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UNIVERSITY OF CALIFORNIA SAN DIEGO
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H. O. PUB. NO. 214

VOL. II

TABLES OF COMPUTED ALTITUDE AND AZIMUTH

LATITUDES 10° — 19°, INCLUSIVE

U. S. NAVY HYDROGRAPHIC OFFICE

SPEED-TIME-DISTANCE [illegible]

SPEED IN KNOTS

TIME

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

SPEE   BLE

UNIVERSITY OF CALIFORNIA, SAN DIEGO
3 1822 00062 9428

TIME

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

FOR CONVERSION OF ARC TO TIME

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

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

″	s
0	0.00
1	0.07
2	0.13
3	0.20
4	0.27
5	0.33
6	0.40
7	0.47
8	0.53
9	0.60
10	0.67
11	0.73
12	0.80
13	0.87
14	0.93
15	1.00
16	1.07
17	1.13
18	1.20
19	1.27
20	1.33
21	1.40
22	1.47
23	1.53
24	1.60
25	1.67
26	1.73
27	1.80
28	1.87
29	1.93
30	2.00
31	2.07
32	2.13
33	2.20
34	2.27
35	2.33
36	2.40
37	2.47
38	2.53
39	2.60
40	2.67
41	2.73
42	2.80
43	2.87
44	2.93
45	3.00
46	3.07
47	3.13
48	3.20
49	3.27
50	3.33
51	3.40
52	3.47
53	3.53
54	3.60
55	3.67
56	3.73
57	3.80
58	3.87
59	3.93
60	4.00

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H. O. PUB. NO. 214

VOL. II

U S. Hydrographic Office

TABLES OF COMPUTED ALTITUDE AND AZIMUTH

LATITUDES 10° — 19°, INCLUSIVE

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PREFACE

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

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

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

Allen Hobbs,
Captain, U. S. Navy (Ret.),
Hydrographer.

16—8472-2

H. O. PUB. NO. 214

TABLES OF COMPUTED ALTITUDE AND AZIMUTH

Description of the Tables

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

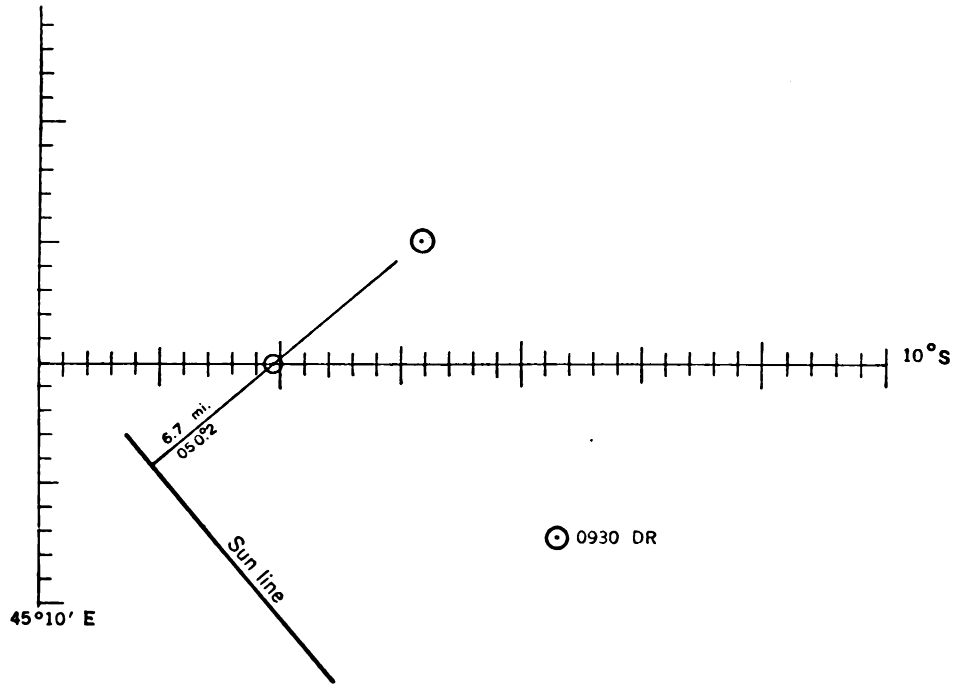
Latitude.—The whole degree with which the tables were entered.

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

Example 1.—On May 19, 1951, the 0930 dead reckoning position of a ship is lat. 10° 07′.2S, long. 45° 31′.5 E. About this time the navigator observes the lower limb of the sun, as follows: watch time (W) $9^h\ 30^m\ 50^s$ AM, watch error (WE) on zone time 11^s slow, height of eye 40 feet, index correction (IC) (—) 1′.1, sextant altitude (hs) 43° 34′.1. Solve the observation for altitude difference (a) and azimuth (Zn), using Δd only.

		May 19, 1951	
W		$9^h\ 30^m\ 50^s$ AM	
WE		(S) 11^s	
ZT		$9^h\ 31^m\ 01^s$	
ZD	(—)	3^h	
GMT*		$6^h\ 31^m\ 01^s$	May 19
GHA for 6^h GMT		270° 55′.0	
Correction for $31^m\ 01^s$		7° 45′.3	
GHA		278° 40′.3	
aλ		45° 19′.7	E (assumed longitude)
LHA		324° 00′.0	
t (H.A.)		36° 00′.0	E
d		19° 36′.4	N d diff. 6′.4
aL		10° 00′.0	S (assumed latitude)
ht (Alt.)		43° 52′.4	Δd (—) 0.60
Correction		(—) 3′.8	
Hc		43° 48′.6	
Ho		43° 41′.9	
a		6. 7	miles away
Zn		050°.2	

	+	⊙ —	
IC		1′.1	
Additional	0′.1		
Correction	14′.8		
Dip		6′.0	
Sum	14′.9	7′.1	
Correction		(+) 7′.8	
hs		43° 34′.1	
Ho		43° 41′.9	
d for 6^h GMT		(+) 19° 36′.1	N code
Correction		(+) 0′.3	(+) 5
d		19° 36′.4	N
Z (Az.)		S 129°.8	E



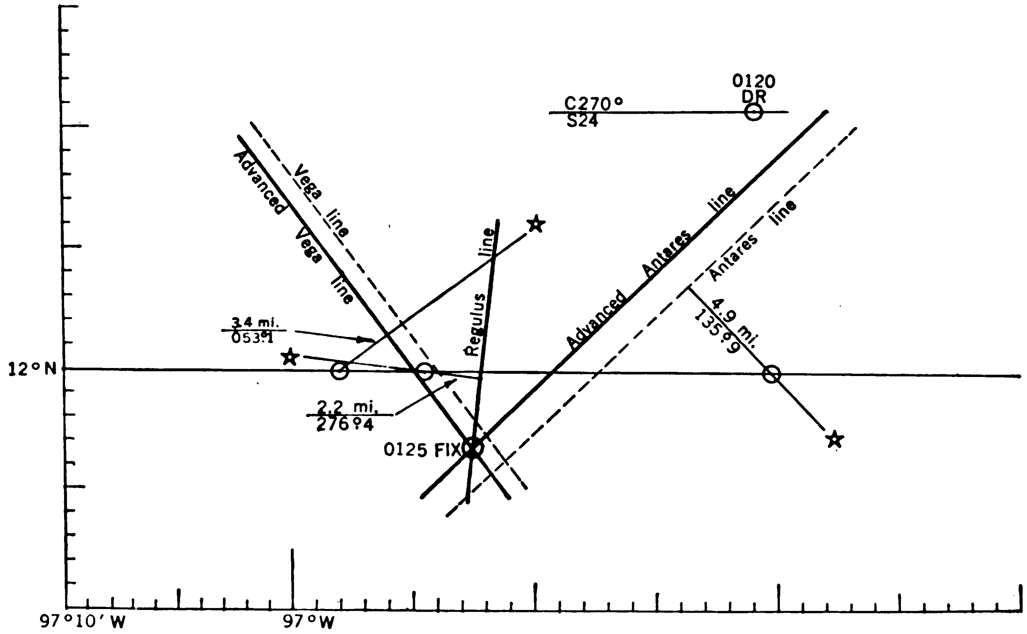
NOTE.—Minus 0.60 is obtained from the Δd column abreast Alt. in the tables. The value (—) 3′.8 (correction for 6′.4 declination difference) is obtained by multiplying 6′.4 by 0.60, or by referring to the multiplication table on the inside back cover, entering with 6′ and then with 0′.4 at the top and with 60 at the side. The two values thus obtained (3′.6 and 0′.2) are then added together to obtain the correction. The correction 3′.8 is subtracted because as the tabulated declination (19° 30′) approaches the exact declination of the body (19° 36′.4), the altitude decreases, as determined by inspection of the table. The tabulated azimuth angle, taken from the table without correction, is reckoned from the observer's elevated pole toward the east when body is rising, or east of the meridian. The sight is plotted from the nearest whole degree of latitude (10° 00′.0 S) and the assumed longitude (45° 19′.7 E).

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

Example 2.—On July 7, 1951, the GMT 0120 dead reckoning position of a ship is lat. 12° 10′.9 N, long. 96° 41′.0 W. The ship is on course 270°, speed 24 knots. Observations are made as indicated below. Solve for a and Zn, using Δd only.

Stars	*GMT*	*Declination*	*Obs. Alt. (Ho)*
Antares	1h 20m 17s	26° 19′.8 S	36° 00′.6
Vega	1h 22m 21s	38° 44′.2 N	22° 17′.8
Regulus	1h 24m 33s	12° 12′.4 N	34° 24′.8

	ANTARES		VEGA		REGULUS
GMT	1h 20m 17s		1h 22m 21s		1h 24m 33s
GHA♈ for 1h GMT	299° 11′.7		299° 11′.7		299° 11′.7
Correction for 20m 17s	5° 05′.1	(22m 21s)	5° 36′.2	(24m 33s)	6° 09′.3
SHA	113° 23′.2		81° 10′.1		208° 33′.3
GHA☆	57° 40′.0		25° 58′.0		153° 54′.3
aλ	96° 40′.0 W		96° 58′.0 W		96° 54′.3 W
LHA	321° 00′.0		289° 00′.0		57° 00′.0
t (H.A.)	39° 00′.0 E		71° 00′.0 E		57° 00′.0 W
d	26° 19′.8 S d diff. 10′.2		38° 44′.2 N d diff. 14′.2		12° 12′.4 N d diff. 12′.4
aL	12° 00′.0 N		12° 00′.0 N		12° 00′.0 N
Δd and correction (+) 0.65	(+) 6′.6	(−) 0.04	(−) 0′.6	(+) 0.11	(+) 1′.3
ht (Alt.)	35° 58′.9		22° 15′.0		34° 21′.3
Hc	36° 05′.5		22° 14′.4		34° 22′.6
Ho	36° 00′.6		22° 17′.8		34° 24′.8
a	4.9 miles away		3.4 miles toward		2.2 miles away
Z (Az.) and Zn N 135°.9 E	135°.9	N 53°.1 E	053°.1	N 83°.6 W	276°.4


0120
DR
C270°
S24
Advanced Vega line
Vega line
Regulus line
Advanced Antares line
Antares line
4.9 mi.
135°.9
3.4 mi.
053°.1
2.2 mi.
276°.4
0125 FIX
12° N
97°10′ W
97° W

NOTE.—The Antares sight is plotted from lat. 12° 00′.0 N, long. 96° 40′.0 W; the Vega sight from lat. 12° 00′.0 N, long. 96° 58′.0 W; and the Regulus sight from lat. 12° 00′.0 N, long. 96° 54′.3 W. In the illustration the Antares line of position is advanced 1.7 miles for a 4.3-minute run and the Vega line is advanced 0.9 mile for a 2.2-minute run, both in the direction of the course, 270°, to obtain a fix at the time of the Regulus sight.

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

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

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

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

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

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

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

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

Longitude.—The dead reckoning longitude.

Example 3.—On August 18, 1951, the 0520 dead reckoning position of a ship is lat. 14° 05′.7 S, long. 11° 17′.0 E. About this time the navigator observes the lower limb of the moon, as follows: watch time (W) $5^{h}\ 20^{m}\ 16^{s}$ AM, watch error (WE) on zone time 4^{s} fast, height of eye 32 feet, index correction (IC) (—) 0′.7, sextant altitude (hs) 28° 12′.2. Solve the observation for a and Zn, using Δd and Δt.

		August 18, 1951		
W		$5^{h}\ 20^{m}\ 16^{s}$ AM		
WE		(F) 4^{s}		
ZT		$5^{h}\ 20^{m}\ 12^{s}$		
ZD	(—)	1^{h}		
GMT		$4^{h}\ 20^{m}\ 12^{s}$	Aug. 18	
GHA for 4^{h} GMT		45° 34′.5		
Correction for $20^{m}\ 12^{s}$		4° 49′.2	code	
Code correction		3′.8	(+) 112	
GHA		50° 27′.5	d for 4^{h} GMT	(—) 8° 31′.1 code
aλ		11° 17′.0 E	Correction	(+) 5′.6 (+)164
LHA		61° 44′.5 W	d	8° 25′.5 S
t (H.A.)		61° 44′.5 S	t diff. 15′.5	
d		8° 25′.5 S	d diff. 4′.5	
aL		14° 00′.0		
ht (Alt.)		29° 05′.8	Δd (—) 0.20; Δt (+) 0.97	
Correction		(+) 14′.2		
Hc		29° 20′.0		
Ho		29° 12′.6		
a		7. 4 miles away		
Zn		268°.0		

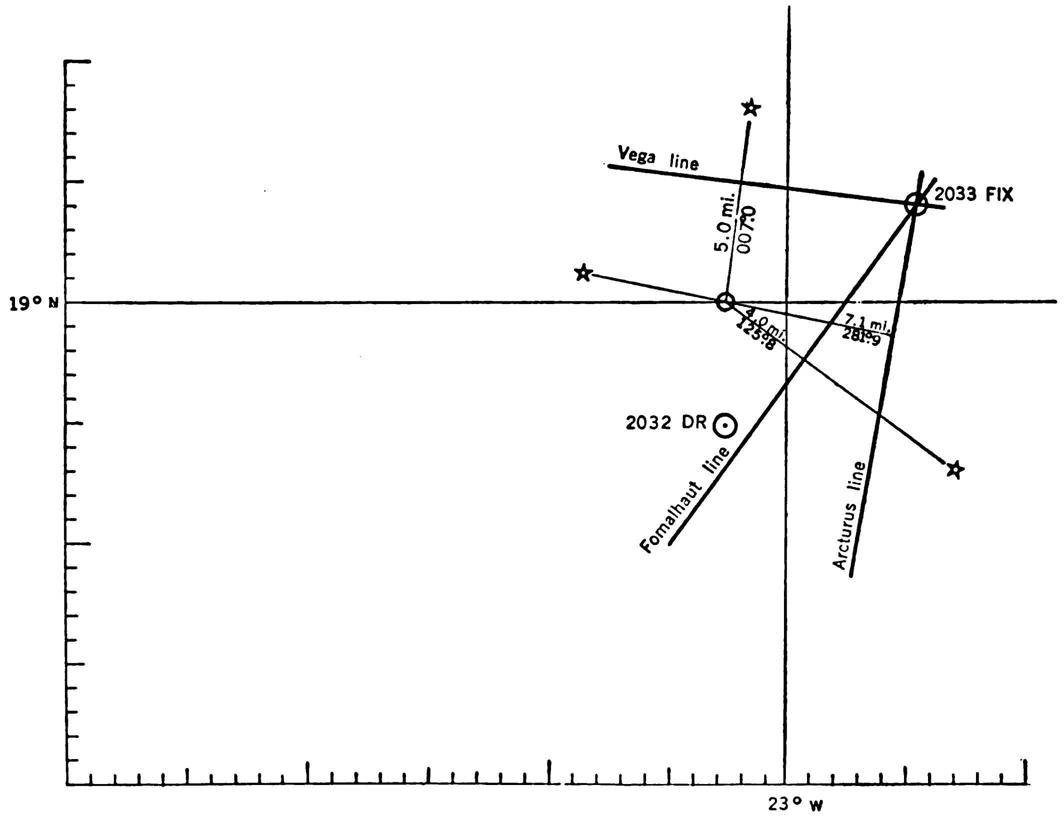
	+	☾	—
IC			0′.7
Additional	18′.1		
Correction	48′.4		
Dip			5′.4
Sum	66′.5		6′.1
Correction		(+)	60′.4
hs			28° 12′.2
Ho			29° 12′.6

t correction	(+)	15′.1
d correction	(—)	0′.9
Correction	(+)	14′.2
Z (Az.)		S 88°.0 W

Example 4.—On September 12, 1951, the GMT 2032 dead reckoning position of a ship is lat. 18° 55′.0 N, long. 23° 02′.6 W. Nearly simultaneous observations are made, as follows:

Stars	*GMT*	*Declination*	*Obs. Alt. (Ho)*
Fomalhaut	20h 32m 15s	29° 52′.6 S	8° 38′.0
Arcturus	20h 33m 00s	19° 26′.1 N	30° 51′.6
Vega	20h 33m 17s	38° 44′.4 N	70° 14′.1

	FOMALHAUT		ARCTURUS		VEGA	
GMT	20h 32m 15s		20h 33m 00s		20h 33m 17s	
GHA♈ for 20h GMT	291° 00′.9		291° 00′.9		291° 00′.9	
Correction for 32m 15s	8° 05′.1	(33m 00s)	8° 16′.4	(33m 17s)	8° 20′.6	
SHA	16° 14′.7		146° 38′.3		81° 10′.3	
GHA☆	315° 20′.7		85° 55′.6		20° 31′.8	
aλ	23° 02′.6 W		23° 02′.6 W		23° 02′.6 W	
LHA	292° 18′.1		62° 53′.0		357° 29′.2	
t (H.A.)	67° 41′.9 E	t diff. 18′.1	62° 53′.0 W	t diff. 7′.0	2° 30′.8 E	t diff. 29′.2
d	29° 52′.6 S	d diff. 7′.4	19° 26′.1 N	d diff. 3′.9	38° 44′.4 N	d diff. 14′.4
aL	19° 00′.0 N		19° 00′.0 N		19° 00′.0 N	
Δd and correction (+) 0. 46	(+) 3′.4	(—) 0. 19	(—) 0′.8	(—) 0. 99	(—) 14′.3	
Δt and correction (+) 0. 77	(+) 14′.0	(+) 0. 92	(+) 6′.4	(+) 0. 13	(+) 3′.8	
ht (Alt.)	8° 16′.6		30° 53′.1		70° 19′.6	
Hc	8° 34′.0		30° 58′.7		70° 09′.1	
Ho	8° 38′.0		30° 51′.6		70° 14′.1	
a	4. 0 miles toward		7. 1 miles away		5. 0 miles toward	
Z (Az.) and Zn N 125°.8 E	125°.8	N 78°.1 W	281°.9	N 7°.0 E	007°.0	



Note.—All three sights are plotted from lat. 19° 00′.0 N, long. 23° 02′.6 W.

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

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

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

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

Azimuth angle greater than 90°:

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

Azimuth angle less than 90°:

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

Example 5.—On November 20, 1951, the 1740 dead reckoning position of a ship is lat. 14° 10′.5 N, long. 160° 15′.0 E. About this time the navigator observes the star Nunki, as follows: watch time (W) $5^h\ 40^m\ 20^s$ PM, watch error (WE) on zone time 8^s slow, height of eye 26 feet, index correction (IC) (—) 1′.0, sextant altitude (hs) 36° 54′.3. Solve the observation for altitude difference (a) and azimuth (Zn), using Δd, Δt, and ΔL.

	November 20, 1951	
W	$5^h\ 40^m\ 20^s$ PM	
WE	(S) 8^s	
ZT	$17^h\ 40^m\ 28^s$	
ZD	(—) 11^h	
GMT	$6^h\ 40^m\ 28^s$ Nov. 20	
GHA ♈ for 6^h GMT	148° 26′.9	
Correction for $40^m\ 28^s$	10° 08′.7	
SHA	76° 55′.9	
GHA☆	235° 31′.5	
aλ	160° 15′.0 E	
LHA	35° 46′.5	
t (H.A.)	35° 46′.5 W	t diff. 13′.5
d	26° 21′.7 S	d diff. 8′.3
aL	14° 10′.5 N	L diff. 10′.5
ht (Alt.)	36° 28′.9	Δd (+) 0.70; Δt (+) 0.64
Correction	(+) 6′.5	
Hc	36° 35′.4	
Ho	36° 47′.2	
a	11. 8 miles toward	
Z (Az.) and Zn	N 139°.1 W	220°.9

	+	☆	—
IC			1′.0
Correction			1′.3
Dip			4′.8
Sum	0′.0		7′.1
Correction			(—) 7′.1
hs			36° 54′.3
Ho			36° 47′.2

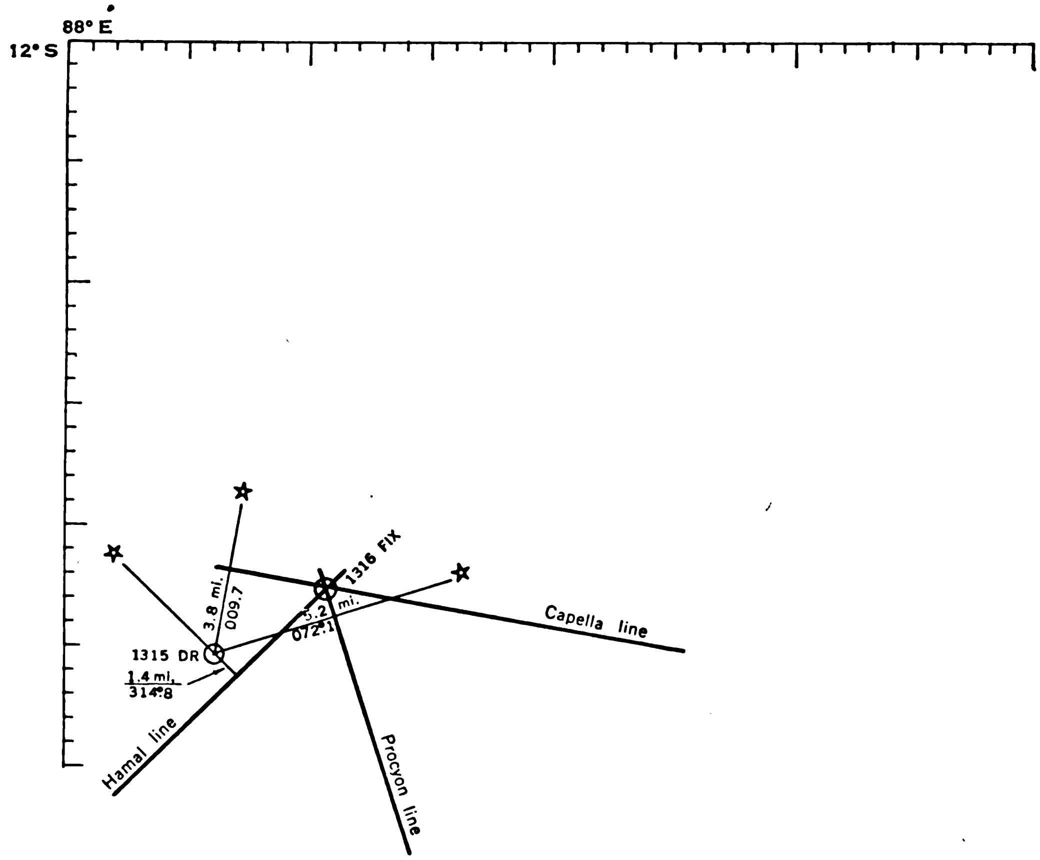
	+	—
t correction	8′.6	
d correction	5′.8	
L correction		7′.9
Sum	14′.4	7′.9
Correction		(+) 6′.5

Note.—The sight is plotted from the dead reckoning position.

Example 6.—On February 10, 1951, the GMT 1315 dead reckoning position of a ship is lat. 12° 25'.0 S, long. 88° 06'.1 E. Nearly simultaneous observations are made, as follows:

Stars	*GMT*	*Declination*	*Obs. Alt. (Ho)*
Capella	$13^{h}\ 15^{m}\ 10^{s}$	45° 57'.3 N	30° 46'.3
Procyon	$13^{h}\ 15^{m}\ 41^{s}$	5° 21'.1 N	39° 46'.4
Hamal	$13^{h}\ 16^{m}\ 25^{s}$	23° 14'.1 N	39° 55'.0

	CAPELLA		PROCYON		HAMAL	
GMT	$13^{h}\ 15^{m}\ 10^{s}$		$13^{h}\ 15^{m}\ 41^{s}$		$13^{h}\ 16^{m}\ 25^{s}$	
GHA♈ for 13^{h} GMT	334° 47'.9		334° 47'.9		334° 47'.9	
Correction for $15^{m}\ 10^{s}$	3° 48'.1	($15^{m}\ 41^{s}$)	3° 55'.9	($16^{m}\ 25^{s}$)	4° 06'.9	
SHA	281° 43'.6		245° 48'.5		328° 53'.9	
GHA☆	260° 19'.6		224° 32'.3		307° 48'.7	
*a*λ	88° 06'.1 E		88° 06'.1 E		88° 06'.1 E	
LHA	348° 25'.7		312° 38'.4		35° 54'.8	
t (H.A.)	11° 34'.3 E	t diff. 25'.7	47° 21'.6 E	t diff. 21'.6	35° 54'.8 W	t diff. 5'.2
d	45° 57'.3 N	d diff. 2'.7	5° 21'.1 N	d diff. 8'.9	23° 14'.1 N	d diff. 14'.1
*a*L	12° 25'.0 S	L diff. 25'.0	12° 25'.0 S	L diff. 25'.0	12° 25'.0 S	L diff. 25'.0
Δd and correction (+) 0.97	(+) 2'.6	(+) 0.35	(+) 3'.1	(−) 0.66	(−) 9'.3	
Δt and correction (+) 0.17	(+) 4'.4	(−) 0.93	(−) 20'.1	(+) 0.70	(+) 3'.6	
ΔL correction	(−) 24'.6		(−) 7'.7		(−) 17'.7	
ht (Alt.)	31° 00'.1		40° 05'.9		40° 19'.8	
Hc	30° 42'.5		39° 41'.2		39° 56'.4	
Ho	30° 46'.3		39° 46'.4		39° 55'.0	
a	3.8 miles toward		5.2 miles toward		1.4 miles away	
Z (Az.) and Zn S 170°.3 E	009°.7	S 107°.9 E	072°.1	S 134°.8 W	314°.8	



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

STAR IDENTIFICATION

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

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

Example 7.—On April 18, 1951, the GMT 0650 dead reckoning position of a ship is lat. 10° 15′.5 S, long. 175° 12′.0 E. About this time the navigator observes a star through a break in the clouds, as follows: sextant altitude (hs) 42° 51′.1, azimuth (Zn) 182°. Identify the star.

SOLUTION

Enter the star identification table for latitude 10° with the approximate arguments Alt. 43° and Az. 2° (Zn 182°=S2° W in south latitude) and find approximate

Dec. 57° S, t (H. A.) 2° W

t (H. A.)	2° W	GMT	6ʰ 50ᵐ
LHA☆	178°	GHA♈ for 6ʰ	295° 32′.9
Longitude	175° E	Correction for 50ᵐ	12° 32′.1
GHA☆	3°	GHA♈	308° 05′.0
GHA♈	308°		
SHA	55°		

Enter the *Nautical Almanac* star list with the approximate sidereal hour angle (SHA) 55° and declination 57° S and identify the star as Peacock.

GREAT-CIRCLE SAILING

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

Example 8.—Find the great-circle distance and the initial course between Bluefields Bluff, Nicaragua, and Bear Island.

Departure	*Destination*
Lat. (L_1) 12° 00′.0 N	Lat. (L_2) 74° 29′.8 N
Long. (λ_1) 83° 41′.0 W	Long. (λ_2) 19° 12′.5 E

SOLUTION

Enter the tables with the nearest tabulated value to L_1 as latitude, L_2 as declination, and DL0 ($\lambda_2 - \lambda_1$ = 19° 12′.5 − (−83° 41′) = 102° 53′.5) as meridian angle (H. A.).

Alt.	*Δd*	*Δt*	*Az.*
8° 08′.2	(−) 0.27	(+) 0.26	N 15°.2 E

Δd correction for 0′.2	(−) 0′.1	
Δt correction for 6′.5	(+) 1′.7	
ΔL correction for 0′.0	0′.0	
	(+) 1′.6	(+) 1′.6
Hc		8° 09′.8
Subtract from		90°
Zenith distance (great-circle distance)		81° 50′.2=4910.2 nautical miles
Great-circle course (N 15°.2 E)		015°.2

If the combination of latitude of departure, latitude of destination, and difference of longitude cannot be found in the table, the name of the latitude of destination is reversed and the supplement of the difference of longitude is used for entering the table. The distance is found by *adding* the altitude to 90°; the great-circle course angle is the supplement of the azimuth angle. In the example, if the latitude of the destination is 74° 29′.8 S, the name is changed to N and the supplement of the difference of longitude is found (180°—102° 53′.5=77° 06′.5). Enter the table with lat. 12°, dec. 74° 30′ (same name as latitude), and H. A. 77°.

Alt.	*Δd*	*Δt*	*Az.*
15° 01′.2	(+) 0.16	(−) 0.26	15°.6

Δd correction for 0′.2	0′.0	
Δt correction for 6′.5	(−) 1′.7	
ΔL correction for 0′.0	0′.0	
	(−) 1′.7	(−) 1′.7
Hc		14° 59′.5
Add to		90°
Zenith distance (great-circle distance)		104° 59′.5=6299.5 nautical miles
Great-circle course (180°—15°.6=N 164°.4 E)		164°.4

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

H.A.	0° 00′			0° 30′			1° 00′			1° 30′			2° 00′			2° 30′			3° 00′			3° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	80 00.0	1.0 05	180.0	80 30.0	1.0 05	180.0	81 00.0	1.0 05	180.0	81 30.0	1.0 06	180.0	82 00.0	1.0 06	180.0	82 30.0	1.0 07	180.0	83 00.0	1.0 07	180.0	83 30.0	1.0 08	180.0	00
1	79 57.0	1.0 15	174.3	80 26.9	99 15	174.0	80 56.7	99 16	173.6	81 26.5	99 17	173.3	81 56.3	99 18	172.9	82 26.1	99 19	172.4	82 55.8	99 21	171.9	83 25.5	99 22	171.2	1
2	79 48.2	98 24	168.6	80 17.6	98 25	168.1	80 47.0	98 26	167.4	81 16.2	97 28	166.7	81 45.4	97 29	165.9	82 14.5	97 31	165.0	82 43.4	96 33	164.0	83 12.2	96 35	162.9	2
3	79 33.8	96 33	163.2	80 02.5	95 34	162.4	80 31.1	95 36	161.5	80 59.5	94 38	160.5	81 27.8	94 40	159.4	81 55.8	93 42	158.1	82 23.6	92 44	156.7	82 51.0	91 47	155.2	3
4	79 14.2	93 41	158.1	79 42.0	92 42	157.0	80 09.6	92 44	155.9	80 37.0	91 46	154.7	81 04.0	90 48	153.3	81 30.8	89 51	151.8	81 57.1	87 53	150.2	82 23.0	86 56	148.3	4
05	78 49.9	90 48	153.3	79 16.6	89 50	152.1	79 43.1	88 52	150.8	80 09.2	86 54	149.4	80 35.0	85 56	147.8	81 00.3	84 58	146.2	81 25.1	82 61	144.3	81 49.3	80 64	142.3	05
6	78 21.2	86 54	148.8	78 46.9	85 56	147.5	79 12.1	84 58	146.1	79 37.0	82 60	144.6	80 01.4	80 62	142.9	80 25.2	79 65	141.1	80 48.5	76 67	139.2	81 11.1	74 70	137.1	6
7	77 48.8	82 59	144.7	78 13.3	81 61	143.3	78 37.4	79 63	141.9	79 00.9	78 66	140.3	79 23.9	76 68	138.5	79 46.4	74 70	136.7	80 08.1	71 72	134.7	80 29.2	69 75	132.6	7
8	77 13.2	78 64	141.0	77 36.5	77 66	139.6	77 59.3	75 68	138.0	78 21.6	73 70	136.4	78 43.3	71 72	134.7	79 04.4	69 74	132.8	79 24.7	67 76	130.9	79 44.3	64 79	128.8	8
9	76 34.6	75 68	137.6	76 56.8	73 70	136.2	77 18.5	71 72	134.6	77 39.6	69 74	133.0	78 00.1	67 76	131.2	78 19.8	65 78	129.4	78 38.9	62 80	127.5	78 57.2	59 82	125.4	9
10	75 53.6	71 72	134.6	76 14.7	69 74	133.1	76 35.3	68 75	131.5	76 55.3	65 77	129.9	77 14.6	63 79	128.2	77 33.2	61 81	126.4	77 51.1	58 82	124.5	78 08.2	56 84	122.5	10
1	75 10.5	68 75	131.8	75 30.6	66 76	130.3	75 50.1	64 78	128.8	76 09.0	62 80	127.2	76 27.3	60 81	125.5	76 44.8	57 83	123.7	77 01.6	55 85	121.9	77 17.6	52 86	120.0	1
2	74 25.6	65 78	129.2	74 44.7	63 79	127.8	75 03.3	61 81	126.3	75 21.2	59 82	124.7	75 38.5	56 84	123.1	75 55.0	54 85	121.4	76 10.9	51 86	119.6	76 25.9	49 88	117.8	2
3	73 39.1	62 80	126.9	73 57.3	60 81	125.5	74 15.0	58 83	124.0	74 32.0	56 84	122.5	74 48.3	53 85	120.9	75 04.0	51 87	119.3	75 19.0	49 88	117.6	75 33.2	46 89	115.8	3
4	72 51.2	59 82	124.9	73 08.6	57 83	123.5	73 25.4	55 84	122.0	73 41.6	53 86	120.5	73 57.2	51 87	119.0	74 12.0	48 88	117.4	74 26.2	46 89	115.8	74 39.6	43 90	114.1	4
15	72 02.2	56 83	122.9	72 18.8	54 85	121.6	72 34.8	52 86	120.2	72 50.2	50 87	118.7	73 05.0	48 88	117.3	73 19.2	46 89	115.7	73 32.6	44 90	114.2	73 45.3	41 91	112.6	15
6	71 12.1	54 85	121.2	71 28.0	52 86	119.9	71 43.3	50 87	118.5	71 58.0	48 88	117.1	72 12.1	46 89	115.7	72 25.6	44 90	114.2	72 38.4	42 91	112.7	72 50.5	39 92	111.2	6
7	70 21.1	52 86	119.6	70 36.3	50 87	118.3	70 51.0	48 88	117.0	71 05.1	46 89	115.6	71 18.6	44 90	114.2	71 31.4	42 91	112.8	71 43.6	40 92	111.4	71 55.2	37 93	109.9	7
8	69 29.4	50 87	118.1	69 44.0	48 88	116.9	69 58.0	46 89	115.6	70 11.5	44 90	114.3	70 24.4	42 91	112.9	70 36.7	40 92	111.6	70 48.4	38 93	110.2	70 59.4	36 94	108.8	8
9	68 36.9	48 88	116.8	68 51.0	46 89	115.5	69 04.4	44 90	114.3	69 17.4	42 91	113.0	69 29.8	40 92	111.7	69 41.5	38 93	110.4	69 52.7	36 93	109.1	70 03.3	34 94	107.7	9
20	67 43.9	46 89	115.5	67 57.4	44 90	114.3	68 10.3	42 91	113.1	68 22.8	41 92	111.9	68 34.7	39 92	110.6	68 46.0	37 93	109.4	68 56.7	35 94	108.1	69 06.8	33 94	106.8	20
1	66 50.3	44 90	114.3	67 03.3	42 91	113.2	67 15.8	41 92	112.0	67 27.7	39 92	110.8	67 39.2	37 93	109.6	67 50.1	35 94	108.4	68 00.4	33 94	107.1	68 10.1	32 95	105.9	1
2	65 56.2	43 91	113.3	66 08.8	41 92	112.1	66 20.8	39 92	111.0	66 32.3	38 93	109.8	66 43.4	36 94	108.7	66 53.8	34 94	107.5	67 03.8	32 95	106.3	67 13.2	30 95	105.1	2
3	65 01.7	41 91	112.2	65 13.8	40 92	111.2	65 25.5	38 93	110.1	65 36.6	36 93	108.9	65 47.2	35 94	107.8	65 57.4	35 95	106.6	66 07.0	31 95	105.5	66 16.0	29 96	104.3	3
4	64 06.9	40 92	111.3	64 18.6	38 93	110.2	64 29.8	37 93	109.2	64 40.6	35 94	108.1	64 50.8	33 94	107.0	65 00.6	32 95	105.9	65 09.9	30 95	104.7	65 18.7	28 96	103.6	4
25	63 11.6	39 93	110.4	63 23.0	37 93	109.4	63 33.9	36 94	108.4	63 44.3	34 94	107.3	63 54.2	32 95	106.2	64 03.7	31 95	105.1	64 12.7	29 96	104.1	64 21.2	27 96	102.9	25
6	62 16.1	37 93	109.6	62 27.1	36 94	108.6	62 37.6	34 94	107.6	62 47.7	33 95	106.6	62 57.4	31 95	105.5	63 06.6	30 96	104.5	63 15.3	28 96	103.4	63 23.5	27 96	102.3	6
7	61 20.3	36 93	108.8	61 31.0	35 94	107.8	61 41.2	33 94	106.9	61 51.0	32 95	105.9	62 00.4	30 95	104.8	62 09.3	29 96	103.8	62 17.7	27 96	102.8	62 25.7	26 96	101.8	7
8	60 24.3	35 94	108.1	60 34.6	34 94	107.1	60 44.5	32 95	106.2	60 54.1	31 95	105.2	61 03.2	30 96	104.2	61 11.8	28 96	103.2	61 20.0	27 96	102.2	61 27.8	25 97	101.2	8
9	59 28.0	34 94	107.4	59 38.0	33 95	106.5	59 47.7	32 95	105.5	59 57.0	30 95	104.6	60 05.8	29 96	103.6	60 14.2	27 96	102.7	60 22.2	26 97	101.7	60 29.8	25 97	100.7	9
30	58 31.5	33 94	106.7	58 41.3	32 95	105.8	58 50.7	31 95	104.9	58 59.7	29 96	104.0	59 08.3	28 96	103.1	59 16.5	27 96	102.1	59 24.3	25 97	101.2	59 31.7	24 97	100.2	30
1	57 34.8	32 95	106.1	57 44.4	31 95	105.2	57 53.5	30 96	104.3	58 02.3	29 96	103.4	58 10.7	27 96	102.5	58 18.7	26 97	101.6	58 26.3	25 97	100.7	58 33.5	23 97	99.8	1
2	56 38.0	32 95	105.5	56 47.3	30 95	104.7	56 56.2	29 96	103.8	57 04.8	28 96	102.9	57 12.9	27 96	102.0	57 20.8	25 97	101.1	57 28.2	24 97	100.2	57 35.2	23 97	99.3	2
3	55 41.0	31 95	105.0	55 50.0	30 96	104.1	55 58.7	28 96	103.3	56 07.1	27 96	102.4	56 15.1	26 97	101.5	56 22.7	25 97	100.7	56 30.0	24 97	99.8	56 36.9	22 97	98.9	3
4	54 43.8	30 95	104.4	54 52.7	29 96	103.6	55 01.2	28 96	102.8	55 09.3	27 96	101.9	55 17.2	25 97	101.1	55 24.6	24 97	100.2	55 31.7	23 97	99.4	55 38.5	22 97	98.5	4
35	53 46.5	29 96	103.9	53 55.2	28 96	103.1	54 03.5	27 96	102.3	54 11.5	26 97	101.5	54 19.1	25 97	100.6	54 26.4	24 97	99.8	54 33.4	23 97	99.0	54 40.0	21 98	98.1	35
6	52 49.1	29 96	103.4	52 57.6	28 96	102.6	53 05.7	27 96	101.8	53 13.5	26 97	101.0	53 21.0	24 97	100.2	53 28.2	23 97	99.4	53 35.0	22 97	98.6	53 41.5	21 98	97.8	6
7	51 51.6	28 96	103.0	51 59.9	27 96	102.2	52 07.8	26 97	101.4	52 15.5	25 97	100.6	52 22.8	24 97	99.8	52 29.9	23 97	99.0	52 36.6	22 98	98.2	52 42.9	21 98	97.4	7
8	50 54.0	28 96	102.5	51 02.1	27 96	101.8	51 09.9	26 97	101.0	51 17.4	25 97	100.2	51 24.6	23 97	99.4	51 31.5	22 97	98.7	51 38.0	21 98	97.9	51 44.3	20 98	97.1	8
9	49 56.2	27 96	102.1	50 04.2	26 97	101.4	50 11.8	25 97	100.6	50 19.2	24 97	99.8	50 26.3	23 97	99.1	50 33.0	22 98	98.3	50 39.5	21 98	97.5	50 45.7	20 98	96.8	9
40	48 58.4	26 96	101.7	49 06.2	26 97	101.0	49 13.7	25 97	100.2	49 20.9	24 97	99.5	49 27.9	23 97	98.7	49 34.5	22 98	98.0	49 40.9	21 98	97.2	49 47.0	20 98	96.5	40
1	48 00.5	26 97	101.3	48 08.2	25 97	100.6	48 15.5	24 97	99.8	48 22.6	23 97	99.1	48 29.5	22 97	98.4	48 36.0	21 98	97.6	48 42.3	20 98	96.9	48 48.2	19 98	96.2	1
2	47 02.5	25 97	100.9	47 10.0	25 97	100.2	47 17.3	24 97	99.5	47 24.3	23 97	98.8	47 31.0	22 98	98.1	47 37.4	21 98	97.3	47 43.6	20 98	96.6	47 49.5	19 98	95.9	2
3	46 04.5	25 97	100.5	46 11.9	24 97	99.8	46 19.0	23 97	99.1	46 25.8	22 97	98.4	46 32.4	22 98	97.7	46 38.8	21 98	97.0	46 44.9	20 98	96.3	46 50.7	19 98	95.6	3
4	45 06.3	25 97	100.2	45 13.6	24 97	99.5	45 20.6	23 97	98.8	45 27.4	22 98	98.1	45 33.9	21 98	97.4	45 40.1	20 98	96.7	45 46.1	20 98	96.0	45 51.8	19 98	95.3	4
45	44 08.2	24 97	99.9	44 15.3	23 97	99.2	44 22.2	23 97	98.5	44 28.9	22 98	97.8	44 35.3	21 98	97.1	44 41.4	20 98	96.4	44 47.3	19 98	95.7	44 53.0	18 98	95.1	45
6	43 09.9	24 97	99.5	43 16.9	23 97	98.9	43 23.7	22 98	98.2	43 30.3	21 98	97.5	43 36.6	21 98	96.8	43 42.7	20 98	96.2	43 48.5	19 98	95.5	43 54.1	18 98	94.8	6
7	42 11.6	23 97	99.2	42 18.5	23 97	98.5	42 25.2	22 98	97.9	42 31.7	21 98	97.2	42 37.9	20 98	96.6	42 43.9	20 98	95.9	42 49.7	19 98	95.2	42 55.2	18 98	94.5	7
8	41 13.3	23 97	98.9	41 20.1	22 98	98.2	41 26.7	22 98	97.6	41 33.1	21 98	96.9	41 39.2	20 98	96.3	41 45.1	19 98	95.6	41 50.8	19 98	95.0	41 56.3	18 98	94.3	8
9	40 14.9	23 97	98.6	40 21.6	22 98	97.9	40 28.1	21 98	97.3	40 34.4	21 98	96.7	40 40.5	20 98	96.0	40 46.3	19 98	95.4	40 52.0	18 98	94.7	40 57.4	18 98	94.1	9
50	39 16.4	22 97	98.3	39 23.0	22 98	97.7	39 29.5	21 98	97.0	39 35.7	20 98	96.4	39 41.7	20 98	95.8	39 47.5	19 98	95.1	39 53.1	18 98	94.5	39 58.5	18 98	93.8	50
1	38 17.9	22 98	98.0	38 24.5	21 98	97.4	38 30.8	21 98	96.8	38 36.9	20 98	96.1	38 42.9	19 98	95.5	38 48.6	19 98	94.9	38 54.2	18 98	94.2	38 59.5	17 98	93.6	1
2	37 19.4	22 98	97.7	37 25.8	21 98	97.1	37 32.1	21 98	96.5	37 38.2	20 98	95.9	37 44.1	19 98	95.3	37 49.7	19 98	94.6	37 55.2	18 98	94.0	38 00.5	17 98	93.4	2
3	36 20.8	22 98	97.5	36 27.2	21 98	96.8	36 33.4	20 98	96.2	36 39.4	20 98	95.6	36 45.2	19 98	95.0	36 50.8	18 98	94.4	36 56.3	18 98	93.8	37 01.5	17 98	93.2	3
4	35 22.2	21 98	97.2	35 28.5	21 98	96.6	35 34.6	20 98	96.0	35 40.6	20 98	95.4	35 46.3	19 98	94.8	35 51.9	18 98	94.2	35 57.3	18 98	93.6	36 02.5	17 98	93.0	4
55	34 23.6	21 98	96.9	34 29.8	20 98	96.3	34 35.8	20 98	95.7	34 41.7	19 98	95.1	34 47.4	19 98	94.6	34 53.0	18 98	94.0	34 58.3	18 98	93.4	35 03.5	17 98	92.8	55
6	33 24.9	21 98	96.7	33 31.1	20 98	96.1	33 37.0	20 98	95.5	33 42.9	19 98	94.9	33 48.5	19 98	94.3	33 54.0	18 98	93.7	33 59.3	17 98	93.1	34 04.5	17 98	92.5	6
7	32 26.2	21 98	96.4	32 32.3	20 98	95.9	32 38.2	20 98	95.3	32 44.0	19 98	94.7	32 49.6	18 98	94.1	32 55.0	18 98	93.5	33 00.3	17 98	92.9	33 05.4	17 98	92.3	7
8	31 27.5	20 98	96.2	31 33.5	20 98	95.6	31 39.4	19 98	95.0	31 45.1	19 98	94.5	31 50.7	18 98	93.9	31 56.1	18 98	93.3	32 01.3	17 98	92.7	32 06.4	17 98	92.1	8
9	30 28.7	20 98	96.0	30 34.7	20 98	95.4	30 40.5	19 98	94.8	30 46.2	19 98	94.2	30 51.7	18 98	93.7	30 57.1	18 98	93.1	31 02.3	17 98	92.5	31 07.3	17 98	92.0	9
60	29 29.9	20 98	95.7	29 35.8	19 98	95.2	29 41.6	19 98	94.6	29 47.2	19 98	94.0	29 52.7	18 98	93.5	29 58.1	18 98	92.9	30 03.2	17 98	92.3	30 08.3	17 98	91.8	60
1	28 31.1	20 98	95.5	28 37.0	19 98	94.9	28 42.7	19 98	94.4	28 48.3	18 98	93.8	28 53.7	18 98	93.3	28 59.0	17 98	92.7	29 04.2	17 98	92.1	29 09.2	17 98	91.6	1
2	27 32.3	20 98	95.3	27 38.1	19 98	94.7	27 43.8	19 98	94.2	27 49.3	18 98	93.6	27 54.7	18 98	93.1	28 00.0	17 98	92.5	28 05.1	17 98	91.9	28 10.2	16 98	91.4	2
3	26 33.4	19 98	95.1	26 39.2	19 98	94.5	26 44.8	19 98	94.0	26 50.3	18 98	93.4	26 55.7	18 98	92.9	27 01.0	17 98	92.3	27 06.1	17 98	91.8	27 11.1	16 98	91.2	3
4	25 34.6	19 98	94.8	25 40.3	19 98	94.3	25 45.9	18 98	93.8	25 51.4	18 98	93.2	25 56.7	18 98	92.7	26 01.9	17 98	92.1	26 07.0	17 98	91.6	26 12.0	16 98	91.0	4
65	24 35.7	19 98	94.6	24 41.4	19 98	94.1	24 46.9	18 98	93.5	24 52.4	18 98	93.0	24 57.7	18 98	92.5	25 02.9	17 98	91.9	25 08.0	17 98	91.4	25 12.9	16 98	90.8	65
6	23 36.8	19 98	94.4	23 42.4	19 98	93.9	23 47.9	18 98	93.3	23 53.3	18 98	92.8	23 58.6	17 98	92.3	24 03.8	17 98	91.7	24 08.9	17 98	91.2	24 13.8	16 98	90.7	6
7	22 37.9	19 98	94.2	22 43.5	18 98	93.7	22 48.9	18 98	93.1	22 54.3	18 98	92.6	22 59.6	17 98	92.1	23 04.8	17 98	91.5	23 09.8	17 98	91.0	23 14.8	16 98	90.5	7
8	21 38.9	19 98	94.0	21 44.5	18 98	93.5	21 49.9	18 98	93.0	21 55.3	18 98	92.4	22 00.5	17 98	91.9	22 05.7	17 98	91.4	22 10.7	17 98	90.8	22 15.7	16 98	90.3	8
9	20 40.0	19 98	93.8	20 45.5	18 98	93.3	20 50.9	18 98	92.8	20 56.2	18 98	92.2	21 01.5	17 98	91.7	21 06.6	17 98	91.2	21 11.6	17 98	90.7	21 16.6	16 98	90.1	9
70	19 41.0	18 98	93.6	19 46.5	18 98	93.1	19 51.9	18 98	92.6	19 57.2	18 98	92.0	20 02.4	17 98	91.5	20 07.5	17 98	91.0	20 12.6	17 98	90.5	20 17.5	16 98	89.9	70
1	18 42.0	18 98	93.4	18 47.5	18 98	92.9	18 52.9	18 98	92.4	18 58.1	17 98	91.9	19 03.3	17 98	91.3	19 08.4	17 98	90.8	19 13.5	17 98	90.3	19 18.4	16 98	89.8	1
2	17 43.0	18 98	93.2	17 48.5	18 98	92.7	17 53.8	18 98	92.2	17 59.1	17 98	91.7	18 04.3	17 98	91.2	18 09.4	17 98	90.6	18 14.4	17 98	90.1	18 19.3	16 98	89.6	2
3	16 44.0	18 98	93.0	16 49.4	18 98	92.5	16 54.8	18 98	92.0	17 00.0	17 98	91.5	17 05.2	17 98	91.0	17 10.3	17 98	90.5	17 15.3	17 98	89.9	17 20.2	16 98	89.4	3
4	15 45.0	18 98	92.9	15 50.4	18 98	92.3	15 55.7	18 98	91.8	16 00.9	17 98	91.3	16 06.1	17 98	90.8	16 11.2	17 98	90.3	16 16.2	17 98	89.8	16 21.1	16 98	89.3	4
75	14 46.0	18 98	92.7	14 51.4	18 98	92.2	14 56.7	18 98	91.6	15 01.9	17 98	91.1	15 07.0	17 98	90.6	15 12.1	17 98	90.1	15 17.1	17 98	89.6	15 22.1	16 98	89.1	75
6	13 47.0	18 98	92.5	13 52.3	18 98	92.0	13 57.6	17 98	91.5	14 02.8	17 98	91.0	14 07.9	17 98	90.4	14 13.0	17 98	89.9	14 18.0	17 98	89.4	14 23.0	16 98	88.9	6
7	12 47.9	18 98	92.3	12 53.3	18 98	91.8	12 58.5	17 98	91.3	13 03.7	17 98	90.8	13 08.9	17 98	90.3	13 13.9	17 98	89.8	13 18.9	17 98	89.3	13 23.9	16 98	88.8	7
8	11 48.9	18 98	92.1	11 54.2	18 98	91.6	11 59.4	17 98	91.1	12 04.6	17 98	90.6	12 09.8	17 98	90.1	12 14.8	17 98	89.6	12 19.9	17 98	89.1	12 24.8	16 98	88.6	8
9	10 49.9	18 98	91.9	10 55.1	18 98	91.4	11 00.4	17 98	90.9	11 05.5	17 98	90.4	11 10.7	17 98	89.9	11 15.8	17 98	89.4	11 20.8	17 98	88.9	11 25.8	17 98	88.4	9
80	9 50.8	18 98	91.8	9 56.1	17 98	91.3	10 01.3	17 98	90.8	10 06.5	17 98	90.3	10 11.6	17 98	89.8	10 16.7	17 98	89.3	10 21.7	17 98	88.8	10 26.7	17 98	88.3	80
1	8 51.7	18 98	91.6	8 57.0	17 98	91.1	9 02.2	17 98	90.6	9 07.4	17 98	90.1	9 12.5	17 98	89.6	9 17.6	17 98	89.1	9 22.6	17 98	88.6	9 27.6	17 98	88.1	1
2	7 52.7	18 98	91.4	7 57.9	17 98	90.9	8 03.1	17 98	90.4	8 08.3	17 98	89.9	8 13.4	17 98	89.4	8 18.5	17 98	88.9	8 23.6	17 98	88.4	8 28.6	17 98	87.9	2
3	6 53.6	17 98	91.2	6 58.8	17 98	90.7	7 04.0	17 98	90.2	7 09.2	17 98	89.7	7 14.3	17 98	89.2	7 19.4	17 98	88.7	7 24.5	17 98	88.2	7 29.5	17 98	87.7	3
4	5 54.5	17 98	91.0	5 59.7	17 98	90.6	6 04.9	17 98	90.1	6 10.1	17 98	89.6	6 15.2	17 98	89.1	6 20.4	17 98	88.6	6 25.4	17 98	88.1	6 30.5	17 98	87.6	4
85				5 00.6	17 98	90.4	5 05.8	17 98	89.9	5 11.0	17 98	89.4	5 16.2	17 98	88.9	5 21.3	17 98	88.4	5 26.4	17 98	87.9	5 31.5	17 98	87.4	85

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	0° 00′				0° 30′				1° 00′				1° 30′			
°	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °
00	80 00.0	1.0	05	180.0	79 30.0	1.0	05	180.0	79 00.0	1.0	04	180.0	78 30.0	1.0	04	180.0
1	79 57.0	1.0	15	174.3	79 27.2	1.0	14	174.5	78 57.3	1.0	13	174.8	78 27.4	1.0	13	175.0
2	79 48.2	98	24	168.6	79 18.8	98	23	169.2	78 49.3	98	22	169.6	78 19.7	99	21	170.1
3	79 33.8	96	33	163.2	79 05.0	96	31	164.0	78 36.1	97	30	164.6	78 07.1	97	29	165.3
4	79 14.2	93	41	158.1	78 46.2	94	39	159.0	78 18.1	94	38	159.9	77 49.8	95	36	160.7
05	78 49.9	90	48	153.3	78 22.8	90	46	154.4	77 55.6	91	44	155.4	77 28.1	92	43	156.3
6	78 21.2	86	54	148.8	77 55.3	87	52	150.0	77 29.0	88	50	151.2	77 02.5	89	49	152.2
7	77 48.8	82	59	144.7	77 24.0	84	58	146.0	76 58.7	85	56	147.3	76 33.2	86	54	148.4
8	77 13.2	78	64	141.0	76 49.4	80	62	142.4	76 25.2	81	61	143.7	76 00.7	82	59	144.9
9	76 34.6	75	68	137.6	76 12.0	76	67	139.0	75 48.8	78	65	140.3	75 25.3	79	63	141.6
10	75 53.6	71	72	134.6	75 32.0	73	70	136.0	75 09.9	74	69	137.3	74 47.4	76	67	138.6
1	75 10.5	68	75	131.8	74 49.9	70	73	133.2	74 28.8	71	72	134.5	74 07.2	73	70	135.8
2	74 25.6	65	78	129.2	74 05.9	66	76	130.6	73 45.7	68	75	132.0	73 25.1	70	73	133.3
3	73 39.1	62	80	126.9	73 20.3	63	78	128.3	73 01.0	65	77	129.6	72 41.2	67	76	130.9
4	72 51.2	59	82	124.9	72 33.3	61	80	126.2	72 14.8	62	79	127.5	71 55.8	64	78	128.8
15	72 02.2	56	83	122.9	71 45.0	58	82	124.3	71 27.3	60	81	125.5	71 09.1	61	80	126.8
6	71 12.1	54	85	121.2	70 55.7	56	84	122.5	70 38.7	57	83	123.7	70 21.2	59	82	125.0
7	70 21.1	52	86	119.6	70 05.4	53	85	120.9	69 49.1	55	84	122.1	69 32.3	57	83	123.3
8	69 29.4	50	87	118.1	69 14.2	51	86	119.3	68 58.6	53	85	120.5	68 42.5	55	84	121.7
9	68 36.9	48	88	116.8	68 22.4	49	88	118.0	68 07.3	51	87	119.1	67 51.8	53	86	120.3
20	67 43.9	46	89	115.5	67 29.9	47	88	116.7	67 15.4	49	88	117.8	67 00.4	51	87	118.9
1	66 50.3	44	90	114.3	66 36.8	46	89	115.5	66 22.8	47	88	116.6	66 08.4	49	88	117.7
2	65 56.2	43	91	113.3	65 43.2	44	90	114.4	65 29.7	46	89	115.4	65 15.8	47	89	116.5
3	65 01.7	41	91	112.2	64 49.2	43	91	113.3	64 36.1	44	90	114.4	64 22.7	46	89	115.4
4	64 06.9	40	92	111.3	63 54.7	41	91	112.4	63 42.1	43	91	113.4	63 29.1	44	90	114.4
25	63 11.6	39	93	110.4	62 59.9	40	92	111.4	62 47.7	41	91	112.4	62 35.0	43	91	113.4
6	62 16.1	37	93	109.6	62 04.7	39	92	110.6	61 52.9	40	92	111.6	61 40.6	41	91	112.5
7	61 20.3	36	93	108.8	61 09.3	38	93	109.8	60 57.8	39	92	110.7	60 45.9	40	92	111.7
8	60 24.3	35	94	108.1	60 13.5	36	93	109.0	60 02.4	38	93	110.0	59 50.8	39	92	110.9
9	59 28.0	34	94	107.4	59 17.5	35	94	108.3	59 06.7	37	93	109.2	58 55.5	38	93	110.1
30	58 31.5	33	94	106.7	58 21.3	35	94	107.6	58 10.8	36	94	108.5	57 59.9	37	93	109.4
1	57 34.8	32	95	106.1	57 24.9	34	94	107.0	57 14.7	35	94	107.9	57 04.0	36	93	108.7
2	56 38.0	32	95	105.5	56 28.3	33	95	106.4	56 18.3	34	94	107.2	56 08.0	35	94	108.1
3	55 41.0	31	96	105.0	55 31.6	32	95	105.8	55 21.8	33	94	106.6	55 11.7	34	94	107.5
4	54 43.8	30	95	104.4	54 34.6	31	96	105.3	54 25.1	32	95	106.1	54 15.3	33	94	106.9
35	53 46.5	29	96	103.9	53 37.6	30	95	104.7	53 28.2	32	95	105.5	53 18.6	33	95	106.3
6	52 49.1	29	96	103.4	52 40.3	30	96	104.2	52 31.2	31	95	105.0	52 21.8	32	95	105.8
7	51 51.6	28	96	103.0	51 43.0	29	96	103.8	51 34.1	30	95	104.5	51 24.9	31	95	105.3
8	50 54.0	28	96	102.5	50 45.6	29	96	103.3	50 36.8	29	96	104.0	50 27.9	30	95	104.8
9	49 56.2	27	96	102.1	49 48.0	28	96	102.8	49 39.5	29	96	103.6	49 30.7	30	96	104.3
40	48 58.4	26	96	101.7	48 50.3	27	96	102.4	48 42.0	28	96	103.2	48 33.4	29	96	103.9
1	48 00.5	26	97	101.3	47 52.6	27	96	102.0	47 44.4	28	96	102.7	47 35.9	29	96	103.4
2	47 02.5	25	97	100.9	46 54.8	26	97	101.6	46 46.7	27	96	102.3	46 38.4	28	96	103.0
3	46 04.5	25	97	100.5	45 56.8	26	97	101.2	45 48.9	27	96	101.9	45 40.8	28	96	102.6
4	45 06.3	25	97	100.2	44 58.8	25	97	100.9	44 51.1	26	97	101.6	44 43.1	27	96	102.2
45	44 08.2	24	97	99.9	44 00.8	25	97	100.5	43 53.2	26	97	101.2	43 45.3	27	96	101.9
6	43 09.9	24	97	99.5	43 02.7	25	97	100.2	42 55.2	25	97	100.8	42 47.5	26	97	101.5
7	42 11.6	23	97	99.2	42 04.5	24	97	99.9	41 57.1	25	97	100.5	41 49.5	26	97	101.2
8	41 13.3	23	97	98.9	41 06.2	24	97	99.5	40 59.0	25	97	100.2	40 51.5	25	97	100.8
9	40 14.9	23	97	98.6	40 07.9	23	97	99.2	40 00.8	24	97	99.9	39 53.4	25	97	100.5
50	39 16.4	22	97	98.3	39 09.6	23	97	98.9	39 02.5	24	97	99.5	38 55.3	24	97	100.2
1	38 17.9	22	98	98.0	38 11.2	23	97	98.6	38 04.2	23	97	99.2	37 57.1	24	97	99.9
2	37 19.4	22	98	97.7	37 12.7	22	97	98.3	37 05.9	23	97	98.9	36 58.9	24	97	99.6
3	36 20.8	22	98	97.5	36 14.3	22	98	98.1	36 07.5	23	97	98.7	36 00.6	23	97	99.3
4	35 22.2	21	98	97.2	35 15.7	22	98	97.8	35 09.1	22	97	98.4	35 02.2	23	97	99.0
55	34 23.6	21	98	96.9	34 17.2	22	98	97.5	34 10.6	22	98	98.1	34 03.9	23	97	98.7
6	33 24.9	21	98	96.7	33 18.6	21	98	97.3	33 12.1	22	96	97.8	33 05.4	22	97	98.4
7	32 26.2	21	98	96.4	32 19.9	21	96	97.0	32 13.5	22	98	97.6	32 07.0	22	98	98.2
8	31 27.5	20	98	96.2	31 21.3	21	98	96.8	31 14.9	21	98	97.3	31 08.5	22	98	97.9
9	30 28.7	20	98	96.0	30 22.6	21	98	96.5	30 16.3	21	98	97.1	30 09.9	22	96	97.7
60	29 29.9	20	98	95.7	29 23.9	20	98	96.3	29 17.7	21	98	96.8	29 11.3	21	98	97.4
1	28 31.1	20	98	95.5	28 25.1	20	98	96.1	28 19.0	21	98	96.6	28 12.7	21	98	97.2
2	27 32.3	20	98	95.3	27 26.3	20	98	95.8	27 20.3	20	98	96.4	27 14.1	21	98	96.9
3	26 33.4	19	98	95.1	26 27.6	20	96	95.6	26 21.5	20	98	96.2	26 15.4	21	98	96.7
4	25 34.6	19	98	94.8	25 28.7	20	98	95.4	25 22.8	20	98	95.9	25 16.7	20	98	96.5
65	24 35.7	19	98	94.6	24 29.9	19	98	95.2	24 24.0	20	98	95.7	24 18.0	20	98	96.2
6	23 36.8	19	98	94.4	23 31.0	19	98	95.0	23 25.2	20	98	95.5	23 19.2	20	98	96.0
7	22 37.9	19	98	94.2	22 32.2	19	98	94.7	22 26.4	20	98	95.3	22 20.5	20	98	95.8
8	21 38.9	19	98	94.0	21 33.3	19	98	94.5	21 27.5	19	98	95.1	21 21.7	20	98	95.6
9	20 40.0	19	98	93.8	20 34.4	19	98	94.3	20 28.6	19	98	94.9	20 22.8	20	98	95.4
70	19 41.0	18	98	93.6	19 35.4	19	98	94.1	19 29.8	19	98	94.7	19 24.0	19	98	95.2
1	18 42.0	18	98	93.4	18 36.5	19	98	93.9	18 30.9	19	96	94.5	18 25.2	19	98	95.0
2	17 43.0	18	98	93.2	17 37.5	18	98	93.7	17 31.9	19	98	94.3	17 26.3	19	98	94.8
3	16 44.0	18	98	93.0	16 38.6	18	98	93.6	16 33.0	19	96	94.1	16 27.4	19	98	94.6
4	15 45.0	18	98	92.9	15 39.6	18	98	93.4	15 34.1	19	98	93.9	15 28.5	19	98	94.4
75	14 46.0	18	98	92.7	14 40.6	18	98	93.2	14 35.1	18	98	93.7	14 29.6	19	98	94.2
6	13 47.0	18	98	92.5	13 41.6	18	98	93.0	13 36.1	18	98	93.5	13 30.6	18	98	94.0
7	12 47.9	18	98	92.3	12 42.6	18	98	92.8	12 37.1	18	98	93.3	12 31.7	18	98	93.8
8	11 48.9	18	98	92.1	11 43.6	18	98	92.6	11 38.2	18	98	93.1	11 32.7	18	98	93.6
9	10 49.9	18	98	91.9	10 44.5	18	98	92.4	10 39.1	18	98	92.9	10 33.7	18	98	93.4
80	9 50.8	18	98	91.8	9 45.5	18	98	92.3	9 40.1	18	98	92.8	9 34.7	18	98	93.3
1	8 51.7	18	98	91.6	8 46.4	18	98	92.1	8 41.1	18	98	92.6	8 35.7	18	98	93.1
2	7 52.7	18	98	91.4	7 47.4	18	98	91.9	7 42.1	18	98	92.4	7 36.7	18	98	92.9
3	6 53.6	17	98	91.2	6 48.3	18	98	91.7	6 43.0	18	98	92.2	6 37.7	18	98	92.7
4	5 54.5	17	98	91.0	5 49.3	16	98	91.5	5 44.0	18	98	92.0	5 38.7	18	98	92.5

H.A.	2° 00′				2° 30′				3° 00′				3° 30′			
°	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °
00	78 00.0	1.0	04	180.0	77 30.0	1.0	04	180.0	77 00.0	1.0	04	180.0	76 30.0	1.0	04	180.0
1	77 57.5	1.0	12	175.2	77 27.6	1.0	12	175.4	76 57.7	1.0	11	175.6	76 27.8	1.0	11	175.7
2	77 50.2	99	20	170.5	77 20.5	99	19	170.8	76 50.9	99	19	171.2	76 21.2	99	18	171.5
3	77 38.0	97	28	165.9	77 08.9	97	27	166.4	76 39.7	97	26	166.9	76 10.4	98	25	167.4
4	77 21.4	95	35	161.4	76 52.8	95	34	162.1	76 24.2	96	32	162.8	75 55.5	96	31	163.4
05	77 00.5	92	41	157.2	76 32.7	93	40	158.0	76 04.7	93	39	158.8	75 36.6	94	37	159.5
6	76 35.7	90	47	153.2	76 08.7	90	46	154.1	75 41.5	91	44	155.0	75 14.2	91	43	155.8
7	76 07.4	87	53	149.5	75 41.3	87	51	150.5	75 14.9	88	50	151.4	74 48.4	89	48	152.3
8	75 35.8	83	57	146.0	75 10.6	84	56	147.1	74 45.2	85	54	148.1	74 19.4	86	53	149.1
9	75 01.4	80	62	142.8	74 37.1	81	60	143.9	74 12.6	82	59	145.0	73 47.7	83	57	146.0
10	74 24.4	77	65	139.8	74 01.1	78	64	140.9	73 37.4	80	62	142.0	73 13.4	81	61	143.1
1	73 45.2	74	69	137.0	73 22.8	75	67	138.2	73 00.0	77	66	139.3	72 36.8	78	64	140.4
2	73 04.0	71	72	134.5	72 42.4	72	70	135.7	72 20.5	74	69	136.8	71 58.1	75	68	137.9
3	72 21.0	68	74	132.1	72 00.3	70	73	133.3	71 39.1	71	72	134.5	71 17.6	72	70	135.6
4	71 36.4	66	77	130.0	71 16.5	67	75	131.2	70 56.2	68	74	132.3	70 35.5	70	73	133.4
15	70 50.5	63	79	128.0	70 31.3	64	77	129.2	70 11.8	66	76	130.3	69 51.8	67	75	131.4
6	70 03.3	61	80	126.1	69 44.9	62	79	127.3	69 26.1	63	78	128.4	69 06.8	65	77	129.5
7	69 15.1	58	82	124.4	68 57.4	60	81	125.6	68 39.2	61	80	126.7	68 20.7	63	79	127.7
8	68 25.9	56	83	122.9	68 08.8	58	82	124.0	67 51.3	59	81	125.0	67 33.4	60	80	126.1
9	67 35.8	54	85	121.4	67 19.4	56	84	122.5	67 02.5	57	83	123.5	66 45.2	58	82	124.6
20	66 45.0	52	86	120.0	66 29.2	54	85	121.1	66 12.9	55	84	122.1	65 56.2	56	83	123.2
1	65 53.5	50	87	118.7	65 38.2	52	86	119.8	65 22.5	53	85	120.8	65 06.3	55	84	121.8
2	65 01.4	49	88	117.5	64 46.6	50	87	118.6	64 31.4	51	86	119.6	64 15.8	53	85	120.6
3	64 08.8	47	89	116.4	63 54.4	48	88	117.4	63 39.7	50	87	118.4	63 24.6	51	86	119.4
4	63 15.6	46	89	115.4	63 01.7	47	89	116.4	62 47.5	48	88	117.3	62 32.8	50	87	118.3
25	62 22.0	44	90	114.4	62 08.6	45	89	115.4	61 54.7	47	89	116.3	61 40.5	48	88	117.2
6	61 28.0	43	91	113.5	61 15.0	44	90	114.4	61 01.6	45	89	115.4	60 47.8	47	89	116.3
7	60 33.6	42	91	112.6	60 21.0	43	91	113.5	60 08.0	44	90	114.4	59 54.6	45	89	115.3
8	59 38.9	40	92	111.8	59 26.6	42	91	112.7	59 14.0	43	91	113.6	59 01.0	44	90	114.5
9	58 43.9	39	92	111.0	58 32.0	40	92	111.9	58 19.7	42	91	112.8	58 07.0	43	90	113.6
30	57 48.6	38	93	110.3	57 37.0	39	92	111.1	57 25.0	40	92	112.0	57 12.7	42	91	112.8
1	56 53.1	37	93	109.6	56 41.7	38	92	110.4	56 30.1	39	92	111.3	56 18.1	41	92	112.1
2	55 57.3	36	93	108.9	55 46.3	37	93	109.8	55 34.9	38	92	110.6	55 23.2	39	92	111.4
3	55 01.3	35	94	108.3	54 50.5	36	93	109.1	54 39.5	37	93	109.9	54 28.1	39	92	110.7
4	54 05.1	34	94	107.7	53 54.6	35	94	108.5	53 43.8	37	93	109.3	53 32.7	38	93	110.1
35	53 08.7	34	94	107.1	52 58.5	35	94	107.9	52 47.9	36	93	108.7	52 37.1	37	93	109.4
6	52 12.1	33	95	106.6	52 02.1	34	94	107.3	51 51.8	35	94	108.1	51 41.2	36	93	108.9
7	51 15.4	32	95	106.0	51 05.7	33	94	106.8	50 55.6	34	94	107.5	50 45.2	35	94	108.3
8	50 18.6	31	95	105.5	50 09.0	32	95	106.3	49 59.2	33	94	107.0	49 49.0	34	94	107.7
9	49 21.6	31	95	105.1	49 12.2	32	95	105.8	49 02.6	33	96	106.5	48 52.7	33	94	107.2
40	48 24.5	30	95	104.6	48 15.3	31	95	105.3	48 05.9	32	96	106.0	47 56.2	33	94	106.7
1	47 27.2	30	96	104.2	47 18.2	30	95	104.9	47 09.0	31	95	105.6	46 59.5	32	95	106.3
2	46 29.9	29	96	103.7	46 21.1	30	95	104.4	46 12.0	31	95	105.1	46 02.7	31	95	105.8
3	45 32.4	28	96	103.3	45 23.8	29	96	104.0	45 14.9	30	95	104.7	45 05.8	31	95	105.4
4	44 34.9	28	96	102.9	44 26.4	29	96	103.6	44 17.7	29	96	104.3	44 08.8	30	95	104.9
45	43 37.2	27	96	102.5	43 28.9	28	96	103.2	43 20.4	29	96	103.9	43 11.6	30	95	104.5
6	42 39.5	27	96	102.2	42 31.3	28	96	102.8	42 23.0	28	96	103.5	42 14.4	29	96	104.1
7	41 41.7	26	96	101.8	41 33.7	27	96	102.4	41 25.5	28	96	103.1	41 17.0	29	96	103.7
8	40 43.8	26	97	101.5	40 36.0	27	96	102.1	40 27.9	27	96	102.7	40 19.6	28	96	103.4
9	39 45.9	26	97	101.1	39 38.1	26	96	101.7	39 30.2	27	96	102.4	39 22.0	28	96	103.0
50	38 47.9	25	97	100.8	38 40.2	26	97	101.4	38 32.4	26	96	102.0	38 24.4	27	96	102.6
1	37 49.8	25	97	100.5	37 42.3	25	97	101.1	37 34.6	26	96	101.7	37 26.7	27	96	102.3
2	36 51.7	24	97	100.2	36 44.3	25	97	100.8	36 36.7	26	97	101.4	36 28.9	26	96	102.0
3	35 53.5	24	97	99.9	35 46.2	25	97	100.5	35 38.7	25	97	101.1	35 31.1	26	97	101.7
4	34 55.2	24	97	99.6	34 48.1	24	97	100.2	34 40.7	25	97	100.8	34 33.2	25	97	101.3
55	33 57.0	23	97	99.3	33 49.9	24	97	99.9	33 42.6	24	97	100.5	33 35.2	25	97	101.0
6	32 58.6	23	97	99.0	32 51.6	24	97	99.6	32 44.5	24	97	100.2	32 37.2	25	97	100.7
7	32 00.2	23	97	98.7	31 53.4	23	97	99.3	31 46.3	24	97	99.9	31 39.1	24	97	100.5
8	31 01.8	22	97	98.5	30 55.0	23	97	99.0	30 48.1	23	97	99.6	30 41.0	24	97	100.2
9	30 03.4	22	98	98.2	29 56.7	23	97	98.8	29 49.8	23	97	99.3	29 42.8	24	97	99.9
60	29 04.9	22	98	98.0	28 58.2	22	97	98.5	28 51.5	23	97	99.1	28 44.6	23	97	99.6
1	28 06.3	22	98	97.7	27 59.8	22	98	98.3	27 53.1	22	97	98.8	27 46.3	23	97	99.4
2	27 07.7	21	98	97.5	27 01.3	22	98	98.0	26 54.7	22	97	98.6	26 48.0	23	97	99.1
3	26 09.1	21	98	97.2	26 02.8	21	98	97.8	25 56.3	22	97	98.3	25 49.6	22	97	98.9
4	25 10.5	21	98	97.0	25 04.2	21	98	97.5	24 57.8	22	98	98.1	24 51.2	22	97	98.6
65	24 11.9	21	98	96.8	24 05.6	21	98	97.3	23 59.3	21	98	97.9	23 52.8	22	97	98.4
6	23 13.2	20	98	96.6	23 07.0	21	98	97.1	23 00.7	21	98	97.6	22 54.3	21	98	98.2
7	22 14.4	20	98	96.3	22 08.3	21	98	96.9	22 02.1	21	98	97.4	21 55.8	21	98	97.9
8	21 15.7	20	98	96.1	21 09.7	20	98	96.6	21 03.5	21	98	97.2	20 57.3	21	98	97.7
9	20 16.9	20	98	95.9	20 11.0	20	98	96.4	20 04.9	20	98	97.0	19 58.7	21	98	97.5
70	19 18.2	20	98	95.7	19 12.2	20	98	96.2	19 06.2	20	98	96.7	19 00.1	21	98	97.3
1	18 19.4	19	98	95.5	18 13.5	20	98	96.0	18 07.5	20	98	96.5	18 01.5	20	98	97.0
2	17 20.5	19	98	95.3	17 14.7	20	98	95.8	17 08.8	20	98	96.3	17 02.8	20	98	96.8
3	16 21.7	19	98	95.1	16 15.9	19	98	95.6	16 10.1	20	98	96.1	16 04.1	20	98	96.6
4	15 22.8	19	98	94.9	15 17.1	19	98	95.4	15 11.3	19	98	95.9	15 05.4	20	98	96.4
75	14 23.9	19	98	94.7	14 18.3	19	98	95.2	14 12.5	19	98	95.7	14 06.7	19	98	96.2
6	13 25.0	19	98	94.5	13 19.4	19	98	95.0	13 13.7	19	98	95.5	13 07.9	19	98	96.0
7	12 26.1	19	98	94.3	12 20.5	19	98	94.8	12 14.9	19	98	95.3	12 09.2	19	98	95.8
8	11 27.2	18	98	94.1	11 21.6	19	98	94.6	11 16.0	19	98	95.1	11 10.4	19	98	95.6
9	10 28.3	18	98	93.9	10 22.7	18	98	94.4	10 17.2	19	98	94.9	10 11.6	19	98	95.4
80	9 29.3	18	98	93.7	9 23.8	18	98	94.2	9 18.3	18	98	94.7	9 12.7	19	98	95.2
1	8 30.3	18	98	93.6	8 24.9	18	98	94.1	8 19.4	18	98	94.6	8 13.9	18	98	95.1
2	7 31.3	18	98	93.4	7 25.9	18	98	93.9	7 20.5	18	98	94.4	7 15.0	18	98	94.9
3	6 32.4	18	98	93.2	6 27.0	18	98	93.7	6 21.6	18	98	94.2	6 16.1	18	98	94.7
4	5 33.4	18	98	93.0	5 28.0	18	98	93.5	5 22.6	18	98	94.0	5 17.2	18	98	94.5

H.A.	4° 00′				4° 30′				5° 00′				5° 30′				6° 00′				6° 30′				7° 00′				7° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	84 00.0	1.0	08	180.0	84 30.0	1.0	09	180.0	85 00.0	1.0	10	180.0	85 30.0	1.0	11	180.0	86 00.0	1.0	12	180.0	86 30.0	1.0	14	180.0	87 00.0	1.0	16	180.0	87 30.0	1.0	19	180.0	00
1	83 55.1	99	24	170.5	84 24.7	98	26	169.7	84 54.2	98	28	168.7	85 23.5	98	31	167.5	85 52.8	97	34	166.0	86 21.8	96	38	164.1	86 50.5	95	43	161.7	87 18.7	93	50	158.4	1
2	83 40.8	95	38	161.6	84 09.2	94	41	160.0	84 37.3	93	44	158.2	85 05.0	92	48	156.1	85 32.2	90	52	153.5	85 58.8	87	57	150.4	86 24.4	84	63	146.4	86 48.8	79	69	141.5	2
3	83 18.1	90	50	153.4	83 44.8	88	53	151.4	84 11.0	86	56	149.0	84 36.4	84	60	146.3	85 01.1	80	65	143.2	85 24.6	76	69	139.5	85 46.9	71	75	135.1	86 07.3	65	80	129.9	3
4	82 48.4	84	59	146.2	83 13.1	81	62	143.9	83 37.1	79	66	141.3	84 00.2	75	70	138.3	84 22.3	71	74	135.0	84 43.0	67	78	131.2	85 02.1	61	82	126.9	85 19.4	54	86	122.0	4
05	82 12.9	77	67	140.1	82 35.7	75	70	137.6	82 57.6	71	73	134.9	83 18.5	68	76	131.9	83 38.1	63	80	128.6	83 56.4	58	83	124.9	84 13.0	52	87	120.9	84 27.7	46	90	116.4	05
6	81 32.9	71	73	134.8	81 53.9	68	75	132.3	82 13.8	65	78	129.6	82 32.7	61	81	126.7	82 50.3	56	84	123.5	83 06.5	51	87	120.1	83 21.1	46	90	116.4	83 33.9	40	92	112.4	6
7	80 49.4	66	77	130.3	81 08.6	63	80	127.9	81 26.9	59	82	125.3	81 44.0	55	85	122.5	81 59.9	51	87	119.5	82 14.4	46	89	116.3	82 27.3	41	92	112.9	82 38.7	35	94	109.3	7
8	80 03.0	61	81	126.5	80 20.8	58	83	124.2	80 37.6	54	85	121.7	80 53.2	50	87	119.0	81 07.6	46	89	116.2	81 20.7	41	91	113.2	81 32.4	36	93	110.1	81 42.5	31	95	106.9	8
9	79 14.6	56	84	123.3	79 31.0	53	86	121.0	79 46.5	50	88	118.6	80 00.8	46	89	116.1	80 14.0	42	91	113.5	80 25.9	38	93	110.8	80 36.5	33	94	107.9	80 45.7	28	96	105.0	9
10	78 24.4	53	86	120.5	78 39.7	49	88	118.3	78 54.0	46	89	116.0	79 07.2	42	91	113.7	79 19.3	38	92	111.2	79 30.3	34	94	108.7	79 40.0	30	95	106.1	79 48.4	26	96	103.4	10
1	77 32.8	49	88	118.0	77 47.1	46	89	116.0	78 00.4	43	91	113.8	78 12.7	39	92	111.6	78 23.9	36	93	109.3	78 34.0	32	95	107.0	78 43.0	28	96	104.6	78 50.7	24	96	102.1	1
2	76 40.1	46	89	115.9	76 53.5	43	91	113.9	77 05.9	40	92	111.9	77 17.4	37	93	109.8	77 27.9	33	94	107.7	77 37.3	30	95	105.5	77 45.6	26	96	103.2	77 52.8	22	97	100.9	2
3	75 46.6	43	91	114.0	75 59.1	40	92	112.2	76 10.8	37	93	110.3	76 21.5	34	94	108.3	76 31.4	31	95	106.3	76 40.2	28	96	104.2	76 48.0	24	96	102.1	76 54.7	21	97	100.0	3
4	74 52.3	41	92	112.4	75 04.1	38	93	110.6	75 15.1	35	94	108.8	75 25.2	32	95	106.9	75 34.5	29	95	105.0	75 42.8	26	96	103.1	75 50.1	23	97	101.1	75 56.4	20	97	99.1	4
15	73 57.3	39	92	110.9	74 08.5	36	93	109.2	74 18.9	33	94	107.5	74 28.5	31	95	105.7	74 37.2	28	96	103.9	74 45.1	25	96	102.1	74 52.0	22	97	100.3	74 58.0	19	98	98.4	15
6	73 01.9	37	93	109.6	73 12.5	34	94	108.0	73 22.4	32	95	106.3	73 31.5	29	96	104.7	73 39.8	26	96	103.0	73 47.2	23	97	101.2	73 53.8	21	97	99.5	73 59.5	18	98	97.7	6
7	72 06.0	35	94	108.4	72 16.1	33	94	106.9	72 25.6	30	95	105.3	72 34.2	28	96	103.7	72 42.1	25	96	102.1	72 49.2	22	97	100.4	72 55.5	20	97	98.8	73 00.9	17	98	97.1	7
8	71 09.8	33	94	107.3	71 19.4	31	95	105.8	71 28.4	29	96	104.3	71 36.7	26	96	102.8	71 44.2	24	97	101.3	71 51.0	21	97	99.7	71 57.0	19	98	98.1	72 02.3	16	98	96.6	8
9	70 13.2	32	95	106.3	70 22.5	30	95	104.9	70 31.1	28	96	103.5	70 39.0	25	96	102.0	70 46.2	23	97	100.6	70 52.7	20	97	99.1	70 58.5	18	98	97.6	71 03.5	16	98	96.1	9
20	69 16.4	31	95	105.4	69 25.3	29	96	104.1	69 33.5	26	96	102.7	69 41.1	24	97	101.3	69 48.0	22	97	99.9	69 54.3	20	97	98.5	69 59.9	17	98	97.0	70 04.8	15	98	95.6	20
1	68 19.3	30	95	104.6	68 27.8	28	96	103.3	68 35.8	25	96	102.0	68 43.1	23	97	100.6	68 49.8	21	97	99.3	68 55.8	19	98	97.9	69 01.2	17	98	96.6	69 05.9	15	98	95.2	1
2	67 22.0	28	96	103.8	67 30.3	27	96	102.6	67 37.9	25	97	101.3	67 45.0	23	97	100.0	67 51.4	20	97	98.7	67 57.3	18	98	97.4	68 02.5	16	98	96.1	68 07.1	14	98	94.8	2
3	66 24.5	27	96	103.1	66 32.5	26	96	101.9	66 39.9	24	97	100.7	66 46.7	22	97	99.4	66 53.0	20	98	98.2	66 58.6	18	98	97.0	67 03.7	16	98	95.7	67 08.2	14	98	94.4	3
4	65 26.9	27	96	102.4	65 34.6	25	97	101.3	65 41.8	23	97	100.1	65 48.4	21	97	98.9	65 54.5	19	98	97.7	66 00.0	17	98	96.5	66 04.9	15	98	95.3	66 09.2	14	98	94.1	4
25	64 29.1	26	96	101.8	64 36.6	24	97	100.7	64 43.6	22	97	99.6	64 50.0	21	97	98.4	64 55.9	19	98	97.3	65 01.2	17	98	96.1	65 06.0	15	98	94.9	65 10.3	13	98	93.8	25
6	63 31.2	25	97	101.3	63 38.5	23	97	100.2	63 45.3	22	97	99.1	63 51.5	20	98	98.0	63 57.2	18	98	96.8	64 02.5	17	98	95.7	64 07.2	15	98	94.6	64 11.3	13	98	93.4	6
7	62 33.2	24	97	100.7	62 40.3	23	97	99.7	62 46.9	21	97	98.6	62 53.0	19	98	97.5	62 58.5	18	98	96.4	63 03.6	16	98	95.4	63 08.2	14	98	94.3	63 12.3	13	98	93.2	7
8	61 35.1	24	97	100.2	61 42.0	22	97	99.2	61 48.4	21	98	98.1	61 54.3	19	98	97.1	61 59.8	17	98	96.1	62 04.8	16	98	95.0	62 09.3	14	98	93.9	62 13.3	13	98	92.9	8
9	60 36.9	23	97	99.7	60 43.6	22	97	98.7	60 49.9	20	98	97.7	60 55.7	19	98	96.7	61 01.0	17	98	95.7	61 05.9	16	98	94.7	61 10.3	14	98	93.7	61 14.3	12	98	92.6	9
30	59 38.7	23	97	99.3	59 45.2	21	98	98.3	59 51.3	20	98	97.3	59 57.0	18	98	96.3	60 02.2	17	98	95.4	60 07.0	15	98	94.4	60 11.4	14	98	93.4	60 15.3	12	98	92.4	30
1	58 40.3	22	97	98.8	58 46.7	21	98	97.9	58 52.7	19	98	96.9	58 58.2	18	98	96.0	59 03.4	16	98	95.0	59 08.1	15	98	94.1	59 12.4	14	98	93.1	59 16.2	12	98	92.1	1
2	57 41.9	22	97	98.4	57 48.1	20	98	97.5	57 54.0	19	98	96.6	57 59.4	18	98	95.7	58 04.5	16	98	94.7	58 09.1	15	98	93.8	58 13.4	13	98	92.8	58 17.2	12	98	91.9	2
3	56 43.4	21	98	98.0	56 49.5	20	98	97.1	56 55.3	19	98	96.2	57 00.6	17	98	95.3	57 05.6	16	98	94.4	57 10.2	15	98	93.5	57 14.3	13	98	92.6	57 18.1	12	98	91.7	3
4	55 44.9	21	98	97.6	55 50.9	19	98	96.8	55 56.5	18	98	95.9	56 01.8	17	98	95.0	56 06.7	16	98	94.1	56 11.2	14	98	93.3	56 15.3	13	98	92.4	56 19.0	12	98	91.5	4
35	54 46.3	20	98	97.3	54 52.2	19	98	96.4	54 57.7	18	98	95.6	55 02.9	17	98	94.7	55 07.7	15	98	93.9	55 12.2	14	98	93.0	55 16.3	13	98	92.1	55 20.0	12	98	91.3	35
6	53 47.6	20	98	96.9	53 53.4	19	98	96.1	53 58.9	18	98	95.3	54 04.0	16	98	94.4	54 08.8	15	98	93.6	54 13.2	14	98	92.8	54 17.2	13	98	91.9	54 20.9	12	98	91.1	6
7	52 49.0	20	98	96.6	52 54.7	18	98	95.8	53 00.0	17	98	95.0	53 05.1	16	98	94.2	53 09.8	15	98	93.3	53 14.1	14	98	92.5	53 18.2	13	98	91.7	53 21.8	12	98	90.9	7
8	51 50.3	19	98	96.3	51 55.9	18	98	95.5	52 01.2	17	98	94.7	52 06.1	16	98	93.9	52 10.8	15	98	93.1	52 15.1	14	98	92.3	52 19.1	13	98	91.5	52 22.7	12	98	90.7	8
9	50 51.5	19	98	96.0	50 57.0	18	98	95.2	51 02.3	17	98	94.4	51 07.2	16	98	93.6	51 11.8	15	98	92.9	51 16.1	14	98	92.1	51 20.0	13	98	91.3	51 23.7	12	98	90.5	9
40	49 52.7	19	98	95.7	49 58.2	18	98	94.9	50 03.3	17	98	94.2	50 08.2	16	98	93.4	50 12.8	15	98	92.6	50 17.0	14	98	91.9	50 20.9	13	98	91.1	50 24.6	12	98	90.3	40
1	48 53.9	18	98	95.4	48 59.3	17	98	94.7	49 04.4	17	98	93.9	49 09.2	16	98	93.2	49 13.7	15	98	92.4	49 17.9	14	98	91.6	49 21.9	13	98	90.9	49 25.5	12	98	90.1	1
2	47 55.1	18	98	95.1	48 00.4	17	98	94.4	48 05.4	16	98	93.7	48 10.2	15	98	92.9	48 14.7	14	98	92.2	48 18.9	13	98	91.4	48 22.8	13	98	90.7	48 26.4	12	98	89.9	2
3	46 56.2	18	98	94.9	47 01.5	17	98	94.2	47 06.5	16	98	93.4	47 11.2	15	98	92.7	47 15.6	14	98	92.0	47 19.8	13	98	91.2	47 23.7	12	98	90.5	47 27.3	12	98	89.8	3
4	45 57.3	18	98	94.6	46 02.5	17	98	93.9	46 07.5	16	98	93.2	46 12.2	15	98	92.5	46 16.6	14	98	91.8	46 20.7	13	98	91.0	46 24.6	12	98	90.3	46 28.2	12	98	89.6	4
45	44 58.4	18	98	94.4	45 03.6	17	98	93.7	45 08.5	16	98	93.0	45 13.1	15	98	92.3	45 17.5	14	98	91.6	45 21.6	13	98	90.9	45 25.5	12	98	90.2	45 29.1	12	98	89.4	45
6	43 59.5	17	98	94.1	44 04.6	17	98	93.4	44 09.5	16	98	92.7	44 14.1	15	98	92.1	44 18.4	14	98	91.4	44 22.6	13	98	90.7	44 26.4	12	98	90.0	44 30.0	12	98	89.3	6
7	43 00.5	17	98	93.9	43 05.6	16	98	93.2	43 10.4	16	98	92.5	43 15.0	15	98	91.8	43 19.4	14	98	91.2	43 23.5	13	98	90.5	43 27.3	12	98	89.8	43 31.0	12	98	89.1	7
8	42 01.6	17	98	93.6	42 06.6	16	98	93.0	42 11.4	16	98	92.3	42 16.0	15	98	91.6	42 20.3	14	98	91.0	42 24.4	13	98	90.3	42 28.3	12	98	89.6	42 31.9	12	98	89.0	8
9	41 02.6	17	98	93.4	41 07.6	16	98	92.8	41 12.4	16	98	92.1	41 16.9	15	98	91.4	41 21.2	14	98	90.8	41 25.3	13	98	90.1	41 29.2	12	98	89.5	41 32.8	12	98	88.8	9
50	40 03.6	17	98	93.2	40 08.6	16	98	92.5	40 13.3	15	98	91.9	40 17.8	15	98	91.3	40 22.1	14	98	90.6	40 26.2	13	98	90.0	40 30.1	13	98	89.3	40 33.7	12	98	88.7	50
1	39 04.6	17	98	93.0	39 09.5	16	98	92.3	39 14.2	15	98	91.7	39 18.8	15	98	91.1	39 23.0	14	98	90.4	39 27.1	13	98	89.8	39 31.0	13	98	89.1	39 34.7	12	98	88.5	1
2	38 05.6	17	98	92.8	38 10.5	16	98	92.1	38 15.2	15	98	91.5	38 19.7	15	98	90.9	38 24.0	14	98	90.2	38 28.0	13	98	89.6	38 31.9	13	98	89.0	38 35.6	12	98	88.3	2
3	37 06.6	17	98	92.6	37 11.4	16	98	91.9	37 16.1	15	98	91.3	37 20.6	15	98	90.7	37 24.9	14	98	90.1	37 29.0	13	98	89.4	37 32.8	13	98	88.8	37 36.5	12	98	88.2	3
4	36 07.5	16	98	92.3	36 12.4	16	98	91.7	36 17.0	15	98	91.1	36 21.5	15	98	90.5	36 25.8	14	98	89.9	36 29.9	13	98	89.3	36 33.8	13	98	88.7	36 37.5	12	98	88.0	4
55	35 08.5	16	98	92.1	35 13.3	16	98	91.5	35 18.0	15	98	90.9	35 22.4	15	98	90.3	35 26.7	14	98	89.7	35 30.8	13	98	89.1	35 34.7	13	98	88.5	35 38.4	12	98	87.9	55
6	34 09.4	16	98	92.0	34 14.2	16	98	91.4	34 18.9	15	98	90.8	34 23.3	15	98	90.2	34 27.6	14	98	89.6	34 31.7	13	98	89.0	34 35.6	13	98	88.4	34 39.4	12	98	87.8	6
7	33 10.4	16	98	91.8	33 15.2	16	98	91.2	33 19.8	15	98	90.6	33 24.2	15	98	90.0	33 28.5	14	98	89.4	33 32.6	13	98	88.8	33 36.6	13	98	88.2	33 40.3	12	98	87.6	7
8	32 11.3	16	98	91.6	32 16.1	16	98	91.0	32 20.7	15	98	90.4	32 25.2	15	98	89.8	32 29.4	14	98	89.2	32 33.6	13	98	88.6	32 37.5	13	98	88.0	32 41.3	12	98	87.5	8
9	31 12.3	16	98	91.4	31 17.0	16	98	90.8	31 21.6	15	98	90.2	31 26.1	15	98	89.6	31 30.4	14	98	89.1	31 34.5	14	98	88.5	31 38.5	13	98	87.9	31 42.3	12	98	87.3	9
60	30 13.2	16	98	91.2	30 17.9	16	98	90.6	30 22.5	15	98	90.0	30 27.0	15	98	89.5	30 31.3	14	98	88.9	30 35.4	14	98	88.3	30 39.4	13	98	87.7	30 43.3	13	98	87.2	60
1	29 14.1	16	98	91.0	29 18.8	16	98	90.4	29 23.4	15	98	89.9	29 27.9	15	98	89.3	29 32.2	14	98	88.7	29 36.4	14	98	88.2	29 40.4	13	98	87.6	29 44.2	13	98	87.0	1
2	28 15.0	16	98	90.8	28 19.8	16	98	90.3	28 24.4	15	98	89.7	28 28.8	15	98	89.1	28 33.1	14	98	88.6	28 37.3	14	98	88.0	28 41.3	13	98	87.4	28 45.2	13	98	86.9	2
3	27 15.9	16	98	90.6	27 20.7	16	98	90.1	27 25.3	15	98	89.5	27 29.7	15	98	89.0	27 34.1	14	98	88.4	27 38.3	14	98	87.9	27 42.3	13	98	87.3	27 46.2	13	98	86.7	3
4	26 16.9	16	98	90.5	26 21.6	16	98	89.9	26 26.2	15	98	89.4	26 30.7	15	98	88.8	26 35.0	14	98	88.3	26 39.2	14	98	87.7	26 43.3	13	98	87.1	26 47.3	13	98	86.6	4
65	25 17.8	16	98	90.3	25 22.5	16	98	89.7	25 27.1	15	98	89.2	25 31.6	15	98	88.6	25 35.9	14	98	88.1	25 40.2	14	98	87.5	25 44.3	14	98	87.0	25 48.3	13	98	86.4	65
6	24 18.7	16	98	90.1	24 23.4	16	98	89.6	24 28.0	15	98	89.0	24 32.5	15	98	88.5	24 36.9	14	98	87.9	24 41.1	14	98	87.4	24 45.3	14	98	86.8	24 49.3	13	98	86.3	6
7	23 19.6	16	98	89.9	23 24.3	16	98	89.4	23 28.9	15	98	88.9	23 33.4	15	98	88.3	23 37.8	14	98	87.8	23 42.1	14	98	87.2	23 46.3	14	98	86.7	23 50.3	13	98	86.2	7
8	22 20.5	16	98	89.8	22 25.2	16	98	89.2	22 29.9	15	98	88.7	22 34.4	15	98	88.2	22 38.8	15	98	87.6	22 43.1	14	98	87.1	22 47.3	14	98	86.6	22 51.4	13	98	86.0	8
9	21 21.4	16	98	89.6	21 26.2	16	98	89.1	21 30.8	15	98	88.5	21 35.3	15	98	88.0	21 39.8	15	98	87.5	21 44.1	14	98	86.9	21 48.3	14	98	86.4	21 52.5	14	98	85.9	9
70	20 22.3	16	98	89.4	20 27.1	16	98	88.9	20 31.7	15	98	88.4	20 36.3	15	98	87.8	20 40.7	15	98	87.3	20 45.1	14	98	86.8	20 49.4	14	98	86.3	20 53.5	14	98	85.7	70
1	19 23.2	16	98	89.3	19 28.0	16	98	88.7	19 32.7	15	98	88.2	19 37.2	15	98	87.7	19 41.7	15	98	87.2	19 46.1	14	98	86.6	19 50.4	14	98	86.1	19 54.6	14	98	85.6	1
2	18 24.2	16	98	89.1	18 28.9	16	98	88.6	18 33.6	15	98	88.0	18 38.2	15	98	87.5	18 42.7	15	98	87.0	18 47.1	15	98	86.5	18 51.5	14	98	86.0	18 55.7	14	98	85.4	2
3	17 25.1	16	98	88.9	17 29.9	16	98	88.4	17 34.6	16	98	87.9	17 39.2	15	98	87.4	17 43.7	15	98	86.8	17 48.1	15	98	86.3	17 52.5	14	98	85.8	17 56.8	14	98	85.3	3
4	16 26.0	16	98	88.7	16 30.8	16	98	88.2	16 35.5	16	98	87.7	16 40.1	15	98	87.2	16 44.7	15	98	86.7	16 49.2	15	98	86.2	16 53.6	15	98	85.7	16 57.9	14	98	85.1	4
75	15 26.9	16	98	88.6	15 31.7	16	98	88.1	15 36.5	16	98	87.6	15 41.1	15	98	87.0	15 45.7	15	98	86.5	15 50.2	15	98	86.0	15 54.7	15	98	85.5	15 59.1	14	98	85.0	75
6	14 27.9	16	98	88.4	14 32.7	16	98	87.9	14 37.4	16	98	87.4	14 42.1	16	98	86.9	14 46.7	15	98	86.4	14 51.3	15	98	85.9	14 55.8	15	98	85.4	15 00.2	15	98	84.8	6
7	13 28.8	16	98	88.2	13 33.6	16	98	87.7	13 38.4	16	98	87.2	13 43.1	16	98	86.7	13 47.8	15	98	86.2	13 52.4	15	98	85.7	13 56.9	15	98	85.2	14 01.4	15	98	84.7	7
8	12 29.7	16	98	88.1	12 34.6	16	98	87.6	12 39.4	16	98	87.1	12 44.1	16	98	86.6	12 48.8	16	98	86.1	12 53.5	15	98	85.6	12 58.0	15	98	85.0	13 02.5	15	98	84.5	8
9	11 30.7	16	98	87.9	11 35.6	16	98	87.4	11 40.4	16	98	86.9	11 45.2	16	98	86.4	11 49.9	16	98	85.9	11 54.5	15	98	85.4	11 59.2	15	98	84.9	12 03.7	15	98	84.4	9
80	10 31.6	16	98	87.7	10 36.5	16	98	87.2	10 41.4	16	98	86.7	10 46.2	16	98	86.2	10 51.0	16	98	85.7	10 55.7	16	98	85.2	11 00.3	15	98	84.7	11 04.9	15	98	84.2	80
1	9 32.6	16	98	87.6	9 37.5	16	98	87.1	9 42.4	16	98	86.6	9 47.2	16	98	86.1	9 52.0	16	98	85.6	9 56.8	16	98	85.1	10 01.5	16	98	84.6	10 06.1	15	98	84.1	1
2	8 33.6	17	98	87.4	8 38.5	16	98	86.9	8 43.4	16	98	86.4	8 48.3	16	98	85.9	8 53.1	16	98	85.4	8 57.9	16	98	84.9	9 02.7	16	98	84.4	9 07.4	16	98	83.9	2
3	7 34.6	17	98	87.2	7 39.5	17	98	86.8	7 44.5	16	98	86.3	7 49.4	16	98	85.8	7 54.2	16	98	85.3	7 59.1	16	98	84.8	8 03.9	16	98	84.3	8 08.6	16	98	83.8	3
4	6 35.5	17	98	87.1	6 40.5	17	98	86.6	6 45.5	17	98	86.1	6 50.4	16	98	85.6	6 55.4	16	98	85.1	7 00.2	16	96	84.6	7 05.1	16	98	84.1	7 09.9	16	98	83.6	4
85	5 36.5	17	98	86.9	5 41.6	17	98	86.4	5 46.6	17	98	85.9	5 51.5	17	98	85.4	5 56.5	16	98	84.9	6 01.4	16	98	84.4	6 06.3	16	98	83.9	6 11.2	16	98	83.4	85
6																					5 02.6	17	98	84.3	5 07.6	16	98	83.8	5 12.5	16	98	83.3	6

H.A.	4° 00′			4° 30′			5° 00′			5° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	76 00.0	1.0 04	180.0	75 30.0	1.0 03	180.0	75 00.0	1.0 03	180.0	74 30.0	1.0 03	180.0
1	75 57.9	1.0 11	175.9	75 28.0	1.0 10	176.0	74 58.0	1.0 10	176.2	74 28.1	1.0 10	176.3
2	75 51.5	99 17	171.8	75 21.8	99 17	172.1	74 52.1	99 16	172.3	74 22.4	99 16	172.6
3	75 41.1	98 24	167.8	75 11.7	98 23	168.2	74 42.3	98 23	168.6	74 12.9	98 22	169.0
4	75 26.6	96 30	163.9	74 57.7	96 29	164.5	74 28.8	97 28	164.9	73 59.8	97 28	165.4
05	75 08.4	94 36	160.2	74 40.1	95 35	160.8	74 11.7	95 34	161.4	73 43.2	95 33	162.0
6	74 46.7	92 42	156.6	74 19.0	92 41	157.3	73 51.2	93 39	158.0	73 23.2	93 38	158.7
7	74 21.6	90 47	153.2	73 54.6	90 46	154.0	73 27.5	91 44	154.8	73 00.2	91 43	155.5
8	73 53.5	87 52	150.0	73 27.3	88 50	150.8	73 00.9	88 49	151.7	72 34.3	89 48	152.4
9	73 22.5	84 56	146.9	72 57.1	85 54	147.9	72 31.5	86 53	148.7	72 05.6	87 52	149.6
10	72 49.1	82 60	144.1	72 24.5	82 58	145.1	71 59.6	83 57	146.0	71 34.5	84 56	146.8
1	72 13.3	79 63	141.4	71 49.5	80 62	142.4	71 25.4	81 60	143.4	71 01.1	82 59	144.3
2	71 35.5	76 66	138.9	71 12.5	77 65	140.0	70 49.2	78 64	140.9	70 25.6	79 62	141.8
3	70 55.8	74 69	136.6	70 33.5	75 68	137.6	70 11.0	76 66	138.6	69 48.1	77 65	139.6
4	70 14.4	71 72	134.5	69 52.9	72 70	135.5	69 31.1	73 69	136.5	69 09.0	74 68	137.4
15	69 31.5	68 74	132.4	69 10.7	70 73	133.5	68 49.6	71 71	134.4	68 28.2	72 70	135.4
6	68 47.2	66 76	130.5	68 27.2	67 75	131.6	68 06.8	69 74	132.6	67 46.1	70 72	133.5
7	68 01.7	64 78	128.8	67 42.4	65 77	129.8	67 22.6	66 76	130.8	67 02.6	67 74	131.7
8	67 15.1	62 79	127.1	66 56.4	63 78	128.1	66 37.3	64 77	129.1	66 17.9	65 76	130.1
9	66 27.5	60 81	125.6	66 09.4	61 80	126.6	65 51.0	62 79	127.6	65 32.2	63 78	128.5
20	65 39.0	58 82	124.2	65 21.6	59 81	125.1	65 03.7	60 80	126.1	64 45.5	61 79	127.0
1	64 49.8	56 83	122.8	64 32.8	57 82	123.8	64 15.5	58 82	124.7	63 57.9	59 81	125.6
2	63 59.7	54 84	121.5	63 43.3	55 84	122.5	63 26.6	56 83	123.4	63 09.4	58 82	124.3
3	63 09.1	52 85	120.3	62 53.2	54 85	121.3	62 36.9	55 84	122.2	62 20.3	56 83	123.1
4	62 17.8	51 86	119.2	62 02.4	52 86	120.1	61 46.6	53 85	121.0	61 30.5	54 84	121.9
25	61 25.9	49 87	118.2	61 11.0	50 86	119.1	60 55.7	52 86	120.0	60 40.0	53 85	120.8
6	60 33.6	48 88	117.2	60 19.1	49 87	118.1	60 04.2	50 87	118.9	59 49.0	51 86	119.8
7	59 40.8	46 89	116.2	59 26.7	48 88	117.1	59 12.2	49 87	117.9	58 57.5	50 87	118.8
8	58 47.6	45 89	115.3	58 33.9	46 89	116.2	58 19.8	47 88	117.0	58 05.4	48 87	117.9
9	57 54.0	44 90	114.5	57 40.7	45 89	115.3	57 27.0	46 89	116.2	57 13.0	47 88	117.0
30	57 00.0	43 90	113.7	56 47.1	44 90	114.5	56 33.8	45 89	115.3	56 20.1	46 89	116.1
1	56 05.8	42 91	112.9	55 53.1	43 90	113.7	55 40.2	44 90	114.5	55 26.9	45 89	115.3
2	55 11.2	41 91	112.2	54 58.9	42 91	113.0	54 46.3	43 90	113.8	54 33.3	44 90	114.6
3	54 16.4	40 92	111.5	54 04.3	41 91	112.3	53 52.0	42 91	113.1	53 39.4	43 90	113.8
4	53 21.3	39 92	110.8	53 09.5	40 92	111.6	52 57.5	41 91	112.4	52 45.2	41 91	113.1
35	52 25.9	38 93	110.2	52 14.5	39 92	111.0	52 02.8	40 92	111.7	51 50.7	40 91	112.5
6	51 30.4	37 93	109.6	51 19.2	38 92	110.3	51 07.7	39 92	111.1	50 56.0	40 92	111.8
7	50 34.6	36 93	109.0	50 23.7	37 93	109.8	50 12.5	38 92	110.5	50 01.0	39 92	111.2
8	49 38.6	35 94	108.5	49 28.0	36 93	109.2	49 17.0	37 93	109.9	49 05.8	38 92	110.6
9	48 42.5	34 94	107.9	48 32.1	35 93	108.7	48 21.4	36 93	109.4	48 10.4	37 93	110.1
40	47 46.2	34 94	107.4	47 36.0	34 94	108.1	47 25.5	35 93	108.8	47 14.8	36 93	109.5
1	46 49.8	33 94	106.9	46 39.8	34 94	107.6	46 29.5	35 94	108.3	46 19.1	35 93	109.0
2	45 53.2	32 95	106.5	45 43.4	33 94	107.2	45 33.4	34 94	107.8	45 23.1	35 94	108.5
3	44 56.4	32 95	106.0	44 46.9	32 94	106.7	44 37.0	33 94	107.4	44 27.0	34 94	108.0
4	43 59.6	31 95	105.6	43 50.2	32 95	106.2	43 40.6	32 94	106.9	43 30.7	33 94	107.6
45	43 02.6	30 95	105.2	42 53.4	31 95	105.8	42 44.0	32 95	106.5	42 34.3	33 94	107.1
6	42 05.5	30 95	104.8	41 56.5	30 95	105.4	41 47.2	31 95	106.0	41 37.8	32 94	106.7
7	41 08.3	29 95	104.4	40 59.5	30 95	105.0	40 50.4	31 95	105.6	40 41.1	31 95	106.3
8	40 11.1	29 96	104.0	40 02.3	29 95	104.6	39 53.4	30 95	105.2	39 44.3	31 95	105.9
9	39 13.7	28 96	103.6	39 05.1	29 96	104.2	38 56.4	29 95	104.8	38 47.4	30 95	105.5
50	38 16.2	28 96	103.3	38 07.8	28 96	103.9	37 59.2	29 95	104.5	37 50.4	30 95	105.1
1	37 18.6	27 96	102.9	37 10.4	28 96	103.5	37 01.9	28 96	104.1	36 53.3	29 95	104.7
2	36 21.0	27 96	102.6	36 12.9	27 96	103.2	36 04.6	28 96	103.8	35 56.1	29 96	104.4
3	35 23.3	26 96	102.2	35 15.3	27 96	102.8	35 07.2	27 96	103.4	34 58.8	28 96	104.0
4	34 25.5	26 96	101.9	34 17.7	26 96	102.5	34 09.7	27 96	103.1	34 01.5	28 96	103.7
55	33 27.7	25 97	101.6	33 20.0	26 96	102.2	33 12.1	27 96	102.8	33 04.0	27 96	103.4
6	32 29.8	25 97	101.3	32 22.2	26 96	101.9	32 14.4	26 96	102.5	32 06.5	27 96	103.0
7	31 31.8	25 97	101.0	31 24.3	25 97	101.6	31 16.7	26 96	102.2	31 08.9	26 96	102.7
8	30 33.8	24 97	100.7	30 26.4	25 97	101.3	30 18.9	25 96	101.9	30 11.2	26 96	102.4
9	29 35.7	24 97	100.5	29 28.4	24 97	101.0	29 21.0	25 97	101.6	29 13.5	25 96	102.1
60	28 37.6	24 97	100.2	28 30.4	24 97	100.7	28 23.1	25 97	101.3	28 15.7	25 96	101.8
1	27 39.4	23 97	99.9	27 32.3	24 97	100.5	27 25.1	24 97	101.0	27 17.8	25 97	101.6
2	26 41.2	23 97	99.7	26 34.2	23 97	100.2	26 27.1	24 97	100.8	26 19.9	24 97	101.3
3	25 42.9	23 97	99.4	25 36.0	23 97	100.0	25 29.0	23 97	100.5	25 21.9	24 97	101.0
4	24 44.6	22 97	99.2	24 37.8	23 97	99.7	24 30.9	23 97	100.2	24 23.9	24 97	100.8
65	23 46.2	22 97	98.9	23 39.5	22 97	99.5	23 32.7	23 97	100.0	23 25.8	23 97	100.5
6	22 47.8	22 97	98.7	22 41.2	22 97	99.2	22 34.5	23 97	99.7	22 27.7	23 97	100.3
7	21 49.4	22 97	98.4	21 42.9	22 97	99.0	21 36.3	22 97	99.5	21 29.6	23 97	100.0
8	20 50.9	21 98	98.2	20 44.5	22 97	98.7	20 38.0	22 97	99.3	20 31.3	22 97	99.8
9	19 52.4	21 98	98.0	19 46.1	21 97	98.5	19 39.6	22 97	99.0	19 33.1	22 97	99.5
70	18 53.9	21 98	97.8	18 47.6	21 97	98.3	18 41.3	21 97	98.8	18 34.8	22 97	99.3
1	17 55.3	21 98	97.6	17 49.1	21 98	98.1	17 42.8	21 97	98.6	17 36.5	21 97	99.1
2	16 56.8	20 98	97.3	16 50.6	21 98	97.9	16 44.4	21 97	98.4	16 38.1	21 97	98.9
3	15 58.1	20 98	97.1	15 52.1	20 98	97.6	15 45.9	21 98	98.1	15 39.7	21 97	98.7
4	14 59.5	20 98	96.9	14 53.5	20 98	97.4	14 47.4	20 98	97.9	14 41.3	21 97	98.4
75	14 00.8	20 98	96.7	13 54.9	20 98	97.2	13 48.9	20 98	97.7	13 42.8	20 97	98.2
6	13 02.1	19 98	96.5	12 56.2	20 98	97.0	12 50.3	20 98	97.5	12 44.3	20 98	98.0
7	12 03.4	19 98	96.3	11 57.6	19 98	96.8	11 51.7	20 98	97.3	11 45.8	20 98	97.8
8	11 04.7	19 98	96.1	10 58.9	19 98	96.6	10 53.1	19 98	97.1	10 47.2	20 98	97.6
9	10 05.9	19 98	95.9	10 00.2	19 98	96.4	9 54.5	19 98	96.9	9 48.7	19 98	97.4
80	9 07.1	19 98	95.7	9 01.5	19 98	96.2	8 55.8	19 98	96.7	8 50.1	19 98	97.2
1	8 08.3	19 98	95.6	8 02.7	19 98	96.0	7 57.1	19 98	96.5	7 51.4	19 98	97.0
2	7 09.5	18 98	95.4	7 04.0	19 98	95.9	6 58.4	19 98	96.4	6 52.8	19 98	96.9
3	6 10.7	18 98	95.2	6 05.2	18 98	95.7	5 59.6	18 98	96.2	5 54.1	19 98	96.7
4	5 11.8	18 98	95.0	5 06.4	18 98	95.5	5 00.9	18 98	96.0			

6° 00′			6° 30′			7° 00′			7° 30′			H.A.
Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
74 00.0	1.0 03	180.0	73 30.0	1.0 03	180.0	73 00.0	1.0 03	180.0	72 30.0	1.0 03	180.0	00
73 58.1	1.0 09	176.4	73 28.2	1.0 09	176.5	72 58.2	1.0 09	176.6	72 28.3	1.0 08	176.7	1
73 52.6	99 15	172.8	73 22.8	99 15	173.0	72 53.0	99 14	173.2	72 23.2	99 14	173.4	2
73 43.4	98 21	169.3	73 13.9	98 21	169.6	72 44.4	98 20	169.9	72 14.8	99 19	170.2	3
73 30.7	97 27	165.9	73 01.5	97 26	166.3	72 32.4	97 25	166.7	72 03.1	97 25	167.0	4
73 14.6	95 32	162.5	72 45.9	96 31	163.0	72 17.1	96 31	163.5	71 48.3	96 30	163.9	05
72 55.2	94 37	159.3	72 27.1	94 36	159.9	71 58.8	94 35	160.4	71 30.5	95 35	160.9	6
72 32.8	92 42	156.2	72 05.2	92 41	156.8	71 37.6	92 40	157.4	71 09.8	93 39	158.0	7
72 07.5	89 47	153.2	71 40.6	90 45	153.9	71 13.5	90 44	154.6	70 46.3	91 43	155.2	8
71 39.6	87 51	150.4	71 13.3	88 50	151.1	70 46.9	88 48	151.9	70 20.3	89 47	152.6	9
71 09.2	85 54	147.7	70 43.6	86 53	148.5	70 17.8	86 52	149.3	69 51.9	87 51	150.0	10
70 36.5	82 58	145.1	70 11.6	83 57	146.0	69 46.5	84 56	146.8	69 21.3	85 55	147.6	1
70 01.7	80 61	142.7	69 37.5	81 60	143.6	69 13.2	82 59	144.4	68 48.5	82 58	145.2	2
69 25.0	78 64	140.5	69 01.5	79 63	141.4	68 37.9	79 62	142.2	68 13.9	80 61	143.0	3
68 46.5	75 67	138.3	68 23.8	76 66	139.2	68 00.8	77 64	140.1	67 37.5	78 63	140.9	4
68 06.5	73 69	136.3	67 44.4	74 68	137.2	67 22.1	75 67	138.1	66 59.5	76 66	139.0	15
67 25.0	71 71	134.5	67 03.6	72 70	135.4	66 41.9	73 69	136.2	66 20.0	74 68	137.1	6
66 42.2	69 73	132.7	66 21.4	70 72	133.6	66 00.4	71 71	134.5	65 39.1	72 70	135.3	7
65 58.1	66 75	131.0	65 38.0	68 74	131.9	65 17.6	69 73	132.8	64 56.9	70 72	133.7	8
65 13.0	64 77	129.4	64 53.5	66 76	130.3	64 33.7	67 75	131.2	64 13.6	68 74	132.1	9
64 26.9	62 78	127.9	64 08.0	64 77	128.8	63 48.8	65 77	129.7	63 29.2	66 76	130.6	20
63 39.9	61 80	126.5	63 21.5	62 79	127.4	63 02.8	63 78	128.3	62 43.9	64 77	129.2	1
62 52.0	59 81	125.2	62 34.2	60 80	126.1	62 16.0	61 79	127.0	61 57.6	62 78	127.8	2
62 03.3	57 82	124.0	61 46.1	58 81	124.8	61 28.4	59 81	125.7	61 10.5	60 80	126.5	3
61 14.0	55 83	122.8	60 57.2	57 83	123.7	60 40.1	58 82	124.5	60 22.7	59 81	125.3	4
60 24.0	54 84	121.7	60 07.7	55 84	122.5	59 51.1	56 83	123.4	59 34.1	57 82	124.2	25
59 33.5	52 85	120.6	59 17.6	53 84	121.5	59 01.4	54 84	122.3	58 44.9	55 83	123.1	6
58 42.4	51 86	119.6	58 26.9	52 85	120.5	58 11.2	53 85	121.3	57 55.1	54 84	122.1	7
57 50.7	50 87	118.7	57 35.7	51 86	119.5	57 20.4	52 85	120.3	57 04.8	53 85	121.1	8
56 58.7	48 87	117.8	56 44.1	49 87	118.6	56 29.2	50 86	119.4	56 13.9	51 86	120.1	9
56 06.2	47 88	116.9	55 52.0	48 88	117.7	55 37.4	49 87	118.5	55 22.6	50 86	119.3	30
55 13.3	46 89	116.1	54 59.5	47 88	116.9	54 45.3	48 88	117.6	54 30.8	49 87	118.4	1
54 20.1	45 89	115.3	54 06.6	46 89	116.1	53 52.8	47 88	116.8	53 38.7	47 88	117.6	2
53 26.5	43 90	114.6	53 13.3	44 89	115.3	52 59.9	45 89	116.1	52 46.1	46 88	116.8	3
52 32.6	42 90	113.9	52 19.8	43 90	114.6	52 06.6	44 89	115.3	51 53.2	45 89	116.1	4
51 38.5	41 91	113.2	51 25.9	42 90	113.9	51 13.1	43 90	114.6	51 00.0	44 89	115.4	35
50 44.0	40 91	112.5	50 31.7	41 91	113.3	50 19.2	42 90	114.0	50 06.4	43 90	114.7	6
49 49.3	40 92	111.9	49 37.3	40 91	112.6	49 25.1	41 91	113.3	49 12.6	42 90	114.0	7
48 54.4	39 92	111.3	48 42.7	39 91	112.0	48 30.7	40 91	112.7	48 18.5	41 91	113.4	8
47 59.2	38 92	110.8	47 47.8	39 92	111.4	47 36.1	39 91	112.1	47 24.1	40 91	112.8	9
47 03.9	37 93	110.2	46 52.7	38 92	110.9	46 41.2	39 92	111.6	46 29.6	39 91	112.2	40
46 08.3	36 93	109.7	45 57.4	37 92	110.3	45 46.2	38 92	111.0	45 34.8	38 92	111.7	1
45 12.6	35 93	109.2	45 01.9	36 93	109.8	44 50.9	37 92	110.5	44 39.7	38 92	111.1	2
44 16.7	35 93	108.7	44 06.2	35 93	109.3	43 55.5	36 93	110.0	43 44.5	37 92	110.6	3
43 20.7	34 94	108.2	43 10.4	35 93	108.8	42 59.9	35 93	109.5	42 49.1	36 93	110.1	4
42 24.4	33 94	107.7	42 14.4	34 94	108.4	42 04.1	35 93	109.0	41 53.6	35 93	109.6	45
41 28.1	33 94	107.3	41 18.2	33 94	107.9	41 08.1	34 93	108.6	40 57.8	35 93	109.2	6
40 31.6	32 94	106.9	40 21.9	33 94	107.5	40 12.0	33 94	108.1	40 02.0	34 93	108.7	7
39 35.0	31 95	106.5	39 25.5	32 94	107.1	39 15.8	33 94	107.7	39 05.9	33 94	108.3	8
38 38.3	31 95	106.1	38 29.0	31 94	106.7	38 19.5	32 94	107.3	38 09.8	33 94	107.9	9
37 41.5	30 95	105.7	37 32.3	31 95	106.3	37 23.0	31 94	106.9	37 13.5	32 94	107.5	50
36 44.5	30 95	105.3	36 35.5	30 95	105.9	36 26.4	31 94	106.5	36 17.1	31 94	107.1	1
35 47.5	29 95	105.0	35 38.7	30 95	105.5	35 29.7	30 95	106.1	35 20.5	31 94	106.7	2
34 50.3	29 95	104.6	34 41.7	29 95	105.2	34 32.9	30 95	105.8	34 23.9	30 95	106.3	3
33 53.1	28 96	104.3	33 44.6	29 95	104.8	33 35.9	29 95	105.4	33 27.1	30 95	106.0	4
32 55.8	28 96	103.9	32 47.5	28 95	104.5	32 38.9	29 95	105.1	32 30.3	29 95	105.6	55
31 58.4	27 96	103.6	31 50.2	28 96	104.2	31 41.8	28 95	104.7	31 33.3	29 95	105.3	6
31 01.0	27 96	103.3	30 52.9	27 96	103.9	30 44.6	28 95	104.4	30 36.3	28 95	105.0	7
30 03.4	26 96	103.0	29 55.5	27 96	103.5	29 47.4	27 96	104.1	29 39.2	28 96	104.6	8
29 05.8	26 96	102.7	28 58.0	26 96	103.2	28 50.0	27 96	103.8	28 41.9	27 96	104.3	9
28 08.1	26 96	102.4	28 00.4	26 96	102.9	27 52.6	26 96	103.5	27 44.7	27 96	104.0	60
27 10.4	25 96	102.1	27 02.8	25 96	102.7	26 55.1	26 96	103.2	26 47.3	26 96	103.7	1
26 12.6	25 96	101.8	26 05.1	25 96	102.4	25 57.6	25 96	102.9	25 49.9	26 96	103.5	2
25 14.7	24 97	101.6	25 07.4	25 96	102.1	24 59.9	25 96	102.6	24 52.4	26 96	103.2	3
24 16.8	24 97	101.3	24 09.6	24 96	101.8	24 02.2	25 96	102.4	23 54.8	25 96	102.9	4
23 18.8	24 97	101.0	23 11.7	24 97	101.6	23 04.5	24 96	102.1	22 57.2	25 96	102.6	65
22 20.8	23 97	100.8	22 13.8	24 97	101.3	22 06.7	24 96	101.8	21 59.5	24 96	102.4	6
21 22.7	23 97	100.5	21 15.8	23 97	101.1	21 08.8	24 97	101.6	21 01.7	24 96	102.1	7
20 24.6	23 97	100.3	20 17.8	23 97	100.8	20 10.9	23 97	101.3	20 03.9	23 96	101.9	8
19 26.5	22 97	100.1	19 19.8	23 97	100.6	19 13.0	23 97	101.1	19 06.1	23 96	101.6	9
18 28.3	22 97	99.8	18 21.7	22 97	100.3	18 15.0	22 97	100.9	18 08.2	23 97	101.4	70
17 30.0	22 97	99.6	17 23.5	22 97	100.1	17 16.9	22 97	100.6	17 10.2	22 97	101.1	1
16 31.8	21 97	99.4	16 25.3	22 97	99.9	16 18.8	22 97	100.4	16 12.2	22 97	100.9	2
15 33.4	21 97	99.2	15 27.1	21 97	99.7	15 20.7	22 97	100.2	15 14.2	22 97	100.7	3
14 35.1	21 97	98.9	14 28.8	21 97	99.5	14 22.5	21 97	100.0	14 16.1	21 97	100.5	4
13 36.7	21 97	98.7	13 30.5	21 97	99.2	13 24.3	21 97	99.7	13 18.0	21 97	100.2	75
12 38.3	20 97	98.5	12 32.2	20 97	99.0	12 26.0	21 97	99.5	12 19.8	21 97	100.0	6
11 39.8	20 97	98.3	11 33.8	20 97	98.8	11 27.7	20 97	99.3	11 21.6	21 97	99.8	7
10 41.3	20 98	98.1	10 35.4	20 97	98.6	10 29.4	20 97	99.1	10 23.4	20 97	99.6	8
9 42.8	20 98	97.9	9 37.0	20 97	98.4	9 31.0	20 97	98.9	9 25.1	20 97	99.4	9
8 44.3	19 98	97.7	8 38.5	19 98	98.2	8 32.7	20 97	98.7	8 26.8	20 97	99.2	80
7 45.7	19 98	97.5	7 40.0	19 98	98.0	7 34.2	19 97	98.5	7 28.4	19 97	99.0	1
6 47.1	19 98	97.3	6 41.5	19 98	97.8	6 35.8	19 97	98.3	6 30.1	19 97	98.8	2
5 48.5	19 98	97.2	5 42.9	19 98	97.7	5 37.3	19 98	98.1	5 31.7	19 97	98.6	3
												4

DECLINATION SAME NAME AS LATITUDE

H.A.	8° 00′				8° 30′				9° 00′				9° 30′			
°	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °
00	88 00.0	1.0	23	180.0	88 30.0	1.0	30	180.0	89 00.0	1.0	40	180.0	89 30.0	1.0	60	180.0
1	87 46.2	90	58	153.6	88 12.3	84	68	146.6	88 35.7	71	81	135.3	88 53.7	45	93	116.8
2	87 11.3	71	76	135.2	87 31.2	61	84	127.1	87 47.3	45	91	116.7	87 58.0	25	96	104.1
3	86 25.5	56	85	123.8	86 40.8	46	90	116.6	86 52.6	32	95	108.4	87 00.1	17	98	99.3
4	85 34.3	46	90	116.5	85 46.6	36	93	110.5	85 55.8	25	96	103.9	86 01.6	13	98	96.9
05	84 40.3	38	93	111.6	84 50.5	30	95	106.5	84 58.1	21	97	101.0	85 02.8	11	98	95.4
6	83 44.8	33	94	108.2	83 53.5	25	96	103.7	83 59.9	18	97	99.1	84 03.9	09	98	94.3
7	82 48.2	29	95	105.6	82 55.8	22	97	101.7	83 01.4	15	98	97.7	83 05.0	08	98	93.5
8	81 51.0	26	96	103.6	81 57.8	20	97	100.1	82 02.8	14	98	96.6	82 06.0	08	98	92.9
9	80 53.4	23	97	101.9	80 59.5	18	97	98.8	81 04.1	12	98	95.7	81 07.0	07	98	92.5
10	79 55.4	21	97	100.6	80 01.0	16	98	97.8	80 05.2	11	98	94.9	80 07.9	07	98	92.0
1	78 57.2	20	97	99.5	79 02.4	15	98	97.0	79 06.3	11	98	94.3	79 08.9	06	98	91.7
2	77 58.9	18	97	98.6	78 03.7	14	98	96.2	78 07.4	10	98	93.8	78 09.8	06	98	91.4
3	77 00.4	17	98	97.8	77 05.0	13	98	95.6	77 08.4	10	98	93.4	77 10.7	06	98	91.1
4	76 01.8	16	98	97.1	76 06.1	13	98	95.0	76 09.4	09	98	93.0	76 11.7	06	98	90.9
15	75 03.1	15	98	96.5	75 07.2	12	98	94.5	75 10.4	09	98	92.6	75 12.6	06	98	90.6
6	74 04.4	15	98	95.9	74 08.3	12	98	94.1	74 11.4	09	98	92.3	74 13.5	06	98	90.4
7	73 05.6	14	98	95.4	73 09.4	11	98	93.7	73 12.3	08	98	92.0	73 14.4	05	98	90.2
8	72 06.7	14	98	94.9	72 10.4	11	98	93.3	72 13.3	08	98	91.7	72 15.3	05	98	90.1
9	71 07.8	13	98	94.5	71 11.4	11	98	93.0	71 14.2	08	98	91.4	71 16.2	05	98	89.9
20	70 08.9	13	98	94.1	70 12.4	10	98	92.7	70 15.1	08	98	91.2	70 17.1	05	98	89.7
1	69 10.0	12	98	93.8	69 13.4	10	98	92.4	69 16.0	08	98	91.0	69 18.0	06	98	89.6
2	68 11.0	12	98	93.5	68 14.3	10	98	92.1	68 17.0	08	98	90.8	68 19.0	06	98	89.4
3	67 12.0	12	98	93.1	67 15.3	10	98	91.9	67 17.9	08	98	90.6	67 19.9	06	98	89.3
4	66 13.0	12	98	92.8	66 16.2	10	98	91.6	66 18.8	08	98	90.4	66 20.8	06	98	89.1
25	65 14.0	11	98	92.6	65 17.1	10	98	91.4	65 19.7	08	98	90.2	65 21.7	06	98	89.0
6	64 15.0	11	98	92.3	64 18.1	09	98	91.2	64 20.6	08	98	90.0	64 22.6	06	98	88.9
7	63 15.9	11	98	92.1	63 19.0	09	98	91.0	63 21.5	08	98	89.8	63 23.6	06	98	88.7
8	62 16.9	11	98	91.8	62 19.9	09	98	90.7	62 22.4	08	98	89.7	62 24.5	06	98	88.6
9	61 17.8	11	98	91.6	61 20.8	09	98	90.6	61 23.4	08	98	89.5	61 25.4	06	98	88.5
30	60 18.7	11	98	91.4	60 21.7	09	98	90.4	60 24.3	08	98	89.4	60 26.3	06	98	88.3
1	59 19.6	11	98	91.2	59 22.6	09	98	90.2	59 25.2	08	98	89.2	59 27.3	06	98	88.2
2	58 20.6	11	98	91.0	58 23.5	09	98	90.0	58 26.1	08	98	89.1	58 28.2	06	98	88.1
3	57 21.5	11	98	90.8	57 24.5	09	98	89.8	57 27.0	08	98	88.9	57 29.2	07	98	88.0
4	56 22.4	11	98	90.6	56 25.4	09	98	89.7	56 27.9	08	98	88.8	56 30.1	07	98	87.9
35	55 23.3	11	98	90.4	55 26.3	09	98	89.5	55 28.9	08	98	88.6	55 31.1	07	98	87.7
6	54 24.2	10	98	90.2	54 27.2	09	98	89.3	54 29.8	08	98	88.5	54 32.0	07	98	87.6
7	53 25.1	10	98	90.0	53 28.1	09	98	89.2	53 30.7	08	98	88.4	53 33.0	07	98	87.5
8	52 26.1	10	98	89.9	52 29.0	09	98	89.0	52 31.7	08	98	88.2	52 34.0	07	98	87.4
9	51 27.0	11	98	89.7	51 30.0	09	98	88.9	51 32.6	08	98	88.1	51 34.9	07	98	87.3
40	50 27.9	11	98	89.5	50 30.9	09	98	88.7	50 33.6	08	98	88.0	50 35.9	07	98	87.2
1	49 28.8	11	98	89.4	49 31.8	10	98	88.6	49 34.5	09	98	87.8	49 36.9	08	98	87.1
2	48 29.7	11	98	89.2	48 32.7	10	98	88.4	48 35.5	09	98	87.7	48 37.9	08	98	86.9
3	47 30.6	11	98	89.0	47 33.7	10	98	88.3	47 36.4	09	98	87.6	47 38.9	08	98	86.8
4	46 31.5	11	98	88.9	46 34.6	10	98	88.2	46 37.4	09	98	87.4	46 39.9	08	98	86.7
45	45 32.5	11	98	88.7	45 35.6	10	98	88.0	45 38.4	09	98	87.3	45 40.9	08	98	86.6
6	44 33.4	11	98	88.6	44 36.5	10	98	87.9	44 39.4	09	98	87.2	44 41.9	08	98	86.5
7	43 34.3	11	98	88.4	43 37.5	10	98	87.7	43 40.3	09	98	87.1	43 43.0	08	98	86.4
8	42 35.3	11	98	88.3	42 38.4	10	98	87.6	42 41.3	09	98	86.9	42 44.0	09	98	86.3
9	41 36.2	11	98	88.1	41 39.4	10	98	87.5	41 42.3	09	98	86.8	41 45.0	09	98	86.1
50	40 37.2	11	98	88.0	40 40.4	10	98	87.3	40 43.3	10	98	86.7	40 46.1	09	98	86.0
1	39 38.1	11	98	87.9	39 41.3	10	98	87.2	39 44.4	10	98	86.6	39 47.2	09	98	85.9
2	38 39.1	11	98	87.7	38 42.3	11	98	87.1	38 45.4	10	98	86.4	38 48.2	09	98	85.8
3	37 40.0	11	98	87.6	37 43.3	11	98	86.9	37 46.4	10	98	86.3	37 49.3	09	98	85.7
4	36 41.0	11	98	87.4	36 44.3	11	98	86.8	36 47.4	10	98	86.2	36 50.4	09	98	85.6
55	35 42.0	11	98	87.3	35 45.3	11	98	86.7	35 48.5	10	98	86.1	35 51.5	10	98	85.4
6	34 42.9	12	98	87.1	34 46.3	11	98	86.5	34 49.5	10	98	85.9	34 52.6	10	98	85.3
7	33 43.9	12	98	87.0	33 47.4	11	98	86.4	33 50.6	11	98	85.8	33 53.7	10	98	85.2
8	32 44.9	12	98	86.9	32 48.4	11	98	86.3	32 51.7	11	98	85.7	32 54.8	10	98	85.1
9	31 45.9	12	98	86.7	31 49.4	11	98	86.1	31 52.8	11	98	85.6	31 55.9	10	98	85.0
60	30 46.9	12	98	86.6	30 50.5	12	98	86.0	30 53.9	11	98	85.4	30 57.1	10	98	84.9
1	29 48.0	12	98	86.5	29 51.5	12	98	85.9	29 55.0	11	98	85.3	29 58.2	11	98	84.7
2	28 49.0	12	98	86.3	28 52.6	12	98	85.7	28 56.1	11	98	85.2	28 59.4	11	98	84.6
3	27 50.0	12	98	86.2	27 53.7	12	98	85.6	27 57.2	11	98	85.1	28 00.6	11	98	84.5
4	26 51.1	13	98	86.0	26 54.8	12	98	85.5	26 58.3	12	98	84.9	27 01.8	11	98	84.4
65	25 52.1	13	98	85.9	25 55.9	12	98	85.3	25 59.5	12	98	84.8	26 03.0	11	98	84.2
6	24 53.2	13	98	85.8	24 57.0	12	98	85.2	25 00.7	12	98	84.7	25 04.2	12	98	84.1
7	23 54.3	13	98	85.6	23 58.1	13	98	85.1	24 01.8	12	98	84.5	24 05.4	12	98	84.0
8	22 55.4	13	98	85.5	22 59.2	13	98	84.9	23 03.0	12	98	84.4	23 06.7	12	98	83.9
9	21 56.5	13	98	85.3	22 00.4	13	98	84.8	22 04.2	13	98	84.3	22 07.9	12	98	83.7
70	20 57.6	13	98	85.2	21 01.6	13	98	84.7	21 05.4	13	98	84.1	21 09.2	12	98	83.6
1	19 58.7	14	98	85.1	20 02.7	13	98	84.5	20 06.7	13	98	84.0	20 10.5	13	98	83.5
2	18 59.9	14	98	84.9	19 03.9	13	98	84.4	19 07.9	13	98	83.9	19 11.8	13	98	83.3
3	18 01.0	14	98	84.8	18 05.1	14	98	84.2	18 09.2	13	98	83.7	18 13.1	13	98	83.2
4	17 02.2	14	98	84.6	17 06.3	14	98	84.1	17 10.4	14	98	83.6	17 14.4	13	98	83.1
75	16 03.3	14	98	84.5	16 07.6	14	98	84.0	16 11.7	14	98	83.4	16 15.8	13	98	82.9
6	15 04.5	14	98	84.3	15 08.8	14	98	83.8	15 13.0	14	98	83.3	15 17.2	14	98	82.8
7	14 05.8	15	98	84.2	14 10.1	14	98	83.7	14 14.4	14	98	83.2	14 18.6	14	98	82.6
8	13 07.0	15	98	84.0	13 11.4	15	98	83.5	13 15.7	14	98	83.0	13 20.0	14	98	82.5
9	12 08.2	15	98	83.9	12 12.7	15	98	83.4	12 17.1	15	98	82.9	12 21.4	14	98	82.4
80	11 09.5	15	98	83.7	11 14.0	15	98	83.2	11 18.4	15	98	82.7	11 22.8	15	98	82.2
1	10 10.7	15	98	83.6	10 15.3	15	98	83.1	10 19.8	15	98	82.6	10 24.3	15	98	82.1
2	9 12.0	15	98	83.4	9 16.7	15	98	82.9	9 21.2	15	98	82.4	9 25.8	15	97	81.9
3	8 13.3	16	98	83.3	8 18.0	16	98	82.8	8 22.7	15	98	82.3	8 27.3	15	97	81.8
4	7 14.7	16	98	83.1	7 19.4	16	98	82.6	7 24.1	16	98	82.1	7 28.8	16	97	81.6
85	6 16.0	16	98	82.9	6 20.8	16	98	82.4	6 25.6	16	98	82.0	6 30.4	16	97	81.5
6	5 17.4	16	98	82.8	5 22.3	16	98	82.3	5 27.1	16	98	81.8	5 32.0	16	97	81.3

H.A.	10° 00′				10° 30′				11° 00′				11° 30′			
°	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °
00	90 00.0	..	98	.. ..	89 30.0	1.0	60	00.0	89 00.0	1.0	40	00.0	88 30.0	1.0	29	00.0
1	89 00.9	00	98	89.9	88 53.8	45	93	63.0	88 35.8	71	80	44.4	88 12.4	84	68	33.1
2	88 01.8	00	98	89.8	87 58.2	24	96	75.6	87 47.6	45	91	62.9	87 31.7	60	84	52.5
3	87 02.7	00	98	89.7	87 00.4	16	97	80.1	86 53.1	32	94	71.0	86 41.6	45	90	62.8
4	86 03.6	01	98	89.7	86 01.9	12	98	82.4	85 56.5	24	96	75.4	85 47.6	35	93	68.7
05	85 04.6	01	98	89.6	85 03.3	09	98	83.8	84 59.0	19	97	78.1	84 51.8	28	95	72.6
6	84 05.5	01	98	89.5	84 04.5	08	98	84.6	84 01.0	16	97	79.8	83 55.1	24	96	75.2
7	83 06.4	01	98	89.4	83 05.6	06	98	85.2	83 02.7	13	97	81.1	82 57.7	20	96	77.1
8	82 07.3	01	98	89.3	82 06.7	05	98	85.7	82 04.3	11	98	82.0	81 59.9	17	97	78.5
9	81 08.2	01	98	89.2	81 07.8	04	98	86.0	81 05.7	10	98	82.7	81 01.9	15	97	79.6
10	80 09.1	02	98	89.1	80 08.8	04	98	86.2	80 07.0	09	98	83.3	80 03.7	13	97	80.4
1	79 10.1	02	98	89.0	79 09.9	03	98	86.4	79 08.3	07	98	83.7	79 05.4	12	97	81.1
2	78 11.0	02	98	89.0	78 10.9	02	98	86.5	78 09.6	07	98	84.1	78 07.0	11	98	81.7
3	77 11.9	02	98	88.9	77 11.9	02	98	86.6	77 10.8	06	98	84.4	77 08.5	10	98	82.1
4	76 12.8	02	98	88.8	76 12.9	01	98	86.7	76 12.0	05	98	84.6	76 09.9	09	98	82.5
15	75 13.8	02	98	88.7	75 13.9	01	98	86.7	75 13.1	04	98	84.8	75 11.3	08	98	82.8
6	74 14.7	02	98	88.6	74 14.9	01	98	86.8	74 14.3	04	98	84.9	74 12.7	07	98	83.1
7	73 15.6	03	98	88.5	73 16.0	00	98	86.8	73 15.4	03	98	85.0	73 14.0	06	98	83.3
8	72 16.5	03	98	88.4	72 17.0	00	98	86.8	72 16.6	03	98	85.1	72 15.3	05	98	83.5
9	71 17.5	03	98	88.3	71 18.0	00	98	86.8	71 17.7	02	98	85.2	71 16.6	05	98	83.7
20	70 18.4	03	98	88.2	70 19.0	01	98	86.8	70 18.8	02	98	85.3	70 17.9	04	98	83.8
1	69 19.4	03	98	88.2	69 20.0	01	98	86.7	69 19.9	01	98	85.3	69 19.1	04	98	83.9
2	68 20.3	03	98	88.1	68 21.0	01	98	86.7	68 21.0	01	98	85.4	68 20.4	03	98	84.0
3	67 21.2	04	98	88.0	67 22.0	01	98	86.7	67 22.1	01	98	85.4	67 21.6	03	98	84.1
4	66 22.2	04	98	87.9	66 23.0	02	98	86.6	66 23.2	00	98	85.4	66 22.8	02	98	84.1
25	65 23.1	04	98	87.8	65 24.0	02	98	86.6	65 24.3	00	98	85.4	65 24.0	02	98	84.2
6	64 24.1	04	98	87.7	64 25.0	02	98	86.5	64 25.4	00	98	85.4	64 25.3	01	98	84.2
7	63 25.1	04	98	87.6	63 26.1	02	98	86.5	63 26.5	01	98	85.4	63 26.5	01	98	84.3
8	62 26.0	04	98	87.5	62 27.1	03	98	86.4	62 27.6	01	98	85.4	62 27.7	01	98	84.3
9	61 27.0	04	98	87.4	61 28.1	03	98	86.4	61 28.7	01	98	85.3	61 28.9	00	98	84.3
30	60 28.0	05	98	87.3	60 29.1	03	98	86.3	60 29.8	02	98	85.3	60 30.1	00	98	84.3
1	59 29.0	05	98	87.2	59 30.2	03	98	86.3	59 30.9	02	98	85.3	59 31.3	00	98	84.3
2	58 29.9	05	98	87.1	58 31.2	04	98	86.2	58 32.1	02	98	85.2	58 32.5	01	98	84.3
3	57 30.9	05	98	87.1	57 32.3	04	98	86.1	57 33.2	02	98	85.2	57 33.7	01	98	84.3
4	56 31.9	05	98	87.0	56 33.3	04	98	86.1	56 34.3	03	98	85.1	56 34.9	01	98	84.2
35	55 32.9	05	98	86.9	55 34.4	04	98	86.0	55 35.4	03	98	85.1	55 36.1	02	98	84.2
6	54 33.9	06	98	86.8	54 35.4	04	98	85.9	54 36.6	03	98	85.0	54 37.3	02	98	84.2
7	53 34.9	06	98	86.7	53 36.5	05	98	85.8	53 37.7	03	98	85.0	53 38.5	02	98	84.1
8	52 35.9	06	98	86.6	52 37.6	05	98	85.8	52 38.8	04	98	84.9	52 39.8	03	98	84.1
9	51 37.0	06	98	86.5	51 38.6	05	98	85.7	51 40.0	04	98	84.9	51 41.0	03	98	84.1
40	50 38.0	06	98	86.4	50 39.7	05	98	85.6	50 41.1	04	98	84.8	50 42.2	03	98	84.0
1	49 39.0	06	98	86.3	49 40.8	05	98	85.5	49 42.3	04	98	84.7	49 43.5	03	98	84.0
2	48 40.1	07	98	86.2	48 41.9	06	98	85.4	48 43.4	05	98	84.7	48 44.7	04	98	83.9
3	47 41.1	07	98	86.1	47 43.0	06	98	85.3	47 44.6	05	98	84.6	47 45.9	04	98	83.9
4	46 42.2	07	98	86.0	46 44.1	06	98	85.3	46 45.8	05	98	84.5	46 47.2	04	98	83.8
45	45 43.2	07	98	85.9	45 45.2	06	98	85.2	45 47.0	06	98	84.5	45 48.5	04	98	83.7
6	44 44.3	07	98	85.8	44 46.4	06	98	85.1	44 48.2	06	98	84.4	44 49.7	05	98	83.7
7	43 45.4	08	98	85.7	43 47.5	07	98	85.0	43 49.4	06	98	84.3	43 51.0	05	98	83.6
8	42 46.4	08	98	85.6	42 48.6	07	98	84.9	42 50.6	06	98	84.2	42 52.3	05	98	83.5
9	41 47.5	08	98	85.5	41 49.8	07	98	84.8	41 51.8	06	98	84.1	41 53.6	06	98	83.5
50	40 48.6	08	98	85.4	40 50.9	07	98	84.7	40 53.0	07	98	84.1	40 54.9	06	98	83.4
1	39 49.7	08	98	85.3	39 52.1	08	98	84.6	39 54.3	07	98	84.0	39 56.2	06	98	83.3
2	38 50.9	08	98	85.2	38 53.3	08	98	84.5	38 55.5	07	98	83.9	38 57.5	06	98	83.2
3	37 52.0	09	98	85.1	37 54.5	08	98	84.4	37 56.8	07	98	83.8	37 58.8	07	98	83.2
4	36 53.1	09	98	84.9	36 55.7	08	98	84.3	36 58.0	08	98	83.7	37 00.2	07	98	83.1
55	35 54.3	09	98	84.8	35 56.9	08	98	84.2	35 59.3	08	98	83.6	36 01.5	07	98	83.0
6	34 55.4	09	98	84.7	34 58.1	09	98	84.1	35 00.6	08	98	83.5	35 02.9	07	98	82.9
7	33 56.6	09	98	84.6	33 59.3	09	98	84.0	34 01.9	08	98	83.4	34 04.2	08	98	82.8
8	32 57.8	10	98	84.5	33 00.6	09	98	83.9	33 03.2	08	98	83.3	33 05.6	08	98	82.7
9	31 59.0	10	98	84.4	32 01.8	09	98	83.8	32 04.5	09	98	83.2	32 07.0	08	98	82.6
60	31 00.2	10	98	84.3	31 03.1	09	98	83.7	31 05.8	09	98	83.1	31 08.4	08	98	82.5
1	30 01.4	10	98	84.2	30 04.3	10	98	83.6	30 07.2	09	98	83.0	30 09.8	09	98	82.4
2	29 02.6	10	98	84.0	29 05.6	10	98	83.5	29 08.5	09	98	82.9	29 11.3	09	98	82.3
3	28 03.8	11	98	83.9	28 06.9	10	98	83.4	28 09.9	10	98	82.8	28 12.7	09	98	82.2
4	27 05.1	11	98	83.8	27 08.2	10	98	83.2	27 11.3	10	98	82.7	27 14.2	09	98	82.1
65	26 06.3	11	98	83.7	26 09.6	11	98	83.1	26 12.7	10	98	82.6	26 15.7	10	98	82.0
6	25 07.6	11	98	83.6	25 10.9	11	98	83.0	25 14.1	10	98	82.5	25 17.2	10	97	81.9
7	24 08.9	11	98	83.4	24 12.3	11	98	82.9	24 15.5	11	98	82.4	24 18.7	10	97	81.8
8	23 10.2	12	98	83.3	23 13.6	11	98	82.8	23 17.0	11	98	82.2	23 20.2	11	97	81.7
9	22 11.5	12	98	83.2	22 15.0	11	98	82.7	22 18.4	11	98	82.1	22 21.7	11	97	81.6
70	21 12.9	12	98	83.1	21 16.4	12	98	82.5	21 19.9	11	98	82.0	21 23.3	11	97	81.5
1	20 14.2	12	98	82.9	20 17.9	12	98	82.4	20 21.4	12	97	81.9	20 24.9	11	97	81.4
2	19 15.6	13	98	82.8	19 19.3	12	98	82.3	19 22.9	12	97	81.8	19 26.4	12	97	81.2
3	18 17.0	13	98	82.7	18 20.8	12	98	82.2	18 24.5	12	97	81.6	18 28.1	12	97	81.1
4	17 18.4	13	98	82.5	17 22.2	13	98	82.0	17 26.0	12	97	81.5	17 29.7	12	97	81.0
75	16 19.8	13	98	82.4	16 23.7	13	97	81.9	16 27.6	13	97	81.4	16 31.3	12	97	80.9
6	15 21.2	13	98	82.3	15 25.2	13	97	81.8	15 29.2	13	97	81.2	15 33.0	13	97	80.7
7	14 22.7	14	98	82.1	14 26.8	13	97	81.6	14 30.8	13	97	81.1	14 34.7	13	97	80.6
8	13 24.2	14	98	82.0	13 28.3	14	97	81.5	13 32.4	14	97	81.0	13 36.4	13	97	80.5
9	12 25.7	14	97	81.9	12 29.9	14	97	81.3	12 34.1	14	97	80.8	12 38.2	14	97	80.3
80	11 27.2	14	97	81.7	11 31.5	14	97	81.2	11 35.7	14	97	80.7	11 39.9	14	97	80.2
1	10 28.7	15	97	81.6	10 33.1	15	97	81.1	10 37.4	14	97	80.6	10 41.7	14	97	80.1
2	9 30.3	15	97	81.4	9 34.7	15	97	80.9	9 39.2	15	97	80.4	9 43.5	14	97	79.9
3	8 31.9	15	97	81.3	8 36.4	15	97	80.8	8 40.9	15	97	80.3	8 45.4	15	97	79.8
4	7 33.5	15	97	81.1	7 38.1	15	97	80.6	7 42.7	15	97	80.1	7 47.2	15	97	79.6
85	6 35.1	16	97	81.0	6 39.8	16	97	80.5	6 44.5	16	97	80.0	6 49.1	15	97	79.5
6	5 36.8	16	97	80.8	5 41.6	16	97	80.3	5 46.3	16	97	79.8	5 51.0	16	97	79.3

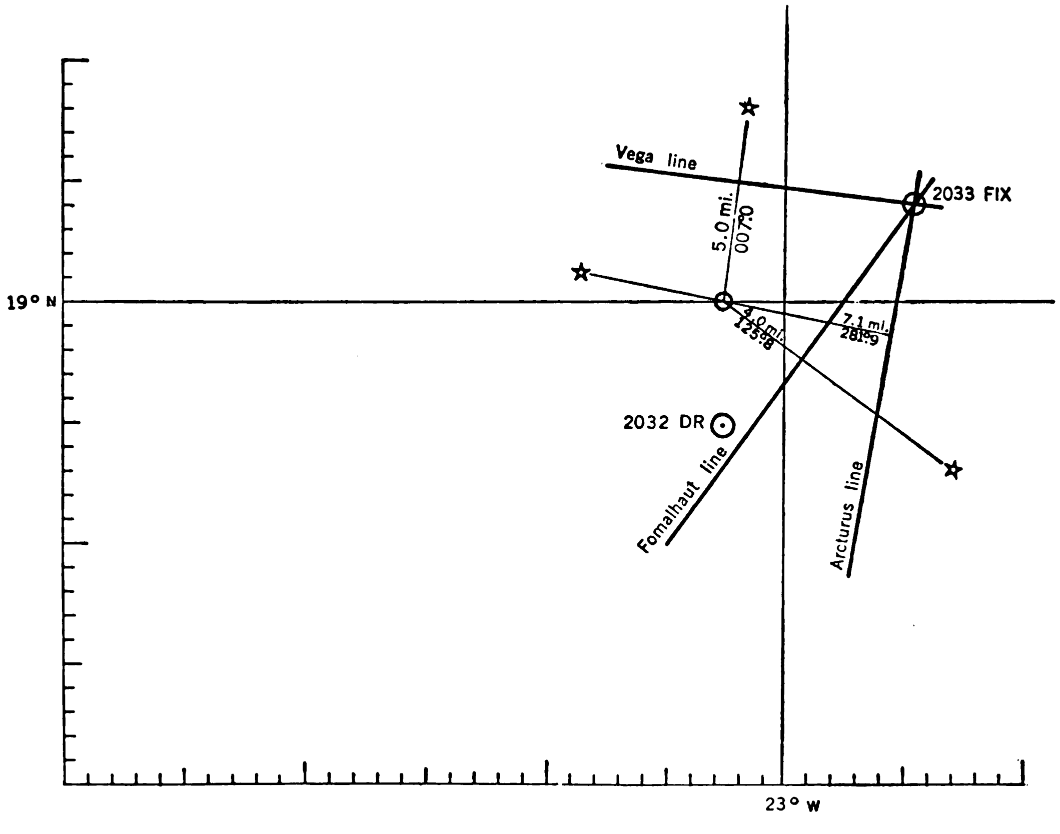
Lat. 10°

H.A.	8° 00′				8° 30′				9° 00′				9° 30′				10° 00′				10° 30′				11° 00′				11° 30′				H.A.
°	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	°
00	72 00.0	1.0	03	180.0	71 30.0	1.0	03	180.0	71 00.0	1.0	03	180.0	70 30.0	1.0	03	180.0	70 00.0	1.0	02	180.0	69 30.0	1.0	02	180.0	69 00.0	1.0	02	180.0	68 30.0	1.0	02	180.0	00
1	71 58.3	1.0	08	176.8	71 28.4	1.0	08	176.9	70 58.4	1.0	08	177.0	70 28.5	1.0	08	177.0	69 58.5	1.0	07	177.1	69 28.6	1.0	07	177.2	68 58.6	1.0	07	177.3	68 28.6	1.0	07	177.3	1
2	71 53.4	99	14	173.6	71 23.6	99	13	173.8	70 53.8	99	13	174.0	70 23.9	99	13	174.1	69 54.1	99	12	174.3	69 24.2	1.0	12	174.4	68 54.4	1.0	12	174.5	68 24.5	1.0	11	174.7	2
3	71 45.2	99	19	170.5	71 15.6	99	18	170.7	70 46.0	99	18	171.0	70 16.4	99	18	171.2	69 46.7	99	17	171.4	69 17.0	99	17	171.6	68 47.4	99	16	171.8	68 17.6	99	16	172.0	3
4	71 33.9	98	24	167.4	71 04.6	98	23	167.7	70 35.2	98	23	168.0	70 05.9	98	22	168.3	69 36.5	98	22	168.6	69 07.0	98	21	168.9	68 37.6	98	21	169.2	68 08.1	98	20	169.4	4
05	71 19.4	96	29	164.4	70 50.5	97	28	164.8	70 21.5	97	28	165.2	69 52.5	97	27	165.5	69 23.4	97	26	165.9	68 54.3	97	26	166.2	68 25.2	97	25	166.5	67 56.0	97	24	166.9	05
6	71 02.1	95	34	161.4	70 33.6	96	33	161.9	70 05.0	95	32	162.4	69 36.4	96	31	162.8	69 07.7	96	31	163.2	68 38.9	96	30	163.6	68 10.1	96	29	164.0	67 41.3	96	29	164.3	6
7	70 41.9	93	38	158.6	70 13.9	93	37	159.1	69 45.8	94	36	159.6	69 17.6	94	36	160.1	68 49.3	94	35	160.6	68 21.0	95	34	161.0	67 52.6	95	33	161.5	67 24.1	95	33	161.9	7
8	70 19.0	91	42	155.8	69 51.5	92	41	156.4	69 23.9	92	40	157.0	68 56.2	92	40	157.5	68 28.5	93	39	158.1	68 00.6	93	38	158.6	67 32.6	93	37	159.0	67 04.6	94	36	159.5	8
9	69 53.6	89	46	153.2	69 26.7	90	45	153.9	68 59.6	90	44	154.5	68 32.5	91	43	155.1	68 05.2	91	42	155.6	67 37.8	91	42	156.2	67 10.4	92	41	156.7	66 42.8	92	40	157.2	9
10	69 25.8	87	50	150.7	68 59.5	88	49	151.4	68 33.0	88	48	152.0	68 06.4	89	47	152.7	67 39.7	89	46	153.3	67 12.9	90	45	153.8	66 45.9	90	44	154.4	66 18.8	90	43	154.9	10
1	68 55.8	85	53	148.3	68 30.1	86	52	149.0	68 04.3	86	51	149.7	67 38.3	87	50	150.4	67 12.1	87	49	151.0	66 45.8	88	48	151.6	66 19.3	88	48	152.2	65 52.8	89	47	152.8	1
2	68 23.7	83	57	146.0	67 58.7	84	56	146.7	67 33.4	84	55	147.5	67 08.0	85	54	148.1	66 42.5	86	53	148.8	66 16.7	86	52	149.5	65 50.8	87	51	150.1	65 24.8	87	50	150.7	2
3	67 49.7	81	60	143.8	67 25.3	82	58	144.6	67 00.7	82	57	145.3	66 35.9	83	56	146.0	66 10.9	84	55	146.7	65 45.8	84	54	147.4	65 20.4	85	54	148.0	64 54.9	85	53	148.7	3
4	67 14.0	79	62	141.8	66 50.2	80	61	142.5	66 26.3	80	60	143.3	66 02.1	81	59	144.0	65 37.7	82	58	144.7	65 13.1	82	57	145.4	64 48.3	83	56	146.1	64 23.4	83	55	146.7	4
15	66 36.6	77	65	139.8	66 13.5	77	64	140.6	65 50.1	78	63	141.4	65 26.6	79	62	142.1	65 02.8	80	61	142.8	64 38.7	80	60	143.5	64 14.5	81	59	144.2	63 50.2	82	58	144.9	15
6	65 57.7	75	67	137.9	65 35.2	75	66	138.7	65 12.5	76	65	139.5	64 49.5	77	64	140.3	64 26.3	78	63	141.0	64 02.9	78	62	141.7	63 39.2	79	61	142.4	63 15.4	80	60	143.1	6
7	65 17.5	72	69	136.2	64 55.6	73	68	137.0	64 33.4	74	67	137.8	64 11.1	75	66	138.5	63 48.4	76	65	139.3	63 25.6	77	64	140.0	63 02.5	77	63	140.7	62 39.2	78	63	141.4	7
8	64 35.9	70	71	134.5	64 14.6	71	70	135.3	63 53.1	72	69	136.1	63 31.3	73	68	136.9	63 09.3	74	67	137.6	62 47.0	75	66	138.4	62 24.5	75	66	139.1	62 01.7	76	65	139.8	8
9	63 53.2	69	73	132.9	63 32.5	69	72	133.7	63 11.5	70	71	134.5	62 50.3	71	70	135.3	62 28.8	72	69	136.1	62 07.1	73	68	136.8	61 45.2	74	67	137.5	61 23.0	74	67	138.2	9
20	63 09.4	67	75	131.4	62 49.3	68	74	132.2	62 28.9	68	73	133.0	62 08.2	69	72	133.8	61 47.3	70	71	134.6	61 26.1	71	70	135.3	61 04.7	72	69	136.0	60 43.0	73	68	136.7	20
1	62 24.6	65	76	130.0	62 05.0	66	75	130.8	61 45.2	67	74	131.6	61 25.0	68	74	132.4	61 04.7	68	73	133.1	60 44.0	69	72	133.9	60 23.1	70	71	134.6	60 02.0	71	70	135.3	1
2	61 38.9	63	78	128.6	61 19.8	64	77	129.4	61 00.5	65	76	130.2	60 40.9	66	75	131.0	60 21.1	67	74	131.8	60 00.9	67	73	132.5	59 40.6	68	72	133.3	59 20.0	69	72	134.0	2
3	60 52.3	61	79	127.4	60 33.8	62	78	128.2	60 15.0	63	77	128.9	59 55.9	64	76	129.7	59 36.6	65	76	130.5	59 16.9	66	75	131.2	58 57.1	67	74	132.0	58 37.0	67	73	132.7	3
4	60 04.9	60	80	126.1	59 46.9	61	79	126.9	59 28.6	61	78	127.7	59 10.0	62	78	128.5	58 51.2	63	77	129.2	58 32.1	64	76	130.0	58 12.7	65	75	130.7	57 53.1	66	74	131.4	4
25	59 16.9	58	81	125.0	58 59.3	59	80	125.8	58 41.5	60	80	126.6	58 23.4	61	79	127.3	58 05.0	62	78	128.1	57 46.4	63	77	128.8	57 27.5	63	77	129.5	57 08.4	64	76	130.2	25
6	58 28.1	56	82	123.9	58 11.1	57	82	124.7	57 53.7	58	81	125.4	57 36.1	59	80	126.2	57 18.2	60	79	126.9	57 00.0	61	78	127.7	56 41.6	62	78	128.4	56 22.9	63	77	129.1	6
7	57 38.8	55	83	122.8	57 22.2	56	82	123.6	57 05.3	57	82	124.4	56 48.1	58	81	125.1	56 30.6	59	80	125.9	56 12.9	59	80	126.6	55 54.9	60	79	127.3	55 36.7	61	78	128.0	7
8	56 48.9	54	84	121.9	56 32.7	54	83	122.6	56 16.2	55	83	123.4	55 59.5	56	82	124.1	55 42.4	57	81	124.9	55 25.2	58	81	125.6	55 07.6	59	80	126.3	54 49.9	60	79	127.0	8
9	55 58.4	52	85	120.9	55 42.6	53	84	121.7	55 26.6	54	84	122.4	55 10.3	55	83	123.2	54 53.7	56	82	123.9	54 36.8	57	82	124.6	54 19.7	57	81	125.3	54 02.4	58	80	126.0	9
30	55 07.5	51	86	120.0	54 52.1	52	85	120.8	54 36.4	53	84	121.5	54 20.5	54	84	122.2	54 04.3	54	83	122.9	53 47.9	55	82	123.7	53 31.2	56	82	124.4	53 14.3	57	81	125.0	30
1	54 16.1	50	86	119.1	54 01.1	50	86	119.9	53 45.8	51	85	120.6	53 30.3	52	84	121.3	53 14.5	53	84	122.1	52 58.5	54	83	122.8	52 42.2	55	83	123.5	52 25.6	56	82	124.1	1
2	53 24.3	48	87	118.3	53 09.7	49	86	119.1	52 54.8	50	86	119.8	52 39.6	51	85	120.5	52 24.2	52	85	121.2	52 08.5	53	84	121.9	51 52.6	53	83	122.6	51 36.5	54	83	123.3	2
3	52 32.1	47	88	117.5	52 17.8	48	87	118.3	52 03.3	49	86	119.0	51 48.5	50	86	119.7	51 33.4	51	85	120.4	51 18.1	51	85	121.1	51 02.6	52	84	121.8	50 46.8	53	84	122.4	3
4	51 39.5	46	88	116.8	51 25.6	47	88	117.5	51 11.4	48	87	118.2	50 56.9	49	86	118.9	50 42.2	49	86	119.6	50 27.3	50	85	120.3	50 12.1	51	85	121.0	49 56.7	52	84	121.6	4
35	50 46.6	45	89	116.1	50 33.0	46	88	116.8	50 19.1	47	88	117.5	50 05.0	47	87	118.2	49 50.7	48	87	118.8	49 36.1	49	86	119.5	49 21.3	50	85	120.2	49 06.2	51	85	120.9	35
6	49 53.4	44	89	115.4	49 40.1	45	89	116.1	49 26.5	46	88	116.8	49 12.8	46	88	117.4	48 58.7	47	87	118.1	48 44.5	48	87	118.8	48 30.0	49	86	119.5	48 15.3	49	86	120.1	6
7	48 59.9	43	90	114.7	48 46.9	44	89	115.4	48 33.6	45	89	116.1	48 20.2	45	88	116.8	48 06.5	46	88	117.4	47 52.5	47	87	118.1	47 38.4	48	87	118.7	47 24.0	48	86	119.4	7
8	48 06.0	42	90	114.1	47 53.3	43	90	114.8	47 40.4	44	89	115.4	47 27.2	44	89	116.1	47 13.9	45	88	116.8	47 00.2	46	88	117.4	46 46.4	47	87	118.1	46 32.3	47	87	118.7	8
9	47 12.0	41	91	113.5	46 59.6	42	90	114.1	46 46.9	43	90	114.8	46 34.0	43	89	115.5	46 20.9	44	89	116.1	46 07.6	45	88	116.8	45 54.1	46	88	117.4	45 40.3	46	87	118.0	9
40	46 17.7	40	91	112.9	46 05.5	41	90	113.6	45 53.1	42	90	114.2	45 40.6	42	90	114.9	45 27.8	43	89	115.5	45 14.7	44	89	116.1	45 01.5	44	88	116.8	44 48.0	45	88	117.4	40
1	45 23.1	39	91	112.3	45 11.2	40	91	113.0	44 59.1	41	90	113.6	44 46.8	41	90	114.3	44 34.3	42	90	114.9	44 21.5	43	89	115.5	44 08.6	44	89	116.2	43 55.4	44	88	116.8	1
2	44 28.3	38	92	111.8	44 16.7	39	91	112.4	44 04.9	40	91	113.1	43 52.8	41	90	113.7	43 40.6	41	90	114.3	43 28.1	42	89	115.0	43 15.4	43	89	115.6	43 02.6	43	89	116.2	2
3	43 33.4	38	92	111.3	43 22.0	38	92	111.9	43 10.4	39	91	112.5	42 58.6	40	91	113.2	42 46.6	40	90	113.8	42 34.4	41	90	114.4	42 22.0	42	89	115.0	42 09.4	42	89	115.6	3
4	42 38.2	37	92	110.8	42 27.1	37	92	111.4	42 15.7	38	91	112.0	42 04.2	39	91	112.6	41 52.4	39	91	113.3	41 40.5	40	90	113.9	41 28.4	41	90	114.5	41 16.0	41	89	115.1	4
45	41 42.9	36	92	110.3	41 32.0	37	92	110.9	41 20.9	37	92	111.5	41 09.6	38	91	112.1	40 58.1	39	91	112.7	40 46.4	39	91	113.4	40 34.5	40	90	114.0	40 22.4	41	90	114.6	45
6	40 47.4	35	93	109.8	40 36.7	36	92	110.4	40 25.8	37	92	111.0	40 14.7	37	92	111.6	40 03.5	38	91	112.2	39 52.0	38	91	112.9	39 40.4	39	90	113.5	39 28.5	40	90	114.0	6
7	39 51.7	35	93	109.4	39 41.2	35	93	110.0	39 30.6	36	92	110.6	39 19.7	36	92	111.2	39 08.7	37	92	111.8	38 57.5	38	91	112.4	38 46.1	38	91	113.0	38 34.5	39	90	113.6	7
8	38 55.9	34	93	108.9	38 45.6	35	93	109.5	38 35.2	35	93	110.1	38 24.5	36	92	110.7	38 13.7	36	92	111.3	38 02.7	37	92	111.9	37 51.6	38	91	112.5	37 40.2	38	91	113.1	8
9	37 59.9	33	94	108.5	37 49.8	34	93	109.1	37 39.6	34	93	109.7	37 29.2	35	93	110.3	37 18.6	36	92	110.9	37 07.8	36	92	111.4	36 56.9	37	91	112.0	36 45.8	37	91	112.6	9
50	37 03.8	33	94	108.1	36 53.9	33	93	108.7	36 43.9	34	93	109.3	36 33.7	34	93	109.8	36 23.3	35	92	110.4	36 12.7	35	92	111.0	36 02.0	36	92	111.6	35 51.1	37	91	112.2	50
1	36 07.6	32	94	107.7	35 57.9	33	94	108.3	35 48.0	33	93	108.8	35 38.0	34	93	109.4	35 27.8	34	93	110.0	35 17.5	35	92	110.6	35 07.0	35	92	111.2	34 56.3	36	92	111.7	1
2	35 11.2	31	94	107.3	35 01.7	32	94	107.9	34 52.0	32	94	108.4	34 42.2	33	93	109.0	34 32.2	34	93	109.6	34 22.1	34	93	110.2	34 11.8	35	92	110.7	34 01.3	35	92	111.3	2
3	34 14.7	31	94	106.9	34 05.4	31	94	107.5	33 55.9	32	94	108.1	33 46.3	32	93	108.6	33 36.5	33	93	109.2	33 26.6	33	93	109.8	33 16.5	34	92	110.3	33 06.2	34	92	110.9	3
4	33 18.1	30	94	106.6	33 09.0	31	94	107.1	32 59.7	31	94	107.7	32 50.2	32	94	108.3	32 40.6	32	93	108.8	32 30.9	33	93	109.4	32 21.0	33	93	109.9	32 10.9	34	92	110.5	4
55	32 21.4	30	95	106.2	32 12.5	30	94	106.8	32 03.3	31	94	107.3	31 54.1	31	94	107.9	31 44.6	32	94	108.4	31 35.1	32	93	109.0	31 25.4	33	93	109.6	31 15.5	33	93	110.1	55
6	31 24.7	29	95	105.9	31 15.8	30	95	106.4	31 06.9	30	94	107.0	30 57.8	31	94	107.5	30 48.5	31	94	108.1	30 39.2	32	93	108.6	30 29.6	32	93	109.2	30 20.0	32	93	109.7	6
7	30 27.8	29	95	105.5	30 19.1	29	95	106.1	30 10.3	30	94	106.6	30 01.4	30	94	107.2	29 52.3	30	94	107.7	29 43.1	31	94	108.3	29 33.8	31	93	108.8	29 24.3	32	93	109.4	7
8	29 30.8	28	95	105.2	29 22.3	29	95	105.8	29 13.7	29	95	106.3	29 04.9	29	94	106.8	28 56.0	30	94	107.4	28 46.9	30	94	107.9	28 37.8	31	94	108.5	28 28.5	31	93	109.0	8
9	28 33.7	28	95	104.9	28 25.4	28	95	105.4	28 16.9	28	95	106.0	28 08.3	29	94	106.5	27 59.5	29	94	107.1	27 50.7	30	94	107.6	27 41.7	30	94	108.1	27 32.6	31	93	108.7	9
60	27 36.6	27	95	104.6	27 28.4	28	95	105.1	27 20.0	28	95	105.7	27 11.6	28	95	106.2	27 03.0	29	94	106.7	26 54.3	29	94	107.3	26 45.5	30	94	107.8	26 36.5	30	94	108.3	60
1	26 39.4	27	96	104.3	26 31.3	27	95	104.8	26 23.1	27	95	105.4	26 14.8	28	95	105.9	26 06.4	28	95	106.4	25 57.8	29	94	107.0	25 49.2	29	94	107.5	25 40.4	29	94	108.0	1
2	25 42.1	26	96	104.0	25 34.1	27	95	104.5	25 26.1	27	95	105.1	25 17.9	27	95	105.6	25 09.7	28	95	106.1	25 01.3	28	94	106.6	24 52.8	29	94	107.2	24 44.2	29	94	107.7	2
3	24 44.7	26	96	103.7	24 36.9	26	96	104.2	24 29.0	27	95	104.8	24 21.0	27	95	105.3	24 12.8	27	95	105.8	24 04.6	28	95	106.3	23 56.3	28	94	106.9	23 47.8	28	94	107.4	3
4	23 47.2	25	96	103.4	23 39.6	26	96	104.0	23 31.8	26	95	104.5	23 23.9	26	95	105.0	23 16.0	27	95	105.5	23 07.9	27	95	106.1	22 59.7	27	94	106.6	22 51.4	28	94	107.1	4
65	22 49.7	25	96	103.2	22 42.2	25	96	103.7	22 34.6	26	96	104.2	22 26.8	26	95	104.7	22 19.0	26	95	105.2	22 11.0	27	95	105.8	22 03.0	27	95	106.3	21 54.9	27	94	106.8	65
6	21 52.2	25	96	102.9	21 44.8	25	96	103.4	21 37.2	25	96	103.9	21 29.6	26	95	104.5	21 21.9	26	95	105.0	21 14.1	26	95	105.5	21 06.2	26	95	106.0	20 58.3	27	94	106.5	6
7	20 54.5	24	96	102.6	20 47.2	24	96	103.1	20 39.9	25	96	103.7	20 32.4	25	96	104.2	20 24.8	25	95	104.7	20 17.2	26	95	105.2	20 09.4	26	95	105.7	20 01.6	26	95	106.2	7
8	19 56.8	24	96	102.4	19 49.7	24	96	102.9	19 42.4	24	96	103.4	19 35.1	25	96	103.9	19 27.6	25	95	104.4	19 20.1	25	95	104.9	19 12.5	26	95	105.5	19 04.8	26	95	106.0	8
9	18 59.1	23	96	102.1	18 52.0	24	96	102.6	18 44.9	24	96	103.2	18 37.7	24	96	103.7	18 30.4	24	96	104.2	18 23.0	25	95	104.7	18 15.5	25	95	105.2	18 08.0	25	95	105.7	9
70	18 01.3	23	96	101.9	17 54.4	23	96	102.4	17 47.3	24	96	102.9	17 40.2	24	96	103.4	17 33.1	24	96	103.9	17 25.8	24	95	104.4	17 18.5	25	95	104.9	17 11.0	25	95	105.5	70
1	17 03.5	23	96	101.6	16 56.6	23	96	102.2	16 49.7	23	96	102.7	16 42.7	23	96	103.2	16 35.7	24	96	103.7	16 28.5	24	96	104.2	16 21.3	24	95	104.7	16 14.1	24	95	105.2	1
2	16 05.6	22	97	101.4	15 58.8	23	96	101.9	15 52.0	23	96	102.4	15 45.2	23	96	102.9	15 38.2	23	96	103.4	15 31.2	23	96	103.9	15 24.1	24	95	104.5	15 17.0	24	95	105.0	2
3	15 07.6	22	97	101.2	15 01.0	22	96	101.7	14 54.3	22	96	102.2	14 47.6	23	96	102.7	14 40.7	23	96	103.2	14 33.8	23	96	103.7	14 26.9	23	96	104.2	14 19.9	23	95	104.7	3
4	14 09.6	22	97	101.0	14 03.1	22	97	101.5	13 56.5	22	96	102.0	13 49.9	22	96	102.5	13 43.2	22	96	103.0	13 36.4	23	96	103.5	13 29.6	23	96	104.0	13 22.7	23	95	104.5	4
75	13 11.6	21	97	100.7	13 05.2	22	97	101.2	12 58.7	22	96	101.8	12 52.2	22	96	102.3	12 45.6	22	96	102.8	12 38.9	22	96	103.3	12 32.2	22	96	103.8	12 25.5	23	96	104.2	75
6	12 13.5	21	97	100.5	12 07.2	21	97	101.0	12 00.8	21	97	101.5	11 54.4	22	96	102.0	11 47.9	22	96	102.5	11 41.4	22	96	103.0	11 34.8	22	96	103.5	11 28.2	22	96	104.0	6
7	11 15.4	21	97	100.3	11 09.2	21	97	100.8	11 02.9	21	97	101.3	10 56.6	21	96	101.8	10 50.2	21	96	102.3	10 43.8	21	96	102.8	10 37.3	22	96	103.3	10 30.8	22	96	103.8	7
8	10 17.3	20	97	100.1	10 11.1	21	97	100.6	10 05.0	21	97	101.1	9 58.7	21	96	101.6	9 52.5	21	96	102.1	9 46.2	21	96	102.6	9 39.8	21	96	103.1	9 33.4	21	96	103.6	8
9	9 19.1	20	97	99.9	9 13.0	20	97	100.4	9 07.0	20	97	100.9	9 00.8	20	97	101.4	8 54.7	21	96	101.9	8 48.5	21	96	102.4	8 42.2	21	96	102.9	8 35.9	21	96	103.4	9
80	8 20.9	20	97	99.7	8 14.9	20	97	100.2	8 08.9	20	97	100.7	8 02.9	20	97	101.2	7 56.8	20	96	101.7	7 50.7	20	96	102.2	7 44.6	20	96	102.7	7 38.4	21	96	103.2	80
1	7 22.6	20	97	99.5	7 16.7	20	97	100.0	7 10.8	20	97	100.5	7 04.9	20	97	101.0	6 58.9	20	97	101.5	6 52.9	20	96	102.0	6 46.9	20	96	102.5	6 40.9	20	96	103.0	1
2	6 24.3	19	97	99.3	6 18.5	19	97	99.8	6 12.7	19	97	100.3	6 06.9	20	97	100.8	6 01.0	20	97	101.3	5 55.1	20	96	101.8	5 49.2	20	96	102.3	5 43.3	20	96	102.8	2
3	5 26.0	19	97	99.1	5 20.3	19	97	99.6	5 14.6	19	97	100.1	5 08.8	19	97	100.6	5 03.1	19	97	101.1													3

Example 4.—On September 12, 1951, the GMT 2032 dead reckoning position of a ship is lat. 18° 55'.0 N, long. 23° 02'.6 W. Nearly simultaneous observations are made, as follows:

Stars	*GMT*	*Declination*	*Obs. Alt. (Ho)*
Fomalhaut	20ʰ 32ᵐ 15ˢ	29° 52'.6 S	8° 38'.0
Arcturus	20ʰ 33ᵐ 00ˢ	19° 26'.1 N	30° 51'.6
Vega	20ʰ 33ᵐ 17ˢ	38° 44'.4 N	70° 14'.1

		FOMALHAUT			**ARCTURUS**			**VEGA**	
GMT		20ʰ 32ᵐ 15ˢ			20ʰ 33ᵐ 00ˢ			20ʰ 33ᵐ 17ˢ	
GHA♈ for 20ʰ GMT		291° 00'.9			291° 00'.9			291° 00'.9	
Correction for 32ᵐ 15ˢ		8° 05'.1		(33ᵐ 00ˢ)	8° 16'.4		(33ᵐ 17ˢ)	8° 20'.6	
SHA		16° 14'.7			146° 38'.3			81° 10'.3	
GHA☆		315° 20'.7			85° 55'.6			20° 31'.8	
aλ		23° 02'.6 W			23° 02'.6 W			23° 02'.6 W	
LHA		292° 18'.1			62° 53'.0			357° 29'.2	
t (H.A.)		67° 41'.9 E	t diff. 18'.1		62° 53'.0 W	t diff. 7'.0		2° 30'.8 E	t diff. 29'.2
d		29° 52'.6 S	d diff. 7'.4		19° 26'.1 N	d diff. 3'.9		38° 44'.4 N	d diff. 14'.4
aL		19° 00'.0 N			19° 00'.0 N			19° 00'.0 N	
Δd and correction	(+) 0.46	(+) 3'.4		(—) 0.19	(—) 0'.8		(—) 0.99	(—) 14'.3	
Δt and correction	(+) 0.77	(+) 14'.0		(+) 0.92	(+) 6'.4		(+) 0.13	(+) 3'.8	
ht (Alt.)		8° 16'.6			30° 53'.1			70° 19'.6	
Hc		8° 34'.0			30° 58'.7			70° 09'.1	
Ho		8° 38'.0			30° 51'.6			70° 14'.1	
a		4.0 miles toward			7.1 miles away			5.0 miles toward	
Z (Az.) and Zn	N 125°.8 E	125°.8		N 78°.1 W	281°.9		N 7°.0 E	007°.0	



Note.—All three sights are plotted from lat. 19° 00'.0 N, long. 23° 02'.6 W.

