.2	3
4	15 45.9	96	27	157.3	15 17.2	96	27	157.4	14 48.5	96	26	157.6	14 19.7	96	26	157.7	13 51.0	96	26	157.9	13 22.2	96	26	158.0	12 53.5	96	26	158.2	12 24.7	96	26	158.3	4
25	15 29.8	96	28	156.4	15 01.2	96	28	156.5	14 32.6	96	28	156.7	14 03.9	95	27	156.8	13 35.3	96	27	157.0	13 06.6	96	27	157.1	12 38.0	96	27	157.3	12 09.3	96	27	157.5	25
6	15 13.2	95	29	155.5	14 44.6	95	29	155.6	14 16.1	95	28	155.8	13 47.6	95	28	156.0	13 19.0	95	28	156.1	12 50.5	95	28	156.3	12 21.9	95	28	156.4	11 53.3	95	28	156.6	6
7	14 55.9	95	30	154.6	14 27.5	95	30	154.7	13 59.0	95	29	154.9	13 30.6	95	29	155.1	13 02.2	95	29	155.2	12 33.7	95	29	155.4	12 05.3	95	29	155.6	11 36.8	95	28	155.7	7
8	14 38.0	94	31	153.7	14 09.7	94	31	153.9	13 41.4	94	30	154.0	13 13.1	94	30	154.2	12 44.7	94	30	154.4	12 16.4	94	30	154.5	11 48.0	94	30	154.7	11 19.7	95	29	154.9	8
9	14 19.6	94	32	152.8	13 51.4	94	31	153.0	13 23.2	94	31	153.1	12 55.0	94	31	153.3	12 26.7	94	31	153.5	11 58.5	94	31	153.7	11 30.3	94	30	153.8	11 02.0	94	30	154.0	9
30	14 00.6	94	32	151.9	13 32.5	94	32	152.1	13 04.4	94	32	152.3	12 36.3	94	32	152.5	12 08.2	94	32	152.6	11 40.1	94	32	152.8	11 12.0	94	31	153.0	10 43.8	94	31	153.2	30
1	13 41.1	93	34	151.0	13 13.1	93	33	151.2	12 45.1	93	33	151.4	12 17.1	93	33	151.6	11 49.1	93	33	151.8	11 21.1	93	33	152.0	10 53.1	93	32	152.1	10 25.1	93	32	152.3	1
2	13 21.0	93	34	150.2	12 53.1	93	34	150.4	12 25.3	93	34	150.5	11 57.4	93	34	150.7	11 29.5	93	34	150.9	11 01.6	93	33	151.1	10 33.7	93	33	151.3	10 05.8	93	33	151.5	2
3	13 00.4	92	35	149.3	12 32.6	92	35	149.5	12 04.9	93	35	149.7	11 37.1	93	35	149.9	11 09.4	93	34	150.1	10 41.6	93	34	150.3	10 13.8	93	34	150.5	9 46.0	93	34	150.6	3
4	12 39.2	92	36	148.4	12 11.6	92	36	148.6	11 44.0	92	36	148.8	11 16.3	92	36	149.0	10 48.7	92	35	149.2	10 21.0	92	35	149.4	9 53.4	92	35	149.6	9 25.7	92	35	149.8	4
35	12 17.5	92	37	147.6	11 50.0	92	37	147.8	11 22.5	92	37	148.0	10 55.0	92	36	148.2	10 27.5	92	36	148.4	10 00.0	92	36	148.6	9 32.4	92	36	148.8	9 04.9	92	36	149.0	35
6	11 55.3	91	38	146.7	11 27.9	91	38	146.9	11 00.6	91	38	147.1	10 33.2	91	37	147.3	10 05.8	91	37	147.5	9 38.4	91	37	147.8	9 11.0	91	37	148.0	8 43.5	91	36	148.2	6
7	11 32.6	91	39	145.9	11 05.4	91	38	146.1	10 38.1	91	38	146.3	10 10.8	91	38	146.5	9 43.6	91	38	146.7	9 16.3	91	38	146.9	8 49.0	91	37	147.1	8 21.7	91	37	147.3	7
8	11 09.4	90	40	145.0	10 42.3	90	39	145.2	10 15.1	90	39	145.5	9 48.0	90	39	145.7	9 20.9	90	39	145.9	8 53.7	91	38	146.1	8 26.6	91	38	146.3	7 59.4	91	38	146.5	8
9	10 45.7	90	40	144.2	10 18.7	90	40	144.4	9 51.7	90	40	144.6	9 24.7	90	40	144.8	8 57.7	90	40	145.1	8 30.7	90	39	145.3	8 03.6	90	39	145.5	7 36.6	90	39	145.7	9
40	10 21.5	90	41	143.3	9 54.6	90	41	143.6	9 27.8	90	41	143.8	9 00.9	90	40	144.0	8 34.0	90	40	144.2	8 07.1	90	40	144.5	7 40.2	90	40	144.7	7 13.3	90	40	144.9	40
1	9 56.8	89	42	142.5	9 30.1	89	42	142.8	9 03.4	89	42	143.0	8 36.6	89	41	143.2	8 09.9	89	41	143.4	7 43.1	89	41	143.7	7 16.3	89	41	143.9	6 49.6	89	40	144.1	1
2	9 31.7	89	43	141.7	9 05.1	89	42	141.9	8 38.5	89	42	142.2	8 11.9	89	42	142.4	7 45.3	89	42	142.6	7 18.6	89	42	142.9	6 52.0	89	41	143.1	6 25.3	89	41	143.3	2
3	9 06.1	88	43	140.9	8 39.6	88	43	141.1	8 13.2	88	43	141.4	7 46.7	88	43	141.6	7 20.2	88	42	141.8	6 53.7	88	42	142.1	6 27.2	88	42	142.3	6 00.7	88	42	142.5	3
4	8 40.1	88	44	140.1	8 13.7	88	44	140.3	7 47.4	88	44	140.5	7 21.0	88	43	140.8	6 54.7	88	43	141.0	6 28.3	88	43	141.3	6 01.9	88	43	141.5	5 35.6	88	43	141.7	4
45	8 13.6	87	45	139.3	7 47.4	87	45	139.5	7 21.2	87	44	139.7	6 55.0	87	44	140.0	6 28.7	87	44	140.2	6 02.5	87	44	140.5	5 36.3	87	44	140.7	5 10.0	87	43	141.0	45
6	7 46.7	87	46	138.5	7 20.6	87	45	138.7	6 54.5	87	45	138.9	6 28.4	87	45	139.2	6 02.3	87	45	139.4	5 36.2	87	44	139.7	5 10.1	87	44	139.9					6
7	7 19.3	86	46	137.7	6 53.4	86	46	137.9	6 27.4	87	46	138.2	6 01.5	87	46	138.4	5 35.5	87	45	138.7	5 09.6	87	45	138.9									7
8	6 51.5	86	47	136.9	6 25.7	86	47	137.1	5 59.9	86	46	137.4	5 34.1	86	46	137.6	5 08.3	86	46	137.9													8
9	6 23.3	86	48	136.1	5 57.7	86	47	136.3	5 32.0	86	47	136.6	5 06.3	86	47	136.9																	9
50	5 54.8	85	48	135.3	5 29.2	85	48	135.6	5 03.7	85	48	135.8																					50
1	5 25.8	85	49	134.5	5 00.4	85	49	134.8																									1

DECLINATION SAME NAME AS LATITUDE

H.A.	24° 00′ Alt.	Δd	Δt	Az.	24° 30′ Alt.	Δd	Δt	Az.	25° 00′ Alt.	Δd	Δt	Az.	25° 30′ Alt.	Δd	Δt	Az.	26° 00′ Alt.	Δd	Δt	Az.	26° 30′ Alt.	Δd	Δt	Az.	27° 00′ Alt.	Δd	Δt	Az.	27° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
91	16 39.3	70	65	72.4	17 00.3	70	65	72.1	17 21.3	70	65	71.7	17 42.3	70	64	71.3	18 03.2	70	64	70.9	18 24.1	70	64	70.6	18 44.9	69	64	70.2	19 05.7	69	64	69.8	91
2	16 00.3	71	65	71.8	16 21.4	70	65	71.4	16 42.5	70	64	71.0	17 03.6	70	64	70.7	17 24.6	70	64	70.3	17 45.6	70	64	69.9	18 06.5	70	64	69.5	18 27.4	70	64	69.2	2
3	15 21.5	71	64	71.1	15 42.7	71	64	70.7	16 03.9	71	64	70.4	16 25.1	70	64	70.0	16 46.2	70	64	69.6	17 07.2	70	64	69.3	17 28.3	70	64	68.9	17 49.2	70	63	68.5	3
4	14 42.9	71	64	70.4	15 04.2	71	64	70.1	15 25.5	71	64	69.7	15 46.7	71	64	69.3	16 07.9	71	64	69.0	16 29.1	70	63	68.6	16 50.2	70	63	68.2	17 11.3	70	63	67.9	4
95	14 04.4	71	64	69.8	14 25.8	71	64	69.4	14 47.2	71	64	69.0	15 08.5	71	63	68.7	15 29.8	71	63	68.3	15 51.0	71	63	67.9	16 12.3	71	63	67.6	16 33.5	71	63	67.2	95
6	13 26.1	72	64	69.1	13 47.6	72	63	68.7	14 09.0	71	63	68.4	14 30.5	71	63	68.0	14 51.9	71	63	67.6	15 13.2	71	63	67.3	15 34.5	71	63	66.9	15 55.8	71	62	66.5	6
7	12 48.0	72	63	68.4	13 09.5	72	63	68.1	13 31.1	72	63	67.7	13 52.6	72	63	67.3	14 14.1	72	63	67.0	14 35.6	71	62	66.6	14 57.0	71	62	66.3	15 18.4	71	62	65.9	7
8	12 10.0	72	63	67.7	12 31.7	72	63	67.4	12 53.3	72	63	67.0	13 14.9	72	62	66.7	13 36.5	72	62	66.3	13 58.1	72	62	66.0	14 19.6	72	62	65.6	14 41.1	72	62	65.2	8
9	11 32.2	73	63	67.1	11 54.0	73	62	66.7	12 15.8	72	62	66.4	12 37.5	72	62	66.0	12 59.2	72	62	65.6	13 20.8	72	62	65.3	13 42.5	72	62	64.9	14 04.1	72	61	64.6	9
100	10 54.6	73	62	66.4	11 16.5	73	62	66.0	11 38.4	73	62	65.7	12 00.2	73	62	65.3	12 22.0	73	62	65.0	12 43.8	73	61	64.6	13 05.5	72	61	64.3	13 27.2	72	61	63.9	100
1	10 17.2	73	62	65.7	10 39.2	73	62	65.4	11 01.2	73	62	65.0	11 23.1	73	61	64.7	11 45.0	73	61	64.3	12 06.9	73	61	64.0	12 28.7	73	61	63.6	12 50.6	73	61	63.3	1
2	9 40.1	74	62	65.0	10 02.1	74	61	64.7	10 24.2	73	61	64.3	10 46.2	73	61	64.0	11 08.2	73	61	63.6	11 30.2	73	61	63.3	11 52.2	73	60	62.9	12 14.1	73	60	62.6	2
3	9 03.1	74	61	64.3	9 25.2	74	61	64.0	9 47.4	74	61	63.7	10 09.6	74	61	63.3	10 31.7	74	61	63.0	10 53.8	74	60	62.6	11 15.9	74	60	62.3	11 37.9	73	60	61.9	3
4	8 26.3	74	61	63.7	8 48.6	74	61	63.3	9 10.9	74	60	63.0	9 33.1	74	60	62.6	9 55.3	74	60	62.3	10 17.5	74	60	62.0	10 39.7	74	60	61.6	11 01.9	74	60	61.3	4
105	7 49.7	75	60	63.0	8 12.1	75	60	62.6	8 34.5	75	60	62.3	8 56.9	75	60	62.0	9 19.2	74	60	61.6	9 41.5	74	60	61.3	10 03.9	74	60	60.9	10 26.1	74	59	60.6	105
6	7 13.4	75	60	62.3	7 35.9	75	60	61.9	7 58.4	75	60	61.6	8 20.9	75	60	61.3	8 43.3	75	59	60.9	9 05.8	75	59	60.6	9 28.2	75	59	60.3	9 50.6	75	59	59.9	6
7	6 37.3	75	60	61.6	6 59.9	75	60	61.3	7 22.5	75	59	60.9	7 45.1	75	59	60.6	8 07.7	75	59	60.3	8 30.2	75	59	59.9	8 52.8	75	59	59.6	9 15.3	75	58	59.3	7
8	6 01.4	76	59	60.9	6 24.2	76	59	60.6	6 46.9	76	59	60.2	7 09.6	76	59	59.9	7 32.3	76	59	59.6	7 55.0	76	58	59.2	8 17.6	76	58	58.9	8 40.3	75	58	58.6	8
9	5 25.8	76	59	60.2	5 48.6	76	59	59.9	6 11.5	76	59	59.5	6 34.3	76	58	59.2	6 57.1	76	58	58.9	7 19.9	76	58	58.6	7 42.7	76	58	58.2	8 05.5	76	58	57.9	9
110					5 13.4	77	58	59.2	5 36.3	77	58	58.8	5 59.3	76	58	58.5	6 22.2	76	58	58.2	6 45.1	76	58	57.9	7 08.1	76	57	57.5	7 30.9	76	57	57.2	110
1									5 01.5	77	58	58.1	5 24.5	77	58	57.8	5 47.6	77	57	57.5	6 10.6	77	57	57.2	6 33.7	77	57	56.9	6 56.7	77	57	56.5	1
2																	5 13.2	77	57	56.8	5 36.4	77	57	56.5	5 59.5	77	56	56.2	6 22.7	77	56	55.8	2
3																					5 02.4	78	56	55.8	5 25.7	78	56	55.5	5 49.0	78	56	55.2	3
4																													5 15.5	78	55	54.5	4

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Lat. 47°

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	71 00.0	1.0 02	180.0	71 30.0	1.0 02	180.0	72 00.0	1.0 02	180.0	73 00.0	1.0 02	180.0	75 00.0	1.0 02	180.0	77 00.0	1.0 02	180.0	77 30.0	1.0 02	180.0	78 30.0	1.0 02	180.0	00
1	70 59.0	1.0 05	177.3	71 29.0	1.0 05	177.2	71 59.0	1.0 05	177.2	72 58.9	1.0 05	177.0	74 58.8	1.0 06	176.7	76 58.7	1.0 07	176.3	77 28.6	1.0 07	176.2	78 28.5	1.0 07	175.9	1
2	70 56.1	1.0 08	174.6	71 26.0	1.0 08	174.5	71 56.0	1.0 08	174.4	72 55.8	1.0 09	174.1	74 55.3	1.0 10	173.5	76 54.8	99 11	172.7	77 24.6	99 11	172.4	78 24.2	99 12	171.9	2
3	70 51.3	99 11	171.9	71 21.1	99 11	171.7	71 50.9	99 12	171.6	72 50.5	99 12	171.2	74 49.5	99 13	170.2	76 48.2	99 15	169.0	77 17.9	99 16	168.7	78 17.0	98 17	167.9	3
4	70 44.6	99 14	169.2	71 14.3	99 15	169.0	71 44.0	99 15	168.8	72 43.2	99 16	168.3	74 41.5	98 17	167.1	76 39.2	98 19	165.5	77 08.6	98 20	165.0	78 07.1	97 21	164.0	4
05	70 36.0	98 17	166.6	71 05.5	98 18	166.3	71 35.0	98 18	166.0	72 33.9	98 19	165.4	74 31.2	97 21	163.9	76 27.8	97 23	162.0	76 56.8	96 24	161.5	77 54.5	96 25	160.2	05
6	70 25.7	98 20	164.0	70 55.0	98 21	163.7	71 24.2	97 21	163.3	72 22.6	97 22	162.6	74 18.8	96 24	160.9	76 14.0	95 27	158.6	76 42.6	95 27	158.0	77 39.4	94 29	156.5	6
7	70 13.5	97 23	161.5	70 42.6	97 24	161.1	71 11.6	97 24	160.7	72 09.4	96 25	159.9	74 04.4	95 27	157.9	75 58.0	94 30	155.4	76 26.1	94 31	154.6	77 21.9	92 33	153.0	7
8	69 59.7	96 26	158.9	70 28.4	96 26	158.5	70 57.2	96 27	158.1	71 54.5	95 28	157.2	73 48.0	94 30	155.0	75 39.9	92 33	152.2	76 07.6	92 34	151.4	77 02.3	91 36	149.7	8
9	69 44.1	95 28	156.5	70 12.6	95 29	156.0	70 41.1	95 30	155.6	71 37.7	94 31	154.5	73 29.8	93 33	152.2	75 19.9	91 36	149.2	75 47.0	90 37	148.3	76 40.7	89 39	146.4	9
10	69 27.0	94 31	154.1	69 55.2	94 32	153.6	70 23.4	94 32	153.1	71 19.3	93 33	152.0	73 09.9	91 36	149.4	74 58.1	89 39	146.3	75 24.7	88 40	145.4	76 17.1	87 42	143.4	10
1	69 08.4	93 34	151.8	69 36.3	93 34	151.2	70 04.1	92 35	150.7	70 59.3	92 36	149.5	72 48.2	90 39	146.8	74 34.5	87 42	143.5	75 00.6	86 43	142.6	75 51.9	85 45	140.5	1
2	68 48.3	92 36	149.5	69 15.9	92 36	148.9	69 43.3	91 37	148.4	70 37.8	90 38	147.1	72 25.1	88 41	144.3	74 09.4	85 44	140.8	74 34.9	85 45	139.9	75 25.1	83 47	137.8	2
3	68 26.9	91 38	147.3	68 54.1	90 39	146.7	69 21.2	90 39	146.1	70 14.9	89 40	144.8	72 00.5	87 43	141.9	73 42.9	84 46	138.3	74 07.9	83 47	137.3	74 56.9	81 49	135.2	3
4	68 04.1	90 40	145.1	68 31.0	89 41	144.5	68 57.7	89 41	143.9	69 50.7	88 42	142.6	71 34.6	85 45	139.5	73 15.0	82 48	135.9	73 39.5	81 49	134.9	74 27.5	79 51	132.7	4
15	67 40.1	89 42	143.0	68 06.6	88 43	142.4	68 33.0	88 43	141.8	69 25.2	86 44	140.4	71 07.4	84 47	137.3	72 46.0	80 50	133.6	73 09.9	79 51	132.6	73 56.8	77 53	130.4	15
6	67 14.9	87 44	141.0	67 41.1	87 44	140.4	68 07.0	86 45	139.7	68 58.5	85 46	138.3	70 39.1	82 49	135.1	72 15.8	79 52	131.4	72 39.3	78 53	130.4	73 25.1	75 54	128.2	6
7	66 48.6	86 46	139.0	67 14.4	86 46	138.4	67 40.0	85 47	137.7	68 30.7	84 48	136.3	70 09.7	81 51	133.1	71 44.6	77 54	129.3	72 07.6	76 54	128.3	72 52.5	74 56	126.1	7
8	66 21.3	85 47	137.1	66 46.7	85 48	136.5	67 12.0	84 48	135.8	68 02.0	83 50	134.3	69 39.3	80 52	131.1	71 12.5	76 55	127.3	71 35.0	74 56	126.3	72 19.0	72 57	124.1	8
9	65 53.0	84 49	135.3	66 18.1	83 49	134.6	66 43.0	83 50	133.9	67 32.2	81 51	132.4	69 08.0	78 54	129.2	70 39.6	74 56	125.4	71 01.6	73 57	124.4	71 44.7	71 58	122.2	9
20	65 23.7	83 50	133.5	65 48.5	82 51	132.8	66 13.1	82 51	132.1	67 01.6	80 52	130.6	68 35.9	77 55	127.4	70 05.8	73 57	123.6	70 27.5	72 58	122.6	71 09.8	69 59	120.4	20
1	64 53.6	82 52	131.8	65 18.1	81 52	131.1	65 42.3	80 53	130.4	66 30.1	79 54	128.9	68 03.0	76 56	125.6	69 31.4	72 58	121.9	69 52.7	70 59	120.8	70 34.2	68 60	118.7	1
2	64 22.7	81 53	130.1	64 46.8	80 53	129.4	65 10.7	79 54	128.7	65 57.9	78 55	127.2	67 29.4	74 57	123.9	68 56.4	70 59	120.2	69 17.3	69 60	119.2	69 58.0	67 61	117.1	2
3	63 51.0	80 54	128.5	64 14.8	79 54	127.8	64 38.4	78 55	127.1	65 25.0	77 56	125.6	66 55.1	73 58	122.3	68 20.7	69 60	118.6	68 41.3	68 61	117.6	69 21.3	65 62	115.5	3
4	63 18.7	79 55	126.9	63 42.2	78 56	126.2	64 05.4	77 56	125.5	64 51.4	76 57	124.0	66 20.2	72 59	120.7	67 44.5	68 61	117.1	68 04.8	67 62	116.1	68 44.2	64 63	114.1	4
25	62 45.6	78 56	125.4	63 08.8	77 57	124.7	63 31.8	76 57	124.0	64 17.1	75 58	122.5	65 44.8	71 60	119.2	67 07.9	67 62	115.6	67 27.8	66 62	114.7	68 06.6	63 63	112.7	25
6	62 12.0	77 57	123.9	62 34.9	76 58	123.2	62 57.6	75 58	122.5	63 42.3	74 59	121.0	65 08.8	70 61	117.8	66 30.8	66 63	114.2	66 50.4	65 63	113.3	67 28.7	63 64	111.3	6
7	61 37.7	76 58	122.5	62 00.4	75 58	121.8	62 22.8	74 59	121.1	63 07.0	73 60	119.6	64 32.4	69 61	116.4	65 53.2	65 63	112.9	66 12.6	64 64	111.9	66 50.4	62 64	110.0	7
8	61 02.9	75 59	121.1	61 25.3	74 59	120.4	61 47.5	74 60	119.7	62 31.2	72 60	118.2	63 55.6	69 62	115.1	65 15.4	64 64	111.6	65 34.5	63 64	110.7	66 11.8	61 65	108.7	8
9	60 27.6	74 60	119.7	60 49.8	73 60	119.1	61 11.7	73 60	118.4	61 54.9	71 61	116.9	63 18.3	68 63	113.8	64 37.2	64 64	110.3	64 56.1	63 65	109.4	65 32.9	60 65	107.5	9
30	59 51.9	73 60	118.4	60 13.8	73 61	117.8	60 35.5	72 61	117.1	61 18.2	70 62	115.6	62 40.7	67 63	112.5	63 58.6	63 65	109.1	64 17.4	62 65	108.2	64 53.8	60 66	106.4	30
1	59 15.7	73 61	117.2	59 37.4	72 61	116.5	59 58.9	71 62	115.8	60 41.1	70 62	114.4	62 02.7	66 64	111.3	63 19.8	62 65	108.0	63 38.4	61 65	107.1	64 14.4	59 66	105.3	1
2	58 39.1	72 62	115.9	59 00.6	71 62	115.2	59 21.8	71 62	114.6	60 03.7	69 63	113.1	61 24.4	66 64	110.1	62 40.8	62 65	106.8	62 59.1	61 66	106.0	63 34.8	58 66	104.2	2
3	58 02.1	71 62	114.7	58 23.4	71 63	114.1	58 44.4	70 63	113.4	59 25.9	68 64	112.0	60 45.9	65 65	109.0	62 01.5	61 66	105.7	62 19.7	60 66	104.9	62 55.0	58 67	103.1	3
4	57 24.8	71 63	113.5	57 45.8	70 63	112.9	58 06.7	69 63	112.2	58 47.8	68 64	110.8	60 07.0	64 65	107.9	61 22.0	61 66	104.7	61 40.0	60 66	103.8	62 15.1	57 67	102.1	4
35	56 47.1	70 63	112.4	57 08.0	69 64	111.7	57 28.7	69 64	111.1	58 09.4	67 64	109.7	59 28.0	64 65	106.8	60 42.3	60 66	103.6	61 00.2	59 67	102.8	61 35.0	57 67	101.1	35
6	56 09.1	69 64	111.3	56 29.8	69 64	110.6	56 50.3	68 64	110.0	57 30.7	67 65	108.8	58 48.7	63 66	105.7	60 02.5	60 67	102.6	60 20.2	59 67	101.8	60 54.8	57 67	100.1	6
7	55 30.8	69 64	110.2	55 51.4	68 64	109.6	56 11.8	68 65	108.9	56 51.8	66 65	107.6	58 09.2	63 66	104.7	59 22.5	59 67	101.6	59 40.1	58 67	100.9	60 14.5	56 67	99.2	7
8	54 52.3	68 65	109.1	55 12.7	68 65	108.5	55 32.9	67 65	107.9	56 12.7	66 66	106.5	57 29.5	62 66	103.7	58 42.3	59 67	100.7	58 59.9	58 67	99.9	59 34.0	56 68	98.3	8
9	54 13.5	68 65	108.1	54 33.8	67 65	107.5	54 53.9	67 66	106.8	55 33.4	65 66	105.5	56 49.7	62 67	102.7	58 02.1	59 67	99.8	58 19.5	58 67	99.0	58 53.5	56 68	97.4	9
40	53 34.5	67 65	107.1	53 54.7	67 66	106.5	54 14.6	66 66	105.8	54 53.8	65 66	104.5	56 09.7	62 67	101.8	57 21.7	58 67	98.9	57 39.0	57 68	98.1	58 12.9	55 68	96.5	40
1	52 55.3	67 66	106.1	53 15.3	66 66	105.5	53 35.1	66 66	104.8	54 14.1	64 66	103.6	55 29.6	61 67	100.9	56 41.2	58 68	98.0	56 58.5	57 68	97.2	57 32.2	55 68	95.7	1
2	52 15.9	67 66	105.1	52 35.8	66 66	104.5	52 55.5	65 66	103.9	53 34.3	64 67	102.6	54 49.3	61 67	99.9	56 00.7	58 68	97.1	56 17.9	57 68	96.4	56 51.4	55 68	94.9	2
3	51 36.3	66 66	104.2	51 56.1	66 66	103.6	52 15.7	65 67	103.0	52 54.3	64 67	101.7	54 09.0	61 67	99.1	55 20.0	58 68	96.3	55 37.2	57 68	95.5	56 10.6	55 68	94.1	3
4	50 56.5	66 66	103.2	51 16.2	65 67	102.6	51 35.7	65 67	102.0	52 14.2	63 67	100.8	53 28.5	61 68	98.2	54 39.3	57 68	95.4	54 56.4	57 68	94.7	55 29.8	55 68	93.3	4
45	50 16.6	66 67	102.3	50 36.2	65 67	101.7	50 55.6	64 67	101.1	51 33.9	63 67	99.9	52 48.0	60 68	97.3	53 58.5	57 68	94.6	54 15.6	56 68	93.9	54 48.9	55 68	92.5	45
6	49 36.6	65 67	101.4	49 56.1	65 67	100.8	50 15.4	64 67	100.2	50 53.5	63 67	99.0	52 07.4	60 68	96.5	53 17.7	57 68	93.8	53 34.7	56 68	93.1	54 08.0	55 68	91.7	6
7	48 56.4	65 67	100.5	49 15.9	64 67	100.0	49 35.1	64 67	99.4	50 13.1	63 68	98.2	51 26.7	60 68	95.7	52 36.9	57 68	93.0	52 53.9	56 68	92.4	53 27.1	55 68	91.0	7
8	48 16.1	65 67	99.7	48 35.5	64 67	99.1	48 54.7	64 68	98.5	49 32.5	62 68	97.3	50 45.9	60 68	94.9	51 56.0	57 68	92.3	52 13.0	56 68	91.6	52 46.2	55 68	90.2	8
9	47 35.8	65 68	98.8	47 55.1	64 68	98.3	48 14.2	63 68	97.7	48 51.9	62 68	96.5	50 05.1	60 68	94.1	51 15.1	57 68	91.5	51 32.1	56 68	90.8	52 05.3	55 68	89.5	9
50	46 55.3	64 68	98.0	47 14.5	64 68	97.4	47 33.6	63 68	96.9	48 11.2	62 68	95.7	49 24.3	60 68	93.3	50 34.2	57 68	90.8	50 51.2	56 68	90.1	51 24.4	55 68	88.8	50
1	46 14.7	64 68	97.2	46 33.9	64 68	96.6	46 52.9	63 68	96.0	47 30.5	62 68	94.9	48 43.4	60 68	92.5	49 53.3	57 68	90.0	50 10.2	56 68	89.4	50 43.5	55 68	88.1	1
2	45 34.1	64 68	96.3	45 53.2	64 68	95.8	46 12.2	63 68	95.2	46 49.7	62 68	94.1	48 02.5	59 68	91.8	49 12.4	57 68	89.3	49 29.3	56 68	88.7	50 02.6	55 68	87.4	2
3	44 53.4	64 68	95.5	45 12.5	63 68	95.0	45 31.4	63 68	94.4	46 08.8	62 68	93.3	47 21.6	59 68	91.0	48 31.5	57 68	88.6	48 48.4	56 68	88.0	49 21.7	55 68	86.7	3
4	44 12.6	64 68	94.8	44 31.7	63 68	94.2	44 50.6	63 68	93.7	45 28.0	62 68	92.6	46 40.7	59 68	90.3	47 50.6	57 68	87.9	48 07.5	56 68	87.3	48 40.9	55 68	86.0	4
55	43 31.8	64 68	94.0	43 50.9	63 68	93.4	44 09.8	63 68	92.9	44 47.1	62 68	91.8	45 59.8	59 68	89.5	47 09.7	57 68	87.2	47 26.7	56 68	86.6	48 00.1	55 68	85.3	55
6	42 51.0	64 68	93.2	43 10.0	63 68	92.7	43 28.9	63 68	92.1	44 06.2	62 68	91.1	45 18.9	59 68	88.8	46 28.8	57 68	86.5	46 45.8	56 68	85.9	47 19.3	55 68	84.7	6
7	42 10.1	64 68	92.4	42 29.1	63 68	91.9	42 48.0	63 68	91.4	43 25.3	62 68	90.3	44 38.0	60 68	88.1	45 48.0	57 68	85.8	46 05.0	57 68	85.2	46 38.6	55 68	84.0	7
8	41 29.2	64 68	91.7	41 48.2	63 68	91.2	42 07.1	63 68	90.6	42 44.4	62 68	89.6	43 57.1	60 68	87.4	45 07.2	57 68	85.1	45 24.3	57 68	84.5	45 57.9	55 68	83.3	8
9	40 48.3	64 68	90.9	41 07.3	63 68	90.4	41 26.2	63 68	89.9	42 03.4	62 68	88.9	43 16.2	60 68	86.7	44 26.4	57 68	84.4	44 43.6	57 68	83.9	45 17.3	56 68	82.7	9
60	40 07.4	64 68	90.2	40 26.4	63 68	89.7	40 45.2	63 68	89.2	41 22.5	62 68	88.1	42 35.4	60 68	86.0	43 45.7	58 68	83.8	44 02.9	57 68	83.2	44 36.8	56 68	82.1	60
1	39 26.5	64 68	89.5	39 45.5	63 68	89.0	40 04.3	63 68	88.5	40 41.6	62 68	87.4	41 54.6	60 68	85.3	43 05.1	58 68	83.1	43 22.3	57 68	82.6	43 56.3	56 67	81.4	1
2	38 45.6	64 68	88.7	39 04.6	63 68	88.3	39 23.4	63 68	87.8	40 00.8	62 68	86.7	41 13.8	60 68	84.6	42 24.5	58 68	82.5	42 41.8	57 67	81.9	43 15.8	56 67	80.8	2
3	38 04.7	64 68	88.0	38 23.7	63 68	87.5	38 42.6	63 68	87.0	39 19.9	62 68	86.0	40 33.1	60 68	84.0	41 44.0	58 67	81.8	42 01.3	58 67	81.3	42 35.5	56 67	80.2	3
4	37 23.8	64 68	87.3	37 42.8	63 68	86.8	38 01.7	63 68	86.3	38 39.1	62 68	85.3	39 52.4	60 68	83.3	41 03.5	58 67	81.2	41 20.9	58 67	80.6	41 55.2	57 67	79.5	4
65	36 42.9	64 68	86.6	37 02.0	63 68	86.1	37 20.9	63 68	85.6	37 58.4	62 68	84.7	39 11.8	60 68	82.6	40 23.1	58 67	80.5	40 40.5	58 67	80.0	41 15.0	57 67	78.9	65
6	36 02.1	64 68	85.9	36 21.1	63 68	85.4	36 40.1	63 68	85.0	37 17.6	62 68	84.0	38 31.3	60 68	82.0	39 42.8	59 67	79.9	40 00.3	58 67	79.4	40 34.9	57 67	78.3	6
7	35 21.3	64 68	85.2	35 40.4	63 68	84.8	35 59.4	63 68	84.3	36 37.0	62 68	83.3	37 50.8	61 67	81.3	39 02.5	59 67	79.3	39 20.1	58 67	78.8	39 54.9	57 67	77.7	7
8	34 40.5	64 68	84.5	34 59.6	64 68	84.1	35 18.7	63 68	83.6	35 56.4	62 68	82.6	37 10.4	61 67	80.7	38 22.3	59 67	78.7	38 40.0	59 67	78.1	39 14.9	58 66	77.1	8
9	33 59.8	64 68	83.9	34 19.0	64 68	83.4	34 38.0	63 68	82.9	35 15.8	63 67	82.0	36 30.0	61 67	80.0	37 42.3	59 67	78.0	38 00.0	59 66	77.5	38 35.1	58 66	76.5	9
70	33 19.2	64 68	83.2	33 38.4	64 68	82.7	33 57.5	63 68	82.2	34 35.3	63 67	81.3	35 49.8	61 67	79.4	37 02.3	60 66	77.4	37 20.1	59 66	76.9	37 55.4	58 66	75.9	70
1	32 38.6	64 68	82.5	32 57.8	64 68	82.0	33 16.9	64 67	81.6	33 54.9	63 67	80.7	35 09.6	61 67	78.8	36 22.4	60 66	76.8	36 40.3	59 66	76.3	37 15.7	59 66	75.3	1
2	31 58.0	64 68	81.8	32 17.3	64 67	81.4	32 36.5	64 67	80.9	33 14.6	63 67	80.0	34 29.5	62 67	78.1	35 42.6	60 66	76.2	36 00.6	60 66	75.7	36 36.2	59 66	74.7	2
3	31 17.5	65 67	81.2	31 36.9	64 67	80.7	31 56.1	64 67	80.3	32 34.3	63 67	79.3	33 49.5	62 66	77.5	35 02.9	60 66	75.6	35 21.0	60 66	75.1	35 56.8	59 66	74.1	3
4	30 37.2	65 67	80.5	30 56.5	64 67	80.0	31 15.8	64 67	79.6	31 54.2	64 67	78.7	33 09.6	62 66	76.9	34 23.4	61 66	75.0	34 41.5	60 66	74.5	35 17.5	60 65	73.5	4
75	29 56.8	65 67	79.8	30 16.3	65 67	79.4	30 35.6	64 67	78.9	31 14.1	64 67	78.0	32 29.8	62 66	76.2	33 43.9	61 66	74.3	34 02.2	61 65	73.9	34 38.3	60 65	72.9	75
6	29 16.6	65 67	79.2	29 36.1	65 67	78.7	29 55.5	65 67	78.3	30 34.1	64 66	77.4	31 50.1	63 66	75.6	33 04.6	61 65	73.7	33 22.9	61 65	73.3	33 59.3	60 65	72.3	6
7	28 36.5	65 67	78.5	28 56.0	65 67	78.1	29 15.5	65 66	77.6	29 54.2	64 66	76.8	31 10.5	63 66	75.0	32 25.3	62 65	73.1	32 43.8	61 65	72.7	33 20.4	61 65	71.7	7
8	27 56.4	66 67	77.9	28 16.0	65 66	77.4	28 35.6	65 66	77.0	29 14.4	64 66	76.1	30 31.1	63 66	74.3	31 46.2	62 65	72.5	32 04.8	62 65	72.1	32 41.6	61 64	71.1	8
9	27 16.5	66 66	77.2	27 36.1	66 66	76.8	27 55.8	65 66	76.3	28 34.8	65 66	75.5	29 51.7	64 65	73.7	31 07.3	62 65	71.9	31 25.9	62 65	71.5	32 02.9	61 64	70.5	9
80	26 36.6	66 66	76.5	26 56.4	66 66	76.1	27 16.1	65 66	75.7	27 55.2	65 66	74.8	29 12.5	64 65	73.1	30 28.4	63 64	71.3	30 47.2	62 64	70.9	31 24.4	62 64	69.9	80
1	25 56.9	66 66	75.9	26 16.7	66 66	75.5	26 36.5	66 66	75.1	27 15.8	65 66	74.2	28 33.4	64 65	72.5	29 49.8	63 64	70.7	30 08.6	63 64	70.3	30 46.0	62 64	69.4	1
2	25 17.2	66 66	75.2	25 37.1	66 66	74.8	25 57.0	66 66	74.4	26 36.5	66 65	73.6	27 54.5	65 65	71.9	29 11.2	63 64	70.1	29 30.2	63 64	69.7	30 07.8	62 63	68.8	2
3	24 37.7	67 66	74.6	24 57.7	67 66	74.2	25 17.6	66 65	73.8	25 57.3	66 65	72.9	27 15.7	65 64	71.2	28 32.8	64 64	69.5	28 51.9	63 64	69.1	29 29.8	63 63	68.2	3
4	23 58.3	67 66	73.9	24 18.4	67 65	73.5	24 38.4	67 65	73.1	25 18.2	66 65	72.3	26 37.0	65 64	70.6	27 54.5	64 64	68.9	28 13.7	64 63	68.5	28 51.9	63 63	67.6	4
85	23 19.1	67 65	73.3	23 39.2	67 65	72.9	23 59.3	67 65	72.5	24 39.3	66 65	71.7	25 58.5	65 64	70.0	27 16.4	64 63	68.3	27 35.7	64 63	67.9	28 14.1	64 63	67.0	85
6	22 39.9	68 65	72.7	23 00.2	67 65	72.3	23 20.4	67 65	71.8	24 00.5	67 64	71.0	25 20.1	66 64	69.4	26 38.5	65 63	67.7	26 57.9	65 63	67.3	27 36.5	64 62	66.4	6
7	22 01.0	68 65	72.0	22 21.3	68 65	71.6	22 41.5	67 64	71.2	23 21.9	67 64	70.4	24 41.9	66 63	68.8	26 00.7	65 63	67.1	26 20.3	65 62	66.7	26 59.1	64 62	65.8	7
8	21 22.1	68 64	71.4	21 42.5	68 64	71.0	22 02.9	68 64	70.6	22 43.4	67 64	69.8	24 03.8	67 63	68.2	25 23.1	66 62	66.5	25 42.8	65 62	66.1	26 21.9	65 62	65.2	8
9	20 43.4	68 64	70.7	21 03.9	68 64	70.3	21 24.4	68 64	69.9	22 05.1	68 64	69.1	23 25.9	67 63	67.5	24 45.7	66 62	65.9	25 05.4	66 62	65.5	25 44.8	65 61	64.6	9
90	20 04.9	69 64	70.1	20 25.5	69 64	69.7	20 46.0	68 64	69.3	21 27.0	68 63	68.5	22 48.2	67 63	66.9	24 08.4	66 62	65.3	24 28.3	66 62	64.9	25 07.9	66 61	64.1	90

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H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	15 00.0	1.0 01	180.0	14 30.0	1.0 01	180.0	14 00.0	1.0 01	180.0	13 00.0	1.0 01	180.0	11 00.0	1.0 01	180.0	9 00.0	1.0 00	180.0	8 30.0	1.0 00	180.0	7 30.0	1.0 00	180.0	00
1	14 59.7	1.0 02	179.1	14 29.7	1.0 02	179.1	13 59.7	1.0 02	179.1	12 59.7	1.0 02	179.1	10 59.7	1.0 02	179.1	8 59.7	1.0 02	179.2	8 29.7	1.0 01	179.2	7 29.7	1.0 01	179.2	1
2	14 58.7	1.0 03	178.2	14 28.7	1.0 03	178.2	13 58.7	1.0 03	178.2	12 58.7	1.0 03	178.2	10 58.8	1.0 03	178.3	8 58.8	1.0 02	178.3	8 28.8	1.0 02	178.3	7 28.8	1.0 02	178.4	2
3	14 57.1	1.0 04	177.3	14 27.1	1.0 04	177.3	13 57.1	1.0 04	177.3	12 57.1	1.0 04	177.3	10 57.2	1.0 04	177.4	8 57.3	1.0 04	177.5	8 27.3	1.0 03	177.5	7 27.4	1.0 03	177.5	3
4	14 54.8	1.0 05	176.3	14 24.8	1.0 05	176.4	13 54.9	1.0 05	176.4	12 54.9	1.0 05	176.4	10 55.1	1.0 05	176.5	8 55.2	1.0 04	176.6	8 25.2	1.0 04	176.7	7 25.3	1.0 04	176.7	4
05	14 51.8	1.0 06	175.4	14 21.9	1.0 06	175.5	13 52.0	1.0 06	175.5	12 52.1	1.0 06	175.6	10 52.3	1.0 06	175.7	8 52.5	1.0 06	175.8	8 22.6	1.0 05	175.8	7 22.7	1.0 05	175.9	05
6	14 48.3	1.0 07	174.5	14 18.3	1.0 07	174.6	13 48.4	1.0 07	174.6	12 48.6	1.0 07	174.7	10 48.9	1.0 07	174.8	8 49.2	1.0 06	175.0	8 19.3	1.0 06	175.0	7 19.5	1.0 06	175.1	6
7	14 44.0	1.0 08	173.6	14 14.1	1.0 08	173.7	13 44.3	1.0 08	173.7	12 44.5	1.0 08	173.8	10 44.9	1.0 08	174.0	8 45.3	1.0 07	174.1	8 15.4	1.0 07	174.2	7 15.7	1.0 07	174.3	7
8	14 39.2	1.0 09	172.7	14 09.3	1.0 09	172.8	13 39.4	1.0 09	172.8	12 39.7	1.0 09	172.9	10 40.3	1.0 09	173.1	8 40.9	1.0 08	173.3	8 11.0	1.0 08	173.3	7 11.3	1.0 08	173.4	8
9	14 33.6	99 10	171.8	14 03.8	99 10	171.9	13 34.0	99 10	171.9	12 34.4	99 10	172.0	10 35.1	99 10	172.2	8 35.8	99 09	172.5	8 06.0	99 09	172.5	7 06.3	99 09	172.6	9
10	14 27.5	99 11	170.9	13 57.7	99 11	171.0	13 27.9	99 11	171.0	12 28.4	99 11	171.1	10 29.3	99 11	171.4	8 30.1	99 10	171.6	8 00.3	99 10	171.7	7 00.8	99 10	171.8	10
1	14 20.7	99 12	170.0	13 51.0	99 12	170.1	13 21.2	99 12	170.1	12 21.8	99 12	170.3	10 22.8	99 12	170.5	8 23.9	99 11	170.8	7 54.1	99 11	170.9	6 54.7	99 11	171.0	1
2	14 13.3	99 14	169.1	13 43.6	99 13	169.2	13 13.9	99 13	169.2	12 14.5	99 13	169.4	10 15.8	99 13	169.7	8 17.0	99 12	170.0	7 47.3	99 12	170.0	6 48.0	99 12	170.2	2
3	14 05.2	99 14	168.2	13 35.6	99 14	168.3	13 05.9	99 14	168.3	12 06.7	99 14	168.5	10 08.2	99 14	168.8	8 09.6	99 13	169.1	7 40.0	99 13	169.2	6 40.7	99 13	169.4	3
4	13 56.5	99 16	167.3	13 26.9	99 15	167.4	12 57.4	99 15	167.5	11 58.2	99 15	167.6	9 59.9	99 15	168.0	8 01.6	99 14	168.3	7 32.0	99 14	168.4	6 32.9	99 14	168.6	4
15	13 47.2	98 16	166.4	13 17.7	98 16	166.5	12 48.2	98 16	166.6	11 49.2	98 16	166.8	9 51.1	98 16	167.1	7 53.0	98 15	167.5	7 23.5	98 15	167.6	6 24.5	98 15	167.8	15
6	13 37.2	98 18	165.5	13 07.8	98 17	165.6	12 38.4	98 17	165.7	11 39.5	98 17	165.9	9 41.7	98 17	166.3	7 43.9	98 16	166.7	7 14.4	98 16	166.8	6 15.5	98 16	167.0	6
7	13 26.7	98 19	164.6	12 57.3	98 18	164.7	12 28.0	98 18	164.8	11 29.2	98 18	165.0	9 31.7	98 18	165.4	7 34.2	98 17	165.8	7 04.8	98 17	165.9	6 06.0	98 17	166.2	7
8	13 15.5	98 20	163.7	12 46.2	98 19	163.8	12 16.9	98 19	163.9	11 18.3	98 19	164.2	9 21.1	98 19	164.6	7 23.9	98 18	165.0	6 54.6	98 18	165.1	5 55.9	98 18	165.3	8
9	13 03.7	97 21	162.8	12 34.5	97 20	163.0	12 05.3	97 20	163.1	11 06.9	97 20	163.3	9 10.0	97 20	163.8	7 13.0	97 19	164.2	6 43.8	97 19	164.3	5 45.3	97 19	164.6	9
20	12 51.4	97 22	162.0	12 22.2	97 21	162.1	11 53.1	97 21	162.2	10 54.8	97 21	162.4	8 58.2	97 20	162.9	7 01.6	97 20	163.4	6 32.5	97 20	163.5	5 34.1	97 20	163.8	20
1	12 38.4	97 23	161.1	12 09.4	97 22	161.2	11 40.3	97 22	161.3	10 42.2	97 22	161.6	8 45.9	97 21	162.1	6 49.7	97 21	162.6	6 20.6	97 21	162.7	5 22.4	97 20	163.0	1
2	12 24.8	97 24	160.2	11 55.9	97 23	160.3	11 26.9	97 23	160.5	10 29.0	97 23	160.7	8 33.1	97 22	161.3	6 37.1	97 22	161.8	6 08.1	97 22	161.9	5 10.2	97 21	162.2	2
3	12 10.7	96 24	159.3	11 41.8	96 24	159.5	11 12.9	96 24	159.6	10 15.2	96 24	159.9	8 19.7	96 23	160.4	6 24.1	96 23	161.0	5 55.2	96 23	161.1				3
4	11 55.9	96 26	158.5	11 27.2	96 25	158.6	10 58.4	96 25	158.8	10 00.8	96 25	159.0	8 05.7	96 24	159.6	6 10.5	96 24	160.2	5 41.6	96 23	160.3				4
25	11 40.6	96 26	157.6	11 12.0	96 26	157.8	10 43.3	96 26	157.9	9 45.9	96 26	158.2	7 51.1	96 25	158.8	5 56.3	96 24	159.4	5 27.6	96 24	159.5				25
6	11 24.8	96 27	156.7	10 56.2	96 27	156.9	10 27.6	96 27	157.1	9 30.4	96 27	157.4	7 36.1	96 26	158.0	5 41.6	96 25	158.6	5 13.0	96 25	158.7				6
7	11 08.3	96 28	155.9	10 39.9	96 28	156.0	10 11.4	96 28	156.2	9 14.4	96 28	156.5	7 20.4	96 27	157.2	5 26.4	96 26	157.8							7
8	10 51.3	96 29	155.0	10 23.0	96 29	155.2	9 54.6	96 29	155.4	8 57.9	96 29	155.7	7 04.3	96 28	156.3	5 10.7	96 27	157.0							8
9	10 33.8	94 30	154.2	10 05.5	94 30	154.4	9 37.3	94 30	154.5	8 40.7	94 29	154.9	6 47.6	94 29	155.5										9
30	10 15.7	94 31	153.3	9 47.6	94 31	153.5	9 19.4	94 31	153.7	8 23.1	94 30	154.0	6 30.4	94 30	154.7										30
1	9 57.1	93 32	152.5	9 29.0	93 32	152.7	9 01.0	93 32	152.9	8 04.9	93 31	153.2	6 12.7	94 30	153.9										1
2	9 37.9	93 33	151.7	9 10.0	93 33	151.9	8 42.1	93 32	152.0	7 46.2	93 32	152.4	5 54.5	93 31	153.1										2
3	9 18.2	93 34	150.8	8 50.4	93 33	151.0	8 22.6	93 33	151.2	7 27.0	93 33	151.6	5 35.7	93 32	152.3										3
4	8 58.0	92 34	150.0	8 30.4	92 34	150.2	8 02.7	92 34	150.4	7 07.3	92 34	150.8	5 16.5	92 33	151.6										4
35	8 37.3	92 35	149.2	8 09.8	92 35	149.4	7 42.2	92 35	149.6	6 47.1	92 35	150.0													35
6	8 16.1	91 36	148.4	7 48.7	91 36	148.6	7 21.3	91 36	148.8	6 26.4	91 35	149.2													6
7	7 54.4	91 37	147.6	7 27.1	91 37	147.8	6 59.8	91 37	148.0	6 05.2	91 36	148.4													7
8	7 32.2	91 38	146.7	7 05.0	91 38	147.0	6 37.9	91 37	147.2	5 43.5	91 37	147.6													8
9	7 09.5	90 39	145.9	6 42.5	90 38	146.2	6 15.4	90 38	146.4	5 21.3	90 38	146.8													9
40	6 46.4	90 39	145.1	6 19.5	90 39	145.4	5 52.5	90 39	145.6																40
1	6 22.8	89 40	144.3	5 56.0	89 40	144.6	5 29.2	89 40	144.8																1
2	5 58.7	89 41	143.6	5 32.0	89 41	143.8	5 05.4	89 40	144.0																2
3	5 34.2	88 42	142.8	5 07.6	88 41	143.0																			3
4	5 09.2	88 42	142.0																						4

DECLINATION SAME NAME AS LATITUDE

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
91	19 26.5	69 64	69.4	19 47.2	69 64	69.0	20 07.8	69 63	68.7	20 49.0	68 63	67.9	22 10.6	68 62	66.3	23 31.3	67 62	64.7	23 51.3	67 61	64.3	24 31.2	66 61	63.5	91
2	18 48.2	69 64	68.8	19 09.0	69 63	68.4	19 29.8	69 63	68.0	20 11.1	69 63	67.2	21 33.2	68 62	65.7	22 54.4	67 61	64.1	23 14.6	67 61	63.7	23 54.7	67 61	62.9	2
3	18 10.2	70 63	68.1	18 31.1	70 63	67.7	18 51.9	69 63	67.4	19 33.5	69 62	66.6	20 56.0	68 62	65.1	22 17.7	68 61	63.5	22 38.0	67 61	63.1	23 18.4	67 60	62.3	3
4	17 32.3	70 63	67.5	17 53.3	70 63	67.1	18 14.3	70 62	66.7	18 56.0	69 62	66.0	20 19.0	69 61	64.4	21 41.2	68 61	62.9	22 01.6	68 60	62.5	22 42.2	68 60	61.7	4
95	16 54.6	70 62	66.8	17 15.7	70 62	66.5	17 36.8	70 62	66.1	18 18.8	70 62	65.3	19 42.2	69 61	63.8	21 04.9	69 60	62.3	21 25.4	68 60	61.9	22 06.3	68 60	61.1	95
6	16 17.1	71 62	66.2	16 38.3	71 62	65.8	16 59.4	71 62	65.4	17 41.7	70 62	64.7	19 05.6	70 61	63.2	20 28.8	69 60	61.7	20 49.4	69 60	61.3	21 30.6	68 59	60.5	6
7	15 39.7	71 62	65.5	16 01.0	71 62	65.2	16 22.3	71 62	64.8	17 04.8	71 61	64.1	18 29.2	70 60	62.6	19 52.8	69 59	61.0	20 13.6	69 59	60.7	20 55.1	69 59	59.9	7
8	15 02.6	71 62	64.9	15 24.0	71 61	64.5	15 45.4	71 61	64.1	16 28.1	71 61	63.4	17 52.9	70 60	61.9	19 17.1	70 59	60.4	19 38.1	70 59	60.1	20 19.8	69 58	59.3	8
9	14 25.6	72 61	64.2	14 47.2	72 61	63.9	15 08.7	72 61	63.5	15 51.6	71 60	62.8	17 16.9	71 60	61.3	18 41.7	70 59	59.8	19 02.7	70 59	59.4	19 44.7	70 58	58.7	9
100	13 48.9	72 61	63.6	14 10.5	72 61	63.2	14 32.2	72 60	62.8	15 15.3	72 60	62.1	16 41.2	71 59	60.7	18 06.4	71 58	59.2	18 27.6	71 58	58.8	19 09.9	70 58	58.1	100
1	13 12.4	73 60	62.9	13 34.1	72 60	62.6	13 55.9	72 60	62.2	14 39.2	72 60	61.5	16 05.6	72 59	60.0	17 31.4	71 58	58.6	17 52.7	71 58	58.2	18 35.3	71 57	57.5	1
2	12 36.0	73 60	62.2	12 57.9	73 60	61.9	13 19.8	73 60	61.5	14 03.4	73 59	60.8	15 30.3	72 58	59.4	16 56.6	72 58	58.0	17 18.0	72 57	57.6	18 00.9	71 57	56.9	2
3	11 59.9	73 60	61.6	12 21.9	73 60	61.2	12 43.9	73 59	60.9	13 27.8	73 59	60.2	14 55.1	73 58	58.8	16 22.0	72 57	57.3	16 43.6	72 57	57.0	17 26.7	72 56	56.3	3
4	11 24.1	74 60	60.9	11 46.2	74 59	60.6	12 08.3	74 59	60.2	12 52.4	73 59	59.5	14 20.3	73 58	58.1	15 47.7	73 57	56.7	16 09.4	72 57	56.4	16 52.8	72 56	55.6	4
105	10 48.4	74 59	60.3	11 10.6	74 59	59.9	11 32.9	74 59	59.6	12 17.2	74 58	58.9	13 45.6	73 57	57.5	15 13.6	73 56	56.1	15 35.5	73 56	55.7	16 19.2	73 56	55.0	105
6	10 13.0	75 59	59.6	10 35.4	75 58	59.2	10 57.7	74 58	58.9	11 42.3	74 58	58.2	13 11.3	74 57	56.9	14 39.7	74 56	55.5	15 01.8	73 56	55.1	15 45.8	73 55	54.4	6
7	9 37.8	75 58	58.9	10 00.3	75 58	58.6	10 22.8	75 58	58.2	11 07.7	75 57	57.6	12 37.1	74 56	56.2	14 06.2	74 56	54.8	14 28.3	74 55	54.5	15 12.6	74 55	53.8	7
8	9 02.9	75 58	58.2	9 25.5	75 58	57.9	9 48.1	75 57	57.6	10 33.2	75 57	56.9	12 03.2	75 56	55.6	13 32.8	74 55	54.2	13 55.2	74 55	53.9	14 39.8	74 54	53.2	8
9	8 28.2	76 57	57.6	8 51.0	76 57	57.2	9 13.7	76 57	56.9	9 59.1	76 56	56.2	11 29.6	75 56	54.9	12 59.8	75 55	53.6	13 22.3	75 54	53.2	14 07.1	75 54	52.5	9
110	7 53.8	76 57	56.9	8 16.7	76 57	56.6	8 39.5	76 56	56.2	9 25.2	76 56	55.6	10 56.3	76 55	54.3	12 27.0	75 54	52.9	12 49.6	75 54	52.6	13 34.8	75 53	51.9	110
1	7 19.7	77 56	56.2	7 42.7	77 56	55.9	8 05.7	77 56	55.6	8 51.6	76 56	54.9	10 23.2	76 55	53.6	11 54.5	76 54	52.3	12 17.3	76 53	51.9	13 02.7	76 53	51.3	1
2	6 45.8	77 56	55.5	7 08.9	77 56	55.2	7 32.1	77 56	54.9	8 18.2	77 55	54.2	9 50.4	77 54	52.9	11 22.3	76 53	51.6	11 45.2	76 53	51.3	12 30.9	76 52	50.6	2
3	6 12.2	78 56	54.8	6 35.5	77 55	54.5	6 58.7	77 55	54.2	7 45.2	77 55	53.6	9 17.9	77 54	52.3	10 50.3	77 53	51.0	11 13.4	77 52	50.7	11 59.5	77 52	50.0	3
4	5 38.9	78 55	54.1	6 02.3	78 55	53.8	6 25.7	78 55	53.5	7 12.4	78 54	52.9	8 45.7	78 53	51.6	10 18.7	77 52	50.3	10 41.9	77 52	50.0	11 28.2	77 51	49.4	4
115	5 05.9	78 55	53.5	5 29.4	78 54	53.1	5 52.9	78 54	52.8	6 39.9	78 54	52.2	8 13.7	78 53	50.9	9 47.3	78 52	49.7	10 10.7	78 52	49.4	10 57.3	78 51	48.7	115
6							5 20.5	79 54	52.1	6 07.7	79 53	51.5	7 42.1	79 52	50.3	9 16.3	78 51	49.0	9 39.8	78 51	48.7	10 26.7	78 50	48.1	6
7										5 35.8	79 53	50.8	7 10.8	79 52	49.6	8 45.5	79 51	48.4	9 09.2	79 50	48.1	9 56.5	79 50	47.4	7
8										5 04.3	80 52	50.1	6 39.8	80 51	48.9	8 15.1	79 50	47.7	8 38.9	79 50	47.4	9 26.5	79 49	46.8	8
9													6 09.1	80 51	48.2	7 45.0	80 50	47.0	8 09.0	80 49	46.7	8 56.8	80 49	46.1	9
120													5 38.7	80 50	47.6	7 15.2	80 49	46.4	7 39.3	80 49	46.1	8 27.5	80 48	45.5	120
1													5 08.7	81 50	46.9	6 45.8	81 49	45.7	7 10.0	81 48	45.4	7 58.5	81 48	44.8	1
2																6 16.7	81 48	45.0	6 41.1	81 48	44.7	7 29.8	81 47	44.1	2
3																5 47.9	82 47	44.3	6 12.4	82 47	44.0	7 01.5	82 47	43.5	3
4																5 19.5	82 47	43.7	5 44.2	82 47	43.4	6 33.5	82 46	42.8	4
125																			5 16.2	83 46	42.7	6 05.9	83 45	42.1	125
6																						5 38.6	83 45	41.4	6
7																						5 11.7	84 44	40.8	7

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Lat. 47°

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
00	79 00.0	1.0 03	180.0	80 00.0	1.0 03	180.0	81 30.0	1.0 03	180.0	83 00.0	1.0 04	180.0	85 00.0	1.0 05	180.0	85 30.0	1.0 06	180.0	86 00.0	1.0 06	180.0	88 00.0	1.0 12	180.0	00
1	78 58.5	1.0 08	175.8	79 58.4	1.0 08	175.4	81 28.1	1.0 09	174.7	82 57.8	1.0 11	173.7	84 57.0	99 15	171.5	85 26.7	99 16	170.7	85 56.3	99 18	169.6	87 53.0	95 32	160.5	1
2	78 54.0	99 12	171.6	79 53.5	99 13	170.9	81 22.5	99 15	169.5	82 51.1	98 18	167.6	84 48.1	96 24	163.4	85 16.9	96 26	161.8	85 45.5	96 28	159.8	87 33.9	93 45	144.5	2
3	78 46.5	98 17	167.4	79 45.4	98 19	166.4	81 13.3	97 21	164.4	82 40.3	96 25	161.7	84 33.8	93 32	155.8	85 01.3	91 34	153.6	85 28.4	89 37	151.0	87 06.7	71 53	132.7	3
4	78 36.2	97 22	163.4	79 34.3	96 23	162.1	81 00.6	95 26	159.6	82 25.5	93 30	156.1	84 14.7	88 38	148.9	84 40.8	86 41	146.3	85 06.1	83 44	143.3	86 34.6	60 58	124.3	4
05	78 23.2	96 26	159.5	79 20.3	95 28	157.9	80 44.8	93 31	154.9	82 07.2	90 36	150.9	83 51.7	83 44	142.7	84 16.2	80 46	139.9	84 39.8	77 49	136.7	85 59.6	53 61	118.1	05
6	78 07.6	94 30	155.7	79 03.6	93 32	153.9	80 26.0	90 36	150.5	81 45.8	87 40	146.0	83 25.4	78 48	137.3	83 48.4	75 51	134.4	84 10.3	71 53	131.2	85 22.7	47 63	113.5	6
7	77 49.6	92 34	152.1	78 44.3	90 36	150.1	80 04.6	88 40	146.4	81 21.6	83 44	141.6	82 56.4	74 52	132.5	83 18.0	70 54	129.6	83 38.4	66 56	126.4	84 44.7	42 65	109.8	7
8	77 29.4	90 37	148.7	78 22.8	88 39	146.5	79 40.8	85 43	142.6	80 55.0	80 48	137.5	82 25.2	69 55	128.4	82 45.5	66 57	125.5	83 04.6	62 59	122.4	84 05.8	39 66	106.9	8
9	77 07.1	88 40	145.4	77 59.2	86 42	143.1	79 14.9	82 46	139.0	80 26.4	77 51	133.8	81 52.3	66 57	124.7	82 11.5	62 59	121.9	82 29.4	58 61	118.9	83 26.4	36 66	104.5	9
10	76 43.0	86 43	142.3	77 33.8	84 45	139.9	78 47.2	79 49	135.7	79 56.1	74 53	130.4	81 18.0	62 59	121.4	81 36.1	59 61	118.8	81 53.1	54 62	115.9	82 46.6	34 67	102.4	10
1	76 17.1	84 46	139.4	77 06.6	81 48	136.9	78 17.8	77 51	132.6	79 24.2	71 55	127.4	80 42.6	59 61	118.6	80 59.8	56 62	116.0	81 15.9	52 63	113.2	82 06.5	32 67	100.7	1
2	75 49.8	82 48	136.6	76 37.9	79 50	134.1	77 47.0	74 53	129.7	78 51.1	68 57	124.5	80 06.2	57 62	116.0	80 22.6	53 63	113.5	80 37.9	49 64	110.9	81 26.2	31 67	99.1	2
3	75 21.0	79 50	134.0	76 07.9	77 52	131.5	77 14.9	72 55	127.1	78 16.9	66 59	122.0	79 29.1	54 63	113.7	79 44.8	51 64	111.3	79 59.5	47 65	108.8	80 45.7	29 68	97.7	3
4	74 50.9	78 52	131.5	75 36.6	75 54	129.0	76 41.7	70 57	124.6	77 41.7	63 60	119.6	78 51.3	52 64	111.6	79 06.4	49 65	109.3	79 20.5	45 66	106.9	80 05.1	29 68	96.5	4
15	74 19.7	76 54	129.2	75 04.3	73 55	126.6	76 07.6	68 58	122.4	77 05.7	61 61	117.4	78 13.0	50 65	109.6	78 27.6	47 65	107.5	78 41.2	44 66	105.2	79 24.4	28 68	95.4	15
6	73 47.5	74 55	127.0	74 31.0	71 57	124.5	75 32.6	66 60	120.2	76 29.1	59 62	115.4	77 34.2	49 65	107.9	77 48.4	46 66	105.8	78 01.6	42 66	103.7	78 43.7	27 68	94.4	6
7	73 14.4	72 57	124.9	73 56.8	69 58	122.4	74 56.9	64 61	118.2	75 51.8	58 63	113.5	76 55.1	47 66	106.3	77 08.9	44 66	104.3	77 21.7	41 67	102.2	78 02.8	27 68	93.4	7
8	72 40.4	71 58	122.9	73 21.9	68 59	120.4	74 20.6	62 62	116.4	75 14.1	56 64	111.8	76 15.7	46 66	104.8	76 29.1	43 67	102.9	76 41.6	40 67	100.9	77 22.0	27 68	92.5	8
9	72 05.7	69 59	121.0	72 46.3	66 60	118.6	73 43.6	61 62	114.6	74 35.8	55 64	110.1	75 36.0	45 67	103.4	75 49.1	42 67	101.6	76 01.3	39 67	99.7	76 41.1	27 68	91.7	9
20	71 30.3	68 60	119.3	72 10.1	65 61	116.9	73 06.2	60 63	112.9	73 57.2	54 65	108.6	74 56.1	44 67	102.1	75 08.9	41 67	100.3	75 20.9	39 68	98.5	76 00.2	26 68	90.9	20
1	70 54.3	66 61	117.6	71 33.3	63 62	115.2	72 28.3	58 64	111.4	73 18.3	53 65	107.1	74 16.0	43 67	100.9	74 28.6	41 67	99.2	74 40.4	38 68	97.4	75 19.3	26 68	90.1	1
2	70 17.8	65 62	116.0	70 56.1	62 63	113.7	71 50.0	57 64	109.9	72 39.0	52 66	105.8	73 35.7	43 67	99.7	73 48.1	40 68	98.1	73 59.8	38 68	96.4	74 38.3	26 68	89.4	2
3	69 40.8	64 62	114.5	70 18.4	61 63	112.2	71 11.3	56 65	108.5	71 59.5	51 66	104.5	72 55.3	42 68	98.6	73 07.6	40 68	97.0	73 19.1	37 68	95.4	73 57.4	26 68	88.7	3
4	69 03.3	63 63	113.0	69 40.3	60 64	110.8	70 32.4	55 65	107.2	71 19.8	50 67	103.3	72 14.8	42 68	97.6	72 26.9	39 68	96.1	72 38.3	37 68	94.5	73 16.5	27 68	88.0	4
25	68 25.5	62 64	111.6	69 01.9	59 65	109.4	69 53.1	55 66	105.9	70 39.9	49 67	102.1	71 34.2	41 68	96.6	71 46.2	39 68	95.1	71 57.5	37 68	93.6	72 35.6	27 68	87.4	25
6	67 47.2	61 64	110.3	68 23.1	58 65	108.1	69 13.7	54 66	104.7	69 59.8	49 67	101.0	70 53.5	41 68	95.6	71 05.4	39 68	94.2	71 16.6	36 68	92.8	71 54.8	27 68	86.8	6
7	67 08.7	60 65	109.0	67 44.1	58 65	106.9	68 34.0	53 66	103.5	69 19.6	48 67	99.9	70 12.7	40 68	94.7	70 24.6	38 68	93.4	70 35.8	36 68	92.0	71 13.9	27 68	86.2	7
8	66 29.9	60 65	107.7	67 04.8	57 66	105.7	67 54.1	52 67	102.4	68 39.2	48 67	98.9	69 31.9	40 68	93.9	69 43.7	38 68	92.5	69 54.9	36 68	91.2	70 33.1	27 68	85.6	8
9	65 50.8	59 66	106.6	66 25.3	56 66	104.5	67 14.1	52 67	101.3	67 58.7	47 68	97.9	68 51.1	40 68	93.0	69 02.8	38 68	91.7	69 13.9	36 68	90.4	69 52.3	28 68	85.0	9
30	65 11.4	58 66	105.4	65 45.6	56 66	103.4	66 33.9	51 67	100.3	67 18.1	47 68	97.0	68 10.2	40 68	92.2	68 21.9	38 68	91.0	68 33.0	36 68	89.7	69 11.6	28 68	84.4	30
1	64 31.9	58 66	104.3	65 05.7	55 67	102.4	65 53.6	51 67	99.3	66 37.5	47 68	96.1	67 29.3	40 68	91.4	67 41.0	38 68	90.2	67 52.1	36 68	89.0	68 30.9	28 68	83.9	1
2	63 52.1	57 67	103.2	64 25.7	55 67	101.3	65 13.1	51 68	98.3	65 56.7	46 68	95.2	66 48.4	40 68	90.7	67 00.1	38 68	89.5	67 11.2	36 68	88.3	67 50.2	29 68	83.4	2
3	63 12.2	57 67	102.2	63 45.5	54 67	100.3	64 32.6	50 68	97.4	65 16.0	46 68	94.3	66 07.5	40 68	89.9	66 19.2	38 68	88.8	66 30.3	36 68	87.6	67 09.6	29 68	82.8	3
4	62 32.1	56 67	101.2	63 05.2	54 67	99.4	63 52.0	50 68	96.5	64 35.1	46 68	93.5	65 26.6	40 68	89.2	65 38.2	38 68	88.1	65 49.4	36 68	87.0	66 29.0	29 68	82.3	4
35	61 51.9	56 67	100.2	62 24.8	54 68	98.4	63 11.3	50 68	95.6	63 54.3	46 68	92.7	64 45.7	40 68	88.5	64 57.4	38 68	87.4	65 08.6	37 68	86.3	65 48.5	30 67	81.8	35
6	61 11.6	55 67	99.3	61 44.2	53 68	97.5	62 30.5	50 68	94.8	63 13.4	46 68	91.9	64 04.8	40 68	87.8	64 16.5	38 68	86.8	64 27.8	37 68	85.7	65 08.0	30 67	81.3	6
7	60 31.2	55 68	98.4	61 03.6	53 68	96.7	61 49.7	49 68	94.0	62 32.5	46 68	91.1	63 23.9	40 68	87.1	63 35.7	39 68	86.1	63 47.0	37 68	85.1	64 27.6	31 67	80.8	7
8	59 50.7	55 68	97.5	60 22.9	53 68	95.8	61 08.9	49 68	93.1	61 51.6	46 68	90.4	62 43.0	40 68	86.5	62 54.8	39 68	85.5	63 06.2	37 68	84.5	63 47.2	31 67	80.3	8
9	59 10.0	55 68	96.6	59 42.2	53 68	94.9	60 28.0	49 68	92.4	61 10.7	46 68	89.6	62 02.2	40 68	85.8	62 14.1	39 68	84.9	62 25.5	37 68	83.9	63 06.9	31 67	79.8	9
40	58 29.4	54 68	95.8	59 01.4	52 68	94.1	59 47.1	49 68	91.6	60 29.7	46 68	88.9	61 21.4	40 68	85.2	61 33.3	39 68	84.3	61 44.9	38 68	83.3	62 26.7	32 67	79.3	40
1	57 48.6	54 68	94.9	58 20.6	52 68	93.3	59 06.2	49 68	90.8	59 48.8	46 68	88.2	60 40.6	41 68	84.6	60 52.6	39 68	83.7	61 04.2	38 68	82.7	61 46.5	32 67	78.8	1
2	57 07.8	54 68	94.1	57 39.7	52 68	92.5	58 25.3	49 68	90.1	59 07.9	46 68	87.5	59 59.9	41 68	84.0	60 12.0	40 68	83.1	60 23.7	38 67	82.1	61 06.4	33 67	78.3	2
3	56 27.0	54 68	93.3	56 58.8	52 68	91.8	57 44.4	49 68	89.4	58 27.1	46 68	86.9	59 19.3	41 68	83.4	59 31.4	40 68	82.5	59 43.2	39 67	81.6	60 26.4	33 67	77.8	3
4	55 46.1	54 68	92.5	56 17.9	52 68	91.0	57 03.5	49 68	88.6	57 46.2	46 68	86.2	58 38.6	41 68	82.8	58 50.9	40 67	81.9	59 02.7	39 67	81.0	59 46.4	34 66	77.4	4
45	55 05.2	54 68	91.8	55 37.0	52 68	90.3	56 22.6	49 68	87.9	57 05.4	46 68	85.5	57 58.1	42 68	82.2	58 10.4	40 67	81.3	58 22.3	39 67	80.5	59 06.5	34 66	76.9	45
6	54 24.3	54 68	91.0	54 56.1	52 68	89.5	55 41.7	49 68	87.3	56 24.6	46 68	84.9	57 17.6	42 67	81.6	57 30.0	41 67	80.8	57 42.0	40 67	79.9	58 26.7	35 66	76.4	6
7	53 43.4	54 68	90.3	54 15.2	52 68	88.8	55 00.8	49 68	86.6	55 43.9	46 68	84.3	56 37.1	42 67	81.0	56 49.6	41 67	80.2	57 01.8	40 67	79.4	57 47.0	35 66	75.9	7
8	53 02.5	54 68	89.5	53 34.3	52 68	88.1	54 20.0	49 68	85.9	55 03.2	47 68	83.6	55 56.7	43 67	80.5	56 09.3	41 67	79.7	56 21.6	40 67	78.8	57 07.3	36 66	75.5	8
9	52 21.6	54 68	88.8	52 53.4	52 68	87.4	53 39.2	50 68	85.3	54 22.6	47 68	83.0	55 16.4	43 67	79.9	55 29.1	42 67	79.1	55 41.5	41 67	78.3	56 27.8	36 66	75.0	9
50	51 40.7	54 68	88.1	52 12.5	52 68	86.7	52 58.4	50 68	84.6	53 42.0	47 68	82.4	54 36.1	43 67	79.4	54 48.9	42 67	78.6	55 01.4	41 67	77.8	55 48.3	37 66	74.5	50
1	50 59.8	54 68	87.4	51 31.7	52 68	86.0	52 17.7	50 68	84.0	53 01.4	47 67	81.8	53 56.0	44 67	78.8	54 08.9	43 67	78.0	54 21.5	42 66	77.3	55 08.9	37 66	74.1	1
2	50 18.9	54 68	86.7	50 50.9	52 68	85.4	51 37.0	50 68	83.3	52 21.0	48 67	81.2	53 15.9	44 67	78.3	53 28.9	43 67	77.5	53 41.6	42 66	76.7	54 29.6	38 65	73.6	2
3	49 38.1	54 68	86.0	50 10.1	53 68	84.7	50 56.4	50 68	82.7	51 40.6	48 67	80.6	52 35.8	44 67	77.7	52 49.0	43 66	77.0	53 01.8	42 66	76.2	53 50.4	38 65	73.2	3
4	48 57.3	54 68	85.4	49 29.4	53 68	84.1	50 15.9	51 68	82.1	51 00.2	48 67	80.0	51 55.9	45 66	77.2	52 09.2	44 66	76.4	52 22.1	43 66	75.7	53 11.3	39 65	72.7	4
55	48 16.5	54 68	84.7	48 48.7	53 68	83.4	49 35.4	51 67	81.5	50 20.0	48 67	79.4	51 16.0	45 66	76.6	51 29.4	44 66	75.9	51 42.5	43 66	75.2	52 32.2	40 65	72.2	55
6	47 35.8	54 68	84.0	48 08.1	53 68	82.8	48 54.9	51 67	80.9	49 39.8	49 67	78.9	50 36.3	45 66	76.1	50 49.8	45 66	75.4	51 03.0	44 66	74.7	51 53.3	40 65	71.8	6
7	46 55.1	55 68	83.4	47 27.5	53 68	82.2	48 14.6	51 67	80.2	48 59.7	49 67	78.3	49 56.6	46 66	75.6	50 10.2	45 66	74.9	50 23.6	44 66	74.2	51 14.5	41 64	71.3	7
8	46 14.5	55 68	82.7	46 47.0	54 67	81.5	47 34.3	51 67	79.6	48 19.6	49 67	77.7	49 17.0	46 66	75.0	49 30.8	45 66	74.4	49 44.3	45 65	73.7	50 35.8	41 64	70.9	8
9	45 33.9	55 68	82.1	46 06.6	54 67	80.9	46 54.1	52 67	79.1	47 39.7	50 66	77.1	48 37.5	47 66	74.5	48 51.4	46 65	73.8	49 05.1	45 65	73.2	49 57.2	42 64	70.4	9
60	44 53.4	55 67	81.5	45 26.2	54 67	80.3	46 13.9	52 67	78.5	46 59.9	50 66	76.6	47 58.1	47 65	74.0	48 12.2	46 65	73.3	48 25.9	46 65	72.7	49 18.7	42 64	69.9	60
1	44 13.0	55 67	80.8	44 45.9	54 67	79.7	45 33.9	52 67	77.9	46 20.1	50 66	76.0	47 18.9	48 65	73.5	47 33.0	47 65	72.8	47 46.9	46 65	72.2	48 40.3	43 64	69.5	1
2	43 32.6	56 67	80.2	44 05.7	54 67	79.1	44 53.9	53 66	77.3	45 40.4	51 66	75.5	46 39.7	48 65	73.0	46 54.0	47 65	72.3	47 08.0	47 65	71.7	48 02.1	43 64	69.0	2
3	42 52.3	56 67	79.6	43 25.5	55 67	78.5	44 14.0	53 66	76.7	45 00.9	51 66	74.9	46 00.6	48 65	72.4	46 15.0	48 65	71.8	46 29.3	47 64	71.2	47 23.9	44 63	68.6	3
4	42 12.1	56 67	79.0	42 45.5	55 67	77.9	43 34.3	53 66	76.1	44 21.4	51 66	74.4	45 21.7	49 65	71.9	45 36.2	48 64	71.3	45 50.6	48 64	70.7	46 45.9	45 63	68.1	4
65	41 32.0	56 67	78.4	42 05.5	55 66	77.3	42 54.6	54 66	75.6	43 42.1	52 65	73.8	44 42.8	49 65	71.4	44 57.5	49 64	70.8	45 12.0	48 64	70.2	46 08.0	45 63	67.6	65
6	40 52.0	57 67	77.8	41 25.7	56 66	76.7	42 15.0	54 66	75.0	43 02.8	52 65	73.3	44 04.1	50 64	70.9	44 18.9	49 64	70.3	44 33.6	49 64	69.7	45 30.2	46 63	67.2	6
7	40 12.0	57 66	77.2	40 45.9	56 66	76.1	41 35.5	54 66	74.4	42 23.7	53 65	72.7	43 25.5	50 64	70.4	43 40.5	50 64	69.8	43 55.3	49 64	69.2	44 52.6	46 63	66.7	7
8	39 32.2	57 66	76.6	40 06.2	56 66	75.5	40 56.2	55 65	73.8	41 44.7	53 65	72.2	42 47.0	51 64	69.9	43 02.2	50 64	69.3	43 17.1	50 63	68.7	44 15.0	47 62	66.2	8
9	38 52.4	58 66	76.0	39 26.7	57 66	74.9	40 16.9	55 65	73.3	41 05.8	53 65	71.6	42 08.7	51 64	69.3	42 23.9	51 63	68.8	42 39.1	50 63	68.2	43 37.6	48 62	65.8	9
70	38 12.8	58 66	75.4	38 47.2	57 66	74.3	39 37.8	55 65	72.7	40 27.0	54 64	71.1	41 30.4	52 63	68.8	41 45.9	51 63	68.3	42 01.1	51 63	67.7	43 00.4	48 62	65.3	70
1	37 33.2	58 66	74.8	38 07.9	57 65	73.7	38 58.8	56 65	72.2	39 48.4	54 64	70.5	40 52.3	52 63	68.3	41 07.9	52 63	67.8	41 23.3	51 63	67.2	42 23.3	49 62	64.9	1
2	36 53.8	58 66	74.2	37 28.7	58 65	73.2	38 19.9	56 65	71.6	39 09.9	55 64	70.0	40 14.4	53 63	67.8	40 30.1	52 63	67.2	40 45.7	52 62	66.7	41 46.3	49 61	64.4	2
3	36 14.5	59 65	73.6	36 49.6	58 65	72.6	37 41.1	57 64	71.0	38 31.5	55 64	69.5	39 36.6	53 63	67.3	39 52.5	53 63	66.7	40 08.2	52 62	66.2	41 09.5	50 61	63.9	3
4	35 35.3	59 65	73.0	36 10.6	58 65	72.0	37 02.5	57 64	70.5	37 53.2	56 64	68.9	38 58.9	54 63	66.8	39 14.9	53 62	66.2	39 30.8	53 62	65.7	40 32.8	51 61	63.4	4
75	34 56.2	60 65	72.4	35 31.7	59 65	71.4	36 24.0	57 64	69.9	37 15.1	56 63	68.4	38 21.4	54 62	66.3	38 37.6	54 62	65.7	38 53.6	53 62	65.2	39 56.3	51 61	63.0	75
6	34 17.3	60 65	71.8	34 53.0	59 64	70.8	35 45.6	58 64	69.4	36 37.2	57 63	67.8	37 44.0	55 62	65.7	38 00.3	54 62	65.2	38 16.6	54 62	64.7	39 19.9	52 60	62.5	6
7	33 38.5	60 64	71.2	34 14.4	59 64	70.3	35 07.4	58 63	68.8	35 59.3	57 63	67.3	37 06.7	55 62	65.2	37 23.3	55 62	64.7	37 39.6	54 61	64.2	38 43.7	52 60	62.0	7
8	32 59.8	61 64	70.7	33 36.0	60 64	69.7	34 29.3	59 63	68.2	35 21.7	58 63	66.8	36 29.7	56 62	64.7	36 46.3	55 61	64.2	37 02.9	55 61	63.7	38 07.6	53 60	61.6	8
9	32 21.3	61 64	70.1	32 57.7	60 64	69.1	33 51.4	59 63	67.7	34 44.1	58 62	66.2	35 52.7	56 61	64.2	36 09.6	56 61	63.7	36 26.3	55 61	63.2	37 31.7	54 60	61.1	9
80	31 42.9	61 64	69.5	32 19.5	61 63	68.6	33 13.6	60 63	67.1	34 06.8	58 62	65.7	35 16.0	57 61	63.7	35 33.0	56 61	63.2	35 49.9	56 60	62.7	36 56.0	54 59	60.6	80
1	31 04.6	62 64	68.9	31 41.5	61 63	68.0	32 36.0	60 62	66.6	33 29.6	59 62	65.1	34 39.4	57 61	63.2	34 56.5	57 60	62.7	35 13.6	57 60	62.2	36 20.4	55 59	60.1	1
2	30 26.5	62 63	68.3	31 03.6	62 63	67.4	31 58.5	61 62	66.0	32 52.5	59 61	64.6	34 03.0	58 60	62.6	34 20.3	58 60	62.2	34 37.5	57 60	61.7	35 45.0	55 59	59.6	2
3	29 48.6	63 63	67.7	30 25.9	62 63	66.8	31 21.2	61 62	65.5	32 15.7	60 61	64.0	33 26.7	58 60	62.1	33 44.2	58 60	61.6	34 01.6	58 60	61.1	35 09.8	56 58	59.1	3
4	29 10.8	63 63	67.2	29 48.4	62 62	66.3	30 44.1	61 62	64.9	31 38.9	60 61	63.5	32 50.6	59 60	61.6	33 08.3	59 60	61.1	33 25.8	58 59	60.6	34 34.8	57 58	58.7	4
85	28 33.2	63 62	66.6	29 11.0	63 62	65.7	30 07.1	62 61	64.3	31 02.4	61 61	63.0	32 14.7	60 60	61.1	32 32.5	59 59	60.6	32 50.2	59 59	60.1	33 59.9	57 58	58.2	85
6	27 55.7	64 62	66.0	28 33.8	63 62	65.1	29 30.3	62 61	63.8	30 26.1	61 60	62.4	31 39.0	60 59	60.6	31 57.0	60 59	60.1	32 14.8	59 59	59.6	33 25.3	58 57	57.7	6
7	27 18.4	64 62	65.4	27 56.8	64 61	64.5	28 53.7	63 61	63.2	29 49.9	62 60	61.9	31 03.4	61 59	60.0	31 21.6	60 59	59.6	31 39.6	60 58	59.1	32 50.8	59 57	57.2	7
8	26 41.3	65 62	64.8	27 19.9	64 61	64.0	28 17.3	63 60	62.6	29 13.9	62 60	61.3	30 28.1	61 59	59.5	30 46.4	61 58	59.0	31 04.6	61 58	58.6	32 16.5	59 57	56.7	8
9	26 04.4	65 61	64.2	26 43.3	65 61	63.4	27 41.0	64 60	62.1	28 38.1	63 59	60.8	29 52.9	62 58	59.0	30 11.4	61 58	58.5	30 29.8	61 58	58.1	31 42.4	60 57	56.2	9
90	25 27.6	66 61	63.6	26 06.8	65 60	62.8	27 05.0	64 60	61.5	28 02.5	63 59	60.2	29 18.0	62 58	58.4	29 36.6	62 58	58.0	29 55.2	62 57	57.5	31 08.5	60 56	55.7	90

H.A.	36° 00′ Alt.	Δd	Δt	Az.	37° 00′ Alt.	Δd	Δt	Az.	38° 30′ Alt.	Δd	Δt	Az.	40° 00′ Alt.	Δd	Δt	Az.	42° 00′ Alt.	Δd	Δt	Az.	42° 30′ Alt.	Δd	Δt	Az.	43° 00′ Alt.	Δd	Δt	Az.	45° 00′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
00	7 00.0	1.0	00	180.0	6 00.0	1.0	00	180.0																									00
1	6 59.7	1.0	01	179.2	5 59.7	1.0	01	179.2																									1
2	6 58.8	1.0	02	178.4	5 58.9	1.0	02	178.4																									2
3	6 57.4	1.0	03	177.6	5 57.4	1.0	03	177.6																									3
4	6 55.3	1.0	04	176.7	5 55.4	1.0	04	176.8																									4
05	6 52.7	1.0	05	175.9	5 52.8	1.0	05	176.0																									05
6	6 49.5	1.0	06	175.1	5 49.7	1.0	06	175.2																									6
7	6 45.8	1.0	07	174.3	5 46.0	1.0	07	174.4																									7
8	6 41.4	1.0	08	173.5	5 41.7	1.0	08	173.6																									8
9	6 36.5	99	09	172.7	5 36.8	99	09	172.8																									9
10	6 31.0	99	10	171.9	5 31.4	99	10	172.0																									10
1	6 24.9	99	11	171.1	5 25.4	99	11	171.2																									1
2	6 18.3	99	12	170.3	5 18.9	99	12	170.4																									2
3	6 11.1	99	13	169.5	5 11.8	99	13	169.6																									3
4	6 03.3	99	14	168.6	5 04.1	99	14	168.8																									4
15	5 55.0	98	15	167.8																													15
6	5 46.1	98	16	167.0																													6
7	5 36.6	98	17	166.3																													7
8	5 26.6	98	18	165.5																													8
9	5 16.1	97	18	164.7																													9
20	5 05.0	97	19	163.9																													20

DECLINATION SAME NAME AS LATITUDE

H.A.	36° 00′ Alt.	Δd	Δt	Az.	37° 00′ Alt.	Δd	Δt	Az.	38° 30′ Alt.	Δd	Δt	Az.	40° 00′ Alt.	Δd	Δt	Az.	42° 00′ Alt.	Δd	Δt	Az.	42° 30′ Alt.	Δd	Δt	Az.	43° 00′ Alt.	Δd	Δt	Az.	45° 00′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
91	24 51.0	66	61	63.1	25 30.5	66	60	62.2	26 29.1	65	59	61.0	27 27.1	64	59	59.7	28 43.2	63	58	57.9	29 02.0	63	57	57.5	29 20.7	62	57	57.0	30 34.8	61	56	55.2	91
2	24 14.6	66	60	62.5	24 54.4	66	60	61.6	25 53.4	65	59	60.4	26 51.8	65	58	59.1	28 08.6	63	57	57.4	28 27.6	63	57	56.9	28 46.5	63	57	56.5	30 01.3	62	56	54.7	2
3	23 38.5	67	60	61.9	24 18.5	66	60	61.1	25 18.0	66	59	59.8	26 16.8	65	58	58.6	27 34.3	64	57	56.8	27 53.4	64	57	56.4	28 12.5	63	56	56.0	29 28.0	62	55	54.2	3
4	23 02.5	67	60	61.3	23 42.7	67	59	60.5	24 42.7	66	58	59.2	25 42.0	66	58	58.0	27 00.1	65	57	56.3	27 19.4	64	56	55.9	27 38.7	64	56	55.4	28 54.9	63	55	53.7	4
95	22 26.7	68	59	60.7	23 07.2	67	59	59.9	24 07.6	67	58	58.7	25 07.4	66	57	57.4	26 26.2	65	56	55.8	26 45.7	65	56	55.3	27 05.1	65	56	54.9	28 22.0	64	54	53.2	95
6	21 51.1	68	59	60.1	22 31.9	68	58	59.3	23 32.8	67	58	58.1	24 33.0	67	57	56.9	25 52.4	66	56	55.2	26 12.1	65	56	54.8	26 31.7	65	55	54.4	27 49.4	64	54	52.7	6
7	21 15.7	69	59	59.5	21 56.9	68	58	58.7	22 58.1	68	57	57.5	23 58.9	67	57	56.3	25 18.9	66	55	54.7	25 38.8	66	55	54.3	25 58.6	66	55	53.9	27 16.9	65	54	52.2	7
8	20 40.6	69	58	58.9	21 22.0	69	58	58.1	22 23.7	68	57	57.0	23 24.9	68	56	55.8	24 45.7	67	55	54.1	25 05.7	67	55	53.7	25 25.6	66	54	53.3	26 44.7	65	53	51.6	8
9	20 05.7	70	58	58.3	20 47.4	69	57	57.5	21 49.5	69	57	56.4	22 51.2	68	56	55.2	24 12.6	67	55	53.6	24 32.8	67	54	53.2	24 52.9	67	54	52.8	26 12.8	66	53	51.1	9
100	19 31.0	70	57	57.7	20 13.0	70	57	56.9	21 15.6	69	56	55.8	22 17.7	69	55	54.6	23 39.8	68	54	53.0	24 00.2	68	54	52.6	24 20.5	68	54	52.2	25 41.0	67	52	50.6	100
1	18 56.5	71	57	57.1	19 38.8	70	57	56.3	20 41.9	70	56	55.2	21 44.5	69	55	54.1	23 07.2	69	54	52.5	23 27.8	68	54	52.1	23 48.2	68	53	51.7	25 09.5	67	52	50.1	1
2	18 22.2	71	57	56.5	19 04.8	71	56	55.8	20 08.4	70	55	54.6	21 11.5	70	55	53.5	22 34.9	69	53	51.9	22 55.6	69	53	51.5	23 16.3	69	53	51.1	24 38.3	68	52	49.5	2
3	17 48.2	72	56	55.9	18 31.1	71	56	55.2	19 35.1	71	55	54.0	20 38.7	70	54	52.9	22 02.8	70	53	51.4	22 23.7	70	53	51.0	22 44.5	69	52	50.6	24 07.3	69	51	49.0	3
4	17 14.5	72	56	55.3	17 57.7	72	55	54.5	19 02.1	71	55	53.4	20 06.2	71	54	52.3	21 31.0	70	53	50.8	21 52.0	70	52	50.4	22 13.0	70	52	50.0	23 36.5	69	51	48.5	4
105	16 41.0	73	55	54.7	17 24.5	72	55	53.9	18 29.4	72	54	52.9	19 33.9	72	53	51.7	20 59.4	71	52	50.2	21 20.6	71	52	49.9	21 41.8	71	52	49.5	23 06.0	70	50	47.9	105
6	16 07.7	73	55	54.1	16 51.5	73	54	53.3	17 56.9	72	54	52.3	19 01.9	72	53	51.2	20 28.0	71	52	49.7	20 49.4	71	52	49.3	21 10.8	71	51	48.9	22 35.7	70	50	47.4	6
7	15 34.7	74	55	53.4	16 18.8	73	54	52.7	17 24.7	73	53	51.7	18 30.2	73	52	50.6	19 57.0	72	51	49.1	20 18.5	72	51	48.7	20 40.1	72	51	48.4	22 05.7	71	50	46.9	7
8	15 02.0	74	54	52.8	15 46.4	74	54	52.1	16 52.7	74	53	51.1	17 58.7	73	52	50.0	19 26.2	73	51	48.5	19 47.9	72	51	48.2	20 09.6	72	50	47.8	21 36.0	72	49	46.3	8
9	14 29.5	75	54	52.2	15 14.2	74	53	51.5	16 21.0	74	52	50.5	17 27.5	74	52	49.4	18 55.6	73	50	48.0	19 17.6	73	50	47.6	19 39.4	73	50	47.2	21 06.5	72	49	45.8	9
110	13 57.3	75	53	51.6	14 42.3	75	53	50.9	15 49.6	75	52	49.9	16 56.6	74	51	48.8	18 25.4	74	50	47.4	18 47.5	74	50	47.0	19 09.5	73	49	46.7	20 37.3	73	48	45.2	110
1	13 25.4	76	53	50.9	14 10.7	75	52	50.3	15 18.5	75	51	49.2	16 25.9	75	51	48.2	17 55.4	74	49	46.8	18 17.7	74	49	46.5	18 39.9	74	49	46.1	20 08.4	73	48	44.7	1
2	12 53.8	76	52	50.3	13 39.4	76	52	49.6	14 47.6	76	51	48.6	15 55.6	75	50	47.6	17 25.7	75	49	46.2	17 48.1	75	49	45.9	18 10.6	75	48	45.5	19 39.8	74	47	44.1	2
3	12 22.4	77	52	49.7	13 08.4	76	51	49.0	14 17.0	76	50	48.0	15 25.5	76	50	47.0	16 56.3	75	48	45.7	17 18.9	75	48	45.3	17 41.5	75	48	45.0	19 11.5	75	47	43.6	3
4	11 51.4	77	51	49.0	12 37.6	77	51	48.4	13 46.8	77	50	47.4	14 55.7	76	49	46.4	16 27.2	76	48	45.1	16 50.0	76	48	44.7	17 12.7	76	47	44.4	18 43.4	75	46	43.0	4
115	11 20.6	78	51	48.4	12 07.2	77	50	47.8	13 16.8	77	49	46.8	14 26.2	77	49	45.8	15 58.4	77	48	44.5	16 21.3	76	47	44.1	16 44.3	76	47	43.8	18 15.6	76	46	42.4	115
6	10 50.2	78	50	47.8	11 37.0	78	50	47.1	12 47.1	78	49	46.2	13 57.0	78	48	45.2	15 29.8	77	47	43.9	15 53.0	77	47	43.5	16 16.1	77	46	43.2	17 48.2	77	45	41.9	6
7	10 20.1	79	50	47.1	11 07.2	79	49	46.5	12 17.8	78	48	45.5	13 28.1	78	48	44.6	15 01.6	78	46	43.3	15 24.9	78	46	43.0	15 48.2	78	46	42.6	17 21.0	77	45	41.3	7
8	9 50.2	79	49	46.5	10 37.7	79	49	45.8	11 48.7	79	48	44.9	12 59.6	79	47	44.0	14 33.7	78	46	42.7	14 57.2	78	46	42.4	15 20.7	78	45	42.0	16 54.2	78	44	40.7	8
9	9 20.7	80	49	45.8	10 08.5	80	48	45.2	11 20.0	79	47	44.3	12 31.3	79	47	43.3	14 06.2	79	45	42.1	14 29.8	79	45	41.8	14 53.4	79	45	41.4	16 27.6	78	44	40.2	9
120	8 51.5	80	48	45.2	9 39.6	80	48	44.6	10 51.6	80	47	43.6	12 03.4	80	46	42.7	13 38.9	79	45	41.5	14 02.7	79	45	41.2	14 26.5	79	44	40.8	16 01.4	79	43	39.6	120
1	8 22.7	81	48	44.5	9 11.1	81	47	43.9	10 23.5	80	46	43.0	11 35.8	80	45	42.1	13 12.0	80	44	40.9	13 35.9	80	44	40.6	13 59.9	80	44	40.2	15 35.5	79	43	39.0	1
2	7 54.2	81	47	43.8	8 42.9	81	46	43.3	9 55.8	81	46	42.4	11 08.6	81	45	41.5	12 45.3	81	44	40.3	13 09.5	80	44	39.9	13 33.6	80	43	39.6	15 09.9	80	42	38.4	2
3	7 26.0	82	46	43.2	8 15.0	82	46	42.6	9 28.4	81	45	41.7	10 41.6	81	44	40.8	12 19.1	81	43	39.6	12 43.4	81	43	39.3	13 07.7	81	43	39.0	14 44.6	81	42	37.8	3
4	6 58.2	82	46	42.5	7 47.5	82	45	41.9	9 01.3	82	45	41.1	10 15.1	82	44	40.2	11 53.1	82	43	39.0	12 17.6	82	42	38.7	12 42.1	81	42	38.4	14 19.7	81	41	37.2	4
125	6 30.7	83	45	41.8	7 20.3	83	45	41.3	8 34.6	83	44	40.4	9 48.8	82	43	39.6	11 27.5	82	42	38.4	11 52.2	82	42	38.1	12 16.8	82	42	37.8	13 55.1	82	40	36.6	125
6	6 03.6	83	45	41.2	6 53.5	83	44	40.6	8 08.3	83	43	39.8	9 22.9	83	43	38.9	11 02.3	83	41	37.8	11 27.1	83	41	37.5	11 51.9	83	41	37.2	13 30.9	82	40	36.0	6
7	5 36.8	84	44	40.5	6 27.0	84	43	39.9	7 42.3	84	43	39.1	8 57.4	83	42	38.3	10 37.4	83	41	37.1	11 02.4	83	41	36.9	11 27.3	83	40	36.6	13 07.0	83	39	35.4	7
8	5 10.5	84	43	39.8	6 01.0	84	43	39.3	7 16.7	84	42	38.4	8 32.3	84	41	37.6	10 12.9	84	40	36.5	10 38.0	84	40	36.2	11 03.1	84	40	36.0	12 43.4	83	39	34.8	8
9					5 35.3	85	42	38.6	6 51.4	85	41	37.8	8 07.5	84	41	37.0	9 48.7	84	40	35.9	10 14.0	84	39	35.6	10 39.3	84	39	35.3	12 20.2	84	38	34.2	9
130					5 09.9	85	42	37.9	6 26.5	85	41	37.1	7 43.0	85	40	36.3	9 24.9	85	39	35.2	9 50.4	85	39	35.0	10 15.8	85	39	34.7	11 57.4	85	37	33.6	130
1									6 02.0	86	40	36.4	7 19.0	85	39	35.7	9 01.5	85	38	34.6	9 27.1	85	38	34.3	9 52.7	85	38	34.1	11 34.9	85	37	33.0	1
2									5 37.9	86	40	35.8	6 55.3	86	39	35.0	8 38.4	86	38	34.0	9 04.2	86	38	33.7	9 29.9	86	37	33.4	11 12.8	86	36	32.4	2
3									5 14.2	87	39	35.1	6 32.1	86	38	34.3	8 15.8	86	37	33.3	8 41.7	86	37	33.1	9 07.6	86	37	32.8	10 51.1	86	36	31.8	3
4													6 09.2	87	37	33.7	7 53.5	87	36	32.7	8 19.6	87	36	32.4	8 45.6	87	36	32.2	10 29.7	87	35	31.2	4
135													5 46.7	87	37	33.0	7 31.6	87	36	32.0	7 57.8	87	36	31.8	8 24.0	87	35	31.5	10 08.7	87	34	30.5	135
6													5 24.6	88	36	32.3	7 10.1	88	35	31.4	7 36.5	88	35	31.1	8 02.8	88	35	30.9	9 48.1	88	34	29.9	6
7													5 03.0	88	36	31.6	6 49.0	88	34	30.7	7 15.5	88	34	30.5	7 42.0	88	34	30.2	9 27.9	88	33	29.3	7
8																	6 28.4	89	34	30.0	6 55.0	89	34	29.8	7 21.6	89	33	29.6	9 08.1	89	32	28.6	8
9																	6 08.1	89	33	29.4	6 34.9	89	33	29.1	7 01.7	89	33	28.9	8 48.7	89	32	28.0	9
140																	5 48.2	90	32	28.7	6 15.2	90	32	28.5	6 42.1	90	32	28.3	8 29.7	90	31	27.4	140
1																	5 28.8	90	32	28.0	5 55.9	90	31	27.8	6 22.9	90	31	27.6	8 11.1	90	30	26.7	1
2																	5 09.8	91	31	27.3	5 37.0	91	31	27.1	6 04.2	91	31	26.9	7 52.9	91	30	26.1	2
3																					5 18.5	91	30	26.5	5 45.9	91	30	26.3	7 35.1	91	29	25.4	3
4																					5 00.5	92	29	25.8	5 28.0	92	29	25.6	7 17.8	91	28	24.8	4
145																									5 10.5	92	28	24.9	7 00.8	92	28	24.1	145
6																													6 44.3	92	27	23.5	6
7																													6 28.3	93	26	22.8	7
8																													6 12.6	93	25	22.1	8
9																													5 57.4	94	25	21.5	9
150																													5 42.7	94	24	20.8	150
1																													5 28.3	94	23	20.1	1
2																													5 14.5	95	22	19.5	2
3																													5 01.1	95	22	18.8	3

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Lat. 47°

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
00	89 00.0	1.0 21	180.0	90 00.0	.. 68	....	88 30.0	1.0 14	00.0	87 30.0	1.0 09	00.0	86 30.0	1.0 06	00.0	85 30.0	1.0 05	00.0	84 30.0	1.0 04	00.0	83 00.0	1.0 03	00.0	00
1	88 47.2	83 49	145.1	89 19.1	01 68	89.6	88 21.4	91 37	23.8	87 24.8	96 25	14.5	86 26.3	98 18	10.3	85 27.2	99 14	07.9	84 27.7	99 11	06.3	82 58.3	1.0 09	04.8	1
2	88 17.9	60 59	125.3	88 38.2	01 68	89.3	87 59.1	74 50	41.1	87 10.0	88 37	27.3	86 15.6	93 28	19.9	85 18.9	96 22	15.4	84 21.0	97 18	12.5	82 53.2	98 14	09.5	2
3	87 42.3	45 63	114.7	87 57.2	02 68	88.9	87 29.2	58 57	52.3	86 48.0	77 45	37.5	86 58.8	86 36	28.4	85 05.6	91 29	22.4	84 10.2	94 24	18.3	82 44.8	96 19	14.1	3
4	87 04.3	36 65	108.5	87 16.3	03 68	88.5	86 55.3	46 60	59.4	86 20.9	67 51	45.3	85 37.1	78 42	35.5	84 47.9	85 36	28.6	83 55.5	89 30	23.7	82 33.3	93 24	18.4	4
05	86 25.0	31 66	104.4	86 35.4	03 68	88.2	86 19.2	38 62	64.1	85 50.3	57 55	51.3	85 11.6	70 47	41.4	84 26.6	79 41	34.1	83 37.5	84 35	28.5	82 19.0	90 28	22.5	05
6	85 45.1	27 67	101.4	85 54.6	04 68	87.8	85 41.8	31 64	67.4	85 17.4	50 58	55.8	84 43.3	63 51	46.3	84 02.3	73 45	38.8	83 16.6	79 39	32.9	82 02.0	86 32	26.3	6
7	85 04.8	25 68	99.2	85 13.7	04 68	87.4	85 03.7	26 64	69.8	84 42.8	43 59	59.2	84 12.7	57 54	50.2	83 35.5	67 48	42.8	82 53.2	74 42	36.8	81 42.8	82 36	29.8	7
8	84 24.3	23 68	97.4	84 32.8	05 68	87.1	84 25.1	22 65	71.5	84 07.2	38 61	61.9	83 40.5	51 56	53.5	83 06.8	61 50	46.3	82 27.7	69 45	40.2	81 21.4	78 39	33.0	8
9	83 43.7	22 68	95.9	83 51.9	06 68	86.7	83 46.2	18 65	72.8	83 30.7	33 62	64.0	83 07.0	46 57	56.1	82 36.5	56 53	49.2	82 00.4	64 48	43.2	80 58.3	73 41	35.9	9
10	83 03.0	21 68	94.6	83 11.1	06 68	86.3	83 07.0	15 66	73.7	82 53.6	29 63	65.7	82 32.6	41 59	58.3	82 05.0	51 54	51.7	81 31.7	59 50	45.9	80 33.6	69 44	38.5	10
1	82 22.1	20 68	93.5	82 30.3	07 68	86.0	82 27.6	13 66	74.5	82 16.1	25 63	67.1	81 57.4	37 60	60.2	81 32.4	47 56	53.8	81 01.8	55 52	48.2	80 07.4	65 46	40.8	1
2	81 41.3	19 68	92.5	81 49.4	08 68	85.6	81 48.1	11 66	75.1	81 38.3	22 64	68.2	81 21.7	33 60	61.7	80 58.9	43 57	55.7	80 30.8	51 53	50.2	79 40.1	61 47	43.0	2
3	81 00.4	19 68	91.6	81 08.7	08 68	85.2	81 08.6	08 66	75.5	81 00.2	19 64	69.1	80 45.4	30 61	63.0	80 24.8	39 58	57.2	79 59.0	47 54	51.9	79 11.7	57 49	44.9	3
4	80 19.5	19 68	90.8	80 27.9	09 68	84.9	80 28.9	07 66	75.8	80 21.8	17 64	69.8	80 08.8	27 62	64.1	79 50.2	35 59	58.6	79 26.4	44 55	53.5	78 42.4	54 50	46.6	4
15	79 38.5	19 68	90.0	79 47.1	10 68	84.5	79 49.2	05 66	76.0	79 43.4	15 64	70.4	79 31.9	24 62	65.0	79 15.0	32 59	59.7	78 53.2	40 56	54.8	78 12.3	50 51	48.1	15
6	78 57.6	19 68	89.3	79 06.4	10 68	84.1	79 09.5	03 66	76.2	79 04.8	12 65	70.9	78 54.7	21 62	65.7	78 39.5	29 60	60.7	78 19.5	37 57	56.0	77 41.5	47 52	49.5	6
7	78 16.7	19 68	88.7	78 25.7	11 68	83.8	78 29.8	02 66	76.3	78 26.0	10 65	71.3	78 17.3	19 63	66.4	78 03.6	27 60	61.6	77 45.4	34 58	57.1	77 10.2	44 53	50.7	7
8	77 35.8	19 68	88.0	77 45.1	11 68	83.4	77 50.0	01 66	76.3	77 47.3	09 65	71.6	77 39.7	17 63	66.9	77 27.5	24 61	62.4	77 10.9	31 58	58.0	76 38.2	41 54	51.8	8
9	76 54.9	20 68	87.4	77 04.4	12 68	83.0	77 10.3	01 66	76.3	77 08.4	07 65	71.8	77 02.0	14 63	67.4	76 51.1	22 61	63.0	76 36.0	29 59	58.8	76 05.9	38 55	52.8	9
20	76 14.1	20 68	86.8	76 23.8	13 68	82.7	76 30.5	02 66	76.3	76 29.5	05 65	72.0	76 24.2	12 63	67.7	76 14.6	19 61	63.6	76 00.9	26 59	59.5	75 33.1	36 55	53.7	20
1	75 33.2	20 68	86.3	75 43.3	13 68	82.3	75 50.8	03 66	76.2	75 50.6	04 65	72.1	75 46.3	11 63	68.0	75 37.9	17 61	64.0	75 25.5	24 59	60.1	74 59.9	33 56	54.5	1
2	74 52.4	20 68	85.7	75 02.7	14 67	81.9	75 11.0	04 66	76.1	75 11.6	02 65	72.2	75 08.3	09 63	68.3	75 01.0	15 62	64.4	74 49.9	22 60	60.6	74 26.5	30 56	55.2	2
3	74 11.6	21 68	85.2	74 22.2	15 67	81.5	74 31.3	05 66	76.0	74 32.7	01 65	72.2	74 30.2	07 64	68.5	74 24.1	13 62	64.8	74 14.2	19 60	61.1	73 52.8	28 57	55.8	3
4	73 30.8	21 68	84.6	73 41.8	15 67	81.2	73 51.6	06 66	75.8	73 53.7	00 65	72.2	73 52.2	06 64	68.6	73 47.0	12 62	65.0	73 38.3	17 60	61.5	73 18.8	26 57	56.4	4
25	72 50.1	22 68	84.1	73 01.4	16 67	80.8	73 12.0	07 66	75.7	73 14.7	02 65	72.2	73 14.0	04 64	68.7	73 09.9	10 62	65.3	73 02.3	15 60	61.9	72 44.6	24 57	56.9	25
6	72 09.4	22 68	83.6	72 21.0	17 67	80.4	72 32.3	09 66	75.5	72 35.8	03 65	72.1	72 35.9	03 64	68.8	72 32.7	08 62	65.5	72 26.1	14 60	62.2	72 10.3	22 58	57.3	6
7	71 28.8	22 68	83.1	71 40.7	17 67	80.0	71 52.7	09 66	75.3	71 56.8	04 65	72.1	71 57.7	01 64	68.8	71 55.4	07 62	65.6	71 49.9	12 60	62.4	71 35.8	20 58	57.7	7
8	70 48.2	23 68	82.7	71 00.4	18 67	79.7	71 13.2	10 66	75.1	71 17.9	06 65	72.0	71 19.6	00 64	68.9	71 18.1	05 62	65.7	71 13.6	10 61	62.6	71 01.1	18 58	58.0	8
9	70 07.6	23 68	82.2	70 20.2	19 67	79.3	70 33.7	11 66	74.9	70 39.0	06 65	71.9	70 41.4	01 64	68.8	70 40.8	03 62	65.8	70 37.2	08 61	62.8	70 26.3	16 58	58.3	9
30	69 27.1	24 67	81.7	69 40.0	19 67	78.9	69 54.2	12 66	74.6	70 00.2	08 65	71.7	70 03.3	03 64	68.8	70 03.5	02 62	65.9	70 00.8	07 61	62.9	69 51.5	14 58	58.6	30
1	68 46.6	24 67	81.2	68 59.9	20 67	78.5	69 14.8	13 66	74.4	69 21.3	09 65	71.6	69 25.1	04 64	68.7	69 26.1	01 62	65.9	69 24.4	05 61	63.0	69 16.5	12 58	58.8	1
2	68 06.2	25 67	80.8	68 19.8	21 67	78.2	68 35.4	14 66	74.1	68 42.5	10 65	71.4	68 47.0	05 63	68.7	68 48.8	01 62	65.9	68 47.9	04 61	63.1	68 41.5	10 58	59.0	2
3	67 25.9	25 67	80.3	67 39.8	21 67	77.8	67 56.0	15 65	73.9	68 03.8	11 65	71.2	68 08.9	06 63	68.6	68 11.4	02 62	65.9	68 11.4	02 61	63.2	68 06.4	09 59	59.1	3
4	66 45.5	26 67	79.9	66 59.8	22 66	77.4	67 16.8	16 65	73.6	67 25.0	12 64	71.0	67 30.8	08 63	68.4	67 34.1	03 62	65.8	67 34.8	01 61	63.2	67 31.2	07 59	59.3	4
35	66 05.3	26 67	79.4	66 19.9	22 66	77.0	66 37.5	17 65	73.3	66 46.4	13 64	70.8	66 52.8	09 63	68.3	66 56.8	05 62	65.8	66 58.3	01 61	63.2	66 56.0	06 59	59.4	35
6	65 25.1	27 67	79.0	65 40.0	23 66	76.6	65 58.4	18 65	73.0	66 07.7	14 64	70.6	66 14.8	10 63	68.2	66 19.5	06 62	65.7	66 21.8	02 61	63.2	66 20.8	04 59	59.4	6
7	64 45.0	27 67	78.5	65 00.3	24 66	76.2	65 19.2	18 65	72.8	65 29.2	15 64	70.4	65 36.8	11 63	68.0	65 42.2	07 62	65.6	65 45.3	03 61	63.1	65 45.5	03 59	59.5	7
8	64 04.9	28 67	78.1	64 20.6	24 66	75.9	64 40.2	19 65	72.5	64 50.6	16 64	70.2	64 58.9	12 63	67.8	65 05.0	08 62	65.5	65 08.8	04 61	63.1	65 10.3	01 59	59.5	8
9	63 24.9	28 67	77.6	63 40.9	25 66	75.5	64 01.2	20 65	72.2	64 12.2	17 64	69.9	64 21.0	13 63	67.6	64 27.8	09 62	65.3	64 32.3	06 61	63.0	64 35.0	00 59	59.5	9
40	62 44.9	29 66	77.2	63 01.3	26 66	75.1	63 22.3	21 65	71.9	63 33.8	17 64	69.7	63 43.2	14 63	67.4	63 50.6	11 62	65.2	63 55.8	07 61	62.9	63 59.7	02 59	59.5	40
1	62 05.1	29 66	76.8	62 21.8	26 66	74.7	62 43.4	22 65	71.5	62 55.4	18 64	69.4	63 05.5	15 63	67.2	63 13.5	12 62	65.0	63 19.4	08 61	62.8	63 24.5	03 59	59.5	1
2	61 25.3	30 66	76.3	61 42.4	27 66	74.3	62 04.7	22 65	71.2	62 17.2	19 64	69.1	62 27.8	16 63	67.0	62 36.4	13 62	64.9	62 43.0	09 61	62.7	62 49.2	04 59	59.4	2
3	60 45.6	31 66	75.9	61 03.0	28 65	73.9	61 26.0	23 64	70.9	61 39.0	20 64	68.9	61 50.1	17 63	66.8	61 59.4	14 62	64.7	62 06.7	11 60	62.6	62 14.0	06 59	59.4	3
4	60 05.9	31 66	75.5	60 23.7	28 65	73.5	60 47.3	24 64	70.6	61 00.8	21 63	68.6	61 12.5	18 63	66.6	61 22.4	15 62	64.5	61 30.4	12 60	62.4	61 38.8	07 59	59.3	4
45	59 26.3	32 66	75.0	59 44.5	29 65	73.1	60 08.8	25 64	70.3	60 22.8	22 63	68.3	60 35.0	19 62	66.3	60 45.5	16 61	64.3	60 54.2	13 60	62.3	61 03.7	08 59	59.2	45
6	58 46.8	32 66	74.6	59 05.4	30 65	72.8	59 30.3	26 64	69.9	59 44.8	23 63	68.0	59 57.6	20 62	66.1	60 08.7	17 61	64.1	60 18.0	14 60	62.1	60 28.5	09 58	59.1	6
7	58 07.4	33 66	74.2	58 26.4	30 65	72.4	58 51.9	26 64	69.6	59 06.9	24 63	67.7	59 20.2	21 62	65.8	59 31.9	18 61	63.9	59 41.8	15 60	61.9	59 53.4	11 58	59.0	7
8	57 28.1	33 65	73.7	57 47.4	31 65	72.0	58 13.6	27 64	69.3	58 29.1	24 63	67.4	58 43.0	22 62	65.5	58 55.2	19 61	63.7	59 05.8	16 60	61.7	59 18.4	12 58	58.8	8
9	56 48.9	34 65	73.3	57 08.6	32 65	71.6	57 35.4	28 64	68.9	57 51.3	25 63	67.1	58 05.7	23 62	65.3	58 18.6	20 61	63.4	58 29.7	17 60	61.5	58 43.4	13 58	58.7	9
50	56 09.7	35 65	72.9	56 29.8	32 64	71.2	56 57.2	29 63	68.6	57 13.7	26 63	66.8	57 28.6	24 62	65.0	57 42.0	21 61	63.2	57 53.8	18 60	61.3	58 08.5	14 58	58.5	50
1	55 30.7	35 65	72.4	55 51.1	33 64	70.8	56 19.2	29 63	68.2	56 36.1	27 62	66.5	56 51.6	25 62	64.7	57 05.5	22 61	62.9	57 17.9	19 60	61.1	57 33.6	15 58	58.4	1
2	54 51.7	36 65	72.0	55 12.5	34 64	70.4	55 41.2	30 63	67.9	55 58.6	28 62	66.2	56 14.6	25 61	64.4	56 29.1	23 60	62.7	56 42.1	20 60	60.9	56 58.8	17 58	58.2	2
3	54 12.8	36 65	71.6	54 34.0	34 64	70.0	55 03.4	31 63	67.5	55 21.3	29 62	65.8	55 37.7	26 61	64.1	55 52.8	24 60	62.4	56 06.4	21 59	60.7	56 24.0	18 58	58.0	3
4	53 34.1	37 64	71.1	53 55.6	35 64	69.6	54 25.6	32 63	67.1	54 44.0	29 62	65.5	55 01.0	27 61	63.8	55 16.6	25 60	62.1	55 30.8	22 59	60.4	55 49.4	19 58	57.8	4
55	52 55.4	38 64	70.7	53 17.3	36 64	69.2	53 48.0	32 63	66.8	54 06.8	30 62	65.2	54 24.3	28 61	63.5	54 40.5	26 60	61.9	54 55.2	23 59	60.2	55 14.8	20 58	57.6	55
6	52 16.8	38 64	70.3	52 39.2	36 63	68.8	53 10.4	33 62	66.4	53 29.7	31 62	64.8	53 47.7	29 61	63.2	54 04.4	27 60	61.6	54 19.8	24 59	59.9	54 40.2	21 57	57.4	6
7	51 38.3	39 64	69.8	52 01.1	37 63	68.3	52 33.0	34 62	66.0	52 52.7	32 61	64.5	53 11.2	30 61	62.9	53 28.5	28 60	61.3	53 44.4	25 59	59.7	54 05.8	22 57	57.2	7
8	51 00.0	39 64	69.4	51 23.1	38 63	67.9	51 55.6	35 62	65.7	52 15.8	33 61	64.1	52 34.9	31 60	62.6	52 52.6	29 60	61.0	53 09.1	26 59	59.4	53 31.4	23 57	57.0	8
9	50 21.7	40 64	69.0	50 45.2	38 63	67.5	51 18.4	35 62	65.3	51 39.1	34 61	63.8	51 58.6	32 60	62.3	52 16.9	29 59	60.7	52 34.0	27 58	59.1	52 57.2	24 57	56.7	9
60	49 43.6	41 63	68.5	50 07.5	39 63	67.1	50 41.3	36 62	64.9	51 02.4	34 61	63.4	51 22.4	32 60	61.9	51 41.2	30 59	60.4	51 58.9	28 58	58.9	52 23.0	25 57	56.5	60
1	49 05.6	41 63	68.1	49 29.8	40 63	66.7	50 04.3	37 61	64.5	50 25.9	35 61	63.1	50 46.4	33 60	61.6	51 05.7	31 59	60.1	51 23.9	29 58	58.6	51 48.9	26 57	56.3	1
2	48 27.7	42 63	67.7	48 52.3	40 62	66.3	49 27.4	38 61	64.2	49 49.4	36 61	62.7	50 10.4	34 60	61.3	50 30.3	32 59	59.8	50 49.0	30 58	58.3	51 14.9	27 56	56.0	2
3	47 49.9	42 63	67.2	48 14.9	41 62	65.9	48 50.6	38 61	63.8	49 13.1	37 60	62.4	49 34.6	35 60	60.9	49 55.0	33 59	59.5	50 14.3	31 58	58.0	50 41.1	28 56	55.7	3
4	47 12.2	43 63	66.8	47 37.6	42 62	65.4	48 14.0	39 61	63.4	48 36.9	37 60	62.0	48 58.9	36 59	60.6	49 19.8	34 58	59.2	49 39.6	32 58	57.7	50 07.3	29 56	55.5	4
65	46 34.7	44 62	66.3	47 00.5	42 62	65.0	47 37.4	40 61	63.0	48 00.9	38 60	61.6	48 23.3	37 59	60.2	48 44.7	35 58	58.8	49 05.1	33 57	57.4	49 33.6	30 56	55.2	65
6	45 57.3	44 62	65.9	46 23.4	43 62	64.6	47 01.0	41 60	62.6	47 24.9	39 60	61.3	47 47.8	37 59	59.9	48 09.8	36 58	58.5	48 30.7	34 57	57.1	49 00.1	31 56	54.9	6
7	45 20.0	45 62	65.5	45 46.5	44 61	64.2	46 24.8	41 60	62.2	46 49.1	40 59	60.9	47 12.5	38 59	59.5	47 35.0	37 58	58.2	47 56.4	35 57	56.8	48 26.6	32 56	54.7	7
8	44 42.8	46 62	65.0	45 09.8	44 61	63.7	45 48.6	42 60	61.8	46 13.4	41 59	60.5	46 37.3	39 58	59.2	47 00.3	37 58	57.8	47 22.2	36 57	56.5	47 53.3	33 55	54.4	8
9	44 05.8	46 61	64.6	44 33.2	45 61	63.3	45 12.6	43 60	61.4	45 37.9	41 59	60.1	46 02.2	40 58	58.8	46 25.7	38 57	57.5	46 48.2	37 57	56.1	47 20.1	34 55	54.1	9
70	43 28.9	47 61	64.1	43 56.7	46 61	62.9	44 36.8	44 60	61.0	45 02.5	42 59	59.7	45 27.3	41 58	58.4	45 51.2	39 57	57.1	46 14.3	38 56	55.8	46 47.1	35 55	53.8	70
1	42 52.2	48 61	63.7	43 20.3	46 60	62.4	44 01.0	44 59	60.6	44 27.2	43 59	59.3	44 52.5	41 58	58.1	45 16.9	40 57	56.8	45 40.5	39 56	55.5	46 14.1	36 55	53.5	1
2	42 15.6	48 61	63.2	42 44.1	47 60	62.0	43 25.5	45 59	60.2	43 52.1	44 58	59.0	44 17.8	42 58	57.7	44 42.8	41 57	56.4	45 06.9	39 56	55.1	45 41.3	37 54	53.2	2
3	41 39.1	49 60	62.8	42 08.0	48 60	61.6	42 50.0	46 59	59.8	43 17.1	44 58	58.6	43 43.3	43 57	57.3	44 08.8	42 56	56.1	44 33.4	40 56	54.8	45 08.6	38 54	52.8	3
4	41 02.8	49 60	62.3	41 32.1	48 60	61.1	42 14.8	46 59	59.4	42 42.2	45 58	58.2	43 09.0	44 57	56.9	43 34.9	43 56	55.7	44 00.0	41 55	54.4	44 36.1	39 54	52.5	4
75	40 26.7	50 60	61.8	40 56.4	49 59	60.7	41 39.6	47 58	58.9	42 07.6	46 58	57.8	42 34.7	45 57	56.6	43 01.2	43 56	55.3	43 26.8	42 55	54.1	44 03.7	40 54	52.2	75
6	39 50.7	51 60	61.4	40 20.8	50 59	60.3	41 04.6	48 58	58.5	41 33.0	47 57	57.4	42 00.7	45 57	56.2	42 27.6	44 56	55.0	42 53.7	43 55	53.7	43 31.4	41 54	51.9	6
7	39 14.8	51 59	60.9	39 45.3	50 59	59.8	40 29.8	49 58	58.1	40 58.6	47 57	56.9	41 26.8	46 56	55.8	41 54.2	45 55	54.6	42 20.8	44 55	53.4	42 59.3	42 53	51.5	7
8	38 39.1	52 59	60.5	39 10.0	51 59	59.4	39 55.2	49 57	57.7	40 24.4	48 57	56.5	40 53.0	47 56	55.4	41 20.9	46 55	54.2	41 48.0	45 54	53.0	42 27.4	43 53	51.2	8
9	38 03.6	53 59	60.0	38 34.9	52 58	58.9	39 20.7	50 57	57.3	39 50.4	49 56	56.1	40 19.4	48 56	55.0	40 47.8	47 55	53.8	41 15.4	46 54	52.6	41 55.5	44 53	50.9	9
80	37 28.3	53 59	59.5	37 59.9	52 58	58.5	38 46.3	51 57	56.8	39 16.5	50 56	55.7	39 46.0	49 55	54.6	40 14.8	48 55	53.4	40 43.0	46 54	52.3	41 23.9	45 52	50.5	80
1	36 53.1	54 58	59.1	37 25.1	53 58	58.0	38 12.2	52 57	56.4	38 42.8	50 56	55.3	39 12.7	49 55	54.2	39 42.0	48 54	53.0	40 10.7	47 54	51.9	40 52.4	45 52	50.2	1
2	36 18.1	55 58	58.6	36 50.5	54 57	57.6	37 38.2	52 56	56.0	38 09.2	51 56	54.9	38 39.6	50 55	53.8	39 09.4	49 54	52.7	39 38.6	48 53	51.5	40 21.1	46 52	49.8	2
3	35 43.2	55 58	58.1	36 16.1	54 57	57.1	37 04.3	53 56	55.5	37 35.8	52 55	54.4	38 06.7	51 55	53.4	38 37.0	50 54	52.3	39 06.6	49 53	51.1	39 49.9	47 52	49.4	3
4	35 08.6	56 57	57.7	35 41.8	55 57	56.6	36 30.7	54 56	55.1	37 02.6	53 55	54.0	37 34.0	52 54	52.9	38 04.7	51 54	51.9	38 34.9	50 53	50.8	39 18.9	48 51	49.1	4
85	34 34.1	56 57	57.2	35 07.7	56 56	56.2	35 57.2	54 55	54.6	36 29.6	53 55	53.6	37 01.4	53 54	52.5	37 32.6	52 53	51.5	38 03.3	51 52	50.4	38 48.1	49 51	48.7	85
6	33 59.8	57 57	56.7	34 33.8	56 56	55.7	35 24.0	55 55	54.2	35 56.8	54 54	53.2	36 29.0	53 54	52.1	37 00.7	52 53	51.0	37 31.8	51 52	50.0	38 17.4	50 51	48.3	6
7	33 25.7	58 57	56.2	34 00.1	57 56	55.2	34 50.9	56 55	53.7	35 24.1	55 54	52.7	35 56.8	54 53	51.7	36 29.0	53 53	50.6	37 00.6	52 52	49.6	37 46.9	51 50	48.0	7
8	32 51.8	58 56	55.7	33 26.6	58 56	54.8	34 18.0	56 54	53.3	34 51.6	56 54	52.3	35 24.8	55 53	51.3	35 57.4	54 52	50.2	36 29.5	53 51	49.2	37 16.6	52 50	47.6	8
9	32 18.0	59 56	55.3	32 53.3	59 55	54.3	33 45.3	57 54	52.8	34 19.4	56 53	51.8	34 53.0	56 53	50.8	35 26.1	55 52	49.8	35 58.7	54 51	48.8	36 46.5	52 50	47.2	9
90	31 44.5	60 56	54.8	32 20.1	59 55	53.8	33 12.8	58 54	52.4	33 47.3	57 53	51.4	34 21.3	56 52	50.4	34 54.9	56 52	49.4	35 28.0	55 51	48.4	36 16.6	53 50	46.8	90

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H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	31 11.2	60 55	54.3	31 47.2	60 55	53.3	32 40.5	59 54	51.9	33 15.4	58 53	50.9	33 49.9	57 52	50.0	34 23.9	56 51	49.0	34 57.5	55 50	48.0	35 46.8	54 49	46.4	91
2	30 38.1	61 55	53.8	31 14.5	60 54	52.9	32 08.4	59 53	51.4	32 43.7	59 52	50.5	33 18.7	58 52	49.5	33 53.2	57 51	48.5	34 27.2	56 50	47.5	35 17.3	55 49	46.0	2
3	30 05.2	62 54	53.3	30 42.0	61 54	52.4	31 36.5	60 53	51.0	32 12.3	59 52	50.0	32 47.7	59 51	49.1	33 22.6	58 51	48.1	33 57.1	57 50	47.1	34 47.9	56 49	45.6	3
4	29 32.5	62 54	52.8	30 09.7	62 54	51.9	31 04.8	61 52	50.5	31 41.0	60 52	49.6	32 16.9	59 51	48.6	32 52.3	59 50	47.7	33 27.2	58 49	46.7	34 18.8	57 48	45.2	4
95	29 00.0	63 54	52.3	29 37.6	62 53	51.4	30 33.3	61 52	50.0	31 10.0	61 51	49.1	31 46.2	60 51	48.2	32 22.1	59 50	47.2	32 57.5	59 49	46.3	33 49.8	58 48	44.8	95
6	28 27.7	64 53	51.8	29 05.7	63 53	50.9	30 02.0	62 52	49.6	30 39.1	62 51	48.7	31 15.9	61 50	47.7	31 52.2	60 50	46.8	32 28.1	59 49	45.9	33 21.1	58 48	44.4	6
7	27 55.7	64 53	51.3	28 34.1	64 52	50.4	29 31.0	63 51	49.1	30 08.5	62 51	48.2	30 45.7	62 50	47.3	31 22.4	61 49	46.4	31 58.8	60 48	45.4	32 52.6	59 47	44.0	7
8	27 23.8	65 53	50.8	28 02.6	64 52	49.9	29 00.2	64 51	48.6	29 38.1	63 50	47.7	30 15.7	62 50	46.8	30 52.9	62 49	45.9	31 29.8	61 48	45.0	32 24.2	60 47	43.6	8
9	26 52.2	66 52	50.3	27 31.4	65 52	49.4	28 29.6	64 51	48.1	29 08.0	64 50	47.3	29 46.0	63 49	46.4	30 23.7	62 48	45.5	31 00.9	62 48	44.6	31 56.1	61 46	43.2	9
100	26 20.9	66 52	49.8	27 00.5	66 51	48.9	27 59.3	65 50	47.6	28 38.0	64 50	46.8	29 16.5	64 49	45.9	29 54.6	63 48	45.0	30 32.4	63 47	44.1	31 28.3	62 46	42.7	100
1	25 49.8	67 51	49.3	26 29.7	66 51	48.4	27 29.1	66 50	47.2	28 08.3	65 49	46.3	28 47.2	65 48	45.4	29 25.8	64 48	44.6	30 04.0	63 47	43.7	31 00.6	62 46	42.3	1
2	25 18.9	67 51	48.7	25 59.2	67 50	47.9	26 59.2	66 49	46.7	27 38.9	66 49	45.8	28 18.2	65 48	45.0	28 57.2	65 47	44.1	29 35.8	64 47	43.2	30 33.2	63 45	41.9	2
3	24 48.3	68 51	48.2	25 29.0	68 50	47.4	26 29.6	67 49	46.2	27 09.7	67 48	45.3	27 49.4	66 48	44.5	28 28.8	65 47	43.6	29 07.9	65 46	42.8	30 06.0	64 45	41.5	3
4	24 17.9	69 50	47.7	24 59.0	68 50	46.9	26 00.2	68 49	45.7	26 40.7	67 48	44.8	27 20.8	67 47	44.0	28 00.7	66 46	43.2	28 40.3	66 46	42.3	29 39.0	65 45	41.0	4
105	23 47.7	69 50	47.2	24 29.3	69 49	46.4	25 31.1	68 48	45.2	26 11.9	68 47	44.4	26 52.5	67 47	43.5	27 32.8	67 46	42.7	28 12.8	66 45	41.9	29 12.3	66 44	40.6	105
6	23 17.9	70 49	46.6	23 59.8	70 49	45.9	25 02.2	69 48	44.7	25 43.5	69 47	43.9	26 24.5	68 46	43.1	27 05.2	68 46	42.2	27 45.7	67 45	41.4	28 45.8	66 44	40.1	6
7	22 48.2	71 49	46.1	23 30.5	70 48	45.3	24 33.5	70 47	44.2	25 15.2	69 47	43.4	25 56.7	69 46	42.6	26 37.8	68 45	41.8	27 18.7	68 44	40.9	28 19.5	67 43	39.7	7
8	22 18.9	71 48	45.6	23 01.6	71 48	44.8	24 05.2	70 47	43.7	24 47.3	70 46	42.9	25 29.1	70 46	42.1	26 10.7	69 45	41.3	26 52.0	69 44	40.5	27 53.5	68 43	39.2	8
9	21 49.8	72 48	45.0	22 32.9	72 47	44.3	23 37.0	71 46	43.1	24 19.5	71 46	42.4	25 01.8	70 45	41.6	25 43.8	70 44	40.8	26 25.6	69 44	40.0	27 27.7	69 42	38.8	9
110	21 21.0	73 48	44.5	22 04.4	72 47	43.8	23 09.2	72 46	42.6	23 52.1	71 45	41.9	24 34.8	71 45	41.1	25 17.2	71 44	40.3	25 59.4	70 43	39.5	27 02.2	69 42	38.3	110
1	20 52.4	73 47	44.0	21 36.3	73 46	43.2	22 41.6	72 46	42.1	23 24.9	72 45	41.4	24 08.0	72 44	40.6	24 50.9	71 43	39.8	25 33.5	71 43	39.0	26 37.0	70 42	37.9	1
2	20 24.2	74 47	43.4	21 08.4	74 46	42.7	22 14.3	73 45	41.6	22 58.0	73 44	40.8	23 41.5	72 44	40.1	24 24.8	72 43	39.3	25 07.9	72 42	38.6	26 12.0	71 41	37.4	2
3	19 56.2	74 46	42.9	20 40.8	74 46	42.1	21 47.3	74 45	41.1	22 31.4	73 44	40.3	23 15.3	73 43	39.6	23 59.0	73 43	38.8	24 42.5	72 42	38.1	25 47.3	72 41	36.9	3
4	19 28.5	75 46	42.3	20 13.5	75 45	41.6	21 20.6	74 44	40.5	22 05.1	74 43	39.8	22 49.4	74 43	39.1	23 33.5	73 42	38.3	24 17.4	73 41	37.6	25 22.8	72 40	36.5	4
115	19 01.1	76 45	41.8	19 46.4	75 45	41.1	20 54.1	75 44	40.0	21 39.0	75 43	39.3	22 23.7	74 42	38.6	23 08.2	74 42	37.8	23 52.6	74 41	37.1	24 58.7	73 40	36.0	115
6	18 34.0	76 45	41.2	19 19.7	76 44	40.5	20 28.0	76 43	39.5	21 13.2	75 42	38.8	21 58.4	75 42	38.1	22 43.3	75 41	37.3	23 28.0	74 40	36.6	24 34.7	74 39	35.5	6
7	18 07.2	77 44	40.6	18 53.3	77 44	40.0	20 02.1	76 43	38.9	20 47.8	76 42	38.2	21 33.3	76 41	37.5	22 18.6	75 41	36.8	23 03.8	75 40	36.1	24 11.1	75 39	35.0	7
8	17 40.7	77 44	40.1	18 27.1	77 43	39.4	19 36.5	77 42	38.4	20 22.6	77 41	37.7	21 08.5	76 41	37.0	21 54.2	76 40	36.3	22 39.8	76 40	35.6	23 47.8	75 38	34.6	8
9	17 14.5	78 43	39.5	18 01.3	78 42	38.8	19 11.3	78 42	37.9	19 57.7	77 41	37.2	20 44.0	77 40	36.5	21 30.1	77 40	35.8	22 16.1	76 39	35.1	23 24.7	76 38	34.1	9
120	16 48.7	79 43	38.9	17 35.8	78 42	38.3	18 46.3	78 41	37.3	19 33.1	78 40	36.6	20 19.8	78 40	36.0	21 06.3	77 39	35.3	21 52.7	77 38	34.6	23 01.9	77 38	33.6	120
1	16 23.1	79 42	38.4	17 10.6	79 41	37.7	18 21.7	79 41	36.8	19 08.9	79 40	36.1	19 55.9	78 39	35.4	20 42.8	78 39	34.8	21 29.6	78 38	34.1	22 39.4	77 37	33.1	1
2	15 57.9	80 42	37.8	16 45.7	80 41	37.2	17 57.3	79 40	36.2	18 44.9	79 39	35.6	19 32.3	79 39	34.9	20 19.6	79 38	34.3	21 06.8	78 38	33.6	22 17.2	78 36	32.6	2
3	15 33.0	80 41	37.2	16 21.2	80 40	36.6	17 33.3	80 40	35.7	18 21.3	80 39	35.0	19 09.1	80 38	34.4	19 56.8	79 38	33.7	20 44.3	79 37	33.1	21 55.3	79 36	32.1	3
4	15 08.4	81 40	36.6	15 57.0	81 40	36.0	17 09.6	81 39	35.1	17 57.9	80 38	34.5	18 46.1	80 38	33.8	19 34.2	80 37	33.2	20 22.1	80 36	32.6	21 33.7	79 36	31.6	4
125	14 44.1	82 40	36.0	15 33.1	81 39	35.4	16 46.3	81 38	34.5	17 34.9	81 38	33.9	18 23.5	81 37	33.3	19 11.9	81 37	32.7	20 00.2	80 36	32.1	21 12.5	80 35	31.1	125
6	14 20.2	82 39	35.5	15 09.5	82 39	34.9	16 23.2	82 38	34.0	17 12.3	82 37	33.4	18 01.2	81 37	32.8	18 50.0	81 36	32.1	19 38.7	81 35	31.5	20 51.5	81 34	30.6	6
7	13 56.7	83 39	34.9	14 46.3	83 38	34.3	16 00.5	82 37	33.4	16 49.9	82 37	32.8	17 39.2	82 36	32.2	18 28.4	82 35	31.6	19 17.5	82 35	31.0	20 30.8	81 34	30.1	7
8	13 33.4	83 38	34.3	14 23.4	83 38	33.7	15 38.2	83 37	32.8	16 27.9	83 36	32.3	17 17.6	83 36	31.7	18 07.1	82 35	31.1	18 56.5	82 34	30.5	20 10.5	82 33	29.6	8
9	13 10.6	84 38	33.7	14 00.9	84 37	33.1	15 16.2	84 36	32.3	16 06.3	83 36	31.7	16 56.3	83 35	31.1	17 46.1	83 34	30.5	18 35.9	83 34	29.9	19 50.4	83 33	29.1	9
130	12 48.1	84 37	33.1	13 38.7	84 36	32.5	14 54.5	84 36	31.7	15 44.9	84 35	31.1	16 35.3	84 34	30.6	17 25.5	84 34	30.0	18 15.7	84 33	29.4	19 30.7	83 32	28.5	130
1	12 25.9	85 36	32.5	13 16.9	85 36	31.9	14 33.2	85 35	31.1	15 24.0	85 34	30.6	16 14.6	84 34	30.0	17 05.2	84 33	29.4	17 55.8	84 33	28.9	19 11.3	84 32	28.0	1
2	12 04.1	86 36	31.9	12 55.4	85 35	31.3	14 12.2	85 34	30.5	15 03.3	85 34	30.0	15 54.4	85 33	29.4	16 45.3	85 33	28.9	17 36.2	85 32	28.3	18 52.3	84 31	27.5	2
3	11 42.7	86 35	31.3	12 34.3	86 35	30.7	13 51.6	86 34	29.9	14 43.1	86 33	29.4	15 34.4	86 33	28.9	16 25.7	85 32	28.3	17 16.9	85 32	27.8	18 33.6	85 31	27.0	3
4	11 21.7	87 34	30.6	12 13.6	86 34	30.1	13 31.4	86 33	29.4	14 23.1	86 33	28.8	15 14.8	86 32	28.3	16 06.5	86 32	27.8	16 58.0	86 31	27.2	18 15.2	86 30	26.4	4
135	11 01.0	87 34	30.0	11 53.2	87 33	29.5	13 11.5	87 32	28.8	14 03.6	87 32	28.3	14 55.6	87 31	27.7	15 47.6	87 31	27.2	16 39.4	86 30	26.7	17 57.1	86 30	25.9	135
6	10 40.7	88 33	29.4	11 33.3	88 33	28.9	12 52.0	87 32	28.2	13 44.4	87 31	27.7	14 36.7	87 31	27.2	15 29.0	87 30	26.7	16 21.2	87 30	26.1	17 39.4	87 29	25.4	6
7	10 20.8	88 33	28.8	11 13.7	88 32	28.3	12 32.8	88 31	27.6	13 25.6	88 31	27.1	14 18.2	88 30	26.6	15 10.8	88 30	26.1	16 03.4	88 29	25.6	17 22.1	87 28	24.8	7
8	10 01.3	89 32	28.2	10 54.5	89 31	27.7	12 14.1	88 31	27.0	13 07.1	88 30	26.5	14 00.1	88 30	26.0	14 53.0	88 29	25.5	15 45.9	88 29	25.0	17 05.0	88 28	24.3	8
9	9 42.2	89 31	27.5	10 35.6	89 31	27.1	11 55.7	89 30	26.4	12 49.1	89 29	25.9	13 42.3	89 29	25.4	14 35.6	89 28	25.0	15 28.7	89 28	24.5	16 48.4	88 27	23.8	9
140	9 23.5	90 31	26.9	10 17.2	90 30	26.5	11 37.7	89 29	25.8	12 31.4	89 29	25.3	13 25.0	89 28	24.9	14 18.5	89 28	24.4	15 12.0	89 27	23.9	16 32.1	89 27	23.2	140
1	9 05.2	90 30	26.3	9 59.2	90 29	25.8	11 20.1	90 29	25.2	12 14.1	90 28	24.7	13 07.9	90 28	24.3	14 01.8	90 27	23.8	14 55.6	90 27	23.4	16 16.1	89 26	22.7	1
2	8 47.2	91 29	25.6	9 41.5	90 29	25.2	11 02.9	90 28	24.6	11 57.1	90 28	24.1	12 51.3	90 27	23.7	13 45.4	90 27	23.2	14 39.5	90 26	22.8	16 00.5	90 25	22.1	2
3	8 29.7	91 28	25.0	9 24.3	91 28	24.6	10 46.1	91 27	23.9	11 40.6	91 27	23.5	12 35.1	91 26	23.1	13 29.5	91 26	22.7	14 23.9	91 25	22.2	15 45.3	90 25	21.6	3
4	8 12.6	91 28	24.4	9 07.5	91 27	24.0	10 29.7	91 27	23.3	11 24.5	91 26	22.9	12 19.2	91 26	22.5	13 13.9	91 25	22.1	14 08.6	91 25	21.7	15 30.5	91 24	21.0	4
145	7 56.0	92 27	23.7	8 51.1	92 27	23.3	10 13.7	92 26	22.7	11 08.7	92 26	22.3	12 03.8	92 25	21.9	12 58.7	92 25	21.5	13 53.7	92 24	21.1	15 16.0	91 24	20.5	145
6	7 39.7	92 26	23.1	8 35.1	92 26	22.7	9 58.1	92 25	22.1	10 53.4	92 25	21.7	11 48.7	92 24	21.3	12 43.9	92 24	20.9	13 39.1	92 24	20.5	15 01.9	92 23	19.9	6
7	7 23.9	93 26	22.4	8 19.5	93 25	22.0	9 42.9	93 25	21.5	10 38.5	93 24	21.1	11 34.0	93 24	20.7	12 29.5	92 23	20.3	13 25.0	92 23	19.9	14 48.1	92 22	19.3	7
8	7 08.5	93 25	21.8	8 04.4	93 25	21.4	9 28.1	93 24	20.9	10 24.0	93 24	20.5	11 19.7	93 23	20.1	12 15.5	93 23	19.7	13 11.2	93 22	19.3	14 34.8	93 22	18.8	8
9	6 53.5	94 24	21.1	7 49.6	94 24	20.8	9 13.8	93 23	20.2	10 09.8	93 23	19.9	11 05.9	93 22	19.5	12 01.9	93 22	19.1	12 57.9	93 22	18.8	14 21.8	93 21	18.2	9
150	6 39.0	94 24	20.5	7 35.4	94 23	20.1	8 59.8	94 23	19.6	9 56.1	94 22	19.2	10 52.4	94 22	18.9	11 48.7	94 21	18.5	12 44.9	94 21	18.2	14 09.2	94 20	17.6	150
1	6 24.9	94 23	19.8	7 21.5	94 22	19.5	8 46.3	94 22	19.0	9 42.9	94 21	18.6	10 39.4	94 21	18.3	11 35.9	94 21	17.9	12 32.3	94 20	17.6	13 57.0	94 20	17.1	1
2	6 11.3	95 22	19.1	7 08.1	95 22	18.8	8 33.2	95 21	18.3	9 30.0	95 21	18.0	10 26.7	95 20	17.7	11 23.5	95 20	17.3	12 20.2	94 20	17.0	13 45.2	94 19	16.5	2
3	5 58.1	96 21	18.5	6 55.1	96 21	18.2	8 20.6	95 20	17.7	9 17.6	95 20	17.4	10 14.5	95 20	17.1	11 11.5	95 19	16.7	12 08.4	95 19	16.4	13 33.7	95 18	15.9	3
4	5 45.3	95 20	17.8	6 42.5	95 20	17.5	8 08.4	95 20	17.1	9 05.6	95 19	16.8	10 02.7	95 19	16.4	10 59.9	95 19	16.1	11 57.0	95 18	15.8	13 22.7	95 18	15.4	4
155	5 33.0	96 20	17.2	6 30.5	96 19	16.9	7 56.6	96 19	16.4	8 54.0	96 19	16.1	9 51.4	96 18	15.8	10 48.7	96 18	15.5	11 46.1	96 18	15.2	13 12.1	96 17	14.8	155
6	5 21.2	96 19	16.5	6 18.8	96 19	16.2	7 45.2	96 18	15.8	8 42.8	96 18	15.5	9 40.4	96 18	15.2	10 38.0	96 17	14.9	11 35.5	96 17	14.6	13 01.8	96 16	14.2	6
7	5 09.8	96 18	15.8	6 07.6	96 18	15.5	7 34.3	96 17	15.1	8 32.1	96 17	14.9	9 29.9	96 17	14.6	10 27.6	96 16	14.3	11 25.4	96 16	14.0	12 52.0	96 16	13.6	7
8				5 56.9	97 17	14.9	7 23.8	97 17	14.5	8 21.8	97 16	14.2	9 19.8	97 16	14.0	10 17.7	97 16	13.7	11 15.7	97 16	13.4	12 42.5	97 15	13.0	8
9				5 46.6	97 16	14.2	7 13.8	97 16	13.8	8 12.0	97 16	13.6	9 10.1	97 15	13.3	10 08.2	97 15	13.1	11 06.4	97 15	12.8	12 33.5	97 14	12.5	9
160				5 36.8	97 16	13.6	7 04.3	97 15	13.2	8 02.6	97 15	13.0	9 00.9	97 15	12.7	9 59.2	97 14	12.5	10 57.5	97 14	12.2	12 24.9	97 14	11.9	160
1				5 27.4	97 15	12.9	6 55.1	97 14	12.6	7 53.6	97 14	12.3	8 52.1	97 14	12.1	9 50.5	97 14	11.9	10 49.0	97 13	11.6	12 16.7	97 13	11.3	1
2				5 18.5	98 14	12.2	6 46.5	98 14	11.9	7 45.1	98 13	11.7	8 43.7	98 13	11.5	9 42.3	98 13	11.3	10 41.0	98 13	11.0	12 08.8	98 12	10.7	2
3				5 10.1	98 13	11.5	6 38.3	98 13	11.2	7 37.0	98 13	11.0	8 35.8	98 12	10.8	9 34.6	98 12	10.6	10 33.3	98 12	10.4	12 01.5	98 12	10.1	3
4				5 02.1	98 12	10.9	6 30.5	98 12	10.6	7 29.4	98 12	10.4	8 28.3	98 12	10.2	9 27.2	98 12	10.0	10 26.1	98 11	09.8	11 54.5	98 11	09.5	4
165							6 23.2	98 11	09.9	7 22.3	98 11	09.8	8 21.3	98 11	09.6	9 20.3	98 11	09.4	10 19.4	98 11	09.2	11 47.9	98 10	08.9	165
6							6 16.4	99 11	09.3	7 15.6	99 10	09.1	8 14.7	99 10	08.9	9 13.9	99 10	08.8	10 13.0	99 10	08.6	11 41.8	99 10	08.3	6
7							6 10.0	99 10	08.6	7 09.3	99 10	08.5	8 08.6	99 10	08.3	9 07.9	99 09	08.2	10 07.1	99 09	08.0	11 36.0	99 09	07.8	7
8							6 04.1	99 09	08.0	7 03.5	99 09	07.8	8 02.9	99 09	07.7	9 02.3	99 09	07.5	10 01.6	99 08	07.4	11 30.7	99 08	07.2	8
9							5 58.7	99 08	07.3	6 58.2	99 08	07.2	7 57.6	99 08	07.0	8 57.1	99 08	06.9	9 56.6	99 08	06.8	11 25.8	99 07	06.6	9
170							5 53.7	99 08	06.6	6 53.3	99 07	06.5	7 52.9	99 07	06.4	8 52.4	99 07	06.3	9 52.0	99 07	06.2	11 21.3	99 07	06.0	170
1							5 49.2	99 07	06.0	6 48.9	99 07	05.9	7 48.5	99 06	05.8	8 48.2	99 06	05.7	9 47.8	99 06	05.5	11 17.3	99 06	05.4	1
2							5 45.2	1.0 06	05.3	6 44.9	1.0 06	05.2	7 44.6	1.0 06	05.1	8 44.4	1.0 06	05.0	9 44.1	1.0 06	04.9	11 13.7	1.0 05	04.8	2
3							5 41.6	1.0 05	04.7	6 41.4	1.0 05	04.6	7 41.2	1.0 05	04.5	8 41.0	1.0 05	04.4	9 40.8	1.0 05	04.3	11 10.5	1.0 05	04.2	3
4							5 38.6	1.0 04	04.0	6 38.4	1.0 04	03.9	7 38.2	1.0 04	03.8	8 38.1	1.0 04	03.8	9 37.9	1.0 04	03.7	11 07.7	1.0 04	03.6	4
175							5 35.9	1.0 04	03.3	6 35.8	1.0 04	03.3	7 35.7	1.0 03	03.2	8 35.6	1.0 03	03.1	9 35.5	1.0 03	03.1	11 05.3	1.0 03	03.0	175
6							5 33.8	1.0 03	02.7	6 33.7	1.0 03	02.6	7 33.7	1.0 03	02.6	8 33.6	1.0 03	02.5	9 33.5	1.0 03	02.5	11 03.4	1.0 02	02.4	6
7							5 32.1	1.0 02	02.0	6 32.1	1.0 02	02.0	7 32.1	1.0 02	01.9	8 32.0	1.0 02	01.9	9 32.0	1.0 02	01.9	11 01.9	1.0 02	01.8	7
8							5 31.0	1.0 01	01.3	6 30.9	1.0 01	01.3	7 30.9	1.0 01	01.3	8 30.9	1.0 01	01.3	9 30.9	1.0 01	01.2	11 00.9	1.0 01	01.2	8
9							5 30.2	1.0 00	00.7	6 30.2	1.0 00	00.7	7 30.2	1.0 00	00.6	8 30.2	1.0 00	00.6	9 30.2	1.0 00	00.6	11 00.2	1.0 00	00.6	9
180							5 30.0	1.0 00	00.0	6 30.0	1.0 00	00.0	7 30.0	1.0 00	00.0	8 30.0	1.0 00	00.0	9 30.0	1.0 00	00.0	11 00.0	1.0 00	00.0	180

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Lat. 47°

H.A.	54° 30′ Alt.	Δd Δt	Az.	55° 00′ Alt.	Δd Δt	Az.	56° 00′ Alt.	Δd Δt	Az.	56° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	82 30.0	1.0 08	00.0	82 00.0	1.0 02	00.0	81 00.0	1.0 02	00.0	80 30.0	1.0 02	00.0
1	82 28.4	1.0 08	04.4	81 58.5	1.0 07	04.1	80 58.7	1.0 06	03.6	80 28.8	1.0 06	03.3
2	82 23.7	98 13	08.8	81 54.1	99 12	08.2	80 54.9	99 10	07.1	80 25.2	99 10	06.6
3	82 15.9	96 18	13.1	81 46.9	97 17	12.1	80 48.6	97 14	10.6	80 19.4	98 14	09.9
4	82 05.3	94 22	17.1	81 37.0	95 21	15.9	80 40.0	96 18	13.9	80 11.2	96 17	13.1
05	81 51.9	91 26	21.0	81 24.5	92 25	19.6	80 29.0	93 22	17.1	80 00.9	94 21	16.1
6	81 36.1	87 30	24.6	81 09.7	89 28	23.0	80 15.9	91 25	20.2	79 48.5	92 24	19.0
7	81 18.0	84 34	27.9	80 52.7	85 32	26.2	80 00.7	88 28	23.1	79 34.3	89 27	21.8
8	80 57.9	80 37	31.0	80 33.7	82 35	29.1	79 43.8	85 31	25.9	79 18.2	86 30	24.4
9	80 35.9	76 39	33.8	80 12.9	78 37	31.9	79 25.1	81 34	28.4	79 00.4	83 32	26.9
10	80 12.4	72 42	36.4	79 50.5	74 40	34.4	79 04.8	78 36	30.8	78 41.2	80 34	29.2
1	79 47.5	68 44	38.7	79 26.7	70 42	36.7	78 43.2	75 38	33.1	78 20.5	77 37	31.4
2	79 21.3	64 45	40.8	79 01.7	67 44	38.8	78 20.2	71 40	35.1	77 58.6	73 38	33.4
3	78 54.0	60 47	42.7	78 35.5	63 45	40.7	77 56.1	68 42	37.0	77 35.4	70 40	35.3
4	78 25.8	57 48	44.5	78 08.3	60 47	42.5	77 31.0	65 43	38.7	77 11.3	67 42	37.0
15	77 56.7	53 50	46.0	77 40.3	56 48	44.0	77 05.0	61 45	40.3	76 46.2	64 43	38.6
6	77 26.9	50 51	47.4	77 11.5	53 49	45.5	76 38.1	58 46	41.8	76 20.2	61 45	40.1
7	76 56.5	47 52	48.7	76 42.0	50 50	46.8	76 10.4	55 47	43.2	75 53.5	58 46	41.5
8	76 25.5	44 53	49.9	76 11.8	47 51	48.0	75 42.1	52 48	44.4	75 26.1	55 47	42.7
9	75 53.9	41 53	50.9	75 41.2	44 52	49.1	75 13.2	49 49	45.5	74 58.0	52 48	43.9
20	75 22.0	38 54	51.8	75 10.0	41 53	50.0	74 43.7	46 50	46.6	74 29.4	49 49	44.9
1	74 49.6	36 54	52.7	74 38.5	39 53	50.9	74 13.8	44 51	47.5	74 00.3	46 49	45.9
2	74 16.9	33 55	53.4	74 06.5	36 54	51.7	73 43.4	41 51	48.4	73 30.7	44 50	46.8
3	73 43.9	31 55	54.1	73 34.3	34 54	52.4	73 12.6	39 52	49.1	73 00.7	41 51	47.6
4	73 10.6	29 56	54.7	73 01.7	31 55	53.1	72 41.5	36 52	49.9	72 30.3	39 51	48.3
25	72 37.1	26 56	55.2	72 28.9	29 55	53.6	72 10.1	34 53	50.5	71 59.6	36 52	49.0
6	72 03.4	24 56	55.7	71 55.8	27 55	54.2	71 38.4	32 53	51.1	71 28.6	34 52	49.6
7	71 29.5	22 57	56.2	71 22.5	25 56	54.6	71 06.4	29 54	51.6	70 57.3	32 53	50.2
8	70 55.5	20 57	56.5	70 49.1	22 56	55.0	70 34.2	27 54	52.1	70 25.7	29 53	50.7
9	70 21.3	18 57	56.9	70 15.5	20 56	55.4	70 01.8	25 54	52.5	69 54.0	27 53	51.1
30	69 46.9	16 57	57.2	69 41.7	19 56	55.7	69 29.2	23 55	52.9	69 22.0	25 54	51.5
1	69 12.5	14 58	57.4	69 07.8	17 57	56.0	68 56.5	21 55	53.3	68 49.9	23 54	51.9
2	68 38.0	13 58	57.6	68 33.9	15 57	56.3	68 23.6	19 55	53.6	68 17.6	21 54	52.3
3	68 03.4	11 58	57.8	67 59.8	13 57	56.5	67 50.7	17 55	53.9	67 45.2	19 54	52.6
4	67 28.7	09 58	58.0	67 25.6	11 57	56.7	67 17.6	15 55	54.1	67 12.6	18 54	52.8
35	66 54.0	08 58	58.1	66 51.4	10 57	56.8	66 44.4	14 55	54.3	66 40.0	16 55	53.1
6	66 19.2	06 58	58.2	66 17.1	08 57	57.0	66 11.1	12 56	54.5	66 07.2	14 55	53.3
7	65 44.5	05 58	58.3	65 42.8	06 57	57.1	65 37.8	10 56	54.6	65 34.4	12 55	53.4
8	65 09.6	03 58	58.3	65 08.4	05 57	57.1	65 04.4	09 56	54.8	65 01.5	11 55	53.6
9	64 34.8	02 58	58.4	64 34.1	03 57	57.2	64 30.9	07 56	54.9	64 28.5	09 55	53.7
40	64 00.0	00 58	58.4	63 59.7	02 57	57.2	63 57.4	05 56	55.0	63 55.5	07 55	53.8
1	63 25.1	01 58	58.4	63 25.2	00 57	57.2	63 23.9	04 56	55.0	63 22.5	06 55	53.9
2	62 50.3	03 58	58.3	62 50.8	01 57	57.2	62 50.4	02 56	55.1	62 49.4	04 55	54.0
3	62 15.5	04 58	58.3	62 16.4	02 57	57.2	62 16.8	01 56	55.1	62 16.3	03 55	54.0
4	61 40.7	05 58	58.2	61 42.0	04 57	57.2	61 43.3	00 56	55.1	61 43.2	01 55	54.0
45	61 05.9	07 58	58.2	61 07.6	05 57	57.1	61 09.7	02 56	55.1	61 10.1	00 55	54.0
6	60 31.1	08 58	58.1	60 33.3	06 57	57.1	60 36.2	03 56	55.0	60 36.9	02 55	54.0
7	59 56.4	09 58	58.0	59 59.0	08 57	57.0	60 02.7	05 56	55.0	60 03.8	03 55	54.0
8	59 21.7	10 58	57.9	59 24.7	09 57	56.9	59 29.2	06 56	54.9	59 30.7	05 55	53.9
9	58 47.1	12 58	57.7	58 50.4	10 57	56.8	58 55.7	07 56	54.9	58 57.7	06 55	53.9
50	58 12.5	13 58	57.6	58 16.2	11 57	56.7	58 22.2	09 56	54.8	58 24.6	07 55	53.8
1	57 38.0	14 57	57.5	57 42.0	13 57	56.5	57 48.8	10 56	54.7	57 51.6	09 55	53.7
2	57 03.5	15 57	57.3	57 07.9	14 57	56.4	57 15.5	11 56	54.6	57 18.6	10 55	53.6
3	56 29.1	16 57	57.1	56 33.9	15 57	56.2	56 42.2	13 55	54.4	56 45.7	11 55	53.5
4	55 54.8	18 57	57.0	55 59.9	16 57	56.1	56 08.9	14 55	54.3	56 12.8	12 55	53.4
55	55 20.5	19 57	56.8	55 26.0	17 56	55.9	55 35.7	15 55	54.2	55 40.0	14 55	53.3
6	54 46.4	20 57	56.6	54 52.1	19 56	55.7	55 02.6	16 55	54.0	55 07.2	15 55	53.1
7	54 12.2	21 57	56.4	54 18.3	20 56	55.5	54 29.5	17 55	53.8	54 34.5	16 54	53.0
8	53 38.2	22 57	56.2	53 44.6	21 56	55.3	53 56.5	19 55	53.7	54 01.9	17 54	52.8
9	53 04.3	23 56	55.9	53 11.0	22 56	55.1	53 23.5	20 55	53.5	53 29.3	19 54	52.7
60	52 30.4	24 56	55.7	52 37.5	23 56	54.9	52 50.7	21 55	53.3	52 56.8	20 54	52.5
1	51 56.6	25 56	55.5	52 04.1	24 56	54.7	52 17.9	22 54	53.1	52 24.4	21 54	52.3
2	51 23.0	26 56	55.2	51 30.7	25 55	54.5	51 45.2	23 54	52.9	51 52.0	22 54	52.1
3	50 49.4	27 56	55.0	50 57.5	26 55	54.2	51 12.7	24 54	52.7	51 19.8	23 54	51.9
4	50 15.9	28 56	54.7	50 24.3	27 55	54.0	50 40.2	25 54	52.5	50 47.6	24 53	51.7
65	49 42.6	29 55	54.5	49 51.3	28 55	53.7	50 07.8	27 54	52.2	50 15.6	26 53	51.5
6	49 09.3	30 55	54.2	49 18.3	29 55	53.5	49 35.5	28 54	52.0	49 43.6	27 53	51.3
7	48 36.2	31 55	53.9	48 45.5	31 55	53.2	49 03.3	29 53	51.8	49 11.7	28 53	51.0
8	48 03.2	32 55	53.7	48 12.8	32 54	52.9	48 31.2	30 53	51.5	48 40.0	29 53	50.8
9	47 30.3	33 55	53.4	47 40.2	33 54	52.7	47 59.2	31 53	51.3	48 08.3	30 53	50.5
70	46 57.5	34 54	53.1	47 07.7	34 54	52.4	47 27.3	32 53	51.0	47 36.8	31 52	50.3
1	46 24.9	35 54	52.8	46 35.4	35 54	52.1	46 55.6	33 53	50.7	47 05.4	32 52	50.0
2	45 52.3	36 54	52.5	46 03.1	36 53	51.8	46 24.0	34 52	50.5	46 34.1	33 52	49.8
3	45 19.9	37 54	52.2	45 31.0	37 53	51.5	45 52.5	35 52	50.2	46 02.9	34 52	49.5
4	44 47.7	38 54	51.9	44 59.1	38 53	51.2	45 21.1	36 52	49.9	45 31.8	35 52	49.2
75	44 15.6	39 53	51.6	44 27.2	39 53	50.9	44 49.9	37 52	49.6	45 00.9	36 51	49.0
6	43 43.6	40 53	51.2	43 55.5	39 53	50.6	44 18.8	38 52	49.3	44 30.1	37 51	48.7
7	43 11.8	41 53	50.9	43 24.0	40 52	50.3	43 47.8	39 51	49.0	43 59.4	38 51	48.4
8	42 40.1	42 53	50.6	42 52.6	41 52	50.0	43 17.0	40 51	48.7	43 28.9	39 51	48.1
9	42 08.5	43 52	50.2	42 21.3	42 52	49.6	42 46.3	41 51	48.4	42 58.5	40 50	47.8
80	41 37.2	44 52	49.9	41 50.2	43 52	49.3	42 15.8	42 51	48.1	42 28.3	41 50	47.5
1	41 05.9	45 52	49.6	41 19.3	44 51	49.0	41 45.4	43 50	47.8	41 58.2	42 50	47.2
2	40 34.9	46 52	49.2	40 48.5	45 51	48.6	41 15.2	44 50	47.4	41 28.3	43 50	46.8
3	40 04.0	47 51	48.9	40 17.9	46 51	48.3	40 45.2	45 50	47.1	40 58.5	44 49	46.5
4	39 33.2	48 51	48.5	39 47.4	47 50	47.9	40 15.3	46 50	46.8	40 28.9	45 49	46.2
85	39 02.7	48 51	48.1	39 17.1	48 50	47.6	39 45.5	47 49	46.4	39 59.5	46 49	45.9
6	38 32.3	49 50	47.8	38 47.0	49 50	47.2	39 16.0	48 49	46.1	39 30.2	47 49	45.5
7	38 02.1	50 50	47.4	38 17.1	50 50	46.9	38 46.6	49 49	45.8	39 01.1	48 48	45.2
8	37 32.0	51 50	47.0	37 47.3	51 49	46.5	38 17.3	50 48	45.4	38 32.1	49 48	44.8
9	37 02.2	52 49	46.7	37 17.7	52 49	46.1	37 48.3	51 48	45.0	38 03.4	50 48	44.5
90	36 32.5	53 49	46.3	36 48.3	52 49	45.8	37 19.4	51 48	44.7	37 34.8	51 47	44.1

H.A.	57° 00′ Alt.	Δd Δt	Az.	57° 30′ Alt.	Δd Δt	Az.	59° 00′ Alt.	Δd Δt	Az.	59° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	80 00.0	1.0 02	00.0	79 30.0	1.0 02	00.0	78 00.0	1.0 01	00.0	77 30.0	1.0 01	00.0
1	79 58.9	1.0 06	03.1	79 29.0	1.0 05	02.9	77 59.1	1.0 04	02.5	77 29.2	1.0 04	02.3
2	79 55.5	99 09	06.2	79 25.8	99 09	05.9	77 56.5	99 07	04.9	77 26.7	99 07	04.7
3	79 50.0	98 13	09.3	79 20.6	98 12	08.7	77 52.1	99 10	07.4	77 22.5	99 10	07.0
4	79 42.3	96 16	12.3	79 13.4	97 15	11.6	77 46.0	97 13	09.8	77 16.7	98 12	09.3
05	79 32.6	94 19	15.2	79 04.2	95 18	14.3	77 38.2	96 16	12.1	77 09.4	96 15	11.5
6	79 21.0	92 22	17.9	78 53.2	93 21	16.9	77 28.8	94 18	14.4	77 00.5	95 17	13.6
7	79 07.5	90 25	20.6	78 40.4	91 24	19.5	77 17.9	93 21	16.6	76 50.1	93 20	15.8
8	78 52.2	87 28	23.1	78 25.9	88 27	21.9	77 05.5	91 23	18.7	76 38.2	91 22	17.8
9	78 35.4	84 31	25.5	78 09.9	85 29	24.2	76 51.7	88 25	20.8	76 25.1	89 24	19.8
10	78 17.0	81 33	27.8	77 52.4	83 31	26.4	76 36.5	86 27	22.7	76 10.6	87 26	21.6
1	77 57.3	78 35	29.9	77 33.6	80 33	28.4	76 20.1	83 29	24.6	75 54.9	84 28	23.5
2	77 36.3	75 37	31.8	77 13.5	77 35	30.3	76 02.5	81 31	26.4	75 38.1	82 30	25.2
3	77 14.2	72 39	33.7	76 52.3	74 37	32.2	75 43.8	78 33	28.0	75 20.1	80 32	26.8
4	76 50.9	69 40	35.4	76 30.0	71 39	33.8	75 24.1	76 34	29.6	75 01.2	77 33	28.4
15	76 26.8	66 42	37.0	76 06.8	68 40	35.4	75 03.4	73 36	31.1	74 41.3	74 35	29.8
6	76 01.8	63 43	38.4	75 42.6	65 42	36.9	74 41.8	70 37	32.5	74 20.5	72 36	31.2
7	75 35.9	60 44	39.8	75 17.7	62 43	38.2	74 19.4	67 39	33.9	73 58.9	69 37	32.5
8	75 09.4	57 45	41.1	74 52.0	59 44	39.5	73 56.2	65 40	35.1	73 36.5	67 38	33.8
9	74 42.2	54 46	42.2	74 25.6	56 45	40.7	73 32.3	62 41	36.3	73 13.4	64 40	34.9
20	74 14.4	51 47	43.3	73 58.7	53 46	41.7	73 07.8	60 42	37.4	72 49.7	61 41	36.0
1	73 46.1	49 48	44.3	73 31.2	51 47	42.7	72 42.7	57 43	38.4	72 25.3	59 42	37.0
2	73 17.3	46 49	45.2	73 03.2	48 47	43.7	72 17.0	54 44	39.3	72 00.4	56 42	38.0
3	72 48.0	43 49	46.0	72 34.7	46 48	44.5	71 50.8	52 44	40.2	71 35.0	54 43	38.9
4	72 18.4	41 50	46.8	72 05.8	43 49	45.3	71 24.1	49 45	41.1	71 09.0	51 44	39.7
25	71 48.4	38 51	47.5	71 36.5	41 49	46.0	70 57.0	47 46	41.8	70 42.7	49 45	40.5
6	71 18.1	36 51	48.1	71 06.9	38 50	46.7	70 29.6	45 46	42.5	70 15.9	46 45	41.2
7	70 47.4	34 51	48.7	70 37.0	36 50	47.3	70 01.7	42 47	43.2	69 48.8	44 46	41.9
8	70 16.6	32 52	49.3	70 06.8	34 51	47.9	69 33.5	40 47	43.8	69 21.3	42 46	42.5
9	69 45.4	29 52	49.7	69 36.3	32 51	48.4	69 05.1	38 48	44.4	68 53.5	40 47	43.1
30	69 14.1	27 53	50.2	69 05.6	29 52	48.8	68 36.3	36 48	44.9	68 25.4	37 47	43.6
1	68 42.6	25 53	50.6	68 34.7	27 52	49.3	68 07.3	33 49	45.4	67 57.0	35 48	44.1
2	68 10.9	23 53	50.9	68 03.6	25 52	49.6	67 38.1	31 49	45.8	67 28.4	33 48	44.6
3	67 39.0	21 53	51.3	67 32.3	23 52	50.0	67 08.6	29 49	46.2	66 59.6	31 48	45.0
4	67 07.1	20 54	51.6	67 00.9	21 53	50.3	66 39.0	27 50	46.6	66 30.5	29 49	45.4
35	66 34.9	18 54	51.8	66 29.4	20 53	50.6	66 09.1	25 50	46.9	66 01.3	27 49	45.8
6	66 02.7	16 54	52.0	65 57.7	18 53	50.8	65 39.2	23 50	47.2	65 31.9	25 49	46.1
7	65 30.4	14 54	52.2	65 25.9	16 53	51.1	65 09.1	21 50	47.5	65 02.3	23 49	46.4
8	64 58.0	12 54	52.4	64 54.0	14 53	51.2	64 38.8	20 51	47.8	64 32.7	21 50	46.6
9	64 25.6	11 54	52.6	64 22.1	13 53	51.4	64 08.5	18 51	48.0	64 02.8	20 50	46.9
40	63 53.1	09 54	52.7	63 50.1	11 53	51.6	63 38.0	16 51	48.2	63 32.9	18 50	47.1
1	63 20.5	07 54	52.8	63 18.0	09 54	51.7	63 07.4	14 51	48.4	63 02.9	16 50	47.3
2	62 47.9	06 54	52.9	62 45.9	08 54	51.8	62 36.8	13 51	48.5	62 32.8	14 50	47.4
3	62 15.2	04 54	52.9	62 13.7	06 54	51.9	62 06.1	11 51	48.7	62 02.6	13 50	47.6
4	61 42.6	03 54	53.0	61 41.5	04 54	51.9	61 35.4	09 51	48.8	61 32.4	11 50	47.7
45	61 09.9	01 54	53.0	61 09.3	03 54	52.0	61 04.6	08 51	48.9	61 02.1	09 51	47.8
6	60 37.2	00 54	53.0	60 37.1	01 54	52.0	60 33.8	06 51	48.9	60 31.7	08 51	47.9
7	60 04.6	02 54	53.0	60 04.8	00 54	52.0	60 02.9	04 51	49.0	60 01.4	06 51	48.0
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9	58 59.2	04 54	52.9	59 00.4	03 54	51.9	59 01.1	01 52	49.0	59 00.5	03 51	48.1
50	58 26.6	06 54	52.9	58 28.2	04 54	51.9	58 30.2	00 52	49.0	58 30.1	01 51	48.1
1	57 54.0	07 54	52.8	57 56.0	06 54	51.9	57 59.3	02 52	49.0	57 59.6	00 51	48.1
2	57 21.4	09 54	52.7	57 23.8	07 54	51.8	57 28.4	03 51	49.0	57 29.2	02 51	48.1
3	56 48.9	10 54	52.6	56 51.6	09 54	51.7	56 57.6	05 51	49.0	56 58.7	03 51	48.1
4	56 16.4	11 54	52.5	56 19.6	10 53	51.6	56 26.7	06 51	48.9	56 28.3	05 51	48.0
55	55 43.9	12 54	52.4	55 47.5	11 53	51.5	55 55.9	07 51	48.9	55 57.9	06 51	48.0
6	55 11.5	14 54	52.3	55 15.5	13 53	51.4	55 25.1	09 51	48.8	55 27.5	08 51	47.9
7	54 39.2	15 54	52.1	54 43.5	14 53	51.3	54 54.3	10 51	48.7	54 57.2	09 50	47.8
8	54 06.9	16 54	52.0	54 11.6	15 53	51.2	54 23.6	11 51	48.6	54 26.8	10 50	47.8
9	53 34.7	17 54	51.8	53 39.8	16 53	51.0	53 52.9	13 51	48.5	53 56.6	12 50	47.7
60	53 02.6	19 53	51.7	53 08.0	18 53	50.9	53 22.3	14 51	48.4	53 26.4	13 50	47.6
1	52 30.5	20 53	51.5	52 36.3	19 53	50.7	52 51.7	15 51	48.3	52 56.2	14 50	47.4
2	51 58.5	21 53	51.3	52 04.7	20 53	50.5	52 21.2	17 51	48.1	52 26.1	16 50	47.3
3	51 26.6	22 53	51.1	51 33.1	21 52	50.3	51 50.8	18 51	48.0	51 56.0	17 50	47.2
4	50 54.8	23 53	50.9	51 01.7	22 52	50.2	51 20.4	19 50	47.8	51 26.1	18 50	47.0
65	50 23.1	25 53	50.7	50 30.3	24 52	50.0	50 50.1	21 50	47.7	50 56.2	19 50	46.9
6	49 51.5	26 53	50.5	49 59.0	25 52	49.8	50 19.9	22 50	47.5	50 26.3	21 50	46.7
7	49 19.9	27 52	50.3	49 27.8	26 52	49.6	49 49.8	23 50	47.3	49 56.6	22 49	46.5
8	48 48.5	28 52	50.1	48 56.7	27 52	49.3	49 19.8	24 50	47.1	49 26.9	23 49	46.4
9	48 17.2	29 52	49.8	48 25.8	28 51	49.1	48 49.9	25 50	46.9	48 57.3	24 49	46.2
70	47 46.0	30 52	49.6	47 54.9	29 51	48.9	48 20.0	27 50	46.7	48 27.9	26 49	46.0
1	47 14.9	31 52	49.3	47 24.1	30 51	48.6	47 50.3	28 49	46.5	47 58.5	27 49	45.8
2	46 43.9	32 51	49.1	46 53.4	31 51	48.4	47 20.6	29 49	46.3	47 29.2	28 49	45.6
3	46 13.0	33 51	48.8	46 22.9	33 51	48.1	46 51.1	30 49	46.1	47 00.0	29 48	45.4
4	45 42.3	34 51	48.6	45 52.5	34 50	47.9	46 21.7	31 49	45.8	46 31.0	30 48	45.2
75	45 11.7	36 51	48.3	45 22.2	35 50	47.6	45 52.4	32 49	45.6	46 02.0	32 48	44.9
6	44 41.2	37 51	48.0	44 52.0	36 50	47.4	45 23.2	33 48	45.4	45 33.2	33 48	44.7
7	44 10.8	38 50	47.7	44 22.0	37 50	47.1	44 54.2	35 48	45.1	45 04.4	34 48	44.4
8	43 40.6	39 50	47.4	43 52.1	38 50	46.8	44 25.2	36 48	44.9	44 35.9	35 47	44.2
9	43 10.5	40 50	47.1	43 22.3	39 49	46.5	43 56.4	37 48	44.6	44 07.4	36 47	44.0
80	42 40.6	41 50	46.8	42 52.7	40 49	46.2	43 27.8	38 48	44.3	43 39.1	37 47	43.7
1	42 10.8	42 49	46.5	42 23.2	41 49	45.9	42 59.3	39 47	44.1	43 10.9	38 47	43.4
2	41 41.2	43 49	46.2	41 53.9	42 49	45.6	42 30.9	40 47	43.8	42 42.8	39 47	43.2
3	41 11.7	44 49	45.9	41 24.7	43 48	45.3	42 02.6	41 47	43.5	42 14.9	40 46	42.9
4	40 42.4	45 49	45.6	40 55.7	44 48	45.0	41 34.5	42 47	43.2	41 47.1	42 46	42.6
85	40 13.3	46 48	45.3	40 26.9	45 48	44.7	41 06.6	43 46	42.9	41 19.5	43 46	42.3
6	39 44.3	47 48	45.0	39 58.2	46 48	44.4	40 38.8	44 46	42.6	40 52.0	44 46	42.0
7	39 15.4	48 48	44.6	39 29.6	47 47	44.1	40 11.2	45 46	42.3	40 24.7	45 45	41.7
8	38 46.8	49 47	44.3	39 01.3	48 47	43.7	39 43.7	46 46	42.0	39 57.5	46 45	41.4
9	38 18.3	49 47	43.9	38 33.1	49 47	43.4	39 16.4	47 45	41.7	39 30.5	47 45	41.1
90	37 50.0	50 47	43.6	38 05.0	50 46	43.0	38 49.3	48 45	41.4	39 03.7	48 44	40.8