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

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

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

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

Azimuth angle greater than 90°:

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

Azimuth angle less than 90°:

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

Example 5.—On November 20, 1951, the 1740 dead reckoning position of a ship is lat. 14° 10′.5 N, long. 160° 15′.0 E. About this time the navigator observes the star Nunki, as follows: watch time (W) 5^h 40^m 20^s PM, watch error (WE) on zone time 8^s slow, height of eye 26 feet, index correction (IC) (—) 1′.0, sextant altitude (hs) 36° 54′.3. Solve the observation for altitude difference (a) and azimuth (Zn), using Δd, Δt, and ΔL.

	November 20, 1951	
W	5^h 40^m 20^s PM	
WE	(S) 8^s	
ZT	17^h 40^m 28^s	
ZD	(—) 11^h	
GMT	6^h 40^m 28^s Nov. 20	
GHA♈ for 6^h GMT	148° 26′.9	
Correction for 40^m 28^s	10° 08′.7	
SHA	76° 55′.9	
GHA☆	235° 31′.5	
aλ	160° 15′.0 E	
LHA	35° 46′.5	
t (H.A.)	35° 46′.5 W	t diff. 13′.5
d	26° 21′.7 S	d diff. 8′.3
aL	14° 10′.5 N	L diff. 10′.5
ht (Alt.)	36° 28′.9	Δd (+) 0.70; Δt (+) 0.64
Correction	(+) 6′.5	
Hc	36° 35′.4	
Ho	36° 47′.2	
a	11.8 miles toward	
Z (Az.) and Zn N 139°.1 W	220°.9	

	+	☆	—
IC			1′.0
Correction			1′.3
Dip			4′.8
Sum	0′.0		7′.1
Correction			(—) 7′.1
hs			36° 54′.3
Ho			36° 47′.2

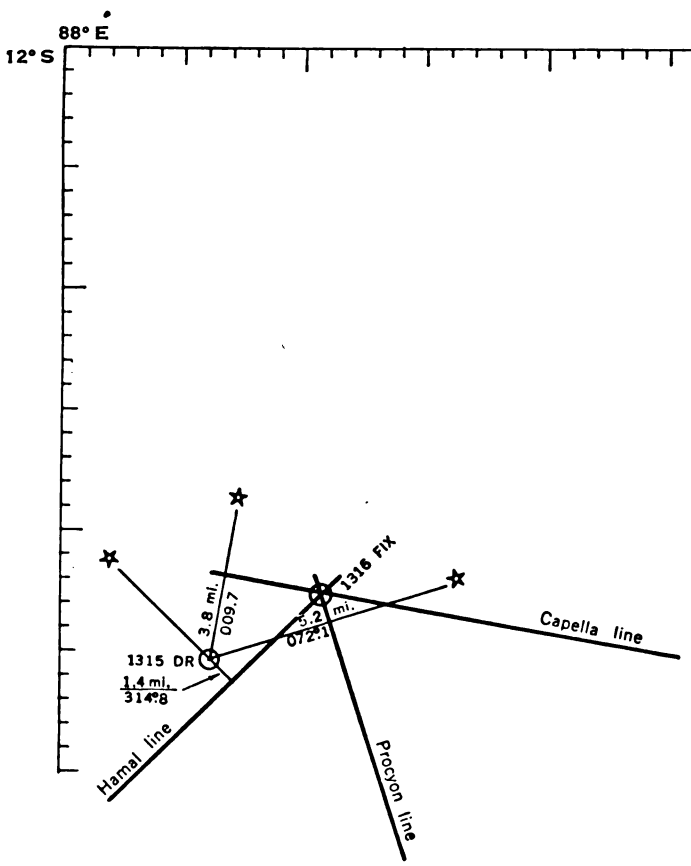
	+	—
t correction	8′.6	
d correction	5′.8	
L correction		7′.9
Sum	14′.4	7′.9
Correction		(+) 6′.5

NOTE.—The sight is plotted from the dead reckoning position.

Example 6.—On February 10, 1951, the GMT 1315 dead reckoning position of a ship is lat. 12° 25′.0 S, long. 88° 06′.1 E. Nearly simultaneous observations are made, as follows:

Stars	*GMT*	*Declination*	*Obs. Alt. (Ho)*
Capella	$13^{h}\ 15^{m}\ 10^{s}$	45° 57′.3 N	30° 46′.3
Procyon	$13^{h}\ 15^{m}\ 41^{s}$	5° 21′.1 N	39° 46′.4
Hamal	$13^{h}\ 16^{m}\ 25^{s}$	23° 14′.1 N	39° 55′.0

		CAPELLA		PROCYON		HAMAL
GMT		$13^{h}\ 15^{m}\ 10^{s}$		$13^{h}\ 15^{m}\ 41^{s}$		$13^{h}\ 16^{m}\ 25^{s}$
GHA ♈ for 13^{h} GMT		334° 47′.9		334° 47′.9		334° 47′.9
Correction for $15^{m}\ 10^{s}$		3° 48′.1	($15^{m}\ 41^{s}$)	3° 55′.9	($16^{m}\ 25^{s}$)	4° 06′.9
SHA		281° 43′.6		245° 48′.5		328° 53′.9
GHA☆		260° 19′.6		224° 32′.3		307° 48′.7
aλ		88° 06′.1 E		88° 06′.1 E		88° 06′.1 E
LHA		348° 25′.7		312° 38′.4		35° 54′.8
t (H.A.)		11° 34′.3 E t diff. 25′.7		47° 21′.6 E t diff. 21′.6		35° 54′.8 W t diff. 5′.2
d		45° 57′.3 N d diff. 2′.7		5° 21′.1 N d diff. 8′.9		23° 14′.1 N d diff. 14′.1
aL		12° 25′.0 S L diff. 25′.0		12° 25′.0 S L diff. 25′.0		12° 25′.0 S L diff. 25′.0
Δd and correction	(+) 0.97	(+) 2′.6	(+) 0.35	(+) 3′.1	(−) 0.66	(−) 9′.3
Δt and correction	(+) 0.17	(+) 4′.4	(−) 0.93	(−) 20′.1	(+) 0.70	(+) 3′.6
ΔL correction		(−) 24′.6		(−) 7′.7		(−) 17′.7
ht (Alt.)		31° 00′.1		40° 05′.9		40° 19′.8
Hc		30° 42′.5		39° 41′.2		39° 56′.4
Ho		30° 46′.3		39° 46′.4		39° 55′.0
a		3.8 miles toward		5.2 miles toward		1.4 miles away
Z (Az.) and Zn	S 170°.3 E	009°.7	S 107°.9 E	072°.1	S 134°.8 W	314°.8



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

STAR IDENTIFICATION

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

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

Example 7.—On April 18, 1951, the GMT 0650 dead reckoning position of a ship is lat. 10° 15′.5 S, long. 175° 12′.0 E. About this time the navigator observes a star through a break in the clouds, as follows: sextant altitude (hs) 42° 51′.1, azimuth (Zn) 182°. Identify the star.

SOLUTION

Enter the star identification table for latitude 10° with the approximate arguments Alt. 43° and Az. 2° (Zn 182°=S2° W in south latitude) and find approximate

Dec. 57° S, t (H. A.) 2° W

t (H. A.)	2° W
LHA☆	178°
Longitude	175° E
GHA☆	3°
GHA ♈	308°
SHA	55°

GMT	6h 50m
GHA ♈ for 6h	295° 32′.9
Correction for 50m	12° 32′.1
GHA ♈	308° 05′.0

Enter the *Nautical Almanac* star list with the approximate sidereal hour angle (SHA) 55° and declination 57° S and identify the star as Peacock.

GREAT-CIRCLE SAILING

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

Example 8.—Find the great-circle distance and the initial course between Bluefields Bluff, Nicaragua, and Bear Island.

Departure	*Destination*
Lat. (L_1) 12° 00′.0 N	Lat. (L_2) 74° 29′.8 N
Long. (λ_1) 83° 41′.0 W	Long. (λ_2) 19° 12′.5 E

SOLUTION

Enter the tables with the nearest tabulated value to L_1 as latitude, L_2 as declination, and DLO ($\lambda_2-\lambda_1$=19° 12′.5—(—83° 41′)=102° 53′.5) as meridian angle (H. A.).

			Alt.	*Δd*	*Δt*	*Az.*
			8° 08′.2	(−) 0.27	(+) 0.26	N 15°.2 E
Δd correction for 0′.2	(−) 0′.1					
Δt correction for 6′.5	(+) 1′.7					
ΔL correction for 0′.0	0′.0					
	(+) 1′.6		(+) 1′.6			
		Hc	8° 09′.8			
		Subtract from	90°			
Zenith distance (great-circle distance)			81° 50′.2=4910.2 nautical miles			
Great-circle course (N 15°.2 E)			015°.2			

If the combination of latitude of departure, latitude of destination, and difference of longitude cannot be found in the table, the name of the latitude of destination is reversed and the supplement of the difference of longitude is used for entering the table. The distance is found by *adding* the altitude to 90°; the great-circle course angle is the supplement of the azimuth angle. In the example, if the latitude of the destination is 74° 29′.8 S, the name is changed to N and the supplement of the difference of longitude is found (180°—102° 53′.5=77° 06′.5). Enter the table with lat. 12°, dec. 74° 30′ (same name as latitude), and H. A. 77°.

			Alt.	*Δd*	*Δt*	*Az.*
			15° 01′.2	(+) 0.16	(−) 0.26	15°.6
Δd correction for 0′.2	0′.0					
Δt correction for 6′.5	(−) 1′.7					
ΔL correction for 0′.0	0′.0					
	(−) 1′.7		(−) 1′.7			
		Hc	14° 59′.5			
		Add to	90°			
Zenith distance (great-circle distance)			104° 59′.5=6299.5 nautical miles			
Great-circle course (180°—15°.6=N 164°.4 E)			164°.4			

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

H.A.	0° 00′				0° 30′				1° 00′				1° 30′				2° 00′				2° 30′				3° 00′				3° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	80 00.0	1.0	05	180.0	80 30.0	1.0	05	180.0	81 00.0	1.0	05	180.0	81 30.0	1.0	06	180.0	82 00.0	1.0	06	180.0	82 30.0	1.0	07	180.0	83 00.0	1.0	07	180.0	83 30.0	1.0	08	180.0	00
1	79 57.0	1.0	15	174.3	80 26.9	99	15	174.0	80 56.7	99	16	173.6	81 26.5	99	17	173.3	81 56.3	99	18	172.9	82 26.1	99	19	172.4	82 55.8	99	21	171.9	83 25.5	99	22	171.2	1
2	79 48.2	98	24	168.6	80 17.6	98	25	168.1	80 47.0	98	26	167.4	81 16.2	97	28	166.7	81 45.4	97	29	165.9	82 14.5	97	31	165.0	82 43.4	96	33	164.0	83 12.2	96	35	162.9	2
3	79 33.8	96	33	163.2	80 02.5	95	34	162.4	80 31.1	95	36	161.5	80 59.5	94	38	160.5	81 27.8	94	40	159.4	81 55.8	93	42	158.1	82 23.6	92	44	156.7	82 51.0	91	47	155.2	3
4	79 14.2	93	41	158.1	79 42.0	92	42	157.0	80 09.6	92	44	155.9	80 37.0	91	46	154.7	81 04.0	90	48	153.3	81 30.8	89	51	151.8	81 57.1	87	53	150.2	82 23.0	86	56	148.3	4
05	78 49.9	90	48	153.3	79 16.6	89	50	152.1	79 43.1	88	52	150.8	80 09.2	86	54	149.4	80 35.0	85	56	147.8	81 00.3	84	58	146.2	81 25.1	82	61	144.3	81 49.3	80	64	142.3	05
6	78 21.2	86	54	148.8	78 46.9	85	56	147.5	79 12.1	84	58	146.1	79 37.0	82	60	144.6	80 01.4	80	62	142.9	80 25.2	79	65	141.1	80 48.5	76	67	139.2	81 11.1	74	70	137.1	6
7	77 48.8	82	59	144.7	78 13.3	81	61	143.3	78 37.4	79	63	141.9	79 00.9	78	66	140.3	79 23.9	76	68	138.5	79 46.4	74	70	136.7	80 08.1	71	72	134.7	80 29.2	69	75	132.6	7
8	77 13.2	78	64	141.0	77 36.5	77	66	139.6	77 59.3	75	68	138.0	78 21.6	73	70	136.4	78 43.3	71	72	134.7	79 04.4	69	74	132.8	79 24.7	67	76	130.9	79 44.3	64	79	128.8	8
9	76 34.6	75	68	137.6	76 56.8	73	70	136.2	77 18.5	71	72	134.6	77 39.6	69	74	133.0	78 00.1	67	76	131.2	78 19.8	65	78	129.4	78 38.9	62	80	127.5	78 57.2	59	82	125.4	9
10	75 53.6	71	72	134.6	76 14.7	69	74	133.1	76 35.3	68	75	131.5	76 55.3	65	77	129.9	77 14.6	63	79	128.2	77 33.2	61	81	126.4	77 51.1	58	82	124.5	78 08.2	56	84	122.5	10
1	75 10.5	68	75	131.8	75 30.6	66	76	130.3	75 50.1	64	78	128.8	76 09.0	62	80	127.2	76 27.3	60	81	125.5	76 44.8	57	83	123.7	77 01.6	55	85	121.9	77 17.6	52	86	120.0	1
2	74 25.6	65	78	129.2	74 44.7	63	79	127.8	75 03.3	61	81	126.3	75 21.2	59	82	124.7	75 38.5	56	84	123.1	75 55.0	54	85	121.4	76 10.9	51	86	119.6	76 25.9	49	88	117.8	2
3	73 39.1	62	80	126.9	73 57.3	60	81	125.5	74 15.0	58	83	124.0	74 32.0	56	84	122.5	74 48.3	53	85	120.9	75 04.0	51	87	119.3	75 19.0	49	88	117.6	75 33.2	46	89	115.8	3
4	72 51.2	59	82	124.9	73 08.6	57	83	123.5	73 25.4	55	84	122.0	73 41.6	53	86	120.5	73 57.2	51	87	119.0	74 12.0	48	88	117.4	74 26.2	46	89	115.8	74 39.6	43	90	114.1	4
15	72 02.2	56	83	122.9	72 18.8	54	85	121.6	72 34.8	52	86	120.2	72 50.2	50	87	118.7	73 05.0	48	88	117.3	73 19.2	46	89	115.7	73 32.6	44	90	114.2	73 45.3	41	91	112.6	15
6	71 12.1	54	85	121.2	71 28.0	52	86	119.9	71 43.3	50	87	118.5	71 58.0	48	88	117.1	72 12.1	46	89	115.7	72 25.6	44	90	114.2	72 38.4	42	91	112.7	72 50.5	39	92	111.2	6
7	70 21.1	52	86	119.6	70 36.3	50	87	118.3	70 51.0	48	88	117.0	71 05.1	46	89	115.6	71 18.6	44	90	114.2	71 31.4	42	91	112.8	71 43.6	40	92	111.4	71 55.2	37	93	109.9	7
8	69 29.4	50	87	118.1	69 44.0	48	88	116.9	69 58.0	46	89	115.6	70 11.5	44	90	114.3	70 24.4	42	91	112.9	70 36.7	40	92	111.6	70 48.4	38	93	110.2	70 59.4	36	94	108.8	8
9	68 36.9	48	88	116.8	68 51.0	46	89	115.5	69 04.4	44	90	114.3	69 17.4	42	91	113.0	69 29.8	40	92	111.7	69 41.5	38	93	110.4	69 52.7	36	93	109.1	70 03.3	34	94	107.7	9
20	67 43.9	46	89	115.5	67 57.4	44	90	114.3	68 10.3	42	91	113.1	68 22.8	41	92	111.9	68 34.7	39	92	110.6	68 46.0	37	93	109.4	68 56.7	35	94	108.1	69 06.8	33	94	106.8	20
1	66 50.3	44	90	114.3	67 03.3	42	91	113.2	67 15.8	41	92	112.0	67 27.7	39	92	110.8	67 39.2	37	93	109.6	67 50.1	35	94	108.4	68 00.4	33	94	107.1	68 10.1	32	95	105.9	1
2	65 56.2	43	91	113.3	66 08.8	41	92	112.1	66 20.8	39	92	111.0	66 32.3	38	93	109.8	66 43.4	36	94	108.7	66 53.8	34	94	107.5	67 03.8	32	95	106.3	67 13.2	30	95	105.1	2
3	65 01.7	41	91	112.2	65 13.8	40	92	111.2	65 25.5	38	93	110.1	65 36.6	36	93	108.9	65 47.2	35	94	107.8	65 57.4	33	95	106.6	66 07.0	31	95	105.5	66 16.0	29	96	104.3	3
4	64 06.9	40	92	111.3	64 18.6	38	93	110.2	64 29.8	37	93	109.2	64 40.6	35	94	108.1	64 50.8	33	94	107.0	65 00.6	32	95	105.9	65 09.9	30	95	104.7	65 18.7	28	96	103.6	4
25	63 11.6	39	93	110.4	63 23.0	37	93	109.4	63 33.9	36	94	108.4	63 44.3	34	94	107.3	63 54.2	32	95	106.2	64 03.7	31	95	105.1	64 12.7	29	96	104.1	64 21.2	27	96	102.9	25
6	62 16.1	37	93	109.6	62 27.1	36	94	108.6	62 37.6	34	94	107.6	62 47.7	33	95	106.6	62 57.4	31	95	105.5	63 06.6	30	96	104.5	63 15.3	28	96	103.4	63 23.5	27	96	102.3	6
7	61 20.3	36	93	108.8	61 31.0	35	94	107.8	61 41.2	33	94	106.9	61 51.0	32	95	105.9	62 00.4	30	95	104.8	62 09.3	29	96	103.8	62 17.7	27	96	102.8	62 25.7	26	96	101.8	7
8	60 24.3	35	94	108.1	60 34.6	34	94	107.1	60 44.5	32	95	106.2	60 54.1	31	95	105.2	61 03.2	30	96	104.2	61 11.8	28	96	103.2	61 20.0	27	96	102.2	61 27.8	25	97	101.2	8
9	59 28.0	34	94	107.4	59 38.0	33	95	106.5	59 47.7	32	95	105.5	59 57.0	30	95	104.6	60 05.8	29	96	103.6	60 14.2	27	96	102.7	60 22.2	26	97	101.7	60 29.8	25	97	100.7	9
30	58 31.5	33	94	106.7	58 41.3	32	95	105.8	58 50.7	31	95	104.9	58 59.7	29	96	104.0	59 08.3	28	96	103.1	59 16.5	27	96	102.1	59 24.3	25	97	101.2	59 31.7	24	97	100.2	30
1	57 34.8	32	95	106.1	57 44.4	31	95	105.2	57 53.5	30	96	104.3	58 02.3	29	96	103.4	58 10.7	27	96	102.5	58 18.7	26	97	101.6	58 26.3	25	97	100.7	58 33.5	23	97	99.8	1
2	56 38.0	32	95	105.5	56 47.3	30	95	104.7	56 56.2	29	96	103.8	57 04.8	28	96	102.9	57 12.9	27	96	102.0	57 20.8	25	97	101.1	57 28.2	24	97	100.2	57 35.2	23	97	99.3	2
3	55 41.0	31	95	105.0	55 50.0	30	96	104.1	55 58.7	28	96	103.3	56 07.1	27	96	102.4	56 15.1	26	97	101.5	56 22.7	25	97	100.7	56 30.0	24	97	99.8	56 36.9	22	97	98.9	3
4	54 43.8	30	95	104.4	54 52.7	29	96	103.6	55 01.2	28	96	102.8	55 09.3	27	96	101.9	55 17.2	25	97	101.1	55 24.6	24	97	100.2	55 31.7	23	97	99.4	55 38.5	22	97	98.5	4
35	53 46.5	29	96	103.9	53 55.2	28	96	103.1	54 03.5	27	96	102.3	54 11.5	26	97	101.5	54 19.1	25	97	100.6	54 26.4	24	97	99.8	54 33.4	23	97	99.0	54 40.0	21	98	98.1	35
6	52 49.1	29	96	103.4	52 57.6	28	96	102.6	53 05.7	27	96	101.8	53 13.5	26	97	101.0	53 21.0	24	97	100.2	53 28.2	23	97	99.4	53 35.0	22	97	98.6	53 41.5	21	98	97.8	6
7	51 51.6	28	96	103.0	51 59.9	27	96	102.2	52 07.8	26	97	101.4	52 15.5	25	97	100.6	52 22.8	24	97	99.8	52 29.9	23	97	99.0	52 36.6	22	98	98.2	52 42.9	21	98	97.4	7
8	50 54.0	28	96	102.5	51 02.1	27	96	101.8	51 09.9	26	97	101.0	51 17.4	25	97	100.2	51 24.6	23	97	99.4	51 31.5	22	97	98.7	51 38.0	21	98	97.9	51 44.3	20	98	97.1	8
9	49 56.2	27	96	102.1	50 04.2	26	97	101.4	50 11.8	25	97	100.6	50 19.2	24	97	99.8	50 26.3	23	97	99.1	50 33.0	22	98	98.3	50 39.5	21	98	97.5	50 45.7	20	98	96.8	9
40	48 58.4	26	96	101.7	49 06.2	26	97	101.0	49 13.7	25	97	100.2	49 20.9	24	97	99.5	49 27.9	23	97	98.7	49 34.5	22	98	98.0	49 40.9	21	98	97.2	49 47.0	20	98	96.5	40
1	48 00.5	26	97	101.3	48 08.2	25	97	100.6	48 15.5	24	97	99.8	48 22.6	23	97	99.1	48 29.5	22	97	98.4	48 36.0	21	98	97.6	48 42.3	20	98	96.9	48 48.2	19	98	96.2	1
2	47 02.5	25	97	100.9	47 10.0	25	97	100.2	47 17.3	24	97	99.5	47 24.3	23	97	98.8	47 31.0	22	98	98.1	47 37.4	21	98	97.3	47 43.6	20	98	96.6	47 49.5	19	98	95.9	2
3	46 04.5	25	97	100.5	46 11.9	24	97	99.8	46 19.0	23	97	99.1	46 25.8	22	97	98.4	46 32.4	22	98	97.7	46 38.8	21	98	97.0	46 44.9	20	98	96.3	46 50.7	19	98	95.6	3
4	45 06.3	25	97	100.2	45 13.6	24	97	99.5	45 20.6	23	97	98.8	45 27.4	22	98	98.1	45 33.9	21	98	97.4	45 40.1	20	98	96.7	45 46.1	20	98	96.0	45 51.8	19	98	95.3	4
45	44 08.2	24	97	99.9	44 15.3	23	97	99.2	44 22.2	23	97	98.5	44 28.9	22	98	97.8	44 35.3	21	98	97.1	44 41.4	20	98	96.4	44 47.3	19	98	95.7	44 53.0	18	98	95.1	45
6	43 09.9	24	97	99.5	43 16.9	23	97	98.9	43 23.7	22	98	98.2	43 30.3	21	98	97.5	43 36.6	21	98	96.8	43 42.7	20	98	96.2	43 48.5	19	98	95.5	43 54.1	18	98	94.8	6
7	42 11.6	23	97	99.2	42 18.5	23	97	98.5	42 25.2	22	98	97.9	42 31.7	21	98	97.2	42 37.9	20	98	96.6	42 43.9	20	98	95.9	42 49.7	19	98	95.2	42 55.2	18	98	94.5	7
8	41 13.3	23	97	98.9	41 20.1	22	98	98.2	41 26.7	22	98	97.6	41 33.1	21	98	96.9	41 39.2	20	98	96.3	41 45.1	19	98	95.6	41 50.8	19	98	95.0	41 56.3	18	98	94.3	8
9	40 14.9	23	97	98.6	40 21.6	22	98	97.9	40 28.1	21	98	97.3	40 34.4	21	98	96.7	40 40.5	20	98	96.0	40 46.3	19	98	95.4	40 52.0	18	98	94.7	40 57.4	18	98	94.1	9
50	39 16.4	22	97	98.3	39 23.0	22	98	97.7	39 29.5	21	98	97.0	39 35.7	20	98	96.4	39 41.7	20	98	95.8	39 47.5	19	98	95.1	39 53.1	18	98	94.5	39 58.5	18	98	93.8	50
1	38 17.9	22	98	98.0	38 24.5	21	98	97.4	38 30.8	21	98	96.8	38 36.9	20	98	96.1	38 42.9	19	98	95.5	38 48.6	19	98	94.9	38 54.2	18	98	94.2	38 59.5	17	98	93.6	1
2	37 19.4	22	98	97.7	37 25.8	21	98	97.1	37 32.1	21	98	96.5	37 38.2	20	98	95.9	37 44.1	19	98	95.3	37 49.7	19	98	94.6	37 55.2	18	98	94.0	38 00.5	17	98	93.4	2
3	36 20.8	22	98	97.5	36 27.2	21	98	96.8	36 33.4	20	98	96.2	36 39.4	20	98	95.6	36 45.2	19	98	95.0	36 50.8	18	98	94.4	36 56.3	18	98	93.8	37 01.5	17	98	93.2	3
4	35 22.2	21	98	97.2	35 28.5	21	98	96.6	35 34.6	20	98	96.0	35 40.6	20	98	95.4	35 46.3	19	98	94.8	35 51.9	18	98	94.2	35 57.3	18	98	93.6	36 02.5	17	98	93.0	4
55	34 23.6	21	98	96.9	34 29.8	20	98	96.3	34 35.8	20	98	95.7	34 41.7	19	98	95.1	34 47.4	19	98	94.6	34 53.0	18	98	94.0	34 58.3	18	98	93.4	35 03.5	17	98	92.8	55
6	33 24.9	21	98	96.7	33 31.1	20	98	96.1	33 37.0	20	98	95.5	33 42.9	19	98	94.9	33 48.5	19	98	94.3	33 54.0	18	98	93.7	33 59.3	17	98	93.1	34 04.5	17	98	92.5	6
7	32 26.2	21	98	96.4	32 32.3	20	98	95.9	32 38.2	20	98	95.3	32 44.0	19	98	94.7	32 49.6	18	98	94.1	32 55.0	18	98	93.5	33 00.3	17	98	92.9	33 05.4	17	98	92.3	7
8	31 27.5	20	98	96.2	31 33.5	20	98	95.6	31 39.4	19	98	95.0	31 45.1	19	98	94.5	31 50.7	18	98	93.9	31 56.1	18	98	93.3	32 01.3	17	98	92.7	32 06.4	17	98	92.1	8
9	30 28.7	20	98	96.0	30 34.7	20	98	95.4	30 40.5	19	98	94.8	30 46.2	19	98	94.2	30 51.7	18	98	93.7	30 57.1	18	98	93.1	31 02.3	17	98	92.5	31 07.3	17	98	92.0	9
60	29 29.9	20	98	95.7	29 35.8	19	98	95.2	29 41.6	19	98	94.6	29 47.2	19	98	94.0	29 52.7	18	98	93.5	29 58.1	18	98	92.9	30 03.2	17	98	92.3	30 08.3	17	98	91.8	60
1	28 31.1	20	98	95.5	28 37.0	19	98	94.9	28 42.7	19	98	94.4	28 48.3	18	98	93.8	28 53.7	18	98	93.3	28 59.0	17	98	92.7	29 04.2	17	98	92.1	29 09.2	17	98	91.6	1
2	27 32.3	20	98	95.3	27 38.1	19	98	94.7	27 43.8	19	98	94.2	27 49.3	18	98	93.6	27 54.7	18	98	93.1	28 00.0	17	98	92.5	28 05.1	17	98	91.9	28 10.2	16	98	91.4	2
3	26 33.4	19	98	95.1	26 39.2	19	98	94.5	26 44.8	19	98	94.0	26 50.3	18	98	93.4	26 55.7	18	98	92.9	27 01.0	17	98	92.3	27 06.1	17	98	91.8	27 11.1	16	98	91.2	3
4	25 34.6	19	98	94.8	25 40.3	19	98	94.3	25 45.9	18	98	93.8	25 51.4	18	98	93.2	25 56.7	18	98	92.7	26 01.9	17	98	92.1	26 07.0	17	98	91.6	26 12.0	16	98	91.0	4
65	24 35.7	19	98	94.6	24 41.4	19	98	94.1	24 46.9	18	98	93.5	24 52.4	18	98	93.0	24 57.7	18	98	92.5	25 02.9	17	98	91.9	25 08.0	17	98	91.4	25 12.9	16	98	90.8	65
6	23 36.8	19	98	94.4	23 42.4	19	98	93.9	23 47.9	18	98	93.3	23 53.3	18	98	92.8	23 58.6	17	98	92.3	24 03.8	17	98	91.7	24 08.9	17	98	91.2	24 13.8	16	98	90.7	6
7	22 37.9	19	98	94.2	22 43.5	18	98	93.7	22 48.9	18	98	93.1	22 54.3	18	98	92.6	22 59.6	17	98	92.1	23 04.8	17	98	91.5	23 09.8	17	98	91.0	23 14.8	16	98	90.5	7
8	21 38.9	19	98	94.0	21 44.5	18	98	93.5	21 49.9	18	98	93.0	21 55.3	18	98	92.4	22 00.5	17	98	91.9	22 05.7	17	98	91.4	22 10.7	17	98	90.8	22 15.7	16	98	90.3	8
9	20 40.0	19	98	93.8	20 45.5	18	98	93.3	20 50.9	18	98	92.8	20 56.2	18	98	92.2	21 01.5	17	98	91.7	21 06.6	17	98	91.2	21 11.6	17	98	90.7	21 16.6	16	98	90.1	9
70	19 41.0	18	98	93.6	19 46.5	18	98	93.1	19 51.9	18	98	92.6	19 57.2	18	98	92.0	20 02.4	17	98	91.5	20 07.5	17	98	91.0	20 12.6	17	98	90.5	20 17.5	16	98	89.9	70
1	18 42.0	18	98	93.4	18 47.5	18	98	92.9	18 52.9	18	98	92.4	18 58.1	17	98	91.9	19 03.3	17	98	91.3	19 08.4	17	98	90.8	19 13.5	17	98	90.3	19 18.4	16	98	89.8	1
2	17 43.0	18	98	93.2	17 48.5	18	98	92.7	17 53.8	18	98	92.2	17 59.1	17	98	91.7	18 04.3	17	98	91.2	18 09.4	17	98	90.6	18 14.4	17	98	90.1	18 19.3	16	98	89.6	2
3	16 44.0	18	98	93.0	16 49.4	18	98	92.5	16 54.8	18	98	92.0	17 00.0	17	98	91.5	17 05.2	17	98	91.0	17 10.3	17	98	90.5	17 15.3	17	98	89.9	17 20.2	16	98	89.4	3
4	15 45.0	18	98	92.9	15 50.4	18	98	92.3	15 55.7	18	98	91.8	16 00.9	17	98	91.3	16 06.1	17	98	90.8	16 11.2	17	98	90.3	16 16.2	17	98	89.8	16 21.1	16	98	89.3	4
75	14 46.0	18	98	92.7	14 51.4	18	98	92.2	14 56.7	18	98	91.6	15 01.9	17	98	91.1	15 07.0	17	98	90.6	15 12.1	17	98	90.1	15 17.1	17	98	89.6	15 22.1	16	98	89.1	75
6	13 47.0	18	98	92.5	13 52.3	18	98	92.0	13 57.6	17	98	91.5	14 02.8	17	98	91.0	14 07.9	17	98	90.4	14 13.0	17	98	89.9	14 18.0	17	98	89.4	14 23.0	16	98	88.9	6
7	12 47.9	18	98	92.3	12 53.3	18	98	91.8	12 58.5	17	98	91.3	13 03.7	17	98	90.8	13 08.9	17	98	90.3	13 13.9	17	98	89.8	13 18.9	17	98	89.3	13 23.9	16	98	88.8	7
8	11 48.9	18	98	92.1	11 54.2	18	98	91.6	11 59.4	17	98	91.1	12 04.6	17	98	90.6	12 09.8	17	98	90.1	12 14.8	17	98	89.6	12 19.9	17	98	89.1	12 24.8	16	98	88.6	8
9	10 49.9	18	98	91.9	10 55.1	18	98	91.4	11 00.4	17	98	90.9	11 05.5	17	98	90.4	11 10.7	17	98	89.9	11 15.8	17	98	89.4	11 20.8	17	98	88.9	11 25.8	17	98	88.4	9
80	9 50.8	18	98	91.8	9 56.1	17	98	91.3	10 01.3	17	98	90.8	10 06.5	17	98	90.3	10 11.6	17	98	89.8	10 16.7	17	98	89.3	10 21.7	17	98	88.8	10 26.7	17	98	88.3	80
1	8 51.7	18	98	91.6	8 57.0	17	98	91.1	9 02.2	17	98	90.6	9 07.4	17	98	90.1	9 12.5	17	98	89.6	9 17.6	17	98	89.1	9 22.6	17	98	88.6	9 27.6	17	98	88.1	1
2	7 52.7	18	98	91.4	7 57.9	17	98	90.9	8 03.1	17	98	90.4	8 08.3	17	98	89.9	8 13.4	17	98	89.4	8 18.5	17	98	88.9	8 23.6	17	98	88.4	8 28.6	17	98	87.9	2
3	6 53.6	17	98	91.2	6 58.8	17	98	90.7	7 04.0	17	98	90.2	7 09.2	17	98	89.7	7 14.3	17	98	89.2	7 19.4	17	98	88.7	7 24.5	17	98	88.2	7 29.5	17	98	87.7	3
4	5 54.5	17	98	91.0	5 59.7	17	98	90.6	6 04.9	17	98	90.1	6 10.1	17	98	89.6	6 15.2	17	98	89.1	6 20.4	17	98	88.6	6 25.4	17	98	88.1	6 30.5	17	98	87.6	4
85					5 00.6	17	98	90.4	5 05.8	17	98	89.9	5 11.0	17	98	89.4	5 16.2	17	98	88.9	5 21.3	17	98	88.4	5 26.4	17	98	87.9	5 31.5	17	98	87.4	85

Lat. 10°

H.A.	0° 00′				0° 30′				1° 00′				1° 30′				2° 00′				2° 30′				3° 00′				3° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	80 00.0	1.0	05	180.0	79 30.0	1.0	05	180.0	79 00.0	1.0	04	180.0	78 30.0	1.0	04	180.0	78 00.0	1.0	04	180.0	77 30.0	1.0	04	180.0	77 00.0	1.0	04	180.0	76 30.0	1.0	04	180.0	00
1	79 57.0	1.0	15	174.3	79 27.2	1.0	14	174.5	78 57.3	1.0	13	174.8	78 27.4	1.0	13	175.0	77 57.5	1.0	12	175.2	77 27.6	1.0	12	175.4	76 57.7	1.0	11	175.6	76 27.8	1.0	11	175.7	1
2	79 48.2	98	24	168.6	79 18.8	98	23	169.2	78 49.3	98	22	169.6	78 19.7	99	21	170.1	77 50.2	99	20	170.5	77 20.5	99	19	170.8	76 50.9	99	19	171.2	76 21.2	99	18	171.5	2
3	79 33.8	96	33	163.2	79 05.0	96	31	164.0	78 36.1	97	30	164.6	78 07.1	97	29	165.3	77 38.0	97	28	165.9	77 08.9	97	27	166.4	76 39.7	97	26	166.9	76 10.4	98	25	167.4	3
4	79 14.2	93	41	158.1	78 46.2	94	39	159.0	78 18.1	94	38	159.9	77 49.8	95	36	160.7	77 21.4	95	35	161.4	76 52.8	95	34	162.1	76 24.2	96	32	162.8	75 55.5	96	31	163.4	4
05	78 49.9	90	48	153.3	78 22.8	90	46	154.4	77 55.6	91	44	155.4	77 28.1	92	43	156.3	77 00.5	92	41	157.2	76 32.7	93	40	158.0	76 04.7	93	39	158.8	75 36.6	94	37	159.5	05
6	78 21.2	86	54	148.8	77 55.3	87	52	150.0	77 29.0	88	50	151.2	77 02.5	89	49	152.2	76 35.7	90	47	153.2	76 08.7	90	46	154.1	75 41.5	91	44	155.0	75 14.2	91	43	155.8	6
7	77 48.8	82	59	144.7	77 24.0	84	58	146.0	76 58.7	85	56	147.3	76 33.2	86	54	148.4	76 07.4	87	53	149.5	75 41.3	87	51	150.5	75 14.9	88	50	151.4	74 48.4	89	48	152.3	7
8	77 13.2	78	64	141.0	76 49.4	80	62	142.4	76 25.2	81	61	143.7	76 00.7	82	59	144.9	75 35.8	83	57	146.0	75 10.6	84	56	147.1	74 45.2	85	54	148.1	74 19.4	86	53	149.1	8
9	76 34.6	75	68	137.6	76 12.0	76	67	139.0	75 48.8	78	65	140.3	75 25.3	79	63	141.6	75 01.4	80	62	142.8	74 37.1	81	60	143.9	74 12.6	82	59	145.0	73 47.7	83	57	146.0	9
10	75 53.6	71	72	134.6	75 32.0	73	70	136.0	75 09.9	74	69	137.3	74 47.4	76	67	138.6	74 24.4	77	65	139.8	74 01.1	78	64	140.9	73 37.4	80	62	142.0	73 13.4	81	61	143.1	10
1	75 10.5	68	75	131.8	74 49.9	70	73	133.2	74 28.8	71	72	134.5	74 07.2	73	70	135.8	73 45.2	74	69	137.0	73 22.8	75	67	138.2	73 00.0	77	66	139.3	72 36.8	78	64	140.4	1
2	74 25.6	65	78	129.2	74 05.9	66	76	130.6	73 45.7	68	75	132.0	73 25.1	70	73	133.3	73 04.0	71	72	134.5	72 42.4	72	70	135.7	72 20.5	74	69	136.8	71 58.1	75	68	137.9	2
3	73 39.1	62	80	126.9	73 20.3	63	78	128.3	73 01.0	65	77	129.6	72 41.2	67	76	130.9	72 21.0	68	74	132.1	72 00.3	70	73	133.3	71 39.1	71	72	134.5	71 17.6	72	70	135.6	3
4	72 51.2	59	82	124.9	72 33.3	61	80	126.2	72 14.8	62	79	127.5	71 55.8	64	78	128.8	71 36.4	66	77	130.0	71 16.5	67	75	131.2	70 56.2	68	74	132.3	70 35.5	70	73	133.4	4
15	72 02.2	56	83	122.9	71 45.0	58	82	124.3	71 27.3	60	81	125.5	71 09.1	61	80	126.8	70 50.5	63	79	128.0	70 31.3	64	77	129.2	70 11.8	66	76	130.3	69 51.8	67	75	131.4	15
6	71 12.1	54	85	121.2	70 55.7	56	84	122.5	70 38.7	57	83	123.7	70 21.2	59	82	125.0	70 03.3	61	80	126.1	69 44.9	62	79	127.3	69 26.1	63	78	128.4	69 06.8	65	77	129.5	6
7	70 21.1	52	86	119.6	70 05.4	53	85	120.9	69 49.1	55	84	122.1	69 32.3	57	83	123.3	69 15.1	58	82	124.4	68 57.4	60	81	125.6	68 39.2	61	80	126.7	68 20.7	63	79	127.7	7
8	69 29.4	50	87	118.1	69 14.2	51	86	119.3	68 58.6	53	85	120.5	68 42.5	55	84	121.7	68 25.9	56	83	122.9	68 08.8	58	82	124.0	67 51.3	59	81	125.0	67 33.4	60	80	126.1	8
9	68 36.9	48	88	116.8	68 22.4	49	88	118.0	68 07.3	51	87	119.1	67 51.8	53	86	120.3	67 35.8	54	85	121.4	67 19.4	56	84	122.5	67 02.5	57	83	123.5	66 45.2	58	82	124.6	9
20	67 43.9	46	89	115.5	67 29.9	47	88	116.7	67 15.4	49	88	117.8	67 00.4	51	87	118.9	66 45.0	52	86	120.0	66 29.2	54	85	121.1	66 12.9	55	84	122.1	65 56.2	56	83	123.2	20
1	66 50.3	44	90	114.3	66 36.8	46	89	115.5	66 22.8	47	88	116.6	66 08.4	49	88	117.7	65 53.5	50	87	118.7	65 38.2	52	86	119.8	65 22.5	53	85	120.8	65 06.3	55	84	121.8	1
2	65 56.2	43	91	113.3	65 43.2	44	90	114.4	65 29.7	46	89	115.4	65 15.8	47	89	116.5	65 01.4	49	88	117.5	64 46.6	50	87	118.6	64 31.4	51	86	119.6	64 15.8	53	85	120.6	2
3	65 01.7	41	91	112.2	64 49.2	43	91	113.3	64 36.1	44	90	114.4	64 22.7	46	89	115.4	64 08.8	47	89	116.4	63 54.4	48	88	117.4	63 39.7	50	87	118.4	63 24.6	51	86	119.4	3
4	64 06.9	40	92	111.3	63 54.7	41	91	112.4	63 42.1	43	91	113.4	63 29.1	44	90	114.4	63 15.6	46	89	115.4	63 01.7	47	89	116.4	62 47.5	48	88	117.3	62 32.8	50	87	118.3	4
25	63 11.6	39	93	110.4	62 59.9	40	92	111.4	62 47.7	41	91	112.4	62 35.0	43	91	113.4	62 22.0	44	90	114.4	62 08.6	45	89	115.4	61 54.7	47	89	116.3	61 40.5	48	88	117.2	25
6	62 16.1	37	93	109.6	62 04.7	39	92	110.6	61 52.9	40	92	111.6	61 40.6	41	91	112.5	61 28.0	43	91	113.5	61 15.0	44	90	114.4	61 01.6	45	89	115.4	60 47.8	47	89	116.3	6
7	61 20.3	36	93	108.8	61 09.3	38	93	109.8	60 57.8	39	92	110.7	60 45.9	40	92	111.7	60 33.6	42	91	112.6	60 21.0	43	91	113.5	60 08.0	44	90	114.4	59 54.6	45	89	115.3	7
8	60 24.3	35	94	108.1	60 13.5	36	93	109.0	60 02.4	38	93	110.0	59 50.8	39	92	110.9	59 38.9	40	92	111.8	59 26.6	42	91	112.7	59 14.0	43	91	113.6	59 01.0	44	90	114.5	8
9	59 28.0	34	94	107.4	59 17.5	35	94	108.3	59 06.7	37	93	109.2	58 55.5	38	93	110.1	58 43.9	39	92	111.0	58 32.0	40	92	111.9	58 19.7	42	91	112.8	58 07.0	43	90	113.6	9
30	58 31.5	33	94	106.7	58 21.3	35	94	107.6	58 10.8	36	94	108.5	57 59.9	37	93	109.4	57 48.6	38	93	110.3	57 37.0	39	92	111.1	57 25.0	40	92	112.0	57 12.7	42	91	112.8	30
1	57 34.8	32	95	106.1	57 24.9	34	94	107.0	57 14.7	35	94	107.9	57 04.0	36	93	108.7	56 53.1	37	93	109.6	56 41.7	38	92	110.4	56 30.1	39	92	111.3	56 18.1	41	92	112.1	1
2	56 38.0	32	95	105.5	56 28.3	33	95	106.4	56 18.3	34	94	107.2	56 08.0	35	94	108.1	55 57.3	36	93	108.9	55 46.3	37	93	109.8	55 34.9	38	92	110.6	55 23.2	39	92	111.4	2
3	55 41.0	31	95	105.0	55 31.6	32	95	105.8	55 21.8	33	94	106.6	55 11.7	34	94	107.5	55 01.3	35	94	108.3	54 50.5	36	93	109.1	54 39.5	37	93	109.9	54 28.1	39	92	110.7	3
4	54 43.8	30	95	104.4	54 34.6	31	95	105.3	54 25.1	32	95	106.1	54 15.3	33	94	106.9	54 05.1	34	94	107.7	53 54.6	35	94	108.5	53 43.8	37	93	109.3	53 32.7	38	93	110.1	4
35	53 46.5	29	96	103.9	53 37.6	30	95	104.7	53 28.2	32	95	105.5	53 18.6	33	95	106.3	53 08.7	34	94	107.1	52 58.5	35	94	107.9	52 47.9	36	93	108.7	52 37.1	37	93	109.4	35
6	52 49.1	29	96	103.4	52 40.3	30	96	104.2	52 31.2	31	95	105.0	52 21.8	32	95	105.8	52 12.1	33	95	106.6	52 02.1	34	94	107.3	51 51.8	35	94	108.1	51 41.2	36	93	108.9	6
7	51 51.6	28	96	103.0	51 43.0	29	96	103.8	51 34.1	30	95	104.5	51 24.9	31	95	105.3	51 15.4	32	95	106.0	51 05.7	33	94	106.8	50 55.6	34	94	107.5	50 45.2	35	94	108.3	7
8	50 54.0	28	96	102.5	50 45.6	29	96	103.3	50 36.8	29	96	104.0	50 27.9	30	95	104.8	50 18.6	31	95	105.5	50 09.0	32	95	106.3	49 59.2	33	94	107.0	49 49.0	34	94	107.7	8
9	49 56.2	27	96	102.1	49 48.0	28	96	102.8	49 39.5	29	96	103.6	49 30.7	30	96	104.3	49 21.6	31	95	105.1	49 12.2	32	95	105.8	49 02.6	33	95	106.5	48 52.7	33	94	107.2	9
40	48 58.4	26	96	101.7	48 50.3	27	96	102.4	48 42.0	28	96	103.2	48 33.4	29	96	103.9	48 24.5	30	95	104.6	48 15.3	31	95	105.3	48 05.9	32	95	106.0	47 56.2	33	94	106.7	40
1	48 00.5	26	97	101.3	47 52.6	27	96	102.0	47 44.4	28	96	102.7	47 35.9	29	96	103.4	47 27.2	30	96	104.2	47 18.2	30	95	104.9	47 09.0	31	95	105.6	46 59.5	32	95	106.3	1
2	47 02.5	25	97	100.9	46 54.8	26	97	101.6	46 46.7	27	96	102.3	46 38.4	28	96	103.0	46 29.9	29	96	103.7	46 21.1	30	95	104.4	46 12.0	31	95	105.1	46 02.7	31	95	105.8	2
3	46 04.5	25	97	100.5	45 56.8	26	97	101.2	45 48.9	27	96	101.9	45 40.8	28	96	102.6	45 32.4	28	96	103.3	45 23.8	29	96	104.0	45 14.9	30	95	104.7	45 05.8	31	95	105.4	3
4	45 06.3	25	97	100.2	44 58.8	25	97	100.9	44 51.1	26	97	101.6	44 43.1	27	96	102.2	44 34.9	28	96	102.9	44 26.4	29	96	103.6	44 17.7	29	96	104.3	44 08.8	30	95	104.9	4
45	44 08.2	24	97	99.9	44 00.8	25	97	100.5	43 53.2	26	97	101.2	43 45.3	27	96	101.9	43 37.2	27	96	102.5	43 28.9	28	96	103.2	43 20.4	29	96	103.9	43 11.6	30	95	104.5	45
6	43 09.9	24	97	99.5	43 02.7	25	97	100.2	42 55.2	25	97	100.8	42 47.5	26	97	101.5	42 39.5	27	96	102.2	42 31.3	28	96	102.8	42 23.0	28	96	103.5	42 14.4	29	96	104.1	6
7	42 11.6	23	97	99.2	42 04.5	24	97	99.9	41 57.1	25	97	100.5	41 49.5	26	97	101.2	41 41.7	26	96	101.8	41 33.7	27	96	102.4	41 25.5	28	96	103.1	41 17.0	29	96	103.7	7
8	41 13.3	23	97	98.9	41 06.2	24	97	99.5	40 59.0	25	97	100.2	40 51.5	25	97	100.8	40 43.8	26	97	101.5	40 36.0	27	96	102.1	40 27.9	27	96	102.7	40 19.6	28	96	103.4	8
9	40 14.9	23	97	98.6	40 07.9	23	97	99.2	40 00.8	24	97	99.9	39 53.4	25	97	100.5	39 45.9	26	97	101.1	39 38.1	26	96	101.7	39 30.2	27	96	102.4	39 22.0	28	96	103.0	9
50	39 16.4	22	97	98.3	39 09.6	23	97	98.9	39 02.5	24	97	99.5	38 55.3	24	97	100.2	38 47.9	25	97	100.8	38 40.2	26	97	101.4	38 32.4	26	96	102.0	38 24.4	27	96	102.6	50
1	38 17.9	22	98	98.0	38 11.2	23	97	98.6	38 04.2	23	97	99.2	37 57.1	24	97	99.9	37 49.8	25	97	100.5	37 42.3	25	97	101.1	37 34.6	26	96	101.7	37 26.7	27	96	102.3	1
2	37 19.4	22	98	97.7	37 12.7	22	97	98.3	37 05.9	23	97	98.9	36 58.9	24	97	99.6	36 51.7	24	97	100.2	36 44.3	25	97	100.8	36 36.7	26	97	101.4	36 28.9	26	96	102.0	2
3	36 20.8	22	98	97.5	36 14.3	22	98	98.1	36 07.5	23	97	98.7	36 00.6	23	97	99.3	35 53.5	24	97	99.9	35 46.2	25	97	100.5	35 38.7	25	97	101.1	35 31.1	26	97	101.7	3
4	35 22.2	21	98	97.2	35 15.7	22	98	97.8	35 09.1	22	97	98.4	35 02.2	23	97	99.0	34 55.2	24	97	99.6	34 48.1	24	97	100.2	34 40.7	25	97	100.8	34 33.2	25	97	101.3	4
55	34 23.6	21	98	96.9	34 17.2	22	98	97.5	34 10.6	22	98	98.1	34 03.9	23	97	98.7	33 57.0	23	97	99.3	33 49.9	24	97	99.9	33 42.6	24	97	100.5	33 35.2	25	97	101.0	55
6	33 24.9	21	98	96.7	33 18.6	21	98	97.3	33 12.1	22	98	97.8	33 05.4	22	97	98.4	32 58.6	23	97	99.0	32 51.6	24	97	99.6	32 44.5	24	97	100.2	32 37.2	25	97	100.7	6
7	32 26.2	21	98	96.4	32 19.9	21	98	97.0	32 13.5	22	98	97.6	32 07.0	22	98	98.2	32 00.2	23	97	98.7	31 53.4	23	97	99.3	31 46.3	24	97	99.9	31 39.1	24	97	100.5	7
8	31 27.5	20	98	96.2	31 21.3	21	98	96.8	31 14.9	21	98	97.3	31 08.5	22	98	97.9	31 01.8	22	97	98.5	30 55.0	23	97	99.0	30 48.1	23	97	99.6	30 41.0	24	97	100.2	8
9	30 28.7	20	98	96.0	30 22.6	21	98	96.5	30 16.3	21	98	97.1	30 09.9	22	98	97.7	30 03.4	22	98	98.2	29 56.7	23	97	98.8	29 49.8	23	97	99.3	29 42.8	24	97	99.9	9
60	29 29.9	20	98	95.7	29 23.9	20	98	96.3	29 17.7	21	98	96.8	29 11.3	21	98	97.4	29 04.9	22	98	98.0	28 58.2	22	97	98.5	28 51.5	23	97	99.1	28 44.6	23	97	99.6	60
1	28 31.1	20	98	95.5	28 25.1	20	98	96.1	28 19.0	21	98	96.6	28 12.7	21	98	97.2	28 06.3	22	98	97.7	27 59.8	22	98	98.3	27 53.1	22	97	98.8	27 46.3	23	97	99.4	1
2	27 32.3	20	98	95.3	27 26.3	20	98	95.8	27 20.3	20	98	96.4	27 14.1	21	98	96.9	27 07.7	21	98	97.5	27 01.3	22	98	98.0	26 54.7	22	97	98.6	26 48.0	23	97	99.1	2
3	26 33.4	19	98	95.1	26 27.6	20	98	95.6	26 21.5	20	98	96.2	26 15.4	21	98	96.7	26 09.1	21	98	97.2	26 02.8	21	98	97.8	25 56.3	22	97	98.3	25 49.6	22	97	98.9	3
4	25 34.6	19	98	94.8	25 28.7	20	98	95.4	25 22.8	20	98	95.9	25 16.7	20	98	96.5	25 10.5	21	98	97.0	25 04.2	21	98	97.5	24 57.8	22	98	98.1	24 51.2	22	97	98.6	4
65	24 35.7	19	98	94.6	24 29.9	19	98	95.2	24 24.0	20	98	95.7	24 18.0	20	98	96.2	24 11.9	21	98	96.8	24 05.6	21	98	97.3	23 59.3	21	98	97.9	23 52.8	22	97	98.4	65
6	23 36.8	19	98	94.4	23 31.0	19	98	95.0	23 25.2	20	98	95.5	23 19.2	20	98	96.0	23 13.2	20	98	96.6	23 07.0	21	98	97.1	23 00.7	21	98	97.6	22 54.3	21	98	98.2	6
7	22 37.9	19	98	94.2	22 32.2	19	98	94.7	22 26.4	20	98	95.3	22 20.5	20	98	95.8	22 14.4	20	98	96.3	22 08.3	21	98	96.9	22 02.1	21	98	97.4	21 55.8	21	98	97.9	7
8	21 38.9	19	98	94.0	21 33.3	19	98	94.5	21 27.5	19	98	95.1	21 21.7	20	98	95.6	21 15.7	20	98	96.1	21 09.7	20	98	96.6	21 03.5	21	98	97.2	20 57.3	21	98	97.7	8
9	20 40.0	19	98	93.8	20 34.4	19	98	94.3	20 28.6	19	98	94.9	20 22.8	20	98	95.4	20 16.9	20	98	95.9	20 11.0	20	98	96.4	20 04.9	20	98	97.0	19 58.7	21	98	97.5	9
70	19 41.0	18	98	93.6	19 35.4	19	98	94.1	19 29.8	19	98	94.7	19 24.0	19	98	95.2	19 18.2	20	98	95.7	19 12.2	20	98	96.2	19 06.2	20	98	96.7	19 00.1	21	98	97.3	70
1	18 42.0	18	98	93.4	18 36.5	19	98	93.9	18 30.9	19	98	94.5	18 25.2	19	98	95.0	18 19.4	19	98	95.5	18 13.5	20	98	96.0	18 07.5	20	98	96.5	18 01.5	20	98	97.0	1
2	17 43.0	18	98	93.2	17 37.5	18	98	93.7	17 31.9	19	98	94.3	17 26.3	19	98	94.8	17 20.5	19	98	95.3	17 14.7	20	98	95.8	17 08.8	20	98	96.3	17 02.8	20	98	96.8	2
3	16 44.0	18	98	93.0	16 38.6	18	98	93.6	16 33.0	19	98	94.1	16 27.4	19	98	94.6	16 21.7	19	98	95.1	16 15.9	19	98	95.6	16 10.1	20	98	96.1	16 04.1	20	98	96.6	3
4	15 45.0	18	98	92.9	15 39.6	18	98	93.4	15 34.1	19	98	93.9	15 28.5	19	98	94.4	15 22.8	19	98	94.9	15 17.1	19	98	95.4	15 11.3	19	98	95.9	15 05.4	20	98	96.4	4
75	14 46.0	18	98	92.7	14 40.6	18	98	93.2	14 35.1	18	98	93.7	14 29.6	19	98	94.2	14 23.9	19	98	94.7	14 18.3	19	98	95.2	14 12.5	19	98	95.7	14 06.7	19	98	96.2	75
6	13 47.0	18	98	92.5	13 41.6	18	98	93.0	13 36.1	18	98	93.5	13 30.6	18	98	94.0	13 25.0	19	98	94.5	13 19.4	19	98	95.0	13 13.7	19	98	95.5	13 07.9	19	98	96.0	6
7	12 47.9	18	98	92.3	12 42.6	18	98	92.8	12 37.1	18	98	93.3	12 31.7	18	98	93.8	12 26.1	19	98	94.3	12 20.5	19	98	94.8	12 14.9	19	98	95.3	12 09.2	19	98	95.8	7
8	11 48.9	18	98	92.1	11 43.6	18	98	92.6	11 38.2	18	98	93.1	11 32.7	18	98	93.6	11 27.2	18	98	94.1	11 21.6	19	98	94.6	11 16.0	19	98	95.1	11 10.4	19	98	95.6	8
9	10 49.9	18	98	91.9	10 44.5	18	98	92.4	10 39.1	18	98	92.9	10 33.7	18	98	93.4	10 28.3	18	98	93.9	10 22.7	18	98	94.4	10 17.2	19	98	94.9	10 11.6	19	98	95.4	9
80	9 50.8	18	98	91.8	9 45.5	18	98	92.3	9 40.1	18	98	92.8	9 34.7	18	98	93.3	9 29.3	18	98	93.7	9 23.8	18	98	94.2	9 18.3	18	98	94.7	9 12.7	19	98	95.2	80
1	8 51.7	18	98	91.6	8 46.4	18	98	92.1	8 41.1	18	98	92.6	8 35.7	18	98	93.1	8 30.3	18	98	93.6	8 24.9	18	98	94.1	8 19.4	18	98	94.6	8 13.9	18	98	95.1	1
2	7 52.7	18	98	91.4	7 47.4	18	98	91.9	7 42.1	18	98	92.4	7 36.7	18	98	92.9	7 31.3	18	98	93.4	7 25.9	18	98	93.9	7 20.5	18	98	94.4	7 15.0	18	98	94.9	2
3	6 53.6	17	98	91.2	6 48.3	18	98	91.7	6 43.0	18	98	92.2	6 37.7	18	98	92.7	6 32.4	18	98	93.2	6 27.0	18	98	93.7	6 21.6	18	98	94.2	6 16.1	18	98	94.7	3
4	5 54.5	17	98	91.0	5 49.3	18	98	91.5	5 44.0	18	98	92.0	5 38.7	18	98	92.5	5 33.4	18	98	93.0	5 28.0	18	98	93.5	5 22.6	18	98	94.0	5 17.2	18	98	94.5	4

H.A.	4° 00′				4° 30′				5° 00′				5° 30′				6° 00′				6° 30′				7° 00′				7° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	84 00.0	1.0	08	180.0	84 30.0	1.0	09	180.0	85 00.0	1.0	10	180.0	85 30.0	1.0	11	180.0	86 00.0	1.0	12	180.0	86 30.0	1.0	14	180.0	87 00.0	1.0	16	180.0	87 30.0	1.0	19	180.0	00
1	83 55.1	99	24	170.5	84 24.7	98	26	169.7	84 54.2	98	28	168.7	85 23.5	98	31	167.5	85 52.8	97	34	166.0	86 21.8	96	38	164.1	86 50.5	95	43	161.7	87 18.7	93	50	158.4	1
2	83 40.8	95	38	161.6	84 09.2	94	41	160.0	84 37.3	93	44	158.2	85 05.0	92	48	156.1	85 32.2	90	52	153.5	85 58.8	87	57	150.4	86 24.4	84	63	146.4	86 48.8	79	69	141.5	2
3	83 18.1	90	50	153.4	83 44.8	88	53	151.4	84 11.0	86	56	149.0	84 36.4	84	60	146.3	85 01.1	80	65	143.2	85 24.6	76	69	139.5	85 46.9	71	75	135.1	86 07.3	65	80	129.9	3
4	82 48.4	84	59	146.2	83 13.1	81	62	143.9	83 37.1	79	66	141.3	84 00.2	75	70	138.3	84 22.3	71	74	135.0	84 43.0	67	78	131.2	85 02.1	61	82	126.9	85 19.4	54	86	122.0	4
05	82 12.9	77	67	140.1	82 35.7	75	70	137.6	82 57.6	71	73	134.9	83 18.5	68	76	131.9	83 38.1	63	80	128.6	83 56.4	58	83	124.9	84 13.0	52	87	120.9	84 27.7	46	90	116.4	05
6	81 32.9	71	73	134.8	81 53.9	68	75	132.3	82 13.8	65	78	129.6	82 32.7	61	81	126.7	82 50.3	56	84	123.5	83 06.5	51	87	120.1	83 21.1	46	90	116.4	83 33.9	40	92	112.4	6
7	80 49.4	66	77	130.3	81 08.6	63	80	127.9	81 26.9	59	82	125.3	81 44.0	55	85	122.5	81 59.9	51	87	119.5	82 14.4	46	89	116.3	82 27.3	41	92	112.9	82 38.7	35	94	109.3	7
8	80 03.0	61	81	126.5	80 20.8	58	83	124.2	80 37.6	54	85	121.7	80 53.2	50	87	119.0	81 07.6	46	89	116.2	81 20.7	41	91	113.2	81 32.4	36	93	110.1	81 42.5	31	95	106.9	8
9	79 14.6	56	84	123.3	79 31.0	53	86	121.0	79 46.5	50	88	118.6	80 00.8	46	89	116.1	80 14.0	42	91	113.5	80 25.9	38	93	110.8	80 36.5	33	94	107.9	80 45.7	28	96	105.0	9
10	78 24.4	53	86	120.5	78 39.7	49	88	118.3	78 54.0	46	89	116.0	79 07.2	42	91	113.7	79 19.3	38	92	111.2	79 30.3	34	94	108.7	79 40.0	30	95	106.1	79 48.4	26	96	103.4	10
1	77 32.8	49	88	118.0	77 47.1	46	89	116.0	78 00.4	43	91	113.8	78 12.7	39	92	111.6	78 23.9	36	93	109.3	78 34.0	32	95	107.0	78 43.0	28	96	104.6	78 50.7	24	96	102.1	1
2	76 40.1	46	89	115.9	76 53.5	43	91	113.9	77 05.9	40	92	111.9	77 17.4	37	93	109.8	77 27.9	33	94	107.7	77 37.3	30	95	105.5	77 45.6	26	96	103.2	77 52.8	22	97	100.9	2
3	75 46.6	43	91	114.0	75 59.1	40	92	112.2	76 10.8	37	93	110.3	76 21.5	34	94	108.3	76 31.4	31	95	106.3	76 40.2	28	96	104.2	76 48.0	24	96	102.1	76 54.7	21	97	100.0	3
4	74 52.3	41	92	112.4	75 04.1	38	93	110.6	75 15.1	35	94	108.8	75 25.2	32	95	106.9	75 34.5	29	95	105.0	75 42.8	26	96	103.1	75 50.1	23	97	101.1	75 56.4	20	97	99.1	4
15	73 57.3	39	92	110.9	74 08.5	36	93	109.2	74 18.9	33	94	107.5	74 28.5	31	95	105.7	74 37.2	28	96	103.9	74 45.1	26	96	102.1	74 52.0	22	97	100.3	74 58.0	19	98	98.4	15
6	73 01.9	37	93	109.6	73 12.5	34	94	108.0	73 22.4	32	95	106.3	73 31.5	29	96	104.7	73 39.8	26	96	103.0	73 47.2	23	97	101.2	73 53.8	21	97	99.5	73 59.5	18	98	97.7	6
7	72 06.0	35	94	108.4	72 16.1	33	94	106.9	72 25.6	30	95	105.3	72 34.2	28	96	103.7	72 42.1	25	96	102.1	72 49.2	22	97	100.4	72 55.5	20	97	98.8	73 00.9	17	98	97.1	7
8	71 09.8	33	94	107.3	71 19.4	31	95	105.8	71 28.4	29	96	104.3	71 36.7	26	96	102.8	71 44.2	24	97	101.3	71 51.0	21	97	99.7	71 57.0	19	98	98.1	72 02.3	16	98	96.6	8
9	70 13.2	32	95	106.3	70 22.5	30	95	104.9	70 31.1	28	96	103.5	70 39.0	25	96	102.0	70 46.2	23	97	100.6	70 52.7	20	97	99.1	70 58.5	18	98	97.6	71 03.5	16	98	96.1	9
20	69 16.4	31	95	105.4	69 25.3	29	96	104.1	69 33.5	26	96	102.7	69 41.1	24	97	101.3	69 48.0	22	97	99.9	69 54.3	20	97	98.5	69 59.9	17	98	97.0	70 04.8	15	98	95.6	20
1	68 19.3	30	95	104.6	68 27.8	28	96	103.3	68 35.8	25	96	102.0	68 43.1	23	97	100.6	68 49.8	21	97	99.3	68 55.8	19	98	97.9	69 01.2	17	98	96.6	69 05.9	15	98	95.2	1
2	67 22.0	28	96	103.8	67 30.3	27	96	102.6	67 37.9	25	97	101.3	67 45.0	23	97	100.0	67 51.4	20	97	98.7	67 57.3	18	98	97.4	68 02.5	16	98	96.1	68 07.1	14	98	94.8	2
3	66 24.5	27	96	103.1	66 32.5	26	96	101.9	66 39.9	24	97	100.7	66 46.7	22	97	99.4	66 53.0	20	98	98.2	66 58.6	18	98	97.0	67 03.7	16	98	95.7	67 08.2	14	98	94.4	3
4	65 26.9	27	96	102.4	65 34.6	26	97	101.3	65 41.8	23	97	100.1	65 48.4	21	97	98.9	65 54.5	19	98	97.7	66 00.0	17	98	96.5	66 04.9	15	98	95.3	66 09.2	14	98	94.1	4
25	64 29.1	26	96	101.8	64 36.6	24	97	100.7	64 43.6	22	97	99.6	64 50.0	21	97	98.4	64 55.9	19	98	97.3	65 01.2	17	98	96.1	65 06.0	15	98	94.9	65 10.3	13	98	93.8	25
6	63 31.2	25	97	101.3	63 38.5	23	97	100.2	63 45.3	22	97	99.1	63 51.5	20	98	98.0	63 57.2	18	98	96.8	64 02.5	17	98	95.7	64 07.2	15	98	94.6	64 11.3	13	98	93.4	6
7	62 33.2	24	97	100.7	62 40.3	23	97	99.7	62 46.9	21	97	98.6	62 53.0	19	98	97.5	62 58.5	18	98	96.4	63 03.6	16	98	95.4	63 08.2	14	98	94.3	63 12.3	13	98	93.2	7
8	61 35.1	24	97	100.2	61 42.0	22	97	99.2	61 48.4	21	98	98.1	61 54.3	19	98	97.1	61 59.8	17	98	96.1	62 04.8	16	98	95.0	62 09.3	14	98	93.9	62 13.3	13	98	92.9	8
9	60 36.9	23	97	99.7	60 43.6	22	97	98.7	60 49.9	20	98	97.7	60 55.7	19	98	96.7	61 01.0	17	98	95.7	61 05.9	16	98	94.7	61 10.3	14	98	93.7	61 14.3	12	98	92.6	9
30	59 38.7	23	97	99.3	59 45.2	21	98	98.3	59 51.3	20	98	97.3	59 57.0	18	98	96.3	60 02.2	17	98	95.4	60 07.0	15	98	94.4	60 11.4	14	98	93.4	60 15.3	12	98	92.4	30
1	58 40.3	22	97	98.8	58 46.7	21	98	97.9	58 52.7	19	98	96.9	58 58.2	18	98	96.0	59 03.4	16	98	95.0	59 08.1	15	98	94.1	59 12.4	14	98	93.1	59 16.2	12	98	92.1	1
2	57 41.9	22	97	98.4	57 48.1	20	98	97.5	57 54.0	19	98	96.6	57 59.4	18	98	95.7	58 04.5	16	98	94.7	58 09.1	15	98	93.8	58 13.4	13	98	92.8	58 17.2	12	98	91.9	2
3	56 43.4	21	98	98.0	56 49.5	20	98	97.1	56 55.3	19	98	96.2	57 00.6	17	98	95.3	57 05.6	16	98	94.4	57 10.2	15	98	93.5	57 14.3	13	98	92.6	57 18.1	12	98	91.7	3
4	55 44.9	21	98	97.6	55 50.9	19	98	96.8	55 56.5	18	98	95.9	56 01.8	17	98	95.0	56 06.7	16	98	94.1	56 11.2	14	98	93.3	56 15.3	13	98	92.4	56 19.0	12	98	91.5	4
35	54 46.3	20	98	97.3	54 52.2	19	98	96.4	54 57.7	18	98	95.6	55 02.9	17	98	94.7	55 07.7	15	98	93.9	55 12.2	14	98	93.0	55 16.3	13	98	92.1	55 20.0	12	98	91.3	35
6	53 47.6	20	98	96.9	53 53.4	19	98	96.1	53 58.9	18	98	95.3	54 04.0	16	98	94.4	54 08.8	15	98	93.6	54 13.2	14	98	92.8	54 17.2	13	98	91.9	54 20.9	12	98	91.1	6
7	52 49.0	20	98	96.6	52 54.7	18	98	95.8	53 00.0	17	98	95.0	53 05.1	16	98	94.2	53 09.8	15	98	93.3	53 14.1	14	98	92.5	53 18.2	13	98	91.7	53 21.8	12	98	90.9	7
8	51 50.3	19	98	96.3	51 55.9	18	98	95.5	52 01.2	17	98	94.7	52 06.1	16	98	93.9	52 10.8	15	98	93.1	52 15.1	14	98	92.3	52 19.1	13	98	91.5	52 22.7	12	98	90.7	8
9	50 51.5	19	98	96.0	50 57.0	18	98	95.2	51 02.3	17	98	94.4	51 07.2	16	98	93.6	51 11.8	15	98	92.9	51 16.1	14	98	92.1	51 20.0	13	98	91.3	51 23.7	12	98	90.5	9
40	49 52.7	19	98	95.7	49 58.2	18	98	94.9	50 03.3	17	98	94.2	50 08.2	16	98	93.4	50 12.8	15	98	92.6	50 17.0	14	98	91.9	50 20.9	13	98	91.1	50 24.6	12	98	90.3	40
1	48 53.9	18	98	95.4	48 59.3	17	98	94.7	49 04.4	17	98	93.9	49 09.2	16	98	93.2	49 13.7	15	98	92.4	49 17.9	14	98	91.6	49 21.9	13	98	90.9	49 25.5	12	98	90.1	1
2	47 55.1	18	98	95.1	48 00.4	17	98	94.4	48 05.4	16	98	93.7	48 10.2	15	98	92.9	48 14.7	14	98	92.2	48 18.9	13	98	91.4	48 22.8	13	98	90.7	48 26.4	12	98	89.9	2
3	46 56.2	18	98	94.9	47 01.5	17	98	94.2	47 06.5	16	98	93.4	47 11.2	15	98	92.7	47 15.6	14	98	92.0	47 19.8	13	98	91.2	47 23.7	12	98	90.5	47 27.3	12	98	89.8	3
4	45 57.3	18	98	94.6	46 02.5	17	98	93.9	46 07.5	16	98	93.2	46 12.2	15	98	92.5	46 16.6	14	98	91.8	46 20.7	13	98	91.0	46 24.6	12	98	90.3	46 28.2	12	98	89.6	4
45	44 58.4	18	98	94.4	45 03.6	17	98	93.7	45 08.5	16	98	93.0	45 13.1	15	98	92.3	45 17.5	14	98	91.6	45 21.6	13	98	90.9	45 25.5	12	98	90.2	45 29.1	12	98	89.4	45
6	43 59.5	17	98	94.1	44 04.6	17	98	93.4	44 09.5	16	98	92.7	44 14.1	15	98	92.1	44 18.4	14	98	91.4	44 22.6	13	98	90.7	44 26.4	12	98	90.0	44 30.0	12	98	89.3	6
7	43 00.5	17	98	93.9	43 05.6	16	98	93.2	43 10.4	16	98	92.5	43 15.0	15	98	91.8	43 19.4	14	98	91.2	43 23.5	13	98	90.5	43 27.3	12	98	89.8	43 31.0	12	98	89.1	7
8	42 01.6	17	98	93.6	42 06.6	16	98	93.0	42 11.4	16	98	92.3	42 16.0	15	98	91.6	42 20.3	14	98	91.0	42 24.4	13	98	90.3	42 28.3	12	98	89.6	42 31.9	12	98	89.0	8
9	41 02.6	17	98	93.4	41 07.6	16	98	92.8	41 12.4	16	98	92.1	41 16.9	15	98	91.4	41 21.2	14	98	90.8	41 25.3	13	98	90.1	41 29.2	12	98	89.5	41 32.8	12	98	88.8	9
50	40 03.6	17	98	93.2	40 08.6	16	98	92.5	40 13.3	15	98	91.9	40 17.8	15	98	91.3	40 22.1	14	98	90.6	40 26.2	13	98	90.0	40 30.1	13	98	89.3	40 33.7	12	98	88.7	50
1	39 04.6	17	98	93.0	39 09.5	16	98	92.3	39 14.2	15	98	91.7	39 18.8	15	98	91.1	39 23.0	14	98	90.4	39 27.1	13	98	89.8	39 31.0	13	98	89.1	39 34.7	12	98	88.5	1
2	38 05.6	17	98	92.8	38 10.5	16	98	92.1	38 15.2	15	98	91.5	38 19.7	15	98	90.9	38 24.0	14	98	90.2	38 28.0	13	98	89.6	38 31.9	13	98	89.0	38 35.6	12	98	88.3	2
3	37 06.6	17	98	92.6	37 11.4	16	98	91.9	37 16.1	15	98	91.3	37 20.6	15	98	90.7	37 24.9	14	98	90.1	37 29.0	13	98	89.4	37 32.8	13	98	88.8	37 36.5	12	98	88.2	3
4	36 07.5	16	98	92.3	36 12.4	16	98	91.7	36 17.0	15	98	91.1	36 21.5	15	98	90.5	36 25.8	14	98	89.9	36 29.9	13	98	89.3	36 33.8	13	98	88.7	36 37.5	12	98	88.0	4
55	35 08.5	16	98	92.1	35 13.3	16	98	91.5	35 18.0	15	98	90.9	35 22.4	15	98	90.3	35 26.7	14	98	89.7	35 30.8	13	98	89.1	35 34.7	13	98	88.5	35 38.4	12	98	87.9	55
6	34 09.4	16	98	92.0	34 14.2	16	98	91.4	34 18.9	15	98	90.8	34 23.3	15	98	90.2	34 27.6	14	98	89.6	34 31.7	13	98	89.0	34 35.6	13	98	88.4	34 39.4	12	98	87.8	6
7	33 10.4	16	98	91.8	33 15.2	16	98	91.2	33 19.8	15	98	90.6	33 24.2	15	98	90.0	33 28.5	14	98	89.4	33 32.6	13	98	88.8	33 36.6	13	98	88.2	33 40.3	12	98	87.6	7
8	32 11.3	16	98	91.6	32 16.1	16	98	91.0	32 20.7	15	98	90.4	32 25.2	15	98	89.8	32 29.4	14	98	89.2	32 33.6	13	98	88.6	32 37.5	13	98	88.0	32 41.3	12	98	87.5	8
9	31 12.3	16	98	91.4	31 17.0	16	98	90.8	31 21.6	15	98	90.2	31 26.1	15	98	89.6	31 30.4	14	98	89.1	31 34.5	14	98	88.5	31 38.5	13	98	87.9	31 42.3	12	98	87.3	9
60	30 13.2	16	98	91.2	30 17.9	16	98	90.6	30 22.5	15	98	90.0	30 27.0	15	98	89.5	30 31.3	14	98	88.9	30 35.4	14	98	88.3	30 39.4	13	98	87.7	30 43.3	13	98	87.2	60
1	29 14.1	16	98	91.0	29 18.8	16	98	90.4	29 23.4	15	98	89.9	29 27.9	15	98	89.3	29 32.2	14	98	88.7	29 36.4	14	98	88.2	29 40.4	13	98	87.6	29 44.2	13	98	87.0	1
2	28 15.0	16	98	90.8	28 19.8	16	98	90.3	28 24.4	15	98	89.7	28 28.8	15	98	89.1	28 33.1	14	98	88.6	28 37.3	14	98	88.0	28 41.3	13	98	87.4	28 45.2	13	98	86.9	2
3	27 15.9	16	98	90.6	27 20.7	16	98	90.1	27 25.3	15	98	89.5	27 29.7	15	98	89.0	27 34.1	14	98	88.4	27 38.3	14	98	87.9	27 42.3	13	98	87.3	27 46.2	13	98	86.7	3
4	26 16.9	16	98	90.5	26 21.6	16	98	89.9	26 26.2	15	98	89.4	26 30.7	15	98	88.8	26 35.0	14	98	88.3	26 39.2	14	98	87.7	26 43.3	13	98	87.1	26 47.3	13	98	86.6	4
65	25 17.8	16	98	90.3	25 22.5	16	98	89.7	25 27.1	15	98	89.2	25 31.6	15	98	88.6	25 35.9	14	98	88.1	25 40.2	14	98	87.5	25 44.3	14	98	87.0	25 48.3	13	98	86.4	65
6	24 18.7	16	98	90.1	24 23.4	16	98	89.6	24 28.0	15	98	89.0	24 32.5	15	98	88.5	24 36.9	14	98	87.9	24 41.1	14	98	87.4	24 45.3	14	98	86.8	24 49.3	13	98	86.3	6
7	23 19.6	16	98	89.9	23 24.3	16	98	89.4	23 28.9	15	98	88.9	23 33.4	15	98	88.3	23 37.8	14	98	87.8	23 42.1	14	98	87.2	23 46.3	14	98	86.7	23 50.3	13	98	86.2	7
8	22 20.5	16	98	89.8	22 25.2	16	98	89.2	22 29.9	15	98	88.7	22 34.4	15	98	88.2	22 38.8	15	98	87.6	22 43.1	14	98	87.1	22 47.3	14	98	86.6	22 51.4	13	98	86.0	8
9	21 21.4	16	98	89.6	21 26.2	16	98	89.1	21 30.8	15	98	88.5	21 35.3	15	98	88.0	21 39.8	15	98	87.5	21 44.1	14	98	86.9	21 48.3	14	98	86.4	21 52.5	14	98	85.9	9
70	20 22.3	16	98	89.4	20 27.1	16	98	88.9	20 31.7	15	98	88.4	20 36.3	15	98	87.8	20 40.7	15	98	87.3	20 45.1	14	98	86.8	20 49.4	14	98	86.3	20 53.5	14	98	85.7	70
1	19 23.2	16	98	89.3	19 28.0	16	98	88.7	19 32.7	15	98	88.2	19 37.2	15	98	87.7	19 41.7	15	98	87.2	19 46.1	14	98	86.6	19 50.4	14	98	86.1	19 54.6	14	98	85.6	1
2	18 24.2	16	98	89.1	18 28.9	16	98	88.6	18 33.6	15	98	88.0	18 38.2	15	98	87.5	18 42.7	15	98	87.0	18 47.1	15	98	86.5	18 51.5	14	98	86.0	18 55.7	14	98	85.4	2
3	17 25.1	16	98	88.9	17 29.9	16	98	88.4	17 34.6	16	98	87.9	17 39.2	15	98	87.4	17 43.7	15	98	86.8	17 48.1	15	98	86.3	17 52.5	14	98	85.8	17 56.8	14	98	85.3	3
4	16 26.0	16	98	88.7	16 30.8	16	98	88.2	16 35.5	16	98	87.7	16 40.1	15	98	87.2	16 44.7	15	98	86.7	16 49.2	15	98	86.2	16 53.6	15	98	85.7	16 57.9	14	98	85.1	4
75	15 26.9	16	98	88.6	15 31.7	16	98	88.1	15 36.5	16	98	87.6	15 41.1	15	98	87.0	15 45.7	15	98	86.5	15 50.2	15	98	86.0	15 54.7	15	98	85.5	15 59.1	14	98	85.0	75
6	14 27.9	16	98	88.4	14 32.7	16	98	87.9	14 37.4	16	98	87.4	14 42.1	16	98	86.9	14 46.7	15	98	86.4	14 51.3	15	98	85.9	14 55.8	15	98	85.4	15 00.2	15	98	84.8	6
7	13 28.8	16	98	88.2	13 33.6	16	98	87.7	13 38.4	16	98	87.2	13 43.1	16	98	86.7	13 47.8	15	98	86.2	13 52.4	15	98	85.7	13 56.9	15	98	85.2	14 01.4	15	98	84.7	7
8	12 29.7	16	98	88.1	12 34.6	16	98	87.6	12 39.4	16	98	87.1	12 44.1	16	98	86.6	12 48.8	16	98	86.1	12 53.5	15	98	85.6	12 58.0	15	98	85.0	13 02.5	15	98	84.5	8
9	11 30.7	16	98	87.9	11 35.6	16	98	87.4	11 40.4	16	98	86.9	11 45.2	16	98	86.4	11 49.9	16	98	85.9	11 54.5	15	98	85.4	11 59.2	15	98	84.9	12 03.7	15	98	84.4	9
80	10 31.6	16	98	87.7	10 36.5	16	98	87.2	10 41.4	16	98	86.7	10 46.2	16	98	86.2	10 51.0	16	98	85.7	10 55.7	16	98	85.2	11 00.3	15	98	84.7	11 04.9	15	98	84.2	80
1	9 32.6	16	98	87.6	9 37.5	16	98	87.1	9 42.4	16	98	86.6	9 47.2	16	98	86.1	9 52.0	16	98	85.6	9 56.8	16	98	85.1	10 01.5	16	98	84.6	10 06.1	15	98	84.1	1
2	8 33.6	17	98	87.4	8 38.5	16	98	86.9	8 43.4	16	98	86.4	8 48.3	16	98	85.9	8 53.1	16	98	85.4	8 57.9	16	98	84.9	9 02.7	16	98	84.4	9 07.4	16	98	83.9	2
3	7 34.6	17	98	87.2	7 39.5	17	98	86.8	7 44.5	16	98	86.3	7 49.4	16	98	85.8	7 54.2	16	98	85.3	7 59.1	16	98	84.8	8 03.9	16	98	84.3	8 08.6	16	98	83.8	3
4	6 35.5	17	98	87.1	6 40.5	17	98	86.6	6 45.5	17	98	86.1	6 50.4	16	98	85.6	6 55.4	16	98	85.1	7 00.2	16	98	84.6	7 05.1	16	98	84.1	7 09.9	16	98	83.6	4
85	5 36.5	17	98	86.9	5 41.6	17	98	86.4	5 46.6	17	98	85.9	5 51.5	17	98	85.4	5 56.5	16	98	84.9	6 01.4	16	98	84.4	6 06.3	16	98	83.9	6 11.2	16	98	83.4	85
6																					5 02.6	17	98	84.3	5 07.6	16	98	83.8	5 12.5	16	98	83.3	6

H.A.	4° 00′ Alt.			Az.	4° 30′ Alt.			Az.	5° 00′ Alt.			Az.	5° 30′ Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	76 00.0	1.0	04	180.0	75 30.0	1.0	03	180.0	75 00.0	1.0	03	180.0	74 30.0	1.0	03	180.0
1	75 57.9	1.0	11	175.9	75 28.0	1.0	10	176.0	74 58.0	1.0	10	176.2	74 28.1	1.0	10	176.3
2	75 51.5	99	17	171.8	75 21.8	99	17	172.1	74 52.1	99	16	172.3	74 22.4	99	16	172.6
3	75 41.1	98	24	167.8	75 11.7	98	23	168.2	74 42.3	98	23	168.6	74 12.9	98	22	169.0
4	75 26.6	96	30	163.9	74 57.7	96	29	164.5	74 28.8	97	28	164.9	73 59.8	97	28	165.4
05	75 08.4	94	36	160.2	74 40.1	95	35	160.8	74 11.7	95	34	161.4	73 43.2	95	33	162.0
6	74 46.7	92	42	156.6	74 19.0	92	41	157.3	73 51.2	93	39	158.0	73 23.2	93	38	158.7
7	74 21.6	90	47	153.2	73 54.6	90	46	154.0	73 27.5	91	44	154.8	73 00.2	91	43	155.5
8	73 53.5	87	52	150.0	73 27.3	88	50	150.8	73 00.9	88	49	151.7	72 34.3	89	48	152.4
9	73 22.5	84	56	146.9	72 57.1	85	54	147.9	72 31.5	86	53	148.7	72 05.6	87	52	149.6
10	72 49.1	82	60	144.1	72 24.5	82	58	145.1	71 59.6	83	57	146.0	71 34.5	84	56	146.8
1	72 13.3	79	63	141.4	71 49.5	80	62	142.4	71 25.4	81	60	143.4	71 01.1	82	59	144.3
2	71 35.5	76	66	138.9	71 12.5	77	65	140.0	70 49.2	78	64	140.9	70 25.6	79	62	141.8
3	70 55.8	74	69	136.6	70 33.5	75	68	137.6	70 11.0	76	66	138.6	69 48.1	77	65	139.6
4	70 14.4	71	72	134.5	69 52.9	72	70	135.5	69 31.1	73	69	136.5	69 09.0	74	68	137.4
15	69 31.5	68	74	132.4	69 10.7	70	73	133.5	68 49.6	71	71	134.4	68 28.2	72	70	135.4
6	68 47.2	66	76	130.5	68 27.2	67	75	131.6	68 06.8	69	74	132.6	67 46.1	70	72	133.5
7	68 01.7	64	78	128.8	67 42.4	66	77	129.8	67 22.6	66	76	130.8	67 02.6	67	74	131.7
8	67 15.1	62	79	127.1	66 56.4	63	78	128.1	66 37.3	64	77	129.1	66 17.9	65	76	130.1
9	66 27.5	60	81	125.6	66 09.4	61	80	126.6	65 51.0	62	79	127.6	65 32.2	63	78	128.5
20	65 39.0	58	82	124.2	65 21.6	59	81	125.1	65 03.7	60	80	126.1	64 45.5	61	79	127.0
1	64 49.8	56	83	122.8	64 32.8	57	82	123.8	64 15.5	58	82	124.7	63 57.9	59	81	125.6
2	63 59.7	54	84	121.5	63 43.3	55	84	122.5	63 26.6	56	83	123.4	63 09.4	58	82	124.3
3	63 09.1	52	85	120.3	62 53.2	54	85	121.3	62 36.9	55	84	122.2	62 20.3	56	83	123.1
4	62 17.8	51	86	119.2	62 02.4	52	86	120.1	61 46.6	53	85	121.0	61 30.5	54	84	121.9
25	61 25.9	49	87	118.2	61 11.0	50	86	119.1	60 55.7	52	86	120.0	60 40.0	53	85	120.8
6	60 33.6	48	88	117.2	60 19.1	49	87	118.1	60 04.2	50	87	118.9	59 49.0	51	86	119.8
7	59 40.8	46	89	116.2	59 26.7	48	88	117.1	59 12.2	49	87	117.9	58 57.5	50	87	118.8
8	58 47.6	45	89	115.3	58 33.9	46	89	116.2	58 19.8	47	88	117.0	58 05.4	48	87	117.9
9	57 54.0	44	90	114.5	57 40.7	45	89	115.3	57 27.0	46	89	116.2	57 13.0	47	88	117.0
30	57 00.0	43	90	113.7	56 47.1	44	90	114.5	56 33.8	45	89	115.3	56 20.1	46	89	116.1
1	56 05.8	42	91	112.9	55 53.1	43	90	113.7	55 40.2	44	90	114.5	55 26.9	45	89	115.3
2	55 11.2	41	91	112.2	54 58.9	42	91	113.0	54 46.3	43	90	113.8	54 33.3	44	90	114.6
3	54 16.4	40	92	111.5	54 04.3	41	91	112.3	53 52.0	42	91	113.1	53 39.4	43	90	113.8
4	53 21.3	39	92	110.8	53 09.5	40	92	111.6	52 57.5	41	91	112.4	52 45.2	41	91	113.1
35	52 25.9	38	93	110.2	52 14.5	39	92	111.0	52 02.8	40	92	111.7	51 50.7	40	91	112.5
6	51 30.4	37	93	109.6	51 19.2	38	92	110.3	51 07.7	39	92	111.1	50 56.0	40	92	111.8
7	50 34.6	36	93	109.0	50 23.7	37	93	109.8	50 12.5	38	92	110.5	50 01.0	39	92	111.2
8	49 38.6	35	94	108.5	49 28.0	36	93	109.2	49 17.0	37	93	109.9	49 05.8	38	92	110.6
9	48 42.5	34	94	107.9	48 32.1	35	93	108.7	48 21.4	36	93	109.4	48 10.4	37	93	110.1
40	47 46.2	34	94	107.4	47 36.0	34	94	108.1	47 25.5	35	93	108.8	47 14.8	36	93	109.5
1	46 49.8	33	94	106.9	46 39.8	34	94	107.6	46 29.5	35	94	108.3	46 19.1	35	93	109.0
2	45 53.2	32	95	106.5	45 43.4	33	94	107.2	45 33.4	34	94	107.8	45 23.1	35	94	108.5
3	44 56.4	32	95	106.0	44 46.9	32	94	106.7	44 37.0	33	94	107.4	44 27.0	34	94	108.0
4	43 59.6	31	95	105.6	43 50.2	32	95	106.2	43 40.6	32	94	106.9	43 30.7	33	94	107.6
45	43 02.6	30	95	105.2	42 53.4	31	95	105.8	42 44.0	32	95	106.5	42 34.3	33	94	107.1
6	42 05.5	30	95	104.8	41 56.5	30	95	105.4	41 47.2	31	95	106.0	41 37.8	32	94	106.7
7	41 08.3	29	95	104.4	40 59.5	30	95	105.0	40 50.4	31	95	105.6	40 41.1	31	95	106.3
8	40 11.1	29	96	104.0	40 02.3	29	95	104.6	39 53.4	30	95	105.2	39 44.3	31	95	105.9
9	39 13.7	28	96	103.6	39 05.1	29	96	104.2	38 56.4	29	95	104.8	38 47.4	30	96	105.5
50	38 16.2	28	96	103.3	38 07.8	28	96	103.9	37 59.2	29	96	104.5	37 50.4	30	96	105.1
1	37 18.6	27	96	102.9	37 10.4	28	96	103.5	37 01.9	28	96	104.1	36 53.3	29	96	104.7
2	36 21.0	27	96	102.6	36 12.9	27	96	103.2	36 04.6	28	96	103.8	35 56.1	29	96	104.4
3	35 23.3	26	96	102.2	35 15.3	27	96	102.8	35 07.2	27	96	103.4	34 58.8	28	96	104.0
4	34 25.5	26	96	101.9	34 17.7	26	96	102.5	34 09.7	27	96	103.1	34 01.5	28	96	103.7
55	33 27.7	25	97	101.6	33 20.0	26	96	102.2	33 12.1	27	96	102.8	33 04.0	27	96	103.4
6	32 29.8	25	97	101.3	32 22.2	26	96	101.9	32 14.4	26	96	102.5	32 06.5	27	96	103.0
7	31 31.8	25	97	101.0	31 24.3	25	97	101.6	31 16.7	26	96	102.2	31 08.9	26	96	102.7
8	30 33.8	24	97	100.7	30 26.4	25	97	101.3	30 18.9	25	96	101.9	30 11.2	26	96	102.4
9	29 35.7	24	97	100.5	29 28.4	24	97	101.0	29 21.0	25	97	101.6	29 13.5	25	96	102.1
60	28 37.6	24	97	100.2	28 30.4	24	97	100.7	28 23.1	25	97	101.3	28 15.7	25	96	101.8
1	27 39.4	23	97	99.9	27 32.3	24	97	100.5	27 25.1	24	97	101.0	27 17.8	25	97	101.6
2	26 41.2	23	97	99.7	26 34.2	23	97	100.2	26 27.1	24	97	100.8	26 19.9	24	97	101.3
3	25 42.9	23	97	99.4	25 36.0	23	97	100.0	25 29.0	23	97	100.5	25 21.9	24	97	101.0
4	24 44.6	22	97	99.2	24 37.8	23	97	99.7	24 30.9	23	97	100.2	24 23.9	24	97	100.8
65	23 46.2	22	97	98.9	23 39.5	22	97	99.5	23 32.7	23	97	100.0	23 25.8	23	97	100.5
6	22 47.8	22	97	98.7	22 41.2	22	97	99.2	22 34.5	23	97	99.7	22 27.7	23	97	100.3
7	21 49.4	22	97	98.4	21 42.9	22	97	99.0	21 36.3	22	97	99.5	21 29.6	23	97	100.0
8	20 50.9	21	98	98.2	20 44.5	22	97	98.7	20 38.0	22	97	99.3	20 31.3	22	97	99.8
9	19 52.4	21	98	98.0	19 46.1	21	97	98.5	19 39.6	22	97	99.0	19 33.1	22	97	99.5
70	18 53.9	21	98	97.8	18 47.6	21	97	98.3	18 41.3	21	97	98.8	18 34.8	22	97	99.3
1	17 55.3	21	98	97.6	17 49.1	21	98	98.1	17 42.8	21	97	98.6	17 36.5	21	97	99.1
2	16 56.8	20	98	97.3	16 50.6	21	98	97.9	16 44.4	21	97	98.4	16 38.1	21	97	98.9
3	15 58.1	20	98	97.1	15 52.1	20	98	97.6	15 45.9	21	98	98.1	15 39.7	21	97	98.7
4	14 59.5	20	98	96.9	14 53.5	20	98	97.4	14 47.4	20	98	97.9	14 41.3	21	97	98.4
75	14 00.8	20	98	96.7	13 54.9	20	98	97.2	13 48.9	20	98	97.7	13 42.8	20	97	98.2
6	13 02.1	19	98	96.5	12 56.2	20	98	97.0	12 50.3	20	98	97.5	12 44.3	20	98	98.0
7	12 03.4	19	98	96.3	11 57.6	19	98	96.8	11 51.7	20	98	97.3	11 45.8	20	98	97.8
8	11 04.7	19	98	96.1	10 58.9	19	98	96.6	10 53.1	19	98	97.1	10 47.2	20	98	97.6
9	10 05.9	19	98	95.9	10 00.2	19	98	96.4	9 54.5	19	98	96.9	9 48.7	19	98	97.4
80	9 07.1	19	98	95.7	9 01.5	19	98	96.2	8 55.8	19	98	96.7	8 50.1	19	98	97.2
1	8 08.3	19	98	95.6	8 02.7	19	98	96.0	7 57.1	19	98	96.5	7 51.4	19	98	97.0
2	7 09.5	18	98	95.4	7 04.0	19	98	95.9	6 58.4	19	98	96.4	6 52.8	19	98	96.9
3	6 10.7	18	98	95.2	6 05.2	18	98	95.7	5 59.6	18	98	96.2	5 54.1	19	98	96.7
4	5 11.8	18	98	95.0	5 06.4	18	98	95.5	5 00.9	18	98	96.0				

H.A.	6° 00′ Alt.			Az.	6° 30′ Alt.			Az.	7° 00′ Alt.			Az.	7° 30′ Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	74 00.0	1.0	03	180.0	73 30.0	1.0	03	180.0	73 00.0	1.0	03	180.0	72 30.0	1.0	03	180.0
1	73 58.1	1.0	09	176.4	73 28.2	1.0	09	176.5	72 58.2	1.0	09	176.6	72 28.3	1.0	08	176.7
2	73 52.6	99	15	172.8	73 22.8	99	15	173.0	72 53.0	99	14	173.2	72 23.2	99	14	173.4
3	73 43.4	98	21	169.3	73 13.9	98	21	169.6	72 44.4	98	20	169.9	72 14.8	99	19	170.2
4	73 30.7	97	27	165.9	73 01.5	97	26	166.3	72 32.4	97	25	166.7	72 03.1	97	25	167.0
05	73 14.6	95	32	162.5	72 45.9	96	31	163.0	72 17.1	96	31	163.5	71 48.3	96	30	163.9
6	72 55.2	94	37	159.3	72 27.1	94	36	159.9	71 58.8	94	35	160.4	71 30.5	95	35	160.9
7	72 32.8	92	42	156.2	72 05.2	92	41	156.8	71 37.6	92	40	157.4	71 09.8	93	39	158.0
8	72 07.5	89	47	153.2	71 40.6	90	45	153.9	71 13.5	90	44	154.6	70 46.3	91	43	155.2
9	71 39.6	87	51	150.4	71 13.3	88	50	151.1	70 46.9	88	48	151.9	70 20.3	89	47	152.6
10	71 09.2	85	54	147.7	70 43.6	86	53	148.5	70 17.8	86	52	149.3	69 51.9	87	51	150.0
1	70 36.5	82	58	145.1	70 11.6	83	57	146.0	69 46.5	84	56	146.8	69 21.3	85	55	147.6
2	70 01.7	80	61	142.7	69 37.5	81	60	143.6	69 13.2	82	59	144.4	68 48.5	82	58	145.2
3	69 25.0	78	64	140.5	69 01.5	79	63	141.4	68 37.9	79	62	142.2	68 13.9	80	61	143.0
4	68 46.5	75	67	138.3	68 23.8	76	66	139.2	68 00.8	77	64	140.1	67 37.5	78	63	140.9
15	68 06.5	73	69	136.3	67 44.4	74	68	137.2	67 22.1	75	67	138.1	66 59.5	76	66	139.0
6	67 25.0	71	71	134.5	67 03.6	72	70	135.4	66 41.9	73	69	136.2	66 20.0	74	68	137.1
7	66 42.2	69	73	132.7	66 21.4	70	72	133.6	66 00.4	71	71	134.5	65 39.1	72	70	135.3
8	65 58.1	66	75	131.0	65 38.0	68	74	131.9	65 17.6	69	73	132.8	64 56.9	70	72	133.7
9	65 13.0	64	77	129.4	64 53.5	66	76	130.3	64 33.7	67	75	131.2	64 13.6	68	74	132.1
20	64 26.9	62	78	127.9	64 08.0	64	77	128.8	63 48.8	65	77	129.7	63 29.2	66	76	130.6
1	63 39.9	61	80	126.5	63 21.5	62	79	127.4	63 02.8	63	78	128.3	62 43.9	64	77	129.2
2	62 52.0	59	81	125.2	62 34.2	60	80	126.1	62 16.0	61	79	127.0	61 57.6	62	78	127.8
3	62 03.3	57	82	124.0	61 46.1	58	81	124.8	61 28.4	59	81	125.7	61 10.5	60	80	126.5
4	61 14.0	55	83	122.8	60 57.2	57	83	123.7	60 40.1	58	82	124.5	60 22.7	59	81	125.3
25	60 24.0	54	84	121.7	60 07.7	55	84	122.5	59 51.1	56	83	123.4	59 34.1	57	82	124.2
6	59 33.5	52	85	120.6	59 17.6	53	84	121.5	59 01.4	54	84	122.3	58 44.9	55	83	123.1
7	58 42.4	51	86	119.6	58 26.9	52	85	120.5	58 11.2	53	85	121.3	57 55.1	54	84	122.1
8	57 50.7	50	87	118.7	57 35.7	51	86	119.5	57 20.4	52	85	120.3	57 04.8	53	85	121.1
9	56 58.7	48	87	117.8	56 44.1	49	87	118.6	56 29.2	50	86	119.4	56 13.9	51	86	120.1
30	56 06.2	47	88	116.9	55 52.0	48	88	117.7	55 37.4	49	87	118.5	55 22.6	50	86	119.3
1	55 13.3	46	89	116.1	54 59.5	47	88	116.9	54 45.3	48	88	117.6	54 30.8	49	87	118.4
2	54 20.1	45	89	115.3	54 06.6	46	89	116.1	53 52.8	47	88	116.8	53 38.7	47	88	117.6
3	53 26.5	43	90	114.6	53 13.3	44	89	115.3	52 59.9	45	89	116.1	52 46.1	46	88	116.8
4	52 32.6	42	90	113.9	52 19.8	43	90	114.6	52 06.6	44	89	115.3	51 53.2	45	89	116.1
35	51 38.5	41	91	113.2	51 25.9	42	90	113.9	51 13.1	43	90	114.6	51 00.0	44	89	115.4
6	50 44.0	40	91	112.5	50 31.7	41	91	113.3	50 19.2	42	90	114.0	50 06.4	43	90	114.7
7	49 49.3	40	92	111.9	49 37.3	40	91	112.6	49 25.1	41	91	113.3	49 12.6	42	90	114.0
8	48 54.4	39	92	111.3	48 42.7	39	91	112.0	48 30.7	40	91	112.7	48 18.5	41	91	113.4
9	47 59.2	38	92	110.8	47 47.8	39	92	111.4	47 36.1	39	91	112.1	47 24.1	40	91	112.8
40	47 03.9	37	93	110.2	46 52.7	38	92	110.9	46 41.2	39	92	111.6	46 29.6	39	91	112.2
1	46 08.3	36	93	109.7	45 57.4	37	92	110.3	45 46.2	38	92	111.0	45 34.8	38	92	111.7
2	45 12.6	35	93	109.2	45 01.9	36	93	109.8	44 50.9	37	92	110.5	44 39.7	38	92	111.1
3	44 16.7	35	93	108.7	44 06.2	35	93	109.3	43 55.5	36	93	110.0	43 44.5	37	92	110.6
4	43 20.7	34	94	108.2	43 10.4	35	93	108.8	42 59.9	35	93	109.5	42 49.1	36	93	110.1
45	42 24.4	33	94	107.7	42 14.4	34	94	108.4	42 04.1	35	93	109.0	41 53.6	35	93	109.6
6	41 28.1	33	94	107.3	41 18.2	33	94	107.9	41 08.1	34	93	108.6	40 57.8	35	93	109.2
7	40 31.6	32	94	106.9	40 21.9	33	94	107.5	40 12.0	33	94	108.1	40 02.0	34	93	108.7
8	39 35.0	31	95	106.5	39 25.5	32	94	107.1	39 15.8	33	94	107.7	39 05.9	33	94	108.3
9	38 38.3	31	95	106.1	38 29.0	31	94	106.7	38 19.5	32	94	107.3	38 09.8	33	94	107.9
50	37 41.5	30	95	105.7	37 32.3	31	95	106.3	37 23.0	31	94	106.9	37 13.5	32	94	107.5
1	36 44.5	30	95	105.3	36 35.5	30	95	105.9	36 26.4	31	94	106.5	36 17.1	31	94	107.1
2	35 47.5	29	95	105.0	35 38.7	30	95	105.5	35 29.7	30	95	106.1	35 20.5	31	94	106.7
3	34 50.3	29	95	104.6	34 41.7	29	95	105.2	34 32.9	30	95	105.8	34 23.9	30	95	106.3
4	33 53.1	28	96	104.3	33 44.6	29	95	104.8	33 35.9	29	95	105.4	33 27.1	30	95	106.0
55	32 55.8	28	96	103.9	32 47.5	28	95	104.5	32 38.9	29	95	105.1	32 30.3	29	95	105.6
6	31 58.4	27	96	103.6	31 50.2	28	96	104.2	31 41.8	28	95	104.7	31 33.3	29	95	105.3
7	31 01.0	27	96	103.3	30 52.9	27	96	103.9	30 44.6	28	95	104.4	30 36.3	28	95	105.0
8	30 03.4	26	96	103.0	29 55.5	27	96	103.5	29 47.4	27	96	104.1	29 39.2	28	95	104.6
9	29 05.8	26	96	102.7	28 58.0	26	96	103.2	28 50.0	27	96	103.8	28 41.9	27	96	104.3
60	28 08.1	25	96	102.4	28 00.4	26	96	102.9	27 52.6	26	96	103.5	27 44.7	27	96	104.0
1	27 10.4	25	96	102.1	27 02.8	25	96	102.7	26 55.1	26	96	103.2	26 47.3	26	96	103.7
2	26 12.6	25	96	101.8	26 05.1	25	96	102.4	25 57.6	25	96	102.9	25 49.9	26	96	103.5
3	25 14.7	24	97	101.6	25 07.4	25	96	102.1	24 59.9	25	96	102.6	24 52.4	25	96	103.2
4	24 16.8	24	97	101.3	24 09.6	24	96	101.8	24 02.2	25	96	102.4	23 54.8	25	96	102.9
65	23 18.8	24	97	101.0	23 11.7	24	97	101.6	23 04.5	24	96	102.1	22 57.2	25	96	102.6
6	22 20.8	23	97	100.8	22 13.8	24	97	101.3	22 06.7	24	96	101.8	21 59.5	24	96	102.4
7	21 22.7	23	97	100.5	21 15.8	23	97	101.1	21 08.8	24	97	101.6	21 01.7	24	96	102.1
8	20 24.6	23	97	100.3	20 17.8	23	97	100.8	20 10.9	23	97	101.3	20 03.9	23	96	101.9
9	19 26.5	22	97	100.1	19 19.8	23	97	100.6	19 13.0	23	97	101.1	19 06.1	23	96	101.6
70	18 28.3	22	97	99.8	18 21.7	22	97	100.3	18 15.0	22	97	100.9	18 08.2	23	97	101.4
1	17 30.0	22	97	99.6	17 23.5	22	97	100.1	17 16.9	22	97	100.6	17 10.2	22	97	101.1
2	16 31.8	21	97	99.4	16 25.3	22	97	99.9	16 18.8	22	97	100.4	16 12.2	22	97	100.9
3	15 33.4	21	97	99.2	15 27.1	21	97	99.7	15 20.7	22	97	100.2	15 14.2	22	97	100.7
4	14 35.1	21	97	98.9	14 28.8	21	97	99.5	14 22.5	21	97	100.0	14 16.1	21	97	100.5
75	13 36.7	21	97	98.7	13 30.5	21	97	99.2	13 24.3	21	97	99.7	13 18.0	21	97	100.2
6	12 38.3	20	97	98.5	12 32.2	20	97	99.0	12 26.0	21	97	99.5	12 19.8	21	97	100.0
7	11 39.8	20	97	98.3	11 33.8	20	97	98.8	11 27.7	20	97	99.3	11 21.6	21	97	99.8
8	10 41.3	20	98	98.1	10 35.4	20	97	98.6	10 29.4	20	97	99.1	10 23.4	20	97	99.6
9	9 42.8	20	98	97.9	9 37.0	20	97	98.4	9 31.0	20	97	98.9	9 25.1	20	97	99.4
80	8 44.3	19	98	97.7	8 38.5	19	98	98.2	8 32.7	20	97	98.7	8 26.8	20	97	99.2
1	7 45.7	19	98	97.5	7 40.0	19	98	98.0	7 34.2	19	97	98.5	7 28.4	19	97	99.0
2	6 47.1	19	98	97.3	6 41.5	19	98	97.8	6 35.8	19	97	98.3	6 30.1	19	97	98.8
3	5 48.5	19	98	97.2	5 42.9	19	98	97.7	5 37.3	19	98	98.1	5 31.7	19	97	98.6
4																

H.A.	8° 00′				8° 30′				9° 00′				9° 30′				10° 00′				10° 30′				11° 00′				11° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	88 00.0	1.0	23	180.0	88 30.0	1.0	30	180.0	89 00.0	1.0	40	180.0	89 30.0	1.0	60	180.0	90 00.0	..	98	....	89 30.0	1.0	60	00.0	89 00.0	1.0	40	00.0	88 30.0	1.0	29	00.0	00
1	87 46.2	90	58	153.6	88 12.3	84	68	146.6	88 35.7	71	81	135.3	88 53.7	45	93	116.8	89 00.9	00	98	89.9	88 53.8	45	93	63.0	88 35.8	71	80	44.4	88 12.4	84	68	33.1	1
2	87 11.3	71	76	135.2	87 31.2	61	84	127.1	87 47.3	45	91	116.7	87 58.0	25	96	104.1	88 01.8	00	98	89.8	87 58.2	24	96	75.6	87 47.6	45	91	62.9	87 31.7	60	84	52.5	2
3	86 25.5	56	85	123.8	86 40.8	46	90	116.6	86 52.6	32	95	108.4	87 00.1	17	98	99.3	87 02.7	00	98	89.7	87 00.4	16	97	80.1	86 53.1	32	94	71.0	86 41.6	45	90	62.8	3
4	85 34.3	46	90	116.5	85 46.6	36	93	110.5	85 55.8	25	96	103.9	86 01.6	13	98	96.9	86 03.6	01	98	89.7	86 01.9	12	98	82.4	85 56.5	24	96	75.4	85 47.6	35	93	68.7	4
05	84 40.3	38	93	111.6	84 50.5	30	95	106.5	84 58.1	21	97	101.0	85 02.8	11	98	95.4	85 04.6	01	98	89.6	85 03.3	09	98	83.8	84 59.0	19	97	78.1	84 51.8	28	95	72.6	05
6	83 44.8	33	94	108.2	83 53.5	26	96	103.7	83 59.9	18	97	99.1	84 03.9	09	98	94.3	84 05.5	01	98	89.5	84 04.5	08	98	84.6	84 01.0	16	97	79.8	83 55.1	24	96	75.2	6
7	82 48.2	29	95	105.6	82 55.8	22	97	101.7	83 01.4	15	98	97.7	83 05.0	08	98	93.5	83 06.4	01	98	89.4	83 05.6	06	98	85.2	83 02.7	13	97	81.1	82 57.7	20	96	77.1	7
8	81 51.0	26	96	103.6	81 57.8	20	97	100.1	82 02.8	14	98	96.6	82 06.0	08	98	92.9	82 07.3	01	98	89.3	82 06.7	05	98	85.7	82 04.3	11	98	82.0	81 59.9	17	97	78.5	8
9	80 53.4	23	97	101.9	80 59.5	18	97	98.8	81 04.1	12	98	95.7	81 07.0	07	98	92.5	81 08.2	01	98	89.2	81 07.8	04	98	86.0	81 05.7	10	98	82.7	81 01.9	15	97	79.6	9
10	79 55.4	21	97	100.6	80 01.0	16	98	97.8	80 05.2	11	98	94.9	80 07.9	07	98	92.0	80 09.1	02	98	89.1	80 08.8	04	98	86.2	80 07.0	09	98	83.3	80 03.7	13	97	80.4	10
1	78 57.2	20	97	99.5	79 02.4	15	98	97.0	79 06.3	11	98	94.3	79 08.9	06	98	91.7	79 10.1	02	98	89.0	79 09.9	03	98	86.4	79 08.3	07	98	83.7	79 05.4	12	97	81.1	1
2	77 58.9	18	97	98.6	78 03.7	14	98	96.2	78 07.4	10	98	93.8	78 09.8	06	98	91.4	78 11.0	02	98	89.0	78 10.9	02	98	86.5	78 09.6	07	98	84.1	78 07.0	11	98	81.7	2
3	77 00.4	17	98	97.8	77 05.0	13	98	95.6	77 08.4	10	98	93.4	77 10.7	06	98	91.1	77 11.9	02	98	88.9	77 11.9	02	98	86.6	77 10.8	06	98	84.4	77 08.5	10	98	82.1	3
4	76 01.8	16	98	97.1	76 06.1	13	98	95.0	76 09.4	09	98	93.0	76 11.7	06	98	90.9	76 12.8	02	98	88.8	76 12.9	01	98	86.7	76 12.0	05	98	84.6	76 09.9	09	98	82.5	4
15	75 03.1	15	98	96.5	75 07.2	12	98	94.5	75 10.4	09	98	92.6	75 12.6	06	98	90.6	75 13.8	02	98	88.7	75 13.9	01	98	86.7	75 13.1	04	98	84.8	75 11.3	08	98	82.8	15
6	74 04.4	15	98	95.9	74 08.3	12	98	94.1	74 11.4	09	98	92.3	74 13.5	06	98	90.4	74 14.7	02	98	88.6	74 14.9	01	98	86.8	74 14.3	04	98	84.9	74 12.7	07	98	83.1	6
7	73 05.6	14	98	95.4	73 09.4	11	98	93.7	73 12.3	08	98	92.0	73 14.4	05	98	90.2	73 15.6	03	98	88.5	73 16.0	00	98	86.8	73 15.4	03	98	85.0	73 14.0	06	98	83.3	7
8	72 06.7	14	98	94.9	72 10.4	11	98	93.3	72 13.3	08	98	91.7	72 15.3	05	98	90.1	72 16.5	03	98	88.4	72 17.0	00	98	86.8	72 16.6	03	98	85.1	72 15.3	05	98	83.5	8
9	71 07.8	13	98	94.5	71 11.4	11	98	93.0	71 14.2	08	98	91.4	71 16.2	05	98	89.9	71 17.5	03	98	88.3	71 18.0	00	98	86.8	71 17.7	02	98	85.2	71 16.6	05	98	83.7	9
20	70 08.9	13	98	94.1	70 12.4	10	98	92.7	70 15.1	08	98	91.2	70 17.1	05	98	89.7	70 18.4	03	98	88.2	70 19.0	01	98	86.8	70 18.8	02	98	85.3	70 17.9	04	98	83.8	20
1	69 10.0	12	98	93.8	69 13.4	10	98	92.4	69 16.0	08	98	91.0	69 18.0	06	98	89.6	69 19.4	03	98	88.2	69 20.0	01	98	86.7	69 19.9	01	98	85.3	69 19.1	04	98	83.9	1
2	68 11.0	12	98	93.5	68 14.3	10	98	92.1	68 17.0	08	98	90.8	68 19.0	06	98	89.4	68 20.3	03	98	88.1	68 21.0	01	98	86.7	68 21.0	01	98	85.4	68 20.4	03	98	84.0	2
3	67 12.0	12	98	93.1	67 15.3	10	98	91.9	67 17.9	08	98	90.6	67 19.9	06	98	89.3	67 21.2	04	98	88.0	67 22.0	01	98	86.7	67 22.1	01	98	85.4	67 21.6	03	98	84.1	3
4	66 13.0	12	98	92.8	66 16.2	10	98	91.6	66 18.8	08	98	90.4	66 20.8	06	98	89.1	66 22.2	04	98	87.9	66 23.0	02	98	86.6	66 23.2	00	98	85.4	66 22.8	02	98	84.1	4
25	65 14.0	11	98	92.6	65 17.1	10	98	91.4	65 19.7	08	98	90.2	65 21.7	06	98	89.0	65 23.1	04	98	87.8	65 24.0	02	98	86.6	65 24.3	00	98	85.4	65 24.0	02	98	84.2	25
6	64 15.0	11	98	92.3	64 18.1	09	98	91.2	64 20.6	08	98	90.0	64 22.6	06	98	88.9	64 24.1	04	98	87.7	64 25.0	02	98	86.5	64 25.4	00	98	85.4	64 25.3	01	98	84.2	6
7	63 15.9	11	98	92.1	63 19.0	09	98	91.0	63 21.5	08	98	89.8	63 23.6	06	98	88.7	63 25.1	04	98	87.6	63 26.1	02	98	86.5	63 26.5	01	98	85.4	63 26.5	01	98	84.3	7
8	62 16.9	11	98	91.8	62 19.9	09	98	90.7	62 22.4	08	98	89.7	62 24.5	06	98	88.6	62 26.0	04	98	87.5	62 27.1	03	98	86.4	62 27.6	01	98	85.4	62 27.7	01	98	84.3	8
9	61 17.8	11	98	91.6	61 20.8	09	98	90.6	61 23.4	08	98	89.5	61 25.4	06	98	88.5	61 27.0	04	98	87.4	61 28.1	03	98	86.4	61 28.7	01	98	85.3	61 28.9	00	98	84.3	9
30	60 18.7	11	98	91.4	60 21.7	09	98	90.4	60 24.3	08	98	89.4	60 26.3	06	98	88.3	60 28.0	05	98	87.3	60 29.1	03	98	86.3	60 29.8	02	98	85.3	60 30.1	00	98	84.3	30
1	59 19.6	11	98	91.2	59 22.6	09	98	90.2	59 25.2	08	98	89.2	59 27.3	06	98	88.2	59 29.0	05	98	87.2	59 30.2	03	98	86.3	59 30.9	02	98	85.3	59 31.3	00	98	84.3	1
2	58 20.6	11	98	91.0	58 23.5	09	98	90.0	58 26.1	08	98	89.1	58 28.2	06	98	88.1	58 29.9	05	98	87.1	58 31.2	04	98	86.2	58 32.1	02	98	85.2	58 32.5	01	98	84.3	2
3	57 21.5	11	98	90.8	57 24.5	09	98	89.8	57 27.0	08	98	88.9	57 29.2	07	98	88.0	57 30.9	05	98	87.1	57 32.3	04	98	86.1	57 33.2	02	98	85.2	57 33.7	01	98	84.3	3
4	56 22.4	11	98	90.6	56 25.4	09	98	89.7	56 27.9	08	98	88.8	56 30.1	07	98	87.9	56 31.9	05	98	87.0	56 33.3	04	98	86.1	56 34.3	03	98	85.1	56 34.9	01	98	84.2	4
35	55 23.3	11	98	90.4	55 26.3	09	98	89.5	55 28.9	08	98	88.6	55 31.1	07	98	87.7	55 32.9	05	98	86.9	55 34.4	04	98	86.0	55 35.4	03	98	85.1	55 36.1	02	98	84.2	35
6	54 24.2	10	98	90.2	54 27.2	09	98	89.3	54 29.8	08	98	88.5	54 32.0	07	98	87.6	54 33.9	06	98	86.8	54 35.4	04	98	85.9	54 36.6	03	98	85.0	54 37.3	02	98	84.2	6
7	53 25.1	10	98	90.0	53 28.1	09	98	89.2	53 30.7	08	98	88.4	53 33.0	07	98	87.5	53 34.9	06	98	86.7	53 36.5	05	98	85.8	53 37.7	03	98	85.0	53 38.5	02	98	84.1	7
8	52 26.1	10	98	89.9	52 29.0	09	98	89.0	52 31.7	08	98	88.2	52 34.0	07	98	87.4	52 35.9	06	98	86.6	52 37.6	06	98	85.8	52 38.8	04	98	84.9	52 39.8	03	98	84.1	8
9	51 27.0	11	98	89.7	51 30.0	09	98	88.9	51 32.6	08	98	88.1	51 34.9	07	98	87.3	51 37.0	06	98	86.5	51 38.6	05	98	85.7	51 40.0	04	98	84.9	51 41.0	03	98	84.1	9
40	50 27.9	11	98	89.5	50 30.9	09	98	88.7	50 33.6	08	98	88.0	50 35.9	07	98	87.2	50 38.0	06	98	86.4	50 39.7	06	98	85.6	50 41.1	04	98	84.8	50 42.2	03	98	84.0	40
1	49 28.8	11	98	89.4	49 31.8	10	98	88.6	49 34.5	09	98	87.8	49 36.9	08	98	87.1	49 39.0	06	98	86.3	49 40.8	05	98	85.5	49 42.3	04	98	84.7	49 43.5	03	98	84.0	1
2	48 29.7	11	98	89.2	48 32.7	10	98	88.4	48 35.5	09	98	87.7	48 37.9	08	98	86.9	48 40.1	07	98	86.2	48 41.9	06	98	85.4	48 43.4	05	98	84.7	48 44.7	04	98	83.9	2
3	47 30.6	11	98	89.0	47 33.7	10	98	88.3	47 36.4	09	98	87.6	47 38.9	08	98	86.8	47 41.1	07	98	86.1	47 43.0	06	98	85.3	47 44.6	05	98	84.6	47 45.9	04	98	83.9	3
4	46 31.5	11	98	88.9	46 34.6	10	98	88.2	46 37.4	09	98	87.4	46 39.9	08	98	86.7	46 42.2	07	98	86.0	46 44.1	06	98	85.3	46 45.8	05	98	84.5	46 47.2	04	98	83.8	4
45	45 32.5	11	98	88.7	45 35.6	10	98	88.0	45 38.4	09	98	87.3	45 40.9	08	98	86.6	45 43.2	07	98	85.9	45 45.2	06	98	85.2	45 47.0	05	98	84.5	45 48.5	04	98	83.7	45
6	44 33.4	11	98	88.6	44 36.5	10	98	87.9	44 39.4	09	98	87.2	44 41.9	08	98	86.5	44 44.3	07	98	85.8	44 46.4	06	98	85.1	44 48.2	06	98	84.4	44 49.7	05	98	83.7	6
7	43 34.3	11	98	88.4	43 37.5	10	98	87.7	43 40.3	09	98	87.1	43 43.0	08	98	86.4	43 45.4	08	98	85.7	43 47.5	07	98	85.0	43 49.4	06	98	84.3	43 51.0	05	98	83.6	7
8	42 35.3	11	98	88.3	42 38.4	10	98	87.6	42 41.3	09	98	86.9	42 44.0	09	98	86.3	42 46.4	08	98	85.6	42 48.6	07	98	84.9	42 50.6	06	98	84.2	42 52.3	05	98	83.5	8
9	41 36.2	11	98	88.1	41 39.4	10	98	87.5	41 42.3	09	98	86.8	41 45.0	09	98	86.1	41 47.5	08	98	85.5	41 49.8	07	98	84.8	41 51.8	06	98	84.1	41 53.6	06	98	83.5	9
50	40 37.2	11	98	88.0	40 40.4	10	98	87.3	40 43.3	10	98	86.7	40 46.1	09	98	86.0	40 48.6	08	98	85.4	40 50.9	07	98	84.7	40 53.0	07	98	84.1	40 54.9	06	98	83.4	50
1	39 38.1	11	98	87.9	39 41.3	10	98	87.2	39 44.4	10	98	86.6	39 47.2	09	98	85.9	39 49.7	08	98	85.3	39 52.1	08	98	84.6	39 54.3	07	98	84.0	39 56.2	06	98	83.3	1
2	38 39.1	11	98	87.7	38 42.3	11	98	87.1	38 45.4	10	98	86.4	38 48.2	09	98	85.8	38 50.9	08	98	85.2	38 53.3	08	98	84.5	38 55.5	07	98	83.9	38 57.5	06	98	83.2	2
3	37 40.0	11	98	87.6	37 43.3	11	98	86.9	37 46.4	10	98	86.3	37 49.3	09	98	85.7	37 52.0	09	98	85.1	37 54.5	08	98	84.4	37 56.8	07	98	83.8	37 58.8	07	98	83.2	3
4	36 41.0	11	98	87.4	36 44.3	11	98	86.8	36 47.4	10	98	86.2	36 50.4	09	98	85.6	36 53.1	09	98	84.9	36 55.7	08	98	84.3	36 58.0	08	98	83.7	37 00.2	07	98	83.1	4
55	35 42.0	11	98	87.3	35 45.3	11	98	86.7	35 48.5	10	98	86.1	35 51.5	10	98	85.4	35 54.3	09	98	84.8	35 56.9	08	98	84.2	35 59.3	08	98	83.6	36 01.5	07	98	83.0	55
6	34 42.9	12	98	87.1	34 46.3	11	98	86.5	34 49.5	10	98	85.9	34 52.6	10	98	85.3	34 55.4	09	98	84.7	34 58.1	09	98	84.1	35 00.6	08	98	83.5	35 02.9	07	98	82.9	6
7	33 43.9	12	98	87.0	33 47.4	11	98	86.4	33 50.6	11	98	85.8	33 53.7	10	98	85.2	33 56.6	09	98	84.6	33 59.3	09	98	84.0	34 01.9	08	98	83.4	34 04.2	08	98	82.8	7
8	32 44.9	12	98	86.9	32 48.4	11	98	86.3	32 51.7	11	98	85.7	32 54.8	10	98	85.1	32 57.8	10	98	84.5	33 00.6	09	98	83.9	33 03.2	08	98	83.3	33 05.6	08	98	82.7	8
9	31 45.9	12	98	86.7	31 49.4	11	98	86.1	31 52.8	11	98	85.6	31 55.9	10	98	85.0	31 59.0	10	98	84.4	32 01.8	09	98	83.8	32 04.5	09	98	83.2	32 07.0	08	98	82.6	9
60	30 46.9	12	98	86.6	30 50.5	12	98	86.0	30 53.9	11	98	85.4	30 57.1	10	98	84.9	31 00.2	10	98	84.3	31 03.1	09	98	83.7	31 05.8	09	98	83.1	31 08.4	08	98	82.5	60
1	29 48.0	12	98	86.5	29 51.5	12	98	85.9	29 55.0	11	98	85.3	29 58.2	11	98	84.7	30 01.4	10	98	84.2	30 04.3	10	98	83.6	30 07.2	09	98	83.0	30 09.8	09	98	82.4	1
2	28 49.0	12	98	86.3	28 52.6	12	98	85.7	28 56.1	11	98	85.2	28 59.4	11	98	84.6	29 02.6	10	98	84.0	29 05.6	10	98	83.5	29 08.5	09	98	82.9	29 11.3	09	98	82.3	2
3	27 50.0	12	98	86.2	27 53.7	12	98	85.6	27 57.2	11	98	85.1	28 00.6	11	98	84.5	28 03.8	11	98	83.9	28 06.9	10	98	83.4	28 09.9	10	98	82.8	28 12.7	09	98	82.2	3
4	26 51.1	13	98	86.0	26 54.8	12	98	85.5	26 58.3	12	98	84.9	27 01.8	11	98	84.4	27 05.1	11	98	83.8	27 08.2	10	98	83.2	27 11.3	10	98	82.7	27 14.2	09	98	82.1	4
65	25 52.1	13	98	85.9	25 55.9	12	98	85.3	25 59.5	12	98	84.8	26 03.0	11	98	84.2	26 06.3	11	98	83.7	26 09.6	11	98	83.1	26 12.7	10	98	82.6	26 15.7	10	98	82.0	65
6	24 53.2	13	98	85.8	24 57.0	12	98	85.2	25 00.7	12	98	84.7	25 04.2	12	98	84.1	25 07.6	11	98	83.6	25 10.9	11	98	83.0	25 14.1	10	98	82.5	25 17.2	10	97	81.9	6
7	23 54.3	13	98	85.6	23 58.1	13	98	85.1	24 01.8	12	98	84.5	24 05.4	12	98	84.0	24 08.9	11	98	83.4	24 12.3	11	98	82.9	24 15.5	11	98	82.4	24 18.7	10	97	81.8	7
8	22 55.4	13	98	85.5	22 59.2	13	98	84.9	23 03.0	12	98	84.4	23 06.7	12	98	83.9	23 10.2	12	98	83.3	23 13.6	11	98	82.8	23 17.0	11	98	82.2	23 20.2	11	97	81.7	8
9	21 56.5	13	98	85.3	22 00.4	13	98	84.8	22 04.2	13	98	84.3	22 07.9	12	98	83.7	22 11.5	12	98	83.2	22 15.0	11	98	82.7	22 18.4	11	98	82.1	22 21.7	11	97	81.6	9
70	20 57.6	13	98	85.2	21 01.6	13	98	84.7	21 05.4	13	98	84.1	21 09.2	12	98	83.6	21 12.9	12	98	83.1	21 16.4	12	98	82.5	21 19.9	11	98	82.0	21 23.3	11	97	81.5	70
1	19 58.7	14	98	85.1	20 02.7	13	98	84.5	20 06.7	13	98	84.0	20 10.5	13	98	83.5	20 14.2	12	98	82.9	20 17.9	12	98	82.4	20 21.4	12	97	81.9	20 24.9	11	97	81.4	1
2	18 59.9	14	98	84.9	19 03.9	13	98	84.4	19 07.9	13	98	83.9	19 11.8	13	98	83.3	19 15.6	13	98	82.8	19 19.3	12	98	82.3	19 22.9	12	97	81.8	19 26.4	12	97	81.2	2
3	18 01.0	14	98	84.8	18 05.1	14	98	84.2	18 09.2	13	98	83.7	18 13.1	13	98	83.2	18 17.0	13	98	82.7	18 20.8	12	98	82.2	18 24.5	12	97	81.6	18 28.1	12	97	81.1	3
4	17 02.2	14	98	84.6	17 06.3	14	98	84.1	17 10.4	14	98	83.6	17 14.4	13	98	83.1	17 18.4	13	98	82.5	17 22.2	13	98	82.0	17 26.0	12	97	81.5	17 29.7	12	97	81.0	4
75	16 03.3	14	98	84.5	16 07.6	14	98	84.0	16 11.7	14	98	83.4	16 15.8	13	98	82.9	16 19.8	13	98	82.4	16 23.7	13	97	81.9	16 27.6	13	97	81.4	16 31.3	12	97	80.9	75
6	15 04.5	14	98	84.3	15 08.8	14	98	83.8	15 13.0	14	98	83.3	15 17.2	14	98	82.8	15 21.2	13	98	82.3	15 25.2	13	97	81.8	15 29.2	13	97	81.2	15 33.0	13	97	80.7	6
7	14 05.8	15	98	84.2	14 10.1	14	98	83.7	14 14.4	14	98	83.2	14 18.6	14	98	82.6	14 22.7	14	98	82.1	14 26.8	13	97	81.6	14 30.8	13	97	81.1	14 34.7	13	97	80.6	7
8	13 07.0	15	98	84.0	13 11.4	15	98	83.5	13 15.7	14	98	83.0	13 20.0	14	98	82.5	13 24.2	14	98	82.0	13 28.3	14	97	81.5	13 32.4	14	97	81.0	13 36.4	13	97	80.5	8
9	12 08.2	15	98	83.9	12 12.7	15	98	83.4	12 17.1	15	98	82.9	12 21.4	14	98	82.4	12 25.7	14	97	81.9	12 29.9	14	97	81.3	12 34.1	14	97	80.8	12 38.2	14	97	80.3	9
80	11 09.5	15	98	83.7	11 14.0	15	98	83.2	11 18.4	15	98	82.7	11 22.8	15	98	82.2	11 27.2	14	97	81.7	11 31.5	14	97	81.2	11 35.7	14	97	80.7	11 39.9	14	97	80.2	80
1	10 10.7	15	98	83.6	10 15.3	15	98	83.1	10 19.8	15	98	82.6	10 24.3	15	98	82.1	10 28.7	15	97	81.6	10 33.1	15	97	81.1	10 37.4	14	97	80.6	10 41.7	14	97	80.1	1
2	9 12.0	15	98	83.4	9 16.7	15	98	82.9	9 21.2	15	98	82.4	9 25.8	15	97	81.9	9 30.3	15	97	81.4	9 34.7	15	97	80.9	9 39.2	15	97	80.4	9 43.5	14	97	79.9	2
3	8 13.3	16	98	83.3	8 18.0	16	98	82.8	8 22.7	15	98	82.3	8 27.3	15	97	81.8	8 31.9	15	97	81.3	8 36.4	15	97	80.8	8 40.9	15	97	80.3	8 45.4	15	97	79.8	3
4	7 14.7	16	98	83.1	7 19.4	16	98	82.6	7 24.1	16	98	82.1	7 28.8	16	97	81.6	7 33.5	15	97	81.1	7 38.1	15	97	80.6	7 42.7	15	97	80.1	7 47.2	15	97	79.6	4
85	6 16.0	16	98	82.9	6 20.8	16	98	82.4	6 25.6	16	98	82.0	6 30.4	16	97	81.5	6 35.1	16	97	81.0	6 39.8	16	97	80.5	6 44.5	16	97	80.0	6 49.1	15	97	79.5	85
6	5 17.4	16	98	82.8	5 22.3	16	98	82.3	5 27.1	16	98	81.8	5 32.0	16	97	81.3	5 36.8	16	97	80.8	5 41.6	16	97	80.3	5 46.3	16	97	79.8	5 51.0	16	97	79.3	6

H.A.	8° 00′				8° 30′				9° 00′				9° 30′				10° 00′				10° 30′				11° 00′				11° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	72 00.0	1.0	03	180.0	71 30.0	1.0	03	180.0	71 00.0	1.0	03	180.0	70 30.0	1.0	03	180.0	70 00.0	1.0	02	180.0	69 30.0	1.0	02	180.0	69 00.0	1.0	02	180.0	68 30.0	1.0	02	180.0	00
1	71 58.3	1.0	08	176.8	71 28.4	1.0	08	176.9	70 58.4	1.0	08	177.0	70 28.5	1.0	08	177.0	69 58.5	1.0	07	177.1	69 28.6	1.0	07	177.2	68 58.6	1.0	07	177.3	68 28.6	1.0	07	177.3	1
2	71 53.4	99	14	173.6	71 23.6	99	13	173.8	70 53.8	99	13	174.0	70 23.9	99	13	174.1	69 54.1	99	12	174.3	69 24.2	1.0	12	174.4	68 54.4	1.0	12	174.5	68 24.5	1.0	11	174.7	2
3	71 45.2	99	19	170.5	71 15.6	99	18	170.7	70 46.0	99	18	171.0	70 16.4	99	18	171.2	69 46.7	99	17	171.4	69 17.0	99	17	171.6	68 47.4	99	16	171.8	68 17.6	99	16	172.0	3
4	71 33.9	98	24	167.4	71 04.6	98	23	167.7	70 35.2	98	23	168.0	70 05.9	98	22	168.3	69 36.5	98	22	168.6	69 07.0	98	21	168.9	68 37.6	98	21	169.2	68 08.1	98	20	169.4	4
05	71 19.4	96	29	164.4	70 50.5	97	28	164.8	70 21.5	97	28	165.2	69 52.5	97	27	165.5	69 23.4	97	26	165.9	68 54.3	97	26	166.2	68 25.2	97	25	166.5	67 56.0	97	24	166.9	05
6	71 02.1	95	34	161.4	70 33.6	95	33	161.9	70 05.0	95	32	162.4	69 36.4	96	31	162.8	69 07.7	96	31	163.2	68 38.9	96	30	163.6	68 10.1	96	29	164.0	67 41.3	96	29	164.3	6
7	70 41.9	93	38	158.6	70 13.9	93	37	159.1	69 45.8	94	36	159.6	69 17.6	94	36	160.1	68 49.3	94	35	160.6	68 21.0	95	34	161.0	67 52.6	95	33	161.5	67 24.1	95	33	161.9	7
8	70 19.0	91	42	155.8	69 51.5	92	41	156.4	69 23.9	92	40	157.0	68 56.2	92	40	157.5	68 28.5	93	39	158.1	68 00.6	93	38	158.6	67 32.6	93	37	159.0	67 04.6	94	36	159.5	8
9	69 53.6	89	46	153.2	69 26.7	90	45	153.9	68 59.6	90	44	154.5	68 32.5	91	43	155.1	68 05.2	91	42	155.6	67 37.8	91	42	156.2	67 10.4	92	41	156.7	66 42.8	92	40	157.2	9
10	69 25.8	87	50	150.7	68 59.5	88	49	151.4	68 33.0	88	48	152.0	68 06.4	89	47	152.7	67 39.7	89	46	153.3	67 12.9	90	45	153.8	66 45.9	90	44	154.4	66 18.8	90	43	154.9	10
1	68 55.8	85	53	148.3	68 30.1	86	52	149.0	68 04.3	86	51	149.7	67 38.3	87	50	150.4	67 12.1	87	49	151.0	66 45.8	88	48	151.6	66 19.3	88	48	152.2	65 52.8	89	47	152.8	1
2	68 23.7	83	57	146.0	67 58.7	84	56	146.7	67 33.4	84	55	147.5	67 08.0	85	54	148.1	66 42.5	86	53	148.8	66 16.7	86	52	149.5	65 50.8	87	51	150.1	65 24.8	87	50	150.7	2
3	67 49.7	81	60	143.8	67 25.3	82	58	144.6	67 00.7	82	57	145.3	66 35.9	83	56	146.0	66 10.9	84	55	146.7	65 45.8	84	54	147.4	65 20.4	85	54	148.0	64 54.9	85	53	148.7	3
4	67 14.0	79	62	141.8	66 50.2	80	61	142.5	66 26.3	80	60	143.3	66 02.1	81	59	144.0	65 37.7	82	58	144.7	65 13.1	82	57	145.4	64 48.3	83	56	146.1	64 23.4	83	55	146.7	4
15	66 36.6	77	65	139.8	66 13.5	77	64	140.6	65 50.1	78	63	141.4	65 26.6	79	62	142.1	65 02.8	80	61	142.8	64 38.7	80	60	143.5	64 14.5	81	59	144.2	63 50.2	82	58	144.9	15
6	65 57.7	75	67	137.9	65 35.2	75	66	138.7	65 12.5	76	65	139.5	64 49.5	77	64	140.3	64 26.3	78	63	141.0	64 02.9	78	62	141.7	63 39.2	79	61	142.4	63 15.4	80	60	143.1	6
7	65 17.5	72	69	136.2	64 55.6	73	68	137.0	64 33.4	74	67	137.8	64 11.1	75	66	138.5	63 48.4	76	65	139.3	63 25.6	77	64	140.0	63 02.5	77	63	140.7	62 39.2	78	63	141.4	7
8	64 35.9	70	71	134.5	64 14.6	71	70	135.3	63 53.1	72	69	136.1	63 31.3	73	68	136.9	63 09.3	74	67	137.6	62 47.0	75	66	138.4	62 24.5	75	66	139.1	62 01.7	76	65	139.8	8
9	63 53.2	69	73	132.9	63 32.5	69	72	133.7	63 11.5	70	71	134.5	62 50.3	71	70	135.3	62 28.8	72	69	136.1	62 07.1	73	68	136.8	61 45.2	74	67	137.5	61 23.0	74	67	138.2	9
20	63 09.4	67	75	131.4	62 49.3	68	74	132.2	62 28.9	68	73	133.0	62 08.2	69	72	133.8	61 47.3	70	71	134.6	61 26.1	71	70	135.3	61 04.7	72	69	136.0	60 43.0	73	68	136.7	20
1	62 24.6	65	76	130.0	62 05.0	66	75	130.8	61 45.2	67	74	131.6	61 25.0	68	74	132.4	61 04.7	68	73	133.1	60 44.0	69	72	133.9	60 23.1	70	71	134.6	60 02.0	71	70	135.3	1
2	61 38.9	63	78	128.6	61 19.8	64	77	129.4	61 00.5	65	76	130.2	60 40.9	66	75	131.0	60 21.1	67	74	131.8	60 00.9	67	73	132.5	59 40.6	68	72	133.3	59 20.0	69	72	134.0	2
3	60 52.3	61	79	127.4	60 33.8	62	78	128.2	60 15.0	63	77	128.9	59 55.9	64	76	129.7	59 36.6	65	76	130.5	59 16.9	66	75	131.2	58 57.1	67	74	132.0	58 37.0	67	73	132.7	3
4	60 04.9	60	80	126.1	59 46.9	61	79	126.9	59 28.6	61	78	127.7	59 10.0	62	78	128.5	58 51.2	63	77	129.2	58 32.1	64	76	130.0	58 12.7	65	75	130.7	57 53.1	66	74	131.4	4
25	59 16.9	58	81	125.0	58 59.3	59	80	125.8	58 41.5	60	80	126.6	58 23.4	61	79	127.3	58 05.0	62	78	128.1	57 46.4	63	77	128.8	57 27.5	63	77	129.5	57 08.4	64	76	130.2	25
6	58 28.1	56	82	123.9	58 11.1	57	82	124.7	57 53.7	58	81	125.4	57 36.1	59	80	126.2	57 18.2	60	79	126.9	57 00.0	61	78	127.7	56 41.6	62	78	128.4	56 22.9	63	77	129.1	6
7	57 38.8	55	83	122.8	57 22.2	56	82	123.6	57 05.3	57	82	124.4	56 48.1	58	81	125.1	56 30.6	59	80	125.9	56 12.9	59	80	126.6	55 54.9	60	79	127.3	55 36.7	61	78	128.0	7
8	56 48.9	54	84	121.9	56 32.7	54	83	122.6	56 16.2	55	83	123.4	55 59.5	56	82	124.1	55 42.4	57	81	124.9	55 25.2	58	81	125.6	55 07.6	59	80	126.3	54 49.9	60	79	127.0	8
9	55 58.4	52	85	120.9	55 42.6	53	84	121.7	55 26.6	54	84	122.4	55 10.3	55	83	123.2	54 53.7	56	82	123.9	54 36.8	57	82	124.6	54 19.7	57	81	125.3	54 02.4	58	80	126.0	9
30	55 07.5	51	86	120.0	54 52.1	52	85	120.8	54 36.4	53	84	121.5	54 20.5	54	84	122.2	54 04.3	54	83	122.9	53 47.9	55	82	123.7	53 31.2	56	82	124.4	53 14.3	57	81	125.0	30
1	54 16.1	50	86	119.1	54 01.1	50	86	119.9	53 45.8	51	85	120.6	53 30.3	52	84	121.3	53 14.5	53	84	122.1	52 58.5	54	83	122.8	52 42.2	55	83	123.5	52 25.6	56	82	124.1	1
2	53 24.3	48	87	118.3	53 09.7	49	86	119.1	52 54.8	50	86	119.8	52 39.6	51	85	120.5	52 24.2	52	85	121.2	52 08.5	53	84	121.9	51 52.6	53	83	122.6	51 36.5	54	83	123.3	2
3	52 32.1	47	88	117.5	52 17.8	48	87	118.3	52 03.3	49	86	119.0	51 48.5	50	86	119.7	51 33.4	51	85	120.4	51 18.1	51	85	121.1	51 02.6	52	84	121.8	50 46.8	53	84	122.4	3
4	51 39.5	46	88	116.8	51 25.6	47	88	117.5	51 11.4	48	87	118.2	50 56.9	49	86	118.9	50 42.2	49	86	119.6	50 27.3	50	85	120.3	50 12.1	51	85	121.0	49 56.7	52	84	121.6	4
35	50 46.6	45	89	116.1	50 33.0	46	88	116.8	50 19.1	47	88	117.5	50 05.0	47	87	118.2	49 50.7	48	87	118.8	49 36.1	49	86	119.5	49 21.3	50	85	120.2	49 06.2	51	85	120.9	35
6	49 53.4	44	89	115.4	49 40.1	45	89	116.1	49 26.5	46	88	116.8	49 12.8	46	88	117.4	48 58.7	47	87	118.1	48 44.5	48	87	118.8	48 30.0	49	86	119.5	48 15.3	49	86	120.1	6
7	48 59.9	43	90	114.7	48 46.9	44	89	115.4	48 33.6	45	89	116.1	48 20.2	45	88	116.8	48 06.5	46	88	117.4	47 52.5	47	87	118.1	47 38.4	48	87	118.7	47 24.0	48	86	119.4	7
8	48 06.0	42	90	114.1	47 53.3	43	90	114.8	47 40.4	44	89	115.4	47 27.2	44	89	116.1	47 13.9	45	88	116.8	47 00.2	46	88	117.4	46 46.4	47	87	118.1	46 32.3	47	87	118.7	8
9	47 12.0	41	91	113.5	46 59.6	42	90	114.1	46 46.9	43	90	114.8	46 34.0	43	89	115.5	46 20.9	44	89	116.1	46 07.6	45	88	116.8	45 54.1	45	88	117.4	45 40.3	46	87	118.0	9
40	46 17.7	40	91	112.9	46 05.5	41	90	113.6	45 53.1	42	90	114.2	45 40.6	42	90	114.9	45 27.8	43	89	115.5	45 14.7	44	89	116.1	45 01.5	44	88	116.8	44 48.0	45	88	117.4	40
1	45 23.1	39	91	112.3	45 11.2	40	91	113.0	44 59.1	41	90	113.6	44 46.8	41	90	114.3	44 34.3	42	90	114.9	44 21.5	43	89	115.5	44 08.6	44	89	116.2	43 55.4	44	88	116.8	1
2	44 28.3	38	92	111.8	44 16.7	39	91	112.4	44 04.9	40	91	113.1	43 52.8	41	90	113.7	43 40.6	41	90	114.3	43 28.1	42	89	115.0	43 15.4	43	89	115.6	43 02.6	43	89	116.2	2
3	43 33.4	38	92	111.3	43 22.0	38	92	111.9	43 10.4	39	91	112.5	42 58.6	40	91	113.2	42 46.6	40	90	113.8	42 34.4	41	90	114.4	42 22.0	42	89	115.0	42 09.4	42	89	115.6	3
4	42 38.2	37	92	110.8	42 27.1	37	92	111.4	42 15.7	38	91	112.0	42 04.2	39	91	112.6	41 52.4	39	91	113.3	41 40.5	40	90	113.9	41 28.4	41	90	114.5	41 16.0	41	89	115.1	4
45	41 42.9	36	92	110.3	41 32.0	37	92	110.9	41 20.9	37	92	111.5	41 09.6	38	91	112.1	40 58.1	39	91	112.7	40 46.4	39	91	113.4	40 34.5	40	90	114.0	40 22.4	41	90	114.6	45
6	40 47.4	35	93	109.8	40 36.7	36	92	110.4	40 25.8	37	92	111.0	40 14.7	37	92	111.6	40 03.5	38	91	112.2	39 52.0	38	91	112.9	39 40.4	39	90	113.5	39 28.5	40	90	114.0	6
7	39 51.7	35	93	109.4	39 41.2	35	93	110.0	39 30.6	36	92	110.6	39 19.7	36	92	111.2	39 08.7	37	92	111.8	38 57.5	38	91	112.4	38 46.1	38	91	113.0	38 34.5	39	90	113.6	7
8	38 55.9	34	93	108.9	38 45.6	35	93	109.5	38 35.2	35	93	110.1	38 24.5	36	92	110.7	38 13.7	36	92	111.3	38 02.7	37	92	111.9	37 51.6	38	91	112.5	37 40.2	38	91	113.1	8
9	37 59.9	33	94	108.5	37 49.8	34	93	109.1	37 39.6	34	93	109.7	37 29.2	35	93	110.3	37 18.6	36	92	110.9	37 07.8	36	92	111.4	36 56.9	37	91	112.0	36 45.8	37	91	112.6	9
50	37 03.8	33	94	108.1	36 53.9	33	93	108.7	36 43.9	34	93	109.3	36 33.7	34	93	109.8	36 23.3	35	92	110.4	36 12.7	35	92	111.0	36 02.0	36	92	111.6	35 51.1	37	91	112.2	50
1	36 07.6	32	94	107.7	35 57.9	33	94	108.3	35 48.0	33	93	108.8	35 38.0	34	93	109.4	35 27.8	34	93	110.0	35 17.5	35	92	110.6	35 07.0	35	92	111.2	34 56.3	36	92	111.7	1
2	35 11.2	31	94	107.3	35 01.7	32	94	107.9	34 52.0	32	94	108.4	34 42.2	33	93	109.0	34 32.2	34	93	109.6	34 22.1	34	93	110.2	34 11.8	35	92	110.7	34 01.3	35	92	111.3	2
3	34 14.7	31	94	106.9	34 05.4	31	94	107.5	33 55.9	32	94	108.1	33 46.3	32	93	108.6	33 36.5	33	93	109.2	33 26.6	33	93	109.8	33 16.5	34	92	110.3	33 06.2	34	92	110.9	3
4	33 18.1	30	94	106.6	33 09.0	31	94	107.1	32 59.7	31	94	107.7	32 50.2	32	94	108.3	32 40.6	32	93	108.8	32 30.9	33	93	109.4	32 21.0	33	93	109.9	32 10.9	34	92	110.5	4
55	32 21.4	30	95	106.2	32 12.5	30	94	106.8	32 03.3	31	94	107.3	31 54.1	31	94	107.9	31 44.6	32	94	108.4	31 35.1	32	93	109.0	31 25.4	33	93	109.6	31 15.5	33	93	110.1	55
6	31 24.7	29	95	105.9	31 15.8	30	95	106.4	31 06.9	30	94	107.0	30 57.8	31	94	107.5	30 48.5	31	94	108.1	30 39.2	32	93	108.6	30 29.6	32	93	109.2	30 20.0	32	93	109.7	6
7	30 27.8	29	95	105.5	30 19.1	29	95	106.1	30 10.3	30	94	106.6	30 01.4	30	94	107.2	29 52.3	30	94	107.7	29 43.1	31	94	108.3	29 33.8	31	93	108.8	29 24.3	32	93	109.4	7
8	29 30.8	28	95	105.2	29 22.3	29	95	105.8	29 13.7	29	95	106.3	29 04.9	29	94	106.8	28 56.0	30	94	107.4	28 46.9	30	94	107.9	28 37.8	31	94	108.5	28 28.5	31	93	109.0	8
9	28 33.7	28	95	104.9	28 25.4	28	95	105.4	28 16.9	28	95	106.0	28 08.3	29	94	106.5	27 59.5	29	94	107.1	27 50.7	30	94	107.6	27 41.7	30	94	108.1	27 32.6	31	93	108.7	9
60	27 36.6	27	95	104.6	27 28.4	28	95	105.1	27 20.0	28	95	105.7	27 11.6	28	95	106.2	27 03.0	29	94	106.7	26 54.3	29	94	107.3	26 45.5	30	94	107.8	26 36.5	30	94	108.3	60
1	26 39.4	27	96	104.3	26 31.3	27	95	104.8	26 23.1	27	95	105.4	26 14.8	28	95	105.9	26 06.4	28	95	106.4	25 57.8	29	94	107.0	25 49.2	29	94	107.5	25 40.4	29	94	108.0	1
2	25 42.1	26	96	104.0	25 34.1	27	95	104.5	25 26.1	27	95	105.1	25 17.9	27	95	105.6	25 09.7	28	95	106.1	25 01.3	28	94	106.6	24 52.8	29	94	107.2	24 44.2	29	94	107.7	2
3	24 44.7	26	96	103.7	24 36.9	26	96	104.2	24 29.0	27	95	104.8	24 21.0	27	95	105.3	24 12.8	27	95	105.8	24 04.6	28	95	106.3	23 56.3	28	94	106.9	23 47.8	28	94	107.4	3
4	23 47.2	25	96	103.4	23 39.6	26	96	104.0	23 31.8	26	95	104.5	23 23.9	26	95	105.0	23 16.0	27	95	105.5	23 07.9	27	95	106.1	22 59.7	27	94	106.6	22 51.4	28	94	107.1	4
65	22 49.7	25	96	103.2	22 42.2	25	96	103.7	22 34.6	26	96	104.2	22 26.8	26	95	104.7	22 19.0	26	95	105.2	22 11.0	27	95	105.8	22 03.0	27	95	106.3	21 54.9	27	94	106.8	65
6	21 52.2	25	96	102.9	21 44.8	25	96	103.4	21 37.2	25	96	103.9	21 29.6	26	95	104.5	21 21.9	26	95	105.0	21 14.1	26	95	105.5	21 06.2	26	95	106.0	20 58.3	27	94	106.5	6
7	20 54.5	24	96	102.6	20 47.2	24	96	103.1	20 39.9	25	96	103.7	20 32.4	25	96	104.2	20 24.8	25	95	104.7	20 17.2	26	95	105.2	20 09.4	26	95	105.7	20 01.6	26	95	106.2	7
8	19 56.8	24	96	102.4	19 49.7	24	96	102.9	19 42.4	24	96	103.4	19 35.1	25	96	103.9	19 27.6	25	95	104.4	19 20.1	25	95	104.9	19 12.5	26	95	105.5	19 04.8	26	95	106.0	8
9	18 59.1	23	96	102.1	18 52.0	24	96	102.6	18 44.9	24	96	103.2	18 37.7	24	96	103.7	18 30.4	24	96	104.2	18 23.0	25	95	104.7	18 15.5	25	95	105.2	18 08.0	25	95	105.7	9
70	18 01.3	23	96	101.9	17 54.4	23	96	102.4	17 47.3	24	96	102.9	17 40.2	24	96	103.4	17 33.1	24	96	103.9	17 25.8	24	95	104.4	17 18.5	25	95	104.9	17 11.0	25	95	105.5	70
1	17 03.5	23	96	101.6	16 56.6	23	96	102.2	16 49.7	23	96	102.7	16 42.7	23	96	103.2	16 35.7	24	96	103.7	16 28.5	24	96	104.2	16 21.3	24	95	104.7	16 14.1	24	95	105.2	1
2	16 05.6	22	97	101.4	15 58.8	23	96	101.9	15 52.0	23	96	102.4	15 45.2	23	96	102.9	15 38.2	23	96	103.4	15 31.2	23	96	103.9	15 24.1	24	95	104.5	15 17.0	24	95	105.0	2
3	15 07.6	22	97	101.2	15 01.0	22	96	101.7	14 54.3	22	96	102.2	14 47.6	23	96	102.7	14 40.7	23	96	103.2	14 33.8	23	96	103.7	14 26.9	23	96	104.2	14 19.9	23	95	104.7	3
4	14 09.6	22	97	101.0	14 03.1	22	97	101.5	13 56.5	22	96	102.0	13 49.9	22	96	102.5	13 43.2	22	96	103.0	13 36.4	23	96	103.5	13 29.6	23	96	104.0	13 22.7	23	95	104.5	4
75	13 11.6	21	97	100.7	13 05.2	22	97	101.2	12 58.7	22	96	101.8	12 52.2	22	96	102.3	12 45.6	22	96	102.8	12 38.9	22	96	103.3	12 32.2	22	96	103.8	12 25.5	23	96	104.2	75
6	12 13.5	21	97	100.5	12 07.2	21	97	101.0	12 00.8	21	97	101.5	11 54.4	22	96	102.0	11 47.9	22	96	102.5	11 41.4	22	96	103.0	11 34.8	22	96	103.5	11 28.2	22	96	104.0	6
7	11 15.4	21	97	100.3	11 09.2	21	97	100.8	11 02.9	21	97	101.3	10 56.6	21	96	101.8	10 50.2	21	96	102.3	10 43.8	21	96	102.8	10 37.3	22	96	103.3	10 30.8	22	96	103.8	7
8	10 17.3	20	97	100.1	10 11.1	21	97	100.6	10 05.0	21	97	101.1	9 58.7	21	96	101.6	9 52.5	21	96	102.1	9 46.2	21	96	102.6	9 39.8	21	96	103.1	9 33.4	21	96	103.6	8
9	9 19.1	20	97	99.9	9 13.0	20	97	100.4	9 07.0	20	97	100.9	9 00.8	20	97	101.4	8 54.7	21	96	101.9	8 48.5	21	96	102.4	8 42.2	21	96	102.9	8 35.9	21	96	103.4	9
80	8 20.9	20	97	99.7	8 14.9	20	97	100.2	8 08.9	20	97	100.7	8 02.9	20	97	101.2	7 56.8	20	96	101.7	7 50.7	20	96	102.2	7 44.6	20	96	102.7	7 38.4	21	96	103.2	80
1	7 22.6	20	97	99.5	7 16.7	20	97	100.0	7 10.8	20	97	100.5	7 04.9	20	97	101.0	6 58.9	20	97	101.5	6 52.9	20	96	102.0	6 46.9	20	96	102.5	6 40.9	20	96	103.0	1
2	6 24.3	19	97	99.3	6 18.5	19	97	99.8	6 12.7	19	97	100.3	6 06.9	20	97	100.8	6 01.0	20	97	101.3	5 55.1	20	96	101.8	5 49.2	20	96	102.3	5 43.3	20	96	102.8	2
3	5 26.0	19	97	99.1	5 20.3	19	97	99.6	5 14.6	19	97	100.1	5 08.8	19	97	100.6	5 03.1	19	97	101.1													3

H.A.	12° 00′			12° 30′			13° 00′			13° 30′			14° 00′			14° 30′			15° 00′			15° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	88 00.0	1.0 23	00.0	87 30.0	1.0 19	00.0	87 00.0	1.0 16	00.0	86 30.0	1.0 13	00.0	86 00.0	1.0 12	00.0	85 30.0	1.0 10	00.0	85 00.0	1.0 09	00.0	84 30.0	1.0 09	00.0	00
1	87 46.3	90 57	26.0	87 18.8	93 49	21.3	86 50.6	95 43	18.0	86 21.9	96 38	15.5	85 52.9	97 34	13.6	85 23.7	98 30	12.1	84 54.3	98 27	10.9	84 24.9	98 25	09.9	1
2	87 11.8	71 76	44.3	86 49.4	78 68	37.9	86 25.0	84 62	33.0	85 59.4	87 56	29.0	85 32.8	90 51	25.9	85 05.6	92 46	23.3	84 38.0	93 43	21.1	84 09.9	94 39	19.3	2
3	86 26.4	56 85	55.5	86 08.4	64 79	49.4	85 48.0	71 74	44.1	85 25.9	76 68	39.7	85 02.4	80 63	36.0	84 37.8	83 59	32.8	84 12.4	86 55	30.0	83 46.2	88 51	27.7	3
4	85 35.6	45 89	62.6	85 20.9	53 85	57.1	85 03.9	60 81	52.2	84 44.9	66 77	47.8	84 24.3	71 72	44.0	84 02.4	75 68	40.6	83 39.4	78 64	37.6	83 15.5	81 61	34.9	4
05	84 42.0	37 92	67.4	84 29.8	45 89	62.5	84 15.3	51 86	58.0	83 59.0	57 82	53.9	83 41.0	63 78	50.2	83 21.5	67 75	46.9	83 00.8	71 71	43.8	82 39.0	74 68	41.0	05
6	83 46.8	31 94	70.7	83 36.4	38 91	66.4	83 24.0	44 89	62.4	83 09.8	50 86	58.6	82 53.9	55 83	55.1	82 36.6	60 80	51.9	82 18.0	64 77	48.9	81 58.3	68 74	46.2	6
7	82 50.6	27 96	73.1	82 41.7	33 93	69.3	82 30.8	39 91	65.7	82 18.4	44 88	62.3	82 04.3	49 86	59.0	81 48.8	54 83	56.0	81 32.1	58 81	53.1	81 14.1	62 78	50.4	7
8	81 53.8	23 96	75.0	81 46.0	29 94	71.6	81 36.4	34 92	68.3	81 25.4	39 90	65.1	81 12.8	44 88	62.1	80 58.9	49 86	59.3	80 43.7	53 84	56.6	80 27.4	56 81	54.0	8
9	80 56.6	21 96	76.4	80 49.6	26 95	73.3	80 41.2	31 93	70.4	80 31.2	35 92	67.5	80 20.0	40 90	64.7	80 07.4	44 88	62.0	79 53.6	48 86	59.4	79 38.7	52 84	57.0	9
10	79 59.0	18 96	77.6	79 52.8	23 95	74.8	79 45.2	28 94	72.0	79 36.3	32 93	69.4	79 26.1	36 91	66.8	79 14.7	40 89	64.3	79 02.1	44 88	61.9	78 48.4	47 86	59.5	10
1	79 01.2	16 97	78.5	78 55.6	21 96	75.9	78 48.8	25 95	73.4	78 40.7	29 93	70.9	78 31.4	33 92	68.5	78 21.0	37 91	66.2	78 09.5	40 89	63.9	77 56.9	44 88	61.7	1
2	78 03.2	15 97	79.2	77 58.2	19 96	76.9	77 52.0	23 95	74.5	77 44.6	26 94	72.2	77 36.2	30 93	70.0	77 26.6	34 92	67.8	77 16.0	37 90	65.7	77 04.4	40 89	63.6	2
3	77 05.1	13 97	79.9	77 00.5	17 96	77.7	76 54.9	21 96	75.5	76 48.2	24 95	73.4	76 40.4	28 94	71.3	76 31.6	31 92	69.2	76 21.9	34 91	67.2	76 11.1	37 90	65.2	3
4	76 06.9	12 97	80.4	76 02.7	15 97	78.4	75 57.6	19 96	76.3	75 51.4	22 95	74.3	75 44.3	25 94	72.3	75 36.2	29 93	70.4	75 27.1	32 92	68.5	75 17.2	35 91	66.6	4
15	75 08.6	11 97	80.9	75 04.8	14 97	78.9	75 00.1	17 96	77.0	74 54.4	20 95	75.1	74 47.8	24 94	73.3	74 40.3	27 94	71.4	74 31.9	29 93	69.6	74 22.7	32 92	67.8	15
6	74 10.2	10 97	81.3	74 06.8	13 97	79.4	74 02.4	16 96	77.6	73 57.2	19 96	75.8	73 51.1	22 95	74.1	73 44.2	25 94	72.3	73 36.4	27 93	70.6	73 27.8	30 92	68.9	6
7	73 11.8	09 97	81.6	73 08.6	12 97	79.9	73 04.7	15 96	78.2	72 59.9	17 96	76.5	72 54.2	20 95	74.8	72 47.7	23 94	73.1	72 40.5	26 94	71.5	72 32.4	28 93	69.9	7
8	72 13.3	08 98	81.9	72 10.4	11 97	80.2	72 06.8	14 97	78.6	72 02.3	16 96	77.0	71 57.1	19 95	75.4	71 51.1	21 95	73.8	71 44.3	24 94	72.3	71 36.8	26 93	70.7	8
9	71 14.8	07 98	82.1	71 12.2	10 97	80.6	71 08.8	12 97	79.0	71 04.7	15 96	77.5	70 59.8	17 96	76.0	70 54.2	20 95	74.5	70 47.9	22 94	73.0	70 40.9	25 94	71.5	9
20	70 16.2	07 98	82.3	70 13.9	09 97	80.8	70 10.8	11 97	79.4	70 07.0	14 96	77.9	70 02.5	16 96	76.5	69 57.2	19 95	75.0	69 51.3	21 95	73.6	69 44.7	23 94	72.2	20
1	69 17.7	06 98	82.5	69 15.5	08 97	81.1	69 12.7	11 97	79.7	69 09.2	13 96	78.3	69 05.0	15 96	76.9	69 00.1	17 96	75.5	68 54.6	20 95	74.1	68 48.4	22 94	72.8	1
2	68 19.1	06 98	82.6	68 17.1	08 97	81.3	68 14.5	10 97	80.0	68 11.3	12 97	78.6	68 07.4	14 96	77.3	68 02.8	16 96	76.0	67 57.7	18 95	74.6	67 51.9	20 94	73.3	2
3	67 20.5	05 98	82.8	67 18.7	07 97	81.5	67 16.3	09 97	80.2	67 13.3	11 97	78.9	67 09.7	13 96	77.6	67 05.5	15 96	76.4	67 00.6	17 95	75.1	66 55.2	19 95	73.8	3
4	66 21.8	04 98	82.9	66 20.2	06 97	81.7	66 18.1	08 97	80.4	66 15.3	10 97	79.2	66 11.9	12 96	77.9	66 08.0	14 96	76.7	66 03.5	16 95	75.5	65 58.4	18 95	74.3	4
25	65 23.2	04 98	83.0	65 21.8	06 97	81.8	65 19.8	08 97	80.6	65 17.2	09 97	79.4	65 14.1	11 96	78.2	65 10.4	13 96	77.0	65 06.2	15 96	75.9	65 01.4	17 95	74.7	25
6	64 24.5	03 98	83.1	64 23.3	05 98	81.9	64 21.5	07 97	80.8	64 19.1	09 97	79.6	64 16.3	11 97	78.5	64 12.8	12 96	77.3	64 08.9	14 96	76.2	64 04.4	16 95	75.1	6
7	63 25.9	03 98	83.1	63 24.8	05 98	82.0	63 23.1	06 97	80.9	63 21.0	08 97	79.8	63 18.3	10 97	78.7	63 15.2	11 96	77.6	63 11.5	13 96	76.5	63 07.3	15 95	75.4	7
8	62 27.2	02 98	83.2	62 26.2	04 98	82.1	62 24.8	06 97	81.0	62 22.8	07 97	80.0	62 20.4	09 97	78.9	62 17.4	11 96	77.8	62 14.0	12 96	76.7	62 10.0	14 95	75.7	8
9	61 28.5	02 98	83.2	61 27.7	04 98	82.2	61 26.4	05 97	81.2	61 24.6	07 97	80.1	61 22.4	08 97	79.1	61 19.6	10 96	78.0	61 16.4	11 96	77.0	61 12.7	13 96	76.0	9
30	60 29.9	02 98	83.3	60 29.2	03 98	82.3	60 28.0	05 97	81.2	60 26.4	06 97	80.2	60 24.3	08 97	79.2	60 21.8	09 96	78.2	60 18.8	11 96	77.2	60 15.4	12 96	76.2	30
1	59 31.2	01 98	83.3	59 30.6	03 98	82.3	59 29.6	04 97	81.3	59 28.2	06 97	80.3	59 26.3	07 97	79.4	59 24.0	08 96	78.4	59 21.2	10 96	77.4	59 18.0	11 96	76.4	1
2	58 32.5	01 98	83.3	58 32.1	02 98	82.4	58 31.2	04 97	81.4	58 29.9	05 97	80.4	58 28.2	06 97	79.5	58 26.1	08 97	78.5	58 23.5	09 96	77.6	58 20.5	11 96	76.6	2
3	57 33.8	00 98	83.3	57 33.5	02 98	82.4	57 32.8	03 97	81.5	57 31.6	04 97	80.5	57 30.1	06 97	79.6	57 28.1	07 97	78.7	57 25.8	09 96	77.8	57 23.0	10 96	76.8	3
4	56 35.1	00 98	83.3	56 34.9	01 98	82.4	56 34.3	03 97	81.5	56 33.3	04 97	80.6	56 32.0	05 97	79.7	56 30.2	07 97	78.8	56 28.0	08 96	77.9	56 25.4	09 96	77.0	4
35	55 36.4	00 98	83.3	55 36.3	01 98	82.4	55 35.9	02 97	81.6	55 35.0	03 97	80.7	55 33.8	05 97	79.8	55 32.2	06 97	78.9	55 30.2	07 96	78.0	55 27.9	09 96	77.1	35
6	54 37.7	01 98	83.3	54 37.8	01 98	82.5	54 37.4	02 97	81.6	54 36.7	03 97	80.7	54 35.7	04 97	79.9	54 34.2	05 97	79.0	54 32.4	07 96	78.1	54 30.2	08 96	77.3	6
7	53 39.0	01 98	83.3	53 39.2	00 98	82.5	53 39.0	01 97	81.6	53 38.4	02 97	80.8	53 37.5	04 97	79.9	53 36.2	05 97	79.1	53 34.6	06 96	78.2	53 32.6	07 96	77.4	7
8	52 40.4	01 98	83.3	52 40.6	00 98	82.5	52 40.5	01 97	81.6	52 40.1	02 97	80.8	52 39.3	03 97	80.0	52 38.2	04 97	79.2	52 36.7	05 96	78.3	52 34.9	07 96	77.5	8
9	51 41.7	02 98	83.3	51 42.0	01 98	82.5	51 42.1	00 97	81.6	51 41.7	02 97	80.8	51 41.1	03 97	80.0	51 40.1	04 97	79.2	51 38.8	05 96	78.4	51 37.2	06 96	77.6	9
40	50 43.0	02 98	83.2	50 43.5	01 98	82.4	50 43.6	00 97	81.7	50 43.4	01 97	80.9	50 42.9	02 97	80.1	50 42.1	03 97	79.3	50 40.9	04 96	78.5	50 39.5	05 96	77.7	40
1	49 44.3	02 98	83.2	49 44.9	01 98	82.4	49 45.1	00 97	81.6	49 45.1	01 97	80.9	49 44.7	02 97	80.1	49 44.0	03 97	79.3	49 43.0	04 97	78.6	49 41.7	05 96	77.8	1
2	48 45.7	03 98	83.2	48 46.3	02 98	82.4	48 46.7	01 97	81.6	48 46.7	00 97	80.9	48 46.5	01 97	80.1	48 45.9	02 97	79.4	48 45.1	03 97	78.6	48 44.0	04 96	77.8	2
3	47 47.0	03 98	83.1	47 47.7	02 98	82.4	47 48.2	01 97	81.6	47 48.4	00 97	80.9	47 48.3	01 97	80.1	47 47.9	02 97	79.4	47 47.2	03 97	78.7	47 46.2	04 96	77.9	3
4	46 48.3	03 98	83.1	46 49.2	02 98	82.3	46 49.8	01 97	81.6	46 50.0	01 97	80.9	46 50.1	00 97	80.1	46 49.8	01 97	79.4	46 49.2	02 97	78.7	46 48.4	03 96	78.0	4
45	45 49.7	04 98	83.0	45 50.6	03 98	82.3	45 51.3	02 97	81.6	45 51.7	01 97	80.9	45 51.8	00 97	80.2	45 51.7	01 97	79.4	45 51.3	02 97	78.7	45 50.6	03 96	78.0	45
6	44 51.0	04 98	83.0	44 52.1	03 98	82.3	44 52.8	02 97	81.6	44 53.4	01 97	80.9	44 53.6	00 97	80.1	44 53.6	00 97	79.4	44 53.4	01 97	78.7	44 52.8	02 96	78.0	6
7	43 52.4	04 98	82.9	43 53.5	03 98	82.2	43 54.4	03 97	81.5	43 55.0	02 97	80.8	43 55.4	01 97	80.1	43 55.5	00 97	79.4	43 55.4	01 97	78.8	43 55.0	02 96	78.1	7
8	42 53.8	04 98	82.9	42 55.0	04 98	82.2	42 56.0	03 97	81.5	42 56.7	02 97	80.8	42 57.2	01 97	80.1	42 57.4	00 97	79.4	42 57.4	00 97	78.8	42 57.2	01 96	78.1	8
9	41 55.1	05 98	82.8	41 56.4	04 98	82.1	41 57.5	03 97	81.5	41 58.4	02 97	80.8	41 59.0	02 97	80.1	41 59.4	01 97	79.4	41 59.5	00 97	78.8	41 59.4	01 96	78.1	9
50	40 56.5	05 98	82.7	40 57.9	04 98	82.1	40 59.1	04 97	81.4	41 00.0	03 97	80.7	41 00.8	02 97	80.1	41 01.3	01 97	79.4	41 01.5	01 97	78.8	41 01.6	00 96	78.1	50
1	39 57.9	05 98	82.7	39 59.4	05 98	82.0	40 00.7	04 97	81.4	40 01.7	03 97	80.7	40 02.6	02 97	80.1	40 03.2	02 97	79.4	40 03.6	01 97	78.7	40 03.8	00 96	78.1	1
2	38 59.3	06 98	82.6	39 00.9	05 98	82.0	39 02.3	04 97	81.3	39 03.4	04 97	80.7	39 04.4	03 97	80.0	39 05.1	02 97	79.4	39 05.6	01 97	78.7	39 05.9	01 96	78.1	2
3	38 00.7	06 98	82.5	38 02.4	05 98	81.9	38 03.9	05 97	81.3	38 05.1	04 97	80.6	38 06.2	03 97	80.0	38 07.0	03 97	79.4	38 07.7	02 97	78.7	38 08.1	01 96	78.1	3
4	37 02.1	06 98	82.4	37 03.9	06 97	81.8	37 05.5	05 97	81.2	37 06.8	04 97	80.6	37 08.0	04 97	79.9	37 09.0	03 97	79.3	37 09.7	02 97	78.7	37 10.3	02 96	78.1	4
55	36 03.6	06 98	82.4	36 05.4	06 97	81.8	36 07.1	05 97	81.1	36 08.5	05 97	80.5	36 09.8	04 97	79.9	36 10.9	03 97	79.3	36 11.8	03 97	78.7	36 12.5	02 96	78.0	55
6	35 05.0	07 98	82.3	35 06.9	06 97	81.7	35 08.7	06 97	81.1	35 10.3	05 97	80.5	35 11.6	04 97	79.8	35 12.9	04 97	79.2	35 13.9	03 97	78.6	35 14.7	02 96	78.0	6
7	34 06.4	07 98	82.2	34 08.5	06 97	81.6	34 10.3	06 97	81.0	34 12.0	05 97	80.4	34 13.5	05 97	79.8	34 14.8	04 97	79.2	34 15.9	03 97	78.6	34 16.9	03 96	78.0	7
8	33 07.9	07 98	82.1	33 10.0	07 97	81.5	33 12.0	06 97	80.9	33 13.7	06 97	80.3	33 15.3	05 97	79.7	33 16.8	04 97	79.1	33 18.0	04 97	78.5	33 19.1	03 96	77.9	8
9	32 09.4	08 98	82.0	32 11.6	07 97	81.4	32 13.6	07 97	80.9	32 15.5	06 97	80.3	32 17.2	05 97	79.7	32 18.7	05 97	79.1	32 20.1	04 96	78.5	32 21.3	04 96	77.9	9
60	31 10.9	08 98	81.9	31 13.2	07 97	81.4	31 15.3	07 97	80.8	31 17.3	06 97	80.2	31 19.1	06 97	79.6	31 20.7	05 97	79.0	31 22.2	05 96	78.4	31 23.6	04 96	77.9	60
1	30 12.4	08 98	81.9	30 14.8	08 97	81.3	30 17.0	07 97	80.7	30 19.0	07 97	80.1	30 21.0	06 97	79.5	30 22.7	06 97	79.0	30 24.3	05 96	78.4	30 25.8	05 96	77.8	1
2	29 13.9	08 97	81.8	29 16.4	08 97	81.2	29 18.7	07 97	80.6	29 20.8	07 97	80.0	29 22.9	06 97	79.5	29 24.7	06 97	78.9	29 26.5	06 96	78.3	29 28.0	05 96	77.8	2
3	28 15.4	09 97	81.7	28 18.0	08 97	81.1	28 20.4	08 97	80.5	28 22.6	07 97	80.0	28 24.8	07 97	79.4	28 26.8	06 97	78.8	28 28.6	06 96	78.3	28 30.3	05 96	77.7	3
4	27 17.0	09 97	81.6	27 19.6	09 97	81.0	27 22.1	08 97	80.4	27 24.5	08 97	79.9	27 26.7	07 97	79.3	27 28.8	07 97	78.8	27 30.8	06 96	78.2	27 32.6	06 96	77.6	4
65	26 18.5	09 97	81.5	26 21.2	09 97	80.9	26 23.8	08 97	80.4	26 26.3	08 97	79.8	26 28.6	08 97	79.2	26 30.8	07 97	78.7	26 32.9	07 96	78.1	26 34.9	06 96	77.6	65
6	25 20.1	10 97	81.4	25 22.9	09 97	80.8	25 25.6	09 97	80.3	25 28.2	08 97	79.7	25 30.6	08 97	79.2	25 32.9	08 97	78.6	25 35.1	07 96	78.1	25 37.2	07 96	77.5	6
7	24 21.7	10 97	81.3	24 24.6	09 97	80.7	24 27.4	09 97	80.2	24 30.0	09 97	79.6	24 32.6	08 97	79.1	24 35.0	08 96	78.5	24 37.3	07 96	78.0	24 39.5	07 96	77.4	7
8	23 23.3	10 97	81.2	23 26.3	10 97	80.6	23 29.2	09 97	80.1	23 31.9	09 97	79.5	23 34.6	09 97	79.0	23 37.1	08 96	78.4	23 39.5	08 96	77.9	23 41.8	08 96	77.4	8
9	22 24.9	10 97	81.0	22 28.0	10 97	80.5	22 31.0	10 97	80.0	22 33.8	09 97	79.4	22 36.6	09 97	78.9	22 39.2	09 96	78.4	22 41.8	08 96	77.8	22 44.2	08 96	77.3	9
70	21 26.5	11 97	80.9	21 29.7	10 97	80.4	21 32.8	10 97	79.9	21 35.7	10 97	79.3	21 38.6	09 97	78.8	21 41.4	09 96	78.3	21 44.0	09 96	77.7	21 46.6	08 96	77.2	70
1	20 28.2	11 97	80.8	20 31.5	11 97	80.3	20 34.6	10 97	79.8	20 37.7	10 97	79.2	20 40.6	10 97	78.7	20 43.5	09 96	78.2	20 46.3	09 96	77.6	20 49.0	09 96	77.1	1
2	19 29.9	11 97	80.7	19 33.2	11 97	80.2	19 36.5	11 97	79.6	19 39.6	10 97	79.1	19 42.7	10 97	78.6	19 45.7	10 96	78.1	19 48.6	09 96	77.5	19 51.4	09 96	77.0	2
3	18 31.6	12 97	80.6	18 35.0	11 97	80.1	18 38.4	11 97	79.5	18 41.6	11 97	79.0	18 44.8	10 96	78.5	18 47.9	10 96	78.0	18 50.9	10 96	77.4	18 53.8	10 96	76.9	3
4	17 33.3	12 97	80.5	17 36.8	12 97	79.9	17 40.3	11 97	79.4	17 43.6	11 97	78.9	17 46.9	11 96	78.4	17 50.1	11 96	77.9	17 53.2	10 96	77.3	17 56.3	10 96	76.8	4
75	16 35.0	12 97	80.3	16 38.7	12 97	79.8	16 42.2	12 97	79.3	16 45.7	11 97	78.8	16 49.1	11 96	78.3	16 52.4	11 96	77.7	16 55.6	11 96	77.2	16 58.7	10 96	76.7	75
6	15 36.8	12 97	80.2	15 40.5	12 97	79.7	15 44.1	12 97	79.2	15 47.7	12 97	78.7	15 51.2	12 96	78.2	15 54.6	11 96	77.6	15 58.0	11 96	77.1	16 01.3	11 96	76.6	6
7	14 38.6	13 97	80.1	14 42.4	13 97	79.6	14 46.1	12 97	79.1	14 49.8	12 97	78.5	14 53.4	12 96	78.0	14 56.9	12 96	77.5	15 00.4	11 96	77.0	15 03.8	11 96	76.5	7
8	13 40.4	13 97	80.0	13 44.3	13 97	79.4	13 48.1	13 97	78.9	13 51.9	12 96	78.4	13 55.6	12 96	77.9	13 59.2	12 96	77.4	14 02.8	12 96	76.9	14 06.3	12 96	76.4	8
9	12 42.2	13 97	79.8	12 46.2	13 97	79.3	12 50.1	13 97	78.8	12 54.0	13 96	78.3	12 57.8	13 96	77.8	13 01.6	12 96	77.3	13 05.3	12 96	76.8	13 08.9	12 96	76.3	9
80	11 44.1	14 97	79.7	11 48.2	14 97	79.2	11 52.2	13 97	78.7	11 56.2	13 96	78.2	12 00.1	13 96	77.7	12 04.0	13 96	77.2	12 07.8	13 96	76.6	12 11.5	12 96	76.1	80
1	10 45.9	14 97	79.6	10 50.1	14 97	79.0	10 54.3	14 96	78.5	10 58.4	14 96	78.0	11 02.4	13 96	77.5	11 06.4	13 96	77.0	11 10.3	13 96	76.5	11 14.2	13 96	76.0	1
2	9 47.9	14 97	79.4	9 52.1	14 97	78.9	9 56.4	14 96	78.4	10 00.6	14 96	77.9	10 04.7	14 96	77.4	10 08.8	14 96	76.9	10 12.9	13 96	76.4	10 16.9	13 95	75.9	2
3	8 49.8	15 97	79.3	8 54.2	15 97	78.8	8 58.5	14 96	78.3	9 02.8	14 96	77.8	9 07.1	14 96	77.3	9 11.3	14 96	76.8	9 15.5	14 96	76.3	9 19.6	14 95	75.8	3
4	7 51.7	15 97	79.1	7 56.2	15 96	78.6	8 00.7	15 96	78.1	8 05.1	15 96	77.6	8 09.4	15 96	77.1	8 13.8	14 96	76.6	8 18.1	14 96	76.1	8 22.3	14 95	75.6	4
85	6 53.7	16 97	79.0	6 58.3	15 96	78.5	7 02.9	15 96	78.0	7 07.4	15 96	77.5	7 11.9	15 96	77.0	7 16.3	15 96	76.5	7 20.7	15 96	76.0	7 25.1	15 95	75.5	85
6	5 55.8	16 97	78.8	6 00.4	16 96	78.3	6 05.1	15 96	77.8	6 09.7	15 96	77.3	6 14.3	15 96	76.8	6 18.9	15 96	76.3	6 23.4	15 95	75.8	6 27.9	15 95	75.3	6
7				5 02.6	16 96	78.2	5 07.3	16 96	77.7	5 12.1	16 96	77.2	5 16.8	16 96	76.7	5 21.5	16 96	76.2	5 26.1	16 95	75.7	5 30.8	15 95	75.2	7

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	12° 00′				12° 30′				13° 00′				13° 30′				14° 00′				14° 30′				15° 00′				15° 30′				H.A.
°	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	°
00	68 00.0	1.0	02	180.0	67 30.0	1.0	02	180.0	67 00.0	1.0	02	180.0	66 30.0	1.0	02	180.0	66 00.0	1.0	02	180.0	65 30.0	1.0	02	180.0	65 00.0	1.0	02	180.0	64 30.0	1.0	02	180.0	00
1	67 58.7	1.0	07	177.4	67 28.7	1.0	07	177.5	66 58.7	1.0	06	177.5	66 28.7	1.0	06	177.6	65 58.8	1.0	06	177.6	65 28.8	1.0	06	177.7	64 58.8	1.0	06	177.7	64 28.8	1.0	06	177.8	1
2	67 54.6	1.0	11	174.8	67 24.7	1.0	11	174.9	66 54.9	1.0	11	175.0	66 25.0	1.0	10	175.1	65 55.1	1.0	10	175.2	65 25.2	1.0	10	175.3	64 55.3	1.0	10	175.4	64 25.4	1.0	10	175.5	2
3	67 47.9	99	16	172.2	67 18.2	99	15	172.4	66 48.5	99	15	172.6	66 18.7	99	15	172.7	65 49.0	99	14	172.9	65 19.2	99	14	173.0	64 49.4	99	14	173.2	64 19.6	99	13	173.3	3
4	67 38.6	98	20	169.7	67 09.1	98	19	169.9	66 39.6	98	19	170.1	66 10.0	99	19	170.3	65 40.5	99	18	170.5	65 10.9	99	18	170.7	64 41.3	99	17	170.9	64 11.6	99	17	171.1	4
05	67 26.8	97	24	167.2	66 57.5	98	23	167.4	66 28.2	98	23	167.7	65 58.9	98	22	168.0	65 29.6	98	22	168.2	65 00.2	98	22	168.5	64 30.8	98	21	168.7	64 01.4	98	21	168.9	05
6	67 12.4	96	28	164.7	66 43.4	97	27	165.0	66 14.5	97	27	165.4	65 45.4	97	26	165.7	65 16.4	97	26	166.0	64 47.3	97	25	166.3	64 18.2	97	25	166.5	63 49.0	97	24	166.8	6
7	66 55.6	95	32	162.3	66 27.0	95	31	162.7	65 58.4	96	31	163.0	65 29.7	96	30	163.4	65 00.9	96	29	163.7	64 32.2	96	29	164.1	64 03.3	96	28	164.4	63 34.5	96	28	164.7	7
8	66 36.5	94	36	159.9	66 08.3	94	35	160.4	65 40.0	94	34	160.8	65 11.7	95	34	161.2	64 43.3	95	33	161.6	64 14.9	95	32	161.9	63 46.4	95	32	162.3	63 17.8	95	31	162.6	8
9	66 15.1	92	39	157.7	65 47.3	93	38	158.1	65 19.5	93	38	158.6	64 51.6	93	37	159.0	64 23.6	93	36	159.4	63 55.5	94	36	159.8	63 27.4	94	35	160.2	62 59.2	94	34	160.6	9
10	65 51.6	91	43	155.5	65 24.3	91	42	156.0	64 56.9	91	41	156.4	64 29.4	92	40	156.9	64 01.8	92	39	157.4	63 34.2	92	39	157.8	63 06.4	93	38	158.2	62 38.6	93	37	158.6	10
1	65 26.1	89	46	153.3	64 59.2	90	45	153.9	64 32.3	90	44	154.4	64 05.3	90	43	154.9	63 38.1	91	43	155.4	63 10.9	91	42	155.8	62 43.6	91	41	156.3	62 16.2	91	40	156.7	1
2	64 58.6	88	49	151.3	64 32.3	88	48	151.8	64 05.8	88	47	152.4	63 39.3	89	46	152.9	63 12.6	89	46	153.4	62 45.8	89	45	153.9	62 18.9	90	44	154.4	61 52.0	90	43	154.9	2
3	64 29.3	86	52	149.3	64 03.5	86	51	149.9	63 37.5	87	50	150.4	63 11.5	87	49	151.0	62 45.3	88	48	151.5	62 19.0	88	48	152.0	61 52.5	88	47	152.6	61 26.0	89	46	153.0	3
4	63 58.2	84	54	147.4	63 33.0	84	54	148.0	63 07.6	85	53	148.6	62 42.0	85	52	149.1	62 16.3	86	51	149.7	61 50.5	86	50	150.2	61 24.5	87	49	150.8	60 58.4	87	49	151.3	4
15	63 25.6	82	57	145.5	63 00.8	83	56	146.2	62 35.9	83	55	146.8	62 10.9	84	54	147.4	61 45.7	84	54	147.9	61 20.3	85	53	148.5	60 54.9	85	52	149.1	60 29.3	86	51	149.6	15
6	62 51.4	80	59	143.8	62 27.2	81	58	144.4	62 02.8	82	58	145.0	61 38.3	82	57	145.7	61 13.6	83	56	146.2	60 48.7	83	55	146.8	60 23.7	84	54	147.4	59 58.6	84	53	147.9	6
7	62 15.8	79	62	142.1	61 52.1	79	61	142.7	61 28.3	80	60	143.4	61 04.2	80	59	144.0	60 40.1	81	58	144.6	60 15.7	81	57	145.2	59 51.2	82	56	145.8	59 26.5	82	56	146.3	7
8	61 38.8	77	64	140.5	61 15.7	77	63	141.1	60 52.4	78	62	141.8	60 28.9	79	61	142.4	60 05.2	79	60	143.0	59 41.3	80	59	143.6	59 17.3	80	59	144.2	58 53.1	81	58	144.8	8
9	61 00.6	75	66	138.9	60 38.0	76	65	139.6	60 15.2	76	64	140.3	59 52.2	77	63	140.9	59 29.0	78	62	141.5	59 05.7	78	61	142.1	58 42.2	79	61	142.7	58 18.5	79	60	143.3	9
20	60 21.2	73	68	137.4	59 59.1	74	67	138.1	59 36.8	75	66	138.8	59 14.4	75	65	139.4	58 51.7	76	64	140.1	58 28.8	76	63	140.7	58 05.8	77	62	141.3	57 42.6	78	62	141.9	20
1	59 40.7	72	69	136.0	59 19.1	72	68	136.7	58 57.4	73	68	137.4	58 35.4	74	67	138.0	58 13.2	74	66	138.7	57 50.8	75	65	139.3	57 28.3	75	64	139.9	57 05.6	76	63	140.5	1
2	58 59.2	70	71	134.7	58 38.1	71	70	135.4	58 16.8	71	69	136.0	57 55.4	72	68	136.7	57 33.7	73	68	137.3	57 11.8	73	67	138.0	56 49.7	74	66	138.6	56 27.5	74	65	139.2	2
3	58 16.7	68	72	133.4	57 56.1	69	72	134.1	57 35.3	70	71	134.7	57 14.3	70	70	135.4	56 53.1	71	69	136.1	56 31.8	72	68	136.7	56 10.2	72	68	137.3	55 48.4	73	67	137.9	3
4	57 33.3	67	74	132.1	57 13.2	67	73	132.8	56 52.9	68	72	133.5	56 32.4	69	71	134.2	56 11.7	69	71	134.8	55 50.8	70	70	135.5	55 29.6	71	69	136.1	55 08.3	71	68	136.7	4
25	56 49.0	65	75	130.9	56 29.5	66	74	131.6	56 09.6	66	74	132.3	55 49.6	67	73	133.0	55 29.3	68	72	133.6	55 08.9	69	71	134.3	54 48.2	69	70	134.9	54 27.4	70	70	135.5	25
6	56 04.0	63	76	129.8	55 44.9	64	76	130.5	55 25.5	65	75	131.2	55 06.0	66	74	131.8	54 46.2	66	73	132.5	54 26.2	67	72	133.1	54 06.0	68	72	133.8	53 45.6	68	71	134.4	6
7	55 18.3	62	77	128.7	54 59.6	63	77	129.4	54 40.7	63	76	130.1	54 21.6	64	75	130.7	54 02.2	65	74	131.4	53 42.7	66	74	132.0	53 22.9	66	73	132.7	53 02.9	67	72	133.3	7
8	54 31.9	60	78	127.7	54 13.6	61	78	128.4	53 55.1	62	77	129.0	53 36.4	63	76	129.7	53 17.5	63	76	130.4	52 58.4	64	75	131.0	52 39.1	65	74	131.6	52 19.6	65	73	132.2	8
9	53 44.8	59	79	126.7	53 27.0	60	79	127.4	53 08.9	61	78	128.0	52 50.7	61	77	128.7	52 32.2	62	77	129.3	52 13.5	63	76	130.0	51 54.6	63	75	130.6	51 35.5	64	75	131.2	9
30	52 57.1	58	80	125.7	52 39.7	58	80	126.4	52 22.1	59	79	127.1	52 04.2	60	78	127.7	51 46.2	61	78	128.4	51 27.9	61	77	129.0	51 09.4	62	76	129.6	50 50.7	63	76	130.3	30
1	52 08.9	56	81	124.8	51 51.9	57	81	125.5	51 34.6	58	80	126.1	51 17.2	59	79	126.8	50 59.5	59	79	127.4	50 41.7	60	78	128.1	50 23.6	61	77	128.7	50 05.3	61	77	129.3	1
2	51 20.1	55	82	123.9	51 03.5	56	81	124.6	50 46.7	56	81	125.3	50 29.6	57	80	125.9	50 12.3	58	80	126.5	49 54.9	59	79	127.2	49 37.2	59	78	127.8	49 19.3	60	78	128.4	2
3	50 30.8	54	83	123.1	50 14.6	54	82	123.8	49 58.1	55	82	124.4	49 41.5	56	81	125.1	49 24.6	57	80	125.7	49 07.5	57	80	126.3	48 50.2	58	79	126.9	48 32.7	59	79	127.6	3
4	49 41.1	52	84	122.3	49 25.2	53	83	122.9	49 09.2	54	82	123.6	48 52.9	55	82	124.2	48 36.4	55	81	124.9	48 19.7	56	81	125.5	48 02.7	57	80	126.1	47 45.6	57	79	126.7	4
35	48 50.9	51	84	121.5	48 35.4	52	84	122.2	48 19.7	53	83	122.8	48 03.8	53	83	123.4	47 47.6	54	82	124.1	47 31.3	55	81	124.7	47 14.8	56	81	125.3	46 58.0	56	80	125.9	35
6	48 00.3	50	85	120.8	47 45.2	51	84	121.4	47 29.8	52	84	122.0	47 14.3	52	83	122.7	46 58.5	53	83	123.3	46 42.5	54	82	123.9	46 26.3	54	82	124.5	46 09.9	55	81	125.1	6
7	47 09.4	49	86	120.0	46 54.6	50	85	120.7	46 39.5	50	84	121.3	46 24.3	51	84	121.9	46 08.9	52	83	122.6	45 53.2	52	83	123.2	45 37.4	53	82	123.8	45 21.4	54	82	124.4	7
8	46 18.0	48	86	119.3	46 03.6	49	86	120.0	45 48.9	49	85	120.6	45 34.0	50	84	121.2	45 18.9	51	84	121.8	45 03.6	51	83	122.5	44 48.1	52	83	123.1	44 32.4	53	82	123.7	8
9	45 26.4	47	87	118.7	45 12.2	48	86	119.3	44 57.8	48	86	119.9	44 43.3	49	85	120.5	44 28.5	50	85	121.2	44 13.5	50	84	121.8	43 58.4	51	83	122.4	43 43.0	51	83	123.0	9
40	44 34.4	46	87	118.0	44 20.5	47	87	118.7	44 06.5	47	86	119.3	43 52.2	48	86	119.9	43 37.8	48	85	120.5	43 23.1	49	85	121.1	43 08.3	50	84	121.7	42 53.3	50	84	122.3	40
1	43 42.1	45	88	117.4	43 28.5	46	87	118.0	43 14.8	46	87	118.6	43 00.8	47	86	119.3	42 46.7	47	86	119.9	42 32.3	48	85	120.5	42 17.8	49	85	121.0	42 03.1	49	84	121.6	1
2	42 49.5	44	88	116.8	42 36.2	45	88	117.4	42 22.8	45	87	118.0	42 09.1	46	87	118.6	41 55.3	46	86	119.2	41 41.2	47	86	119.8	41 27.0	48	85	120.4	41 12.7	48	85	121.0	2
3	41 56.6	43	89	116.3	41 43.6	44	88	116.9	41 30.5	44	88	117.5	41 17.1	45	87	118.1	41 03.6	45	87	118.6	40 49.8	46	86	119.2	40 35.9	47	86	119.8	40 21.8	47	85	120.4	3
4	41 03.5	42	89	115.7	40 50.8	43	88	116.3	40 37.9	43	88	116.9	40 24.8	44	88	117.5	40 11.6	44	87	118.1	39 58.1	45	87	118.7	39 44.5	46	86	119.2	39 30.7	46	86	119.8	4
45	40 10.1	41	89	115.2	39 57.7	42	89	115.8	39 45.1	42	88	116.3	39 32.3	43	88	116.9	39 19.3	44	88	117.5	39 06.1	44	87	118.1	38 52.8	45	87	118.7	38 39.3	45	86	119.2	45
6	39 16.5	40	90	114.6	39 04.4	41	89	115.2	38 52.0	41	89	115.8	38 39.5	42	88	116.4	38 26.8	43	88	117.0	38 13.9	43	88	117.6	38 00.8	44	87	118.1	37 47.6	44	87	118.7	6
7	38 22.7	39	90	114.1	38 10.8	40	90	114.7	37 58.7	41	89	115.3	37 46.4	41	89	115.9	37 34.0	42	88	116.5	37 21.4	42	88	117.0	37 08.6	43	87	117.6	36 55.7	43	87	118.2	7
8	37 28.7	39	90	113.7	37 17.0	39	90	114.2	37 05.2	40	90	114.8	36 53.1	40	89	115.4	36 41.0	41	89	116.0	36 28.6	41	88	116.5	36 16.1	42	88	117.1	36 03.4	42	87	117.6	8
9	36 34.5	38	91	113.2	36 23.0	38	90	113.8	36 11.4	39	90	114.3	35 59.7	40	90	114.9	35 47.7	40	89	115.5	35 35.6	41	89	116.0	35 23.4	41	88	116.6	35 11.0	42	88	117.2	9
50	35 40.1	37	91	112.7	35 28.9	38	91	113.3	35 17.5	38	90	113.9	35 06.0	39	90	114.4	34 54.3	39	89	115.0	34 42.4	40	89	115.6	34 30.4	40	89	116.1	34 18.3	41	88	116.7	50
1	34 45.5	36	91	112.3	34 34.5	37	91	112.9	34 23.4	37	90	113.4	34 12.1	38	90	114.0	34 00.6	38	90	114.5	33 49.0	39	89	115.1	33 37.3	39	89	115.6	33 25.4	40	89	116.2	1
2	33 50.7	36	92	111.9	33 40.0	36	91	112.4	33 29.0	37	91	113.0	33 18.0	37	90	113.5	33 06.8	38	90	114.1	32 55.4	38	90	114.6	32 43.9	39	89	115.2	32 32.3	39	89	115.7	2
3	32 55.8	35	92	111.5	32 45.3	35	91	112.0	32 34.6	36	91	112.6	32 23.7	36	91	113.1	32 12.7	37	90	113.7	32 01.6	37	90	114.2	31 50.3	38	90	114.8	31 38.9	38	89	115.3	3
4	32 00.7	34	92	111.1	31 50.4	35	92	111.6	31 39.9	35	91	112.2	31 29.3	36	91	112.7	31 18.5	36	91	113.3	31 07.6	37	90	113.8	30 56.6	37	90	114.3	30 45.4	37	90	114.9	4
55	31 05.5	34	92	110.7	30 55.4	34	92	111.2	30 45.1	34	92	111.8	30 34.7	35	91	112.3	30 24.2	35	91	112.8	30 13.5	36	91	113.4	30 02.7	36	90	113.9	29 51.7	37	90	114.5	55
6	30 10.2	33	92	110.3	30 00.2	33	92	110.8	29 50.2	34	92	111.4	29 40.0	34	92	111.9	29 29.6	35	91	112.5	29 19.2	35	91	113.0	29 08.6	36	90	113.5	28 57.9	36	90	114.1	6
7	29 14.7	32	93	109.9	29 04.9	33	92	110.5	28 55.1	33	92	111.0	28 45.1	34	92	111.5	28 34.9	34	91	112.1	28 24.7	34	91	112.6	28 14.3	35	91	113.1	28 03.8	35	90	113.7	7
8	28 19.1	32	93	109.6	28 09.5	32	93	110.1	27 59.8	32	92	110.6	27 50.0	33	92	111.2	27 40.1	33	92	111.7	27 30.1	34	91	112.2	27 19.9	34	91	112.8	27 09.6	34	91	113.3	8
9	27 23.3	31	93	109.2	27 14.0	31	93	109.8	27 04.5	32	92	110.3	26 54.9	32	92	110.8	26 45.2	33	92	111.3	26 35.3	33	92	111.9	26 25.4	33	91	112.4	26 15.3	34	91	112.9	9
60	26 27.5	30	93	108.9	26 18.3	31	93	109.4	26 09.0	31	93	109.9	25 59.6	32	92	110.5	25 50.1	32	92	111.0	25 40.4	32	92	111.5	25 30.7	33	91	112.0	25 20.8	33	91	112.6	60
1	25 31.5	30	93	108.6	25 22.5	30	93	109.1	25 13.4	31	93	109.6	25 04.2	31	93	110.1	24 54.8	31	92	110.7	24 45.4	32	92	111.2	24 35.8	32	92	111.7	24 26.2	32	91	112.2	1
2	24 35.4	29	94	108.2	24 26.6	30	93	108.8	24 17.7	30	93	109.3	24 08.6	30	93	109.8	23 59.5	31	92	110.3	23 50.2	31	92	110.8	23 40.9	31	92	111.4	23 31.4	32	92	111.9	2
3	23 39.3	29	94	107.9	23 30.6	29	94	108.4	23 21.8	29	93	109.0	23 13.0	30	93	109.5	23 04.0	30	93	110.0	22 54.9	30	92	110.5	22 45.8	31	92	111.0	22 36.5	31	92	111.6	3
4	22 43.0	28	94	107.6	22 34.5	28	94	108.1	22 25.9	29	93	108.7	22 17.2	29	93	109.2	22 08.4	29	93	109.7	21 59.5	30	92	110.2	21 50.6	30	92	110.7	21 41.5	30	92	111.2	4
65	21 46.6	28	94	107.3	21 38.3	28	94	107.8	21 29.9	28	94	108.4	21 21.4	29	93	108.9	21 12.7	29	93	109.4	21 04.0	29	93	109.9	20 55.2	29	92	110.4	20 46.3	30	92	110.9	65
6	20 50.2	27	94	107.0	20 42.0	27	94	107.6	20 33.7	28	94	108.1	20 25.4	28	93	108.6	20 17.0	28	93	109.1	20 08.4	29	93	109.6	19 59.8	29	93	110.1	19 51.1	29	92	110.6	6
7	19 53.6	27	94	106.8	19 45.6	27	94	107.3	19 37.5	27	94	107.8	19 29.3	27	94	108.3	19 21.1	28	93	108.8	19 12.7	28	93	109.3	19 04.3	28	93	109.8	18 55.7	29	92	110.3	7
8	18 57.0	26	94	106.5	18 49.2	26	94	107.0	18 41.2	27	94	107.5	18 33.2	27	94	108.0	18 25.1	27	93	108.5	18 16.9	27	93	109.0	18 08.6	28	93	109.5	18 00.3	28	93	110.0	8
9	18 00.3	26	95	106.2	17 52.6	26	94	106.7	17 44.8	26	94	107.2	17 37.0	26	94	107.7	17 29.0	27	94	108.2	17 21.0	27	93	108.8	17 12.9	27	93	109.3	17 04.7	27	93	109.8	9
70	17 03.6	25	95	106.0	16 56.0	25	94	106.5	16 48.3	26	94	107.0	16 40.6	26	94	107.5	16 32.8	26	94	108.0	16 25.0	26	93	108.5	16 17.1	27	93	109.0	16 09.1	27	93	109.5	70
1	16 06.7	25	95	105.7	15 59.3	25	95	106.2	15 51.8	25	94	106.7	15 44.2	25	94	107.2	15 36.6	26	94	107.7	15 28.9	26	94	108.2	15 21.1	26	93	108.7	15 13.3	26	93	109.2	1
2	15 09.8	24	95	105.5	15 02.5	24	95	106.0	14 55.2	25	94	106.5	14 47.8	25	94	107.0	14 40.3	25	94	107.5	14 32.7	25	94	108.0	14 25.1	26	93	108.5	14 17.5	26	93	109.0	2
3	14 12.8	24	95	105.2	14 05.7	24	95	105.7	13 58.5	24	95	106.2	13 51.2	24	94	106.7	13 43.9	25	94	107.2	13 36.5	25	94	107.7	13 29.0	25	94	108.2	13 21.5	25	93	108.7	3
4	13 15.8	23	95	105.0	13 08.8	23	95	105.5	13 01.7	24	95	106.0	12 54.6	24	94	106.5	12 47.4	24	94	107.0	12 40.2	24	94	107.5	12 32.9	24	94	108.0	12 25.5	25	93	108.5	4
75	12 18.6	23	95	104.7	12 11.8	23	95	105.2	12 04.9	23	96	105.7	11 57.9	23	95	106.2	11 50.8	24	94	106.7	11 43.8	24	94	107.2	11 36.6	24	94	107.7	11 29.5	24	94	108.2	75
6	11 21.5	22	95	104.5	11 14.7	23	95	105.0	11 07.9	23	95	105.5	11 01.1	23	95	106.0	10 54.2	23	94	106.5	10 47.3	23	94	107.0	10 40.3	23	94	107.5	10 33.3	23	94	108.0	6
7	10 24.2	22	95	104.3	10 17.6	22	95	104.8	10 11.0	22	95	105.3	10 04.3	22	95	105.8	9 57.5	23	95	106.3	9 50.8	23	94	106.8	9 43.9	23	94	107.3	9 37.1	23	94	107.8	7
8	9 27.0	22	96	104.1	9 20.5	22	95	104.6	9 14.0	22	95	105.1	9 07.4	22	95	105.6	9 00.8	22	95	106.1	8 54.1	22	94	106.6	8 47.5	22	94	107.0	8 40.7	22	94	107.5	8
9	8 29.6	21	96	103.9	8 23.3	21	95	104.4	8 16.9	21	95	104.9	8 10.4	21	95	105.4	8 04.0	22	95	105.8	7 57.5	22	95	106.3	7 50.9	22	94	106.8	7 44.4	22	94	107.3	9
80	7 32.2	21	96	103.7	7 26.0	21	96	104.2	7 19.7	21	95	104.7	7 13.4	21	95	105.1	7 07.1	21	95	105.6	7 00.7	21	96	106.1	6 54.4	21	94	106.6	6 47.9	21	94	107.1	80
1	6 34.8	20	96	103.5	6 28.7	20	96	104.0	6 22.5	21	96	104.5	6 16.4	21	95	104.9	6 10.2	21	95	105.4	6 04.0	21	95	105.9	5 57.7	21	94	106.4	5 51.4	21	94	106.9	1
2	5 37.3	20	96	103.3	5 31.3	20	96	103.8	5 25.3	20	96	104.3	5 19.3	20	95	104.7	5 13.2	20	95	105.2	5 07.1	20	95	105.7	5 01.0	20	95	106.2					2

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	84 00.0	1.0 08	00.0	83 30.0	1.0 07	00.0	83 00.0	1.0 07	00.0	82 30.0	1.0 06	00.0	82 00.0	1.0 06	00.0	81 30.0	1.0 06	00.0	81 00.0	1.0 05	00.0	80 30.0	1.0 05	00.0	00
1	83 55.3	99 23	09.1	83 25.7	99 21	08.4	82 56.0	99 20	07.8	82 26.2	99 18	07.3	81 56.5	99 17	06.8	81 26.7	99 16	06.4	80 56.9	99 15	06.0	80 27.1	99 15	05.7	1
2	83 41.5	96 36	17.8	83 12.9	96 34	16.5	82 44.1	96 32	15.3	82 15.2	97 30	14.3	81 46.1	97 28	13.4	81 16.9	97 26	12.6	80 47.7	98 25	11.9	80 18.3	98 24	11.3	2
3	83 19.6	90 48	25.7	82 52.5	91 45	23.9	82 25.0	92 42	22.3	81 57.3	93 40	20.9	81 29.3	94 38	19.6	81 01.0	94 36	18.5	80 32.6	95 34	17.5	80 04.1	95 32	16.6	3
4	82 50.8	83 57	32.6	82 25.5	85 54	30.5	81 59.6	87 51	28.6	81 33.3	88 49	26.9	81 06.6	90 46	25.4	80 39.6	91 44	24.1	80 12.2	91 42	22.8	79 44.7	92 40	21.7	4
05	82 16.4	77 65	38.5	81 52.9	79 62	36.3	81 28.8	82 59	34.2	81 04.0	83 56	32.4	80 38.8	85 54	30.7	80 13.1	86 51	29.1	79 47.0	88 49	27.7	79 20.6	89 47	26.4	05
6	81 37.5	71 71	43.6	81 15.9	74 68	41.3	80 53.4	76 65	39.2	80 30.3	78 62	37.2	80 06.6	80 60	35.4	79 42.3	82 58	33.7	79 17.5	83 55	32.1	78 52.4	85 53	30.7	6
7	80 55.1	65 75	47.9	80 35.2	68 73	45.6	80 14.4	71 70	43.4	79 52.8	73 68	41.4	79 30.6	75 65	39.5	79 07.7	77 63	37.8	78 44.3	79 61	36.2	78 20.4	80 58	34.6	7
8	80 10.0	60 79	51.6	79 51.6	63 76	49.3	79 32.4	66 74	47.1	79 12.3	68 72	45.1	78 51.5	70 70	43.2	78 30.0	73 67	41.5	78 08.0	75 65	39.8	77 45.3	76 63	38.2	8
9	79 22.7	55 82	54.7	79 05.8	58 80	52.5	78 47.9	61 77	50.4	78 29.3	64 75	48.4	78 09.8	66 73	46.5	77 49.7	68 71	44.7	77 28.9	70 69	43.0	77 07.5	72 67	41.4	9
10	78 33.7	51 84	57.3	78 18.1	54 82	55.2	78 01.5	57 80	53.2	77 44.1	59 78	51.2	77 25.9	62 76	49.4	77 07.0	64 74	47.6	76 47.4	66 72	45.9	76 27.2	68 70	44.3	10
1	77 43.3	47 86	59.6	77 28.8	50 84	57.6	77 13.5	53 82	55.6	76 57.2	55 80	53.7	76 40.2	58 79	51.9	76 22.5	60 77	50.2	76 04.0	63 75	48.5	75 45.0	65 73	46.9	1
2	76 51.9	43 87	61.6	76 38.4	46 86	59.6	76 24.1	49 84	57.7	76 08.9	52 83	55.9	75 53.0	54 81	54.2	75 36.3	57 79	52.5	75 19.0	59 78	50.9	75 01.0	61 76	49.3	2
3	75 59.5	40 89	63.3	75 47.0	43 87	61.4	75 33.6	46 86	59.6	75 19.4	49 84	57.9	75 04.5	51 83	56.2	74 48.8	53 81	54.5	74 32.5	56 80	52.9	74 15.5	58 78	51.4	3
4	75 06.4	38 90	64.8	74 54.7	40 88	63.0	74 42.2	43 87	61.3	74 28.9	45 86	59.6	74 14.9	48 84	57.9	74 00.2	50 83	56.4	73 44.7	52 81	54.8	73 28.7	55 80	53.3	4
15	74 12.6	35 90	66.1	74 01.7	38 89	64.4	73 50.0	40 88	62.7	73 37.6	43 87	61.1	73 24.4	45 86	59.5	73 10.5	47 84	58.0	72 56.0	50 83	56.5	72 40.8	52 81	55.0	15
6	73 18.3	33 91	67.3	73 08.1	35 90	65.6	72 57.2	38 89	64.0	72 45.5	40 88	62.5	72 33.1	42 87	61.0	72 20.0	45 85	59.5	72 06.2	47 84	58.0	71 51.9	49 83	56.6	6
7	72 23.6	31 92	68.3	72 14.1	33 91	66.7	72 03.8	35 90	65.2	71 52.8	38 89	63.7	71 41.1	40 88	62.2	71 28.8	42 86	60.8	71 15.8	44 85	59.4	71 02.2	46 84	58.0	7
8	71 28.5	29 92	69.2	71 19.6	31 91	67.7	71 09.9	33 90	66.3	70 59.5	36 89	64.8	70 48.5	38 88	63.4	70 36.9	40 87	62.0	70 24.6	42 86	60.6	70 11.7	44 85	59.3	8
9	70 33.1	27 93	70.0	70 24.7	29 92	68.6	70 15.6	31 91	67.2	70 05.9	34 90	65.8	69 55.5	36 89	64.4	69 44.4	38 88	63.1	69 32.8	40 87	61.8	69 20.6	42 86	60.5	9
20	69 37.5	25 93	70.8	69 29.6	27 92	69.4	69 21.0	30 92	68.0	69 11.8	32 91	66.7	69 02.0	34 90	65.4	68 51.5	36 89	64.1	68 40.5	38 88	62.8	68 28.9	40 87	61.5	20
1	68 41.6	24 94	71.4	68 34.1	26 93	70.1	68 26.0	28 92	68.8	68 17.3	30 91	67.5	68 08.1	32 90	66.2	67 58.2	34 90	65.0	67 47.7	36 89	63.7	67 36.7	38 88	62.5	1
2	67 45.4	22 94	72.0	67 38.4	24 93	70.8	67 30.8	26 92	69.5	67 22.6	28 92	68.2	67 13.8	30 91	67.0	67 04.5	32 90	65.8	66 54.6	34 89	64.6	66 44.1	36 88	63.4	2
3	66 49.2	21 94	72.6	66 42.5	23 93	71.4	66 35.4	25 93	70.1	66 27.6	27 92	68.9	66 19.3	29 91	67.7	66 10.4	30 91	66.5	66 01.0	32 90	65.4	65 51.1	34 89	64.2	3
4	65 52.7	20 94	73.1	65 46.5	22 94	71.9	65 39.7	24 93	70.7	65 32.3	25 92	69.5	65 24.5	27 92	68.4	65 16.1	29 91	67.2	65 07.2	31 90	66.1	64 57.7	32 89	64.9	4
25	64 56.1	19 95	73.5	64 50.2	20 94	72.4	64 43.8	22 93	71.2	64 36.9	24 93	70.1	64 29.4	26 92	69.0	64 21.5	27 91	67.8	64 13.0	29 91	66.7	64 04.0	31 90	65.6	25
6	63 59.4	18 95	73.9	63 53.8	19 94	72.8	63 47.8	21 94	71.7	63 41.2	23 93	70.6	63 34.2	24 92	69.5	63 26.6	26 92	68.4	63 18.6	28 91	67.3	63 10.1	29 90	66.3	6
7	63 02.5	17 95	74.3	62 57.3	18 94	73.2	62 51.6	20 94	72.1	62 45.4	21 93	71.1	62 38.8	23 93	70.0	62 31.6	25 92	68.9	62 24.0	26 91	67.9	62 15.9	28 91	66.9	7
8	62 05.6	16 95	74.6	62 00.7	17 95	73.6	61 55.3	19 94	72.5	61 49.5	20 93	71.5	61 43.1	22 93	70.5	61 36.4	23 92	69.4	61 29.1	25 92	68.4	61 21.4	26 91	67.4	8
9	61 08.6	15 95	74.9	61 04.0	16 95	73.9	60 58.9	18 94	72.9	60 53.4	19 94	71.9	60 47.4	21 93	70.9	60 41.0	22 93	69.9	60 34.1	24 92	68.9	69 26.8	25 91	67.9	9
30	60 11.5	14 95	75.2	60 07.2	15 95	74.2	60 02.4	17 94	73.2	59 57.2	18 94	72.2	59 51.5	20 93	71.3	59 45.4	21 93	70.3	59 38.9	22 92	69.3	59 31.9	24 92	68.4	30
1	59 14.3	13 95	75.5	59 10.3	14 95	74.5	59 05.8	16 94	73.5	59 00.8	17 94	72.6	58 55.5	19 94	71.6	58 49.7	20 93	70.7	58 43.5	21 92	69.7	58 36.9	23 92	68.8	1
2	58 17.1	12 95	75.7	58 13.3	13 95	74.8	58 09.1	15 95	73.8	58 04.4	16 94	72.9	57 59.4	18 94	71.9	57 53.9	19 93	71.0	57 48.0	20 93	70.1	57 41.8	22 92	69.2	2
3	57 19.8	11 96	75.9	57 16.3	13 95	75.0	57 12.3	14 95	74.1	57 07.9	15 94	73.2	57 03.1	17 94	72.2	56 58.0	18 93	71.3	56 52.4	19 93	70.4	56 46.5	20 92	69.5	3
4	56 22.5	10 96	76.1	56 19.2	12 95	75.2	56 15.4	13 96	74.3	56 11.3	14 94	73.4	56 06.8	16 94	72.5	56 01.9	17 94	71.6	55 56.7	18 93	70.8	55 51.0	19 93	69.9	4
35	55 25.1	10 96	76.3	55 22.0	11 95	75.4	55 18.5	12 95	74.5	55 14.6	14 95	73.7	55 10.4	15 94	72.8	55 05.8	16 94	71.9	55 00.8	17 93	71.1	54 55.5	18 93	70.2	35
6	54 27.7	09 96	76.4	54 24.8	10 96	75.6	54 21.5	11 95	74.7	54 17.9	13 95	73.9	54 13.9	14 94	73.0	54 09.6	15 94	72.2	54 04.9	16 93	71.3	53 59.9	17 93	70.5	6
7	53 30.2	08 96	76.6	53 27.6	10 95	75.7	53 24.5	11 95	74.9	53 21.1	12 95	74.1	53 17.4	13 94	73.2	53 13.3	14 94	72.4	53 08.9	15 94	71.6	53 04.1	16 93	70.8	7
8	52 32.8	08 96	76.7	52 30.3	09 96	75.9	52 27.4	10 95	75.1	52 24.3	11 95	74.2	52 20.8	12 94	73.4	52 16.9	13 94	72.6	52 12.8	14 94	71.8	52 08.3	16 93	71.0	8
9	51 35.2	07 96	76.8	51 32.9	08 96	76.0	51 30.3	09 95	75.2	51 27.4	10 95	74.4	51 24.1	11 95	73.6	51 20.5	13 94	72.8	51 16.6	14 94	72.0	51 12.4	15 93	71.2	9
40	50 37.7	06 96	76.9	50 35.6	08 96	76.1	50 33.2	09 96	75.3	50 30.4	10 95	74.6	50 27.4	11 95	73.8	50 24.0	12 94	73.0	50 20.4	13 94	72.2	50 16.4	14 93	71.4	40
1	49 40.1	06 96	77.0	49 38.2	07 96	76.2	49 36.0	08 95	75.5	49 33.5	09 95	74.7	49 30.6	10 95	73.9	49 27.5	11 94	73.2	49 24.1	12 94	72.4	49 20.3	13 94	71.6	1
2	48 42.5	05 96	77.1	48 40.8	06 96	76.3	48 38.8	07 95	75.6	48 36.5	08 95	74.8	48 33.8	09 95	74.1	48 30.9	10 94	73.3	48 27.7	11 94	72.6	48 24.2	12 94	71.8	2
3	47 44.9	05 96	77.2	47 43.4	06 96	76.4	47 41.5	07 95	75.7	47 39.4	08 95	74.9	47 37.0	09 95	74.2	47 34.3	09 94	73.5	47 31.3	10 94	72.7	47 28.1	11 94	72.0	3
4	46 47.3	04 96	77.2	46 45.9	05 96	76.5	46 44.3	06 95	75.8	46 42.3	07 95	75.0	46 40.1	08 95	74.3	46 37.6	09 94	73.6	46 34.9	10 94	72.9	46 31.8	11 94	72.1	4
45	45 49.7	04 96	77.3	45 48.5	04 96	76.6	45 47.0	05 96	75.8	45 45.2	06 95	75.1	45 43.2	07 95	74.4	45 40.9	08 95	73.7	45 38.4	09 94	73.0	45 35.6	10 94	72.3	45
6	44 52.0	03 96	77.3	44 51.0	04 96	76.6	44 49.7	05 96	75.9	44 48.1	06 95	75.2	44 46.3	07 95	74.5	44 44.2	07 95	73.8	44 41.9	08 94	73.1	44 39.3	09 94	72.4	6
7	43 54.4	03 96	77.4	43 53.5	03 96	76.7	43 52.4	04 96	76.0	43 51.0	05 95	75.3	43 49.3	06 95	74.6	43 47.5	07 95	73.9	43 45.3	08 94	73.2	43 42.9	08 94	72.5	7
8	42 56.7	02 96	77.4	42 56.0	03 96	76.7	42 55.0	04 96	76.0	42 53.8	04 95	75.3	42 52.4	05 95	74.7	42 50.7	06 95	74.0	42 48.7	07 94	73.3	42 46.6	08 94	72.6	8
9	41 59.1	02 96	77.4	41 58.5	02 96	76.7	41 57.7	03 96	76.1	41 56.6	04 95	75.4	41 55.4	05 95	74.7	41 53.9	05 95	74.1	41 52.1	06 94	73.4	41 50.1	07 94	72.7	9
50	41 01.4	01 96	77.4	41 01.0	02 96	76.8	41 00.3	03 96	76.1	40 59.5	03 95	75.4	40 58.4	04 95	74.8	40 57.0	05 95	74.1	40 55.5	06 94	73.5	40 53.7	06 94	72.8	50
1	40 03.7	01 96	77.4	40 03.5	01 96	76.8	40 03.0	02 96	76.1	40 02.3	03 95	75.5	40 01.3	03 95	74.8	40 00.2	04 95	74.2	39 58.8	05 94	73.5	39 57.3	06 94	72.9	1
2	39 06.0	00 96	77.4	39 05.9	01 96	76.8	39 05.6	01 96	76.2	39 05.1	02 95	75.5	39 04.3	03 95	74.9	39 03.3	04 95	74.2	39 02.2	04 94	73.6	39 00.8	05 94	72.9	2
3	38 08.4	00 96	77.4	38 08.4	00 96	76.8	38 08.2	01 96	76.2	38 07.8	02 95	75.5	38 07.3	02 95	74.9	38 06.5	03 95	74.3	38 05.5	04 94	73.6	38 04.3	04 94	73.0	3
4	37 10.7	01 96	77.4	37 10.9	00 96	76.8	37 10.8	00 96	76.2	37 10.6	01 95	75.6	37 10.2	02 95	74.9	37 09.6	02 95	74.3	37 08.8	03 95	73.7	37 07.8	04 94	73.0	4
55	36 13.0	01 96	77.4	36 13.3	01 95	76.8	36 13.5	00 96	76.2	36 13.4	01 95	75.6	36 13.2	01 95	74.9	36 12.7	02 95	74.3	36 12.1	02 95	73.7	36 11.2	03 94	73.1	55
6	35 15.4	02 96	77.4	35 15.8	01 96	76.8	35 16.1	01 95	76.2	35 16.2	00 95	75.6	35 16.1	01 95	75.0	35 15.8	01 95	74.3	35 15.4	02 95	73.7	35 14.7	02 94	73.1	6
7	34 17.7	02 96	77.4	34 18.3	02 96	76.8	34 18.7	01 96	76.2	34 19.0	01 95	75.6	34 19.0	00 95	75.0	34 18.9	01 95	74.4	34 18.6	01 95	73.7	34 18.2	02 94	73.1	7
8	33 20.0	03 96	77.3	33 20.8	02 96	76.7	33 21.3	02 96	76.2	33 21.7	01 95	75.6	33 22.0	00 95	75.0	33 22.0	00 95	74.4	33 21.9	01 95	73.8	33 21.6	01 94	73.2	8
9	32 22.4	03 96	77.3	32 23.3	03 96	76.7	32 24.0	02 96	76.1	32 24.5	02 95	75.5	32 24.9	01 95	74.9	32 25.1	00 95	74.4	32 25.2	00 95	73.8	32 25.1	01 94	73.2	9
60	31 24.7	04 96	77.3	31 25.8	03 96	76.7	31 26.6	03 96	76.1	31 27.3	02 95	75.5	31 27.8	02 95	74.9	31 28.2	01 95	74.3	31 28.4	00 95	73.8	31 28.5	00 94	73.2	60
1	30 27.1	04 96	77.2	30 28.3	04 96	76.7	30 29.3	03 96	76.1	30 30.1	03 95	75.5	30 30.8	02 95	74.9	30 31.3	02 95	74.3	30 31.7	01 95	73.8	30 31.9	01 94	73.2	1
2	29 29.5	05 96	77.2	29 30.8	04 96	76.6	29 31.9	04 96	76.0	29 32.9	03 95	75.5	29 33.7	03 95	74.9	29 34.4	02 95	74.3	29 35.0	02 95	73.7	29 35.4	01 94	73.2	2
3	28 31.9	05 96	77.1	28 33.3	04 96	76.6	28 34.6	04 96	76.0	28 35.7	04 95	75.4	28 36.7	03 95	74.9	28 37.6	03 95	74.3	28 38.3	02 95	73.7	28 38.8	02 94	73.1	3
4	27 34.3	05 96	77.1	27 35.8	05 96	76.5	27 37.2	04 96	75.9	27 38.5	04 95	75.4	27 39.7	04 95	74.8	27 40.7	03 95	74.3	27 41.5	03 95	73.7	27 42.3	02 94	73.1	4
65	26 36.7	06 96	77.0	26 38.4	05 96	76.5	26 39.9	05 96	75.9	26 41.4	05 95	75.3	26 42.6	04 95	74.8	26 43.8	04 95	74.2	26 44.8	03 94	73.7	26 45.7	03 94	73.1	65
6	25 39.1	06 96	76.9	25 40.9	06 96	76.4	25 42.6	05 95	75.8	25 44.2	05 95	75.3	25 45.6	05 95	74.7	25 47.0	04 95	74.2	25 48.1	04 94	73.6	25 49.2	03 94	73.1	6
7	24 41.6	07 96	76.9	24 43.5	06 96	76.3	24 45.3	06 95	75.8	24 47.1	05 95	75.2	24 48.6	05 95	74.7	24 50.1	05 95	74.1	24 51.5	04 94	73.6	24 52.7	04 94	73.0	7
8	23 44.0	07 96	76.8	23 46.1	07 96	76.3	23 48.1	06 95	75.7	23 49.9	06 95	75.2	23 51.7	06 95	74.6	23 53.3	05 95	74.1	23 54.8	05 94	73.5	23 56.2	04 94	73.0	8
9	22 46.5	08 96	76.7	22 48.7	07 96	76.2	22 50.8	07 95	75.6	22 52.8	06 95	75.1	22 54.7	06 95	74.6	22 56.5	06 95	74.0	22 58.1	05 94	73.5	22 59.7	05 94	72.9	9
70	21 49.0	08 96	76.6	21 51.3	08 96	76.1	21 53.6	07 95	75.6	21 55.7	07 95	75.0	21 57.7	07 95	74.5	21 59.7	06 95	74.0	22 01.5	06 94	73.4	22 03.2	06 94	72.9	70
1	20 51.5	08 96	76.6	20 54.0	08 96	76.0	20 56.4	08 95	75.5	20 58.6	07 95	75.0	21 00.8	07 95	74.4	21 02.9	07 95	73.9	21 04.9	06 94	73.4	21 06.7	06 94	72.8	1
2	19 54.1	09 96	76.5	19 56.7	09 96	75.9	19 59.2	08 95	75.4	20 01.6	08 95	74.9	20 03.9	08 95	74.4	20 06.1	07 95	73.8	20 08.3	07 94	73.3	20 10.3	07 94	72.8	2
3	18 56.6	09 96	76.4	18 59.4	09 95	75.9	19 02.0	09 95	75.3	19 04.6	08 95	74.8	19 07.0	08 95	74.3	19 09.4	08 95	73.7	19 11.7	07 94	73.2	19 13.9	07 94	72.7	3
4	17 59.2	10 96	76.3	18 02.1	09 95	75.8	18 04.8	09 95	75.2	18 07.5	09 95	74.7	18 10.2	09 95	74.2	18 12.7	08 94	73.7	18 15.1	08 94	73.1	18 17.5	08 94	72.6	4
75	17 01.8	10 96	76.2	17 04.8	10 95	75.7	17 07.7	10 95	75.1	17 10.6	09 95	74.6	17 13.3	09 95	74.1	17 16.0	09 94	73.6	17 18.6	09 94	73.1	17 21.1	08 94	72.5	75
6	16 04.4	11 96	76.1	16 07.6	10 95	75.6	16 10.6	10 95	75.1	16 13.6	10 95	74.5	16 16.5	10 95	74.0	16 19.3	09 94	73.5	16 22.1	09 94	73.0	16 24.7	09 94	72.5	6
7	15 07.1	11 96	76.0	15 10.4	11 95	75.5	15 13.5	10 95	74.9	15 16.7	10 95	74.4	15 19.7	10 95	73.9	15 22.7	10 94	73.4	15 25.6	10 94	72.9	15 28.4	09 94	72.4	7
8	14 09.8	11 96	75.9	14 13.2	11 95	75.4	14 16.5	11 95	74.8	14 19.8	11 95	74.3	14 22.9	11 95	73.8	14 26.1	10 94	73.3	14 29.1	10 94	72.8	14 32.1	10 94	72.3	8
9	13 12.5	12 95	75.8	13 16.0	12 95	75.2	13 19.5	11 95	74.7	13 22.9	11 95	74.2	13 26.2	11 94	73.7	13 29.5	11 94	73.2	13 32.7	11 94	72.7	13 35.8	10 94	72.2	9
80	12 15.3	12 95	75.6	12 18.9	12 95	75.1	12 22.5	12 95	74.6	12 26.0	12 95	74.1	12 29.5	12 94	73.6	12 32.9	11 94	73.1	12 36.3	11 94	72.6	12 39.6	11 94	72.1	80
1	11 18.0	13 95	75.5	11 21.8	13 95	75.0	11 25.5	12 95	74.5	11 29.2	12 95	74.0	11 32.8	12 94	73.5	11 36.4	12 94	73.0	11 39.9	12 94	72.5	11 43.4	11 94	72.0	1
2	10 20.8	13 95	75.4	10 24.7	13 95	74.9	10 28.6	13 95	74.4	10 32.4	13 95	73.9	10 36.2	12 94	73.4	10 39.9	12 94	72.9	10 43.6	12 94	72.4	10 47.2	12 94	71.9	2
3	9 23.7	14 95	75.3	9 27.7	13 95	74.8	9 31.7	13 95	74.2	9 35.7	13 94	73.7	9 39.6	13 94	73.2	9 43.5	13 94	72.7	9 47.3	13 94	72.2	9 51.1	13 93	71.7	3
4	8 26.5	14 95	75.1	8 30.7	14 95	74.6	8 34.9	14 95	74.1	8 39.0	14 94	73.6	8 43.0	13 94	73.1	8 47.1	13 94	72.6	8 51.1	13 94	72.1	8 55.0	13 93	71.6	4
85	7 29.5	14 96	75.0	7 33.8	14 95	74.5	7 38.1	14 95	74.0	7 42.3	14 94	73.5	7 46.5	14 94	73.0	7 50.7	14 94	72.5	7 54.9	14 94	72.0	7 59.0	14 93	71.5	85
6	6 32.4	15 96	74.8	6 36.9	15 95	74.3	6 41.3	15 95	73.8	6 45.7	15 94	73.3	6 50.0	14 94	72.8	6 54.4	14 94	72.4	6 58.7	14 94	71.9	7 03.0	14 93	71.4	6
7	5 35.4	15 96	74.7	5 40.0	15 95	74.2	5 44.6	15 95	73.7	5 49.1	15 94	73.2	5 53.6	15 94	72.7	5 58.1	15 94	72.2	6 02.6	15 93	71.7	6 07.0	15 93	71.2	7
8																5 01.9	15 94	72.1	5 06.5	15 93	71.6	5 11.1	15 93	71.1	8

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
°	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	°
00	64 00.0	1.0 02	180.0	63 30.0	1.0 02	180.0	63 00.0	1.0 02	180.0	62 30.0	1.0 02	180.0	62 00.0	1.0 02	180.0	61 30.0	1.0 02	180.0	61 00.0	1.0 02	180.0	60 30.0	1.0 02	180.0	00
1	63 58.9	1.0 06	177.8	63 28.9	1.0 06	177.9	62 58.9	1.0 05	177.9	62 28.9	1.0 05	177.9	61 59.0	1.0 05	178.0	61 29.0	1.0 05	178.0	60 59.0	1.0 05	178.1	60 29.0	1.0 05	178.1	1
2	63 55.5	1.0 09	175.6	63 25.6	1.0 09	175.7	62 55.7	1.0 09	175.8	62 25.7	1.0 09	175.9	61 55.8	1.0 09	176.0	61 25.9	1.0 08	176.0	60 56.0	1.0 08	176.1	60 26.1	1.0 08	176.2	2
3	63 49.9	99 13	173.4	63 20.1	99 13	173.6	62 50.3	99 13	173.7	62 20.4	99 12	173.8	61 50.6	99 12	173.9	61 20.8	99 12	174.1	60 51.0	99 12	174.2	60 21.1	99 11	174.3	3
4	63 42.0	99 17	171.3	63 12.4	99 16	171.5	62 42.7	99 16	171.6	62 13.0	99 16	171.8	61 43.4	99 15	172.0	61 13.7	99 15	172.1	60 44.0	99 15	172.2	60 14.3	99 15	172.4	4
05	63 32.0	98 20	169.2	63 02.5	98 20	169.4	62 33.1	98 20	169.6	62 03.6	98 19	169.8	61 34.1	98 19	170.0	61 04.6	98 18	170.2	60 35.0	98 18	170.3	60 05.5	99 18	170.5	05
6	63 19.8	97 24	167.1	62 50.6	97 23	167.3	62 21.4	98 23	167.6	61 52.1	98 22	167.8	61 22.8	98 22	168.0	60 53.5	98 22	168.2	60 24.2	98 21	168.5	59 54.8	98 21	168.7	6
7	63 05.5	96 27	165.0	62 36.6	97 27	165.3	62 07.6	97 26	165.6	61 38.6	97 26	165.8	61 09.6	97 25	166.1	60 40.5	97 25	166.4	60 11.4	97 24	166.6	59 42.3	97 24	166.8	7
8	62 49.2	95 30	163.0	62 20.6	96 30	163.3	61 51.9	96 29	163.6	61 23.2	96 29	163.9	60 54.4	96 28	164.2	60 25.6	96 28	164.5	59 56.8	96 27	164.8	59 27.9	96 27	165.0	8
9	62 31.0	94 34	161.0	62 02.6	94 33	161.3	61 34.3	95 32	161.7	61 05.9	95 32	162.0	60 37.4	95 31	162.3	60 08.9	95 31	162.7	59 40.4	95 30	163.0	59 11.8	95 30	163.3	9
10	62 10.8	93 37	159.0	61 42.8	93 36	159.4	61 14.8	93 35	159.8	60 46.7	94 35	160.2	60 18.6	94 34	160.5	59 50.4	94 34	160.9	59 22.2	94 33	161.2	58 53.9	94 33	161.5	10
1	61 48.7	92 40	157.2	61 21.2	92 39	157.6	60 53.5	92 38	158.0	60 25.8	92 38	158.4	59 58.0	93 37	158.7	59 30.2	93 36	159.1	59 02.3	93 36	159.5	58 34.3	93 35	159.8	1
2	61 24.9	90 43	155.3	60 57.7	91 42	155.8	60 30.5	91 41	156.2	60 03.2	91 40	156.6	59 35.8	91 40	157.0	59 08.3	92 39	157.4	58 40.8	92 39	157.8	58 13.2	92 38	158.2	2
3	60 59.4	89 45	153.5	60 32.6	89 44	154.0	60 05.8	90 44	154.4	59 38.9	90 43	154.9	59 11.9	90 42	155.3	58 44.8	90 42	155.7	58 17.6	91 41	156.1	57 50.4	91 40	156.5	3
4	60 32.2	87 48	151.8	60 05.9	88 47	152.3	59 39.5	88 46	152.7	59 13.0	89 46	153.2	58 46.4	89 45	153.7	58 19.7	89 44	154.1	57 53.0	89 44	154.5	57 26.1	90 43	154.9	4
15	60 03.5	86 50	150.1	59 37.7	86 50	150.6	59 11.7	87 49	151.1	58 45.6	87 48	151.6	58 19.5	87 47	152.0	57 53.2	88 47	152.5	57 26.8	88 46	152.9	57 00.3	88 45	153.4	15
6	59 33.3	84 53	148.5	59 07.9	85 52	149.0	58 42.4	85 51	149.5	58 16.8	86 50	150.0	57 51.0	86 50	150.5	57 25.2	86 49	151.0	56 59.2	87 48	151.4	56 33.2	87 48	151.9	6
7	59 01.8	83 55	146.9	58 36.8	83 54	147.4	58 11.8	84 53	148.0	57 46.6	84 53	148.5	57 21.3	85 52	149.0	56 55.8	85 51	149.5	56 30.3	85 50	149.9	56 04.6	86 50	150.4	7
8	58 28.8	81 57	145.4	58 04.4	82 56	145.9	57 39.8	82 55	146.5	57 15.0	83 55	147.0	56 50.2	83 54	147.5	56 25.2	84 53	148.0	56 00.0	84 52	148.5	55 34.8	84 52	149.0	8
9	57 54.6	80 59	143.9	57 30.6	80 58	144.5	57 06.5	81 57	145.0	56 42.2	81 57	145.6	56 17.8	82 56	146.1	55 53.2	82 55	146.6	55 28.6	82 54	147.1	55 03.8	83 54	147.6	9
20	57 19.2	78 61	142.5	56 55.7	79 60	143.1	56 32.0	79 59	143.6	56 08.2	80 59	144.2	55 44.2	80 58	144.7	55 20.1	81 57	145.2	54 55.9	81 56	145.7	54 31.5	81 56	146.3	20
1	56 42.7	77 63	141.1	56 19.6	77 62	141.7	55 56.4	78 61	142.3	55 33.0	78 60	142.8	55 09.5	79 60	143.4	54 45.9	79 59	143.9	54 22.1	80 58	144.4	53 58.1	80 57	144.9	1
2	56 05.1	75 64	139.8	55 42.5	76 64	140.4	55 19.7	76 63	141.0	54 56.8	77 62	141.5	54 33.7	77 61	142.1	54 10.5	78 61	142.6	53 47.2	78 60	143.2	53 23.7	79 59	143.7	2
3	55 26.4	73 66	138.5	55 04.3	74 65	139.1	54 42.0	75 64	139.7	54 19.6	75 64	140.3	53 56.9	76 63	140.8	53 34.2	76 62	141.4	53 11.2	77 62	141.9	52 48.2	77 61	142.5	3
4	54 46.8	72 68	137.3	54 25.2	73 67	137.9	54 03.3	73 66	138.5	53 41.3	74 65	139.1	53 19.1	74 65	139.6	52 56.8	75 64	140.2	52 34.3	75 63	140.7	52 11.7	76 62	141.3	4
25	54 06.3	70 69	136.1	53 45.1	71 68	136.7	53 23.7	72 67	137.3	53 02.2	72 67	137.9	52 40.4	73 66	138.5	52 18.5	73 65	139.0	51 56.5	74 65	139.6	51 34.3	74 64	140.1	25
6	53 25.0	69 70	135.0	53 04.2	70 70	135.6	52 43.2	70 69	136.2	52 22.1	71 68	136.8	52 00.8	71 67	137.4	51 39.4	72 67	137.9	51 17.7	72 66	138.5	50 56.0	73 65	139.0	6
7	52 42.8	67 72	133.9	52 22.5	68 71	134.5	52 01.9	69 70	135.1	51 41.2	69 69	135.7	51 20.4	70 69	136.3	50 59.3	70 68	136.8	50 38.1	71 67	137.4	50 16.8	71 67	138.0	7
8	51 59.9	66 73	132.9	51 40.0	67 72	133.5	51 19.9	67 71	134.1	50 59.6	68 71	134.7	50 39.2	68 70	135.2	50 18.5	69 69	135.8	49 57.8	70 69	136.4	49 36.8	70 68	136.9	8
9	51 16.2	65 74	131.9	50 56.7	65 73	132.5	50 37.0	66 73	133.1	50 17.2	66 72	133.6	49 57.2	67 71	134.2	49 37.0	68 70	134.8	49 16.6	68 70	135.4	48 56.1	69 69	135.9	9
30	50 31.8	63 75	130.9	50 12.8	64 74	131.5	49 53.5	64 74	132.1	49 34.1	65 73	132.7	49 14.5	66 72	133.3	48 54.7	66 72	133.8	48 34.7	67 71	134.4	48 14.6	67 70	134.9	30
1	49 46.9	62 76	129.9	49 28.2	63 75	130.5	49 09.3	63 75	131.1	48 50.3	64 74	131.7	48 31.1	64 73	132.3	48 11.7	65 73	132.9	47 52.2	65 72	133.4	47 32.5	66 71	134.0	1
2	49 01.2	61 77	129.0	48 43.0	61 76	129.6	48 24.5	62 76	130.2	48 05.9	62 75	130.8	47 47.1	63 74	131.4	47 28.1	64 74	132.0	47 09.0	64 73	132.5	46 49.6	65 72	133.1	2
3	48 15.1	59 78	128.2	47 57.2	60 77	128.8	47 39.1	60 77	129.4	47 20.9	61 76	129.9	47 02.5	62 75	130.5	46 43.9	62 75	131.1	46 25.1	63 74	131.7	46 06.2	63 73	132.2	3
4	47 28.3	58 79	127.3	47 10.9	59 78	127.9	46 53.2	59 77	128.5	46 35.3	60 77	129.1	46 17.3	60 76	129.7	45 59.1	61 76	130.3	45 40.7	62 75	130.8	45 22.1	62 74	131.4	4
35	46 41.1	57 80	126.5	46 24.0	57 79	127.1	46 06.7	58 78	127.7	45 49.2	59 78	128.3	45 31.5	59 77	128.9	45 13.7	60 76	129.4	44 55.7	60 76	130.0	44 37.5	61 75	130.6	35
6	45 53.4	56 80	125.7	45 36.6	56 80	126.3	45 19.7	57 79	126.9	45 02.6	57 79	127.5	44 45.3	58 78	128.1	44 27.8	58 77	128.6	44 10.2	59 77	129.2	43 52.4	60 76	129.8	6
7	45 05.2	54 81	125.0	44 48.8	55 80	125.6	44 32.2	56 80	126.2	44 15.4	56 79	126.7	43 58.5	57 79	127.3	43 41.4	57 78	127.9	43 24.1	58 78	128.4	43 06.7	58 77	129.0	7
8	44 16.5	53 82	124.3	44 00.5	54 81	124.8	43 44.3	54 81	125.4	43 27.9	55 80	126.0	43 11.3	56 79	126.6	42 54.5	56 79	127.1	42 37.6	57 78	127.7	42 20.6	57 78	128.3	8
9	43 27.5	52 82	123.6	43 11.8	53 82	124.1	42 55.9	53 81	124.7	42 39.9	54 81	125.3	42 23.6	54 80	125.9	42 07.2	55 80	126.4	41 50.7	55 79	127.0	41 33.9	56 78	127.5	9
40	42 38.1	51 83	122.9	42 22.7	52 82	123.5	42 07.1	52 82	124.0	41 51.4	53 81	124.6	41 35.5	53 81	125.2	41 19.5	54 80	125.7	41 03.2	54 80	126.3	40 46.9	55 79	126.9	40
1	41 48.3	50 84	122.2	41 33.2	50 83	122.8	41 18.0	51 83	123.4	41 02.6	52 82	123.9	40 47.0	52 81	124.5	40 31.3	53 81	125.1	40 15.4	53 80	125.6	39 59.4	54 80	126.2	1
2	40 58.1	49 84	121.6	40 43.4	49 84	122.2	40 28.5	50 83	122.7	40 13.4	51 83	123.3	39 58.1	51 82	123.9	39 42.8	52 82	124.4	39 27.2	52 81	125.0	39 11.5	53 80	125.5	2
3	40 07.6	48 85	121.0	39 53.2	48 84	121.5	39 38.6	49 84	122.1	39 23.8	49 83	122.7	39 08.9	50 83	123.2	38 53.8	51 82	123.8	38 38.6	51 82	124.3	38 23.2	52 81	124.9	3
4	39 16.8	47 85	120.4	39 02.6	47 85	121.0	38 48.4	48 84	121.5	38 33.9	48 84	122.1	38 19.3	49 83	122.6	38 04.6	49 83	123.2	37 49.6	50 82	123.7	37 34.6	50 82	124.3	4
45	38 25.7	46 86	119.8	38 11.8	46 85	120.4	37 57.8	47 85	120.9	37 43.7	47 84	121.5	37 29.4	48 84	122.1	37 14.9	48 83	122.6	37 00.3	49 83	123.2	36 45.6	49 82	123.7	45
6	37 34.2	45 86	119.3	37 20.7	45 86	119.8	37 07.0	46 85	120.4	36 53.2	46 85	120.9	36 39.2	47 84	121.5	36 25.0	47 84	122.0	36 10.7	48 83	122.6	35 56.2	48 83	123.1	6
7	36 42.6	44 87	118.7	36 29.3	44 86	119.3	36 15.9	45 86	119.8	36 02.3	45 85	120.4	35 48.6	46 85	120.9	35 34.8	46 84	121.5	35 20.8	47 84	122.0	35 06.6	47 83	122.6	7
8	35 50.6	43 87	118.2	35 37.6	44 87	118.8	35 24.5	44 86	119.3	35 11.2	45 86	119.9	34 57.8	45 85	120.4	34 44.2	45 85	121.0	34 30.5	46 84	121.5	34 16.7	46 84	122.0	8
9	34 58.4	42 87	117.7	34 45.7	43 87	118.3	34 32.9	43 86	118.8	34 19.9	44 86	119.4	34 06.7	44 86	119.9	33 53.4	45 85	120.4	33 40.0	45 85	121.0	33 26.4	45 84	121.5	9
50	34 06.0	41 88	117.2	33 53.5	42 87	117.8	33 41.0	42 87	118.3	33 28.2	43 86	118.9	33 15.4	43 86	119.4	33 02.3	44 86	119.9	32 49.2	44 85	120.5	32 35.9	45 85	121.0	50
1	33 13.3	40 88	116.7	33 01.1	41 88	117.3	32 48.8	41 87	117.8	32 36.4	42 87	118.4	32 23.8	42 86	118.9	32 11.0	43 86	119.5	31 58.1	43 86	120.0	31 45.1	44 85	120.5	1
2	32 20.5	40 88	116.3	32 08.5	40 88	116.8	31 56.5	40 88	117.4	31 44.3	41 87	117.9	31 31.9	41 87	118.4	31 19.4	42 86	119.0	31 06.8	42 86	119.5	30 54.1	43 85	120.0	2
3	31 27.4	39 89	115.8	31 15.7	39 88	116.4	31 03.9	40 88	116.9	30 51.9	40 88	117.5	30 39.8	40 87	118.0	30 27.6	41 87	118.5	30 15.3	41 86	119.0	30 02.8	42 86	119.6	3
4	30 34.1	38 89	115.4	30 22.7	38 89	116.0	30 11.1	39 88	116.5	29 59.4	39 88	117.0	29 47.6	40 88	117.6	29 35.6	40 87	118.1	29 23.5	40 87	118.6	29 11.3	41 86	119.1	4
55	29 40.6	37 89	115.0	29 29.4	38 89	115.5	29 18.1	38 89	116.1	29 06.7	38 88	116.6	28 55.1	39 88	117.1	28 43.4	39 87	117.6	28 31.5	40 87	118.2	28 19.6	40 87	118.7	55
6	28 47.0	36 90	114.6	28 36.0	37 89	115.1	28 24.9	37 89	115.7	28 13.7	38 89	116.2	28 02.4	38 88	116.7	27 50.9	38 88	117.2	27 39.4	39 87	117.8	27 27.7	39 87	118.3	6
7	27 53.2	36 90	114.2	27 42.5	36 90	114.7	27 31.6	36 89	115.3	27 20.6	37 89	115.8	27 09.5	37 88	116.3	26 58.3	38 88	116.8	26 47.0	38 88	117.3	26 35.5	38 87	117.9	7
8	26 59.2	35 90	113.8	26 48.7	35 90	114.3	26 38.1	36 90	114.9	26 27.3	36 89	115.4	26 16.4	36 89	115.9	26 05.5	37 88	116.4	25 54.4	37 88	116.9	25 43.2	38 88	117.5	8
9	26 05.1	34 90	113.5	25 54.8	35 90	114.0	25 44.4	35 90	114.5	25 33.8	35 89	115.0	25 23.2	36 89	115.5	25 12.5	36 89	116.0	25 01.6	36 88	116.6	24 50.7	37 88	117.1	9
60	25 10.8	33 91	113.1	25 00.7	34 90	113.6	24 50.5	34 90	114.1	24 40.2	35 90	114.6	24 29.8	35 89	115.2	24 19.3	35 89	115.7	24 08.7	36 88	116.2	23 58.0	36 88	116.7	60
1	24 16.4	33 91	112.7	24 06.5	33 91	113.3	23 56.5	33 90	113.8	23 46.4	34 90	114.3	23 36.3	34 90	114.8	23 26.0	34 89	115.3	23 15.6	35 89	115.8	23 05.1	35 88	116.3	1
2	23 21.8	32 91	112.4	23 12.1	32 91	112.9	23 02.4	33 90	113.4	22 52.5	33 90	113.9	22 42.5	33 90	114.5	22 32.5	34 89	115.0	22 22.3	34 89	115.5	22 12.1	34 89	116.0	2
3	22 27.1	31 91	112.1	22 17.7	32 91	112.6	22 08.1	32 91	113.1	21 58.4	32 90	113.6	21 48.7	33 90	114.1	21 38.8	33 90	114.6	21 28.9	33 89	115.1	21 18.9	34 89	115.6	3
4	21 32.3	31 92	111.7	21 23.0	31 91	112.3	21 13.7	31 91	112.8	21 04.2	32 91	113.3	20 54.7	32 90	113.8	20 45.0	32 90	114.3	20 35.3	33 90	114.8	20 25.5	33 89	115.3	4
65	20 37.4	30 92	111.4	20 28.3	30 91	111.9	20 19.1	31 91	112.4	20 09.9	31 91	113.0	20 00.5	31 90	113.5	19 51.1	32 90	114.0	19 41.6	32 90	114.5	19 32.0	32 89	115.0	65
6	19 42.3	29 92	111.1	19 33.4	30 92	111.6	19 24.5	30 91	112.1	19 15.4	30 91	112.6	19 06.3	31 91	113.2	18 57.1	31 90	113.7	18 47.8	31 90	114.2	18 38.4	31 90	114.7	6
7	18 47.1	29 92	110.8	18 38.4	29 92	111.3	18 29.7	29 92	111.8	18 20.8	30 91	112.3	18 11.9	30 91	112.8	18 02.9	30 90	113.3	17 53.8	30 90	113.8	17 44.6	31 90	114.3	7
8	17 51.8	28 92	110.5	17 43.3	28 92	111.0	17 34.8	29 92	111.5	17 26.1	29 91	112.1	17 17.4	29 91	112.6	17 08.6	29 91	113.1	16 59.7	30 90	113.6	16 50.7	30 90	114.0	8
9	16 56.5	28 92	110.3	16 48.1	28 92	110.8	16 39.7	28 92	111.3	16 31.3	28 92	111.8	16 22.7	29 91	112.3	16 14.1	29 91	112.8	16 05.5	29 91	113.3	15 56.7	29 90	113.8	9
70	16 01.0	27 93	110.0	15 52.8	27 92	110.5	15 44.6	27 92	111.0	15 36.4	28 92	111.5	15 28.0	28 91	112.0	15 19.6	28 91	112.5	15 11.1	28 91	113.0	15 02.6	29 90	113.5	70
1	15 05.4	26 93	109.7	14 57.4	27 92	110.2	14 49.4	27 92	110.7	14 41.3	27 92	111.2	14 33.2	27 92	111.7	14 24.9	28 91	112.2	14 16.7	28 91	112.7	14 08.3	28 91	113.2	1
2	14 09.7	26 93	109.5	14 01.9	26 93	110.0	13 54.1	26 92	110.5	13 46.2	26 92	111.0	13 38.2	27 92	111.4	13 30.2	27 91	111.9	13 22.1	27 91	112.4	13 13.9	27 91	112.9	2
3	13 14.0	25 93	109.2	13 06.4	25 93	109.7	12 58.7	26 92	110.2	12 51.0	26 92	110.7	12 43.2	26 92	111.2	12 35.3	26 92	111.7	12 27.4	26 91	112.2	12 19.5	27 91	112.7	3
4	12 18.1	25 93	109.0	12 10.7	25 93	109.5	12 03.2	25 93	110.0	11 55.6	25 92	110.4	11 48.0	25 92	110.9	11 40.4	26 92	111.4	11 32.7	26 91	111.9	11 24.9	26 91	112.4	4
75	11 22.2	24 93	108.7	11 14.9	24 93	109.2	11 07.6	25 93	109.7	11 00.2	25 92	110.2	10 52.8	25 92	110.7	10 45.3	25 92	111.2	10 37.8	25 92	111.7	10 30.2	25 91	112.2	75
6	10 26.2	24 93	108.5	10 19.1	24 93	109.0	10 11.9	24 93	109.5	10 04.7	24 93	110.0	9 57.5	24 92	110.5	9 50.2	24 92	111.0	9 42.8	25 92	111.4	9 35.5	25 91	111.9	6
7	9 30.1	23 94	108.3	9 23.2	23 93	108.8	9 16.2	23 93	109.2	9 09.2	24 93	109.7	9 02.1	24 92	110.2	8 55.0	24 92	110.7	8 47.8	24 92	111.2	8 40.6	24 92	111.7	7
8	8 34.0	23 94	108.0	8 27.2	23 93	108.5	8 20.4	23 93	109.0	8 13.5	23 93	109.5	8 06.6	23 93	110.0	7 59.7	23 92	110.5	7 52.7	23 92	111.0	7 45.7	23 92	111.5	8
9	7 37.8	22 94	107.8	7 31.1	22 94	108.3	7 24.5	22 93	108.8	7 17.8	22 93	109.3	7 11.0	22 93	109.8	7 04.3	23 92	110.3	6 57.5	23 92	110.8	6 50.6	23 92	111.3	9
80	6 41.5	22 94	107.6	6 35.0	22 94	108.1	6 28.5	22 93	108.6	6 22.0	22 93	109.1	6 15.4	22 93	109.6	6 08.8	22 93	110.1	6 02.2	22 92	110.6	5 55.5	22 92	111.0	80
1	5 45.1	21 94	107.4	5 38.8	21 94	107.9	5 32.5	21 93	108.4	5 26.1	21 93	108.9	5 19.7	21 93	109.4	5 13.3	21 93	109.9	5 06.8	22 92	110.3	5 00.3	22 92	110.8	1

H.A.	20° 00′			20° 30′			21° 00′			21° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	80 00.0	1.0 05	00.0	79 30.0	1.0 04	00.0	79 00.0	1.0 04	00.0	78 30.0	1.0 04	00.0
1	79 57.2	1.0 14	05.4	79 27.4	1.0 13	05.1	78 57.5	1.0 12	04.9	78 27.6	1.0 12	04.7
2	79 48.9	98 23	10.7	79 19.5	98 22	10.2	78 50.0	98 20	09.7	78 20.4	99 20	09.2
3	79 35.4	96 31	15.8	79 06.6	96 29	15.0	78 37.7	97 28	14.3	78 08.7	97 27	13.7
4	79 16.9	93 38	20.6	78 48.9	94 37	19.7	78 20.8	94 35	18.8	77 52.5	95 34	18.0
05	78 53.9	90 45	25.2	78 26.9	90 43	24.1	77 59.7	91 42	23.0	77 32.3	92 40	22.1
6	78 26.8	86 51	29.4	78 00.9	87 49	28.1	77 34.7	88 48	27.0	77 08.2	89 46	25.9
7	77 56.1	82 56	33.2	77 31.3	83 55	31.9	77 06.2	84 53	30.6	76 40.7	85 51	29.5
8	77 22.2	78 61	36.7	76 58.6	79 59	35.3	76 34.6	81 57	34.0	76 10.2	82 56	32.8
9	76 45.5	74 65	39.9	76 23.1	76 63	38.5	76 00.2	77 62	37.1	75 36.8	78 60	35.9
10	76 06.5	70 69	42.8	75 45.1	72 67	41.4	75 23.3	74 65	40.0	75 01.0	75 63	38.7
1	75 25.3	67 72	45.4	75 05.1	68 70	44.0	74 44.3	70 68	42.6	74 23.1	72 66	41.3
2	74 42.4	63 74	47.8	74 23.2	65 73	46.3	74 03.4	67 71	45.0	73 43.2	68 69	43.6
3	73 57.8	60 76	49.9	73 39.6	62 75	48.5	73 20.9	63 73	47.1	73 01.6	65 72	45.8
4	73 12.0	57 78	51.9	72 54.7	59 77	50.5	72 36.9	60 76	49.1	72 18.5	62 74	47.8
15	72 25.0	54 80	53.6	72 08.6	56 79	52.2	71 51.6	57 77	50.9	71 34.1	59 76	49.6
6	71 36.9	51 82	55.2	71 21.3	53 80	53.9	71 05.2	55 79	52.6	70 48.6	56 78	51.3
7	70 48.0	48 83	56.7	70 33.2	50 82	55.3	70 17.8	52 80	54.1	70 02.0	54 79	52.8
8	69 58.2	46 84	58.0	69 44.2	48 83	56.7	69 29.6	50 82	55.4	69 14.5	51 81	54.2
9	69 07.8	44 85	59.2	68 54.4	45 84	57.9	68 40.5	47 83	56.7	68 26.1	49 82	55.5
20	68 16.8	41 86	60.3	68 04.1	43 85	59.1	67 50.8	45 84	57.9	67 37.1	47 83	56.7
1	67 25.2	39 87	61.3	67 13.1	41 86	60.1	67 00.5	43 85	58.9	66 47.4	45 84	57.8
2	66 33.1	37 87	62.2	66 21.6	39 87	61.1	66 00.6	41 86	59.9	65 57.1	42 85	58.8
3	65 40.7	36 88	63.1	65 29.7	37 87	61.9	65 18.3	39 86	60.8	65 06.3	41 85	59.7
4	64 47.8	34 89	63.8	64 37.4	36 88	62.7	64 26.5	37 87	61.7	64 15.1	39 86	60.6
25	63 54.6	32 89	64.6	63 44.7	34 88	63.5	63 34.3	35 88	62.4	63 23.4	37 87	61.4
6	63 01.1	31 90	65.2	62 51.6	32 89	64.2	62 41.7	34 88	63.1	62 31.3	35 87	62.1
7	62 07.3	29 90	65.8	61 58.3	31 89	64.8	61 48.8	32 88	63.8	61 38.9	34 88	62.8
8	61 13.3	28 90	66.4	61 04.7	29 90	65.4	60 55.7	31 89	64.4	60 46.2	32 88	63.4
9	60 19.0	27 91	66.9	60 10.8	28 90	66.0	60 02.3	29 90	65.0	59 53.2	31 89	64.0
30	59 24.6	25 91	67.4	59 16.8	27 90	66.5	59 08.6	28 90	65.5	59 00.0	29 89	64.6
1	58 29.9	24 91	67.9	58 22.5	25 91	66.9	58 14.7	27 90	66.0	58 06.5	28 90	65.1
2	57 35.1	23 92	68.3	57 28.1	24 91	67.4	57 20.6	25 90	66.5	57 12.8	27 90	65.6
3	56 40.1	22 92	68.7	56 33.4	23 91	67.8	56 26.4	24 91	66.9	56 18.9	25 90	66.0
4	55 45.0	21 92	69.0	55 38.7	22 92	68.1	55 31.9	23 91	67.3	55 24.8	24 90	66.4
35	54 49.8	20 92	69.3	54 43.8	21 92	68.5	54 37.4	22 91	67.7	54 30.6	23 91	66.8
6	53 54.5	19 92	69.7	53 48.7	20 92	68.8	53 42.6	21 91	68.0	53 36.2	22 91	67.2
7	52 59.0	18 93	69.9	52 53.6	19 92	69.1	52 47.8	20 92	68.3	52 41.7	21 91	67.5
8	52 03.5	17 93	70.2	51 58.3	18 92	69.4	51 52.8	19 92	68.6	51 47.0	20 91	67.8
9	51 07.8	16 93	70.4	51 02.9	17 92	69.7	50 57.8	18 92	68.9	50 52.3	19 91	68.1
40	50 12.1	15 93	70.7	50 07.5	16 93	69.9	50 02.6	17 92	69.1	49 57.4	18 92	68.4
1	49 16.3	14 93	70.9	49 12.0	15 93	70.1	49 07.3	16 92	69.4	49 02.4	17 92	68.6
2	48 20.4	13 93	71.1	48 16.4	14 93	70.3	48 12.0	15 92	69.6	48 07.3	16 92	68.8
3	47 24.5	12 93	71.3	47 20.7	13 93	70.5	47 16.6	14 92	69.8	47 12.2	15 92	69.1
4	46 28.5	11 93	71.4	46 24.9	12 93	70.7	46 21.1	13 93	70.0	46 17.0	14 92	69.3
45	45 32.5	11 93	71.6	45 29.2	12 93	70.9	45 25.5	12 93	70.2	45 21.7	13 92	69.4
6	44 36.4	10 94	71.7	44 33.3	11 93	71.0	44 29.9	12 93	70.3	44 26.3	12 92	69.6
7	43 40.3	09 94	71.8	43 37.4	10 93	71.1	43 34.3	11 93	70.5	43 30.9	12 92	69.8
8	42 44.1	08 94	71.9	42 41.5	09 93	71.3	42 38.6	10 93	70.6	42 35.4	11 93	69.9
9	41 47.9	08 94	72.0	41 45.5	09 93	71.4	41 42.8	09 93	70.7	41 39.9	10 93	70.0
50	40 51.7	07 94	72.1	40 49.5	08 93	71.5	40 47.0	09 93	70.8	40 44.4	09 93	70.2
1	39 55.5	06 94	72.2	39 53.4	07 93	71.6	39 51.2	08 93	70.9	39 48.8	09 93	70.3
2	38 59.2	06 94	72.3	38 57.4	06 94	71.7	38 55.3	07 93	71.0	38 53.1	08 93	70.4
3	38 02.9	05 94	72.4	38 01.3	06 94	71.7	37 59.5	06 93	71.1	37 57.4	07 93	70.5
4	37 06.6	04 94	72.4	37 05.1	05 94	71.8	37 03.5	06 93	71.2	37 01.7	06 93	70.5
55	36 10.2	04 94	72.5	36 09.0	04 94	71.8	36 07.6	05 93	71.2	36 06.0	06 93	70.6
6	35 13.9	03 94	72.5	35 12.9	04 94	71.9	35 11.7	04 93	71.3	35 10.3	05 93	70.7
7	34 17.5	02 94	72.5	34 16.7	03 94	71.9	34 15.7	04 93	71.3	34 14.5	04 93	70.7
8	33 21.1	02 94	72.6	33 20.5	02 94	72.0	33 19.7	03 93	71.4	33 18.7	04 93	70.8
9	32 24.8	01 94	72.6	32 24.3	02 94	72.0	32 23.7	02 93	71.4	32 22.9	03 93	70.8
60	31 28.4	01 94	72.6	31 28.1	01 94	72.0	31 27.7	02 93	71.4	31 27.1	02 93	70.8
1	30 32.0	00 94	72.6	30 31.9	01 94	72.0	30 31.7	01 93	71.4	30 31.3	02 93	70.8
2	29 35.6	01 94	72.6	29 35.7	00 94	72.0	29 35.7	00 93	71.4	29 35.5	01 93	70.9
3	28 39.2	01 94	72.6	28 39.5	01 94	72.0	28 39.7	00 93	71.4	28 39.7	00 93	70.9
4	27 42.9	02 94	72.6	27 43.3	01 94	72.0	27 43.7	01 93	71.4	27 43.8	00 93	70.9
65	26 46.5	02 94	72.5	26 47.1	02 94	72.0	26 47.6	01 93	71.4	26 48.0	01 93	70.9
6	25 50.1	03 94	72.5	25 51.0	02 94	72.0	25 51.6	02 93	71.4	25 52.2	02 93	70.8
7	24 53.8	03 94	72.5	24 54.8	03 94	71.9	24 55.6	03 93	71.4	24 56.4	02 93	70.8
8	23 57.4	04 94	72.4	23 58.6	04 94	71.9	23 59.6	03 93	71.3	24 00.6	03 93	70.8
9	23 01.1	05 94	72.4	23 02.4	04 94	71.9	23 03.7	04 93	71.3	23 04.8	04 93	70.8
70	22 04.8	05 94	72.3	22 06.3	05 94	71.8	22 07.7	04 93	71.3	22 09.0	04 93	70.7
1	21 08.5	06 94	72.3	21 10.2	05 94	71.8	21 11.7	05 93	71.2	21 13.2	05 93	70.7
2	20 12.2	06 94	72.2	20 14.1	06 93	71.7	20 15.8	06 93	71.2	20 17.5	05 93	70.6
3	19 16.0	07 94	72.2	19 18.0	07 93	71.6	19 19.9	06 93	71.1	19 21.7	06 93	70.6
4	18 19.7	07 94	72.1	18 21.9	07 93	71.6	18 24.0	07 93	71.0	18 26.0	07 93	70.5
75	17 23.5	08 94	72.0	17 25.9	08 93	71.5	17 28.1	07 93	71.0	17 30.3	07 93	70.5
6	16 27.3	09 94	71.9	16 29.8	08 93	71.4	16 32.3	08 93	70.9	16 34.6	08 93	70.4
7	15 31.2	09 94	71.9	15 33.8	09 93	71.3	15 36.5	09 93	70.8	15 39.0	08 93	70.3
8	14 35.0	10 94	71.8	14 37.9	09 93	71.2	14 40.7	09 93	70.7	14 43.4	09 93	70.2
9	13 38.9	10 93	71.7	13 41.9	10 93	71.2	13 44.9	10 93	70.6	13 47.8	10 93	70.1
80	12 42.9	11 93	71.6	12 46.0	11 93	71.1	12 49.2	10 93	70.5	12 52.2	10 93	70.0
1	11 46.8	11 93	71.5	11 50.2	11 93	71.0	11 53.5	11 93	70.4	11 56.7	11 92	69.9
2	10 50.8	12 93	71.3	10 54.3	12 93	70.8	10 57.8	12 93	70.3	11 01.2	11 92	69.8
3	9 54.8	12 93	71.2	9 58.5	12 93	70.7	10 02.2	12 93	70.2	10 05.8	12 92	69.7
4	8 58.9	13 93	71.1	9 02.8	13 93	70.6	9 06.6	13 92	70.1	9 10.4	13 92	69.6
85	8 03.0	14 93	71.0	8 07.1	13 93	70.5	8 11.1	13 92	70.0	8 15.0	13 92	69.5
6	7 07.2	14 93	70.9	7 11.4	14 93	70.4	7 15.6	14 92	69.9	7 19.7	14 92	69.4
7	6 11.4	15 93	70.7	6 15.8	15 93	70.2	6 20.1	14 92	69.7	6 24.4	14 92	69.2
8	5 15.6	15 93	70.6	5 20.2	15 93	70.1	5 24.7	15 92	69.6	5 29.2	15 92	69.1

22° 00′			22° 30′			23° 00′			23° 30′			H.A.
Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
78 00.0	1.0 04	00.0	77 30.0	1.0 04	00.0	77 00.0	1.0 04	00.0	76 30.0	1.0 03	00.0	00
77 57.7	1.0 11	04.4	77 27.8	1.0 11	04.3	76 57.9	1.0 10	04.1	76 28.0	1.0 10	03.9	1
77 50.9	99 19	08.8	77 21.2	99 18	08.5	76 51.6	99 17	08.1	76 21.9	99 17	07.8	2
77 39.6	97 26	13.1	77 10.4	97 25	12.6	76 41.2	97 24	12.1	76 12.0	98 23	11.6	3
77 24.1	95 32	17.2	76 55.6	95 31	16.6	76 26.9	96 30	15.9	75 58.2	96 29	15.3	4
77 04.6	92 38	21.2	76 36.9	93 37	20.4	76 08.9	93 36	19.6	75 40.9	94 35	18.9	05
76 41.5	89 44	24.9	76 14.6	90 43	24.0	75 47.4	91 41	23.1	75 20.1	91 40	22.2	6
76 15.0	86 49	28.4	75 49.0	87 48	27.4	75 22.7	88 46	26.4	74 56.2	89 45	25.5	7
75 45.4	83 54	31.6	75 20.4	84 52	30.5	74 55.0	85 51	29.5	74 29.4	86 49	28.5	8
75 13.1	80 58	34.6	74 49.0	81 56	33.5	74 24.6	82 55	32.4	73 59.9	83 53	31.4	9
74 38.3	76 62	37.4	74 15.2	78 60	36.2	73 51.8	79 58	35.1	73 27.9	80 57	34.0	10
74 01.4	73 65	40.0	73 39.2	74 63	38.8	73 16.7	76 62	37.6	72 53.8	77 60	36.5	1
73 22.5	70 68	42.4	73 01.3	71 66	41.1	72 39.7	73 65	40.0	72 17.7	74 63	38.8	2
72 41.8	67 70	44.5	72 21.6	68 69	43.3	72 00.9	70 67	42.1	71 39.8	71 66	41.0	3
71 59.6	64 72	46.5	71 40.3	65 71	45.3	71 20.5	67 70	44.1	71 00.3	68 68	43.0	4
71 16.1	61 74	48.4	70 57.6	62 73	47.1	70 38.7	64 72	46.0	70 19.3	65 70	44.8	15
70 31.4	58 76	50.0	70 13.7	60 75	48.8	69 55.6	61 74	47.7	69 37.0	63 72	46.5	6
69 45.6	56 78	51.6	69 28.7	57 77	50.4	69 11.4	59 76	49.2	68 53.6	60 74	48.1	7
68 58.8	53 79	53.0	68 42.7	55 78	51.8	68 26.1	56 77	50.7	68 09.1	58 76	49.6	8
68 11.2	51 81	54.3	67 55.8	52 80	53.2	67 39.9	54 78	52.1	67 23.6	55 77	51.0	9
67 22.8	48 82	55.5	67 08.1	50 81	54.4	66 52.9	51 80	53.3	66 37.3	53 78	52.2	20
66 33.8	46 83	56.7	66 19.7	48 82	55.6	66 05.2	49 81	54.5	65 50.2	51 80	53.4	1
65 44.1	44 84	57.7	65 30.7	46 83	56.6	65 16.8	47 82	55.5	65 02.4	49 81	54.5	2
64 53.9	42 84	58.6	64 41.1	44 84	57.6	64 27.8	45 83	56.5	64 14.0	47 82	55.5	3
64 03.2	40 85	59.5	63 50.9	42 84	58.5	63 38.2	43 84	57.5	63 25.0	45 83	56.5	4
63 12.1	38 86	60.4	63 00.3	40 85	59.3	62 48.1	41 84	58.3	62 35.5	43 83	57.3	25
62 20.5	37 86	61.1	62 09.3	38 86	60.1	61 57.6	40 85	59.1	61 45.6	41 84	58.2	6
61 28.6	35 87	61.8	61 17.9	37 86	60.9	61 06.7	38 86	59.9	60 55.2	39 85	58.9	7
60 36.4	34 88	62.5	60 26.1	35 87	61.5	60 15.4	36 86	60.6	60 04.3	38 85	59.6	8
59 43.8	32 88	63.1	59 34.0	33 87	62.2	59 23.8	35 86	61.2	59 13.2	36 86	60.3	9
58 51.0	31 88	63.7	58 41.6	32 88	62.7	58 31.8	33 87	61.8	58 21.7	34 86	60.9	30
57 57.9	29 89	64.2	57 49.0	31 88	63.3	57 39.6	32 88	62.4	57 29.9	33 87	61.5	1
57 04.6	28 89	64.7	56 56.0	29 89	63.8	56 47.1	30 88	62.9	56 37.8	32 87	62.1	2
56 11.1	27 90	65.1	56 02.9	28 89	64.3	55 54.4	29 88	63.4	55 45.5	30 88	62.6	3
55 17.4	25 90	65.6	55 09.6	27 89	64.7	55 01.4	28 89	63.9	54 52.9	29 88	63.1	4
54 23.5	24 90	66.0	54 16.0	25 90	65.1	54 08.3	27 89	64.3	54 00.1	28 88	63.5	35
53 29.4	23 90	66.4	53 22.4	24 90	65.5	53 14.9	25 89	64.7	53 07.2	26 89	63.9	6
52 35.2	22 90	66.7	52 28.5	23 90	65.9	52 21.4	24 90	65.1	52 14.0	25 89	64.3	7
51 40.9	21 91	67.0	51 34.5	22 90	66.2	51 27.7	23 90	65.5	51 20.7	24 89	64.7	8
50 46.5	20 91	67.3	50 40.3	21 90	66.6	50 33.9	22 90	65.8	50 27.2	23 89	65.0	9
49 51.9	19 91	67.6	49 46.1	20 91	66.8	49 40.0	21 90	66.1	49 33.6	22 90	65.3	40
48 57.2	18 91	67.9	48 51.7	19 91	67.1	48 45.9	20 90	66.4	48 39.8	21 90	65.6	1
48 02.4	17 92	68.1	47 57.2	18 91	67.4	47 51.7	19 90	66.6	47 45.9	20 90	65.9	2
47 07.5	16 92	68.3	47 02.6	17 91	67.6	46 57.4	18 91	66.9	46 51.9	19 90	66.2	3
46 12.6	15 92	68.5	46 07.9	16 91	67.8	46 03.0	17 91	67.1	45 57.8	18 90	66.4	4
45 17.6	14 92	68.7	45 13.2	15 91	68.0	45 08.5	16 91	67.3	45 03.6	17 90	66.6	45
44 22.4	13 92	68.9	44 18.3	14 92	68.2	44 14.0	15 91	67.5	44 09.3	16 91	66.8	6
43 27.3	12 92	69.1	43 23.4	13 92	68.4	43 19.3	14 91	67.7	43 15.0	15 91	67.0	7
42 32.1	12 92	69.2	42 28.4	12 92	68.6	42 24.6	13 91	67.9	42 20.5	14 91	67.2	8
41 36.8	11 92	69.4	41 33.4	12 92	68.7	41 29.8	12 91	68.1	41 26.0	13 91	67.4	9
40 41.5	10 92	69.5	40 38.3	11 92	68.9	40 35.0	12 92	68.2	40 31.4	12 91	67.5	50
39 46.1	09 92	69.6	39 43.2	10 92	69.0	39 40.1	11 92	68.3	39 36.8	11 91	67.7	1
38 50.7	08 92	69.7	38 48.0	09 92	69.1	38 45.2	10 92	68.5	38 42.1	11 91	67.8	2
37 55.2	08 92	69.8	37 52.8	08 92	69.2	37 50.2	09 92	68.6	37 47.4	10 91	67.9	3
36 59.7	07 92	69.9	36 57.5	08 92	69.3	36 55.2	08 92	68.7	36 52.6	09 91	68.0	4
36 04.2	06 92	70.0	36 02.3	07 92	69.4	36 00.1	08 92	68.8	35 57.7	08 91	68.1	55
35 08.7	06 93	70.1	35 06.9	06 92	69.4	35 05.0	07 92	68.8	35 02.9	07 91	68.2	6
34 13.1	05 93	70.1	34 11.6	05 92	69.5	34 09.9	06 92	68.9	34 08.0	07 92	68.3	7
33 17.6	04 93	70.2	33 16.2	05 92	69.6	33 14.7	05 92	69.0	33 13.1	06 92	68.4	8
32 22.0	03 93	70.2	32 20.9	04 92	69.6	32 19.6	05 92	69.0	32 18.1	05 92	68.4	9
31 26.4	03 93	70.2	31 25.5	03 92	69.7	31 24.4	04 92	69.1	31 23.2	04 92	68.5	60
30 30.8	02 93	70.3	30 30.1	03 92	69.7	30 29.2	03 92	69.1	30 28.2	04 92	68.5	1
29 35.1	01 93	70.3	29 34.6	02 92	69.7	29 34.0	02 92	69.1	29 33.2	03 92	68.6	2
28 39.5	01 93	70.3	28 39.2	01 92	69.7	28 38.8	02 92	69.2	28 38.2	02 92	68.6	3
27 43.9	00 93	70.3	27 43.8	01 92	69.7	27 43.6	01 92	69.2	27 43.2	01 92	68.6	4
26 48.2	01 93	70.3	26 48.4	00 92	69.7	26 48.3	00 92	69.2	26 48.2	01 92	68.6	65
25 52.6	01 93	70.3	25 52.9	01 92	69.7	25 53.1	00 92	69.2	25 53.1	00 92	68.6	6
24 57.0	02 93	70.3	24 57.5	01 92	69.7	24 57.9	01 92	69.2	24 58.1	01 92	68.6	7
24 01.4	02 93	70.3	24 02.1	02 92	69.7	24 02.6	02 92	69.2	24 03.1	01 92	68.6	8
23 05.8	03 93	70.2	23 06.6	03 92	69.7	23 07.4	02 92	69.1	23 08.1	02 92	68.6	9
22 10.2	04 93	70.2	22 11.2	03 92	69.7	22 12.2	03 92	69.1	22 13.1	03 92	68.6	70
21 14.6	04 93	70.1	21 15.8	04 92	69.6	21 17.0	04 92	69.1	21 18.1	03 92	68.5	1
20 19.0	05 93	70.1	20 20.5	05 92	69.6	20 21.8	04 92	69.0	20 23.1	04 92	68.5	2
19 23.5	06 92	70.0	19 25.1	05 92	69.5	19 26.7	05 92	69.0	19 28.1	05 92	68.5	3
18 27.9	06 92	70.0	18 29.8	06 92	69.5	18 31.5	06 92	68.9	18 33.2	05 92	68.4	4
17 32.4	07 92	69.9	17 34.4	07 92	69.4	17 36.4	06 92	68.9	17 38.2	06 92	68.4	75
16 36.9	07 92	69.9	16 39.1	07 92	69.3	16 41.3	07 92	68.8	16 43.3	07 91	68.3	6
15 41.5	08 92	69.8	15 43.9	08 92	69.3	15 46.2	08 92	68.7	15 48.4	07 91	68.2	7
14 46.0	09 92	69.7	14 48.6	08 92	69.2	14 51.1	08 92	68.7	14 53.6	08 91	68.2	8
13 50.6	09 92	69.6	13 53.4	09 92	69.1	13 56.1	09 92	68.6	13 58.7	09 91	68.1	9
12 55.3	10 92	69.5	12 58.2	10 92	69.0	13 01.1	10 92	68.5	13 03.9	09 91	68.0	80
11 59.9	11 92	69.4	12 03.1	10 92	68.9	12 06.1	10 92	68.4	12 09.2	10 91	67.9	1
11 04.6	11 92	69.3	11 07.9	11 92	68.8	11 11.2	11 92	68.3	11 14.4	11 91	67.8	2
10 09.4	12 92	69.2	10 12.9	12 92	68.7	10 16.3	11 91	68.2	10 19.8	11 91	67.7	3
9 14.1	12 92	69.1	9 17.8	12 92	68.6	9 21.5	12 91	68.1	9 25.1	12 91	67.6	4
8 19.0	13 92	69.0	8 22.8	13 92	68.5	8 26.7	13 91	68.0	8 30.5	13 91	67.5	85
7 23.8	14 92	68.9	7 27.9	14 92	68.4	7 31.9	13 91	67.9	7 35.9	13 91	67.4	6
6 28.7	14 92	68.7	6 33.0	14 91	68.2	6 37.2	14 91	67.7	6 41.4	14 91	67.2	7
5 33.7	15 92	68.6	5 38.2	15 91	68.1	5 42.6	15 91	67.6	5 47.0	15 91	67.1	8

H.A.	20° 00′				20° 30′				21° 00′				21° 30′				22° 00′				22° 30′				23° 00′				23° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	60 00.0	1.0	02	180.0	59 30.0	1.0	02	180.0	59 00.0	1.0	02	180.0	58 30.0	1.0	02	180.0	58 00.0	1.0	02	180.0	57 30.0	1.0	01	180.0	57 00.0	1.0	01	180.0	56 30.0	1.0	01	180.0	00
1	59 59.0	1.0	05	178.1	59 29.0	1.0	05	178.2	58 59.1	1.0	05	178.2	58 29.1	1.0	05	178.2	57 59.1	1.0	04	178.3	57 29.1	1.0	04	178.3	56 59.1	1.0	04	178.3	56 29.1	1.0	04	178.3	1
2	59 56.1	1.0	08	176.2	59 26.2	1.0	08	176.3	58 56.3	1.0	08	176.4	58 26.3	1.0	08	176.4	57 56.4	1.0	07	176.5	57 26.5	1.0	07	176.6	56 56.5	1.0	07	176.6	56 26.6	1.0	07	176.7	2
3	59 51.3	99	11	174.4	59 21.5	99	11	174.5	58 51.6	1.0	11	174.6	58 21.8	1.0	11	174.7	57 51.9	1.0	10	174.8	57 22.0	1.0	10	174.9	56 52.2	1.0	10	174.9	56 22.3	1.0	10	175.0	3
4	59 44.6	99	14	172.5	59 14.8	99	14	172.7	58 45.1	99	14	172.8	58 15.4	99	14	172.9	57 45.6	99	13	173.0	57 15.9	99	13	173.2	56 46.1	99	13	173.3	56 16.3	99	13	173.4	4
05	59 35.9	99	17	170.7	59 06.4	99	17	170.9	58 36.8	99	17	171.0	58 07.2	99	17	171.2	57 37.6	99	16	171.3	57 08.0	99	16	171.5	56 38.3	99	16	171.6	56 08.7	99	16	171.8	05
6	59 25.4	98	21	168.9	58 56.1	98	20	169.1	58 26.6	98	20	169.3	57 57.2	98	20	169.4	57 27.8	98	19	169.6	56 58.3	98	19	169.8	56 28.9	98	18	170.0	55 59.4	98	18	170.1	6
7	59 13.1	97	24	167.1	58 44.0	97	23	167.3	58 14.8	97	23	167.5	57 45.5	97	22	167.7	57 16.3	98	22	167.9	56 47.0	98	22	168.1	56 17.7	98	21	168.3	55 48.5	98	21	168.5	7
8	58 59.0	96	26	165.3	58 30.1	96	26	165.6	58 01.1	97	26	165.8	57 32.1	97	25	166.0	57 03.1	97	25	166.3	56 34.1	97	24	166.5	56 05.0	97	24	166.7	55 35.9	97	24	166.9	8
9	58 43.1	95	29	163.6	58 14.5	96	29	163.8	57 45.8	96	28	164.1	57 17.0	96	28	164.4	56 48.3	96	28	164.6	56 19.5	96	27	164.9	55 50.6	96	26	165.1	55 21.8	96	26	165.4	9
10	58 25.6	95	32	161.8	57 57.2	95	32	162.1	57 28.8	95	31	162.4	57 00.3	95	31	162.7	56 31.8	95	30	163.0	56 03.3	95	30	163.3	55 34.7	95	29	163.6	55 06.1	95	29	163.8	10
1	58 06.3	93	35	160.2	57 38.3	94	34	160.5	57 10.2	94	34	160.8	56 42.0	94	33	161.1	56 13.8	94	33	161.4	55 45.5	94	32	161.7	55 17.2	94	32	162.0	54 48.9	95	31	162.3	1
2	57 45.5	92	37	158.5	57 17.8	93	37	158.9	56 50.0	93	36	159.2	56 22.1	93	36	159.6	55 54.2	93	35	159.9	55 26.3	93	35	160.2	54 58.3	93	34	160.5	54 30.2	94	34	160.8	2
3	57 23.1	91	40	156.9	56 55.7	91	39	157.3	56 28.2	92	39	157.7	56 00.7	92	38	158.0	55 33.2	92	38	158.4	55 05.5	92	37	158.7	54 37.8	92	36	159.0	54 10.1	93	36	159.4	3
4	56 59.2	90	42	155.3	56 32.1	90	42	155.7	56 05.0	90	41	156.1	55 37.9	91	40	156.5	55 10.6	91	40	156.9	54 43.4	91	39	157.2	54 16.0	91	39	157.6	53 48.6	91	38	157.9	4
15	56 33.8	89	45	153.8	56 07.1	89	44	154.2	55 40.4	89	43	154.6	55 13.6	89	43	155.0	54 46.7	90	42	155.4	54 19.8	90	41	155.8	53 52.8	90	41	156.2	53 25.7	90	40	156.5	15
6	56 07.0	87	47	152.3	55 40.8	88	46	152.7	55 14.4	88	46	153.2	54 48.0	88	45	153.6	54 21.5	88	44	154.0	53 54.9	89	44	154.4	53 28.2	89	43	154.8	53 01.5	89	42	155.1	6
7	55 38.9	86	49	150.9	55 13.0	86	48	151.3	54 47.1	87	48	151.7	54 21.1	87	47	152.2	53 54.9	87	46	152.6	53 28.7	88	46	153.0	53 02.4	88	45	153.4	52 36.0	88	44	153.8	7
8	55 00.5	85	51	149.5	54 44.0	85	50	149.9	54 18.5	85	50	150.4	53 52.9	86	49	150.8	53 27.1	86	48	151.2	53 01.3	86	48	151.7	52 35.4	87	47	152.1	52 00.4	87	46	152.5	8
9	54 38.8	83	53	148.1	54 13.8	84	52	148.6	53 48.7	84	52	149.0	53 23.4	84	51	149.5	52 58.1	85	50	149.9	52 32.6	85	50	150.4	52 07.1	85	49	150.8	51 41.5	86	48	151.2	9
20	54 07.0	82	55	146.7	53 42.4	82	54	147.2	53 17.7	83	54	147.7	52 52.8	83	53	148.2	52 27.9	83	52	148.6	52 02.9	84	52	149.1	51 37.7	84	51	149.5	51 12.5	84	50	150.0	20
1	53 34.1	80	57	145.5	53 09.9	81	56	146.0	52 45.6	81	55	146.4	52 21.1	82	55	146.9	51 56.6	82	54	147.4	51 31.9	82	53	147.8	51 07.2	83	53	148.3	50 42.3	83	52	148.7	1
2	53 00.0	79	58	144.2	52 36.3	79	58	144.7	52 12.4	80	57	145.2	51 48.4	80	56	145.7	51 24.2	81	56	146.2	51 00.0	81	55	146.6	50 35.6	81	54	147.1	50 11.1	82	54	147.6	2
3	52 25.0	78	60	143.0	52 01.6	78	59	143.5	51 38.1	78	59	144.0	51 14.5	79	58	144.5	50 50.8	79	57	145.0	50 27.0	80	57	145.5	50 03.0	80	56	145.9	49 38.9	80	55	146.4	3
4	51 48.9	76	62	141.8	51 26.0	77	61	142.3	51 02.9	77	60	142.8	50 39.7	78	60	143.3	50 16.4	78	59	143.8	49 53.0	78	58	144.3	49 29.4	79	58	144.8	49 05.8	79	57	145.3	4
25	51 11.9	75	63	140.7	50 49.4	75	62	141.2	50 26.8	76	62	141.7	50 04.0	76	61	142.2	49 41.1	77	60	142.7	49 18.1	77	60	143.2	48 54.9	77	59	143.7	48 31.6	78	58	144.2	25
6	50 34.0	73	65	139.6	50 11.9	74	64	140.1	49 49.7	74	63	140.6	49 27.4	75	62	141.1	49 04.9	75	62	141.6	48 42.2	76	61	142.1	48 19.5	76	60	142.6	47 56.6	76	60	143.1	6
7	49 55.3	72	66	138.5	49 33.6	72	65	139.0	49 11.8	73	64	139.6	48 49.9	73	64	140.1	48 27.8	74	63	140.6	48 05.6	74	63	141.1	47 43.2	75	62	141.6	47 20.7	75	61	142.1	7
8	49 15.7	71	67	137.5	48 54.5	71	67	138.0	48 33.1	72	66	138.5	48 11.5	72	65	139.1	47 49.9	73	64	139.6	47 28.0	73	64	140.1	47 06.1	73	63	140.6	46 44.0	74	62	141.1	8
9	48 35.4	69	68	136.5	48 14.6	70	68	137.0	47 53.6	70	67	137.5	47 32.4	71	66	138.1	47 11.2	71	66	138.6	46 49.7	72	65	139.1	46 28.2	72	64	139.6	46 06.5	73	64	140.1	9
30	47 54.3	68	70	135.5	47 33.9	68	69	136.0	47 13.3	69	68	136.6	46 52.6	69	68	137.1	46 31.7	70	67	137.6	46 10.7	70	66	138.2	45 49.5	71	66	138.7	45 28.2	71	65	139.2	30
1	47 12.6	67	71	134.6	46 52.6	67	70	135.1	46 32.4	68	70	135.7	46 12.0	68	69	136.2	45 51.5	69	68	136.7	45 30.9	69	67	137.2	45 10.1	69	67	137.7	44 49.2	70	66	138.3	1
2	46 30.2	65	72	133.7	46 10.5	66	71	134.2	45 50.7	66	70	134.7	45 30.8	67	70	135.3	45 10.7	67	69	135.8	44 50.4	68	69	136.3	44 30.1	68	68	136.8	44 09.5	69	67	137.4	2
3	45 47.1	64	73	132.8	45 27.9	64	72	133.3	45 08.4	65	71	133.9	44 48.9	65	71	134.4	44 29.2	66	70	134.9	44 00.3	66	70	135.5	43 49.3	67	69	136.0	43 29.2	67	68	136.5	3
4	45 03.4	63	74	131.9	44 44.6	63	73	132.5	44 25.6	64	72	133.0	44 06.4	64	72	133.6	43 47.0	65	71	134.1	43 27.6	65	71	134.6	43 08.0	66	70	135.1	42 48.2	66	69	135.7	4
35	44 19.2	61	75	131.1	44 00.7	62	74	131.7	43 42.1	62	74	132.2	43 23.3	63	73	132.7	43 04.3	63	72	133.3	42 45.2	64	72	133.8	42 26.0	64	71	134.3	42 06.6	65	70	134.8	35
6	43 34.4	60	76	130.3	43 16.3	61	75	130.9	42 58.0	61	74	131.4	42 39.6	62	74	132.0	42 21.0	62	73	132.5	42 02.3	63	72	133.0	41 43.4	63	72	133.5	41 24.4	64	71	134.1	6
7	42 49.1	59	76	129.6	42 31.4	59	76	130.1	42 13.5	60	75	130.6	41 55.4	60	75	131.2	41 37.2	61	74	131.7	41 18.8	61	73	132.2	41 00.3	62	73	132.8	40 41.7	62	72	133.3	7
8	42 03.3	58	77	128.8	41 45.9	58	77	129.4	41 28.4	59	76	129.9	41 10.7	59	75	130.4	40 52.8	60	75	131.0	40 34.8	60	74	131.5	40 16.7	61	74	132.0	39 58.4	61	73	132.5	8
9	41 17.0	57	78	128.1	41 00.0	57	77	128.6	40 42.8	58	77	129.2	40 25.5	58	76	129.7	40 08.0	59	76	130.3	39 50.3	59	75	130.8	39 32.5	60	74	131.3	39 14.6	60	74	131.8	9
40	40 30.3	55	79	127.4	40 13.6	56	78	127.9	39 56.8	56	78	128.5	39 39.8	57	77	129.0	39 22.6	57	76	129.6	39 05.3	58	76	130.1	38 47.9	58	75	130.6	38 30.3	59	75	131.1	40
1	39 43.2	54	79	126.7	39 26.8	55	79	127.3	39 10.3	55	78	127.8	38 53.7	56	78	128.3	38 36.9	56	77	128.9	38 19.9	57	76	129.4	38 02.8	57	76	129.9	37 45.6	58	75	130.4	1
2	38 55.6	53	80	126.1	38 39.6	54	79	126.6	38 23.4	54	79	127.2	38 07.1	55	78	127.7	37 50.6	55	78	128.2	37 34.0	56	77	128.7	37 17.3	56	77	129.3	37 00.4	56	76	129.8	2
3	38 07.7	52	81	125.4	37 52.0	53	80	126.0	37 36.1	53	79	126.5	37 20.1	54	79	127.1	37 04.0	54	78	127.6	36 47.7	54	78	128.1	36 31.3	55	77	128.6	36 14.8	55	77	129.1	3
4	37 19.3	51	81	124.8	37 04.0	51	81	125.4	36 48.5	52	80	125.9	36 32.8	52	80	126.4	36 17.0	53	79	127.0	36 01.1	53	78	127.5	35 45.0	54	78	128.0	35 28.8	54	77	128.5	4
45	36 30.7	50	82	124.2	36 15.6	50	81	124.8	36 00.4	51	81	125.3	35 45.1	51	80	125.8	35 29.6	52	80	126.4	35 14.0	52	79	126.9	34 58.2	53	78	127.4	34 42.4	53	78	127.9	45
6	35 41.6	49	82	123.7	35 26.9	49	82	124.2	35 12.0	50	81	124.7	34 57.0	50	81	125.3	34 41.8	51	80	125.8	34 26.5	51	80	126.3	34 11.1	52	79	126.8	33 55.6	52	79	127.3	6
7	34 52.3	48	83	123.1	34 37.9	48	82	123.6	34 23.3	49	82	124.2	34 08.6	49	81	124.7	33 53.7	50	81	125.2	33 38.8	50	80	125.7	33 23.6	51	80	126.3	33 08.4	51	79	126.8	7
8	34 02.7	47	83	122.6	33 48.5	47	83	123.1	33 34.2	48	82	123.6	33 19.8	48	82	124.2	33 05.3	49	81	124.7	32 50.6	49	81	125.2	32 35.8	50	80	125.7	32 20.9	50	80	126.2	8
9	33 12.7	46	84	122.0	32 58.9	46	83	122.6	32 44.9	47	83	123.1	32 30.8	47	82	123.6	32 16.6	48	82	124.1	32 02.2	48	81	124.7	31 47.7	49	81	125.2	31 33.1	49	80	125.7	9
50	32 22.5	45	84	121.5	32 08.9	45	84	122.1	31 55.3	46	83	122.6	31 41.4	46	83	123.1	31 27.5	47	82	123.6	31 13.4	47	82	124.1	30 59.2	47	81	124.7	30 44.9	48	81	125.2	50
1	31 32.0	44	85	121.0	31 18.7	44	84	121.6	31 05.3	45	84	122.1	30 51.8	45	83	122.6	30 38.2	46	83	123.1	30 24.4	46	82	123.6	30 10.5	47	82	124.2	29 56.5	47	81	124.7	1
2	30 41.2	43	85	120.6	30 28.2	44	85	121.1	30 15.1	44	84	121.6	30 01.9	44	84	122.1	29 48.5	45	83	122.6	29 35.1	45	83	123.2	29 21.5	46	82	123.7	29 07.7	46	82	124.2	2
3	29 50.2	42	85	120.1	29 37.5	43	85	120.6	29 24.7	43	84	121.1	29 11.7	43	84	121.7	28 58.7	44	84	122.2	28 45.5	44	83	122.7	28 32.1	45	83	123.2	28 18.7	45	82	123.7	3
4	28 59.0	41	86	119.6	28 46.6	42	85	120.2	28 34.0	42	85	120.7	28 21.3	42	84	121.2	28 08.5	43	84	121.7	27 55.6	43	84	122.2	27 42.6	44	83	122.7	27 29.4	44	83	123.2	4
55	28 07.5	40	86	119.2	27 55.4	41	86	119.7	27 43.1	41	85	120.2	27 30.6	42	85	120.8	27 18.1	42	84	121.3	27 05.5	42	84	121.8	26 52.7	43	84	122.3	26 39.9	43	83	122.8	55
6	27 15.9	40	86	118.8	27 03.9	40	86	119.3	26 51.9	40	86	119.8	26 39.8	41	85	120.3	26 27.5	41	85	120.8	26 15.1	41	84	121.3	26 02.7	42	84	121.9	25 50.1	42	83	122.4	6
7	26 24.0	39	87	118.4	26 12.3	39	86	118.9	26 00.5	39	86	119.4	25 48.6	40	86	119.9	25 36.7	40	85	120.4	25 24.6	40	85	120.9	25 12.4	41	84	121.4	25 00.1	41	84	121.9	7
8	25 31.9	38	87	118.0	25 20.5	38	87	118.5	25 09.0	39	86	119.0	24 57.3	39	86	119.5	24 45.6	39	85	120.0	24 33.8	40	85	120.5	24 21.8	40	84	121.0	24 09.8	40	84	121.5	8
9	24 39.6	37	87	117.6	24 28.4	37	87	118.1	24 17.2	38	87	118.6	24 05.8	38	86	119.1	23 54.3	38	86	119.6	23 42.8	39	85	120.1	23 31.1	39	85	120.6	23 19.3	39	84	121.1	9
60	23 47.1	36	88	117.2	23 36.2	37	87	117.7	23 25.2	37	87	118.2	23 14.1	37	86	118.7	23 02.9	38	86	119.2	22 51.6	38	86	119.7	22 40.2	38	85	120.2	22 28.7	38	85	120.7	60
1	22 54.5	35	88	116.8	22 43.8	36	88	117.4	22 33.0	36	87	117.9	22 22.2	36	87	118.4	22 11.2	37	86	118.9	22 00.2	37	86	119.4	21 49.0	37	86	119.9	21 37.8	38	85	120.4	1
2	22 01.7	35	88	116.5	21 51.3	35	88	117.0	21 40.7	35	88	117.5	21 30.1	36	87	118.0	21 19.4	36	87	118.5	21 08.6	36	86	119.0	20 57.7	36	86	119.5	20 46.7	37	85	120.0	2
3	21 08.7	34	89	116.1	20 58.5	34	88	116.6	20 48.2	34	88	117.1	20 37.8	35	87	117.6	20 27.4	35	87	118.1	20 16.8	35	87	118.6	20 06.2	36	86	119.1	19 55.4	36	86	119.6	3
4	20 15.6	33	89	115.8	20 05.6	33	88	116.3	19 55.6	34	88	116.8	19 45.4	34	88	117.3	19 35.2	34	87	117.8	19 24.9	35	87	118.3	19 14.5	35	86	118.8	19 04.0	35	86	119.3	4
65	19 22.3	32	89	115.5	19 12.6	33	89	116.0	19 02.8	33	88	116.5	18 52.8	33	88	117.0	18 42.8	33	87	117.5	18 32.8	34	87	118.0	18 22.6	34	87	118.5	18 12.4	34	86	119.0	65
6	18 28.9	32	89	115.2	18 19.4	32	89	115.7	18 09.8	32	88	116.2	18 00.1	32	88	116.7	17 50.3	33	88	117.2	17 40.5	33	87	117.6	17 30.6	33	87	118.1	17 20.6	33	87	118.6	6
7	17 35.4	31	89	114.8	17 26.1	31	89	115.3	17 16.7	31	89	115.8	17 07.2	32	88	116.3	16 57.7	32	88	116.8	16 48.1	32	88	117.3	16 38.4	32	87	117.8	16 28.6	33	87	118.3	7
8	16 41.7	30	90	114.5	16 32.6	30	89	115.0	16 23.4	31	89	115.5	16 14.2	31	89	116.0	16 04.9	31	88	116.5	15 55.5	31	88	117.0	15 46.1	32	88	117.5	15 36.6	32	87	118.0	8
9	15 47.9	30	90	114.3	15 39.0	30	90	114.8	15 30.1	30	89	115.2	15 21.0	30	89	115.7	15 12.0	30	88	116.2	15 02.8	31	88	116.7	14 53.6	31	88	117.2	14 44.3	31	87	117.7	9
70	14 54.0	29	90	114.0	14 45.3	29	90	114.5	14 36.5	29	89	115.0	14 27.7	29	89	115.5	14 18.9	30	89	115.9	14 10.0	30	88	116.4	14 01.0	30	88	116.9	13 51.9	30	88	117.4	70
1	13 59.9	28	90	113.7	13 51.4	28	90	114.2	13 42.9	29	90	114.7	13 34.3	29	89	115.2	13 25.7	29	89	115.7	13 17.0	29	88	116.2	13 08.2	29	88	116.7	12 59.4	29	88	117.1	1
2	13 05.7	27	90	113.4	12 57.5	28	90	113.9	12 49.2	28	90	114.4	12 40.8	28	89	114.9	12 32.4	28	89	115.4	12 23.9	28	89	115.9	12 15.4	29	88	116.4	12 06.8	29	88	116.9	2
3	12 11.5	27	91	113.2	12 03.4	27	90	113.7	11 55.3	27	90	114.2	11 47.1	27	90	114.6	11 38.9	27	89	115.1	11 30.7	28	89	115.6	11 22.4	28	88	116.1	11 14.0	28	88	116.6	3
4	11 17.1	26	91	112.9	11 09.2	26	90	113.4	11 01.3	26	90	113.9	10 53.4	27	90	114.4	10 45.4	27	89	114.9	10 37.3	27	89	115.4	10 29.3	27	89	115.9	10 21.1	27	88	116.3	4
75	10 22.6	25	91	112.7	10 15.0	26	91	113.2	10 07.3	26	90	113.6	9 59.5	26	90	114.1	9 51.7	26	90	114.6	9 43.9	26	89	115.1	9 36.0	26	89	115.6	9 28.1	26	89	116.1	75
6	9 28.0	25	91	112.4	9 20.6	25	91	112.9	9 13.1	25	90	113.4	9 05.5	25	90	113.9	8 58.0	25	90	114.4	8 50.3	25	89	114.9	8 42.7	26	89	115.4	8 35.0	26	89	115.9	6
7	8 33.4	24	91	112.2	8 26.1	24	91	112.7	8 18.8	24	91	113.2	8 11.5	25	90	113.7	8 04.1	25	90	114.2	7 56.7	25	90	114.6	7 49.2	25	89	115.1	7 41.8	25	89	115.6	7
8	7 38.6	24	91	112.0	7 31.6	24	91	112.5	7 24.4	24	91	112.9	7 17.3	24	90	113.4	7 10.1	24	90	113.9	7 02.9	24	90	114.4	6 55.7	24	89	114.9	6 48.4	24	89	115.4	8
9	6 43.8	23	92	111.7	6 36.9	23	91	112.2	6 30.0	23	91	112.7	6 23.0	23	91	113.2	6 16.1	23	90	113.7	6 09.1	23	90	114.2	6 02.1	23	90	114.7	5 55.0	24	89	115.2	9
80	5 48.9	22	92	111.5	5 42.2	22	91	112.0	5 35.4	22	91	112.5	5 28.7	23	91	113.0	5 21.9	23	90	113.5	5 15.1	23	90	114.0	5 08.3	23	90	114.5	5 01.5	23	89	115.0	80

H.A.	24° 00′				24° 30′				25° 00′				25° 30′				26° 00′				26° 30′				27° 00′				27° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	76 00.0	1.0	03	00.0	75 30.0	1.0	03	00.0	75 00.0	1.0	03	00.0	74 30.0	1.0	03	00.0	74 00.0	1.0	03	00.0	73 30.0	1.0	03	00.0	73 00.0	1.0	03	00.0	72 30.0	1.0	03	00.0	00
1	75 58.1	1.0	10	03.8	75 28.1	1.0	09	03.6	74 58.2	1.0	09	03.5	74 28.3	1.0	09	03.4	73 58.3	1.0	08	03.3	73 28.4	1.0	08	03.1	72 58.4	1.0	08	03.0	72 28.5	1.0	08	02.9	1
2	75 52.2	99	16	07.5	75 22.5	99	15	07.2	74 52.8	99	15	07.0	74 23.1	99	14	06.7	73 53.3	99	14	06.5	73 23.5	99	13	06.3	72 53.7	99	13	06.1	72 23.9	99	13	05.9	2
3	75 42.6	98	22	11.2	75 13.3	98	21	10.8	74 43.9	98	20	10.4	74 14.5	98	20	10.0	73 45.0	98	19	09.7	73 15.5	98	19	09.4	72 46.0	98	18	09.1	72 16.4	99	17	08.8	3
4	75 29.4	96	28	14.7	75 00.5	96	27	14.2	74 31.6	97	26	13.7	74 02.5	97	25	13.2	73 33.5	97	24	12.8	73 04.3	97	24	12.4	72 35.2	97	23	12.0	72 05.9	97	22	11.6	4
05	75 12.7	94	33	18.2	74 44.3	95	32	17.5	74 15.9	95	31	16.9	73 47.4	95	30	16.4	73 18.9	95	29	15.8	72 50.2	96	28	15.3	72 21.4	96	28	14.8	71 52.6	96	27	14.4	05
6	74 52.6	92	38	21.5	74 25.0	92	37	20.7	73 57.2	93	36	20.0	73 29.3	93	35	19.4	73 01.3	94	34	18.8	72 33.1	94	33	18.2	72 04.9	94	32	17.6	71 36.6	95	31	17.1	6
7	74 29.5	89	43	24.6	74 02.6	90	42	23.8	73 35.5	91	41	23.0	73 08.3	91	40	22.3	72 40.9	92	38	21.6	72 13.4	92	37	20.9	71 45.7	92	36	20.3	71 18.0	93	35	19.7	7
8	74 03.5	87	48	27.6	73 37.4	87	46	26.7	73 11.1	88	45	25.8	72 44.5	89	44	25.1	72 17.8	89	42	24.3	71 51.0	90	41	23.6	71 24.0	90	40	22.9	70 56.8	91	39	22.2	8
9	73 34.8	84	52	30.4	73 09.6	85	50	29.4	72 44.0	85	49	28.5	72 18.3	86	48	27.7	71 52.3	87	46	26.9	71 26.2	88	45	26.1	70 59.8	88	44	25.3	70 33.3	89	43	24.6	9
10	73 03.8	81	55	33.0	72 39.4	82	54	32.0	72 14.7	83	52	31.1	71 49.7	84	51	30.2	71 24.5	84	50	29.3	70 59.1	85	49	28.5	70 33.4	86	48	27.7	70 07.6	86	46	26.9	10
1	72 30.6	78	59	35.4	72 07.0	79	57	34.4	71 43.1	80	56	33.5	71 19.0	81	55	32.5	70 54.5	82	53	31.6	70 29.9	83	52	30.8	70 04.9	83	51	29.9	69 39.8	84	50	29.1	1
2	71 55.3	75	62	37.7	71 32.6	76	60	36.7	71 09.6	77	59	35.7	70 46.2	78	58	34.7	70 22.6	79	56	33.8	69 58.7	80	55	32.9	69 34.5	81	54	32.1	69 10.1	82	53	31.2	2
3	71 18.3	72	64	39.9	70 56.4	73	63	38.8	70 34.2	75	62	37.8	70 11.7	76	60	36.8	69 48.8	77	59	35.9	69 25.7	78	58	35.0	69 02.3	79	56	34.1	68 38.6	79	55	33.2	3
4	70 39.6	69	67	41.9	70 18.6	71	66	40.8	69 57.2	72	64	39.8	69 35.5	73	63	38.8	69 13.4	74	62	37.8	68 51.0	75	60	36.9	68 28.3	76	59	36.0	68 05.4	77	58	35.1	4
15	69 59.5	67	69	43.7	69 39.3	68	68	42.6	69 18.7	69	66	41.6	68 57.7	70	65	40.6	68 36.4	72	64	39.6	68 14.8	73	63	38.7	67 52.9	74	62	37.8	67 30.6	75	60	36.9	15
6	69 18.0	64	71	45.4	68 58.6	65	70	44.4	68 38.8	67	69	43.3	68 18.6	68	67	42.3	67 58.1	69	66	41.3	67 37.2	70	65	40.4	67 16.0	71	64	39.5	66 54.5	72	62	38.6	6
7	68 35.3	61	73	47.0	68 16.7	63	72	46.0	67 57.6	64	70	44.9	67 38.2	65	69	43.9	67 18.4	67	68	42.9	66 58.3	68	67	42.0	66 37.8	69	66	41.1	66 17.0	70	64	40.1	7
8	67 51.6	59	74	48.5	67 33.7	60	73	47.4	67 15.4	62	72	46.4	66 56.7	63	71	45.4	66 37.6	64	70	44.4	66 18.2	65	69	43.5	65 58.4	66	68	42.6	65 38.3	68	66	41.6	8
9	67 06.8	57	76	49.9	66 49.7	58	75	48.8	66 32.1	59	74	47.8	66 14.1	61	73	46.8	65 55.7	62	71	45.8	65 37.0	63	70	44.9	65 17.9	64	69	44.0	64 58.5	65	68	43.1	9
20	66 21.2	54	77	51.2	66 04.7	56	76	50.1	65 47.8	57	75	49.1	65 30.5	58	74	48.1	65 12.9	60	73	47.2	64 54.8	61	72	46.2	64 36.4	62	71	45.3	64 17.7	63	70	44.4	20
1	65 34.8	52	78	52.4	65 19.0	53	78	51.3	65 02.7	55	76	50.3	64 46.1	56	75	49.4	64 29.1	57	74	48.4	64 11.7	59	73	47.5	63 54.0	60	72	46.5	63 35.9	61	71	45.6	1
2	64 47.7	50	80	53.5	64 32.5	51	79	52.5	64 16.9	53	78	51.5	64 00.9	54	77	50.5	63 44.5	55	76	49.6	63 27.8	56	75	48.6	63 10.7	58	74	47.7	62 53.2	59	72	46.8	2
3	63 59.9	48	81	54.5	63 45.3	49	80	53.5	63 30.3	51	79	52.5	63 14.9	52	78	51.6	62 59.2	53	77	50.6	62 43.1	54	76	49.7	62 26.6	56	75	48.8	62 09.7	57	74	47.9	3
4	63 11.5	46	82	55.5	62 57.5	47	81	54.5	62 43.1	49	80	53.5	62 28.3	50	79	52.6	62 13.2	51	78	51.7	61 57.6	52	77	50.7	61 41.8	54	76	49.8	61 25.5	55	75	49.0	4
25	62 22.5	44	82	56.4	62 09.1	45	82	55.4	61 55.3	47	80	54.5	61 41.1	48	80	53.5	61 26.5	49	79	52.6	61 11.6	50	78	51.7	60 56.3	52	77	50.8	60 40.6	53	76	49.9	25
6	61 33.1	42	83	57.2	61 20.2	44	82	56.3	61 06.9	45	81	55.3	60 53.3	46	80	54.4	60 39.3	47	80	53.5	60 24.9	49	79	52.6	60 10.2	50	78	51.7	59 55.1	51	77	50.9	6
7	60 43.2	41	84	58.0	60 30.8	42	83	57.1	60 18.1	43	82	56.1	60 05.0	44	81	55.2	59 51.5	46	80	54.4	59 37.7	47	80	53.5	59 23.5	48	79	52.6	59 09.0	49	78	51.7	7
8	59 52.9	39	84	58.7	59 41.0	40	84	57.8	59 28.8	41	83	56.9	59 16.2	43	82	56.0	59 03.3	44	81	55.1	58 49.9	45	80	54.3	58 36.3	46	80	53.4	58 22.3	47	79	52.6	8
9	59 02.2	37	85	59.4	58 50.8	39	84	58.5	58 39.1	40	84	57.6	58 27.0	41	83	56.8	58 14.5	42	82	55.9	58 01.7	43	81	55.0	57 48.6	44	80	54.2	57 35.1	45	79	53.3	9
30	58 11.2	36	86	60.1	58 00.3	37	85	59.2	57 49.0	38	84	58.3	57 37.4	39	83	57.4	57 25.4	40	82	56.6	57 13.1	42	82	55.7	57 00.5	43	81	54.9	56 47.5	44	80	54.1	30
1	57 19.8	34	86	60.6	57 09.4	35	85	59.8	56 58.6	37	85	58.9	56 47.4	38	84	58.1	56 35.9	39	83	57.2	56 24.1	40	82	56.4	56 11.9	41	82	55.6	55 59.4	42	81	54.8	1
2	56 28.2	33	86	61.2	56 18.1	34	86	60.4	56 07.8	35	85	59.5	55 57.1	36	84	58.7	55 46.1	37	84	57.8	55 34.7	38	83	57.0	55 23.0	40	82	56.2	55 11.0	41	81	55.4	2
3	55 36.2	31	87	61.7	55 26.7	33	86	60.9	55 16.7	34	86	60.1	55 06.5	35	85	59.2	54 55.9	36	84	58.4	54 45.0	37	83	57.6	54 33.7	38	83	56.8	54 22.2	39	82	56.0	3
4	54 44.1	30	87	62.2	54 34.9	31	87	61.4	54 25.4	32	86	60.6	54 15.5	33	85	59.8	54 05.4	34	85	59.0	53 54.9	35	84	58.2	53 44.1	37	83	57.4	53 33.0	38	82	56.6	4
35	53 51.7	29	88	62.7	53 42.9	30	87	61.9	53 33.8	31	86	61.1	53 24.4	32	86	60.3	53 14.6	33	85	59.5	53 04.6	34	84	58.7	52 54.2	35	84	57.9	52 43.5	36	83	57.1	35
6	52 59.1	27	88	63.1	52 50.7	29	87	62.3	52 42.0	30	87	61.5	52 32.9	31	86	60.7	52 23.6	32	86	60.0	52 13.9	33	85	59.2	52 04.0	34	84	58.4	51 53.7	35	83	57.7	6
7	52 06.3	26	88	63.5	51 58.3	27	88	62.7	51 49.9	28	87	62.0	51 41.3	29	86	61.2	51 32.3	30	86	60.4	51 23.1	31	85	59.7	51 13.5	32	84	58.9	51 03.7	33	84	58.1	7
8	51 13.3	25	89	63.9	51 05.6	26	88	63.1	50 57.7	27	87	62.4	50 49.4	28	87	61.6	50 40.8	29	86	60.8	50 32.0	30	86	60.1	50 22.8	31	85	59.3	50 13.4	32	84	58.6	8
9	50 20.2	24	89	64.3	50 12.8	25	88	63.5	50 05.2	26	88	62.7	49 57.3	27	87	62.0	49 49.1	28	86	61.2	49 40.6	29	86	60.5	49 31.9	30	85	59.8	49 22.8	31	85	59.0	9
40	49 26.9	23	89	64.6	49 19.9	24	89	63.8	49 12.6	25	88	63.1	49 05.1	26	87	62.4	48 57.2	27	87	61.6	48 49.1	28	86	60.9	48 40.7	28	86	60.2	48 32.0	29	85	59.4	40
1	48 33.4	22	89	64.9	48 26.8	23	89	64.2	48 19.8	24	88	63.4	48 12.6	24	88	62.7	48 05.1	25	87	62.0	47 57.4	26	86	61.2	47 49.4	27	86	60.5	47 41.1	28	85	59.8	1
2	47 39.9	21	90	65.2	47 33.5	22	89	64.5	47 26.9	22	88	63.7	47 20.0	23	88	63.0	47 12.9	24	87	62.3	47 05.5	25	87	61.6	46 57.8	26	86	60.9	46 49.9	27	86	60.2	2
3	46 46.2	20	90	65.5	46 40.2	20	89	64.7	46 33.9	21	89	64.0	46 27.3	22	88	63.3	46 20.5	23	88	62.6	46 13.4	24	87	61.9	46 06.1	25	86	61.2	45 58.5	26	86	60.5	3
4	45 52.4	19	90	65.7	45 46.7	19	89	65.0	45 40.7	20	89	64.3	45 34.5	21	88	63.6	45 28.0	22	88	62.9	45 21.2	23	87	62.2	45 14.3	24	87	61.5	45 07.0	25	86	60.8	4
45	44 58.5	18	90	65.9	44 53.0	18	90	65.2	44 47.4	19	89	64.6	44 41.5	20	88	63.9	44 35.3	21	88	63.2	44 28.9	22	87	62.5	44 22.3	23	87	61.8	44 15.4	23	86	61.1	45
6	44 04.5	17	90	66.2	43 59.3	17	90	65.5	43 54.0	18	89	64.8	43 48.4	19	89	64.1	43 42.5	20	88	63.4	43 36.4	21	88	62.8	43 30.1	21	87	62.1	43 23.5	22	87	61.4	6
7	43 10.4	16	90	66.4	43 05.5	17	90	65.7	43 00.5	17	89	65.0	42 55.2	18	89	64.3	42 49.6	19	88	63.7	42 43.8	20	88	63.0	42 37.8	20	87	62.3	42 31.6	21	87	61.7	7
8	42 16.2	15	90	66.6	42 11.6	16	90	65.9	42 06.9	16	90	65.2	42 01.8	17	89	64.6	41 56.6	18	88	63.9	41 51.1	19	88	63.2	41 45.4	19	88	62.6	41 39.5	20	87	61.9	8
9	41 21.9	14	90	66.7	41 17.7	15	90	66.1	41 13.2	15	90	65.4	41 08.4	16	89	64.8	41 03.5	17	89	64.1	40 58.3	18	88	63.5	40 52.9	18	88	62.8	40 47.3	19	87	62.2	9
50	40 27.6	13	91	66.9	40 23.6	14	90	66.2	40 19.4	14	90	65.6	40 15.0	15	89	64.9	40 10.3	16	89	64.3	40 05.4	17	88	63.7	40 00.3	17	88	63.0	39 55.0	18	87	62.4	50
1	39 33.3	12	91	67.0	39 29.5	13	90	66.4	39 25.6	14	90	65.8	39 21.4	14	89	65.1	39 17.0	15	89	64.5	39 12.4	16	88	63.8	39 07.6	16	88	63.2	39 02.6	17	87	62.6	1
2	38 38.8	11	91	67.2	38 35.3	12	90	66.5	38 31.6	13	90	65.9	38 27.8	13	90	65.3	38 23.7	14	89	64.6	38 19.4	15	89	64.0	38 14.8	15	88	63.4	38 10.1	16	88	62.8	2
3	37 44.3	10	91	67.3	37 41.1	11	90	66.7	37 37.7	12	90	66.1	37 34.0	12	90	65.4	37 30.2	13	89	64.8	37 26.2	14	89	64.2	37 22.0	14	88	63.6	37 17.6	15	88	62.9	3
4	36 49.8	10	91	67.4	36 46.8	10	91	66.8	36 43.6	11	90	66.2	36 40.3	12	90	65.6	36 36.7	12	89	64.9	36 33.0	13	89	64.3	36 29.0	13	88	63.7	36 24.9	14	88	63.1	4
55	35 55.2	09	91	67.5	35 52.5	09	91	66.9	35 49.6	10	90	66.3	35 46.5	11	90	65.7	35 43.2	11	89	65.1	35 39.7	12	89	64.5	35 36.0	13	88	63.9	35 32.2	13	88	63.2	55
6	35 00.6	08	91	67.6	34 58.1	09	91	67.0	34 55.4	09	90	66.4	34 52.6	10	90	65.8	34 49.6	10	90	65.2	34 46.4	11	89	64.6	34 43.0	12	88	64.0	34 39.4	12	88	63.4	6
7	34 05.9	07	91	67.7	34 03.7	08	91	67.1	34 01.3	08	90	66.5	33 58.7	09	90	65.9	33 55.9	10	90	65.3	33 53.0	10	89	64.7	33 49.8	11	89	64.1	33 46.5	11	88	63.5	7
8	33 11.2	06	91	67.8	33 09.2	07	91	67.2	33 07.1	08	90	66.6	33 04.7	08	90	66.0	33 02.2	09	90	65.4	32 59.5	09	89	64.8	32 56.7	10	89	64.2	32 53.6	10	88	63.6	8
9	32 16.5	06	91	67.8	32 14.8	06	91	67.3	32 12.8	07	90	66.7	32 10.7	07	90	66.1	32 08.5	08	90	65.5	32 06.0	08	89	64.9	32 03.4	09	89	64.3	32 00.7	09	88	63.7	9
60	31 21.8	05	91	67.9	31 20.3	05	91	67.3	31 18.6	06	90	66.7	31 16.7	06	90	66.1	31 14.7	07	90	65.6	31 12.5	08	89	65.0	31 10.2	08	89	64.4	31 07.7	09	88	63.8	60
1	30 27.0	04	91	67.9	30 25.7	05	91	67.4	30 24.3	05	90	66.8	30 22.6	06	90	66.2	30 20.9	06	90	65.6	30 18.9	07	89	65.1	30 16.9	07	89	64.5	30 14.6	08	88	63.9	1
2	29 32.3	03	91	68.0	29 31.2	04	91	67.4	29 29.9	04	90	66.8	29 28.6	05	90	66.3	29 27.0	05	90	65.7	29 25.3	06	89	65.1	29 23.5	06	89	64.5	29 21.5	07	89	64.0	2
3	28 37.5	03	91	68.0	28 36.6	03	91	67.5	28 35.6	04	91	66.9	28 34.5	04	90	66.3	28 33.2	05	90	65.7	28 31.7	05	89	65.2	28 30.2	05	89	64.6	28 28.4	06	89	64.0	3
4	27 42.7	02	91	68.0	27 42.0	02	91	67.5	27 41.3	03	91	66.9	27 40.3	03	90	66.4	27 39.3	04	90	65.8	27 38.1	04	89	65.2	27 36.8	05	89	64.7	27 35.3	05	89	64.1	4
65	26 47.9	01	91	68.1	26 47.4	02	91	67.5	26 46.9	02	91	66.9	26 46.2	03	90	66.4	26 45.4	03	90	65.8	26 44.4	03	89	65.3	26 43.3	04	89	64.7	26 42.1	04	89	64.1	65
6	25 53.1	00	91	68.1	25 52.9	01	91	67.5	25 52.5	01	91	67.0	25 52.1	02	90	66.4	25 51.5	02	90	65.8	25 50.8	03	89	65.3	25 49.9	03	89	64.7	25 49.0	03	89	64.2	6
7	24 58.2	00	91	68.1	24 58.3	00	91	67.5	24 58.1	01	91	67.0	24 57.9	01	90	66.4	24 57.6	01	90	65.9	24 57.1	02	90	65.3	24 56.5	02	89	64.8	24 55.8	03	89	64.2	7
8	24 03.4	01	91	68.1	24 03.7	01	91	67.5	24 03.8	00	91	67.0	24 03.8	00	90	66.4	24 03.6	01	90	65.9	24 03.4	01	90	65.3	24 03.0	01	89	64.8	24 02.5	02	89	64.2	8
9	23 08.6	02	91	68.1	23 09.1	01	91	67.5	23 09.4	01	91	67.0	23 09.6	01	90	66.4	23 09.7	00	90	65.9	23 09.7	00	90	65.3	23 09.6	01	89	64.8	23 09.3	01	89	64.2	9
70	22 13.8	02	91	68.0	22 14.5	02	91	67.5	22 15.0	02	91	67.0	22 15.5	01	90	66.4	22 15.8	01	90	65.9	22 16.0	01	90	65.3	22 16.1	00	89	64.8	22 16.1	00	89	64.2	70
1	21 19.0	03	91	68.0	21 19.9	03	91	67.5	21 20.6	02	91	66.9	21 21.3	02	90	66.4	21 21.9	02	90	65.9	21 22.3	01	89	65.3	21 22.6	01	89	64.8	21 22.9	01	89	64.2	1
2	20 24.3	04	91	68.0	20 25.3	03	91	67.4	20 26.3	03	90	66.9	20 27.2	03	90	66.4	20 27.9	02	90	65.8	20 28.6	02	89	65.3	20 29.2	02	89	64.8	20 29.7	01	89	64.2	2
3	19 29.5	04	91	67.9	19 30.8	04	91	67.4	19 31.9	04	90	66.9	19 33.0	03	90	66.3	19 34.0	03	90	65.8	19 34.9	03	89	65.3	19 35.7	03	89	64.8	19 36.5	02	89	64.2	3
4	18 34.7	05	91	67.9	18 36.2	05	91	67.4	18 37.6	05	90	66.8	18 38.9	04	90	66.3	18 40.1	04	90	65.8	18 41.3	04	89	65.2	18 42.3	03	89	64.7	18 43.3	03	89	64.2	4
75	17 40.0	06	91	67.8	17 41.7	05	91	67.3	17 43.3	05	90	66.8	17 44.8	05	90	66.3	17 46.3	05	90	65.7	17 47.6	04	89	65.2	17 48.9	04	89	64.7	17 50.1	04	89	64.2	75
6	16 45.3	06	91	67.8	16 47.2	06	91	67.3	16 49.0	06	90	66.7	16 50.7	06	90	66.2	16 52.4	05	90	65.7	16 54.0	05	89	65.2	16 55.5	05	89	64.6	16 56.9	05	89	64.1	6
7	15 50.6	07	91	67.7	15 52.7	07	91	67.2	15 54.7	07	90	66.7	15 56.7	06	90	66.2	15 58.6	06	90	65.6	16 00.4	06	89	65.1	16 02.1	06	89	64.6	16 03.7	05	89	64.1	7
8	14 55.9	08	91	67.6	14 58.3	08	91	67.1	15 00.5	07	90	66.6	15 02.7	07	90	66.1	15 04.7	07	90	65.6	15 06.8	07	89	65.1	15 08.7	06	89	64.5	15 10.6	06	89	64.0	8
9	14 01.3	08	91	67.6	14 03.8	08	91	67.0	14 06.3	08	90	66.5	14 08.6	08	90	66.0	14 11.0	08	90	65.5	14 13.2	07	89	65.0	14 15.4	07	89	64.5	14 17.5	07	88	64.0	9
80	13 06.7	09	91	67.5	13 09.4	09	91	67.0	13 12.1	09	90	66.5	13 14.7	09	90	65.9	13 17.2	08	90	65.4	13 19.7	08	89	64.9	13 22.1	08	89	64.4	13 24.4	08	88	63.9	80
1	12 12.2	10	91	67.4	12 15.1	10	91	66.9	12 17.9	09	90	66.4	12 20.7	09	90	65.9	12 23.5	09	90	65.4	12 26.2	09	89	64.8	12 28.8	09	89	64.3	12 31.4	08	88	63.8	1
2	11 17.6	10	91	67.3	11 20.7	10	90	66.8	11 23.8	10	90	66.3	11 26.8	10	90	65.8	11 29.8	10	90	65.3	11 32.7	10	89	64.8	11 35.6	09	89	64.3	11 38.4	09	88	63.7	2
3	10 23.1	11	91	67.2	10 26.5	11	90	66.7	10 29.7	11	90	66.2	10 33.0	11	90	65.7	10 36.1	11	89	65.2	10 39.3	10	89	64.7	10 42.4	10	89	64.2	10 45.4	10	88	63.7	3
4	9 28.7	12	91	67.1	9 32.2	12	90	66.6	9 35.7	12	90	66.1	9 39.1	11	90	65.6	9 42.5	11	89	65.1	9 45.9	11	89	64.6	9 49.2	11	88	64.1	9 52.5	11	88	63.6	4
85	8 34.3	13	91	67.0	8 38.0	12	90	66.5	8 41.7	12	90	66.0	8 45.4	12	90	65.5	8 49.0	12	89	65.0	8 52.6	12	89	64.5	8 56.1	12	88	64.0	8 59.6	12	88	63.5	85
6	7 39.9	13	90	66.9	7 43.9	13	90	66.4	7 47.8	13	90	65.9	7 51.6	13	89	65.4	7 55.5	13	89	64.9	7 59.3	13	89	64.4	8 03.0	12	88	63.9	8 06.7	12	88	63.4	6
7	6 45.6	14	90	66.7	6 49.8	14	90	66.2	6 53.9	14	90	65.7	6 58.0	14	89	65.2	7 02.0	13	89	64.7	7 06.0	13	89	64.2	7 10.0	13	88	63.7	7 14.0	13	88	63.2	7
8	5 51.4	15	90	66.6	5 55.7	14	90	66.1	6 00.0	14	90	65.6	6 04.3	14	89	65.1	6 08.6	14	89	64.6	6 12.8	14	89	64.1	6 17.0	14	88	63.6	6 21.2	14	88	63.1	8
9					5 01.7	15	90	66.0	5 06.2	15	90	65.5	5 10.7	15	89	65.0	5 15.2	15	89	64.5	5 19.7	15	88	64.0	5 24.1	15	88	63.5	5 28.6	15	88	63.0	9

H.A.	24° 00′			24° 30′			25° 00′			25° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	56 00.0	1.0 01	180.0	55 30.0	1.0 01	180.0	55 00.0	1.0 01	180.0	54 30.0	1.0 01	180.0
1	55 59.2	1.0 04	178.4	55 29.2	1.0 04	178.4	54 59.2	1.0 04	178.4	54 29.2	1.0 04	178.4
2	55 56.6	1.0 07	176.7	55 26.7	1.0 07	176.8	54 56.7	1.0 07	176.8	54 26.8	1.0 07	176.9
3	55 52.4	1.0 10	175.1	55 22.6	1.0 10	175.2	54 52.7	1.0 10	175.3	54 22.8	1.0 09	175.3
4	55 46.6	99 12	173.5	55 16.8	99 12	173.6	54 47.0	99 12	173.7	54 17.2	99 12	173.8
05	55 39.0	99 15	171.9	55 09.4	99 15	172.0	54 39.7	99 15	172.2	54 10.1	99 15	172.3
6	55 29.9	98 18	170.3	55 00.4	98 18	170.5	54 30.9	98 17	170.6	54 01.3	98 17	170.8
7	55 19.1	98 21	168.7	54 49.8	98 20	168.9	54 20.5	98 20	169.1	53 51.1	98 20	169.3
8	55 06.8	97 23	167.2	54 37.6	97 23	167.4	54 08.5	97 22	167.6	53 39.3	97 22	167.8
9	54 52.9	96 26	165.6	54 24.0	96 25	165.8	53 55.0	97 25	166.1	53 26.0	97 25	166.3
10	54 37.4	96 28	164.1	54 08.8	96 28	164.3	53 40.0	96 27	164.6	53 11.3	96 27	164.8
1	54 20.5	95 31	162.6	53 52.1	95 30	162.9	53 23.6	95 30	163.1	52 55.1	95 29	163.4
2	54 02.1	94 33	161.1	53 34.0	94 33	161.4	53 05.8	94 32	161.7	52 37.6	94 32	162.0
3	53 42.3	93 35	159.7	53 14.4	93 35	160.0	52 46.6	93 34	160.3	52 18.6	93 34	160.6
4	53 21.1	92 38	158.3	52 53.6	92 37	158.6	52 26.0	92 36	158.9	51 58.3	92 36	159.2
15	52 58.6	91 40	156.9	52 31.3	91 39	157.2	52 04.1	91 39	157.6	51 36.7	91 38	157.9
6	52 34.7	89 42	155.5	52 07.8	90 41	155.9	51 40.9	90 41	156.2	51 13.9	90 40	156.6
7	52 09.6	88 44	154.2	51 43.1	89 43	154.6	51 16.5	89 43	154.9	50 49.8	89 42	155.3
8	51 43.3	87 46	152.9	51 17.1	87 45	153.3	50 50.8	88 45	153.7	50 24.5	88 44	154.0
9	51 15.8	86 48	151.6	50 50.0	86 47	152.0	50 24.1	86 46	152.4	49 58.1	87 46	152.8
20	50 47.1	85 50	150.4	50 21.7	85 49	150.8	49 56.2	85 48	151.2	49 30.6	85 48	151.6
1	50 17.4	83 51	149.2	49 52.3	84 51	149.6	49 27.2	84 50	150.0	49 01.9	84 49	150.4
2	49 46.6	82 53	148.0	49 21.9	82 52	148.4	48 57.1	83 52	148.9	48 32.3	83 51	149.3
3	49 14.8	81 55	146.9	48 50.5	81 54	147.3	48 26.1	81 53	147.7	48 01.6	82 53	148.2
4	48 42.0	79 56	145.7	48 18.1	80 56	146.2	47 54.1	80 55	146.6	47 30.0	81 54	147.1
25	48 08.2	78 58	144.7	47 44.7	79 57	145.1	47 21.1	79 56	145.6	46 57.4	79 56	146.0
6	47 33.6	77 59	143.6	47 10.5	77 58	144.1	46 47.3	78 58	144.5	46 23.9	78 57	145.0
7	46 58.1	76 60	142.6	46 35.4	76 60	143.0	46 12.6	76 59	143.5	45 49.6	77 59	144.0
8	46 21.8	74 62	141.6	45 59.5	75 61	142.1	45 37.0	75 60	142.5	45 14.4	75 60	143.0
9	45 44.7	73 63	140.6	45 22.7	73 62	141.1	45 00.7	74 62	141.6	44 38.5	74 61	142.0
30	45 06.8	72 64	139.7	44 45.3	72 64	140.2	44 23.6	72 63	140.6	44 01.8	73 62	141.1
1	44 28.2	70 66	138.8	44 07.0	71 65	139.2	43 45.7	71 64	139.7	43 24.3	72 64	140.2
2	43 48.9	69 67	137.9	43 28.1	69 66	138.4	43 07.2	70 65	138.9	42 46.2	70 65	139.3
3	43 08.9	68 68	137.0	42 48.5	68 67	137.5	42 28.0	69 66	138.0	42 07.3	69 66	138.5
4	42 28.3	67 69	136.2	42 08.3	67 68	136.7	41 48.1	67 68	137.2	41 27.8	68 67	137.7
35	41 47.1	65 70	135.4	41 27.4	66 69	135.9	41 07.7	66 68	136.4	40 47.7	67 68	136.9
6	41 05.3	64 71	134.6	40 46.0	64 70	135.1	40 26.6	65 69	135.6	40 07.0	65 69	136.1
7	40 22.9	63 72	133.8	40 04.0	63 71	134.3	39 44.9	64 70	134.8	39 25.8	64 70	135.3
8	39 40.0	62 72	133.1	39 21.4	62 72	133.6	39 02.8	62 71	134.1	38 43.9	63 71	134.6
9	38 56.6	60 73	132.3	38 38.4	61 73	132.8	38 20.0	61 72	133.4	38 01.6	62 71	133.9
40	38 12.6	59 74	131.6	37 54.8	60 73	132.2	37 36.8	60 73	132.7	37 18.7	61 72	133.2
1	37 28.3	58 75	131.0	37 10.8	59 74	131.5	36 53.1	59 74	132.0	36 35.4	59 73	132.5
2	36 43.4	57 76	130.3	36 26.3	57 75	130.8	36 09.0	58 74	131.3	35 51.6	58 74	131.8
3	35 58.1	56 76	129.7	35 41.3	56 76	130.2	35 24.4	57 75	130.7	35 07.3	57 74	131.2
4	35 12.4	55 77	129.0	34 56.0	55 76	129.6	34 39.4	56 76	130.1	34 22.7	56 75	130.6
45	34 26.4	54 78	128.4	34 10.2	54 77	129.0	33 54.0	54 76	129.5	33 37.6	55 76	130.0
6	33 39.9	52 78	127.9	33 24.1	53 78	128.4	33 08.1	53 77	128.9	32 52.1	54 76	129.4
7	32 53.0	51 79	127.3	32 37.6	52 78	127.8	32 22.0	52 78	128.3	32 06.2	53 77	128.8
8	32 05.9	50 79	126.7	31 50.7	51 79	127.2	31 35.4	51 78	127.8	31 20.0	52 78	128.3
9	31 18.3	49 80	126.2	31 03.5	50 79	126.7	30 48.5	50 79	127.2	30 33.4	51 78	127.7
50	30 30.5	48 80	125.7	30 16.0	49 80	126.2	30 01.3	49 79	126.7	29 46.5	49 79	127.2
1	29 42.4	47 81	125.2	29 28.1	48 80	125.7	29 13.8	48 80	126.2	28 59.3	48 79	126.7
2	28 53.9	46 81	124.7	28 40.0	47 81	125.2	28 25.9	47 80	125.7	28 11.8	47 80	126.2
3	28 05.2	45 82	124.2	27 51.5	46 81	124.7	27 37.8	46 81	125.2	27 23.9	46 80	125.7
4	27 16.2	44 82	123.7	27 02.8	45 82	124.3	26 49.4	45 81	124.8	26 35.8	45 81	125.3
55	26 26.9	43 82	123.3	26 13.9	44 82	123.8	26 00.7	44 82	124.3	25 47.4	44 81	124.8
6	25 37.4	42 83	122.9	25 24.6	43 82	123.4	25 11.8	43 82	123.9	24 58.8	43 82	124.4
7	24 47.7	42 83	122.4	24 35.2	42 83	122.9	24 22.5	42 82	123.4	24 09.9	42 82	123.9
8	23 57.7	41 84	122.0	23 45.5	41 83	122.5	23 33.1	41 83	123.0	23 20.7	42 82	123.5
9	23 07.5	40 84	121.6	22 55.5	40 84	122.1	22 43.5	40 83	122.6	22 31.3	41 83	123.1
60	22 17.1	39 84	121.2	22 05.4	39 84	121.7	21 53.6	39 84	122.2	21 41.7	40 83	122.7
1	21 26.4	38 85	120.9	21 15.0	38 84	121.4	21 03.5	38 84	121.9	20 51.9	39 83	122.3
2	20 35.6	37 85	120.5	20 24.5	37 85	121.0	20 13.2	38 84	121.5	20 01.9	38 84	122.0
3	19 44.6	36 85	120.1	19 33.7	36 85	120.6	19 22.7	37 84	121.1	19 11.7	37 84	121.6
4	18 53.4	35 86	119.8	18 42.8	36 85	120.3	18 32.1	36 85	120.8	18 21.3	36 84	121.3
65	18 02.1	34 86	119.5	17 51.7	35 85	120.0	17 41.2	35 85	120.4	17 30.7	35 85	120.9
6	17 10.5	34 86	119.1	17 00.4	34 86	119.6	16 50.2	34 85	120.1	16 39.9	34 85	120.6
7	16 18.8	33 86	118.8	16 08.9	33 86	119.3	15 59.0	33 86	119.8	15 49.0	34 85	120.3
8	15 27.0	32 87	118.5	15 17.3	32 86	119.0	15 07.6	32 86	119.5	14 57.9	33 85	120.0
9	14 35.0	31 87	118.2	14 25.6	31 86	118.7	14 16.1	32 86	119.2	14 06.6	32 86	119.7
70	13 42.8	30 87	117.9	13 33.7	31 87	118.4	13 24.5	31 86	118.9	13 15.2	31 86	119.4
1	12 50.6	30 87	117.6	12 41.6	30 87	118.1	12 32.7	30 87	118.6	12 23.6	30 86	119.1
2	11 58.1	29 88	117.4	11 49.5	29 87	117.8	11 40.7	29 87	118.3	11 31.9	29 86	118.8
3	11 05.6	28 88	117.1	10 57.1	28 87	117.6	10 48.6	28 87	118.1	10 40.1	29 87	118.6
4	10 12.9	27 88	116.8	10 04.7	27 88	117.3	9 56.4	28 87	117.8	9 48.1	28 87	118.3
75	9 20.2	27 88	116.6	9 12.2	27 88	117.1	9 04.1	27 87	117.6	8 56.1	27 87	118.0
6	8 27.3	26 88	116.3	8 19.5	26 88	116.8	8 11.7	26 88	117.3	8 03.8	26 87	117.8
7	7 34.3	25 88	116.1	7 26.7	25 88	116.6	7 19.1	25 88	117.1	7 11.5	25 87	117.6
8	6 41.1	24 89	115.9	6 33.8	24 88	116.4	6 26.5	25 88	116.9	6 19.1	25 88	117.3
9	5 47.9	24 89	115.7	5 40.8	24 88	116.1	5 33.7	24 88	116.6	5 26.6	24 88	117.1

26° 00′			26° 30′			27° 00′			27° 30′			H.A.
Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
54 00.0	1.0 01	180.0	53 30.0	1.0 01	180.0	53 00.0	1.0 01	180.0	52 30.0	1.0 01	180.0	00
53 59.2	1.0 04	178.5	53 29.2	1.0 04	178.5	52 59.2	1.0 04	178.5	52 29.2	1.0 04	178.5	1
53 56.8	1.0 06	176.9	53 26.9	1.0 06	177.0	52 56.9	1.0 06	177.0	52 27.0	1.0 06	177.1	2
53 52.9	1.0 09	175.4	53 23.0	1.0 09	175.5	52 53.1	1.0 09	175.6	52 23.2	1.0 09	175.6	3
53 47.4	99 12	173.9	53 17.6	99 12	174.0	52 47.8	99 11	174.1	52 18.0	99 11	174.2	4
53 40.4	99 14	172.4	53 10.7	99 14	172.5	52 41.0	99 14	172.6	52 11.3	99 14	172.8	05
53 31.8	98 17	170.9	53 02.2	99 17	171.0	52 32.7	99 16	171.2	52 03.1	99 16	171.3	6
53 21.7	98 19	169.4	52 52.3	98 19	169.6	52 22.9	98 19	169.8	51 53.5	98 18	169.9	7
53 10.1	97 22	168.0	52 40.9	97 21	168.1	52 11.7	97 21	168.3	51 42.4	98 21	168.5	8
52 57.1	97 24	166.5	52 28.0	97 24	166.7	51 59.0	97 24	166.9	51 29.9	97 23	167.1	9
52 42.5	96 26	165.1	52 13.8	96 26	165.3	51 44.9	96 26	165.5	51 16.1	96 25	165.7	10
52 26.6	95 29	163.7	51 58.1	95 28	163.9	51 29.5	95 28	164.2	51 00.9	95 28	164.4	1
52 09.3	94 31	162.3	51 41.0	94 31	162.5	51 12.7	95 30	162.8	50 44.3	95 30	163.1	2
51 50.6	93 33	160.9	51 22.6	93 33	161.2	50 54.5	94 32	161.5	50 26.4	94 32	161.7	3
51 30.6	92 35	159.6	51 02.9	93 35	159.9	50 35.1	93 34	160.2	50 07.3	93 34	160.4	4
51 09.4	91 38	158.2	50 41.9	92 37	158.5	50 14.4	92 36	158.9	49 46.9	92 36	159.2	15
50 46.8	90 40	156.9	50 19.7	91 39	157.3	49 52.5	91 38	157.6	49 25.3	91 38	157.9	6
50 23.1	89 42	155.7	49 56.3	89 41	156.0	49 29.4	90 40	156.4	49 02.5	90 40	156.7	7
49 58.1	88 43	154.4	49 31.7	88 43	154.8	49 05.1	89 42	155.1	48 38.5	89 42	155.5	8
49 32.1	87 45	153.2	49 05.9	87 45	153.6	48 39.7	87 44	153.9	48 13.5	88 44	154.3	9
49 04.9	86 47	152.0	48 39.1	86 47	152.4	48 13.2	86 46	152.8	47 47.3	87 45	153.2	20
48 36.6	85 49	150.8	48 11.2	85 48	151.2	47 45.7	85 48	151.6	47 20.1	85 47	152.0	1
48 07.3	83 50	149.7	47 42.3	84 50	150.1	47 17.1	84 49	150.5	46 51.9	84 49	150.9	2
47 37.0	82 52	148.6	47 12.3	82 52	149.0	46 47.6	83 51	149.4	46 22.7	83 50	149.8	3
47 05.7	81 54	147.5	46 41.4	81 53	148.0	46 17.0	81 52	148.4	45 52.5	82 52	148.8	4
46 33.6	80 55	146.5	46 09.6	80 55	146.9	45 45.6	80 54	147.3	45 21.5	81 53	147.8	25
46 00.5	78 57	145.4	45 36.9	79 56	145.9	45 13.3	79 55	146.3	44 49.5	79 55	146.8	6
45 26.5	77 58	144.4	45 03.4	77 57	144.9	44 40.1	78 57	145.3	44 16.7	78 56	145.8	7
44 51.8	76 59	143.5	44 29.0	76 59	143.9	44 06.1	77 58	144.4	43 43.1	77 57	144.8	8
44 16.2	75 60	142.5	43 53.8	75 60	143.0	43 31.2	75 59	143.4	43 08.6	76 59	143.9	9
43 39.9	73 62	141.6	43 17.8	74 61	142.1	42 55.7	74 60	142.5	42 33.4	74 60	143.0	30
43 02.8	72 63	140.7	42 41.1	72 62	141.2	42 19.4	73 62	141.6	41 57.5	73 61	142.1	1
42 25.0	71 64	139.8	42 03.7	71 63	140.3	41 42.3	72 63	140.8	41 20.8	72 62	141.2	2
41 46.5	69 65	139.0	41 25.6	70 65	139.5	41 04.6	70 64	139.9	40 43.5	71 63	140.4	3
41 07.4	68 66	138.1	40 46.9	69 66	138.6	40 26.3	69 65	139.1	40 05.5	69 64	139.6	4
40 27.7	67 67	137.3	40 07.6	67 67	137.8	39 47.3	68 66	138.3	39 26.9	68 65	138.8	35
39 47.4	66 68	136.6	39 27.6	66 68	137.1	39 07.7	67 67	137.5	38 47.6	67 66	138.0	6
39 06.5	65 69	135.8	38 47.0	65 68	136.3	38 27.5	65 68	136.8	38 07.8	66 67	137.3	7
38 25.0	63 70	135.1	38 05.9	64 69	135.6	37 46.8	64 69	136.0	37 27.5	65 68	136.5	8
37 43.0	62 71	134.4	37 24.3	63 70	134.8	37 05.5	63 70	135.3	36 46.5	63 69	135.8	9
37 00.5	61 72	133.7	36 42.2	61 71	134.2	36 23.7	62 70	134.6	36 05.1	62 70	135.1	40
36 17.5	60 72	133.0	35 59.5	60 72	133.5	35 41.4	61 71	134.0	35 23.2	61 71	134.5	1
35 34.1	59 73	132.3	35 16.4	59 73	132.8	34 58.6	59 72	133.3	34 40.8	60 71	133.8	2
34 50.2	57 74	131.7	34 32.8	58 73	132.2	34 15.4	58 73	132.7	33 57.9	59 72	133.2	3
34 05.8	56 74	131.1	33 48.8	57 74	131.6	33 31.8	57 74	132.1	33 14.6	58 73	132.5	4
33 21.1	55 75	130.5	33 04.4	56 75	131.0	32 47.7	56 74	131.5	32 30.8	56 74	131.9	45
32 35.9	54 76	129.9	32 19.6	55 75	130.4	32 03.2	55 75	130.9	31 46.7	55 74	131.4	6
31 50.4	53 76	129.3	31 34.4	53 76	129.8	31 18.3	54 76	130.3	31 02.1	54 75	130.8	7
31 04.5	52 77	128.8	30 48.8	52 77	129.3	30 33.1	53 76	129.7	30 17.2	53 75	130.2	8
30 18.2	51 78	128.2	30 02.9	51 77	128.7	29 47.5	52 77	129.2	29 31.9	52 76	129.7	9
29 31.6	50 78	127.7	29 16.6	50 78	128.2	29 01.5	51 77	128.7	28 46.3	51 77	129.2	50
28 44.7	49 79	127.2	28 30.0	49 78	127.7	28 15.2	50 78	128.2	28 00.3	50 77	128.7	1
27 57.5	48 79	126.7	27 43.1	48 79	127.2	27 28.6	48 78	127.7	27 14.0	49 78	128.2	2
27 10.0	47 80	126.2	26 55.9	47 79	126.7	26 41.7	47 79	127.2	26 27.4	48 78	127.7	3
26 22.1	46 80	125.7	26 08.4	46 80	126.2	25 54.5	46 79	126.7	25 40.5	47 79	127.2	4
25 34.0	45 80	125.3	25 20.6	45 80	125.8	25 07.0	45 80	126.3	24 53.3	46 79	126.8	55
24 45.7	44 81	124.9	24 32.5	44 81	125.4	24 19.2	44 80	125.8	24 05.9	45 80	126.3	6
23 57.1	43 81	124.4	23 44.2	43 81	124.9	23 31.2	43 80	125.4	23 18.1	44 80	125.9	7
23 08.2	42 82	124.0	22 55.6	42 81	124.5	22 42.9	42 81	125.0	22 30.1	43 80	125.5	8
22 19.1	41 82	123.6	22 06.8	41 82	124.1	21 54.4	41 81	124.6	21 41.9	42 81	125.1	9
21 29.8	40 82	123.2	21 17.8	40 82	123.7	21 05.6	41 82	124.2	20 53.4	41 81	124.7	60
20 40.3	39 83	122.8	20 28.5	39 82	123.3	20 16.7	40 82	123.8	20 04.7	40 82	124.3	1
19 50.5	38 83	122.5	19 39.0	38 83	123.0	19 27.5	39 82	123.5	19 15.8	39 82	123.9	2
19 00.6	37 84	122.1	18 49.4	37 83	122.6	18 38.1	38 83	123.1	18 26.7	38 82	123.6	3
18 10.4	36 84	121.8	17 59.5	37 83	122.3	17 48.5	37 83	122.7	17 37.4	37 83	123.2	4
17 20.1	35 84	121.4	17 09.4	36 84	121.9	16 58.7	36 83	122.4	16 47.8	36 83	122.9	65
16 29.6	35 84	121.1	16 19.2	35 84	121.6	16 08.7	35 84	122.1	15 58.1	35 83	122.6	6
15 38.9	34 85	120.8	15 28.7	34 84	121.3	15 18.5	34 84	121.8	15 08.2	34 83	122.2	7
14 48.0	33 85	120.5	14 38.1	33 85	121.0	14 28.2	33 84	121.4	14 18.2	33 84	121.9	8
13 57.0	32 85	120.2	13 47.4	32 86	120.7	13 37.7	32 84	121.1	13 27.9	33 84	121.6	9
13 05.9	31 86	119.9	12 56.5	31 85	120.4	12 47.0	32 85	120.8	12 37.6	32 84	121.3	70
12 14.6	30 86	119.6	12 05.4	31 85	120.1	11 56.2	31 85	120.6	11 47.0	31 84	121.0	1
11 23.1	30 86	119.3	11 14.2	30 86	119.8	11 05.3	30 85	120.3	10 56.3	30 85	120.8	2
10 31.5	29 86	119.0	10 22.9	29 86	119.5	10 14.2	29 85	120.0	10 05.5	29 85	120.5	3
9 39.8	28 86	118.8	9 31.4	28 86	119.3	9 23.0	28 86	119.8	9 14.5	28 85	120.2	4
8 47.9	27 86	118.5	8 39.8	27 86	119.0	8 31.6	27 86	119.5	8 23.4	27 85	120.0	75
7 56.0	26 87	118.3	7 48.1	26 86	118.8	7 40.1	27 86	119.3	7 32.1	27 86	119.8	6
7 03.9	26 87	118.1	6 56.2	26 87	118.5	6 48.5	26 86	119.0	6 40.8	26 86	119.5	7
6 11.7	25 87	117.8	6 04.3	25 87	118.3	5 56.8	25 86	118.8	5 49.3	25 86	119.3	8
5 19.4	24 87	117.6	5 12.2	24 87	118.1	5 05.0	24 86	118.6				9

DECLINATION SAME NAME AS LATITUDE

H.A. °	28° 00′ Alt. ° ′	Δd	Δt	Az. °
00	72 00.0	1.0	02	00.0
1	71 58.5	1.0	07	02.9
2	71 54.1	99	12	05.7
3	71 46.8	99	17	08.5
4	71 36.7	98	22	11.3
05	71 23.8	96	26	14.0
6	71 08.2	95	30	16.6
7	70 50.1	93	34	19.1
8	70 29.5	91	38	21.6
9	70 06.6	89	42	24.0
10	69 41.6	87	45	26.2
1	69 14.5	85	48	28.4
2	68 45.4	83	51	30.4
3	68 14.6	80	54	32.4
4	67 42.2	78	57	34.3
15	67 08.1	75	59	36.0
6	66 32.7	73	61	37.7
7	65 55.9	71	63	39.3
8	65 17.9	69	65	40.8
9	64 38.8	66	67	42.2
20	63 58.6	64	68	43.5
1	63 17.5	62	70	44.7
2	62 35.4	60	71	45.9
3	61 52.6	58	73	47.0
4	61 09.0	56	74	48.1
25	60 24.6	54	75	49.1
6	59 39.7	52	76	50.0
7	58 54.1	50	77	50.9
8	58 08.0	48	78	51.7
9	57 21.3	47	78	52.5
30	56 34.2	45	79	53.3
1	55 46.6	43	80	54.0
2	54 58.7	42	81	54.6
3	54 10.3	40	81	55.2
4	53 21.6	39	82	55.8
35	52 32.5	37	82	56.4
6	51 43.2	36	83	56.9
7	50 53.5	34	83	57.4
8	50 03.6	33	84	57.9
9	49 13.5	32	84	58.3
40	48 23.1	30	84	58.7
1	47 32.5	29	85	59.1
2	46 41.7	28	85	59.5
3	45 50.7	27	85	59.8
4	44 59.5	25	86	60.1
45	44 08.2	24	86	60.5
6	43 16.7	23	86	60.7
7	42 25.1	22	86	61.0
8	41 33.4	21	86	61.3
9	40 41.5	20	87	61.5
50	39 49.5	19	87	61.7
1	38 57.4	18	87	61.9
2	38 05.2	17	87	62.1
3	37 13.0	16	87	62.3
4	36 20.6	15	87	62.5
55	35 28.2	14	88	62.6
6	34 35.7	13	88	62.8
7	33 43.1	12	88	62.9
8	32 50.4	11	88	63.0
9	31 57.8	10	88	63.1
60	31 05.0	09	88	63.2
1	30 12.2	08	88	63.3
2	29 19.4	07	88	63.4
3	28 26.6	06	88	63.5
4	27 33.7	06	88	63.5
65	26 40.8	05	88	63.6
6	25 47.9	04	88	63.6
7	24 54.9	03	88	63.7
8	24 02.0	02	88	63.7
9	23 09.0	01	88	63.7
70	22 16.0	01	88	63.7
1	21 23.0	00	88	63.7
2	20 30.1	01	88	63.7
3	19 37.1	02	88	63.7
4	18 44.1	03	88	63.7
75	17 51.2	04	88	63.6
6	16 58.2	04	88	63.6
7	16 05.3	05	88	63.6
8	15 12.4	06	88	63.5
9	14 19.6	07	88	63.4
80	13 26.7	08	88	63.4
1	12 33.9	08	88	63.3
2	11 41.1	09	88	63.2
3	10 48.4	10	88	63.1
4	9 55.7	11	88	63.1
85	9 03.0	11	88	63.0
6	8 10.4	12	88	62.9
7	7 17.9	13	88	62.7
8	6 25.4	14	87	62.6
9	5 32.9	15	87	62.5
90				