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H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	36 03.0	54 49	45.9	36 19.1	53 48	45.4	36 50.8	52 48	44.3	37 06.4	52 47	43.8	37 21.9	51 47	43.2	37 37.2	51 46	42.7	38 22.3	49 45	41.1	38 37.0	49 44	40.5	91
2	35 33.7	55 48	45.5	35 50.0	54 48	45.0	36 22.3	53 47	44.0	36 38.2	53 47	43.4	36 53.9	52 46	42.9	37 09.5	52 46	42.4	37 55.5	50 44	40.7	38 10.5	50 44	40.2	2
3	35 04.6	55 48	45.1	35 21.2	55 48	44.6	35 53.9	54 47	43.6	36 10.1	54 46	43.1	36 26.2	53 46	42.5	36 42.1	53 46	42.0	37 28.9	51 44	40.4	37 44.2	51 44	39.9	3
4	34 35.7	56 48	44.7	34 52.6	56 47	44.2	35 25.8	55 47	43.2	35 42.3	55 46	42.7	35 58.6	54 46	42.2	36 14.8	54 45	41.7	37 02.5	52 44	40.1	37 18.1	52 43	39.5	4
95	34 07.0	57 47	44.3	34 24.1	57 47	43.8	34 57.9	56 46	42.8	35 14.6	55 46	42.3	35 31.2	55 45	41.8	35 47.7	55 45	41.3	36 36.2	53 43	39.7	36 52.1	53 43	39.2	95
6	33 38.5	58 47	43.9	33 55.9	58 47	43.4	34 30.2	57 46	42.4	34 47.2	56 45	41.9	35 04.0	56 45	41.4	35 20.8	56 44	40.9	36 10.2	54 43	39.4	36 28.4	54 43	38.9	6
7	33 10.3	59 47	43.5	33 27.9	58 46	43.0	34 02.7	58 46	42.1	34 19.9	57 45	41.6	34 37.1	57 45	41.1	34 54.1	56 44	40.6	35 44.3	55 43	39.0	36 00.8	55 42	38.5	7
8	32 42.2	60 46	43.1	33 00.0	59 46	42.6	33 35.4	59 45	41.7	33 52.9	58 45	41.2	34 10.3	58 44	40.7	34 27.6	57 44	40.2	35 18.6	56 42	38.7	35 35.4	56 42	38.2	8
9	32 14.3	60 46	42.7	32 32.4	60 46	42.2	33 08.3	59 45	41.3	33 26.1	59 44	40.8	33 43.7	59 44	40.3	34 01.2	58 44	39.8	34 53.2	57 42	38.3	35 10.2	57 42	37.8	9
100	31 46.7	61 46	42.3	32 05.0	61 45	41.8	32 41.4	60 44	40.9	32 59.4	60 44	40.4	33 17.3	60 44	39.9	33 35.2	59 43	39.4	34 27.9	58 42	38.0	34 45.2	58 41	37.5	100
1	31 19.3	62 45	41.9	31 37.9	62 45	41.4	32 14.7	61 44	40.5	32 33.0	61 44	40.0	32 51.2	60 43	39.5	33 09.3	60 43	39.0	34 02.8	59 41	37.6	34 20.4	59 41	37.1	1
2	30 52.1	63 45	41.4	31 10.9	63 45	41.0	31 48.3	62 44	40.1	32 06.8	62 43	39.6	32 25.3	61 43	39.1	32 43.6	61 42	38.7	33 37.9	60 41	37.2	33 55.8	59 41	36.8	2
3	30 25.1	64 45	41.0	30 44.2	63 44	40.6	31 22.1	63 43	39.7	31 40.9	62 43	39.2	31 59.6	62 42	38.7	32 18.1	62 42	38.3	33 13.3	61 41	36.9	33 31.5	60 40	36.4	3
4	29 58.4	65 44	40.6	30 17.7	64 44	40.1	30 56.1	64 43	39.2	31 15.1	63 43	38.8	31 34.1	63 42	38.3	31 52.9	63 42	37.9	32 48.9	62 40	36.5	33 07.3	61 40	36.0	4
105	29 31.9	65 44	40.1	29 51.5	65 43	39.7	30 30.3	64 43	38.8	30 49.6	64 42	38.4	31 08.8	64 42	37.9	31 27.9	64 41	37.5	32 24.6	63 40	36.1	32 43.3	62 40	35.6	105
6	29 05.6	66 43	39.7	29 25.4	66 43	39.3	30 04.8	65 42	38.4	30 24.3	65 42	38.0	30 43.8	65 41	37.5	31 03.1	64 41	37.1	32 00.6	63 40	35.7	32 19.6	63 39	35.3	6
7	28 39.6	67 43	39.3	28 59.6	67 43	38.8	29 39.5	66 42	38.0	29 59.2	66 41	37.5	30 18.9	66 41	37.1	30 38.6	65 41	36.7	31 36.8	64 39	35.3	31 56.1	64 39	34.9	7
8	28 13.8	68 43	38.8	28 34.1	67 42	38.4	29 14.4	67 41	37.6	29 34.4	67 41	37.1	29 54.4	66 41	36.7	30 14.2	66 40	36.3	31 13.3	65 39	34.9	31 32.8	65 38	34.5	8
9	27 48.3	68 42	38.4	28 08.8	68 42	38.0	28 49.6	68 41	37.1	29 09.9	67 41	36.7	29 30.0	67 40	36.3	29 50.2	67 40	35.8	30 50.0	66 38	34.5	31 09.7	66 38	34.1	9
110	27 23.0	69 42	37.9	27 43.8	69 41	37.5	28 25.0	68 41	36.7	28 45.5	68 40	36.3	29 06.0	68 40	35.9	29 26.3	68 39	35.4	30 26.9	67 38	34.2	30 46.9	67 38	33.7	110
1	26 58.0	70 41	37.5	27 19.0	70 41	37.1	28 00.7	69 40	36.3	28 21.4	69 40	35.8	28 42.1	69 39	35.4	29 02.7	69 39	35.0	30 04.0	68 38	33.8	30 24.3	67 37	33.3	1
2	26 33.3	71 41	37.0	26 54.5	71 40	36.6	27 36.6	70 40	35.8	27 57.6	70 39	35.4	28 18.5	70 39	35.0	28 39.4	69 38	34.6	29 41.4	69 37	33.3	30 01.9	68 37	32.9	2
3	26 08.8	71 40	36.5	26 30.2	71 40	36.2	27 12.8	71 39	35.4	27 34.0	71 39	35.0	27 55.2	70 38	34.6	28 16.2	70 38	34.2	29 19.0	69 37	32.9	29 39.8	69 36	32.5	3
4	25 44.5	72 40	36.1	26 06.2	72 40	35.7	26 49.3	72 39	34.9	27 10.7	71 38	34.5	27 32.1	71 38	34.1	27 53.4	71 38	33.7	28 56.9	70 36	32.5	29 17.9	70 36	32.1	4
115	25 20.6	73 39	35.6	25 42.4	73 39	35.2	26 26.0	72 38	34.5	26 47.6	72 38	34.1	27 09.2	72 38	33.7	27 30.8	72 37	33.3	28 35.0	71 36	32.1	28 56.3	71 36	31.7	115
6	24 56.9	74 39	35.1	25 19.0	73 39	34.8	26 02.9	73 38	34.0	26 24.8	73 38	33.6	26 46.7	73 37	33.3	27 08.5	72 37	32.9	28 13.4	72 36	31.7	28 34.9	72 35	31.3	6
7	24 33.5	74 39	34.7	24 55.8	74 38	34.3	25 40.2	74 37	33.6	26 02.3	74 37	33.2	26 24.4	73 37	32.8	26 46.4	73 36	32.4	27 52.0	73 35	31.3	28 13.8	72 35	30.9	7
8	24 10.3	75 38	34.2	24 32.8	75 38	33.8	25 17.7	75 37	33.1	25 40.0	74 37	32.7	26 02.3	74 36	32.4	26 24.6	74 36	32.0	27 30.9	73 35	30.8	27 52.9	73 34	30.5	8
9	23 47.5	76 38	33.7	24 10.2	76 37	33.4	24 55.5	75 37	32.6	25 18.1	75 36	32.3	25 40.6	75 36	31.9	26 03.0	75 35	31.5	27 10.1	74 34	30.4	27 32.3	74 34	30.0	9
120	23 24.9	77 37	33.2	23 47.8	76 37	32.9	24 33.6	76 36	32.2	24 56.3	76 36	31.8	25 19.1	76 35	31.5	25 41.8	76 35	31.1	26 49.5	75 34	30.0	27 12.0	75 33	29.6	120
1	23 02.6	77 37	32.7	23 25.8	77 36	32.4	24 11.9	77 36	31.7	24 34.9	77 35	31.3	24 57.9	76 35	31.0	25 20.8	76 35	30.6	26 29.2	76 33	29.6	26 51.9	76 33	29.2	1
2	22 40.6	78 36	32.3	23 04.0	78 36	31.9	23 50.6	77 35	31.2	24 13.8	77 35	30.9	24 36.9	77 34	30.5	25 00.1	77 34	30.2	26 09.1	76 33	29.1	26 32.0	76 33	28.8	2
3	22 18.9	79 36	31.8	22 42.5	78 35	31.4	23 29.5	78 35	30.8	23 52.9	78 34	30.4	24 16.3	78 34	30.1	24 39.6	78 34	29.7	25 49.4	77 32	28.7	26 12.5	77 32	28.3	3
4	21 57.5	79 35	31.3	22 21.3	79 35	30.9	23 08.7	79 34	30.3	23 32.3	79 34	29.9	23 55.9	79 33	29.6	24 19.5	78 33	29.3	25 29.9	78 32	28.2	25 53.2	78 32	27.9	4
125	21 36.5	80 35	30.8	22 00.4	80 34	30.4	22 48.2	80 34	29.8	23 12.1	79 33	29.5	23 35.9	79 33	29.1	23 59.6	79 33	28.8	25 10.6	79 32	27.8	25 34.2	79 31	27.4	125
6	21 15.7	81 34	30.3	21 39.8	80 34	30.0	22 28.0	80 33	29.3	22 52.1	80 33	29.0	23 16.1	80 32	28.7	23 40.1	80 32	28.3	24 51.7	79 31	27.3	25 15.5	79 31	27.0	6
7	20 55.2	81 34	29.8	21 19.6	81 33	29.5	22 08.2	81 33	28.8	22 32.4	81 32	28.5	22 56.6	81 32	28.2	23 20.8	81 32	27.9	24 33.1	80 31	26.9	24 57.1	80 30	26.6	7
8	20 35.0	82 33	29.3	20 59.6	82 33	29.0	21 48.6	82 32	28.3	22 13.0	81 32	28.0	22 37.4	81 31	27.7	23 01.8	81 31	27.4	24 14.7	81 30	26.4	24 38.9	81 30	26.1	8
9	20 15.2	83 33	28.8	20 39.9	82 32	28.5	21 29.3	82 32	27.8	21 54.0	82 31	27.5	22 18.6	82 31	27.2	22 43.1	82 31	26.9	23 56.6	81 30	26.0	24 21.0	81 29	25.7	9
130	19 55.7	83 32	28.2	20 20.6	83 32	27.9	21 10.4	83 31	27.3	21 35.2	83 31	27.0	22 00.0	83 30	26.7	22 24.8	82 30	26.4	23 38.9	82 29	25.5	24 03.5	82 29	25.2	130
1	19 36.5	84 31	27.7	20 01.6	84 31	27.4	20 51.7	83 31	26.8	21 16.7	83 30	26.6	21 41.7	83 30	26.3	22 06.7	83 30	26.0	23 21.4	83 29	25.0	23 46.2	83 28	24.7	1
2	19 17.6	84 31	27.2	19 42.9	84 31	26.9	20 33.4	84 30	26.3	20 58.6	84 30	26.1	21 23.8	84 29	25.8	21 48.9	84 29	25.5	23 04.2	83 28	24.6	23 29.2	83 28	24.3	2
3	18 59.1	85 30	26.7	19 24.5	85 30	26.4	20 15.4	85 29	25.8	20 40.8	85 29	25.6	21 06.2	85 29	25.3	21 31.5	84 29	25.0	22 47.3	84 28	24.1	23 12.5	84 27	23.8	3
4	18 40.8	86 30	26.2	19 06.5	85 30	25.9	19 57.7	85 29	25.3	20 23.3	85 29	25.1	20 48.9	85 28	24.8	21 14.4	85 28	24.5	22 30.8	85 27	23.6	22 56.2	85 27	23.4	4
135	18 23.0	86 29	25.6	18 48.8	86 29	25.4	19 40.4	86 28	24.8	20 06.1	86 28	24.6	20 31.9	86 28	24.3	20 57.6	86 27	24.0	22 14.5	85 27	23.2	22 40.1	85 26	22.9	135
6	18 05.4	87 29	25.1	18 31.4	87 28	24.8	19 23.4	86 28	24.3	19 49.3	86 28	24.1	20 15.2	86 27	23.8	20 41.1	86 27	23.5	21 58.6	86 26	22.7	22 24.3	86 26	22.4	6
7	17 48.2	87 28	24.6	18 14.4	87 28	24.3	19 06.7	87 27	23.8	19 32.8	87 27	23.5	19 58.9	87 27	23.3	20 24.9	87 26	23.0	21 42.9	87 26	22.2	22 08.9	86 25	21.9	7
8	17 31.4	88 28	24.0	17 57.7	88 27	23.8	18 50.3	88 27	23.3	19 16.6	88 26	23.0	19 42.9	87 26	22.8	20 09.1	87 26	22.5	21 27.6	87 25	21.7	21 53.8	87 25	21.5	8
9	17 14.9	88 27	23.5	17 41.4	88 27	23.3	18 34.3	88 26	22.8	19 00.8	88 26	22.5	19 27.2	88 26	22.3	19 53.6	88 25	22.0	21 12.6	88 24	21.3	21 38.9	88 24	21.0	9
140	16 58.7	89 26	23.0	17 25.4	89 26	22.7	18 18.7	89 26	22.2	18 45.3	89 25	22.0	19 11.8	89 25	21.8	19 38.4	89 25	21.5	20 58.0	88 24	20.8	21 24.4	88 24	20.5	140
1	16 43.0	89 26	22.4	17 09.8	89 25	22.2	18 03.3	89 25	21.7	18 30.1	89 25	21.5	18 56.8	89 24	21.2	19 23.6	89 24	21.0	20 43.6	89 23	20.3	21 10.3	89 23	20.0	1
2	16 27.5	90 25	21.9	16 54.5	90 25	21.7	17 48.4	90 24	21.2	18 15.3	90 24	21.0	18 42.2	90 24	20.7	19 09.1	90 24	20.5	20 29.6	89 23	19.8	20 56.4	89 23	19.5	2
3	16 12.4	90 25	21.3	16 39.6	90 24	21.1	17 33.7	90 24	20.7	18 00.8	90 24	20.4	18 27.9	90 23	20.2	18 54.9	90 23	20.0	20 15.9	90 22	19.3	20 42.9	90 22	19.1	3
4	15 57.7	91 24	20.8	16 25.0	91 24	20.6	17 19.5	91 23	20.1	17 46.7	91 23	19.9	18 13.9	91 23	19.7	18 41.1	91 22	19.5	20 02.6	90 22	18.8	20 29.7	90 21	18.6	4
145	15 43.4	91 23	20.2	16 10.8	91 23	20.0	17 05.6	91 23	19.6	17 32.9	91 22	19.4	18 00.3	91 22	19.2	18 27.6	91 22	19.0	19 49.5	91 21	18.3	20 16.8	91 21	18.1	145
6	15 29.4	92 23	19.7	15 57.0	92 22	19.5	16 52.0	92 22	19.1	17 19.5	92 22	18.9	17 47.0	92 22	18.7	18 14.5	92 21	18.4	19 36.9	91 21	17.8	20 04.3	91 20	17.6	6
7	15 15.8	92 22	19.1	15 43.5	92 22	18.9	16 38.8	92 21	18.5	17 06.5	92 21	18.3	17 34.1	92 21	18.1	18 01.7	92 21	17.9	19 24.5	92 20	17.3	19 52.1	92 20	17.1	7
8	15 02.6	93 21	18.6	15 30.4	93 21	18.4	16 26.0	93 21	18.0	16 53.8	93 21	17.8	17 21.6	93 20	17.6	17 49.3	93 20	17.4	19 12.5	92 19	16.8	19 40.2	92 19	16.6	8
9	14 49.7	93 21	18.0	15 17.7	93 21	17.8	16 13.5	93 20	17.5	16 41.5	93 20	17.3	17 09.4	93 20	17.1	17 37.3	93 20	16.9	19 00.9	93 19	16.3	19 28.7	93 19	16.1	9
150	14 37.3	94 20	17.5	15 05.3	94 20	17.3	16 01.5	93 20	16.9	16 29.5	93 19	16.7	16 57.5	93 19	16.5	17 25.6	93 19	16.4	18 49.6	93 18	15.8	19 17.5	93 18	15.6	150
1	14 25.2	94 20	16.9	14 53.4	94 19	16.7	15 49.7	94 19	16.4	16 17.9	94 19	16.2	16 46.1	94 18	16.0	17 14.2	94 18	15.8	18 38.6	94 18	15.3	19 06.7	94 17	15.1	1
2	14 13.5	94 19	16.3	14 41.8	94 19	16.2	15 38.4	94 18	15.8	16 06.7	94 18	15.6	16 35.0	94 18	15.5	17 03.2	94 18	15.3	18 28.0	94 17	14.8	18 56.2	94 17	14.6	2
3	14 02.2	95 18	15.8	14 30.6	95 18	15.6	15 27.4	95 18	15.3	15 55.8	95 17	15.1	16 24.2	95 17	14.9	16 52.6	95 17	14.8	18 17.7	95 16	14.3	18 46.1	95 16	14.1	3
4	13 51.2	95 18	15.2	14 19.8	95 17	15.0	15 16.8	95 17	14.7	15 45.4	95 17	14.6	16 13.9	95 17	14.4	16 42.4	95 16	14.2	18 07.8	95 16	13.7	18 36.3	95 16	13.6	4
155	13 40.7	96 17	14.6	14 09.4	95 17	14.5	15 06.6	95 16	14.2	15 35.3	95 16	14.0	16 03.9	95 16	13.9	16 32.5	95 16	13.7	17 58.3	95 15	13.2	18 26.9	95 15	13.1	155
6	13 30.6	96 16	14.1	13 59.3	96 16	13.9	14 56.8	96 16	13.6	15 25.5	96 16	13.5	15 54.3	96 15	13.3	16 23.0	96 15	13.2	17 49.1	96 15	12.7	18 17.8	96 15	12.6	6
7	13 20.8	96 16	13.5	13 49.7	96 15	13.3	14 47.4	96 15	13.1	15 16.2	96 15	12.9	15 45.0	96 15	12.8	16 13.9	96 15	12.6	17 40.3	96 14	12.2	18 09.1	96 14	12.0	7
8	13 11.5	96 15	12.9	13 40.4	96 15	12.8	14 38.3	96 14	12.5	15 07.2	96 14	12.4	15 36.2	96 14	12.2	16 05.1	96 14	12.1	17 31.8	96 14	11.7	18 00.7	96 13	11.5	8
9	13 02.5	97 14	12.3	13 31.6	97 14	12.2	14 29.6	97 14	11.9	14 58.7	97 14	11.8	15 27.7	97 14	11.7	15 56.7	97 13	11.6	17 23.7	97 13	11.2	17 52.7	97 13	11.0	9
160	12 54.0	97 14	11.8	13 23.1	97 13	11.6	14 21.4	97 13	11.4	14 50.5	97 13	11.3	15 19.6	97 13	11.1	15 48.7	97 13	11.0	17 16.0	97 12	10.6	17 45.1	97 12	10.5	160
1	12 45.9	97 13	11.2	13 15.1	97 13	11.1	14 13.5	97 12	10.8	14 42.7	97 12	10.7	15 11.9	97 12	10.6	15 41.1	97 12	10.5	17 08.6	97 12	10.1	17 37.8	97 12	10.0	1
2	12 38.1	98 12	10.6	13 07.4	98 12	10.5	14 06.0	98 12	10.3	14 35.3	98 12	10.2	15 04.6	98 12	10.0	15 33.8	98 11	09.9	17 01.6	98 11	09.6	17 30.9	98 11	09.5	2
3	12 30.8	98 12	10.0	13 00.2	98 11	09.9	13 58.9	98 11	09.7	14 28.3	98 11	09.6	14 57.6	98 11	09.5	15 27.0	98 11	09.4	16 55.0	98 10	09.1	17 24.4	98 10	08.9	3
4	12 23.9	98 11	09.4	12 53.3	98 11	09.3	13 52.2	98 10	09.1	14 21.6	98 10	09.0	14 51.1	98 10	08.9	15 20.5	98 10	08.8	16 48.8	98 10	08.5	17 18.2	98 10	08.4	4
165	12 17.4	98 10	08.8	12 46.9	98 10	08.8	13 45.9	98 10	08.6	14 15.4	98 10	08.5	14 44.9	98 10	08.4	15 14.4	98 10	08.3	16 42.9	98 09	08.0	17 12.4	98 09	07.9	165
6	12 11.3	99 09	08.3	12 40.9	99 09	08.2	13 40.0	99 09	08.0	14 09.6	99 09	07.9	14 39.1	99 09	07.8	15 08.7	99 09	07.7	16 37.4	99 09	07.5	17 06.9	99 08	07.4	6
7	12 05.6	99 09	07.7	12 35.3	99 09	07.6	13 34.5	99 08	07.4	14 04.1	99 08	07.4	14 33.8	99 08	07.3	15 03.4	99 08	07.2	16 32.2	99 08	06.9	17 01.9	99 08	06.9	7
8	12 00.4	99 08	07.1	12 30.1	99 08	07.0	13 29.4	99 08	06.9	13 59.1	99 08	06.8	14 28.8	99 08	06.7	14 58.5	99 08	06.6	16 27.5	99 07	06.4	16 57.2	99 07	06.3	8
9	11 55.5	99 07	06.5	12 25.3	99 07	06.4	13 24.7	99 07	06.3	13 54.5	99 07	06.2	14 24.2	99 07	06.2	14 53.9	99 07	06.1	16 23.1	99 07	05.9	16 52.8	99 07	05.8	9
170	11 51.1	99 07	05.9	12 20.9	99 07	05.9	13 20.5	99 06	05.7	13 50.2	99 06	05.7	14 20.0	99 06	05.6	14 49.8	99 06	05.5	16 19.1	99 06	05.3	16 48.9	99 06	05.3	170
1	11 47.1	99 06	05.3	12 16.9	99 06	05.3	13 16.6	99 06	05.2	13 46.4	99 06	05.1	14 16.2	99 06	05.0	14 46.0	99 06	05.0	16 15.5	99 05	04.8	16 45.3	99 05	04.8	1
2	11 43.5	1.0 05	04.7	12 13.4	1.0 05	04.7	13 13.1	1.0 05	04.6	13 43.0	1.0 05	04.5	14 12.8	1.0 05	04.5	14 42.7	1.0 05	04.4	16 12.2	1.0 05	04.3	16 42.1	1.0 05	04.2	2
3	11 40.4	1.0 05	04.1	12 10.3	1.0 05	04.1	13 10.0	1.0 04	04.0	13 39.9	1.0 04	04.0	14 09.8	1.0 04	03.9	14 39.7	1.0 04	03.9	16 09.4	1.0 04	03.7	16 39.3	1.0 04	03.7	3
4	11 37.6	1.0 04	03.6	12 07.5	1.0 04	03.5	13 07.4	1.0 04	03.4	13 37.3	1.0 04	03.4	14 07.2	1.0 04	03.4	14 37.1	1.0 04	03.3	16 06.9	1.0 04	03.2	16 36.8	1.0 03	03.2	4
175	11 35.3	1.0 03	03.0	12 05.2	1.0 03	02.9	13 05.1	1.0 03	02.9	13 35.1	1.0 03	02.8	14 05.0	1.0 03	02.8	14 35.0	1.0 03	02.8	16 04.8	1.0 03	02.7	16 34.7	1.0 03	02.6	175
6	11 33.4	1.0 02	02.4	12 03.3	1.0 02	02.3	13 03.3	1.0 02	02.3	13 33.2	1.0 02	02.3	14 03.2	1.0 02	02.2	14 33.2	1.0 02	02.2	16 03.1	1.0 02	02.1	16 33.0	1.0 02	02.1	6
7	11 31.9	1.0 02	01.8	12 01.9	1.0 02	01.8	13 01.8	1.0 02	01.7	13 31.8	1.0 02	01.7	14 01.8	1.0 02	01.7	14 31.8	1.0 02	01.7	16 01.7	1.0 02	01.6	16 31.7	1.0 02	01.6	7
8	11 30.8	1.0 01	01.2	12 00.8	1.0 01	01.2	13 00.8	1.0 01	01.1	13 30.8	1.0 01	01.1	14 00.8	1.0 01	01.1	14 30.8	1.0 01	01.1	16 00.8	1.0 01	01.1	16 30.8	1.0 01	01.1	8
9	11 30.2	1.0 00	00.6	12 00.2	1.0 00	00.6	13 00.2	1.0 00	00.6	13 30.2	1.0 00	00.6	14 00.2	1.0 00	00.6	14 30.2	1.0 00	00.6	16 00.2	1.0 00	00.5	16 30.2	1.0 00	00.5	9
180	11 30.0	1.0 00	00.0	12 00.0	1.0 00	00.0	13 00.0	1.0 00	00.0	13 30.0	1.0 00	00.0	14 00.0	1.0 00	00.0	14 30.0	1.0 00	00.0	16 00.0	1.0 00	00.0	16 30.0	1.0 00	00.0	180

Lat. 47°

H.A.	60° 00′ Alt.	Δd Δt	Az.	60° 30′ Alt.	Δd Δt	Az.	62° 00′ Alt.	Δd Δt	Az.	62° 30′ Alt.	Δd Δt	Az.	63° 00′ Alt.	Δd Δt	Az.	69° 00′ Alt.	Δd Δt	Az.	69° 30′ Alt.	Δd Δt	Az.	74° 30′ Alt.	Δd Δt	Az.	H.A.
°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	°
00	77 00.0	1.0 01	00.0	76 30.0	1.0 01	00.0	75 00.0	1.0 01	00.0	74 30.0	1.0 01	00.0	74 00.0	1.0 01	00.0	68 00.0	1.0 01	00.0	67 30.0	1.0 01	00.0	62 30.0	1.0 00	00.0	00
1	76 59.2	1.0 04	02.2	76 29.2	1.0 04	02.1	74 59.4	1.0 03	01.8	74 29.4	1.0 03	01.7	73 59.4	1.0 03	01.6	67 59.7	1.0 02	01.0	67 29.7	1.0 02	00.9	62 29.8	1.0 01	00.6	1
2	76 56.8	99 07	04.4	76 27.0	99 06	04.2	74 57.4	1.0 05	03.6	74 27.5	1.0 05	03.4	73 57.6	1.0 05	03.3	67 58.6	1.0 03	01.9	67 28.7	1.0 03	01.8	62 29.2	1.0 02	01.2	2
3	76 52.9	99 09	06.6	76 23.3	99 09	06.3	74 54.2	99 08	05.4	74 24.5	99 07	05.2	73 54.7	99 07	04.9	67 56.9	1.0 04	02.9	67 27.1	1.0 04	02.7	62 28.1	1.0 02	01.7	3
4	76 47.4	98 12	08.8	76 18.0	98 11	08.3	74 49.7	98 10	07.2	74 20.2	98 09	06.9	73 50.6	99 09	06.5	67 54.5	99 05	03.8	67 24.8	99 05	03.6	62 26.7	99 03	02.3	4
05	76 40.4	97 14	10.9	76 11.4	97 13	10.4	74 44.0	97 12	08.9	74 14.7	98 11	08.5	73 45.4	98 11	08.1	67 51.5	99 06	04.8	67 21.9	99 06	04.5	62 24.8	99 04	02.9	05
6	76 32.0	95 16	13.0	76 03.3	96 16	12.3	74 37.0	96 14	10.7	74 08.1	97 13	10.2	73 39.1	97 12	09.7	67 47.8	98 07	05.7	67 18.3	98 07	05.4	62 22.6	99 04	03.5	6
7	76 22.1	94 19	15.0	75 53.9	94 18	14.3	74 28.8	95 16	12.3	74 00.3	95 15	11.8	73 31.6	96 14	11.3	67 43.4	98 08	06.6	67 14.1	98 08	06.3	62 19.9	98 05	04.0	7
8	76 10.8	92 21	16.9	75 43.2	92 20	16.1	74 19.5	94 17	14.0	73 51.4	94 17	13.4	73 23.1	94 16	12.8	67 38.3	97 09	07.5	67 09.3	97 09	07.2	62 16.8	98 06	04.6	8
9	75 58.2	90 23	18.8	75 31.2	90 22	17.9	74 09.0	92 19	15.6	73 41.4	92 18	14.9	73 13.6	93 18	14.2	67 32.7	96 11	08.4	67 03.8	96 10	08.1	62 13.4	97 06	05.1	9
10	75 44.4	88 25	20.6	75 18.0	88 24	19.7	73 57.5	90 21	17.2	73 30.3	91 20	16.4	73 03.0	91 19	15.7	67 26.3	95 12	09.3	66 57.8	95 11	08.9	62 09.5	97 07	05.7	10
1	75 29.4	85 27	22.4	75 03.6	86 26	21.4	73 44.9	89 23	18.7	73 18.3	89 22	17.9	72 51.4	90 21	17.1	67 19.4	94 13	10.2	66 51.1	94 12	09.8	62 05.2	96 08	06.3	1
2	75 13.3	83 29	24.1	74 48.2	84 28	23.0	73 31.3	87 24	20.1	73 05.2	87 23	19.3	72 38.9	88 22	18.5	67 11.8	93 14	11.1	66 43.9	93 13	10.6	62 00.6	95 08	06.8	2
3	74 56.1	81 30	25.6	74 31.7	82 29	24.5	73 16.8	85 26	21.5	72 51.3	85 25	20.6	72 25.5	86 24	19.8	67 03.7	92 15	11.9	66 36.0	92 14	11.4	61 55.6	95 09	07.3	3
4	74 37.9	78 32	27.2	74 14.2	79 31	26.0	73 01.3	83 27	22.9	72 36.4	83 26	21.9	72 11.3	84 25	21.0	66 54.9	91 16	12.8	66 27.6	91 15	12.2	61 50.1	94 10	07.9	4
15	74 18.8	76 33	28.6	73 55.8	77 32	27.4	72 45.0	80 29	24.2	72 20.7	81 28	23.2	71 56.2	82 26	22.3	66 45.6	89 16	13.6	66 18.7	90 16	13.0	61 44.3	93 10	08.4	15
6	73 58.7	73 35	30.0	73 36.6	75 33	28.8	72 27.8	78 30	25.4	72 04.2	79 29	24.4	71 40.3	80 28	23.4	66 35.7	88 17	14.4	66 09.2	89 17	13.8	61 38.2	92 11	08.9	6
7	73 37.9	71 36	31.2	73 16.5	72 35	30.0	72 09.8	76 31	26.6	71 46.9	77 30	25.6	71 23.6	78 29	24.6	66 25.2	87 18	15.2	65 59.1	87 18	14.6	61 31.7	91 11	09.4	7
8	73 16.3	68 37	32.5	72 55.6	70 36	31.2	71 51.1	74 32	27.8	71 28.9	75 31	26.7	71 06.2	76 30	25.7	66 14.2	85 19	16.0	65 48.6	86 18	15.3	61 24.8	90 12	09.9	8
9	72 54.0	66 38	33.6	72 34.1	67 37	32.4	71 31.7	71 33	28.8	71 10.1	73 32	27.8	70 48.2	74 31	26.7	66 02.7	84 20	16.7	65 37.5	84 19	16.0	61 17.5	89 13	10.4	9
20	72 31.0	63 39	34.7	72 11.9	65 38	33.4	71 11.7	69 34	29.9	70 50.7	70 33	28.8	70 29.5	72 32	27.7	65 50.7	82 21	17.4	65 26.0	83 20	16.7	61 10.0	88 13	10.9	20
1	72 07.4	61 40	35.7	71 49.0	62 39	34.4	70 51.0	67 35	30.9	70 30.7	68 34	29.7	70 10.1	69 33	28.7	65 38.2	81 22	18.1	65 14.0	81 21	17.4	61 02.0	86 14	11.4	1
2	71 43.3	58 41	36.7	71 25.6	60 40	35.4	70 29.7	64 36	31.8	70 10.2	66 35	30.7	69 50.2	67 34	29.6	65 25.2	79 22	18.8	65 01.5	80 22	18.1	60 53.8	85 14	11.9	2
3	71 18.6	56 42	37.6	71 01.6	57 41	36.3	70 07.9	62 37	32.7	69 49.0	64 36	31.5	69 29.8	65 35	30.4	65 11.8	77 23	19.5	64 48.5	78 22	18.8	60 45.2	84 15	12.3	3
4	70 53.4	53 43	38.4	70 37.2	55 42	37.1	69 45.5	60 38	33.5	69 27.4	61 37	32.4	69 08.8	63 36	31.2	64 57.9	76 24	20.1	64 35.2	76 23	19.4	60 36.3	82 15	12.8	4
25	70 27.7	51 43	39.2	70 12.2	52 42	37.9	69 22.7	57 39	34.3	69 05.2	59 38	33.1	68 47.3	60 37	32.0	64 43.6	74 25	20.8	64 21.4	75 24	20.0	60 27.1	81 16	13.2	25
6	70 01.7	48 44	39.9	69 46.9	50 43	38.7	68 59.4	55 40	35.0	68 42.6	57 38	33.9	68 25.4	58 37	32.8	64 28.9	72 25	21.4	64 07.2	73 24	20.6	60 17.5	80 16	13.7	6
7	69 35.2	46 45	40.6	69 21.1	48 44	39.3	68 35.7	53 40	35.7	68 19.6	55 39	34.6	68 03.0	56 38	33.5	64 13.8	70 26	22.0	63 52.6	71 25	21.2	60 07.7	78 17	14.1	7
8	69 08.4	44 45	41.2	68 55.0	46 44	40.0	68 11.6	51 41	36.4	67 56.2	52 40	35.2	67 40.3	54 39	34.1	63 58.3	68 26	22.5	63 37.6	69 26	21.7	59 57.6	77 17	14.5	8
9	68 41.3	42 46	41.8	68 28.6	43 45	40.6	67 47.2	48 41	37.0	67 32.4	50 40	35.9	67 17.1	52 39	34.8	63 42.4	67 27	23.1	63 22.3	68 26	22.3	59 47.2	75 18	14.9	9
30	68 13.8	39 46	42.4	68 01.8	41 45	41.2	67 22.4	46 42	37.6	67 08.3	48 41	36.5	66 53.6	49 40	35.3	63 26.2	65 28	23.6	63 06.6	66 27	22.8	59 36.5	74 18	15.3	30
1	67 46.1	37 47	42.9	67 34.7	39 46	41.7	66 57.3	44 42	38.1	66 43.8	46 41	37.0	66 29.8	47 40	35.9	63 09.6	63 28	24.1	62 50.6	64 27	23.3	59 25.6	72 19	15.7	1
2	67 18.1	35 47	43.4	67 07.4	37 46	42.2	66 31.8	42 43	38.7	66 19.0	44 42	37.5	66 05.7	45 41	36.4	62 52.7	61 29	24.6	62 34.3	62 28	23.8	59 14.4	71 19	16.1	2
3	66 49.9	33 47	43.8	66 39.8	35 46	42.6	66 06.2	40 43	39.1	65 53.9	42 42	38.0	65 41.2	43 41	36.9	62 35.5	59 29	25.1	62 17.7	60 28	24.2	59 02.9	69 20	16.4	3
4	66 21.5	31 48	44.2	66 12.0	33 47	43.0	65 40.2	38 44	39.6	65 28.6	39 43	38.5	65 16.5	41 42	37.4	62 18.0	57 30	25.5	62 00.7	58 29	24.7	58 51.2	68 20	16.8	4
35	65 52.9	29 48	44.6	65 43.9	31 47	43.4	65 14.0	36 44	40.0	65 03.0	37 43	38.9	64 51.6	39 42	37.8	62 00.3	55 30	26.0	61 43.5	56 29	25.1	58 39.3	66 20	17.1	35
6	65 24.1	27 48	44.9	65 15.7	29 47	43.8	64 47.6	34 44	40.4	64 37.2	35 43	39.3	64 26.4	37 42	38.2	61 42.2	53 31	26.4	61 26.0	55 30	25.5	58 27.1	64 21	17.5	6
7	64 55.1	25 49	45.2	64 47.3	27 48	44.1	64 21.0	32 45	40.7	64 11.2	33 44	39.7	64 00.9	35 43	38.6	61 23.9	51 31	26.8	61 08.3	53 30	25.9	58 14.7	63 21	17.8	7
8	64 26.0	23 49	45.5	64 18.8	25 48	44.4	63 54.2	30 45	41.1	63 45.0	31 44	40.0	63 35.3	33 43	38.9	61 05.3	50 31	27.2	60 50.3	51 30	26.3	58 02.1	61 21	18.1	8
9	63 56.7	21 49	45.8	63 50.1	23 48	44.6	63 27.2	28 45	41.4	63 18.6	29 44	40.3	63 09.5	31 43	39.3	60 46.6	48 32	27.5	60 32.1	49 31	26.6	57 49.3	59 22	18.4	9
40	63 27.4	19 49	46.0	63 21.3	21 48	44.9	63 00.1	26 45	41.7	62 52.1	28 44	40.6	62 43.6	29 44	39.6	60 27.5	46 32	27.9	60 13.6	47 31	27.0	57 36.3	57 22	18.7	40
1	62 57.9	18 49	46.2	62 52.3	19 48	45.1	62 32.8	24 46	41.9	62 25.4	26 45	40.9	62 17.4	27 44	39.8	60 08.3	44 32	28.2	59 55.0	45 31	27.3	57 23.1	56 22	19.0	1
2	62 28.3	16 49	46.4	62 23.3	17 49	45.3	62 05.4	22 46	42.2	61 58.5	24 45	41.1	61 51.1	25 44	40.1	59 48.9	42 33	28.5	59 36.1	43 32	27.6	57 09.7	54 23	19.3	2
3	61 58.6	14 50	46.5	61 54.2	16 49	45.5	61 37.9	20 46	42.4	61 31.5	22 45	41.3	61 24.7	23 44	40.3	59 29.3	40 33	28.8	59 17.1	41 32	27.9	56 56.1	52 23	19.5	3
4	61 28.9	12 50	46.7	61 25.0	14 49	45.6	61 10.3	19 46	42.6	61 04.5	20 45	41.5	60 58.2	22 44	40.5	59 09.5	38 33	29.1	58 57.9	39 32	28.2	56 42.3	51 23	19.8	4
45	60 59.1	11 50	46.8	60 55.7	12 49	45.8	60 42.6	17 46	42.7	60 37.3	18 45	41.7	60 31.5	20 45	40.7	58 49.6	36 34	29.3	58 38.5	38 33	28.4	56 28.4	49 23	20.0	45
6	60 29.3	09 50	46.9	60 26.3	11 49	45.9	60 14.7	15 46	42.9	60 10.0	17 46	41.9	60 04.8	18 45	40.9	58 29.4	34 34	29.6	58 18.9	36 33	28.7	56 14.3	47 24	20.2	6
7	59 59.4	07 50	47.0	59 56.9	09 49	46.0	59 46.9	13 47	43.0	59 42.6	15 46	42.0	59 38.0	16 45	41.1	58 09.2	33 34	29.8	57 59.2	34 33	28.9	56 00.1	45 24	20.5	7
8	59 29.4	06 50	47.0	59 27.5	07 49	46.1	59 18.9	12 47	43.1	59 15.2	13 46	42.2	59 11.0	15 45	41.2	57 48.8	31 34	30.0	57 39.4	32 33	29.1	55 45.7	43 24	20.7	8
9	58 59.5	04 50	47.1	58 58.0	06 49	46.1	58 50.9	10 47	43.2	58 47.7	11 46	42.3	58 44.1	13 45	41.3	57 28.3	29 34	30.2	57 19.4	30 34	29.3	55 31.2	42 24	20.9	9
50	58 29.5	03 50	47.1	58 28.5	04 49	46.2	58 22.9	08 47	43.3	58 20.2	10 46	42.4	58 17.0	11 45	41.4	57 07.6	27 35	30.4	56 59.3	28 34	29.5	55 16.6	40 25	21.1	50
1	57 59.5	01 50	47.1	57 58.9	03 49	46.2	57 54.8	07 47	43.4	57 52.6	08 46	42.4	57 49.9	09 45	41.5	56 46.9	25 35	30.6	56 39.1	27 34	29.7	55 01.8	38 25	21.2	1
2	57 29.5	00 50	47.1	57 29.4	01 49	46.2	57 26.7	05 47	43.4	57 24.9	06 46	42.5	57 22.8	08 45	41.6	56 26.0	23 35	30.7	56 18.8	25 34	29.8	54 46.9	36 25	21.4	2
3	56 59.5	02 50	47.1	56 59.8	01 49	46.2	56 58.5	03 47	43.5	56 57.3	05 46	42.6	56 55.6	06 45	41.6	56 05.1	22 35	30.9	55 58.4	23 34	30.0	54 31.9	34 25	21.6	3
4	56 29.5	03 50	47.1	56 30.3	-02 49	46.2	56 30.4	02 47	43.5	56 29.6	03 46	42.6	56 28.4	05 45	41.7	55 44.1	20 35	31.0	55 37.9	21 34	30.1	54 16.8	33 25	21.7	4
55	55 59.5	05 50	47.1	56 00.8	04 49	46.2	56 02.2	00 47	43.5	56 01.9	02 46	42.6	56 01.2	03 45	41.7	55 23.0	18 35	31.1	55 17.3	19 34	30.2	54 01.6	31 26	21.9	55
6	55 29.6	06 50	47.0	55 31.3	05 49	46.1	55 34.0	01 47	43.5	55 34.2	00 46	42.6	55 34.0	01 45	41.7	55 01.8	16 35	31.2	54 56.7	18 35	30.4	53 46.3	29 26	22.0	6
7	54 59.6	08 50	47.0	55 01.8	06 49	46.1	55 05.9	03 47	43.5	55 06.5	01 46	42.6	55 06.7	00 45	41.7	54 40.5	15 36	31.3	54 36.0	16 35	30.5	53 30.9	27 26	22.1	7
8	54 29.7	09 50	46.9	54 32.3	08 49	46.0	54 37.7	04 47	43.5	54 38.8	03 46	42.6	54 39.5	02 45	41.7	54 19.2	13 36	31.4	54 15.2	14 35	30.6	53 15.5	26 26	22.3	8
9	53 59.9	10 50	46.8	54 02.9	09 49	46.0	54 09.6	06 47	43.4	54 11.1	04 46	42.6	54 12.3	03 45	41.7	53 57.9	11 36	31.5	53 54.4	12 35	30.6	52 59.9	24 26	22.4	9
60	53 30.1	12 50	46.7	53 33.5	11 49	45.9	53 41.5	07 47	43.4	53 43.4	06 46	42.5	53 45.0	05 45	41.7	53 36.5	09 36	31.5	53 33.5	11 35	30.7	52 44.3	22 26	22.5	60
1	53 00.3	13 50	46.6	53 04.1	12 49	45.8	53 13.4	09 47	43.3	53 15.8	07 46	42.5	53 17.8	06 45	41.6	53 15.1	08 36	31.6	53 12.6	09 35	30.8	52 28.6	20 26	22.6	1
2	52 30.6	15 49	46.5	52 34.8	13 49	45.7	52 45.3	10 47	43.2	52 48.2	09 46	42.4	52 50.7	08 45	41.6	52 53.6	06 36	31.6	52 51.6	07 35	30.8	52 12.9	18 26	22.7	2
3	52 01.0	16 49	46.4	52 05.5	15 49	45.6	52 17.3	11 47	43.1	52 20.6	10 46	42.3	52 23.5	09 45	41.5	52 32.2	04 36	31.7	52 30.7	06 35	30.8	51 57.1	17 26	22.7	3
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65	51 01.8	18 49	46.1	51 07.2	17 48	45.3	51 21.5	14 46	43.0	51 25.6	13 46	42.2	51 29.4	12 45	41.4	51 49.2	01 36	31.7	51 48.7	02 35	30.9	51 25.4	13 27	22.9	65
6	50 32.4	20 49	45.9	50 38.2	19 48	45.2	50 53.6	16 46	42.8	50 58.1	15 46	42.1	51 02.3	13 45	41.3	51 27.7	00 36	31.7	51 27.7	01 35	30.9	51 09.5	11 27	22.9	6
7	50 03.0	21 49	45.8	50 09.2	20 48	45.0	50 25.8	17 46	42.7	50 30.8	16 46	41.9	50 35.4	15 45	41.2	51 06.2	02 36	31.7	51 06.6	01 35	30.9	50 53.6	10 27	23.0	7
8	49 33.7	22 49	45.6	49 40.3	21 48	44.9	49 58.1	18 46	42.6	50 03.4	17 45	41.8	50 08.5	16 45	41.1	50 44.7	04 36	31.7	50 45.6	03 35	30.9	50 37.6	08 27	23.0	8
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70	48 35.4	25 48	45.3	48 42.7	24 48	44.5	49 02.9	21 46	42.3	49 09.0	20 45	41.6	49 14.9	19 44	40.8	50 01.7	07 36	31.6	50 03.7	06 35	30.8	50 05.6	05 27	23.0	70
1	48 06.4	26 48	45.1	48 14.1	25 48	44.3	48 35.4	22 46	42.2	48 41.9	21 45	41.4	48 48.1	20 44	40.7	49 40.3	08 36	31.6	49 42.7	07 35	30.8	49 49.6	03 27	23.1	1
2	47 37.5	27 48	44.9	47 45.5	26 47	44.2	48 07.9	24 46	42.0	48 14.9	23 45	41.3	48 21.5	22 44	40.5	49 18.9	10 36	31.5	49 21.7	09 35	30.8	49 33.5	01 27	23.1	2
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4	46 39.9	30 48	44.5	46 48.7	29 47	43.8	47 13.4	26 45	41.6	47 21.1	25 45	40.9	47 28.5	24 44	40.2	48 36.2	13 36	31.4	48 40.0	12 35	30.6	49 01.5	02 27	23.1	4
75	46 11.3	31 48	44.2	46 20.4	30 47	43.5	46 46.2	27 45	41.5	46 54.3	26 44	40.8	47 02.1	26 44	40.0	48 14.9	15 35	31.3	48 19.1	14 35	30.6	48 45.4	04 27	23.1	75
6	45 42.9	32 47	44.0	45 52.3	31 47	43.3	46 19.2	29 45	41.3	46 27.6	28 44	40.6	46 35.9	27 44	39.9	47 53.6	16 35	31.2	47 58.3	15 35	30.5	48 29.4	05 27	23.0	6
7	45 14.5	33 47	43.8	45 24.3	32 46	43.1	45 52.2	30 45	41.1	46 01.1	29 44	40.4	46 09.7	28 43	39.7	47 32.4	18 35	31.1	47 37.6	17 34	30.4	48 13.4	07 27	23.0	7
8	44 46.2	34 47	43.5	44 56.4	33 46	42.9	45 25.4	31 45	40.9	45 34.6	30 44	40.2	45 43.6	29 43	39.5	47 11.3	19 35	31.1	47 16.9	18 34	30.3	47 57.4	09 27	23.0	8
9	44 18.1	35 47	43.3	44 28.6	35 46	42.6	44 58.7	32 44	40.7	45 08.3	32 44	40.0	45 17.6	31 43	39.3	46 50.2	21 35	30.9	46 56.3	20 34	30.2	47 41.5	10 27	22.9	9
80	43 50.1	36 46	43.0	44 00.9	36 46	42.4	44 32.1	33 44	40.4	44 42.0	33 44	39.8	44 51.7	32 43	39.1	46 29.2	22 35	30.8	46 35.7	21 34	30.1	47 25.6	12 26	22.9	80
1	43 22.2	38 46	42.8	43 33.4	37 46	42.2	44 05.6	35 44	40.2	44 15.9	34 43	39.6	44 26.0	33 43	38.9	46 08.3	23 35	30.7	46 15.2	23 34	30.0	47 09.7	14 26	22.8	1
2	42 54.5	39 46	42.5	43 06.0	38 45	41.9	43 39.3	36 44	40.0	43 49.9	35 43	39.3	44 00.4	34 43	38.7	45 47.4	25 35	30.6	45 54.8	24 34	29.9	46 53.8	15 26	22.8	2
3	42 26.9	40 46	42.3	42 38.8	39 45	41.6	43 13.0	37 44	39.7	43 24.0	36 43	39.1	43 34.8	36 42	38.5	45 26.6	26 34	30.5	45 34.4	25 34	29.8	46 38.0	17 26	22.7	3
4	41 59.5	41 46	42.0	42 11.6	40 45	41.4	42 46.9	38 43	39.5	42 58.3	38 43	38.9	43 09.4	37 42	38.2	45 05.9	28 34	30.3	45 14.1	27 34	29.6	46 22.2	18 26	22.7	4
85	41 32.2	42 45	41.7	41 44.7	41 45	41.1	42 21.0	39 43	39.3	42 32.7	39 42	38.6	42 44.2	38 42	38.0	44 45.3	29 34	30.2	44 53.9	28 34	29.5	46 06.4	20 26	22.6	85
6	41 05.0	43 45	41.4	41 17.8	42 44	40.8	41 55.2	40 43	39.0	42 07.2	40 42	38.4	42 19.1	39 42	37.8	44 24.8	30 34	30.0	44 33.8	30 33	29.4	45 50.8	21 26	22.5	6
7	40 38.0	44 45	41.1	40 51.2	43 44	40.6	41 29.5	42 43	38.7	41 41.9	41 42	38.1	41 54.1	40 41	37.5	44 04.4	32 34	29.9	44 13.8	31 33	29.2	45 35.1	23 26	22.4	7
8	40 11.2	45 44	40.9	40 24.6	45 44	40.3	41 03.9	43 42	38.5	41 16.7	42 42	37.9	41 29.2	41 41	37.3	43 44.0	33 34	29.7	43 53.9	32 33	29.1	45 19.5	25 26	22.3	8
9	39 44.5	46 44	40.6	39 58.3	46 44	40.0	40 38.5	44 42	38.2	40 51.6	43 42	37.6	41 04.5	43 41	37.0	43 23.8	35 34	29.5	43 34.0	34 33	28.9	45 04.0	26 26	22.2	9
90	39 18.0	47 44	40.2	39 32.0	47 43	39.7	40 13.3	45 42	37.9	40 26.7	44 41	37.4	40 39.9	44 41	36.8	43 03.7	36 33	29.4	43 14.3	35 33	28.7	44 48.6	28 26	22.1	90

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H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	38 51.6	48 44	39.9	39 06.0	48 43	39.4	39 48.2	46 42	37.7	40 02.0	45 41	37.1	40 15.5	45 40	36.5	42 43.6	37 33	29.2	42 54.7	36 32	28.6	44 33.2	29 26	22.0	91
2	38 25.4	49 43	39.6	38 40.1	49 43	39.1	39 23.3	47 41	37.4	39 37.4	47 41	36.8	39 51.2	46 40	36.2	42 23.7	39 33	29.0	42 35.2	38 32	28.4	44 17.9	31 25	21.9	2
3	37 59.4	50 43	39.3	38 14.4	50 43	38.8	38 58.5	48 41	37.1	39 12.9	48 40	36.5	39 27.1	47 40	36.0	42 04.0	40 33	28.8	42 15.8	39 32	28.2	44 02.7	32 25	21.8	3
4	37 33.6	51 43	39.0	37 48.9	51 42	38.4	38 33.9	49 41	36.8	38 48.7	49 40	36.2	39 03.2	48 40	35.7	41 44.3	41 33	28.6	41 56.5	40 32	28.0	43 47.5	33 25	21.7	4
95	37 07.9	52 42	38.7	37 23.5	52 42	38.1	38 09.5	50 40	36.5	38 24.5	50 40	35.9	38 39.4	49 39	35.4	41 24.8	42 32	28.4	41 37.4	42 32	27.8	43 32.4	35 25	21.5	95
6	36 42.4	53 42	38.3	36 58.4	53 42	37.8	37 45.3	51 40	36.2	38 00.6	51 40	35.7	38 15.8	50 39	35.1	41 05.3	44 32	28.2	41 18.3	43 32	27.6	43 17.5	36 25	21.4	6
7	36 17.1	54 42	38.0	36 33.4	54 41	37.5	37 21.2	52 40	35.9	37 36.8	52 39	35.4	37 52.4	51 39	34.8	40 46.1	45 32	28.0	40 59.4	44 31	27.4	43 02.6	38 25	21.3	7
8	35 52.0	55 42	37.7	36 08.6	55 41	37.1	36 57.3	53 40	35.6	37 13.3	53 39	35.0	37 29.1	52 38	34.5	40 26.9	46 32	27.8	40 40.6	46 31	27.2	42 47.8	39 24	21.1	8
9	35 27.1	56 41	37.3	35 44.0	56 41	36.8	36 33.6	54 39	35.3	36 49.9	54 39	34.7	37 06.0	54 38	34.2	40 07.9	47 31	27.6	40 22.0	47 31	27.0	42 33.0	40 24	21.0	9
100	35 02.4	57 41	37.0	35 19.5	57 40	36.5	36 10.1	55 39	34.9	36 26.6	55 38	34.4	36 43.1	55 38	33.9	39 49.0	49 31	27.4	40 03.5	48 31	26.8	42 18.4	42 24	20.8	100
1	34 37.9	58 41	36.6	34 55.3	58 40	36.1	35 46.7	56 39	34.6	36 03.6	56 38	34.1	36 20.3	56 38	33.6	39 30.3	50 31	27.1	39 45.1	49 30	26.6	42 03.9	43 24	20.7	1
2	34 13.6	59 40	36.3	34 31.3	59 40	35.8	35 23.6	57 38	34.3	35 40.7	57 38	33.8	35 57.8	57 37	33.3	39 11.7	51 31	26.9	39 26.9	50 30	26.3	41 49.5	45 24	20.5	2
3	33 49.5	60 40	35.9	34 07.5	60 39	35.4	35 00.6	58 38	34.0	35 18.1	58 37	33.5	35 35.4	58 37	33.0	38 53.3	52 30	26.7	39 08.8	52 30	26.1	41 35.2	46 24	20.4	3
4	33 25.6	61 39	35.5	33 43.9	61 39	35.1	34 37.9	59 38	33.6	34 55.6	59 37	33.1	35 13.3	59 37	32.6	38 35.0	53 30	26.4	38 50.9	53 30	25.9	41 21.0	47 23	20.2	4
105	33 01.9	62 39	35.2	33 20.4	61 39	34.7	34 15.3	60 37	33.3	34 33.4	60 37	32.8	34 51.3	60 36	32.3	38 16.9	54 30	26.2	38 33.1	54 29	25.6	41 06.9	49 23	20.0	105
6	32 38.5	63 39	34.8	32 57.3	62 38	34.3	33 53.0	61 37	32.9	34 11.3	61 36	32.5	34 29.5	61 36	32.0	37 58.9	56 30	25.9	38 15.5	55 29	25.4	40 53.0	50 23	19.9	6
7	32 15.2	64 38	34.4	32 34.3	63 38	34.0	33 30.8	62 37	32.6	33 49.5	62 36	32.1	34 08.0	62 36	31.6	37 41.1	57 29	25.7	37 58.0	56 29	25.1	40 39.1	51 23	19.7	7
8	31 52.2	65 38	34.1	32 11.5	64 38	33.6	33 08.9	63 36	32.2	33 27.8	63 36	31.8	33 46.6	63 35	31.3	37 23.5	58 29	25.4	37 40.7	57 29	24.9	40 25.4	52 23	19.5	8
9	31 29.4	65 38	33.7	31 49.0	65 37	33.2	32 47.2	64 36	31.9	33 06.4	64 35	31.4	33 25.5	63 35	31.0	37 06.0	59 29	25.1	37 23.6	58 28	24.6	40 11.8	54 22	19.3	9
110	31 06.8	66 37	33.3	31 26.7	66 37	32.8	32 25.7	65 35	31.5	32 45.2	65 35	31.1	33 04.5	64 35	30.6	36 48.7	60 29	24.9	37 06.6	60 28	24.4	39 58.3	55 22	19.1	110
1	30 44.5	67 37	32.9	31 04.6	67 36	32.5	32 04.4	66 35	31.1	32 24.2	66 35	30.7	32 43.8	65 34	30.3	36 31.6	61 28	24.6	36 49.8	61 28	24.1	39 45.0	56 22	18.9	1
2	30 22.4	68 36	32.5	30 42.8	68 36	32.1	31 43.4	67 35	30.8	32 03.4	67 34	30.3	32 23.3	66 34	29.9	36 14.6	62 28	24.3	36 33.2	62 27	23.8	39 31.8	57 22	18.7	2
3	30 00.5	69 36	32.1	30 21.1	69 36	31.7	31 22.5	68 34	30.4	31 42.8	67 34	30.0	32 03.0	67 33	29.5	35 57.9	63 28	24.1	36 16.7	63 27	23.6	39 18.7	58 22	18.5	3
4	29 38.9	70 36	31.7	29 59.8	69 35	31.3	31 01.9	69 34	30.0	31 22.5	68 34	29.6	31 43.0	68 33	29.2	35 41.3	64 27	23.8	36 00.5	64 27	23.3	39 05.8	60 21	18.3	4
115	29 17.5	71 35	31.3	29 38.6	70 35	30.9	30 41.6	70 34	29.7	31 02.4	69 33	29.2	31 23.1	69 33	28.8	35 24.9	65 27	23.5	35 44.4	65 26	23.0	38 53.0	61 21	18.1	115
6	28 56.4	71 35	30.9	29 17.7	71 34	30.5	30 21.4	70 33	29.3	30 42.5	70 33	28.9	31 03.5	70 32	28.4	35 08.7	66 27	23.2	35 28.5	66 26	22.7	38 40.3	62 21	17.9	6
7	28 35.5	72 34	30.5	28 57.1	72 34	30.1	30 01.5	71 33	28.9	30 22.9	71 32	28.5	30 44.1	71 32	28.1	34 52.6	67 26	22.9	35 12.7	67 26	22.5	38 27.8	63 21	17.7	7
8	28 14.9	73 34	30.1	28 36.7	73 34	29.7	29 41.9	72 32	28.5	30 03.5	72 32	28.1	30 25.0	72 32	27.7	34 36.8	68 26	22.6	34 57.2	68 26	22.2	38 15.4	64 20	17.5	8
9	27 54.5	74 34	29.7	28 16.6	74 33	29.3	29 22.5	73 32	28.1	29 44.3	73 32	27.7	30 06.1	72 31	27.3	34 21.2	69 26	22.3	34 41.9	69 25	21.9	38 03.2	65 20	17.3	9
120	27 34.4	75 33	29.2	27 56.7	74 33	28.9	29 03.3	74 32	27.7	29 25.4	73 31	27.3	29 47.4	73 31	26.9	34 05.7	70 25	22.0	34 26.7	70 25	21.6	37 51.1	66 20	17.0	120
1	27 14.5	75 33	28.8	27 37.1	75 32	28.4	28 44.4	75 31	27.3	29 06.8	74 31	26.9	29 29.0	74 30	26.6	33 50.5	71 25	21.7	34 11.8	71 25	21.3	37 39.2	67 20	16.8	1
2	26 54.9	76 32	28.4	27 17.7	76 32	28.0	28 25.8	75 31	26.9	28 48.3	75 30	26.5	29 10.8	75 30	26.2	33 35.5	72 25	21.4	33 57.0	72 24	21.0	37 27.5	68 19	16.6	2
3	26 35.6	77 32	28.0	26 58.6	77 31	27.6	28 07.4	76 30	26.5	28 30.2	76 30	26.1	28 52.9	76 29	25.8	33 20.6	73 24	21.1	33 42.5	73 24	20.7	37 15.8	70 19	16.4	3
4	26 16.5	78 31	27.5	26 39.8	77 31	27.2	27 49.2	77 30	26.1	28 12.3	77 29	25.7	28 35.3	77 29	25.4	33 06.0	74 24	20.8	33 28.1	74 24	20.4	37 04.4	71 19	16.1	4
125	25 57.7	78 31	27.1	26 21.2	78 30	26.8	27 31.4	78 29	25.7	27 54.6	77 29	25.3	28 17.8	77 29	25.0	32 51.6	75 24	20.5	33 14.0	74 23	20.1	36 53.1	72 19	15.9	125
6	25 39.2	79 30	26.7	26 02.9	79 30	26.3	27 13.8	78 29	25.3	27 37.2	78 29	24.9	28 00.7	78 28	24.6	32 37.4	76 23	20.1	33 00.1	75 23	19.7	36 42.0	73 18	15.6	6
7	25 21.0	80 30	26.2	25 44.9	80 30	25.9	26 56.4	79 28	24.9	27 20.1	79 28	24.5	27 43.8	79 28	24.2	32 23.4	76 23	19.8	32 46.3	76 22	19.4	36 31.1	74 18	15.4	7
8	25 03.1	81 29	25.8	25 27.2	80 29	25.5	26 39.3	80 28	24.5	27 03.3	80 28	24.1	27 27.2	80 27	23.8	32 09.7	77 23	19.5	32 32.8	77 22	19.1	36 20.3	74 18	15.2	8
9	24 45.4	81 29	25.3	25 09.8	81 29	25.0	26 22.5	81 28	24.0	26 46.7	80 27	23.7	27 10.8	80 27	23.4	31 56.1	78 22	19.2	32 19.5	78 22	18.8	36 09.7	75 17	14.9	9
130	24 28.1	82 28	24.9	24 52.6	82 28	24.6	26 06.0	81 27	23.6	26 30.4	81 27	23.3	26 54.7	81 26	23.0	31 42.8	79 22	18.8	32 06.5	79 21	18.5	35 59.2	76 17	14.7	130
1	24 11.0	83 28	24.4	24 35.7	82 28	24.1	25 49.8	82 27	23.2	26 14.3	82 26	22.9	26 38.9	82 26	22.5	31 29.7	80 21	18.5	31 53.6	80 21	18.1	35 49.0	77 17	14.4	1
2	23 54.2	83 27	24.0	24 19.2	83 27	23.7	25 33.8	83 26	22.8	25 58.6	83 26	22.4	26 23.3	82 25	22.1	31 16.9	81 21	18.2	31 41.0	80 21	17.8	35 38.9	78 17	14.1	2
3	23 37.7	84 27	23.5	24 02.9	84 27	23.2	25 18.1	83 26	22.3	25 43.1	83 25	22.0	26 08.1	83 25	21.7	31 04.2	81 21	17.8	31 28.6	81 20	17.5	35 29.0	79 16	13.9	3
4	23 21.5	85 26	23.1	23 46.9	84 26	22.8	25 02.7	84 25	21.9	25 27.9	84 25	21.6	25 53.1	84 25	21.3	30 51.8	82 20	17.5	31 16.4	82 20	17.1	35 19.2	80 16	13.6	4
135	23 05.7	85 26	22.6	23 31.2	85 26	22.3	24 47.6	85 25	21.4	25 13.0	85 24	21.2	25 38.4	84 24	20.9	30 39.7	83 20	17.1	31 04.5	83 20	16.8	35 09.7	81 16	13.4	135
6	22 50.1	86 25	22.1	23 15.8	86 25	21.9	24 32.8	85 24	21.0	24 58.4	85 24	20.7	25 23.9	85 24	20.4	30 27.7	84 20	16.8	30 52.8	83 19	16.5	35 00.3	82 15	13.1	6
7	22 34.8	86 25	21.7	23 00.7	86 25	21.4	24 18.3	86 24	20.6	24 44.0	86 23	20.3	25 09.8	86 23	20.0	30 16.0	84 19	16.4	30 41.3	84 19	16.1	34 51.1	82 15	12.8	7
8	22 19.9	87 24	21.2	22 46.0	87 24	20.9	24 04.0	87 23	20.1	24 30.0	87 23	19.8	24 55.9	86 23	19.6	30 04.6	85 19	16.1	30 30.0	85 18	15.8	34 42.1	83 15	12.6	8
9	22 05.2	88 24	20.7	22 31.5	87 24	20.5	23 50.1	87 23	19.7	24 16.3	87 22	19.4	24 42.4	87 22	19.1	29 53.3	86 18	15.7	30 19.0	86 18	15.4	34 33.3	84 14	12.3	9
140	21 50.9	88 23	20.3	22 17.3	88 23	20.0	23 36.5	88 22	19.2	24 02.8	88 22	19.0	24 29.1	88 22	18.7	29 42.4	86 18	15.4	30 08.2	86 18	15.1	34 24.7	85 14	12.0	140
1	21 36.9	89 23	19.8	22 03.5	89 23	19.5	23 23.2	88 22	18.8	23 49.7	88 21	18.5	24 16.1	88 21	18.3	29 31.6	87 17	15.0	29 57.7	87 17	14.7	34 16.3	85 14	11.7	1
2	21 23.2	89 22	19.3	21 50.0	89 22	19.1	23 10.1	89 21	18.3	23 36.8	89 21	18.1	24 03.5	89 21	17.8	29 21.2	88 17	14.7	29 47.4	88 17	14.4	34 08.1	86 13	11.5	2
3	21 09.8	90 22	18.8	21 36.8	90 21	18.6	22 57.4	90 21	17.9	23 24.3	89 20	17.6	23 51.1	89 20	17.4	29 10.9	88 17	14.3	29 37.4	88 16	14.0	34 00.0	87 13	11.2	3
4	20 56.8	90 21	18.3	21 23.9	90 21	18.1	22 45.0	90 20	17.4	23 12.0	90 20	17.2	23 39.0	90 20	16.9	29 00.9	89 16	13.9	29 27.6	89 16	13.7	33 52.2	88 13	10.9	4
145	20 44.1	91 21	17.9	21 11.3	91 20	17.6	22 32.9	91 20	17.0	23 00.1	91 19	16.7	23 27.2	90 19	16.5	28 51.2	89 16	13.6	29 18.0	89 16	13.3	33 44.5	88 12	10.6	145
6	20 31.7	91 20	17.4	20 59.1	91 20	17.2	22 21.2	91 19	16.5	22 48.5	91 19	16.3	23 15.8	91 19	16.0	28 41.7	90 15	13.2	29 08.7	90 15	13.0	33 37.1	89 12	10.3	6
7	20 19.6	92 20	16.9	20 47.2	92 19	16.7	22 09.7	92 19	16.0	22 37.2	92 18	15.8	23 04.6	91 18	15.6	28 32.5	91 15	12.8	28 59.7	91 15	12.6	33 29.9	90 12	10.1	7
8	20 07.9	92 19	16.4	20 35.6	92 19	16.2	21 58.6	92 18	15.6	22 26.2	92 18	15.4	22 53.8	92 18	15.1	28 23.5	91 14	12.5	28 50.9	91 14	12.2	33 22.8	90 11	09.8	8
9	19 56.6	93 18	15.9	20 24.4	93 18	15.7	21 47.7	93 18	15.1	22 15.5	93 17	14.9	22 43.3	92 17	14.7	28 14.8	92 14	12.1	28 42.3	92 14	11.9	33 16.0	91 11	09.5	9
150	19 45.5	93 18	15.4	20 13.5	93 18	15.2	21 37.3	93 17	14.6	22 05.2	93 17	14.4	22 33.0	93 16	14.2	28 06.4	92 14	11.7	28 34.1	92 13	11.5	33 09.3	91 11	09.2	150
1	19 34.8	94 17	14.9	20 02.9	94 17	14.7	21 27.1	93 16	14.2	21 55.1	93 16	14.0	22 23.1	93 16	13.8	27 58.2	93 13	11.3	28 26.0	93 13	11.1	33 02.9	92 10	08.9	1
2	19 24.5	94 17	14.4	19 52.7	94 16	14.2	21 17.2	94 16	13.7	21 45.4	94 16	13.5	22 13.6	94 15	13.3	27 50.3	93 13	11.0	28 18.3	93 13	10.8	32 56.7	92 10	08.6	2
3	19 14.4	94 16	13.9	19 42.8	94 16	13.7	21 07.7	94 15	13.2	21 36.0	94 15	13.0	22 04.3	94 15	12.9	27 42.7	94 12	10.6	28 10.7	94 12	10.4	32 50.7	93 10	08.3	3
4	19 04.8	95 16	13.4	19 33.2	95 15	13.2	20 58.5	95 15	12.7	21 27.0	95 15	12.6	21 55.4	95 14	12.4	27 35.3	94 12	10.2	28 03.5	94 12	10.0	32 44.9	93 09	08.0	4
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6	18 46.5	96 14	12.4	19 15.2	96 14	12.2	20 41.2	96 14	11.8	21 09.8	95 13	11.6	21 38.5	96 13	11.5	27 21.3	95 11	09.4	27 49.8	95 11	09.3	32 33.9	94 09	07.4	6
7	18 37.9	96 14	11.9	19 06.7	96 14	11.7	20 33.0	96 13	11.3	21 01.7	96 13	11.1	21 30.5	96 13	11.0	27 14.7	95 11	09.1	27 43.3	95 10	08.9	32 28.7	95 08	07.1	7
8	18 29.6	96 13	11.4	18 58.5	96 13	11.2	20 25.1	96 12	10.8	20 54.0	96 12	10.7	21 22.9	96 12	10.5	27 08.4	96 10	08.7	27 37.1	96 10	08.5	32 23.8	95 08	06.8	8
9	18 21.7	97 13	10.9	18 50.7	97 12	10.7	20 17.6	97 12	10.3	20 46.6	97 12	10.2	21 15.5	97 12	10.1	27 02.4	96 10	08.3	27 31.2	96 09	08.1	32 19.0	96 08	06.5	9
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1	18 07.0	97 11	09.9	18 36.2	97 11	09.7	20 03.6	97 11	09.4	20 32.8	97 11	09.2	21 01.9	97 11	09.1	26 51.1	97 09	07.5	27 20.2	97 09	07.4	32 10.2	97 07	05.9	1
2	18 00.2	98 11	09.4	18 29.4	98 11	09.2	19 57.1	97 10	08.9	20 26.4	97 10	08.8	20 55.6	97 10	08.6	26 45.9	97 08	07.1	27 15.1	97 08	07.0	32 06.1	97 06	05.6	2
3	17 53.7	98 10	08.8	18 23.0	98 10	08.7	19 51.0	98 10	08.4	20 20.3	98 10	08.3	20 49.6	98 09	08.2	26 41.0	97 08	06.7	27 10.2	97 08	06.6	32 02.2	97 06	05.3	3
4	17 47.6	98 10	08.3	18 17.0	98 09	08.2	19 45.2	98 09	07.9	20 14.6	98 09	07.8	20 44.0	98 09	07.7	26 36.3	98 07	06.3	27 05.6	98 07	06.2	31 58.5	98 06	05.0	4
165	17 41.8	98 09	07.8	18 11.3	98 09	07.7	19 39.7	98 09	07.4	20 09.2	98 08	07.3	20 38.7	98 08	07.2	26 31.9	98 07	06.0	27 01.3	98 07	05.8	31 55.1	98 05	04.7	165
6	17 36.5	98 08	07.3	18 06.0	98 08	07.2	19 34.6	98 08	06.9	20 04.2	98 08	06.8	20 33.7	98 08	06.7	26 27.8	98 06	05.6	26 57.3	98 06	05.5	31 51.9	98 05	04.4	6
7	17 31.5	99 08	06.8	18 01.1	99 08	06.7	19 29.9	99 07	06.4	19 59.5	99 07	06.3	20 29.1	99 07	06.3	26 24.0	99 06	05.2	26 53.6	99 06	05.1	31 48.9	98 05	04.1	7
8	17 26.8	99 07	06.3	17 56.5	99 07	06.2	19 25.5	99 07	05.9	19 55.1	99 07	05.9	20 24.8	99 07	05.8	26 20.5	99 05	04.8	26 50.1	99 05	04.7	31 46.1	99 04	03.7	8
9	17 22.5	99 07	05.7	17 52.3	99 06	05.7	19 21.4	99 06	05.4	19 51.1	99 06	05.4	20 20.8	99 06	05.3	26 17.2	99 05	04.4	26 46.9	99 05	04.3	31 43.5	99 04	03.4	9
170	17 18.6	99 06	05.2	17 48.4	99 06	05.2	19 17.7	99 06	05.0	19 47.5	99 06	04.9	20 17.2	99 05	04.8	26 14.2	99 04	04.0	26 44.0	99 04	03.9	31 41.2	99 04	03.1	170
1	17 15.1	99 05	04.7	17 44.9	99 05	04.6	19 14.3	99 05	04.5	19 44.1	99 05	04.4	20 14.0	99 05	04.3	26 11.5	99 04	03.6	26 41.3	99 04	03.5	31 39.1	99 03	02.8	1
2	17 11.9	1.0 05	04.2	17 41.8	1.0 05	04.1	19 11.3	99 04	04.0	19 41.2	99 04	03.9	20 11.0	99 04	03.9	26 09.1	99 04	03.2	26 38.9	99 04	03.1	31 37.2	99 03	02.5	2
3	17 09.1	1.0 04	03.7	17 39.0	1.0 04	03.6	19 08.7	1.0 04	03.5	19 38.6	1.0 04	03.4	20 08.4	1.0 04	03.4	26 07.0	1.0 03	02.8	26 36.8	1.0 03	02.7	31 35.5	1.0 02	02.2	3
4	17 06.7	1.0 03	03.1	17 36.6	1.0 03	03.1	19 06.4	1.0 03	03.0	19 36.3	1.0 03	02.9	20 06.2	1.0 03	02.9	26 05.1	1.0 03	02.4	26 35.0	1.0 03	02.3	31 34.0	1.0 02	01.9	4
175	17 04.7	1.0 03	02.6	17 34.6	1.0 03	02.6	19 04.4	1.0 03	02.5	19 34.4	1.0 03	02.4	20 04.3	1.0 03	02.4	26 03.6	1.0 02	02.0	26 33.5	1.0 02	02.0	31 32.8	1.0 02	01.6	175
6	17 03.0	1.0 02	02.1	17 32.9	1.0 02	02.1	19 02.8	1.0 02	02.0	19 32.8	1.0 02	02.0	20 02.8	1.0 02	01.9	26 02.3	1.0 02	01.6	26 32.2	1.0 02	01.6	31 31.8	1.0 01	01.3	6
7	17 01.7	1.0 02	01.6	17 31.7	1.0 02	01.5	19 01.6	1.0 01	01.5	19 31.6	1.0 01	01.5	20 01.6	1.0 01	01.4	26 01.3	1.0 01	01.2	26 31.3	1.0 01	01.2	31 31.0	1.0 01	00.9	7
8	17 00.7	1.0 01	01.0	17 30.7	1.0 01	01.0	19 00.7	1.0 01	01.0	19 30.7	1.0 01	01.0	20 00.7	1.0 01	01.0	26 00.6	1.0 01	00.8	26 30.6	1.0 01	00.8	31 30.4	1.0 01	00.6	8
9	17 00.2	1.0 00	00.5	17 30.2	1.0 00	00.5	19 00.2	1.0 00	00.5	19 30.2	1.0 00	00.5	20 00.2	1.0 00	00.5	26 00.1	1.0 00	00.4	26 30.1	1.0 00	00.4	31 30.1	1.0 00	00.3	9
180	17 00.0	1.0 00	00.0	17 30.0	1.0 00	00.0	19 00.0	1.0 00	00.0	19 30.0	1.0 00	00.0	20 00.0	1.0 00	00.0	26 00.0	1.0 00	00.0	26 30.0	1.0 00	00.0	31 30.0	1.0 00	00.0	180

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ALTITUDE

Lat. 47°

AZ.	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	47	180	51	180	55	180	59	180	63	180	67	180	71	180	75	180	79	180	83	180	87	180	00
4	47	174	51	174	55	173	59	173	63	172	67	171	71	169	75	167	79	163	82	156	86	135	4
8	46	168	50	168	54	166	58	165	62	164	66	162	70	159	74	155	77	149	81	138	84	115	8
12	46	163	50	161	54	160	57	158	61	156	65	153	69	149	72	144	76	137	79	125	81	105	12
16	45	157	49	156	52	154	56	151	60	149	64	145	67	141	71	135	74	127	76	115	78	99	16
20	44	152	47	150	51	148	55	145	58	142	62	138	65	134	69	127	72	119	74	109	76	95	20
24	42	147	46	145	50	142	53	139	57	136	60	132	63	127	66	121	69	113	71	103	73	91	24
28	41	142	44	140	48	137	51	134	55	130	58	126	61	121	64	115	66	108	69	99	70	88	28
32	39	137	42	135	46	132	49	129	53	125	56	121	59	116	61	110	64	103	66	95	68	86	32
36	37	133	40	130	44	127	47	124	50	120	53	116	56	111	59	106	61	99	63	92	65	84	36
40	35	129	38	126	42	123	45	120	48	116	51	112	54	107	56	102	58	96	60	89	62	81	40
44	33	125	36	122	39	119	42	115	45	112	48	108	51	103	53	98	56	93	58	86	59	79	44
48	30	121	34	118	37	115	40	112	43	108	46	104	48	100	51	95	53	90	55	84	57	77	48
52	28	117	31	114	34	111	37	108	40	104	43	101	46	96	48	92	50	87	52	81	54	75	52
56	26	114	29	111	32	108	35	104	37	101	40	97	43	93	45	89	48	84	50	79	51	73	56
60	23	110	26	107	29	104	32	101	35	98	38	94	40	90	43	86	45	81	47	77	49	71	60
64	20	107	23	104	26	101	29	98	32	95	35	91	37	87	40	83	42	79	44	74	46	69	64
68	18	104	21	101	24	98	27	95	29	92	32	88	35	85	37	81	40	77	42	72	44	67	68
72	15	101	18	98	21	95	24	92	27	89	29	85	32	82	34	78	37	74	39	70	41	66	72
76	12	98	15	95	18	92	21	89	24	86	27	83	29	79	32	76	34	72	37	68	39	64	76
80	10	95	13	92	16	89	18	86	21	83	24	80	27	77	29	73	32	69	34	66	36	62	80
84	07	92	10	89	13	86	16	83	18	80	21	77	24	74	27	71	29	67	32	64	34	60	84
88	04	89	07	86	10	83	13	80	16	77	19	74	21	71	24	68	27	65	29	61	32	58	88
92	02	86	04	83	07	80	10	78	13	75	16	72	19	69	22	66	24	62	27	59	29	56	92
96	*01*	83	02	79	05	77	08	75	11	72	13	69	16	66	19	63	22	60	25	57	27	54	96
100	*04*	80	*01*	77	02	75	05	72	08	69	11	66	14	64	17	61	20	58	22	55	25	51	100
104	*07*	77	*04*	74	*01*	72	02	69	05	66	08	64	11	61	14	58	17	55	20	52	23	49	104
108	*09*	74	*06*	71	*03*	69	*00*	66	03	64	06	61	09	58	12	56	15	53	18	50	21	47	108
112	*12*	71	*09*	68	*06*	66	*03*	63	01	61	04	58	07	56	10	53	13	50	16	48	19	45	112
116	*14*	68	*11*	65	*08*	63	*05*	60	*02*	58	01	55	05	53	08	50	11	48	14	45	17	43	116
120	*17*	64	*14*	62	*10*	59	*07*	57	*04*	55	*01*	52	03	50	06	48	09	45	12	43	15	40	120
124	*19*	61	*16*	59	*13*	56	*09*	54	*06*	52	*03*	49	00	47	04	45	07	43	10	40	14	38	124
128	*22*	58	*18*	55	*15*	53	*12*	51	*08*	48	*05*	46	*02*	44	02	42	05	40	09	38	12	35	128
132	*24*	54	*20*	52	*17*	50	*14*	47	*10*	45	*07*	43	*03*	42	00	39	03	37	07	35	10	33	132
136	*26*	50	*23*	48	*19*	46	*16*	44	*12*	42	*09*	40	*05*	38	*02*	36	02	34	05	32	09	30	136
140	*28*	47	*25*	44	*21*	42	*17*	40	*14*	38	*10*	37	*07*	35	*03*	33	00	31	04	30	08	28	140
144	*30*	43	*26*	41	*23*	39	*19*	37	*16*	35	*12*	33	*08*	32	*05*	30	*01*	28	03	27	06	25	144
148	*32*	38	*28*	37	*24*	35	*21*	33	*17*	31	*13*	30	*10*	28	*06*	27	*02*	25	02	24	05	23	148
152	*33*	34	*30*	32	*26*	31	*22*	29	*18*	28	*15*	26	*11*	25	*07*	24	*03*	22	01	21	04	20	152
156	*35*	30	*31*	28	*27*	27	*23*	25	*20*	24	*16*	23	*12*	22	*08*	20	*04*	19	*00*	18	03	17	156
160	*36*	25	*32*	24	*28*	22	*24*	21	*21*	20	*17*	19	*13*	18	*09*	17	*05*	16	*01*	15	03	14	160
164	*37*	20	*33*	19	*29*	18	*25*	17	*21*	16	*18*	15	*14*	15	*10*	14	*06*	13	*02*	12	02	11	164
168	*38*	15	*34*	14	*30*	14	*26*	13	*22*	12	*18*	11	*14*	11	*10*	10	*06*	10	*02*	09	02	09	168
172	*39*	10	*35*	10	*31*	09	*27*	09	*23*	08	*19*	08	*15*	07	*11*	07	*07*	07	*03*	06	01	06	172
176	*39*	05	*35*	05	*31*	05	*27*	04	*23*	04	*19*	04	*15*	04	*11*	03	*07*	03	*03*	03	01	03	176
180	*39*	00	*35*	00	*31*	00	*27*	00	*23*	00	*19*	00	*15*	00	*11*	00	*07*	00	*03*	00	01	00	180
	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		

1c—11630

FIGURES IN ITALICS INDICATE THAT DECLINATION IS OF CONTRARY NAME TO LATITUDE

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STAR IDENTIFICATION TABLE

Lat 47°

AZ.	48°		52°		56°		60°		64°		68°		72°		76°		80°		84°		88°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	89	00	85	00	81	00	77	00	73	00	69	00	65	00	61	00	57	00	53	00	49	00	00
4	87	68	84	26	81	14	77	09	73	06	69	04	65	03	61	02	57	01	53	01	49	00	4
8	85	77	83	43	80	26	76	17	72	12	69	08	65	06	61	04	57	03	53	01	49	00	8
12	82	79	81	53	78	35	75	24	72	17	68	12	64	09	61	06	57	04	53	02	49	01	12
16	79	79	79	58	77	42	74	30	71	22	67	16	64	11	60	08	57	05	53	03	49	01	16
20	76	78	76	62	75	47	73	35	70	26	67	19	63	14	60	09	56	06	53	03	49	01	20
24	74	78	74	63	73	50	71	38	69	29	66	22	63	16	59	11	56	07	52	04	49	01	24
28	71	77	71	64	71	52	69	41	67	32	65	24	62	18	59	13	56	08	52	05	49	01	28
32	69	75	69	65	68	54	67	43	66	34	63	26	62	20	58	14	55	09	52	05	49	02	32
36	66	74	66	64	66	54	65	45	64	36	62	28	60	21	57	15	55	10	52	06	49	02	36
40	63	73	64	64	64	55	63	46	62	37	61	30	59	23	57	16	54	11	51	06	49	02	40
44	61	72	61	63	62	55	61	47	61	39	60	31	58	24	56	17	54	12	51	07	48	02	44
48	58	70	59	63	59	55	59	47	59	39	58	32	57	25	55	18	53	12	51	07	48	02	48
52	56	69	57	62	57	55	57	47	57	40	57	32	56	26	54	19	52	13	50	07	48	02	52
56	53	67	54	61	55	54	55	47	56	40	55	33	54	26	53	20	52	13	50	08	48	02	56
60	51	66	52	60	53	53	54	47	54	40	54	33	53	27	52	20	51	14	50	08	48	03	60
64	48	64	49	58	51	52	52	46	52	40	52	33	52	27	51	20	51	14	49	08	48	03	64
68	46	62	47	57	49	52	50	46	50	40	51	33	51	27	50	21	50	14	49	08	48	03	68
72	43	61	45	56	46	50	48	45	49	39	49	33	50	27	50	21	49	15	49	09	48	03	72
76	41	59	43	54	44	49	46	44	47	38	48	33	48	27	49	21	48	15	48	09	47	03	76
80	39	57	40	53	42	48	44	43	45	38	46	32	47	27	48	21	48	15	48	09	47	03	80
84	36	56	38	51	40	47	42	42	44	37	45	32	46	26	47	21	47	15	47	09	47	03	84
88	34	54	36	50	38	45	40	41	42	36	43	31	45	26	46	20	46	15	47	09	47	03	88
92	32	52	34	48	36	44	38	40	40	35	42	30	43	25	45	20	46	14	46	09	47	03	92
96	30	50	32	46	35	42	37	38	39	34	41	29	42	25	44	19	45	14	46	09	47	03	96
100	28	48	30	45	33	41	35	37	37	33	39	28	41	24	43	19	44	14	46	08	47	03	100
104	26	46	28	43	31	39	33	36	36	32	38	27	40	23	42	18	44	13	45	08	46	03	104
108	24	44	27	41	29	38	32	34	34	30	37	26	39	22	41	18	43	13	45	08	46	03	108
112	22	42	25	39	28	36	30	33	33	29	36	25	38	21	40	17	43	13	44	08	46	03	112
116	20	40	23	37	26	34	29	31	32	28	34	24	37	20	40	16	42	12	44	08	46	03	116
120	18	38	21	35	25	32	28	29	31	26	33	23	36	19	39	16	41	12	44	07	46	02	120
124	17	35	20	33	23	30	26	28	29	25	32	22	35	18	38	15	41	11	43	07	46	02	124
128	15	33	19	31	22	28	25	26	28	23	31	20	34	17	37	14	40	10	43	06	46	02	128
132	14	31	17	29	21	26	24	24	27	21	30	19	34	16	37	13	40	10	43	06	46	02	132
136	12	28	16	26	19	24	23	22	26	20	30	17	33	15	36	12	39	09	43	06	46	02	136
140	11	26	15	24	18	22	22	20	25	18	29	16	32	14	36	11	39	08	42	05	45	02	140
144	10	24	14	22	17	20	21	18	25	16	28	14	32	12	35	10	39	08	42	05	45	02	144
148	09	21	13	20	16	18	20	16	24	15	27	13	31	11	35	09	38	07	42	04	45	02	148
152	08	18	12	17	16	16	19	14	23	13	27	11	31	10	34	08	38	06	42	04	45	01	152
156	07	16	11	15	15	14	19	12	23	11	26	10	30	08	34	07	38	05	41	03	45	01	156
160	07	13	10	12	14	11	18	10	22	09	26	08	30	07	34	06	38	04	41	03	45	01	160
164	06	11	10	10	14	09	18	08	22	07	26	07	30	06	33	05	37	03	41	02	45	01	164
168	06	08	10	07	13	07	17	06	21	06	25	05	29	04	33	03	37	03	41	02	45	01	168
172	05	05	09	05	13	05	17	04	21	04	25	03	29	03	33	02	37	02	41	01	45	00	172
176	05	03	09	02	13	02	17	02	21	02	25	02	29	01	33	01	37	01	41	01	45	00	176
180	05	00	09	00	13	00	17	00	21	00	25	00	29	00	33	00	37	00	41	00	45	00	180
	48°		52°		56°		60°		64°		68°		72°		76°		80°		84°		88°		

16—11439

FIGURES IN ITALICS INDICATE THAT DECLINATION IS OF CONTRARY NAME TO LATITUDE

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Lat. 48°

H.A.	0° 00′			0° 30′			1° 00′			1° 30′			2° 00′			2° 30′			3° 00′			3° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		′	Δt °		°
00	42 00.0	1.0 01	180.0	42 30.0	1.0 01	180.0	43 00.0	1.0 01	180.0	43 30.0	1.0 01	180.0	44 00.0	1.0 01	180.0	44 30.0	1.0 01	180.0	45 00.0	1.0 01	180.0	45 30.0	1.0 01	180.0	00
1	41 59.5	1.0 02	178.7	42 29.5	1.0 02	178.6	42 59.5	1.0 02	178.6	43 29.5	1.0 02	178.6	43 59.5	1.0 02	178.6	44 29.5	1.0 02	178.6	44 59.5	1.0 02	178.6	45 29.5	1.0 02	178.6	1
2	41 58.1	1.0 04	177.3	42 28.1	1.0 04	177.3	42 58.1	1.0 04	177.3	43 28.1	1.0 04	177.2	43 58.1	1.0 04	177.2	44 28.0	1.0 04	177.2	44 58.0	1.0 04	177.2	45 28.0	1.0 04	177.2	2
3	41 55.8	1.0 06	176.0	42 25.7	1.0 06	175.9	42 55.7	1.0 06	175.9	43 25.7	1.0 06	175.9	43 55.6	1.0 06	175.8	44 25.6	1.0 06	175.8	44 55.5	1.0 06	175.8	45 25.5	1.0 06	175.7	3
4	41 52.5	1.0 07	174.6	42 22.4	1.0 07	174.6	42 52.3	1.0 07	174.5	43 22.3	1.0 07	174.5	43 52.2	1.0 07	174.5	44 22.2	1.0 07	174.4	44 52.1	1.0 07	174.4	45 22.0	1.0 07	174.3	4
05	41 48.2	1.0 09	173.3	42 18.1	1.0 09	173.2	42 48.1	1.0 09	173.2	43 18.0	1.0 09	173.1	43 47.9	1.0 09	173.1	44 17.8	1.0 09	173.0	44 47.7	1.0 09	173.0	45 17.6	1.0 09	172.9	05
6	41 43.1	1.0 10	171.9	42 12.9	1.0 10	171.9	42 42.8	1.0 10	171.8	43 12.7	1.0 10	171.8	43 42.5	1.0 10	171.7	44 12.4	1.0 11	171.6	44 42.2	1.0 11	171.6	45 12.1	1.0 11	171.5	6
7	41 37.0	99 12	170.6	42 06.8	99 12	170.5	42 36.6	99 12	170.5	43 06.4	99 12	170.4	43 36.3	99 12	170.3	44 06.1	99 12	170.2	44 35.9	99 12	170.2	45 05.7	99 12	170.1	7
8	41 30.0	99 13	169.3	41 59.8	99 13	169.2	42 29.5	99 13	169.1	42 59.3	99 14	169.0	43 29.0	99 14	168.9	43 58.8	99 14	168.9	44 28.5	99 14	168.8	44 58.3	99 14	168.7	8
9	41 22.1	99 15	168.0	41 51.8	99 15	167.9	42 21.5	99 15	167.8	42 51.2	99 15	167.7	43 20.9	99 15	167.6	43 50.6	99 15	167.5	44 20.2	99 15	167.4	44 49.9	99 16	167.3	9
10	41 13.3	99 16	166.7	41 42.9	99 16	166.5	42 12.5	99 16	166.4	42 42.2	99 17	166.3	43 11.8	99 17	166.2	43 41.4	99 17	166.1	44 11.0	99 17	166.0	44 40.6	99 17	165.9	10
1	41 03.5	99 18	165.3	41 33.1	99 18	165.2	42 02.7	99 18	165.1	42 32.2	98 18	165.0	43 01.8	98 18	164.9	43 31.3	98 18	164.8	44 00.8	98 18	164.6	44 30.3	98 19	164.5	1
2	40 52.9	98 19	164.0	41 22.4	98 19	163.9	41 51.9	98 19	163.8	42 21.4	98 20	163.7	42 50.8	98 20	163.5	43 20.3	98 20	163.4	43 49.7	98 20	163.3	44 19.2	98 20	163.1	2
3	40 41.5	98 21	162.7	41 10.9	98 21	162.6	41 40.3	98 21	162.5	42 09.6	98 21	162.3	42 39.0	98 21	162.2	43 08.4	98 21	162.1	43 37.7	98 22	161.9	44 07.1	98 22	161.8	3
4	40 29.1	98 22	161.5	40 58.4	98 22	161.3	41 27.7	98 22	161.2	41 57.0	98 22	161.0	42 26.3	98 23	160.9	42 55.6	98 23	160.7	43 24.8	97 23	160.6	43 54.0	97 23	160.4	4
15	40 15.9	97 23	160.2	40 45.1	97 24	160.0	41 14.3	97 24	159.9	41 43.5	97 24	159.7	42 12.7	97 24	159.6	42 41.9	97 24	159.4	43 11.0	97 24	159.2	43 40.1	97 25	159.1	15
6	40 01.9	97 25	158.9	40 31.0	97 25	158.7	41 00.1	97 25	158.6	41 29.2	97 25	158.4	41 58.3	97 26	158.3	42 27.3	97 26	158.1	42 56.3	97 26	157.9	43 25.4	97 26	157.7	6
7	39 47.0	97 26	157.6	40 16.0	97 26	157.5	40 45.0	97 26	157.3	41 14.0	97 27	157.1	41 43.0	97 27	157.0	42 11.9	96 27	156.8	42 40.8	96 27	156.6	43 09.7	96 27	156.4	7
8	39 31.4	96 27	156.4	40 00.2	96 28	156.2	40 29.1	96 28	156.0	40 58.0	96 28	155.9	41 26.8	96 28	155.7	41 55.7	96 28	155.5	42 24.5	96 29	155.3	42 53.3	96 29	155.1	8
9	39 14.9	96 29	155.1	39 43.6	96 29	155.0	40 12.4	96 29	154.8	40 41.2	96 29	154.6	41 09.9	96 30	154.4	41 38.6	96 30	154.2	42 07.3	96 30	154.0	42 35.9	96 30	153.8	9
20	38 57.6	96 30	153.9	39 26.3	96 30	153.7	39 54.9	95 30	153.5	40 23.5	95 31	153.3	40 52.1	95 31	153.1	41 20.7	95 31	152.9	41 49.3	95 31	152.7	42 17.8	95 32	152.5	20
1	38 39.6	95 31	152.7	39 08.1	95 32	152.5	39 36.6	95 32	152.3	40 05.1	95 32	152.1	40 33.6	95 32	151.9	41 02.0	95 32	151.7	41 30.5	95 33	151.5	41 58.9	95 33	151.2	1
2	38 20.8	95 33	151.5	38 49.2	95 33	151.3	39 17.6	95 33	151.1	39 45.9	95 33	150.8	40 14.3	94 33	150.6	40 42.6	94 34	150.4	41 10.9	94 34	150.2	41 39.2	94 34	150.0	2
3	38 01.2	94 34	150.3	38 29.5	94 34	150.1	38 57.8	94 34	149.8	39 26.0	94 34	149.6	39 54.2	94 35	149.4	40 22.4	94 35	149.2	40 50.6	94 35	149.0	41 18.7	94 35	148.7	3
4	37 40.9	94 35	149.1	38 09.1	94 35	148.9	38 37.2	94 35	148.6	39 05.3	94 36	148.4	39 33.4	94 36	148.2	40 01.5	93 36	148.0	40 29.5	93 36	147.7	40 57.5	93 37	147.5	4
25	37 19.9	93 36	147.9	37 48.0	93 36	147.7	38 16.0	93 37	147.4	38 43.9	93 37	147.2	39 11.9	93 37	147.0	39 39.8	93 37	146.7	40 07.7	93 38	146.5	40 35.6	93 38	146.3	25
6	36 58.3	93 37	146.7	37 26.2	93 38	146.5	37 54.0	93 38	146.3	38 21.9	93 38	146.0	38 49.7	93 38	145.8	39 17.4	93 38	145.5	39 45.2	92 39	145.3	40 12.9	92 39	145.0	6
7	36 35.9	93 38	145.6	37 03.6	92 39	145.3	37 31.4	92 39	145.1	37 59.1	92 39	144.8	38 26.7	92 39	144.6	38 54.4	92 40	144.3	39 22.0	92 40	144.1	39 49.5	92 40	143.8	7
8	36 12.9	92 39	144.4	36 40.5	92 40	144.2	37 08.1	92 40	143.9	37 35.6	92 40	143.7	38 03.1	92 40	143.4	38 30.6	92 41	143.2	38 58.1	91 41	142.9	39 25.5	91 41	142.7	8
9	35 49.2	92 41	143.3	36 16.7	92 41	143.0	36 44.1	91 41	142.8	37 11.5	91 41	142.5	37 38.9	91 41	142.3	38 06.3	91 42	142.0	38 33.6	91 42	141.7	39 00.8	91 42	141.5	9
30	35 24.9	91 42	142.2	35 52.2	91 42	141.9	36 19.5	91 42	141.6	36 46.8	91 42	141.4	37 14.0	91 42	141.1	37 41.2	91 43	140.9	38 08.4	90 43	140.6	38 35.5	90 43	140.3	30
1	34 59.9	91 43	141.0	35 27.1	91 43	140.8	35 54.3	90 43	140.5	36 21.4	90 43	140.3	36 48.5	90 44	140.0	37 15.6	90 44	139.7	37 42.6	90 44	139.4	38 09.6	90 44	139.2	1
2	34 34.4	90 44	139.9	35 01.4	90 44	139.7	35 28.5	90 44	139.4	35 55.4	90 44	139.1	36 22.4	90 44	138.9	36 49.3	90 45	138.6	37 16.2	90 45	138.3	37 43.0	89 45	138.0	2
3	34 08.2	90 44	138.9	34 35.2	90 45	138.6	35 02.0	90 45	138.3	35 28.9	89 45	138.0	35 55.7	89 45	137.8	36 22.5	89 46	137.5	36 49.2	89 46	137.2	37 15.9	89 46	136.9	3
4	33 41.5	89 45	137.8	34 08.3	89 46	137.5	34 35.1	89 46	137.2	35 01.8	89 46	136.9	35 28.4	89 46	136.7	35 55.1	89 47	136.4	36 21.6	89 47	136.1	36 48.2	88 47	135.8	4
35	33 14.3	89 46	136.7	33 40.9	89 47	136.4	34 07.5	89 47	136.2	34 34.1	88 47	135.9	35 00.6	88 47	135.6	35 27.1	88 48	135.3	35 53.5	88 48	135.0	36 19.9	88 48	134.7	35
6	32 46.5	88 47	135.6	33 13.0	88 47	135.4	33 39.4	88 48	135.1	34 05.9	88 48	134.8	34 32.2	88 48	134.5	34 58.6	88 48	134.2	35 24.9	88 49	133.9	35 51.1	87 49	133.6	6
7	32 18.2	88 48	134.6	32 44.5	88 48	134.3	33 10.8	88 49	134.0	33 37.1	88 49	133.7	34 03.4	87 49	133.5	34 29.5	87 49	133.2	34 55.7	87 49	132.9	35 21.8	87 50	132.6	7
8	31 49.3	87 49	133.6	32 15.5	87 49	133.3	32 41.7	87 49	133.0	33 07.9	87 50	132.7	33 34.0	87 50	132.4	34 00.0	87 50	132.1	34 26.0	87 50	131.8	34 52.0	86 50	131.5	8
9	31 20.0	87 50	132.5	31 46.1	87 50	132.3	32 12.1	87 50	132.0	32 38.1	87 50	131.7	33 04.1	86 51	131.4	33 30.0	86 51	131.1	33 55.9	86 51	130.8	34 21.7	86 51	130.5	9
40	30 50.2	87 50	131.5	31 16.1	86 51	131.2	31 42.0	86 51	130.9	32 07.9	86 51	130.6	32 33.7	86 51	130.3	32 59.5	86 52	130.0	33 25.2	86 52	129.7	33 50.9	86 52	129.4	40
1	30 19.9	86 51	130.5	30 45.7	86 51	130.2	31 11.5	86 52	129.9	31 37.2	86 52	129.6	32 02.9	86 52	129.3	32 28.5	85 52	129.0	32 54.1	85 53	128.7	33 19.7	85 53	128.4	1
2	29 49.1	86 52	129.5	30 14.8	86 52	129.2	30 40.4	85 52	128.9	31 06.0	85 53	128.6	31 31.6	85 53	128.3	31 57.1	85 53	128.0	32 22.6	85 53	127.7	32 48.0	85 54	127.4	2
3	29 18.0	85 53	128.6	29 43.5	85 53	128.3	30 09.0	85 53	127.9	30 34.5	85 53	127.6	30 59.9	85 54	127.3	31 25.3	84 54	127.0	31 50.6	84 54	126.7	32 15.9	84 54	126.4	3
4	28 46.3	85 53	127.6	29 11.8	85 54	127.3	29 37.1	85 54	127.0	30 02.5	84 54	126.7	30 27.7	84 54	126.3	30 53.0	84 54	126.0	31 18.2	84 55	125.7	31 43.3	84 55	125.4	4
45	28 14.3	84 54	126.6	28 39.6	84 54	126.3	29 04.9	84 54	126.0	29 30.1	84 55	125.7	29 55.2	84 55	125.4	30 20.3	84 55	125.1	30 45.4	83 55	124.7	31 10.4	83 56	124.4	45
6	27 41.9	84 55	125.7	28 07.1	84 55	125.4	28 32.2	84 55	125.0	28 57.3	84 55	124.7	29 22.3	83 56	124.4	29 47.3	83 56	124.1	30 12.2	83 56	123.8	30 37.1	83 56	123.5	6
7	27 09.1	84 55	124.7	27 34.1	83 56	124.4	27 59.1	83 56	124.1	28 24.1	83 56	123.8	28 49.0	83 56	123.5	29 13.8	83 56	123.1	29 38.7	83 57	122.8	30 03.4	82 57	122.5	7
8	26 35.9	83 56	123.8	27 00.8	83 56	123.5	27 25.7	83 56	123.2	27 50.5	83 56	122.8	28 15.3	83 57	122.5	28 40.0	82 57	122.2	29 04.7	82 57	121.9	29 29.4	82 57	121.6	8
9	26 02.4	83 56	122.9	26 27.2	83 57	122.5	26 51.9	82 57	122.2	27 16.6	82 57	121.9	27 41.3	82 57	121.6	28 05.9	82 57	121.3	28 30.5	82 58	120.9	28 55.0	82 58	120.6	9
50	25 28.5	82 57	121.9	25 53.1	82 57	121.6	26 17.8	82 57	121.3	26 42.4	82 58	121.0	27 06.9	82 58	120.7	27 31.4	82 58	120.3	27 55.9	81 58	120.0	28 20.3	81 58	119.7	50
1	24 54.2	82 58	121.0	25 18.8	82 58	120.7	25 43.3	82 58	120.4	26 07.8	82 58	120.1	26 32.2	81 58	119.8	26 56.6	81 59	119.4	27 21.0	81 59	119.1	27 45.3	81 59	118.8	1
2	24 19.7	82 58	120.1	24 44.1	81 58	119.8	25 08.5	81 58	119.5	25 32.9	81 59	119.2	25 57.2	81 59	118.9	26 21.5	81 59	118.5	26 45.7	81 59	118.2	27 09.9	81 59	117.9	2
3	23 44.8	81 59	119.2	24 09.1	81 59	118.9	24 33.4	81 59	118.6	24 57.7	81 59	118.3	25 21.9	81 59	118.0	25 46.1	80 60	117.6	26 10.2	80 60	117.3	26 34.3	80 60	117.0	3
4	23 09.6	81 59	118.4	23 33.8	81 59	118.0	23 58.0	81 59	117.7	24 22.2	80 60	117.4	24 46.3	80 60	117.1	25 10.4	80 60	116.7	25 34.4	80 60	116.4	25 58.3	80 60	116.1	4
55	22 34.1	80 60	117.5	22 58.3	80 60	117.2	23 22.4	80 60	116.8	23 46.4	80 60	116.5	24 10.4	80 60	116.2	24 34.4	80 60	115.9	24 58.3	80 61	115.5	25 22.2	79 61	115.2	55
6	21 58.4	80 60	116.6	22 22.4	80 60	116.3	22 46.4	80 60	116.0	23 10.3	80 61	115.6	23 34.2	80 61	115.3	23 58.1	79 61	115.0	24 21.9	79 61	114.7	24 45.7	79 61	114.3	6
7	21 22.4	80 60	115.8	21 46.3	80 61	115.4	22 10.2	80 61	115.1	22 34.0	79 61	114.8	22 57.8	79 61	114.5	23 21.6	79 61	114.1	23 45.3	79 61	113.8	24 09.0	79 62	113.5	7
8	20 46.1	79 61	114.9	21 09.9	79 61	114.6	21 33.7	79 61	114.3	21 57.4	79 61	113.9	22 21.2	79 62	113.6	22 44.8	79 62	113.3	23 08.4	79 62	112.9	23 32.0	79 62	112.6	8
9	20 09.5	79 61	114.1	20 33.3	79 61	113.7	20 57.0	79 62	113.4	21 20.6	79 62	113.1	21 44.2	79 62	112.7	22 07.8	79 62	112.4	22 31.4	78 62	112.1	22 54.9	78 62	111.7	9
60	19 32.8	79 62	113.2	19 56.4	79 62	112.9	20 20.0	79 62	112.6	20 43.6	78 62	112.2	21 07.1	78 62	111.9	21 30.6	78 62	111.6	21 54.0	78 63	111.2	22 17.5	78 63	110.9	60
1	18 55.8	79 62	112.4	19 19.3	78 62	112.1	19 42.8	78 62	111.7	20 06.3	78 62	111.4	20 29.7	78 63	111.1	20 53.2	78 63	110.7	21 16.5	78 63	110.4	21 39.8	78 63	110.1	1
2	18 18.5	78 62	111.6	18 42.0	78 63	111.2	19 05.4	78 63	110.9	19 28.8	78 63	110.6	19 52.2	78 63	110.2	20 15.5	78 63	109.9	20 38.8	78 63	109.6	21 02.0	77 63	109.2	2
3	17 41.1	78 63	110.7	18 04.5	78 63	110.4	18 27.8	78 63	110.1	18 51.1	78 63	109.7	19 14.4	78 63	109.4	19 37.7	77 63	109.1	20 00.9	77 64	108.7	20 24.0	77 64	108.4	3
4	17 03.4	78 63	109.9	17 26.7	78 63	109.6	17 50.0	78 63	109.3	18 13.2	77 63	108.9	18 36.5	77 64	108.6	18 59.6	77 64	108.3	19 22.8	77 64	107.9	19 45.8	77 64	107.6	4
65	16 25.6	77 63	109.1	16 48.8	77 64	108.8	17 12.0	77 64	108.5	17 35.2	77 64	108.1	17 58.3	77 64	107.8	18 21.4	77 64	107.4	18 44.5	77 64	107.1	19 07.5	77 64	106.8	65
6	15 47.6	77 64	108.3	16 10.7	77 64	108.0	16 33.8	77 64	107.6	16 56.9	77 64	107.3	17 20.0	77 64	107.0	17 43.0	77 64	106.6	18 06.0	77 64	106.3	18 29.0	76 64	106.0	6
7	15 09.4	77 64	107.5	15 32.4	77 64	107.2	15 55.5	77 64	106.8	16 18.5	77 64	106.5	16 41.5	77 64	106.2	17 04.5	76 64	105.8	17 27.4	76 65	105.5	17 50.3	76 65	105.2	7
8	14 31.0	77 64	106.7	14 54.0	77 64	106.4	15 17.0	77 64	106.0	15 40.0	76 65	105.7	16 02.9	76 65	105.4	16 25.8	76 65	105.0	16 48.6	76 65	104.7	17 11.5	76 65	104.4	8
9	13 52.5	77 64	105.9	14 15.4	76 65	105.6	14 38.3	76 65	105.3	15 01.2	76 65	104.9	15 24.1	76 65	104.6	15 46.9	76 65	104.3	16 09.7	76 65	103.9	16 32.5	76 65	103.6	9
70	13 13.8	76 65	105.1	13 36.7	76 65	104.8	13 59.5	76 65	104.5	14 22.4	76 65	104.1	14 45.2	76 65	103.8	15 08.0	76 65	103.5	15 30.7	76 65	103.1	15 53.4	76 65	102.8	70
1	12 35.0	76 65	104.4	12 57.8	76 65	104.0	13 20.6	76 65	103.7	13 43.4	76 65	103.4	14 06.1	76 65	103.0	14 28.8	76 65	102.7	14 51.5	76 65	102.3	15 14.2	76 66	102.0	1
2	11 56.0	76 65	103.6	12 18.8	76 65	103.2	12 41.5	76 65	102.9	13 04.2	76 65	102.6	13 26.9	76 66	102.2	13 49.6	76 66	101.9	14 12.3	75 66	101.6	14 34.9	75 66	101.2	2
3	11 16.9	76 65	102.8	11 39.6	76 65	102.5	12 02.3	76 66	102.1	12 25.0	76 66	101.8	12 47.7	75 66	101.5	13 10.3	75 66	101.1	13 32.9	75 66	100.8	13 55.5	75 66	100.4	3
4	10 37.7	76 66	102.0	11 00.4	76 66	101.7	11 23.0	75 66	101.4	11 45.7	75 66	101.0	12 08.3	75 66	100.7	12 30.8	75 66	100.4	12 53.4	75 66	100.0	13 15.9	75 66	99.7	4
75	9 58.4	75 66	101.3	10 21.0	75 66	100.9	10 43.6	75 66	100.6	11 06.2	75 66	100.3	11 28.8	75 66	99.9	11 51.3	75 66	99.6	12 13.8	75 66	99.2	12 36.3	75 66	98.9	75
6	9 19.0	75 66	100.5	9 41.5	75 66	100.2	10 04.1	75 66	99.8	10 26.6	75 66	99.5	10 49.2	75 66	99.2	11 11.7	75 66	98.8	11 34.1	75 66	98.5	11 56.6	75 66	98.1	6
7	8 39.4	75 66	99.7	9 02.0	75 66	99.4	9 24.5	75 66	99.1	9 47.0	75 66	98.7	10 09.5	75 66	98.4	10 32.0	75 66	98.1	10 54.4	75 66	97.7	11 16.8	75 66	97.4	7
8	7 59.8	75 66	99.0	8 22.3	75 66	98.6	8 44.8	75 66	98.3	9 07.3	75 66	98.0	9 29.7	75 66	97.6	9 52.2	75 66	97.3	10 14.6	75 66	97.0	10 37.0	75 66	96.6	8
9	7 20.1	75 66	98.2	7 42.6	75 66	97.9	8 05.0	75 66	97.6	8 27.5	75 66	97.2	8 49.9	75 66	96.9	9 12.3	75 67	96.5	9 34.7	75 67	96.2	9 57.1	75 67	95.9	9
80	6 40.3	75 66	97.5	7 02.8	75 66	97.1	7 25.2	75 66	96.8	7 47.6	75 67	96.5	8 10.0	75 67	96.1	8 32.4	75 67	95.8	8 54.8	75 67	95.5	9 17.1	74 67	95.1	80
1	6 00.5	75 66	96.7	6 22.9	75 67	96.4	6 45.3	75 67	96.0	7 07.7	75 67	95.7	7 30.1	75 67	95.4	7 52.4	74 67	95.0	8 14.8	74 67	94.7	8 37.1	74 67	94.4	1
2	5 20.6	75 67	96.0	5 43.0	75 67	95.6	6 05.4	75 67	95.3	6 27.7	75 67	95.0	6 50.1	74 67	94.6	7 12.4	74 67	94.3	7 34.7	74 67	93.9	7 57.0	74 67	93.6	2
3				5 03.0	75 67	94.9	5 25.4	74 67	94.5	5 47.7	74 67	94.2	6 10.0	74 67	93.9	6 32.4	74 67	93.5	6 54.7	74 67	93.2	7 17.0	74 67	92.9	3
4										5 07.7	74 67	93.5	5 30.0	74 67	93.1	5 52.3	74 67	92.8	6 14.6	74 67	92.5	6 36.8	74 67	92.1	4
85																5 12.2	74 67	92.0	5 34.4	74 67	91.7	5 56.7	74 67	91.4	85
6																						5 16.6	74 67	90.6	6

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H.A.	0° 00′			0° 30′			1° 00′			1° 30′			2° 00′			2° 30′			3° 00′			3° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	42 00.0	1.0 01	180.0	41 30.0	1.0 01	180.0	41 00.0	1.0 01	180.0	40 30.0	1.0 01	180.0	40 00.0	1.0 01	180.0	39 30.0	1.0 01	180.0	39 00.0	1.0 01	180.0	38 30.0	1.0 01	180.0	00
1	41 59.5	1.0 02	178.7	41 29.5	1.0 02	178.7	40 59.5	1.0 02	178.7	40 29.5	1.0 02	178.7	39 59.5	1.0 02	178.7	39 29.5	1.0 02	178.7	38 59.6	1.0 02	178.7	38 29.6	1.0 02	178.7	1
2	41 58.1	1.0 04	177.3	41 28.1	1.0 04	177.3	40 58.1	1.0 04	177.4	40 28.2	1.0 04	177.4	39 58.2	1.0 04	177.4	39 28.2	1.0 04	177.4	38 58.2	1.0 04	177.4	38 28.2	1.0 04	177.4	2
3	41 55.8	1.0 06	176.0	41 25.8	1.0 05	176.0	40 55.8	1.0 05	176.0	40 25.9	1.0 05	176.1	39 55.9	1.0 05	176.1	39 25.9	1.0 05	176.1	38 56.0	1.0 05	176.1	38 26.0	1.0 05	176.2	3
4	41 52.5	1.0 07	174.6	41 22.5	1.0 07	174.7	40 52.6	1.0 07	174.7	40 22.6	1.0 07	174.7	39 52.7	1.0 07	174.8	39 22.8	1.0 07	174.8	38 52.8	1.0 07	174.9	38 22.9	1.0 07	174.9	4
05	41 48.2	1.0 09	173.3	41 18.3	1.0 09	173.3	40 48.4	1.0 08	173.4	40 18.5	1.0 08	173.4	39 48.6	1.0 08	173.5	39 18.7	1.0 08	173.5	38 48.8	1.0 08	173.6	38 18.8	1.0 08	173.6	05
6	41 43.1	1.0 10	171.9	41 13.2	1.0 10	172.0	40 43.3	1.0 10	172.1	40 13.5	1.0 10	172.1	39 43.6	1.0 10	172.2	39 13.7	1.0 10	172.3	38 43.8	1.0 10	172.3	38 14.0	1.0 10	172.4	6
7	41 37.0	99 12	170.6	41 07.2	99 12	170.7	40 37.3	99 12	170.8	40 07.5	99 11	170.8	39 37.7	99 11	170.9	39 07.9	99 11	171.0	38 38.0	99 11	171.0	38 08.2	99 11	171.1	7
8	41 30.0	99 13	169.3	41 00.2	99 13	169.4	40 30.5	99 13	169.5	40 00.7	99 13	169.5	39 30.9	99 13	169.6	39 01.1	99 13	169.7	38 31.3	99 13	169.8	38 01.5	99 13	169.8	8
9	41 22.1	99 15	168.0	40 52.4	99 15	168.1	40 22.7	99 14	168.2	39 52.9	99 14	168.2	39 23.2	99 14	168.3	38 53.5	99 14	168.4	38 23.8	99 14	168.5	37 54.0	99 14	168.6	9
10	41 13.3	99 16	166.7	40 43.6	99 16	166.8	40 14.0	99 16	166.9	39 44.3	99 16	167.0	39 14.7	99 16	167.1	38 45.0	99 16	167.1	38 15.3	99 16	167.2	37 45.7	99 15	167.3	10
1	41 03.5	99 18	165.3	40 34.0	99 18	165.5	40 04.4	99 17	165.6	39 34.8	99 17	165.7	39 05.2	99 17	165.8	38 35.6	99 17	165.9	38 06.0	99 17	166.0	37 36.4	99 17	166.1	1
2	40 52.9	98 19	164.0	40 23.5	98 19	164.2	39 54.0	98 19	164.3	39 24.4	98 19	164.4	38 54.9	98 19	164.5	38 25.4	98 18	164.6	37 55.9	98 18	164.7	37 26.4	98 18	164.8	2
3	40 41.5	98 21	162.7	40 12.1	98 20	162.9	39 42.6	98 20	163.0	39 13.2	98 20	163.1	38 43.8	98 20	163.3	38 14.3	98 20	163.4	37 44.9	98 20	163.5	37 15.4	98 20	163.6	3
4	40 29.1	98 22	161.5	39 59.8	98 22	161.6	39 30.5	98 22	161.7	39 01.1	98 22	161.9	38 31.8	98 21	162.0	38 02.4	98 21	162.1	37 33.1	98 21	162.3	37 03.7	98 21	162.4	4
15	40 15.9	97 23	160.2	39 46.7	97 23	160.3	39 17.5	97 23	160.5	38 48.2	98 23	160.6	38 19.0	98 23	160.8	37 49.7	98 23	160.9	37 20.4	98 22	161.0	36 51.1	98 22	161.2	15
6	40 01.9	97 25	158.9	39 32.8	97 25	159.1	39 03.6	97 24	159.2	38 34.5	97 24	159.4	38 05.3	97 24	159.5	37 36.2	97 24	159.7	37 07.0	97 24	159.8	36 37.8	97 24	160.0	6
7	39 47.0	97 26	157.6	39 18.0	97 26	157.8	38 49.0	97 26	158.0	38 19.9	97 26	158.1	37 50.9	97 25	158.3	37 21.8	97 25	158.4	36 52.7	97 25	158.6	36 23.6	97 25	158.7	7
8	39 31.4	96 27	156.4	39 02.4	96 27	156.6	38 33.5	96 27	156.7	38 04.6	96 27	156.9	37 35.6	97 27	157.1	37 06.7	97 27	157.2	36 37.7	97 26	157.4	36 08.7	97 26	157.5	8
9	39 14.9	96 29	155.1	38 46.1	96 29	155.3	38 17.3	96 28	155.5	37 48.4	96 28	155.7	37 19.6	96 28	155.8	36 50.7	96 28	156.0	36 21.8	96 28	156.2	35 53.0	96 27	156.4	9
20	38 57.6	96 30	153.9	38 28.9	96 30	154.1	38 00.2	96 30	154.3	37 31.5	96 29	154.5	37 02.8	96 29	154.6	36 34.0	96 29	154.8	36 05.3	96 29	155.0	35 36.5	96 29	155.2	20
1	38 39.6	95 31	152.7	38 11.0	95 31	152.9	37 42.4	95 31	153.1	37 13.8	95 31	153.3	36 45.2	95 31	153.4	36 16.6	95 30	153.6	35 47.9	96 30	153.8	35 19.2	96 30	154.0	1
2	38 20.8	95 33	151.5	37 52.3	95 32	151.7	37 23.9	95 32	151.9	36 55.4	95 32	152.1	36 26.9	95 32	152.3	35 58.4	95 32	152.5	35 29.8	95 31	152.6	35 01.3	95 31	152.8	2
3	38 01.2	94 34	150.3	37 32.9	94 34	150.5	37 04.6	94 33	150.7	36 36.2	95 33	150.9	36 07.8	95 33	151.1	35 39.4	95 33	151.3	35 11.0	95 33	151.5	34 42.6	95 32	151.7	3
4	37 40.9	94 35	149.1	37 12.8	94 35	149.3	36 44.5	94 35	149.5	36 16.3	94 34	149.7	35 48.1	94 34	149.9	35 19.8	94 34	150.1	34 51.5	94 34	150.3	34 23.2	94 34	150.5	4
25	37 19.9	93 36	147.9	36 51.9	94 36	148.1	36 23.8	94 36	148.3	35 55.7	94 35	148.6	35 27.6	94 35	148.8	34 59.4	94 35	149.0	34 31.3	94 35	149.2	34 03.1	94 35	149.4	25
6	36 58.3	93 37	146.7	36 30.3	93 37	147.0	36 02.4	93 37	147.2	35 34.4	93 37	147.4	35 06.4	93 36	147.6	34 38.4	93 36	147.8	34 10.4	94 36	148.1	33 42.3	94 36	148.3	6
7	36 35.9	93 38	145.6	36 08.1	93 38	145.8	35 40.3	93 38	146.0	35 12.5	93 38	146.3	34 44.6	93 38	146.5	34 16.7	93 37	146.7	33 48.8	93 37	146.9	33 20.9	93 37	147.1	7
8	36 12.9	92 39	144.4	35 45.2	92 39	144.7	35 17.5	92 39	144.9	34 49.8	92 39	145.1	34 22.1	92 39	145.4	33 54.3	93 38	145.6	33 26.6	93 38	145.8	32 58.8	93 38	146.0	8
9	35 49.2	92 41	143.3	35 21.7	92 40	143.5	34 54.1	92 40	143.8	34 26.6	92 40	144.0	33 59.0	92 40	144.2	33 31.3	92 39	144.5	33 03.7	92 39	144.7	32 36.0	92 39	144.9	9
30	35 24.9	91 42	142.2	34 57.5	91 41	142.4	34 30.1	91 41	142.7	34 02.7	91 41	142.9	33 35.2	92 41	143.1	33 07.7	92 40	143.4	32 40.2	92 40	143.6	32 12.6	92 40	143.9	30
1	34 59.9	91 43	141.0	34 32.7	91 42	141.3	34 05.4	91 42	141.6	33 38.1	91 42	141.8	33 10.8	91 42	142.0	32 43.5	91 41	142.3	32 16.1	91 41	142.5	31 48.7	91 41	142.8	1
2	34 34.4	90 44	139.9	34 07.3	90 43	140.2	33 40.2	90 43	140.5	33 13.0	91 43	140.7	32 45.8	91 43	141.0	32 18.6	91 42	141.2	31 51.4	91 42	141.5	31 24.1	91 42	141.7	2
3	34 08.2	90 44	138.9	33 41.3	90 44	139.1	33 14.3	90 44	139.4	32 47.3	90 44	139.6	32 20.2	90 44	139.9	31 53.2	90 43	140.1	31 26.0	90 43	140.4	30 58.9	91 43	140.6	3
4	33 41.5	89 45	137.8	33 14.7	89 45	138.0	32 47.9	90 45	138.3	32 21.0	90 45	138.6	31 54.1	90 45	138.8	31 27.1	90 44	139.1	31 00.2	90 44	139.3	30 33.2	90 44	139.6	4
35	33 14.3	89 46	136.7	32 47.6	89 46	137.0	32 20.9	89 46	137.2	31 54.2	89 46	137.5	31 27.4	89 45	137.8	31 00.6	89 45	138.0	30 33.7	90 45	138.3	30 06.9	90 45	138.6	35
6	32 46.5	88 47	135.6	32 20.0	89 47	135.9	31 53.4	89 47	136.2	31 26.8	89 47	136.5	31 00.1	89 46	136.7	30 33.5	89 46	137.0	30 06.8	89 46	137.3	29 40.0	89 46	137.5	6
7	32 18.2	88 48	134.6	31 51.8	88 48	134.9	31 25.3	88 48	135.2	30 58.9	88 47	135.4	30 32.4	88 47	135.7	30 05.8	89 47	136.0	29 39.3	89 47	136.2	29 12.7	89 46	136.5	7
8	31 49.3	87 49	133.6	31 23.1	88 49	133.9	30 56.8	88 48	134.1	30 30.4	88 48	134.4	30 04.1	88 48	134.7	29 37.7	88 48	135.0	29 11.2	88 48	135.2	28 44.8	88 47	135.5	8
9	31 20.0	87 50	132.5	30 53.9	87 49	132.8	30 27.7	87 49	133.1	30 01.5	87 49	133.4	29 35.3	87 49	133.7	29 09.0	88 49	134.0	28 42.7	88 48	134.2	28 16.4	88 48	134.5	9
40	30 50.2	87 50	131.5	30 24.2	87 50	131.8	29 58.2	87 50	132.1	29 32.1	87 50	132.4	29 06.0	87 50	132.7	28 39.9	87 49	133.0	28 13.7	87 49	133.2	27 47.5	87 49	133.5	40
1	30 19.9	86 51	130.5	29 54.0	86 51	130.8	29 28.1	86 51	131.1	29 02.2	86 51	131.4	28 36.3	87 50	131.7	28 10.3	87 50	132.0	27 44.2	87 50	132.2	27 18.2	87 50	132.5	1
2	29 49.1	86 52	129.5	29 23.4	86 52	129.8	28 57.7	86 52	130.1	28 31.9	86 51	130.4	28 06.0	86 51	130.7	27 40.2	86 51	131.0	27 14.3	86 51	131.3	26 48.3	87 50	131.6	2
3	29 18.0	85 53	128.6	28 52.4	85 52	128.9	28 26.7	85 52	129.1	28 01.1	86 52	129.4	27 35.4	86 52	129.7	27 09.7	86 52	130.0	26 43.9	86 51	130.3	26 18.1	86 51	130.6	3
4	28 46.3	85 53	127.6	28 20.9	85 53	127.9	27 55.4	85 53	128.2	27 29.9	85 53	128.5	27 04.3	85 53	128.8	26 38.7	85 52	129.1	26 13.0	86 52	129.4	25 47.4	86 52	129.6	4
45	28 14.3	84 54	126.6	27 49.0	84 54	126.9	27 23.6	85 54	127.2	26 58.2	85 53	127.5	26 32.8	85 53	127.8	26 07.3	85 53	128.1	25 41.8	85 53	128.4	25 16.2	85 53	128.7	45
6	27 41.9	84 55	125.7	27 16.7	84 54	126.0	26 51.5	84 54	126.3	26 26.2	84 54	126.6	26 00.9	84 54	126.9	25 35.5	85 54	127.2	25 10.1	85 53	127.5	24 44.7	85 53	127.8	6
7	27 09.1	84 55	124.7	26 44.0	84 55	125.0	26 18.9	84 55	125.3	25 53.7	84 55	125.6	25 28.6	84 54	125.9	25 03.3	84 54	126.2	24 38.1	84 54	126.5	24 12.8	84 54	126.8	7
8	26 35.9	83 56	123.8	26 11.0	83 56	124.1	25 46.0	83 56	124.4	25 20.9	84 55	124.7	24 55.9	84 55	125.0	24 30.8	84 55	125.3	24 05.6	84 55	125.6	23 40.4	84 54	125.9	8
9	26 02.4	83 56	122.9	25 37.5	83 56	123.2	25 12.7	83 56	123.5	24 47.7	83 56	123.8	24 22.8	83 56	124.1	23 57.8	83 56	124.4	23 32.8	83 55	124.7	23 07.7	84 55	125.0	9
50	25 28.5	82 57	121.9	25 03.8	82 57	122.3	24 39.0	83 57	122.6	24 14.2	83 56	122.9	23 49.4	83 56	123.2	23 24.5	83 56	123.5	22 59.6	83 56	123.8	22 34.7	83 56	124.1	50
1	24 54.2	82 58	121.0	24 29.6	82 57	121.4	24 05.0	82 57	121.7	23 40.3	82 57	122.0	23 15.6	82 57	122.3	22 50.9	83 57	122.6	22 26.1	83 56	122.9	22 01.3	83 56	123.2	1
2	24 19.7	82 58	120.1	23 55.2	82 58	120.5	23 30.7	82 58	120.8	23 06.1	82 58	121.1	22 41.5	82 57	121.4	22 16.9	82 57	121.7	21 52.2	82 57	122.0	21 27.5	82 57	122.3	2
3	23 44.8	81 59	119.2	23 20.4	81 58	119.6	22 56.0	81 58	119.9	22 31.6	82 58	120.2	22 07.1	82 58	120.5	21 42.5	82 58	120.8	21 18.0	82 58	121.1	20 53.4	82 57	121.4	3
4	23 09.6	81 59	118.4	22 45.4	81 59	118.7	22 21.0	81 59	119.0	21 56.7	81 59	119.3	21 32.3	81 58	119.6	21 07.9	81 58	119.9	20 43.5	82 58	120.3	20 19.0	82 58	120.6	4
55	22 34.1	80 60	117.5	22 10.0	81 59	117.8	21 45.8	81 59	118.1	21 21.5	81 59	118.4	20 57.3	81 59	118.8	20 33.0	81 59	119.1	20 08.6	81 59	119.4	19 44.3	81 58	119.7	55
6	21 58.4	80 60	116.6	21 34.3	80 60	116.9	21 10.2	80 60	117.3	20 46.1	81 60	117.6	20 21.9	81 59	117.9	19 57.7	81 59	118.2	19 33.5	81 59	118.5	19 09.2	81 59	118.8	6
7	21 22.4	80 60	115.8	20 58.4	80 60	116.1	20 34.4	80 60	116.4	20 10.4	80 60	116.7	19 46.3	80 60	117.0	19 22.2	80 60	117.4	18 58.1	80 59	117.7	18 33.9	81 59	118.0	7
8	20 46.1	79 61	114.9	20 22.2	80 61	115.2	19 58.3	80 61	115.6	19 34.4	80 60	115.9	19 10.4	80 60	116.2	18 46.4	80 60	116.5	18 22.4	80 60	116.8	17 58.3	80 60	117.1	8
9	20 09.5	79 61	114.1	19 45.8	79 61	114.4	19 22.0	79 61	114.7	18 58.1	80 61	115.0	18 34.3	80 61	115.4	18 10.4	80 61	115.7	17 46.4	80 60	116.0	17 22.5	80 60	116.3	9
60	19 32.8	79 62	113.2	19 09.1	79 62	113.5	18 45.4	79 61	113.9	18 21.6	79 61	114.2	17 57.9	79 61	114.5	17 34.1	79 61	114.8	17 10.2	80 61	115.2	16 46.4	80 61	115.5	60
1	18 55.8	79 62	112.4	18 32.2	79 62	112.7	18 08.6	79 62	113.0	17 44.9	79 62	113.4	17 21.2	79 61	113.7	16 57.5	79 61	114.0	16 33.8	79 61	114.3	16 10.0	79 61	114.6	1
2	18 18.5	78 62	111.6	17 55.0	78 62	111.9	17 31.5	78 62	112.2	17 07.9	79 62	112.5	16 44.3	79 62	112.9	16 20.7	79 62	113.2	15 57.1	79 62	113.5	15 33.4	79 61	113.8	2
3	17 41.1	78 63	110.7	17 17.7	78 63	111.1	16 54.2	78 62	111.4	16 30.7	78 62	111.7	16 07.2	78 62	112.0	15 43.7	79 62	112.4	15 20.1	79 62	112.7	14 56.5	79 62	113.0	3
4	17 03.4	78 63	109.9	16 40.1	78 63	110.3	16 16.7	78 63	110.6	15 53.3	78 63	110.9	15 29.9	78 63	111.2	15 06.5	78 62	111.6	14 43.0	78 62	111.9	14 19.5	78 62	112.2	4
65	16 25.6	77 63	109.1	16 02.3	78 63	109.4	15 39.0	78 63	109.8	15 15.7	78 63	110.1	14 52.4	78 63	110.4	14 29.0	78 63	110.7	14 05.6	78 63	111.1	13 42.2	78 62	111.4	65
6	15 47.6	77 64	108.3	15 24.4	77 64	108.6	15 01.2	77 63	109.0	14 37.9	78 63	109.3	14 14.7	78 63	109.6	13 51.4	78 63	109.9	13 28.0	78 63	110.3	13 04.7	78 63	110.6	6
7	15 09.4	77 64	107.5	14 46.3	77 64	107.8	14 23.1	77 64	108.2	13 59.9	77 64	108.5	13 36.8	77 63	108.8	13 13.5	77 63	109.1	12 50.3	78 63	109.5	12 27.0	78 63	109.8	7
8	14 31.0	77 64	106.7	14 08.0	77 64	107.0	13 44.9	77 64	107.4	13 21.8	77 64	107.7	12 58.7	77 64	108.0	12 35.5	77 64	108.4	12 12.3	77 64	108.7	11 49.2	77 63	109.0	8
9	13 52.5	77 64	105.9	13 29.5	77 64	106.3	13 06.5	77 64	106.6	12 43.5	77 64	106.9	12 20.4	77 64	107.2	11 57.3	77 64	107.6	11 34.2	77 64	107.9	11 11.1	77 64	108.2	9
70	13 13.8	76 65	105.1	12 50.9	76 65	105.5	12 27.9	77 65	105.8	12 05.0	77 64	106.1	11 42.0	77 64	106.5	11 19.0	77 64	106.8	10 55.9	77 64	107.1	10 32.9	77 64	107.4	70
1	12 35.0	76 65	104.4	12 12.1	76 65	104.7	11 49.2	76 65	105.0	11 26.3	76 65	105.3	11 03.4	76 65	105.7	10 40.5	77 64	106.0	10 17.5	77 64	106.3	9 54.5	77 64	106.7	1
2	11 56.0	76 65	103.6	11 33.2	76 65	103.9	11 10.4	76 65	104.2	10 47.5	76 65	104.6	10 24.7	76 65	104.9	10 01.8	76 65	105.2	9 38.9	76 65	105.6	9 16.0	76 64	105.9	2
3	11 16.9	76 65	102.8	10 54.2	76 65	103.1	10 31.4	76 65	103.5	10 08.6	76 65	103.8	9 45.8	76 65	104.1	9 23.0	76 65	104.5	9 00.1	76 65	104.8	8 37.3	76 65	105.1	3
4	10 37.7	76 66	102.0	10 15.0	76 65	102.4	9 52.3	76 65	102.7	9 29.6	76 65	103.0	9 06.8	76 65	103.4	8 44.0	76 65	103.7	8 21.2	76 65	104.0	7 58.4	76 65	104.3	4
75	9 58.4	75 66	101.3	9 35.7	76 66	101.6	9 13.1	76 66	101.9	8 50.4	76 65	102.3	8 27.7	76 65	102.6	8 05.0	76 65	102.9	7 42.2	76 65	103.2	7 19.5	76 65	103.6	75
6	9 19.0	75 66	100.5	8 56.4	75 66	100.8	8 33.7	75 66	101.2	8 11.1	75 66	101.5	7 48.4	76 66	101.8	7 25.8	76 66	102.2	7 03.1	76 65	102.5	6 40.4	76 65	102.8	6
7	8 39.4	75 66	99.7	8 16.9	75 66	100.1	7 54.3	75 66	100.4	7 31.7	75 66	100.7	7 09.1	75 66	101.1	6 46.5	75 66	101.4	6 23.8	75 66	101.7	6 01.2	76 66	102.1	7
8	7 59.8	75 66	99.0	7 37.3	75 66	99.3	7 14.8	75 66	99.6	6 52.2	75 66	100.0	6 29.6	75 66	100.3	6 07.1	75 66	100.6	5 44.5	75 66	101.0	5 21.9	75 66	101.3	8
9	7 20.1	75 66	98.2	6 57.6	75 66	98.6	6 35.1	75 66	98.9	6 12.6	75 66	99.2	5 50.1	75 66	99.6	5 27.6	75 66	99.9	5 05.0	75 66	100.2				9
80	6 40.3	75 66	97.5	6 17.9	75 66	97.8	5 55.4	75 66	98.1	5 33.0	75 66	98.5	5 10.5	75 66	98.8										80
1	6 00.5	75 66	96.7	5 38.1	75 66	97.0	5 15.6	75 66	97.4																1
2	5 20.6	75 67	96.0																						2

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Lat. 48°

H.A.	4° 00′ Alt.	Δd Δt	Az.	4° 30′ Alt.	Δd Δt	Az.	5° 00′ Alt.	Δd Δt	Az.	5° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	46 00.0	1.0 01	180.0	46 30.0	1.0 01	180.0	47 00.0	1.0 01	180.0	47 30.0	1.0 01	180.0
1	45 59.5	1.0 03	178.6	46 29.5	1.0 03	178.6	46 59.5	1.0 03	178.5	47 29.5	1.0 03	178.5
2	45 58.0	1.0 04	177.1	46 28.0	1.0 04	177.1	46 58.0	1.0 04	177.1	47 27.9	1.0 04	177.1
3	45 55.5	1.0 06	175.7	46 25.4	1.0 06	175.7	46 55.4	1.0 06	175.6	47 25.4	1.0 06	175.6
4	45 52.0	1.0 08	174.3	46 21.9	1.0 08	174.2	46 51.8	1.0 08	174.2	47 21.8	1.0 08	174.1
05	45 47.5	1.0 09	172.8	46 17.3	1.0 09	172.8	46 47.2	1.0 09	172.7	47 17.1	1.0 09	172.7
6	45 42.0	99 11	171.4	46 11.8	99 11	171.3	46 41.6	99 11	171.3	47 11.5	99 11	171.2
7	45 35.5	99 12	170.0	46 05.3	99 13	169.9	46 35.1	99 13	169.8	47 04.8	99 13	169.7
8	45 28.0	99 14	168.6	45 57.7	99 14	168.5	46 27.5	99 14	168.4	46 57.2	99 14	168.3
9	45 19.6	99 16	167.2	45 49.2	99 16	167.1	46 18.9	99 16	167.0	46 48.5	99 16	166.8
10	45 10.2	99 17	165.8	45 39.8	99 17	165.7	46 09.4	99 18	165.5	46 38.9	99 18	165.4
1	44 59.8	98 19	164.4	45 29.4	98 19	164.3	45 58.8	98 19	164.1	46 28.3	98 19	164.0
2	44 48.6	98 20	163.0	45 18.0	98 20	162.9	45 47.4	98 21	162.7	46 16.8	98 21	162.6
3	44 36.4	98 22	161.6	45 05.7	98 22	161.5	45 35.0	98 22	161.3	46 04.3	98 22	161.2
4	44 23.3	97 23	160.3	44 52.5	97 24	160.1	45 21.7	97 24	159.9	45 50.9	97 24	159.8
15	44 09.3	97 25	158.9	44 38.4	97 25	158.7	45 07.5	97 25	158.6	45 36.5	97 25	158.4
6	43 54.4	97 26	157.6	44 23.4	97 26	157.4	44 52.3	97 27	157.2	45 21.3	96 27	157.0
7	43 38.6	96 28	156.2	44 07.5	96 28	156.0	44 36.4	96 28	155.9	45 05.2	96 28	155.7
8	43 22.0	96 29	154.9	43 50.8	96 29	154.7	44 19.5	96 29	154.5	44 48.2	96 30	154.3
9	43 04.6	95 30	153.6	43 33.2	95 31	153.4	44 01.8	95 31	153.2	44 30.4	95 31	153.0
20	42 46.3	95 32	152.3	43 14.8	95 32	152.1	43 43.3	95 32	151.9	44 11.7	95 32	151.7
1	42 27.3	95 33	151.0	42 55.6	94 33	150.8	43 24.0	94 34	150.6	43 52.3	94 34	150.3
2	42 07.4	94 34	149.7	42 35.6	94 35	149.5	43 03.8	94 35	149.3	43 32.0	94 35	149.0
3	41 46.8	94 36	148.5	42 14.9	94 36	148.2	42 43.0	93 36	148.0	43 11.0	93 36	147.8
4	41 25.5	93 37	147.2	41 53.4	93 37	147.0	42 21.3	93 37	146.7	42 49.2	93 38	146.5
25	41 03.4	93 38	146.0	41 31.2	93 38	145.8	41 58.9	92 38	145.5	42 26.7	92 39	145.2
6	40 40.6	92 39	144.8	41 08.2	92 39	144.5	41 35.8	92 40	144.3	42 03.4	92 40	144.0
7	40 17.1	92 40	143.6	40 44.6	92 41	143.3	41 12.0	91 41	143.1	41 39.5	91 41	142.8
8	39 52.9	91 41	142.4	40 20.3	91 42	142.1	40 47.6	91 42	141.8	41 14.9	91 42	141.6
9	39 28.1	91 42	141.2	39 55.3	91 43	140.9	40 22.5	90 43	140.7	40 49.6	90 43	140.4
30	39 02.6	90 44	140.0	39 29.7	90 44	139.8	39 56.7	90 44	139.5	40 23.7	90 44	139.2
1	38 36.5	90 44	138.9	39 03.4	90 45	138.6	39 30.3	89 45	138.3	39 57.1	89 45	138.0
2	38 09.8	89 45	137.8	38 36.6	89 46	137.5	39 03.3	89 46	137.2	39 30.0	89 46	136.9
3	37 42.5	89 46	136.6	38 09.1	89 47	136.3	38 35.7	88 47	136.0	39 02.2	88 47	135.7
4	37 14.7	88 47	135.5	37 41.1	88 48	135.2	38 07.6	88 48	134.9	38 33.9	88 48	134.6
35	36 46.3	88 48	134.4	37 12.6	88 48	134.1	37 38.9	87 49	133.8	38 05.1	87 49	133.5
6	36 17.3	87 49	133.3	36 43.5	87 49	133.0	37 09.6	87 50	132.7	37 35.7	87 50	132.4
7	35 47.9	87 50	132.3	36 13.9	87 50	131.9	36 39.9	86 50	131.6	37 05.8	86 51	131.3
8	35 17.9	86 51	131.2	35 43.8	86 51	130.9	36 09.6	86 51	130.6	36 35.4	86 51	130.2
9	34 47.5	86 52	130.1	35 13.2	86 52	129.8	35 38.9	86 52	129.5	36 04.5	85 52	129.2
40	34 16.5	85 52	129.1	34 42.1	85 53	128.8	35 07.7	85 53	128.5	35 33.2	85 53	128.1
1	33 45.2	85 53	128.1	34 10.6	85 53	127.8	34 36.0	85 54	127.4	35 01.4	84 54	127.1
2	33 13.3	84 54	127.1	33 38.7	84 54	126.7	34 03.9	84 54	126.4	34 29.1	84 54	126.1
3	32 41.1	84 54	126.1	33 06.3	84 55	125.7	33 31.4	84 55	125.4	33 56.5	84 55	125.1
4	32 08.4	84 55	125.1	32 33.5	83 55	124.8	32 58.5	83 56	124.4	33 23.4	83 56	124.1
45	31 35.4	83 56	124.1	32 00.3	83 56	123.8	32 25.2	83 56	123.4	32 50.0	83 56	123.1
6	31 02.0	83 56	123.1	31 26.7	83 57	122.8	31 51.5	82 57	122.5	32 16.2	82 57	122.1
7	30 28.1	82 57	122.2	30 52.8	82 57	121.8	31 17.4	82 57	121.5	31 42.0	82 58	121.2
8	29 54.0	82 58	121.2	30 18.5	82 58	120.9	30 43.0	82 58	120.6	31 07.5	81 58	120.2
9	29 19.5	82 58	120.3	29 43.9	81 58	120.0	30 08.3	81 58	119.6	30 32.6	81 59	119.3
50	28 44.7	81 59	119.4	29 09.0	81 59	119.0	29 33.2	81 59	118.7	29 57.4	81 59	118.3
1	28 09.5	81 59	118.4	28 33.7	81 59	118.1	28 57.9	80 59	117.8	29 22.0	80 60	117.4
2	27 34.1	80 60	117.5	27 58.1	80 60	117.2	28 22.2	80 60	116.9	28 46.2	80 60	116.5
3	26 58.3	80 60	116.6	27 22.3	80 60	116.3	27 46.2	80 60	116.0	28 10.1	80 61	115.6
4	26 22.3	80 60	115.7	26 46.2	80 61	115.4	27 10.0	79 61	115.1	27 33.8	79 61	114.7
55	25 46.0	79 61	114.9	26 09.8	79 61	114.5	26 33.5	79 61	114.2	26 57.2	79 61	113.8
6	25 09.4	79 61	114.0	25 33.1	79 62	113.6	25 56.7	79 62	113.3	26 20.3	79 62	113.0
7	24 32.6	79 62	113.1	24 56.2	79 62	112.8	25 19.7	78 62	112.4	25 43.2	78 62	112.1
8	23 55.6	78 62	112.3	24 19.1	78 62	111.9	24 42.5	78 62	111.6	25 05.9	78 63	111.2
9	23 18.3	78 62	111.4	23 41.7	78 63	111.1	24 05.1	78 63	110.7	24 28.4	78 63	110.4
60	22 40.8	78 63	110.6	23 04.1	78 63	110.2	23 27.4	78 63	109.9	23 50.7	77 63	109.5
1	22 03.1	78 63	109.7	22 26.4	77 63	109.4	22 49.6	77 63	109.0	23 12.7	77 64	108.7
2	21 25.2	77 63	108.9	21 48.4	77 64	108.5	22 11.5	77 64	108.2	22 34.6	77 64	107.9
3	20 47.2	77 64	108.1	21 10.2	77 64	107.7	21 33.3	77 64	107.4	21 56.3	77 64	107.0
4	20 08.9	77 64	107.2	20 31.9	77 64	106.9	20 54.9	77 64	106.6	21 17.8	76 64	106.2
65	19 30.5	77 64	106.4	19 53.4	76 64	106.1	20 16.3	76 65	105.7	20 39.2	76 65	105.4
6	18 51.9	76 65	105.6	19 14.8	76 65	105.3	19 37.6	76 65	104.9	20 00.4	76 65	104.6
7	18 13.1	76 65	104.8	18 36.0	76 65	104.5	18 58.8	76 65	104.1	19 21.5	76 65	103.8
8	17 34.3	76 65	104.0	17 57.0	76 65	103.7	18 19.8	76 65	103.3	18 42.4	76 65	103.0
9	16 55.2	76 65	103.2	17 18.0	76 65	102.9	17 40.6	76 65	102.5	18 03.3	75 66	102.2
70	16 16.1	76 65	102.4	16 38.8	75 66	102.1	17 01.4	75 66	101.8	17 24.0	75 66	101.4
1	15 36.8	75 66	101.7	15 59.4	75 66	101.3	16 22.0	75 66	101.0	16 44.6	75 66	100.6
2	14 57.5	75 66	100.9	15 20.0	75 66	100.5	15 42.6	75 66	100.2	16 05.0	75 66	99.9
3	14 18.0	75 66	100.1	14 40.5	75 66	99.8	15 03.0	75 66	99.4	15 25.4	75 66	99.1
4	13 38.4	75 66	99.3	14 00.9	75 66	99.0	14 23.3	75 66	98.7	14 45.8	75 66	98.3
75	12 58.8	75 66	98.6	13 21.2	75 66	98.2	13 43.6	75 66	97.9	14 06.0	75 66	97.5
6	12 19.0	75 66	97.8	12 41.4	75 66	97.5	13 03.8	75 66	97.1	13 26.2	74 66	96.8
7	11 39.2	75 66	97.0	12 01.6	75 66	96.7	12 23.9	74 67	96.4	12 46.3	74 67	96.0
8	10 59.3	75 67	96.3	11 21.7	74 67	95.9	11 44.0	74 67	95.6	12 06.3	74 67	95.3
9	10 19.4	74 67	95.5	10 41.7	74 67	95.2	11 04.0	74 67	94.8	11 26.3	74 67	94.5
80	9 39.4	74 67	94.8	10 01.7	74 67	94.4	10 24.0	74 67	94.1	10 46.3	74 67	93.8
1	8 59.4	74 67	94.0	9 21.7	74 67	93.7	9 43.9	74 67	93.3	10 06.2	74 67	93.0
2	8 19.3	74 67	93.3	8 41.6	74 67	92.9	9 03.8	74 67	92.6	9 26.1	74 67	92.3
3	7 39.2	74 67	92.5	8 01.5	74 67	92.2	8 23.7	74 67	91.8	8 46.0	74 67	91.5
4	6 59.1	74 67	91.8	7 21.4	74 67	91.4	7 43.6	74 67	91.1	8 05.8	74 67	90.8
85	6 19.0	74 67	91.0	6 41.2	74 67	90.7	7 03.5	74 67	90.4	7 25.7	74 67	90.0
6	5 38.8	74 67	90.3	6 01.1	74 67	90.0	6 23.3	74 67	89.6	6 45.5	74 67	89.3
7				5 20.9	74 67	89.2	5 43.2	74 67	88.9	6 05.4	74 67	88.5
8							5 03.0	74 67	88.1	5 25.3	74 67	87.8
9												
90												

H.A.	6° 00′ Alt.	Δd Δt	Az.	6° 30′ Alt.	Δd Δt	Az.	7° 00′ Alt.	Δd Δt	Az.	7° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	48 00.0	1.0 01	180.0	48 30.0	1.0 01	180.0	49 00.0	1.0 01	180.0	49 30.0	1.0 01	180.0
1	47 59.5	1.0 03	178.5	48 29.5	1.0 03	178.5	48 59.5	1.0 03	178.5	49 29.5	1.0 03	178.5
2	47 57.9	1.0 04	177.0	48 27.9	1.0 04	177.0	48 57.9	1.0 04	177.0	49 27.9	1.0 04	176.9
3	47 55.3	1.0 06	175.5	48 25.3	1.0 06	175.5	48 55.2	1.0 06	175.5	49 25.2	1.0 06	175.4
4	47 51.7	1.0 08	174.1	48 21.6	1.0 08	174.0	48 51.5	1.0 08	174.0	49 21.5	1.0 08	173.9
05	47 47.0	1.0 09	172.6	48 16.9	1.0 10	172.5	48 46.8	1.0 10	172.5	49 16.7	1.0 10	172.4
6	47 41.3	99 11	171.1	48 11.2	99 11	171.0	48 41.0	99 11	171.0	49 10.8	99 12	170.9
7	47 34.6	99 13	169.6	48 04.4	99 13	169.6	48 34.2	99 13	169.5	49 03.9	99 13	169.4
8	47 26.9	99 15	168.2	47 56.6	99 15	168.1	48 26.3	99 15	168.0	48 56.0	99 15	167.9
9	47 18.2	99 16	166.7	47 47.8	99 16	166.6	48 17.5	99 16	166.5	48 47.1	99 17	166.4
10	47 08.5	99 18	165.3	47 38.0	99 18	165.2	48 07.6	98 18	165.0	48 37.1	98 18	164.9
1	46 57.8	98 19	163.9	47 27.3	98 20	163.7	47 56.7	98 20	163.6	48 26.2	98 20	163.4
2	46 46.2	98 21	162.4	47 15.5	98 21	162.3	47 44.9	98 21	162.1	48 14.2	98 22	162.0
3	46 33.6	98 23	161.0	47 02.8	98 23	160.9	47 32.1	97 23	160.7	48 01.3	97 23	160.5
4	46 20.0	97 24	159.6	46 49.2	97 24	159.4	47 18.3	97 24	159.3	47 47.5	97 25	159.1
15	46 05.6	97 26	158.2	46 34.6	97 26	158.0	47 03.7	97 26	157.8	47 32.7	97 26	157.7
6	45 50.2	96 27	156.8	46 19.2	96 27	156.6	46 48.1	96 28	156.4	47 16.9	96 28	156.2
7	45 34.0	96 28	155.5	46 02.8	96 29	155.3	46 31.6	96 29	155.1	47 00.3	96 29	154.8
8	45 16.9	96 30	154.1	45 45.6	96 30	153.9	46 14.2	95 30	153.7	46 42.8	95 31	153.5
9	44 58.9	95 31	152.8	45 27.5	95 32	152.5	45 56.0	95 32	152.3	46 24.5	95 22	152.1
20	44 40.2	95 33	151.4	45 08.5	95 33	151.2	45 36.9	94 33	151.0	46 05.2	94 33	150.7
1	44 20.5	94 34	150.1	44 48.8	94 34	149.9	45 17.0	94 34	149.6	45 45.2	94 35	149.4
2	44 00.1	94 35	148.8	44 28.2	94 36	148.6	44 56.3	94 36	148.3	45 24.4	93 36	148.1
3	43 39.0	93 37	147.5	44 06.9	93 37	147.3	44 34.8	93 37	147.0	45 02.7	93 37	146.8
4	43 17.0	93 38	146.2	43 44.8	93 38	146.0	44 12.6	93 38	145.7	44 40.3	92 39	145.5
25	42 54.4	92 39	145.0	43 22.0	92 39	144.7	43 49.6	92 40	144.4	44 17.2	92 40	144.2
6	42 31.0	92 40	143.7	42 58.5	92 40	143.5	43 25.9	91 41	143.2	43 53.3	91 41	142.9
7	42 06.9	91 41	142.5	42 34.2	91 42	142.2	43 01.5	91 42	141.9	43 28.8	91 42	141.7
8	41 42.1	91 42	141.3	42 09.3	91 43	141.0	42 36.4	90 43	140.7	43 03.5	90 43	140.4
9	41 16.7	90 43	140.1	41 43.7	90 44	139.8	42 10.7	90 44	139.5	42 37.6	90 44	139.2
30	40 50.6	90 44	138.9	41 17.5	90 45	138.6	41 44.3	89 45	138.3	42 11.1	89 45	138.0
1	40 23.9	89 46	137.7	40 50.6	89 46	137.4	41 17.3	89 46	137.1	41 43.9	89 46	136.8
2	39 56.6	89 46	136.6	40 23.2	88 47	136.3	40 49.7	88 47	136.0	41 16.2	88 47	135.7
3	39 28.7	88 47	135.4	39 55.1	88 48	135.1	40 21.5	88 48	134.8	40 47.8	88 48	134.5
4	39 00.2	88 49	134.3	39 26.5	87 49	134.0	39 52.7	87 49	133.7	40 18.9	87 49	133.4
35	38 31.2	87 49	133.2	38 57.4	87 49	132.9	39 23.4	87 50	132.6	39 49.4	87 50	132.2
6	38 01.7	87 50	132.1	38 27.7	86 50	131.8	38 53.6	86 51	131.4	39 19.4	86 51	131.1
7	37 31.7	86 51	131.0	37 57.5	86 51	130.7	38 23.2	86 51	130.4	38 49.0	86 52	130.0
8	37 01.1	86 52	129.9	37 26.8	85 52	129.6	37 52.4	85 52	129.3	38 18.0	85 52	128.9
9	36 30.1	85 52	128.9	36 55.6	85 53	128.5	37 21.1	85 53	128.2	37 46.5	85 53	127.9
40	35 58.6	85 53	127.8	36 24.0	85 53	127.5	36 49.3	84 54	127.2	37 14.6	84 54	126.8
1	35 26.7	84 54	126.8	35 51.9	84 54	126.5	36 17.1	84 54	126.1	36 42.2	84 55	125.8
2	34 54.3	84 55	125.8	35 19.4	84 55	125.4	35 44.5	83 55	125.1	36 09.4	83 55	124.7
3	34 21.5	83 55	124.8	34 46.5	83 56	124.4	35 11.4	83 56	124.1	35 36.3	83 56	123.7
4	33 48.3	83 56	123.8	34 13.2	83 56	123.4	34 38.0	83 56	123.1	35 02.7	82 57	122.7
45	33 14.8	82 57	122.8	33 39.5	82 57	122.4	34 04.1	82 57	122.1	34 28.7	82 57	121.7
6	32 40.8	82 57	121.8	33 05.4	82 57	121.5	33 29.9	82 58	121.1	33 54.4	81 58	120.8
7	32 06.5	82 58	120.8	32 31.0	81 58	120.5	32 55.4	81 58	120.1	33 19.7	81 58	119.8
8	31 31.9	81 58	119.9	31 56.2	81 58	119.5	32 20.5	81 59	119.2	32 44.7	81 59	118.8
9	30 56.9	81 59	118.9	31 21.1	81 59	118.6	31 45.3	80 59	118.2	32 09.4	80 59	117.9
50	30 21.6	80 59	118.0	30 45.7	80 60	117.7	31 09.8	80 60	117.3	31 33.8	80 60	117.0
1	29 46.0	80 60	117.1	30 10.0	80 60	116.7	30 33.9	80 60	116.4	30 57.8	80 60	116.0
2	29 10.1	80 60	116.2	29 34.0	80 60	115.8	29 57.8	79 61	115.5	30 21.6	79 61	115.1
3	28 33.9	79 61	115.3	28 57.7	79 61	114.9	29 21.5	79 61	114.6	29 45.1	79 61	114.2
4	27 57.5	79 61	114.4	28 21.2	79 61	114.0	28 44.8	79 62	113.7	29 08.4	78 62	113.3
55	27 20.8	79 62	113.5	27 44.4	79 62	113.1	28 07.9	78 62	112.8	28 31.4	78 62	112.4
6	26 43.9	78 62	112.6	27 07.3	78 62	112.3	27 30.8	78 62	111.9	27 54.2	78 62	111.6
7	26 06.7	78 62	111.7	26 30.1	78 62	111.4	26 53.4	78 63	111.0	27 16.7	78 63	110.7
8	25 29.3	78 63	110.9	25 52.6	78 63	110.5	26 15.8	77 63	110.2	26 39.0	77 63	109.8
9	24 51.7	77 63	110.0	25 14.9	77 63	109.7	25 38.1	77 63	109.8	26 01.2	77 63	109.0
60	24 13.8	77 63	109.2	24 37.0	77 64	108.8	25 00.1	77 64	108.5	25 23.1	77 64	108.1
1	23 35.8	77 64	108.3	23 58.9	77 64	108.0	24 21.9	77 64	107.6	24 44.9	76 64	107.3
2	22 57.6	77 64	107.5	23 20.6	77 64	107.2	23 43.6	76 64	106.8	24 06.5	76 64	106.5
3	22 19.3	76 64	106.7	22 42.2	76 64	106.3	23 05.0	76 64	106.0	23 27.9	76 65	105.6
4	21 40.7	76 64	105.9	22 03.6	76 65	105.5	22 26.4	76 65	105.2	22 49.1	76 65	104.8
65	21 02.0	76 65	105.1	21 24.8	76 65	104.7	21 47.5	76 65	104.4	22 10.2	76 65	104.0
6	20 23.2	76 65	104.2	20 45.9	76 65	103.9	21 08.6	76 65	103.5	21 31.2	75 65	103.2
7	19 44.2	76 65	103.4	20 06.9	75 65	103.1	20 29.5	75 65	102.7	20 52.1	75 65	102.4
8	19 05.1	75 65	102.6	19 27.7	75 65	102.3	19 50.3	75 66	102.0	20 12.8	75 66	101.6
9	18 25.9	75 66	101.9	18 48.4	75 66	101.5	19 10.9	75 66	101.2	19 33.4	75 66	100.8
70	17 46.5	75 66	101.1	18 09.0	75 66	100.7	18 31.5	75 66	100.4	18 53.9	75 66	100.0
1	17 07.1	75 66	100.3	17 29.5	75 66	99.9	17 52.0	75 66	99.6	18 14.3	75 66	99.2
2	16 27.5	75 66	99.5	16 49.9	75 66	99.2	17 12.3	75 66	98.8	17 34.7	74 66	98.5
3	15 47.9	75 66	98.7	16 10.3	75 66	98.4	16 32.6	74 66	98.0	16 54.9	74 66	97.7
4	15 08.1	75 66	98.0	15 30.5	74 66	97.6	15 52.8	74 66	97.3	16 15.1	74 66	96.9
75	14 28.3	74 66	97.2	14 50.7	74 66	96.9	15 13.0	74 67	96.5	15 35.2	74 67	96.2
6	13 48.5	74 67	96.4	14 10.8	74 67	96.1	14 33.0	74 67	95.7	14 55.3	74 67	95.4
7	13 08.6	74 67	95.7	13 30.8	74 67	95.3	13 53.1	74 67	95.0	14 15.3	74 67	94.6
8	12 28.6	74 67	94.9	12 50.8	74 67	94.6	13 13.1	74 67	94.2	13 35.2	74 67	93.9
9	11 48.6	74 67	94.2	12 10.8	74 67	93.8	12 33.0	74 67	93.5	12 55.2	74 67	93.1
80	11 08.5	74 67	93.4	11 30.7	74 67	93.1	11 52.9	74 67	92.7	12 15.1	74 67	92.4
1	10 28.4	74 67	92.7	10 50.6	74 67	92.3	11 12.8	74 67	92.0	11 35.0	74 67	91.6
2	9 48.3	74 67	91.9	10 10.5	74 67	91.6	10 32.7	74 67	91.2	10 54.8	74 67	90.9
3	9 08.2	74 67	91.2	9 30.4	74 67	90.8	9 52.5	74 67	90.5	10 14.7	74 67	90.1
4	8 28.0	74 67	90.4	8 50.2	74 67	90.1	9 12.4	74 67	89.7	9 34.5	74 67	89.4
85	7 47.9	74 67	89.7	8 10.1	74 67	89.3	8 32.2	74 67	89.0	8 54.4	74 67	88.7
6	7 07.7	74 67	88.9	7 29.9	74 67	88.6	7 52.1	74 67	88.3	8 14.3	74 67	87.9
7	6 27.6	74 67	88.2	6 49.8	74 67	87.9	7 12.0	74 67	87.5	7 34.1	74 67	87.2
8	5 47.5	74 67	87.5	6 09.7	74 67	87.1	6 31.9	74 67	86.8	6 54.1	74 67	86.4
9	5 07.4	74 67	86.7	5 29.6	74 67	86.4	5 51.8	74 67	86.0	6 14.0	74 67	85.7
90							5 11.8	74 67	85.3	5 34.0	74 67	85.0

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H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	38 00.0	1.0 01	180.0	37 30.0	1.0 01	180.0	37 00.0	1.0 01	180.0	36 30.0	1.0 01	180.0	36 00.0	1.0 01	180.0	35 30.0	1.0 01	180.0	35 00.0	1.0 01	180.0	34 30.0	1.0 01	180.0	00
1	37 59.6	1.0 02	178.7	37 29.6	1.0 02	178.7	36 59.6	1.0 02	178.8	36 29.6	1.0 02	178.8	35 59.6	1.0 02	178.8	35 29.6	1.0 02	178.8	34 59.6	1.0 02	178.8	34 29.6	1.0 02	178.8	1
2	37 58.2	1.0 04	177.5	37 28.2	1.0 04	177.5	36 58.3	1.0 04	177.5	36 28.3	1.0 04	177.5	35 58.3	1.0 04	177.5	35 28.3	1.0 04	177.6	34 58.3	1.0 04	177.6	34 28.3	1.0 04	177.6	2
3	37 56.0	1.0 05	176.2	37 26.0	1.0 05	176.2	36 56.1	1.0 05	176.3	36 26.1	1.0 05	176.3	35 56.1	1.0 05	176.3	35 26.2	1.0 05	176.3	34 56.2	1.0 05	176.4	34 26.2	1.0 05	176.4	3
4	37 52.9	1.0 07	174.9	37 23.0	1.0 07	175.0	36 53.0	1.0 07	175.0	36 23.1	1.0 06	175.1	35 53.1	1.0 06	175.1	35 23.2	1.0 06	175.1	34 53.2	1.0 06	175.2	34 23.3	1.0 06	175.2	4
05	37 48.9	1.0 08	173.7	37 19.0	1.0 08	173.7	36 49.1	1.0 08	173.8	36 19.2	1.0 08	173.8	35 49.3	1.0 08	173.9	35 19.3	1.0 08	173.9	34 49.4	1.0 08	174.0	34 19.5	1.0 08	174.0	05
6	37 44.1	1.0 10	172.4	37 14.2	1.0 10	172.5	36 44.3	1.0 09	172.5	36 14.4	1.0 09	172.6	35 44.5	1.0 09	172.6	35 14.6	1.0 09	172.7	34 44.8	1.0 09	172.7	34 14.9	1.0 09	172.8	6
7	37 38.3	99 11	171.2	37 08.5	99 11	171.2	36 38.7	99 11	171.3	36 08.8	99 11	171.4	35 39.0	99 11	171.4	35 09.1	1.0 11	171.5	34 39.3	1.0 11	171.5	34 09.4	1.0 10	171.6	7
8	37 31.8	99 12	169.9	37 02.0	99 12	170.0	36 32.2	99 12	170.1	36 02.4	99 12	170.1	35 32.6	99 12	170.2	35 02.8	99 12	170.3	34 32.9	99 12	170.3	34 03.1	99 12	170.4	8
9	37 24.3	99 14	168.7	36 54.6	99 14	168.8	36 24.8	99 14	168.8	35 55.1	99 14	168.9	35 25.3	99 13	169.0	34 55.6	99 13	169.1	34 25.8	99 13	169.1	33 56.0	99 13	169.2	9
10	37 16.0	99 15	167.4	36 46.3	99 15	167.5	36 16.6	99 15	167.6	35 46.9	99 15	167.7	35 17.2	99 15	167.8	34 47.5	99 15	167.9	34 17.8	99 15	168.0	33 48.1	99 15	168.0	10
1	37 06.8	99 17	166.2	36 37.2	99 17	166.3	36 07.6	99 16	166.4	35 38.0	99 16	166.5	35 08.3	99 16	166.6	34 38.7	99 16	166.7	34 09.1	99 16	166.8	33 39.4	99 16	166.9	1
2	36 56.8	98 18	165.0	36 27.3	98 18	165.1	35 57.7	99 18	165.2	35 28.2	99 18	165.3	34 58.6	99 18	165.4	34 29.0	99 17	165.5	33 59.5	99 17	165.6	33 29.9	99 17	165.7	2
3	36 46.0	98 19	163.7	36 16.5	98 19	163.8	35 47.0	98 19	164.0	35 17.6	98 19	164.1	34 48.1	98 19	164.2	34 18.6	98 19	164.3	33 49.1	98 19	164.4	33 19.6	98 19	164.5	3
4	36 34.3	98 21	162.5	36 04.9	98 21	162.6	35 35.5	98 20	162.8	35 06.1	98 20	162.9	34 36.7	98 20	163.0	34 07.3	98 20	163.1	33 37.9	98 20	163.2	33 08.5	98 20	163.4	4
15	36 21.9	98 22	161.3	35 52.6	98 22	161.4	35 23.2	98 22	161.6	34 53.9	98 22	161.7	34 24.6	98 22	161.8	33 55.3	98 21	161.9	33 25.9	98 21	162.1	32 56.6	98 21	162.2	15
6	36 08.6	97 23	160.1	35 39.4	97 23	160.2	35 10.2	97 23	160.4	34 40.9	97 23	160.5	34 11.7	97 23	160.6	33 42.4	98 23	160.8	33 13.2	98 22	160.9	32 43.9	98 22	161.0	6
7	35 54.5	97 25	158.9	35 25.4	97 25	159.0	34 56.3	97 24	159.2	34 27.1	97 24	159.3	33 58.0	97 24	159.5	33 28.8	97 24	159.6	32 59.7	97 24	159.8	32 30.5	97 24	159.9	7
8	35 39.7	97 26	157.7	35 10.7	97 26	157.9	34 41.6	97 26	158.0	34 12.6	97 26	158.2	33 43.5	97 25	158.3	33 14.5	97 25	158.5	32 45.4	97 25	158.6	32 16.3	97 25	158.8	8
9	35 24.1	96 27	156.5	34 55.1	96 27	156.7	34 26.2	96 27	156.8	33 57.3	96 27	157.0	33 28.3	97 27	157.2	32 59.4	97 26	157.3	32 30.4	97 26	157.5	32 01.4	97 26	157.6	9
20	35 07.7	96 29	155.3	34 38.9	96 28	155.5	34 10.1	96 28	155.7	33 41.2	96 28	155.8	33 12.4	96 28	156.0	32 43.5	96 28	156.2	32 14.6	96 27	156.3	31 45.7	96 27	156.5	20
1	34 50.6	96 30	154.2	34 21.9	96 30	154.4	33 53.2	96 29	154.5	33 24.4	96 29	154.7	32 55.7	96 29	154.9	32 26.9	96 29	155.0	31 58.2	96 29	155.2	31 29.4	96 28	155.4	1
2	34 32.7	95 31	153.0	34 04.1	95 31	153.2	33 35.5	95 31	153.4	33 06.9	96 30	153.6	32 38.3	95 30	153.7	32 09.6	96 30	153.9	31 41.0	96 30	154.1	31 12.3	96 30	154.3	2
3	34 14.1	95 32	151.9	33 45.7	95 32	152.1	33 17.2	95 32	152.2	32 48.7	95 32	152.4	32 20.2	95 31	152.6	31 51.6	95 31	152.8	31 23.1	95 31	153.0	30 54.5	95 31	153.2	3
4	33 54.9	94 33	150.7	33 26.5	95 33	150.9	32 58.1	95 33	151.1	32 29.8	95 33	151.3	32 01.4	95 32	151.5	31 32.9	95 32	151.7	31 04.5	95 32	151.9	30 36.0	95 32	152.1	4
25	33 34.9	94 34	149.6	33 06.7	94 34	149.8	32 38.4	94 34	150.0	32 10.1	94 34	150.2	31 41.9	94 34	150.4	31 13.6	94 33	150.6	30 45.2	94 33	150.8	30 16.9	94 33	151.0	25
6	33 14.2	94 36	148.5	32 46.1	94 35	148.7	32 18.0	94 35	148.9	31 49.9	94 35	149.1	31 21.7	94 35	149.3	30 53.5	94 34	149.5	30 25.3	94 34	149.7	29 57.1	94 34	149.9	6
7	32 52.9	93 37	147.4	32 24.9	93 36	147.6	31 56.9	93 36	147.8	31 28.9	93 36	148.0	31 00.9	94 36	148.2	30 32.8	94 36	148.4	30 04.7	94 35	148.6	29 36.6	94 35	148.8	7
8	32 30.9	93 38	146.3	32 03.1	93 37	146.5	31 35.2	93 37	146.7	31 07.3	93 37	146.9	30 39.4	93 37	147.1	30 11.5	93 37	147.3	29 43.5	93 36	147.5	29 15.5	93 36	147.8	8
9	32 08.3	92 39	145.2	31 40.6	92 39	145.4	31 12.9	93 38	145.6	30 45.1	93 38	145.8	30 17.3	93 38	146.1	29 49.5	93 38	146.3	29 21.6	93 37	146.5	28 53.8	93 37	146.7	9
30	31 45.1	92 40	144.1	31 17.5	92 40	144.3	30 49.9	92 39	144.5	30 22.2	92 39	144.8	29 54.6	92 39	145.0	29 26.9	92 39	145.2	28 59.2	92 38	145.4	28 31.4	92 38	145.7	30
1	31 21.2	91 41	143.0	30 53.8	92 41	143.2	30 26.3	92 40	143.5	29 58.8	92 40	143.7	29 31.2	92 40	143.9	29 03.7	92 40	144.2	28 36.1	92 39	144.4	28 08.5	92 39	144.6	1
2	30 56.8	91 42	141.9	30 29.4	91 42	142.2	30 02.1	91 41	142.4	29 34.7	91 41	142.7	29 07.3	91 41	142.9	28 39.9	91 41	143.1	28 12.4	92 40	143.4	27 44.9	92 40	143.6	2
3	30 31.7	91 43	140.9	30 04.5	91 42	141.1	29 37.3	91 42	141.4	29 10.1	91 42	141.6	28 42.8	91 42	141.9	28 15.5	91 42	142.1	27 48.2	91 41	142.3	27 20.8	91 41	142.6	3
4	30 06.1	90 44	139.8	29 39.1	90 43	140.1	29 12.0	90 43	140.3	28 44.9	90 43	140.6	28 17.7	91 43	140.8	27 50.5	91 42	141.1	27 23.4	91 42	141.3	26 56.1	91 42	141.5	4
35	29 40.0	90 44	138.8	29 13.0	90 44	139.1	28 46.1	90 44	139.3	28 19.1	90 44	139.6	27 52.1	90 44	139.8	27 25.0	90 43	140.1	26 58.0	90 43	140.3	26 30.9	90 43	140.5	35
6	29 13.3	89 45	137.8	28 46.5	89 45	138.0	28 19.6	89 45	138.3	27 52.8	90 45	138.6	27 25.9	90 45	138.8	26 59.0	90 44	139.1	26 32.1	90 44	139.3	26 05.1	90 44	139.5	6
7	28 46.0	89 46	136.8	28 19.4	89 46	137.0	27 52.7	89 46	137.3	27 26.0	89 46	137.6	26 59.2	89 45	137.8	26 32.4	89 45	138.1	26 05.6	89 45	138.3	25 38.8	89 45	138.6	7
8	28 18.3	88 47	135.8	27 51.7	88 47	136.0	27 25.2	89 47	136.3	26 58.6	89 46	136.6	26 32.0	89 46	136.8	26 05.3	89 46	137.1	25 38.7	89 46	137.3	25 12.0	89 46	137.6	8
9	27 50.0	88 48	134.8	27 23.6	88 48	135.0	26 57.2	88 47	135.3	26 30.7	88 47	135.6	26 04.3	88 47	135.8	25 37.7	88 47	136.1	25 11.2	89 47	136.3	24 44.6	89 46	136.6	9
40	27 21.3	87 49	133.8	26 55.0	88 48	134.1	26 28.7	88 48	134.3	26 02.4	88 48	134.6	25 36.0	88 48	134.9	25 09.7	88 48	135.1	24 43.2	88 47	135.4	24 16.8	88 47	135.6	40
1	26 52.1	87 49	132.8	26 25.9	87 49	133.1	25 59.8	87 49	133.4	25 33.6	87 49	133.6	25 07.3	87 49	133.9	24 41.1	88 48	134.2	24 14.8	88 48	134.4	23 48.5	88 48	134.7	1
2	26 22.4	87 50	131.8	25 56.4	87 50	132.1	25 30.3	87 50	132.4	25 04.3	87 50	132.7	24 38.2	87 49	132.9	24 12.1	87 49	133.2	23 45.9	87 49	133.5	23 19.7	87 49	133.7	2
3	25 52.2	86 51	130.9	25 26.4	86 51	131.2	25 00.5	86 51	131.4	24 34.5	87 50	131.7	24 08.6	87 50	132.0	23 42.6	87 50	132.3	23 16.5	87 50	132.5	22 50.5	87 49	132.8	3
4	25 21.7	86 52	129.9	24 55.9	86 51	130.2	24 30.1	86 51	130.5	24 04.3	86 51	130.8	23 38.5	86 51	131.0	23 12.6	86 51	131.3	22 46.7	86 50	131.6	22 20.8	86 50	131.9	4
45	24 50.7	85 52	129.0	24 25.0	85 52	129.3	23 59.4	86 52	129.6	23 33.7	86 52	129.8	23 08.0	86 52	130.1	22 42.3	86 51	130.4	22 16.5	86 51	130.7	21 50.7	86 51	131.0	45
6	24 19.3	85 53	128.0	23 53.8	85 53	128.3	23 28.2	85 53	128.6	23 02.7	85 52	128.9	22 37.1	85 52	129.2	22 11.5	85 52	129.5	21 45.8	86 52	129.8	21 20.2	86 52	130.0	6
7	23 47.4	84 54	127.1	23 22.1	85 53	127.4	22 56.7	85 53	127.7	22 31.2	85 53	128.0	22 05.8	85 53	128.3	21 40.3	85 53	128.6	21 14.8	85 52	128.8	20 49.2	85 52	129.1	7
8	23 15.2	84 54	126.2	22 50.0	84 54	126.5	22 24.7	84 54	126.8	21 59.4	84 54	127.1	21 34.1	85 53	127.4	21 08.7	85 53	127.7	20 43.3	85 53	127.9	20 17.9	85 53	128.2	8
9	22 42.7	84 55	125.3	22 17.5	84 55	125.6	21 52.4	84 55	125.9	21 27.2	84 54	126.2	21 02.0	84 54	126.5	20 36.7	84 54	126.8	20 11.5	84 54	127.0	19 46.2	84 54	127.3	9
50	22 09.7	83 56	124.4	21 44.7	83 55	124.7	21 19.7	84 55	125.0	20 54.6	84 55	125.3	20 29.5	84 55	125.6	20 04.4	84 55	125.9	19 39.2	84 54	126.2	19 14.0	84 54	126.4	50
1	21 36.4	83 56	123.5	21 11.5	83 56	123.8	20 46.6	83 56	124.1	20 21.7	83 56	124.4	19 56.7	83 55	124.7	19 31.7	83 55	125.0	19 06.6	84 55	125.3	18 41.6	84 55	125.6	1
2	21 02.8	83 57	122.6	20 38.0	83 56	122.9	20 13.2	83 56	123.2	19 48.4	83 56	123.5	19 23.5	83 56	123.8	18 58.6	83 56	124.1	18 33.7	83 56	124.4	18 08.7	83 55	124.7	2
3	20 28.8	82 57	121.7	20 04.1	82 57	122.0	19 39.4	82 57	122.3	19 14.7	82 57	122.6	18 50.0	83 56	122.9	18 25.2	83 56	123.2	18 00.4	83 56	123.5	17 35.6	83 56	123.8	3
4	19 54.5	82 58	120.9	19 29.9	82 58	121.2	19 05.4	82 57	121.5	18 40.7	82 57	121.8	18 16.1	82 57	122.1	17 51.4	82 57	122.4	17 26.8	82 57	122.7	17 02.0	82 56	123.0	4
55	19 19.9	81 58	120.0	18 55.4	81 58	120.3	18 31.0	82 58	120.6	18 06.5	82 58	120.9	17 41.9	82 57	121.2	17 17.4	82 57	121.5	16 52.8	82 57	121.8	16 28.2	82 57	122.1	55
6	18 44.9	81 59	119.1	18 20.6	81 59	119.5	17 56.3	81 58	119.8	17 31.9	81 58	120.1	17 07.4	81 58	120.4	16 43.0	82 58	120.7	16 18.5	82 58	121.0	15 54.0	82 57	121.3	6
7	18 09.7	81 59	118.3	17 45.5	81 59	118.6	17 21.3	81 59	118.9	16 57.0	81 59	119.2	16 32.7	81 58	119.5	16 08.3	81 58	119.8	15 44.0	81 58	120.1	15 19.6	81 58	120.4	7
8	17 34.2	80 60	117.5	17 10.1	80 59	117.8	16 46.0	81 59	118.1	16 21.8	81 59	118.4	15 57.6	81 59	118.7	15 33.4	81 59	119.0	15 09.1	81 59	119.3	14 44.8	81 58	119.6	8
9	16 58.5	80 60	116.6	16 34.5	80 60	116.9	16 10.4	80 60	117.2	15 46.3	80 60	117.6	15 22.2	80 59	117.9	14 58.1	80 59	118.2	14 33.9	81 59	118.5	14 09.8	81 59	118.8	9
60	16 22.5	80 60	115.8	15 58.5	80 60	116.1	15 34.6	80 60	116.4	15 10.6	80 60	116.7	14 46.6	80 60	117.0	14 22.6	80 60	117.3	13 58.5	80 59	117.7	13 34.4	80 59	118.0	60
1	15 46.2	79 61	115.0	15 22.4	79 61	115.3	14 58.5	80 61	115.6	14 34.6	80 60	115.9	14 10.7	80 60	116.2	13 46.8	80 60	116.5	13 22.8	80 60	116.8	12 58.9	80 60	117.1	1
2	15 09.7	79 61	114.1	14 45.9	79 61	114.5	14 22.2	79 61	114.8	13 58.4	79 61	115.1	13 34.6	79 61	115.4	13 10.7	79 60	115.7	12 46.9	80 60	116.0	12 23.0	80 60	116.3	2
3	14 32.9	79 62	113.3	14 09.3	79 62	113.6	13 45.6	79 61	114.0	13 21.9	79 61	114.3	12 58.2	79 61	114.6	12 34.4	79 61	114.9	12 10.7	79 61	115.2	11 46.9	79 61	115.5	3
4	13 55.9	78 62	112.5	13 32.4	79 62	112.8	13 08.8	79 62	113.2	12 45.2	79 62	113.5	12 21.6	79 61	113.8	11 57.9	79 61	114.1	11 34.2	79 61	114.4	11 10.5	79 61	114.7	4
65	13 18.7	78 62	111.7	12 55.3	78 62	112.0	12 31.8	78 62	112.3	12 08.2	78 62	112.7	11 44.7	79 62	113.0	11 21.1	79 62	113.3	10 57.6	79 62	113.6	10 34.0	79 61	113.9	65
6	12 41.3	78 63	110.9	12 17.9	78 63	111.2	11 54.5	78 62	111.6	11 31.1	78 62	111.9	11 07.6	78 62	112.2	10 44.2	78 62	112.5	10 20.7	78 62	112.8	9 57.2	78 62	113.1	6
7	12 03.7	78 63	110.1	11 40.4	78 63	110.4	11 17.1	78 63	110.8	10 53.7	78 63	111.1	10 30.4	78 62	111.4	10 07.0	78 62	111.7	9 43.6	78 62	112.0	9 20.1	78 62	112.4	7
8	11 25.9	77 63	109.3	11 02.7	77 63	109.6	10 39.4	78 63	110.0	10 16.2	78 63	110.3	9 52.9	78 63	110.6	9 29.6	78 63	110.9	9 06.2	78 63	111.2	8 42.9	78 62	111.6	8
9	10 48.0	77 64	108.5	10 24.8	77 63	108.9	10 01.6	77 63	109.2	9 38.4	77 63	109.5	9 15.2	77 63	109.8	8 52.0	77 63	110.2	8 28.7	78 63	110.5	8 05.5	78 63	110.8	9
70	10 09.8	77 64	107.8	9 46.7	77 64	108.1	9 23.6	77 64	108.4	9 00.5	77 64	108.7	8 37.3	77 63	109.1	8 14.2	77 63	109.4	7 51.0	77 63	109.7	7 27.8	77 63	110.0	70
1	9 31.5	77 64	107.0	9 08.5	77 64	107.3	8 45.4	77 64	107.6	8 22.4	77 64	108.0	7 59.3	77 64	108.3	7 36.2	77 64	108.6	7 13.1	77 63	108.9	6 50.0	77 63	109.2	1
2	8 53.0	76 64	106.2	8 30.1	77 64	106.5	8 07.1	77 64	106.9	7 44.1	77 64	107.2	7 21.1	77 64	107.5	6 58.1	77 64	107.8	6 35.1	77 64	108.2	6 12.0	77 64	108.5	2
3	8 14.4	76 65	105.4	7 51.5	76 64	105.8	7 28.6	76 64	106.1	7 05.7	76 64	106.4	6 42.7	76 64	106.7	6 19.8	77 64	107.1	5 56.8	77 64	107.4	5 33.9	77 64	107.7	3
4	7 35.6	76 65	104.7	7 12.8	76 65	105.0	6 49.9	76 65	105.3	6 27.1	76 65	105.6	6 04.2	76 64	106.0	5 41.3	76 64	106.3	5 18.4	76 64	106.6				4
75	6 56.7	76 65	103.9	6 33.9	76 65	104.2	6 11.2	76 65	104.6	5 48.4	76 65	104.9	5 25.5	76 65	105.2	5 02.7	76 64	105.5							75
6	6 17.7	76 65	103.1	5 55.0	76 65	103.5	5 32.2	76 65	103.8	5 09.5	76 65	104.1													6
7	5 38.5	76 65	102.4	5 15.9	76 65	102.7																			7

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Lat. 48°

H.A.	8° 00′ Alt.	Δd Δt	Az.	8° 30′ Alt.	Δd Δt	Az.	9° 00′ Alt.	Δd Δt	Az.	9° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	50 00.0	1.0 01	180.0	50 30.0	1.0 01	180.0	51 00.0	1.0 01	180.0	51 30.0	1.0 01	180.0
1	49 59.5	1.0 03	178.5	50 29.5	1.0 03	178.4	50 59.5	1.0 03	178.4	51 29.4	1.0 03	178.4
2	49 57.8	1.0 04	176.9	50 27.8	1.0 05	176.9	50 57.8	1.0 05	176.9	51 27.8	1.0 05	176.8
3	49 55.1	1.0 06	175.4	50 25.1	1.0 06	175.3	50 55.1	1.0 06	175.3	51 25.0	1.0 06	175.3
4	49 51.4	1.0 08	173.8	50 21.3	1.0 08	173.8	50 51.2	1.0 08	173.7	51 21.1	1.0 08	173.7
05	49 46.5	1.0 10	172.3	50 16.4	1.0 10	172.2	50 46.3	1.0 10	172.2	51 16.2	1.0 10	172.1
6	49 40.7	99 12	170.8	50 10.5	99 12	170.7	50 40.3	99 12	170.6	51 10.1	99 12	170.5
7	49 33.7	99 13	169.3	50 03.5	99 13	169.2	50 33.2	99 14	169.1	51 03.0	99 14	169.0
8	49 25.7	99 15	167.8	49 55.4	99 15	167.7	50 25.1	99 15	167.5	50 54.8	99 15	167.4
9	49 16.7	99 17	166.3	49 46.3	99 17	166.1	50 15.9	99 17	166.0	50 45.5	99 17	165.9
10	49 06.7	98 18	164.8	49 36.2	98 19	164.6	50 05.7	98 19	164.5	50 35.2	98 19	164.4
1	48 55.6	98 20	163.3	49 25.0	98 20	163.1	49 54.4	98 20	163.0	50 23.8	98 21	162.8
2	48 43.6	98 22	161.8	49 12.9	98 22	161.7	49 42.2	98 22	161.5	50 11.5	98 22	161.3
3	48 30.5	97 23	160.4	48 59.8	97 23	160.2	49 28.9	97 24	160.0	49 58.1	97 24	159.8
4	48 16.6	97 25	158.9	48 45.7	97 25	158.7	49 14.7	97 25	158.5	49 43.8	97 26	158.3
15	48 01.7	97 26	157.5	48 30.6	97 27	157.3	48 59.6	96 27	157.1	49 28.5	96 27	156.9
6	47 45.8	96 28	156.0	48 14.6	96 28	155.8	48 43.5	96 28	155.6	49 12.3	96 29	155.4
7	47 29.1	96 29	154.6	47 57.8	96 30	154.4	48 26.4	96 30	154.2	48 55.1	95 30	154.0
8	47 11.4	95 31	153.2	47 40.0	95 31	153.0	48 08.5	95 31	152.8	48 37.0	95 32	152.5
9	46 52.9	95 32	151.9	47 21.3	95 32	151.6	47 49.7	95 33	151.4	48 18.1	94 33	151.1
20	46 33.5	94 34	150.5	47 01.8	94 34	150.2	47 30.1	94 34	150.0	47 58.3	94 34	149.7
1	46 13.4	94 35	149.1	46 41.5	94 35	148.9	47 09.6	94 36	148.6	47 37.6	93 36	148.4
2	45 52.4	93 36	147.8	46 20.3	93 37	147.5	46 48.3	93 37	147.3	47 16.2	93 37	147.0
3	45 30.6	93 38	146.5	45 58.4	93 38	146.2	46 26.2	93 38	145.9	46 53.9	92 38	145.7
4	45 08.0	92 39	145.2	45 35.7	92 39	144.9	46 03.3	92 39	144.6	46 30.9	92 40	144.3
25	44 44.7	92 40	143.9	45 12.2	92 40	143.6	45 39.7	91 41	143.3	46 07.1	91 41	143.0
6	44 20.7	91 41	142.6	44 48.1	91 41	142.3	45 15.4	91 42	142.0	45 42.6	91 42	141.7
7	43 56.0	91 42	141.4	44 23.2	91 43	141.1	44 50.3	90 43	140.8	45 17.4	90 43	140.5
8	43 30.6	90 43	140.1	43 57.6	90 44	139.8	44 24.6	90 44	139.5	44 51.5	90 44	139.2
9	43 04.5	90 44	138.9	43 31.4	89 45	138.6	43 58.2	89 45	138.3	44 25.0	89 45	138.0
30	42 37.8	89 46	137.7	43 04.5	89 46	137.4	43 31.2	89 46	137.1	43 57.8	89 46	136.8
1	42 10.5	89 47	136.5	42 37.0	88 47	136.2	43 03.5	88 47	135.9	43 30.0	88 47	135.6
2	41 42.6	88 48	135.3	42 09.0	88 48	135.0	42 35.3	88 48	134.7	43 01.5	87 48	134.4
3	41 14.1	87 48	134.2	41 40.3	87 49	133.9	42 06.5	87 49	133.5	42 32.6	87 49	133.2
4	40 45.0	87 49	133.0	41 11.1	87 50	132.7	41 37.1	87 50	132.4	42 03.0	86 50	132.0
35	40 15.4	86 50	131.9	40 41.3	86 50	131.6	41 07.1	86 51	131.2	41 32.9	86 51	130.9
6	39 45.3	86 51	130.8	40 11.0	86 51	130.5	40 36.7	86 52	130.1	41 02.3	85 52	129.8
7	39 14.6	85 52	129.7	39 40.2	85 52	129.4	40 05.7	85 52	129.0	40 31.2	85 53	128.7
8	38 43.5	85 53	128.6	39 08.9	85 53	128.3	39 34.3	85 53	127.9	39 59.6	84 53	127.6
9	38 11.9	84 53	127.5	38 37.2	84 54	127.2	39 02.4	84 54	126.8	39 27.6	84 54	126.5
40	37 39.8	84 54	126.5	38 05.0	84 54	126.1	38 30.1	84 55	125.8	38 55.1	83 55	125.4
1	37 07.3	83 55	125.4	37 32.3	83 55	125.1	37 57.3	83 55	124.7	38 22.2	83 56	124.4
2	36 34.4	83 56	124.4	36 59.3	83 56	124.1	37 24.1	83 56	123.7	37 48.8	82 56	123.3
3	36 01.1	83 56	123.4	36 25.8	82 56	123.0	36 50.5	82 57	122.7	37 15.1	82 57	122.3
4	35 27.3	82 57	122.4	35 51.9	82 57	122.0	36 16.5	82 57	121.7	36 41.0	81 57	121.3
45	34 53.3	82 57	121.4	35 17.7	81 58	121.0	35 42.1	81 58	120.7	36 06.5	81 58	120.3
6	34 18.8	81 58	120.4	34 43.2	81 58	120.1	35 07.4	81 58	119.7	35 31.7	81 59	119.3
7	33 44.0	81 59	119.4	34 08.2	81 59	119.1	34 32.4	80 59	118.7	34 56.5	80 59	118.4
8	33 08.9	80 59	118.5	33 33.0	80 59	118.1	33 57.0	80 59	117.8	34 21.0	80 60	117.4
9	32 33.4	80 60	117.5	32 57.4	80 60	117.2	33 21.4	80 60	116.8	33 45.2	79 60	116.5
50	31 57.7	80 60	116.6	32 21.6	79 60	116.2	32 45.4	79 60	115.9	33 09.1	79 61	115.5
1	31 21.6	79 61	115.7	31 45.4	79 61	115.3	32 09.1	79 61	115.0	32 32.8	79 61	114.6
2	30 45.3	79 61	114.8	31 09.0	79 61	114.4	31 32.6	79 61	114.0	31 56.1	78 61	113.7
3	30 08.7	79 61	113.9	30 32.3	78 62	113.5	30 55.8	78 62	113.1	31 19.2	78 62	112.8
4	29 31.9	78 62	113.0	29 55.4	78 62	112.6	30 18.8	78 62	112.2	30 42.1	78 62	111.9
55	28 54.8	78 62	112.1	29 18.2	78 62	111.7	29 41.5	78 62	111.4	30 04.7	77 63	111.0
6	28 17.5	78 63	111.2	28 40.8	77 63	110.8	29 04.0	77 63	110.5	29 27.1	77 63	110.1
7	27 39.9	77 63	110.3	28 03.1	77 63	110.0	28 26.3	77 63	109.6	28 49.3	77 63	109.2
8	27 02.2	77 63	109.5	27 25.3	77 63	109.1	27 48.3	77 64	108.7	28 11.3	77 64	108.4
9	26 24.2	77 64	108.6	26 47.3	77 64	108.3	27 10.2	76 64	107.9	27 33.1	76 64	107.5
60	25 46.1	77 64	107.8	26 09.0	76 64	107.4	26 31.9	76 64	107.1	26 54.8	76 64	106.7
1	25 07.8	76 64	106.9	25 30.6	76 64	106.6	25 53.5	76 64	106.2	26 16.2	76 64	105.9
2	24 29.3	76 64	106.1	24 52.1	76 65	105.7	25 14.8	76 65	105.4	25 37.5	76 65	105.0
3	23 50.6	76 65	105.3	24 13.4	76 65	104.9	24 36.0	76 65	104.6	24 58.7	75 65	104.2
4	23 11.8	76 65	104.5	23 34.5	75 65	104.1	23 57.1	75 65	103.7	24 19.7	75 65	103.4
65	22 32.9	75 65	103.6	22 55.5	75 65	103.3	23 18.0	75 65	102.9	23 40.6	75 65	102.6
6	21 53.8	75 65	102.8	22 16.4	75 65	102.5	22 38.9	75 66	102.1	23 01.3	75 66	101.8
7	21 14.6	75 66	102.0	21 37.1	75 66	101.7	21 59.5	75 66	101.3	22 21.9	75 66	101.0
8	20 35.3	75 66	101.2	20 57.7	75 66	100.9	21 20.1	75 66	100.5	21 42.5	74 66	100.2
9	19 55.9	75 66	100.5	20 18.3	75 66	100.1	20 40.6	74 66	99.7	21 02.9	74 66	99.4
70	19 16.3	75 66	99.7	19 38.7	74 66	99.3	20 01.0	74 66	99.0	20 23.3	74 66	98.6
1	18 36.7	74 66	98.9	18 59.0	74 66	98.5	19 21.3	74 66	98.2	19 43.5	74 66	97.8
2	17 57.0	74 66	98.1	18 19.3	74 66	97.8	18 41.5	74 66	97.4	19 03.7	74 66	97.1
3	17 17.2	74 66	97.3	17 39.5	74 66	97.0	18 01.7	74 66	96.6	18 23.8	74 67	96.3
4	16 37.4	74 67	96.6	16 59.6	74 67	96.2	17 21.8	74 67	95.9	17 43.9	74 67	95.5
75	15 57.4	74 67	95.8	16 19.6	74 67	95.5	16 41.8	74 67	95.1	17 03.9	74 67	94.8
6	15 17.5	74 67	95.0	15 39.7	74 67	94.7	16 01.8	74 67	94.3	16 23.9	74 67	94.0
7	14 37.5	74 67	94.3	14 59.6	74 67	93.9	15 21.7	74 67	93.6	15 43.8	74 67	93.2
8	13 57.4	74 67	93.5	14 19.5	74 67	93.2	14 41.7	74 67	92.8	15 03.7	74 67	92.5
9	13 17.3	74 67	92.8	13 39.4	74 67	92.4	14 01.5	74 67	92.1	14 23.6	73 67	91.7
80	12 37.2	74 67	92.0	12 59.3	74 67	91.7	13 21.4	74 67	91.3	13 43.5	73 67	91.0
1	11 57.1	74 67	91.3	12 19.2	74 67	90.9	12 41.3	74 67	90.6	13 03.3	73 67	90.2
2	11 16.9	74 67	90.5	11 39.0	74 67	90.2	12 01.1	74 67	89.9	12 23.2	73 67	89.5
3	10 36.8	74 67	89.8	10 58.9	74 67	89.5	11 21.0	74 67	89.1	11 43.0	73 67	88.8
4	9 56.6	74 67	89.1	10 18.8	74 67	88.7	10 40.8	74 67	88.4	11 02.9	74 67	88.0
85	9 16.5	74 67	88.3	9 38.6	74 67	88.0	10 00.7	74 67	87.6	10 22.8	74 67	87.3
6	8 36.4	74 67	87.6	8 58.5	74 67	87.2	9 20.6	74 67	86.9	9 42.7	74 67	86.6
7	7 56.3	74 67	86.8	8 18.4	74 67	86.5	8 40.5	74 67	86.2	9 02.6	74 67	85.8
8	7 16.2	74 67	86.1	7 38.4	74 67	85.8	8 00.5	74 67	85.4	8 22.6	74 67	85.1
9	6 36.2	74 67	85.4	6 58.4	74 67	85.0	7 20.5	74 67	84.7	7 42.6	74 67	84.3
90	5 56.2	74 67	84.6	6 18.4	74 67	84.3	6 40.6	74 66	84.0	7 02.7	74 66	83.6