H.A. °	28° 30′ Alt. ° ′	Δd	Δt	Az. °
00	71 30.0	1.0	02	00.0
1	71 28.6	1.0	07	02.8
2	71 24.3	99	12	05.5
3	71 17.2	99	16	08.2
4	71 07.4	98	21	10.9
05	70 54.9	96	25	13.5
6	70 39.7	95	29	16.1
7	70 22.1	93	33	18.6
8	70 02.1	92	37	21.0
9	69 39.8	90	41	23.3
10	69 15.4	88	44	25.5
1	68 48.9	85	47	27.6
2	68 20.6	83	50	29.7
3	67 50.5	81	53	31.6
4	67 18.7	79	56	33.4
15	66 45.4	76	58	35.2
6	66 10.6	74	60	36.8
7	65 34.5	72	62	38.4
8	64 57.2	70	64	39.9
9	64 18.8	67	66	41.3
20	63 39.2	65	68	42.6
1	62 58.7	63	69	43.9
2	62 17.3	61	70	45.1
3	61 35.1	59	72	46.2
4	60 52.1	57	73	47.2
25	60 08.3	55	74	48.2
6	59 23.9	53	75	49.2
7	58 38.9	51	76	50.1
8	57 53.3	49	77	50.9
9	57 07.2	48	78	51.7
30	56 20.6	46	78	52.5
1	55 33.5	44	79	53.2
2	54 46.0	43	80	53.8
3	53 58.1	41	80	54.5
4	53 09.9	40	81	55.1
35	52 21.3	38	82	55.6
6	51 32.4	37	82	56.2
7	50 43.1	35	82	56.7
8	49 53.6	34	83	57.1
9	49 03.9	32	83	57.6
40	48 13.9	31	84	58.0
1	47 23.7	30	84	58.4
2	46 33.2	29	84	58.8
3	45 42.6	27	85	59.1
4	44 51.8	26	85	59.5
45	44 00.8	25	85	59.8
6	43 09.7	24	85	60.1
7	42 18.4	23	86	60.4
8	41 27.0	22	86	60.6
9	40 35.5	21	86	60.9
50	39 43.8	19	86	61.1
1	38 52.0	18	86	61.3
2	38 00.1	17	87	61.5
3	37 08.2	16	87	61.7
4	36 16.1	15	87	61.9
55	35 23.9	14	87	62.0
6	34 31.7	13	87	62.2
7	33 39.4	12	87	62.3
8	32 47.1	11	87	62.4
9	31 54.7	11	87	62.5
60	31 02.2	10	88	62.7
1	30 09.7	09	88	62.7
2	29 17.2	08	88	62.8
3	28 24.6	07	88	62.9
4	27 32.0	06	88	63.0
65	26 39.3	05	88	63.0
6	25 46.6	04	88	63.1
7	24 53.9	03	88	63.1
8	24 01.2	03	88	63.1
9	23 08.5	02	88	63.2
70	22 15.8	01	88	63.2
1	21 23.1	00	88	63.2
2	20 30.3	01	88	63.2
3	19 37.6	02	88	63.2
4	18 44.9	02	88	63.1
75	17 52.2	03	88	63.1
6	16 59.5	04	88	63.1
7	16 06.8	05	88	63.0
8	15 14.2	06	88	63.0
9	14 21.5	06	88	62.9
80	13 28.9	07	88	62.9
1	12 36.4	08	88	62.8
2	11 43.8	09	88	62.7
3	10 51.3	10	87	62.6
4	9 58.9	11	87	62.6
85	9 06.5	11	87	62.5
6	8 14.1	12	87	62.4
7	7 21.8	13	87	62.2
8	6 29.5	14	87	62.1
9	5 37.3	15	87	62.0
90				

H.A. °	29° 00′ Alt. ° ′	Δd	Δt	Az. °
00	71 00.0	1.0	02	00.0
1	70 58.6	1.0	07	02.7
2	70 54.5	99	12	05.4
3	70 47.6	99	16	08.0
4	70 38.0	98	20	10.6
05	70 25.9	97	24	13.2
6	70 11.2	95	29	15.6
7	69 54.0	94	32	18.1
8	69 34.6	92	36	20.4
9	69 12.9	90	40	22.7
10	68 49.0	88	43	24.9
1	68 23.2	86	46	26.9
2	67 55.5	84	49	28.9
3	67 26.1	82	52	30.8
4	66 55.0	79	54	32.7
15	66 22.3	77	57	34.4
6	65 48.3	75	59	36.0
7	65 12.9	73	61	37.6
8	64 36.2	70	63	39.1
9	63 58.4	68	65	40.5
20	63 19.6	66	66	41.8
1	62 39.7	64	68	43.0
2	61 58.9	62	69	44.2
3	61 17.3	60	71	45.3
4	60 34.9	58	72	46.4
25	59 51.7	56	73	47.4
6	59 07.9	54	74	48.4
7	58 23.4	52	75	49.3
8	57 38.4	50	76	50.1
9	56 52.8	49	77	50.9
30	56 06.7	47	78	51.7
1	55 20.1	45	78	52.4
2	54 33.1	44	79	53.0
3	53 45.7	42	80	53.7
4	52 57.9	41	80	54.3
35	52 09.7	39	81	54.9
6	51 21.2	38	81	55.4
7	50 32.4	36	82	55.9
8	49 43.4	35	82	56.4
9	48 54.0	33	83	56.9
40	48 04.4	32	83	57.3
1	47 14.6	31	83	57.7
2	46 24.5	29	84	58.1
3	45 34.3	28	84	58.4
4	44 43.8	27	84	58.8
45	43 53.2	26	85	59.1
6	43 02.4	25	85	59.4
7	42 11.5	23	85	59.7
8	41 20.4	22	85	60.0
9	40 29.2	21	86	60.2
50	39 37.9	20	86	60.5
1	38 46.4	19	86	60.7
2	37 54.8	18	86	60.9
3	37 03.2	17	86	61.1
4	36 11.4	16	86	61.3
55	35 19.6	15	87	61.4
6	34 27.6	14	87	61.6
7	33 35.6	13	87	61.7
8	32 43.6	12	87	61.8
9	31 51.4	11	87	62.0
60	30 59.3	10	87	62.1
1	30 07.0	09	87	62.2
2	29 14.7	08	87	62.3
3	28 22.4	07	87	62.3
4	27 30.1	06	87	62.4
65	26 37.7	06	87	62.5
6	25 45.3	05	87	62.5
7	24 52.9	04	87	62.6
8	24 00.4	03	87	62.6
9	23 08.0	02	87	62.6
70	22 15.5	01	87	62.6
1	21 23.0	00	87	62.6
2	20 30.5	00	87	62.6
3	19 38.1	01	87	62.6
4	18 45.6	02	87	62.6
75	17 53.1	03	87	62.6
6	17 00.7	04	87	62.6
7	16 08.3	05	87	62.5
8	15 15.8	05	87	62.5
9	14 23.5	06	87	62.4
80	13 31.1	07	87	62.4
1	12 38.8	08	87	62.3
2	11 46.5	09	87	62.2
3	10 54.2	10	87	62.1
4	10 02.0	10	87	62.0
85	9 09.8	11	87	62.0
6	8 17.7	12	87	61.8
7	7 25.6	13	87	61.7
8	6 33.6	14	87	61.6
9	5 41.7	14	86	61.5
90				

H.A. °	30° 00′ Alt. ° ′	Δd	Δt	Az. °
00	70 00.0	1.0	02	00.0
1	69 58.7	1.0	07	02.5
2	69 54.8	99	11	05.0
3	69 48.3	99	15	07.5
4	69 39.3	98	19	10.0
05	69 27.8	97	23	12.4
6	69 13.9	96	27	14.8
7	68 57.6	94	31	17.1
8	68 39.2	93	34	19.3
9	68 18.6	91	38	21.5
10	67 55.9	89	41	23.6
1	67 31.3	87	44	25.6
2	67 04.8	85	47	27.5
3	66 36.7	83	50	29.4
4	66 06.9	81	52	31.2
15	65 35.6	79	55	32.8
6	65 02.8	77	57	34.5
7	64 28.7	74	59	36.0
8	63 53.4	72	61	37.5
9	63 16.9	70	63	38.8
20	62 39.3	68	64	40.2
1	62 00.7	66	66	41.4
2	61 21.2	64	67	42.6
3	60 40.8	62	69	43.7
4	59 59.5	60	70	44.8
25	59 17.6	58	71	45.8
6	58 34.9	56	72	46.7
7	57 51.5	54	73	47.6
8	57 07.5	52	74	48.5
9	56 23.0	51	75	49.3
30	55 37.9	49	76	50.1
1	54 52.4	47	77	50.8
2	54 06.3	46	77	51.5
3	53 19.9	44	78	52.2
4	52 33.0	42	79	52.8
35	51 45.8	41	79	53.4
6	50 58.2	39	80	53.9
7	50 10.2	38	80	54.5
8	49 22.0	36	81	55.0
9	48 33.5	35	81	55.4
40	47 44.7	34	82	55.9
1	46 55.7	32	82	56.3
2	46 06.4	31	82	56.7
3	45 16.9	30	83	57.1
4	44 27.2	29	83	57.4
45	43 37.3	27	83	57.8
6	42 47.2	26	84	58.1
7	41 57.0	25	84	58.4
8	41 06.6	24	84	58.7
9	40 16.0	23	84	58.9
50	39 25.4	22	85	59.2
1	38 34.6	20	85	59.4
2	37 43.6	19	85	59.6
3	36 52.6	18	85	59.8
4	36 01.5	17	85	60.0
55	35 10.2	16	86	60.2
6	34 18.9	15	86	60.4
7	33 27.5	14	86	60.5
8	32 36.0	13	86	60.7
9	31 44.5	12	86	60.8
60	30 52.9	11	86	60.9
1	30 01.2	10	86	61.0
2	29 09.5	09	86	61.1
3	28 17.7	08	86	61.2
4	27 25.9	07	86	61.3
65	26 34.1	06	86	61.3
6	25 42.2	06	86	61.4
7	24 50.3	05	87	61.5
8	23 58.4	04	87	61.5
9	23 06.5	03	87	61.5
70	22 14.5	02	87	61.5
1	21 22.6	01	87	61.6
2	20 30.6	00	87	61.6
3	19 38.7	01	87	61.6
4	18 46.7	02	87	61.6
75	17 54.7	02	87	61.5
6	17 02.8	03	87	61.5
7	16 10.9	04	87	61.5
8	15 19.0	05	86	61.4
9	14 27.1	06	86	61.4
80	13 35.2	07	86	61.3
1	12 43.4	08	86	61.3
2	11 51.6	08	86	61.2
3	10 59.8	09	86	61.1
4	10 08.1	10	86	61.0
85	9 16.4	11	86	60.9
6	8 24.8	12	86	60.8
7	7 33.2	13	86	60.7
8	6 41.7	13	86	60.6
9	5 50.3	14	86	60.5
90				

H.A. °	32° 00′ Alt. ° ′	Δd	Δt	Az. °
00	68 00.0	1.0	02	00.0
1	67 58.8	1.0	06	02.3
2	67 55.3	1.0	10	04.5
3	67 49.5	99	13	06.8
4	67 41.5	98	17	09.0
05	67 31.1	97	21	11.1
6	67 18.6	96	24	13.3
7	67 04.0	95	28	15.4
8	66 47.3	94	31	17.4
9	66 28.6	92	34	19.4
10	66 08.1	91	37	21.3
1	65 45.6	89	40	23.2
2	65 21.5	87	43	25.0
3	64 55.7	85	46	26.8
4	64 28.3	83	48	28.4
15	63 59.5	81	50	30.0
6	63 29.2	79	53	31.6
7	62 57.6	77	55	33.1
8	62 24.8	75	57	34.5
9	61 50.8	73	59	35.8
20	61 15.6	71	60	37.1
1	60 39.5	69	62	38.3
2	60 02.4	67	63	39.5
3	59 24.3	65	65	40.6
4	58 45.5	64	66	41.7
25	58 05.8	62	67	42.7
6	57 25.3	60	69	43.7
7	56 44.2	58	70	44.6
8	56 02.4	56	71	45.5
9	55 20.0	54	72	46.3
30	54 37.0	53	73	47.1
1	53 53.4	51	73	47.8
2	53 09.4	49	74	48.5
3	52 24.9	48	75	49.2
4	51 39.9	46	76	49.9
35	50 54.5	44	76	50.5
6	50 08.8	43	77	51.1
7	49 22.6	41	78	51.6
8	48 36.1	40	78	52.1
9	47 49.3	38	79	52.6
40	47 02.2	37	79	53.1
1	46 14.8	36	79	53.6
2	45 27.1	34	80	54.0
3	44 39.2	33	80	54.4
4	43 51.1	32	81	54.8
45	43 02.7	30	81	55.1
6	42 14.1	29	81	55.5
7	41 25.3	28	82	55.8
8	40 36.4	27	82	56.1
9	39 47.2	25	82	56.4
50	38 57.9	24	82	56.7
1	38 08.5	23	83	56.9
2	37 18.9	22	83	57.2
3	36 29.2	21	83	57.4
4	35 39.4	20	83	57.6
55	34 49.4	19	83	57.8
6	33 59.4	17	84	58.0
7	33 09.2	16	84	58.2
8	32 19.0	15	84	58.3
9	31 28.6	14	84	58.5
60	30 38.2	13	84	58.6
1	29 47.8	12	84	58.7
2	28 57.2	11	84	58.8
3	28 06.6	10	84	58.9
4	27 16.0	09	84	59.0
65	26 25.3	08	85	59.1
6	25 34.6	07	85	59.2
7	24 43.8	06	85	59.3
8	23 53.0	05	85	59.3
9	23 02.2	04	85	59.4
70	22 11.3	03	85	59.4
1	21 20.5	02	85	59.4
2	20 29.6	01	85	59.4
3	19 38.7	01	85	59.4
4	18 47.8	00	85	59.4
75	17 57.0	01	85	59.4
6	17 06.1	02	85	59.4
7	16 15.2	03	85	59.4
8	15 24.4	04	85	59.4
9	14 33.5	05	85	59.3
80	13 42.7	06	85	59.3
1	12 51.9	07	85	59.2
2	12 01.2	08	85	59.2
3	11 10.5	09	84	59.1
4	10 19.8	09	84	59.0
85	9 29.2	10	84	58.9
6	8 38.6	11	84	58.8
7	7 48.0	12	84	58.7
8	6 57.6	13	84	58.6
9	6 07.1	14	84	58.5
90	5 16.8	15	84	58.4

H.A. °	34° 00′ Alt. ° ′	Δd	Δt	Az. °
00	66 00.0	1.0	02	00.0
1	65 58.9	1.0	05	02.0
2	65 55.8	1.0	09	04.1
3	65 50.6	99	12	06.1
4	65 43.3	99	16	08.1
05	65 34.0	98	19	10.1
6	65 22.7	97	22	12.0
7	65 09.4	96	25	13.9
8	64 54.3	95	28	15.8
9	64 37.3	93	31	17.6
10	64 18.5	92	34	19.4
1	63 58.0	90	37	21.1
2	63 35.9	89	39	22.8
3	63 12.3	87	42	24.4
4	62 47.1	85	44	26.0
15	62 20.5	84	47	27.5
6	61 52.5	82	49	29.0
7	61 23.2	80	51	30.4
8	60 52.7	78	53	31.8
9	60 21.0	76	55	33.1
20	59 48.2	74	56	34.3
1	59 14.4	72	58	35.5
2	58 39.6	70	60	36.7
3	58 03.9	69	61	37.8
4	57 27.2	67	62	38.8
25	56 49.8	65	64	39.8
6	56 11.6	63	65	40.8
7	55 32.6	61	66	41.7
8	54 53.0	60	67	42.6
9	54 12.7	58	68	43.4
30	53 31.8	56	69	44.2
1	52 50.3	54	70	45.0
2	52 08.2	53	71	45.7
3	51 25.7	51	72	46.4
4	50 42.7	49	72	47.1
35	49 59.2	48	73	47.7
6	49 15.3	46	74	48.3
7	48 31.0	45	74	48.9
8	47 46.3	43	75	49.4
9	47 01.2	42	76	49.9
40	46 15.8	40	76	50.4
1	45 30.1	39	77	50.9
2	44 44.1	37	77	51.3
3	43 57.9	36	78	51.8
4	43 11.3	35	78	52.2
45	42 24.5	33	78	52.6
6	41 37.5	32	79	52.9
7	40 50.2	31	79	53.3
8	40 02.8	29	79	53.6
9	39 15.1	28	80	53.9
50	38 27.3	27	80	54.2
1	37 39.3	26	80	54.5
2	36 51.1	24	80	54.7
3	36 02.8	23	81	55.0
4	35 14.4	22	81	55.2
55	34 25.8	21	81	55.4
6	33 37.1	20	81	55.6
7	32 48.2	19	82	55.8
8	31 59.3	17	82	56.0
9	31 10.3	16	82	56.2
60	30 21.2	15	82	56.3
1	29 32.0	14	82	56.4
2	28 42.7	13	82	56.6
3	27 53.3	12	82	56.7
4	27 03.9	11	82	56.8
65	26 14.5	10	83	56.9
6	25 24.9	09	83	57.0
7	24 35.4	08	83	57.1
8	23 45.8	07	83	57.1
9	22 56.1	06	83	57.2
70	22 06.4	05	83	57.2
1	21 16.7	04	83	57.3
2	20 27.0	03	83	57.3
3	19 37.3	02	83	57.3
4	18 47.6	01	83	57.3
75	17 57.8	00	83	57.3
6	17 08.1	01	83	57.3
7	16 18.3	02	83	57.3
8	15 28.6	03	83	57.3
9	14 38.9	04	83	57.3
80	13 49.2	05	83	57.2
1	12 59.5	06	83	57.2
2	12 09.9	07	83	57.1
3	11 20.3	08	83	57.1
4	10 30.7	09	83	57.0
85	9 41.2	10	82	56.9
6	8 51.7	11	82	56.8
7	8 02.3	12	82	56.7
8	7 12.9	13	82	56.6
9	6 23.6	14	82	56.5
90	5 34.3	14	82	56.4

H.A. °	34° 30′ Alt. ° ′	Δd	Δt	Az. °
00	65 30.0	1.0	02	00.0
1	65 29.0	1.0	05	02.0
2	65 25.9	1.0	08	04.0
3	65 20.8	99	12	05.9
4	65 13.7	99	15	07.9
05	65 04.6	98	18	09.8
6	64 53.6	97	22	11.7
7	64 40.6	96	25	13.6
8	64 25.8	95	28	15.4
9	64 09.2	94	31	17.2
10	63 50.9	92	33	18.9
1	63 30.9	91	36	20.6
2	63 09.3	89	39	22.3
3	62 46.1	87	41	23.9
4	62 21.4	86	43	25.4
15	61 55.3	84	46	26.9
6	61 27.9	82	48	28.4
7	60 59.1	80	50	29.8
8	60 29.2	79	52	31.1
9	59 58.1	77	54	32.4
20	59 25.8	75	55	33.7
1	58 52.6	73	57	34.8
2	58 18.3	71	59	36.0
3	57 43.2	69	60	37.1
4	57 07.1	68	61	38.1
25	56 30.2	66	63	39.1
6	55 52.5	64	64	40.1
7	55 14.1	62	65	41.0
8	54 35.0	60	66	41.9
9	53 55.2	59	67	42.7
30	53 14.8	57	68	43.5
1	52 33.9	55	69	44.3
2	51 52.3	53	70	45.0
3	51 10.3	52	71	45.7
4	50 27.7	50	72	46.4
35	49 44.7	49	72	47.0
6	49 01.3	47	73	47.6
7	48 17.5	45	74	48.2
8	47 33.2	44	74	48.7
9	46 48.6	42	75	49.3
40	46 03.7	41	75	49.8
1	45 18.4	40	76	50.2
2	44 32.8	38	76	50.7
3	43 47.0	37	77	51.1
4	43 00.8	35	77	51.5
45	42 14.4	34	78	51.9
6	41 27.8	33	78	52.3
7	40 41.0	31	78	52.6
8	39 53.9	30	79	53.0
9	39 06.6	29	79	53.3
50	38 19.2	27	79	53.6
1	37 31.5	26	80	53.9
2	36 43.7	25	80	54.1
3	35 55.8	24	80	54.4
4	35 07.7	23	80	54.6
55	34 19.4	21	81	54.8
6	33 31.1	20	81	55.0
7	32 42.6	19	81	55.2
8	31 54.0	18	81	55.4
9	31 05.3	17	81	55.6
60	30 16.5	16	81	55.7
1	29 27.7	15	82	55.9
2	28 38.7	14	82	56.0
3	27 49.7	12	82	56.1
4	27 00.6	11	82	56.2
65	26 11.4	10	82	56.3
6	25 22.2	09	82	56.4
7	24 33.0	08	82	56.5
8	23 43.7	07	82	56.6
9	22 54.3	06	82	56.6
70	22 04.9	05	82	56.7
1	21 15.6	04	82	56.7
2	20 26.1	03	82	56.8
3	19 36.7	02	82	56.8
4	18 47.3	01	82	56.8
75	17 57.8	00	82	56.8
6	17 08.4	01	82	56.8
7	16 18.9	02	82	56.8
8	15 29.5	03	82	56.8
9	14 40.1	04	82	56.7
80	13 50.7	05	82	56.7
1	13 01.3	06	82	56.7
2	12 11.9	07	82	56.6
3	11 22.6	08	82	56.6
4	10 33.3	09	82	56.5
85	9 44.1	10	82	56.4
6	8 54.9	11	82	56.3
7	8 05.8	12	82	56.2
8	7 16.7	12	82	56.1
9	6 27.6	13	82	56.0
90	5 38.7	14	82	55.9

H.A. °	35° 30′ Alt. ° ′	Δd	Δt	Az. °
00	64 30.0	1.0	02	00.0
1	64 29.0	1.0	05	01.9
2	64 26.1	1.0	08	03.8
3	64 21.2	99	11	05.6
4	64 14.5	99	14	07.5
05	64 05.8	98	18	09.3
6	63 55.3	97	21	11.2
7	63 43.0	96	24	12.9
8	63 28.8	95	26	14.7
9	63 13.0	94	29	16.4
10	62 55.4	93	32	18.1
1	62 36.3	91	35	19.7
2	62 15.6	90	37	21.3
3	61 53.3	88	39	22.9
4	61 29.7	87	42	24.4
15	61 04.6	85	44	25.8
6	60 38.2	83	46	27.2
7	60 10.5	82	48	28.6
8	59 41.7	80	50	29.9
9	59 11.6	78	52	31.2
20	58 40.5	76	54	32.4
1	58 08.4	74	55	33.6
2	57 35.2	73	57	34.7
3	57 01.1	71	58	35.8
4	56 26.2	69	60	36.8
25	55 50.4	67	61	37.8
6	55 13.8	65	62	38.7
7	54 36.4	64	63	39.7
8	53 58.4	62	65	40.5
9	53 19.6	60	66	41.4
30	52 40.3	58	67	42.2
1	52 00.3	57	68	42.9
2	51 19.8	55	68	43.7
3	50 38.7	53	69	44.4
4	49 57.2	52	70	45.0
35	49 15.1	50	71	45.7
6	48 32.6	49	72	46.3
7	47 49.7	47	72	46.9
8	47 06.4	45	73	47.4
9	46 22.7	44	73	48.0
40	45 38.7	42	74	48.5
1	44 54.3	41	74	48.9
2	44 09.5	40	75	49.4
3	43 24.5	38	76	49.8
4	42 39.2	37	76	50.3
45	41 53.7	35	76	50.7
6	41 07.8	34	77	51.0
7	40 21.8	33	77	51.4
8	39 35.5	31	78	51.7
9	38 49.0	30	78	52.1
50	38 02.3	29	78	52.4
1	37 15.4	27	78	52.6
2	36 28.4	26	79	52.9
3	35 41.2	25	79	53.2
4	34 53.8	24	79	53.4
55	34 06.3	23	79	53.6
6	33 18.6	21	80	53.9
7	32 30.8	20	80	54.1
8	31 42.9	19	80	54.3
9	30 54.9	18	80	54.4
60	30 06.8	17	80	54.6
1	29 18.6	16	80	54.7
2	28 30.3	14	81	54.9
3	27 41.9	13	81	55.0
4	26 53.5	12	81	55.1
65	26 05.0	11	81	55.2
6	25 16.4	10	81	55.3
7	24 27.8	09	81	55.4
8	23 39.1	08	81	55.5
9	22 50.4	07	81	55.6
70	22 01.7	06	81	55.6
1	21 12.9	05	81	55.7
2	20 24.1	04	81	55.7
3	19 35.3	03	81	55.7
4	18 46.4	02	81	55.7
75	17 57.6	01	81	55.8
6	17 08.7	00	81	55.8
7	16 19.9	01	81	55.8
8	15 31.0	02	81	55.7
9	14 42.2	03	81	55.7
80	13 53.4	04	81	55.7
1	13 04.6	05	81	55.6
2	12 15.9	06	81	55.6
3	11 27.1	07	81	55.5
4	10 38.4	08	81	55.5
85	9 49.8	09	81	55.4
6	9 01.2	10	81	55.3
7	8 12.6	11	81	55.2
8	7 24.1	12	81	55.1
9	6 35.6	13	81	55.0
90	5 47.2	14	81	54.9

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	28° 00′ Alt.	Δd	Δt	Az.	28° 30′ Alt.	Δd	Δt	Az.	29° 00′ Alt.	Δd	Δt	Az.	30° 00′ Alt.	Δd	Δt	Az.
°	° ′			°	° ′			°	° ′			°	° ′			°
00	52 00.0	1.0	01	180.0	51 30.0	1.0	01	180.0	51 00.0	1.0	01	180.0	50 00.0	1.0	01	180.0
1	51 59.3	1.0	04	178.6	51 29.3	1.0	04	178.6	50 59.3	1.0	04	178.6	49 59.3	1.0	03	178.7
2	51 57.0	1.0	06	177.1	51 27.1	1.0	06	177.2	50 57.1	1.0	06	177.2	49 57.2	1.0	06	177.3
3	51 53.4	1.0	09	175.7	51 23.5	1.0	08	175.8	50 53.6	1.0	08	175.8	49 53.8	1.0	08	176.0
4	51 48.2	99	11	174.3	51 18.4	99	11	174.4	50 48.6	99	11	174.5	49 48.9	99	10	174.6
05	51 41.6	99	14	172.9	51 11.9	99	13	173.0	50 42.2	99	13	173.1	49 42.7	99	13	173.3
6	51 33.5	99	16	171.5	51 03.9	99	16	171.6	50 34.3	99	15	171.7	49 35.1	99	15	172.0
7	51 24.0	98	18	170.1	50 54.6	98	18	170.2	50 25.1	98	18	170.4	49 26.2	98	17	170.7
8	51 13.2	98	20	168.7	50 43.9	98	20	168.9	50 14.6	98	20	169.0	49 15.9	98	19	169.4
9	51 00.9	97	23	167.3	50 31.8	97	22	167.5	50 02.7	97	22	167.7	49 04.4	97	21	168.1
10	50 47.2	96	25	166.0	50 18.3	96	25	166.2	49 49.4	96	24	166.4	48 51.5	97	24	166.8
1	50 32.2	96	27	164.6	50 03.5	96	27	164.9	49 34.8	96	26	165.1	48 37.4	96	26	165.5
2	50 15.9	95	29	163.3	49 47.5	95	29	163.6	49 19.0	95	28	163.8	48 22.0	95	28	164.3
3	49 58.3	94	32	162.0	49 30.1	94	31	162.3	49 01.9	94	30	162.5	48 05.4	94	30	163.0
4	49 39.4	93	34	160.7	49 11.5	93	33	161.0	48 43.5	93	32	161.3	47 47.5	94	32	161.8
15	49 19.3	92	36	159.5	48 51.7	92	35	159.8	48 24.0	92	34	160.1	47 28.5	93	34	160.6
6	48 58.0	91	38	158.2	48 30.7	91	37	158.6	48 03.3	91	36	158.9	47 08.3	92	35	159.5
7	48 35.5	90	39	157.0	48 08.5	90	39	157.4	47 41.4	90	38	157.7	46 47.0	91	37	158.3
8	48 11.9	89	41	155.8	47 45.2	89	41	156.2	47 18.4	89	40	156.5	46 24.6	90	39	157.2
9	47 47.1	88	43	154.7	47 20.7	88	42	155.0	46 54.3	88	42	155.4	46 01.2	89	41	156.0
20	47 21.3	87	45	153.5	46 55.3	87	44	153.9	46 29.1	87	44	154.2	45 36.7	88	43	154.9
1	46 54.5	86	46	152.4	46 28.8	86	46	152.8	46 03.0	86	45	153.2	45 11.2	87	44	153.9
2	46 26.6	84	48	151.3	46 01.2	85	48	151.7	45 35.8	85	47	152.1	44 44.6	85	46	152.8
3	45 57.8	83	50	150.2	45 32.7	84	49	150.6	45 07.6	84	48	151.0	44 17.2	84	47	151.8
4	45 28.0	82	51	149.2	45 03.3	82	51	149.6	44 38.5	83	50	150.0	43 48.8	83	49	150.8
25	44 57.3	81	53	148.2	44 32.9	81	52	148.6	44 08.6	81	52	149.0	43 19.5	82	50	149.8
6	44 25.7	80	54	147.2	44 01.7	80	53	147.6	43 37.7	80	53	148.0	42 49.3	81	52	148.8
7	43 53.2	78	56	146.2	43 29.6	79	55	146.6	43 06.0	79	54	147.1	42 18.3	80	53	147.9
8	43 19.9	77	57	145.3	42 56.7	78	56	145.7	42 33.4	78	56	146.1	41 46.5	78	54	147.0
9	42 45.9	76	58	144.3	42 23.0	76	57	144.8	42 00.1	77	57	145.2	41 13.9	77	56	146.1
30	42 11.0	75	59	143.4	41 48.6	75	59	143.9	41 26.0	75	58	144.3	40 40.6	76	57	145.2
1	41 35.5	73	60	142.6	41 13.4	74	60	143.0	40 51.2	74	59	143.4	40 06.5	75	58	144.3
2	40 59.2	72	62	141.7	40 37.5	73	61	142.2	40 15.6	73	60	142.6	39 31.7	74	59	143.5
3	40 22.2	71	63	140.9	40 00.9	71	62	141.3	39 39.4	72	62	141.8	38 56.2	72	60	142.7
4	39 44.6	70	64	140.0	39 23.6	70	63	140.5	39 02.5	71	62	141.0	38 20.0	71	61	141.9
35	39 06.4	69	65	139.3	38 45.7	69	64	139.7	38 25.0	69	64	140.2	37 43.2	70	62	141.1
6	38 27.5	67	66	138.5	38 07.2	68	65	139.0	37 46.9	68	64	139.4	37 05.8	69	63	140.3
7	37 48.0	66	67	137.7	37 28.1	67	66	138.2	37 08.1	67	66	138.7	36 27.8	68	64	139.6
8	37 08.0	65	68	137.0	36 48.5	65	67	137.5	36 28.8	66	66	138.0	35 49.2	66	65	138.9
9	36 27.5	64	68	136.3	36 08.3	64	68	136.8	35 49.0	64	67	137.3	35 10.1	65	66	138.2
40	35 46.4	63	69	135.6	35 27.6	63	69	136.1	35 08.6	63	68	136.6	34 30.4	64	67	137.5
1	35 04.8	61	70	134.9	34 46.3	62	70	135.4	34 27.8	62	69	135.9	33 50.3	63	68	136.8
2	34 22.7	60	71	134.3	34 04.6	61	70	134.8	33 46.4	61	70	135.2	33 09.6	62	69	136.2
3	33 40.2	59	72	133.7	33 22.4	59	71	134.1	33 04.6	60	70	134.6	32 28.5	61	69	135.6
4	32 57.2	58	72	133.0	32 39.8	58	72	133.5	32 22.3	59	71	134.0	31 46.9	59	70	135.0
45	32 13.8	57	73	132.4	31 56.8	57	72	132.9	31 39.6	58	72	133.4	31 04.8	58	71	134.4
6	31 30.0	56	74	131.8	31 13.3	56	73	132.3	30 56.4	56	72	132.8	30 22.4	57	71	133.8
7	30 45.8	55	74	131.3	30 29.4	55	74	131.8	30 12.9	55	73	132.3	29 39.5	56	72	133.2
8	30 01.2	53	75	130.7	29 45.1	54	74	131.2	29 28.9	54	74	131.7	28 56.3	55	73	132.7
9	29 16.3	52	76	130.2	29 00.5	53	75	130.7	28 44.6	53	74	131.2	28 12.6	54	73	132.1
50	28 31.0	51	76	129.7	28 15.5	52	76	130.2	28 00.0	52	75	130.6	27 28.6	53	74	131.6
1	27 45.3	50	77	129.2	27 30.2	51	76	129.6	27 15.0	51	76	130.1	26 44.2	52	74	131.1
2	26 59.3	49	77	128.7	26 44.5	49	77	129.2	26 29.6	50	76	129.6	25 59.6	50	75	130.6
3	26 13.0	48	78	128.2	25 58.6	48	77	128.7	25 44.0	49	77	129.2	25 14.5	49	76	130.1
4	25 26.4	47	78	127.7	25 12.3	47	78	128.2	24 58.0	48	77	128.7	24 29.2	48	76	129.7
55	24 39.6	46	79	127.3	24 25.7	46	78	127.8	24 11.7	47	78	128.2	23 43.6	47	77	129.2
6	23 52.4	45	79	126.8	23 38.8	45	79	127.3	23 25.2	46	78	127.8	22 57.6	46	77	128.8
7	23 05.0	44	80	126.4	22 51.7	44	79	126.9	22 38.4	45	78	127.4	22 11.4	45	77	128.3
8	22 17.3	43	80	126.0	22 04.3	43	79	126.5	21 51.3	44	79	127.0	21 24.9	44	78	127.9
9	21 29.3	42	80	125.6	21 16.7	42	80	126.1	21 03.9	43	79	126.5	20 38.2	43	78	127.5
60	20 41.2	41	81	125.2	20 28.8	41	80	125.7	20 16.3	42	80	126.2	19 51.2	42	79	127.1
1	19 52.7	40	81	124.8	19 40.7	40	81	125.3	19 28.5	41	80	125.8	19 04.0	41	79	126.7
2	19 04.1	39	81	124.4	18 52.3	39	81	124.9	18 40.4	40	80	125.4	18 16.5	40	80	126.4
3	18 15.3	38	82	124.1	18 03.8	38	81	124.6	17 52.2	39	81	125.0	17 28.8	39	80	126.0
4	17 26.2	37	82	123.7	17 15.0	38	82	124.2	17 03.7	38	81	124.7	16 40.9	38	80	125.7
65	16 37.0	36	82	123.4	16 26.0	37	82	123.9	16 15.0	37	82	124.3	15 52.8	37	81	125.3
6	15 47.5	35	83	123.0	15 36.9	36	82	123.5	15 26.1	36	82	124.0	15 04.4	36	81	125.0
7	14 57.9	35	83	122.7	14 47.5	35	83	123.2	14 37.0	35	82	123.7	14 15.9	35	81	124.7
8	14 08.1	34	83	122.4	13 58.0	34	83	122.9	13 47.8	34	82	123.4	13 27.2	34	81	124.3
9	13 18.1	33	84	122.1	13 08.3	33	83	122.6	12 58.4	33	83	123.1	12 38.4	33	82	124.0
70	12 28.0	32	84	121.8	12 18.4	32	83	122.3	12 08.8	32	83	122.8	11 49.3	33	82	123.8
1	11 37.7	31	84	121.5	11 28.4	31	84	122.0	11 19.0	31	83	122.5	11 00.1	32	82	123.5
2	10 47.3	30	84	121.3	10 38.2	30	84	121.7	10 29.1	30	83	122.2	10 10.7	31	83	123.2
3	9 56.7	29	84	121.0	9 47.9	29	84	121.5	9 39.0	30	84	122.0	9 21.2	30	83	122.9
4	9 06.0	28	85	120.7	8 57.4	29	84	121.2	8 48.8	29	84	121.7	8 31.6	29	83	122.7
75	8 15.1	28	85	120.5	8 06.8	28	85	121.0	7 58.5	28	84	121.5	7 41.8	28	83	122.4
6	7 24.1	27	85	120.2	7 16.1	27	85	120.7	7 08.0	27	84	121.2	6 51.8	27	83	122.2
7	6 33.0	26	85	120.0	6 25.2	26	85	120.5	6 17.4	26	84	121.0	6 01.7	26	84	121.9
8	5 41.8	25	86	119.8	5 34.3	25	85	120.3	5 26.7	25	85	120.8	5 11.5	25	84	121.7

32° 00′ Alt.	Δd	Δt	Az.	34° 00′ Alt.	Δd	Δt	Az.	34° 30′ Alt.	Δd	Δt	Az.	35° 30′ Alt.	Δd	Δt	Az.	H.A.
° ′			°	° ′			°	° ′			°	° ′			°	°
48 00.0	1.0	01	180.0	46 00.0	1.0	01	180.0	45 30.0	1.0	01	180.0	44 30.0	1.0	01	180.0	00
47 59.3	1.0	03	178.7	45 59.4	1.0	03	178.8	45 29.4	1.0	03	178.8	44 29.4	1.0	03	178.9	1
47 57.4	1.0	05	177.5	45 57.5	1.0	05	177.6	45 27.6	1.0	05	177.6	44 27.6	1.0	05	177.7	2
47 54.1	1.0	08	176.2	45 54.5	1.0	07	176.4	45 24.5	1.0	07	176.5	44 24.7	1.0	07	176.6	3
47 49.6	99	10	174.9	45 50.2	1.0	09	175.2	45 20.3	1.0	09	175.3	44 20.6	1.0	09	175.4	4
47 43.7	99	12	173.7	45 44.7	99	11	174.1	45 14.9	99	11	174.1	44 15.3	99	11	174.3	05
47 36.6	99	14	172.4	45 37.9	99	13	172.9	45 08.3	99	13	173.0	44 08.9	99	13	173.2	6
47 28.2	98	16	171.2	45 30.0	99	15	171.7	45 00.5	99	15	171.8	44 01.3	99	15	172.1	7
47 18.5	98	18	170.0	45 20.9	98	17	170.6	44 51.5	98	17	170.7	43 52.6	98	16	171.0	8
47 07.6	97	20	168.8	45 10.6	98	19	169.4	44 41.3	98	19	169.6	43 42.7	98	18	169.9	9
46 55.5	97	22	167.5	44 59.2	97	21	168.3	44 30.1	97	21	168.4	43 31.8	97	20	168.8	10
46 42.1	96	24	166.4	44 46.6	96	23	167.1	44 17.6	96	23	167.3	43 19.7	97	22	167.7	1
46 27.6	95	26	165.2	44 32.8	96	25	166.0	44 04.1	96	24	166.2	43 06.5	96	24	166.6	2
46 11.9	95	28	164.0	44 18.0	95	27	164.9	43 49.5	95	26	165.1	42 52.3	95	26	165.5	3
45 55.0	94	30	162.8	44 02.1	94	28	163.8	43 33.7	94	28	164.0	42 37.0	95	27	164.5	4
45 37.1	93	32	161.7	43 45.0	94	30	162.7	43 16.9	94	30	163.0	42 20.7	94	29	163.4	15
45 18.0	92	34	160.6	43 27.0	93	32	161.7	42 59.1	93	31	161.9	42 03.3	93	31	162.4	6
44 57.8	91	35	159.5	43 07.8	92	34	160.6	42 40.3	92	33	160.9	41 45.0	92	32	161.4	7
44 36.6	90	37	158.4	42 47.7	91	35	159.6	42 20.4	91	35	159.8	41 25.6	91	34	160.4	8
44 14.3	89	39	157.3	42 26.6	90	37	158.5	41 59.5	90	36	158.8	41 05.3	91	35	159.4	9
43 51.0	88	40	156.3	42 04.5	89	38	157.5	41 37.7	89	38	157.8	40 44.1	90	37	158.4	20
43 26.8	87	42	155.3	41 41.5	88	40	156.6	41 15.0	88	39	156.9	40 21.9	89	38	157.5	1
43 01.6	86	44	154.2	41 17.5	87	41	155.6	40 51.3	87	41	155.9	39 58.8	88	40	156.5	2
42 35.4	85	45	153.3	40 52.6	86	43	154.6	40 26.8	86	42	155.0	39 34.9	87	41	155.6	3
42 08.4	84	47	152.3	40 26.9	85	44	153.7	40 01.3	85	44	154.0	39 10.1	86	43	154.7	4
41 40.5	83	48	151.3	40 00.3	84	46	152.8	39 35.0	84	45	153.1	38 44.4	85	44	153.8	25
41 11.7	82	49	150.4	39 32.8	83	47	151.9	39 07.9	83	47	152.2	38 18.0	84	45	153.0	6
40 42.1	81	51	149.5	39 04.6	82	48	151.0	38 40.0	82	48	151.4	37 50.7	82	47	152.1	7
40 11.7	80	52	148.6	38 35.5	81	50	150.1	38 11.3	81	49	150.5	37 22.6	81	48	151.3	8
39 40.5	78	53	147.7	38 05.7	79	51	149.3	37 41.8	80	50	149.7	36 53.9	80	49	150.4	9
39 08.6	77	54	146.9	37 35.2	78	52	148.5	37 11.6	79	52	148.8	36 24.3	79	50	149.6	30
38 35.9	76	56	146.0	37 03.9	77	53	147.6	36 40.7	77	53	148.0	35 54.1	78	52	148.8	1
38 02.5	75	57	145.2	36 32.0	76	54	146.9	36 09.1	76	54	147.3	35 23.2	77	53	148.1	2
37 28.5	74	58	144.4	35 59.3	75	56	146.1	35 36.8	75	55	146.5	34 51.6	76	54	147.3	3
36 53.8	73	59	143.6	35 26.0	74	57	145.3	35 03.9	74	56	145.7	34 19.3	75	55	146.5	4
36 18.4	71	60	142.9	34 52.1	73	58	144.6	34 30.3	73	57	145.0	33 46.4	73	56	145.8	35
35 42.4	70	61	142.1	34 17.5	71	59	143.9	33 56.1	72	58	144.3	33 12.9	72	57	145.1	6
35 05.9	69	62	141.4	33 42.4	70	60	143.1	33 21.3	70	59	143.6	32 38.8	71	58	144.4	7
34 28.7	68	63	140.7	33 06.7	69	60	142.5	32 45.9	69	60	142.9	32 04.2	70	59	143.7	8
33 51.0	67	64	140.0	32 30.4	68	61	141.8	32 10.0	68	61	142.2	31 28.9	69	60	143.1	9
33 12.8	65	65	139.3	31 53.6	67	62	141.1	31 33.5	67	62	141.6	30 53.2	68	60	142.4	40
32 34.0	64	65	138.7	31 16.2	65	63	140.5	30 56.5	66	62	140.9	30 16.9	66	61	141.8	1
31 54.8	63	66	138.0	30 38.4	64	64	139.9	30 19.0	65	63	140.3	29 40.1	65	62	141.2	2
31 15.0	62	67	137.4	30 00.0	63	65	139.2	29 41.0	63	64	139.7	29 02.8	64	63	140.6	3
30 34.8	61	68	136.8	29 21.2	62	65	138.6	29 02.6	62	65	139.1	28 25.0	63	64	140.0	4
29 54.2	60	68	136.2	28 41.9	61	66	138.1	28 23.7	61	66	138.5	27 46.8	62	64	139.4	45
29 13.1	58	69	135.7	28 02.2	60	67	137.5	27 44.3	60	66	137.9	27 08.2	61	65	138.8	6
28 31.6	57	70	135.1	27 22.1	59	68	136.9	27 04.5	59	67	137.4	26 29.1	59	66	138.3	7
27 49.7	56	70	134.6	26 41.6	57	68	136.4	26 24.3	58	68	136.9	25 49.5	58	67	137.8	8
27 07.4	55	71	134.0	26 00.6	56	69	135.9	25 43.7	57	68	136.3	25 09.6	57	67	137.2	9
26 24.7	54	72	133.5	25 19.3	55	70	135.4	25 02.7	55	69	135.8	24 29.3	56	68	136.7	50
25 41.6	53	72	133.0	24 37.6	54	70	134.9	24 21.4	54	70	135.3	23 48.6	55	68	136.2	1
24 58.3	52	73	132.5	23 55.5	53	71	134.4	23 39.6	53	70	134.8	23 07.6	54	69	135.8	2
24 14.5	51	73	132.0	23 13.1	52	71	133.9	22 57.6	52	71	134.4	22 26.2	53	70	135.3	3
23 30.5	50	74	131.6	22 30.4	51	72	133.4	22 15.2	51	71	133.9	21 44.5	51	70	134.8	4
22 46.1	48	74	131.1	21 47.3	50	72	133.0	21 32.4	50	72	133.5	21 02.4	50	71	134.4	55
22 01.5	47	75	130.7	21 04.0	48	73	132.6	20 49.4	49	72	133.0	20 20.0	49	71	134.0	6
21 16.5	46	75	130.2	20 20.3	47	73	132.1	20 06.1	48	73	132.6	19 37.4	48	72	133.5	7
20 31.3	45	76	129.8	19 36.3	46	74	131.7	19 22.4	47	73	132.2	18 54.4	47	72	133.1	8
19 45.7	44	76	129.4	18 52.1	45	74	131.3	18 38.5	45	74	131.8	18 11.1	46	73	132.7	9
19 00.0	43	77	129.0	18 07.6	44	75	130.9	17 54.3	44	74	131.4	17 27.6	45	73	132.3	60
18 14.0	42	77	128.7	17 22.8	43	75	130.6	17 09.9	43	74	131.0	16 43.8	44	73	132.0	1
17 27.7	41	78	128.3	16 37.8	42	75	130.2	16 25.2	42	75	130.7	15 59.7	43	74	131.6	2
16 41.2	40	78	127.9	15 52.6	41	76	129.8	15 40.2	41	75	130.3	15 15.4	42	74	131.2	3
15 54.5	39	78	127.6	15 07.1	40	76	129.5	14 55.1	40	76	130.0	14 30.9	40	75	130.9	4
15 07.5	38	79	127.2	14 21.3	39	77	129.1	14 09.6	39	76	129.6	13 46.1	39	75	130.6	65
14 20.4	37	79	126.9	13 35.4	38	77	128.8	13 24.0	38	76	129.3	13 01.1	38	75	130.2	6
13 33.0	36	79	126.6	12 49.3	37	77	128.5	12 38.2	37	77	129.0	12 15.9	37	76	129.9	7
12 45.5	35	80	126.3	12 02.9	36	78	128.2	11 52.1	36	77	128.7	11 30.5	36	76	129.6	8
11 57.8	34	80	126.0	11 16.4	35	78	127.9	11 05.9	35	77	128.4	10 44.9	35	76	129.3	9
11 09.9	33	80	125.7	10 29.7	34	78	127.6	10 19.5	34	78	128.1	9 59.0	34	77	129.0	70
10 21.8	32	80	125.4	9 42.8	33	78	127.3	9 32.9	33	78	127.8	9 13.1	33	77	128.8	1
9 33.5	31	81	125.1	8 55.7	32	79	127.0	8 46.1	32	78	127.5	8 26.9	32	77	128.5	2
8 45.1	30	81	124.9	8 08.4	31	79	126.8	7 59.2	31	78	127.3	7 40.6	31	78	128.2	3
7 56.6	29	81	124.6	7 21.0	30	79	126.5	7 12.1	30	79	127.0	6 54.1	30	78	128.0	4
7 07.9	28	81	124.4	6 33.5	29	80	126.3	6 24.8	29	79	126.8	6 07.4	29	78	127.7	75
6 19.0	28	82	124.1	5 45.8	28	80	126.1	5 37.4	28	79	126.5	5 20.6	28	78	127.5	6
5 30.0	27	82	123.9													7
																8

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	64 00.0	1.0 02	00.0	63 00.0	1.0 02	00.0	61 30.0	1.0 01	00.0	60 00.0	1.0 01	00.0	58 00.0	1.0 01	00.0	57 30.0	1.0 01	00.0	57 00.0	1.0 01	00.0	55 00.0	1.0 01	00.0	00
1	63 59.0	1.0 05	01.8	62 59.1	1.0 04	01.8	61 29.2	1.0 04	01.6	59 59.2	1.0 04	01.5	57 59.3	1.0 04	01.4	57 29.3	1.0 04	01.4	56 59.3	1.0 03	01.3	54 59.4	1.0 03	01.2	1
2	63 56.2	1.0 08	03.7	62 56.4	1.0 08	03.5	61 26.6	1.0 07	03.3	59 56.8	1.0 07	03.1	57 57.1	1.0 06	02.8	57 27.2	1.0 06	02.7	56 57.2	1.0 06	02.7	54 57.5	1.0 05	02.5	2
3	63 51.5	99 11	05.5	62 51.9	99 10	05.3	61 22.4	99 10	04.9	59 52.9	99 09	04.6	57 53.5	1.0 08	04.2	57 23.6	1.0 08	04.1	56 53.8	1.0 08	04.0	54 54.3	1.0 07	03.7	3
4	63 44.8	99 14	07.3	62 45.6	99 13	07.0	61 16.5	99 13	06.5	59 47.4	99 12	06.1	57 48.5	99 11	05.6	57 18.7	99 11	05.5	56 49.0	99 10	05.3	54 49.9	99 09	04.9	4
05	63 36.4	98 17	09.1	62 37.5	98 16	08.7	61 09.0	98 15	08.1	59 40.4	99 14	07.6	57 42.0	99 13	07.0	57 12.4	99 13	06.8	56 42.8	99 13	06.7	54 44.2	99 12	06.1	05
6	63 26.1	97 20	10.9	62 27.7	97 19	10.4	60 59.8	98 18	09.7	59 31.8	98 17	09.1	57 34.1	98 15	08.3	57 04.7	98 15	08.2	56 35.2	98 15	08.0	54 37.2	98 14	07.3	6
7	63 14.1	96 23	12.6	62 16.2	97 22	12.1	60 49.1	97 21	11.3	59 21.7	97 19	10.6	57 24.9	97 18	09.7	56 55.6	98 17	09.5	56 26.4	98 17	09.3	54 29.1	98 16	08.5	7
8	63 00.3	95 26	14.4	62 03.0	96 25	13.7	60 36.7	96 23	12.8	59 10.1	96 22	12.0	57 14.3	97 20	11.0	56 45.2	97 20	10.8	56 16.2	97 19	10.6	54 19.7	97 18	09.7	8
9	62 44.8	94 29	16.0	61 48.1	95 27	15.3	60 22.8	95 26	14.3	58 57.1	95 24	13.4	57 02.3	96 22	12.3	56 33.5	96 22	12.1	56 04.7	96 21	11.8	54 09.2	96 20	10.9	9
10	62 27.6	93 31	17.7	61 31.7	93 30	16.9	60 07.5	94 28	15.8	58 42.7	94 26	14.8	56 49.0	95 24	13.6	56 20.5	95 24	13.4	55 52.0	95 23	13.1	53 57.4	96 22	12.0	10
1	62 08.9	92 34	19.3	61 13.8	92 32	18.5	59 50.6	93 30	17.3	58 26.9	93 29	16.2	56 34.5	94 26	14.9	56 06.2	94 26	14.6	55 38.0	94 25	14.3	53 44.5	95 23	13.2	1
2	61 48.6	90 36	20.9	60 54.3	91 35	20.0	59 32.3	91 33	18.7	58 09.7	92 31	17.6	56 18.6	93 28	16.2	55 50.7	93 28	15.8	55 22.8	93 27	15.5	53 30.5	94 25	14.3	2
3	61 26.8	89 39	22.4	60 33.4	89 37	21.4	59 12.7	90 35	20.1	57 51.2	91 33	18.9	56 01.6	92 30	17.4	55 34.0	92 30	17.1	55 06.4	92 29	16.7	53 15.3	93 27	15.4	3
4	61 03.6	87 41	23.9	60 11.2	88 39	22.9	58 51.7	89 37	21.5	57 31.4	90 35	20.2	55 43.3	91 32	18.6	55 16.1	91 32	18.2	54 48.8	91 31	17.9	52 59.0	92 29	16.5	4
15	60 39.0	85 43	25.3	59 47.5	86 42	24.3	58 29.4	87 39	22.8	57 10.4	88 37	21.5	55 23.8	89 34	19.8	54 57.0	90 34	19.4	54 30.1	90 33	19.0	52 41.7	91 31	17.6	15
6	60 13.1	84 45	26.7	59 22.6	85 44	25.6	58 05.9	86 41	24.1	56 48.2	87 39	22.7	55 03.3	88 36	21.0	54 36.8	88 35	20.5	54 10.3	89 35	20.1	52 23.4	90 32	18.6	6
7	59 46.0	82 47	28.0	58 56.5	83 46	26.9	57 41.2	84 43	25.3	56 24.9	85 41	23.9	54 41.6	87 38	22.1	54 15.5	87 37	21.7	53 49.4	87 37	21.2	52 04.0	88 34	19.7	7
8	59 17.6	80 49	29.3	58 29.2	81 47	28.2	57 15.4	83 45	26.6	56 00.4	84 43	25.0	54 18.9	85 40	23.2	53 53.2	86 39	22.7	53 27.5	86 38	22.3	51 43.6	87 36	20.7	8
9	58 48.2	79 51	30.6	58 00.7	80 49	29.4	56 48.4	81 47	27.7	55 34.8	82 44	26.2	53 55.1	84 41	24.3	53 29.9	84 41	23.8	53 04.5	85 40	23.4	51 22.3	86 37	21.6	9
20	58 17.6	77 53	31.8	57 31.2	78 51	30.6	56 20.4	79 48	28.9	55 08.3	81 46	27.3	53 30.3	82 43	25.3	53 05.5	83 42	24.8	52 40.6	83 41	24.4	51 00.1	84 39	22.6	20
1	57 46.0	75 54	32.9	57 00.6	76 53	31.7	55 51.3	78 50	30.0	54 40.7	79 48	28.3	53 04.6	81 44	26.3	52 40.3	81 44	25.8	52 15.8	82 43	25.4	50 36.9	83 40	23.5	1
2	57 13.4	73 56	34.0	56 29.1	74 54	32.8	55 21.3	76 52	31.0	54 12.2	78 49	29.4	52 37.9	79 46	27.3	52 14.1	80 45	26.8	51 50.0	80 44	26.3	50 12.9	82 41	24.5	2
3	56 39.8	71 57	35.1	55 56.6	73 56	33.9	54 50.4	74 53	32.1	53 42.7	76 51	30.4	52 10.4	78 47	28.3	51 47.0	78 47	27.8	51 23.4	79 46	27.3	49 48.0	80 43	25.3	3
4	56 05.4	70 59	36.1	55 23.2	71 57	34.9	54 18.6	73 54	33.1	53 12.4	74 52	31.3	51 42.0	76 49	29.2	51 19.0	77 48	28.7	50 55.9	77 47	28.2	49 22.3	79 44	26.2	4
25	55 30.1	68 60	37.1	54 49.0	69 58	35.9	53 45.9	71 56	34.0	52 41.3	73 53	32.3	51 12.8	75 50	30.1	50 50.3	75 49	29.6	50 27.6	76 48	29.0	48 55.8	77 45	27.1	25
6	54 54.1	66 61	38.1	54 14.0	67 60	36.8	53 12.5	69 57	34.9	52 09.3	71 55	33.2	50 42.8	73 51	31.0	50 20.7	74 50	30.4	49 58.6	74 50	29.9	48 28.5	76 47	27.9	6
7	54 17.2	64 63	39.0	53 38.3	66 61	37.7	52 38.3	68 58	35.8	51 36.6	69 56	34.1	50 12.0	72 52	31.8	49 50.4	72 52	31.3	49 28.7	73 51	30.7	48 00.6	74 48	28.7	7
8	53 39.7	63 64	39.9	53 01.8	64 62	38.6	52 03.3	66 59	36.7	51 03.1	68 57	34.9	49 40.5	70 54	32.6	49 19.4	70 53	32.1	48 58.2	71 52	31.5	47 31.9	73 49	29.4	8
9	53 01.5	61 65	40.7	52 24.6	62 63	39.4	51 27.7	64 61	37.5	50 29.0	66 58	35.7	49 08.3	68 55	33.4	48 47.7	69 54	32.9	48 26.9	69 53	32.3	47 02.5	71 50	30.2	9
30	52 22.7	59 66	41.5	51 46.8	61 64	40.2	50 51.4	63 62	38.3	49 54.2	64 59	36.5	48 35.4	67 56	34.2	48 15.3	67 55	33.6	47 55.0	68 54	33.1	46 32.4	70 51	30.9	30
1	51 43.2	57 67	42.3	51 08.3	59 65	41.0	50 14.4	61 63	39.1	49 18.7	63 60	37.2	48 01.9	65 57	34.9	47 42.3	66 56	34.4	47 22.5	66 55	33.8	46 01.7	68 52	31.6	1
2	51 03.2	56 68	43.0	50 29.3	57 66	41.7	49 36.9	59 64	39.8	48 42.7	61 61	38.0	47 27.8	64 58	35.6	47 08.6	64 57	35.1	46 49.3	65 56	34.5	45 30.4	67 53	32.3	2
3	50 22.6	54 68	43.7	49 49.7	56 67	42.4	48 58.8	58 64	40.5	48 06.0	60 62	38.7	46 53.1	62 59	36.3	46 34.4	63 58	35.7	46 15.5	63 57	35.2	44 58.5	65 54	33.0	3
4	49 41.6	52 69	44.4	49 09.6	54 68	43.1	48 20.1	56 65	41.2	47 28.8	58 63	39.3	46 17.8	60 60	37.0	45 59.6	61 59	36.4	45 41.2	62 58	35.8	44 26.1	64 55	33.6	4
35	49 00.0	51 70	45.0	48 29.0	52 68	43.7	47 41.0	54 66	41.8	46 51.1	56 64	40.0	45 42.0	59 61	37.6	45 24.3	59 60	37.0	45 06.4	60 59	36.5	43 53.1	62 56	34.2	35
6	48 18.0	49 71	45.6	47 48.0	51 69	44.3	47 01.4	53 67	42.4	46 12.9	55 64	40.6	45 05.7	57 61	38.2	44 48.4	58 61	37.6	44 31.0	58 60	37.1	43 19.6	61 57	34.8	6
7	47 35.5	48 71	46.2	47 06.5	49 70	44.9	46 21.3	51 68	43.0	45 34.2	53 65	41.2	44 28.9	56 62	38.8	44 12.1	56 61	38.2	43 55.1	57 61	37.7	42 45.6	59 57	35.4	7
8	46 52.7	46 72	46.8	46 24.5	48 71	45.5	45 40.7	50 68	43.6	44 55.1	52 66	41.8	43 51.6	54 63	39.4	43 35.3	55 62	38.8	43 18.8	55 61	38.2	42 11.1	57 58	36.0	8
9	46 09.4	45 73	47.3	45 42.2	46 71	46.0	44 59.8	48 69	44.1	44 15.5	50 67	42.3	43 13.9	53 64	39.9	42 58.0	53 63	39.4	42 42.0	54 62	38.8	41 36.2	56 59	36.5	9
40	45 25.8	43 73	47.8	44 59.5	45 72	46.5	44 18.4	47 70	44.7	43 35.6	49 67	42.8	42 35.8	51 64	40.5	42 20.4	52 63	39.9	42 04.8	52 63	39.3	41 00.8	54 60	37.0	40
1	44 41.9	42 74	48.3	44 16.4	43 72	47.0	43 36.7	45 70	45.2	42 55.2	47 68	43.3	41 57.2	50 65	41.0	41 42.3	50 64	40.4	41 27.2	51 63	39.8	40 25.0	53 60	37.5	1
2	43 57.6	40 74	48.8	43 33.0	42 73	47.5	42 54.6	44 71	45.6	42 14.5	46 68	43.8	41 18.3	48 66	41.4	41 03.8	49 65	40.9	40 49.1	49 64	40.3	39 48.8	51 61	38.0	2
3	43 13.0	39 75	49.2	42 49.3	40 73	48.0	42 12.2	42 71	46.1	41 33.4	44 69	44.3	40 39.0	47 66	41.9	40 25.0	47 65	41.3	40 10.8	48 65	40.8	39 12.2	50 62	38.5	3
4	42 28.1	37 75	49.6	42 05.3	39 74	48.4	41 29.5	41 72	46.5	40 52.0	43 70	44.7	39 59.4	45 67	42.4	39 45.8	46 66	41.8	39 32.0	46 65	41.2	38 35.3	48 62	38.9	4
45	41 43.0	36 76	50.0	41 20.9	37 74	48.8	40 46.4	39 72	46.9	40 10.2	41 70	45.1	39 19.4	44 67	42.8	39 06.2	44 66	42.2	38 52.9	45 66	41.6	37 58.0	47 63	39.4	45
6	40 57.5	35 76	50.4	40 36.4	36 75	49.2	40 03.1	38 73	47.3	39 28.2	40 71	45.5	38 39.1	42 68	43.2	38 26.4	43 67	42.6	38 13.5	43 66	42.0	37 20.3	45 63	39.8	6
7	40 11.9	33 76	50.8	39 51.5	35 75	49.5	39 19.5	36 73	47.7	38 45.9	38 71	45.9	37 58.5	41 68	43.6	37 46.2	41 67	43.0	37 33.8	42 67	42.4	36 42.4	44 64	40.2	7
8	39 26.0	32 77	51.1	39 06.4	33 76	49.9	38 35.7	35 74	48.1	38 03.3	37 71	46.3	37 17.6	39 69	44.0	37 05.8	40 68	43.4	36 53.8	40 67	42.8	36 04.1	42 64	40.5	8
9	38 39.9	31 77	51.4	38 21.1	32 76	50.2	37 51.6	34 74	48.4	37 20.4	36 72	46.7	36 36.5	38 69	44.3	36 25.0	38 68	43.7	36 13.5	39 68	43.2	35 25.5	41 65	40.9	9
50	37 53.6	29 78	51.8	37 35.6	31 76	50.5	37 07.3	32 74	48.8	36 37.4	34 72	47.0	35 55.1	36 69	44.7	35 44.1	37 69	44.1	35 32.9	37 68	43.5	34 46.7	40 65	41.3	50
1	37 07.1	28 78	52.0	36 49.9	29 77	50.8	36 22.8	31 75	49.1	35 54.0	33 73	47.3	35 13.4	35 70	45.0	35 02.8	36 69	44.4	34 52.1	36 68	43.8	34 07.6	38 66	41.6	1
2	36 20.4	27 78	52.3	36 04.0	28 77	51.1	35 38.0	30 75	49.4	35 10.5	31 73	47.6	34 31.5	34 70	45.3	34 21.4	34 69	44.7	34 11.0	35 69	44.2	33 28.2	37 66	41.9	2
3	35 33.6	26 78	52.6	35 17.9	27 77	51.4	34 53.1	28 75	49.6	34 26.8	30 73	47.9	33 49.4	32 71	45.6	33 39.7	33 70	45.0	33 29.8	33 69	44.5	32 48.7	35 66	42.2	3
4	34 46.6	24 79	52.8	34 31.6	25 77	51.7	34 08.0	27 75	49.9	33 42.8	29 74	48.2	33 07.1	31 71	45.9	32 57.8	31 70	45.3	32 48.3	32 70	44.7	32 08.8	34 67	42.5	4
55	33 59.4	23 79	53.1	33 45.2	24 78	51.9	33 22.7	26 76	50.1	32 58.7	27 74	48.4	32 24.6	29 71	46.1	32 15.7	30 70	45.6	32 06.6	30 70	45.0	31 28.8	32 67	42.8	55
6	33 12.1	22 79	53.3	32 58.7	23 78	52.1	32 37.3	25 76	50.4	32 14.4	26 74	48.7	31 41.9	28 71	46.4	31 33.4	29 71	45.8	31 24.7	29 70	45.3	30 48.6	31 67	43.0	6
7	32 24.7	21 79	53.5	32 11.9	22 78	52.3	31 51.7	23 76	50.6	31 30.0	25 74	48.9	30 59.0	27 72	46.6	30 50.9	27 71	46.1	30 42.6	28 70	45.5	30 08.2	30 68	43.3	7
8	31 37.1	20 79	53.7	31 25.1	21 78	52.5	31 05.9	22 76	50.8	30 45.4	24 75	49.1	30 16.0	25 72	46.9	30 08.3	26 71	46.3	30 00.4	26 71	45.7	29 27.6	28 68	43.5	8
9	30 49.5	18 80	53.9	30 38.2	19 78	52.7	30 20.1	21 77	51.0	30 00.7	22 75	49.3	29 32.8	24 72	47.1	29 25.5	25 72	46.5	29 18.0	25 71	46.0	28 46.8	27 68	43.8	9
60	30 01.7	17 80	54.0	29 51.1	18 79	52.9	29 34.1	20 77	51.2	29 15.8	21 75	49.5	28 49.4	23 72	47.3	28 42.5	23 72	46.7	28 35.4	24 71	46.2	28 05.8	26 68	44.0	60
1	29 13.8	16 80	54.2	29 03.9	17 79	53.0	28 48.0	18 77	51.4	28 30.8	20 75	49.7	28 06.0	22 73	47.5	27 59.4	22 72	46.9	27 52.7	22 71	46.4	27 24.7	24 69	44.2	1
2	28 25.9	15 80	54.3	28 16.7	16 79	53.2	28 01.8	17 77	51.5	27 45.7	19 75	49.8	27 22.4	20 73	47.6	27 16.2	21 72	47.1	27 09.9	21 72	46.5	26 43.5	23 69	44.3	2
3	27 37.9	14 80	54.5	27 29.3	15 79	53.3	27 15.5	16 77	51.7	27 00.5	17 76	50.0	26 38.7	19 73	47.8	26 32.9	19 72	47.3	26 27.0	20 72	46.7	26 02.1	22 69	44.5	3
4	26 49.7	13 80	54.6	26 41.9	14 79	53.5	26 29.1	15 77	51.8	26 15.2	16 76	50.1	25 54.8	18 73	48.0	25 49.4	18 73	47.4	25 43.9	19 72	46.9	25 20.6	20 69	44.7	4
65	26 01.6	12 80	54.7	25 54.4	12 79	53.6	25 42.6	14 78	51.9	25 29.7	15 76	50.3	25 10.9	17 73	48.1	25 05.9	17 73	47.5	25 00.7	17 72	47.0	24 39.0	19 70	44.8	65
6	25 13.3	10 80	54.8	25 06.8	11 79	53.7	24 56.1	13 78	52.0	24 44.3	14 76	50.4	24 26.9	15 74	48.2	24 22.2	16 73	47.7	24 17.5	16 72	47.1	23 57.3	18 70	45.0	6
7	24 25.0	09 81	54.9	24 19.1	10 80	53.8	24 09.4	11 78	52.1	23 58.7	13 76	50.5	23 42.8	14 74	48.3	23 38.5	14 73	47.8	23 34.1	15 72	47.3	23 15.5	16 70	45.1	7
8	23 36.7	08 81	54.9	23 31.4	09 80	53.9	23 22.8	10 78	52.2	23 13.1	11 76	50.6	22 58.6	13 74	48.5	22 54.7	13 73	47.9	22 50.7	14 73	47.4	22 33.6	15 70	45.2	8
9	22 48.3	07 81	55.0	22 43.7	08 80	53.9	22 36.0	09 78	52.3	22 27.4	10 76	50.7	22 14.3	12 74	48.6	22 10.8	12 73	48.0	22 07.2	12 73	47.5	21 51.6	14 70	45.3	9
70	21 59.8	06 81	55.1	21 55.9	07 80	54.0	21 49.2	08 78	52.4	21 41.6	09 76	50.8	21 30.0	10 74	48.6	21 26.8	11 73	48.1	21 23.6	11 73	47.6	21 09.5	12 70	45.4	70
1	21 11.4	05 81	55.1	21 08.1	06 80	54.1	21 02.4	07 78	52.5	20 55.8	08 76	50.8	20 45.6	09 74	48.7	20 42.8	09 73	48.2	20 39.9	10 73	47.7	20 27.4	11 70	45.5	1
2	20 22.9	04 81	55.2	20 20.2	05 80	54.1	20 15.5	06 78	52.5	20 10.0	07 76	50.9	20 01.2	08 74	48.8	19 58.8	08 74	48.3	19 56.3	09 73	47.7	19 45.2	10 70	45.6	2
3	19 34.4	03 81	55.2	19 32.4	04 80	54.1	19 28.6	05 78	52.5	19 24.1	06 76	51.0	19 16.7	07 74	48.8	19 14.7	07 74	48.3	19 12.5	07 73	47.8	19 03.0	09 70	45.7	3
4	18 45.9	02 81	55.2	18 44.5	03 80	54.2	18 41.7	03 78	52.6	18 38.2	04 77	51.0	18 32.2	06 74	48.9	18 30.5	06 74	48.4	18 28.7	06 73	47.8	18 20.7	07 71	45.7	4
75	17 57.3	01 81	55.2	17 56.6	02 80	54.2	17 54.8	02 78	52.6	17 52.3	03 77	51.0	17 47.7	04 74	48.9	17 46.3	05 74	48.4	17 44.9	05 73	47.9	17 38.3	06 71	45.8	75
6	17 08.8	00 81	55.2	17 08.6	00 80	54.2	17 07.8	01 78	52.6	17 06.3	02 77	51.0	17 03.1	03 74	49.0	17 02.1	03 74	48.4	17 01.1	04 73	47.9	16 56.0	05 71	45.8	6
7	16 20.2	01 81	55.2	16 20.7	01 80	54.2	16 20.9	00 78	52.6	16 20.4	01 77	51.1	16 18.6	02 74	49.0	16 17.9	02 74	48.5	16 17.2	03 73	47.9	16 13.6	04 71	45.9	7
8	15 31.7	02 81	55.2	15 32.8	02 80	54.2	15 33.9	01 78	52.6	15 34.4	00 77	51.1	15 34.0	01 74	49.0	15 33.7	01 74	48.5	15 33.3	01 73	48.0	15 31.2	02 71	45.9	8
9	14 43.2	03 81	55.2	14 44.9	03 80	54.2	14 47.0	02 78	52.6	14 48.4	01 77	51.1	14 49.4	00 74	49.0	14 49.5	00 74	48.5	14 49.5	00 73	48.0	14 48.8	01 71	45.9	9
80	13 54.7	04 81	55.2	13 57.0	04 80	54.1	14 00.0	03 78	52.6	14 02.5	02 77	51.0	14 04.8	02 74	49.0	14 05.2	01 74	48.5	14 05.6	01 73	48.0	14 06.3	00 71	45.9	80
1	13 06.2	05 81	55.1	13 09.1	05 80	54.1	13 13.1	04 78	52.6	13 16.5	03 77	51.0	13 20.2	03 74	49.0	13 21.0	02 74	48.5	13 21.7	02 73	47.9	13 23.9	01 71	45.9	1
2	12 17.7	06 81	55.1	12 21.3	06 80	54.1	12 26.2	05 78	52.5	12 30.6	05 76	51.0	12 35.7	04 74	48.9	12 36.8	04 74	48.4	12 37.8	03 73	47.9	12 41.5	03 71	45.9	2
3	11 29.3	07 81	55.0	11 33.5	07 80	54.0	11 39.3	06 78	52.5	11 44.7	06 76	50.9	11 51.1	05 74	48.9	11 52.6	05 74	48.4	11 54.0	05 73	47.9	11 59.1	04 71	45.8	3
4	10 40.9	08 81	55.0	10 45.7	08 80	53.9	10 52.5	07 78	52.4	10 58.8	07 76	50.9	11 06.6	06 74	48.9	11 08.4	06 74	48.4	11 10.2	06 73	47.8	11 16.7	05 71	45.8	4
85	9 52.5	09 81	54.9	9 57.9	09 80	53.9	10 05.7	08 78	52.4	10 13.0	08 76	50.8	10 22.1	07 74	48.8	10 24.3	07 74	48.3	10 26.4	07 73	47.8	10 34.4	06 71	45.8	85
6	9 04.2	10 80	54.8	9 10.2	10 79	53.8	9 18.9	09 78	52.3	9 27.2	09 76	50.8	9 37.7	08 74	48.8	9 40.2	08 73	48.3	9 42.6	08 73	47.7	9 52.0	08 70	45.7	6
7	8 15.9	11 80	54.7	8 22.6	11 79	53.7	8 32.2	10 78	52.2	8 41.4	10 76	50.7	8 53.3	10 74	48.7	8 56.1	09 73	48.2	8 58.9	09 73	47.7	9 09.7	09 70	45.7	7
8	7 27.7	12 80	54.6	7 34.9	12 79	53.6	7 45.5	12 78	52.1	7 55.7	11 76	50.6	8 08.9	11 74	48.6	8 12.1	11 73	48.1	8 15.2	10 73	47.6	8 27.5	10 70	45.6	8
9	6 39.6	13 80	54.5	6 47.4	13 79	53.5	6 58.9	13 78	52.0	7 10.1	12 76	50.5	7 24.6	12 74	48.5	7 28.1	12 73	48.0	7 31.6	12 73	47.5	7 45.3	11 70	45.5	9
90	5 51.5	14 80	54.4	5 59.9	14 79	53.4	6 12.3	14 77	51.9	6 24.5	13 76	50.4	6 40.3	13 74	48.4	6 44.2	13 73	47.9	6 48.1	13 72	47.4	7 03.2	12 70	45.4	90

Lat. 10°

H.A.	36° 00′			37° 00′			38° 30′			40° 00′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	44 00.0	1.0 01	180.0	43 00.0	1.0 01	180.0	41 30.0	1.0 01	180.0	40 00.0	1.0 01	180.0
1	43 59.4	1.0 03	178.9	42 59.4	1.0 03	178.9	41 29.5	1.0 03	179.0	39 59.5	1.0 03	179.0
2	43 57.7	1.0 05	177.8	42 57.7	1.0 05	177.8	41 27.8	1.0 04	177.9	39 57.9	1.0 04	178.0
3	43 54.8	1.0 07	176.6	42 54.9	1.0 07	176.7	41 25.2	1.0 06	176.9	39 55.4	1.0 06	177.0
4	43 50.7	1.0 09	175.5	42 51.0	1.0 08	175.6	41 21.4	1.0 08	175.8	39 51.8	1.0 08	176.0
05	43 45.5	99 11	174.4	42 46.0	99 10	174.6	41 16.6	99 10	174.8	39 47.1	99 09	175.0
6	43 39.2	99 12	173.3	42 39.8	99 12	173.5	41 10.7	99 12	173.8	39 41.5	99 11	174.0
7	43 31.7	99 14	172.2	42 32.5	99 14	172.4	41 03.7	99 13	172.7	39 34.8	99 13	173.0
8	43 23.1	98 16	171.1	42 24.2	98 16	171.3	40 55.7	98 15	171.7	39 27.2	98 14	172.1
9	43 13.4	98 18	170.0	42 14.8	98 18	170.3	40 46.7	98 17	170.7	39 18.5	98 16	171.1
10	43 02.6	97 20	168.9	42 04.3	97 19	169.2	40 36.6	97 18	169.7	39 08.9	98 18	170.1
1	42 50.7	97 22	167.8	41 52.7	97 21	168.2	40 25.5	97 20	168.7	38 58.3	97 19	169.2
2	42 37.7	96 23	166.8	41 40.1	96 23	167.2	40 13.4	96 22	167.7	38 46.7	96 21	168.2
3	42 23.7	95 25	165.7	41 26.4	96 24	166.1	40 00.4	96 23	166.7	38 34.1	96 22	167.3
4	42 08.6	95 27	164.7	41 11.8	96 26	165.1	39 46.3	95 25	165.7	38 20.6	95 24	166.3
15	41 52.5	94 29	163.7	40 56.1	94 28	164.1	39 31.2	94 27	164.8	38 06.2	95 26	165.4
6	41 35.4	93 30	162.7	40 39.4	93 29	163.1	39 15.3	94 28	163.8	37 50.9	94 27	164.5
7	41 17.3	92 32	161.7	40 21.8	93 31	162.2	38 58.3	93 30	162.9	37 34.6	93 29	163.6
8	40 58.2	92 33	160.7	40 03.2	92 33	161.2	38 40.5	92 31	162.0	37 17.5	92 30	162.7
9	40 38.2	91 35	159.7	39 43.7	91 34	160.2	38 21.7	91 33	161.0	36 59.4	92 31	161.8
20	40 17.2	90 36	158.7	39 23.3	90 36	159.3	38 02.1	90 34	160.1	36 40.6	91 33	160.9
1	39 55.3	89 38	157.8	39 01.9	89 37	158.4	37 41.6	90 36	159.2	36 20.8	90 34	160.1
2	39 32.5	88 39	156.9	38 39.7	88 38	157.5	37 20.2	89 37	158.4	36 00.3	89 36	159.2
3	39 08.9	87 41	155.9	38 16.7	87 40	156.6	36 58.0	88 38	157.5	35 38.9	88 37	158.4
4	38 44.4	86 42	155.0	37 52.8	86 41	155.7	36 35.0	87 40	156.6	35 16.8	87 38	157.6
25	38 19.0	85 44	154.2	37 28.0	85 43	154.8	36 11.2	86 41	155.8	34 53.8	86 40	156.8
6	37 52.9	84 45	153.3	37 02.5	84 44	154.0	35 46.6	85 42	155.0	34 30.1	85 41	156.0
7	37 25.9	83 46	152.4	36 36.2	83 45	153.2	35 21.2	84 44	154.2	34 05.7	84 42	155.2
8	36 58.2	82 47	151.6	36 09.1	82 46	152.3	34 55.1	83 45	153.4	33 40.5	83 43	154.4
9	36 29.8	80 49	150.8	35 41.3	81 48	151.5	34 28.3	82 46	152.6	33 14.6	82 44	153.6
30	36 00.6	79 50	150.0	35 12.8	80 49	150.7	34 00.7	80 47	151.8	32 48.0	81 45	152.9
1	35 30.7	78 51	149.2	34 43.6	79 50	150.0	33 32.5	79 48	151.1	32 20.8	80 47	152.2
2	35 00.1	77 52	148.4	34 13.7	78 51	149.2	33 03.6	78 49	150.3	31 52.8	79 48	151.4
3	34 28.8	76 53	147.7	33 43.1	76 52	148.5	32 34.0	77 50	149.6	31 24.3	78 49	150.7
4	33 56.9	75 54	147.0	33 11.9	75 53	147.7	32 03.8	76 51	148.9	30 55.1	77 50	150.0
35	33 24.4	74 55	146.2	32 40.0	74 54	147.0	31 33.0	75 52	148.2	30 25.3	76 51	149.4
6	32 51.2	72 56	145.5	32 07.6	73 55	146.3	31 01.6	74 53	147.5	29 54.9	74 52	148.7
7	32 17.5	71 57	144.8	31 34.5	72 56	145.7	30 29.5	73 54	146.9	29 23.9	73 53	148.1
8	31 43.2	70 58	144.2	31 00.9	71 57	145.0	29 57.0	71 55	146.2	28 52.3	72 54	147.4
9	31 08.3	69 59	143.5	30 26.7	70 58	144.3	29 23.8	70 56	145.6	28 20.3	71 54	146.8
40	30 32.9	68 60	142.9	29 52.0	68 59	143.7	28 50.2	69 57	145.0	27 47.6	70 55	146.2
1	29 56.9	67 61	142.2	29 16.8	67 60	143.1	28 16.0	68 58	144.3	27 14.5	69 56	145.6
2	29 20.5	65 62	141.6	28 41.1	66 60	142.5	27 41.3	67 59	143.7	26 40.8	68 57	145.0
3	28 43.6	64 62	141.0	28 04.8	65 61	141.9	27 06.1	66 59	143.2	26 06.7	66 58	144.4
4	28 06.1	63 63	140.4	27 28.1	64 62	141.3	26 30.4	64 60	142.6	25 32.1	65 58	143.9
45	27 28.3	62 64	139.9	26 50.9	63 63	140.7	25 54.3	63 61	142.0	24 57.0	64 59	143.3
6	26 50.0	61 65	139.3	26 13.3	61 63	140.2	25 17.7	62 62	141.5	24 21.5	63 60	142.8
7	26 11.2	60 65	138.7	25 35.3	60 64	139.6	24 40.7	61 62	141.0	23 45.5	62 61	142.3
8	25 32.0	58 66	138.2	24 56.8	59 65	139.1	24 03.3	60 63	140.4	23 09.1	61 61	141.7
9	24 52.5	57 67	137.7	24 17.9	58 65	138.6	23 25.5	59 64	139.9	22 32.4	59 62	141.2
50	24 12.5	56 67	137.2	23 38.6	57 66	138.1	22 47.2	57 64	139.4	21 55.2	58 63	140.8
1	23 32.2	55 68	136.7	22 59.0	56 67	137.6	22 08.6	56 65	139.0	21 17.6	57 63	140.3
2	22 51.5	54 68	136.2	22 19.0	54 67	137.1	21 29.6	55 66	138.5	20 39.7	56 64	139.8
3	22 10.4	53 69	135.8	21 38.6	53 68	136.7	20 50.3	54 66	138.0	20 01.4	55 64	139.4
4	21 29.0	52 70	135.3	20 57.9	52 68	136.2	20 10.6	53 67	137.6	19 22.7	54 65	138.9
55	20 47.3	51 70	134.9	20 16.8	51 69	135.8	19 30.6	52 67	137.1	18 43.7	52 66	138.5
6	20 05.3	49 71	134.4	19 35.5	50 69	135.3	18 50.2	51 68	136.7	18 04.4	51 66	138.1
7	19 22.9	48 71	134.0	18 53.8	49 70	134.9	18 09.6	49 68	136.3	17 24.8	50 67	137.7
8	18 40.3	47 72	133.6	18 11.8	48 70	134.5	17 28.6	48 69	135.9	16 44.9	49 67	137.3
9	17 57.3	46 72	133.2	17 29.5	47 71	134.1	16 47.4	47 69	135.5	16 04.6	48 68	136.9
60	17 14.1	45 72	132.8	16 47.0	45 71	133.7	16 05.8	46 70	135.1	15 24.1	47 68	136.5
1	16 30.6	44 73	132.4	16 04.2	44 72	133.4	15 24.0	45 70	134.8	14 43.3	45 68	136.2
2	15 46.9	43 73	132.1	15 21.1	43 72	133.0	14 41.9	44 71	134.4	14 02.2	44 69	135.8
3	15 02.9	42 74	131.7	14 37.7	42 73	132.7	13 59.6	43 71	134.1	13 20.9	43 69	135.5
4	14 18.7	41 74	131.4	13 54.2	41 73	132.3	13 17.0	42 71	133.7	12 39.3	42 70	135.1
65	13 34.2	40 74	131.0	13 10.4	40 73	132.0	12 34.2	40 72	133.4	11 57.5	41 70	134.8
6	12 49.6	39 75	130.7	12 26.3	39 74	131.7	11 51.1	39 72	133.1	11 15.5	40 70	134.5
7	12 04.7	37 75	130.4	11 42.1	38 74	131.3	11 07.8	38 72	132.8	10 33.2	39 71	134.2
8	11 19.6	36 76	130.1	10 57.6	37 74	131.0	10 24.3	37 73	132.5	9 59.7	38 71	133.9
9	10 34.3	35 76	129.8	10 12.9	36 75	130.7	9 40.6	36 73	132.2	9 08.0	36 72	133.6
70	9 48.8	34 76	129.5	9 28.1	35 75	130.5	8 56.8	35 73	131.9	8 25.1	35 72	133.3
1	9 03.1	33 76	129.2	8 43.0	34 75	130.2	8 12.7	34 74	131.6	7 42.0	34 72	133.0
2	8 17.2	32 77	129.0	7 57.8	32 76	129.9	7 28.4	33 74	131.4	6 58.7	33 72	132.8
3	7 31.2	31 77	128.7	7 12.4	31 76	129.7	6 44.0	32 74	131.1	6 15.3	32 73	132.5
4	6 45.0	30 77	128.5	6 26.8	30 76	129.4	5 59.3	31 75	130.9	5 31.7	31 73	132.3
75	5 58.7	29 78	128.2	5 41.1	29 76	129.2	5 14.6	30 75	130.6			
6	5 12.2	28 78	128.0									

H.A.	42° 00′			42° 30′			43° 00′			45° 00′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	38 00.0	1.0 01	180.0	37 30.0	1.0 01	180.0	37 00.0	1.0 01	180.0	35 00.0	1.0 01	180.0
1	37 59.5	1.0 02	179.1	37 29.5	1.0 02	179.1	36 59.5	1.0 02	179.1	34 59.6	1.0 02	179.1
2	37 58.1	1.0 04	178.1	37 28.1	1.0 04	178.1	36 58.1	1.0 04	178.2	34 58.2	1.0 04	178.3
3	37 55.6	1.0 06	177.2	37 25.7	1.0 06	177.2	36 55.8	1.0 06	177.3	34 56.0	1.0 05	177.4
4	37 52.2	1.0 07	176.2	37 22.3	1.0 07	176.3	36 52.5	1.0 07	176.3	34 52.9	1.0 07	176.6
05	37 47.9	99 09	175.3	37 18.0	99 09	175.4	36 48.2	99 09	175.4	34 48.9	99 08	175.7
6	37 42.5	99 10	174.4	37 12.8	99 10	174.4	36 43.0	99 10	174.5	34 44.0	99 10	174.8
7	37 36.3	99 12	173.4	37 06.6	99 12	173.5	36 36.9	99 12	173.6	34 38.3	99 11	174.0
8	37 29.0	98 14	172.5	36 59.5	99 13	172.6	36 29.9	99 13	172.7	34 31.6	99 12	173.1
9	37 20.9	98 15	171.6	36 51.4	98 15	171.7	36 22.0	98 15	171.8	34 24.1	98 14	172.3
10	37 11.8	98 17	170.7	36 42.5	98 16	170.8	36 13.1	98 16	170.9	34 15.8	98 15	171.5
1	37 01.7	97 18	169.8	36 32.6	97 18	169.9	36 03.4	97 18	170.1	34 06.6	97 17	170.6
2	36 50.8	97 20	168.9	36 21.8	97 20	169.0	35 52.7	97 19	169.2	33 56.5	97 18	169.8
3	36 38.9	96 21	168.0	36 10.1	96 21	168.1	35 41.2	96 21	168.3	33 45.7	96 20	169.0
4	36 26.2	96 23	167.1	35 57.5	96 22	167.3	35 28.8	96 22	167.5	33 33.9	96 21	168.2
15	36 12.5	95 24	166.2	35 44.0	95 24	166.4	35 15.5	95 24	166.6	33 21.4	95 22	167.3
6	35 58.0	94 26	165.3	35 29.7	94 25	165.5	35 01.4	94 25	165.7	33 08.0	95 24	166.5
7	35 42.6	94 27	164.5	35 14.5	94 27	164.7	34 46.5	94 26	164.9	32 53.9	94 25	165.7
8	35 26.4	93 28	163.6	34 58.5	93 28	163.9	34 30.7	93 28	164.1	32 39.0	93 26	165.0
9	35 09.3	92 30	162.8	34 41.7	92 29	163.0	34 14.0	92 29	163.3	32 23.2	93 28	164.2
20	34 51.4	91 31	162.0	34 24.0	91 31	162.2	33 56.6	91 30	162.5	32 06.7	92 29	163.4
1	34 32.7	90 32	161.1	34 05.6	90 32	161.4	33 38.4	91 32	161.6	31 49.5	91 30	162.6
2	34 13.2	89 34	160.3	33 46.3	90 33	160.6	33 19.4	90 33	160.9	31 31.5	90 31	161.9
3	33 52.9	89 35	159.5	33 26.3	89 35	159.8	32 59.7	89 34	160.1	31 12.8	89 32	161.2
4	33 31.9	88 36	158.7	33 05.5	88 36	159.0	32 39.2	88 35	159.3	30 53.3	88 34	160.4
25	33 10.1	87 38	158.0	32 44.0	87 37	158.3	32 17.9	87 37	158.6	30 33.2	88 35	159.7
6	32 47.5	86 39	157.2	32 21.8	86 38	157.5	31 56.0	86 38	157.8	30 12.3	87 36	159.0
7	32 24.3	85 40	156.4	31 58.8	85 39	156.8	31 33.3	85 39	157.1	29 50.8	86 37	158.3
8	32 00.3	84 41	155.7	31 35.1	84 41	156.0	31 09.9	84 40	156.3	29 28.6	85 38	157.6
9	31 35.7	83 42	155.0	31 10.8	83 42	155.3	30 45.9	83 41	155.6	29 05.7	84 39	156.9
30	31 10.3	82 43	154.3	30 45.8	82 43	154.6	30 21.2	82 42	154.9	28 42.2	83 40	156.2
1	30 44.3	81 44	153.6	30 20.1	81 44	153.9	29 55.8	81 43	154.2	28 18.1	82 41	155.6
2	30 17.7	80 45	152.9	29 53.8	80 45	153.2	29 29.8	80 44	153.6	27 53.3	81 42	154.9
3	29 50.4	79 46	152.2	29 26.8	79 46	152.5	29 03.2	79 45	152.9	27 28.0	80 43	154.3
4	29 22.6	78 47	151.5	28 59.3	78 47	151.9	28 36.0	78 46	152.2	27 02.1	79 44	153.6
35	28 54.1	76 48	150.9	28 31.1	77 48	151.2	28 08.1	77 47	151.6	26 35.5	78 45	153.0
6	28 25.0	75 49	150.2	28 02.4	75 49	150.6	27 39.7	76 48	151.0	26 08.5	76 46	152.4
7	27 55.4	74 50	149.6	27 33.1	74 50	150.0	27 10.8	75 49	150.3	25 40.8	75 47	151.8
8	27 25.2	73 51	149.0	27 03.3	73 51	149.4	26 41.3	73 50	149.7	25 12.7	74 48	151.2
9	26 54.5	72 52	148.4	26 32.9	72 52	148.8	26 11.2	72 51	149.1	24 44.0	73 49	150.7
40	26 23.3	71 53	147.8	26 02.0	71 52	148.2	25 40.7	71 52	148.6	24 14.8	72 50	150.1
1	25 51.5	70 54	147.2	25 30.6	70 53	147.6	25 09.6	70 53	148.0	23 45.1	71 50	149.5
2	25 19.2	68 55	146.6	24 58.7	69 54	147.0	24 38.0	69 53	147.4	23 14.9	70 51	149.0
3	24 46.5	67 55	146.1	24 26.3	68 55	146.5	24 06.0	68 54	146.9	22 44.2	69 52	148.5
4	24 13.3	66 56	145.5	23 53.4	66 56	145.9	23 33.5	67 55	146.3	22 13.1	67 53	148.0
45	23 39.6	65 57	145.0	23 20.1	65 56	145.4	23 00.5	65 56	145.8	21 41.5	66 53	147.4
6	23 05.5	64 58	144.5	22 46.3	64 57	144.9	22 27.1	64 56	145.3	21 09.5	65 54	146.9
7	22 30.9	63 58	144.0	22 12.1	63 58	144.4	21 53.2	63 57	144.8	20 37.1	64 55	146.5
8	21 55.9	61 59	143.5	21 37.5	62 58	143.9	21 18.9	62 58	144.3	20 04.2	63 55	146.0
9	21 20.6	60 60	143.0	21 02.5	60 59	143.4	20 44.3	61 58	143.8	19 31.0	61 56	145.5
50	20 44.8	59 60	142.5	20 27.0	59 60	142.9	20 09.2	60 59	143.4	18 57.3	60 57	145.1
1	20 08.6	58 61	142.0	19 51.2	58 60	142.5	19 33.8	58 60	142.9	18 23.3	59 57	144.6
2	19 32.1	57 62	141.6	19 15.0	57 61	142.0	18 57.9	57 60	142.5	17 48.9	58 58	144.2
3	18 55.2	56 62	141.1	18 38.5	56 61	141.6	18 21.7	56 61	142.0	17 14.1	57 59	143.8
4	18 18.0	54 63	140.7	18 01.6	55 62	141.2	17 45.2	55 61	141.6	16 39.0	56 59	143.3
55	17 40.4	53 63	140.3	17 24.4	53 63	140.7	17 08.3	54 62	141.2	16 03.6	54 60	142.9
6	17 02.5	52 64	139.9	16 46.8	52 63	140.3	16 31.1	52 63	140.8	15 27.8	53 60	142.5
7	16 24.2	51 64	139.5	16 08.9	51 64	139.9	15 53.6	51 63	140.4	14 51.7	52 61	142.2
8	15 45.7	50 65	139.1	15 30.7	50 64	139.5	15 15.8	50 64	140.0	14 15.3	51 61	141.8
9	15 06.8	49 65	138.7	14 52.3	49 65	139.2	14 37.6	49 64	139.6	13 38.6	50 62	141.4
60	14 27.7	47 66	138.3	14 13.5	48 65	138.8	13 59.2	48 64	139.3	13 01.6	48 62	141.1
1	13 48.3	46 66	138.0	13 34.4	46 66	138.4	13 20.5	47 65	138.9	12 24.3	47 63	140.7
2	13 08.6	45 67	137.6	12 55.1	45 66	138.1	12 41.5	45 65	138.6	11 46.7	46 63	140.4
3	12 28.7	44 67	137.3	12 15.5	44 66	137.8	12 02.3	44 66	138.2	11 08.9	45 63	140.0
4	11 48.5	43 67	137.0	11 35.6	43 67	137.4	11 22.8	43 66	137.9	10 30.8	44 64	139.7
65	11 08.0	42 68	136.7	10 55.5	42 67	137.1	10 43.0	42 67	137.6	9 52.5	42 64	139.4
6	10 27.4	40 68	136.3	10 15.2	41 68	136.8	10 03.0	41 67	137.3	9 14.0	41 65	139.1
7	9 46.4	39 69	136.0	9 34.7	39 68	136.5	9 22.8	39 67	137.0	8 35.2	40 65	138.8
8	9 05.3	38 69	135.8	8 53.9	38 68	136.2	8 42.4	38 68	136.7	7 56.2	39 65	138.6
9	8 24.0	37 69	135.5	8 12.9	37 69	135.9	8 01.8	37 68	136.4	7 17.0	38 66	138.3
70	7 42.5	36 70	135.2	7 31.7	36 69	135.7	7 20.9	36 68	136.1	6 37.5	36 66	138.0
1	7 00.7	35 70	134.9	6 50.3	35 69	135.4	6 39.9	35 69	135.9	5 57.9	35 66	137.8
2	6 18.8	33 70	134.7	6 08.7	34 70	135.2	5 58.7	34 69	135.6	5 18.1	34 67	137.5
3	5 36.7	32 70	134.4	5 27.0	32 70	134.9	5 17.2	32 69	135.4			
4												
75												
6												

DECLINATION SAME NAME AS LATITUDE

H.A.	36° 00′			37° 00′			38° 30′			40° 00′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
91	5 03.5	15 80	54.3	5 12.5	15 79	53.3	5 25.9	15 77	51.8	5 39.0	14 76	50.3
2												

H.A.	42° 00′			42° 30′			43° 00′			45° 00′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
91	5 56.2	14 73	48.3	6 00.4	14 73	47.8	6 04.6	14 72	47.3	6 21.1	14 70	45.3
2	5 12.1	15 73	48.2	5 16.6	15 73	47.7	5 21.2	15 72	47.2	5 39.1	15 70	45.2

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	54 00.0	1.0 01	00.0	53 00.0	1.0 01	00.0	51 30.0	1.0 01	00.0	50 30.0	1.0 01	00.0	49 30.0	1.0 01	00.0	48 30.0	1.0 01	00.0	47 30.0	1.0 01	00.0	46 00.0	1.0 01	00.0	00
1	53 59.4	1.0 03	01.2	52 59.4	1.0 03	01.1	51 29.5	1.0 03	01.1	50 29.5	1.0 03	01.0	49 29.5	1.0 03	01.0	48 29.5	1.0 02	00.9	47 29.5	1.0 02	00.9	45 59.6	1.0 02	00.8	1
2	53 57.6	1.0 05	02.4	52 57.7	1.0 05	02.3	51 27.8	1.0 05	02.1	50 27.9	1.0 04	02.0	49 28.0	1.0 04	02.0	48 28.1	1.0 04	01.9	47 28.1	1.0 04	01.8	45 58.3	1.0 04	01.7	2
3	53 54.5	1.0 07	03.5	52 54.7	1.0 07	03.4	51 25.1	1.0 06	03.2	50 25.3	1.0 06	03.1	49 25.5	1.0 06	02.9	48 25.6	1.0 06	02.8	47 25.8	1.0 05	02.7	45 56.1	1.0 06	02.5	3
4	53 50.3	99 09	04.7	52 50.7	99 09	04.5	51 21.2	99 08	04.2	50 21.6	99 08	04.1	49 21.9	99 08	03.9	48 22.3	99 07	03.7	47 22.6	99 07	03.6	45 53.0	1.0 07	03.4	4
05	53 44.8	99 11	05.9	52 45.4	99 11	05.6	51 16.3	99 10	05.3	50 16.9	99 10	05.1	49 17.4	99 09	04.9	48 17.9	99 09	04.7	47 18.4	99 08	04.5	45 49.1	99 08	04.2	05
6	53 38.2	98 13	07.0	52 39.1	99 12	06.7	51 10.3	99 12	06.3	50 11.1	99 11	06.1	49 11.9	99 11	05.8	48 12.6	99 10	05.6	47 13.3	99 10	05.4	45 44.3	99 09	05.1	6
7	53 30.4	98 15	08.2	52 31.6	98 14	07.9	51 03.3	98 14	07.4	50 04.4	98 13	07.1	49 05.4	98 12	06.8	48 06.4	98 12	06.5	47 07.3	98 11	06.3	45 38.7	99 11	05.9	7
8	53 21.4	97 17	09.3	52 22.9	97 16	08.9	50 55.2	98 15	08.4	49 56.6	98 15	08.1	48 57.9	98 14	07.7	47 59.2	98 14	07.4	47 00.4	98 13	07.1	45 32.2	98 12	06.7	8
9	53 11.2	97 19	10.4	52 13.2	97 18	10.0	50 46.0	97 17	09.4	49 47.8	97 16	09.1	48 49.5	97 16	08.7	47 51.1	97 15	08.3	46 52.7	97 14	08.0	45 24.9	98 14	07.5	9
10	52 59.9	96 21	11.6	52 02.4	96 20	11.1	50 35.8	96 19	10.4	49 38.0	96 18	10.0	48 40.0	97 17	09.6	47 42.1	97 17	09.2	46 44.0	97 16	08.9	45 16.8	97 15	08.3	10
1	52 47.5	95 22	12.7	51 50.4	96 22	12.2	50 24.6	96 20	11.4	49 27.2	96 20	11.0	48 29.7	96 19	10.6	47 32.1	96 18	10.1	46 34.4	96 17	09.7	45 07.8	96 16	09.1	1
2	52 34.0	94 24	13.7	51 37.5	94 23	13.2	50 12.3	95 22	12.4	49 15.4	95 21	11.9	48 18.4	95 20	11.5	47 21.3	95 20	11.0	46 24.0	95 19	10.6	44 58.0	96 18	09.9	2
3	52 19.5	93 26	14.8	51 23.5	93 25	14.2	49 59.1	94 24	13.4	49 02.7	94 23	12.9	48 06.2	94 22	12.4	47 09.5	95 21	11.9	46 12.8	95 20	11.4	44 47.4	95 19	10.7	3
4	52 03.8	92 28	15.9	51 08.4	93 27	15.2	49 45.0	93 25	14.4	48 49.1	93 24	13.8	47 53.1	93 23	13.3	46 56.9	94 22	12.7	46 00.6	94 22	12.2	44 36.0	94 20	11.5	4
15	51 47.2	91 29	16.9	50 52.4	91 28	16.2	49 29.8	92 27	15.3	48 34.5	92 26	14.7	47 39.1	93 25	14.1	46 43.5	93 24	13.6	45 47.7	93 23	13.1	44 23.8	93 22	12.3	15
6	51 29.5	90 31	17.9	50 35.4	90 30	17.2	49 13.8	91 28	16.2	48 19.1	91 27	15.6	47 24.2	92 26	15.0	46 29.2	92 25	14.4	45 33.9	92 24	13.9	44 10.8	93 23	13.1	6
7	51 10.8	89 33	18.9	50 17.4	89 32	18.2	48 56.8	90 30	17.2	48 02.7	90 29	16.5	47 08.5	91 28	15.9	46 14.0	91 27	15.3	45 19.4	91 26	14.7	43 57.1	92 24	13.8	7
8	50 51.2	88 34	19.9	49 58.5	88 33	19.1	48 38.9	89 31	18.1	47 45.5	89 30	17.4	46 51.9	90 29	16.7	45 58.1	90 28	16.1	45 04.0	90 27	15.4	43 42.6	91 26	14.6	8
9	50 30.7	86 36	20.8	49 38.7	87 34	20.1	48 20.2	88 33	18.9	47 27.5	88 31	18.2	46 34.5	88 30	17.5	45 41.3	89 29	16.9	44 47.9	89 28	16.2	43 27.4	90 27	15.3	9
20	50 09.2	85 37	21.8	49 18.0	86 36	21.0	48 00.6	86 34	19.8	47 08.6	87 33	19.1	46 16.3	87 32	18.3	45 23.8	88 30	17.7	44 31.0	88 29	17.0	43 11.5	89 28	16.0	20
1	49 46.8	84 39	22.7	48 56.4	84 37	21.8	47 40.1	85 35	20.6	46 48.9	86 34	19.9	45 57.3	86 33	19.1	45 05.5	87 32	18.4	44 13.4	87 31	17.7	42 54.8	88 29	16.7	1
2	49 23.6	82 40	23.6	48 34.0	83 39	22.7	47 18.9	84 37	21.5	46 28.4	84 35	20.7	45 37.6	85 34	19.9	44 46.5	85 33	19.2	43 55.1	86 32	18.5	42 37.5	87 30	17.4	2
3	48 59.6	81 41	24.4	48 10.8	82 40	23.6	46 56.9	83 38	22.3	46 07.1	83 37	21.5	45 17.1	84 35	20.7	44 26.7	84 34	19.9	43 36.0	85 33	19.2	42 19.4	85 31	18.1	3
4	48 34.8	80 43	25.3	47 46.8	80 41	24.4	46 34.1	81 39	23.1	45 45.1	82 38	22.2	44 55.8	82 37	21.4	44 06.2	83 35	20.6	43 16.2	84 34	19.9	42 00.8	84 32	18.8	4
25	48 09.1	78 44	26.1	47 22.0	79 43	25.2	46 10.6	80 40	23.9	45 22.4	81 39	23.0	44 33.9	81 38	22.2	43 45.0	82 36	21.4	42 55.8	82 35	20.6	41 41.4	83 33	19.4	25
6	47 42.8	77 45	26.9	46 56.5	77 44	26.0	45 46.3	79 42	24.6	44 59.0	79 40	23.7	44 11.3	80 39	22.9	43 23.2	80 38	22.1	42 34.7	81 36	21.2	41 21.5	82 34	20.1	6
7	47 15.7	75 46	27.7	46 30.3	76 45	26.7	45 21.3	77 43	25.3	44 34.8	78 41	24.5	43 47.9	79 40	23.6	43 00.6	79 39	22.7	42 13.0	80 37	21.9	41 00.9	81 35	20.7	7
8	46 47.9	74 47	28.4	46 03.4	75 46	27.5	44 55.7	76 44	26.1	44 10.1	76 42	25.2	43 24.0	77 41	24.3	42 37.5	78 40	23.4	41 50.6	78 38	22.6	40 39.7	79 36	21.3	8
9	46 19.4	72 49	29.2	45 35.8	73 47	28.2	44 29.4	74 45	26.8	43 44.6	75 43	25.8	42 59.4	76 42	24.9	42 13.7	76 41	24.1	41 27.7	77 39	23.2	40 17.9	78 37	21.9	9
30	45 50.2	71 50	29.9	45 07.5	72 48	28.9	44 02.5	73 46	27.4	43 18.6	74 44	26.5	42 34.2	74 43	25.6	41 49.3	75 42	24.7	41 04.1	76 40	23.8	39 55.5	77 38	22.5	30
1	45 20.5	69 51	30.6	44 38.7	70 49	29.6	43 35.0	71 47	28.1	42 51.9	72 45	27.2	42 08.3	73 44	26.2	41 24.4	74 43	25.3	40 40.0	74 41	24.4	39 32.6	75 39	23.1	1
2	44 50.1	68 52	31.3	44 09.2	69 50	30.2	43 06.8	70 48	28.8	42 24.6	71 46	27.8	41 42.0	72 45	26.8	40 58.8	72 43	25.9	40 15.3	73 42	25.0	39 09.1	74 40	23.7	2
3	44 19.1	66 53	31.9	43 39.1	67 51	30.9	42 38.1	68 49	29.4	41 56.8	69 47	28.4	41 15.0	70 46	27.4	40 32.7	71 44	26.5	39 50.0	72 43	25.6	38 45.1	73 41	24.2	3
4	43 47.6	65 53	32.6	43 08.5	66 52	31.5	42 08.9	67 50	30.0	41 28.4	68 48	29.0	40 47.5	69 47	28.0	40 06.1	69 45	27.1	39 24.2	70 44	26.1	38 20.6	71 42	24.8	4
35	43 15.5	63 54	33.2	42 37.4	64 53	32.1	41 39.1	65 51	30.6	40 59.5	66 49	29.6	40 19.5	67 48	28.6	39 39.0	68 46	27.6	38 57.9	69 45	26.7	37 55.6	70 42	25.3	35
6	42 43.0	62 55	33.8	42 05.7	63 54	32.7	41 08.8	64 51	31.1	40 30.1	65 50	30.1	39 51.0	66 48	29.1	39 11.3	67 47	28.2	38 31.2	67 45	27.2	37 30.1	68 43	25.8	6
7	42 09.9	60 56	34.3	41 33.5	61 54	33.3	40 38.0	62 52	31.7	40 00.2	63 51	30.7	39 21.9	64 49	29.7	38 43.2	65 48	28.7	38 03.9	66 46	27.7	37 04.2	67 44	26.3	7
8	41 36.3	59 57	34.9	41 00.9	60 55	33.8	40 06.7	61 53	32.2	39 29.8	62 51	31.2	38 52.5	63 50	30.2	38 14.6	64 48	29.2	37 36.2	64 47	28.2	36 37.7	66 45	26.8	8
9	41 02.3	57 57	35.4	40 27.8	58 56	34.3	39 34.9	59 54	32.8	38 59.0	60 52	31.7	38 22.5	61 51	30.7	37 45.5	62 49	29.7	37 08.0	63 48	28.7	36 10.9	64 46	27.3	9
40	40 27.8	55 58	35.9	39 54.2	56 57	34.9	39 02.7	58 54	33.3	38 27.7	59 53	32.2	37 52.1	60 51	31.2	37 16.0	61 50	30.2	36 39.4	61 48	29.2	35 43.6	63 46	27.7	40
1	39 52.9	54 59	36.4	39 20.3	55 57	35.3	38 30.1	56 55	33.7	37 56.0	57 54	32.7	37 21.3	58 52	31.7	36 46.1	59 51	30.7	36 10.4	60 49	29.7	35 15.9	61 47	28.2	1
2	39 17.6	52 59	36.9	38 45.9	53 58	35.8	37 57.1	55 56	34.2	37 23.9	56 54	33.2	36 50.1	57 53	32.1	36 15.8	58 51	31.1	35 40.9	58 50	30.1	34 47.8	60 48	28.6	2
3	38 42.0	51 60	37.4	38 11.1	52 59	36.3	37 23.7	53 56	34.7	36 51.3	54 55	33.6	36 18.5	55 53	32.6	35 45.0	56 52	31.5	35 11.1	57 50	30.5	34 19.3	58 48	29.0	3
4	38 05.9	49 61	37.8	37 36.0	50 59	36.7	36 49.9	52 57	35.1	36 18.5	53 55	34.0	35 46.5	54 54	33.0	35 13.9	55 52	32.0	34 40.9	55 51	30.9	33 50.4	57 49	29.4	4
45	37 29.5	48 61	38.2	37 00.4	49 60	37.1	36 15.7	50 58	35.5	35 45.2	51 56	34.5	35 14.1	52 54	33.4	34 42.5	53 53	32.4	34 10.3	54 52	31.4	33 21.2	55 49	29.8	45
6	36 52.8	46 62	38.7	36 24.6	47 60	37.6	35 41.2	49 58	35.9	35 11.6	50 57	34.9	34 41.4	51 55	33.8	34 10.7	52 54	32.8	33 39.4	53 52	31.7	32 51.6	54 50	30.2	6
7	36 15.7	45 62	39.1	35 48.4	46 61	38.0	35 06.4	47 59	36.3	34 37.6	48 57	35.3	34 08.4	49 56	34.2	33 38.5	50 54	33.2	33 08.2	51 53	32.1	32 21.7	52 50	30.6	7
8	35 38.3	43 63	39.4	35 11.9	44 61	38.3	34 31.2	46 59	36.7	34 03.4	47 58	35.6	33 35.0	48 56	34.6	33 06.0	49 55	33.5	32 36.6	50 53	32.5	31 51.5	51 51	30.9	8
9	35 00.6	42 63	39.8	34 35.1	43 62	38.7	33 55.8	44 60	37.1	33 28.8	45 58	36.0	33 01.3	46 57	34.9	32 33.3	47 55	33.9	32 04.7	48 54	32.8	31 20.9	49 51	31.3	9
50	34 22.7	41 64	40.1	33 58.0	42 62	39.0	33 20.0	43 60	37.4	32 53.9	44 59	36.3	32 27.3	45 57	35.3	32 00.2	46 56	34.2	31 32.5	47 54	33.2	30 50.1	48 52	31.6	50
1	33 44.4	39 64	40.5	33 20.7	40 63	39.4	32 44.0	42 61	37.7	32 18.8	42 59	36.7	31 53.1	43 58	35.6	31 26.8	44 56	34.5	31 00.0	45 55	33.5	30 19.0	46 52	31.9	1
2	33 05.9	38 65	40.8	32 43.1	39 63	39.7	32 07.7	40 61	38.1	31 43.4	41 59	37.0	31 18.5	42 58	35.9	30 53.2	43 56	34.9	30 27.3	44 55	33.8	29 47.6	45 53	32.3	2
3	32 27.2	36 65	41.1	32 05.2	37 64	40.0	31 31.1	39 61	38.4	31 07.7	39 60	37.3	30 43.7	40 58	36.2	30 19.3	41 57	35.2	29 54.3	42 55	34.1	29 15.9	43 53	32.6	3
4	31 48.3	35 65	41.4	31 27.1	36 64	40.3	30 54.3	37 62	38.7	30 31.8	38 60	37.6	30 08.7	39 59	36.5	29 45.1	40 57	35.5	29 21.0	41 56	34.4	28 44.0	42 54	32.8	4
55	31 09.1	33 66	41.7	30 48.8	34 64	40.6	30 17.3	36 62	38.9	29 55.6	37 61	37.9	29 33.4	37 59	36.8	29 10.7	38 58	35.7	28 47.5	39 56	34.7	28 11.8	40 54	33.1	55
6	30 29.7	32 66	41.9	30 10.2	33 65	40.8	29 40.0	34 62	39.2	29 19.2	35 61	38.1	28 57.9	36 60	37.1	28 36.1	37 58	36.0	28 13.8	38 57	34.9	27 39.4	39 54	33.4	6
7	29 50.1	31 66	42.2	29 31.5	31 65	41.1	29 02.6	33 63	39.5	28 42.6	34 61	38.4	28 22.2	34 60	37.3	28 01.3	35 58	36.3	27 39.8	36 57	35.2	27 06.8	37 55	33.6	7
8	29 10.3	29 67	42.4	28 52.5	30 65	41.3	28 24.9	31 63	39.7	28 05.8	32 62	38.6	27 46.3	33 60	37.6	27 26.2	34 59	36.5	27 05.7	35 57	35.4	26 34.0	36 55	33.9	8
9	28 30.4	28 67	42.7	28 13.4	29 66	41.6	27 47.1	30 63	39.9	27 28.8	31 62	38.9	27 10.1	32 60	37.8	26 51.0	32 59	36.7	26 31.3	33 58	35.7	26 00.9	34 55	34.1	9
60	27 50.2	26 67	42.9	27 34.1	27 66	41.8	27 09.0	29 64	40.2	26 51.7	29 62	39.1	26 33.8	30 61	38.0	26 15.5	31 59	37.0	25 56.7	32 58	35.9	25 27.7	33 56	34.3	60
1	27 10.0	25 67	43.1	26 54.7	26 66	42.0	26 30.8	27 64	40.4	26 14.3	28 62	39.3	25 57.4	29 61	38.2	25 39.9	29 60	37.2	25 22.0	30 58	36.1	24 54.3	31 56	34.5	1
2	26 29.5	24 68	43.3	26 15.1	24 66	42.2	25 52.5	26 64	40.6	25 36.8	26 63	39.5	25 20.7	27 61	38.4	25 04.1	28 60	37.4	24 47.1	29 58	36.3	24 20.7	30 56	34.7	2
3	25 49.0	22 68	43.4	25 35.4	23 66	42.4	25 14.0	24 64	40.7	24 59.2	25 63	39.7	24 43.9	26 62	38.6	24 28.2	27 60	37.5	24 12.1	27 59	36.5	23 47.0	28 56	34.9	3
4	25 08.3	21 68	43.6	24 55.5	22 67	42.5	24 35.4	23 65	40.9	24 21.4	24 63	39.8	24 07.0	24 62	38.8	23 52.1	25 60	37.7	23 36.8	26 59	36.7	23 13.1	27 57	35.1	4
65	24 27.5	20 68	43.8	24 15.5	20 67	42.7	23 56.6	22 65	41.1	23 43.5	22 63	40.0	23 29.9	23 62	38.9	23 15.9	24 61	37.9	23 01.5	24 59	36.8	22 39.1	25 57	35.3	65
6	23 46.6	18 68	43.9	23 35.4	19 67	42.8	23 17.7	20 65	41.2	23 05.4	21 64	40.2	22 52.7	22 62	39.1	22 39.6	22 61	38.0	22 26.0	23 59	37.0	22 04.9	24 57	35.4	6
7	23 05.5	17 69	44.0	22 55.1	18 67	43.0	22 38.7	19 65	41.4	22 27.3	19 64	40.3	22 15.4	20 62	39.2	22 03.1	21 61	38.2	21 50.4	22 60	37.1	21 30.6	22 57	35.6	7
8	22 24.4	16 69	44.2	22 14.8	16 67	43.1	21 59.6	17 65	41.5	21 49.0	18 64	40.4	21 37.9	19 63	39.4	21 26.5	19 61	38.3	21 14.7	20 60	37.3	20 56.2	21 58	35.7	8
9	21 43.2	14 69	44.3	21 34.4	15 68	43.2	21 20.4	16 66	41.6	21 10.6	17 64	40.6	21 00.4	17 63	39.5	20 49.8	18 61	38.4	20 38.8	19 60	37.4	20 21.6	20 58	35.8	9
70	21 01.9	13 69	44.4	20 53.9	14 68	43.3	20 41.1	15 66	41.7	20 32.1	15 64	40.7	20 22.8	16 63	39.6	20 13.0	17 61	38.6	20 02.9	17 60	37.5	19 47.0	18 58	35.9	70
1	20 20.6	12 69	44.5	20 13.3	12 68	43.4	20 01.8	13 66	41.8	19 53.6	14 64	40.8	19 45.1	15 63	39.7	19 36.1	15 62	38.7	19 26.9	16 60	37.6	19 12.3	17 58	36.1	1
2	19 39.1	10 69	44.5	19 32.7	11 68	43.5	19 22.3	12 66	41.9	19 15.0	13 64	40.9	19 07.3	13 63	39.8	18 59.2	14 62	38.8	18 50.8	14 60	37.7	18 37.5	15 58	36.2	2
3	18 57.7	09 69	44.6	18 52.0	10 68	43.6	18 42.8	11 66	42.0	18 36.3	11 65	40.9	18 29.4	12 63	39.9	18 22.2	12 62	38.8	18 14.6	13 60	37.8	18 02.6	14 58	36.2	3
4	18 16.1	08 69	44.7	18 11.2	08 68	43.6	18 03.3	09 66	42.1	17 57.5	10 65	41.0	17 51.5	10 63	40.0	17 45.1	11 62	38.9	17 38.3	12 61	37.9	17 27.6	12 58	36.3	4
75	17 34.6	07 69	44.7	17 30.5	07 68	43.7	17 23.7	08 66	42.1	17 18.7	08 65	41.1	17 13.5	09 63	40.0	17 07.9	10 62	39.0	17 02.0	10 61	38.0	16 52.6	11 58	36.4	75
6	16 53.0	05 69	44.8	16 49.6	06 68	43.7	16 44.0	07 66	42.2	16 39.9	07 65	41.1	16 35.4	08 63	40.1	16 30.7	08 62	39.1	16 25.6	09 61	38.0	16 17.5	09 59	36.5	6
7	16 11.3	04 69	44.8	16 08.8	05 68	43.8	16 04.3	05 66	42.2	16 01.0	06 65	41.2	15 57.4	06 64	40.1	15 53.5	07 62	39.1	15 49.2	07 61	38.1	15 42.4	08 59	36.5	7
8	15 29.7	03 69	44.8	15 27.9	03 68	43.8	15 24.6	04 66	42.2	15 22.1	04 65	41.2	15 19.3	05 64	40.2	15 16.2	05 62	39.1	15 12.8	06 61	38.1	15 07.2	07 59	36.6	8
9	14 48.0	02 69	44.9	14 47.0	02 68	43.8	14 44.9	03 66	42.3	14 43.1	03 65	41.2	14 41.1	04 64	40.2	14 38.9	04 62	39.2	14 36.3	04 61	38.1	14 32.0	05 59	36.6	9
80	14 06.3	00 69	44.9	14 06.0	01 68	43.8	14 05.1	01 66	42.3	14 04.2	02 65	41.3	14 03.0	02 64	40.2	14 01.5	03 62	39.2	13 59.8	03 61	38.2	13 56.7	04 59	36.6	80
1	13 24.6	01 69	44.9	13 25.1	01 68	43.8	13 25.4	00 66	42.3	13 25.2	00 65	41.3	13 24.8	01 64	40.2	13 24.2	01 62	39.2	13 23.3	02 61	38.2	13 21.5	02 59	36.6	1
2	12 43.0	02 69	44.8	12 44.2	02 68	43.8	12 45.6	01 66	42.3	12 46.3	01 65	41.3	12 46.7	00 64	40.2	12 46.8	00 62	39.2	12 46.8	00 61	38.2	12 46.2	01 59	36.6	2
3	12 01.3	04 69	44.8	12 03.3	03 68	43.8	12 05.9	03 66	42.3	12 07.3	02 65	41.2	12 08.5	02 64	40.2	12 09.5	01 62	39.2	12 10.2	01 61	38.2	12 11.0	01 59	36.6	3
4	11 19.7	05 69	44.8	11 22.4	04 68	43.8	11 26.1	04 66	42.2	11 28.3	04 65	41.2	11 30.4	03 64	40.2	11 32.1	03 62	39.2	11 33.7	02 61	38.2	11 35.7	02 59	36.6	4
85	10 38.0	06 69	44.8	10 41.5	06 68	43.7	10 46.4	05 66	42.2	10 49.4	05 65	41.2	10 52.2	05 64	40.2	10 54.8	04 62	39.2	10 57.2	04 61	38.1	11 00.4	03 59	36.6	85
6	9 56.5	07 69	44.7	10 00.7	07 68	43.7	10 06.7	06 66	42.2	10 10.5	06 65	41.2	10 14.1	06 63	40.1	10 17.5	06 62	39.1	10 20.7	05 61	38.1	10 25.2	05 59	36.6	6
7	9 14.9	08 69	44.7	9 19.9	08 68	43.6	9 27.1	08 66	42.1	9 31.6	07 65	41.1	9 36.0	07 63	40.1	9 40.2	07 62	39.1	9 44.3	07 61	38.1	9 50.0	06 59	36.6	7
8	8 33.4	10 69	44.6	8 39.1	09 68	43.6	8 47.5	09 66	42.1	8 52.8	09 65	41.1	8 58.0	08 63	40.1	9 03.0	08 62	39.0	9 07.8	08 61	38.0	9 14.8	08 59	36.5	8
9	7 51.9	11 69	44.5	7 58.4	11 68	43.5	8 07.9	10 66	42.0	8 14.0	10 65	41.0	8 20.0	10 63	40.0	8 25.8	10 62	39.0	8 31.5	09 61	38.0	8 39.7	09 58	36.5	9
90	7 10.5	12 69	44.4	7 17.8	12 68	43.4	7 28.4	12 66	41.9	7 35.3	11 64	40.9	7 42.0	11 63	39.9	7 48.6	11 62	38.9	7 55.1	11 60	37.9	8 04.6	10 58	36.4	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	34 00.0	1.0 01	180.0	33 00.0	1.0 01	180.0	31 30.0	1.0 01	180.0	30 30.0	1.0 01	180.0	29 30.0	1.0 01	180.0	28 30.0	1.0 01	180.0	27 30.0	1.0 01	180.0	26 06.0	1.0 01	180.0	00
1	33 59.6	1.0 02	179.2	32 59.6	1.0 02	179.2	31 29.6	1.0 02	179.2	30 29.6	1.0 02	179.2	29 29.6	1.0 02	179.3	28 29.6	1.0 02	179.3	27 29.6	1.0 02	179.3	25 59.7	1.0 02	179.3	1
2	33 58.3	1.0 04	178.3	32 58.3	1.0 03	178.4	31 28.4	1.0 03	178.4	30 28.4	1.0 03	178.5	29 28.5	1.0 03	178.5	28 28.5	1.0 03	178.6	27 28.6	1.0 03	178.6	25 58.7	1.0 03	178.7	2
3	33 56.1	1.0 05	177.5	32 56.2	1.0 05	177.6	31 26.4	1.0 05	177.7	30 26.5	1.0 05	177.7	29 26.6	1.0 04	177.8	28 26.7	1.0 04	177.9	27 26.8	1.0 04	177.9	25 57.0	1.0 04	178.0	3
4	33 53.1	1.0 06	176.7	32 53.3	1.0 06	176.8	31 23.6	1.0 06	176.9	30 23.8	1.0 06	177.0	29 24.0	1.0 06	177.1	28 24.2	1.0 05	177.2	27 24.3	1.0 05	177.3	25 54.6	1.0 05	177.4	4
05	33 49.2	99 08	175.8	32 49.5	99 08	175.9	31 20.0	99 07	176.1	30 20.3	1.0 07	176.2	29 20.6	1.0 07	176.4	28 20.9	1.0 07	176.5	27 21.2	1.0 06	176.6	25 51.6	1.0 06	176.7	05
6	33 44.5	99 09	175.0	32 44.9	99 09	175.1	31 15.6	99 09	175.4	30 16.0	99 08	175.5	29 16.5	99 08	175.6	28 16.9	99 08	175.8	27 17.3	99 08	175.9	25 47.9	99 07	176.1	6
7	33 38.9	99 11	174.2	32 39.5	99 10	174.3	31 10.4	99 10	174.6	30 11.0	99 10	174.7	29 11.6	99 09	174.9	28 12.2	99 09	175.1	27 12.7	99 09	175.2	25 43.5	99 08	175.4	7
8	33 32.5	99 12	173.3	32 33.3	99 12	173.5	31 04.5	99 11	173.8	30 05.2	99 11	174.0	29 06.0	99 11	174.2	28 06.7	99 10	174.4	27 07.4	99 10	174.5	25 38.5	99 09	174.8	8
9	33 25.2	98 14	172.5	32 26.2	98 13	172.7	30 57.7	98 13	173.1	29 58.7	98 12	173.3	28 59.6	98 12	173.5	28 00.5	98 11	173.7	27 01.5	98 11	173.9	25 32.8	99 11	174.2	9
10	33 17.1	98 15	171.7	32 18.3	98 14	171.9	30 50.2	98 14	172.3	29 51.4	98 13	172.5	28 52.5	98 13	172.8	27 53.7	98 13	173.0	26 54.8	98 12	173.2	25 26.4	98 12	173.5	10
1	33 08.1	97 16	170.9	32 09.7	98 16	171.2	30 41.9	98 15	171.5	29 43.3	98 15	171.8	28 44.7	98 14	172.0	27 46.1	98 14	172.3	26 47.4	98 13	172.5	25 19.4	98 13	172.9	1
2	32 58.4	97 18	170.1	32 00.2	97 17	170.4	30 32.8	97 16	170.8	29 34.5	97 16	171.1	28 36.2	97 15	171.3	27 37.8	97 15	171.6	26 39.4	97 14	171.9	25 11.8	97 14	172.2	2
3	32 47.8	96 19	169.3	31 49.9	97 18	169.6	30 23.0	97 18	170.1	29 25.0	97 17	170.3	28 26.9	97 17	170.6	27 28.8	97 16	170.9	26 30.7	97 16	171.2	25 03.5	97 15	171.6	3
4	32 36.4	96 20	168.5	31 38.8	96 20	168.8	30 12.4	96 19	169.3	29 14.7	96 18	169.6	28 16.9	96 18	169.9	27 19.2	96 17	170.2	26 21.3	96 17	170.5	24 54.5	96 16	171.0	4
15	32 24.2	96 22	167.7	31 27.0	95 21	168.1	30 01.0	96 20	168.6	29 03.7	96 20	168.9	28 06.3	96 19	169.2	27 08.8	96 18	169.6	26 11.3	96 18	169.9	24 45.0	96 17	170.4	15
6	32 11.2	95 23	166.9	31 14.4	95 22	167.3	29 49.0	95 21	167.8	28 52.0	95 21	168.2	27 54.9	95 20	168.6	26 57.8	95 20	168.9	26 00.6	95 19	169.2	24 34.7	95 18	169.7	6
7	31 57.5	94 24	166.2	31 01.0	94 24	166.5	29 36.2	94 23	167.1	28 39.5	94 22	167.5	27 42.8	95 21	167.9	26 46.0	95 21	168.2	25 49.2	95 20	168.6	24 23.9	95 19	169.1	7
8	31 43.0	93 25	165.4	30 46.9	94 25	165.8	29 22.6	94 24	166.4	28 26.4	94 23	166.8	27 30.1	94 22	167.2	26 33.7	94 22	167.6	25 37.2	94 21	168.0	24 12.4	94 20	168.5	8
9	31 27.7	93 27	164.6	30 32.0	93 26	165.1	29 08.4	93 25	165.7	28 12.6	93 24	166.1	27 16.6	93 24	166.5	26 20.6	93 23	166.9	25 24.6	93 22	167.3	24 00.4	94 21	167.9	9
20	31 11.6	92 28	163.9	30 16.4	92 27	164.3	28 53.5	92 26	165.0	27 58.0	92 25	165.4	27 02.5	93 25	165.9	26 06.9	93 24	166.3	25 11.3	93 23	166.7	23 47.7	93 22	167.3	20
1	30 54.9	91 29	163.1	30 00.1	91 28	163.6	28 37.8	92 27	164.3	27 42.8	92 26	164.8	26 47.8	92 26	165.2	25 52.6	92 25	165.6	24 57.4	92 24	166.1	23 34.4	92 23	166.7	1
2	30 37.3	90 30	162.4	29 43.1	91 30	162.9	28 21.5	91 28	163.6	27 27.0	91 28	164.1	26 32.4	91 27	164.6	25 37.6	91 26	165.0	24 42.9	91 26	165.5	23 20.5	92 24	166.1	2
3	30 19.1	90 32	161.7	29 25.4	90 31	162.2	28 04.5	90 29	162.9	27 10.4	90 29	163.4	26 16.3	90 28	163.9	25 22.1	90 27	164.4	24 27.7	91 26	164.9	23 06.1	91 25	165.5	3
4	30 00.2	89 33	161.0	29 06.9	89 32	161.5	27 46.8	89 31	162.3	26 53.3	89 30	162.8	25 59.6	90 29	163.3	25 05.8	90 28	163.8	24 12.0	90 27	164.2	22 51.0	90 26	165.0	4
25	29 40.6	88 34	160.3	28 47.8	88 33	160.8	27 28.5	88 32	161.6	26 35.4	89 31	162.1	25 42.3	89 30	162.6	24 49.0	89 29	163.2	23 55.6	89 28	163.7	22 35.4	89 27	164.4	25
6	29 20.3	87 35	159.6	28 28.1	87 34	160.1	27 09.5	87 33	160.9	26 17.0	88 32	161.5	25 24.3	88 31	162.0	24 31.6	88 30	162.5	23 38.7	88 29	163.1	22 19.2	88 28	163.8	6
7	28 59.3	86 36	158.9	28 07.6	86 35	159.4	26 49.9	87 34	160.3	25 57.9	87 33	160.9	25 05.8	87 32	161.4	24 13.6	87 31	161.9	23 21.2	87 30	162.5	22 02.5	88 29	163.3	7
8	28 37.7	85 37	158.2	27 46.6	85 36	158.8	26 29.7	86 35	159.7	25 38.2	86 34	160.2	24 46.7	86 33	160.8	23 55.0	86 32	161.4	23 03.1	86 31	161.9	21 45.2	87 30	162.7	8
9	28 15.4	84 38	157.5	27 24.9	84 37	158.1	26 08.8	85 36	159.0	25 18.0	85 35	159.6	24 26.9	85 34	160.2	23 35.8	85 33	160.8	22 44.5	86 32	161.3	21 27.4	86 31	162.2	9
30	27 52.5	83 39	156.9	27 02.6	83 38	157.5	25 47.4	84 37	158.4	24 57.1	84 36	159.0	24 06.6	84 35	159.6	23 16.1	84 34	160.2	22 25.3	85 33	160.8	21 09.0	85 31	161.6	30
1	27 29.0	82 40	156.2	26 39.6	82 39	156.9	25 25.4	83 38	157.8	24 35.6	83 37	158.4	23 45.8	83 36	159.0	22 55.8	83 35	159.6	22 05.6	84 34	160.2	20 50.2	84 32	161.1	1
2	27 04.8	81 41	155.6	26 16.1	81 40	156.2	25 02.7	82 39	157.2	24 13.6	82 38	157.8	23 24.3	82 37	158.5	22 34.9	82 36	159.1	21 45.3	83 35	159.7	20 30.8	83 33	160.6	2
3	26 40.1	80 42	155.0	25 52.0	80 41	155.6	24 39.6	81 40	156.6	23 51.0	81 39	157.2	23 02.4	81 38	157.9	22 13.5	82 36	158.5	21 24.6	82 36	159.1	20 10.9	82 34	160.1	3
4	26 14.8	79 43	154.3	25 27.3	79 42	155.0	24 15.8	80 40	156.0	23 27.9	80 39	156.7	22 39.9	80 38	157.3	21 51.6	80 37	158.0	21 03.3	81 36	158.6	19 50.5	81 35	159.5	4
35	25 48.9	78 44	153.7	25 02.1	78 43	154.4	23 51.5	79 41	155.4	23 04.3	79 40	156.1	22 16.8	79 39	156.8	21 29.2	79 38	157.4	20 41.5	80 37	158.1	19 29.6	80 36	159.0	35
6	25 22.5	77 45	153.1	24 36.3	77 44	153.8	23 26.7	78 42	154.9	22 40.1	78 41	155.6	21 53.3	78 40	156.2	21 06.3	78 39	156.9	20 19.2	79 38	157.6	19 08.2	79 36	158.5	6
7	24 55.5	76 46	152.5	24 10.0	76 45	153.3	23 01.4	77 43	154.3	22 15.4	77 42	155.0	21 29.2	77 41	155.7	20 42.9	77 40	156.4	19 56.4	78 39	157.1	18 46.3	78 37	158.1	7
8	24 28.0	75 47	152.0	23 43.2	75 46	152.7	22 35.5	75 44	153.8	21 50.2	76 43	154.5	21 04.6	76 42	155.2	20 19.0	76 41	155.9	19 33.1	77 40	156.6	18 24.0	77 38	157.6	8
9	24 00.0	73 48	151.4	23 15.8	74 46	152.1	22 09.2	74 45	153.2	21 24.5	75 44	154.0	20 39.6	75 43	154.7	19 54.6	75 41	155.4	19 09.4	75 40	156.1	18 01.3	76 39	157.1	9
40	23 31.5	72 48	150.9	22 48.0	73 47	151.6	21 42.3	73 46	152.7	20 58.3	74 44	153.4	20 14.1	74 43	154.2	19 29.7	74 42	154.9	18 45.2	74 41	155.6	17 38.1	75 39	156.6	40
1	23 02.5	71 49	150.3	22 19.6	72 48	151.1	21 15.0	72 46	152.2	20 31.6	72 45	152.9	19 48.1	73 44	153.7	19 04.4	73 43	154.4	18 20.5	73 42	155.1	17 14.4	74 40	156.2	1
2	22 33.0	70 50	149.8	21 50.8	70 49	150.6	20 47.2	71 47	151.7	20 04.5	71 46	152.4	19 21.7	72 45	153.2	18 38.7	72 44	153.9	17 55.5	72 43	154.7	16 50.4	73 41	155.7	2
3	22 03.0	69 51	149.3	21 21.5	69 50	150.0	20 18.9	70 48	151.2	19 37.0	70 47	152.0	18 54.8	70 46	152.7	18 12.5	71 44	153.5	17 29.9	71 43	154.2	16 25.9	71 42	155.3	3
4	21 32.6	68 51	148.7	20 51.8	68 50	149.5	19 50.2	69 49	150.7	19 09.0	69 47	151.5	18 27.5	69 46	152.2	17 45.8	70 45	153.0	17 04.0	70 44	153.7	16 01.0	70 42	154.9	4
45	21 01.7	67 52	148.2	20 21.6	67 51	149.0	19 21.1	67 49	150.2	18 40.5	68 48	151.0	17 59.8	68 47	151.8	17 18.8	68 46	152.5	16 37.7	69 45	153.3	15 35.7	69 43	154.4	45
6	20 30.4	65 53	147.8	19 51.0	66 52	148.6	18 51.6	66 50	149.8	18 11.7	67 49	150.5	17 31.6	67 48	151.3	16 51.4	67 46	152.1	16 10.9	68 45	152.9	15 10.0	68 43	154.0	6
7	19 58.6	64 54	147.3	19 20.0	65 52	148.1	18 21.6	65 51	149.3	17 42.4	65 49	150.1	17 03.1	66 48	150.9	16 23.5	66 47	151.7	15 43.8	66 46	152.4	14 43.9	67 44	153.6	7
8	19 26.5	63 54	146.8	18 48.5	63 53	147.6	17 51.2	64 51	148.8	17 12.8	64 50	149.7	16 34.1	65 49	150.5	15 55.3	65 48	151.2	15 16.3	65 46	152.0	14 17.5	66 45	153.2	8
9	18 53.9	62 55	146.3	18 16.7	62 54	147.2	17 20.5	63 52	148.4	16 42.7	63 51	149.2	16 04.8	63 50	150.0	15 26.7	64 48	150.8	14 48.4	64 47	151.6	13 50.6	64 45	152.8	9
50	18 21.0	61 56	145.9	17 44.5	61 54	146.7	16 49.3	62 53	148.0	16 12.3	62 51	148.8	15 35.1	62 50	149.6	14 57.7	62 49	150.4	14 20.1	63 48	151.2	13 23.5	63 46	152.4	50
1	17 47.7	59 56	145.5	17 11.9	60 55	146.3	16 17.8	60 53	147.6	15 41.5	61 52	148.4	15 05.0	61 51	149.2	14 28.3	61 50	150.0	13 51.5	62 48	150.8	12 55.9	62 46	152.1	1
2	17 14.0	58 57	145.0	16 38.9	59 56	145.9	15 45.9	59 54	147.1	15 10.3	59 52	148.0	14 34.6	60 51	148.8	13 58.6	60 50	149.6	13 22.5	60 49	150.5	12 28.1	61 47	151.7	2
3	16 40.0	57 57	144.6	16 05.6	57 56	145.5	15 13.7	58 54	146.7	14 38.8	58 53	147.6	14 03.8	59 52	148.4	13 28.6	59 51	149.3	12 53.2	59 49	150.1	11 59.9	59 48	151.3	3
4	16 05.6	56 58	144.2	15 31.9	56 57	145.1	14 41.1	57 55	146.3	14 07.0	57 54	147.2	13 32.7	57 52	148.0	12 58.2	58 51	148.9	12 23.6	58 50	149.7	11 31.4	58 48	151.0	4
55	15 30.8	55 58	143.8	14 57.9	55 57	144.7	14 08.2	55 55	146.0	13 34.8	56 54	146.8	13 01.3	56 53	147.7	12 27.5	56 52	148.5	11 53.6	57 50	149.4	11 02.5	57 49	150.6	55
6	14 55.8	53 59	143.4	14 23.6	54 58	144.3	13 35.0	54 56	145.6	13 02.3	55 55	146.4	12 29.5	55 53	147.3	11 56.5	55 52	148.2	11 23.4	55 51	149.0	10 33.4	56 49	150.3	6
7	14 20.4	52 59	143.0	13 49.0	53 58	143.9	13 01.4	53 56	145.2	12 29.5	53 55	146.1	11 57.4	54 54	147.0	11 25.2	54 53	147.8	10 52.8	54 51	148.7	10 04.0	54 50	150.0	7
8	13 44.7	51 60	142.7	13 14.0	51 59	143.5	12 27.6	52 57	144.9	11 56.4	52 56	145.7	11 25.1	52 54	146.6	10 53.6	53 53	147.5	10 21.9	53 52	148.3	9 34.2	53 50	149.6	8
9	13 08.7	50 60	142.3	12 38.7	50 59	143.2	11 53.4	51 57	144.5	11 23.0	51 56	145.4	10 52.4	51 55	146.3	10 21.7	51 54	147.2	9 50.8	52 52	148.0	9 04.2	52 50	149.3	9
60	12 32.5	49 61	142.0	12 03.2	49 60	142.8	11 19.0	49 58	144.2	10 49.3	50 57	145.1	10 19.4	50 55	145.9	9 49.5	50 54	146.8	9 19.4	50 53	147.7	8 33.9	51 51	149.0	60
1	11 55.9	47 61	141.6	11 27.4	48 60	142.5	10 44.2	48 58	143.9	10 15.3	48 57	144.7	9 46.2	49 56	145.6	9 17.0	49 55	146.5	8 47.7	49 53	147.4	8 03.4	49 51	148.7	1
2	11 19.1	46 62	141.3	10 51.3	46 61	142.2	10 09.3	47 59	143.5	9 41.1	47 58	144.4	9 12.7	47 56	145.3	8 44.3	48 55	146.2	8 15.7	48 54	147.1	7 32.6	48 52	148.4	2
3	10 42.0	45 62	141.0	10 14.9	45 61	141.9	9 34.0	46 59	143.2	9 06.6	46 58	144.1	8 39.0	46 57	145.0	8 11.3	46 55	145.9	7 43.5	46 54	146.8	7 01.5	47 52	148.2	3
4	10 04.6	44 63	140.6	9 38.3	44 61	141.6	8 58.5	44 60	142.9	8 31.8	45 58	143.8	8 05.0	45 57	144.7	7 38.1	45 56	145.6	7 11.0	45 54	146.5	6 30.2	45 53	147.9	4
65	9 27.1	43 63	140.3	9 01.4	43 62	141.3	8 22.8	43 60	142.6	7 56.8	43 59	143.5	7 30.8	44 57	144.4	7 04.6	44 56	145.4	6 38.3	44 55	146.3	5 58.7	44 53	147.6	65
6	8 49.2	41 63	140.0	8 24.3	42 62	141.0	7 46.8	42 60	142.3	7 21.6	42 59	143.3	6 56.3	42 58	144.2	6 30.9	42 57	145.1	6 05.4	43 55	146.0	5 26.9	43 54	147.4	6
7	8 11.2	40 64	139.8	7 47.0	40 63	140.7	7 10.6	41 61	142.1	6 46.1	41 59	143.0	6 21.6	41 58	143.9	5 56.9	41 57	144.8	5 32.2	41 56	145.7				7
8	7 32.9	39 64	139.5	7 09.5	39 63	140.4	6 34.1	39 61	141.8	6 10.4	40 60	142.7	5 46.7	40 59	143.6	5 22.8	40 57	144.6							8
9	6 54.4	38 64	139.2	6 31.7	38 63	140.1	5 57.5	38 61	141.5	5 34.5	38 60	142.5	5 11.5	38 59	143.4										9
70	6 15.7	37 65	139.0	5 53.7	37 64	139.9	5 20.6	37 62	141.3																70
1	5 36.8	35 65	138.7	5 15.6	35 64	139.6																			1

DECLINATION SAME NAME AS LATITUDE

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	6 29.2	13 69	44.3	6 37.2	13 68	43.4	6 48.9	13 66	41.9	6 56.6	13 64	40.9	7 04.1	12 63	39.9	7 11.5	12 62	38.9	7 18.8	12 60	37.9	7 29.5	12 58	36.4	91
2	5 47.9	15 69	44.3	5 56.6	14 67	43.3	6 09.5	14 66	41.8	6 18.0	14 64	40.8	6 26.3	14 63	39.8	6 34.5	14 62	38.8	6 42.6	13 60	37.8	6 54.5	13 58	36.3	2
3	5 06.7	16 69	44.1	5 16.2	16 67	43.2	5 30.2	15 65	41.7	5 39.4	15 64	40.7	5 48.5	15 63	39.7	5 57.5	15 62	38.7	6 06.4	15 60	37.7	6 19.6	14 58	36.2	3
4										5 60.9	17 64	40.6	5 10.8	16 63	39.6	5 20.6	16 61	38.6	5 30.3	16 60	37.6	5 44.7	16 58	36.1	4
95																						5 09.9	17 58	36.0	95

H.A.	54° 30′				55° 00′				56° 00′				56° 30′				57° 00′				57° 30′				59° 00′				59° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	45 30.0	1.0	01	00.0	45 00.0	1.0	01	00.0	44 00.0	1.0	01	00.0	43 30.0	1.0	01	00.0	43 00.0	1.0	01	00.0	42 30.0	1.0	01	00.0	41 00.0	1.0	01	00.0	40 30.0	1.0	01	00.0	00
1	45 29.6	1.0	02	00.8	44 59.6	1.0	02	00.8	43 59.6	1.0	02	00.8	43 29.6	1.0	02	00.8	42 59.6	1.0	02	00.7	42 29.6	1.0	02	00.7	40 59.6	1.0	02	00.7	40 29.7	1.0	02	00.7	1
2	45 28.3	1.0	04	01.7	44 58.3	1.0	04	01.6	43 58.4	1.0	03	01.6	43 28.4	1.0	03	01.5	42 58.5	1.0	03	01.5	42 28.5	1.0	03	01.5	40 58.6	1.0	03	01.4	40 28.6	1.0	03	01.3	2
3	45 26.2	1.0	05	02.5	44 56.2	1.0	05	02.4	43 56.4	1.0	05	02.3	43 26.5	1.0	05	02.3	42 56.5	1.0	04	02.2	42 26.6	1.0	04	02.2	40 56.8	1.0	04	02.0	40 26.9	1.0	04	02.0	3
4	45 23.2	1.0	06	03.3	44 53.3	1.0	06	03.2	43 53.6	1.0	06	03.1	43 23.7	1.0	06	03.0	42 53.9	1.0	06	03.0	42 24.0	1.0	06	02.9	40 54.4	1.0	05	02.7	40 24.5	1.0	05	02.7	4
05	45 19.3	99	08	04.1	44 49.6	99	08	04.0	43 50.0	99	07	03.9	43 20.2	99	07	03.8	42 50.4	99	07	03.7	42 20.6	99	07	03.6	40 51.2	99	06	03.4	40 21.4	99	06	03.3	05
6	45 14.7	99	09	04.9	44 45.0	99	09	04.8	43 45.6	99	09	04.6	43 15.9	99	08	04.5	42 46.2	99	08	04.4	42 16.5	99	08	04.4	40 47.4	99	08	04.1	40 17.6	99	07	04.0	6
7	45 09.2	99	11	05.8	44 39.6	99	10	05.6	43 40.4	99	10	05.4	43 10.8	99	10	05.3	42 41.3	99	10	05.2	42 11.7	99	09	05.1	40 42.8	99	09	04.8	40 13.2	99	09	04.6	7
8	45 02.8	98	12	06.6	44 33.4	98	12	06.4	43 34.5	98	11	06.2	43 05.0	98	11	06.0	42 35.5	98	11	05.9	42 06.1	98	11	05.8	40 37.6	98	10	05.4	40 08.1	98	10	05.3	8
9	44 55.6	98	13	07.4	44 26.4	98	13	07.2	43 27.7	98	13	06.9	42 58.4	98	12	06.8	42 29.1	98	12	06.6	41 59.7	98	12	06.5	40 31.7	98	11	06.1	40 02.3	98	11	06.0	9
10	44 47.7	97	15	08.2	44 18.5	97	14	08.0	43 20.2	97	14	07.7	42 51.1	97	14	07.5	42 21.9	97	13	07.4	41 52.7	97	13	07.2	40 25.1	97	12	06.7	39 55.8	97	12	06.6	10
1	44 38.9	96	16	09.0	44 09.9	97	16	08.8	43 12.0	97	15	08.4	42 43.0	97	15	08.2	42 14.0	97	14	08.1	41 44.9	97	14	07.9	40 17.8	97	13	07.4	39 48.7	97	13	07.2	1
2	44 29.2	96	17	09.7	44 00.5	96	17	09.5	43 02.9	96	16	09.2	42 34.1	96	16	09.0	42 05.3	96	16	08.8	41 36.5	96	15	08.6	40 09.8	96	14	08.1	39 40.9	96	14	07.9	2
3	44 18.9	95	19	10.5	43 50.3	95	18	10.3	42 53.2	95	18	09.9	42 24.6	95	17	09.7	41 55.9	95	17	09.5	41 27.3	96	16	09.3	40 01.2	96	15	08.7	39 32.5	96	15	08.5	3
4	44 07.7	94	20	11.3	43 39.4	94	20	11.1	42 42.7	95	19	10.6	42 14.3	95	18	10.4	41 45.8	95	18	10.2	41 17.4	95	18	10.0	39 52.0	95	17	09.3	39 23.4	95	16	09.1	4
15	43 55.7	94	21	12.0	43 27.7	94	21	11.8	42 31.4	94	20	11.3	42 03.3	94	20	11.1	41 35.1	94	19	10.9	41 06.8	94	19	10.6	39 42.0	94	18	10.0	39 13.7	94	17	09.8	15
6	43 43.0	93	22	12.8	43 15.2	93	22	12.5	42 19.5	93	21	12.0	41 51.5	93	21	11.8	41 23.6	93	20	11.5	40 55.6	93	20	11.3	39 31.5	94	19	10.6	39 03.4	94	18	10.4	6
7	43 29.6	92	24	13.5	43 02.0	92	23	13.3	42 06.8	92	22	12.7	41 39.1	92	22	12.5	41 11.4	92	21	12.2	40 43.7	93	21	12.0	39 20.3	93	20	11.2	38 52.4	93	19	11.0	7
8	43 15.4	91	25	14.3	42 48.1	91	24	14.0	41 53.4	91	23	13.4	41 26.0	91	23	13.1	40 58.6	92	22	12.9	40 31.1	92	22	12.6	39 08.5	92	21	11.8	38 40.9	92	20	11.6	8
9	43 00.4	90	26	15.0	42 33.5	90	26	14.7	41 39.4	90	25	14.1	41 12.2	90	24	13.8	40 45.1	91	24	13.5	40 17.9	91	23	13.3	38 56.0	91	22	12.4	38 28.7	91	21	12.2	9
20	42 44.8	89	27	15.7	42 18.1	89	27	15.4	41 24.6	89	26	14.8	40 57.8	90	25	14.5	40 30.9	90	25	14.2	40 04.0	90	24	13.9	38 43.0	90	23	13.0	38 15.9	90	22	12.8	20
1	42 28.5	88	28	16.4	42 02.1	88	28	16.1	41 09.2	88	27	15.4	40 42.7	89	26	15.1	40 16.1	89	26	14.8	39 49.5	89	25	14.5	38 29.4	89	24	13.6	38 02.6	89	23	13.4	1
2	42 11.5	87	29	17.1	41 45.4	87	29	16.7	40 53.2	87	28	16.1	40 27.0	87	27	15.8	40 00.7	88	27	15.4	39 34.4	88	26	15.1	38 15.1	88	26	14.2	37 48.6	88	24	13.9	2
3	41 53.8	86	31	17.7	41 28.1	86	30	17.4	40 36.5	86	29	16.7	40 10.6	86	28	16.4	39 44.6	87	28	16.1	39 18.6	87	27	15.7	38 00.3	87	26	14.8	37 34.1	87	25	14.5	3
4	41 35.5	84	32	18.4	41 10.1	85	31	18.1	40 19.2	85	30	17.4	39 53.6	85	29	17.0	39 28.0	85	29	16.7	39 02.3	86	28	16.3	37 45.0	86	27	15.4	37 19.1	86	26	15.0	4
25	41 16.5	83	33	19.1	40 51.5	83	32	18.7	40 01.2	84	31	18.0	39 36.0	84	30	17.6	39 10.7	84	30	17.3	38 45.4	85	29	16.9	37 29.0	85	27	15.9	37 03.5	85	27	15.6	25
6	40 56.9	82	34	19.7	40 32.2	82	33	19.3	39 42.7	83	32	18.6	39 17.8	83	31	18.2	38 52.9	83	31	17.9	38 27.9	83	30	17.5	37 12.5	84	28	16.5	36 47.3	84	28	16.1	6
7	40 36.7	81	35	20.3	40 12.4	81	34	19.9	39 23.6	82	33	19.2	38 59.1	82	32	18.8	38 34.5	82	32	18.4	38 09.9	82	21	18.1	36 55.5	83	29	17.0	36 30.6	83	29	16.7	7
8	40 15.8	80	36	20.9	39 51.9	80	35	20.5	39 03.9	80	34	19.8	38 39.7	81	33	19.4	38 15.5	81	33	19.0	37 51.2	81	32	18.6	36 38.0	82	30	17.5	36 13.4	82	30	17.2	8
9	39 54.4	78	37	21.5	39 30.9	79	36	21.1	38 43.6	79	35	20.3	38 19.9	79	34	19.9	37 56.0	80	33	19.6	37 32.1	80	33	19.2	36 19.9	81	31	18.1	35 55.7	81	30	17.7	9
30	39 32.5	77	38	22.1	39 09.3	77	37	21.7	38 22.8	78	36	20.9	37 59.4	78	35	20.5	37 36.0	78	34	20.1	37 12.4	79	34	19.7	36 01.4	79	32	18.6	35 37.5	80	31	18.2	30
1	39 10.0	76	38	22.7	38 47.2	76	38	22.3	38 01.5	77	36	21.4	37 38.5	77	36	21.0	37 15.4	77	35	20.6	36 52.2	77	34	20.2	35 42.3	78	33	19.1	35 18.8	78	32	18.7	1
2	38 46.9	74	39	23.3	38 24.6	75	39	22.8	37 39.6	75	37	22.0	37 17.0	75	37	21.6	36 54.3	76	36	21.2	36 31.6	76	35	20.8	35 22.8	77	33	19.6	34 59.7	77	33	19.2	2
3	38 23.3	73	40	23.8	38 01.4	73	39	23.4	37 17.2	74	38	22.5	36 55.0	74	37	22.1	36 32.8	74	37	21.7	36 10.4	75	36	21.3	35 02.7	76	34	20.6	34 40.0	76	34	19.6	3
4	37 59.2	72	41	24.3	37 37.7	72	40	23.9	36 54.4	73	39	23.0	36 32.6	73	38	22.6	36 10.7	73	38	22.2	35 48.7	73	37	21.7	34 42.3	74	35	20.5	34 20.0	75	34	20.1	4
35	37 34.6	70	42	24.9	37 13.5	70	41	24.4	36 31.0	71	40	23.5	36 09.7	71	39	23.1	35 48.2	72	38	22.7	35 26.6	72	38	22.2	34 21.3	73	36	21.0	33 59.4	73	35	20.6	35
6	37 09.5	69	43	25.4	36 48.9	69	42	24.9	36 07.2	70	40	24.0	35 46.3	70	40	23.6	35 25.2	70	39	23.1	35 04.0	71	38	22.7	34 00.0	72	36	21.4	33 38.5	72	36	21.0	6
7	36 44.0	67	43	25.9	36 23.8	68	43	25.4	35 43.0	68	41	24.5	35 22.4	69	40	24.0	35 01.8	69	40	23.6	34 41.0	69	39	23.2	33 38.2	70	37	21.9	33 17.1	71	36	21.4	7
8	36 18.0	66	44	26.3	35 58.2	66	43	25.9	35 18.2	67	42	25.0	34 58.1	67	41	24.5	34 37.9	68	40	24.0	34 17.6	68	40	23.6	33 16.0	69	38	22.3	32 55.3	69	37	21.9	8
9	35 51.6	64	45	26.8	35 32.2	65	44	26.3	34 53.1	66	43	25.4	34 33.4	66	42	24.9	34 13.6	66	41	24.5	33 53.7	67	40	24.0	32 53.4	67	38	22.7	32 33.1	68	38	22.3	9
40	35 24.7	63	45	27.3	35 05.8	63	45	26.8	34 27.6	64	43	25.8	34 08.3	64	43	25.4	33 48.9	65	42	24.9	33 29.4	65	41	24.5	32 30.4	66	39	23.1	32 10.5	66	38	22.7	40
1	34 57.5	62	46	27.7	34 39.0	62	45	27.2	34 01.6	63	44	26.3	33 42.8	63	43	25.8	33 23.8	63	42	25.3	33 04.8	64	42	24.9	32 07.0	65	40	23.5	31 47.6	65	39	23.1	1
2	34 29.8	60	47	28.1	34 11.7	60	46	27.6	33 35.2	61	45	26.7	33 16.8	62	44	26.2	32 58.3	62	43	25.7	32 39.7	62	42	25.3	31 43.2	63	40	23.9	31 24.2	64	39	23.4	2
3	34 01.8	59	47	28.5	33 44.1	59	47	28.1	33 08.5	60	45	27.1	32 50.5	60	44	26.6	32 32.5	60	44	26.1	32 14.3	61	43	25.7	31 19.1	62	41	24.3	31 00.5	62	40	23.8	3
4	33 33.3	57	48	29.0	33 16.1	57	47	28.5	32 41.4	58	46	27.5	32 23.9	59	45	27.0	32 06.3	59	44	26.5	31 48.5	59	44	26.1	30 54.7	60	41	24.6	30 36.5	61	41	24.2	4
45	33 04.6	56	49	29.3	32 47.8	56	48	28.8	32 14.0	57	46	27.9	31 56.9	57	46	27.4	31 39.7	58	45	26.9	31 22.4	58	44	26.4	30 29.8	59	42	25.0	30 12.1	59	41	24.5	45
6	32 35.4	54	49	29.7	32 19.1	55	48	29.2	31 46.2	55	47	28.2	31 29.5	56	46	27.7	31 12.8	56	45	27.3	30 55.9	56	45	26.8	30 04.7	57	42	25.3	29 47.4	58	42	24.9	6
7	32 06.0	53	50	30.1	31 50.1	53	49	29.6	31 18.1	54	47	28.6	31 01.9	54	47	28.1	30 45.6	55	46	27.6	30 29.1	55	45	27.1	29 39.3	56	43	25.7	29 22.4	56	42	25.2	7
8	31 36.2	51	50	30.4	31 20.8	52	49	29.9	30 49.6	52	48	28.9	30 33.9	53	47	28.4	30 18.0	53	46	28.0	30 02.0	53	46	27.5	29 13.5	54	43	26.0	28 57.1	55	43	25.5	8
9	31 06.1	50	51	30.8	30 51.1	50	50	30.3	30 20.9	51	48	29.3	30 05.6	51	48	28.8	29 50.2	52	47	28.3	29 34.6	52	46	27.8	28 47.4	53	44	26.3	28 31.5	53	43	25.8	9
50	30 35.7	48	51	31.1	30 21.2	49	50	30.6	29 51.8	49	49	29.6	29 37.0	50	48	29.1	29 22.0	50	47	28.6	29 06.9	50	47	28.1	28 21.1	51	44	26.6	28 05.6	52	44	26.2	50
1	30 05.0	47	52	31.4	29 51.0	47	51	30.9	29 22.5	48	49	29.9	29 08.1	48	49	29.4	28 53.6	49	48	28.9	28 39.0	49	47	28.4	27 54.4	50	45	26.9	27 39.4	50	44	26.4	1
2	29 34.1	45	52	31.7	29 20.5	46	51	31.2	28 52.9	46	50	30.2	28 39.0	47	49	29.7	28 24.9	47	48	29.2	28 10.7	47	48	28.7	27 27.6	48	45	27.2	27 13.0	49	44	26.7	2
3	29 02.9	44	52	32.0	28 49.7	44	52	31.5	28 23.0	45	50	30.5	28 00.5	45	49	30.0	27 55.9	46	49	29.5	27 42.2	46	48	29.0	27 00.4	47	46	27.5	26 46.3	47	45	27.0	3
4	28 31.4	42	53	32.3	28 18.7	43	52	31.8	27 52.9	43	51	30.8	27 39.9	44	50	30.3	27 26.7	44	49	29.8	27 13.4	44	48	29.3	26 33.0	45	46	27.8	26 19.3	46	45	27.3	4
55	27 59.7	41	53	32.6	27 47.4	41	52	32.1	27 22.6	42	51	31.1	27 10.0	42	50	30.5	26 57.3	43	49	30.0	26 44.4	43	49	29.5	26 05.4	44	46	28.0	25 52.1	44	46	27.5	55
6	27 27.7	39	54	32.9	27 15.9	40	53	32.3	26 52.0	40	51	31.3	26 39.8	41	51	30.8	26 27.6	41	50	30.3	26 15.2	41	49	29.8	25 37.5	42	47	28.3	25 24.7	43	46	27.8	6
7	26 55.6	38	54	33.1	26 44.2	38	53	32.6	26 21.1	39	52	31.6	26 09.5	39	51	31.0	25 57.7	40	50	30.5	25 45.8	40	49	30.0	25 09.4	41	47	28.5	24 57.1	41	46	28.0	7
8	26 23.2	36	54	33.3	26 12.3	37	54	32.8	25 50.1	37	52	31.8	25 38.9	38	51	31.3	25 27.5	38	51	30.8	25 16.1	38	50	30.3	24 41.1	39	48	28.7	24 29.2	40	47	28.2	8
9	25 50.6	35	55	33.6	25 40.1	35	54	33.1	25 18.9	36	52	32.0	25 08.1	36	52	31.5	24 57.2	36	51	31.0	24 46.2	37	50	30.5	24 12.6	38	48	28.9	24 01.2	38	47	28.4	9
60	25 17.8	33	55	33.8	25 07.8	34	54	33.3	24 47.5	34	53	32.2	24 37.1	35	52	31.7	24 26.7	35	51	31.2	24 16.1	35	50	30.7	23 43.9	36	48	29.2	23 32.9	37	47	28.7	60
1	24 44.9	32	55	34.0	24 35.3	32	54	33.5	24 15.9	33	53	32.4	24 06.0	33	52	31.9	23 56.0	33	51	31.4	23 45.9	34	51	30.9	23 15.0	35	48	29.4	23 04.5	35	48	28.8	1
2	24 11.7	30	56	34.2	24 02.6	31	55	33.7	23 44.1	31	53	32.6	23 34.6	32	52	32.1	23 25.1	32	52	31.6	23 15.5	32	51	31.1	22 46.0	33	49	29.5	22 35.9	34	48	29.0	2
3	23 38.4	29	56	34.4	23 29.8	29	55	33.9	23 12.1	30	54	32.8	23 03.1	30	53	32.3	22 54.1	30	52	31.8	22 44.9	31	51	31.3	22 16.7	32	49	29.7	22 07.2	32	48	29.2	3
4	23 05.0	27	56	34.6	22 56.8	28	55	34.0	22 40.0	28	54	33.0	22 31.5	29	53	32.5	22 22.8	29	52	32.0	22 14.1	29	52	31.4	21 47.4	30	49	29.9	21 38.2	31	48	29.4	4
65	22 31.4	26	56	34.7	22 23.6	26	56	34.2	22 07.7	27	54	33.2	21 59.7	27	53	32.6	21 51.5	27	52	32.1	21 43.2	28	52	31.6	21 17.8	29	49	30.1	21 09.2	29	49	29.6	65
6	21 57.7	24	56	34.9	21 50.3	25	56	34.4	21 35.4	25	54	33.3	21 27.7	26	53	32.8	21 20.0	26	53	32.3	21 12.2	26	52	31.8	20 48.2	27	50	30.2	20 40.0	27	49	29.7	6
7	21 23.8	23	57	35.0	21 16.9	23	56	34.5	21 02.8	24	54	33.5	20 55.6	24	54	33.0	20 48.4	24	53	32.4	20 41.0	25	52	31.9	20 18.3	26	50	30.4	20 10.6	26	49	29.9	7
8	20 49.8	21	57	35.2	20 43.4	22	56	34.7	20 30.2	22	55	33.6	20 23.4	23	54	33.1	20 16.6	23	53	32.6	20 09.7	23	52	32.1	19 48.4	24	50	30.5	19 41.1	24	49	30.0	8
9	20 15.7	20	57	35.3	20 09.7	20	56	34.8	19 57.4	21	55	33.7	19 51.1	21	54	33.2	19 44.8	21	53	32.7	19 38.3	22	53	32.2	19 18.4	23	50	30.6	19 11.5	23	50	30.1	9
70	19 41.5	18	57	35.4	19 36.0	19	56	34.9	19 24.5	19	55	33.9	19 18.7	20	54	33.3	19 12.8	20	53	32.8	19 06.8	20	53	32.3	18 48.2	21	50	30.7	18 41.8	21	50	30.2	70
1	19 07.2	17	57	35.5	19 02.1	17	57	35.0	18 51.6	18	55	34.0	18 46.2	18	54	33.4	18 40.7	18	54	32.9	18 35.1	19	53	32.4	18 17.9	20	51	30.9	18 12.0	20	50	30.3	1
2	18 32.8	15	57	35.6	18 28.2	16	57	35.1	18 18.5	16	55	34.1	18 13.6	17	54	33.5	18 08.5	17	54	33.0	18 03.4	17	53	32.5	17 47.6	18	51	31.0	17 42.2	18	50	30.4	2
3	17 58.4	14	58	35.7	17 54.1	14	57	35.2	17 45.4	15	55	34.2	17 40.9	15	55	33.6	17 36.3	15	54	33.1	17 31.6	16	53	32.6	17 17.2	16	51	31.1	17 12.2	17	50	30.5	3
4	17 23.9	13	58	35.8	17 20.0	13	57	35.3	17 12.2	13	55	34.2	17 08.1	14	55	33.7	17 04.0	14	54	33.2	16 59.8	14	53	32.7	16 46.6	15	51	31.1	16 42.1	15	50	30.6	4
75	16 49.3	11	58	35.9	16 45.9	11	57	35.4	16 38.9	12	56	34.3	16 35.3	12	55	33.8	16 31.6	12	54	33.3	16 27.8	13	53	32.8	16 16.0	13	51	31.2	16 12.0	14	50	30.7	75
6	16 14.6	10	58	35.9	16 11.7	10	57	35.4	16 05.5	10	56	34.4	16 02.4	11	55	33.9	15 59.1	11	54	33.3	15 55.8	11	53	32.8	15 45.4	12	51	31.3	15 41.8	12	50	30.8	6
7	15 39.9	08	58	36.0	15 37.4	09	57	35.5	15 32.1	09	56	34.4	15 29.4	09	55	33.9	15 26.6	09	54	33.4	15 23.7	10	54	32.9	15 14.7	10	51	31.3	15 11.5	11	50	30.8	7
8	15 05.2	07	58	36.0	15 03.1	07	57	35.5	14 58.7	08	56	34.5	14 56.4	08	55	34.0	14 54.1	08	54	33.5	14 51.6	08	54	32.9	14 43.9	09	51	31.4	14 41.2	09	51	30.9	8
9	14 30.4	05	58	36.1	14 28.7	06	57	35.6	14 25.2	06	56	34.5	14 23.4	06	55	34.0	14 21.5	07	54	33.5	14 19.5	07	54	33.0	14 13.1	07	51	31.4	14 10.9	08	51	30.9	9
80	13 55.6	04	58	36.1	13 54.4	04	57	35.6	13 51.7	05	56	34.6	13 50.3	05	55	34.0	13 48.8	05	54	33.5	13 47.3	05	54	33.0	13 42.3	06	51	31.5	13 40.5	06	51	31.0	80
1	13 20.8	03	58	36.1	13 20.0	03	57	35.6	13 18.2	03	56	34.6	13 17.2	03	55	34.1	13 16.2	04	54	33.6	13 15.1	04	54	33.0	13 11.4	04	51	31.5	13 10.1	05	51	31.0	1
2	12 45.9	01	58	36.1	12 45.6	01	57	35.6	12 44.7	02	56	34.6	12 44.1	02	55	34.1	12 43.5	02	54	33.6	12 42.9	02	54	33.1	12 40.6	03	51	31.5	12 39.7	03	51	31.0	2
3	12 11.1	00	58	36.1	12 11.2	00	57	35.6	12 11.1	00	56	34.6	12 11.0	00	55	34.1	12 10.9	01	54	33.6	12 10.6	01	54	33.1	12 09.7	01	52	31.5	12 09.2	02	51	31.0	3
4	11 36.2	02	58	36.1	11 36.7	02	57	35.6	11 37.6	01	56	34.6	11 37.9	01	55	34.1	11 38.2	01	54	33.6	11 38.4	01	54	33.1	11 38.8	00	52	31.5	11 38.8	00	51	31.0	4
85	11 01.4	03	58	36.1	11 02.3	03	57	35.6	11 04.0	03	56	34.6	11 04.8	02	55	34.1	11 05.5	02	54	33.6	11 06.2	02	54	33.1	11 07.9	02	51	31.5	11 08.3	01	51	31.0	85
6	10 26.6	05	58	36.1	10 27.9	04	57	35.6	10 30.5	04	56	34.6	10 31.7	04	55	34.1	10 32.8	04	54	33.5	10 33.9	04	54	33.0	10 37.0	03	51	31.5	10 37.9	03	51	31.0	6
7	9 51.8	06	58	36.1	9 53.6	06	57	35.6	9 57.0	06	56	34.5	9 58.6	05	55	34.0	10 00.2	05	54	33.5	10 01.7	05	54	33.0	10 06.1	05	51	31.5	10 07.4	04	51	31.0	7
8	9 17.0	07	58	36.0	9 19.2	07	57	35.5	9 23.5	07	56	34.5	9 25.6	07	55	34.0	9 27.6	07	54	33.5	9 29.6	07	54	33.0	9 35.2	06	51	31.5	9 37.0	06	51	31.0	8
9	8 42.3	09	58	36.0	8 44.9	09	57	35.5	8 50.0	08	56	34.5	8 52.5	08	55	34.0	8 55.0	08	54	33.5	8 57.4	08	54	32.9	9 04.4	08	51	31.4	9 06.6	07	51	30.9	9
90	8 07.6	10	58	35.9	8 10.7	10	57	35.4	8 16.6	10	56	34.4	8 19.6	10	55	33.9	8 22.4	10	54	33.4	8 25.3	09	53	32.9	8 33.6	09	51	31.4	8 36.3	09	51	30.9	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	25 30.0	1.0 01	180.0	25 00.0	1.0 01	180.0	24 00.0	1.0 01	180.0	23 30.0	1.0 01	180.0	23 00.0	1.0 00	180.0	22 30.0	1.0 00	180.0	21 00.0	1.0 00	180.0	20 30.0	1.0 00	180.0	00
1	25 29.7	1.0 02	179.4	24 59.7	1.0 02	179.4	23 59.7	1.0 02	179.4	23 29.7	1.0 02	179.4	22 59.7	1.0 02	179.4	22 29.7	1.0 02	179.4	20 59.7	1.0 01	179.4	20 29.7	1.0 01	179.5	1
2	25 28.7	1.0 03	178.7	24 58.7	1.0 03	178.7	23 58.7	1.0 03	178.8	23 28.8	1.0 03	178.8	22 58.8	1.0 03	178.8	22 28.8	1.0 02	178.8	20 58.9	1.0 02	178.9	20 28.9	1.0 02	178.9	2
3	25 27.0	1.0 04	178.1	24 57.1	1.0 04	178.1	23 57.2	1.0 04	178.2	23 27.2	1.0 04	178.2	22 57.3	1.0 04	178.2	22 27.3	1.0 04	178.3	20 57.4	1.0 03	178.3	20 27.5	1.0 03	178.4	3
4	25 24.7	1.0 05	177.4	24 54.8	1.0 05	177.5	23 55.0	1.0 05	177.6	23 25.0	1.0 05	177.6	22 55.1	1.0 05	177.6	22 25.2	1.0 04	177.7	20 55.5	1.0 04	177.8	20 25.5	1.0 04	177.8	4
05	25 21.7	1.0 06	176.8	24 51.9	1.0 06	176.8	23 52.1	1.0 06	176.9	23 22.3	1.0 06	177.0	22 52.4	1.0 06	177.0	22 22.5	1.0 06	177.1	20 52.9	1.0 05	177.2	20 23.0	1.0 05	177.3	05
6	25 18.1	99 07	176.2	24 48.3	99 07	176.2	23 48.7	99 07	176.3	23 18.8	99 07	176.4	22 49.0	99 07	176.5	22 19.2	99 06	176.5	20 49.8	99 06	176.7	20 20.0	99 06	176.8	6
7	25 13.8	99 08	175.5	24 44.0	99 08	175.6	23 44.6	99 08	175.7	23 14.8	99 08	175.8	22 45.1	99 08	175.9	22 15.3	99 07	175.9	20 46.1	99 07	176.2	20 16.3	99 07	176.2	7
8	25 08.8	99 09	174.9	24 39.2	99 09	175.0	23 39.9	99 09	175.1	23 10.2	99 09	175.2	22 40.5	99 09	175.3	22 10.9	99 08	175.4	20 41.8	99 08	175.6	20 12.2	99 08	175.7	8
9	25 03.2	99 10	174.2	24 33.7	99 10	174.3	23 34.5	99 10	174.5	23 05.0	99 10	174.6	22 35.4	99 10	174.7	22 05.8	99 09	174.8	20 37.0	99 09	175.1	20 07.4	99 09	175.1	9
10	24 57.0	98 12	173.6	24 27.5	98 11	173.7	23 28.6	98 11	173.9	22 59.1	98 11	174.0	22 29.6	98 11	174.1	22 00.1	98 10	174.2	20 31.7	98 10	174.5	20 02.2	98 10	174.6	10
1	24 50.1	98 13	173.0	24 20.7	98 12	173.1	23 22.0	98 12	173.3	22 52.7	98 12	173.4	22 23.3	98 12	173.5	21 53.9	98 11	173.7	20 25.7	98 11	174.0	19 56.4	98 11	174.1	1
2	24 42.6	97 14	172.4	24 13.3	97 13	172.5	23 14.8	97 13	172.7	22 45.6	98 13	172.9	22 16.3	98 13	173.0	21 47.1	98 12	173.1	20 19.3	98 12	173.4	19 50.0	98 12	173.6	2
3	24 34.4	97 15	171.7	24 05.3	97 14	171.9	23 07.1	97 14	172.1	22 37.9	97 14	172.3	22 08.8	97 14	172.4	21 39.7	97 13	172.5	20 12.3	97 13	172.9	19 43.1	97 12	173.0	3
4	24 25.6	97 16	171.1	23 56.6	97 15	171.3	22 58.7	97 15	171.6	22 29.7	97 15	171.7	22 00.7	97 14	171.8	21 31.7	97 14	172.0	20 04.7	97 14	172.4	19 35.7	97 13	172.5	4
15	24 16.2	96 17	170.5	23 47.3	96 16	170.7	22 49.7	96 16	171.0	22 20.9	96 16	171.1	21 52.0	96 15	171.3	21 23.2	96 15	171.4	19 56.6	96 14	171.8	19 27.7	96 14	172.0	15
6	24 06.1	95 18	169.9	23 37.5	96 18	170.1	22 40.1	96 17	170.4	22 11.5	96 17	170.5	21 42.8	96 16	170.7	21 14.1	96 16	170.9	19 47.9	96 15	171.3	19 19.2	96 15	171.5	6
7	23 55.4	95 19	169.3	23 27.0	95 18	169.5	22 30.0	95 18	169.8	22 01.5	95 18	170.0	21 32.9	95 17	170.1	21 04.4	95 17	170.3	19 38.7	95 16	170.8	19 10.2	95 16	171.0	7
8	23 44.2	94 20	168.7	23 15.9	94 20	168.9	22 19.2	94 19	169.2	21 50.9	94 19	169.4	21 22.5	95 18	169.6	20 54.2	95 18	169.8	19 29.0	95 17	170.3	19 00.6	95 17	170.5	8
9	23 32.3	94 21	168.1	23 04.2	94 20	168.3	22 07.9	94 20	168.7	21 39.7	94 20	168.9	21 11.6	94 19	169.0	20 43.4	94 19	169.2	19 18.8	94 18	169.8	18 50.6	94 18	169.9	9
20	23 19.8	93 22	167.5	22 51.9	93 21	167.7	21 56.0	93 21	168.1	21 28.0	93 20	168.3	21 00.1	93 20	168.5	20 32.1	93 20	168.7	19 08.0	93 19	169.3	18 40.0	93 18	169.4	20
1	23 06.7	92 23	166.9	22 39.0	92 22	167.1	21 43.5	93 22	167.5	21 15.8	93 21	167.7	20 48.0	93 21	167.9	20 20.2	93 21	168.2	18 56.8	93 20	168.7	18 28.9	93 19	168.9	1
2	22 53.0	92 24	166.3	22 25.5	92 23	166.6	21 30.5	92 23	167.0	21 03.0	92 22	167.2	20 35.4	92 22	167.4	20 07.8	92 22	167.6	18 45.0	92 20	168.2	18 17.3	92 20	168.4	2
3	22 38.8	91 25	165.8	22 11.5	91 24	166.0	21 16.9	91 24	166.4	20 49.6	91 23	166.7	20 22.2	91 23	166.9	19 54.9	91 22	167.1	18 32.7	91 21	167.7	18 05.3	91 21	168.0	3
4	22 24.0	90 26	165.2	21 56.9	90 25	165.4	21 02.8	90 24	165.9	20 35.7	90 24	166.1	20 08.6	90 24	166.4	19 41.4	90 23	166.6	18 19.9	91 22	167.3	17 52.7	91 22	167.5	4
25	22 08.6	89 27	164.6	21 41.8	89 26	164.9	20 48.1	90 25	165.4	20 21.3	90 25	165.6	19 54.4	90 25	165.8	19 27.4	90 24	166.1	18 06.6	90 23	166.8	17 39.6	90 23	167.0	25
6	21 52.7	89 27	164.1	21 26.1	89 27	164.3	20 32.9	89 26	164.8	20 06.3	89 26	165.1	19 39.6	89 25	165.3	19 13.0	89 25	165.6	17 52.8	89 24	166.3	17 26.1	89 23	166.5	6
7	21 36.2	88 28	163.5	21 09.9	88 28	163.8	20 17.2	88 27	164.3	19 50.8	88 27	164.6	19 24.4	88 26	164.8	18 58.0	88 26	165.1	17 38.6	88 25	165.8	17 12.1	88 24	166.0	7
8	21 19.2	87 29	163.0	20 53.1	87 29	163.2	20 00.9	87 28	163.8	19 34.8	87 28	164.0	19 08.7	87 27	164.3	18 42.5	87 27	164.6	17 23.8	87 25	165.3	16 57.6	88 25	165.6	8
9	21 01.6	86 30	162.4	20 35.8	86 30	162.7	19 44.2	86 29	163.3	19 18.3	86 28	163.5	18 52.4	86 28	163.8	18 26.5	86 27	164.1	17 08.6	87 26	164.9	16 42.6	87 26	165.1	9
30	20 43.5	85 31	161.9	20 18.0	85 31	162.2	19 26.9	85 30	162.8	19 01.3	85 29	163.0	18 35.7	85 29	163.3	18 10.0	86 28	163.6	16 53.0	86 27	164.4	16 27.2	86 26	164.7	30
1	20 24.9	84 32	161.4	19 59.7	84 31	161.7	19 09.1	84 30	162.2	18 43.8	84 30	162.5	18 18.5	85 30	162.8	17 53.1	85 29	163.1	16 36.8	85 28	163.9	16 11.4	85 27	164.2	1
2	20 05.8	83 33	160.9	19 40.9	83 32	161.2	18 50.9	83 31	161.8	18 25.8	84 31	162.0	18 00.8	84 30	162.3	17 35.7	84 30	162.6	16 20.3	84 28	163.5	15 55.1	84 28	163.8	2
3	19 46.2	82 34	160.4	19 21.6	82 33	160.7	18 32.1	82 32	161.3	18 07.4	83 32	161.6	17 42.6	83 31	161.9	17 17.8	83 31	162.2	16 03.2	83 29	163.0	15 38.3	83 29	163.3	3
4	19 26.1	81 34	159.9	19 01.7	81 34	160.2	18 12.9	81 33	160.8	17 48.5	82 32	161.1	17 24.0	82 32	161.4	16 59.5	82 31	161.7	15 45.8	82 30	162.6	15 21.1	82 29	162.9	4
35	19 05.5	80 35	159.4	18 41.5	80 35	159.7	17 53.2	80 34	160.3	17 29.1	81 33	160.6	17 04.9	81 33	160.9	16 40.7	81 32	161.2	15 27.9	81 31	162.2	15 03.5	81 30	162.5	35
6	18 44.5	79 36	158.9	18 20.7	79 35	159.2	17 33.1	79 34	159.8	17 09.2	80 34	160.2	16 45.4	80 33	160.5	16 21.4	80 33	160.8	15 09.5	80 31	161.7	14 45.5	80 31	162.0	6
7	18 22.9	78 37	158.4	17 59.5	78 36	158.7	17 12.5	78 35	159.4	16 49.0	79 35	159.7	16 25.4	79 34	160.0	16 01.8	79 34	160.3	14 50.8	79 32	161.3	14 27.1	79 31	161.6	7
8	18 00.9	77 37	157.9	17 37.8	77 37	158.3	16 51.5	77 36	158.9	16 28.2	77 35	159.2	16 05.0	78 35	159.6	15 41.7	78 34	159.9	14 31.6	78 33	160.9	14 08.2	78 32	161.2	8
9	17 38.5	76 38	157.5	17 15.7	76 38	157.8	16 30.0	76 36	158.5	16 07.1	76 36	158.8	15 44.1	77 35	159.1	15 21.2	77 35	159.5	14 12.1	77 33	160.5	13 49.0	77 33	160.8	9
40	17 15.6	75 39	157.0	16 53.2	75 38	157.3	16 08.1	75 37	158.0	15 45.5	75 37	158.4	15 22.9	75 36	158.7	15 00.2	76 36	159.0	13 52.1	76 34	160.1	13 29.4	76 33	160.4	40
1	16 52.3	74 40	156.5	16 30.2	74 39	156.9	15 45.8	74 38	157.6	15 23.5	74 37	157.9	15 01.2	74 37	158.3	14 38.9	74 36	158.6	13 31.8	75 35	159.7	13 09.4	75 34	160.0	1
2	16 28.6	73 40	156.1	16 06.8	73 40	156.5	15 23.0	73 39	157.2	15 01.1	73 38	157.5	14 39.2	73 37	157.9	14 17.2	73 37	158.2	13 11.1	74 35	159.3	12 49.0	74 35	159.6	2
3	16 04.4	72 41	155.7	15 43.0	72 40	156.0	14 59.9	72 39	156.7	14 38.3	72 39	157.1	14 16.7	72 38	157.5	13 55.1	72 38	157.8	12 50.0	72 36	158.9	12 28.2	73 35	159.2	3
4	15 39.9	70 42	155.2	15 18.8	70 41	155.6	14 36.4	71 40	156.3	14 15.2	71 39	156.7	13 53.9	71 39	157.1	13 32.6	71 38	157.4	12 28.5	71 36	158.5	12 07.1	71 36	158.9	4
45	15 14.9	69 42	154.8	14 54.1	69 42	155.2	14 12.5	70 40	155.9	13 51.6	70 40	156.3	13 30.7	70 39	156.7	13 09.7	70 39	157.0	12 06.7	70 37	158.1	11 45.6	70 36	158.5	45
6	14 49.6	68 43	154.4	14 29.2	68 42	154.8	13 48.2	68 41	155.5	13 27.6	69 40	155.9	13 07.1	69 40	156.3	12 46.5	69 39	156.7	11 44.5	69 38	157.8	11 23.8	69 37	158.1	6
7	14 23.9	67 44	154.0	14 03.8	67 43	154.4	13 23.5	67 42	155.1	13 03.3	67 41	155.5	12 43.1	67 41	155.9	12 22.9	68 40	156.3	11 22.0	68 38	157.4	11 01.6	68 38	157.8	7
8	13 57.8	66 44	153.6	13 38.1	66 43	154.0	12 58.5	66 42	154.8	12 38.7	66 42	155.1	12 18.8	66 41	155.5	11 58.9	66 40	155.9	10 59.1	67 39	157.1	10 39.1	67 38	157.4	8
9	13 31.3	64 45	153.2	13 12.0	65 44	153.6	12 33.1	65 43	154.4	12 13.7	65 42	154.8	11 54.2	65 42	155.2	11 34.6	65 41	155.5	10 35.9	65 39	156.7	10 16.2	66 39	157.1	9
50	13 04.5	63 45	152.8	12 45.5	63 45	153.2	12 07.4	64 43	154.0	11 48.3	64 43	154.4	11 29.2	64 42	154.8	11 10.0	64 42	155.2	10 12.4	64 40	156.4	9 53.1	64 39	156.8	50
1	12 37.4	62 46	152.5	12 18.7	62 45	152.9	11 41.4	62 44	153.7	11 22.6	62 43	154.1	11 03.9	63 43	154.5	10 45.1	63 42	154.8	9 48.5	63 40	156.0	9 29.6	63 40	156.4	1
2	12 09.9	61 46	152.1	11 51.6	61 46	152.5	11 15.0	61 44	153.3	10 56.6	61 44	153.7	10 38.2	61 43	154.1	10 19.8	61 43	154.5	9 24.4	62 41	155.7	9 05.8	62 40	156.1	2
3	11 42.0	60 47	151.7	11 24.1	60 46	152.1	10 48.3	60 45	153.0	10 30.3	60 44	153.4	10 12.3	60 44	153.8	9 54.2	60 43	154.2	8 59.9	60 41	155.4	8 41.7	61 41	155.8	3
4	11 13.9	58 47	151.4	10 56.4	58 47	151.8	10 21.2	59 46	152.6	10 03.6	59 45	153.0	9 46.0	59 44	153.4	9 28.3	59 44	153.9	8 35.1	59 42	155.1	8 17.4	59 41	155.5	4
55	10 45.4	57 48	151.0	10 28.3	57 47	151.5	9 53.9	57 46	152.3	9 36.7	57 45	152.7	9 19.4	58 45	153.1	9 02.1	58 44	153.5	8 10.1	58 42	154.8	7 52.7	58 42	155.2	55
6	10 16.7	56 48	150.7	9 59.9	56 48	151.1	9 26.3	56 47	152.0	9 09.4	56 46	152.4	8 52.6	56 45	152.8	8 35.7	56 45	153.2	7 44.8	57 43	154.5	7 27.8	57 42	154.9	6
7	9 47.6	55 49	150.4	9 31.2	55 48	150.8	8 58.4	55 47	151.7	8 41.9	55 46	152.1	8 25.4	55 46	152.5	8 08.9	55 45	152.9	7 19.2	55 43	154.2	7 02.5	55 42	154.6	7
8	9 18.3	53 49	150.1	9 02.3	53 49	150.5	8 30.2	54 47	151.3	8 14.1	54 47	151.8	7 58.0	54 46	152.2	7 41.9	54 46	152.6	6 53.3	54 44	153.9	6 37.1	54 43	154.3	8
9	8 48.6	52 50	149.8	8 33.0	52 49	150.2	8 01.7	52 48	151.0	7 46.0	52 47	151.5	7 30.3	52 47	151.9	7 14.6	53 46	152.3	6 27.2	53 44	153.6	6 11.3	53 43	154.0	9
60	8 18.7	51 50	149.5	8 03.5	51 50	149.9	7 33.0	51 48	150.8	7 17.7	51 48	151.2	7 02.4	51 47	151.6	6 47.0	51 46	152.1	6 00.8	51 44	153.4	5 45.4	52 44	153.8	60
1	7 48.6	49 51	149.2	7 33.7	50 50	149.6	7 04.0	50 49	150.5	6 49.1	50 48	150.9	6 34.1	50 47	151.3	6 19.2	50 47	151.8	5 34.2	50 45	153.1	5 19.1	50 44	153.5	1
2	7 18.2	48 51	148.9	7 03.7	48 50	149.3	6 34.8	48 49	150.2	6 20.2	48 48	150.6	6 05.7	49 48	151.1	5 51.1	49 47	151.5	5 07.3	49 45	152.8				2
3	6 47.5	47 52	148.6	6 33.4	47 51	149.0	6 05.3	47 50	149.9	5 51.1	47 49	150.4	5 37.0	47 48	150.8	5 22.8	47 48	151.3							3
4	6 16.6	46 52	148.3	6 02.9	46 51	148.8	5 35.5	46 50	149.7	5 21.8	46 49	150.1	5 08.1	46 48	150.6										4
65	5 45.4	44 52	148.1	5 32.2	44 52	148.5	5 05.6	44 50	149.4																65
6	5 14.1	43 53	147.8	5 01.2	43 52	148.3																			6

DECLINATION SAME NAME AS LATITUDE

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	7 33.0	12 58	35.9	7 36.4	11 57	35.4	7 43.3	11 56	34.3	7 46.6	11 55	33.8	7 49.9	11 54	33.3	7 53.2	11 53	32.8	8 02.8	11 51	31.3	8 06.0	10 50	30.8	91
2	6 58.4	13 58	35.8	7 02.3	13 57	35.3	7 10.0	13 55	34.3	7 13.7	13 55	33.8	7 17.5	12 54	33.3	7 21.2	12 53	32.8	7 32.1	12 51	31.3	7 35.7	12 50	30.8	2
3	6 23.9	14 57	35.7	6 28.2	14 57	35.2	6 36.7	14 55	34.2	6 40.9	14 55	33.7	6 45.1	14 54	33.2	6 49.2	14 53	32.7	7 01.5	13 51	31.2	7 05.5	13 50	30.7	3
4	5 49.5	16 57	35.6	5 54.2	16 57	35.1	6 03.5	15 55	34.1	6 08.2	15 54	33.6	6 12.8	15 54	33.1	6 17.3	15 53	32.6	6 30.9	15 51	31.1	6 35.4	15 50	30.6	4
95	5 15.1	17 57	35.5	5 20.2	17 56	35.0	5 30.4	17 55	34.0	5 35.5	17 54	33.5	5 40.5	17 54	33.0	5 45.5	17 53	32.5	6 00.4	16 51	31.1	6 05.3	16 50	30.6	95
6										5 02.9	18 54	33.4	5 08.3	18 54	32.9	5 13.8	18 53	32.5	5 29.9	18 51	31.0	5 35.3	18 50	30.5	6
7																						5 05.4	19 50	30.4	7

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	40 00.0	1.0 01	00.0	39 30.0	1.0 01	00.0	38 00.0	1.0 00	00.0	37 30.0	1.0 00	00.0	37 00.0	1.0 00	00.0	31 00.0	1.0 00	00.0	30 30.0	1.0 00	00.0	25 30.0	1.0 00	00.0	00
1	39 59.7	1.0 02	00.7	39 29.7	1.0 02	00.6	37 59.7	1.0 02	00.6	37 29.7	1.0 02	00.6	36 59.7	1.0 01	00.6	30 59.8	1.0 01	00.4	30 29.8	1.0 01	00.4	25 29.8	1.0 01	00.3	1
2	39 58.7	1.0 03	01.3	39 28.7	1.0 03	01.3	37 58.8	1.0 03	01.2	37 28.8	1.0 02	01.2	36 58.8	1.0 02	01.1	30 59.1	1.0 02	00.8	30 29.2	1.0 02	00.8	25 29.4	1.0 01	00.6	2
3	39 57.0	1.0 04	02.0	39 27.0	1.0 04	01.9	37 57.2	1.0 04	01.8	37 27.3	1.0 04	01.7	36 57.4	1.0 03	01.7	30 58.1	1.0 03	01.3	30 28.1	1.0 02	01.2	25 28.6	1.0 02	00.9	3
4	39 54.6	1.0 05	02.6	39 24.7	1.0 05	02.5	37 55.1	1.0 05	02.4	37 25.2	1.0 04	02.3	36 55.3	1.0 04	02.3	30 56.6	1.0 03	01.7	30 26.6	1.0 03	01.6	25 27.6	1.0 02	01.2	4
05	39 51.6	99 06	03.3	39 21.8	99 06	03.2	37 52.3	99 06	03.0	37 22.5	99 05	02.9	36 52.7	99 05	02.8	30 54.6	99 04	02.1	30 24.8	1.0 04	02.0	25 26.2	1.0 03	01.5	05
6	39 47.9	99 07	03.9	39 18.2	99 07	03.8	37 49.0	99 07	03.6	37 19.2	99 06	03.5	36 49.5	99 06	03.4	30 52.3	99 05	02.5	30 22.5	99 05	02.4	25 24.5	99 03	01.8	6
7	39 43.6	99 08	04.5	39 13.9	99 08	04.4	37 45.0	99 08	04.1	37 15.3	99 07	04.1	36 45.7	99 07	04.0	30 49.5	99 05	02.9	30 19.8	99 05	02.8	25 22.5	99 04	02.1	7
8	39 38.6	98 09	05.2	39 09.0	98 09	05.1	37 40.4	98 09	04.7	37 10.9	99 08	04.6	36 41.3	99 08	04.5	30 46.2	99 06	03.3	30 16.6	99 06	03.2	25 20.3	99 04	02.4	8
9	39 32.9	98 11	05.8	39 03.5	98 10	05.7	37 35.2	98 10	05.3	37 05.8	98 09	05.2	36 36.4	98 09	05.1	30 42.6	98 07	03.7	30 13.1	98 07	03.6	25 17.7	99 05	02.6	9
10	39 26.6	98 12	06.5	38 57.3	98 11	06.3	37 29.5	98 11	05.9	37 00.2	98 10	05.8	36 30.9	98 10	05.6	30 38.5	98 07	04.1	30 09.1	98 07	04.0	25 14.8	98 05	02.9	10
1	39 19.6	97 13	07.1	38 50.5	97 12	06.9	37 23.1	97 12	06.5	36 53.9	97 11	06.3	36 24.8	97 11	06.2	30 34.1	98 08	04.6	30 04.8	98 08	04.4	25 11.6	98 06	03.2	1
2	39 12.0	96 14	07.7	38 43.1	96 13	07.5	37 16.1	97 13	07.0	36 47.1	97 12	06.9	36 18.1	97 12	06.7	30 29.2	97 09	05.0	30 00.0	97 09	04.8	25 08.1	97 06	03.5	2
3	39 03.7	96 15	08.3	38 35.0	96 14	08.1	37 08.6	96 14	07.6	36 39.8	96 13	07.4	36 10.9	96 13	07.3	30 23.8	97 10	05.4	29 54.8	97 09	05.2	25 04.4	97 07	03.8	3
4	38 54.9	95 16	08.9	38 26.3	95 15	08.7	37 00.5	96 14	08.2	36 31.8	96 14	08.0	36 03.2	96 14	07.8	30 18.1	96 10	05.8	29 49.3	96 10	05.6	25 00.3	96 07	04.1	4
15	38 45.4	95 17	09.6	38 17.0	95 16	09.3	36 51.8	95 15	08.7	36 23.4	95 15	08.5	35 54.9	95 15	08.3	30 12.0	96 11	06.2	29 43.3	96 11	06.0	24 55.9	96 08	04.4	15
6	38 35.3	94 18	10.2	38 07.1	94 17	09.9	36 42.5	94 16	09.3	36 14.3	94 16	09.1	35 46.0	94 16	08.9	30 05.4	95 12	06.6	29 36.9	96 11	06.4	24 51.3	95 08	04.7	6
7	38 24.5	93 19	10.8	37 56.6	93 18	10.5	36 32.7	93 17	09.8	36 04.7	93 17	09.6	35 36.7	94 17	09.4	29 58.5	94 12	06.9	29 30.2	94 12	06.8	24 46.3	95 09	04.9	7
8	38 13.2	92 20	11.3	37 45.5	92 19	11.1	36 22.4	93 18	10.4	35 54.6	93 18	10.1	35 26.7	93 17	09.9	29 51.1	94 13	07.3	29 23.0	94 13	07.1	24 41.1	94 09	05.2	8
9	38 01.3	91 21	11.9	37 33.9	91 20	11.7	36 11.4	92 19	10.9	35 43.9	92 19	10.7	35 16.3	92 18	10.4	29 43.4	93 14	07.7	29 15.5	93 13	07.5	24 35.6	94 10	05.5	9
20	37 48.8	90 22	12.5	37 21.6	91 21	12.2	36 00.0	91 20	11.4	35 32.7	91 20	11.2	35 05.4	91 19	10.9	29 35.3	92 14	08.1	29 07.6	92 14	07.9	24 29.8	93 10	05.8	20
1	37 35.7	90 23	13.1	37 08.8	90 22	12.8	35 48.0	90 21	12.0	35 21.0	90 20	11.7	34 53.9	90 20	11.4	29 26.7	91 15	08.5	28 59.3	91 14	08.2	24 23.7	92 11	06.0	1
2	37 22.1	89 24	13.6	36 55.5	89 23	13.3	35 35.5	89 22	12.5	35 08.7	89 21	12.2	34 41.9	89 21	11.9	29 17.8	91 15	08.9	28 50.6	91 15	08.6	24 17.4	91 11	06.3	2
3	37 07.9	88 25	14.2	36 41.6	88 24	13.9	35 22.4	88 23	13.0	34 56.0	88 22	12.7	34 29.4	88 22	12.4	29 08.5	90 16	09.2	28 41.6	90 16	09.0	24 10.7	91 12	06.6	3
4	36 53.1	87 26	14.7	36 27.1	87 25	14.4	35 08.9	87 23	13.5	34 42.7	87 23	13.2	34 16.5	87 22	12.9	28 58.9	89 17	09.6	28 32.2	89 16	09.3	24 03.8	90 12	06.8	4
25	36 37.8	86 26	15.3	36 12.2	86 26	14.9	34 54.8	86 24	14.0	34 29.0	86 24	13.7	34 03.0	86 23	13.4	28 48.9	88 17	10.0	28 22.4	88 17	09.7	23 56.7	89 12	07.1	25
6	36 22.0	84 27	15.8	35 56.7	85 27	15.5	34 40.3	85 25	14.5	34 14.7	85 25	14.2	33 49.1	85 24	13.9	28 38.5	87 18	10.3	28 12.3	87 17	10.0	23 49.2	88 13	07.4	6
7	36 05.7	83 28	16.3	35 40.7	83 28	16.0	34 25.3	84 26	15.0	34 00.0	84 25	14.6	33 34.7	84 25	14.3	28 27.7	86 18	10.7	28 01.9	86 18	10.4	23 41.5	87 13	07.6	7
8	35 48.8	82 29	16.8	35 24.1	82 28	16.5	34 09.8	83 27	15.4	33 44.8	83 26	15.1	33 19.9	83 26	14.8	28 16.6	85 19	11.0	27 51.0	85 19	10.7	23 33.6	86 14	07.9	8
9	35 31.5	81 30	17.3	35 07.1	81 29	17.0	33 53.8	82 27	15.9	33 29.2	82 27	15.6	33 04.6	82 26	15.2	28 05.1	84 20	11.4	27 39.9	84 19	11.1	23 25.4	85 14	08.1	9
30	35 13.6	80 31	17.8	34 49.7	80 30	17.5	33 37.4	81 28	16.4	33 13.1	81 28	16.0	32 48.8	81 27	15.7	27 53.3	83 20	11.7	27 28.4	83 20	11.4	23 16.9	84 15	08.4	30
1	34 55.3	79 31	18.3	34 31.7	79 31	17.9	33 20.5	79 29	16.8	32 56.6	80 28	16.5	32 32.7	80 28	16.1	27 41.2	82 21	12.0	27 16.6	82 20	11.7	23 08.2	83 15	08.6	1
2	34 36.5	77 32	18.8	34 13.3	78 31	18.4	33 03.2	78 30	17.3	32 39.6	78 29	16.9	32 16.1	79 28	16.5	27 28.7	81 21	12.4	27 04.4	81 21	12.0	22 59.2	82 15	08.8	2
3	34 17.3	76 33	19.2	33 54.4	76 32	18.9	32 45.4	77 30	17.7	32 22.3	77 30	17.3	31 59.1	77 29	16.9	27 15.9	80 22	12.7	26 51.9	80 21	12.3	22 50.0	81 16	09.1	3
4	33 57.6	75 34	19.7	33 35.1	75 33	19.3	32 27.2	76 31	18.1	32 04.5	76 30	17.7	31 41.6	76 30	17.4	27 02.7	79 22	13.0	26 39.1	79 22	12.7	22 40.6	80 16	09.3	4
35	33 37.4	73 34	20.1	33 15.3	74 34	19.7	32 08.6	74 32	18.5	31 46.3	75 31	18.2	31 23.8	75 30	17.8	26 49.3	77 23	13.3	26 26.0	78 22	13.0	22 30.9	79 17	09.6	35
6	33 16.9	72 35	20.6	32 55.2	72 34	20.2	31 49.6	73 32	19.0	31 27.6	73 32	18.6	31 05.6	74 31	18.2	26 35.5	76 23	13.6	26 12.6	76 23	13.3	22 20.9	78 17	09.8	6
7	32 55.9	71 36	21.0	32 34.6	71 35	20.6	31 30.3	72 33	19.4	31 08.7	72 32	18.9	30 47.0	72 32	18.5	26 21.5	75 24	13.9	25 58.9	75 23	13.6	22 10.8	77 17	10.0	7
8	32 34.5	69 36	21.4	32 13.6	70 36	21.0	31 10.5	71 34	19.7	30 49.3	71 33	19.3	30 28.0	71 32	18.9	26 07.1	74 24	14.2	25 44.9	74 24	13.8	22 00.4	76 18	10.2	8
9	32 12.7	68 37	21.8	31 52.3	68 36	21.4	30 50.3	69 34	20.1	30 29.5	69 34	19.7	30 08.7	70 33	19.3	25 52.4	72 25	14.5	25 30.6	73 24	14.1	21 49.8	74 18	10.4	9
40	31 50.6	67 38	22.2	31 30.5	67 37	21.8	30 29.8	68 35	20.5	30 09.4	68 34	20.1	29 49.0	68 33	19.7	25 37.5	71 25	14.8	25 16.1	71 25	14.4	21 39.0	73 18	10.7	40
1	31 28.0	65 38	22.6	31 08.4	66 37	22.2	30 09.0	66 35	20.9	29 49.0	67 35	20.4	29 28.9	67 34	20.0	25 22.2	70 26	15.1	25 01.2	70 25	14.7	21 28.0	72 19	10.9	1
2	31 05.1	64 39	23.0	30 45.9	64 38	22.5	29 47.7	65 36	21.2	29 28.2	65 35	20.8	29 08.5	66 34	20.4	25 06.7	69 26	15.4	24 46.1	69 26	15.0	21 16.7	71 19	11.1	2
3	30 41.8	62 39	23.4	30 23.1	63 39	22.9	29 26.2	64 36	21.6	29 07.0	64 36	21.1	28 47.8	64 35	20.7	24 50.9	67 27	15.6	24 30.7	67 26	15.2	21 05.3	69 19	11.3	3
4	30 18.2	61 40	23.7	29 59.9	61 39	23.3	29 04.3	62 37	21.9	28 45.6	63 36	21.5	28 26.8	63 36	21.0	24 34.9	66 27	15.9	24 15.1	66 26	15.5	20 53.7	68 20	11.5	4
45	29 54.3	60 40	24.1	29 36.4	60 40	23.6	28 42.1	61 38	22.2	28 23.8	61 37	21.8	28 05.4	61 36	21.3	24 18.6	65 28	16.1	23 59.2	65 27	15.7	20 41.8	67 20	11.7	45
6	29 30.0	58 41	24.4	29 12.6	58 40	23.9	28 19.6	59 38	22.6	28 01.7	60 37	22.1	27 43.8	60 37	21.6	24 02.0	63 28	16.4	23 43.1	63 27	16.0	20 29.8	65 20	11.8	6
7	29 05.5	57 41	24.7	28 48.4	57 41	24.3	27 56.8	58 39	22.9	27 39.3	58 38	22.4	27 21.8	59 37	22.0	23 45.2	62 28	16.6	23 26.7	62 28	16.2	20 17.6	64 21	12.0	7
8	28 40.6	55 42	25.1	28 24.0	55 41	24.6	27 33.6	56 39	23.2	27 16.7	57 38	22.7	26 59.6	57 38	22.2	23 28.2	60 29	16.9	23 10.1	61 28	16.4	20 05.2	63 21	12.2	8
9	28 15.4	54 42	25.4	27 59.3	54 42	24.9	27 10.2	55 39	23.5	26 53.7	55 39	23.0	26 37.1	56 38	22.5	23 10.9	59 29	17.1	22 53.2	59 28	16.7	19 52.6	61 21	12.4	9
50	27 50.0	52 43	25.7	27 34.3	53 42	25.2	26 46.6	53 40	23.8	26 30.5	54 39	23.3	26 14.3	54 38	22.8	22 53.4	57 30	17.3	22 36.2	58 29	16.9	19 39.8	60 22	12.6	50
1	27 24.2	51 43	26.0	27 09.0	51 43	25.5	26 22.6	52 40	24.0	26 07.0	52 40	23.6	25 51.3	53 39	23.1	22 35.7	56 30	17.6	22 18.9	56 29	17.1	19 26.9	58 22	12.7	1
2	26 58.3	49 44	26.2	26 43.5	50 43	25.7	25 58.5	50 41	24.3	25 43.3	51 40	23.8	25 28.0	51 39	23.3	22 17.8	54 30	17.8	22 01.4	55 29	17.3	19 13.8	57 22	12.9	2
3	26 32.0	48 44	26.5	26 17.7	48 43	26.0	25 34.0	49 41	24.6	25 19.3	49 40	24.1	25 04.4	50 40	23.6	21 59.6	53 31	18.0	21 43.7	53 30	17.5	19 00.5	55 22	13.0	3
4	26 05.5	46 45	26.8	25 51.6	46 44	26.3	25 09.3	47 42	24.8	24 55.1	48 41	24.3	24 40.7	48 40	23.8	21 41.3	51 31	18.2	21 25.8	52 30	17.7	18 47.1	54 23	13.2	4
55	25 38.8	45 45	27.0	25 25.3	45 44	26.5	24 44.4	46 42	25.1	24 30.6	46 41	24.6	24 16.7	47 40	24.1	21 22.8	50 31	18.4	21 07.7	50 30	17.9	18 33.6	53 23	13.4	55
6	25 11.8	43 45	27.3	24 58.8	43 45	26.8	24 19.3	44 42	25.3	24 05.9	45 41	24.8	23 52.5	45 41	24.3	21 04.0	48 32	18.6	20 49.5	49 31	18.1	18 19.8	51 23	13.5	6
7	24 44.6	42 46	27.5	24 32.1	42 45	27.0	23 54.0	43 43	25.5	23 41.0	43 42	25.0	23 28.0	44 41	24.5	20 45.1	47 32	18.7	20 31.0	47 31	18.3	18 06.0	49 23	13.6	7
8	24 17.3	40 46	27.7	24 05.2	40 45	27.2	23 28.4	41 43	25.7	23 16.0	42 42	25.2	23 03.4	42 41	24.7	20 26.1	45 32	18.9	20 12.4	46 31	18.4	17 52.0	48 24	13.8	8
9	23 49.7	39 46	27.9	23 38.1	39 46	27.4	23 02.7	40 43	25.9	22 50.7	40 42	25.4	22 38.6	40 42	24.9	20 06.8	44 32	19.1	19 53.6	44 32	18.6	17 37.8	46 24	13.9	9
60	23 21.9	37 47	28.1	23 10.7	37 46	27.6	22 36.7	38 44	26.1	22 25.2	39 43	25.6	22 13.6	39 42	25.1	19 47.4	42 33	19.3	19 34.7	42 32	18.8	17 23.6	45 24	14.0	60
1	22 53.9	35 47	28.3	22 43.2	36 46	27.8	22 10.6	37 44	26.3	21 59.6	37 43	25.8	21 48.4	37 42	25.3	19 27.8	41 33	19.4	19 15.6	41 32	18.9	17 09.2	43 24	14.2	1
2	22 25.8	34 47	28.5	22 15.6	34 46	28.0	21 44.3	35 44	26.5	21 33.7	35 43	26.0	21 23.0	36 43	25.5	19 08.1	39 33	19.6	18 56.4	39 32	19.1	16 54.7	42 24	14.3	2
3	21 57.5	32 47	28.7	21 47.7	33 47	28.2	21 17.9	34 44	26.7	21 07.8	34 44	26.2	20 57.5	34 43	25.7	18 48.3	38 33	19.7	18 37.0	38 33	19.2	16 40.0	40 25	14.4	3
4	21 29.0	31 48	28.9	21 19.7	31 47	28.4	20 51.3	32 45	26.8	20 41.6	32 44	26.3	20 31.9	33 43	25.8	18 28.3	36 34	19.9	18 17.4	36 33	19.4	16 25.3	39 25	14.5	4
65	21 00.4	29 48	29.0	20 51.6	30 47	28.5	20 24.5	31 45	27.0	20 15.3	31 44	26.5	20 06.0	31 43	26.0	18 08.1	34 34	20.0	17 57.8	35 33	19.5	16 10.4	37 25	14.6	65
6	20 31.7	28 48	29.2	20 23.3	28 47	28.7	19 57.6	29 45	27.1	19 48.9	29 44	26.6	19 40.1	30 43	26.1	17 47.9	33 34	20.1	17 38.0	33 33	19.6	15 55.5	35 25	14.7	6
7	20 02.8	26 48	29.3	19 54.9	27 48	28.8	19 30.6	27 45	27.3	19 22.3	28 44	26.8	19 14.0	28 44	26.3	17 27.5	31 34	20.2	17 18.1	31 33	19.7	15 40.4	34 25	14.8	7
8	19 33.8	25 49	29.5	19 26.3	25 48	29.0	19 03.5	26 45	27.4	18 55.7	26 45	26.9	18 47.8	26 44	26.4	17 07.0	30 34	20.3	16 58.1	30 34	19.8	15 25.3	32 25	14.9	8
9	19 04.6	23 49	29.6	18 57.7	23 48	29.1	18 36.2	24 46	27.5	18 28.9	25 45	27.0	18 21.5	25 44	26.5	16 46.4	28 34	20.5	16 38.0	28 34	20.0	15 10.1	30 26	15.0	9
70	18 35.4	22 49	29.7	18 28.9	22 48	29.2	18 08.8	23 46	27.7	18 01.9	23 45	27.1	17 55.0	23 44	26.6	16 25.7	26 35	20.6	16 17.8	27 34	20.1	14 54.8	29 26	15.1	70
1	18 06.1	20 49	29.8	18 00.0	20 48	29.3	17 41.3	21 46	27.8	17 34.9	21 45	27.3	17 28.5	22 44	26.7	16 04.9	25 35	20.6	15 57.5	25 34	20.1	14 39.4	27 26	15.1	1
2	17 36.6	19 49	29.9	17 31.0	19 48	29.4	17 13.7	20 46	27.9	17 07.8	20 45	27.4	17 01.8	20 45	26.8	15 44.0	23 35	20.7	15 37.1	23 34	20.2	14 23.9	25 26	15.2	2
3	17 07.1	17 49	30.0	17 02.0	17 49	29.5	16 46.1	18 46	28.0	16 40.6	18 45	27.4	16 35.1	19 45	26.9	15 23.1	21 35	20.8	15 16.6	22 34	20.3	14 08.4	24 26	15.3	3
4	16 37.5	15 49	30.1	16 32.8	16 49	29.6	16 18.3	16 46	28.0	16 13.4	17 46	27.5	16 08.3	17 45	27.0	15 02.0	20 35	20.9	14 56.1	20 34	20.4	13 52.7	22 26	15.3	4
75	16 07.8	14 50	30.2	16 03.6	14 49	29.7	15 50.5	15 46	28.1	15 46.0	15 46	27.6	15 41.4	15 45	27.1	14 40.9	18 35	21.0	14 35.5	18 34	20.5	13 37.1	20 26	15.4	75
6	15 38.1	12 50	30.3	15 34.3	13 49	29.7	15 22.6	13 47	28.2	15 18.6	14 46	27.7	15 14.5	14 45	27.2	14 19.8	17 35	21.0	14 14.8	17 35	20.5	13 21.4	19 26	15.5	6
7	15 08.3	11 50	30.3	15 05.0	11 49	29.8	14 54.7	12 47	28.3	14 51.1	12 46	27.7	14 47.5	12 45	27.2	13 58.5	15 35	21.1	13 54.0	15 35	20.6	13 05.6	17 26	15.5	7
8	14 38.5	09 50	30.4	14 35.6	10 49	29.8	14 26.7	10 47	28.3	14 23.6	10 46	27.8	14 20.4	11 45	27.3	13 37.2	13 36	21.1	13 33.2	13 35	20.6	12 49.8	15 26	15.6	8
9	14 08.6	08 50	30.4	14 06.2	08 49	29.9	13 58.6	09 47	28.4	13 56.0	09 46	27.8	13 53.3	09 45	27.3	13 15.9	12 36	21.2	13 12.4	12 35	20.7	12 33.9	14 26	15.6	9
80	13 38.6	06 50	30.4	13 36.7	07 49	29.9	13 30.6	07 47	28.4	13 28.4	07 46	27.9	13 26.2	08 45	27.4	12 54.5	10 36	21.2	12 51.5	10 35	20.7	12 18.0	12 27	15.6	80
1	13 08.7	05 50	30.5	13 07.2	05 49	30.0	13 02.5	06 47	28.4	13 00.8	06 46	27.9	12 59.0	06 45	27.4	12 33.1	08 36	21.3	12 30.6	09 35	20.8	12 02.1	10 27	15.7	1
2	12 38.7	03 50	30.5	12 37.7	03 49	30.0	12 34.3	04 47	28.4	12 33.1	04 46	27.9	12 31.8	04 45	27.4	12 11.7	07 36	21.3	12 09.6	07 35	20.8	11 46.1	09 27	15.7	2
3	12 08.7	02 50	30.5	12 08.2	02 49	30.0	12 06.2	02 47	28.5	12 05.4	03 46	28.0	12 04.6	03 45	27.4	11 50.2	05 36	21.3	11 48.7	05 35	20.8	11 30.1	07 27	15.7	3
4	11 38.7	00 50	30.5	11 38.6	00 49	30.0	11 38.0	01 47	28.5	11 37.7	01 46	28.0	11 37.3	01 45	27.4	11 28.7	03 36	21.3	11 27.7	04 35	20.8	11 14.1	05 27	15.7	4
85	11 08.7	01 50	30.5	11 09.1	01 49	30.0	11 09.8	01 47	28.5	11 10.0	00 46	28.0	11 10.1	00 45	27.5	11 07.2	02 36	21.3	11 06.7	02 35	20.8	10 58.1	04 27	15.7	85
6	10 38.7	03 50	30.5	10 39.5	03 49	30.0	10 41.7	02 47	28.5	10 42.3	02 46	28.0	10 42.8	02 45	27.4	10 45.7	00 36	21.3	10 45.6	00 35	20.8	10 42.1	02 27	15.7	6
7	10 08.8	04 50	30.5	10 10.0	04 49	30.0	10 13.5	04 47	28.5	10 14.6	04 46	27.9	10 15.6	03 45	27.4	10 24.2	01 36	21.3	10 24.6	01 35	20.8	10 26.1	00 27	15.7	7
8	9 38.8	06 50	30.5	9 40.5	06 49	29.9	9 45.4	05 47	28.4	9 46.9	05 46	27.9	9 48.4	05 45	27.4	10 02.7	03 36	21.3	10 03.6	03 35	20.8	10 10.0	01 27	15.7	8
9	9 08.9	07 50	30.4	9 11.0	07 49	29.9	9 17.3	07 47	28.4	9 19.3	07 46	27.9	9 21.2	06 45	27.4	9 41.2	05 36	21.3	9 42.6	05 35	20.8	9 54.0	03 27	15.7	9
90	8 38.9	09 50	30.4	8 41.6	09 49	29.9	8 49.2	08 47	28.4	8 51.6	08 46	27.9	8 54.0	08 45	27.4	9 19.8	06 36	21.3	9 21.6	06 35	20.8	9 38.0	05 27	15.7	90

Lat. 10°

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	20 00.0	1.0 00	180.0	19 30.0	1.0 00	180.0	18 00.0	1.0 00	180.0	17 30.0	1.0 00	180.0	17 00.0	1.0 00	180.0	11 00.0	1.0 00	180.0	10 30.0	1.0 00	180.0	5 30.0	1.0 00	180.0	00
1	19 59.7	1.0 01	179.5	19 29.7	1.0 01	179.5	17 59.7	1.0 01	179.5	17 29.7	1.0 01	179.5	16 59.8	1.0 01	179.5	10 59.8	1.0 01	179.6	10 29.8	1.0 01	179.6	5 29.9	1.0 01	179.7	1
2	19 58.9	1.0 02	178.9	19 28.9	1.0 02	179.0	17 59.0	1.0 02	179.0	17 29.0	1.0 02	179.0	16 59.0	1.0 02	179.1	10 59.2	1.0 02	179.3	10 29.3	1.0 02	179.3	5 29.4	1.0 01	179.5	2
3	19 57.5	1.0 03	178.4	19 27.6	1.0 03	178.4	17 57.7	1.0 03	178.5	17 27.8	1.0 03	178.5	16 57.8	1.0 03	178.6	10 58.3	1.0 02	178.9	10 28.3	1.0 02	178.9	5 28.8	1.0 02	179.2	3
4	19 55.6	1.0 04	177.9	19 25.7	1.0 04	177.9	17 55.9	1.0 04	178.0	17 26.0	1.0 04	178.1	16 56.1	1.0 04	178.1	10 57.0	1.0 03	178.5	10 27.1	1.0 03	178.6	5 27.8	1.0 02	178.9	4
05	19 53.1	1.0 05	177.3	19 23.3	1.0 05	177.4	17 53.6	1.0 05	177.5	17 23.8	1.0 05	177.6	16 53.9	1.0 04	177.6	10 55.3	1.0 03	178.2	10 25.4	1.0 03	178.2	5 26.5	1.0 03	178.7	05
6	19 50.1	99 06	176.8	19 20.3	99 06	176.9	17 50.8	99 06	177.0	17 21.0	99 05	177.1	16 51.2	99 05	177.2	10 53.2	99 04	177.8	10 23.4	99 04	177.9	5 25.0	99 03	178.4	6
7	19 46.6	99 07	176.3	19 16.8	99 07	176.4	17 47.6	99 06	176.6	17 17.8	99 06	176.6	16 48.0	99 06	176.7	10 50.8	99 05	177.5	10 21.0	99 05	177.5	5 23.2	99 03	178.1	7
8	19 42.5	99 08	175.8	19 12.8	99 08	175.8	17 43.7	99 07	176.1	17 14.1	99 07	176.1	16 44.4	99 07	176.2	10 48.0	99 05	177.1	10 18.3	99 05	177.2	5 21.2	99 04	177.9	8
9	19 37.8	99 09	175.2	19 08.3	99 08	175.3	17 39.4	99 08	175.6	17 09.8	99 08	175.7	16 40.2	99 08	175.7	10 44.8	99 06	176.7	10 15.2	99 06	176.8	5 18.8	99 04	177.6	9
10	19 32.7	98 10	174.7	19 03.2	98 09	174.8	17 34.6	98 09	175.1	17 05.1	98 09	175.2	16 35.6	98 08	175.3	10 41.2	98 07	176.4	10 11.7	98 06	176.5	5 16.2	99 05	177.3	10
1	19 27.0	98 10	174.2	18 57.6	98 10	174.3	17 29.3	98 10	174.6	16 59.9	98 10	174.7	16 30.5	98 09	174.8	10 37.3	98 07	176.0	10 07.9	98 07	176.1	5 13.3	98 05	177.1	1
2	19 20.7	98 11	173.7	18 51.4	98 11	173.8	17 23.5	98 10	174.1	16 54.2	98 10	174.2	16 24.9	98 10	174.4	10 33.0	98 08	175.7	10 03.7	98 08	175.8	5 10.1	98 06	176.8	2
3	19 13.9	97 12	173.2	18 44.8	97 12	173.3	17 17.3	97 11	173.6	16 48.1	97 11	173.8	16 18.9	97 11	173.9	10 28.3	97 08	175.3	9 59.1	97 08	175.4	5 06.7	97 06	176.5	3
4	19 06.6	97 13	172.6	18 37.6	97 13	172.8	17 10.5	97 12	173.2	16 41.4	97 12	173.3	16 12.4	97 12	173.4	10 23.3	97 09	174.9	9 54.2	97 09	175.1	5 03.0	97 07	176.3	4
15	18 58.8	96 14	172.1	18 29.9	96 14	172.3	17 03.2	96 13	172.7	16 34.3	96 13	172.8	16 05.4	96 12	173.0	10 17.9	97 10	174.6	9 49.0	97 09	174.7				15
6	18 50.5	96 15	171.6	18 21.7	96 15	171.8	16 55.5	96 14	172.2	16 26.7	96 13	172.4	15 57.9	96 13	172.5	10 12.2	96 10	174.2	9 43.3	96 10	174.4				6
7	18 41.6	95 16	171.1	18 13.0	95 15	171.3	16 47.2	95 14	171.8	16 18.6	95 14	171.9	15 50.0	95 14	172.1	10 06.1	96 11	173.9	9 37.4	96 11	174.0				7
8	18 32.2	95 16	170.6	18 03.8	95 16	170.8	16 38.5	95 15	171.3	16 10.1	95 15	171.5	15 41.6	95 15	171.6	9 59.6	95 11	173.5	9 31.1	95 11	173.7				8
9	18 22.3	94 17	170.1	17 54.1	94 17	170.3	16 29.3	94 16	170.8	16 01.1	94 16	171.0	15 32.8	94 16	171.2	9 52.8	95 12	173.2	9 24.4	95 12	173.4				9
20	18 12.0	94 18	169.6	17 43.9	94 18	169.8	16 19.7	94 17	170.4	15 51.6	94 17	170.6	15 23.5	94 16	170.7	9 45.6	94 13	172.9	9 17.4	94 12	173.0				20
1	18 01.1	93 19	169.1	17 33.2	93 19	169.3	16 09.6	93 18	169.9	15 41.7	93 17	170.1	15 13.7	93 17	170.3	9 38.1	93 13	172.5	9 10.1	93 13	172.7				1
2	17 49.7	92 20	168.7	17 22.0	92 19	168.9	15 59.0	92 18	169.5	15 31.3	92 18	169.7	15 03.5	92 18	169.9	9 30.2	93 14	172.2	9 02.4	93 13	172.4				2
3	17 37.8	91 21	168.2	17 10.4	92 20	168.4	15 47.9	92 19	169.0	15 20.4	92 19	169.2	14 52.9	92 18	169.4	9 22.0	92 14	171.8	8 54.4	92 14	172.0				3
4	17 25.5	91 21	167.7	16 58.2	91 21	167.9	15 36.4	91 20	168.6	15 09.2	91 20	168.8	14 41.9	91 19	169.0	9 13.4	91 15	171.5	8 46.0	91 14	171.7				4
25	17 12.6	90 22	167.2	16 45.6	90 22	167.4	15 24.5	90 21	168.1	14 57.4	90 20	168.3	14 30.4	90 20	168.6	9 04.6	91 15	171.2	8 37.3	91 15	171.4				25
6	16 59.3	89 23	166.8	16 32.6	89 23	167.0	15 12.1	89 21	167.7	14 45.3	89 21	167.9	14 18.4	90 21	168.1	8 55.3	90 16	170.8	8 28.3	90 16	171.1				6
7	16 45.6	88 24	166.3	16 19.0	88 23	166.5	14 59.3	89 22	167.3	14 32.7	89 22	167.5	14 06.1	89 21	167.7	8 45.8	89 16	170.5	8 19.0	89 16	170.8				7
8	16 31.3	88 24	165.8	16 05.0	88 24	166.1	14 46.1	88 23	166.8	14 19.7	88 22	167.1	13 53.3	88 22	167.3	8 35.9	88 17	170.2	8 09.3	88 17	170.4				8
9	16 16.6	87 25	165.4	15 50.6	87 25	165.6	14 32.4	87 24	166.4	14 06.3	87 23	166.7	13 40.1	87 23	166.9	8 25.7	88 18	169.9	7 59.4	88 17	170.1				9
30	16 01.5	86 26	164.9	15 35.7	86 26	165.2	14 18.3	86 24	166.0	13 52.4	86 24	166.2	13 26.6	86 23	166.5	8 15.1	87 18	169.6	7 49.1	87 18	169.8				30
1	15 45.9	85 27	164.5	15 20.4	85 26	164.8	14 03.7	85 25	165.6	13 38.2	85 24	165.8	13 12.6	85 24	166.1	8 04.3	86 19	169.3	7 38.5	86 18	169.5				1
2	15 29.9	84 27	164.0	15 04.6	84 27	164.3	13 48.8	84 26	165.2	13 23.5	84 25	165.4	12 58.2	84 25	165.7	7 53.1	85 19	168.9	7 27.6	85 19	169.2				2
3	15 13.4	83 28	163.6	14 48.4	83 28	163.9	13 33.5	83 26	164.8	13 08.4	83 26	165.0	12 43.4	84 25	165.3	7 41.6	84 20	168.6	7 16.4	84 19	168.9				3
4	14 56.5	82 29	163.2	14 31.8	82 28	163.5	13 17.7	82 27	164.4	12 53.0	83 26	164.6	12 28.2	83 26	164.9	7 29.8	83 20	168.3	7 04.9	83 20	168.6				4
35	14 39.2	81 30	162.8	14 14.8	81 29	163.1	13 01.6	81 28	164.0	12 37.1	82 27	164.3	12 12.7	82 27	164.5	7 17.7	82 21	168.0	6 53.1	82 20	168.3				35
6	14 21.5	80 30	162.3	13 57.4	80 30	162.6	12 45.1	80 28	163.6	12 20.9	81 28	163.9	11 56.7	81 27	164.2	7 05.3	81 21	167.7	6 41.0	81 21	168.0				6
7	14 03.4	79 31	161.9	13 39.6	79 30	162.2	12 28.2	79 29	163.2	12 04.3	80 28	163.5	11 40.4	80 28	163.8	6 52.6	80 22	167.5	6 28.6	80 21	167.8				7
8	13 44.8	78 32	161.5	13 21.4	78 31	161.8	12 10.9	78 29	162.8	11 47.3	79 29	163.1	11 23.8	79 28	163.4	6 39.7	79 22	167.2	6 15.9	79 22	167.5				8
9	13 25.9	77 32	161.1	13 02.8	77 32	161.5	11 53.2	77 30	162.4	11 30.0	77 30	162.8	11 06.7	78 29	163.1	6 26.4	78 23	166.9	6 02.9	78 22	167.2				9
40	13 06.6	76 33	160.7	12 43.8	76 32	161.1	11 35.2	76 31	162.1	11 12.3	76 30	162.4	10 49.4	76 30	162.7	6 12.8	77 23	166.6	5 49.7	77 23	166.9				40
1	12 46.9	75 33	160.3	12 24.4	75 33	160.7	11 16.8	75 31	161.7	10 54.2	75 31	162.0	10 31.6	75 30	162.4	5 59.0	76 24	166.3	5 36.2	76 23	166.7				1
2	12 26.8	74 34	160.0	12 04.7	74 34	160.3	10 58.1	74 32	161.3	10 35.8	74 31	161.7	10 13.6	74 31	162.0	5 44.9	75 24	166.1	5 22.4	75 23	166.4				2
3	12 06.4	73 35	159.6	11 44.6	73 34	159.9	10 39.0	73 32	161.0	10 17.1	73 32	161.3	9 55.2	73 31	161.7	5 30.5	74 24	165.8	5 08.4	74 24	166.1				3
4	11 45.6	72 35	159.2	11 24.2	72 35	159.6	10 19.6	72 33	160.6	9 58.0	72 32	161.0	9 36.4	72 32	161.3	5 15.9	73 25	165.5							4
45	11 24.5	70 36	158.9	11 03.4	70 35	159.2	9 59.8	71 33	160.3	9 38.6	71 33	160.7	9 17.4	71 32	161.0	5 01.0	72 25	165.3							45
6	11 03.0	69 36	158.5	10 42.2	69 36	158.9	9 39.8	70 34	160.0	9 18.9	70 33	160.3	8 58.0	70 33	160.7										6
7	10 41.2	68 37	158.2	10 20.8	68 36	158.5	9 19.4	68 35	159.6	8 58.8	68 34	160.0	8 38.3	69 33	160.4										7
8	10 19.0	67 37	157.8	9 59.0	67 37	158.2	8 58.6	67 35	159.3	8 38.5	67 34	159.7	8 18.3	67 34	160.1										8
9	9 56.6	66 38	157.5	9 36.9	66 37	157.9	8 37.6	66 36	159.0	8 17.8	66 35	159.4	7 58.0	66 34	159.8										9
50	9 33.8	64 38	157.1	9 14.4	64 38	157.5	8 16.3	65 36	158.7	7 56.9	65 35	159.1	7 37.4	65 35	159.5										50
1	9 10.7	63 39	156.8	8 51.7	63 38	157.2	7 54.7	63 36	158.4	7 35.6	64 36	158.8	7 16.5	64 35	159.2										1
2	8 47.3	62 40	156.5	8 28.7	62 39	156.9	7 32.8	62 37	158.1	7 14.1	62 36	158.5	6 55.4	62 36	158.9										2
3	8 23.5	61 40	156.2	8 05.3	61 39	156.6	7 10.6	61 37	157.8	6 52.3	61 37	158.2	6 34.0	61 36	158.6										3
4	7 59.6	59 40	155.9	7 41.7	59 40	156.3	6 48.1	60 38	157.5	6 30.2	60 37	157.9	6 12.3	60 37	158.3										4
55	7 35.3	58 41	155.6	7 17.8	58 40	156.0	6 25.4	58 38	157.2	6 07.8	58 38	157.6	5 50.3	59 37	158.0										55
6	7 10.7	57 41	155.3	6 53.7	57 41	155.7	6 02.4	57 39	157.0	5 45.2	57 38	157.4	5 28.1	57 37	157.8										6
7	6 45.9	56 42	155.0	6 29.2	56 41	155.4	5 39.1	56 39	156.7	5 22.4	56 38	157.1	5 05.6	56 38	157.5										7
8	6 20.8	54 42	154.7	6 04.6	54 42	155.2	5 15.6	54 40	156.4																8
9	5 55.5	53 43	154.5	5 39.6	53 42	154.9																			9
60	5 29.9	52 43	154.2	5 14.4	52 42	154.6																			60
1	5 04.1	50 43	154.0																						1

DECLINATION SAME NAME AS LATITUDE

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	8 09.1	10 50	30.3	8 12.2	10 49	29.8	8 21.1	10 47	28.3	8 24.0	10 46	27.8	8 26.9	10 45	27.3	8 58.3	08 36	21.3	9 00.7	08 35	20.8	9 22.0	06 27	15.7	91
2	7 39.3	12 50	30.3	7 42.8	12 49	29.8	7 53.1	11 47	28.3	7 56.5	11 46	27.8	7 59.8	11 45	27.3	8 36.9	10 36	21.2	8 39.8	09 35	20.7	9 06.0	08 27	15.7	2
3	7 09.5	13 50	30.2	7 13.5	13 49	29.7	7 25.1	13 47	28.2	7 29.0	13 46	27.7	7 32.8	13 45	27.2	8 15.5	11 36	21.2	8 18.9	11 35	20.7	8 50.0	10 27	15.7	3
4	6 39.8	15 49	30.1	6 44.2	15 49	29.6	6 57.2	14 46	28.2	7 01.5	14 46	27.7	7 05.8	14 45	27.2	7 54.2	13 36	21.2	7 58.0	13 35	20.7	8 34.0	11 27	15.6	4
95	6 10.2	16 49	30.1	6 15.0	16 49	29.6	6 29.4	16 46	28.1	6 34.1	16 46	27.6	6 38.8	16 45	27.1	7 32.9	14 35	21.1	7 37.2	14 35	20.6	8 18.1	13 26	15.6	95
6	5 40.6	18 49	30.0	5 45.9	18 48	29.5	6 01.6	17 46	28.0	6 06.8	17 45	27.5	6 12.0	17 45	27.0	7 11.6	16 35	21.1	7 16.4	16 35	20.6	8 02.3	15 26	15.6	6
7	5 11.1	19 49	29.9	5 16.8	19 48	29.4	5 33.9	19 46	27.9	5 39.5	19 45	27.4	5 45.2	19 45	26.9	6 50.4	18 35	21.0	6 55.7	17 34	20.5	7 46.4	16 26	15.5	7
8							5 06.3	20 46	27.8	5 12.4	20 45	27.3	5 18.4	20 44	26.8	6 29.3	19 35	20.9	6 35.0	19 34	20.4	7 30.6	18 26	15.5	8
9																6 08.2	21 35	20.9	6 14.4	21 34	20.4	7 14.9	20 26	15.4	9
100																5 47.2	22 35	20.8	5 53.9	22 34	20.3	6 59.2	21 26	15.4	100
1																5 26.3	24 35	20.7	5 33.4	24 34	20.2	6 43.5	23 26	15.3	1
2																5 05.5	25 35	20.6	5 13.1	25 34	20.1	6 28.0	25 26	15.3	2
3																						6 12.5	26 26	15.2	3
4																						5 57.0	28 26	15.1	4
105																						5 41.6	29 26	15.0	105
6																						5 26.4	31 25	15.0	6
7																						5 11.2	33 25	14.9	7

STAR IDENTIFICATION TABLE

Lat. 10°

ALTITUDE

AZ.	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	84	180	88	180	88	00	84	00	80	00	76	00	72	00	68	00	64	00	60	00	56	00	00
4	83	146	86	117	86	63	83	33	79	21	75	15	72	11	68	09	64	07	60	06	56	05	4
8	80	127	82	104	82	75	80	52	77	37	74	28	70	22	67	17	63	14	59	12	55	10	8
12	77	116	78	99	78	79	77	62	75	48	72	38	69	30	65	25	62	21	58	18	54	15	12
16	73	110	74	96	74	81	73	67	72	55	69	45	67	38	63	32	60	27	57	23	53	19	16
20	69	105	70	94	70	82	70	71	68	60	66	51	64	43	61	37	58	32	55	27	52	23	20
24	65	102	66	93	66	83	66	73	65	64	63	55	61	48	59	42	56	36	53	31	50	27	24
28	62	100	62	92	62	83	62	75	61	66	60	59	58	52	56	45	54	40	51	35	48	30	28
32	58	98	58	91	59	83	58	76	58	68	56	61	55	55	53	49	51	43	49	38	46	33	32
36	54	97	54	90	55	83	54	76	54	70	53	63	52	57	50	51	48	46	46	41	44	36	36
40	50	96	50	90	51	83	51	77	50	71	49	65	48	59	47	53	45	48	44	43	42	38	40
44	46	95	47	89	47	83	47	77	46	71	46	66	45	60	44	55	42	50	41	45	39	40	44
48	42	94	43	88	43	83	43	77	43	72	42	67	42	61	41	56	39	51	38	46	36	42	48
52	38	93	39	88	39	83	39	77	39	72	39	67	38	62	37	57	36	52	35	48	34	43	52
56	34	92	35	87	35	82	35	77	35	73	35	68	35	63	34	58	33	53	32	49	31	44	56
60	30	91	31	87	31	82	31	77	31	73	31	68	31	63	31	59	30	54	29	50	28	45	60
64	26	90	27	86	27	82	28	77	28	73	28	68	28	64	27	59	27	55	26	50	26	46	64
68	22	90	23	85	23	81	24	77	24	72	24	68	24	64	24	59	24	55	23	51	23	46	68
72	18	89	19	85	19	81	20	76	20	72	20	68	21	64	20	59	20	55	20	51	20	47	72
76	14	88	15	84	16	80	16	76	16	72	17	68	17	64	17	59	17	55	17	51	17	47	76
80	11	88	11	84	12	80	12	76	13	72	13	67	13	63	14	59	14	55	14	51	14	47	80
84	07	87	07	83	08	79	08	75	09	71	09	67	10	63	10	59	11	55	11	51	11	47	84
88	03	86	03	82	04	79	05	75	05	71	06	67	06	63	07	59	07	55	08	51	08	47	88
92	*01*	86	*01*	82	00	78	01	74	02	70	02	66	03	62	04	58	04	54	05	50	06	46	92
96	*05*	85	*04*	81	*04*	77	*03*	73	*02*	69	*01*	65	*01*	61	00	58	01	54	02	50	03	46	96
100	*09*	84	*08*	80	*08*	76	*07*	72	*06*	68	*05*	65	*04*	61	*03*	57	*02*	53	*01*	49	*00*	45	100
104	*13*	83	*12*	79	*11*	75	*10*	72	*09*	68	*08*	64	*07*	60	*06*	56	*05*	52	*04*	48	*03*	44	104
108	*17*	83	*16*	79	*15*	75	*14*	71	*13*	67	*12*	63	*11*	59	*10*	55	*08*	51	*07*	47	*06*	43	108
112	*21*	82	*20*	78	*19*	74	*18*	69	*17*	65	*15*	61	*14*	58	*13*	54	*11*	50	*10*	46	*08*	42	112
116	*25*	81	*24*	77	*23*	72	*22*	68	*20*	64	*19*	60	*17*	56	*16*	52	*14*	49	*13*	45	*11*	41	116
120	*29*	80	*28*	75	*26*	71	*25*	67	*24*	63	*22*	59	*21*	55	*19*	51	*17*	47	*15*	43	*14*	40	120
124	*32*	79	*31*	74	*30*	70	*29*	65	*27*	61	*26*	57	*24*	53	*22*	49	*20*	46	*18*	42	*16*	38	124
128	*36*	77	*35*	73	*34*	68	*32*	64	*31*	59	*29*	55	*27*	51	*25*	47	*23*	44	*21*	40	*18*	37	128
132	*40*	76	*39*	71	*37*	66	*36*	62	*34*	57	*32*	53	*30*	49	*28*	45	*26*	42	*23*	38	*21*	35	132
136	*44*	74	*43*	69	*41*	64	*39*	60	*37*	55	*35*	51	*33*	47	*31*	43	*28*	40	*26*	36	*23*	33	136
140	*48*	73	*46*	67	*45*	62	*43*	57	*41*	53	*38*	48	*36*	44	*33*	41	*31*	37	*28*	34	*25*	31	140
144	*52*	70	*50*	65	*48*	59	*46*	54	*44*	50	*41*	45	*38*	42	*36*	38	*33*	34	*30*	31	*27*	28	144
148	*55*	68	*53*	62	*51*	56	*49*	51	*47*	46	*44*	42	*41*	38	*38*	35	*35*	32	*32*	29	*29*	26	148
152	*59*	65	*57*	58	*55*	52	*52*	47	*49*	43	*46*	38	*43*	35	*40*	31	*37*	28	*34*	26	*30*	23	152
156	*62*	61	*60*	54	*58*	48	*55*	43	*52*	38	*49*	34	*45*	31	*42*	28	*39*	25	*35*	22	*32*	20	156
160	*66*	56	*63*	49	*60*	43	*57*	38	*54*	33	*51*	30	*47*	26	*44*	24	*40*	21	*37*	19	*33*	17	160
164	*69*	49	*66*	42	*63*	36	*60*	32	*56*	28	*53*	24	*49*	22	*45*	19	*42*	17	*38*	16	*34*	14	164
168	*72*	41	*68*	34	*65*	29	*61*	25	*58*	21	*54*	19	*50*	17	*46*	15	*43*	13	*39*	12	*35*	11	168
172	*74*	30	*70*	24	*67*	20	*63*	17	*59*	15	*55*	13	*51*	11	*47*	10	*43*	09	*39*	08	*36*	07	172
176	*75*	16	*72*	13	*68*	10	*64*	09	*60*	07	*56*	07	*52*	06	*48*	05	*44*	04	*40*	04	*36*	04	176
180	*76*	00	*72*	00	*68*	00	*64*	00	*60*	00	*56*	00	*52*	00	*48*	00	*44*	00	*40*	00	*36*	00	180
	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		

16—8472

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

STAR IDENTIFICATION TABLE

ALTITUDE

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

Lat.
10°

16—8472

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

H.A.	0° 00′			0° 30′			1° 00′			1° 30′			2° 00′			2° 30′			3° 00′			3° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	79 00.0	1.0 04	180.0	79 30.0	1.0 05	180.0	80 00.0	1.0 05	180.0	80 30.0	1.0 05	180.0	81 00.0	1.0 05	180.0	81 30.0	1.0 06	180.0	82 00.0	1.0 06	180.0	82 30.0	1.0 07	180.0	00
1	78 57.3	1.0 13	174.8	79 27.2	1.0 14	174.5	79 57.0	1.0 15	174.3	80 26.9	99 15	174.0	80 56.7	99 16	173.6	81 26.5	99 17	173.3	81 56.3	99 18	172.9	82 26.1	99 19	172.4	1
2	78 49.3	98 22	169.6	79 18.8	98 23	169.2	79 48.3	98 24	168.6	80 17.7	98 25	168.1	80 47.0	98 26	167.4	81 16.3	97 28	166.7	81 45.5	97 29	165.9	82 14.6	97 31	165.0	2
3	78 36.2	97 30	164.6	79 05.1	96 31	164.0	79 33.9	96 33	163.2	80 02.6	95 34	162.4	80 31.2	95 36	161.5	80 59.6	94 37	160.5	81 27.9	94 39	159.4	81 55.9	93 42	158.1	3
4	78 18.2	94 37	159.9	78 46.4	94 39	159.0	79 14.4	93 40	158.1	79 42.2	92 42	157.0	80 09.8	92 44	155.9	80 37.2	91 46	154.7	81 04.2	90 48	153.3	81 31.0	89 51	151.8	4
05	77 55.8	91 44	155.4	78 23.0	91 46	154.4	78 50.1	90 48	153.3	79 16.9	89 49	152.1	79 43.4	88 51	150.8	80 09.5	87 54	149.4	80 35.3	85 56	147.8	81 00.6	84 58	146.2	05
6	77 29.3	88 50	151.2	77 55.6	87 52	150.0	78 21.5	86 54	148.8	78 47.2	85 56	147.5	79 12.5	84 58	146.1	79 37.4	82 60	144.6	80 01.8	81 62	142.9	80 25.7	79 65	141.1	6
7	76 59.1	85 56	147.2	77 24.3	84 57	146.0	77 49.2	82 59	144.7	78 13.8	81 61	143.3	78 37.8	79 63	141.8	79 01.4	78 65	140.2	79 24.5	76 67	138.5	79 47.0	74 70	136.7	7
8	76 25.7	81 60	143.6	76 49.9	80 62	142.3	77 13.7	79 64	141.0	77 37.0	77 66	139.6	77 59.9	75 68	138.0	78 22.2	74 70	136.4	78 44.0	71 72	134.7	79 05.1	69 74	132.8	8
9	75 49.4	78 65	140.3	76 12.5	76 66	139.0	76 35.2	75 68	137.6	76 57.5	73 70	136.1	77 19.2	71 72	134.6	77 40.3	69 74	132.9	78 00.9	67 76	131.2	78 20.7	65 78	129.4	9
10	75 10.5	75 68	137.3	75 32.7	73 70	135.9	75 54.4	71 72	134.5	76 15.5	70 73	133.0	76 36.1	68 75	131.5	76 56.1	66 77	129.9	77 15.5	63 79	128.2	77 34.2	61 80	126.4	10
1	74 29.5	71 72	134.5	74 50.7	70 73	133.1	75 11.4	68 75	131.7	75 31.5	66 76	130.3	75 51.1	64 78	128.7	76 10.0	62 80	127.1	76 28.3	60 81	125.5	76 46.0	57 83	123.7	1
2	73 46.6	68 74	131.9	74 06.8	67 76	130.6	74 26.5	65 77	129.2	74 45.7	63 79	127.7	75 04.3	61 80	126.2	75 22.3	59 82	124.7	75 39.6	57 83	123.0	75 56.3	54 85	121.3	2
3	73 01.9	65 77	129.6	73 21.3	64 78	128.3	73 40.1	62 80	126.9	73 58.4	60 81	125.5	74 16.1	58 82	124.0	74 33.2	56 84	122.5	74 49.7	54 85	120.9	75 05.4	51 86	119.2	3
4	72 15.8	63 79	127.4	72 34.4	61 80	126.1	72 52.4	59 82	124.8	73 09.8	57 83	123.4	73 26.7	55 84	121.9	73 43.0	53 85	120.5	73 58.6	51 88	118.9	74 13.6	49 88	117.3	4
15	71 28.4	60 81	125.5	71 46.2	58 82	124.2	72 03.4	57 83	122.9	72 20.1	55 84	121.5	72 36.2	53 86	120.1	72 51.7	51 87	118.7	73 06.6	49 88	117.2	73 20.8	46 89	115.6	15
6	70 39.9	58 83	123.6	70 57.0	56 84	122.4	71 13.5	54 85	121.1	71 29.4	52 86	119.8	71 44.8	50 87	118.4	71 59.7	48 88	117.0	72 13.8	46 89	115.6	72 27.4	44 90	114.1	6
7	69 50.4	55 84	122.0	70 06.8	54 85	120.7	70 22.6	52 86	119.5	70 37.9	50 87	118.2	70 52.7	48 88	116.9	71 06.8	46 89	115.5	71 20.4	44 90	114.1	71 33.3	42 91	112.7	7
8	69 00.0	53 85	120.4	69 15.8	52 86	119.2	69 31.0	50 87	118.0	69 45.7	48 88	116.8	69 59.8	46 89	115.5	70 13.4	44 90	114.2	70 26.4	42 91	112.8	70 38.8	40 92	111.5	8
9	68 08.9	51 86	119.0	68 24.0	50 87	117.8	68 38.6	48 88	116.6	68 52.8	46 89	115.4	69 06.3	44 90	114.2	69 19.4	43 91	112.9	69 31.9	41 92	111.6	69 43.7	39 92	110.3	9
20	67 17.0	49 87	117.7	67 31.6	48 88	116.5	67 45.7	46 89	115.4	67 59.3	44 90	114.2	68 12.4	43 91	113.0	68 24.9	41 92	111.7	68 36.9	39 92	110.5	68 48.3	37 93	109.2	20
1	66 24.6	48 88	116.4	66 38.6	46 89	115.3	66 52.2	44 90	114.2	67 05.3	43 91	113.0	67 17.9	41 91	111.9	67 30.0	39 92	110.7	67 41.5	38 93	109.5	67 52.5	36 93	108.2	1
2	65 31.6	46 89	115.3	65 45.1	45 90	114.2	65 58.3	43 91	113.1	66 10.9	41 91	112.0	66 23.1	40 92	110.8	66 34.7	38 93	109.7	66 45.8	36 93	108.5	66 56.4	34 94	107.3	2
3	64 38.1	45 90	114.2	64 51.2	43 91	113.2	65 03.9	42 91	112.1	65 16.1	40 92	111.0	65 27.8	38 93	109.9	65 39.1	37 93	108.8	65 49.8	35 94	107.6	66 00.1	33 94	106.5	3
4	63 44.1	43 91	113.2	63 56.8	42 91	112.2	64 09.1	40 92	111.1	64 20.9	39 92	110.1	64 32.3	37 93	109.0	64 43.2	35 94	107.9	64 53.6	34 94	106.8	65 03.5	32 95	105.7	4
25	62 49.8	42 91	112.3	63 02.1	40 92	111.3	63 14.0	39 92	110.2	63 25.5	37 93	109.2	63 36.5	36 94	108.2	63 47.0	34 94	107.1	63 57.1	33 95	106.0	64 06.7	31 95	105.0	25
6	61 55.1	41 92	111.4	62 07.1	39 92	110.4	62 18.6	38 93	109.4	62 29.7	36 93	108.4	62 40.4	35 94	107.4	62 50.6	33 94	106.4	63 00.4	32 95	105.3	63 09.7	30 95	104.3	6
7	61 00.1	39 92	110.5	61 11.7	38 93	109.6	61 22.9	37 93	108.6	61 33.7	35 94	107.6	61 44.1	34 94	106.6	61 54.0	32 95	105.6	62 03.5	31 95	104.6	62 12.5	29 96	103.6	7
8	60 04.8	38 93	109.7	60 16.1	37 93	108.8	60 27.0	36 94	107.9	60 37.5	34 94	106.9	60 47.5	33 95	106.0	60 57.2	31 95	105.0	61 06.4	30 95	104.0	61 15.2	29 96	108.0	8
9	59 09.3	37 93	109.0	59 20.2	36 94	108.1	59 30.8	35 94	107.2	59 41.0	33 94	106.2	59 50.8	32 95	105.3	60 00.2	31 95	104.4	60 09.2	29 96	103.4	60 17.8	28 96	102.4	9
30	58 13.4	36 93	108.3	58 24.1	35 94	107.4	58 34.4	34 94	106.5	58 44.4	32 95	105.6	58 53.9	31 95	104.7	59 03.1	30 95	103.8	59 11.8	29 96	102.8	59 20.2	27 96	101.9	30
1	57 17.4	35 94	107.6	57 27.8	34 94	106.7	57 37.9	33 95	105.9	57 47.6	32 95	105.0	57 56.9	30 95	104.1	58 05.8	29 96	103.2	58 14.3	28 96	102.3	58 22.5	27 96	101.4	1
2	56 21.2	34 94	107.0	56 31.3	33 94	106.1	56 41.1	32 95	105.3	56 50.6	31 95	104.4	56 59.7	30 96	103.5	57 08.4	28 96	102.7	57 16.7	27 96	101.8	57 24.7	26 96	100.9	2
3	55 24.8	34 94	106.4	55 34.7	32 95	105.5	55 44.2	31 95	104.7	55 53.5	30 95	103.9	56 02.3	29 96	103.0	56 10.9	28 96	102.1	56 19.0	27 96	101.3	56 26.8	25 97	100.4	3
4	54 28.2	33 95	105.8	54 37.9	32 95	105.0	54 47.2	31 95	104.2	54 56.2	29 96	103.3	55 04.9	28 96	102.5	55 13.2	27 96	101.7	55 21.2	26 96	100.8	55 28.8	25 97	100.0	4
35	53 31.4	32 95	105.2	53 40.9	31 95	104.4	53 50.0	30 96	103.6	53 58.9	29 96	102.8	54 07.3	28 96	102.0	54 15.5	27 96	101.2	54 23.3	25 97	100.4	54 30.8	24 97	99.5	35
6	52 34.5	31 95	104.7	52 43.8	30 95	103.9	52 52.7	29 96	103.1	53 01.4	28 96	102.3	53 09.7	27 96	101.5	53 17.7	26 97	100.7	53 25.3	25 97	99.9	53 32.7	24 97	99.1	6
7	51 37.5	31 95	104.2	51 46.6	30 96	103.4	51 55.3	29 96	102.7	52 03.8	28 96	101.9	52 11.9	27 96	101.1	52 19.8	26 97	100.3	52 27.3	25 97	99.5	52 34.5	23 97	98.7	7
8	50 40.3	30 95	103.7	50 49.2	29 96	103.0	50 57.8	28 96	102.2	51 06.1	27 96	101.4	51 14.1	26 97	100.7	51 21.8	25 97	99.9	51 29.2	24 97	99.1	51 36.2	23 97	98.3	8
9	49 43.1	30 96	103.3	49 51.8	29 96	102.5	50 00.2	28 96	101.8	50 08.3	27 96	101.0	50 16.2	26 97	100.3	50 23.7	25 97	99.5	50 31.0	24 97	98.7	50 37.9	23 97	98.0	9
40	48 45.7	29 96	102.8	48 54.2	23 96	102.1	49 02.5	27 96	101.4	49 10.5	26 97	100.6	49 18.2	25 97	99.9	49 25.6	24 97	99.1	49 32.8	23 97	98.4	49 39.6	22 97	97.6	40
1	47 48.2	28 96	102.4	47 56.6	28 96	101.7	48 04.7	27 96	100.9	48 12.6	26 97	100.2	48 20.1	25 97	99.5	48 27.4	24 97	98.8	48 34.5	23 97	98.0	48 41.2	22 97	97.3	1
2	46 50.6	28 96	102.0	46 58.9	27 96	101.3	47 06.8	26 97	100.6	47 14.6	25 97	99.8	47 22.0	24 97	99.1	47 29.2	24 97	98.4	47 36.1	23 97	97.7	47 42.8	22 97	97.0	2
3	45 53.0	27 96	101.6	46 01.1	27 96	100.9	46 08.9	26 97	100.2	46 16.5	25 97	99.5	46 23.8	24 97	98.8	46 30.9	23 97	98.1	46 37.7	22 97	97.4	46 44.3	21 98	96.6	3
4	44 55.2	27 96	101.2	45 03.2	26 97	100.5	45 10.9	25 97	99.8	45 18.4	24 97	99.1	45 25.6	24 97	98.4	45 32.6	23 97	97.7	45 39.3	22 97	97.0	45 45.8	21 98	96.3	4
45	43 57.4	27 96	100.8	44 05.2	26 97	100.1	44 12.8	25 97	99.5	44 20.2	24 97	98.8	44 27.3	23 97	98.1	44 34.2	23 97	97.4	44 40.8	22 98	96.7	44 47.2	21 98	96.0	45
6	42 59.5	26 97	100.4	43 07.2	25 97	99.8	43 14.7	25 97	99.1	43 22.0	24 97	98.4	43 29.0	23 97	97.8	43 35.8	22 97	97.1	43 42.3	21 98	96.4	43 48.6	21 98	95.8	6
7	42 01.6	26 97	100.1	42 09.2	25 97	99.4	42 16.5	24 97	98.8	42 23.7	23 97	98.1	42 30.6	23 97	97.5	42 37.3	22 98	96.8	42 43.8	21 98	96.1	42 50.0	20 98	95.5	7
8	41 03.5	25 97	99.7	41 11.0	25 97	99.1	41 18.3	24 97	98.5	41 25.4	23 97	97.8	41 32.2	22 97	97.2	41 38.8	22 98	96.5	41 45.2	21 98	95.9	41 51.4	20 98	95.2	8
9	40 05.5	25 97	99.4	40 12.8	24 97	98.8	40 20.0	24 97	98.1	40 27.0	23 97	97.5	40 33.7	22 98	96.9	40 40.3	21 98	96.2	40 46.6	21 98	95.6	40 52.7	20 98	94.9	9
50	39 07.3	25 97	99.1	39 14.6	24 97	98.5	39 21.7	23 97	97.8	39 28.6	23 97	97.2	39 35.2	22 98	96.6	39 41.7	21 98	95.9	39 48.0	21 98	95.3	39 54.0	20 98	94.7	50
1	38 09.2	24 97	98.8	38 16.3	24 97	98.2	38 23.3	23 97	97.5	38 30.1	22 97	96.9	38 36.7	22 98	96.3	38 43.1	21 98	95.7	38 49.3	20 98	95.0	38 55.3	20 98	94.4	1
2	37 10.9	24 97	98.5	37 18.0	23 97	97.9	37 24.9	23 97	97.3	37 31.6	22 98	96.6	37 38.2	21 98	96.0	37 44.5	21 98	95.4	37 50.6	20 98	94.8	37 56.6	19 98	94.2	2
3	36 12.6	24 97	98.2	36 19.7	23 97	97.6	36 26.5	22 97	97.0	36 33.1	22 98	96.4	36 39.6	21 98	95.8	36 45.8	21 98	95.1	36 51.9	20 98	94.5	36 57.8	19 98	93.9	3
4	35 14.3	23 97	97.9	35 21.3	23 97	97.3	35 28.0	22 98	96.7	35 34.6	22 98	96.1	35 41.0	21 98	95.5	35 47.2	20 98	94.9	35 53.2	20 98	94.3	35 59.0	19 98	93.7	4
55	34 16.0	23 97	97.6	34 22.8	23 97	97.0	34 29.5	22 98	96.4	34 36.0	21 98	95.8	34 42.3	21 98	95.2	34 48.5	20 98	94.6	34 54.4	20 98	94.0	35 00.3	19 98	93.5	55
6	33 17.6	23 97	97.3	33 24.3	22 98	96.8	33 30.9	22 98	96.2	33 37.4	21 98	95.6	33 43.7	21 98	95.0	33 49.8	20 98	94.4	33 55.7	20 98	93.8	34 01.5	19 98	93.2	6
7	32 19.1	23 97	97.1	32 25.8	22 98	96.5	32 32.4	22 98	95.9	32 38.7	21 98	95.3	32 45.0	20 98	94.7	32 51.0	20 98	94.2	32 56.9	19 98	93.6	33 02.6	19 98	93.0	7
8	31 20.7	22 98	96.8	31 27.3	22 98	96.2	31 33.8	21 98	95.7	31 40.1	21 98	95.1	31 46.3	20 98	94.5	31 52.3	20 98	93.9	31 58.1	19 98	93.4	32 03.8	19 98	92.8	8
9	30 22.2	22 98	96.5	30 28.7	22 98	96.0	30 35.1	21 98	95.4	30 41.4	21 98	94.8	30 47.5	20 98	94.3	30 53.5	20 98	93.7	30 59.3	19 98	93.1	31 05.0	19 98	92.6	9
60	29 23.6	22 98	96.3	29 30.1	21 98	95.7	29 36.5	21 98	95.2	29 42.7	20 98	94.6	29 48.8	20 98	94.0	29 54.7	20 98	93.5	30 00.5	19 98	92.9	30 06.1	19 98	92.3	60
1	28 25.1	22 98	96.0	28 31.5	21 98	95.5	28 37.8	21 98	94.9	28 44.0	20 98	94.4	28 50.0	20 98	93.8	28 55.9	19 98	93.2	29 01.7	19 98	92.7	29 07.3	18 98	92.1	1
2	27 26.5	22 98	95.8	27 32.9	21 98	95.2	27 39.1	21 98	94.7	27 45.3	20 98	94.1	27 51.3	20 98	93.6	27 57.1	19 98	93.0	28 02.8	19 98	92.5	28 08.4	18 98	91.9	2
3	26 27.9	21 98	95.6	26 34.2	21 98	95.0	26 40.4	20 98	94.5	26 46.5	20 98	93.9	26 52.5	20 98	93.4	26 58.3	19 98	92.8	27 04.0	19 98	92.3	27 09.6	18 98	91.7	3
4	25 29.3	21 98	95.3	25 35.5	21 98	94.8	25 41.7	20 98	94.2	25 47.7	20 98	93.7	25 53.7	20 98	93.1	25 59.5	19 98	92.6	26 05.1	19 98	92.1	26 10.7	18 98	91.5	4
65	24 30.6	21 98	95.1	24 36.8	21 98	94.5	24 43.0	20 98	94.0	24 49.0	20 98	93.5	24 54.8	19 98	92.9	25 00.6	19 98	92.4	25 06.3	19 98	91.8	25 11.8	18 98	91.3	65
6	23 31.9	21 98	94.9	23 38.1	20 98	94.3	23 44.2	20 98	93.8	23 50.2	20 98	93.3	23 56.0	19 98	92.7	24 01.8	19 98	92.2	24 07.4	19 98	91.6	24 12.9	18 98	91.1	6
7	22 33.2	21 98	94.6	22 39.4	20 98	94.1	22 45.4	20 98	93.6	22 51.4	20 98	93.0	22 57.2	19 98	92.5	23 02.9	19 98	92.0	23 08.5	19 98	91.4	23 14.0	18 98	90.9	7
8	21 34.5	21 98	94.4	21 40.6	20 98	93.9	21 46.6	20 98	93.4	21 52.5	20 98	92.8	21 58.3	19 98	92.3	22 04.0	19 98	91.8	22 09.6	18 98	91.2	22 15.1	18 98	90.7	8
9	20 35.8	20 98	94.2	20 41.9	20 98	93.7	20 47.8	20 98	93.1	20 53.7	19 98	92.6	20 59.5	19 98	92.1	21 05.2	19 98	91.6	21 10.8	18 98	91.0	21 16.2	18 98	90.5	9
70	19 37.0	20 98	94.0	19 43.1	20 98	93.5	19 49.0	20 98	92.9	19 54.9	19 98	92.4	20 00.6	19 98	91.9	20 06.3	19 98	91.4	20 11.9	18 98	90.8	20 17.4	18 98	90.3	70
1	18 38.3	20 98	93.8	18 44.3	20 98	93.2	18 50.2	20 98	92.7	18 56.0	19 98	92.2	19 01.8	19 98	91.7	19 07.4	19 98	91.2	19 13.0	18 98	90.6	19 18.5	18 98	90.1	1
2	17 39.5	20 98	93.5	17 45.5	20 98	93.0	17 51.4	19 98	92.5	17 57.2	19 98	92.0	18 02.9	19 98	91.5	18 08.5	19 98	91.0	18 14.1	18 98	90.5	18 19.6	18 98	89.9	2
3	16 40.7	20 98	93.3	16 46.6	20 98	92.8	16 52.5	19 98	92.3	16 58.3	19 98	91.8	17 04.0	19 98	91.3	17 09.6	19 98	90.8	17 15.2	18 98	90.3	17 20.7	18 98	89.7	3
4	15 41.9	20 98	93.1	15 47.8	20 98	92.6	15 53.7	19 98	92.1	15 59.4	19 98	91.6	16 05.1	19 98	91.1	16 10.7	19 98	90.6	16 16.3	18 98	90.1	16 21.8	18 98	89.6	4
75	14 43.1	20 98	92.9	14 49.0	20 98	92.4	14 54.8	19 98	91.9	15 00.5	19 98	91.4	15 06.2	19 98	90.9	15 11.8	19 98	90.4	15 17.4	18 96	89.9	15 22.9	18 98	89.4	75
6	13 44.3	20 98	92.7	13 50.1	19 98	92.2	13 55.9	19 98	91.7	14 01.7	19 98	91.2	14 07.3	19 98	90.7	14 12.9	19 98	90.2	14 18.5	18 98	89.7	14 24.0	18 98	89.2	6
7	12 45.4	20 98	92.5	12 51.3	19 98	92.0	12 57.0	19 98	91.5	13 02.8	19 98	91.0	13 08.4	19 98	90.5	13 14.0	19 98	90.0	13 19.6	18 98	89.5	13 25.1	18 98	89.0	7
8	11 46.6	19 98	92.3	11 52.4	19 98	91.8	11 58.2	19 98	91.3	12 03.9	19 98	90.8	12 09.5	19 98	90.3	12 15.2	19 98	89.8	12 20.7	18 98	89.3	12 26.2	18 98	88.8	8
9	10 47.7	19 98	92.1	10 53.5	19 98	91.6	10 59.3	19 98	91.1	11 05.0	19 98	90.6	11 10.6	19 98	90.1	11 16.3	19 98	89.6	11 21.8	18 98	89.1	11 27.3	18 98	88.6	9
80	9 48.9	19 98	91.9	9 54.7	19 98	91.4	10 00.4	19 98	90.9	10 06.1	19 98	90.4	10 11.7	19 98	89.9	10 17.4	19 98	89.4	10 22.9	18 98	88.9	10 28.4	18 98	88.4	80
1	8 50.0	19 98	91.7	8 55.8	19 98	91.2	9 01.5	19 98	90.7	9 07.2	19 98	90.2	9 12.9	19 98	89.7	9 18.5	19 98	89.2	9 24.0	18 98	88.7	9 29.6	18 98	88.2	1
2	7 51.1	19 98	91.5	7 56.9	19 98	91.0	8 02.6	19 98	90.5	8 08.3	19 98	90.0	8 14.0	19 98	89.6	8 19.6	19 98	89.1	8 25.2	19 98	88.6	8 30.7	18 98	88.1	2
3	6 52.2	19 98	91.3	6 58.0	19 98	90.8	7 03.7	19 98	90.4	7 09.4	19 98	89.9	7 15.1	19 98	89.4	7 20.7	19 98	88.9	7 26.3	19 98	88.4	7 31.8	18 98	87.9	3
4	5 53.4	19 98	91.1	5 59.1	19 98	90.7	6 04.8	19 98	90.2	6 10.5	19 98	89.7	6 16.2	19 98	89.2	6 21.8	19 98	88.7	6 27.4	19 98	88.2	6 33.0	19 98	87.7	4
85				5 00.2	19 98	90.5	5 05.9	19 98	90.0	5 11.6	19 98	89.5	5 17.3	19 98	89.0	5 22.9	19 98	88.5	5 28.5	19 98	88.0	5 34.1	19 98	87.5	85

H.A.	0° 00′				0° 30′				1° 00′				1° 30′				2° 00′				2° 30′				3° 00′				3° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	79 00.0	1.0	04	180.0	78 30.0	1.0	04	180.0	78 00.0	1.0	04	180.0	77 30.0	1.0	04	180.0	77 00.0	1.0	04	180.0	76 30.0	1.0	04	180.0	76 00.0	1.0	04	180.0	75 30.0	1.0	03	180.0	00
1	78 57.3	1.0	13	174.8	78 27.4	1.0	13	175.0	77 57.5	1.0	12	175.2	77 27.6	1.0	12	175.4	76 57.7	1.0	11	175.6	76 27.8	1.0	11	175.7	75 57.9	1.0	11	175.9	75 28.0	1.0	10	176.0	1
2	78 49.3	98	22	169.6	78 19.8	99	21	170.1	77 50.2	99	20	170.5	77 20.6	99	19	170.8	76 50.9	99	19	171.2	76 21.2	99	18	171.5	75 51.6	99	17	171.8	75 21.8	99	17	172.1	2
3	78 36.2	97	30	164.6	78 07.2	97	29	165.3	77 38.1	97	28	165.9	77 08.9	97	27	166.4	76 39.7	97	26	166.9	76 10.4	98	25	167.4	75 41.1	98	24	167.8	75 11.8	98	23	168.2	3
4	78 18.2	94	37	159.9	77 49.9	95	36	160.7	77 21.5	95	35	161.4	76 52.9	95	34	162.1	76 24.3	96	32	162.7	75 55.5	96	31	163.3	75 26.7	96	30	163.9	74 57.8	96	29	164.4	4
05	77 55.8	91	44	155.4	77 28.3	92	43	156.3	77 00.6	92	41	157.2	76 32.8	93	40	158.0	76 04.9	93	39	158.8	75 36.8	94	37	159.5	75 08.5	94	36	160.2	74 40.2	95	35	160.8	05
6	77 29.3	88	50	151.2	77 02.7	89	49	152.2	76 35.9	90	47	153.2	76 08.9	90	46	154.1	75 41.7	91	44	155.0	75 14.3	92	43	155.8	74 46.8	92	42	156.6	74 19.1	93	41	157.3	6
7	76 59.1	85	56	147.2	76 33.5	86	54	148.4	76 07.7	87	52	149.5	75 41.5	88	51	150.5	75 15.2	88	50	151.4	74 48.6	89	48	152.3	74 21.8	90	47	153.2	73 54.8	90	46	154.0	7
8	76 25.7	81	60	143.6	76 01.1	82	59	144.8	75 36.2	84	57	146.0	75 11.0	85	56	147.0	74 45.5	85	54	148.1	74 19.7	86	53	149.0	73 53.7	87	51	149.9	73 27.5	88	50	150.8	8
9	75 49.4	78	65	140.3	75 25.8	79	63	141.6	75 01.8	80	61	142.7	74 37.5	82	60	143.9	74 12.9	83	58	144.9	73 48.0	83	57	145.9	73 22.8	84	56	146.9	72 57.4	85	54	147.8	9
10	75 10.5	75	68	137.3	74 47.9	76	67	138.5	74 24.9	77	65	139.7	74 01.6	79	64	140.9	73 37.9	80	62	142.0	73 13.8	81	61	143.0	72 49.4	82	60	144.0	72 24.8	83	58	145.0	10
1	74 29.5	71	72	134.5	74 07.9	73	70	135.8	73 45.8	74	69	137.0	73 23.3	76	67	138.1	73 00.5	77	66	139.3	72 37.3	78	64	140.3	72 13.8	79	63	141.4	71 49.9	80	62	142.4	1
2	73 46.6	68	74	131.9	73 25.8	70	73	133.2	73 04.7	71	72	134.4	72 43.1	73	70	135.6	72 21.1	74	69	136.7	71 58.7	75	67	137.8	71 36.0	76	66	138.9	71 12.9	77	65	139.9	2
3	73 01.9	65	77	129.6	72 42.1	67	75	130.8	72 21.7	68	74	132.1	72 01.0	70	73	133.3	71 39.8	71	71	134.4	71 18.3	72	70	135.5	70 56.3	74	69	136.5	70 34.1	75	68	137.6	3
4	72 15.8	63	79	127.4	71 56.8	64	78	128.7	71 37.3	66	76	129.9	71 17.3	67	75	131.1	70 56.9	69	74	132.2	70 36.2	70	73	133.3	70 15.0	71	71	134.4	69 53.5	72	70	135.4	4
15	71 28.4	60	81	125.5	71 10.2	62	80	126.7	70 51.4	63	78	127.9	70 32.2	65	77	129.1	70 12.6	66	76	130.2	69 52.6	67	75	131.3	69 32.2	69	74	132.3	69 11.4	70	72	133.4	15
6	70 39.9	58	83	123.6	70 22.4	59	81	124.9	70 04.4	61	80	126.0	69 45.9	62	79	127.2	69 27.0	64	78	128.3	69 07.7	65	77	129.4	68 48.0	66	76	130.4	68 27.9	68	75	131.5	6
7	69 50.4	55	84	122.0	69 33.6	57	83	123.2	69 16.2	59	82	124.3	68 58.4	60	81	125.5	68 40.2	61	80	126.6	68 21.6	63	79	127.6	68 02.6	64	78	128.7	67 43.1	65	76	129.7	7
8	69 00.0	53	85	120.4	68 43.8	55	84	121.6	68 27.1	56	83	122.7	68 10.0	58	82	123.8	67 52.4	59	81	124.9	67 34.4	61	80	126.0	67 16.0	62	79	127.0	66 57.3	63	78	128.0	8
9	68 08.9	51	86	119.0	67 53.2	53	85	120.1	67 37.2	54	85	121.2	67 20.6	56	84	122.3	67 03.7	57	83	123.4	66 46.3	59	82	124.4	66 28.5	60	81	125.5	66 10.4	61	80	126.4	9
20	67 17.0	49	87	117.7	67 02.0	51	87	118.8	66 46.4	52	86	119.9	66 30.5	54	85	120.9	66 14.1	55	84	122.0	65 57.3	57	83	123.0	65 40.1	58	82	124.0	65 22.5	59	81	125.0	20
1	66 24.6	48	88	116.4	66 10.0	49	88	117.5	65 55.0	51	87	118.6	65 39.6	52	86	119.6	65 23.8	53	85	120.7	65 07.5	55	84	121.7	64 50.9	56	83	122.6	64 33.9	57	82	123.6	1
2	65 31.6	46	89	115.3	65 17.5	48	88	116.3	65 03.0	49	88	117.4	64 48.1	50	87	118.4	64 32.8	52	86	119.4	64 17.1	53	85	120.4	64 01.0	54	84	121.4	63 44.5	56	84	122.3	2
3	64 38.1	45	90	114.2	64 24.5	46	89	115.2	64 10.5	47	88	116.3	63 56.0	49	88	117.3	63 41.2	50	87	118.2	63 26.0	51	86	119.2	63 10.3	53	85	120.2	62 54.3	54	85	121.1	3
4	63 44.1	43	91	113.2	63 31.0	45	90	114.2	63 17.4	46	89	115.2	63 03.4	47	88	116.2	62 49.0	49	88	117.2	62 34.3	50	87	118.1	62 19.1	51	86	119.0	62 03.6	52	86	120.0	4
25	62 49.8	42	91	112.3	62 37.1	43	90	113.2	62 23.9	45	90	114.2	62 10.3	46	89	115.2	61 56.4	47	88	116.1	61 42.1	48	88	117.0	61 27.4	50	87	118.0	61 12.3	51	86	118.9	25
6	61 55.1	41	92	111.4	61 42.8	42	91	112.3	61 30.0	43	90	113.3	61 16.8	45	90	114.2	61 03.3	46	89	115.1	60 49.4	47	89	116.1	60 35.1	48	88	117.0	60 20.5	49	87	117.8	6
7	61 00.1	39	92	110.5	60 48.1	41	92	111.5	60 35.7	42	91	112.4	60 22.9	43	90	113.3	60 09.8	44	90	114.2	59 56.3	46	89	115.1	59 42.4	47	89	116.0	59 28.2	48	88	116.9	7
8	60 04.8	38	93	109.7	59 53.1	40	92	110.7	59 41.1	41	92	111.6	59 28.7	42	91	112.5	59 15.9	43	90	113.4	59 02.7	44	90	114.2	58 49.2	46	89	115.1	58 35.4	47	89	116.0	8
9	59 09.3	37	93	109.0	58 57.9	38	92	109.9	58 46.2	40	92	110.8	58 34.1	41	91	111.7	58 21.6	42	91	112.5	58 08.9	43	90	113.4	57 55.7	44	90	114.2	57 42.2	45	89	115.1	9
30	58 13.4	36	93	108.3	58 02.4	37	93	109.2	57 51.0	39	92	110.0	57 39.2	40	92	110.9	57 27.1	41	91	111.8	57 14.6	42	91	112.6	57 01.8	43	90	113.4	56 48.7	44	90	114.3	30
1	57 17.4	35	94	107.6	57 06.6	36	93	108.5	56 55.5	38	93	109.3	56 44.1	39	92	110.2	56 32.3	40	92	111.0	56 20.1	41	91	111.8	56 07.6	42	91	112.7	55 54.9	43	90	113.5	1
2	56 21.2	34	94	107.0	56 10.7	36	94	107.8	55 59.8	37	93	108.7	55 48.7	38	93	109.5	55 37.1	39	92	110.3	55 25.3	40	92	111.1	55 13.2	41	91	111.9	55 00.7	42	91	112.7	2
3	55 24.8	34	94	106.4	55 14.5	35	94	107.2	55 03.9	36	94	108.0	54 53.0	37	93	108.8	54 41.8	38	93	109.6	54 30.2	39	92	110.4	54 18.4	40	92	111.2	54 06.2	41	91	112.0	3
4	54 28.2	33	95	105.8	54 18.2	34	94	106.6	54 07.8	35	94	107.4	53 57.2	36	93	108.2	53 46.2	37	93	109.0	53 34.9	38	93	109.8	53 23.3	39	92	110.5	53 11.5	40	92	111.3	4
35	53 31.4	32	95	105.2	53 21.6	33	94	106.0	53 11.5	34	94	106.8	53 01.1	35	94	107.6	52 50.4	36	93	108.4	52 39.4	37	93	109.1	52 28.1	38	92	109.9	52 16.5	39	92	110.7	35
6	52 34.5	31	95	104.7	52 24.9	32	95	105.5	52 15.1	33	94	106.3	52 04.9	34	94	107.0	51 54.4	35	94	107.8	51 43.7	36	93	108.5	51 32.6	37	93	109.3	51 21.3	38	92	110.0	6
7	51 37.5	31	95	104.2	51 28.1	32	95	105.0	51 18.5	33	95	105.7	51 08.5	34	94	106.5	50 58.3	35	94	107.2	50 47.7	36	94	108.0	50 36.9	36	93	108.7	50 25.8	37	93	109.4	7
8	50 40.3	30	95	103.7	50 31.2	31	95	104.5	50 21.7	32	95	105.2	50 11.9	33	94	106.0	50 01.9	34	94	106.7	49 51.6	35	94	107.4	49 41.0	36	93	108.1	49 30.2	37	93	108.9	8
9	49 43.1	30	96	103.3	49 34.1	30	95	104.0	49 24.8	31	95	104.7	49 15.2	32	95	105.5	49 05.4	33	94	106.2	48 55.3	34	94	106.9	48 45.0	35	94	107.6	48 34.4	36	93	108.3	9
40	48 45.7	29	96	102.8	48 36.9	30	96	103.5	48 27.8	31	95	104.3	48 18.4	32	95	105.0	48 08.8	33	95	105.7	47 58.9	33	94	106.4	47 48.8	34	94	107.1	47 38.4	35	94	107.8	40
1	47 48.2	28	96	102.4	47 39.5	29	96	103.1	47 30.6	30	95	103.8	47 21.4	31	95	104.5	47 12.0	32	95	105.2	47 02.3	33	95	105.9	46 52.4	34	94	106.6	46 42.2	34	94	107.3	1
2	46 50.6	28	96	102.0	46 42.1	29	96	102.7	46 33.4	30	96	103.4	46 24.4	30	95	104.1	46 15.1	31	95	104.7	46 05.6	32	95	105.4	45 55.9	33	94	106.1	45 45.9	34	94	106.8	2
3	45 53.0	27	96	101.6	45 44.6	28	96	102.3	45 36.0	29	96	102.9	45 27.2	30	95	103.6	45 18.1	31	96	104.3	45 08.8	31	96	105.0	44 59.2	32	95	105.6	44 49.4	33	94	106.3	3
4	44 55.2	27	96	101.2	44 47.0	28	96	101.9	44 38.6	29	96	102.5	44 29.9	29	96	103.2	44 21.0	30	95	103.9	44 11.8	31	95	104.5	44 02.4	32	95	105.2	43 52.8	32	95	105.9	4
45	43 57.4	27	96	100.8	43 49.3	27	96	101.5	43 41.0	28	96	102.1	43 32.5	29	96	102.8	43 23.7	30	96	103.5	43 14.8	30	95	104.1	43 05.5	31	95	104.8	42 56.1	32	95	105.4	45
6	42 59.5	26	97	100.4	42 51.6	27	96	101.1	42 43.4	28	96	101.8	42 35.0	28	96	102.4	42 26.4	29	96	103.1	42 17.6	30	95	103.7	42 08.5	31	95	104.3	41 59.3	31	96	105.0	6
7	42 01.6	26	97	100.1	41 53.7	26	96	100.7	41 45.7	27	96	101.4	41 37.5	28	96	102.0	41 29.0	29	96	102.7	41 20.3	29	96	103.3	41 11.4	30	95	103.9	41 02.3	31	95	104.6	7
8	41 03.5	25	97	99.7	40 55.8	26	97	100.4	40 47.9	27	96	101.0	40 39.8	27	96	101.7	40 31.5	28	96	102.3	40 23.0	29	96	102.9	40 14.2	29	96	103.6	40 05.3	30	96	104.2	8
9	40 05.5	25	97	99.4	39 57.9	26	97	100.0	39 50.1	26	97	100.7	39 42.1	27	96	101.3	39 33.9	28	96	101.9	39 25.5	28	96	102.6	39 16.9	29	96	103.2	39 08.1	30	95	103.8	9
50	39 07.3	25	97	99.1	38 59.9	25	97	99.7	38 52.2	26	97	100.3	38 44.3	27	96	101.0	38 36.2	27	96	101.6	38 28.0	28	96	102.2	38 19.5	28	96	102.8	38 10.9	29	96	103.4	50
1	38 09.2	24	97	98.8	38 01.8	25	97	99.4	37 54.2	26	97	100.0	37 46.5	26	97	100.6	37 38.5	27	96	101.2	37 30.4	27	96	101.8	37 22.1	28	96	102.4	37 13.5	29	96	103.0	1
2	37 10.9	24	97	98.5	37 03.6	25	97	99.1	36 56.2	25	97	99.7	36 48.5	26	97	100.3	36 40.7	26	96	100.9	36 32.7	27	96	101.5	36 24.5	28	96	102.1	36 16.1	28	96	102.7	2
3	36 12.6	24	97	98.2	36 05.5	24	97	98.8	35 58.1	25	97	99.4	35 50.6	25	97	100.0	35 42.8	26	97	100.6	35 34.9	27	96	101.2	35 26.9	27	96	101.8	35 18.6	28	96	102.4	3
4	35 14.3	23	97	97.9	35 07.2	24	97	98.5	35 00.0	25	97	99.1	34 52.5	25	97	99.7	34 44.9	26	97	100.3	34 37.1	26	96	100.8	34 29.2	27	96	101.4	34 21.1	27	96	102.0	4
55	34 16.0	23	97	97.6	34 09.0	24	97	98.2	34 01.8	24	97	98.8	33 54.4	25	97	99.4	33 46.9	25	97	100.0	33 39.3	26	97	100.5	33 31.4	26	96	101.1	33 23.4	27	96	101.7	55
6	33 17.6	23	97	97.3	33 10.6	23	97	97.9	33 03.6	24	97	98.5	32 56.3	24	97	99.1	32 48.9	25	97	99.7	32 41.3	25	77	100.2	32 33.6	26	96	100.8	32 25.7	27	96	101.4	6
7	32 19.1	23	97	97.1	32 12.3	23	97	97.6	32 05.3	24	97	98.2	31 58.1	24	97	98.8	31 50.8	25	97	99.4	31 43.3	25	97	99.9	31 35.7	26	97	100.5	31 27.9	26	96	101.1	7
8	31 20.7	22	98	96.8	31 13.9	23	97	97.4	31 07.0	23	97	97.9	30 59.9	24	97	98.5	30 52.7	24	97	99.1	30 45.3	25	97	99.6	30 37.8	25	97	100.2	30 30.1	26	96	100.8	8
9	30 22.2	22	98	96.5	30 15.5	23	97	97.1	30 08.6	23	97	97.7	30 01.6	24	97	98.2	29 54.5	24	97	98.8	29 47.2	25	97	99.4	29 39.8	25	97	99.9	29 32.2	25	97	100.5	9
60	29 23.6	22	98	96.3	29 17.0	22	97	96.8	29 10.2	23	97	97.4	29 03.3	23	97	98.0	28 56.3	24	97	98.5	28 49.1	24	97	99.1	28 41.7	25	97	99.6	28 34.3	25	97	100.2	60
1	28 25.1	22	98	96.0	28 18.5	22	98	96.6	28 11.8	23	97	97.1	28 05.0	23	97	97.7	27 58.0	23	97	98.2	27 50.9	24	97	98.8	27 43.6	24	97	99.3	27 36.3	25	97	99.9	1
2	27 26.5	22	98	95.8	27 20.0	22	98	96.3	27 13.3	22	98	96.9	27 06.6	23	97	97.4	26 59.7	23	97	98.0	26 52.6	24	97	98.5	26 45.5	24	97	99.1	26 38.2	24	97	99.6	2
3	26 27.9	21	98	95.6	26 21.4	22	98	96.1	26 14.9	22	98	96.6	26 08.2	23	97	97.2	26 01.3	23	97	97.7	25 54.4	23	97	98.3	25 47.3	24	97	98.8	25 40.1	24	97	99.3	3
4	25 29.3	21	98	95.3	25 22.9	22	98	95.9	25 16.3	22	98	96.4	25 09.7	22	97	96.9	25 02.9	23	97	97.5	24 56.1	23	97	98.0	24 49.1	23	97	98.5	24 42.0	24	97	99.1	4
65	24 30.6	21	98	95.1	24 24.3	21	98	95.6	24 17.8	22	98	96.2	24 11.2	22	98	96.7	24 04.5	22	97	97.2	23 57.7	23	97	97.8	23 50.8	23	97	98.3	23 43.8	24	97	98.8	65
6	23 31.9	21	98	94.9	23 25.6	21	98	95.4	23 19.2	22	98	95.9	23 12.7	22	98	96.5	23 06.1	22	97	97.0	22 59.4	23	97	97.5	22 52.5	23	97	98.0	22 45.6	23	97	98.6	6
7	22 33.2	21	98	94.6	22 27.0	21	98	95.2	22 20.6	21	98	95.7	22 14.2	22	98	96.2	22 07.6	22	98	96.7	22 01.0	22	97	97.3	21 54.2	23	97	97.8	21 47.3	23	97	98.3	7
8	21 34.5	21	98	94.4	21 28.3	21	98	94.9	21 22.0	21	98	95.5	21 15.6	22	98	96.0	21 09.1	22	98	96.5	21 02.5	22	97	97.0	20 55.8	22	97	97.6	20 49.0	23	97	98.1	8
9	20 35.8	20	98	94.2	20 29.6	21	98	94.7	20 23.4	21	98	95.2	20 17.0	21	98	95.8	20 10.6	22	98	96.3	20 04.0	22	98	96.8	19 57.4	22	97	97.3	19 50.7	23	97	97.8	9
70	19 37.0	20	98	94.0	19 30.9	21	98	94.5	19 24.7	21	98	95.0	19 18.4	21	98	95.5	19 12.0	21	98	96.0	19 05.5	22	98	96.6	18 59.0	22	97	97.1	18 52.3	22	97	97.6	70
1	18 38.3	20	98	93.8	18 32.2	20	98	94.3	18 26.0	21	98	94.8	18 19.8	21	98	95.3	18 13.4	21	98	95.8	18 07.0	22	98	96.3	18 00.5	22	98	96.8	17 53.9	22	97	97.4	1
2	17 39.5	20	98	93.5	17 33.5	20	98	94.1	17 27.3	21	98	94.6	17 21.1	21	98	95.1	17 14.8	21	98	95.6	17 08.5	21	98	96.1	17 02.0	22	98	96.6	16 55.5	22	97	97.1	2
3	16 40.7	20	98	93.3	16 34.7	20	98	93.8	16 28.6	20	98	94.4	16 22.4	21	98	94.9	16 16.2	21	98	95.4	16 09.9	21	98	95.9	16 03.5	21	98	96.4	15 57.1	22	97	96.9	3
4	15 41.9	20	98	93.1	15 35.9	20	98	93.6	15 29.9	20	98	94.1	15 23.7	21	98	94.7	15 17.6	21	98	95.2	15 11.3	21	98	95.7	15 05.0	21	98	96.2	14.58.6	21	98	96.7	4
75	14 43.1	20	98	92.9	14 37.1	20	98	93.4	14 31.1	20	98	93.9	14 25.0	20	98	94.4	14 18.9	21	98	95.0	14 12.7	21	98	95.5	14 06.4	21	98	96.0	14 00.1	21	98	96.5	75
6	13 44.3	20	98	92.7	13 38.3	20	98	93.2	13 32.4	20	98	93.7	13 26.3	20	98	94.2	13 20.2	20	98	94.7	13 14.0	21	98	95.2	13 07.8	21	98	95.7	13 01.5	21	98	96.2	6
7	12 45.4	20	98	92.5	12 39.5	20	98	93.0	12 33.6	20	98	93.5	12 27.6	20	98	94.0	12 21.5	20	98	94.5	12 15.4	20	98	95.0	12 09.2	21	98	95.5	12 03.0	21	98	96.0	7
8	11 46.6	19	98	92.3	11 40.7	20	98	92.8	11 34.8	20	98	93.3	11 28.8	20	98	93.8	11 22.8	20	98	94.3	11 16.7	20	98	94.8	11 10.6	21	98	95.3	11 04.4	21	98	95.8	8
9	10 47.7	19	98	92.1	10 41.9	20	98	92.6	10 36.0	20	98	93.1	10 30.0	20	98	93.6	10 24.0	20	98	94.1	10 18.0	20	98	94.6	10 11.9	20	98	95.1	10 05.8	21	98	95.6	9
80	9 48.9	19	98	91.9	9 43.0	20	98	92.4	9 37.2	20	98	92.9	9 31.2	20	98	93.4	9 25.3	20	98	93.9	9 19.3	20	98	94.4	9 13.2	20	98	94.9	9 07.2	20	98	95.4	80
1	8 50.0	19	98	91.7	8 44.2	19	98	92.2	8 38.3	20	98	92.7	8 32.4	20	98	93.2	8 26.5	20	98	93.7	8 20.6	20	98	94.2	8 14.6	20	98	94.7	8 08.5	20	98	95.2	1
2	7 51.1	19	98	91.5	7 45.3	19	98	92.0	7 39.5	19	98	92.5	7 33.6	20	98	93.0	7 27.7	20	98	93.5	7 21.8	20	98	94.0	7 15.8	20	98	94.5	7 09.8	20	98	95.0	2
3	6 52.2	19	98	91.3	6 46.5	19	98	91.8	6 40.7	19	98	92.3	6 34.8	20	98	92.8	6 28.9	20	98	93.3	6 23.0	20	98	93.8	6 17.1	20	98	94.3	6 11.2	20	98	94.8	3
4	5 53.4	19	98	91.1	5 47.6	19	98	91.6	5 41.8	19	98	92.1	5 36.0	19	98	92.6	5 30.1	20	98	93.1	5 24.3	20	98	93.6	5 18.4	20	98	94.1	5 12.5	20	98	94.6	4

at.
1°

H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	83 00.0	1.0 07	180.0	83 30.0	1.0 08	180.0	84 00.0	1.0 08	180.0	84 30.0	1.0 09	180.0	85 00.0	1.0 10	180.0	85 30.0	1.0 11	180.0	86 00.0	1.0 12	180.0	86 30.0	1.0 14	180.0	00
1	82 55.8	99 21	171.9	83 25.5	99 22	171.3	83 55.1	99 24	170.6	84 24.7	98 26	169.7	84 54.2	98 28	168.7	85 23.6	98 31	167.5	85 52.8	97 34	166.0	86 21.8	96 38	164.2	1
2	82 43.5	96 33	164.0	83 12.3	96 35	162.9	83 40.9	95 38	161.6	84 09.3	94 40	160.1	84 37.4	93 44	158.3	85 05.1	92 47	156.1	85 32.3	90 52	153.6	85 58.9	87 57	150.4	2
3	82 23.7	92 44	156.8	82 51.2	91 47	155.2	83 18.3	90 49	153.4	83 45.0	88 53	151.4	84 11.2	86 56	149.1	84 36.7	84 60	146.4	85 01.4	81 64	143.2	85 25.0	77 69	139.5	3
4	81 57.4	87 53	150.2	82 23.3	86 56	148.3	82 48.7	84 59	146.3	83 13.5	81 62	143.9	83 37.5	79 66	141.3	84 00.6	75 69	138.4	84 22.7	72 73	135.0	84 43.5	67 77	131.2	4
05	81 25.5	82 61	144.3	81 49.7	80 64	142.3	82 13.3	77 66	140.1	82 36.2	75 70	137.6	82 58.1	72 73	134.9	83 19.0	68 76	131.9	83 38.7	63 79	128.6	83 57.0	58 83	124.9	05
6	80 49.0	77 67	139.2	81 11.6	74 70	137.1	81 33.5	72 72	134.8	81 54.5	68 75	132.3	82 14.5	65 78	129.6	82 33.4	61 81	126.7	82 51.1	57 84	123.5	83 07.3	52 87	120.1	6
7	80 08.8	72 72	134.7	80 29.8	69 74	132.6	80 50.1	66 77	130.3	81 09.4	63 79	127.9	81 27.7	59 82	125.3	81 44.9	55 84	122.5	82 00.8	51 87	119.5	82 15.4	46 89	116.3	7
8	79 25.5	67 76	130.8	79 45.1	64 78	128.8	80 03.9	61 81	126.5	80 21.8	58 83	124.2	80 38.6	54 85	121.6	80 54.3	50 87	119.0	81 08.7	46 89	116.2	81 21.9	41 91	113.2	8
9	78 39.8	62 79	127.4	78 58.1	60 81	125.4	79 15.6	57 83	123.3	79 32.1	53 85	121.0	79 47.6	50 87	118.6	80 02.0	46 89	116.1	80 15.3	42 91	113.5	80 27.2	38 92	110.7	9
10	77 52.1	58 82	124.5	78 09.3	56 84	122.5	78 25.5	53 86	120.4	78 40.9	50 87	118.3	78 55.3	46 89	116.0	79 08.6	43 91	113.7	79 20.8	39 92	111.2	79 31.8	35 93	108.7	10
1	77 02.8	55 84	121.9	77 18.9	52 86	120.0	77 34.1	49 88	118.0	77 48.5	46 89	115.9	78 01.8	43 90	113.8	78 14.2	39 92	111.6	78 25.5	36 93	109.3	78 35.7	32 94	106.9	1
2	76 12.2	52 86	119.6	76 27.3	49 88	117.7	76 41.6	46 89	115.9	76 55.0	43 90	113.9	77 07.5	40 92	111.9	77 19.1	37 93	109.8	77 29.6	33 94	107.6	77 39.1	30 95	105.4	2
3	75 20.4	49 88	117.5	75 34.7	46 89	115.8	75 48.2	44 90	114.0	76 00.8	41 91	112.1	76 12.6	38 93	110.2	76 23.4	35 94	108.2	76 33.3	31 95	106.2	76 42.2	28 95	104.1	3
4	74 27.8	46 89	115.7	74 41.3	44 90	114.0	74 54.0	41 91	112.3	75 05.9	38 92	110.5	75 17.0	36 93	108.7	75 27.2	33 94	106.9	75 36.6	29 95	105.0	75 44.9	26 96	103.0	4
15	73 34.4	44 90	114.1	73 47.2	41 91	112.5	73 59.2	39 92	110.8	74 10.5	36 93	109.1	74 21.0	34 94	107.4	74 30.7	31 95	105.6	74 39.5	28 96	103.8	74 47.4	25 96	102.0	15
6	72 40.3	42 91	112.6	72 52.5	39 92	111.1	73 03.9	37 93	109.5	73 14.7	35 94	107.9	73 24.6	32 94	106.2	73 33.8	29 95	104.6	73 42.2	27 96	102.9	73 49.7	24 96	101.1	6
7	71 45.6	40 92	111.3	71 57.3	38 93	109.8	72 08.2	35 94	108.3	72 18.4	33 94	106.7	72 27.9	30 95	105.2	72 36.7	28 96	103.6	72 44.7	26 96	102.0	72 51.9	23 97	100.3	7
8	70 50.5	38 93	110.1	71 01.7	36 93	108.6	71 12.1	34 94	107.2	71 21.9	31 95	105.7	71 31.0	29 95	104.2	71 39.3	27 96	102.7	71 47.0	24 96	101.2	71 53.8	22 97	99.6	8
9	69 55.0	37 93	108.9	70 05.7	34 94	107.6	70 15.7	32 94	106.2	70 25.1	30 95	104.8	70 33.8	28 96	103.3	70 41.8	26 96	101.9	70 49.1	23 97	100.4	70 55.7	21 97	98.9	9
20	68 59.1	35 94	107.9	69 09.4	33 94	106.6	69 19.0	31 95	105.3	69 28.0	29 95	103.9	69 36.4	27 96	102.5	69 44.1	25 96	101.2	69 51.1	22 97	99.8	69 57.5	20 97	98.3	20
1	68 03.0	34 94	107.0	68 12.8	32 95	105.7	68 22.1	30 95	104.4	68 30.7	28 96	103.1	68 38.8	26 96	101.8	68 46.2	24 97	100.5	68 53.0	22 97	99.1	68 59.2	19 97	97.8	1
2	67 06.5	33 94	106.1	67 16.0	31 95	104.9	67 24.9	29 96	103.7	67 33.3	27 96	102.4	67 41.1	25 96	101.1	67 48.3	23 97	99.9	67 54.8	21 97	98.6	68 00.8	19 97	97.3	2
3	66 09.8	32 95	105.3	66 19.0	30 95	104.1	66 27.6	28 96	102.9	66 35.7	26 96	101.7	66 43.2	24 97	100.5	66 50.2	22 97	99.3	66 56.5	20 97	98.0	67 02.3	18 98	96.8	3
4	65 12.9	30 95	104.6	65 21.8	29 96	103.4	65 30.1	27 96	102.3	65 38.0	25 96	101.1	65 45.3	23 97	99.9	65 52.0	22 97	98.7	65 58.2	20 97	97.5	66 03.8	18 98	96.3	4
25	64 15.8	30 95	103.9	64 24.4	28 96	102.8	64 32.5	26 96	101.6	64 40.1	24 97	100.5	64 47.2	23 97	99.4	64 53.7	21 97	98.2	64 59.8	19 97	97.1	65 05.2	17 98	95.9	25
6	63 18.5	29 96	103.2	63 26.9	27 96	102.1	63 34.8	25 96	101.1	63 42.2	24 97	100.0	63 49.0	22 97	98.9	63 55.4	20 97	97.7	64 01.3	19 98	96.6	64 06.6	17 98	95.5	6
7	62 21.1	28 96	102.6	62 29.3	26 96	101.5	62 36.9	25 97	100.5	62 44.1	23 97	99.4	62 50.8	22 97	98.4	62 57.0	20 97	97.3	63 02.8	18 98	96.2	63 08.0	17 98	95.1	7
8	61 23.6	27 96	102.0	61 31.5	26 96	101.0	61 39.0	24 97	100.0	61 46.0	23 97	99.0	61 52.5	21 97	97.9	61 58.6	19 98	96.9	62 04.2	18 98	95.8	62 09.3	16 98	94.8	8
9	60 25.9	26 96	101.5	60 33.6	25 97	100.5	60 40.9	24 97	99.5	60 47.7	22 97	98.5	60 54.1	21 97	97.5	61 00.1	19 98	96.5	61 05.6	18 98	95.5	61 10.6	16 98	94.4	9
30	59 28.1	26 96	100.9	59 35.7	24 97	100.0	59 42.8	23 97	99.0	59 49.5	22 97	98.1	59 55.7	20 97	97.1	60 01.5	19 98	96.1	60 06.9	17 98	95.1	60 11.9	16 98	94.1	30
1	58 30.3	25 97	100.4	58 37.6	24 97	99.5	58 44.6	23 97	98.6	58 51.1	21 97	97.6	58 57.2	20 98	96.7	59 03.0	18 98	95.7	59 08.2	17 98	94.8	59 13.1	16 98	93.8	1
2	57 32.3	25 97	100.0	57 39.5	23 97	99.1	57 46.3	22 97	98.2	57 52.7	21 97	97.2	57 58.7	19 98	96.3	58 04.3	18 98	95.4	58 09.5	17 98	94.5	58 14.3	15 98	93.5	2
3	56 34.2	24 97	99.5	56 41.3	23 97	98.6	56 48.0	22 97	97.8	56 54.3	20 97	96.9	57 00.2	19 98	96.0	57 05.7	18 98	95.1	57 10.8	16 98	94.1	57 15.5	15 98	93.2	3
4	55 36.1	24 97	99.1	55 43.0	22 97	98.2	55 49.6	21 97	97.4	55 55.8	20 98	96.5	56 01.6	19 98	95.6	56 07.0	17 98	94.7	56 12.1	16 98	93.9	56 16.7	15 98	93.0	4
35	54 37.9	23 97	98.7	54 44.7	22 97	97.8	54 51.1	21 97	97.0	54 57.2	20 98	96.1	55 02.9	18 98	95.3	55 08.3	17 98	94.4	55 13.3	16 98	93.6	55 17.9	15 98	92.7	35
6	53 39.7	23 97	98.3	53 46.3	22 97	97.5	53 52.7	21 98	96.6	53 58.6	19 98	95.8	54 04.3	18 98	95.0	54 09.6	17 98	94.1	54 14.5	16 98	93.3	54 19.1	15 98	92.4	6
7	52 41.4	22 97	97.9	52 47.9	21 97	97.1	52 54.1	20 98	96.3	53 00.0	19 98	95.5	53 05.6	18 98	94.7	53 10.8	17 98	93.9	53 15.7	16 98	93.0	53 20.2	15 98	92.2	7
8	51 43.0	22 97	97.6	51 49.5	21 98	96.8	51 55.6	20 98	96.0	52 01.4	19 98	95.2	52 06.9	18 98	94.4	52 12.0	17 98	93.6	52 16.9	16 98	92.8	52 21.4	14 98	92.0	8
9	50 44.6	22 97	97.2	50 51.0	21 98	96.4	50 57.0	20 98	95.7	51 02.7	19 98	94.9	51 08.1	18 98	94.1	51 13.2	16 98	93.3	51 18.0	15 98	92.5	51 22.5	14 98	91.7	9
40	49 46.1	21 98	96.9	49 52.4	20 98	96.1	49 58.4	19 98	95.4	50 04.0	18 98	94.6	50 09.4	17 98	93.8	50 14.4	16 98	93.1	50 19.2	15 98	92.3	50 23.6	14 98	91.5	40
1	48 47.7	21 98	96.6	48 53.8	20 98	95.8	48 59.7	19 98	95.1	49 05.3	18 98	94.3	49 10.6	17 98	93.6	49 15.6	16 98	92.8	49 20.3	15 98	92.0	49 24.7	14 98	91.3	1
2	47 49.1	21 98	96.2	47 55.2	20 98	95.5	48 01.0	19 98	94.8	48 06.6	18 98	94.0	48 11.8	17 98	93.3	48 16.8	16 98	92.6	48 21.5	15 98	91.8	48 25.9	14 98	91.1	2
3	46 50.6	21 98	95.9	46 56.6	20 98	95.2	47 02.3	19 98	94.5	47 07.8	18 98	93.8	47 13.0	17 98	93.1	47 17.9	16 98	92.3	47 22.6	15 98	91.6	47 27.0	14 98	90.9	3
4	45 52.0	20 98	95.6	45 57.9	19 98	94.9	46 03.6	19 98	94.2	46 09.0	18 98	93.5	46 14.2	17 98	92.8	46 19.1	16 98	92.1	46 23.7	15 98	91.4	46 28.1	14 98	90.7	4
45	44 53.3	20 98	95.4	44 59.2	19 98	94.7	45 04.9	18 98	94.0	45 10.2	18 98	93.3	45 15.4	17 98	92.6	45 20.2	16 98	91.9	45 24.8	15 98	91.2	45 29.2	14 98	90.5	45
6	43 54.7	20 98	95.1	44 00.5	19 98	94.4	44 06.1	18 98	93.7	44 11.4	17 98	93.0	44 16.5	17 98	92.3	44 21.4	16 98	91.6	44 25.9	15 98	91.0	44 30.3	14 98	90.3	6
7	42 56.0	20 98	94.8	43 01.8	19 98	94.1	43 07.3	18 98	93.5	43 12.6	17 98	92.8	43 17.7	16 98	92.1	43 22.5	16 98	91.4	43 27.0	15 98	90.8	43 31.4	14 98	90.1	7
8	41 57.3	19 98	94.5	42 03.0	19 98	93.9	42 08.5	18 98	93.2	42 13.8	17 98	92.6	42 18.8	16 98	91.9	42 23.6	16 98	91.2	42 28.2	15 98	90.6	42 32.5	14 98	89.9	8
9	40 58.6	19 98	94.3	41 04.2	19 98	93.6	41 09.7	18 98	93.0	41 14.9	17 98	92.3	41 19.9	16 98	91.7	41 24.7	16 98	91.0	41 29.3	15 98	90.4	41 33.6	14 98	89.7	9
50	39 59.8	19 98	94.0	40 05.5	18 98	93.4	40 10.9	18 98	92.7	40 16.1	17 98	92.1	40 21.0	16 98	91.5	40 25.8	16 98	90.8	40 30.4	15 98	90.2	40 34.7	14 98	89.5	50
1	39 01.1	19 98	93.8	39 06.7	18 98	93.2	39 12.0	18 98	92.5	39 17.2	17 98	91.9	39 22.2	16 98	91.2	39 26.9	15 98	90.6	39 31.5	15 98	90.0	39 35.8	14 98	89.3	1
2	38 02.3	19 98	93.5	38 07.8	18 98	92.9	38 13.2	17 98	92.3	38 18.3	17 98	91.7	38 23.3	16 98	91.0	38 28.0	15 98	90.4	38 32.6	15 98	89.8	38 36.9	14 98	89.1	2
3	37 03.5	19 98	93.3	37 09.0	18 98	92.7	37 14.3	17 98	92.1	37 19.5	17 98	91.5	37 24.4	16 98	90.8	37 29.1	15 98	90.2	37 33.7	15 98	89.6	37 38.0	14 98	89.0	3
4	36 04.7	19 98	93.1	36 10.2	18 98	92.5	36 15.5	17 98	91.9	36 20.6	17 98	91.2	36 25.5	16 98	90.6	36 30.2	15 98	90.0	36 34.8	15 98	89.4	36 39.1	14 98	88.8	4
55	35 05.9	18 98	92.9	35 11.3	18 98	92.3	35 16.6	17 98	91.6	35 21.7	17 98	91.0	35 26.6	16 98	90.4	35 31.3	15 98	89.8	35 35.9	15 98	89.2	35 40.2	14 98	88.6	55
6	34 07.1	18 98	92.6	34 12.5	18 98	92.0	34 17.7	17 98	91.4	34 22.8	17 98	90.8	34 27.7	16 98	90.2	34 32.4	15 98	89.6	34 37.0	15 98	89.0	34 41.4	14 98	88.4	6
7	33 08.2	18 98	92.4	33 13.6	18 98	91.8	33 18.8	17 98	91.2	33 23.9	17 98	90.6	33 28.8	16 98	90.1	33 33.5	15 98	89.5	33 38.1	15 98	88.9	33 42.5	14 98	88.3	7
8	32 09.4	18 98	92.2	32 14.7	18 98	91.6	32 20.0	17 98	91.0	32 25.0	17 98	90.4	32 29.9	16 98	89.9	32 34.6	16 98	89.3	32 39.2	15 98	88.7	32 43.6	14 98	88.1	8
9	31 10.5	18 98	92.0	31 15.9	18 98	91.4	31 21.1	17 98	90.8	31 26.1	17 98	90.3	31 31.0	16 98	89.7	31 35.8	16 98	89.1	31 40.3	15 98	88.5	31 44.8	14 98	87.9	9
60	30 11.6	18 98	91.8	30 17.0	18 98	91.2	30 22.2	17 98	90.6	30 27.2	17 98	90.1	30 32.1	16 98	89.5	30 36.9	16 98	88.9	30 41.5	15 98	88.3	30 45.9	15 98	87.8	60
1	29 12.8	18 98	91.6	29 18.1	18 98	91.0	29 23.3	17 98	90.4	29 28.3	17 98	89.9	29 33.2	16 98	89.3	29 38.0	16 98	88.7	29 42.6	15 98	88.2	29 47.1	15 98	87.6	1
2	28 13.9	18 98	91.4	28 19.2	18 98	90.8	28 24.4	17 98	90.2	28 29.4	17 98	89.7	28 34.3	16 98	89.1	28 39.1	16 98	88.6	28 43.7	15 98	88.0	28 48.2	15 98	87.4	2
3	27 15.0	18 98	91.2	27 20.3	17 98	90.6	27 25.5	17 98	90.0	27 30.5	17 98	89.5	27 35.4	16 98	88.9	27 40.2	16 98	88.4	27 44.9	15 98	87.8	27 49.4	15 98	87.3	3
4	26 16.1	18 98	91.0	26 21.4	17 98	90.4	26 26.6	17 98	89.9	26 31.6	17 98	89.3	26 36.6	16 98	88.8	26 41.4	16 98	88.2	26 46.0	15 98	87.7	26 50.6	15 98	87.1	4
65	25 17.2	18 98	90.8	25 22.5	17 98	90.2	25 27.7	17 98	89.7	25 32.7	17 98	89.1	25 37.7	16 98	88.6	25 42.5	16 98	88.0	25 47.2	15 98	87.5	25 51.7	15 98	86.9	65
6	24 18.3	18 98	90.6	24 23.6	17 98	90.0	24 28.8	17 98	89.5	24 33.9	17 98	88.9	24 38.8	16 98	88.4	24 43.6	16 98	87.9	24 48.3	16 98	87.3	24 52.9	15 98	86.8	6
7	23 19.4	18 98	90.4	23 24.7	17 98	89.8	23 29.9	17 98	89.3	23 35.0	17 98	88.8	23 39.9	16 98	88.2	23 44.8	16 98	87.7	23 49.5	16 98	87.1	23 54.1	15 98	86.6	7
8	22 20.5	18 98	90.2	22 25.8	17 98	89.6	22 31.0	17 98	89.1	22 36.1	17 98	88.6	22 41.1	16 98	88.0	22 45.9	16 98	87.5	22 50.7	16 98	87.0	22 55.3	15 98	86.4	8
9	21 21.6	18 98	90.0	21 26.9	17 98	89.5	21 32.1	17 98	88.9	21 37.2	17 98	88.4	21 42.2	16 98	87.9	21 47.1	16 98	87.3	21 51.9	16 98	86.8	21 56.6	15 98	86.3	9
70	20 22.7	18 98	89.8	20 28.0	17 98	89.3	20 33.2	17 98	88.7	20 38.3	17 98	88.2	20 43.3	17 98	87.7	20 48.3	16 98	87.2	20 53.1	16 98	86.6	20 57.8	16 98	86.1	70
1	19 23.8	18 98	89.6	19 29.1	18 98	89.1	19 34.4	17 98	88.6	19 39.5	17 98	88.0	19 44.5	17 98	87.5	19 49.4	16 98	87.0	19 54.3	16 98	86.5	19 59.0	16 98	85.9	1
2	18 24.9	18 98	89.4	18 30.3	18 98	88.9	18 35.5	17 98	88.4	18 40.6	17 98	87.9	18 45.7	17 98	87.3	18 50.6	16 98	86.8	18 55.5	16 98	86.3	19 00.3	16 98	85.8	2
3	17 26.1	18 98	89.2	17 31.4	18 98	88.7	17 36.6	17 98	88.2	17 41.8	17 98	87.7	17 46.8	17 98	87.2	17 51.8	17 98	86.6	17 56.7	16 98	86.1	18 01.6	16 98	85.6	3
4	16 27.2	18 98	89.0	16 32.5	18 98	88.5	16 37.7	17 98	88.0	16 42.9	17 98	87.5	16 48.0	17 98	87.0	16 53.0	17 98	86.5	16 58.0	16 98	86.0	17 02.8	16 98	85.4	4
75	15 28.3	18 98	88.9	15 33.6	18 98	88.3	15 38.9	17 98	87.8	15 44.1	17 98	87.3	15 49.2	17 98	86.8	15 54.3	17 98	86.3	15 59.2	16 98	85.8	16 04.1	16 98	85.3	75
6	14 29.4	18 98	88.7	14 34.7	18 98	88.2	14 40.0	18 98	87.7	14 45.2	17 98	87.1	14 50.4	17 98	86.6	14 55.5	17 98	86.1	15 00.5	17 98	85.6	15 05.5	16 98	85.1	6
7	13 30.5	18 98	88.5	13 35.9	18 98	88.0	13 41.2	18 98	87.5	13 46.4	17 98	87.0	13 51.6	17 98	86.5	13 56.7	17 98	86.0	14 01.8	17 98	85.4	14 06.8	17 98	84.9	7
8	12 31.6	18 98	88.3	12 37.0	18 98	87.8	12 42.3	18 98	87.3	12 47.6	17 98	86.8	12 52.8	17 98	86.3	12 58.0	17 98	85.8	13 03.1	17 98	85.3	13 08.1	17 98	84.8	8
9	11 32.8	18 98	88.1	11 38.2	18 98	87.6	11 43.5	18 98	87.1	11 48.8	18 98	86.6	11 54.1	17 98	86.1	11 59.3	17 98	85.6	12 04.4	17 98	85.1	12 09.5	17 98	84.6	9
80	10 33.9	18 98	87.9	10 39.3	18 98	87.4	10 44.7	18 98	86.9	10 50.0	18 98	86.4	10 55.3	18 98	85.9	11 00.5	17 98	85.4	11 05.7	17 98	84.9	11 10.8	17 98	84.4	80
1	9 35.1	18 98	87.8	9 40.5	18 98	87.3	9 45.9	18 98	86.8	9 51.3	18 98	86.3	9 56.6	18 98	85.8	10 01.8	17 98	85.3	10 07.1	17 98	84.8	10 12.2	17 98	84.3	1
2	8 36.2	18 98	87.6	8 41.7	18 98	87.1	8 47.1	18 98	86.6	8 52.5	18 98	86.1	8 57.8	18 98	85.6	9 03.1	18 98	85.1	9 08.4	17 98	84.6	9 13.6	17 98	84.1	2
3	7 37.4	18 98	87.4	7 42.9	18 98	86.9	7 48.3	18 98	86.4	7 53.7	18 98	85.9	7 59.1	18 98	85.4	8 04.5	18 98	84.9	8 09.8	18 98	84.4	8 15.1	18 98	83.9	3
4	6 38.5	18 98	87.2	6 44.0	18 98	86.7	6 49.5	18 98	86.2	6 55.0	18 98	85.7	7 00.4	18 98	85.2	7 05.8	18 98	84.7	7 11.2	18 98	84.2	7 16.5	18 98	83.7	4
85	5 39.7	19 98	87.0	5 45.3	18 98	86.5	5 50.8	18 98	86.0	5 56.3	18 98	85.5	6 01.7	18 98	85.0	6 07.2	18 98	84.5	6 12.6	18 98	84.0	6 18.0	18 98	83.6	85
6													5 03.1	18 98	84.9	5 08.6	18 98	84.4	5 14.0	18 98	83.9	5 19.5	18 98	83.4	6

DECLINATION CONTRARY NAME TO LATITUDE

Lat. 11°

H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	75 00.0	1.0 03	180.0	74 30.0	1.0 03	180.0	74 00.0	1.0 03	180.0	73 30.0	1.0 03	180.0	73 00.0	1.0 03	180.0	72 30.0	1.0 03	180.0	72 00.0	1.0 03	180.0	71 30.0	1.0 03	180.0	00
1	74 58.0	1.0 10	176.2	74 28.1	1.0 10	176.3	73 58.1	1.0 09	176.4	73 28.2	1.0 09	176.5	72 58.3	1.0 09	176.6	72 28.3	1.0 08	176.7	71 58.4	1.0 08	176.8	71 28.4	1.0 08	176.9	1
2	74 52.1	99 16	172.3	74 22.4	99 16	172.6	73 52.6	99 15	172.8	73 22.8	99 15	173.0	72 53.0	99 14	173.2	72 23.2	99 14	173.4	71 53.4	99 14	173.6	71 23.6	99 13	173.8	2
3	74 42.3	98 23	168.6	74 12.9	98 22	168.9	73 43.4	98 21	169.3	73 13.9	98 21	169.6	72 44.4	98 20	169.9	72 14.8	99 19	170.2	71 45.2	99 19	170.4	71 15.6	99 18	170.7	3
4	74 28.8	97 28	164.9	73 59.8	97 28	165.4	73 30.7	97 27	165.8	73 01.6	97 26	166.2	72 32.4	97 25	166.6	72 03.2	97 25	167.0	71 33.9	98 24	167.4	71 04.6	98 23	167.7	4
05	74 11.8	95 34	161.4	73 43.2	95 33	161.9	73 14.6	95 32	162.5	72 45.9	96 31	163.0	72 17.2	96 30	163.4	71 48.4	96 30	163.9	71 19.5	96 29	164.3	70 50.6	97 28	164.7	05
6	73 51.3	93 39	158.0	73 23.4	93 38	158.6	72 55.3	94 37	159.2	72 27.1	94 36	159.8	71 58.9	94 35	160.4	71 30.5	95 34	160.9	71 02.1	95 34	161.4	70 33.6	95 33	161.9	6
7	73 27.7	91 44	154.7	73 00.4	91 43	155.4	72 32.9	92 42	156.1	72 05.4	92 41	156.8	71 37.7	93 40	157.4	71 09.8	93 39	158.0	70 41.9	93 38	158.5	70 13.9	94 37	159.1	7
8	73 01.1	88 49	151.6	72 34.5	89 48	152.4	72 07.7	90 46	153.1	71 40.7	90 45	153.9	71 13.7	91 44	154.5	70 46.4	91 43	155.2	70 19.1	91 42	155.8	69 51.6	92 41	156.4	8
9	72 31.8	86 53	148.7	72 05.9	87 52	149.5	71 39.8	87 51	150.3	71 13.5	88 49	151.1	70 47.0	88 48	151.8	70 20.4	89 47	152.5	69 53.7	89 46	153.1	69 26.8	90 45	153.8	9
10	71 59.9	83 57	145.9	71 34.8	84 56	146.8	71 09.4	85 54	147.6	70 43.8	86 53	148.4	70 18.0	86 52	149.2	69 52.1	87 51	149.9	69 25.9	87 50	150.6	68 59.6	88 49	151.3	10
1	71 25.8	81 60	143.3	71 01.4	82 59	144.2	70 36.7	83 58	145.1	70 11.9	83 57	145.9	69 46.8	84 56	146.7	69 21.4	85 54	147.5	68 55.9	85 53	148.2	68 30.2	86 52	148.9	1
2	70 49.6	78 64	140.8	70 25.9	79 62	141.8	70 02.0	80 61	142.7	69 37.8	81 60	143.5	69 13.4	82 59	144.3	68 48.8	83 58	145.1	68 23.9	83 57	145.9	67 58.8	84 56	146.6	2
3	70 11.5	76 66	138.5	69 48.6	77 65	139.5	69 25.4	78 64	140.4	69 01.9	79 63	141.3	68 38.1	80 62	142.1	68 14.2	80 61	142.9	67 50.0	81 60	143.7	67 25.5	82 58	144.5	3
4	69 31.6	73 69	136.4	69 09.4	74 68	137.3	68 47.0	75 67	138.2	68 24.2	76 66	139.1	68 01.1	77 64	140.0	67 37.8	78 63	140.8	67 14.2	79 62	141.6	66 50.4	80 61	142.4	4
15	68 50.2	71 71	134.3	68 28.8	72 70	135.3	68 07.0	73 69	136.2	67 44.9	74 68	137.1	67 22.5	75 67	138.0	66 59.8	76 66	138.8	66 36.9	77 65	139.7	66 13.7	78 64	140.5	15
6	68 07.4	69 73	132.4	67 46.6	70 72	133.4	67 25.5	71 71	134.3	67 04.1	72 70	135.2	66 42.4	73 69	136.1	66 20.3	74 68	137.0	65 58.0	75 67	137.8	65 35.5	76 66	138.6	6
7	67 23.4	67 75	130.7	67 03.2	68 74	131.6	66 42.7	69 73	132.5	66 22.0	70 72	133.5	66 00.9	71 71	134.3	65 39.5	72 70	135.2	65 17.8	73 69	136.0	64 55.9	74 68	136.8	7
8	66 38.1	64 77	129.0	66 18.6	66 76	129.9	65 58.8	67 75	130.9	65 38.6	68 74	131.8	65 18.1	69 73	132.6	64 57.4	70 72	133.5	64 36.3	71 71	134.3	64 14.9	72 70	135.2	8
9	65 51.8	62 79	127.4	65 32.9	64 78	128.4	65 13.7	65 77	129.3	64 54.1	66 76	130.2	64 34.3	67 75	131.1	64 14.1	68 74	131.9	63 53.6	69 73	132.7	63 32.8	70 72	133.6	9
20	65 04.6	60 80	125.9	64 46.3	62 79	126.9	64 27.6	63 78	127.8	64 08.6	64 77	128.7	63 49.3	65 76	129.6	63 29.7	66 76	130.4	63 09.8	67 75	131.2	62 49.6	68 74	132.1	20
1	64 16.5	59 81	124.6	63 58.7	60 81	125.5	63 40.6	61 80	126.4	63 22.2	62 79	127.3	63 03.5	63 78	128.1	62 44.4	64 77	129.0	62 25.0	65 76	129.8	62 05.4	66 75	130.6	1
2	63 27.6	57 83	123.2	63 10.4	58 82	124.2	62 52.8	59 81	125.1	62 34.9	60 80	125.9	62 16.7	61 79	126.8	61 58.2	62 78	127.6	61 39.3	63 78	128.4	61 20.2	64 77	129.3	2
3	62 38.0	55 84	122.0	62 21.3	56 83	122.9	62 04.2	57 82	123.8	61 46.8	58 81	124.7	61 29.1	60 80	125.5	61 11.1	61 80	126.3	60 52.8	62 79	127.2	60 34.2	63 78	128.0	3
4	61 47.7	54 85	120.9	61 31.5	55 84	121.7	61 14.9	56 83	122.6	60 58.0	57 82	123.5	60 40.8	58 82	124.3	60 23.3	59 81	125.1	60 05.5	60 80	125.9	59 47.4	61 79	126.7	4
25	60 56.9	52 86	119.8	60 41.1	53 85	120.6	60 25.0	54 84	121.5	60 08.6	55 83	122.3	59 51.8	56 83	123.2	59 34.8	57 82	124.0	59 17.5	58 81	124.8	58 59.8	59 80	125.6	25
6	60 05.5	51 86	118.7	59 50.2	52 86	119.6	59 34.5	53 85	120.4	59 18.5	54 84	121.3	59 02.2	55 84	122.1	58 45.6	56 83	122.9	58 28.8	57 82	123.7	58 11.6	58 81	124.5	6
7	59 13.6	49 87	117.7	58 58.7	50 87	118.6	58 43.4	51 86	119.4	58 27.9	52 85	120.2	58 12.0	53 85	121.0	57 55.9	54 84	121.8	57 39.4	55 83	122.6	57 22.7	56 82	123.4	7
8	58 21.2	48 88	116.8	58 06.7	49 87	117.6	57 51.9	50 87	118.4	57 36.8	51 86	119.3	57 21.3	52 85	120.1	57 05.6	53 85	120.8	56 49.6	54 84	121.6	56 33.2	55 83	122.4	8
9	57 28.4	47 89	115.9	57 14.3	48 88	116.7	56 59.9	49 87	117.5	56 45.1	50 87	118.3	56 30.1	51 86	119.1	56 14.8	52 86	119.9	55 59.1	53 85	120.7	55 43.2	53 84	121.4	9
30	56 35.3	45 89	115.1	56 21.5	46 89	115.9	56 07.5	47 88	116.7	55 53.1	48 87	117.5	55 38.4	49 87	118.2	55 23.5	50 86	119.0	55 08.2	51 86	119.7	54 52.7	52 85	120.5	30
1	55 41.8	44 90	114.3	55 28.4	45 89	115.1	55 14.6	46 89	115.8	55 00.6	47 88	116.6	54 46.3	48 88	117.4	54 31.7	49 87	118.1	54 16.9	50 86	118.9	54 01.7	51 86	119.6	1
2	54 47.9	43 90	113.5	54 34.8	44 90	114.3	54 21.5	45 89	115.1	54 07.8	46 89	115.8	53 53.8	47 88	116.6	53 39.6	48 88	117.3	53 25.1	49 87	118.0	53 10.3	50 86	118.8	2
3	53 53.7	42 91	112.8	53 41.0	43 90	113.5	53 27.9	44 90	114.3	53 14.6	45 89	115.0	53 01.0	46 89	115.8	52 47.1	47 88	116.5	52 32.9	48 88	117.3	52 18.5	49 87	118.0	3
4	52 59.3	41 91	112.1	52 46.8	42 91	112.8	52 34.1	43 90	113.6	52 21.1	44 90	114.3	52 07.8	45 89	115.1	51 54.2	46 89	115.8	51 40.4	47 88	116.5	51 26.3	47 88	117.2	4
35	52 04.6	40 92	111.4	51 52.4	41 91	112.2	51 40.0	42 91	112.9	51 27.3	43 90	113.6	51 14.3	44 90	114.3	51 01.0	45 89	115.1	50 47.5	45 89	115.8	50 33.7	46 88	116.5	35
6	51 09.6	39 92	110.8	50 57.8	40 92	111.5	50 45.6	41 91	112.2	50 33.2	42 91	112.9	50 20.5	43 90	113.7	50 07.5	44 90	114.4	49 54.3	44 89	115.1	49 40.9	45 89	115.8	6
7	50 14.5	38 92	110.2	50 02.8	39 92	110.9	49 50.9	40 91	111.6	49 38.8	41 91	112.3	49 26.4	42 91	113.0	49 13.7	43 90	113.7	49 00.8	43 90	114.4	48 47.7	44 89	115.1	7
8	49 19.1	37 93	109.6	49 07.7	38 92	110.3	48 56.1	39 92	111.0	48 44.2	40 91	111.7	48 32.0	41 91	112.4	48 19.7	42 91	113.1	48 07.0	42 90	113.7	47 54.2	43 90	114.4	8
9	48 23.5	37 93	109.0	48 12.4	38 93	109.7	48 01.0	38 92	110.4	47 49.3	39 92	111.1	47 37.5	40 91	111.8	47 25.4	41 91	112.5	47 13.0	42 90	113.1	47 00.4	42 90	113.8	9
40	47 27.7	36 93	108.5	47 16.8	37 93	109.2	47 05.7	38 92	109.8	46 54.3	38 92	110.5	46 42.7	39 92	111.2	46 30.8	40 91	111.9	46 18.7	41 91	112.5	46 06.4	41 90	113.2	40
1	46 31.8	35 94	108.0	46 21.1	36 93	108.6	46 10.2	37 93	109.3	45 59.0	38 92	110.0	45 47.7	38 92	110.6	45 36.0	39 92	111.3	45 24.2	40 91	112.0	45 12.1	41 91	112.6	1
2	45 35.7	34 94	107.5	45 25.2	35 93	108.1	45 14.5	36 93	108.8	45 03.6	37 93	109.5	44 52.4	38 92	110.1	44 41.1	38 92	110.8	44 29.5	39 92	111.4	44 17.7	40 91	112.1	2
3	44 39.4	34 94	107.0	44 29.2	35 94	107.6	44 18.7	35 93	108.3	44 08.0	36 93	108.9	43 57.0	37 93	109.6	43 45.9	38 92	110.2	43 34.5	38 92	110.9	43 23.0	39 92	111.5	3
4	43 43.0	33 94	106.5	43 32.9	34 94	107.2	43 22.7	35 94	107.8	43 12.2	35 93	108.5	43 01.5	36 93	109.1	42 50.5	37 93	109.7	42 39.4	37 92	110.4	42 28.1	38 92	111.0	4
45	42 46.5	33 94	106.1	42 36.6	33 94	106.7	42 26.5	34 94	107.3	42 16.2	35 94	108.0	42 05.7	35 93	108.6	41 55.0	36 93	109.2	41 44.1	37 92	109.9	41 33.0	37 92	110.5	45
6	41 49.8	32 95	105.6	41 40.1	33 94	106.3	41 30.2	33 94	106.9	41 20.1	34 94	107.5	41 09.8	35 93	108.1	40 59.3	36 93	108.8	40 48.6	36 93	109.4	40 37.7	37 92	110.0	6
7	40 53.0	31 95	105.2	40 43.5	32 95	105.8	40 33.8	33 94	106.5	40 23.9	33 94	107.1	40 13.8	34 94	107.7	40 03.5	35 93	108.3	39 53.0	35 93	108.9	39 42.3	36 93	109.5	7
8	39 56.1	31 96	104.8	39 46.8	31 95	105.4	39 37.3	32 94	106.0	39 27.5	33 94	106.6	39 17.6	33 94	107.3	39 07.5	34 94	107.9	38 57.2	35 93	108.5	38 46.7	35 93	109.1	8
9	38 59.1	30 95	104.4	38 50.0	31 95	105.0	38 40.6	32 95	105.6	38 31.0	32 94	106.2	38 21.3	33 94	106.8	38 11.4	33 94	107.4	38 01.3	34 93	108.0	37 51.0	35 93	108.6	9
50	38 02.0	30 95	104.0	37 53.0	30 95	104.6	37 43.8	31 95	105.2	37 34.4	32 95	105.8	37 24.9	32 94	106.4	37 15.1	33 94	107.0	37 05.2	33 94	107.6	36 55.1	34 93	108.2	50
1	37 04.9	29 95	103.6	36 56.0	30 95	104.2	36 46.9	30 96	104.8	36 37.7	31 95	105.4	36 28.3	32 94	106.0	36 18.7	32 94	106.6	36 09.0	33 94	107.2	35 59.1	33 94	107.8	1
2	36 07.6	29 96	103.3	35 58.9	29 96	103.9	35 50.0	30 96	104.5	35 40.9	31 96	105.1	35 31.7	31 96	105.6	35 22.2	32 94	106.2	35 12.7	32 94	106.8	35 02.9	33 94	107.4	2
3	35 10.2	28 96	102.9	35 01.6	29 96	103.5	34 52.9	29 96	104.1	34 44.0	30 95	104.7	34 34.9	31 95	105.3	34 25.6	31 94	105.8	34 16.2	32 94	106.4	34 06.7	32 94	107.0	3
4	34 12.8	28 96	102.6	34 04.3	28 96	103.2	33 55.7	29 95	103.8	33 46.9	30 95	104.3	33 38.0	30 95	104.9	33 28.9	31 95	105.5	33 19.7	31 94	106.0	33 10.3	32 94	106.6	4
55	33 15.3	27 96	102.3	33 06.9	28 96	102.8	32 58.5	29 96	103.4	32 49.8	29 95	104.0	32 41.1	30 95	104.6	32 32.1	30 96	105.1	32 23.0	31 95	105.7	32 13.8	31 94	106.2	55
6	32 17.7	27 96	101.9	32 09.5	28 96	102.5	32 01.1	28 96	103.1	31 52.6	29 95	103.6	31 44.0	29 95	104.2	31 35.2	30 95	104.8	31 26.3	30 95	105.3	31 17.2	31 94	105.9	6
7	31 20.0	27 96	101.6	31 11.9	27 96	102.2	31 03.7	28 96	102.8	30 55.4	28 96	103.3	30 46.9	29 96	103.9	30 38.2	29 95	104.4	30 29.4	30 96	105.0	30 20.5	30 95	105.5	7
8	30 22.3	26 96	101.3	30 14.3	27 96	101.9	30 06.2	27 96	102.4	29 58.0	28 96	103.0	29 49.6	28 96	103.5	29 41.1	29 95	104.1	29 32.5	29 96	104.6	29 23.7	30 95	105.2	8
9	29 24.5	26 96	101.0	29 16.7	26 96	101.6	29 08.7	27 96	102.1	29 00.6	27 96	102.7	28 52.3	28 96	103.2	28 44.0	28 95	103.8	28 35.5	29 95	104.3	28 26.8	29 95	104.9	9
60	28 26.7	26 96	100.7	28 18.9	26 96	101.3	28 11.1	26 96	101.8	28 03.1	27 96	102.4	27 55.0	27 96	102.9	27 46.7	28 96	103.5	27 38.3	28 95	104.0	27 29.8	29 95	104.5	60
1	27 28.8	25 97	100.4	27 21.2	26 96	101.0	27 13.4	26 96	101.5	27 05.5	26 96	102.1	26 57.5	27 96	102.6	26 49.4	27 96	103.2	26 41.2	28 95	103.7	26 32.8	28 95	104.2	1
2	26 30.8	25 97	100.2	26 23.3	25 96	100.7	26 15.7	26 96	101.2	26 07.9	26 96	101.8	26 00.0	26 96	102.3	25 52.0	27 96	102.9	25 43.9	27 96	103.4	25 35.7	28 95	103.9	2
3	25 32.8	25 97	99.9	25 25.4	25 97	100.4	25 17.9	25 96	101.0	25 10.2	26 96	101.5	25 02.4	26 96	102.0	24 54.6	26 96	102.6	24 46.6	27 96	103.1	24 38.5	27 95	103.6	3
4	24 34.8	24 97	99.6	24 27.5	25 97	100.1	24 20.0	25 96	100.7	24 12.5	25 96	101.2	24 04.8	26 96	101.7	23 57.0	26 96	102.3	23 49.2	26 96	102.8	23 41.2	27 96	103.3	4
65	23 36.7	24 97	99.4	23 29.5	24 97	99.9	23 22.1	25 97	100.4	23 14.7	25 96	100.9	23 07.1	25 96	101.5	22 59.5	26 96	102.0	22 51.7	26 96	102.5	22 43.8	26 96	103.0	65
6	22 38.6	24 97	99.1	22 31.4	24 97	99.6	22 24.2	24 97	100.1	22 16.8	25 96	100.7	22 09.4	25 96	101.2	22 01.8	25 96	101.7	21 54.2	26 96	102.2	21 46.4	26 96	102.8	6
7	21 40.4	23 97	98.8	21 33.3	24 97	99.4	21 26.2	24 97	99.9	21 18.9	24 97	100.4	21 11.6	25 96	100.9	21 04.1	25 96	101.4	20 56.6	25 96	102.0	20 49.0	26 96	102.5	7
8	20 42.2	23 97	98.6	20 35.2	23 97	99.1	20 28.1	24 97	99.6	20 21.0	24 97	100.2	20 13.7	24 96	100.7	20 06.4	25 96	101.2	19 58.9	25 96	101.7	19 51.4	25 96	102.2	8
9	19 43.9	23 97	98.3	19 37.0	23 97	98.9	19 30.0	23 97	99.4	19 23.0	24 97	99.9	19 15.8	24 97	100.4	19 08.6	24 96	100.9	19 01.2	25 96	101.4	18 53.8	25 96	102.0	9
70	18 45.6	23 97	98.1	18 38.8	23 97	98.6	18 31.9	23 97	99.1	18 24.9	23 97	99.6	18 17.9	24 97	100.2	18 10.7	24 96	100.7	18 03.5	24 96	101.2	17 56.2	24 96	101.7	70
1	17 47.3	22 97	97.9	17 40.5	23 97	98.4	17 33.7	23 97	98.9	17 26.8	23 97	99.4	17 19.9	23 97	99.9	17 12.8	24 97	100.4	17 05.7	24 96	100.9	16 58.5	24 96	101.4	1
2	16 48.9	22 97	97.6	16 42.3	22 97	98.2	16 35.5	23 97	98.7	16 28.7	23 97	99.2	16 21.8	23 97	99.7	16 14.9	23 97	100.2	16 07.8	24 96	100.7	16 00.7	24 96	101.2	2
3	15 50.5	22 97	97.4	15 43.9	22 97	97.9	15 37.3	22 97	98.4	15 30.5	23 97	98.9	15 23.7	23 97	99.4	15 16.9	23 97	99.9	15 09.9	23 97	100.4	15 02.9	23 96	101.0	3
4	14 52.1	22 97	97.2	14 45.6	22 97	97.7	14 39.0	22 97	98.2	14 32.3	22 97	98.7	14 25.6	23 97	99.2	14 18.8	23 97	99.7	14 12.0	23 97	100.2	14 05.1	23 96	100.7	4
75	13 53.7	21 97	97.0	13 47.2	22 97	97.5	13 40.7	22 97	98.0	13 34.1	22 97	98.5	13 27.5	22 97	99.0	13 20.8	22 97	99.5	13 14.0	23 97	100.0	13 07.2	23 97	100.5	75
6	12 55.2	21 98	96.7	12 48.8	21 97	97.2	12 42.3	22 97	97.7	12 35.8	22 97	98.2	12 29.3	22 97	98.7	12 22.6	22 97	99.2	12 16.0	22 97	99.7	12 09.2	23 97	100.2	6
7	11 56.7	21 98	96.5	11 50.4	21 97	97.0	11 44.0	21 97	97.5	11 37.5	22 97	98.0	11 31.0	22 97	98.5	11 24.5	22 97	99.0	11 17.9	22 97	99.5	11 11.3	22 97	100.0	7
8	10 58.2	21 98	96.3	10 51.9	21 97	96.8	10 45.6	21 97	97.3	10 39.2	21 97	97.8	10 32.8	21 97	98.3	10 26.3	22 97	98.8	10 19.8	22 97	99.3	10 13.2	22 97	99.8	8
9	9 59.6	21 98	96.1	9 53.4	21 98	96.6	9 47.1	21 97	97.1	9 40.8	21 97	97.6	9 34.5	21 97	98.1	9 28.1	21 97	98.6	9 21.7	22 97	99.1	9 15.2	22 97	99.6	9
80	9 01.0	20 98	95.9	8 54.9	21 98	96.4	8 48.7	21 97	96.9	8 42.4	21 97	97.4	8 36.2	21 97	97.9	8 29.8	21 97	98.4	8 23.5	21 97	98.9	8 17.1	21 97	99.4	80
1	8 02.4	20 98	95.7	7 56.3	20 98	96.2	7 50.2	21 98	96.7	7 44.0	21 97	97.2	7 37.8	21 97	97.7	7 31.5	21 97	98.2	7 25.3	21 97	98.7	7 19.0	21 97	99.1	1
2	7 03.8	20 98	95.5	6 57.8	20 98	96.0	6 51.7	20 98	96.5	6 45.6	20 97	97.0	6 39.4	21 97	97.5	6 33.2	21 97	98.0	6 27.0	21 97	98.4	6 20.8	21 97	98.9	2
3	6 05.2	20 98	95.3	5 59.2	20 98	95.8	5 53.1	20 98	96.3	5 47.1	20 98	96.8	5 41.0	20 97	97.3	5 34.9	20 97	97.8	5 28.8	20 97	98.2	5 22.6	21 97	98.7	3
4	5 06.5	20 98	95.1	5 00.6	20 98	95.6																			4

H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	87 00.0	1.0 16	180.0	87 30.0	1.0 20	180.0	88 00.0	1.0 23	180.0	88 30.0	1.0 29	180.0	89 00.0	1.0 40	180.0	89 30.0	1.0 60	180.0	90 00.0	.. 98	....	89 30.0	1.0 60	00.0	00
1	86 50.5	95 43	161.7	87 18.8	93 50	158.4	87 46.2	90 58	153.7	88 12.4	84 68	146.6	88 35.8	71 80	135.4	88 53.9	46 93	116.9	89 01.1	00 98	89.9	88 54.0	45 92	62.9	1
2	86 24.6	84 62	146.5	86 49.0	79 69	141.6	87 11.6	71 76	135.3	87 31.5	61 84	127.1	87 47.6	46 91	116.8	87 58.3	25 96	104.1	88 02.2	00 98	89.8	87 58.6	24 96	75.5	2
3	85 47.2	71 74	135.1	86 07.7	65 80	130.0	86 25.9	56 85	123.8	86 41.3	46 90	116.7	86 53.1	33 94	108.4	87 00.6	17 97	99.3	87 03.3	00 98	89.7	87 00.9	16 97	80.1	3
4	85 02.6	61 82	126.9	85 19.9	54 86	122.0	85 34.9	46 90	116.6	85 47.3	36 93	110.5	85 56.5	25 96	103.9	86 02.3	13 98	96.9	86 04.4	01 98	89.6	86 02.7	12 97	82.3	4
05	84 13.7	53 86	120.9	84 28.5	46 89	116.5	84 41.1	38 92	111.7	84 51.4	30 95	106.5	84 59.0	21 97	101.0	85 03.7	11 98	95.3	85 05.5	01 98	89.5	85 04.2	09 98	83.7	05
6	83 22.0	46 89	116.4	83 34.8	40 92	112.4	83 45.7	33 94	108.2	83 54.5	26 96	103.7	84 01.0	18 97	99.1	84 05.1	09 98	94.3	84 06.6	01 98	89.4	84 05.6	07 98	84.6	6
7	82 28.4	41 91	112.9	82 39.8	35 93	109.3	82 49.4	29 95	105.6	82 57.0	22 96	101.6	83 02.7	15 97	97.6	83 06.3	08 98	93.5	83 07.7	01 98	89.3	83 07.0	06 98	85.2	7
8	81 33.6	37 93	110.1	81 43.8	31 94	106.9	81 52.3	26 96	103.5	81 59.2	20 97	100.1	82 04.3	14 98	96.5	82 07.5	08 98	92.9	82 08.8	01 98	89.2	82 08.3	05 98	85.6	8
9	80 37.9	33 94	107.9	80 47.1	28 95	104.9	80 54.9	23 96	101.9	81 01.1	18 97	98.8	81 05.7	13 98	95.6	81 08.6	07 98	92.4	81 09.9	02 98	89.1	81 09.6	04 98	85.9	9
10	79 41.5	30 95	106.0	79 50.0	26 96	103.3	79 57.1	21 97	100.6	80 02.8	17 97	97.8	80 07.0	12 98	94.9	80 09.8	07 98	92.0	80 11.0	02 98	89.0	80 10.8	03 98	86.1	10
1	78 44.7	28 95	104.5	78 52.5	24 96	102.0	78 59.1	20 97	99.5	79 04.4	15 98	96.9	79 08.3	11 98	94.3	79 10.9	06 98	91.6	79 12.2	02 98	88.9	79 12.0	03 98	86.3	1
2	77 47.5	26 96	103.2	77 54.8	22 97	100.9	78 00.9	18 97	98.5	78 05.9	14 98	96.1	78 09.6	10 98	93.7	78 12.0	06 98	91.3	78 13.3	02 98	88.9	78 13.2	02 98	86.4	2
3	76 50.1	25 96	102.0	76 56.9	21 97	99.9	77 02.6	17 97	97.7	77 07.3	14 98	95.5	77 10.8	10 98	93.3	77 13.2	06 98	91.0	77 14.4	02 98	88.8	77 14.5	02 98	86.5	3
4	75 52.3	23 96	101.0	75 58.8	20 97	99.0	76 04.2	16 98	97.0	76 08.6	13 98	94.9	76 12.0	09 98	92.9	76 14.3	06 98	90.8	76 15.5	02 98	88.7	76 15.7	01 98	86.6	4
15	74 54.5	22 97	100.2	75 00.6	19 97	98.3	75 05.7	16 98	96.4	75 09.9	12 98	94.4	75 13.1	09 98	92.5	75 15.4	06 98	90.5	75 16.6	03 98	88.6	75 16.9	01 98	86.6	15
6	73 56.4	21 97	99.4	74 02.2	18 97	97.6	74 07.1	15 98	95.8	74 11.2	12 98	94.0	74 14.3	09 98	92.1	74 16.5	06 98	90.3	74 17.8	03 98	88.5	74 18.1	00 98	86.6	6
7	72 58.2	20 97	98.7	73 03.8	17 98	97.0	73 08.5	14 98	95.3	73 12.4	12 98	93.6	73 15.4	09 98	91.8	73 17.6	06 98	90.1	73 18.9	03 98	88.4	73 19.3	00 98	86.6	7
8	72 00.0	19 97	98.0	72 05.3	16 98	96.4	72 09.9	14 98	94.8	72 13.6	11 98	93.2	72 16.6	08 98	91.6	72 18.7	06 98	89.9	72 20.0	03 98	88.3	72 20.5	00 98	86.6	8
9	71 01.6	18 97	97.4	71 06.7	16 98	95.9	71 11.1	13 98	94.4	71 14.8	11 98	92.8	71 17.7	08 98	91.3	71 19.8	06 98	89.7	71 21.1	03 98	88.2	71 21.7	01 98	86.6	9
20	70 03.2	18 98	96.9	70 08.1	15 98	95.4	70 12.4	13 98	94.0	70 16.0	11 98	92.5	70 18.8	08 98	91.0	70 20.9	06 98	89.6	70 22.3	03 98	88.1	70 22.9	01 98	86.6	20
1	69 04.7	17 98	96.4	69 09.5	15 98	95.0	69 13.6	13 98	93.6	69 17.1	10 98	92.2	69 19.9	08 98	90.8	69 22.0	06 98	89.4	69 23.4	04 98	88.0	69 24.1	01 98	86.6	1
2	68 06.1	17 98	95.9	68 10.8	15 98	94.6	68 14.8	12 98	93.3	68 18.2	10 98	91.9	68 21.0	08 98	90.6	68 23.1	06 98	89.2	68 24.5	04 98	87.9	68 25.3	02 98	86.5	2
3	67 07.5	16 98	95.5	67 12.1	14 98	94.2	67 16.0	12 98	93.0	67 19.4	10 98	91.7	67 22.1	08 98	90.4	67 24.2	06 98	89.1	67 25.7	04 98	87.8	67 26.5	02 98	86.5	3
4	66 08.8	16 98	95.1	66 13.3	14 98	93.9	66 17.2	12 98	92.7	66 20.5	10 98	91.4	66 23.2	08 98	90.2	66 25.3	06 98	88.9	66 26.8	04 98	87.7	66 27.8	02 98	86.4	4
25	65 10.2	16 98	94.7	65 14.5	14 98	93.6	65 18.4	12 98	92.4	65 21.6	10 98	91.2	65 24.3	08 98	90.0	65 26.4	06 98	88.8	65 28.0	04 98	87.6	65 29.0	02 98	86.4	25
6	64 11.5	15 98	94.4	64 15.8	13 98	93.2	64 19.5	12 98	92.1	64 22.7	10 98	90.9	64 25.4	08 98	89.8	64 27.6	06 98	88.6	64 29.2	04 98	87.5	64 30.2	03 98	86.3	6
7	63 12.7	15 98	94.0	63 16.9	13 98	92.9	63 20.6	12 98	91.8	63 23.8	10 98	90.7	63 26.5	08 98	89.6	63 28.7	06 98	88.5	63 30.3	05 98	87.4	63 31.4	03 98	86.3	7
8	62 14.0	15 98	93.7	62 18.1	13 98	92.7	62 21.8	11 98	91.6	62 25.0	10 98	90.5	62 27.6	08 98	89.4	62 29.8	06 98	88.4	62 31.5	05 98	87.3	62 32.7	03 98	86.2	8
9	61 15.2	14 98	93.4	61 19.3	13 98	92.4	61 22.9	11 98	91.3	61 26.1	10 98	90.3	61 28.7	08 98	89.3	61 30.9	07 98	88.2	61 32.6	05 98	87.2	61 33.9	03 98	86.1	9
30	60 16.4	14 98	93.1	60 20.4	13 98	92.1	60 24.0	11 98	91.1	60 27.2	10 98	90.1	60 29.8	08 98	89.1	60 32.1	07 98	88.1	60 33.8	05 98	87.1	60 35.1	04 98	86.1	30
1	59 17.6	14 98	92.8	59 21.6	13 98	91.9	59 25.1	11 98	90.9	59 28.3	10 98	89.9	59 30.9	08 98	88.9	59 33.2	07 98	88.0	59 35.0	05 98	87.0	59 36.4	04 98	86.0	1
2	58 18.7	14 98	92.6	58 22.7	13 98	91.6	58 26.2	11 98	90.7	58 29.4	10 98	89.7	58 32.1	08 98	88.8	58 34.3	07 98	87.8	58 36.2	06 98	86.9	58 37.6	04 98	85.9	2
3	57 19.9	14 98	92.3	57 23.8	12 98	91.4	57 27.3	11 98	90.5	57 30.5	10 98	89.6	57 33.2	08 98	88.6	57 35.5	07 98	87.7	57 37.4	06 98	86.8	57 38.9	04 98	85.8	3
4	56 21.0	14 98	92.1	56 24.9	12 98	91.2	56 28.4	11 98	90.3	56 31.6	10 98	89.4	56 34.3	08 98	88.5	56 36.6	07 98	87.6	56 38.6	06 98	86.7	56 40.1	05 98	85.8	4
35	55 22.2	14 98	91.8	55 26.0	12 98	91.0	55 29.5	11 98	90.1	55 32.7	10 98	89.2	55 35.4	09 98	88.3	55 37.8	07 98	87.4	55 39.8	06 98	86.6	55 41.4	05 98	85.7	35
6	54 23.3	13 98	91.6	54 27.1	12 98	90.7	54 30.6	11 98	89.9	54 33.8	10 98	89.0	54 36.6	09 98	88.2	54 39.0	07 98	87.3	54 41.0	06 98	86.5	54 42.7	05 98	85.6	6
7	53 24.4	13 98	91.4	53 28.3	12 98	90.5	53 31.8	11 98	89.7	53 34.9	10 98	88.9	53 37.7	09 98	88.0	53 40.1	08 98	87.2	53 42.2	06 98	86.3	53 44.0	05 98	85.5	7
8	52 25.5	13 98	91.2	52 29.4	12 98	90.3	52 32.9	11 98	89.5	52 36.0	10 98	88.7	52 38.8	09 98	87.9	52 41.3	08 98	87.1	52 43.4	07 98	86.2	52 45.2	05 98	85.4	8
9	51 26.6	13 98	90.9	51 30.5	12 98	90.1	51 34.0	11 98	89.3	51 37.1	10 98	88.5	51 40.0	09 98	87.7	51 42.5	08 98	86.9	51 44.7	07 98	86.1	51 46.5	06 98	85.3	9
40	50 27.7	13 98	90.7	50 31.6	12 98	90.0	50 35.1	11 98	89.2	50 38.3	10 98	88.4	50 41.1	09 98	87.6	50 43.7	08 98	86.8	50 45.9	07 98	86.0	50 47.8	06 98	85.2	40
1	49 28.9	13 98	90.5	49 32.7	12 98	89.8	49 36.2	11 98	89.0	49 39.4	10 98	88.2	49 42.3	09 98	87.5	49 44.9	08 98	86.7	49 47.2	07 98	85.9	49 49.2	06 98	85.1	1
2	48 30.0	13 98	90.3	48 33.8	12 98	89.6	48 37.3	11 98	88.8	48 40.5	10 98	88.1	48 43.4	09 98	87.3	48 46.1	08 98	86.6	48 48.4	07 98	85.8	48 50.5	06 98	85.1	2
3	47 31.1	13 98	90.1	47 34.9	12 98	89.4	47 38.4	11 98	88.7	47 41.7	10 98	87.9	47 44.6	09 98	87.2	47 47.3	08 98	86.4	47 49.7	07 98	85.7	47 51.8	07 98	85.0	3
4	46 32.2	13 98	89.9	46 36.0	12 98	89.2	46 39.5	11 98	88.5	46 42.8	10 98	87.8	46 45.8	10 98	87.0	46 48.5	09 98	86.3	46 51.0	08 98	85.6	46 53.1	07 98	84.9	4
45	45 33.3	13 98	89.8	45 37.1	12 98	89.0	45 40.7	11 98	88.3	45 43.9	11 98	87.6	45 47.0	10 98	86.9	45 49.7	09 98	86.2	45 52.2	08 98	85.5	45 54.5	07 98	84.8	45
6	44 34.4	13 98	89.6	44 38.2	12 98	88.9	44 41.8	12 98	88.2	44 45.1	11 98	87.5	44 48.2	10 98	86.8	44 51.0	09 98	86.1	44 53.5	08 98	85.4	44 55.8	07 98	84.7	6
7	43 35.5	13 98	89.4	43 39.3	12 98	88.7	43 42.9	12 98	88.0	43 46.3	11 98	87.3	43 49.4	10 98	86.6	43 52.2	09 98	85.9	43 54.8	08 98	85.3	43 57.2	07 98	84.6	7
8	42 36.6	13 98	89.2	42 40.4	12 98	88.5	42 44.1	12 98	87.9	42 47.4	11 98	87.2	42 50.6	10 98	86.5	42 53.5	09 98	85.8	42 56.1	08 98	85.1	42 58.6	08 98	84.5	8
9	41 37.7	13 98	89.0	41 41.6	13 98	88.4	41 45.2	12 98	87.7	41 48.6	11 98	87.0	41 51.8	10 98	86.4	41 54.7	09 98	85.7	41 57.5	09 98	85.0	41 59.9	08 98	84.4	9
50	40 38.8	13 98	88.9	40 42.7	13 98	88.2	40 46.4	12 98	87.5	40 49.8	11 98	86.9	40 53.0	10 98	86.2	40 56.0	10 98	85.6	40 58.8	09 98	84.9	41 01.3	08 98	84.3	50
1	39 39.9	13 98	88.7	39 43.8	13 98	88.0	39 47.5	12 98	87.4	39 51.0	11 98	86.7	39 54.3	11 98	86.1	39 57.3	10 98	85.4	40 00.1	09 98	84.8	40 02.7	08 98	84.1	1
2	38 41.0	13 98	88.5	38 45.0	13 98	87.9	38 48.7	12 98	87.2	38 52.2	11 98	86.6	38 55.5	11 98	86.0	38 58.6	10 98	85.3	39 01.5	09 98	84.7	39 04.2	09 98	84.0	2
3	37 42.2	13 98	88.3	37 46.1	13 98	87.7	37 49.9	12 98	87.1	37 53.4	11 98	86.5	37 56.8	11 98	85.8	37 59.9	10 98	85.2	38 02.8	09 98	84.6	38 05.6	09 98	83.9	3
4	36 43.3	14 98	88.2	36 47.3	13 98	87.6	36 51.0	12 98	86.9	36 54.6	12 98	86.3	36 58.0	11 98	85.7	37 01.2	10 98	85.1	37 04.2	10 98	84.4	37 07.0	09 98	83.8	4
55	35 44.4	14 98	88.0	35 48.4	13 98	87.4	35 52.2	12 98	86.8	35 55.9	12 98	86.2	35 59.3	11 98	85.6	36 02.5	11 98	84.9	36 05.6	10 98	84.3	36 08.5	09 98	83.7	55
6	34 45.6	14 98	87.8	34 49.6	13 98	87.2	34 53.4	13 98	86.6	34 57.1	12 98	86.0	35 00.6	11 98	85.4	35 03.9	11 98	84.8	35 07.0	10 98	84.2	35 09.9	09 98	83.6	6
7	33 46.7	14 98	87.7	33 50.8	13 98	87.1	33 54.6	13 98	86.5	33 58.3	12 98	85.9	34 01.9	11 98	85.3	34 05.2	11 98	84.7	34 08.4	10 98	84.1	34 11.4	10 98	83.5	7
8	32 47.9	14 98	87.5	32 51.9	13 98	86.9	32 55.9	13 98	86.3	32 59.6	12 98	85.7	33 03.2	12 98	85.1	33 06.6	11 98	84.6	33 09.8	11 98	84.0	33 12.9	10 98	83.4	8
9	31 49.0	14 98	87.3	31 53.1	13 98	86.8	31 57.1	13 98	86.2	32 00.9	12 98	85.6	32 04.5	12 98	85.0	32 08.0	11 98	84.4	32 11.3	11 98	83.8	32 14.4	10 97	83.3	9
60	30 50.2	14 98	87.2	30 54.3	14 98	86.6	30 58.3	13 98	86.0	31 02.2	13 98	85.5	31 05.8	12 98	84.9	31 09.3	11 98	84.3	31 12.7	11 98	83.7	31 15.9	10 97	83.1	60
1	29 51.4	14 98	87.0	29 55.5	14 98	86.5	29 59.6	13 98	85.9	30 03.4	13 98	85.3	30 07.2	12 98	84.7	30 10.7	12 98	84.2	30 14.2	11 98	83.6	30 17.5	11 97	83.0	1
2	28 52.6	14 98	86.9	28 56.8	14 98	86.3	29 00.8	13 98	85.7	29 04.8	13 98	85.2	29 08.5	12 98	84.6	29 12.2	12 98	84.0	29 15.7	11 98	83.5	29 19.0	11 97	82.9	2
3	27 53.8	14 98	86.7	27 58.0	14 98	86.1	28 02.1	13 98	85.6	28 06.1	13 98	85.0	28 09.9	13 98	84.5	28 13.6	12 98	83.9	28 17.1	12 98	83.3	28 20.6	11 97	82.8	3
4	26 55.0	14 98	86.5	26 59.2	14 98	86.0	27 03.4	14 98	85.4	27 07.4	13 98	84.9	27 11.3	13 98	84.3	27 15.0	12 98	83.8	27 18.7	12 97	83.2	27 22.1	11 97	82.6	4
65	25 56.2	15 98	86.4	26 00.5	14 98	85.8	26 04.7	14 98	85.3	26 08.7	13 98	84.7	26 12.7	13 98	84.2	26 16.5	12 98	83.6	26 20.2	12 97	83.1	26 23.7	12 97	82.5	65
6	24 57.4	15 98	86.2	25 01.8	14 98	85.7	25 06.0	14 98	85.1	25 10.1	14 98	84.6	25 14.1	13 98	84.0	25 18.0	13 98	83.5	25 21.7	12 97	82.9	25 25.3	12 97	82.4	6
7	23 58.6	15 98	86.1	24 03.0	14 98	85.5	24 07.3	14 98	85.0	24 11.5	14 98	84.4	24 15.5	13 98	83.9	24 19.5	13 98	83.3	24 23.3	13 97	82.8	24 27.0	12 97	82.3	7
8	22 59.9	15 98	85.9	23 04.3	15 98	85.4	23 08.6	14 98	84.8	23 12.9	14 98	84.3	23 17.0	14 98	83.7	23 21.0	13 97	83.2	23 24.9	13 97	82.7	23 28.6	12 97	82.1	8
9	22 01.1	15 98	85.7	22 05.6	15 98	85.2	22 10.0	14 98	84.7	22 14.3	14 98	84.1	22 18.4	14 98	83.6	22 22.5	13 97	83.1	22 26.4	13 97	82.5	22 30.3	13 97	82.0	9
70	21 02.4	15 98	85.6	21 06.9	15 98	85.0	21 11.4	15 98	84.5	21 15.7	14 98	84.0	21 19.9	14 98	83.5	21 24.0	14 97	82.9	21 28.1	13 97	82.4	21 32.0	13 97	81.9	70
1	20 03.7	15 98	85.4	20 08.3	15 98	84.9	20 12.7	15 98	84.4	20 17.1	14 98	83.8	20 21.4	14 97	83.3	20 25.6	14 97	82.8	20 29.7	13 97	82.2	20 33.7	13 97	81.7	1
2	19 05.0	16 98	85.3	19 09.6	15 98	84.7	19 14.1	15 98	84.2	19 18.6	15 98	83.7	19 22.9	14 97	83.2	19 27.2	14 97	82.6	19 31.3	14 97	82.1	19 35.4	13 97	81.6	2
3	18 06.3	16 98	85.1	18 11.0	15 98	84.6	18 15.5	15 98	84.0	18 20.0	15 98	83.5	18 24.5	15 97	83.0	18 28.8	14 97	82.5	18 33.0	14 97	82.0	18 37.2	14 97	81.4	3
4	17 07.6	16 98	84.9	17 12.3	16 98	84.4	17 17.0	15 98	83.9	17 21.5	15 98	83.4	17 26.0	15 97	82.9	17 30.4	15 97	82.3	17 34.7	14 97	81.8	17 38.9	14 97	81.3	4
75	16 09.0	16 98	84.8	16 13.7	16 98	84.2	16 18.4	15 98	83.7	16 23.0	15 97	83.2	16 27.6	15 97	82.7	16 32.0	15 97	82.2	16 36.4	14 97	81.7	16 40.7	14 97	81.2	75
6	15 10.3	16 98	84.6	15 15.1	16 98	84.1	15 19.9	16 98	83.6	15 24.6	15 97	83.1	15 29.2	15 97	82.5	15 33.7	15 97	82.0	15 38.1	15 97	81.5	15 42.5	15 97	81.0	6
7	14 11.7	16 98	84.4	14 16.6	16 98	83.9	14 21.4	16 98	83.4	14 26.1	16 97	82.9	14 30.8	15 97	82.4	14 35.4	15 97	81.9	14 39.9	15 97	81.4	14 44.4	15 97	80.9	7
8	13 13.1	16 98	84.3	13 18.0	16 98	83.8	13 22.9	16 97	83.2	13 27.7	16 97	82.7	13 32.4	16 97	82.2	13 37.1	15 97	81.7	13 41.7	15 97	81.2	13 46.2	15 97	80.7	8
9	12 14.5	17 98	84.1	12 19.5	16 98	83.6	12 24.4	16 97	83.1	12 29.3	16 97	82.6	12 34.1	16 97	82.1	12 38.8	16 97	81.6	12 43.5	16 97	81.1	12 48.1	15 97	80.6	9
80	11 15.9	17 98	83.9	11 21.0	17 98	83.4	11 25.9	17 97	82.9	11 30.9	16 97	82.4	11 35.7	16 97	81.9	11 40.6	16 97	81.4	11 45.3	16 97	80.9	11 50.0	16 97	80.4	80
1	10 17.4	17 98	83.8	10 22.5	17 97	83.3	10 27.5	17 97	82.8	10 32.5	17 97	82.2	10 37.4	16 97	81.7	10 42.3	16 97	81.2	10 47.2	16 97	80.7	10 52.0	16 97	80.2	1
2	9 18.8	17 98	83.6	9 24.0	17 97	83.1	9 29.1	17 97	82.6	9 34.1	17 97	82.1	9 39.2	17 97	81.6	9 44.1	17 97	81.1	9 49.1	16 97	80.6	9 53.9	16 97	80.1	2
3	8 20.3	17 98	83.4	8 25.5	17 97	82.9	8 30.7	17 97	82.4	8 35.8	17 97	81.9	8 40.9	17 97	81.4	8 46.0	17 97	80.9	8 51.0	17 97	80.4	8 55.9	17 97	79.9	3
4	7 21.8	18 97	83.2	7 27.1	18 97	82.7	7 32.3	17 97	82.2	7 37.5	17 97	81.7	7 42.7	17 97	81.2	7 47.8	17 97	80.7	7 52.9	17 97	80.3	7 58.0	17 97	79.8	4
85	6 23.3	18 97	83.1	6 28.7	18 97	82.6	6 34.0	18 97	82.1	6 39.2	18 97	81.6	6 44.5	17 97	81.1	6 49.7	17 97	80.6	6 54.9	17 97	80.1	7 00.0	17 97	79.6	85
6	5 24.9	18 97	82.9	5 30.3	18 97	82.4	5 35.6	18 97	81.9	5 41.0	18 97	81.4	5 46.3	18 97	80.9	5 51.6	18 97	80.4	5 56.9	18 97	79.9	6 02.1	17 96	79.4	6
7																						5 04.2	18 96	79.2	7