H.A.	10° 00′ Alt.	Δd Δt	Az.	10° 30′ Alt.	Δd Δt	Az.	11° 00′ Alt.	Δd Δt	Az.	11° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	52 00.0	1.0 01	180.0	52 30.0	1.0 01	180.0	53 00.0	1.0 01	180.0	53 30.0	1.0 01	180.0
1	51 59.4	1.0 03	178.4	52 29.4	1.0 03	178.4	52 59.4	1.0 03	178.4	53 29.4	1.0 03	178.4
2	51 57.8	1.0 05	176.8	52 27.7	1.0 05	176.8	52 57.7	1.0 05	176.7	53 27.7	1.0 05	176.7
3	51 55.0	1.0 07	175.2	52 24.9	1.0 07	175.2	52 54.9	1.0 07	175.1	53 24.8	1.0 07	175.1
4	51 51.1	1.0 08	173.6	52 21.0	1.0 08	173.6	52 50.9	1.0 09	173.5	53 20.8	1.0 09	173.4
05	51 46.0	1.0 10	172.0	52 15.9	1.0 10	172.0	52 45.8	1.0 10	171.9	53 15.6	1.0 10	171.8
6	51 39.9	99 12	170.4	52 09.7	99 12	170.4	52 39.5	99 12	170.3	53 09.3	99 12	170.2
7	51 32.7	99 14	168.9	52 02.4	99 14	168.8	52 32.2	99 14	168.7	53 01.9	99 14	168.5
8	51 24.4	99 16	167.3	51 54.1	99 16	167.2	52 23.7	99 16	167.1	52 53.4	99 16	166.9
9	51 15.1	99 17	165.8	51 44.6	99 18	165.6	52 14.2	99 18	165.5	52 43.8	98 18	165.3
10	51 04.7	98 19	164.2	51 34.1	98 19	164.1	52 03.6	98 19	163.9	52 33.1	98 20	163.7
1	50 53.2	98 21	162.7	51 22.6	98 21	162.5	51 52.0	98 21	162.3	52 21.3	98 21	162.2
2	50 40.8	98 22	161.1	51 10.0	98 23	161.0	51 39.3	97 23	160.8	52 08.5	97 23	160.6
3	50 27.3	97 24	159.6	50 56.4	97 24	159.5	51 25.5	97 25	159.3	51 54.6	97 25	159.1
4	50 12.8	97 26	158.1	50 41.8	97 26	157.9	51 10.8	97 26	157.7	51 39.8	97 26	157.5
15	49 57.4	96 27	156.7	50 26.3	96 28	156.4	50 55.1	96 28	156.2	51 24.0	96 28	156.0
6	49 41.0	96 29	155.2	50 09.8	96 29	155.0	50 38.5	96 29	154.7	51 07.2	96 30	154.5
7	49 23.7	95 30	153.7	49 52.3	95 31	153.5	50 20.9	95 31	153.3	50 49.4	95 31	153.0
8	49 05.5	95 32	152.3	49 34.0	95 32	152.1	50 02.4	95 32	151.8	50 30.8	95 33	151.6
9	48 46.4	94 33	150.9	49 14.7	94 34	150.6	49 43.0	94 34	150.4	50 11.2	94 34	150.1
20	48 26.4	94 35	149.5	48 54.6	94 35	149.2	49 22.7	94 35	149.0	49 50.8	93 36	148.7
1	48 05.6	93 36	148.1	48 33.6	93 36	147.8	49 01.6	93 37	147.6	49 29.5	93 37	147.3
2	47 44.0	93 37	146.7	48 11.8	93 38	146.5	48 39.6	93 38	146.2	49 07.4	92 38	145.9
3	47 21.6	92 39	145.4	47 49.3	92 39	145.1	48 16.9	92 39	144.8	48 44.4	92 39	144.5
4	46 58.4	92 40	144.1	47 25.9	92 40	143.8	47 53.4	91 40	143.5	48 20.7	91 41	143.2
25	46 34.5	91 41	142.7	47 01.8	91 41	142.4	47 29.1	91 42	142.1	47 56.3	91 42	141.8
6	46 09.8	91 42	141.4	46 37.0	90 43	141.1	47 04.1	90 43	140.8	47 31.1	90 43	140.5
7	45 44.4	90 43	140.2	46 11.4	90 44	139.8	46 38.4	90 44	139.5	47 05.2	89 44	139.2
8	45 18.4	89 45	138.9	45 45.2	89 45	138.6	46 12.0	89 45	138.3	46 38.7	89 45	137.9
9	44 51.7	89 46	137.7	45 18.3	89 46	137.3	45 44.9	89 46	137.0	46 11.4	88 46	136.7
30	44 24.3	88 47	136.4	44 50.8	88 47	136.1	45 17.2	88 47	135.8	45 43.6	88 47	135.4
1	43 56.3	88 48	135.2	44 22.6	88 48	134.9	44 48.9	87 48	134.5	45 15.1	87 48	134.2
2	43 27.8	87 49	134.0	43 53.9	87 49	133.7	44 20.0	87 49	133.3	44 46.0	87 49	133.0
3	42 58.6	87 50	132.9	43 24.6	87 50	132.5	43 50.5	86 50	132.2	44 16.4	86 50	131.8
4	42 28.9	86 50	131.7	42 54.7	86 51	131.3	43 20.5	86 51	131.0	43 46.2	86 51	130.6
35	41 58.6	86 51	130.6	42 24.3	85 52	130.2	42 49.9	85 52	129.8	43 15.4	85 52	129.5
6	41 27.9	85 52	129.4	41 53.4	85 52	129.1	42 18.8	85 53	128.7	42 44.2	84 53	128.4
7	40 56.6	85 53	128.3	41 22.0	84 53	128.0	41 47.3	84 53	127.6	42 12.5	84 54	127.2
8	40 24.9	84 54	127.2	40 50.1	84 54	126.9	41 15.2	84 54	126.5	41 40.3	83 54	126.1
9	39 52.7	84 54	126.1	40 17.7	83 55	125.8	40 42.7	83 55	125.4	41 07.6	83 55	125.0
40	39 20.0	83 55	125.1	39 45.0	83 55	124.7	40 09.8	83 56	124.3	40 34.5	82 56	124.0
1	38 47.0	83 56	124.0	39 11.7	82 56	123.7	39 36.4	82 56	123.3	40 01.0	82 57	122.9
2	38 13.5	82 56	123.0	38 38.1	82 57	122.6	39 02.7	82 57	122.3	39 27.1	81 57	121.9
3	37 39.6	82 57	122.0	38 04.1	81 57	121.6	38 28.5	81 58	121.2	38 52.9	81 58	120.8
4	37 05.4	81 58	121.0	37 29.7	81 58	120.6	37 54.0	81 58	120.2	38 18.2	81 58	119.8
45	36 30.8	81 58	120.0	36 55.0	81 58	119.6	37 19.1	80 59	119.2	37 43.2	80 59	118.8
6	35 55.8	80 59	119.0	36 19.9	80 59	118.6	36 43.9	80 59	118.2	37 07.9	80 59	117.9
7	35 20.5	80 59	118.0	35 44.5	80 60	117.6	36 08.4	80 60	117.3	36 32.2	79 60	116.9
8	34 44.9	80 60	117.0	35 08.8	79 60	116.7	35 32.6	79 60	116.3	35 56.3	79 60	115.9
9	34 09.0	79 60	116.1	34 32.8	79 61	115.7	34 56.4	79 61	115.3	35 20.0	79 61	115.0
50	33 32.8	79 61	115.2	33 56.4	79 61	114.8	34 20.0	78 61	114.4	34 43.5	78 61	114.0
1	32 56.3	78 61	114.2	33 19.9	78 61	113.9	33 43.3	78 62	113.5	34 06.7	78 62	113.1
2	32 19.6	78 62	113.3	32 43.0	78 62	112.9	33 06.4	78 62	112.6	33 29.6	77 63	112.2
3	31 42.6	78 62	112.4	32 05.9	78 62	112.0	32 29.2	77 62	111.7	32 52.3	77 63	111.3
4	31 05.4	77 62	111.5	31 28.6	77 63	111.1	31 51.7	77 63	110.8	32 14.8	77 63	110.4
55	30 27.9	77 63	110.6	30 51.0	77 63	110.3	31 14.1	77 63	109.9	31 37.1	77 63	109.5
6	29 50.2	77 63	109.7	30 13.3	77 63	109.4	30 36.2	76 63	109.0	30 59.1	76 64	108.6
7	29 12.3	77 63	108.9	29 35.3	76 64	108.5	29 58.2	76 64	108.1	30 21.0	76 64	107.8
8	28 34.2	76 64	108.0	28 57.1	76 64	107.6	29 19.9	76 64	107.3	29 42.7	76 64	106.9
9	27 56.0	76 64	107.2	28 18.8	76 64	106.8	28 41.5	76 64	106.4	29 04.2	75 64	106.1
60	27 17.5	76 64	106.3	27 40.2	76 64	106.0	28 02.9	75 65	105.6	28 25.5	75 65	105.2
1	26 38.9	76 65	105.5	27 01.6	75 65	105.1	27 24.2	75 65	104.7	27 46.7	75 65	104.4
2	26 00.2	75 65	104.7	26 22.7	75 65	104.3	26 45.3	75 65	103.9	27 07.7	75 65	103.5
3	25 21.2	75 65	103.8	25 43.8	75 65	103.5	26 06.2	75 65	103.1	26 28.6	75 65	102.7
4	24 42.2	75 65	103.0	25 04.6	75 65	102.7	25 27.1	75 65	102.3	25 49.4	74 66	101.9
65	24 03.0	75 66	102.2	24 25.4	75 66	101.8	24 47.8	74 66	101.5	25 10.1	74 66	101.1
6	23 23.7	75 66	101.4	23 46.1	74 66	101.0	24 08.4	74 66	100.7	24 30.6	74 66	100.3
7	22 44.3	74 66	100.6	23 06.6	74 66	100.2	23 28.9	74 66	99.9	23 51.1	74 66	99.5
8	22 04.8	74 66	99.8	22 27.1	74 66	99.5	22 49.3	74 66	99.1	23 11.4	74 66	98.7
9	21 25.2	74 66	99.0	21 47.4	74 66	98.7	22 09.6	74 66	98.3	22 31.7	74 66	97.9
70	20 45.5	74 66	98.2	21 07.7	74 66	97.9	21 29.8	74 66	97.5	21 51.9	74 66	97.2
1	20 05.7	74 66	97.5	20 27.9	74 66	97.1	20 50.0	74 66	96.7	21 12.0	73 67	96.4
2	19 25.9	74 66	96.7	19 48.0	74 67	96.3	20 10.1	74 67	96.0	20 32.1	73 67	95.6
3	18 46.0	74 67	95.9	19 08.1	74 67	95.6	19 30.1	73 67	95.2	19 52.1	73 67	94.8
4	18 06.0	74 67	95.2	18 28.1	73 67	94.8	18 50.1	73 67	94.4	19 12.1	73 67	94.1
75	17 26.0	74 67	94.4	17 48.1	73 67	94.0	18 10.1	73 67	93.7	18 32.0	73 67	93.3
6	16 46.0	73 67	93.6	17 08.0	73 67	93.3	17 30.0	73 67	92.9	17 51.9	73 67	92.6
7	16 05.9	73 67	92.9	16 27.9	73 67	92.5	16 49.9	73 67	92.2	17 11.8	73 67	91.8
8	15 25.8	73 67	92.1	15 47.8	73 67	91.8	16 09.8	73 67	91.4	16 31.7	73 67	91.1
9	14 45.6	73 67	91.4	15 07.6	73 67	91.0	15 29.6	73 67	90.7	15 51.5	73 67	90.3
80	14 05.5	73 67	90.6	14 27.5	73 67	90.3	14 49.5	73 67	89.9	15 11.4	73 67	89.6
1	13 25.4	73 67	89.9	13 47.3	73 67	89.6	14 09.3	73 67	89.2	14 31.3	73 67	88.8
2	12 45.2	73 67	89.2	13 07.2	73 67	88.8	13 29.2	73 67	88.5	13 51.1	73 67	88.1
3	12 05.1	73 67	88.4	12 27.1	73 67	88.1	12 49.1	73 67	87.7	13 11.0	73 67	87.4
4	11 24.9	73 67	87.7	11 47.0	73 67	87.3	12 08.9	73 67	87.0	12 30.9	73 67	86.6
85	10 44.8	73 67	86.9	11 06.9	73 67	86.6	11 28.9	73 67	86.3	11 50.8	73 67	85.9
6	10 04.8	74 67	86.2	10 26.8	73 67	85.9	10 48.8	73 67	85.5	11 10.8	73 67	85.2
7	9 24.7	74 67	85.5	9 46.8	73 67	85.1	10 08.8	73 67	84.8	10 30.8	73 67	84.4
8	8 44.7	74 67	84.7	9 06.8	74 67	84.4	9 28.9	74 67	84.1	9 50.9	73 66	83.7
9	8 04.8	74 66	84.0	8 26.9	74 66	83.7	8 49.0	74 66	83.3	9 11.0	74 66	83.0
90	7 24.9	74 66	83.3	7 47.0	74 66	82.9	8 09.1	74 66	82.6	8 31.2	74 66	82.2

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H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
00	34 00.0	1.0 01	180.0	33 30.0	1.0 01	180.0	33 00.0	1.0 01	180.0	32 30.0	1.0 01	180.0	32 00.0	1.0 01	180.0	31 30.0	1.0 01	180.0	31 00.0	1.0 01	180.0	30 30.0	1.0 01	180.0	00
1	33 59.6	1.0 02	178.8	33 29.6	1.0 02	178.8	32 59.6	1.0 02	178.8	32 29.6	1.0 02	178.8	31 59.6	1.0 02	178.8	31 29.6	1.0 02	178.8	30 59.6	1.0 02	178.9	30 29.6	1.0 02	178.9	1
2	33 58.3	1.0 04	177.6	33 28.3	1.0 03	177.6	32 58.4	1.0 03	177.6	32 28.4	1.0 03	177.7	31 58.4	1.0 03	177.7	31 28.4	1.0 03	177.7	30 58.4	1.0 03	177.7	30 28.4	1.0 03	177.7	2
3	33 56.2	1.0 05	176.4	33 26.3	1.0 05	176.4	32 56.3	1.0 05	176.5	32 26.3	1.0 05	176.5	31 56.3	1.0 05	176.5	31 26.4	1.0 05	176.5	30 56.4	1.0 05	176.6	30 26.4	1.0 05	176.6	3
4	33 53.3	1.0 06	175.2	33 23.4	1.0 06	175.3	32 53.4	1.0 06	175.3	32 23.5	1.0 06	175.3	31 53.5	1.0 06	175.4	31 23.5	1.0 06	175.4	30 53.6	1.0 06	175.4	30 23.6	1.0 06	175.5	4
05	33 49.6	1.0 08	174.0	33 19.6	1.0 08	174.1	32 49.7	1.0 08	174.1	32 19.8	1.0 07	174.2	31 49.8	1.0 07	174.2	31 19.9	1.0 07	174.2	30 50.0	1.0 07	174.3	30 20.1	1.0 07	174.3	05
6	33 45.0	1.0 09	172.8	33 15.1	1.0 09	172.9	32 45.2	1.0 09	172.9	32 15.3	1.0 09	173.0	31 45.4	1.0 09	173.0	31 15.5	1.0 09	173.1	30 45.6	1.0 09	173.1	30 15.7	1.0 09	173.2	6
7	33 39.6	1.0 10	171.7	33 09.7	1.0 10	171.7	32 39.8	1.0 10	171.8	32 10.0	1.0 10	171.8	31 40.1	1.0 10	171.9	31 10.3	1.0 10	171.9	30 40.4	1.0 10	172.0	30 10.5	1.0 10	172.1	7
8	33 33.3	99 12	170.5	33 03.5	99 12	170.5	32 33.7	99 12	170.6	32 03.9	99 12	170.7	31 34.1	99 11	170.7	31 04.2	99 11	170.8	30 34.4	99 11	170.9	30 04.6	99 11	170.9	8
9	33 26.3	99 13	169.3	32 56.5	99 13	169.4	32 26.8	99 13	169.5	31 57.0	99 13	169.5	31 27.2	99 13	169.6	30 57.4	99 13	169.7	30 27.7	99 13	169.7	29 57.9	99 12	169.8	9
10	33 18.4	99 14	168.1	32 48.7	99 14	168.2	32 19.0	99 14	168.3	31 49.3	99 14	168.4	31 19.6	99 14	168.5	30 49.8	99 14	168.5	30 20.1	99 14	168.6	29 50.4	99 14	168.7	10
1	33 09.8	99 16	167.0	32 40.1	99 16	167.0	32 10.5	99 16	167.1	31 40.8	99 15	167.2	31 11.1	99 15	167.3	30 41.5	99 15	167.4	30 11.8	99 15	167.5	29 42.1	99 15	167.6	1
2	33 00.3	99 17	165.8	32 30.7	99 17	165.9	32 01.1	99 17	166.0	31 31.5	99 17	166.1	31 01.9	99 17	166.2	30 32.3	99 17	166.3	30 02.7	99 16	166.4	29 33.1	99 16	166.5	2
3	32 50.1	98 18	164.6	32 20.5	98 18	164.7	31 51.0	98 18	164.8	31 21.5	98 18	164.9	30 52.0	98 18	165.0	30 22.4	98 18	165.1	29 52.9	98 18	165.2	29 23.3	98 18	165.3	3
4	32 39.0	98 20	163.5	32 09.6	98 20	163.6	31 40.1	98 19	163.7	31 10.7	98 19	163.8	30 41.2	98 19	163.9	30 11.7	98 19	164.0	29 42.3	98 19	164.1	29 12.8	98 19	164.2	4
15	32 27.2	98 21	162.3	31 57.8	98 21	162.4	31 28.5	98 21	162.6	30 59.1	98 21	162.7	30 29.7	98 20	162.8	30 00.3	98 20	162.9	29 30.9	98 20	163.0	29 01.5	98 26	163.1	15
6	32 14.6	98 22	161.2	31 45.4	98 22	161.3	31 16.1	98 22	161.4	30 46.8	98 22	161.6	30 17.5	98 22	161.7	29 48.1	98 22	161.8	29 18.8	98 21	161.9	28 49.5	98 21	162.0	6
7	32 01.3	97 23	160.0	31 32.1	97 23	160.2	31 02.9	97 23	160.3	30 33.7	97 23	160.4	30 04.5	97 23	160.6	29 35.2	97 23	160.7	29 06.0	97 23	160.8	28 36.8	97 22	161.0	7
8	31 47.2	97 25	158.9	31 18.1	97 25	159.0	30 49.0	97 24	159.2	30 19.9	97 24	159.3	29 50.7	97 24	159.5	29 21.6	97 24	159.6	28 52.5	97 24	159.7	28 23.3	97 24	159.9	8
9	31 32.4	97 26	157.8	31 03.4	97 26	157.9	30 34.4	97 26	158.1	30 05.3	97 25	158.2	29 36.3	97 25	158.4	29 07.3	97 25	158.5	28 38.2	97 25	158.6	28 09.1	97 25	158.8	9
20	31 16.8	96 27	156.7	30 47.9	96 27	156.8	30 19.0	96 27	157.0	29 50.1	96 27	157.1	29 21.1	96 26	157.3	28 52.2	97 26	157.4	28 23.2	97 26	157.6	27 54.3	97 26	157.7	20
1	31 00.6	96 28	155.5	30 31.8	96 28	155.7	30 02.9	96 28	155.9	29 34.1	96 28	156.0	29 05.3	96 28	156.2	28 36.4	96 27	156.3	28 07.6	96 27	156.5	27 38.7	96 27	156.6	1
2	30 43.6	96 29	154.4	30 14.9	96 29	154.6	29 46.2	96 29	154.8	29 17.5	96 29	154.9	28 48.7	96 29	155.1	28 20.0	96 29	155.3	27 51.2	96 28	155.4	27 22.4	96 28	155.6	2
3	30 25.9	95 31	153.3	29 57.3	95 30	153.5	29 28.7	95 30	153.7	29 00.1	95 30	153.9	28 31.5	95 30	154.0	28 02.8	95 30	154.2	27 34.2	95 30	154.4	27 05.5	96 29	154.5	3
4	30 07.6	95 32	152.2	29 39.1	95 32	152.4	29 10.6	95 31	152.6	28 42.1	95 31	152.8	28 13.6	95 31	153.0	27 45.0	95 31	153.1	27 16.5	95 31	153.3	26 47.9	95 30	153.5	4
25	29 48.5	95 33	151.2	29 20.2	95 33	151.3	28 51.8	95 32	151.5	28 23.4	95 32	151.7	27 55.0	95 32	151.9	27 26.5	95 32	152.1	26 58.1	95 32	152.3	26 29.6	95 31	152.4	25
6	29 28.8	94 34	150.1	29 00.6	94 34	150.3	28 32.3	94 34	150.5	28 04.0	94 33	150.7	27 35.7	94 33	150.8	27 07.4	94 33	151.0	26 39.1	94 33	151.2	26 10.7	95 33	151.4	6
7	29 08.5	94 35	149.0	28 40.4	94 35	149.2	28 12.2	94 35	149.4	27 44.0	94 34	149.6	27 15.9	94 34	149.8	26 47.7	94 34	150.0	26 19.4	94 34	150.2	25 51.2	94 34	150.4	7
8	28 47.5	93 36	148.0	28 19.5	93 36	148.2	27 51.5	93 36	148.4	27 23.4	94 35	148.6	26 55.4	94 35	148.8	26 27.3	94 35	149.0	25 59.2	94 35	149.2	25 31.1	94 35	149.4	8
9	28 25.9	93 37	146.9	27 58.0	93 37	147.1	27 30.1	93 37	147.3	27 02.2	93 36	147.5	26 34.2	93 36	147.7	26 06.3	93 36	147.9	25 38.3	93 36	148.1	25 10.3	93 36	148.3	9
30	28 03.7	93 38	145.9	27 35.9	93 38	146.1	27 08.1	93 38	146.3	26 40.3	93 37	146.5	26 12.5	93 37	146.7	25 44.6	93 37	146.9	25 16.8	93 37	147.1	24 48.9	93 37	147.3	30
1	27 40.9	92 39	144.8	27 13.2	92 39	145.1	26 45.6	92 39	145.3	26 17.9	92 38	145.5	25 50.2	92 38	145.7	25 22.4	92 38	145.9	24 54.7	92 38	146.1	24 26.9	93 38	146.3	1
2	27 17.4	92 40	143.8	26 49.9	92 40	144.0	26 22.4	92 40	144.3	25 54.8	92 39	144.5	25 27.2	92 39	144.7	24 59.6	92 39	144.9	24 32.0	92 39	145.1	24 04.4	92 39	145.3	2
3	26 53.5	91 41	142.8	26 26.1	91 41	143.0	25 58.6	91 40	143.2	25 31.2	91 40	143.5	25 03.8	92 40	143.7	24 36.3	92 40	143.9	24 08.8	92 40	144.1	23 41.3	92 39	144.4	3
4	26 28.9	91 42	141.8	26 01.6	91 42	142.0	25 34.3	91 41	142.2	25 07.0	91 41	142.5	24 39.7	91 41	142.7	24 12.4	91 41	142.9	23 45.0	91 41	143.2	23 17.6	91 40	143.4	4
35	26 03.8	90 43	140.8	25 36.6	90 43	141.0	25 09.5	91 42	141.3	24 42.3	91 42	141.5	24 15.1	91 42	141.7	23 47.9	91 42	141.9	23 20.6	91 41	142.2	22 53.4	91 41	142.4	35
6	25 38.1	90 44	139.8	25 11.1	90 43	140.0	24 44.1	90 43	140.3	24 17.0	90 43	140.5	23 50.0	90 43	140.7	23 22.9	90 43	141.0	22 55.8	90 42	141.2	22 28.6	90 42	141.4	6
7	25 11.9	90 44	138.8	24 45.1	90 44	139.0	24 18.2	90 44	139.3	23 51.2	90 44	139.5	23 24.3	90 44	139.8	22 57.3	90 43	140.0	22 30.3	90 43	140.2	22 03.3	90 43	140.5	7
8	24 45.2	89 45	137.8	24 18.5	89 45	138.1	23 51.7	89 45	138.3	23 24.9	89 45	138.6	22 58.1	89 44	138.8	22 31.3	90 44	139.1	22 04.4	90 44	139.3	21 37.5	90 44	139.5	8
9	24 18.0	89 46	136.9	23 51.4	89 46	137.1	23 24.8	89 46	137.4	22 58.1	89 46	137.6	22 31.4	89 45	137.9	22 04.7	89 45	138.1	21 38.0	89 45	138.4	21 11.2	89 45	138.6	9
40	23 50.3	88 47	135.9	23 23.9	88 47	136.2	22 57.3	88 47	136.4	22 30.8	88 46	136.7	22 04.2	89 46	136.9	21 37.7	89 46	137.2	21 11.1	89 46	137.4	20 44.4	89 45	137.7	40
1	23 22.2	88 48	134.9	22 55.8	88 48	135.2	22 29.4	88 47	135.5	22 03.0	88 47	135.7	21 36.6	88 47	136.0	21 10.1	88 47	136.2	20 43.6	88 46	136.5	20 17.1	88 46	136.7	1
2	22 53.5	87 48	134.0	22 27.3	87 48	134.3	22 01.0	88 48	134.5	21 34.8	88 48	134.8	21 08.4	88 48	135.0	20 42.1	88 47	135.3	20 15.8	88 47	135.6	19 49.4	88 47	135.8	2
3	22 24.4	87 49	133.1	21 58.3	87 49	133.3	21 32.2	87 49	133.6	21 06.0	87 49	133.9	20 39.9	87 48	134.1	20 13.7	87 48	134.4	19 47.4	87 48	134.6	19 21.2	88 48	134.9	3
4	21 54.9	87 50	132.1	21 28.9	87 50	132.4	21 02.9	87 50	132.7	20 36.9	87 49	132.9	20 10.8	87 49	133.2	19 44.7	87 49	133.5	19 18.6	87 49	133.7	18 52.5	87 48	134.0	4
45	21 24.9	86 51	131.2	20 59.0	86 50	131.5	20 33.2	86 50	131.8	20 07.3	86 50	132.0	19 41.3	86 50	132.3	19 15.4	87 50	132.6	18 49.4	87 49	132.8	18 23.4	87 49	133.1	45
6	20 54.5	86 51	130.3	20 28.8	86 51	130.6	20 03.0	86 51	130.9	19 37.2	86 51	131.1	19 11.4	86 51	131.4	18 45.6	86 50	131.7	18 19.8	86 50	131.9	17 53.9	86 50	132.2	6
7	20 23.7	85 52	129.4	19 58.1	85 52	129.7	19 32.4	85 52	130.0	19 06.8	86 51	130.2	18 41.1	86 51	130.5	18 15.4	86 51	130.8	17 49.7	86 51	131.1	17 23.9	86 51	131.3	7
8	19 52.4	85 53	128.5	19 27.0	85 52	128.8	19 01.5	85 52	129.1	18 35.9	85 52	129.3	18 10.4	85 52	129.6	17 44.8	85 52	129.9	17 19.2	85 51	130.2	16 53.6	85 51	130.4	8
9	19 20.8	84 53	127.6	18 55.5	85 53	127.9	18 30.1	85 53	128.2	18 04.7	85 53	128.5	17 39.3	85 53	128.7	17 13.8	85 52	129.0	16 48.3	85 52	129.3	16 22.8	85 52	129.6	9
50	18 48.8	84 54	126.7	18 23.6	84 54	127.0	17 58.3	84 54	127.3	17 33.1	84 53	127.6	17 07.8	84 53	127.9	16 42.4	84 53	128.1	16 17.1	85 53	128.4	15 51.7	85 53	128.7	50
1	18 16.5	84 55	125.9	17 51.4	84 54	126.1	17 26.2	84 54	126.4	17 01.1	84 54	126.7	16 35.9	84 54	127.0	16 10.7	84 54	127.3	15 45.4	84 53	127.6	15 20.2	84 53	127.8	1
2	17 43.8	83 55	125.0	17 18.8	83 55	125.3	16 53.7	83 55	125.6	16 28.7	84 55	125.9	16 03.6	84 54	126.1	15 38.5	84 54	126.4	15 13.4	84 54	126.7	14 48.3	84 54	127.0	2
3	17 10.7	83 56	124.1	16 45.8	83 55	124.4	16 20.9	83 55	124.7	15 56.0	83 55	125.0	15 31.0	83 55	125.3	15 06.1	83 55	125.6	14 41.1	83 54	125.9	14 16.0	83 54	126.1	3
4	16 37.3	83 56	123.3	16 12.5	83 56	123.6	15 47.7	83 56	123.9	15 22.9	83 56	124.1	14 58.1	83 55	124.4	14 33.2	83 55	124.7	14 08.4	83 55	125.0	13 43.5	83 55	125.3	4
55	16 03.6	82 57	122.4	15 38.9	82 57	122.7	15 14.2	82 56	123.0	14 49.5	82 56	123.3	14 24.8	82 56	123.6	14 00.1	83 56	123.9	13 35.3	83 56	124.2	13 10.5	83 55	124.5	55
6	15 29.5	82 57	121.6	15 05.0	82 57	121.9	14 40.4	82 57	122.2	14 15.8	82 57	122.5	13 51.2	82 57	122.8	13 26.6	82 56	123.1	13 01.9	82 56	123.4	12 37.3	82 56	123.6	6
7	14 55.2	81 58	120.7	14 30.7	81 58	121.0	14 06.3	82 57	121.3	13 41.8	82 57	121.6	13 17.3	82 57	121.9	12 52.8	82 57	122.2	12 28.2	82 57	122.5	12 03.7	82 56	122.8	7
8	14 20.5	81 58	119.9	13 56.2	81 58	120.2	13 31.8	81 58	120.5	13 07.5	81 58	120.8	12 43.1	81 58	121.1	12 18.7	81 57	121.4	11 54.2	81 57	121.7	11 29.8	82 57	122.0	8
9	13 45.6	81 59	119.1	13 21.4	81 59	119.4	12 57.1	81 58	119.7	12 32.8	81 58	120.0	12 08.6	81 58	120.3	11 44.3	81 58	120.6	11 19.9	81 58	120.9	10 55.6	81 57	121.2	9
60	13 10.3	80 59	118.3	12 46.2	80 59	118.6	12 22.1	81 59	118.9	11 57.9	81 59	119.2	11 33.7	81 58	119.5	11 09.6	81 58	119.8	10 45.3	81 58	120.1	10 21.1	81 58	120.4	60
1	12 34.9	80 60	117.4	12 10.8	80 59	117.8	11 46.8	80 59	118.1	11 22.7	80 59	118.4	10 58.7	80 59	118.7	10 34.6	80 59	119.0	10 10.5	80 59	119.3	9 46.3	80 58	119.6	1
2	11 59.1	80 60	116.6	11 35.2	80 60	116.9	11 11.2	80 60	117.3	10 47.3	80 60	117.6	10 23.3	80 59	117.9	9 59.3	80 59	118.2	9 35.3	80 59	118.5	9 11.3	80 59	118.8	2
3	11 23.1	79 60	115.8	10 59.3	79 60	116.1	10 35.4	80 60	116.5	10 11.6	80 60	116.8	9 47.7	80 60	117.1	9 23.8	80 60	117.4	8 59.9	80 59	117.7	8 36.0	80 59	118.0	3
4	10 46.8	79 61	115.0	10 23.1	79 61	115.3	9 59.4	79 60	115.7	9 35.6	79 60	116.0	9 11.8	79 60	116.3	8 48.0	79 60	116.6	8 24.2	79 60	116.9	8 00.4	79 60	117.2	4
65	10 10.3	79 61	114.2	9 46.7	79 61	114.6	9 23.0	79 61	114.9	8 59.4	79 61	115.2	8 35.7	79 61	115.5	8 12.0	79 60	115.8	7 48.3	79 60	116.1	7 24.5	79 60	116.4	65
6	9 33.6	78 62	113.5	9 10.1	79 61	113.8	8 46.5	79 61	114.1	8 22.9	79 61	114.4	7 59.3	79 61	114.7	7 35.7	79 61	115.0	7 12.1	79 61	115.3	6 48.5	79 61	115.6	6
7	8 56.7	78 62	112.7	8 33.2	78 62	113.0	8 09.7	78 62	113.3	7 46.2	78 62	113.6	7 22.7	78 61	113.9	6 59.2	78 61	114.2	6 35.7	78 61	114.5	6 12.1	78 61	114.9	7
8	8 19.5	78 62	111.9	7 56.1	78 62	112.2	7 32.8	78 62	112.5	7 09.4	78 62	112.8	6 45.9	78 62	113.1	6 22.5	78 62	113.5	5 59.1	78 61	113.8	5 35.6	78 61	114.1	8
9	7 42.2	78 63	111.1	7 18.9	78 62	111.4	6 55.6	78 62	111.7	6 32.2	78 62	112.1	6 08.9	78 62	112.4	5 45.6	78 62	112.7	5 22.2	78 62	113.0				9
70	7 04.6	77 63	110.3	6 41.4	77 63	110.7	6 18.2	77 63	111.0	5 54.9	77 62	111.3	5 31.7	78 62	111.6	5 08.4	78 62	111.9							70
1	6 26.9	77 63	109.6	6 03.7	77 63	109.9	5 40.6	77 63	110.2	5 17.4	77 63	110.5													1
2	5 49.0	77 64	108.8	5 25.9	77 63	109.1	5 02.8	77 63	109.4																2
3	5 10.9	77 64	108.0																						3

DECLINATION SAME NAME AS LATITUDE

H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
91	5 16.2	74 67	83.9	5 38.5	74 66	83.6	6 00.7	74 66	83.2	6 22.9	74 66	82.9	6 45.0	74 66	82.5	7 07.2	74 66	82.2	7 29.3	74 66	81.9	7 51.5	74 66	81.5	91
2							5 20.8	74 66	82.5	5 43.0	74 66	82.1	6 05.3	74 66	81.8	6 27.4	74 66	81.5	6 49.6	74 66	81.1	7 11.8	74 66	80.8	2
3										5 03.3	74 66	81.4	5 25.6	74 66	81.1	5 47.8	74 66	80.7	6 10.0	74 66	80.4	6 32.2	74 68	80.1	3
4																5 08.2	74 66	80.0	5 30.5	74 66	79.7	5 52.7	74 66	79.3	4
95																						5 13.3	74 66	78.6	95

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Lat. 48°

H.A.	12° 00′ Alt.	Δd	Δt	Az.	12° 30′ Alt.	Δd	Δt	Az.	13° 00′ Alt.	Δd	Δt	Az.	13° 30′ Alt.	Δd	Δt	Az.
°	° ′			°	° ′			°	° ′			°	° ′			°
00	54 00.0	1.0	01	180.0	54 30.0	1.0	01	180.0	55 00.0	1.0	01	180.0	55 30.0	1.0	01	180.0
1	53 59.4	1.0	03	178.3	54 29.4	1.0	03	178.3	54 59.4	1.0	03	178.3	55 29.4	1.0	03	178.3
2	53 57.7	1.0	05	176.7	54 27.6	1.0	05	176.6	54 57.6	1.0	05	176.6	55 27.6	1.0	05	176.6
3	53 54.8	1.0	07	175.0	54 24.7	1.0	07	175.0	54 54.6	1.0	07	174.9	55 24.6	1.0	07	174.9
4	53 50.7	1.0	09	173.4	54 20.6	1.0	09	173.3	54 50.5	1.0	09	173.2	55 20.4	1.0	09	173.1
05	53 45.5	1.0	11	171.7	54 15.3	1.0	11	171.6	54 45.2	99	11	171.5	55 15.0	99	11	171.4
6	53 39.1	99	12	170.1	54 08.9	99	13	170.0	54 38.7	99	13	169.9	55 08.5	99	13	169.8
7	53 31.6	99	14	168.4	54 01.3	99	14	168.3	54 31.0	99	15	168.2	55 00.7	99	15	168.1
8	53 23.0	99	16	166.8	53 52.6	99	16	166.7	54 22.3	99	16	166.5	54 51.9	99	17	166.4
9	53 13.3	98	18	165.2	53 42.8	98	18	165.0	54 12.4	98	18	164.9	54 41.9	98	19	164.7
10	53 02.5	98	20	163.6	53 31.9	98	20	163.4	54 01.3	98	20	163.3	54 30.7	98	20	163.1
1	52 50.6	98	22	162.0	53 19.9	98	22	161.8	53 49.2	98	22	161.6	54 18.5	98	22	161.5
2	52 37.7	97	23	160.4	53 06.9	97	23	160.2	53 36.1	97	24	160.0	54 05.2	97	24	159.8
3	52 23.7	97	25	158.9	52 52.8	97	25	158.7	53 21.8	97	25	158.4	53 50.9	97	26	158.2
4	52 08.8	96	27	157.3	52 37.7	96	27	157.1	53 06.6	96	27	156.9	53 35.5	96	27	156.7
15	51 52.8	96	28	155.8	52 21.6	96	28	155.6	52 50.3	96	29	155.3	53 19.0	96	29	155.1
6	51 35.8	95	30	154.3	52 04.5	95	30	154.0	52 33.1	95	30	153.8	53 01.6	95	31	153.5
7	51 17.9	95	31	152.8	51 46.4	95	32	152.5	52 14.9	95	32	152.3	52 43.3	95	32	152.0
8	50 59.1	94	33	151.3	51 27.4	94	33	151.0	51 55.7	94	33	150.8	52 24.0	94	34	150.5
9	50 39.4	94	34	149.8	51 07.5	94	35	149.6	51 35.7	94	35	149.3	52 03.7	94	35	149.0
20	50 18.8	93	36	148.4	50 46.8	93	36	148.1	51 14.7	93	36	147.8	51 42.6	93	37	147.5
1	49 57.3	93	37	147.0	50 25.1	93	37	146.7	50 52.9	92	38	146.4	51 20.6	92	38	146.1
2	49 35.0	92	38	145.6	50 02.7	92	39	145.3	50 30.3	92	39	145.0	50 57.8	92	39	144.7
3	49 12.0	92	40	144.2	49 39.4	91	40	143.9	50 06.8	91	40	143.6	50 34.2	91	41	143.3
4	48 48.1	91	41	142.8	49 15.4	91	41	142.5	49 42.6	91	42	142.2	50 09.8	91	42	141.9
25	48 23.5	90	42	141.5	48 50.6	90	43	141.2	49 17.6	90	43	140.8	49 44.6	90	43	140.5
6	47 58.1	90	43	140.2	48 25.0	90	44	139.8	48 51.9	90	44	139.5	49 18.8	89	44	139.2
7	47 32.0	89	45	138.9	47 58.8	89	45	138.5	48 25.5	89	45	138.2	48 52.2	89	45	137.8
8	47 05.3	89	46	137.6	47 31.9	89	46	137.2	47 58.4	88	46	136.9	48 24.9	88	47	136.5
9	46 37.9	88	47	136.3	47 04.3	88	47	136.0	47 30.7	88	47	135.6	47 56.9	87	48	135.3
30	46 09.9	88	48	135.1	46 36.1	87	48	134.7	47 02.3	87	48	134.4	47 28.4	87	49	134.0
1	45 41.2	87	49	133.9	46 07.3	87	49	133.5	46 33.3	87	49	133.1	46 59.2	86	50	132.8
2	45 12.0	86	50	132.6	45 37.9	86	50	132.3	46 03.7	86	50	131.9	46 29.4	86	51	131.5
3	44 42.1	86	51	131.5	45 07.9	86	51	131.1	45 33.5	85	51	130.7	45 59.1	85	51	130.3
4	44 11.8	85	51	130.3	44 37.3	85	52	129.9	45 02.8	85	52	129.5	45 28.2	85	52	129.2
35	43 40.9	85	52	129.1	44 06.3	85	53	128.8	44 31.6	84	53	128.4	44 56.9	84	53	128.0
6	43 09.5	84	53	128.0	43 34.7	84	53	127.6	43 59.9	84	54	127.2	44 25.0	83	54	126.9
7	42 37.6	84	54	126.9	43 02.7	83	54	126.5	43 27.7	83	54	126.1	43 52.6	83	55	125.7
8	42 05.3	83	55	125.8	42 30.2	83	55	125.4	42 55.0	83	55	125.0	43 19.8	82	55	124.6
9	41 32.5	83	55	124.7	41 57.2	82	56	124.3	42 21.9	82	56	123.9	42 46.5	82	56	123.5
40	40 59.2	82	56	123.6	41 23.9	82	56	123.2	41 48.4	82	57	122.8	42 12.9	81	57	122.4
1	40 25.6	82	57	122.5	40 50.1	81	57	122.2	41 14.5	81	57	121.8	41 38.8	81	57	121.4
2	39 51.6	81	57	121.5	40 15.9	81	58	121.1	40 40.1	81	58	120.7	41 04.3	80	58	120.3
3	39 17.1	81	58	120.5	39 41.3	81	58	120.1	40 05.4	80	58	119.7	40 29.5	80	59	119.3
4	38 42.4	80	59	119.5	39 06.4	80	59	119.1	39 30.4	80	59	118.7	39 54.3	80	59	118.3
45	38 07.2	80	59	118.5	38 31.2	80	59	118.1	38 55.0	79	60	117.7	39 18.8	79	60	117.3
6	37 31.8	79	60	117.5	37 55.6	79	60	117.1	38 19.3	79	60	116.7	38 42.9	79	60	116.3
7	36 56.0	79	60	116.5	37 19.7	79	60	116.1	37 43.3	79	61	115.7	38 06.8	78	61	115.3
8	36 19.9	79	61	115.5	36 43.5	78	61	115.2	37 07.0	78	61	114.8	37 30.4	78	61	114.4
9	35 43.5	78	61	114.6	36 07.0	78	61	114.2	36 30.4	78	61	113.8	36 53.7	78	62	113.4
50	35 06.9	78	62	113.6	35 30.2	78	62	113.3	35 53.5	77	62	112.9	36 16.7	77	62	112.5
1	34 30.0	78	62	112.7	34 53.2	77	62	112.3	35 16.4	77	62	111.9	35 39.5	77	62	111.6
2	33 52.8	77	62	111.8	34 16.0	77	62	111.4	34 39.0	77	63	111.0	35 02.0	77	63	110.6
3	33 15.4	77	63	110.9	33 38.5	77	63	110.5	34 01.5	76	63	110.1	34 24.3	76	63	109.7
4	32 37.8	77	63	110.0	33 00.8	76	63	109.6	33 23.7	76	63	109.2	33 46.5	76	63	108.8
55	32 00.0	76	63	109.1	32 22.9	76	64	108.7	32 45.6	76	64	108.4	33 08.4	76	64	108.0
6	31 22.0	76	64	108.2	31 44.7	76	64	107.9	32 07.4	76	64	107.5	32 30.1	75	64	107.1
7	30 43.7	76	64	107.4	31 06.4	76	64	107.0	31 29.1	75	64	106.6	31 51.6	75	64	106.2
8	30 05.3	75	64	106.5	30 28.0	75	64	106.1	30 50.5	75	65	105.8	31 13.0	75	65	105.4
9	29 26.8	75	65	105.7	29 49.3	75	65	105.3	30 11.8	75	65	104.9	30 34.2	75	65	104.5
60	28 48.0	75	65	104.8	29 10.5	75	65	104.5	29 32.9	75	65	104.1	29 55.3	74	65	103.7
1	28 09.2	75	65	104.0	28 31.6	75	65	103.6	28 53.9	74	65	103.2	29 16.2	74	65	102.9
2	27 30.1	75	65	103.2	27 52.5	74	65	102.8	28 14.8	74	65	102.4	28 37.0	74	66	102.0
3	26 51.0	74	65	102.4	27 13.3	74	66	102.0	27 35.5	74	66	101.6	27 57.7	74	66	101.2
4	26 11.7	74	66	101.5	26 33.9	74	66	101.2	26 56.1	74	66	100.8	27 18.2	74	66	100.4
65	25 32.3	74	66	100.7	25 54.5	74	66	100.4	26 16.6	74	66	100.0	26 38.7	73	66	99.6
6	24 52.8	74	66	99.9	25 14.9	74	66	99.6	25 37.0	74	66	99.2	25 59.1	73	66	98.8
7	24 13.2	74	66	99.1	24 35.3	74	66	98.8	24 57.4	73	66	98.4	25 19.3	73	66	98.0
8	23 33.5	74	66	98.4	23 55.6	73	66	98.0	24 17.6	73	66	97.6	24 39.5	73	66	97.2
9	22 53.8	73	66	97.6	23 15.8	73	66	97.2	23 37.8	73	66	96.8	23 59.7	73	67	96.5
70	22 13.9	73	66	96.8	22 35.9	73	67	96.4	22 57.9	73	67	96.1	23 19.8	73	67	95.7
1	21 34.0	73	67	96.0	21 56.0	73	67	95.7	22 17.9	73	67	95.3	22 39.8	73	67	94.9
2	20 54.1	73	67	95.3	21 16.0	73	67	94.9	21 37.9	73	67	94.5	21 59.8	73	67	94.1
3	20 14.1	73	67	94.5	20 36.0	73	67	94.1	20 57.9	73	67	93.8	21 19.7	73	67	93.4
4	19 34.0	73	67	93.7	19 55.9	73	67	93.4	20 17.8	73	67	93.0	20 39.6	73	67	92.6
75	18 54.0	73	67	93.0	19 15.9	73	67	92.6	19 37.7	73	67	92.2	19 59.5	73	67	91.9
6	18 13.9	73	67	92.2	18 35.7	73	67	91.9	18 57.6	73	67	91.5	19 19.4	73	67	91.1
7	17 33.7	73	67	91.5	17 55.6	73	67	91.1	18 17.4	73	67	90.7	18 39.2	73	67	90.4
8	16 53.6	73	67	90.7	17 15.5	73	67	90.4	17 37.3	73	67	90.0	17 59.1	73	67	89.6
9	16 13.4	73	67	90.0	16 35.3	73	67	89.6	16 57.1	73	67	89.3	17 18.9	73	67	88.9
80	15 33.3	73	67	89.2	15 55.2	73	67	88.9	16 17.0	73	67	88.5	16 38.8	73	67	88.2
1	14 53.2	73	67	88.5	15 15.0	73	67	88.1	15 36.9	73	67	87.8	15 58.7	73	67	87.4
2	14 13.0	73	67	87.8	14 34.9	73	67	87.4	14 56.8	73	67	87.0	15 18.6	73	67	86.7
3	13 32.9	73	67	87.0	13 54.8	73	67	86.7	14 16.7	73	67	86.3	14 38.5	73	67	86.0
4	12 52.8	73	67	86.3	13 14.8	73	67	85.9	13 36.6	73	67	85.6	13 58.5	73	67	85.2
85	12 12.8	73	67	85.6	12 34.7	73	67	85.2	12 56.6	73	67	84.9	13 18.5	73	67	84.5
6	11 32.8	73	67	84.8	11 54.7	73	67	84.5	12 16.7	73	67	84.1	12 38.6	73	66	83.8
7	10 52.8	73	66	84.1	11 14.8	73	66	83.7	11 36.8	73	66	83.4	11 58.7	73	66	83.0
8	10 12.9	73	66	83.4	10 34.9	73	66	83.0	10 56.9	73	66	82.7	11 18.9	73	66	82.3
9	9 33.1	73	66	82.6	9 55.1	73	66	82.3	10 17.1	73	66	81.9	10 39.1	73	66	81.6
90	8 53.3	74	66	81.9	9 15.4	74	66	81.6	9 37.4	73	66	81.2	9 59.4	73	66	80.9

14° 00′ Alt.	Δd	Δt	Az.	14° 30′ Alt.	Δd	Δt	Az.	15° 00′ Alt.	Δd	Δt	Az.	15° 30′ Alt.	Δd	Δt	Az.	H.A.
° ′			°	° ′			°	° ′			°	° ′			°	°
56 00.0	1.0	01	180.0	56 30.0	1.0	01	180.0	57 00.0	1.0	01	180.0	57 30.0	1.0	01	180.0	00
55 59.4	1.0	03	178.3	56 29.4	1.0	03	178.2	56 59.4	1.0	03	178.2	57 29.4	1.0	03	178.2	1
55 57.6	1.0	05	176.5	56 27.5	1.0	05	176.5	56 57.5	1.0	05	176.5	57 27.5	1.0	05	176.4	2
55 54.5	1.0	07	174.8	56 24.5	1.0	07	174.7	56 54.4	1.0	07	174.7	57 24.4	1.0	07	174.6	3
55 50.3	1.0	09	173.1	56 20.2	1.0	09	173.0	56 50.1	1.0	09	172.9	57 20.0	1.0	09	172.8	4
55 44.9	99	11	171.4	56 14.7	99	11	171.3	56 44.5	99	11	171.2	57 14.4	99	11	171.1	05
55 38.2	99	13	169.6	56 08.0	99	13	169.5	56 37.8	99	13	169.4	57 07.5	99	13	169.3	6
55 30.4	99	15	167.9	56 00.1	99	15	167.8	56 29.8	99	15	167.7	56 59.5	99	15	167.6	7
55 21.5	99	17	166.3	55 51.1	99	17	166.1	56 20.6	99	17	166.0	56 50.2	99	17	165.8	8
55 11.4	98	19	164.6	55 40.9	98	19	164.4	56 10.3	98	19	164.3	56 39.8	98	19	164.1	9
55 00.1	98	21	162.9	55 29.5	98	21	162.7	55 58.9	98	21	162.6	56 28.2	98	21	162.4	10
54 47.8	98	22	161.3	55 17.0	97	23	161.1	55 46.3	97	23	160.9	56 15.5	97	23	160.7	1
54 34.4	97	24	159.6	55 03.5	97	24	159.4	55 32.6	97	25	159.2	56 01.6	97	25	159.0	2
54 19.8	97	26	158.0	54 48.8	97	26	157.8	55 17.8	96	26	157.6	55 46.7	96	27	157.3	3
54 04.3	96	28	156.4	54 33.1	96	28	156.2	55 01.9	96	28	155.9	55 30.7	96	28	155.7	4
53 47.7	96	29	154.8	54 16.4	96	30	154.6	54 45.0	95	30	154.3	55 13.6	95	30	154.1	15
53 30.2	95	31	153.3	53 58.7	95	31	153.0	54 27.1	95	31	152.7	54 55.6	95	32	152.5	6
53 11.6	95	32	151.7	53 40.0	94	33	151.5	54 08.3	94	33	151.2	54 36.5	94	33	150.9	7
52 52.2	94	34	150.2	53 20.3	94	34	149.9	53 48.4	94	35	149.6	54 16.5	94	35	149.3	8
52 31.8	93	36	148.7	52 59.8	93	36	148.4	53 27.7	93	36	148.1	53 55.6	93	36	147.8	9
52 10.5	93	37	147.2	52 38.3	93	37	146.9	53 06.0	92	38	146.6	53 33.8	92	38	146.3	20
51 48.3	92	38	145.8	52 15.9	92	39	145.5	52 43.5	92	39	145.1	53 11.0	92	39	144.8	1
51 25.3	92	40	144.3	51 52.8	91	40	144.0	52 20.2	91	40	143.7	52 47.5	91	41	143.3	2
51 01.5	91	41	142.9	51 28.8	91	41	142.6	51 56.0	91	42	142.3	52 23.1	90	42	141.9	3
50 36.9	90	42	141.5	51 04.0	90	43	141.2	51 31.0	90	43	140.8	51 58.0	90	43	140.5	4
50 11.6	90	43	140.2	50 38.5	90	44	139.8	51 05.3	89	44	139.5	51 32.0	89	44	139.1	25
49 45.5	89	45	138.8	50 12.2	89	45	138.5	50 38.8	89	45	138.1	51 05.4	88	46	137.7	6
49 18.7	88	46	137.5	49 45.2	88	46	137.1	50 11.7	88	46	136.8	50 38.1	88	47	136.4	7
48 51.3	88	47	136.2	49 17.6	88	47	135.8	49 43.8	87	47	135.4	50 10.0	87	48	135.1	8
48 23.2	87	48	134.9	48 49.3	87	48	134.5	49 15.4	87	49	134.2	49 41.4	87	49	133.8	9
47 54.4	87	49	133.6	48 20.4	86	49	133.3	48 46.2	86	50	132.9	49 12.1	86	50	132.5	30
47 25.0	86	50	132.4	47 50.8	86	50	132.0	48 16.5	86	50	131.6	48 42.2	85	51	131.2	1
46 55.1	85	51	131.2	47 20.7	85	51	130.8	47 46.2	85	51	130.4	48 11.7	85	52	130.0	2
46 24.6	85	52	130.0	46 50.0	85	52	129.6	47 15.4	84	52	129.2	47 40.7	84	53	128.8	3
45 53.6	84	53	128.8	46 18.8	84	53	128.4	46 44.0	84	53	128.0	47 09.1	84	53	127.6	4
45 22.0	84	53	127.6	45 47.1	84	54	127.2	46 12.1	83	54	126.8	46 37.0	83	54	126.4	35
44 50.0	83	54	126.5	45 14.9	83	54	126.1	45 39.7	83	55	125.7	46 04.5	82	55	125.3	6
44 17.4	83	55	125.3	44 42.2	82	55	124.9	45 06.9	82	55	124.5	45 31.5	82	56	124.1	7
43 44.5	82	56	124.2	44 09.1	82	56	123.8	44 33.6	82	56	123.4	44 58.0	81	56	123.0	8
43 11.1	82	56	123.1	43 35.5	81	57	122.7	43 59.9	81	57	122.3	44 24.2	81	57	121.9	9
42 37.2	81	57	122.1	43 01.5	81	57	121.7	43 25.8	81	58	121.2	43 49.9	80	58	120.8	40
42 03.0	81	58	121.0	42 27.2	80	58	120.6	42 51.2	80	58	120.2	43 15.2	80	58	119.8	1
41 28.4	80	58	119.9	41 52.4	80	58	119.5	42 16.3	80	59	119.1	42 40.2	79	59	118.7	2
40 53.4	80	59	118.9	41 17.3	79	59	118.5	41 41.1	79	59	118.1	42 04.8	79	60	117.7	3
40 18.1	79	59	117.9	40 41.9	79	60	117.5	41 05.5	79	60	117.1	41 29.1	78	60	116.7	4
39 42.5	79	60	116.9	40 06.1	79	60	116.5	40 29.6	78	60	116.1	40 53.1	78	61	115.7	45
39 06.5	78	60	115.9	39 30.0	78	61	115.5	39 53.4	78	61	115.1	40 16.7	78	61	114.7	6
38 30.3	78	61	114.9	38 53.6	78	61	114.5	39 16.9	77	61	114.1	39 40.1	77	62	113.7	7
37 53.7	78	61	114.0	38 17.0	77	62	113.6	38 40.1	77	62	113.2	39 03.2	77	62	112.8	8
37 16.9	77	62	113.0	37 40.0	77	62	112.6	38 03.1	77	62	112.2	38 26.1	76	62	111.8	9
36 39.8	77	62	112.1	37 02.9	77	62	111.7	37 25.8	76	63	111.3	37 48.7	76	63	110.9	50
36 02.5	77	63	111.2	36 25.4	76	63	110.8	36 48.3	76	63	110.4	37 11.1	76	63	110.0	1
35 24.9	76	63	110.2	35 47.8	76	63	109.8	36 10.5	76	63	109.4	36 33.2	75	63	109.0	2
34 47.2	76	63	109.3	35 09.9	76	63	108.9	35 32.6	75	64	108.5	35 55.2	75	64	108.1	3
34 09.2	76	64	108.5	34 31.8	75	64	108.1	34 54.4	75	64	107.7	35 16.9	75	64	107.3	4
33 31.0	75	64	107.6	33 53.6	75	64	107.2	34 16.1	75	64	106.8	34 38.5	75	64	106.4	55
32 52.6	75	64	106.7	33 15.1	75	64	106.3	33 37.5	75	64	105.9	33 59.9	74	65	105.5	6
32 14.1	75	64	105.8	32 36.5	75	65	105.4	32 58.8	74	65	105.0	33 21.1	74	65	104.6	7
31 35.4	75	65	105.0	31 57.7	74	65	104.6	32 20.0	74	65	104.2	32 42.2	74	65	103.8	8
30 56.5	74	65	104.1	31 18.8	74	65	103.7	31 41.0	74	65	103.4	32 03.1	74	65	103.0	9
30 17.5	74	65	103.3	30 39.7	74	65	102.9	31 01.9	74	65	102.5	31 23.9	73	66	102.1	60
29 38.4	74	65	102.5	30 00.5	74	66	102.1	30 22.6	73	66	101.7	30 44.6	73	66	101.3	1
28 59.1	74	66	101.7	29 21.2	74	66	101.3	29 43.2	73	66	100.9	30 05.2	73	66	100.5	2
28 19.8	74	66	100.8	28 41.8	73	66	100.4	29 03.8	73	66	100.1	29 25.7	73	66	99.7	3
27 40.3	73	66	100.0	28 02.3	73	66	99.6	28 24.2	73	66	99.3	28 46.0	73	66	98.9	4
27 00.7	73	66	99.2	27 22.6	73	66	98.8	27 44.5	73	66	98.5	28 06.3	73	66	98.1	65
26 21.0	73	66	98.4	26 42.9	73	66	98.1	27 04.8	73	66	97.7	27 29.6	72	66	97.3	6
25 41.3	73	66	97.6	26 03.1	73	66	97.3	26 24.9	73	66	96.9	26 46.7	72	67	96.5	7
25 01.4	73	66	96.9	25 23.3	73	67	96.5	25 45.1	72	67	96.1	26 06.8	72	67	95.7	8
24 21.5	73	67	96.1	24 43.4	73	67	95.7	25 05.1	72	67	95.3	25 26.8	72	67	94.9	9
23 41.6	73	67	95.3	24 03.4	73	67	94.9	24 25.1	72	67	94.6	24 46.8	72	67	94.2	70
23 01.6	73	67	94.5	23 23.4	72	67	94.2	23 45.1	72	67	93.8	24 06.7	72	67	93.4	1
22 21.6	73	67	93.8	22 43.3	72	67	93.4	23 05.0	72	67	93.0	23 26.6	72	67	92.7	2
21 41.5	73	67	93.0	22 03.2	72	67	92.6	22 24.9	72	67	92.3	22 46.5	72	67	91.9	3
21 01.4	72	67	92.3	21 23.1	72	67	91.9	21 44.8	72	67	91.5	22 06.4	72	67	91.1	4
20 21.3	72	67	91.5	20 43.0	72	67	91.1	21 04.6	72	67	90.8	21 26.2	72	67	90.4	75
19 41.1	72	67	90.8	20 02.8	72	67	90.4	20 24.5	72	67	90.0	20 46.1	72	67	89.7	6
19 01.0	72	67	90.0	19 22.7	72	67	89.7	19 44.3	72	67	89.3	20 05.9	72	67	88.9	7
18 20.8	72	67	89.3	18 42.5	72	67	88.9	19 04.2	72	67	88.5	19 25.8	72	67	88.2	8
17 40.7	72	67	88.5	18 02.4	72	67	88.2	18 24.1	72	67	87.8	18 45.7	72	67	87.4	9
17 00.6	72	67	87.8	17 22.3	72	67	87.4	17 44.0	72	67	87.1	18 05.6	72	67	86.7	80
16 20.4	72	67	87.1	16 42.2	72	67	86.7	17 03.9	72	67	86.3	17 25.5	72	67	86.0	1
15 40.4	73	67	86.3	16 02.1	72	67	86.0	16 23.8	72	67	85.6	16 45.5	72	67	85.3	2
15 00.3	73	67	85.6	15 22.1	72	67	85.2	15 43.8	72	67	84.9	16 05.5	72	67	84.5	3
14 20.3	73	67	84.9	14 42.1	73	67	84.5	15 03.8	72	67	84.2	15 25.6	72	66	83.8	4
13 40.3	73	66	84.2	14 02.2	73	66	83.8	14 23.9	73	66	83.4	14 45.7	72	66	83.1	85
13 00.4	73	66	83.4	13 22.3	73	66	83.1	13 44.1	73	66	82.7	14 05.9	73	66	82.4	6
12 20.6	73	66	82.7	12 42.4	73	66	82.3	13 04.3	73	66	82.0	13 26.1	73	66	81.6	7
11 40.8	73	66	82.0	12 02.7	73	66	81.6	12 24.6	73	66	81.3	12 46.4	73	66	80.9	8
11 01.1	73	66	81.3	11 23.0	73	66	80.9	11 44.9	73	66	80.6	12 06.8	73	66	80.2	9
10 21.4	73	66	80.5	10 43.4	73	66	80.2	11 05.4	73	66	79.8	11 27.3	73	66	79.5	90

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H.A.	12° 00′ Alt.	Δd	Δt	Az.	12° 30′ Alt.	Δd	Δt	Az.	13° 00′ Alt.	Δd	Δt	Az.	13° 30′ Alt.	Δd	Δt	Az.	14° 00′ Alt.	Δd	Δt	Az.	14° 30′ Alt.	Δd	Δt	Az.	15° 00′ Alt.	Δd	Δt	Az.	15° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
00	30 00.0	1.0	01	180.0	29 30.0	1.0	01	180.0	29 00.0	1.0	01	180.0	28 30.0	1.0	01	180.0	28 00.0	1.0	01	180.0	27 30.0	1.0	01	180.0	27 00.0	1.0	01	180.0	26 30.0	1.0	01	180.0	00
1	29 59.6	1.0	02	178.9	29 29.6	1.0	02	178.9	28 59.6	1.0	02	178.9	28 29.6	1.0	02	178.9	27 59.6	1.0	02	178.9	27 29.6	1.0	02	178.9	26 59.6	1.0	02	178.9	26 29.6	1.0	02	178.9	1
2	29 58.4	1.0	03	177.7	29 28.4	1.0	03	177.8	28 58.4	1.0	03	177.8	28 28.4	1.0	03	177.8	27 58.5	1.0	03	177.8	27 28.5	1.0	03	177.8	26 58.5	1.0	03	177.8	26 28.5	1.0	03	177.8	2
3	29 56.4	1.0	05	176.6	29 26.5	1.0	05	176.6	28 56.5	1.0	05	176.7	26 26.5	1.0	05	176.7	27 56.5	1.0	04	176.7	27 26.6	1.0	04	176.7	26 56.6	1.0	04	176.7	26 26.6	1.0	04	176.8	3
4	29 53.7	1.0	06	175.5	29 23.7	1.0	06	175.5	28 53.8	1.0	06	175.5	28 23.8	1.0	06	175.6	27 53.8	1.0	06	175.6	27 23.9	1.0	06	175.6	26 53.9	1.0	06	175.7	26 24.0	1.0	06	175.7	4
05	29 50.1	1.0	07	174.4	29 20.2	1.0	07	174.4	28 50.3	1.0	07	174.4	28 20.3	1.0	07	174.5	27 50.4	1.0	07	174.5	27 20.5	1.0	07	174.5	26 50.5	1.0	07	174.6	26 20.6	1.0	07	174.6	05
6	29 45.8	1.0	09	173.2	29 15.9	1.0	08	173.3	28 46.0	1.0	08	173.3	28 16.1	1.0	08	173.4	27 46.2	1.0	08	173.4	27 16.3	1.0	08	173.5	26 46.4	1.0	08	173.5	26 16.4	1.0	08	173.6	6
7	29 40.7	1.0	10	172.1	29 10.8	1.0	10	172.2	28 40.9	1.0	10	172.2	28 11.1	1.0	10	172.3	27 41.2	1.0	10	172.3	27 11.3	1.0	10	172.4	26 41.4	1.0	09	172.4	26 11.6	1.0	09	172.5	7
8	29 34.8	99	11	171.0	29 04.9	99	11	171.1	28 35.1	99	11	171.1	28 05.3	99	11	171.2	27 35.4	99	11	171.2	27 05.6	99	11	171.3	26 35.8	99	11	171.4	26 05.9	99	11	171.4	8
9	29 28.1	99	12	169.9	28 58.3	99	12	169.9	28 28.5	99	12	170.0	27 58.7	99	12	170.1	27 29.0	99	12	170.1	26 59.2	99	12	170.2	26 29.4	99	12	170.3	25 59.6	99	12	170.3	9
10	29 20.7	99	14	168.8	28 50.9	99	14	168.8	28 21.2	99	13	168.9	27 51.4	99	13	169.0	27 21.7	99	13	169.1	26 52.0	99	13	169.1	26 22.2	99	13	169.2	25 52.5	99	13	169.3	10
1	29 12.5	99	15	167.7	28 42.8	99	15	167.7	28 13.1	99	15	167.8	27 43.4	99	15	167.9	27 13.7	99	15	168.0	26 44.0	99	14	168.1	26 14.3	99	14	168.1	25 44.6	99	14	168.2	1
2	29 03.5	99	16	166.6	28 33.9	99	16	166.6	28 04.2	99	16	166.7	27 34.6	99	16	166.8	27 05.0	99	16	166.9	26 35.4	99	16	167.0	26 05.7	99	16	167.1	25 36.1	99	15	167.2	2
3	28 53.8	99	17	165.4	28 24.2	99	17	165.5	27 54.7	99	17	165.6	27 25.1	99	17	165.7	26 55.5	99	17	165.8	26 26.0	99	17	165.9	25 56.4	99	17	166.0	25 26.8	99	17	166.1	3
4	28 43.3	98	19	164.3	28 13.8	98	19	164.5	27 44.3	98	18	164.6	27 14.8	98	18	164.7	26 45.3	98	18	164.8	26 15.8	98	18	164.9	25 46.3	98	18	165.0	25 16.8	98	18	165.1	4
15	28 32.1	98	20	163.3	28 02.7	98	20	163.4	27 33.3	98	20	163.5	27 03.9	98	20	163.6	26 34.4	98	19	163.7	26 05.0	98	19	163.8	25 35.5	98	19	163.9	25 06.1	98	19	164.0	15
6	28 20.2	98	21	162.2	27 50.8	98	21	162.3	27 21.5	98	21	162.4	26 52.1	98	21	162.5	26 22.8	98	21	162.6	25 53.4	98	20	162.7	25 24.1	98	20	162.9	24 54.7	98	20	163.0	6
7	28 07.5	98	22	161.1	27 38.3	98	22	161.2	27 09.0	98	22	161.3	26 39.7	98	22	161.5	26 10.5	98	22	161.6	25 41.2	98	22	161.7	25 11.9	98	21	161.8	24 42.6	98	21	161.9	7
8	27 54.1	97	23	160.0	27 25.0	97	23	160.1	26 55.8	97	23	160.3	26 26.6	97	23	160.4	25 57.4	97	23	160.5	25 28.2	97	23	160.6	24 59.0	97	22	160.8	24 29.8	97	22	160.9	8
9	27 40.1	97	25	158.9	27 11.0	97	24	159.1	26 41.9	97	24	159.2	26 12.8	97	24	159.3	25 43.7	97	24	159.5	25 14.6	97	24	159.6	24 45.4	97	24	159.7	24 16.3	97	24	159.9	9
20	27 25.3	97	26	157.9	26 56.3	97	26	158.0	26 27.3	97	25	158.1	25 58.3	97	25	158.3	25 29.3	97	25	158.4	25 00.2	97	25	158.6	24 31.2	97	25	158.7	24 02.2	97	25	158.8	20
1	27 09.8	96	27	156.8	26 40.9	96	27	156.9	26 12.0	96	27	157.1	25 43.1	96	26	157.2	25 14.2	96	26	157.4	24 45.2	96	26	157.5	24 16.3	96	26	157.7	23 47.3	97	26	157.8	1
2	26 53.6	96	28	155.7	26 24.8	96	28	155.9	25 56.0	96	28	156.1	25 27.2	96	28	156.2	24 58.4	96	27	156.4	24 29.6	96	27	156.5	24 00.7	96	27	156.7	23 31.9	96	27	156.8	2
3	26 36.8	96	29	154.7	26 08.1	96	29	154.9	25 39.4	96	29	155.0	25 10.7	96	29	155.2	24 42.0	96	28	155.3	24 13.2	96	28	155.5	23 44.5	96	28	155.7	23 15.7	96	28	155.8	3
4	26 19.3	95	30	153.6	25 50.7	95	30	153.8	25 22.1	95	30	154.0	24 53.5	95	30	154.2	24 24.9	95	30	154.3	23 56.3	95	29	154.5	23 27.6	96	29	154.6	22 59.0	96	29	154.8	4
25	26 01.2	95	31	152.6	25 32.7	95	31	152.8	25 04.2	95	31	153.0	24 35.7	95	31	153.1	24 07.2	95	31	153.3	23 38.6	95	30	153.5	23 10.1	95	30	153.6	22 41.6	95	30	153.8	25
6	25 42.4	95	32	151.6	25 14.0	95	32	151.8	24 45.6	95	32	151.9	24 17.2	95	32	152.1	23 48.8	95	32	152.3	23 20.4	95	31	152.5	22 52.0	95	31	152.6	22 23.5	95	31	152.8	6
7	25 23.0	94	33	150.6	24 54.7	94	33	150.7	24 26.4	94	33	150.9	23 58.1	94	33	151.1	23 29.8	94	33	151.3	23 01.5	94	32	151.5	22 33.2	94	32	151.7	22 04.9	94	32	151.8	7
8	25 02.9	94	34	149.5	24 34.8	94	34	149.7	24 06.6	94	34	149.9	23 38.4	94	34	150.1	23 10.3	94	34	150.3	22 42.1	94	33	150.5	22 13.8	94	33	150.7	21 45.6	94	33	150.8	8
9	24 42.3	93	35	148.5	24 14.2	93	35	148.7	23 46.2	94	35	148.9	23 18.1	94	35	149.1	22 50.1	94	35	149.3	22 22.0	94	34	149.5	21 53.9	94	34	149.7	21 25.8	94	34	149.9	9
30	24 21.0	93	36	147.5	23 53.1	93	36	147.7	23 25.2	93	36	147.9	22 57.2	93	36	148.1	22 29.3	93	36	148.3	22 01.3	93	35	148.5	21 33.3	93	35	148.7	21 05.3	93	35	148.9	30
1	23 59.2	93	37	146.5	23 31.4	93	37	146.7	23 03.6	93	37	146.9	22 35.7	93	37	147.1	22 07.9	93	37	147.4	21 40.0	93	36	147.6	21 12.2	93	36	147.8	20 44.3	93	36	147.9	1
2	23 36.7	92	38	145.5	23 09.1	92	38	145.8	22 41.4	92	38	146.0	22 13.7	92	38	146.2	21 46.0	92	38	146.4	21 18.2	92	37	146.6	20 50.5	93	37	146.8	20 22.7	93	37	147.0	2
3	23 13.7	92	39	144.6	22 46.2	92	39	144.8	22 18.6	92	39	145.0	21 51.0	92	39	145.2	21 23.4	92	38	145.4	20 55.8	92	38	145.6	20 28.2	92	38	145.8	20 00.6	92	38	146.0	3
4	22 50.2	91	40	143.6	22 22.8	91	40	143.8	21 55.3	92	40	144.0	21 27.9	92	40	144.2	21 00.4	92	39	144.5	20 32.9	92	39	144.7	20 05.4	92	39	144.9	19 37.9	92	39	145.1	4
35	22 26.1	91	41	142.6	21 58.8	91	41	142.9	21 31.5	91	41	143.1	21 04.1	91	40	143.3	20 36.8	91	40	143.5	20 09.4	91	40	143.7	19 42.0	91	40	144.0	19 14.6	91	40	144.2	35
6	22 01.5	91	42	141.7	21 34.3	91	42	141.9	21 07.1	91	42	142.1	20 39.9	91	41	142.3	20 12.6	91	41	142.6	19 45.4	91	41	142.8	19 18.1	91	41	143.0	18 50.9	91	40	143.2	6
7	21 36.3	90	43	140.7	21 09.2	90	43	140.9	20 42.2	90	42	141.2	20 15.1	90	42	141.4	19 48.0	90	42	141.6	19 20.9	90	42	141.9	18 53.7	90	42	142.1	18 26.6	91	41	142.3	7
8	21 10.6	90	44	139.8	20 43.7	90	43	140.0	20 16.8	90	43	140.2	19 49.8	90	43	140.5	19 22.8	90	43	140.7	18 55.8	90	43	140.9	18 28.8	90	42	141.2	18 01.8	90	42	141.4	8
9	20 44.4	89	44	138.8	20 17.6	89	44	139.1	19 50.8	89	44	139.3	19 24.0	89	44	139.6	18 57.1	90	44	139.8	18 30.3	90	43	140.0	18 03.4	90	43	140.3	17 36.5	90	43	140.5	9
40	20 17.8	89	45	137.9	19 51.1	89	45	138.1	19 24.4	89	45	138.4	18 57.7	89	45	138.6	18 31.0	89	44	138.9	18 04.2	89	44	139.1	17 37.5	89	44	139.3	17 10.7	89	44	139.6	40
1	19 50.6	88	46	137.0	19 24.1	89	46	137.2	18 57.5	89	46	137.5	18 30.9	89	45	137.7	18 04.3	89	45	138.0	17 37.7	89	45	138.2	17 11.1	89	45	138.4	16 44.4	89	45	138.7	1
2	19 23.0	88	47	136.1	18 56.6	88	47	136.3	18 30.1	88	46	136.6	18 03.7	88	46	136.8	17 37.2	88	46	137.1	17 10.7	88	46	137.3	16 44.2	88	46	137.6	16 17.7	88	45	137.8	2
3	18 54.9	88	48	135.2	18 28.6	88	47	135.4	18 02.3	88	47	135.7	17 36.0	88	47	135.9	17 09.6	88	47	136.2	16 43.3	88	46	136.4	16 16.9	88	46	136.7	15 50.5	88	46	136.9	3
4	18 26.4	87	48	134.3	18 00.2	87	48	134.5	17 34.0	87	48	134.8	17 07.8	87	48	135.0	16 41.6	87	47	135.3	16 15.4	88	47	135.5	15 49.1	88	47	135.8	15 22.8	88	47	136.0	4
45	17 57.4	87	49	133.4	17 31.4	87	49	133.6	17 05.3	87	49	133.9	16 39.2	87	48	134.1	16 13.1	87	48	134.4	15 47.0	87	48	134.7	15 20.9	87	48	134.9	14 54.7	87	48	135.2	45
6	17 28.0	86	50	132.5	17 02.1	86	49	132.7	16 36.2	86	49	133.0	16 10.2	87	49	133.3	15 44.2	87	49	133.5	15 18.3	87	49	133.8	14 52.2	87	48	134.0	14 26.2	87	48	134.3	6
7	16 58.2	86	50	131.6	16 32.4	86	50	131.9	16 06.6	86	50	132.1	15 40.8	86	50	132.4	15 14.9	86	50	132.6	14 49.1	86	49	132.9	14 23.2	86	49	133.2	13 57.3	86	49	133.4	7
8	16 27.9	86	51	130.7	16 02.3	86	51	131.0	15 36.6	86	51	131.3	15 10.9	86	50	131.5	14 45.2	86	50	131.8	14 19.4	86	50	132.1	13 53.7	86	50	132.3	13 27.9	86	50	132.6	8
9	15 57.3	85	52	129.8	15 31.8	85	52	130.1	15 06.2	85	51	130.4	14 40.6	85	51	130.7	14 15.0	85	51	130.9	13 49.4	85	51	131.2	13 23.8	85	50	131.5	12 58.1	86	50	131.7	9
50	15 26.3	85	52	129.0	15 00.9	85	52	129.3	14 35.4	85	52	129.5	14 10.0	85	52	129.8	13 44.5	85	52	130.1	13 19.0	85	51	130.3	12 53.5	85	51	130.6	12 28.0	85	51	130.9	50
1	14 54.9	84	53	128.1	14 29.6	84	53	128.4	14 04.3	84	53	128.7	13 39.0	84	52	129.0	13 13.6	85	52	129.2	12 48.2	85	52	129.5	12 22.9	85	52	129.8	11 57.4	85	52	130.0	1
2	14 23.1	84	54	127.3	13 58.0	84	53	127.6	13 32.8	84	53	127.8	13 07.6	84	53	128.1	12 42.3	84	53	128.4	12 17.1	84	53	128.7	11 51.8	84	52	128.9	11 26.5	84	52	129.2	2
3	13 51.0	83	54	126.4	13 26.0	84	54	126.7	13 00.9	84	54	127.0	12 35.8	84	54	127.3	12 10.7	84	53	127.6	11 45.5	84	53	127.8	11 20.4	84	53	128.1	10 55.2	84	53	128.4	3
4	13 18.5	83	55	125.6	12 53.6	83	54	125.9	12 28.6	83	54	126.2	12 03.7	83	54	126.4	11 38.7	83	54	126.7	11 13.7	83	54	127.0	10 48.6	83	54	127.3	10 23.6	83	53	127.6	4
55	12 45.7	83	55	124.8	12 20.9	83	55	125.0	11 56.1	83	55	125.3	11 31.2	83	55	125.6	11 06.3	83	54	125.9	10 41.4	83	54	126.2	10 16.5	83	54	126.5	9 51.6	83	54	126.8	55
6	12 12.6	82	56	123.9	11 47.9	82	56	124.2	11 23.1	82	55	124.5	10 58.4	83	55	124.8	10 33.6	83	55	125.1	10 08.9	83	55	125.4	9 44.1	83	55	125.7	9 19.3	83	54	125.9	6
7	11 39.1	82	56	123.1	11 14.5	82	56	123.4	10 49.9	82	56	123.7	10 25.3	82	56	124.0	10 00.6	82	56	124.3	9 36.0	82	55	124.6	9 11.3	82	55	124.9	8 46.6	82	55	125.1	7
8	11 05.3	82	57	122.3	10 40.8	82	57	122.6	10 16.3	82	56	122.9	9 51.8	82	56	123.2	9 27.3	82	56	123.5	9 02.7	82	56	123.8	8 38.2	82	56	124.1	8 13.6	82	56	124.3	8
9	10 31.2	81	57	121.5	10 06.9	81	57	121.8	9 42.5	81	57	122.1	9 18.1	81	57	122.4	8 53.6	81	57	122.7	8 29.2	81	56	123.0	8 04.8	82	56	123.3	7 40.3	82	56	123.5	9
60	9 56.8	81	58	120.7	9 32.6	81	58	121.0	9 08.3	81	57	121.3	8 44.0	81	57	121.6	8 19.7	81	57	121.9	7 55.4	81	57	122.2	7 31.0	81	57	122.5	7 06.7	81	56	122.8	60
1	9 22.2	81	58	119.9	8 58.0	81	58	120.2	8 33.8	81	58	120.5	8 09.7	81	58	120.8	7 45.5	81	58	121.1	7 21.2	81	57	121.4	6 57.0	81	57	121.7	6 32.8	81	57	122.0	1
2	8 47.2	80	59	119.1	8 23.2	80	59	119.4	7 59.1	80	58	119.7	7 35.0	80	58	120.0	7 10.9	80	58	120.3	6 46.8	80	58	120.6	6 22.7	80	58	120.9	5 58.6	80	57	121.2	2
3	8 12.0	80	59	118.3	7 48.1	80	59	118.6	7 24.1	80	59	118.9	7 00.1	80	59	119.2	6 36.1	80	58	119.5	6 12.1	80	58	119.8	5 48.1	80	58	120.1	5 24.1	80	58	120.4	3
4	7 36.5	79	60	117.5	7 12.7	80	59	117.8	6 48.8	80	59	118.1	6 24.9	80	59	118.4	6 01.0	80	59	118.7	5 37.1	80	59	119.0	5 13.2	80	59	119.3					4
65	7 00.8	79	60	116.7	6 37.0	79	60	117.0	6 13.3	79	60	117.3	5 49.5	79	60	117.6	5 25.7	79	59	118.0	5 01.9	79	59	118.3									65
6	6 24.8	79	60	115.9	6 01.2	79	60	116.3	5 37.5	79	60	116.6	5 13.8	79	60	116.9																	6
7	5 48.6	79	61	115.2	5 25.0	79	61	115.5	5 01.5	79	60	115.8																					7
8	5 12.1	78	61	114.4																													8

DECLINATION SAME NAME AS LATITUDE

H.A.	12° 00′ Alt.	Δd	Δt	Az.	12° 30′ Alt.	Δd	Δt	Az.	13° 00′ Alt.	Δd	Δt	Az.	13° 30′ Alt.	Δd	Δt	Az.	14° 00′ Alt.	Δd	Δt	Az.	14° 30′ Alt.	Δd	Δt	Az.	15° 00′ Alt.	Δd	Δt	Az.	15° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
91	8 13.6	74	66	81.2	8 35.7	74	66	80.8	8 57.8	74	66	80.5	9 19.8	74	66	80.1	9 41.9	73	66	79.8	10 03.9	73	66	79.5	10 25.9	73	66	79.1	10 47.9	73	66	78.8	91
2	7 34.0	74	66	80.4	7 56.1	74	66	80.1	8 18.2	74	66	79.8	8 40.3	74	66	79.4	9 02.4	74	66	79.1	9 24.5	74	66	78.7	9 46.5	73	65	78.4	10 08.5	73	65	78.1	2
3	6 54.4	74	66	79.7	7 16.6	74	66	79.4	7 38.8	74	66	79.0	8 00.9	74	66	78.7	8 23.0	74	65	78.4	8 45.1	74	65	78.0	9 07.2	74	65	77.7	9 29.3	74	65	77.3	3
4	6 14.9	74	66	79.0	6 37.2	74	66	78.7	6 59.4	74	65	78.3	7 21.6	74	65	78.0	7 43.8	74	65	77.6	8 05.9	74	65	77.3	8 28.1	74	65	77.0	8 50.2	74	65	76.6	4
95	5 35.6	74	66	78.3	5 57.9	74	65	77.9	6 20.1	74	65	77.6	6 42.4	74	65	77.3	7 04.6	74	65	76.9	7 26.8	74	65	76.6	7 49.0	74	65	76.2	8 11.2	74	65	75.9	95
6					5 18.7	74	65	77.2	5 41.0	74	65	76.9	6 03.3	74	65	76.5	6 25.6	74	65	76.2	6 47.8	74	65	75.8	7 10.1	74	65	75.5	7 32.3	74	65	75.2	6
7									5 01.9	75	65	76.1	5 24.3	74	65	75.8	5 46.6	74	65	75.5	6 09.0	74	65	75.1	6 31.3	74	64	74.8	6 53.6	74	64	74.5	7
8																	5 07.8	75	64	74.7	5 30.2	75	64	74.4	5 52.6	75	64	74.1	6 15.0	75	64	73.7	8
9																									5 14.1	75	64	73.3	5 36.5	75	64	73.0	9

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Lat. 48°

H.A.	16° 00′ Alt.	Δd	Δt	Az.	16° 30′ Alt.	Δd	Δt	Az.	17° 00′ Alt.	Δd	Δt	Az.	17° 30′ Alt.	Δd	Δt	Az.
°	° ′			°	° ′			°	° ′			°	° ′			°
00	58 00.0	1.0	01	180.0	58 30.0	1.0	01	180.0	59 00.0	1.0	01	180.0	59 30.0	1.0	01	180.0
1	57 59.4	1.0	03	178.2	58 29.4	1.0	03	178.2	58 59.4	1.0	03	178.1	59 29.3	1.0	03	178.1
2	57 57.5	1.0	05	176.4	58 27.4	1.0	05	176.3	58 57.4	1.0	05	176.3	59 27.4	1.0	05	176.2
3	57 54.3	1.0	07	174.6	58 24.2	1.0	07	174.5	58 54.2	1.0	08	174.4	59 24.1	1.0	08	174.4
4	57 49.9	1.0	09	172.8	58 19.7	1.0	10	172.7	58 49.6	1.0	10	172.6	59 19.5	1.0	10	172.5
05	57 44.2	99	12	171.0	58 14.0	99	12	170.9	58 43.8	99	12	170.8	59 13.6	99	12	170.6
6	57 37.3	99	14	169.2	58 07.0	99	14	169.1	58 36.7	99	14	168.9	59 06.5	99	14	168.8
7	57 29.1	99	16	167.4	57 58.8	99	16	167.3	58 28.4	99	16	167.1	58 58.0	99	16	167.0
8	57 19.8	99	18	165.7	57 49.3	98	18	165.5	58 18.8	98	18	165.3	58 48.4	98	18	165.2
9	57 09.2	98	20	163.9	57 38.7	98	20	163.7	58 08.1	98	20	163.5	58 37.5	98	20	163.3
10	56 57.5	98	21	162.2	57 26.8	98	22	162.0	57 56.1	98	22	161.8	58 25.4	98	22	161.6
1	56 44.7	97	23	160.5	57 13.8	97	24	160.2	57 43.0	97	24	160.0	58 12.1	97	24	159.8
2	56 30.7	97	25	158.8	56 59.7	97	25	158.5	57 28.7	97	26	158.3	57 57.6	97	26	158.1
3	56 15.6	96	27	157.1	56 44.4	96	27	156.8	57 13.3	96	27	156.6	57 42.1	96	28	156.3
4	55 59.4	96	29	155.4	56 28.1	96	29	155.2	56 56.8	95	29	154.9	57 25.4	95	30	154.6
15	55 42.2	95	30	153.8	56 10.7	95	31	153.5	56 39.2	95	31	153.2	57 07.7	95	31	152.9
6	55 24.0	95	32	152.2	55 52.3	94	32	151.9	56 20.6	94	33	151.6	56 48.9	94	33	151.3
7	55 04.7	94	34	150.6	55 32.9	94	34	150.3	56 01.0	94	34	150.0	56 29.1	94	35	149.7
8	54 44.6	93	35	149.0	55 12.5	93	36	148.7	55 40.5	93	36	148.4	56 08.4	93	36	148.1
9	54 23.4	93	37	147.5	54 51.2	93	37	147.2	55 19.0	92	37	146.8	55 46.7	92	38	146.5
20	54 01.4	92	38	146.0	54 29.0	92	38	145.6	54 56.6	92	39	145.3	55 24.0	92	39	144.9
1	53 38.5	91	40	144.5	54 05.9	91	40	144.1	54 33.3	91	40	143.8	55 00.5	91	41	143.4
2	53 14.8	91	41	143.0	53 42.0	91	41	142.6	54 09.1	90	42	142.3	54 36.2	90	42	141.9
3	52 50.2	90	42	141.6	53 17.2	90	43	141.2	53 44.2	90	43	140.8	54 11.0	89	43	140.4
4	52 24.8	89	44	140.1	52 51.7	89	44	139.8	53 18.4	89	44	139.4	53 45.1	89	44	139.0
25	51 58.7	89	45	138.7	52 25.4	89	45	138.4	52 51.9	88	45	138.0	53 18.4	88	46	137.6
6	51 31.9	88	46	137.4	51 58.3	88	46	137.0	52 24.7	88	47	136.6	52 50.9	87	47	136.2
7	51 04.4	88	47	136.0	51 30.6	87	47	135.6	51 56.7	87	48	135.2	52 22.8	87	48	134.8
8	50 36.1	87	48	134.7	51 02.2	87	48	134.3	51 28.1	86	49	133.9	51 54.0	86	49	133.5
9	50 07.3	86	49	133.4	50 33.1	86	49	133.0	50 58.9	86	50	132.6	51 24.5	85	50	132.2
30	49 37.8	86	50	132.1	50 03.4	85	50	131.7	50 29.0	85	51	131.3	50 54.5	85	51	130.9
1	49 07.7	85	51	130.8	49 33.2	85	51	130.4	49 58.5	84	52	130.0	50 23.8	84	52	129.6
2	48 37.0	84	52	129.6	49 02.3	84	52	129.2	49 27.5	84	53	128.8	49 52.6	84	53	128.3
3	48 05.8	84	53	128.4	48 30.9	84	53	128.0	48 55.9	83	53	127.6	49 20.9	83	54	127.1
4	47 34.1	83	54	127.2	47 59.0	83	54	126.8	48 23.9	83	54	126.3	48 48.6	82	55	125.9
35	47 01.9	83	54	126.0	47 26.6	82	55	125.6	47 51.3	82	55	125.2	48 15.8	82	55	124.7
6	46 29.2	82	55	124.9	46 53.7	82	56	124.4	47 18.2	81	56	124.0	47 42.6	81	56	123.6
7	45 56.0	82	56	123.7	46 20.4	81	56	123.3	46 44.7	81	57	122.9	47 08.9	81	57	122.4
8	45 22.4	81	57	122.6	45 46.6	81	57	122.2	46 10.8	80	57	121.8	46 34.9	80	57	121.3
9	44 48.3	80	57	121.5	45 12.4	80	58	121.1	45 36.5	80	58	120.7	46 00.4	80	58	120.2
40	44 13.9	80	58	120.4	44 37.9	80	58	120.0	45 01.7	79	58	119.6	45 25.5	79	59	119.1
1	43 39.1	79	59	119.4	44 02.9	79	59	118.9	44 26.6	79	59	118.5	44 50.2	79	59	118.1
2	43 03.9	79	59	118.3	43 27.6	79	59	117.9	43 51.2	78	60	117.5	44 14.6	78	60	117.0
3	42 28.4	79	60	117.3	42 51.9	78	60	116.9	43 15.4	78	60	116.4	43 38.7	78	60	116.0
4	41 52.6	78	60	116.3	42 16.0	78	60	115.8	42 39.3	77	61	115.4	43 02.5	77	61	115.0
45	41 16.4	78	61	115.3	41 39.7	77	61	114.8	42 02.9	77	61	114.4	42 25.9	77	61	114.0
6	40 40.0	77	61	114.3	41 03.1	77	61	113.9	41 26.2	77	62	113.4	41 49.1	76	62	113.0
7	40 03.2	77	62	113.3	40 26.2	77	62	112.9	40 49.2	76	62	112.5	41 12.0	76	62	112.0
8	39 26.2	77	62	112.3	39 49.1	76	62	111.9	40 11.9	76	62	111.5	40 34.7	76	63	111.1
9	38 49.0	76	62	111.4	39 11.8	76	63	111.0	39 34.5	76	63	110.6	39 57.1	75	63	110.1
50	38 11.5	76	63	110.5	38 34.2	76	63	110.0	38 56.8	75	63	109.6	39 19.3	75	63	109.2
1	37 33.7	75	63	109.5	37 56.3	75	63	109.1	38 18.8	75	64	108.7	38 41.3	75	64	108.3
2	36 55.8	75	64	108.6	37 18.3	75	64	108.2	37 40.7	75	64	107.8	38 03.0	74	64	107.4
3	36 17.7	75	64	107.7	36 40.1	75	64	107.3	37 02.4	74	64	106.9	37 24.6	74	64	106.5
4	35 39.3	75	64	106.8	36 01.6	74	64	106.4	36 23.9	74	64	106.0	36 46.1	74	65	105.6
55	35 00.8	74	64	106.0	35 23.1	74	65	105.6	35 45.2	74	65	105.1	36 07.3	73	65	104.7
6	34 22.1	74	65	105.1	34 44.3	74	65	104.7	35 06.4	73	65	104.3	35 28.4	73	65	103.9
7	33 43.3	74	65	104.2	34 05.4	74	65	103.8	34 27.4	73	65	103.4	34 49.3	73	65	103.0
8	33 04.3	74	65	103.4	33 26.3	73	65	103.0	33 48.3	73	65	102.6	34 10.2	73	66	102.2
9	32 25.2	73	65	102.6	32 47.2	73	66	102.1	33 09.0	73	66	101.7	33 30.9	73	66	101.3
60	31 45.9	73	66	101.7	32 07.8	73	66	101.3	32 29.7	73	66	100.9	32 51.4	72	66	100.5
1	31 06.6	73	66	100.9	31 28.4	73	66	100.5	31 50.2	72	66	100.1	32 11.9	72	66	99.7
2	30 27.1	73	66	100.1	30 48.9	73	66	99.7	31 10.6	72	66	99.3	31 32.3	72	66	98.9
3	29 47.5	73	66	99.3	30 09.3	72	66	98.9	30 31.0	72	66	98.5	30 52.6	72	66	98.1
4	29 07.8	73	66	98.5	29 29.6	72	66	98.1	29 51.2	72	66	97.7	30 12.8	72	66	97.3
65	28 28.1	72	66	97.7	28 49.8	72	66	97.3	29 11.4	72	66	96.9	29 32.9	72	67	96.5
6	27 48.3	72	66	96.9	28 09.9	72	67	96.5	28 31.5	72	67	96.1	28 53.0	72	67	95.7
7	27 08.4	72	67	96.1	27 30.0	72	67	95.7	27 51.6	72	67	95.3	28 13.0	72	67	94.9
8	26 28.4	72	67	95.3	26 50.0	72	67	94.9	27 11.6	72	67	94.6	27 33.0	71	67	94.2
9	25 48.4	72	67	94.6	26 10.0	72	67	94.2	26 31.5	72	67	93.8	26 53.0	71	67	93.4
70	25 08.4	72	67	93.8	25 29.9	72	67	93.4	25 51.4	72	67	93.0	26 12.9	71	67	92.6
1	24 28.3	72	67	93.0	24 49.9	72	67	92.6	25 11.3	71	67	92.3	25 32.7	71	67	91.9
2	23 48.2	72	67	92.3	24 09.7	72	67	91.9	24 31.2	71	67	91.5	24 52.6	71	67	91.1
3	23 08.1	72	67	91.5	23 29.6	72	67	91.1	23 51.1	71	67	90.8	24 12.5	71	67	90.4
4	22 27.9	72	67	90.8	22 49.5	72	67	90.4	23 10.9	71	67	90.0	23 32.3	71	67	89.6
75	21 47.8	72	67	90.0	22 09.3	72	67	89.7	22 30.8	71	67	89.3	22 52.2	71	67	88.9
6	21 07.7	72	67	89.3	21 29.2	72	67	88.9	21 50.6	71	67	88.5	22 12.0	71	67	88.2
7	20 27.5	72	67	88.5	20 49.0	72	67	88.2	21 10.5	71	67	87.8	21 31.9	71	67	87.4
8	19 47.4	72	67	87.8	20 08.9	72	67	87.4	20 30.4	72	67	87.1	20 51.8	71	67	86.7
9	19 07.3	72	67	87.1	19 28.8	72	67	86.7	19 50.3	72	67	86.3	20 11.8	71	67	86.0
80	18 27.2	72	67	86.4	18 48.8	72	67	86.0	19 10.3	72	67	85.6	19 31.7	71	67	85.2
1	17 47.1	72	67	85.6	18 08.7	72	67	85.3	18 30.3	72	67	84.9	18 51.8	72	67	84.5
2	17 07.1	72	67	84.9	17 28.7	72	67	84.5	17 50.3	72	67	84.2	18 11.8	72	66	83.8
3	16 27.2	72	67	84.2	16 48.8	72	66	83.8	17 10.4	72	66	83.4	17 31.9	72	66	83.1
4	15 47.3	72	66	83.4	16 08.9	72	66	83.1	16 30.5	72	66	82.7	16 52.1	72	66	82.4
85	15 07.4	72	66	82.7	15 29.1	72	66	82.4	15 50.7	72	66	82.0	16 12.3	72	66	81.7
6	14 27.6	72	66	82.0	14 49.3	72	66	81.7	15 11.0	72	66	81.3	15 32.7	72	66	80.9
7	13 47.9	73	66	81.3	14 09.6	72	66	80.9	14 31.4	72	66	80.6	14 53.1	72	66	80.2
8	13 08.2	73	66	80.6	13 30.0	73	66	80.2	13 51.8	72	66	79.9	14 13.5	72	66	79.5
9	12 28.7	73	66	79.9	12 50.5	73	66	79.5	13 12.3	73	66	79.2	13 34.1	73	66	78.8
90	11 49.2	73	66	79.1	12 11.1	73	66	78.8	12 32.9	73	65	78.4	12 54.8	73	65	78.1

H.A.	18° 00′ Alt.	Δd	Δt	Az.	18° 30′ Alt.	Δd	Δt	Az.	19° 00′ Alt.	Δd	Δt	Az.	19° 30′ Alt.	Δd	Δt	Az.
°	° ′			°	° ′			°	° ′			°	° ′			°
00	60 00.0	1.0	01	180.0	60 30.0	1.0	01	180.0	61 00.0	1.0	01	180.0	61 30.0	1.0	01	180.0
1	59 59.3	1.0	03	178.1	60 29.3	1.0	03	178.1	60 59.3	1.0	03	178.1	61 29.3	1.0	03	178.0
2	59 57.3	1.0	06	176.2	60 27.3	1.0	06	176.2	60 57.3	1.0	06	176.1	61 27.2	1.0	06	176.1
3	59 54.0	1.0	08	174.3	60 23.9	1.0	08	174.2	60 53.9	1.0	08	174.2	61 23.8	1.0	08	174.1
4	59 49.4	1.0	10	172.4	60 19.2	1.0	10	172.3	60 49.1	1.0	10	172.2	61 19.0	1.0	10	172.1
05	59 43.4	99	12	170.5	60 13.2	99	12	170.4	60 43.0	99	12	170.3	61 12.8	99	13	170.2
6	59 36.2	99	14	168.7	60 05.9	99	14	168.5	60 35.6	99	15	168.4	61 05.3	99	15	168.2
7	59 27.6	99	16	166.8	59 57.3	99	16	166.7	60 26.8	99	17	166.5	60 56.4	99	17	166.3
8	59 17.9	98	18	165.0	59 47.4	98	19	164.8	60 16.8	98	19	164.6	60 46.3	98	19	164.4
9	59 06.8	98	20	163.2	59 36.2	98	21	163.0	60 05.5	98	21	162.7	60 34.9	98	21	162.5
10	58 54.6	97	22	161.3	59 23.8	97	23	161.1	59 53.0	97	23	160.9	60 22.2	97	23	160.7
1	58 41.2	97	24	159.6	59 10.2	97	25	159.3	59 39.3	97	25	159.1	60 08.3	97	25	158.8
2	58 26.6	96	26	157.8	58 55.5	96	26	157.5	59 24.4	96	27	157.3	59 53.2	96	27	157.0
3	58 10.8	96	28	156.1	58 39.6	96	28	155.8	59 08.3	96	29	155.5	59 36.9	95	29	155.2
4	57 54.0	95	30	154.3	58 22.6	95	30	154.1	58 51.1	95	30	153.8	59 19.5	95	31	153.4
15	57 36.1	95	32	152.7	58 04.5	94	32	152.3	58 32.8	94	32	152.0	59 01.1	94	33	151.7
6	57 17.1	94	33	151.0	57 45.3	94	34	150.7	58 13.4	94	34	150.3	58 41.5	93	34	150.0
7	56 57.1	92	35	149.3	57 25.1	93	35	149.0	57 53.0	93	36	148.7	58 20.9	93	36	148.3
8	56 36.2	93	37	147.7	57 04.0	92	37	147.4	57 31.7	92	37	147.0	57 59.3	92	38	146.7
9	56 14.3	92	38	146.1	56 41.9	92	38	145.8	57 09.4	92	39	145.4	57 36.8	91	39	145.0
20	55 51.5	91	40	144.6	56 18.8	91	40	144.2	56 46.1	91	40	143.8	57 13.3	91	14	143.5
1	55 27.8	91	41	143.0	55 54.9	90	41	142.7	56 22.0	90	42	142.3	56 49.0	90	42	141.9
2	55 03.2	90	42	141.5	55 30.1	90	43	141.2	55 57.0	89	43	140.8	56 23.8	89	43	140.4
3	54 37.8	89	44	140.1	55 04.6	89	44	139.7	55 31.2	89	44	139.3	55 57.8	88	45	138.8
4	54 11.7	89	45	138.6	54 38.2	88	45	138.2	55 04.6	88	46	137.8	55 31.0	88	46	137.4
25	53 44.7	88	46	137.2	54 11.1	88	46	136.8	54 37.3	87	47	136.4	55 03.4	87	47	135.9
6	53 17.1	87	47	135.8	53 43.2	87	48	135.4	54 09.2	87	48	134.9	54 35.1	86	48	134.5
7	52 48.8	86	48	134.4	53 14.7	86	49	134.0	53 40.5	86	49	133.6	54 06.2	86	49	133.1
8	52 19.8	86	49	133.1	52 45.4	85	50	132.6	53 11.0	85	50	132.2	53 36.5	85	50	131.8
9	51 50.1	85	50	131.7	52 15.6	85	51	131.3	52 41.0	84	51	130.9	53 06.3	84	51	130.4
30	51 19.8	84	51	130.4	51 45.1	84	52	130.0	52 10.3	84	52	129.6	52 35.4	83	52	129.1
1	50 49.0	84	52	129.2	51 14.1	83	53	128.7	51 39.1	83	53	128.3	52 04.0	83	53	127.8
2	50 17.6	83	53	127.9	50 42.5	83	54	127.5	51 07.3	83	54	127.0	51 32.0	82	54	126.6
3	49 45.7	83	54	126.7	50 10.4	82	54	126.3	50 35.0	82	55	125.8	50 59.5	82	55	125.3
4	49 13.2	82	55	125.5	49 37.8	82	55	125.0	50 02.2	81	55	124.6	50 26.5	81	56	124.1
35	48 40.3	81	56	124.3	49 04.7	81	56	123.9	49 28.9	81	56	123.4	49 53.1	80	56	123.0
6	48 06.9	81	56	123.1	48 31.1	80	57	122.7	48 55.2	80	57	122.2	49 19.2	80	57	121.8
7	47 33.1	80	57	122.0	47 57.1	80	57	121.6	48 21.0	80	58	121.1	48 44.8	79	58	120.6
8	46 58.8	80	58	120.9	47 22.7	79	58	120.4	47 46.4	79	58	120.0	48 10.1	79	59	119.5
9	46 24.2	79	58	119.8	46 47.9	79	59	119.3	47 11.5	78	59	118.9	47 35.0	78	59	118.4
40	45 49.1	79	59	118.7	46 12.7	78	59	118.3	46 36.1	78	59	117.8	46 59.5	78	60	117.3
1	45 13.7	78	60	117.6	45 37.1	78	60	117.2	46 00.4	77	60	116.7	46 23.6	77	60	116.3
2	44 38.0	78	60	116.6	45 01.3	77	60	116.1	45 24.4	77	61	115.7	45 47.5	77	61	115.2
3	44 01.9	77	61	115.6	44 25.1	77	61	115.1	44 48.1	77	61	114.7	45 11.0	76	61	114.2
4	43 25.6	77	61	114.5	43 48.6	76	61	114.1	44 11.5	76	62	113.6	44 34.2	76	62	113.2
45	42 48.9	76	62	113.5	43 11.8	76	62	113.1	43 34.5	76	62	112.7	43 57.2	75	62	112.2
6	42 12.0	76	62	112.6	42 34.7	76	62	112.1	42 57.4	75	62	111.7	43 19.9	75	63	111.2
7	41 34.8	76	62	111.6	41 57.4	75	63	111.2	42 19.9	75	63	110.7	42 42.4	75	63	110.3
8	40 57.3	75	63	110.6	41 19.8	75	63	110.2	41 42.3	75	63	109.8	42 04.6	74	63	109.3
9	40 19.6	75	63	109.7	40 42.0	75	63	109.3	41 04.4	74	64	108.8	41 26.6	74	64	108.4
50	39 41.7	75	64	108.8	40 04.0	74	64	108.3	40 26.3	74	64	107.9	40 48.4	74	64	107.4
1	39 03.6	74	64	107.8	39 25.8	74	64	107.4	39 48.0	74	64	107.0	40 10.0	73	64	106.5
2	38 25.3	74	64	106.9	38 47.4	74	64	106.5	39 09.5	73	64	106.1	39 31.4	73	65	105.6
3	37 46.8	74	64	106.1	38 08.8	73	65	105.6	38 30.8	73	65	105.2	38 52.7	73	65	104.8
4	37 08.1	73	65	105.2	37 30.1	73	65	104.7	37 52.0	73	65	104.3	38 13.8	72	65	103.9
55	36 29.3	73	65	104.3	36 51.2	73	65	103.9	37 13.0	73	65	103.4	37 34.7	72	65	103.0
6	35 50.3	73	65	103.4	36 12.1	73	65	103.0	36 33.9	72	65	102.6	36 55.5	72	66	102.2
7	35 11.2	73	65	102.6	35 33.0	72	66	102.2	35 54.6	72	66	101.7	36 16.2	72	66	101.3
8	34 32.0	72	66	101.8	34 53.7	72	66	101.3	35 15.3	72	66	100.9	35 36.8	72	66	100.5
9	33 52.6	72	66	100.9	34 14.2	72	66	100.5	34 35.8	72	66	100.1	34 57.3	71	66	99.7
60	33 13.1	72	66	100.1	33 34.7	72	66	99.7	33 56.2	72	66	99.3	34 17.6	71	66	98.8
1	32 33.5	72	66	99.3	32 55.1	72	66	98.9	33 16.6	71	66	98.4	33 37.9	71	66	98.0
2	31 53.9	72	66	98.5	32 15.4	72	66	98.1	32 36.8	71	66	97.6	32 58.1	71	66	97.2
3	31 14.1	72	66	97.7	31 35.6	71	66	97.3	31 57.0	71	66	96.8	32 18.3	71	67	96.4
4	30 34.3	72	66	96.9	30 55.7	71	67	96.5	31 17.1	71	67	96.1	31 38.4	71	67	95.6
65	29 54.4	71	67	96.1	30 15.8	71	67	95.7	30 37.1	71	67	95.3	30 58.4	71	67	94.9
6	29 14.5	71	67	95.3	29 35.8	71	67	94.9	29 57.1	71	67	94.5	30 18.4	71	67	94.1
7	28 34.5	71	67	94.5	28 55.8	71	67	94.1	29 17.1	71	67	93.7	29 38.3	71	67	93.3
8	27 54.4	71	67	93.8	28 15.7	71	67	93.4	28 37.0	71	67	93.0	28 58.2	71	67	92.6
9	27 14.3	71	67	93.0	27 35.7	71	67	92.6	27 56.9	71	67	92.2	28 18.1	70	67	91.8
70	26 34.2	71	67	92.2	26 55.5	71	67	91.8	27 16.8	71	67	91.4	27 37.9	70	67	91.0
1	25 54.1	71	67	91.5	26 15.4	71	67	91.1	26 36.6	71	67	90.7	26 57.8	70	67	90.3
2	25 14.0	71	67	90.7	25 35.3	71	67	90.3	25 56.5	71	67	90.0	26 17.6	70	67	89.6
3	24 33.8	71	67	90.0	24 55.1	71	67	89.6	25 16.3	71	67	89.2	25 37.5	70	67	88.8
4	23 53.7	71	67	89.3	24 15.0	71	67	88.9	24 36.2	71	67	88.5	24 57.4	70	67	88.1
75	23 13.5	71	67	88.5	23 34.8	71	67	88.1	23 56.1	71	67	87.7	24 17.3	71	67	87.4
6	22 33.4	71	67	87.8	22 54.7	71	67	87.4	23 16.0	71	67	87.0	23 37.2	71	67	86.6
7	21 53.3	71	67	87.0	22 14.6	71	67	86.7	22 35.9	71	67	86.3	22 57.1	71	67	85.9
8	21 13.2	71	67	86.3	21 34.6	71	67	85.9	21 55.8	71	67	85.6	22 17.1	71	67	85.2
9	20 33.2	71	67	85.6	20 54.5	71	67	85.2	21 15.8	71	67	84.8	21 37.1	71	67	84.5
80	19 53.2	71	67	84.9	20 14.5	71	67	84.5	20 35.9	71	66	84.1	20 57.2	71	66	83.7
1	19 13.2	71	67	84.2	19 34.6	71	66	83.8	19 56.0	71	66	83.4	20 17.3	71	66	83.0
2	18 33.3	72	66	83.4	18 54.7	71	66	83.1	19 16.1	71	66	82.7	19 37.5	71	66	82.3
3	17 53.4	72	66	82.7	18 14.9	71	66	82.4	18 36.3	71	66	82.0	18 57.7	71	66	81.6
4	17 13.6	72	66	82.0	17 35.1	72	66	81.6	17 56.6	71	66	81.3	18 18.0	71	66	80.9
85	16 33.9	72	66	81.3	16 55.5	72	66	80.9	17 17.0	72	66	80.6	17 38.4	71	66	80.2
6	15 54.3	72	66	80.6	16 15.9	72	66	80.2	16 37.4	72	66	79.9	16 58.9	72	66	79.5
7	15 14.7	72	66	79.9	15 36.3	72	66	79.5	15 57.9	72	66	79.1	16 19.5	72	66	78.8
8	14 35.2	72	66	79.2	14 56.9	72	66	78.8	15 18.5	72	65	78.4	15 40.1	72	65	78.1
9	13 55.9	72	65	78.4	14 17.6	72	65	78.1	14 39.3	72	65	77.7	15 00.9	72	65	77.4
90	13 16.6	73	65	77.7	13 38.3	73	65	77.4	14 00.1	72	65	77.0	14 21.8	72	65	76.7

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H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	26 00.0	1.0 01	180.0	25 30.0	1.0 01	180.0	25 00.0	1.0 01	180.0	24 30.0	1.0 01	180.0	24 00.0	1.0 01	180.0	23 30.0	1.0 01	180.0	23 00.0	1.0 01	180.0	22 30.0	1.0 01	180.0	00
1	25 59.6	1.0 02	178.9	25 29.6	1.0 02	178.9	24 59.6	1.0 02	178.9	24 29.6	1.0 02	179.0	23 59.6	1.0 02	179.0	23 29.6	1.0 02	179.0	22 59.6	1.0 02	179.0	22 29.6	1.0 02	179.0	1
2	25 58.5	1.0 03	177.9	25 28.5	1.0 03	177.9	24 58.5	1.0 03	177.9	24 28.5	1.0 03	177.9	23 58.5	1.0 03	177.9	23 28.6	1.0 03	177.9	22 58.6	1.0 03	177.9	22 28.6	1.0 03	178.0	2
3	25 56.6	1.0 04	176.8	25 26.7	1.0 04	176.8	24 56.7	1.0 04	176.8	24 26.7	1.0 04	176.9	23 56.7	1.0 04	176.9	23 26.7	1.0 04	176.9	22 56.8	1.0 04	176.9	22 26.8	1.0 04	176.9	3
4	25 54.0	1.0 06	175.7	25 24.1	1.0 06	175.8	24 54.1	1.0 06	175.8	24 24.1	1.0 06	175.8	23 54.2	1.0 05	175.8	23 24.2	1.0 05	175.9	22 54.2	1.0 05	175.9	22 24.3	1.0 05	175.9	4
05	25 50.6	1.0 07	174.7	25 20.7	1.0 07	174.7	24 50.8	1.0 07	174.7	24 20.8	1.0 07	174.8	23 50.9	1.0 07	174.8	23 21.0	1.0 07	174.8	22 51.0	1.0 07	174.9	22 21.1	1.0 07	174.9	05
6	25 46.5	1.0 08	173.6	25 16.6	1.0 08	173.6	24 46.7	1.0 08	173.7	24 16.8	1.0 08	173.7	23 46.9	1.0 08	173.8	23 17.0	1.0 08	173.8	22 47.1	1.0 08	173.8	22 17.2	1.0 08	173.9	6
7	25 41.7	1.0 09	172.5	25 11.8	1.0 09	172.6	24 41.9	1.0 09	172.6	24 12.1	1.0 09	172.7	23 42.2	1.0 09	172.7	23 12.3	1.0 09	172.8	22 42.4	1.0 09	172.8	22 12.5	1.0 09	172.9	7
8	25 36.1	99 11	171.5	25 06.3	99 10	171.5	24 36.4	99 10	171.6	24 06.6	99 10	171.6	23 36.7	99 10	171.7	23 06.9	99 10	171.7	22 37.0	99 10	171.8	22 07.2	99 10	171.9	8
9	25 29.8	99 12	170.4	25 00.0	99 12	170.5	24 30.2	99 12	170.5	24 00.4	99 12	170.6	23 30.6	99 11	170.7	23 00.8	99 11	170.7	22 31.0	99 11	170.8	22 01.2	99 11	170.8	9
10	25 22.7	99 13	169.4	24 53.0	99 13	169.4	24 23.2	99 13	169.5	23 53.5	99 13	169.6	23 23.7	99 13	169.6	22 53.9	99 13	169.7	22 24.2	99 12	169.8	21 54.4	99 12	169.8	10
1	25 14.9	99 14	168.3	24 45.2	99 14	168.4	24 15.5	99 14	168.5	23 45.8	99 14	168.5	23 16.1	99 14	168.6	22 46.4	99 14	168.7	22 16.7	99 14	168.8	21 47.0	99 14	168.8	1
2	25 06.4	99 15	167.2	24 36.8	99 15	167.3	24 07.1	99 15	167.4	23 37.5	99 15	167.5	23 07.8	99 15	167.6	22 38.2	99 15	167.7	22 08.5	99 15	167.7	21 38.9	99 15	167.8	2
3	24 57.2	99 17	166.2	24 27.6	99 16	166.3	23 58.0	99 16	166.4	23 28.5	99 16	166.5	22 58.9	99 16	166.6	22 29.3	99 16	166.7	21 59.7	99 16	166.7	21 30.1	99 16	166.8	3
4	24 47.3	98 18	165.2	24 17.8	98 18	165.3	23 48.2	98 18	165.4	23 18.7	98 17	165.4	22 49.2	98 17	165.5	22 19.7	98 17	165.6	21 50.1	98 17	165.7	21 20.6	98 17	165.8	4
15	24 36.7	98 19	164.1	24 07.2	98 19	164.2	23 37.7	98 19	164.3	23 08.3	98 19	164.4	22 38.8	98 18	164.5	22 09.4	98 18	164.6	21 39.9	98 18	164.7	21 10.4	98 18	164.8	15
6	24 25.3	98 20	163.1	23 55.9	98 20	163.2	23 26.6	98 20	163.3	22 57.2	98 20	163.4	22 27.8	98 20	163.5	21 58.4	98 19	163.6	21 29.0	98 19	163.7	20 59.6	98 19	163.8	6
7	24 13.3	98 21	162.1	23 44.0	98 21	162.2	23 14.7	98 21	162.3	22 45.4	98 21	162.4	22 16.0	98 21	162.5	21 46.7	98 21	162.6	21 17.4	98 20	162.7	20 48.1	98 20	162.9	7
8	24 00.6	97 22	161.0	23 31.4	97 22	161.1	23 02.1	97 22	161.3	22 32.9	97 22	161.4	22 03.6	97 22	161.5	21 34.4	97 22	161.6	21 05.1	98 22	161.8	20 35.9	98 21	161.9	8
9	23 47.2	97 23	160.0	23 18.0	97 23	160.1	22 48.9	97 23	160.3	22 19.7	97 23	160.4	21 50.6	97 23	160.5	21 21.4	97 23	160.6	20 52.2	97 23	160.8	20 23.1	97 22	160.9	9
20	23 33.1	97 25	159.0	23 04.1	97 24	159.1	22 35.0	97 24	159.3	22 05.9	97 24	159.4	21 36.9	97 24	159.5	21 07.8	97 24	159.7	20 38.7	97 24	159.8	20 09.6	97 24	159.9	20
1	23 18.4	97 26	158.0	22 49.4	97 26	158.1	22 20.5	97 25	158.3	21 51.5	97 25	158.4	21 22.5	97 25	158.5	20 53.5	97 25	158.7	20 24.5	97 25	158.8	19 55.5	97 25	158.9	1
2	23 03.0	96 27	157.0	22 34.1	96 27	157.1	22 05.3	96 26	157.3	21 36.4	96 26	157.4	21 07.5	96 26	157.5	20 38.6	96 26	157.7	20 09.7	96 26	157.8	19 40.8	96 26	158.0	2
3	22 47.0	96 28	156.0	22 18.2	96 28	156.1	21 49.4	96 27	156.3	21 20.6	96 27	156.4	20 51.8	96 27	156.6	20 23.0	96 27	156.7	19 54.2	96 27	156.9	19 25.4	96 27	157.0	3
4	22 30.3	96 29	155.0	22 01.6	96 29	155.1	21 32.9	96 28	155.3	21 04.2	96 28	155.4	20 35.5	96 28	155.6	20 06.8	96 28	155.7	19 38.1	96 28	155.9	19 09.4	96 28	156.1	4
25	22 13.0	95 30	154.0	21 44.4	95 30	154.1	21 15.8	95 30	154.3	20 47.2	95 29	154.5	20 18.6	95 29	154.6	19 50.0	95 29	154.8	19 21.4	95 29	154.9	18 52.8	95 29	155.1	25
6	21 55.1	95 31	153.0	21 26.6	95 31	153.2	20 58.1	95 31	153.3	20 29.6	95 30	153.5	20 01.1	95 30	153.7	19 32.6	95 30	153.8	19 04.1	95 30	154.0	18 35.6	95 30	154.2	6
7	21 36.5	95 32	152.0	21 08.2	95 32	152.2	20 39.8	95 32	152.4	20 11.4	95 31	152.5	19 43.0	95 31	152.7	19 14.6	95 31	152.9	18 46.2	95 31	153.0	18 17.8	95 31	153.2	7
8	21 17.4	94 33	151.0	20 49.1	94 33	151.2	20 20.9	94 33	151.4	19 52.6	94 32	151.6	19 24.3	94 32	151.7	18 56.0	94 32	151.9	18 27.7	94 32	152.1	17 59.4	94 32	152.3	8
9	20 57.6	94 34	150.1	20 29.5	94 34	150.2	20 01.3	94 34	150.4	19 33.2	94 33	150.6	19 05.0	94 33	150.8	18 36.8	94 33	151.0	18 08.6	94 33	151.2	17 40.4	94 33	151.3	9
30	20 37.3	93 35	149.1	20 09.3	93 35	149.3	19 41.2	93 34	149.5	19 13.2	94 34	149.7	18 45.1	94 34	149.9	18 17.1	94 34	150.0	17 49.0	94 24	150.2	17 20.9	94 34	150.4	30
1	20 16.4	93 36	148.1	19 48.5	93 36	148.3	19 20.6	93 35	148.5	18 52.6	93 35	148.7	18 24.7	93 35	148.9	17 56.7	93 35	149.1	17 28.8	93 35	149.3	17 00.8	93 34	149.5	1
2	19 54.9	93 37	147.2	19 27.1	93 36	147.4	18 59.3	93 36	147.6	18 31.5	93 36	147.8	18 03.7	93 36	148.0	17 35.8	93 36	148.2	17 08.0	93 36	148.4	16 40.1	93 35	148.6	2
3	19 32.9	92 38	146.3	19 05.2	92 37	146.5	18 37.5	92 37	146.7	18 09.8	92 37	146.9	17 42.1	92 37	147.1	17 14.4	92 37	147.3	16 46.7	92 36	147.5	16 18.9	93 36	147.7	3
4	19 10.3	92 39	145.3	18 42.8	92 38	145.5	18 15.2	92 38	145.7	17 47.6	92 38	145.9	17 20.0	92 38	146.1	16 52.4	92 38	146.3	16 24.8	92 37	146.6	15 57.2	92 37	146.8	4
35	18 47.2	91 39	144.4	18 19.8	91 39	144.6	17 52.3	92 39	144.8	17 24.9	92 39	145.0	16 57.4	92 39	145.2	16 29.9	92 38	145.4	16 02.4	92 38	145.6	15 34.9	92 38	145.9	35
6	18 23.6	91 40	143.5	17 56.3	91 40	143.7	17 28.9	91 40	143.9	17 01.6	91 40	144.1	16 34.2	91 39	144.3	16 06.9	91 39	144.5	15 39.5	91 39	144.7	15 12.1	91 39	145.0	6
7	17 59.4	91 41	142.5	17 32.2	91 41	142.8	17 05.0	91 41	143.0	16 37.8	91 40	143.2	16 10.6	91 40	143.4	15 43.3	91 40	143.6	15 16.1	91 40	143.9	14 48.8	91 40	144.1	7
8	17 34.7	90 42	141.6	17 07.7	90 42	141.9	16 40.6	90 42	142.1	16 13.5	90 41	142.3	15 46.4	90 41	142.5	15 19.3	90 41	142.7	14 52.1	90 41	143.0	14 25.0	91 40	143.2	8
9	17 09.6	90 43	140.7	16 42.6	90 43	140.9	16 15.7	90 42	141.2	15 48.7	90 42	141.4	15 21.7	90 42	141.6	14 54.7	90 42	141.9	14 27.7	90 42	142.1	14 00.7	90 41	142.3	9
40	16 43.9	89 44	139.8	16 17.1	89 43	140.1	15 50.3	89 43	140.3	15 23.4	89 43	140.5	14 56.6	90 43	140.7	14 29.7	90 43	141.0	14 02.8	90 42	141.2	13 35.9	90 42	141.4	40
1	16 17.8	89 44	138.9	15 51.1	89 44	139.2	15 24.4	89 44	139.4	14 57.6	89 44	139.6	14 30.9	89 44	139.9	14 04.2	89 43	140.1	13 37.4	89 43	140.3	13 10.6	89 43	140.6	1
2	15 51.1	89 45	138.0	15 24.6	89 45	138.3	14 58.0	89 45	138.5	14 31.4	89 44	138.8	14 04.8	89 44	139.0	13 38.2	89 44	139.2	13 11.6	89 44	139.5	12 44.9	89 44	139.7	2
3	15 24.1	88 46	137.2	14 57.6	88 46	137.4	14 31.2	88 45	137.6	14 04.7	88 45	137.9	13 38.2	88 45	138.1	13 11.7	88 45	138.4	12 45.2	88 45	138.6	12 18.7	88 44	138.9	3
4	14 56.5	88 47	136.3	14 30.2	88 46	136.5	14 03.9	88 46	136.8	13 37.6	88 46	137.0	13 11.2	88 46	137.3	12 44.9	88 46	137.5	12 18.5	88 45	137.8	11 52.1	88 45	138.0	4
45	14 28.6	87 47	135.4	14 02.4	87 47	135.7	13 36.2	87 47	135.9	13 10.0	87 47	136.2	12 43.8	87 46	136.4	12 17.5	87 46	136.7	11 51.3	88 46	136.9	11 25.0	88 46	137.2	45
6	14 00.2	87 48	134.5	13 34.1	87 48	134.8	13 08.1	87 48	135.1	12 42.0	87 47	135.3	12 15.9	87 47	135.6	11 49.7	87 47	135.8	11 23.6	87 47	136.1	10 57.5	87 47	136.3	6
7	13 31.4	86 49	133.7	13 05.4	86 49	134.0	12 39.5	87 48	134.2	12 13.5	87 48	134.5	11 47.5	87 48	134.7	11 21.6	87 48	135.0	10 55.6	87 47	135.2	10 29.5	87 47	135.5	7
8	13 02.1	86 49	132.8	12 36.3	86 49	133.1	12 10.5	86 49	133.4	11 44.7	86 49	133.6	11 18.8	86 49	133.9	10 52.9	86 48	134.1	10 27.1	86 48	134.4	10 01.2	86 48	134.7	8
9	12 32.5	86 50	132.0	12 06.8	86 50	132.3	11 41.1	86 50	132.5	11 15.4	86 49	132.8	10 49.7	86 49	133.0	10 23.9	86 49	133.3	9 58.2	86 49	133.6	9 32.4	86 49	133.8	9
50	12 02.5	85 51	131.2	11 36.9	85 50	131.4	11 11.3	85 50	131.7	10 45.7	85 50	132.0	10 20.1	85 50	132.2	9 54.5	85 50	132.5	9 28.9	85 49	132.7	9 03.3	85 49	133.0	50
1	11 32.0	85 51	130.3	11 06.6	85 51	130.6	10 41.1	85 51	130.9	10 15.7	85 51	131.1	9 50.2	85 51	131.4	9 24.7	85 50	131.7	8 59.2	85 50	131.9	8 33.7	85 50	132.2	1
2	11 01.2	84 52	129.5	10 35.9	84 52	129.8	10 10.6	84 52	130.0	9 45.3	84 51	130.3	9 19.9	85 51	130.6	8 54.5	85 51	130.9	8 29.2	85 51	131.1	8 03.8	85 51	131.4	2
3	10 30.1	84 53	128.7	10 04.9	84 52	128.9	9 39.7	84 52	129.2	9 14.5	84 52	129.5	8 49.2	84 52	129.8	8 24.0	84 52	130.0	7 58.7	84 51	130.3	7 33.5	84 51	130.6	3
4	9 58.5	84 53	127.9	9 33.5	84 53	128.1	9 08.4	84 53	128.4	8 43.3	84 53	128.7	8 18.2	84 52	129.0	7 53.1	84 52	129.2	7 27.9	84 52	129.5	7 02.8	84 52	129.8	4
55	9 26.7	83 54	127.0	9 01.7	83 54	127.3	8 36.8	83 53	127.6	8 11.8	83 53	127.9	7 46.8	83 53	128.2	7 21.8	83 53	128.4	6 56.8	83 52	128.7	6 31.8	83 52	129.0	55
6	8 54.4	83 54	126.2	8 29.6	83 54	126.5	8 04.8	83 54	126.8	7 39.9	83 54	127.1	7 15.1	83 53	127.4	6 50.2	83 53	127.6	6 25.3	83 53	127.9	6 00.4	83 53	128.2	6
7	8 21.9	82 55	125.4	7 57.2	82 55	125.7	7 32.5	82 54	126.0	7 07.7	82 54	126.3	6 43.0	83 54	126.6	6 18.2	83 54	126.9	5 53.5	83 54	127.1	5 28.7	83 53	127.4	7
8	7 49.0	82 55	124.6	7 24.4	82 55	124.9	6 59.8	82 55	125.2	6 35.2	82 55	125.5	6 10.6	82 55	125.8	5 45.9	82 54	126.1	5 21.3	82 54	126.4				8
9	7 15.8	82 56	123.8	6 51.3	82 56	124.1	6 26.9	82 55	124.4	6 02.4	82 55	124.7	5 37.8	82 55	125.0	5 13.3	82 55	125.3							9
60	6 42.3	81 56	123.0	6 18.0	81 56	123.3	5 53.6	81 56	123.6	5 29.2	81 56	123.9	5 04.8	81 56	124.2										60
1	6 08.5	81 57	122.3	5 44.3	81 57	122.6	5 20.0	81 56	122.9																1
2	5 34.4	80 57	121.5	5 10.3	81 57	121.8																			2
3	5 00.1	80 58	120.7																						3

DECLINATION SAME NAME AS LATITUDE

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
91	11 09.8	73 65	78.4	11 31.8	73 65	78.1	11 53.7	73 65	77.7	12 15.5	73 65	77.4	12 37.4	73 65	77.0	12 59.2	73 65	76.7	13 21.0	73 65	76.3	13 42.8	73 65	76.0	91
2	10 30.5	73 65	77.7	10 52.5	73 65	77.4	11 14.5	73 65	77.0	11 36.4	73 65	76.7	11 58.3	73 65	76.3	12 20.2	73 65	76.0	12 42.1	73 65	75.6	13 03.9	73 65	75.3	2
3	9 51.4	73 65	77.0	10 13.4	73 65	76.6	10 35.4	73 65	76.3	10 57.4	73 65	76.0	11 19.4	73 65	75.6	11 41.3	73 65	75.3	12 03.2	73 64	74.9	12 25.1	73 64	74.6	3
4	9 12.3	74 65	76.3	9 34.4	74 65	75.9	9 56.5	74 65	75.6	10 18.5	73 65	75.2	10 40.6	73 64	74.9	11 02.6	73 64	74.5	11 24.5	73 64	74.2	11 46.5	73 64	73.9	4
95	8 33.4	74 65	75.6	8 55.5	74 65	75.2	9 17.7	74 64	74.9	9 39.8	74 64	74.5	10 01.9	74 64	74.2	10 23.9	74 64	73.8	10 46.0	73 64	73.5	11 08.0	73 64	73.2	95
6	7 54.6	74 64	74.8	8 16.8	74 64	74.5	8 39.0	74 64	74.2	9 01.1	74 64	73.8	9 23.3	74 64	73.5	9 45.4	74 64	73.1	10 07.6	74 64	72.8	10 29.6	74 64	72.4	6
7	7 15.9	74 64	74.1	7 38.1	74 64	73.8	8 00.4	74 64	73.4	8 22.7	74 64	73.1	8 44.9	74 64	72.8	9 07.1	74 64	72.4	9 29.3	74 64	72.1	9 51.4	74 63	71.7	7
8	6 37.3	75 64	73.4	6 59.7	74 64	73.1	7 22.0	74 64	72.7	7 44.3	74 64	72.4	8 06.6	74 64	72.0	8 28.9	74 63	71.7	8 51.2	74 63	71.4	9 13.4	74 63	71.0	8
9	5 58.9	75 64	72.7	6 21.3	75 64	72.3	6 43.7	75 64	72.0	7 06.1	75 63	71.7	7 28.5	75 63	71.3	7 50.9	74 63	71.0	8 13.2	74 63	70.7	8 35.5	74 63	70.3	9
100	5 20.7	75 64	72.0	5 43.2	75 63	71.6	6 05.6	75 63	71.3	6 28.1	75 63	71.0	6 50.5	75 63	70.6	7 13.0	75 63	70.3	7 35.4	75 63	69.9	7 57.8	75 63	69.6	100
1				5 05.1	75 63	70.9	5 27.7	75 63	70.6	5 50.2	75 63	70.2	6 12.8	75 63	69.9	6 35.3	75 63	69.6	6 57.8	75 62	69.2	7 20.3	75 62	68.9	1
2										5 12.5	75 63	69.5	5 35.1	75 62	69.2	5 57.7	75 62	68.9	6 20.3	75 62	68.5	6 42.9	75 62	68.2	2
3																5 20.4	76 62	68.1	5 43.0	76 62	67.8	6 05.7	76 62	67.5	3
4																			5 06.0	76 62	67.1	5 28.7	76 61	66.8	4

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Lat. 48°

H.A.	20° 00′			20° 30′			21° 00′			21° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	62 00.0	1.0 01	180.0	62 30.0	1.0 01	180.0	63 00.0	1.0 01	180.0	63 30.0	1.0 01	180.0
1	61 59.3	1.0 04	178.0	62 29.3	1.0 04	178.0	62 59.3	1.0 04	177.9	63 29.3	1.0 04	177.9
2	61 57.2	1.0 06	176.0	62 27.2	1.0 06	175.9	62 57.1	1.0 06	175.9	63 27.1	1.0 06	175.8
3	61 53.7	1.0 08	174.0	62 23.6	1.0 08	173.9	62 53.5	1.0 08	173.8	63 23.4	1.0 08	173.8
4	61 48.8	1.0 10	172.0	62 18.7	99 11	171.9	62 48.5	99 11	171.8	63 18.4	99 11	171.7
05	61 42.6	99 13	170.0	62 12.3	99 13	169.9	62 42.1	99 13	169.8	63 11.8	99 13	169.6
6	61 34.9	99 15	168.1	62 04.6	99 15	167.9	62 34.3	99 15	167.8	63 03.9	99 16	167.6
7	61 26.0	99 17	166.1	61 55.6	98 17	166.0	62 25.1	98 18	165.8	62 54.6	98 18	165.6
8	61 15.7	98 19	164.2	61 45.2	98 20	164.0	62 14.6	98 20	163.8	62 43.9	98 20	163.6
9	61 04.2	98 21	162.3	61 33.4	98 22	162.1	62 02.7	97 22	161.8	62 31.9	97 22	161.6
10	60 51.3	97 23	160.4	61 20.5	97 24	160.2	61 49.5	97 24	159.9	62 18.6	97 24	159.7
1	60 37.3	97 26	158.6	61 06.2	96 26	158.3	61 35.1	96 26	158.0	62 04.0	96 26	157.7
2	60 22.0	96 27	156.7	60 50.8	96 28	156.4	61 19.5	96 28	156.1	61 48.2	96 28	155.8
3	60 05.6	95 29	154.9	60 34.1	95 30	154.6	61 02.7	95 30	154.3	61 31.2	95 30	154.0
4	59 48.0	95 31	153.1	60 16.4	95 32	152.8	60 44.7	94 32	152.5	61 13.0	94 32	152.1
15	59 29.3	94 33	151.4	59 57.5	94 33	151.0	60 25.6	94 34	150.7	60 53.6	93 34	150.3
6	59 09.5	93 35	149.7	59 37.5	93 35	149.3	60 05.4	93 35	148.9	60 33.2	93 36	148.6
7	58 48.7	93 36	148.0	59 16.5	92 37	147.6	59 44.1	92 37	147.2	60 11.8	92 37	146.8
8	58 26.9	92 38	146.3	58 54.5	92 38	145.9	59 21.9	91 39	145.5	59 49.3	91 39	145.1
9	58 04.2	91 39	144.7	58 31.5	91 40	144.3	58 58.7	91 40	143.9	59 25.8	90 41	143.4
20	57 40.5	90 41	143.1	58 07.6	90 41	142.6	58 34.6	90 42	142.2	59 01.5	90 42	141.8
1	57 15.9	90 42	141.5	57 42.8	89 43	141.1	58 09.5	89 43	140.6	58 36.2	89 44	140.2
2	56 50.5	89 44	139.9	57 17.1	89 44	139.5	57 43.7	88 44	139.1	58 10.1	88 45	138.6
3	56 24.3	88 45	138.4	56 50.7	88 45	138.0	57 17.0	88 46	137.6	57 43.2	87 46	137.1
4	55 57.2	87 46	136.9	56 23.4	87 47	136.5	56 49.5	87 47	136.1	57 15.5	86 47	135.6
25	55 29.5	87 48	135.5	55 55.4	86 48	135.0	56 21.2	86 48	134.6	56 47.0	86 49	134.1
6	55 01.0	86 49	134.1	55 26.7	86 49	133.6	55 52.3	85 49	133.2	56 17.8	85 50	132.7
7	54 31.8	85 50	132.7	54 57.3	85 50	132.2	55 22.7	85 50	131.8	55 48.0	84 51	131.3
8	54 01.9	84 51	131.3	54 27.2	84 51	130.9	54 52.4	84 51	130.4	55 17.5	83 52	129.9
9	53 31.5	84 52	130.0	53 56.6	83 52	129.5	54 21.5	83 52	129.0	54 46.4	83 53	128.6
30	53 00.4	83 53	128.7	53 25.3	83 53	128.2	53 50.1	82 53	127.7	54 14.7	82 54	127.2
1	52 28.8	82 54	127.4	52 53.5	82 54	126.9	53 18.0	82 54	126.4	53 42.5	81 55	125.9
2	51 56.6	82 54	126.1	52 21.1	81 55	125.6	52 45.5	81 55	125.2	53 09.7	81 55	124.7
3	51 23.9	81 55	124.9	51 48.2	81 56	124.4	52 12.4	80 56	123.9	52 36.5	80 56	123.4
4	50 50.8	81 56	123.7	51 14.9	80 56	123.2	51 38.9	80 57	122.7	52 02.7	79 57	122.2
35	50 17.1	80 57	122.5	50 41.0	80 57	122.0	51 04.8	79 57	121.5	51 28.5	79 58	121.0
6	49 43.0	79 58	121.3	50 06.8	79 58	120.8	50 30.4	79 58	120.4	50 53.9	78 58	119.9
7	49 08.5	79 58	120.2	49 32.1	78 58	119.7	49 55.6	78 59	119.2	50 18.9	78 59	118.7
8	48 33.6	78 59	119.1	48 57.0	78 59	118.6	49 20.3	77 59	118.1	49 43.5	77 60	117.6
9	47 58.3	78 59	118.0	48 21.6	77 60	117.5	48 44.8	77 60	117.0	49 07.8	77 60	116.5
40	47 22.7	77 60	116.9	47 45.8	77 60	116.4	48 08.8	76 60	115.9	48 31.7	76 61	115.4
1	46 46.7	77 61	115.8	47 09.7	76 61	115.3	47 32.5	76 61	114.9	47 55.3	76 61	114.4
2	46 10.4	76 61	114.8	46 33.3	76 61	114.3	46 56.0	76 61	113.8	47 18.6	75 62	113.3
3	45 33.8	76 61	113.7	45 56.5	75 62	113.3	46 19.1	75 62	112.8	46 41.6	75 62	112.3
4	44 56.9	75 62	112.7	45 19.5	75 62	112.3	45 41.9	75 62	111.8	46 04.3	74 63	111.3
45	44 19.8	75 62	111.7	44 42.2	75 63	111.3	45 04.5	74 63	110.8	45 26.8	74 63	110.3
6	43 42.4	75 63	110.8	44 04.7	74 63	110.3	44 26.9	74 63	109.8	44 49.0	73 63	109.4
7	43 04.7	74 63	109.8	43 26.9	74 63	109.3	43 49.0	73 63	108.9	44 11.0	73 64	108.4
8	42 26.8	74 64	108.9	42 48.9	74 64	108.4	43 10.9	73 64	107.9	43 32.8	73 64	107.5
9	41 48.7	74 64	107.9	42 10.7	73 64	107.5	42 32.6	73 64	107.0	42 54.4	72 64	106.5
50	41 10.4	73 64	107.0	41 32.3	73 64	106.5	41 54.1	72 64	106.1	42 15.8	72 65	105.6
1	40 31.9	73 64	106.1	40 53.7	73 65	105.6	41 15.5	72 65	105.2	41 37.1	72 65	104.7
2	39 53.3	73 65	105.2	40 15.0	72 65	104.7	40 36.6	72 65	104.3	40 58.2	72 65	103.8
3	39 14.4	72 65	104.3	39 36.1	72 65	103.9	39 57.7	72 65	103.4	40 19.1	71 65	103.0
4	38 35.5	72 65	103.4	38 57.0	72 65	103.0	39 18.5	71 65	102.5	39 39.9	71 66	102.1
55	37 56.3	72 65	102.6	38 17.9	72 66	102.1	38 39.3	71 66	101.7	39 00.6	71 66	101.2
6	37 17.1	72 66	101.7	37 38.5	71 66	101.3	37 59.9	71 66	100.8	38 21.2	71 66	100.4
7	36 37.7	71 66	100.9	36 59.1	71 66	100.4	37 20.4	71 66	100.0	37 41.6	71 66	99.6
8	35 58.2	71 66	100.0	36 19.6	71 66	99.6	36 40.8	71 66	99.2	37 02.0	70 66	98.7
9	35 18.7	71 66	99.2	35 40.0	71 66	98.8	36 01.2	71 66	98.4	36 22.3	70 66	97.9
60	34 39.0	71 66	98.4	35 00.2	71 66	98.0	35 21.4	70 66	97.5	35 42.5	70 66	97.1
1	33 59.2	71 66	97.6	34 20.4	71 66	97.2	34 41.6	70 66	96.7	35 02.6	70 67	96.3
2	33 19.4	71 66	96.8	33 40.6	70 67	96.4	34 01.7	70 67	96.0	34 22.6	70 67	95.5
3	32 39.5	71 67	96.0	33 00.6	70 67	95.6	33 21.7	70 67	95.2	33 42.7	70 67	94.7
4	31 59.6	71 67	95.2	32 20.7	70 67	94.8	32 41.7	70 67	94.4	33 02.6	70 67	94.0
65	31 19.5	70 67	94.4	31 40.6	70 67	94.0	32 01.6	70 67	93.6	32 22.6	70 67	93.2
6	30 39.5	70 67	93.7	31 00.6	70 67	93.3	31 21.6	70 67	92.8	31 42.5	70 67	92.4
7	29 59.4	70 67	92.9	30 20.5	70 67	92.5	30 41.4	70 67	92.1	31 02.3	70 67	91.7
8	29 19.3	70 67	92.2	29 40.4	70 67	91.7	30 01.3	70 67	91.3	30 22.2	69 67	90.9
9	28 39.2	70 67	91.4	29 00.2	70 67	91.0	29 21.2	70 67	90.6	29 42.1	69 67	90.2
70	27 59.0	70 67	90.6	28 20.1	70 67	90.2	28 41.0	70 67	89.8	29 01.9	69 67	89.4
1	27 18.9	70 67	89.9	27 39.9	70 67	89.5	28 00.9	70 67	89.1	28 21.8	70 67	88.7
2	26 38.7	70 67	89.2	26 59.8	70 67	88.8	27 20.7	70 67	88.4	27 41.6	70 67	88.0
3	25 58.6	70 67	88.4	26 19.6	70 67	88.0	26 40.6	70 67	87.6	27 01.5	70 67	87.2
4	25 18.5	70 67	87.7	25 39.5	70 67	87.3	26 00.5	70 67	86.9	26 21.4	70 67	86.5
75	24 38.4	70 67	87.0	24 59.4	70 67	86.6	25 20.4	70 67	86.2	25 41.4	70 67	85.8
6	23 58.3	70 67	86.2	24 19.4	70 67	85.9	24 40.4	70 67	85.5	25 01.4	70 67	85.1
7	23 18.3	70 67	85.5	23 39.4	70 67	85.1	24 00.4	70 67	84.7	24 21.4	70 67	84.3
8	22 38.3	71 67	84.8	22 59.4	70 67	84.4	23 20.4	70 66	84.0	23 41.5	70 66	83.6
9	21 58.3	71 67	84.1	22 19.4	70 66	83.7	22 40.5	70 66	83.3	23 01.6	70 66	82.9
80	21 18.4	71 66	83.4	21 39.6	71 66	83.0	22 00.7	70 66	82.6	22 21.8	70 66	82.2
1	20 38.5	71 66	82.7	20 59.8	71 66	82.3	21 20.9	70 66	81.9	21 42.0	70 66	81.5
2	19 58.8	71 66	81.9	20 20.0	71 66	81.6	20 41.2	71 66	81.2	21 02.4	70 66	80.8
3	19 19.0	71 66	81.2	19 40.3	71 66	80.9	20 01.6	71 66	80.5	20 22.8	71 66	80.1
4	18 39.4	71 66	80.5	19 00.7	71 66	80.2	19 22.0	71 66	79.8	19 43.3	71 66	79.4
85	17 59.8	71 66	79.8	18 21.2	71 66	79.5	18 42.5	71 66	79.1	19 03.8	71 66	78.7
6	17 20.4	71 66	79.1	17 41.8	71 66	78.8	18 03.2	71 65	78.4	18 24.5	71 65	78.0
7	16 41.0	72 65	78.4	17 02.5	72 65	78.1	17 23.9	71 65	77.7	17 45.3	71 65	77.3
8	16 01.7	72 65	77.7	16 23.2	72 65	77.4	16 44.7	72 65	77.0	17 06.2	71 65	76.6
9	15 22.5	72 65	77.0	15 44.1	72 65	76.7	16 05.7	72 65	76.3	16 27.2	72 65	75.9
90	14 43.5	72 65	76.3	15 05.1	72 65	76.0	15 26.7	72 65	75.6	15 48.3	72 65	75.2

H.A.	22° 00′			22° 30′			23° 00′			23° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	64 00.0	1.0 01	180.0	64 30.0	1.0 01	180.0	65 00.0	1.0 01	180.0	65 30.0	1.0 01	180.0
1	63 59.3	1.0 04	177.9	64 29.2	1.0 04	177.9	64 59.2	1.0 04	177.8	65 29.2	1.0 04	177.8
2	63 57.0	1.0 06	175.8	64 27.0	1.0 06	175.7	64 57.0	1.0 06	175.6	65 26.9	1.0 06	175.6
3	63 53.3	1.0 09	173.7	64 23.2	1.0 09	173.6	64 53 1	1.0 09	173.5	65 23.0	1.0 09	173.4
4	63 48.2	99 11	171.6	64 18.0	99 11	171.5	64 47.8	99 11	171.3	65 17.7	99 11	171.2
05	63 41.6	99 13	169.5	64 11.3	99 14	169.3	64 41.0	99 14	169.2	65 10.8	99 14	169.0
6	63 33.6	99 16	167.4	64 03.2	99 16	167.2	64 32.8	99 16	167.1	65 02.4	99 16	166.9
7	63 24.1	98 18	165.4	63 53.6	98 18	165.2	64 23.1	98 19	165.0	64 52.5	98 19	164.7
8	63 13.3	98 20	163.4	63 42.6	98 21	163.1	64 12.0	98 21	162.9	64 41.3	98 21	162.6
9	63 01.1	97 22	161.4	63 30.3	97 23	161.1	63 59.5	97 23	160.8	64 28.6	97 23	160.6
10	62 47.6	97 25	159.4	63 16.6	97 25	159.1	63 45.6	96 25	158.8	64 14.5	96 26	158.5
1	62 32.9	96 27	157.4	63 01.7	96 27	157.1	63 30.4	96 27	156.8	63 59.2	96 28	156.5
2	62 16.8	95 29	155.5	62 45.4	95 29	155.2	63 14.0	95 29	154.9	63 42.5	95 30	154.5
3	61 59.6	95 31	153.6	62 28.0	95 31	153.3	62 56.3	94 31	152.9	63 24.6	94 32	152.6
4	61 41.2	94 33	151.8	62 09.4	94 33	151.4	62 37.5	94 33	151.0	63 05.5	93 34	150.6
15	61 21.6	93 34	150.0	61 49.6	93 35	149.6	62 17.5	93 35	149.2	62 45.3	93 36	148.8
6	61 01.0	92 36	148.2	61 28.7	92 37	147.8	61 56.3	92 37	147.4	62 23.9	92 37	146.9
7	60 39.3	92 38	146.4	61 06.8	91 38	146.0	61 34.2	91 39	145.6	62 01.5	91 39	145.1
8	60 16.6	91 39	144.7	60 43.8	91 40	144.3	61 11.0	90 40	143.8	61 38.0	90 41	143.4
9	59 52.9	90 41	143.0	60 19.9	90 41	142.6	60 46.8	89 42	142.1	61 13.6	89 42	141.7
20	59 28.3	89 42	141.4	59 55.0	89 43	140.9	60 21.7	89 43	140.5	60 48.2	88 44	140.0
1	59 02.8	88 44	139.8	59 29.3	88 44	139.3	59 55.7	88 45	138.8	60 22.0	87 45	138.3
2	58 36.4	88 45	138.2	59 02.7	87 46	137.7	59 28.8	87 46	137.2	59 54.9	87 46	136.7
3	58 09.3	87 47	136.6	58 35.3	87 47	136.2	59 01.2	86 47	135.7	59 27.0	86 48	135.2
4	57 41.3	86 48	135.1	58 07.1	86 48	134.6	58 32.7	85 49	134.2	58 58.3	85 49	133.6
25	57 12.6	85 49	133.7	57 38.2	85 49	133.2	58 03.6	85 50	132.7	58 28.9	84 50	132.2
6	56 43.2	85 50	132.2	57 08.5	84 50	131.7	57 33.7	84 51	131.2	57 58.8	83 51	130.7
7	56 13.2	84 51	130.8	56 38.2	83 52	130.3	57 03.2	83 52	129.8	57 28.0	83 52	129.3
8	55 42.5	83 52	129.4	56 07.3	83 53	128.9	56 32.0	82 53	128.4	56 56.6	82 53	127.9
9	55 11.1	82 53	128.1	55 35.8	82 54	127.6	56 00.3	81 54	127.0	56 24.6	81 54	126.5
30	54 39.2	82 54	126.7	55 03.7	81 54	126.2	55 27.9	81 55	125.7	55 52.1	80 55	125.2
1	54 06.8	81 55	125.4	54 31.0	80 55	124.9	54 55.1	80 56	124.4	55 19.0	80 56	123.9
2	53 33.8	80 56	124.2	53 57.8	80 56	123.7	54 21.7	79 56	123.2	54 45.5	79 57	122.6
3	53 00.4	80 57	122.9	53 24.2	79 57	122.4	53 47.9	79 57	121.9	54 11.4	78 58	121.4
4	52 26.5	79 57	121.7	52 50.1	79 58	121.2	53 13.6	78 58	120.7	53 36.9	78 58	120.2
35	51 52.1	78 58	120.5	52 15.5	78 58	120.0	52 38.8	77 59	119.5	53 02.0	77 59	119.0
6	51 17.3	78 59	119.4	51 40.6	77 59	118.9	52 03.7	77 59	118.4	52 26.7	76 60	117.8
7	50 42.1	77 59	118.2	51 05.2	77 60	117.7	51 28.2	76 60	117.2	51 51.0	76 60	116.7
8	50 06.6	77 60	117.1	50 29.5	76 60	116.6	50 52.3	76 60	116.1	51 15.0	75 61	115.6
9	49 30.7	76 60	116.0	49 53.4	76 61	115.5	50 16.1	75 61	115.0	50 38.6	75 61	114.5
40	48 54.4	76 61	114.9	49 17.1	75 61	114.4	49 39.5	75 61	113.9	50 01.9	74 62	113.4
1	48 17.9	75 61	113.9	48 40.4	75 62	113.4	49 02.7	74 62	112.9	49 24.9	74 62	112.4
2	47 41.0	75 62	112.8	48 03.4	74 62	112.3	48 25.6	74 62	111.8	48 47.6	73 63	111.3
3	47 03.9	74 62	111.8	47 26.1	74 63	111.3	47 48.2	73 63	110.8	48 10.1	73 63	110.3
4	46 26.5	74 63	110.8	46 48.6	73 63	110.3	47 10.5	73 63	109.8	47 32.3	73 63	109.3
45	45 48.8	73 63	109.8	46 10.8	73 63	109.4	46 32.6	73 64	108.9	46 54.4	72 64	108.4
6	45 11.0	73 64	108.9	45 32.8	73 64	108.4	45 54.5	72 64	107.9	46 16.1	72 64	107.4
7	44 32.9	73 64	107.9	44 54.6	72 64	107.4	45 16.2	72 64	106.9	45 37.7	71 64	106.4
8	43 54.6	72 64	107.0	44 16.2	72 64	106.5	44 37.7	72 64	106.0	44 59.1	71 65	105.5
9	43 16.1	72 64	106.1	43 37.6	72 65	105.6	43 59.1	71 65	105.1	44 20.4	71 65	104.6
50	42 37.4	72 65	105.1	42 58.9	71 65	104.7	43 20.2	71 65	104.2	43 41.4	71 65	103.7
1	41 58.6	71 65	104.2	42 20.0	71 65	103.8	42 41.2	71 65	103.3	43 02.4	70 65	102.8
2	41 19.6	71 65	103.4	41 40.9	71 65	102.9	42 02.1	70 65	102.4	42 23.1	70 66	101.9
3	40 40.5	71 65	102.5	41 01.7	71 66	102.0	41 22.8	70 66	101.5	41 43.8	70 66	101.1
4	40 01.2	71 66	101.6	40 22.4	70 66	101.2	40 43.4	70 66	100.7	41 04.3	70 66	100.2
55	39 21.8	71 66	100.8	39 42.9	70 66	100.3	40 03.9	70 66	99.8	40 24.8	69 66	99.4
6	38 42.3	70 66	99.9	39 03.4	70 66	99.5	39 24.3	70 66	99.0	39 45.1	69 66	98.5
7	38 02.7	70 66	99.1	38 23.7	70 66	98.7	38 44.6	69 66	98.2	39 05.4	69 66	97.7
8	37 23.0	70 66	98.3	37 44.0	70 66	97.8	38 04.8	69 66	97.4	38 25.6	69 67	96.9
9	36 43.3	70 66	97.5	37 04.2	70 66	97.0	37 25.0	69 67	96.6	37 45.7	69 67	96.1
60	36 03.4	70 66	96.7	36 24.3	69 67	96.2	36 45.1	69 67	95.8	37 05.7	69 67	95.3
1	35 23.5	70 67	95.9	35 44.4	69 67	95.4	36 05.1	69 67	95.0	36 25.7	69 67	94.5
2	34 43.6	70 67	95.1	35 04.4	69 67	94.6	35 25.1	69 67	94.2	35 45.7	69 67	93.8
3	34 03.5	69 67	94.3	34 24.3	69 67	93.9	34 45.0	69 67	93.4	35 05.6	68 67	93.0
4	33 23.5	69 67	93.5	33 44.2	69 67	93.1	34 04.9	69 67	92.7	34 25.5	68 67	92.2
65	32 43.4	69 67	92.8	33 04.1	69 67	92.3	33 24.8	69 67	91.9	33 45.4	68 67	91.5
6	32 03.3	69 67	92.0	32 24.0	69 67	91.6	32 44.7	69 67	91.1	33 05.2	68 67	90.7
7	31 23.2	69 67	91.2	31 43.9	69 67	90.8	32 04.5	69 67	90.4	32 25.1	68 67	90.0
8	30 43.0	69 67	90.5	31 03.7	69 67	90.1	31 24.4	69 67	89.7	31 44.9	68 67	89.2
9	30 02.9	69 67	89.8	30 23.6	69 67	89.3	30 44.2	69 67	88.9	31 04.8	68 67	88.5
70	29 22.7	69 67	89.0	29 43.4	69 67	88.6	30 04.1	69 67	88.2	30 24.7	68 67	87.8
1	28 42.6	69 67	88.3	29 03.3	69 67	87.9	29 24.0	69 67	87.5	29 44.6	68 67	87.0
2	28 02.5	69 67	87.5	28 23.2	69 67	87.1	28 43.9	69 67	86.7	29 04.5	69 67	86.3
3	27 22.4	69 67	86.8	27 43.1	69 67	86.4	28 03.8	69 67	86.0	28 24.4	69 67	85.6
4	26 42.3	69 67	86.1	27 03.1	69 67	85.7	27 23.8	69 67	85.3	27 44.4	69 67	84.9
75	26 02.3	69 67	85.4	26 23.1	69 67	85.0	26 43.8	69 67	84.6	27 04.5	69 67	84.2
6	25 22.3	70 67	84.7	25 43.1	69 67	84.3	26 03.9	69 66	83.9	26 24.6	69 66	83.5
7	24 42.3	70 66	84.0	25 03.2	69 66	83.6	25 24.0	69 66	83.2	25 44.7	69 66	82.8
8	24 02.4	70 66	83.2	24 23.3	70 66	82.9	24 44.1	69 66	82.5	25 04.9	69 66	82.1
9	23 22.6	70 66	82.5	23 43.5	70 66	82.1	24 04.4	69 66	81.8	24 25.2	69 66	81.4
80	22 42.8	70 66	81.8	23 03.8	70 66	81.4	23 24.7	70 66	81.1	23 45.5	69 66	80.7
1	22 03.1	70 66	81.1	22 24.1	70 66	80.7	22 45.0	70 66	80.4	23 05.9	70 66	80.0
2	21 23.5	70 66	80.4	21 44.5	70 66	80.0	22 05.5	70 66	79.7	22 26.5	70 66	79.3
3	20 43.9	70 66	79.7	21 05.0	70 66	79.4	21 26.1	70 66	79.0	21 47.1	70 66	78.6
4	20 04.5	71 66	79.0	20 25.6	70 66	78.7	20 46.7	70 65	78.3	21 07.7	70 65	77.9
85	19 25.1	71 65	78.3	19 46.3	71 65	78.0	20 07.4	70 65	77.6	20 28.5	70 65	77.2
6	18 45.8	71 65	77.6	19 07.1	71 65	77.3	19 28.3	71 65	76.9	19 49.4	70 65	76.5
7	18 06.7	71 65	77.0	18 28.0	71 65	76.6	18 49.2	71 65	76.2	19 10.5	71 65	75.8
8	17 27.6	71 65	76.3	17 49.0	71 65	75.9	18 10.3	71 65	75.5	18 31.6	71 65	75.1
9	16 48.7	72 65	75.6	17 10.1	71 65	75.2	17 31.5	71 64	74.8	17 52.8	71 64	74.5
90	16 09.8	72 64	74.9	16 31.3	72 64	74.5	16 52.8	71 64	74.1	17 14.2	71 64	73.8

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H.A.	20° 00′ Alt.	Δd	Δt	Az.	20° 30′ Alt.	Δd	Δt	Az.	21° 00′ Alt.	Δd	Δt	Az.	21° 30′ Alt.	Δd	Δt	Az.	22° 00′ Alt.	Δd	Δt	Az.	22° 30′ Alt.	Δd	Δt	Az.	23° 00′ Alt.	Δd	Δt	Az.	23° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
00	22 00.0	1.0	01	180.0	21 30.0	1.0	01	180.0	21 00.0	1.0	01	180.0	20 30.0	1.0	01	180.0	20 00.0	1.0	01	180.0	19 30.0	1.0	01	180.0	19 00.9	1.0	01	180.0	18 30.0	1.0	01	180.0	00
1	21 59.6	1.0	02	179.0	21 29.6	1.0	02	179.0	20 59.6	1.0	02	179.0	20 29.7	1.0	02	179.0	19 59.7	1.0	02	179.0	19 29.7	1.0	02	179.0	18 59.7	1.0	02	179.0	18 29.7	1.0	02	179.0	1
2	21 58.6	1.0	03	178.0	21 28.6	1.0	03	178.0	20 58.6	1.0	03	178.0	20 28.6	1.0	03	178.0	19 58.6	1.0	03	178.0	19 28.6	1.0	03	178.0	18 58.6	1.0	03	178.1	18 28.6	1.0	03	178.1	2
3	21 56.8	1.0	04	177.0	21 26.8	1.0	04	177.0	20 56.8	1.0	04	177.0	20 26.9	1.0	04	177.0	19 56.9	1.0	04	177.0	19 26.9	1.0	04	177.1	18 56.9	1.0	04	177.1	18 27.0	1.0	04	177.1	3
4	21 54.3	1.0	05	175.9	21 24.4	1.0	05	176.0	20 54.4	1.0	05	176.0	20 24.4	1.0	05	176.0	19 54.5	1.0	05	176.1	19 24.5	1.0	05	176.1	18 54.5	1.0	05	176.1	18 24.6	1.0	05	176.1	4
05	21 51.1	1.0	06	174.9	21 21.2	1.0	06	175.0	20 51.3	1.0	06	175.0	20 21.3	1.0	06	175.0	19 51.4	1.0	06	175.1	19 21.4	1.0	06	175.1	18 51.5	1.0	06	175.1	18 21.5	1.0	06	175.2	05
6	21 47.2	1.0	08	173.9	21 17.3	1.0	08	174.0	20 47.4	1.0	08	174.0	20 17.5	1.0	08	174.0	19 47.6	1.0	07	174.1	19 17.7	1.0	07	174.1	18 47.7	1.0	07	174.2	18 17.8	1.0	07	174.2	6
7	21 42.6	1.0	09	172.9	21 12.8	1.0	09	173.0	20 42.9	1.0	09	173.0	20 13.0	1.0	09	173.1	19 43.1	1.0	09	173.1	19 13.2	1.0	09	173.2	18 43.3	1.0	08	173.2	18 13.4	1.0	08	173.2	7
8	21 37.3	99	10	171.9	21 07.5	1.0	10	172.0	20 37.6	1.0	10	172.0	20 07.8	1.0	10	172.1	19 37.9	1.0	10	172.1	19 08.1	1.0	10	172.2	18 38.2	1.0	10	172.2	18 08.4	1.0	10	172.3	8
9	21 31.3	99	11	170.9	21 01.5	99	11	171.0	20 31.7	99	11	171.0	20 01.9	99	11	171.1	19 32.1	99	11	171.1	19 02.3	99	11	171.2	18 32.5	99	11	171.3	18 02.6	99	11	171.3	9
10	21 24.7	99	12	169.9	20 54.9	99	12	170.0	20 25.1	99	12	170.0	19 55.4	99	12	170.1	19 25.6	99	12	170.2	18 55.8	99	12	170.2	18 26.0	99	12	170.3	17 56.3	99	12	170.4	10
1	21 17.3	99	13	168.9	20 47.6	99	13	169.0	20 17.8	99	13	169.1	19 48.1	99	13	169.1	19 18.4	99	13	169.2	18 48.7	99	13	169.3	18 18.9	99	13	169.3	17 49.2	99	13	169.4	1
2	21 09.2	99	15	167.9	20 39.5	99	14	168.0	20 09.9	99	14	168.1	19 40.2	99	14	168.1	19 10.5	99	14	168.2	18 40.9	99	14	168.3	18 11.2	99	14	168.4	17 41.5	99	14	168.5	2
3	21 00.5	99	16	166.9	20 30.8	99	16	167.0	20 01.2	99	16	167.1	19 31.6	99	15	167.2	19 02.0	99	15	167.3	18 32.4	99	15	167.3	18 02.8	99	15	167.4	17 33.1	99	15	167.5	3
4	20 51.0	98	17	165.9	20 21.5	98	17	166.0	19 51.9	99	17	166.1	19 22.4	99	16	166.2	18 52.8	99	16	166.3	18 23.3	99	16	166.4	17 53.7	99	16	166.5	17 24.1	99	16	166.6	4
15	20 40.9	98	18	164.9	20 11.4	98	18	165.0	19 42.0	98	18	165.1	19 12.5	98	18	165.2	18 43.0	98	18	165.3	18 13.5	98	17	165.4	17 44.0	98	17	165.5	17 14.5	98	17	165.6	15
6	20 30.2	98	19	163.9	20 00.7	98	19	164.1	19 31.3	98	19	164.2	19 01.9	98	19	164.3	18 32.5	98	19	164.4	18 03.0	98	18	164.5	17 33.6	98	18	164.6	17 04.2	98	18	164.7	6
7	20 18.7	98	20	163.0	19 49.4	98	20	163.1	19 20.0	98	20	163.2	18 50.7	98	20	163.3	18 21.3	98	20	163.4	17 52.0	98	20	163.5	17 22.6	98	19	163.6	16 53.2	98	19	163.7	7
8	20 06.6	98	21	162.0	19 37.4	98	21	162.1	19 08.1	98	21	162.2	18 38.8	98	21	162.3	18 09.5	98	21	162.5	17 40.3	98	21	162.6	17 11.0	98	20	162.7	16 41.7	98	20	162.8	8
9	19 53.9	97	22	161.0	19 24.7	97	22	161.1	18 55.5	97	22	161.3	18 26.3	97	22	161.4	17 57.1	97	22	161.5	17 27.9	97	22	161.6	16 58.7	97	22	161.7	16 29.5	97	21	161.9	9
20	19 40.5	97	23	160.0	19 11.4	97	23	160.2	18 42.3	97	23	160.3	18 13.2	97	23	160.4	17 44.1	97	23	160.6	17 14.9	97	23	160.7	16 45.8	97	23	160.8	16 16.7	97	22	160.9	20
1	19 26.5	97	24	159.1	18 57.5	97	24	159.2	18 28.4	97	24	159.3	17 59.4	97	24	159.5	17 30.4	97	24	159.6	17 01.3	97	24	159.7	16 32.3	97	24	159.9	16 03.3	97	23	160.0	1
2	19 11.8	96	25	158.1	18 42.9	96	25	158.3	18 14.0	96	26	158.4	17 45.0	96	25	158.5	17 16.1	96	25	158.7	16 47.1	97	25	158.8	16 18.2	97	25	158.9	15 49.2	97	24	159.1	2
3	18 56.6	96	26	157.2	18 27.7	96	26	157.3	17 58.9	96	26	157.4	17 30.0	96	26	157.6	17 01.2	96	26	157.7	16 32.3	96	26	157.9	16 03.5	96	26	158.0	15 34.6	96	25	158.2	3
4	18 40.7	96	28	156.2	18 11.9	96	27	156.4	17 43.2	96	27	156.5	17 14.4	96	27	156.7	16 45.7	96	27	156.8	16 16.9	96	27	157.0	15 48.1	96	27	157.1	15 19.4	96	26	157.2	4
25	18 24.2	95	28	155.3	17 55.5	95	28	155.4	17 26.9	96	28	155.6	16 58.2	96	28	155.7	16 29.6	96	28	155.9	16 00.9	96	28	156.0	15 32.2	96	28	156.2	15 03.5	96	27	156.3	25
6	18 07.1	95	30	154.3	17 38.5	95	29	154.5	17 10.0	95	29	154.6	16 41.4	95	29	154.8	16 12.9	95	29	155.0	15 44.3	95	29	155.1	15 15.7	95	28	155.3	14 47.1	95	28	155.4	6
7	17 49.4	95	30	153.4	17 20.9	95	30	153.5	16 52.5	95	30	153.7	16 24.0	95	30	153.9	15 55.6	95	30	154.0	15 27.1	95	30	154.2	14 58.6	95	29	154.4	14 30.2	95	29	154.5	7
8	17 31.1	94	31	152.4	17 02.8	94	31	152.6	16 34.4	94	31	152.8	16 06.1	95	31	153.0	15 37.7	95	31	153.1	15 09.4	95	31	153.3	14 41.0	95	30	153.5	14 12.6	95	30	153.6	8
9	17 12.2	94	32	151.5	16 44.0	94	32	151.7	16 15.8	94	32	151.9	15 47.5	94	32	152.0	15 19.3	94	32	152.2	14 51.0	94	31	152.4	14 22.8	94	31	152.6	13 54.5	94	31	152.7	9
30	16 52.8	94	33	150.6	16 24.7	94	33	150.8	15 56.6	94	33	151.0	15 28.4	94	33	151.1	15 00.3	94	33	151.3	14 32.1	94	32	151.5	14 04.0	94	32	151.7	13 35.8	94	32	151.9	30
1	16 32.8	93	34	149.7	16 04.8	93	34	149.9	15 36.8	93	34	150.0	15 08.8	93	34	150.2	14 40.7	93	34	150.4	14 12.7	93	33	150.6	13 44.7	93	33	150.8	13 16.6	94	33	151.0	1
2	16 12.3	93	35	148.8	15 44.4	93	35	149.0	15 16.5	93	35	149.1	14 48.6	93	35	149.3	14 20.7	93	34	149.5	13 52.7	93	34	149.7	13 24.8	93	34	149.9	12 56.9	93	34	150.1	2
3	15 51.2	93	36	147.9	15 23.4	93	36	148.1	14 55.6	93	36	148.2	14 27.8	93	35	148.4	14 00.0	93	35	148.6	13 32.2	93	35	148.8	13 04.4	93	35	149.0	12 36.6	93	35	149.2	3
4	15 29.5	92	37	147.0	15 01.9	92	37	147.2	14 34.2	92	37	147.4	14 06.6	92	36	147.6	13 38.9	92	36	147.8	13 11.2	92	36	148.0	12 43.5	92	36	148.1	12 15.8	92	36	148.3	4
35	15 07.4	92	38	146.1	14 39.9	92	38	146.3	14 12.3	92	37	146.5	13 44.8	92	37	146.7	13 17.2	92	37	146.9	12 49.6	92	37	147.1	12 22.0	92	37	147.3	11 54.4	92	36	147.5	35
6	14 44.7	91	39	145.2	14 17.3	91	38	145.4	13 49.9	91	38	145.6	13 22.4	91	38	145.8	12 55.0	91	38	146.0	12 27.5	92	38	146.2	12 00.1	92	37	146.4	11 32.6	92	37	146.6	6
7	14 21.5	91	39	144.3	13 54.2	91	39	144.5	13 26.9	91	39	144.7	12 59.6	91	39	144.9	12 32.3	91	39	145.1	12 05.0	91	38	145.3	11 37.6	91	38	145.6	11 10.3	91	38	145.8	7
8	13 57.8	91	40	143.4	13 30.7	91	40	143.6	13 03.5	91	40	143.8	12 36.3	91	40	144.1	12 09.1	91	39	144.3	11 41.9	91	39	144.5	11 14.7	91	39	144.7	10 47.4	91	39	144.9	8
9	13 33.7	90	41	142.5	13 06.6	90	41	142.8	12 39.6	90	41	143.0	12 12.5	90	40	143.2	11 45.4	90	40	143.4	11 18.3	90	40	143.6	10 51.2	90	40	143 9	10 24.1	90	40	144.1	9
40	13 09.0	90	42	141.7	12 42.1	90	42	141.9	12 15.1	90	42	142.1	11 48.2	90	41	142.3	11 21.2	90	41	142.6	10 54.3	90	41	142.8	10 27.3	90	41	143.0	10 00.3	90	40	143.2	40
1	12 43.9	89	43	140.8	12 17.1	89	42	141.0	11 50.3	89	42	141.3	11 23.4	89	42	141.5	10 56.6	89	42	141.7	10 29.8	89	42	141.9	10 02.9	90	41	142.2	9 36.1	90	41	142.4	1
2	12 18.3	89	43	139.9	11 51.6	89	43	140.2	11 24.9	89	43	140.4	10 58.2	89	43	140.6	10 31.5	89	43	140.9	10 04.8	89	42	141.1	9 38.1	89	42	141.3	9 11.3	89	42	141.6	2
3	11 52.2	88	44	139.1	11 25.6	88	44	139.3	10 59.1	89	44	139.6	10 32.5	89	44	139.8	10 05.9	89	43	140.0	9 39.4	89	43	140.3	9 12.8	89	43	140.5	8 46.2	89	43	140.7	3
4	11 25.7	88	45	138.2	10 59.3	88	45	138.5	10 32.8	88	44	138.7	10 06.4	88	44	139.0	9 39.9	88	44	139.2	9 13.5	88	44	139.4	8 47.0	88	44	139.7	8 20.5	88	43	139.9	4
45	10 58.7	88	46	137.4	10 32.4	88	45	137.6	10 06.1	88	45	137.9	9 39.8	88	45	138.1	9 13.5	88	45	138.4	8 47.1	88	45	138.6	8 20.8	88	44	138.9	7 54.5	88	44	139.1	45
6	10 31.3	87	46	136.6	10 05.2	87	46	136.8	9 39.0	87	46	137.1	9 12.8	87	46	137.3	8 46.6	87	46	137.6	8 20.4	87	45	137.8	7 54.2	87	45	138.0	7 28.0	87	45	138.3	6
7	10 03.5	87	47	135.7	9 37.5	87	47	136.0	9 11.4	87	47	136.2	8 45.4	87	46	136.5	8 19.3	87	46	136.7	7 53.2	87	46	137.0	7 27.1	87	46	137.2	7 01.0	87	46	137.5	7
8	9 35.3	86	48	134.9	9 09.4	86	48	135.2	8 43.5	86	47	135.4	8 17.5	86	47	135.7	7 51.6	86	47	135.9	7 25.6	87	47	136.2	6 59.7	87	46	136.4	6 33.7	87	46	136.7	8
9	9 06.6	86	48	134.1	8 40.9	86	48	134.3	8 15.1	86	48	134.6	7 49.3	86	48	134.9	7 23.4	86	48	135.1	6 57.6	86	47	135.4	6 31.8	86	47	135.6	6 06.0	86	47	135.9	9
50	8 37.6	86	49	133.3	8 12.0	86	49	133.5	7 46.3	86	49	133.8	7 20.6	86	48	134.1	6 54.9	86	48	134.3	6 29.2	86	48	134.6	6 03.5	86	48	134.8	5 37.8	86	48	135.1	50
1	8 08.2	85	50	132.5	7 42.7	85	49	132.7	7 17.1	85	49	133.0	6 51.6	85	49	133.3	6 26.0	85	49	133.5	6 00.4	85	49	133.8	5 34.9	85	48	134.0	5 09.3	85	48	134.3	1
2	7 38.4	85	50	131.7	7 13.0	85	50	131.9	6 47.6	85	50	132.2	6 22.1	85	50	132.5	5 56.7	85	49	132.7	5 31.3	85	49	133.0	5 05.8	85	49	133.3					2
3	7 08.2	84	51	130.9	6 42.9	84	51	131.1	6 17.6	84	50	131.4	5 52.3	84	50	131.7	5 27.0	84	50	131.9	5 01.7	84	50	132.2									3
4	6 37.7	84	52	130.1	6 12.5	84	51	130.3	5 47.3	84	51	130.6	5 22.2	84	51	130.9																	4
55	6 06.8	83	52	129.3	5 41.7	83	52	129.5	5 16.7	83	52	129.8																					55
6	5 35.5	83	53	128.5	5 10.6	83	52	128.8																									6
7	5 03.9	83	53	127.7																													7

DECLINATION SAME NAME AS LATITUDE

H.A.	20° 00′ Alt.	Δd	Δt	Az.	20° 30′ Alt.	Δd	Δt	Az.	21° 00′ Alt.	Δd	Δt	Az.	21° 30′ Alt.	Δd	Δt	Az.	22° 00′ Alt.	Δd	Δt	Az.	22° 30′ Alt.	Δd	Δt	Az.	23° 00′ Alt.	Δd	Δt	Az.	23° 30′ Alt.	Δd	Δt	Az.	H.A.
°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	° ′			°	°
91	14 04.5	72	65	75.6	14 26.2	72	65	75.3	14 47.9	72	64	74.9	15 09.5	72	64	74.5	15 31.1	72	64	74.2	15 52.7	72	64	73.8	16 14.3	72	64	73.5	16 35.8	72	64	73.1	91
2	13 25.7	73	64	74.9	13 47.5	73	64	74.6	14 09.2	72	64	74.2	14 30.9	72	64	73.8	14 52.6	72	64	73.5	15 14.2	72	64	73.1	15 35.8	72	64	72.8	15 57.4	72	64	72.4	2
3	12 47.0	73	64	74.2	13 08.8	73	64	73.9	13 30.6	73	64	73.5	13 52.4	73	64	73.1	14 14.2	72	64	72.8	14 35.9	72	64	72.4	14 57.6	72	64	72.1	15 19.2	72	63	71.7	3
4	12 08.4	73	64	73.5	12 30.3	73	64	73.2	12 52.2	73	64	72.8	13 14.1	73	64	72.5	13 35.9	73	64	72.1	13 57.7	73	63	71.7	14 19.4	72	63	71.4	14 41.2	72	63	71.0	4
95	11 30.0	73	64	72.8	11 52.0	73	64	72.5	12 13.9	73	64	72.1	12 35.9	73	63	71.8	12 57.8	73	63	71.4	13 19.6	73	63	71.1	13 41.5	73	63	70.7	14 03.3	73	63	70.3	95
6	10 51.7	74	64	72.1	11 13.8	73	63	71.8	11 35.8	73	63	71.4	11 57.8	73	63	71.1	12 19.8	73	63	70.7	12 41.7	73	63	70.4	13 03.7	73	63	70.0	13 25.5	73	63	69.7	6
7	10 13.6	74	63	71.4	10 35.7	74	63	71.1	10 57.8	74	63	70.7	11 19.9	74	63	70.4	11 42.0	73	63	70.0	12 04.0	73	63	69.7	12 26.0	73	62	69.3	12 48.0	73	62	69.0	7
8	9 35.6	74	63	70.7	9 57.8	74	63	70.3	10 20.0	74	63	70.0	10 42.2	74	63	69.7	11 04.3	74	62	69.3	11 26.4	74	62	69.0	11 48.5	74	62	68.6	12 10.6	74	62	68.3	8
9	8 57.8	74	63	70.0	9 20.1	74	63	69.6	9 42.4	74	62	69.3	10 04.6	74	62	69.0	10 26.8	74	62	68.6	10 49.1	74	62	68.3	11 11.2	74	62	67.9	11 33.4	74	62	67.6	9
100	8 20.2	75	62	69.3	8 42.6	75	62	68.9	9 04.9	74	62	68.6	9 27.2	74	62	68.3	9 49.6	74	62	67.9	10 11.8	74	62	67.6	10 34.1	74	62	67.2	10 56.4	74	61	66.9	100
1	7 42.7	75	62	68.6	8 05.2	75	62	68.2	8 27.6	75	62	67.9	8 50.0	75	62	67.6	9 12.4	75	62	67.2	9 34.8	75	61	66.9	9 57.2	75	61	66.5	10 19.5	74	61	66.2	1
2	7 05.4	75	62	67.9	7 28.0	75	62	67.5	7 50.5	75	62	67.2	8 13.0	75	61	66.9	8 35.5	75	61	66.5	8 58.0	75	61	66.2	9 20.5	75	61	65.9	9 42.9	75	61	65.5	2
3	6 28.4	75	62	67.1	6 51.0	75	61	66.8	7 13.6	75	61	66.5	7 36.2	75	61	66.2	7 58.8	75	61	65.8	8 21.4	75	61	65.5	8 43.9	75	61	65.2	9 06.5	75	60	64.8	3
4	5 51.5	76	61	66.4	6 14.2	76	61	66.1	6 36.9	76	61	65.8	6 59.6	76	61	65.4	7 22.3	76	61	65.1	7 44.9	76	60	64.8	8 07.6	75	60	64.5	8 30.2	75	60	64.1	4
105	5 14.8	76	61	65.7	5 37.6	76	61	65.4	6 00.4	76	60	65.1	6 23.2	76	60	64.7	6 46.0	76	60	64.4	7 08.7	76	60	64.1	7 31.5	76	60	63.7	7 54.2	76	60	63.4	105
6					5 01.2	76	60	64.7	5 24.1	76	60	64.3	5 47.0	76	60	64.0	6 09.9	76	60	63.7	6 32.7	76	60	63.4	6 55.6	76	59	63.0	7 18.4	76	59	62.7	6
7													5 11.0	77	60	63.3	5 34.0	77	60	63.0	5 57.0	77	59	62.7	6 19.9	77	59	62.3	6 42.9	76	59	62.0	7
8																					5 21.4	77	59	61.9	5 44.5	77	59	61.6	6 07.5	77	58	61.3	8
9																									5 09.3	77	58	60.9	5 32.4	77	58	60.6	9