H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	71 00.0	1.0 03	180.0	70 30.0	1.0 03	180.0	70 00.0	1.0 02	180.0	69 30.0	1.0 02	180.0	69 00.0	1.0 02	180.0	68 30.0	1.0 02	180.0	68 00.0	1.0 02	180.0	67 30.0	1.0 02	180.0	00
1	70 58.4	1.0 08	177.0	70 28.5	1.0 08	177.0	69 58.5	1.0 07	177.1	69 28.6	1.0 07	177.2	68 58.6	1.0 07	177.3	68 28.6	1.0 07	177.3	67 58.7	1.0 07	177.4	67 28.7	1.0 07	177.4	1
2	70 53.8	99 13	173.9	70 23.9	99 13	174.1	69 54.1	1.0 12	174.2	69 24.2	1.0 12	174.4	68 54.4	1.0 12	174.5	68 24.5	1.0 11	174.6	67 54.6	1.0 11	174.8	67 24.7	1.0 11	174.9	2
3	70 46.0	99 18	170.9	70 16.4	99 17	171.2	69 46.7	99 17	171.4	69 17.0	99 17	171.6	68 47.4	99 16	171.8	68 17.6	99 16	172.0	67 47.9	99 16	172.2	67 18.2	99 15	172.4	3
4	70 35.3	98 23	168.0	70 05.9	98 22	168.3	69 36.5	98 22	168.6	69 07.1	98 21	168.9	68 37.6	98 21	169.1	68 08.1	98 20	169.4	67 38.6	98 20	169.6	67 09.1	98 19	169.9	4
05	70 21.6	97 28	165.1	69 52.5	97 27	165.5	69 23.4	97 26	165.8	68 54.3	97 26	166.2	68 25.2	97 25	166.5	67 56.0	97 24	166.8	67 26.7	97 24	167.1	66 57.5	98 23	167.4	05
6	70 05.0	96 32	162.3	69 36.4	96 31	162.7	69 07.7	96 31	163.2	68 39.0	96 30	163.6	68 10.1	96 29	163.9	67 41.3	96 29	164.3	67 12.4	96 28	164.6	66 43.4	97 27	165.0	6
7	69 45.8	94 36	159.6	69 17.6	94 36	160.1	68 49.4	94 35	160.5	68 21.0	95 34	161.0	67 52.6	95 33	161.4	67 24.1	95 33	161.8	66 55.6	95 32	162.2	66 27.0	95 31	162.6	7
8	69 24.0	92 40	156.9	68 56.3	92 40	157.5	68 28.5	93 39	158.0	68 00.6	93 38	158.5	67 32.6	93 37	159.0	67 04.6	94 36	159.4	66 36.4	94 36	159.9	66 08.2	94 35	160.3	8
9	68 59.7	90 44	154.4	68 32.5	91 43	155.0	68 05.3	91 42	155.5	67 37.9	91 42	156.1	67 10.4	92 41	156.6	66 42.8	92 40	157.1	66 15.1	92 39	157.6	65 47.3	93 38	158.1	9
10	68 33.1	88 48	151.9	68 06.5	89 47	152.6	67 39.8	89 46	153.2	67 12.9	90 45	153.8	66 45.9	90 44	154.3	66 18.8	91 43	154.8	65 51.6	91 43	155.4	65 24.2	91 42	155.9	10
1	68 04.4	87 51	149.6	67 38.3	87 50	150.3	67 12.1	88 49	150.9	66 45.8	88 48	151.5	66 19.3	88 48	152.1	65 52.7	89 47	152.7	65 26.0	89 46	153.2	64 59.2	90 45	153.8	1
2	67 33.6	85 54	147.4	67 08.1	85 54	148.0	66 42.5	86 52	148.7	66 16.7	86 52	149.4	65 50.8	87 51	150.0	65 24.7	87 50	150.6	64 58.5	88 49	151.2	64 32.2	88 48	151.7	2
3	67 00.9	82 57	145.2	66 36.0	83 56	145.9	66 11.0	84 55	146.6	65 45.8	84 54	147.3	65 20.4	85 54	147.9	64 54.9	85 53	148.6	64 29.2	86 52	149.2	64 03.4	86 51	149.7	3
4	66 26.4	80 60	143.2	66 02.2	81 59	143.9	65 37.7	82 58	144.6	65 13.1	82 57	145.3	64 48.3	83 56	146.0	64 23.3	84 55	146.6	63 58.2	84 54	147.2	63 32.9	85 54	147.8	4
15	65 50.3	78 63	141.2	65 26.7	79 62	142.0	65 02.8	80 61	142.7	64 38.8	80 60	143.4	64 14.5	81 59	144.1	63 50.1	82 58	144.8	63 25.5	82 57	145.4	63 00.7	83 56	146.0	15
6	65 12.7	76 65	139.4	64 49.7	77 64	140.1	64 26.4	78 63	140.9	64 02.9	79 62	141.6	63 39.2	79 61	142.3	63 15.4	80 60	143.0	62 51.3	81 59	143.6	62 27.1	81 58	144.3	6
7	64 33.7	74 67	137.6	64 11.2	75 66	138.4	63 48.5	76 65	139.1	63 25.6	77 64	139.9	63 02.5	77 63	140.6	62 39.2	78 63	141.3	62 15.7	79 62	141.9	61 52.0	79 61	142.6	7
8	63 53.3	72 69	135.9	63 31.5	73 68	136.7	63 09.4	74 67	137.5	62 47.0	75 66	138.2	62 24.5	76 66	138.9	62 01.7	76 65	139.6	61 38.7	77 64	140.3	61 15.5	78 63	141.0	8
9	63 11.8	71 71	134.4	62 50.5	71 70	135.1	62 29.0	72 69	135.9	62 07.2	73 68	136.6	61 45.2	74 67	137.4	61 22.9	74 67	138.1	61 00.5	75 66	138.7	60 37.8	76 65	139.4	9
20	62 29.1	69 73	132.8	62 08.4	70 72	133.6	61 47.4	70 71	134.4	61 26.2	71 70	135.1	61 04.7	72 69	135.9	60 43.0	73 68	136.6	60 21.1	73 68	137.3	59 58.9	74 67	137.9	20
1	61 45.5	67 74	131.4	61 25.3	68 74	132.2	61 04.8	69 73	133.0	60 44.1	69 72	133.7	60 23.1	70 71	134.4	60 02.0	71 70	135.1	59 40.5	72 69	135.8	59 18.9	72 68	136.5	1
2	61 00.8	65 76	130.0	60 41.2	66 75	130.8	60 21.2	67 74	131.6	60 01.0	68 73	132.3	59 40.6	69 72	133.1	59 19.9	69 72	133.8	58 59.0	70 71	134.5	58 37.9	71 70	135.2	2
3	60 15.3	63 77	128.8	59 56.1	64 76	129.5	59 36.7	65 76	130.3	59 17.0	66 75	131.0	58 57.1	67 74	131.7	58 36.9	68 73	132.5	58 16.5	68 72	133.2	57 55.9	69 72	133.9	3
4	59 29.0	62 78	127.5	59 10.3	63 78	128.3	58 51.4	64 77	129.0	58 32.2	64 76	129.8	58 12.7	65 75	130.5	57 53.0	66 75	131.2	57 33.1	67 74	131.9	57 13.0	68 73	132.6	4
25	58 41.9	60 80	126.3	58 23.7	61 79	127.1	58 05.2	62 78	127.8	57 46.5	63 77	128.6	57 27.5	64 77	129.3	57 08.3	64 76	130.0	56 48.9	65 75	130.7	56 29.2	66 74	131.4	25
6	57 54.1	59 81	125.2	57 36.4	60 80	126.0	57 18.4	60 79	126.7	57 00.1	61 78	127.5	56 41.6	62 78	128.2	56 22.8	63 77	128.9	56 03.8	64 76	129.6	55 44.6	64 76	130.3	6
7	57 05.7	57 82	124.2	56 48.4	58 81	124.9	56 30.8	59 80	125.6	56 13.0	60 80	126.4	55 54.9	61 79	127.1	55 36.6	61 78	127.8	55 18.1	62 77	128.5	54 59.3	63 77	129.2	7
8	56 16.6	56 83	123.1	55 59.8	57 82	123.9	55 42.7	58 81	124.6	55 25.3	58 81	125.3	55 07.6	59 80	126.0	54 49.8	60 79	126.7	54 31.6	61 78	127.4	54 13.3	62 78	128.1	8
9	55 27.0	54 84	122.2	55 10.6	55 83	122.9	54 53.9	56 82	123.6	54 36.9	57 82	124.3	54 19.7	58 81	125.0	54 02.2	59 80	125.7	53 44.6	59 79	126.4	53 26.6	60 79	127.1	9
30	54 36.9	53 84	121.2	54 20.9	54 84	122.0	54 04.6	55 83	122.7	53 48.0	56 82	123.4	53 31.2	56 82	124.1	53 14.2	57 81	124.8	52 56.9	58 80	125.5	52 39.4	59 80	126.1	30
1	53 46.3	52 85	120.3	53 30.7	53 84	121.1	53 14.8	53 84	121.8	52 58.6	54 83	122.5	52 42.2	55 83	123.2	52 25.5	56 82	123.9	52 08.6	57 81	124.5	51 51.5	57 81	125.2	1
2	52 55.3	51 86	119.5	52 40.0	51 85	120.2	52 24.4	52 85	120.9	52 08.7	53 84	121.6	51 52.6	54 83	122.3	51 36.3	55 83	123.0	51 19.8	55 82	123.6	51 03.1	56 82	124.3	2
3	52 03.8	49 86	118.7	51 48.9	50 86	119.4	51 33.7	51 85	120.1	51 18.3	52 85	120.8	51 02.6	53 84	121.5	50 46.7	53 84	122.1	50 30.6	54 83	122.8	50 14.2	55 82	123.4	3
4	51 12.0	48 87	117.9	50 57.4	49 86	118.6	50 42.5	50 86	119.3	50 27.4	51 85	120.0	50 12.1	51 85	120.6	49 56.6	52 84	121.3	49 40.8	53 84	122.0	49 24.8	54 83	122.6	4
35	50 19.7	47 88	117.2	50 05.5	48 87	117.8	49 51.0	49 87	118.5	49 36.2	50 86	119.2	49 21.3	50 85	119.9	49 06.1	51 85	120.5	48 50.6	52 84	121.2	48 35.0	52 84	121.8	35
6	49 27.2	46 88	116.4	49 13.2	47 88	117.1	48 59.0	48 87	117.8	48 44.6	48 87	118.5	48 30.0	49 86	119.1	48 15.1	50 86	119.8	48 00.0	51 85	120.4	47 44.7	51 84	121.1	6
7	48 34.3	45 89	115.8	48 20.6	46 88	116.4	48 06.8	47 88	117.1	47 52.7	47 87	117.8	47 38.4	48 87	118.4	47 23.8	49 86	119.1	47 09.1	50 86	119.7	46 54.1	50 85	120.3	7
8	47 41.1	44 89	115.1	47 27.7	45 89	115.8	47 14.2	46 88	116.4	47 00.4	46 88	117.1	46 46.4	47 87	117.7	46 32.2	48 87	118.4	46 17.7	48 86	119.0	46 03.1	49 86	119.6	8
9	46 47.6	43 90	114.5	46 34.6	44 89	115.1	46 21.3	45 89	115.8	46 07.8	45 88	116.4	45 54.1	46 88	117.1	45 40.2	47 87	117.7	45 26.0	47 87	118.3	45 11.7	48 86	118.9	9
40	45 53.9	42 90	113.8	45 41.1	43 90	114.5	45 28.1	44 89	115.1	45 14.9	44 89	115.8	45 01.5	45 88	116.4	44 47.9	46 88	117.0	44 34.0	46 87	117.7	44 20.0	47 87	118.3	40
1	44 59.9	41 90	113.3	44 47.4	42 90	113.9	44 34.6	43 90	114.5	44 21.7	43 89	115.2	44 08.6	44 89	115.8	43 55.3	45 88	116.4	43 41.7	45 88	117.0	43 28.0	46 87	117.7	1
2	44 05.6	40 91	112.7	43 53.4	41 90	113.3	43 40.9	42 90	114.0	43 28.3	43 89	114.6	43 15.4	43 89	115.2	43 02.4	44 89	115.8	42 49.1	45 88	116.4	42 35.7	45 88	117.0	2
3	43 11.2	40 91	112.1	42 59.2	40 91	112.8	42 47.0	41 90	113.4	42 34.6	42 90	114.0	42 22.0	42 89	114.6	42 09.2	43 89	115.2	41 56.2	44 89	115.8	41 43.1	44 88	116.4	3
4	42 16.5	39 91	111.6	42 04.8	39 91	112.2	41 52.8	40 91	112.9	41 40.7	41 90	113.5	41 28.4	41 90	114.1	41 15.8	42 89	114.7	41 03.1	43 89	115.3	40 50.2	43 88	115.9	4
45	41 21.7	38 92	111.1	41 10.2	39 91	111.7	40 58.5	39 91	112.3	40 46.6	40 91	112.9	40 34.5	41 90	113.5	40 22.2	41 90	114.1	40 09.7	42 89	114.7	39 57.1	42 89	115.3	45
6	40 26.6	37 92	110.6	40 15.4	38 92	111.2	40 03.9	39 91	111.8	39 52.2	39 91	112.4	39 40.4	40 90	113.0	39 28.3	40 90	113.6	39 16.1	41 90	114.2	39 03.7	42 89	114.8	6
7	39 31.4	37 92	110.1	39 20.4	37 92	110.7	39 09.1	38 92	111.3	38 57.7	38 91	111.9	38 46.1	39 91	112.5	38 34.3	40 90	113.1	38 22.3	40 90	113.7	38 10.2	41 90	114.3	7
8	38 36.0	36 93	109.7	38 25.2	36 92	110.3	38 14.2	37 92	110.9	38 02.9	38 92	111.4	37 51.6	38 91	112.0	37 40.0	39 91	112.6	37 28.3	39 90	113.2	37 16.4	40 90	113.8	8
9	37 40.5	35 93	109.2	37 29.9	36 92	109.8	37 19.0	36 92	110.4	37 08.0	37 92	111.0	36 56.9	38 91	111.6	36 45.5	38 91	112.1	36 34.0	39 91	112.7	36 22.4	39 90	113.3	9
50	36 44.8	35 93	108.8	36 34.4	35 93	109.4	36 23.8	36 92	110.0	36 13.0	36 92	110.5	36 02.0	37 92	111.1	35 50.9	37 91	111.7	35 39.6	38 91	112.3	35 28.2	38 91	112.8	50
1	35 49.0	34 93	108.4	35 38.7	34 93	108.9	35 28.3	35 93	109.5	35 17.7	36 92	110.1	35 07.0	36 92	110.7	34 56.1	37 92	111.2	34 45.0	37 91	111.8	34 33.8	38 91	112.4	1
2	34 53.0	33 93	108.0	34 43.0	34 93	108.5	34 32.7	34 93	109.1	34 22.3	35 93	109.7	34 11.8	35 92	110.2	34 01.1	36 92	110.8	33 50.2	36 92	111.4	33 39.2	37 91	111.9	2
3	33 56.9	33 94	107.6	33 47.0	33 93	108.1	33 37.0	34 93	108.7	33 26.8	34 93	109.3	33 16.5	35 92	109.8	33 06.0	35 92	110.4	32 55.3	36 92	110.9	32 44.5	36 91	111.5	3
4	33 00.7	32 94	107.2	32 51.0	33 94	107.7	32 41.2	33 93	108.3	32 31.1	34 93	108.9	32 21.0	34 93	109.4	32 10.7	35 92	110.0	32 00.2	35 92	110.5	31 49.6	36 92	111.1	4
55	32 04.4	32 94	106.8	31 54.9	32 94	107.4	31 45.2	33 93	107.9	31 35.3	33 93	108.5	31 25.4	33 93	109.0	31 15.3	34 93	109.6	31 05.0	34 92	110.1	30 54.6	35 92	110.7	55
6	31 08.0	31 94	106.4	30 58.6	31 94	107.0	30 49.1	32 94	107.5	30 39.4	32 93	108.1	30 29.6	33 93	108.6	30 19.7	33 93	109.2	30 09.6	34 92	109.7	29 59.4	34 92	110.3	6
7	30 11.4	30 94	106.1	30 02.2	31 94	106.6	29 52.9	31 94	107.2	29 43.4	32 94	107.7	29 33.8	32 93	108.3	29 24.0	33 93	108.8	29 14.1	33 93	109.4	29 04.1	34 92	109.9	7
8	29 14.8	30 95	105.7	29 05.7	30 94	106.3	28 56.5	31 94	106.8	28 47.2	31 94	107.4	28 37.8	32 94	107.9	28 28.2	32 93	108.5	28 18.5	33 93	109.0	28 08.7	33 93	109.5	8
9	28 18.0	29 95	105.4	28 09.1	30 94	105.9	28 00.1	30 94	106.5	27 51.0	31 94	107.0	27 41.7	31 94	107.6	27 32.3	32 93	108.1	27 22.8	32 93	108.6	27 13.1	32 93	109.2	9
60	27 21.2	29 95	105.1	27 12.5	29 95	105.6	27 03.6	30 94	106.2	26 54.6	30 94	106.7	26 45.5	31 94	107.2	26 36.2	31 94	107.8	26 26.9	31 93	108.3	26 17.4	32 93	108.8	60
1	26 24.3	28 95	104.8	26 15.7	29 95	105.3	26 07.0	29 95	105.8	25 58.1	30 94	106.4	25 49.2	30 94	106.9	25 40.1	30 94	107.4	25 30.9	31 93	107.9	25 21.6	31 93	108.5	1
2	25 27.3	28 95	104.5	25 18.8	28 95	105.0	25 10.3	29 95	105.5	25 01.6	29 94	106.0	24 52.8	30 94	106.6	24 43.9	30 94	107.1	24 34.8	30 94	107.6	24 25.7	31 93	108.1	2
3	24 30.2	28 95	104.1	24 21.9	28 95	104.7	24 13.5	28 95	105.2	24 04.9	29 95	105.7	23 56.3	29 94	106.3	23 47.5	29 94	106.8	23 38.6	30 94	107.3	23 29.7	30 94	107.8	3
4	23 33.1	27 96	103.9	23 24.9	27 95	104.4	23 16.6	28 95	104.9	23 08.2	28 95	105.4	22 59.7	29 94	105.9	22 51.1	29 94	106.5	22 42.4	29 94	107.0	22 33.5	30 94	107.5	4
65	22 35.9	27 96	103.6	22 27.8	27 95	104.1	22 19.6	27 95	104.6	22 11.4	28 95	105.1	22 03.0	28 95	105.6	21 54.5	28 94	106.2	21 46.0	29 94	106.7	21 37.3	29 94	107.2	65
6	21 38.6	26 96	103.3	21 30.6	27 95	103.8	21 22.6	27 95	104.3	21 14.5	27 95	104.8	21 06.2	28 95	105.3	20 57.9	28 94	105.9	20 49.5	28 94	106.4	20 41.0	28 94	106.9	6
7	20 41.2	26 96	103.0	20 33.4	26 95	103.5	20 25.5	27 95	104.0	20 17.5	27 95	104.5	20 09.4	27 95	105.1	20 01.2	27 95	105.6	19 53.0	28 94	106.1	19 44.6	28 94	106.6	7
8	19 43.8	26 96	102.7	19 36.1	26 96	103.2	19 28.3	26 95	103.8	19 20.5	26 95	104.3	19 12.5	27 95	104.8	19 04.5	27 95	105.3	18 56.3	27 96	105.8	18 48.1	27 94	106.3	8
9	18 46.3	25 96	102.5	18 38.7	26 96	103.0	18 31.1	26 96	103.5	18 23.3	26 95	104.0	18 15.5	26 95	104.5	18 07.6	26 95	105.0	17 59.6	27 95	105.5	17 51.6	27 94	106.0	9
70	17 48.8	25 96	102.2	17 41.3	25 96	102.7	17 33.8	25 96	103.2	17 26.2	26 95	103.7	17 18.5	26 95	104.2	17 10.7	26 96	104.7	17 02.8	26 95	105.2	16 54.9	27 95	105.7	70
1	16 51.2	24 96	101.9	16 43.8	25 96	102.5	16 36.4	25 96	103.0	16 28.9	25 96	103.5	16 21.3	25 95	104.0	16 13.7	26 95	104.5	16 06.0	26 95	105.0	15 58.2	26 95	105.5	1
2	15 53.5	24 96	101.7	15 46.3	24 96	102.2	15 39.0	24 96	102.7	15 31.6	25 96	103.2	15 24.1	25 95	103.7	15 16.6	25 95	104.2	15 09.0	25 96	104.7	15 01.4	26 95	105.2	2
3	14 55.8	24 96	101.5	14 48.7	24 96	102.0	14 41.5	24 96	102.5	14 34.2	24 96	103.0	14 26.9	25 96	103.5	14 19.5	25 95	104.0	14 12.0	25 95	104.5	14 04.5	25 95	105.0	3
4	13 58.1	23 96	101.2	13 51.1	24 96	101.7	13 44.0	24 96	102.2	13 36.8	24 96	102.7	13 29.6	24 96	103.2	13 22.3	24 95	103.7	13 15.0	25 95	104.2	13 07.6	25 95	104.7	4
75	13 00.3	23 96	101.0	12 53.4	23 96	101.5	12 46.4	23 96	102.0	12 39.3	24 96	102.5	12 32.2	24 96	103.0	12 25.1	24 96	103.5	12 17.9	24 95	104.0	12 10.6	24 95	104.5	75
6	12 02.5	23 96	100.7	11 55.6	23 96	101.2	11 48.7	23 96	101.7	11 41.8	23 96	102.2	11 34.8	23 96	102.7	11 27.8	24 96	103.2	11 20.7	24 95	103.7	11 13.5	24 95	104.2	6
7	11 04.6	22 97	100.5	10 57.8	23 96	101.0	10 51.0	23 96	101.5	10 44.2	23 96	102.0	10 37.3	23 96	102.5	10 30.4	23 96	103.0	10 23.4	23 96	103.5	10 16.4	23 95	104.0	7
8	10 06.6	22 97	100.3	10 00.0	22 96	100.8	9 53.3	22 96	101.3	9 46.6	23 96	101.8	9 39.8	23 96	102.3	9 33.0	23 96	102.8	9 26.1	23 96	103.3	9 19.2	23 95	103.8	8
9	9 08.7	22 97	100.1	9 02.1	22 97	100.6	8 55.5	22 96	101.1	8 48.9	22 96	101.6	8 42.2	22 96	102.0	8 35.5	22 96	102.5	8 28.8	23 96	103.0	8 22.0	23 96	103.5	9
80	8 10.7	21 97	99.9	8 04.2	22 97	100.3	7 57.7	22 96	100.8	7 51.2	22 96	101.3	7 44.6	22 96	101.8	7 38.0	22 96	102.3	7 31.4	22 96	102.8	7 24.7	22 96	103.3	80
1	7 12.6	21 97	99.6	7 06.2	21 97	100.1	6 59.8	21 97	100.6	6 53.4	22 96	101.1	6 46.9	22 96	101.6	6 40.4	22 96	102.1	6 33.9	22 96	102.6	6 27.3	22 96	103.1	1
2	6 14.5	21 97	99.4	6 08.2	21 97	99.9	6 01.9	21 97	100.4	5 55.6	21 96	100.9	5 49.2	21 96	101.4	5 42.8	21 96	101.9	5 36.4	21 96	102.4	5 30.0	22 96	102.9	2
3	5 16.4	21 97	99.2	5 10 2	21 97	99.7	5 04.0	21 97	100.2																3

H.A.	12° 00′			12° 30′			13° 00′			13° 30′			14° 00′			14° 30′			15° 00′			15° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	89 00.0	1.0 40	00.0	88 30.0	1.0 29	00.0	88 00.0	1.0 28	00.0	87 30.0	1.0 18	00.0	87 00.0	1.0 15	00.0	86 30.0	1.0 13	00.0	86 00.0	1.0 12	00.0	85 30.0	1.0 10	00.0	00
1	88 36.0	71 80	44.3	88 12.5	84 68	33.0	87 46.4	90 57	26.0	87 19.0	93 49	21.2	86 50.7	95 42	17.9	86 22.0	96 37	15.5	85 53.0	97 33	13.6	85 23.8	98 30	12.1	1
2	87 48.0	45 90	62.8	87 32.0	61 83	52.3	87 12.1	71 75	44.2	86 49.6	79 68	37.8	86 25.2	84 61	32.8	85 59.6	87 56	28.9	85 33.0	90 50	25.8	85 05.8	92 46	23.2	2
3	86 53.7	32 94	70.9	86 42.1	45 90	62.6	86 26.9	56 84	55.4	86 08.8	64 79	49.2	85 48.4	71 73	44.0	85 26.3	76 68	39.6	85 02.8	80 63	35.8	84 38.2	84 59	32.6	3
4	85 57.3	24 96	75.3	85 48.4	35 93	68.6	85 36.4	45 89	62.5	85 21.6	53 85	57.0	85 04.6	60 80	52.0	84 45.6	66 76	47.7	84 24.9	71 72	43.8	84 03.0	75 68	40.4	4
05	85 00.0	19 96	78.0	84 52.8	28 94	72.5	84 43.0	37 92	67.3	84 30.7	45 88	62.4	84 16.3	52 85	57.9	83 59.9	57 82	53.8	83 41.8	63 78	50.1	83 22.4	67 74	46.7	05
6	84 02.2	16 97	79.8	83 56.3	24 95	75.1	83 48.0	31 93	70.6	83 37.6	38 91	66.3	83 25.2	45 88	62.3	83 10.9	50 85	58.5	82 55.1	56 82	55.0	82 37.7	60 79	51.7	6
7	83 04.1	13 97	81.0	82 59.1	20 96	77.0	82 52.0	27 94	73.0	82 43.1	33 92	69.2	82 32.2	39 90	65.6	82 19.7	44 88	62.1	82 05.7	49 85	58.9	81 50.2	54 83	55.8	7
8	82 05.8	11 97	81.9	82 01.6	17 96	78.4	81 55.4	23 95	74.9	81 47.6	29 94	71.4	81 38.1	34 92	68.2	81 27.0	39 90	65.0	81 14.4	44 88	62.0	81 00.5	49 85	59.1	8
9	81 07.5	10 97	82.6	81 03.8	15 97	79.4	80 58.4	21 95	76.3	80 51.5	26 94	73.2	80 43.0	31 93	70.2	80 33.1	35 91	67.3	80 21.8	40 89	64.5	80 09.2	44 87	61.8	9
10	80 09.0	08 98	83.2	80 05.8	13 97	80.3	80 01.0	18 96	77.4	79 54.9	23 95	74.6	79 47.3	27 94	71.9	79 38.4	32 92	69.2	79 28.2	36 91	66.6	79 16.8	40 89	64.1	10
1	79 10.5	07 98	83.6	79 07.7	12 97	81.0	79 03.4	16 96	78.4	78 57.9	21 95	75.8	78 51.1	25 94	73.2	78 43.0	29 93	70.8	78 33.8	33 92	68.4	78 23.4	37 90	66.0	1
2	78 12.0	06 98	84.0	78 09.4	10 97	81.5	78 05.7	15 96	79.1	78 00.7	19 95	76.7	77 54.5	23 95	74.4	77 47.2	26 94	72.1	77 38.8	30 92	69.8	77 29.2	34 91	67.6	2
3	77 13.4	06 98	84.2	77 11.2	09 97	82.0	77 07.8	13 97	79.7	77 03.3	17 96	77.5	76 57.7	20 95	75.3	76 51.0	24 94	73.2	76 43.2	28 93	71.1	76 34.5	31 92	69.0	3
4	76 14.8	05 98	84.4	76 12.8	08 97	82.4	76 09.8	12 97	80.3	76 05.7	15 96	78.2	76 00.6	19 95	76.2	75 54.5	22 95	74.1	75 47.4	25 94	72.2	75 39.3	29 93	70.2	4
15	75 16.1	04 98	84.6	75 14.4	07 97	82.7	75 11.7	11 97	80.7	75 08.0	14 96	78.8	75 03.3	17 96	76.9	74 57.7	20 95	75.0	74 51.1	23 94	73.1	74 43.7	26 93	71.2	15
6	74 17.5	04 98	84.8	74 16.0	07 97	82.9	74 13.5	10 97	81.1	74 10.2	13 97	79.3	74 05.9	16 96	77.5	74 00.7	19 95	75.7	73 54.7	22 94	73.9	73 47.8	24 94	72.1	6
7	73 18.8	03 98	84.9	73 17.5	06 97	83.1	73 15.3	09 97	81.4	73 12.3	12 97	79.7	73 08.3	14 96	78.0	73 03.6	17 95	76.3	72 58.0	20 95	74.6	72 51.6	23 94	72.9	7
8	72 20.2	02 98	85.0	72 19.0	05 98	83.3	72 17.1	08 97	81.7	72 14.3	11 97	80.1	72 10.7	13 96	78.4	72 06.3	16 96	76.8	72 01.1	19 96	75.2	71 55.2	21 94	73.6	8
9	71 21.5	02 98	85.0	71 20.5	05 98	83.5	71 18.8	07 97	81.9	71 16.2	10 97	80.4	71 12.9	12 96	78.8	71 08.9	15 96	77.3	71 04.1	17 95	75.8	70 58.6	20 95	74.3	9
20	70 22.8	02 98	85.1	70 22.0	04 98	83.6	70 20.4	06 97	82.1	70 18.1	09 97	80.6	70 15.1	11 96	79.2	70 11.4	14 96	77.7	70 06.9	16 95	76.2	70 01.8	18 95	74.8	20
1	69 24.1	01 98	85.1	69 23.5	03 98	83.7	69 22.1	06 97	82.3	69 20.0	08 97	80.9	69 17.2	10 97	79.5	69 13.8	13 96	78.1	69 09.7	15 96	76.7	69 04.9	17 95	75.3	1
2	68 25.4	01 98	85.2	68 24.9	03 98	83.8	68 23.7	05 97	82.4	68 21.8	07 97	81.1	68 19.3	09 97	79.7	68 16.1	12 96	78.4	68 12.3	14 96	77.1	68 07.9	16 95	75.7	2
3	67 26.8	00 98	85.2	67 26.3	02 98	83.9	67 25.3	05 97	82.6	67 23.6	07 97	81.3	67 21.3	09 97	80.0	67 18.4	11 96	78.7	67 14.9	13 96	77.4	67 10.7	15 95	76.1	3
4	66 28.1	00 98	85.2	66 27.8	02 98	83.9	66 26.9	04 97	82.7	66 25.4	06 97	81.4	66 23.3	08 97	80.2	66 20.6	10 96	78.9	66 17.4	12 96	77.7	66 13.5	14 96	76.5	4
25	65 29.4	00 98	85.2	65 29.2	02 98	84.0	65 28.5	03 97	82.8	65 27.2	05 97	81.6	65 25.3	07 97	80.4	65 22.8	09 96	79.2	65 19.8	11 96	78.0	65 16.2	13 96	76.8	25
6	64 30.7	01 98	85.2	64 30.6	01 98	84.0	64 30.0	03 97	82.8	64 28.9	05 97	81.7	64 27.2	07 97	80.5	64 25.0	08 96	79.4	64 22.2	10 96	78.2	64 18.8	12 96	77.1	6
7	63 32.0	01 98	85.1	63 32.1	01 98	84.0	63 31.6	02 97	82.9	63 30.6	04 97	81.8	63 29.1	06 97	80.7	63 27.1	08 97	79.5	63 24.5	09 96	78.4	63 21.4	11 96	77.3	7
8	62 33.3	01 98	85.1	62 33.5	00 98	84.0	62 33.2	02 97	82.9	62 32.3	04 97	81.9	62 31.0	05 97	80.8	62 29.1	07 97	79.7	62 26.8	09 96	78.6	62 23.9	10 96	77.5	8
9	61 34.6	02 98	85.1	61 34.9	00 98	84.0	61 34.7	02 97	83.0	61 34.0	03 97	81.9	61 32.8	05 97	80.9	61 31.2	06 97	79.8	61 29.0	08 96	78.8	61 26.4	10 96	77.7	9
30	60 36.0	02 98	85.0	60 36.3	00 98	84.0	60 36.2	01 97	83.0	60 35.7	03 97	82.0	60 34.7	04 97	81.0	60 33.2	06 97	79.9	60 31.2	07 96	78.9	60 28.8	09 96	77.9	30
1	59 37.3	02 98	85.0	59 37.8	01 98	84.0	59 37.8	01 97	83.0	59 37.4	02 97	82.0	59 36.5	04 97	81.0	59 35.2	05 97	80.1	59 33.4	07 96	79.1	59 31.2	08 95	78.1	1
2	58 38.6	03 98	84.9	58 39.2	01 98	84.0	58 39.3	00 97	83.0	58 39.0	02 97	82.1	58 38.3	03 97	81.1	58 37.2	05 97	80.1	58 35.6	06 96	79.2	58 33.6	07 96	78.2	2
3	57 40.0	03 98	84.9	57 40.6	02 98	84.0	57 40.9	00 97	83.0	57 40.7	01 97	82.1	57 40.1	03 97	81.2	57 39.1	04 97	80.2	57 37.7	05 96	79.3	57 35.9	07 96	78.4	3
4	56 41.3	03 98	84.8	56 42.0	02 98	83.9	56 42.4	01 97	83.0	56 42.4	01 97	82.1	56 41.9	02 97	81.2	56 41.1	03 97	80.3	56 39.8	05 96	79.4	56 38.2	06 96	78.5	4
35	55 42.6	03 98	84.8	55 43.5	02 98	83.9	55 43.9	01 97	83.0	55 44.0	00 97	82.1	55 43.7	02 97	81.2	55 43.0	03 97	80.3	55 41.9	04 96	79.5	55 40.5	06 96	78.6	35
6	54 44.0	04 98	84.7	54 44.9	02 98	83.9	54 45.5	01 97	83.0	54 45.7	00 97	82.1	54 45.5	01 97	81.3	54 44.9	02 97	80.4	54 44.0	04 97	79.5	54 42.7	05 96	78.7	6
7	53 45.3	04 98	84.7	53 46.4	03 98	83.8	53 47.0	02 97	83.0	53 47.3	00 97	82.1	53 47.3	01 97	81.3	53 46.9	02 97	80.4	53 46.1	03 97	79.6	53 45.0	04 96	78.7	7
8	52 46.7	04 98	84.6	52 47.8	03 98	83.8	52 48.6	02 97	82.9	52 49.0	01 97	82.1	52 49.1	00 97	81.3	52 48.8	01 97	80.5	52 48.2	03 97	79.6	52 47.2	04 96	78.8	8
9	51 48.1	05 98	84.5	51 49.3	03 98	83.7	51 50.1	02 97	82.9	51 50.6	01 97	82.1	51 50.8	00 97	81.3	51 50.7	01 97	80.5	51 50.2	02 97	79.7	51 49.4	03 96	78.9	9
40	50 49.4	05 98	84.4	50 50.7	04 98	83.7	50 51.7	03 97	82.9	50 52.3	02 97	82.1	50 52.6	01 97	81.3	50 52.6	01 97	80.5	50 52.3	02 97	79.7	50 51.6	03 96	78.9	40
1	49 50.8	05 98	84.4	49 52.2	04 98	83.6	49 53.2	03 97	82.8	49 54.0	02 97	82.0	49 54.4	01 97	81.3	49 54.5	00 97	80.5	49 54.3	01 97	79.7	49 53.8	02 96	78.9	1
2	48 52.2	05 98	84.3	48 53.7	04 98	83.5	48 54.8	03 97	82.8	48 55.6	02 97	82.0	48 56.2	01 97	81.3	48 56.4	00 97	80.5	48 56.4	01 97	79.7	48 56.0	02 96	79.0	2
3	47 53.6	06 98	84.2	47 55.1	05 98	83.5	47 56.4	04 97	82.7	47 57.3	03 97	82.0	47 58.0	02 97	81.2	47 58.4	01 97	80.5	47 58.4	00 97	79.7	47 58.2	01 96	79.0	3
4	46 55.0	06 98	84.1	46 56.6	06 98	83.4	46 58.0	04 97	82.7	46 59.0	03 97	81.9	46 59.8	02 97	81.2	47 00.3	01 97	80.5	47 00.5	00 97	79.7	47 00.4	01 96	79.0	4
45	45 56.4	06 98	84.0	45 58.1	05 97	83.3	45 59.5	04 97	82.6	46 00.7	03 97	81.9	46 01.6	02 97	81.2	46 02.2	02 97	80.5	46 02.5	01 97	79.7	46 02.6	00 96	79.0	45
6	44 57.9	06 98	84.0	44 59.6	05 97	83.3	45 01.1	05 97	82.5	45 02.4	04 97	81.8	45 03.4	03 97	81.1	45 04.1	02 97	80.4	45 04.6	01 97	79.7	45 04.8	00 96	79.0	6
7	43 59.3	07 98	83.9	44 01.1	06 97	83.2	44 02.7	05 97	82.5	44 04.1	04 97	81.8	44 05.2	03 97	81.1	44 06.0	02 97	80.4	44 06.6	02 97	79.7	44 07.0	01 96	79.0	7
8	43 00.7	07 98	83.8	43 02.7	06 97	83.1	43 04.4	05 97	82.4	43 05.8	04 97	81.7	43 07.0	04 97	81.0	43 08.0	03 97	80.4	43 08.7	02 97	79.7	43 09.1	01 96	79.0	8
9	42 02.2	07 98	83.7	42 04.2	06 97	83.0	42 06.0	06 97	82.3	42 07.5	05 97	81.7	42 08.8	04 97	81.0	42 09.9	03 97	80.3	42 10.7	02 97	79.6	42 11.3	02 96	79.0	9
50	41 03.7	07 98	83.6	41 05.7	07 97	82.9	41 07.6	06 97	82.3	41 09.2	05 97	81.6	41 10.7	04 97	80.9	41 11.8	04 97	80.3	41 12.8	03 97	79.6	41 13.5	02 96	79.0	50
1	40 05.1	08 98	83.5	40 07.3	07 97	82.8	40 09.3	06 97	82.2	40 11.0	05 97	81.5	40 12.5	05 97	80.9	40 13.8	04 97	80.2	40 14.9	03 97	79.6	40 15.7	02 96	78.9	1
2	39 06.6	08 98	83.4	39 08.9	07 97	82.8	39 10.9	06 97	82.1	39 12.7	06 97	81.5	39 14.4	05 97	80.8	39 15.8	04 97	80.2	39 16.9	04 97	79.5	39 17.9	03 96	78.9	2
3	38 08.1	08 97	83.3	38 10.4	07 97	82.7	38 12.6	07 97	82.0	38 14.5	06 97	81.4	38 16.2	05 97	80.8	38 17.7	05 97	80.1	38 19.0	04 96	79.5	38 20.1	03 96	78.9	3
4	37 09.6	08 97	83.2	37 12.0	08 97	82.6	37 14.3	07 97	81.9	37 16.3	06 97	81.3	37 18.1	06 97	80.7	37 19.7	05 97	80.1	37 21.1	04 96	79.4	37 22.3	04 96	78.8	4
55	36 11.1	09 97	83.1	36 13.6	08 97	82.5	36 15.9	07 97	81.9	36 18.0	07 97	81.2	36 20.0	06 97	80.6	36 21.7	05 97	80.0	36 23.2	04 96	79.4	36 24.6	04 96	78.8	55
6	35 12.7	09 97	83.0	35 15.3	08 97	82.4	35 17.6	08 97	81.8	35 19.8	07 97	81.2	35 21.9	06 97	80.5	35 23.7	06 97	79.9	35 25.3	05 96	79.3	35 26.8	05 96	78.7	6
7	34 14.2	09 97	82.9	34 16.9	09 97	82.3	34 19.4	08 97	81.7	34 21.7	07 97	81.1	34 23.8	07 97	80.5	34 25.7	06 97	79.9	34 27.5	06 96	79.3	34 29.1	05 96	78.7	7
8	33 15.8	09 97	82.8	33 18.5	09 97	82.2	33 21.1	08 97	81.6	33 23.5	08 97	81.0	33 25.7	07 97	80.4	33 27.7	07 97	79.8	33 29.6	06 96	79.2	33 31.3	05 96	78.6	8
9	32 17.4	10 97	82.7	32 20.2	09 97	82.1	32 22.8	09 97	81.5	32 25.3	08 97	80.9	32 27.6	07 97	80.3	32 29.8	07 97	79.7	32 31.8	06 96	79.1	32 33.6	06 96	78.5	9
60	31 19.0	10 97	82.6	31 21.9	09 97	82.0	31 24.6	09 97	81.4	31 27.2	08 97	80.8	31 29.6	08 97	80.2	31 31.8	07 97	79.6	31 33.9	07 96	79.0	31 35.9	06 96	78.5	60
1	30 20.6	10 97	82.4	30 23.5	10 97	81.9	30 26.4	09 97	81.3	30 29.0	09 97	80.7	30 31.6	08 97	80.1	30 33.9	08 97	79.5	30 36.1	07 96	79.0	30 38.2	07 96	78.4	1
2	29 22.2	10 97	82.3	29 25.3	10 97	81.7	29 28.2	09 97	81.2	29 30.9	09 97	80.6	29 33.5	08 97	80.0	29 36.0	08 96	79.5	29 38.3	07 96	78.9	29 40.5	07 96	78.3	2
3	28 23.8	11 97	82.2	28 27.0	10 97	81.6	28 30.0	10 97	81.1	28 32.8	09 97	80.5	28 35.5	09 97	79.9	28 38.1	08 96	79.4	28 40.5	08 96	78.8	28 42.8	07 96	78.2	3
4	27 25.5	11 97	82.1	27 28.7	10 97	81.5	27 31.8	10 97	81.0	27 34.7	10 97	80.4	27 37.6	09 97	79.8	27 40.2	09 96	79.3	27 42.8	08 96	78.7	27 45.2	08 96	78.2	4
65	26 27.2	11 97	82.0	26 30.5	11 97	81.4	26 33.6	10 97	80.8	26 36.7	10 97	80.3	26 39.6	09 97	79.7	26 42.4	09 96	79.2	26 45.0	09 96	78.6	26 47.5	08 96	78.1	65
6	25 28.9	11 97	81.8	25 32.2	11 97	81.3	25 35.5	11 97	80.7	25 38.6	10 97	80.2	25 41.6	10 97	79.6	25 44.5	09 96	79.1	25 47.3	09 96	78.5	25 49.9	09 96	78.0	6
7	24 30.6	12 97	81.7	24 34.0	11 97	81.2	24 37.4	11 97	80.6	24 40.6	11 97	80.1	24 43.7	10 97	79.5	24 46.7	10 96	79.0	24 49.6	09 96	78.4	24 52.3	09 96	77.9	7
8	23 32.3	12 97	81.6	23 35.8	12 97	81.0	23 39.3	11 97	80.5	23 42.6	11 97	80.0	23 45.8	11 96	79.4	23 48.9	10 96	78.9	23 51.9	10 96	78.3	23 54.8	09 96	77.8	8
9	22 34.0	12 97	81.5	22 37.7	12 97	80.9	22 41.2	12 97	80.4	22 44.6	11 97	79.8	22 47.9	11 96	79.3	22 51.1	10 96	78.8	22 54.2	10 96	78.2	22 57.2	10 96	77.7	9
70	21 35.8	13 97	81.3	21 39.5	12 97	80.8	21 43.1	12 97	80.3	21 46.7	12 97	79.7	21 50.1	11 96	79.2	21 53.4	11 96	78.7	21 56.6	11 96	78.1	21 59.7	10 96	77.6	70
1	20 37.6	13 97	81.2	20 41.4	13 97	80.7	20 45.1	12 97	80.1	20 48.7	12 97	79.6	20 52.2	12 96	79.1	20 55.6	11 96	78.5	20 58.9	11 96	78.0	21 02.2	11 96	77.5	1
2	19 39.4	13 97	81.1	19 43.3	13 97	80.5	19 47.1	13 97	80.0	19 50.8	12 96	79.5	19 54.4	12 96	78.9	19 57.9	12 96	78.4	20 01.3	11 96	77.9	20 04.7	11 96	77.4	2
3	18 41.2	13 97	80.9	18 45.2	13 97	80.4	18 49.1	13 97	79.9	18 52.9	13 96	79.3	18 56.6	12 96	78.8	19 00.2	12 96	78.3	19 03.8	12 96	77.8	19 07.2	11 96	77.2	3
4	17 43.1	14 97	80.8	17 47.1	13 97	80.3	17 51.1	13 97	79.7	17 55.0	13 96	79.2	17 58.8	13 96	78.7	18 02.6	12 96	78.2	18 06.2	12 96	77.7	18 09.8	12 96	77.1	4
75	16 45.0	14 97	80.6	16 49.1	14 97	80.1	16 53.2	13 97	79.6	16 57.2	13 96	79.1	17 01.1	13 96	78.6	17 04.9	13 96	78.0	17 08.7	12 96	77.5	17 12.4	12 96	77.0	75
6	15 46.9	14 97	80.5	15 51.1	14 97	80.0	15 55.3	14 96	79.5	15 59.4	14 96	78.9	16 03.4	13 96	78.4	16 07.3	13 96	77.9	16 11.2	13 96	77.4	16 15.0	13 96	76.9	6
7	14 48.8	15 97	80.3	14 53.1	14 97	79.8	14 57.4	14 96	79.3	15 01.6	14 96	78.8	15 05.7	14 96	78.3	15 09.8	13 96	77.8	15 13.7	13 96	77.3	15 17.7	13 96	76.8	7
8	13 50.7	15 97	80.2	13 55.1	15 97	79.7	13 59.5	14 96	79.2	14 03.8	14 96	78.7	14 08.0	14 96	78.2	14 12.2	14 96	77.6	14 16.3	14 96	77.1	14 20.3	13 95	76.6	8
9	12 52.7	15 97	80.0	12 57.2	15 96	79.5	13 01.7	15 96	79.0	13 06.1	15 96	78.5	13 10.4	14 96	78.0	13 14.7	14 96	77.5	13 18.9	14 96	77.0	13 23.1	14 95	76.5	9
80	11 54.7	15 97	79.9	11 59.3	15 96	79.4	12 03.9	15 96	78.9	12 08.4	15 96	78.4	12 12.8	15 96	77.9	12 17.2	15 96	77.4	12 21.5	14 96	76.9	12 25.8	14 95	76.4	80
1	10 56.7	16 97	79.7	11 01.4	16 96	79.2	11 06.1	15 96	78.7	11 10.7	15 96	78.2	11 15.2	15 96	77.7	11 19.7	15 96	77.2	11 24.2	15 96	76.7	11 28.6	15 95	76.2	1
2	9 58.8	16 97	79.6	10 03.6	16 96	79.1	10 08.3	16 96	78.6	10 13.0	16 96	78.1	10 17.7	15 96	77.6	10 22.3	15 96	77.1	10 26.9	15 95	76.6	10 31.4	15 95	76.1	2
3	9 00.9	16 96	79.4	9 05.8	16 96	78.9	9 10.6	16 96	78.4	9 15.4	16 96	77.9	9 20.2	16 96	77.4	9 24.9	16 96	76.9	9 29.6	16 95	76.4	9 34.3	15 95	75.9	3
4	8 03.0	17 96	79.3	8 08.0	17 96	78.8	8 12.9	16 96	78.3	8 17.9	16 96	77.8	8 22.7	16 96	77.3	8 27.6	16 96	76.8	8 32.4	16 95	76.3	8 37.2	16 95	75.8	4
85	7 05.2	17 96	79.1	7 10.2	17 96	78.6	7 15.3	17 96	78.1	7 20.3	17 96	77.6	7 25.3	17 96	77.1	7 30.3	16 95	76.6	7 35.2	16 95	76.1	7 40.1	16 95	75.6	85
6	6 07.3	17 96	78.9	6 12.5	17 96	78.4	6 17.7	17 96	77.9	6 22.8	17 96	77.4	6 27.9	17 96	76.9	6 33.0	17 95	76.4	6 38.0	17 95	75.9	6 43.1	17 95	75.4	6
7	5 09.6	18 96	78.7	5 14.8	18 96	78.3	5 20.1	18 96	77.8	5 25.3	17 96	77.3	5 30.6	17 96	76.8	5 35.8	17 95	76.3	5 40.9	17 95	75.8	5 46.1	17 95	75.3	7

DECLINATION CONTRARY NAME TO LATITUDE

Lat. 11°

H.A.	12° 00′			12° 30′			13° 00′			13° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	67 00.0	1.0 02	180.0	66 30.0	1.0 02	180.0	66 00.0	1.0 02	180.0	65 30.0	1.0 02	180.0
1	66 58.7	1.0 06	177.5	66 28.7	1.0 06	177.6	65 58.8	1.0 06	177.6	65 28.8	1.0 06	177.7
2	66 54.9	1.0 11	175.0	66 25.0	1.0 10	175.1	65 55.1	1.0 10	175.2	65 25.2	1.0 10	175.3
3	66 48.5	99 15	172.5	66 18.7	99 15	172.7	65 49.0	99 14	172.8	65 19.2	99 14	173.0
4	66 39.6	98 19	170.1	66 10.0	99 19	170.3	65 40.4	99 18	170.5	65 10.8	99 18	170.7
05	66 28.2	98 23	167.7	65 58.9	98 22	167.9	65 29.5	98 22	168.2	65 00.2	98 22	168.4
6	66 14.4	97 27	165.3	65 45.4	97 26	165.6	65 16.3	97 26	165.9	64 47.2	97 25	166.2
7	65 58.3	96 31	163.0	65 29.6	96 30	163.3	65 00.9	96 29	163.7	64 32.1	96 29	164.0
8	65 40.0	94 34	160.7	65 11.6	95 34	161.1	64 43.2	95 33	161.5	64 14.8	95 32	161.9
9	65 19.4	93 38	158.5	64 51.5	93 37	158.9	64 23.5	93 36	159.4	63 55.4	94 36	159.8
10	64 56.8	92 41	156.4	64 29.3	92 40	156.8	64 01.7	92 40	157.3	63 34.1	92 39	157.7
1	64 32.2	90 44	154.3	64 05.2	90 43	154.8	63 38.0	91 43	155.3	63 10.8	91 42	155.7
2	64 05.7	88 47	152.3	63 39.1	89 46	152.8	63 12.4	89 46	153.3	62 45.6	90 45	153.8
3	63 37.4	87 50	150.3	63 11.3	87 49	150.9	62 45.1	88 48	151.4	62 18.8	88 48	151.9
4	63 07.4	85 53	148.4	62 41.8	86 52	149.0	62 16.1	86 51	149.6	61 50.2	86 50	150.1
15	62 35.8	83 55	146.6	62 10.7	84 54	147.2	61 45.5	84 54	147.8	61 20.1	85 53	148.4
6	62 02.6	82 58	144.9	61 38.1	82 57	145.5	61 13.3	83 56	146.1	60 48.4	83 55	146.7
7	61 28.1	80 60	143.2	61 04.0	81 59	143.8	60 39.8	81 58	144.4	60 15.4	82 57	145.0
8	60 52.2	78 62	141.6	60 28.6	79 61	142.2	60 04.9	79 60	142.9	59 41.0	80 59	143.5
9	60 15.0	77 64	140.1	59 51.9	77 63	140.7	59 28.7	78 62	141.3	59 05.3	78 61	142.0
20	59 36.6	75 66	138.6	59 14.0	75 65	139.2	58 51.3	76 64	139.9	58 28.4	77 63	140.5
1	58 57.1	73 68	137.2	58 35.0	74 67	137.8	58 12.8	74 66	138.5	57 50.4	75 65	139.1
2	58 16.5	71 69	135.8	57 55.0	72 68	136.5	57 33.3	73 68	137.1	57 11.3	73 67	137.8
3	57 35.0	70 71	134.5	57 14.0	71 70	135.2	56 52.7	71 69	135.8	56 31.2	72 68	136.5
4	56 52.6	68 72	133.3	56 32.0	69 71	133.9	56 11.2	70 71	134.6	55 50.2	70 70	135.2
25	56 09.3	67 74	132.1	55 49.2	67 73	132.7	55 28.8	68 72	133.4	55 08.3	69 71	134.0
6	55 25.2	65 75	130.9	55 05.5	66 74	131.6	54 45.6	67 73	132.2	54 25.5	67 73	132.9
7	54 40.3	64 76	129.8	54 21.1	64 75	130.5	54 01.6	65 74	131.1	53 42.0	66 74	131.8
8	53 54.7	62 77	128.8	53 35.9	63 76	129.4	53 16.9	64 76	130.1	52 57.7	64 75	130.7
9	53 08.5	61 78	127.8	52 50.1	62 77	128.4	52 31.5	62 77	129.1	52 12.7	63 76	129.7
30	52 21.6	60 79	126.8	52 03.7	60 78	127.4	51 45.5	61 78	128.1	51 27.1	62 77	128.7
1	51 34.2	58 80	125.9	51 16.6	59 79	126.5	50 58.8	60 79	127.1	50 40.8	60 78	127.8
2	50 46.1	57 81	125.0	50 29.0	58 80	125.6	50 11.6	58 80	126.2	49 54.0	59 79	126.9
3	49 57.6	56 82	124.1	49 40.8	56 81	124.7	49 23.8	57 80	125.4	49 06.6	58 80	126.0
4	49 08.6	54 82	123.3	48 52.2	55 82	123.9	48 35.6	56 81	124.5	48 18.7	56 81	125.2
35	48 19.1	53 83	122.5	48 03.1	54 83	123.1	47 46.8	55 82	123.7	47 30.3	55 81	124.3
6	47 29.2	52 84	121.7	47 13.5	53 83	122.3	46 57.6	53 83	123.0	46 41.5	54 82	123.6
7	46 38.9	51 84	121.0	46 23.5	52 84	121.6	46 08.0	52 83	122.2	45 52.2	53 83	122.8
8	45 48.2	50 85	120.2	45 33.2	51 85	120.9	45 17.9	51 84	121.5	45 02.5	52 84	122.1
9	44 57.2	49 86	119.6	44 42.4	49 85	120.2	44 27.5	50 85	120.8	44 12.4	51 84	121.4
40	44 05.8	48 86	118.9	43 51.4	48 86	119.5	43 36.7	49 85	120.1	43 21.9	50 85	120.7
1	43 14.1	47 87	118.3	42 59.9	47 86	118.9	42 45.6	48 86	119.5	42 31.1	49 85	120.1
2	42 22.0	46 87	117.6	42 08.2	46 87	118.2	41 54.2	47 86	118.8	41 40.0	48 86	119.4
3	41 29.7	45 88	117.0	41 16.2	45 87	117.6	41 02.4	46 87	118.2	40 48.5	47 86	118.8
4	40 37.1	44 88	116.5	40 23.9	45 88	117.1	40 10.4	45 87	117.6	39 56.8	46 87	118.2
45	39 44.3	43 88	115.9	39 31.3	44 88	116.5	39 18.1	44 88	117.1	39 04.7	45 87	117.7
6	38 51.2	42 89	115.4	38 38.4	43 88	116.0	38 25.5	43 88	116.5	38 12.5	44 88	117.1
7	37 57.8	41 89	114.9	37 45.4	42 89	115.4	37 32.7	42 88	116.0	37 19.9	43 88	116.6
8	37 04.3	41 90	114.4	36 52.1	41 89	114.9	36 39.7	42 89	115.5	36 27.1	42 88	116.1
9	36 10.5	40 90	113.9	35 58.5	40 90	114.4	35 46.4	41 89	115.0	35 34.1	41 89	115.6
50	35 16.6	39 90	113.4	35 04.8	39 90	114.0	34 52.9	40 89	114.5	34 40.8	40 89	115.1
1	34 22.4	38 91	112.9	34 10.9	39 90	113.5	33 59.2	39 90	114.0	33 47.4	40 89	114.6
2	33 28.1	37 91	112.5	33 16.8	38 90	113.0	33 05.3	38 90	113.6	32 53.7	39 90	114.1
3	32 33.6	37 91	112.1	32 22.5	37 91	112.6	32 11.3	38 90	113.1	31 59.9	38 90	113.7
4	31 38.9	36 91	111.6	31 28.0	36 91	112.2	31 17.0	37 91	112.7	31 05.9	37 90	113.3
55	30 44.1	35 92	111.2	30 33.4	36 91	111.8	30 22.6	36 91	112.3	30 11.7	37 91	112.8
6	29 49.1	35 92	110.8	29 38.6	35 92	111.4	29 28.0	36 91	111.9	29 17.3	36 91	112.4
7	28 54.0	34 92	110.4	28 43.7	34 92	111.0	28 33.3	35 91	111.5	28 22.8	35 91	112.0
8	27 58.7	33 92	110.1	27 48.7	34 92	110.6	27 38.5	34 92	111.1	27 28.1	35 91	111.7
9	27 03.3	33 92	109.7	26 53.5	33 92	110.2	26 43.4	34 92	110.8	26 33.3	34 92	111.3
60	26 07.8	32 93	109.3	25 58.1	33 92	109.9	25 48.3	33 92	110.4	25 38.4	33 92	110.9
1	25 12.2	32 93	109.0	25 02.7	32 93	109.5	24 53.0	32 92	110.0	24 43.3	33 92	110.6
2	24 16.5	31 93	108.7	24 07.1	31 93	109.2	23 57.6	32 92	109.7	23 48.1	32 92	110.2
3	23 20.6	30 93	108.3	23 11.4	31 93	108.9	23 02.1	31 93	109.4	22 52.8	31 92	109.9
4	22 24.6	30 93	108.0	22 15.6	30 93	108.5	22 06.5	31 93	109.0	21 57.3	31 93	109.6
65	21 28.6	29 94	107.7	21 19.7	30 93	108.2	21 10.8	30 93	108.7	21 01.8	30 93	109.2
6	20 32.4	29 94	107.4	20 23.7	29 93	107.9	20 15.0	29 93	108.4	20 06.1	30 93	108.9
7	19 36.2	28 94	107.1	19 27.6	29 94	107.6	19 19.0	29 93	108.1	19 10.3	29 93	108.6
8	18 39.8	28 94	106.8	18 31.5	28 94	107.3	18 23.0	28 94	107.8	18 14.5	29 93	108.3
9	17 43.4	27 94	106.5	17 35.2	28 94	107.0	17 26.9	28 94	107.5	17 18.5	28 93	108.0
70	16 46.9	27 94	106.3	16 38.8	27 94	106.8	16 30.7	27 94	107.3	16 22.5	28 94	107.8
1	15 50.3	26 94	106.0	15 42.4	27 94	106.5	15 34.4	27 94	107.0	15 26.3	27 94	107.5
2	14 53.7	26 95	105.7	14 45.9	26 94	106.2	14 38.0	26 94	106.7	14 30.1	26 94	107.2
3	13 56.9	25 95	105.5	13 49.3	26 94	106.0	13 41.6	26 94	106.5	13 33.8	26 94	106.9
4	13 00.1	25 95	105.2	12 52.6	25 95	105.7	12 45.1	25 94	106.2	12 37.4	25 94	106.7
75	12 03.3	24 95	105.0	11 55.9	25 95	105.5	11 48.5	25 94	105.9	11 41.0	25 94	106.4
6	11 06.3	24 95	104.7	10 59.1	24 95	105.2	10 51.8	24 95	105.7	10 44.5	25 94	106.2
7	10 09.3	24 95	104.5	10 02.2	24 95	105.0	9 55.1	24 95	105.5	9 47.9	24 94	106.0
8	9 12.3	23 96	104.2	9 05.3	23 95	104.7	8 58.3	23 95	105.2	8 51.2	24 95	105.7
9	8 15.2	23 96	104.0	8 08.3	23 95	104.5	8 01.4	23 95	105.0	7 54.5	23 95	105.5
80	7 18.0	22 96	103.8	7 11.3	22 95	104.3	7 04.5	23 95	104.8	6 57.7	23 95	105.3
1	6 20.8	22 96	103.6	6 14.2	22 95	104.1	6 07.5	22 95	104.6	6 00.8	22 95	105.0
2	5 23.5	22 96	103.4	5 17.0	22 95	103.9	5 10.5	22 95	104.3	5 03.9	22 95	104.8

14° 00′			14° 30′			15° 00′			15° 30′			H.A.
Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
65 00.0	1.0 02	180.0	64 30.0	1.0 02	180.0	64 00.0	1.0 02	180.0	63 30.0	1.0 02	180.0	00
64 58.8	1.0 06	177.7	64 28.8	1.0 06	177.8	63 58.9	1.0 06	177.8	63 28.9	1.0 06	177.8	1
64 55.3	1.0 10	175.4	64 25.4	1.0 10	175.5	63 55.5	1.0 09	175.6	63 25.6	1.0 09	175.7	2
64 49.4	99 14	173.1	64 19.6	99 13	173.3	63 49.8	99 13	173.4	63 20.0	99 13	173.5	3
64 41.2	99 17	170.9	64 11.6	99 17	171.1	63 42.0	99 17	171.3	63 12.3	99 16	171.4	4
64 30.8	98 21	168.7	64 01.4	98 21	168.9	63 31.9	98 20	169.1	63 02.5	98 20	169.3	05
64 18.1	97 25	166.5	63 48.9	97 24	166.7	63 19.7	97 24	167.0	62 50.5	97 23	167.3	6
64 03.3	96 28	164.3	63 34.4	96 28	164.6	63 05.5	96 27	164.9	62 36.5	97 27	165.2	7
63 46.3	95 32	162.2	63 17.7	95 31	162.6	62 49.1	95 31	162.9	62 20.5	96 30	163.2	8
63 27.3	94 35	160.1	62 59.1	94 34	160.5	62 30.8	94 34	160.9	62 02.5	94 33	161.2	9
63 06.3	93 38	158.1	62 38.5	93 37	158.5	62 10.6	93 37	158.9	61 42.6	93 36	159.3	10
62 43.4	91 41	156.2	62 16.0	92 40	156.6	61 48.5	92 40	157.0	61 20.9	92 39	157.5	1
62 18.7	90 44	154.3	61 51.7	90 43	154.7	61 24.7	90 43	155.2	60 57.5	91 42	155.6	2
61 52.3	88 47	152.4	61 25.8	89 46	152.9	60 59.1	89 45	153.4	60 32.3	89 45	153.8	3
61 24.2	87 49	150.6	60 58.1	87 49	151.1	60 31.9	88 48	151.6	60 05.6	88 47	152.1	4
60 54.6	85 52	148.9	60 28.9	86 51	149.4	60 03.2	86 50	149.9	59 37.3	86 50	150.5	15
60 23.4	84 54	147.2	59 58.2	84 54	147.8	59 32.9	85 53	148.3	59 07.5	85 52	148.8	6
59 50.8	82 57	145.6	59 26.1	83 56	146.2	59 01.3	83 55	146.7	58 36.3	83 54	147.3	7
59 16.9	80 59	144.1	58 52.7	81 58	144.6	58 28.3	81 57	145.2	58 03.8	82 56	145.7	8
58 41.7	79 61	142.6	58 18.0	79 60	143.1	57 54.1	80 59	143.7	57 30.0	80 58	144.3	9
58 05.3	77 63	141.1	57 42.1	78 62	141.7	57 18.6	78 61	142.3	56 55.1	79 60	142.9	20
57 27.8	76 64	139.7	57 05.0	76 64	140.3	56 42.1	77 63	140.9	56 18.9	77 62	141.5	1
56 49.2	74 66	138.4	56 26.9	75 65	139.0	56 04.4	75 64	139.6	55 41.7	76 64	140.2	2
56 09.6	73 68	137.1	55 47.7	73 67	137.7	55 25.7	74 66	138.3	55 03.5	74 65	138.9	3
55 29.0	71 69	135.9	55 07.6	72 68	136.5	54 46.1	72 68	137.1	54 24.3	73 67	137.7	4
54 47.5	69 70	134.7	54 26.6	70 70	135.3	54 05.5	71 69	135.9	53 44.2	71 68	136.5	25
54 05.2	68 72	133.5	53 44.8	69 71	134.1	53 24.1	69 70	134.7	53 03.2	70 70	135.3	6
53 22.1	66 73	132.4	53 02.1	67 72	133.0	52 41.9	68 72	133.6	52 21.4	68 71	134.2	7
52 38.3	65 74	131.4	52 18.7	66 74	132.0	51 58.9	66 73	132.6	51 38.9	67 72	133.2	8
51 53.7	64 75	130.3	51 34.5	64 75	131.0	51 15.1	65 74	131.6	50 55.6	66 73	132.2	9
51 08.5	62 76	129.4	50 49.7	63 76	130.0	50 30.7	64 75	130.6	50 11.6	64 74	131.2	30
50 22.7	61 77	128.4	50 04.3	62 77	129.0	49 45.7	62 76	129.6	49 26.9	63 75	130.2	1
49 36.2	60 78	127.5	49 18.2	60 78	128.1	49 00.0	61 77	128.7	48 41.7	62 76	129.3	2
48 49.2	58 79	126.6	48 31.6	59 79	127.2	48 13.8	60 78	127.8	47 55.8	60 77	128.4	3
48 01.7	57 80	125.8	47 44.4	58 79	126.4	47 27.0	58 79	127.0	47 09.4	59 78	127.6	4
47 13.6	56 81	125.0	46 56.8	57 80	125.6	46 39.7	57 80	126.2	46 22.5	58 79	126.8	35
46 25.2	55 82	124.2	46 08.6	55 81	124.8	45 51.9	56 80	125.4	45 35.0	57 80	126.0	6
45 36.2	54 82	123.4	45 20.0	54 82	124.0	45 03.7	55 81	124.6	44 47.1	55 81	125.2	7
44 46.8	52 83	122.7	44 31.0	53 82	123.3	44 15.0	54 82	123.9	43 58.8	54 81	124.5	8
43 57.1	51 84	122.0	43 41.6	52 83	122.6	43 25.9	53 82	123.2	43 10.0	53 82	123.8	9
43 06.9	50 84	121.3	42 51.8	51 84	121.9	42 36.4	51 83	122.5	42 20.9	52 83	123.1	40
42 16.4	49 85	120.6	42 01.6	50 84	121.2	41 46.5	50 84	121.8	41 31.3	51 83	122.4	1
41 25.6	48 85	120.0	41 11.0	49 85	120.6	40 56.3	49 84	121.2	40 41.4	50 84	121.7	2
40 34.4	47 86	119.4	40 20.2	48 85	120.0	40 05.8	48 85	120.6	39 51.2	49 84	121.1	3
39 43.0	46 86	118.8	39 29.0	47 86	119.4	39 14.9	47 85	120.0	39 00.6	48 85	120.5	4
38 51.2	45 87	118.2	38 37.5	46 86	118.8	38 23.7	46 86	119.4	38 09.7	47 85	119.9	45
37 59.2	44 87	117.7	37 45.8	45 87	118.2	37 32.2	45 86	118.8	37 18.5	46 86	119.4	6
37 06.9	44 88	117.1	36 53.8	44 87	117.7	36 40.5	45 87	118.3	36 27.0	45 86	118.8	7
36 14.4	43 88	116.6	36 01.5	43 88	117.2	35 48.5	44 87	117.7	35 35.3	44 87	118.3	8
35 21.6	42 88	116.1	35 09.0	42 88	116.7	34 56.2	43 88	117.2	34 43.3	43 87	117.8	9
34 28.6	41 89	115.6	34 16.2	41 88	116.2	34 03.7	42 88	116.7	33 51.1	42 87	117.3	50
33 35.4	40 89	115.1	33 23.3	41 89	115.7	33 11.0	41 88	116.2	32 58.6	42 88	116.8	1
32 42.0	39 89	114.7	32 30.1	40 89	115.2	32 18.1	40 89	115.8	32 05.9	41 88	116.3	2
31 48.4	39 90	114.2	31 36.7	39 89	114.8	31 24.9	40 89	115.3	31 13.0	40 88	115.9	3
30 54.6	38 90	113.8	30 43.2	38 90	114.3	30 31.6	39 89	114.9	30 19.9	39 89	115.4	4
30 00.6	37 90	113.4	29 49.4	38 90	113.9	29 38.1	38 90	114.5	29 26.6	38 89	115.0	55
29 06.5	36 91	113.0	28 55.5	37 90	113.5	28 44.4	37 90	114.0	28 33.1	38 89	114.6	6
28 12.2	36 91	112.6	28 01.4	36 90	113.1	27 50.5	36 90	113.6	27 39.5	37 90	114.2	7
27 17.7	35 91	112.2	27 07.1	35 91	112.7	26 56.5	36 90	113.2	26 45.7	36 90	113.8	8
26 23.1	34 91	111.8	26 12.7	35 91	112.3	26 02.3	35 91	112.9	25 51.7	35 90	113.4	9
25 28.3	34 91	111.4	25 18.2	34 91	112.0	25 07.9	34 91	112.5	24 57.5	35 90	113.0	60
24 33.4	33 92	111.1	24 23.5	33 91	111.6	24 13.4	34 91	112.1	24 03.3	34 91	112.6	1
23 38.4	32 92	110.7	23 28.7	33 92	111.3	23 18.8	33 91	111.8	23 08.8	33 91	112.3	2
22 43.3	32 92	110.4	22 33.7	32 92	110.9	22 24.0	32 91	111.4	22 14.3	33 91	111.9	3
21 48.0	31 92	110.1	21 38.6	31 92	110.6	21 29.1	32 92	111.1	21 19.6	32 91	111.6	4
20 52.6	31 92	109.7	20 43.4	31 92	110.3	20 34.1	31 92	110.8	20 24.7	31 92	111.3	65
19 57.2	30 93	109.4	19 48.1	30 92	109.9	19 39.0	31 92	110.4	19 29.8	31 92	111.0	6
19 01.6	29 93	109.1	18 52.7	30 93	109.6	18 43.8	30 92	110.1	18 34.7	30 92	110.6	7
18 05.9	29 93	108.8	17 57.2	29 93	109.3	17 48.4	29 92	109.8	17 39.6	30 92	110.3	8
17 10.1	28 93	108.5	17 01.6	29 93	109.0	16 53.0	29 93	109.5	16 44.3	29 92	110.0	9
16 14.2	28 93	108.3	16 05.8	28 93	108.8	15 57.4	28 93	109.3	15 48.9	28 92	109.8	70
15 18.2	27 93	108.0	15 10.0	27 93	108.5	15 01.8	28 93	109.0	14 53.4	28 93	109.5	1
14 22.1	27 94	107.7	14 14.1	27 93	108.2	14 06.0	27 93	108.7	13 57.9	27 93	109.2	2
13 26.0	26 94	107.4	13 18.1	26 93	107.9	13 10.2	27 93	108.4	13 02.2	27 93	108.9	3
12 29.8	26 94	107.2	12 22.0	26 94	107.7	12 14.3	26 93	108.2	12 06.4	26 93	108.7	4
11 33.5	25 94	106.9	11 25.9	25 94	107.4	11 18.3	26 93	107.9	11 10.6	26 93	108.4	75
10 37.1	25 94	106.7	10 29.7	25 94	107.2	10 22.2	25 94	107.7	10 14.7	25 93	108.2	6
9 40.6	24 94	106.4	9 33.4	24 94	106.9	9 26.0	24 94	107.4	9 18.7	25 93	107.9	7
8 44.1	24 94	106.2	8 37.0	24 94	106.7	8 29.8	24 94	107.2	8 22.6	24 94	107.7	8
7 47.5	23 94	106.0	7 40.5	23 94	106.5	7 33.5	23 94	107.0	7 26.4	24 94	107.5	9
6 50.9	23 95	105.8	6 44.0	23 94	106.2	6 37.1	23 94	106.7	6 30.2	23 94	107.2	80
5 54.2	22 95	105.5	5 47.4	22 94	106.0	5 40.7	23 94	106.5	5 33.9	23 94	107.0	1
												2

at.
1°

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	85 00.0	1.0 09	00.0	84 30.0	1.0 08	00.0	84 00.0	1.0 08	00.0	83 30.0	1.0 07	00.0	83 00.0	1.0 07	00.0	82 30.0	1.0 06	00.0	82 00.0	1.0 06	00.0	81 30.0	1.0 05	00.0	00
1	84 54.4	98 27	10.9	84 24.9	98 25	09.9	83 55.3	99 23	09.1	83 25.7	99 21	08.4	82 56.0	99 20	07.8	82 26.3	99 18	07.2	81 56.5	99 17	06.8	81 26.7	99 16	06.3	1
2	84 38.1	93 42	21.0	84 10.0	94 39	19.2	83 41.7	95 36	17.7	83 13.0	96 34	16.4	82 44.2	96 32	15.2	82 15.3	97 30	14.2	81 46.2	97 28	13.3	81 17.0	97 26	12.5	2
3	84 12.7	86 55	29.9	83 46.6	88 51	27.6	83 19.9	90 48	25.5	82 52.8	91 45	23.7	82 25.3	92 42	22.2	81 57.6	93 40	20.8	81 29.5	94 37	19.5	81 01.3	94 36	18.4	3
4	83 40.0	78 64	37.4	83 16.0	81 60	34.8	82 51.3	83 57	32.4	82 26.0	85 54	30.3	82 00.1	87 51	28.5	81 33.8	88 48	26.8	81 07.0	90 46	25.3	80 40.0	91 44	23.9	4
05	83 01.6	71 71	43.6	82 39.8	74 68	40.9	82 17.1	77 64	38.4	81 53.6	79 61	36.1	81 29.5	82 58	34.1	81 04.7	83 56	32.2	80 39.5	85 53	30.5	80 13.8	86 51	29.0	05
6	82 19.1	64 76	48.7	81 59.3	68 73	46.0	81 38.5	71 70	43.4	81 16.9	74 67	41.1	80 54.4	76 65	39.0	80 31.2	78 62	37.0	80 07.5	80 59	35.2	79 43.2	82 57	33.5	6
7	81 33.4	58 80	52.9	81 15.4	62 77	50.2	80 56.4	65 75	47.7	80 36.4	68 72	45.4	80 15.6	71 70	43.2	79 54.1	73 67	41.2	79 31.8	75 65	39.4	79 08.9	77 62	37.6	7
8	80 45.3	53 83	56.4	80 29.0	56 81	53.8	80 11.6	60 78	51.4	79 53.2	63 76	49.1	79 33.9	66 74	47.0	79 13.8	68 71	44.9	78 53.0	71 69	43.0	78 31.5	73 67	41.3	8
9	79 55.5	48 85	59.3	79 40.5	52 83	56.8	79 24.5	55 81	54.5	79 07.6	58 79	52.3	78 49.7	61 77	50.2	78 31.0	64 75	48.2	78 11.6	66 73	46.3	77 51.4	68 71	44.5	9
10	79 04.2	44 87	61.7	78 50.5	47 85	59.4	78 35.8	51 84	57.1	78 20.1	54 82	55.0	78 03.6	57 80	53.0	77 46.2	59 78	51.0	77 28.0	62 76	49.2	77 09.0	64 74	47.4	10
1	78 11.8	40 89	63.7	77 59.3	44 87	61.5	77 45.7	47 85	59.4	77 31.2	50 84	57.4	77 15.8	53 82	55.4	76 59.6	55 80	53.5	76 42.5	58 78	51.7	76 24.8	60 76	50.0	1
2	77 18.6	37 90	65.5	77 07.0	40 88	63.4	76 54.5	43 87	61.4	76 41.0	46 85	59.4	76 26.7	49 84	57.5	76 11.5	52 82	55.7	75 55.6	54 80	53.9	75 38.9	57 79	52.3	2
3	76 24.7	34 91	67.0	76 14.0	37 89	65.0	76 02.4	40 88	63.1	75 49.8	43 87	61.2	75 36.5	46 85	59.4	75 22.3	49 84	57.6	75 07.4	51 82	55.9	74 51.7	53 81	54.3	3
4	75 30.2	32 92	68.3	75 20.3	35 90	66.4	75 09.5	37 89	64.6	74 57.8	40 88	62.8	74 45.4	43 87	61.1	74 32.1	45 85	59.4	74 18.1	48 84	57.7	74 03.3	50 82	56.1	4
15	74 35.3	29 92	69.4	74 26.1	32 91	67.6	74 16.0	35 90	65.9	74 05.1	38 89	64.2	73 53.5	40 88	62.5	73 41.0	43 86	60.9	73 27.9	45 85	59.3	73 14.0	47 84	57.7	15
6	73 40.0	27 93	70.4	73 31.4	30 92	68.7	73 22.0	33 91	67.1	73 11.8	35 90	65.4	73 00.9	38 89	63.8	72 49.2	40 87	62.2	72 36.8	42 86	60.7	72 23.8	45 85	59.2	6
7	72 44.4	25 93	71.3	72 36.3	28 92	69.7	72 27.6	31 91	68.1	72 18.0	33 90	66.5	72 07.8	35 89	65.0	71 56.8	38 88	63.5	71 45.1	40 87	62.0	71 32.8	42 86	60.5	7
8	71 48.4	24 94	72.1	71 41.0	26 93	70.5	71 32.7	29 92	69.0	71 23.8	31 91	67.5	71 14.2	33 90	66.0	71 03.9	36 89	64.6	70 52.9	38 88	63.1	70 41.2	40 87	61.7	8
9	70 52.3	22 94	72.8	70 45.3	24 93	71.3	70 37.6	27 92	69.8	70 29.2	29 92	68.4	70 20.2	31 91	66.9	70 10.5	33 90	65.5	70 00.1	36 89	64.2	69 49.1	38 88	62.8	9
20	69 55.9	21 94	73.4	69 49.4	23 94	71.9	69 42.2	25 93	70.5	69 34.3	27 92	69.2	69 25.8	29 91	67.8	69 16.6	32 90	66.4	69 06.9	34 89	65.1	68 56.5	36 88	63.8	20
1	68 59.4	19 94	73.9	68 53.3	21 94	72.6	68 46.6	24 93	71.2	68 39.2	26 92	69.9	68 31.1	28 92	68.5	68 22.5	30 91	67.2	68 13.3	32 90	66.0	68 03.4	34 89	64.7	1
2	68 02.8	18 95	74.4	67 57.0	20 94	73.1	67 50.7	22 93	71.8	67 43.7	24 93	70.5	67 36.2	26 92	69.2	67 28.0	28 91	68.0	67 19.3	30 90	66.7	67 10.0	32 90	65.5	2
3	67 06.0	17 95	74.8	67 00.6	19 94	73.6	66 54.7	21 94	72.3	66 48.1	23 93	71.1	66 41.0	25 92	69.9	66 33.3	27 92	68.6	66 25.0	28 91	67.4	66 16.2	30 90	66.2	3
4	66 09.1	16 95	75.2	66 04.1	18 94	74.0	65 58.5	20 94	72.8	65 52.3	21 93	71.6	65 45.6	23 93	70.4	65 38.3	25 92	69.2	65 30.5	27 91	68.1	65 22.2	29 91	66.9	4
25	65 12.1	15 95	75.6	65 07.4	17 95	74.4	65 02.1	18 94	73.3	64 56.3	20 94	72.1	64 50.0	22 93	70.9	64 43.2	24 92	69.8	64 35.8	25 92	68.7	64 27.9	27 91	67.5	25
6	64 15.0	14 95	75.9	64 10.6	16 95	74.8	64 05.7	17 94	73.6	64 00.2	19 94	72.5	63 54.3	21 93	71.4	63 47.8	22 93	70.3	63 40.8	24 92	69.2	63 33.3	26 91	68.1	6
7	63 17.8	13 95	76.2	63 13.7	15 95	75.1	63 09.1	16 94	74.0	63 04.0	18 94	72.9	62 58.4	20 93	71.8	62 52.3	21 93	70.8	62 45.7	23 92	69.7	62 38.6	24 92	68.6	7
8	62 20.6	12 96	76.5	62 16.8	14 95	75.4	62 12.4	15 95	74.3	62 07.6	17 94	73.3	62 02.4	18 94	72.2	61 56.6	20 93	71.2	61 50.4	22 92	70.1	61 43.6	23 92	69.1	8
9	61 23.3	11 96	76.7	61 19.7	13 95	75.7	61 15.7	14 95	74.6	61 11.2	16 94	73.6	61 06.2	17 94	72.6	61 00.8	19 93	71.6	60 54.9	20 93	70.6	60 48.5	22 92	69.6	9
30	60 26.0	10 96	76.9	60 22.6	12 95	75.9	60 18.9	13 95	74.9	60 14.6	15 94	73.9	60 10.0	16 94	72.9	60 04.8	18 93	71.9	59 59.3	19 93	70.9	59 53.3	21 92	70.0	30
1	59 28.6	10 96	77.1	59 25.5	11 95	76.1	59 22.0	12 95	75.2	59 18.0	14 94	74.2	59 13.6	15 94	73.2	59 08.8	17 94	72.2	59 03.5	18 93	71.3	58 57.9	20 93	70.3	1
2	58 31.1	09 96	77.3	58 28.3	10 95	76.3	58 25.0	12 95	75.4	58 21.3	13 95	74.4	58 17.2	14 94	73.5	58 12.7	16 94	72.5	58 07.7	17 93	71.6	58 02.4	19 93	70.7	2
3	57 33.7	08 96	77.4	57 31.0	09 96	76.5	57 28.0	11 95	75.6	57 24.5	12 95	74.7	57 20.7	14 94	73.7	57 16.4	15 94	72.8	57 11.8	16 93	71.9	57 06.7	17 93	71.0	3
4	56 36.2	07 96	77.6	56 33.7	09 96	76.7	56 30.9	10 95	75.8	56 27.7	11 95	74.9	56 24.1	13 94	74.0	56 20.1	14 94	73.1	56 15.7	15 94	72.2	56 11.0	16 93	71.3	4
35	55 38.6	07 96	77.7	55 36.4	08 96	76.8	55 33.8	09 95	75.9	55 30.8	11 95	75.0	55 27.5	12 94	74.2	55 23.7	13 94	73.3	55 19.6	14 94	72.4	55 15.2	16 93	71.6	35
6	54 41.1	06 96	77.8	54 39.1	07 96	76.9	54 36.7	09 95	76.1	54 33.9	10 95	75.2	54 30.8	11 95	74.4	54 27.3	12 94	73.5	54 23.5	13 94	72.7	54 19.2	15 93	71.8	6
7	53 43.5	06 96	77.9	53 41.7	07 96	77.1	53 39.5	08 95	76.2	53 36.9	09 95	75.4	53 34.0	10 95	74.5	53 30.8	11 94	73.7	53 27.2	13 94	72.9	53 23.3	14 93	72.0	7
8	52 45.9	05 96	78.0	52 44.3	06 96	77.2	52 42.3	07 95	76.3	52 39.9	08 95	75.5	52 37.3	09 95	74.7	52 34.2	11 94	73.9	52 30.9	12 94	73.0	52 27.2	13 94	72.2	8
9	51 48.3	04 96	78.0	51 46.8	05 96	77.2	51 45.0	07 95	76.4	51 42.9	08 95	75.6	51 40.4	09 95	74.8	51 37.6	10 94	74.0	51 34.5	11 94	73.2	51 31.1	12 94	72.4	9
40	50 50.7	04 96	78.1	50 49.4	05 96	77.3	50 47.8	06 95	76.5	50 45.8	07 95	75.7	50 43.6	08 95	75.0	50 41.0	09 94	74.2	50 38.1	10 94	73.4	50 34.9	11 94	72.6	40
1	49 53.0	03 96	78.2	49 51.9	04 96	77.4	49 50.5	05 96	76.6	49 48.7	06 95	75.8	49 46.7	07 95	75.1	49 44.3	08 95	74.3	49 41.7	09 94	73.5	49 38.7	10 94	72.8	1
2	48 55.4	03 96	78.2	48 54.4	04 96	77.4	48 53.2	05 96	76.7	48 51.6	06 95	75.9	48 49.8	07 95	75.2	48 47.6	08 95	74.4	48 45.2	09 94	73.7	48 42.4	10 94	72.9	2
3	47 57.7	02 96	78.2	47 56.9	03 96	77.5	47 55.8	04 96	76.8	47 54.5	05 95	76.0	47 52.8	06 95	75.3	47 50.9	07 95	74.5	47 48.6	08 94	73.8	47 46.1	09 94	73.0	3
4	47 00.0	02 96	78.3	46 59.4	03 96	77.5	46 58.5	04 96	76.8	46 57.3	04 95	76.1	46 55.8	05 95	75.3	46 54.1	06 95	74.6	46 52.0	07 94	73.9	46 49.7	08 94	73.2	4
45	46 02.4	01 96	78.3	46 01.9	02 96	77.6	46 01.2	03 96	76.9	46 00.1	04 95	76.1	45 58.8	05 95	75.4	45 57.3	06 95	74.7	45 55.5	07 94	74.0	45 53.4	07 94	73.3	45
6	45 04.7	01 96	78.3	45 04.4	02 96	77.6	45 03.8	02 96	76.9	45 02.9	03 95	76.2	45 01.8	04 95	75.5	45 00.5	05 95	74.8	44 58.8	06 94	74.1	44 56.9	07 94	73.4	6
7	44 07.0	00 96	78.3	44 06.9	01 96	77.6	44 06.4	02 96	76.9	44 05.8	03 95	76.2	44 04.8	04 95	75.5	44 03.6	04 95	74.8	44 02.2	05 94	74.1	44 00.5	06 94	73.4	7
8	43 09.4	00 96	78.3	43 09.3	00 96	77.6	43 09.1	01 96	76.9	43 08.5	02 95	76.3	43 07.8	03 95	75.6	43 06.8	04 95	74.9	43 05.5	05 94	74.2	43 04.0	05 94	73.5	8
9	42 11.7	01 96	78.3	42 11.8	00 96	77.6	42 11.7	01 96	77.0	42 11.3	02 95	76.3	42 10.7	02 95	75.6	42 09.9	03 95	74.9	42 08.8	04 94	74.3	42 07.5	05 94	73.6	9
50	41 14.0	01 96	78.3	41 14.3	00 96	77.6	41 14.3	00 96	77.0	41 14.1	01 95	76.3	41 13.7	02 95	75.6	41 13.0	03 95	75.0	41 12.2	03 94	74.3	41 11.0	04 94	73.6	50
1	40 16.3	02 96	78.3	40 16.7	01 96	77.6	40 16.9	00 96	77.0	40 16.9	00 95	76.3	40 16.6	01 95	75.6	40 16.1	02 95	75.0	40 15.4	03 95	74.3	40 14.5	03 94	73.7	1
2	39 18.7	02 96	78.2	39 19.2	01 96	77.6	39 19.6	01 96	77.0	39 19.7	00 95	76.3	39 19.6	01 95	75.7	39 19.3	01 95	75.0	39 18.7	02 95	74.4	39 18.0	03 94	73.7	2
3	38 21.0	03 96	78.2	38 21.7	02 96	77.6	38 22.2	01 96	76.9	38 22.4	01 95	76.3	38 22.5	00 95	75.7	38 22.4	01 95	75.0	38 22.0	02 95	74.4	38 21.4	02 94	73.8	3
4	37 23.4	03 96	78.2	37 24.2	02 96	77.6	37 24.8	02 96	76.9	37 25.2	01 95	76.3	37 25.4	00 95	75.7	37 25.5	00 95	75.0	37 25.3	01 95	74.4	37 24.9	02 94	73.8	4
55	36 25.7	04 96	78.1	36 26.7	03 96	77.5	36 27.4	02 96	76.9	36 28.0	02 95	76.3	36 28.4	01 95	75.7	36 28.6	00 95	75.0	36 28.6	00 95	74.4	36 28.3	01 94	73.8	55
6	35 28.1	04 96	78.1	35 29.2	03 96	77.5	35 30.1	03 96	76.9	35 30.8	02 95	76.3	35 31.3	01 95	75.6	35 31.7	01 95	75.0	35 31.8	00 95	74.4	35 31.8	00 94	73.8	6
7	34 30.5	04 96	78.0	34 31.7	04 96	77.4	34 32.7	03 96	76.8	34 33.6	03 95	76.2	34 34.3	02 95	75.6	34 34.8	01 95	75.0	34 35.1	01 95	74.4	34 35.2	00 94	73.8	7
8	33 32.8	05 96	78.0	33 34.2	04 96	77.4	33 35.4	04 96	76.8	33 36.4	03 95	76.2	33 37.2	02 95	75.6	33 37.9	02 95	75.0	33 38.4	01 95	74.4	33 38.7	01 94	73.8	8
9	32 35.2	05 96	77.9	32 36.7	05 96	77.3	32 38.0	04 96	76.7	32 39.2	04 95	76.2	32 40.2	03 95	75.6	32 41.0	02 95	75.0	32 41.6	02 95	74.4	32 42.1	01 94	73.8	9
60	31 37.6	06 96	77.9	31 39.3	05 96	77.3	31 40.7	05 96	76.7	31 42.0	04 95	76.1	31 43.1	04 95	75.5	31 44.1	03 95	74.9	31 44.9	02 94	74.4	31 45.6	02 94	73.8	60
1	30 40.1	06 96	77.8	30 41.8	06 96	77.2	30 43.4	05 96	76.6	30 44.8	05 95	76.1	30 46.1	04 95	75.5	30 47.2	03 95	74.9	30 48.2	03 94	74.3	30 49.0	02 94	73.7	1
2	29 42.5	06 96	77.7	29 44.4	06 96	77.2	29 46.1	05 96	76.6	29 47.7	05 95	76.0	29 49.1	05 95	75.4	29 50.4	04 95	74.9	29 51.5	04 94	74.3	29 52.5	03 94	73.7	2
3	28 45.0	07 96	77.7	28 47.0	06 96	77.1	28 48.8	06 95	76.5	28 50.5	05 95	76.0	28 52.1	05 95	75.4	28 53.5	05 95	74.8	28 54.8	04 94	74.2	28 56.0	04 94	73.7	3
4	27 47.4	07 96	77.6	27 49.6	07 96	77.0	27 51.6	06 95	76.5	27 53.4	06 95	75.9	27 55.1	05 95	75.3	27 56.7	05 95	74.8	27 58.1	05 94	74.2	27 59.4	04 94	73.6	4
65	26 49.9	08 96	77.5	26 52.2	07 96	76.9	26 54.3	07 95	76.4	26 56.3	06 95	75.8	26 58.2	06 95	75.3	26 59.9	06 95	74.7	27 01.5	05 94	74.1	27 02.9	05 94	73.6	65
6	25 52.4	08 96	77.4	25 54.8	08 96	76.9	25 57.1	07 95	76.3	25 59.2	07 95	75.8	26 01.2	06 95	75.2	26 03.1	06 95	74.6	26 04.8	06 94	74.1	26 06.4	05 94	73.5	6
7	24 55.0	09 96	77.3	24 57.5	08 96	76.8	24 59.9	08 95	76.2	25 02.1	07 95	75.7	25 04.3	07 95	75.1	25 06.3	07 95	74.6	25 08.2	06 94	74.0	25 10.0	06 94	73.5	7
8	23 57.5	09 96	77.2	24 00.1	09 96	76.7	24 02.7	08 95	76.1	24 05.1	08 95	75.6	24 07.4	07 95	75.1	24 09.5	07 95	74.5	24 11.6	07 94	74.0	24 13.5	06 94	73.4	8
9	23 00.1	09 96	77.1	23 02.8	09 95	76.6	23 05.5	09 95	76.1	23 08.0	08 95	75.5	23 10.5	08 95	75.0	23 12.8	08 95	74.4	23 15.0	07 94	73.9	23 17.1	07 94	73.3	9
70	22 02.7	10 96	77.0	22 05.6	09 95	76.5	22 08.3	09 95	76.0	22 11.0	09 95	75.4	22 13.6	08 95	74.9	22 16.0	08 94	74.4	22 18.4	08 94	73.8	22 20.7	07 94	73.3	70
1	21 05.3	10 96	76.9	21 08.3	10 95	76.4	21 11.2	10 95	75.9	21 14.0	09 95	75.3	21 16.7	09 95	74.8	21 19.3	09 94	74.3	21 21.9	08 94	73.7	21 24.3	08 94	73.2	1
2	20 07.9	11 96	76.8	20 11.1	10 95	76.3	20 14.1	10 95	75.8	20 17.1	10 95	75.2	20 19.9	09 95	74.7	20 22.7	09 94	74.2	20 25.3	09 94	73.6	20 27.9	08 94	73.1	2
3	19 10.6	11 96	76.7	19 13.8	11 95	76.2	19 17.0	10 95	75.7	19 20.1	10 95	75.1	19 23.1	10 95	74.6	19 26.0	10 94	74.1	19 28.8	09 94	73.6	19 31.5	09 94	73.0	3
4	18 13.3	11 95	76.6	18 16.7	11 95	76.1	18 20.0	11 95	75.6	18 23.2	11 95	75.0	18 26.3	10 95	74.5	18 29.4	10 94	74.0	18 32.4	10 94	73.5	18 35.2	09 94	72.9	4
75	17 16.0	12 95	76.5	17 19.5	12 95	76.0	17 23.0	11 95	75.4	17 26.3	11 95	74.9	17 29.6	11 94	74.4	17 32.8	11 94	73.9	17 35.9	10 94	73.4	17 38.9	10 94	72.8	75
6	16 18.7	12 95	76.4	16 22.4	12 95	75.9	16 26.0	12 95	75.3	16 29.5	12 95	74.8	16 32.9	11 94	74.3	16 36.2	11 94	73.8	16 39.5	11 94	73.3	16 42.7	11 94	72.7	6
7	15 21.5	13 95	76.2	15 25.3	12 95	75.7	15 29.0	12 95	75.2	15 32.6	12 95	74.7	15 36.2	12 94	74.2	15 39.7	12 94	73.7	15 43.1	11 94	73.2	15 46.4	11 94	72.6	7
8	14 24.3	13 95	76.1	14 28.2	13 95	75.6	14 32.1	13 95	75.1	14 35.8	12 95	74.6	14 39.5	12 94	74.1	14 43.2	12 94	73.6	14 46.7	12 94	73.0	14 50.3	12 94	72.5	8
9	13 27.2	14 95	76.0	13 31.2	13 95	75.5	13 35.2	13 95	75.0	13 39.1	13 95	74.5	13 42.9	13 94	73.9	13 46.7	13 94	73.4	13 50.4	12 94	72.9	13 54.1	12 94	72.4	9
80	12 30.0	14 95	75.8	12 34.2	14 95	75.3	12 38.3	14 95	74.8	12 42.4	13 94	74.3	12 46.3	13 94	73.8	12 50.3	13 94	73.3	12 54.1	13 94	72.8	12 58.0	13 93	72.3	80
1	11 32.9	14 95	75.7	11 37.2	14 95	75.2	11 41.5	14 95	74.7	11 45.7	14 94	74.2	11 49.8	14 94	73.7	11 53.9	14 94	73.2	11 57.9	13 94	72.7	12 01.9	13 93	72.2	1
2	10 35.9	15 95	75.6	10 40.3	15 95	75.1	10 44.7	15 95	74.6	10 49.0	14 94	74.1	10 53.3	14 94	73.6	10 57.5	14 94	73.0	11 01.7	14 94	72.5	11 05.8	14 93	72.0	2
3	9 38.9	15 95	75.4	9 43.4	15 95	74.9	9 47.9	15 95	74.4	9 52.4	15 94	73.9	9 56.8	15 94	73.4	10 01.2	15 94	72.9	10 05.5	14 94	72.4	10 09.8	14 93	71.9	3
4	8 41.9	16 95	75.3	8 46.6	16 95	74.8	8 51.2	15 94	74.3	8 55.8	15 94	73.8	9 00.4	15 94	73.3	9 04.9	15 94	72.8	9 09.4	15 93	72.3	9 13.9	15 93	71.8	4
85	7 44.9	16 95	75.1	7 49.8	16 95	74.6	7 54.6	16 94	74.1	7 59.3	16 94	73.6	8 04.0	16 94	73.1	8 08.7	16 94	72.6	8 13.3	15 93	72.1	8 17.9	15 93	71.6	85
6	6 48.0	17 95	75.0	6 53.0	16 95	74.5	6 57.9	16 94	74.0	7 02.8	16 94	73.5	7 07.7	16 94	73.0	7 12.5	16 94	72.5	7 17.3	16 93	72.0	7 22.1	16 93	71.5	6
7	5 51.2	17 95	74.8	5 56.3	17 94	74.3	6 01.3	17 94	73.8	6 06.4	17 94	73.3	6 11.4	17 94	72.8	6 16.4	17 93	72.3	6 21.3	16 93	71.8	6 26.3	16 93	71.3	7
8							5 04.8	17 94	73.6	5 10.0	17 94	73.1	5 15.1	17 94	72.6	5 20.3	17 93	72.2	5 25.4	17 93	71.7	5 30.5	17 93	71.2	8

H.A.	16° 00′				16° 30′				17° 00′				17° 30′				18° 00′				18° 30′				19° 00′				19° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	63 00.0	1.0	02	180.0	62 30.0	1.0	02	180.0	62 00.0	1.0	02	180.0	61 30.0	1.0	02	180.0	61 00.0	1.0	02	180.0	60 30.0	1.0	02	180.0	60 00.0	1.0	02	180.0	59 30.0	1.0	02	180.0	00
1	62 58.9	1.0	05	177.9	62 28.9	1.0	05	177.9	61 59.0	1.0	05	178.0	61 29.0	1.0	05	178.0	60 59.0	1.0	05	178.0	60 29.0	1.0	05	178.1	59 59.0	1.0	05	178.1	59 29.0	1.0	05	178.1	1
2	62 55.7	1.0	09	175.8	62 25.7	1.0	09	175.9	61 55.8	1.0	09	175.9	61 25.9	1.0	09	176.0	60 56.0	1.0	08	176.1	60 26.0	1.0	08	176.2	59 56.1	1.0	08	176.2	59 26.2	1.0	08	176.3	2
3	62 50.2	99	13	173.7	62 20.4	99	12	173.8	61 50.6	99	12	173.9	61 20.8	99	12	174.0	60 51.0	99	12	174.1	60 21.1	99	11	174.2	59 51.3	99	11	174.3	59 21.4	99	11	174.4	3
4	62 42.7	99	16	171.6	62 13.0	99	16	171.8	61 43.3	99	16	171.9	61 13.6	99	15	172.1	60 43.9	99	15	172.2	60 14.2	99	15	172.3	59 44.5	99	14	172.5	59 14.8	99	14	172.6	4
05	62 33.0	98	20	169.5	62 03.5	98	19	169.7	61 34.0	98	19	169.9	61 04.5	98	18	170.1	60 35.0	98	18	170.3	60 05.4	99	18	170.5	59 35.9	99	18	170.6	59 06.3	99	17	170.8	05
6	62 21.3	98	23	167.5	61 52.0	98	23	167.7	61 22.7	98	22	168.0	60 53.4	98	22	168.2	60 24.1	98	21	168.4	59 54.7	98	21	168.6	59 25.3	98	21	168.8	58 56.0	98	20	169.0	6
7	62 07.5	97	26	165.5	61 38.5	97	26	165.8	61 09.5	97	25	166.0	60 40.4	97	25	166.3	60 11.3	97	24	166.5	59 42.1	97	24	166.8	59 13.0	97	24	167.0	58 43.8	97	23	167.2	7
8	61 51.8	96	29	163.5	61 23.1	96	29	163.8	60 54.3	96	28	164.1	60 25.5	96	28	164.4	59 56.6	96	27	164.7	59 27.7	96	27	164.9	58 58.8	96	27	165.2	58 29.9	97	26	165.5	8
9	61 34.1	95	33	161.6	61 05.7	95	32	161.9	60 37.2	95	31	162.2	60 08.7	95	31	162.6	59 40.2	95	30	162.9	59 11.6	95	30	163.2	58 42.9	96	29	163.5	58 14.2	96	29	163.7	9
10	61 14.6	94	36	159.7	60 46.5	94	35	160.1	60 18.4	94	34	160.4	59 50.2	94	34	160.8	59 21.9	94	33	161.1	58 53.6	94	33	161.4	58 25.3	95	32	161.7	57 56.9	95	32	162.0	10
1	60 53.3	92	38	157.9	60 25.6	93	38	158.2	59 57.8	93	37	158.6	59 29.9	93	37	159.0	59 02.0	93	36	159.3	58 34.0	93	35	159.7	58 06.0	94	35	160.0	57 37.9	94	34	160.4	1
2	60 30.2	91	41	156.1	60 02.9	91	41	156.5	59 35.5	92	40	156.9	59 08.0	92	39	157.3	58 40.4	92	39	157.6	58 12.8	92	38	158.0	57 45.1	92	37	158.4	57 17.4	93	37	158.7	2
3	60 05.5	90	44	154.3	59 38.5	90	43	154.7	59 11.5	90	43	155.2	58 44.4	90	42	155.6	58 17.2	91	41	156.0	57 50.0	91	41	156.4	57 22.6	91	40	156.8	56 55.2	91	39	157.1	3
4	59 39.2	88	46	152.6	59 12.6	89	46	153.1	58 46.0	89	45	153.5	58 19.3	89	44	153.9	57 52.5	89	44	154.4	57 25.6	90	43	154.8	56 58.6	90	42	155.2	56 31.6	90	42	155.6	4
15	59 11.3	87	49	150.9	58 45.2	87	48	151.4	58 19.0	88	47	151.9	57 52.7	88	47	152.3	57 26.3	88	46	152.8	56 59.8	88	45	153.2	56 33.2	89	45	153.6	56 06.5	89	44	154.1	15
6	58 42.0	85	51	149.3	58 16.3	86	50	149.8	57 50.5	86	50	150.3	57 24.6	86	49	150.8	56 58.6	87	48	151.2	56 32.5	87	48	151.7	56 06.4	87	47	152.1	55 40.1	88	46	152.6	6
7	58 11.2	84	53	147.8	57 46.0	84	53	148.3	57 20.7	85	52	148.8	56 55.2	85	51	149.3	56 29.6	85	51	149.8	56 04.0	86	50	150.2	55 38.2	86	49	150.7	55 12.3	86	48	151.1	7
8	57 39.2	82	56	146.3	57 14.4	83	55	146.8	56 49.5	83	54	147.3	56 24.5	84	53	147.8	55 59.3	84	53	148.3	55 34.1	84	52	148.8	55 08.7	85	51	149.3	54 43.2	85	51	149.7	8
9	57 05.9	81	58	144.8	56 41.5	81	57	145.4	56 17.1	82	56	145.9	55 52.5	82	55	146.4	55 27.8	83	55	146.9	55 02.9	83	54	147.4	54 38.0	83	53	147.9	54 12.9	84	52	148.3	9
20	56 31.3	79	59	143.4	56 07.5	80	59	144.0	55 43.4	80	58	144.5	55 19.3	81	57	145.0	54 55.0	81	56	145.5	54 30.6	82	56	146.0	54 06.1	82	55	146.5	53 41.4	82	54	147.0	20
1	55 55.7	78	61	142.1	55 32.2	78	60	142.6	55 08.7	79	60	143.2	54 45.0	79	59	143.7	54 21.1	80	58	144.2	53 57.1	80	58	144.7	53 33.0	81	57	145.2	53 08.8	81	56	145.7	1
2	55 18.9	76	63	140.7	54 56.0	77	62	141.3	54 32.8	77	61	141.9	54 09.6	78	61	142.4	53 46.1	78	60	142.9	53 22.6	79	59	143.5	52 58.9	79	59	144.0	52 35.1	80	58	144.5	2
3	54 41.2	75	65	139.5	54 18.6	75	64	140.0	53 55.9	76	63	140.6	53 33.1	76	62	141.2	53 10.1	77	62	141.7	52 47.0	77	61	142.2	52 23.7	78	60	142.7	52 00.3	78	60	143.3	3
4	54 02.4	73	66	138.3	53 40.3	74	65	138.8	53 18.1	74	65	139.4	52 55.7	75	64	139.9	52 33.1	75	63	140.5	52 10.4	76	62	141.0	51 47.6	76	62	141.6	51 24.6	77	61	142.1	4
25	53 22.7	72	68	137.1	53 01.1	72	67	137.7	52 39.3	73	66	138.2	52 17.3	73	65	138.8	51 55.2	74	65	139.3	51 32.9	74	64	139.9	51 10.5	75	63	140.4	50 47.9	75	63	140.9	25
6	52 42.2	70	69	135.9	52 21.0	71	68	136.5	51 59.6	72	68	137.1	51 38.1	72	67	137.7	51 16.4	73	66	138.2	50 54.5	73	65	138.8	50 32.5	74	65	139.3	50 10.4	74	64	139.8	6
7	52 00.8	69	70	134.8	51 40.1	70	70	135.4	51 19.1	70	69	136.0	50 58.0	71	68	136.6	50 36.7	71	67	137.1	50 15.3	72	67	137.7	49 53.7	72	66	138.2	49 32.0	73	65	138.7	7
8	51 18.7	68	71	133.8	50 58.3	68	71	134.4	50 37.8	69	70	134.9	50 17.1	69	69	135.5	49 56.2	70	69	136.1	49 35.2	70	68	136.6	49 14.0	71	67	137.2	48 52.7	71	67	137.7	8
9	50 35.8	66	73	132.8	50 15.9	67	72	133.3	49 55.7	67	71	133.9	49 35.5	68	71	134.5	49 15.0	68	70	135.1	48 54.4	69	69	135.6	48 33.6	69	69	136.2	48 12.7	70	68	136.7	9
30	49 52.2	65	74	131.8	49 32.7	65	73	132.4	49 13.0	66	72	132.9	48 53.1	67	72	133.5	48 33.1	67	71	134.1	48 12.8	68	70	134.6	47 52.5	68	70	135.2	47 31.9	69	69	135.7	30
1	49 08.0	63	75	130.8	48 48.8	64	74	131.4	48 29.5	65	73	132.0	48 10.0	65	73	132.6	47 50.4	66	72	133.1	47 30.6	66	72	133.7	47 10.6	67	71	134.2	46 50.5	67	70	134.8	1
2	48 23.1	62	76	129.9	48 04.4	63	75	130.5	47 45.4	63	74	131.1	47 26.4	64	74	131.7	47 07.1	64	73	132.2	46 47.7	65	73	132.8	46 28.1	66	72	133.3	46 08.3	66	71	133.9	2
3	47 37.6	61	77	129.0	47 19.3	61	76	129.6	47 00.7	62	75	130.2	46 42.0	63	75	130.8	46 23.2	63	74	131.3	46 04.1	64	74	131.9	45 44.9	64	73	132.4	45 25.6	65	72	133.0	3
4	46 51.6	60	78	128.2	46 33.6	60	77	128.8	46 15.5	61	76	129.3	45 57.1	61	76	129.9	45 38.7	62	75	130.5	45 20.0	62	74	131.0	45 01.2	63	74	131.6	44 42.2	64	73	132.1	4
35	46 05.0	58	78	127.4	45 47.4	59	78	127.9	45 29.7	60	77	128.5	45 11.7	60	77	129.1	44 53.6	61	76	129.6	44 35.3	61	75	130.2	44 16.8	62	75	130.8	43 58.2	62	74	131.3	35
6	45 18.0	57	79	126.6	45 00.7	58	79	127.1	44 43.3	58	78	127.7	44 25.7	59	77	128.3	44 08.0	59	77	128.8	43 50.0	60	76	129.4	43 31.9	61	76	130.0	43 13.7	61	75	130.5	6
7	44 30.4	56	80	125.8	44 13.5	57	79	126.4	43 56.5	57	79	126.9	43 39.2	58	78	127.5	43 21.8	58	78	128.1	43 04.3	59	77	128.6	42 46.5	59	76	129.2	42 28.7	60	76	129.7	7
8	43 42.4	55	81	125.0	43 25.9	55	80	125.6	43 09.2	56	80	126.2	42 52.3	57	79	126.8	42 35.2	57	78	127.3	42 18.0	58	78	127.9	42 00.6	58	77	128.4	41 43.1	59	77	129.0	8
9	42 54.0	54	81	124.3	42 37.8	54	81	124.9	42 21.4	55	80	125.5	42 04.9	55	80	126.0	41 48.2	56	79	126.6	41 31.3	56	79	127.1	41 14.3	57	78	127.7	40 57.1	58	77	128.2	9
40	42 05.2	53	82	123.6	41 49.3	53	82	124.2	41 33.2	54	81	124.8	41 17.0	54	80	125.3	41 00.7	55	80	125.9	40 44.1	55	79	126.4	40 27.4	56	79	127.0	40 10.6	56	78	127.5	40
1	41 15.9	52	83	123.0	41 00.4	52	82	123.5	40 44.7	53	82	124.1	40 28.8	53	81	124.7	40 12.7	54	81	125.2	39 56.5	54	80	125.8	39 40.2	55	79	126.3	39 23.7	55	79	126.8	1
2	40 26.3	51	83	122.3	40 11.1	51	83	122.9	39 55.7	52	82	123.4	39 40.1	52	82	124.0	39 24.4	53	81	124.6	39 08.5	53	81	125.1	38 52.5	54	80	125.6	38 36.3	54	80	126.2	2
3	39 36.4	49	84	121.7	39 21.5	50	83	122.3	39 06.4	51	83	122.8	38 51.1	51	82	123.4	38 35.7	52	82	123.9	38 20.2	52	81	124.5	38 04.5	53	81	125.0	37 48.6	53	80	125.5	3
4	38 46.1	48	84	121.1	38 31.5	49	84	121.6	38 16.7	50	83	122.2	38 01.8	50	83	122.7	37 46.7	51	82	123.3	37 31.4	51	82	123.8	37 16.0	52	81	124.4	37 00.5	52	81	124.9	4
45	37 55.5	48	85	120.5	37 41.2	48	84	121.0	37 26.7	49	84	121.6	37 12.1	49	83	122.2	36 57.3	50	83	122.7	36 42.3	50	82	123.2	36 27.2	51	82	123.8	36 12.0	51	81	124.3	45
6	37 04.6	47	85	119.9	36 50.6	47	85	120.5	36 36.4	48	84	121.0	36 22.0	48	84	121.6	36 07.5	49	83	122.1	35 52.9	49	83	122.7	35 38.1	50	82	123.2	35 23.2	50	82	123.7	6
7	36 13.4	46	86	119.4	35 59.7	46	85	119.9	35 45.8	47	85	120.5	35 31.7	47	84	121.0	35 17.5	48	84	121.6	35 03.2	48	83	122.1	34 48.7	49	83	122.6	34 34.0	49	82	123.2	7
8	35 22.0	45	86	118.8	35 08.5	45	86	119.4	34 54.9	46	85	119.9	34 41.1	46	85	120.5	34 27.2	47	84	121.0	34 13.1	47	84	121.5	33 58.9	48	83	122.1	33 44.6	48	83	122.6	8
9	34 30.2	44	87	118.3	34 17.0	44	86	118.9	34 03.7	45	86	119.4	33 50.2	45	85	119.9	33 36.5	46	85	120.5	33 22.8	46	84	121.0	33 08.9	47	84	121.5	32 54.8	47	83	122.1	9
50	33 38.3	43	87	117.8	33 25.3	43	87	118.4	33 12.2	44	86	118.9	32 59.0	44	86	119.4	32 45.6	45	85	120.0	32 32.1	45	85	120.5	32 18.5	46	84	121.0	32 04.8	46	84	121.5	50
1	32 46.1	42	87	117.3	32 33.4	43	87	117.9	32 20.5	43	87	118.4	32 07.6	43	86	118.9	31 54.5	44	86	119.5	31 41.3	44	85	120.0	31 27.9	45	85	120.5	31 14.4	45	84	121.0	1
2	31 53.6	41	88	116.9	31 41.2	42	87	117.4	31 28.6	42	87	117.9	31 15.9	43	86	118.5	31 03.1	43	86	119.0	30 50.1	43	86	119.5	30 37.0	44	85	120.0	30 23.8	44	85	120.5	2
3	31 01.0	40	88	116.4	30 48.8	41	88	116.9	30 36.5	41	87	117.5	30 24.0	42	87	118.0	30 11.4	42	86	118.5	29 58.8	43	86	119.0	29 45.9	43	86	119.6	29 33.0	43	85	120.1	3
4	30 08.1	40	88	115.9	29 56.2	40	88	116.5	29 44.1	40	88	117.0	29 31.9	41	87	117.5	29 19.6	41	87	118.1	29 07.1	42	86	118.6	28 54.6	42	86	119.1	28 41.9	42	86	119.6	4
55	29 15.0	39	89	115.5	29 03.3	39	88	116.0	28 51.5	40	88	116.6	28 39.6	40	88	117.1	28 27.5	40	87	117.6	28 15.3	41	87	118.1	28 03.0	41	86	118.6	27 50.6	42	86	119.2	55
6	28 21.8	38	89	115.1	28 10.3	38	89	115.6	27 58.7	39	88	116.1	27 47.0	39	88	116.7	27 35.2	40	88	117.2	27 23.3	40	87	117.7	27 11.2	40	87	118.2	26 59.0	41	86	118.7	6
7	27 28.4	37	89	114.7	27 17.1	38	89	115.2	27 05.8	38	89	115.7	26 54.3	38	88	116.2	26 42.7	39	88	116.8	26 31.0	39	87	117.3	26 19.2	40	87	117.8	26 07.3	40	87	118.3	7
8	26 34.8	37	90	114.3	26 23.7	37	89	114.8	26 12.6	37	89	115.3	26 01.4	38	88	115.8	25 50.0	38	88	116.4	25 38.6	38	88	116.9	25 27.0	39	87	117.4	25 15.3	39	87	117.9	8
9	25 41.0	36	90	113.9	25 30.2	36	90	114.4	25 19.3	37	89	114.9	25 08.3	37	89	115.4	24 57.2	37	88	116.0	24 45.9	38	88	116.5	24 34.6	38	88	117.0	24 23.2	38	87	117.5	9
60	24 47.1	35	90	113.5	24 36.5	35	90	114.0	24 25.8	36	89	114.5	24 15.0	36	89	115.1	24 04.1	36	89	115.6	23 53.1	37	88	116.1	23 42.0	37	88	116.6	23 30.8	37	88	117.1	60
1	23 53.0	34	90	113.2	23 42.6	35	90	113.7	23 32.1	35	90	114.2	23 21.6	35	89	114.7	23 10.9	36	89	115.2	23 00.1	36	89	115.7	22 49.3	36	88	116.2	22 38.3	37	88	116.7	1
2	22 58.8	34	91	112.8	22 48.6	34	90	113.3	22 38.3	34	90	113.8	22 28.0	35	90	114.3	22 17.5	35	89	114.8	22 07.0	35	89	115.3	21 56.3	36	88	115.8	21 45.6	36	88	116.3	2
3	22 04.4	33	91	112.4	21 54.4	33	90	113.0	21 44.4	34	90	113.5	21 34.2	34	90	114.0	21 24.0	34	89	114.5	21 13.7	35	89	115.0	21 03.2	35	89	115.5	20 52.7	35	88	116.0	3
4	21 09.9	32	91	112.1	21 00.1	33	91	112.6	20 50.3	33	90	113.1	20 40.3	33	90	113.6	20 30.3	34	90	114.1	20 20.2	34	89	114.6	20 10.0	34	89	115.1	19 59.7	34	89	115.6	4
65	20 15.3	32	91	111.8	20 05.7	32	91	112.3	19 56.0	32	91	112.8	19 46.3	33	90	113.3	19 36.5	33	90	113.8	19 26.6	33	90	114.3	19 16.6	33	89	114.8	19 06.5	34	89	115.3	65
6	19 20.5	31	91	111.5	19 11.1	31	91	112.0	19 01.7	32	91	112.5	18 52.1	32	90	113.0	18 42.5	32	90	113.5	18 32.8	32	90	114.0	18 23.1	33	89	114.5	18 13.2	33	89	115.0	6
7	18 25.6	30	92	111.1	18 16.5	31	91	111.6	18 07.2	31	91	112.1	17 57.9	31	91	112.6	17 48.4	32	90	113.1	17 38.9	32	90	113.6	17 29.4	32	90	114.1	17 19.7	32	89	114.6	7
8	17 30.6	30	92	110.8	17 21.6	30	92	111.3	17 12.6	30	91	111.8	17 03.4	31	91	112.3	16 54.2	31	91	112.8	16 44.9	31	90	113.3	16 35.6	31	90	113.8	16 26.1	32	90	114.3	8
9	16 35.5	29	92	110.5	16 26.7	29	92	111.0	16 17.9	30	91	111.5	16 08.9	30	91	112.0	15 59.9	30	91	112.5	15 50.8	30	90	113.0	15 41.6	31	90	113.5	15 32.4	31	90	114.0	9
70	15 40.3	29	92	110.3	15 31.7	29	92	110.8	15 23.0	29	92	111.2	15 14.2	29	91	111.7	15 05.4	30	91	112.2	14 56.5	30	91	112.7	14 47.6	30	90	113.2	14 38.5	30	90	113.7	70
1	14 45.0	28	92	110.0	14 36.6	28	92	110.5	14 28.1	28	92	111.0	14 19.5	29	91	111.5	14 10.8	29	91	112.0	14 02.1	29	91	112.4	13 53.4	29	90	112.9	13 44.6	29	90	113.4	1
2	13 49.6	28	92	109.7	13 41.4	28	92	110.2	13 33.0	28	92	110.7	13 24.6	28	92	111.2	13 16.2	28	91	111.7	13 07.7	28	91	112.2	12 59.1	29	91	112.7	12 50.5	29	90	113.1	2
3	12 54.1	27	93	109.4	12 46.0	27	92	109.9	12 37.9	27	92	110.4	12 29.6	27	92	110.9	12 21.4	28	92	111.4	12 13.1	28	91	111.9	12 04.7	28	91	112.4	11 56.3	28	91	112.9	3
4	11 58.5	26	93	109.2	11 50.6	27	92	109.7	11 42.6	27	92	110.1	11 34.6	27	92	110.6	11 26.5	27	92	111.1	11 18.4	27	91	111.6	11 10.2	27	91	112.1	11 01.9	28	91	112.6	4
75	11 02.9	26	93	108.9	10 55.1	26	93	109.4	10 47.3	26	92	109.9	10 39.4	26	92	110.4	10 31.5	26	92	110.9	10 23.5	27	92	111.4	10 15.5	27	91	111.9	10 07.5	27	91	112.3	75
6	10 07.1	25	93	108.7	9 59.5	25	93	109.1	9 51.9	26	93	109.6	9 44.2	26	92	110.1	9 36.4	26	92	110.6	9 28.7	26	92	111.1	9 20.8	26	91	111.6	9 13.0	26	91	112.1	6
7	9 11.3	25	93	108.4	9 03.8	25	93	108.9	8 56.3	25	93	109.4	8 48.8	25	92	109.9	8 41.3	25	92	110.4	8 33.7	25	92	110.9	8 26.0	26	92	111.4	8 18.4	26	91	111.8	7
8	8 15.3	24	93	108.2	8 08.1	24	93	108.7	8 00.7	24	93	109.2	7 53.4	25	92	109.6	7 46.0	25	92	110.1	7 38.6	25	92	110.6	7 31.1	25	92	111.1	7 23.6	25	91	111.6	8
9	7 19.3	24	93	107.9	7 12.2	24	93	108.4	7 05.1	24	93	108.9	6 57.9	24	93	109.4	6 50.7	24	92	109.9	6 43.4	24	92	110.4	6 36.1	24	92	110.9	6 28.8	24	91	111.4	9
80	6 23.3	23	94	107.7	6 16.3	23	93	108.2	6 09.3	23	93	108.7	6 02.3	23	93	109.2	5 55.2	24	92	109.7	5 48.2	24	92	110.2	5 41.1	24	92	110.6	5 33.9	24	92	111.1	80
1	5 27.1	23	94	107.5	5 20.3	23	93	108.0	5 13.5	23	93	108.5	5 06.6	23	93	109.0																	1

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	81 00.0	1.0 05	00.0	80 30.0	1.0 05	00.0	80 00.0	1.0 05	00.0	79 30.0	1.0 04	00.0	79 00.0	1.0 04	00.0	78 30.0	1.0 04	00.0	78 00.0	1.0 04	00.0	77 30.0	1.0 04	00.0	00
1	80 56.9	99 15	06.0	80 27.1	99 14	05.7	79 57.2	1.0 14	05.4	79 27.4	1.0 13	05.1	78 57.5	1.0 12	04.8	78 27.6	1.0 12	04.6	77 57.7	1.0 11	04.4	77 27.8	1.0 11	04.2	1
2	80 47.8	98 25	11.8	80 18.4	98 24	11.2	79 49.0	98 22	10.6	79 19.6	98 21	10.1	78 50.1	98 20	09.6	78 20.5	99 19	09.2	77 51.0	99 18	08.8	77 21.3	99 18	08.4	2
3	80 32.9	95 34	17.4	80 04.3	95 32	16.5	79 35.6	96 30	15.7	79 06.8	96 29	14.9	78 37.9	97 28	14.3	78 08.9	97 27	13.6	77 39.8	97 26	13.0	77 10.6	97 25	12.5	3
4	80 12.7	92 42	22.7	79 45.1	92 40	21.5	79 17.3	93 38	20.5	78 49.3	94 36	19.6	78 21.2	94 35	18.7	77 52.9	95 33	17.9	77 24.5	95 32	17.1	76 55.9	95 31	16.4	4
05	79 47.7	88 49	27.5	79 21.2	89 47	26.2	78 54.5	90 45	25.0	78 27.5	90 43	23.9	78 00.3	91 41	22.9	77 32.8	92 40	21.9	77 05.2	92 38	21.0	76 37.4	93 37	20.2	05
6	79 18.4	83 55	32.0	78 53.2	85 53	30.5	78 27.6	86 51	29.2	78 01.7	87 49	28.0	77 35.5	88 47	26.8	77 09.0	89 45	25.7	76 42.3	89 44	24.7	76 15.3	90 42	23.8	6
7	78 45.5	79 60	36.0	78 21.6	81 58	34.5	77 57.2	82 56	33.0	77 32.4	83 54	31.7	77 07.3	84 52	30.5	76 41.8	85 50	29.3	76 16.0	86 49	28.2	75 50.0	87 47	27.2	7
8	78 09.4	75 65	39.6	77 46.7	76 63	38.0	77 23.6	78 61	36.5	76 59.9	79 59	35.1	76 35.9	81 57	33.8	76 11.5	82 55	32.6	75 46.7	83 53	31.4	75 21.6	84 52	30.3	8
9	77 30.6	70 69	42.8	77 09.2	72 67	41.2	76 47.2	74 65	39.7	76 24.7	76 63	38.3	76 01.8	77 61	36.9	75 38.4	79 59	35.6	75 14.7	80 58	34.4	74 50.6	81 56	33.3	9
10	76 49.4	66 72	45.7	76 29.2	68 70	44.1	76 08.4	70 68	42.6	75 47.1	72 66	41.1	75 25.2	74 64	39.8	75 02.9	75 63	38.4	74 40.2	76 61	37.2	74 17.1	78 59	36.0	10
1	76 06.4	63 75	48.3	75 47.3	65 73	46.7	75 27.6	67 71	45.2	75 07.3	68 69	43.7	74 46.5	70 68	42.4	74 25.3	72 66	41.0	74 03.6	73 64	39.8	73 41.4	75 63	38.5	1
2	75 21.6	59 77	50.6	75 03.6	61 75	49.1	74 44.9	63 74	47.6	74 25.7	65 72	46.1	74 06.0	67 70	44.7	73 45.7	68 69	43.4	73 25.0	70 67	42.1	73 03.8	71 66	40.9	2
3	74 35.4	56 79	52.7	74 18.4	58 77	51.2	74 00.7	60 76	49.7	73 42.5	62 74	48.3	73 23.7	63 73	46.9	73 04.4	65 71	45.5	72 44.6	67 70	44.3	72 24.4	68 68	43.0	3
4	73 47.9	52 81	54.6	73 31.9	55 79	53.1	73 15.2	57 78	51.6	72 57.9	59 76	50.2	72 40.0	60 75	48.8	72 21.7	62 73	47.5	72 02.8	64 72	46.3	71 43.4	65 71	45.0	4
15	72 59.4	50 82	56.2	72 44.3	52 81	54.8	72 28.5	54 80	53.4	72 12.1	56 78	52.0	71 55.1	57 77	50.6	71 37.6	59 75	49.3	71 19.6	61 74	48.1	71 01.1	62 73	46.9	15
6	72 10.0	47 84	57.8	71 55.7	49 82	56.3	71 40.7	51 81	54.9	71 25.1	53 80	53.6	71 09.0	55 78	52.3	70 52.4	56 77	51.0	70 35.2	58 76	49.8	70 17.5	60 74	48.6	6
7	71 19.8	44 85	59.1	71 06.3	46 84	57.7	70 52.1	48 82	56.4	70 37.3	50 81	55.1	70 22.0	52 80	53.8	70 06.1	54 79	52.5	69 49.7	55 77	51.3	69 32.8	57 76	50.1	7
8	70 29.0	42 86	60.4	70 16.1	44 85	59.0	70 02.6	46 84	57.7	69 48.6	48 82	56.4	69 34.0	50 81	55.2	69 18.9	51 80	53.9	69 03.3	53 79	52.7	68 47.2	55 78	51.6	8
9	69 37.5	40 87	61.5	69 25.3	42 86	60.2	69 12.5	44 84	58.9	68 59.2	45 83	57.6	68 45.3	47 82	56.4	68 30.9	49 81	55.2	68 16.0	51 80	54.0	68 00.6	52 79	52.9	9
20	68 45.5	38 87	62.5	68 33.9	39 86	61.2	68 21.8	41 85	60.0	68 09.1	43 84	58.8	67 55.9	45 83	57.6	67 42.2	47 82	56.4	67 28.0	48 81	55.2	67 13.3	50 80	54.1	20
1	67 53.0	36 88	63.4	67 42.0	37 87	62.2	67 30.5	39 86	61.0	67 18.5	41 85	59.8	67 05.9	43 84	58.6	66 52.8	44 83	57.5	66 39.3	46 82	56.4	66 25.2	48 81	55.2	1
2	67 00.1	34 89	64.3	66 49.7	36 88	63.1	66 38.8	37 87	61.9	66 27.3	39 86	60.8	66 15.4	41 85	59.6	66 02.9	42 84	58.5	65 49.9	44 83	57.4	65 36.5	46 82	56.3	2
3	66 06.9	32 89	65.1	65 57.0	34 88	63.9	65 46.6	36 88	62.8	65 35.7	37 87	61.6	65 24.3	39 86	60.5	65 12.4	40 85	59.4	65 00.1	42 84	58.3	64 47.2	44 83	57.3	3
4	65 13.3	30 90	65.8	65 04.0	32 89	64.6	64 54.1	34 88	63.5	64 43.7	35 87	62.4	64 32.8	37 86	61.3	64 21.5	39 86	60.3	64 09.7	40 85	59.2	63 57.4	42 84	58.2	4
25	64 19.5	29 90	66.4	64 10.6	30 89	65.3	64 01.2	32 89	64.2	63 51.3	34 88	63.2	63 41.0	35 87	62.1	63 30.2	37 86	61.1	63 18.9	38 85	60.0	63 07.2	40 84	59.0	25
6	63 25.4	27 91	67.0	63 16.9	29 90	66.0	63 08.0	31 89	64.9	62 58.6	32 88	63.9	62 48.7	34 88	62.8	62 38.4	35 87	61.8	62 27.7	37 86	60.8	62 16.5	38 85	59.8	6
7	62 31.0	26 91	67.6	62 23.0	28 90	66.5	62 14.5	29 90	65.5	62 05.6	31 89	64.5	61 56.2	32 88	63.5	61 46.4	33 87	62.5	61 36.1	35 86	61.5	61 25.4	36 86	60.5	7
8	61 36.5	25 91	68.1	61 28.9	26 91	67.1	61 20.8	28 90	66.1	61 12.3	29 89	65.1	61 03.4	31 89	64.1	60 54.0	32 88	63.1	60 44.2	33 87	62.1	60 34.0	35 86	61.2	8
9	60 41.8	23 92	68.6	60 34.5	25 91	67.6	60 26.9	26 90	66.6	60 18.8	28 90	65.6	60 10.2	29 89	64.6	60 01.3	30 88	63.7	59 52.0	32 88	62.7	59 42.2	33 87	61.8	9
30	59 46.8	22 92	69.0	59 40.0	24 91	68.0	59 32.7	25 90	67.1	59 25.0	26 90	66.1	59 16.9	28 89	65.2	59 08.4	29 89	64.2	58 59.5	30 88	63.3	58 50.2	32 87	62.4	30
1	58 51.8	21 92	69.4	58 45.3	22 91	68.4	58 38.4	24 91	67.5	58 31.1	25 90	66.6	58 23.4	26 90	65.7	58 15.2	28 89	64.7	58 06.7	29 88	63.8	57 57.9	30 88	62.9	1
2	57 56.6	20 92	69.8	57 50.4	21 92	68.8	57 43.9	23 91	67.9	57 36.9	24 90	67.0	57 29.6	25 90	66.1	57 21.9	26 89	65.2	57 13.8	28 89	64.3	57 05.3	29 88	63.4	2
3	57 01.3	19 92	70.1	56 55.5	20 92	69.2	56 49.2	21 91	68.3	56 42.6	23 91	67.4	56 35.7	24 90	66.5	56 28.3	25 90	65.6	56 20.6	26 89	64.8	56 12.5	28 88	63.9	3
4	56 05.8	18 93	70.4	56 00.3	19 92	69.5	55 54.4	20 92	68.6	55 48.2	21 91	67.8	55 41.6	23 90	66.9	55 34.6	24 90	66.0	55 27.2	25 89	65.2	55 19.5	26 89	64.3	4
35	55 10.3	17 93	70.7	55 05.1	18 92	69.8	54 59.5	19 92	69.0	54 53.6	20 91	68.1	54 47.3	22 91	67.3	54 40.7	23 90	66.4	54 33.7	24 90	65.6	54 26.3	25 89	64.7	35
6	54 14.7	16 93	71.0	54 09.8	17 92	70.1	54 04.5	18 92	69.3	53 58.9	19 91	68.4	53 52.9	20 91	67.6	53 46.6	22 90	66.8	53 40.0	23 90	66.0	53 33.0	24 89	65.1	6
7	53 19.0	15 93	71.2	53 14.3	16 93	70.4	53 09.4	17 92	69.5	53 04.1	18 92	68.7	52 58.4	19 91	67.9	52 52.4	20 91	67.1	52 46.1	22 90	66.3	52 39.5	23 89	65.5	7
8	52 23.2	14 93	71.4	52 18.8	15 93	70.6	52 14.1	16 92	69.8	52 09.1	17 92	69.0	52 03.8	18 91	68.2	51 58.1	19 91	67.4	51 52.1	21 90	66.6	51 45.8	22 90	65.8	8
9	51 27.3	13 93	71.6	51 23.2	14 93	70.8	51 18.8	15 92	70.0	51 14.1	16 92	69.3	51 09.0	17 91	68.5	51 03.7	18 91	67.7	50 58.0	19 90	66.9	50 52.0	20 90	66.1	9
40	50 31.4	12 93	71.8	50 27.6	13 93	71.0	50 23.4	14 92	70.3	50 19.0	15 92	69.5	50 14.2	16 92	68.7	50 09.1	17 91	67.9	50 03.8	18 90	67.2	49 58.1	19 90	66.4	40
1	49 35.4	11 93	72.0	49 31.8	12 93	71.2	49 27.9	13 92	70.5	49 23.8	14 92	69.7	49 19.3	15 92	68.9	49 14.5	16 91	68.2	49 09.4	17 91	67.4	49 04.1	18 90	66.7	1
2	48 39.4	11 93	72.1	48 36.0	12 93	71.4	48 32.4	13 93	70.6	48 28.5	14 92	69.9	48 24.3	15 92	69.2	48 19.8	15 91	68.4	48 15.0	16 91	67.7	48 09.9	17 90	66.9	2
3	47 43.3	10 94	72.3	47 40.2	11 93	71.6	47 36.8	12 93	70.8	47 33.1	13 92	70.1	47 29.2	14 92	69.3	47 25.0	15 91	68.6	47 20.5	15 91	67.9	47 15.7	16 91	67.2	3
4	46 47.2	09 94	72.4	46 44.3	10 93	71.7	46 41.1	11 93	71.0	46 37.7	12 92	70.2	46 34.0	13 92	69.5	46 30.1	14 92	68.8	46 25.9	15 91	68.1	46 21.4	15 91	67.4	4
45	45 51.0	08 94	72.5	45 48.3	09 93	71.8	45 45.4	10 93	71.1	45 42.3	11 93	70.4	45 38.8	12 92	69.7	45 35.1	13 92	69.0	45 31.2	14 91	68.3	45 27.0	15 91	67.6	45
6	44 54.8	08 94	72.6	44 52.4	08 93	71.9	44 49.7	09 93	71.2	44 46.8	10 93	70.5	44 43.6	11 92	69.8	44 40.1	12 92	69.1	44 36.4	13 91	68.4	44 32.5	14 91	67.8	6
7	43 58.5	07 94	72.7	43 56.4	08 93	72.1	43 53.9	09 93	71.4	43 51.2	09 93	70.7	43 48.3	10 92	70.0	43 45.1	11 92	69.3	43 41.6	12 92	68.6	43 37.9	13 91	67.9	7
8	43 02.3	06 94	72.8	43 00.3	07 93	72.1	42 58.1	08 93	71.5	42 55.6	09 93	70.8	42 52.9	09 92	70.1	42 50.0	10 92	69.4	42 46.8	11 92	68.7	42 43.3	12 91	68.1	8
9	42 06.0	06 94	72.9	42 04.2	06 94	72.2	42 02.2	07 93	71.6	42 00.0	08 93	70.9	41 57.5	09 92	70.2	41 54.8	09 92	69.6	41 51.8	10 92	68.9	41 48.7	11 91	68.2	9
50	41 09.7	05 94	73.0	41 08.1	06 94	72.3	41 06.3	06 93	71.6	41 04.3	07 93	71.0	41 02.1	08 92	70.3	40 59.6	09 92	69.7	40 56.9	09 92	69.0	40 53.9	10 91	68.3	50
1	40 13.4	04 94	73.0	40 12.0	05 94	72.4	40 10.4	06 93	71.7	40 08.6	06 93	71.1	40 06.6	07 92	70.4	40 04.3	08 92	69.8	40 01.9	09 92	69.1	39 59.2	09 91	68.5	1
2	39 17.0	04 94	73.1	39 15.9	04 94	72.4	39 14.5	05 93	71.8	39 12.9	06 93	71.1	39 11.1	06 93	70.5	39 09.1	07 92	69.9	39 06.8	08 92	69.2	39 04.4	09 91	68.6	2
3	38 20.7	03 94	73.1	38 19.7	04 94	72.5	38 18.5	04 93	71.8	38 17.1	05 93	71.2	38 15.6	06 93	70.6	38 13.8	06 92	69.9	38 11.7	07 92	69.3	38 09.5	08 91	68.7	3
4	37 24.3	02 94	73.1	37 23.5	03 94	72.5	37 22.6	04 93	71.9	37 21.4	04 93	71.3	37 20.0	05 93	70.6	37 18.4	06 92	70.0	37 16.6	06 92	69.4	37 14.7	07 92	68.7	4
55	36 28.0	02 94	73.2	36 27.4	02 94	72.5	36 26.6	03 93	71.9	36 25.6	04 93	71.3	36 24.4	04 93	70.7	36 23.1	05 92	70.1	36 21.5	06 92	69.4	36 19.8	06 92	68.8	55
6	35 31.6	01 94	73.2	35 31.2	02 94	72.6	35 30.6	02 93	72.0	35 29.8	03 93	71.3	35 28.8	04 93	70.7	35 27.7	04 92	70.1	35 26.3	05 92	69.5	35 24.8	05 92	68.9	6
7	34 35.2	00 94	73.2	34 35.0	01 94	72.6	34 34.6	02 93	72.0	34 34.0	02 93	71.4	34 33.2	03 93	70.8	34 32.3	03 92	70.2	34 31.2	04 92	69.5	34 29.9	05 92	68.9	7
8	33 38.8	00 94	73.2	33 38.8	00 94	72.6	33 38.6	01 93	72.0	33 38.2	02 93	71.4	33 37.6	02 93	70.8	33 36.9	03 92	70.2	33 36.0	03 92	69.6	33 34.9	04 92	69.0	8
9	32 42.4	01 94	73.2	32 42.6	00 94	72.6	32 42.6	00 93	72.0	32 42.4	01 93	71.4	32 42.0	01 93	70.8	32 41.5	02 92	70.2	32 40.8	03 92	69.6	32 39.9	03 92	69.0	9
60	31 46.1	01 94	73.2	31 46.4	01 94	72.6	31 46.5	00 93	72.0	31 46.5	00 93	71.4	31 46.4	01 93	70.8	31 46.0	01 92	70.2	31 45.6	02 92	69.6	31 44.9	02 92	69.1	60
1	30 49.7	02 94	73.2	30 50.2	01 94	72.6	30 50.5	01 93	72.0	30 50.7	00 93	71.4	30 50.7	00 93	70.8	30 50.6	01 92	70.2	30 50.3	01 92	69.7	30 49.9	02 92	69.1	1
2	29 53.3	03 94	73.1	29 54.0	02 94	72.6	29 54.5	01 93	72.0	29 54.9	01 93	71.4	29 55.1	00 93	70.8	29 55.2	00 92	70.2	29 55.1	01 92	69.7	29 54.9	01 92	69.1	2
3	28 57.0	03 94	73.1	28 57.8	03 94	72.5	28 58.5	02 93	72.0	28 59.1	02 93	71.4	28 59.5	01 93	70.8	28 59.7	01 92	70.2	28 59.9	00 92	69.7	28 59.9	00 92	69.1	3
4	28 00.6	04 94	73.1	28 01.6	03 94	72.5	28 02.5	03 93	71.9	28 03.3	02 93	71.4	28 03.9	02 93	70.8	28 04.3	01 92	70.2	28 04.6	01 92	69.7	28 04.8	00 92	69.1	4
65	27 04.3	04 94	73.0	27 05.5	04 94	72.5	27 06.5	03 93	71.9	27 07.4	03 93	71.3	27 08.2	02 93	70.8	27 08.9	02 92	70.2	27 09.4	02 92	69.7	27 09.8	01 92	69.1	65
6	26 07.9	05 94	73.0	26 09.3	04 94	72.4	26 10.5	04 93	71.9	26 11.6	03 93	71.3	26 12.6	03 93	70.8	26 13.5	03 92	70.2	26 14.2	02 92	69.6	26 14.8	02 92	69.1	6
7	25 11.6	05 94	72.9	25 13.2	05 94	72.4	25 14.6	04 93	71.8	25 15.9	04 93	71.3	25 17.0	04 93	70.7	25 18.1	03 92	70.2	25 19.0	03 92	69.6	25 19.8	02 92	69.1	7
8	24 15.3	06 94	72.9	24 17.0	05 94	72.3	24 18.6	05 93	71.8	24 20.1	05 93	71.2	24 21.4	04 93	70.7	24 22.7	04 92	70.1	24 23.8	04 92	69.6	24 24.8	03 92	69.0	8
9	23 19.1	06 94	72.8	23 20.9	06 93	72.3	23 22.7	06 93	71.7	23 24.3	05 93	71.2	23 25.9	05 93	70.6	23 27.3	05 92	70.1	23 28.6	04 92	69.5	23 29.8	04 92	69.0	9
70	22 22.8	07 94	72.7	22 24.8	07 93	72.2	22 26.8	06 93	71.7	22 28.6	06 93	71.1	22 30.3	06 92	70.6	22 31.9	05 92	70.0	22 33.4	05 92	69.5	22 34.8	04 92	69.0	70
1	21 26.6	08 94	72.7	21 28.8	07 93	72.1	21 30.9	07 93	71.6	21 32.9	06 93	71.1	21 34.8	06 92	70.5	21 36.6	06 92	70.0	21 38.3	05 92	69.4	21 39.8	05 92	68.9	1
2	20 30.4	08 94	72.6	20 32.7	08 93	72.1	20 35.0	07 93	71.5	20 37.2	07 93	71.0	20 39.3	07 92	70.5	20 41.2	06 92	69.9	20 43.1	06 92	69.4	20 44.9	06 92	68.9	2
3	19 34.2	09 94	72.5	19 36.7	08 93	72.0	19 39.2	08 93	71.4	19 41.5	08 93	70.9	19 43.8	07 92	70.4	19 45.9	07 92	69.9	19 48.0	07 92	69.3	19 50.0	06 92	68.8	3
4	18 38.0	09 94	72.4	18 40.7	09 93	71.9	18 43.3	09 93	71.4	18 45.9	08 93	70.8	18 48.3	08 92	70.3	18 50.7	08 92	69.8	18 52.9	07 92	69.3	18 55.1	07 91	68.7	4
75	17 41.9	10 94	72.3	17 44.8	09 93	71.8	17 47.5	09 93	71.3	17 50.2	09 93	70.8	17 52.9	09 92	70.2	17 55.4	08 92	69.7	17 57.8	08 92	69.2	18 00.2	08 91	68.7	75
6	16 45.8	10 93	72.2	16 48.8	10 93	71.7	16 51.8	10 93	71.2	16 54.7	09 93	70.7	16 57.5	09 92	70.1	17 00.2	09 92	69.6	17 02.8	09 92	69.1	17 05.4	08 91	68.6	6
7	15 49.7	11 93	72.1	15 52.9	11 93	71.6	15 56.0	10 93	71.1	15 59.1	10 93	70.6	16 02.1	10 92	70.0	16 05.0	10 92	69.5	16 07.8	09 92	69.0	16 10.6	09 91	68.5	7
8	14 53.7	11 93	72.0	14 57.0	11 93	71.5	15 00.3	11 93	71.0	15 03.6	11 92	70.5	15 06.7	10 92	70.0	15 09.8	10 92	69.4	15 12.8	10 92	68.9	15 15.8	10 91	68.4	8
9	13 57.7	12 93	71.9	14 01.2	12 93	71.4	14 04.7	11 93	70.9	14 08.1	11 92	70.4	14 11.4	11 92	69.9	14 14.7	11 92	69.3	14 17.9	11 92	68.8	14 21.0	10 91	68.3	9
80	13 01.7	12 93	71.8	13 05.4	12 93	71.3	13 09.1	12 93	70.8	13 12.6	12 92	70.3	13 16.1	12 92	69.7	13 19.6	11 92	69.2	13 23.0	11 92	68.7	13 26.3	11 91	68.2	80
1	12 05.8	13 93	71.7	12 09.7	13 93	71.2	12 13.5	13 93	70.6	12 17.2	12 92	70.1	12 20.9	12 92	69.6	12 24.5	12 92	69.1	12 28.1	12 91	68.6	12 31.7	12 91	68.1	1
2	11 09.9	14 93	71.5	11 13.9	13 93	71.0	11 17.9	13 92	70.5	11 21.8	13 92	70.0	11 25.7	13 92	69.5	11 29.5	13 92	69.0	11 33.3	12 91	68.5	11 37.0	12 91	68.0	2
3	10 14.1	14 93	71.4	10 18.3	14 93	70.9	10 22.4	14 92	70.4	10 26.5	14 92	69.9	10 30.6	13 92	69.4	10 34.6	13 92	68.9	10 38.5	13 91	68.4	10 42.4	13 91	67.9	3
4	9 18.3	15 93	71.3	9 22.6	14 93	70.8	9 27.0	14 92	70.3	9 31.2	14 92	69.8	9 35.5	14 92	69.3	9 39.7	14 91	68.8	9 43.8	14 91	68.3	9 47.9	14 91	67.7	4
85	8 22.5	15 93	71.1	8 27.0	15 93	70.6	8 31.5	15 92	70.1	8 36.0	15 92	69.6	8 40.4	15 92	69.1	8 44.8	15 91	68.6	8 49.1	14 91	68.1	8 53.4	14 91	67.6	85
6	7 26.8	16 93	71.0	7 31.5	16 92	70.5	7 36.2	15 92	70.0	7 40.8	15 92	69.5	7 45.4	15 92	69.0	7 50.0	15 91	68.5	7 54.5	15 91	68.0	7 59.0	15 91	67.5	6
7	6 31.2	16 93	70.8	6 36.0	16 92	70.3	6 40.9	16 92	69.8	6 45.7	16 92	69.3	6 50.5	16 91	68.8	6 55.2	16 91	68.3	6 59.9	16 91	67.8	7 04.6	16 91	67.3	7
8	5 35.6	17 93	70.7	5 40.6	17 92	70.2	5 45.6	17 92	69.7	5 50.6	17 92	69.2	5 55.6	16 91	68.7	6 00.5	16 91	68.2	6 05.4	16 91	67.7	6 10.3	16 90	67.2	8
9													5 00.7	17 91	68.5	5 05.8	17 91	68.0	5 10.9	17 91	67.5	5 16.0	17 90	67.0	9

Lat. 11°

H.A.	20° 00′			20° 30′			21° 00′			21° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	59 00.0	1.0 02	180.0	58 30.0	1.0 02	180.0	58 00.0	1.0 02	180.0	57 30.0	1.0 01	180.0
1	58 59.1	1.0 05	178.2	58 29.1	1.0 06	178.2	57 59.1	1.0 04	178.2	57 29.1	1.0 04	178.3
2	58 56.3	1.0 08	176.4	58 26.3	1.0 08	176.4	57 56.4	1.0 08	176.5	57 26.4	1.0 07	176.5
3	58 51.6	1.0 11	174.5	58 21.7	1.0 11	174.6	57 51.9	1.0 10	174.7	57 22.0	1.0 10	174.8
4	58 45.1	99 14	172.7	58 15.3	99 14	172.9	57 45.6	99 14	173.0	57 15.8	99 13	173.1
05	58 36.7	99 17	171.0	58 07.1	99 17	171.1	57 37.5	99 16	171.3	57 07.9	99 16	171.4
6	58 26.5	98 20	169.2	57 57.1	98 20	169.4	57 27.7	98 19	169.5	56 58.2	98 19	169.7
7	58 14.6	97 23	167.4	57 45.4	97 22	167.6	57 16.1	98 22	167.9	56 46.9	98 22	168.1
8	58 60.9	97 26	165.7	57 31.9	97 25	165.9	57 02.9	97 25	166.2	56 33.8	97 24	166.4
9	57 45.5	96 28	164.0	57 16.8	96 28	164.3	56 48.0	96 28	164.5	56 19.2	96 27	164.8
10	57 28.5	95 31	162.3	57 00.0	95 31	162.6	56 31.5	95 30	162.9	56 02.9	95 30	163.2
1	57 09.8	94 34	160.7	56 41.6	94 33	161.0	56 13.4	94 33	161.3	55 45.1	94 32	161.6
2	56 49.5	93 36	159.1	56 21.7	93 36	159.4	55 53.8	93 35	159.7	55 25.8	93 35	160.1
3	56 27.8	92 39	157.5	56 60.2	92 38	157.9	55 32.6	92 38	158.2	55 05.0	92 37	158.6
4	56 04.5	90 41	156.0	55 37.3	91 41	156.3	55 10.1	91 40	156.7	54 42.7	91 39	157.1
15	55 39.8	89 43	154.5	55 13.0	90 43	154.9	54 46.1	90 42	155.2	54 19.1	90 42	155.6
6	55 13.7	88 46	153.0	54 47.3	88 45	153.4	54 20.7	89 44	153.8	53 54.1	89 44	154.2
7	54 46.3	87 48	151.6	54 20.2	87 47	152.0	53 54.1	87 46	152.4	53 27.8	88 46	152.8
8	54 17.6	85 50	150.2	53 52.0	86 49	150.6	53 26.2	86 48	151.0	53 00.3	86 48	151.5
9	53 47.7	84 52	148.8	53 22.4	84 51	149.3	52 57.1	85 50	149.7	52 31.6	85 50	150.1
20	53 16.6	83 54	147.5	52 51.8	83 53	148.0	52 26.8	83 52	148.4	52 01.7	84 52	148.9
1	52 44.4	81 55	146.2	52 19.9	82 55	146.7	51 55.4	82 54	147.1	51 30.7	82 53	147.6
2	52 11.1	80 57	145.0	51 47.1	80 57	145.4	51 22.9	81 56	145.9	50 58.6	81 55	146.4
3	51 36.8	79 59	143.8	51 13.1	79 58	144.2	50 49.4	79 58	144.7	50 25.5	80 57	145.2
4	51 01.5	77 60	142.6	50 38.2	78 60	143.1	50 14.9	78 59	143.6	49 51.4	79 58	144.1
25	50 25.2	76 62	141.4	50 02.4	76 61	141.9	49 39.4	77 60	142.4	49 16.3	77 60	142.9
6	49 48.1	75 63	140.3	49 25.7	75 63	140.9	49 03.1	75 62	141.4	48 40.4	76 61	141.9
7	49 10.1	73 65	139.3	48 48.1	74 64	139.8	48 25.9	74 63	140.3	48 03.6	75 63	140.8
8	48 31.2	72 66	138.2	48 09.6	72 65	138.8	47 47.9	73 65	139.3	47 26.0	73 64	139.8
9	47 51.6	70 67	137.2	47 30.4	71 67	137.8	47 09.0	71 66	138.3	46 47.5	72 65	138.8
30	47 11.3	69 68	136.3	46 50.4	70 68	136.8	46 29.5	70 67	137.3	46 08.4	71 66	137.8
1	46 30.2	68 70	135.3	46 09.8	68 69	135.9	45 49.2	69 68	136.4	45 28.5	69 68	136.9
2	45 48.5	67 71	134.4	45 28.4	67 70	134.9	45 08.2	68 69	135.5	44 47.9	68 69	136.0
3	45 06.1	65 72	133.5	44 46.4	66 71	134.1	44 26.6	66 70	134.6	44 06.6	67 70	135.1
4	44 23.1	64 73	132.7	44 03.8	65 72	133.2	43 44.3	65 71	133.7	43 24.8	65 71	134.3
35	43 39.5	63 74	131.8	43 20.5	63 73	132.4	43 01.5	64 72	132.9	42 42.3	64 72	133.4
6	42 55.3	62 74	131.0	42 36.8	62 74	131.6	42 18.1	63 73	132.1	41 59.2	63 73	132.6
7	42 10.6	60 75	130.3	41 52.4	61 75	130.8	41 34.1	61 74	131.3	41 15.6	62 74	131.9
8	41 25.4	59 76	129.5	41 07.6	60 76	130.0	40 49.6	60 75	130.6	40 31.5	61 74	131.1
9	40 39.7	58 77	128.8	40 22.3	59 76	129.3	40 04.6	59 76	129.8	39 46.9	59 75	130.4
40	39 53.6	57 78	128.1	39 36.5	57 77	128.6	39 19.2	58 76	129.1	39 01.7	58 76	129.7
1	39 07.0	56 78	127.4	38 50.2	56 78	127.9	38 33.3	57 77	128.4	38 16.2	57 77	129.0
2	38 20.0	55 79	126.7	38 03.5	55 78	127.2	37 46.9	56 78	127.8	37 30.2	56 77	128.3
3	37 32.6	54 80	126.1	37 16.5	54 79	126.6	37 00.2	55 79	127.1	36 43.7	55 78	127.7
4	36 44.8	53 80	125.4	36 29.0	53 80	126.0	36 13.0	53 79	126.5	35 56.9	54 79	127.0
45	35 56.6	51 81	124.8	35 41.1	52 80	125.4	35 25.5	52 80	125.9	35 09.7	53 79	126.4
6	35 08.1	50 81	124.3	34 52.9	51 81	124.8	34 37.6	51 80	125.3	34 22.1	52 80	125.8
7	34 19.3	49 82	123.7	34 04.4	50 81	124.2	33 49.4	50 81	124.7	33 34.2	51 80	125.2
8	33 30.1	48 82	123.1	33 15.5	49 82	123.7	33 00.8	49 82	124.2	32 45.9	50 81	124.7
9	32 40.6	47 83	122.6	32 26.3	48 82	123.1	32 11.9	48 82	123.6	31 57.3	49 82	124.1
50	31 50.9	47 83	122.1	31 36.9	47 83	122.6	31 22.7	47 82	123.1	31 08.4	48 82	123.6
1	31 00.8	46 84	121.6	30 47.1	46 83	122.1	30 33.2	46 83	122.6	30 19.2	47 82	123.1
2	30 10.5	45 84	121.1	29 57.0	45 84	121.6	29 43.5	45 84	122.1	29 29.8	46 83	122.6
3	29 19.9	44 85	120.6	29 06.7	44 84	121.1	28 53.4	45 84	121.6	28 40.0	45 83	122.1
4	28 29.1	43 85	120.1	28 16.2	43 85	120.6	28 03.2	44 84	121.1	27 50.0	44 84	121.7
55	27 38.0	42 86	119.7	27 25.4	42 85	120.2	27 12.6	43 84	120.7	26 59.8	43 84	121.2
6	26 46.8	41 86	119.2	26 34.4	41 85	119.7	26 21.9	42 85	120.3	26 09.3	42 85	120.8
7	25 55.3	40 86	118.8	25 43.1	41 86	119.3	25 30.9	41 85	119.8	25 18.5	41 85	120.3
8	25 03.5	39 86	118.4	24 51.7	40 86	118.9	24 39.7	40 86	119.4	24 27.6	40 85	119.9
9	24 11.6	39 87	118.0	24 00.0	39 86	118.5	23 48.3	39 86	119.0	23 36.4	40 86	119.5
60	23 19.5	38 87	117.6	23 08.1	38 87	118.1	22 56.7	38 86	118.6	22 45.1	39 86	119.1
1	22 27.2	37 87	117.2	22 16.1	37 87	117.7	22 04.8	38 86	118.2	21 53.5	38 86	118.7
2	21 34.8	36 88	116.8	21 23.9	37 87	117.3	21 12.9	37 87	117.8	21 01.8	37 87	118.3
3	20 42.1	35 88	116.5	20 31.5	36 88	117.0	20 20.7	36 87	117.5	20 09.8	36 87	118.0
4	19 49.3	35 88	116.1	19 38.9	35 88	116.6	19 28.4	35 88	117.1	19 17.7	36 87	117.6
65	18 56.4	34 88	115.8	18 46.2	34 88	116.3	18 35.9	34 88	116.8	18 25.5	35 87	117.3
6	18 03.3	33 89	115.5	17 53.3	33 88	116.0	17 43.2	34 88	116.4	17 33.0	34 88	116.9
7	17 10.0	32 89	115.1	17 00.2	33 89	115.6	16 50.4	33 88	116.1	16 40.5	33 88	116.6
8	16 16.6	32 89	114.8	16 07.1	32 89	115.3	15 57.4	32 88	115.8	15 47.7	32 88	116.3
9	15 23.1	31 89	114.5	15 13.8	31 89	115.0	15 04.3	32 89	115.5	14 54.9	32 88	116.0
70	14 29.5	30 90	114.2	14 20.3	31 89	114.7	14 11.1	31 89	115.2	14 01.8	31 89	115.7
1	13 35.7	30 90	113.9	13 26.7	30 90	114.4	13 17.8	30 89	114.9	13 08.7	30 89	115.4
2	12 41.8	29 90	113.6	12 33.1	29 90	114.1	12 24.3	29 89	114.6	12 15.4	30 89	115.1
3	11 47.8	28 90	113.4	11 39.2	29 90	113.9	11 30.7	29 90	114.3	11 22.0	29 89	114.8
4	10 53.6	28 90	113.1	10 45.3	28 90	113.6	10 36.9	28 90	114.1	10 28.5	28 89	114.6
75	9 59.4	27 91	112.8	9 51.3	27 90	113.3	9 43.1	27 90	113.8	9 34.9	27 90	114.3
6	9 05.1	26 91	112.6	8 57.1	27 90	113.1	8 49.2	27 90	113.6	8 41.2	27 90	114.0
7	8 10.7	26 91	112.3	8 02.9	26 91	112.8	7 55.1	26 90	113.3	7 47.3	26 90	113.8
8	7 16.1	25 91	112.1	7 08.6	25 91	112.6	7 01.0	25 90	113.1	6 53.4	25 90	113.6
9	6 21.5	24 91	111.9	6 14.1	25 91	112.3	6 06.8	25 91	112.8	5 59.3	25 90	113.3
80	5 26.8	24 91	111.6	5 19.6	24 91	112.1	5 12.4	24 91	112.6	5 05.2	24 90	113.1

22° 00′			22° 30′			23° 00′			23° 30′			H.A.
Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
57 00.0	1.0 01	180.0	56 30.0	1.0 01	180.0	56 00.0	1.0 01	180.0	55 30.0	1.0 01	180.0	00
56 59.1	1.0 04	178.3	56 29.1	1.0 04	178.3	55 59.2	1.0 04	178.4	55 29.2	1.0 04	178.4	1
56 56.5	1.0 07	176.6	56 26.6	1.0 07	176.7	55 56.6	1.0 07	176.7	55 26.7	1.0 07	176.8	2
56 52.1	1.0 10	174.9	56 22.3	1.0 10	175.0	55 52.4	1.0 10	175.1	55 22.5	1.0 10	175.2	3
56 46.0	99 13	173.2	56 16.3	99 13	173.3	55 46.5	99 13	173.4	55 16.7	99 12	173.6	4
56 38.2	99 16	171.6	56 08.6	99 16	171.7	55 39.0	99 15	171.8	55 09.3	99 15	172.0	05
56 28.7	98 19	169.9	55 59.3	98 18	170.1	55 29.8	98 18	170.2	55 00.3	98 18	170.4	6
56 17.6	98 21	168.3	55 48.3	98 21	168.4	55 19.0	98 21	168.6	54 49.6	98 20	168.8	7
56 04.8	97 24	166.6	55 35.7	97 24	166.8	55 06.6	97 23	167.1	54 37.4	97 23	167.3	8
55 50.4	96 27	165.0	55 21.5	96 26	165.3	54 52.6	96 26	165.5	54 23.7	96 25	165.7	9
55 34.4	95 29	163.5	55 05.7	95 29	163.7	54 37.1	96 28	164.0	54 08.4	96 28	164.2	10
55 16.8	94 32	161.9	54 48.5	95 31	162.2	54 20.1	95 31	162.5	53 51.6	95 30	162.7	1
54 57.8	93 34	160.4	54 29.7	94 34	160.7	54 01.6	94 33	161.0	53 33.5	94 33	161.3	2
54 37.3	92 36	158.9	54 09.5	93 36	159.2	53 41.7	93 36	159.5	53 13.9	93 35	159.8	3
54 15.4	91 39	157.4	53 47.9	92 38	157.8	53 20.4	92 38	158.1	52 52.9	92 37	158.4	4
53 52.1	90 41	156.0	53 25.0	90 40	156.3	52 57.8	91 40	156.7	52 30.6	91 39	157.0	15
53 27.4	89 43	154.6	53 00.7	89 43	155.0	52 33.8	90 42	155.3	52 06.9	90 41	155.7	6
53 01.5	88 45	153.2	52 35.1	88 45	153.6	52 08.6	88 44	154.0	51 42.1	89 43	154.4	7
52 34.4	87 47	151.9	52 08.3	87 47	152.3	51 42.2	87 46	152.7	51 16.0	87 45	153.1	8
52 06.0	85 49	150.6	51 40.3	86 49	151.0	51 14.6	86 48	151.4	50 48.7	86 47	151.8	9
51 36.5	84 51	149.3	51 11.2	84 50	149.7	50 45.8	85 50	150.1	50 20.4	85 49	150.6	20
51 05.9	83 53	148.1	50 41.0	83 52	148.5	50 16.0	83 52	148.9	49 50.9	84 51	149.4	1
50 34.2	82 54	146.8	50 09.7	82 54	147.3	49 45.0	82 53	147.7	49 20.3	83 53	148.2	2
50 01.5	80 56	145.7	49 37.3	81 56	146.1	49 13.1	81 55	146.6	48 48.8	81 54	147.0	3
49 27.8	79 58	144.5	49 04.0	79 57	145.0	48 40.2	80 56	145.5	48 16.2	80 56	145.9	4
48 53.1	78 59	143.4	48 29.8	78 59	143.9	48 06.3	78 58	144.4	47 42.8	79 57	144.8	25
48 17.6	76 61	142.3	47 54.6	77 60	142.8	47 31.6	77 59	143.3	47 08.4	77 59	143.8	6
47 41.2	75 62	141.3	47 18.6	75 61	141.8	46 56.0	76 61	142.3	46 33.2	76 60	142.7	7
47 03.9	74 63	140.3	46 41.8	74 63	140.8	46 19.5	74 62	141.3	45 57.1	75 61	141.7	8
46 25.9	72 65	139.3	46 04.1	73 64	139.8	45 42.3	73 63	140.3	45 20.2	74 63	140.8	9
45 47.1	71 66	138.3	45 25.8	71 65	138.8	45 04.2	72 65	139.3	44 42.6	72 64	139.8	30
45 07.6	70 67	137.4	44 46.6	70 66	137.9	44 25.5	71 66	138.4	44 04.2	71 65	138.9	1
44 27.4	68 68	136.5	44 06.8	69 67	137.0	43 46.1	69 67	137.5	43 25.2	70 66	138.0	2
43 46.5	67 69	135.6	43 26.3	68 69	136.1	43 05.9	68 68	136.6	42 45.4	69 67	137.1	3
43 05.0	66 70	134.8	42 45.2	66 70	135.3	42 25.2	67 69	135.8	42 05.1	67 68	136.3	4
42 22.9	65 71	133.9	42 03.4	65 71	134.5	41 43.8	66 70	135.0	41 24.1	66 69	135.5	35
41 40.2	64 72	133.1	41 21.1	64 71	133.7	41 01.9	64 71	134.2	40 42.5	65 70	134.7	6
40 57.0	62 73	132.4	40 38.2	63 72	132.9	40 19.3	63 72	133.4	40 00.3	64 71	133.9	7
40 13.2	61 74	131.6	39 54.8	62 73	132.1	39 36.3	62 73	132.6	39 17.6	62 72	133.2	8
39 28.9	60 75	130.9	39 10.9	60 74	131.4	38 52.7	61 74	131.9	38 34.4	61 73	132.4	9
38 44.2	59 76	130.2	38 26.5	59 75	130.7	38 08.6	60 74	131.2	37 50.7	60 74	131.7	40
37 58.9	58 76	129.5	37 41.6	58 76	130.0	37 24.1	59 75	130.5	37 06.5	59 74	131.0	1
37 13.3	57 77	128.8	36 56.2	57 76	129.3	36 39.1	57 76	129.8	36 21.8	58 75	130.4	2
36 27.2	55 78	128.2	36 10.5	56 77	128.7	35 53.7	56 76	129.2	35 36.7	57 76	129.7	3
35 40.7	54 78	127.5	35 24.3	55 78	128.1	35 07.8	55 77	128.6	34 51.2	56 77	129.1	4
34 53.8	53 79	126.9	34 37.7	54 78	127.4	34 21.6	54 78	128.0	34 05.3	55 77	128.5	45
34 06.5	52 79	126.3	33 50.8	53 79	126.9	33 34.9	53 78	127.4	33 19.0	53 78	127.9	6
33 18.9	51 80	125.8	33 03.5	52 79	126.3	32 47.9	52 79	126.8	32 32.3	52 78	127.3	7
32 30.9	50 80	125.2	32 15.8	51 80	125.7	32 00.6	51 80	126.2	31 45.2	51 79	126.7	8
31 42.7	49 81	124.7	31 27.8	50 80	125.2	31 12.9	50 80	125.7	30 57.9	50 80	126.2	9
30 54.1	48 82	124.1	30 39.5	49 81	124.6	30 24.9	49 80	125.1	30 10.2	49 80	125.7	50
30 05.1	47 82	123.6	29 50.9	48 82	124.1	29 36.6	48 81	124.6	29 22.2	48 81	125.1	1
29 16.0	46 82	123.1	29 02.0	47 82	123.6	28 48.0	47 82	124.1	28 33.8	47 81	124.6	2
28 26.5	45 83	122.6	28 12.9	46 82	123.1	27 59.1	46 82	123.6	27 45.2	46 81	124.1	3
27 36.8	44 83	122.2	27 23.4	45 83	122.7	27 09.9	45 82	123.2	26 56.4	45 82	123.7	4
26 46.8	43 84	121.7	26 33.7	44 83	122.2	26 20.5	44 83	122.7	26 07.2	44 82	123.2	55
25 56.6	43 84	121.3	25 43.7	43 84	121.8	25 30.8	43 83	122.3	25 17.8	44 83	122.8	6
25 06.1	42 85	120.8	24 53.5	42 84	121.3	24 40.9	42 84	121.8	24 28.2	43 83	122.3	7
24 15.4	41 85	120.4	24 03.1	41 84	120.9	23 50.7	41 84	121.4	23 38.3	42 84	121.9	8
23 24.5	40 85	120.0	23 12.5	40 85	120.5	23 00.4	41 84	121.0	22 48.2	41 84	121.5	9
22 33.4	39 86	119.6	22 21.6	39 85	120.1	22 09.8	40 85	120.6	21 57.8	40 84	121.1	60
21 42.1	38 86	119.2	21 30.6	39 85	119.7	21 19.0	39 85	120.2	21 07.3	39 85	120.7	1
20 50.6	37 86	118.8	20 39.3	38 86	119.3	20 28.0	38 85	119.8	20 16.5	38 85	120.3	2
19 58.9	37 86	118.5	19 47.9	37 86	119.0	19 36.8	37 86	119.5	19 25.6	37 85	120.0	3
19 07.0	36 87	118.1	18 56.3	36 86	118.6	18 45.4	36 86	119.1	18 34.5	37 86	119.6	4
18 15.0	35 87	117.8	18 04.5	35 87	118.3	17 53.9	35 86	118.8	17 43.2	36 86	119.2	65
17 22.8	34 87	117.4	17 12.5	34 87	117.9	17 02.1	35 86	118.4	16 51.7	35 86	118.9	6
16 30.5	33 87	117.1	16 20.4	34 87	117.6	16 10.3	34 87	118.1	16 00.1	34 86	118.6	7
15 38.0	33 88	116.8	15 28.1	33 87	117.3	15 18.2	33 87	117.8	15 08.3	33 87	118.3	8
14 45.3	32 88	116.5	14 35.7	32 88	117.0	14 26.0	32 87	117.5	14 16.3	33 87	117.9	9
13 52.5	31 88	116.2	13 43.1	31 88	116.7	13 33.7	32 88	117.2	13 24.2	32 87	117.6	70
12 59.6	30 88	115.9	12 50.4	31 88	116.4	12 41.2	31 88	116.9	12 32.0	31 87	117.3	1
12 06.5	30 88	115.6	11 57.6	30 88	116.1	11 48.6	30 88	116.6	11 39.6	30 88	117.1	2
11 13.4	29 89	115.3	11 04.6	29 88	115.8	10 55.9	29 88	116.3	10 47.1	29 88	116.8	3
10 20.1	28 89	115.0	10 11.6	28 89	115.5	10 03.0	29 88	116.0	9 54.4	29 88	116.5	4
9 26.6	28 89	114.8	9 18.4	28 89	115.3	9 10.0	28 88	115.8	9 01.6	28 88	116.2	75
8 33.1	27 89	114.5	8 25.0	27 89	115.0	8 16.9	27 89	115.5	8 08.8	27 88	116.0	6
7 39.5	26 90	114.3	7 31.6	26 89	114.8	7 23.7	26 89	115.3	7 15.8	27 89	115.7	7
6 45.7	26 90	114.0	6 38.1	26 89	114.5	6 30.4	26 89	115.0	6 22.7	26 89	115.5	8
5 51.9	25 90	113.8	5 44.4	25 90	114.3	5 37.0	25 89	114.8	5 29.4	25 89	115.3	9
												80

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	77 00.0	1.0 04	00.0	76 30.0	1.0 03	00.0	76 00.0	1.0 03	00.0	75 30.0	1.0 03	00.0	75 00.0	1.0 03	00.0	74 30.0	1.0 03	00.0	74 00.0	1.0 03	00.0	73 30.0	1.0 03	00.0	00
1	76 57.9	1.0 10	04.1	76 28.0	1.0 10	03.9	75 58.1	1.0 10	03.7	75 28.2	1.0 09	03.6	74 58.2	1.0 09	03.5	74 28.3	1.0 09	03.3	73 58.3	1.0 08	03.2	73 28.4	1.0 08	03.1	1
2	76 51.7	99 17	08.1	76 22.0	99 16	07.7	75 52.3	99 16	07.4	75 22.6	99 15	07.2	74 52.9	99 15	06.9	74 23.1	99 14	06.7	73 53.4	99 14	06.4	73 23.6	99 13	06.2	2
3	76 41.4	97 24	12.0	76 12.2	98 23	11.5	75 42.8	98 22	11.1	75 13.5	98 21	10.7	74 44.1	98 20	10.3	74 14.6	98 20	09.9	73 45.2	98 19	09.6	73 15.7	98 18	09.3	3
4	76 27.3	96 30	15.8	75 58.6	96 29	15.2	75 29.7	96 28	14.6	75 00.8	96 27	14.1	74 31.9	97 26	13.6	74 02.9	97 25	13.1	73 33.8	97 24	12.7	73 04.6	97 23	12.3	4
05	76 09.5	93 36	19.4	75 41.4	94 34	18.7	75 13.2	94 33	18.0	74 44.9	95 32	17.4	74 16.4	95 31	16.8	73 47.9	95 30	16.2	73 19.3	95 29	15.7	72 50.7	96 28	15.2	05
6	75 48.2	91 41	22.9	75 20.8	91 39	22.1	74 53.3	92 38	21.3	74 25.7	92 37	20.6	73 57.9	93 36	19.9	73 30.0	93 35	19.2	73 01.9	94 34	18.6	72 33.8	94 33	18.0	6
7	75 23.7	88 46	26.2	74 57.2	89 44	25.3	74 30.4	89 43	24.4	74 03.5	90 42	23.6	73 36.4	91 40	22.8	73 09.2	91 39	22.1	72 41.8	92 38	21.4	72 14.3	92 37	20.8	7
8	74 56.2	85 50	29.3	74 30.6	86 49	28.3	74 04.7	87 47	27.4	73 38.6	87 46	26.5	73 12.2	88 44	25.7	72 45.7	89 43	24.9	72 19.0	89 42	24.1	71 52.1	90 41	23.4	8
9	74 26.1	82 54	32.2	74 01.4	83 53	31.1	73 36.3	84 51	30.2	73 11.0	85 50	29.2	72 45.5	86 48	28.3	72 19.7	86 47	27.5	71 53.8	87 46	26.6	71 27.6	88 45	25.9	9
10	73 53.6	79 58	34.9	73 29.8	80 56	33.8	73 05.6	81 55	32.8	72 41.2	82 53	31.8	72 16.4	83 52	30.8	71 51.4	84 51	29.9	71 26.2	84 50	29.1	71 00.8	85 48	28.3	10
1	73 18.9	76 61	37.4	72 55.9	77 60	36.3	72 32.7	78 58	35.2	72 09.1	79 57	34.2	71 45.2	80 55	33.2	71 21.0	81 54	32.3	70 56.6	82 53	31.4	70 31.9	83 51	30.5	1
2	72 42.2	73 64	39.7	72 20.1	74 63	38.6	71 57.8	75 61	37.5	71 35.0	76 60	36.4	71 12.0	77 58	35.4	70 48.6	78 57	34.5	70 24.9	79 56	33.5	70 01.0	80 54	32.7	2
3	72 03.7	70 67	41.9	71 42.6	71 65	40.7	71 21.0	72 64	39.6	70 59.2	74 62	38.6	70 36.9	75 61	37.5	70 14.4	76 60	36.5	69 51.5	77 58	35.6	69 28.3	78 57	34.7	3
4	71 23.6	67 69	43.8	71 03.4	68 68	42.7	70 42.7	70 66	41.6	70 21.7	71 65	40.5	70 00.3	72 64	39.5	69 38.5	73 62	38.5	69 16.4	74 61	37.5	68 54.0	75 60	36.6	4
15	70 42.1	64 71	45.7	70 22.7	65 70	44.5	70 02.9	67 68	43.4	69 42.7	68 67	42.4	69 22.1	69 66	41.3	69 01.1	70 65	40.3	68 39.8	72 63	39.3	68 18.2	73 62	38.4	15
6	69 59.4	61 73	47.4	69 40.8	63 72	46.2	69 21.8	64 70	45.1	69 02.4	65 69	44.1	68 42.5	67 68	43.0	68 22.3	68 67	42.0	68 01.8	69 66	41.0	67 40.9	70 64	40.1	6
7	69 15.5	59 75	49.0	68 57.7	60 74	47.8	68 39.5	61 72	46.7	68 20.8	63 71	45.7	68 01.8	64 70	44.6	67 42.3	65 69	43.6	67 22.5	67 68	42.6	67 02.4	68 66	41.7	7
8	68 30.6	56 76	50.4	68 13.5	58 75	49.3	67 56.0	59 74	48.2	67 38.1	60 73	47.1	67 19.8	62 72	46.1	67 01.1	63 70	45.1	66 42.1	64 69	44.1	66 22.6	65 68	43.2	8
9	67 44.8	54 78	51.8	67 28.4	55 77	50.7	67 11.7	57 76	49.6	66 54.5	58 74	48.5	66 36.9	59 73	47.5	66 18.9	61 72	46.5	66 00.5	62 71	45.5	65 41.8	63 70	44.6	9
20	66 58.1	51 79	53.0	66 42.5	53 78	51.9	66 26.4	54 77	50.9	66 09.9	56 76	49.8	65 53.0	57 74	48.8	65 35.7	58 73	47.8	65 18.1	60 72	46.8	65 00.0	61 71	45.9	20
1	66 10.7	49 80	54.2	65 55.7	51 79	53.1	65 40.3	52 78	52.0	65 24.5	53 77	51.0	65 08.3	55 76	50.0	64 51.7	56 75	49.0	64 34.7	57 74	48.1	64 17.3	59 73	47.1	1
2	65 22.6	47 81	55.2	65 08.3	48 80	54.2	64 53.6	50 79	53.1	64 38.4	51 78	52.1	64 22.8	53 77	51.1	64 06.8	54 76	50.2	63 50.5	55 75	49.2	63 33.7	56 74	48.3	2
3	64 34.0	45 82	56.2	64 20.3	46 81	55.2	64 06.1	48 80	54.2	63 51.6	49 79	53.2	63 36.6	51 78	52.2	63 21.2	52 77	51.2	63 05.5	53 76	50.3	62 49.4	54 75	49.4	3
4	63 44.8	43 83	57.1	63 31.6	44 82	56.1	63 18.1	46 81	55.1	63 04.1	47 80	54.1	62 49.7	49 79	53.2	62 35.0	50 78	52.2	62 19.9	51 77	51.3	62 04.4	52 76	50.4	4
25	62 55.0	41 84	58.0	62 42.5	43 83	57.0	62 29.5	44 82	56.0	62 16.1	45 81	55.1	62 02.3	47 80	54.1	61 48.1	48 79	53.2	61 33.6	49 78	52.2	61 18.7	50 77	51.3	25
6	62 04.9	39 84	58.8	61 52.8	41 83	57.8	61 40.4	42 82	56.9	61 27.6	43 82	55.9	61 14.3	45 81	55.0	61 00.7	46 80	54.0	60 46.7	47 79	53.1	60 32.4	48 78	52.2	6
7	61 14.3	38 85	59.5	61 02.8	39 84	58.6	60 50.9	40 83	57.6	60 38.6	42 82	56.7	60 25.9	43 82	55.8	60 12.8	44 81	54.9	59 59.4	45 80	54.0	59 45.6	47 79	53.1	7
8	60 23.4	36 86	60.2	60 12.3	37 85	59.3	60 00.9	39 84	58.4	59 49.1	40 83	57.4	59 36.9	41 82	56.5	59 24.4	42 81	55.6	59 11.5	44 80	54.8	58 58.2	45 80	53.9	8
9	59 32.1	34 86	60.9	59 21.5	36 85	60.0	59 10.6	37 84	59.0	58 59.3	38 84	58.1	58 47.6	40 83	57.2	58 35.6	41 82	56.4	58 23.2	42 81	55.5	58 10.4	43 80	54.6	9
30	58 40.5	33 86	61.5	58 30.4	34 86	60.6	58 19.9	35 85	59.7	58 09.1	37 84	58.8	57 57.9	38 84	57.9	57 46.3	39 83	57.0	57 34.4	40 82	56.2	57 22.2	41 81	55.3	30
1	57 48.6	32 87	62.0	57 38.9	33 86	61.1	57 28.9	34 86	60.3	57 18.6	35 85	59.4	57 07.8	36 84	58.5	56 56.7	38 83	57.7	56 45.3	39 82	56.8	56 33.5	40 82	56.0	1
2	56 56.4	30 87	62.6	56 47.2	31 87	61.7	56 37.6	33 86	60.8	56 27.7	34 85	60.0	56 17.4	35 84	59.1	56 06.8	36 84	58.3	55 55.8	37 83	57.4	55 44.5	38 82	56.6	2
3	56 04.1	29 88	63.0	55 55.2	30 87	62.2	55 46.1	31 86	61.3	55 36.6	32 86	60.5	55 26.7	33 85	59.7	55 16.6	35 84	58.8	55 06.0	36 84	58.0	54 55.2	37 83	57.2	3
4	55 11.4	27 88	63.5	55 03.0	29 87	62.7	54 54.3	30 87	61.8	54 45.2	31 86	61.0	54 35.8	32 86	60.2	54 26.0	33 85	59.4	54 15.9	34 84	58.6	54 05.5	35 83	57.8	4
35	54 18.6	26 88	63.9	54 10.6	27 88	63.1	54 02.3	28 87	62.3	53 53.6	30 86	61.5	53 44.5	31 86	60.7	53 35.2	32 85	59.9	53 25.5	33 84	59.1	53 15.6	34 84	58.3	35
6	53 25.7	25 89	64.3	53 18.0	26 88	63.5	53 10.0	27 87	62.7	53 01.7	28 87	61.9	52 53.1	29 86	61.1	52 44.2	30 85	60.3	52 34.9	31 85	59.5	52 25.3	32 84	58.8	6
7	52 32.5	24 89	64.7	52 25.2	25 88	63.9	52 17.6	26 88	63.1	52 09.7	27 87	62.3	52 01.4	28 86	61.5	51 52.9	29 86	60.7	51 44.0	30 85	60.0	51 34.9	31 85	59.2	7
8	51 39.2	23 89	65.0	51 32.2	24 89	64.2	51 25.0	25 88	63.5	51 17.4	26 87	62.7	51 09.6	27 87	61.9	51 01.4	28 86	61.2	50 52.9	29 86	60.4	50 44.2	30 85	59.6	8
9	50 45.7	21 89	65.4	50 39.1	23 89	64.6	50 32.2	24 88	63.8	50 25.0	25 88	63.1	50 17.5	26 87	62.3	50 09.7	26 86	61.5	50 01.6	27 86	60.8	49 53.2	28 85	60.0	9
40	49 52.1	20 90	65.7	49 45.8	21 89	64.9	49 39.3	22 88	64.1	49 32.4	23 88	63.4	49 25.3	24 87	62.6	49 17.8	25 87	61.9	49 10.1	26 86	61.2	49 02.1	27 86	60.4	40
1	48 58.4	19 90	65.9	48 52.4	20 89	65.2	48 46.2	21 89	64.4	48 39.7	22 88	63.7	48 32.9	23 88	63.0	48 25.8	24 87	62.2	48 18.4	25 86	61.5	48 10.8	26 86	60.8	1
2	48 04.6	18 90	66.2	47 58.9	19 89	65.5	47 53.0	20 89	64.7	47 46.8	21 88	64.0	47 40.3	22 88	63.3	47 33.6	23 87	62.5	47 26.6	24 87	61.8	47 19.3	25 86	61.1	2
3	47 10.6	17 90	66.4	47 05.3	18 90	65.7	46 59.7	19 89	65.0	46 53.8	20 89	64.3	46 47.7	21 88	63.6	46 41.3	22 87	62.8	46 34.6	23 87	62.1	46 27.7	24 86	61.4	3
4	46 16.6	16 90	66.7	46 11.6	17 90	65.9	46 06.3	18 89	65.2	46 00.7	19 89	64.5	45 54.9	20 88	63.8	45 48.8	21 88	63.1	45 42.5	22 87	62.4	45 35.9	22 87	61.7	4
45	45 22.5	15 90	66.9	45 17.7	16 90	66.2	45 12.7	17 89	65.5	45 07.5	18 89	64.8	45 02.0	19 88	64.1	44 56.2	20 88	63.4	44 50.2	20 87	62.7	44 43.9	21 87	62.0	45
6	44 28.3	14 90	67.1	44 23.8	15 90	66.4	44 19.1	16 90	65.7	44 14.2	17 89	65.0	44 09.0	18 89	64.3	44 03.5	19 88	63.6	43 57.8	19 88	62.9	43 51.9	20 87	62.2	6
7	43 34.0	14 90	67.2	43 29.8	14 90	66.6	43 25.4	15 90	65.9	43 20.7	16 89	65.2	43 15.8	17 89	64.5	43 10.7	18 88	63.8	43 05.3	18 88	63.2	42 59.7	19 87	62.5	7
8	42 39.7	13 91	67.4	42 35.8	13 90	66.7	42 31.6	14 90	66.1	42 27.2	15 89	65.4	42 22.6	16 89	64.7	42 17.8	17 88	64.0	42 12.7	17 88	63.4	42 07.4	18 87	62.7	8
9	41 45.3	12 91	67.5	41 41.6	13 90	66.9	41 37.7	13 90	66.2	41 33.7	14 89	65.6	41 29.3	15 89	64.9	41 24.8	16 88	64.2	41 20.0	16 88	63.6	41 15.0	17 87	62.9	9
50	40 50.8	11 91	67.7	40 47.4	12 90	67.0	40 43.8	12 90	66.4	40 40.0	13 90	65.7	40 36.0	14 89	65.1	40 31.7	15 89	64.4	40 27.2	15 88	63.8	40 22.5	16 88	63.1	50
1	39 56.3	10 91	67.8	39 53.2	11 90	67.2	39 49.8	11 90	66.5	39 46.3	12 90	65.9	39 42.5	13 89	65.2	39 38.5	14 89	64.6	39 34.3	14 88	63.9	39 29.9	15 88	63.3	1
2	39 01.7	09 91	67.9	38 58.9	10 91	67.3	38 55.8	11 90	66.6	38 52.5	11 90	66.0	38 49.0	12 89	65.4	38 45.3	13 89	64.7	38 41.4	13 88	64.1	38 37.3	14 88	63.5	2
3	38 07.1	08 91	68.0	38 04.5	09 91	67.4	38 01.7	10 90	66.8	37 58.7	10 90	66.1	37 55.4	11 89	65.5	37 52.0	12 89	64.9	37 48.4	12 88	64.2	37 44.6	13 88	63.6	3
4	37 12.5	08 91	68.1	37 10.1	08 91	67.5	37 07.5	09 90	66.9	37 04.8	10 90	66.2	37 01.8	10 90	65.6	36 58.7	11 89	65.0	36 55.3	12 88	64.4	36 51.8	12 88	63.8	4
55	36 17.8	07 91	68.2	36 15.7	07 91	67.6	36 13.4	08 90	67.0	36 10.8	09 90	66.3	36 08.1	09 90	65.7	36 05.3	10 89	65.1	36 02.2	11 89	64.5	35 58.9	11 88	63.9	55
6	35 23.1	06 91	68.3	35 21.2	07 91	67.7	35 19.1	07 90	67.1	35 16.9	08 90	66.4	35 14.4	08 90	65.8	35 11.8	09 89	65.2	35 09.0	10 89	64.6	35 06.0	10 88	64.0	6
7	34 28.4	05 91	68.3	34 26.7	06 91	67.7	34 24.9	06 90	67.1	34 22.9	07 90	66.5	34 20.7	08 90	65.9	34 18.3	08 89	65.3	34 15.8	09 89	64.7	34 13.0	09 88	64.1	7
8	33 33.6	04 91	68.4	33 32.2	05 91	67.8	33 30.6	06 90	67.2	33 28.8	06 90	66.6	33 26.9	07 90	66.0	33 24.8	07 89	65.4	33 22.5	08 89	64.8	33 20.0	08 88	64.2	8
9	32 38.9	04 91	68.4	32 37.7	04 91	67.8	32 36.3	05 90	67.2	32 34.8	05 90	66.7	32 33.1	06 90	66.1	32 31.2	07 89	65.5	32 29.2	07 89	64.9	32 27.0	08 88	64.3	9
60	31 44.1	03 91	68.5	31 43.1	04 91	67.9	31 42.0	04 90	67.3	31 40.7	05 90	66.7	31 39.2	05 90	66.1	31 37.6	06 89	65.5	31 35.8	06 89	64.9	31 33.9	07 89	64.4	60
1	30 49.3	02 91	68.5	30 48.5	03 91	67.9	30 47.6	03 91	67.3	30 46.6	04 90	66.8	30 45.4	04 90	66.2	30 44.0	05 89	65.6	30 42.5	05 89	65.0	30 40.8	06 89	64.4	1
2	29 54.5	02 91	68.5	29 54.0	02 91	67.9	29 53.3	03 91	67.4	29 52.5	03 90	66.8	29 51.5	04 90	66.2	29 50.3	04 89	65.6	29 49.1	05 89	65.1	29 47.6	05 89	64.5	2
3	28 59.7	01 91	68.5	28 59.4	01 91	68.0	28 58.9	02 91	67.4	28 58.3	02 90	66.8	28 57.6	03 90	66.2	28 56.7	03 89	65.7	28 55.6	04 89	65.1	28 54.5	04 89	64.5	3
4	28 04.9	00 91	68.5	28 04.8	01 91	68.0	28 04.5	01 91	67.4	28 04.2	01 90	66.8	28 03.7	02 90	66.3	28 03.0	02 89	65.7	28 02.2	03 89	65.1	28 01.3	03 89	64.6	4
65	27 10.1	01 91	68.5	27 10.2	00 91	68.0	27 10.2	00 91	67.4	27 10.0	01 90	66.8	27 09.7	01 90	66.3	27 09.3	02 89	65.7	27 08.8	02 89	65.2	27 08.1	03 89	64.6	65
6	26 15.3	01 91	68.5	26 15.6	01 91	68.0	26 15.8	00 91	67.4	26 15.9	00 90	66.8	26 15.8	00 90	66.3	26 15.6	01 90	65.7	26 15.3	01 89	65.2	26 14.9	02 89	64.6	6
7	25 20.4	02 91	68.5	25 21.0	02 91	68.0	25 21.4	01 91	67.4	25 21.7	01 90	66.8	25 21.9	00 90	66.3	25 21.9	00 90	65.7	25 21.9	00 89	65.2	25 21.7	01 89	64.6	7
8	24 25.6	03 91	68.5	24 26.4	02 91	67.9	24 27.0	02 91	67.4	24 27.6	02 90	66.8	24 28.0	01 90	66.3	24 28.2	01 89	65.7	24 28.4	00 89	65.2	24 28.4	00 89	64.6	8
9	23 30.9	03 91	68.5	23 31.8	03 91	67.9	23 32.7	03 91	67.4	23 33.4	02 90	66.8	23 34.0	02 90	66.3	23 34.5	02 89	65.7	23 34.9	01 89	65.2	23 35.2	01 89	64.6	9
70	22 36.1	04 91	68.4	22 37.3	04 91	67.9	22 38.3	03 91	67.3	22 39.3	03 90	66.8	22 40.1	03 90	66.2	22 40.9	02 89	65.7	22 41.5	02 89	65.2	22 42.0	02 89	64.6	70
1	21 41.3	05 91	68.4	21 42.7	04 91	67.8	21 44.0	04 90	67.3	21 45.2	04 90	66.8	21 46.2	03 90	66.2	21 47.2	03 89	65.7	21 48.0	03 89	65.1	21 48.8	02 89	64.6	1
2	20 46.6	06 91	68.3	20 48.2	05 91	67.8	20 49.7	05 90	67.3	20 51.0	04 90	66.7	20 52.3	04 90	66.2	20 53.5	04 89	65.6	20 54.6	03 89	65.1	20 55.6	03 89	64.6	2
3	19 51.9	06 91	68.3	19 53.7	06 91	67.7	19 55.4	05 90	67.2	19 57.0	05 90	66.7	19 58.5	05 90	66.1	19 59.9	05 89	65.6	20 01.2	04 89	65.1	20 02.4	04 89	64.5	3
4	18 57.2	07 91	68.2	18 59.2	06 91	67.7	19 01.1	06 90	67.1	19 02.9	06 90	66.6	19 04.6	06 90	66.1	19 06.2	05 89	65.6	19 07.8	05 89	65.0	19 09.2	05 89	64.5	4
75	18 02.5	07 91	68.1	18 04.7	07 91	67.6	18 06.8	07 90	67.1	18 08.8	07 90	66.6	18 10.8	06 90	66.0	18 12.6	06 89	65.5	18 14.4	06 89	65.0	18 16.1	05 89	64.5	75
6	17 07.9	08 91	68.1	17 10.3	08 91	67.5	17 12.6	08 90	67.0	17 14.8	07 90	66.5	17 17.0	07 90	66.0	17 19.0	07 89	65.4	17 21.0	07 89	64.9	17 23.0	06 88	64.4	6
7	16 13.2	09 91	68.0	16 15.8	09 91	67.5	16 18.4	08 90	66.9	16 20.8	08 90	66.4	16 23.2	08 90	65.9	16 25.5	08 89	65.4	16 27.7	07 89	64.9	16 29.9	07 88	64.3	7
8	15 18.7	09 91	67.9	15 21.5	09 91	67.4	15 24.2	09 90	66.9	15 26.9	09 90	66.3	15 29.4	09 90	65.8	15 32.0	08 89	65.3	15 34.4	08 89	64.8	15 36.8	08 88	64.3	8
9	14 24.1	10 91	67.8	14 27.1	10 91	67.3	14 30.0	10 90	66.8	14 32.9	09 90	66.3	14 35.7	09 90	65.7	14 38.5	09 89	65.2	14 41.1	09 89	64.7	14 43.7	09 88	64.2	9
80	13 29.6	11 91	67.7	13 32.8	11 90	67.2	13 35.9	10 90	66.7	13 39.0	10 90	66.2	13 42.0	10 89	65.7	13 45.0	10 89	65.1	13 47.9	10 89	64.6	13 50.7	09 88	64.1	80
1	12 35.1	11 91	67.6	12 38.5	11 90	67.1	12 41.9	11 90	66.6	12 45.2	11 90	66.1	12 48.4	11 89	65.6	12 51.6	10 89	65.0	12 54.7	10 89	64.5	12 57.8	10 88	64.0	1
2	11 40.7	12 91	67.5	11 44.3	12 90	67.0	11 47.9	12 90	66.5	11 51.4	12 90	66.0	11 54.8	11 89	65.5	11 58.2	11 89	64.9	12 01.5	11 88	64.4	12 04.8	11 88	63.9	2
3	10 46.3	13 90	67.4	10 50.1	13 90	66.9	10 53.9	12 90	66.4	10 57.6	12 90	65.9	11 01.3	12 89	65.3	11 04.9	12 89	64.8	11 08.4	12 88	64.3	11 11.9	12 88	63.8	3
4	9 52.0	13 90	67.2	9 56.0	13 90	66.7	9 59.9	13 90	66.2	10 03.9	13 89	65.7	10 07.8	13 89	65.2	10 11.6	13 89	64.7	10 15.4	13 88	64.2	10 19.1	12 88	63.7	4
85	8 57.7	14 90	67.1	9 01.9	14 90	66.6	9 06.1	14 90	66.1	9 10.2	14 89	65.6	9 14.3	14 89	65.1	9 18.3	13 89	64.6	9 22.4	13 88	64.1	9 26.3	13 88	63.6	85
6	8 03.4	15 90	67.0	8 07.9	15 90	66.5	8 12.2	15 90	66.0	8 16.6	14 89	65.5	8 20.9	14 89	65.0	8 25.2	14 89	64.5	8 29.4	14 88	64.0	8 33.6	14 88	63.5	6
7	7 09.3	15 90	66.8	7 13.9	15 90	66.3	7 18.5	15 90	65.9	7 23.0	15 89	65.4	7 27.6	15 89	64.9	7 32.0	15 88	64.4	7 36.5	15 88	63.9	7 40.9	15 88	63.4	7
8	6 15.1	16 90	66.7	6 20.0	16 90	66.2	6 24.8	16 90	65.7	6 29.5	16 89	65.2	6 34.3	16 89	64.7	6 39.0	16 88	64.2	6 43.7	16 88	63.7	6 48.3	15 88	63.2	8
9	5 21.1	17 90	66.5	5 26.1	17 90	66.1	5 31.1	17 89	65.6	5 36.1	17 89	65.1	5 41.0	16 89	64.6	5 46.0	16 88	64.1	5 50.9	16 88	63.6	5 55.8	16 87	63.1	9
90																						5 03.3	17 87	62.9	90

Lat. 11°

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	55 00.0	1.0 01	180.0	54 30.0	1.0 01	180.0	54 00.0	1.0 01	180.0	53 30.0	1.0 01	180.0	53 00.0	1.0 01	180.0	52 30.0	1.0 01	180.0	52 00.0	1.0 01	180.0	51 30.0	1.0 01	180.0	00
1	54 59.2	1.0 04	178.4	54 29.2	1.0 04	178.4	53 59.2	1.0 04	178.5	53 29.2	1.0 04	178.5	52 59.2	1.0 04	178.5	52 29.2	1.0 04	178.5	51 59.3	1.0 04	178.6	51 29.3	1.0 04	178.6	1
2	54 56.7	1.0 07	176.8	54 26.8	1.0 07	176.9	53 56.8	1.0 07	176.9	53 26.9	1.0 06	177.0	52 56.9	1.0 06	177.0	52 27.0	1.0 06	177.1	51 57.0	1.0 06	177.1	51 27.1	1.0 06	177.2	2
3	54 52.6	1.0 10	175.2	54 22.8	1.0 09	175.3	53 52.9	1.0 09	175.4	53 23.0	1.0 09	175.5	52 53.1	1.0 09	175.5	52 23.2	1.0 09	175.6	51 53.3	1.0 09	175.7	51 23.4	1.0 08	175.7	3
4	54 46.9	99 12	173.7	54 17.2	99 12	173.8	53 47.4	99 12	173.9	53 17.6	99 12	174.0	52 47.8	99 12	174.0	52 17.9	99 11	174.1	51 48.1	99 11	174.2	51 18.3	99 11	174.3	4
05	54 39.6	99 15	172.1	54 10.0	99 15	172.2	53 40.3	99 14	172.3	53 10.6	99 14	172.5	52 40.9	99 14	172.6	52 11.2	99 14	172.7	51 41.5	99 14	172.8	51 11.8	99 13	172.9	05
6	54 30.7	98 18	170.5	54 01.2	98 17	170.7	53 31.7	98 17	170.8	53 02.1	99 17	171.0	52 32.5	99 16	171.1	52 03.0	99 16	171.3	51 33.4	99 16	171.4	51 03.8	99 16	171.5	6
7	54 20.3	98 20	169.0	53 50.9	98 20	169.2	53 21.5	98 19	169.3	52 52.1	98 19	169.5	52 22.7	98 19	169.7	51 53.3	98 19	169.8	51 23.8	98 18	170.0	50 54.4	98 18	170.1	7
8	54 08.2	97 22	167.5	53 39.1	97 22	167.7	53 09.9	97 22	167.9	52 40.6	97 22	168.0	52 11.4	97 21	168.2	51 42.2	98 21	168.4	51 12.9	98 20	168.6	50 43.6	98 20	168.8	8
9	53 54.7	97 25	166.0	53 25.7	97 25	166.2	52 56.7	97 24	166.4	52 27.7	97 24	166.6	51 58.7	97 24	166.8	51 29.6	97 23	167.0	51 00.5	97 23	167.2	50 31.4	97 23	167.4	9
10	53 39.7	96 28	164.5	53 10.9	96 27	164.7	52 42.2	96 27	164.9	52 13.4	96 26	165.2	51 44.5	96 26	165.4	51 15.7	96 26	165.6	50 46.8	96 25	165.8	50 17.9	96 25	166.0	10
1	53 23.2	95 30	163.0	52 54.7	95 29	163.3	52 26.2	95 29	163.5	51 57.6	96 29	163.8	51 29.0	95 28	164.0	51 00.4	96 28	164.3	50 31.7	96 27	164.5	50 03.0	96 27	164.7	1
2	53 05.3	94 32	161.6	52 37.0	94 32	161.8	52 08.8	94 31	162.1	51 40.4	94 31	162.4	51 12.1	95 30	162.6	50 43.7	96 30	162.9	50 15.3	95 30	163.2	49 46.9	95 29	163.4	2
3	52 45.9	93 34	160.1	52 18.0	93 34	160.4	51 50.0	93 34	160.7	51 22.0	94 33	161.0	50 53.9	94 33	161.3	50 25.7	94 32	161.6	49 57.6	94 32	161.8	49 29.4	94 31	162.1	3
4	52 25.3	92 37	158.8	51 57.6	92 36	159.1	51 29.9	92 36	159.4	51 02.1	93 35	159.7	50 34.3	93 34	160.0	50 06.5	93 34	160.3	49 38.6	93 34	160.6	49 10.7	93 33	160.8	4
15	52 03.3	91 39	157.4	51 35.9	91 38	157.7	51 08.5	91 38	158.0	50 41.1	92 37	158.4	50 13.6	92 37	158.7	49 46.0	92 36	159.0	49 18.4	92 36	159.3	48 50.7	92 35	159.6	15
6	51 40.0	90 41	156.0	51 13.0	90 40	156.4	50 45.9	90 40	156.7	50 18.7	91 39	157.1	49 51.5	91 39	157.4	49 24.3	91 38	157.7	48 57.0	91 38	158.0	48 29.6	91 37	158.4	6
7	51 15.5	89 43	154.7	50 48.8	89 42	155.1	50 22.0	89 42	155.5	49 55.2	90 41	155.8	49 28.3	90 41	156.1	49 01.4	90 40	156.5	48 34.3	90 40	156.8	48 07.3	90 39	157.1	7
8	50 49.7	88 45	153.5	50 23.4	88 44	153.8	49 57.0	88 44	154.2	49 30.5	88 43	154.6	49 03.9	89 42	154.9	48 37.3	89 42	155.3	48 10.6	89 42	155.6	47 43.8	89 41	156.0	8
9	50 22.8	87 47	152.2	49 56.8	87 46	152.6	49 30.7	87 46	153.0	49 04.6	87 45	153.3	48 38.4	88 44	153.7	48 12.1	88 44	154.1	47 45.7	88 43	154.4	47 19.3	88 43	154.8	9
20	49 54.8	85 48	151.0	49 29.2	86 48	151.4	49 03.4	86 47	151.8	48 37.6	86 47	152.2	48 11.8	86 46	152.5	47 45.8	87 46	152.9	47 19.8	87 45	153.3	46 53.7	87 44	153.6	20
1	49 25.7	84 50	149.8	49 00.4	84 50	150.2	48 35.0	85 49	150.6	48 09.6	85 48	151.0	47 44.1	85 48	151.4	47 18.5	85 47	151.8	46 52.8	86 47	152.2	46 27.0	86 46	152.5	1
2	48 55.5	83 52	148.6	48 30.6	83 51	149.0	48 05.6	83 51	149.4	47 40.5	84 50	149.9	47 15.3	84 50	150.3	46 50.1	84 49	150.7	46 24.8	85 48	151.0	45 59.3	85 48	151.4	2
3	48 24.3	82 54	147.5	47 59.8	82 53	147.9	47 35.2	82 52	148.3	47 10.5	83 52	148.7	46 45.6	83 51	149.2	46 20.7	83 50	149.6	45 55.8	83 50	150.0	45 30.7	84 49	150.4	3
4	47 52.2	80 55	146.4	47 28.0	81 54	146.8	47 03.8	81 54	147.2	46 39.4	81 53	147.7	46 15.0	82 53	148.1	45 50.4	82 52	148.5	45 25.8	82 52	148.9	45 01.1	83 51	149.3	4
25	47 19.1	79 57	145.3	46 55.3	79 56	145.7	46 31.4	80 55	146.2	46 07.5	80 55	146.6	45 43.4	80 54	147.0	45 19.2	81 54	147.5	44 54.9	81 53	147.9	44 30.6	81 52	148.3	25
6	46 45.1	78 58	144.2	46 21.7	78 57	144.7	45 58.2	79 57	145.1	45 34.6	79 56	145.6	45 10.9	79 56	146.0	44 47.1	80 55	146.4	44 23.2	80 54	146.9	43 59.2	80 54	147.3	6
7	46 10.3	77 60	143.2	45 47.2	77 59	143.7	45 24.1	77 58	144.1	45 00.9	78 58	144.6	44 37.5	78 57	145.0	44 14.1	78 56	145.5	43 50.6	79 56	145.9	43 26.9	79 55	146.3	7
8	45 34.6	75 61	142.2	45 11.9	76 60	142.7	44 49.2	76 60	143.1	44 26.3	76 59	143.6	44 03.4	77 58	144.0	43 40.3	77 58	144.5	43 17.1	77 57	144.9	42 53.9	78 56	145.4	8
9	44 58.1	74 62	141.2	44 35.8	74 61	141.7	44 13.5	75 61	142.2	43 51.0	75 60	142.6	43 28.4	75 60	143.1	43 05.7	76 59	143.5	42 42.9	76 58	144.0	42 20.0	77 58	144.4	9
30	44 20.9	73 63	140.3	43 59.0	73 63	140.8	43 37.0	74 62	141.2	43 14.9	74 61	141.7	42 52.6	74 61	142.2	42 30.3	75 60	142.6	42 07.9	75 60	143.1	41 45.3	75 59	143.5	30
1	43 42.9	71 64	139.4	43 21.4	72 64	139.9	42 59.7	72 63	140.3	42 38.0	73 63	140.8	42 16.2	73 62	141.3	41 54.2	73 61	141.7	41 32.1	74 61	142.2	41 10.0	74 60	142.6	1
2	43 04.2	70 66	138.5	42 43.1	71 65	139.0	42 21.8	71 64	139.5	42 00.4	71 64	139.9	41 39.0	72 63	140.4	41 17.4	72 62	140.9	40 55.7	73 62	141.3	40 33.9	73 61	141.8	2
3	42 24.8	69 67	137.6	42 04.1	69 66	138.1	41 43.2	70 66	138.6	41 22.2	70 65	139.1	41 01.1	71 64	139.5	40 39.9	71 64	140.0	40 18.5	71 63	140.5	39 57.1	72 62	140.9	3
4	41 44.8	68 68	136.8	41 24.4	68 67	137.3	41 03.9	69 66	137.8	40 43.3	69 66	138.2	40 22.6	69 65	138.7	40 01.7	70 65	139.2	39 40.7	70 64	139.7	39 19.6	70 63	140.1	4
35	41 04.2	67 69	136.0	40 44.2	67 68	136.5	40 24.0	67 68	137.0	40 03.8	68 67	137.4	39 43.4	68 66	137.9	39 22.9	69 66	138.4	39 02.3	69 65	138.9	38 41.6	69 64	139.3	35
6	40 22.9	65 70	135.2	40 03.3	66 69	135.7	39 43.5	66 68	136.2	39 23.6	67 68	136.6	39 03.6	67 67	137.1	38 43.5	67 67	137.6	38 23.2	68 66	138.1	38 02.9	68 66	138.5	6
7	39 41.1	64 71	134.4	39 21.9	65 70	134.9	39 02.4	65 69	135.4	38 42.9	65 69	135.9	38 23.2	66 68	136.4	38 03.5	66 68	136.8	37 43.6	66 67	137.3	37 23.6	67 66	137.8	7
8	38 58.8	63 72	133.7	38 39.9	63 71	134.2	38 20.8	64 70	134.6	38 01.6	64 70	135.1	37 42.3	65 69	135.6	37 22.9	65 68	136.1	37 03.4	65 68	136.6	36 43.7	66 67	137.0	8
9	38 15.9	62 72	132.9	37 57.3	62 72	133.4	37 38.6	63 71	133.9	37 19.8	63 71	134.4	37 00.9	63 70	134.9	36 41.8	64 69	135.4	36 22.6	64 69	135.9	36 03.3	65 68	136.3	9
40	37 32.6	61 73	132.2	37 14.3	61 73	132.7	36 56.0	61 72	133.2	36 37.5	62 71	133.7	36 18.9	62 71	134.2	36 00.2	63 70	134.7	35 41.3	63 70	135.2	35 22.4	63 69	135.6	40
1	36 48.7	59 74	131.5	36 30.8	60 73	132.0	36 12.8	60 73	132.5	35 54.7	61 72	133.0	35 36.4	61 72	133.5	35 18.0	61 71	134.0	34 59.6	62 70	134.5	34 41.0	62 70	135.0	1
2	36 04.4	58 75	130.9	35 46.8	59 74	131.4	35 29.2	59 74	131.9	35 11.4	60 73	132.4	34 53.5	60 72	132.8	34 35.4	60 72	133.3	34 17.3	61 71	133.8	33 59.0	61 71	134.3	2
3	35 19.6	57 75	130.2	35 02.4	58 75	130.7	34 45.1	58 74	131.2	34 27.6	58 74	131.7	34 10.0	59 73	132.2	33 52.4	59 73	132.7	33 34.6	60 72	133.2	33 16.6	60 71	133.6	3
4	34 34.4	56 76	129.6	34 17.6	56 75	130.1	34 00.6	57 75	130.6	33 43.4	57 74	131.1	33 26.2	58 74	131.6	33 08.8	58 73	132.1	32 51.4	58 73	132.5	32 33.8	59 72	133.0	4
45	33 48.8	55 77	129.0	33 32.3	55 76	129.5	33 15.6	56 76	130.0	32 58.8	56 75	130.5	32 41.9	57 74	131.0	32 24.9	57 74	131.4	32 07.8	57 73	131.9	31 50.5	58 73	132.4	45
6	33 02.8	54 77	128.4	32 46.6	54 77	128.9	32 30.3	55 76	129.4	32 13.8	55 76	129.9	31 57.2	55 75	130.4	31 40.6	56 75	130.8	31 23.8	56 74	131.3	31 06.8	57 74	131.8	6
7	32 16.5	53 78	127.8	32 00.6	53 77	128.3	31 44.6	54 77	128.8	31 28.4	54 76	129.3	31 12.2	54 76	129.8	30 55.8	55 75	130.3	30 39.3	55 75	130.8	30 22.7	55 74	131.2	7
8	31 29.8	52 78	127.2	31 14.2	52 78	127.7	30 58.5	53 77	128.2	30 42.7	53 77	128.7	30 26.7	53 76	129.2	30 10.7	54 76	129.7	29 54.5	54 75	130.2	29 38.3	54 75	130.7	8
9	30 42.7	51 79	126.7	30 27.4	51 78	127.2	30 12.0	52 78	127.7	29 56.5	52 77	128.2	29 40.9	52 77	128.7	29 25.2	53 76	129.2	29 09.4	53 76	129.6	28 53.4	53 75	130.1	9
50	29 55.3	50 80	126.2	29 40.3	50 79	126.7	29 25.3	50 78	127.1	29 10.1	51 78	127.6	28 54.8	51 78	128.1	28 39.3	52 77	128.6	28 23.8	52 76	129.1	28 08.2	52 76	129.6	50
1	29 07.6	49 80	125.6	28 52.9	49 80	126.1	28 38.1	49 79	126.6	28 23.3	50 79	127.1	28 08.3	50 78	127.6	27 53.2	51 78	128.1	27 38.0	51 77	128.6	27 22.7	51 76	129.1	1
2	28 19.6	48 80	125.1	28 05.2	48 80	125.6	27 50.7	48 80	126.1	27 36.1	49 79	126.6	27 21.5	49 79	127.1	27 06.7	49 78	127.6	26 51.8	50 78	128.1	26 36.8	50 77	128.6	2
3	27 31.3	47 81	124.6	27 17.2	47 80	125.1	27 03.0	47 80	125.6	26 48.7	48 80	126.1	26 34.3	48 79	126.6	26 19.8	48 79	127.1	26 05.3	49 78	127.6	25 50.6	49 78	128.1	3
4	26 42.7	46 82	124.2	26 28.9	46 81	124.7	26 15.0	46 80	125.2	26 01.0	47 80	125.7	25 46.9	47 80	126.1	25 32.7	47 79	126.6	25 18.4	48 78	127.1	25 04.1	48 78	127.6	4
55	25 53.8	45 82	123.7	25 40.3	45 81	124.2	25 26.7	46 81	124.7	25 13.0	46 80	125.2	24 59.2	46 80	125.7	24 45.3	46 79	126.2	24 31.3	47 79	126.7	24 17.2	47 78	127.1	55
6	25 04.7	44 82	123.3	24 51.5	44 82	123.8	24 38.2	45 81	124.2	24 24.7	45 81	124.7	24 11.2	45 80	125.2	23 57.6	45 80	125.7	23 43.9	46 80	126.2	23 30.2	46 79	126.7	6
7	24 15.3	43 83	122.8	24 02.4	43 82	123.3	23 49.3	44 82	123.8	23 36.2	44 81	124.3	23 23.0	44 81	124.8	23 09.7	45 80	125.3	22 56.3	45 80	125.8	22 42.8	45 79	126.2	7
8	23 25.7	42 83	122.4	23 13.0	42 83	122.9	23 00.3	43 82	123.4	22 47.4	43 82	123.9	22 34.5	43 81	124.4	22 21.5	44 81	124.9	22 08.4	44 80	125.3	21 55.2	44 80	125.8	8
9	22 35.9	41 83	122.0	22 23.5	41 83	122.5	22 11.0	42 82	123.0	21 58.4	42 82	123.5	21 45.8	42 82	123.9	21 33.0	43 81	124.4	21 20.2	43 81	124.9	21 07.3	43 80	125.4	9
60	21 45.8	40 84	121.6	21 33.7	41 83	122.1	21 21.5	41 83	122.6	21 09.2	41 82	123.1	20 56.8	41 82	123.5	20 44.3	42 82	124.0	20 31.8	42 81	124.5	20 19.2	42 81	125.0	60
1	20 55.5	39 84	121.2	20 43.7	40 84	121.7	20 31.7	40 83	122.2	20 19.7	40 83	122.7	20 07.6	40 82	123.2	19 55.4	41 82	123.6	19 43.1	41 82	124.1	19 30.8	41 81	124.6	1
2	20 05.0	39 84	120.8	19 53.4	39 84	121.3	19 41.8	39 84	121.8	19 30.0	39 83	122.3	19 18.2	40 83	122.8	19 06.3	40 82	123.3	18 54.3	40 82	123.7	18 42.2	40 81	124.2	2
3	19 14.3	38 85	120.4	19 03.0	38 84	120.9	18 51.6	38 84	121.4	18 40.1	38 83	121.9	18 28.5	39 83	122.4	18 16.9	39 83	122.9	18 05.2	39 82	123.4	17 53.4	39 82	123.9	3
4	18 23.5	37 85	120.1	18 12.4	37 85	120.6	18 01.2	37 84	121.1	17 50.0	38 84	121.6	17 38.7	38 83	122.0	17 27.3	38 83	122.5	17 15.9	38 82	123.0	17 04.4	38 82	123.5	4
65	17 32.4	36 85	119.7	17 21.6	36 85	120.2	17 10.7	36 84	120.7	16 59.7	37 84	121.2	16 48.7	37 84	121.7	16 37.6	37 83	122.2	16 26.4	37 83	122.7	16 15.2	38 82	123.1	65
6	16 41.2	35 86	119.4	16 30.6	35 85	119.9	16 20.0	36 85	120.4	16 09.3	36 84	120.9	15 58.5	36 84	121.3	15 47.6	36 84	121.8	15 36.7	36 83	122.3	15 25.7	37 83	122.8	6
7	15 49.8	34 86	119.1	15 39.5	35 86	119.6	15 29.1	35 85	120.0	15 18.6	35 85	120.5	15 08.1	35 84	121.0	14 57.5	35 84	121.5	14 46.8	36 83	122.0	14 36.1	36 83	122.5	7
8	14 58.2	34 86	118.7	14 48.1	34 86	119.2	14 38.0	34 85	119.7	14 27.8	34 85	120.2	14 17.5	34 84	120.7	14 07.2	35 84	121.2	13 56.8	35 84	121.7	13 46.4	35 83	122.1	8
9	14 06.5	33 86	118.4	13 56.7	33 86	118.9	13 46.8	33 86	119.4	13 36.8	33 85	119.9	13 26.8	33 85	120.4	13 16.7	34 84	120.9	13 06.6	34 84	121.3	12 56.4	34 84	121.8	9
70	13 14.7	32 87	118.1	13 05.0	32 86	118.6	12 55.4	32 86	119.1	12 45.7	32 86	119.6	12 35.9	33 85	120.1	12 26.1	33 85	120.6	12 16.2	33 84	121.0	12 06.3	33 84	121.5	70
1	12 22.6	31 87	117.8	12 13.3	31 87	118.3	12 03.8	31 86	118.8	11 54.4	32 86	119.3	11 44.8	32 85	119.8	11 35.3	32 85	120.3	11 25.7	32 84	120.7	11 16.0	32 84	121.2	1
2	11 39.5	30 87	117.5	11 21.3	31 87	118.0	11 12.2	31 86	118.5	11 02.9	31 86	119.0	10 53.6	31 85	119.5	10 44.3	31 85	120.0	10 35.0	31 85	120.5	10 25.5	31 84	120.9	2
3	10 38.2	30 87	117.3	10 29.3	30 87	117.8	10 20.3	30 86	118.2	10 11.3	30 86	118.7	10 02.3	30 86	119.2	9 53.2	30 85	119.7	9 44.1	30 85	120.2	9 34.9	31 85	120.7	3
4	9 45.8	29 88	117.0	9 37.1	29 87	117.5	9 28.4	29 87	118.0	9 19.6	29 86	118.4	9 10.8	29 86	118.9	9 02.0	30 86	119.4	8 53.1	30 85	119.9	8 44.2	30 85	120.4	4
75	8 53.2	28 88	116.7	8 44.8	28 87	117.2	8 36.3	28 87	117.7	8 27.8	28 87	118.2	8 19.2	29 86	118.7	8 10.6	29 86	119.2	8 02.0	29 86	119.6	7 53.3	29 85	120.1	75
6	8 00.6	27 88	116.5	7 52.3	27 88	117.0	7 44.1	28 87	117.4	7 35.8	28 87	117.9	7 27.5	28 86	118.4	7 19.1	28 86	118.9	7 10.7	28 86	119.4	7 02.3	28 85	119.9	6
7	7 07.8	27 88	116.2	6 59.8	27 88	116.7	6 51.8	27 87	117.2	6 43.7	27 87	117.7	6 35.6	27 87	118.2	6 27.5	27 86	118.6	6 19.4	27 86	119.1	6 11.2	27 85	119.6	7
8	6 14.9	26 88	116.0	6 07.1	26 88	116.5	5 59.3	26 88	117.0	5 51.5	26 87	117.4	5 43.6	26 87	117.9	5 35.7	26 86	118.4	5 27.8	26 86	118.9	5 19.9	26 86	119.4	8
9	5 21.9	25 88	115.7	5 14.3	25 88	116.2	5 06.8	25 88	116.7																9

16—8472

H.A.	28° 00′				28° 30′				29° 00′				30° 00′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	73 00.0	1.0	03	00.0	72 30.0	1.0	02	00.0	72 00.0	1.0	02	00.0	71 00.0	1.0	02	00.0
1	72 58.4	1.0	08	03.0	72 28.5	1.0	07	02.9	71 58.5	1.0	07	02.8	70 58.6	1.0	07	02.7
2	72 53.8	99	13	06.0	72 24.0	99	12	05.8	71 54.2	99	12	05.6	70 54.5	99	11	05.3
3	72 46.1	98	18	09.0	72 16.6	99	17	08.7	71 47.0	99	17	08.4	70 47.8	99	16	07.9
4	72 35.5	97	22	11.9	72 06.2	97	22	11.5	71 37.0	98	21	11.2	70 38.3	98	20	10.5
05	72 21.9	96	27	14.7	71 53.1	96	26	14.3	71 24.2	96	26	13.8	70 26.3	97	24	13.0
6	72 05.6	94	32	17.5	71 37.3	95	31	16.9	71 08.8	95	30	16.4	70 11.8	95	28	15.5
7	71 46.6	92	36	20.1	71 18.8	93	35	19.5	70 50.9	93	34	19.0	69 54.9	94	32	17.9
8	71 25.1	90	40	22.7	70 57.9	91	39	22.0	70 30.6	91	38	21.4	69 35.6	92	36	20.2
9	71 01.2	88	44	25.1	70 34.7	89	42	24.4	70 08.0	89	41	23.7	69 14.2	90	39	22.5
10	70 35.1	86	47	27.5	70 09.3	86	46	26.7	69 43.2	87	45	26.0	68 50.7	88	43	24.6
1	70 06.9	83	50	29.7	69 41.8	84	49	28.9	69 16.4	85	48	28.1	68 25.2	86	46	26.7
2	69 36.8	81	53	31.8	69 12.4	82	52	31.0	68 47.7	83	51	30.2	67 57.8	84	49	28.7
3	69 04.9	79	56	33.8	68 41.2	79	55	32.9	68 17.2	80	54	32.1	67 28.7	82	51	30.6
4	68 31.3	76	58	35.7	68 08.4	77	57	34.8	67 45.1	78	56	34.0	66 57.9	79	54	32.4
15	67 56.2	74	61	37.5	67 34.0	75	60	36.6	67 11.5	76	58	35.7	66 25.6	77	56	34.1
6	67 19.7	71	63	39.2	66 58.2	72	62	38.3	66 36.4	73	61	37.4	65 51.9	75	58	35.7
7	66 41.9	69	65	40.7	66 21.1	70	64	39.8	66 00.0	71	63	39.0	65 16.9	73	60	37.3
8	66 02.9	66	67	42.2	65 42.8	68	66	41.3	65 22.3	69	64	40.4	64 40.6	71	62	38.7
9	65 22.8	64	68	43.6	65 03.3	65	67	42.7	64 43.6	66	66	41.8	64 03.2	68	64	40.1
20	64 41.6	62	70	44.9	64 22.9	63	69	44.0	64 03.8	64	68	43.2	63 24.7	66	66	41.4
1	63 59.6	60	72	46.2	63 41.5	61	70	45.3	63 23.1	62	70	44.4	62 45.3	64	67	42.7
2	63 16.6	58	73	47.4	62 59.2	59	72	46.5	62 41.4	60	71	45.6	62 04.9	62	69	43.9
3	62 32.9	55	74	48.4	62 16.1	57	73	47.6	61 59.0	58	72	46.7	61 23.7	60	70	45.0
4	61 48.5	53	75	49.5	61 32.3	55	74	48.6	61 15.7	56	73	47.7	60 41.7	58	71	46.0
25	61 03.4	51	76	50.4	60 47.8	53	75	49.6	60 31.8	54	74	48.7	59 58.9	56	72	47.0
6	60 17.7	50	77	51.4	60 02.6	51	76	50.5	59 47.3	52	75	49.6	59 15.5	54	73	48.0
7	59 31.4	48	78	52.2	59 16.9	49	77	51.4	59 02.1	50	76	50.5	58 31.5	52	74	48.9
8	58 44.6	46	79	53.0	58 30.7	47	78	52.2	58 16.4	48	77	51.3	57 46.8	50	75	49.7
9	57 57.3	44	80	53.8	57 43.9	45	79	52.9	57 30.1	46	78	52.1	57 01.6	49	76	50.5
30	57 09.6	43	80	54.5	56 56.7	44	79	53.7	56 43.4	45	79	52.8	56 16.0	47	77	51.2
1	56 21.4	41	81	55.2	56 09.0	42	80	54.3	55 56.3	43	79	53.5	55 29.8	45	78	51.9
2	55 32.9	39	82	55.8	55 21.0	40	81	55.0	55 08.7	41	80	54.2	54 43.2	43	78	52.6
3	54 44.0	38	82	56.4	54 32.5	39	81	55.6	54 20.7	40	80	54.8	53 56.2	42	79	53.2
4	53 54.8	36	82	57.0	53 43.8	37	82	56.2	53 32.4	38	81	55.4	53 08.8	40	80	53.8
35	53 05.3	35	83	57.5	52 54.7	36	82	56.7	52 43.8	37	82	55.9	52 21.1	39	80	54.4
6	52 15.5	33	84	58.0	52 05.3	34	83	57.2	51 54.9	35	82	56.5	51 33.1	37	81	54.9
7	51 25.4	32	84	58.4	51 15.7	33	83	57.7	51 05.6	34	82	56.9	50 44.7	36	81	55.5
8	50 35.1	31	84	58.9	50 25.8	32	84	58.1	50 16.1	33	83	57.4	49 56.0	34	82	55.9
9	49 44.6	29	84	59.3	49 35.6	30	84	58.6	49 26.4	31	83	57.8	49 07.1	33	82	56.4
40	48 53.8	28	85	59.7	48 45.3	29	84	59.0	48 36.4	30	84	58.2	48 18.0	32	82	56.8
1	48 02.9	27	85	60.1	47 54.7	28	85	59.3	47 46.2	29	84	58.6	47 28.6	30	83	57.2
2	47 11.8	26	86	60.4	47 03.9	26	85	59.7	46 55.9	27	84	59.0	46 38.9	29	83	57.6
3	46 20.5	24	86	60.7	46 13.0	25	85	60.0	46 05.3	26	84	59.3	45 49.1	28	83	57.9
4	45 29.0	23	86	61.0	45 21.9	24	85	60.3	45 14.6	25	85	59.6	44 59.1	27	84	58.3
45	44 37.4	22	86	61.3	44 30.7	23	86	60.6	44 23.7	24	85	59.9	44 08.9	25	84	58.6
6	43 45.7	21	86	61.6	43 39.3	22	86	60.9	43 32.6	23	85	60.2	43 18.6	24	84	58.9
7	42 53.8	20	87	61.8	42 47.7	21	86	61.2	42 41.4	21	86	60.5	42 28.1	23	84	59.2
8	42 01.9	19	87	62.1	41 56.1	20	86	61.4	41 50.1	20	86	60.7	41 37.5	22	85	59.4
9	41 09.8	18	87	62.3	41 04.3	19	86	61.6	40 58.7	19	86	61.0	40 46.7	21	85	59.7
50	40 17.6	17	87	62.5	40 12.5	17	87	61.8	40 07.1	18	86	61.2	39 55.8	20	85	59.9
1	39 25.3	16	87	62.7	39 20.5	16	87	62.0	39 15.5	17	86	61.4	39 04.8	19	85	60.1
2	38 33.0	15	87	62.8	38 28.4	15	87	62.2	38 23.7	16	86	61.6	38 13.7	17	85	60.3
3	37 40.5	14	88	63.0	37 36.3	14	87	62.4	37 31.9	15	86	61.7	37 22.4	16	86	60.5
4	36 48.0	13	88	63.1	36 44.1	13	87	62.5	36 40.0	14	87	61.9	36 31.1	15	86	60.7
55	35 55.4	12	88	63.3	35 51.8	12	87	62.7	35 48.0	13	87	62.0	35 39.8	14	86	60.8
6	35 02.8	11	88	63.4	34 59.5	12	87	62.8	34 55.9	12	87	62.2	34 48.3	13	86	61.0
7	34 10.1	10	88	63.5	34 07.0	11	87	62.9	34 03.8	11	87	62.3	33 56.8	12	86	61.1
8	33 17.4	09	88	63.6	33 14.6	10	88	63.0	33 11.6	10	87	62.4	33 05.2	11	86	61.2
9	32 24.6	08	88	63.7	32 22.1	09	88	63.1	32 19.4	09	87	62.5	32 13.5	10	86	61.3
60	31 31.8	07	88	63.8	31 29.5	08	88	63.2	31 27.1	08	87	62.6	31 21.8	09	86	61.4
1	30 38.9	06	88	63.8	30 36.9	07	88	63.3	30 34.8	07	87	62.7	30 30.0	08	86	61.5
2	29 46.1	06	88	63.9	29 44.3	06	88	63.3	29 42.4	07	87	62.8	29 38.2	07	86	61.6
3	28 53.1	06	88	64.0	28 51.7	06	88	63.4	28 50.1	06	87	62.8	28 46.4	07	86	61.7
4	28 00.2	04	88	64.0	27 59.0	04	88	63.4	27 57.7	05	87	62.9	27 54.5	06	86	61.7
65	27 07.3	03	88	64.0	27 06.3	03	88	63.5	27 05.2	04	87	62.9	27 02.7	05	87	61.8
6	26 14.3	02	88	64.1	26 13.6	03	88	63.5	26 12.8	03	87	62.9	26 10.7	04	87	61.8
7	25 21.3	01	88	64.1	25 20.9	02	88	63.5	25 20.3	02	87	63.0	25 18.8	03	87	61.9
8	24 28.4	00	88	64.1	24 28.2	01	88	63.5	24 27.9	01	87	63.0	24 26.9	02	87	61.9
9	23 35.4	00	88	64.1	23 35.4	00	88	63.5	23 35.4	00	87	63.0	23 34.9	01	87	61.9
70	22 42.4	01	88	64.1	22 42.7	01	88	63.5	22 42.9	00	87	63.0	22 42.9	00	87	61.9
1	21 49.4	02	88	64.1	21 50.0	02	88	63.5	21 50.4	01	87	63.0	21 51.0	01	87	61.9
2	20 56.5	03	88	64.0	20 57.3	02	88	63.5	20 58.0	02	87	63.0	20 59.0	01	87	61.9
3	20 03.5	04	88	64.0	20 04.6	03	88	63.5	20 05.5	03	87	62.9	20 07.1	02	87	61.9
4	19 10.6	04	88	64.0	19 11.9	04	88	63.4	19 13.0	04	87	62.9	19 15.1	03	87	61.9
75	18 17.7	05	88	63.9	18 19.2	05	88	63.4	18 20.6	05	87	62.9	18 23.2	04	86	61.8
6	17 24.8	06	88	63.9	17 26.5	06	88	63.4	17 28.2	05	87	62.8	17 31.3	05	86	61.8
7	16 31.9	07	88	63.8	16 33.9	07	88	63.3	16 35.8	06	87	62.8	16 39.4	06	86	61.7
8	15 39.1	08	88	63.8	15 41.3	07	88	63.2	15 43.5	07	87	62.7	15 47.5	07	86	61.7
9	14 46.3	08	88	63.7	14 48.7	08	88	63.2	14 51.1	08	87	62.7	14 55.7	07	86	61.6
80	13 53.5	09	88	63.6	13 56.2	09	88	63.1	13 58.8	09	87	62.6	14 03.9	08	86	61.5
1	13 00.8	10	88	63.5	13 03.7	10	87	63.0	13 06.6	09	87	62.5	13 12.1	09	86	61.5
2	12 08.1	11	88	63.4	12 11.2	10	87	62.9	12 14.4	10	87	62.4	12 20.4	10	86	61.4
3	11 15.4	11	88	63.3	11 18.8	11	87	62.8	11 22.2	11	87	62.3	11 28.7	11	86	61.3
4	10 22.8	12	88	63.2	10 26.4	12	87	62.7	10 30.0	12	87	62.2	10 37.1	12	86	61.2
85	9 30.3	13	88	63.1	9 34.1	13	87	62.6	9 38.0	13	87	62.1	9 45.5	12	86	61.1
6	8 37.8	14	87	63.0	8 41.9	14	87	62.5	8 45.9	14	87	62.0	8 54.0	13	86	61.0
7	7 45.3	15	87	62.9	7 49.7	14	87	62.4	7 54.0	14	86	61.9	8 02.5	14	86	60.9
8	6 52.9	15	87	62.7	6 57.5	15	87	62.2	7 02.1	15	86	61.7	7 11.1	15	86	60.7
9	6 00.6	16	87	62.6	6 05.4	16	87	62.1	6 10.2	16	86	61.6	6 19.8	16	85	60.6
90	5 08.4	17	87	62.4	5 13.4	17	87	61.9	5 18.5	17	86	61.4	5 28.5	17	85	60.5

32° 00′				34° 00′				34° 30′				35° 30′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
69 00.0	1.0	02	00.0	67 00.0	1.0	02	00.0	66 30.0	1.0	02	00.0	65 30.0	1.0	02	00.0	00
68 58.8	1.0	06	02.4	66 58.9	1.0	05	02.1	66 28.9	1.0	05	02.1	65 29.0	1.0	05	02.0	1
68 55.1	1.0	10	04.7	66 55.6	1.0	09	04.2	66 25.8	1.0	09	04.1	65 26.0	1.0	08	03.9	2
68 49.1	99	14	07.1	66 50.2	99	13	06.3	66 20.5	99	12	06.2	65 20.9	99	12	05.9	3
68 40.7	98	18	09.4	66 42.7	98	16	08.4	66 13.1	99	16	08.2	65 13.9	99	15	07.8	4
68 30.0	97	22	11.6	66 33.0	98	20	10.5	66 03.7	98	19	10.2	65 05.0	98	18	09.7	05
68 17.0	96	25	13.9	66 21.3	97	23	12.5	65 52.3	97	22	12.2	64 54.1	97	21	11.6	6
68 01.8	95	29	16.0	66 07.6	96	26	14.5	65 38.9	96	25	14.1	64 41.4	96	24	13.4	7
67 44.4	93	32	18.2	65 51.9	94	29	16.4	65 23.6	94	29	16.0	64 26.8	96	27	15.2	8
67 25.1	92	36	20.2	65 34.4	93	32	18.3	65 06.5	93	32	17.8	64 10.4	94	30	17.0	9
67 03.8	90	39	22.2	65 15.0	91	35	20.1	64 47.5	92	34	19.6	63 52.4	92	33	18.7	10
66 40.6	88	42	24.1	64 53.9	90	38	21.9	64 26.9	90	37	21.4	63 32.7	91	36	20.4	1
66 15.7	86	44	26.0	64 31.1	88	41	23.6	64 04.6	88	40	23.1	63 11.3	89	38	22.0	2
65 49.0	84	47	27.8	64 06.7	86	43	25.3	63 40.8	87	42	24.7	62 48.5	88	41	23.6	3
65 20.8	82	50	29.5	63 40.8	84	46	26.9	63 15.4	85	45	26.3	62 24.1	86	43	25.2	4
64 51.1	80	52	31.1	63 13.4	83	48	28.4	62 48.6	83	47	27.8	61 58.4	84	45	26.6	15
64 20.0	78	54	32.7	62 44.7	81	50	29.9	62 20.4	81	49	29.3	61 31.3	82	47	28.1	6
63 47.6	76	56	34.2	62 14.7	79	52	31.4	61 51.0	79	51	30.7	61 03.0	81	49	29.5	7
63 13.9	74	58	35.6	61 43.4	77	54	32.7	61 20.3	77	53	32.1	60 33.4	79	51	30.8	8
62 39.1	72	60	36.9	61 11.0	75	56	34.1	60 48.4	76	55	33.4	60 02.7	77	53	32.1	9
62 03.1	70	62	38.2	60 37.5	73	58	35.3	60 15.5	74	57	34.6	59 30.9	75	55	33.3	20
61 26.2	68	63	39.5	60 02.9	71	59	36.5	59 41.5	72	58	35.8	58 58.1	73	56	34.5	1
60 48.3	66	65	40.6	59 27.4	69	61	37.7	59 06.6	70	60	37.0	58 24.3	71	58	35.6	2
60 09.5	64	66	41.8	58 51.0	67	62	38.8	58 30.7	68	61	38.1	57 49.5	69	59	36.7	3
59 29.9	62	67	42.8	58 13.7	65	64	39.8	57 54.0	66	63	39.1	57 13.9	68	61	37.7	4
58 49.5	60	69	43.8	57 35.5	63	65	40.8	57 16.4	64	64	40.1	56 37.5	66	62	38.7	25
58 08.3	58	70	44.8	56 56.7	61	66	41.8	56 38.1	62	65	41.1	56 00.3	64	63	39.7	6
57 26.5	56	71	45.7	56 17.1	60	67	42.7	55 59.1	60	66	42.0	55 22.3	62	64	40.6	7
56 44.1	54	72	46.5	55 36.8	58	68	43.6	55 19.3	59	67	42.8	54 43.7	60	66	41.4	8
56 01.0	52	73	47.4	54 55.9	56	69	44.4	54 39.0	57	68	43.7	54 04.4	58	67	42.3	9
55 17.4	51	74	48.1	54 14.4	54	70	45.2	53 58.0	55	69	44.5	53 24.4	57	68	43.1	30
54 33.3	49	74	48.9	53 32.4	53	71	45.9	53 16.5	53	70	45.2	52 43.9	55	68	43.8	1
53 48.7	47	75	49.6	52 49.8	51	72	46.6	52 34.4	52	71	45.9	52 02.9	53	69	44.5	2
53 03.7	46	76	50.2	52 06.7	49	73	47.3	51 51.8	50	72	46.6	51 21.3	52	70	45.2	3
52 18.2	44	76	50.9	51 23.2	48	73	48.0	51 08.8	48	72	47.3	50 39.3	50	71	45.9	4
51 32.3	42	77	51.4	50 39.2	46	74	48.6	50 25.3	47	73	47.9	49 56.7	48	72	46.5	35
50 46.1	41	78	52.0	49 54.9	44	75	49.2	49 41.4	45	74	48.5	49 13.8	47	72	47.1	6
49 59.5	39	78	52.5	49 10.1	43	75	49.7	48 57.1	44	74	49.0	48 30.4	45	73	47.7	7
49 12.6	38	79	53.1	48 25.0	41	76	50.3	48 12.5	42	75	49.6	47 46.7	44	74	48.2	8
48 25.4	37	79	53.5	47 39.5	40	76	50.8	47 27.4	41	76	50.1	47 02.6	42	74	48.8	9
47 37.9	35	80	54.0	46 53.7	38	77	51.2	46 42.1	39	76	50.6	46 18.1	41	75	49.2	40
46 50.1	34	80	54.4	46 07.7	37	77	51.7	45 56.5	38	77	51.0	45 33.4	39	75	49.7	1
46 02.1	32	80	54.8	45 21.3	36	78	52.1	45 10.5	36	77	51.5	44 48.3	38	76	50.2	2
45 13.8	31	81	55.2	44 34.7	34	78	52.5	44 24.3	35	77	51.9	44 02.9	36	76	50.6	3
44 25.3	30	81	55.6	43 47.8	33	78	52.9	43 37.9	34	78	52.3	43 17.3	35	76	51.0	4
43 36.6	28	81	55.9	43 00.7	31	79	53.3	42 51.2	32	78	52.6	42 31.4	34	77	51.4	45
42 47.8	27	82	56.2	42 13.4	30	79	53.6	42 04.2	31	79	53.0	41 45.3	32	77	51.7	6
41 58.7	26	82	56.5	41 25.8	29	80	54.0	41 17.1	30	79	53.3	40 58.9	31	78	52.1	7
41 09.5	25	82	56.8	40 38.1	28	80	54.3	40 29.7	28	79	53.6	40 12.4	30	78	52.4	8
40 20.1	24	83	57.1	39 50.2	26	80	54.6	39 42.2	27	80	53.9	39 25.6	28	78	52.7	9
39 30.6	22	83	57.4	39 02.1	25	80	54.8	38 54.5	26	80	54.2	38 38.7	27	79	53.0	50
38 40.9	21	83	57.6	38 13.9	24	81	55.1	38 06.7	24	80	54.5	37 51.6	26	79	53.3	1
37 51.2	20	83	57.8	37 25.5	23	81	55.3	37 18.6	23	80	54.7	37 04.3	25	79	53.5	2
37 01.2	19	83	58.0	36 37.0	21	81	55.6	36 30.5	22	80	55.0	36 16.9	23	79	53.8	3
36 11.2	18	84	58.2	35 48.4	20	81	55.8	35 42.2	21	81	55.2	35 29.3	22	80	54.0	4
35 21.1	17	84	58.4	34 59.6	19	81	56.0	34 53.8	20	81	55.4	34 41.6	21	80	54.2	55
34 30.9	16	84	58.6	34 10.7	18	82	56.2	34 05.2	19	81	55.6	33 53.8	20	80	54.4	6
33 40.6	15	84	58.7	33 21.7	17	82	56.4	33 16.6	17	81	55.8	33 05.8	19	80	54.6	7
32 50.2	14	84	58.9	32 32.7	16	82	56.5	32 27.8	16	81	55.9	32 17.8	17	80	54.8	8
31 59.8	13	84	59.0	31 43.5	15	82	56.7	31 39.0	15	82	56.1	31 29.6	16	80	54.9	9
31 09.3	11	84	59.1	30 54.2	14	82	56.8	30 50.1	14	82	56.2	30 41.4	15	81	55.1	60
30 18.7	10	84	59.2	30 04.9	12	82	56.9	30 01.1	13	82	56.4	29 53.0	14	81	55.2	1
29 28.1	09	84	59.3	29 15.5	11	82	57.0	29 12.0	12	82	56.5	29 04.6	13	81	55.3	2
28 37.4	08	85	59.4	28 26.1	10	82	57.1	28 22.9	11	82	56.6	28 16.1	12	81	55.4	3
27 46.7	07	85	59.5	27 36.6	09	83	57.2	27 33.7	10	82	56.7	27 27.6	11	81	55.6	4
26 55.9	07	85	59.6	26 47.0	08	83	57.3	26 44.5	09	82	56.8	26 39.0	10	81	55.6	65
26 05.1	06	85	59.6	25 57.4	07	83	57.4	25 55.2	08	82	56.8	25 50.4	09	81	55.7	6
25 14.3	05	85	59.7	25 07.8	06	83	57.4	25 05.9	07	82	56.9	25 01.7	07	81	55.8	7
24 23.5	04	85	59.7	24 18.2	05	83	57.5	24 16.5	06	82	57.0	24 12.9	06	81	55.9	8
23 32.6	03	85	59.7	23 28.5	04	83	57.5	23 27.2	05	82	57.0	23 24.2	05	81	55.9	9
22 41.7	02	85	59.7	22 38.8	03	83	57.6	22 37.7	04	82	57.0	22 35.4	04	81	56.0	70
21 50.9	01	85	59.8	21 49.0	02	83	57.6	21 48.3	03	82	57.1	21 46.6	03	81	56.0	1
21 00.0	00	85	59.8	20 59.3	01	83	57.6	20 58.9	02	82	57.1	20 57.7	02	81	56.0	2
20 09.1	01	85	59.8	20 09.6	00	83	57.6	20 09.4	01	82	57.1	20 08.9	01	81	56.0	3
19 18.2	02	85	59.7	19 19.8	01	83	57.6	19 20.0	00	82	57.1	19 20.1	00	81	56.0	4
18 27.3	03	85	59.7	18 30.1	02	83	57.6	18 30.5	01	82	57.1	18 31.2	01	81	56.0	75
17 36.5	04	85	59.7	17 40.4	03	83	57.6	17 41.1	02	82	57.1	17 42.4	02	81	56.0	6
16 45.7	05	85	59.7	16 50.6	04	83	57.6	16 51.7	03	82	57.0	16 53.5	03	81	56.0	7
15 54.8	06	85	59.6	16 00.9	05	83	57.5	16 02.3	04	82	57.0	16 04.7	04	81	56.0	8
15 04.0	06	85	59.6	15 11.3	06	83	57.5	15 12.9	05	82	57.0	15 15.9	05	81	55.9	9
14 13.3	07	85	59.5	14 21.6	06	83	57.4	14 23.5	06	82	56.9	14 27.1	06	81	55.9	80
13 22.6	08	84	59.4	13 32.0	07	83	57.4	13 34.2	07	82	56.9	13 38.4	07	81	55.8	1
12 31.9	09	84	59.3	12 42.4	08	83	57.3	12 44.9	08	82	56.8	12 49.7	08	81	55.8	2
11 41.2	10	84	59.3	11 52.9	09	82	57.2	11 55.6	09	82	56.7	12 01.0	09	81	55.7	3
10 50.6	11	84	59.2	11 03.3	10	82	57.1	11 06.4	10	82	56.6	11 12.4	10	81	55.6	4
10 00.1	12	84	59.1	10 13.9	11	82	57.1	10 17.2	11	82	56.6	10 23.8	11	81	55.5	85
9 09.6	13	84	59.0	9 24.5	12	82	57.0	9 28.1	12	82	56.5	9 35.2	12	81	55.5	6
8 19.1	14	84	58.9	8 35.1	13	82	56.9	8 39.1	13	82	56.4	8 46.8	13	81	55.3	7
7 28.8	14	84	58.7	7 45.9	14	82	56.7	7 50.1	14	82	56.2	7 58.3	14	81	55.2	8
6 38.4	15	84	58.6	6 56.6	15	82	56.6	7 01.1	15	81	56.1	7 10.0	15	80	55.1	9
5 48.2	16	84	58.5	6 07.5	16	82	56.5	6 12.3	16	81	56.0	6 21.7	16	80	55.0	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	28° 00′				28° 30′				29° 00′				30° 00′			
°	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °
00	51 00.0	1.0	01	180.0	50 30.0	1.0	01	180.0	50 00.0	1.0	01	180.0	49 00.0	1.0	01	180.0
1	50 59.3	1.0	04	178.6	50 29.3	1.0	04	178.6	49 59.3	1.0	04	178.6	48 59.3	1.0	03	178.7
2	50 57.1	1.0	06	177.2	50 27.2	1.0	06	177.2	49 57.2	1.0	06	177.3	48 57.3	1.0	06	177.4
3	50 53.5	1.0	08	175.8	50 23.6	1.0	08	175.9	49 53.7	1.0	08	175.9	48 53.9	1.0	08	176.0
4	50 48.5	99	11	174.4	50 18.7	99	11	174.5	49 48.8	99	10	174.6	48 49.2	99	10	174.7
05	50 42.0	99	13	173.0	50 12.3	99	13	173.1	49 42.6	99	13	173.2	48 43.1	99	12	173.4
6	50 34.2	99	15	171.6	50 04.6	99	15	171.8	49 35.0	99	15	171.9	48 35.7	99	15	172.1
7	50 24.9	98	18	170.3	49 55.5	98	17	170.4	49 26.0	98	17	170.6	48 27.0	98	17	170.8
8	50 14.3	98	20	168.9	49 45.0	98	20	169.1	49 15.7	98	19	169.3	48 17.0	98	19	169.6
9	50 02.3	97	22	167.6	49 33.2	97	22	167.8	49 04.0	97	22	167.9	48 05.6	97	21	168.3
10	49 49.0	96	24	166.3	49 20.0	97	24	166.5	48 51.1	97	24	166.7	47 53.1	97	23	167.0
1	49 34.3	96	26	164.9	49 05.6	96	26	165.2	48 36.8	96	26	165.4	47 39.2	96	25	165.8
2	49 18.4	95	29	163.6	48 49.9	95	28	163.9	48 21.3	95	28	164.1	47 24.2	95	27	164.6
3	49 01.2	94	31	162.4	48 32.9	94	30	162.6	48 04.6	94	30	162.9	47 07.9	95	29	163.4
4	48 42.7	93	33	161.1	48 14.7	93	32	161.4	47 46.7	94	32	161.6	46 50.5	94	31	162.2
15	48 23.0	92	35	159.9	47 55.3	93	34	160.2	47 27.5	93	34	160.4	46 31.8	93	33	161.0
6	48 02.2	91	37	158.7	47 34.7	92	36	159.0	47 07.2	92	36	159.3	46 12.1	92	35	159.8
7	47 40.2	90	38	157.5	47 13.0	91	38	157.8	46 45.8	91	38	158.1	45 51.2	91	37	158.7
8	47 17.0	89	40	156.3	46 50.2	90	40	156.6	46 23.3	90	39	156.9	45 29.3	90	38	157.6
9	46 52.8	88	42	155.1	46 26.3	89	42	155.5	45 59.7	89	41	155.8	45 06.3	89	40	156.5
20	46 27.5	87	44	154.0	46 01.3	88	43	154.4	45 35.0	88	43	154.7	44 42.2	88	42	155.4
1	46 01.2	86	46	152.9	45 35.3	86	45	153.3	45 09.3	87	44	153.6	44 17.2	87	43	154.3
2	45 33.8	85	47	151.8	45 08.3	85	47	152.2	44 42.6	86	46	152.5	43 51.2	86	45	153.3
3	45 05.5	84	49	150.7	44 40.3	84	48	151.1	44 15.0	84	48	151.5	43 24.2	85	46	152.2
4	44 36.3	83	50	149.7	44 11.4	83	50	150.1	43 46.5	83	49	150.5	42 56.3	84	48	151.2
25	44 06.1	82	52	148.7	43 41.6	82	51	149.1	43 17.0	82	51	149.5	42 27.5	83	49	150.3
6	43 35.1	80	53	147.7	43 10.9	81	53	148.1	42 46.7	81	52	148.5	41 57.9	82	51	149.3
7	43 03.2	79	54	146.7	42 39.4	80	54	147.1	42 15.5	80	53	147.6	41 27.4	80	52	148.4
8	42 30.5	78	56	145.8	42 07.0	78	55	146.2	41 43.5	79	55	146.6	40 56.1	79	53	147.4
9	41 57.0	77	57	144.9	41 33.9	77	57	145.3	41 10.7	77	56	145.7	40 24.0	78	55	146.5
30	41 22.7	76	58	144.0	41 00.0	76	58	144.4	40 37.1	76	57	144.8	39 51.2	77	56	145.7
1	40 47.7	74	60	143.1	40 25.3	75	59	143.5	40 02.8	75	58	144.0	39 17.6	76	57	144.8
2	40 11.9	73	61	142.2	39 49.9	74	60	142.7	39 27.8	74	60	143.1	38 43.3	75	58	144.0
3	39 35.5	72	62	141.4	39 13.9	72	61	141.8	38 52.1	73	61	142.3	38 08.3	73	59	143.2
4	38 58.4	71	63	140.6	38 37.1	71	62	141.0	38 15.7	72	62	141.5	37 32.6	72	60	142.4
35	38 20.7	70	64	139.8	37 59.8	70	63	140.2	37 38.7	70	63	140.7	36 56.4	71	62	141.6
6	37 42.4	68	65	139.0	37 21.8	69	64	139.5	37 01.1	69	64	139.9	36 19.4	70	63	140.8
7	37 03.5	67	66	138.3	36 43.2	68	65	138.7	36 22.9	68	65	139.2	35 41.9	69	63	140.1
8	36 24.0	66	67	137.5	36 04.1	66	66	138.0	35 44.1	67	66	138.4	35 03.9	67	64	139.4
9	35 43.9	65	68	136.8	35 24.4	65	67	137.3	35 04.8	66	66	137.7	34 25.2	66	65	138.6
40	35 03.3	64	68	136.1	34 44.2	64	68	136.6	34 24.9	64	67	137.0	33 46.0	65	66	138.0
1	34 22.2	63	69	135.4	34 03.4	63	69	135.9	33 44.5	63	68	136.4	33 06.3	64	67	137.3
2	33 40.7	61	70	134.8	33 22.2	62	70	135.2	33 03.6	62	69	135.7	32 26.1	63	68	136.6
3	32 58.6	60	71	134.1	32 40.5	61	70	134.6	32 22.3	61	70	135.1	31 45.5	62	69	136.0
4	32 16.1	59	72	133.5	31 58.3	59	71	134.0	31 40.4	60	70	134.4	31 04.3	61	69	135.4
45	31 33.2	58	72	132.9	31 15.7	58	72	133.4	30 58.2	59	71	133.8	30 22.7	59	70	134.8
6	30 49.8	57	73	132.3	30 32.7	57	72	132.8	30 15.5	58	72	133.2	29 40.7	58	71	134.2
7	30 06.1	56	74	131.7	29 49.3	56	73	132.2	29 32.4	56	72	132.7	28 58.3	57	71	133.6
8	29 21.9	55	74	131.2	29 05.4	55	74	131.6	28 48.9	55	73	132.1	28 15.4	56	72	133.1
9	28 37.4	54	75	130.6	28 21.2	54	74	131.1	28 05.0	54	74	131.6	27 32.2	55	73	132.5
50	27 52.5	53	75	130.1	27 36.7	53	75	130.6	27 20.7	53	74	131.0	26 48.6	54	73	132.0
1	27 07.3	52	76	129.6	26 51.7	52	75	130.0	26 36.1	52	75	130.5	26 04.7	53	74	131.5
2	26 21.7	50	76	129.1	26 06.5	51	76	129.5	25 51.2	51	76	130.0	25 20.4	52	74	131.0
3	25 35.8	49	77	128.6	25 20.9	50	76	129.0	25 05.9	50	76	129.5	24 35.7	51	75	130.5
4	24 49.6	48	78	128.1	24 35.0	49	77	128.6	24 20.3	49	76	129.0	23 50.8	50	75	130.0
55	24 03.1	47	78	127.6	23 48.8	48	78	128.1	23 34.5	48	77	128.6	23 05.5	49	76	129.5
6	23 16.3	46	78	127.2	23 02.3	47	78	127.7	22 48.3	47	77	128.1	22 19.9	48	76	129.1
7	22 29.2	45	79	126.7	22 15.6	46	78	127.2	22 01.8	46	78	127.7	21 34.1	47	77	128.6
8	21 41.9	44	79	126.3	21 28.5	45	79	126.8	21 15.1	45	78	127.3	20 47.9	45	77	128.2
9	20 54.3	43	80	125.9	20 41.2	44	79	126.4	20 28.1	44	79	126.8	20 01.5	44	78	127.8
60	20 06.5	42	80	125.5	19 53.7	43	80	126.0	19 40.8	43	79	126.4	19 14.9	43	78	127.4
1	19 18.4	42	80	125.1	19 05.9	42	80	125.6	18 53.3	42	80	126.1	18 27.9	43	79	127.0
2	18 30.1	41	81	124.7	18 17.9	41	80	125.2	18 05.6	41	80	125.7	17 40.8	42	79	126.6
3	17 41.5	40	81	124.3	17 29.6	40	81	124.8	17 17.6	40	80	125.3	16 53.4	41	79	126.3
4	16 52.8	39	82	124.0	16 41.2	39	81	124.5	16 29.4	39	81	124.9	16 05.8	40	80	125.9
65	16 03.9	38	82	123.6	15 52.5	38	81	124.1	15 41.0	38	81	124.6	15 18.0	39	80	125.5
6	15 14.7	37	82	123.3	15 03.6	37	82	123.8	14 52.5	37	81	124.2	14 30.0	38	80	125.2
7	14 25.4	36	82	122.9	14 14.5	36	82	123.4	14 03.7	36	82	123.9	13 41.7	37	81	124.9
8	13 35.9	35	83	122.6	13 25.3	35	82	1[illegible]3.1	13 14.7	35	82	123.6	12 53.3	36	81	124.5
9	12 46.2	34	83	122.3	12 35.9	34	83	122.8	12 25.5	35	82	123.3	12 04.7	35	81	124.2
70	11 56.3	33	83	122.0	11 46.3	33	83	122.5	11 36.2	34	82	123.0	11 15.9	34	82	123.9
1	11 06.3	32	84	121.7	10 56.5	33	83	122.2	10 46.7	33	83	122.7	10 27.0	33	82	123.6
2	10 16.1	32	84	121.4	10 06.6	32	83	121.9	9 57.0	32	83	122.4	9 37.8	32	82	123.3
3	9 25.7	31	84	121.1	9 16.5	31	84	121.6	9 07.2	31	83	122.1	8 48.6	31	82	123.1
4	8 35.3	30	84	120.9	8 26.3	30	84	121.3	8 17.3	30	84	121.8	7 59.1	30	83	122.8
75	7 44.6	29	85	120.6	7 35.9	29	84	121.1	7 27.1	29	84	121.6	7 09.5	29	83	122.5
6	6 53.9	28	85	120.3	6 45.4	28	84	120.8	6 36.9	28	84	121.3	6 19.8	29	83	122.3
7	6 03.0	27	85	120.1	5 54.8	27	85	120.6	5 46.5	28	84	121.1	5 29.9	28	83	122.0
8	5 12.0	27	85	119.9	5 04.0	27	85	120.3								

H.A.	32° 00′				34° 00′				34° 30′				35° 30′			
°	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °
00	47 00.0	1.0	01	180.0	45 00.0	1.0	01	180.0	44 30.0	1.0	01	180.0	43 30.0	1.0	01	180.0
1	46 59.4	1.0	03	178.8	44 59.4	1.0	03	178.8	44 29.4	1.0	03	178.8	43 29.4	1.0	03	178.9
2	46 57.4	1.0	05	177.5	44 57.6	1.0	05	177.7	44 27.6	1.0	05	177.7	43 27.7	1.0	05	177.8
3	46 54.3	1.0	07	176.3	44 54.6	1.0	07	176.5	44 24.7	1.0	07	176.5	43 24.8	1.0	07	176.6
4	46 49.8	99	10	175.0	44 50.4	1.0	09	175.3	44 20.5	1.0	09	175.4	43 20.8	1.0	09	175.5
05	46 44.1	99	12	173.8	44 45.0	99	11	174.2	44 15.2	99	11	174.2	43 15.6	99	10	174.4
6	46 37.1	99	14	172.6	44 38.4	99	13	173.0	44 08.7	99	13	173.1	43 09.3	99	12	173.3
7	46 28.9	98	16	171.4	44 30.6	99	15	171.9	44 01.1	99	15	172.0	43 01.9	99	14	172.2
8	46 19.4	98	18	170.2	44 21.7	98	17	170.7	43 52.3	98	17	170.8	42 53.3	98	16	171.1
9	46 08.7	98	20	169.0	44 11.6	98	19	169.6	43 42.3	98	18	169.7	42 43.7	98	18	170.0
10	45 56.9	97	22	167.8	44 00.4	97	21	168.5	43 31.3	97	20	168.6	42 32.9	97	20	168.9
1	45 43.8	96	24	166.6	43 48.1	97	22	167.3	43 19.1	97	22	167.5	42 21.1	97	22	167.9
2	45 29.6	96	26	165.4	43 34.6	96	24	166.2	43 05.8	96	24	166.4	42 08.2	96	23	166.8
3	45 14.2	95	28	164.3	43 20.0	95	26	165.1	42 51.4	95	26	165.4	41 54.2	95	25	165.8
4	44 57.7	94	29	163.1	43 04.4	95	28	164.1	42 36.0	95	27	164.3	41 39.2	95	27	164.7
15	44 40.0	93	31	162.0	42 47.7	94	30	163.0	42 19.5	94	29	163.2	41 23.1	94	28	163.7
6	44 21.3	93	33	160.9	42 30.0	93	31	161.9	42 02.0	93	31	162.2	41 06.1	93	30	162.7
7	44 01.5	92	35	159.8	42 11.2	92	33	160.9	41 43.5	92	32	161.2	40 48.1	93	32	161.7
8	43 40.7	91	36	158.8	41 51.4	91	35	159.9	41 24.0	91	34	160.2	40 29.1	92	33	160.7
9	43 18.9	90	38	157.7	41 30.7	90	36	158.9	41 03.5	91	36	159.2	40 09.1	91	35	159.7
20	42 56.0	89	40	156.7	41 09.0	90	38	157.9	40 42.1	90	37	158.2	39 48.2	90	36	158.7
1	42 32.2	88	41	155.6	40 46.3	89	30	156.9	40 19.7	89	39	157.2	39 26.4	89	38	157.8
2	42 07.4	87	43	154.6	40 22.8	88	41	155.9	39 56.5	88	40	156.3	39 03.7	88	39	156.9
3	41 41.8	86	44	153.7	39 58.3	87	42	155.0	39 32.3	87	42	155.3	38 40.2	87	41	156.0
4	41 15.2	85	46	152.7	39 33.0	86	44	154.1	39 07.3	86	43	154.4	38 15.7	86	42	155.1
25	40 47.7	84	47	151.7	39 06.8	85	45	153.2	38 41.4	85	44	153.5	37 50.5	85	43	154.2
6	40 19.4	83	49	150.8	38 39.8	83	46	152.3	38 14.7	84	46	152.6	37 24.4	84	45	153.3
7	39 50.3	81	50	149.9	38 12.0	82	48	151.4	37 47.3	83	47	151.7	36 57.6	83	46	152.4
8	39 20.4	80	51	149.0	37 43.4	81	49	150.5	37 19.0	82	48	150.9	36 30.0	82	47	151.6
9	38 49.7	79	52	148.1	37 14.0	80	50	149.7	36 50.0	80	50	150.1	36 01.6	81	48	150.8
30	38 18.2	78	54	147.3	36 43.9	79	51	148.9	36 20.2	79	51	149.2	35 32.5	80	50	150.0
1	37 46.0	77	55	146.5	36 13.1	78	53	148.0	35 49.7	78	52	148.4	35 02.7	79	51	149.2
2	37 13.1	76	56	145.6	35 41.6	77	54	147.3	35 18.5	77	53	147.6	34 32.1	78	52	148.4
3	36 39.5	75	57	144.8	35 09.4	76	55	146.5	34 46.7	76	54	146.9	34 01.0	76	53	147.7
4	36 05.3	73	58	144.1	34 36.6	75	56	145.7	34 14.2	75	55	146.1	33 29.1	75	54	146.9
35	35 30.4	72	59	143.3	34 03.1	73	57	145.0	33 41.0	74	56	145.4	32 56.7	74	55	146.2
6	34 54.9	71	60	142.6	33 29.0	72	58	144.2	33 07.3	72	57	144.7	32 23.6	73	56	145.5
7	34 18.8	70	61	141.8	32 54.2	71	59	143.5	32 32.9	71	58	144.0	31 49.9	72	57	144.8
8	33 42.1	69	62	141.1	32 19.0	70	60	142.8	31 57.9	70	59	143.3	31 15.7	71	58	144.1
9	33 04.9	68	63	140.4	31 43.1	69	61	142.2	31 22.4	69	60	142.6	30 40.9	70	59	143.4
40	32 27.1	66	64	139.8	31 06.7	68	62	141.5	30 46.4	68	61	141.9	30 05.5	68	60	142.8
1	31 48.8	65	65	139.1	30 29.8	66	62	140.9	30 09.8	67	62	141.3	29 29.6	67	61	142.1
2	31 10.0	64	66	138.5	29 52.4	65	63	140.2	29 32.7	66	63	140.7	28 53.2	66	61	141.5
3	30 30.7	63	66	137.8	29 14.4	64	64	139.6	28 55.2	64	63	140.0	28 16.3	65	62	140.9
4	29 50.9	62	67	137.2	28 36.0	63	65	139.0	28 17.1	63	64	139.5	27 39.0	64	63	140.3
45	29 10.7	61	68	136.6	27 57.2	62	66	138.4	27 38.6	62	65	138.9	27 01.1	63	64	139.7
6	28 30.0	60	68	136.0	27 17.9	61	66	137.8	26 59.6	61	66	138.3	26 22.9	62	65	139.2
7	27 48.9	58	69	135.5	26 38.1	60	67	137.3	26 20.2	60	66	137.7	25 44.1	60	65	138.6
8	27 07.4	57	70	134.9	25 58.0	58	68	136.7	25 40.4	59	67	137.2	25 05.0	59	66	138.1
9	26 25.5	56	70	134.4	25 17.4	57	68	136.2	25 00.2	58	68	136.7	24 25.5	58	67	137.6
50	25 43.2	55	71	133.9	24 36.5	56	69	135.7	24 19.6	56	68	136.1	23 45.5	57	67	137.0
1	25 00.6	54	72	133.3	23 55.1	55	70	135.2	23 38.6	55	69	135.6	23 05.2	56	68	136.5
2	24 17.6	53	72	132.8	23 13.5	54	70	134.7	22 57.2	54	70	135.2	22 24.5	55	68	136.1
3	23 34.2	52	73	132.4	22 31.4	53	71	134.2	22 15.5	53	70	134.7	21 43.5	54	69	135.6
4	22 50.5	51	73	131.9	21 49.0	52	71	133.7	21 33.4	52	71	134.2	21 02.1	53	70	135.1
55	22 06.5	50	74	131.4	21 06.3	51	72	133.3	20 51.1	51	71	133.7	20 20.3	51	70	134.7
6	21 22.2	49	74	131.0	20 23.3	50	72	132.8	20 08.4	50	72	133.3	19 38.3	50	71	134.2
7	20 37.6	48	75	130.5	19 39.9	49	73	132.4	19 25.3	49	72	132.9	18 55.9	49	71	133.8
8	19 52.7	47	75	130.1	18 56.3	47	73	132.0	18 42.0	48	73	132.5	18 13.3	48	72	133.4
9	19 07.5	45	76	129.7	18 12.4	46	74	131.6	17 58.4	47	73	132.0	17 30.3	47	72	133.0
60	18 22.1	44	76	129.3	17 28.2	45	74	131.2	17 14.6	46	74	131.6	16 47.1	46	73	132.6
1	17 36.4	43	77	128.9	16 43.7	44	75	130.8	16 30.4	45	74	131.3	16 03.6	45	73	132.2
2	16 50.4	42	77	128.5	15 59.0	43	75	130.4	15 46.0	43	74	130.9	15 19.8	44	73	131.8
3	16 04.2	41	77	128.2	15 14.0	42	75	130.0	15 01.3	42	75	130.5	14 35.8	43	74	131.4
4	15 17.8	40	78	127.8	14 28.8	41	76	129.7	14 16.4	41	75	130.2	13 51.5	42	74	131.1
65	14 31.1	39	78	127.4	13 43.4	40	76	129.3	13 31.3	40	76	129.8	13 07.0	41	75	130.7
6	13 44.3	38	78	127.1	12 57.7	39	76	129.0	12 46.0	39	76	129.5	12 22.3	40	75	130.4
7	12 57.2	37	79	126.8	12 11.8	38	77	128.7	12 00.4	38	76	129.1	11 37.3	39	75	130.1
8	12 09.9	36	79	126.5	11 25.8	37	77	128.4	11 14.6	37	77	128.8	10 52.1	38	76	129.8
9	11 22.5	36	79	126.1	10 39.5	36	77	128.0	10 28.6	36	77	128.5	10 06.8	37	76	129.5
70	10 34.8	35	80	125.8	9 53.0	35	78	127.7	9 42.4	35	77	128.2	9 21.2	36	76	129.2
1	9 47.0	34	80	125.5	9 06.3	34	78	127.5	8 56.1	34	78	127.9	8 35.4	34	77	128.9
2	8 59.0	33	80	125.3	8 19.5	33	78	127.2	8 09.5	33	78	127.6	7 49.5	33	77	128.6
3	8 10.8	32	81	125.0	7 32.5	32	79	126.9	7 22.8	32	78	127.4	7 03.4	32	77	128.3
4	7 22.4	31	81	124.7	6 45.3	31	79	126.6	6 35.9	31	78	127.1	6 17.1	31	77	128.1
75	6 34.0	30	81	124.5	5 57.9	30	79	126.4	5 48.9	30	79	126.9	5 30.6	30	78	127.8
6	5 45.3	29	81	124.2	5 10.4	29	79	126.1	5 01.7	29	79	126.6				
7																
8																

DECLINATION SAME NAME AS LATITUDE

H.A.	28° 00′				28° 30′				29° 00′				30° 00′			
°	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °
91																

H.A.	32° 00′				34° 00′				34° 30′				35° 30′			
°	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °
91					5 18.4	17	82	56.4	5 23.5	17	81	55.9	5 33.5	17	80	54.9

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	65 00.0	1.0 02	00.0	64 00.0	1.0 02	00.0	62 30.0	1.0 01	00.0	61 00.0	1.0 01	00.0	59 00.0	1.0 01	00.0	58 30.0	1.0 01	00.0	58 00.0	1.0 01	00.0	56 00.0	1.0 01	00.0	00
1	64 59.0	1.0 05	01.9	63 59.1	1.0 05	01.8	62 29.1	1.0 04	01.7	60 59.2	1.0 04	01.6	58 59.3	1.0 04	01.4	58 29.3	1.0 04	01.4	57 59.3	1.0 04	01.4	55 59.4	1.0 03	01.3	1
2	64 56.1	1.0 08	03.8	63 56.3	1.0 08	03.6	62 26.5	1.0 07	03.4	60 56.8	1.0 07	03.2	58 57.0	1.0 06	02.9	58 27.1	1.0 06	02.8	57 57.2	1.0 06	02.8	55 57.4	1.0 05	02.5	2
3	64 51.2	99 11	05.7	63 51.6	99 11	05.4	62 22.2	99 10	05.1	60 52.7	99 09	04.7	58 53.3	1.0 09	04.3	58 23.5	1.0 08	04.2	57 53.6	1.0 08	04.1	55 54.2	1.0 08	03.8	3
4	64 44.3	99 15	07.6	63 45.1	99 14	07.2	62 16.1	99 13	06.7	60 47.1	99 12	06.3	58 48.2	99 11	05.7	58 18.4	99 11	05.6	57 48.7	99 11	05.5	55 49.6	99 10	05.0	4
05	64 35.6	98 18	09.5	63 36.8	98 17	09.0	62 08.4	98 16	08.4	60 39.8	98 15	07.8	58 41.6	99 13	07.2	58 12.0	99 13	07.0	57 42.3	99 13	06.9	55 43.8	99 12	06.3	05
6	64 25.0	97 21	11.3	63 26.7	97 20	10.8	61 58.9	98 18	10.0	60 31.0	98 17	09.4	58 33.5	98 16	08.6	58 04.1	98 15	08.4	57 34.6	98 15	08.2	55 36.7	98 14	07.5	6
7	64 12.6	96 24	13.1	63 14.8	96 23	12.5	61 47.9	97 21	11.6	60 20.7	97 20	10.9	58 24.0	97 18	10.0	57 54.8	97 18	09.7	57 25.6	98 17	09.5	55 28.4	98 16	08.7	7
8	63 58.3	95 27	14.9	63 01.2	95 25	14.2	61 35.2	96 24	13.2	60 08.8	96 22	12.4	58 13.1	97 20	11.3	57 44.2	97 20	11.1	57 15.1	97 20	10.8	55 18.8	97 18	10.0	8
9	63 42.3	94 29	16.6	62 45.9	94 28	15.8	61 20.9	96 26	14.8	59 55.4	95 25	13.8	58 00.9	96 23	12.7	57 32.2	96 22	12.4	57 03.4	96 22	12.1	55 08.0	96 20	11.2	9
10	63 24.7	92 32	18.3	62 29.1	93 31	17.5	61 05.1	94 29	16.3	59 40.6	94 27	15.3	57 47.3	95 25	14.0	57 18.9	95 24	13.7	56 50.4	95 24	13.4	54 56.0	96 22	12.3	10
1	63 05.4	91 35	19.9	62 10.6	92 33	19.1	60 47.8	92 31	17.8	59 24.4	93 29	16.7	57 32.4	94 27	15.3	57 04.2	94 26	15.0	56 36.1	94 26	14.7	54 42.9	95 24	13.5	1
2	62 44.5	90 37	21.5	61 50.6	90 36	20.6	60 29.1	91 34	19.3	59 06.8	92 32	18.1	57 16.2	93 29	16.6	56 48.4	93 28	16.3	56 20.5	93 28	15.9	54 28.5	94 26	14.7	2
3	62 22.1	88 40	23.1	61 29.2	89 38	22.1	60 08.9	90 36	20.7	58 47.9	90 34	19.4	56 58.7	91 31	17.9	56 31.3	92 30	17.5	56 03.8	92 30	17.1	54 13.1	93 28	15.8	3
4	61 58.3	86 42	24.6	61 06.3	87 40	23.6	59 47.4	88 38	22.1	58 27.7	89 36	20.7	56 40.1	90 33	19.1	56 13.0	90 32	18.7	55 45.8	91 32	18.3	53 56.5	92 29	16.9	4
15	61 33.1	85 44	26.1	60 42.1	85 43	25.0	59 24.6	87 40	23.5	58 06.2	88 38	22.0	56 20.2	89 35	20.3	55 53.5	89 34	19.9	55 26.7	89 34	19.5	53 38.9	90 31	18.0	15
6	61 06.6	83 46	27.5	60 16.6	84 45	26.4	59 09.6	85 42	24.8	57 43.5	86 40	23.3	55 59.2	88 37	21.5	55 32.9	88 36	21.1	55 06.5	88 36	20.6	53 20.1	89 33	19.0	6
7	60 38.8	81 48	28.8	59 49.8	82 47	27.7	58 35.3	83 44	26.0	57 19.6	85 42	24.5	55 37.1	86 39	22.6	55 11.2	86 38	22.2	54 45.2	87 37	21.7	53 00.4	88 35	20.1	7
8	60 09.7	79 50	30.2	59 21.9	80 48	29.0	58 08.9	82 46	27.3	56 54.6	83 43	25.7	55 13.9	85 40	23.7	54 48.4	85 40	23.3	54 22.9	85 39	22.8	52 39.7	87 36	21.1	8
9	59 39.6	77 52	31.4	58 52.8	79 50	30.2	57 41.3	80 48	28.5	56 28.5	82 45	26.8	54 49.7	83 42	24.8	54 24.6	84 41	24.4	53 59.5	84 41	23.9	52 18.0	85 38	22.1	9
20	59 08.3	76 54	32.6	58 22.6	77 52	31.4	57 12.7	78 49	29.6	56 01.4	80 47	28.0	54 24.4	82 44	25.9	53 59.9	82 43	25.4	53 35.2	82 42	24.9	51 55.4	84 39	23.1	20
1	58 36.1	74 55	33.8	57 51.4	75 54	32.5	56 43.1	77 51	30.7	55 33.3	78 48	29.0	53 58.2	80 45	26.9	53 34.1	81 44	26.4	53 09.9	81 44	25.9	51 31.8	82 41	24.0	1
2	58 02.8	72 57	34.9	57 19.3	73 55	33.6	56 12.5	75 52	31.8	55 04.3	77 50	30.1	53 31.1	79 47	27.9	53 07.5	79 46	27.4	52 43.7	79 45	26.9	51 07.4	81 42	25.0	2
3	57 28.6	70 58	36.0	56 46.2	71 57	34.7	55 41.0	73 54	32.8	54 34.3	75 51	31.1	53 03.1	77 48	28.9	52 39.9	77 47	28.4	52 16.6	78 47	27.8	50 42.1	80 43	25.9	3
4	56 53.6	68 60	37.0	56 12.2	70 58	35.7	55 08.7	72 55	33.8	54 03.5	73 53	32.1	52 34.2	75 50	29.8	52 11.5	76 49	29.3	51 48.7	76 48	28.8	50 16.0	78 45	26.7	4
25	56 17.7	66 61	38.0	55 37.4	68 59	36.7	54 35.4	70 57	34.8	53 31.8	72 54	33.0	52 04.5	74 51	30.7	51 42.3	74 50	30.2	51 20.0	75 49	29.6	49 49.1	77 46	27.6	25
6	55 41.0	65 62	39.0	55 01.8	66 61	37.6	54 01.4	68 58	35.7	52 59.3	70 55	33.9	51 34.0	72 52	31.6	51 12.3	73 51	31.1	50 50.4	73 50	30.5	49 21.5	75 47	28.4	6
7	55 03.6	63 64	39.9	54 25.5	64 62	38.6	53 26.7	66 59	36.6	52 26.1	68 57	34.8	51 02.8	71 53	32.5	50 41.6	71 52	31.9	50 20.2	72 52	31.3	48 53.1	74 49	29.2	7
8	54 25.5	61 65	40.8	53 48.4	63 63	39.4	52 51.2	65 60	37.5	51 52.1	67 58	35.6	50 30.8	69 54	33.3	50 10.1	69 54	32.7	49 49.2	70 53	32.2	48 24.0	72 50	30.0	8
9	53 46.7	59 66	41.6	53 10.7	61 64	40.2	52 15.0	63 61	38.3	51 17.5	65 59	36.4	49 58.2	67 56	34.1	49 37.9	68 55	33.5	49 17.5	68 54	32.9	47 54.2	70 51	30.8	9
30	53 07.3	58 67	42.4	52 32.3	59 65	41.0	51 38.2	61 62	39.1	50 42.2	63 60	37.2	49 24.9	66 57	34.8	49 05.1	66 56	34.3	48 45.1	67 55	33.7	47 23.7	69 52	31.5	30
1	52 27.3	56 68	43.1	51 53.4	57 66	41.8	51 00.7	60 63	39.8	50 06.3	62 61	38.0	48 50.9	64 58	35.6	48 31.6	65 57	35.0	48 12.2	65 56	34.4	46 52.7	67 53	32.2	1
2	51 46.8	54 68	43.9	51 13.8	56 67	42.5	50 22.7	58 64	40.6	49 29.7	60 62	38.7	48 16.4	62 59	36.3	47 57.6	63 58	35.7	47 38.6	64 57	35.1	46 21.0	66 54	32.9	2
3	51 05.7	52 69	44.6	50 33.7	54 68	43.2	49 44.2	56 65	41.3	48 52.6	58 63	39.4	47 41.2	61 59	37.0	47 22.9	61 59	36.4	47 04.4	62 58	35.8	45 48.7	64 55	33.5	3
4	50 24.1	51 70	45.2	49 53.2	52 68	43.9	49 05.0	55 66	41.9	48 15.0	57 64	40.0	47 05.5	59 60	37.6	46 47.7	60 60	37.0	46 29.7	60 59	36.4	45 15.9	63 56	34.2	4
35	49 42.1	49 71	45.8	49 12.1	51 69	44.5	48 25.4	53 67	42.6	47 36.9	55 64	40.7	46 29.3	58 61	38.3	46 12.0	58 60	37.7	45 54.4	59 60	37.1	44 42.5	61 56	34.8	35
6	48 59.6	48 72	46.4	48 30.6	49 70	45.1	47 45.4	51 68	43.2	46 58.2	53 65	41.3	45 52.6	56 62	38.9	45 35.7	57 61	38.3	45 18.7	57 60	37.7	44 08.7	59 57	35.4	6
7	48 16.7	46 72	47.0	47 48.7	48 71	45.7	47 04.9	50 68	43.8	46 19.2	52 66	41.9	45 15.4	54 63	39.4	44 59.0	55 62	38.9	44 42.4	56 61	38.3	43 34.3	58 58	36.0	7
8	47 33.5	45 73	47.6	47 06.3	46 71	46.3	46 23.9	48 69	44.3	45 39.6	50 67	42.4	44 37.8	53 63	40.0	44 21.9	53 63	39.4	44 05.7	54 62	38.8	42 59.5	56 59	36.5	8
9	46 49.8	43 73	48.1	46 23.6	44 72	46.8	45 42.6	47 70	44.9	44 59.7	49 67	43.0	43 59.7	51 64	40.5	43 44.2	52 63	40.0	43 28.6	52 63	39.4	42 24.2	55 60	37.1	9
40	46 05.8	41 74	48.6	45 40.5	43 72	47.3	45 00.8	45 70	45.4	44 19.3	47 68	43.5	43 21.2	50 65	41.1	43 06.2	50 64	40.5	42 51.0	51 63	39.9	41 48.5	53 60	37.6	40
1	45 21.5	40 74	49.1	44 57.0	41 73	47.8	44 18.8	44 71	45.9	43 38.6	46 68	44.0	42 42.3	48 65	41.6	42 27.8	49 65	41.0	42 13.1	49 64	40.4	41 12.4	52 61	38.1	1
2	44 36.8	39 75	49.5	44 13.3	40 73	48.2	43 36.3	42 71	46.3	42 57.5	44 69	44.5	42 03.1	47 66	42.0	41 49.0	47 65	41.4	41 34.7	48 64	40.9	40 35.9	50 62	38.5	2
3	43 51.9	37 75	49.9	43 29.2	39 74	48.7	42 53.6	41 72	46.8	42 16.1	43 70	44.9	41 23.5	45 67	42.5	41 09.8	46 66	41.9	40 56.0	46 65	41.3	39 59.0	49 62	39.0	3
4	43 06.7	36 76	50.3	42 44.8	37 74	49.1	42 10.5	39 72	47.2	41 34.4	41 70	45.3	40 43.5	44 67	42.9	40 30.3	44 66	42.3	40 17.0	45 66	41.8	39 21.8	47 63	39.4	4
45	42 21.2	34 76	50.7	42 00.2	36 75	49.5	41 27.2	38 73	47.6	40 52.3	40 71	45.8	40 03.2	42 68	43.4	39 50.5	43 67	42.8	39 37.6	43 66	42.2	38 44.2	46 63	39.9	45
6	41 35.5	33 77	51.1	41 15.3	34 75	49.8	40 43.5	36 73	48.0	40 10.0	38 71	46.1	39 22.6	41 68	43.8	39 10.3	41 67	43.2	38 57.9	42 67	42.6	38 06.3	44 64	40.3	6
7	40 49.6	32 77	51.4	40 30.2	33 76	50.2	39 59.7	35 74	48.3	39 27.4	37 71	46.5	38 41.8	39 69	44.1	38 29.9	40 68	43.5	38 17.9	40 67	43.0	37 28.0	43 64	40.7	7
8	40 03.4	30 77	51.8	39 44.8	32 76	50.5	39 15.5	34 74	48.7	38 44.5	35 72	46.9	38 00.6	38 69	44.5	37 49.2	38 68	43.9	37 37.6	39 68	43.3	36 49.5	41 65	41.0	8
9	39 17.0	29 78	52.1	38 59.3	30 76	50.8	38 31.2	32 74	49.0	38 01.4	34 72	47.2	37 19.2	36 69	44.8	37 08.2	37 69	44.3	36 57.0	37 68	43.7	36 10.7	40 65	41.4	9
50	38 30.5	28 78	52.4	38 13.5	29 77	51.1	37 46.6	31 75	49.3	37 18.1	33 73	47.5	36 37.5	35 70	45.2	36 27.0	36 69	44.6	36 16.2	36 68	44.0	35 31.6	38 66	41.7	50
1	37 43.8	26 78	52.6	37 27.5	28 77	51.4	37 01.8	29 75	49.6	36 34.5	31 73	47.8	35 55.6	34 70	45.5	35 45.5	34 70	44.9	35 35.2	35 69	44.3	34 52.3	37 66	42.1	1
2	36 56.9	25 78	52.9	36 41.4	26 77	51.7	36 16.9	28 75	49.9	35 50.8	30 73	48.1	35 13.5	32 71	45.8	35 03.8	33 70	45.2	34 53.9	33 69	44.6	34 12.7	35 66	42.4	2
3	36 09.8	24 79	53.2	35 55.1	25 77	52.0	35 31.7	27 76	50.2	35 06.8	29 74	48.4	34 31.2	31 71	46.1	34 21.9	31 70	45.5	34 12.4	32 69	44.9	33 32.9	34 67	42.7	3
4	35 22.6	23 79	53.4	35 08.6	24 78	52.2	34 46.4	26 76	50.4	34 22.7	27 74	48.7	33 48.7	29 71	46.4	33 39.8	30 70	45.8	33 30.7	30 70	45.2	32 52.9	33 67	42.9	4
55	34 35.2	21 79	53.6	34 22.0	23 78	52.4	34 00.9	24 76	50.7	33 38.4	26 74	48.9	33 06.0	28 71	46.6	32 57.5	29 71	46.0	32 48.8	29 70	45.5	32 12.7	31 67	43.2	55
6	33 47.8	20 79	53.8	33 35.3	21 78	52.6	33 15.3	23 76	50.9	32 53.9	25 74	49.1	32 23.1	27 72	46.8	32 15.0	27 71	46.3	32 06.8	28 70	45.7	31 32.3	30 68	43.5	6
7	33 00.2	19 80	54.0	32 48.4	20 78	52.8	32 29.5	22 76	51.1	32 09.3	23 75	49.4	31 40.0	26 72	47.1	31 32.3	26 71	46.5	31 24.5	26 71	45.9	30 51.7	28 68	43.7	7
8	32 12.5	18 80	54.2	32 01.4	19 78	53.0	31 43.7	21 77	51.3	31 24.5	22 75	49.6	30 56.8	24 72	47.3	30 49.5	25 72	46.7	30 42.1	25 71	46.2	30 10.9	27 68	43.9	8
9	31 24.7	17 80	54.3	31 14.3	18 79	53.2	30 57.6	19 77	51.5	30 39.6	21 75	49.8	30 13.5	23 72	47.5	30 06.6	23 72	46.9	29 59.5	24 71	46.4	29 30.0	26 68	44.1	9
60	30 36.8	16 80	54.5	30 27.1	17 79	53.4	30 11.5	18 77	51.6	29 54.6	20 75	49.9	29 30.0	21 73	47.7	29 23.5	22 72	47.1	29 16.8	22 71	46.6	28 48.9	24 69	44.3	60
1	29 48.8	14 80	54.6	29 39.8	15 79	53.5	29 25.3	17 77	51.8	29 09.4	18 75	50.1	28 46.4	20 73	47.9	28 40.3	21 72	47.3	28 34.0	21 72	46.7	28 07.7	23 69	44.5	1
2	29 00.7	13 80	54.8	28 52.4	14 79	53.6	28 38.9	16 77	51.9	28 24.2	17 76	50.3	28 02.6	19 73	48.0	27 56.9	19 72	47.5	27 51.1	20 72	46.9	27 26.3	22 69	44.7	2
3	28 12.6	12 80	54.9	28 05.0	13 79	53.8	27 52.5	14 78	52.1	27 38.9	16 76	50.4	27 18.8	18 73	48.2	27 13.5	18 73	47.6	27 08.0	18 72	47.1	26 44.8	20 69	44.9	3
4	27 24.3	11 80	55.0	27 17.4	12 79	53.9	27 06.0	13 78	52.2	26 53.4	15 76	50.5	26 34.9	16 73	48.3	26 29.9	17 73	47.8	26 24.8	17 72	47.2	26 03.2	19 70	45.0	4
65	26 36.1	10 81	55.1	26 29.8	11 79	54.0	26 19.4	12 78	52.3	26 07.9	13 76	50.7	25 50.8	15 74	48.5	25 46.2	16 73	47.9	25 41.5	16 72	47.4	25 21.5	18 70	45.2	65
6	25 47.8	09 81	55.2	25 42.1	10 80	54.1	25 32.8	11 78	52.4	25 22.4	12 76	50.8	25 06.7	14 74	48.6	25 02.5	14 73	48.0	24 58.2	15 72	47.5	24 39.6	16 70	45.3	6
7	24 59.4	08 81	55.2	24 54.4	09 80	54.1	24 46.1	10 78	52.5	24 36.7	11 76	50.9	24 22.5	13 74	48.7	24 18.7	13 73	48.1	24 14.7	13 73	47.6	23 57.7	15 70	45.4	7
8	24 11.0	07 81	55.3	24 06.7	08 80	54.2	23 59.4	09 78	52.6	23 51.0	10 76	50.9	23 38.2	11 74	48.8	23 34.8	12 73	48.2	23 [illegible].2	12 73	47.7	23 15.7	14 70	45.5	8
9	23 22.5	06 81	55.4	23 18.9	06 80	54.3	23 12.6	08 78	52.7	23 05.2	09 76	51.0	22 53.9	10 74	48.9	22 50.8	11 73	48.3	22 47.6	11 73	47.8	22 33.7	12 70	45.6	9
70	22 34.0	05 81	55.4	22 31.0	05 80	54.3	22 25.7	06 78	52.7	22 19.4	08 76	51.1	22 09.5	09 74	48.9	22 06.8	09 73	48.4	22 04.0	10 73	47.9	21 51.5	11 70	45.7	70
1	21 45.5	04 81	55.4	21 43.2	04 80	54.4	21 38.8	05 78	52.8	21 33.6	06 76	51.2	21 25.1	08 74	49.0	21 22.7	08 74	48.5	21 20.3	08 73	47.9	21 09.3	10 70	45.8	1
2	20 57.0	03 81	55.5	20 55.3	03 80	54.4	20 51.9	04 78	52.8	20 47.7	05 77	51.2	20 40.6	07 74	49.1	20 38.6	07 74	48.5	20 36.5	07 73	48.0	20 27.1	08 70	45.9	2
3	20 08.5	02 81	55.5	20 07.4	02 80	54.4	20 05.0	03 78	52.8	20 01.8	04 77	51.2	19 56.1	05 74	49.1	19 54.5	06 74	48.6	19 52.7	06 73	48.0	19 44.8	07 71	45.9	3
4	19 20.0	00 81	55.5	19 19.5	01 80	54.4	19 18.1	02 78	52.9	19 15.8	03 77	51.3	19 11.6	04 74	49.1	19 10.3	04 74	48.6	19 08.9	05 73	48.1	19 02.5	06 71	46.0	4
75	18 31.4	01 81	55.5	18 31.6	00 80	54.4	18 31.1	01 78	52.9	18 29.9	02 77	51.3	18 27.0	03 74	49.2	18 26.1	03 74	48.6	18 25.1	04 73	48.1	18 20.1	05 71	46.0	75
6	17 42.9	02 81	55.5	17 43.6	01 80	54.4	17 44.2	00 78	52.9	17 43.9	01 77	51.3	17 42.4	02 74	49.2	17 41.9	02 74	48.7	17 41.2	02 73	48.1	17 37.7	03 71	46.0	6
7	16 54.4	03 81	55.5	16 55.7	02 80	54.4	16 57.2	01 78	52.9	16 58.0	00 77	51.3	16 57.9	01 74	49.2	16 57.6	01 74	48.7	16 57.3	01 73	48.2	16 55.3	02 71	46.1	7
8	16 05.8	04 81	55.4	16 07.8	03 80	54.4	16 10.3	02 78	52.8	16 12.0	02 77	51.3	16 13.3	01 74	49.2	16 13.4	00 74	48.7	16 13.4	00 73	48.2	16 12.9	01 71	46.1	8
9	15 17.3	05 81	55.4	15 19.9	04 80	54.4	15 23.3	03 78	52.8	15 26.1	03 77	51.3	15 28.7	02 74	49.2	15 29.2	01 74	48.7	15 29.6	01 73	48.2	15 30.5	00 71	46.1	9
80	14 28.9	06 81	56.4	14 32.1	05 80	54.3	14 36.4	04 78	52.8	14 40.1	04 77	51.2	14 44.1	03 74	49.2	14 44.9	03 74	48.7	14 45.7	02 73	48.1	14 48.0	01 71	46.1	80
1	13 40.4	07 81	55.3	13 44.2	06 80	54.3	13 49.5	06 78	52.8	13 54.2	05 76	51.2	13 59.5	04 74	49.2	14 00.7	04 74	48.6	14 01.8	04 73	48.1	14 05.6	03 71	46.1	1
2	12 52.0	08 81	55.3	12 56.4	07 80	54.2	13 02.6	07 78	52.7	13 08.3	06 76	51.2	13 15.0	05 74	49.1	13 16.5	05 74	48.6	13 18.0	05 73	48.1	13 23.2	04 71	46.0	2
3	12 03.6	09 81	55.2	12 08.7	08 80	54.2	12 15.8	08 78	52.6	12 22.4	07 76	51.1	12 30.5	06 74	49.1	12 32.4	06 74	48.6	12 34.2	06 73	48.0	12 40.8	05 71	46.0	3
4	11 15.3	10 80	55.1	11 20.9	09 79	54.1	11 29.0	09 78	52.6	11 36.6	08 76	51.1	11 46.0	07 74	49.0	11 48.2	07 74	48.5	11 50.4	07 73	48.0	11 58.5	06 71	46.0	4
85	10 27.0	11 80	55.0	10 33.2	10 79	54.0	10 42.2	10 78	52.5	10 50.8	09 76	51.0	11 01.6	09 74	49.0	11 04.1	08 73	48.5	11 06.6	08 73	47.9	11 16.1	08 70	45.9	85
6	9 38.7	12 80	54.9	9 45.6	11 79	53.9	9 55.5	11 78	52.4	10 05.1	10 76	50.9	10 17.2	10 74	48.9	10 20.1	10 73	48.4	10 22.9	09 73	47.9	10 33.9	09 70	45.9	6
7	8 50.5	13 80	54.8	8 58.0	12 79	53.8	9 08.9	12 78	52.3	9 19.4	11 76	50.8	9 32.8	11 74	48.8	9 36.1	11 73	48.3	9 39.3	11 73	47.8	9 51.6	10 70	45.8	7
8	8 02.4	14 80	54.7	8 10.5	13 79	53.7	8 22.3	13 78	52.2	8 33.8	13 76	50.7	8 48.5	12 74	48.7	8 52.1	12 73	48.2	8 55.7	12 73	47.7	9 09.4	11 70	45.7	8
9	7 14.4	15 80	54.6	7 23.0	14 79	53.6	7 35.8	14 77	52.1	7 48.2	14 76	50.6	8 04.3	13 74	48.6	8 08.2	13 73	48.1	8 12.1	13 72	47.6	8 27.3	12 70	45.6	9
90	6 26.4	16 80	54.5	6 35.6	15 79	53.5	6 49.3	15 77	52.0	7 02.7	15 76	50.5	7 20.1	14 73	48.5	7 24.4	14 73	48.0	7 28.6	14 72	47.5	7 45.2	14 70	45.5	90

DECLINATION CONTRARY NAME TO LATITUDE

Lat. 11°

H.A.	36° 00′			37° 00′			38° 30′			40° 00′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	43 00.0	1.0 01	180.0	42 00.0	1.0 01	180.0	40 30.0	1.0 01	180.0	39 00.0	1.0 01	180.0
1	42 59.4	1.0 03	178.9	41 59.4	1.0 03	178.9	40 29.5	1.0 03	179.0	38 59.5	1.0 03	179.0
2	42 57.7	1.0 05	177.8	41 57.8	1.0 05	177.9	40 27.9	1.0 04	177.9	38 58.0	1.0 04	178.0
3	42 54.9	1.0 07	176.7	41 55.0	1.0 06	176.8	40 25.2	1.0 06	176.9	38 55.4	1.0 06	177.0
4	42 50.9	1.0 08	175.6	41 51.2	1.0 08	175.7	40 21.5	1.0 08	175.9	38 51.9	1.0 08	176.1
05	42 45.8	99 10	174.5	41 46.2	99 10	174.6	40 16.8	99 10	174.9	38 47.4	99 09	175.1
6	42 39.6	99 12	173.4	41 40.2	99 12	173.6	40 11.0	99 11	173.9	38 41.8	99 11	174.1
7	42 32.3	99 14	172.3	41 33.1	99 14	172.5	40 04.2	99 13	172.8	38 35.3	99 13	173.1
8	42 23.8	98 16	171.2	41 24.9	98 15	171.5	39 56.3	98 15	171.8	38 27.7	98 14	172.2
9	42 14.3	98 18	170.2	41 15.6	98 17	170.4	39 47.5	98 16	170.8	38 19.2	98 16	171.2
10	42 03.7	97 19	169.1	41 05.3	97 19	169.4	39 37.6	98 18	169.8	38 09.8	98 17	170.3
1	41 52.0	97 21	168.0	40 53.9	97 21	168.4	39 26.7	97 20	168.9	37 59.3	97 19	169.3
2	41 39.3	96 23	167.0	40 41.6	96 22	167.4	39 14.8	96 21	167.9	37 47.9	97 21	168.4
3	41 25.5	96 25	166.0	40 28.1	96 24	166.3	39 01.9	96 23	166.9	37 35.6	96 22	167.4
4	41 10.7	95 26	164.9	40 13.7	95 26	165.3	38 48.1	95 25	165.9	37 22.3	95 24	166.5
15	40 54.9	94 28	163.9	39 58.3	94 27	164.4	38 33.3	95 26	165.0	37 08.1	95 25	165.6
6	40 38.1	93 30	162.9	39 42.0	94 29	163.4	38 17.6	94 28	164.0	36 53.0	94 27	164.7
7	40 20.3	93 31	161.9	39 24.6	93 30	162.4	38 01.0	93 29	163.1	36 37.0	93 28	163.8
8	40 01.5	92 33	160.9	39 06.4	92 32	161.5	37 43.4	92 31	162.2	36 20.1	93 30	162.9
9	39 41.8	91 34	160.0	38 47.2	91 34	160.5	37 24.9	92 32	161.3	36 02.4	92 31	162.0
20	39 21.2	90 36	159.0	38 27.1	90 35	159.6	37 05.6	91 34	160.4	35 43.8	91 32	161.2
1	38 59.7	89 37	158.1	38 06.1	89 36	158.7	36 45.4	90 35	159.5	35 24.4	90 34	160.3
2	38 37.3	88 39	157.2	37 44.3	89 38	157.8	36 24.4	89 36	158.6	35 04.2	89 35	159.5
3	38 14.0	87 40	156.3	37 21.5	88 39	156.9	36 02.5	88 38	157.8	34 43.1	88 36	158.6
4	37 49.9	86 42	155.4	36 58.0	87 41	156.0	35 39.8	87 39	156.9	34 21.3	88 38	157.8
25	37 24.9	85 43	154.5	36 33.7	86 42	155.2	35 16.4	86 40	156.1	33 58.6	87 39	157.0
6	36 59.2	84 44	153.6	36 08.5	85 43	154.3	34 52.1	85 42	155.3	33 35.3	86 40	156.2
7	36 32.6	83 46	152.8	35 42.6	84 44	153.5	34 27.1	84 43	154.5	33 11.2	85 41	155.4
8	36 05.3	82 47	152.0	35 15.9	83 46	152.7	34 01.4	83 44	153.7	32 46.3	84 43	154.7
9	35 37.3	81 48	151.2	34 48.5	81 47	151.9	33 34.9	82 45	152.9	32 20.8	83 44	153.9
30	35 08.5	80 49	150.4	34 20.4	80 48	151.1	33 07.7	81 46	152.1	31 54.6	82 45	153.2
1	34 39.0	79 50	149.6	33 51.6	79 49	150.3	32 39.9	80 48	151.4	31 27.6	81 46	152.4
2	34 08.8	78 51	148.8	33 22.0	78 50	149.6	32 11.3	79 49	150.7	31 00.1	79 47	151.7
3	33 38.0	77 52	148.0	32 51.9	77 51	148.8	31 42.2	78 50	149.9	30 31.9	78 48	151.0
4	33 06.5	76 54	147.3	32 21.1	76 52	148.1	31 12.3	77 51	149.2	30 03.0	77 49	150.3
35	32 34.4	74 55	146.6	31 49.6	75 53	147.4	30 41.9	76 52	148.5	29 33.6	76 50	149.7
6	32 01.7	73 56	145.9	31 17.5	74 54	146.7	30 10.8	74 53	147.8	29 03.5	75 51	149.0
7	31 28.3	72 57	145.2	30 44.9	73 55	146.0	29 39.2	73 54	147.2	28 32.9	74 52	148.3
8	30 54.4	71 57	144.5	30 11.7	71 56	145.3	29 07.0	72 55	146.5	28 01.7	73 53	147.7
9	30 20.0	70 58	143.9	29 37.9	70 57	144.7	28 34.3	71 56	145.9	27 30.0	72 54	147.1
40	29 44.9	69 59	143.2	29 03.6	69 58	144.0	28 01.0	70 56	145.3	26 57.7	71 55	146.5
1	29 09.4	68 60	142.6	28 28.7	68 59	143.4	27 27.1	69 57	144.6	26 24.9	69 56	145.9
2	28 33.4	66 61	142.0	27 53.4	67 60	142.8	26 52.8	68 58	144.0	25 51.6	68 56	145.3
3	27 56.8	65 62	141.3	27 17.5	66 61	142.2	26 18.0	67 59	143.5	25 17.8	67 57	144.7
4	27 19.8	64 62	140.8	26 41.2	65 61	141.6	25 42.7	65 60	142.9	24 43.5	66 58	144.1
45	26 42.3	63 63	140.2	26 04.4	63 62	141.0	25 06.9	64 60	142.3	24 08.8	65 59	143.6
6	26 04.4	62 64	139.6	25 27.1	62 63	140.5	24 30.7	63 61	141.8	23 33.6	64 59	143.0
7	25 26.0	61 65	139.1	24 49.4	61 64	139.9	23 54.0	62 62	141.2	22 58.0	63 60	142.5
8	24 47.2	60 65	138.5	24 11.3	60 64	139.4	23 16.9	61 62	140.7	22 21.9	61 61	142.0
9	24 08.0	58 66	138.0	23 32.8	59 65	138.9	22 39.5	60 63	140.2	21 45.5	60 61	141.5
50	23 28.4	57 67	137.5	22 53.9	58 66	138.4	22 01.6	58 64	139.7	21 08.6	59 62	141.0
1	22 48.4	56 67	137.0	22 14.6	57 66	137.9	21 23.3	57 64	139.2	20 31.4	58 63	140.5
2	22 08.0	55 68	136.5	21 34.9	56 67	137.4	20 44.6	56 65	138.7	19 53.7	57 63	140.1
3	21 27.3	54 68	136.0	20 54.8	54 67	136.9	20 05.6	55 66	138.3	19 15.8	56 64	139.6
4	20 46.3	53 69	135.6	20 14.5	53 68	136.5	19 26.2	54 66	137.8	18 37.4	55 64	139.2
55	20 04.9	52 70	135.1	19 33.7	52 68	136.0	18 46.5	53 67	137.4	17 58.7	53 65	138.7
6	19 23.2	51 70	134.7	18 52.7	51 69	135.6	18 06.5	52 67	137.0	17 19.7	52 66	138.3
7	18 41.1	49 71	134.3	18 11.3	50 69	135.2	17 26.1	51 68	136.5	16 40.4	51 66	137.9
8	17 58.8	48 71	133.8	17 29.6	49 70	134.8	16 45.4	49 68	136.1	16 09.7	50 67	137.5
9	17 16.2	47 72	133.4	16 47.7	48 70	134.4	16 04.5	48 69	135.7	15 20.7	49 67	137.1
60	16 33.3	46 72	133.0	16 05.4	47 71	134.0	15 23.2	47 69	135.3	14 40.5	48 68	136.7
1	15 50.1	45 72	132.7	15 22.9	46 71	133.6	14 41.7	46 70	135.0	14 00.0	47 68	136.3
2	15 06.6	44 73	132.3	14 40.1	44 72	133.2	13 59.9	45 70	134.6	13 19.2	45 68	136.0
3	14 22.9	43 73	131.9	13 57.0	43 72	132.8	13 17.8	44 71	134.2	12 38.1	44 69	135.6
4	13 39.0	42 74	131.6	13 13.7	42 73	132.5	12 35.5	43 71	133.9	11 56.8	43 69	135.3
65	12 54.8	41 74	131.2	12 30.2	41 73	132.2	11 52.9	42 71	133.5	11 15.2	42 70	134.9
6	12 10.4	40 74	130.9	11 46.4	40 73	131.8	11 10.1	41 72	133.2	10 33.4	41 70	134.6
7	11 25.7	39 75	130.6	11 02.4	39 74	131.5	10 27.0	39 72	132.9	9 51.3	40 70	134.3
8	10 40.9	38 75	130.2	10 18.2	38 74	131.2	9 43.8	38 72	132.6	9 09.1	39 71	134.0
9	9 55.8	37 75	129.9	9 33.7	37 74	130.9	9 00.3	37 73	132.3	8 26.6	38 71	133.7
70	9 10.5	36 76	129.6	8 49.1	36 75	130.6	8 16.7	36 73	132.0	7 43.9	37 71	133.4
1	8 25.1	35 76	129.4	8 04.3	35 75	130.3	7 32.8	35 73	131.7	7 01.0	35 72	133.1
2	7 39.5	34 76	129.1	7 19.3	34 75	130.0	6 48.7	34 74	131.4	6 18.0	34 72	132.9
3	6 53.6	33 77	128.8	6 34.1	33 76	129.8	6 04.5	33 74	131.2	5 34.7	33 72	132.6
4	6 07.7	32 77	128.5	5 48.7	32 76	129.5	5 20.1	32 74	130.9			
75	5 21.5	31 77	128.3	5 03.2	31 76	129.2						

42° 00′			42° 30′			43° 00′			45° 00′			H.A.
Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
37 00.0	1.0 01	180.0	36 30.0	1.0 01	180.0	36 00.0	1.0 01	180.0	34 09.0	1.0 01	180.0	00
36 59.5	1.0 02	179.1	36 29.5	1.0 02	179.1	35 59.5	1.0 02	179.1	33 59.6	1.0 02	179.1	1
36 58.1	1.0 04	178.1	36 28.1	1.0 04	178.2	35 58.1	1.0 04	178.2	33 58.2	1.0 04	178.3	2
36 55.7	1.0 06	177.2	36 25.8	1.0 06	177.3	35 55.8	1.0 05	177.3	33 56.1	1.0 05	177.4	3
36 52.4	1.0 07	176.3	36 22.5	1.0 07	176.3	35 52.6	1.0 07	176.4	33 53.0	1.0 07	176.6	4
36 48.1	99 09	175.4	36 18.2	99 09	175.4	35 48.4	99 08	175.5	33 49.1	99 08	175.7	05
36 42.8	99 10	174.4	36 13.1	99 10	174.5	35 43.3	99 10	174.6	33 44.3	99 09	174.9	6
36 36.7	99 12	173.5	36 07.0	99 12	173.6	35 37.3	99 12	173.7	33 38.6	99 11	174.1	7
36 29.5	99 13	172.6	36 00.0	99 13	172.7	35 30.4	99 13	172.8	33 32.1	99 12	173.2	8
36 21.5	98 15	171.7	35 52.0	98 15	171.8	35 22.6	98 14	171.9	33 24.7	98 14	172.4	9
36 12.5	98 16	170.8	35 43.2	98 16	170.9	35 13.9	98 16	171.1	33 16.5	98 15	171.6	10
36 02.7	97 18	169.9	35 33.5	97 18	170.0	35 04.3	97 17	170.2	33 07.4	97 17	170.7	1
35 51.9	97 19	169.0	35 22.8	97 19	169.2	34 53.8	97 19	169.3	32 57.5	97 18	169.9	2
35 40.2	96 21	168.1	35 11.3	96 21	168.3	34 42.4	96 20	168.5	32 46.8	96 19	169.1	3
35 27.6	96 22	167.2	34 58.9	96 22	167.4	34 30.2	96 22	167.6	32 35.2	96 21	168.3	4
35 14.2	95 24	166.4	34 45.7	95 24	166.6	34 17.2	95 23	166.8	32 22.8	95 22	167.5	15
34 59.9	94 25	165.5	34 31.6	94 25	165.7	34 03.2	95 25	165.9	32 09.7	95 23	166.7	6
34 44.8	94 27	164.7	34 16.6	94 26	164.9	33 48.5	94 26	165.1	31 55.7	94 25	165.9	7
34 28.8	93 28	163.8	34 00.9	93 28	164.0	33 32.9	93 27	164.3	31 41.0	93 26	165.1	8
34 11.9	92 29	163.0	33 44.3	92 29	163.2	33 16.6	92 29	163.5	31 25.5	93 27	164.3	9
33 54.3	91 31	162.2	33 26.9	92 30	162.4	32 59.4	92 30	162.6	31 09.2	92 28	163.6	20
33 35.9	91 32	161.4	33 08.7	91 32	161.6	32 41.4	91 31	161.9	30 52.2	91 30	162.8	1
33 16.7	90 33	160.6	32 49.7	90 33	160.8	32 22.7	90 32	161.1	30 34.4	90 31	162.1	2
32 56.7	89 35	159.8	32 30.0	89 34	160.0	32 03.2	89 34	160.3	30 16.0	90 32	161.3	3
32 35.9	88 36	159.0	32 09.5	88 35	159.3	31 43.0	88 35	159.5	29 56.8	89 33	160.6	4
32 14.4	87 37	158.2	31 48.2	87 37	158.5	31 22.0	87 36	158.8	29 36.9	88 34	159.9	25
31 52.2	86 38	157.4	31 26.3	86 38	157.7	31 00.4	86 37	158.0	29 16.3	87 35	159.2	6
31 29.2	85 39	156.7	31 03.6	85 39	157.0	30 38.0	86 38	157.3	28 55.0	86 37	158.5	7
31 05.6	84 41	156.0	30 40.3	84 40	156.3	30 14.9	85 40	156.6	28 33.1	85 38	157.8	8
30 41.2	83 42	155.2	30 16.2	83 41	155.6	29 51.2	84 41	155.9	28 10.5	84 39	157.1	9
30 16.2	82 43	154.5	29 51.5	82 42	154.8	29 26.8	83 42	155.2	27 47.3	83 40	156.4	30
29 50.6	81 44	153.8	29 26.2	81 43	154.2	29 01.7	82 43	154.5	27 23.4	82 41	155.8	1
29 24.3	80 45	153.1	29 00.2	80 44	153.5	28 36.0	81 44	153.8	26 59.0	81 42	155.1	2
28 57.3	79 46	152.4	28 33.5	79 45	152.8	28 09.7	80 45	153.1	26 33.9	80 43	154.5	3
28 29.8	78 47	151.8	28 06.3	78 46	152.1	27 42.8	78 46	152.5	26 08.2	79 44	153.9	4
28 01.6	77 48	151.1	27 38.5	77 47	151.5	27 15.3	77 47	151.8	25 42.0	78 45	153.2	35
27 32.9	76 49	150.5	27 10.1	76 48	150.8	26 47.2	76 48	151.2	25 15.2	77 46	152.6	6
27 03.6	75 50	149.9	26 41.1	75 49	150.2	26 18.6	75 49	150.6	24 47.9	76 46	152.0	7
26 33.7	74 51	149.2	26 11.6	74 50	149.6	25 49.4	74 50	150.0	24 20.0	75 47	151.5	8
26 03.3	73 52	148.6	25 41.5	73 51	149.0	25 19.7	73 50	149.4	23 51.6	74 48	150.9	9
25 32.4	71 52	148.0	25 10.9	72 52	148.4	24 49.4	72 51	148.8	23 22.7	73 49	150.3	40
25 01.0	70 53	147.5	24 39.8	71 53	147.8	24 18.7	71 52	148.2	22 53.3	72 50	149.8	1
24 29.0	69 54	146.9	24 08.3	69 53	147.3	23 47.4	70 53	147.7	22 23.4	70 51	149.2	2
23 56.6	68 55	146.3	23 36.2	68 54	146.7	23 15.7	68 54	147.1	21 53.0	69 51	148.7	3
23 23.7	67 56	145.8	23 03.6	67 55	146.2	22 43.4	67 54	146.6	21 22.2	68 52	148.2	4
22 50.4	66 56	145.2	22 30.6	66 56	145.6	22 10.8	66 55	146.1	20 50.9	67 53	147.7	45
22 16.6	65 57	144.7	21 57.1	65 56	145.1	21 37.7	65 56	145.5	20 19.2	66 54	147.2	6
21 42.3	63 58	144.2	21 23.3	64 57	144.6	21 04.1	64 57	145.0	19 47.0	65 54	146.7	7
21 07.7	62 58	143.7	20 48.9	63 58	144.1	20 30.2	63 57	144.5	19 14.4	63 55	146.2	8
20 32.6	61 59	143.2	20 14.2	61 59	143.6	19 55.8	62 58	144.0	18 41.4	62 56	145.7	9
19 57.1	60 60	142.7	19 39.1	60 59	143.2	19 21.0	60 59	143.6	18 08.1	61 56	145.3	50
19 21.3	59 60	142.3	19 03.6	59 60	142.7	18 45.8	59 59	143.1	17 34.3	60 57	144.8	1
18 45.0	58 61	141.8	18 27.7	58 60	142.2	18 10.3	58 60	142.7	17 00.2	59 58	144.4	2
18 08.4	57 62	141.4	17 51.4	57 61	141.8	17 34.4	57 60	142.2	16 25.7	58 58	143.9	3
17 31.5	55 62	140.9	17 14.8	56 62	141.4	16 58.1	56 61	141.8	15 50.8	56 59	143.5	4
16 54.1	54 63	140.5	16 37.9	54 62	140.9	16 21.5	55 62	141.4	15 15.6	55 59	143.1	55
16 16.5	53 63	140.1	16 00.6	53 63	140.5	15 44.6	53 62	141.0	14 40.1	54 60	142.7	6
15 38.5	52 64	139.7	15 23.0	52 63	140.1	15 07.3	52 63	140.6	14 04.2	53 60	142.3	7
15 00.3	51 64	139.3	14 45.0	51 64	139.7	14 29.7	51 63	140.2	13 28.1	52 61	141.9	8
14 21.7	50 65	138.9	14 06.8	50 64	139.3	13 51.9	50 64	139.8	12 51.6	51 61	141.6	9
13 42.8	48 65	138.5	13 28.3	49 65	139.0	13 13.7	49 64	139.4	12 14.9	49 62	141.2	60
13 03.7	47 66	138.1	12 49.5	47 65	138.6	12 35.2	48 65	139.0	11 37.8	48 62	140.8	1
12 24.2	46 66	137.8	12 10.4	46 66	138.2	11 56.5	46 65	138.7	11 00.5	47 63	140.5	2
11 44.5	45 67	137.4	11 31.0	45 66	137.9	11 17.5	45 65	138.4	10 22.9	46 63	140.2	3
11 04.6	44 67	137.1	10 51.4	44 66	137.6	10 38.2	44 66	138.0	9 45.0	45 64	139.8	4
10 24.4	43 67	136.8	10 11.5	43 67	137.2	9 58.7	43 66	137.7	9 06.9	43 64	139.5	65
9 43.9	41 68	136.5	9 31.4	42 67	136.9	9 18.9	42 67	137.4	8 28.6	42 64	139.2	6
9 03.2	40 68	136.2	8 51.1	40 68	136.6	8 38.9	41 67	137.1	7 50.0	41 65	138.9	7
8 22.3	39 69	135.9	8 10.5	39 68	136.3	7 58.7	39 67	136.8	7 11.2	40 65	138.6	8
7 41.2	38 69	135.6	7 29.7	38 68	136.0	7 18.3	38 68	136.5	6 32.2	39 65	138.4	9
6 59.8	37 69	135.3	6 48.8	37 69	135.8	6 37.6	37 68	136.2	5 52.9	37 66	138.1	70
6 18.3	36 70	135.0	6 07.6	36 69	135.5	5 56.8	36 68	136.0	5 13.5	36 66	137.8	1
5 36.6	35 70	134.8	5 26.2	35 69	135.2	5 15.7	35 69	135.7				2
												3
												4
												75

DECLINATION SAME NAME AS LATITUDE

H.A.	36° 00′			37° 00′			38° 30′			40° 00′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
91	5 38.5	17 80	54.4	5 48.3	16 79	53.4	6 02.9	16 77	51.9	6 17.3	16 76	50.4
2				5 01.1	17 78	53.2	5 16.6	17 77	51.8	5 31.9	17 76	50.3
3												

42° 00′			42° 30′			43° 00′			45° 00′			H.A.
Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
6 36.0	15 73	48.4	6 40.6	15 73	47.9	6 45.2	15 72	47.4	7 03.3	15 70	45.4	91
5 52.0	17 73	48.3	5 57.0	16 73	47.8	6 01.9	16 72	47.3	6 21.3	16 70	45.3	2
5 08.1	18 73	48.2	5 13.4	18 72	47.7	5 18.6	18 72	47.2	5 39.5	17 70	45.2	3

LA.	46° 00′ Alt.		Az.	47° 00′ Alt.		Az.	48° 30′ Alt.		Az.	49° 30′ Alt.		Az.	50° 30′ Alt.		Az.	51° 30′ Alt.		Az.	52° 30′ Alt.		Az.	54° 00′ Alt.		Az.	H.A.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	55 00.0	1.0 01	00.0	54 00.0	1.0 01	00.0	52 30.0	1.0 01	00.0	51 30.0	1.0 01	00.0	50 30.0	1.0 01	00.0	49 30.0	1.0 01	00.0	48 30.0	1.0 01	00.0	47 00.0	1.0 01	00.0	00
1	54 59.4	1.0 03	01.2	53 59.4	1.0 03	01.2	52 29.4	1.0 03	01.1	51 29.5	1.0 03	01.0	50 29.5	1.0 03	01.0	49 29.5	1.0 02	01.0	48 29.5	1.0 02	00.9	46 59.6	1.0 02	00.9	1
2	54 57.5	1.0 05	02.4	53 57.6	1.0 05	02.3	52 27.8	1.0 05	02.2	51 27.9	1.0 04	02.1	50 27.9	1.0 04	02.0	49 28.0	1.0 04	01.9	48 28.1	1.0 04	01.8	46 58.2	1.0 04	01.7	2
3	54 54.4	1.0 07	03.6	53 54.6	1.0 07	03.5	52 25.0	1.0 06	03.3	51 25.2	1.0 06	03.1	50 25.4	1.0 06	03.0	49 25.6	1.0 06	02.9	48 25.8	1.0 06	02.8	46 56.0	1.0 05	02.6	3
4	54 50.1	99 09	04.8	53 50.5	99 09	04.6	52 21.1	99 08	04.3	51 21.4	99 08	04.2	50 21.8	99 08	04.0	49 22.1	99 07	03.8	48 22.5	99 07	03.7	46 52.9	99 07	03.4	4
05	54 44.5	99 11	06.0	53 45.1	99 11	05.8	52 16.1	99 10	05.4	51 16.6	99 10	05.2	50 17.2	99 09	05.0	49 17.7	99 09	04.8	48 18.2	99 09	04.6	46 49.0	99 08	04.3	05
6	54 37.7	98 13	07.2	53 38.6	98 13	06.9	52 10.0	99 12	06.5	51 10.8	99 12	06.2	50 11.6	99 11	06.0	49 12.3	99 11	05.7	48 13.1	99 10	05.5	46 44.1	99 10	05.1	6
7	54 29.7	98 15	08.4	53 31.0	98 15	08.0	52 02.8	98 14	07.5	51 03.9	98 13	07.2	50 05.0	98 13	06.9	49 06.0	98 12	06.7	48 07.0	98 12	06.4	46 38.4	98 11	06.0	7
8	54 20.5	97 17	09.5	53 22.2	97 17	09.2	51 54.5	98 16	08.6	50 55.9	98 15	08.2	49 57.3	98 14	07.9	48 58.7	98 14	07.6	48 00.0	98 13	07.3	46 31.8	98 12	06.8	8
9	54 10.2	96 19	10.7	53 12.2	97 18	10.3	51 45.2	97 17	09.6	50 47.0	97 17	09.2	49 48.8	97 16	08.9	48 50.4	97 15	08.5	47 52.1	97 15	08.2	46 24.4	97 14	07.7	9
10	53 58.7	96 21	11.8	53 01.2	96 20	11.4	51 34.8	96 19	10.7	50 37.0	96 18	10.2	49 39.2	96 18	09.8	48 41.3	97 17	09.4	47 43.3	97 16	09.0	46 16.1	97 15	08.5	10
1	53 46.0	95 23	13.0	52 49.1	95 22	12.4	51 23.4	95 21	11.7	50 26.1	96 20	11.2	49 28.7	96 19	10.8	48 31.2	96 18	10.3	47 33.6	96 18	09.9	46 07.0	96 17	09.3	1
2	53 32.3	94 25	14.1	52 35.8	94 24	13.5	51 10.9	95 22	12.7	50 14.1	95 22	12.2	49 17.2	95 21	11.7	48 20.1	95 20	11.2	47 23.0	95 19	10.8	45 57.1	96 18	10.1	2
3	53 17.4	93 27	15.2	52 21.6	93 26	14.5	50 57.5	94 24	13.7	50 01.2	94 23	13.1	49 04.8	94 22	12.6	48 08.2	94 21	12.1	47 11.5	95 20	11.6	45 46.3	95 19	10.9	3
4	53 01.5	92 28	16.2	52 06.3	92 27	15.6	50 43.0	93 26	14.7	49 47.3	93 25	14.1	48 51.5	93 24	13.5	47 55.4	94 23	13.0	46 59.3	94 22	12.5	45 34.7	94 21	11.7	4
15	52 44.5	91 30	17.3	51 49.9	91 29	16.6	50 27.7	92 27	15.6	49 32.5	92 26	15.0	48 37.2	92 25	14.4	47 41.8	93 24	13.8	46 46.1	93 23	13.3	45 22.4	93 22	12.5	15
6	52 26.5	90 32	18.3	51 32.6	90 30	17.6	50 11.3	91 29	16.6	49 16.8	91 28	15.9	48 22.1	91 27	15.3	47 27.2	92 26	14.7	46 32.2	92 25	14.1	45 09.2	92 23	13.3	6
7	52 07.5	88 33	19.3	51 14.3	80 32	18.6	49 54.1	90 30	17.5	49 00.2	90 29	16.8	48 06.2	90 28	16.2	47 11.9	91 27	15.5	46 17.4	91 26	14.9	44 55.3	91 24	14.0	7
8	51 47.6	87 35	20.3	50 55.1	88 34	19.5	49 35.9	88 32	18.4	48 42.7	89 31	17.7	47 49.3	89 29	17.0	46 55.7	90 28	16.4	46 01.8	90 27	15.7	44 40.6	90 26	14.8	8
9	51 26.7	86 36	21.3	50 35.0	86 35	20.5	49 16.8	87 33	19.3	48 24.4	88 32	18.6	47 31.7	88 31	17.9	46 38.7	89 30	17.2	45 45.5	89 29	16.5	44 25.2	89 27	15.5	9
20	51 04.8	85 38	22.2	50 13.9	86 37	21.4	48 56.9	86 35	20.2	48 05.2	86 33	19.4	47 13.2	87 32	18.7	46 20.9	87 31	18.0	45 28.4	88 30	17.3	44 09.1	88 28	16.3	20
1	50 42.1	83 39	23.1	49 52.0	84 38	22.3	48 36.2	85 36	21.0	47 45.2	85 35	20.3	46 54.0	86 33	19.5	46 02.4	86 32	18.7	45 10.5	87 31	18.0	43 52.2	87 29	17.0	1
2	50 18.5	82 41	24.0	49 29.3	82 39	23.2	48 14.7	83 37	21.9	47 24.5	84 36	21.1	46 33.9	84 35	20.3	45 43.1	85 33	19.5	44 51.9	85 32	18.8	43 34.7	86 30	17.7	2
3	49 54.1	80 42	24.9	49 05.7	81 41	24.0	47 52.3	82 39	22.7	47 02.9	83 37	21.9	46 13.1	83 36	21.1	45 23.0	84 35	20.3	44 32.6	84 33	19.5	43 16.4	85 32	18.4	3
4	49 28.9	79 43	25.8	48 41.3	80 42	24.8	47 29.2	81 40	23.5	46 40.6	81 38	22.6	45 51.6	82 37	21.8	45 02.3	83 36	21.0	44 12.6	83 34	20.2	42 57.5	84 33	19.1	4
25	49 02.9	77 45	26.6	48 16.2	78 43	25.7	47 05.3	79 41	24.3	46 17.6	80 40	23.4	45 29.4	81 38	22.5	44 40.8	81 37	21.7	43 51.9	82 36	20.9	42 38.0	83 34	19.7	25
6	48 36.2	76 46	27.4	47 50.3	77 44	26.4	46 40.8	78 42	25.0	45 53.8	79 41	24.1	45 06.5	79 39	23.3	44 18.7	80 38	22.4	43 30.6	80 37	21.6	42 17.8	81 35	20.4	6
7	48 08.7	74 47	28.2	47 23.8	75 45	27.2	46 15.5	76 43	25.8	45 29.4	77 42	24.9	44 42.8	78 40	24.0	43 55.9	79 39	23.1	43 08.6	79 38	22.3	41 56.9	80 36	21.0	7
8	47 40.5	73 48	29.0	46 56.5	74 47	28.0	45 49.5	75 44	26.5	45 04.3	76 43	25.6	44 18.6	77 41	24.7	43 32.5	77 40	23.8	42 46.0	78 39	22.9	41 35.5	79 37	21.7	8
9	47 11.6	71 49	29.7	46 28.5	72 48	28.7	45 22.9	74 45	27.2	44 38.5	74 44	26.3	43 53.7	75 43	25.3	43 08.4	76 41	24.4	42 22.7	76 40	23.5	41 13.5	77 38	22.3	9
30	46 42.1	70 50	30.4	45 59.9	71 49	29.4	44 55.6	72 46	27.9	44 12.2	73 45	26.9	43 28.2	74 44	26.0	42 43.8	74 42	25.1	41 58.9	75 41	24.2	40 50.9	76 39	22.9	30
1	46 12.0	68 51	31.1	45 30.7	69 50	30.1	44 27.8	71 47	28.6	43 45.2	71 46	27.6	43 02.1	72 44	26.6	42 18.5	73 43	25.7	41 34.5	74 42	24.8	40 27.7	75 40	23.4	1
2	45 41.2	67 52	31.8	45 00.9	68 51	30.7	43 59.3	69 48	29.2	43 17.6	70 47	28.2	42 35.4	71 45	27.2	41 52.7	72 44	26.3	41 09.5	72 42	25.4	40 04.0	73 40	24.0	2
3	45 09.9	65 53	32.5	44 30.5	66 52	31.4	43 30.3	68 49	29.8	42 49.5	68 48	28.8	42 08.2	69 46	27.9	41 26.3	70 45	26.9	40 44.0	71 43	25.9	39 39.8	72 41	24.6	3
4	44 38.0	64 54	33.1	43 59.5	65 52	32.0	43 00.7	66 50	30.4	42 20.8	67 49	29.4	41 40.4	68 47	28.4	40 59.4	69 46	27.5	40 18.0	69 44	26.5	39 15.0	71 42	25.1	4
35	44 05.6	62 55	33.7	43 28.1	63 53	32.6	42 30.6	65 51	31.0	41 51.6	65 50	30.0	41 12.1	66 48	29.0	40 32.0	67 47	28.0	39 51.5	68 45	27.1	38 49.8	69 43	25.6	35
6	43 32.7	61 56	34.3	42 56.1	62 54	33.2	42 00.0	63 52	31.6	41 21.9	64 50	30.6	40 43.3	65 49	29.6	40 04.1	66 47	28.6	39 24.4	67 46	27.6	38 24.0	68 44	26.2	6
7	42 59.3	59 56	34.9	42 23.6	60 55	33.8	41 28.9	61 53	32.2	40 51.7	62 51	31.1	40 14.0	63 50	30.1	39 35.7	64 48	29.1	38 56.9	65 47	28.1	37 57.9	66 44	26.7	7
8	42 25.4	57 57	35.4	41 50.6	58 56	34.3	40 57.3	60 53	32.7	40 21.0	61 52	31.6	39 44.2	62 50	30.6	39 06.8	63 49	29.6	38 29.0	64 47	28.6	37 31.2	65 45	27.1	8
9	41 51.0	56 58	35.9	41 17.2	57 56	34.8	40 25.3	58 54	33.2	39 49.9	59 53	32.2	39 14.0	60 51	31.1	38 37.5	61 50	30.1	38 00.5	62 48	29.1	37 04.1	63 46	27.6	9
40	41 16.2	54 59	36.4	40 43.3	55 57	35.3	39 52.8	57 55	33.7	39 18.3	58 53	32.6	38 43.3	59 52	31.6	38 07.8	60 50	30.6	37 31.7	61 49	29.6	36 36.6	62 47	28.1	40
1	40 41.1	53 59	36.9	40 09.1	54 58	35.8	39 19.9	55 56	34.2	38 46.4	56 54	33.1	38 12.3	57 52	32.1	37 37.6	58 51	31.0	37 02.4	59 49	30.0	36 08.7	60 47	28.5	1
2	40 05.5	51 60	37.4	39 34.4	52 58	36.3	38 46.6	54 56	34.7	38 14.0	55 55	33.6	37 40.8	56 53	32.5	37 07.0	57 52	31.5	36 32.7	58 50	30.5	35 40.4	59 48	29.0	2
3	39 29.5	50 61	37.9	38 59.3	51 59	36.8	38 12.9	52 57	35.1	37 41.2	53 55	34.0	37 08.9	54 54	33.0	36 36.1	55 52	31.9	36 02.7	56 51	30.9	35 11.6	57 48	29.4	3
4	38 53.2	48 61	38.3	38 23.9	49 60	37.2	37 38.8	51 57	35.5	37 08.0	52 56	34.5	36 36.7	53 54	33.4	36 04.7	54 53	32.3	35 32.3	55 51	31.3	34 42.6	56 49	29.8	4
45	38 16.5	47 62	38.7	37 48.1	48 60	37.6	37 04.4	49 58	36.0	36 34.5	50 56	34.9	36 04.1	51 55	33.8	35 33.1	52 53	32.8	35 01.5	53 52	31.7	34 13.1	54 50	30.2	45
6	37 39.5	45 62	39.1	37 12.0	46 61	38.0	36 29.7	48 58	36.4	36 00.7	49 57	35.3	35 31.1	50 55	34.2	35 01.0	51 54	33.1	34 30.4	52 52	32.1	33 43.4	53 50	30.6	6
7	37 02.1	44 63	39.5	36 35.6	45 61	38.4	35 54.6	46 59	36.8	35 26.5	47 58	35.7	34 57.9	48 56	34.6	34 28.6	49 54	33.5	33 58.9	50 53	32.5	33 13.3	51 51	30.9	7
8	36 24.5	42 63	39.9	35 58.8	43 62	38.8	35 19.2	45 60	37.1	34 52.0	46 58	36.0	34 24.3	47 56	35.0	33 56.0	48 55	33.9	33 27.1	49 54	32.8	32 42.8	50 51	31.3	8
9	35 46.6	41 64	40.3	35 21.8	42 62	39.1	34 43.5	43 60	37.5	34 17.2	44 58	36.4	33 50.4	45 57	35.3	33 23.0	46 55	34.2	32 55.0	47 54	33.2	32 12.1	48 52	31.6	9
50	35 08.4	39 64	40.6	34 44.5	40 63	39.5	34 07.5	42 60	37.8	33 42.1	43 59	36.7	33 16.2	44 57	35.6	32 49.7	45 56	34.6	32 22.6	46 54	33.5	31 41.1	47 52	31.9	50
1	34 29.9	38 64	40.9	34 06.9	39 63	39.8	33 31.3	40 61	38.1	33 06.8	41 59	37.1	32 41.7	42 58	36.0	32 16.1	43 56	34.9	31 50.0	44 55	33.8	31 09.8	45 53	32.3	1
2	33 51.2	36 65	41.2	33 29.1	37 63	40.1	32 54.8	39 61	38.5	32 31.2	40 60	37.4	32 07.0	41 58	36.3	31 42.3	42 57	35.2	31 17.1	43 55	34.1	30 38.2	44 53	32.6	2
3	33 12.3	35 65	41.5	32 51.0	36 64	40.4	32 18.0	37 62	38.8	31 55.3	38 60	37.7	31 32.0	39 59	36.6	31 08.2	40 57	35.5	30 43.9	41 56	34.4	30 06.4	42 53	32.9	3
4	32 33.1	34 66	41.8	32 12.7	34 64	40.7	31 41.0	36 62	39.0	31 19.2	37 61	38.0	30 56.8	38 59	36.9	30 33.9	39 58	35.8	30 10.4	40 56	34.7	29 34.3	41 54	33.1	4
55	31 53.7	32 66	42.1	31 34.2	33 65	41.0	31 03.8	34 62	39.3	30 42.9	35 61	38.2	30 21.4	36 59	37.1	29 59.3	37 58	36.1	29 36.8	38 56	35.0	29 02.0	39 54	33.4	55
6	31 14.2	31 66	42.3	30 55.5	32 65	41.2	30 26.4	33 63	39.6	30 06.3	34 61	38.5	29 45.7	35 60	37.4	29 24.5	36 58	36.3	29 02.9	37 57	35.3	28 29.4	38 55	33.7	6
7	30 34.4	29 67	42.6	30 16.6	30 65	41.5	29 48.8	32 63	39.8	29 29.5	32 62	38.7	29 09.8	33 60	37.7	28 49.5	34 59	36.6	28 28.8	35 57	35.5	27 56.7	36 55	33.9	7
8	29 54.5	28 67	42.8	29 37.5	29 65	41.7	29 10.9	30 63	40.1	28 52.6	31 62	39.0	28 33.7	32 60	37.9	28 14.3	33 59	36.8	27 54.5	34 58	35.7	27 23.7	35 55	34.2	8
9	29 14.4	26 67	43.0	28 58.2	27 66	41.9	28 32.9	29 64	40.3	28 15.5	30 62	39.2	27 57.5	30 61	38.1	27 39.0	31 59	37.0	27 20.0	32 58	36.0	26 50.5	33 56	34.4	9
60	28 34.1	25 67	43.2	28 18.8	26 66	42.1	27 54.8	27 64	40.5	27 38.2	28 62	39.4	27 21.0	29 61	38.3	27 03.4	30 60	37.3	26 45.3	31 58	36.2	26 17.2	32 56	34.6	60
1	27 53.7	24 68	43.4	27 39.2	25 66	42.3	27 16.5	26 64	40.7	27 00.7	27 63	39.6	26 44.4	28 61	38.5	26 27.6	28 60	37.5	26 10.4	29 58	36.4	25 43.7	30 56	34.8	1
2	27 13.1	22 68	43.6	26 59.4	23 66	42.5	26 38.0	24 64	40.9	26 23.1	25 63	39.8	26 07.6	26 62	38.7	25 51.7	27 60	37.6	25 35.4	28 59	36.6	25 10.0	29 56	35.0	2
3	26 32.4	21 68	43.8	26 19.6	22 67	42.7	25 59.4	23 65	41.1	25 45.3	24 63	40.0	25 30.7	25 62	38.9	25 15.7	25 60	37.8	25 00.2	26 59	36.8	24 36.1	27 57	35.2	3
4	25 51.6	20 68	43.9	25 39.6	20 67	42.8	25 20.6	22 65	41.2	25 07.4	22 63	40.1	24 53.7	23 62	39.1	24 39.5	24 61	38.0	24 24.9	25 59	36.9	24 02.1	26 57	35.3	4
65	25 10.7	18 68	44.1	24 59.5	19 67	43.0	24 41.7	20 65	41.4	24 29.3	21 64	40.3	24 16.5	22 62	39.2	24 03.2	23 61	38.2	23 49.4	23 59	37.1	23 28.0	24 57	35.5	65
6	24 29.7	17 69	44.2	24 19.3	18 67	43.1	24 02.8	19 65	41.5	23 51.2	20 64	40.4	23 39.2	20 62	39.4	23 26.7	21 61	38.3	23 13.8	22 60	37.2	22 53.7	23 57	35.7	6
7	23 48.6	16 69	44.3	23 38.9	16 67	43.3	23 23.7	18 65	41.7	23 12.9	18 64	40.6	23 01.8	19 63	39.5	22 50.2	20 61	38.4	22 38.1	20 60	37.4	22 19.3	21 58	35.8	7
8	23 07.4	14 69	44.5	22 58.5	15 67	43.4	22 44.5	16 65	41.8	22 34.6	17 64	40.7	22 24.2	18 63	39.6	22 13.5	18 61	38.6	22 02.3	19 60	37.5	21 44.8	20 58	35.9	8
9	22 26.1	13 69	44.6	22 18.0	14 68	43.5	22 05.2	15 66	41.9	21 56.1	15 64	40.8	21 46.6	16 63	39.8	21 36.7	17 61	38.7	21 26.4	18 60	37.6	21 10.2	18 58	36.0	9
70	21 44.7	12 69	44.6	21 37.5	12 68	43.6	21 25.8	13 66	42.0	21 17.6	14 64	40.9	21 08.9	15 63	39.9	20 59.9	15 62	38.8	20 50.4	16 60	37.7	20 35.5	17 58	36.2	70
1	21 03.3	10 69	44.7	20 56.8	11 68	43.7	20 46.4	12 66	42.1	20 39.0	13 64	41.0	20 31.1	13 63	40.0	20 22.9	14 62	38.9	20 14.3	15 60	37.8	20 00.7	16 58	36.3	1
2	20 21.8	09 69	44.8	20 16.1	10 68	43.7	20 06.9	11 66	42.2	20 00.3	11 65	41.1	19 53.3	12 63	40.0	19 45.9	13 62	39.0	19 38.1	13 60	37.9	19 25.8	14 58	36.4	2
3	19 40.3	08 69	44.9	19 35.4	08 68	43.8	19 27.3	09 66	42.2	19 21.5	10 65	41.2	19 15.4	11 63	40.1	19 08.8	11 62	39.1	19 01.9	12 60	38.0	18 50.9	13 58	36.4	3
4	18 58.7	07 69	44.9	18 54.6	07 68	43.9	18 47.7	08 66	42.3	18 42.7	09 65	41.2	18 37.4	09 63	40.2	18 31.7	10 62	39.1	18 25.6	10 61	38.1	18 15.9	11 58	36.5	4
75	18 17.1	05 69	45.0	18 13.8	06 68	43.9	18 08.1	07 66	42.3	18 03.9	07 65	41.3	17 59.4	08 63	40.2	17 54.5	08 62	39.2	17 49.3	09 61	38.1	17 40.8	10 59	36.6	75
6	17 35.5	04 69	45.0	17 32.9	05 68	44.0	17 28.4	05 66	42.4	17 25.0	06 65	41.3	17 21.3	06 64	40.3	17 17.2	07 62	39.2	17 12.9	08 61	38.2	17 05.7	08 59	36.6	6
7	16 53.8	03 69	45.0	16 52.0	03 68	44.0	16 48.7	04 66	42.4	16 46.1	05 65	41.4	16 43.2	05 64	40.3	16 40.0	06 62	39.3	16 36.4	06 61	38.2	16 30.5	07 59	36.7	7
8	16 12.1	01 69	45.0	16 11.1	02 68	44.0	16 09.0	03 66	42.4	16 07.2	03 65	41.4	16 05.1	04 64	40.4	16 02.7	04 62	39.3	15 59.9	05 61	38.3	15 55.3	06 59	36.7	8
9	15 30.5	00 69	45.0	15 30.2	01 68	44.0	15 29.2	01 66	42.5	15 28.2	02 65	41.4	15 26.9	02 64	40.4	15 25.3	03 62	39.3	15 23.4	03 61	38.3	15 20.1	04 59	36.7	9
80	14 48.8	01 69	45.0	14 49.3	01 68	44.0	14 49.5	00 66	42.5	14 49.2	01 65	41.4	14 48.8	01 64	40.4	14 48.0	02 62	39.4	14 46.9	02 61	38.3	14 44.9	03 59	36.8	80
1	14 07.1	02 69	45.0	14 08.3	02 68	44.0	14 09.7	01 66	42.5	14 10.3	01 65	41.4	14 10.6	00 64	40.4	14 10.6	00 62	39.4	14 10.4	01 61	38.3	14 09.6	01 59	36.8	1
2	13 25.4	04 69	45.0	13 27.4	03 68	44.0	13 30.0	02 66	42.4	13 31.3	02 65	41.4	13 32.4	02 64	40.4	13 33.3	01 62	39.4	13 33.9	01 61	38.3	13 34.3	00 59	36.8	2
3	12 43.8	05 69	45.0	12 46.5	04 68	44.0	12 50.2	04 66	42.4	12 52.4	03 65	41.4	12 54.3	03 64	40.4	12 55.9	03 62	39.3	12 57.4	02 61	38.3	12 59.1	02 59	36.8	3
4	12 02.2	06 69	44.9	12 05.7	06 68	43.9	12 10.5	05 66	42.4	12 13.4	05 65	41.4	12 16.1	04 64	40.3	12 18.6	04 62	39.3	12 20.9	04 61	38.3	12 23.8	03 59	36.8	4
85	11 20.6	07 69	44.9	11 24.8	07 68	43.9	11 30.8	06 66	42.3	11 34.5	06 65	41.3	11 38.0	06 63	40.3	11 41.3	05 62	39.3	11 44.4	05 61	38.3	11 48.6	04 59	36.7	85
6	10 39.0	08 69	44.8	10 44.0	08 68	43.8	10 51.1	08 66	42.3	10 55.6	07 65	41.3	10 59.9	07 63	40.3	11 04.0	07 62	39.3	11 07.9	06 61	38.2	11 13.3	06 59	36.7	6
7	9 57.5	10 69	44.8	10 03.3	09 68	43.8	10 11.5	09 66	42.2	10 16.8	09 65	41.2	10 21.9	08 63	40.2	10 26.8	08 62	39.2	10 31.5	08 61	38.2	10 38.1	07 59	36.7	7
8	9 16.1	11 69	44.7	9 22.6	11 68	43.7	9 32.0	10 66	42.2	9 38.0	10 65	41.2	9 43.9	10 63	40.2	9 49.6	09 62	39.2	9 55.1	09 61	38.1	10 03.0	09 59	36.6	8
9	8 34.7	12 69	44.6	8 41.9	12 68	43.6	8 52.4	11 66	42.1	8 59.2	11 64	41.1	9 05.9	11 63	40.1	9 12.4	11 62	39.1	9 18.7	10 60	38.1	9 27.9	10 58	36.6	9
90	7 53.3	13 69	44.5	8 01.3	13 68	43.5	8 13.0	13 66	42.0	8 20.6	13 64	41.0	8 28.0	12 63	40.0	8 35.3	12 62	39.0	8 42.4	12 60	38.0	8 52.8	11 58	36.5	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	33 00.0	1.0 01	180.0	32 00.0	1.0 01	180.0	30 30.0	1.0 01	180.0	29 30.0	1.0 01	180.0	28 30.0	1.0 01	180.0	27 30.0	1.0 01	180.0	26 30.0	1.0 01	180.0	25 00.0	1.0 01	180.0	00
1	32 59.6	1.0 02	179.2	31 59.6	1.0 02	179.2	30 29.6	1.0 02	179.2	29 29.6	1.0 02	179.3	28 29.6	1.0 02	179.3	27 29.6	1.0 02	179.3	26 29.7	1.0 02	179.3	24 59.7	1.0 02	179.4	1
2	32 58.3	1.0 04	178.3	31 58.3	1.0 03	178.4	30 28.4	1.0 03	178.5	29 28.5	1.0 03	178.5	28 28.5	1.0 03	178.6	27 28.6	1.0 03	178.6	26 28.6	1.0 03	178.6	24 58.7	1.0 03	178.7	2
3	32 56.2	1.0 05	177.5	31 56.3	1.0 05	177.6	30 26.4	1.0 05	177.7	29 26.6	1.0 04	177.8	28 26.7	1.0 04	177.8	27 26.8	1.0 04	177.9	26 26.9	1.0 04	178.0	24 57.0	1.0 04	178.1	3
4	32 53.2	1.0 06	176.7	31 53.4	1.0 06	176.8	30 23.7	1.0 06	176.9	29 23.9	1.0 06	177.0	28 24.1	1.0 06	177.1	27 24.2	1.0 05	177.2	26 24.4	1.0 05	177.3	24 54.7	1.0 05	177.4	4
05	32 49.4	99 08	175.9	31 49.7	99 08	176.0	30 20.1	1.0 07	176.2	29 20.4	1.0 07	176.3	28 20.7	1.0 07	176.4	27 21.0	1.0 07	176.5	26 21.3	1.0 06	176.6	24 51.7	1.0 06	176.8	05
6	32 44.7	99 09	175.0	31 45.2	99 09	175.2	30 15.8	99 09	175.4	29 16.2	99 08	175.5	28 16.6	99 08	175.7	27 17.0	99 08	175.8	26 17.4	99 08	175.9	24 48.0	99 07	176.1	6
7	32 39.2	99 11	174.2	31 39.8	99 10	174.4	30 10.7	99 10	174.6	29 11.3	99 10	174.8	28 11.8	99 09	175.0	27 12.4	99 09	175.1	26 12.9	99 09	175.3	24 43.7	99 08	175.5	7
8	32 32.9	99 12	173.4	31 33.7	99 12	173.6	30 04.8	99 11	173.9	29 05.5	99 11	174.1	28 06.3	99 10	174.2	27 07.0	99 10	174.4	26 07.7	99 10	174.6	24 38.7	99 09	174.8	8
9	32 25.7	98 13	172.6	31 26.7	98 13	172.8	29 58.1	98 12	173.1	28 59.1	98 12	173.3	28 00.0	98 12	173.5	27 00.9	99 11	173.7	26 01.8	99 11	173.9	24 33.1	99 10	174.2	9
10	32 17.7	98 15	171.8	31 18.9	98 14	172.0	29 50.7	98 14	172.4	28 51.9	98 13	172.6	27 53.0	98 13	172.8	26 54.1	98 12	173.0	25 55.2	98 12	173.3	24 26.8	98 12	173.6	10
1	32 08.9	98 16	171.0	31 10.4	98 16	171.3	29 42.5	98 15	171.6	28 43.9	98 14	171.9	27 45.3	98 14	172.1	26 46.6	98 14	172.4	25 48.0	98 13	172.6	24 19.9	98 13	172.9	1
2	31 59.3	97 17	170.2	31 01.0	97 17	170.5	29 33.6	97 16	170.9	28 35.2	97 16	171.2	27 36.8	97 15	171.4	26 38.4	97 15	171.7	25 40.0	97 14	171.9	24 12.3	97 14	172.3	2
3	31 48.8	97 19	169.4	30 50.9	97 18	169.7	29 23.9	97 17	170.1	28 25.8	97 17	170.4	27 27.7	97 16	170.7	26 29.6	97 16	171.0	25 31.4	97 15	171.3	24 04.1	97 15	171.7	3
4	31 37.6	96 20	168.6	30 40.0	96 19	168.9	29 13.4	96 19	169.4	28 15.7	96 18	169.7	27 17.9	96 18	170.0	26 20.0	96 17	170.3	25 22.1	96 17	170.6	23 55.3	97 16	171.1	4
15	31 25.6	95 21	167.8	30 28.3	96 21	168.2	29 02.2	96 20	168.7	28 04.8	96 19	169.0	27 07.3	96 19	169.3	26 09.8	96 18	169.7	25 12.2	96 18	170.0	23 45.8	96 17	170.4	15
6	31 12.8	95 23	167.1	30 15.8	95 22	167.4	28 50.3	95 21	168.0	27 53.2	95 20	168.3	26 56.1	95 20	168.7	25 58.9	95 19	169.0	25 01.6	95 19	169.3	23 35.7	96 18	169.8	6
7	30 59.2	94 24	166.3	30 02.6	94 23	166.7	28 37.7	95 22	167.2	27 40.9	95 22	167.6	26 44.1	95 21	168.0	25 47.3	95 20	168.3	24 50.4	95 20	168.7	23 25.0	95 19	169.2	7
8	30 44.9	94 25	165.5	29 48.7	94 24	165.9	28 24.3	94 23	166.5	27 28.0	94 23	166.9	26 31.5	94 22	167.3	25 35.1	94 21	167.7	24 38.5	94 21	168.1	23 13.6	94 20	168.6	8
9	30 29.8	93 26	164.8	29 34.0	93 26	165.2	28 10.2	93 25	165.8	27 14.3	93 24	166.2	26 18.3	93 23	166.6	25 22.2	94 23	167.0	24 26.0	94 22	167.4	23 01.7	94 21	168.0	9
20	30 14.0	92 28	164.0	29 18.6	92 27	164.5	27 55.5	92 26	165.1	26 59.9	93 25	165.6	26 04.3	93 24	166.0	25 08.6	93 24	166.4	24 12.9	93 23	166.8	22 49.1	93 22	167.4	20
1	29 57.4	91 29	163.3	29 02.5	92 28	163.8	27 40.0	92 27	164.4	26 44.9	92 26	164.9	25 49.7	92 25	165.3	24 54.5	92 25	165.8	23 59.1	92 24	166.2	22 36.0	92 23	166.8	1
2	29 40.1	91 30	162.6	28 45.7	91 29	163.1	27 23.9	91 28	163.8	26 29.2	91 27	164.2	25 34.5	91 26	164.7	24 39.7	91 26	165.1	23 44.8	92 25	165.6	22 22.3	92 24	166.2	2
3	29 22.1	90 31	161.9	28 28.2	90 30	162.4	27 07.1	90 29	163.1	26 12.9	90 28	163.6	25 18.6	91 28	164.0	24 24.3	91 27	164.5	23 29.8	91 26	165.0	22 08.0	91 25	165.6	3
4	29 03.4	89 32	161.1	28 10.0	89 31	161.7	26 49.6	89 30	162.4	25 55.9	90 29	162.9	25 02.1	90 29	163.4	24 08.2	90 28	163.9	23 14.2	90 27	164.4	21 53.1	90 26	165.1	4
25	28 44.1	88 33	160.4	27 51.1	88 33	161.0	26 31.5	89 31	161.8	25 38.3	89 30	162.3	24 45.0	89 30	162.8	23 51.6	89 29	163.3	22 58.1	89 28	163.8	21 37.6	89 27	164.5	25
6	28 24.0	87 35	159.7	27 31.6	87 34	160.3	26 12.8	88 32	161.1	25 20.1	88 31	161.6	24 27.3	88 31	162.2	23 34.3	88 30	162.7	22 41.3	88 29	163.2	21 21.6	89 28	163.9	6
7	28 03.3	86 36	159.1	27 11.4	87 35	159.6	25 53.4	87 33	160.5	25 01.2	87 32	161.0	24 08.9	87 32	161.6	23 16.5	87 31	162.1	22 24.0	88 30	162.6	21 05.0	88 29	163.4	7
8	27 41.9	85 37	158.4	26 50.6	86 36	159.0	25 33.4	86 34	159.8	24 41.7	86 33	160.4	23 50.0	86 33	160.9	22 58.1	87 32	161.5	22 06.1	87 31	162.0	20 47.9	87 29	162.8	8
9	27 19.9	84 38	157.7	26 29.2	85 37	158.3	25 12.8	85 35	159.2	24 21.7	85 34	159.8	23 30.5	85 34	160.3	22 39.1	86 33	160.9	21 47.7	86 32	161.5	20 30.2	86 30	162.3	9
30	26 57.3	83 39	157.1	26 07.1	84 38	157.7	24 51.6	84 36	158.6	24 01.0	84 35	159.2	23 10.4	85 34	159.8	22 19.6	85 33	160.3	21 28.7	85 33	160.9	20 12.1	85 31	161.8	30
1	26 34.0	82 40	156.4	25 44.4	83 39	157.0	24 29.8	83 37	158.0	23 39.8	83 36	158.6	22 49.7	84 35	159.2	21 59.5	84 34	159.8	21 09.1	84 33	160.4	19 53.4	84 32	161.2	1
2	26 10.2	81 41	155.8	25 21.2	82 40	156.4	24 07.4	82 38	157.4	23 18.0	82 37	158.0	22 28.5	83 36	158.6	21 38.8	83 35	159.2	20 49.1	83 34	159.8	19 34.1	83 33	160.7	2
3	25 45.7	80 42	155.2	24 57.3	81 41	155.8	23 44.5	81 39	156.8	22 55.7	81 38	157.4	22 06.7	82 37	158.0	21 17.7	82 36	158.7	20 28.5	82 35	159.3	19 14.4	82 34	160.2	3
4	25 20.7	79 43	154.5	24 32.9	80 42	155.2	23 21.0	80 40	156.2	22 32.8	80 39	156.8	21 44.5	81 38	157.5	20 56.0	81 37	158.1	20 07.4	81 36	158.7	18 54.2	81 35	159.7	4
35	24 55.1	78 44	153.9	24 07.9	79 43	154.6	22 56.9	79 41	155.6	22 09.4	79 40	156.3	21 21.6	80 39	156.9	20 33.8	80 38	157.6	19 45.8	80 37	158.2	18 33.5	80 35	159.2	35
6	24 28.9	77 44	153.3	23 42.4	78 43	154.0	22 32.3	78 42	155.1	21 45.4	78 41	155.7	20 58.3	79 40	156.4	20 11.1	79 39	157.1	19 23.7	79 38	157.7	18 12.3	79 36	158.7	6
7	24 02.2	76 45	152.8	23 16.4	77 44	153.5	22 07.3	77 43	154.5	21 20.9	77 42	155.2	20 34.5	78 41	155.9	19 47.9	78 40	156.5	19 01.1	78 38	157.2	17 50.7	78 37	158.2	7
8	23 35.0	75 46	152.2	22 49.8	76 45	152.9	21 41.6	76 44	154.0	20 56.0	76 42	154.7	20 10.2	77 41	155.3	19 24.2	77 40	156.0	18 38.0	77 39	156.7	17 28.6	77 38	157.7	8
9	23 07.3	74 47	151.6	22 22.7	74 46	152.3	21 15.5	75 44	153.4	20 30.5	75 43	154.1	19 45.3	75 42	154.8	19 00.0	76 41	155.5	18 14.5	76 40	156.2	17 06.0	76 38	157.2	9
40	22 39.0	73 48	151.1	21 55.1	73 47	151.8	20 48.9	74 45	152.9	20 04.6	74 44	153.6	19 20.1	74 43	154.3	18 35.4	75 42	155.0	17 50.5	75 41	155.7	16 43.0	75 39	156.8	40
1	22 10.3	72 49	150.5	21 27.1	72 48	151.3	20 21.9	73 46	152.4	19 38.2	73 45	153.1	18 54.3	73 44	153.8	18 10.3	74 43	154.5	17 26.1	74 41	155.3	16 19.5	74 40	156.3	1
2	21 41.1	71 50	150.0	20 58.5	71 48	150.7	19 54.3	72 47	151.9	19 11.3	72 46	152.6	18 28.1	72 44	153.3	17 44.7	72 43	154.1	17 01.2	73 42	154.8	15 55.6	73 40	155.9	2
3	21 11.4	70 50	149.5	20 29.5	70 49	150.2	19 26.3	70 47	151.4	18 44.0	71 46	152.1	18 01.5	71 45	152.9	17 18.8	71 44	153.6	16 35.9	72 43	154.3	15 31.3	72 41	155.4	3
4	20 41.2	68 51	148.9	20 00.0	69 50	149.7	18 57.9	69 48	150.9	18 16.2	70 47	151.6	17 34.4	70 46	152.4	16 52.4	70 45	153.1	16 10.2	70 44	153.9	15 06.6	71 42	155.0	4
45	20 10.6	67 52	148.4	19 30.1	68 51	149.2	18 29.0	68 49	150.4	17 48.0	68 48	151.2	17 06.9	69 47	151.9	16 25.5	69 45	152.7	15 44.0	69 44	153.4	14 41.5	70 42	154.6	45
6	19 39.6	66 52	148.0	18 59.8	67 51	148.7	17 59.7	67 50	149.9	17 19.4	67 48	150.7	16 38.9	68 47	151.5	15 58.3	68 46	152.2	15 17.5	68 45	153.0	14 16.0	68 43	154.1	6
7	19 08.1	65 53	147.5	18 29.0	65 52	148.3	17 30.0	66 50	149.5	16 50.4	66 49	150.2	16 10.6	66 48	151.0	15 30.7	67 47	151.8	14 50.6	67 46	152.6	13 50.1	67 44	153.7	7
8	18 36.2	64 54	147.0	17 57.8	64 53	147.8	16 59.8	65 51	149.0	16 20.9	65 50	149.8	15 41.9	65 49	150.6	15 02.6	66 47	151.4	14 23.2	66 46	152.2	13 23.9	66 44	153.3	8
9	18 03.9	63 54	146.5	17 26.2	63 53	147.4	16 29.3	63 52	148.6	15 51.1	64 50	149.4	15 12.8	64 49	150.2	14 34.2	64 48	151.0	13 55.6	65 47	151.7	12 57.2	65 45	152.9	9
50	17 31.3	61 55	146.1	16 54.3	62 54	146.9	15 58.4	62 52	148.1	15 20.9	63 51	148.9	14 43.3	63 50	149.7	14 05.5	63 49	150.6	13 27.5	63 47	151.3	12 30.3	64 46	152.5	50
1	16 58.2	60 56	145.6	16 21.9	61 55	146.5	15 27.1	61 53	147.7	14 50.4	61 52	148.5	14 13.4	62 50	149.3	13 36.3	62 49	150.1	12 59.1	62 48	151.0	12 02.9	63 46	152.2	1
2	16 24.8	59 56	145.2	15 49.2	59 55	146.0	14 55.5	60 53	147.3	14 19.4	60 52	148.1	13 43.2	60 51	148.9	13 06.8	61 50	149.8	12 30.3	61 48	150.6	11 35.2	61 47	151.8	2
3	15 51.0	58 57	144.8	15 16.1	58 56	145.6	14 23.5	59 54	146.9	13 48.1	59 53	147.7	13 12.7	59 52	148.5	12 37.0	60 50	149.4	12 01.2	60 49	150.2	11 07.2	60 47	151.4	3
4	15 16.9	57 57	144.4	14 42.7	57 56	145.2	13 51.1	58 54	146.5	13 16.5	58 53	147.3	12 41.8	58 52	148.2	12 06.8	58 51	149.0	11 31.8	59 50	149.8	10 38.9	59 48	151.1	4
55	14 42.4	56 58	144.0	14 08.9	56 57	144.8	13 18.4	56 55	146.1	12 44.6	57 54	146.9	12 10.5	57 53	147.8	11 36.3	57 51	148.6	11 02.0	57 50	149.5	10 10.2	58 48	150.7	55
6	14 07.6	54 59	143.6	13 34.8	55 57	144.4	12 45.4	55 56	145.7	12 12.3	55 54	146.6	11 39.0	56 53	147.4	11 05.5	56 52	148.3	10 31.9	56 51	149.1	9 41.3	56 49	150.4	6
7	13 32.4	53 59	143.2	13 00.4	53 58	144.1	12 12.1	54 56	145.3	11 39.7	54 55	146.2	11 07.1	54 54	147.1	10 34.4	55 52	147.9	10 01.5	55 51	148.8	9 12.0	55 49	150.0	7
8	12 57.0	52 60	142.8	12 25.7	52 58	143.7	11 38.5	53 57	145.0	11 06.8	53 55	145.9	10 34.9	53 54	146.7	10 02.9	53 53	147.6	9 30.8	54 52	148.4	8 42.4	54 50	149.7	8
9	12 21.2	51 60	142.4	11 50.7	51 59	143.3	11 04.5	51 57	144.6	10 33.6	52 56	145.5	10 02.5	52 55	146.4	9 31.2	52 53	147.2	8 59.9	52 52	148.1	8 12.6	53 50	149.4	9
60	11 45.2	50 61	142.1	11 15.3	50 59	143.0	10 30.3	50 58	144.3	10 00.1	50 56	145.2	9 29.7	51 55	146.0	8 59.2	51 54	146.9	8 28.6	51 53	147.8	7 42.5	51 51	149.1	60
1	11 08.8	48 61	141.7	10 39.7	49 60	142.6	9 55.8	49 58	144.0	9 26.3	49 57	144.8	8 56.7	49 56	145.7	8 26.9	50 54	146.6	7 57.1	50 53	147.5	7 12.1	50 51	148.8	1
2	10 32.2	47 61	141.4	10 03.8	47 60	142.3	9 21.0	48 58	143.6	8 52.2	48 57	144.5	8 23.4	48 56	145.4	7 54.4	48 55	146.3	7 25.3	49 53	147.2	6 41.4	49 52	148.5	2
3	9 55.4	46 62	141.1	9 27.7	46 61	142.0	8 45.9	47 59	143.3	8 17.9	47 58	144.2	7 49.8	47 56	145.1	7 21.6	47 55	146.0	6 53.2	47 54	146.9	6 10.5	48 52	148.2	3
4	9 18.2	45 62	140.8	8 51.3	45 61	141.7	8 10.6	45 59	143.0	7 43.4	46 58	143.9	7 16.0	46 57	144.8	6 48.5	46 56	145.7	6 20.9	46 54	146.6	5 39.4	46 52	147.9	4
65	8 40.8	44 63	140.4	8 14.6	44 62	141.4	7 35.1	44 60	142.7	7 08.5	44 58	143.6	6 41.9	44 57	144.5	6 15.2	45 56	145.4	5 48.4	45 55	146.3	5 08.0	45 53	147.7	65
6	8 03.2	42 63	140.1	7 37.7	43 62	141.1	6 59.2	43 60	142.4	6 33.5	43 59	143.3	6 07.6	43 58	144.2	5 41.7	43 56	145.1	5 15.6	43 55	146.0				6
7	7 25.3	41 64	139.8	7 00.6	41 62	140.8	6 23.2	42 60	142.1	5 58.2	42 59	143.1	5 33.1	42 58	144.0	5 07.9	42 57	144.9							7
8	6 47.2	40 64	139.6	6 23.2	40 63	140.5	5 47.0	40 61	141.9	5 22.7	41 60	142.8													8
9	6 08.9	39 64	139.3	5 45.6	39 63	140.2	5 10.5	39 61	141.6																9
70	5 30.4	38 64	139.0	5 07.8	38 63	140.0																			70