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Lat. 48°

H.A.	24° 00′ Alt.	Az.	24° 30′ Alt.	Az.	25° 00′ Alt.	Az.	25° 30′ Alt.	Az.	26° 00′ Alt.	Az.	26° 30′ Alt.	Az.	27° 00′ Alt.	Az.	27° 30′ Alt.	Az.	H.A.
°	° ′ Δd Δt °	°	° ′ Δd Δt °	°	° ′ Δd Δt °	°	° ′ Δd Δt °	°	° ′ Δd Δt °	°	° ′ Δd Δt °	°	° ′ Δd Δt °	°	° ′ Δd Δt °	°	°
00	66 00.0 1.0 01	180.0	66 30.0 1.0 01	180.0	67 00.0 1.0 01	180.0	67 30.0 1.0 01	180.0	68 00.0 1.0 01	180.0	68 30.0 1.0 01	180.0	69 00.0 1.0 01	180.0	69 30.0 1.0 01	180.0	00
1	65 59.2 1.0 04	177.8	66 29.2 1.0 04	177.7	66 59.2 1.0 04	177.7	67 29.2 1.0 04	177.6	67 59.2 1.0 04	177.6	68 29.1 1.0 04	177.6	68 59.1 1.0 04	177.5	69 29.1 1.0 04	177.5	1
2	65 56.9 1.0 07	175.5	66 26.8 1.0 07	175.4	66 56.8 1.0 07	175.4	67 26.7 1.0 07	175.3	67 56.6 1.0 07	175.2	68 26.6 1.0 07	175.1	68 56.5 1.0 07	175.0	69 26.5 1.0 07	174.9	2
3	65 52.9 1.0 09	173.3	66 22.8 1.0 09	173.2	66 52.7 1.0 09	173.1	67 22.6 1.0 10	172.9	67 52.5 1.0 10	172.8	68 22.3 1.0 10	172.7	68 52.2 1.0 10	172.6	69 22.0 1.0 10	172.4	3
4	65 47.5 99 12	171.1	66 17.3 99 12	170.9	66 47.1 99 12	170.8	67 16.8 99 12	170.6	67 46.6 99 12	170.5	68 16.4 99 13	170.3	68 46.1 99 13	170.1	69 15.9 99 13	169.9	4
05	65 40.5 99 14	168.9	66 10.2 99 14	168.7	66 39.8 99 15	168.5	67 09.5 99 15	168.3	67 39.2 99 15	168.1	68 08.8 99 15	167.9	68 38.4 99 16	167.7	69 08.0 99 16	167.5	05
6	65 32.0 99 17	166.7	66 01.5 99 17	166.5	66 31.1 98 17	166.2	67 00.6 98 17	166.0	67 30.1 98 18	165.8	67 59.6 98 18	165.5	68 29.0 98 18	165.3	68 58.5 98 19	165.0	6
7	65 22.0 98 19	164.5	65 51.4 98 19	164.3	66 20.8 98 20	164.0	66 50.1 98 20	163.8	67 19.5 98 20	163.5	67 48.8 98 21	163.2	68 18.0 98 21	162.9	68 47.3 97 21	162.6	7
8	65 10.5 98 21	162.4	65 39.8 97 22	162.1	66 09.0 97 22	161.8	66 38.1 97 22	161.5	67 07.3 97 23	161.2	67 36.4 97 23	160.9	68 05.5 97 24	160.6	68 34.5 97 24	160.2	8
9	64 57.7 97 24	160.3	65 26.7 97 24	160.0	65 55.7 97 24	159.7	66 24.7 97 25	159.3	66 53.6 96 25	159.0	67 22.5 96 26	158.7	67 51.4 96 26	158.3	68 20.2 96 26	157.9	9
10	64 43.4 96 26	158.2	65 12.3 96 26	157.9	65 41.1 96 27	157.5	66 09.8 96 27	157.2	66 38.5 96 28	156.8	67 07.2 95 28	156.4	67 35.8 95 28	156.0	68 04.3 95 29	155.6	10
1	64 27.8 96 28	156.1	64 56.5 95 28	155.8	65 25.0 95 29	155.4	65 53.6 95 29	155.1	66 22.0 95 30	154.7	66 50.4 95 30	154.3	67 18.8 94 31	153.8	67 47.1 94 31	153.4	1
2	64 11.0 95 30	154.1	64 39.4 95 31	153.8	65 07.7 94 31	153.4	65 36.0 94 31	153.0	66 04.2 94 32	152.6	66 32.3 94 32	152.1	67 00.4 93 33	151.7	67 28.4 93 33	151.2	2
3	63 52.8 94 32	152.2	64 21.0 94 33	151.8	64 49.1 94 33	151.4	65 17.1 93 34	150.9	65 45.1 93 34	150.5	66 12.9 93 34	150.1	66 40.7 92 35	149.6	67 08.4 92 35	149.1	3
4	63 33.5 93 34	150.2	64 01.4 93 35	149.8	64 29.2 93 35	149.4	64 57.0 92 35	149.0	65 24.7 92 36	148.5	65 52.3 92 36	148.0	66 19.8 92 37	147.5	66 47.2 91 37	147.0	4
15	63 13.0 92 36	148.4	63 40.7 92 36	147.9	64 08.2 92 37	147.5	64 35.7 91 37	147.0	65 03.1 91 38	146.5	65 30.4 91 38	146.0	65 57.6 91 39	145.5	66 24.7 90 39	145.0	15
6	62 51.4 91 38	146.5	63 18.8 91 38	146.1	63 46.1 91 39	145.6	64 13.3 91 39	145.1	64 40.4 90 40	144.6	65 07.4 90 40	144.1	65 34.3 90 41	143.6	66 01.1 89 41	143.0	6
7	62 28.7 91 40	144.7	62 55.8 90 40	144.2	63 22.9 90 40	143.7	63 49.8 90 41	143.2	64 16.6 89 41	142.7	64 43.4 89 42	142.2	65 10.0 88 42	141.7	65 36.5 88 43	141.1	7
8	62 05.0 90 41	142.9	62 31.9 89 42	142.4	62 58.6 89 42	141.9	63 25.3 89 43	141.4	63 51.8 88 43	140.9	64 18.3 88 43	140.4	64 44.6 87 44	139.8	65 10.7 87 44	139.2	8
9	61 40.3 89 43	141.2	62 06.9 88 43	140.7	62 33.4 88 44	140.2	62 59.8 88 44	139.7	63 26.0 87 45	139.1	63 52.2 87 45	138.6	64 18.2 86 46	138.0	64 44.0 86 46	137.4	9
20	61 14.7 88 44	139.5	61 41.0 88 45	139.0	62 07.2 87 45	138.5	62 33.3 87 46	137.9	62 59.3 86 46	137.4	63 25.2 86 46	136.8	63 50.9 85 47	136.3	64 16.4 85 48	135.7	20
1	60 48.2 87 46	137.8	61 14.2 87 46	137.3	61 40.2 86 46	136.8	62 06.0 86 47	136.3	62 31.7 85 47	135.7	62 57.3 85 48	135.1	63 22.7 84 48	134.6	63 47.9 84 49	133.9	1
2	60 20.8 86 47	136.2	60 46.6 86 47	135.7	61 12.3 85 48	135.2	61 37.8 85 48	134.6	62 03.3 84 49	134.1	62 28.5 84 49	133.5	62 53.7 84 50	132.9	63 18.6 83 50	132.3	2
3	59 52.6 85 48	134.7	60 18.2 85 49	134.1	60 43.6 85 49	133.6	61 08.9 84 50	133.0	61 34.0 84 50	132.5	61 59.0 83 50	131.9	62 23.9 83 51	131.3	62 48.6 82 51	130.7	3
4	59 23.7 85 49	133.1	59 49.0 84 50	132.6	60 14.1 84 50	132.1	60 39.2 83 51	131.5	61 04.0 83 51	130.9	61 28.8 82 52	130.3	61 53.3 82 52	129.7	62 17.7 81 52	129.1	4
25	58 54.0 84 51	131.6	59 19.1 83 51	131.1	59 44.0 83 51	130.5	60 08.7 82 52	130.0	60 33.4 82 52	129.4	60 57.8 81 53	128.8	61 22.1 81 53	128.2	61 46.3 80 54	127.6	25
6	58 23.7 83 52	130.2	58 48.5 82 52	129.6	59 13.1 82 52	129.1	59 37.7 81 53	128.5	60 02.0 81 53	127.9	60 26.2 80 54	127.3	60 50.3 80 54	126.7	61 14.1 79 55	126.1	6
7	57 52.7 82 53	128.7	58 17.2 82 53	128.2	58 41.7 81 53	127.6	59 05.9 81 54	127.1	59 30.0 80 54	126.5	59 54.0 80 55	125.9	60 17.8 79 55	125.3	60 41.4 78 56	124.7	7
8	57 21.1 81 54	127.3	57 45.4 81 54	126.8	58 09.6 80 54	126.2	58 33.6 80 55	125.7	58 57.5 79 55	125.1	59 21.2 79 56	124.5	59 44.7 78 56	123.9	60 08.1 78 56	123.3	8
9	56 48.9 81 55	126.0	57 13.0 80 55	125.4	57 36.9 80 55	124.9	58 00.7 79 56	124.3	58 24.3 79 56	123.7	58 47.8 78 56	123.1	59 11.1 77 57	122.5	59 34.2 77 57	121.9	9
30	56 16.1 80 55	124.7	56 40.0 79 56	124.1	57 03.7 79 56	123.6	57 27.3 78 57	123.0	57 50.7 78 57	122.4	58 13.9 77 57	121.8	58 37.0 77 58	121.2	58 59.9 76 58	120.6	30
1	55 42.8 79 56	123.4	56 06.5 79 57	122.8	56 30.0 78 57	122.3	56 53.4 78 57	121.7	57 16.6 77 58	121.1	57 39.6 76 58	120.5	58 02.4 76 58	119.9	58 25.1 75 59	119.3	1
2	55 09.1 78 57	122.1	55 32.5 78 57	121.5	55 55.8 77 58	121.0	56 19.0 77 58	120.4	56 41.9 76 58	119.8	57 04.8 76 59	119.2	57 27.4 75 59	118.6	57 49.9 75 59	118.0	2
3	54 34.8 78 58	120.9	54 58.1 77 58	120.3	55 21.2 77 58	119.7	55 44.1 76 59	119.2	56 06.9 76 59	118.6	56 29.5 75 59	118.0	56 52.0 75 60	117.4	57 14.2 74 60	116.8	3
4	54 00.1 77 58	119.6	54 23.2 77 59	119.1	54 46.1 76 59	118.5	55 08.9 76 59	118.0	55 31.5 75 60	117.4	55 53.9 74 60	116.8	56 16.1 74 60	116.2	56 38.2 73 61	115.6	4
35	53 25.0 77 59	118.5	53 47.9 76 59	117.9	54 10.6 75 60	117.4	54 33.2 75 60	116.8	54 55.6 74 60	116.2	55 17.9 74 61	115.6	55 39.9 73 61	115.0	56 01.8 73 61	114.4	35
6	52 49.5 76 60	117.3	53 12.2 75 60	116.8	53 34.8 75 60	116.2	53 57.2 74 61	115.6	54 19.4 74 61	115.1	54 41.5 73 61	114.5	55 03.4 73 61	113.9	55 25.1 72 62	113.3	6
7	52 13.7 75 60	116.2	52 36.2 75 61	115.6	52 58.6 74 61	115.1	53 20.8 74 61	114.5	53 42.9 73 61	113.9	54 04.8 73 62	113.4	54 26.5 72 62	112.8	54 48.1 72 62	112.2	7
8	51 37.5 75 61	115.0	51 59.8 74 61	114.5	52 22.1 74 61	114.0	52 44.1 73 62	113.4	53 06.0 73 62	112.8	53 27.8 72 62	112.3	53 49.4 72 62	111.7	54 10.8 71 63	111.1	8
9	51 00.9 74 61	114.0	51 23.2 74 62	113.4	51 45.2 73 62	112.9	52 07.1 73 62	112.3	52 28.9 72 62	111.8	52 50.5 72 63	111.2	53 11.9 71 63	110.6	53 33.2 71 63	110.0	9
40	50 24.1 74 62	112.9	50 46.2 73 62	112.4	51 08.1 73 62	111.8	51 29.9 72 63	111.3	51 51.5 72 63	110.7	52 12.9 71 63	110.1	52 34.2 71 63	109.6	52 55.3 70 63	109.0	40
1	49 47.0 73 62	111.8	50 08.9 73 63	111.3	50 30.7 72 63	110.8	50 52.3 72 63	110.2	51 13.8 71 63	109.7	51 35.1 71 63	109.1	51 56.2 70 64	108.5	52 17.2 70 64	107.9	1
2	49 09.6 73 63	110.8	49 31.4 72 63	110.3	49 53.0 72 63	109.8	50 14.5 71 63	109.2	50 35.9 71 64	108.7	50 57.0 70 64	108.1	51 18.1 70 64	107.5	51 38.9 69 64	106.9	2
3	48 31.9 72 63	109.8	48 53.6 72 63	109.3	49 15.1 72 64	108.7	49 36.5 71 64	108.2	49 57.7 70 64	107.7	50 18.8 70 64	107.1	50 39.7 69 64	106.5	51 00.4 69 64	106.0	3
4	47 54.0 72 64	108.8	48 15.6 72 64	108.3	48 37.0 71 64	107.8	48 58.2 71 64	107.2	49 19.4 70 64	106.7	49 40.3 70 64	106.1	50 01.1 69 65	105.6	50 21.7 68 65	105.0	4
45	47 15.9 72 64	107.8	47 37.4 71 64	107.3	47 58.7 71 64	106.8	48 19.8 70 64	106.3	48 40.8 70 65	105.7	49 01.7 69 65	105.2	49 22.3 69 65	104.6	49 42.9 68 65	104.1	45
6	46 37.6 71 64	106.9	46 58.9 71 64	106.4	47 20.1 70 65	105.8	47 41.2 70 65	105.3	48 02.1 69 65	104.8	48 22.8 69 65	104.2	48 43.4 68 65	103.7	49 03.9 68 65	103.1	6
7	45 59.1 71 64	105.9	46 20.3 71 65	105.4	46 41.4 70 65	104.9	47 02.4 70 65	104.4	47 23.2 69 65	103.9	47 43.8 69 65	103.3	48 04.3 68 65	102.8	48 24.7 68 66	102.2	7
8	45 20.4 71 65	105.0	45 41.5 70 65	104.5	46 02.5 70 65	104.0	46 23.4 69 65	103.5	46 44.1 69 65	103.0	47 04.7 68 65	102.4	47 25.1 68 66	101.9	47 45.4 67 66	101.3	8
9	44 41.5 70 65	104.1	45 02.6 70 65	103.6	45 23.5 69 65	103.1	45 44.3 69 65	102.6	46 04.9 69 66	102.1	46 25.4 68 66	101.5	46 45.8 68 66	101.0	47 06.0 67 66	100.5	9
50	44 02.5 70 65	103.2	44 23.5 70 65	102.7	44 44.3 69 66	102.2	45 05.0 69 66	101.7	45 25.6 68 66	101.2	45 46.0 68 66	100.7	46 06.3 67 66	100.1	46 26.4 67 66	99.6	50
1	43 23.4 70 66	102.3	43 44.3 69 66	101.8	44 05.0 69 66	101.3	44 25.7 69 66	100.8	44 46.2 68 66	100.3	45 06.5 68 66	99.8	45 26.7 67 66	99.3	45 46.8 67 66	98.7	1
2	42 44.1 70 66	101.5	43 04.9 69 66	101.0	43 25.6 69 66	100.5	43 46.2 68 66	100.0	44 06.6 68 66	99.5	44 26.9 67 66	98.9	44 47.0 67 66	98.4	45 07.1 66 66	97.9	2
3	42 04.7 69 66	100.6	42 25.4 69 66	100.1	42 46.1 69 66	99.6	43 06.6 68 66	99.1	43 27.0 68 66	98.6	43 47.2 67 66	98.1	44 07.3 67 66	97.6	44 27.3 66 66	97.1	3
4	41 25.2 69 66	99.7	41 45.9 69 66	99.3	42 06.4 68 66	98.8	42 26.9 68 66	98.3	42 47.2 68 66	97.8	43 07.4 67 66	97.3	43 27.5 67 67	96.8	43 47.4 66 67	96.2	4
55	40 45.5 69 66	98.9	41 06.2 69 66	98.4	41 26.7 68 66	97.9	41 47.1 68 66	97.4	42 07.4 67 66	97.0	42 27.5 67 67	96.5	42 47.6 66 67	95.9	43 07.4 66 67	95.4	55
6	40 05.8 69 66	98.1	40 26.4 68 66	97.6	40 46.9 68 66	97.1	41 07.3 68 67	96.6	41 27.5 67 67	96.1	41 47.6 67 67	95.6	42 07.6 66 67	95.1	42 27.4 66 67	94.6	6
7	39 26.1 69 66	97.3	39 46.6 68 66	96.8	40 07.0 68 67	96.3	40 27.4 68 67	95.8	40 47.6 67 67	95.3	41 07.6 67 67	94.8	41 27.6 66 67	94.4	41 47.4 66 67	93.8	7
8	38 46.2 69 67	96.5	39 06.7 68 67	96.0	39 27.1 68 67	95.5	39 47.4 67 67	95.0	40 07.6 67 67	94.5	40 27.6 67 67	94.1	40 47.5 66 67	93.6	41 07.3 66 67	93.1	8
9	38 06.3 68 67	95.7	38 26.8 68 67	95.2	38 47.1 68 67	94.7	39 07.4 67 67	94.2	39 27.5 67 67	93.8	39 47.5 67 67	93.3	40 07.4 66 67	92.8	40 27.2 66 67	92.3	9
60	37 26.3 68 67	94.9	37 46.7 68 67	94.4	38 07.1 68 67	93.9	38 27.3 67 67	93.5	38 47.4 67 67	93.0	39 07.5 66 67	92.5	39 27.3 66 67	92.0	39 47.1 66 67	91.5	60
1	36 46.3 68 67	94.1	37 06.7 68 67	93.6	37 27.0 68 67	93.2	37 47.2 67 67	92.7	38 07.3 67 67	92.2	38 27.3 66 67	91.7	38 47.2 66 67	91.3	39 07.0 66 67	90.8	1
2	36 06.2 68 67	93.3	36 26.6 68 67	92.8	36 46.9 68 67	92.4	37 07.1 67 67	91.9	37 27.2 67 67	91.5	37 47.2 66 67	91.0	38 07.1 66 67	90.5	38 26.8 66 67	90.0	2
3	35 26.1 68 67	92.5	35 46.5 68 67	92.1	36 06.8 67 67	91.6	36 27.0 67 67	91.2	36 47.1 67 67	90.7	37 07.1 66 67	90.2	37 26.9 66 67	89.8	37 46.7 66 67	89.3	3
4	34 46.0 68 67	91.8	35 06.4 68 67	91.3	35 26.7 67 67	90.9	35 46.8 67 67	90.4	36 06.9 67 67	90.0	36 26.9 66 67	89.5	36 46.8 66 67	89.0	37 06.5 66 67	88.6	4
65	34 05.9 68 67	91.0	34 26.2 68 67	90.6	34 46.5 67 67	90.1	35 06.7 67 67	89.7	35 26.8 67 67	89.2	35 46.8 66 67	88.8	36 06.6 66 67	88.3	36 26.4 66 67	87.8	65
6	33 25.7 68 67	90.3	33 46.1 68 67	89.8	34 06.4 67 67	89.4	34 26.6 67 67	88.9	34 46.6 67 67	88.5	35 06.6 66 67	88.0	35 26.5 66 67	87.6	35 46.3 66 67	87.1	6
7	32 45.6 68 67	89.5	33 05.9 68 67	89.1	33 26.2 67 67	88.7	33 46.4 67 67	88.2	34 06.5 67 67	87.8	34 26.5 67 67	87.3	34 46.4 66 67	86.9	35 06.2 66 67	86.4	7
8	32 05.4 68 67	88.8	32 25.8 68 67	88.4	32 46.1 67 67	87.9	33 06.3 67 67	87.5	33 26.4 67 67	87.0	33 46.4 67 67	86.6	34 06.3 66 67	86.1	34 26.2 66 67	85.7	8
9	31 25.3 68 67	88.1	31 45.7 68 67	87.6	32 06.0 68 67	87.2	32 26.2 67 67	86.8	32 46.3 67 67	86.3	33 06.4 67 67	85.9	33 26.3 66 67	85.4	33 46.1 66 67	85.0	9
70	30 45.2 68 67	87.3	31 05.6 68 67	86.9	31 25.9 68 67	86.5	31 46.1 67 67	86.0	32 06.3 67 67	85.6	32 26.3 67 67	85.2	32 46.3 66 67	84.7	33 06.2 66 67	84.3	70
1	30 05.1 68 67	86.6	30 25.5 68 67	86.2	30 45.8 68 67	85.8	31 06.1 67 67	85.3	31 26.3 67 67	84.9	31 46.4 67 67	84.5	32 06.3 67 66	84.0	32 26.2 66 66	83.6	1
2	29 25.0 68 67	85.9	29 45.5 68 67	85.5	30 05.8 68 67	85.0	30 26.1 67 67	84.6	30 46.3 67 67	84.2	31 06.4 67 66	83.8	31 26.4 67 66	83.3	31 46.4 66 66	82.9	2
3	28 45.0 68 67	85.2	29 05.5 68 67	84.8	29 25.8 68 67	84.3	29 46.2 68 66	83.9	30 06.4 67 66	83.5	30 26.5 67 66	83.1	30 46.6 67 66	82.6	31 06.6 66 66	82.2	3
4	28 05.0 68 67	84.5	28 25.5 68 66	84.1	28 45.9 68 66	83.6	29 06.3 68 66	83.2	29 26.5 67 66	82.8	29 46.7 67 66	82.4	30 06.8 67 66	81.9	30 26.8 67 66	81.5	4
75	27 25.1 69 66	83.8	27 45.6 68 66	83.4	28 06.0 68 66	82.9	28 26.4 68 66	82.5	28 46.7 68 66	82.1	29 07.0 67 66	81.7	29 27.1 67 66	81.3	29 47.2 67 66	80.8	75
6	26 45.2 69 66	83.1	27 05.7 68 66	82.7	27 26.2 68 66	82.2	27 46.7 68 66	81.8	28 07.0 68 66	81.4	28 27.3 67 66	81.0	28 47.5 67 66	80.6	29 07.6 67 66	80.1	6
7	26 05.4 69 66	82.4	26 26.0 69 66	82.0	26 46.5 68 66	81.5	27 06.9 68 66	81.1	27 27.3 68 66	80.7	27 47.6 68 66	80.3	28 07.9 67 66	79.9	28 28.1 67 66	79.5	7
8	25 25.6 69 66	81.7	25 46.2 69 66	81.3	26 06.8 68 66	80.9	26 27.3 68 66	80.4	26 47.8 68 66	80.0	27 08.1 68 66	79.6	27 28.4 68 66	79.2	27 48.6 67 66	78.8	8
9	24 45.9 69 66	81.0	25 06.6 69 66	80.6	25 27.2 69 66	80.2	25 47.8 68 66	79.8	26 08.3 68 66	79.4	26 28.7 68 66	78.9	26 49.0 68 66	78.5	27 09.3 67 65	78.1	9
80	24 06.3 69 66	80.3	24 27.0 69 66	79.9	24 47.7 69 66	79.5	25 08.3 69 66	79.1	25 28.8 68 66	78.7	25 49.3 68 65	78.3	26 09.7 68 65	77.9	26 30.0 68 65	77.4	80
1	23 26.8 69 66	79.6	23 47.6 69 66	79.2	24 08.3 69 66	78.8	24 28.9 69 65	78.4	24 49.5 69 65	78.0	25 10.1 68 65	77.6	25 30.5 68 65	77.2	25 50.9 68 65	76.8	1
2	22 47.3 70 66	78.9	23 08.2 69 65	78.5	23 28.9 69 65	78.1	23 49.7 69 65	77.7	24 10.3 69 65	77.3	24 30.9 69 65	76.9	24 51.4 68 65	76.5	25 11.9 68 65	76.1	2
3	22 08.0 70 65	78.2	22 28.9 70 65	77.8	22 49.7 69 65	77.4	23 10.5 69 65	77.0	23 31.2 69 65	76.6	23 51.8 69 65	76.2	24 12.4 69 65	75.8	24 33.0 68 65	75.4	3
4	21 28.7 70 65	77.5	21 49.7 70 65	77.1	22 10.6 70 65	76.7	22 31.4 69 65	76.4	22 52.2 69 65	76.0	23 12.9 69 65	75.6	23 33.6 69 65	75.2	23 54.2 69 64	74.8	4
85	20 49.6 70 65	76.8	21 10.6 70 65	76.4	21 31.6 70 65	76.1	21 52.5 70 65	75.7	22 13.3 69 65	75.3	22 34.1 69 64	74.9	22 54.8 69 64	74.5	23 15.5 69 64	74.1	85
6	20 10.6 70 65	76.1	20 31.6 70 65	75.8	20 52.6 70 65	75.4	21 13.6 70 65	75.0	21 34.5 70 64	74.6	21 55.4 69 64	74.2	22 16.2 69 64	73.8	22 36.9 69 64	73.4	6
7	19 31.6 71 65	75.5	19 52.8 70 65	75.1	20 13.9 70 64	74.7	20 34.9 70 64	74.3	20 55.9 70 64	73.9	21 16.8 70 64	73.6	21 37.7 70 64	73.2	21 58.5 69 64	72.8	7
8	18 52.8 71 64	74.8	19 14.0 71 64	74.4	19 35.2 70 64	74.0	19 56.3 70 64	73.6	20 17.4 70 64	73.3	20 38.4 70 64	72.9	20 59.3 70 64	72.5	21 20.2 70 64	72.1	8
9	18 14.2 71 64	74.1	18 35.4 71 64	73.7	18 56.7 71 64	73.3	19 17.8 71 64	73.0	19 39.0 70 64	72.6	20 00.1 70 64	72.2	20 21.1 70 63	71.8	20 42.1 70 63	71.5	9
90	17 35.6 71 64	73.4	17 57.0 71 64	73.0	18 18.3 71 64	72.7	18 39.5 71 64	72.3	19 00.7 71 64	71.9	19 21.9 71 63	71.6	19 43.0 70 63	71.2	20 04.1 70 63	70.8	90

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DECLINATION CONTRARY NAME TO LATITUDE

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	
00	18 00.0	1.0 01	180.0	17 30.0	1.0 01	180.0	17 00.0	1.0 01	180.0	16 30.0	1.0 01	180.0	16 00.0	1.0 01	180.0	15 30.0	1.0 01	180.0	15 00.0	1.0 01	180.0	14 30.0	1.0 01	180.0	00
1	17 59.7	1.0 02	179.0	17 29.7	1.0 02	179.0	16 59.7	1.0 02	179.1	16 29.7	1.0 02	179.1	15 59.7	1.0 02	179.1	15 29.7	1.0 02	179.1	14 59.7	1.0 02	179.1	14 29.7	1.0 02	179.1	1
2	17 58.7	1.0 03	178.1	17 28.7	1.0 03	178.1	16 58.7	1.0 03	178.1	16 28.7	1.0 03	178.1	15 58.7	1.0 03	178.1	15 28.7	1.0 03	178.1	14 58.7	1.0 03	178.2	14 28.7	1.0 03	178.2	2
3	17 57.0	1.0 04	177.1	17 27.0	1.0 04	177.1	16 57.0	1.0 04	177.2	16 27.0	1.0 04	177.2	15 57.1	1.0 04	177.2	15 27.1	1.0 04	177.2	14 57.1	1.0 04	177.2	14 27.1	1.0 04	177.3	3
4	17 54.6	1.0 05	176.2	17 24.7	1.0 05	176.2	16 54.7	1.0 05	176.2	16 24.7	1.0 05	176.2	15 54.8	1.0 05	176.3	15 24.8	1.0 05	176.3	14 54.8	1.0 05	176.3	14 24.9	1.0 05	176.3	4
05	17 51.6	1.0 06	175.2	17 21.7	1.0 06	175.2	16 51.7	1.0 06	175.3	16 21.8	1.0 06	175.3	15 51.8	1.0 06	175.3	15 21.9	1.0 06	175.4	14 51.9	1.0 06	175.4	14 22.0	1.0 06	175.4	05
6	17 47.9	1.0 07	174.2	17 18.0	1.0 07	174.3	16 48.1	1.0 07	174.3	16 18.1	1.0 07	174.4	15 48.2	1.0 07	174.4	15 18.3	1.0 07	174.4	14 48.4	1.0 07	174.5	14 18.5	1.0 07	174.5	6
7	17 43.5	1.0 08	173.3	17 13.7	1.0 08	173.3	16 43.8	1.0 08	173.4	16 13.9	1.0 08	173.4	15 44.0	1.0 08	173.5	15 14.1	1.0 08	173.5	14 44.2	1.0 08	173.6	14 14.3	1.0 08	173.6	7
8	17 38.5	1.0 09	172.3	17 08.7	1.0 09	172.4	16 38.8	1.0 09	172.4	16 08.9	1.0 09	172.5	15 39.1	1.0 09	172.5	15 09.2	1.0 09	172.6	14 39.4	1.0 09	172.6	14 09.5	1.0 09	172.7	8
9	17 32.8	99 11	171.4	17 03.0	99 11	171.4	16 33.2	99 10	171.5	16 03.4	99 10	171.6	15 33.5	99 10	171.6	15 03.7	99 10	171.7	14 33.9	99 10	171.7	14 04.1	99 10	171.8	9
10	17 26.5	99 12	170.4	16 56.7	99 12	170.5	16 26.9	99 12	170.6	15 57.1	99 11	170.6	15 27.4	99 11	170.7	14 57.6	99 11	170.7	14 27.8	99 11	170.8	13 58.0	99 11	170.9	10
1	17 19.5	99 13	169.5	16 49.7	99 13	169.5	16 20.0	99 13	169.6	15 50.3	99 12	169.7	15 20.5	99 12	169.8	14 50.8	99 12	169.8	14 21.1	99 12	169.9	13 51.3	99 12	170.0	1
2	17 11.8	99 14	168.5	16 42.1	99 14	168.6	16 12.5	99 14	168.7	15 42.8	99 14	168.8	15 13.1	99 13	168.8	14 43.4	99 13	168.9	14 13.7	99 13	169.0	13 44.0	99 13	169.1	2
3	17 03.5	99 15	167.6	16 33.9	99 15	167.7	16 04.3	99 15	167.8	15 34.6	99 15	167.8	15 05.0	99 15	167.9	14 35.4	99 14	168.0	14 05.7	99 14	168.1	13 36.1	99 14	168.2	3
4	16 54.6	99 16	166.6	16 25.0	99 16	166.7	15 55.4	99 16	166.8	15 25.9	99 16	166.9	14 56.3	99 16	167.0	14 26.7	99 15	167.1	13 57.1	99 15	167.2	13 27.5	99 15	167.3	4
15	16 45.0	98 17	165.7	16 15.5	98 17	165.8	15 46.0	98 17	165.9	15 16.4	98 17	166.0	14 46.9	98 17	166.1	14 17.4	98 16	166.2	13 47.9	98 16	166.3	13 18.4	98 16	166.4	15
6	16 34.7	98 18	164.8	16 05.3	98 18	164.9	15 35.9	98 18	165.0	15 06.4	98 18	165.1	14 37.0	98 18	165.2	14 07.5	98 18	165.3	13 38.1	98 17	165.4	13 08.6	98 17	165.5	6
7	16 23.9	98 19	163.8	15 54.5	98 19	163.9	15 25.1	98 19	164.0	14 55.8	98 19	164.2	14 26.4	98 19	164.3	13 57.0	98 19	164.4	13 27.6	98 18	164.5	12 58.2	98 18	164.6	7
8	16 12.4	98 20	162.9	15 43.1	98 20	163.0	15 13.8	98 20	163.1	14 44.5	98 20	163.2	14 15.2	98 20	163.3	13 45.9	98 20	163.5	13 16.5	98 19	163.6	12 47.2	98 19	163.7	8
9	16 00.3	97 21	162.0	15 31.1	97 21	162.1	15 01.8	97 21	162.2	14 32.6	97 21	162.3	14 03.4	97 21	162.4	13 34.1	97 21	162.6	13 04.9	97 20	162.7	12 35.6	97 20	162.8	9
20	15 47.5	97 22	161.1	15 18.4	97 22	161.2	14 49.3	97 22	161.3	14 20.1	97 22	161.4	13 51.0	97 22	161.5	13 21.8	97 22	161.7	12 52.6	97 21	161.8	12 23.5	97 21	161.9	20
1	15 34.2	97 23	160.1	15 05.1	97 23	160.3	14 36.1	97 23	160.4	14 07.0	97 23	160.5	13 37.9	97 23	160.6	13 08.9	97 23	160.8	12 39.8	97 22	160.9	12 10.7	97 22	161.0	1
2	15 20.3	97 24	159.2	14 51.3	97 24	159.3	14 22.3	97 24	159.5	13 53.3	97 24	159.6	13 24.3	97 24	159.7	12 55.4	97 24	159.9	12 26.4	97 23	160.0	11 57.4	97 23	160.1	2
3	15 05.7	96 25	158.3	14 36.8	96 25	158.4	14 07.9	96 25	158.6	13 39.1	96 25	158.7	13 10.2	96 25	158.9	12 41.3	96 24	159.0	12 12.3	96 24	159.1	11 43.4	96 24	159.3	3
4	14 50.6	96 26	157.4	14 21.8	96 26	157.5	13 53.0	96 26	157.7	13 24.2	96 26	157.8	12 55.4	96 26	158.0	12 26.6	96 25	158.1	11 57.8	96 25	158.3	11 28.9	96 25	158.4	4
25	14 34.8	96 27	156.5	14 06.2	96 27	156.6	13 37.5	96 27	156.8	13 08.7	96 27	156.9	12 40.0	96 26	157.1	12 11.3	96 26	157.2	11 42.6	96 26	157.4	11 13.9	96 26	157.5	25
6	14 18.5	95 28	155.6	13 49.9	95 28	155.7	13 21.3	95 28	155.9	12 52.7	95 28	156.1	12 24.1	95 27	156.2	11 55.5	95 27	156.4	11 26.9	95 27	156.5	10 58.3	95 27	156.7	6
7	14 01.7	95 29	154.7	13 33.2	95 29	154.9	13 04.7	95 29	155.0	12 36.2	95 29	155.2	12 07.6	95 28	155.3	11 39.1	95 28	155.5	11 10.6	95 28	155.6	10 42.1	95 28	155.8	7
8	13 44.2	95 30	153.8	13 15.8	95 30	154.0	12 47.4	95 30	154.1	12 19.0	95 30	154.3	11 50.6	95 29	154.5	11 22.2	95 29	154.6	10 53.8	95 29	154.8	10 25.4	95 29	155.0	8
9	13 26.2	94 31	152.9	12 57.9	94 31	153.1	12 29.6	94 31	153.3	12 01.3	94 30	153.4	11 33.0	94 30	153.6	11 04.7	94 30	153.8	10 36.4	94 30	153.9	10 08.1	94 30	154.1	9
30	13 07.7	94 32	152.0	12 39.5	94 32	152.2	12 11.3	94 31	152.4	11 43.1	94 31	152.6	11 14.9	94 31	152.7	10 46.7	94 31	152.9	10 18.5	94 31	153.1	9 50.3	94 31	153.2	30
1	12 48.6	94 33	151.1	12 20.5	94 33	151.3	11 52.4	94 32	151.5	11 24.3	94 32	151.7	10 56.2	94 32	151.9	10 28.1	94 32	152.0	10 00.0	94 32	152.2	9 31.9	94 31	152.4	1
2	12 28.9	93 34	150.3	12 01.0	93 33	150.5	11 33.0	93 33	150.6	11 05.0	93 33	150.8	10 37.1	93 33	151.0	10 09.1	93 33	151.2	9 41.1	93 32	151.4	9 13.1	93 32	151.6	2
3	12 08.7	93 34	149.4	11 40.9	93 34	149.6	11 13.1	93 34	149.8	10 45.2	93 34	150.0	10 17.3	93 34	150.2	9 49.5	93 34	150.4	9 21.6	93 33	150.5	8 53.7	93 33	150.7	3
4	11 48.1	92 35	148.5	11 20.3	92 35	148.7	10 52.6	92 35	148.9	10 24.9	92 35	149.1	9 57.1	92 35	149.3	9 29.4	93 34	149.5	9 01.6	93 34	149.7	8 33.8	93 34	149.9	4
35	11 26.8	92 36	147.7	10 59.2	92 36	147.9	10 31.6	92 36	148.1	10 04.0	92 36	148.3	9 36.4	92 35	148.5	9 08.7	92 35	148.7	8 41.1	92 35	148.9	8 13.4	92 35	149.1	35
6	11 05.1	92 37	146.8	10 37.6	92 37	147.0	10 10.1	92 37	147.2	9 42.6	92 36	147.4	9 15.1	92 36	147.6	8 47.6	92 36	147.8	8 20.1	92 36	148.0	7 52.5	92 36	148.2	6
7	10 42.9	91 38	146.0	10 15.5	91 38	146.2	9 48.2	91 37	146.4	9 20.8	91 37	146.6	8 53.4	91 37	146.8	8 26.0	91 37	147.0	7 58.6	91 37	147.2	7 31.2	91 36	147.4	7
8	10 20.2	91 39	145.1	9 53.0	91 38	145.3	9 25.7	91 38	145.6	8 58.4	91 38	145.8	8 31.2	91 38	146.0	8 03.9	91 38	146.2	7 36.6	91 37	146.4	7 09.3	91 37	146.6	8
9	9 57.0	90 39	144.3	9 29.9	90 39	144.5	9 02.7	90 39	144.7	8 35.6	90 39	144.9	8 08.5	90 39	145.2	7 41.3	91 38	145.4	7 14.1	91 38	145.6	6 47.0	91 38	145.8	9
40	9 33.3	90 40	143.5	9 06.3	90 40	143.7	8 39.3	90 40	143.9	8 12.3	90 40	144.1	7 45.3	90 39	144.3	7 18.3	90 39	144.6	6 51.2	90 39	144.8	6 24.2	90 39	145.0	40
1	9 09.2	90 41	142.6	8 42.3	90 41	142.8	8 15.4	90 41	143.1	7 48.5	90 40	143.3	7 21.6	90 40	143.5	6 54.7	90 40	143.7	6 27.8	90 40	144.0	6 00.9	90 40	144.2	1
2	8 44.6	89 42	141.8	8 17.8	89 42	142.0	7 51.1	89 41	142.3	7 24.3	89 41	142.5	6 57.6	89 41	142.7	6 30.8	89 41	142.9	6 04.0	89 40	143.2	5 37.2	89 40	143.4	2
3	8 19.5	89 42	141.0	7 52.9	89 42	141.2	7 26.3	89 42	141.4	6 59.6	89 42	141.7	6 33.0	89 42	141.9	6 06.4	89 41	142.1	5 39.7	89 41	142.4	5 13.0	89 41	142.6	3
4	7 54.0	88 43	140.2	7 27.5	88 43	140.4	7 01.0	88 43	140.6	6 34.5	88 43	140.9	6 08.0	88 42	141.1	5 41.5	88 42	141.3	5 15.0	88 42	141.6				4
45	7 28.1	88 44	139.3	7 01.7	88 44	139.6	6 35.4	88 44	139.8	6 09.0	88 43	140.1	5 42.6	88 43	140.3	5 16.2	88 43	140.5							45
6	7 01.7	87 45	138.5	6 35.5	87 44	138.8	6 09.2	88 44	139.0	5 43.0	88 44	139.3	5 16.7	88 44	139.5										6
7	6 34.9	87 45	137.7	6 08.8	87 45	138.0	5 42.7	87 45	138.2	5 16.6	87 45	138.5													7
8	6 07.7	87 46	136.9	5 41.7	87 46	137.2	5 15.8	87 46	137.4																8
9	5 40.1	86 47	136.1	5 14.3	86 46	136.4																			9
50	5 12.1	86 47	135.4																						50

DECLINATION SAME NAME AS LATITUDE

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	
91	16 57.2	71 64	72.7	17 18.6	71 64	72.4	17 40.0	71 64	72.0	18 01.4	71 63	71.6	18 22.7	71 63	71.3	18 43.9	71 63	70.9	19 05.1	71 63	70.5	19 26.3	70 63	70.1	91
2	16 18.9	72 64	72.0	16 40.4	72 63	71.7	17 01.9	71 63	71.3	17 23.3	71 63	71.0	17 44.7	71 63	70.6	18 06.1	71 63	70.2	18 27.4	71 63	69.8	18 48.6	71 63	69.5	2
3	15 40.8	72 63	71.4	16 02.4	72 63	71.0	16 24.0	72 63	70.6	16 45.5	72 63	70.3	17 06.9	71 63	69.9	17 28.4	71 63	69.5	17 49.7	71 62	69.2	18 11.1	71 62	68.8	3
4	15 02.9	72 63	70.7	15 24.5	72 63	70.3	15 46.2	72 63	70.0	16 07.7	72 63	69.6	16 29.3	72 62	69.2	16 50.8	72 62	68.9	17 12.3	72 62	68.5	17 33.7	71 62	68.1	4
95	14 25.1	73 63	70.0	14 46.8	72 63	69.6	15 08.5	72 62	69.3	15 30.2	72 62	68.9	15 51.8	72 62	68.6	16 13.5	72 62	68.2	16 35.0	72 62	67.8	16 56.6	72 62	67.5	95
6	13 47.4	73 62	69.3	14 09.2	73 62	69.0	14 31.1	73 62	68.6	14 52.8	73 62	68.2	15 14.6	72 62	67.9	15 36.3	72 62	67.5	15 57.9	72 62	67.2	16 19.6	72 61	66.8	6
7	13 09.9	73 62	68.6	13 31.9	73 62	68.3	13 53.8	73 62	67.9	14 15.6	73 62	67.6	14 37.5	73 62	67.2	14 59.3	73 61	66.9	15 21.0	72 61	66.5	15 42.8	72 61	66.1	7
8	12 32.6	73 62	67.9	12 54.7	73 62	67.6	13 16.6	73 62	67.2	13 38.6	73 61	66.9	14 00.5	73 61	66.5	14 22.4	73 61	66.2	14 44.3	73 61	65.8	15 06.1	73 61	65.5	8
9	11 55.5	74 62	67.3	12 17.6	74 61	66.9	12 39.7	74 61	66.6	13 01.8	73 61	66.2	13 23.8	73 61	65.9	13 45.8	73 61	65.5	14 07.8	73 61	65.2	14 29.7	73 60	64.8	9
100	11 18.6	74 61	66.6	11 40.8	74 61	66.2	12 03.0	74 61	65.9	12 25.1	74 61	65.5	12 47.3	74 61	65.2	13 09.4	74 60	64.8	13 31.4	74 60	64.5	13 53.5	73 60	64.1	100
1	10 41.9	74 61	65.9	11 04.2	74 61	65.5	11 26.4	74 61	65.2	11 48.7	74 60	64.8	12 10.9	74 60	64.5	12 33.1	74 60	64.2	12 55.3	74 60	63.8	13 17.5	74 60	63.5	1
2	10 05.3	75 61	65.2	10 27.7	75 60	64.8	10 50.1	75 60	64.5	11 12.5	74 60	64.2	11 34.8	74 60	63.8	11 57.1	74 60	63.5	12 19.4	74 60	63.1	12 41.6	74 59	62.8	2
3	9 29.0	75 60	64.5	9 51.5	75 60	64.1	10 14.0	75 60	63.8	10 36.4	75 60	63.5	10 58.9	75 60	63.1	11 21.3	75 59	62.8	11 43.7	75 59	62.5	12 06.0	75 59	62.1	3
4	8 52.9	75 60	63.8	9 15.5	75 60	63.5	9 38.0	75 60	63.1	10 00.6	75 59	62.8	10 23.2	75 59	62.5	10 45.7	75 59	62.1	11 08.2	75 59	61.8	11 30.7	75 59	61.4	4
105	8 16.9	76 60	63.1	8 39.7	76 59	62.8	9 02.3	76 59	62.4	9 25.0	76 59	62.1	9 47.7	75 59	61.8	10 10.3	75 59	61.4	10 32.9	75 58	61.1	10 55.5	75 58	60.8	105
6	7 41.3	76 59	62.4	8 04.1	76 59	62.1	8 26.9	76 59	61.7	8 49.7	76 59	61.4	9 12.4	76 58	61.1	9 35.2	76 58	60.7	9 57.9	76 58	60.4	10 20.6	76 58	60.1	6
7	7 05.8	76 59	61.7	7 28.7	76 59	61.4	7 51.6	76 58	61.0	8 14.5	76 58	60.7	8 37.4	76 58	60.4	9 00.3	76 58	60.1	9 23.1	76 58	59.7	9 45.9	76 57	59.4	7
8	6 30.6	77 58	61.0	6 53.6	77 58	60.7	7 16.6	77 58	60.3	7 39.6	77 58	60.0	8 02.6	77 58	59.7	8 25.6	77 57	59.4	8 48.6	77 57	59.0	9 11.5	76 57	58.7	8
9	5 55.6	77 58	60.3	6 18.7	77 58	60.0	6 41.9	77 58	59.6	7 05.0	77 57	59.3	7 28.1	77 57	59.0	7 51.2	77 57	58.7	8 14.3	77 57	58.3	8 37.3	77 57	58.0	9
110	5 20.8	78 58	59.6	5 44.1	77 57	59.2	6 07.3	77 57	58.9	6 30.6	77 57	58.6	6 53.8	77 57	58.3	7 17.0	77 56	58.0	7 40.2	77 56	57.7	8 03.4	77 56	57.3	110
1				5 09.7	78 57	58.5	5 33.1	78 57	58.2	5 56.4	78 56	57.9	6 19.8	78 56	57.6	6 43.1	78 56	57.3	7 06.4	78 56	57.0	7 29.7	78 56	56.6	1
2										5 22.6	78 56	57.2	5 46.0	78 56	56.9	6 09.5	78 56	56.6	6 32.9	78 55	56.3	6 56.3	78 55	55.9	2
3													5 12.5	79 56	56.2	5 36.1	79 55	55.9	5 59.6	79 55	55.6	6 23.2	78 55	55.2	3
4																5 03.0	79 55	55.2	5 26.7	79 55	54.9	5 50.4	79 54	54.5	4
115																						5 17.8	79 54	53.8	115

Lat. 48°

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt °	°	′	Δt °	°	′	Δt °	°	′	Δt °	°	′	Δt °	°	′	Δt °	°	′	Δt °	°	′	Δt °	°	
00	70 00.0	1.0 02	180.0	70 30.0	1.0 02	180.0	71 00.0	1.0 02	180.0	72 00.0	1.0 02	180.0	74 00.0	1.0 02	180.0	76 00.0	1.0 02	180.0	76 30.0	1.0 02	180.0	77 30.0	1.0 02	180.0	00
1	69 59.1	1.0 05	177.4	70 29.1	1.0 05	177.4	70 59.1	1.0 05	177.3	71 59.0	1.0 05	177.2	73 58.9	1.0 05	176.9	75 58.8	1.0 06	176.6	76 28.8	1.0 06	176.5	77 28.7	1.0 07	176.2	1
2	69 56.4	1.0 08	174.8	70 26.3	1.0 08	174.7	70 56.2	1.0 08	174.6	71 56.1	1.0 08	174.4	73 55.7	1.0 09	173.9	75 55.2	1.0 10	173.2	76 25.1	1.0 10	173.0	77 24.8	99 11	172.5	2
3	69 51.9	99 10	172.3	70 21.7	99 11	172.1	70 51.6	99 11	172.0	71 51.2	99 11	171.6	73 50.3	99 12	170.8	75 49.3	99 14	169.8	76 18.9	99 14	169.5	77 18.2	99 15	168.8	3
4	69 45.6	99 13	169.7	70 15.3	99 14	169.5	70 45.0	99 14	169.3	71 44.4	99 14	168.9	73 42.9	99 16	167.8	75 41.0	98 18	166.5	76 10.5	98 18	166.1	77 09.2	98 19	165.2	4
05	69 37.6	99 16	167.2	70 07.2	99 16	167.0	70 36.7	98 17	166.7	71 35.7	98 18	166.2	73 33.4	98 19	164.9	75 30.5	97 21	163.2	75 59.7	97 22	162.7	76 57.8	97 23	161.7	05
6	69 27.9	98 19	164.7	69 57.3	98 19	164.5	70 26.6	98 20	164.1	71 25.2	98 20	163.5	73 22.0	97 22	162.0	75 17.9	96 25	160.0	75 46.7	96 25	159.5	76 44.0	95 27	158.2	6
7	69 16.5	97 22	162.3	69 45.7	97 22	162.0	70 14.8	97 22	161.6	71 12.9	97 23	160.9	73 06.6	96 25	159.1	75 03.1	95 28	156.9	75 31.5	95 29	156.3	76 28.0	94 30	154.9	7
8	69 03.5	97 24	159.9	69 32.4	96 25	159.5	70 01.3	96 25	159.1	70 58.9	96 26	158.3	72 53.4	95 28	156.4	74 46.4	94 31	153.9	75 14.4	93 32	153.2	76 10.0	92 33	151.7	8
9	68 48.9	96 27	157.5	69 17.6	96 27	157.1	69 46.2	95 28	156.7	70 43.3	95 29	155.8	72 36.4	94 31	153.7	74 27.9	92 34	151.0	74 55.4	92 35	150.3	75 50.9	90 36	148.6	9
10	68 32.8	95 29	155.2	69 01.2	95 30	154.8	69 29.6	94 30	154.3	70 26.0	94 31	153.3	72 17.8	92 34	151.0	74 07.6	91 37	148.2	74 34.7	90 37	147.4	75 28.2	89 39	145.7	10
1	68 15.3	94 32	153.0	68 43.4	94 32	152.5	69 11.4	93 33	152.0	70 07.2	93 34	150.9	71 57.5	91 36	148.5	73 45.7	89 39	145.6	74 12.3	88 40	144.7	75 04.8	87 42	142.9	1
2	67 56.3	93 34	150.7	68 24.1	93 34	150.2	68 51.9	92 35	149.7	69 47.0	92 36	148.6	71 35.8	90 38	146.0	73 22.2	87 41	143.0	73 48.3	87 42	142.1	74 39.8	85 44	140.2	2
3	67 36.0	92 36	148.6	68 03.5	92 36	148.1	68 31.0	91 37	147.5	69 25.4	90 38	146.3	71 12.7	88 41	143.7	72 57.3	86 44	140.5	73 23.0	85 44	139.6	74 13.5	83 46	137.7	3
4	67 14.5	91 38	146.5	67 41.7	90 38	145.9	68 08.8	90 39	145.4	69 02.5	89 40	144.1	70 48.3	87 43	141.4	72 31.2	84 46	138.1	72 56.3	83 46	137.2	73 45.8	82 48	135.2	4
15	66 51.7	90 40	144.4	67 18.6	89 40	143.9	67 45.3	89 41	143.3	68 38.4	88 42	142.0	70 22.7	86 45	139.2	72 03.8	83 48	135.8	72 28.4	82 48	134.9	73 16.9	80 50	132.9	15
6	66 27.8	89 42	142.5	66 54.4	88 42	141.9	67 20.8	88 43	141.3	68 13.1	87 44	140.0	69 55.9	84 46	137.1	71 35.2	81 49	133.7	71 59.5	80 50	132.7	72 47.9	78 52	130.7	6
7	66 02.8	88 43	140.5	66 29.0	87 44	139.9	66 55.1	87 44	139.3	67 46.8	86 46	138.0	69 28.0	83 48	135.0	71 05.7	80 51	131.6	71 29.5	79 52	130.6	72 16.1	77 53	128.6	7
8	65 36.8	87 45	138.6	66 02.7	86 46	138.0	66 28.4	86 46	137.4	67 19.4	84 47	136.0	68 59.1	82 50	133.0	70 35.2	78 52	129.6	70 58.5	77 53	128.6	71 44.3	75 54	126.6	8
9	65 09.8	86 47	136.8	65 35.3	85 47	136.2	66 00.8	84 48	135.5	66 51.1	83 49	134.2	68 29.3	80 51	131.2	70 03.8	77 54	127.7	70 26.8	76 54	126.7	71 11.7	74 56	124.7	9
20	64 41.8	84 48	135.0	65 07.1	84 48	134.4	65 32.2	83 49	133.8	66 21.8	82 50	132.4	67 58.7	79 52	129.3	69 31.7	76 55	125.8	69 54.2	75 56	124.9	70 38.3	72 57	122.9	20
1	64 13.0	83 49	133.3	64 38.0	83 50	132.7	65 02.8	82 50	132.0	65 51.8	81 52	130.6	67 27.2	78 54	127.6	68 58.8	74 56	124.1	69 20.9	73 57	123.1	70 04.2	71 58	121.1	1
2	63 43.4	82 51	131.7	64 08.1	82 51	131.0	64 32.5	81 52	130.3	65 20.9	80 53	128.9	66 55.1	77 55	125.9	68 25.2	73 57	122.4	68 47.0	72 58	121.5	69 29.6	70 59	119.5	2
3	63 13.1	81 52	130.0	63 37.4	81 52	129.4	64 01.6	80 53	128.7	64 49.3	79 54	127.3	66 22.2	76 56	124.2	67 51.0	72 58	120.8	68 12.4	71 58	119.8	68 54.4	69 60	117.9	3
4	62 42.0	80 53	128.5	63 06.0	80 53	127.8	63 29.9	79 54	127.1	64 17.1	78 55	125.7	65 48.7	75 57	122.7	67 16.2	71 59	119.2	67 37.3	70 59	118.3	68 18.6	68 60	116.4	4
25	62 10.2	80 54	126.9	62 34.0	79 54	126.3	62 57.6	78 55	125.6	63 44.1	77 56	124.2	65 14.6	74 58	121.1	66 40.9	70 60	117.7	67 01.7	69 60	116.8	67 42.4	67 61	114.9	25
6	61 37.8	79 55	125.5	62 01.3	78 55	124.8	62 24.6	77 56	124.1	63 10.7	76 57	122.7	64 40.0	73 59	119.7	66 05.1	69 60	116.3	66 25.7	68 61	115.4	67 05.8	66 62	113.5	6
7	61 04.8	78 56	124.0	61 28.1	77 56	123.4	61 51.1	77 57	122.7	62 36.6	75 58	121.3	64 04.9	72 59	118.3	65 28.9	68 61	114.9	65 49.2	67 61	114.0	66 28.8	65 62	112.2	7
8	60 31.3	77 57	122.6	60 54.3	76 57	122.0	61 17.1	76 58	121.3	62 02.0	74 58	119.9	63 29.3	71 60	116.9	64 52.3	67 62	113.6	65 12.4	66 62	112.7	65 51.5	64 63	110.9	8
9	59 57.2	76 58	121.2	60 20.0	76 58	120.6	60 42.5	75 58	119.9	61 27.0	73 59	118.5	62 53.3	70 61	115.6	64 15.4	67 62	112.3	64 35.2	65 63	111.4	65 13.8	63 63	109.6	9
30	59 22.6	75 58	119.9	59 45.2	75 59	119.3	60 07.5	74 59	118.6	60 51.5	73 60	117.2	62 16.8	69 61	114.3	63 38.0	66 63	111.0	63 57.6	65 63	110.2	64 35.8	63 64	108.4	30
1	58 47.6	75 59	118.6	59 09.9	74 59	118.0	59 32.0	73 60	117.3	60 15.6	72 60	116.0	61 40.1	69 62	113.0	63 00.4	65 63	109.8	63 19.8	64 63	109.0	63 57.6	62 64	107.2	1
2	58 12.2	74 60	117.4	58 34.3	73 60	116.7	58 56.2	73 60	116.1	59 39.3	71 61	114.7	61 03.9	68 62	111.8	62 22.5	64 64	108.7	62 41.7	63 64	107.8	63 19.1	61 64	106.1	2
3	57 36.3	73 60	116.2	57 58.2	73 61	115.5	58 19.9	72 61	114.9	59 02.7	71 62	113.5	60 25.5	67 63	110.6	61 44.3	64 64	107.5	62 03.4	63 64	106.7	62 40.5	61 65	105.0	3
4	57 00.1	73 61	115.0	57 21.8	72 61	114.3	57 43.3	71 62	113.7	58 25.7	70 62	112.3	59 47.8	67 63	109.5	61 05.9	63 64	106.4	61 24.8	62 65	105.6	62 01.6	60 65	103.9	4
35	56 23.5	72 61	113.8	56 45.1	71 62	113.2	57 06.4	71 62	112.5	57 48.4	69 63	111.2	59 09.8	66 64	108.4	60 27.3	63 65	105.3	60 46.0	62 65	104.5	61 22.5	60 65	102.9	35
6	55 46.6	71 62	112.7	56 06.0	71 62	112.0	56 29.1	70 63	111.4	57 10.8	69 63	110.1	58 31.6	66 64	107.3	59 48.5	62 65	104.3	60 07.1	61 65	103.5	60 43.3	59 66	101.9	6
7	55 09.4	71 62	111.6	55 30.6	70 63	110.9	55 51.6	70 63	110.3	56 33.0	68 63	109.0	57 53.2	65 64	106.2	59 09.5	62 65	103.3	59 28.0	61 65	102.5	60 04.0	59 66	100.9	7
8	54 32.0	70 63	110.5	54 53.0	70 63	109.9	55 13.8	69 63	109.2	55 54.9	68 64	107.9	57 14.5	65 65	105.2	58 30.4	61 66	102.3	58 48.7	61 66	101.5	59 24.5	59 66	100.0	8
9	53 54.2	70 63	109.4	54 15.1	69 64	108.8	54 35.8	69 64	108.2	55 16.6	67 64	106.9	56 35.7	64 65	104.2	57 51.1	61 66	101.3	58 09.3	60 66	100.6	58 44.9	58 66	99.1	9
40	53 16.2	69 64	108.4	53 37.0	69 64	107.8	53 57.6	68 64	107.2	54 38.1	67 65	105.9	55 56.7	64 65	103.2	57 11.7	61 66	100.4	57 29.8	60 66	99.7	58 05.2	58 66	98.1	40
1	52 38.0	69 64	107.4	52 58.7	68 64	106.8	53 19.1	68 64	106.1	53 59.4	67 65	104.9	55 17.6	64 66	102.3	56 32.1	61 66	99.5	56 50.1	60 66	98.7	57 25.4	58 66	97.3	1
2	51 59.6	69 64	106.4	52 20.1	68 65	105.8	52 40.4	67 65	105.2	53 20.5	66 65	103.9	54 38.3	63 66	101.3	55 52.5	60 66	98.6	56 10.4	59 66	97.9	56 45.6	58 67	96.4	2
3	51 21.0	68 65	105.4	51 41.4	68 65	104.8	52 01.6	67 65	104.2	52 41.5	66 65	103.0	53 58.8	63 66	100.4	55 12.7	60 66	97.7	55 30.6	59 66	97.0	56 05.6	58 67	95.5	3
4	50 42.2	68 65	104.4	51 02.5	67 65	103.8	51 22.6	67 65	103.3	52 02.3	65 66	102.0	53 19.3	63 66	99.5	54 32.9	60 66	96.8	54 50.7	59 67	96.1	55 25.6	57 67	94.7	4
45	50 03.2	68 65	103.5	50 23.4	67 65	102.9	50 43.4	66 65	102.3	51 22.9	65 66	101.1	52 39.6	63 66	98.6	53 53.0	60 67	96.0	54 10.8	59 67	95.3	54 45.6	57 67	93.9	45
6	49 24.1	67 65	102.6	49 44.2	67 66	102.0	50 04.2	66 66	101.4	50 43.5	65 66	100.2	51 59.9	62 66	97.8	53 13.0	59 67	95.2	53 30.8	59 67	94.5	54 05.5	57 67	93.1	6
7	48 44.9	67 66	101.7	49 04.9	66 66	101.1	49 24.7	66 66	100.5	50 03.9	65 66	99.4	51 20.1	62 66	96.9	52 33.0	59 67	94.3	52 50.7	59 67	93.7	53 25.4	57 67	92.3	7
8	48 05.5	67 66	100.8	48 25.4	66 66	100.2	48 45.2	66 66	99.7	49 24.3	65 66	98.5	50 40.2	62 67	96.1	51 53.0	59 67	93.5	52 10.6	59 67	92.9	52 45.3	57 67	91.5	8
9	47 26.0	67 66	99.9	47 45.9	66 66	99.3	48 05.6	65 66	98.8	48 44.5	64 66	97.6	50 00.2	62 67	95.3	51 12.9	59 67	92.7	51 30.5	58 67	92.1	52 05.2	57 67	90.8	9
50	46 46.4	66 66	99.0	47 06.2	66 66	98.5	47 25.9	65 66	97.9	48 04.7	64 66	96.8	49 20.2	62 67	94.4	50 32.8	59 67	92.0	50 50.4	58 67	91.3	51 25.0	57 67	90.0	50
1	46 06.7	66 66	98.2	46 26.5	66 66	97.6	46 46.1	65 66	97.1	47 24.8	64 67	96.0	48 40.2	62 67	93.6	49 52.6	59 67	91.2	50 10.3	58 67	90.6	50 44.9	57 67	89.3	1
2	45 26.9	66 66	97.4	45 46.6	65 66	96.8	46 06.2	65 67	96.3	46 44.8	64 67	95.2	48 00.1	62 67	92.9	49 12.5	59 67	90.4	49 30.1	58 67	89.8	50 04.7	57 67	88.6	2
3	44 47.1	66 67	96.5	45 06.7	65 67	96.0	45 26.3	65 67	95.5	46 04.8	64 67	94.4	47 20.0	61 67	92.1	48 32.4	59 67	89.7	48 50.0	58 67	89.1	49 24.6	57 67	87.8	3
4	44 07.2	66 67	95.7	44 26.8	65 67	95.2	44 46.3	65 67	94.7	45 24.8	64 67	93.6	46 39.9	61 67	91.3	47 52.2	59 67	89.0	48 09.8	58 67	88.4	48 44.5	57 67	87.1	4
55	43 27.2	66 67	94.9	43 46.8	65 67	94.4	44 06.2	65 67	93.9	44 44.7	64 67	92.8	45 59.7	61 67	90.6	47 12.1	59 67	88.2	47 29.7	58 67	87.6	48 04.4	57 67	86.4	55
6	42 47.2	65 67	94.1	43 06.7	65 67	93.6	43 26.2	65 67	93.1	44 04.6	64 67	92.0	45 19.6	61 67	89.8	46 32.0	59 67	87.5	46 49.6	59 67	86.9	47 24.4	57 67	85.7	6
7	42 07.1	65 67	93.3	42 26.6	65 67	92.8	42 46.1	64 67	92.3	43 24.4	63 67	91.3	44 39.4	61 67	89.1	45 51.9	59 67	86.8	46 09.5	59 67	86.2	46 44.3	57 67	85.1	7
8	41 27.0	65 67	92.6	41 46.5	65 67	92.1	42 05.9	64 67	91.5	42 44.3	63 67	90.5	43 59.3	61 67	88.4	45 11.8	59 67	86.1	45 29.5	59 67	85.5	46 04.4	58 67	84.4	8
9	40 46.9	65 67	91.8	41 06.4	65 67	91.3	41 25.8	64 67	90.8	42 04.2	63 67	89.8	43 19.2	62 67	87.6	44 31.7	59 67	85.4	44 49.5	59 67	84.9	45 24.4	58 66	83.7	9
60	40 06.7	65 67	91.0	40 26.3	65 67	90.5	40 45.6	64 67	90.0	41 24.0	63 67	89.0	42 39.1	62 67	86.9	43 51.7	60 67	84.7	44 09.5	59 67	84.2	44 44.5	58 66	83.0	60
1	39 26.6	65 67	90.3	39 46.1	65 67	89.8	40 05.5	64 67	89.3	40 43.9	64 67	88.3	41 59.0	62 67	86.2	43 11.8	60 66	84.1	43 29.6	59 66	83.5	44 04.7	58 66	82.4	1
2	38 46.5	65 67	89.6	39 06.0	65 67	89.1	39 25.4	64 67	88.6	40 03.8	64 67	87.6	41 19.0	62 67	85.5	42 31.9	60 66	83.4	42 49.7	59 66	82.8	43 25.0	58 66	81.7	2
3	38 06.3	65 67	88.8	38 25.8	65 67	88.3	38 45.2	64 67	87.8	39 23.7	64 67	86.9	40 39.0	62 67	84.8	41 52.0	60 66	82.7	42 09.9	59 66	82.2	42 45.3	58 66	81.1	3
4	37 26.2	65 67	88.1	37 45.7	65 67	87.6	38 05.1	65 67	87.1	38 43.6	64 67	86.1	39 59.0	62 66	84.1	41 12.2	60 66	82.0	41 30.2	60 66	81.5	42 05.6	59 66	80.4	4
65	36 46.1	65 67	87.4	37 05.6	65 67	86.9	37 25.0	65 67	86.4	38 03.5	64 67	85.4	39 19.1	62 66	83.5	40 32.5	60 66	81.4	40 50.5	60 66	80.9	41 26.1	59 66	79.8	65
6	36 06.0	65 67	86.6	36 25.5	65 67	86.2	36 45.0	65 67	85.7	37 23.5	64 67	84.7	38 39.2	62 66	82.8	39 52.8	60 66	80.7	40 10.9	60 66	80.2	40 46.6	59 66	79.2	6
7	35 25.9	65 67	85.9	35 45.5	65 67	85.5	36 05.0	65 67	85.0	36 43.6	64 67	84.0	37 59.4	62 66	82.1	39 13.3	61 66	80.1	39 31.4	60 66	79.6	40 07.2	59 66	78.5	7
8	34 45.9	66 67	85.2	35 05.5	65 67	84.8	35 25.0	65 67	84.3	36 03.7	64 66	83.4	37 19.7	63 66	81.4	38 33.8	61 66	79.4	38 51.9	60 66	78.9	39 27.9	60 65	77.9	8
9	34 05.9	66 67	84.5	34 25.5	65 67	84.1	34 45.1	65 66	83.6	35 23.8	64 66	82.7	36 40.0	63 66	80.8	37 54.3	61 66	78.8	38 12.6	61 65	78.3	38 48.7	60 65	77.3	9
70	33 25.9	66 66	83.8	33 45.6	65 66	83.4	34 05.2	65 66	82.9	34 44.0	64 66	82.0	36 00.4	63 66	80.1	37 15.0	61 65	78.1	37 33.3	61 65	77.7	38 09.6	60 65	76.6	70
1	32 46.1	66 66	83.1	33 05.8	66 66	82.7	33 25.4	65 66	82.2	34 04.3	65 66	81.3	35 20.9	63 66	79.4	36 35.7	62 65	77.5	36 54.2	61 65	77.0	37 30.6	60 65	76.0	1
2	32 06.2	66 66	82.4	32 26.0	66 66	82.0	32 45.6	65 66	81.6	33 24.7	65 66	80.6	34 41.5	63 66	78.8	35 56.6	62 65	76.9	36 15.1	61 65	76.4	36 51.7	61 65	75.4	2
3	31 26.5	66 66	81.8	31 46.3	66 66	81.3	32 06.0	65 66	80.9	32 45.1	65 66	80.0	34 02.2	64 65	78.1	35 17.5	62 65	76.2	35 36.1	62 65	75.8	36 12.9	61 64	74.8	3
4	30 46.8	66 66	81.1	31 06.6	66 66	80.6	31 26.4	66 66	80.2	32 05.6	65 66	79.3	33 22.9	64 65	77.5	34 38.6	62 65	75.6	34 57.3	62 65	75.1	35 34.2	61 64	74.2	4
75	30 07.1	66 66	80.4	30 27.0	66 66	80.0	30 46.8	66 66	79.5	31 26.2	65 66	78.6	32 43.8	64 65	76.8	33 59.8	63 65	75.0	34 18.5	62 64	74.5	34 55.6	62 64	73.6	75
6	29 27.6	67 66	79.7	29 47.5	66 66	79.3	30 07.4	66 66	78.9	30 46.9	65 65	78.0	32 04.7	64 65	76.2	33 21.0	63 64	74.4	33 39.9	62 64	73.9	34 17.2	62 64	73.0	6
7	28 48.1	67 66	79.0	29 08.1	67 66	78.6	29 28.1	66 65	78.2	30 07.7	66 65	77.3	31 25.8	65 65	75.6	32 42.4	63 64	73.7	33 01.4	63 64	73.3	33 38.9	62 64	72.3	7
8	28 08.8	67 65	78.4	28 28.8	67 65	78.0	28 48.8	66 65	77.5	29 28.5	66 65	76.7	30 47.0	65 65	74.9	32 04.0	64 64	73.1	32 23.0	63 64	72.7	33 00.7	63 63	71.7	8
9	27 29.5	67 65	77.7	27 49.6	67 65	77.3	28 09.7	67 65	76.9	28 49.5	66 65	76.0	30 08.3	65 64	74.3	31 25.6	64 64	72.5	31 44.7	64 64	72.0	32 22.6	63 63	71.1	9
80	26 50.3	67 65	77.0	27 10.5	67 65	76.6	27 30.6	67 65	76.2	28 10.6	66 65	75.4	29 29.7	65 64	73.6	30 47.4	64 63	71.9	31 06.6	64 63	71.4	31 44.7	63 63	70.5	80
1	26 11.2	68 65	76.4	26 31.5	67 65	76.0	26 51.7	67 65	75.5	27 31.8	67 64	74.7	28 51.2	66 64	73.0	30 09.3	64 63	71.3	30 28.6	64 63	70.8	31 06.9	64 63	69.9	1
2	25 32.3	68 65	75.7	25 52.6	68 65	75.3	26 12.9	67 64	74.9	26 53.2	67 64	74.1	28 12.9	66 64	72.4	29 31.4	65 63	70.6	29 50.8	65 63	70.2	30 29.3	64 62	69.3	2
3	24 53.4	68 65	75.0	25 13.8	68 64	74.6	25 34.2	68 64	74.2	26 14.6	67 64	73.4	27 34.7	66 63	71.7	28 53.5	65 63	70.0	29 13.1	65 63	69.6	29 51.8	64 62	68.7	3
4	24 14.7	68 64	74.4	24 35.2	68 64	74.0	24 55.6	68 64	73.6	25 36.2	67 64	72.8	26 56.6	67 63	71.1	28 15.9	66 62	69.4	28 35.5	65 62	69.0	29 14.5	65 62	68.1	4
85	23 36.1	69 64	73.7	23 56.7	68 64	73.3	24 17.2	68 64	72.9	24 58.0	68 64	72.1	26 18.7	67 63	70.5	27 38.4	66 62	68.8	27 58.1	66 62	68.4	28 37.3	65 62	67.5	85
6	22 57.6	69 64	73.1	23 18.3	69 64	72.7	23 38.8	68 64	72.3	24 19.8	68 63	71.5	25 41.0	67 63	69.8	27 01.0	66 62	68.2	27 20.9	66 62	67.8	28 00.3	65 61	66.9	6
7	22 19.3	69 64	72.4	22 40.0	69 64	72.0	23 00.7	69 63	71.6	23 41.8	68 63	70.8	25 03.4	68 62	69.2	26 23.8	67 62	67.6	26 43.8	66 62	67.1	27 23.4	66 61	66.3	7
8	21 41.1	69 63	71.7	22 01.9	69 63	71.3	22 22.7	69 63	71.0	23 04.0	69 63	70.2	24 25.9	68 62	68.6	25 46.8	67 61	66.9	26 06.9	67 61	66.5	26 46.8	66 61	65.7	8
9	21 03.1	70 63	71.1	21 23.9	70 63	70.7	21 44.8	69 63	70.3	22 26.3	69 63	69.5	23 48.6	68 62	67.9	25 10.0	67 61	66.3	25 30.1	67 61	65.9	26 10.3	67 61	65.1	9
90	20 25.1	70 63	70.4	20 46.1	70 63	70.0	21 07.1	70 63	69.6	21 48.8	69 62	68.9	23 11.5	69 62	67.3	24 33.3	68 61	65.7	24 53.6	68 61	65.3	25 33.9	67 60	64.5	90

16—11489

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	28° 00′		28° 30′		29° 00′		30° 00′		32° 00′		34° 00′		34° 30′		35° 30′		H.A.
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
°	° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		°
00	14 00.0 1.0 01	180.0	13 30.0 1.0 01	180.0	13 00.0 1.0 01	180.0	12 00.0 1.0 01	180.0	10 00.0 1.0 00	180.0	8 00.0 1.0 00	180.0	7 30.0 1.0 00	180.0	6 30.0 1.0 00	180.0	00
1	13 59.7 1.0 02	179.1	13 29.7 1.0 02	179.1	12 59.7 1.0 02	179.1	11 59.7 1.0 02	179.1	9 59.7 1.0 02	179.1	7 59.7 1.0 01	179.2	7 29.7 1.0 01	179.2	6 29.7 1.0 01	179.2	1
2	13 58.7 1.0 03	178.2	13 28.7 1.0 03	178.2	12 58.7 1.0 03	178.2	11 58.8 1.0 03	178.2	9 58.8 1.0 03	178.3	7 58.8 1.0 02	178.3	7 28.8 1.0 02	178.3	6 28.9 1.0 02	178.4	2
3	13 57.1 1.0 04	177.3	13 27.2 1.0 04	177.3	12 57.2 1.0 04	177.3	11 57.2 1.0 04	177.3	9 57.3 1.0 04	177.4	7 57.4 1.0 03	177.5	7 27.4 1.0 03	177.5	6 27.4 1.0 03	177.5	3
4	13 54.9 1.0 05	176.4	13 24.9 1.0 06	176.4	12 55.0 1.0 05	176.4	11 55.0 1.0 05	176.5	9 55.2 1.0 05	176.6	7 55.3 1.0 04	176.7	7 25.3 1.0 04	176.7	6 25.4 1.0 04	176.7	4
05	13 52.0 1.0 06	175.5	13 22.1 1.0 06	175.5	12 52.1 1.0 06	175.5	11 52.3 1.0 06	175.6	9 52.5 1.0 06	175.7	7 52.7 1.0 05	175.8	7 22.7 1.0 05	175.8	6 22.8 1.0 05	175.9	05
6	13 48.5 1.0 07	174.5	13 18.6 1.0 07	174.6	12 48.7 1.0 07	174.6	11 48.8 1.0 07	174.7	9 49.2 1.0 07	174.8	7 49.5 1.0 06	175.0	7 19.5 1.0 06	175.0	6 19.7 1.0 06	175.1	6
7	13 44.4 1.0 08	173.6	13 14.5 1.0 08	173.7	12 44.6 1.0 08	173.7	11 44.8 1.0 08	173.8	9 45.2 1.0 08	174.0	7 45.6 1.0 07	174.1	7 15.8 1.0 07	174.2	6 16.0 1.0 07	174.3	7
8	13 39.6 1.0 09	172.7	13 09.8 1.0 09	172.8	12 39.9 1.0 09	172.8	11 40.2 1.0 09	172.9	9 40.7 1.0 08	173.1	7 41.3 1.0 08	173.3	7 11.4 1.0 08	173.4	6 11.7 1.0 08	173.5	8
9	13 34.3 99 10	171.8	13 04.4 99 10	171.9	12 34.6 99 10	171.9	11 34.9 99 10	172.1	9 35.6 99 09	172.3	7 36.3 99 09	172.5	7 06.5 99 09	172.5	6 06.8 99 09	172.6	9
10	13 28.2 99 11	170.9	12 58.4 99 11	171.0	12 28.7 99 11	171.1	11 29.1 99 11	171.2	9 29.9 99 10	171.4	7 30.8 99 10	171.7	7 01.0 99 10	171.7	6 01.4 99 10	171.8	10
1	13 21.6 99 12	170.0	12 51.9 99 12	170.1	12 22.1 99 12	170.2	11 22.6 99 12	170.3	9 23.6 99 11	170.6	7 24.6 99 11	170.8	6 54.9 99 11	170.9	5 55.4 99 11	171.0	1
2	13 14.3 99 13	169.1	12 44.6 99 13	169.2	12 14.9 99 13	169.3	11 15.6 99 13	169.4	9 16.8 99 12	169.7	7 18.0 99 12	170.0	6 48.2 99 12	170.1	5 48.8 99 12	170.2	2
3	13 06.5 99 14	168.2	12 36.8 99 14	168.3	12 07.2 99 14	168.4	11 07.9 99 14	168.5	9 09.3 99 13	168.9	7 10.7 99 13	169.2	6 41.0 99 13	169.2	5 41.7 99 13	169.4	3
4	12 58.0 99 15	167.3	12 28.4 99 15	167.4	11 58.8 99 15	167.5	10 59.6 99 15	167.7	9 01.2 99 14	168.0	7 02.9 99 14	168.3	6 33.3 99 14	168.4	5 34.1 99 14	168.6	4
15	12 48.9 98 16	166.4	12 19.3 98 16	166.5	11 49.8 98 16	166.6	10 50.7 98 16	166.8	8 52.6 98 15	167.2	6 54.5 98 15	167.5	6 24.9 98 15	167.6	5 25.8 98 15	167.8	15
6	12 39.1 98 17	165.6	12 09.7 98 17	165.7	11 40.2 98 17	165.7	10 41.3 98 17	165.9	8 43.4 98 16	166.3	6 45.5 98 16	166.7	6 16.0 98 16	166.8	5 17.1 98 16	167.0	6
7	12 28.8 98 18	164.7	11 59.4 98 18	164.8	11 30.0 98 18	164.9	10 31.2 98 18	165.1	8 33.6 98 17	165.5	6 36.0 98 17	165.9	6 06.6 98 17	166.0	5 07.7 98 16	166.2	7
8	12 17.9 98 19	163.8	11 48.6 98 19	163.9	11 19.3 98 19	164.0	10 20.6 98 19	164.2	8 23.3 98 18	164.6	6 25.9 98 18	165.1	5 56.6 98 18	165.2			8
9	12 06.4 97 20	162.9	11 37.2 97 20	163.0	11 07.9 98 20	163.1	10 09.4 98 20	163.4	8 12.4 98 19	163.8	6 15.3 98 19	164.2	5 46.0 98 18	164.4			9
20	11 54.3 97 21	162.0	11 25.1 97 21	162.1	10 56.0 97 21	162.3	9 57.6 97 21	162.5	8 00.9 97 20	163.0	6 04.1 97 20	163.4	5 34.9 97 19	163.5			20
1	11 41.6 97 22	161.1	11 12.5 97 22	161.3	10 43.4 97 22	161.4	9 45.3 97 22	161.6	7 48.8 97 21	162.1	5 52.4 97 20	162.6	5 23.3 97 20	162.7			1
2	11 28.4 97 23	160.3	10 59.4 97 23	160.4	10 30.4 97 23	160.5	9 32.3 97 22	160.8	7 36.2 97 22	161.3	5 40.1 97 21	161.8	5 11.1 97 21	161.9			2
3	11 14.5 96 24	159.4	10 45.6 96 24	159.5	10 16.7 96 24	159.7	9 18.8 96 23	159.9	7 23.1 96 23	160.5	5 27.3 96 22	161.0					3
4	11 00.1 96 25	158.5	10 31.3 96 25	158.7	10 02.5 96 25	158.8	9 04.8 96 24	159.1	7 09.4 96 24	159.7	5 14.0 96 23	160.2					4
25	10 45.2 96 26	157.7	10 16.4 96 26	157.8	9 47.7 96 26	158.0	8 50.2 96 25	158.3	6 55.2 96 25	158.8	5 00.1 96 24	159.4					25
6	10 29.6 96 27	156.8	10 01.0 96 27	157.0	9 32.3 96 26	157.1	8 35.1 96 26	157.4	6 40.4 96 25	158.0							6
7	10 13.5 96 28	156.0	9 45.0 96 28	156.1	9 16.5 96 27	156.3	8 19.4 96 27	156.6	6 25.1 96 26	157.2							7
8	9 56.9 96 29	155.1	9 28.5 96 28	155.3	9 00.0 96 28	155.4	8 03.2 96 28	155.8	6 09.3 96 27	156.4							8
9	9 39.8 94 29	154.3	9 11.4 94 29	154.4	8 43.1 94 29	154.6	7 46.4 94 29	154.9	5 53.0 96 28	155.6							9
30	9 22.1 94 30	153.4	8 53.8 94 30	153.6	8 25.6 94 30	153.8	7 29.1 94 30	154.1	5 36.1 94 29	154.8							30
1	9 03.8 94 31	152.6	8 35.7 94 31	152.8	8 07.6 94 31	152.9	7 11.3 94 30	153.3	5 18.8 94 30	154.0							1
2	8 45.1 93 32	151.7	8 17.1 93 32	151.9	7 49.1 93 32	152.1	6 53.0 93 31	152.5	5 00.9 93 31	153.2							2
3	8 25.8 93 33	150.9	7 57.9 93 33	151.1	7 30.0 93 33	151.3	6 34.2 93 32	151.7									3
4	8 06.1 93 34	150.1	7 38.3 93 34	150.3	7 10.5 93 33	150.5	6 14.9 93 33	150.8									4
35	7 45.8 92 35	149.3	7 18.1 92 34	149.5	6 50.5 92 34	149.7	5 55.1 92 34	150.0									35
6	7 25.0 92 35	148.4	6 57.5 92 35	148.6	6 29.9 92 35	148.8	5 34.8 92 35	149.2									6
7	7 03.8 91 36	147.6	6 36.3 91 36	147.8	6 08.9 91 36	148.0	5 14.0 91 36	148.4									7
8	6 42.0 91 37	146.8	6 14.7 91 37	147.0	5 47.4 91 37	147.2											8
9	6 19.8 91 38	146.0	5 52.6 91 38	146.2	5 25.5 91 37	146.4											9
40	5 57.1 90 39	145.2	5 30.1 90 38	145.4	5 03.0 90 38	145.6											40
1	5 34.0 90 39	144.4	5 07.1 90 39	144.6													1
2	5 10.4 89 40	143.6															2

DECLINATION SAME NAME AS LATITUDE

H.A.	28° 00′		28° 30′		29° 00′		30° 00′		32° 00′		34° 00′		34° 30′		35° 30′		H.A.
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
°	° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		° ′ Δd Δt °		°
91	19 47.4 70 63	69.8	20 08.5 70 62	69.4	20 29.5 70 62	69.0	21 11.4 70 62	68.2	22 34.5 69 61	66.7	23 56.8 68 61	65.1	24 17.2 68 60	64.7	24 57.8 67 60	63.9	91
2	19 09.8 71 62	69.1	19 31.0 70 62	68.7	19 52.1 70 62	68.3	20 34.2 70 62	67.6	21 57.8 69 61	66.0	23 20.5 69 60	64.5	23 41.0 68 60	64.1	24 21.8 68 60	63.3	2
3	18 32.4 71 62	68.4	18 53.7 71 62	68.1	19 14.9 71 62	67.7	19 57.2 70 61	66.9	21 21.2 70 61	65.4	22 44.3 69 60	63.9	23 05.0 69 60	63.5	23 46.1 68 59	62.7	3
4	17 55.1 71 62	67.8	18 16.5 71 62	67.4	18 37.8 71 61	67.0	19 20.3 71 61	66.3	20 44.8 70 60	64.8	22 08.4 69 60	63.2	22 29.1 69 59	62.8	23 10.5 69 59	62.1	4
95	17 18.1 72 62	67.1	17 39.5 71 61	66.7	18 00.9 71 61	66.4	18 43.6 71 61	65.6	20 08.5 70 60	64.1	21 32.6 70 59	62.6	21 53.5 70 59	62.2	22 35.2 69 59	61.4	95
6	16 41.2 72 61	66.5	17 02.7 72 61	66.1	17 24.2 72 61	65.7	18 07.2 71 60	65.0	19 32.5 71 60	63.5	20 57.1 70 59	62.0	21 18.1 70 59	61.6	22 00.0 70 58	60.8	6
7	16 04.5 72 61	65.8	16 26.1 72 61	65.4	16 47.7 72 61	65.1	17 30.9 72 60	64.3	18 56.7 71 59	62.9	20 21.7 71 59	61.4	20 42.9 70 58	61.0	21 25.0 70 58	60.2	7
8	15 27.9 73 61	65.1	15 49.7 72 60	64.8	16 11.4 72 60	64.4	16 54.8 72 60	63.7	18 21.0 72 59	62.2	19 46.6 71 58	60.7	20 07.9 71 58	60.4	20 50.3 71 58	59.6	8
9	14 51.6 73 60	64.5	15 13.5 73 60	64.1	15 35.3 73 60	63.7	16 18.9 73 59	63.0	17 45.6 72 59	61.6	19 11.7 71 58	60.1	19 33.1 71 58	59.7	20 15.8 71 57	59.0	9
100	14 15.5 73 60	63.8	14 37.5 73 60	63.4	14 59.4 73 60	63.1	15 43.2 73 59	62.4	17 10.4 72 58	60.9	18 37.0 72 57	59.5	18 58.5 72 57	59.1	19 41.5 71 57	58.4	100
1	13 39.6 74 60	63.1	14 01.7 74 59	62.8	14 23.7 73 59	62.4	15 07.8 73 59	61.7	16 35.4 73 58	60.3	18 02.5 72 57	58.9	18 24.2 72 57	58.5	19 07.4 72 56	57.8	1
2	13 03.9 74 59	62.4	13 26.1 74 59	62.1	13 48.3 74 59	61.8	14 32.5 74 58	61.1	16 00.7 73 58	59.7	17 28.3 73 57	58.2	17 50.1 73 56	57.9	18 33.6 72 56	57.1	2
3	12 28.4 74 59	61.8	12 50.7 74 59	61.4	13 13.0 74 58	61.1	13 57.5 74 58	60.4	15 26.1 74 57	59.0	16 54.3 73 56	57.6	17 16.2 73 56	57.2	18 00.0 73 56	56.5	3
4	11 53.1 75 58	61.1	12 15.6 75 58	60.8	12 38.0 75 58	60.4	13 22.7 74 58	59.7	14 51.8 74 57	58.4	16 20.5 74 56	57.0	16 42.6 74 56	56.6	17 26.6 73 55	55.9	4
105	11 18.1 75 58	60.4	11 40.6 75 58	60.1	12 03.2 75 58	59.8	12 48.1 75 57	59.1	14 17.8 75 56	57.7	15 46.9 74 55	56.3	16 09.2 74 55	56.0	16 53.5 74 55	55.3	105
6	10 43.3 76 58	59.7	11 06.0 76 57	59.4	11 28.6 75 57	59.1	12 13.8 75 57	58.4	13 44.0 75 56	57.1	15 13.7 75 55	55.7	15 36.0 74 55	55.3	16 20.6 74 54	54.6	6
7	10 08.7 76 57	59.1	10 31.5 76 57	58.7	10 54.3 76 57	58.4	11 39.8 76 56	57.7	13 10.4 75 56	56.4	14 40.6 75 55	55.0	15 03.1 75 54	54.7	15 48.0 75 54	54.0	7
8	9 34.4 76 57	58.4	9 57.3 76 57	58.1	10 20.2 76 56	57.7	11 05.9 76 56	57.1	12 37.1 76 55	55.7	14 07.9 75 54	54.4	14 30.5 75 54	54.1	15 15.6 75 53	53.4	8
9	9 00.4 77 56	57.7	9 23.4 77 56	57.4	9 46.4 77 56	57.0	10 32.4 77 56	56.4	12 04.0 76 55	55.1	13 35.3 76 54	53.8	13 58.1 76 54	53.4	14 43.5 76 53	52.7	9
110	8 26.6 77 56	57.0	8 49.7 77 56	56.7	9 12.8 77 55	56.4	9 59.1 77 55	55.7	11 31.3 77 54	54.4	13 03.1 76 53	53.1	13 26.0 76 53	52.8	14 11.7 76 53	52.1	110
1	7 53.0 78 55	56.3	8 16.3 78 55	56.0	8 39.5 78 55	55.7	9 26.0 77 55	55.0	10 58.7 77 54	53.8	12 31.1 77 53	52.5	12 54.2 77 53	52.1	13 40.2 77 52	51.5	1
2	7 19.7 78 55	55.6	7 43.1 78 55	55.3	8 06.5 78 55	55.0	8 53.2 78 54	54.4	10 26.5 78 53	53.1	11 59.4 77 52	51.8	12 22.6 77 52	51.5	13 08.9 77 52	50.8	2
3	6 46.7 78 55	54.9	7 10.3 78 54	54.6	7 33.8 78 54	54.3	8 20.8 78 54	53.7	9 54.5 78 53	52.4	11 28.0 78 52	51.1	11 51.4 78 52	50.8	12 37.9 78 51	50.2	3
4	6 14.0 79 54	54.2	6 37.7 79 54	53.9	7 01.3 79 54	53.6	7 48.6 79 53	53.0	9 22.9 78 52	51.7	10 56.9 78 51	50.5	11 20.4 78 51	50.2	12 07.3 78 51	49.5	4
115	5 41.6 79 54	53.5	6 05.4 79 53	53.2	6 29.1 79 53	52.9	7 16.6 79 53	52.3	8 51.5 79 52	51.1	10 26.1 79 51	49.8	10 49.7 79 51	49.5	11 36.9 79 50	48.9	115
6	5 09.4 80 53	52.8	5 33.4 80 53	52.5	5 57.3 80 53	52.2	6 45.0 80 52	51.6	8 20.4 79 51	50.4	9 55.6 79 50	49.2	10 19.3 79 50	48.8	11 06.8 79 50	48.2	6
7			5 01.6 80 52	51.8	5 25.7 80 52	51.5	6 13.7 80 52	50.9	7 49.6 80 51	49.7	9 25.4 80 50	48.5	9 49.3 80 50	48.2	10 37.0 79 49	47.6	7
8							5 42.7 80 51	50.2	7 19.2 80 50	49.0	8 55.5 80 49	47.8	9 19.5 80 49	47.5	10 07.5 80 49	46.9	8
9							5 12.0 81 51	49.5	6 49.0 81 50	48.3	8 25.9 81 49	47.1	8 50.0 81 49	46.8	9 38.4 80 48	46.2	9
120									6 19.2 81 49	47.6	7 56.6 81 48	46.5	8 20.9 81 48	46.2	9 09.5 81 48	45.6	120
1									5 49.7 82 49	46.9	7 27.7 82 48	45.8	7 52.1 82 47	45.5	8 41.0 81 47	44.9	1
2									5 20.5 82 48	46.2	6 59.1 82 47	45.1	7 23.7 82 47	44.8	8 12.8 82 46	44.2	2
3											6 30.8 83 47	44.4	6 55.5 82 46	44.1	7 45.0 82 46	43.6	3
4											6 02.9 83 46	43.7	6 27.8 83 46	43.4	7 17.5 83 45	42.9	4
125											5 35.3 83 45	43.0	6 00.3 83 45	42.8	6 50.4 83 45	42.2	125
6											5 08.1 84 45	42.3	5 33.3 84 44	42.1	6 23.6 84 44	41.5	6
7													5 06.5 84 44	41.4	5 57.2 84 43	40.8	7
8															5 31.1 85 43	40.1	8
9															5 05.4 85 42	39.4	9

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Lat. 48°

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	78 00.0	1.0 02	180.0	79 00.0	1.0 02	180.0	80 30.0	1.0 03	180.0	82 00.0	1.0 03	180.0	84 00.0	1.0 04	180.0	84 30.0	1.0 04	180.0	85 00.0	1.0 05	180.0	87 00.0	1.0 08	180.0	00
1	77 58.6	1.0 07	176.1	78 58.5	1.0 07	175.8	80 28.3	1.0 08	175.3	81 58.1	1.0 10	174.5	83 57.5	99 12	172.9	84 27.3	99 13	172.3	84 57.1	99 14	171.7	86 55.3	98 22	166.7	1
2	77 54.6	99 11	172.3	78 54.2	99 12	171.7	80 23.4	99 14	170.6	81 52.4	99 16	169.1	83 50.2	98 20	166.0	84 19.4	97 21	164.9	84 48.5	97 23	163.6	86 42.0	91 34	154.6	2
3	77 47.8	99 16	168.4	78 46.9	98 17	167.6	80 15.2	98 19	166.0	81 42.9	97 21	163.8	83 38.2	95 27	159.5	84 06.6	94 29	157.9	84 34.6	93 31	156.1	86 21.5	83 43	144.4	3
4	77 38.5	98 20	164.7	78 36.9	97 21	163.6	80 04.0	96 24	161.6	81 30.1	95 27	158.8	83 22.2	91 33	153.3	83 49.4	90 35	151.4	84 16.2	88 37	149.3	85 55.8	75 49	136.0	4
05	77 26.7	96 24	161.1	78 24.3	96 25	159.7	79 49.9	94 28	157.3	81 14.0	92 32	154.0	83 02.4	88 38	147.7	83 28.4	86 40	145.6	83 53.8	84 43	143.2	85 26.2	68 54	129.2	05
6	77 12.5	95 27	157.5	78 09.2	94 29	156.0	79 33.1	92 32	153.2	80 55.0	90 36	149.5	82 39.4	84 43	142.6	83 04.2	81 45	140.3	83 28.2	79 47	137.8	84 53.9	62 57	123.8	6
7	76 56.1	93 31	154.1	77 51.7	92 33	152.4	79 13.8	90 36	149.3	80 33.4	87 40	145.3	82 13.7	80 47	138.0	82 37.3	77 49	135.6	83 00.0	74 51	133.0	84 19.6	57 59	119.3	7
8	76 37.5	92 34	150.9	77 32.1	90 36	149.0	78 52.2	88 39	145.7	80 09.4	84 43	141.4	81 45.7	76 50	133.8	82 08.2	73 52	131.4	82 29.7	70 54	128.8	83 44.0	52 61	115.6	8
9	76 17.0	90 37	147.7	77 10.4	88 39	145.8	78 28.5	85 42	142.2	79 43.4	81 46	137.8	81 15.9	72 52	130.1	81 37.2	70 54	127.7	81 57.6	66 56	125.1	83 07.3	49 62	112.5	9
10	75 54.7	88 40	144.8	76 46.9	86 42	142.7	78 03.0	83 45	139.0	79 15.6	78 49	134.5	80 44.4	69 55	126.7	81 04.7	66 56	124.4	81 24.1	63 58	121.9	82 29.9	46 63	109.9	10
1	75 30.7	86 43	141.9	76 21.8	84 44	139.7	77 35.9	80 48	135.9	78 46.1	76 51	131.4	80 11.6	66 57	123.6	80 31.0	63 58	121.4	80 49.4	60 59	118.9	81 51.9	43 64	107.6	1
2	75 05.2	84 45	139.2	75 55.1	82 47	137.0	77 07.2	78 50	133.1	78 15.4	73 53	128.5	79 37.6	63 58	120.9	79 56.2	61 59	118.7	80 13.9	57 61	116.3	81 13.4	41 65	105.5	2
3	74 38.3	82 47	136.6	75 27.0	80 49	134.3	76 37.3	76 52	130.5	77 43.4	71 55	125.9	79 02.7	61 59	118.4	79 20.6	58 61	116.3	79 37.5	55 62	114.0	80 34.5	39 65	103.7	3
4	74 10.1	80 49	134.2	74 57.7	78 51	131.9	76 06.2	74 54	128.0	77 10.3	68 57	123.4	78 27.0	59 61	116.1	78 44.2	56 62	114.0	79 00.6	53 63	111.9	79 55.4	38 66	102.1	4
15	73 40.7	79 51	131.8	74 27.3	76 52	129.5	75 34.0	72 55	125.6	76 36.4	66 58	121.1	77 50.6	57 62	114.0	78 07.3	54 62	112.0	78 23.0	51 63	109.9	79 16.0	37 66	100.7	15
6	73 10.3	77 52	129.6	73 55.8	75 54	127.3	75 01.0	70 56	123.5	76 01.6	65 59	119.0	77 13.7	55 62	112.1	77 29.8	52 63	110.2	77 45.1	49 64	108.2	78 36.5	36 66	99.3	6
7	72 38.9	75 54	127.5	73 23.4	73 55	125.2	74 27.1	68 58	121.4	75 26.2	63 60	117.0	76 36.3	54 63	110.3	76 51.9	51 64	108.4	77 06.8	48 64	106.5	77 56.8	35 66	98.1	7
8	72 06.7	74 55	125.5	72 50.3	71 57	123.2	73 52.5	67 59	119.5	74 50.2	61 61	115.2	75 58.4	52 64	108.6	76 13.7	50 64	106.9	76 28.1	47 65	105.0	77 17.0	34 67	96.9	8
9	71 33.6	72 56	123.6	72 16.3	70 58	121.4	73 17.2	65 60	117.6	74 13.6	60 62	113.4	75 20.2	51 64	107.1	75 35.1	48 65	105.4	75 49.2	46 65	103.6	76 37.1	34 67	95.9	9
20	70 59.8	71 57	121.8	71 41.7	68 59	119.6	72 41.4	64 61	115.9	73 36.5	59 62	111.8	74 41.7	50 65	105.7	74 56.3	47 65	104.0	75 10.1	45 66	102.3	75 57.2	33 67	94.9	20
1	70 25.4	70 58	120.1	71 06.5	67 60	117.9	72 05.0	63 61	114.3	72 59.0	57 63	110.3	74 02.9	49 65	104.3	74 17.2	46 65	102.7	74 30.8	44 66	101.0	75 17.1	33 67	93.9	1
2	69 50.4	69 59	118.4	70 30.8	66 60	116.3	71 28.2	61 62	112.7	72 21.2	56 64	108.8	73 23.9	48 65	103.0	73 37.9	46 66	101.5	73 51.3	43 66	99.9	74 37.1	33 67	93.0	2
3	69 14.8	67 60	116.9	69 54.5	65 61	114.7	70 50.9	60 63	111.2	71 43.0	55 64	107.4	72 44.7	47 66	101.8	72 58.5	45 66	100.3	73 11.7	43 66	98.7	73 56.9	33 67	92.2	3
4	68 38.7	66 61	115.4	69 17.8	64 62	113.2	70 13.3	59 63	109.8	71 04.6	54 64	106.1	72 05.3	47 66	100.6	72 18.9	44 66	99.2	72 31.9	42 66	97.7	73 16.8	32 67	91.4	4
25	68 02.2	65 62	113.9	68 40.7	63 62	111.8	69 35.4	59 64	108.5	70 25.9	54 65	104.8	71 25.8	46 66	99.5	71 39.3	44 66	98.1	71 52.1	42 66	96.7	72 36.7	32 67	90.6	25
6	67 25.3	65 62	112.5	68 03.3	62 63	110.5	68 57.2	58 64	107.2	69 47.0	53 65	103.7	70 46.1	46 66	98.5	70 59.5	43 66	97.1	71 12.2	41 67	95.7	71 56.5	32 67	89.8	6
7	66 48.1	64 63	111.2	67 25.5	61 63	109.2	68 18.7	57 65	106.0	69 07.9	52 65	102.5	70 06.4	45 66	97.5	70 19.6	43 67	96.2	70 32.2	41 67	94.8	71 16.4	32 67	89.1	7
8	66 10.5	63 63	109.9	66 47.5	60 64	107.9	67 40.0	56 65	104.8	68 28.6	52 66	101.4	69 26.5	45 67	96.5	69 39.6	43 67	95.2	69 52.2	41 67	93.9	70 36.2	32 67	88.4	8
9	65 32.6	62 64	108.7	66 09.2	60 64	106.7	67 01.1	56 65	103.6	67 49.2	51 66	100.3	68 46.6	44 67	95.6	68 59.6	43 67	94.3	69 12.1	41 67	93.1	69 56.1	33 67	87.7	9
30	64 54.4	61 64	107.5	65 30.6	59 65	105.6	66 22.0	55 65	102.6	67 09.6	51 66	99.3	68 06.6	44 67	94.7	68 19.6	42 67	93.5	68 32.0	41 67	92.2	69 16.0	33 67	87.1	30
1	64 16.0	61 64	106.3	64 51.8	58 65	104.5	65 42.7	55 66	101.5	66 30.0	50 66	98.3	67 26.6	44 67	93.8	67 39.5	42 67	92.7	67 51.9	40 67	91.4	68 35.9	33 67	86.4	1
2	63 37.4	60 65	105.2	64 12.8	58 65	103.4	65 03.3	54 66	100.5	65 50.2	50 66	97.4	66 46.5	44 67	93.0	66 59.4	42 67	91.8	67 11.7	40 67	90.7	67 55.9	33 67	85.8	2
3	62 58.5	60 65	104.1	63 33.7	57 66	102.3	64 23.8	54 66	99.5	65 10.3	50 67	96.5	66 06.4	44 67	92.2	66 19.2	42 67	91.1	66 31.6	40 67	89.9	67 15.9	33 67	85.2	3
4	62 19.5	59 65	103.1	62 54.4	57 66	101.3	63 44.1	53 66	98.5	64 30.4	49 67	95.6	65 26.3	44 67	91.4	65 39.1	42 67	90.3	65 51.4	40 67	89.2	66 35.9	34 67	84.6	4
35	61 40.3	59 66	102.1	62 15.0	57 66	100.3	63 04.4	53 66	97.6	63 50.4	49 67	94.7	64 46.1	44 67	90.6	64 58.9	42 67	89.6	65 11.3	40 67	88.5	65 55.9	34 66	84.0	35
6	61 01.0	58 66	101.1	61 35.4	56 66	99.4	62 24.5	53 66	96.7	63 10.4	49 67	93.9	64 06.0	43 67	89.9	64 18.8	42 67	88.8	64 31.2	41 67	87.8	65 16.0	34 66	83.4	6
7	60 21.5	58 66	100.1	60 55.7	56 66	98.4	61 44.6	53 67	95.8	62 30.3	49 67	93.0	63 25.8	44 67	89.1	63 38.7	42 67	88.1	63 51.1	41 67	87.1	64 36.2	34 66	82.8	7
8	59 42.0	58 66	99.2	60 16.0	56 66	97.5	61 04.6	52 67	95.0	61 50.2	49 67	92.2	62 45.7	44 67	88.4	62 58.5	42 67	87.4	63 11.0	41 67	86.4	63 56.3	35 66	82.3	8
9	59 02.3	57 66	98.3	59 36.2	55 67	96.6	60 24.6	52 67	94.1	61 10.1	49 67	91.5	62 05.6	44 67	87.7	62 18.4	42 67	86.8	62 30.9	41 67	85.8	63 16.6	35 66	81.7	9
40	58 22.5	57 66	97.4	58 56.2	55 67	95.8	59 44.6	52 67	93.3	60 29.9	49 67	90.7	61 25.5	44 67	87.0	61 38.4	42 67	86.1	61 50.9	41 67	85.1	62 36.9	35 66	81.2	40
1	57 42.6	57 67	96.5	58 16.3	55 67	94.9	59 04.5	52 67	92.5	59 49.8	49 67	89.9	60 45.4	44 67	86.4	60 58.3	43 67	85.4	61 10.9	41 67	84.5	61 57.2	36 66	80.6	1
2	57 02.7	57 67	95.6	57 36.2	55 67	94.1	58 24.3	52 67	91.7	59 09.6	49 67	89.2	60 05.3	44 67	85.7	60 18.3	43 67	84.8	60 31.0	42 66	83.9	61 17.7	36 66	80.1	2
3	56 22.7	57 67	94.8	56 56.2	55 67	93.3	57 44.2	52 67	90.9	58 29.5	49 67	88.5	59 25.3	44 67	85.1	59 38.4	43 67	84.2	59 51.1	42 66	83.3	60 38.1	37 66	79.6	3
4	55 42.7	56 67	94.0	56 16.1	55 67	92.5	57 04.1	52 67	90.2	57 49.4	49 67	87.8	58 45.3	44 67	84.4	58 58.5	43 66	83.5	59 11.2	42 66	82.7	59 58.7	37 66	79.0	4
45	55 02.6	56 67	93.2	55 36.0	55 67	91.7	56 23.9	52 67	89.5	57 09.3	49 67	87.1	58 05.4	45 66	83.8	58 18.6	43 66	82.9	58 31.5	42 66	82.1	59 19.3	37 66	78.5	45
6	54 22.5	56 67	92.4	54 55.8	55 67	91.0	55 43.8	52 67	88.7	56 29.2	49 67	86.4	57 25.5	45 66	83.2	57 38.8	44 66	82.3	57 51.7	43 66	81.5	58 40.0	38 65	78.0	6
7	53 42.4	56 67	91.6	54 15.7	55 67	90.2	55 03.6	52 67	88.0	55 49.1	49 67	85.7	56 45.7	45 66	82.5	56 59.0	44 66	81.7	57 12.0	43 66	80.9	58 00.8	38 65	77.5	7
8	53 02.3	56 67	90.9	53 35.5	55 67	89.5	54 23.5	52 67	87.3	55 09.1	49 67	85.1	56 05.9	45 66	81.9	56 19.3	44 66	81.1	56 32.4	43 66	80.3	57 21.6	39 65	77.0	8
9	52 22.1	56 67	90.1	52 55.4	55 67	88.7	53 43.4	52 67	86.6	54 29.1	49 67	84.4	55 26.2	46 66	81.3	55 39.7	45 66	80.6	55 52.9	44 66	79.8	56 42.5	39 65	76.5	9
50	51 42.0	56 67	89.4	52 15.3	55 67	88.0	53 03.4	52 67	85.9	53 49.2	50 66	83.8	54 46.5	46 66	80.7	55 00.1	45 66	80.0	55 13.4	44 66	79.2	56 03.6	40 65	76.0	50
1	51 01.9	56 67	88.6	51 35.1	55 67	87.3	52 23.3	52 67	85.3	53 09.3	50 66	83.1	54 06.9	46 66	80.2	54 20.6	45 66	79.4	54 34.0	44 66	78.6	55 24.6	40 65	75.5	1
2	50 21.7	56 67	87.9	50 55.1	55 67	86.6	51 43.4	52 67	84.6	52 29.5	50 66	82.5	53 27.4	46 66	79.6	53 41.2	46 66	78.8	53 54.7	45 65	78.1	54 45.8	41 65	75.0	2
3	49 41.6	56 67	87.2	50 15.0	55 67	85.9	51 03.4	53 66	83.9	51 49.7	50 66	81.9	52 47.9	47 66	79.0	53 01.8	46 65	78.3	53 15.5	45 65	77.5	54 07.1	41 64	74.5	3
4	49 01.5	56 67	86.5	49 35.0	55 67	85.2	50 23.5	53 66	83.3	51 10.0	50 66	81.2	52 08.6	47 65	78.4	52 22.6	46 65	77.7	52 36.3	45 65	77.0	53 28.5	42 64	74.0	4
55	48 21.5	57 67	85.8	48 55.0	55 67	84.6	49 43.7	53 66	82.6	50 30.4	51 66	80.6	51 29.3	47 65	77.9	51 43.4	47 65	77.1	51 57.2	46 65	76.4	52 49.9	42 64	73.5	55
6	47 41.4	57 67	85.1	48 15.0	55 66	83.9	49 03.9	53 66	82.0	49 50.8	51 66	80.0	50 50.1	48 65	77.3	51 04.3	47 65	76.6	51 18.3	46 65	75.9	52 11.5	43 64	73.0	6
7	47 01.5	57 67	84.5	47 35.1	55 66	83.2	48 24.2	53 66	81.4	49 11.3	51 66	79.4	50 11.0	48 65	76.7	50 25.3	47 65	76.0	50 39.4	47 65	75.4	51 33.1	43 64	72.5	7
8	46 21.5	57 66	83.8	46 55.3	56 66	82.6	47 44.5	54 66	80.7	48 31.9	52 66	78.8	49 31.9	49 65	76.2	49 46.4	48 65	75.5	50 00.6	47 64	74.8	50 54.9	44 64	72.0	8
9	45 41.6	57 66	83.1	46 15.5	56 66	81.9	47 04.9	54 66	80.1	47 52.5	52 65	78.2	48 53.0	49 65	75.6	49 07.5	48 65	75.0	49 21.9	47 64	74.3	50 16.8	44 63	71.5	9
60	45 01.8	57 66	82.5	45 35.8	56 66	81.3	46 25.4	54 66	79.5	47 13.2	52 65	77.6	48 14.1	49 65	75.1	48 28.8	49 64	74.4	48 43.3	48 64	73.8	49 38.7	45 63	71.0	60
1	44 22.0	57 66	81.8	44 56.1	56 66	80.7	45 46.0	54 66	78.9	46 34.1	52 65	77.0	47 35.4	50 64	74.5	47 50.2	49 64	73.9	48 04.8	48 64	73.2	49 00.8	45 63	70.6	1
2	43 42.3	56 66	81.2	44 16.6	56 66	80.0	45 06.6	55 65	78.3	45 55.0	53 65	76.5	46 56.8	50 64	74.0	47 11.7	49 64	73.3	47 26.4	49 64	72.7	48 23.0	46 63	70.1	2
3	43 02.7	56 66	80.5	43 37.1	57 66	79.4	44 27.3	55 65	77.7	45 16.0	53 65	75.9	46 18.2	51 64	73.4	46 33.3	50 64	72.8	46 48.1	49 64	72.2	47 45.4	46 63	69.6	3
4	42 23.1	58 66	79.9	42 57.6	57 66	78.8	43 48.2	55 65	77.1	44 37.1	53 65	75.3	45 39.8	51 64	72.9	45 55.0	50 64	72.3	46 10.0	50 63	71.6	47 07.8	47 62	69.1	4
65	41 43.7	58 66	79.2	42 18.3	57 65	78.2	43 09.1	56 65	76.5	43 58.3	54 64	74.7	45 01.5	51 64	72.3	45 16.8	51 63	71.7	45 31.9	50 63	71.1	46 30.3	47 62	68.6	65
6	41 04.2	59 66	78.6	41 39.1	58 65	77.5	42 30.1	56 65	75.9	43 19.7	54 64	74.2	44 23.3	52 63	71.8	44 38.7	51 63	71.2	44 54.0	51 63	70.6	45 53.0	48 62	68.1	6
7	40 24.9	59 65	78.0	40 59.9	58 65	76.9	41 51.2	56 65	75.3	42 41.1	55 64	73.6	43 45.2	52 63	71.3	44 00.8	52 63	70.7	44 16.2	51 63	70.1	45 15.8	48 62	67.6	7
8	39 45.7	59 65	77.4	40 20.9	58 65	76.3	41 12.4	57 64	74.7	42 02.6	55 64	73.0	43 07.2	53 63	70.7	43 23.0	52 63	70.1	43 38.5	51 63	69.6	44 38.8	49 62	67.1	8
9	39 06.6	59 65	76.7	39 41.9	58 65	75.7	40 33.8	57 64	74.1	41 24.3	55 64	72.5	42 29.4	53 63	70.2	42 45.3	53 63	69.6	43 00.9	52 62	69.0	44 01.8	49 61	66.7	9
70	38 27.6	60 65	76.1	39 03.0	59 65	75.1	39 55.2	57 64	73.5	40 46.1	56 64	71.9	41 51.7	54 63	69.7	42 07.7	53 62	69.1	42 23.5	52 62	68.5	43 25.0	50 61	66.2	70
1	37 48.6	60 65	75.5	38 24.3	59 64	74.5	39 16.8	58 64	72.9	40 08.0	56 63	71.3	41 14.1	54 62	69.1	41 30.3	54 62	68.6	41 46.2	53 62	68.0	42 48.4	51 61	65.7	1
2	37 09.8	60 65	74.9	37 45.7	59 64	73.9	38 38.5	58 64	72.3	39 30.0	57 63	70.8	40 36.7	55 62	68.6	40 53.0	54 62	68.0	41 09.1	53 62	67.5	42 11.9	51 61	65.2	2
3	36 31.1	61 64	74.3	37 07.2	60 64	73.3	38 00.3	58 63	71.8	38 52.2	57 63	70.2	39 59.4	55 62	68.1	40 15.8	54 62	67.5	40 32.1	54 61	67.0	41 35.5	52 60	64.7	3
4	35 52.5	61 64	73.7	36 28.8	60 64	72.7	37 22.2	59 63	71.2	38 14.5	57 63	69.6	39 22.2	55 62	67.5	39 38.8	55 61	67.0	39 55.2	54 61	66.4	40 59.3	52 60	64.2	4
75	35 14.0	61 64	73.1	35 50.5	60 64	72.1	36 44.3	59 63	70.6	37 36.9	58 62	69.1	38 45.2	56 61	67.0	39 01.9	55 61	66.5	39 18.4	55 61	65.9	40 23.2	53 60	63.7	75
6	34 35.7	61 64	72.5	35 12.4	61 63	71.5	36 06.5	60 63	70.0	36 59.5	58 62	68.5	38 08.3	56 61	66.5	38 25.2	56 61	65.9	38 41.9	55 61	65.4	39 47.3	53 60	63.2	6
7	33 57.5	62 64	71.9	34 34.3	61 63	70.9	35 28.8	60 63	69.5	36 22.2	59 62	68.0	37 31.6	57 61	65.9	37 48.6	56 61	65.4	38 05.4	56 60	64.9	39 11.5	54 59	62.7	7
8	33 19.4	62 63	71.3	33 56.5	61 63	70.3	34 51.3	60 62	68.9	35 45.0	59 62	67.4	36 55.0	57 61	65.4	37 12.1	57 60	64.9	37 29.2	57 60	64.4	38 35.9	55 59	62.3	8
9	32 41.4	63 63	70.7	33 18.7	62 63	69.7	34 13.9	61 62	68.3	35 08.0	60 61	66.9	36 18.6	58 60	64.9	36 35.9	58 60	64.4	36 53.1	57 60	63.8	38 00.4	55 59	61.8	9
80	32 03.6	63 63	70.1	32 41.1	62 62	69.1	33 36.7	61 62	67.7	34 31.2	60 61	66.3	35 42.3	58 60	64.3	35 59.8	58 60	63.8	36 17.1	58 60	63.3	37 25.2	56 59	61.3	80
1	31 25.9	63 63	69.5	32 03.7	63 62	68.6	32 59.6	62 62	67.2	33 54.5	60 61	65.7	35 06.2	59 60	63.8	35 23.8	59 60	63.3	35 41.3	58 59	62.8	36 50.0	56 58	60.8	1
2	30 48.4	64 62	68.9	31 26.4	63 62	68.0	32 22.7	62 61	66.6	33 18.0	61 61	65.2	34 30.2	59 60	63.3	34 48.0	59 59	62.8	35 05.7	59 59	62.3	36 15.1	57 58	60.3	2
3	30 11.1	64 62	68.3	30 49.3	63 62	67.4	31 45.9	62 61	66.0	32 41.6	61 60	64.6	33 54.5	60 59	62.7	34 12.4	60 59	62.2	34 30.2	59 59	61.7	35 40.3	58 58	59.8	3
4	29 33.8	64 62	67.7	30 12.3	64 61	66.8	31 09.3	63 61	65.4	32 05.5	62 60	64.1	33 18.9	60 59	62.2	33 37.0	60 59	61.7	33 55.0	60 58	61.2	35 05.7	58 57	59.3	4
85	28 56.8	65 62	67.1	29 35.5	64 61	66.2	30 32.9	63 60	64.9	31 29.4	62 60	63.5	32 43.5	61 59	61.6	33 01.7	61 58	61.2	33 19.9	60 58	60.7	34 31.3	59 57	58.8	85
6	28 19.9	65 61	66.5	28 58.8	65 61	65.6	29 56.6	64 60	64.3	30 53.6	63 59	62.9	32 08.2	62 58	61.1	32 26.6	61 58	60.6	32 44.9	61 58	60.2	33 57.1	59 57	58.3	6
7	27 43.2	66 61	65.9	28 22.4	65 60	65.0	29 20.5	64 60	63.7	30 17.9	63 59	62.4	31 33.2	62 58	60.6	31 51.7	62 58	60.1	32 10.2	61 58	59.6	33 23.0	60 56	57.7	7
8	27 06.6	66 61	65.3	27 46.1	65 60	64.4	28 44.6	65 60	63.1	29 42.5	64 59	61.8	30 58.3	63 58	60.0	31 17.0	62 58	59.6	31 35.7	62 57	59.1	32 49.2	61 56	57.2	8
9	26 30.2	66 60	64.7	27 09.9	66 60	63.8	28 08.9	65 59	62.6	29 07.2	64 59	61.3	30 23.6	63 57	59.5	30 42.5	63 57	59.0	31 01.3	63 57	58.6	32 15.5	61 56	56.7	9
90	25 54.0	67 60	64.1	26 34.0	66 60	63.2	27 33.4	66 59	62.0	28 32.1	65 58	60.7	29 49.1	64 57	58.9	30 08.2	63 57	58.5	30 27.1	63 57	58.0	31 42.0	62 55	56.2	90

DECLINATION CONTRARY NAME TO LATITUDE

Lat. 48°

H.A.	36° 00′ Alt.	Az.	37° 00′ Alt.	Az.	38° 30′ Alt.	Az.	40° 00′ Alt.	Az.	42° 00′ Alt.	Az.	42° 30′ Alt.	Az.	43° 00′ Alt.	Az.	45° 00′ Alt.	Az.	H.A.
°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	°
00	6 00.0 1.0 00	180.0	5 00.0 1.0 00	180.0													00
1	5 59.7 1.0 01	179.2															1
2	5 58.9 1.0 02	178.4															2
3	5 57.4 1.0 03	177.6															3
4	5 55.4 1.0 04	176.7															4
05	5 52.9 1.0 05	175.9															05
6	5 49.8 1.0 06	175.1															6
7	5 46.1 1.0 07	174.3															7
8	5 41.8 1.0 08	173.5															8
9	5 37.0 99 09	172.7															9
10	5 31.6 99 10	171.9															10
1	5 25.6 99 11	171.1															1
2	5 19.1 99 12	170.3															2
3	5 12.1 99 13	169.5															3
4	5 04.5 99 14	168.7															4

DECLINATION SAME NAME AS LATITUDE

H.A.	36° 00′ Alt.	Az.	37° 00′ Alt.	Az.	38° 30′ Alt.	Az.	40° 00′ Alt.	Az.	42° 00′ Alt.	Az.	42° 30′ Alt.	Az.	43° 00′ Alt.	Az.	45° 00′ Alt.	Az.	H.A.
°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	°
91	25 18.0 67 60	63.5	25 58.2 67 59	62.6	26 58.0 66 59	61.4	27 57.1 65 58	60.1	29 14.8 64 57	58.4	29 34.1 64 57	57.9	29 53.2 64 56	57.5	31 08.8 62 55	55.7	91
2	24 42.2 68 59	62.9	25 22.7 67 59	62.1	26 22.9 67 58	60.8	27 22.4 66 58	59.6	28 40.8 65 56	57.8	29 00.1 64 56	57.4	29 19.4 64 56	57.0	30 35.7 63 55	55.2	2
3	24 06.6 68 59	62.3	24 47.3 68 59	61.5	25 47.9 67 58	60.2	26 47.9 66 57	59.0	28 06.9 65 56	57.3	28 26.4 65 56	56.9	28 45.9 65 56	56.4	30 02.9 64 54	54.7	3
4	23 31.1 69 59	61.7	24 12.1 68 58	60.9	25 13.2 67 58	59.7	26 13.6 67 57	58.4	27 33.2 66 56	56.7	27 52.9 66 56	56.3	28 12.5 65 55	55.9	29 30.2 64 54	54.1	4
95	22 55.9 69 58	61.1	23 37.2 69 58	60.3	24 38.6 68 57	59.1	25 39.5 67 56	57.8	26 59.7 66 55	56.2	27 19.6 66 55	55.8	27 39.4 66 55	55.3	28 57.8 65 54	53.6	95
6	22 20.9 69 58	60.4	23 02.4 69 58	59.7	24 04.3 68 57	58.5	25 05.6 68 56	57.3	26 26.5 67 55	55.6	26 46.5 67 55	55.2	27 06.5 66 54	54.8	28 25.6 65 53	53.1	6
7	21 46.0 70 58	59.8	22 27.9 70 57	59.1	23 30.2 69 56	57.9	24 32.0 68 56	56.7	25 53.5 67 55	55.1	26 13.7 67 54	54.7	26 33.8 67 54	54.3	27 53.6 66 53	52.6	7
8	21 11.4 70 57	59.2	21 53.5 70 57	58.5	22 56.3 69 56	57.3	23 58.5 69 55	56.1	25 20.7 68 54	54.5	25 41.0 68 54	54.1	26 01.3 68 54	53.7	27 21.8 67 53	52.0	8
9	20 37.0 71 57	58.6	21 19.4 70 56	57.9	22 22.6 70 56	56.7	23 25.3 69 55	55.5	24 48.1 69 54	54.0	25 08.6 68 54	53.6	25 29.1 68 53	53.2	26 50.3 67 52	51.5	9
100	20 02.9 71 57	58.0	20 45.5 71 56	57.3	21 49.2 70 55	56.1	22 52.3 70 55	55.0	24 15.7 69 54	53.4	24 36.4 69 53	53.0	24 57.1 69 53	52.6	26 19.0 68 52	51.0	100
1	19 28.9 72 56	57.4	20 11.9 71 56	56.7	21 16.0 71 55	55.5	22 19.6 70 54	54.4	23 43.6 70 53	52.8	24 04.5 69 53	52.4	24 25.3 69 53	52.0	25 47.9 68 51	50.4	1
2	18 55.2 72 56	56.8	19 38.5 72 55	56.0	20 43.0 71 55	54.9	21 47.1 71 54	53.8	23 11.7 70 53	52.3	23 32.8 70 52	51.9	23 53.8 70 52	51.5	25 17.1 69 51	49.9	2
3	18 21.8 73 55	56.2	19 05.3 72 55	55.4	20 10.2 72 54	54.3	21 14.8 71 53	53.2	22 40.1 71 52	51.7	23 01.3 71 52	51.3	23 22.5 70 52	50.9	24 46.5 70 51	49.4	3
4	17 48.6 73 55	55.5	18 32.4 73 54	54.8	19 37.8 72 54	53.7	20 42.8 72 53	52.6	22 08.7 71 52	51.1	22 30.1 71 52	50.7	22 51.4 71 51	50.4	24 16.1 70 50	48.8	4
105	17 15.6 74 55	54.9	17 59.7 73 54	54.2	19 05.5 73 53	53.1	20 11.0 73 53	52.0	21 37.6 72 51	50.5	21 59.1 72 51	50.2	22 20.6 72 51	49.8	23 46.0 71 50	48.3	105
6	16 42.8 74 54	54.3	17 27.2 74 54	53.6	18 33.5 73 53	52.5	19 39.5 73 52	51.4	21 06.7 72 51	50.0	21 28.4 72 51	49.6	21 50.1 72 50	49.2	23 16.2 71 49	47.7	6
7	16 10.4 75 54	53.7	16 55.1 74 53	53.0	18 01.8 74 52	51.9	19 08.2 74 52	50.8	20 36.1 73 51	49.4	20 58.0 73 50	49.0	21 19.8 73 50	48.7	22 46.6 72 49	47.2	7
8	15 38.2 75 53	53.0	16 23.1 75 53	52.3	17 30.3 74 52	51.3	18 37.2 74 51	50.2	20 05.8 74 50	48.8	20 27.8 73 50	48.5	20 49.8 73 50	48.1	22 17.3 73 48	46.6	8
9	15 06.2 76 53	52.4	15 51.5 75 52	51.7	16 59.1 75 52	50.7	18 06.5 75 51	49.6	19 35.7 74 50	48.2	19 57.9 74 49	47.9	20 20.1 74 49	47.5	21 48.3 73 48	46.1	9
110	14 34.5 76 52	51.8	15 20.1 76 52	51.1	16 28.2 76 51	50.1	17 36.0 75 50	49.0	19 05.9 75 49	47.6	19 28.3 75 49	47.3	19 50.6 74 49	46.9	21 19.5 74 48	45.5	110
1	14 03.2 77 52	51.1	14 49.0 76 51	50.5	15 57.6 76 51	49.5	17 05.8 76 50	48.4	18 36.4 75 49	47.1	18 58.9 75 48	46.7	19 21.4 75 48	46.4	20 51.0 74 47	44.9	1
2	13 32.0 77 51	50.5	14 18.2 77 51	49.8	15 27.2 77 50	48.8	16 35.9 76 49	47.8	18 07.1 76 48	46.5	18 29.8 76 48	46.1	18 52.5 76 48	45.8	20 22.8 75 47	44.4	2
3	13 01.2 77 51	49.8	13 47.6 77 50	49.2	14 57.1 77 50	48.2	16 06.3 77 49	47.2	17 38.1 76 48	45.9	18 01.0 76 48	45.5	18 23.9 76 47	45.2	19 54.8 76 46	43.8	3
4	12 30.7 78 50	49.2	13 17.4 78 50	48.6	14 27.3 78 49	47.6	15 37.0 77 48	46.6	17 09.5 77 47	45.3	17 32.5 77 47	44.9	17 55.5 77 47	44.6	19 27.2 76 46	43.2	4
115	12 00.4 78 50	48.6	12 47.4 78 49	47.9	13 57.8 78 49	47.0	15 08.0 78 48	46.0	16 41.1 77 47	44.7	17 04.3 77 47	44.3	17 27.5 77 46	44.0	18 59.8 77 45	42.7	115
6	11 30.5 79 49	47.9	12 17.8 79 49	47.3	13 28.6 79 48	46.3	14 39.2 78 47	45.4	16 13.0 78 46	44.1	16 36.4 78 46	43.7	16 59.7 78 46	43.4	18 32.8 77 45	42.1	6
7	11 00.8 79 49	47.3	11 48.5 79 48	46.6	12 59.7 79 48	45.7	14 10.8 79 47	44.7	15 45.2 78 46	43.5	16 08.8 78 46	43.1	16 32.3 78 45	42.8	18 06.0 78 44	41.5	7
8	10 31.5 80 48	46.6	11 19.4 80 48	46.0	12 31.2 80 47	45.1	13 42.7 79 46	44.1	15 17.8 79 45	42.9	15 41.5 79 45	42.5	16 05.2 79 45	42.2	17 39.5 78 44	40.9	8
9	10 02.5 80 48	45.9	10 50.7 80 47	45.3	12 02.9 80 47	44.4	13 14.9 80 46	43.5	14 50.6 80 45	42.3	15 14.5 79 44	41.9	15 38.3 79 44	41.6	17 13.4 79 43	40.4	9
120	9 33.8 81 47	45.3	10 22.3 81 47	44.7	11 35.0 81 46	43.8	12 47.4 80 45	42.9	14 23.8 80 44	41.6	14 47.8 80 44	41.3	15 11.8 80 44	41.0	16 47.6 80 43	39.8	120
1	9 05.4 81 47	44.6	9 54.3 81 46	44.0	11 07.4 81 45	43.1	12 20.3 81 45	42.2	13 57.3 81 44	41.0	14 21.5 81 43	40.7	14 45.6 81 43	40.4	16 22.0 80 42	39.2	1
2	8 37.4 82 46	43.9	9 26.5 82 46	43.4	10 40.1 82 45	42.5	11 53.5 81 44	41.6	13 31.1 81 43	40.4	13 55.4 81 43	40.1	14 19.8 81 43	39.8	15 56.8 81 41	38.6	2
3	8 09.7 82 46	43.3	8 59.1 82 45	42.7	10 13.1 82 44	41.8	11 27.0 82 44	41.0	13 05.2 82 43	39.8	13 29.7 82 42	39.5	13 54.2 82 42	39.2	15 32.0 81 41	38.0	3
4	7 42.4 83 45	42.6	8 32.1 83 44	42.0	9 46.5 83 44	41.2	11 00.8 82 43	40.3	12 39.7 82 42	39.2	13 04.4 82 42	38.9	13 29.0 82 41	38.6	15 07.4 82 40	37.4	4
125	7 15.4 83 44	41.9	8 05.4 83 44	41.4	9 20.3 83 43	40.5	10 35.0 83 42	39.7	12 14.5 83 41	38.5	12 39.4 83 41	38.2	13 04.2 83 41	38.0	14 43.2 82 40	36.8	125
6	6 48.7 84 44	41.2	7 39.0 84 43	40.7	8 54.4 84 43	39.9	10 09.6 84 42	39.0	11 49.7 83 41	37.9	12 14.7 83 41	37.6	12 39.6 83 40	37.3	14 19.3 83 39	36.2	6
7	6 22.5 84 43	40.6	7 13.0 84 43	40.0	8 28.8 84 42	39.2	9 44.5 84 41	38.4	11 25.2 84 40	37.3	11 50.4 84 40	37.0	12 15.5 84 40	36.7	13 55.8 83 39	35.6	7
8	5 56.5 85 43	39.9	6 47.4 85 42	39.3	8 03.6 85 41	38.5	9 19.8 85 41	37.7	11 01.1 84 40	36.6	11 26.4 84 39	36.4	11 51.7 84 39	36.1	13 32.6 84 38	35.0	8
9	5 31.0 85 42	39.2	6 22.1 85 41	38.6	7 38.8 85 41	37.9	8 55.4 85 40	37.1	10 37.3 85 39	36.0	11 02.8 85 39	35.7	11 28.2 85 38	35.4	13 09.8 85 37	34.4	9
130	5 05.8 86 42	38.5	5 57.3 86 41	38.0	7 14.4 86 40	37.2	8 31.4 86 39	36.4	10 13.9 85 38	35.3	10 39.5 85 38	35.1	11 05.1 85 38	34.8	12 47.3 85 37	33.7	130
1			5 32.8 86 40	37.3	6 50.3 86 40	36.5	8 07.7 86 39	35.7	9 50.9 86 38	34.7	10 16.6 86 38	34.4	10 42.4 86 37	34.2	12 25.2 86 36	33.1	1
2			5 08.6 87 40	36.6	6 26.6 87 39	35.8	7 44.5 87 38	35.1	9 28.2 86 37	34.0	9 54.1 86 37	33.8	10 20.0 86 37	33.5	12 03.4 86 36	32.5	2
3					6 03.3 87 38	35.1	7 21.6 87 37	34.4	9 05.9 87 36	33.4	9 32.0 87 36	33.1	9 58.0 87 36	32.9	11 42.0 87 35	31.9	3
4					5 40.4 88 38	34.5	6 59.1 87 37	33.7	8 44.0 87 36	32.7	9 10.2 87 36	32.5	9 36.4 87 35	32.2	11 21.0 87 34	31.3	4
135					5 17.9 88 37	33.8	6 37.0 88 36	33.0	8 22.5 88 35	32.1	8 48.8 88 35	31.8	9 15.2 88 35	31.6	11 00.4 88 34	30.6	135
6							6 15.3 88 36	32.4	8 01.3 88 35	31.4	8 27.8 88 34	31.2	8 54.3 88 34	30.9	10 40.1 88 33	30.0	6
7							5 54.0 89 35	31.7	7 40.6 89 34	30.8	8 07.2 89 34	30.5	8 33.9 89 33	30.3	10 20.2 89 32	29.4	7
8							5 33.2 89 34	31.0	7 20.3 89 33	30.1	7 47.1 89 33	29.9	8 13.8 89 33	29.6	10 00.8 89 32	28.7	8
9							5 12.7 90 34	30.3	7 00.4 90 33	29.4	7 27.3 90 32	29.2	7 54.2 90 32	29.0	9 41.7 90 31	28.1	9
140									6 40.8 90 32	28.7	7 07.9 90 32	28.5	7 34.9 90 31	28.3	9 23.0 90 30	27.4	140
1									6 21.7 91 31	28.1	6 48.9 91 31	27.9	7 16.1 91 31	27.6	9 04.7 90 30	26.8	1
2									6 03.1 91 30	27.4	6 30.4 91 30	27.2	6 57.7 91 30	27.0	8 46.8 91 29	26.1	2
3									5 44.8 91 30	26.7	6 12.2 91 30	26.5	6 39.7 91 29	26.3	8 29.3 91 28	25.5	3
4									5 27.0 92 29	26.0	5 54.5 92 29	25.8	6 22.1 92 29	25.6	8 12.2 92 28	24.8	4
145									5 09.6 92 28	25.3	5 37.3 92 28	25.1	6 04.9 92 28	25.0	7 55.6 92 27	24.2	145
6											5 20.4 93 27	24.5	5 48.2 93 27	24.3	7 39.4 93 26	23.5	6
7											5 04.0 93 27	23.8	5 31.9 93 26	23.6	7 23.6 93 26	22.9	7
8													5 16.1 93 26	22.9	7 08.2 93 25	22.2	8
9													5 00.7 94 25	22.2	6 53.2 94 24	21.5	9
150															6 38.7 94 23	20.9	150
1															6 24.7 95 23	20.2	1
2															6 11.0 95 22	19.5	2
3															5 57.8 95 21	18.8	3
4															5 45.1 96 20	18.2	4
155															5 32.8 96 20	17.5	155
6															5 21.0 96 19	16.8	6
7															5 09.6 96 18	16.1	7

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Lat. 48°

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	
00	88 00.0	1.0 11	180.0	89 00.0	1.0 21	180.0	89 30.0	1.0 33	00.0	88 30.0	1.0 14	00.0	87 30.0	1.0 08	00.0	86 30.0	1.0 06	00.0	85 30.0	1.0 04	00.0	84 00.0	1.0 03	00.0	00
1	87 53.2	95 31	160.8	88 47.6	83 47	145.6	89 10.1	60 59	52.7	88 21.7	91 36	23.4	87 25.0	97 24	14.3	86 26.5	98 17	10.1	85 27.3	99 13	07.7	83 58.0	99 10	05.6	1
2	87 34.8	83 44	145.0	88 19.2	61 58	125.8	88 34.7	34 64	68.7	88 00.2	74 49	40.6	87 10.8	88 35	26.8	86 16.2	93 27	19.5	85 19.3	96 21	15.1	83 52.2	98 16	11.1	2
3	87 08.4	71 52	133.2	87 44.4	46 62	115.1	87 56.5	22 65	74.8	87 31.1	59 55	51.7	86 49.5	77 44	36.9	86 00.0	86 35	27.8	85 06.6	91 28	21.9	83 42.7	95 22	16.3	3
4	86 37.1	61 57	124.8	87 07.1	37 64	108.8	87 17.4	16 66	77.9	86 58.0	47 59	58.9	86 23.2	67 50	44.7	85 39.0	79 41	34.9	84 49.6	86 34	28.1	83 29.8	91 27	21.2	4
05	86 02.9	53 60	118.5	86 28.7	31 65	104.6	86 38.0	12 66	79.6	86 22.7	38 61	63.7	85 53.4	58 53	50.7	85 14.4	71 46	40.8	84 29.0	80 39	33.5	83 13.7	87 31	25.8	05
6	85 26.8	47 62	113.8	85 49.6	28 66	101.6	85 58.5	09 66	80.6	85 46.2	32 62	67.0	85 21.3	50 56	55.2	84 46.8	64 49	45.7	84 05.4	73 43	38.2	82 55.0	82 35	29.9	6
7	84 49.6	43 63	110.1	85 10.1	25 66	99.3	85 18.8	06 66	81.3	85 08.9	26 63	69.4	84 47.7	44 58	58.7	84 17.1	57 52	49.6	83 39.5	67 46	42.2	82 33.8	78 30	33.6	7
8	84 11.5	39 64	107.2	84 30.4	23 66	97.5	84 39.1	04 66	81.7	84 31.2	22 64	71.1	84 12.9	38 59	61.4	83 45.8	52 54	52.9	83 11.6	62 49	45.6	82 10.6	73 42	36.9	8
9	83 32.9	36 65	104.7	83 50.5	22 67	96.0	83 59.4	02 66	81.9	83 53.0	19 64	72.5	83 37.2	34 60	63.6	83 13.2	46 56	55.6	82 42.2	57 51	48.6	81 45.7	68 44	39.9	9
10	82 53.9	34 66	102.6	83 10.5	21 67	94.7	83 19.6	01 66	82.0	83 14.6	16 64	73.5	83 01.0	29 61	65.3	82 39.6	42 57	57.8	82 11.5	52 53	51.1	81 19.2	64 46	42.6	10
1	82 14.6	32 66	100.9	82 30.5	20 67	93.6	82 39.9	00 66	82.0	82 36.0	13 64	74.2	82 24.3	26 62	66.7	82 05.3	37 58	59.7	81 39.8	47 54	53.2	80 51.4	60 48	44.9	1
2	81 35.1	31 66	99.3	81 50.4	20 67	92.6	82 00.1	02 66	81.9	81 57.4	11 65	74.8	81 47.3	23 62	67.8	81 30.4	34 59	61.2	81 07.2	43 55	55.1	80 22.6	55 50	47.0	2
3	80 55.4	30 66	97.9	81 10.3	20 67	91.7	81 20.4	03 66	81.8	81 18.6	09 65	75.2	81 10.0	20 62	68.7	80 55.0	30 60	62.5	80 34.0	40 56	56.7	79 52.8	52 51	48.8	3
4	80 15.6	29 67	96.6	80 30.1	19 67	90.8	80 40.6	04 66	81.7	80 39.7	07 65	75.5	80 32.5	17 63	69.5	80 19.2	27 60	63.6	80 00.2	36 57	58.0	79 22.2	48 52	50.4	4
15	79 35.6	28 67	95.5	79 50.0	19 67	90.1	80 00.9	05 66	81.5	80 00.8	05 65	75.8	79 54.8	15 63	70.1	79 43.1	24 61	64.5	79 25.9	33 58	59.2	78 50.9	45 53	51.9	15
6	78 55.6	28 67	94.5	79 09.8	19 67	89.3	79 21.2	06 66	81.3	79 21.9	04 65	75.9	79 17.0	13 63	70.5	79 06.7	22 61	65.3	78 51.2	30 58	60.2	78 19.1	41 54	53.1	6
7	78 15.6	27 67	93.5	78 29.7	19 67	88.7	78 41.5	07 66	81.1	78 43.0	02 65	76.0	78 39.1	11 63	70.9	78 30.2	19 61	65.9	78 16.2	27 59	61.1	77 46.7	38 55	54.3	7
8	77 35.5	27 67	92.6	77 49.6	20 67	88.0	78 01.9	08 66	80.9	78 04.0	01 65	76.1	78 01.2	09 63	71.2	77 53.4	17 61	66.5	77 41.0	25 59	61.9	77 13.9	35 55	55.3	8
9	76 55.4	27 67	91.7	77 09.5	20 67	87.4	77 22.3	08 66	80.6	77 25.0	01 65	76.1	77 23.1	07 63	71.5	77 16.5	15 62	66.9	77 05.4	22 60	62.5	76 40.7	33 56	56.2	9
20	76 15.2	27 67	90.9	76 29.4	20 67	86.8	76 42.7	09 66	80.4	76 46.1	02 65	76.0	76 45.0	05 64	71.7	76 39.5	13 62	67.3	76 29.7	20 60	63.1	76 07.2	30 56	56.9	20
1	75 35.1	27 67	90.1	75 49.3	20 67	86.2	76 03.1	10 66	80.1	76 07.1	03 65	76.0	76 06.9	04 64	71.8	76 02.5	11 62	67.6	75 53.9	18 60	63.6	75 33.5	28 57	57.6	1
2	74 55.0	27 67	89.4	75 09.2	21 67	85.6	75 23.6	11 66	79.8	75 28.2	04 65	75.9	75 28.7	02 64	71.9	75 25.3	09 62	67.9	75 17.8	16 60	64.0	74 59.4	25 57	58.2	2
3	74 14.8	27 67	88.7	74 29.2	21 67	85.1	74 44.1	12 66	79.5	74 49.2	05 65	75.7	74 50.6	01 64	71.9	74 48.1	07 62	68.1	74 41.7	14 60	64.3	74 25.2	23 57	58.8	3
4	73 34.7	27 67	88.0	73 49.2	21 67	84.6	74 04.6	13 66	79.2	74 10.4	07 65	75.6	74 12.4	00 64	71.9	74 10.8	06 62	68.2	74 05.5	12 61	64.6	73 50.8	21 58	59.2	4
25	72 54.6	27 67	87.4	73 09.3	22 67	84.1	73 25.2	13 66	78.9	73 31.5	08 65	75.4	73 34.3	02 64	71.9	73 33.5	04 62	68.4	73 29.2	10 61	64.8	73 16.2	19 58	59.6	25
6	72 14.5	27 67	86.7	72 29.4	22 66	83.5	72 45.8	14 66	78.6	72 52.6	09 65	75.2	72 56.1	03 64	71.8	72 56.2	03 62	68.4	72 52.8	08 61	65.0	72 41.5	17 58	60.0	6
7	71 34.4	28 67	86.1	71 49.5	23 66	83.0	72 06.5	15 65	78.3	72 13.8	10 65	75.0	72 18.0	04 64	71.8	72 18.8	01 62	68.5	72 16.4	07 61	65.2	72 06.7	15 58	60.3	7
8	70 54.4	28 67	85.5	71 09.7	23 66	82.5	71 27.2	16 65	78.0	71 35.1	11 65	74.8	71 39.8	05 64	71.7	71 41.5	00 62	68.5	71 39.9	05 61	65.3	71 31.7	13 58	60.6	8
9	70 14.3	28 67	84.9	70 29.9	24 66	82.1	70 47.9	16 65	77.6	70 56.3	12 64	74.6	71 01.8	06 63	71.5	71 04.1	01 62	68.5	71 03.4	04 61	65.4	70 56.7	11 58	60.8	9
30	69 34.4	28 67	84.4	69 50.2	24 66	81.6	70 08.8	17 65	77.3	70 17.7	12 64	74.4	70 23.7	08 63	71.4	70 26.8	03 62	68.4	70 26.9	02 61	65.4	70 21.7	10 59	61.0	30
1	68 54.4	29 66	83.8	69 10.5	25 66	81.1	69 29.6	18 65	77.0	69 39.0	13 64	74.1	69 45.6	09 63	71.3	69 49.5	04 62	68.4	69 50.4	01 61	65.5	69 46.5	08 59	61.1	1
2	68 14.5	29 66	83.3	68 30.8	25 66	80.6	68 50.5	19 65	76.6	69 00.4	14 64	73.9	69 07.6	10 63	71.1	69 12.1	05 62	68.3	69 13.9	01 61	65.5	69 11.4	06 59	61.2	2
3	67 34.7	30 66	82.7	67 51.2	26 66	80.2	68 11.5	19 65	76.3	68 21.9	15 64	73.6	68 29.7	11 63	70.9	68 34.9	06 62	68.2	68 37.4	02 61	65.5	68 36.1	05 59	61.3	3
4	66 54.9	30 66	82.2	67 11.7	26 66	79.7	67 32.5	20 65	75.9	67 43.4	16 64	73.3	67 51.8	12 63	70.7	67 57.6	08 62	68.1	68 00.9	03 61	65.4	68 00.9	03 59	61.4	4
35	66 15.2	30 66	81.7	66 32.2	27 66	79.3	66 53.6	21 65	75.6	67 05.0	17 64	73.1	67 13.9	13 63	70.5	67 20.4	09 62	67.9	67 24.4	05 61	65.3	67 25.6	02 59	61.4	35
6	65 35.5	31 66	81.1	65 52.8	27 66	78.8	66 14.8	22 65	75.2	66 26.6	18 64	72.8	66 36.1	14 63	70.3	66 43.2	10 62	67.8	66 47.9	06 61	65.3	66 50.4	00 59	61.5	6
7	64 55.8	31 66	80.6	65 13.5	28 66	78.4	65 36.0	22 65	74.9	65 48.3	19 64	72.5	65 58.3	15 63	70.1	66 06.0	11 62	67.6	66 11.4	07 61	65.2	66 15.1	01 59	61.4	7
8	64 16.2	32 66	80.1	64 34.2	28 65	77.9	64 57.3	23 64	74.5	65 10.0	19 64	72.2	65 20.6	16 63	69.8	65 28.9	12 62	67.5	65 35.0	08 61	65.1	65 39.8	02 59	61.4	8
9	63 36.7	32 66	79.6	63 55.0	29 65	77.5	64 18.6	24 64	74.1	64 31.8	20 64	71.9	64 42.9	17 63	69.6	64 51.9	13 62	67.3	64 58.6	09 61	64.9	65 04.6	04 59	61.4	9
40	62 57.3	32 66	79.1	63 15.8	29 65	77.0	63 40.0	24 64	73.8	63 53.7	21 63	71.6	64 05.3	18 63	69.3	64 14.9	14 62	67.1	64 22.3	11 60	64.8	64 29.4	05 59	61.3	40
1	62 17.9	33 66	78.6	62 36.7	30 65	76.6	63 01.5	25 64	73.4	63 15.6	22 63	71.3	63 27.8	19 62	69.1	63 37.9	15 62	66.9	63 46.0	12 60	64.6	63 54.2	06 59	61.2	1
2	61 38.5	33 65	78.1	61 57.7	30 65	76.1	62 23.1	26 64	73.0	62 37.7	23 63	70.9	62 50.3	20 62	68.8	63 01.0	16 61	66.6	63 09.7	13 60	64.5	63 19.0	08 59	61.1	2
3	60 59.3	34 65	77.6	61 18.8	31 65	75.7	61 44.7	27 64	72.7	61 59.7	24 63	70.6	62 12.9	20 62	68.5	62 24.2	17 61	66.4	62 33.5	14 60	64.3	62 43.8	09 58	61.0	3
4	60 20.1	34 65	77.2	60 39.9	32 65	75.2	61 06.4	27 64	72.3	61 21.9	24 63	70.3	61 35.6	21 62	68.2	61 47.4	18 61	66.2	61 57.4	15 60	64.1	62 08.7	10 58	60.9	4
45	59 41.0	35 65	76.7	60 01.1	32 64	74.8	60 28.2	28 64	71.9	60 44.2	25 63	70.0	60 58.4	22 62	68.0	61 10.8	19 61	65.9	61 21.3	16 60	63.9	61 33.7	11 58	60.8	45
6	59 02.0	35 65	76.2	59 22.4	33 64	74.4	59 50.1	29 63	71.5	60 06.5	26 63	69.6	60 21.2	23 62	67.7	60 34.1	20 61	65.7	60 45.3	17 60	63.7	60 58.7	13 58	60.6	6
7	58 23.0	36 65	75.7	58 43.8	33 64	73.9	59 12.0	29 63	71.2	59 28.9	27 62	69.3	59 44.1	24 62	67.4	59 57.6	21 61	65.4	60 09.4	18 60	63.5	60 23.7	14 58	60.5	7
8	57 44.2	36 65	75.3	58 05.3	34 64	73.5	58 34.1	30 63	70.8	58 51.4	27 62	68.9	59 07.1	25 62	67.1	59 21.1	22 61	65.2	59 33.5	19 60	63.2	59 48.8	15 58	60.3	8
9	57 05.4	37 64	74.8	57 26.8	35 64	73.1	57 56.2	31 63	70.4	58 14.0	28 62	68.6	58 30.1	26 61	66.8	58 44.7	23 61	64.9	58 57.7	20 60	63.0	59 13.9	16 58	60.1	9
50	56 26.7	37 64	74.3	56 48.4	35 64	72.6	57 18.4	32 63	70.0	57 36.6	29 62	68.2	57 53.3	26 61	66.4	58 08.4	24 60	64.6	58 21.9	21 59	62.8	58 39.2	17 58	59.9	50
1	55 48.1	38 64	73.8	56 10.2	36 64	72.2	56 40.8	32 63	69.6	56 59.4	30 62	67.9	57 16.5	27 61	66.1	57 32.2	25 60	64.3	57 46.3	22 59	62.5	58 04.4	18 58	59.7	1
2	55 09.6	38 64	73.4	55 32.0	36 63	71.7	56 03.2	33 62	69.2	56 22.2	31 62	67.5	56 39.9	28 61	65.8	56 56.9	26 60	64.0	57 10.7	23 59	62.3	57 29.8	19 58	59.5	2
3	54 31.1	39 64	72.9	54 53.9	37 63	71.3	55 25.7	34 62	68.8	55 45.2	31 62	67.2	56 03.3	29 61	65.5	56 20.0	27 60	63.7	56 35.2	24 59	62.0	56 55.2	20 58	59.3	3
4	53 52.8	40 64	72.4	54 15.9	38 63	70.9	54 48.3	34 62	68.4	55 08.2	32 61	66.8	55 26.8	30 61	65.1	55 44.0	28 60	63.4	55 59.8	25 59	61.7	56 20.7	21 57	59.1	4
55	53 14.6	40 64	72.0	53 38.1	38 63	70.4	54 11.0	35 62	68.1	54 31.4	33 61	66.4	54 50.4	31 60	64.8	55 08.2	28 60	63.1	55 24.5	26 59	61.4	55 46.3	22 57	58.9	55
6	52 36.5	41 63	71.5	53 00.3	39 63	70.0	53 33.8	36 62	67.7	53 54.6	34 61	66.1	54 14.2	31 60	64.5	54 32.4	29 59	62.8	54 49.3	27 59	61.2	55 12.0	23 57	58.6	6
7	51 58.4	41 63	71.0	52 22.6	39 63	69.5	52 56.7	36 62	67.3	53 18.0	34 61	65.7	53 38.0	32 60	64.1	53 56.7	30 59	62.5	54 14.2	28 58	60.9	54 37.8	25 57	58.4	7
8	51 20.5	42 63	70.6	51 45.1	40 62	69.1	52 19.8	37 61	66.9	52 41.4	35 61	65.3	53 01.9	33 60	63.8	53 21.2	31 59	62.2	53 39.1	29 58	60.6	54 03.6	26 57	58.1	8
9	50 42.7	42 63	70.1	51 07.6	41 62	68.7	51 42.9	38 61	66.5	52 05.0	36 60	64.9	52 26.0	34 60	63.4	52 45.7	32 59	61.9	53 04.2	30 58	60.3	53 29.6	27 57	57.9	9
60	50 05.0	43 63	69.6	50 30.3	41 62	68.2	51 06.2	39 61	66.0	51 28.7	37 60	64.6	51 50.1	35 60	63.1	52 10.4	33 59	61.5	52 29.4	31 58	60.0	52 55.6	28 56	57.6	60
1	49 27.4	44 62	69.2	49 53.0	42 62	67.8	50 29.5	39 61	65.6	50 52.5	37 60	64.2	51 14.4	36 59	62.7	51 35.1	34 59	61.2	51 54.7	32 58	59.7	52 21.8	29 56	57.3	1
2	48 50.0	44 62	68.7	49 15.9	42 62	67.3	49 53.0	40 61	65.2	50 16.4	38 60	63.8	50 38.8	36 59	62.3	51 00.0	34 58	60.9	51 20.1	33 57	59.4	51 48.0	30 56	57.1	2
3	48 12.6	45 62	68.2	48 39.0	43 61	66.9	49 16.6	41 60	64.8	49 40.5	39 60	63.4	50 03.3	37 59	62.0	50 25.0	35 58	60.5	50 45.6	33 57	59.0	51 14.4	31 56	56.8	3
4	47 35.4	45 62	67.8	48 02.1	44 61	66.4	48 40.4	41 60	64.4	49 04.6	40 60	63.0	49 27.9	38 59	61.6	49 50.1	36 58	60.2	50 11.2	34 57	58.7	50 40.9	31 56	56.5	4
65	46 58.3	46 62	67.3	47 25.3	44 61	66.0	48 04.2	42 60	64.0	48 28.9	40 59	62.6	48 52.6	39 59	61.2	49 15.3	37 58	59.8	49 37.0	35 57	58.4	50 07.4	32 56	56.2	65
6	46 21.3	46 61	66.8	46 48.7	45 61	65.6	47 28.2	43 60	63.6	47 53.3	41 59	62.2	48 17.5	39 58	60.9	48 40.7	38 58	59.5	49 02.9	36 57	58.0	49 34.1	33 55	55.9	6
7	45 44.5	47 61	66.4	46 12.2	46 61	65.1	46 52.3	43 60	63.2	47 17.9	42 59	61.8	47 42.5	40 58	60.5	48 06.2	39 57	59.1	48 28.9	37 56	57.7	49 01.0	34 55	55.6	7
8	45 07.7	48 61	65.9	45 35.9	46 60	64.7	46 16.5	44 59	62.7	46 42.6	43 59	61.4	47 07.6	41 58	60.1	47 31.8	39 57	58.7	47 55.0	38 56	57.4	48 27.9	35 55	55.3	8
9	44 31.2	48 61	65.4	44 59.7	47 60	64.2	45 40.9	45 59	62.3	46 07.4	43 58	61.0	46 32.9	42 58	59.7	46 57.5	40 57	58.4	47 21.2	39 56	57.0	47 55.0	36 55	55.0	9
70	43 54.7	49 61	65.0	44 23.6	48 60	63.8	45 05.5	45 59	61.9	45 32.3	44 58	60.6	45 58.3	43 57	59.3	46 23.4	41 57	58.0	46 47.6	40 56	56.7	47 22.2	37 54	54.6	70
1	43 18.4	49 60	64.5	43 47.7	48 60	63.3	44 30.1	46 59	61.5	44 57.4	45 58	60.2	45 23.9	43 57	58.9	45 49.4	42 56	57.6	46 14.2	40 56	56.3	46 49.5	38 54	54.3	1
2	42 42.2	50 60	64.0	43 11.9	49 59	62.8	43 54.9	47 58	61.0	44 22.6	46 58	59.8	44 49.5	44 57	58.5	45 15.6	43 56	57.3	45 40.8	41 55	56.0	46 16.9	39 54	54.0	2
3	42 06.2	51 60	63.6	42 36.2	49 59	62.4	43 19.9	48 58	60.6	43 48.0	46 57	59.4	44 15.4	45 57	58.1	44 41.9	44 56	56.9	45 07.6	42 55	55.6	45 44.5	40 54	53.7	3
4	41 30.3	51 60	63.1	42 00.7	50 59	61.9	42 45.0	48 58	60.2	43 13.5	47 57	59.0	43 41.3	46 56	57.7	44 08.4	44 56	56.5	44 34.6	43 55	55.2	45 12.3	41 54	53.3	4
75	40 54.6	52 59	62.6	41 25.4	51 59	61.5	42 10.2	49 58	59.7	42 39.2	48 57	58.5	43 07.5	46 56	57.3	43 35.9	45 55	56.1	44 01.7	44 55	54.9	44 40.1	42 53	53.0	75
6	40 19.1	52 59	62.1	40 50.2	51 58	61.0	41 35.6	50 57	59.3	42 05.1	48 57	58.1	42 33.8	47 56	56.9	43 01.7	46 55	55.7	43 28.9	45 54	54.5	44 08.2	43 53	52.6	6
7	39 43.6	53 59	61.6	40 15.2	52 58	60.5	41 01.2	50 57	58.8	41 31.0	49 56	57.7	42 00.2	48 56	56.5	42 28.6	47 55	55.3	42 56.3	45 54	54.1	43 36.3	43 53	52.3	7
8	39 08.4	54 58	61.2	39 40.3	53 58	60.1	40 26.9	51 57	58.4	40 57.2	50 56	57.3	41 26.8	49 55	56.1	41 55.7	48 55	54.9	42 23.8	46 54	53.7	43 04.7	44 53	51.9	8
9	38 33.3	54 58	60.7	39 05.6	53 58	59.6	39 52.8	52 57	58.0	40 23.5	51 56	56.8	40 53.5	49 55	55.7	41 22.9	48 54	54.5	41 51.5	47 54	53.4	42 33.1	45 52	51.6	9
80	37 58.4	55 58	60.2	38 31.0	54 57	59.1	39 18.9	52 56	57.5	39 50.0	51 56	56.4	40 20.5	50 55	55.3	40 50.3	49 54	54.1	41 19.4	48 53	53.0	42 01.8	46 52	51.2	80
1	37 23.6	56 58	59.7	37 56.6	55 57	58.7	38 45.1	53 56	57.1	39 16.6	52 55	56.0	39 47.6	51 55	54.8	40 17.8	50 54	53.7	40 47.4	49 53	52.6	41 30.6	47 52	50.8	1
2	36 49.0	56 57	59.2	37 22.4	55 57	58.2	38 11.5	54 56	56.6	38 43.4	53 55	55.5	39 14.8	52 54	54.4	39 45.6	51 54	53.3	40 15.6	50 53	52.2	40 59.5	48 51	50.5	2
3	36 14.6	57 57	58.7	36 48.4	56 56	57.7	37 38.0	54 55	56.1	38 10.4	54 55	55.1	38 42.2	52 54	54.0	39 13.4	51 53	52.9	39 44.0	50 52	51.8	40 28.6	49 51	50.1	3
4	35 40.4	57 57	58.3	36 14.5	56 56	57.2	37 04.8	55 55	55.7	37 37.6	54 54	54.6	38 09.9	53 54	53.6	38 41.5	52 53	52.5	39 12.6	51 52	51.4	39 57.9	50 51	49.7	4
85	35 06.3	58 56	57.8	35 40.9	57 56	56.8	36 31.7	56 55	55.2	37 05.0	55 54	54.2	37 37.6	54 53	53.1	38 09.8	53 53	52.1	38 41.3	52 52	51.0	39 27.4	50 51	49.3	85
6	34 32.5	59 56	57.3	35 07.4	58 56	56.3	35 58.8	57 54	54.8	36 32.5	56 54	53.7	37 05.6	55 53	52.7	37 38.2	54 52	51.6	38 10.2	53 52	50.6	38 57.0	51 50	48.9	6
7	33 58.8	59 56	56.8	34 34.1	58 55	55.8	35 26.1	57 54	54.3	36 00.2	56 54	53.3	36 33.8	55 53	52.3	37 06.8	55 52	51.2	37 39.3	54 51	50.2	38 26.9	52 50	48.5	7
8	33 25.3	60 56	56.3	34 01.0	59 55	55.3	34 53.6	58 54	53.8	35 28.1	57 53	52.8	36 02.1	56 52	51.8	36 35.6	55 52	50.8	37 08.5	54 51	49.7	37 56.9	53 50	48.2	8
9	32 52.0	60 55	55.8	33 28.1	60 55	54.8	34 21.3	59 54	53.4	34 56.2	58 53	52.4	35 30.6	57 52	51.4	36 04.6	56 51	50.4	36 38.0	55 51	49.3	37 27.1	54 49	47.8	9
90	32 18.9	61 55	55.3	32 55.3	60 54	54.3	33 49.2	59 53	52.9	34 24.5	58 52	51.9	34 59.4	58 52	50.9	35 33.8	57 51	49.9	36 07.6	56 50	48.9	36 57.4	55 49	47.4	90

Lat. 48°

H.A.	46° 00′ Alt.		Az.	47° 00′ Alt.		Az.	48° 30′ Alt.		Az.	49° 30′ Alt.		Az.	50° 30′ Alt.		Az.	51° 30′ Alt.		Az.	52° 30′ Alt.		Az.	54° 00′ Alt.		Az.	H.A.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	31 46.0	62 54	54.8	32 22.8	61 54	53.8	33 17.3	60 53	52.4	33 53.0	59 52	51.5	34 28.3	58 51	50.5	35 03.1	58 51	49.5	35 37.5	57 50	48.5	36 28.0	55 49	47.0	91
2	31 13.3	62 54	54.3	31 50.5	62 54	53.4	32 45.5	61 53	51.9	33 21.7	60 52	51.0	33 57.4	59 51	50.0	34 32.7	58 50	49.1	35 07.5	58 50	48.1	35 58.7	56 48	46.5	2
3	30 40.8	63 54	53.8	31 18.4	62 53	52.9	32 14.0	61 52	51.5	32 50.6	61 51	50.5	33 26.8	60 51	49.6	34 02.5	59 50	48.6	34 37.7	58 49	47.6	35 29.7	57 48	46.1	3
4	30 08.5	64 53	53.3	30 46.5	63 53	52.4	31 42.7	62 52	51.0	32 19.7	61 51	50.1	32 56.3	61 50	49.1	33 32.5	60 50	48.2	34 08.2	59 49	47.2	35 00.9	58 48	45.7	4
95	29 36.5	64 53	52.7	30 14.8	64 52	51.9	31 11.6	63 51	50.5	31 49.1	62 51	49.6	32 26.1	61 50	48.7	33 02.7	61 49	47.7	33 38.8	60 49	46.8	34 32.2	59 47	45.3	95
6	29 04.6	65 53	52.2	29 43.4	64 52	51.4	30 40.8	63 51	50.0	31 18.6	63 50	49.1	31 56.0	62 50	48.2	32 33.1	61 49	47.3	33 09.7	61 48	46.3	34 03.8	60 47	44.9	6
7	28 33.0	65 52	51.7	29 12.1	65 52	50.8	30 10.1	64 51	49.5	30 48.4	63 50	48.6	31 26.2	63 49	47.7	32 03.7	62 49	46.8	32 40.7	61 48	45.9	33 35.6	60 47	44.5	7
8	28 01.6	66 52	51.2	28 41.1	66 51	50.3	29 39.7	65 50	49.0	30 18.3	64 50	48.2	30 56.6	63 49	47.3	31 34.5	63 48	46.4	32 12.0	62 47	45.4	33 07.5	61 46	44.0	8
9	27 30.4	67 52	50.7	28 10.3	66 51	49.8	29 09.5	65 50	48.5	29 48.5	65 49	47.7	30 27.2	64 49	46.8	31 05.6	64 48	45.9	31 43.5	63 47	45.0	32 39.8	62 46	43.6	9
100	26 59.5	67 51	50.2	27 39.7	67 51	49.3	28 39.5	66 50	48.0	29 19.0	65 49	47.2	29 58.1	65 48	46.3	30 36.9	64 48	45.4	31 15.3	64 47	44.5	32 12.2	63 46	43.2	100
1	26 28.8	68 51	49.6	27 09.4	67 50	48.8	28 09.8	67 49	47.5	28 49.6	66 48	46.7	29 29.2	66 48	45.8	30 08.4	65 47	45.0	30 47.2	64 46	44.1	31 44.8	64 45	42.7	1
2	25 58.3	69 50	49.1	26 39.3	68 50	48.3	27 40.3	67 49	47.0	28 20.5	67 48	46.2	29 00.5	66 47	45.4	29 40.1	66 47	44.5	30 19.4	65 46	43.6	31 17.7	64 45	42.3	2
3	25 28.1	69 50	48.6	26 09.5	69 49	47.8	27 11.0	68 48	46.5	27 51.7	68 48	45.7	28 32.1	67 47	44.9	29 12.1	67 46	44.0	29 51.8	66 46	43.2	30 50.8	65 44	41.8	3
4	24 58.1	70 50	48.0	25 39.9	69 49	47.2	26 42.0	69 48	46.0	27 23.1	68 47	45.2	28 03.9	68 47	44.4	28 44.3	67 46	43.5	29 24.5	67 45	42.7	30 24.1	66 44	41.4	4
105	24 28.4	70 49	47.5	25 10.5	70 48	46.7	26 13.2	69 48	45.5	26 54.7	69 47	44.7	27 35.9	68 46	43.9	28 16.8	68 45	43.1	28 57.4	67 45	42.2	29 57.7	67 44	40.9	105
6	23 58.9	71 49	47.0	24 41.4	71 48	46.2	25 44.7	70 47	45.0	26 26.6	70 46	44.2	27 08.2	69 46	43.4	27 49.5	69 45	42.6	28 30.5	68 44	41.8	29 31.5	67 43	40.5	6
7	23 29.7	72 48	46.4	24 12.6	71 48	45.7	25 16.5	71 47	44.5	25 58.7	70 46	43.7	26 40.7	70 45	42.9	27 22.5	69 45	42.1	28 03.9	69 44	41.3	29 05.6	68 43	40.0	7
8	23 00.8	72 48	45.9	23 44.0	72 47	45.1	24 48.4	71 46	44.0	25 31.1	71 46	43.2	26 13.5	70 45	42.4	26 55.7	70 44	41.6	27 37.6	70 44	40.8	28 39.9	69 42	39.6	8
9	22 32.1	73 47	45.3	23 15.7	73 47	44.6	24 20.7	72 46	43.4	25 03.8	72 45	42.7	25 46.6	71 44	41.9	26 29.2	71 44	41.1	27 11.5	70 43	40.3	28 14.4	70 42	39.1	9
110	22 03.7	73 47	44.8	22 47.7	73 46	44.0	23 53.2	73 45	42.9	24 36.7	72 45	42.2	25 19.9	72 44	41.4	26 02.9	71 43	40.6	26 45.6	71 43	39.8	27 49.2	70 42	38.6	110
1	21 35.5	74 46	44.2	22 19.9	74 46	43.5	23 26.0	73 45	42.4	24 09.9	73 44	41.6	24 53.5	73 44	40.9	25 36.9	72 43	40.1	26 20.0	72 42	39.4	27 24.3	71 41	38.2	1
2	21 07.7	75 46	43.7	21 52.4	74 45	43.0	22 59.1	74 44	41.9	23 43.3	74 44	41.1	24 27.3	73 43	40.4	25 11.1	73 42	39.6	25 54.7	72 42	38.9	26 59.6	72 41	37.7	2
3	20 40.1	75 45	43.1	21 25.2	75 45	42.4	22 32.4	75 44	41.3	23 17.1	74 43	40.6	24 01.5	74 43	39.9	24 45.7	73 42	39.1	25 29.6	73 41	38.4	26 35.2	72 40	37.2	3
4	20 12.8	76 45	42.6	20 58.2	76 44	41.9	22 06.1	75 43	40.8	22 51.1	75 43	40.1	23 35.9	75 42	39.4	24 20.5	74 42	38.6	25 04.8	74 41	37.9	26 11.0	73 40	36.8	4
115	19 45.8	76 44	42.0	20 31.6	76 44	41.3	21 40.0	76 43	40.3	22 25.4	75 42	39.5	23 10.6	75 42	38.8	23 55.5	75 41	38.1	24 40.3	74 40	37.4	25 47.1	74 39	36.3	115
6	19 19.1	77 44	41.4	20 05.2	77 43	40.7	21 14.2	76 42	39.7	21 59.9	76 42	39.0	22 45.5	76 41	38.3	23 30.9	75 41	37.6	24 16.1	75 40	36.9	25 23.5	75 39	35.8	6
7	18 52.7	78 44	40.9	19 39.2	77 43	40.2	20 48.7	77 42	39.2	21 34.8	77 41	38.5	22 20.8	76 41	37.8	23 06.6	76 40	37.1	23 52.1	76 39	36.4	25 00.2	75 38	35.3	7
8	18 26.6	78 43	40.3	19 13.4	78 42	39.6	20 23.5	78 42	38.6	21 10.0	77 41	37.9	21 56.3	77 40	37.3	22 42.5	77 40	36.6	23 28.5	76 39	35.9	24 37.1	76 38	34.8	8
9	18 00.8	79 42	39.7	18 48.0	79 42	39.1	19 58.6	78 41	38.1	20 45.4	78 40	37.4	21 32.2	78 40	36.7	22 18.7	77 39	36.1	23 05.1	77 38	35.4	24 14.3	77 37	34.3	9
120	17 35.3	79 42	39.1	18 22.8	79 41	38.5	19 34.0	79 40	37.5	20 21.2	79 40	36.9	21 08.3	78 39	36.2	21 55.2	78 39	35.5	22 42.0	78 38	34.9	23 51.8	77 37	33.8	120
1	17 10.1	80 41	38.6	17 58.0	80 41	37.9	19 09.7	79 40	37.0	19 57.3	79 39	36.3	20 44.7	79 39	35.7	21 32.0	79 38	35.0	22 19.2	78 38	34.3	23 29.6	78 37	33.3	1
2	16 45.2	81 41	38.0	17 33.5	80 40	37.3	18 45.7	80 39	36.4	19 33.6	80 39	35.8	20 21.5	80 38	35.1	21 09.2	79 38	34.5	21 56.7	79 37	33.8	23 07.7	79 36	32.8	2
3	16 20.7	81 40	37.4	17 09.3	81 40	36.8	18 22.0	81 39	35.8	19 10.3	80 38	35.2	19 58.5	80 38	34.6	20 46.6	80 37	33.9	21 34.5	80 36	33.3	22 46.1	79 36	32.3	3
4	15 56.5	82 40	36.8	16 45.4	82 39	36.2	17 58.7	81 38	35.3	18 47.3	81 38	34.7	19 35.9	81 37	34.0	20 24.3	81 37	33.4	21 12.6	80 36	32.8	22 24.8	80 35	31.8	4
125	15 32.6	82 39	36.2	16 21.9	82 39	35.6	17 35.6	82 38	34.7	18 24.7	82 37	34.1	19 13.6	81 37	33.5	20 02.4	81 36	32.9	20 51.0	81 35	32.3	22 03.8	81 34	31.3	125
6	15 09.0	83 39	35.6	15 58.7	83 38	35.0	17 12.9	82 37	34.1	18 02.3	82 37	33.5	18 51.6	82 36	32.9	19 40.8	82 36	32.3	20 29.8	82 35	31.7	21 43.1	81 34	30.8	6
7	14 45.8	83 38	35.0	15 35.8	83 38	34.4	16 50.6	83 37	33.6	17 40.3	83 36	33.0	18 29.9	83 36	32.4	19 19.4	82 35	31.8	20 08.8	82 34	31.2	21 22.7	82 33	30.3	7
8	14 23.0	84 38	34.4	15 13.3	84 37	33.8	16 28.6	84 36	33.0	17 18.6	83 36	32.4	18 08.6	83 35	31.8	18 58.4	83 34	31.2	19 48.2	83 34	30.7	21 02.6	83 33	29.8	8
9	14 00.5	84 37	33.8	14 51.1	84 36	33.3	16 06.9	84 36	32.4	16 57.3	84 35	31.8	17 47.6	84 34	31.3	18 37.8	84 34	30.7	19 27.9	83 33	30.1	20 42.8	83 32	29.2	9
130	13 38.3	85 36	33.2	14 29.2	85 36	32.7	15 45.5	85 35	31.8	16 36.3	84 34	31.3	17 26.9	84 34	30.7	18 17.5	84 33	30.1	19 07.9	84 33	29.6	20 23.4	84 32	28.7	130
1	13 16.5	85 36	32.6	14 07.8	85 35	32.1	15 24.5	85 34	31.2	16 15.6	85 34	30.7	17 06.6	85 33	30.2	17 57.5	85 33	29.6	18 48.3	85 32	29.0	20 04.3	84 31	28.2	1
2	12 55.1	86 35	32.0	13 46.6	86 35	31.5	15 03.9	86 34	30.7	15 55.3	86 33	30.1	16 46.6	85 33	29.6	17 37.8	85 32	29.0	18 28.9	85 32	28.5	19 45.5	85 31	27.7	2
3	12 34.0	87 35	31.4	13 25.9	86 34	30.9	14 43.6	86 33	30.1	15 35.3	86 33	29.5	16 26.9	86 32	29.0	17 18.5	86 32	28.5	18 10.0	86 31	27.9	19 27.0	85 30	27.1	3
4	12 13.3	87 34	30.7	13 05.5	87 33	30.2	14 23.6	87 33	29.5	15 15.7	87 32	29.0	16 07.6	87 32	28.4	16 59.5	86 31	27.9	17 51.3	86 30	27.4	19 08.9	86 30	26.6	4
135	11 52.9	88 33	30.1	12 45.4	87 33	29.6	14 04.1	87 32	28.9	14 56.4	87 32	28.4	15 48.7	87 31	27.9	16 40.9	87 30	27.4	17 33.0	87 30	26.8	18 51.1	87 29	26.1	135
6	11 33.0	88 33	29.5	12 25.8	88 32	29.0	13 44.8	88 31	28.3	14 37.5	88 31	27.8	15 30.1	88 30	27.3	16 22.6	87 30	26.8	17 15.1	87 29	26.3	18 33.6	87 29	25.5	6
7	11 13.4	89 32	28.9	12 06.5	88 32	28.4	13 26.0	88 31	27.7	14 19.0	88 30	27.2	15 11.9	88 30	26.7	16 04.7	88 29	26.2	16 57.5	88 29	25.7	18 16.5	88 28	25.0	7
8	10 54.2	89 31	28.3	11 47.6	89 31	27.8	13 07.5	89 30	27.1	14 00.8	89 30	26.6	14 54.0	89 29	26.1	15 47.1	89 29	25.6	16 40.2	88 28	25.2	17 59.7	88 27	24.4	8
9	10 35.4	89 31	27.6	11 29.0	89 30	27.2	12 49.5	89 30	26.5	13 43.0	89 29	26.0	14 36.5	89 29	25.5	15 29.9	89 28	25.1	16 23.3	89 28	24.6	17 43.3	89 27	23.9	9
140	10 17.0	90 30	27.0	11 10.9	90 30	26.5	12 31.7	90 29	25.9	13 25.6	90 28	25.4	14 19.4	90 28	25.0	15 13.1	90 27	24.5	16 06.8	89 27	24.0	17 27.2	89 26	23.3	140
1	9 58.9	90 29	26.4	10 53.2	90 29	25.9	12 14.4	90 28	25.3	13 08.5	90 28	24.8	14 02.6	90 27	24.4	14 56.6	90 27	23.9	15 50.6	90 26	23.5	17 11.5	90 26	22.8	1
2	9 41.3	91 29	25.7	10 35.8	91 28	25.3	11 57.5	91 28	24.6	12 51.9	91 27	24.2	13 46.2	91 27	23.8	14 40.6	90 26	23.3	15 34.8	90 26	22.9	16 56.1	90 25	22.2	2
3	9 24.1	91 28	25.1	10 18.9	91 28	24.7	11 40.9	91 27	24.0	12 35.6	91 26	23.6	13 30.2	91 26	23.2	14 24.8	91 26	22.8	15 19.4	91 25	22.3	16 41.1	91 24	21.7	3
4	9 07.3	92 27	24.4	10 02.3	92 27	24.0	11 24.8	92 26	23.4	12 19.7	92 26	23.0	13 14.6	91 25	22.6	14 09.5	91 25	22.2	15 04.3	91 24	21.8	16 26.5	91 24	21.1	4
145	8 50.9	92 27	23.8	9 46.2	92 26	23.4	11 09.0	92 26	22.8	12 04.2	92 25	22.4	12 59.4	92 25	22.0	13 54.5	92 24	21.6	14 49.6	92 24	21.2	16 12.2	92 23	20.6	145
6	8 34.9	93 26	23.1	9 30.4	93 26	22.7	10 53.7	92 25	22.2	11 49.1	92 24	21.8	12 44.6	92 24	21.4	13 40.0	92 24	21.0	14 35.3	92 23	20.6	15 58.3	92 23	20.0	6
7	8 19.4	93 25	22.5	9 15.1	93 25	22.1	10 38.7	93 24	21.5	11 34.4	93 24	21.2	12 30.1	93 23	20.8	13 25.8	93 23	20.4	14 21.4	93 23	20.0	15 44.7	93 22	19.4	7
8	8 04.2	93 25	21.8	9 00.2	93 24	21.5	10 24.2	93 24	20.9	11 20.2	93 23	20.5	12 16.1	93 23	20.2	13 12.0	93 22	19.8	14 07.8	93 22	19.4	15 31.6	93 21	18.9	8
9	7 49.5	94 24	21.2	8 45.7	94 23	20.8	10 10.1	94 23	20.3	11 06.3	94 22	19.9	12 02.4	94 22	19.6	12 58.6	94 22	19.2	13 54.7	93 21	18.8	15 18.8	93 21	18.3	9
150	7 35.2	94 23	20.5	8 31.7	94 23	20.2	9 56.4	94 22	19.7	10 52.8	94 22	19.3	11 49.2	94 21	19.0	12 45.6	94 21	18.6	13 41.9	94 21	18.3	15 06.4	94 20	17.7	150
1	7 21.4	94 22	19.9	8 18.1	94 22	19.5	9 43.1	94 21	19.0	10 39.7	94 21	18.7	11 36.3	94 21	18.3	12 32.9	94 20	18.0	13 29.5	94 20	17.7	14 54.3	94 19	17.2	1
2	7 08.0	95 22	19.2	8 04.9	95 21	18.9	9 30.2	95 21	18.4	10 27.1	95 20	18.1	11 23.9	95 20	17.7	12 20.7	95 20	17.4	13 17.5	95 19	17.1	14 42.7	95 19	16.6	2
3	6 55.0	95 21	18.5	7 52.1	95 21	18.2	9 17.7	95 20	17.7	10 14.8	95 20	17.4	11 11.9	95 19	17.1	12 08.9	95 19	16.8	13 05.9	95 19	16.5	14 31.4	95 18	16.0	3
4	6 42.4	96 20	17.9	7 39.8	96 20	17.6	9 05.7	95 19	17.1	10 03.0	95 19	16.8	11 00.3	95 19	16.5	11 57.5	95 18	16.2	12 54.7	95 18	15.9	14 20.5	95 17	15.4	4
155	6 30.4	96 19	17.2	7 27.9	96 19	16.9	8 54.1	96 19	16.5	9 51.6	96 18	16.2	10 49.1	96 18	15.9	11 46.5	96 18	15.6	12 44.0	96 17	15.3	14 10.1	96 17	14.8	155
6	6 18.7	96 19	16.5	7 16.4	96 18	16.2	8 43.0	96 18	15.8	9 40.6	96 18	15.5	10 38.3	96 17	15.3	11 35.9	96 17	15.0	12 33.6	96 17	14.7	14 00.0	96 16	14.3	6
7	6 07.5	96 18	15.8	7 05.4	96 18	15.6	8 32.2	96 17	15.2	9 30.1	96 17	14.9	10 27.9	96 17	14.6	11 25.8	96 16	14.4	12 23.6	96 16	14.1	13 50.3	96 16	13.7	7
8	5 56.8	97 17	15.2	6 54.9	97 17	14.9	8 21.9	97 16	14.5	9 20.0	97 16	14.3	10 18.0	97 16	14.0	11 16.0	97 16	13.8	12 14.0	97 15	13.5	13 41.0	97 15	13.1	8
9	5 46.5	97 16	14.5	6 44.8	97 16	14.2	8 12.1	97 16	13.9	9 10.3	97 15	13.6	10 08.5	97 15	13.4	11 06.7	97 15	13.1	12 04.8	97 15	12.9	13 32.1	97 14	12.5	9
160	5 36.7	97 16	13.8	6 35.1	97 15	13.6	8 02.7	97 15	13.2	9 01.0	97 15	13.0	9 59.4	97 14	12.8	10 57.8	97 14	12.5	11 56.1	97 14	12.3	13 23.6	97 13	11.9	160
1	5 27.4	98 15	13.1	6 25.9	98 15	12.9	7 53.7	98 14	12.6	8 52.2	98 14	12.4	9 50.8	98 14	12.1	10 49.3	98 13	11.9	11 47.8	97 13	11.7	13 15.5	97 13	11.3	1
2	5 18.5	98 14	12.4	6 17.2	98 14	12.2	7 45.2	98 13	11.9	8 43.9	98 13	11.7	9 42.5	98 13	11.5	10 41.2	98 13	11.3	11 39.8	98 12	11.1	13 07.8	98 12	10.7	2
3	5 10.0	98 13	11.8	6 08.9	98 13	11.6	7 37.1	98 13	11.3	8 35.9	98 12	11.1	9 34.7	98 12	10.9	10 33.5	98 12	10.7	11 32.3	98 12	10.5	13 00.5	98 11	10.2	3
4	5 02.1	98 12	11.1	6 01.1	98 12	10.9	7 29.5	98 12	10.6	8 28.4	98 12	10.4	9 27.4	98 12	10.2	10 26.3	98 11	10.0	11 25.3	98 11	09.9	12 53.6	98 11	09.6	4
165				5 53.7	98 12	10.2	7 22.3	98 11	10.0	8 21.4	98 11	09.8	9 20.5	98 11	09.6	10 19.5	98 11	09.4	11 18.6	98 10	09.2	12 47.2	98 10	09.0	165
6				5 46.8	99 11	09.5	7 15.6	99 10	09.3	8 14.8	99 10	09.1	9 14.0	99 10	09.0	10 13.2	99 10	08.8	11 12.4	99 10	08.6	12 41.1	99 09	08.4	6
7				5 40.4	99 10	08.9	7 09.3	99 10	08.6	8 08.6	99 10	08.5	9 08.0	99 09	08.3	10 07.2	99 09	08.2	11 06.5	99 09	08.0	12 35.5	99 09	07.8	7
8				5 34.4	99 09	08.2	7 03.5	99 09	08.0	8 02.9	99 09	07.8	9 02.4	99 09	07.7	10 01.8	99 08	07.6	11 01.1	99 08	07.4	12 30.2	99 08	07.2	8
9				5 28.9	99 08	07.5	6 58.2	99 08	07.3	7 57.7	99 08	07.2	8 57.2	99 08	07.1	9 56.7	99 08	06.9	10 56.2	99 08	06.8	12 25.4	99 07	06.6	9
170				5 23.9	99 08	06.8	6 53.3	99 07	06.7	7 52.9	99 07	06.5	8 52.5	99 07	06.4	9 52.1	99 07	06.3	10 51.6	99 07	06.2	12 21.0	99 07	06.0	170
1				5 19.4	99 07	06.2	6 48.9	99 07	06.0	7 48.6	99 06	05.9	8 48.2	99 06	05.8	9 47.9	99 06	05.7	10 47.5	99 06	05.6	12 17.0	99 06	05.4	1
2				5 15.3	1.0 06	05.5	6 44.9	1.0 06	05.3	7 44.7	1.0 06	05.2	8 44.4	1.0 06	05.1	9 44.1	1.0 06	05.0	10 43.9	1.0 05	04.9	12 13.5	1.0 05	04.8	2
3				5 11.7	1.0 05	04.8	6 41.4	1.0 05	04.7	7 41.2	1.0 05	04.6	8 41.0	1.0 05	04.5	9 40.8	1.0 05	04.4	10 40.6	1.0 05	04.3	12 10.3	1.0 05	04.2	3
4				5 08.6	1.0 04	04.1	6 38.4	1.0 04	04.0	7 38.3	1.0 04	03.9	8 38.1	1.0 04	03.9	9 38.0	1.0 04	03.8	10 37.8	1.0 04	03.7	12 07.6	1.0 04	03.6	4
175				5 06.0	1.0 04	03.4	6 35.8	1.0 04	03.3	7 35.7	1.0 03	03.3	8 35.6	1.0 03	03.2	9 35.5	1.0 03	03.2	10 35.4	1.0 03	03.1	12 05.3	1.0 03	03.0	175
6				5 03.8	1.0 03	02.7	6 33.7	1.0 03	02.7	7 33.7	1.0 03	02.6	8 33.6	1.0 03	02.6	9 33.5	1.0 03	02.5	10 33.5	1.0 03	02.5	12 03.4	1.0 02	02.4	6
7				5 02.2	1.0 02	02.1	6 32.1	1.0 02	02.0	7 32.1	1.0 02	02.0	8 32.0	1.0 02	01.9	9 32.0	1.0 02	01.9	10 32.0	1.0 02	01.9	12 01.9	1.0 02	01.8	7
8				5 01.0	1.0 01	01.4	6 30.9	1.0 01	01.3	7 30.9	1.0 01	01.3	8 30.9	1.0 01	01.3	9 30.9	1.0 01	01.3	10 30.9	1.0 01	01.2	12 00.8	1.0 01	01.2	8
9				5 00.2	1.0 00	00.7	6 30.2	1.0 00	00.7	7 30.2	1.0 00	00.7	8 30.2	1.0 00	00.6	9 30.2	1.0 00	00.6	10 30.2	1.0 00	00.6	12 00.2	1.0 00	00.6	9
180				5 00.0	1.0 00	00.0	6 30.0	1.0 00	00.0	7 30.0	1.0 00	00.0	8 30.0	1.0 00	00.0	9 30.0	1.0 00	00.0	10 30.0	1.0 00	00.0	12 00.0	1.0 00	00.0	180

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Lat. 48°

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	83 30.0	1.0 03	00.0	83 00.0	1.0 03	00.0	82 00.0	1.0 02	00.0	81 30.0	1.0 02	00.0	81 00.0	1.0 02	00.0	80 30.0	1.0 02	00.0	79 00.0	1.0 02	00.0	78 30.0	1.0 02	00.0	00
1	83 28.2	99 09	05.1	82 58.4	1.0 08	04.7	81 58.6	1.0 07	04.0	81 28.7	1.0 06	03.7	80 58.8	1.0 06	03.5	80 28.9	1.0 06	03.3	78 59.1	1.0 05	02.7	78 29.1	1.0 04	02.5	1
2	83 22.9	98 15	10.1	82 53.5	98 13	09.3	81 54.4	99 12	08.0	81 24.8	99 11	07.4	80 55.1	99 10	06.9	80 25.5	99 09	06.5	78 56.2	99 08	05.4	78 26.4	99 07	05.1	2
3	83 14.1	95 20	15.0	82 45.4	96 18	13.8	81 47.5	97 16	11.8	81 18.4	97 15	11.0	80 49.1	98 14	10.3	80 19.8	98 13	09.6	78 51.5	98 11	08.0	78 22.0	98 10	07.6	3
4	83 02.2	92 25	19.5	82 34.4	93 23	18.0	81 38.0	95 20	15.5	81 09.5	95 19	14.5	80 40.8	96 18	13.6	80 12.0	96 16	12.7	78 45.0	97 14	10.6	78 15.9	97 13	10.0	4
05	82 47.4	89 29	23.8	82 20.6	90 27	22.0	81 26.0	92 24	19.1	80 58.3	93 22	17.9	80 30.3	94 21	16.7	80 02.2	94 20	15.7	78 36.8	96 17	13.1	78 08.1	96 16	12.4	05
6	82 30.0	84 33	27.7	82 04.4	86 31	25.8	81 11.8	89 27	22.5	80 44.9	90 26	21.0	80 17.8	91 24	19.7	79 50.3	92 23	18.6	78 26.8	94 19	15.6	77 58.6	94 18	14.8	6
7	82 10.2	80 36	31.3	81 45.8	82 34	29.2	80 55.4	86 30	25.6	80 29.5	87 29	24.0	80 03.3	88 27	22.6	79 36.7	89 26	21.3	78 15.2	92 22	18.0	77 47.6	92 21	17.0	7
8	81 48.3	76 39	34.5	81 25.3	78 37	32.4	80 37.1	82 33	28.5	80 12.3	84 32	26.8	79 47.0	85 30	25.3	79 21.2	86 28	23.9	78 02.1	89 24	20.2	77 35.2	90 23	19.2	8
9	81 24.7	71 42	37.5	81 02.9	74 40	35.2	80 17.1	78 36	31.2	79 53.3	80 34	29.5	79 29.0	82 32	27.8	79 04.2	83 31	26.3	77 47.5	87 27	22.4	77 21.3	88 25	21.3	9
10	80 59.6	67 44	40.1	80 39.0	70 42	37.8	79 55.6	75 38	33.7	79 32.8	77 36	31.9	79 09.5	79 35	30.2	78 45.7	80 33	28.6	77 31.5	84 29	24.5	77 06.1	85 27	23.3	10
1	80 33.1	63 46	42.4	80 13.8	66 44	40.2	79 32.6	71 40	36.0	79 11.0	73 39	34.1	78 48.7	75 37	32.4	78 25.8	77 35	30.7	77 14.3	82 31	26.4	76 49.6	83 29	25.1	1
2	80 05.4	59 48	44.6	79 47.3	62 46	42.3	79 08.4	67 42	38.1	78 47.8	70 40	36.2	78 26.6	72 39	34.4	78 04.7	74 37	32.7	76 55.8	79 33	28.3	76 32.0	80 31	26.9	2
3	79 36.8	55 49	46.4	79 19.8	58 47	44.2	78 43.1	64 44	40.0	78 23.6	66 42	38.1	78 03.3	69 40	36.3	77 42.4	71 39	34.6	76 36.3	76 34	30.0	76 13.2	77 33	28.6	3
4	79 07.3	51 50	48.1	78 51.4	55 49	45.9	78 16.8	60 45	41.8	77 58.3	63 44	39.8	77 39.1	65 42	38.0	77 19.1	68 40	36.3	76 15.7	73 36	31.6	75 53.5	75 34	30.2	4
15	78 37.0	48 51	49.6	78 22.2	51 50	47.4	77 49.7	57 47	43.3	77 32.2	60 45	41.4	77 13.9	62 43	39.6	76 54.9	64 42	37.9	75 54.2	70 37	33.2	75 32.8	72 36	31.8	15
6	78 06.2	45 52	50.9	77 52.3	48 51	48.8	77 21.7	54 48	44.8	77 05.2	56 46	42.9	76 47.9	59 45	41.1	76 29.8	61 43	39.4	75 31.8	67 39	34.6	75 11.3	69 37	33.2	6
7	77 34.7	42 53	52.1	77 21.8	45 52	50.0	76 53.1	51 49	46.1	76 37.5	53 47	44.2	76 21.1	56 46	42.4	76 04.0	58 44	40.7	75 08.6	65 40	36.0	74 48.9	67 38	34.5	7
8	77 02.8	39 54	53.2	76 50.8	42 52	51.2	76 23.9	48 50	47.3	76 09.2	50 48	45.5	75 53.7	53 47	43.7	75 37.5	55 45	42.0	74 44.6	62 41	37.2	74 25.8	64 40	35.8	8
9	76 30.5	36 54	54.1	76 19.3	39 53	52.2	75 54.1	45 50	48.4	75 40.3	47 49	46.6	75 25.7	50 48	44.8	75 10.3	52 46	43.1	74 20.0	59 42	38.4	74 02.0	61 41	36.9	9
20	75 57.8	33 55	55.0	75 47.4	36 54	53.0	75 23.9	42 51	49.3	75 10.9	45 50	47.6	74 57.1	47 48	45.8	74 42.6	50 47	44.2	73 54.8	56 43	39.5	73 37.6	58 42	38.0	20
1	75 24.7	31 56	55.7	75 15.1	34 54	53.8	74 53.2	39 52	50.2	74 41.1	42 50	48.5	74 28.1	44 49	46.8	74 14.4	47 48	45.1	73 29.0	54 44	40.5	73 12.6	56 43	39.0	1
2	74 51.4	28 56	56.4	74 42.5	31 55	54.6	74 22.2	37 52	51.0	74 10.8	39 51	49.3	73 58.6	42 50	47.7	73 45.7	44 48	46.0	73 02.7	51 45	41.4	72 47.0	53 43	40.0	2
3	74 17.9	26 56	57.0	74 09.7	29 55	55.2	73 50.8	34 53	51.8	73 40.2	37 52	50.1	73 28.8	39 50	48.5	73 16.6	42 49	46.9	72 35.9	49 45	42.3	72 21.0	51 44	40.8	3
4	73 44.1	24 57	57.5	73 36.6	26 56	55.8	73 19.2	32 53	52.4	73 09.2	34 52	50.8	72 58.6	37 51	49.2	72 47.1	39 50	47.6	72 08.7	46 46	43.1	71 54.5	48 45	41.7	4
25	73 10.2	21 57	58.0	73 03.3	24 56	56.3	72 47.2	29 54	53.0	72 38.0	32 52	51.4	72 28.0	34 51	49.8	72 17.3	37 50	48.3	71 41.0	44 47	43.8	71 27.6	46 45	42.4	25
6	72 36.1	19 57	58.4	72 29.8	22 56	56.7	72 15.0	27 54	53.5	72 06.5	30 53	52.0	71 57.2	32 52	50.4	71 47.2	35 51	48.9	71 13.1	41 47	44.5	71 00.4	43 46	43.1	6
7	72 01.8	17 57	58.7	71 56.2	20 56	57.1	71 42.7	25 54	54.0	71 34.8	28 53	52.5	71 26.1	30 52	51.0	71 16.8	32 51	49.5	70 44.7	39 48	45.2	70 32.8	41 47	43.8	7
8	71 27.5	16 57	59.0	71 22.4	18 56	57.5	71 10.1	23 55	54.4	71 02.8	26 54	52.9	70 54.9	28 52	51.4	70 46.2	30 51	50.0	70 16.1	37 48	45.7	70 04.8	39 47	44.4	8
9	70 53.0	14 58	59.3	70 48.5	16 57	57.8	70 37.4	21 55	54.8	70 30.7	23 54	53.3	70 23.4	26 53	51.9	70 15.3	28 52	50.5	69 47.2	34 49	46.3	69 36.6	36 47	44.9	9
30	70 18.4	12 58	59.5	70 14.5	14 57	58.0	70 04.5	19 55	55.1	69 58.4	21 54	53.7	69 51.7	24 53	52.3	69 44.3	26 52	50.9	69 18.1	32 49	46.8	69 08.1	34 48	45.4	30
1	69 43.8	10 58	59.7	69 40.4	13 57	58.3	69 31.5	17 55	55.4	69 26.0	19 54	54.0	69 19.9	22 53	52.6	69 13.0	24 52	51.3	68 48.8	30 49	47.2	68 39.4	32 48	45.9	1
2	69 09.1	09 58	59.8	69 06.2	11 57	58.4	68 58.4	15 55	55.7	68 53.5	18 54	54.3	68 47.9	20 54	52.9	68 41.7	22 53	51.6	68 19.2	28 50	47.6	68 10.5	30 49	46.3	2
3	68 34.4	07 58	60.0	68 32.0	09 57	58.6	68 25.2	14 55	55.9	68 20.8	16 55	54.6	68 15.8	18 54	53.2	68 10.1	20 53	51.9	67 49.4	26 50	48.0	67 41.3	28 49	46.7	3
4	67 59.6	05 58	60.1	67 57.7	07 57	58.7	67 51.9	12 56	56.1	67 48.0	14 55	54.8	67 43.6	16 54	53.5	67 38.5	18 53	52.2	67 19.5	24 50	48.3	67 12.0	26 49	47.1	4
35	67 24.8	04 58	60.1	67 23.3	06 57	58.8	67 18.5	10 56	56.2	67 15.2	12 55	55.0	67 11.3	14 54	53.7	67 06.7	16 53	52.4	66 49.5	22 50	48.6	66 42.5	24 49	47.4	35
6	66 50.0	02 58	60.2	66 49.0	04 57	58.9	66 45.1	08 56	56.4	66 42.3	10 55	55.1	66 38.9	12 54	53.9	66 34.9	14 53	52.6	66 19.3	20 51	48.9	66 12.9	22 50	47.7	6
7	66 15.1	01 58	60.2	66 14.6	03 57	59.0	66 11.7	07 56	56.5	66 09.4	09 55	55.3	66 06.4	11 54	54.0	66 02.9	13 53	52.8	65 48.9	18 51	49.2	65 43.1	20 50	48.0	7
8	65 40.3	01 58	60.2	65 40.2	01 57	59.0	65 38.2	05 56	56.6	65 36.3	07 55	55.4	65 33.9	09 54	54.2	65 30.9	11 53	53.0	65 18.5	17 51	49.4	65 13.3	18 50	48.2	8
9	65 05.5	02 58	60.2	65 05.8	00 57	59.0	65 04.7	04 56	56.6	65 03.3	06 55	55.4	65 01.3	07 54	54.3	64 58.8	09 54	53.1	64 48.0	15 51	49.6	64 43.3	17 50	48.4	9
40	64 30.6	03 58	60.2	64 31.4	01 57	59.0	64 31.1	02 56	56.7	64 30.2	04 55	55.5	64 28.7	06 54	54.3	64 26.7	08 54	53.2	64 17.4	13 51	49.7	64 13.2	15 50	48.6	40
1	63 55.8	05 58	60.1	63 56.9	03 57	59.0	63 57.6	01 56	56.7	63 57.1	02 55	55.5	63 56.1	04 54	54.4	63 54.6	06 54	53.3	63 46.7	11 51	49.9	63 43.0	13 50	48.8	1
2	63 21.0	06 58	60.0	63 22.6	04 57	58.9	63 24.0	01 56	56.7	63 24.0	01 55	55.6	63 23.4	03 54	54.5	63 22.4	04 54	53.3	63 16.0	10 51	50.0	63 12.8	11 50	48.9	2
3	62 46.3	07 58	59.9	62 48.2	06 57	58.9	62 50.5	02 56	56.7	62 50.9	00 55	55.6	62 50.8	01 54	54.5	62 50.1	03 54	53.4	62 45.2	08 51	50.1	62 42.5	10 51	49.0	3
4	62 11.5	09 58	59.8	62 13.8	07 57	58.8	62 17.0	04 56	56.6	62 17.8	02 55	55.6	62 18.1	00 54	54.5	62 17.9	01 54	53.4	62 14.4	06 51	50.2	62 12.2	08 51	49.1	4
45	61 36.8	10 58	59.7	61 39.5	08 57	58.7	61 43.4	05 56	56.6	61 44.7	03 55	55.5	61 45.4	02 54	54.5	61 45.7	00 54	53.4	61 43.5	05 51	50.2	61 41.8	06 51	49.2	45
6	61 02.2	11 58	59.6	61 05.2	09 57	58.6	61 09.9	08 56	56.5	61 11.6	05 55	55.5	61 12.7	03 54	54.4	61 13.4	02 54	53.4	61 12.7	03 51	50.3	61 11.4	05 51	49.3	6
7	60 27.6	12 58	59.5	60 31.0	11 57	58.5	60 36.5	08 56	56.4	60 38.5	06 55	55.4	60 40.1	05 54	54.4	60 41.2	03 54	53.4	60 41.8	02 52	50.3	60 41.0	03 51	49.3	7
8	59 53.0	13 58	59.3	59 56.8	12 57	58.3	60 03.0	09 56	56.3	60 05.5	07 55	55.3	60 07.5	06 54	54.3	60 09.0	04 54	53.3	60 10.9	00 52	50.3	60 10.6	02 51	49.3	8
9	59 18.5	15 57	59.2	59 22.7	13 57	58.2	59 29.6	10 56	56.2	59 32.5	09 55	55.3	59 34.8	07 54	54.3	59 36.8	06 54	53.3	59 40.0	01 51	50.3	59 40.1	00 51	49.3	9
50	58 44.1	16 57	59.0	58 48.6	14 57	58.0	58 56.3	11 56	56.1	58 59.5	10 55	55.2	59 02.3	09 54	54.2	59 04.6	07 54	53.2	59 09.1	03 51	50.3	59 09.7	01 51	49.3	50
1	58 09.7	17 57	58.8	58 14.5	15 57	57.9	58 23.0	13 56	56.0	58 26.6	11 55	55.0	58 29.7	10 54	54.1	58 32.5	08 54	53.1	58 38.2	04 51	50.3	58 39.2	03 51	49.3	1
2	57 35.4	18 57	58.6	57 40.6	17 57	57.7	57 49.7	14 55	55.9	57 53.7	13 55	54.9	57 57.2	11 54	54.0	58 00.4	10 53	53.0	58 07.3	06 51	50.2	58 08.8	04 51	49.3	2
3	57 01.1	19 57	58.4	57 06.7	18 56	57.5	57 16.5	15 55	55.7	57 20.9	14 55	54.8	57 24.8	12 54	53.9	57 28.3	11 53	52.9	57 36.5	07 51	50.2	57 38.4	06 51	49.2	3
4	56 27.0	20 57	58.2	56 32.8	19 56	57.3	56 43.4	16 55	55.5	56 48.1	15 55	54.6	56 52.4	14 54	53.7	56 56.3	12 53	52.8	57 05.7	08 51	50.1	57 08.0	07 51	49.2	4
55	55 52.9	21 57	58.0	55 59.1	20 56	57.1	56 10.3	17 55	55.4	56 15.4	16 54	54.5	56 20.0	15 54	53.6	56 24.3	14 53	52.7	56 34.9	10 51	50.0	56 37.6	08 51	49.1	55
6	55 18.9	22 57	57.8	55 25.4	21 56	56.9	55 37.3	19 55	55.2	55 42.7	17 54	54.3	55 47.8	16 54	53.4	55 52.4	15 53	52.6	56 04.2	11 51	49.9	56 07.3	10 50	49.0	6
7	54 45.0	23 56	57.5	54 51.8	22 56	56.7	55 04.4	20 55	55.0	55 10.2	19 54	54.1	55 15.6	17 54	53.3	55 20.6	16 53	52.4	55 33.5	12 51	49.8	55 37.0	11 50	48.9	7
8	54 11.1	24 56	57.3	54 18.3	23 56	56.5	54 31.5	21 55	54.8	54 37.7	20 54	54.0	54 43.4	19 53	53.1	54 48.8	17 53	52.3	55 02.8	14 51	49.7	55 06.8	13 50	48.8	8
9	53 37.4	25 56	57.1	53 44.9	24 56	56.2	53 58.8	22 54	54.6	54 05.2	21 54	53.8	54 11.3	20 53	52.9	54 17.1	19 53	52.1	54 32.3	15 51	49.5	54 36.6	14 50	48.7	9
60	53 03.7	26 56	56.8	53 11.5	26 55	56.0	53 26.1	23 54	54.4	53 32.S	22 54	53.6	53 39.3	21 53	52.7	53 45.5	20 53	51.9	54 01.7	16 51	49.4	54 06.5	15 50	48.6	60
1	52 30.2	28 56	56.5	52 38.3	26 55	55.8	52 53.5	24 54	54.2	53 00.6	23 54	53.4	53 07.4	22 53	52.5	53 13.9	21 52	51.7	53 31.3	18 51	49.3	53 36.4	16 50	48.4	1
2	51 56.7	29 56	56.3	52 05.1	27 55	55.5	52 21.0	25 54	53.9	52 28.5	24 53	53.1	52 35.6	23 53	52.3	52 42.4	22 52	51.5	53 00.9	19 51	49.1	53 06.4	18 50	48.3	2
3	51 23.4	30 55	56.0	51 32.1	29 55	55.2	51 48.6	26 54	53.7	51 56.4	25 53	52.9	52 03.9	24 53	52.1	52 11.0	23 52	51.3	52 30.6	20 50	48.9	52 36.5	19 50	48.1	3
4	50 50.2	31 55	55.7	50 59.2	30 55	55.0	51 16.3	28 54	53.5	51 24.4	27 53	52.7	51 32.2	26 53	51.9	51 39.7	24 52	51.1	52 00.4	21 50	48.8	52 06.6	20 50	48.0	4
65	50 17.0	32 55	55.5	50 26.3	31 55	54.7	50 44.1	29 54	53.2	50 52.5	28 53	52.4	51 00.7	27 52	51.7	51 08.5	26 52	50.9	51 30.2	23 50	48.6	51 36.8	22 50	47.8	65
6	49 44.0	33 55	55.2	49 53.6	32 54	54 4	50 12.0	30 53	52.9	50 20.8	29 53	52.2	50 29.2	28 52	51.4	50 37.4	27 52	50.7	51 00.1	24 50	48.4	51 07.1	23 49	47.6	6
7	49 11.1	33 55	54.9	49 21.0	33 54	54.1	49 40.0	31 53	52.7	49 49.1	30 53	51.9	49 57.9	29 52	51.2	50 06.4	28 52	50.5	50 30.2	25 50	48.2	50 37.5	24 49	47.4	7
8	48 38.4	34 54	54.6	48 48.6	34 54	53.9	49 08.2	32 53	52.4	49 17.5	31 52	51.7	49 26.7	30 52	51.0	49 35.5	29 51	50.2	50 00.3	26 50	48.0	50 08.0	25 49	47.2	8
9	48 05.7	35 54	54.3	48 16.2	35 54	53.6	48 36.4	33 53	52.1	48 46.1	32 52	51.4	48 55.5	31 52	50.7	49 04.7	30 51	50.0	49 30.5	27 49	47.8	49 38.6	26 49	47.0	9
70	47 33.2	36 54	54.0	47 44.0	36 54	53.3	48 04.8	34 53	51.9	48 14.8	33 52	51.2	48 24.5	32 52	50.4	48 34.0	31 51	49.7	49 00.8	28 49	47.6	49 09.2	28 49	46.8	70
1	47 06.8	37 54	53.6	47 11.9	36 53	53.0	47 33.2	35 52	51.6	47 43.6	34 52	50.9	47 53.6	33 51	50.2	48 03.4	32 51	49.5	48 31.3	30 49	47.3	48 40.0	29 49	46.6	1
2	46 28.5	38 54	53.3	46 39.9	37 53	52.6	47 01.9	36 52	51.3	47 12.5	35 52	50.6	47 22.8	34 51	49.9	47 33.0	33 51	49.2	48 01.8	31 49	47.1	48 10.9	30 48	46.4	2
3	45 56.4	39 53	53.0	46 08.0	38 53	52.3	46 30.6	37 52	51.0	46 41.5	36 51	50.3	46 52.2	35 51	49.6	47 02.6	34 50	48.9	47 32.5	32 49	46.9	47 41.9	31 48	46.1	3
4	45 24.4	40 53	52.7	45 36.3	39 53	52.0	45 59.5	38 52	50.7	46 10.7	37 51	50.0	46 21.7	36 51	49.3	46 32.4	35 50	48.7	47 03.2	33 49	46.6	47 13.0	32 48	45.9	4
75	44 52.6	41 53	52.3	45 04.7	40 52	51.7	45 28.5	39 51	50.4	45 40.0	38 51	49.7	45 51.3	37 50	49.1	46 02.3	36 50	48.4	46 34.1	34 48	46.4	46 44.2	33 48	45.7	75
6	44 20.9	42 53	52.0	44 33.3	41 52	51.4	44 57.6	40 51	50.1	45 09.4	39 51	49.4	45 21.0	38 50	48.8	45 32.4	38 50	48.1	46 05.1	35 48	46.1	46 15.5	34 48	45.4	6
7	43 49.3	43 52	51.6	44 02.0	42 52	51.0	44 26.9	41 51	49.8	44 39.0	40 50	49.1	44 50.9	39 50	48.5	45 02.6	39 49	47.8	45 36.3	36 48	45.8	45 47.0	35 47	45.2	7
8	43 17.9	44 52	51.3	43 30.9	43 52	50.7	43 56.3	42 51	49.4	44 08.7	41 50	48.8	44 20.9	40 50	48.2	44 32.9	40 49	47.5	45 07.5	37 48	45.6	45 18.6	37 47	44.9	8
9	42 46.6	45 52	51.0	42 59.9	44 51	50.3	43 25.9	43 50	49.1	43 38.6	42 50	48.5	43 51.1	41 49	47.8	44 03.4	41 49	47.2	44 38.9	38 47	45.3	44 50.3	38 47	44.6	9
80	42 15.5	46 52	50.6	42 29.1	45 51	50.0	42 55.6	44 50	48.8	43 08.6	43 50	48.2	43 21.4	42 49	47.5	43 34.0	42 49	46.9	44 10.5	39 47	45.0	44 22.2	39 47	44.4	80
1	41 44.6	46 51	50.2	41 58.4	46 51	49.6	42 25.5	45 50	48.4	42 38.8	44 49	47.8	42 51.9	43 49	47.2	43 04.7	43 48	46.6	43 42.1	41 47	44.7	43 54.2	40 46	44.1	1
2	41 13.8	47 51	49.9	41 27.9	47 51	49.3	41 55.6	45 50	48.1	42 09.1	45 49	47.5	42 22.5	44 49	46.9	42 35.6	44 48	46.3	43 14.0	42 47	44.4	43 26.3	41 46	43.8	2
3	40 43.2	48 51	49.5	40 57.6	48 50	48.9	41 25.8	46 49	47.8	41 39.6	46 49	47.2	41 53.2	45 48	46.6	42 06.7	45 48	46.0	42 45.9	43 46	44.1	42 58.6	42 46	43.5	3
4	40 12.7	49 50	49.1	40 27.4	48 50	48.6	40 56.1	47 49	47.4	41 10.2	47 49	46.8	41 24.2	46 48	46.2	41 37.9	46 48	45.6	42 18.0	44 46	43.8	42 31.0	43 45	43.2	4
85	39 42.5	50 50	48.8	39 57.4	49 50	48.2	40 26.6	48 49	47.1	40 41.0	48 48	46.5	40 55.3	47 48	45.9	41 09.3	47 47	45.3	41 50.3	45 46	43.5	42 03.6	44 45	42.9	85
6	39 12.4	51 50	48.4	39 27.5	50 49	47.8	39 57.3	49 49	46.7	40 12.0	49 48	46.1	40 26.5	48 48	45.6	40 40.8	47 47	45.0	41 22.8	46 46	43.2	41 36.4	45 45	42.6	6
7	38 42.4	52 50	48.0	38 57.9	51 49	47.4	39 28.2	50 48	46.3	39 43.2	50 48	45.8	39 57.9	49 47	45.2	40 12.5	48 47	44.6	40 55.3	47 45	42.9	41 09.3	46 45	42.3	7
8	38 12.7	52 49	47.6	38 28.4	52 49	47.1	38 59.3	51 48	46.0	39 14.5	50 48	45.4	39 29.5	50 47	44.9	39 44.4	49 47	44.3	40 28.1	48 45	42.6	40 42.3	47 45	42.0	8
9	37 43.1	53 49	47.2	37 59.1	53 49	46.7	38 30.5	52 48	45.6	38 46.0	51 47	45.1	39 01.3	51 47	44.5	39 16.5	50 46	43.9	40 01.0	49 45	42.3	40 15.5	48 44	41.7	9
90	37 13.8	54 49	46.8	37 29.9	54 48	46.3	38 01.9	53 47	45.2	38 17.6	52 47	44.7	38 33.2	52 46	44.1	38 48.7	51 46	43.6	39 34.1	50 45	41.9	39 48.9	49 44	41.4	90

16—11480

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	36 44.6	55 48	46.4	37 01.0	55 48	45.9	37 33.5	54 47	44.9	37 49.5	53 47	44.3	38 05.4	53 46	43.8	38 21.1	52 46	43.2	39 07.4	51 44	41.6	39 22.5	50 44	41.0	91
2	36 15.6	55 48	46.0	36 32.3	55 48	45.5	37 05.3	55 47	44.5	37 21.5	54 46	43.9	37 37.7	54 46	43.4	37 53.7	53 45	42.9	38 40.8	52 44	41.3	38 56.2	51 44	40.7	2
3	35 46.8	57 48	45.6	36 03.7	56 47	45.1	36 37.2	55 46	44.1	36 53.8	55 46	43.6	37 10.2	54 46	43.0	37 26.5	54 45	42.5	38 14.4	53 44	40.9	38 30.1	52 43	40.4	3
4	35 18.2	58 47	45.2	35 35.4	57 47	44.7	36 09.4	56 46	43.7	36 26.2	56 46	43.2	36 42.9	55 45	42.7	36 59.4	55 45	42.1	37 48.2	54 43	40.6	38 04.2	53 43	40.0	4
95	34 49.8	58 47	44.8	35 07.2	58 47	44.3	35 41.8	57 46	43.3	35 58.8	57 45	42.8	36 15.8	56 45	42.3	36 32.6	56 44	41.8	37 22.2	54 43	40.2	37 38.5	54 43	39.7	95
6	34 21.6	59 47	44.4	34 39.3	59 46	43.9	35 14.3	58 45	42.9	35 31.7	58 45	42.4	35 48.9	57 45	41.9	36 05.9	57 44	41.4	36 56.4	55 43	39.9	37 12.9	55 42	39.3	6
7	33 53.6	60 46	44.0	34 11.6	60 46	43.5	34 47.1	59 45	42.5	35 04.7	58 45	42.0	35 22.1	58 44	41.5	35 39.5	58 44	41.0	36 30.8	56 42	39.5	36 47.6	56 42	39.0	7
8	33 25.8	61 46	43.6	33 44.0	60 46	43.1	34 20.1	60 45	42.1	34 37.9	59 44	41.6	34 55.6	59 44	41.1	35 13.2	58 43	40.6	36 05.3	57 42	39.1	36 22.4	57 42	38.6	8
9	32 58.3	62 46	43.1	33 16.7	61 45	42.7	33 53.2	61 44	41.7	34 11.3	60 44	41.2	34 29.3	60 44	40.7	34 47.2	59 43	40.3	35 40.1	58 42	38.8	35 57.5	58 41	38.3	9
100	32 30.9	62 45	42.7	32 49.6	62 45	42.2	33 26.6	61 44	41.3	33 45.0	61 44	40.8	34 03.2	61 43	40.3	34 21.4	60 43	39.9	35 15.0	59 41	38.4	35 32.7	59 41	37.9	100
1	32 03.8	63 45	42.3	32 22.7	63 44	41.8	33 00.2	62 44	40.9	33 18.8	62 43	40.4	33 37.3	61 43	39.9	33 55.7	61 42	39.5	34 50.2	60 41	38.0	35 08.1	60 41	37.5	1
2	31 36.9	64 44	41.8	31 56.1	64 44	41.4	32 34.1	63 43	40.5	32 52.9	63 43	40.0	33 11.7	62 42	39.5	33 30.3	62 42	39.1	34 25.6	61 41	37.6	34 43.8	60 40	37.2	2
3	31 10.3	65 44	41.4	31 29.7	64 44	41.0	32 08.1	64 43	40.0	32 27.2	63 42	39.6	32 46.2	63 42	39.1	33 05.1	63 42	38.7	34 01.2	62 40	37.3	34 19.6	61 40	36.8	3
4	30 43.8	66 44	41.0	31 03.5	65 43	40.5	31 42.4	65 42	39.6	32 01.8	64 42	39.2	32 21.0	64 42	38.7	32 40.1	64 41	38.3	33 37.0	63 40	36.9	33 55.7	62 40	36.4	4
105	30 17.6	66 43	40.5	30 37.5	66 43	40.1	31 16.9	65 42	39.2	31 36.5	65 42	38.8	31 56.0	65 41	38.3	32 15.4	64 41	37.9	33 13.0	63 40	36.5	33 32.0	63 39	36.0	105
6	29 51.7	67 43	40.1	30 11.8	67 42	39.6	30 51.7	66 42	38.8	31 11.5	66 41	38.3	31 31.2	66 41	37.9	31 50.9	65 40	37.4	32 49.2	64 39	36.1	33 08.5	64 39	35.6	6
7	29 26.0	68 42	39.6	29 46.3	68 42	39.2	30 26.6	67 41	38.3	30 46.7	67 41	37.9	31 06.7	66 40	37.5	31 26.6	66 40	37.0	32 25.7	65 39	35.7	32 45.2	65 38	35.2	7
8	29 00.5	69 42	39.2	29 21.0	68 42	38.7	30 01.9	68 41	37.9	30 22.2	68 41	37.5	30 42.4	67 40	37.0	31 02.5	67 40	36.6	32 02.4	66 38	35.3	32 22.1	66 38	34.9	8
9	28 35.3	69 42	38.7	28 56.0	69 41	38.3	29 37.3	69 40	37.5	29 57.9	68 40	37.0	30 18.3	68 40	36.6	30 38.7	68 39	36.2	31 39.3	67 38	34.9	31 59.3	67 38	34.5	9
110	28 10.3	70 41	38.2	28 31.3	70 41	37.8	29 13.0	69 40	37.0	29 33.8	69 40	36.6	29 54.5	69 39	36.2	30 15.1	69 39	35.8	31 16.4	68 38	34.5	31 36.7	67 37	34.1	110
1	27 45.6	71 41	37.8	28 06.8	71 40	37.4	28 49.0	70 40	36.6	29 10.0	70 39	36.2	29 30.9	70 39	35.8	29 51.8	69 38	35.3	30 53.8	69 37	34.1	31 14.3	68 37	33.7	1
2	27 21.1	72 40	37.3	27 42.5	71 40	36.9	28 25.2	71 39	36.1	28 46.4	71 39	35.7	29 07.6	70 38	35.3	29 28.7	70 38	34.9	30 31.4	69 37	33.7	30 52.2	69 36	33.2	2
3	26 56.9	72 40	36.8	27 18.5	72 40	36.5	28 01.6	72 39	35.7	28 23.1	71 38	35.3	28 44.5	71 38	34.9	29 05.8	71 38	34.5	30 09.3	70 36	33.3	30 30.3	70 36	32.8	3
4	26 32.9	73 39	36.4	26 54.8	73 39	36.0	27 38.4	72 38	35.2	28 00.0	72 38	34.8	28 21.7	72 38	34.4	28 43.2	72 37	34.0	29 47.4	71 36	32.8	30 08.7	71 36	32.4	4
115	26 09.3	74 39	35.9	26 31.3	74 39	35.5	27 15.3	73 38	34.8	27 37.2	73 38	34.4	27 59.1	73 37	34.0	28 20.9	72 37	33.6	29 25.8	72 36	32.4	29 47.3	72 35	32.0	115
6	25 45.9	74 39	35.4	26 08.2	74 38	35.0	26 52.6	74 37	34.3	27 14.7	74 37	33.9	27 36.8	73 37	33.5	27 58.8	73 36	33.2	29 04.4	73 35	32.0	29 26.1	72 35	31.6	6
7	25 22.7	75 38	34.9	25 45.2	75 38	34.6	26 30.1	75 37	33.8	26 52.4	74 37	33.5	27 14.7	74 36	33.1	27 37.0	74 36	32.7	28 43.2	73 35	31.6	29 05.2	73 34	31.2	7
8	24 59.9	76 38	34.5	25 22.6	76 37	34.1	26 07.9	75 37	33.4	26 30.4	75 36	33.0	26 52.9	75 36	32.6	27 15.4	75 36	32.3	28 22.4	74 34	31.1	28 44.6	74 34	30.7	8
9	24 37.3	77 37	34.0	25 00.2	76 37	33.6	25 45.9	76 36	32.9	26 08.7	76 36	32.5	26 31.4	76 35	32.2	26 54.1	75 35	31.8	28 01.7	75 34	30.7	28 24.2	75 34	30.3	9
120	24 15.0	77 37	33.5	24 38.2	77 36	33.1	25 24.3	77 36	32.4	25 47.3	77 35	32.1	26 10.2	76 35	31.7	26 33.1	76 35	31.3	27 41.4	76 34	30.2	28 04.0	75 33	29.9	120
1	23 53.0	78 36	33.0	24 16.4	78 36	32.6	25 02.9	77 35	31.9	25 26.1	77 35	31.6	25 49.2	77 34	31.2	26 12.3	77 34	30.9	27 21.3	76 33	29.8	27 44.2	76 33	29.4	1
2	23 31.3	79 36	32.5	23 54.8	78 35	32.1	24 41.8	78 35	31.5	25 05.2	78 34	31.1	25 28.6	78 34	30.8	25 51.9	78 34	30.4	27 01.5	77 33	29.4	27 24.6	77 32	29.0	2
3	23 09.9	79 35	32.0	23 33.6	79 35	31.7	24 21.0	79 34	31.0	24 44.6	79 34	30.6	25 08.2	78 34	30.3	25 31.7	78 33	30.0	26 41.9	78 32	28.9	27 05.2	78 32	28.6	3
4	22 48.8	80 35	31.5	23 12.7	80 34	31.2	24 00.5	79 34	30.5	24 24.3	79 33	30.2	24 48.0	79 33	29.8	25 11.8	79 33	29.5	26 22.7	79 32	28.5	26 46.2	78 31	28.1	4
125	22 28.0	81 34	31.0	22 52.1	80 34	30.7	23 40.2	80 33	30.0	24 04.3	80 33	29.7	24 28.2	80 33	29.4	24 52.2	80 32	29.0	26 03.7	79 31	28.0	26 27.4	79 31	27.7	125
6	22 07.4	81 34	30.5	22 31.8	81 33	30.2	23 20.3	81 33	29.5	23 44.5	81 32	29.2	24 08.7	81 32	28.9	24 32.8	80 32	28.5	25 45.0	80 31	27.6	26 08.9	80 30	27.2	6
7	21 47.2	82 33	30.0	22 11.8	82 33	29.7	23 00.7	81 32	29.0	23 25.1	81 32	28.7	23 49.5	81 32	28.4	24 13.8	81 31	28.1	25 26.5	81 30	27.1	25 50.7	80 30	26.8	7
8	21 27.3	82 33	29.4	21 52.0	82 32	29.1	22 41.3	82 32	28.5	23 05.9	82 31	28.2	23 30.5	82 31	27.9	23 55.0	82 31	27.6	25 08.4	81 30	26.6	25 32.7	81 29	26.3	8
9	21 07.8	83 32	28.9	21 32.6	83 32	28.6	22 22.3	83 31	28.0	22 47.1	83 31	27.7	23 11.9	82 31	27.4	23 36.6	82 30	27.1	24 50.5	82 29	26.2	25 15.1	82 29	25.9	9
130	20 48.5	84 32	28.4	21 13.6	84 31	28.1	22 03.6	83 31	27.5	22 28.6	83 30	27.2	22 53.5	83 30	26.9	23 18.4	83 30	26.6	24 33.0	83 29	25.7	24 57.7	82 28	25.4	130
1	20 29.5	84 31	27.9	20 54.8	84 31	27.6	21 45.2	84 30	27.0	22 10.4	84 30	26.7	22 35.5	84 30	26.4	23 00.6	84 29	26.1	24 15.7	83 28	25.2	24 40.7	83 28	24.9	1
2	20 10.9	85 30	27.4	20 36.4	85 30	27.1	21 27.1	85 30	26.5	21 52.5	84 29	26.2	22 17.8	84 29	25.9	22 43.1	84 29	25.7	23 58.7	84 28	24.8	24 23.9	84 27	24.5	2
3	19 52.6	85 30	26.8	20 18.2	85 30	26.6	21 09.4	85 29	26.0	21 34.9	85 29	25.7	22 00.4	85 28	25.4	22 25.8	85 28	25.2	23 42.1	85 27	24.3	24 07.4	84 27	24.0	3
4	19 34.7	86 29	26.3	20 00.4	86 29	26.0	20 51.9	86 29	25.5	21 17.6	86 28	25.2	21 43.3	86 28	24.9	22 08.9	85 28	24.7	23 25.7	85 27	23.8	23 51.2	85 26	23.5	4
135	19 17.0	87 29	25.8	19 43.0	86 29	25.5	20 34.8	86 28	25.0	21 00.7	86 28	24.7	21 26.5	86 27	24.4	21 52.3	86 27	24.2	23 09.6	86 26	23.3	23 35.3	86 26	23.1	135
6	18 59.7	87 28	25.3	19 25.8	87 28	25.0	20 18.0	87 27	24.5	20 44.1	87 27	24.2	21 10.1	87 27	23.9	21 36.1	87 27	23.7	22 53.9	86 26	22.9	23 19.8	86 25	22.6	6
7	18 42.8	88 28	24.7	19 09.1	88 27	24.5	20 01.5	87 27	23.9	20 27.8	87 27	23.7	20 53.9	87 26	23.4	21 20.1	87 26	23.2	22 38.5	87 25	22.4	23 04.5	87 25	22.1	7
8	18 26.2	88 27	24.2	18 52.6	88 27	23.9	19 45.4	88 26	23.4	20 11.8	88 26	23.2	20 38.1	88 26	22.9	21 04.5	88 26	22.7	22 23.3	87 25	21.9	22 49.6	87 24	21.6	8
9	18 09.9	89 27	23.6	18 36.5	89 26	23.4	19 29.6	88 26	22.9	19 56.2	88 26	22.7	20 22.7	88 25	22.4	20 49.2	88 25	22.2	22 08.5	88 24	21.4	22 34.9	88 24	21.1	9
140	17 54.0	89 26	23.1	18 20.7	89 26	22.9	19 14.2	89 25	22.4	19 40.9	89 25	22.1	20 07.5	89 25	21.9	20 34.2	89 24	21.6	21 54.0	89 24	20.9	22 20.6	89 23	20.7	140
1	17 38.4	90 25	22.5	18 05.3	90 25	22.3	18 59.1	90 25	21.8	19 25.9	89 24	21.6	19 52.7	89 24	21.4	20 19.6	89 24	21.1	21 39.9	89 23	20.4	22 06.6	89 23	20.2	1
2	17 23.2	90 25	22.0	17 50.2	90 25	21.8	18 44.3	90 24	21.3	19 11.3	90 24	21.1	19 38.3	90 24	20.9	20 05.2	90 23	20.6	21 26.0	90 22	19.9	21 52.9	90 22	19.7	2
3	17 08.3	91 24	21.5	17 35.5	91 24	21.2	18 29.9	91 23	20.8	18 57.0	90 23	20.6	19 24.2	90 23	20.3	19 51.3	90 23	20.1	21 12.5	90 22	19.4	21 39.6	90 22	19.2	3
4	16 53.8	91 24	20.9	17 21.2	91 23	20.7	18 15.8	91 23	20.3	18 43.1	91 23	20.0	19 10.4	91 22	19.8	19 37.6	91 22	19.6	20 59.3	91 21	18.9	21 26.5	91 21	18.7	4
145	16 39.7	92 23	20.3	17 07.2	92 23	20.1	18 02.1	91 22	19.7	18 29.5	91 22	19.5	18 56.9	91 22	19.3	19 24.4	91 22	19.1	20 46.5	91 21	18.4	21 13.8	91 21	18.2	145
6	16 25.9	92 22	19.8	16 53.5	92 22	19.6	17 48.7	92 22	19.2	18 16.3	92 22	19.0	18 43.9	92 21	18.8	19 11.4	92 21	18.6	20 34.0	92 20	17.9	21 01.5	92 20	17.7	6
7	16 12.5	93 22	19.2	16 40.2	92 22	19.0	17 35.7	92 21	18.6	18 03.4	92 21	18.4	18 31.1	92 21	18.2	18 58.8	92 20	18.0	20 21.8	92 20	17.4	20 49.4	92 20	17.2	7
8	15 59.4	93 21	18.7	16 27.3	93 21	18.5	17 23.1	93 20	18.1	17 50.9	93 20	17.9	18 18.7	93 20	17.7	18 46.6	93 20	17.5	20 10.0	93 19	16.9	20 37.7	93 19	16.7	8
9	15 46.8	93 20	18.1	16 14.8	93 20	17.9	17 10.8	93 20	17.5	17 38.7	93 20	17.4	18 06.7	93 19	17.2	18 34.7	93 19	17.0	19 58.4	93 19	16.4	20 26.4	93 18	16.2	9
150	15 34.5	94 20	17.5	16 02.6	94 20	17.4	16 58.8	94 19	17.0	17 26.9	94 19	16.8	17 55.0	94 19	16.6	18 23.1	94 19	16.4	19 47.3	93 18	15.9	20 15.3	93 18	15.7	150
1	15 22.6	94 19	17.0	15 50.8	94 19	16.8	16 47.3	94 19	16.4	17 15.5	94 18	16.3	17 43.7	94 18	16.1	18 11.9	94 18	15.9	19 36.5	94 17	15.4	20 04.6	94 17	15.2	1
2	15 11.0	95 19	16.4	15 39.4	95 18	16.2	16 36.1	94 18	15.9	17 04.5	94 18	15.7	17 32.8	94 18	15.6	18 01.1	94 17	15.4	19 26.0	94 17	14.9	19 54.3	94 17	14.7	2
3	14 59.9	95 18	15.8	15 28.4	95 18	15.7	16 25.3	95 17	15.3	16 53.8	95 17	15.2	17 22.2	95 17	15.0	17 50.6	95 17	14.8	19 15.9	95 16	14.3	19 44.3	95 16	14.2	3
4	14 49.1	95 17	15.3	15 17.7	95 17	15.1	16 14.9	95 17	14.8	16 43.4	95 17	14.6	17 12.0	95 16	14.5	17 40.5	95 16	14.3	19 06.1	95 16	13.8	19 34.6	95 16	13.7	4
155	14 38.8	96 17	14.7	15 07.4	96 16	14.5	16 04.8	96 16	14.2	16 33.5	96 16	14.1	17 02.1	96 16	13.9	17 30.8	96 16	13.8	18 56.7	95 15	13.3	19 25.3	95 15	13.1	155
6	14 28.8	96 16	14.1	14 57.6	96 16	14.0	15 55.1	96 16	13.7	16 23.9	96 15	13.5	16 52.6	96 15	13.4	17 21.4	96 15	13.2	18 47.6	96 14	12.8	19 16.4	96 14	12.6	6
7	14 19.2	96 15	13.5	14 48.1	96 15	13.4	15 45.8	96 15	13.1	16 14.7	96 15	13.0	16 43.5	96 15	12.8	17 12.4	96 14	12.7	18 38.9	96 14	12.3	19 07.8	96 14	12.1	7
8	14 10.0	97 15	13.0	14 38.9	97 15	12.8	15 36.9	97 14	12.6	16 05.8	97 14	12.4	16 34.8	97 14	12.3	17 03.8	97 14	12.2	18 30.6	96 13	11.7	18 59.5	96 13	11.6	8
9	14 01.2	97 14	12.4	14 30.2	97 14	12.3	15 28.3	97 14	12.0	15 57.4	97 13	11.9	16 26.4	97 13	11.7	16 55.5	97 13	11.6	18 22.6	97 13	11.2	18 51.6	97 13	11.1	9
160	13 52.7	97 13	11.8	14 21.9	97 13	11.7	15 20.2	97 13	11.4	15 49.3	97 13	11.3	16 18.5	97 13	11.2	16 47.6	97 13	11.1	18 15.0	97 12	10.7	18 44.1	97 12	10.6	160
1	13 44.7	97 13	11.2	14 14.0	97 13	11.1	15 12.4	97 12	10.9	15 41.6	97 12	10.8	16 10.9	97 12	10.6	16 40.1	97 12	10.5	18 07.7	97 12	10.2	18 36.9	97 11	10.0	1
2	13 37.1	98 12	10.6	14 06.4	98 12	10.5	15 05.0	98 12	10.3	15 34.3	98 12	10.2	16 03.6	98 11	10.1	16 32.9	98 11	10.0	18 00.8	98 11	09.6	18 30.1	98 11	09.5	2
3	13 29.9	98 11	10.1	13 59.3	98 11	10.0	14 58.1	98 11	09.7	15 27.4	98 11	09.6	15 56.8	98 11	09.5	16 26.2	98 11	09.4	17 54.3	98 10	09.1	18 23.6	98 10	09.0	3
4	13 23.1	98 11	09.5	13 52.6	98 11	09.4	14 51.5	98 10	09.2	15 20.9	98 10	09.1	15 50.3	98 10	09.0	16 19.8	98 10	08.9	17 48.1	98 10	08.6	18 17.5	98 10	08.5	4
165	13 16.7	98 10	08.9	13 46.2	98 10	08.8	14 45.2	98 10	08.6	15 14.8	98 10	08.5	15 44.3	98 09	08.4	16 13.8	98 09	08.3	17 42.3	98 09	08.0	18 11.8	98 09	07.9	165
6	13 10.7	99 09	08.3	13 40.3	99 09	08.2	14 39.4	99 09	08.0	15 09.0	99 09	08.0	15 38.6	99 09	07.9	16 08.2	99 09	07.8	17 36.9	99 08	07.5	18 06.4	99 08	07.4	6
7	13 05.1	99 09	07.7	13 34.7	99 09	07.6	14 34.0	99 08	07.5	15 03.7	99 08	07.4	15 33.3	99 08	07.3	16 02.9	99 08	07.2	17 31.8	99 08	07.0	18 01.4	99 08	06.9	7
8	12 59.9	99 08	07.1	13 29.6	99 08	07.0	14 29.0	99 08	06.9	14 58.7	99 08	06.8	15 28.4	99 08	06.7	15 58.1	99 07	06.7	17 27.1	99 07	06.4	17 56.8	99 07	06.4	8
9	12 55.2	99 07	06.5	13 24.9	99 07	06.5	14 24.4	99 07	06.3	14 54.1	99 07	06.3	15 23.9	99 07	06.2	15 53.6	99 07	06.1	17 22.8	99 07	05.9	17 52.5	99 06	05.8	9
170	12 50.8	99 07	05.9	13 20.6	99 06	05.9	14 20.2	99 06	05.8	14 49.9	99 06	05.7	15 19.7	99 06	05.6	15 49.5	99 06	05.6	17 18.8	99 06	05.4	17 48.6	99 06	05.3	170
1	12 46.9	99 06	05.3	13 16.7	99 06	05.3	14 16.3	99 06	05.2	14 46.2	99 06	05.1	15 16.0	99 06	05.1	15 45.8	99 06	05.0	17 15.3	99 05	04.8	17 45.1	99 05	04.8	1
2	12 43.3	1.0 05	04.8	13 13.2	1.0 05	04.7	14 12.9	1.0 05	04.6	14 42.8	1.0 05	04.6	15 12.6	1.0 05	04.5	15 42.5	1.0 05	04.5	17 12.1	1.0 05	04.3	17 41.9	1.0 05	04.3	2
3	12 40.2	1.0 04	04.2	13 10.1	1.0 04	04.1	14 09.9	1.0 04	04.0	14 39.8	1.0 04	04.0	15 09.7	1.0 04	03.9	15 39.6	1.0 04	03.9	17 09.2	1.0 04	03.8	17 39.1	1.0 04	03.7	3
4	12 37.5	1.0 04	03.6	13 07.4	1.0 04	03.5	14 07.3	1.0 04	03.5	14 37.2	1.0 04	03.4	15 07.1	1.0 04	03.4	15 37.0	1.0 04	03.3	17 06.8	1.0 03	03.2	17 36.7	1.0 03	03.2	4
175	12 35.2	1.0 03	03.0	13 05.2	1.0 03	02.9	14 05.0	1.0 03	02.9	14 35.0	1.0 03	02.8	15 04.9	1.0 03	02.8	15 34.9	1.0 03	02.8	17 04.7	1.0 03	02.7	17 34.7	1.0 03	02.7	175
6	12 33.3	1.0 02	02.4	13 03.3	1.0 02	02.4	14 03.2	1.0 02	02.3	14 33.2	1.0 02	02.3	15 03.2	1.0 02	02.3	15 33.1	1.0 02	02.2	17 03.0	1.0 02	02.2	17 33.0	1.0 02	02.1	6
7	12 31.9	1.0 02	01.8	13 01.9	1.0 02	01.8	14 01.8	1.0 02	01.7	14 31.8	1.0 02	01.7	15 01.8	1.0 02	01.7	15 31.8	1.0 02	01.7	17 01.7	1.0 02	01.6	17 31.7	1.0 02	01.6	7
8	12 30.8	1.0 01	01.2	13 00.8	1.0 01	01.2	14 00.8	1.0 01	01.2	14 30.8	1.0 01	01.1	15 00.8	1.0 01	01.1	15 30.8	1.0 01	01.1	17 00.8	1.0 01	01.1	17 30.7	1.0 01	01.1	8
9	12 30.2	1.0 00	00.6	13 00.2	1.0 00	00.6	14 00.2	1.0 00	00.6	14 30.2	1.0 00	00.6	15 00.2	1.0 00	00.6	15 30.2	1.0 00	00.6	17 00.2	1.0 00	00.5	17 30.2	1.0 00	00.5	9
180	12 30.0	1.0 00	00.0	13 00.0	1.0 00	00.0	14 00.0	1.0 00	00.0	14 30.0	1.0 00	00.0	15 00.0	1.0 00	00.0	15 30.0	1.0 00	00.0	17 00.0	1.0 00	00.0	17 30.0	1.0 00	00.0	180

Lat. 48°

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	78 00.0	1.0 01	00.0	77 30.0	1.0 01	00.0	76 00.0	1.0 01	00.0	75 30.0	1.0 01	00.0	75 00.0	1.0 01	00.0	69 00.0	1.0 01	00.0	68 30.0	1.0 01	00.0	63 30.0	1.0 00	00.0	00
1	77 59.2	1.0 04	02.4	77 29.2	1.0 04	02.3	75 59.3	1.0 03	01.9	75 29.4	1.0 03	01.8	74 59.4	1.0 03	01.8	68 59.6	1.0 02	01.0	68 29.7	1.0 02	01.0	63 29.8	1.0 01	00.6	1
2	77 56.6	99 07	04.8	77 26.8	99 07	04.5	75 57.3	1.0 06	03.9	75 27.4	1.0 05	03.7	74 57.5	1.0 05	03.5	68 58.6	1.0 03	02.0	68 28.7	1.0 03	01.9	63 29.2	1.0 02	01.2	2
3	77 52.5	99 10	07.2	77 22.9	99 09	06.8	75 53.9	99 08	05.8	75 24.2	99 07	05.5	74 54.5	99 07	05.2	68 56.9	1.0 04	03.0	68 27.0	1.0 04	02.9	63 28.1	1.0 02	01.8	3
4	77 46.6	98 12	09.5	77 17.4	98 12	09.0	75 49.2	98 10	07.7	75 19.7	98 10	07.3	74 50.2	98 09	07.0	68 54.4	99 05	04.0	68 24.7	99 05	03.8	63 26.6	99 03	02.4	4
05	77 39.2	96 15	11.8	77 10.3	96 14	11.1	75 43.2	97 12	09.5	75 14.0	97 12	09.1	74 44.8	98 11	08.6	68 51.3	99 06	05.0	68 21.7	99 06	04.7	63 24.8	99 04	03.0	05
6	77 30.3	95 17	14.0	77 01.9	95 17	13.3	75 35.9	96 14	11.4	75 07.1	96 14	10.8	74 38.2	96 13	10.3	68 47.5	98 08	05.9	68 18.0	98 07	05.7	63 22.5	99 04	03.6	6
7	77 19.9	93 20	16.1	76 51.9	93 19	15.3	75 27.4	95 16	13.2	74 58.9	95 15	12.5	74 30.4	95 15	12.0	68 43.0	97 09	06.9	68 13.7	98 08	06.6	63 19.8	98 05	04.2	7
8	77 08.0	91 22	18.2	76 40.7	91 21	17.3	75 17.6	93 18	14.9	74 49.6	93 17	14.2	74 21.5	94 17	13.6	68 37.8	97 10	07.9	68 08.8	97 09	07.5	63 16.6	98 06	04.7	8
9	76 54.8	89 24	20.2	76 28.1	89 23	19.2	75 06.7	91 20	16.6	74 39.2	92 19	15.8	74 11.6	92 18	15.1	68 32.0	96 11	08.8	68 03.2	96 10	08.4	63 13.1	97 07	05.3	9
10	76 40.3	86 26	22.1	76 14.2	87 25	21.1	74 54.7	89 22	18.3	74 27.7	90 21	17.4	74 00.6	91 20	16.6	68 25.5	95 12	09.7	67 57.0	95 11	09.3	63 09.2	97 07	05.9	10
1	76 24.6	84 28	24.0	75 59.2	85 27	22.8	74 41.6	88 24	19.8	74 15.2	88 23	18.9	73 48.6	89 22	18.1	68 18.4	94 13	10.7	67 50.2	94 12	10.2	63 04.9	96 08	06.5	1
2	76 07.7	81 30	25.7	75 43.1	83 29	24.5	74 27.4	85 25	21.4	74 01.7	86 24	20.4	73 35.7	87 23	19.5	68 10.7	93 14	11.6	67 42.8	93 13	11.1	63 00.2	95 08	07.0	2
3	75 49.8	79 32	27.4	75 25.9	80 30	26.1	74 12.3	83 27	22.8	73 47.2	84 26	21.8	73 21.8	85 25	20.9	68 02.3	92 15	12.4	67 34.8	92 14	11.9	62 55.0	94 09	07.6	3
4	75 30.8	76 33	28.9	75 07.8	78 32	27.7	73 56.3	81 28	24.2	73 31.8	82 27	23.2	73 07.0	83 26	22.2	67 53.3	90 16	13.3	67 26.2	91 15	12.8	62 49.6	94 10	08.1	4
15	75 11.0	74 35	30.4	74 48.7	75 33	29.1	73 39.4	79 30	25.6	73 15.6	80 28	24.5	72 51.4	81 27	23.5	67 43.8	89 17	14.2	67 17.1	89 16	13.6	62 43.7	93 10	08.7	15
6	74 50.2	71 36	31.8	74 28.7	72 35	30.5	73 21.6	76 31	26.9	72 58.5	78 30	25.8	72 35.1	79 29	24.7	67 33.7	88 18	15.0	67 07.4	88 17	14.4	62 37.4	92 11	09.2	6
7	74 28.7	68 37	33.1	74 08.0	70 36	31.8	73 03.1	74 32	28.1	72 40.7	75 31	27.0	72 17.9	77 30	25.9	67 23.0	86 19	15.8	66 57.1	87 18	15.2	62 30.8	91 12	09.7	7
8	74 06.4	66 38	34.3	73 46.5	67 37	33.0	72 43.9	72 33	29.3	72 22.1	73 32	28.1	72 00.0	74 31	27.0	67 11.8	85 20	16.6	66 46.4	85 19	15.9	62 23.8	89 12	10.3	8
9	73 43.4	63 39	35.5	73 24.3	65 38	34.1	72 23.9	69 34	30.4	72 02.9	71 33	29.2	71 41.4	72 32	28.1	67 00.1	83 20	17.4	66 35.1	84 20	16.7	62 16.5	88 13	10.8	9
20	73 19.8	60 40	36.6	73 01.4	62 39	35.2	72 03.3	67 35	31.4	71 43.0	68 34	30.2	71 22.2	70 33	29.1	66 47.9	81 21	18.1	66 23.3	82 20	17.4	62 08.8	87 13	11.3	20
1	72 55.6	58 41	37.6	72 38.0	60 40	36.2	71 42.1	65 36	32.4	71 22.5	66 35	31.2	71 02.4	67 34	30.1	66 35.1	80 22	18.9	66 11.1	80 21	18.1	62 00.8	86 14	11.8	1
2	72 30.8	55 42	38.6	72 14.0	57 41	37.2	71 20.3	62 37	33.3	71 01.4	64 36	32.1	70 42.0	65 35	31.0	66 21.9	78 23	19.6	65 58.4	79 22	18.8	61 52.4	85 14	12.3	2
3	72 05.5	53 43	39.4	71 49.4	55 42	38.1	70 57.9	60 38	34.2	70 39.8	61 37	33.0	70 21.1	63 36	31.8	66 08.2	76 24	20.3	65 45.2	77 23	19.5	61 43.8	83 15	12.7	3
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25	71 13.6	48 44	41.0	70 59.0	50 43	39.7	70 11.8	55 40	35.8	69 55.1	57 38	34.6	69 37.8	58 37	33.5	65 39.6	73 25	21.6	65 17.6	74 24	20.7	61 25.4	81 16	13.7	25
6	70 47.1	45 45	41.8	70 33.2	47 44	40.4	69 48.1	53 40	36.6	69 32.0	54 39	35.4	69 15.5	56 38	34.2	65 24.6	71 26	22.2	65 03.2	72 25	21.3	61 15.8	79 17	14.1	6
7	70 20.2	43 45	42.4	70 07.0	45 44	41.1	69 24.0	50 41	37.3	69 08.6	52 40	36.1	68 52.7	54 39	34.9	65 09.3	69 26	22.8	64 48.4	70 25	21.9	61 05.9	78 17	14.5	7
8	69 52.9	41 46	43.0	69 40.4	43 45	41.7	68 59.5	48 41	37.9	68 44.8	50 40	36.7	68 29.5	52 39	35.5	64 53.5	67 27	23.4	64 33.2	68 26	22.5	60 55.6	76 18	15.0	8
9	69 25.4	38 46	43.6	69 13.5	40 45	42.3	68 34.6	46 42	38.5	68 20.6	48 41	37.3	68 06.0	49 40	36.2	64 37.4	65 27	23.9	64 17.7	66 26	23.0	60 45.1	75 18	15.4	9
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1	68 29.5	34 47	44.6	68 18.9	36 46	43.3	67 44.0	42 43	39.7	67 31.2	43 42	38.5	67 18.0	45 41	37.3	64 04.2	62 28	25.0	63 45.6	63 28	24.1	60 23.3	72 19	16.2	1
2	68 01.2	32 48	45.1	67 51.3	34 46	43.8	67 18.2	39 43	40.1	67 06.1	41 42	39.0	66 53.5	43 41	37.8	63 47.1	60 29	25.5	63 29.0	61 28	24.6	60 12.0	70 19	16.6	2
3	67 32.6	30 48	45.5	67 23.4	32 47	44.2	66 52.2	37 44	40.6	66 40.7	39 43	39.4	66 28.8	41 42	38.3	63 29.7	58 30	25.9	63 12.2	59 29	25.0	60 00.4	68 20	16.9	3
4	67 03.9	28 48	45.8	66 55.3	30 47	44.6	66 26.0	35 44	41.0	66 15.1	37 43	39.9	66 03.8	39 42	38.7	63 12.0	56 30	26.4	62 55.1	57 29	25.5	59 48.6	67 20	17.3	4
35	66 35.0	26 48	46.2	66 27.0	28 47	45.0	65 59.5	33 44	41.4	65 49.3	35 43	40.3	65 38.5	37 42	39.2	62 54.0	54 30	26.8	62 37.7	55 29	25.9	59 36.6	65 20	17.6	35
6	66 06.0	24 49	46.5	65 58.5	26 48	45.3	65 32.8	31 45	41.8	65 23.2	33 44	40.7	65 13.1	35 43	39.5	62 35.8	52 31	27.2	62 20.0	53 30	26.3	59 24.3	63 21	18.0	6
7	65 36.8	22 49	46.8	65 29.9	24 48	45.6	65 06.0	29 45	42.1	64 56.9	31 44	41.0	64 47.4	33 43	39.9	62 17.3	50 31	27.6	62 02.1	51 30	26.7	59 11.8	62 21	18.3	7
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9	64 38.0	18 49	47.3	64 32.2	20 48	46.1	64 11.8	25 46	42.7	64 03.9	27 45	41.6	63 55.6	29 44	40.5	61 39.6	46 32	28.4	61 25.5	47 31	27.4	58 46.1	58 22	18.9	9
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1	63 38.9	15 50	47.6	63 34.2	17 49	46.5	63 17.0	22 46	43.2	63 10.3	23 45	42.2	63 03.1	25 44	41.1	61 01.0	42 33	29.0	60 48.1	44 32	28.1	58 19.7	55 22	19.5	1
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4	62 09.6	10 50	48.0	62 06.4	11 49	47.0	61 54.0	16 46	43.8	61 48.9	18 46	42.8	61 43.4	19 45	41.7	60 01.7	37 33	29.9	59 50.6	38 33	29.0	57 38.7	50 23	20.3	4
45	61 39.7	08 50	48.1	61 37.0	10 49	47.1	61 26.2	14 47	44.0	61 21.6	16 46	42.9	61 16.6	18 45	41.9	59 41.7	35 34	30.1	59 31.0	36 33	29.2	57 24.7	48 24	20.5	45
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7	60 39.8	05 50	48.3	60 38.1	06 49	47.3	60 30.3	11 47	44.2	60 26.8	13 46	43.2	60 22.8	14 45	42.2	59 01.1	31 34	30.6	58 51.6	32 33	29.7	56 56.2	44 24	21.0	7
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9	59 39.8	02 50	48.3	59 39.1	03 49	47.4	59 34.2	08 47	44.4	59 31.7	09 46	43.4	59 28.7	11 45	42.4	58 19.9	27 35	31.0	58 11.5	29 34	30.1	56 27.2	41 25	21.4	9
50	59 09.8	00 50	48.4	59 09.6	02 49	47.4	59 06.1	06 47	44.5	59 04.1	07 46	43.5	59 01.6	09 45	42.5	57 59.2	26 35	31.2	57 51.3	27 34	30.3	56 12.5	39 25	21.6	50
1	58 39.8	01 50	48.3	58 40.0	00 49	47.4	58 38.0	04 47	44.5	58 36.4	06 46	43.5	58 34.5	07 45	42.6	57 38.3	24 35	31.4	57 31.0	25 34	30.4	55 57.6	37 25	21.8	1
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9	54 40.6	13 50	47.8	54 44.2	11 49	47.0	54 52.8	08 47	44.4	54 55.0	07 46	43.5	54 56.7	05 45	42.7	54 48.9	10 36	32.2	54 45.8	11 35	31.4	53 55.3	23 26	22.9	9
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6	51 13.8	22 49	46.8	51 20.1	21 48	46.1	51 37.3	17 46	43.7	51 42.4	16 45	42.9	51 47.2	15 45	42.1	52 18.5	02 36	32.4	52 19.0	01 35	31.6	52 04.7	10 27	23.4	6
7	50 44.5	23 49	46.7	50 51.3	22 48	45.9	51 09.6	19 46	43.6	51 15.1	18 45	42.8	51 20.3	17 45	42.0	51 57.0	04 36	32.4	51 58.0	03 35	31.5	51 48.7	09 27	23.4	7
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3	47 51.0	30 48	45.4	48 00.0	29 47	44.7	48 25.1	27 45	42.6	48 32.9	26 45	41.8	48 40.4	25 44	41.1	49 48.5	13 36	32.1	49 52.3	12 35	31.3	50 12.6	02 27	23.5	3
4	47 22.5	31 47	45.2	47 31.8	30 47	44.5	47 58.0	28 45	42.4	48 06.2	27 44	41.7	48 14.1	26 44	40.9	49 27.2	14 35	32.0	49 31.4	13 35	31.2	49 56.6	03 27	23.5	4
75	46 54.1	32 47	45.0	47 03.7	32 47	44.3	47 30.9	29 45	42.2	47 39.5	28 44	41.5	47 47.8	27 44	40.8	49 06.0	16 35	31.9	49 10.6	15 35	31.2	49 40.6	05 27	23.5	75
6	46 25.7	34 47	44.7	46 35.7	33 46	44.1	47 04.0	30 45	42.0	47 13.0	29 44	41.3	47 21.7	29 43	40.6	48 44.8	17 35	31.8	48 49.9	17 34	31.1	49 24.6	07 27	23.5	6
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9	45 01.5	37 46	44.0	45 12.5	36 46	43.3	45 44.0	34 44	41.3	45 54.0	33 44	40.6	46 03.8	32 43	40.0	47 41.5	22 35	31.5	47 48.0	21 34	30.8	48 36.7	11 27	23.4	9
80	44 33.7	38 46	43.7	44 45.0	37 46	43.1	45 17.6	35 44	41.1	45 27.9	34 43	40.4	45 38.1	33 43	39.7	47 20.6	23 35	31.4	47 27.4	22 34	30.7	48 20.7	13 26	23.3	80
1	44 06.0	39 46	43.4	44 17.7	38 45	42.8	44 51.2	36 44	40.9	45 02.0	35 43	40.2	45 12.5	35 42	39.5	46 59.7	25 35	31.3	47 07.0	24 34	30.6	48 04.9	15 26	23.3	1
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3	43 11.1	41 45	42.9	43 23.4	41 45	42.3	43 59.0	38 43	40.4	44 10.4	38 43	39.7	44 21.6	37 42	39.1	46 18.2	28 34	31.0	46 26.3	27 34	30.3	47 33.2	18 26	23.1	3
4	42 43.8	42 45	42.6	42 56.4	42 45	42.0	43 33.0	40 43	40.1	43 44.8	39 42	39.5	43 56.4	38 42	38.8	45 57.6	29 34	30.8	46 06.1	28 34	30.2	47 17.5	19 26	23.1	4
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6	41 49.8	44 45	42.0	42 03.0	44 44	41.4	42 41.6	42 42	39.6	42 54.0	41 42	39.0	43 06.3	41 41	38.3	45 16.6	32 34	30.5	45 26.0	31 33	29.9	46 46.1	22 26	22.9	6
7	41 23.0	45 44	41.7	41 36.5	45 44	41.1	42 16.1	43 42	39.3	42 28.9	42 42	38.7	42 41.5	42 41	38.1	44 56.3	33 34	30.4	45 06.0	32 33	29.7	46 30.5	24 26	22.8	7
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9	40 29.9	48 44	41.1	40 44.1	47 43	40.5	41 25.5	45 42	38.8	41 39.0	45 41	38.2	41 52.2	44 41	37.6	44 15.9	36 33	30.0	44 26.5	35 33	29.4	45 59.5	27 26	22.6	9
90	40 03.6	49 44	40.8	40 18.0	48 43	40.2	41 00.5	46 42	38.5	41 14.2	46 41	37.9	41 27.8	45 40	37.3	43 55.8	37 33	29.8	44 06.8	36 33	29.2	45 44.1	28 26	22.5	90

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H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	39 37.4	50 43	40.5	39 52.2	49 43	39.9	40 35.6	47 41	38.2	40 49.7	47 41	37.6	41 03.6	46 40	37.0	43 35.9	38 33	29.7	43 47.3	38 32	29.0	45 28.8	30 25	22.4	91
2	39 11.5	51 43	40.1	39 26.5	50 42	39.6	40 10.8	48 41	37.9	40 25.2	48 40	37.3	40 39.5	47 40	36.7	43 16.1	40 33	29.5	43 27.9	39 32	28.8	45 13.5	31 25	22.3	2
3	38 45.7	52 43	39.8	39 01.0	51 42	39.3	39 46.2	49 41	37.6	40 01.0	49 40	37.0	40 15.6	48 40	36.4	42 56.4	41 33	29.3	43 08.6	40 32	28.6	44 58.3	33 25	22.2	3
4	38 20.0	53 42	39.5	38 35.7	52 42	38.9	39 21.8	50 40	37.3	39 36.9	50 40	36.7	39 51.8	49 39	36.2	42 36.9	42 32	29.1	42 49.4	41 32	28.4	44 43.2	34 25	22.0	4
95	37 54.6	54 42	39.1	38 10.6	53 42	38.6	38 57.6	51 40	37.0	39 13.0	51 40	36.4	39 28.2	50 39	35.9	42 17.4	43 32	28.9	42 30.3	43 32	28.2	44 28.2	36 25	21.9	95
6	37 29.3	54 42	38.8	37 45.6	54 41	38.3	38 33.5	53 40	36.7	38 49.2	52 39	36.1	39 04.7	51 39	35.6	41 58.1	45 32	28.6	42 11.4	44 31	28.0	44 13.2	37 25	21.8	6
7	37 04.3	55 41	38.5	37 20.8	55 41	37.9	38 09.7	54 40	36.3	38 25.6	53 39	35.8	38 41.5	53 38	35.3	41 38.9	46 32	28.4	41 52.6	45 31	27.8	43 58.4	39 25	21.6	7
8	36 39.4	56 41	38.1	36 56.2	56 41	37.6	37 46.0	55 39	36.0	38 02.2	54 39	35.5	38 18.4	54 38	35.0	41 19.9	47 32	28.2	41 33.9	46 31	27.6	43 43.7	40 24	21.5	8
9	36 14.7	57 41	37.8	36 31.9	57 40	37.2	37 22.4	56 39	35.7	37 39.0	55 38	35.2	37 55.5	55 38	34.6	41 01.0	48 31	28.0	41 15.4	48 31	27.4	43 29.0	41 24	21.3	9
100	35 50.2	58 40	37.4	36 07.6	58 40	36.9	36 59.1	57 39	35.4	37 16.0	56 38	34.8	37 32.8	56 38	34.3	40 42.2	49 31	27.7	40 57.0	49 30	27.2	43 14.4	43 24	21.2	100
1	35 26.0	59 40	37.0	35 43.6	59 40	36.5	36 36.0	58 38	35.0	36 53.2	57 38	34.5	37 10.2	57 37	34.0	40 23.6	51 31	27.5	40 38.7	50 30	26.9	43 00.0	44 24	21.0	1
2	35 01.9	60 40	36.7	35 19.8	60 39	36.2	36 13.0	58 38	34.7	36 30.5	58 37	34.2	36 47.8	58 37	33.7	40 05.1	52 31	27.3	40 20.6	51 30	26.7	42 45.6	45 24	20.9	2
3	34 38.0	61 39	36.3	34 56.2	61 39	35.8	35 50.3	59 38	34.4	36 08.0	59 37	33.9	36 25.7	59 37	33.4	39 46.8	53 30	27.0	40 02.6	52 30	26.5	42 31.4	47 24	20.7	3
4	34 14.3	62 39	35.9	34 32.8	62 39	35.5	35 27.7	60 37	34.0	35 45.8	60 37	33.5	36 03.7	60 36	33.0	39 28.6	54 30	26.8	39 44.8	54 29	26.2	42 17.3	48 23	20.5	4
105	33 50.9	63 39	35.6	34 09.7	62 38	35.1	35 05.4	61 37	33.7	35 23.7	61 36	33.2	35 41.9	61 36	32.7	39 10.6	55 30	26.5	39 27.1	55 29	26.0	42 03.3	49 23	20.3	105
6	33 27.6	64 38	35.2	33 46.7	63 38	34.7	34 43.2	62 37	33.3	35 01.8	62 36	32.8	35 20.3	61 36	32.3	38 52.8	56 29	26.3	39 09.6	56 29	25.7	41 49.4	51 23	20.2	6
7	33 04.6	65 38	34.8	33 23.9	64 38	34.3	34 21.3	63 36	32.9	34 40.2	63 36	32.5	34 59.0	62 35	32.0	38 35.1	57 29	26.0	38 52.3	57 29	25.5	41 35.6	52 23	20.0	7
8	32 41.8	65 38	34.4	33 01.4	65 37	34.0	33 59.5	64 36	32.6	34 18.7	64 35	32.1	34 37.8	63 35	31.7	38 17.6	59 29	25.7	38 35.1	58 28	25.2	41 21.9	53 23	19.8	8
9	32 19.2	66 37	34.0	32 39.1	66 37	33.6	33 38.0	65 36	32.2	33 57.5	65 35	31.8	34 16.8	64 35	31.3	38 00.2	60 29	25.5	38 18.1	59 28	25.0	41 08.4	54 22	19.6	9
110	31 56.9	67 37	33.6	32 17.0	67 36	33.2	33 16.7	66 35	31.8	33 36.5	66 35	31.4	33 56.1	65 34	30.9	37 43.1	61 28	25.2	38 01.2	60 28	24.7	40 55.0	55 22	19.4	110
1	31 34.8	68 36	33.2	31 55.1	68 36	32.8	32 55.7	67 35	31.5	33 15.7	66 34	31.0	33 35.5	66 34	30.6	37 26.1	62 28	24.9	37 44.5	61 28	24.4	40 41.7	57 22	19.2	1
2	31 12.9	69 36	32.8	31 33.5	69 36	32.4	32 34.8	68 34	31.1	32 55.1	67 34	30.7	33 15.2	67 34	30.2	37 09.2	63 28	24.6	37 28.0	62 27	24.1	40 28.6	58 22	19.0	2
3	30 51.3	70 36	32.4	31 12.1	69 35	32.0	32 14.2	69 34	30.7	32 34.7	68 34	30.3	32 55.1	68 33	29.9	36 52.6	64 27	24.4	37 11.7	63 27	23.9	40 15.6	59 21	18.8	3
4	30 29.9	70 35	32.0	30 51.0	70 35	31.6	31 53.8	69 34	30.3	32 14.6	69 33	29.9	32 35.3	69 33	29.5	36 36.1	65 27	24.1	36 55.5	64 27	23.6	40 02.7	60 21	18.6	4
115	30 08.7	71 35	31.6	30 30.0	71 34	31.2	31 33.6	70 33	30.0	31 54.7	70 33	29.5	32 15.6	70 32	29.1	36 19.8	66 27	23.8	36 39.5	65 26	23.3	39 49.9	61 21	18.4	115
6	29 47.8	72 34	31.2	30 09.4	72 34	30.8	31 13.7	71 33	29.6	31 35.0	71 32	29.2	31 56.2	71 32	28.7	36 03.7	67 26	23.5	36 23.7	66 26	23.0	39 37.4	62 21	18.2	6
7	29 27.1	73 34	30.8	29 48.9	73 34	30.4	30 54.0	72 32	29.2	31 15.5	72 32	28.8	31 37.0	71 32	28.4	35 47.8	68 26	23.2	36 08.1	67 26	22.7	39 24.9	64 20	18.0	7
8	29 06.7	74 34	30.4	29 28.8	73 33	30.0	30 34.6	73 32	28.8	30 56.3	72 32	28.4	31 18.0	72 31	28.0	35 32.1	69 26	22.9	35 52.7	68 25	22.4	39 12.6	65 20	17.7	8
9	28 46.5	74 33	29.9	29 08.8	74 33	29.5	30 15.3	74 32	28.4	30 37.4	73 31	28.0	30 59.3	73 31	27.6	35 16.6	70 26	22.6	35 37.5	69 25	22.1	39 00.5	66 20	17.5	9
120	28 26.6	75 33	29.5	28 49.2	75 32	29.1	29 56.4	74 31	28.0	30 18.7	74 31	27.6	30 40.9	74 30	27.2	35 01.3	71 25	22.3	35 22.5	70 25	21.8	38 48.5	67 20	17.3	120
1	28 07.0	76 32	29.1	28 29.8	76 32	28.7	29 37.7	75 31	27.6	30 00.2	75 30	27.2	30 22.6	75 30	26.8	34 46.2	72 25	22.0	35 07.6	71 24	21.5	38 36.6	68 20	17.0	1
2	27 47.6	77 32	28.6	28 10.6	77 32	28.3	29 19.2	76 30	27.2	29 42.0	76 30	26.8	30 04.6	75 30	26.4	34 31.3	72 24	21.6	34 53.0	72 24	21.2	38 24.9	69 19	16.8	2
3	27 28.5	77 31	28.2	27 51.7	77 31	27.8	29 01.0	77 30	26.8	29 24.0	76 30	26.4	29 46.9	76 29	26.0	34 16.6	73 24	21.3	34 38.6	73 24	20.9	38 13.4	70 19	16.6	3
4	27 09.7	78 31	27.8	27 33.1	78 31	27.4	28 43.1	77 30	26.3	29 06.3	77 29	26.0	29 29.4	77 29	25.6	34 02.1	74 24	21.0	34 24.3	74 23	20.6	38 02.0	71 19	16.3	4
125	26 51.1	79 30	27.3	27 14.8	79 30	27.0	28 25.4	78 29	25.9	28 48.8	78 29	25.6	29 12.2	78 28	25.2	33 47.8	75 23	20.7	34 10.3	75 23	20.3	37 50.8	72 18	16.1	125
6	26 32.8	80 30	26.9	26 56.7	79 30	26.5	28 08.0	79 29	25.5	28 31.6	79 28	25.2	28 55.2	79 28	24.8	33 33.7	76 23	20.4	33 56.5	76 23	20.0	37 39.8	73 18	15.8	6
7	26 14.8	80 30	26.4	26 38.9	80 29	26.1	27 50.8	80 28	25.1	28 14.7	79 28	24.7	28 38.5	79 27	24.4	33 19.9	77 23	20.0	33 42.9	77 22	19.6	37 28.9	74 18	15.6	7
8	25 57.1	81 29	26.0	26 21.3	81 29	25.7	27 33.9	80 28	24.7	27 58.0	80 27	24.3	28 22.0	80 27	24.0	33 06.2	78 22	19.7	33 29.5	77 22	19.3	37 18.2	75 18	15.4	8
9	25 39.6	82 29	25.5	26 04.1	82 28	25.2	27 17.3	81 27	24.2	27 41.6	81 27	23.9	28 05.8	81 27	23.6	32 52.8	79 22	19.4	33 16.3	78 22	19.0	37 07.6	76 17	15.1	9
130	25 22.4	82 28	25.1	25 47.1	82 28	24.8	27 00.9	82 27	23.8	27 25.5	82 26	23.5	27 49.9	81 26	23.2	32 39.6	79 22	19.0	33 03.3	79 21	18.7	36 57.2	77 17	14.8	130
1	25 05.6	83 28	24.6	25 30.5	83 27	24.3	26 44.9	82 26	23.4	27 09.6	82 26	23.1	27 34.3	82 26	22.7	32 26.6	80 21	18.7	32 50.6	80 21	18.3	36 47.0	78 17	14.6	1
2	24 49.0	84 27	24.2	25 14.1	84 27	23.9	26 29.1	83 26	22.9	26 54.0	83 26	22.6	27 18.9	83 25	22.3	32 13.8	81 21	18.4	32 38.1	81 20	18.0	36 37.0	78 16	14.3	2
3	24 32.7	84 27	23.7	24 58.0	84 26	23.4	26 13.6	84 25	22.5	26 38.7	84 25	22.2	27 03.8	84 25	21.9	32 01.3	82 20	18.0	32 25.8	81 20	17.7	36 27.2	79 16	14.1	3
4	24 16.7	85 26	23.2	24 42.2	85 26	22.9	25 58.3	84 25	22.1	26 23.7	84 25	21.8	26 49.0	84 24	21.5	31 49.0	82 20	17.7	32 13.7	82 20	17.3	36 17.5	80 16	13.8	4
135	24 01.0	86 26	22.8	24 26.7	85 25	22.5	25 43.4	85 24	21.6	26 08.9	85 24	21.3	26 34.4	85 24	21.0	31 37.0	83 20	17.3	32 01.9	83 19	17.0	36 08.0	81 16	13.5	135
6	23 45.6	86 25	22.3	24 11.5	86 25	22.0	25 28.8	86 24	21.2	25 54.5	86 24	20.9	26 20.1	86 23	20.6	31 25.1	84 19	17.0	31 50.3	84 19	16.6	35 58.7	82 15	13.3	6
7	23 30.6	87 25	21.8	23 56.6	87 24	21.6	25 14.4	86 23	20.7	25 40.3	86 23	20.5	26 06.1	86 23	20.2	31 13.5	85 19	16.6	31 38.9	84 19	16.3	35 49.6	83 15	13.0	7
8	23 15.8	87 24	21.4	23 42.0	87 24	21.1	25 00.3	87 23	20.3	25 26.4	87 23	20.0	25 52.4	87 22	19.7	31 02.2	85 19	16.3	31 27.7	85 18	15.9	35 40.7	83 15	12.7	8
9	23 01.3	88 24	20.9	23 27.7	88 23	20.6	24 46.6	88 22	19.8	25 12.8	87 22	19.6	25 39.0	87 22	19.3	30 51.1	86 18	15.9	31 16.8	86 18	15.6	35 31.9	84 14	12.4	9
140	22 47.2	88 23	20.4	23 13.7	88 23	20.1	24 33.1	88 22	19.4	24 59.5	88 22	19.1	25 25.9	88 21	18.9	30 40.2	87 18	15.5	31 06.2	86 17	15.2	35 23.4	85 14	12.2	140
1	22 33.3	89 23	19.9	23 00.0	89 22	19.7	24 19.9	89 21	18.9	24 46.5	89 21	18.7	25 13.1	89 21	18.4	30 29.6	87 17	15.2	30 55.7	87 17	14.9	35 15.0	86 14	11.9	1
2	22 19.8	90 22	19.4	22 46.7	89 22	19.2	24 07.1	89 21	18.5	24 33.8	89 21	18.2	25 00.6	89 20	18.0	30 19.2	88 17	14.8	30 45.5	88 17	14.5	35 06.8	86 13	11.6	2
3	22 06.6	90 21	19.0	22 33.6	90 21	18.7	23 54.5	90 20	18.0	24 21.4	90 20	17.8	24 48.3	90 20	17.5	30 09.0	88 16	14.4	30 35.6	88 16	14.2	34 58.9	87 13	11.3	3
4	21 53.7	91 21	18.5	22 20.9	91 21	18.2	23 42.3	90 20	17.5	24 09.3	90 20	17.3	24 36.4	90 19	17.1	29 59.2	89 16	14.1	30 25.9	89 16	13.8	34 51.1	88 13	11.0	4
145	21 41.2	91 20	18.0	22 08.5	91 20	17.8	23 30.3	91 19	17.1	23 57.5	91 19	16.8	24 24.8	91 19	16.6	29 49.5	90 16	13.7	30 16.4	90 15	13.4	34 43.5	88 12	10.7	145
6	21 28.9	92 20	17.5	21 56.4	92 20	17.3	23 18.7	91 19	16.6	23 46.1	91 19	16.4	24 13.4	91 18	16.2	29 40.1	90 15	13.3	30 07.2	90 15	13.1	34 36.1	89 12	10.5	6
7	21 17.0	92 19	17.0	21 44.6	92 19	16.8	23 07.4	92 18	16.1	23 34.9	92 18	15.9	24 02.4	92 18	15.7	29 31.0	91 15	13.0	29 58.2	91 15	12.7	34 28.9	90 12	10.2	7
8	21 05.5	92 19	16.5	21 33.2	92 18	16.3	22 56.4	92 18	15.7	23 24.0	92 18	15.5	23 51.7	92 17	15.3	29 22.1	91 14	12.6	29 49.5	91 14	12.4	34 21.9	90 11	09.9	8
9	20 54.2	93 18	16.0	21 22.1	93 18	15.8	22 45.7	93 17	15.2	23 13.5	93 17	15.0	23 41.3	93 17	14.8	29 13.5	92 14	12.2	29 41.1	92 14	12.0	34 15.1	91 11	09.6	9
150	20 43.3	93 18	15.5	21 11.4	93 17	15.3	22 35.3	93 17	14.7	23 03.3	93 17	14.5	23 31.2	93 16	14.3	29 05.1	92 14	11.8	29 32.8	92 13	11.6	34 08.6	91 11	09.3	150
1	20 32.8	94 17	15.0	21 00.9	94 17	14.8	22 25.3	94 16	14.3	22 53.3	94 16	14.1	23 21.4	94 16	13.9	28 57.0	93 13	11.5	29 24.9	93 13	11.2	34 02.2	92 10	09.0	1
2	20 22.6	94 16	14.5	20 50.8	94 16	14.3	22 15.5	94 16	13.8	22 43.7	94 15	13.6	23 11.9	94 15	13.4	28 49.2	93 13	11.1	29 17.2	93 12	10.9	33 56.0	93 10	08.7	2
3	20 12.7	95 16	14.0	20 41.1	95 16	13.8	22 06.1	94 15	13.3	22 34.5	94 15	13.1	23 02.8	94 15	12.9	28 41.6	94 12	10.7	29 09.8	94 12	10.5	33 50.0	93 10	08.4	3
4	20 03.1	95 15	13.5	20 31.6	95 15	13.3	21 57.1	95 15	12.8	22 25.5	95 14	12.6	22 54.0	95 14	12.5	28 34.3	94 12	10.3	29 02.6	94 12	10.1	33 44.3	94 09	08.1	4
155	19 53.9	95 15	13.0	20 22.5	95 15	12.8	21 48.3	95 14	12.3	22 16.9	95 14	12.2	22 45.4	95 14	12.0	28 27.3	95 11	09.9	28 55.7	95 11	09.7	33 38.7	94 09	07.8	155
6	19 45.1	96 14	12.5	20 13.8	96 14	12.3	21 39.9	96 13	11.9	22 08.6	96 13	11.7	22 37.2	96 13	11.5	28 20.5	95 11	09.5	28 49.0	95 11	09.4	33 33.4	95 09	07.5	6
7	19 36.6	96 14	12.0	20 05.4	96 13	11.8	21 31.8	96 13	11.4	22 00.6	96 13	11.2	22 29.4	96 13	11.1	28 14.0	95 10	09.1	28 42.6	95 10	09.0	33 28.3	95 08	07.2	7
8	19 28.4	96 13	11.5	19 57.4	96 13	11.3	21 24.1	96 12	10.9	21 53.0	96 12	10.7	22 21.8	96 12	10.6	28 07.7	96 10	08.8	28 36.5	96 10	08.6	33 23.3	95 08	06.9	8
9	19 20.6	97 12	10.9	19 49.7	97 12	10.8	21 16.6	97 12	10.4	21 45.6	97 12	10.3	22 14.6	97 12	10.1	28 01.7	96 10	08.4	28 30.6	96 09	08.2	33 18.6	96 08	06.6	9
160	19 13.2	97 12	10.4	19 42.3	97 12	10.3	21 09.6	97 11	09.9	21 38.6	97 11	09.8	22 07.7	97 11	09.6	27 56.0	97 09	08.0	28 25.0	97 09	07.8	33 14.1	96 07	06.3	160
1	19 06.1	97 11	09.9	19 35.3	97 11	09.8	21 02.8	97 11	09.4	21 32.0	97 11	09.3	22 01.2	97 10	09.2	27 50.6	97 09	07.6	28 19.7	97 08	07.4	33 09.9	97 07	06.0	1
2	18 59.4	98 11	09.4	19 28.6	98 10	09.3	20 56.4	98 10	08.9	21 25.7	98 10	08.8	21 54.9	97 10	08.7	27 45.4	97 08	07.2	28 14.6	97 08	07.1	33 05.8	97 06	05.7	2
3	18 53.0	98 10	08.9	19 22.3	98 10	08.8	20 50.4	98 10	08.4	21 19.7	98 09	08.3	21 49.0	98 09	08.2	27 40.5	98 08	06.8	28 09.8	98 08	06.7	33 01.9	97 06	05.3	3
4	18 47.0	98 09	08.4	19 16.4	98 09	08.3	20 44.6	98 09	08.0	21 14.0	98 09	07.8	21 43.4	98 09	07.7	27 35.9	98 07	06.4	28 05.3	98 07	06.3	32 58.3	98 06	05.0	4
165	18 41.3	98 09	07.9	19 10.8	98 09	07.8	20 39.2	98 08	07.5	21 08.7	98 08	07.4	21 38.2	98 08	07.3	27 31.6	98 07	06.0	28 01.0	98 07	05.9	32 54.9	98 05	04.7	165
6	18 36.0	99 08	07.3	19 05.5	99 08	07.2	20 34.2	98 08	07.0	21 03.7	98 08	06.9	21 33.3	98 08	06.8	27 27.5	98 06	05.6	27 57.0	98 06	05.5	32 51.7	98 05	04.4	6
7	18 31.0	99 08	06.8	19 00.7	99 08	06.7	20 29.5	99 07	06.5	20 59.1	99 07	06.4	21 28.7	99 07	06.3	27 23.8	99 06	05.2	27 53.3	99 06	05.1	32 48.7	98 05	04.1	7
8	18 26.5	99 07	06.3	18 56.1	99 07	06.2	20 25.1	99 07	06.0	20 54.8	99 07	05.9	21 24.5	99 06	05.8	27 20.2	99 05	04.8	27 49.9	99 05	04.7	32 46.0	99 04	03.8	8
9	18 22.2	99 06	05.8	18 52.0	99 06	05.7	20 21.1	99 06	05.5	20 50.9	99 06	05.4	21 20.6	99 06	05.3	27 17.0	99 05	04.4	27 46.7	99 05	04.3	32 43.4	99 04	03.5	9
170	18 18.4	99 06	05.2	18 48.2	99 06	05.2	20 17.5	99 06	05.0	20 47.2	99 05	04.9	21 17.0	99 05	04.9	27 14.1	99 04	04.0	27 43.8	99 04	03.9	32 41.1	99 04	03.2	170
1	18 14.9	99 05	04.7	18 44.7	99 05	04.7	20 14.2	99 05	04.5	20 44.0	99 05	04.4	21 13.8	99 05	04.4	27 11.4	99 04	03.6	27 41.2	99 04	03.5	32 39.0	99 03	02.8	1
2	18 11.8	1.0 05	04.2	18 41.6	1.0 05	04.1	20 11.2	1.0 04	04.0	20 41.0	1.0 04	03.9	21 10.9	1.0 04	03.9	27 09.0	99 04	03.2	27 38.8	99 03	03.2	32 37.1	99 03	02.5	2
3	18 09.0	1.0 04	03.7	18 38.9	1.0 04	03.6	20 08.6	1.0 04	03.5	20 38.5	1.0 04	03.4	21 08.3	1.0 04	03.4	27 06.9	1.0 03	02.8	27 36.8	1.0 03	02.8	32 35.4	1.0 02	02.2	3
4	18 06.6	1.0 03	03.2	18 36.5	1.0 03	03.1	20 06.3	1.0 03	03.0	20 36.2	1.0 03	03.0	21 06.1	1.0 03	02.9	27 05.1	1.0 03	02.4	27 35.0	1.0 03	02.4	32 34.0	1.0 02	01.9	4
175	18 04.6	1.0 03	02.6	18 34.5	1.0 03	02.6	20 04.4	1.0 03	02.5	20 34.3	1.0 03	02.5	21 04.3	1.0 03	02.4	27 03.5	1.0 02	02.0	27 33.5	1.0 02	02.0	32 32.8	1.0 02	01.6	175
6	18 02.9	1.0 02	02.1	18 32.9	1.0 02	02.1	20 02.8	1.0 02	02.0	20 32.8	1.0 02	02.0	21 02.7	1.0 02	01.9	27 02.3	1.0 02	01.6	27 32.2	1.0 02	01.6	32 31.8	1.0 01	01.3	6
7	18 01.7	1.0 02	01.6	18 31.6	1.0 02	01.6	20 01.6	1.0 01	01.5	20 31.6	1.0 01	01.5	21 01.5	1.0 01	01.5	27 01.3	1.0 01	01.2	27 31.2	1.0 01	01.2	32 31.0	1.0 01	01.0	7
8	18 00.7	1.0 01	01.1	18 30.7	1.0 01	01.0	20 00.7	1.0 01	01.0	20 30.7	1.0 01	01.0	21 00.7	1.0 01	01.0	27 00.6	1.0 01	00.8	27 30.6	1.0 01	00.8	32 30.4	1.0 01	00.6	8
9	18 00.2	1.0 00	00.5	18 30.2	1.0 00	00.5	20 00.2	1.0 00	00.5	20 30.2	1.0 00	00.5	21 00.2	1.0 00	00.5	27 00.1	1.0 00	00.4	27 30.1	1.0 00	00.4	32 30.1	1.0 00	00.3	9
180	18 00.0	1.0 00	00.0	18 30.0	1.0 00	00.0	20 00.0	1.0 00	00.0	20 30.0	1.0 00	00.0	21 00.0	1.0 00	00.0	27 00.0	1.0 00	00.0	27 30.0	1.0 00	00.0	32 30.0	1.0 00	00.0	180

STAR IDENTIFICATION TABLE

Lat. 48°

ALTITUDE

AZ.	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	46	180	50	180	54	180	58	180	62	180	66	180	70	180	74	180	78	180	82	180	86	180	00
4	46	174	50	174	54	173	58	173	62	172	66	171	70	170	74	168	78	165	82	159	85	144	4
8	45	169	49	168	53	167	57	166	61	164	65	162	69	160	73	156	77	151	80	141	83	123	8
12	45	163	49	162	53	160	57	159	60	157	64	154	68	151	72	146	75	139	78	129	81	111	12
16	44	158	48	156	52	154	55	152	59	150	63	147	66	142	70	137	73	130	76	119	78	104	16
20	43	152	47	150	50	148	54	146	58	143	61	139	65	135	68	129	71	122	74	112	76	99	20
24	41	147	45	145	49	143	52	140	56	137	59	133	63	128	66	123	69	115	71	106	73	95	24
28	40	142	44	140	47	138	51	135	54	131	57	127	61	123	63	117	66	110	68	101	70	91	28
32	38	138	42	135	45	133	49	130	52	126	55	122	58	117	61	112	64	105	66	97	68	88	32
36	36	133	40	131	43	128	46	125	50	121	53	117	56	113	59	107	61	101	63	94	65	86	36
40	34	129	38	126	41	124	44	120	47	117	50	113	53	108	56	103	58	97	60	91	62	83	40
44	32	125	35	122	39	119	42	116	45	113	48	109	51	104	53	100	56	94	58	88	60	81	44
48	30	121	33	118	36	116	39	112	42	109	45	105	48	101	51	96	53	91	55	85	57	79	48
52	28	118	31	115	34	112	37	109	40	105	43	101	45	97	48	93	50	88	52	82	54	77	52
56	25	114	28	111	31	108	34	105	37	102	40	98	43	94	45	90	48	85	50	80	52	74	56
60	23	111	26	108	29	105	32	102	35	98	37	95	40	91	43	87	45	82	47	78	49	72	60
64	20	107	23	104	26	102	29	98	32	95	35	92	37	88	40	84	42	80	45	75	47	70	64
68	18	104	21	101	24	98	26	95	29	92	32	89	35	85	37	81	40	77	42	73	44	68	68
72	15	101	18	98	21	95	24	92	27	89	29	86	32	82	35	79	37	75	40	71	42	66	72
76	12	98	15	95	18	92	21	89	24	86	27	83	29	80	32	76	35	72	37	69	39	64	76
80	10	95	13	92	16	89	18	86	21	83	24	80	27	77	29	74	32	70	35	66	37	62	80
84	07	92	10	89	13	86	16	83	19	81	21	78	24	74	27	71	30	68	32	64	35	60	84
88	04	89	07	86	10	83	13	81	16	78	19	75	22	72	24	69	27	65	30	62	32	58	88
92	02	86	05	83	08	80	11	78	13	75	16	72	19	69	22	66	25	63	27	60	30	56	92
96	*01*	83	02	80	05	78	08	75	11	72	14	69	17	66	20	64	22	60	25	57	28	54	96
100	*04*	80	*01*	77	02	75	05	72	08	69	11	67	14	64	17	61	20	58	23	55	26	52	100
104	*06*	77	*03*	74	*00*	72	03	69	06	66	09	64	12	61	15	58	18	56	21	53	24	50	104
108	*09*	74	*06*	71	*03*	69	00	66	03	64	07	61	10	58	13	56	16	53	19	50	22	47	108
112	*11*	71	*08*	68	*05*	66	*02*	63	01	61	04	58	07	56	10	53	14	50	17	48	20	45	112
116	*14*	67	*11*	65	*08*	62	*04*	60	*01*	58	02	55	05	53	08	50	12	48	15	45	18	43	116
120	*16*	64	*13*	62	*10*	59	*07*	57	*03*	55	*00*	52	03	50	06	48	10	45	13	43	16	40	120
124	*19*	61	*15*	58	*12*	56	*09*	54	*06*	52	*02*	49	01	47	04	45	08	43	11	40	14	38	124
128	*21*	57	*18*	55	*14*	53	*11*	51	*08*	48	*04*	46	*01*	44	03	42	06	40	09	38	13	36	128
132	*23*	54	*20*	51	*16*	49	*13*	47	*10*	45	*06*	43	*03*	41	01	39	04	37	08	35	11	33	132
136	*25*	50	*22*	48	*18*	46	*15*	44	*11*	42	*08*	40	*04*	38	*01*	36	03	34	06	32	10	30	136
140	*27*	46	*24*	44	*20*	42	*17*	40	*13*	38	*10*	37	*06*	35	*02*	33	01	31	05	30	08	28	140
144	*29*	42	*26*	40	*22*	38	*18*	37	*15*	35	*11*	33	*07*	32	*04*	30	*00*	28	04	27	07	25	144
148	*31*	38	*27*	36	*24*	34	*20*	33	*16*	31	*12*	30	*09*	28	*05*	27	*01*	25	02	24	06	23	148
152	*33*	34	*29*	32	*25*	30	*21*	29	*18*	28	*14*	26	*10*	25	*06*	24	*02*	22	01	21	05	20	152
156	*34*	29	*30*	28	*26*	26	*23*	25	*19*	24	*15*	23	*11*	21	*07*	20	*03*	19	01	18	04	17	156
160	*35*	25	*31*	23	*27*	22	*24*	21	*20*	20	*16*	19	*12*	18	*08*	17	*04*	16	*00*	15	04	14	160
164	*36*	20	*32*	19	*28*	18	*24*	17	*21*	16	*17*	15	*13*	14	*09*	14	*05*	13	*01*	12	03	11	164
168	*37*	15	*33*	14	*29*	13	*25*	13	*21*	12	*17*	11	*13*	11	*09*	10	*05*	10	*01*	09	03	09	168
172	*38*	10	*34*	10	*30*	09	*26*	09	*22*	08	*18*	08	*14*	07	*10*	07	*06*	06	*02*	06	02	06	172
176	*38*	05	*34*	05	*30*	05	*26*	04	*22*	04	*18*	04	*14*	04	*10*	03	*06*	03	*02*	03	02	03	176
180	*38*	00	*34*	00	*30*	00	*26*	00	*22*	00	*18*	00	*14*	00	*10*	00	*06*	00	*02*	00	02	00	180
	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		

16—11439

FIGURES IN ITALICS INDICATE THAT DECLINATION IS OF CONTRARY NAME TO LATITUDE

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STAR IDENTIFICATION TABLE

AZ.	48°		52°		56°		60°		64°		68°		72°		76°		80°		84°		88°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	90	...	86	00	82	00	78	00	74	00	70	00	66	00	62	00	58	00	54	00	50	00	00
4	87	89	85	31	82	16	78	09	74	06	70	04	66	03	62	02	58	01	54	01	50	00	4
8	85	87	83	49	81	29	77	18	73	12	70	09	66	06	62	04	58	03	54	01	50	00	8
12	82	86	81	58	79	38	76	26	73	18	69	13	65	09	62	06	58	04	54	02	50	01	12
16	79	84	79	63	77	45	75	32	72	23	68	16	65	12	61	08	58	05	54	03	50	01	16
20	77	83	77	65	75	49	73	37	71	27	68	20	64	14	61	10	57	06	54	03	50	01	20
24	74	81	74	66	73	52	72	40	69	30	67	23	64	16	60	11	57	07	53	04	50	01	24
28	71	80	72	67	71	54	70	43	68	33	66	25	63	18	60	13	57	09	53	05	50	01	28
32	69	78	69	67	69	56	68	45	66	36	64	27	62	20	59	14	56	10	53	05	50	02	32
36	66	76	67	67	67	56	66	47	65	37	63	29	61	22	58	16	56	10	53	06	50	02	36
40	64	75	64	66	65	57	64	47	63	39	62	31	60	23	58	17	55	11	52	06	50	02	40
44	61	73	62	65	62	57	62	48	62	40	60	32	59	24	57	18	55	12	52	07	49	02	44
48	58	72	59	64	60	56	60	48	60	40	59	33	58	25	56	19	54	13	52	07	49	02	48
52	56	70	57	63	58	56	58	48	58	41	57	33	57	26	55	19	53	13	51	08	49	02	52
56	53	68	55	62	56	55	56	48	56	41	56	34	55	27	54	20	53	14	51	08	49	03	56
60	51	67	52	61	53	54	54	48	55	41	55	34	54	27	53	21	52	14	51	08	49	03	60
64	48	65	50	59	51	53	52	47	53	41	53	34	53	27	52	21	52	15	50	08	49	03	64
68	46	63	48	58	49	52	50	46	51	40	52	34	52	28	51	21	51	15	50	09	49	03	68
72	44	62	45	57	47	51	48	46	49	40	50	34	50	27	50	21	50	15	50	09	49	03	72
76	41	60	43	55	45	50	46	45	48	39	49	33	49	27	49	21	49	15	49	09	48	03	76
80	39	58	41	54	43	49	45	44	46	38	47	33	48	27	49	21	49	15	49	09	48	03	80
84	37	56	39	52	41	47	43	43	44	38	46	32	47	27	48	21	48	15	48	09	48	03	84
88	35	54	37	50	39	46	41	41	43	37	44	32	46	26	47	21	47	15	48	09	48	03	88
92	32	52	35	49	37	44	39	40	41	36	43	31	44	26	46	20	47	15	47	09	48	03	92
96	30	50	33	47	35	43	37	39	40	34	42	30	43	25	45	20	46	14	47	09	48	03	96
100	28	48	31	45	33	41	36	37	38	33	40	29	42	24	44	19	45	14	47	09	48	03	100
104	26	46	29	43	32	40	34	36	37	32	39	28	41	23	43	19	45	14	46	08	47	03	104
108	24	44	27	41	30	38	33	34	35	31	38	27	40	23	42	18	44	13	46	08	47	03	108
112	23	42	26	39	28	36	31	33	34	29	37	26	39	22	41	17	43	13	45	08	47	03	112
116	21	40	24	37	27	34	30	31	33	28	35	24	38	21	41	17	43	12	45	08	47	03	116
120	19	38	22	35	25	32	28	30	31	26	34	23	37	20	40	16	42	12	45	07	47	03	120
124	18	36	21	33	24	30	27	28	30	25	33	22	36	19	39	15	42	11	44	07	47	02	124
128	16	33	19	31	23	29	26	26	29	23	32	20	35	17	38	14	41	10	44	07	47	02	128
132	15	31	18	29	21	27	25	24	28	22	31	19	35	16	38	13	41	10	44	06	47	02	132
136	13	29	17	27	20	24	24	22	27	20	31	18	34	15	37	12	40	09	44	06	47	02	136
140	12	26	16	24	19	22	23	20	26	18	30	16	33	14	37	11	40	08	43	05	46	02	140
144	11	24	15	22	18	20	22	18	26	17	29	15	33	12	36	10	40	08	43	05	46	02	144
148	10	21	14	20	17	18	21	16	25	15	28	13	32	11	36	09	39	07	43	04	46	02	148
152	09	19	13	17	17	16	20	15	24	13	28	11	32	10	35	08	39	06	43	04	46	01	152
156	08	16	12	15	16	14	20	12	24	11	27	10	31	08	35	07	39	05	42	03	46	01	156
160	08	13	11	12	15	11	19	10	23	09	27	08	31	07	35	06	39	04	42	03	46	01	160
164	07	11	11	10	15	09	19	08	23	08	27	07	31	06	34	05	38	03	42	02	46	01	164
168	07	08	11	07	14	07	18	06	22	06	26	05	30	04	34	03	38	03	42	02	46	01	168
172	06	05	10	05	14	05	18	04	22	04	26	03	30	03	34	02	38	02	42	01	46	00	172
176	06	03	10	02	14	02	18	02	22	02	26	02	30	01	34	01	38	01	42	01	46	00	176
180	06	00	10	00	14	00	18	00	22	00	26	00	30	00	34	00	38	00	42	00	46	00	180
	48°		52°		56°		60°		64°		68°		72°		76°		80°		84°		88°		

16—11439

FIGURES IN ITALICS INDICATE THAT DECLINATION IS OF CONTRARY NAME TO LATITUDE

Digitized by Google

Lat. 49°

H.A.	0° 00′		0° 30′		1° 00′		1° 30′		2° 00′		2° 30′		3° 00′		3° 30′		H.A.
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	° ′ Δd Δt	°	°
00	41 00.0 1.0 01	180.0	41 30.0 1.0 01	180.0	42 00.0 1.0 01	180.0	42 30.0 1.0 01	180.0	43 00.0 1.0 01	180.0	43 30.0 1.0 01	180.0	44 00.0 1.0 01	180.0	44 30.0 1.0 01	180.0	00
1	40 59.5 1.0 02	178.7	41 29.5 1.0 02	178.7	41 59.5 1.0 02	178.7	42 29.5 1.0 02	178.6	42 59.5 1.0 02	178.6	43 29.5 1.0 02	178.6	43 59.5 1.0 02	178.6	44 29.5 1.0 02	178.6	1
2	40 58.2 1.0 04	177.4	41 28.2 1.0 04	177.3	41 58.2 1.0 04	177.3	42 28.1 1.0 04	177.3	42 58.1 1.0 04	177.3	43 28.1 1.0 04	177.2	43 58.1 1.0 04	177.2	44 28.1 1.0 04	177.2	2
3	40 55.9 1.0 05	176.0	41 25.9 1.0 05	176.0	41 55.8 1.0 05	176.0	42 25.8 1.0 05	175.9	42 55.8 1.0 05	175.9	43 25.7 1.0 06	175.9	43 55.7 1.0 06	175.8	44 25.7 1.0 06	175.8	3
4	40 52.7 1.0 07	174.7	41 22.7 1.0 07	174.7	41 52.6 1.0 07	174.6	42 22.6 1.0 07	174.6	42 52.5 1.0 07	174.5	43 22.4 1.0 07	174.5	43 52.4 1.0 07	174.5	44 22.3 1.0 07	174.4	4
05	40 48.6 1.0 08	173.4	41 18.6 1.0 08	173.3	41 48.5 1.0 08	173.3	42 18.4 1.0 08	173.2	42 48.3 1.0 09	173.2	43 18.2 1.0 09	173.1	43 48.1 1.0 09	173.1	44 18.0 1.0 09	173.0	05
6	40 43.7 1.0 10	172.1	41 13.5 1.0 10	172.0	41 43.4 1.0 10	172.0	42 13.3 1.0 10	171.9	42 43.2 1.0 10	171.8	43 13.0 1.0 10	171.8	43 42.9 1.0 10	171.7	44 12.8 1.0 10	171.6	6
7	40 37.8 99 11	170.8	41 07.6 99 11	170.7	41 37.4 99 11	170.6	42 07.3 99 12	170.5	42 37.1 99 12	170.5	43 06.9 99 12	170.4	43 36.7 99 12	170.3	44 06.6 99 12	170.2	7
8	40 31.0 99 13	169.5	41 00.8 99 13	169.4	41 30.6 99 13	169.3	42 00.4 99 13	169.2	42 30.1 99 13	169.1	42 59.9 99 13	169.0	43 29.7 99 13	169.0	43 59.4 99 13	168.9	8
9	40 23.4 99 14	168.1	40 53.1 99 14	168.1	41 22.8 99 14	168.0	41 52.5 99 14	167.9	42 22.2 99 15	167.8	42 52.0 99 15	167.7	43 21.7 99 15	167.6	43 51.4 99 15	167.5	9
10	40 14.9 99 16	166.8	40 44.5 99 16	166.8	41 14.2 99 16	166.7	41 43.8 99 16	166.5	42 13.5 99 16	166.4	42 43.1 99 16	166.3	43 12.7 99 16	166.2	43 42.4 99 16	166.1	10
1	40 05.5 99 17	165.6	40 35.1 99 17	165.4	41 04.6 99 17	165.3	41 34.2 99 17	165.2	42 03.8 99 18	165.1	42 33.4 99 18	165.0	43 02.9 99 18	164.9	43 32.5 98 18	164.8	1
2	39 55.2 98 18	164.3	40 24.7 98 19	164.2	40 54.3 98 19	164.0	41 23.8 98 19	163.9	41 53.3 98 19	163.8	42 22.7 98 19	163.7	42 52.2 98 19	163.5	43 21.7 98 19	163.4	2
3	39 44.1 98 20	163.0	40 13.6 98 20	162.9	40 43.0 98 20	162.7	41 12.4 98 20	162.6	41 41.8 98 20	162.5	42 11.2 98 21	162.3	42 40.6 98 21	162.2	43 10.0 98 21	162.1	3
4	39 32.2 98 21	161.7	40 01.6 98 21	161.6	40 30.9 98 22	161.4	41 00.2 98 22	161.3	41 29.6 98 22	161.2	41 58.9 98 22	161.0	42 28.2 98 22	160.9	42 57.5 98 22	160.7	4
15	39 19.4 98 23	160.5	39 48.7 98 23	160.3	40 18.0 97 23	160.2	40 47.2 97 23	160.0	41 16.4 97 23	159.9	41 45.6 97 23	159.7	42 14.8 97 24	159.6	42 44.0 97 24	159.4	15
6	39 05.9 97 24	159.2	39 35.0 97 24	159.0	40 04.2 97 24	158.9	40 33.3 97 24	158.7	41 02.5 97 25	158.6	41 31.6 97 25	158.4	42 00.7 97 25	158.3	42 29.8 97 25	158.1	6
7	38 51.5 97 25	157.9	39 20.6 97 25	157.8	39 49.6 97 26	157.6	40 18.6 97 26	157.5	40 47.7 97 26	157.3	41 16.7 97 26	157.1	41 45.7 97 26	157.0	42 14.7 97 27	156.8	7
8	38 36.3 97 27	156.7	39 05.3 97 27	156.5	39 34.2 96 27	156.4	40 03.2 96 27	156.2	40 32.1 96 27	156.0	41 01.0 96 28	155.8	41 29.9 96 28	155.7	41 58.7 96 28	155.5	8
9	38 20.4 96 28	155.5	38 49.2 96 28	155.3	39 18.1 96 28	155.1	39 46.9 96 28	154.9	40 15.7 96 29	154.8	40 44.5 96 29	154.6	41 13.3 96 29	154.4	41 42.0 96 29	154.2	9
20	38 03.6 96 29	154.3	38 32.4 96 29	154.1	39 01.1 96 30	153.9	39 29.8 96 30	153.7	39 58.5 96 30	153.5	40 27.2 96 30	153.3	40 55.8 95 30	153.1	41 24.5 95 30	152.9	20
1	37 46.2 95 30	153.0	38 14.8 96 31	152.9	38 43.4 96 31	152.7	39 12.0 96 31	152.5	39 40.6 96 31	152.3	40 09.1 96 31	152.1	40 37.7 95 32	151.9	41 06.2 95 32	151.7	1
2	37 27.9 95 32	151.8	37 56.5 95 32	151.6	38 25.0 95 32	151.4	38 53.4 95 32	151.2	39 21.9 95 32	151.0	39 50.3 95 33	150.8	40 18.7 95 33	150.6	40 47.1 95 33	150.4	2
3	37 09.0 95 33	150.6	37 37.4 95 33	150.4	38 05.8 95 33	150.2	38 34.1 94 33	150.0	39 02.5 94 34	149.8	39 30.8 94 34	149.6	39 59.1 94 34	149.4	40 27.3 94 34	149.2	3
4	36 49.4 94 34	149.5	37 17.6 94 34	149.3	37 45.9 94 34	149.0	38 14.1 94 35	148.8	38 42.3 94 35	148.6	39 10.5 94 35	148.4	39 38.6 94 35	148.2	40 06.8 94 35	147.9	4
25	36 29.0 94 35	148.3	36 57.2 94 35	148.1	37 25.3 94 35	147.9	37 53.4 94 36	147.6	38 21.5 94 36	147.4	38 49.5 93 36	147.2	39 17.5 93 36	147.0	39 45.5 93 37	146.7	25
6	36 08.0 93 36	147.1	36 36.0 93 36	146.9	37 04.0 93 37	146.7	37 32.0 93 37	146.5	37 59.9 93 37	146.2	38 27.8 93 37	146.0	38 55.7 93 37	145.8	39 23.6 93 38	145.5	6
7	35 46.3 93 37	146.0	36 14.2 93 37	145.7	36 42.0 93 38	145.5	37 09.9 93 38	145.3	37 37.7 93 38	145.0	38 05.5 93 38	144.8	38 33.2 92 39	144.6	39 01.0 92 39	144.3	7
8	35 23.9 93 38	144.8	35 51.7 92 39	144.6	36 19.4 92 39	144.4	36 47.1 92 39	144.1	37 14.8 92 39	143.9	37 42.5 92 39	143.6	38 10.1 92 40	143.4	38 37.7 92 40	143.1	8
9	35 00.9 92 39	143.7	35 28.6 92 40	143.5	35 56.2 92 40	143.2	36 23.8 92 40	143.0	36 51.3 92 40	142.7	37 18.8 92 40	142.5	37 46.3 92 41	142.2	38 13.7 91 41	142.0	9
30	34 37.3 92 40	142.6	35 04.8 92 41	142.3	35 32.3 92 41	142.1	35 59.7 91 41	141.8	36 27.2 91 41	141.6	36 54.5 91 42	141.3	37 21.9 91 42	141.1	37 49.2 91 42	140.8	30
1	34 13.1 91 41	141.5	34 40.5 91 42	141.2	35 07.8 91 42	141.0	35 35.1 91 42	140.7	36 02.4 91 42	140.5	36 29.6 91 42	140.2	36 56.8 91 43	139.9	37 24.0 91 43	139.7	1
2	33 48.3 91 42	140.4	34 15.5 91 43	140.1	34 42.7 91 43	139.9	35 09.9 91 43	139.6	35 37.0 90 43	139.3	36 04.1 90 43	139.1	36 31.2 90 44	138.8	36 58.2 90 44	138.5	2
3	33 22.9 90 43	139.3	33 50.0 90 43	139.0	34 17.1 90 44	138.8	34 44.1 90 44	138.5	35 11.1 90 44	138.2	35 38.1 90 44	138.0	36 05.0 90 45	137.7	36 31.9 90 45	137.4	3
4	32 57.0 90 44	138.2	33 23.9 90 44	137.9	33 50.9 90 45	137.7	34 17.8 90 45	137.4	34 44.6 89 45	137.1	35 11.4 89 45	136.9	35 38.2 89 46	136.6	36 05.0 89 46	136.3	4
35	32 30.5 89 45	137.1	32 57.3 89 45	136.9	33 24.1 89 46	136.6	33 50.8 89 46	136.3	34 17.6 89 46	136.1	34 44.3 89 46	135.8	35 10.9 89 46	135.5	35 37.5 89 47	135.2	35
6	32 03.4 89 46	136.1	32 30.1 89 46	135.8	32 56.8 89 46	135.5	33 23.4 89 47	135.3	33 50.0 89 47	135.0	34 16.6 88 47	134.7	34 43.1 88 47	134.4	35 09.5 88 48	134.1	6
7	31 35.9 89 47	135.0	32 02.4 88 47	134.8	32 29.0 88 47	134.5	32 55.4 88 47	134.2	33 21.9 88 48	133.9	33 48.3 88 48	133.6	34 14.7 88 48	133.4	34 41.0 88 48	133.1	7
8	31 07.8 88 48	134.0	31 34.2 88 48	133.7	32 00.6 88 48	133.5	32 27.0 88 48	133.2	32 53.3 88 48	132.9	33 19.6 88 49	132.6	33 45.8 87 49	132.3	34 12.0 87 49	132.0	8
9	30 39.2 88 48	133.0	31 05.5 88 49	132.7	31 31.8 87 49	132.4	31 58.0 87 49	132.1	32 24.2 87 49	131.8	32 50.4 87 49	131.6	33 16.5 87 50	131.3	33 42.5 87 50	131.0	9
40	30 10.2 87 49	132.0	30 36.4 87 49	131.7	31 02.5 87 50	131.4	31 28.6 87 50	131.1	31 54.7 87 50	130.8	32 20.7 87 50	130.5	32 46.7 87 50	130.2	33 12.6 86 51	129.9	40
1	29 40.7 87 50	131.0	30 06.8 87 50	130.7	30 32.8 87 50	130.4	30 58.7 86 51	130.1	31 24.7 86 51	129.8	31 50.5 86 51	129.5	32 16.4 86 51	129.2	32 42.2 86 51	128.9	1
2	29 10.8 86 51	130.0	29 36.7 86 51	129.7	30 02.6 86 51	129.4	30 28.4 86 51	129.1	30 54.2 86 51	128.8	31 19.9 86 52	128.5	31 45.7 86 52	128.2	32 11.3 85 52	127.9	2
3	28 40.4 86 51	129.0	29 06.2 86 52	128.7	29 31.9 86 52	128.4	29 57.6 86 52	128.1	30 23.3 85 52	127.8	30 48.9 85 52	127.5	31 14.5 85 53	127.2	31 40.1 85 53	126.9	3
4	28 09.6 86 52	128.0	28 35.2 85 52	127.7	29 00.9 85 52	127.4	29 26.4 85 53	127.1	29 52.0 85 53	126.8	30 17.5 85 53	126.5	30 43.0 85 53	126.2	31 08.4 85 53	125.9	4
45	27 38.4 85 53	127.0	28 03.9 85 53	126.7	28 29.4 85 53	126.4	28 54.9 85 53	126.1	29 20.3 85 54	125.8	29 45.7 85 54	125.5	30 11.0 84 54	125.2	30 36.3 84 54	124.9	45
6	27 06.7 85 53	126.1	27 32.2 85 54	125.8	27 57.5 85 54	125.5	28 22.9 84 54	125.2	28 48.2 84 54	124.9	29 13.4 84 54	124.6	29 38.6 84 55	124.3	30 03.8 84 55	123.9	6
7	26 34.7 84 54	125.1	27 00.0 84 54	124.8	27 25.3 84 54	124.5	27 50.5 84 55	124.2	28 15.7 84 55	123.9	28 40.8 84 55	123.6	29 05.9 84 55	123.3	29 31.0 83 55	123.0	7
8	26 02.4 84 55	124.2	26 27.5 84 55	123.9	26 52.7 84 55	123.6	27 17.8 84 55	123.3	27 42.8 83 55	123.0	28 07.9 83 56	122.7	28 32.8 83 56	122.3	28 57.8 83 56	122.0	8
9	25 29.6 84 55	123.3	25 54.7 83 55	123.0	26 19.7 83 56	122.7	26 44.7 83 56	122.3	27 09.7 83 56	122.0	27 34.6 83 56	121.7	27 59.4 83 56	121.4	28 24.2 83 56	121.1	9
50	24 56.5 83 56	122.3	25 21.5 83 56	122.0	25 46.4 83 56	121.7	26 11.3 83 56	121.4	26 36.1 83 56	121.1	27 00.9 83 57	120.8	27 25.7 82 57	120.5	27 50.4 82 57	120.2	50
1	24 23.1 83 56	121.4	24 48.0 83 56	121.1	25 12.8 83 57	120.8	25 37.5 82 57	120.5	26 02.2 82 57	120.2	26 26.9 82 57	119.9	26 51.6 82 57	119.5	27 16.2 82 58	119.2	1
2	23 49.4 82 57	120.5	24 14.1 82 57	120.2	24 38.8 82 57	119.9	25 03.5 82 57	119.6	25 28.1 82 57	119.3	25 52.6 82 58	119.0	26 17.2 82 58	118.6	26 41.7 82 58	118.3	2
3	23 15.3 82 57	119.6	23 39.9 82 57	119.3	24 04.5 82 58	119.0	24 29.1 82 58	118.7	24 53.6 82 58	118.4	25 18.0 81 58	118.1	25 42.5 81 58	117.7	26 06.9 81 58	117.4	3
4	22 40.9 82 58	118.7	23 05.5 82 58	118.4	23 29.9 82 58	118.1	23 54.4 81 58	117.8	24 18.8 81 58	117.5	24 43.2 81 59	117.2	25 07.5 81 59	116.8	25 31.8 81 59	116.5	4
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6	21 31.3 81 59	117.0	21 55.7 81 59	116.7	22 19.9 81 59	116.3	22 44.2 81 59	116.0	23 08.4 81 59	115.7	23 32.6 81 59	115.4	23 56.7 80 60	115.1	24 20.8 80 60	114.7	6
7	20 56.1 81 59	116.1	21 20.3 81 59	115.8	21 44.5 81 59	115.5	22 08.7 80 60	115.2	22 32.8 80 60	114.8	22 56.9 80 60	114.5	23 20.9 80 60	114.2	23 44.9 80 60	113.9	7
8	20 20.6 80 60	115.2	20 44.8 80 60	114.9	21 08.9 80 60	114.6	21 32.9 80 60	114.3	21 57.0 80 60	114.0	22 20.9 80 60	113.6	22 44.9 80 60	113.3	23 08.8 80 61	113.0	8
9	19 44.9 80 60	114.4	20 09.0 80 60	114.1	20 33.0 80 60	113.8	20 56.9 80 60	113.4	21 20.9 80 61	113.1	21 44.8 80 61	112.8	22 08.6 79 61	112.5	22 32.4 79 61	112.1	9
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2	17 56.3 79 61	111.9	18 20.1 79 61	111.5	18 43.9 79 61	111.2	19 07.6 79 61	110.9	19 31.3 79 62	110.6	19 54.9 79 62	110.2	20 18.5 79 62	109.9	20 42.1 79 62	109.6	2
3	17 19.7 79 61	111.0	17 43.4 79 62	110.7	18 07.1 79 62	110.4	18 30.7 79 62	110.1	18 54.3 79 62	109.7	19 17.9 79 62	109.4	19 41.4 78 62	109.1	20 04.9 78 62	108.8	3
4	16 42.9 79 62	110.2	17 06.5 79 62	109.9	17 30.1 79 62	109.6	17 53.6 78 62	109.2	18 17.2 78 62	108.9	18 40.7 78 62	108.6	19 04.1 78 62	108.3	19 27.6 78 63	107.9	4
65	16 05.8 79 62	109.4	16 29.4 78 62	109.1	16 52.9 78 62	108.7	17 16.4 78 62	108.4	17 39.8 78 62	108.1	18 03.3 78 63	107.8	18 26.7 78 63	107.4	18 50.0 78 63	107.1	65
6	15 28.6 78 62	108.6	15 52.1 78 62	108.2	16 15.5 78 63	107.9	16 38.9 78 63	107.6	17 02.3 78 63	107.3	17 25.7 78 63	106.9	17 49.0 78 63	106.6	18 12.3 78 63	106.3	6
7	14 51.2 78 63	107.8	15 14.6 78 63	107.4	15 38.0 78 63	107.1	16 01.3 78 63	106.8	16 24.7 78 63	106.5	16 48.0 78 63	106.1	17 11.2 77 63	105.8	17 34.4 77 63	105.5	7
8	14 13.6 78 63	107.0	14 37.0 78 63	106.6	15 00.3 78 63	106.3	15 23.6 78 63	106.0	15 46.8 77 63	105.7	16 10.1 77 63	105.3	16 33.3 77 64	105.0	16 56.4 77 64	104.7	8
9	13 35.9 78 63	106.2	13 59.2 78 63	105.8	14 22.4 77 63	105.5	14 45.7 77 63	105.2	15 08.9 77 64	104.9	15 32.0 77 64	104.5	15 55.2 77 64	104.2	16 18.3 77 64	103.9	9
70	12 58.0 77 63	105.4	13 21.2 77 64	105.0	13 44.4 77 64	104.7	14 07.6 77 64	104.4	14 30.7 77 64	104.1	14 53.9 77 64	103.7	15 16.9 77 64	103.4	15 40.0 77 64	103.1	70
1	12 20.0 77 64	104.6	12 43.1 77 64	104.2	13 06.3 77 64	103.9	13 29.4 77 64	103.6	13 52.5 77 64	103.3	14 15.6 77 64	102.9	14 38.6 77 64	102.6	15 01.6 77 64	102.3	1
2	11 41.8 77 64	103.8	12 04.9 77 64	103.5	12 28.0 77 64	103.1	12 51.1 77 64	102.8	13 14.1 77 64	102.5	13 37.1 77 64	102.1	14 00.1 77 64	101.8	14 23.1 76 64	101.5	2
3	11 03.5 77 64	103.0	11 26.6 77 64	102.7	11 49.6 77 64	102.3	12 12.6 77 64	102.0	12 35.6 77 64	101.7	12 58.6 77 64	101.4	13 21.5 76 64	101.0	13 44.4 76 65	100.7	3
4	10 25.1 77 64	102.2	10 48.1 77 64	101.9	11 11.1 77 64	101.6	11 34.1 77 64	101.2	11 57.0 76 64	100.9	12 19.9 76 65	100.6	12 42.8 76 65	100.2	13 05.7 76 65	99.9	4
75	9 46.6 77 64	101.4	10 09.5 77 64	101.1	10 32.5 76 65	100.8	10 55.4 76 65	100.5	11 18.3 76 65	100.1	11 41.2 76 65	99.8	12 04.1 76 65	99.5	12 26.9 76 65	99.1	75
6	9 07.9 76 65	100.7	9 30.9 76 65	100.3	9 53.8 76 65	100.0	10 16.7 76 65	99.7	10 39.5 76 65	99.3	11 02.4 76 65	99.0	11 25.2 76 65	98.7	11 48.0 76 65	98.4	6
7	8 29.2 76 65	99.9	8 52.1 76 65	99.6	9 15.0 76 65	99.2	9 37.8 76 65	98.9	10 00.6 76 65	98.6	10 23.4 76 65	98.2	10 46.2 76 65	97.9	11 09.0 76 65	97.6	7
8	7 50.4 76 65	99.1	8 13.2 76 65	98.8	8 36.1 76 65	98.5	8 58.9 76 65	98.1	9 21.7 76 65	97.8	9 44.5 76 65	97.5	10 07.2 76 65	97.1	10 30.0 76 65	96.8	8
9	7 11.5 76 65	98.3	7 34.3 76 65	98.0	7 57.1 76 65	97.7	8 19.9 76 65	97.4	8 42.6 76 65	97.0	9 05.4 76 65	96.7	9 28.1 76 65	96.4	9 50.8 76 65	96.0	9
80	6 32.5 76 65	97.6	6 55.3 76 65	97.3	7 18.0 76 65	96.9	7 40.8 76 65	96.6	8 03.5 76 65	96.3	8 26.3 76 65	95.9	8 49.0 76 65	95.6	9 11.7 76 65	95.3	80
1	5 53.4 76 65	96.8	6 16.2 76 65	96.5	6 38.9 76 65	96.2	7 01.7 76 65	95.8	7 24.4 76 65	95.5	7 47.1 76 65	95.2	8 09.8 76 65	94.8	8 32.4 76 65	94.5	1
2	5 14.3 76 65	96.1	5 37.1 76 65	95.7	5 59.8 76 65	95.4	6 22.5 76 65	95.1	6 45.2 76 65	94.7	7 07.9 76 65	94.4	7 30.5 76 65	94.1	7 53.2 75 66	93.8	2
3					5 20.6 76 65	94.6	5 43.3 76 65	94.3	6 05.9 76 65	94.0	6 28.6 76 66	93.7	6 51.2 75 66	93.3	7 13.9 75 66	93.0	3
4							5 04.0 76 66	93.6	5 26.6 76 66	93.2	5 49.3 75 66	92.9	6 11.9 75 66	92.6	6 34.6 75 66	92.2	4
85											5 10.0 75 66	92.1	5 32.6 75 66	91.8	5 55.2 75 66	91.5	85
6															5 15.9 75 66	90.7	6

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H.A.	0° 00′			0° 30′			1° 00′			1° 30′			2° 00′			2° 30′			3° 00′			3° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	
00	41 00.0	1.0 01	180.0	40 30.0	1.0 01	180.0	40 00.0	1.0 01	180.0	39 30.0	1.0 01	180.0	39 00.0	1.0 01	180.0	38 30.0	1.0 01	180.0	38 00.0	1.0 01	180.0	37 30.0	1.0 01	180.0	00
1	40 59.5	1.0 02	178.7	40 29.5	1.0 02	178.7	39 59.6	1.0 02	178.7	39 29.6	1.0 02	178.7	38 59.6	1.0 02	178.7	38 29.6	1.0 02	178.7	37 59.6	1.0 02	178.7	37 29.6	1.0 02	178.7	
2	40 58.2	1.0 04	177.4	40 28.2	1.0 04	177.4	39 58.2	1.0 04	177.4	39 28.2	1.0 04	177.4	38 58.2	1.0 04	177.4	38 28.2	1.0 04	177.4	37 58.3	1.0 04	177.5	37 28.3	1.0 04	177.5	2
3	40 55.9	1.0 05	176.0	40 25.9	1.0 05	176.1	39 56.0	1.0 05	176.1	39 26.0	1.0 05	176.1	38 56.0	1.0 05	176.1	38 26.1	1.0 05	176.2	37 56.1	1.0 05	176.2	37 26.1	1.0 05	176.2	3
4	40 52.7	1.0 07	174.7	40 22.8	1.0 07	174.7	39 52.8	1.0 07	174.8	39 22.9	1.0 07	174.8	38 52.9	1.0 07	174.9	38 23.0	1.0 07	174.9	37 53.0	1.0 07	174.9	37 23.1	1.0 06	175.0	4
05	40 48.6	1.0 08	173.4	40 18.7	1.0 08	173.4	39 48.8	1.0 08	173.5	39 18.9	1.0 08	173.5	38 49.0	1.0 08	173.6	38 19.1	1.0 08	173.6	37 49.1	1.0 08	173.7	37 19.2	1.0 08	173.7	05
6	40 43.7	1.0 10	172.1	40 13.8	1.0 10	172.1	39 43.9	1.0 10	172.2	39 14.0	1.0 10	172.2	38 44.1	1.0 10	172.3	38 14.3	1.0 09	172.4	37 44.4	1.0 09	172.4	37 14.5	1.0 09	172.5	6
7	40 37.8	99 11	170.8	40 08.0	99 11	170.8	39 38.1	99 11	170.9	39 08.3	99 11	171.0	38 38.4	99 11	171.0	38 08.6	99 11	171.1	37 38.7	99 11	171.2	37 08.9	99 11	171.2	7
8	40 31.0	99 13	169.5	40 01.2	99 13	169.5	39 31.5	99 13	169.6	39 01.7	99 12	169.7	38 31.9	99 12	169.8	38 02.1	99 12	169.8	37 32.3	99 12	169.9	37 02.5	99 12	170.0	8
9	40 23.4	99 14	168.1	39 53.6	99 14	168.2	39 23.9	99 14	168.3	38 54.2	99 14	168.4	38 24.4	99 14	168.5	37 54.7	99 14	168.6	37 25.0	99 14	168.7	36 55.2	99 14	168.7	9
10	40 14.9	99 16	166.8	39 45.2	99 16	166.9	39 15.5	99 15	167.0	38 45.8	99 15	167.1	38 16.2	99 15	167.2	37 46.5	99 15	167.3	37 16.8	99 15	167.4	36 47.1	99 15	167.5	10
1	40 05.5	99 17	165.6	39 35.9	99 17	165.7	39 06.3	99 17	165.8	38 36.7	99 17	165.9	38 07.0	99 17	166.0	37 37.4	99 16	166.1	37 07.8	99 16	166.2	36 38.2	99 16	166.3	1
2	39 55.2	98 18	164.3	39 25.7	98 18	164.4	38 56.2	98 18	164.5	38 26.6	98 18	164.6	37 57.1	98 18	164.7	37 27.5	99 18	164.8	36 58.0	99 18	164.9	36 28.4	99 18	165.0	2
3	39 44.1	98 20	163.0	39 14.7	98 20	163.1	38 45.2	98 20	163.2	38 15.8	98 19	163.4	37 46.3	98 19	163.5	37 16.8	98 19	163.6	36 47.3	98 19	163.7	36 17.8	98 19	163.8	3
4	39 32.2	98 21	161.7	39 02.8	98 21	161.9	38 33.5	98 21	162.0	38 04.1	98 21	162.1	37 34.7	98 21	162.2	37 05.3	98 21	162.4	36 35.9	98 20	162.5	36 06.5	98 20	162.6	4
15	39 19.4	98 23	160.5	38 50.2	98 22	160.6	38 20.9	98 22	160.7	37 51.6	98 22	160.9	37 22.3	98 22	161.0	36 53.0	98 22	161.1	36 23.7	98 22	161.3	35 54.3	98 22	161.4	15
6	39 05.9	97 24	159.2	38 36.7	97 24	159.3	38 07.5	97 24	159.5	37 38.3	97 23	159.6	37 09.1	97 23	159.8	36 39.9	97 23	159.9	36 10.6	97 23	160.1	35 41.4	97 23	160.2	6
7	38 51.5	97 25	157.9	38 22.4	97 25	158.1	37 53.3	97 25	158.3	37 24.2	97 25	158.4	36 55.1	97 25	158.6	36 26.0	97 24	158.7	35 56.8	97 24	158.9	35 27.7	97 24	159.0	7
8	38 36.3	97 27	156.7	38 07.3	97 26	156.9	37 38.3	97 26	157.0	37 09.3	97 26	157.2	36 40.3	97 26	157.4	36 11.3	97 26	157.5	35 42.2	97 26	157.7	35 13.2	97 26	157.8	8
9	38 20.4	96 28	155.5	37 51.5	96 28	155.6	37 22.6	96 28	155.8	36 53.7	96 27	156.0	36 24.8	96 27	156.2	35 55.8	96 27	156.3	35 26.9	97 27	156.5	34 57.9	97 27	156.6	9
20	38 03.6	96 29	154.3	37 34.9	96 29	154.4	37 06.1	96 29	154.6	36 37.3	96 29	154.8	36 08.5	96 28	155.0	35 39.7	96 28	155.1	35 10.8	96 28	155.3	34 42.0	96 28	155.5	20
1	37 46.2	95 30	153.0	37 17.5	96 30	153.2	36 48.8	96 30	153.4	36 20.2	96 30	153.6	35 51.5	96 30	153.8	35 22.7	96 29	154.0	34 54.0	96 29	154.1	34 25.3	96 29	154.3	1
2	37 27.9	95 32	151.8	36 59.4	95 31	152.0	36 30.9	95 31	152.2	36 02.3	95 31	152.4	35 33.7	95 31	152.6	35 05.1	95 31	152.8	34 36.5	95 30	153.0	34 07.8	95 30	153.1	2
3	37 09.0	95 33	150.6	36 40.6	95 33	150.8	36 12.2	95 32	151.0	35 43.7	95 32	151.2	35 15.2	95 32	151.4	34 46.7	95 32	151.6	34 18.2	95 32	151.8	33 49.7	95 31	152.0	3
4	36 49.4	94 34	149.5	36 21.1	94 34	149.7	35 52.7	94 34	149.9	35 24.4	94 33	150.1	34 56.1	95 33	150.3	34 27.7	95 33	150.5	33 59.3	95 33	150.7	33 30.9	95 32	150.9	4
25	36 29.0	94 35	148.3	36 00.8	94 35	148.5	35 32.6	94 35	148.7	35 04.4	94 34	148.9	34 36.2	94 34	149.1	34 07.9	94 34	149.3	33 39.7	94 34	149.5	33 11.4	94 34	149.7	25
6	36 08.0	93 36	147.1	35 39.9	94 36	147.3	35 11.9	94 36	147.6	34 43.8	94 36	147.8	34 15.7	94 35	148.0	33 47.5	94 35	148.2	33 19.4	94 35	148.4	32 51.2	94 35	148.6	6
7	35 46.3	93 37	146.0	35 18.4	93 37	146.2	34 50.4	93 37	146.4	34 22.5	93 37	146.6	33 54.5	93 36	146.9	33 26.5	93 36	147.1	32 58.4	93 36	147.3	32 30.4	94 36	147.5	7
8	35 23.9	93 38	144.8	34 56.1	93 38	145.1	34 28.3	93 38	145.3	34 00.5	93 38	145.5	33 32.6	93 37	145.7	33 04.7	93 37	146.0	32 36.8	93 37	146.2	32 08.9	93 37	146.4	8
9	35 00.9	92 39	143.7	34 33.3	92 39	143.9	34 05.6	92 39	144.2	33 37.9	92 39	144.4	33 10.2	92 38	144.6	32 42.4	93 38	144.9	32 14.6	93 38	145.1	31 46.8	93 38	145.3	9
30	34 37.3	92 40	142.6	34 09.8	92 40	142.8	33 42.3	92 40	143.1	33 14.7	92 40	143.3	32 47.1	92 40	143.5	32 19.4	92 39	143.8	31 51.8	92 39	144.0	31 24.1	92 39	144.2	30
1	34 13.1	91 41	141.5	33 45.7	91 41	141.7	33 18.3	91 41	142.0	32 50.8	92 41	142.2	32 23.4	92 40	142.4	31 55.9	92 40	142.7	31 28.3	92 40	142.9	31 00.8	92 40	143.1	1
2	33 48.3	91 42	140.4	33 21.0	91 42	140.6	32 53.7	91 42	140.9	32 26.4	91 42	141.1	31 59.1	91 41	141.4	31 31.7	91 41	141.6	31 04.3	91 41	141.8	30 36.9	91 41	142.1	2
3	33 22.9	90 43	139.3	32 55.8	90 43	139.5	32 28.6	91 43	139.8	32 01.4	91 43	140.0	31 34.2	91 42	140.3	31 07.0	91 42	140.5	30 39.7	91 42	140.8	30 12.4	91 42	141.0	3
4	32 57.0	90 44	138.2	32 30.0	90 44	138.5	32 02.9	90 44	138.7	31 35.9	90 44	139.0	31 08.8	90 43	139.2	30 41.7	90 43	139.5	30 14.5	91 43	139.7	29 47.3	91 43	140.0	4
35	32 30.5	89 45	137.1	32 03.6	90 45	137.4	31 36.7	90 45	137.7	31 09.8	90 44	137.9	30 42.8	90 44	138.2	30 15.8	90 44	138.4	29 48.8	90 44	138.7	29 21.8	90 44	138.9	35
6	32 03.4	89 46	136.1	31 36.7	89 46	136.4	31 09.9	89 45	136.6	30 43.1	89 45	136.9	30 16.3	89 45	137.1	29 49.4	90 45	137.4	29 22.6	90 45	137.7	28 55.6	90 44	137.9	6
7	31 35.9	89 47	135.0	31 09.3	89 47	135.3	30 42.6	89 46	135.6	30 16.0	89 46	135.8	29 49.3	89 46	136.1	29 22.5	89 46	136.4	28 55.8	89 45	136.6	28 29.0	89 45	136.9	7
8	31 07.8	88 48	134.0	30 41.3	88 47	134.3	30 14.8	88 47	134.6	29 48.3	89 47	134.8	29 21.7	89 47	135.1	28 55.1	89 47	135.4	28 28.5	89 46	135.6	28 01.8	89 46	135.9	8
9	30 39.2	88 48	133.0	30 12.9	88 48	133.3	29 46.5	88 48	133.5	29 20.1	88 48	133.8	28 53.7	88 48	134.1	28 27.2	88 47	134.3	28 00.7	88 47	134.6	27 34.2	88 47	134.9	9
40	30 10.2	87 49	132.0	29 44.0	87 49	132.2	29 17.8	88 49	132.5	28 51.5	88 48	132.8	28 25.2	88 48	133.1	27 58.8	88 48	133.3	27 32.5	88 48	133.6	27 06.1	88 48	133.9	40
1	29 40.7	87 50	131.0	29 14.6	87 50	131.2	28 48.5	87 49	131.5	28 22.4	87 49	131.8	27 56.2	87 49	132.1	27 30.0	87 49	132.4	27 03.7	88 49	132.6	26 37.5	88 48	132.9	1
2	29 10.8	86 51	130.0	28 44.8	87 50	130.3	28 18.8	87 50	130.5	27 52.8	87 50	130.8	27 26.8	87 50	131.1	27 00.7	87 50	131.4	26 34.5	87 49	131.7	26 08.4	87 49	131.9	2
3	28 40.4	86 51	129.0	28 14.6	86 51	129.3	27 48.7	86 51	129.6	27 22.8	86 51	129.8	26 56.9	86 50	130.1	26 30.9	87 50	130.4	26 04.9	87 50	130.7	25 38.9	87 50	131.0	3
4	28 09.6	86 52	128.0	27 43.9	86 52	128.3	27 18.1	86 52	128.6	26 52.4	86 51	128.9	26 26.6	86 51	129.2	26 00.7	86 51	129.4	25 34.8	86 51	129.7	25 08.9	86 51	130.0	4
45	27 38.4	85 53	127.0	27 12.8	85 52	127.3	26 47.2	85 52	127.6	26 21.5	86 52	127.9	25 55.8	86 52	128.2	25 30.1	86 52	128.5	25 04.4	86 51	128.8	24 38.6	86 51	129.1	45
6	27 06.7	85 53	126.1	26 41.3	85 53	126.4	26 15.8	85 53	126.7	25 50.3	85 53	127.0	25 24.7	85 53	127.3	24 59.1	85 52	127.5	24 33.5	85 52	127.8	24 07.8	86 52	128.1	6
7	26 34.7	84 54	125.1	26 09.4	85 54	125.4	25 44.0	85 54	125.7	25 18.6	85 53	126.0	24 53.2	85 53	126.3	24 27.7	85 53	126.6	24 02.2	85 53	126.9	23 36.7	85 53	127.2	7
8	26 02.4	84 55	124.2	25 37.1	84 54	124.5	25 11.9	84 54	124.8	24 46.6	84 54	125.1	24 21.3	84 54	125.4	23 55.9	85 54	125.7	23 30.5	85 53	126.0	23 05.1	85 53	126.3	8
9	25 29.6	84 55	123.3	25 04.5	84 55	123.6	24 39.4	84 55	123.9	24 14.2	84 55	124.2	23 49.0	84 54	124.5	23 23.8	84 54	124.8	22 58.5	84 54	125.1	22 33.2	84 54	125.3	9
50	24 56.5	83 56	122.3	24 31.6	83 56	122.6	24 06.5	83 55	123.0	23 41.5	84 55	123.3	23 16.4	84 55	123.6	22 51.2	84 55	123.8	22 26.1	84 55	124.1	22 00.9	84 54	124.4	50
1	24 23.1	83 56	121.4	23 58.2	83 56	121.7	23 33.3	83 56	122.0	23 08.4	83 56	122.3	22 43.4	83 56	122.6	22 18.4	83 55	122.9	21 53.3	84 55	123.2	21 28.2	84 55	123.5	1
2	23 49.4	82 57	120.5	23 24.6	83 57	120.8	22 59.8	83 56	121.1	22 35.0	83 56	121.4	22 10.1	83 56	121.7	21 45.2	83 56	122.0	21 20.2	83 56	122.3	20 55.3	83 56	122.6	2
3	23 15.3	82 57	119.6	22 50.6	82 57	119.9	22 25.9	82 57	120.2	22 01.2	82 57	120.5	21 36.5	83 57	120.9	21 11.7	83 56	121.2	20 46.8	83 56	121.5	20 22.0	83 56	121.8	3
4	22 40.9	82 58	118.7	22 16.4	82 58	119.0	21 51.8	82 57	119.4	21 27.2	82 57	119.7	21 02.5	82 57	120.0	20 37.8	82 57	120.3	20 13.1	82 57	120.6	19 48.3	83 57	120.9	4
55	22 06.3	81 58	117.9	21 41.8	82 58	118.2	21 17.3	82 58	118.5	20 52.8	82 58	118.8	20 28.3	82 58	119.1	20 03.7	82 57	119.4	19 39.0	82 57	119.7	19 14.4	82 57	120.0	55
6	21 31.3	81 59	117.0	21 07.0	81 59	117.3	20 42.6	81 58	117.6	20 18.2	81 58	117.9	19 53.7	82 58	118.2	19 29.2	82 58	118.5	19 04.7	82 58	118.8	18 40.2	82 58	119.1	6
7	20 56.1	81 59	116.1	20 31.9	81 59	116.4	20 07.6	81 59	116.7	19 43.2	81 59	117.0	19 18.9	81 58	117.4	18 54.5	81 58	117.7	18 30.1	81 58	118.0	18 05.6	82 58	118.3	7
8	20 20.6	80 60	115.2	19 56.5	81 59	115.6	19 32.3	81 59	115.9	19 08.1	81 59	116.2	18 43.8	81 59	116.5	18 19.5	81 59	116.8	17 55.2	81 59	117.1	17 30.8	81 58	117.4	8
9	19 44.9	80 60	114.4	19 20.8	80 60	114.7	18 56.7	80 60	115.0	18 32.6	81 60	115.3	18 08.4	81 59	115.7	17 44.2	81 59	116.0	17 20.0	81 59	116.3	16 55.8	81 59	116.6	9
60	19 09.0	80 60	113.5	18 45.0	80 60	113.9	18 21.0	80 60	114.2	17 56.9	80 60	114.5	17 32.8	80 60	114.8	17 08.7	80 60	115.1	16 44.6	80 59	115.4	16 20.4	81 59	115.7	60
1	18 32.8	80 61	112.7	18 08.9	80 61	113.0	17 44.9	80 60	113.3	17 21.0	80 60	113.7	16 57.0	80 60	114.0	16 33.0	80 60	114.3	16 08.9	80 60	114.6	15 44.8	80 60	114.9	1
2	17 56.3	79 61	111.9	17 32.5	79 61	112.2	17 08.7	80 61	112.5	16 44.8	80 61	112.8	16 20.9	80 61	113.1	15 57.0	80 60	113.4	15 33.0	80 60	113.8	15 09.0	80 60	114.1	2
3	17 19.7	79 61	111.0	16 56.0	79 61	111.4	16 32.2	79 61	111.7	16 08.4	79 61	112.0	15 44.6	79 61	112.3	15 20.7	80 61	112.6	14 56.9	80 61	112.9	14 33.0	80 60	113.2	3
4	16 42.9	79 62	110.2	16 19.2	79 62	110.5	15 55.5	79 61	110.8	15 31.8	79 61	111.2	15 08.1	79 61	111.5	14 44.3	79 61	111.8	14 20.5	79 61	112.1	13 56.7	79 61	112.4	4
65	16 05.8	79 62	109.4	15 42.2	79 62	109.7	15 18.6	79 62	110.0	14 55.0	79 62	110.3	14 31.3	79 62	110.7	14 07.6	79 61	111.0	13 43.9	79 61	111.3	13 20.2	79 61	111.6	65
6	15 28.6	78 62	108.6	15 05.1	78 62	108.9	14 41.5	78 62	109.2	14 18.0	79 62	109.5	13 54.4	79 62	109.9	13 30.8	79 62	110.2	13 07.2	79 62	110.5	12 43.5	79 62	110.8	6
7	14 51.2	78 63	107.8	14 27.8	78 62	108.1	14 04.3	78 62	108.4	13 40.8	78 62	108.7	13 17.3	78 62	109.0	12 53.7	78 62	109.4	12 30.2	79 62	109.7	12 06.6	79 62	110.0	7
8	14 13.6	78 63	107.0	13 50.2	78 63	107.3	13 26.9	78 63	107.6	13 03.4	78 63	107.9	12 40.0	78 62	108.2	12 16.5	78 62	108.6	11 53.0	78 62	108.9	11 29.5	78 62	109.2	8
9	13 35.9	78 63	106.2	13 12.6	78 63	106.5	12 49.3	78 63	106.8	12 25.9	78 63	107.1	12 02.5	78 63	107.4	11 39.1	78 63	107.8	11 15.7	78 62	108.1	10 52.3	78 62	108.4	9
70	12 58.0	77 63	105.4	12 34.8	78 63	105.7	12 11.5	78 63	106.0	11 48.2	78 63	106.3	11 24.9	78 63	106.6	11 01.6	78 63	107.0	10 38.2	78 63	107.3	10 14.8	78 63	107.6	70
1	12 20.0	77 64	104.6	11 56.8	77 64	104.9	11 33.6	77 63	105.2	11 10.3	77 63	105.5	10 47.1	78 63	105.9	10 23.8	78 63	106.2	10 00.5	78 63	106.5	9 37.2	78 63	106.8	1
2	11 41.8	77 64	103.8	11 18.7	77 64	104.1	10 55.5	77 64	104.4	10 32.4	77 64	104.8	10 09.2	77 63	105.1	9 45.9	77 63	105.4	9 22.7	77 63	105.7	8 59.5	78 63	106.0	2
3	11 03.5	77 64	103.0	10 40.4	77 64	103.3	10 17.3	77 64	103.6	9 54.2	77 64	104.0	9 31.1	77 64	104.3	9 07.9	77 64	104.6	8 44.8	77 64	104.9	8 21.6	77 63	105.3	3
4	10 25.1	77 64	102.2	10 02.1	77 64	102.5	9 39.0	77 64	102.9	9 16.0	77 64	103.2	8 52.9	77 64	103.5	8 29.8	77 64	103.8	8 06.6	77 64	104.2	7 43.5	77 64	104.5	4
75	9 46.6	77 64	101.4	9 23.6	77 64	101.8	9 00.6	77 64	102.1	8 37.6	77 64	102.4	8 14.5	77 64	102.7	7 51.5	77 64	103.1	7 28.4	77 64	103.4	7 05.3	77 64	103.7	75
6	9 07.9	76 65	100.7	8 45.0	76 64	101.0	8 22.0	77 64	101.3	7 59.1	77 64	101.6	7 36.1	77 64	102.0	7 13.1	77 64	102.3	6 50.1	77 64	102.6	6 27.0	77 64	102.9	6
7	8 29.2	76 65	99.9	8 06.3	76 65	100.2	7 43.4	76 65	100.5	7 20.5	76 65	100.9	6 57.5	77 64	101.2	6 34.6	77 64	101.5	6 11.6	77 64	101.8	5 48.6	77 64	102.2	7
8	7 50.4	76 65	99.1	7 27.5	76 65	99.4	7 04.6	76 65	99.8	6 41.8	76 65	100.1	6 18.9	76 65	100.4	5 55.9	76 65	100.7	5 33.0	76 64	101.1	5 10.1	76 64	101.4	8
9	7 11.5	76 65	98.3	6 48.6	76 65	98.7	6 25.8	76 65	99.0	6 03.0	76 65	99.3	5 40.1	76 65	99.7	5 17.2	76 65	100.0							9
80	6 32.5	76 65	97.6	6 09.7	76 65	97.9	5 46.9	76 65	98.2	5 24.1	76 65	98.6	5 01.2	76 65	98.9										80
1	5 53.4	76 65	96.8	5 30.7	76 65	97.1	5 07.9	76 65	97.5																1
2	5 14.3	76 65	96.1																						2

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Lat. 49°

H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	45 00.0	1.0 01	180.0	45 30.0	1.0 01	180.0	46 00.0	1.0 01	180.0	46 30.0	1.0 01	180.0	47 00.0	1.0 01	180.0	47 30.0	1.0 01	180.0	48 00.0	1.0 01	180.0	48 30.0	1.0 01	180.0	00
1	44 59.5	1.0 02	178.6	45 29.5	1.0 02	178.6	45 59.5	1.0 02	178.6	46 29.5	1.0 02	178.6	46 59.5	1.0 02	178.5	47 29.5	1.0 03	178.5	47 59.5	1.0 03	178.5	48 29.5	1.0 03	178.5	1
2	44 58.1	1.0 04	177.2	45 28.0	1.0 04	177.2	45 58.0	1.0 04	177.1	46 28.0	1.0 04	177.1	46 58.0	1.0 04	177.1	47 28.0	1.0 04	177.1	47 58.0	1.0 04	177.0	48 27.9	1.0 04	177.0	2
3	44 55.6	1.0 06	175.8	45 25.6	1.0 06	175.7	45 55.6	1.0 06	175.7	46 25.5	1.0 06	175.7	46 55.5	1.0 06	175.6	47 25.5	1.0 06	175.6	47 55.4	1.0 06	175.6	48 25.4	1.0 06	175.5	3
4	44 52.3	1.0 07	174.4	45 22.2	1.0 07	174.3	45 52.1	1.0 07	174.3	46 22.1	1.0 07	174.2	46 52.0	1.0 08	174.2	47 21.9	1.0 08	174.1	47 51.9	1.0 08	174.1	48 21.8	1.0 08	174.0	4
05	44 47.9	1.0 09	173.0	45 17.8	1.0 09	172.9	45 47.7	1.0 09	172.8	46 17.6	1.0 09	172.8	46 47.5	1.0 09	172.7	47 17.4	1.0 09	172.7	47 47.3	1.0 09	172.6	48 17.2	1.0 09	172.5	05
6	44 42.6	1.0 10	171.6	45 12.5	1.0 10	171.5	45 42.3	1.0 11	171.4	46 12.2	1.0 11	171.4	46 42.0	1.0 11	171.3	47 11.9	99 11	171.2	47 41.7	99 11	171.1	48 11.6	99 11	171.1	6
7	44 36.4	99 12	170.2	45 06.2	99 12	170.1	45 36.0	99 12	170.0	46 05.8	99 12	169.9	46 35.6	99 12	169.8	47 05.4	99 12	169.8	47 35.2	99 13	169.7	48 05.0	99 13	169.6	7
8	44 29.2	99 14	168.8	44 58.9	99 14	168.7	45 28.7	99 14	168.6	45 58.4	99 14	168.5	46 28.2	99 14	168.4	46 57.9	99 14	168.3	47 27.6	99 14	168.2	47 57.3	99 14	168.1	8
9	44 21.0	99 15	167.4	44 50.7	99 15	167.3	45 20.4	99 15	167.2	45 50.1	99 15	167.1	46 19.8	99 16	167.0	46 49.4	99 16	166.9	47 19.1	99 16	166.8	47 48.7	99 16	166.6	9
10	44 12.0	99 17	166.0	44 41.6	99 17	165.9	45 11.2	99 17	165.8	45 40.8	99 17	165.7	46 10.4	99 17	165.6	46 40.0	99 17	165.4	47 09.6	99 17	165.3	47 39.2	99 18	165.2	10
1	44 02.9	98 18	164.6	44 31.6	98 18	164.5	45 01.1	98 18	164.4	45 30.6	98 19	164.3	46 00.1	98 19	164.1	46 29.6	98 19	164.0	46 59.1	98 19	163.9	47 28.6	98 19	163.7	1
2	43 51.2	98 20	163.3	44 20.6	98 20	163.2	44 50.1	98 20	163.0	45 19.5	98 20	162.9	45 48.9	98 20	162.7	46 18.3	98 20	162.6	46 47.7	98 21	162.5	47 17.1	98 21	162.3	2
3	43 39.4	98 21	161.9	44 08.8	98 21	161.8	44 38.1	98 21	161.6	45 07.4	98 22	161.5	45 36.8	98 22	161.3	46 06.1	98 22	161.2	46 35.4	98 22	161.0	47 04.7	98 22	160.9	3
4	43 26.7	98 23	160.6	43 56.0	98 23	160.4	44 25.3	98 23	160.3	44 54.5	97 23	160.1	45 23.7	97 23	160.0	45 53.0	97 23	159.8	46 22.2	97 24	159.6	46 51.3	97 24	159.5	4
15	43 13.2	97 24	159.2	43 42.4	97 24	159.1	44 11.5	97 24	158.9	44 40.7	97 24	158.8	45 09.8	97 25	158.6	45 38.9	97 25	158.4	46 08.0	97 25	158.2	46 37.1	97 25	158.1	15
6	42 58.9	97 25	157.9	43 27.9	97 26	157.8	43 57.0	97 26	157.6	44 26.0	97 26	157.4	44 55.0	97 26	157.2	45 24.0	97 26	157.0	45 53.0	97 26	156.9	46 21.9	97 27	156.7	6
7	42 43.6	97 27	156.6	43 12.6	96 27	156.4	43 41.5	96 27	156.2	44 10.4	96 27	156.1	44 39.3	96 28	155.9	45 08.2	96 28	155.7	45 37.1	96 28	155.5	46 05.9	96 28	155.3	7
8	42 27.6	96 28	155.3	42 56.4	96 28	155.1	43 25.3	96 28	154.9	43 54.1	96 29	154.7	44 22.8	96 29	154.5	44 51.6	96 29	154.3	45 20.3	96 29	154.1	45 49.0	96 30	153.9	8
9	42 10.7	96 29	154.0	42 39.5	96 30	153.8	43 08.2	96 30	153.6	43 36.8	96 30	153.4	44 05.5	95 30	153.2	44 34.1	95 30	153.0	45 02.7	96 31	152.8	45 31.3	96 31	152.6	9
20	41 53.1	95 31	152.7	42 21.7	95 31	152.5	42 50.3	95 31	152.3	43 18.8	95 31	152.1	43 47.3	95 32	151.9	44 15.8	95 32	151.7	44 44.3	95 32	151.5	45 12.8	95 32	151.2	20
1	41 34.7	95 32	151.5	42 03.1	95 32	151.2	42 31.6	95 32	151.0	43 00.0	95 33	150.8	43 28.4	95 33	150.6	43 56.8	95 33	150.4	44 25.1	94 33	150.1	44 53.4	94 34	149.9	1
2	41 15.5	95 33	150.2	41 43.8	94 33	150.0	42 12.1	94 34	149.8	42 40.4	94 34	149.5	43 08.7	94 34	149.3	43 36.9	94 34	149.1	44 05.1	94 35	148.8	44 33.3	94 35	148.6	2
3	40 55.5	94 34	148.9	41 23.8	94 35	148.7	41 51.9	94 35	148.5	42 20.1	94 35	148.3	42 48.2	94 35	148.0	43 16.3	94 36	147.8	43 44.4	93 36	147.5	44 12.4	93 36	147.3	3
4	40 34.9	94 36	147.7	41 02.9	94 36	147.5	41 31.0	93 36	147.2	41 59.0	93 36	147.0	42 27.0	93 37	146.8	42 54.9	93 37	146.5	43 22.9	93 37	146.3	43 50.8	93 37	146.0	4
25	40 13.5	93 37	146.5	40 41.4	93 37	146.2	41 09.3	93 37	146.0	41 37.2	93 38	145.8	42 05.1	93 38	145.5	42 32.9	93 38	145.3	43 00.6	93 38	145.0	43 28.4	92 38	144.7	25
6	39 51.4	93 38	145.3	40 19.2	93 38	145.0	40 47.0	93 38	144.8	41 14.7	92 39	144.5	41 42.4	92 39	144.3	42 10.1	92 39	144.0	42 37.7	92 39	143.7	43 05.3	92 40	143.5	6
7	39 28.6	92 39	144.1	39 56.3	92 39	143.8	40 23.9	92 40	143.6	40 51.5	92 40	143.3	41 19.1	92 40	143.0	41 46.6	92 40	142.8	42 14.1	92 40	142.5	42 41.5	91 41	142.2	7
8	39 05.2	92 40	142.9	39 32.7	92 40	142.6	40 00.2	92 41	142.4	40 27.7	91 41	142.1	40 55.1	91 41	141.8	41 22.5	91 41	141.6	41 49.8	91 42	141.3	42 17.1	91 42	141.0	8
9	38 41.2	91 41	141.7	39 08.5	91 41	141.5	39 35.9	91 42	141.2	40 03.2	91 42	140.9	40 30.4	91 42	140.6	40 57.7	91 42	140.4	41 24.9	91 43	140.1	41 52.0	90 43	139.8	9
30	38 16.5	91 42	140.6	38 43.7	91 42	140.3	39 10.9	91 43	140.0	39 38.1	90 43	139.7	40 05.2	90 43	139.5	40 32.3	90 43	139.2	40 59.3	90 44	138.9	41 26.3	90 44	138.6	30
1	37 51.1	90 43	139.4	38 18.2	90 43	139.1	38 45.3	90 44	138.9	39 12.3	90 44	138.6	39 39.3	90 44	138.3	40 06.2	90 44	138.0	40 33.1	90 45	137.7	41 00.0	89 45	137.4	1
2	37 25.2	90 44	138.3	37 52.2	90 44	138.0	38 19.1	90 45	137.7	38 46.0	90 45	137.4	39 12.8	89 45	137.1	39 39.6	89 45	136.8	40 06.3	89 46	136.6	40 33.0	89 46	136.3	2
3	36 58.7	89 45	137.1	37 25.6	89 45	136.9	37 52.3	89 46	136.6	38 19.1	89 46	136.3	38 45.7	89 46	136.0	39 12.4	89 46	135.7	39 39.0	89 47	135.4	40 05.5	88 47	135.1	3
4	36 31.7	89 46	136.0	36 58.4	89 46	135.8	37 25.0	89 46	135.5	37 51.6	89 47	135.2	38 18.1	88 47	134.9	38 44.6	88 47	134.6	39 11.1	88 47	134.3	39 37.5	88 48	134.0	4
35	36 04.1	88 47	134.9	36 30.6	88 47	134.6	36 57.1	88 47	134.4	37 23.6	88 48	134.1	37 50.0	88 48	133.8	38 16.3	88 48	133.5	38 42.6	88 48	133.1	39 08.9	87 49	132.8	35
6	35 36.0	88 48	133.9	36 02.4	88 48	133.6	36 28.7	88 48	133.3	36 55.0	88 48	133.0	37 21.3	87 49	132.7	37 47.5	87 49	132.4	38 13.6	87 49	132.0	38 39.7	87 49	131.7	6
7	35 07.3	88 49	132.8	35 33.6	87 49	132.5	35 59.8	87 49	132.2	36 26.0	87 49	131.9	36 52.1	87 50	131.6	37 18.1	87 50	131.3	37 44.2	87 50	130.9	38 10.1	86 50	130.6	7
8	34 38.2	87 49	131.7	35 04.3	87 50	131.4	35 30.4	87 50	131.1	35 56.4	87 50	130.8	36 22.4	87 50	130.5	36 48.3	86 50	130.2	37 14.2	86 51	129.9	37 40.0	86 51	129.5	8
9	34 08.6	87 50	130.7	34 34.5	87 50	130.4	35 00.5	86 51	130.1	35 26.4	86 51	129.7	35 52.2	86 51	129.4	36 18.0	86 51	129.1	36 43.7	86 52	128.8	37 09.4	86 52	128.5	9
40	33 38.5	86 51	129.6	34 04.3	86 51	129.3	34 30.1	86 51	129.0	34 55.9	86 52	128.7	35 21.6	86 52	128.4	35 47.2	85 52	128.1	36 12.8	85 52	127.7	36 38.4	85 53	127.4	40
1	33 07.9	86 52	128.6	33 33.6	86 52	128.3	33 59.3	85 52	128.0	34 24.9	85 52	127.7	34 50.5	85 52	127.3	35 16.0	85 53	127.0	35 41.5	85 53	126.7	36 06.9	85 53	126.4	1
2	32 37.0	85 53	127.6	33 02.5	85 53	127.3	33 28.1	85 53	127.0	33 53.6	85 53	126.6	34 19.0	85 53	126.3	34 44.4	85 53	126.0	35 09.7	84 54	125.7	35 35.0	84 54	125.3	2
3	32 05.6	85 53	126.6	32 31.0	85 53	126.3	32 56.4	85 53	125.9	33 21.8	84 54	125.6	33 47.1	84 54	125.3	34 12.3	84 54	125.0	34 37.5	84 54	124.7	35 02.7	84 54	124.3	3
4	31 33.7	84 54	125.6	31 59.1	84 54	125.3	32 24.3	84 54	124.9	32 49.6	84 54	124.6	33 14.8	84 54	124.3	33 39.9	84 55	124.0	34 05.0	84 55	123.6	34 30.0	83 55	123.3	4
45	31 01.5	84 54	124.6	31 26.7	84 55	124.3	31 51.9	84 55	124.0	32 17.0	84 55	123.6	32 42.0	83 55	123.3	33 07.0	83 55	123.0	33 32.0	83 56	122.7	33 56.9	83 56	122.3	45
6	30 28.9	84 55	123.6	30 54.0	84 55	123.3	31 19.1	83 55	123.0	31 44.0	83 56	122.7	32 09.0	83 56	122.3	32 33.8	83 56	122.0	32 58.7	83 56	121.7	33 23.5	82 56	121.3	6
7	29 56.0	83 56	122.7	30 20.9	83 56	122.3	30 45.9	83 56	122.0	31 10.7	83 56	121.7	31 35.5	83 56	121.4	32 00.3	82 56	121.0	32 25.0	82 57	120.7	32 49.7	82 57	120.4	7
8	29 22.7	83 56	121.7	29 47.5	83 56	121.4	30 12.3	83 56	121.1	30 37.0	82 57	120.7	31 01.7	82 57	120.4	31 26.4	82 57	120.1	31 51.0	82 57	119.7	32 15.5	82 57	119.4	8
9	28 49.0	82 57	120.8	29 13.7	82 57	120.4	29 38.4	82 57	120.1	30 03.0	82 57	119.8	30 27.6	82 57	119.5	30 52.2	82 58	119.1	31 16.6	82 58	118.8	31 41.1	81 58	118.4	9
50	28 15.0	82 57	119.8	28 39.6	82 57	119.5	29 04.2	82 58	119.2	29 28.7	82 58	118.8	29 53.2	81 58	118.5	30 17.6	81 58	118.2	30 42.0	81 58	117.8	31 06.3	81 58	117.5	50
1	27 40.7	82 58	118.9	28 05.2	82 58	118.6	28 29.7	81 58	118.2	28 54.1	81 58	117.9	29 18.5	81 58	117.6	29 42.8	81 59	117.2	30 07.0	81 59	116.9	30 31.2	81 59	116.6	1
2	27 06.1	81 58	118 0	27 30.5	81 58	117.7	27 54.9	81 59	117.3	28 19.2	81 59	117.0	28 43.4	81 59	116.7	29 07.6	81 59	116.3	29 31.8	80 59	116.0	29 55.9	80 59	115.6	2
3	26 31.2	81 59	117.1	26 55.5	81 59	116.8	27 19.7	81 59	116.4	27 43.9	81 59	116.1	28 08.1	80 59	115.8	28 32.2	80 60	115.4	28 56.3	80 60	115.1	29 20.3	80 60	114.7	3
4	25 56.0	81 59	116.2	26 20.2	81 59	115.9	26 44.4	80 59	115.5	27 08.5	80 60	115.2	27 32.5	80 60	114.8	27 56.5	80 60	114.5	28 20.5	80 60	114.2	28 44.4	80 60	113.8	4
55	25 20.6	80 60	115.3	25 44.7	80 60	115.0	26 08.7	80 60	114.6	26 32.7	80 60	114.3	26 56.7	80 30	114.0	27 20.6	80 60	113.6	27 44.4	79 60	113.3	28 08.3	79 61	112.9	55
6	24 44.8	80 60	114.4	25 08.8	80 60	114.1	25 32.8	80 60	113.7	25 56.7	80 60	113.4	26 20.6	79 61	113.1	26 44.4	79 61	112.7	27 08.2	79 61	112.4	27 31.9	79 61	112.0	6
7	24 08.9	80 60	113.5	24 32.8	80 60	113.2	24 56.6	79 61	112.9	25 20.5	79 61	112.5	25 44.2	79 61	112.2	26 08.0	79 61	111.8	26 31.7	79 61	111.5	26 55.3	79 61	111.2	7
8	23 32.7	79 61	112.7	23 56.5	79 61	112.3	24 20.3	79 61	112.0	24 44.0	79 61	111.7	25 07.7	79 61	111.3	25 31.3	79 61	111.0	25 54.9	79 62	110.6	26 18.5	78 62	110.3	8
9	22 56.2	79 61	111.8	23 20.0	79 61	111.5	23 43.6	79 61	111.1	24 07.3	79 62	110.8	24 30.9	79 62	110.5	24 54.5	78 62	110.1	25 18.0	78 62	109.8	25 41.4	78 62	109.4	9
60	22 19.6	79 61	110.9	22 43.2	79 62	110.6	23 06.8	79 62	110.3	23 30.4	78 62	109.9	23 53.9	78 62	109.6	24 17.4	78 62	109.3	24 40.8	78 62	108.9	25 04.2	78 62	108.6	60
1	21 42.7	79 62	110.1	22 06.3	79 62	109.8	22 29.8	78 62	109.4	22 53.3	78 62	109.1	23 16.7	78 62	108.8	23 40.1	78 62	108.4	24 03.5	78 63	108.1	24 26.8	78 63	107.7	1
2	21 05.6	78 62	109.3	21 29.1	78 62	108.9	21 52.6	78 62	108.6	22 16.0	78 62	108.2	22 39.4	78 63	107.9	23 02.7	78 63	107.6	23 26.0	78 63	107.2	23 49.2	77 63	106.9	2
3	20 28.4	78 62	108.4	20 51.8	78 62	108.1	21 15.2	78 63	107.8	21 38.5	78 63	107.4	22 01.8	78 63	107.1	22 25.1	77 63	106.7	22 48.3	77 63	106.4	23 11.5	77 63	106.0	3
4	19 50.9	78 63	107.6	20 14.3	78 63	107.3	20 37.6	78 63	106.9	21 00.9	78 63	106.6	21 24.1	77 63	106.2	21 47.3	77 63	105.9	22 10.5	77 63	105.6	22 33.6	77 63	105.2	4
65	19 13.3	78 63	106.8	19 36.6	78 63	106.4	19 59.9	77 63	106.1	20 23.1	77 63	105.8	20 46.3	77 63	105.4	21 09.4	77 63	105.1	21 32.5	77 64	104.7	21 55.5	77 64	104.4	65
6	18 35.6	77 63	106.0	18 58.8	77 63	105.6	19 22.0	77 63	105.3	19 45.1	77 64	104.9	20 08.2	77 64	104.6	20 31.3	77 64	104.3	20 54.3	77 64	103.9	21 17.3	77 64	103.6	6
7	17 57.6	77 63	105.1	18 20.8	77 64	104.8	18 43.9	77 64	104.5	19 07.0	77 64	104.1	19 30.1	77 64	103.8	19 53.1	77 64	103.4	20 16.1	77 64	103.1	20 39.0	76 64	102.8	7
8	17 19.6	77 64	104.3	17 42.7	77 64	104.0	18 05.7	77 64	103.7	18 28.8	77 64	103.3	18 51.8	77 64	103.0	19 14.7	76 64	102.6	19 37.7	76 64	102.3	20 00.6	76 64	102.0	8
9	16 41.4	77 64	103.5	17 04.4	77 64	103.2	17 27.4	77 64	102.9	17 50.4	77 64	102.5	18 13.4	76 64	102.2	18 36.3	76 64	101.8	18 59.1	76 64	101.5	19 22.0	76 64	101.2	9
70	16 03.0	77 64	102.7	16 26.0	77 64	102.4	16 49.0	76 64	102.1	17 11.9	76 64	101.7	17 34.8	76 64	101.4	17 57.7	76 64	101.0	18 20.5	76 65	100.7	18 43.3	76 65	100.4	70
1	15 24.6	77 64	101.9	15 47.5	76 64	101.6	16 10.4	76 64	101.3	16 33.3	76 64	100.9	16 56.2	76 65	100.6	17 19.0	76 65	100.2	17 41.8	76 65	99.9	18 04.5	76 65	99.6	1
2	14 46.0	76 64	101.1	15 08.9	76 65	100.8	15 31.8	76 65	100.5	15 54.6	76 65	100.1	16 17.4	76 65	99.8	16 40.2	76 65	99.5	17 03.0	76 65	99.1	17 25.7	76 65	98.8	2
3	14 07.3	76 65	100.4	14 30.2	76 65	100.0	14 53.0	76 65	99.7	15 15.8	76 65	99.4	15 38.6	76 65	99.0	16 01.4	76 65	98.7	16 24.1	76 65	98.3	16 46.7	76 65	98.0	3
4	13 28.6	76 65	99.6	13 51.4	76 65	99.2	14 14.2	76 65	98.9	14 37.0	76 65	98.6	14 59.7	76 65	98.2	15 22.4	76 65	97.9	15 45.1	76 65	97.6	16 07.7	75 65	97.2	4
75	12 49.7	76 65	98.8	13 12.5	76 65	98.5	13 35.3	76 65	98.1	13 58.0	76 65	97.8	14 20.7	76 65	97.5	14 43.4	76 65	97.1	15 06.0	75 65	96.8	15 28.6	75 65	96.4	75
6	12 10.8	76 65	98.0	12 33.5	76 65	97.7	12 56.3	76 65	97.4	13 19.0	76 65	97.0	13 41.6	76 65	96.7	14 04.3	75 65	96.3	14 26.9	75 65	96.0	14 49.5	75 65	95.7	6
7	11 31.8	76 65	97.2	11 54.5	76 65	96.9	12 17.2	76 65	96.6	12 39.9	76 65	96.2	13 02.5	75 65	95.9	13 25.1	75 65	95.6	13 47.7	75 65	95.2	14 10.3	75 65	94.9	7
8	10 52.7	76 65	96.5	11 15.4	76 65	96.1	11 38.0	76 65	95.8	12 00.7	75 65	95.5	12 23.3	75 65	95.1	12 45.9	75 65	94.8	13 08.5	75 65	94.5	13 31.1	75 65	94.1	8
9	10 13.5	76 65	95.7	10 36.2	76 65	95.4	10 58.9	75 65	95.0	11 21.5	75 65	94.7	11 44.1	75 65	94.4	12 06.7	75 65	94.0	12 29.2	75 66	93.7	12 51.8	75 66	93.4	9
80	9 34.3	76 65	94.9	9 57.0	75 65	94.6	10 19.6	75 65	94.3	10 42.2	75 65	93.9	11 04.8	75 66	93.6	11 27.4	75 66	93.3	11 49.9	75 66	92.9	12 12.5	75 66	92.6	80
1	8 55.1	75 65	94.2	9 17.7	75 65	93.8	9 40.4	75 66	93.5	10 03.0	75 66	93.2	10 25.5	75 66	92.8	10 48.1	75 66	92.5	11 10.6	75 66	92.2	11 33.1	75 66	91.8	1
2	8 15.8	75 66	93.4	8 38.4	75 66	93.1	9 01.0	75 66	92.8	9 23.6	75 66	92.4	9 46.2	75 66	92.1	10 08.8	75 66	91.8	10 31.3	75 66	91.4	10 53.8	75 66	91.1	2
3	7 36.5	75 66	92.7	7 59.1	75 66	92.3	8 21.7	75 66	92.0	8 44.3	75 66	91.7	9 06.9	75 66	91.3	9 29.4	75 66	91.0	9 51.9	75 66	90.7	10 14.4	75 66	90.3	3
4	6 57.2	75 66	91.9	7 19.8	75 66	91.6	7 42.4	75 66	91.2	8 04.9	75 66	90.9	8 27.5	75 66	90.6	8 50.0	75 66	90.2	9 12.6	75 66	89.9	9 35.1	75 66	89.6	4
85	6 17.8	75 66	91.1	6 40.4	75 66	90.8	7 03.0	75 66	90.5	7 25.6	75 66	90.2	7 48.1	75 66	89.8	8 10.7	75 66	89.5	8 33.2	75 66	89.2	8 55.7	75 66	88.8	85
6	5 38.5	75 66	90.4	6 01.1	75 66	90.1	6 23.6	75 66	89.7	6 46.2	75 66	89.4	7 08.8	75 66	89.1	7 31.3	75 66	88.7	7 53.8	75 66	88.4	8 16.4	75 66	88.1	6
7				5 21.7	75 66	89.3	5 44.3	75 66	89.0	6 06.9	75 66	88.6	6 29.4	75 66	88.3	6 52.0	75 66	88.0	7 14.5	75 66	87.6	7 37.0	75 66	87.3	7
8							5 04.9	75 66	88.2	5 27.5	75 66	87.9	5 50.1	75 66	87.6	6 12.6	75 66	87.2	6 35.2	75 65	86.9	6 57.7	75 65	86.6	8
9													5 10.8	75 66	86.8	5 33.3	75 65	86.5	5 55.9	75 65	86.1	6 18.4	75 65	85.8	9
90																			5 16.6	75 65	85.4	5 39.2	75 65	85.1	90

H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	37 00.0	1.0 01	180.0	36 30.0	1.0 01	180.0	36 00.0	1.0 01	180.0	35 30.0	1.0 01	180.0	35 00.0	1.0 01	180.0	34 30.0	1.0 01	180.0	34 00.0	1.0 01	180.0	33 30.0	1.0 01	180.0	00
1	36 59.6	1.0 02	178.8	36 29.6	1.0 02	178.8	35 59.6	1.0 02	178.8	35 29.6	1.0 02	178.8	34 59.6	1.0 02	178.8	34 29.6	1.0 02	178.8	33 59.6	1.0 02	178.8	33 29.6	1.0 02	178.8	1
2	36 58.3	1.0 04	177.5	36 28.3	1.0 04	177.5	35 58.3	1.0 04	177.5	35 28.3	1.0 04	177.6	34 58.3	1.0 03	177.6	34 28.3	1.0 03	177.6	33 58.4	1.0 03	177.6	33 28.4	1.0 03	177.6	2
3	36 56.1	1.0 05	176.3	36 26.2	1.0 05	176.3	35 56.2	1.0 05	176.3	35 26.2	1.0 05	176.3	34 56.2	1.0 05	176.4	34 26.3	1.0 05	176.4	33 56.3	1.0 05	176.4	33 26.3	1.0 05	176.4	3
4	36 53.1	1.0 06	175.0	36 23.2	1.0 06	175.0	35 53.2	1.0 06	175.1	35 23.3	1.0 06	175.1	34 53.3	1.0 06	175.1	34 23.4	1.0 06	175.2	33 53.4	1.0 06	175.2	33 23.5	1.0 06	175.2	4
05	36 49.3	1.0 08	173.8	36 19.4	1.0 08	173.8	35 49.4	1.0 08	173.9	35 19.5	1.0 08	173.9	34 49.6	1.0 08	173.9	34 19.7	1.0 08	174.0	33 49.7	1.0 08	174.0	33 19.8	1.0 07	174.1	05
6	36 44.6	1.0 09	172.5	36 14.7	1.0 09	172.6	35 44.8	1.0 09	172.6	35 14.9	1.0 09	172.7	34 45.0	1.0 09	172.7	34 15.1	1.0 09	172.8	33 45.2	1.0 09	172.8	33 15.3	1.0 09	172.9	6
7	36 39.0	1.0 11	171.3	36 09.2	1.0 11	171.3	35 39.3	1.0 10	171.4	35 09.5	1.0 10	171.5	34 39.6	1.0 10	171.5	34 09.8	1.0 10	171.6	33 39.9	1.0 10	171.6	33 10.1	1.0 10	171.7	7
8	36 32.7	99 12	170.0	36 02.9	99 12	170.1	35 33.0	99 12	170.2	35 03.2	99 12	170.3	34 33.4	99 12	170.3	34 03.6	99 12	170.4	33 33.8	99 12	170.5	33 04.0	99 11	170.5	8
9	36 25.4	99 13	168.8	35 55.7	99 13	168.9	35 25.9	99 13	169.0	34 56.2	99 13	169.1	34 26.4	99 13	169.1	33 56.6	99 13	169.2	33 26.9	99 13	169.3	32 57.1	99 13	169.3	9
10	36 17.4	99 15	167.6	35 47.7	99 15	167.7	35 18.0	99 15	167.8	34 48.3	99 14	167.8	34 18.6	99 14	167.9	33 48.9	99 14	168.0	33 19.1	99 14	168.1	32 49.4	99 14	168.2	10
1	36 08.5	99 16	166.4	35 38.9	99 16	166.5	35 09.2	99 16	166.6	34 39.6	99 16	166.6	34 09.9	99 16	166.7	33 40.3	99 16	166.8	33 10.6	99 16	166.9	32 41.0	99 15	167.0	1
2	35 58.8	99 18	165.1	35 29.3	99 17	165.3	34 59.7	99 17	165.4	34 30.1	99 17	165.5	34 00.5	99 17	165.6	33 30.9	99 17	165.7	33 01.3	99 17	165.8	32 31.7	99 17	165.8	2
3	35 48.4	98 19	163.9	35 18.9	98 19	164.0	34 49.3	98 19	164.2	34 19.8	98 18	164.3	33 50.3	98 18	164.4	33 20.8	98 18	164.5	32 51.3	98 18	164.6	32 21.7	98 18	164.7	3
4	35 37.1	98 20	162.7	35 07.6	98 20	162.8	34 38.2	98 20	163.0	34 08.8	98 20	163.1	33 39.3	98 20	163.2	33 09.9	98 19	163.3	32 40.4	98 19	163.4	32 10.9	98 19	163.5	4
15	35 25.0	98 21	161.5	34 55.6	98 21	161.7	34 26.3	98 21	161.8	33 56.9	98 21	161.9	33 27.6	98 21	162.0	32 58.2	98 21	162.2	32 28.8	98 21	162.3	31 59.4	98 20	162.4	15
6	35 12.1	98 23	160.3	34 42.9	98 23	160.5	34 13.6	98 22	160.6	33 44.3	98 22	160.7	33 15.0	98 22	160.9	32 45.7	98 22	161.0	32 16.4	98 22	161.1	31 47.1	98 22	161.2	6
7	34 58.5	97 24	159.1	34 29.3	97 24	159.3	34 00.1	97 24	159.4	33 31.0	97 24	159.6	33 01.8	97 23	159.7	32 32.5	97 23	159.8	32 03.3	97 23	160.0	31 34.1	97 23	160.1	7
8	34 44.1	97 25	158.0	34 15.0	97 25	158.1	33 45.9	97 25	158.3	33 16.8	97 25	158.4	32 47.7	97 25	158.6	32 18.6	97 24	158.7	31 49.5	97 24	158.8	31 20.3	97 24	159.0	8
9	34 29.0	97 26	156.8	34 00.0	97 26	157.0	33 31.0	97 26	157.1	33 02.0	97 26	157.3	32 33.0	97 26	157.4	32 03.9	97 26	157.6	31 34.9	97 26	157.7	31 05.9	97 25	157.9	9
20	34 13.1	96 28	155.6	33 44.2	96 28	155.8	33 15.3	96 27	156.0	32 46.4	96 27	156.1	32 17.5	96 27	156.3	31 48.6	96 27	156.4	31 19.6	96 27	156.6	30 50.7	97 26	156.7	20
1	33 56.5	96 29	154.5	33 27.7	96 29	154.6	32 58.9	96 28	154.8	32 30.1	96 28	155.0	32 01.3	96 28	155.1	31 32.5	96 28	155.3	31 03.6	96 28	155.5	30 34.8	96 28	155.6	1
2	33 39.2	96 30	153.3	33 10.5	96 30	153.5	32 41.8	96 30	153.7	32 13.1	96 30	153.8	31 44.4	96 29	154.0	31 15.7	96 29	154.2	30 46.9	96 29	154.4	30 18.2	96 29	154.5	2
3	33 21.2	95 31	152.2	32 52.6	95 31	152.4	32 24.0	95 31	152.5	31 55.4	95 31	152.7	31 26.8	95 30	152.9	30 58.2	95 30	153.1	30 29.6	95 30	153.3	30 00.9	96 30	153.4	3
4	33 02.4	95 32	151.1	32 34.0	95 32	151.2	32 05.5	95 32	151.4	31 37.0	95 32	151.6	31 08.5	95 32	151.8	30 40.0	95 31	152.0	30 11.5	95 31	152.2	29 43.0	95 31	152.3	4
25	32 43.0	94 33	149.9	32 14.7	94 33	150.1	31 46.4	95 33	150.3	31 18.0	95 33	150.5	30 49.6	95 33	150.7	30 21.2	95 32	150.9	29 52.8	95 32	151.1	29 24.4	95 32	151.3	25
6	32 23.0	94 35	148.8	31 54.8	94 34	149.0	31 26.5	94 34	149.2	30 58.3	94 34	149.4	30 30.0	94 34	149.6	30 01.7	94 34	149.8	29 33.4	94 33	150.0	29 05.1	94 33	150.2	6
7	32 02.3	94 36	147.7	31 34.2	94 35	147.9	31 06.1	94 35	148.1	30 37.9	94 35	148.3	30 09.8	94 35	148.5	29 41.6	94 35	148.7	29 13.4	94 34	148.9	28 45.2	94 34	149.1	7
8	31 40.9	93 37	146.6	31 13.0	93 36	146.8	30 45.0	93 36	147.0	30 16.9	93 36	147.2	29 48.9	93 36	147.4	29 20.9	94 36	147.6	28 52.8	94 35	147.8	28 24.7	94 35	148.0	8
9	31 19.0	93 38	145.5	30 51.1	93 37	145.7	30 23.2	93 37	146.0	29 55.3	93 37	146.2	29 27.4	93 37	146.4	28 59.5	93 37	146.6	28 31.5	93 36	146.8	28 03.6	93 36	147.0	9
30	30 56.4	92 39	144.4	30 28.6	92 38	144.7	30 00.9	93 38	144.9	29 33.1	93 38	145.1	29 05.3	93 38	145.3	28 37.5	93 38	145.5	28 09.7	93 37	145.7	27 41.8	93 37	146.0	30
1	30 33.2	92 40	143.4	30 05.6	92 39	143.6	29 38.0	92 39	143.8	29 10.3	92 39	144.0	28 42.6	92 39	144.3	28 14.9	92 39	144.5	27 47.2	92 38	144.7	27 19.5	92 38	144.9	1
2	30 09.4	92 41	142.3	29 41.9	92 40	142.5	29 14.4	92 40	142.8	28 46.9	92 40	143.0	28 19.3	92 40	143.2	27 51.8	92 40	143.4	27 24.2	92 39	143.7	26 56.6	92 39	143.9	2
3	29 45.1	91 42	141.3	29 17.7	91 41	141.5	28 50.3	91 41	141.7	28 22.9	91 41	142.0	27 55.5	91 41	142.2	27 28.0	92 40	142.4	27 00.6	92 40	142.6	26 33.1	92 40	142.9	3
4	29 20.1	91 42	140.2	28 52.9	91 42	140.5	28 25.7	91 42	140.7	27 58.4	91 42	140.9	27 31.1	91 42	141.2	27 03.8	91 41	141.4	26 36.4	91 41	141.6	26 09.0	91 41	141.9	4
35	28 54.7	90 43	139.2	28 27.6	90 43	139.4	28 00.5	90 43	139.7	27 33.3	91 43	139.9	27 06.1	91 42	140.1	26 38.9	91 42	140.4	26 11.7	91 42	140.6	25 44.5	91 42	140.9	35
6	28 28.7	90 44	138.2	28 01.7	90 44	138.4	27 34.7	90 44	138.7	27 07.7	90 44	138.9	26 40.6	90 43	139.1	26 13.6	90 43	139.4	25 46.5	90 43	139.6	25 19.3	90 43	139.9	6
7	28 02.2	89 45	137.1	27 35.3	90 45	137.4	27 08.5	90 45	137.6	26 41.6	90 44	137.9	26 14.6	90 44	138.1	25 47.7	90 44	138.4	25 20.7	90 44	138.6	24 53.7	90 44	138.9	7
8	27 35.1	89 46	136.1	27 08.4	89 46	136.4	26 41.7	89 45	136.6	26 14.9	89 45	136.9	25 48.1	89 45	137.1	25 21.3	89 45	137.4	24 54.4	90 45	137.6	24 27.6	90 44	137.9	8
9	27 07.6	89 47	135.1	26 41.0	89 46	135.4	26 14.4	89 46	135.7	25 47.8	89 46	135.9	25 21.1	89 46	136.2	24 54.4	89 46	136.4	24 27.7	89 45	136.7	24 00.9	89 45	136.9	9
40	26 39.6	88 47	134.2	26 13.2	88 47	134.4	25 46.7	88 47	134.7	25 20.1	88 47	134.9	24 53.6	89 47	135.2	24 27.0	89 46	135.4	24 00.4	89 46	135.7	23 33.8	89 46	136.0	40
1	26 11.1	88 48	133.2	25 44.8	88 48	133.4	25 18.4	88 48	133.7	24 52.0	88 48	134.0	24 25.6	88 47	134.2	23 59.2	88 47	134.5	23 32.7	88 47	134.7	23 06.2	88 47	135.0	1
2	25 42.2	87 49	132.2	25 16.0	87 49	132.5	24 49.8	88 49	132.7	24 23.5	88 48	133.0	23 57.2	88 48	133.3	23 30.9	88 48	133.5	23 04.5	88 48	133.8	22 38.1	88 48	134.0	2
3	25 12.8	87 50	131.2	24 46.7	87 49	131.5	24 20.6	87 49	131.8	23 54.5	87 49	132.0	23 28.3	87 49	132.3	23 02.1	87 49	132.6	22 35.9	87 48	132.8	22 09.6	88 48	133.1	3
4	24 43.0	87 50	130.3	24 17.0	87 50	130.6	23 51.0	87 50	130.8	23 25.0	87 50	131.1	22 59.0	87 50	131.4	22 32.9	87 49	131.6	22 06.8	87 49	131.9	21 40.7	87 49	132.2	4
45	24 12.8	86 51	129.3	23 46.9	86 51	129.6	23 21.1	86 51	129.9	22 55.2	86 50	130.2	22 29.2	86 50	130.4	22 03.3	87 50	130.7	21 37.3	87 50	131.0	21 11.3	87 50	131.2	45
6	23 42.1	86 52	128.4	23 16.4	86 52	128.7	22 50.6	86 51	129.0	22 24.9	86 51	129.2	21 59.1	86 51	129.5	21 33.2	86 51	129.8	21 07.4	86 51	130.1	20 41.5	86 50	130.3	6
7	23 11.1	85 52	127.5	22 45.5	85 52	127.8	22 19.8	85 52	128.0	21 54.2	86 52	128.3	21 28.5	86 52	128.6	21 02.8	86 51	128.9	20 37.0	86 51	129.1	20 11.3	86 51	129.4	7
8	22 39.6	85 53	126.5	22 14.2	85 53	126.8	21 48.6	85 53	127.1	21 23.1	85 52	127.4	20 57.5	85 52	127.7	20 31.9	85 52	128.0	20 06.3	85 52	128.2	19 40.6	86 52	128.5	8
9	22 07.8	85 54	125.6	21 42.5	85 53	125.9	21 17.1	85 53	126.2	20 51.6	85 53	126.5	20 26.2	85 53	126.8	20 00.7	85 53	127.1	19 35.2	85 52	127.3	19 09.7	85 52	127.6	9
50	21 35.7	84 54	124.7	21 10.4	84 54	125.0	20 45.1	84 54	125.3	20 19.8	84 54	125.6	19 54.5	85 53	125.9	19 29.1	85 53	126.2	19 03.7	85 53	126.4	18 38.3	85 53	126.7	50
1	21 03.1	84 55	123.8	20 38.0	84 55	124.1	20 12.8	84 54	124.4	19 47.6	84 54	124.7	19 22.4	84 54	125.0	18 57.1	84 54	125.3	18 31.9	84 54	125.6	18 06.6	84 53	125.8	1
2	20 30.3	83 55	122.9	20 05.2	83 55	123.2	19 40.2	84 55	123.5	19 15.1	84 55	123.8	18 50.0	84 55	124.1	18 24.8	84 54	124.4	17 59.7	84 54	124.7	17 34.5	84 54	125.0	2
3	19 57.1	83 56	122.1	19 32.1	83 56	122.3	19 07.2	83 56	122.6	18 42.2	83 55	122.9	18 17.2	83 55	123.2	17 52.2	83 55	123.5	17 27.1	84 55	123.8	17 02.0	84 55	124.1	3
4	19 23.5	83 56	121.2	18 58.7	83 56	121.5	18 33.9	83 56	121.8	18 09.0	83 56	122.1	17 44.1	83 56	122.4	17 19.2	83 56	122.6	16 54.2	83 55	122.9	16 29.3	83 55	123.2	4
55	18 49.7	82 57	120.3	18 25.0	82 57	120.6	18 00.3	83 57	120.9	17 35.5	83 56	121.2	17 10.7	83 56	121.5	16 45.9	83 56	121.8	16 21.1	83 56	122.1	15 56.2	83 56	122.4	55
6	18 15.6	82 57	119.4	17 51.0	82 57	119.7	17 26.3	82 57	120.0	17 01.7	82 57	120.3	16 37.0	82 57	120.6	16 12.3	82 57	120.9	15 47.5	82 56	121.2	15 22.8	83 56	121.5	6
7	17 41.2	82 58	118.6	17 16.7	82 58	118.9	16 52.1	82 58	119.2	16 27.6	82 57	119.5	16 03.0	82 57	119.8	15 38.4	82 57	120.1	15 13.7	82 57	120.4	14 49.1	82 57	120.7	7
8	17 06.5	81 58	117.7	16 42.0	81 58	118.0	16 17.6	81 58	118.3	15 53.2	82 58	118.6	15 28.7	82 58	118.9	15 04.2	82 58	119.2	14 39.6	82 57	119.5	14 15.1	82 57	119.8	8
9	16 31.5	81 59	116.9	16 07.2	81 59	117.2	15 42.8	81 58	117.5	15 18.5	81 58	117.8	14 54.1	81 58	118.1	14 29.7	81 58	118.4	14 05.2	81 58	118.7	13 40.8	82 58	119.0	9
60	15 56.2	81 59	116.0	15 32.0	81 59	116.4	15 07.8	81 59	116.7	14 43.5	81 59	117.0	14 19.2	81 59	117.3	13 54.9	81 58	117.6	13 30.6	81 58	117.9	13 06.2	81 58	118.2	60
1	15 20.7	80 60	115.2	14 56.6	80 59	115.5	14 32.5	81 59	115.8	14 08.3	81 59	116.1	13 44.1	81 59	116.4	13 19.9	81 59	116.7	12 55.6	81 59	117.0	12 31.4	81 58	117.3	1
2	14 45.0	80 60	114.4	14 21.0	80 60	114.7	13 56.9	80 60	115.0	13 32.8	80 60	115.3	13 08.7	80 59	115.6	12 44.6	80 59	115.9	12 20.5	81 59	116.2	11 56.3	81 59	116.5	2
3	14 09.0	80 60	113.6	13 45.1	80 60	113.9	13 21.1	80 60	114.2	12 57.1	80 60	114.5	12 33.1	80 60	114.8	12 09.1	80 60	115.1	11 45.0	80 59	115.4	11 20.9	80 59	115.7	3
4	13 32.8	80 61	112.7	13 09.0	80 61	113.1	12 45.1	80 60	113.4	12 21.2	80 60	113.7	11 57.3	80 60	114.0	11 33.3	80 60	114.3	11 09.3	80 60	114.6	10 45.4	80 60	114.9	4
65	12 56.4	79 61	111.9	12 32.7	79 61	112.2	12 08.9	79 61	112.6	11 45.0	79 61	112.9	11 21.2	80 60	113.2	10 57.3	80 60	113.5	10 33.4	80 60	113.8	10 09.5	80 60	114.1	65
6	12 19.8	79 61	111.1	11 56.1	79 61	111.4	11 32.4	79 61	111.7	11 08.7	79 61	112.1	10 44.9	79 61	112.4	10 21.1	79 61	112.7	9 57.3	79 61	113.0	9 33.5	79 60	113.3	6
7	11 43.0	79 62	110.3	11 19.4	79 62	110.6	10 55.7	79 61	110.9	10 32.1	79 61	111.3	10 08.4	79 61	111.6	9 44.7	79 61	111.9	9 21.0	79 61	112.2	8 57.2	79 61	112.5	7
8	11 06.0	78 62	109.5	10 42.4	79 62	109.8	10 18.9	79 62	110.1	9 55.3	79 62	110.5	9 31.7	79 62	110.8	9 08.1	79 61	111.1	8 44.4	79 61	111.4	8 20.8	79 61	111.7	8
9	10 28.8	78 62	108.7	10 05.3	78 62	109.0	9 41.8	78 62	109.4	9 18.3	78 62	109.7	8 54.8	78 62	110.0	8 31.2	79 62	110.3	8 07.7	79 62	110.6	7 44.1	79 61	110.9	9
70	9 51.4	78 63	107.9	9 28.0	78 62	108.2	9 04.6	78 62	108.6	8 41.2	78 62	108.9	8 17.7	78 62	109.2	7 54.2	78 62	109.5	7 30.7	78 62	109.8	7 07.2	78 62	110.1	70
1	9 13.9	78 63	107.1	8 50.6	78 63	107.5	8 27.2	78 63	107.8	8 03.8	78 62	108.1	7 40.4	78 62	108.4	7 17.0	78 62	108.7	6 53.6	78 62	109.0	6 30.2	78 62	109.4	1
2	8 36.2	78 63	106.4	8 12.9	78 63	106.7	7 49.6	78 63	107.0	7 26.3	78 63	107.3	7 03.0	78 63	107.6	6 39.7	78 63	107.9	6 16.3	78 62	108.3	5 53.0	78 62	108.6	2
3	7 58.4	77 63	105.6	7 35.1	77 63	105.9	7 11.9	77 63	106.2	6 48.7	78 63	106.5	6 25.4	78 63	106.8	6 02.1	78 63	107.2	5 38.8	78 63	107.5	5 15.6	78 63	107.8	3
4	7 20.4	77 64	104.8	6 57.2	77 63	105.1	6 34.0	77 63	105.4	6 10.8	77 63	105.8	5 47.7	77 63	106.1	5 24.4	77 63	106.4	5 01.2	77 63	106.7				4
75	6 42.2	77 64	104.0	6 19.1	77 64	104.3	5 56.0	77 64	104.7	5 32.9	77 64	105.0	5 09.8	77 63	105.3										75
6	6 04.0	77 64	103.2	5 40.9	77 64	103.6	5 17.9	77 64	103.9																6
7	5 25.6	77 64	102.5	5 02.6	77 64	102.8																			7

DECLINATION SAME NAME AS LATITUDE

H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91																						5 00.0	75 65	84.3	91

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Lat. 49°

H.A.	8° 00′ Alt.	Δd	Δt	Az.	8° 30′ Alt.	Δd	Δt	Az.	9° 00′ Alt.	Δd	Δt	Az.	9° 30′ Alt.	Δd	Δt	Az.
°	° ′			°	° ′			°	° ′			°	° ′			°
00	49 00.0	1.0	01	180.0	49 30.0	1.0	01	180.0	50 00.0	1.0	01	180.0	50 30.0	1.0	01	180.0
1	48 59.5	1.0	03	178.5	49 29.5	1.0	03	178.5	49 59.5	1.0	03	178.5	50 29.5	1.0	03	178.4
2	48 57.9	1.0	04	177.0	49 27.9	1.0	04	177.0	49 57.9	1.0	04	176.9	50 27.9	1.0	04	176.9
3	48 55.3	1.0	06	175.5	49 25.3	1.0	06	175.4	49 55.3	1.0	06	175.4	50 25.2	1.0	06	175.4
4	48 51.7	1.0	08	174.0	49 21.6	1.0	08	173.9	49 51.6	1.0	08	173.9	50 21.5	1.0	08	173.8
05	48 47.1	1.0	09	172.5	49 17.0	1.0	10	172.4	49 46.8	1.0	10	172.3	50 16.7	1.0	10	172.3
6	48 41.4	99	11	171.0	49 11.2	99	11	170.9	40 41.1	99	11	170.8	50 10.9	99	11	170.7
7	48 34.7	99	13	169.5	49 04.5	99	13	169.4	49 34.3	99	13	169.3	50 04.1	99	13	169.2
8	48 27.1	99	14	168.0	48 56.8	99	15	167.9	49 26.5	99	15	167.8	49 56.2	99	15	167.7
9	48 18.4	99	16	166.5	48 48.0	99	16	166.4	49 17.6	99	16	166.3	49 47.3	99	16	166.2
10	48 08.7	99	18	165.1	48 38.3	99	18	164.9	49 07.8	98	18	164.8	49 37.4	98	18	164.7
1	47 58.1	98	19	163.6	48 27.6	98	19	163.5	48 57.0	98	20	163.3	49 26.5	98	20	163.2
2	47 46.5	98	21	162.2	48 15.9	98	21	162.0	48 45.2	98	21	161.9	49 14.6	98	21	161.7
3	47 34.0	98	22	160.7	48 03.2	98	23	160.6	48 32.5	97	23	160.4	49 01.7	97	23	160.2
4	47 20.5	97	24	159.3	47 49.7	97	24	159.1	48 18.8	97	24	158.9	48 47.9	97	25	158.8
15	47 06.1	97	25	157.9	47 35.2	97	26	157.7	48 04.2	97	26	157.5	48 33.2	97	26	157.3
6	46 50.9	96	27	156.5	47 19.8	96	27	156.3	47 48.7	96	27	156.1	48 17.6	96	28	155.9
7	46 34.7	96	28	155.1	47 03.5	96	29	154.9	47 32.3	96	29	154.7	48 01.1	96	29	154.5
8	46 17.7	96	30	153.7	46 46.4	96	30	153.5	47 15.0	95	30	153.3	47 43.7	95	30	153.1
9	45 59.9	95	31	152.3	46 28.4	95	31	152.1	46 56.9	95	32	151.9	47 25.4	95	32	151.7
20	45 41.2	95	32	151.0	46 09.6	95	33	150.8	46 38.0	95	33	150.5	47 06.3	94	23	150.3
1	45 21.7	94	34	149.7	45 50.0	94	34	149.4	46 18.2	94	34	149.2	46 46.4	94	34	148.9
2	45 01.4	94	35	148.3	45 29.6	94	35	148.1	45 57.6	94	36	147.8	46 25.7	93	36	147.6
3	44 40.4	93	36	147.0	45 08.4	93	37	146.8	45 36.3	93	37	146.5	46 04.2	93	37	146.3
4	44 18.6	93	38	145.7	44 46.4	93	38	145.5	45 14.2	93	38	145.2	45 42.0	92	38	144.9
25	43 56.1	92	39	144.5	44 23.8	92	39	144.2	44 51.4	92	39	143.9	45 19.0	92	39	143.6
6	43 32.9	92	40	143.2	44 00.4	92	40	142.9	44 27.9	92	40	142.7	44 55.3	91	41	142.4
7	43 08.9	91	41	142.0	43 36.3	91	41	141.7	44 03.6	91	42	141.4	44 30.9	91	42	141.1
8	42 44.4	91	42	140.7	43 11.6	91	42	140.4	43 38.7	90	43	140.1	44 05.9	90	43	139.9
9	42 19.1	90	43	139.5	42 46.2	90	43	139.2	43 13.2	90	44	138.9	43 40.2	90	44	138.6
30	41 53.2	90	44	138.3	42 20.2	90	44	138.0	42 47.0	89	45	137.7	43 13.8	89	45	137.4
1	41 26.8	89	45	137.1	41 53.5	89	45	136.8	42 20.2	89	46	136.5	42 46.9	89	46	136.2
2	40 59.7	89	46	136.0	41 26.3	89	46	135.6	41 52.8	88	47	135.3	42 19.3	88	47	135.0
3	40 32.0	88	47	134.8	40 58.5	88	47	134.5	41 24.9	88	48	134.2	41 51.2	88	48	133.8
4	40 03.8	88	48	133.7	40 30.1	88	48	133.3	40 56.4	87	48	133.0	41 22.6	87	49	132.7
35	39 35.1	87	49	132.5	40 01.2	87	49	132.2	40 27.3	87	49	131.9	40 53.4	87	50	131.6
6	39 05.8	87	50	131.4	39 31.8	87	50	131.1	39 57.8	86	50	130.8	40 23.7	86	50	130.4
7	38 36.0	86	50	130.3	39 01.9	86	51	130.0	39 27.7	86	51	129.7	39 53.5	86	51	129.3
8	38 05.8	86	51	129.2	38 31.5	86	51	128.9	38 57.2	85	52	128.6	39 22.8	85	52	128.2
9	37 35.1	85	52	128.1	38 00.6	85	52	127.8	38 26.2	85	52	127.5	38 51.6	85	53	127.1
40	37 03.9	85	53	127.1	37 29.3	85	53	126.8	37 54.7	85	53	126.4	38 20.0	84	53	126.1
1	36 32.3	84	53	126.0	36 57.6	84	54	125.7	37 22.8	84	54	125.4	37 48.0	84	54	125.0
2	36 00.2	84	54	125.0	36 25.4	84	54	124.7	36 50.5	84	54	124.3	37 15.6	83	55	124.0
3	35 27.8	84	55	124.0	35 52.8	83	55	123.6	36 17.8	83	55	123.3	36 42.7	83	55	123.0
4	34 54.9	83	55	123.0	35 19.9	83	56	122.6	35 44.7	83	56	122.3	36 09.5	83	56	121.9
45	34 21.7	83	56	122.0	34 46.5	83	56	121.6	35 11.3	82	56	121.3	35 35.9	82	57	120.9
6	33 48.2	82	57	121.0	34 12.8	82	57	120.6	34 37.4	82	57	120.3	35 02.0	82	57	120.0
7	33 14.3	82	57	120.0	33 38.8	82	57	119.7	34 03.3	82	57	119.3	34 27.7	81	58	119.0
8	32 40.0	82	58	119.1	33 04.4	81	58	118.7	33 28.8	81	58	118.4	33 53.1	81	58	118.0
9	32 05.4	81	58	118.1	32 29.8	81	58	117.8	32 54.0	81	58	117.4	33 18.2	81	59	117.0
50	31 30.6	81	59	117.2	31 54.8	81	59	116.8	32 18.9	80	59	116.5	32 43.0	80	59	116.1
1	30 55.4	80	59	116.2	31 19.5	80	59	115.9	31 43.5	80	59	115.5	32 07.5	80	60	115.2
2	30 19.9	80	60	115.3	30 43.9	80	60	114.9	31 07.9	80	60	114.6	31 31.8	80	60	114.2
3	29 44.2	80	60	114.4	30 08.1	80	60	114.0	30 32.0	79	60	113.7	30 55.7	79	60	113.3
4	29 08.2	79	60	113.5	29 32.0	79	61	113.1	29 55.8	79	61	112.8	30 19.5	79	61	112.4
55	28 32.0	79	61	112.6	28 55.7	79	61	112.2	29 19.4	79	61	111.9	29 43.0	79	61	111.5
6	27 55.6	79	61	111.7	28 19.2	79	61	111.8	28 42.7	78	61	111.0	29 06.2	78	62	110.6
7	27 18.9	79	62	110.8	27 42.4	78	62	110.5	28 05.9	78	62	110.1	28 29.3	78	62	109.8
8	26 42.0	78	62	109.9	27 05.4	78	62	109.6	27 28.8	78	62	109.2	27 52.1	78	62	108.9
9	26 04.9	78	62	109.1	26 28.2	78	62	108.7	26 51.5	78	62	108.4	27 14.8	77	63	108.0
60	25 27.6	78	62	108.2	25 50.9	78	63	107.9	26 14.1	77	63	107.5	26 37.3	77	63	107.2
1	24 50.1	77	63	107.4	25 13.3	77	63	107.0	25 36.5	77	63	106.7	25 59.6	77	63	106.3
2	24 12.4	77	63	106.5	24 35.6	77	63	106.2	24 58.7	77	63	105.8	25 21.7	77	63	105.5
3	23 34.6	77	63	105.7	23 57.7	77	63	105.3	24 20.7	77	63	105.0	24 43.7	77	64	104.6
4	22 56.6	77	64	104.9	23 19.7	77	64	104.5	23 42.6	76	64	104.2	24 05.6	76	64	103.8
65	22 18.5	77	64	104.0	22 41.5	76	64	103.7	23 04.4	76	64	103.3	23 27.3	76	64	103.0
6	21 40.3	76	64	103.2	22 03.2	76	64	102.9	22 26.0	76	64	102.5	22 48.9	76	64	102.2
7	21 01.9	76	64	102.4	21 24.8	76	64	102.1	21 47.6	76	64	101.7	22 10.3	76	64	101.4
8	20 23.4	76	64	101.6	20 46.2	76	64	101.3	21 09.0	76	64	100.9	21 31.7	76	65	100.6
9	19 44.8	76	65	100.8	20 07.5	76	65	100.5	20 30.3	76	65	100.1	20 52.9	76	65	99.8
70	19 06.1	76	65	100.0	19 28.8	76	65	99.7	19 51.5	76	65	99.3	20 14.1	75	65	99.0
1	18 27.3	76	65	99.2	18 49.9	76	65	98.9	19 12.6	75	65	98.5	19 35.2	75	65	98.2
2	17 48.4	76	65	98.4	18 11.0	75	65	98.1	18 33.6	75	65	97.7	18 56.2	75	65	97.4
3	17 09.4	75	65	97.7	17 32.0	75	65	97.3	17 54.6	75	65	97.0	18 17.1	75	65	96.6
4	16 30.3	75	65	96.9	16 52.9	75	65	96.5	17 15.5	75	65	96.2	17 38.0	75	65	95.8
75	15 51.2	75	65	96.1	16 13.8	75	65	95.8	16 36.3	75	65	95.4	16 58.8	75	65	95.1
6	15 12.1	75	65	95.3	15 34.6	75	65	95.0	15 57.1	75	65	94.6	16 19.6	75	65	94.3
7	14 32.8	75	65	94.6	14 55.4	75	65	94.2	15 17.8	75	65	93.9	15 40.3	75	66	93.5
8	13 53.6	75	66	93.8	14 16.1	75	66	93.4	14 38.5	75	66	93.1	15 01.0	75	66	92.8
9	13 14.3	75	66	93.0	13 36.8	75	66	92.7	13 59.2	75	66	92.3	14 21.7	75	66	92.0
80	12 35.0	75	66	92.3	12 57.4	75	66	91.9	13 19.9	75	66	91.6	13 42.3	75	66	91.2
1	11 55.6	75	66	91.5	12 18.1	75	66	91.2	12 40.5	75	66	90.8	13 02.9	75	66	90.5
2	11 16.3	75	66	90.7	11 38.7	75	66	90.4	12 01.2	75	66	90.1	12 23.6	75	66	89.7
3	10 36.9	75	66	90.0	10 59.4	75	66	89.6	11 21.8	75	66	89.3	11 44.2	75	66	89.0
4	9 57.5	75	66	89.2	10 20.0	75	66	88.9	10 42.4	75	66	88.6	11 04.9	75	66	88.2
85	9 18.2	75	66	88.5	9 40.7	75	66	88.1	10 03.1	75	66	87.8	10 25.5	75	66	87.5
6	8 38.8	75	66	87.7	9 01.3	75	66	87.4	9 23.8	75	66	87.1	9 46.2	75	65	86.7
7	7 59.5	75	66	87.0	8 22.0	75	65	86.6	8 44.5	75	65	86.3	9 06.9	75	65	86.0
8	7 20.2	75	66	86.2	7 42.7	75	66	85.9	8 05.2	75	65	85.6	8 27.7	75	65	85.2
9	6 41.0	75	66	85.5	7 03.5	75	66	85.1	7 26.0	75	66	84.8	7 48.5	75	65	84.5
90	6 01.8	75	66	84.7	6 24.3	75	66	84.4	6 46.8	75	66	84.1	7 09.3	75	66	83.7

10° 00′ Alt.	Δd	Δt	Az.	10° 30′ Alt.	Δd	Δt	Az.	11° 00′ Alt.	Δd	Δt	Az.	11° 30′ Alt.	Δd	Δt	Az.	H.A.
° ′			°	° ′			°	° ′			°	° ′			°	°
51 00.0	1.0	01	180.0	51 30.0	1.0	01	180.0	52 00.0	1.0	01	180.0	52 30.0	1.0	01	180.0	00
50 59.5	1.0	03	178.4	51 29.5	1.0	03	178.4	51 59.5	1.0	03	178.4	52 29.4	1.0	03	178.4	1
50 57.9	1.0	04	176.9	51 27.8	1.0	05	176.8	51 57.8	1.0	05	176.8	52 27.8	1.0	05	176.8	2
50 55.2	1.0	06	175.3	51 25.1	1.0	06	175.3	51 55.1	1.0	06	175.2	52 25.0	1.0	06	175.2	3
50 51.4	1.0	08	173.8	51 21.3	1.0	08	173.7	51 51.3	1.0	08	173.6	52 21.2	1.0	08	173.6	4
50 46.6	1.0	10	172.2	51 16.5	1.0	10	172.1	51 46.3	1.0	10	172.1	52 16.2	1.0	10	172.0	05
50 40.7	99	12	170.7	51 10.6	99	12	170.6	51 40.4	99	12	170.5	52 10.2	99	12	170.4	6
50 33.8	99	13	169.1	51 03.6	99	13	169.0	51 33.3	99	14	168.9	52 03.1	99	14	168.8	7
50 25.9	99	15	167.6	50 55.5	99	15	167.5	51 25.2	99	15	167.3	51 54.9	99	15	167.2	8
50 16.9	99	17	166.0	50 46.5	99	17	165.9	51 16.1	99	17	165.8	51 45.7	99	17	165.7	9
50 06.9	98	18	164.5	50 36.4	98	18	164.4	51 05.9	98	19	164.3	51 35.4	98	19	164.1	10
49 55.9	98	20	163.0	50 25.3	98	20	162.9	50 54.7	98	20	162.7	51 24.1	98	20	162.6	1
49 43.9	98	22	161.5	50 13.2	98	22	161.4	50 42.5	98	22	161.2	51 11.8	98	22	161.0	2
49 31.0	97	23	160.0	50 00.2	97	23	159.9	50 29.4	97	24	159.7	50 58.5	97	24	159.5	3
49 17.1	97	25	158.6	49 46.1	97	25	158.4	50 15.2	97	26	158.2	50 44.3	97	26	158.0	4
49 02.2	97	26	157.1	49 31.2	97	26	156.9	50 00.1	96	27	156.7	50 29.0	96	27	156.5	15
48 46.4	96	28	155.7	49 15.3	96	28	155.5	49 44.1	96	28	155.3	50 12.9	96	28	155.0	6
48 29.8	96	29	154.2	48 58.5	96	29	154.0	49 27.2	96	30	153.8	49 55.8	95	30	153.6	7
48 12.2	95	31	152.8	48 40.8	95	31	152.6	49 09.4	95	31	152.4	49 37.9	95	31	152.1	8
47 53.8	95	32	151.4	48 22.3	95	32	151.2	48 50.7	95	33	150.9	49 19.0	94	23	150.7	9
47 34.6	94	33	150.0	48 02.9	94	34	149.8	48 31.1	94	34	149.5	48 59.3	94	34	149.3	20
47 14.5	94	35	148.7	47 42.7	94	35	148.4	48 10.8	94	35	148.2	48 38.8	93	36	147.9	1
46 53.7	93	36	147.3	47 21.7	93	36	147.1	47 49.6	93	37	146.8	48 17.5	93	37	146.5	2
46 32.1	93	37	146.0	46 59.9	93	38	145.7	47 27.6	93	38	145.4	47 55.4	92	38	145.2	3
46 09.7	92	39	144.7	46 37.3	92	39	144.4	47 04.9	92	39	144.1	47 32.5	92	39	143.8	4
45 46.5	92	40	143.4	46 14.0	92	40	143.1	46 41.5	91	40	142.8	47 08.9	91	41	142.5	25
45 22.7	91	41	142.1	45 50.0	91	41	141.8	46 17.3	91	41	141.5	46 44.6	91	42	141.2	6
44 58.2	91	42	140.8	45 25.3	91	42	140.5	45 52.5	90	43	140.2	46 19.6	90	43	139.9	7
44 32.9	90	43	139.6	45 00.0	90	43	139.2	45 27.0	90	44	138.9	45 53.9	90	44	138.6	8
44 07.1	90	44	138.3	44 34.0	89	44	138.0	45 00.8	89	45	137.7	45 27.5	89	45	137.4	9
43 40.6	89	45	137.1	44 07.3	89	45	136.8	44 34.0	89	46	136.5	45 00.6	89	46	136.1	30
43 13.5	89	46	135.9	43 40.0	88	46	135.6	44 06.5	88	47	135.2	44 33.0	88	47	134.9	1
42 45.8	88	47	134.7	43 12.2	88	47	134.4	43 38.5	88	48	134.0	44 04.8	88	48	133.7	2
42 17.5	88	48	133.5	42 43.8	87	48	133.2	43 10.0	87	49	132.9	43 36.1	87	49	132.5	3
41 48.7	87	49	132.4	42 14.8	87	49	132.0	42 40.8	87	49	131.7	43 06.8	86	50	131.4	4
41 19.4	87	50	131.2	41 45.3	86	50	130.9	42 11.2	86	50	130.5	42 37.0	86	51	130.2	35
40 49.5	86	51	130.1	41 15.3	86	51	129.8	41 41.0	86	51	129.4	42 06.7	85	51	129.1	6
40 19.2	86	51	129.0	40 44.8	85	52	128.6	41 10.4	85	52	128.3	41 35.9	85	52	127.9	7
39 48.3	85	52	127.9	40 13.8	85	52	127.5	40 39.2	85	53	127.2	41 04.6	84	53	126.8	8
39 17.0	85	53	126.8	39 42.4	84	53	126.5	40 07.7	84	53	126.1	40 32.9	84	54	125.7	9
38 45.3	84	54	125.7	39 10.5	84	54	125.4	39 35.6	84	54	125.0	40 00.7	83	54	124.7	40
38 13.1	84	54	124.7	38 38.2	83	55	124.3	39 03.2	83	55	124.0	39 28.1	83	55	123.6	1
37 40.6	83	55	123.6	38 05.5	83	55	123.3	38 30.4	83	55	122.9	38 55.2	83	56	122.6	2
37 07.6	83	56	122.6	37 32.4	83	56	122.3	37 57.1	82	56	121.9	38 21.8	82	56	121.5	3
36 34.2	82	56	121.6	36 58.9	82	56	121.2	37 23.5	82	57	120.9	37 48.1	82	57	120.5	4
36 00.5	82	57	120.6	36 25.1	82	57	120.2	36 49.6	81	57	119.9	37 14.0	81	57	119.5	45
35 26.5	82	57	119.6	35 50.9	81	58	119.2	36 15.3	81	58	118.9	36 39.5	81	58	118.5	6
34 52.1	81	58	118.6	35 16.4	81	58	118.3	35 40.6	81	58	117.9	36 04.8	80	58	117.5	7
34 17.4	81	58	117.6	34 41.6	81	59	117.3	35 05.7	80	59	116.9	35 29.7	80	59	116.6	8
33 42.3	80	59	116.7	34 06.4	80	59	116.3	34 30.4	80	59	116.0	34 54.4	80	59	115.6	9
33 07.0	80	59	115.7	33 31.0	80	60	115.4	33 54.9	80	60	115.0	34 18.7	79	60	114.7	50
32 31.4	80	60	114.8	32 55.3	79	60	114.5	33 19.1	79	60	114.1	33 42.8	79	60	113.7	1
31 55.6	79	60	113.9	32 19.3	79	60	113.5	32 43.0	79	60	113.2	33 06.7	79	61	112.8	2
31 19.5	79	61	113.0	31 43.1	79	61	112.6	32 06.7	79	61	112.2	32 30.3	78	61	111.9	3
30 43.1	79	61	112.1	31 06.7	78	61	111.7	31 30.2	78	61	111.3	31 53.6	78	61	111.0	4
30 06.5	78	61	111.2	30 30.0	78	62	110.8	30 53.4	78	62	110.4	31 16.8	78	62	110.1	55
29 29.7	78	62	110.3	29 53.1	78	62	109.9	30 16.4	78	62	109.6	30 39.7	77	62	109.2	6
28 52.7	78	62	109.4	29 16.0	78	62	109.0	29 39.2	77	62	108.7	30 02.4	77	62	108.3	7
28 15.4	78	62	108.5	28 38.7	77	62	108.2	29 01.8	77	63	107.8	29 24.9	77	63	107.4	8
27 38.0	77	63	107.7	28 01.2	77	63	107.3	28 24.3	77	63	106.9	28 47.3	77	63	106.6	9
27 00.4	77	63	106.8	27 23.5	77	63	106.5	27 46.5	77	63	106.1	28 09.5	76	63	105.7	60
26 22.7	77	63	106.0	26 45.7	77	63	105.6	27 08.6	76	63	105.2	27 31.5	76	64	104.9	1
25 44.7	77	63	105.1	26 07.7	76	64	104.8	26 30.6	76	64	104.4	26 53.4	76	64	104.0	2
25 06.7	76	64	104.3	25 29.5	76	64	103.9	25 52.4	76	64	103.6	26 15.2	76	64	103.2	3
24 28.4	76	64	103.5	24 51.3	76	64	103.1	25 14.0	76	64	102.7	25 36.8	76	64	102.4	4
23 50.1	76	64	102.6	24 12.9	76	64	102.3	24 35.6	76	64	101.9	24 58.3	75	64	101.6	65
23 11.6	76	64	101.8	23 34.4	76	64	101.5	23 57.0	75	64	101.1	24 19.6	75	65	100.8	6
22 33.0	76	64	101.0	22 55.7	76	65	100.7	23 18.3	75	65	100.3	23 40.9	75	65	99.9	7
21 54.4	76	65	100.2	22 17.0	75	65	99.9	22 39.6	75	65	99.5	23 02.1	75	65	99.1	8
21 15.6	75	65	99.4	21 38.2	75	65	99.1	22 00.7	75	65	98.7	22 23.2	75	65	98.3	9
20 36.7	75	65	98.6	20 59.2	75	65	98.3	21 21.8	75	65	97.9	21 44.2	75	65	97.6	70
19 57.7	75	65	97.8	20 20.3	75	65	97.5	20 42.7	75	65	97.1	21 05.2	75	65	96.8	1
19 18.7	75	65	97.0	19 41.2	75	65	96.7	20 03.6	75	65	96.3	20 26.0	75	65	96.0	2
18 39.6	75	65	96.3	19 02.1	75	65	95.9	19 24.5	75	65	95.6	19 46.9	75	65	95.2	3
18 00.4	75	65	95.5	18 22.9	75	65	95.1	18 45.3	75	65	94.8	19 07.6	74	65	94.4	4
17 21.2	75	65	94.7	17 43.7	75	65	94.4	18 06.0	75	65	94.0	18 28.4	74	66	93.7	75
16 42.0	75	66	93.9	17 04.4	75	66	93.6	17 26.8	74	66	93.2	17 49.1	74	66	92.9	6
16 02.7	75	66	93.2	16 25.1	75	66	92.8	16 47.4	74	66	92.5	17 09.8	74	66	92.1	7
15 23.4	75	66	92.4	15 45.8	75	66	92.1	16 08.1	74	66	91.7	16 30.4	74	66	91.4	8
14 44.0	75	66	91.7	15 06.4	75	66	91.3	15 28.7	74	66	91.0	15 51.0	74	66	90.6	9
14 04.7	75	66	90.9	14 27.1	74	66	90.6	14 49.4	74	66	90.2	15 11.7	74	66	89.9	80
13 25.3	75	66	90.1	13 47.7	74	66	89.8	14 10.0	74	66	89.5	14 32.3	74	66	89.1	1
12 46.0	75	66	89.4	13 08.3	74	66	89.0	13 30.7	74	66	88.7	13 53.0	74	66	88.4	2
12 06.6	75	66	88.6	12 29.0	75	66	88.3	12 51.3	74	66	87.9	13 13.6	74	66	87.6	3
11 27.3	75	66	87.9	11 49.6	75	66	87.5	12 12.0	74	66	87.2	12 34.3	74	65	86.9	4
10 47.9	75	66	87.1	11 10.3	75	66	86.8	11 32.7	75	65	86.5	11 55.0	74	65	86.1	85
10 06.6	75	65	86.4	10 31.0	75	65	86.0	10 53.4	75	65	85.7	11 15.8	74	65	85.4	6
9 29.4	75	65	85.6	9 51.8	75	65	85.3	10 14.2	75	65	85.0	10 36.6	75	65	84.6	7
8 50.1	75	66	84.9	9 12.6	75	65	84.6	9 35.0	75	65	84.2	9 57.4	75	65	83.9	8
8 11.0	75	65	84.1	8 33.4	75	65	83.8	8 55.9	75	66	83.5	9 18.3	75	65	83.1	9
7 31.8	75	66	83.4	7 54.3	75	65	83.1	8 16.8	75	65	82.7	8 39.2	75	66	82.4	90

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H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
00	33 06.0	1.0 01	180.0	32 30.0	1.0 01	180.0	32 00.0	1.0 01	180.0	31 30.0	1.0 01	180.0	31 00.0	1.0 01	180.0	30 30.0	1.0 01	180.0	30 00.0	1.0 01	180.0	29 30.0	1.0 01	180.0	00
1	32 59.6	1.0 02	178.8	32 29.6	1.0 02	178.8	31 59.6	1.0 02	178.8	31 29.6	1.0 02	178.8	30 59.6	1.0 02	178.9	30 29.6	1.0 02	178.9	29 59.6	1.0 02	178.9	29 29.6	1.0 02	178.9	1
2	32 58.4	1.0 03	177.6	32 28.4	1.0 03	177.7	31 58.4	1.0 03	177.7	31 28.4	1.0 03	177.7	30 58.4	1.0 03	177.7	30 28.4	1.0 03	177.7	29 58.4	1.0 03	177.7	29 28.5	1.0 03	177.7	2
3	32 56.4	1.0 05	176.5	32 26.4	1.0 05	176.5	31 56.4	1.0 05	176.5	31 26.4	1.0 05	176.5	30 56.5	1.0 05	176.6	30 26.5	1.0 06	176.6	29 56.5	1.0 05	176.6	29 26.5	1.0 04	176.6	3
4	32 53.5	1.0 06	175.3	32 23.6	1.0 06	175.3	31 53.6	1.0 06	175.3	31 23.6	1.0 06	175.4	30 53.7	1.0 06	175.4	30 23.7	1.0 06	175.4	29 53.8	1.0 06	175.5	29 23.8	1.0 06	175.5	4
05	32 49.9	1.0 07	174.1	32 19.9	1.0 07	174.1	31 50.0	1.0 07	174.2	31 20.1	1.0 07	174.2	30 50.1	1.0 07	174.3	30 20.2	1.0 07	174.3	29 50.3	1.0 07	174.3	29 20.3	1.0 07	174.4	05
6	32 45.4	1.0 09	172.9	32 15.5	1.0 09	173.0	31 45.6	1.0 09	173.0	31 15.7	1.0 09	173.1	30 45.8	1.0 08	173.1	30 15.9	1.0 08	173.2	29 46.0	1.0 08	173.2	29 16.1	1.0 08	173.3	6
7	32 40.2	1.0 10	171.8	32 10.3	1.0 10	171.8	31 40.5	1.0 10	171.9	31 10.6	1.0 10	171.9	30 40.7	1.0 10	172.0	30 10.8	1.0 10	172.0	29 41.0	1.0 10	172.1	29 11.1	1.0 10	172.1	7
8	32 34.1	99 11	170.6	32 04.3	99 11	170.7	31 34.5	99 11	170.7	31 04.7	99 11	170.8	30 34.8	99 11	170.8	30 05.0	99 11	170.9	29 35.2	99 11	171.0	29 05.3	99 11	171.0	8
9	32 27.3	99 13	169.4	31 57.5	99 13	169.5	31 27.8	99 13	169.6	30 58.0	99 12	169.6	30 28.2	99 12	169.7	29 58.4	99 12	169.8	29 28.6	99 12	169.8	28 58.8	99 12	169.9	9
10	32 19.7	99 14	168.3	31 50.0	99 14	168.3	31 20.2	99 14	168.4	30 50.5	99 14	168.5	30 20.8	99 14	168.6	29 51.0	99 14	168.6	29 21.3	99 13	168.7	28 51.5	99 13	168.8	10
1	32 11.3	99 15	167.1	31 41.6	99 15	167.2	31 11.9	99 15	167.3	30 42.3	99 15	167.4	30 12.6	99 15	167.4	29 42.9	99 15	167.5	29 13.2	99 15	167.6	28 43.5	99 15	167.7	1
2	32 02.1	99 17	165.9	31 32.5	99 16	166.0	31 02.9	99 16	166.1	30 33.3	99 16	166.2	30 03.7	99 16	166.3	29 34.0	99 16	166.4	29 04.4	99 16	166.5	28 34.8	99 16	166.6	2
3	31 52.2	98 18	164.8	31 22.6	98 18	164.9	30 53.1	99 18	165.0	30 23.5	99 17	165.1	29 54.0	99 17	165.2	29 24.4	99 17	165.3	28 54.8	99 17	165.4	28 25.3	99 17	165.5	3
4	31 41.5	98 19	163.6	31 12.0	98 19	163.8	30 42.5	98 19	163.9	30 13.0	98 19	164.0	29 43.5	98 19	164.1	29 14.0	98 18	164.2	28 44.5	98 18	164.3	28 15.0	98 18	164.4	4
15	31 30.0	98 20	162.5	31 00.6	98 20	162.6	30 31.2	98 20	162.7	30 01.8	98 20	162.9	29 32.4	98 20	163.0	29 02.9	98 20	163.1	28 33.5	98 20	163.2	28 04.1	98 19	163.3	15
6	31 17.8	98 22	161.4	30 48.5	98 21	161.5	30 19.2	98 21	161.6	29 49.8	98 21	161.7	29 20.5	98 21	161.9	28 51.1	98 21	162.0	28 21.8	98 21	162.1	27 52.4	98 21	162.2	6
7	31 04.9	97 23	160.2	30 35.6	97 23	160.4	30 06.4	98 22	160.5	29 37.1	98 22	160.6	29 07.9	98 22	160.8	28 38.6	98 22	160.9	28 09.3	98 22	161.0	27 40.0	98 22	161.1	7
8	30 51.2	97 24	159.1	30 22.0	97 24	159.3	29 52.9	97 24	159.4	29 23.7	97 24	159.5	28 54.5	97 23	159.7	28 25.3	97 23	159.8	27 56.1	97 23	159.9	27 26.9	97 23	160.0	8
9	30 36.8	97 25	158.0	30 07.7	97 25	158.1	29 38.7	97 25	158.3	29 09.6	97 25	158.4	28 40.5	97 25	158.6	28 11.4	97 24	158.7	27 42.3	97 24	158.8	27 13.2	97 24	159.0	9
20	30 21.7	97 26	156.9	29 52.7	97 26	157.0	29 23.8	97 26	157.2	28 54.8	97 26	157.3	28 25.8	97 26	157.5	27 56.7	97 26	157.6	27 27.7	97 25	157.8	26 58.7	97 25	157.9	20
1	30 05.9	96 28	155.8	29 37.0	96 27	155.9	29 08.1	96 27	156.1	28 39.2	96 27	156.2	28 10.3	96 27	156.4	27 41.4	96 27	156.6	27 12.5	96 27	156.7	26 43.6	96 26	156.8	1
2	29 49.4	96 29	154.7	29 20.6	96 28	154.8	28 51.9	96 28	155.0	28 23.1	96 28	155.2	27 54.2	96 28	155.3	27 25.4	96 28	155.5	26 56.6	96 28	155.6	26 27.7	96 27	155.8	2
3	29 32.3	96 30	153.6	29 03.6	96 30	153.8	28 34.9	96 29	153.9	28 06.2	96 29	154.1	27 37.5	96 29	154.3	27 08.8	96 29	154.4	26 40.0	96 29	154.6	26 11.3	96 29	154.7	3
4	29 14.4	95 31	152.5	28 45.8	95 31	152.7	28 17.3	95 30	152.9	27 48.7	95 30	153.0	27 20.1	95 30	153.2	26 51.4	95 30	153.4	26 22.8	95 30	153.5	25 54.2	96 30	153.7	4
25	28 55.9	95 32	151.4	28 27.5	95 32	151.6	27 59.0	95 32	151.8	27 30.5	95 31	152.0	27 02.0	95 31	152.1	26 33.5	95 31	152.3	26 04.9	95 31	152.5	25 36.4	95 31	152.7	25
6	28 36.8	94 33	150.4	28 08.4	95 33	150.5	27 40.0	95 33	150.7	27 11.7	95 32	150.9	26 43.3	95 32	151.1	26 14.9	95 32	151.3	25 46.4	95 32	151.5	25 18.0	95 32	151.6	6
7	28 17.0	94 34	149.3	27 48.7	94 34	149.5	27 20.5	94 34	149.7	26 52.2	94 33	149.9	26 23.9	94 33	150.1	25 55.6	94 33	150.2	25 27.3	94 33	150.4	24 59.0	94 33	150.6	7
8	27 56.6	94 35	148.2	27 28.5	94 35	148.4	27 00.3	94 35	148.6	26 32.2	94 34	148.8	26 04.0	94 34	149.0	25 35.8	94 34	149.2	25 07.6	94 34	149.4	24 39.4	94 34	149.6	8
9	27 35.6	93 36	147.2	27 07.6	93 36	147.4	26 39.5	93 36	147.6	26 11.5	94 35	147.8	25 43.4	94 35	148.0	25 15.3	94 35	148.2	24 47.3	94 35	148.4	24 19.1	94 35	148.6	9
30	27 13.9	93 37	146.2	26 46.0	93 37	146.4	26 18.1	93 37	146.6	25 50.2	93 36	146.8	25 22.3	93 36	147.0	24 54.3	93 36	147.2	24 26.3	93 36	147.4	23 58.3	93 36	147.6	30
1	26 51.7	93 38	145.1	26 24.0	93 38	145.3	25 56.2	93 38	145.6	25 28.3	93 37	145.8	25 00.5	93 37	146.0	24 32.7	93 37	146.2	24 04.8	93 37	146.4	23 36.9	93 37	146.6	1
2	26 28.9	92 39	144.1	26 01.3	92 39	144.3	25 33.6	92 39	144.5	25 05.9	92 38	144.7	24 38.2	92 38	145.0	24 10.5	92 38	145.2	23 42.7	93 38	145.4	23 15.0	93 38	145.6	2
3	26 05.6	92 40	143.1	25 38.0	92 40	143.3	25 10.5	92 39	143.5	24 42.9	92 39	143.7	24 15.3	92 39	144.0	23 47.7	92 39	144.2	23 20.1	92 39	144.4	22 52.4	92 38	144.6	3
4	25 41.7	91 41	142.1	25 14.2	91 41	142.3	24 46.8	91 40	142.5	24 19.4	92 40	142.8	23 51.9	92 40	143.0	23 24.4	92 40	143.2	22 56.9	92 40	143.4	22 29.4	92 39	143.6	4
35	25 17.2	91 42	141.1	24 49.9	91 41	141.3	24 22.6	91 41	141.5	23 55.3	91 41	141.8	23 27.9	91 41	142.0	23 00.5	91 41	142.2	22 33.2	91 40	142.4	22 05.8	91 40	142.7	35
6	24 52.2	91 42	140.1	24 25.0	91 42	140.3	23 57.9	91 42	140.6	23 30.6	91 42	140.8	23 03.4	91 42	141.0	22 36.2	91 42	141.2	22 08.9	91 41	141.5	21 41.6	91 41	141.7	6
7	24 26.7	90 43	139.1	23 59.7	90 43	139.3	23 32.6	90 43	139.6	23 05.5	90 43	139.8	22 38.4	90 43	140.0	22 11.3	90 42	140.3	21 44.1	91 42	140.5	21 17.0	91 42	140.7	7
8	24 00.7	90 44	138.1	23 33.8	90 44	138.4	23 06.8	90 44	138.6	22 39.8	90 44	138.8	22 12.9	90 43	139.1	21 45.9	90 43	139.3	21 18.8	90 43	139.6	20 51.8	90 43	139.8	8
9	23 34.2	89 45	137.2	23 07.4	89 45	137.4	22 40.5	89 45	137.7	22 13.7	90 44	137.9	21 46.8	90 44	138.1	21 20.0	90 44	138.4	20 53.1	90 44	138.6	20 26.1	90 44	138.8	9
40	23 07.1	89 46	136.2	22 40.5	89 46	136.5	22 13.8	89 45	136.7	21 47.1	89 45	136.9	21 20.3	89 45	137.2	20 53.6	89 45	137.4	20 26.8	89 45	137.7	20 00.0	89 44	137.9	40
1	22 39.7	88 47	135.2	22 13.1	89 46	135.5	21 46.5	89 46	135.8	21 20.0	89 46	136.0	20 53.3	89 46	136.2	20 26.7	89 46	136.5	20 00.0	89 45	136.7	19 33.4	89 45	137.0	1
2	22 11.7	88 47	134.3	21 45.3	88 47	134.6	21 18.9	88 47	134.8	20 52.4	88 47	135.1	20 25.9	88 46	135.3	19 59.4	88 46	135.6	19 32.8	88 46	135.8	19 06.3	89 46	136.1	2
3	21 43.3	88 48	133.4	21 17.0	88 48	133.6	20 50.7	88 48	133.9	20 24.4	88 47	134.1	19 58.0	88 47	134.4	19 31.6	88 47	134.6	19 05.2	88 47	134.9	18 38.7	88 47	135.1	3
4	21 14.5	87 49	132.4	20 48.3	87 49	132.7	20 22.1	87 48	133.0	19 55.9	87 48	133.2	19 29.6	88 48	133.5	19 03.4	88 48	133.7	18 37.1	88 48	134.0	18 10.8	88 47	134.2	4
45	20 45.2	87 49	131.5	20 19.2	87 49	131.8	19 53.1	87 49	132.0	19 27.0	87 49	132.3	19 00.9	87 49	132.6	18 34.7	87 48	132.8	18 08.5	87 48	133.1	17 42.3	87 48	133.3	45
6	20 15.5	86 50	130.6	19 49.6	87 50	130.9	19 23.6	87 50	131.1	18 57.7	87 50	131.4	18 31.6	87 49	131.7	18 05.6	87 49	131.9	17 39.6	87 49	132.2	17 13.5	87 49	132.4	6
7	19 45.5	86 51	129.7	19 19.6	86 51	130.0	18 53.8	86 50	130.2	18 27.9	86 50	130.5	18 02.0	86 50	130.8	17 36.1	86 50	131.0	17 10.2	86 50	131.3	16 44.2	87 49	131.6	7
8	19 15.0	86 51	128.8	18 49.3	86 51	129.1	18 23.5	86 51	129.3	17 57.8	86 51	129.6	17 32.0	86 51	129.9	17 06.2	86 50	130.1	16 40.4	86 50	130.4	16 14.6	86 50	130.7	8
9	18 44.1	85 52	127.9	18 18.5	85 52	128.2	17 52.9	85 52	128.4	17 27.3	85 52	128.7	17 01.6	86 51	129.0	16 35.9	86 51	129.3	16 10.2	86 51	129.5	15 44.5	86 51	129.8	9
50	18 12.8	85 53	127.0	17 47.4	85 52	127.3	17 21.9	85 52	127.6	16 56.4	85 52	127.8	16 30.8	85 52	128.1	16 05.3	85 52	128.4	15 39.7	85 52	128.7	15 14.1	85 51	128.9	50
1	17 41.2	84 53	126.1	17 15.9	85 53	126.4	16 50.5	85 53	126.7	16 25.1	85 53	127.0	15 59.7	85 53	127.2	15 34.2	85 52	127.5	15 08.8	85 52	127.8	14 43.3	85 52	128.1	1
2	17 09.3	84 54	125.2	16 44.0	84 54	125.5	16 18.7	84 54	125.8	15 53.5	84 53	126.1	15 28.2	84 53	126.4	15 02.8	84 53	126.6	14 37.5	85 53	126.9	14 12.1	85 53	127.2	2
3	16 36.9	84 54	124.4	16 11.8	84 54	124.7	15 46.7	84 54	124.9	15 21.5	84 54	125.2	14 56.3	84 54	125.5	14 31.1	84 54	125.8	14 05.8	84 53	126.1	13 40.6	84 53	126.3	3
4	16 04.3	83 55	123.5	15 39.3	83 55	123.8	15 14.2	84 55	124.1	14 49.2	84 54	124.4	14 24.1	84 54	124.7	13 59.0	84 54	124.9	13 33.8	84 54	125.2	13 08.7	84 54	125.5	4
55	15 31.3	83 56	122.7	15 06.4	83 55	122.9	14 41.5	83 55	123.2	14 16.5	83 55	123.5	13 51.5	83 55	123.8	13 26.5	83 55	124.1	13 01.5	83 54	124.4	12 36.5	83 54	124.7	55
6	14 58.0	83 56	121.8	14 33.2	83 56	122.1	14 08.4	83 56	122.4	13 43.5	83 56	122.7	13 18.7	83 55	123.0	12 53.8	83 55	123.3	12 28.9	83 55	123.5	12 03.9	83 55	123.8	6
7	14 24.4	82 56	121.0	13 59.7	82 56	121.3	13 35.0	82 56	121.6	13 10.2	83 56	121.8	12 45.5	83 56	122.1	12 20.7	83 56	122.4	11 55.9	83 55	122.7	11 31.1	83 55	123.0	7
8	13 50.5	82 57	120.1	13 25.9	82 57	120.4	13 01.3	82 57	120.7	12 36.6	82 56	121.0	12 12.0	82 56	121.3	11 47.3	82 56	121.6	11 22.6	82 56	121.9	10 57.9	82 56	122.2	8
9	13 16.3	82 57	119.3	12 51.8	82 57	119.6	12 27.3	82 57	119.9	12 02.8	82 57	120.2	11 38.2	82 57	120.5	11 13.6	82 57	120.8	10 49.1	82 56	121.1	10 24.4	82 56	121.3	9
60	12 41.8	81 58	118.5	12 17.4	81 58	118.8	11 53.0	81 58	119.1	11 28.6	81 57	119.4	11 04.1	82 57	119.7	10 39.7	82 57	119.9	10 15.2	82 57	120.2	9 50.7	82 57	120.5	60
1	12 07.1	81 58	117.6	11 42.8	81 58	117.9	11 18.5	81 58	118.2	10 54.2	81 58	118.5	10 29.8	81 58	118.8	10 05.4	81 58	119.1	9 41.0	81 57	119.4	9 16.6	81 57	119.7	1
2	11 32.1	81 59	116.8	11 07.9	81 59	117.1	10 43.7	81 58	117.4	10 19.4	81 58	117.7	9 55.2	81 58	118.0	9 30.9	81 58	118.3	9 06.6	81 58	118.6	8 42.3	81 58	118.9	2
3	10 56.9	80 59	116.0	10 32.7	80 59	116.3	10 08.6	80 59	116.6	9 44.5	81 59	116.9	9 20.3	81 58	117.2	8 56.1	81 58	117.5	8 31.9	81 58	117.8	8 07.7	81 58	118.1	3
4	10 21.4	80 60	115.2	9 57.3	80 59	115.5	9 33.3	80 59	115.8	9 09.2	80 59	116.1	8 45.2	80 59	116.4	8 21.1	80 59	116.7	7 57.0	80 59	117.0	7 32.9	80 58	117.3	4
65	9 45.6	80 60	114.4	9 21.7	80 60	114.7	8 57.7	80 60	115.0	8 33.8	80 60	115.3	8 09.8	80 59	115.6	7 45.8	80 59	115.9	7 21.8	80 59	116.2	6 57.8	80 59	116.5	65
6	9 09.7	79 60	113.6	8 45.8	80 60	113.9	8 22.0	80 60	114.2	7 58.1	80 60	114.5	7 34.2	80 60	114.8	7 10.3	80 60	115.1	6 46.4	80 59	115.4	6 22.5	80 59	115.7	6
7	8 33.5	79 61	112.8	8 09.7	79 61	113.1	7 45.9	79 60	113.4	7 22.2	79 60	113.7	6 58.4	79 60	114.0	6 34.5	79 60	114.3	6 10.7	79 60	114.6	5 46.9	79 60	115.0	7
8	7 57.1	79 61	112.0	7 33.4	79 61	112.3	7 09.7	79 61	112.6	6 46.0	79 61	112.9	6 22.3	79 60	113.3	5 58.6	79 60	113.6	5 34.8	79 60	113.9	5 11.1	79 60	114.2	8
9	7 20.5	79 61	111.2	6 56.9	79 61	111.5	6 33.3	79 61	111.9	6 09.7	79 61	112.2	5 46.0	79 61	112.5	5 22.4	79 61	112.8							9
70	6 43.7	78 62	110.4	6 20.2	78 62	110.8	5 56.7	78 61	111.1	5 33.1	79 61	111.4	5 09.5	79 61	111.7										70
1	6 06.7	78 62	109.7	5 43.3	78 62	110.0	5 19.8	78 62	110.3																1
2	5 29.6	78 62	108.9	5 06.2	78 62	109.2																			2

DECLINATION SAME NAME AS LATITUDE

H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
91	5 22.6	75 65	84.0	5 45.1	75 65	83.7	6 07.7	75 65	83.3	6 30.2	75 65	83.0	6 52.8	75 65	82.7	7 15.3	75 65	82.3	7 37.8	75 65	82.0	8 00.2	75 65	81.7	91
2				5 06.0	75 65	82.9	5 28.6	75 65	82.6	5 51.2	75 65	82.2	6 13.8	75 65	81.9	6 36.3	75 65	81.6	6 58.8	75 65	81.2	7 21.3	75 65	80.9	2
3										5 12.2	75 65	81.5	5 34.8	75 65	81.2	5 57.4	75 65	80.8	6 20.0	75 65	80.5	6 42.5	75 65	80.2	3
4																5 18.6	75 64	80.1	5 41.2	75 64	79.8	6 03.8	75 64	79.4	4
95																			5 02.5	75 64	79.0	5 25.1	75 64	78.7	95

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Lat. 49°

H.A.	12° 00′ Alt.	Δd Δt	Az.	12° 30′ Alt.	Δd Δt	Az.	13° 00′ Alt.	Δd Δt	Az.	13° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	53 00.0	1.0 01	180.0	53 30.0	1.0 01	180.0	54 00.0	1.0 01	180.0	54 30.0	1.0 01	180.0
1	52 59.4	1.0 03	178.4	53 29.4	1.0 03	178.4	53 59.4	1.0 03	178.3	54 29.4	1.0 03	178.3
2	52 57.8	1.0 05	176.8	53 27.7	1.0 05	176.7	53 57.7	1.0 05	176.7	54 27.7	1.0 05	176.7
3	52 55.0	1.0 06	175.1	53 24.9	1.0 07	175.1	53 54.9	1.0 07	175.0	54 24.8	1.0 07	175.0
4	52 51.1	1.0 08	173.5	53 21.0	1.0 08	173.4	53 50.9	1.0 08	173.4	54 20.8	1.0 09	173.3
05	52 46.1	1.0 10	171.9	53 16.0	1.0 10	171.8	53 45.8	1.0 10	171.7	54 15.7	1.0 10	171.7
6	52 40.0	99 12	170.3	53 09.8	99 12	170.2	53 39.6	99 12	170.1	54 09.4	99 12	170.0
7	52 32.8	99 14	168.7	53 02.6	99 14	168.6	53 32.3	99 14	168.5	54 02.0	99 14	168.4
8	52 24.6	99 16	167.1	52 54.2	99 16	167.0	53 23.9	99 16	166.9	53 53.5	99 16	166.7
9	52 15.3	99 17	165.5	52 44.8	99 17	165.4	53 14.4	99 18	165.2	53 43.9	98 18	165.1
10	52 04.9	98 19	164.0	52 34.4	98 19	163.8	53 03.8	98 19	163.6	53 33.3	98 20	163.5
1	51 53.5	98 21	162.4	52 22.9	98 21	162.2	52 52.2	98 21	162.1	53 21.6	98 21	161.9
2	51 41.1	98 22	160.9	52 10.3	97 23	160.7	52 39.6	97 23	160.5	53 08.8	97 23	160.3
3	51 27.7	97 24	159.3	51 56.8	97 24	159.1	52 25.9	97 24	158.9	52 55.0	97 25	158.7
4	51 13.3	97 26	157.8	51 42.3	97 26	157.6	52 11.3	97 26	157.4	52 40.3	97 26	157.2
15	50 57.9	96 27	156.3	51 26.8	96 27	156.1	51 55.7	96 28	155.9	52 24.5	96 28	155.6
6	50 41.7	96 29	154.8	51 10.4	96 29	154.6	51 39.1	96 29	154.4	52 07.8	96 29	154.1
7	50 24.4	95 30	153.3	50 53.0	95 30	153.1	51 21.6	95 31	152.9	51 50.1	95 31	152.6
8	50 06.3	95 32	151.9	50 34.8	95 32	151.6	51 03.2	95 32	151.4	51 31.6	95 32	151.1
9	49 47.3	94 33	150.4	50 15.6	94 33	150.2	50 43.9	94 34	149.9	51 12.1	94 34	149.7
20	49 27.5	94 34	149.0	49 55.6	94 35	148.8	50 23.7	94 35	148.5	50 51.8	93 35	148.2
1	49 06.8	93 36	147.6	49 34.8	93 36	147.3	50 02.8	93 36	147.1	50 30.6	93 37	146.8
2	48 45.4	93 37	146.2	49 13.2	93 37	145.9	49 40.9	93 38	145.7	50 08.7	92 38	145.4
3	48 23.1	92 38	144.9	48 50.7	92 39	144.6	49 18.3	92 39	144.3	49 45.9	92 39	144.0
4	48 00.1	92 40	143.5	48 27.5	92 40	143.2	48 55.0	91 40	142.9	49 22.4	91 40	142.6
25	47 36.3	91 41	142.2	48 03.6	91 41	141.9	48 30.9	91 41	141.6	48 58.1	91 42	141.2
6	47 11.8	91 42	140.9	47 39.0	90 42	140.6	48 06.1	90 43	140.2	48 33.1	90 43	139.9
7	46 46.6	90 43	139.6	47 13.6	90 43	139.3	47 40.5	90 44	138.9	48 07.4	89 44	138.6
8	46 20.8	89 44	138.3	46 47.6	89 44	138.0	47 14.3	89 45	137.6	47 41.0	89 45	137.3
9	45 54.2	89 45	137.0	46 20.9	89 46	136.7	46 47.5	89 46	136.4	47 14.0	88 46	136.0
30	45 27.1	88 46	135.8	45 53.6	88 46	135.5	46 20.0	88 47	135.1	46 46.4	88 47	134.8
1	44 59.4	88 47	134.6	45 25.7	88 48	134.2	45 52.0	87 48	133.9	46 18.2	87 48	133.5
2	44 31.0	87 48	133.4	44 57.2	87 48	133.0	45 23.3	87 49	132.7	45 49.3	87 49	132.3
3	44 02.1	87 49	132.2	44 28.1	87 49	131.8	44 54.1	86 50	131.5	45 20.0	86 50	131.1
4	43 32.7	86 50	131.0	43 58.5	86 50	130.7	44 24.3	86 50	130.3	44 50.0	86 51	129.9
35	43 02.7	86 51	129.9	43 28.4	86 51	129.5	43 54.0	85 51	129.1	44 19.6	85 52	128.8
6	42 32.3	85 52	128.7	42 57.8	85 52	128.4	43 23.3	85 52	128.0	43 48.7	85 52	127.6
7	42 01.3	85 52	127.6	42 26.7	84 53	127.2	42 52.0	84 53	126.9	43 17.2	84 53	126.5
8	41 29.9	84 53	126.5	41 55.1	84 53	126.1	42 20.3	84 54	125.8	42 45.4	84 54	125.4
9	40 58.0	84 54	125.4	41 23.1	84 54	125.0	41 48.1	83 54	124.7	42 13.1	83 55	124.3
40	40 25.7	83 55	124.3	40 50.7	83 55	123.9	41 15.5	83 55	123.6	41 40.3	83 55	123.2
1	39 53.0	83 55	123.3	40 17.8	83 55	122.9	40 42.5	82 56	122.5	41 07.2	82 56	122.1
2	39 19.9	82 56	122.2	39 44.6	82 56	121.8	40 09.1	82 56	121.5	40 33.7	82 56	121.1
3	38 46.4	82 56	121.2	39 10.9	82 57	120.8	39 35.4	81 57	120.4	39 59.8	81 57	120.0
4	38 12.5	81 57	120.1	38 36.9	81 57	119.8	39 01.3	81 57	119.4	39 25.5	81 58	119.0
45	37 38.3	81 58	119.1	38 02.6	81 58	118.8	38 26.8	81 58	118.4	38 50.9	80 58	118.0
6	37 03.8	81 58	118.1	37 27.9	80 58	117.8	37 52.0	80 58	117.4	38 16.0	80 59	117.0
7	36 28.9	80 59	117.2	36 52.9	80 59	116.8	37 16.9	80 59	116.4	37 40.8	80 59	116.0
8	35 53.7	80 59	116.2	36 17.7	80 59	115.8	36 41.5	79 60	115.4	37 05.3	79 60	115.1
9	35 18.3	79 60	115.2	35 42.1	79 60	114.9	36 05.8	79 60	114.5	36 29.5	79 60	114.1
50	34 42.5	79 60	114.3	35 06.2	79 60	113.9	35 29.9	79 60	113.5	35 53.4	78 61	113.2
1	34 06.5	79 60	113.4	34 30.1	79 61	113.0	34 53.6	78 61	112.6	35 17.1	78 61	112.2
2	33 30.2	78 61	112.4	33 53.8	78 61	112.1	34 17.2	78 61	111.7	34 40.6	78 61	111.3
3	32 53.7	78 61	111.5	33 17.2	78 61	111.1	33 40.5	78 62	110.8	34 03.8	77 62	110.4
4	32 17.0	78 62	110.6	32 40.3	78 62	110.2	33 03.6	77 62	109.9	33 26.8	77 62	109.5
55	31 40.1	78 62	109.7	32 03.3	77 62	109.3	32 26.4	77 62	109.0	32 49.5	77 62	108.6
6	31 02.9	77 62	108.8	31 26.0	77 62	108.4	31 49.1	77 62	108.1	32 12.1	77 63	107.7
7	30 25.5	77 63	107.9	30 48.6	77 63	107.6	31 11.6	77 63	107.2	31 34.5	76 63	106.8
8	29 48.0	77 63	107.1	30 11.0	77 63	106.7	30 33.9	76 63	106.3	30 56.8	76 63	106.0
9	29 10.3	76 63	106.2	29 33.2	76 63	105.8	29 56.1	76 63	105.5	30 18.9	76 63	105.1
60	28 32.4	76 63	105.4	28 55.3	76 64	105.0	29 18.0	76 64	104.6	29 40.8	76 64	104.2
1	27 54.4	76 64	104.5	28 17.2	76 64	104.1	28 39.9	76 64	103.8	29 02.6	75 64	103.4
2	27 16.2	76 64	103.7	27 38.9	76 64	103.3	28 01.6	75 64	102.9	28 24.2	75 64	102.6
3	26 37.9	76 64	102.8	27 00.6	75 64	102.5	27 23.2	75 64	102.1	27 45.7	75 64	101.7
4	25 59.4	75 64	102.0	26 22.1	75 64	101.7	26 44.6	75 64	101.3	27 07.1	75 64	100.9
65	25 20.9	75 64	101.2	25 43.5	75 65	100.8	26 06.0	75 65	100.5	26 28.4	75 65	100.1
6	24 42.2	75 65	100.4	25 04.7	75 65	100.0	25 27.2	75 65	99.7	25 49.6	75 65	99.3
7	24 03.5	75 65	99.6	24 25.9	75 65	99.2	24 48.4	75 65	98.9	25 10.7	74 66	98.5
8	23 24.6	75 65	98.8	23 47.0	75 65	98.4	24 09.4	75 65	98.1	24 31.8	74 65	97.7
9	22 45.7	75 65	98.0	23 08.1	75 65	97.6	23 30.4	74 65	97.3	23 52.7	74 65	96.9
70	22 06.6	75 65	97.2	22 29.0	74 65	96.8	22 51.3	74 65	96.5	23 13.6	74 65	96.1
1	21 27.5	75 65	96.4	21 49.9	74 65	96.1	22 12.2	74 65	95.7	22 34.4	74 65	95.3
2	20 48.4	74 65	95.6	21 10.7	74 65	95.3	21 33.0	74 65	94.9	21 55.2	74 65	94.6
3	20 09.2	74 65	94.9	20 31.5	74 65	94.5	20 53.7	74 65	94.1	21 16.0	74 65	93.8
4	19 30.0	74 65	94.1	19 52.2	74 66	93.7	20 14.5	74 66	93.4	20 36.7	74 66	93.0
75	18 50.7	74 66	93.3	19 12.9	74 66	93.0	19 35.2	74 66	92.6	19 57.3	74 66	92.2
6	18 11.4	74 66	92.5	18 33.6	74 66	92.2	18 55.8	74 66	91.8	19 18.0	74 66	91.5
7	17 32.0	74 66	91.8	17 54.3	74 66	91.4	18 16.5	74 66	91.1	18 38.6	74 66	90.7
8	16 52.7	74 66	91.0	17 14.9	74 66	90.7	17 37.1	74 66	90.3	17 59.3	74 66	90.0
9	16 13.3	74 66	90.3	16 35.6	74 66	89.9	16 57.8	74 66	89.6	17 19.9	74 66	89.2
80	15 34.0	74 66	89.5	15 56.2	74 66	89.2	16 18.4	74 66	88.8	16 40.6	74 66	88.5
1	14 54.6	74 66	88.8	15 16.8	74 66	88.4	15 39.0	74 66	88.1	16 01.2	74 66	87.7
2	14 15.2	74 66	88.0	14 37.5	74 66	87.7	14 59.7	74 66	87.3	15 21.9	74 66	87.0
3	13 35.9	74 66	87.3	13 58.2	74 66	86.9	14 20.4	74 65	86.6	14 42.6	74 65	86.2
4	12 56.6	74 65	86.5	13 18.9	74 65	86.2	13 41.1	74 65	85.8	14 03.3	74 65	85.5
85	12 17.3	74 65	85.8	12 39.6	74 65	85.4	13 01.9	74 65	85.1	13 24.1	74 65	84.7
6	11 38.1	74 65	85.0	12 00.4	74 65	84.7	12 22.7	74 65	84.3	12 45.0	74 65	84.0
7	10 58.9	74 65	84.3	11 21.2	74 65	83.9	11 43.5	74 66	83.6	12 05.8	74 65	83.3
8	10 19.8	75 65	83.5	10 42.1	74 65	83.2	11 04.5	74 65	82.9	11 26.8	74 65	82.5
9	9 40.7	75 65	82.8	10 03.1	75 65	82.5	10 25.4	75 65	82.1	10 47.8	74 66	81.8
90	9 01.7	75 65	82.1	9 24.1	75 65	81.7	9 46.5	75 65	81.4	10 08.9	75 65	81.0

H.A.	14° 00′ Alt.	Δd Δt	Az.	14° 30′ Alt.	Δd Δt	Az.	15° 00′ Alt.	Δd Δt	Az.	15° 30′ Alt.	Δd Δt	Az.
°	° ′		°	° ′		°	° ′		°	° ′		°
00	55 00.0	1.0 01	180.0	55 30.0	1.0 01	180.0	56 00.0	1.0 01	180.0	56 30.0	1.0 01	180.0
1	54 59.4	1.0 03	178.3	55 29.4	1.0 03	178.3	55 59.4	1.0 03	178.3	56 29.4	1.0 03	178.3
2	54 57.7	1.0 05	176.6	55 27.7	1.0 05	176.6	55 57.6	1.0 05	176.5	56 27.6	1.0 05	176.5
3	54 54.8	1.0 07	174.9	55 24.7	1.0 07	174.9	55 54.7	1.0 07	174.8	56 24.6	1.0 07	174.8
4	54 50.7	1.0 09	173.2	55 20.6	1.0 09	173.2	55 50.5	1.0 09	173.1	56 20.4	1.0 09	173.0
05	54 45.5	1.0 11	171.6	55 15.4	99 11	171.5	55 45.2	99 11	171.4	56 15.1	99 11	171.3
6	54 39.2	99 12	169.9	55 09.0	99 13	169.8	55 38.8	99 13	169.7	56 08.5	99 13	169.6
7	54 31.7	99 14	168.2	55 01.4	99 14	168.1	55 31.1	99 15	168.0	56 00.8	99 15	167.9
8	54 23.2	99 16	166.6	54 52.8	99 16	166.5	55 22.4	99 16	166.3	55 52.0	99 17	166.2
9	54 13.5	98 18	165.0	54 43.0	98 18	164.8	55 12.5	98 18	164.6	55 42.0	98 18	164.5
10	54 02.7	98 20	163.3	54 32.1	98 20	163.2	55 01.5	98 20	163.0	55 30.9	98 20	162.8
1	53 50.9	98 21	161.7	54 20.2	98 22	161.5	54 49.5	98 22	161.3	55 18.8	98 22	161.2
2	53 38.0	97 23	160.1	54 07.2	97 23	159.9	54 36.4	97 24	159.7	55 05.5	97 24	159.5
3	53 24.1	97 25	158.5	53 53.2	97 25	158.3	54 22.2	97 25	158.1	54 51.2	97 26	157.9
4	53 09.2	96 26	157.0	53 38.1	96 27	156.7	54 07.0	96 27	156.5	54 35.9	96 27	156.3
15	52 53.3	96 28	155.4	53 22.1	96 28	155.2	53 50.8	96 29	154.9	54 19.5	96 29	154.7
6	52 36.4	95 30	153.9	53 05.1	96 30	153.6	53 33.7	96 30	153.4	54 02.2	95 30	153.1
7	52 18.6	95 31	152.4	52 47.1	95 31	152.1	53 15.5	95 32	151.8	53 43.9	95 32	151.6
8	51 59.9	94 33	150.9	52 28.2	94 33	150.6	52 56.5	94 33	150.3	53 24.7	94 34	150.0
9	51 40.3	94 34	149.4	52 08.4	94 34	149.1	52 36.6	94 35	148.8	53 04.6	93 35	148.5
20	51 19.8	93 36	147.9	51 47.8	93 36	147.6	52 15.7	93 36	147.3	52 43.6	93 36	147.0
1	50 58.5	93 37	146.5	51 26.3	93 37	146.2	51 54.1	92 37	145.9	52 21.8	92 38	145.6
2	50 36.4	92 38	145.1	51 04.0	92 39	144.8	51 31.6	92 39	144.4	51 59.1	92 39	144.1
3	50 13.4	92 40	143.7	50 40.9	91 40	143.3	51 08.3	91 40	143.0	51 35.6	91 40	142.7
4	49 49.7	91 41	142.3	50 17.0	91 41	142.0	50 44.2	91 41	141.6	51 11.4	90 42	141.3
25	49 25.3	90 42	140.9	49 52.4	90 42	140.6	50 19.4	90 43	140.3	50 46.4	90 43	139.9
6	49 00.1	90 43	139.6	49 27.0	90 43	139.2	49 53.9	89 44	138.9	50 20.7	89 44	138.6
7	48 34.2	89 44	138.3	49 01.0	89 44	137.9	49 27.7	89 45	137.6	49 54.3	89 45	137.2
8	48 07.7	89 45	137.0	48 34.3	89 46	136.6	49 00.8	88 46	136.3	49 27.2	88 46	135.9
9	47 40.5	88 46	135.7	48 06.9	88 47	135.3	48 33.3	88 47	135.0	48 59.5	87 47	134.6
30	47 12.7	88 47	134.4	47 38.9	87 48	134.1	48 05.1	87 48	133.7	48 31.2	87 48	133.3
1	46 44.3	87 48	133.2	47 10.4	87 49	132.8	47 36.4	87 49	132.5	48 02.3	86 49	132.1
2	46 15.3	86 49	132.0	46 41.2	86 50	131.6	47 07.0	86 50	131.2	47 32.8	86 50	130.8
3	45 45.8	86 50	130.8	46 11.5	86 50	130.4	46 37.1	85 51	130.0	47 02.7	85 51	129.6
4	45 15.7	85 51	129.6	45 41.2	85 51	129.2	46 06.7	85 52	128.8	46 32.1	85 52	128.4
35	44 45.1	85 52	128.4	45 10.5	85 52	128.0	45 35.8	84 52	127.6	46 01.1	84 53	127.3
6	44 14.0	84 53	127.3	44 39.2	84 53	126.9	45 04.4	84 53	126.5	45 29.5	84 53	126.1
7	43 42.4	84 53	126.1	44 07.5	84 54	125.7	44 32.5	83 54	125.4	44 57.5	83 54	125.0
8	43 10.4	83 54	125.0	43 35.3	83 54	124.6	44 00.2	83 55	124.2	44 25.0	82 55	123.8
9	42 37.9	83 55	123.9	43 02.7	83 55	123.5	43 27.4	82 55	123.1	43 52.1	82 56	122.7
40	42 05.1	82 55	122.8	42 29.7	82 56	122.4	42 54.3	82 56	122.0	43 18.8	81 56	121.6
1	41 31.8	82 56	121.8	41 56.3	82 56	121.4	42 20.7	81 57	121.0	42 45.1	81 57	120.6
2	40 58.1	81 57	120.7	41 22.5	81 57	120.3	41 46.8	81 57	119.9	42 11.0	81 57	119.5
3	40 24.1	81 57	119.7	40 48.3	81 58	119.3	41 12.5	80 58	118.9	41 36.6	80 58	118.5
4	39 49.7	80 58	118.6	40 13.8	80 58	118.2	40 37.8	80 58	117.9	41 01.8	80 58	117.5
45	39 15.0	80 58	117.6	39 39.0	80 59	117.2	40 02.9	80 59	116.8	40 26.7	79 59	116.4
6	38 40.0	80 59	116.6	39 03.8	79 59	116.2	39 27.6	79 59	115.8	39 51.3	79 60	115.4
7	38 04.6	79 59	115.6	38 28.4	79 60	115.3	38 52.0	79 60	114.9	39 15.6	78 60	114.5
8	37 29.0	79 60	114.7	37 52.6	79 60	114.3	38 16.2	78 60	113.9	38 39.7	78 60	113.5
9	36 53.1	79 60	113.7	37 16.6	78 60	113.3	37 40.1	78 61	112.9	38 03.4	78 61	112.5
50	36 16.9	78 61	112.8	36 40.3	78 61	112.4	37 03.7	78 61	112.0	37 26.9	77 61	111.6
1	35 40.5	78 61	111.8	36 03.8	78 61	111.4	36 27.1	77 61	111.1	36 50.2	77 62	110.7
2	35 03.8	78 61	110.9	35 27.1	77 62	110.5	35 50.2	77 62	110.1	36 13.3	77 62	109.7
3	34 27.0	77 62	110.0	34 50.1	77 62	109.6	35 13.2	77 62	109.2	35 36.1	76 62	108.8
4	33 49.9	77 62	109.1	34 12.9	77 62	108.7	34 35.9	76 62	108.3	34 58.8	76 63	107.9
55	33 12.6	77 62	108.2	33 35.5	76 63	107.8	33 58.4	76 63	107.4	34 21.2	76 63	107.0
6	32 35.1	76 63	107.3	32 58.0	76 63	106.9	33 20.8	76 63	106.5	33 43.5	76 63	106.2
7	31 57.4	76 63	106.4	32 20.2	76 63	106.1	32 43.0	76 63	105.7	33 05.6	75 63	105.3
8	31 19.6	76 63	105.6	31 42.3	76 63	105.2	32 05.0	75 64	104.8	32 27.6	75 64	104.4
9	30 41.6	76 64	104.7	31 04.2	75 64	104.3	31 26.8	75 64	104.0	31 49.4	75 64	103.6
60	30 03.4	75 64	103.9	30 26.0	75 64	103.5	30 48.6	75 64	103.1	31 11.0	75 64	102.7
1	29 25.2	75 64	103.0	29 47.7	75 64	102.6	30 10.2	75 64	102.3	30 32.6	75 64	101.9
2	28 46.7	75 64	102.2	29 09.2	75 64	101.8	29 31.6	75 64	101.4	29 54.0	74 64	101.0
3	28 08.2	75 64	101.4	28 30.6	75 64	101.0	28 53.0	74 65	100.6	29 15.3	74 65	100.2
4	27 29.6	75 65	100.5	27 51.9	75 65	100.2	28 14.3	74 65	99.8	28 36.5	74 65	99.4
65	26 50.8	75 65	99.7	27 13.1	74 65	99.4	27 35.4	74 65	99.0	27 57.6	74 65	98.6
6	26 12.0	74 65	98.9	26 34.3	74 65	98.5	26 56.5	74 65	98.2	27 18.7	74 66	97.8
7	25 33.0	74 65	98.1	25 55.3	74 65	97.7	26 17.5	74 65	97.4	26 39.6	74 65	97.0
8	24 54.0	74 65	97.3	25 16.3	74 65	97.0	25 38.4	74 65	96.6	26 00.5	74 65	96.2
9	24 15.0	74 65	96.5	24 37.2	74 65	96.2	24 59.3	74 65	95.8	25 21.4	74 65	95.4
70	23 35.8	74 65	95.7	23 58.0	74 65	95.4	24 20.1	74 65	95.0	24 42.2	73 65	94.6
1	22 56.6	74 65	95.0	23 18.8	74 65	94.6	23 40.9	74 65	94.2	24 02.9	73 66	93.9
2	22 17.4	74 65	94.2	22 39.5	74 65	93.8	23 01.6	74 66	93.5	23 23.6	73 66	93.1
3	21 38.1	74 66	93.4	22 00.2	74 66	93.1	22 22.3	73 66	92.7	22 44.3	73 66	92.3
4	20 58.8	74 66	92.6	21 20.9	74 66	92.3	21 43.0	73 66	91.9	22 05.0	73 66	91.6
75	20 19.5	74 66	91.9	20 41.6	74 66	91.5	21 03.6	73 66	91.2	21 25.6	73 66	90.8
6	19 40.1	74 66	91.1	20 02.2	74 66	90.8	20 24.3	73 66	90.4	20 46.2	73 66	90.0
7	19 00.8	74 66	90.4	19 22.8	74 66	90.0	19 44.9	73 66	89.6	20 06.9	73 66	89.3
8	18 21.4	74 66	89.6	18 43.5	74 66	89.3	19 05.5	73 66	88.9	19 27.5	73 66	88.5
9	17 42.0	74 66	88.9	18 04.1	74 66	88.5	18 26.2	73 66	88.1	18 48.2	73 66	87.8
80	17 02.7	74 66	88.1	17 24.8	74 66	87.8	17 46.8	73 66	87.4	18 08.9	73 66	87.0
1	16 23.4	74 66	87.4	16 45.5	74 66	87.0	17 07.5	74 65	86.7	17 29.6	73 65	86.3
2	15 44.0	74 65	86.6	16 06.2	74 65	86.3	16 28.3	74 65	85.9	16 50.3	73 65	85.6
3	15 04.8	74 65	85.9	15 26.9	74 65	85.5	15 49.0	74 65	85.2	16 11.1	74 65	84.8
4	14 25.5	74 65	85.1	14 47.7	74 65	84.8	15 09.8	74 65	84.4	15 31.9	74 65	84.1
85	13 46.3	74 65	84.4	14 08.5	74 65	84.0	14 30.7	74 65	83.7	14 52.8	74 65	83.3
6	13 07.2	74 65	83.7	13 29.4	74 65	83.3	13 51.6	74 66	83.0	14 13.7	74 65	82.6
7	12 28.1	74 65	82.9	12 50.3	74 65	82.6	13 12.5	74 66	82.2	13 34.7	74 66	81.9
8	11 49.1	74 65	82.2	12 11.3	74 65	81.8	12 33.6	74 65	81.5	12 55.8	74 65	81.2
9	11 10.1	74 65	81.4	11 32.4	74 65	81.1	11 54.7	74 65	80.8	12 16.9	74 65	80.4
90	10 31.2	74 65	80.7	10 53.5	74 65	80.4	11 15.9	74 65	80.0	11 38.1	74 64	79.7

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H.A.	12° 00′			12° 30′			13° 00′			13° 30′			14° 00′			14° 30′			15° 00′			15° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	29 00.0	1.0 01	180.0	28 30.0	1.0 01	180.0	28 00.0	1.0 01	180.0	27 30.0	1.0 01	180.0	27 00.0	1.0 01	180.0	26 30.0	1.0 01	180.0	26 00.0	1.0 01	180.0	25 30.0	1.0 01	180.0	00
1	28 59.6	1.0 02	178.9	28 29.6	1.0 02	178.9	27 59.6	1.0 02	178.9	27 29.6	1.0 02	178.9	26 59.6	1.0 02	178.9	26 29.6	1.0 02	178.9	25 59.6	1.0 02	178.9	25 29.6	1.0 02	178.9	1
2	28 58.5	1.0 03	177.8	28 28.5	1.0 03	177.8	27 58.5	1.0 03	177.8	27 28.5	1.0 03	177.8	26 58.5	1.0 03	177.8	26 28.5	1.0 03	177.8	25 58.5	1.0 03	177.9	25 28.5	1.0 03	177.9	2
3	28 56.5	1.0 04	176.6	28 26.6	1.0 04	176.7	27 56.6	1.0 04	176.7	27 26.6	1.0 04	176.7	26 56.6	1.0 04	176.7	26 26.7	1.0 04	176.8	25 56.7	1.0 04	176.8	25 26.7	1.0 04	176.8	3
4	28 53.9	1.0 06	175.5	28 23.9	1.0 06	175.6	27 53.9	1.0 06	175.6	27 24.0	1.0 06	175.6	26 54.0	1.0 06	175.6	26 24.1	1.0 06	175.7	25 54.1	1.0 06	175.7	25 24.1	1.0 05	175.7	4
05	28 50.4	1.0 07	174.4	28 20.5	1.0 07	174.5	27 50.5	1.0 07	174.5	27 20.6	1.0 07	174.5	26 50.7	1.0 07	174.6	26 20.7	1.0 07	174.6	25 50.8	1.0 07	174.6	25 20.8	1.0 07	174.7	05
6	28 46.2	1.0 08	173.3	28 16.3	1.0 08	173.3	27 46.4	1.0 08	173.4	27 16.5	1.0 08	173.4	26 46.6	1.0 08	173.5	26 16.6	1.0 08	173.5	25 46.7	1.0 08	173.6	25 16.8	1.0 08	173.6	6
7	28 41.2	1.0 10	172.2	28 11.4	1.0 09	172.2	27 41.5	1.0 09	172.3	27 11.6	1.0 09	172.3	26 41.7	1.0 09	172.4	26 11.8	1.0 09	172.4	25 42.0	1.0 09	172.5	25 12.1	1.0 09	172.5	7
8	28 35.5	99 11	171.1	28 05.7	99 11	171.1	27 35.8	99 11	171.2	27 06.0	99 11	171.3	26 36.1	99 10	171.3	26 06.3	99 10	171.4	25 36.5	99 10	171.4	25 06.6	99 10	171.5	8
9	28 29.0	99 12	170.0	27 59.2	99 12	170.0	27 29.4	99 12	170.1	26 59.6	99 12	170.2	26 29.8	99 12	170.2	26 00.0	99 12	170.3	25 30.2	99 12	170.4	25 00.4	99 12	170.4	9
10	28 21.8	99 13	168.9	27 52.0	99 13	168.9	27 22.3	99 13	169.0	26 52.5	99 13	169.1	26 22.8	99 13	169.2	25 53.0	99 13	169.2	25 23.3	99 13	169.3	24 53.5	99 13	169.4	10
1	28 13.8	99 15	167.8	27 44.1	99 14	167.9	27 14.4	99 14	167.9	26 44.7	99 14	168.0	26 15.0	99 14	168.1	25 45.3	99 14	168.2	25 15.6	99 14	168.2	24 45.9	99 14	168.3	1
2	28 05.1	99 16	166.7	27 35.5	99 16	166.8	27 05.8	99 16	166.8	26 36.2	99 15	166.9	26 06.5	99 15	167.0	25 36.9	99 15	167.1	25 07.2	99 15	167.2	24 37.6	99 15	167.3	2
3	27 55.7	99 17	165.6	27 26.1	99 17	165.7	26 56.5	99 17	165.8	26 26.9	99 17	165.9	25 57.3	99 16	166.0	25 27.7	99 16	166.0	24 58.1	99 16	166.1	24 28.5	99 16	166.2	3
4	27 45.5	98 18	164.5	27 16.0	98 18	164.6	26 46.5	98 18	164.7	26 17.0	98 18	164.8	25 47.4	98 18	164.9	25 17.9	98 18	165.0	24 48.4	98 17	165.1	24 18.8	98 17	165.2	4
15	27 34.6	98 19	163.4	27 05.2	98 19	163.5	26 35.7	98 19	163.6	26 06.3	98 19	163.7	25 36.8	98 19	163.8	25 07.4	98 19	163.9	24 37.9	98 19	164.0	24 08.4	98 18	164.1	15
6	27 23.0	98 20	162.3	26 53.7	98 20	162.4	26 24.3	98 20	162.6	25 54.9	98 20	162.7	25 25.5	98 20	162.8	24 56.1	98 20	162.9	24 26.7	98 20	163.0	23 57.3	98 20	163.1	6
7	27 10.7	98 22	161.2	26 41.4	98 22	161.4	26 12.1	98 21	161.5	25 42.8	98 21	161.6	25 13.5	98 21	161.7	24 44.2	98 21	161.8	24 14.9	98 21	162.0	23 45.5	98 21	162.1	7
8	26 57.7	97 23	160.2	26 28.5	97 23	160.3	25 59.3	97 23	160.4	25 30.1	97 22	160.6	25 00.8	97 22	160.7	24 31.6	97 22	160.8	24 02.3	98 22	160.9	23 33.1	98 22	161.0	8
9	26 44.0	97 24	159.1	26 14.9	97 24	159.2	25 45.8	97 24	159.4	25 16.6	97 24	159.5	24 47.5	97 23	159.6	24 18.3	97 23	159.8	23 49.1	97 23	159.9	23 20.0	97 23	160.0	9
20	26 29.7	97 25	158.0	26 00.6	97 25	158.2	25 31.6	97 25	158.3	25 02.5	97 25	158.5	24 33.4	97 24	158.6	24 04.4	97 24	158.7	23 35.3	97 24	158.9	23 06.2	97 24	159.0	20
1	26 14.6	97 26	157.0	25 45.7	97 26	157.1	25 16.7	97 26	157.3	24 47.7	97 26	157.4	24 18.7	97 26	157.6	23 49.7	97 25	157.7	23 20.8	97 25	157.9	22 51.7	97 25	158.0	1
2	25 58.9	96 27	155.9	25 30.0	96 27	156.1	25 01.2	96 27	156.2	24 32.3	96 27	156.4	24 03.4	96 27	156.5	23 34.5	96 26	156.7	23 05.6	96 26	156.8	22 36.7	96 26	157.0	2
3	25 42.5	96 28	154.9	25 13.8	96 28	155.1	24 45.0	96 28	155.2	24 16.2	96 28	155.4	23 47.4	96 28	155.5	23 18.6	96 28	155.7	22 49.8	96 27	155.8	22 21.0	96 27	156.0	3
4	25 25.5	96 29	153.9	24 56.8	96 29	154.0	24 28.2	96 29	154.2	23 59.5	96 29	154.3	23 30.8	96 29	154.5	23 02.1	96 29	154.7	22 33.4	96 28	154.8	22 04.6	96 28	155.0	4
25	25 07.8	95 30	152.8	24 39.3	95 30	153.0	24 10.7	95 30	153.2	23 42.1	95 30	153.3	23 13.5	95 30	153.5	22 44.9	95 30	153.7	22 16.3	95 29	153.8	21 47.7	95 29	154.0	25
6	24 49.6	95 32	151.8	24 21.1	95 31	152.0	23 52.6	95 31	152.2	23 24.1	95 31	152.3	22 55.6	95 31	152.5	22 27.1	95 31	152.7	21 58.6	95 30	152.8	21 30.1	95 30	153.0	6
7	24 30.7	94 33	150.8	24 02.3	95 32	151.0	23 33.9	95 32	151.1	23 05.6	95 32	151.3	22 37.2	95 32	151.5	22 08.8	95 32	151.7	21 40.4	95 31	151.8	21 11.9	95 31	152.0	7
8	24 11.1	94 34	149.8	23 42.9	94 33	150.0	23 14.6	94 33	150.1	22 46.4	94 33	150.3	22 18.1	94 33	150.5	21 49.8	94 33	150.7	21 21.5	94 32	150.9	20 53.2	94 32	151.0	8
9	23 51.0	94 35	148.8	23 22.9	94 34	149.0	22 54.7	94 34	149.1	22 26.6	94 34	149.3	21 58.4	94 34	149.5	21 30.2	94 34	149.7	21 02.0	94 33	149.9	20 33.8	94 33	150.1	9
30	23 30.3	93 35	147.8	23 02.3	93 35	148.0	22 34.3	93 35	148.2	22 06.2	94 35	148.3	21 38.2	94 35	148.5	21 10.1	94 35	148.7	20 42.0	94 34	148.9	20 13.9	94 34	149.1	30
1	23 09.0	93 36	146.8	22 41.1	93 36	147.0	22 13.2	93 36	147.2	21 45.3	93 36	147.4	21 17.3	93 36	147.6	20 49.4	93 35	147.8	20 21.4	93 35	148.0	19 53.4	93 35	148.1	1
2	22 47.2	93 37	145.8	22 19.4	93 37	146.0	21 51.6	93 37	146.2	21 23.8	93 37	146.4	20 55.9	93 37	146.6	20 28.1	93 36	146.8	20 00.2	93 36	147.0	19 32.3	93 36	147.2	2
3	22 24.8	92 38	144.8	21 57.1	92 38	145.0	21 29.4	92 38	145.2	21 01.7	92 38	145.4	20 34.0	92 37	145.6	20 06.2	92 37	145.8	19 38.5	93 37	146.0	19 10.7	93 37	146.2	3
4	22 01.8	92 39	143.8	21 34.3	92 39	144.1	21 06.7	92 39	144.3	20 39.1	92 39	144.5	20 11.5	92 38	144.7	19 43.9	92 38	144.9	19 16.2	92 38	145.1	18 48.6	92 38	145.3	4
35	21 38.3	91 40	142.9	21 10.9	91 40	143.1	20 43.4	92 40	143.3	20 16.0	92 39	143.5	19 48.5	92 39	143.7	19 21.0	92 39	143.9	18 53.5	92 39	144.2	18 25.9	92 39	144.4	35
6	21 14.3	91 41	141.9	20 47.0	91 41	142.1	20 19.7	91 40	142.4	19 52.3	91 40	142.6	19 24.9	91 40	142.8	18 57.5	91 40	143.0	18 30.1	91 40	143.2	18 02.7	91 40	143.4	6
7	20 49.8	91 42	141.0	20 22.6	91 42	141.2	19 55.4	91 41	141.4	19 28.1	91 41	141.6	19 00.9	91 41	141.9	18 33.6	91 41	142.1	18 06.3	91 41	142.3	17 39.0	91 40	142.5	7
8	20 24.7	90 43	140.0	19 57.7	90 42	140.2	19 30.6	90 42	140.5	19 03.4	90 42	140.7	18 36.3	90 42	140.9	18 09.2	91 42	141.2	17 42.0	91 41	141.4	17 14.8	91 41	141.6	8
9	19 59.2	90 43	139.1	19 32.2	90 43	139.3	19 05.3	90 43	139.5	18 38.3	90 43	139.8	18 11.3	90 43	140.0	17 44.2	90 42	140.2	17 17.2	90 42	140.5	16 50.1	90 42	140.7	9
40	19 33.2	89 44	138.1	19 06.3	89 44	138.4	18 39.5	90 44	138.6	18 12.6	90 44	138.9	17 45.7	90 43	139.1	17 18.8	90 43	139.3	16 51.9	90 43	139.5	16 24.9	90 43	139.8	40
1	19 06.7	89 45	137.2	18 40.0	89 45	137.5	18 13.2	89 45	137.7	17 46.5	89 44	137.9	17 19.7	89 44	138.2	16 52.9	89 44	138.4	16 26.1	89 44	138.6	15 59.3	89 44	138.9	1
2	18 39.7	89 46	136.3	18 13.1	89 45	136.5	17 46.5	89 45	136.8	17 19.9	89 45	137.0	16 53.2	89 45	137.3	16 26.6	89 45	137.5	15 59.9	89 44	137.7	15 33.2	89 44	138.0	2
3	18 12.3	88 46	135.4	17 45.8	88 46	135.6	17 19.3	88 46	135.9	16 52.8	88 46	136.1	16 26.3	88 46	136.4	15 59.7	89 45	136.6	15 33.2	89 45	136.9	15 06.6	89 45	137.1	3
4	17 44.4	88 47	134.5	17 18.1	88 47	134.7	16 51.7	88 47	135.0	16 25.3	88 47	135.2	15 58.9	88 46	135.5	15 32.5	88 46	135.7	15 06.0	88 46	136.0	14 39.6	88 46	136.2	4
45	17 16.1	87 48	133.6	16 49.9	87 48	133.8	16 23.6	88 47	134.1	15 57.4	88 47	134.3	15 31.1	88 47	134.6	15 04.8	88 47	134.8	14 38.5	88 47	135.1	14 12.1	88 46	135.3	45
6	16 47.4	87 49	132.7	16 21.3	87 48	133.0	15 55.2	87 48	133.2	15 29.0	87 48	133.5	15 02.8	87 48	133.7	14 36.7	87 48	134.0	14 10.5	87 47	134.2	13 44.3	87 47	134.5	6
7	16 18.3	87 49	131.8	15 52.3	87 49	132.1	15 26.3	87 49	132.3	15 00.2	87 49	132.6	14 34.2	87 48	132.8	14 08.1	87 48	133.1	13 42.0	87 48	133.4	13 16.0	87 48	133.6	7
8	15 48.7	86 50	130.9	15 22.9	86 50	131.2	14 57.0	86 50	131.5	14 31.1	86 49	131.7	14 05.1	86 49	132.0	13 39.2	87 49	132.2	13 13.2	87 49	132.5	12 47.3	87 48	132.8	8
9	15 18.8	86 51	130.1	14 53.0	86 50	130.3	14 27.3	86 50	130.6	14 01.5	86 50	130.9	13 35.7	86 50	131.1	13 09.8	86 50	131.4	12 44.0	86 49	131.6	12 18.1	86 49	131.9	9
50	14 48.5	85 51	129.2	14 22.8	85 51	129.5	13 57.2	86 51	129.7	13 31.5	86 51	130.0	13 05.8	86 50	130.3	12 40.1	86 50	130.5	12 14.4	86 50	130.8	11 48.7	86 50	131.0	50
1	14 17.8	85 52	128.3	13 52.3	85 52	128.6	13 26.7	85 51	128.9	13 01.2	85 51	129.1	12 35.6	85 51	129.4	12 10.0	85 51	129.7	11 44.4	85 51	129.9	11 18.8	85 50	130.2	1
2	13 46.7	85 52	127.5	13 21.3	85 52	127.7	12 55.9	85 52	128.0	12 30.4	85 52	128.3	12 05.0	85 52	128.6	11 39.5	85 51	128.8	11 14.0	85 51	129.1	10 48.5	85 51	129.4	2
3	13 15.3	84 53	126.6	12 50.0	84 53	126.9	12 24.7	84 53	127.2	11 59.4	84 52	127.4	11 34.0	84 52	127.7	11 08.7	85 52	128.0	10 43.3	85 52	128.3	10 17.9	85 52	128.5	3
4	12 43.5	84 54	125.8	12 18.4	84 53	126.1	11 53.2	84 53	126.3	11 28.0	84 53	126.6	11 02.7	84 53	126.9	10 37.5	84 53	127.2	10 12.2	84 52	127.4	9 47.0	84 52	127.7	4
55	12 11.4	84 54	124.9	11 46.4	84 54	125.2	11 21.3	84 54	125.5	10 56.2	84 54	125.8	10 31.1	84 53	126.1	10 05.9	84 53	126.3	9 40.8	84 53	126.6	9 15.6	84 53	126.9	55
6	11 39.0	83 55	124.1	11 14.0	83 54	124.4	10 49.1	83 54	124.7	10 24.1	83 54	125.0	9 59.1	83 54	125.2	9 34.1	83 54	125.5	9 09.0	83 53	125.8	8 44.0	84 53	126.1	6
7	11 06.3	83 55	123.3	10 41.4	83 55	123.6	10 16.5	83 55	123.9	9 51.7	83 55	124.1	9 26.8	83 54	124.4	9 01.9	83 54	124.7	8 36.9	83 54	125.0	8 12.0	83 54	125.3	7
8	10 33.2	82 56	122.5	10 08.5	82 55	122.7	9 43.7	83 55	123.0	9 18.9	83 55	123.3	8 54.1	83 55	123.6	8 29.3	83 55	123.9	8 04.5	83 55	124.2	7 39.7	83 54	124.5	8
9	9 59.8	82 56	121.6	9 35.2	82 56	121.9	9 10.5	82 56	122.2	8 45.9	82 56	122.5	8 21.2	82 55	122.8	7 56.5	82 55	123.1	7 31.8	82 55	123.4	7 07.1	82 55	123.7	9
60	9 26.2	82 57	120.8	9 01.6	82 56	121.1	8 37.1	82 56	121.4	8 12.5	82 56	121.7	7 48.0	82 56	122.0	7 23.4	82 56	122.3	6 58.8	82 56	122.6	6 34.2	82 55	122.9	60
1	8 52.2	81 57	120.0	8 27.8	81 57	120.3	8 03.4	81 57	120.6	7 38.9	82 57	120.9	7 14.4	82 56	121.2	6 50.0	82 56	121.5	6 25.5	82 56	121.8	6 01.0	82 56	122.1	1
2	8 18.0	81 57	119.2	7 53.7	81 57	119.5	7 29.3	81 57	119.8	7 05.0	81 57	120.1	6 40.6	81 57	120.4	6 16.2	81 57	120.7	5 51.9	81 56	121.0	5 27.5	81 56	121.3	2
3	7 43.5	81 58	118.4	7 19.3	81 58	118.7	6 55.0	81 58	119.0	6 30.8	81 57	119.3	6 06.5	81 57	119.6	5 42.3	81 57	119.9	5 18.0	81 57	120.2				3
4	7 08.8	80 58	117.6	6 44.6	80 58	117.9	6 20.5	81 58	118.2	5 56.3	81 58	118.5	5 32.2	81 58	118.8	5 08.0	81 58	119.1							4
65	6 33.8	80 59	116.8	6 09.7	80 59	117.1	5 45.7	80 58	117.4	5 21.6	80 58	117.7													65
6	5 58.5	80 59	116.0	5 34.6	80 59	116.3	5 10.6	80 59	116.6																6
7	5 23.0	79 60	115.3																						7

DECLINATION SAME NAME AS LATITUDE

H.A.	12° 00′			12° 30′			13° 00′			13° 30′			14° 00′			14° 30′			15° 00′			15° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
91	8 22.7	75 65	81.3	8 45.2	75 65	81.0	9 07.6	75 65	80.6	9 30.0	75 65	80.3	9 52.4	75 65	80.0	10 14.8	75 64	79.6	10 37.1	74 64	79.3	10 59.5	74 64	79.0	91
2	7 43.8	75 65	80.6	8 06.3	75 65	80.2	8 28.8	75 65	79.9	8 51.2	75 64	79.6	9 13.7	75 64	79.2	9 36.1	75 64	78.9	9 58.5	75 64	78.6	10 20.9	75 64	78.2	2
3	7 05.1	75 64	79.8	7 27.6	75 64	79.5	7 50.1	75 64	79.2	8 12.6	75 64	78.8	8 35.1	75 64	78.5	8 57.5	75 64	78.2	9 20.0	75 64	77.8	9 42.4	75 64	77.5	3
4	6 26.4	75 64	79.1	6 48.9	75 64	78.8	7 11.5	75 64	78.4	7 34.0	75 64	78.1	7 56.5	75 64	77.8	8 19.0	75 64	77.4	8 41.5	75 64	77.1	9 04.0	75 64	76.8	4
95	5 47.7	75 64	78.4	6 10.4	75 64	78.0	6 33.0	75 64	77.7	6 55.5	75 64	77.4	7 18.1	75 64	77.0	7 40.7	75 64	76.7	8 03.2	75 64	76.4	8 25.8	75 64	76.0	95
6	5 09.2	76 64	77.6	5 31.9	76 64	77.3	5 54.6	75 64	77.0	6 17.2	75 64	76.6	6 39.8	75 64	76.3	7 02.4	75 64	76.0	7 25.0	75 63	75.6	7 47.6	75 63	75.3	6
7							5 16.3	76 64	76.2	5 39.0	76 64	75.9	6 01.6	76 63	75.6	6 24.3	76 63	75.2	6 47.0	75 63	74.9	7 09.6	75 63	74.6	7
8										5 00.8	76 63	75.2	5 23.6	76 63	74.8	5 46.3	76 63	74.5	6 09.0	76 63	74.2	6 31.7	76 63	73.8	8
9																5 08.4	76 63	73.8	5 31.2	76 63	73.4	5 54.0	76 63	73.1	9
100																						5 16.4	76 62	72.4	100

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Lat. 49°

H.A.	16° 00′		16° 30′		17° 00′		17° 30′		18° 00′		18° 30′		19° 00′		19° 30′		H.A.
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
°	° ′ Δd Δt °	°	° ′ Δd Δt °	°	° ′ Δd Δt °	°	° ′ Δd Δt °	°	° ′ Δd Δt °	°	° ′ Δd Δt °	°	° ′ Δd Δt °	°	° ′ Δd Δt °	°	°
00	57 00.0 1.0 01	180.0	57 30.0 1.0 01	180.0	58 00.0 1.0 01	180.0	58 30.0 1.0 01	180.0	59 00.0 1.0 01	180.0	59 30.0 1.0 01	180.0	60 00.0 1.0 01	180.0	60 30.0 1.0 01	180.0	00
1	56 59.4 1.0 08	178.2	57 29.4 1.0 08	178.2	57 59.4 1.0 08	178.2	58 29.4 1.0 08	178.2	58 59.4 1.0 08	178.2	59 29.4 1.0 08	178.1	59 59.4 1.0 08	178.1	60 29.3 1.0 08	178.1	1
2	56 57.6 1.0 05	176.5	57 27.5 1.0 05	176.4	57 57.5 1.0 05	176.4	58 27.5 1.0 05	176.4	58 57.5 1.0 05	176.3	59 27.4 1.0 05	176.3	59 57.4 1.0 05	176.2	60 27.4 1.0 05	176.2	2
3	56 54.6 1.0 07	174.7	57 24.5 1.0 07	174.7	57 54.4 1.0 07	174.6	58 24.4 1.0 07	174.5	58 54.3 1.0 07	174.5	59 24.2 1.0 07	174.4	59 54.2 1.0 08	174.3	60 24.1 1.0 08	174.3	3
4	56 50.3 1.0 09	173.0	57 20.2 1.0 09	172.9	57 50.1 1.0 09	172.8	58 20.0 1.0 09	172.7	58 49.9 1.0 09	172.6	59 19.8 1.0 10	172.5	59 49.6 1.0 10	172.5	60 19.5 1.0 10	172.4	4
05	56 44.9 99 11	171.2	57 14.7 99 11	171.1	57 44.6 99 11	171.0	58 14.4 99 11	170.9	58 44.2 99 12	170.8	59 14.0 99 12	170.7	59 43.8 99 12	170.6	60 13.6 99 12	170.5	05
6	56 38.3 99 13	169.5	57 08.1 99 13	169.4	57 37.8 99 13	169.2	58 07.6 99 13	169.1	58 37.3 99 14	169.0	59 07.0 99 14	168.9	59 36.8 99 14	168.7	60 06.5 99 14	168.6	6
7	56 30.5 99 15	167.7	57 00.2 99 15	167.6	57 29.9 99 15	167.5	57 59.5 99 15	167.3	58 29.2 99 16	167.2	58 58.8 99 16	167.0	59 28.5 99 16	166.9	59 58.1 99 16	166.7	7
8	56 21.6 99 17	166.0	56 51.2 99 17	165.9	57 20.7 99 17	165.7	57 50.3 99 17	165.6	58 19.9 98 18	165.4	58 49.4 98 18	165.2	59 18.9 98 18	165.1	59 48.4 98 18	164.9	8
9	56 11.5 98 19	164.3	56 41.0 98 19	164.2	57 10.5 98 19	164.0	57 39.9 98 19	163.8	58 09.3 98 19	163.6	58 38.8 98 20	163.4	59 08.2 98 20	163.2	59 37.6 98 20	163.0	9
10	56 00.3 98 20	162.6	56 29.7 98 21	162.4	56 59.0 98 21	162.3	57 28.4 98 21	162.1	57 57.7 98 21	161.9	58 27.0 98 22	161.7	58 56.2 98 22	161.4	59 25.5 97 22	161.2	10
1	55 48.0 97 22	161.0	56 17.3 97 23	160.8	56 46.5 97 23	160.5	57 15.7 97 23	160.3	57 44.8 97 23	160.1	58 14.0 97 24	159.9	58 43.1 97 24	159.7	59 12.2 97 24	159.4	1
2	55 34.6 97 24	159.3	56 03.7 97 24	159.1	56 32.8 97 25	158.9	57 01.9 97 25	158.6	57 30.9 97 25	158.4	57 59.9 97 25	158.2	58 28.9 97 26	157.9	58 57.8 96 26	157.7	2
3	55 20.2 97 26	157.7	55 49.2 96 26	157.4	56 18.1 96 26	157.2	56 47.0 96 27	156.9	57 15.9 96 27	156.7	57 44.7 96 27	156.4	58 13.5 96 27	156.2	58 42.3 96 28	155.9	3
4	55 04.7 96 28	156.0	55 33.5 96 28	155.8	56 02.3 96 28	155.5	56 31.0 96 28	155.3	56 59.8 96 29	155.0	57 28.4 96 29	154.7	57 57.1 96 29	154.5	58 25.7 96 29	154.2	4
15	54 48.2 96 29	154.4	55 16.9 96 29	154.2	55 45.5 96 30	153.9	56 14.1 96 30	153.6	56 42.6 96 30	153.4	57 11.1 96 31	153.1	57 39.6 96 31	152.8	58 08.0 96 31	152.5	15
6	54 30.7 96 31	152.8	54 59.2 96 31	152.6	55 27.7 96 31	152.3	55 56.1 96 32	152.0	56 24.5 96 32	151.7	56 52.8 94 32	151.4	57 21.1 94 32	151.1	57 49.3 94 33	150.8	6
7	54 12.3 94 32	151.3	54 40.6 94 33	151.0	55 08.9 94 33	150.7	55 37.1 94 33	150.4	56 05.3 94 34	150.1	56 33.5 94 34	149.8	57 01.6 94 34	149.5	57 29.6 93 34	149.1	7
8	53 52.9 94 34	149.7	54 21.1 94 34	149.4	54 49.2 94 34	149.1	55 17.2 93 35	148.8	55 45.2 93 35	148.5	56 13.2 93 35	148.2	56 41.1 93 36	147.9	57 09.0 93 36	147.5	8
9	53 32.6 93 35	148.2	54 00.6 93 36	147.9	54 28.5 93 36	147.6	54 56.4 93 36	147.3	55 24.2 93 37	147.0	55 52.0 92 37	146.6	56 19.7 92 37	146.3	56 47.4 92 38	145.9	9
20	53 11.5 93 37	146.7	53 39.3 93 37	146.4	54 07.0 92 37	146.1	54 34.7 92 38	145.8	55 02.3 92 38	145.4	55 29.9 92 38	145.1	55 57.4 92 39	144.7	56 24.9 91 39	144.4	20
1	52 49.4 92 38	145.2	53 17.1 92 38	144.9	53 44.6 92 39	144.6	54 12.1 92 39	144.2	54 39.5 91 39	143.9	55 06.9 91 40	143.5	55 34.2 91 40	143.2	56 01.5 91 40	142.8	1
2	52 26.6 92 39	143.8	52 54.0 91 40	143.5	53 21.4 91 40	143.1	53 48.7 91 40	142.8	54 15.9 91 41	142.4	54 43.1 90 41	142.0	55 10.2 90 41	141.7	55 37.3 90 42	141.3	2
3	52 02.9 91 41	142.4	52 30.2 91 41	142.0	52 57.4 90 41	141.7	53 24.5 90 42	141.3	53 51.5 90 42	140.9	54 18.5 90 42	140.6	54 45.4 90 43	140.2	55 12.3 89 43	139.8	3
4	51 38.5 90 43	140.9	52 05.6 90 42	140.6	52 32.6 90 43	140.2	52 59.5 90 43	139.9	53 26.3 89 43	139.5	53 53.1 89 44	139.1	54 19.8 89 44	138.7	54 46.5 89 44	138.3	4
25	51 13.4 90 43	139.6	51 40.2 89 43	139.2	52 07.0 89 44	138.8	52 33.8 89 44	138.5	53 00.4 89 44	138.1	53 27.0 88 45	137.7	53 53.5 88 45	137.3	54 19.9 88 45	136.9	25
6	50 47.5 89 44	138.2	51 14.1 89 45	137.8	51 40.8 89 45	137.5	52 07.3 88 45	137.1	52 33.8 88 46	136.7	53 00.2 88 46	136.3	53 26.5 88 46	135.9	53 52.7 87 47	135.6	6
7	50 20.9 88 45	136.9	50 47.4 88 46	136.5	51 13.8 88 46	136.1	51 40.2 88 46	135.7	52 06.4 87 47	135.3	52 32.6 87 47	134.9	52 58.7 87 47	134.5	53 24.8 87 48	134.1	7
8	49 53.6 88 46	135.5	50 19.9 88 47	135.2	50 46.2 87 47	134.8	51 12.3 87 47	134.4	51 38.4 87 48	134.0	52 04.4 87 48	133.6	52 30.4 86 48	133.2	52 56.2 86 49	132.8	8
9	49 25.7 87 48	134.2	49 51.9 87 48	133.9	50 17.9 87 48	133.5	50 43.9 86 48	133.1	51 09.8 86 49	132.7	51 35.6 86 49	132.3	52 01.3 86 49	131.8	52 27.0 85 50	131.4	9
30	48 57.2 87 49	133.0	49 23.2 86 49	132.6	49 49.1 86 49	132.2	50 14.8 86 49	131.8	50 40.6 86 50	131.4	51 06.2 85 50	131.0	51 31.7 85 50	130.5	51 57.2 85 51	130.1	30
1	48 28.1 86 49	131.7	48 53.9 86 50	131.3	49 19.6 86 50	130.9	49 45.2 85 50	130.5	50 10.7 85 51	130.1	50 36.2 85 51	129.7	51 01.5 84 51	129.3	51 26.8 84 52	128.8	1
2	47 58.4 85 50	130.5	48 24.0 85 51	130.1	48 49.6 85 51	129.7	49 15.0 85 51	129.3	49 40.3 84 52	128.9	50 05.6 84 52	128.4	50 30.8 84 52	128.0	50 55.8 83 52	127.6	2
3	47 28.2 85 51	129.2	47 53.7 85 52	128.8	48 19.0 84 52	128.4	48 44.3 84 52	128.0	49 09.4 84 52	127.6	49 34.5 83 53	127.2	49 59.5 83 53	126.8	50 24.4 83 53	126.3	3
4	46 57.5 84 52	128.0	47 22.7 84 52	127.6	47 47.9 84 53	127.2	48 13.0 83 53	126.8	48 38.0 83 53	126.4	49 02.9 83 53	126.0	49 27.7 83 54	125.6	49 52.4 82 54	125.1	4
35	46 26.2 84 53	126.9	46 51.3 84 53	126.5	47 16.3 83 53	126.1	47 41.3 83 54	125.6	48 06.1 83 54	125.2	48 30.8 82 54	124.8	48 55.5 82 55	124.4	49 20.0 82 55	123.9	35
6	45 54.5 83 54	125.7	46 19.4 83 54	125.3	46 44.3 83 54	124.9	47 09.0 82 54	124.5	47 33.7 82 55	124.1	47 58.3 82 55	123.6	48 22.7 81 55	123.2	48 47.1 81 56	122.8	6
7	45 22.3 83 54	124.6	45 47.1 82 55	124.2	46 11.8 82 55	123.8	46 36.4 82 55	123.3	47 00.9 82 55	122.9	47 25.3 81 56	122.5	47 49.6 81 56	122.1	48 13.8 81 56	121.6	7
8	44 49.7 82 55	123.4	45 14.3 82 55	123.0	45 38.8 82 56	122.6	46 03.3 81 56	122.2	46 27.6 81 56	121.8	46 51.9 81 56	121.4	47 16.0 80 57	120.9	47 40.1 80 57	120.5	8
9	44 16.6 82 56	122.3	44 41.1 81 56	121.9	45 05.5 81 56	121.5	45 29.8 81 56	121.1	45 54.0 81 57	120.7	46 18.1 80 57	120.2	46 42.1 80 57	119.8	47 06.0 80 57	119.4	9
40	43 43.2 81 56	121.2	44 07.5 81 57	120.8	44 31.7 81 57	120.4	44 55.9 80 57	120.0	45 19.9 80 57	119.6	45 43.9 80 58	119.2	46 07.7 79 58	118.7	46 31.5 79 58	118.3	40
1	43 09.3 81 57	120.2	43 33.5 80 57	119.8	43 57.6 80 57	119.4	44 21.6 80 58	118.9	44 45.5 80 58	118.5	45 09.3 79 58	118.1	45 33.0 79 58	117.6	45 56.6 79 59	117.2	1
2	42 35.1 80 58	119.1	42 59.2 80 58	118.7	43 23.1 80 48	118.3	43 47.0 79 58	117.9	44 10.7 79 58	117.5	44 34.4 79 59	117.0	44 58.0 78 59	116.6	45 21.5 78 59	116.2	2
3	42 00.6 80 58	118.1	42 24.5 80 58	117.7	42 48.3 79 59	117.3	43 12.0 79 59	116.8	43 35.6 79 59	116.4	43 59.2 78 59	116.0	44 22.6 78 59	115.6	44 46.0 78 60	115.1	3
4	41 25.7 79 59	117.1	41 49.4 79 59	116.6	42 13.1 79 59	116.2	42 36.7 79 59	115.8	43 00.2 78 60	115.4	43 23.7 78 60	115.0	43 47.0 78 60	114.5	44 10.2 77 60	114.1	4
45	40 50.4 79 59	116.0	41 14.1 79 59	115.6	41 37.7 78 60	115.2	42 01.1 78 60	114.8	42 24.5 78 60	114.4	42 47.8 77 60	114.0	43 11.0 77 60	113.5	43 34.1 77 61	113.1	45
6	40 14.9 79 60	115.0	40 38.5 78 60	114.6	41 01.9 78 60	114.2	41 25.3 78 60	113.8	41 48.5 77 60	113.4	42 11.7 77 61	113.0	42 34.8 77 61	112.5	42 57.8 76 61	112.1	6
7	39 39.1 78 60	114.1	40 02.5 78 60	113.7	40 25.9 78 60	113.2	40 49.1 77 61	112.8	41 12.3 77 61	112.4	41 35.3 77 61	112.0	41 58.3 76 61	111.5	42 21.2 76 61	111.1	7
8	39 03.1 78 61	113.1	39 26.4 78 61	112.7	39 49.6 77 61	112.3	40 12.7 77 61	111.9	40 35.8 77 61	111.4	40 58.7 76 61	111.0	41 21.6 76 62	110.6	41 44.3 76 62	110.1	8
9	38 26.7 77 61	112.1	38 49.9 77 61	111.7	39 13.0 77 61	111.3	39 36.1 77 61	110.9	39 59.0 76 62	110.5	40 21.9 76 62	110.1	40 44.6 76 62	109.6	41 07.3 75 62	109.2	9
50	37 50.1 77 61	111.2	38 13.2 77 62	110.8	38 36.2 77 62	110.4	38 59.2 76 62	110.0	39 22.0 76 62	109.5	39 44.8 76 62	109.1	40 07.4 75 62	108.7	40 30.0 75 62	108.3	50
1	37 13.3 77 62	110.3	37 36.3 77 62	109.9	37 59.2 76 62	109.4	38 22.1 76 62	109.0	38 44.8 76 62	108.6	39 07.5 75 62	108.2	39 30.0 75 63	107.8	39 52.5 75 63	107.3	1
2	36 36.3 77 62	109.3	36 59.2 76 62	108.9	37 22.0 76 62	108.5	37 44.8 76 62	108.1	38 07.4 75 63	107.7	38 30.0 75 63	107.3	38 52.5 75 63	106.9	39 14.8 74 63	106.4	2
3	35 59.0 76 62	108.4	36 21.9 76 63	108.0	36 44.6 76 63	107.6	37 07.2 75 63	107.2	37 29.8 75 63	106.8	37 52.3 75 63	106.4	38 14.7 74 63	106.0	38 37.0 74 63	105.5	3
4	35 21.6 76 63	107.5	35 44.3 76 63	107.1	36 07.0 75 63	106.7	36 29.6 75 63	106.3	36 52.0 75 63	105.9	37 14.5 75 63	105.5	37 36.8 74 63	105.1	37 59.0 74 64	104.6	4
55	34 44.0 76 63	106.6	35 06.6 75 63	106.2	35 29.2 75 63	105.8	35 51.7 75 63	105.4	36 14.1 75 64	105.0	36 36.4 74 64	104.6	36 58.7 74 64	104.2	37 20.8 74 64	103.8	55
6	34 06.2 75 63	105.8	34 28.7 75 63	105.4	34 51.2 75 64	105.0	35 13.7 75 64	104.5	35 36.0 74 64	104.1	35 58.3 74 64	103.7	36 20.4 74 64	103.3	36 42.5 73 64	102.9	6
7	33 28.2 75 64	104.9	33 50.7 75 64	104.5	34 13.1 75 64	104.1	34 35.5 74 64	103.7	34 57.8 74 64	103.3	35 20.0 74 64	102.9	35 42.1 74 64	102.4	36 04.1 73 64	102.0	7
8	32 50.1 75 64	104.0	33 12.5 75 64	103.6	33 34.9 74 64	103.2	33 57.2 74 64	102.8	34 19.4 74 64	102.4	34 41.5 74 64	102.0	35 03.6 73 64	101.6	35 25.5 73 64	101.2	8
9	32 11.8 75 64	103.2	32 34.2 74 64	102.8	32 56.5 74 64	102.4	33 18.7 74 64	102.0	33 40.9 74 64	101.6	34 03.0 73 64	101.2	34 25.0 73 65	100.8	34 46.9 73 65	100.3	9
60	31 33.4 75 64	102.3	31 55.7 74 64	101.9	32 18.0 74 64	101.5	32 40.2 74 64	101.1	33 02.3 74 65	100.7	33 24.3 73 65	100.3	33 46.2 73 65	99.9	34 08.1 73 65	99.5	60
1	30 54.9 74 64	101.5	31 17.2 74 64	101.1	31 39.4 74 65	100.7	32 01.5 74 65	100.3	32 23.5 73 65	99.9	32 45.5 73 65	99.5	33 07.4 73 65	99.1	33 29.2 73 65	98.7	1
2	30 16.3 74 65	100.7	30 38.5 74 65	100.3	31 00.6 74 65	99.9	31 22.7 73 65	99.5	31 44.7 73 65	99.1	32 06.6 73 65	98.7	32 28.5 73 65	98.3	32 50.3 72 65	97.9	2
3	29 37.5 74 65	99.8	29 59.7 74 65	99.4	30 21.8 74 65	99.1	30 43.8 73 65	98.7	31 05.8 73 65	98.3	31 27.7 73 65	97.9	31 49.5 73 65	97.5	32 11.2 72 65	97.1	3
4	28 58.7 74 65	99.0	29 20.8 74 65	98.6	29 42.9 73 65	98.2	30 04.9 73 65	97.9	30 26.8 73 65	97.5	30 48.7 73 65	97.1	31 10.4 72 65	96.7	31 32.1 72 65	96.3	4
65	28 19.8 74 65	98.2	28 41.9 74 65	97.8	29 03.9 73 65	97.4	29 25.9 73 65	97.1	29 47.7 73 65	96.7	30 09.6 73 65	96.3	30 31.3 72 65	95.9	30 53.0 72 65	95.5	65
6	27 40.8 74 65	97.4	28 02.9 73 65	97.0	28 24.8 73 65	96.6	28 46.8 73 65	96.3	29 08.6 73 65	95.9	29 30.4 73 65	95.5	29 52.1 72 65	95.1	30 13.8 72 65	94.7	6
7	27 01.7 74 65	96.6	27 23.8 73 65	96.2	27 45.7 73 65	95.9	28 07.6 73 65	95.5	28 29.4 73 65	95.1	28 51.2 72 65	94.7	29 12.9 72 65	94.3	29 34.5 72 65	93.9	7
8	26 22.6 73 65	95.8	26 44.6 73 65	95.4	27 06.5 73 65	95.1	27 28.4 73 65	94.7	27 50.2 73 65	94.3	28 11.9 72 66	93.9	28 33.6 72 66	93.5	28 55.2 72 66	93.1	8
9	25 43.4 73 65	95.0	26 05.4 73 65	94.7	26 27.3 73 65	94.3	26 49.1 73 66	93.9	27 10.9 73 66	93.5	27 32.7 72 66	93.1	27 54.3 72 66	92.7	28 15.9 72 66	92.3	9
70	25 04.2 73 65	94.3	25 26.1 73 66	93.9	25 48.0 73 66	93.5	26 09.9 73 66	93.1	26 31.6 72 66	92.7	26 53.3 72 66	92.4	27 15.0 72 66	92.0	27 36.6 72 66	91.6	70
1	24 24.9 73 66	93.5	24 46.8 73 66	93.1	25 08.7 73 66	92.7	25 30.5 73 66	92.4	25 52.3 72 66	92.0	26 14.0 72 66	91.6	26 35.6 72 66	91.2	26 57.2 72 66	90.8	1
2	23 45.6 73 66	92.7	24 07.5 73 66	92.3	24 29.4 73 66	92.0	24 51.2 73 66	91.6	25 12.9 72 66	91.2	25 34.6 72 66	90.8	25 56.3 72 66	90.4	26 17.8 72 66	90.1	2
3	23 06.3 73 65	91.9	23 28.2 73 66	91.6	23 50.0 73 66	91.2	24 11.8 73 66	90.8	24 33.6 72 66	90.4	24 55.3 72 66	90.1	25 16.9 72 66	89.7	25 38.5 72 66	89.3	3
4	22 26.9 73 66	91.2	22 48.8 73 66	90.8	23 10.7 73 66	90.4	23 32.5 73 66	90.1	23 54.2 72 66	89.7	24 15.9 72 66	89.3	24 37.6 72 66	88.9	24 59.1 72 66	88.6	4
75	21 47.6 73 66	90.4	22 09.5 73 66	90.1	22 31.3 73 66	89.7	22 53.1 73 66	89.3	23 14.9 72 66	88.9	23 36.6 72 66	88.6	23 58.2 72 66	88.2	24 19.8 72 66	87.8	75
6	21 08.2 73 66	89.7	21 30.1 73 66	89.3	21 52.0 73 66	88.9	22 13.8 73 66	88.6	22 35.5 72 66	88.2	22 57.2 72 66	87.8	23 18.9 72 66	87.4	23 40.5 72 66	87.1	6
7	20 28.8 73 66	88.9	20 50.7 73 66	88.6	21 12.6 73 66	88.2	21 34.4 73 66	87.8	21 56.2 72 66	87.4	22 17.9 72 66	87.1	22 39.6 72 66	86.7	23 01.2 72 65	86.3	7
8	19 49.5 73 66	88.2	20 11.4 73 66	87.8	20 33.3 73 66	87.4	20 55.1 73 66	87.1	21 16.9 72 66	86.7	21 38.6 72 65	86.3	22 00.3 72 65	86.0	22 21.9 72 65	85.6	8
9	19 10.2 73 66	87.4	19 32.1 73 66	87.1	19 54.0 73 65	86.7	20 15.8 73 65	86.3	20 37.6 73 65	86.0	20 59.3 72 65	85.6	21 21.0 72 65	85.2	21 42.7 72 65	84.9	9
80	18 30.8 73 65	86.7	18 52.8 73 65	86.3	19 14.7 73 65	86.0	19 36.5 73 65	85.6	19 58.3 73 65	85.2	20 20.1 72 65	84.9	20 41.8 72 65	84.5	21 03.5 72 65	84.1	80
1	17 51.6 73 65	85.9	18 13.5 73 65	85.6	18 35.4 73 65	85.2	18 57.3 73 65	84.9	19 19.1 73 65	84.5	19 40.9 73 65	84.1	20 02.7 72 65	83.8	20 24.4 72 65	83.4	1
2	17 12.3 73 65	85.2	17 34.3 73 65	84.8	17 56.2 73 65	84.5	18 18.1 73 65	84.1	18 40.0 73 65	83.8	19 01.8 73 65	83.4	19 23.6 72 65	83.0	19 45.3 72 65	82.7	2
3	16 33.1 73 65	84.5	16 55.1 73 65	84.1	17 17.1 73 65	83.8	17 39.0 73 65	83.4	18 00.9 73 65	83.0	18 22.7 73 65	82.7	18 44.5 73 65	82.3	19 06.3 72 65	82.0	3
4	15 54.0 73 65	83.7	16 16.0 73 65	83.4	16 38.0 73 65	83.0	16 59.9 73 65	82.7	17 21.8 73 65	82.3	17 43.7 73 65	82.0	18 05.5 73 65	81.6	18 27.3 73 65	81.2	4
85	15 14.9 74 65	83.0	15 36.9 73 65	82.6	15 58.9 73 65	82.3	16 20.9 73 65	81.9	16 42.9 73 65	81.6	17 04.8 73 65	81.2	17 26.6 73 65	80.9	17 48.5 73 65	80.5	85
6	14 35.8 74 65	82.3	14 57.9 74 65	81.9	15 20.0 73 65	81.6	15 42.0 73 65	81.2	16 04.0 73 65	80.9	16 25.9 73 65	80.5	16 47.8 73 65	80.1	17 09.7 73 64	79.8	86
7	13 56.8 74 65	81.5	14 19.0 74 65	81.2	14 41.1 74 65	80.8	15 03.1 73 65	80.5	15 25.1 73 65	80.1	15 47.1 73 64	79.8	16 09.1 73 64	79.4	16 31.0 73 64	79.1	87
8	13 17.9 74 65	80.8	13 40.1 74 65	80.5	14 02.2 74 65	80.1	14 24.3 74 64	79.8	14 46.4 73 64	79.4	15 08.4 73 64	79.1	15 30.4 73 64	78.7	15 52.4 73 64	78.4	88
9	12 39.1 74 65	80.1	13 01.3 74 64	79.7	13 23.5 74 64	79.4	13 45.6 74 64	79.0	14 07.7 74 64	78.7	14 29.8 74 64	78.3	14 51.9 73 64	78.0	15 13.9 73 64	77.6	89
90	12 00.4 74 64	79.3	12 22.6 74 64	79.0	12 44.9 74 64	78.7	13 07.0 74 64	78.3	13 29.2 74 64	78.0	13 51.3 74 64	77.6	14 13.4 74 64	77.3	14 35.5 74 64	76.9	90

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DECLINATION CONTRARY NAME TO LATITUDE

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	25 00.0	1.0 01	180.0	24 30.0	1.0 01	180.0	24 00.0	1.0 01	180.0	23 30.0	1.0 01	180.0	23 00.0	1.0 01	180.0	22 30.0	1.0 01	180.0	22 00.0	1.0 01	180.0	21 30.0	1.0 01	180.0	00
1	24 59.6	1.0 02	178.9	24 29.6	1.0 02	178.9	23 59.6	1.0 02	179.0	23 29.6	1.0 02	179.0	22 59.6	1.0 02	179.0	22 29.6	1.0 02	179.0	21 59.6	1.0 02	179.0	21 29.7	1.0 02	179.0	1
2	24 58.5	1.0 03	177.9	24 28.6	1.0 03	177.9	23 58.6	1.0 03	177.9	23 28.6	1.0 03	177.9	22 58.6	1.0 03	177.9	22 28.6	1.0 03	177.9	21 58.6	1.0 03	178.0	21 28.6	1.0 03	178.0	2
3	24 56.7	1.0 04	176.8	24 26.7	1.0 04	176.8	23 56.8	1.0 04	176.9	23 26.8	1.0 04	176.9	22 56.8	1.0 04	176.9	22 26.8	1.0 04	176.9	21 56.8	1.0 04	176.9	21 26.9	1.0 04	177.0	3
4	24 54.2	1.0 05	175.8	24 24.2	1.0 05	175.8	23 54.3	1.0 05	175.8	23 24.3	1.0 05	175.8	22 54.3	1.0 05	175.9	22 24.4	1.0 05	175.9	21 54.4	1.0 05	175.9	21 24.4	1.0 05	176.0	4
05	24 50.9	1.0 07	174.7	24 21.0	1.0 07	174.7	23 51.0	1.0 07	174.8	23 21.1	1.0 07	174.8	22 51.1	1.0 06	174.8	22 21.2	1.0 06	174.9	21 51.3	1.0 06	174.9	21 21.3	1.0 06	174.9	05
6	24 46.9	1.0 08	173.6	24 17.0	1.0 08	173.7	23 47.1	1.0 08	173.7	23 17.2	1.0 08	173.8	22 47.2	1.0 08	173.8	22 17.3	1.0 08	173.9	21 47.4	1.0 08	173.9	21 17.5	1.0 08	173.9	6
7	24 42.2	1.0 09	172.6	24 12.3	1.0 09	172.6	23 42.4	1.0 09	172.7	23 12.5	1.0 09	172.7	22 42.6	1.0 09	172.8	22 12.8	1.0 09	172.8	21 42.9	1.0 09	172.9	21 13.0	1.0 09	172.9	7
8	24 36.8	99 10	171.5	24 06.9	1.0 10	171.6	23 37.1	1.0 10	171.6	23 07.2	1.0 10	171.7	22 37.4	1.0 10	171.8	22 07.5	1.0 10	171.8	21 37.6	1.0 10	171.9	21 07.8	1.0 10	171.9	8
9	24 30.6	99 11	170.5	24 00.8	99 11	170.5	23 31.0	99 11	170.6	23 01.2	99 11	170.7	22 31.4	99 11	170.7	22 01.5	99 11	170.8	21 31.7	99 11	170.9	21 01.9	99 11	170.9	9
10	24 23.7	99 13	169.4	23 54.0	99 13	169.5	23 24.2	99 12	169.6	22 54.4	99 12	169.6	22 24.7	99 12	169.7	21 54.9	99 12	169.8	21 25.1	99 12	169.8	20 55.4	99 12	169.9	10
1	24 16.2	99 14	168.4	23 46.5	99 14	168.5	23 16.7	99 14	168.5	22 47.0	99 14	168.6	22 17.3	99 13	168.7	21 47.6	99 13	168.8	21 17.8	99 13	168.8	20 48.1	99 13	168.9	1
2	24 07.9	99 15	167.4	23 38.2	99 15	167.4	23 08.6	99 15	167.5	22 38.9	99 15	167.6	22 09.2	99 15	167.7	21 39.6	99 14	167.8	21 09.9	99 14	167.8	20 40.2	99 14	167.9	2
3	23 58.9	99 16	166.3	23 29.3	99 16	166.4	22 59.7	99 16	166.5	22 30.1	99 16	166.6	22 00.5	99 16	166.7	21 30.9	99 16	166.7	21 01.3	99 16	166.8	20 31.6	99 15	166.9	3
4	23 49.3	98 17	165.3	23 19.7	98 17	165.4	22 50.2	99 17	165.5	22 20.6	99 17	165.6	21 51.1	99 17	165.6	21 21.5	99 17	165.7	20 51.9	99 17	165.8	20 22.4	99 16	165.9	4
15	23 38.9	98 18	164.2	23 09.4	98 18	164.3	22 40.0	98 18	164.4	22 10.5	98 18	164.5	21 41.0	98 18	164.6	21 11.5	98 18	164.7	20 42.0	98 18	164.8	20 12.5	98 18	164.9	15
6	23 27.9	98 20	163.2	22 58.5	98 19	163.3	22 29.1	98 19	163.4	21 59.6	98 19	163.5	21 30.2	98 19	163.6	21 00.8	98 19	163.7	20 31.4	98 19	163.8	20 01.9	98 19	163.9	6
7	23 16.2	98 21	162.2	22 46.9	98 20	162.3	22 17.5	98 20	162.4	21 48.2	98 20	162.5	21 18.8	98 20	162.6	20 49.4	98 20	162.7	20 20.1	98 20	162.9	19 50.7	98 20	163.0	7
8	23 03.8	98 22	161.2	22 34.6	98 22	161.3	22 05.3	98 21	161.4	21 36.0	98 21	161.5	21 06.7	98 21	161.6	20 37.4	98 21	161.8	20 08.1	98 21	161.9	19 38.9	98 21	162.0	8
9	22 50.8	97 23	160.1	22 21.6	97 23	160.3	21 52.4	97 23	160.4	21 23.2	97 22	160.5	20 54.0	97 22	160.6	20 24.8	97 22	160.8	19 55.6	97 22	160.9	19 26.4	97 22	161.0	9
20	22 37.1	97 24	159.1	22 08.0	97 24	159.3	21 38.9	97 24	159.4	21 09.8	97 23	159.5	20 40.6	97 23	159.7	20 11.5	97 23	159.8	19 42.4	97 23	159.9	19 13.2	97 23	160.0	20
1	22 22.7	97 25	158.1	21 53.7	97 25	158.3	21 24.7	97 25	158.4	20 55.7	97 25	158.5	20 26.6	97 24	158.7	19 57.6	97 24	158.8	19 28.5	97 24	158.9	18 59.5	97 24	159.1	1
2	22 07.8	96 26	157.1	21 38.8	96 26	157.3	21 09.9	96 26	157.4	20 40.9	96 26	157.6	20 12.0	97 25	157.7	19 43.0	97 25	157.8	19 14.1	97 25	158.0	18 45.1	97 25	158.1	2
3	21 52.1	96 27	156.1	21 23.3	96 27	156.3	20 54.5	96 27	156.4	20 25.6	96 27	156.6	19 56.7	96 26	156.7	19 27.9	96 26	156.9	18 59.0	96 26	157.0	18 30.1	96 26	157.1	3
4	21 35.9	96 28	155.1	21 07.2	96 28	155.3	20 38.4	96 28	155.4	20 09.6	96 28	155.6	19 40.9	96 27	155.7	19 12.1	96 27	155.9	18 43.3	96 27	156.0	18 14.5	96 27	156.2	4
25	21 19.0	95 29	154.1	20 50.4	96 29	154.3	20 21.7	96 29	154.5	19 53.1	96 29	154.6	19 24.4	96 28	154.8	18 55.7	96 28	154.9	18 27.0	96 28	155.1	17 58.3	96 28	155.2	25
6	21 01.6	95 30	153.2	20 33.0	95 30	153.3	20 04.5	95 30	153.5	19 35.9	95 30	153.7	19 07.3	95 29	153.8	18 38.8	95 29	154.0	18 10.2	95 29	154.1	17 41.6	95 29	154.3	6
7	20 43.5	95 31	152.2	20 15.1	95 31	152.4	19 46.6	95 31	152.5	19 18.1	95 31	152.7	18 49.7	95 30	152.9	18 21.2	95 30	153.0	17 52.7	95 30	153.2	17 24.2	95 30	153.4	7
8	20 24.8	94 32	151.2	19 56.5	94 32	151.4	19 28.1	95 32	151.6	18 59.8	95 32	151.7	18 31.4	95 31	151.9	18 03.0	95 31	152.1	17 34.7	95 31	152.2	17 06.3	95 31	152.4	8
9	20 05.6	94 33	150.2	19 37.4	94 33	150.4	19 09.1	94 33	150.6	18 40.9	94 32	150.8	18 12.6	94 32	151.0	17 44.3	94 32	151.1	17 16.0	94 32	151.3	16 47.8	94 32	151.5	9
30	19 45.8	94 34	149.3	19 17.6	94 34	149.5	18 49.5	94 34	149.7	18 21.4	94 33	149.8	17 53.2	94 33	150.0	17 25.0	94 33	150.2	16 56.9	94 33	150.4	16 28.7	94 33	150.6	30
1	19 25.4	93 35	148.3	18 57.4	93 35	148.5	18 29.3	93 35	148.7	18 01.3	93 34	148.9	17 33.3	94 34	149.1	17 05.2	94 34	149.3	16 37.1	94 34	149.5	16 09.1	94 34	149.6	1
2	19 04.4	93 36	147.4	18 36.5	93 36	147.6	18 08.6	93 35	147.8	17 40.7	93 35	148.0	17 12.8	93 35	148.2	16 44.8	93 35	148.3	16 16.9	93 35	148.5	15 48.9	93 35	148.7	2
3	18 43.0	93 37	146.4	18 15.2	93 37	146.6	17 47.4	93 36	146.8	17 19.6	93 36	147.0	16 51.7	93 36	147.2	16 23.9	93 36	147.4	15 56.0	93 36	147.6	15 28.2	93 35	147.8	3
4	18 20.9	92 38	145.5	17 53.3	92 37	145.7	17 25.6	92 37	145.9	16 57.9	92 37	146.1	16 30.2	92 37	146.3	16 02.4	92 37	146.5	15 34.7	92 36	146.7	15 07.0	92 36	146.9	4
35	17 58.4	92 38	144.6	17 30.8	92 38	144.8	17 03.2	92 38	145.0	16 35.7	92 38	145.2	16 08.1	92 38	145.4	15 40.5	92 37	145.6	15 12.8	92 37	145.8	14 45.2	92 37	146.0	35
6	17 35.3	91 39	143.6	17 07.9	91 39	143.9	16 40.4	92 39	144.1	16 12.9	92 39	144.3	15 45.5	92 39	144.5	15 18.0	92 38	144.7	14 50.5	92 38	144.9	14 22.9	92 38	145.1	6
7	17 11.7	91 40	142.7	16 44.4	91 40	142.9	16 17.1	91 40	143.2	15 49.7	91 40	143.4	15 22.3	91 39	143.6	14 55.0	91 39	143.8	14 27.6	91 39	144.0	14 00.2	91 39	144.2	7
8	16 47.6	91 41	141.8	16 20.4	91 41	142.0	15 53.2	91 41	142.3	15 26.0	91 40	142.5	14 58.7	91 40	142.7	14 31.5	91 40	142.9	14 04.2	91 40	143.1	13 36.9	91 40	143.3	8
9	16 23.1	90 42	140.9	15 56.0	90 42	141.1	15 28.9	90 41	141.4	15 01.7	90 41	141.6	14 34.6	90 41	141.8	14 07.5	90 41	142.0	13 40.3	91 41	142.2	13 13.2	91 40	142.5	9
40	15 58.0	90 43	140.0	15 31.0	90 42	140.2	15 04.0	90 42	140.5	14 37.0	90 42	140.7	14 10.0	90 42	140.9	13 43.0	90 42	141.1	13 16.0	90 41	141.4	12 48.9	90 41	141.6	40
1	15 32.5	89 43	139.1	15 05.6	90 43	139.3	14 38.8	90 43	139.6	14 11.9	90 43	139.8	13 45.0	90 43	140.0	13 18.1	90 42	140.3	12 51.2	90 42	140.5	12 24.3	90 42	140.7	1
2	15 06.5	89 44	138.2	14 39.7	89 44	138.5	14 13.0	89 44	138.7	13 46.2	89 43	138.9	13 19.5	89 43	139.2	12 52.7	89 43	139.4	12 25.9	89 43	139.6	11 59.1	89 43	139.8	2
3	14 40.0	89 45	137.3	14 13.4	89 45	137.6	13 46.8	89 44	137.8	13 20.2	89 44	138.1	12 53.5	89 44	138.3	12 26.8	89 44	138.5	12 00.2	89 44	138.8	11 33.5	89 43	139.0	3
4	14 13.1	88 46	136.5	13 46.6	88 45	136.7	13 20.1	88 45	136.9	12 53.6	88 45	137.2	12 27.1	88 45	137.4	12 00.6	88 45	137.7	11 34.0	89 44	137.9	11 07.4	89 44	138.1	4
45	13 45.8	88 46	135.6	13 19.4	88 46	135.8	12 53.0	88 46	136.1	12 26.6	88 46	136.3	12 00.2	88 45	136.6	11 33.8	88 45	136.8	11 07.4	88 45	137.0	10 41.0	88 45	137.3	45
6	13 18.0	87 47	134.7	12 51.8	88 47	135.0	12 25.5	88 47	135.2	11 59.3	88 46	135.5	11 33.0	88 46	135.7	11 06.7	88 46	136.0	10 40.4	88 46	136.2	10 14.0	88 46	136.4	6
7	12 49.8	87 48	133.9	12 23.7	87 47	134.1	11 57.6	87 47	134.4	11 31.4	87 47	134.6	11 05.3	87 47	134.9	10 39.1	87 47	135.1	10 12.9	87 46	135.4	9 46.7	87 46	135.6	7
8	12 21.3	87 48	133.0	11 55.3	87 48	133.3	11 29.2	87 48	133.5	11 03.2	87 48	133.8	10 37.2	87 48	134.0	10 11.1	87 47	134.3	9 45.0	87 47	134.5	9 19.0	87 47	134.8	8
9	11 52.3	86 49	132.2	11 26.4	86 49	132.4	11 00.5	86 49	132.7	10 34.6	86 48	132.9	10 08.7	86 48	133.2	9 42.7	86 48	133.4	9 16 8	87 48	133.7	8 50.8	87 48	133.9	9
50	11 22.9	86 50	131.3	10 57.1	86 49	131.6	10 31.4	86 49	131.8	10 05.6	86 49	132.1	9 39.8	86 49	132.4	9 14.0	86 49	132.6	8 48.1	86 48	132.9	8 22.3	86 48	133.1	50
1	10 53.1	85 50	130.5	10 27.5	86 50	130.7	10 01.8	86 50	131.0	9 36.2	86 50	131.3	9 10.5	86 49	131.5	8 44.8	86 49	131.8	8 19.1	86 49	132.0	7 53.4	86 49	132.3	1
2	10 23.0	85 51	129.6	9 57.5	85 51	129.9	9 31.9	85 50	130.2	9 06.4	85 50	130.4	8 40.8	85 50	130.7	8 15.3	85 50	131.0	7 49.7	85 50	131.2	7 24.1	85 49	131.5	2
3	9 52.5	85 51	128.8	9 27.1	85 51	129.1	9 01.7	85 51	129.3	8 36.2	85 51	129.6	8 10.8	85 51	129.9	7 45.3	85 50	130.1	7 19.9	85 50	130.4	6 54.4	85 50	130.7	3
4	9 21.7	84 52	128.0	8 56.4	84 52	128.3	8 31.1	84 52	128.5	8 05.7	84 51	128.8	7 40.4	84 51	129.1	7 15.1	84 51	129.3	6 49.7	85 51	129.6	6 24.4	85 51	129.9	4
55	8 50.5	84 53	127.2	8 25.3	84 52	127.4	8 00.1	84 52	127.7	7 34.9	84 52	128.0	7 09.7	84 52	128.3	6 44.5	84 52	128.5	6 19.2	84 51	128.8	5 54.0	84 51	129.1	55
6	8 18.9	84 53	126.4	7 53.9	84 53	126.6	7 28.8	84 53	126.9	7 03.7	84 53	127.2	6 38.6	84 52	127.5	6 13.5	84 52	127.7	5 48.4	84 52	128.0	5 23.3	84 52	128.3	6
7	7 47.1	83 54	125.5	7 22.1	83 53	125.8	6 57.2	83 53	126.1	6 32.2	83 53	126.4	6 07.2	83 53	126.7	5 42.2	83 53	126.9	5 17.2	83 53	127.2				7
8	7 14.9	83 54	124.7	6 50.0	83 54	125.0	6 25.2	83 54	125.3	6 00.3	83 54	125.6	5 35.5	83 53	125.9	5 10.6	83 53	126.1							8
9	6 42.4	82 55	123.9	6 17.6	82 54	124.2	5 52.9	82 54	124.5	5 28.2	83 54	124.8	5 03.4	83 54	125.1										9
60	6 09.6	82 55	123.1	5 44.9	82 55	123.4	5 20.3	82 55	123.7																60
1	5 36.5	82 56	122.4	5 11.9	82 55	122.6																			1
2	5 03.1	81 56	121.6																						2

DECLINATION SAME NAME AS LATITUDE

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	11 21.8	74 64	78.6	11 44.0	74 64	78.3	12 06.3	74 64	77.9	12 28.5	74 64	77.6	12 50.8	74 64	77.2	13 12.9	74 64	76.9	13 35.1	74 64	76.6	13 57.2	74 64	76.2	91
2	10 43.2	74 64	77.9	11 05.6	74 64	77.5	11 27.9	74 64	77.2	11 50.2	74 64	76.9	12 12.4	74 64	76.5	12 34.6	74 64	76.2	12 56.9	74 64	75.8	13 19.0	74 63	75.5	2
3	10 04.8	75 64	77.2	10 27.2	75 64	76.8	10 49.5	75 64	76.5	11 11.9	74 64	76.1	11 34.2	74 64	75.8	11 56.5	74 63	75.5	12 18.8	74 63	75.1	12 41.0	74 63	74.8	3
4	9 26.5	75 64	76.4	9 48.9	75 64	76.1	10 11.3	75 63	75.8	10 33.7	75 63	75.4	10 56.1	75 63	75.1	11 18.4	74 63	74.7	11 40.8	74 63	74.4	12 03.1	74 63	74.1	4
95	8 48.3	75 63	75.7	9 10.8	75 63	75.4	9 33.2	75 63	75.0	9 55.7	75 63	74.7	10 18.1	75 63	74.4	10 40.5	75 63	74.0	11 02.9	75 63	73.7	11 25.3	75 63	73.3	95
6	8 10.2	75 63	75 0	8 32.7	75 63	74.6	8 55.3	75 63	74.3	9 17.8	75 63	74.0	9 40.3	75 63	73.6	10 02.8	75 63	73.3	10 25.2	75 63	73.0	10 47.7	75 62	72.6	6
7	7 32.2	75 63	74.2	7 54.8	75 63	73.9	8 17.4	75 63	73.6	8 40.0	75 63	73.2	9 02.6	75 63	72.9	9 25.1	75 62	72.6	9 47.7	75 62	72.2	10 10.2	75 62	71.9	7
8	6 54.4	76 63	73.5	7 17.1	76 63	73.2	7 39.8	76 63	72.8	8 02.4	75 62	72.5	8 25.0	75 62	72.2	8 47.7	75 62	71.9	9 10.2	75 62	71.5	9 32.8	75 62	71.2	8
9	6 16.7	76 63	72.8	6 39.5	76 62	72.4	7 02.2	76 62	72.1	7 24.9	76 62	71.8	7 47.6	76 62	71.5	8 10.3	76 62	71.1	8 33.0	76 62	70.8	8 55.6	75 62	70.5	9
100	5 39.2	76 62	72.0	6 02.0	76 62	71.7	6 24.8	76 62	71.4	6 47.6	76 62	71.1	7 10.4	76 62	70.7	7 33.2	76 62	70.4	7 55.9	76 62	70.1	8 18.6	76 61	69.7	100
1	5 01.9	76 62	71.3	5 24.7	76 62	71.0	5 47.6	76 62	70.7	6 10.5	76 62	70.3	6 33.3	76 62	70.0	6 56.2	76 61	69.7	7 19.0	76 61	69.4	7 41.8	76 61	69.0	1
2							5 10.6	76 62	69.9	5 33.5	76 61	69.6	5 56.4	76 61	69.3	6 19.3	76 61	69.0	6 42.2	76 61	68.6	7 05.1	76 61	68.3	2
3													5 19.7	77 61	68.5	5 42.7	77 61	68.2	6 05.7	77 61	67.9	6 28.6	77 60	67.6	3
4																5 06.2	77 61	67.5	5 29.3	77 60	67.2	5 52.4	77 60	66.8	4
105																						5 16.3	77 60	66.1	105

Lat. 49°

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	61 00.0	1.0 01	180.0	61 30.0	1.0 01	180.0	62 00.0	1.0 01	180.0	62 30.0	1.0 01	180.0	63 00.0	1.0 01	180.0	63 30.0	1.0 01	180.0	64 00.0	1.0 01	180.0	64 30.0	1.0 01	180.0	00
1	60 59.3	1.0 03	178.1	61 29.3	1.0 03	178.0	61 59.3	1.0 03	178.0	62 29.3	1.0 03	178.0	62 59.3	1.0 04	178.0	63 29.3	1.0 04	177.9	63 59.3	1.0 04	177.9	64 29.3	1.0 04	177.9	1
2	60 57.3	1.0 06	176.1	61 27.3	1.0 06	176.1	61 57.3	1.0 06	176.0	62 27.2	1.0 06	176.0	62 57.2	1.0 06	175.9	63 27.2	1.0 06	175.9	63 57.1	1.0 06	175.8	64 27.1	1.0 06	175.7	2
3	60 54.0	1.0 08	174.2	61 23.9	1.0 08	174.1	61 53.9	1.0 08	174.0	62 23.8	1.0 08	174.0	62 53.7	1.0 08	173.9	63 23.6	1.0 08	173.8	63 53.5	1.0 08	173.7	64 23.4	1.0 08	173.6	3
4	60 49.4	1.0 10	172.3	61 19.2	1.0 10	172.2	61 49.1	1.0 10	172.1	62 19.0	1.0 10	172.0	62 48.8	99 10	171.9	63 18.7	99 11	171.8	63 48.5	99 11	171.6	64 18.3	99 11	171.5	4
05	60 43.4	99 12	170.4	61 13.2	99 12	170.2	61 43.0	99 12	170.1	62 12.8	99 13	170.0	62 42.6	99 13	169.8	63 12.3	99 13	169.7	63 42.1	99 13	169.6	64 11.8	99 13	169.4	05
6	60 36.2	99 14	168.5	61 05.9	99 14	168.3	61 35.6	99 15	168.2	62 05.3	99 15	168.0	62 34.9	99 15	167.8	63 04.6	99 15	167.7	63 34.3	99 15	167.5	64 03.9	99 16	167.3	6
7	60 27.7	99 16	166.6	60 57.3	99 16	166.4	61 26.9	99 17	166.2	61 56.4	99 17	166.1	62 26.0	98 17	165.9	62 55.5	98 17	165.7	63 25.1	98 18	165.5	63 54.6	98 18	165.3	7
8	60 17.9	98 18	164.7	60 47.4	98 19	164.5	61 16.9	98 19	164.3	61 46.3	98 19	164.1	62 15.7	98 19	163.9	62 45.1	98 20	163.7	63 14.5	98 20	163.5	63 43.9	98 20	163.2	8
9	60 06.9	98 20	162.8	60 36.3	98 21	162.6	61 05.6	98 21	162.4	61 34.9	98 21	162.2	62 04.2	98 21	162.0	62 33.4	97 22	161.7	63 02.7	97 22	161.5	63 31.9	97 22	161.2	9
10	59 54.7	97 22	161.0	60 23.9	97 23	160.8	60 53.1	97 23	160.5	61 22.2	97 23	160.3	61 51.4	97 23	160.0	62 20.5	97 24	159.8	62 49.5	97 24	159.5	63 18.6	97 24	159.2	10
1	59 41.3	97 24	159.2	60 10.3	97 25	158.9	60 39.4	97 25	158.7	61 08.4	97 25	158.4	61 37.3	96 25	158.1	62 06.2	96 26	157.9	62 35.1	96 26	157.6	63 04.0	96 26	157.3	1
2	59 26.7	96 26	157.4	59 55.6	96 26	157.1	60 24.5	96 27	156.9	60 53.3	96 27	156.6	61 22.1	96 27	156.3	61 50.8	96 28	156.0	62 19.5	96 28	155.7	62 48.2	96 28	155.3	2
3	59 11.1	96 28	155.6	59 39.8	96 28	155.3	60 08.4	96 29	155.1	60 37.1	96 29	154.7	61 05.7	95 29	154.4	61 34.2	95 30	154.1	62 02.7	95 30	153.8	62 31.1	95 30	153.4	3
4	58 54.3	95 30	153.9	59 22.8	95 30	153.6	59 51.3	95 30	153.3	60 19.7	95 31	153.0	60 48.1	95 31	152.6	61 16.5	94 31	152.3	61 44.7	94 32	151.9	62 13.0	94 32	151.6	4
15	58 36.4	95 32	152.2	59 04.7	94 32	151.8	59 33.0	94 32	151.5	60 01.3	94 32	151.2	60 29.5	94 33	150.8	60 57.6	94 33	150.5	61 25.7	93 34	150.1	61 53.7	93 34	149.7	15
6	58 17.5	94 33	150.5	58 45.7	94 34	150.1	59 13.8	94 34	149.8	59 41.8	93 34	149.5	60 09.8	93 35	149.1	60 37.7	93 35	148.7	61 05.5	93 35	148.3	61 33.3	93 36	147.9	6
7	57 57.6	93 35	148.8	58 25.6	93 35	148.5	58 53.5	93 35	148.1	59 21.3	93 36	147.7	59 49.0	92 36	147.4	60 16.7	92 37	147.0	60 44.4	92 37	146.6	61 11.9	92 37	146.2	7
8	57 36.8	93 36	147.2	58 04.5	92 37	146.8	58 32.2	92 37	146.4	58 59.8	92 37	146.1	59 27.3	92 38	145.7	59 54.8	91 38	145.3	60 22.2	91 39	144.9	60 49.5	91 39	144.5	8
9	57 15.0	92 38	145.6	57 42.5	92 38	145.2	58 10.0	91 39	144.8	58 37.3	91 39	144.4	59 04.7	91 39	144.0	59 31.9	91 40	143.6	59 59.1	90 40	143.2	60 26.2	90 40	142.8	9
20	56 52.2	91 39	144.0	57 19.6	91 40	143.6	57 46.8	91 40	143.2	58 14.0	90 40	142.8	58 41.1	90 41	142.4	59 08.1	90 41	142.0	59 35.1	90 42	141.5	60 01.9	89 42	141.1	20
1	56 28.7	90 41	142.4	56 55.8	90 41	142.0	57 22.8	90 41	141.6	57 49.8	90 42	141.2	58 16.6	89 42	140.8	58 43.4	89 43	140.4	59 10.1	89 43	139.9	59 36.8	89 43	139.5	1
2	56 04.3	90 42	140.9	56 31.2	90 42	140.5	56 58.0	89 43	140.1	57 24.7	89 43	139.7	57 51.4	89 43	139.2	58 17.9	88 44	138.8	58 44.4	88 44	138.4	59 10.8	88 45	137.9	2
3	55 39.0	89 43	139.4	56 05.7	89 44	139.0	56 32.3	89 44	138.6	56 58.8	88 44	138.2	57 25.3	88 45	137.7	57 51.6	88 45	137.3	58 17.8	87 46	136.8	58 44.0	87 46	136.3	3
4	55 13.0	88 45	137.9	55 39.5	88 45	137.5	56 05.9	88 45	137.1	56 32.2	88 46	136.7	56 58.4	87 46	136.2	57 24.5	87 46	135.8	57 50.5	87 47	135.3	58 16.4	86 47	134.8	4
25	54 46.3	88 46	136.5	55 12.6	87 46	136.1	55 38.7	87 46	135.6	56 04.8	87 47	135.2	56 30.8	86 47	134.7	56 56.7	86 48	134.3	57 22.5	86 48	133.8	57 48.1	85 48	133.3	25
6	54 18.8	87 47	135.1	54 44.9	87 47	134.6	55 10.9	86 48	134.2	55 36.7	86 48	133.8	56 02.5	86 48	133.3	56 28.2	85 49	132.8	56 53.7	85 49	132.4	57 19.2	85 49	131.9	6
7	53 50.7	86 48	133.7	54 16.6	86 48	133.3	54 42.3	86 49	132.8	55 08.0	85 49	132.4	55 33.5	85 49	131.9	55 59.0	85 50	131.4	56 24.3	84 50	131.0	56 49.5	84 50	130.5	7
8	53 21.9	86 49	132.3	53 47.6	85 49	131.9	54 13.1	85 50	131.4	54 38.6	85 50	131.0	55 03.9	84 50	130.5	55 29.2	84 51	130.0	55 54.3	84 51	129.6	56 19.3	83 51	129.1	8
9	52 52.5	85 50	131.0	53 18.0	85 50	130.6	53 43.3	84 51	130.1	54 08.6	84 51	129.6	54 33.7	84 51	129.2	54 58.7	83 52	128.7	55 23.6	83 52	128.2	55 48.4	82 52	127.7	9
30	52 22.5	84 51	129.7	52 47.8	84 51	129.2	53 12.9	84 52	128.8	53 38.0	83 52	128.3	54 02.9	83 52	127.8	54 27.7	83 53	127.4	54 52.4	82 53	126.9	55 17.0	82 53	126.4	30
1	51 51.9	84 52	128.4	52 17.0	83 52	127.9	52 42.0	83 52	127.5	53 06.8	83 53	127.0	53 31.5	82 53	126.6	53 56.2	82 53	126.1	54 20.7	81 54	125.6	54 45.1	81 54	125.1	1
2	51 20.8	83 53	127.1	51 45.7	83 53	126.7	52 10.5	82 53	126.2	52 35.1	82 54	125.8	52 59.7	82 54	125.3	53 24.1	81 54	124.8	53 48.4	81 55	124.3	54 12.6	80 55	123.8	2
3	50 49.2	82 54	125.9	51 13.9	82 54	125.4	51 38.4	82 54	125.0	52 02.9	81 54	124.5	52 27.3	81 55	124.0	52 51.5	81 55	123.6	53 15.6	80 55	123.1	53 39.6	80 56	122.6	3
4	50 17.0	82 54	124.7	50 41.6	82 55	124.2	51 06.0	81 55	123.8	51 30.3	81 55	123.3	51 54.4	80 56	122.8	52 18.5	80 56	122.3	52 42.4	80 56	121.8	53 06.2	79 56	121.3	4
35	49 44.4	81 55	123.5	50 08.8	81 55	123.0	50 33.0	81 56	122.6	50 57.1	80 56	122.1	51 21.1	80 56	121.6	51 45.0	79 56	121.1	52 08.8	79 57	120.6	52 32.4	79 57	120.1	35
6	49 11.4	81 56	122.3	49 35.6	80 56	121.9	49 59.6	80 56	121.4	50 23.6	80 57	120.9	50 47.4	79 57	120.4	51 11.1	79 57	120.0	51 34.7	78 57	119.5	51 58.2	78 58	119.0	6
7	48 37.9	80 56	121.2	49 01.9	80 57	120.7	49 25.8	79 57	120.2	49 49.6	79 57	119.8	50 13.3	79 58	119.3	50 36.8	78 58	118.8	51 00.2	78 58	118.3	51 23.5	77 58	117.8	7
8	48 04.0	80 57	120.0	48 27.9	79 57	119.6	48 51.6	79 58	119.1	49 15.2	79 58	118.6	49 38.7	78 58	118.2	50 02.1	78 58	117.7	50 25.4	77 59	117.2	50 48.5	77 59	116.7	8
9	47 29.8	79 58	118.9	47 53.5	79 58	118.5	48 17.0	78 58	118.0	48 40.5	78 58	117.5	49 03.9	78 59	117.1	49 27.1	77 59	116.6	49 50.2	77 59	116.1	50 13.2	76 59	115.6	9
40	46 55.1	79 58	117.8	47 18.7	78 59	117.4	47 42.1	78 59	116.9	48 05.4	78 59	116.4	48 28.6	77 59	116.0	48 51.7	77 60	115.5	49 14.7	76 60	115.0	49 37.5	76 60	114.5	40
1	46 20.2	78 59	116.8	46 43.6	78 59	116.3	47 06.9	77 59	115.8	47 30.0	77 60	115.4	47 53.1	77 60	114.9	48 16.0	76 60	114.4	48 38.9	76 60	113.9	49 01.6	75 60	113.4	1
2	45 44.8	78 59	115.7	46 08.1	77 60	115.2	46 31.3	77 60	114.8	46 54.3	77 60	114.3	47 17.2	76 60	113.8	47 40.1	76 60	113.4	48 02.7	75 61	112.9	48 25.3	75 61	112.4	2
3	45 09.2	77 60	114.7	45 32.4	77 60	114.2	45 55.4	77 60	113.8	46 18.3	76 60	113.3	46 41.1	76 61	112.8	47 03.8	75 61	112.3	47 26.3	75 61	111.8	47 48.8	75 61	111.4	3
4	44 33.3	77 60	113.6	44 56.3	77 61	113.2	45 19.2	76 61	112.7	45 42.0	76 61	112.3	46 04.7	75 61	111.8	46 27.2	75 61	111.3	46 49.7	75 62	110.8	47 12.0	74 62	110.3	4
45	43 57.1	76 61	112.6	44 20.0	76 61	112.2	44 42.8	76 61	111.7	45 05.4	75 61	111.3	45 28.0	75 62	110.8	45 50.4	75 62	110.3	46 12.8	74 62	109.8	46 35.0	74 62	109.4	45
6	43 20.6	76 61	111.6	43 43.4	76 61	111.2	44 06.1	75 62	110.7	44 28.6	75 62	110.3	44 51.1	75 62	109.8	45 13.4	74 62	109.3	45 35.6	74 62	108.9	45 57.7	73 62	108.4	6
7	42 43.9	76 62	110.7	43 06.6	75 62	110.2	43 29.2	75 62	109.8	43 51.6	75 62	109.3	44 13.9	74 62	108.8	44 36.2	74 62	108.4	44 58.3	73 63	107.9	45 20.3	73 63	107.4	7
8	42 07.0	75 62	109.7	42 29.6	75 62	109.3	42 52.0	75 62	108.8	43 14.4	74 62	108.4	43 36.6	74 63	107.9	43 58.7	74 63	107.4	44 20.7	73 63	107.0	44 42.6	73 63	106.5	8
9	41 29.8	75 62	108.8	41 52.3	75 62	108.3	42 14.6	74 63	107.9	42 36.9	74 63	107.4	42 59.0	74 63	107.0	43 21.1	73 63	106.5	43 43.0	73 63	106.0	44 04.8	72 63	105.5	9
50	40 52.5	75 63	107.8	41 14.8	74 63	107.4	41 37.1	74 63	106.9	41 59.2	74 63	106.5	42 21.3	73 63	106.0	42 43.2	73 63	105.6	43 05.0	73 63	105.1	43 26.8	72 64	104.6	50
1	40 14.9	74 63	106.9	40 37.2	74 63	106.5	40 59.3	74 63	106.0	41 21.4	73 63	105.6	41 43.4	73 63	105.1	42 05.2	73 64	104.7	42 27.0	72 64	104.2	42 48.6	72 64	103.7	1
2	39 37.1	74 63	106.0	39 59.3	74 63	105.6	40 21.4	73 63	105.1	40 43.4	73 64	104.7	41 05.3	73 64	104.2	41 27.1	72 64	103.8	41 48.7	72 64	103.3	42 10.3	72 64	102.8	2
3	38 59.2	74 63	105.1	39 21.3	74 64	104.7	39 43.3	73 64	104.2	40 05.2	73 64	103.8	40 27.1	73 64	103.3	40 48.8	72 64	102.9	41 10.3	72 64	102.4	41 31.8	71 64	101.9	3
4	38 21.1	74 64	104.2	38 43.2	73 64	103.8	39 05.1	73 64	103.3	39 26.9	73 64	102.9	39 48.7	72 64	102.4	40 10.3	72 64	102.0	40 31.8	72 64	101.5	40 53.3	71 64	101.1	4
55	37 42.9	73 64	103.3	38 04.9	73 64	102.9	38 26.7	73 64	102.5	38 48.5	72 64	102.0	39 10.2	72 64	101.6	39 31.7	72 64	101.1	39 53.2	71 65	100.7	40 14.6	71 65	100.2	55
6	37 04.5	73 64	102.5	37 26.4	73 64	102.0	37 48.2	73 64	101.6	38 09.9	72 64	101.2	38 31.6	72 65	100.7	38 53.1	72 65	100.3	39 14.5	71 65	99.8	39 35.8	71 65	99.4	6
7	36 26.0	73 64	101.6	36 47.9	73 64	101.2	37 09.6	72 65	100.7	37 31.3	72 65	100.3	37 52.8	72 65	99.9	38 14.3	71 65	99.4	38 35.6	71 65	99.0	38 56.9	71 65	98.5	7
8	35 47.4	73 65	100.8	36 09.2	72 65	100.3	36 30.9	72 65	99.9	36 52.5	72 65	99.5	37 14.0	72 65	99.0	37 35.4	71 65	98.6	37 56.7	71 65	98.2	38 17.9	71 65	97.7	8
9	35 08.7	73 65	99.9	35 30.4	72 65	99.5	35 52.1	72 65	99.1	36 13.6	72 65	98.6	36 35.1	71 65	98.2	36 56.4	71 65	97.8	37 17.7	71 65	97.3	37 38.9	70 65	96.9	9
60	34 29.9	72 65	99.1	34 51.5	72 65	98.7	35 13.2	72 65	98.2	35 34.7	72 65	97.8	35 56.1	71 65	97.4	36 17.4	71 65	97.0	36 38.6	71 65	96.5	36 59.8	70 65	96.1	60
1	33 50.9	72 65	98.3	34 12.6	72 65	97.9	34 34.2	72 65	97.4	34 55.6	71 65	97.0	35 17.0	71 65	96.6	35 38.3	71 65	96.1	35 59.5	71 65	95.7	36 20.6	70 65	95.3	1
2	33 12.0	72 65	97.5	33 33.6	72 65	97.0	33 55.1	72 65	96.6	34 16.5	71 65	96.2	34 37.9	71 65	95.8	34 59.1	71 65	95.3	35 20.3	70 65	94.9	35 41.4	70 65	94.5	2
3	32 32.9	72 65	96.6	32 54.5	72 65	96.2	33 16.0	72 65	95.8	33 37.4	71 65	95.4	33 58.7	71 65	95.0	34 19.9	71 65	94.5	34 41.1	70 65	94.1	35 02.1	70 66	93.7	3
4	31 53.8	72 65	95.8	32 15.3	72 65	95.4	32 36.8	71 65	95.0	32 58.2	71 65	94.6	33 19.4	71 65	94.2	33 40.7	71 66	93.8	34 01.8	70 66	93.3	34 22.8	70 66	92.9	4
65	31 14.6	72 65	95.1	31 36.1	72 65	94.6	31 57.5	71 65	94.2	32 18.9	71 66	93.8	32 40.2	71 66	93.4	33 01.4	71 66	93.0	33 22.5	70 66	92.6	33 43.5	70 66	92.1	65
6	30 35.3	72 65	94.3	30 56.8	72 65	93.9	31 18.3	71 66	93.5	31 39.6	71 66	93.0	32 00.9	71 66	92.6	32 22.0	70 66	92.2	32 43.1	70 66	91.8	33 04.2	70 66	91.4	6
7	29 56.1	72 66	93.5	30 17.5	71 66	93.1	30 39.0	71 66	92.7	31 00.3	71 66	92.3	31 21.5	71 66	91.9	31 42.7	70 66	91.4	32 03.8	70 66	91.0	32 24.8	70 66	90.6	7
8	29 16.8	72 66	92.7	29 38.2	71 66	92.3	29 59.6	71 66	91.9	30 20.9	71 66	91.5	30 42.2	71 66	91.1	31 03.3	70 66	90.7	31 24.4	70 66	90.3	31 45.4	70 66	89.8	8
9	28 37.4	72 66	91.9	28 58.9	71 66	91.5	29 20.3	71 66	91.1	29 41.6	71 66	90.7	30 02.8	71 66	90.3	30 24.0	70 66	89.9	30 45.1	70 66	89.5	31 06.1	70 66	89.1	9
70	27 58.1	72 66	91.2	28 19.5	71 66	90.8	28 40.9	71 66	90.4	29 02.2	71 66	90.0	29 23.5	71 66	89.6	29 44.6	70 66	89.2	30 05.7	70 66	88.8	30 26.7	70 66	88.3	70
1	27 18.7	72 66	90.4	27 40.2	71 66	90.0	28 01.5	71 66	89.6	28 22.9	71 66	89.2	28 44.1	71 66	88.8	29 05.3	70 66	88.4	29 26.4	70 66	88.0	29 47.4	70 66	87.6	1
2	26 39.4	72 66	89.7	27 00.8	71 66	89.3	27 22.2	71 66	88.9	27 43.5	71 66	88.5	28 04.8	71 66	88.1	28 25.9	70 66	87.7	28 47.0	70 66	87.3	29 08.1	70 66	86.9	2
3	26 00.0	72 66	88.9	26 21.5	71 66	88.5	26 42.8	71 66	88.1	27 04.2	71 66	87.7	27 25.4	71 66	87.3	27 46.6	71 65	86.9	28 07.7	70 65	86.5	28 28.8	70 65	86.1	3
4	25 20.7	72 66	88.2	25 42.1	71 66	87.8	26 03.5	71 66	87.4	26 24.8	71 65	87.0	26 46.1	71 65	86.6	27 07.3	71 65	86.2	27 28.4	70 65	85.8	27 49.5	70 65	85.4	4
75	24 41.3	72 66	87.4	25 02.8	71 66	87.0	25 24.2	71 65	86.7	25 45.5	71 65	86.3	26 06.8	71 65	85.9	26 28.0	71 65	85.5	26 49.2	70 65	85.1	27 10.3	70 65	84.7	75
6	24 02.0	72 65	86.7	24 23.5	72 65	86.3	24 44.9	71 65	85.9	25 06.3	71 65	85.5	25 27.6	71 65	85.1	25 48.8	71 65	84.7	26 10.0	71 65	84.4	26 31.1	70 65	84.0	6
7	23 22.7	72 65	85.9	23 44.2	72 65	85.6	24 05.7	71 65	85.2	24 27.1	71 65	84.8	24 48.4	71 65	84.4	25 09.7	71 65	84.0	25 30.9	71 65	83.6	25 52.0	70 65	83.2	7
8	22 43.5	72 65	85.2	23 05.0	72 65	84.8	23 26.5	71 65	84.5	23 47.9	71 65	84.1	24 09.2	71 65	83.7	24 30.5	71 65	83.3	24 51.8	71 65	82.9	25 12.9	70 65	82.5	8
9	22 04.3	72 65	84.5	22 25.8	72 65	84.1	22 47.3	72 65	83.7	23 08.8	71 65	83.4	23 30.1	71 65	83.0	23 51.5	71 65	82.6	24 12.7	71 65	82.2	24 34.0	71 65	81.8	9
80	21 25.1	72 65	83.8	21 46.7	72 65	83.4	22 08.2	72 65	83.0	22 29.7	71 65	82.6	22 51.1	71 65	82.3	23 12.5	71 65	81.9	23 33.8	71 65	81.5	23 55.0	71 65	81.1	80
1	20 46.0	72 65	83.0	21 07.6	72 65	82.7	21 29.2	72 65	82.3	21 50.7	72 65	81.9	22 12.1	71 65	81.5	22 33.5	71 65	81.2	22 54.9	71 65	80.8	23 16.2	71 65	80.4	1
2	20 07.0	72 65	82.3	20 28.6	72 65	81.9	20 50.2	72 65	81.6	21 11.7	72 65	81.2	21 33.2	72 65	80.8	21 54.7	71 65	80.4	22 16.1	71 65	80.1	22 37.4	71 64	79.7	2
3	19 28.0	72 65	81.6	19 49.7	72 65	81.2	20 11.3	72 65	80.9	20 32.9	72 65	80.5	20 54.4	72 65	80.1	21 15.9	72 64	79.7	21 37.3	71 64	79.4	21 58.7	71 64	79.0	3
4	18 49.1	72 65	80.9	19 10.8	72 65	80.5	19 32.5	72 65	80.1	19 54.1	72 64	79.8	20 15.7	72 64	79.4	20 37.2	72 64	79.0	20 58.7	72 64	78.7	21 20.1	71 64	78.3	4
85	18 10.3	73 65	80.1	18 32.0	72 64	79.8	18 53.7	72 64	79.4	19 15.4	72 64	79.1	19 37.0	72 64	78.7	19 58.6	72 64	78.3	20 20.2	72 64	77.9	20 41.6	72 64	77.6	85
6	17 31.5	73 64	79.4	17 53.3	73 64	79.1	18 15.1	72 64	78.7	18 36.8	72 64	78.3	18 58.5	72 64	78.0	19 20.1	72 64	77.6	19 41.7	72 64	77.2	20 03.3	72 64	76.9	6
7	16 52.9	73 64	78.7	17 14.7	73 64	78.4	17 36.5	73 64	78.0	17 58.3	72 64	77.6	18 20.0	72 64	77.3	18 41.7	72 64	76.9	19 03.4	72 64	76.5	19 25.0	72 64	76.2	7
8	16 14.3	73 64	78.0	16 36.2	73 64	77.6	16 58.1	73 64	77.3	17 19.9	73 64	76.9	17 41.7	73 64	76.6	18 03.4	72 64	76.2	18 25.1	72 64	75.8	18 46.8	72 63	75.5	8
9	15 35.9	73 64	77.3	15 57.8	73 64	76.9	16 19.7	73 64	76.6	16 41.6	73 64	76.2	17 03.5	73 64	75.9	17 25.3	73 63	75.5	17 47.0	72 63	75.1	18 08.8	72 63	74.8	9
90	14 57.5	73 64	76.6	15 19.5	73 64	76.2	15 41.5	73 64	75.9	16 03.5	73 63	75.5	16 25.4	73 63	75.2	16 47.2	73 63	74.8	17 09.1	73 63	74.4	17 30.8	73 63	74.1	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
00	21 00.0	1.0 01	180.0	20 30.0	1.0 01	180.0	20 00.0	1.0 01	180.0	19 30.0	1.0 01	180.0	19 00.0	1.0 01	180.0	18 30.0	1.0 01	180.0	18 00.0	1.0 01	180.0	17 30.0	1.0 01	180.0	00
1	20 59.7	1.0 02	179.0	20 29.7	1.0 02	179.0	19 59.7	1.0 02	179.0	19 29.7	1.0 02	179.0	18 59.7	1.0 02	179.0	18 29.7	1.0 02	179.0	17 59.7	1.0 02	179.0	17 29.7	1.0 02	179.0	1
2	20 58.6	1.0 03	178.0	20 28.6	1.0 03	178.0	19 58.6	1.0 03	178.0	19 28.6	1.0 03	178.0	18 58.7	1.0 03	178.0	18 28.7	1.0 03	178.1	17 58.7	1.0 03	178.1	17 28.7	1.0 03	178.1	2
3	20 56.9	1.0 04	177.0	20 26.9	1.0 04	177.0	19 56.9	1.0 04	177.0	19 27.0	1.0 04	177.0	18 57.0	1.0 04	177.1	18 27.0	1.0 04	177.1	17 57.0	1.0 04	177.1	17 27.0	1.0 04	177.1	3
4	20 54.5	1.0 05	176.0	20 24.5	1.0 05	176.0	19 54.5	1.0 05	176.0	19 24.6	1.0 05	176.1	18 54.6	1.0 05	176.1	18 24.6	1.0 05	176.1	17 54.7	1.0 05	176.1	17 24.7	1.0 05	176.2	4
05	20 51.4	1.0 06	175.0	20 21.4	1.0 06	175.0	19 51.5	1.0 06	175.0	19 21.5	1.0 06	175.1	18 51.6	1.0 06	175.1	18 21.6	1.0 06	175.1	17 51.7	1.0 06	175.2	17 21.7	1.0 06	175.2	05
6	20 47.6	1.0 07	174.0	20 17.7	1.0 07	174.0	19 47.7	1.0 07	174.0	19 17.8	1.0 07	174.1	18 47.9	1.0 07	174.1	18 18.0	1.0 07	174.2	17 48.0	1.0 07	174.2	17 18.1	1.0 07	174.2	6
7	20 43.1	1.0 09	173.0	20 13.2	1.0 09	173.0	19 43.3	1.0 08	173.1	19 13.4	1.0 08	173.1	18 43.5	1.0 08	173.1	18 13.6	1.0 08	173.2	17 43.7	1.0 08	173.2	17 13.8	1.0 08	173.3	7
8	20 37.9	1.0 10	172.0	20 08.1	1.0 10	172.0	19 38.2	1.0 10	172.1	19 08.4	1.0 10	172.1	18 38.5	1.0 09	172.2	18 08.6	1.0 09	172.2	17 38.8	1.0 09	172.3	17 08.9	1.0 09	172.3	8
9	20 32.1	99 11	171.0	20 02.3	99 11	171.0	19 32.5	99 11	171.1	19 02.6	99 11	171.1	18 32.8	99 11	171.2	18 03.0	99 11	171.3	17 33.2	99 10	171.3	17 03.3	99 10	171.4	9
10	20 25.6	99 12	170.0	19 55.8	99 12	170.0	19 26.0	99 12	170.1	18 56.2	99 12	170.2	18 26.5	99 12	170.2	17 56.7	99 12	170.3	17 26.9	99 12	170.4	16 57.1	99 11	170.4	10
1	20 18.4	99 13	169.0	19 48.7	99 13	169.0	19 18.9	99 13	169.1	18 49.2	99 13	169.2	18 19.4	99 13	169.3	17 49.7	99 13	169.3	17 20.0	99 13	169.4	16 50.2	99 13	169.5	1
2	20 10.5	99 14	168.0	19 40.8	99 14	168.1	19 11.2	99 14	168.1	18 41.5	99 14	168.2	18 11.8	99 14	168.3	17 42.1	99 14	168.4	17 12.4	99 14	168.4	16 42.7	99 14	168.5	2
3	20 02.0	99 15	167.0	19 32.4	99 15	167.1	19 02.7	99 15	167.2	18 33.1	99 15	167.2	18 03.5	99 15	167.3	17 33.8	99 15	167.4	17 04.2	99 15	167.5	16 34.6	99 15	167.6	3
4	19 52.8	99 16	166.0	19 23.2	99 16	166.1	18 53.7	99 16	166.2	18 24.1	99 16	166.3	17 54.5	99 16	166.4	17 24.9	99 16	166.5	16 55.4	99 16	166.5	16 25.8	99 16	166.6	4
15	19 43.0	98 17	165.0	19 13.5	98 17	165.1	18 44.0	98 17	165.2	18 14.4	98 17	165.3	17 44.9	98 17	165.4	17 15.4	98 17	165.5	16 45.9	98 17	165.6	16 16.3	98 17	165.7	15
6	19 32.5	98 19	164.0	19 03.0	98 18	164.1	18 33.6	98 18	164.2	18 04.1	98 18	164.4	17 34.7	98 18	164.4	17 05.2	98 18	164.5	16 35.8	98 18	164.6	16 06.3	98 18	164.7	6
7	19 21.3	98 20	163.1	18 52.0	98 20	163.2	18 22.6	98 19	163.3	17 53.2	98 19	163.4	17 23.8	98 19	163.5	16 54.4	98 19	163.6	16 25.0	98 19	163.7	15 55.6	98 19	163.8	7
8	19 09.6	98 21	162.1	18 40.3	98 21	162.2	18 10.9	98 20	162.3	17 41.6	98 20	162.4	17 12.3	98 20	162.5	16 43.0	98 20	162.7	16 13.7	98 20	162.8	15 44.4	98 20	162.9	8
9	18 57.1	97 22	161.1	18 27.9	97 22	161.2	17 58.7	97 22	161.4	17 29.4	97 21	161.5	17 00.2	97 21	161.6	16 31.0	97 21	161.7	16 01.7	98 21	161.8	15 32.5	98 21	161.9	9
20	18 44.1	97 23	160.2	18 14.9	97 23	160.3	17 45.8	97 22	160.4	17 16.6	97 22	160.5	16 47.5	97 22	160.7	16 18.3	97 22	160.8	15 49.1	97 22	160.9	15 20.0	97 22	161.0	20
1	18 30.4	97 24	159.2	18 01.4	97 24	159.3	17 32.3	97 24	159.5	17 03.2	97 23	159.6	16 34.1	97 23	159.7	16 05.0	97 23	159.8	15 36.0	97 23	160.0	15 06.9	97 23	160.1	1
2	18 16.1	97 25	158.2	17 47.2	97 25	158.4	17 18.2	97 25	158.5	16 49.2	97 24	158.6	16 20.2	97 24	158.8	15 51.2	97 24	158.9	15 22.2	97 24	159.0	14 53.2	97 24	159.2	2
3	18 01.2	96 26	157.3	17 32.3	96 26	157.4	17 03.4	96 26	157.6	16 34.5	96 25	157.7	16 05.6	96 25	157.8	15 36.7	96 25	158.0	15 07.8	96 25	158.1	14 38.9	96 25	158.3	3
4	17 45.7	96 27	156.3	17 16.9	96 27	156.5	16 48.1	96 27	156.6	16 19.3	96 26	156.8	15 50.5	96 26	156.9	15 21.7	96 26	157.1	14 52.8	96 26	157.2	14 24.0	96 26	157.4	4
25	17 29.6	96 28	155.4	17 00.9	96 28	155.5	16 32.2	96 27	155.7	16 03.5	96 27	155.8	15 34.8	96 27	156.0	15 06.0	96 27	156.1	14 37.3	96 27	156.3	14 08.6	96 27	156.4	25
6	17 13.0	95 29	154.5	16 44.3	95 29	154.6	16 15.7	95 28	154.8	15 47.1	95 28	154.9	15 18.5	95 28	155.1	14 49.8	95 28	155.2	14 21.2	95 28	155.4	13 52.5	96 28	155.5	6
7	16 55.7	95 30	153.5	16 27.2	95 30	153.7	15 58.7	95 29	153.8	15 30.1	95 29	154.0	15 01.6	95 29	154.2	14 33.1	95 29	154.3	14 04.5	95 29	154.5	13 36.0	95 29	154.6	7
8	16 37.9	95 31	152.6	16 09.4	95 30	152.8	15 41.0	95 30	152.9	15 12.6	95 30	153.1	14 44.2	95 30	153.3	14 15.7	95 30	153.4	13 47.3	95 30	153.6	13 18.8	95 29	153.7	8
9	16 19.5	94 32	151.7	15 51.1	94 31	151.8	15 22.8	94 31	152.0	14 54.5	94 31	152.2	14 26.2	94 31	152.3	13 57.8	94 31	152.5	13 29.5	94 31	152.7	13 01.1	95 30	152.8	9
30	16 00.5	94 33	150.7	15 32.3	94 32	150.9	15 04.1	94 32	151.1	14 35.9	94 32	151.3	14 07.6	94 32	151.4	13 39.4	94 32	151.6	13 11.1	94 31	151.8	12 42.9	94 31	152.0	30
1	15 41.0	94 33	149.8	15 12.9	94 33	150.0	14 44.8	94 33	150.2	14 16.7	94 33	150.4	13 48.5	94 33	150.5	13 20.4	94 33	150.7	12 52.3	94 32	150.9	12 24.1	94 32	151.1	1
2	15 20.9	93 34	148.9	14 52.9	93 34	149.1	14 24.9	93 34	149.3	13 56.9	93 34	149.5	13 28.9	93 34	149.7	13 00.9	93 33	149.8	12 32.9	93 33	150.0	12 04.8	93 33	150.2	2
3	15 00.3	93 35	148.0	14 32.4	93 35	148.2	14 04.6	93 35	148.4	13 36.7	93 35	148.6	13 08.8	93 34	148.8	12 40.9	93 34	149.0	12 12.9	93 34	149.1	11 45.0	93 34	149.3	3
4	14 39.2	93 36	147.1	14 11.4	93 36	147.3	13 43.7	93 36	147.5	13 15.9	93 36	147.7	12 48.1	93 35	147.9	12 20.3	93 35	148.1	11 52.5	93 35	148.3	11 24.7	93 35	148.5	4
35	14 17.6	92 37	146.2	13 49.9	92 37	146.4	13 22.3	92 37	146.6	12 54.6	92 36	146.8	12 26.9	92 36	147.0	11 59.2	92 36	147.2	11 31.5	92 36	147.4	11 03.8	92 36	147.6	35
6	13 55.4	92 38	145.3	13 27.9	92 38	145.5	13 00.3	92 37	145.7	12 32.8	92 37	145.9	12 05.2	92 37	146.1	11 37.6	92 37	146.3	11 10.1	92 37	146.5	10 42.5	92 36	146.7	6
7	13 32.8	91 39	144.4	13 05.3	91 38	144.6	12 37.9	91 38	144.8	12 10.5	91 38	145.1	11 43.0	92 38	145.3	11 15.6	92 38	145.5	10 48.1	92 37	145.7	10 20.6	92 37	145.9	7
8	13 09.6	91 39	143.5	12 42.3	91 39	143.8	12 15.0	91 39	144.0	11 47.7	91 39	144.2	11 20.4	91 39	144.4	10 53.0	91 38	144.6	10 25.7	91 38	144.8	9 58.3	91 38	145.0	8
9	12 46.0	91 40	142.7	12 18.8	91 40	142.9	11 51.6	91 40	143.1	11 24.4	91 40	143.3	10 57.2	91 39	143.5	10 30.0	91 39	143.7	10 02.7	91 39	144.0	9 35.5	91 39	144.2	9
40	12 21.9	90 41	141.8	11 54.8	90 41	142.0	11 27.7	90 41	142.2	11 00.7	90 40	142.5	10 33.6	90 40	142.7	10 06.5	90 40	142.9	9 39.4	90 40	143.1	9 12.2	90 40	143.3	40
1	11 57.3	90 42	140.9	11 30.4	90 42	141.2	11 03.4	90 41	141.4	10 36.4	90 41	141.6	10 09.5	90 41	141.8	9 42.5	90 41	142.1	9 15.5	90 41	142.3	8 48.5	90 40	142.5	1
2	11 32.3	89 42	140.1	11 05.5	89 42	140.3	10 38.6	89 42	140.5	10 11.8	90 42	140.8	9 44.9	90 42	141.0	9 18.1	90 41	141.2	8 51.2	90 41	141.4	8 24.3	90 41	141.7	2
3	11 06.8	89 43	139.2	10 40.1	89 43	139.5	10 13.4	89 43	139.7	9 46.7	89 43	139.9	9 19.9	89 42	140.1	8 53.2	89 42	140.4	8 26.4	89 42	140.6	7 59.7	89 42	140.8	3
4	10 40.9	89 44	138.4	10 14.3	89 44	138.6	9 47.7	89 44	138.8	9 21.1	89 43	139.1	8 54.5	89 43	139.3	8 27.9	89 43	139.5	8 01.2	89 43	139.8	7 34.6	89 43	140.0	4
45	10 14.5	88 45	137.5	9 48.0	88 44	137.8	9 21.6	88 44	138.0	8 55.1	88 44	138.2	8 28.6	88 44	138.5	8 02.1	88 44	138.7	7 35.6	88 43	139.0	7 09.1	88 43	139.2	45
6	9 47.7	88 45	136.7	9 21.4	88 45	136.9	8 55.0	88 45	137.2	8 28.7	88 45	137.4	8 02.3	88 45	137.7	7 35.9	88 44	137.9	7 09.5	88 44	138.1	6 43.1	88 44	138.4	6
7	9 20.5	87 46	135.9	8 54.3	87 46	136.1	8 28.1	87 46	136.3	8 01.8	87 45	136.6	7 35.6	88 45	136.8	7 09.3	88 45	137.1	6 43.0	88 45	137.3	6 16.8	88 45	137.6	7
8	8 52.9	87 47	135.0	8 26.8	87 46	135.3	8 00.7	87 46	135.5	7 34.6	87 46	135.8	7 08.4	87 46	136.0	6 42.3	87 46	136.3	6 16.2	87 46	136.5	5 50.0	87 45	136.8	8
9	8 24.9	87 47	134.2	7 58.9	87 47	134.5	7 32.9	87 47	134.7	7 06.9	87 47	135.0	6 40.9	87 47	135.2	6 14.9	87 46	135.5	5 48.9	87 46	135.7	5 22.8	87 46	136.0	9
50	7 56.4	86 48	133.4	7 30.6	86 48	133.6	7 04.7	86 48	133.9	6 38.9	86 47	134.1	6 13.0	86 47	134.4	5 47.1	86 47	134.7	5 21.2	86 47	134.9				50
1	7 27.6	86 49	132.6	7 01.9	86 48	132.8	6 36.2	86 48	133.1	6 10.4	86 48	133.3	5 44.7	86 48	133.6	5 18.9	86 48	133.9							1
2	6 58.5	85 49	131.8	6 32.8	85 49	132.0	6 07.2	85 49	132.3	5 41.6	85 49	132.5	5 16.0	85 48	132.8										2
3	6 28.9	85 50	130.9	6 03.4	85 50	131.2	5 37.9	85 49	131.5	5 12.4	85 49	131.7													3
4	5 59.0	85 50	130.1	5 33.6	85 50	130.4	5 08.2	85 50	130.7																4
55	5 28.7	84 51	129.3	5 03.5	84 51	129.6																			55

DECLINATION SAME NAME AS LATITUDE

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
91	14 19.3	74 64	75.9	14 41.4	73 63	75.5	15 03.4	73 63	75.2	15 25.4	73 63	74.8	15 47.4	73 63	74.4	16 09.3	73 63	74.1	16 31.2	73 63	73.7	16 53.1	73 63	73.4	91
2	13 41.2	74 63	75.1	14 03.3	74 63	74.8	14 25.4	74 63	74.4	14 47.5	73 63	74.1	15 09.5	73 63	73.7	15 31.5	73 63	73.4	15 53.5	73 63	73.0	16 15.4	73 62	72.7	2
3	13 03.2	74 63	74.4	13 25.4	74 63	74.1	13 47.6	74 63	73.7	14 09.7	74 63	73.4	14 31.8	74 63	73.0	14 53.9	74 63	72.7	15 15.9	73 62	72.3	15 37.9	73 62	72.0	3
4	12 25.4	74 63	73.7	12 47.6	74 63	73.4	13 09.8	74 63	73.0	13 32.0	74 62	72.7	13 54.2	74 62	72.3	14 16.4	74 62	72.0	14 38.5	74 62	71.6	15 00.5	74 62	71.3	4
95	11 47.6	74 63	73.0	12 10.0	74 62	72.7	12 32.3	74 62	72.3	12 54.5	74 62	72.0	13 16.8	74 62	71.6	13 39.0	74 62	71.3	14 01.2	74 62	70.9	14 23.3	74 62	70.6	95
6	11 10.1	75 62	72.3	11 32.5	75 62	71.9	11 54.8	75 62	71.6	12 17.2	74 62	71.3	12 39.5	74 62	70.9	13 01.8	74 62	70.6	13 24.1	74 62	70.2	13 46.3	74 61	69.9	6
7	10 32.7	75 62	71.6	10 55.1	75 62	71.2	11 17.6	75 62	70.9	11 40.0	75 62	70.6	12 02.4	75 62	70.2	12 24.7	75 61	69.9	12 47.1	74 61	69.5	13 09.4	74 61	69.2	7
8	9 55.4	75 62	70.9	10 17.9	75 62	70.5	10 40.4	75 62	70.2	11 02.9	75 61	69.8	11 25.4	75 61	69.5	11 47.9	75 61	69.2	12 10.3	75 61	68.8	12 32.7	75 61	68.5	8
9	9 18.3	75 62	70.1	9 40.9	75 61	69.8	10 03.5	75 61	69.5	10 26.1	75 61	69.1	10 48.6	75 61	68.8	11 11.2	75 61	68.5	11 33.7	75 61	68.1	11 56.2	75 61	67.8	9
100	8 41.3	76 61	69.4	9 04.0	76 61	69.1	9 26.7	76 61	68.8	9 49.4	76 61	68.4	10 12.0	75 61	68.1	10 34.6	75 61	67.8	10 57.2	75 60	67.4	11 19.8	75 60	67.1	100
1	8 04.6	76 61	68.7	8 27.4	76 61	68.4	8 50.1	76 61	68.0	9 12.9	76 61	67.7	9 35.6	76 60	67.4	9 58.3	76 60	67.0	10 21.0	76 60	66.7	10 43.7	76 60	66.4	1
2	7 28.0	76 61	68.0	7 50.9	76 61	67.6	8 13.7	76 60	67.3	8 36.5	76 60	67.0	8 59.4	76 60	66.7	9 22.2	76 60	66.3	9 44.9	76 60	66.0	10 07.7	76 60	65.7	2
3	6 51.6	77 60	67.3	7 14.6	76 60	66.9	7 37.5	76 60	66.6	8 00.4	76 60	66.3	8 23.3	76 60	66.0	8 46.2	76 60	65.6	9 09.1	76 59	65.3	9 31.9	76 59	65.0	3
4	6 15.4	77 60	66.5	6 38.4	77 60	66.2	7 01.5	77 60	65.9	7 24.5	77 60	65.6	7 47.5	77 59	65.2	8 10.4	77 59	64.9	8 33.4	77 59	64.6	8 56.4	76 59	64.3	4
105	5 39.4	77 60	65.8	6 02.5	77 60	65.5	6 25.6	77 59	65.2	6 48.7	77 59	64.8	7 11.8	77 59	64.5	7 34.9	77 59	64.2	7 58.0	77 59	63.9	8 21.0	77 59	63.5	105
6	5 03.6	77 59	65.1	5 26.8	77 59	64.8	5 50.0	77 59	64.4	6 13.2	77 59	64.1	6 36.4	77 59	63.8	6 59.6	77 58	63.5	7 22.7	77 58	63.2	7 45.9	77 58	62.8	6
7							5 14.6	78 59	63.7	5 37.9	78 58	63.4	6 01.2	78 58	63.1	6 24.5	78 58	62.8	6 47.7	78 58	62.4	7 11.0	77 58	62.1	7
8										5 02.8	78 58	62.7	5 26.2	78 58	62.3	5 49.6	78 58	62.0	6 12.9	78 58	61.7	6 36.3	78 57	61.4	8
9																5 14.9	78 58	61.3	5 38.4	78 57	61.0	6 01.8	78 57	60.7	9
110																			5 04.1	79 57	60.3	5 27.6	79 57	60.0	110

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Lat. 49°

H.A.	24° 00′			24° 30′			25° 00′			25° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	65 00.0	1.0 01	180.0	65 30.0	1.0 01	180.0	66 00.0	1.0 01	180.0	66 30.0	1.0 01	180.0
1	64 59.3	1.0 04	177.8	65 29.2	1.0 04	177.8	65 59.2	1.0 04	177.8	66 29.2	1.0 04	177.7
2	64 57.0	1.0 06	175.7	65 27.0	1.0 06	175.6	65 56.9	1.0 06	175.5	66 26.9	1.0 06	175.5
3	64 53.3	1.0 09	173.5	65 23.2	1.0 09	173.4	65 53.1	1.0 09	173.3	66 23.0	1.0 09	173.2
4	64 48.2	99 11	171.4	65 18.0	99 11	171.3	65 47.8	99 11	171.1	66 17.6	99 12	171.0
05	64 41.6	99 13	169.3	65 11.3	99 14	169.1	65 41.0	99 14	168.9	66 10.7	99 14	168.8
6	64 33.5	99 16	167.2	65 03.1	99 16	167.0	65 32.7	99 16	166.8	66 02.3	99 16	166.6
7	64 24.1	98 18	165.1	64 53.5	98 18	164.8	65 23.0	98 19	164.6	65 52.4	98 19	164.4
8	64 13.2	98 20	163.0	64 42.6	98 21	162.8	65 11.8	98 21	162.5	65 41.1	98 21	162.2
9	64 01.1	97 22	161.0	64 30.2	97 23	160.7	64 59.3	97 23	160.4	65 28.4	97 23	160.1
10	63 47.6	97 25	158.9	64 16.5	96 25	158.7	64 45.5	96 25	158.3	65 14.4	96 26	158.0
1	63 32.8	96 27	157.0	64 01.6	96 27	156.6	64 30.3	96 27	156.3	64 59.0	96 28	156.0
2	63 16.8	95 29	155.0	63 45.3	95 29	154.7	64 13.8	95 29	154.3	64 42.3	95 30	153.9
3	62 59.5	95 31	153.1	63 27.9	94 31	152.7	63 56.2	94 31	152.4	64 24.4	94 32	152.0
4	62 41.2	94 32	151.2	63 09.3	94 33	150.8	63 37.3	93 33	150.4	64 05.3	93 34	150.0
15	62 21.6	93 34	149.4	62 49.5	93 35	149.0	63 17.3	93 35	148.5	63 45.1	92 36	148.1
6	62 01.0	92 36	147.5	62 28.7	92 36	147.1	62 56.3	92 37	146.7	63 23.7	91 37	146.3
7	61 39.4	91 38	145.8	62 06.8	91 38	145.3	62 34.1	91 39	144.9	63 01.4	91 39	144.4
8	61 16.8	91 39	144.0	61 43.9	90 40	143.6	62 11.0	90 40	143.1	62 38.0	90 41	142.6
9	60 53.2	90 41	142.3	61 20.1	90 41	141.9	61 46.9	89 42	141.4	62 13.6	89 42	140.9
20	60 28.7	89 42	140.6	60 55.3	89 43	140.2	61 21.9	88 43	139.7	61 48.3	88 44	139.2
1	60 03.3	88 44	139.0	60 29.7	88 44	138.5	60 56.0	88 45	138.0	61 22.2	87 45	137.5
2	59 37.0	87 45	137.4	60 03.2	87 45	136.9	60 29.3	87 46	136.4	60 55.2	86 46	135.9
3	59 10.0	87 46	135.9	59 35.9	86 47	135.4	60 01.7	86 47	134.9	60 27.4	85 48	134.3
4	58 42.2	86 48	134.3	59 07.9	85 48	133.8	59 33.5	85 48	133.3	59 58.9	85 49	132.8
25	58 13.7	85 49	132.8	58 39.2	85 49	132.3	59 04.5	84 49	131.8	59 29.7	84 50	131.3
6	57 44.5	84 50	131.4	58 09.7	84 50	130.9	58 34.8	83 51	130.3	58 59.8	83 51	129.8
7	57 14.6	83 51	130.0	57 39.6	83 51	129.4	58 04.5	83 52	128.9	58 29.2	82 52	128.4
8	56 44.2	83 52	128.6	57 08.9	82 52	128.0	57 33.6	82 53	127.5	57 58.1	81 53	127.0
9	56 13.1	82 53	127.2	56 37.6	82 53	126.7	57 02.1	81 53	126.1	57 26.3	81 54	125.6
30	55 41.5	81 54	125.9	56 05.8	81 54	125.3	56 30.0	80 54	124.8	56 54.1	80 55	124.3
1	55 09.3	81 54	124.6	55 33.4	80 55	124.0	55 57.4	80 55	123.5	56 21.3	79 55	123.0
2	54 36.6	80 55	123.3	55 00.6	80 56	122.8	55 24.4	79 56	122.2	55 48.0	79 56	121.7
3	54 03.5	79 56	122.0	54 27.2	79 56	121.5	54 50.8	78 57	121.0	55 14.3	78 57	120.4
4	53 29.9	79 57	120.8	53 53.5	78 57	120.3	54 16.9	78 57	119.8	54 40.1	77 58	119.2
35	52 55.9	78 57	119.6	53 19.3	78 58	119.1	53 42.5	77 58	118.6	54 05.6	77 58	118.0
6	52 21.5	78 58	118.4	52 44.7	77 58	117.9	53 07.7	77 59	117.4	53 30.7	76 59	116.9
7	51 46.7	77 59	117.3	52 09.7	77 59	116.8	52 32.6	76 59	116.3	52 55.4	76 59	115.7
8	51 11.5	76 59	116.2	51 34.4	76 59	115.7	51 57.1	76 60	115.1	52 19.7	75 60	114.6
9	50 36.0	76 60	115.1	50 58.8	75 60	114.6	51 21.3	75 60	114.0	51 43.8	75 60	113.5
40	50 00.2	75 60	114.0	50 22.8	75 60	113.5	50 45.2	75 61	113.0	51 07.5	74 61	112.4
1	49 24.1	75 61	112.9	49 46.6	75 61	112.4	50 08.9	74 61	111.9	50 31.0	74 61	111.4
2	48 47.7	75 61	111.9	49 10.0	74 61	111.4	49 32.2	74 62	110.9	49 54.2	73 62	110.3
3	48 11.1	74 62	110.9	48 33.3	74 62	110.4	48 55.3	73 62	109.8	49 17.2	73 62	109.3
4	47 34.2	74 62	109.9	47 56.2	73 62	109.3	48 18.2	73 62	108.8	48 39.9	72 62	108.3
45	46 57.0	73 62	108.9	47 19.0	73 62	108.4	47 40.8	72 63	107.9	48 02.5	72 63	107.3
6	46 19.7	73 63	107.9	46 41.5	73 63	107.4	47 03.2	72 63	106.9	47 24.8	72 63	106.4
7	45 42.1	73 63	106.9	46 03.9	72 63	106.4	46 25.5	72 63	105.9	46 46.9	71 63	105.4
8	45 04.4	72 63	106.0	45 26.0	72 63	105.5	45 47.5	71 64	105.0	46 08.9	71 64	104.5
9	44 26.4	72 63	105.1	44 48.0	72 64	104.6	45 09.4	71 64	104.1	45 30.7	71 64	103.6
50	43 48.3	72 64	104.1	44 09.8	71 64	103.7	44 31.2	71 64	103.2	44 52.4	71 64	102.7
1	43 10.1	72 64	103.2	43 31.5	71 64	102.8	43 52.8	71 64	102.3	44 13.9	70 64	101.8
2	42 31.7	71 64	102.4	42 53.0	71 64	101.9	43 14.2	70 64	101.4	43 35.3	70 65	100.9
3	41 53.2	71 64	101.5	42 14.5	71 64	101.0	42 35.6	70 65	100.5	42 56.6	70 65	100.0
4	41 14.6	71 65	100.6	41 35.8	70 65	100.1	41 56.8	70 65	99.7	42 17.8	70 65	99.2
55	40 35.8	71 65	99.8	40 57.0	70 65	99.3	41 18.0	70 65	98.8	41 38.9	69 65	98.3
6	39 57.0	70 65	98.9	40 18.1	70 65	98.4	40 39.0	70 65	98.0	40 59.9	69 65	97.5
7	39 18.0	70 65	98.1	39 39.1	70 65	97.6	40 00.0	70 65	97.1	40 20.8	69 65	96.7
8	38 39.0	70 65	97.2	39 00.0	70 65	96.8	39 20.9	69 65	96.3	39 41.7	69 65	95.9
9	38 00.0	70 65	96.4	38 20.9	70 65	96.0	38 41.8	69 65	95.5	39 02.5	69 65	95.1
60	37 20.8	70 65	95.6	37 41.7	70 65	95.2	38 02.6	69 65	94.7	38 23.3	69 65	94.3
1	36 41.6	70 65	94.8	37 02.5	70 65	94.4	37 23.3	69 65	93.9	37 44.0	69 66	93.5
2	36 02.4	70 65	94.0	36 23.2	69 66	93.6	36 44.0	69 66	93.1	37 04.7	69 66	92.7
3	35 23.1	70 66	93.2	35 43.9	69 66	92.8	36 04.7	69 66	92.4	36 25.4	69 66	91.9
4	34 43.8	70 66	92.5	35 04.6	69 66	92.0	35 25.4	69 66	91.6	35 46.0	69 66	91.1
65	34 04.4	70 66	91.7	34 25.3	69 66	91.3	34 46.0	69 66	90.8	35 06.7	69 66	90.4
6	33 25.1	70 66	90.9	33 45.9	69 66	90.5	34 06.7	69 66	90.1	34 27.3	69 66	89.6
7	32 45.7	70 66	90.2	33 06.5	69 66	89.7	33 27.3	69 66	89.3	33 47.9	69 66	88.9
8	32 06.4	70 66	89.4	32 27.2	69 66	89.0	32 47.9	69 66	88.6	33 08.6	69 66	88.1
9	31 27.0	70 66	88.7	31 47.8	69 66	88.3	32 08.6	69 66	87.8	32 29.3	69 66	87.4
70	30 47.6	70 66	87.9	31 08.5	69 66	87.5	31 29.3	69 66	87.1	31 50.0	69 65	86.7
1	30 08.3	70 66	87.2	30 29.2	69 65	86.8	30 50.0	69 65	86.4	31 10.7	69 65	85.9
2	29 29.0	70 65	86.5	29 49.9	69 65	86.0	30 10.7	69 65	85.6	30 31.4	69 65	85.2
3	28 49.7	70 65	85.7	29 10.6	70 65	85.3	29 31.5	69 65	84.9	29 52.2	69 65	84.5
4	28 10.5	70 65	85.0	28 31.4	70 65	84.6	28 52.3	69 65	84.2	29 13.1	69 65	83.8
75	27 31.3	70 65	84.3	27 52.3	70 65	83.9	28 13.2	69 65	83.5	28 34.0	69 65	83.1
6	26 52.2	70 65	83.6	27 13.2	70 65	83.2	27 34.1	70 65	82.8	27 54.9	69 65	82.3
7	26 13.1	70 65	82.8	26 34.1	70 65	82.4	26 55.1	70 65	82.0	27 15.9	69 65	81.6
8	25 34.1	70 65	82.1	25 55.1	70 65	81.7	26 16.1	70 65	81.3	26 37.0	70 65	80.9
9	24 55.1	70 65	81.4	25 16.2	70 65	81.0	25 37.2	70 65	80.6	25 58.2	70 65	80.2
80	24 16.2	71 65	80.7	24 37.4	70 65	80.3	24 58.4	70 65	79.9	25 19.4	70 64	79.5
1	23 37.4	71 65	80.0	23 58.6	71 64	79.6	24 19.7	70 64	79.2	24 40.8	70 64	78.8
2	22 58.7	71 64	79.3	23 19.9	71 64	78.9	23 41.1	70 64	78.5	24 02.2	70 64	78.1
3	22 20.1	71 64	78.6	22 41.3	71 64	78.2	23 02.6	71 64	77.8	23 23.7	70 64	77.5
4	21 41.5	71 64	77.9	22 02.9	71 64	77.5	22 24.1	71 64	77.1	22 45.4	71 64	76.8
85	21 03.1	71 64	77.2	21 24.5	71 64	76.8	21 45.8	71 64	76.4	22 07.1	71 64	76.1
6	20 24.7	72 64	76.5	20 46.2	71 64	76.1	21 07.6	71 64	75.8	21 29.0	71 63	75.4
7	19 46.5	72 64	75.8	20 08.0	72 63	75.4	20 29.5	71 63	75.1	20 50.9	71 63	74.7
8	19 08.4	72 63	75.1	19 30.0	72 63	74.7	19 51.5	72 63	74.4	20 13.0	72 63	74.0
9	18 30.4	72 63	74.4	18 52.1	72 63	74.0	19 13.7	72 63	73.7	19 35.2	72 63	73.3
90	17 52.6	72 63	73.7	18 14.3	72 63	73.4	18 36.0	72 63	73.0	18 57.6	72 62	72.6

26° 00′			26° 30′			27° 00′			27° 30′			H.A.
Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
67 00.0	1.0 01	180.0	67 30.0	1.0 01	180.0	68 00.0	1.0 01	180.0	68 30.0	1.0 01	180.0	00
66 59.2	1.0 04	177.7	67 29.2	1.0 04	177.7	67 59.2	1.0 04	177.6	68 29.2	1.0 04	177.6	1
66 56.8	1.0 07	175.4	67 26.8	1.0 07	175.3	67 56.7	1.0 07	175.2	68 26.7	1.0 07	175.2	2
66 52.9	1.0 09	173.1	67 22.8	1.0 09	173.0	67 52.7	1.0 09	172.9	68 22.5	1.0 10	172.8	3
66 47.4	99 12	170.8	67 17.2	99 12	170.7	67 47.0	99 12	170.5	68 16.8	99 12	170.4	4
66 40.4	99 14	168.6	67 10.1	99 14	168.4	67 39.7	99 15	168.2	68 09.4	99 15	168.0	05
66 31.9	99 17	166.4	67 01.4	98 17	166.1	67 30.9	98 17	165.9	68 00.4	98 18	165.7	6
66 21.8	98 19	164.1	66 51.2	98 19	163.9	67 20.6	98 20	163.6	67 49.9	98 20	163.4	7
66 10.4	97 21	162.0	66 39.6	97 22	161.7	67 08.7	97 22	161.4	67 37.9	97 22	161.1	8
65 57.5	97 24	159.8	66 26.5	97 24	159.5	66 55.5	97 24	159.2	67 24.4	96 25	158.8	9
65 43.2	96 26	157.7	66 12.0	96 26	157.4	66 40.8	96 27	157.0	67 09.5	96 27	156.6	10
65 27.6	95 28	155.6	65 56.2	95 29	155.2	66 24.7	95 29	154.9	66 53.2	95 29	154.5	1
65 10.7	95 30	153.6	65 39.0	94 31	153.2	66 07.3	94 31	152.8	66 35.5	94 32	152.3	2
64 52.6	94 32	151.6	65 20.7	94 33	151.1	65 48.7	93 33	150.7	66 16.6	93 34	150.3	3
64 33.2	93 34	149.6	65 01.1	93 35	149.2	65 28.8	92 35	148.7	65 56.5	92 35	148.2	4
64 12.7	92 36	147.7	64 40.3	92 36	147.2	65 07.8	91 37	146.7	65 35.2	91 37	146.3	15
63 51.1	91 38	145.8	64 18.5	91 38	145.3	64 45.7	91 39	144.8	65 12.8	90 39	144.3	6
63 28.5	90 39	144.0	63 55.5	90 40	143.5	64 22.5	90 40	143.0	64 49.3	89 41	142.4	7
63 04.8	89 41	142.2	63 31.6	89 42	141.7	63 58.3	89 42	141.1	64 24.8	88 42	140.6	8
62 40.2	89 43	140.4	63 06.7	88 43	139.9	63 33.1	88 43	139.4	63 59.4	87 44	138.8	9
62 14.7	88 44	138.7	62 40.9	87 44	138.2	63 07.0	87 45	137.6	63 33.0	86 45	137.1	20
61 48.3	87 45	137.0	62 14.2	86 46	136.5	62 40.1	86 46	135.9	63 05.8	85 47	135.4	1
61 21.0	86 47	135.4	61 46.7	85 47	134.9	62 12.3	85 48	134.3	62 37.7	85 48	133.7	2
60 53.0	85 48	133.8	61 18.4	85 48	133.3	61 43.7	84 49	132.7	62 08.9	84 49	132.1	3
60 24.2	84 49	132.3	60 49.4	84 50	131.7	61 14.4	83 50	131.1	61 39.3	83 50	130.5	4
59 54.7	83 50	130.7	60 19.7	83 51	130.2	60 44.4	82 51	129.6	61 09.1	82 52	129.0	25
59 24.6	82 51	129.3	59 49.3	82 52	128.7	60 13.8	82 52	128.1	60 38.2	81 53	127.5	6
58 53.8	82 52	127.8	59 18.2	81 53	127.3	59 42.5	81 53	126.7	60 06.6	80 54	126.1	7
58 22.4	81 53	126.4	58 46.6	80 54	125.9	59 10.7	80 54	125.3	59 34.6	79 54	124.7	8
57 50.4	80 54	125.1	58 14.4	80 54	124.5	58 38.3	79 55	123.9	59 01.9	79 55	123.3	9
57 18.0	79 55	123.7	57 41.7	79 55	123.1	58 05.3	78 56	122.6	58 28.8	78 56	122.0	30
56 45.0	79 56	122.4	57 08.5	78 56	121.8	57 31.9	78 56	121.3	57 55.1	77 57	120.7	1
56 11.5	78 56	121.1	56 34.9	78 57	120.6	56 58.0	77 57	120.0	57 21.1	76 58	119.4	2
55 37.6	77 57	119.9	56 00.7	77 58	119.3	56 23.7	76 58	118.7	56 46.6	76 58	118.2	3
55 03.3	77 58	118.7	55 26.2	76 58	118.1	55 49.0	76 58	117.5	56 11.7	75 59	116.9	4
54 28.5	76 58	117.5	54 51.3	76 59	116.9	55 13.9	75 59	116.3	55 36.4	75 59	115.8	35
53 53.4	76 59	116.3	54 16.0	75 59	115.7	54 38.5	75 60	115.2	55 00.8	74 60	114.6	6
53 18.0	75 60	115.2	53 40.4	75 60	114.6	54 02.7	74 60	114.0	54 24.8	73 60	113.5	7
52 42.2	75 60	114.0	53 04.5	74 60	113.5	53 26.6	73 61	112.9	53 48.5	73 61	112.4	8
52 06.1	74 61	113.0	52 28.2	74 61	112.4	52 50.2	73 61	111.8	53 12.0	72 61	111.3	9
51 29.7	74 61	111.9	51 51.7	73 61	111.3	52 13.5	73 62	110.8	52 35.2	72 62	110.2	40
50 53.0	73 62	110.8	51 14.9	73 62	110.3	51 36.6	72 62	109.7	51 58.1	72 62	109.2	1
50 16.1	73 62	109.8	50 37.8	72 62	109.3	50 59.4	72 62	108.7	51 20.8	71 63	108.1	2
49 39.0	72 62	108.8	50 00.6	72 62	108.2	50 22.0	71 63	107.7	50 43.3	71 63	107.1	3
49 01.6	72 63	107.8	49 23.1	71 63	107.3	49 44.4	71 63	106.7	50 05.6	70 63	106.2	4
48 24.0	72 63	106.8	48 45.4	71 63	106.3	49 06.6	71 63	105.7	49 27.7	70 63	105.2	45
47 46.2	71 63	105.9	48 07.5	71 63	105.3	48 28.7	70 64	104.8	48 49.6	70 64	104.3	6
47 08.3	71 64	104.9	47 29.5	70 64	104.4	47 50.5	70 64	103.9	48 11.4	69 64	103.3	7
46 30.1	71 64	104.0	46 51.3	70 64	103.5	47 12.2	70 64	102.9	47 33.0	69 64	102.4	8
45 51.9	70 64	103.1	46 12.9	70 64	102.6	46 33.8	69 64	102.0	46 54.5	69 64	101.5	9
45 13.5	70 64	102.2	45 34.4	70 64	101.7	45 55.2	69 64	101.1	46 15.9	69 65	100.6	50
44 34.9	70 64	101.3	44 55.8	69 65	100.8	45 16.5	69 65	100.3	45 37.2	68 65	99.7	1
43 56.3	70 65	100.4	44 17.1	69 65	99.9	44 37.8	69 65	99.4	44 58.3	68 65	98.9	2
43 17.5	69 65	99.5	43 38.2	69 65	99.0	43 58.9	69 65	98.5	44 19.4	68 65	98.0	3
42 38.6	69 65	98.7	42 59.3	69 65	98.2	43 19.9	68 65	97.7	43 40.4	68 65	97.2	4
41 59.7	69 65	97.8	42 20.3	69 65	97.4	42 40.9	68 65	96.9	43 01.3	68 65	96.4	55
41 20.6	69 65	97.0	41 41.3	69 65	96.5	42 01.8	68 65	96.0	42 22.1	68 65	95.5	6
40 41.5	69 65	96.2	41 02.1	68 65	95.7	41 22.6	68 65	95.2	41 42.9	68 65	94.7	7
40 02.4	69 65	95.4	40 22.9	68 65	94.9	40 43.4	68 65	94.4	41 03.7	67 66	93.9	8
39 23.2	69 65	94.6	39 43.7	68 65	94.1	40 04.1	68 66	93.6	40 24.4	67 66	93.2	9
38 43.9	69 66	93.8	39 04.4	68 66	93.3	39 24.8	68 66	92.8	39 45.1	67 66	92.4	60
38 04.6	68 66	93.0	38 25.1	68 66	92.5	38 45.5	68 66	92.1	39 05.7	67 66	91.6	1
37 25.3	68 66	92.2	37 45.8	68 66	91.8	38 06.1	68 66	91.3	38 26.4	67 66	90.8	2
36 45.9	68 66	91.5	37 06.4	68 66	91.0	37 26.8	68 66	90.5	37 47.0	67 66	90.1	3
36 06.6	68 66	90.7	36 27.0	68 66	90.2	36 47.4	68 66	89.8	37 07.6	67 66	89.3	4
35 27.2	68 66	89.9	35 47.7	68 66	89.5	36 08.0	68 66	89.0	36 28.3	67 66	88.6	65
34 47.9	68 66	89.2	35 08.3	68 66	88.7	35 28.7	68 66	88.3	35 48.9	67 66	87.8	6
34 08.5	68 66	88.4	34 29.0	68 66	88.0	34 49.3	68 66	87.6	35 09.6	67 66	87.1	7
33 29.2	68 66	87.7	33 49.6	68 66	87.3	34 10.0	68 66	86.8	34 30.3	67 65	86.4	8
32 49.8	68 66	87.0	33 10.3	68 65	86.5	33 30.7	68 65	86.1	33 51.0	68 65	85.6	9
32 10.5	69 65	86.2	32 31.1	68 65	85.8	32 51.5	68 65	85.4	33 11.8	68 65	84.9	70
31 31.3	69 65	85.5	31 51.8	68 65	85.1	32 12.3	68 65	84.6	32 32.6	68 65	84.2	1
30 52.1	69 65	84.8	31 12.6	68 65	84.4	31 33.1	68 65	83.9	31 53.5	68 65	83.5	2
30 12.9	69 65	84.1	30 33.5	68 65	83.6	30 54.0	68 65	83.2	31 14.4	68 65	82.8	3
29 33.8	69 65	83.4	29 54.4	69 65	82.9	30 14.9	68 65	82.5	30 35.4	68 65	82.1	4
28 54.7	69 65	82.6	29 15.4	69 65	82.2	29 35.9	68 65	81.8	29 56.4	68 65	81.4	75
28 15.7	69 65	81.9	28 36.4	69 65	81.5	28 57.0	69 65	81.1	29 17.5	68 65	80.7	6
27 36.7	69 65	81.2	27 57.5	69 65	80.8	28 18.2	69 65	80.4	28 38.7	69 65	80.0	7
26 57.9	69 65	80.5	27 18.7	69 65	80.1	27 39.4	69 64	79.7	28 00.0	69 64	79.3	8
26 19.1	70 64	79.8	26 39.9	69 64	79.4	27 00.7	69 64	79.0	27 21.4	69 64	78.6	9
25 40.4	70 64	79.1	26 01.3	70 64	78.7	26 22.1	69 64	78.3	26 42.8	69 64	77.9	80
25 01.8	70 64	78.4	25 22.7	70 64	78.0	25 43.6	69 64	77.7	26 04.4	69 64	77.3	1
24 23.3	70 64	77.8	24 44.3	70 64	77.4	25 05.2	70 64	77.0	25 26.1	69 64	76.6	2
23 44.8	70 64	77.1	24 05.9	70 64	76.7	24 26.9	70 64	76.3	24 47.8	70 64	75.9	3
23 06.5	70 64	76.4	23 27.6	70 64	76.0	23 48.7	70 63	75.6	24 09.7	70 63	75.2	4
22 28.3	71 63	75.7	22 49.5	71 63	75.3	23 10.6	70 63	74.9	23 31.7	70 63	74.5	85
21 50.3	71 63	75.0	22 11.5	71 63	74.6	22 32.7	71 63	74.2	22 53.8	70 63	73.8	6
21 12.3	71 63	74.3	21 33.6	71 63	73.9	21 54.9	71 63	73.6	22 16.1	71 63	73.2	7
20 34.5	71 63	73.6	20 55.8	71 63	73.3	21 17.2	71 63	72.9	21 38.5	71 62	72.5	8
19 56.8	72 63	72.9	20 18.2	71 62	72.6	20 39.6	71 62	72.2	21 01.0	71 62	71.8	9
19 19.2	72 62	72.3	19 40.7	72 62	71.9	20 02.2	72 62	71.5	20 23.7	71 62	71.1	90

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DECLINATION CONTRARY NAME TO LATITUDE

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	17 00.0	1.0 01	180.0	16 30.0	1.0 01	180.0	16 00.0	1.0 01	180.0	15 30.0	1.0 01	180.0	15 00.0	1.0 01	180.0	14 30.0	1.0 01	180.0	14 00.0	1.0 01	180.0	13 30.0	1.0 01	180.0	00
1	16 59.7	1.0 02	179.0	16 29.7	1.0 02	179.1	15 59.7	1.0 02	179.1	15 29.7	1.0 02	179.1	14 59.7	1.0 02	179.1	14 29.7	1.0 02	179.1	13 59.7	1.0 02	179.1	13 29.7	1.0 02	179.1	1
2	16 58.7	1.0 03	178.1	16 28.7	1.0 03	178.1	15 58.7	1.0 03	178.1	15 28.7	1.0 03	178.1	14 58.7	1.0 03	178.1	14 28.7	1.0 03	178.2	13 58.7	1.0 03	178.2	13 28.7	1.0 03	178.2	2
3	16 57.0	1.0 04	177.1	16 27.1	1.0 04	177.2	15 57.1	1.0 04	177.2	15 27.1	1.0 04	177.2	14 57.1	1.0 04	177.2	14 27.1	1.0 04	177.2	13 57.2	1.0 04	177.2	13 27.2	1.0 04	177.3	3
4	16 54.8	1.0 05	176.2	16 24.8	1.0 05	176.2	15 54.8	1.0 05	176.2	15 24.9	1.0 05	176.3	14 54.9	1.0 05	176.3	14 24.9	1.0 05	176.3	13 55.0	1.0 05	176.3	13 25.0	1.0 05	176.4	4
05	16 51.8	1.0 06	175.2	16 21.9	1.0 06	175.3	15 51.9	1.0 06	175.3	15 22.0	1.0 06	175.3	14 52.0	1.0 06	175.4	14 22.1	1.0 06	175.4	13 52.1	1.0 06	175.4	13 22.2	1.0 06	175.4	05
6	16 48.2	1.0 07	174.3	16 18.3	1.0 07	174.3	15 48.4	1.0 07	174.3	15 18.4	1.0 07	174.4	14 48.5	1.0 07	174.4	14 18.6	1.0 07	174.5	13 48.7	1.0 07	174.5	13 18.7	1.0 07	174.5	6
7	16 44.0	1.0 08	173.3	16 14.1	1.0 08	173.4	15 44.2	1.0 08	173.4	15 14.3	1.0 08	173.5	14 44.4	1.0 08	173.5	14 14.5	1.0 08	173.5	13 44.6	1.0 08	173.6	13 14.7	1.0 08	173.6	7
8	16 39.1	1.0 09	172.4	16 09.2	1.0 09	172.4	15 39.3	1.0 09	172.5	15 09.5	1.0 09	172.5	14 39.6	1.0 09	172.6	14 09.7	1.0 09	172.6	13 39.9	1.0 09	172.7	13 10.0	1.0 09	172.7	8
9	16 33.5	99 10	171.4	16 03.7	99 10	171.5	15 33.8	99 10	171.5	15 04.0	99 10	171.6	14 34.2	99 10	171.6	14 04.4	99 10	171.7	13 34.5	99 10	171.8	13 04.7	99 10	171.8	9
10	16 27.3	99 11	170.5	15 57.5	99 11	170.5	15 27.7	99 11	170.6	14 57.9	99 11	170.7	14 28.2	99 11	170.7	13 58.4	99 11	170.8	13 28.6	99 11	170.8	12 58.8	99 11	170.9	10
1	16 20.5	99 12	169.5	15 50.7	99 12	169.6	15 21.0	99 12	169.7	14 51.2	99 12	169.7	14 21.5	99 12	169.8	13 51.8	99 12	169.9	13 22.0	99 12	169.9	12 52.2	99 12	170.0	1
2	16 13.0	99 14	168.6	15 43.3	99 13	168.7	15 13.6	99 13	168.7	14 43.9	99 13	168.8	14 14.2	99 13	168.9	13 44.5	99 13	169.0	13 14.8	99 13	169.0	12 45.1	99 13	169.1	2
3	16 04.9	99 15	167.7	15 35.3	99 14	167.7	15 05.6	99 14	167.8	14 36.0	99 14	167.9	14 06.3	99 14	168.0	13 36.7	99 14	168.0	13 07.0	99 14	168.1	12 37.4	99 14	168.2	3
4	15 56.2	99 16	166.7	15 26.6	99 16	166.8	14 57.0	99 15	166.9	14 27.4	99 15	167.0	13 57.8	99 15	167.1	13 28.2	99 15	167.1	12 58.6	99 15	167.2	12 29.0	99 15	167.3	4
15	15 46.8	98 17	165.8	15 17.3	98 17	165.9	14 47.8	98 16	166.0	14 18.2	98 16	166.0	13 48.7	98 16	166.1	13 19.1	98 16	166.2	12 49.6	98 16	166.3	12 20.1	98 16	166.4	15
6	15 36.8	98 18	164.8	15 07.4	98 18	164.9	14 37.9	98 17	165.0	14 08.4	98 17	165.1	13 39.0	98 17	165.2	13 09.5	98 17	165.3	12 40.0	98 17	165.4	12 10.5	98 17	165.5	6
7	15 26.2	98 19	163.9	14 56.8	98 19	164.0	14 27.4	98 18	164.1	13 58.0	98 18	164.2	13 28.6	98 18	164.3	12 59.2	98 18	164.4	12 29.8	98 18	164.5	12 00.4	98 18	164.6	7
8	15 15.0	98 20	163.0	14 45.7	98 20	163.1	14 16.4	98 19	163.2	13 47.0	98 19	163.3	13 17.7	98 19	163.4	12 48.3	98 19	163.5	12 19.0	98 19	163.6	11 49.6	98 19	163.7	8
9	15 03.2	98 21	162.1	14 33.9	98 21	162.2	14 04.7	98 20	162.3	13 35.4	98 20	162.4	13 06.1	98 20	162.5	12 36.9	98 20	162.6	12 07.6	98 20	162.7	11 38.3	98 20	162.9	9
20	14 50.8	97 22	161.1	14 21.6	97 22	161.3	13 52.4	97 21	161.4	13 23.2	97 21	161.5	12 54.0	97 21	161.6	12 24.8	97 21	161.7	11 55.6	97 21	161.9	11 26.4	97 21	162.0	20
1	14 37.8	97 23	160.2	14 08.7	97 23	160.3	13 39.5	97 22	160.5	13 10.4	97 22	160.6	12 41.3	97 22	160.7	12 12.2	97 22	160.8	11 43.1	97 22	161.0	11 14.0	97 22	161.1	1
2	14 24.1	97 24	159.3	13 55.1	97 24	159.4	13 26.1	97 23	159.6	12 57.1	97 23	159.7	12 28.0	97 23	159.8	11 59.0	97 23	160.0	11 30.0	97 23	160.1	11 00.9	97 23	160.2	2
3	14 09.9	96 25	158.4	13 41.0	96 24	158.5	13 12.1	96 24	158.7	12 43.1	96 24	158.8	12 14.2	97 24	158.9	11 45.2	97 24	159.1	11 16.3	97 24	159.2	10 47.3	97 24	159.3	3
4	13 55.2	96 26	157.5	13 26.3	96 25	157.6	12 57.5	96 25	157.8	12 28.6	96 25	157.9	11 59.7	96 25	158.1	11 30.9	96 25	158.2	11 02.0	96 25	158.3	10 33.1	96 25	158.5	4
25	13 39.8	96 27	156.6	13 11.1	96 26	156.7	12 42.3	96 26	156.9	12 13.5	96 26	157.0	11 44.8	96 26	157.2	11 16.0	96 26	157.3	10 47.2	96 26	157.5	10 18.4	96 25	157.6	25
6	13 23.9	96 27	155.7	12 55.2	96 27	155.8	12 26.6	96 27	156.0	11 57.9	96 27	156.1	11 29.2	96 27	156.3	11 00.5	96 27	156.4	10 31.8	96 26	156.6	10 03.1	96 26	156.7	6
7	13 07.4	95 28	154.8	12 38.8	95 28	155.0	12 10.3	95 28	155.1	11 41.7	95 28	155.3	11 13.1	95 28	155.4	10 44.5	95 28	155.6	10 15.9	95 27	155.7	9 47.3	95 27	155.9	7
8	12 50.4	95 29	153.9	12 21.9	95 29	154.1	11 53.4	95 29	154.2	11 24.9	95 29	154.4	10 56.5	95 29	154.5	10 28.0	95 28	154.7	9 59.5	95 28	154.9	9 31.0	95 28	155.0	8
9	12 32.8	95 30	153.0	12 04.4	95 30	153.2	11 36.0	95 30	153.3	11 07.7	95 30	153.5	10 39.3	95 30	153.7	10 10.9	95 29	153.8	9 42.5	95 29	154.0	9 14.1	95 29	154.2	9
30	12 14.6	94 31	152.1	11 46.4	94 31	152.3	11 18.1	94 31	152.5	10 49.8	94 31	152.6	10 21.6	94 30	152.8	9 53.3	94 30	153.0	9 25.0	94 30	153.2	8 56.7	94 30	153.3	30
1	11 56.0	94 32	151.3	11 27.8	94 32	151.4	10 59.7	94 32	151.6	10 31.5	94 31	151.8	10 03.3	94 31	152.0	9 35.1	94 31	152.1	9 06.9	94 31	152.3	8 38.8	94 31	152.5	1
2	11 36.8	93 33	150.4	11 08.7	94 33	150.6	10 40.7	94 32	150.7	10 12.6	94 32	150.9	9 44.5	94 32	151.1	9 16.5	94 32	151.3	8 48.4	94 32	151.5	8 20.3	94 32	151.6	2
3	11 17.1	93 34	149.5	10 49.1	93 34	149.7	10 21.2	93 33	149.9	9 53.2	93 33	150.1	9 25.3	93 33	150.3	8 57.3	93 33	150.4	8 29.3	93 33	150.6	8 01.4	93 32	150.8	3
4	10 56.8	93 35	148.6	10 29.0	93 34	148.8	10 01.2	93 34	149.0	9 33.3	93 34	149.2	9 05.5	93 34	149.4	8 37.6	93 34	149.6	8 09.8	93 33	149.8	7 41.9	93 33	150.0	4
35	10 36.1	92 35	147.8	10 08.4	92 35	148.0	9 40.7	92 35	148.2	9 12.9	92 35	148.4	8 45.2	92 35	148.6	8 17.5	92 34	148.8	7 49.7	93 34	148.9	7 22.0	93 34	149.1	35
6	10 14.9	92 36	146.9	9 47.3	92 36	147.1	9 19.7	92 36	147.3	8 52.0	92 36	147.5	8 24.4	92 35	147.7	7 56.8	92 35	147.9	7 29.2	92 35	148.1	7 01.5	92 35	148.3	6
7	9 53.2	92 37	146.1	9 25.7	92 37	146.3	8 58.2	92 37	146.5	8 30.7	92 36	146.7	8 03.2	92 36	146.9	7 35.6	92 36	147.1	7 08.1	92 36	147.3	6 40.6	92 36	147.5	7
8	9 30.9	91 38	145.2	9 03.6	91 38	145.4	8 36.2	91 37	145.6	8 08.8	91 37	145.9	7 41.4	91 37	146.1	7 14.0	91 37	146.3	6 46.6	91 37	146.5	6 19.2	91 36	146.7	8
9	9 08.3	91 39	144.4	8 41.0	91 38	144.6	8 13.7	91 38	144.8	7 46.5	91 38	145.0	7 19.2	91 38	145.2	6 51.9	91 38	145.4	6 24.6	91 37	145.6	5 57.3	91 37	145.9	9
40	8 45.1	90 39	143.5	8 18.0	90 39	143.8	7 50.8	90 39	144.0	7 23.7	91 39	144.2	6 56.5	91 39	144.4	6 29.4	91 38	144.6	6 02.2	91 38	144.8	5 35.0	91 38	145.0	40
1	8 21.5	90 40	142.7	7 54.5	90 40	142.9	7 27.4	90 40	143.2	7 00.4	90 40	143.4	6 33.4	90 39	143.6	6 06.3	90 39	143.8	5 39.3	90 39	144.0	5 12.2	90 39	144.2	1
2	7 57.4	90 41	141.9	7 30.5	90 41	142.1	7 03.6	90 40	142.3	6 36.7	90 40	142.6	6 09.8	90 40	142.8	5 42.9	90 40	143.0	5 15.9	90 40	143.2				2
3	7 32.9	89 42	141.1	7 06.1	89 41	141.3	6 39.3	89 41	141.5	6 12.6	89 41	141.7	5 45.8	89 41	142.0	5 19.0	89 40	142.2							3
4	7 07.9	89 42	140.2	6 41.3	89 42	140.5	6 14.6	89 42	140.7	5 48.0	89 42	140.9	5 21.3	89 42	141.2										4
45	6 42.5	88 43	139.4	6 16.0	88 43	139.7	5 49.5	88 43	139.9	5 22.9	88 42	140.1													45
6	6 16.7	88 44	138.6	5 50.3	88 44	138.9	5 23.9	88 43	139.1																6
7	5 50.5	88 44	137.8	5 24.2	88 44	138.1																			7
8	5 23.9	87 45	137.0																						8

DECLINATION SAME NAME AS LATITUDE

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	17 14.9	73 63	73.0	17 36.7	73 62	72.7	17 58.4	72 62	72.3	18 20.1	72 62	71.9	18 41.8	72 62	71.6	19 03.4	72 62	71.2	19 25.0	72 62	70.8	19 46.5	72 62	70.5	91
2	16 37.3	73 62	72.3	16 59.2	73 62	72.0	17 21.0	73 62	71.6	17 42.8	73 62	71.2	18 04.5	72 62	70.9	18 26.2	72 62	70.5	18 47.9	72 62	70.2	19 09.5	72 61	69.8	2
3	15 59.9	73 62	71.6	16 21.8	73 62	71.3	16 43.7	73 62	70.9	17 05.6	73 62	70.6	17 27.4	73 62	70.2	17 49.2	73 61	69.8	18 10.9	72 61	69.5	18 32.6	72 61	69.1	3
4	15 22.6	73 62	70.9	15 44.6	73 62	70.6	16 06.6	73 62	70.2	16 28.5	73 61	69.9	16 50.4	73 61	69.5	17 12.3	73 61	69.2	17 34.1	73 61	68.8	17 55.9	73 61	68.4	4
95	14 45.5	74 62	70.2	15 07.6	74 61	69.9	15 29.6	73 61	69.5	15 51.6	73 61	69.2	16 13.6	73 61	68.8	16 35.6	73 61	68.5	16 57.5	73 61	68.1	17 19.4	73 61	67.8	95
6	14 08.5	74 61	69.5	14 30.7	74 61	69.2	14 52.8	74 61	68.8	15 14.9	74 61	68.5	15 37.0	74 61	68.1	15 59.1	73 61	67.8	16 21.1	73 60	67.4	16 43.1	73 60	67.1	6
7	13 31.7	74 61	68.8	13 54.0	74 61	68.5	14 16.2	74 61	68.2	14 38.4	74 61	67.8	15 00.6	74 60	67.5	15 22.7	74 60	67.1	15 44.8	74 60	66.8	16 06.9	74 60	66.4	7
8	12 55.1	75 61	68.1	13 17.4	74 61	67.8	13 39.8	74 60	67.5	14 02.0	74 60	67.1	14 24.3	74 60	66.8	14 46.5	74 60	66.4	15 08.8	74 60	66.1	15 30.9	74 60	65.7	8
9	12 18.6	75 60	67.4	12 41.1	75 60	67.1	13 03.5	75 60	66.8	13 25.9	75 60	66.4	13 48.2	74 60	66.1	14 10.6	74 60	65.7	14 32.9	74 60	65.4	14 55.1	74 59	65.0	9
100	11 42.4	75 60	66.7	12 04.9	75 60	66.4	12 27.4	75 60	66.1	12 49.9	75 60	65.7	13 12.3	75 60	65.4	13 34.8	75 59	65.1	13 57.2	75 59	64.7	14 19.5	75 59	64.4	100
1	11 06.3	75 60	66.0	11 28.9	75 60	65.7	11 51.5	75 59	65.4	12 14.1	75 59	65.0	12 36.7	75 59	64.7	12 59.2	75 59	64.4	13 21.7	75 59	64.0	13 44.2	75 59	63.7	1
2	10 30.4	76 59	65.3	10 53.1	76 59	65.0	11 15.8	76 59	64.7	11 38.5	76 59	64.3	12 01.2	75 59	64.0	12 23.8	75 59	63.7	12 46.4	75 58	63.3	13 09.0	75 58	63.0	2
3	9 54.8	76 59	64.6	10 17.6	76 59	64.3	10 40.4	76 59	64.0	11 03.1	76 59	63.6	11 25.9	76 58	63.3	11 48.6	76 58	63.0	12 11.3	76 58	62.6	12 34.0	76 58	62.3	3
4	9 19.3	76 59	63.9	9 42.2	76 59	63.6	10 05.1	76 58	63.3	10 28.0	76 58	62.9	10 50.8	76 58	62.6	11 13.7	76 58	62.3	11 36.5	76 58	62.0	11 59.3	76 58	61.6	4
105	8 44.0	77 58	63.2	9 07.1	77 58	62.9	9 30.1	77 58	62.6	9 53.0	77 58	62.2	10 16.0	76 58	61.9	10 38.9	76 58	61.6	11 01.9	76 57	61.3	11 24.8	76 57	60.9	105
6	8 09.0	77 58	62.5	8 32.1	77 58	62.2	8 55.2	77 58	61.9	9 18.3	77 57	61.5	9 41.4	77 57	61.2	10 04.4	77 57	60.9	10 27.5	77 57	60.6	10 50.5	77 57	60.2	6
7	7 34.2	77 58	61.8	7 57.4	77 57	61.5	8 20.6	77 57	61.2	8 43.8	77 57	60.8	9 07.0	77 57	60.5	9 30.1	77 57	60.2	9 53.3	77 57	59.9	10 16.4	77 56	59.6	7
8	6 59.6	78 57	61.1	7 23.0	78 57	60.8	7 46.3	78 57	60.5	8 09.6	78 57	60.1	8 32.8	78 57	59.8	8 56.1	78 56	59.5	9 19.4	77 56	59.2	9 42.6	77 56	58.9	8
9	6 25.3	78 57	60.4	6 48.7	78 57	60.1	7 12.1	78 56	59.7	7 35.5	78 56	59.4	7 58.9	78 56	59.1	8 22.3	78 56	58.8	8 45.7	78 56	58.5	9 09.0	78 56	58.2	9
110	5 51.2	78 56	59.6	6 14.7	78 56	59.3	6 38.3	78 56	59.0	7 01.8	78 56	58.7	7 25.3	78 56	58.4	7 48.8	78 55	58.1	8 12.3	78 55	57.8	8 35.7	78 55	57.5	110
1	5 17.4	79 56	58.9	5 41.0	79 56	58.6	6 04.6	79 56	58.3	6 28.3	79 55	58.0	6 51.9	79 55	57.7	7 15.5	79 55	57.4	7 39.1	79 55	57.1	8 02.7	79 55	56.8	1
2				5 07.5	79 56	57.9	5 31.3	79 55	57.6	5 55.0	79 55	57.3	6 18.8	79 55	57.0	6 42.5	79 55	56.7	7 06.2	79 54	56.4	7 29.9	79 54	56.0	2
3										5 22.0	80 55	56.6	5 45.9	79 54	56.3	6 09.7	79 54	56.0	6 33.5	79 54	55.6	6 57.4	79 54	55.3	3
4													5 13.3	80 54	55.5	5 37.2	80 54	55.2	6 01.2	80 53	54.9	6 25.1	80 53	54.6	4
115																5 05.0	80 53	54.5	5 29.1	80 53	54.2	5 53.2	80 53	53.9	115
6																						5 21.5	81 52	53.2	6

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Lat. 49°

H.A.	28° 00′			28° 30′			29° 00′			30° 00′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	69 00.0	1.0 01	180.0	69 30.0	1.0 01	180.0	70 00.0	1.0 01	180.0	71 00.0	1.0 02	180.0
1	68 59.2	1.0 04	177.5	69 29.1	1.0 04	177.5	69 59.1	1.0 04	177.4	70 59.1	1.0 05	177.3
2	68 56.6	1.0 07	175.1	69 26.6	1.0 07	175.0	69 56.5	1.0 07	174.9	70 56.4	1.0 08	174.7
3	68 52.4	1.0 10	172.6	69 22.3	1.0 10	172.5	69 52.1	1.0 10	172.4	70 51.8	99 11	172.1
4	68 46.5	99 13	170.2	69 16.3	99 13	170.0	69 46.0	99 13	169.8	70 45.5	99 13	169.4
05	68 39.0	99 15	167.8	69 08.6	99 15	167.6	69 38.2	99 16	167.3	70 37.4	99 16	166.8
6	68 29.9	98 18	165.4	68 59.4	98 18	165.2	69 28.8	98 18	164.9	70 27.6	98 19	164.3
7	68 19.2	98 20	163.1	68 48.5	98 21	162.8	69 17.7	97 21	162.5	70 16.1	97 22	161.8
8	68 07.0	97 23	160.8	68 36.0	97 23	160.4	69 05.1	97 24	160.1	70 03.0	96 24	159.3
9	67 53.3	96 25	158.5	68 22.1	96 26	158.1	68 50.9	96 26	157.7	69 48.3	95 27	156.9
10	67 38.1	96 28	156.2	68 06.7	95 28	155.8	68 35.2	95 28	155.4	69 32.1	95 29	154.5
1	67 21.6	95 30	154.0	67 49.9	94 30	153.6	68 18.2	94 31	153.2	69 14.5	94 32	152.2
2	67 03.7	94 32	151.9	67 31.7	93 32	151.4	67 59.7	93 33	151.0	68 55.4	93 34	150.0
3	66 44.5	93 34	149.8	67 12.3	92 34	149.3	67 40.0	92 35	148.8	68 35.1	91 36	147.8
4	66 24.1	92 36	147.8	66 51.6	91 36	147.2	67 19.0	91 37	146.7	68 13.4	90 38	145.6
15	66 02.5	91 38	145.8	66 29.7	90 38	145.2	66 56.8	90 39	144.7	67 50.6	89 40	143.5
6	65 39.8	90 40	143.8	66 06.7	89 40	143.3	66 33.5	89 41	142.7	67 26.7	88 42	141.5
7	65 16.0	89 41	141.9	65 42.6	88 42	141.3	66 09.1	88 42	140.8	67 01.7	87 43	139.6
8	64 51.3	88 43	140.1	65 17.6	87 43	139.5	65 43.7	87 44	138.9	66 35.6	86 45	137.6
9	64 25.5	87 44	138.2	64 51.5	86 45	137.7	65 17.4	86 45	137.1	66 08.6	85 46	135.8
20	63 58.8	86 46	136.5	64 24.6	85 46	135.9	64 50.1	85 47	135.3	65 40.8	84 48	134.0
1	63 31.3	85 47	134.8	63 56.7	84 48	134.2	64 22.0	84 48	133.6	65 12.0	83 49	132.3
2	63 03.0	84 48	133.1	63 28.1	84 49	132.5	63 53.1	83 49	131.9	64 42.5	82 50	130.6
3	62 33.9	83 50	131.5	62 58.7	83 50	130.9	63 23.4	82 51	130.3	64 12.3	81 52	129.0
4	62 04.1	82 51	129.9	62 28.6	82 51	129.3	62 53.0	81 52	128.7	63 41.3	80 53	127.4
25	61 33.5	81 52	128.4	61 57.8	81 52	127.8	62 22.0	80 53	127.2	63 09.7	79 54	125.8
6	61 02.4	80 53	126.9	61 26.4	80 53	126.3	61 50.3	79 54	125.7	62 37.5	78 55	124.3
7	60 30.6	80 54	125.5	60 54.4	79 54	124.9	61 18.0	78 55	124.2	62 04.7	77 56	122.9
8	59 58.3	79 55	124.1	60 21.8	78 55	123.5	60 45.2	78 56	122.8	61 31.4	76 56	121.5
9	59 25.4	78 56	122.7	59 48.7	77 56	122.1	60 11.9	77 56	121.4	60 57.6	76 57	120.1
30	58 52.0	77 56	121.4	59 15.1	77 57	120.7	59 38.1	76 57	120.1	60 23.3	75 58	118.8
1	58 18.2	77 57	120.1	58 41.1	76 57	119.4	59 03.8	75 58	118.8	59 48.6	74 59	117.5
2	57 43.9	76 58	118.8	58 06.6	75 58	118.2	58 29.1	75 58	117.5	59 13.5	73 59	116.2
3	57 09.2	75 58	117.6	57 31.7	75 59	116.9	57 54.0	74 59	116.3	58 38.0	73 60	115.0
4	56 34.1	75 59	116.3	56 56.4	74 59	115.7	57 18.5	73 60	115.1	58 02.2	72 60	113.8
35	55 58.7	74 60	115.2	56 20.8	73 60	114.6	56 42.7	73 60	113.9	57 26.0	72 61	112.7
6	55 22.9	73 60	114.0	55 44.8	73 60	113.4	56 06.6	72 61	112.8	56 49.5	71 61	111.5
7	54 46.8	73 61	112.9	55 08.5	72 61	112.3	55 30.1	72 61	111.7	56 12.8	70 62	110.4
8	54 10.3	72 61	111.8	54 32.0	72 61	111.2	54 53.4	71 62	110.6	55 35.8	70 62	109.3
9	53 33.7	72 62	110.7	53 55.1	71 62	110.1	54 16.4	71 62	109.5	54 58.5	69 62	108.3
40	52 56.7	71 62	109.6	53 18.0	71 62	109.0	53 39.2	70 62	108.5	54 21.0	69 63	107.2
1	52 19.5	71 62	108.6	52 40.7	70 63	108.0	53 01.8	70 63	107.4	53 43.3	69 63	106.2
2	51 42.1	71 63	107.6	52 03.2	70 63	107.0	52 24.1	69 63	106.4	53 05.4	68 63	105.2
3	51 04.5	70 63	106.6	51 25.4	70 63	106.0	51 46.3	69 63	105.4	52 27.3	68 64	104.2
4	50 26.6	70 63	105.6	50 47.5	69 64	105.0	51 08.2	69 64	104.5	51 49.1	68 64	103.3
45	49 48.6	70 64	104.6	50 09.4	69 64	104.1	50 30.0	68 64	103.5	51 10.7	67 64	102.4
6	49 10.5	69 64	103.7	49 31.2	69 64	103.2	49 51.7	68 64	102.6	50 32.2	67 64	101.4
7	48 32.2	69 64	102.8	48 52.8	68 64	102.2	49 13.2	68 64	101.7	49 53.6	67 65	100.5
8	47 53.7	69 64	101.9	48 14.2	68 64	101.3	48 34.6	68 65	100.8	49 14.8	67 65	99.6
9	47 15.1	68 64	101.0	47 35.6	68 65	100.4	47 55.9	67 65	99.9	48 36.0	66 65	98.8
50	46 36.4	68 65	100.1	46 56.8	68 65	99.6	47 17.0	67 65	99.0	47 57.0	66 65	97.9
1	45 57.6	68 65	99.2	46 17.9	67 65	98.7	46 38.1	67 65	98.1	47 18.0	66 65	97.1
2	45 18.7	68 65	98.4	45 39.0	67 65	97.8	45 59.1	67 65	97.3	46 38.9	66 65	96.2
3	44 39.7	68 65	97.5	44 59.9	67 65	97.0	45 20.0	67 65	96.5	45 59.7	66 65	95.4
4	44 00.7	67 65	96.7	44 20.8	67 65	96.2	44 40.9	67 65	95.6	45 20.5	66 65	94.6
55	43 21.5	67 65	95.9	43 41.7	67 65	95.3	44 01.7	66 65	94.8	44 41.3	65 66	93.8
6	42 42.4	67 65	95.0	43 02.5	67 65	94.5	43 22.4	66 65	94.0	44 02.0	65 66	93.0
7	42 03.1	67 65	94.2	42 23.2	67 66	93.7	42 43.2	66 66	93.2	43 22.6	65 66	92.2
8	41 23.8	67 66	93.4	41 43.9	67 66	93.0	42 03.8	66 66	92.4	42 43.3	65 66	91.4
9	40 44.5	67 66	92.7	41 04.6	67 66	92.2	41 24.5	66 66	91.7	42 03.9	65 66	90.7
60	40 05.2	67 66	91.9	40 25.2	67 66	91.4	40 45.1	66 66	90.9	41 24.6	65 66	89.9
1	39 25.9	67 66	91.1	39 45.9	67 66	90.6	40 05.8	66 66	90.1	40 45.2	65 66	89.2
2	38 46.5	67 66	90.4	39 06.5	67 66	89.9	39 26.4	66 66	89.4	40 05.9	65 66	88.4
3	38 07.1	67 66	89.6	38 27.2	67 66	89.1	38 47.1	66 66	88.6	39 26.5	65 66	87.7
4	37 27.8	67 66	88.9	37 47.8	67 66	88.4	38 07.7	66 66	87.9	38 47.2	65 66	86.9
65	36 48.4	67 66	88.1	37 08.5	67 66	87.6	37 28.4	66 66	87.2	38 07.9	65 65	86.2
6	36 09.1	67 66	87.4	36 29.1	67 66	86.9	36 49.1	66 65	86.4	37 28.6	66 65	85.5
7	35 29.8	67 65	86.6	35 49.9	67 65	86.2	36 09.8	66 65	85.7	36 49.4	66 65	84.8
8	34 50.5	67 65	85.9	35 10.6	67 65	85.5	35 30.6	66 65	85.0	36 10.2	66 65	84.1
9	34 11.3	67 65	85.2	34 31.4	67 65	84.8	34 51.4	67 65	84.3	35 31.1	66 65	83.4
70	33 32.1	67 65	84.5	33 52.2	67 65	84.0	34 12.2	67 65	83.6	34 52.0	66 65	82.7
1	32 52.9	67 65	83.8	33 13.1	67 65	83.3	33 33.2	67 65	82.9	34 13.0	66 65	82.0
2	32 13.8	68 65	83.1	32 34.0	67 65	82.6	32 54.1	67 65	82.2	33 34.1	66 65	81.3
3	31 34.7	68 65	82.4	31 55.0	67 65	81.9	32 15.2	67 65	81.5	32 55.2	66 65	80.6
4	30 55.8	68 65	81.7	31 16.1	67 65	81.2	31 36.3	67 65	80.8	32 16.4	67 65	79.9
75	30 16.9	68 65	81.0	30 37.2	68 65	80.5	30 57.4	67 65	80.1	31 37.7	67 64	79.2
6	29 38.0	68 65	80.3	29 58.4	68 64	79.9	30 18.7	68 64	79.4	30 59.1	67 64	78.6
7	28 59.3	68 64	79.6	29 19.7	68 64	79.2	29 40.1	68 64	78.7	30 20.5	67 64	77.9
8	28 20.6	68 64	78.9	28 41.1	68 64	78.5	29 01.5	68 64	78.1	29 42.1	67 64	77.2
9	27 42.0	69 64	78.2	28 02.6	68 64	77.8	28 23.0	68 64	77.4	29 03.8	68 64	76.5
80	27 03.5	69 64	77.5	27 24.1	69 64	77.1	27 44.7	68 64	76.7	28 25.5	68 64	75.9
1	26 25.1	69 64	76.8	26 45.8	69 64	76.4	27 06.4	69 64	76.0	27 47.4	68 63	75.2
2	25 46.9	69 64	76.2	26 07.6	69 64	75.8	26 28.3	69 63	75.4	27 09.4	68 63	74.5
3	25 08.7	69 63	75.5	25 29.5	69 63	75.1	25 50.2	69 63	74.7	26 31.5	69 63	73.9
4	24 30.6	70 63	74.8	24 51.5	69 63	74.4	25 12.3	69 63	74.0	25 53.8	69 63	73.2
85	23 52.7	70 63	74.1	24 13.7	70 63	73.7	24 34.6	70 63	73.4	25 16.2	69 62	72.6
6	23 14.9	70 63	73.5	23 35.9	70 63	73.1	23 56.9	70 63	72.7	24 38.7	69 62	71.9
7	22 37.2	70 63	72.8	22 58.4	70 62	72.4	23 19.4	70 62	72.0	24 01.3	70 62	71.2
8	21 59.7	71 62	72.1	22 20.9	71 62	71.7	22 42.0	70 62	71.3	23 24.1	70 62	70.6
9	21 22.3	71 62	71.4	21 43.6	71 62	71.1	22 04.8	71 62	70.7	22 47.1	70 61	69.9
90	20 45.1	71 62	70.8	21 06.4	71 62	70.4	21 27.7	71 62	70.0	22 10.2	71 61	69.3

32° 00′			34° 00′			34° 30′			35° 30′			H.A.
Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
73 00.0	1.0 02	180.0	75 00.0	1.0 02	180.0	75 30.0	1.0 02	180.0	76 30.0	1.0 02	180.0	00
72 59.0	1.0 05	177.1	74 58.9	1.0 05	176.8	75 28.9	1.0 06	176.7	76 28.8	1.0 06	176.5	1
72 56.0	1.0 08	174.2	74 55.6	1.0 09	173.6	75 25.5	1.0 09	173.4	76 25.2	1.0 10	173.1	2
72 51.1	99 11	171.3	74 50.2	99 13	170.5	75 19.9	99 13	170.2	76 19.3	99 14	169.6	3
72 44.2	99 15	168.5	74 42.6	98 16	167.3	75 12.1	98 17	167.0	76 11.1	98 17	166.2	4
72 35.4	98 18	165.7	74 32.9	98 19	164.3	75 02.2	98 20	163.8	76 00.6	97 21	162.9	05
72 24.8	97 21	162.9	74 21.2	97 23	161.3	74 50.2	97 23	160.8	75 48.0	96 24	159.7	6
72 12.3	97 24	160.2	74 07.6	96 26	158.3	74 36.3	95 26	157.8	75 33.3	95 28	156.6	7
71 58.2	96 26	157.6	73 52.2	94 29	155.5	74 20.5	94 29	154.9	75 16.7	93 31	153.5	8
71 42.3	95 29	155.0	73 35.0	93 31	152.7	74 02.9	93 32	152.0	74 58.2	92 34	150.6	9
71 24.9	93 32	152.5	73 16.1	92 34	150.0	73 43.6	91 35	149.3	74 38.1	90 36	147.8	10
71 06.0	92 34	150.0	72 55.6	90 37	147.4	73 22.7	90 37	146.7	74 16.3	89 39	145.0	1
70 45.6	91 36	147.7	72 33.7	89 39	144.9	73 00.3	88 40	144.1	73 53.0	87 41	142.4	2
70 23.9	90 38	145.3	72 10.4	88 41	142.5	72 36.6	87 42	141.7	73 28.3	85 43	139.9	3
70 00.9	89 40	143.1	71 45.8	86 43	140.1	72 11.5	85 44	139.3	73 02.4	84 45	137.5	4
69 36.6	87 42	140.9	71 20.0	85 45	137.9	71 45.3	84 46	137.1	72 35.2	82 47	135.2	15
69 11.3	86 44	138.9	70 53.0	83 47	135.8	71 17.9	83 47	134.9	72 07.0	81 49	133.1	6
68 44.9	85 46	136.8	70 25.1	82 48	133.7	70 49.5	81 49	132.8	71 37.7	79 50	131.0	7
68 17.5	84 47	134.9	69 56.1	81 50	131.7	70 20.2	80 50	130.8	71 07.5	78 52	129.0	8
67 49.1	82 49	133.0	69 26.3	79 51	129.8	69 50.0	78 52	128.9	70 36.5	77 53	127.0	9
67 19.9	81 50	131.2	68 55.6	78 52	127.9	69 18.9	77 53	127.1	70 04.7	75 54	125.2	20
66 49.9	80 51	129.4	68 24.2	77 54	126.2	68 47.2	76 54	125.3	69 32.2	74 55	123.4	1
66 19.1	79 52	127.7	67 52.1	76 55	124.5	68 14.7	75 55	123.6	68 59.0	73 56	121.7	2
65 47.6	78 54	126.1	67 19.3	75 56	122.8	67 41.6	74 56	122.0	68 25.3	72 57	120.1	3
65 15.5	77 55	124.5	66 46.0	74 57	121.3	67 07.9	73 57	120.4	67 50.9	71 58	118.6	4
64 42.8	76 56	123.0	66 12.1	73 57	119.7	66 33.7	72 58	118.9	67 16.1	70 59	117.1	25
64 09.5	75 56	121.5	65 37.6	72 58	118.3	65 59.0	71 59	117.4	66 40.9	69 60	115.6	6
63 35.6	74 57	120.0	65 02.7	71 59	116.9	65 23.8	70 59	116.0	66 05.2	68 60	114.2	7
63 01.3	73 58	118.6	64 27.4	70 60	115.5	64 48.3	69 60	114.7	65 29.1	67 61	112.9	8
62 26.5	73 59	117.3	63 51.7	69 60	114.2	64 12.3	68 60	113.3	64 52.7	66 61	111.6	9
61 51.4	72 59	116.0	63 15.6	68 61	112.9	63 36.0	68 61	112.1	64 15.9	66 62	110.4	30
61 15.8	71 60	114.7	62 39.2	68 61	111.6	62 59.4	67 62	110.8	63 38.9	65 62	109.2	1
60 39.9	70 60	113.5	62 02.4	67 62	110.4	62 22.4	66 62	109.6	63 01.6	64 63	108.0	2
60 03.6	70 61	112.3	61 25.4	66 62	109.3	61 45.2	66 62	108.5	62 24.0	64 63	106.9	3
59 27.0	69 61	111.1	60 48.1	66 63	108.1	61 07.8	65 63	107.4	61 46.2	63 63	105.8	4
58 50.1	69 62	110.0	60 10.6	65 63	107.0	60 30.1	65 63	106.3	61 08.2	63 64	104.7	35
58 13.0	68 62	108.8	59 32.9	65 63	106.0	59 52.2	64 63	105.2	60 30.1	62 64	103.6	6
57 35.6	68 63	107.8	58 54.9	64 64	104.9	59 14.1	64 64	104.2	59 51.7	62 64	102.6	7
56 58.0	67 63	106.7	58 16.8	64 64	103.9	58 35.9	63 64	103.1	59 13.2	61 64	101.6	8
56 20.2	67 63	105.7	57 38.5	64 64	102.9	57 57.5	63 64	102.2	58 34.6	61 65	100.7	9
55 42.2	66 64	104.7	57 00.0	63 64	101.9	57 18.9	62 64	101.2	57 55.9	61 65	99.7	40
55 04.1	66 64	103.7	56 21.5	63 64	101.0	56 40.2	62 65	100.3	57 17.0	60 65	98.8	1
54 25.8	66 64	102.7	55 42.8	63 65	100.0	56 01.4	62 65	99.3	56 38.1	60 65	97.9	2
53 47.3	65 64	101.8	55 03.9	62 65	99.1	55 22.6	62 65	98.4	55 59.1	60 65	97.0	3
53 08.7	65 65	100.8	54 25.0	62 65	98.2	54 43.6	61 65	97.5	55 20.0	60 65	96.2	4
52 30.0	65 65	99.9	53 46.0	62 65	97.3	54 04.5	61 65	96.7	54 40.8	60 65	95.3	45
51 51.1	65 65	99.0	53 07.0	62 65	96.5	53 25.4	61 65	95.8	54 01.6	60 65	94.5	6
51 12.2	64 65	98.2	52 27.8	62 65	95.6	52 46.2	61 65	95.0	53 22.3	59 66	93.7	7
50 33.2	64 65	97.3	51 48.6	61 65	94.8	52 07.0	61 65	94.2	52 43.0	59 66	92.9	8
49 54.1	64 65	96.4	51 09.4	61 65	94.0	51 27.7	61 66	93.4	52 03.7	59 66	92.1	9
49 15.0	64 65	95.6	50 30.1	61 66	93.2	50 48.4	61 66	92.6	51 24.3	59 66	91.3	50
48 35.8	64 65	94.8	49 50.8	61 66	92.4	50 09.0	61 66	91.8	50 45.0	59 66	90.5	1
47 56.5	64 65	94.0	49 11.4	61 66	91.6	49 29.7	61 66	91.0	50 05.6	59 66	89.8	2
47 17.2	64 66	93.2	48 32.1	61 66	90.8	48 50.3	61 66	90.2	49 26.2	59 66	89.0	3
46 37.9	63 66	92.4	47 52.7	61 66	90.1	48 11.0	61 66	89.5	48 46.9	59 66	88.3	4
45 58.6	63 66	91.6	47 13.3	61 66	89.3	47 31.6	61 66	88.7	48 07.6	59 66	87.5	55
45 19.2	63 66	90.8	46 34.0	61 66	88.6	46 52.2	61 66	88.0	47 28.2	59 65	86.8	6
44 39.9	63 66	90.1	45 54.6	61 66	87.9	46 12.9	61 66	87.3	46 49.0	59 65	86.1	7
44 00.5	63 66	89.3	45 15.3	61 66	87.1	45 33.6	61 65	86.6	46 09.7	60 65	85.4	8
43 21.2	63 66	88.6	44 36.0	61 65	86.4	44 54.3	61 65	85.9	45 30.5	60 65	84.7	9
42 41.8	63 66	87.8	43 56.7	61 65	85.7	44 15.1	61 65	85.1	44 51.3	60 65	84.0	60
42 02.5	63 66	87.1	43 17.5	62 65	85.0	43 35.9	61 65	84.4	44 12.2	60 65	83.3	1
41 23.2	64 65	86.4	42 38.3	62 65	84.3	42 56.7	61 65	83.8	43 33.1	60 65	82.7	2
40 43.9	64 65	85.7	41 59.2	62 65	83.6	42 17.6	61 65	83.1	42 54.1	60 65	82.0	3
40 04.7	64 65	85.0	41 20.1	62 65	82.9	41 38.6	61 65	82.4	42 15.2	60 65	81.3	4
39 25.5	64 65	84.3	40 41.1	62 65	82.2	40 59.6	62 65	81.7	41 36.3	61 65	80.7	65
38 46.4	64 65	83.6	40 02.1	62 65	81.6	40 20.7	62 65	81.0	40 57.5	61 65	80.0	6
38 07.3	64 65	82.9	39 23.2	62 65	80.9	39 41.8	62 65	80.4	40 18.7	61 64	79.4	7
37 28.2	64 65	82.2	38 44.4	63 65	80.2	39 03.1	62 64	79.7	39 40.1	61 64	78.7	8
36 49.3	64 65	81.5	38 05.6	63 64	79.6	38 24.4	62 64	79.1	39 01.5	62 64	78.1	9
36 10.4	65 65	80.8	37 26.9	63 64	78.9	37 45.8	63 64	78.4	38 23.1	62 64	77.4	70
35 31.6	65 65	80.1	36 48.3	63 64	78.2	37 07.3	63 64	77.8	37 44.7	62 64	76.8	1
34 52.8	65 64	79.5	36 09.9	63 64	77.6	36 28.8	63 64	77.1	37 06.4	62 64	76.1	2
34 14.2	65 64	78.8	35 31.5	64 64	76.9	35 50.5	63 64	76.5	36 28.3	63 63	75.5	3
33 35.6	65 64	78.1	34 53.2	64 64	76.3	35 12.3	64 64	75.8	35 50.2	63 63	74.9	4
32 57.1	66 64	77.5	34 15.0	64 63	75.6	34 34.2	64 63	75.2	35 12.3	63 63	74.2	75
32 18.7	66 64	76.8	33 36.9	64 63	75.0	33 56.2	64 63	74.5	34 34.5	63 63	73.6	6
31 40.5	66 64	76.2	32 58.9	65 63	74.4	33 18.3	64 63	73.9	33 56.8	64 63	73.0	7
31 02.3	66 63	75.5	32 21.1	65 63	73.7	32 40.5	65 63	73.3	33 19.2	64 62	72.4	8
30 24.2	67 63	74.8	31 43.4	65 63	73.1	32 02.9	65 62	72.6	32 41.7	64 62	71.7	9
29 46.3	67 63	74.2	31 05.8	66 62	72.4	31 25.4	65 62	72.0	32 04.4	65 62	71.1	80
29 08.5	67 63	73.5	30 28.3	66 62	71.8	30 48.0	66 62	71.4	31 27.2	65 62	70.5	1
28 30.8	67 63	72.9	29 51.0	66 62	71.2	30 10.8	66 62	70.7	30 50.2	65 61	69.9	2
27 53.3	68 62	72.2	29 13.8	67 62	70.5	29 33.7	66 62	70.1	30 13.3	66 61	69.3	3
27 15.8	68 62	71.6	28 36.7	67 61	69.9	28 56.8	67 61	69.5	29 36.6	66 61	68.6	4
26 38.6	68 62	70.9	27 59.8	67 61	69.3	28 20.0	67 61	68.9	29 00.0	66 61	68.0	85
26 01.4	69 62	70.3	27 23.1	68 61	68.7	27 43.3	67 61	68.2	28 23.6	67 60	67.4	6
25 24.4	69 61	69.6	26 46.5	68 61	68.0	27 06.9	68 61	67.6	27 47.3	67 60	66.8	7
24 47.6	69 61	69.0	26 10.1	68 60	67.4	26 30.6	68 60	67.0	27 11.2	68 60	66.2	8
24 11.0	69 61	68.4	25 33.8	69 60	66.8	25 54.4	68 60	66.4	26 35.3	68 60	65.5	9
23 34.4	70 61	67.7	24 57.8	69 60	66.1	25 18.4	69 60	65.7	25 59.6	68 59	64.9	90

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Lat 49°

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
00	13 00.0	1.0 01	180.0	12 30.0	1.0 01	180.0	12 00.0	1.0 00	180.0	11 00.0	1.0 00	180.0	9 00.0	1.0 00	180.0	7 00.0	1.0 00	180.0	6 30.0	1.0 00	180.0	5 30.0	1.0 00	180.0	00
1	12 59.7	1.0 02	179.1	12 29.7	1.0 02	179.1	11 59.7	1.0 02	179.1	10 59.7	1.0 02	179.1	8 59.7	1.0 01	179.1	6 59.7	1.0 01	179.2	6 29.7	1.0 01	179.2	5 29.7	1.0 01	179.2	1
2	12 58.8	1.0 03	178.2	12 28.8	1.0 03	178.2	11 58.8	1.0 03	178.2	10 58.8	1.0 03	178.2	8 58.8	1.0 02	178.3	6 58.9	1.0 02	178.3	6 28.9	1.0 02	178.3	5 28.9	1.0 02	178.4	2
3	12 57.2	1.0 04	177.3	12 27.2	1.0 04	177.3	11 57.2	1.0 04	177.3	10 57.3	1.0 04	177.4	8 57.3	1.0 03	177.4	6 57.4	1.0 03	177.5	6 27.4	1.0 03	177.5	5 27.5	1.0 03	177.5	3
4	12 55.0	1.0 05	176.4	12 25.1	1.0 05	176.4	11 55.1	1.0 05	176.4	10 55.2	1.0 05	176.5	8 55.3	1.0 04	176.6	6 55.4	1.0 04	176.7	6 25.4	1.0 04	176.7	5 25.5	1.0 04	176.7	4
05	12 52.2	1.0 06	175.5	12 22.3	1.0 06	175.5	11 52.3	1.0 06	175.5	10 52.4	1.0 06	175.6	8 52.6	1.0 05	175.7	6 52.8	1.0 05	175.8	6 22.9	1.0 05	175.9	5 23.0	1.0 05	175.9	05
6	12 48.8	1.0 07	174.6	12 18.9	1.0 07	174.6	11 49.0	1.0 07	174.6	10 49.1	1.0 07	174.7	8 49.4	1.0 06	174.9	6 49.7	1.0 06	175.0	6 19.8	1.0 06	175.0	5 19.9	1.0 06	175.1	6
7	12 44.8	1.0 08	173.7	12 14.9	1.0 08	173.7	11 45.0	1.0 08	173.8	10 45.2	1.0 08	173.8	8 45.6	1.0 07	174.0	6 46.0	1.0 07	174.2	6 16.1	1.0 07	174.2	5 16.3	1.0 07	174.3	7
8	12 40.1	1.0 09	172.8	12 10.3	1.0 09	172.8	11 40.4	1.0 09	172.9	10 40.6	1.0 09	173.0	8 41.2	1.0 08	173.1	6 41.7	1.0 08	173.3	6 11.8	1.0 08	173.4	5 12.1	1.0 08	173.5	8
9	12 34.9	99 10	171.9	12 05.0	99 10	171.9	11 35.2	99 10	172.0	10 35.5	99 10	172.1	8 36.2	99 09	172.3	6 36.8	99 09	172.5	6 07.0	99 09	172.6	5 07.3	99 09	172.7	9
10	12 29.0	99 11	171.0	11 59.2	99 11	171.0	11 29.4	99 11	171.1	10 29.8	99 11	171.2	8 30.6	99 10	171.4	6 31.4	99 10	171.7	6 01.6	99 10	171.7	5 02.0	99 10	171.8	10
1	12 22.5	99 12	170.1	11 52.7	99 12	170.1	11 23.0	99 12	170.2	10 23.5	99 12	170.3	8 24.4	99 11	170.6	6 25.4	99 11	170.8	5 55.6	99 11	170.9				1
2	12 15.4	99 13	169.2	11 45.7	99 13	169.2	11 16.0	99 13	169.3	10 16.6	99 12	169.5	8 17.7	99 12	169.7	6 18.9	99 12	170.0	5 49.1	99 12	170.1				2
3	12 07.7	99 14	168.3	11 38.1	99 14	168.4	11 08.4	99 14	168.4	10 09.1	99 13	168.6	8 10.4	99 13	168.9	6 11.8	99 13	169.2	5 42.1	99 13	169.3				3
4	11 59.4	99 15	167.4	11 29.8	99 15	167.5	11 00.2	99 15	167.6	10 01.0	99 14	167.7	8 02.6	99 14	168.0	6 04.1	99 14	168.4	5 34.5	99 14	168.4				4
15	11 50.5	98 16	166.5	11 21.0	98 16	166.6	10 51.4	98 16	166.7	9 52.3	99 15	166.8	7 54.1	99 15	167.2	5 55.9	99 15	167.5	5 26.3	99 14	167.6				15
6	11 41.0	98 17	165.6	11 11.5	98 17	165.7	10 42.1	98 17	165.8	9 43.1	98 16	166.0	7 45.1	98 16	166.4	5 47.1	98 16	166.7	5 17.6	98 15	166.8				6
7	11 31.0	98 18	164.7	11 01.5	98 18	164.8	10 32.1	98 18	164.9	9 33.3	98 17	165.1	7 35.5	98 17	165.5	5 37.8	98 16	165.9	5 08.4	98 16	166.0				7
8	11 20.3	98 19	163.8	10 50.9	98 19	163.9	10 21.6	98 18	164.1	9 22.9	98 18	164.3	7 25.4	98 18	164.7	5 27.9	98 17	165.1							8
9	11 09.0	98 20	163.0	10 39.8	98 20	163.1	10 10.5	98 19	163.2	9 11.9	98 19	163.4	7 14.7	98 19	163.8	5 17.5	98 18	164.3							9
20	10 57.2	97 21	162.1	10 28.0	97 21	162.2	9 58.8	97 20	162.3	9 00.4	97 20	162.5	7 03.5	97 20	163.0	5 06.6	97 19	163.5							20
1	10 44.8	97 22	161.2	10 15.7	97 21	161.3	9 46.6	97 21	161.5	8 48.3	97 21	161.7	6 51.7	97 21	162.2										1
2	10 31.9	97 23	160.3	10 02.8	97 22	160.5	9 33.8	97 22	160.6	8 35.7	97 22	160.8	6 39.4	97 21	161.3										2
3	10 18.3	97 23	159.5	9 49.4	97 23	159.6	9 20.4	97 23	159.7	8 22.5	97 23	160.0	6 26.5	97 22	160.5										3
4	10 04.3	96 24	158.6	9 35.4	96 24	158.7	9 06.5	96 24	158.9	8 08.7	96 24	159.2	6 13.2	96 23	159.7										4
25	9 49.6	96 25	157.7	9 20.8	96 25	157.9	8 52.1	96 25	158.0	7 54.5	96 25	158.3	5 59.2	96 24	158.9										25
6	9 34.5	96 26	156.9	9 05.8	96 26	157.0	8 37.1	96 26	157.2	7 39.6	96 26	157.5	5 44.8	96 25	158.1										6
7	9 18.7	95 27	156.0	8 50.1	96 27	156.2	8 21.5	95 27	156.3	7 24.3	95 26	156.6	5 29.8	95 26	157.2										7
8	9 02.5	95 28	155.2	8 34.0	95 28	155.3	8 05.5	95 28	155.5	7 08.4	95 27	155.8	5 14.3	95 27	156.4										8
9	8 45.7	95 29	154.3	8 17.3	95 29	154.5	7 48.9	95 29	154.7	6 52.0	95 28	155.0													9
30	8 28.4	94 30	153.5	8 00.1	94 30	153.7	7 31.8	94 29	153.8	6 35.1	94 29	154.2													30
1	8 10.6	94 31	152.7	7 42.4	94 30	152.8	7 14.2	94 30	153.0	6 17.7	94 30	153.3													1
2	7 52.2	94 31	151.8	7 24.1	94 31	152.0	6 56.0	94 31	152.2	5 59.8	94 31	152.5													2
3	7 33.4	93 32	151.0	7 05.4	93 32	151.2	6 37.4	93 32	151.3	5 41.4	93 32	151.7													3
4	7 14.0	93 33	150.2	6 46.2	93 33	150.3	6 18.3	93 33	150.5	5 22.5	93 32	150.9													4
35	6 54.2	93 34	149.3	6 26.4	93 34	149.5	5 58.7	93 34	149.7	5 03.1	93 33	150.1													35
6	6 33.9	92 35	148.5	6 06.2	92 34	148.7	5 38.6	92 34	148.9																6
7	6 13.1	92 35	147.7	5 45.5	92 35	147.9	5 18.0	92 35	148.1																7
8	5 51.8	91 36	146.9	5 24.4	91 36	147.1																			8
9	5 30.0	91 37	146.1	5 02.7	91 37	146.3																			9
40	5 07.8	91 38	145.3																						40

DECLINATION SAME NAME AS LATITUDE

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	′	Δd Δt	°	°
91	20 08.0	72 62	70.1	20 29.4	71 61	69.7	20 50.8	71 61	69.3	21 33.5	71 61	68.6	22 58.1	70 60	67.1	24 21.9	69 60	65.5	24 42.6	69 59	65.1	25 24.0	69 59	64.3	91
2	19 31.1	72 61	69.4	19 52.6	72 61	69.1	20 14.1	72 61	68.7	20 56.9	71 61	67.9	22 21.9	71 60	66.4	23 46.1	70 59	64.9	24 07.0	70 59	64.5	24 48.6	69 59	63.7	2
3	18 54.3	72 61	68.8	19 15.9	72 61	68.4	19 37.5	72 61	68.0	20 20.5	72 60	67.3	21 46.0	71 60	65.8	23 10.6	70 59	64.2	23 31.6	70 59	63.8	24 13.5	70 58	63.1	3
4	18 17.7	72 61	68.1	18 39.4	72 61	67.7	19 01.1	72 60	67.3	19 44.3	72 60	66.6	21 10.2	71 59	65.1	22 35.2	71 59	63.6	22 56.4	70 58	63.2	23 38.5	70 58	62.4	4
95	17 41.3	73 60	67.4	18 03.1	73 60	67.0	18 24.8	72 60	66.7	19 08.2	72 60	66.0	20 34.5	72 59	64.5	22 00.1	71 58	63.0	22 21.3	71 58	62.6	23 03.7	70 58	61.8	95
6	17 05.0	73 60	66.7	17 26.9	73 60	66.4	17 48.8	73 60	66.0	18 32.4	73 59	65.3	19 59.1	72 59	63.8	21 25.1	71 58	62.3	21 46.5	71 58	62.0	22 29.1	71 57	61.2	6
7	16 28.9	73 60	66.1	16 50.9	73 60	65.7	17 12.9	73 59	65.3	17 56.7	73 59	64.6	19 23.9	72 58	63.2	20 50.3	72 58	61.7	21 11.8	72 57	61.3	21 54.7	71 57	60.6	7
8	15 53.1	74 60	65.4	16 15.2	74 59	65.0	16 37.2	74 59	64.7	17 21.3	73 59	64.0	18 48.9	73 58	62.5	20 15.8	72 57	61.1	20 37.4	72 57	60.7	21 20.5	72 57	59.9	8
9	15 17.4	74 59	64.7	15 39.6	74 59	64.4	16 01.8	74 59	64.0	16 46.0	74 58	63.3	18 14.0	73 58	61.9	19 41.4	73 57	60.4	20 03.2	72 57	60.1	20 46.5	72 56	59.3	9
100	14 41.9	74 59	64.0	15 04.2	74 59	63.7	15 26.5	74 58	63.3	16 10.9	74 58	62.6	17 39.4	74 57	61.2	19 07.3	73 56	59.8	19 29.2	73 56	59.4	20 12.8	73 56	58.7	100
1	14 06.6	75 58	63.3	14 29.0	75 58	63.0	14 51.4	75 58	62.7	15 36.1	74 58	62.0	17 05.0	74 57	60.6	18 33.4	73 56	59.1	18 55.4	73 56	58.8	19 39.3	73 56	58.1	1
2	13 31.5	75 58	62.7	13 54.1	75 58	62.3	14 16.6	75 58	62.0	15 01.5	75 57	61.3	16 30.9	74 57	59.9	17 59.7	74 56	58.5	18 21.9	74 56	58.1	19 06.0	73 55	57.4	2
3	12 56.7	75 58	62.0	13 19.3	75 58	61.6	13 41.9	75 57	61.3	14 27.0	75 57	60.6	15 56.9	75 56	59.2	17 26.3	74 55	57.9	17 48.5	74 55	57.5	18 32.9	74 55	56.8	3
4	12 22.0	76 57	61.3	12 44.8	76 57	61.0	13 07.5	76 57	60.6	13 52.9	76 57	59.9	15 23.2	75 56	58.6	16 53.1	75 55	57.2	17 15.5	75 55	56.9	18 00.1	74 54	56.2	4
105	11 47.6	76 57	60.6	12 10.5	76 57	60.3	12 33.3	76 57	59.9	13 18.9	76 56	59.3	14 49.7	76 55	57.9	16 20.1	75 55	56.6	16 42.6	75 54	56.2	17 27.5	75 54	55.5	105
6	11 13.4	77 57	59.9	11 36.4	77 56	59.6	11 59.4	76 56	59.3	12 45.2	76 56	58.6	14 16.5	76 55	57.3	15 47.4	76 54	55.9	16 10.0	75 54	55.6	16 55.2	75 53	54.9	6
7	10 39.5	77 56	59.2	11 02.6	77 56	58.9	11 25.6	77 56	58.6	12 11.7	77 55	57.9	13 43.5	76 55	56.6	15 14.9	76 54	55.3	15 37.7	76 54	54.9	16 23.1	76 53	54.2	7
8	10 05.8	77 56	58.5	10 29.0	77 56	58.2	10 52.2	77 55	57.9	11 38.5	77 55	57.2	13 10.8	77 54	55.9	14 42.7	76 53	54.6	15 05.6	76 53	54.3	15 51.3	76 53	53.6	8
9	9 32.4	78 55	57.8	9 55.7	78 55	57.5	10 19.0	78 55	57.2	11 05.5	77 55	56.6	12 38.3	77 54	55.3	14 10.7	77 53	54.0	14 33.8	77 53	53.6	15 19.8	77 52	53.0	9
110	8 59.2	78 55	57.1	9 22.6	78 55	56.8	9 46.0	78 54	56.5	10 32.8	78 54	55.9	12 06.1	78 53	54.6	13 39.1	77 52	53.3	14 02.2	77 52	53.0	14 48.5	77 52	52.3	110
1	8 26.2	79 54	56.4	8 49.8	78 54	56.1	9 13.3	78 54	55.8	10 00.3	78 54	55.2	11 34.1	78 53	53.9	13 07.6	78 52	52.6	13 30.9	78 52	52.3	14 17.5	77 51	51.7	1
2	7 53.6	79 54	55.7	8 17.2	79 54	55.4	8 40.9	79 54	55.1	9 28.1	79 53	54.5	11 02.5	78 52	53.2	12 36.5	78 51	52.0	12 59.9	78 51	51.6	13 46.8	78 51	51.0	2
3	7 21.2	79 54	55.0	7 45.0	79 53	54.7	8 08.7	79 53	54.4	8 56.2	79 53	53.8	10 31.1	79 52	52.6	12 05.6	79 51	51.3	12 29.2	79 51	51.0	13 16.3	78 50	50.3	3
4	6 49.0	80 53	54.3	7 13.0	80 53	54.0	7 36.9	80 53	53.7	8 24.6	80 52	53.1	10 00.0	79 51	51.9	11 35.0	79 50	50.6	11 58.8	79 50	50.3	12 46.1	79 50	49.7	4
115	6 17.2	80 53	53.6	6 41.2	80 52	53.3	7 05.3	80 52	53.0	7 53.3	80 52	52.4	9 29.1	80 51	51.2	11 04.8	80 50	50.0	11 28.6	79 50	49.7	12 16.3	79 49	49.0	115
6	5 45.7	81 52	52.9	6 09.8	81 52	52.6	6 34.0	80 52	52.3	7 22.2	80 51	51.7	8 58.6	80 50	50.5	10 34.8	80 49	49.3	10 58.8	80 49	49.0	11 46.7	80 49	48.4	6
7	5 14.4	81 52	52.2	5 38.7	81 51	51.9	6 03.0	81 51	51.6	6 51.5	81 51	51.0	8 28.4	81 50	49.8	10 05.1	80 49	48.6	10 29.2	80 49	48.3	11 17.4	80 48	47.7	7
8				5 07.9	81 51	51.2	5 32.3	81 51	50.9	6 21.1	81 50	50.3	7 58.5	81 49	49.1	9 35.7	81 48	47.9	10 00.0	81 48	47.6	10 48.5	81 48	47.0	8
9							5 01.9	82 50	50.2	5 50.9	82 50	49.6	7 28.9	82 49	48.4	9 06.6	81 48	47.3	9 31.0	81 48	47.0	10 19.8	81 47	46.4	9
120										5 21.1	82 49	48.9	6 59.6	82 48	47.7	8 37.9	82 47	46.6	9 02.4	82 47	46.3	9 51.5	82 47	45.7	120
1													6 30.6	82 48	47.0	8 09.5	82 47	45.9	8 34.2	82 47	45.6	9 23.5	82 46	45.0	1
2													6 02.0	83 47	46.3	7 41.4	83 46	45.2	8 06.2	83 46	44.9	8 55.8	83 46	44.3	2
3													5 33.7	83 47	45.6	7 13.6	83 46	44.5	7 38.6	83 45	44.2	8 28.5	83 45	43.7	3
4													5 05.7	84 46	44.9	6 46.2	84 45	43.8	7 11.3	84 45	43.5	8 01.5	84 44	43.0	4
125																6 19.1	84 45	43.1	6 44.4	84 44	42.8	7 34.8	84 44	42.3	125
6																5 52.4	85 44	42.4	6 17.8	85 44	42.1	7 08.5	84 43	41.6	6
7																5 26.1	85 43	41.7	5 51.6	85 43	41.4	6 42.5	85 43	40.9	7
8																5 00.1	85 43	41.0	5 25.7	85 42	40.7	6 17.0	85 42	40.2	8
9																			5 00.2	86 42	40.0	5 51.7	86 41	39.5	9
130																						5 26.9	86 41	38.8	130
1																						5 02.4	87 40	38.1	1

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Lat. 49°

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt °	°	′	Δt °	°	′	Δt °	°	′	Δt °	°	′	Δt °	°	′	Δt °	°	′	Δt °	°	′	Δt °	°	
00	77 09.0	1.0 02	180.0	78 00.0	1.0 02	180.0	79 30.0	1.0 02	180.0	81 00.0	1.0 03	180.0	83 00.0	1.0 04	180.0	83 30.0	1.0 04	180.0	84 00.0	1.0 04	180.0	86 00.0	1.0 06	180.0	00
1	76 58.8	1.0 06	176.4	77 58.7	1.0 07	176.2	79 28.5	1.0 07	175.7	80 58.3	1.0 08	175.1	82 57.9	1.0 10	173.9	83 27.8	99 11	173.5	83 57.6	99 12	173.0	85 56.5	99 17	170.0	1
2	76 55.1	99 10	172.8	77 54.7	99 11	172.4	79 24.1	99 12	171.5	80 53.3	99 14	170.3	82 51.7	98 17	168.0	83 21.2	98 18	167.2	83 50.5	98 19	166.2	85 46.4	95 27	160.4	2
3	76 49.0	99 14	169.3	77 48.2	99 15	168.6	79 16.9	98 17	167.3	80 45.1	98 19	165.6	82 41.6	96 23	162.2	83 10.4	96 24	161.1	83 39.0	95 26	159.8	85 30.5	90 35	151.8	3
4	76 40.5	98 18	165.8	77 39.2	98 19	164.9	79 06.8	97 21	163.2	80 33.7	96 24	161.0	82 27.7	94 29	156.7	82 55.7	93 30	155.3	83 23.4	92 32	153.7	85 09.6	84 41	144.2	4
05	76 29.7	97 22	162.4	77 27.7	96 23	161.3	78 54.1	95 25	159.2	80 19.5	94 28	156.6	82 10.6	91 34	151.6	82 37.6	90 35	150.0	83 04.2	88 37	148.1	84 44.8	78 46	137.7	05
6	76 16.7	96 25	159.1	77 14.0	95 27	157.8	78 39.0	94 29	155.4	80 02.5	92 32	152.4	81 50.4	88 38	146.8	82 16.4	86 40	145.0	82 42.0	84 42	143.0	84 16.9	73 50	132.1	6
7	76 01.7	94 28	155.9	76 58.0	94 30	154.4	78 21.5	92 33	151.8	79 43.1	89 36	148.5	81 27.6	84 42	142.4	81 52.6	82 44	140.5	82 17.0	80 45	138.4	83 46.6	68 54	127.4	7
8	75 44.6	93 32	152.8	76 40.1	92 33	151.2	78 01.8	90 36	148.3	79 21.4	87 40	144.7	81 02.5	81 45	138.4	81 26.5	79 47	136.4	81 49.8	77 48	134.3	83 14.4	63 56	123.3	8
9	75 25.7	91 34	149.8	76 20.1	90 36	148.1	77 40.2	88 39	145.0	78 57.7	84 43	141.3	80 35.4	78 48	134.7	80 58.4	76 50	132.7	81 20.8	73 51	130.5	82 40.9	59 58	119.7	9
10	75 05.1	90 37	146.9	75 58.5	88 39	145.1	77 16.8	86 42	141.9	78 32.2	82 45	138.0	80 06.6	75 50	131.3	80 28.7	72 52	129.3	80 50.1	70 53	127.1	82 06.2	55 59	116.7	10
1	74 42.8	88 40	144.2	75 35.1	86 41	142.3	76 51.7	83 44	138.9	78 05.1	80 48	134.9	79 36.3	72 53	128.2	79 57.6	70 54	126.2	80 18.1	67 55	124.1	81 30.6	53 60	114.0	1
2	74 19.0	86 42	141.5	75 10.3	85 44	139.5	76 25.1	81 47	136.1	77 36.5	77 50	132.1	79 04.8	69 54	125.4	79 25.2	67 56	123.4	79 44.9	64 57	121.3	80 54.3	51 61	111.6	2
3	73 53.8	85 44	139.0	74 44.1	83 46	137.0	75 57.2	79 49	133.5	77 06.7	75 52	129.4	78 32.2	67 56	122.7	78 51.9	65 57	120.8	79 10.8	62 58	118.8	80 17.4	48 62	109.4	3
4	73 27.4	83 46	136.6	74 16.6	81 48	134.5	75 28.0	77 50	131.0	76 35.8	73 53	126.9	77 58.6	65 57	120.3	78 17.7	62 58	118.5	78 36.0	60 59	116.5	79 40.1	47 63	107.5	4
15	72 59.8	81 48	134.3	73 48.0	79 49	132.2	74 57.8	76 52	128.7	76 03.8	71 55	124.6	77 24.3	63 58	118.1	77 42.7	60 59	116.3	78 00.4	58 60	114.4	79 02.3	45 63	105.7	15
6	72 31.1	80 50	132.1	73 18.3	78 51	130.0	74 26.6	74 53	126.5	75 31.0	69 56	122.4	76 49.2	61 59	116.1	77 07.1	58 60	114.3	77 24.3	56 61	112.4	78 24.3	44 64	104.1	6
7	72 01.4	78 51	130.0	72 47.7	76 52	127.9	73 54.5	72 55	124.4	74 57.4	67 57	120.4	76 13.6	59 60	114.1	76 31.0	57 61	112.4	76 47.7	54 62	110.6	77 46.0	42 64	102.7	7
8	71 30.8	77 52	128.0	72 16.2	75 54	125.9	73 21.6	71 56	122.4	74 23.1	66 58	118.4	75 37.4	58 61	112.4	75 54.4	55 62	110.7	76 10.6	53 62	108.9	77 07.5	41 64	101.3	8
9	70 59.3	76 54	126.0	71 43.9	73 55	124.0	72 48.0	69 57	120.5	73 48.2	64 59	116.6	75 00.8	56 62	110.7	75 17.3	54 62	109.1	75 33.2	52 63	107.4	76 28.8	41 65	100.0	9
20	70 27.1	74 55	124.2	71 10.9	72 56	122.1	72 13.8	68 58	118.7	73 12.7	63 60	114.9	74 23.8	55 62	109.1	74 40.0	53 63	107.5	74 55.5	51 63	105.9	75 50.0	40 65	98.8	20
1	69 54.2	73 56	122.5	70 37.3	71 57	120.4	71 39.0	67 59	117.0	72 36.8	62 61	113.3	73 46.4	54 63	107.6	74 02.3	52 63	106.1	74 17.5	50 64	104.5	75 11.0	39 65	97.7	1
2	69 20.7	72 57	120.8	70 03.0	69 58	118.7	71 03.7	65 60	115.4	72 00.4	61 61	111.7	73 08.7	53 63	106.2	73 24.3	51 64	104.7	73 39.3	49 64	103.2	74 32.0	39 65	96.7	2
3	68 46.6	71 58	119.2	69 28.3	68 59	117.1	70 27.9	64 60	113.9	71 23.7	60 62	110.3	72 30.8	52 64	104.9	72 46.2	50 64	103.5	73 00.9	48 64	102.0	73 52.8	38 65	95.7	3
4	68 12.0	70 59	117.6	68 53.0	67 60	115.6	69 51.7	63 61	112.4	70 46.6	59 62	108.9	71 52.7	51 64	103.6	72 07.8	49 64	102.2	72 22.3	47 65	100.8	73 13.6	38 65	94.7	4
25	67 36.9	69 59	116.1	68 17.3	66 60	114.2	69 15.1	62 62	111.0	70 09.2	58 63	107.5	71 14.3	51 64	102.4	71 29.2	49 64	101.1	71 43.6	47 65	99.7	72 34.4	38 66	93.8	25
6	67 01.3	68 60	114.7	67 41.2	65 61	112.8	68 38.2	61 62	109.6	69 31.5	57 63	106.3	70 35.8	50 64	101.3	70 50.5	48 65	100.0	71 04.7	46 65	98.6	71 55.1	38 66	92.9	6
7	66 25.4	67 61	113.3	67 04.7	64 61	111.4	68 01.0	61 62	108.4	68 53.6	56 64	105.0	69 57.1	50 65	100.2	70 11.7	48 65	98.9	70 25.7	46 65	97.6	71 15.8	37 66	92.1	7
8	65 49.0	66 61	112.0	66 27.9	64 62	110.1	67 23.5	60 63	107.1	68 15.5	56 64	103.9	69 18.3	49 65	99.2	69 32.8	47 65	97.9	69 46.7	45 65	96.6	70 36.4	37 66	91.3	8
9	65 12.4	65 62	110.7	65 50.8	63 62	108.9	66 45.8	59 63	105.9	67 37.2	55 64	102.7	68 39.4	49 65	98.1	68 53.7	47 65	96.9	69 07.5	45 65	95.7	69 57.1	37 66	90.5	9
30	64 35.4	64 62	109.5	65 13.4	62 63	107.7	66 07.8	59 64	104.8	66 58.7	54 64	101.7	68 00.4	48 65	97.2	68 14.6	47 65	96.0	68 28.3	45 65	94.8	69 17.7	37 66	89.7	30
1	63 58.2	64 62	108.3	64 35.8	62 63	106.5	65 29.7	58 64	103.6	66 20.1	54 65	100.6	67 21.3	48 65	96.2	67 35.4	46 65	95.1	67 49.1	45 66	93.9	68 38.3	37 66	89.0	1
2	63 20.7	63 63	107.1	63 57.9	61 63	105.4	64 51.3	58 64	102.6	65 41.3	54 65	99.6	66 42.1	48 65	95.3	66 56.2	46 65	94.2	67 09.8	44 66	93.1	67 59.0	37 66	88.3	2
3	62 42.9	63 63	106.0	63 19.9	61 64	104.3	64 12.8	57 64	101.5	65 02.4	53 65	98.6	66 02.9	47 65	94.4	66 16.9	46 66	93.3	66 30.5	44 66	92.2	67 19.6	38 66	87.6	3
4	62 05.0	62 64	104.9	62 41.7	60 64	103.2	63 34.2	57 65	100.5	64 23.5	53 65	97.7	65 23.7	47 66	93.6	65 37.6	46 66	92.5	65 51.1	44 66	91.4	66 40.3	38 66	86.9	4
35	61 26.9	62 64	103.9	62 03.3	60 64	102.2	62 55.4	56 65	99.5	63 44.4	53 65	96.7	64 44.3	47 66	92.7	64 58.3	46 66	91.7	65 11.8	44 66	90.6	66 01.0	38 65	86.2	35
6	60 48.6	61 64	102.8	61 24.7	59 64	101.2	62 16.5	56 65	98.6	63 05.3	52 65	95.8	64 05.0	47 66	91.9	64 18.9	46 66	90.9	64 32.4	44 66	89.9	65 21.8	38 65	85.6	6
7	60 10.1	61 64	101.8	60 46.0	59 65	100.2	61 37.6	56 65	97.7	62 26.1	52 65	95.0	63 25.7	47 66	91.1	63 39.6	46 66	90.1	63 53.0	44 66	89.1	64 42.5	38 65	84.9	7
8	59 31.5	60 65	100.9	60 07.2	59 65	99.3	60 58.5	55 65	96.8	61 46.9	52 65	94.1	62 46.3	47 66	90.4	63 00.2	46 66	89.4	63 13.7	44 66	88.4	64 03.4	38 65	84.3	8
9	58 52.8	60 65	99.9	59 28.3	58 65	98.3	60 19.4	55 65	95.9	61 07.6	52 66	93.3	62 06.9	47 66	89.6	62 20.8	46 66	88.7	62 34.3	44 66	87.7	63 24.2	39 65	83.7	9
40	58 14.0	60 65	99.0	58 49.3	58 65	97.4	59 40.2	55 65	95.0	60 28.3	52 66	92.5	61 27.6	47 66	88.9	61 41.5	46 66	87.9	61 55.0	44 66	87.0	62 45.1	39 65	83.1	40
1	57 35.0	60 65	98.1	58 10.3	58 65	96.5	59 01.0	55 65	94.2	59 48.9	52 66	91.7	60 48.2	47 66	88.2	61 02.2	46 66	87.2	61 15.7	45 65	86.3	62 06.1	39 65	82.5	1
2	56 56.0	59 65	97.2	57 31.1	58 65	95.7	58 21.7	55 66	93.3	59 09.6	52 66	90.9	60 08.9	47 66	87.4	60 22.9	46 65	86.6	60 36.5	45 65	85.6	61 27.1	40 65	81.9	2
3	56 16.9	59 65	96.3	56 51.9	57 65	94.8	57 42.4	55 66	92.5	58 30.2	52 66	90.1	59 29.6	47 65	86.7	59 43.6	46 65	85.9	59 57.2	45 65	85.0	60 48.1	40 65	81.3	3
4	55 37.8	59 65	95.4	56 12.7	57 65	94.0	57 03.0	55 66	91.7	57 50.9	52 66	89.4	58 50.3	47 65	86.1	59 04.3	46 65	85.2	59 18.0	45 65	84.3	60 09.2	40 65	80.7	4
45	54 58.6	59 65	94.6	55 33.4	57 66	93.2	56 23.7	55 66	91.0	57 11.5	52 66	88.6	58 11.0	48 65	85.4	58 25.1	46 65	84.5	58 38.9	45 65	83.7	59 30.4	41 65	80.2	45
6	54 19.3	59 66	93.8	54 54.1	57 66	92.4	55 44.3	55 66	90.2	56 32.2	52 66	87.9	57 31.8	48 65	84.7	57 46.0	47 65	83.9	57 59.8	46 65	83.1	58 51.7	41 64	79.6	6
7	53 40.0	59 66	93.0	54 14.7	57 66	91.6	55 05.0	55 66	89.4	55 52.8	52 66	87.2	56 52.7	48 65	84.1	57 06.9	47 65	83.3	57 20.7	46 65	82.4	58 13.0	41 64	79.1	7
8	53 00.7	59 66	92.2	53 35.4	57 66	90.8	54 25.6	55 66	88.7	55 13.5	52 65	86.5	56 13.5	48 65	83.4	56 27.8	47 65	82.6	56 41.7	46 65	81.8	57 34.4	42 64	78.5	8
9	52 21.3	59 66	91.4	52 56.0	57 66	90.1	53 46.3	55 66	88.0	54 34.3	52 65	85.8	55 34.4	48 65	82.8	55 48.8	47 65	82.0	56 02.8	46 65	81.2	56 55.8	42 64	78.0	9
50	51 42.0	59 66	90.6	52 16.7	57 66	89.3	53 06.9	55 66	87.3	53 55.0	52 65	85.1	54 55.4	49 65	82.2	55 09.8	48 65	81.4	55 23.9	47 65	80.6	56 17.4	42 64	77.4	50
1	51 02.6	59 66	89.9	51 37.3	57 66	88.6	52 27.6	55 65	86.5	53 15.8	52 65	84.4	54 16.5	49 65	81.5	54 30.9	48 65	80.8	54 45.1	47 65	80.0	55 39.0	43 64	76.9	1
2	50 23.3	59 66	89.1	50 58.0	57 66	87.8	51 48.4	55 65	85.8	52 36.7	52 65	83.8	53 37.6	49 65	80.9	53 52.1	48 65	80.2	54 06.4	47 64	79.4	55 00.7	43 64	76.3	2
3	49 43.9	59 66	88.4	50 18.6	57 66	87.1	51 09.1	55 65	85.2	51 57.6	53 65	83.1	52 58.7	49 65	80.3	53 13.4	48 64	79.6	53 27.8	47 64	78.8	54 22.5	44 64	75.8	3
4	49 04.6	59 66	87.7	49 39.3	57 65	86.4	50 29.9	55 65	84.5	51 18.5	53 65	82.5	52 20.0	50 64	79.7	52 34.7	49 64	79.0	52 49.2	48 64	78.3	53 44.4	44 63	75.3	4
55	48 25.3	59 65	86.9	49 00.1	57 65	85.7	49 50.8	55 65	83.8	50 39.5	53 65	81.8	51 41.3	50 64	79.1	51 56.1	49 64	78.4	52 10.7	48 64	77.7	53 06.3	45 63	74.8	55
6	47 46.0	59 65	86.2	48 20.8	57 65	85.0	49 11.6	55 65	83.1	50 00.6	53 65	81.2	51 02.7	50 64	78.5	51 17.6	49 64	77.8	51 32.3	49 64	77.1	52 28.4	45 63	74.2	6
7	47 06.7	59 65	85.5	47 41.6	58 65	84.3	48 32.6	56 65	82.5	49 21.7	54 65	80.6	50 24.1	50 64	77.9	50 39.2	50 64	77.2	50 53.9	49 64	76.5	51 50.6	45 63	73.7	7
8	46 27.5	59 65	84.8	47 02.5	58 65	83.6	47 53.6	56 65	81.8	48 42.9	54 65	79.9	49 45.7	51 64	77.3	50 00.8	50 64	76.7	50 15.7	49 64	76.0	51 12.8	46 63	73.2	8
9	45 48.3	59 65	84.1	46 23.4	58 65	83.0	47 14.7	56 65	81.2	48 04.2	54 64	79.3	49 07.3	51 64	76.7	49 22.6	50 64	76.1	49 37.6	50 63	75.4	50 35.2	46 63	72.7	9
60	45 09.2	59 65	83.5	45 44.4	58 65	82.3	46 35.8	56 65	80.5	47 25.6	54 64	78.7	48 29.1	52 64	76.2	48 44.4	51 63	75.5	48 59.5	50 63	74.9	49 57.7	47 62	72.2	60
1	44 30.1	59 65	82.8	45 05.4	58 65	81.6	45 57.0	56 65	79.9	46 47.0	55 64	78.1	47 50.9	52 63	75.6	48 06.3	51 63	74.9	48 21.6	50 63	74.3	49 20.3	47 62	71.6	1
2	43 51.1	60 65	82.1	44 26.5	58 65	81.0	45 18.3	57 64	79.3	46 08.5	55 64	77.5	47 12.8	52 63	75.0	47 28.4	52 63	74.4	47 43.7	51 63	73.7	48 43.0	48 62	71.1	2
3	43 12.1	60 65	81.4	43 47.6	59 65	80.3	44 39.7	57 64	78.6	45 30.1	55 64	76.9	46 34.8	53 63	74.4	46 50.5	52 63	73.8	47 06.0	51 63	73.2	48 05.8	48 62	70.6	3
4	42 33.2	60 65	80.8	43 08.9	59 64	79.7	44 01.1	57 64	78.0	44 51.9	55 64	76.3	45 57.0	53 63	73.9	46 12.8	52 63	73.3	46 28.4	52 63	72.6	47 28.7	49 62	70.1	4
65	41 54.4	60 65	80.1	42 30.2	59 64	79.0	43 22.7	58 64	77.4	44 13.7	56 63	75.7	45 19.2	53 63	73.3	45 35.1	53 63	72.7	45 50.8	52 62	72.1	46 51.7	49 61	69.6	65
6	41 15.6	60 64	79.5	41 51.6	59 64	78.4	42 44.3	58 64	76.8	43 35.6	56 63	75.1	44 41.6	54 63	72.7	44 57.6	53 62	72.1	45 13.4	53 62	71.5	46 14.9	50 61	69.1	6
7	40 37.0	61 64	78.8	41 13.1	60 64	77.8	42 06.0	58 64	76.1	42 57.6	56 63	74.5	44 04.0	54 62	72.2	44 20.2	54 62	71.6	44 36.2	53 62	71.0	45 38.2	50 61	68.6	7
8	39 58.4	61 64	78.2	40 34.6	60 64	77.1	41 27.9	58 63	75.5	42 19.7	57 63	73.9	43 26.6	55 62	71.6	43 42.9	54 62	71.0	43 59.0	53 62	70.5	45 01.6	51 61	68.1	8
9	39 19.9	61 64	77.5	39 56.3	60 64	76.5	40 49.8	59 63	74.9	41 42.0	57 63	73.3	42 49.3	55 62	71.1	43 05.7	54 62	70.5	43 22.0	54 62	69.9	44 25.2	51 61	67.6	9
70	38 41.5	61 64	76.9	39 18.1	60 64	75.9	40 11.8	59 63	74.3	41 04.3	58 63	72.7	42 12.1	55 62	70.5	42 28.7	55 62	69.9	42 45.1	54 61	69.4	43 48.9	52 60	67.0	70
1	38 03.3	62 64	76.3	38 40.0	61 63	75.3	39 34.0	59 63	73.7	40 26.8	58 62	72.1	41 35.1	56 62	70.0	41 51.8	55 61	69.4	42 08.3	55 61	68.8	43 12.7	52 60	66.5	1
2	37 25.1	62 63	75.6	38 01.9	61 63	74.6	38 56.3	60 63	73.1	39 49.4	58 62	71.6	40 58.2	56 61	69.4	41 15.0	56 61	68.8	41 31.7	55 61	68.3	42 36.6	53 60	66.0	2
3	36 47.0	62 63	75.0	37 24.0	61 63	74.0	38 18.7	60 62	72.5	39 12.1	59 62	71.0	40 21.4	57 61	68.8	40 38.4	56 61	68.3	40 55.2	56 61	67.8	42 00.8	54 60	65.5	3
4	36 09.0	62 63	74.4	36 46.3	62 63	73.4	37 41.2	60 62	71.9	38 35.0	59 62	70.4	39 44.8	57 61	68.3	40 01.8	57 61	67.8	40 18.8	56 60	67.2	41 25.0	54 59	65.0	4
75	35 31.2	63 63	73.8	36 08.6	62 63	72.8	37 03.8	61 62	71.3	37 58.0	59 61	69.8	39 08.3	58 61	67.7	39 25.5	57 60	67.2	39 42.6	57 60	66.7	40 49.4	55 59	64.5	75
6	34 53.4	63 63	73.1	35 31.0	62 62	72.2	36 26.6	61 62	70.7	37 21.1	60 61	69.2	38 31.9	58 60	67.2	38 49.3	58 60	66.7	39 06.5	57 60	66.1	40 13.9	55 59	64.0	6
7	34 15.8	63 62	72.5	34 53.6	63 62	71.6	35 49.5	62 62	70.1	36 44.3	60 61	68.7	37 55.7	59 60	66.6	38 13.2	58 60	66.1	38 30.6	58 60	65.6	39 38.6	56 59	63.5	7
8	33 38.3	64 62	71.9	34 16.4	63 62	71.0	35 12.6	62 61	69.5	36 07.8	61 61	68.1	37 19.6	59 60	66.1	37 37.3	59 60	65.6	37 54.8	58 59	65.1	39 03.5	56 58	63.0	8
9	33 01.0	64 62	71.3	33 39.2	63 62	70.4	34 35.8	62 61	68.9	35 31.3	61 60	67.5	36 43.7	60 60	65.5	37 01.5	59 59	65.0	37 19.2	59 59	64.5	38 28.5	57 58	62.5	9
80	32 23.8	64 62	70.7	33 02.2	64 61	69.7	33 59.1	63 61	68.4	34 55.0	62 60	66.9	36 08.0	60 59	65.0	36 25.9	60 59	64.5	36 43.7	59 59	64.0	37 53.7	57 58	61.9	80
1	31 46.7	65 62	70.0	32 25.4	64 61	69.1	33 22.6	63 61	67.8	34 18.9	62 60	66.4	35 32.4	60 59	64.4	35 50.5	60 59	63.9	36 08.4	60 59	63.4	37 19.0	58 57	61.4	1
2	31 09.8	65 61	69.4	31 48.6	64 61	68.5	32 46.2	63 60	67.2	33 42.9	62 60	65.8	34 57.0	61 59	63.9	35 15.2	61 59	63.4	35 33.3	60 58	62.9	36 44.6	59 57	60.9	2
3	30 33.0	65 61	68.8	31 12.1	65 61	67.9	32 10.0	64 60	66.6	33 07.1	63 59	65.2	34 21.7	61 58	63.3	34 40.1	61 58	62.8	34 58.4	61 58	62.4	36 10.3	59 57	60.4	3
4	29 56.4	66 61	68.2	30 35.7	65 60	67.3	31 34.0	64 60	66.0	32 31.4	63 59	64.6	33 46.6	62 58	62.8	34 05.2	62 58	62.3	34 23.6	61 58	61.8	35 36.1	60 57	59.9	4
85	29 19.9	66 60	67.6	29 59.4	66 60	66.7	30 58.1	65 60	65.4	31 56.0	64 59	64.1	33 11.7	62 58	62.2	33 30.4	62 58	61.7	33 49.0	62 57	61.3	35 02.2	60 56	59.4	85
6	28 43.6	67 60	67.0	29 23.4	66 60	66.1	30 22.4	65 59	64.8	31 20.6	64 59	63.5	32 37.0	63 58	61.7	32 55.8	63 57	61.2	33 14.5	62 57	60.7	34 28.4	61 56	58.8	6
7	28 07.5	67 60	66.4	28 47.5	66 60	65.5	29 46.9	66 59	64.2	30 45.5	65 58	62.9	32 02.4	63 57	61.1	32 21.4	63 57	60.6	32 40.3	63 57	60.2	33 54.8	61 56	58.3	7
8	27 31.5	67 60	65.7	28 11.7	67 59	64.9	29 11.5	66 59	63.6	30 10.6	65 58	62.3	31 28.0	64 57	60.5	31 47.2	64 57	60.1	32 06.2	63 56	59.6	33 21.4	62 55	57.8	8
9	26 55.7	68 59	65.1	27 36.2	67 59	64.3	28 36.3	66 58	63.0	29 35.8	66 58	61.7	30 53.9	64 57	60.0	31 13.2	64 56	59.5	31 32.4	64 56	59.1	32 48.2	63 55	57.3	9
90	26 20.1	68 59	64.5	27 00.8	68 59	63.7	28 01.3	67 58	62.4	29 01.2	66 57	61.2	30 19.9	65 56	59.4	30 39.3	65 56	59.0	30 58.7	64 56	58.5	32 15.2	63 55	56.7	90

16—11439

Lat. 49°

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
91	25 44.6	69 59	63.9	26 25.6	68 58	63.1	27 26.5	67 58	61.8	28 26.8	67 57	60.6	29 46.1	65 56	58.9	30 05.7	65 56	58.4	30 25.2	65 55	58.0	31 42.4	64 54	56.2	91
2	25 09.4	69 58	63.3	25 50.6	68 58	62.5	26 51.9	68 57	61.3	27 52.6	67 57	60.0	29 12.5	66 56	58.3	29 32.3	66 55	57.9	29 51.9	65 55	57.4	31 09.8	64 54	55.7	2
3	24 34.3	69 58	62.7	25 15.8	69 58	61.9	26 17.5	68 57	60.7	27 18.6	68 56	59.4	28 39.1	67 55	57.7	28 59.0	66 55	57.3	29 18.9	66 55	56.9	30 37.4	65 54	55.1	3
4	23 59.4	70 58	62.1	24 41.2	69 57	61.3	25 43.3	69 57	60.1	26 44.9	68 56	58.8	28 05.9	67 55	57.2	28 26.0	67 55	56.8	28 46.0	67 54	56.3	30 05.2	65 53	54.6	4
95	23 24.8	70 57	61.4	24 06.8	70 57	60.7	25 09.3	69 56	59.5	26 11.3	69 56	58.3	27 32.9	68 55	56.6	27 53.2	67 54	56.2	28 13.3	67 54	55.8	29 33.2	66 53	54.1	95
6	22 50.3	71 57	60.8	23 32.5	70 57	60.0	24 35.5	70 56	58.9	25 37.9	69 55	57.7	27 00.2	68 54	56.0	27 20.6	68 54	55.6	27 40.9	68 54	55.2	29 01.4	67 53	53.5	6
7	22 16.0	71 57	60.2	22 58.5	71 56	59.4	24 01.9	70 56	58.3	25 04.7	70 55	57.1	26 27.6	69 54	55.5	26 48.2	68 54	55.1	27 08.7	68 53	54.7	28 29.9	67 52	53.0	7
8	21 42.0	71 56	59.6	22 24.8	71 56	58.8	23 28.5	71 55	57.7	24 31.8	70 55	56.5	25 55.3	69 54	54.9	26 16.0	69 53	54.5	26 36.7	69 53	54.1	27 58.5	68 52	52.5	8
9	21 08.1	72 56	58.9	21 51.2	72 56	58.2	22 55.4	71 55	57.1	23 59.1	71 54	55.9	25 23.2	70 53	54.3	25 44.1	69 53	53.9	26 04.9	69 53	53.5	27 27.4	68 51	51.9	9
100	20 34.5	72 56	58.3	21 17.9	72 55	57.6	22 22.5	72 54	56.5	23 26.6	71 54	55.3	24 51.4	70 53	53.8	25 12.4	70 52	53.4	25 33.4	70 52	53.0	26 56.6	69 51	51.4	100
1	20 01.1	73 55	57.7	20 44.7	73 55	57.0	21 49.8	72 54	55.8	22 54.4	72 53	54.7	24 19.7	71 52	53.2	24 40.9	71 52	52.8	25 02.0	70 52	52.4	26 26.0	69 51	50.8	1
2	19 28.0	73 55	57.1	20 11.9	73 54	56.3	21 17.3	72 54	55.2	22 22.4	72 53	54.1	23 48.3	71 52	52.6	24 09.7	71 52	52.2	24 31.0	71 51	51.8	25 55.6	70 50	50.3	2
3	18 55.1	74 54	56.4	19 39.2	73 54	55.7	20 45.1	73 53	54.6	21 50.6	72 53	53.5	23 17.2	72 52	52.0	23 38.7	72 51	51.6	24 00.2	71 51	51.3	25 25.4	71 50	49.7	3
4	18 22.4	74 54	55.8	19 06.8	74 54	55.1	20 13.1	73 53	54.0	21 19.0	73 52	52.9	22 46.3	72 51	51.4	23 07.9	72 51	51.1	23 29.6	72 51	50.7	24 55.5	71 49	49.2	4
105	17 50.0	75 54	55.2	18 34.6	74 53	54.5	19 41.4	74 52	53.4	20 47.8	74 52	52.3	22 15.6	73 51	50.9	22 37.4	73 50	50.5	22 59.2	73 50	50.1	24 25.8	72 49	48.6	105
6	17 17.8	75 53	54.5	18 02.7	75 53	53.8	19 09.9	74 52	52.8	20 16.7	74 51	51.7	21 45.2	73 50	50.3	22 07.2	73 50	49.9	22 29.2	73 50	49.5	23 56.4	72 49	48.0	6
7	16 45.8	76 53	53.9	17 31.1	75 52	53.2	18 38.7	75 52	52.2	19 46.0	75 51	51.1	21 15.1	74 50	49.7	21 37.2	74 50	49.3	21 59.3	74 49	49.0	23 27.3	73 48	47.5	7
8	16 14.2	76 52	53.3	16 59.7	76 52	52.6	18 07.7	75 51	51.6	19 15.5	75 50	50.5	20 45.2	74 49	49.1	21 07.5	74 49	48.7	21 29.8	74 49	48.4	22 58.4	74 48	46.9	8
9	15 42.7	76 52	52.6	16 28.6	76 51	51.9	17 37.0	76 51	50.9	18 45.2	76 50	49.9	20 15.6	75 49	48.5	20 38.0	75 49	48.2	21 00.5	75 48	47.8	22 29.8	74 47	46.4	9
110	15 11.6	77 51	52.0	15 57.7	77 51	51.3	17 06.6	76 50	50.3	18 15.2	76 50	49.3	19 46.2	76 48	47.9	20 08.9	75 48	47.6	20 31.5	75 48	47.2	22 01.4	75 47	45.8	110
1	14 40.7	77 51	51.3	15 27.1	77 51	50.7	16 36.5	77 50	49.7	17 45.5	77 49	48.7	19 17.1	76 48	47.3	19 39.9	76 48	47.0	20 02.7	76 47	46.6	21 33.4	75 46	45.2	1
2	14 10.1	78 51	50.7	14 56.8	78 50	50.0	16 06.6	77 49	49.0	17 16.1	77 49	48.1	18 48.3	77 48	46.7	19 11.3	76 47	46.4	19 34.2	76 47	46.0	21 05.6	76 46	44.6	2
3	13 39.8	78 50	50.0	14 26.8	78 50	49.4	15 37.0	78 49	48.4	16 47.0	78 48	47.4	18 19.8	77 47	46.1	18 43.0	77 47	45.8	19 06.1	77 46	45.4	20 38.0	76 45	44.1	3
4	13 09.8	79 50	49.4	13 57.0	79 49	48.7	15 07.7	78 48	47.8	16 18.1	78 48	46.8	17 51.6	78 47	45.5	18 14.9	78 46	45.2	18 38.2	77 46	44.8	20 10.8	77 45	43.5	4
115	12 40.1	79 49	48.7	13 27.6	79 49	48.1	14 38.7	79 48	47.1	15 49.6	79 47	46.2	17 23.7	78 46	44.9	17 47.1	78 46	44.6	18 10.5	78 46	44.2	19 43.9	78 44	42.9	115
6	12 10.6	80 49	48.1	12 58.4	80 48	47.4	14 10.0	79 47	46.5	15 21.3	79 47	45.6	16 56.0	79 46	44.3	17 19.7	79 45	44.0	17 43.2	79 45	43.6	19 17.2	78 44	42.3	6
7	11 41.5	80 48	47.4	12 29.6	80 48	46.8	13 41.6	80 47	45.9	14 53.4	80 46	44.9	16 28.7	79 45	43.7	16 52.5	79 45	43.4	17 16.2	79 44	43.0	18 50.9	79 43	41.7	7
8	11 12.7	81 48	46.7	12 01.1	81 47	46.1	13 13.5	80 46	45.2	14 25.7	80 46	44.3	16 01.7	80 45	43.1	16 25.6	80 44	42.7	16 49.5	80 44	42.4	18 24.8	79 43	41.1	8
9	10 44.2	81 47	46.1	11 32.8	81 47	45.5	12 45.7	81 46	44.6	13 58.4	81 45	43.7	15 35.0	80 44	42.4	15 59.1	80 44	42.1	16 23.1	80 44	41.8	17 59.1	80 42	40.6	9
120	10 16.0	82 46	45.4	11 04.9	82 46	44.8	12 18.2	81 45	43.9	13 31.4	81 44	43.0	15 08.6	81 43	41.8	15 32.8	81 43	41.5	15 57.0	81 43	41.2	17 33.6	80 42	40.0	120
1	9 48.1	82 46	44.7	10 37.4	82 45	44.1	11 51.1	82 45	43.3	13 04.7	82 44	42.4	14 42.5	81 43	41.2	15 06.9	81 43	40.9	15 31.3	81 42	40.6	17 08.5	81 41	39.4	1
2	9 20.6	83 45	44.1	10 10.1	82 45	43.5	11 24.3	82 44	42.6	12 38.3	82 43	41.7	14 16.7	82 42	40.6	14 41.3	82 42	40.3	15 05.8	82 42	40.0	16 43.7	81 41	38.8	2
3	8 53.4	82 45	43.4	9 43.2	83 44	42.8	10 57.8	83 44	42.0	12 12.3	83 43	41.1	13 51.3	82 42	39.9	14 16.0	82 42	39.6	14 40.7	82 41	39.4	16 19.2	82 40	38.2	3
4	8 26.5	84 44	42.7	9 16.6	83 44	42.1	10 31.6	83 43	41.3	11 46.6	83 42	40.4	13 26.2	83 41	39.3	13 51.0	83 41	39.0	14 15.9	83 41	38.7	15 55.0	82 40	37.6	4
125	8 00.0	84 44	42.0	8 50.4	84 43	41.5	10 05.8	84 42	40.6	11 21.2	84 42	39.8	13 01.4	83 41	38.7	13 26.4	83 40	38.4	13 51.4	83 40	38.1	15 31.2	83 39	37.0	125
6	7 33.8	84 43	41.3	8 24.5	84 43	40.8	9 40.4	84 42	40.0	10 56.2	84 41	39.1	12 37.0	84 40	38.0	13 02.2	84 40	37.8	13 27.3	84 40	37.5	15 07.7	84 39	36.3	6
7	7 08.0	85 42	40.6	7 59.0	85 42	40.1	9 15.3	85 41	39.3	10 31.5	85 41	38.5	12 12.9	84 40	37.4	12 38.2	84 39	37.1	13 03.5	84 39	36.8	14 44.6	84 38	35.7	7
8	6 42.6	85 42	39.9	7 33.8	85 41	39.4	8 50.5	85 41	38.6	10 07.2	85 40	37.8	11 49.2	85 39	36.7	12 14.7	85 39	36.5	12 40.1	85 38	36.2	14 21.7	85 37	35.1	8
9	6 17.5	86 41	39.2	7 09.0	86 41	38.7	8 26.1	86 40	37.9	9 43.2	86 39	37.2	11 25.8	85 38	36.1	11 51.4	85 38	35.8	12 17.0	85 38	35.6	13 59.3	85 37	34.5	9
130	5 52.8	86 41	38.5	6 44.5	86 40	38.0	8 02.1	86 39	37.3	9 19.6	86 39	36.5	11 02.8	86 38	35.5	11 28.6	86 38	35.2	11 54.3	86 37	34.9	13 37.2	86 36	33.9	130
1	5 28.4	87 40	37.8	6 20.5	87 39	37.3	7 38.5	87 39	36.6	8 56.4	87 38	35.8	10 40.2	86 37	34.8	11 06.1	86 37	34.5	11 32.0	86 37	34.3	13 15.4	86 36	33.2	1
2	5 04.5	87 39	37.1	5 56.8	87 39	36.6	7 15.2	87 38	35.9	8 33.6	87 37	35.1	10 17.9	87 37	34.1	10 43.9	87 36	33.9	11 10.0	87 36	33.6	12 54.0	87 35	32.6	2
3				5 33.5	88 38	35.9	6 52.3	88 38	35.2	8 11.1	87 37	34.5	9 56.0	87 36	33.5	10 22.2	87 36	33.2	10 48.3	87 35	33.0	12 33.0	87 34	32.0	3
4				5 10.6	88 38	35.2	6 29.8	88 37	34.5	7 49.0	88 36	33.8	9 34.4	88 35	32.8	10 00.8	88 35	32.6	10 27.1	88 35	32.3	12 12.3	88 34	31.4	4
135							6 07.7	88 36	33.8	7 27.3	88 36	33.1	9 13.3	88 35	32.2	9 39.8	88 34	31.9	10 06.2	88 34	31.7	11 52.0	88 33	30.7	135
6							5 46.0	89 36	33.1	7 06.0	89 35	32.4	8 52.5	89 34	31.5	9 19.1	89 34	31.3	9 45.7	89 34	31.0	11 32.1	89 33	30.1	6
7							5 24.7	89 35	32.4	6 45.1	89 34	31.7	8 32.2	89 33	30.8	8 58.9	89 33	30.6	9 25.6	89 33	30.4	11 12.5	89 32	29.4	7
8							5 03.8	90 34	31.7	6 24.6	90 34	31.1	8 12.2	90 33	30.2	8 39.1	90 32	29.9	9 05.9	90 32	29.7	10 53.4	89 31	28.8	8
9										6 04.5	90 33	30.4	7 52.6	90 32	29.5	8 19.6	90 32	29.3	8 46.6	90 32	29.0	10 34.6	90 31	28.2	9
140										5 44.8	91 32	29.7	7 33.4	90 31	28.8	8 00.6	90 31	28.6	8 27.7	90 31	28.4	10 16.2	90 30	27.5	140
1										5 25.5	91 31	29.0	7 14.7	91 31	28.1	7 41.9	91 30	27.9	8 09.2	91 30	27.7	9 58.2	91 29	26.9	1
2										5 06.7	91 31	28.3	6 56.3	91 30	27.4	7 23.7	91 30	27.2	7 51.1	91 29	27.0	9 40.6	91 29	26.2	2
3													6 38.4	92 29	26.8	7 05.9	92 29	26.6	7 33.4	92 29	26.4	9 23.5	92 28	25.6	3
4													6 20.9	92 28	26.1	6 48.5	92 28	25.9	7 16.2	92 28	25.7	9 06.7	92 27	24.9	4
145													6 03.8	93 28	25.4	6 31.6	93 28	25.2	6 59.3	93 27	25.0	8 50.3	92 27	24.2	145
6													5 47.1	93 27	24.7	6 15.0	93 27	24.5	6 42.9	93 27	24.3	8 34.4	93 26	23.6	6
7													5 30.9	93 26	24.0	5 58.9	93 26	23.8	6 26.9	93 26	23.6	8 18.8	93 25	22.9	7
8													5 15.1	94 26	23.3	5 43.2	94 25	23.1	6 11.3	94 25	22.9	8 03.7	94 24	22.2	8
9																5 28.0	94 25	22.4	5 56.2	94 24	22.3	7 49.0	94 24	21.6	9
150																5 13.2	94 24	21.7	5 41.5	94 24	21.6	7 34.8	94 23	20.9	150
1																			5 27.3	95 23	20.9	7 21.0	95 22	20.2	1
2																			5 13.5	95 22	20.2	7 07.6	95 22	19.5	2
3																			5 00.1	95 21	19.5	6 54.6	95 21	18.9	3
4																						6 42.1	96 20	18.2	4
155																						6 30.1	96 19	17.5	155
6																						6 18.4	96 19	16.8	6
7																						6 07.3	97 18	16.1	7
8																						5 56.6	97 17	15.4	8
9																						5 46.3	97 16	14.8	9
160																						5 36.5	97 16	14.1	160
1																						5 27.2	98 15	13.4	1
2																						5 18.3	98 14	12.7	2
3																						5 09.9	98 13	12.0	3
4																						5 02.0	98 12	11.3	4

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	° ′	Δt	°	°
00	5 00.0	1.0 00	180.0																						00

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Lat. 49°

H.A	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	87 00.0	1.0 08	180.0	88 00.0	1.0 11	180.0	89 30.0	1.0 33	180.0	89 30.0	1.0 32	00.0	88 30.0	1.0 13	00.0	87 30.0	1.0 08	00.0	86 30.0	1.0 06	00.0	85 00.0	1.0 04	00.0	00
1	86 55.5	98 21	166.9	87 53.4	95 30	161.1	89 10.4	61 58	126.8	89 10.7	60 58	52.2	88 22.0	92 35	22.9	87 25.2	97 23	14.0	86 26.6	98 16	09.9	84 57.7	99 11	06.7	1
2	86 42.6	92 33	155.0	87 35.6	84 43	145.5	88 35.4	37 63	110.0	88 36.1	35 62	68.3	88 01.2	75 47	40.0	87 11.5	88 34	26.3	86 16.7	94 26	19.1	84 50.9	97 18	13.2	2
3	86 22.8	84 42	144.8	87 10.0	72 51	133.8	87 57.6	26 64	103.1	87 58.7	23 64	74.5	87 33.0	60 54	51.1	86 51.0	78 42	36.4	86 01.2	87 34	27.3	84 39.8	93 25	19.3	3
4	85 57.8	76 48	136.5	86 39.6	62 56	125.3	87 19.0	21 65	99.2	87 20.5	16 64	77.6	87 00.7	48 57	58.4	86 25.4	68 48	44.1	85 40.9	79 40	34.3	84 25.0	88 30	24.9	4
05	85 29.0	69 52	129.7	86 06.2	54 59	119.0	86 40.0	18 65	96.7	86 41.9	12 65	79.4	86 26.3	39 59	63.2	85 56.6	59 52	50.1	85 17.0	72 44	40.2	84 06.8	83 35	30.0	05
6	84 57.6	63 56	124.3	85 31.0	48 61	114.2	86 00.8	16 65	94.9	86 03.2	09 65	80.5	85 50.7	32 61	66.6	85 25.4	51 55	54.6	84 50.4	65 48	45.0	83 45.8	78 39	34.4	6
7	84 24.2	57 58	119.8	84 54.6	43 62	110.5	85 21.6	15 66	93.5	85 24.3	06 65	81.1	85 14.2	27 62	69.0	84 52.6	45 57	58.2	84 21.6	58 51	49.0	83 22.4	72 42	38.4	7
8	83 49.4	53 60	116.0	84 17.3	40 63	107.5	84 42.2	15 66	92.4	84 45.4	04 65	81.5	84 37.2	23 62	70.8	84 18.6	39 58	60.9	83 51.1	52 53	52.3	82 57.1	67 45	41.8	8
9	83 13.5	49 61	112.9	83 39.5	37 64	105.0	84 02.9	14 66	91.4	84 06.4	03 65	81.7	83 59.9	19 63	72.1	83 43.8	34 59	63.1	83 19.4	47 54	55.0	82 30.1	62 47	44.8	9
10	82 36.9	46 62	110.2	83 01.3	35 64	102.9	83 23.5	14 66	90.6	83 27.5	01 65	81.8	83 22.4	16 63	73.1	83 08.5	30 60	64.8	82 46.7	42 56	57.2	82 01.7	57 49	47.4	10
1	81 59.7	44 63	107.9	82 22.8	33 65	101.1	82 44.2	14 66	89.8	82 48.5	00 65	81.9	82 44.6	13 63	73.9	82 32.6	26 60	66.3	82 13.2	38 57	59.1	81 32.2	53 51	49.6	1
2	81 22.0	42 63	105.8	81 44.1	32 65	99.5	82 04.8	14 66	89.1	82 09.6	02 65	81.8	82 06.7	11 63	74.5	81 56.4	23 61	67.4	81 39.2	34 58	60.7	81 01.8	48 52	51.6	2
3	80 44.0	40 64	104.0	81 05.2	30 65	98.1	81 25.5	14 66	88.4	81 30.6	03 65	81.7	81 28.7	09 63	74.9	81 20.0	20 61	68.3	81 04.6	31 58	62.0	80 30.5	45 53	53.3	3
4	80 05.7	39 64	102.3	80 26.2	30 65	96.8	80 46.1	15 66	87.8	80 51.7	04 65	81.6	80 50.7	07 64	75.3	80 43.3	18 61	69.1	80 29.7	28 59	63.1	79 58.7	41 54	54.8	4
15	79 27.1	37 65	100.9	79 47.0	29 65	95.6	80 06.8	15 66	87.2	80 12.7	05 65	81.4	80 12.6	05 64	75.5	80 06.5	15 62	69.7	79 54.4	25 59	64.0	79 26.2	38 55	56.1	15
6	78 48.4	36 65	99.5	79 07.8	28 65	94.6	79 27.5	15 66	86.7	79 33.8	06 65	81.2	79 34.5	04 64	75.7	79 29.5	13 62	70.2	79 18.9	22 60	64.8	78 53.4	35 56	57.2	6
7	78 09.5	36 65	98.2	78 28.5	28 66	93.6	78 48.2	16 65	86.1	78 54.9	07 65	81.0	78 56.3	02 64	75.8	78 52.4	11 62	70.6	78 43.2	20 60	65.5	78 20.1	32 56	58.2	7
8	77 30.4	35 65	97.1	77 49.2	28 66	92.6	78 08.9	16 65	85.6	78 16.1	08 65	80.7	78 18.2	01 64	75.8	78 15.2	09 62	70.9	78 07.3	17 60	66.1	77 46.5	29 56	59.1	8
9	76 51.3	34 65	96.0	77 09.9	27 66	91.8	77 29.7	16 65	85.1	77 37.2	09 65	80.5	77 40.0	01 64	75.8	77 38.0	07 62	71.1	77 31.3	15 60	66.5	77 12.6	26 57	59.8	9
20	76 12.2	34 65	95.0	76 30.6	27 66	90.9	76 50.5	17 65	84.6	76 58.4	09 65	80.2	77 01.8	02 64	75.8	77 00.7	06 62	71.3	76 55.1	13 60	66.9	76 38.4	24 57	60.5	20
1	75 32.9	34 65	94.0	75 51.2	27 66	90.2	76 11.3	17 65	84.1	76 19.6	10 65	79.9	76 23.7	03 64	75.7	76 23.4	04 62	71.5	76 18.9	11 61	67.2	76 04.1	22 58	61.0	1
2	74 53.6	33 66	93.1	75 11.8	27 66	89.4	75 32.2	18 65	83.6	75 40.9	11 64	79.7	75 45.6	04 64	75.6	75 46.1	03 62	71.5	75 42.5	09 61	67.5	75 29.6	19 58	61.5	2
3	74 14.3	33 66	92.2	74 32.5	27 66	88.7	74 53.1	18 65	83.2	75 02.2	12 64	79.4	75 07.4	05 64	75.5	75 08.8	01 62	71.6	75 06.1	08 61	67.7	74 54.9	17 58	61.9	3
4	73 35.0	33 66	91.4	73 53.1	28 66	88.0	74 14.0	19 65	82.7	74 23.5	13 64	79.1	74 29.3	07 63	75.3	74 31.4	00 62	71.6	74 29.7	06 61	67.9	74 20.1	15 58	62.3	4
25	72 55.6	33 66	90.6	73 13.8	28 66	87.4	73 35.0	19 65	82.2	73 44.9	14 64	78.7	73 51.3	08 63	75.2	73 54.1	02 62	71.6	73 53.2	04 61	68.0	73 45.2	13 58	62.6	25
6	72 16.2	33 66	89.9	72 34.5	28 65	86.7	72 56.0	20 65	81.8	73 06.3	14 64	78.4	73 13.2	09 63	75.0	73 16.7	03 62	71.5	73 16.7	03 61	68.1	73 10.2	12 58	62.9	6
7	71 36.9	33 66	89.1	71 55.2	28 65	86.1	72 17.1	20 65	81.3	72 27.8	15 64	78.1	72 35.2	10 63	74.8	72 39.4	04 62	71.5	72 40.2	01 61	68.1	72 35.1	10 59	63.1	7
8	70 57.5	33 66	88.4	71 15.9	28 65	85.5	71 38.2	21 65	80.9	71 49.3	16 64	77.8	71 57.3	11 63	74.6	72 02.1	05 62	71.4	72 03.7	00 61	68.1	72 00.0	08 59	63.3	8
9	70 18.2	33 66	87.7	70 36.7	29 65	84.9	70 59.3	22 65	80.5	71 10.8	17 64	77.4	71 19.3	12 63	74.4	71 24.8	07 62	71.2	71 27.1	01 61	68.1	71 24.8	06 59	63.4	9
30	69 38.9	33 66	87.0	69 57.5	29 65	84.3	70 20.6	22 65	80.0	70 32.4	17 64	77.1	70 41.5	13 63	74.1	70 47.5	08 62	71.1	70 50.6	03 61	68.1	70 49.6	05 59	63.5	30
1	68 59.6	33 65	86.4	69 18.4	29 65	83.7	69 41.8	23 64	79.6	69 54.1	18 64	76.8	70 03.6	14 63	73.9	70 10.3	09 62	70.9	70 14.1	04 61	68.0	70 14.4	03 59	63.6	1
2	68 20.3	34 65	85.8	68 39.3	30 65	83.2	69 03.1	23 64	79.2	69 15.8	19 64	76.4	69 25.8	14 63	73.6	69 33.1	10 62	70.8	69 37.6	05 61	67.9	69 39.1	02 59	63.6	2
3	67 41.1	34 65	85.1	68 00.2	30 65	82.6	68 24.5	24 64	78.7	68 37.6	20 64	76.1	68 48.1	15 63	73.3	68 56.0	11 62	70.6	69 01.2	06 61	67.8	69 03.9	00 59	63.6	3
4	67 01.9	34 65	84.5	67 21.2	30 65	82.1	67 45.9	25 64	78.3	67 59.4	20 64	75.7	68 10.4	16 63	73.1	68 18.9	12 62	70.4	68 24.7	08 61	67.7	68 28.6	01 59	63.6	4
35	66 22.7	34 65	83.9	66 42.2	31 65	81.5	67 07.4	25 64	77.9	67 21.3	21 63	75.4	67 32.8	17 63	72.8	67 41.8	13 62	70.2	67 48.3	09 61	67.6	67 53.3	02 59	63.6	35
6	65 43.6	35 65	83.3	66 03.3	31 65	81.0	66 29.0	26 64	77.4	66 43.2	22 63	75.0	66 55.2	18 62	72.5	67 04.8	14 62	70.0	67 12.0	10 61	67.4	67 18.1	04 59	63.6	6
7	65 04.5	35 65	82.7	65 24.5	32 65	80.5	65 50.6	26 64	77.0	66 05.2	23 63	74.6	66 17.7	19 62	72.2	66 27.8	15 62	69.7	66 35.6	11 60	67.3	66 42.8	05 59	63.5	7
8	64 25.5	35 65	82.2	64 45.7	32 65	80.0	65 12.2	27 64	76.6	65 27.3	23 63	74.3	65 40.2	20 62	71.9	65 50.9	16 61	69.5	65 59.4	12 60	67.1	66 07.6	06 59	63.4	8
9	63 46.5	36 65	81.6	64 07.0	32 64	79.5	64 34.0	28 64	76.2	64 49.5	24 63	73.9	65 02.9	21 62	71.6	65 14.1	17 61	69.3	65 23.1	13 60	66.9	65 32.5	08 59	63.3	9
40	63 07.6	36 65	81.1	63 28.3	33 64	79.0	63 55.8	28 64	75.7	64 11.7	25 63	73.5	64 25.5	21 62	71.3	64 37.3	18 61	69.0	64 47.0	14 60	66.7	64 57.3	09 58	63.2	40
1	62 28.7	36 65	80.5	62 49.7	33 64	78.5	63 17.7	29 63	75.3	63 34.0	26 63	73.2	63 48.3	22 62	71.0	64 00.6	19 61	68.7	64 10.8	15 60	66.5	64 22.2	10 58	63.1	1
2	61 49.9	37 65	80.0	62 11.2	34 64	78.0	62 39.6	29 63	74.9	62 56.3	26 63	72.8	63 11.1	23 62	70.6	63 23.9	20 61	68.5	63 34.8	16 60	66.3	63 47.1	11 58	62.9	2
3	61 11.2	37 64	79.4	61 32.7	34 64	77.5	62 01.7	30 63	74.5	62 18.8	27 62	72.4	62 34.0	24 62	70.3	62 47.4	21 61	68.2	62 58.8	17 60	66.0	63 12.1	12 58	62.8	3
4	60 32.6	38 64	78.9	60 54.3	35 64	77.0	61 23.8	31 63	74.0	61 41.3	28 62	72.0	61 57.0	25 62	70.0	62 10.8	22 61	67.9	62 22.8	18 60	65.8	62 37.1	13 58	62.6	4
45	59 54.0	38 64	78.4	60 16.0	35 64	76.5	60 46.0	31 63	73.6	61 03.9	28 62	71.7	61 20.0	25 61	69.7	61 34.4	22 61	67.6	61 46.9	19 60	65.6	62 02.2	15 58	62.4	45
6	59 15.5	38 64	77.8	59 37.8	36 64	76.0	60 08.3	32 63	73.2	60 26.6	29 62	71.3	60 43.2	26 61	69.3	60 58.1	23 60	67.3	61 11.1	20 60	65.3	61 27.3	16 58	62.2	6
7	58 37.0	39 64	77.3	58 59.6	36 63	75.5	59 30.6	33 63	72.8	59 49.3	30 62	70.9	60 06.4	27 61	69.0	60 21.8	24 60	67.0	60 35.4	21 59	65.0	60 52.5	17 58	62.0	7
8	57 58.7	39 64	76.8	58 21.5	37 63	75.0	58 53.1	33 62	72.3	59 12.2	31 62	70.5	59 29.7	28 61	68.6	59 45.6	25 60	66.7	59 59.8	22 59	64.8	60 17.8	18 58	61.8	8
9	57 20.4	40 64	76.3	57 43.5	37 63	74.6	58 15.6	34 62	71.9	58 35.1	31 62	70.1	58 53.1	29 61	68.3	59 09.5	26 60	66.4	59 24.2	23 59	64.5	59 43.1	19 58	61.6	9
50	56 42.2	40 64	75.8	57 05.6	38 63	74.1	57 38.2	34 62	71.5	57 58.1	32 61	69.7	58 16.6	29 61	67.9	58 33.4	27 60	66.1	58 48.7	24 59	64.2	59 08.6	20 58	61.4	50
1	56 04.1	41 63	75.3	56 27.8	39 63	73.6	57 01.0	35 62	71.1	57 21.3	33 61	69.3	57 40.1	30 61	67.6	57 57.5	28 60	65.8	58 13.3	25 59	63.9	58 34.0	21 57	61.2	1
2	55 26.0	41 63	74.8	55 50.1	39 63	73.1	56 23.8	36 62	70.6	56 44.5	33 61	68.9	57 03.8	31 60	67.2	57 21.6	29 60	65.4	57 38.0	26 59	63.6	57 59.6	22 57	60.9	2
3	54 48.1	42 63	74.3	55 12.5	40 63	72.7	55 46.7	36 62	70.2	56 07.8	34 61	68.5	56 27.6	32 60	66.8	56 45.9	29 59	65.1	57 02.8	27 59	63.4	57 25.2	23 57	60.7	3
4	54 10.3	42 63	73.8	54 35.0	40 62	72.2	55 09.7	37 61	69.8	55 31.2	35 61	68.1	55 51.4	33 60	66.5	56 10.2	30 59	64.8	56 27.6	28 58	63.0	56 51.0	24 57	60.4	4
55	53 32.5	43 63	73.3	53 57.5	41 62	71.7	54 32.8	38 61	69.4	54 54.7	35 61	67.7	55 15.4	33 60	66.1	55 34.7	31 59	64.4	55 52.6	29 58	62.7	56 16.8	25 57	60.2	55
6	52 54.9	43 63	72.8	53 20.2	41 62	71.2	53 56.0	38 61	68.9	54 18.4	36 60	67.3	54 39.4	34 60	65.7	54 59.2	32 59	64.1	55 17.6	30 58	62.4	55 42.7	26 57	59.9	6
7	52 17.3	44 62	72.3	52 43.0	42 62	70.8	53 19.3	39 61	68.5	53 42.1	37 60	66.9	54 03.6	35 60	65.4	54 23.9	33 59	63.7	54 42.8	30 58	62.1	55 08.7	27 56	59.6	7
8	51 39.9	44 62	71.8	52 05.9	42 62	70.3	52 42.8	40 61	68.1	53 05.9	38 60	66.5	53 27.9	36 59	65.0	53 48.6	33 59	63.4	54 08.1	31 58	61.8	54 34.8	28 56	59.3	8
9	51 02.6	45 62	71.3	51 28.9	43 61	69.8	52 06.3	40 61	67.6	52 29.9	38 60	66.1	52 52.3	36 59	64.6	53 13.5	34 58	63.0	53 33.4	32 58	61.5	54 01.0	29 56	59.0	9
60	50 25.3	45 62	70.8	50 52.0	44 61	69.4	51 30.0	41 60	67.2	51 53.9	39 60	65.7	52 16.8	37 59	64.2	52 38.4	35 58	62.7	52 58.9	33 57	61.1	53 27.3	30 56	58.7	60
1	49 48.2	46 62	70.3	50 15.2	44 61	68.9	50 53.7	42 60	66.8	51 18.1	40 60	65.3	51 41.4	38 59	63.8	52 03.5	36 58	62.3	52 24.5	34 57	60.8	52 53.7	31 56	58.4	1
2	49 11.2	46 61	69.8	49 38.5	45 61	68.4	50 17.6	42 60	66.3	50 42.4	40 59	64.9	51 06.1	39 59	63.4	51 28.7	37 58	61.9	51 50.2	35 57	60.4	52 20.2	32 56	58.1	2
3	48 34.3	47 61	69.3	49 02.0	45 61	67.9	49 41.6	43 60	65.9	50 06.8	41 59	64.5	50 31.0	39 58	63.0	50 54.0	38 58	61.6	51 16.0	36 57	60.1	51 46.8	33 55	57.8	3
4	47 57.6	47 61	68.8	48 25.6	46 60	67.5	49 05.8	43 60	65.4	49 31.4	42 59	64.1	49 56.0	40 58	62.6	50 19.5	38 57	61.2	50 41.9	36 57	59.7	51 13.5	34 55	57.5	4
65	47 20.9	48 61	68.3	47 49.3	46 60	67.0	48 30.0	44 59	65.0	48 56.0	43 59	63.6	49 21.1	41 58	62.2	49 45.0	39 57	60.8	50 08.0	37 56	59.4	50 40.4	35 55	57.2	65
6	46 44.4	48 61	67.8	47 13.1	47 60	66.5	47 54.4	45 59	64.6	48 20.8	43 58	63.2	48 46.3	42 58	61.8	49 10.7	40 57	60.5	49 34.2	38 56	59.0	50 07.4	36 55	56.9	6
7	46 08.0	49 60	67.3	46 37.1	48 60	66.1	47 18.9	45 59	64.1	47 45.8	44 58	62.8	48 11.6	42 58	61.4	48 36.6	41 57	60.1	49 00.5	39 56	58.7	49 34.5	36 55	56.6	7
8	45 31.8	50 60	66.8	46 01.1	48 60	65.6	46 43.6	46 59	63.7	47 10.8	45 58	62.4	47 37.1	43 57	61.0	48 02.5	41 57	59.7	48 26.9	40 56	58.3	49 01.7	37 54	56.2	8
9	44 55.7	50 60	66.3	45 25.4	49 59	65.1	46 08.4	47 58	63.2	46 36.0	45 58	61.9	47 02.8	44 57	60.6	47 28.6	42 56	59.3	47 53.5	41 56	57.9	48 29.0	38 54	55.9	9
70	44 19.7	51 60	65.9	44 49.7	49 59	64.6	45 33.3	47 58	62.8	46 01.3	46 58	61.5	46 28.5	45 57	60.2	46 54.8	43 56	58.9	47 20.2	42 55	57.6	47 56.5	39 54	55.5	70
1	43 43.8	51 60	65.4	44 14.2	50 59	64.2	44 58.4	48 58	62.3	45 26.8	47 57	61.1	45 54.4	45 57	59.8	46 21.2	44 56	58.5	46 47.0	42 55	57.2	47 24.1	40 54	55.2	1
2	43 08.1	52 59	64.9	43 38.9	51 59	63.7	44 23.6	49 58	61.9	44 52.4	47 57	60.6	45 20.5	46 56	59.4	45 47.7	45 56	58.1	46 14.0	43 55	56.8	46 51.9	41 54	54.8	2
3	42 32.6	52 59	64.4	43 03.7	51 58	63.2	43 49.0	49 57	61.4	44 18.2	48 57	60.2	44 46.7	47 56	59.0	45 14.3	45 55	57.7	45 41.1	44 55	56.4	46 19.7	42 53	54.5	3
4	41 57.1	53 59	63.9	42 28.6	52 58	62.7	43 14.5	50 57	61.0	43 44.1	49 57	59.8	44 13.0	48 56	58.6	44 41.1	46 55	57.3	45 08.4	45 54	56.1	45 47.8	43 53	54.1	4
75	41 21.9	54 59	63.4	41 53.7	52 58	62.2	42 40.1	51 57	60.5	43 10.2	49 56	59.3	43 39.5	48 56	58.1	44 08.1	47 55	56.9	44 35.8	46 54	55.7	45 15.9	43 53	53.8	75
6	40 46.8	54 58	62.9	41 18.9	53 58	61.8	42 05.9	51 57	60.1	42 36.4	50 56	58.9	43 06.2	49 55	57.7	43 35.2	48 55	56.5	44 03.4	46 54	55.3	44 44.3	44 53	53.4	6
7	40 11.8	55 58	62.4	40 44.3	54 57	61.3	41 31.9	52 56	59.6	42 02.8	51 56	58.4	42 33.0	50 55	57.3	43 02.4	48 54	56.1	43 31.1	47 54	54.9	44 12.7	45 52	53.0	7
8	39 37.0	55 58	61.9	40 09.9	54 57	60.8	40 58.0	53 56	59.1	41 29.3	52 56	58.0	41 59.9	50 55	56.8	42 29.8	49 54	55.7	42 59.0	48 53	54.5	43 41.4	46 52	52.7	8
9	39 02.3	56 57	61.4	39 35.6	55 57	60.3	40 24.3	53 56	58.7	40 56.0	52 55	57.6	41 27.1	51 54	56.4	41 57.4	50 54	55.3	42 27.0	49 53	54.1	43 10.1	47 52	52.3	9
80	38 27.9	56 57	60.9	39 01.5	56 57	59.8	39 50.8	54 56	58.2	40 22.9	53 55	57.1	40 54.3	52 54	56.0	41 25.1	51 54	54.8	41 55.3	50 53	53.7	42 39.1	48 52	51.9	80
1	37 53.6	57 57	60.4	38 27.5	56 56	59.3	39 17.4	55 55	57.7	39 49.9	54 55	56.6	40 21.8	53 54	55.5	40 53.0	52 53	54.4	41 23.6	50 52	53.3	42 06.2	49 51	51.5	1
2	37 19.4	58 57	59.9	37 53.8	57 56	58.9	38 44.2	55 55	57.3	39 17.1	54 54	56.2	39 49.4	53 54	55.1	40 21.1	52 53	54.0	40 52.2	51 52	52.9	41 37.4	49 51	51.1	2
3	36 45.5	58 56	59.4	37 20.2	57 56	58.4	38 11.2	56 55	56.8	38 44.5	55 54	55.7	39 17.2	54 53	54.7	39 49.4	53 53	53.6	40 20.9	52 52	52.4	41 06.9	50 51	50.7	3
4	36 11.7	59 56	58.9	36 46.7	58 55	57.9	37 38.3	57 54	56.3	38 12.1	56 54	55.3	38 45 2	55 53	54.2	39 17.8	54 52	53.1	39 49.7	53 52	52.0	40 36.5	51 50	50.4	4
85	35 38.1	59 56	58.4	36 13.5	59 55	57.4	37 05.7	57 54	55.8	37 39.8	56 53	54.8	38 13.4	55 53	53.8	38 46.4	55 52	52.7	39 18.8	54 51	51.6	40 06.3	52 50	50.0	85
6	35 04.6	60 55	57.9	35 40.4	59 55	56.9	36 33.2	58 54	55.4	37 07.7	57 53	54.4	37 41.7	56 52	53.3	38 15.2	55 52	52.3	38 48.0	54 51	51.2	39 36.2	53 50	49.6	6
7	34 31.4	61 55	57.4	35 07.6	60 54	56.4	36 00.9	59 54	54.9	36 35.8	58 53	53.9	37 10.2	57 52	52.9	37 44.1	56 51	51.8	38 17.4	55 51	50.8	39 06.3	54 49	49.2	7
8	33 58.4	61 55	56.8	34 34.9	60 54	55.9	35 28.8	59 53	54.4	36 04.1	58 53	53.4	36 39.0	58 52	52.4	37 13.3	57 51	51.4	37 47.1	56 50	50.3	38 36.7	54 49	48.7	8
9	33 25.5	62 54	56.3	34 02.4	61 54	55.4	34 56.9	60 53	53.9	35 32.6	59 52	52.9	36 07.9	58 52	51.9	36 42.6	57 51	50.9	37 16.8	57 50	49.9	38 07.2	55 49	48.3	9
90	32 52.8	62 54	55.8	33 30.1	62 54	54.9	34 25.2	61 53	53.4	35 01.3	60 52	52.5	35 37.0	59 51	51.5	36 12.2	58 50	50.5	36 46.8	57 50	49.5	37 37.9	56 49	47.9	90

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H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	
91	32 20.4	63 54	55.3	32 58.0	62 53	54.4	33 53.6	61 52	53.0	34 30.2	61 52	52.0	35 06.3	60 51	51.0	35 41.9	59 50	50.0	36 17.0	58 49	49.0	37 08.7	57 48	47.5	91
2	31 48.1	64 53	54.8	32 26.1	63 53	53.9	33 22.3	62 52	52.5	33 59.3	61 51	51.5	34 35.8	60 50	50.6	35 11.8	60 50	49.6	35 47.4	59 49	48.6	36 39.8	58 48	47.1	2
3	31 16.1	64 53	54.3	31 54.4	64 52	53.3	32 51.2	63 52	52.0	33 28.6	62 51	51.0	34 05.5	61 50	50.1	34 42.0	60 49	49.1	35 18.0	60 49	48.1	36 11.1	58 48	46.7	3
4	30 44.2	65 53	53.7	31 22.9	64 52	52.8	32 20.3	63 51	51.5	32 58.1	63 50	50.6	33 35.4	62 50	49.6	34 12.3	61 49	48.7	34 48.7	60 48	47.7	35 42.6	59 47	46.2	4
95	30 12.6	65 52	53.2	30 51.7	65 52	52.3	31 49.6	64 51	51.0	32 27.8	63 50	50.1	33 05.5	63 49	49.1	33 42.8	62 49	48.2	34 19.7	61 48	47.3	35 14.2	60 47	45.8	95
6	29 41.2	66 52	52.7	30 20.6	65 51	51.8	31 19.1	65 50	50.5	31 57.7	64 50	49.6	32 35.8	63 49	48.7	33 13.6	63 48	47.7	33 50.9	62 48	46.8	34 46.1	61 46	45.4	6
7	29 10.0	67 52	52.1	29 49.8	66 51	51.3	30 48.9	65 50	50.0	31 27.8	65 49	49.1	32 06.4	64 49	48.2	32 44.6	63 48	47.3	33 22.3	63 47	46.3	34 18.2	62 46	44.9	7
8	28 39.0	67 51	51.6	29 19.2	67 51	50.8	30 18.9	66 50	49.5	30 58.2	65 49	48.6	31 37.2	65 48	47.7	32 15.8	64 48	46.8	32 54.0	63 47	45.9	33 50.5	62 46	44.5	8
9	28 08.3	68 51	51.1	28 48.8	67 50	50.2	29 49.1	67 49	49.0	30 28.8	66 49	48.1	31 08.2	65 48	47.2	31 47.2	65 47	46.3	32 25.8	64 47	45.4	33 23.0	63 45	44.0	9
100	27 37.8	68 50	50.5	28 18.7	68 50	49.7	29 19.5	67 49	48.5	29 59.6	67 48	47.6	30 39.4	66 48	46.7	31 18.8	65 47	45.9	31 57.9	65 46	45.0	32 55.8	64 45	43.6	100
1	27 07.5	69 50	50.0	27 48.8	69 49	49.2	28 50.1	68 49	47.9	29 30.6	67 48	47.1	30 10.8	67 47	46.2	30 50.7	66 46	45.4	31 30.2	66 46	44.5	32 28.7	65 45	43.2	1
2	26 37.5	70 50	49.5	27 19.1	69 49	48.7	28 21.0	68 48	47.4	29 01.9	68 47	46.6	29 42.5	67 47	45.8	30 22.8	67 46	44.9	31 02.7	66 45	44.0	32 01.9	65 44	42.7	2
3	26 07.7	70 49	48.9	26 49.7	70 49	48.1	27 52.1	69 48	46.9	28 33.4	69 47	46.1	29 14.4	68 46	45.3	29 55.1	68 46	44.4	30 35.5	67 45	43.6	31 35.4	66 44	42.2	3
4	25 38.1	71 49	48.4	26 20.5	70 48	47.6	27 23.5	70 47	46.4	28 05.2	69 47	45.6	28 46.6	69 46	44.8	29 27.7	68 45	43.9	30 08.5	68 45	43.1	31 09.0	67 44	41.8	4
105	25 08.8	71 48	47.8	25 51.5	71 48	47.1	26 55.1	70 47	45.9	27 37.2	70 46	45.1	28 19.0	69 46	44.3	29 00.5	69 45	43.4	29 41.7	68 44	42.6	30 42.9	68 43	41.3	105
6	24 39.8	72 48	47.3	25 22.8	72 47	46.5	26 27.0	71 46	45.4	27 09.5	71 46	44.6	27 51.6	70 45	43.8	28 33.6	70 44	42.9	29 15.2	69 44	42.1	30 17.0	68 43	40.9	6
7	24 11.0	73 48	46.7	24 54.4	72 47	46.0	25 59.1	72 46	44.8	26 42.0	71 45	44.0	27 24.6	71 45	43.3	28 06.9	70 44	42.5	28 48.9	70 43	41.6	29 51.4	69 42	40.4	7
8	23 42.4	73 47	46.2	24 26.2	73 47	45.4	25 31.5	72 46	44.3	26 14.7	72 45	43.5	26 57.7	71 44	42.7	27 40.4	71 44	42.0	28 22.9	71 43	41.2	29 26.0	70 42	39.9	8
9	23 14.2	74 47	45.6	23 58.3	73 46	44.9	25 04.2	73 45	43.8	25 47.8	72 45	43.0	26 31.1	72 44	42.2	27 14.2	72 43	41.5	27 57.1	71 43	40.7	29 00.9	70 41	39.5	9
110	22 46.2	74 46	45.1	23 30.7	74 46	44.3	24 37.1	73 45	43.2	25 21.0	73 44	42.5	26 04.8	73 43	41.7	26 48.3	72 43	41.0	27 31.6	72 42	40.2	28 36.0	71 41	39.0	110
1	22 18.4	75 46	44.5	23 03.3	75 45	43.8	24 10.2	74 44	42.7	24 54.6	74 44	42.0	25 38.7	73 43	41.2	26 22.6	73 42	40.4	27 06.3	73 42	39.7	28 11.3	72 41	38.5	1
2	21 51.0	76 45	43.9	22 36.2	75 45	43.2	23 43.7	75 44	42.2	24 28.4	74 43	41.4	25 12.9	74 43	40.7	25 57.2	74 42	39.9	26 41.3	73 41	39.2	27 46.9	73 40	38.0	2
3	21 23.8	76 45	43.4	22 09.4	76 44	42.7	23 17.4	75 43	41.6	24 02.5	75 43	40.9	24 47.4	75 42	40.2	25 32.1	74 41	39.4	26 16.6	74 41	38.7	27 22.8	73 40	37.5	3
4	20 56.9	77 44	42.8	21 42.8	76 44	42.1	22 51.4	76 43	41.1	23 36.9	76 42	40.4	24 22.2	75 42	39.6	25 07.2	75 41	38.9	25 52.1	75 40	38.2	26 59.0	74 39	37.1	4
115	20 30.3	77 44	42.2	21 16.6	77 43	41.6	22 25.7	77 42	40.5	23 11.5	76 42	39.8	23 57.2	76 41	39.1	24 42.7	76 41	38.4	25 27.9	75 40	37.7	26 35.4	75 39	36.6	115
6	20 04.0	78 43	41.7	20 50.6	78 43	41.0	22 00.3	77 42	40.0	22 46.5	77 41	39.3	23 32.5	77 41	38.6	24 18.4	76 40	37.9	25 04.0	76 39	37.2	26 12.1	75 38	36.1	6
7	19 38.0	78 43	41.1	20 24.9	78 42	40.4	21 35.1	78 41	39.4	22 21.7	77 41	38.7	23 08.1	77 40	38.0	23 54.3	77 40	37.4	24 40.4	77 39	36.6	25 49.0	76 38	35.6	7
8	19 12.3	79 42	40.5	19 59.6	79 42	39.9	21 10.3	78 41	38.9	21 57.2	78 40	38.2	22 44.0	78 40	37.5	23 30.6	78 39	36.8	24 17.0	77 38	36.1	25 26.3	77 37	35.1	8
9	18 46.8	80 42	39.9	19 34.5	79 41	39.3	20 45.7	79 40	38.3	21 33.0	79 40	37.6	22 20.2	78 39	37.0	23 07.1	78 39	36.3	23 53.9	78 38	35.6	25 03.8	77 37	34.6	9
120	18 21.7	80 41	39.3	19 09.7	80 41	38.7	20 21.5	80 40	37.7	21 09.1	79 39	37.1	21 56.6	79 39	36.4	22 44.0	79 38	35.8	23 31.2	78 37	35.1	24 41.6	78 36	34.1	120
1	17 56.9	81 41	38.7	18 45.3	80 40	38.1	19 57.5	80 39	37.2	20 45.5	80 39	36.5	21 33.4	80 38	35.9	22 21.1	79 38	35.2	23 08.7	79 37	34.6	24 19.7	79 36	33.6	1
2	17 32.5	81 40	38.2	18 21.1	81 40	37.5	19 33.9	81 39	36.6	20 22.3	80 38	36.0	21 10.5	80 38	35.3	21 58.6	80 37	34.7	22 46.5	80 36	34.0	23 58.1	79 36	33.1	2
3	17 08.3	82 40	37.6	17 57.3	82 39	37.0	19 10.6	81 38	36.0	19 59.3	81 38	35.4	20 47.9	81 37	34.8	21 36.3	81 37	34.2	22 24.6	80 36	33.5	23 36.7	80 35	32.5	3
4	16 44.5	82 39	37.0	17 33.8	82 39	36.4	18 47.6	82 38	35.5	19 36.6	82 37	34.9	20 25.6	81 37	34.2	21 14.4	81 36	33.6	22 03.0	81 35	33.0	23 15.7	81 35	32.0	4
125	16 21.0	83 39	36.4	17 10.6	83 38	35.8	18 24.9	82 37	34.9	19 14.3	82 37	34.3	20 03.6	82 36	33.7	20 52.7	82 36	33.1	21 41.7	82 35	32.5	22 55.0	81 34	31.5	125
6	15 57.8	83 38	35.8	16 47.8	83 38	35.2	18 02.6	83 37	34.3	18 52.3	83 36	33.7	19 41.9	83 36	33.1	20 31.4	82 35	32.5	21 20.8	82 34	31.9	22 34.6	82 34	31.0	6
7	15 34.9	84 38	35.2	16 25.2	84 37	34.6	17 40.5	84 36	33.7	18 30.6	83 36	33.2	19 20.5	83 35	32.6	20 10.4	83 34	32.0	21 00.1	83 34	31.4	22 14.4	82 33	30.5	7
8	15 12.4	84 37	34.6	16 03.1	84 36	34.0	17 18.8	84 36	33.2	18 09.2	84 35	32.6	18 59.5	84 34	32.0	19 49.7	84 34	31.4	20 39.8	83 33	30.8	21 54.6	83 32	30.0	8
9	14 50.3	85 36	34.0	15 41.2	85 36	33.4	16 57.5	85 35	32.6	17 48.2	84 34	32.0	18 38.8	84 34	31.4	19 29.3	84 33	30.9	20 19.7	84 33	30.3	21 35.1	84 32	29.4	9
130	14 28.5	85 36	33.3	15 19.7	85 35	32.8	16 36.4	85 34	32.0	17 27.5	85 34	31.4	18 18.4	85 33	30.9	19 09.3	85 33	30.3	20 00.0	84 32	29.8	21 16.0	84 31	28.9	130
1	14 07.0	86 35	32.7	14 58.6	86 35	32.2	16 15.8	86 34	31.4	17 07.1	86 33	30.9	17 58.4	85 33	30.3	18 49.6	85 32	29.8	19 40.7	85 32	29.2	20 57.1	85 31	28.4	1
2	13 45.9	86 35	32.1	14 37.8	86 34	31.6	15 55.4	86 33	30.8	16 47.1	86 33	30.3	17 38.7	86 32	29.7	18 30.2	86 32	29.2	19 21.6	86 31	28.7	20 38.6	85 30	27.8	2
3	13 25.2	87 34	31.5	14 17.3	87 33	31.0	15 35.5	87 33	30.2	16 27.4	87 32	29.7	17 19.4	86 32	29.2	18 11.2	86 31	28.6	19 02.9	86 31	28.1	20 20.4	86 30	27.3	3
4	13 04.8	87 33	30.9	13 57.3	87 33	30.4	15 15.8	87 32	29.6	16 08.1	87 32	29.1	17 00.4	87 31	28.6	17 52.5	87 31	28.1	18 44.6	87 30	27.5	20 02.5	86 29	26.7	4
135	12 44.8	88 33	30.2	13 37.5	88 32	29.7	14 56.6	88 32	29.0	15 49.2	88 31	28.5	16 41.7	87 30	28.0	17 34.1	87 30	27.5	18 26.5	87 29	27.0	19 44.9	87 29	26.2	135
6	12 25.2	88 32	29.6	13 18.2	88 32	29.1	14 37.7	88 31	28.4	15 30.5	88 30	27.9	16 23.4	88 30	27.4	17 16.1	88 29	26.9	18 08.8	88 29	26.4	19 27.7	88 28	25.7	6
7	12 05.9	89 31	29.0	12 59.2	89 31	28.5	14 19.1	89 30	27.8	15 12.3	89 30	27.3	16 05.4	88 29	26.8	16 58.5	88 29	26.4	17 51.5	88 28	25.9	19 10.8	88 28	25.1	7
8	11 47.0	89 31	28.3	12 40.6	89 30	27.9	14 00.9	89 30	27.2	14 54.4	89 29	26.7	15 47.8	89 29	26.3	16 41.2	89 28	25.8	17 34.5	89 28	25.3	18 54.3	89 27	24.6	8
9	11 28.5	90 30	27.7	12 22.4	90 30	27.3	13 43.1	90 29	26.6	14 36.9	90 29	26.1	15 30.6	89 28	25.7	16 24.3	89 28	25.2	17 17.8	89 27	24.7	18 38.1	89 26	24.0	9
140	11 10.4	90 30	27.1	12 04.6	90 29	26.6	13 25.7	90 28	26.0	14 19.8	90 28	25.5	15 13.7	90 28	25.1	16 07.7	90 27	24.6	17 01.6	90 27	24.2	18 22.3	90 26	23.5	140
1	10 52.7	91 29	26.4	11 47.1	91 28	26.0	13 08.7	91 28	25.4	14 03.0	90 27	24.9	14 57.2	90 27	24.5	15 51.5	90 26	24.0	16 45.6	90 26	23.6	18 06.8	90 25	22.9	1
2	10 35.4	91 28	25.8	11 30.0	91 28	25.4	12 52.0	91 27	24.7	13 46.6	91 27	24.3	14 41.1	91 26	23.9	15 35.6	91 26	23.4	16 30.1	91 25	23.0	17 51.6	91 25	22.3	2
3	10 18.4	92 28	25.1	11 13.4	92 27	24.7	12 35.7	91 26	24.1	13 30.6	91 26	23.7	14 25.4	91 26	23.3	15 20.1	91 25	22.9	16 14.9	91 25	22.4	17 36.8	91 24	21.8	3
4	10 01.9	92 27	24.5	10 57.1	92 26	24.1	12 19.8	92 26	23.5	13 14.9	92 25	23.1	14 10.0	92 25	22.7	15 05.0	92 25	22.3	16 00.0	92 24	21.9	17 22.4	91 23	21.2	4
145	9 45.8	92 26	23.8	10 41.2	92 26	23.5	12 04.3	92 25	22.9	12 59.7	92 25	22.5	13 55.0	92 24	22.1	14 50.3	92 24	21.7	15 45.6	92 23	21.3	17 08.3	92 23	20.7	145
6	9 30.1	93 26	23.2	10 25.8	93 25	22.8	11 49.2	93 24	22.2	12 44.8	93 24	21.9	13 40.4	93 24	21.5	14 36.0	93 23	21.1	15 31.5	92 23	20.7	16 54.6	92 22	20.1	6
7	9 14.8	93 25	22.5	10 10.7	93 24	22.2	11 34.5	93 24	21.6	12 30.4	93 23	21.2	13 26.2	93 23	20.9	14 22.0	93 23	20.5	15 17.7	93 22	20.1	16 41.3	93 22	19.5	7
8	8 59.9	94 24	21.9	9 56.0	94 24	21.5	11 20.2	94 23	21.0	12 16.3	93 23	20.6	13 12.4	93 22	20.3	14 08.4	93 22	19.9	15 04.4	93 22	19.5	16 28.3	93 21	19.0	8
9	8 45.4	94 23	21.2	9 41.8	94 23	20.9	11 06.3	94 22	20.4	12 02.7	94 22	20.0	12 58.9	94 22	19.6	13 55.2	94 21	19.3	14 51.4	94 21	18.9	16 15.7	94 20	18.4	9
150	8 31.4	94 23	20.6	9 28.0	94 22	20.2	10 52.9	94 22	19.7	11 49.4	94 21	19.4	12 45.9	94 21	19.0	13 42.4	94 21	18.7	14 38.9	94 20	18.3	16 03.5	94 20	17.8	150
1	8 17.8	95 22	19.9	9 14.6	95 22	19.6	10 39.8	95 21	19.1	11 36.5	95 21	18.7	12 33.3	95 20	18.4	13 30.0	94 20	18.1	14 26.7	94 20	17.7	15 51.6	94 19	17.2	1
2	8 04.6	95 21	19.2	9 01.6	95 21	18.9	10 27.1	95 20	18.4	11 24.1	95 20	18.1	12 21.0	95 20	17.8	13 18.0	95 19	17.5	14 14.9	95 19	17.1	15 40.2	95 18	16.7	2
3	7 51.9	95 21	18.6	8 49.1	95 20	18.3	10 14.9	95 20	17.8	11 12.1	95 19	17.5	12 09.2	95 19	17.2	13 06.3	95 19	16.9	14 03.5	95 18	16.6	15 29.1	95 18	16.1	3
4	7 39.5	96 20	17.9	8 37.0	96 20	17.6	10 03.1	96 19	17.2	11 00.4	96 19	16.9	11 57.8	96 18	16.6	12 55.1	96 18	16.3	13 52.4	96 18	16.0	15 18.4	95 17	15.5	4
155	7 27.7	96 19	17.2	8 25.3	96 19	16.9	9 51.7	96 18	16.5	10 49.2	96 18	16.2	11 46.8	96 18	15.9	12 44.3	96 17	15.6	13 41.8	96 17	15.4	15 08.1	96 17	14.9	155
6	7 16.2	96 18	16.5	8 14.0	96 18	16.3	9 40.7	96 18	15.9	10 38.4	96 17	15.6	11 36.2	96 17	15.3	12 33.9	96 17	15.0	13 31.6	96 16	14.8	14 58.1	96 16	14.3	6
7	7 05.2	97 18	15.9	8 03.2	97 17	15.6	9 30.1	97 17	15.2	10 28.1	97 17	15.0	11 26.0	97 16	14.7	12 23.9	96 16	14.4	13 21.8	96 16	14.2	14 48.6	96 15	13.7	7
8	6 54.7	97 17	15.2	7 52.8	97 17	14.9	9 20.0	97 16	14.6	10 18.1	97 16	14.3	11 16.2	97 16	14.1	12 14.3	97 15	13.8	13 12.3	97 15	13.5	14 39.4	97 15	13.2	8
9	6 44.6	97 16	14.5	7 42.9	97 16	14.3	9 10.3	97 15	13.9	10 08.6	97 15	13.7	11 06.9	97 15	13.4	12 05.1	97 15	13.2	13 03.3	97 14	12.9	14 30.7	97 14	12.6	9
160	6 35.0	97 15	13.8	7 33.4	97 15	13.6	9 01.1	97 15	13.3	9 59.5	97 14	13.0	10 57.9	97 14	12.8	11 56.3	97 14	12.6	12 54.7	97 14	12.3	14 22.3	97 13	12.0	160
1	6 25.8	98 15	13.2	7 24.4	98 14	12.9	8 52.3	98 14	12.6	9 50.8	98 14	12.4	10 49.4	98 13	12.2	11 48.0	98 13	11.9	12 46.5	98 13	11.7	14 14.3	98 13	11.4	1
2	6 17.1	98 14	12.5	7 15.8	98 14	12.3	8 43.9	98 13	12.0	9 42.6	98 13	11.7	10 41.3	98 13	11.5	11 40.0	98 13	11.3	12 38.7	98 12	11.1	14 06.7	98 12	10.8	2
3	6 08.8	98 13	11.8	7 07.7	98 13	11.6	8 36.0	98 12	11.3	9 34.8	98 12	11.1	10 33.7	98 12	10.9	11 32.5	98 12	10.7	12 31.3	98 12	10.5	13 59.6	98 11	10.2	3
4	6 01.0	98 12	11.1	7 00.0	98 12	10.9	8 28.5	98 12	10.6	9 27.4	98 12	10.5	10 26.4	98 11	10.3	11 25.4	98 11	10.1	12 24.4	98 11	09.9	13 52.8	98 11	09.6	4
165	5 53.6	99 11	10.4	6 52.7	99 11	10.2	8 21.4	99 11	10.0	9 20.5	99 11	09.8	10 19.6	99 11	09.6	11 18.7	98 10	09.5	12 17.8	98 10	09.3	13 46.4	98 10	09.0	165
6	5 46.7	99 11	09.7	6 46.0	99 10	09.6	8 14.8	99 10	09.3	9 14.0	99 10	09.2	10 13.3	99 10	09.0	11 12.5	99 10	08.8	12 11.7	99 10	08.7	13 40.5	99 09	08.4	6
7	5 40.3	99 10	09.0	6 39.7	99 10	08.9	8 08.7	99 10	08.7	9 08.0	99 09	08.5	10 07.3	99 09	08.4	11 06.6	99 09	08.2	12 05.9	99 09	08.1	13 34.9	99 09	07.8	7
8	5 34.4	99 09	08.3	6 33.8	99 09	08.2	8 03.0	99 09	08.0	9 02.4	99 09	07.9	10 01.8	99 08	07.7	11 01.2	99 08	07.6	12 00.6	99 08	07.4	13 29.8	99 08	07.2	8
9	5 28.9	99 08	07.7	6 28.4	99 08	07.5	7 57.7	99 08	07.3	8 57.2	99 08	07.2	9 56.7	99 08	07.1	10 56.3	99 08	06.9	11 55.8	99 07	06.8	13 25.0	99 07	06.6	9
170	5 23.9	99 08	07.0	6 23.5	99 07	06.8	7 52.9	99 07	06.7	8 52.5	99 07	06.6	9 52.1	99 07	06.4	10 51.7	99 07	06.3	11 51.3	99 07	06.2	13 20.7	99 07	06.0	170
1	5 19.4	99 07	06.3	6 19.0	99 07	06.2	7 48.6	99 06	06.0	8 48.2	99 06	05.9	9 47.9	99 06	05.8	10 47.6	99 06	05.7	11 47.3	99 06	05.6	13 16.8	99 06	05.4	1
2	5 15.3	1.0 06	05.6	6 15.1	1.0 06	05.5	7 44.7	1.0 06	05.3	8 44.4	1.0 06	05.2	9 44.2	1.0 06	05.2	10 43.9	1.0 05	05.1	11 43.6	1.0 05	05.0	13 13.2	1.0 05	04.8	2
3	5 11.7	1.0 05	04.9	6 11.5	1.0 05	04.8	7 41.2	1.0 05	04.7	8 41.0	1.0 05	04.6	9 40.8	1.0 05	04.5	10 40.6	1.0 05	04.4	11 40.4	1.0 05	04.3	13 10.1	1.0 04	04.2	3
4	5 08.6	1.0 04	04.2	6 08.5	1.0 04	04.1	7 38.3	1.0 04	04.0	8 38.1	1.0 04	03.9	9 38.0	1.0 04	03.9	10 37.8	1.0 04	03.8	11 37.7	1.0 04	03.7	13 07.5	1.0 04	03.6	4
175	5 06.0	1.0 04	03.5	6 05.9	1.0 04	03.4	7 35.7	1.0 03	03.3	8 35.6	1.0 03	03.3	9 35.5	1.0 03	03.2	10 35.4	1.0 03	03.2	11 35.3	1.0 03	03.1	13 05.2	1.0 03	03.0	175
6	5 03.8	1.0 03	02.8	6 03.8	1.0 03	02.7	7 33.7	1.0 03	02.7	8 33.6	1.0 03	02.6	9 33.5	1.0 03	02.6	10 33.5	1.0 03	02.5	11 33.4	1.0 02	02.5	13 03.3	1.0 02	02.4	6
7	5 02.2	1.0 02	02.1	6 02.1	1.0 02	02.1	7 32.1	1.0 02	02.0	8 32.0	1.0 02	02.0	9 32.0	1.0 02	01.9	10 32.0	1.0 02	01.9	11 31.9	1.0 02	01.9	13 01.9	1.0 02	01.8	7
8	5 01.0	1.0 01	01.4	6 00.9	1.0 01	01.4	7 30.9	1.0 01	01.3	8 30.9	1.0 01	01.3	9 30.9	1.0 01	01.3	10 30.9	1.0 01	01.3	11 30.9	1.0 01	01.2	13 00.8	1.0 01	01.2	8
9	5 00.2	1.0 00	00.7	6 00.2	1.0 00	00.7	7 30.2	1.0 00	00.7	8 30.2	1.0 00	00.7	9 30.2	1.0 00	00.6	10 30.2	1.0 00	00.6	11 30.2	1.0 00	00.6	13 00.2	1.0 00	00.6	9
180	5 00.0	1.0 00	00.0	6 00.0	1.0 00	00.0	7 30.0	1.0 00	00.0	8 30.0	1.0 00	00.0	9 30.0	1.0 00	00.0	10 30.0	1.0 00	00.0	11 30.0	1.0 00	00.0	13 00.0	1.0 00	00.0	180

Lat. 49°

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	84 30.0	1.0 03	00.0	84 00.0	1.0 03	00.0	83 00.0	1.0 03	00.0	82 30.0	1.0 02	00.0	82 00.0	1.0 02	00.0	81 30.0	1.0 02	00.0	80 00.0	1.0 02	00.0	79 30.0	1.0 02	00.0	00
1	84 27.9	99 10	06.0	83 58.1	99 09	05.5	82 58.4	1.0 08	04.6	82 28.6	1.0 07	04.2	81 58.7	1.0 07	03.9	81 28.8	1.0 06	03.6	79 59.0	1.0 05	03.0	79 29.0	1.0 05	02.8	1
2	84 21.8	97 17	11.9	83 52.5	98 15	10.8	82 53.7	98 13	09.1	82 24.2	98 12	08.4	81 54.6	99 11	07.8	81 25.0	99 10	07.2	79 55.9	99 08	05.9	79 26.2	99 08	05.5	2
3	84 11.8	94 23	17.5	83 43.4	95 21	15.9	82 46.0	96 18	13.4	82 17.1	97 16	12.4	81 48.0	97 15	11.5	81 18.9	97 14	10.7	79 50.9	98 12	08.8	79 21.4	98 11	08.3	3
4	83 58.2	90 28	22.7	83 31.0	91 26	20.8	82 35.5	93 22	17.6	82 07.3	94 20	16.3	81 39.0	95 19	15.2	81 10.4	95 18	14.1	79 43.9	97 15	11.6	79 14.9	97 14	10.9	4
05	83 41.6	85 32	27.4	83 15.6	87 30	25.2	82 22.3	90 26	21.5	81 55.1	91 24	20.0	81 27.5	92 23	18.6	80 59.7	93 21	17.4	79 35.1	95 18	14.4	79 06.5	95 17	13.5	05
6	83 22.1	80 36	31.7	82 57.6	83 34	29.3	82 06.7	87 30	25.2	81 40.5	88 28	23.5	81 13.9	89 26	21.9	80 46.9	90 25	20.5	79 24.4	93 21	17.0	78 56.5	93 19	16.1	6
7	83 00.3	75 40	35.5	82 37.2	78 37	33.0	81 48.9	83 33	28.6	81 23.8	85 31	26.7	80 58.2	86 29	25.0	80 32.1	87 28	23.5	79 12.0	90 23	19.6	78 44.8	91 22	18.5	7
8	82 36.5	70 43	38.9	82 14.8	74 40	36.3	81 29.1	79 36	31.7	81 05.1	81 34	29.7	80 40.6	83 32	27.9	80 15.6	84 30	26.2	78 58.1	88 26	22.0	78 31.5	89 24	20.8	8
9	82 10.9	66 45	41.9	81 50.7	69 43	39.2	81 07.5	75 38	34.5	80 44.8	77 36	32.5	80 21.4	79 35	30.6	79 57.4	81 33	28.8	78 42.6	85 28	24.3	78 16.9	86 27	23.0	9
10	81 44.0	61 47	44.5	81 25.1	65 45	41.9	80 44.5	71 41	37.1	80 22.9	73 39	35.0	80 00.6	75 37	33.0	79 37.7	77 35	31.2	78 25.7	82 30	26.5	78 00.8	84 29	25.1	10
1	81 15.8	57 49	46.8	80 58.2	60 47	44.2	80 20.1	67 43	39.5	79 59.7	69 41	37.3	79 38.5	72 39	35.3	79 16.6	74 37	33.4	78 07.5	79 32	28.5	77 43.5	81 31	27.1	1
2	80 46.6	53 50	48.9	80 30.3	56 48	46.3	79 54.5	63 44	41.6	79 35.2	66 42	39.4	79 15.2	68 41	37.4	78 54.4	71 39	35.5	77 48.1	76 34	30.5	77 25.0	78 33	29.0	2
3	80 16.5	49 51	50.7	80 01.4	52 50	48.1	79 27.9	59 46	43.5	79 09.7	62 44	41.3	78 50.7	65 42	39.3	78 31.0	67 41	37.4	77 27.6	73 36	32.3	77 05.4	75 34	30.7	3
4	79 45.8	45 52	52.2	79 31.7	49 51	49.8	79 00.4	55 47	45.2	78 43.3	58 45	43.1	78 25.4	61 44	41.0	78 06.6	64 42	39.1	77 06.1	70 37	33.9	76 44.8	72 36	32.4	4
15	79 14.3	42 53	53.6	79 01.3	45 52	51.2	78 32.1	52 48	46.7	78 16.0	55 47	44.6	77 59.1	58 45	42.6	77 41.3	60 43	40.7	76 43.7	67 39	35.5	76 23.2	69 37	33.9	15
6	78 42.4	38 54	54.8	78 30.3	42 52	52.5	78 03.1	49 49	48.1	77 48.0	52 48	46.0	77 32.1	55 46	44.1	77 15.3	57 45	42.2	76 20.5	64 40	37.0	76 00.9	66 39	35.4	6
7	78 10.0	35 55	55.9	77 58.9	39 53	53.6	77 33.5	46 50	49.4	77 19.4	49 49	47.3	77 04.4	51 47	45.4	76 48.5	54 46	43.5	75 56.4	61 41	38.3	75 37.7	63 40	36.7	7
8	77 37.2	33 55	56.8	77 27.0	36 54	54.7	77 03.4	43 51	50.5	76 50.2	46 50	48.5	76 36.1	48 48	46.6	76 21.1	51 47	44.7	75 31.7	58 42	39.6	75 13.8	61 41	38.0	8
9	77 04.1	30 56	57.7	76 54.7	33 54	55.5	76 32.8	40 52	51.5	76 20.4	43 50	49.5	76 07.2	46 49	47.7	75 53.1	48 47	45.8	75 06.3	56 43	40.7	74 49.3	58 42	39.1	9
20	76 30.7	27 56	58.4	76 22.1	31 55	56.3	76 01.8	37 52	52.4	75 50.3	40 51	50.5	75 37.9	43 50	48.6	75 24.7	45 48	46.9	74 40.3	53 44	41.8	74 24.1	55 43	40.2	20
1	75 57.1	25 56	59.0	75 49.2	28 55	57.0	75 30.4	34 53	53.2	75 19.7	37 52	51.3	75 08.1	40 50	49.5	74 55.7	43 49	47.8	74 13.9	50 45	42.8	73 58.5	52 44	41.2	1
2	75 23.3	23 57	59.6	75 16.0	26 56	57.7	74 58.8	32 53	53.9	74 48.8	35 52	52.1	74 38.0	37 51	50.3	74 26.4	40 50	48.6	73 46.9	48 46	43.7	73 32.3	50 44	42.1	2
3	74 49.2	20 57	60.1	74 42.7	23 56	58.2	74 26.8	29 54	54.6	74 17.6	32 52	52.8	74 07.5	35 51	51.1	73 56.7	38 50	49.4	73 19.5	45 46	44.5	73 05.7	47 45	43.0	3
4	74 15.0	18 57	60.5	74 09.1	21 56	58.7	73 54.6	27 54	55.2	73 46.1	30 53	53.4	73 36.8	32 52	51.7	73 26.6	35 51	50.1	72 51.7	42 47	45.3	72 38.6	45 46	43.8	4
25	73 40.7	16 57	60.8	73 35.4	19 56	59.1	73 22.2	25 54	55.7	73 14.4	27 53	54.0	73 05.7	30 52	52.3	72 56.3	33 51	50.7	72 23.5	40 47	46.0	72 11.2	42 46	44.5	25
6	73 06.3	14 58	61.2	73 01.6	17 57	59.5	72 49.6	23 55	56.1	72 42.4	25 54	54.5	72 34.5	28 52	52.9	72 25.7	30 51	51.3	71 55.1	38 48	46.7	71 43.4	40 47	45.2	6
7	72 31.8	13 58	61.4	72 27.6	15 57	59.8	72 16.9	21 55	56.5	72 10.3	23 54	54.9	72 03.0	26 53	53.3	71 54.9	28 52	51.8	71 26.3	35 48	47.3	71 15.4	38 47	45.8	7
8	71 57.2	11 58	61.6	71 53.6	13 57	60.0	71 44.0	19 55	56.9	71 38.0	21 54	55.3	71 31.3	24 53	53.8	71 23.9	26 52	52.3	70 57.2	33 49	47.8	70 47.0	35 48	46.4	8
9	71 22.5	09 58	61.8	71 19.4	12 57	60.3	71 10.9	17 55	57.2	71 05.6	19 54	55.7	70 59.5	22 53	54.2	70 52.6	24 52	52.7	70 28.0	31 49	48.3	70 18.4	33 48	46.9	9
30	70 47.8	07 58	62.0	70 45.2	10 57	60.5	70 37.8	15 55	57.5	70 33.0	17 54	56.0	70 27.5	20 54	54.5	70 21.3	22 53	53.0	69 58.4	29 50	48.8	69 49.5	31 48	47.4	30
1	70 13.0	06 58	62.1	70 10.9	08 57	60.6	70 04.6	13 56	57.7	70 00.3	15 55	56.2	69 55.4	18 54	54.8	69 49.7	20 53	53.4	69 28.8	27 50	49.2	69 20.4	29 49	47.8	1
2	69 38.2	04 58	62.2	69 36.6	07 57	60.7	69 31.3	11 56	57.9	69 27.6	14 55	56.5	69 23.2	16 54	55.1	69 18.1	18 53	53.7	68 58.9	25 50	49.5	68 51.2	27 49	48.2	2
3	69 03.4	03 58	62.2	69 02.2	05 57	60.8	68 57.9	09 56	58.0	68 54.7	12 55	56.7	68 50.8	14 54	55.3	68 46.3	16 53	53.9	68 28.9	23 50	49.9	68 21.8	25 49	48.6	3
4	68 28.6	01 58	62.3	68 27.9	03 57	60.9	68 24.5	08 56	58.2	68 21.8	10 55	56.8	68 18.4	12 54	55.5	68 14.5	14 53	54.1	67 58.7	21 50	50.2	67 52.2	23 50	48.9	4
35	67 53.7	00 58	62.3	67 53.5	02 57	60.9	67 51.0	06 56	58.3	67 48.8	08 55	57.0	67 46.0	10 54	55.6	67 42.5	13 53	54.3	67 28.4	19 51	50.5	67 22.5	21 50	49.2	35
6	67 18.9	02 58	62.3	67 19.0	00 57	61.0	67 17.5	05 56	58.4	67 15.8	07 55	57.1	67 13.5	09 54	55.8	67 10.5	11 53	54.5	66 58.0	17 51	50.7	66 52.6	19 50	49.4	6
7	66 44.0	03 58	62.2	66 44.6	01 57	61.0	66 44.0	03 56	58.4	66 42.7	05 55	57.2	66 40.9	07 54	55.9	66 38.4	09 54	54.6	66 27.5	15 51	50.9	66 22.6	17 50	49.7	7
8	66 09.2	04 58	62.2	66 10.2	02 57	60.9	66 10.4	02 56	58.5	66 09.6	04 55	57.2	66 08.3	06 54	56.0	66 06.3	08 54	54.8	65 56.9	13 51	51.1	65 52.6	15 50	49.9	8
9	65 34.4	06 58	62.1	65 35.8	04 57	60.9	65 36.9	00 56	58.5	65 36.5	02 55	57.3	65 35.6	04 54	56.0	65 34.1	06 54	54.8	65 26.2	12 51	51.2	65 22.5	14 50	50.0	9
40	64 59.6	07 58	62.0	65 01.4	05 57	60.8	65 03.3	01 56	58.5	65 03.4	01 55	57.3	65 03.0	02 54	56.1	65 01.9	04 54	54.9	64 55.5	10 51	51.4	64 52.3	12 50	50.2	40
1	64 24.9	08 58	61.9	64 27.1	06 57	60.8	64 29.8	03 56	58.4	64 30.3	01 55	57.3	64 30.3	01 54	56.1	64 29.7	03 54	55.0	64 24.7	08 51	51.5	64 22.0	10 51	50.3	1
2	63 50.2	09 58	61.8	63 52.7	08 57	60.7	63 56.2	04 56	58.4	63 57.2	02 55	57.3	63 57.6	00 54	56.1	63 57.5	01 54	55.0	63 53.9	07 51	51.6	63 51.7	08 51	50.4	2
3	63 15.5	11 58	61.7	63 18.4	09 57	60.6	63 22.7	05 56	58.3	63 24.1	04 55	57.2	63 24.9	02 54	56.1	63 25.3	00 54	55.0	63 23.1	05 51	51.6	63 21.3	07 51	50.5	3
4	62 40.9	12 58	61.5	62 44.2	10 57	60.4	62 49.2	07 56	58.3	62 51.0	05 55	57.2	62 52.3	03 54	56.1	62 53.0	02 54	55.0	62 52.2	03 51	51.7	62 50.9	05 51	50.6	4
45	62 06.3	13 58	61.4	62 10.0	11 57	60.3	62 15.8	08 56	58.2	62 18.6	06 55	57.1	62 19.6	05 54	56.0	62 20.8	03 54	54.9	62 21.3	02 52	51.7	62 20.5	04 51	50.6	45
6	61 31.8	14 57	61.2	61 35.8	13 57	60.2	61 42.4	09 56	58.1	61 44.9	08 55	57.0	61 47.0	06 54	56.0	61 48.6	04 54	54.9	61 50.4	00 52	51.7	61 50.0	02 51	50.7	6
7	60 57.3	15 57	61.0	61 01.7	14 57	60.0	61 09.0	11 56	57.9	61 11.9	09 55	56.9	61 14.4	07 54	55.9	61 16.4	06 54	54.8	61 19.5	01 51	51.7	61 19.6	01 51	50.7	7
8	60 22.9	16 57	60.8	60 27.6	15 57	59.8	60 35.6	12 55	57.8	60 39.0	10 55	56.8	60 41.8	09 54	55.8	60 44.2	07 54	54.8	60 48.6	03 51	51.7	60 49.1	01 51	50.7	8
9	59 48.6	17 57	60.6	59 53.6	16 57	59.7	60 02.3	13 55	57.7	60 06.0	12 55	56.7	60 09.3	10 54	55.7	60 12.1	09 54	54.7	60 17.7	04 51	51.7	60 18.7	02 51	50.7	9
50	59 14.3	19 57	60.4	59 19.7	17 56	59.5	59 29.1	14 55	57.5	59 33.2	13 55	56.5	59 36.8	11 54	55.6	59 40.0	10 53	54.6	59 46.9	05 51	51.6	59 48.3	04 51	50.6	50
1	58 40.1	20 57	60.2	58 45.8	18 56	59.3	58 55.9	15 55	57.4	59 00.4	14 55	56.4	59 04.4	13 54	55.4	59 07.9	11 53	54.5	59 16.9	07 51	51.6	59 17.8	05 51	50.6	1
2	58 06.0	21 57	60.0	58 12.0	19 56	59.1	58 22.8	17 55	57.2	58 27.6	15 54	56.2	58 32.0	14 54	55.3	58 35.9	12 53	54.4	58 45.2	08 51	51.5	58 47.4	07 51	50.5	2
3	57 32.0	22 57	59.8	57 38.3	20 56	58.8	57 49.8	18 55	57.0	57 54.9	16 54	56.1	57 59.6	15 54	55.2	58 03.9	14 53	54.2	58 14.4	10 51	51.4	58 17.1	08 51	50.4	3
4	56 58.0	23 56	59.5	57 04.6	22 56	58.6	57 16.8	19 55	56.8	57 22.3	18 54	55.9	57 27.4	16 54	55.0	57 32.0	15 53	54.1	57 43.7	11 51	51.3	57 46.7	10 50	50.4	4
55	56 24.1	24 56	59.3	56 31.1	23 56	58.4	56 43.9	20 55	56.6	56 49.7	19 54	55.7	56 55.1	17 54	54.8	57 00.2	16 53	53.9	57 13.0	12 51	51.2	57 16.4	11 50	50.3	55
6	55 50.3	25 56	59.0	55 57.6	24 56	58.2	56 11.0	21 55	56.4	56 17.2	20 54	55.5	56 23.0	19 53	54.6	56 28.4	17 53	53.8	56 42.3	14 51	51.1	56 46.2	12 50	50.2	6
7	55 16.6	26 56	58.8	55 24.2	25 56	57.9	55 38.3	22 54	56.2	55 44.8	21 54	55.3	55 50.9	20 53	54.5	55 56.7	19 53	53.6	56 11.7	15 51	50.9	56 16.0	14 50	50.0	7
8	54 43.0	27 56	58.5	54 50.9	26 55	57.7	55 05.6	23 54	56.0	55 12.5	22 54	55.1	55 18.9	21 53	54.3	55 25.1	20 53	53.4	55 41.2	16 51	50.8	55 45.9	15 50	49.9	8
9	54 09.5	28 56	58.2	54 17.7	27 55	57.4	54 33.1	24 54	55.7	54 40.2	23 54	54.9	54 47.0	22 53	54.1	54 53.5	21 52	53.2	55 10.7	17 51	50.6	55 15.8	16 50	49.8	9
60	53 36.1	29 56	57.9	53 44.6	28 55	57.1	54 00.6	26 54	55.5	54 08.1	24 53	54.7	54 15.2	23 53	53.8	54 22.0	22 52	53.0	54 40.3	19 51	50.5	54 45.7	17 50	49.6	60
1	53 02.8	30 55	57.7	53 11.6	29 55	56.9	53 28.2	27 54	55.2	53 36.0	25 53	54.4	53 43.5	24 53	53.6	53 50.6	23 52	52.8	54 10.9	20 50	50.3	54 15.8	19 50	49.5	1
2	52 29.6	31 55	57.4	52 38.7	30 55	56.6	52 55.9	28 54	55.0	53 04.0	27 53	54.2	53 11.8	26 53	53.4	53 19.3	24 52	52.6	53 39.8	21 50	50.1	53 45.9	20 50	49.3	2
3	51 56.5	32 55	57.1	52 05.9	31 54	56.3	52 23.7	29 54	54.7	52 32.1	28 53	53.9	52 40.3	27 52	53.2	52 48.1	26 52	52.4	53 09.6	22 50	49.9	53 16.1	21 50	49.1	3
4	51 23.5	33 55	56.8	51 33.2	32 54	56.0	51 51.6	30 53	54.5	52 00.4	29 53	53.7	52 08.8	28 52	52.9	52 17.0	27 52	52.1	52 39.5	23 50	49.7	52 46.4	22 49	48.9	4
65	50 50.6	34 55	56.5	51 00.6	33 54	55.7	51 19.6	31 53	54.2	51 28.7	30 53	53.4	51 37.5	29 52	52.7	51 46.0	28 52	51.9	52 09.5	25 50	49.5	52 16.8	24 49	48.7	65
6	50 17.9	35 54	56.1	50 28.1	34 54	55.4	50 47.8	32 53	53.9	50 57.1	31 52	53.2	51 06.2	30 52	52.4	51 15.0	29 51	51.6	51 39.6	26 50	49.3	51 47.2	25 49	48.6	6
7	49 45.3	36 54	55.8	49 55.8	35 54	55.1	50 16.0	33 53	53.6	50 25.7	32 52	52.9	50 35.1	31 52	52.1	50 44.2	30 51	51.4	51 09.8	27 50	49.1	51 17.7	26 49	48.3	7
8	49 12.7	36 54	55.5	49 23.6	36 54	54.8	49 44.4	34 53	53.3	49 54.4	33 52	52.6	50 04.1	32 52	51.9	50 13.5	31 51	51.1	50 40.1	28 49	48.9	50 48.4	27 49	48.1	8
9	48 40.4	37 54	55.2	48 51.5	37 53	54.5	49 12.8	35 52	53.1	49 23.1	34 52	52.3	49 33.2	33 51	51.6	49 42.9	32 51	50.9	50 10.5	29 49	48.7	50 19.1	28 49	47.9	9
70	48 08.1	38 54	54.9	48 19.5	37 53	54.2	48 41.4	36 52	52.8	48 52.0	35 52	52.0	49 02.4	34 51	51.3	49 12.4	33 51	50.6	49 41.0	30 49	48.4	49 50.0	29 48	47.7	70
1	47 36.0	39 53	54.5	47 47.6	38 53	53.8	48 10.2	37 52	52.4	48 21.1	36 51	51.7	48 31.7	35 51	51.0	48 42.1	34 50	50.3	49 11.6	31 49	48.2	49 20.9	31 48	47.4	1
2	47 04.0	40 53	54.2	47 15.9	39 53	53.5	47 39.0	38 52	52.1	47 50.2	37 51	51.4	48 01.2	36 51	50.8	48 11.8	35 50	50.1	48 42.3	33 49	47.9	48 52.0	33 48	47.2	2
3	46 32.2	41 53	53.8	46 44.3	40 52	53.2	47 08.0	39 51	51.8	47 19.5	38 51	51.1	47 30.7	37 50	50.5	47 41.7	36 50	49.8	48 13.2	34 48	47.7	48 23.1	33 48	47.0	3
4	46 00.5	42 53	53.5	46 12.9	41 52	52.8	46 37.1	40 51	51.5	46 48.9	39 51	50.8	47 00.4	38 50	50.2	47 11.7	37 50	49.5	47 44.1	35 48	47.4	47 54.4	34 48	46.7	4
75	45 28.9	43 52	53.1	45 41.6	42 52	52.5	46 06.4	41 51	51.2	46 18.5	40 51	50.5	46 30.3	39 50	49.8	46 41.9	38 50	49.2	47 15.2	36 48	47.1	47 25.8	35 47	46.4	75
6	44 57.5	44 52	52.8	45 10.5	43 52	52.1	45 35.8	42 51	50.8	45 48.2	41 50	50.2	46 00.3	40 50	49.5	46 12.2	39 49	48.9	46 46.4	37 48	46.9	46 57.4	36 47	46.2	6
7	44 26.2	45 52	52.4	44 39.5	44 51	51.8	45 05.4	42 51	50.5	45 18.0	42 50	49.9	45 30.4	41 50	49.2	45 42.6	40 49	48.6	46 17.8	38 48	46.6	46 29.0	37 47	45.9	7
8	43 55.1	46 52	52.0	44 08.6	45 51	51.4	44 35.1	43 50	50.2	44 48.0	43 50	49.5	45 00.7	42 49	48.9	45 13.1	41 49	48.3	45 49.3	39 47	46.3	46 00.8	38 47	45.6	8
9	43 24.1	46 51	51.7	43 37.9	46 51	51.1	44 04.9	44 50	49.8	44 18.1	44 50	49.2	44 31.1	43 49	48.6	44 43.8	42 49	47.9	45 20.9	40 47	46.0	45 32.8	39 47	45.3	9
80	42 53.3	47 51	51.3	43 07.4	47 51	50.7	43 34.9	45 50	49.5	43 48.4	45 49	48.9	44 01.6	44 49	48.2	44 14.7	43 48	47.6	44 52.6	41 47	45.7	45 04.8	40 46	45.1	80
1	42 22.7	48 51	50.9	42 37.0	47 50	50.3	43 05.1	46 49	49.1	43 18.8	45 49	48.5	43 32.3	45 49	47.9	43 45.7	44 48	47.3	44 24.5	42 47	45.4	44 37.0	41 46	44.8	1
2	41 52.2	49 51	50.6	42 06.8	48 50	50.0	42 35.4	47 49	48.8	42 49.4	46 49	48.2	43 03.2	46 48	47.6	43 16.8	45 48	47.0	43 56.6	43 46	45.1	44 09.4	42 46	44.5	2
3	41 21.9	50 50	50.2	41 36.7	49 50	49.6	42 05.8	48 49	48.4	42 20.1	47 48	47.8	42 34.2	47 48	47.2	42 48.2	46 48	46.6	43 28.8	44 46	44.8	43 41.9	43 46	44.2	3
4	40 51.7	51 50	49.8	41 06.8	50 50	49.2	41 36.5	49 49	48.1	41 51.0	48 48	47.5	42 05.4	48 48	46.9	42 19.6	47 47	46.3	43 01.1	45 46	44.5	43 14.5	44 45	43.9	4
85	40 21.8	51 50	49.4	40 37.1	51 49	48.8	41 07.3	50 48	47.7	41 22.1	49 48	47.1	41 36.8	49 47	46.5	41 51.3	48 47	45.9	42 33.6	46 46	44.2	42 47.3	45 45	43.5	85
6	39 52.0	52 49	49.0	40 07.6	52 49	48.4	40 38.3	51 48	47.3	40 53.4	50 48	46.7	41 08.3	49 47	46.2	41 23.1	49 47	45.6	42 00.3	47 45	43.8	42 20.3	46 45	43.2	6
7	39 22.3	53 49	48.6	39 38.2	53 49	48.1	40 09.4	52 48	46.9	40 24.8	51 47	46.4	40 40.0	50 47	45.8	40 55.0	50 46	45.2	41 39.1	48 45	43.5	41 53.4	47 45	42.9	7
8	38 52.9	54 49	48.2	39 09.0	53 48	47.7	39 40.7	52 48	46.6	39 56.4	52 47	46.0	40 11.8	51 47	45.4	40 27.2	51 46	44.9	41 12.1	49 45	43.2	41 28.7	48 44	42.6	8
9	38 23.7	55 48	47.8	38 40.0	54 48	47.3	39 12.2	53 47	46.2	39 28.1	53 47	45.6	39 43.9	52 46	45.1	39 59.5	52 46	44.5	40 45.2	50 44	42.8	41 00.1	49 44	42.3	9
90	37 54.6	56 48	47.4	38 11.2	55 48	46.9	38 43.9	54 47	45.8	39 00.1	54 46	45.3	39 16.1	53 46	44.7	39 31.9	53 46	44.2	40 18.6	51 44	42.5	40 33.8	50 44	41.9	90

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H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	37 25.7	56 48	47.0	37 42.6	56 47	46.5	38 15.8	55 47	45.4	38 32.2	54 46	44.9	38 48.5	54 46	44.3	39 04.6	53 45	43.8	39 52.1	52 44	42.1	40 07.6	51 43	41.6	91
2	36 57.0	57 47	46.6	37 14.1	57 47	46.1	37 47.9	56 46	45.0	38 04.6	55 46	44.5	38 21.1	55 45	44.0	38 37.5	54 45	43.4	39 25.7	53 44	41.8	39 41.5	52 43	41.2	2
3	36 28.5	58 47	46.2	36 45.9	58 47	45.6	37 20.1	57 46	44.6	37 37.1	56 46	44.1	37 53.9	56 45	43.6	38 10.5	55 45	43.0	38 59.6	54 43	41.4	39 15.7	53 43	40.9	3
4	36 00.3	59 47	45.7	36 17.8	58 46	45.2	36 52.6	58 46	44.2	37 09.8	57 45	43.7	37 26.8	57 45	43.2	37 43.7	56 44	42.7	38 33.6	55 43	41.1	38 50.0	54 42	40.5	4
95	35 32.2	60 46	45.3	35 50.0	59 46	44.8	36 25.2	58 45	43.8	36 42.7	58 45	43.3	37 00.0	57 44	42.8	37 17.2	57 44	42.3	38 07.9	56 43	40.7	38 24.5	55 42	40.2	95
6	35 04.3	60 46	44.9	35 22.3	60 46	44.4	35 58.1	59 45	43.4	36 15.8	59 44	42.9	36 33.3	58 44	42.4	36 50.8	58 44	41.9	37 42.3	57 42	40.3	37 59.2	56 42	39.8	6
7	34 36.6	61 46	44.5	34 54.9	61 45	44.0	35 31.1	60 45	43.0	35 49.1	60 44	42.5	36 06.9	59 44	42.0	36 24.6	59 43	41.5	37 16.9	57 42	40.0	37 34.1	57 42	39.5	7
8	34 09.2	62 45	44.0	34 27.7	62 45	43.5	35 04.4	61 44	42.6	35 22.6	60 44	42.1	35 40.7	60 43	41.6	35 58.6	60 43	41.1	36 51.7	58 42	39.6	37 09.2	58 41	39.1	8
9	33 41.9	63 45	43.6	34 00.7	62 45	43.1	34 37.9	62 44	42.2	34 56.3	61 43	41.7	35 14.6	61 43	41.2	35 32.8	60 43	40.7	36 26.7	59 41	39.2	36 44.4	59 41	38.7	9
100	33 14.9	63 45	43.1	33 33.9	63 44	42.7	34 11.6	62 44	41.7	34 30.2	62 43	41.3	34 48.8	62 43	40.8	35 07.3	61 42	40.3	36 01.9	60 41	38.8	36 19.9	60 41	38.3	100
1	32 48.1	64 44	42.7	33 07.3	64 44	42.2	33 45.5	63 43	41.3	34 04.4	63 43	40.9	34 23.2	63 42	40.4	34 41.9	62 42	39.9	35 37.3	61 41	38.5	35 55.6	61 40	38.0	1
2	32 21.5	65 44	42.3	32 41.0	65 44	41.8	33 19.6	64 43	40.9	33 38.7	64 42	40.4	33 57.8	63 42	40.0	34 16.8	63 42	39.5	35 13.0	62 40	38.1	35 31.5	61 40	37.6	2
3	31 55.1	66 44	41.8	32 14.8	65 43	41.4	32 53.9	65 42	40.5	33 13.3	65 42	40.0	33 32.6	64 42	39.5	33 51.8	64 41	39.1	34 48.8	63 40	37.7	35 07.6	62 40	37.2	3
4	31 29.0	67 43	41.4	31 48.9	66 43	40.9	32 28.5	66 42	40.0	32 48.1	65 42	39.6	33 07.7	65 41	39.1	33 27.1	65 41	38.7	34 24.8	64 40	37.3	34 43.9	63 39	36.8	4
105	31 03.1	67 43	40.9	31 23.3	67 42	40.5	32 03.3	66 42	39.6	32 23.2	66 41	39.1	32 42.9	66 41	38.7	33 02.6	65 40	38.3	34 01.1	64 39	36.9	34 20.4	64 39	36.4	105
6	30 37.5	68 42	40.4	30 57.8	68 42	40.0	31 38.3	67 41	39.2	31 58.4	67 41	38.7	32 18.5	67 40	38.3	32 38.4	66 40	37.8	33 37.6	65 39	36.5	33 57.1	65 38	36.0	6
7	30 12.1	69 42	40.0	30 32.6	68 42	39.6	31 13.6	68 41	38.7	31 33.9	68 40	38.3	31 54.2	67 40	37.8	32 14.3	67 40	37.4	33 14.3	66 38	36.1	33 34.1	66 38	35.6	7
8	29 46.9	70 42	39.5	30 07.7	69 41	39.1	30 49.1	69 40	38.3	31 09.7	68 40	37.8	31 30.2	68 40	37.4	31 50.6	68 39	37.0	32 51.2	67 38	35.7	33 11.3	67 38	35.2	8
9	29 22.0	70 41	39.1	29 43.0	70 41	38.6	30 24.8	69 40	37.8	30 45.6	69 40	37.4	31 06.4	69 39	37.0	31 27.0	69 39	36.5	32 28.4	68 38	35.3	32 48.7	67 37	34.8	9
110	28 57.3	71 41	38.6	29 18.5	71 40	38.2	30 00.8	70 40	37.4	30 21.9	70 39	37.0	30 42.8	70 39	36.5	31 03.7	69 38	36.1	32 05.8	69 37	34.8	32 26.3	68 37	34.4	110
1	28 32.9	72 40	38.1	28 54.3	71 40	37.7	29 37.1	71 39	36.9	29 58.3	71 39	36.5	30 19.5	70 38	36.1	30 40.6	70 38	35.7	31 43.4	69 37	34.4	32 04.2	69 36	34.0	1
2	28 08.7	73 40	37.6	28 30.4	72 39	37.2	29 13.5	72 39	36.4	29 35.0	71 38	36.0	29 56.4	71 38	35.6	30 17.8	71 38	35.2	31 21.3	70 36	34.0	31 42.3	70 36	33.6	2
3	27 44.8	73 39	37.2	28 06.7	73 39	36.8	28 50.3	72 38	36.0	29 12.0	72 38	35.6	29 33.6	72 38	35.2	29 55.2	72 37	34.8	30 59.4	71 36	33.6	31 20.6	71 36	33.2	3
4	27 21.2	74 39	36.7	27 43.3	74 39	36.3	28 27.3	73 38	35.5	28 49.2	73 38	35.1	29 11.1	73 37	34.7	29 32.8	72 37	34.3	30 37.7	72 36	33.1	30 59.2	72 35	32.7	4
115	26 57.8	74 38	36.2	27 20.1	74 38	35.8	28 04.5	74 37	35.1	28 26.7	74 37	34.7	28 48.8	73 37	34.3	29 10.8	73 36	33.9	30 16.3	73 35	32.7	30 38.1	72 35	32.3	115
6	26 34.7	75 38	35.7	26 57.2	75 38	35.3	27 42.1	75 37	34.6	28 04.4	74 37	34.2	28 26.7	74 36	33.8	28 48.9	74 36	33.4	29 55.2	73 35	32.3	30 17.1	73 34	31.9	6
7	26 11.8	76 38	35.2	26 34.6	76 37	34.9	27 19.9	75 37	34.1	27 42.4	75 36	33.7	28 04.9	75 36	33.4	28 27.4	75 36	33.0	29 34.3	74 34	31.8	29 56.5	74 34	31.5	7
8	25 49.3	77 37	34.7	26 12.2	76 37	34.4	26 57.9	76 36	33.6	27 20.7	76 36	33.3	27 43.4	76 35	32.9	28 06.1	75 35	32.5	29 13.7	75 34	31.4	29 36.1	75 34	31.0	8
9	25 27.0	77 37	34.2	25 50.1	77 36	33.9	26 36.2	77 36	33.2	26 59.2	77 35	32.8	27 22.2	76 35	32.4	27 45.0	76 35	32.1	28 53.3	76 34	31.0	29 15.9	75 33	30.6	9
120	25 05.0	78 36	33.7	25 28.3	78 36	33.4	26 14.9	77 35	32.7	26 38.0	77 35	32.3	27 01.2	77 34	32.0	27 24.3	77 34	31.6	28 33.2	76 33	30.5	28 56.0	76 33	30.1	120
1	24 43.3	79 36	33.2	25 06.8	78 35	32.9	25 53.7	78 35	32.2	26 17.1	78 34	31.8	26 40.5	78 34	31.5	27 03.8	78 34	31.1	28 13.3	77 33	30.1	28 36.4	77 32	29.7	1
2	24 21.8	79 35	32.7	24 45.6	79 35	32.4	25 32.9	79 34	31.7	25 56.5	79 34	31.4	26 20.0	78 34	31.0	26 43.5	78 33	30.7	27 53.7	78 32	29.6	28 17.0	78 32	29.3	2
3	24 00.7	80 35	32.2	24 24.6	80 34	31.9	25 12.4	79 34	31.2	25 36.2	79 33	30.9	25 59.9	79 33	30.5	26 23.6	79 33	30.2	27 34.4	78 32	29.2	27 57.9	78 31	28.8	3
4	23 39.9	80 34	31.7	24 04.0	80 34	31.4	24 52.1	80 33	30.7	25 16.1	80 33	30.4	25 40.0	80 33	30.1	26 03.9	80 32	29.7	27 15.3	79 31	28.7	27 39.1	79 31	28.4	4
125	23 19.3	81 34	31.2	23 43.6	81 33	30.9	24 32.1	81 33	30.2	24 56.3	81 32	29.9	25 20.5	80 32	29.6	25 44.6	80 32	29.3	26 56.6	80 31	28.2	27 20.5	80 30	27.9	125
6	22 59.1	82 33	30.7	23 23.6	82 33	30.4	24 12.5	81 32	29.7	24 36.8	81 32	29.4	25 01.2	81 32	29.1	25 25.5	81 31	28.8	26 38.1	80 30	27.8	27 02.2	80 30	27.5	6
7	22 39.2	82 33	30.2	23 03.8	82 32	29.9	23 53.1	82 32	29.2	24 17.7	82 31	28.9	24 42.2	82 31	28.6	25 06.7	82 31	28.3	26 19.9	81 30	27.3	26 44.2	81 30	27.0	7
8	22 19.5	83 32	29.6	22 44.4	83 32	29.3	23 34.0	83 31	28.7	23 58.8	82 31	28.4	24 23.5	82 31	28.1	24 48.2	82 30	27.8	26 02.0	82 29	26.9	26 26.5	82 29	26.5	8
9	22 00.2	84 32	29.1	22 25.3	83 31	28.8	23 15.2	83 31	28.2	23 40.2	83 30	27.9	24 05.1	83 30	27.6	24 29.9	83 30	27.3	25 44.3	82 29	26.4	26 09.0	82 29	26.1	9
130	21 41.2	84 31	28.6	22 06.4	84 31	28.3	22 56.8	84 30	27.7	23 21.9	84 30	27.4	23 47.0	84 30	27.1	24 12.0	83 29	26.8	25 27.0	83 28	25.9	25 51.9	83 28	25.6	130
1	21 22.5	85 31	28.1	21 47.9	85 30	27.8	22 38.6	84 30	27.2	23 03.9	84 29	26.9	23 29.2	84 29	26.6	23 54.4	84 29	26.3	25 09.9	84 28	25.4	25 35.0	84 28	25.1	1
2	21 04.2	85 30	27.5	21 29.7	85 30	27.3	22 20.8	85 29	26.7	22 46.3	85 29	26.4	23 11.7	85 29	26.1	23 37.1	85 28	25.8	24 53.2	84 27	25.0	25 18.4	84 27	24.7	2
3	20 46.1	86 30	27.0	21 11.9	86 29	26.7	22 03.2	86 29	26.2	22 28.9	85 28	25.9	22 54.5	85 28	25.6	23 20.1	85 28	25.3	24 36.7	85 27	24.5	25 02.2	85 27	24.2	3
4	20 28.4	86 29	26.5	20 54.3	86 29	26.2	21 46.0	86 28	25.7	22 11.9	86 28	25.4	22 37.7	86 28	25.1	23 03.4	86 27	24.8	24 20.6	86 26	24.0	24 46.2	85 26	23.7	4
135	20 11.0	87 28	25.9	20 37.1	87 28	25.7	21 29.1	87 28	25.1	21 55.1	87 27	24.9	22 21.1	87 27	24.6	22 47.0	86 27	24.3	24 04.7	86 26	23.5	24 30.5	86 26	23.2	135
6	19 54.0	87 28	25.4	20 20.2	87 28	25.1	21 12.6	87 27	24.6	21 38.7	87 27	24.4	22 04.9	87 27	24.1	22 31.0	87 26	23.8	23 49.1	87 25	23.0	24 15.1	87 25	22.7	6
7	19 37.2	88 27	24.9	20 03.6	88 27	24.6	20 56.3	88 27	24.1	21 22.7	88 26	23.8	21 49.0	88 26	23.6	22 15.2	88 26	23.3	23 33.9	87 25	22.5	24 00.1	87 25	22.3	7
8	19 20.9	89 27	24.3	19 47.4	88 26	24.1	20 40.4	88 26	23.6	21 06.9	88 26	23.3	21 33.4	88 25	23.1	21 59.8	88 25	22.8	23 19.0	88 24	22.0	23 45.3	88 24	21.8	8
9	19 04.8	89 26	23.8	19 31.5	89 26	23.5	20 24.9	89 25	23.0	20 51.5	89 25	22.8	21 18.1	89 25	22.6	21 44.7	89 25	22.3	23 04.4	88 24	21.5	23 30.9	88 24	21.3	9
140	18 49.1	90 26	23.2	19 16.0	89 25	23.0	20 09.6	89 25	22.5	20 36.4	89 25	22.3	21 03.2	89 24	22.0	21 29.9	89 24	21.8	22 50.1	89 23	21.1	23 16.7	89 23	20.8	140
1	18 33.8	90 25	22.7	19 00.8	90 25	22.4	19 54.7	90 24	22.0	20 21.7	90 24	21.7	20 48.6	90 24	21.5	21 15.5	90 24	21.3	22 36.1	89 23	20.6	23 02.9	89 22	20.3	1
2	18 18.8	90 24	22.1	18 45.9	90 24	21.9	19 40.2	90 24	21.4	20 07.2	90 23	21.2	20 34.3	90 23	21.0	21 01.4	90 23	20.8	22 22.4	90 22	20.1	22 49.4	90 22	19.8	2
3	18 04.1	91 24	21.6	18 31.4	91 24	21.3	19 25.9	91 23	20.9	19 53.2	91 23	20.7	20 20.4	91 23	20.5	20 47.6	91 22	20.2	22 09.1	90 22	19.6	22 36.2	90 21	19.3	3
4	17 49.8	91 23	21.0	18 17.3	91 23	20.8	19 12.1	91 23	20.4	19 39.4	91 22	20.2	20 06.8	91 22	19.9	20 34.1	91 22	19.7	21 56.1	91 21	19.0	22 23.4	91 21	18.8	4
145	17 35.9	92 23	20.5	18 03.5	92 22	20.2	18 58.5	92 22	19.8	19 26.1	92 22	19.6	19 53.6	92 22	19.4	20 21.0	92 21	19.2	21 43.4	91 21	18.5	22 10.8	91 20	18.3	145
6	17 22.3	92 22	19.9	17 50.0	92 22	19.7	18 45.4	92 21	19.3	19 13.0	92 21	19.1	19 40.6	92 21	18.9	20 08.3	92 21	18.7	21 31.0	92 20	18.0	21 58.6	92 20	17.8	6
7	17 09.1	93 21	19.3	17 36.9	93 21	19.1	18 32.5	93 21	18.7	19 00.3	93 21	18.5	19 28.1	93 20	18.3	19 55.8	92 20	18.1	21 19.0	92 20	17.5	21 46.7	92 19	17.3	7
8	16 56.3	93 21	18.8	17 24.2	93 21	18.6	18 20.1	93 20	18.2	18 48.0	93 20	18.0	19 15.9	93 20	17.8	19 43.8	93 20	17.6	21 07.3	93 19	17.0	21 35.2	93 19	16.8	8
9	16 43.8	94 20	18.2	17 11.9	94 20	18.0	18 08.0	93 20	17.6	18 36.0	93 19	17.5	19 04.0	93 19	17.3	19 32.0	93 19	17.1	20 56.0	93 18	16.5	21 24.0	93 18	16.3	9
150	16 31.7	94 20	17.6	16 59.9	94 19	17.5	17 56.2	94 19	17.1	18 24.4	94 19	16.9	18 52.5	94 19	16.7	19 20.6	94 18	16.5	20 45.0	94 18	16.0	21 13.1	94 18	15.8	150
1	16 20.0	94 19	17.1	16 48.3	94 19	16.9	17 44.8	94 18	16.5	18 13.1	94 18	16.4	18 41.4	94 18	16.2	19 09.6	94 18	16.0	20 34.3	94 17	15.5	21 02.5	94 17	15.3	1
2	16 08.6	95 18	16.5	16 37.0	95 18	16.3	17 33.8	95 18	16.0	18 02.2	95 18	15.8	18 30.6	95 17	15.6	18 58.9	95 17	15.5	20 24.0	94 17	15.0	20 52.3	94 16	14.8	2
3	15 57.6	95 18	15.9	16 26.1	95 18	15.8	17 23.1	95 17	15.4	17 51.6	95 17	15.3	18 20.1	95 17	15.1	18 48.6	95 17	14.9	20 14.0	95 16	14.4	20 42.4	95 16	14.3	3
4	15 47.0	95 17	15.3	16 15.6	95 17	15.2	17 12.9	95 17	14.9	17 41.5	95 16	14.7	18 10.1	95 16	14.6	18 38.7	95 16	14.4	20 04.4	95 15	13.9	20 32.9	95 15	13.7	4
155	15 36.8	96 16	14.8	16 05.5	96 16	14.6	17 02.9	96 16	14.3	17 31.7	96 16	14.2	18 00.4	96 16	14.0	18 29.0	96 15	13.9	19 55.1	96 15	13.4	20 23.7	96 15	13.2	155
6	15 26.9	96 16	14.2	15 55.8	96 16	14.0	16 53.4	96 15	13.8	17 22.2	96 15	13.6	17 51.0	96 15	13.5	18 19.8	96 15	13.3	19 46.1	96 14	12.9	20 14.9	96 14	12.7	6
7	15 17.5	96 15	13.6	15 46.4	96 15	13.5	16 44.2	96 15	13.2	17 13.1	96 14	13.0	17 42.0	96 14	12.9	18 10.9	96 14	12.8	19 37.6	96 14	12.3	20 06.4	96 14	12.2	7
8	15 08.4	97 14	13.0	15 37.4	97 14	12.9	16 35.4	97 14	12.6	17 04.4	97 14	12.5	17 33.4	97 14	12.4	18 02.4	97 14	12.2	19 29.3	97 13	11.8	19 58.3	97 13	11.7	8
9	14 59.8	97 14	12.4	15 28.8	97 14	12.3	16 27.0	97 13	12.1	16 56.1	97 13	11.9	17 25.2	97 13	11.8	17 54.3	97 13	11.7	19 21.4	97 13	11.3	19 50.5	97 12	11.1	9
160	14 51.5	97 13	11.9	15 20.6	97 13	11.7	16 19.0	97 13	11.5	16 48.2	97 13	11.4	17 17.3	97 12	11.2	17 46.5	97 12	11.1	19 13.9	97 12	10.8	19 43.1	97 12	10.6	160
1	14 43.6	98 12	11.3	15 12.8	98 12	11.2	16 11.3	97 12	10.9	16 40.6	97 12	10.8	17 09.8	97 12	10.7	17 39.1	97 12	10.6	19 06.8	97 11	10.2	19 36.0	97 11	10.1	1
2	14 36.1	98 12	10.7	15 05.4	98 12	10.6	16 04.1	98 11	10.4	16 33.4	98 11	10.2	17 02.7	98 11	10.1	17 32.0	98 11	10.0	19 00.0	98 11	09.7	19 29.3	98 11	09.6	2
3	14 29.0	98 11	10.1	14 58.4	98 11	10.0	15 57.2	98 11	09.8	16 26.6	98 11	09.7	16 56.0	98 11	09.6	17 25.4	98 10	09.5	18 53.5	98 10	09.2	19 22.9	98 10	09.1	3
4	14 22.3	98 11	09.5	14 51.7	98 10	09.4	15 50.7	98 10	09.2	16 20.1	98 10	09.1	16 49.6	98 10	09.0	17 19.1	98 10	08.9	18 47.4	98 10	08.6	19 16.9	98 09	08.5	4
165	14 16.0	98 10	08.9	14 45.5	98 10	08.8	15 44.6	98 10	08.6	16 14.1	98 09	08.6	16 43.6	98 09	08.5	17 13.1	98 09	08.4	18 41.7	98 09	08.1	19 11.2	98 09	08.0	165
6	14 10.1	99 09	08.3	14 39.7	99 09	08.2	15 38.8	99 09	08.1	16 08.4	99 09	08.0	16 38.0	99 09	07.9	17 07.6	99 09	07.8	18 36.3	99 08	07.6	19 05.9	99 08	07.5	6
7	14 04.6	99 08	07.7	14 34.2	99 08	07.7	15 33.5	99 08	07.5	16 03.2	99 08	07.4	16 32.8	99 08	07.3	17 02.4	99 08	07.3	18 31.4	99 08	07.0	19 01.0	99 08	06.9	7
8	13 59.5	99 08	07.1	14 29.2	99 08	07.1	15 28.6	99 08	06.9	15 58.3	99 08	06.9	16 28.0	99 07	06.8	16 57.7	99 07	06.7	18 26.7	99 07	06.5	18 56.4	99 07	06.4	8
9	13 54.8	99 07	06.6	14 24.5	99 07	06.5	15 24.0	99 07	06.4	15 53.8	99 07	06.3	16 23.5	99 07	06.2	16 53.2	99 07	06.2	18 22.5	99 06	05.9	18 52.2	99 06	05.9	9
170	13 50.5	99 06	06.0	14 20.3	99 06	05.9	15 19.9	99 06	05.8	15 49.6	99 06	05.7	16 19.4	99 06	05.7	16 49.2	99 06	05.6	18 18.6	99 06	05.4	18 48.4	99 06	05.3	170
1	13 46.6	99 06	05.4	14 16.4	99 06	05.3	15 16.1	99 06	05.2	15 45.9	99 06	05.1	16 15.7	99 06	05.1	16 45.6	99 05	05.0	18 15.0	99 05	04.9	18 44.9	99 05	04.8	1
2	13 43.1	1.0 05	04.8	14 13.0	1.0 05	04.7	15 12.7	1.0 05	04.6	15 42.6	1.0 05	04.6	16 12.4	1.0 05	04.5	16 42.3	1.0 05	04.5	18 11.9	1.0 05	04.3	18 41.8	1.0 05	04.3	2
3	13 40.0	1.0 04	04.2	14 09.9	1.0 04	04.1	15 09.7	1.0 04	04.0	15 39.6	1.0 04	04.0	16 09.5	1.0 04	04.0	16 39.4	1.0 04	03.9	18 09.1	1.0 04	03.8	18 39.0	1.0 04	03.7	3
4	13 37.4	1.0 04	03.6	14 07.3	1.0 04	03.5	15 07.2	1.0 04	03.5	15 37.1	1.0 04	03.4	16 07.0	1.0 04	03.4	16 36.9	1.0 04	03.4	18 06.7	1.0 03	03.2	18 36.6	1.0 03	03.2	4
175	13 35.1	1.0 03	03.0	14 05.1	1.0 03	03.0	15 05.0	1.0 03	02.9	15 34.9	1.0 03	02.9	16 04.9	1.0 03	02.8	16 34.8	1.0 03	02.8	18 04.6	1.0 03	02.7	18 34.6	1.0 03	02.7	175
6	13 33.3	1.0 02	02.4	14 03.2	1.0 02	02.4	15 03.2	1.0 02	02.3	15 33.1	1.0 02	02.3	16 03.1	1.0 02	02.3	16 33.1	1.0 02	02.2	18 03.0	1.0 02	02.2	18 32.9	1.0 02	02.1	6
7	13 31.8	1.0 02	01.8	14 01.8	1.0 02	01.8	15 01.8	1.0 02	01.7	15 31.8	1.0 02	01.7	16 01.8	1.0 02	01.7	16 31.7	1.0 02	01.7	18 01.7	1.0 02	01.6	18 31.7	1.0 02	01.6	7
8	13 30.8	1.0 01	01.2	14 00.8	1.0 01	01.2	15 00.8	1.0 01	01.2	15 30.8	1.0 01	01.1	16 00.8	1.0 01	01.1	16 30.8	1.0 01	01.1	18 00.7	1.0 01	01.1	18 30.7	1.0 01	01.1	8
9	13 30.2	1.0 00	00.6	14 00.2	1.0 00	00.6	15 00.2	1.0 00	00.6	15 30.2	1.0 00	00.6	16 00.2	1.0 00	00.6	16 30.2	1.0 00	00.6	18 00.2	1.0 00	00.5	18 30.2	1.0 00	00.5	9
180	13 30.0	1.0 00	00.0	14 00.0	1.0 00	00.0	15 00.0	1.0 00	00.0	15 30.0	1.0 00	00.0	16 00.0	1.0 00	00.0	16 30.0	1.0 00	00.0	18 00.0	1.0 00	00.0	18 30.0	1.0 00	00.0	180

Lat. 49°

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	Alt.	Δd	Az.	
°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	′	Δt	°	
00	79 00.0	1.0 02	00.0	78 30.0	1.0 01	00.0	77 00.0	1.0 01	00.0	76 30.0	1.0 01	00.0	76 00.0	1.0 01	00.0	70 00.0	1.0 01	00.0	69 30.0	1.0 01	00.0	64 30.0	1.0 00	00.0	00
1	78 59.1	1.0 04	02.6	78 29.2	1.0 04	02.5	76 59.3	1.0 04	02.1	76 29.3	1.0 03	02.0	75 59.4	1.0 03	01.9	69 59.6	1.0 02	01.0	69 29.7	1.0 02	01.0	64 29.8	1.0 01	00.6	1
2	78 56.4	99 07	05.2	78 26.6	99 07	04.9	76 57.1	99 06	04.2	76 27.3	1.0 06	03.9	75 57.4	1.0 05	03.7	69 58.6	1.0 03	02.1	69 28.6	1.0 03	02.0	64 29.1	1.0 02	01.2	2
3	78 51.9	98 10	07.8	78 22.4	99 10	07.3	76 53.6	99 08	06.2	76 23.9	99 08	05.9	75 54.2	99 07	05.6	69 56.8	99 04	03.1	69 26.9	1.0 04	03.0	64 28.1	1.0 02	01.9	3
4	78 45.8	97 13	10.3	78 16.6	97 12	09.7	76 48.6	98 11	08.3	76 19.2	98 10	07.8	75 49.8	98 10	07.4	69 54.3	99 05	04.2	69 24.5	99 05	04.0	64 26.6	99 03	02.5	4
05	78 37.9	96 16	12.8	78 09.1	96 15	12.1	76 42.3	97 13	10.2	76 13.2	97 12	09.7	75 44.0	97 12	09.2	69 51.0	99 07	05.2	69 21.4	99 06	05.0	64 24.7	99 04	03.1	05
6	78 28.4	94 18	15.2	78 00.1	94 17	14.3	76 34.6	96 15	12.2	76 05.9	96 14	11.6	75 37.1	96 14	11.0	69 47.1	98 08	06.2	69 17.7	98 07	05.9	64 22.3	99 05	03.7	6
7	78 17.3	92 21	17.5	77 49.6	93 20	16.5	76 25.7	94 17	14.1	75 57.4	94 16	13.4	75 29.0	95 15	12.8	69 42.5	97 09	07.2	69 13.3	97 08	06.9	64 19.6	98 05	04.3	7
8	78 04.8	90 23	19.7	77 37.7	90 22	18.7	76 15.4	92 19	16.0	75 47.7	93 18	15.2	75 19.8	93 17	14.4	69 37.2	97 10	08.2	69 08.2	97 10	07.9	64 16.4	98 06	04.9	8
9	77 50.8	87 25	21.8	77 24.5	88 24	20.7	76 04.0	90 21	17.8	75 36.8	91 20	16.9	75 09.4	92 19	16.1	69 31.2	96 11	09.2	69 02.5	96 11	08.8	64 12.9	97 07	05.5	9
10	77 35.5	85 28	23.8	77 09.9	86 26	22.6	75 51.4	88 23	19.5	75 24.8	89 22	18.6	74 57.9	90 21	17.7	69 24.6	95 12	10.2	68 56.2	95 12	09.7	64 08.9	97 07	06.1	10
1	77 19.0	82 29	25.8	76 54.2	83 28	24.5	75 37.8	86 25	21.2	75 11.7	87 23	20.2	74 45.5	88 22	19.2	69 17.3	94 13	11.1	68 49.2	94 13	10.7	64 04.5	96 08	06.7	1
2	77 01.4	79 31	27.6	76 37.3	81 30	26.3	75 23.0	84 26	22.8	74 57.7	85 25	21.7	74 32.0	86 24	20.7	69 09.4	92 14	12.1	68 41.6	93 14	11.6	63 59.7	95 09	07.3	2
3	76 42.6	77 33	29.3	76 19.4	78 32	27.9	75 07.3	82 28	24.3	74 42.6	83 27	23.2	74 17.6	84 25	22.2	69 00.8	91 15	13.0	68 33.4	91 15	12.4	63 54.5	94 09	07.9	3
4	76 22.9	74 34	30.9	76 00.5	75 33	29.5	74 50.7	79 29	25.7	74 26.7	81 28	24.6	74 02.3	82 27	23.5	68 51.7	90 16	13.9	68 24.7	90 16	13.3	63 48.9	93 10	08.4	4
15	76 02.2	71 36	32.4	75 40.6	73 34	31.0	74 33.2	77 31	27.1	74 09.9	78 29	26.0	73 46.2	79 28	24.9	68 41.9	88 17	14.8	68 15.3	89 17	14.2	63 43.0	92 11	09.0	15
6	75 40.7	68 37	33.9	75 19.9	70 36	32.4	74 14.8	75 32	28.5	73 52.2	76 31	27.3	73 29.3	77 30	26.1	68 31.6	87 18	15.7	68 05.4	87 17	15.0	63 36.6	91 11	09.5	6
7	75 18.4	65 38	35.2	74 58.4	67 37	33.7	73 55.6	72 33	29.7	73 33.8	74 32	28.5	73 11.5	75 31	27.3	68 20.7	85 19	16.5	67 55.0	86 18	15.8	63 29.9	90 12	10.1	7
8	74 55.3	63 40	36.4	74 36.2	65 38	35.0	73 35.8	70 34	30.9	73 14.7	71 33	29.7	72 53.1	72 32	28.5	68 09.2	84 20	17.3	67 44.0	84 19	16.6	63 22.8	89 12	10.6	8
9	74 31.6	60 41	37.6	74 13.3	62 39	36.1	73 15.2	67 35	32.0	72 54.8	69 34	30.8	72 34.0	70 33	29.6	67 57.2	82 21	18.1	67 32.5	83 20	17.4	63 15.4	88 13	11.1	9
20	74 07.3	57 41	38.7	73 49.8	59 40	37.2	72 54.0	65 36	33.1	72 34.4	66 35	31.8	72 14.3	68 34	30.6	67 44.8	81 22	18.9	67 20.5	81 21	18.1	63 07.6	87 14	11.7	20
1	73 42.4	55 42	39.7	73 25.7	57 41	38.2	72 32.2	62 37	34.1	72 13.3	64 36	32.8	71 54.0	65 35	31.6	67 31.8	79 22	19.6	67 08.0	80 22	18.8	62 59.5	86 14	12.2	1
2	73 17.0	52 43	40.6	73 01.1	54 42	39.2	72 09.9	60 38	35.0	71 51.7	61 37	33.8	71 33.1	63 36	32.5	67 18.3	77 23	20.4	66 55.1	78 22	19.5	62 51.0	84 15	12.7	2
3	72 51.2	49 44	41.5	72 36.0	52 43	40.0	71 47.0	57 39	35.9	71 29.6	59 38	34.6	71 11.7	61 36	33.4	67 04.4	75 24	21.1	66 41.7	76 23	20.2	62 42.2	83 15	13.2	3
4	72 24.9	47 44	42.3	72 10.5	49 43	40.9	71 23.7	55 40	36.8	71 07.0	57 38	35.5	70 49.8	58 37	34.2	66 50.0	73 25	21.7	66 27.8	74 24	20.9	62 33.1	82 16	13.6	4
25	71 58.2	44 45	43.1	71 44.5	47 44	41.6	70 59.9	52 40	37.5	70 43.9	54 39	36.3	70 27.4	56 38	35.0	66 35.2	72 25	22.4	66 13.6	73 24	21.5	62 23.7	80 16	14.1	25
6	71 31.1	42 46	43.7	71 18.2	44 44	42.3	70 35.8	50 41	38.3	70 20.5	52 40	37.0	70 04.6	54 39	35.7	66 20.0	70 26	23.0	65 58.9	71 25	22.2	62 13.9	79 17	14.6	6
7	71 03.8	40 46	44.4	70 51.5	42 45	43.0	70 11.2	48 42	39.0	69 56.6	50 40	37.7	69 41.4	51 39	36.4	66 04.4	68 27	23.7	65 43.9	69 26	22.8	62 03.9	77 17	15.0	7
8	70 36.1	37 47	45.0	70 24.5	40 45	43.6	69 46.3	45 42	39.6	69 32.3	47 41	38.3	69 17.9	49 40	37.1	65 48.4	66 27	24.2	65 28.5	67 26	23.3	61 53.5	76 18	15.4	8
9	70 08.1	35 47	45.5	69 57.3	37 46	44.1	69 21.0	43 43	40.2	69 07.8	45 41	38.9	68 54.0	47 40	37.7	65 32.1	64 28	24.8	65 12.7	65 27	23.9	61 42.9	74 18	15.9	9
30	69 39.9	33 47	46.0	69 29.7	35 46	44.7	68 55.5	41 43	40.8	68 42.9	43 42	39.5	68 29.8	45 41	38.3	65 15.4	62 28	25.3	64 56.6	63 27	24.4	61 32.0	73 19	16.3	30
1	69 11.5	31 48	46.5	69 01.9	33 47	45.1	68 29.6	39 43	41.3	68 17.7	41 42	40.0	68 05.2	42 41	38.8	64 58.4	60 29	25.9	64 40.2	61 28	24.9	61 20.8	71 19	16.7	1
2	68 42.9	29 48	46.9	68 33.9	31 47	45.6	68 03.5	37 44	41.7	67 52.3	39 43	40.5	67 40.4	40 42	39.3	64 41.1	58 29	26.4	64 23.4	59 28	25.4	61 09.4	69 19	17.1	2
3	68 14.0	27 48	47.3	68 05.7	29 47	46.0	67 37.2	35 44	42.2	67 26.6	36 43	41.0	67 15.4	38 42	39.8	64 23.4	56 30	26.8	64 06.4	58 29	25.9	60 57.7	68 20	17.4	3
4	67 45.1	25 49	47.6	67 37.3	27 48	46.3	67 10.7	32 45	42.6	67 00.7	34 44	41.4	66 50.1	36 43	40.2	64 05.5	54 30	27.3	63 49.0	56 29	26.3	60 45.8	66 20	17.8	4
35	67 15.9	23 49	47.9	67 08.8	25 48	46.7	66 43.9	30 45	43.0	66 34.5	32 44	41.8	66 24.6	34 43	40.6	63 47.3	52 31	27.7	63 31.4	54 30	26.8	60 33.7	64 21	18.2	35
6	66 46.6	21 49	48.2	66 40.1	23 48	47.0	66 17.0	28 45	43.3	66 08.2	30 44	42.1	65 58.9	32 43	41.0	63 28.9	50 31	28.2	63 13.6	52 30	27.2	60 21.3	63 21	18.5	6
7	66 17.2	19 49	48.4	66 11.3	21 48	47.2	65 49.9	26 45	43.6	65 41.7	28 44	42.5	65 33.0	30 43	41.3	63 10.2	48 32	28.5	62 55.5	50 31	27.6	60 08.7	61 21	18.8	7
8	65 47.7	17 49	48.7	65 42.3	19 48	47.5	65 22.7	25 46	43.9	65 15.1	26 45	42.8	65 06.9	28 44	41.6	62 51.3	47 32	28.9	62 37.1	48 31	28.0	59 55.8	59 22	19.2	8
9	65 18.1	15 49	48.9	65 13.2	17 49	47.7	64 55.3	23 46	44.2	64 48.3	24 45	43.0	64 40.7	26 44	41.9	62 32.1	45 32	29.3	62 18.6	46 31	28.3	59 42.8	57 22	19.5	9
40	64 48.5	14 50	49.0	64 44.1	15 49	47.9	64 27.8	21 46	44.4	64 21.3	22 45	43.3	64 14.3	24 44	42.2	62 12.8	43 33	29.6	61 59.8	44 32	28.6	59 29.6	56 22	19.8	40
1	64 18.7	12 50	49.2	64 14.9	14 49	48.0	64 00.2	19 46	44.6	63 54.3	21 45	43.5	63 47.8	22 44	42.4	61 53.2	41 33	29.9	61 40.8	42 32	29.0	59 16.2	54 23	20.1	1
2	63 48.9	10 50	49.3	63 45.6	12 49	48.2	63 32.5	17 46	44.8	63 27.1	19 45	43.7	63 21.2	20 45	42.6	61 33.5	39 33	30.2	61 21.7	40 32	29.3	59 02.6	52 23	20.3	2
3	63 19.0	09 50	49.4	63 16.2	10 49	48.3	63 04.7	15 46	45.0	62 59.9	17 46	43.9	62 54.5	19 45	42.8	61 13.6	37 33	30.5	61 02.3	38 32	29.6	58 48.8	50 23	20.6	3
4	62 49.1	07 50	49.5	62 46.8	09 49	48.4	62 36.8	14 47	45.2	62 32.5	15 46	44.1	62 27.7	17 45	43.0	60 53.5	35 34	30.8	60 42.8	36 33	29.8	58 34.9	49 24	20.9	4
45	62 19.2	05 50	49.6	62 17.3	07 49	48.5	62 08.9	12 47	45.3	62 05.1	13 46	44.2	62 00.8	15 45	43.2	60 33.3	33 34	31.0	60 23.2	34 33	30.1	58 20.8	47 24	21.1	45
6	61 49.2	04 50	49.6	61 47.8	05 49	48.5	61 40.9	10 47	45.4	61 37.6	12 46	44.3	61 33.9	13 45	43.3	60 13.0	31 34	31.3	60 03.4	33 33	30.3	58 06.5	45 24	21.3	6
7	61 19.2	02 50	49.6	61 18.3	04 49	48.6	61 12.8	08 47	45.5	61 10.1	10 46	44.4	61 06.8	12 45	43.4	59 52.5	29 34	31.5	59 43.5	31 33	30.5	57 52.1	43 24	21.6	7
8	60 49.2	01 50	49.7	60 48.8	02 49	48.6	60 44.8	07 47	45.6	60 42.5	08 46	44.5	60 39.7	10 45	43.5	59 31.8	27 35	31.7	59 23.4	29 34	30.7	57 37.6	41 24	21.8	8
9	60 19.2	01 50	49.6	60 19.2	01 49	48.6	60 16.6	05 47	45.6	60 14.9	07 46	44.6	60 12.6	08 45	43.6	59 11.1	26 35	31.9	59 03.2	27 34	30.9	57 22.9	40 25	22.0	9
50	59 49.2	02 50	49.6	59 49.7	01 49	48.6	59 48.5	04 47	45.7	59 47.2	05 46	44.7	59 45.5	07 45	43.7	58 50.3	24 35	32.0	58 42.9	25 34	31.1	57 08.1	38 25	22.2	50
1	59 19.2	04 50	49.6	59 20.2	02 49	48.6	59 20.3	02 47	45.7	59 19.5	03 46	44.7	59 18.3	05 45	43.7	58 29.4	22 35	32.2	58 22.6	23 34	31.3	56 53.2	36 25	22.3	1
2	58 49.3	05 50	49.6	58 50.6	04 49	48.6	58 52.2	00 47	45.7	58 51.8	02 46	44.7	58 51.0	03 45	43.8	58 08.3	20 35	32.3	58 02.1	22 34	31.4	56 38.2	34 25	22.5	2
3	58 19.3	07 50	49.5	58 21.1	05 49	48.5	58 24.0	01 47	45.7	58 24.1	00 46	44.7	58 23.8	02 45	43.8	57 47.2	18 35	32.5	57 41.5	20 34	31.6	56 23.1	32 25	22.7	3
4	57 49.4	08 50	49.4	57 51.6	07 49	48.5	57 55.8	03 47	45.7	57 56.4	01 46	44.7	57 56.6	00 45	43.8	57 26.1	17 35	32.6	57 20.9	18 34	31.7	56 07.9	30 26	22.8	4
55	57 19.5	10 50	49.3	57 22.2	08 49	48.4	57 27.7	04 47	45.6	57 28.7	03 46	44.7	57 29.3	01 45	43.8	57 04.8	15 35	32.7	57 00.2	16 35	31.8	55 52.5	29 26	23.0	55
6	56 49.7	11 50	49.3	56 52.7	10 49	48.3	56 59.6	06 47	45.6	57 01.0	04 46	44.7	57 02.1	03 45	43.8	56 43.5	13 36	32.8	56 39.4	14 35	31.9	55 37.1	27 26	23.1	6
7	56 19.9	12 50	49.1	56 23.3	11 49	48.3	56 31.4	07 47	45.5	56 33.4	06 46	44.6	56 34.9	04 45	43.7	56 22.2	11 36	32.9	56 18.6	13 35	32.0	55 21.7	25 26	23.2	7
8	55 50.1	14 50	49.0	55 54.0	12 49	48.1	56 03.4	08 47	45.5	56 05.7	07 46	44.6	56 07.7	06 45	43.7	56 00.8	10 36	32.9	55 57.7	11 35	32.0	55 06.1	23 26	23.3	8
9	55 20.4	15 49	48.9	55 24.7	14 49	48.0	55 35.3	10 47	45.4	55 38.1	09 46	44.5	55 40.5	07 45	43.6	55 39.4	08 36	33.0	55 36.8	09 35	32.1	54 50.5	22 26	23.4	9
60	54 50.8	16 49	48.8	54 55.5	15 49	47.9	55 07.3	11 47	45.3	55 10.5	10 46	44.4	55 13.4	09 45	43.6	55 18.0	06 36	33.0	55 15.9	08 35	32.2	54 34.8	20 26	23.5	60
1	54 21.2	17 49	48.6	54 26.3	16 49	47.8	54 39.3	13 47	45.2	54 43.0	11 46	44.4	54 46.2	10 45	43.5	54 56.5	05 36	33.1	54 54.9	06 35	32.2	54 19.0	18 26	23.6	1
2	53 51.7	19 49	48.5	53 57.2	18 48	47.6	54 11.4	14 46	45.1	54 15.5	13 46	44.3	54 19.2	12 45	43.4	54 35.0	03 36	33.1	54 33.9	04 35	32.2	54 03.2	16 26	23.7	2
3	53 22.3	20 49	48.3	53 28.1	19 48	47.5	53 43.6	15 46	45.0	53 48.0	14 46	44.2	53 52.1	13 45	43.3	54 13.5	01 36	33.1	54 12.9	03 35	32.3	53 47.4	14 26	23.8	3
4	52 52.9	21 49	48.1	52 59.1	20 48	47.3	53 15.8	17 46	44.9	53 20.6	16 46	44.0	53 25.2	14 45	43.2	53 52.0	00 36	33.1	53 51.9	01 35	32.3	53 31.5	13 27	23.8	4
65	52 23.7	22 49	48.0	52 30.2	21 48	47.2	52 48.0	18 46	44.7	52 53.3	17 45	43.9	52 58.2	16 45	43.1	53 30.5	02 36	33.1	53 30.9	01 35	32.3	53 15.6	11 27	23.9	65
6	51 54.5	24 48	47.8	52 01.4	23 48	47.0	52 20.4	19 46	44.6	52 26.0	18 45	43.8	52 31.4	17 45	43.0	53 09.0	04 36	33.1	53 09.9	02 35	32.3	52 59.6	09 27	23.9	6
7	51 25.4	25 48	47.6	51 32.7	24 48	46.8	51 52.8	21 46	44.4	51 58.8	20 45	43.6	52 04.6	19 45	42.8	52 47.5	05 36	33.1	52 48.9	04 35	32.2	52 43.7	07 27	24.0	7
8	50 56.4	26 48	47.4	51 04.0	25 48	46.6	51 25.3	22 46	44.3	51 31.7	21 45	43.5	51 37.8	20 44	42.7	52 26.1	07 36	33.0	52 27.9	06 35	32.2	52 27.7	06 27	24.0	8
9	50 27.5	27 48	47.2	50 35.5	26 47	46.4	50 57.8	23 46	44.1	51 04.7	22 45	43.3	51 11.2	21 44	42.5	52 04.6	08 36	33.0	52 06.9	07 35	32.2	52 11.6	04 27	24.0	9
70	49 58.6	28 48	46.9	50 07.0	28 47	46.2	50 30.5	25 45	43.9	50 37.7	24 45	43.2	50 44.6	23 44	42.4	51 43.2	10 36	32.9	51 46.0	09 35	32.1	51 55.6	02 27	24.0	70
1	49 29.9	30 48	46.7	49 38.7	29 47	46.0	50 03.2	26 45	43.7	50 10.8	25 45	43.0	50 18.1	24 44	42.2	51 21.8	11 36	32.9	51 25.1	10 35	32.1	51 39.6	01 27	24.0	1
2	49 01.3	31 47	46.5	49 10.4	30 47	45.8	49 36.0	27 45	43.5	49 44.0	26 44	42.8	49 51.7	25 44	42.1	51 00.5	13 36	32.8	51 04.2	12 35	32.0	51 23.6	01 27	24.0	2
3	48 32.8	32 47	46.2	48 42.3	31 47	45.5	49 09.0	28 45	43.3	49 17.3	27 44	42.6	49 25.4	26 44	41.9	50 39.2	14 35	32.7	50 43.4	13 35	31.9	51 07.5	03 27	24.0	3
4	48 04.5	33 47	46.0	48 14.3	32 47	45.3	48 42.0	29 45	43.1	48 50.7	29 44	42.4	48 59.2	28 44	41.7	50 17.9	16 35	32.6	50 22.6	15 35	31.9	50 51.5	04 27	24.0	4
75	47 36.2	34 47	45.7	47 46.3	33 46	45.1	48 15.1	31 45	42.9	48 24.2	30 44	42.2	48 33.0	29 43	41.5	49 56.7	17 35	32.5	50 01.8	16 34	31.8	50 35.5	06 27	24.0	75
6	47 08.1	35 47	45.5	47 18.5	34 46	44.8	47 48.4	32 44	42.7	47 57.8	31 44	42.0	48 07.0	30 43	41.3	49 35.6	19 35	32.4	49 41.1	18 34	31.7	50 19.5	08 27	24.0	6
7	46 40.1	36 46	45.2	46 50.9	36 46	44.5	47 21.8	33 44	42.5	47 31.5	32 44	41.8	47 41.1	31 43	41.1	49 14.5	20 35	32.3	49 20.5	19 34	31.6	50 03.5	09 27	23.9	7
8	46 12.2	37 46	45.0	46 23.3	37 46	44.3	46 55.2	34 44	42.2	47 05.4	33 43	41.6	47 15.3	33 43	40.9	48 53.5	22 35	32.2	48 59.9	21 34	31.5	49 47.6	11 27	23.9	8
9	45 44.4	39 46	44.7	45 55.9	38 45	44.0	46 28.8	35 44	42.0	46 39.3	35 43	41.3	46 49.6	34 43	40.6	48 32.5	23 35	32.1	48 39.4	22 34	31.4	49 31.6	12 26	23.8	9
80	45 16.8	40 46	44.4	45 28.6	39 45	43.8	46 02.5	37 44	41.8	46 13.4	36 43	41.1	46 24.0	35 42	40.4	48 11.7	25 35	32.0	48 18.9	24 34	31.2	49 15.7	14 26	23.8	80
1	44 49.4	41 46	44.1	45 01.4	40 45	43.5	45 36.4	38 43	41.5	45 47.6	37 43	40.9	45 58.5	36 42	40.2	47 50.9	26 35	31.8	47 58.5	25 34	31.1	48 59.9	16 26	23.7	1
2	44 22.0	42 45	43.8	44 34.4	41 45	43.2	45 10.4	39 43	41.3	45 21.9	38 43	40.6	45 33.2	37 42	39.9	47 30.1	27 34	31.7	47 38.2	27 34	31.0	48 44.1	17 26	23.7	2
3	43 54.8	43 45	43.5	44 07.6	42 45	42.9	44 44.5	40 43	41.0	44 56.3	39 42	40.3	45 08.0	38 42	39.7	47 09.5	29 34	31.5	47 18.0	28 34	30.8	48 28.3	19 26	23.6	3
4	43 27.8	44 45	43.2	43 40.8	43 44	42.6	44 18.7	41 43	40.7	44 30.9	40 42	40.1	44 42.9	40 42	39.4	46 49.0	30 34	31.4	46 57.9	29 33	30.7	48 12.6	20 26	23.5	4
85	43 00.9	45 45	42.9	43 14.2	44 44	42.3	43 53.1	42 42	40.5	44 05.6	41 42	39.8	44 18.0	41 41	39.2	46 28.5	32 34	31.2	46 37.8	31 33	30.5	47 56.9	22 26	23.4	85
6	42 34.2	46 44	42.6	42 47.8	45 44	42.0	43 27.6	43 42	40.2	43 40.5	43 42	39.6	43 53.2	42 41	38.9	46 08.1	33 34	31.1	46 17.9	32 33	30.4	47 41.3	23 26	23.3	6
7	42 07.6	47 44	42.3	42 21.5	46 44	41.7	43 02.3	44 42	39.9	43 15.5	44 41	39.3	43 28.5	43 41	38.7	45 47.9	34 34	30.9	45 58.0	33 33	30.2	47 25.7	25 26	23.2	7
8	41 41.2	48 44	42.0	41 55.4	47 43	41.4	42 37.1	45 42	39.6	42 50.7	45 41	39.0	43 04.0	44 41	38.4	45 27.7	36 33	30.7	45 38.3	35 33	30.0	47 10.2	26 26	23.1	8
9	41 14.9	49 44	41.7	41 29.5	48 43	41.1	42 12.1	46 41	39.3	42 26.0	46 41	38.7	42 39.6	45 40	38.1	45 07.7	37 33	30.5	45 18.6	36 33	29.9	46 54.8	28 26	23.0	9
90	40 48.8	50 43	41.3	41 03.7	49 43	40.8	41 47.2	48 41	39.0	42 01.4	47 41	38.4	42 15.4	46 40	37.8	44 47.7	38 33	30.3	44 59.1	37 32	29.7	46 39.4	29 26	22.9	90

Lat. 49°

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	40 22.9	51 43	41.0	40 38.1	50 42	40.5	41 22.5	49 41	38.7	41 37.0	48 40	38.1	41 51.3	47 40	37.5	44 27.9	39 33	30.1	44 39.6	39 32	29.5	46 24.1	31 25	22.8	91
2	39 57.1	52 43	40.7	40 12.6	51 42	40.1	40 58.0	50 41	38.4	41 12.8	49 40	37.8	41 27.4	48 40	37.3	44 08.2	41 33	29.9	44 20.3	40 32	29.3	46 08.9	32 25	22.7	2
3	39 31.6	53 42	40.3	39 47.3	52 42	39.8	40 33.6	51 40	38.1	40 48.7	50 40	37.5	41 03.7	49 39	37.0	43 48.6	42 32	29.7	44 01.1	41 32	29.1	45 53.8	34 25	22.5	3
4	39 06.2	54 42	40.0	39 22.2	53 42	39.5	40 09.4	52 40	37.8	40 24.8	51 40	37.2	40 40.1	51 39	36.7	43 29.2	43 32	29.5	43 42.0	42 32	28.9	45 38.7	35 25	22.4	4
95	38 41.0	55 42	39.6	38 57.3	54 41	39.1	39 45.4	53 40	37.5	40 01.1	52 39	36.9	40 16.7	52 39	36.4	43 09.8	44 32	29.3	43 23.1	44 31	28.7	45 23.8	37 25	22.3	95
6	38 15.9	56 41	39.3	38 32.6	55 41	38.8	39 21.5	54 39	37.1	39 37.5	53 39	36.6	39 53.4	53 38	36.0	42 50.6	46 32	29.1	43 04.2	45 31	28.5	45 08.9	38 25	22.1	6
7	37 51.1	57 41	38.9	38 08.0	56 41	38.4	38 57.8	55 39	36.8	39 14.2	54 39	36.3	39 30.3	54 38	35.7	42 31.6	47 32	28.9	42 45.5	46 31	28.3	44 54.1	39 24	22.0	7
8	37 26.5	57 41	38.6	37 43.6	57 40	38.1	38 34.3	56 39	36.5	38 51.0	55 38	36.0	39 07.4	55 38	35.4	42 12.7	48 31	28.6	42 27.0	47 31	28.0	44 39.4	41 24	21.8	8
9	37 02.0	58 40	38.2	37 19.5	58 40	37.7	38 11.0	57 39	36.2	38 27.9	56 38	35.6	38 44.7	56 38	35.1	41 53.9	49 31	28.4	42 08.5	49 30	27.8	44 24.8	42 24	21.7	9
100	36 37.8	59 40	37.8	36 55.5	59 40	37.3	37 47.9	58 38	35.8	38 05.1	57 38	35.3	38 22.2	57 37	34.8	41 35.2	50 31	28.2	41 50.2	50 30	27.6	44 10.3	43 24	21.5	100
1	36 13.7	60 40	37.5	36 31.7	60 39	37.0	37 25.0	59 38	35.5	37 42.5	58 37	35.0	37 59.8	58 37	34.4	41 16.7	52 31	27.9	41 32.1	51 30	27.3	43 55.9	45 24	21.4	1
2	35 49.9	61 39	37.1	36 08.1	61 39	36.6	37 02.2	59 38	35.1	37 20.0	59 37	34.6	37 37.7	59 37	34.1	40 58.4	53 30	27.7	41 14.1	52 30	27.1	43 41.7	46 24	21.2	2
3	35 26.2	62 39	36.7	35 44.8	62 39	36.2	36 39.7	60 37	34.8	36 57.7	60 37	34.3	37 15.7	60 36	33.8	40 40.2	54 30	27.4	40 56.2	53 30	26.9	43 27.5	47 23	21.0	3
4	35 02.8	63 39	36.3	35 21.6	63 38	35.9	36 17.3	61 37	34.4	36 35.7	61 36	33.9	36 53.9	61 36	33.4	40 22.1	55 30	27.2	40 38.5	54 29	26.6	43 13.4	49 23	20.8	4
105	34 39.6	64 38	36.0	34 58.6	63 38	35.5	35 55.2	62 37	34.1	36 13.8	62 36	33.6	36 32.3	61 36	33.1	40 04.2	56 30	26.9	40 21.0	56 29	26.4	42 59.5	50 23	20.7	105
6	34 16.6	65 38	35.6	34 35.9	64 38	35.1	35 33.2	63 36	33.7	35 52.1	63 36	33.2	36 10.9	62 35	32.7	39 46.5	57 29	26.6	40 03.6	57 29	26.1	42 45.6	51 23	20.5	6
7	33 53.8	65 38	35.2	34 13.4	65 37	34.7	35 11.5	64 36	33.3	35 30.7	64 35	32.9	35 49.7	63 35	32.4	39 28.9	58 29	26.4	39 46.4	58 28	25.8	42 31.9	52 23	20.3	7
8	33 31.2	66 37	34.8	33 51.1	66 37	34.3	34 50.0	65 36	33.0	35 09.4	65 35	32.5	35 28.8	64 35	32.0	39 11.6	59 29	26.1	39 29.3	59 28	25.6	42 18.3	54 22	20.1	8
9	33 08.9	67 37	34.4	33 29.0	67 36	33.9	34 28.7	66 35	32.6	34 48.4	66 35	32.1	35 08.0	65 34	31.7	38 54.3	60 28	25.8	39 12.4	60 28	25.3	42 04.9	55 22	19.9	9
110	32 46.8	68 36	34.0	33 07.1	68 36	33.5	34 07.6	67 35	32.2	34 27.6	66 34	31.8	34 47.5	66 34	31.3	38 37.3	61 28	25.5	38 55.6	61 28	25.0	41 51.5	56 22	19.7	110
1	32 24.9	69 36	33.6	32 45.5	69 36	33.1	33 46.7	68 34	31.8	34 07.0	67 34	31.4	34 27.1	67 34	30.9	38 20.4	62 28	25.2	38 39.1	62 27	24.7	41 38.3	57 22	19.5	1
2	32 03.2	70 36	33.2	32 24.1	69 35	32.7	33 26.1	68 34	31.4	33 46.6	68 34	31.0	34 07.0	68 33	30.6	38 03.7	63 28	25.0	38 22.7	63 27	24.5	41 25.2	58 22	19.3	2
3	31 41.8	70 35	32.7	32 02.9	70 35	32.3	33 05.7	69 34	31.1	33 26.4	69 33	30.6	33 47.1	69 33	30.2	37 47.2	65 27	24.7	38 06.5	64 27	24.2	41 12.3	60 21	19.1	3
4	31 20.6	71 35	32.3	31 42.0	71 34	31.9	32 45.5	70 33	30.7	33 06.5	70 33	30.2	33 27.4	70 32	29.8	37 30.8	65 27	24.4	37 50.4	65 26	23.9	40 59.5	61 21	18.9	4
115	30 59.7	72 34	31.9	31 21.3	72 34	31.5	32 25.5	71 33	30.3	32 46.8	71 32	29.9	33 07.9	70 32	29.4	37 14.7	67 27	24.1	37 34.6	66 26	23.6	40 46.8	62 21	18.7	115
6	30 39.0	73 34	31.5	31 00.8	73 34	31.1	32 05.8	72 32	29.9	32 27.3	72 32	29.5	32 48.7	71 32	29.0	36 58.7	67 26	23.8	37 18.9	67 26	23.3	40 34.3	63 21	18.4	6
7	30 18.6	74 34	31.1	30 40.6	73 33	30.7	31 46.3	73 32	29.5	32 08.1	72 32	29.1	32 29.7	72 31	28.7	36 42.9	68 26	23.5	37 03.4	68 26	23.0	40 21.9	64 20	18.2	7
8	29 58.4	74 33	30.6	30 20.7	74 33	30.3	31 27.1	73 32	29.1	31 49.1	73 31	28.7	32 11.0	73 31	28.3	36 27.4	69 26	23.2	36 48.1	69 25	22.7	40 09.7	65 20	18.0	8
9	29 38.5	75 33	30.2	30 01.0	75 32	29.8	31 08.1	74 31	28.7	31 30.3	74 31	28.3	31 52.4	74 30	27.9	36 12.0	70 25	22.9	36 33.0	70 25	22.4	39 57.6	66 20	17.8	9
120	29 18.8	76 32	29.8	29 41.5	76 32	29.4	30 49.3	75 31	28.3	31 11.8	75 30	27.9	31 34.2	75 30	27.5	35 56.8	71 25	22.5	36 18.1	71 25	22.1	39 45.7	67 20	17.5	120
1	28 59.4	77 32	29.3	29 22.3	76 32	29.0	30 30.8	76 30	27.8	30 53.5	76 30	27.5	31 16.1	75 30	27.1	35 41.8	72 25	22.2	36 03.4	72 24	21.8	39 33.9	68 19	17.3	1
2	28 40.2	77 31	28.9	29 03.4	77 31	28.5	30 12.5	77 30	27.4	30 35.5	76 30	27.1	30 58.3	76 29	26.7	35 27.0	73 24	21.9	35 48.9	73 24	21.5	39 22.3	69 19	17.0	2
3	28 21.3	78 31	28.5	28 44.7	78 31	28.1	29 54.5	77 30	27.0	30 17.7	77 29	26.6	30 40.8	77 29	26.3	35 12.4	74 24	21.6	35 34.6	74 24	21.2	39 10.9	70 19	16.8	3
4	28 02.7	79 31	28.0	28 26.3	79 30	27.7	29 36.8	78 29	26.6	30 00.1	78 29	26.2	30 23.5	78 28	25.9	34 58.0	75 24	21.3	35 20.4	75 23	20.8	38 59.6	71 19	16.6	4
125	27 44.4	79 30	27.6	28 08.2	79 30	27.2	29 19.3	79 29	26.2	29 42.9	79 28	25.8	30 06.4	78 28	25.5	34 43.9	76 23	20.9	35 06.5	75 23	20.5	38 48.4	72 18	16.3	125
6	27 26.3	80 30	27.1	27 50.3	80 29	26.8	29 02.0	79 28	25.7	29 25.9	79 28	25.4	29 49.6	79 28	25.0	34 29.9	76 23	20.6	34 52.8	76 22	20.2	38 37.4	73 18	16.1	6
7	27 08.5	81 29	26.7	27 32.7	81 29	26.3	28 45.1	80 28	25.3	29 09.1	80 27	25.0	29 33.1	80 27	24.6	34 16.2	77 23	20.3	34 39.3	77 22	19.9	38 26.6	74 18	15.8	7
8	26 50.9	81 29	26.2	27 15.4	81 28	25.9	28 28.4	81 27	24.9	28 52.6	81 27	24.6	29 16.8	81 27	24.2	34 02.7	78 22	19.9	34 26.1	78 22	19.5	38 16.0	75 17	15.6	8
9	26 33.7	82 28	25.7	26 58.3	82 28	25.4	28 11.9	82 27	24.5	28 36.4	81 27	24.1	29 00.8	81 26	23.8	33 49.4	79 22	19.6	34 13.0	79 21	19.2	38 05.5	76 17	15.3	9
130	26 16.7	83 28	25.3	26 41.6	83 27	25.0	27 55.8	82 26	24.0	28 20.4	82 26	23.7	28 45.0	82 26	23.4	33 36.3	80 21	19.2	34 00.2	80 21	18.9	37 55.2	77 17	15.0	130
1	26 00.1	83 27	24.8	26 25.1	83 27	24.5	27 39.9	83 26	23.6	28 04.8	83 26	23.3	28 29.6	83 25	22.9	33 23.4	81 21	18.9	33 47.5	80 21	18.5	37 45.1	78 17	14.8	1
2	25 43.7	84 27	24.4	26 08.9	84 26	24.1	27 24.3	84 26	23.1	27 49.3	83 25	22.8	28 14.4	83 25	22.5	33 10.8	81 21	18.6	33 35.1	81 20	18.2	37 35.1	79 16	14.5	2
3	25 27.6	85 26	23.9	25 53.0	85 26	23.6	27 09.0	84 25	22.7	27 34.2	84 25	22.4	27 59.4	84 24	22.1	32 58.4	82 20	18.2	33 22.9	82 20	17.9	37 25.4	80 16	14.2	3
4	25 11.8	85 26	23.4	25 37.4	85 26	23.1	26 53.9	85 25	22.3	27 19.4	85 24	22.0	27 44.8	85 24	21.7	32 46.2	83 20	17.9	33 11.0	83 20	17.5	37 15.8	81 16	14.0	4
135	24 56.3	86 25	22.9	25 22.1	86 25	22.7	26 39.2	85 24	21.8	27 04.8	85 24	21.5	27 30.4	85 24	21.2	32 34.2	83 20	17.5	32 59.2	83 19	17.2	37 06.3	81 15	13.7	135
6	24 41.1	87 25	22.5	25 07.1	86 25	22.2	26 24.7	86 24	21.4	26 50.5	86 23	21.1	27 16.3	86 23	20.8	32 22.5	84 19	17.1	32 47.7	84 19	16.8	36 57.1	82 15	13.4	6
7	24 26.2	87 24	22.0	24 52.3	87 24	21.7	26 10.5	87 23	20.9	26 36.5	87 23	20.6	27 02.4	86 23	20.3	32 11.0	85 19	16.8	32 36.5	85 18	16.5	36 48.1	83 15	13.2	7
8	24 11.6	88 24	21.5	24 37.9	88 24	21.3	25 56.6	87 23	20.4	26 22.8	87 22	20.2	26 48.9	87 22	19.9	31 59.8	86 18	16.4	32 25.4	85 18	16.1	36 39.2	84 14	12.9	8
9	23 57.3	88 23	21.0	24 23.8	88 23	20.8	25 43.0	88 22	20.0	26 09.3	88 22	19.7	26 35.6	88 22	19.5	31 48.8	86 18	16.1	32 14.6	86 18	15.8	36 30.5	84 14	12.6	9
140	23 43.4	89 23	20.6	24 10.0	89 22	20.3	25 29.7	88 22	19.5	25 56.2	88 21	19.3	26 22.7	88 21	19.0	31 38.0	87 18	15.7	32 04.0	87 17	15.4	36 22.0	85 14	12.3	140
1	23 29.7	89 22	20.1	23 56.5	89 22	19.8	25 16.7	89 21	19.1	25 43.3	89 21	18.8	26 10.0	89 21	18.6	31 27.5	88 17	15.3	31 53.7	87 17	15.0	36 13.7	86 14	12.0	1
2	23 16.4	90 22	19.6	23 43.3	90 21	19.3	25 04.0	90 21	18.6	25 30.8	89 20	18.4	25 57.6	89 20	18.1	31 17.2	88 17	15.0	31 43.6	88 16	14.7	36 05.6	87 13	11.7	2
3	23 03.3	90 21	19.1	23 30.4	90 21	18.9	24 51.5	90 20	18.1	25 18.5	90 20	17.9	25 45.5	90 20	17.7	31 07.1	89 16	14.6	31 33.7	89 16	14.3	35 57.7	87 13	11.5	3
4	22 50.6	91 21	18.6	23 17.9	91 20	18.4	24 39.4	91 20	17.7	25 06.6	90 19	17.4	25 33.7	90 19	17.2	30 57.3	89 16	14.2	31 24.1	89 16	14.0	35 50.0	88 13	11.2	4
145	22 38.2	91 20	18.1	23 05.6	91 20	17.9	24 27.6	91 19	17.2	24 54.9	91 19	17.0	25 22.2	91 19	16.7	30 47.8	90 15	13.8	31 14.7	90 15	13.6	35 42.4	89 12	10.9	145
6	22 26.2	92 20	17.6	22 53.7	92 19	17.4	24 16.2	92 19	16.7	24 43.6	91 18	16.5	25 11.0	91 18	16.3	30 38.5	90 15	13.5	31 05.6	90 15	13.2	35 35.1	89 12	10.6	6
7	22 14.4	92 19	17.1	22 42.1	92 19	16.9	24 05.0	92 18	16.3	24 32.6	92 18	16.0	25 00.1	92 18	15.8	30 29.5	91 15	13.1	30 56.7	91 14	12.8	35 28.0	90 12	10.3	7
8	22 03.0	93 18	16.6	22 30.8	93 18	16.4	23 54.1	92 18	15.8	24 21.8	92 17	15.6	24 49.6	92 17	15.4	30 20.7	92 14	12.7	30 48.1	91 14	12.5	35 21.0	90 11	10.0	8
9	21 51.9	93 18	16.1	22 19.8	93 18	15.9	23 43.5	93 17	15.3	24 11.4	93 17	15.1	24 39.3	93 17	14.9	30 12.1	92 14	12.3	30 39.7	92 14	12.1	35 14.3	91 11	09.7	9
150	21 41.1	94 17	15.6	22 09.2	94 17	15.4	23 33.3	93 17	14.8	24 01.3	93 16	14.6	24 29.3	93 16	14.4	30 03.9	93 13	11.9	30 31.6	92 13	11.7	35 07.8	92 11	09.4	150
1	21 30.7	94 17	15.1	21 58.9	94 17	14.9	23 23.4	94 16	14.4	23 51.5	94 16	14.2	24 19.6	94 16	14.0	29 55.8	93 13	11.6	30 23.7	93 13	11.4	35 01.4	92 10	09.1	1
2	21 20.6	94 16	14.6	21 48.9	94 16	14.4	23 13.8	94 15	13.9	23 42.0	94 15	13.7	24 10.3	94 15	13.5	29 48.1	93 12	11.2	30 16.1	93 12	11.0	34 55.3	93 10	08.8	2
3	21 10.9	95 16	14.1	21 39.3	95 16	13.9	23 04.5	95 15	13.4	23 32.9	95 15	13.2	24 01.3	95 15	13.0	29 40.6	94 12	10.8	30 08.7	94 12	10.6	34 49.4	93 10	08.5	3
4	21 01.5	95 15	13.6	21 30.0	95 15	13.4	22 55.6	95 14	12.9	23 24.0	95 14	12.7	23 52.5	95 14	12.6	29 33.3	94 12	10.4	30 01.6	94 11	10.2	34 43.7	94 09	08.2	4
155	20 52.4	95 15	13.1	21 21.0	95 14	12.9	22 46.9	95 14	12.4	23 15.5	95 14	12.3	23 44.1	95 13	12.1	29 26.4	95 11	10.0	29 54.8	95 11	09.8	34 38.2	94 09	07.9	155
6	20 43.7	96 14	12.6	21 12.4	96 14	12.4	22 38.6	96 13	11.9	23 07.3	96 13	11.8	23 36.0	96 13	11.6	29 19.6	95 11	09.6	29 48.2	95 11	09.4	34 32.9	95 08	07.6	6
7	20 35.3	96 13	12.0	21 04.1	96 13	11.9	22 30.6	96 13	11.5	22 59.4	96 13	11.3	23 28.3	96 12	11.2	29 13.2	96 10	09.2	29 41.9	96 10	09.1	34 27.8	95 08	07.3	7
8	20 27.2	97 13	11.5	20 56.2	96 13	11.4	22 23.0	96 12	11.0	22 51.9	96 12	10.8	23 20.8	96 12	10.7	29 07.0	96 10	08.8	29 35.8	96 10	08.7	34 22.9	95 08	07.0	8
9	20 19.5	97 12	11.0	20 48.6	97 12	10.9	22 15.7	97 12	10.5	22 44.7	97 12	10.3	23 13.7	97 11	10.2	29 01.1	96 09	08.4	29 30.0	96 09	08.3	34 18.2	96 07	06.7	9
160	20 12.2	97 12	10.5	20 41.3	97 12	10.4	22 08.7	97 11	10.0	22 37.8	97 11	09.9	23 06.9	97 11	09.7	28 55.4	97 09	08.0	29 24.4	97 09	07.9	34 13.8	96 07	06.3	160
1	20 05.2	97 11	10.0	20 34.4	97 11	09.9	22 02.0	97 11	09.5	22 31.2	97 10	09.4	23 00.4	97 10	09.2	28 50.1	97 08	07.7	29 19.2	97 08	07.5	34 09.5	97 07	06.0	1
2	19 58.5	98 10	09.5	20 27.8	98 10	09.3	21 55.7	98 10	09.0	22 25.0	98 10	08.9	22 54.2	98 10	08.8	28 45.0	97 08	07.3	29 14.1	97 08	07.1	34 05.5	97 06	05.7	2
3	19 52.3	98 10	08.9	20 21.6	98 10	08.8	21 49.7	98 09	08.5	22 19.0	98 09	08.4	22 48.4	98 09	08.3	28 40.1	98 08	06.9	29 09.4	98 07	06.7	34 01.7	97 06	05.4	3
4	19 46.3	98 09	08.4	20 15.8	98 09	08.3	21 44.0	98 09	08.0	22 13.5	98 09	07.9	22 42.9	98 09	07.8	28 35.6	98 07	06.5	29 04.9	98 07	06.3	33 58.1	98 06	05.1	4
165	19 40.7	98 09	07.9	20 10.2	98 09	07.8	21 38.7	98 08	07.5	22 08.2	98 08	07.4	22 37.7	98 08	07.3	28 31.3	98 07	06.1	29 00.7	98 07	05.9	33 54.7	98 05	04.8	165
6	19 35.5	99 08	07.4	20 05.1	99 08	07.3	21 33.8	99 08	07.0	22 03.3	99 08	06.9	22 32.9	99 08	06.8	28 27.2	98 06	05.7	28 56.8	98 06	05.6	33 51.5	98 05	04.5	6
7	19 30.6	99 08	06.9	20 00.2	99 07	06.8	21 29.1	99 07	06.5	21 58.7	99 07	06.4	22 28.4	99 07	06.3	28 23.5	99 06	05.3	28 53.1	99 06	05.2	33 48.6	98 05	04.1	7
8	19 26.1	99 07	06.3	19 55.8	99 07	06.3	21 24.8	99 07	06.0	21 54.5	99 07	05.9	22 24.2	99 06	05.9	28 20.0	99 05	04.9	28 49.7	99 05	04.8	33 45.8	99 04	03.8	8
9	19 21.9	99 06	05.8	19 51.7	99 06	05.7	21 20.9	99 06	05.5	21 50.6	99 06	05.4	22 20.3	99 06	05.4	28 16.8	99 05	04.5	28 46.5	99 05	04.4	33 43.3	99 04	03.5	9
170	19 18.1	99 06	05.3	19 47.9	99 06	05.2	21 17.2	99 05	05.0	21 47.0	99 05	05.0	22 16.8	99 05	04.9	28 13.9	99 04	04.0	28 43.7	99 04	04.0	33 41.0	99 04	03.2	170
1	19 14.7	99 05	04.8	19 44.5	99 05	04.7	21 14.0	99 05	04.5	21 43.8	99 05	04.5	22 13.6	99 05	04.4	28 11.3	99 04	03.6	28 41.1	99 04	03.6	33 38.9	99 03	02.9	1
2	19 11.6	1.0 05	04.2	19 41.5	1.0 04	04.2	21 11.0	1.0 04	04.0	21 40.9	1.0 04	04.0	22 10.8	1.0 04	03.9	28 08.9	99 03	03.2	28 38.8	99 03	03.2	33 37.0	99 03	02.6	2
3	19 08.9	1.0 04	03.7	19 38.8	1.0 04	03.7	21 08.5	1.0 04	03.5	21 38.3	1.0 04	03.5	22 08.2	1.0 04	03.4	28 06.8	1.0 03	02.8	28 36.7	1.0 03	02.8	33 35.4	1.0 02	02.2	3
4	19 06.5	1.0 03	03.2	19 36.5	1.0 03	03.1	21 06.2	1.0 03	03.0	21 36.1	1.0 03	03.0	22 06.1	1.0 03	02.9	28 05.0	1.0 03	02.4	28 34.9	1.0 03	02.4	33 34.0	1.0 02	01.9	4
175	19 04.5	1.0 03	02.6	19 34.5	1.0 03	02.6	21 04.3	1.0 03	02.5	21 34.3	1.0 03	02.5	22 04.2	1.0 03	02.4	28 03.5	1.0 02	02.0	28 33.4	1.0 02	02.0	33 32.8	1.0 02	01.6	175
6	19 02.9	1.0 02	02.1	19 32.9	1.0 02	02.1	21 02.8	1.0 02	02.0	21 32.7	1.0 02	02.0	22 02.7	1.0 02	02.0	28 02.2	1.0 02	01.6	28 32.2	1.0 02	01.6	33 31.8	1.0 01	01.3	6
7	19 01.6	1.0 02	01.6	19 31.6	1.0 02	01.6	21 01.6	1.0 01	01.5	21 31.5	1.0 01	01.5	22 01.5	1.0 01	01.5	28 01.3	1.0 01	01.2	28 31.2	1.0 01	01.2	33 31.0	1.0 01	01.0	7
8	19 00.7	1.0 01	01.1	19 30.7	1.0 01	01.0	21 00.7	1.0 01	01.0	21 30.7	1.0 01	01.0	22 00.7	1.0 01	01.0	28 00.6	1.0 01	00.8	28 30.5	1.0 01	00.8	33 30.4	1.0 01	00.6	8
9	19 00.2	1.0 00	00.5	19 30.2	1.0 00	00.5	21 00.2	1.0 00	00.5	21 30.2	1.0 00	00.5	22 00.2	1.0 00	00.5	28 00.1	1.0 00	00.4	28 30.1	1.0 00	00.4	33 30.1	1.0 00	00.3	9
180	19 00.0	1.0 00	00.0	19 30.0	1.0 00	00.0	21 00.0	1.0 00	00.0	21 30.0	1.0 00	00.0	22 00.0	1.0 00	00.0	28 00.0	1.0 00	00.0	28 30.0	1.0 00	00.0	33 30.0	1.0 00	00.0	180

STAR IDENTIFICATION TABLE

Lat. 49°

ALTITUDE

AZ.	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	45	180	49	180	53	180	57	180	61	180	65	180	69	180	73	180	77	180	81	180	85	180	00
4	45	174	49	174	53	174	57	173	61	172	65	171	69	170	73	169	77	166	81	161	84	150	4
8	44	169	48	168	52	167	56	166	60	165	64	163	68	161	72	158	76	153	79	145	83	129	8
12	44	163	48	162	52	161	56	159	59	157	63	155	67	152	71	148	74	142	78	132	80	117	12
16	43	158	47	156	51	155	55	153	58	150	62	148	66	144	69	139	73	132	76	122	78	108	16
20	42	153	46	151	49	149	53	147	57	144	60	141	64	136	67	131	70	124	73	115	75	102	20
24	41	148	44	146	48	144	52	141	55	138	59	134	62	130	65	124	68	118	71	109	73	98	24
28	39	143	43	141	46	138	50	136	53	132	57	129	60	124	63	119	66	112	68	104	70	94	28
32	37	138	41	136	45	133	48	130	51	127	55	123	58	119	61	113	63	107	66	100	68	91	32
36	36	134	39	131	43	129	46	126	49	122	52	118	55	114	58	109	61	103	63	96	65	88	36
40	34	130	37	127	40	124	44	121	47	118	50	114	53	110	56	105	58	99	60	92	62	85	40
44	32	126	35	123	38	120	41	117	45	114	48	110	50	106	53	101	56	95	58	89	60	83	44
48	29	122	33	119	36	116	39	113	42	110	45	106	48	102	51	97	53	92	55	86	57	80	48
52	27	118	30	115	34	112	37	109	40	106	43	102	45	98	48	94	50	89	53	84	55	78	52
56	25	114	28	112	31	109	34	106	37	102	40	99	43	95	45	91	48	86	50	81	52	76	56
60	22	111	25	108	29	105	32	102	34	99	37	96	40	92	43	88	45	83	47	79	49	74	60
64	20	108	23	105	26	102	29	99	32	96	35	92	37	89	40	85	43	81	45	76	47	71	64
68	17	104	20	102	23	99	26	96	29	93	32	89	35	86	37	82	40	78	42	74	45	69	68
72	15	101	18	98	21	96	24	93	27	90	29	86	32	83	35	79	37	76	40	72	42	67	72
76	12	98	15	95	18	93	21	90	24	87	27	84	30	80	32	77	35	73	37	69	40	65	76
80	10	95	13	92	16	90	19	87	21	84	24	81	27	78	30	74	32	71	35	67	37	63	80
84	07	92	10	89	13	87	16	84	19	81	22	78	25	75	27	72	30	68	33	65	35	61	84
88	04	89	07	86	10	84	13	81	16	78	19	75	22	72	25	69	28	66	30	62	33	59	88
92	02	86	05	83	08	81	11	78	14	75	17	72	20	69	22	66	25	63	28	60	31	57	92
96	*01*	83	02	80	05	78	08	75	11	72	14	70	17	67	20	64	23	61	26	58	28	54	96
100	*03*	80	*00*	77	03	75	06	72	09	69	12	67	15	64	18	61	21	58	23	55	26	52	100
104	*06*	77	*03*	74	00	72	03	69	06	67	09	64	12	61	15	59	18	56	21	53	24	50	104
108	*09*	74	*05*	71	*02*	69	01	66	04	64	07	61	10	59	13	56	16	53	19	51	22	48	108
112	*11*	70	*08*	68	*05*	66	*02*	63	02	61	05	58	08	56	11	53	14	51	17	48	20	45	112
116	*14*	67	*10*	65	*07*	62	*04*	60	*01*	58	03	55	06	53	09	51	12	48	15	46	19	43	116
120	*16*	64	*13*	62	*09*	59	*06*	57	*03*	55	00	52	04	50	07	48	10	45	14	43	17	41	120
124	*18*	61	*15*	58	*12*	56	*08*	54	*05*	51	*02*	49	02	47	05	45	08	43	12	40	15	38	124
128	*21*	57	*17*	55	*14*	53	*10*	50	*07*	48	*04*	46	*00*	44	03	42	07	40	10	38	14	36	128
132	*23*	53	*19*	51	*16*	49	*12*	47	*09*	45	*05*	43	*02*	41	02	39	05	37	09	35	12	33	132
136	*25*	50	*21*	48	*18*	46	*14*	44	*11*	42	*07*	40	*04*	38	*00*	36	04	34	07	32	11	31	136
140	*27*	46	*23*	44	*20*	42	*16*	40	*12*	38	*09*	36	*05*	35	*02*	33	02	31	06	30	09	28	140
144	*28*	42	*25*	40	*21*	38	*18*	36	*14*	35	*10*	33	*07*	31	*03*	30	01	28	05	27	08	25	144
148	*30*	38	*26*	36	*23*	34	*19*	33	*15*	31	*12*	30	*08*	28	*04*	27	*00*	25	03	24	07	23	148
152	*32*	33	*28*	32	*24*	30	*20*	29	*17*	27	*13*	26	*09*	25	*05*	24	*01*	22	02	21	06	20	152
156	*33*	29	*29*	27	*25*	26	*22*	25	*18*	24	*14*	23	*10*	21	*06*	20	*02*	19	01	18	05	17	156
160	*34*	24	*30*	23	*26*	22	*23*	21	*19*	20	*15*	19	*11*	18	*07*	17	*03*	16	01	15	05	14	160
164	*35*	20	*31*	19	*27*	18	*23*	17	*20*	16	*16*	15	*12*	14	*08*	14	*04*	13	00	12	04	11	164
168	*36*	15	*32*	14	*28*	13	*24*	13	*20*	12	*16*	11	*12*	11	*08*	10	*04*	10	*00*	09	04	09	168
172	*37*	10	*33*	09	*29*	09	*25*	08	*21*	08	*17*	08	*13*	07	*09*	07	*05*	06	*01*	06	03	06	172
176	*37*	05	*33*	05	*29*	04	*25*	04	*21*	04	*17*	04	*13*	04	*09*	03	*05*	03	*01*	03	03	03	176
180	*37*	00	*33*	00	*29*	00	*25*	00	*21*	00	*17*	00	*13*	00	*09*	00	*05*	00	*01*	00	03	00	180
	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		

16—11430

FIGURES IN ITALICS INDICATE THAT DECLINATION IS OF CONTRARY NAME TO LATITUDE

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STAR IDENTIFICATION TABLE

AZ.	48°		52°		56°		60°		64°		68°		72°		76°		80°		84°		88°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	89	180	87	00	83	00	79	00	75	00	71	00	67	00	63	00	59	00	55	00	51	00	00
4	87	109	86	39	83	18	79	10	75	07	71	05	67	03	63	02	59	01	55	01	51	00	4
8	85	98	84	56	81	32	78	20	74	13	71	09	67	06	63	04	59	03	55	01	51	00	8
12	82	93	82	64	80	42	77	28	74	19	70	13	66	09	63	06	59	04	55	02	51	01	12
16	79	89	79	67	78	48	76	34	73	24	69	17	66	12	62	08	59	05	55	03	51	01	16
20	77	87	77	69	76	52	74	39	72	28	69	21	65	15	62	10	58	06	55	04	51	01	20
24	74	85	75	70	74	55	72	42	70	32	68	24	65	17	61	12	58	08	54	04	51	01	24
28	72	82	72	70	72	57	71	45	69	35	66	26	64	19	61	13	58	09	54	05	51	01	28
32	69	81	70	69	70	58	69	47	67	37	65	28	63	21	60	15	57	10	54	05	51	02	32
36	66	79	67	69	67	58	67	48	66	39	64	30	62	23	59	16	57	11	54	06	51	02	36
40	64	77	65	68	65	58	65	49	64	40	63	32	61	24	59	17	56	12	53	06	51	02	40
44	61	75	62	67	63	58	63	49	62	41	61	33	60	25	58	18	56	12	53	07	50	02	44
48	59	73	60	66	61	58	61	50	61	41	60	34	59	26	57	19	55	13	53	07	50	02	48
52	56	71	57	65	58	57	59	50	59	42	58	34	57	27	56	20	54	14	52	08	50	02	52
56	54	70	55	63	56	56	57	49	57	42	57	35	56	27	55	21	54	14	52	08	50	03	56
60	51	68	53	62	54	55	55	49	55	42	55	35	55	28	54	21	53	15	52	08	50	03	60
64	49	66	51	60	52	54	53	48	54	42	54	35	54	28	53	21	52	15	51	09	50	03	64
68	46	64	48	59	50	53	51	47	52	41	52	35	53	28	52	22	52	15	51	09	50	03	68
72	44	62	46	57	48	52	49	46	50	41	51	34	51	28	51	22	51	15	51	09	50	03	72
76	42	61	44	56	46	51	47	45	48	40	49	34	50	28	50	22	50	15	50	09	49	03	76
80	40	59	42	54	44	49	45	44	47	39	48	33	49	28	49	21	50	15	50	09	49	03	80
84	37	57	40	53	42	48	43	43	45	38	47	33	48	27	48	21	49	15	49	09	49	03	84
88	35	55	38	51	40	47	42	42	44	37	45	32	46	27	48	21	48	15	49	09	49	03	88
92	33	53	35	49	38	45	40	41	42	36	44	31	45	26	47	21	48	15	48	09	49	03	92
96	31	51	34	47	36	43	38	39	40	35	42	30	44	25	46	20	47	15	48	09	49	03	96
100	29	49	32	45	34	42	37	38	39	34	41	29	43	25	45	20	46	14	48	09	49	03	100
104	27	47	30	44	32	40	35	36	38	32	40	28	42	24	44	19	46	14	47	09	48	03	104
108	25	45	28	42	31	38	34	35	36	31	39	27	41	23	43	18	45	14	47	08	48	03	108
112	23	43	26	40	29	36	32	33	35	30	37	26	40	22	42	18	44	13	46	08	48	03	112
116	22	40	25	38	28	35	31	31	34	28	36	25	39	21	42	17	44	13	46	08	48	03	116
120	20	38	23	35	26	33	29	30	32	27	35	23	38	20	41	16	43	12	46	07	48	03	120
124	18	36	22	33	25	31	28	28	31	25	34	22	37	19	40	15	43	11	45	07	48	02	124
128	17	33	20	31	24	29	27	26	30	24	33	21	36	18	39	14	42	11	45	07	48	02	128
132	15	31	19	29	22	27	26	24	29	22	32	19	36	16	39	13	42	10	45	06	48	02	132
136	14	29	18	27	21	25	25	22	28	20	32	18	35	15	38	12	41	09	45	06	48	02	136
140	13	26	17	24	20	23	24	21	27	18	31	16	34	14	38	11	41	09	44	05	47	02	140
144	12	24	16	22	19	20	23	19	26	17	30	15	34	13	37	10	41	08	44	05	47	02	144
148	11	21	15	20	18	18	22	17	26	15	29	13	33	11	37	09	40	07	44	04	47	02	148
152	10	19	14	17	18	16	21	15	25	13	29	12	33	10	36	08	40	06	44	04	47	01	152
156	09	16	13	15	17	14	21	13	25	11	28	10	32	09	36	07	40	05	43	03	47	01	156
160	09	13	12	12	16	11	20	10	24	09	28	08	32	07	36	06	40	04	43	03	47	01	160
164	08	11	12	10	16	09	20	08	24	08	28	07	32	06	35	05	39	04	43	02	47	01	164
168	08	08	12	08	15	07	19	06	23	06	27	05	31	04	35	04	39	03	43	02	47	01	168
172	07	05	11	05	15	05	19	04	23	04	27	03	31	03	35	02	39	02	43	01	47	00	172
176	07	03	11	03	15	02	19	02	23	02	27	02	31	01	35	01	39	01	43	01	47	00	176
180	07	00	11	00	15	00	19	00	23	00	27	00	31	00	35	00	39	00	43	00	47	00	180
	48°		52°		56°		60°		64°		68°		72°		76°		80°		84°		88°		

16—11439

FIGURES IN ITALICS INDICATE THAT DECLINATION IS OF CONTRARY NAME TO LATITUDE

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ALTITUDE CORRECTION FOR D. R. LATITUDE

Az.		LATITUDE DIFFERENCE (minutes of arc)															Az.		LAT. DIFF. (tenths of minutes of arc)									Az.	
°	°	1′	2′	3′	4′	5′	6′	7′	8′	9′	10′	11′	12′	13′	14′	15′	°	°	0.1′	0.2′	0.3′	0.4′	0.5′	0.6′	0.7′	0.8′	0.9′	°	°
0	180	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	0	180	0. 1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	0	180
1	179	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	1	179										1	179
2	178	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	2	178										2	178
3	177	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	3	177										3	177
4	176	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	4	176										4	176
5	175	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	13.9	14 9	5	175	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	5	175
6	174	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	9.9	10.9	11.9	12.9	13.9	14.9	6	174										6	174
7	173	1.0	2.0	3.0	4.0	5.0	6.0	6.9	7.9	8.9	9.9	10.9	11.9	12.9	13.9	14.9	7	173										7	173
8	172	1.0	2.0	3.0	4.0	5.0	5.9	6.9	7.9	8.9	9.9	10.9	11.9	12.9	13.9	14.9	8	172										8	172
9	171	1.0	2.0	3.0	4.0	4.9	5.9	6.9	7.9	8.9	9.9	10.9	11.9	12.8	13.8	14.8	9	171										9	171
10	170	1.0	2.0	3.0	3.9	4.9	5.9	6.9	7.9	8.9	9.8	10.8	11.8	12.8	13.8	14.8	10	170	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	10	170
11	169	1.0	2.0	2.9	3.9	4.9	5.9	6.9	7.9	8.8	9.8	10.8	11.8	12.8	13.7	14.7	11	169										11	169
12	168	1.0	2.0	2.9	3.9	4.9	5.9	6.8	7.8	8.8	9.8	10.8	11.7	12.7	13.7	14.7	12	168										12	168
13	167	1.0	1.9	2.9	3.9	4.9	5.8	6.8	7.8	8.8	9.7	10.7	11.7	12.6	13.6	14.6	13	167										13	167
14	166	1.0	1.9	2.9	3.9	4.9	5.8	6.8	7.8	8.7	9.7	10.7	11.6	12.6	13.6	14.6	14	166										14	166
15	165	1.0	1.9	2.9	3.9	4.8	5.8	6.8	7.7	8.7	9.7	10.6	11.6	12.6	13.5	14.5	15	165	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	15	165
16	164	1.0	1.9	2.9	3.8	4.8	5.8	6.7	7.7	8.7	9.6	10.6	11.5	12.5	13.5	14.4	16	164										16	164
17	163	1.0	1.9	2.9	3.8	4.8	5.7	6.7	7.7	8.6	9.6	10.5	11.5	12.4	13.4	14.3	17	163										17	163
18	162	1.0	1.9	2.9	3.8	4.8	5.7	6.7	7.6	8.6	9.5	10.5	11.4	12.4	13.3	14.3	18	162										18	162
19	161	0.9	1.9	2.8	3.8	4.7	5.7	6.6	7.6	8.5	9.5	10.4	11.3	12.3	13.2	14.2	19	161									0.9	19	161
20	160	0.9	1.9	2.8	3.8	4.7	5.6	6.6	7.5	8.5	9.4	10.3	11.3	12.2	13.2	14.1	20	160	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.8	20	160
21	159	0.9	1.9	2.8	3.7	4.7	5.6	6.5	7.5	8.4	9.3	10.3	11.2	12.1	13.1	14.0	21	159							0.7	0.7		21	159
22	158	0.9	1.9	2.8	3.7	4.6	5.6	6.5	7.4	8.3	9.3	10.2	11.1	12.1	13.0	13.9	22	158							0.6			22	158
23	157	0.9	1.8	2.8	3.7	4.6	5.5	6.4	7.4	8.3	9.2	10.1	11.0	12.0	12.9	13.8	23	157						0.6				23	157
24	156	0.9	1.8	2.7	3.7	4.6	5.5	6.4	7.3	8.2	9.1	10.0	11.0	11.9	12.8	13.7	24	156						0.5				24	156
25	155	0.9	1.8	2.7	3.6	4.5	5.4	6.3	7.3	8.2	9.1	10.0	10.9	11.8	12.7	13.6	25	155	0.1	0.2	0.3	0.4	0.5	0.5	0.6	0.7	0.8	25	155
26	154	0.9	1.8	2.7	3.6	4.5	5.4	6.3	7.2	8.1	9.0	9.9	10.8	11.7	12.6	13.5	26	154					0.4					26	154
27	153	0.9	1.8	2.7	3.6	4.5	5.3	6.2	7.1	8.0	8.9	9.8	10.7	11.6	12.5	13.4	27	153										27	153
28	152	0.9	1.8	2.6	3.5	4.4	5.3	6.2	7.1	7.9	8.8	9.7	10.6	11.5	12.4	13.2	28	152				0.4						28	152
29	151	0.9	1.7	2.6	3.5	4.4	5.2	6.1	7.0	7.9	8.7	9.6	10.5	11.4	12.2	13.1	29	151				0.3						29	151
30	150	0.9	1.7	2.6	3.5	4.3	5.2	6.1	7.0	7.8	8.7	9.5	10.4	11.3	12.1	13.0	30	150	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8	30	150
31	149	0.9	1.7	2.6	3.4	4.3	5.1	6.0	6.9	7.7	8.6	9.4	10.3	11.1	12.0	12.9	31	149										31	149
32	148	0.8	1.7	2.5	3.4	4.2	5.1	5.9	6.8	7.6	8.5	9.3	10.2	11.0	11.9	12.7	32	148										32	148
33	147	0.8	1.7	2.5	3.4	4.2	5.0	5.9	6.7	7.5	8.4	9.2	10.1	10.9	11.7	12.6	33	147				0.3					0.8	33	147
34	146	0.8	1.7	2.5	3.3	4.1	5.0	5.8	6.6	7.5	8.3	9.1	9.9	10.8	11.6	12.4	34	146				0.2					0.7	34	146
35	145	0.8	1.6	2.5	3.3	4.1	4.9	5.7	6.6	7.4	8.2	9.0	9.8	10.6	11.5	12.3	35	145	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.7	35	145
36	144	0.8	1.6	2.4	3.2	4.0	4.9	5.7	6.5	7.3	8.1	8.9	9.7	10.5	11.3	12.1	36	144								0.6		36	144
37	143	0.8	1.6	2.4	3.2	4.0	4.8	5.6	6.4	7.2	8.0	8.8	9.6	10.4	11.2	12.0	37	143										37	143
38	142	0.8	1.6	2.4	3.2	3.9	4.7	5.5	6.3	7.1	7.9	8.7	9.5	10.2	11.0	11.8	38	142							0.6			38	142
39	141	0.8	1.6	2.3	3.1	3.9	4.7	5.4	6.2	7.0	7.8	8.5	9.3	10.1	10.9	11.7	39	141							0.5			39	141
40	140	0.8	1.5	2.3	3.1	3.8	4.6	5.4	6.1	6.9	7.7	8.4	9.2	10.0	10.7	11.5	40	140	0.1	0.2	0.2	0.3	0.4	0.5	0.5	0.6	0.7	40	140
41	139	0.8	1.5	2.3	3.0	3.8	4.5	5.3	6.0	6.8	7.5	8.3	9.1	9.8	10.6	11.3	41	139		0.2				0.5				41	139
42	138	0.7	1.5	2.2	3.0	3.7	4.5	5.2	5.9	6.7	7.4	8.2	8.9	9.7	10.4	11.1	42	138		0.1				0.4				42	138
43	137	0.7	1.5	2.2	2.9	3.7	4.4	5.1	5.9	6.6	7.3	8.0	8.8	9.5	10.2	11.0	43	137									0.7	43	137
44	136	0.7	1.4	2.2	2.9	3.6	4.3	5.0	5.8	6.5	7.2	7.9	8.6	9.4	10.1	10.8	44	136									0.6	44	136
45	135	0.7	1.4	2.1	2.8	3.5	4.2	4.9	5.7	6.4	7.1	7.8	8.5	9.2	9.9	10.6	45	135	0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.6	45	135
46	134	0.7	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3	6.9	7.6	8.3	9.0	9.7	10.4	46	134					0.3			0.6		46	134
47	133	0.7	1.4	2.0	2.7	3.4	4.1	4.8	5.5	6.1	6.8	7.5	8.2	8.9	9.5	10.2	47	133								0.5		47	133
48	132	0.7	1.3	2.0	2.7	3.3	4.0	4.7	5.4	6.0	6.7	7.4	8.0	8.7	9.4	10.0	48	132										48	132
49	131	0.7	1.3	2.0	2.6	3.3	3.9	4.6	5.2	5.9	6.6	7.2	7.9	8.5	9.2	9.8	49	131							0.5			49	131
50	130	0.6	1.3	1.9	2.6	3.2	3.9	4.5	5.1	5.8	6.4	7.1	7.7	8.4	9.0	9.6	50	130	0.1	0.1	0.2	0.3	0.3	0.4	0.4	0.5	0.6	50	130
51	129	0.6	1.3	1.9	2.5	3.1	3.8	4.4	5.0	5.7	6.3	6.9	7.6	8.2	8.8	9.4	51	129				0.3						51	129
52	128	0.6	1.2	1.8	2.5	3.1	3.7	4.3	4.9	5.5	6.2	6.8	7.4	8.0	8.6	9.2	52	128				0.2					0.6	52	128
53	127	0.6	1.2	1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.6	7.2	7.8	8.4	9.0	53	127									0.5	53	127
54	126	0.6	1.2	1.8	2.4	2.9	3.5	4.1	4.7	5.3	5.9	6.5	7.1	7.6	8.2	8.8	54	126						0.4				54	126
55	125	0.6	1.1	1.7	2.3	2.9	3.4	4.0	4.6	5.2	5.7	6.3	6.9	7.5	8.0	8.6	55	125	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.5	0.5	55	125
56	124	0.6	1.1	1.7	2.2	2.8	3.4	3.9	4.5	5.0	5.6	6.2	6.7	7.3	7.8	8.4	56	124								0.4		56	124
57	123	0.5	1.1	1.6	2.2	2.7	3.3	3.8	4.4	4.9	5.4	6.0	6.5	7.1	7.6	8.2	57	123										57	123
58	122	0.5	1.1	1.6	2.1	2.6	3.2	3.7	4.2	4.8	5.3	5.8	6.4	7.0	7.4	7.9	58	122										58	122
59	121	0.5	1.0	1.5	2.1	2.6	3.1	3.6	4.1	4.6	5.2	5.7	6.2	6.7	7.2	7.7	59	121	0.1					0.3			0.5	59	121
60	120	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	60	120	0.0	0.1	0.2	0.2	0.2	0.3	0.4	0.4	0.4	60	120
61	119	0.5	1.0	1.5	1.9	2.4	2.9	3.4	3.9	4.4	4.8	5.3	5.8	6.3	6.8	7.3	61	119			0.1				0.3			61	119
62	118	0.5	0.9	1.4	1.9	2.3	2.8	3.3	3.8	4.2	4.7	5.2	5.6	6.1	6.6	7.0	62	118										62	118
63	117	0.5	0.9	1.4	1.8	2.3	2.7	3.2	3.6	4.1	4.5	5.0	5.4	5.9	6.4	6.8	63	117										63	117
64	116	0.4	0.9	1.3	1.8	2.2	2.6	3.1	3.5	3.9	4.4	4.8	5.3	5.7	6.1	6.6	64	116								0.4		64	116
65	115	0.4	0.8	1.3	1.7	2.1	2.5	3.0	3.4	3.8	4.2	4.6	5.1	5.5	5.9	6.3	65	115	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.4	65	115
66	114	0.4	0.8	1.2	1.6	2.0	2.4	2.8	3.3	3.7	4.1	4.5	4.9	5.3	5.7	6.1	66	114						0.2			0.4	66	114
67	113	0.4	0.8	1.2	1.6	2.0	2.3	2.7	3.1	3.5	3.9	4.3	4.7	5.1	5.5	5.9	67	113				0.2					0.4	67	113
68	112	0.4	0.7	1.1	1.5	1.9	2.2	2.6	3.0	3.4	3.7	4.1	4.5	4.9	5.2	5.6	68	112				0.1					0.3	68	112
69	111	0.4	0.7	1.1	1.4	1.8	2.2	2.5	2.9	3.2	3.6	3.9	4.3	4.7	5.0	5.4	69	111							0.3		0.3	69	111
70	110	0.3	0.7	1.0	1.4	1.7	2.1	2.4	2.7	3.1	3.4	3.8	4.1	4.4	4.8	5.1	70	110	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	70	110
71	109	0.3	0.7	1.0	1.3	1.6	2.0	2.3	2.6	2.9	3.3	3.6	3.9	4.2	4.6	4.9	71	109								0.3		71	109
72	108	0.3	0.6	0.9	1.2	1.5	1.9	2.2	2.5	2.8	3.1	3.4	3.7	4.0	4.3	4.6	72	108					0.2			0.2		72	108
73	107	0.3	0.6	0.9	1.2	1.5	1.8	2.0	2.3	2.6	2.9	3.2	3.5	3.8	4.1	4.4	73	107					0.1				0.3	73	107
74	106	0.3	0.6	0.8	1.1	1.4	1.7	1.9	2.2	2.5	2.8	3.0	3.3	3.6	3.9	4.1	74	106									0.2	74	106
75	105	0.3	0.5	0.8	1.0	1.3	1.6	1.8	2.1	2.3	2.6	2.8	3.1	3.4	3.6	3.9	75	105	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	75	105
76	104	0.2	0.5	0.7	1.0	1.2	1.5	1.7	1.9	2.2	2.4	2.7	2.9	3.1	3.4	3.6	76	104		0.0				0.1				76	104
77	103	0.2	0.4	0.7	0.9	1.1	1.3	1.6	1.8	2.0	2.2	2.5	2.7	2.9	3.1	3.4	77	103							0.2			77	103
78	102	0.2	0.4	0.6	0.8	1.0	1.2	1.5	1.7	1.9	2.1	2.3	2.5	2.7	2.9	3.1	78	102							0.1			78	102
79	101	0.2	0.4	0.6	0.8	1.0	1.1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	2.7	2.9	79	101								0.2		79	101
80	100	0.2	0.3	0.5	0.7	0.9	1.0	1.2	1.4	1.6	1.7	1.9	2.1	2.3	2.4	2.6	80	100	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	80	100
81	99	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.3	1.4	1.6	1.7	1.9	2.0	2.2	2.3	81	99			0.0						0.1	81	99
82	98	0.1	0.3	0.4	0.6	0.7	0.8	1.0	1.1	1.3	1.4	1.5	1.7	1.8	1.9	2.1	82	98				0.1						82	98
83	97	0.1	0.2	0.4	0.5	0.6	0.7	0.9	1.0	1.1	1.2	1.3	1.5	1.6	1.7	1.8	83	97				0.0						83	97
84	96	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.3	1.4	1.5	1.6	84	96					0.1					84	96
85	95	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.0	1.1	1.2	1.3	85	95	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	85	95
86	94	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.6	0.7	0.8	0.8	0.9	1.0	1.0	86	94						0.0	0.0	0.1	0.1	86	94
87	93	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.8	87	93								0.0	0.0	87	93
88	92	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.5	88	92										88	92
89	91	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	89	91										89	91
90	90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90	90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90	90
Az.		1′	2′	3′	4′	5′	6′	7′	8′	9′	10′	11′	12′	13′	14′	15′	Az.		0.1′	0.2′	0.3′	0.4′	0.5′	0.6′	0.7′	0.8′	0.9′	Az.	

Azimuth angle greater than 90°:
If DR latitude is greater than selected tabulated latitude, ΔL correction is *minus;* but for DR latitude less than selected tabulated latitude, the correction is *plus.*
Azimuth angle less than 90°:
If DR latitude is greater than selected tabulated latitude, ΔL correction is *plus;* but for DR latitude less than selected tabulated latitude, the correction is *minus.*

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ALTITUDE CORRECTION FOR D. R. LATITUDE

Az.		LATITUDE DIFFERENCE (minutes of arc)															Az.		LAT. DIFF. (tenths of minutes of arc)									Az.	
°	°	16′	17′	18′	19′	20′	21′	22′	23′	24′	25′	26′	27′	28′	29′	30′	°	°	0.1′	0.2′	0.3′	0.4′	0.5′	0.6′	0.7′	0.8′	0.9′	°	°
0	180	16.0	17.0	18.0	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0	0	180										0	180
1	179	16.0	17.0	18.0	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0	1	179										1	179
2	178	16.0	17.0	18.0	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0	2	178										2	178
3	177	16.0	17.0	18.0	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0	3	177										3	177
4	176	16.0	17.0	18.0	19.0	20.0	20.9	21.9	22.9	23.9	24.9	25.9	26.9	27.9	28.9	29.9	4	176										4	176
5	175	15.9	16.9	17.9	18.9	19.9	20.9	21.9	22.9	23.9	24.9	25.9	26.9	27.9	28.9	29.9	5	175	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	5	175
6	174	15.9	16.9	17.9	18.9	19.9	20.9	21.9	22.9	23.9	24.9	25.9	26.9	27.8	28.8	29.8	6	174										6	174
7	173	15.9	16.9	17.9	18.9	19.9	20.8	21.8	22.8	23.8	24.8	25.8	26.8	27.8	28.8	29.8	7	173										7	173
8	172	15.8	16.8	17.8	18.8	19.8	20.8	21.8	22.8	23.8	24.8	25.7	26.7	27.7	28.7	29.7	8	172										8	172
9	171	15.8	16.8	17.8	18.8	19.8	20.7	21.7	22.7	23.7	24.7	25.7	26.7	27.7	28.6	29.6	9	171										9	171
10	170	15.8	16.7	17.7	18.7	19.7	20.7	21.7	22.7	23.6	24.6	25.6	26.6	27.6	28.6	29.5	10	170	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	10	170
11	169	15.7	16.7	17.7	18.7	19.6	20.6	21.6	22.6	23.6	24.5	25.5	26.5	27.5	28.5	29.4	11	169										11	169
12	168	15.7	16.6	17.6	18.6	19.6	20.5	21.5	22.5	23.5	24.5	25.4	26.4	27.4	28.4	29.3	12	168										12	168
13	167	15.6	16.6	17.5	18.5	19.5	20.5	21.4	22.4	23.4	24.4	25.3	26.3	27.3	28.3	29.2	13	167										13	167
14	166	15.5	16.5	17.5	18.4	19.4	20.4	21.3	22.3	23.3	24.3	25.2	26.2	27.2	28.1	29.1	14	166										14	166
15	165	15.5	16.4	17.4	18.4	19.3	20.3	21.3	22.2	23.2	24.1	25.1	26.1	27.0	28.0	29.0	15	165	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	15	165
16	164	15.4	16.3	17.3	18.3	19.2	20.2	21.1	22.1	23.1	24.0	25.0	26.0	26.9	27.9	28.8	16	164										16	164
17	163	15.3	16.3	17.2	18.2	19.1	20.1	21.0	22.0	23.0	23.9	24.9	25.8	26.8	27.7	28.7	17	163										17	163
18	162	15.2	16.2	17.1	18.1	19.0	20.0	20.9	21.9	22.8	23.8	24.7	25.7	26.6	27.6	28.5	18	162										18	162
19	161	15.1	16.1	17.0	18.0	18.9	19.9	20.8	21.7	22.7	23.6	24.6	25.5	26.5	27.4	28.4	19	161									0.9	19	161
20	160	15.0	16.0	16.9	17.9	18.8	19.7	20.7	21.6	22.6	23.5	24.4	25.4	26.3	27.3	28.2	20	160	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.8	20	160
21	159	14.9	15.9	16.8	17.7	18.7	19.6	20.5	21.5	22.4	23.3	24.3	25.2	26.1	27.1	28.0	21	159							0.7	0.7		21	159
22	158	14.8	15.8	16.7	17.6	18.5	19.5	20.4	21.3	22.3	23.2	24.1	25.0	26.0	26.9	27.8	22	158							0.6			22	158
23	157	14.7	15.6	16.6	17.5	18.4	19.3	20.3	21.2	22.1	23.0	23.9	24.9	25.8	26.7	27.6	23	157						0.6				23	157
24	156	14.6	15.5	16.4	17.4	18.3	19.2	20.1	21.0	21.9	22.8	23.8	24.7	25.6	26.5	27.4	24	156						0.5				24	156
25	155	14.5	15.4	16.3	17.2	18.1	19.0	19.9	20.8	21.8	22.7	23.6	24.5	25.4	26.3	27.2	25	155	0.1	0.2	0.3	0.4	0.5	0.5	0.6	0.7	0.8	25	155
26	154	14.4	15.3	16.2	17.1	18.0	18.9	19.8	20.7	21.6	22.5	23.4	24.3	25.2	26.1	27.0	26	154					0.4					26	154
27	153	14.3	15.1	16.0	16.9	17.8	18.7	19.6	20.5	21.4	22.3	23.2	24.1	24.9	25.8	26.7	27	153										27	153
28	152	14.1	15.0	15.9	16.8	17.7	18.5	19.4	20.3	21.2	22.1	23.0	23.8	24.7	25.6	26.5	28	152				0.4						28	152
29	151	14.0	14.9	15.7	16.6	17.5	18.4	19.2	20.1	21.0	21.9	22.7	23.6	24.5	25.4	26.2	29	151				0.3						29	151
30	150	13.9	14.7	15.6	16.5	17.3	18.2	19.1	19.9	20.8	21.7	22.5	23.4	24.2	25.1	26.0	30	150	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8	30	150
31	149	13.7	14.6	15.4	16.3	17.1	18.0	18.9	19.7	20.6	21.4	22.3	23.1	24.0	24.9	25.7	31	149										31	149
32	148	13.6	14.4	15.3	16.1	17.0	17.8	18.7	19.5	20.4	21.2	22.0	22.9	23.7	24.6	25.4	32	148										32	148
33	147	13.4	14.3	15.1	15.9	16.8	17.6	18.5	19.3	20.1	21.0	21.8	22.6	23.5	24.3	25.2	33	147				0.3					0.8	33	147
34	146	13.3	14.1	14.9	15.8	16.6	17.4	18.2	19.1	19.9	20.7	21.6	22.4	23.2	24.0	24.9	34	146				0.2					0.7	34	146
35	145	13.1	13.9	14.7	15.6	16.4	17.2	18.0	18.8	19.7	20.5	21.3	22.1	22.9	23.8	24.6	35	145	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.7	35	145
36	144	12.9	13.8	14.6	15.4	16.2	17.0	17.8	18.6	19.4	20.2	21.0	21.8	22.7	23.5	24.3	36	144								0.6		36	144
37	143	12.8	13.6	14.4	15.2	16.0	16.8	17.6	18.4	19.2	20.0	20.8	21.6	22.4	23.2	24.0	37	143										37	143
38	142	12.6	13.4	14.2	15.0	15.8	16.5	17.3	18.1	18.9	19.7	20.5	21.3	22.1	22.9	23.6	38	142							0.6			38	142
39	141	12.4	13.2	14.0	14.8	15.5	16.3	17.1	17.9	18.7	19.4	20.2	21.0	21.8	22.5	23.3	39	141							0.5			39	141
40	140	12.3	13.0	13.8	14.6	15.3	16.1	16.9	17.6	18.4	19.2	19.9	20.7	21.4	22.2	23.0	40	140	0.1	0.2	0.2	0.3	0.4	0.5	0.5	0.6	0.7	40	140
41	139	12.1	12.8	13.6	14.3	15.1	15.8	16.6	17.4	18.1	18.9	19.6	20.4	21.1	21.9	22.6	41	139		0.2				0.5				41	139
42	138	11.9	12.6	13.4	14.1	14.9	15.6	16.3	17.1	17.8	18.6	19.3	20.1	20.8	21.6	22.3	42	138		0.1				0.4				42	138
43	137	11.7	12.4	13.2	13.9	14.6	15.4	16.1	16.8	17.6	18.3	19.0	19.7	20.5	21.2	21.9	43	137									0.7	43	137
44	136	11.5	12.2	13.0	13.7	14.4	15.1	15.8	16.5	17.3	18.0	18.7	19.4	20.1	20.9	21.6	44	136									0.6	44	136
45	135	11.3	12.0	12.7	13.4	14.1	14.8	15.6	16.3	17.0	17.7	18.4	19.1	19.8	20.5	21.2	45	135	0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.6	45	135
46	134	11.1	11.8	12.5	13.2	13.9	14.6	15.3	16.0	16.7	17.4	18.1	18.8	19.5	20.1	20.8	46	134					0.3			0.6		46	134
47	133	10.9	11.6	12.3	13.0	13.6	14.3	15.0	15.7	16.4	17.1	17.7	18.4	19.1	19.8	20.5	47	133								0.5		47	133
48	132	10.7	11.4	12.0	12.7	13.4	14.1	14.7	15.4	16.1	16.7	17.4	18.1	18.7	19.4	20.1	48	132										48	132
49	131	10.5	11.2	11.8	12.5	13.1	13.8	14.4	15.1	15.7	16.4	17.1	17.7	18.4	19.0	19.7	49	131							0.5			49	131
50	130	10.3	10.9	11.6	12.2	12.9	13.5	14.1	14.8	15.4	16.1	16.7	17.4	18.0	18.6	19.3	50	130	0.1	0.1	0.2	0.3	0.3	0.4	0.4	0.5	0.6	50	130
51	129	10.1	10.7	11.3	12.0	12.6	13.2	13.8	14.5	15.1	15.7	16.4	17.0	17.6	18.3	18.9	51	129				0.3						51	129
52	128	9.9	10.5	11.1	11.7	12.3	12.9	13.5	14.2	14.8	15.4	16.0	16.6	17.2	17.9	18.5	52	128				0.2					0.6	52	128
53	127	9.6	10.2	10.8	11.4	12.0	12.6	13.2	13.8	14.4	15.0	15.6	16.2	16.9	17.5	18.1	53	127									0.5	53	127
54	126	9.4	10.0	10.6	11.2	11.8	12.3	12.9	13.5	14.1	14.7	15.3	15.9	16.5	17.0	17.6	54	126						0.4				54	126
55	125	9.2	9.8	10.3	10.9	11.5	12.0	12.6	13.2	13.8	14.3	14.9	15.5	16.1	16.6	17.2	55	125	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.5	0.5	55	125
56	124	8.9	9.5	10.1	10.6	11.2	11.7	12.3	12.9	13.4	14.0	14.5	15.1	15.7	16.2	16.8	56	124								0.4		56	124
57	123	8.7	9.3	9.8	10.3	10.9	11.4	12.0	12.5	13.1	13.6	14.2	14.7	15.2	15.8	16.3	57	123										57	123
58	122	8.5	9.0	9.5	10.1	10.6	11.1	11.7	12.2	12.7	13.2	13.8	14.3	14.8	15.4	15.9	58	122										58	122
59	121	8.2	8.8	9.3	9.8	10.3	10.8	11.3	11.8	12.4	12.9	13.4	13.9	14.4	14.9	15.5	59	121	0.1				0.3				0.5	59	121
60	120	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	60	120	0.0	0.1	0.2	0.2	0.2	0.3	0.4	0.4	0.4	60	120
61	119	7.8	8.2	8.7	9.2	9.7	10.2	10.7	11.2	11.6	12.1	12.6	13.1	13.6	14.1	14.5	61	119			0.1				0.3			61	119
62	118	7.5	8.0	8.5	8.9	9.4	9.9	10.3	10.8	11.3	11.7	12.2	12.7	13.1	13.6	14.1	62	118										62	118
63	117	7.3	7.7	8.2	8.6	9.1	9.5	10.0	10.4	10.9	11.3	11.8	12.3	12.7	13.2	13.6	63	117										63	117
64	116	7.0	7.5	7.9	8.3	8.8	9.2	9.6	10.1	10.5	11.0	11.4	11.8	12.3	12.7	13.2	64	116								0.4		64	116
65	115	6.8	7.2	7.6	8.0	8.5	8.9	9.3	9.7	10.1	10.6	11.0	11.4	11.8	12.3	12.7	65	115	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.4	65	115
66	114	6.5	6.9	7.3	7.7	8.1	8.5	8.9	9.4	9.8	10.2	10.6	11.0	11.4	11.8	12.2	66	114						0.2				66	114
67	113	6.3	6.6	7.0	7.4	7.8	8.2	8.6	9.0	9.4	9.8	10.2	10.5	10.9	11.3	11.7	67	113				0.2					0.4	67	113
68	112	6.0	6.4	6.7	7.1	7.5	7.9	8.2	8.6	9.0	9.4	9.7	10.1	10.5	10.9	11.2	68	112				0.1					0.3	68	112
69	111	5.7	6.1	6.5	6.8	7.2	7.5	7.9	8.2	8.6	9.0	9.3	9.7	10.0	10.4	10.8	69	111							0.3			69	111
70	110	5.5	5.8	6.2	6.5	6.8	7.2	7.5	7.9	8.2	8.6	9.0	9.2	9.6	9.9	10.3	70	110	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	70	110
71	109	5.2	5.5	5.9	6.2	6.5	6.8	7.2	7.5	7.8	8.1	8.5	8.8	9.1	9.4	9.8	71	109								0.3		71	109
72	108	4.9	5.3	5.6	5.9	6.2	6.5	6.8	7.1	7.4	7.7	8.0	8.3	8.7	9.0	9.3	72	108					0.2			0.2		72	108
73	107	4.7	5.0	5.3	5.6	5.8	6.1	6.4	6.7	7.0	7.3	7.6	7.9	8.2	8.5	8.8	73	107					0.1				0.3	73	107
74	106	4.4	4.7	5.0	5.2	5.5	5.8	6.1	6.3	6.6	6.9	7.2	7.4	7.7	8.0	8.3	74	106									0.2	74	106
75	105	4.1	4.4	4.7	4.9	5.2	5.4	5.7	6.0	6.2	6.5	6.7	7.0	7.2	7.5	7.8	75	105	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	75	105
76	104	3.9	4.1	4.4	4.6	4.8	5.1	5.3	5.6	5.8	6.0	6.3	6.5	6.8	7.0	7.3	76	104		0.0				0.1				76	104
77	103	3.6	3.8	4.0	4.3	4.5	4.7	5.0	5.2	5.4	5.6	5.8	6.1	6.3	6.5	6.7	77	103							0.2			77	103
78	102	3.3	3.5	3.7	4.0	4.2	4.4	4.6	4.8	5.0	5.2	5.4	5.6	5.8	6.0	6.2	78	102							0.1			78	102
79	101	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0	5.2	5.3	5.5	5.7	79	101								0.2		79	101
80	100	2.8	3.0	3.1	3.3	3.5	3.6	3.8	4.0	4.2	4.3	4.5	4.7	4.9	5.0	5.2	80	100	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	80	100
81	99	2.5	2.7	2.8	3.0	3.1	3.3	3.4	3.6	3.8	3.9	4.1	4.2	4.4	4.5	4.7	81	99			0.0						0.1	81	99
82	98	2.2	2.4	2.5	2.6	2.8	2.9	3.1	3.2	3.3	3.5	3.6	3.8	3.9	4.0	4.2	82	98				0.1						82	98
83	97	1.9	2.1	2.2	2.3	2.4	2.6	2.7	2.8	2.9	3.0	3.2	3.3	3.4	3.5	3.7	83	97				0.0						83	97
84	96	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	84	96					0.1					84	96
85	95	1.4	1.5	1.6	1.7	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.4	2.5	2.6	85	95	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	85	95
86	94	1.1	1.2	1.3	1.3	1.4	1.5	1.5	1.6	1.7	1.7	1.8	1.9	2.0	2.0	2.1	86	94						0.0	0.0	0.1	0.1	86	94
87	93	0.8	0.9	0.9	1.0	1.0	1.1	1.2	1.2	1.3	1.3	1.4	1.4	1.5	1.5	1.6	87	93								0.0	0.0	87	93
88	92	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.0	88	92										88	92
89	91	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	89	91										89	91
90	90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90	90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90	90
Az.		16′	17′	18′	19′	20′	21′	22′	23′	24′	25′	26′	27′	28′	29′	30′	Az.		0.1′	0.2′	0.3′	0.4′	0.5′	0.6′	0.7′	0.8′	0.9′	Az.	

Azimuth angle greater than 90°:
If DR latitude is greater than selected tabulated latitude, ΔL correction is *minus;* but for DR latitude less than selected tabulated latitude, the correction is *plus.*

Azimuth angle less than 90°:
If DR latitude is greater than selected tabulated latitude, ΔL correction is *plus;* but for DR latitude less than selected tabulated latitude, the correction is *minus.*

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MULTIPLICATION TABLE

Δ	1′	2′	3′	4′	5′	6′	7′	8′	9′	10′	11′	12′	13′	14′	15′	Δ
01	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	01
2	.0	.0	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.3	.3	.3	2
3	.0	.1	.1	.1	.2	.2	.2	.2	.3	.3	.3	.4	.4	.4	.5	3
4	.0	.1	.1	.2	.2	.2	.3	.3	.4	.4	.4	.5	.5	.6	.6	4
05	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.8	05
6	.1	.1	.2	.2	.3	.4	.4	.5	.5	.6	.7	.7	.8	.8	.9	6
7	.1	.1	.2	.3	.4	.4	.5	.6	.6	.7	.8	.8	.9	1.0	1.1	7
8	.1	.2	.2	.3	.4	.5	.6	.6	.7	.8	.9	1.0	1.0	1.1	1.2	8
9	.1	.2	.3	.4	.5	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4	9
10	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	10
1	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4	1.5	1.7	1
2	.1	.2	.4	.5	.6	.7	.8	1.0	1.1	1.2	1.3	1.4	1.6	1.7	1.8	2
3	.1	.3	.4	.5	.7	.8	.9	1.0	1.2	1.3	1.4	1.6	1.7	1.8	2.0	3
4	.1	.3	.4	.6	.7	.8	1.0	1.1	1.3	1.4	1.5	1.7	1.8	2.0	2.1	4
15	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	1.5	1.7	1.8	2.0	2.1	2.3	15
6	.2	.3	.5	.6	.8	1.0	1.1	1.3	1.4	1.6	1.8	1.9	2.1	2.2	2.4	6
7	.2	.3	.5	.7	.9	1.0	1.2	1.4	1.5	1.7	1.9	2.0	2.2	2.4	2.6	7
8	.2	.4	.5	.7	.9	1.1	1.3	1.4	1.6	1.8	2.0	2.2	2.3	2.5	2.7	8
9	.2	.4	.6	.8	1.0	1.1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	2.7	2.9	9
20	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	20
1	.2	.4	.6	.8	1.1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	2.7	2.9	3.2	1
2	.2	.4	.7	.9	1.1	1.3	1.5	1.8	2.0	2.2	2.4	2.6	2.9	3.1	3.3	2
3	.2	.5	.7	.9	1.2	1.4	1.6	1.8	2.1	2.3	2.5	2.8	3.0	3.2	3.5	3
4	.2	.5	.7	1.0	1.2	1.4	1.7	1.9	2.2	2.4	2.6	2.9	3.1	3.4	3.6	4
25	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.0	2.3	2.5	2.8	3.0	3.3	3.5	3.8	25
6	.3	.5	.8	1.0	1.3	1.6	1.8	2.1	2.3	2.6	2.9	3.1	3.4	3.6	3.9	6
7	.3	.5	.8	1.1	1.4	1.6	1.9	2.2	2.4	2.7	3.0	3.2	3.5	3.8	4.1	7
8	.3	.6	.8	1.1	1.4	1.7	2.0	2.2	2.5	2.8	3.1	3.4	3.6	3.9	4.2	8
9	.3	.6	.9	1.2	1.5	1.7	2.0	2.3	2.6	2.9	3.2	3.5	3.8	4.1	4.4	9
30	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.5	30
1	.3	.6	.9	1.2	1.6	1.9	2.2	2.5	2.8	3.1	3.4	3.7	4.0	4.3	4.7	1
2	.3	.6	1.0	1.3	1.6	1.9	2.2	2.6	2.9	3.2	3.5	3.8	4.2	4.5	4.8	2
3	.3	.7	1.0	1.3	1.7	2.0	2.3	2.6	3.0	3.3	3.6	4.0	4.3	4.6	5.0	3
4	.3	.7	1.0	1.4	1.7	2.0	2.4	2.7	3.1	3.4	3.7	4.1	4.4	4.8	5.1	4
35	0.4	0.7	1.1	1.4	1.8	2.1	2.5	2.8	3.2	3.5	3.9	4.2	4.6	4.9	5.3	35
6	.4	.7	1.1	1.4	1.8	2.2	2.5	2.9	3.2	3.6	4.0	4.3	4.7	5.0	5.4	6
7	.4	.7	1.1	1.5	1.9	2.2	2.6	3.0	3.3	3.7	4.1	4.4	4.8	5.2	5.6	7
8	.4	.8	1.1	1.5	1.9	2.3	2.7	3.0	3.4	3.8	4.2	4.6	4.9	5.3	5.7	8
9	.4	.8	1.2	1.6	2.0	2.3	2.7	3.1	3.5	3.9	4.3	4.7	5.1	5.5	5.9	9
40	0.4	0.8	1.2	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4	4.8	5.2	5.6	6.0	40
1	.4	.8	1.2	1.6	2.1	2.5	2.9	3.3	3.7	4.1	4.5	4.9	5.3	5.7	6.2	1
2	.4	.8	1.3	1.7	2.1	2.5	2.9	3.4	3.8	4.2	4.6	5.0	5.5	5.9	6.3	2
3	.4	.9	1.3	1.7	2.2	2.6	3.0	3.4	3.9	4.3	4.7	5.2	5.6	6.0	6.5	3
4	.4	.9	1.3	1.8	2.2	2.6	3.1	3.5	4.0	4.4	4.8	5.3	5.7	6.2	6.6	4
45	0.5	0.9	1.4	1.8	2.3	2.7	3.2	3.6	4.1	4.5	5.0	5.4	5.9	6.3	6.8	45
6	.5	.9	1.4	1.8	2.3	2.8	3.2	3.7	4.1	4.6	5.0	5.5	6.0	6.4	6.9	6
7	.5	.9	1.4	1.9	2.4	2.8	3.3	3.7	4.2	4.6	5.1	5.6	6.0	6.5	7.0	7
8	.5	1.0	1.4	1.9	2.4	2.9	3.3	3.8	4.2	4.7	5.1	5.6	6.1	6.6	7.0	8
9	.5	1.0	1.5	2.0	2.5	2.9	3.4	3.8	4.3	4.8	5.2	5.7	6.2	6.7	7.1	9
50	0.5	1.0	1.5	2.0	2.5	3.0	3.5	3.9	4.4	4.9	5.4	5.9	6.4	6.9	7.4	50
1	.5	1.0	1.5	2.0	2.6	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	1
2	.5	1.0	1.6	2.1	2.6	3.1	3.6	4.1	4.6	5.1	5.6	6.1	6.6	7.1	7.6	2
3	.5	1.1	1.6	2.1	2.7	3.2	3.7	4.2	4.7	5.2	5.7	6.2	6.7	7.2	7.7	3
4	.5	1.1	1.6	2.2	2.7	3.2	3.7	4.3	4.8	5.3	5.8	6.3	6.8	7.3	7.8	4
55	0.6	1.1	1.7	2.2	2.8	3.3	3.8	4.4	4.9	5.4	5.9	6.4	6.9	7.4	7.9	55
6	.6	1.1	1.7	2.2	2.8	3.3	3.9	4.4	5.0	5.5	6.0	6.5	7.0	7.5	8.0	6
7	.6	1.1	1.7	2.3	2.9	3.4	3.9	4.5	5.0	5.6	6.1	6.6	7.1	7.6	8.1	7
8	.6	1.2	1.7	2.3	2.9	3.4	4.0	4.5	5.1	5.6	6.2	6.7	7.2	7.7	8.2	8
9	.6	1.2	1.8	2.4	3.0	3.5	4.0	4.6	5.2	5.7	6.2	6.8	7.3	7.8	8.3	9
60	0.6	1.2	1.8	2.4	3.0	3.5	4.1	4.7	5.2	5.8	6.3	6.9	7.4	8.0	8.5	60
1	.6	1.2	1.8	2.4	3.1	3.6	4.2	4.7	5.3	5.8	6.4	6.9	7.5	8.0	8.6	1
2	.6	1.2	1.9	2.5	3.1	3.6	4.2	4.8	5.3	5.9	6.4	7.0	7.5	8.1	8.6	2
3	.6	1.3	1.9	2.5	3.2	3.7	4.3	4.8	5.4	5.9	6.5	7.0	7.6	8.1	8.7	3
4	.6	1.3	1.9	2.6	3.2	3.7	4.3	4.9	5.4	6.0	6.5	7.1	7.6	8.2	8.7	4
65	0.7	1.3	2.0	2.6	3.3	3.8	4.4	4.9	5.5	6.0	6.6	7.1	7.7	8.2	8.8	65
6	.7	1.3	2.0	2.6	3.3	3.8	4.4	5.0	5.5	6.1	6.6	7.2	7.7	8.3	8.8	6
7	.7	1.3	2.0	2.7	3.4	3.9	4.5	5.0	5.6	6.1	6.7	7.2	7.8	8.3	8.9	7
8	.7	1.4	2.0	2.7	3.4	4.0	4.5	5.1	5.6	6.2	6.7	7.3	7.8	8.4	8.9	8
9	.7	1.4	2.1	2.8	3.5	4.0	4.6	5.1	5.7	6.2	6.8	7.3	7.9	8.4	9.0	9
70	0.7	1.4	2.1	2.8	3.5	4.0	4.6	5.2	5.7	6.3	6.8	7.4	7.9	8.5	9.0	70
1	.7	1.4	2.1	2.8	3.6	4.1	4.7	5.2	5.8	6.3	6.9	7.4	8.0	8.5	9.1	1
2	.7	1.4	2.2	2.9	3.6	4.1	4.7	5.3	5.8	6.4	6.9	7.5	8.0	8.6	9.1	2
3	.7	1.5	2.2	2.9	3.7	4.2	4.8	5.3	5.9	6.4	7.0	7.5	8.1	8.6	9.2	3
4	.7	1.5	2.2	3.0	3.7	4.2	4.8	5.4	5.9	6.5	7.0	7.6	8.1	8.7	9.2	4
75	0.8	1.5	2.3	3.0	3.8	4.3	4.9	5.4	6.0	6.5	7.1	7.6	8.2	8.7	9.3	75
6	.8	1.5	2.3	3.0	3.8	4.3	4.9	5.5	6.0	6.6	7.1	7.7	8.2	8.8	9.3	6
7	.8	1.5	2.3	3.1	3.9	4.4	5.0	5.5	6.1	6.6	7.2	7.7	8.3	8.8	9.4	7
8	.8	1.6	2.3	3.1	3.9	4.4	5.0	5.6	6.1	6.7	7.2	7.8	8.3	8.9	9.4	8
9	.8	1.6	2.4	3.2	4.0	4.5	5.1	5.6	6.2	6.7	7.3	7.8	8.4	8.9	9.5	9
80	0.8	1.6	2.4	3.2	4.0	4.5	5.1	5.7	6.2	6.8	7.3	7.9	8.4	9.0	9.5	80
1	.8	1.6	2.4	3.2	4.1	4.6	5.2	5.7	6.3	6.8	7.4	7.9	8.5	9.0	9.6	1
2	.8	1.6	2.5	3.3	4.1	4.6	5.2	5.8	6.3	6.9	7.4	8.0	8.5	9.1	9.6	2
3	.8	1.7	2.5	3.3	4.2	4.7	5.3	5.8	6.4	6.9	7.5	8.0	8.6	9.1	9.7	3
4	.8	1.7	2.5	3.4	4.2	4.7	5.3	5.9	6.4	7.0	7.5	8.1	8.6	9.2	9.7	4
85	0.9	1.7	2.6	3.4	4.3	4.8	5.4	5.9	6.5	7.0	7.6	8.1	8.7	9.2	9.8	85
6	.9	1.7	2.6	3.4	4.3	4.8	5.4	6.0	6.5	7.1	7.6	8.2	8.7	9.3	9.8	6
7	.9	1.7	2.6	3.5	4.4	4.9	5.5	6.0	6.6	7.1	7.7	8.2	8.8	9.3	9.9	7
8	.9	1.8	2.6	3.5	4.4	5.0	5.5	6.1	6.6	7.2	7.7	8.3	8.8	9.4	9.9	8
9	.9	1.8	2.7	3.6	4.5	5.0	5.6	6.1	6.7	7.2	7.8	8.3	8.9	9.4	10.0	9
90	0.9	1.8	2.7	3.6	4.5	5.1	5.6	6.2	6.7	7.3	7.8	8.4	8.9	9.5	10.0	90
1	.9	1.8	2.7	3.6	4.6	5.1	5.7	6.2	6.8	7.3	7.9	8.4	9.0	9.5	10.1	1
2	.9	1.8	2.8	3.7	4.6	5.2	5.7	6.3	6.8	7.4	7.9	8.5	9.0	9.6	10.1	2
3	.9	1.9	2.8	3.7	4.7	5.2	5.8	6.3	6.9	7.4	8.0	8.5	9.1	9.6	10.2	3
4	.9	1.9	2.8	3.8	4.7	5.3	5.8	6.4	6.9	7.5	8.0	8.6	9.1	9.7	10.2	4
95	1.0	1.9	2.9	3.8	4.8	5.3	5.9	6.4	7.0	7.5	8.1	8.6	9.2	9.7	10.3	95
6	1.0	1.9	2.9	3.8	4.8	5.4	5.9	6.5	7.0	7.6	8.1	8.7	9.2	9.8	10.3	6
7	1.0	1.9	2.9	3.9	4.9	5.4	6.0	6.5	7.1	7.6	8.2	8.7	9.3	9.8	10.4	7
8	1.0	2.0	2.9	3.9	4.9	5.5	6.0	6.6	7.1	7.7	8.2	8.8	9.3	9.9	10.4	8
99	1.0	2.0	3.0	4.0	5.0	5.5	6.1	6.6	7.2	7.7	8.3	8.8	9.4	9.9	10.5	99
Δ	1′	2′	3′	4′	5′	6′	7′	8′	9′	10′	11′	12′	13′	14′	15′	Δ

Δ	0.1′	0.2′	0.3′	0.4′	0.5′	0.6′	0.7′	0.8′	0.9′	Δ
01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	01
2										2
3										3
4										4
05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	05
6								0.0	0.1	6
7							0.0	0.1		7
8						0.0	0.1			8
9					0.0	0.1				9
10	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	10
1										1
2				0.0						2
3				0.1						3
4										4
15	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	15
6			0.0						0.1	6
7			0.1						0.2	7
8								0.1		8
9								0.2		9
20	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	20
1							0.1			1
2							0.2			2
3										3
4		0.0				0.1				4
25	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	25
6										6
7								0.2		7
8								0.3		8
9					0.1					9
30	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	30
1								0.2		1
2								0.3		2
3										3
4										4
35	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	35
6							0.2			6
7				0.1						7
8				0.2					0.3	8
9									0.4	9
40	0.0	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	40
1						0.2				1
2						0.3				2
3								0.3		3
4								0.4		4
45	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	45
6										6
7										7
8		0.1		0.2		0.3		0.4		8
9										9
50	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5	50
1										1
2										2
3										3
4										4
55	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.6	55
6							0.4			6
7							0.5			7
8					0.3					8
9					0.4					9
60	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.5	0.6	60
1								0.5		1
2				0.2				0.6		2
3				0.3						3
4						0.4				4
65	0.1	0.2	0.3	0.3	0.4	0.5	0.5	0.6	0.7	65
6							0.5			6
7							0.6			7
8										8
9				0.3						9
70	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.6	0.7	70
1								0.6		1
2								0.7		2
3										3
4	0.1					0.4				4
75	0.2	0.2	0.3	0.4	0.5	0.5	0.6	0.7	0.8	75
6										6
7							0.5			7
8							0.6			8
9										9
80	0.2	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.8	80
1							0.6			1
2							0.7			2
3				0.2						3
4				0.3				0.7	0.8	4
85	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	85
6										6
7				0.3						7
8				0.4						8
9										9
90	0.2	0.3	0.4	0.5	0.5	0.6	0.7	0.8	0.9	90
1					0.5					1
2					0.6					2
3						0.6				3
4						0.7		0.8	0.8	4
95	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	95
6										6
7										7
8										8
99										99
Δ	0.2′	0.3′	0.4′	0.5′	0.6′	0.7′	0.8′	0.9′	Δ	

Δd or Δt

Δd or Δt

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MULTIPLICATION TABLE

Δ	DEC. DIFF. OR H. A. DIFF. (minutes of arc)														Δ	DEC. DIFF. OR H. A. DIFF. (tenths of minutes)									Δ
	16′	17′	18′	19′	20′	21′	22′	23′	24′	25′	26′	27′	28′	29′	30′		0.1′	0.2′	0.3′	0.4′	0.5′	0.6′	0.7′	0.8′	0.9′	
01	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	01
2	.3	.3	.4	.4	.4	.4	.4	.5	.5	.5	.5	.5	.6	.6	.6	2										2
3	.5	.5	.5	.6	.6	.6	.7	.7	.7	.8	.8	.8	.8	.9	.9	3										3
4	.6	.7	.7	.8	.8	.8	.9	.9	1.0	1.0	1.0	1.1	1.1	1.2	1.2	4										4
05	0.8	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.4	1.4	1.5	1.5	05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	05
6	1.0	1.0	1.1	1.1	1.2	1.3	1.3	1.4	1.4	1.5	1.6	1.6	1.7	1.7	1.8	6							0.0	0.0	0.1	6
7	1.1	1.2	1.3	1.3	1.4	1.5	1.5	1.6	1.7	1.8	1.8	1.9	2.0	2.0	2.1	7					0.0		0.1			7
8	1.3	1.4	1.4	1.5	1.6	1.7	1.8	1.8	1.9	2.0	2.1	2.2	2.2	2.3	2.4	8					0.1					8
9	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.3	2.4	2.5	2.6	2.7	9						0.0 0.1				9
10	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	10	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	10
1	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.8	2.9	3.0	3.1	3.2	3.3	1										1
2	1.9	2.0	2.2	2.3	2.4	2.5	2.6	2.8	2.9	3.0	3.1	3.2	3.4	3.5	3.6	2				0.0						2
3	2.1	2.2	2.3	2.5	2.6	2.7	2.9	3.0	3.1	3.3	3.4	3.5	3.6	3.8	3.9	3				0.1						3
4	2.2	2.4	2.5	2.7	2.8	2.9	3.1	3.2	3.4	3.5	3.6	3.8	3.9	4.1	4.2	4										4
15	2.4	2.6	2.7	2.9	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	4.5	15	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	15
6	2.6	2.7	2.9	3.0	3.2	3.4	3.5	3.7	3.8	4.0	4.2	4.3	4.5	4.6	4.8	6				0.0				0.1		6
7	2.7	2.9	3.1	3.2	3.4	3.6	3.7	3.9	4.1	4.3	4.4	4.6	4.8	4.9	5.1	7				0.1				0.2		7
8	2.9	3.1	3.2	3.4	3.6	3.8	4.0	4.1	4.3	4.5	4.7	4.9	5.0	5.2	5.4	8										8
9	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	4.9	5.1	5.3	5.5	5.7	9						0.1 0.2				9
20	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0	5.2	5.4	5.6	5.8	6.0	20	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	20
1	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0	5.3	5.5	5.7	5.9	6.1	6.3	1							0.1			1
2	3.5	3.7	4.0	4.2	4.4	4.6	4.8	5.1	5.3	5.5	5.7	5.9	6.2	6.4	6.6	2							0.2			2
3	3.7	3.9	4.1	4.4	4.6	4.8	5.1	5.3	5.5	5.8	6.0	6.2	6.4	6.7	6.9	3										3
4	3.8	4.1	4.3	4.6	4.8	5.0	5.3	5.5	5.8	6.0	6.2	6.5	6.7	7.0	7.2	4						0.1				4
25	4.0	4.3	4.5	4.8	5.0	5.3	5.5	5.8	6.0	6.3	6.5	6.8	7.0	7.3	7.5	25	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	25
6	4.2	4.4	4.7	4.9	5.2	5.5	5.7	6.0	6.2	6.5	6.8	7.0	7.3	7.5	7.8	6										6
7	4.3	4.6	4.9	5.1	5.4	5.7	5.9	6.2	6.5	6.8	7.0	7.3	7.6	7.8	8.1	7								0.2		7
8	4.5	4.8	5.0	5.3	5.6	5.9	6.2	6.4	6.7	7.0	7.3	7.6	7.8	8.1	8.4	8								0.3		8
9	4.6	4.9	5.2	5.5	5.8	6.1	6.4	6.7	7.0	7.3	7.5	7.8	8.1	8.4	8.7	9					0.1					9
30	4.8	5.1	5.4	5.7	6.0	6.3	6.6	6.9	7.2	7.5	7.8	8.1	8.4	8.7	9.0	30	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	30
1	5.0	5.3	5.6	5.9	6.2	6.5	6.8	7.1	7.4	7.8	8.1	8.4	8.7	9.0	9.3	1								0.2		1
2	5.1	5.4	5.8	6.1	6.4	6.7	7.0	7.4	7.7	8.0	8.3	8.6	9.0	9.3	9.6	2								0.3		2
3	5.3	5.6	5.9	6.3	6.6	6.9	7.3	7.6	7.9	8.3	8.6	8.9	9.2	9.6	9.9	3										3
4	5.4	5.8	6.1	6.5	6.8	7.1	7.5	7.8	8.2	8.5	8.8	9.2	9.5	9.9	10.2	4										4
35	5.6	6.0	6.3	6.7	7.0	7.4	7.7	8.1	8.4	8.8	9.1	9.5	9.8	10.2	10.5	35	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	35
6	5.8	6.1	6.5	6.8	7.2	7.6	7.9	8.3	8.6	9.0	9.4	9.7	10.1	10.4	10.8	6							0.3			6
7	5.9	6.3	6.7	7.0	7.4	7.8	8.1	8.5	8.9	9.3	9.6	10.0	10.4	10.7	11.1	7				0.1						7
8	6.1	6.5	6.8	7.2	7.6	8.0	8.4	8.7	9.1	9.5	9.9	10.3	10.6	11.0	11.4	8				0.2				0.3		8
9	6.2	6.6	7.0	7.4	7.8	8.2	8.6	9.0	9.4	9.8	10.1	10.5	10.9	11.3	11.7	9								0.4		9
40	6.4	6.8	7.2	7.6	8.0	8.4	8.8	9.2	9.6	10.0	10.4	10.8	11.2	11.6	12.0	40	0.0	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	40
1	6.6	7.0	7.4	7.8	8.2	8.6	9.0	9.4	9.8	10.3	10.7	11.1	11.5	11.9	12.3	1						0.2				1
2	6.7	7.1	7.6	8.0	8.4	8.8	9.2	9.7	10.1	10.5	10.9	11.3	11.8	12.2	12.6	2						0.3				2
3	6.9	7.3	7.7	8.2	8.6	9.0	9.5	9.9	10.3	10.8	11.2	11.6	12.0	12.5	12.9	3								0.3		3
4	7.0	7.5	7.9	8.4	8.8	9.2	9.7	10.1	10.6	11.0	11.4	11.9	12.3	12.8	13.2	4								0.4		4
45	7.2	7.7	8.1	8.6	9.0	9.5	9.9	10.4	10.8	11.3	11.7	12.2	12.6	13.1	13.5	45	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	45
6	7.4	7.8	8.3	8.7	9.2	9.7	10.1	10.6	11.0	11.5	12.0	12.4	12.9	13.3	13.8	6										6
7	7.5	8.0	8.5	8.9	9.4	9.9	10.3	10.8	11.3	11.8	12.2	12.7	13.2	13.6	14.1	7										7
8	7.7	8.2	8.6	9.1	9.6	10.1	10.6	11.0	11.5	12.0	12.5	13.0	13.4	13.9	14.4	8										8
9	7.8	8.3	8.8	9.3	9.8	10.3	10.8	11.3	11.8	12.3	12.7	13.2	13.7	14.2	14.7	9					0.1		0.2		0.4	9
50	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	50	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	50
1	8.2	8.7	9.2	9.7	10.2	10.7	11.2	11.7	12.2	12.8	13.3	13.8	14.3	14.8	15.3	1										1
2	8.3	8.8	9.4	9.9	10.4	10.9	11.4	12.0	12.5	13.0	13.5	14.0	14.6	15.1	15.6	2										2
3	8.5	9.0	9.5	10.1	10.6	11.1	11.7	12.2	12.7	13.3	13.8	14.3	14.8	15.4	15.9	3										3
4	8.6	9.2	9.7	10.3	10.8	11.3	11.9	12.4	13.0	13.5	14.0	14.6	15.1	15.7	16.2	4										4
55	8.8	9.4	9.9	10.5	11.0	11.6	12.1	12.7	13.2	13.8	14.3	14.9	15.4	16.0	16.5	55	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	55
6	9.0	9.5	10.1	10.6	11.2	11.8	12.3	12.9	13.4	14.0	14.6	15.1	15.7	16.2	16.8	6								0.4		6
7	9.1	9.7	10.3	10.8	11.4	12.0	12.5	13.1	13.7	14.3	14.8	15.4	16.0	16.5	17.1	7								0.5		7
8	9.3	9.9	10.4	11.0	11.6	12.2	12.8	13.3	13.9	14.5	15.1	15.7	16.2	16.8	17.4	8						0.3				8
9	9.4	10.0	10.6	11.2	11.8	12.4	13.0	13.6	14.2	14.8	15.3	15.9	16.5	17.1	17.7	9						0.4				9
60	9.6	10.2	10.8	11.4	12.0	12.6	13.2	13.8	14.4	15.0	15.6	16.2	16.8	17.4	18.0	60	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.5	60
1	9.8	10.4	11.0	11.6	12.2	12.8	13.4	14.0	14.6	15.3	15.9	16.5	17.1	17.7	18.3	1									0.5	1
2	9.9	10.5	11.2	11.8	12.4	13.0	13.6	14.3	14.9	15.5	16.1	16.7	17.4	18.0	18.6	2				0.2					0.6	2
3	10.1	10.7	11.3	12.0	12.6	13.2	13.9	14.5	15.1	15.8	16.4	17.0	17.6	18.3	18.9	3				0.3						3
4	10.2	10.9	11.5	12.2	12.8	13.4	14.1	14.7	15.4	16.0	16.6	17.3	17.9	18.6	19.2	4							0.4			4
65	10.4	11.1	11.7	12.4	13.0	13.7	14.3	15.0	15.6	16.3	16.9	17.6	18.2	18.9	19.5	65	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.5	0.6	65
6	10.6	11.2	11.9	12.5	13.2	13.9	14.5	15.2	15.8	16.5	17.2	17.8	18.5	19.1	19.8	6										6
7	10.7	11.4	12.1	12.7	13.4	14.1	14.7	15.4	16.1	16.8	17.4	18.1	18.8	19.4	20.1	7										7
8	10.9	11.6	12.2	12.9	13.6	14.3	15.0	15.6	16.3	17.0	17.7	18.4	19.0	19.7	20.4	8								0.5		8
9	11.0	11.7	12.4	13.1	13.8	14.5	15.2	15.9	16.6	17.3	17.9	18.6	19.3	20.0	20.7	9						0.3		0.6		9
70	11.2	11.9	12.6	13.3	14.0	14.7	15.4	16.1	16.8	17.5	18.2	18.9	19.6	20.3	21.0	70	0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.6	70
1	11.4	12.1	12.8	13.5	14.2	14.9	15.6	16.3	17.0	17.8	18.5	19.2	19.9	20.6	21.3	1										1
2	11.5	12.2	13.0	13.7	14.4	15.1	15.8	16.6	17.3	18.0	18.7	19.4	20.2	20.9	21.6	2									0.6	2
3	11.7	12.4	13.1	13.9	14.6	15.3	16.1	16.8	17.5	18.3	19.0	19.7	20.4	21.2	21.9	3									0.7	3
4	11.8	12.6	13.3	14.1	14.8	15.5	16.3	17.0	17.8	18.5	19.2	20.0	20.7	21.5	22.2	4				0.1			0.4			4
75	12.0	12.8	13.5	14.3	15.0	15.8	16.5	17.3	18.0	18.8	19.5	20.3	21.0	21.8	22.5	75	0.1	0.2	0.2	0.3	0.4	0.5	0.5	0.6	0.7	75
6	12.2	12.9	13.7	14.4	15.2	16.0	16.7	17.5	18.2	19.0	19.8	20.5	21.3	22.0	22.8	6										6
7	12.3	13.1	13.9	14.6	15.4	16.2	16.9	17.7	18.5	19.3	20.0	20.8	21.6	22.3	23.1	7										7
8	12.5	13.3	14.0	14.8	15.6	16.4	17.2	17.9	18.7	19.5	20.3	21.1	21.8	22.6	23.4	8							0.5			8
9	12.6	13.4	14.2	15.0	15.8	16.6	17.4	18.2	19.0	19.8	20.5	21.3	22.1	22.9	23.7	9							0.6			9
80	12.8	13.6	14.4	15.2	16.0	16.8	17.6	18.4	19.2	20.0	20.8	21.6	22.4	23.2	24.0	80	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.6	0.7	80
1	13.0	13.8	14.6	15.4	16.2	17.0	17.8	18.6	19.4	20.3	21.1	21.9	22.7	23.5	24.3	1								0.6		1
2	13.1	13.9	14.8	15.6	16.4	17.2	18.0	18.9	19.7	20.5	21.3	22.1	23.0	23.8	24.6	2								0.7		2
3	13.3	14.1	14.9	15.8	16.6	17.4	18.3	19.1	19.9	20.8	21.6	22.4	23.2	24.1	24.9	3					0.2					3
4	13.4	14.3	15.1	16.0	16.8	17.6	18.5	19.3	20.2	21.0	21.8	22.7	23.5	24.4	25.2	4					0.3				0.7	4
85	13.6	14.5	15.3	16.2	17.0	17.9	18.7	19.6	20.4	21.3	22.1	23.0	23.8	24.7	25.5	85	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8	85
6	13.8	14.6	15.5	16.3	17.2	18.1	18.9	19.8	20.6	21.5	22.4	23.2	24.1	24.9	25.8	6										6
7	13.9	14.8	15.7	16.5	17.4	18.3	19.1	20.0	20.9	21.8	22.6	23.5	24.4	25.2	26.1	7				0.3						7
8	14.1	15.0	15.8	16.7	17.6	18.5	19.4	20.2	21.1	22.0	22.9	23.8	24.6	25.5	26.4	8				0.4						8
9	14.2	15.1	16.0	16.9	17.8	18.7	19.6	20.5	21.4	22.3	23.1	24.0	24.9	25.8	26.7	9					0.4					9
90	14.4	15.3	16.2	17.1	18.0	18.9	19.8	20.7	21.6	22.5	23.4	24.3	25.2	26.1	27.0	90	0.1	0.2	0.3	0.4	0.5	0.5	0.6	0.7	0.8	90
1	14.6	15.5	16.4	17.3	18.2	19.1	20.0	20.9	21.8	22.8	23.7	24.6	25.5	26.4	27.3	1						0.5				1
2	14.7	15.6	16.6	17.5	18.4	19.3	20.2	21.2	22.1	23.0	23.9	24.8	25.8	26.7	27.6	2						0.6	0.6			2
3	14.9	15.8	16.7	17.7	18.6	19.5	20.5	21.4	22.3	23.3	24.2	25.1	26.0	27.0	27.9	3							0.7			3
4	15.0	16.0	16.9	17.9	18.8	19.7	20.7	21.6	22.6	23.5	24.4	25.4	26.3	27.3	28.2	4								0.8	0.8	4
95	15.2	16.2	17.1	18.1	19.0	20.0	20.9	21.9	22.8	23.8	24.7	25.7	26.6	27.6	28.5	95	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	95
6	15.4	16.3	17.3	18.2	19.2	20.2	21.1	22.1	23.0	24.0	25.0	25.9	26.9	27.8	28.8	6										6
7	15.5	16.5	17.5	18.4	19.4	20.4	21.3	22.3	23.3	24.3	25.2	26.2	27.2	28.1	29.1	7										7
8	15.7	16.7	17.6	18.6	19.6	20.6	21.6	22.5	23.5	24.5	25.5	26.5	27.4	28.4	29.4	8										8
99	15.8	16.8	17.8	18.8	19.8	20.8	21.8	22.8	23.8	24.8	25.7	26.7	27.7	28.7	29.7	99										99
Δ	16′	17′	18′	19′	20′	21′	22′	23′	24′	25′	26′	27′	28′	29′	30′	Δ	0.1′	0.2′	0.3′	0.4′	0.5′	0.6′	0.7′	0.8′	0.9′	Δ

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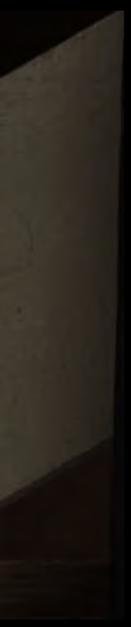
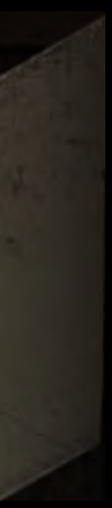

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