DECLINATION SAME NAME AS LATITUDE

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	7 12.1	15 69	44.4	7 20.8	14 67	43.4	7 33.6	14 66	41.9	7 41.9	14 64	40.9	7 50.2	14 63	39.9	7 58.2	13 62	38.9	8 06.2	13 60	37.9	8 17.8	13 58	36.4	91
2	6 30.9	16 69	44.3	6 40.3	16 67	43.3	6 54.2	15 65	41.8	7 03.4	15 64	40.8	7 12.4	15 63	39.8	7 21.3	15 62	38.9	7 30.0	14 60	37.9	7 42.8	14 58	36.4	2
3	5 49.8	17 68	44.2	5 59.9	17 67	43.2	6 15.0	17 65	41.7	6 24.9	16 64	40.7	6 34.7	16 63	39.7	6 44.3	16 61	38.8	6 53.9	16 60	37.8	7 08.0	15 58	36.3	3
4	5 08.7	18 68	44.1	5 19.7	18 67	43.1	5 35.8	18 65	41.6	5 46.5	18 64	40.6	5 57.1	18 63	39.6	6 07.5	17 61	38.6	6 17.9	17 60	37.7	6 33.2	17 58	36.2	4
95										5 08.2	19 64	40.5	5 19.5	19 62	39.5	5 30.8	19 61	38.5	5 41.9	18 60	37.6	5 58.4	18 58	36.1	95
6																			5 06.1	20 60	37.4	5 23.8	20 58	36.0	6

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	46 30.0	1.0 01	00.0	46 00.0	1.0 01	00.0	45 00.0	1.0 01	00.0	44 30.0	1.0 01	00.0	44 00.0	1.0 01	00.0	43 30.0	1.0 01	00.0	42 00.0	1.0 01	00.0	41 30.0	1.0 01	00.0	00
1	46 29.6	1.0 02	00.8	45 59.6	1.0 02	00.8	44 59.6	1.0 02	00.8	44 29.6	1.0 02	00.8	43 59.6	1.0 02	00.8	43 29.6	1.0 02	00.7	41 59.6	1.0 02	00.7	41 29.7	1.0 02	00.7	1
2	46 28.3	1.0 04	01.7	45 58.3	1.0 04	01.7	44 58.4	1.0 03	01.6	44 28.4	1.0 03	01.5	43 58.4	1.0 03	01.5	43 28.5	1.0 03	01.5	41 58.6	1.0 03	01.4	41 28.6	1.0 03	01.4	2
3	46 26.1	1.0 05	02.5	45 56.2	1.0 05	02.5	44 56.3	1.0 05	02.4	44 26.4	1.0 05	02.3	43 56.5	1.0 05	02.3	43 26.6	1.0 04	02.2	41 56.8	1.0 04	02.1	41 26.9	1.0 04	02.0	3
4	46 23.1	1.0 06	03.4	45 53.2	1.0 06	03.3	44 53.5	1.0 06	03.2	44 23.6	1.0 06	03.1	43 53.8	1.0 06	03.0	43 23.9	1.0 06	03.0	41 54.3	1.0 05	02.8	41 24.4	1.0 05	02.7	4
05	46 19.2	99 08	04.2	45 49.4	99 08	04.1	44 49.9	99 07	03.9	44 20.1	99 07	03.9	43 50.3	99 07	03.8	43 20.5	99 07	03.7	41 51.1	99 06	03.5	41 21.3	99 06	03.4	05
6	46 14.4	99 09	05.0	45 44.8	99 09	04.9	44 45.4	99 09	04.7	44 15.7	99 09	04.6	43 46.0	99 08	04.5	43 16.3	99 08	04.4	41 47.2	99 08	04.1	41 17.5	99 08	04.0	6
7	46 08.8	98 11	05.9	45 39.3	99 10	05.7	44 40.2	99 10	05.5	44 10.6	99 10	05.4	43 41.0	99 10	05.3	43 11.4	99 09	05.2	41 42.6	99 09	04.8	41 13.0	99 09	04.7	7
8	46 02.4	98 12	06.7	45 33.0	98 12	06.5	44 34.1	98 11	06.3	44 04.7	98 11	06.1	43 35.2	98 11	06.0	43 05.8	98 11	05.9	41 37.3	98 10	05.5	41 07.8	98 10	05.4	8
9	45 55.1	98 14	07.5	45 25.9	98 13	07.3	44 27.3	98 13	07.0	43 58.0	98 12	06.9	43 28.7	98 12	06.7	42 59.4	98 12	06.6	41 31.3	98 11	06.2	41 01.9	98 11	06.0	9
10	45 47.0	97 15	08.3	45 17.9	97 15	08.1	44 19.7	97 14	07.8	43 50.6	97 14	07.6	43 21.4	97 13	07.5	42 52.2	97 13	07.3	41 24.6	97 12	06.8	40 55.4	97 12	06.7	10
1	45 38.1	96 16	09.1	45 09.2	96 16	08.9	44 11.3	97 15	08.6	43 42.3	97 15	08.4	43 13.4	97 15	08.2	42 44.4	97 14	08.0	41 17.3	97 13	07.5	40 48.2	97 13	07.4	1
2	45 28.4	96 18	09.9	44 59.7	96 17	09.7	44 02.2	96 16	09.3	43 33.4	96 16	09.1	43 04.6	96 16	08.9	42 35.8	96 16	08.7	41 09.2	96 15	08.2	40 40.3	96 14	08.0	2
3	45 17.8	95 19	10.7	44 49.3	95 18	10.5	43 52.3	95 18	10.0	43 23.7	95 17	09.8	42 55.1	95 17	09.6	42 26.5	95 17	09.4	41 00.5	96 16	08.8	40 31.8	96 15	08.6	3
4	45 06.5	94 20	11.5	44 38.2	94 20	11.2	43 41.6	94 19	10.8	43 13.3	95 19	10.6	42 44.9	95 18	10.3	42 16.5	95 18	10.1	40 51.1	95 17	09.5	40 22.7	95 16	09.3	4
15	44 54.4	93 21	12.3	44 26.4	93 21	12.0	43 30.2	94 20	11.5	43 02.1	94 20	11.3	42 34.0	94 19	11.0	42 05.8	94 19	10.8	40 41.1	94 18	10.1	40 12.8	94 17	09.9	15
6	44 41.5	92 23	13.0	44 13.7	93 22	12.7	43 18.1	93 21	12.2	42 50.2	93 21	12.0	42 22.3	93 21	11.7	41 54.4	93 20	11.5	40 30.4	93 19	10.8	40 02.4	94 18	10.5	6
7	44 27.9	92 24	13.8	44 00.4	92 24	13.5	43 05.3	92 23	12.9	42 37.7	92 22	12.7	42 10.0	92 22	12.4	41 42.4	92 21	12.1	40 19.1	93 20	11.4	39 51.3	93 20	11.1	7
8	44 13.5	91 25	14.5	43 46.3	91 25	14.2	42 51.7	91 24	13.6	42 24.4	91 23	13.4	41 57.0	91 23	13.1	41 29.6	91 22	12.8	40 07.2	92 21	12.0	39 39.6	92 20	11.8	8
9	43 58.4	90 26	15.2	43 31.5	90 26	14.9	42 37.5	90 25	14.3	42 10.5	90 24	14.0	41 43.4	90 24	13.7	41 16.3	91 23	13.5	39 54.6	91 22	12.6	39 27.3	91 22	12.4	9
20	43 42.5	89 28	15.9	43 16.0	89 27	15.6	42 22.6	89 26	15.0	41 55.9	89 25	14.7	41 29.1	89 25	14.4	41 02.2	90 24	14.1	39 41.4	90 23	13.2	39 14.4	90 22	13.0	20
1	43 26.0	87 29	16.7	42 59.7	88 28	16.3	42 07.0	88 27	15.7	41 40.6	88 27	15.4	41 14.1	88 26	15.0	40 47.6	89 25	14.7	39 27.7	89 24	13.8	39 00.9	89 23	13.5	1
2	43 08.8	86 30	17.3	42 42.8	87 29	17.0	41 50.8	87 28	16.3	41 24.7	87 28	16.0	40 58.5	87 27	15.7	40 32.3	88 26	15.4	39 13.3	88 25	14.4	38 46.8	88 24	14.1	2
3	42 50.9	85 31	18.0	42 25.3	85 30	17.7	41 33.9	86 29	17.0	41 08.1	86 29	16.6	40 42.3	86 28	16.3	40 16.4	86 28	16.0	38 58.3	87 26	15.0	38 32.2	87 25	14.7	3
4	42 32.3	84 32	18.7	42 07.1	84 31	18.3	41 16.4	85 30	17.6	40 50.9	85 30	17.3	40 25.4	85 29	16.9	39 59.9	85 28	16.6	38 42.8	86 27	15.6	38 17.0	86 26	15.2	4
25	42 13.1	83 33	19.4	41 48.3	83 32	19.0	40 58.3	84 31	18.2	40 33.2	84 31	17.9	40 08.0	84 30	17.5	39 42.8	84 29	17.2	38 26.7	85 28	16.1	38 01.2	85 27	15.8	25
6	41 53.3	82 34	20.0	41 28.8	82 33	19.6	40 39.5	82 32	18.9	40 14.8	83 32	18.5	39 50.0	83 31	18.1	39 25.1	83 30	17.8	38 10.1	84 29	16.7	37 44.9	84 28	16.3	6
7	41 32.9	80 35	20.6	41 08.7	81 34	20.2	40 20.2	81 33	19.5	39 55.8	81 33	19.1	39 31.4	82 32	18.7	39 06.9	82 31	18.3	37 52.9	83 30	17.2	37 28.1	83 29	16.9	7
8	41 11.8	79 36	21.2	40 48.1	79 35	20.8	40 00.3	80 34	20.0	39 36.3	80 33	19.7	39 12.2	80 33	19.3	38 48.1	81 32	18.9	37 35.2	81 30	17.8	37 10.7	82 30	17.4	8
9	40 50.2	78 37	21.8	40 26.8	78 36	21.4	39 39.8	79 35	20.6	39 16.2	79 34	20.2	38 52.5	79 34	19.8	38 28.7	79 33	19.4	37 16.9	80 31	18.3	36 52.9	80 31	17.9	9
30	40 28.0	76 38	22.4	40 05.0	77 37	22.0	39 18.8	77 36	21.2	38 55.6	78 35	20.8	38 32.3	78 35	20.4	38 08.9	78 34	20.0	36 58.2	79 32	18.8	36 34.5	79 31	18.4	30
1	40 05.2	75 39	23.0	39 42.7	75 38	22.6	38 57.3	76 37	21.7	38 34.4	76 36	21.3	38 11.5	77 35	20.9	37 48.5	77 35	20.5	36 39.0	78 33	19.3	36 15.6	78 32	18.9	1
2	39 42.0	74 40	23.6	39 19.8	74 39	23.1	38 35.2	75 38	22.3	38 12.8	75 37	21.9	37 50.2	75 36	21.4	37 27.6	76 36	21.0	36 19.3	76 34	19.8	35 56.3	77 33	19.4	2
3	39 18.1	72 41	24.1	38 56.4	73 40	23.7	38 12.6	73 38	22.8	37 50.6	74 38	22.4	37 28.5	74 37	21.9	37 06.2	74 36	21.5	35 59.1	75 34	20.3	35 36.5	75 34	19.9	3
4	38 53.8	71 41	24.7	38 32.5	71 41	24.2	37 49.5	72 39	23.3	37 27.9	72 39	22.9	37 06.2	73 38	22.4	36 44.4	73 37	22.0	35 38.4	74 35	20.8	35 16.3	74 34	20.3	4
35	38 29.0	69 42	25.2	38 08.1	70 41	24.7	37 26.0	71 40	23.8	37 04.8	71 39	23.4	36 43.5	71 39	22.9	36 22.1	71 38	22.5	35 17.3	72 36	21.2	34 55.6	73 35	20.8	35
6	38 03.7	68 43	25.7	37 43.2	68 42	25.2	37 02.0	69 41	24.3	36 41.2	69 40	23.9	36 20.3	70 39	23.4	35 59.3	70 39	23.0	34 55.8	71 37	21.7	34 34.4	71 36	21.2	6
7	37 37.9	67 44	26.2	37 17.9	67 43	25.7	36 37.5	68 42	24.8	36 17.1	68 41	24.3	35 56.7	68 40	23.9	35 36.1	69 39	23.4	34 33.8	70 37	22.1	34 12.9	70 37	21.7	7
8	37 11.7	65 44	26.7	36 52.1	66 44	26.2	36 12.6	66 42	25.3	35 52.6	67 42	24.8	35 32.6	67 41	24.3	35 12.5	67 40	23.9	34 11.5	68 38	22.5	33 50.9	69 37	22.1	8
9	36 45.1	64 45	27.1	36 25.9	64 44	26.7	35 47.2	65 43	25.7	35 27.7	65 42	25.2	35 08.1	66 41	24.8	34 48.4	66 41	24.3	33 48.7	67 39	23.0	33 28.6	67 38	22.5	9
40	36 18.0	62 46	27.6	35 59.3	63 45	27.1	35 21.5	63 44	26.2	35 02.4	64 43	25.7	34 43.2	64 42	25.2	34 24.0	64 41	24.7	33 25.5	65 39	23.4	33 05.8	66 39	22.9	40
1	35 50.5	61 46	28.0	35 32.2	61 46	27.5	34 55.3	62 44	26.6	34 36.7	62 44	26.1	34 18.0	63 43	25.6	33 59.1	63 42	25.2	33 02.0	64 40	23.8	32 42.7	64 39	23.3	1
2	35 22.6	59 47	28.5	35 04.8	60 46	28.0	34 28.8	60 45	27.0	34 10.6	61 44	26.5	33 52.3	61 43	26.0	33 33.9	62 43	25.6	32 38.0	63 40	24.2	32 19.2	63 40	23.7	2
3	34 54.4	58 48	28.9	34 37.0	58 47	28.4	34 01.9	59 45	27.4	33 44.1	59 45	26.9	33 26.3	60 44	26.4	33 08.3	60 43	26.0	32 13.8	61 41	24.5	31 55.4	61 40	24.1	3
4	34 25.8	56 48	29.3	34 08.8	57 48	28.8	33 34.6	57 46	27.8	33 17.3	58 45	27.3	32 59.9	58 45	26.8	32 42.4	59 44	26.3	31 49.1	60 42	24.9	31 31.2	60 41	24.4	4
45	33 56.8	55 49	29.7	33 40.3	55 48	29.2	33 06.9	56 47	28.2	32 50.1	56 46	27.7	32 33.1	57 45	27.2	32 16.1	57 44	26.7	31 24.2	58 42	25.3	31 06.7	59 41	24.8	45
6	33 27.5	53 49	30.0	33 11.4	54 49	29.5	32 39.0	54 47	28.5	32 22.6	55 46	28.0	32 06.1	55 46	27.5	31 49.4	56 45	27.1	30 58.9	57 43	25.6	30 41.8	57 42	25.1	6
7	32 57.8	52 50	30.4	32 42.2	52 49	29.9	32 10.7	53 48	28.9	31 54.7	53 47	28.4	31 38.7	54 46	27.9	31 22.5	54 45	27.4	30 33.3	55 43	25.9	30 16.6	56 42	25.5	7
8	32 27.8	50 50	30.8	32 12.7	51 50	30.3	31 42.1	51 48	29.2	31 26.6	52 47	28.7	31 10.9	52 47	28.2	30 55.2	53 46	27.7	30 07.4	54 44	26.3	29 51.2	54 43	25.8	8
9	31 57.6	49 51	31.1	31 42.9	49 50	30.6	31 13.1	50 49	29.6	30 58.1	50 48	29.1	30 42.9	51 47	28.6	30 27.7	51 46	28.1	29 41.1	52 44	26.6	29 25.4	53 43	26.1	9
50	31 27.0	47 51	31.4	31 12.8	48 51	30.9	30 43.9	48 49	29.9	30 29.3	49 48	29.4	30 14.6	49 48	28.9	29 59.8	50 47	28.4	29 14.7	51 45	26.9	28 59.4	51 44	26.4	50
1	30 56.1	46 52	31.7	30 42.4	46 51	31.2	30 14.4	47 50	30.2	30 00.3	47 49	29.7	29 46.0	48 48	29.2	29 31.7	48 47	28.7	28 47.9	49 45	27.2	28 33.1	50 44	26.7	1
2	30 25.0	44 52	32.0	30 11.7	45 52	31.5	29 44.7	45 50	30.5	29 31.0	46 49	30.0	29 17.2	46 49	29.5	29 03.3	47 48	29.0	28 20.9	48 45	27.5	28 06.5	48 45	27.0	2
3	29 53.6	43 53	32.3	29 40.8	43 52	31.8	29 14.7	44 50	30.8	29 01.4	44 50	30.3	28 48.1	45 49	29.8	28 34.6	45 48	29.3	27 53.6	46 46	27.7	27 39.7	47 45	27.2	3
4	29 22.0	41 53	32.6	29 09.6	42 52	32.1	28 44.4	42 51	31.1	28 31.6	43 50	30.5	28 18.7	43 49	30.0	28 05.7	44 49	29.5	27 26.0	45 46	28.0	27 12.6	45 46	27.5	4
55	28 50.1	40 53	32.9	28 38.2	40 53	32.4	28 13.9	41 51	31.3	28 01.6	41 50	30.8	27 49.1	42 50	30.3	27 36.6	42 49	29.8	26 58.3	43 47	28.3	26 45.3	43 46	27.7	55
6	28 18.0	38 54	33.1	28 06.5	39 53	32.6	27 43.2	39 52	31.6	27 31.3	40 51	31.1	27 19.3	40 50	30.5	27 07.2	40 49	30.0	26 30.3	42 47	28.5	26 17.7	42 46	28.0	6
7	27 45.7	37 54	33.4	27 34.7	37 53	32.9	27 12.2	38 52	31.8	27 00.8	38 51	31.3	26 49.3	39 50	30.8	26 37.6	39 50	30.3	26 02.1	40 47	28.7	25 50.0	40 47	28.2	7
8	27 13.2	35 55	33.6	27 02.6	36 54	33.1	26 41.0	36 52	32.1	26 30.1	37 52	31.5	26 19.0	37 51	31.0	26 07.8	37 50	30.5	25 33.7	39 48	29.0	25 22.0	39 47	28.4	8
9	26 40.5	34 55	33.9	26 30.3	34 54	33.3	26 09.7	35 53	32.3	25 59.2	35 52	31.8	25 48.6	36 51	31.2	25 37.9	36 50	30.7	25 05.0	37 48	29.2	24 53.9	37 47	28.7	9
60	26 07.6	32 55	34.1	25 57.9	33 54	33.5	25 38.1	33 53	32.5	25 28.1	34 52	32.0	25 17.9	34 51	31.4	25 07.7	34 51	30.9	24 36.2	35 48	29.4	24 25.5	36 48	28.9	60
1	25 34.5	31 55	34.3	25 25.3	31 55	33.7	25 06.4	32 53	32.7	24 56.8	32 52	32.2	24 47.1	33 52	31.6	24 37.3	33 51	31.1	24 07.3	34 49	29.6	23 57.0	34 48	29.1	1
2	25 01.3	29 56	34.5	24 52.5	30 55	33.9	24 34.5	30 53	32.9	24 25.4	31 53	32.4	24 16.1	31 52	31.8	24 06.8	31 51	31.3	23 38.1	32 49	29.8	23 28.3	33 48	29.2	2
3	24 27.9	28 56	34.6	24 19.5	28 55	34.1	24 02.5	29 54	33.1	23 53.8	29 53	32.5	23 45.0	29 52	32.0	23 36.1	30 51	31.5	23 08.8	31 49	29.9	22 59.5	31 48	29.4	3
4	23 54.3	26 56	34.8	23 46.4	27 55	34.3	23 30.3	27 54	33.2	23 22.0	28 53	32.7	23 13.7	28 52	32.2	23 05.2	28 52	31.7	22 39.3	29 49	30.1	22 30.5	30 49	29.6	4
65	23 20.6	25 56	35.0	23 13.2	25 56	34.4	22 57.9	26 54	33.4	22 50.1	26 53	32.9	22 42.2	26 53	32.3	22 34.3	27 52	31.8	22 09.7	28 50	30.3	22 01.3	28 49	29.7	65
6	22 46.8	23 57	35.1	22 39.8	24 56	34.6	22 25.4	24 54	33.5	22 18.1	25 54	33.0	22 10.7	25 53	32.5	22 03.1	25 52	32.0	21 39.9	26 50	30.4	21 32.0	27 49	29.9	6
7	22 12.9	22 57	35.3	22 06.3	22 56	34.7	21 52.8	23 55	33.7	21 45.9	23 54	33.2	21 39.0	23 53	32.6	21 31.9	24 52	32.1	21 10.1	25 50	30.6	21 02.6	25 49	30.0	7
8	21 38.8	20 57	35.4	21 32.7	21 56	34.9	21 20.1	21 55	33.8	21 13.7	22 54	33.3	21 07.1	22 53	32.8	21 00.5	22 52	32.3	20 40.1	23 50	30.7	20 33.1	23 49	30.2	8
9	21 04.6	19 57	35.5	20 58.9	19 56	35.0	20 47.2	20 55	33.9	20 41.3	20 54	33.4	20 35.2	20 53	32.9	20 29.0	21 53	32.4	20 09.9	22 50	30.8	20 03.4	22 50	30.3	9
70	20 30.4	17 57	35.6	20 25.1	18 57	35.1	20 14.3	18 55	34.1	20 08.8	19 54	33.5	20 03.1	19 54	33.0	19 57.4	19 53	32.5	19 39.7	20 51	30.9	19 33.6	20 50	30.4	70
1	19 56.0	16 57	35.7	19 51.2	16 57	35.2	19 41.3	17 55	34.2	19 36.2	17 54	33.6	19 31.0	17 54	33.1	19 25.7	18 53	32.6	19 09.4	19 51	31.0	19 03.8	19 50	30.5	1
2	19 21.6	14 58	35.8	19 17.2	15 57	35.3	19 08.2	15 55	34.3	19 03.5	16 55	33.7	18 58.8	16 54	33.2	18 54.0	16 53	32.7	18 39.0	17 51	31.1	18 33.8	17 50	30.6	2
3	18 47.0	13 58	35.9	18 43.1	13 57	35.4	18 35.0	14 55	34.3	18 30.8	14 55	33.8	18 26.5	14 54	33.3	18 22.1	15 53	32.8	18 08.5	16 51	31.2	18 03.8	16 50	30.7	3
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75	17 37.8	10 58	36.1	17 34.8	10 57	35.5	17 28.4	11 56	34.5	17 25.1	11 55	34.0	17 21.7	11 54	33.4	17 18.2	12 53	32.9	17 07.3	13 51	31.4	17 03.5	13 50	30.9	75
6	17 03.1	09 58	36.1	17 00.5	09 57	35.6	16 55.0	09 56	34.6	16 52.1	10 55	34.0	16 49.2	10 54	33.5	16 46.2	10 53	33.0	16 36.6	11 51	31.4	16 33.3	11 50	30.9	6
7	16 28.4	07 58	36.2	16 26.2	07 57	35.6	16 21.6	08 56	34.6	16 19.2	08 55	34.1	16 16.7	08 54	33.6	16 14.1	09 54	33.0	16 05.9	09 51	31.5	16 03.0	10 51	31.0	7
8	15 53.6	06 58	36.2	15 51.9	06 57	35.7	15 48.1	06 56	34.6	15 46.1	07 55	34.1	15 44.1	07 54	33.6	15 41.9	07 54	33.1	15 35.1	08 51	31.5	15 32.7	08 51	31.0	8
9	15 18.8	04 58	36.2	15 17.5	05 57	35.7	15 14.6	05 56	34.7	15 13.1	05 55	34.2	15 11.5	06 54	33.6	15 09.8	06 54	33.1	15 04.3	06 51	31.6	15 02.3	07 51	31.1	9
80	14 44.0	03 58	36.3	14 43.1	03 57	35.7	14 41.1	04 56	34.7	14 40.0	04 55	34.2	14 38.8	04 54	33.7	14 37.6	04 54	33.2	14 33.4	05 51	31.6	14 31.9	05 51	31.1	80
1	14 09.2	01 58	36.3	14 08.7	02 57	35.7	14 07.6	02 56	34.7	14 06.9	02 55	34.2	14 06.2	03 54	33.7	14 05.4	03 54	33.2	14 02.6	03 52	31.6	14 01.5	04 51	31.1	1
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3	12 59.5	01 58	36.3	12 59.9	01 57	35.8	13 00.5	01 56	34.7	13 00.7	01 55	34.2	13 00.8	00 54	33.7	13 00.9	00 54	33.2	13 00.8	00 52	31.6	13 00.6	01 51	31.1	3
4	12 24.7	03 58	36.3	12 25.5	03 57	35.7	12 26.9	02 56	34.7	12 27.6	02 55	34.2	12 28.1	02 54	33.7	12 28.7	02 54	33.2	12 29.9	01 52	31.6	12 30.2	01 51	31.1	4
85	11 49.8	04 58	36.2	11 51.1	04 57	35.7	11 53.4	04 56	34.7	11 54.5	03 55	34.2	11 55.5	03 54	33.7	11 56.4	03 54	33.2	11 59.0	03 51	31.6	11 59.7	02 51	31.1	85
6	11 15.0	06 58	36.2	11 16.7	06 57	35.7	11 19.9	05 56	34.7	11 21.4	05 55	34.2	11 22.8	05 54	33.7	11 24.2	05 54	33.1	11 28.1	04 51	31.6	11 29.3	04 51	31.1	6
7	10 40.3	07 58	36.2	10 42.4	07 57	35.7	10 46.4	07 56	34.6	10 48.3	06 55	34.1	10 50.2	06 54	33.6	10 52.0	06 54	33.1	10 57.2	06 51	31.6	10 58.9	05 51	31.1	7
8	10 05.5	08 58	36.1	10 08.0	08 57	35.6	10 12.9	08 56	34.6	10 15.3	08 55	34.1	10 17.6	08 54	33.6	10 19.9	07 54	33.1	10 26.4	07 51	31.6	10 28.5	07 51	31.1	8
9	9 30.8	10 58	36.1	9 33.8	10 57	35.6	9 39.5	09 56	34.6	9 42.3	09 55	34.0	9 45.0	09 54	33.5	9 47.7	09 54	33.0	9 55.6	08 51	31.5	9 58.1	08 51	31.0	9
90	8 56.2	11 58	36.0	8 59.5	11 57	35.5	9 06.1	11 56	34.5	9 09.3	11 55	34.0	9 12.5	11 54	33.5	9 15.6	10 53	33.0	9 24.8	10 51	31.5	9 27.8	10 50	31.0	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	24 30.0	1.0 01	180.0	24 00.0	1.0 01	180.0	23 00.0	1.0 01	180.0	22 30.0	1.0 00	180.0	22 00.0	1.0 00	180.0	21 30.0	1.0 00	180.0	20 00.0	1.0 00	180.0	19 30.0	1.0 00	180.0	*00*
1	24 29.7	1.0 02	179.4	23 59.7	1.0 02	179.4	22 59.7	1.0 02	179.4	22 29.7	1.0 02	179.4	21 59.7	1.0 02	179.4	21 29.7	1.0 01	179.4	19 59.7	1.0 01	179.5	19 29.7	1.0 01	179.5	*1*
2	24 28.7	1.0 03	178.7	23 58.7	1.0 03	178.7	22 58.8	1.0 03	178.8	22 28.8	1.0 03	178.8	21 58.8	1.0 03	178.8	21 28.8	1.0 02	178.8	19 58.9	1.0 02	178.9	19 28.9	1.0 02	178.9	*2*
3	24 27.0	1.0 04	178.1	23 57.1	1.0 04	178.1	22 57.2	1.0 04	178.2	22 27.2	1.0 04	178.2	21 57.3	1.0 04	178.2	21 27.3	1.0 03	178.3	19 57.5	1.0 03	178.4	19 27.5	1.0 03	178.4	*3*
4	24 24.8	1.0 05	177.5	23 54.8	1.0 05	177.5	22 55.0	1.0 05	177.6	22 25.1	1.0 05	177.6	21 55.2	1.0 04	177.7	21 25.3	1.0 04	177.7	19 55.5	1.0 04	177.8	19 25.6	1.0 04	177.8	*4*
05	24 21.8	1.0 06	176.8	23 51.9	1.0 06	176.9	22 52.2	1.0 06	177.0	22 22.3	1.0 06	177.0	21 52.5	1.0 06	177.1	21 22.6	1.0 05	177.1	19 53.0	1.0 05	177.3	19 23.1	1.0 05	177.3	*05*
6	24 18.2	99 07	176.2	23 48.4	99 07	176.2	22 48.8	99 07	176.4	22 19.0	99 07	176.4	21 49.1	99 07	176.5	21 19.3	99 06	176.5	19 49.9	99 06	176.7	19 20.1	99 06	176.8	*6*
7	24 14.0	99 08	175.5	23 44.2	99 08	175.6	22 44.7	99 08	175.8	22 15.0	99 08	175.8	21 45.2	99 08	175.9	21 15.5	99 07	176.0	19 46.2	99 07	176.2	19 16.5	99 07	176.2	*7*
8	24 09.1	99 09	174.9	23 39.4	99 09	175.0	22 40.1	99 09	175.2	22 10.4	99 09	175.2	21 40.7	99 08	175.3	21 11.1	99 08	175.4	19 42.0	99 08	175.6	19 12.3	99 08	175.7	*8*
9	24 03.5	99 10	174.3	23 34.0	99 10	174.4	22 34.8	99 10	174.6	22 05.2	99 10	174.7	21 35.6	99 10	174.7	21 06.0	99 09	174.8	19 37.3	99 09	175.1	19 07.7	99 09	175.2	*9*
10	23 57.4	98 11	173.7	23 27.9	98 11	173.8	22 28.9	98 11	174.0	21 59.4	98 11	174.1	21 29.9	98 10	174.2	21 00.4	98 10	174.3	19 31.9	98 10	174.6	19 02.4	98 10	174.7	*10*
1	23 50.5	98 12	173.0	23 21.2	98 12	173.2	22 22.4	98 12	173.4	21 53.0	98 12	173.5	21 23.7	98 11	173.6	20 54.3	98 11	173.7	19 26.1	98 11	174.0	18 56.7	98 10	174.1	*1*
2	23 43.1	97 13	172.4	23 13.8	98 13	172.5	22 15.3	98 13	172.8	21 46.1	98 13	172.9	21 16.8	98 12	173.0	20 47.5	98 12	173.1	19 19.7	98 12	173.5	18 50.4	98 11	173.6	*2*
3	23 35.0	97 14	171.8	23 05.9	97 14	171.9	22 07.6	97 14	172.2	21 38.5	97 14	172.3	21 09.3	97 13	172.5	20 40.2	97 13	172.6	19 12.7	97 12	173.0	18 43.5	97 12	173.1	*3*
4	23 26.3	97 16	171.2	22 57.3	97 15	171.3	21 59.3	97 15	171.6	21 30.3	97 15	171.7	21 01.3	97 14	171.9	20 32.3	97 14	172.0	19 05.2	97 13	172.4	18 36.2	97 13	172.6	*4*
15	23 17.0	96 17	170.6	22 48.1	96 16	170.7	21 50.4	96 16	171.0	21 21.6	96 16	171.2	20 52.7	96 15	171.3	20 23.8	96 15	171.5	18 57.2	96 14	171.9	18 28.3	96 14	172.0	*15*
6	23 07.0	96 18	170.0	22 38.3	96 17	170.1	21 41.0	96 17	170.5	21 12.3	96 16	170.6	20 43.5	96 16	170.8	20 14.8	96 16	170.9	18 48.6	96 15	171.4	18 19.9	96 15	171.5	*6*
7	22 56.5	95 19	169.4	22 28.0	95 18	169.5	21 30.9	95 18	169.9	21 02.4	95 17	170.0	20 33.8	95 17	170.2	20 05.3	95 17	170.4	18 39.5	95 16	170.9	18 10.9	95 16	171.0	*7*
8	22 45.3	94 20	168.8	22 17.0	94 19	169.0	21 20.3	95 19	169.3	20 51.9	95 18	169.5	20 23.5	95 18	169.7	19 55.1	95 18	169.8	18 29.9	95 17	170.3	18 01.5	95 17	170.5	*8*
9	22 33.5	94 21	168.2	22 05.4	94 20	168.4	21 09.1	94 20	168.7	20 40.9	94 19	168.9	20 12.7	94 19	169.1	19 44.4	94 19	169.3	18 19.7	94 18	169.8	17 51.5	94 17	170.0	*9*
20	22 21.2	93 22	167.6	21 53.2	93 21	167.8	20 57.3	93 21	168.2	20 29.3	93 20	168.4	20 01.3	93 20	168.6	19 33.2	93 20	168.8	18 09.1	94 19	169.3	17 41.0	94 18	169.5	*20*
1	22 08.3	93 23	167.0	21 40.5	93 22	167.2	20 44.9	93 22	167.6	20 17.1	93 21	167.8	19 49.3	93 21	168.0	19 21.5	93 20	168.2	17 57.9	93 19	168.8	17 30.0	93 19	169.0	*1*
2	21 54.7	92 24	166.4	21 27.2	92 23	166.7	20 32.0	92 22	167.1	20 04.4	92 22	167.3	19 36.8	92 22	167.5	19 09.2	92 21	167.7	17 46.2	92 20	168.3	17 18.6	92 20	168.5	*2*
3	21 40.6	91 24	165.9	21 13.3	91 24	166.1	20 18.6	91 23	166.5	19 51.2	91 23	166.7	19 23.8	91 23	167.0	18 56.4	91 22	167.2	17 34.1	92 21	167.8	17 06.6	92 21	168.0	*3*
4	21 26.0	90 25	165.3	20 58.9	90 25	165.5	20 04.6	91 24	166.0	19 37.4	91 24	166.2	19 10.2	91 23	166.4	18 43.1	91 23	166.7	17 21.4	91 22	167.3	16 54.1	91 22	167.5	*4*
25	21 10.8	90 26	164.7	20 43.9	90 26	165.0	19 50.1	90 25	165.4	19 23.1	90 25	165.7	18 56.2	90 24	165.9	18 29.2	90 24	166.1	17 08.2	90 23	166.8	16 41.2	90 22	167.1	*25*
6	20 55.0	89 27	164.2	20 28.3	89 27	164.4	19 35.0	89 26	164.9	19 08.3	89 26	165.2	18 41.6	89 25	165.4	18 14.8	89 25	165.6	16 54.5	89 24	166.4	16 27.7	89 23	166.6	*6*
7	20 38.7	88 28	163.6	20 12.3	88 28	163.9	19 19.4	88 27	164.4	18 53.0	88 26	164.6	18 26.5	88 26	164.9	18 00.0	88 26	165.1	16 40.4	89 24	165.9	16 13.8	89 24	166.1	*7*
8	20 21.8	87 29	163.1	19 55.7	87 29	163.4	19 03.3	87 28	163.9	18 37.1	87 27	164.1	18 10.9	87 27	164.4	17 44.6	88 26	164.6	16 25.8	88 25	165.4	15 59.5	88 25	165.6	*8*
9	20 04.4	86 30	162.6	19 38.5	86 29	162.8	18 46.7	86 29	163.4	18 20.8	87 28	163.6	17 54.8	87 28	163.9	17 28.8	87 27	164.2	16 10.7	87 26	164.9	15 44.6	87 25	165.2	*9*
30	19 46.5	85 31	162.0	19 20.9	85 30	162.3	18 29.6	86 29	162.9	18 03.9	86 29	163.1	17 38.2	86 28	163.4	17 12.5	86 28	163.7	15 55.2	86 27	164.5	15 29.4	86 26	164.7	*30*
1	19 28.1	84 32	161.5	19 02.7	84 31	161.8	18 12.0	85 30	162.4	17 46.6	85 30	162.6	17 21.1	85 29	162.9	16 55.7	85 29	163.2	15 39.2	85 27	164.0	15 13.6	85 27	164.3	*1*
2	19 09.1	83 32	161.0	18 44.1	84 32	161.3	17 53.9	84 31	161.9	17 28.7	84 30	162.1	17 03.6	84 30	162.4	16 38.4	84 30	162.7	15 22.7	84 28	163.6	14 57.4	84 28	163.8	*2*
3	18 49.7	83 33	160.5	18 24.9	83 33	160.8	17 35.3	83 32	161.4	17 10.4	83 31	161.7	16 45.6	83 31	162.0	16 20.7	83 30	162.2	15 05.8	83 29	163.1	14 40.8	83 28	163.4	*3*
4	18 29.8	82 34	160.0	18 05.3	82 34	160.3	17 16.2	82 33	160.9	16 51.7	82 32	161.2	16 27.1	82 32	161.5	16 02.5	82 31	161.8	14 48.5	82 30	162.7	14 23.8	82 29	163.0	*4*
35	18 09.4	81 35	159.5	17 45.2	81 34	159.8	16 56.7	81 33	160.4	16 32.5	81 33	160.7	16 08.2	81 32	161.0	15 43.8	81 32	161.3	14 30.7	81 30	162.2	14 06.3	81 30	162.5	*35*
6	17 48.5	80 36	159.0	17 24.6	80 35	159.3	16 36.7	80 34	159.9	16 12.8	80 34	160.3	15 48.8	80 33	160.6	15 24.8	80 33	160.9	14 12.6	80 31	161.8	13 48.4	80 30	162.1	*6*
7	17 27.1	79 36	158.5	17 03.6	79 36	158.8	16 16.3	79 35	159.5	15 52.7	79 34	159.8	15 29.0	79 34	160.1	15 05.3	79 33	160.4	13 54.0	79 32	161.4	13 30.1	79 31	161.7	*7*
8	17 05.3	77 37	158.0	16 42.1	78 37	158.4	15 55.5	78 36	159.0	15 32.1	78 35	159.3	15 08.7	78 34	159.7	14 45.3	78 34	160.0	13 34.9	78 32	161.0	13 11.4	78 32	161.3	*8*
9	16 43.1	76 38	157.6	16 20.1	77 37	157.9	15 34.2	77 36	158.6	15 11.1	77 36	158.9	14 48.1	77 35	159.2	14 25.0	77 35	159.6	13 15.5	77 33	160.5	12 52.3	77 32	160.9	*9*
40	16 20.4	75 39	157.1	15 57.8	75 38	157.5	15 12.4	76 37	158.1	14 49.7	76 36	158.5	14 27.0	76 36	158.8	14 04.2	76 35	159.1	12 55.7	76 34	160.1	12 32.8	76 33	160.5	*40*
1	15 57.3	74 39	156.7	15 35.0	74 39	157.0	14 50.3	75 38	157.7	14 27.9	75 37	158.0	14 05.5	75 36	158.4	13 43.0	75 36	158.7	12 35.5	75 34	159.7	12 13.0	75 34	160.1	*1*
2	15 33.7	73 40	156.2	15 11.7	73 39	156.6	14 27.7	73 38	157.3	14 05.7	74 38	157.6	13 43.6	74 37	158.0	13 21.5	74 37	158.3	12 14.9	74 35	159.4	11 52.7	74 34	159.7	*2*
3	15 09.7	72 41	155.8	14 48.1	72 40	156.1	14 04.8	72 39	156.8	13 43.0	72 38	157.2	13 21.3	73 38	157.6	12 59.5	73 37	157.9	11 54.0	73 36	159.0	11 32.1	73 35	159.3	*3*
4	14 45.4	71 41	155.3	14 24.1	71 41	155.7	13 41.4	71 40	156.4	13 20.0	71 39	156.8	12 58.6	71 38	157.2	12 37.2	72 38	157.5	11 32.7	72 36	158.6	11 11.1	72 36	158.9	*4*
45	14 20.6	70 42	154.9	13 59.7	70 41	155.3	13 17.7	70 40	156.0	12 56.6	70 40	156.4	12 35.6	70 39	156.8	12 14.4	70 38	157.1	11 11.0	71 37	158.2	10 49.8	71 36	158.6	*45*
6	13 55.5	69 43	154.5	13 34.9	69 42	154.9	12 53.6	69 41	155.6	12 32.9	69 40	156.0	12 12.1	69 40	156.4	11 51.4	69 39	156.7	10 48.9	70 37	157.8	10 28.1	70 37	158.2	*6*
7	13 29.9	67 43	154.1	13 09.7	68 43	154.5	12 29.1	68 41	155.2	12 08.7	68 41	155.6	11 48.3	68 40	156.0	11 27.9	68 40	156.4	10 26.5	68 38	157.5	10 06.0	68 37	157.9	*7*
8	13 04.0	66 44	153.7	12 44.1	66 43	154.1	12 04.2	67 42	154.9	11 44.2	67 41	155.2	11 24.2	67 41	155.6	11 04.1	67 40	156.0	10 03.8	67 38	157.1	9 43.7	67 38	157.5	*8*
9	12 37.7	65 44	153.3	12 18.2	65 44	153.7	11 39.0	65 43	154.5	11 19.4	66 42	154.9	10 59.7	66 41	155.2	10 40.0	66 41	155.6	9 40.8	66 39	156.8	9 21.0	66 38	157.2	*9*
50	12 11.1	64 45	152.9	11 51.9	64 44	153.3	11 13.5	64 43	154.1	10 54.2	64 43	154.5	10 34.9	64 42	154.9	10 15.5	64 41	155.3	9 17.4	65 40	156.4	8 57.9	65 39	156.8	*50*
1	11 44.1	63 46	152.6	11 25.3	63 45	153.0	10 47.6	63 44	153.7	10 28.7	63 43	154.1	10 09.7	63 42	154.5	9 50.7	63 42	154.9	8 53.7	64 40	156.1	8 34.6	64 39	156.5	*1*
2	11 16.8	61 46	152.2	10 58.4	62 45	152.6	10 21.3	62 44	153.4	10 02.8	62 44	153.8	9 44.2	62 43	154.2	9 25.6	62 42	154.6	8 29.6	62 41	155.8	8 10.9	62 40	156.2	*2*
3	10 49.2	60 47	151.8	10 31.1	60 46	152.2	9 54.8	61 45	153.0	9 36.6	61 44	153.4	9 18.4	61 44	153.8	9 00.2	61 43	154.2	8 05.3	61 41	155.5	7 47.0	61 40	155.9	*3*
4	10 21.2	59 47	151.5	10 03.5	59 47	151.9	9 27.9	59 45	152.7	9 10.1	59 45	153.1	8 52.3	59 44	153.5	8 34.4	60 43	153.9	7 40.7	60 42	155.1	7 22.8	60 41	155.5	*4*
55	9 52.9	58 48	151.1	9 35.6	58 47	151.5	9 00.8	58 46	152.4	8 43.3	58 45	152.8	8 25.9	58 44	153.2	8 08.4	58 44	153.6	7 15.8	59 42	154.8	6 58.2	59 41	155.2	*55*
6	9 24.3	57 48	150.8	9 07.3	57 48	151.2	8 33.3	57 46	152.0	8 16.3	57 46	152.5	7 59.2	57 45	152.9	7 42.1	57 44	153.3	6 50.6	57 42	154.5	6 33.4	57 42	154.9	*6*
7	8 55.4	55 49	150.5	8 38.8	55 48	150.9	8 05.6	56 47	151.7	7 48.9	56 46	152.1	7 32.2	56 45	152.6	7 15.5	56 45	153.0	6 25.1	56 43	154.2	6 08.3	56 42	154.7	*7*
8	8 26.3	54 49	150.1	8 10.0	54 48	150.6	7 37.5	54 47	151.4	7 21.2	54 47	151.8	7 04.9	54 46	152.3	6 48.6	55 45	152.7	5 59.4	55 43	153.9	5 43.0	55 43	154.4	*8*
9	7 56.8	53 50	149.8	7 41.0	53 49	150.3	7 09.2	53 48	151.1	6 53.3	53 47	151.5	6 37.4	53 46	152.0	6 21.4	53 46	152.4	5 33.4	53 44	153.7	5 17.4	53 43	154.1	*9*
60	7 27.1	51 50	149.5	7 11.6	52 49	150.0	6 40.6	52 48	150.8	6 25.1	52 47	151.2	6 09.5	52 47	151.7	5 54.0	52 46	152.1	5 07.2	52 44	153.4				*60*
1	6 57.0	50 50	149.2	6 42.0	50 50	149.7	6 11.8	50 48	150.5	5 56.6	50 48	151.0	5 41.5	51 47	151.4	5 26.3	51 47	151.8							*1*
2	6 26.8	49 51	148.9	6 12.1	49 50	149.4	5 42.7	49 49	150.3	5 27.9	49 48	150.7	5 13.2	49 48	151.1										*2*
3	5 56.3	48 51	148.7	5 42.0	48 51	149.1	5 13.3	48 49	150.0																*3*
4	5 25.5	46 52	148.4	5 11.6	46 51	148.8																			*4*

DECLINATION SAME NAME AS LATITUDE

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	8 21.6	13 58	35.9	8 25.4	12 57	35.4	8 32.8	12 55	34.4	8 36.4	12 55	33.9	8 40.0	12 54	33.4	8 43.6	12 53	32.9	8 54.1	11 51	31.4	8 57.5	11 50	30.9	91
2	7 47.1	14 57	35.9	7 51.2	14 57	35.4	7 59.5	14 55	34.4	8 03.6	14 55	33.9	8 07.6	13 54	33.4	8 11.6	13 53	32.9	8 23.4	13 51	31.4	8 27.3	13 50	30.9	2
3	7 12.6	15 57	35.8	7 17.2	15 57	35.3	7 26.3	15 55	34.3	7 30.8	15 54	33.8	7 35.3	15 54	33.3	7 39.7	15 53	32.8	7 52.8	14 51	31.3	7 57.1	14 50	30.8	3
4	6 38.2	17 57	35.7	6 43.2	17 56	35.2	6 53.2	16 55	34.2	6 58.1	16 54	33.7	7 03.0	16 54	33.2	7 07.8	16 53	32.7	7 22.2	16 51	31.2	7 27.0	16 50	30.7	4
95	6 03.9	18 57	35.6	6 09.3	18 56	35.1	6 20.1	18 55	34.1	6 25.5	18 54	33.6	6 30.8	18 54	33.1	6 36.1	18 53	32.6	6 51.8	17 51	31.1	6 56.9	17 50	30.6	95
6	5 29.7	20 57	35.5	5 35.5	19 56	35.0	5 47.1	19 55	34.0	5 52.9	19 54	33.5	5 58.7	19 53	33.0	6 04.4	19 53	32.5	6 21.4	19 51	31.0	6 27.0	19 50	30.5	6
7				5 01.8	21 56	34.9	5 14.3	21 55	33.9	5 20.5	21 54	33.4	5 26.6	21 53	32.9	5 32.8	20 52	32.4	5 51.1	20 50	30.9	5 57.1	20 50	30.4	7
8																			5 20.8	22 50	30.8	5 27.3	22 50	30.3	8

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	41 00.0	1.0 01	00.0	40 30.0	1.0 01	00.0	39 00.0	1.0 01	00.0	38 30.0	1.0 00	00.0	38 00.0	1.0 00	00.0	32 00.0	1.0 00	00.0	31 30.0	1.0 00	00.0	26 30.0	1.0 00	00.0	00
1	40 59.7	1.0 02	00.7	40 29.7	1.0 02	00.6	38 59.7	1.0 02	00.6	38 29.7	1.0 02	00.6	37 59.7	1.0 01	00.6	31 59.8	1.0 01	00.4	31 29.8	1.0 01	00.4	26 29.8	1.0 01	00.3	1
2	40 58.6	1.0 03	01.3	40 28.7	1.0 03	01.3	38 58.8	1.0 03	01.2	38 28.8	1.0 03	01.2	37 58.8	1.0 02	01.2	31 59.1	1.0 02	00.8	31 29.2	1.0 02	00.8	26 29.4	1.0 01	00.6	2
3	40 56.9	1.0 04	02.0	40 27.0	1.0 04	01.9	38 57.2	1.0 04	01.8	38 27.3	1.0 04	01.8	37 57.3	1.0 03	01.7	31 58.0	1.0 03	01.3	31 28.1	1.0 02	01.2	26 28.6	1.0 02	00.9	3
4	40 54.6	1.0 05	02.6	40 24.7	1.0 05	02.6	38 55.0	1.0 05	02.4	38 25.2	1.0 05	02.4	37 55.3	1.0 04	02.3	31 56.5	1.0 03	01.7	31 26.6	1.0 03	01.6	26 27.5	1.0 02	01.2	4
05	40 51.5	99 06	03.3	40 21.7	99 06	03.2	38 52.2	99 06	03.0	38 22.4	99 06	02.9	37 52.6	99 05	02.9	31 54.6	99 04	02.1	31 24.7	99 04	02.0	26 26.2	1.0 03	01.5	05
6	40 47.8	99 07	04.0	40 18.0	99 07	03.9	38 48.8	99 07	03.6	38 19.1	99 07	03.5	37 49.4	99 06	03.4	31 52.2	99 05	02.5	31 22.4	99 05	02.5	26 24.5	99 03	01.8	6
7	40 43.4	99 08	04.6	40 13.7	99 08	04.5	38 44.8	99 08	04.2	38 15.2	99 08	04.1	37 45.5	99 07	04.0	31 49.4	99 05	02.9	31 19.7	99 05	02.9	26 22.5	99 04	02.1	7
8	40 38.3	98 10	05.3	40 08.8	98 09	05.1	38 40.2	98 09	04.8	38 10.7	98 09	04.7	37 41.1	98 08	04.6	31 46.1	99 06	03.4	31 16.5	99 06	03.3	26 20.2	99 04	02.4	8
9	40 32.6	98 11	05.9	40 03.2	98 10	05.8	38 35.0	98 10	05.4	38 05.6	98 10	05.3	37 36.1	98 09	05.1	31 42.5	98 07	03.8	31 13.0	98 07	03.7	26 17.6	99 05	02.7	9
10	40 26.2	97 12	06.6	39 56.9	97 11	06.4	38 29.1	98 11	06.0	37 59.9	98 10	05.8	37 30.6	98 10	05.7	31 38.4	98 08	04.2	31 09.0	98 07	04.1	26 14.7	98 05	03.0	10
1	40 19.1	97 13	07.2	39 50.0	97 13	07.0	38 22.7	97 12	06.6	37 53.6	97 11	06.4	37 24.4	97 11	06.3	31 33.9	98 08	04.6	31 04.6	98 08	04.5	26 11.5	98 06	03.3	1
2	40 11.4	96 14	07.8	39 42.5	96 14	07.6	38 15.7	97 13	07.1	37 46.7	97 12	07.0	37 17.7	97 12	06.8	31 28.9	97 09	05.0	30 59.8	97 09	04.9	26 08.0	97 06	03.5	2
3	40 03.1	96 15	08.4	39 34.4	96 15	08.3	38 08.1	96 14	07.7	37 39.3	96 13	07.5	37 10.4	96 13	07.4	31 23.6	97 10	05.4	30 54.6	97 09	05.3	26 04.2	97 07	03.8	3
4	39 54.1	95 16	09.1	39 25.6	95 16	08.9	37 59.9	95 15	08.3	37 31.3	95 14	08.1	37 02.6	95 14	07.9	31 17.8	96 10	05.8	30 49.0	96 10	05.7	26 00.1	96 07	04.1	4
15	39 44.5	94 17	09.7	39 16.2	94 17	09.5	37 51.1	95 16	08.9	37 22.7	95 15	08.6	36 54.2	95 15	08.4	31 11.6	95 11	06.2	30 43.0	96 11	06.1	25 55.7	96 08	04.4	15
6	39 34.3	94 18	10.3	39 06.2	94 18	10.1	37 41.7	94 17	09.4	37 13.5	94 16	09.2	36 45.3	94 16	09.0	31 05.0	95 12	06.6	30 36.6	96 11	06.4	25 51.1	95 08	04.7	6
7	39 23.5	93 19	10.9	38 55.6	93 19	10.7	37 31.8	93 17	10.0	37 03.9	93 17	09.7	36 35.8	93 17	09.5	30 58.0	94 12	07.0	30 29.8	94 12	06.8	25 46.1	95 09	05.0	7
8	39 12.0	92 20	11.5	38 44.4	92 20	11.2	37 21.4	92 18	10.5	36 53.6	93 18	10.3	36 25.8	93 18	10.0	30 50.6	94 13	07.4	30 22.6	94 13	07.2	25 40.9	94 09	05.3	8
9	39 09.0	91 21	12.1	38 32.6	91 21	11.8	37 10.3	92 19	11.1	36 42.8	92 19	10.8	36 15.3	92 18	10.6	30 42.8	93 14	07.8	30 15.0	93 13	07.6	25 35.3	94 10	05.5	9
20	38 47.4	90 22	12.7	38 20.3	90 22	12.4	36 58.8	91 20	11.6	36 31.5	91 20	11.3	36 04.3	91 19	11.1	30 34.7	92 14	08.2	30 07.0	92 14	08.0	25 29.5	93 10	05.8	20
1	38 34.2	89 23	13.2	38 07.3	89 22	13.0	36 46.7	90 21	12.1	36 19.7	90 21	11.9	35 52.7	90 20	11.6	30 26.1	91 15	08.6	29 58.7	91 15	08.3	25 23.4	92 11	06.1	1
2	38 20.4	88 24	13.8	37 53.8	88 23	13.5	36 34.0	89 22	12.6	36 07.3	89 21	12.4	35 40.6	89 21	12.1	30 17.1	90 16	08.9	29 50.0	91 15	08.7	25 17.0	91 11	06.4	2
3	38 06.0	87 25	14.4	37 39.8	87 24	14.1	36 20.9	88 23	13.2	35 54.5	88 22	12.9	35 28.0	88 22	12.6	30 07.8	90 16	09.3	29 40.9	90 16	09.1	25 10.3	91 12	06.6	3
4	37 51.1	86 26	14.9	37 25.2	86 25	14.6	36 07.2	87 24	13.7	35 41.1	87 23	13.4	35 15.0	87 23	13.1	29 58.0	89 17	09.7	29 31.4	89 16	09.4	25 03.4	90 12	06.9	4
25	37 35.7	85 27	15.5	37 10.1	85 26	15.1	35 53.0	86 24	14.2	35 27.2	86 24	13.9	35 01.4	86 23	13.6	29 47.9	88 17	10.1	29 21.6	88 17	09.8	24 56.2	89 12	07.2	25
6	37 19.7	84 28	16.0	36 54.5	84 27	15.7	35 38.4	85 25	14.7	35 12.9	85 25	14.3	34 47.4	85 24	14.0	29 37.5	87 18	10.4	29 11.4	87 18	10.1	24 48.7	88 13	07.4	6
7	37 03.2	83 28	16.5	36 38.3	83 28	16.2	35 23.2	84 26	15.2	34 58.0	84 26	14.8	34 32.8	84 25	14.5	29 26.7	86 19	10.8	29 00.9	86 18	10.5	24 41.0	87 13	07.7	7
8	36 46.2	82 29	17.0	36 21.6	82 29	16.7	35 07.6	83 27	15.6	34 42.8	83 26	15.3	34 17.9	83 26	15.0	29 15.5	85 19	11.1	28 50.0	85 19	10.8	24 33.0	86 14	07.9	8
9	36 28.7	81 30	17.5	36 04.5	81 29	17.2	34 51.5	81 28	16.1	34 27.0	82 27	15.8	34 02.5	82 26	15.4	29 03.9	84 20	11.5	28 38.8	84 19	11.2	24 24.8	85 14	08.2	9
30	36 10.7	79 31	18.0	35 46.9	80 30	17.7	34 34.9	80 28	16.6	34 10.8	80 28	16.2	33 46.6	81 27	15.8	28 52.1	83 20	11.8	28 27.2	83 20	11.5	24 16.3	84 15	08.4	30
1	35 52.2	78 32	18.5	35 28.7	78 31	18.1	34 17.9	79 29	17.0	33 54.1	79 28	16.6	33 30.3	80 28	16.3	28 39.8	82 21	12.1	28 15.3	82 20	11.8	24 07.5	83 15	08.7	1
2	35 33.3	77 32	19.0	35 10.2	77 32	18.6	34 00.4	78 30	17.5	33 37.0	78 29	17.1	33 13.6	78 29	16.7	28 27.3	81 21	12.5	28 03.1	81 21	12.1	23 58.5	82 15	08.9	2
3	35 13.9	76 33	19.5	34 51.1	76 32	19.1	33 42.5	77 31	17.9	33 19.5	77 30	17.5	32 56.4	77 29	17.1	28 14.4	79 22	12.8	27 50.5	80 21	12.5	23 49.2	81 16	09.2	3
4	34 54.0	74 34	19.9	34 31.7	75 33	19.5	33 24.2	75 31	18.3	33 01.6	76 31	17.9	32 38.9	76 30	17.5	28 01.2	78 23	13.1	27 37.7	78 22	12.8	23 39.8	80 16	09.4	4
35	34 33.7	73 35	20.4	34 11.8	73 34	20.0	33 05.5	74 32	18.7	32 43.2	74 31	18.3	32 20.9	75 31	18.0	27 47.7	77 23	13.4	27 24.5	77 22	13.1	23 30.0	79 17	09.6	35
6	34 13.0	72 35	20.8	33 51.5	72 35	20.4	32 46.4	73 33	19.2	32 24.5	73 32	18.8	32 02.6	73 31	18.3	27 33.8	76 24	13.7	27 11.0	76 23	13.4	23 20.1	78 17	09.9	6
7	33 51.9	70 36	21.2	33 30.7	71 35	20.8	32 26.8	71 33	19.6	32 05.4	72 32	19.1	31 43.8	72 32	18.7	27 19.7	75 24	14.0	26 57.2	75 23	13.7	23 09.9	77 17	10.1	7
8	33 30.3	69 37	21.7	33 09.6	69 36	21.2	32 06.9	70 34	20.0	31 45.9	70 33	19.5	31 24.7	71 32	19.1	27 05.2	73 25	14.3	26 43.2	74 24	14.0	22 59.5	75 18	10.3	8
9	33 08.4	68 37	22.1	32 48.1	68 36	21.6	31 46.6	69 34	20.3	31 26.0	69 34	19.9	31 05.3	69 33	19.5	26 50.5	72 25	14.6	26 28.8	72 24	14.3	22 48.8	74 18	10.5	9
40	32 46.0	66 38	22.5	32 26.2	66 37	22.0	31 26.0	67 35	20.7	31 05.7	68 34	20.3	30 45.4	68 34	19.9	26 35.5	71 26	14.9	26 14.2	71 25	14.5	22 38.0	73 18	10.7	40
1	32 23.4	65 38	22.9	32 03.9	65 38	22.4	31 05.0	66 36	21.1	30 45.2	66 35	20.6	30 25.3	67 34	20.2	26 20.1	70 26	15.2	25 59.2	70 25	14.8	22 26.9	72 19	10.9	1
2	32 00.3	63 39	23.2	31 41.3	64 38	22.8	30 43.6	65 36	21.4	30 24.2	65 35	21.0	30 04.7	65 35	20.6	26 04.6	68 26	15.5	25 44.1	68 26	15.1	22 15.6	70 19	11.1	2
3	31 36.9	62 40	23.6	31 18.3	62 39	23.1	30 21.9	63 37	21.8	30 03.0	63 36	21.3	29 43.9	64 35	20.9	25 48.7	67 27	15.8	25 28.6	67 26	15.3	22 04.1	69 19	11.3	3
4	31 13.1	60 40	24.0	30 55.0	61 39	23.5	29 59.9	62 37	22.1	29 41.4	62 37	21.7	29 22.7	62 36	21.2	25 32.6	65 27	16.0	25 12.9	66 27	15.6	21 52.5	68 20	11.5	4
45	30 49.0	59 41	24.3	30 31.3	59 40	23.8	29 37.6	60 38	22.5	29 19.5	61 37	22.0	29 01.3	61 36	21.5	25 16.2	64 28	16.3	24 56.9	64 27	15.9	21 40.6	66 20	11.7	45
6	30 24.6	57 41	24.6	30 07.4	58 40	24.2	29 14.9	59 38	22.8	28 57.3	59 38	22.3	28 39.5	59 37	21.8	24 59.6	63 28	16.5	24 40.7	63 27	16.1	21 28.5	65 20	11.9	6
7	29 59.9	56 42	25.0	29 43.1	56 41	24.5	28 52.0	57 39	23.1	28 34.8	58 38	22.6	28 17.4	58 37	22.2	24 42.7	61 29	16.8	24 24.3	62 28	16.3	21 16.3	64 21	12.1	7
8	29 34.9	54 42	25.3	29 18.5	55 41	24.8	28 28.8	56 39	23.4	28 12.0	56 38	22.9	27 55.1	56 38	22.4	24 25.6	60 29	17.0	24 07.6	60 28	16.6	21 03.8	62 21	12.3	8
9	29 09.6	53 43	25.6	28 53.7	53 42	25.1	28 05.2	54 40	23.7	27 48.9	55 39	23.2	27 32.5	55 38	22.7	24 08.2	58 29	17.2	23 50.7	59 29	16.8	20 51.2	61 21	12.5	9
50	28 44.0	51 43	25.9	28 28.5	52 42	25.4	27 41.5	53 40	24.0	27 25.6	53 39	23.5	27 09.6	53 39	23.0	23 50.7	57 30	17.5	23 33.6	57 29	17.0	20 38.4	60 22	12.6	50
1	28 18.1	50 44	26.2	28 03.1	50 43	25.7	27 17.4	51 40	24.2	27 02.0	52 40	23.8	26 46.4	52 39	23.3	23 32.9	55 30	17.7	23 16.2	56 29	17.2	20 25.4	58 22	12.8	1
2	27 52.0	48 44	26.5	27 37.4	49 43	26.0	26 53.1	50 41	24.5	26 38.1	50 40	24.0	26 23.0	50 39	23.5	23 14.9	54 30	17.9	22 58.7	54 30	17.4	20 12.3	57 22	13.0	2
3	27 25.6	47 44	26.7	27 11.5	47 44	26.2	26 28.5	48 41	24.8	26 14.0	49 41	24.3	25 59.4	49 40	23.8	22 56.7	52 31	18.1	22 40.9	53 30	17.6	19 59.0	55 22	13.1	3
4	26 59.0	45 45	27.0	26 45.4	46 44	26.5	26 03.8	47 42	25.0	25 49.7	47 41	24.5	25 35.5	47 40	24.0	22 38.3	51 31	18.3	22 23.0	51 30	17.8	19 45.5	54 23	13.3	4
55	26 32.2	44 45	27.2	26 19.0	44 44	26.7	25 38.7	45 42	25.3	25 25.1	46 41	24.8	25 11.4	46 41	24.3	22 19.7	49 31	18.5	22 04.8	50 31	18.0	19 31.9	52 23	13.4	55
6	26 05.1	42 45	27.5	25 52.4	43 45	27.0	25 13.5	44 42	25.5	25 09.4	44 42	25.0	24 47.1	44 41	24.5	22 09.9	48 32	18.7	21 46.5	48 31	18.2	19 18.2	51 23	13.6	6
7	25 37.8	41 46	27.7	25 25.5	41 45	27.2	24 48.1	42 43	25.7	24 35.4	42 42	25.2	24 22.6	43 41	24.7	21 41.9	46 32	18.9	21 28.0	47 31	18.4	19 04.3	49 23	13.7	7
8	25 10.3	39 46	27.9	24 58.5	40 45	27.4	24 22.4	41 43	25.9	24 10.2	41 42	25.4	23 57.9	41 42	24.9	21 22.8	45 32	19.0	21 09.3	45 31	18.6	18 50.2	48 24	13.9	8
9	24 42.6	38 46	28.2	24 31.3	38 46	27.6	23 56.6	39 43	26.1	23 44.8	39 43	25.6	23 33.0	40 42	25.1	21 03.5	43 32	19.2	20 50.5	44 32	18.7	18 36.1	46 24	14.0	9
60	24 14.7	36 47	28.4	24 03.9	36 46	27.8	23 30.6	37 44	26.3	23 19.3	38 43	25.8	23 07.9	38 42	25.3	20 44.0	42 33	19.4	20 31.5	42 32	18.9	18 21.8	44 24	14.1	60
1	23 46.7	35 47	28.5	23 36.3	35 46	28.0	23 04.4	36 44	26.5	22 53.5	36 43	26.0	22 42.6	37 42	25.5	20 24.4	40 33	19.5	20 12.3	40 32	19.0	18 07.3	43 24	14.2	1
2	23 18.5	33 47	28.7	23 08.5	33 47	28.2	22 38.0	34 44	26.7	22 27.6	35 43	26.2	22 17.2	35 43	25.7	20 04.6	39 33	19.7	19 53.0	39 32	19.2	17 52.8	41 24	14.4	2
3	22 50.1	32 48	28.9	22 40.6	32 47	28.4	22 11.5	33 44	26.9	22 01.6	33 44	26.3	21 51.6	33 43	25.8	19 44.7	37 33	19.8	19 33.6	37 33	19.3	17 38.1	40 25	14.5	3
4	22 21.5	30 48	29.1	22 12.5	30 47	28.6	21 44.8	31 45	27.0	21 35.3	32 44	26.5	21 25.8	32 43	26.0	19 24.7	35 34	20.0	19 14.0	36 33	19.5	17 23.4	38 25	14.6	4
65	21 52.8	28 48	29.2	21 44.3	29 47	28.7	21 17.9	30 45	27.2	21 09.0	30 44	26.7	20 59.9	30 43	26.2	19 04.5	34 34	20.1	18 54.3	34 33	19.6	17 08.5	36 25	14.7	65
6	21 24.0	27 48	29.4	21 15.9	27 47	28.9	20 51.0	28 45	27.3	20 42.5	28 44	26.8	20 33.9	29 44	26.3	18 44.2	32 34	20.2	18 34.5	32 33	19.7	16 53.5	35 25	14.8	6
7	20 55.0	25 48	29.5	20 47.4	26 48	29.0	20 23.9	27 45	27.5	20 15.9	27 45	26.9	20 07.8	27 44	26.4	18 23.8	31 34	20.3	18 14.6	31 33	19.8	16 38.4	33 25	14.9	7
8	20 26.0	24 49	29.7	20 18.8	24 48	29.1	19 56.7	25 46	27.6	19 49.1	25 45	27.1	19 41.5	26 44	26.6	18 03.3	29 34	20.5	17 54.5	29 34	20.0	16 23.3	32 25	15.0	8
9	19 56.8	22 49	29.8	19 50.0	23 48	29.3	19 29.3	23 46	27.7	19 22.3	24 45	27.2	19 15.1	24 44	26.7	17 42.6	27 35	20.6	17 34.4	28 34	20.1	16 08.0	30 26	15.1	9
70	19 27.5	21 49	29.9	19 21.2	21 48	29.4	19 01.9	22 46	27.8	18 55.3	22 45	27.3	18 48.6	22 44	26.8	17 21.9	26 35	20.7	17 14.1	26 34	20.2	15 52.7	28 26	15.1	70
1	18 58.1	19 49	30.0	18 52.3	19 48	29.5	18 34.4	20 46	27.9	18 28.2	21 45	27.4	18 22.0	21 44	26.9	17 01.1	24 35	20.8	16 53.8	24 34	20.2	15 37.3	27 26	15.2	1
2	18 28.6	18 49	30.1	18 23.3	18 48	29.6	18 06.7	19 46	28.0	18 01.1	19 45	27.5	17 55.3	19 45	27.0	16 40.1	22 35	20.8	16 33.4	23 34	20.3	15 21.8	25 26	15.3	2
3	17 59.0	16 49	30.2	17 54.1	16 49	29.7	17 39.0	17 46	28.1	17 33.8	17 46	27.6	17 28.6	18 45	27.1	16 19.1	21 35	20.9	16 12.9	21 34	20.4	15 06.2	23 26	15.4	3
4	17 29.4	15 50	30.3	17 25.0	15 49	29.7	17 11.3	16 46	28.2	17 06.5	16 46	27.7	17 01.7	16 45	27.2	15 58.1	19 35	21.0	15 52.3	19 34	20.5	14 50.6	22 26	15.4	4
75	16 59.7	13 50	30.3	16 55.7	13 49	29.8	16 43.4	14 47	28.3	16 39.1	14 46	27.7	16 34.8	15 45	27.2	15 36.9	18 35	21.1	15 31.6	18 35	20.6	14 34.9	20 26	15.5	75
6	16 29.9	11 50	30.4	16 26.4	12 49	29.9	16 15.5	13 47	28.3	16 11.7	13 46	27.8	16 07.8	13 45	27.3	15 15.7	16 35	21.1	15 10.9	16 35	20.6	14 19.2	18 26	15.5	6
7	16 00.1	10 50	30.5	15 57.0	10 49	29.9	15 47.5	11 47	28.4	15 44.2	11 46	27.9	15 40.8	11 45	27.4	14 54.5	14 36	21.2	14 50.2	14 35	20.7	14 03.4	17 26	15.6	7
8	15 30.2	08 50	30.5	15 27.6	09 49	30.0	15 19.5	09 47	28.4	15 16.6	10 46	27.9	15 13.7	10 45	27.4	14 33.2	13 36	21.2	14 29.4	13 35	20.7	13 47.6	15 26	15.6	8
9	15 00.3	07 50	30.5	14 58.2	07 49	30.0	14 51.4	08 47	28.5	14 49.0	08 46	28.0	14 46.6	08 45	27.4	14 11.8	11 36	21.3	14 08.5	11 35	20.8	13 31.7	13 27	15.7	9
80	14 30.3	05 50	30.6	14 28.7	06 49	30.1	14 23.3	06 47	28.5	14 21.4	07 46	28.0	14 19.4	07 45	27.5	13 50.4	09 36	21.3	13 47.6	10 35	20.8	13 15.8	12 27	15.7	80
1	14 00.4	04 50	30.6	13 59.2	04 49	30.1	13 55.2	05 47	28.5	13 53.7	05 46	28.0	13 52.2	05 45	27.5	13 29.0	08 36	21.3	13 26.7	08 35	20.8	12 59.8	10 27	15.7	1
2	13 30.4	02 50	30.6	13 29.6	03 49	30.1	13 27.1	03 47	28.6	13 26.1	03 46	28.0	13 25.0	04 45	27.5	13 07.6	06 36	21.4	13 05.7	06 35	20.9	12 43.9	08 27	15.7	2
3	13 00.4	01 50	30.6	13 00.1	01 49	30.1	12 58.9	02 47	28.6	12 58.4	02 46	28.1	12 57.8	02 45	27.5	12 46.1	04 36	21.4	12 44.7	05 35	20.9	12 27.9	07 27	15.8	3
4	12 30.4	01 50	30.6	12 30.6	00 49	30.1	12 30.7	00 47	28.6	12 30.7	00 46	28.1	12 30.5	00 45	27.5	12 24.6	03 36	21.4	12 23.7	03 35	20.9	12 11.9	05 27	15.8	4
85	12 00.4	02 50	30.6	12 01.0	02 49	30.1	12 02.6	01 47	28.6	12 03.0	01 46	28.1	12 03.3	01 45	27.5	12 03.1	01 36	21.4	12 02.7	01 35	20.9	11 55.9	03 27	15.8	85
6	11 30.4	04 50	30.6	11 31.5	04 49	30.1	11 34.4	03 47	28.6	11 35.3	03 46	28.0	11 36.1	03 45	27.5	11 41.6	00 36	21.4	11 41.7	00 35	20.9	11 39.8	02 27	15.8	6
7	11 00.4	05 50	30.6	11 02.0	05 49	30.1	11 06.2	05 47	28.5	11 07.6	04 46	28.0	11 08.9	04 45	27.5	11 20.1	02 36	21.4	11 20.7	02 35	20.9	11 23.8	00 27	15.8	7
8	10 30.5	07 50	30.5	10 32.5	07 49	30.0	10 38.1	06 47	28.5	10 39.9	06 46	28.0	10 41.6	06 45	27.5	10 58.6	04 36	21.4	10 59.7	04 35	20.9	11 07.8	02 27	15.8	8
9	10 00.6	08 50	30.5	10 03.0	08 49	30.0	10 10.0	08 47	28.5	10 12.3	07 46	28.0	10 14.5	07 45	27.5	10 37.1	05 36	21.4	10 38.7	05 35	20.9	10 51.7	04 27	15.8	9
90	9 30.7	10 50	30.5	9 33.6	10 49	30.0	9 41.9	09 47	28.4	9 44.7	09 46	27.9	9 47.3	09 45	27.4	10 15.7	07 36	21.4	10 17.7	07 35	20.9	10 35.7	05 27	15.8	90

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	19 00.0	1.0 00	180.0	18 30.0	1.0 00	180.0	17 00.0	1.0 00	180.0	16 30.0	1.0 00	180.0	16 00.0	1.0 00	180.0	10 00.0	1.0 00	180.0	9 30.0	1.0 00	180.0				00
1	18 59.7	1.0 01	179.5	18 29.7	1.0 01	179.5	16 59.7	1.0 01	179.5	16 29.8	1.0 01	179.5	15 59.8	1.0 01	179.5	9 59.8	1.0 01	179.6	9 29.8	1.0 01	179.6				1
2	18 58.9	1.0 02	178.9	18 28.9	1.0 02	179.0	16 59.0	1.0 02	179.0	16 29.0	1.0 02	179.0	15 59.0	1.0 02	179.1	9 59.3	1.0 02	179.3	9 29.3	1.0 02	179.3				2
3	18 57.6	1.0 03	178.4	18 27.6	1.0 03	178.4	16 57.7	1.0 03	178.5	16 27.8	1.0 03	178.6	15 57.8	1.0 03	178.6	9 58.3	1.0 02	178.9	9 28.4	1.0 02	178.9				3
4	18 55.7	1.0 04	177.9	18 25.7	1.0 04	177.9	16 56.0	1.0 04	178.0	16 26.0	1.0 04	178.1	15 56.1	1.0 04	178.1	9 57.0	1.0 03	178.5	9 27.1	1.0 03	178.6				4
05	18 53.2	1.0 05	177.4	18 23.3	1.0 05	177.4	16 53.7	1.0 05	177.5	16 23.8	1.0 05	177.6	15 53.9	1.0 04	177.6	9 55.3	1.0 03	178.2	9 25.4	1.0 03	178.2				05
6	18 50.2	99 06	176.8	18 20.4	99 06	176.9	16 50.9	99 05	177.1	16 21.1	99 05	177.1	15 51.3	99 05	177.2	9 53.3	99 04	177.8	9 23.4	99 04	177.9				6
7	18 46.7	99 07	176.3	18 16.9	99 07	176.4	16 47.7	99 06	176.6	16 17.9	99 06	176.6	15 48.1	99 06	176.7	9 50.8	99 05	177.5	9 21.1	99 05	177.5				7
8	18 42.6	99 08	175.8	18 13.0	99 08	175.9	16 43.9	99 07	176.1	16 14.2	99 07	176.2	15 44.5	99 07	176.2	9 48.1	99 05	177.1	9 18.3	99 05	177.2				8
9	18 38.1	99 09	175.3	18 08.4	99 08	175.4	16 39.6	99 08	175.6	16 10.0	99 08	175.7	15 40.4	99 08	175.8	9 44.9	99 06	176.7	9 15.3	99 06	176.8				9
10	18 32.9	98 09	174.7	18 03.4	98 09	174.8	16 34.9	98 09	175.1	16 05.3	98 09	175.2	15 35.8	98 08	175.3	9 41.4	98 06	176.4	9 11.8	98 06	176.5				10
1	18 27.3	98 10	174.2	17 57.9	98 10	174.3	16 29.6	98 10	174.6	16 00.2	98 09	174.7	15 30.8	98 09	174.8	9 37.5	98 07	176.0	9 08.0	98 07	176.1				1
2	18 21.1	98 11	173.7	17 51.8	98 11	173.8	16 23.9	98 10	174.2	15 54.5	98 10	174.3	15 25.2	98 10	174.4	9 33.2	98 08	175.7	9 03.8	98 08	175.8				2
3	18 14.4	97 12	173.2	17 45.2	97 12	173.3	16 17.6	97 11	173.7	15 48.4	97 11	173.8	15 19.2	97 11	173.9	9 28.6	97 08	175.3	8 59.3	97 08	175.4				3
4	18 07.1	97 13	172.7	17 38.1	97 13	172.8	16 10.9	97 12	173.2	15 41.8	97 12	173.3	15 12.7	97 12	173.5	9 23.6	97 09	175.0	8 54.4	97 09	175.1				4
15	17 59.4	96 14	172.2	17 30.5	96 14	172.3	16 03.7	96 13	172.7	15 34.8	96 13	172.9	15 05.8	96 12	173.0	9 18.2	97 10	174.6	8 49.2	97 09	174.7				15
6	17 51.1	96 15	171.7	17 22.3	96 14	171.8	15 56.0	96 14	172.3	15 27.2	96 13	172.4	14 58.4	96 13	172.6	9 12.5	96 10	174.3	8 43.6	96 10	174.4				6
7	17 42.3	95 15	171.2	17 13.7	96 15	171.3	15 47.8	95 14	171.8	15 19.2	95 14	172.0	14 50.6	95 14	172.1	9 06.4	96 11	173.9	8 37.7	96 10	174.1				7
8	17 33.0	95 16	170.7	17 04.6	96 16	170.8	15 39.2	95 15	171.3	15 10.7	95 15	171.5	14 42.2	95 15	171.7	9 00.0	95 11	173.6	8 31.4	96 11	173.7				8
9	17 23.2	94 17	170.2	16 55.0	94 17	170.4	15 30.1	94 16	170.9	15 01.8	94 16	171.0	14 33.5	94 15	171.2	8 53.2	95 12	173.2	8 24.8	96 12	173.4				9
20	17 12.9	94 18	169.7	16 44.8	94 18	169.9	15 20.5	94 17	170.4	14 52.4	94 16	170.6	14 24.3	94 16	170.8	8 46.1	94 12	172.9	8 17.9	94 12	173.0				20
1	17 02.1	93 19	169.2	16 34.2	93 18	169.4	15 10.5	93 18	170.0	14 42.5	93 17	170.1	14 14.6	93 17	170.3	8 38.6	93 13	172.5	8 10.6	93 13	172.7				1
2	16 50.9	92 20	168.7	16 23.2	92 19	168.9	15 00.0	92 18	169.5	14 32.2	93 18	169.7	14 04.5	93 18	169.9	8 30.8	93 14	172.2	8 02.9	93 13	172.4				2
3	16 39.1	92 20	168.2	16 11.6	92 20	168.4	14 49.0	92 19	169.1	14 21.5	92 19	169.3	13 53.9	92 18	169.5	8 22.6	92 14	171.9	7 55.0	92 14	172.1				3
4	16 26.8	91 21	167.8	15 50.6	91 21	168.0	14 37.6	91 20	168.6	14 10.3	91 19	168.8	13 43.0	91 19	169.0	8 14.1	92 15	171.5	7 46.7	92 14	171.7				4
25	16 14.1	90 22	167.3	15 47.1	90 22	167.5	14 25.8	90 20	168.2	13 58.7	90 20	168.4	13 31.5	90 20	168.6	8 05.3	91 15	171.2	7 38.0	91 15	171.4				25
6	16 00.9	89 23	166.8	15 34.1	89 22	167.1	14 13.5	90 21	167.7	13 46.6	90 21	168.0	13 19.7	90 20	168.2	7 56.1	90 16	170.9	7 29.1	90 15	171.1				6
7	15 47.3	89 24	166.4	15 20.7	89 23	166.6	14 00.8	89 22	167.3	13 34.1	89 22	167.5	13 07.5	89 21	167.8	7 46.6	89 16	170.5	7 19.8	89 16	170.8				7
8	15 33.1	88 24	165.9	15 06.8	88 24	166.1	13 47.6	88 23	166.9	13 21.2	88 22	167.1	12 54.8	88 22	167.4	7 36.7	89 17	170.2	7 10.2	89 17	170.5				8
9	15 18.6	87 25	165.4	14 52.5	87 25	165.7	13 34.0	87 23	166.5	13 07.9	87 23	166.7	12 41.7	87 22	167.0	7 26.6	88 17	169.9	7 00.3	88 17	170.2				9
30	15 03.5	86 26	165.0	14 37.7	86 25	165.3	13 20.1	86 24	166.0	12 54.1	86 24	166.3	12 28.2	86 23	166.6	7 16.1	87 18	169.6	6 50.0	87 18	169.8				30
1	14 48.1	85 26	164.6	14 22.5	85 26	164.8	13 05.6	85 25	165.6	12 40.0	86 24	165.9	12 14.3	86 24	166.2	7 05.3	86 18	169.3	6 39.5	86 18	169.5				1
2	14 32.2	84 27	164.1	14 06.8	84 27	164.4	12 50.8	85 25	165.2	12 25.4	85 26	165.5	12 00.0	85 24	165.8	6 54.2	85 19	169.0	6 28.6	85 19	169.2				2
3	14 15.8	83 28	163.7	13 50.8	83 27	164.0	12 35.6	84 26	164.8	12 10.5	84 26	165.1	11 45.3	84 25	165.4	6 42.8	84 20	168.7	6 17.5	84 19	168.9				3
4	13 59.1	82 29	163.3	13 34.3	83 28	163.5	12 19.9	83 27	164.4	11 55.1	83 26	164.7	11 30.3	83 26	165.0	6 31.0	83 20	168.4	6 06.0	83 20	168.6				4
35	13 41.9	81 29	162.8	13 17.4	82 29	163.1	12 03.9	82 27	164.0	11 39.4	82 27	164.3	11 14.8	82 26	164.6	6 19.0	82 21	168.1	5 54.3	82 20	168.3				35
6	13 24.3	81 30	162.4	13 00.1	81 30	162.7	11 47.5	81 28	163.6	11 23.3	81 27	163.9	10 59.0	81 27	164.2	6 06.7	81 21	167.8	5 42.3	81 21	168.1				6
7	13 06.3	80 31	162.0	12 42.4	80 30	162.3	11 30.7	80 29	163.2	11 06.8	80 28	163.5	10 42.8	80 28	163.9	5 54.1	80 22	167.5	5 29.9	80 21	167.8				7
8	12 47.9	78 31	161.6	12 24.3	79 31	161.9	11 13.6	79 29	162.9	10 49.9	79 29	163.2	10 26.3	79 28	163.5	5 41.2	79 22	167.2	5 17.3	79 22	167.5				8
9	12 29.1	77 32	161.2	12 05.9	78 31	161.5	10 56.0	78 30	162.5	10 32.7	78 29	162.8	10 09.3	78 29	163.1	5 27.9	78 22	166.9	5 04.4	78 22	167.2				9
40	12 09.9	76 33	160.8	11 47.0	76 32	161.1	10 38.1	77 30	162.1	10 15.1	77 30	162.4	9 52.1	77 29	162.8	5 14.5	77 23	166.6							40
1	11 50.4	75 33	160.4	11 27.8	75 33	160.8	10 19.8	76 31	161.8	9 57.2	76 30	162.1	9 34.4	76 30	162.4	5 09.7	76 24	166.3							1
2	11 30.5	74 34	160.0	11 08.2	74 33	160.4	10 01.2	75 32	161.4	9 38.9	75 31	161.7	9 16.5	75 30	162.1										2
3	11 10.2	73 34	159.7	10 48.2	73 34	160.0	9 42.3	73 32	161.0	9 20.2	73 32	161.4	8 58.2	74 31	161.7										3
4	10 49.5	72 35	159.3	10 27.9	72 34	159.6	9 23.0	72 33	160.7	9 01.3	72 32	161.0	8 39.6	72 32	161.4										4
45	10 28.5	71 36	158.9	10 07.3	71 35	159.3	9 03.3	71 33	160.4	8 42.0	71 33	160.7	8 20.6	71 32	161.1										45
6	10 07.2	70 36	158.6	9 46.3	70 36	158.9	8 43.4	70 34	160.0	8 22.4	70 33	160.4	8 01.4	70 33	160.7										6
7	9 45.5	69 37	158.2	9 24.9	69 36	158.6	8 23.1	69 34	159.7	8 02.4	69 34	160.1	7 41.8	69 33	160.4										7
8	9 23.5	67 37	157.9	9 03.3	67 37	158.3	8 02.5	68 35	159.4	7 42.2	68 34	159.7	7 21.9	68 34	160.1										8
9	9 01.1	66 38	157.5	8 41.3	66 37	157.9	7 41.6	66 35	159.1	7 21.7	66 35	159.4	7 01.7	67 34	159.8										9
50	8 38.5	65 38	157.2	8 19.0	65 38	157.6	7 20.4	65 36	158.7	7 00.8	65 35	159.1	6 41.2	65 35	159.5										50
1	8 15.5	64 39	156.9	7 56.4	64 38	157.3	6 58.9	64 36	158.4	6 39.7	64 36	158.8	6 20.5	64 35	159.2										1
2	7 52.2	62 39	156.6	7 33.5	63 39	157.0	6 37.1	63 37	158.1	6 18.3	63 36	158.5	5 59.4	63 36	158.9										2
3	7 28.6	61 40	156.3	7 10.3	61 39	156.6	6 15.0	61 37	157.8	5 56.6	62 37	158.2	5 38.1	62 36	158.6										3
4	7 04.8	60 40	155.9	6 46.8	60 40	156.3	5 52.7	60 38	157.6	5 34.6	60 37	158.0	5 16.5	60 36	158.4										4
55	6 40.6	59 41	155.6	6 23.0	59 40	156.1	5 30.0	59 38	157.3	5 12.3	59 38	157.7													55
6	6 16.2	57 41	155.4	5 59.0	57 41	155.8	5 07.2	58 39	157.0																6
7	5 51.5	56 42	155.1	5 34.7	56 41	155.5																			7
8	5 26.5	55 42	154.8	5 10.1	55 41	155.2																			8
9	5 01.3	54 42	154.5																						9

DECLINATION SAME NAME AS LATITUDE

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	9 00.9	11 50	30.4	9 04.2	11 49	29.9	9 13.9	11 47	28.4	9 17.1	10 46	27.9	9 20.2	10 45	27.4	9 54.2	09 36	21.3	9 56.8	08 35	20.8	10 19.7	07 27	15.8	91
2	8 31.1	13 50	30.3	8 34.8	13 49	29.8	8 45.9	12 47	28.3	8 49.5	12 46	27.8	8 53.1	12 45	27.3	9 32.8	10 36	21.3	9 35.9	10 35	20.8	10 03.7	09 27	15.7	2
3	8 01.3	14 49	30.3	8 05.6	14 49	29.8	8 18.0	14 46	28.3	8 22.1	14 46	27.8	8 26.1	13 45	27.3	9 11.5	12 36	21.3	9 15.0	12 35	20.8	9 47.8	10 27	15.7	3
4	7 31.7	16 49	30.2	7 36.3	15 49	29.7	7 50.1	15 46	28.2	7 54.6	15 46	27.7	7 59.1	15 45	27.2	8 50.1	13 35	21.2	8 54.1	13 35	20.7	9 31.8	12 26	15.7	4
95	7 02.1	17 49	30.1	7 07.2	17 48	29.6	7 22.3	17 46	28.1	7 27.3	17 45	27.6	7 32.2	16 45	27.1	8 28.8	15 35	21.2	8 33.3	15 35	20.7	9 15.9	14 26	15.6	95
6	6 32.6	19 49	30.0	6 38.1	18 48	29.5	6 54.6	18 46	28.1	7 00.0	18 45	27.6	7 05.4	18 45	27.1	8 07.6	17 35	21.1	8 12.6	16 34	20.6	9 00.0	15 26	15.6	6
7	6 03.1	20 49	29.9	6 09.1	20 48	29.4	6 26.9	20 46	28.0	6 32.8	20 45	27.5	6 38.6	19 44	27.0	7 46.4	18 35	21.0	7 51.9	18 34	20.5	8 44.2	17 26	15.6	7
8	5 33.8	21 49	29.8	5 40.2	21 48	29.3	5 59.3	21 46	27.9	6 05.7	21 45	27.4	6 12.0	21 44	26.9	7 25.3	20 35	21.0	7 31.2	20 34	20.5	8 28.4	18 26	15.5	8
9	5 04.5	23 49	29.7	5 11.4	23 48	29.2	5 31.9	23 46	27.8	5 38.6	23 45	27.3	5 45.4	22 44	26.8	7 04.3	21 35	20.9	7 10.7	21 34	20.4	8 12.7	20 26	15.5	9
100							5 04.5	24 46	27.7	5 11.7	24 45	27.2	5 18.9	24 44	26.7	6 43.3	23 35	20.8	6 50.2	23 34	20.3	7 57.0	22 26	15.4	100
1																6 22.4	24 35	20.7	6 29.7	24 34	20.2	7 41.4	23 26	15.4	1
2																6 01.6	26 35	20.6	6 09.4	26 34	20.2	7 25.8	25 26	15.3	2
3																5 40.9	28 34	20.5	5 49.2	28 34	20.1	7 10.4	27 26	15.2	3
4																5 20.3	29 34	20.4	5 29.0	29 33	20.0	6 54.9	28 26	15.1	4
105																			5 09.0	31 33	19.9	6 39.6	30 25	15.1	105
6																						6 24.3	31 25	15.0	6
7																						6 09.1	33 25	14.9	7
8																						5 54.0	35 25	14.8	8
9																						5 39.0	36 25	14.7	9
110																						5 24.1	38 25	14.6	110
1																						5 09.3	39 24	14.5	1

STAR IDENTIFICATION TABLE

ALTITUDE

AZ.	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	83	180	87	180	89	00	85	00	81	00	77	00	73	00	69	00	65	00	61	00	57	00	00
4	82	150	85	127	86	75	84	37	80	23	76	16	73	12	69	09	65	08	61	06	57	05	4
8	79	131	82	110	82	82	81	56	78	40	75	29	71	23	68	18	64	15	60	12	56	10	8
12	76	120	78	103	78	84	77	65	75	51	73	40	70	32	66	26	63	22	59	18	55	15	12
16	73	113	74	99	74	85	74	70	72	58	70	47	67	39	64	33	61	27	58	23	54	20	16
20	69	108	70	97	70	85	70	73	69	63	67	53	65	45	62	38	59	33	56	28	53	24	20
24	65	105	66	95	66	85	66	75	65	66	64	57	62	49	59	43	57	37	54	32	51	28	24
28	61	102	62	94	63	85	62	76	62	68	60	60	59	53	57	47	54	41	52	36	49	31	28
32	58	100	58	93	59	85	59	77	58	70	57	63	56	56	54	50	52	44	49	39	47	34	32
36	54	98	54	92	55	85	55	78	54	71	53	64	52	58	51	52	49	46	47	41	45	37	36
40	50	97	50	91	51	84	51	78	51	72	50	66	49	60	48	54	46	49	44	43	42	39	40
44	46	96	47	90	47	84	47	78	47	72	46	67	45	61	44	56	43	50	42	45	40	41	44
48	42	95	43	89	43	84	43	78	43	73	43	67	42	62	41	57	40	52	39	47	37	42	48
52	38	94	39	89	39	83	39	78	39	73	39	68	39	63	38	58	37	53	36	48	35	43	52
56	34	93	35	88	35	83	35	78	36	73	35	68	35	63	35	59	34	54	33	49	32	45	56
60	30	92	31	87	31	83	32	78	32	73	32	68	32	64	31	59	31	54	30	50	29	45	60
64	26	91	27	87	27	82	28	78	28	73	28	69	28	64	28	59	27	55	27	51	26	46	64
68	22	90	23	86	24	82	24	77	24	73	24	68	24	64	24	60	24	55	24	51	23	47	68
72	18	89	19	85	20	81	20	77	21	73	21	68	21	64	21	60	21	55	21	51	21	47	72
76	14	89	15	85	16	80	16	76	17	72	17	68	17	64	18	60	18	55	18	51	18	47	76
80	11	88	11	84	12	80	13	76	13	72	13	68	14	64	14	59	14	55	15	51	15	47	80
84	07	87	07	83	08	79	09	75	09	71	10	67	10	63	11	59	11	55	12	51	12	47	84
88	03	86	03	83	04	79	05	75	06	71	06	67	07	63	07	59	08	55	09	51	09	47	88
92	*01*	86	*00*	82	00	78	01	74	02	70	03	66	03	62	04	58	05	54	06	50	06	46	92
96	*05*	85	*04*	81	*03*	77	*03*	73	*02*	69	*01*	65	*00*	61	01	58	02	54	03	50	03	46	96
100	*09*	84	*08*	80	*07*	76	*06*	72	*05*	68	*04*	64	*03*	61	*02*	57	*01*	53	*00*	49	01	45	100
104	*13*	83	*12*	79	*11*	75	*10*	71	*09*	67	*08*	64	*07*	60	*06*	56	*05*	52	*03*	48	*02*	44	104
108	*17*	82	*16*	78	*15*	74	*14*	70	*13*	66	*12*	62	*10*	59	*09*	55	*08*	51	*06*	47	*05*	43	108
112	*21*	81	*20*	77	*19*	73	*18*	69	*16*	65	*15*	61	*14*	57	*12*	54	*11*	50	*09*	46	*08*	42	112
116	*25*	80	*24*	76	*22*	72	*21*	68	*20*	64	*18*	60	*17*	56	*15*	52	*14*	48	*12*	45	*10*	41	116
120	*28*	79	*27*	75	*26*	71	*25*	66	*23*	62	*22*	58	*20*	55	*18*	51	*17*	47	*15*	43	*13*	40	120
124	*32*	78	*31*	74	*30*	69	*28*	65	*27*	61	*25*	57	*23*	53	*21*	49	*19*	45	*17*	42	*15*	38	124
128	*36*	77	*35*	72	*33*	68	*32*	63	*30*	59	*28*	55	*26*	51	*24*	47	*22*	43	*20*	40	*18*	36	128
132	*40*	75	*39*	70	*37*	66	*35*	61	*34*	57	*31*	53	*29*	49	*27*	45	*25*	41	*22*	38	*20*	35	132
136	*44*	73	*42*	68	*41*	64	*39*	59	*37*	55	*35*	50	*32*	46	*30*	43	*27*	39	*25*	36	*22*	33	136
140	*47*	72	*46*	66	*44*	61	*42*	56	*40*	52	*38*	48	*35*	44	*32*	40	*30*	37	*27*	34	*24*	30	140
144	*51*	69	*49*	64	*47*	58	*45*	53	*43*	49	*40*	45	*38*	41	*35*	37	*32*	34	*29*	31	*26*	28	144
148	*55*	66	*53*	61	*51*	55	*48*	50	*46*	46	*43*	42	*40*	38	*37*	34	*34*	31	*31*	28	*28*	26	148
152	*58*	63	*56*	57	*54*	51	*51*	46	*49*	42	*46*	38	*43*	34	*39*	31	*36*	28	*33*	25	*29*	23	152
156	*62*	59	*59*	52	*57*	47	*54*	42	*51*	37	*48*	34	*45*	30	*41*	27	*38*	25	*34*	22	*31*	20	156
160	*65*	54	*62*	47	*60*	41	*57*	37	*53*	33	*50*	29	*46*	26	*43*	23	*39*	21	*36*	19	*32*	17	160
164	*68*	48	*65*	41	*62*	35	*59*	31	*55*	27	*52*	24	*48*	21	*44*	19	*41*	17	*37*	15	*33*	14	164
168	*71*	39	*68*	33	*64*	28	*61*	24	*57*	21	*53*	18	*49*	16	*45*	15	*42*	13	*38*	12	*34*	10	168
172	*73*	28	*69*	23	*66*	19	*62*	16	*58*	14	*54*	13	*50*	11	*46*	10	*42*	09	*38*	08	*35*	07	172
176	*74*	15	*71*	12	*67*	10	*63*	08	*59*	07	*55*	06	*51*	06	*47*	05	*43*	04	*39*	04	*35*	04	176
180	*75*	00	*71*	00	*67*	00	*63*	00	*59*	00	*55*	00	*51*	00	*47*	00	*43*	00	*39*	00	*35*	00	180
	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		

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

STAR IDENTIFICATION TABLE

ALTITUDE

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

16—8472

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

H.A.	0° 00′				0° 30′				1° 00′				1° 30′				2° 00′				2° 30′				3° 00′				3° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	78 00.0	1.0	04	180.0	78 30.0	1.0	04	180.0	79 00.0	1.0	04	180.0	79 30.0	1.0	05	180.0	80 00.0	1.0	05	180.0	80 30.0	1.0	05	180.0	81 00.0	1.0	05	180.0	81 30.0	1.0	06	180.0	00
1	77 57.5	1.0	12	175.2	78 27.4	1.0	13	175.0	78 57.3	1.0	13	174.8	79 27.2	1.0	14	174.5	79 57.1	1.0	15	174.3	80 26.9	99	15	174.0	80 56.7	99	16	173.6	81 26.6	99	17	173.3	1
2	77 50.2	99	20	170.5	78 19.8	99	21	170.1	78 49.4	98	22	169.6	79 18.9	98	23	169.2	79 48.3	98	24	168.6	80 17.7	98	25	168.1	80 47.1	98	26	167.4	81 16.4	97	28	166.7	2
3	77 38.2	97	28	165.9	78 07.3	97	29	165.3	78 36.3	97	30	164.6	79 05.2	96	31	164.0	79 34.0	96	32	163.2	80 02.8	96	34	162.4	80 31.3	95	36	161.5	80 59.8	94	37	160.5	3
4	77 21.6	95	35	161.4	77 50.1	95	36	160.7	78 18.4	94	37	159.9	78 46.6	94	39	159.0	79 14.6	93	40	158.1	79 42.4	92	42	157.0	80 10.0	92	44	155.9	80 37.4	91	46	154.7	4
05	77 00.8	93	41	157.2	77 28.5	92	43	156.3	77 56.0	91	44	155.4	78 23.3	91	46	154.4	78 50.4	90	47	153.3	79 17.2	89	49	152.1	79 43.7	88	51	150.8	80 09.8	87	53	149.4	05
6	76 36.2	90	47	153.2	77 03.0	89	48	152.2	77 29.6	88	50	151.1	77 55.9	87	52	150.0	78 21.9	86	54	148.8	78 47.6	85	56	147.5	79 12.9	84	58	146.1	79 37.8	82	60	144.6	6
7	76 08.0	87	52	149.4	76 33.9	86	54	148.4	76 59.5	85	56	147.2	77 24.8	84	57	146.0	77 49.7	82	59	144.7	78 14.3	81	61	143.3	78 38.4	80	63	141.8	79 02.0	78	65	140.3	7
8	75 36.6	84	57	145.9	76 01.6	83	59	144.8	76 26.2	81	60	143.6	76 50.4	80	62	142.3	77 14.3	79	64	141.0	77 37.7	77	66	139.5	78 00.6	76	68	138.0	78 23.0	74	70	136.4	8
9	75 02.4	81	61	142.7	75 26.4	79	63	141.5	75 50.0	78	65	140.3	76 13.2	77	66	139.0	76 36.0	75	68	137.6	76 58.2	73	70	136.1	77 20.0	72	72	134.6	77 41.2	70	73	132.9	9
10	74 25.6	77	65	139.7	74 48.6	76	67	138.5	75 11.3	75	68	137.2	75 33.5	73	70	135.9	75 55.2	72	71	134.5	76 16.4	70	73	133.0	76 37.1	68	75	131.5	76 57.2	66	77	129.8	10
1	73 46.6	74	68	136.9	74 08.7	73	70	135.7	74 30.4	72	71	134.4	74 51.6	70	73	133.1	75 12.3	68	74	131.7	75 32.5	66	76	130.2	75 52.2	64	78	128.7	76 11.2	62	79	127.1	1
2	73 05.5	71	71	134.4	73 26.8	70	73	133.1	73 47.5	68	74	131.9	74 07.8	67	76	130.5	74 27.6	65	77	129.1	74 46.9	63	79	127.7	75 05.6	61	80	126.2	75 23.6	59	82	124.6	2
3	72 22.7	69	74	132.0	72 43.1	67	75	130.8	73 03.0	66	77	129.5	73 22.5	64	78	128.2	73 41.4	62	79	126.8	73 59.7	60	81	125.4	74 17.5	58	82	123.9	74 34.7	56	84	122.4	3
4	71 38.4	66	76	129.8	71 57.9	64	78	128.6	72 17.0	63	79	127.4	72 35.6	61	80	126.1	72 53.7	59	81	124.7	73 11.3	58	83	123.3	73 28.2	56	84	121.9	73 44.6	53	85	120.4	4
15	70 52.6	63	78	127.8	71 11.4	62	79	126.6	71 29.8	60	81	125.4	71 47.6	59	82	124.1	72 04.9	57	83	122.8	72 21.7	55	84	121.4	72 37.9	53	85	120.0	72 53.5	51	87	118.6	15
6	70 05.7	61	80	125.9	70 23.8	60	81	124.8	70 41.4	58	82	123.6	70 58.5	56	83	122.3	71 15.1	54	85	121.0	71 31.2	53	86	119.7	71 46.6	51	87	118.3	72 01.5	49	88	116.9	6
7	69 17.6	59	82	124.2	69 35.1	57	83	123.1	69 52.0	56	84	121.9	70 08.4	54	85	120.6	70 24.4	52	86	119.4	70 39.8	50	87	118.1	70 54.6	49	88	116.8	71 08.9	47	89	115.4	7
8	68 28.6	57	83	122.6	68 45.4	55	84	121.5	69 01.7	54	85	120.3	69 17.5	52	86	119.1	69 32.9	50	87	117.9	69 47.6	48	88	116.6	70 01.9	47	89	115.4	70 15.6	45	90	114.1	8
9	67 38.8	55	84	121.1	67 55.0	53	85	120.0	68 10.7	52	86	118.9	68 25.9	50	87	117.7	68 40.7	48	88	116.5	68 54.9	47	89	115.3	69 08.6	45	90	114.1	69 21.7	43	91	112.8	9
20	66 48.2	53	85	119.7	67 03.8	51	86	118.6	67 19.0	50	87	117.5	67 33.7	48	88	116.4	67 47.8	46	89	115.2	68 01.5	45	90	114.1	68 14.7	43	90	112.8	68 27.4	41	91	111.6	20
1	65 56.9	51	87	118.4	66 12.0	50	87	117.4	66 26.6	48	88	116.3	66 40.8	46	89	115.2	66 54.5	45	90	114.1	67 07.7	43	90	112.9	67 20.4	41	91	111.7	67 32.6	40	92	110.5	1
2	65 05.0	49	87	117.2	65 19.6	48	88	116.2	65 33.8	46	89	115.1	65 47.4	45	90	114.0	66 00.7	43	90	112.9	66 13.4	42	91	111.8	66 25.7	40	92	110.7	66 37.5	38	92	109.5	2
3	64 12.6	48	88	116.1	64 26.7	46	89	115.1	64 40.4	45	90	114.0	64 53.6	43	90	113.0	65 06.4	42	91	111.9	65 18.8	40	92	110.8	65 30.6	39	92	109.7	65 42.0	37	93	108.6	3
4	63 19.6	46	89	115.0	63 33.3	45	90	114.0	63 46.6	44	90	113.0	63 59.4	42	91	112.0	64 11.8	41	92	111.0	64 23.7	39	92	109.9	64 35.2	37	93	108.8	64 46.2	36	93	107.7	4
25	62 26.2	45	90	114.0	62 39.5	44	90	113.1	62 52.4	42	91	112.1	63 04.8	41	92	111.1	63 16.8	39	92	110.1	63 28.4	38	93	109.0	63 39.5	36	93	108.0	63 50.2	35	94	106.9	25
6	61 32.4	44	90	113.1	61 45.3	42	91	112.1	61 57.8	41	91	111.2	62 09.9	40	92	110.2	62 21.6	38	93	109.2	62 32.8	37	93	108.2	62 43.6	35	94	107.2	62 54.0	34	94	106.2	6
7	60 38.3	42	91	112.2	60 50.8	41	91	111.3	61 02.9	40	92	110.3	61 14.7	38	92	109.4	61 26.0	37	93	108.4	61 36.9	36	94	107.4	61 47.4	34	94	106.4	61 57.5	33	94	105.4	7
8	59 43.8	41	91	111.4	59 55.9	40	92	110.4	60 07.7	39	92	109.5	60 19.2	37	93	108.6	60 30.2	36	93	107.7	60 40.8	35	94	106.7	60 51.0	33	94	105.7	61 00.8	32	95	104.8	8
9	58 48.9	40	92	110.6	59 00.8	39	92	109.7	59 12.3	38	93	108.8	59 23.4	36	93	107.9	59 34.2	35	94	106.9	59 44.5	34	94	106.0	59 54.4	32	95	105.1	60 04.0	31	95	104.1	9
30	57 53.9	39	92	109.8	58 05.4	38	93	108.9	58 16.6	37	93	108.1	58 27.5	35	94	107.2	58 37.9	34	94	106.3	58 48.0	33	94	105.4	58 57.7	32	95	104.4	59 07.0	30	95	103.5	30
1	56 58.5	38	93	109.1	57 09.8	37	93	108.2	57 20.7	36	94	107.4	57 31.3	35	94	106.5	57 41.5	33	94	105.6	57 51.3	32	95	104.7	58 00.8	31	95	103.8	58 09.9	30	95	102.9	1
2	56 02.9	37	93	108.4	56 13.9	36	93	107.6	56 24.6	35	94	106.7	56 34.9	34	94	105.9	56 44.9	33	95	105.0	56 54.5	31	95	104.2	57 03.7	30	95	103.3	57 12.6	29	96	102.4	2
3	55 07.2	36	93	107.8	55 17.9	35	94	106.9	55 28.3	34	94	106.1	55 38.4	33	94	105.3	55 48.1	32	95	104.4	55 57.5	31	95	103.6	56 06.5	30	96	102.7	56 15.2	28	96	101.9	3
4	54 11.2	36	94	107.1	54 21.7	34	94	106.3	54 31.8	33	94	105.5	54 41.7	32	95	104.7	54 51.2	31	95	103.9	55 00.4	30	95	103.1	55 09.2	29	96	102.2	55 17.7	28	96	101.4	4
35	53 15.0	35	94	106.5	53 25.3	34	94	105.8	53 35.2	33	95	105.0	53 44.9	32	95	104.2	53 54.2	31	95	103.4	54 03.2	29	96	102.5	54 11.8	28	96	101.7	54 20.2	27	96	100.9	35
6	52 18.6	34	94	106.0	52 28.7	33	95	105.2	52 38.4	32	95	104.4	52 47.9	31	95	103.6	52 57.0	30	95	102.8	53 05.8	29	96	102.1	53 14.3	28	96	101.3	53 22.5	27	96	100.4	6
7	51 22.1	33	94	105.4	51 32.0	32	95	104.7	51 41.5	31	95	103.9	51 50.8	30	95	103.1	51 59.7	29	96	102.4	52 08.4	28	96	101.6	52 16.7	27	96	100.8	52 24.7	26	96	100.0	7
8	50 25.5	33	95	104.9	50 35.1	32	95	104.2	50 44.5	31	95	103.4	50 53.6	30	96	102.7	51 02.4	29	96	101.9	51 10.8	28	96	101.1	51 19.0	27	96	100.4	51 26.9	26	96	99.6	8
9	49 28.7	32	95	104.4	49 38.2	31	95	103.7	49 47.4	30	95	102.9	49 56.3	29	96	102.2	50 04.9	28	96	101.4	50 13.2	27	96	100.7	50 21.2	26	96	99.9	50 29.0	25	97	99.2	9
40	48 31.8	31	95	103.9	48 41.1	31	95	103.2	48 50.1	30	96	102.5	48 58.9	29	96	101.7	49 07.3	28	96	101.0	49 15.5	27	96	100.3	49 23.4	26	96	99.5	49 31.0	25	97	98.8	40
1	47 34.8	31	95	103.5	47 43.9	30	95	102.7	47 52.8	29	96	102.0	48 01.3	28	96	101.3	48 09.7	27	96	100.6	48 17.7	26	96	99.9	48 25.5	25	97	99.1	48 33.0	25	97	98.4	1
2	46 37.7	30	95	103.0	46 46.6	29	96	102.3	46 55.3	29	96	101.6	47 03.8	28	96	100.9	47 11.9	27	96	100.2	47 19.9	26	97	99.5	47 27.5	25	97	98.8	47 34.9	24	97	98.1	2
3	45 40.4	30	96	102.6	45 49.2	29	96	101.9	45 57.8	28	96	101.2	46 06.1	27	96	100.5	46 14.1	26	96	99.8	46 21.9	26	97	99.1	46 29.5	25	97	98.4	46 36.8	24	97	97.7	3
4	44 43.1	29	96	102.2	44 51.8	28	96	101.5	45 00.2	28	96	100.8	45 08.3	27	96	100.1	45 16.3	26	97	99.4	45 24.0	25	97	98.7	45 31.4	24	97	98.1	45 38.6	24	97	97.4	4
45	43 45.7	29	96	101.7	43 54.2	28	96	101.1	44 02.5	27	96	100.4	44 10.5	26	96	99.7	44 18.4	26	97	99.1	44 25.9	25	97	98.4	44 33.3	24	97	97.7	44 40.4	23	97	97.0	45
6	42 48.2	28	96	101.4	42 56.6	28	96	100.7	43 04.7	27	96	100.0	43 12.7	26	97	99.4	43 20.4	25	97	98.7	43 27.8	25	97	98.0	43 35.1	24	97	97.4	43 42.1	23	97	96.7	6
7	41 50.6	28	96	101.0	41 58.9	27	96	100.3	42 06.9	26	96	99.7	42 14.7	26	97	99.0	42 22.3	25	97	98.4	42 29.7	24	97	97.7	42 36.9	23	97	97.1	42 43.8	23	97	96.4	7
8	40 52.9	28	96	100.6	41 01.1	27	96	100.0	41 09.0	26	97	99.3	41 16.7	25	97	98.7	41 24.2	25	97	98.0	41 31.5	24	97	97.4	41 38.6	23	97	96.7	41 45.5	22	97	96.1	8
9	39 55.2	27	96	100.2	40 03.3	26	96	99.6	40 11.1	26	97	99.0	40 18.7	25	97	98.4	40 26.1	24	97	97.7	40 33.3	24	97	97.1	40 40.3	23	97	96.4	40 47.1	22	97	95.8	9
50	38 57.4	27	96	99.9	39 05.4	26	97	99.3	39 13.1	25	97	98.7	39 20.6	25	97	98.0	39 27.9	24	97	97.4	39 35.1	23	97	96.8	39 42.0	23	97	96.1	39 48.7	22	97	95.5	50
1	37 59.6	26	97	99.6	38 07.4	26	97	98.9	38 15.0	25	97	98.3	38 22.5	24	97	97.7	38 29.7	24	97	97.1	38 36.8	23	97	96.5	38 43.6	22	97	95.8	38 50.2	22	97	95.2	1
2	37 01.7	26	97	99.2	37 09.4	25	97	98.6	37 16.9	25	97	98.0	37 24.3	24	97	97.4	37 31.5	24	97	96.8	37 38.4	23	97	96.2	37 45.2	22	97	95.6	37 51.8	22	97	94.9	2
3	36 03.7	26	97	98.9	36 11.4	25	97	98.3	36 18.8	25	97	97.7	36 26.1	24	97	97.1	36 33.2	23	97	96.5	36 40.1	23	97	95.9	36 46.8	22	97	95.3	36 53.3	21	98	94.7	3
4	35 05.7	25	97	98.6	35 13.3	25	97	98.0	35 20.6	24	97	97.4	35 27.8	24	97	96.8	35 34.8	23	97	96.2	35 41.7	22	97	95.6	35 48.3	22	97	95.0	35 54.8	21	98	94.4	4
55	34 07.7	25	97	98.3	34 15.1	25	97	97.7	34 22.4	24	97	97.1	34 29.5	23	97	96.5	34 36.5	23	97	95.9	34 43.2	22	97	95.3	34 49.8	22	98	94.7	34 56.3	21	98	94.1	55
6	33 09.6	25	97	98.0	33 16.9	24	97	97.4	33 24.2	24	97	96.8	33 31.2	23	97	96.2	33 38.1	23	97	95.7	33 44.8	22	97	95.1	33 51.3	22	98	94.5	33 57.7	21	98	93.9	6
7	32 11.4	25	97	97.7	32 18.7	24	97	97.1	32 25.9	24	97	96.5	32 32.8	23	97	96.0	32 39.7	22	97	95.4	32 46.3	22	98	94.8	32 52.8	21	98	94.2	32 59.2	21	98	93.6	7
8	31 13.3	24	97	97.4	31 20.5	24	97	96.8	31 27.5	23	97	96.3	31 34.5	23	97	95.7	31 41.2	22	97	95.1	31 47.8	22	98	94.5	31 54.3	21	98	94.0	32 00.6	21	98	93.4	8
9	30 15.0	24	97	97.1	30 22.2	24	97	96.6	30 29.2	23	97	96.0	30 36.0	23	97	95.4	30 42.8	22	97	94.9	30 49.3	22	98	94.3	30 55.7	21	98	93.7	31 02.0	21	98	93.2	9
60	29 16.8	24	97	96.8	29 23.9	23	97	96.3	29 30.8	23	97	95.7	29 37.6	22	97	95.2	29 44.3	22	98	94.6	29 50.8	21	98	94.0	29 57.2	21	98	93.5	30 03.4	21	98	92.9	60
1	28 18.5	24	97	96.6	28 25.5	23	97	96.0	28 32.4	23	97	95.5	28 39.1	22	97	94.9	28 45.8	22	98	94.4	28 52.2	21	98	93.8	28 58.6	21	98	93.2	29 04.8	20	98	92.7	1
2	27 20.2	23	97	96.3	27 27.1	23	97	95.8	27 34.0	23	97	95.2	27 40.7	22	98	94.7	27 47.2	22	98	94.1	27 53.7	21	98	93.6	28 00.0	21	98	93.0	28 06.1	20	98	92.5	2
3	26 21.8	23	97	96.0	26 28.7	23	97	95.5	26 35.5	22	97	95.0	26 42.2	22	98	94.4	26 48.7	22	98	93.9	26 55.1	21	98	93.3	27 01.4	21	98	92.8	27 07.5	20	98	92.2	3
4	25 23.5	23	97	95.8	25 30.3	23	97	95.3	25 37.0	22	98	94.7	25 43.6	22	98	94.2	25 50.1	21	98	93.6	25 56.5	21	98	93.1	26 02.7	21	98	92.5	26 08.9	20	98	92.0	4
65	24 25.1	23	97	95.5	24 31.8	22	97	95.0	24 38.5	22	98	94.5	24 45.1	22	98	93.9	24 51.5	21	98	93.4	24 57.9	21	98	92.9	25 04.1	21	98	92.3	25 10.2	20	98	91.8	65
6	23 26.6	23	97	95.3	23 33.4	22	98	94.8	23 40.0	22	98	94.2	23 46.5	22	98	93.7	23 52.9	21	98	93.2	23 59.3	21	98	92.6	24 05.5	20	98	92.1	24 11.5	20	98	91.6	6
7	22 28.2	22	97	95.0	22 34.9	22	98	94.5	22 41.5	22	98	94.0	22 48.0	21	98	93.5	22 54.3	21	98	92.9	23 00.6	21	98	92.4	23 06.8	20	98	91.9	23 12.9	20	98	91.3	7
8	21 29.7	22	97	94.8	21 36.4	22	98	94.3	21 42.9	22	98	93.8	21 49.4	21	98	93.2	21 55.7	21	98	92.7	22 02.0	21	98	92.2	22 08.1	20	98	91.6	22 14.2	20	98	91.1	8
9	20 31.2	22	98	94.6	20 37.8	22	98	94.0	20 44.3	22	98	93.5	20 50.8	21	98	93.0	20 57.1	21	98	92.5	21 03.3	21	98	92.0	21 09.5	20	98	91.4	21 15.5	20	98	90.9	9
70	19 32.7	22	98	94.3	19 39.3	22	98	93.8	19 45.8	21	98	93.3	19 52.2	21	98	92.8	19 58.5	21	98	92.3	20 04.7	21	98	91.7	20 10.8	20	98	91.2	20 16.8	20	98	90.7	70
1	18 34.2	22	98	94.1	18 40.7	22	98	93.6	18 47.2	21	98	93.1	18 53.5	21	98	92.5	18 59.8	21	98	92.0	19 06.0	21	98	91.5	19 12.1	20	98	91.0	19 18.1	20	98	90.5	1
2	17 35.6	22	98	93.9	17 42.1	22	98	93.4	17 48.5	21	98	92.8	17 54.9	21	98	92.3	18 01.2	21	98	91.8	18 07.3	20	98	91.3	18 13.4	20	98	90.8	18 19.5	20	98	90.3	2
3	16 37.1	22	98	93.6	16 43.5	21	98	93.1	16 49.9	21	98	92.6	16 56.2	21	98	92.1	17 02.5	21	98	91.6	17 08.7	20	98	91.1	17 14.7	20	98	90.6	17 20.8	20	98	90.1	3
4	15 38.5	22	98	93.4	15 44.9	21	98	92.9	15 51.3	21	98	92.4	15 57.6	21	98	91.9	16 03.8	21	98	91.4	16 10.0	20	98	90.9	16 16.1	20	98	90.4	16 22.1	20	98	89.9	4
75	14 39.9	21	98	93.2	14 46.3	21	98	92.7	14 52.6	21	98	92.2	14 58.9	21	98	91.7	15 05.1	21	98	91.2	15 11.3	20	98	90.7	15 17.4	20	98	90.2	15 23.4	20	98	89.6	75
6	13 41.3	21	98	93.0	13 47.7	21	98	92.5	13 54.0	21	98	92.0	14 00.3	21	98	91.5	14 06.5	21	98	91.0	14 12.6	20	98	90.4	14 18.7	20	98	89.9	14 24.7	20	98	89.4	6
7	12 42.7	21	98	92.7	12 49.0	21	98	92.2	12 55.3	21	98	91.7	13 01.6	21	98	91.2	13 07.8	21	98	90.7	13 13.9	20	98	90.2	13 20.0	20	98	89.7	13 26.0	20	98	89.2	7
8	11 44.0	21	98	92.5	11 50.4	21	98	92.0	11 56.7	21	98	91.5	12 02.9	21	98	91.0	12 09.1	21	98	90.5	12 15.2	20	98	90.0	12 21.3	20	98	89.5	12 27.3	20	98	89.0	8
9	10 45.4	21	98	92.3	10 51.7	21	98	91.8	10 58.0	21	98	91.3	11 04.2	21	98	90.8	11 10.4	21	98	90.3	11 16.5	20	98	89.8	11 22.6	20	98	89.3	11 28.7	20	98	88.8	9
80	9 46.8	21	98	92.1	9 53.1	21	98	91.6	9 59.3	21	98	91.1	10 05.5	21	98	90.6	10 11.7	21	98	90.1	10 17.9	20	98	89.6	10 23.9	20	98	89.1	10 30.0	20	98	88.6	80
1	8 48.1	21	98	91.9	8 54.4	21	98	91.4	9 00.6	21	98	90.9	9 06.9	21	98	90.4	9 13.0	21	98	89.9	9 19.2	20	98	89.4	9 25.3	20	98	88.9	9 31.3	20	98	88.4	1
2	7 49.4	21	98	91.7	7 55.7	21	98	91.2	8 02.0	21	98	90.7	8 08.2	21	98	90.2	8 14.3	21	98	89.7	8 20.5	20	98	89.2	8 26.6	20	98	88.7	8 32.6	20	98	88.2	2
3	6 50.8	21	98	91.5	6 57.0	21	98	91.0	7 03.3	21	98	90.5	7 09.5	21	98	90.0	7 15.7	21	98	89.5	7 21.8	20	98	89.0	7 27.9	20	98	88.5	7 34.0	20	98	88.0	3
4	5 52.1	21	98	91.3	5 58.4	21	98	90.8	6 04.6	21	98	90.3	6 10.8	21	98	89.8	6 17.0	21	98	89.3	6 23.1	20	98	88.8	6 29.2	20	98	88.3	6 35.3	20	98	87.8	4
85									5 05.9	21	98	90.1	5 12.1	21	98	89.6	5 18.3	21	98	89.1	5 24.5	20	98	88.6	5 30.6	20	98	88.1	5 36.7	20	98	87.6	85

H.A.	0° 00′			0° 30′			1° 00′			1° 30′			2° 00′			2° 30′			3° 00′			3° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	78 00.0	1.0 04	180.0	77 30.0	1.0 04	180.0	77 00.0	1.0 04	180.0	76 30.0	1.0 04	180.0	76 00.0	1.0 04	180.0	75 30.0	1.0 03	180.0	75 00.0	1.0 03	180.0	74 30.0	1.0 03	180.0	00
1	77 57.5	1.0 12	175.2	77 27.6	1.0 12	175.4	76 57.7	1.0 11	175.6	76 27.8	1.0 11	175.7	75 57.9	1.0 10	175.9	75 28.0	1.0 10	176.0	74 58.0	1.0 10	176.1	74 28.1	1.0 10	176.3	1
2	77 50.2	99 20	170.5	77 20.6	99 19	170.8	76 50.9	99 19	171.2	76 21.3	99 18	171.5	75 51.6	99 17	171.8	75 21.9	99 17	172.1	74 52.1	99 16	172.3	74 22.4	99 16	172.6	2
3	77 38.2	97 28	165.9	77 09.0	97 27	166.4	76 39.8	98 26	166.9	76 10.5	98 25	167.4	75 41.2	98 24	167.8	75 11.8	98 23	168.2	74 42.4	98 22	168.6	74 12.9	98 22	168.9	3
4	77 21.6	95 35	161.4	76 53.0	96 33	162.1	76 24.4	96 32	162.7	75 55.6	96 31	163.3	75 26.8	96 30	163.9	74 57.9	96 29	164.4	74 28.9	97 28	164.9	73 59.9	97 28	165.4	4
05	77 00.8	93 41	157.2	76 33.0	93 40	158.0	76 05.0	94 38	158.8	75 36.9	94 37	159.5	75 08.7	94 36	160.1	74 40.3	95 35	160.8	74 11.9	95 34	161.4	73 43.3	95 33	161.9	05
6	76 36.2	90 47	153.2	76 09.2	90 46	154.1	75 42.0	91 44	155.0	75 14.6	92 43	155.8	74 47.0	92 42	156.5	74 19.3	93 40	157.3	73 51.5	93 39	157.9	73 23.5	93 38	158.6	6
7	76 08.0	87 52	149.4	75 41.9	88 51	150.4	75 15.5	88 49	151.4	74 48.9	89 48	152.3	74 22.0	90 47	153.1	73 55.0	90 45	153.9	73 27.9	91 44	154.7	73 00.6	91 43	155.4	7
8	75 36.6	84 57	145.9	75 11.4	85 56	147.0	74 45.8	86 54	148.0	74 20.1	86 53	149.0	73 54.0	87 51	149.9	73 27.8	88 50	150.8	73 01.4	88 49	151.6	72 34.7	89 48	152.4	8
9	75 02.4	81 61	142.7	74 38.1	82 60	143.8	74 13.4	83 58	144.9	73 48.5	84 57	145.9	73 23.3	84 56	146.8	72 57.8	85 54	147.8	72 32.1	86 53	148.6	72 06.2	87 52	149.5	9
10	74 25.6	77 65	139.7	74 02.2	79 64	140.8	73 38.4	80 62	141.9	73 14.3	81 61	143.0	72 49.9	82 59	144.0	72 25.3	83 58	144.9	72 00.3	84 57	145.9	71 35.2	84 56	146.7	10
1	73 46.6	74 68	136.9	73 24.0	76 67	138.1	73 01.1	77 66	139.2	72 37.9	78 64	140.3	72 14.3	79 63	141.3	71 50.4	80 62	142.3	71 26.3	81 60	143.2	71 01.8	82 59	144.1	1
2	73 05.5	71 71	134.4	72 43.9	73 70	135.5	72 21.8	74 69	136.7	71 59.4	75 67	137.8	71 36.6	76 66	138.8	71 13.5	78 65	139.8	70 50.1	79 63	140.8	70 26.4	79 62	141.7	2
3	72 22.7	69 74	132.0	72 01.9	70 73	133.2	71 40.7	71 71	134.3	71 19.1	73 70	135.4	70 57.1	74 69	136.5	70 34.8	75 67	137.5	70 12.1	76 66	138.5	69 49.1	77 65	139.4	3
4	71 38.4	66 76	129.8	71 18.3	67 75	131.0	70 57.9	69 74	132.1	70 37.1	70 72	133.2	70 15.8	71 71	134.3	69 54.3	73 70	135.3	69 32.3	74 69	136.3	69 10.1	75 68	137.2	4
15	70 52.6	63 78	127.8	70 33.4	65 77	129.0	70 13.7	66 76	130.1	69 53.6	68 75	131.2	69 33.1	69 74	132.2	69 12.2	70 72	133.3	68 51.0	71 71	134.2	68 29.5	72 70	135.2	15
6	70 05.7	61 80	125.9	69 47.1	63 79	127.1	69 28.2	64 78	128.2	69 08.8	65 77	129.3	68 49.0	67 76	130.3	68 28.8	68 74	131.3	68 08.3	69 73	132.3	67 47.4	70 72	133.3	6
7	69 17.6	59 82	124.2	68 59.8	60 81	125.3	68 41.5	62 80	126.4	68 22.8	63 78	127.5	68 03.7	64 77	128.6	67 44.2	66 76	129.6	67 24.3	67 75	130.5	67 04.1	68 74	131.5	7
8	68 28.6	57 83	122.6	68 11.4	58 82	123.7	67 53.8	60 81	124.8	67 35.7	61 80	125.9	67 17.2	62 79	126.9	66 58.4	63 78	127.9	66 39.1	65 77	128.9	66 19.6	66 76	129.8	8
9	67 38.8	55 84	121.1	67 22.2	56 83	122.2	67 05.1	58 82	123.3	66 47.7	59 81	124.3	66 29.8	60 81	125.3	66 11.6	61 80	126.3	65 52.9	63 79	127.3	65 34.0	64 78	128.2	9
20	66 48.2	53 85	119.7	66 32.1	54 85	120.8	66 15.7	56 84	121.8	65 58.8	57 83	122.9	65 41.5	58 82	123.9	65 23.8	60 81	124.8	65 05.8	61 80	125.8	64 47.4	62 79	126.7	20
1	65 56.9	51 87	118.4	65 41.4	52 86	119.5	65 25.5	54 85	120.5	65 09.1	55 84	121.5	64 52.4	56 83	122.5	64 35.2	58 82	123.5	64 17.8	59 81	124.4	63 59.9	60 80	125.3	1
2	65 05.0	49 87	117.2	64 50.0	51 87	118.3	64 34.6	52 86	119.3	64 18.7	53 85	120.2	64 02.5	55 84	121.2	63 45.9	56 83	122.2	63 29.0	57 83	123.1	63 11.6	58 82	124.0	2
3	64 12.6	48 88	116.1	63 58.0	49 88	117.1	63 43.1	50 87	118.1	63 27.7	52 86	119.0	63 12.0	53 85	120.0	62 55.9	54 84	120.9	62 39.4	55 84	121.8	62 22.6	57 83	122.7	3
4	63 19.6	46 89	115.0	63 05.5	48 88	116.0	62 51.0	49 88	117.0	62 36.1	50 87	117.9	62 20.9	51 86	118.9	62 05.2	53 85	119.8	61 49.3	54 85	120.7	61 32.9	55 84	121.6	4
25	62 26.2	45 90	114.0	62 12.5	46 89	115.0	61 58.5	48 88	115.9	61 44.0	49 88	116.9	61 29.2	50 87	117.8	61 14.0	51 86	118.7	60 58.5	52 86	119.6	60 42.6	53 85	120.4	25
6	61 32.4	44 90	113.1	61 19.1	45 90	114.0	61 05.5	46 89	114.9	60 51.4	47 88	115.9	60 37.0	49 88	116.8	60 22.3	50 87	117.6	60 07.2	51 86	118.5	59 51.7	52 86	119.4	6
7	60 38.3	42 91	112.2	60 25.3	44 90	113.1	60 12.1	45 90	114.0	59 58.4	46 89	114.9	59 44.4	47 88	115.8	59 30.1	48 88	116.7	59 15.4	50 87	117.5	59 00.3	51 86	118.4	7
8	59 43.8	41 91	111.4	59 31.2	42 91	112.3	59 18.3	44 90	113.1	59 05.0	45 90	114.0	58 51.4	46 89	114.9	58 37.4	47 88	115.7	58 23.1	48 88	116.6	58 08.5	49 87	117.4	8
9	58 48.9	40 92	110.6	58 36.7	41 91	111.4	58 24.1	43 91	112.3	58 11.2	44 90	113.2	57 57.9	45 90	114.0	57 44.3	46 89	114.9	57 30.4	47 88	115.7	57 16.1	48 88	116.5	9
30	57 53.9	39 92	109.8	57 42.0	40 92	110.7	57 29.7	41 91	111.5	57 17.1	43 91	112.4	57 04.2	44 90	113.2	56 50.9	45 90	114.0	56 37.3	46 89	114.8	56 23.4	47 88	115.6	30
1	56 58.5	38 93	109.1	56 46.9	39 92	109.9	56 35.0	40 92	110.8	56 22.7	42 91	111.6	56 10.1	43 91	112.4	55 57.1	44 90	113.2	55 43.9	45 90	114.0	55 30.3	46 89	114.8	1
2	56 02.9	37 93	108.4	55 51.6	38 93	109.2	55 39.9	39 92	110.0	55 28.0	40 92	110.9	55 15.6	42 91	111.7	55 03.0	43 91	112.5	54 50.1	44 90	113.2	54 36.9	45 90	114.0	2
3	55 07.2	36 93	107.8	54 56.1	37 93	108.6	54 44.7	38 92	109.4	54 33.0	40 92	110.2	54 21.0	41 92	111.0	54 08.7	42 91	111.7	53 56.0	43 91	112.5	53 43.1	44 90	113.3	3
4	54 11.2	36 94	107.1	54 00.3	37 93	107.9	53 49.2	38 93	108.7	53 37.8	39 92	109.5	53 26.0	40 92	110.3	53 14.0	41 92	111.0	53 01.7	42 91	111.8	52 49.1	43 91	112.5	4
35	53 15.0	35 94	106.5	53 04.4	36 94	107.3	52 53.5	37 93	108.1	52 42.3	38 93	108.9	52 30.9	39 92	109.6	52 19.1	40 92	110.4	52 07.1	41 91	111.1	51 54.7	42 91	111.9	35
6	52 18.6	34 94	106.0	52 08.3	35 94	106.7	51 57.6	36 93	107.5	51 46.7	37 93	108.2	51 35.5	38 93	109.0	51 24.0	39 92	109.7	51 12.2	40 92	110.5	51 09.1	41 91	111.2	6
7	51 22.1	33 94	105.4	51 12.0	34 94	106.2	51 01.6	35 94	106.9	50 50.9	36 93	107.7	50 39.9	37 93	108.4	50 28.6	38 93	109.1	50 17.1	39 92	109.9	50 05.3	40 92	110.6	7
8	50 25.5	33 95	104.9	50 15.6	34 94	105.6	50 05.4	34 94	106.4	49 54.9	35 94	107.1	49 44.1	36 93	107.8	49 33.1	37 93	108.5	49 21.8	38 93	109.3	49 10.2	39 92	110.0	8
9	49 28.7	32 95	104.4	49 19.0	33 95	105.1	49 09.0	34 94	105.8	48 58.7	35 94	106.6	48 48.2	36 94	107.3	48 37.4	36 93	108.0	48 26.3	37 93	108.7	48 15.0	38 92	109.4	9
40	48 31.8	31 95	103.9	48 22.3	32 95	104.6	48 12.4	33 94	105.3	48 02.4	34 94	106.0	47 52.0	35 94	106.7	47 41.4	36 93	107.4	47 30.6	37 93	108.1	47 19.5	37 93	108.8	40
1	47 34.8	31 95	103.5	47 25.4	32 95	104.2	47 15.8	33 95	104.9	47 05.9	33 94	105.5	46 55.8	34 94	106.2	46 45.4	35 94	106.9	46 34.7	36 93	107.6	46 23.9	37 93	108.3	1
2	46 37.7	30 95	103.0	46 28.4	31 95	103.7	46 19.0	32 95	104.4	46 09.3	33 95	105.1	45 59.3	34 94	105.7	45 49.2	34 94	106.4	45 38.7	35 94	107.1	45 28.1	36 93	107.8	2
3	45 40.4	30 96	102.6	45 31.4	31 95	103.3	45 22.1	31 95	103.9	45 12.6	32 95	104.6	45 02.8	33 94	105.3	44 52.8	34 94	105.9	44 42.6	34 94	106.6	44 32.1	35 94	107.3	3
4	44 43.1	29 96	102.2	44 34.2	30 95	102.8	44 25.1	31 95	103.5	44 15.7	32 95	104.2	44 06.1	32 95	104.8	43 56.3	33 94	105.5	43 46.2	34 94	106.1	43 36.0	35 94	106.8	4
45	43 45.7	29 96	101.7	43 36.9	30 96	102.4	43 27.9	30 95	103.1	43 18.7	31 95	103.7	43 09.3	32 95	104.4	42 59.7	33 95	105.0	42 49.8	33 94	105.7	42 39.7	34 94	106.3	45
6	42 48.2	28 96	101.4	42 39.6	29 96	102.0	42 30.7	30 96	102.7	42 21.7	31 95	103.3	42 12.4	31 95	103.9	42 02.9	32 95	104.6	41 53.2	33 94	105.2	41 43.3	33 94	105.9	6
7	41 50.6	28 96	101.0	41 42.1	29 96	101.6	41 33.4	29 96	102.3	41 24.5	30 95	102.9	41 15.4	31 95	103.5	41 06.1	31 95	104.2	40 56.5	32 95	104.8	40 46.8	33 94	105.4	7
8	40 52.9	28 96	100.6	40 44.6	28 96	101.2	40 36.0	29 96	101.9	40 27.3	30 96	102.5	40 18.3	30 95	103.1	40 09.1	31 95	103.7	39 59.7	32 95	104.4	39 50.2	32 95	105.0	8
9	39 55.2	27 96	100.2	39 47.0	28 96	100.9	39 38.6	28 96	101.5	39 29.9	29 96	102.1	39 21.1	30 95	102.7	39 12.1	30 95	103.4	39 02.8	31 95	104.0	38 53.4	32 95	104.6	9
50	38 57.4	27 96	99.9	38 49.3	27 96	100.5	38 41.0	28 96	101.1	38 32.5	29 96	101.7	38 23.8	29 96	102.4	38 14.9	30 95	103.0	38 05.8	31 95	103.6	37 56.6	31 95	104.2	50
1	37 59.6	26 97	99.6	37 51.6	27 96	100.2	37 43.4	28 96	100.8	37 35.0	28 96	101.4	37 26.4	29 96	102.0	37 17.7	29 96	102.6	37 08.7	30 95	103.2	36 59.6	31 95	103.8	1
2	37 01.7	26 97	99.2	36 53.8	27 96	99.8	36 45.7	27 96	100.4	36 37.4	28 96	101.0	36 29.0	28 96	101.6	36 20.4	29 96	102.2	36 11.6	30 95	102.8	36 02.6	30 95	103.4	2
3	36 03.7	26 97	98.9	35 55.9	26 97	99.5	35 47.9	27 96	100.1	35 39.8	27 96	100.7	35 31.5	28 96	101.3	35 23.0	29 96	101.9	35 14.3	29 96	102.5	35 05.4	30 95	103.0	3
4	35 05.7	25 97	98.6	34 58.0	26 97	99.2	34 50.1	27 96	99.8	34 42.1	27 96	100.4	34 33.9	28 96	100.9	34 25.5	28 96	101.5	34 16.9	29 96	102.1	34 08.2	29 96	102.7	4
55	34 07.7	25 97	98.3	34 00.1	26 97	98.9	33 52.3	26 97	99.4	33 44.3	27 96	100.0	33 36.2	27 96	100.6	33 27.9	28 96	101.2	33 19.5	28 96	101.8	33 10.9	29 96	102.3	55
6	33 09.6	25 97	98.0	33 02.0	25 97	98.6	32 54.4	26 97	99.1	32 46.5	26 96	99.7	32 38.5	27 96	100.3	32 30.3	27 96	100.9	32 22.0	28 96	101.4	32 13.6	28 96	102.0	6
7	32 11.4	25 97	97.7	32 04.0	25 97	98.3	31 56.4	26 97	98.8	31 48.6	26 97	99.4	31 40.7	27 96	100.0	31 32.7	27 96	100.5	31 24.5	28 96	101.1	31 16.1	28 96	101.7	7
8	31 13.3	24 97	97.4	31 05.9	25 97	98.0	30 58.4	25 97	98.5	30 50.7	26 97	99.1	30 42.9	26 96	99.7	30 34.9	27 96	100.2	30 26.8	27 96	100.8	30 18.6	28 96	101.3	8
9	30 15.0	24 97	97.1	30 07.7	25 97	97.7	30 00.3	25 97	98.2	29 52.7	25 97	98.8	29 45.0	26 97	99.4	29 37.2	26 96	99.9	29 29.2	27 96	100.5	29 21.0	27 96	101.0	9
60	29 16.8	24 97	96.8	29 09.6	24 97	97.4	29 02.2	25 97	98.0	28 54.7	25 97	98.5	28 47.1	26 97	99.1	28 39.3	26 96	99.6	28 31.4	27 96	100.2	28 23.4	27 96	100.7	60
1	28 18.5	24 97	96.6	28 11.3	24 97	97.1	28 04.1	24 97	97.7	27 56.6	25 97	98.2	27 49.1	25 97	98.8	27 41.4	26 97	99.3	27 33.6	26 96	99.9	27 25.7	27 96	100.4	1
2	27 20.2	23 97	96.3	27 13.1	24 97	96.9	27 05.9	24 97	97.4	26 58.5	25 97	97.9	26 51.1	25 97	98.5	26 43.5	25 97	99.0	26 35.8	26 96	99.6	26 27.9	26 96	100.1	2
3	26 21.8	23 97	96.0	26 14.8	24 97	96.6	26 07.7	24 97	97.1	26 00.4	24 97	97.7	25 53.0	25 97	98.2	25 45.5	25 97	98.7	25 37.9	26 97	99.3	25 30.1	26 96	99.8	3
4	25 23.5	23 97	95.8	25 16.5	23 97	96.3	25 09.4	24 97	96.9	25 02.2	24 97	97.4	24 54.9	25 97	97.9	24 47.5	25 97	98.5	24 39.9	25 97	99.0	24 32.3	26 96	99.5	4
65	24 25.1	23 97	95.5	24 18.1	23 97	96.1	24 11.1	24 97	96.6	24 04.0	24 97	97.1	23 56.8	24 97	97.7	23 49.4	25 97	98.2	23 42.0	25 97	98.7	23 34.4	25 97	99.3	65
6	23 26.6	23 97	95.3	23 19.8	23 97	95.8	23 12.8	23 97	96.3	23 05.7	24 97	96.9	22 58.6	24 97	97.4	22 51.3	24 97	97.9	22 43.9	25 97	98.5	22 36.4	25 97	99.0	6
7	22 28.2	22 97	95.0	22 21.4	23 97	95.6	22 14.5	23 97	96.1	22 07.5	24 97	96.6	22 00.4	24 97	97.1	21 53.2	24 97	97.7	21 45.9	25 97	98.2	21 38.5	25 97	98.7	7
8	21 29.7	22 97	94.8	21 22.9	23 97	95.3	21 16.1	23 97	95.8	21 09.2	23 97	96.4	21 02.1	24 97	96.9	20 55.0	24 97	97.4	20 47.7	24 97	97.9	20 40.4	25 97	98.4	8
9	20 31.2	22 98	94.6	20 24.5	23 97	95.1	20 17.7	23 97	95.6	20 10.8	23 97	96.1	20 03.8	23 97	96.6	19 56.8	24 97	97.2	19 49.6	24 97	97.7	19 42.3	24 97	98.2	9
70	19 32.7	22 98	94.3	19 26.0	22 97	94.8	19 19.3	23 97	95.4	19 12.4	23 97	95.9	19 05.5	23 97	96.4	18 58.5	24 97	96.9	18 51.4	24 97	97.4	18 44.2	24 97	97.9	70
1	18 34.2	22 98	94.1	18 27.5	22 98	94.6	18 20.8	22 97	95.1	18 14.1	23 97	95.6	18 07.2	23 97	96.1	18 00.2	23 97	96.7	17 53.2	24 97	97.2	17 46.1	24 97	97.7	1
2	17 35.6	22 98	93.9	17 29.0	22 98	94.4	17 22.4	22 97	94.9	17 15.6	23 97	95.4	17 08.8	23 97	95.9	17 01.9	23 97	96.4	16 55.0	23 97	96.9	16 47.9	24 97	97.4	2
3	16 37.1	22 98	93.6	16 30.5	22 98	94.1	16 23.9	22 98	94.7	16 17.2	22 97	95.2	16 10.4	23 97	95.7	16 03.6	23 97	96.2	15 56.7	23 97	96.7	15 49.7	23 97	97.2	3
4	15 38.5	22 98	93.4	15 32.0	22 98	93.9	15 25.4	22 98	94.4	15 18.7	22 97	94.9	15 12.0	23 97	95.4	15 05.2	23 97	95.9	14 58.4	23 97	96.4	14 51.5	23 97	96.9	4
75	14 39.9	21 98	93.2	14 33.4	22 98	93.7	14 26.9	22 98	94.2	14 20.3	22 98	94.7	14 13.6	22 97	95.2	14 06.8	23 97	95.7	14 00.0	23 97	96.2	13 53.2	23 97	96.7	75
6	13 41.3	21 98	93.0	13 34.8	22 98	93.5	13 28.3	22 98	94.0	13 21.8	22 98	94.5	13 15.1	22 97	95.0	13 08.4	22 97	95.5	13 01.7	23 97	96.0	12 54.9	23 97	96.5	6
7	12 42.7	21 98	92.7	12 36.2	22 98	93.2	12 29.8	22 98	93.7	12 23.2	22 98	94.2	12 16.6	22 98	94.7	12 10.0	22 97	95.2	12 03.3	22 97	95.7	11 56.6	23 97	96.2	7
8	11 44.0	21 98	92.5	11 37.6	21 98	93.0	11 31.2	22 98	93.5	11 24.7	22 98	94.0	11 18.1	22 98	94.5	11 11.5	22 97	95.0	11 04.9	22 97	95.5	10 58.2	22 97	96.0	8
9	10 45.4	21 98	92.3	10 39.0	21 98	92.8	10 32.6	21 98	93.3	10 26.1	22 98	93.8	10 19.6	22 98	94.3	10 13.1	22 98	94.8	10 06.5	22 97	95.3	9 59.8	22 97	95.8	9
80	9 46.8	21 98	92.1	9 40.4	21 98	92.6	9 34.0	21 98	93.1	9 27.6	22 98	93.6	9 21.1	22 98	94.1	9 14.6	22 98	94.6	9 08.0	22 97	95.1	9 01.4	22 97	95.6	80
1	8 48.1	21 98	91.9	8 41.8	21 98	92.4	8 35.4	21 98	92.9	8 29.0	21 98	93.4	8 22.6	22 98	93.9	8 16.1	22 98	94.4	8 09.6	22 97	94.8	8 03.0	22 97	95.3	1
2	7 49.4	21 98	91.7	7 43.1	21 98	92.2	7 36.8	21 98	92.7	7 30.4	21 98	93.2	7 24.0	21 98	93.6	7 17.5	22 98	94.1	7 11.1	22 98	94.6	7 04.6	22 97	95.1	2
3	6 50.8	21 98	91.5	6 44.5	21 98	92.0	6 38.2	21 98	92.4	6 31.8	21 98	92.9	6 25.4	21 98	93.4	6 19.0	21 98	93.9	6 12.6	22 98	94.4	6 06.1	22 97	94.9	3
4	5 52.1	21 98	91.3	5 45.8	21 98	91.7	5 39.5	21 98	92.2	5 33.2	21 98	92.7	5 26.8	21 98	93.2	5 20.4	21 98	93.7	5 14.0	21 98	94.2	5 07.6	21 98	94.7	4

H.A.	4° 00′				4° 30′				5° 00′				5° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	82 00.0	1.0	06	180.0	82 30.0	1.0	06	180.0	83 00.0	1.0	07	180.0	83 30.0	1.0	07	180.0
1	81 56.3	99	18	172.9	82 26.1	99	19	172.4	82 55.8	99	20	171.9	83 25.5	99	22	171.3
2	81 45.5	97	29	165.9	82 14.6	97	31	165.1	82 43.6	96	33	164.1	83 12.4	96	35	162.9
3	81 28.0	94	39	159.4	81 56.1	93	41	158.2	82 23.9	92	44	156.8	82 51.4	91	46	155.2
4	81 04.5	90	48	153.4	81 31.2	89	50	151.9	81 57.6	87	53	150.2	82 23.6	86	56	148.4
05	80 35.6	86	56	147.9	81 01.0	84	58	146.2	81 25.9	82	61	144.4	81 50.2	80	63	142.3
6	80 02.3	81	62	142.9	80 26.2	79	64	141.2	80 49.5	77	67	139.2	81 12.2	74	69	137.1
7	79 25.1	76	67	138.5	79 47.6	74	70	136.7	80 09.5	72	72	134.7	80 30.6	69	74	132.6
8	78 44.8	72	72	134.7	79 05.9	69	74	132.8	79 26.4	67	76	130.8	79 46.1	64	78	128.8
9	78 01.8	68	75	131.2	78 21.7	65	77	129.4	78 40.9	63	79	127.4	78 59.2	60	81	125.4
10	77 16.6	64	78	128.1	77 35.3	61	80	126.3	77 53.3	59	82	124.5	78 10.5	56	84	122.5
1	76 29.6	60	81	125.4	76 47.3	58	83	123.7	77 04.2	55	84	121.8	77 20.3	52	86	119.9
2	75 41.0	57	83	123.0	75 57.7	55	85	121.3	76 13.7	52	86	119.5	76 28.9	49	87	117.7
3	74 51.2	54	85	120.8	75 07.0	52	86	119.2	75 22.1	49	88	117.5	75 36.5	47	89	115.7
4	74 00.3	51	86	118.9	74 15.3	49	88	117.3	74 29.6	47	89	115.6	74 43.2	44	90	114.0
15	73 08.4	49	88	117.1	73 22.7	47	89	115.6	73 36.4	44	90	114.0	73 49.3	42	91	112.4
6	72 15.8	47	89	115.5	72 29.5	44	90	114.0	72 42.4	42	91	112.5	72 54.7	40	92	111.0
7	71 22.5	45	90	114.0	71 35.6	42	91	112.6	71 48.0	40	92	111.2	71 59.7	38	92	109.7
8	70 28.7	43	91	112.7	70 41.1	41	91	111.3	70 53.0	38	92	109.9	71 04.2	36	93	108.5
9	69 34.3	41	91	111.5	69 46.3	39	92	110.2	69 57.6	37	93	108.8	70 08.4	35	94	107.5
20	68 39.5	39	92	110.4	68 51.0	37	93	109.1	69 01.9	35	93	107.8	69 12.3	33	94	106.5
1	67 44.3	38	93	109.3	67 55.4	36	93	108.1	68 05.9	34	94	106.8	68 15.9	32	94	105.6
2	66 48.7	37	93	108.4	66 59.4	35	94	107.2	67 09.6	33	94	106.0	67 19.2	31	95	104.7
3	65 52.9	35	94	107.5	66 03.2	34	94	106.3	66 13.1	32	95	105.2	66 22.4	30	95	104.0
4	64 56.8	34	94	106.6	65 06.8	33	94	105.5	65 16.3	31	95	104.4	65 25.3	29	95	103.2
25	64 00.4	33	94	105.9	64 10.1	32	95	104.8	64 19.4	30	95	103.7	64 28.1	28	96	102.6
6	63 03.9	32	95	105.1	63 13.3	31	95	104.1	63 22.3	29	95	103.0	63 30.8	28	96	101.9
7	62 07.1	31	95	104.4	62 16.3	30	95	103.4	62 25.0	28	96	102.4	62 33.3	27	96	101.3
8	61 10.2	31	95	103.8	61 19.1	29	96	102.8	61 27.6	28	96	101.8	61 35.7	26	96	100.8
9	60 13.1	30	95	103.2	60 21.8	28	96	102.2	60 30.1	27	96	101.2	60 38.0	25	96	100.2
30	59 15.9	29	96	102.6	59 24.4	28	96	101.6	59 32.5	26	96	100.7	59 40.2	25	96	99.7
1	58 18.6	28	96	102.0	58 26.9	27	96	101.1	58 34.8	26	96	100.2	58 42.3	24	97	99.3
2	57 21.1	28	96	101.5	57 29.2	26	96	100.6	57 37.0	25	96	99.7	57 44.3	24	97	98.8
3	56 23.5	27	96	101.0	56 31.5	26	96	100.1	56 39.1	25	97	99.3	56 46.3	23	97	98.4
4	55 25.9	27	96	100.5	55 33.7	25	96	99.7	55 41.1	24	97	98.8	55 48.2	23	97	98.0
35	54 28.2	26	96	100.1	54 35.8	25	97	99.2	54 43.1	24	97	98.4	54 50.1	23	97	97.6
6	53 30.3	26	96	99.6	53 37.8	24	97	98.8	53 45.0	23	97	98.0	53 51.9	22	97	97.2
7	52 32.4	25	97	99.2	52 39.8	24	97	98.4	52 46.9	23	97	97.6	52 53.6	22	97	96.8
8	51 34.5	25	97	98.8	51 41.7	24	97	98.0	51 48.7	23	97	97.2	51 55.3	22	97	96.5
9	50 36.4	24	97	98.4	50 43.6	23	97	97.7	50 50.4	22	97	96.9	50 57.0	21	97	96.1
40	49 38.4	24	97	98.0	49 45.4	23	97	97.3	49 52.1	22	97	96.5	49 58.6	21	97	95.8
1	48 40.2	24	97	97.7	48 47.2	23	97	96.9	48 53.8	22	97	96.2	49 00.2	21	97	95.5
2	47 42.0	23	97	97.3	47 48.9	22	97	96.6	47 55.5	21	97	95.9	48 01.8	21	97	95.2
3	46 43.8	23	97	97.0	46 50.6	22	97	96.3	46 57.1	21	97	95.6	47 03.3	20	97	94.9
4	45 45.5	23	97	96.7	45 52.2	22	97	96.0	45 58.6	21	97	95.3	46 04.8	20	98	94.6
45	44 47.2	22	97	96.3	44 53.8	22	97	95.7	45 00.2	21	97	95.0	45 06.3	20	98	94.3
6	43 48.9	22	97	96.0	43 55.4	21	97	95.4	44 01.7	21	98	94.7	44 07.7	20	98	94.0
7	42 50.5	22	97	95.7	42 57.0	21	97	95.1	43 03.2	20	98	94.4	43 09.2	20	98	93.7
8	41 52.1	22	97	95.4	41 58.5	21	98	94.8	42 04.7	20	98	94.1	42 10.6	19	98	93.5
9	40 53.6	22	97	95.1	41 00.0	21	98	94.5	41 06.1	20	98	93.9	41 12.0	19	98	93.2
50	39 55.2	21	98	94.9	40 01.5	21	98	94.2	40 07.6	20	98	93.6	40 13.4	19	98	92.9
1	38 56.7	21	98	94.6	39 02.9	20	98	94.0	39 09.0	20	98	93.3	39 14.8	19	98	92.7
2	37 58.2	21	98	94.3	38 04.4	20	98	93.7	38 10.4	20	98	93.1	38 16.2	19	98	92.5
3	36 59.6	21	98	94.1	37 05.8	20	98	93.4	37 11.8	20	98	92.8	37 17.5	19	98	92.2
4	36 01.1	21	98	93.8	36 07.2	20	98	93.2	36 13.1	19	98	92.6	36 18.9	19	98	92.0
55	35 02.5	21	98	93.6	35 08.6	20	98	93.0	35 14.5	19	98	92.4	35 20.2	19	98	91.8
6	34 03.9	20	98	93.3	34 10.0	20	98	92.7	34 15.9	19	98	92.1	34 21.6	19	98	91.5
7	33 05.3	20	98	93.1	33 11.4	20	98	92.5	33 17.2	19	98	91.9	33 22.9	19	98	91.3
8	32 06.7	20	98	92.8	32 12.7	20	98	92.2	32 18.6	19	98	91.7	32 24.2	19	98	91.1
9	31 08.1	20	98	92.6	31 14.1	20	98	92.0	31 19.9	19	98	91.4	31 25.5	19	98	90.9
60	30 09.5	20	98	92.4	30 15.4	20	98	91.8	30 21.2	19	98	91.2	30 26.9	19	98	90.6
1	29 10.8	20	98	92.1	29 16.8	19	98	91.6	29 22.5	19	98	91.0	29 28.2	19	98	90.4
2	28 12.2	20	98	91.9	28 18.1	19	98	91.3	28 23.8	19	98	90.8	28 29.5	19	98	90.2
3	27 13.5	20	98	91.7	27 19.4	19	98	91.1	27 25.2	19	98	90.6	27 30.8	19	98	90.0
4	26 14.9	20	98	91.4	26 20.7	19	98	90.9	26 26.5	19	98	90.4	26 32.1	19	98	89.8
65	25 16.2	20	98	91.2	25 22.0	19	98	90.7	25 27.8	19	98	90.1	25 33.4	19	98	89.6
6	24 17.5	20	98	91.0	24 23.4	19	98	90.5	24 29.1	19	98	89.9	24 34.7	19	98	89.4
7	23 18.8	20	98	90.8	23 24.7	19	98	90.3	23 30.4	19	98	89.7	23 36.0	19	98	89.2
8	22 20.1	20	98	90.6	22 26.0	19	98	90.1	22 31.7	19	98	89.5	22 37.4	19	98	89.0
9	21 21.4	20	98	90.4	21 27.3	19	98	89.8	21 33.0	19	98	89.3	21 38.7	19	98	88.8
70	20 22.8	20	98	90.2	20 28.6	19	98	89.6	20 34.4	19	98	89.1	20 40.0	19	98	88.6
1	19 24.1	20	98	90.0	19 29.9	19	98	89.4	19 35.7	19	98	88.9	19 41.3	19	98	88.4
2	18 25.4	20	98	89.8	18 31.2	19	98	89.2	18 37.0	19	98	88.7	18 42.7	19	98	88.2
3	17 26.7	20	98	89.5	17 32.6	19	98	89.0	17 38.3	19	98	88.5	17 44.0	19	98	88.0
4	16 28.0	20	98	89.3	16 33.9	19	98	88.8	16 39.7	19	98	88.3	16 45.4	19	98	87.8
75	15 29.3	20	98	89.1	15 35.2	19	98	88.6	15 41.0	19	98	88.1	15 46.7	19	98	87.6
6	14 30.6	20	98	88.9	14 36.5	20	98	88.4	14 42.3	19	98	87.9	14 48.1	19	98	87.4
7	13 32.0	20	98	88.7	13 37.9	20	98	88.2	13 43.7	19	98	87.7	13 49.5	19	98	87.2
8	12 33.3	20	98	88.5	12 39.2	20	98	88.0	12 45.1	19	98	87.5	12 50.9	19	98	87.0
9	11 34.6	20	98	88.3	11 40.6	20	98	87.8	11 46.4	19	98	87.3	11 52.3	19	98	86.8
80	10 36.0	20	98	88.1	10 41.9	20	98	87.6	10 47.8	20	98	87.1	10 53.7	19	98	86.6
1	9 37.3	20	98	87.9	9 43.3	20	98	87.4	9 49.2	20	98	86.9	9 55.1	20	98	86.4
2	8 38.7	20	98	87.7	8 44.7	20	98	87.2	8 50.6	20	98	86.7	8 56.5	20	98	86.2
3	7 40.0	20	98	87.5	7 46.0	20	98	87.0	7 52.0	20	98	86.5	7 58.0	20	98	86.0
4	6 41.4	20	98	87.3	6 47.4	20	98	86.8	6 53.4	20	98	86.3	6 59.4	20	98	85.8
85	5 42.8	20	98	87.1	5 48.8	20	98	86.6	5 54.9	20	98	86.1	6 00.9	20	98	85.6
6													5 02.4	20	98	85.4

H.A.	6° 00′				6° 30′				7° 00′				7° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	84 00.0	1.0	08	180.0	84 30.0	1.0	09	180.0	85 00.0	1.0	10	180.0	85 30.0	1.0	11	180.0
1	83 55.2	99	24	170.6	84 24.7	98	26	169.7	84 54.2	98	28	168.8	85 23.6	98	31	167.6
2	83 41.0	95	37	161.6	84 09.4	94	40	160.1	84 37.5	93	43	158.3	85 05.2	92	47	156.2
3	83 18.5	90	49	153.5	83 45.2	88	52	151.4	84 11.4	86	56	149.1	84 37.0	84	60	146.4
4	82 49.0	84	59	146.3	83 13.8	82	62	144.0	83 37.9	79	65	141.4	84 01.1	76	69	138.4
05	82 13.8	78	66	140.1	82 36.7	75	69	137.7	82 58.7	72	72	135.0	83 19.7	68	76	132.0
6	81 34.1	72	72	134.8	81 55.2	69	75	132.4	82 15.3	65	78	129.7	82 34.2	61	81	126.7
7	80 50.9	66	77	130.4	81 10.3	63	79	127.9	81 28.7	59	82	125.3	81 45.9	55	84	122.5
8	80 04.9	61	80	126.5	80 22.8	58	82	124.2	80 39.7	54	85	121.6	80 55.4	51	87	119.0
9	79 16.8	57	83	123.2	79 33.3	54	85	121.0	79 48.9	50	87	118.6	80 03.4	46	89	116.1
10	78 26.9	53	85	120.4	78 42.3	50	87	118.2	78 56.7	46	89	116.0	79 10.1	43	90	113.6
1	77 35.6	50	87	118.0	77 50.0	46	89	115.9	78 03.5	43	90	113.8	78 15.9	40	92	111.5
2	76 43.3	46	89	115.8	76 56.8	44	90	113.9	77 09.4	40	91	111.8	77 21.0	37	92	109.7
3	75 50.0	44	90	113.9	76 02.7	41	91	112.1	76 14.6	38	92	110.1	76 25.5	35	93	108.2
4	74 56.0	41	91	112.2	75 08.0	39	92	110.5	75 19.2	36	93	108.6	75 29.5	33	94	106.8
15	74 01.4	39	92	110.7	74 12.8	37	93	109.1	74 23.4	34	94	107.3	74 33.1	31	94	105.6
6	73 06.3	37	93	109.4	73 17.1	35	93	107.8	73 27.2	32	94	106.1	73 36.4	30	95	104.5
7	72 10.7	36	93	108.2	72 21.0	33	94	106.6	72 30.6	31	95	105.1	72 39.5	28	95	103.5
8	71 14.8	34	94	107.1	71 24.7	32	94	105.6	71 33.8	29	95	104.1	71 42.3	27	96	102.6
9	70 18.5	33	94	106.1	70 28.0	30	95	104.7	70 36.8	28	95	103.2	70 44.9	26	96	101.8
20	69 22.0	31	95	105.1	69 31.1	29	95	103.8	69 39.6	27	96	102.4	69 47.4	25	96	101.0
1	68 25.2	30	95	104.3	68 34.0	28	95	103.0	68 42.2	26	96	101.7	68 49.7	24	96	100.3
2	67 28.3	29	95	103.5	67 36.7	27	96	102.2	67 44.6	26	96	101.0	67 51.9	23	96	99.7
3	66 31.1	28	96	102.8	66 39.3	26	96	101.6	66 47.0	25	96	100.3	66 54.0	23	97	99.1
4	65 33.8	27	96	102.1	65 41.8	26	96	100.9	65 49.2	24	96	99.7	65 56.0	22	97	98.6
25	64 36.4	27	96	101.5	64 44.1	25	96	100.3	64 51.3	23	97	99.2	64 58.0	21	97	98.0
6	63 38.8	26	96	100.9	63 46.3	24	96	99.8	63 53.3	23	97	98.7	63 59.8	21	97	97.5
7	62 41.1	25	96	100.3	62 48.4	24	97	99.2	62 55.2	22	97	98.2	63 01.6	20	97	97.1
8	61 43.3	25	96	99.8	61 50.4	23	97	98.7	61 57.1	22	97	97.7	62 03.3	20	97	96.7
9	60 45.4	24	97	99.3	60 52.4	23	97	98.3	60 58.9	21	97	97.3	61 05.0	20	97	96.2
30	59 47.4	23	97	98.8	59 54.3	22	97	97.8	60 00.7	21	97	96.8	60 06.7	19	97	95.9
1	58 49.4	23	97	98.3	58 56.1	22	97	97.4	59 02.4	20	97	96.4	59 08.3	19	97	95.5
2	57 51.3	23	97	97.9	57 57.9	21	97	97.0	58 04.0	20	97	96.1	58 09.8	19	97	95.1
3	56 53.1	22	97	97.5	56 59.6	21	97	96.6	57 05.7	20	97	95.7	57 11.3	18	98	94.8
4	55 54.9	22	97	97.1	56 01.3	21	97	96.2	56 07.2	19	97	95.3	56 12.8	18	98	94.5
35	54 56.7	21	97	96.7	55 02.9	20	97	95.9	55 08.8	19	97	95.0	55 14.3	18	98	94.1
6	53 58.4	21	97	96.3	54 04.5	20	97	95.5	54 10.3	19	98	94.7	54 15.8	18	98	93.8
7	53 00.0	21	97	96.0	53 06.1	20	97	95.2	53 11.8	19	98	94.4	53 17.2	17	98	93.5
8	52 01.6	21	97	95.7	52 07.6	19	98	94.9	52 13.3	18	98	94.1	52 18.6	17	98	93.3
9	51 03.2	20	97	95.3	51 09.1	19	98	94.6	51 14.7	18	98	93.8	51 20.0	17	98	93.0
40	50 04.8	20	97	95.0	50 10.6	19	98	94.3	50 16.2	18	98	93.5	50 21.4	17	98	92.7
1	49 06.3	20	98	94.7	49 12.1	19	98	94.0	49 17.6	18	98	93.2	49 22.8	17	98	92.5
2	48 07.8	20	98	94.4	48 13.5	19	98	93.7	48 19.0	18	98	92.9	48 24.1	17	98	92.2
3	47 09.2	19	98	94.1	47 14.9	19	98	93.4	47 20.3	18	98	92.7	47 25.5	17	98	92.0
4	46 10.7	19	98	93.9	46 16.3	18	98	93.1	46 21.7	17	98	92.4	46 26.8	17	98	91.7
45	45 12.1	19	98	93.6	45 17.7	18	98	92.9	45 23.1	17	98	92.2	45 28.2	17	98	91.5
6	44 13.6	19	98	93.3	44 19.1	18	98	92.6	44 24.4	17	98	91.9	44 29.5	16	98	91.2
7	43 15.0	19	98	93.1	43 20.5	18	98	92.4	43 25.8	17	98	91.7	43 30.8	16	98	91.0
8	42 16.3	19	98	92.8	42 21.8	18	98	92.1	42 27.1	17	98	91.5	42 32.1	16	98	90.8
9	41 17.7	19	98	92.5	41 23.2	18	98	91.9	41 28.4	17	98	91.2	41 33.4	16	98	90.6
50	40 19.1	18	98	92.3	40 24.5	18	98	91.7	40 29.8	17	98	91.0	40 34.8	16	98	90.4
1	39 20.4	18	98	92.1	39 25.9	18	98	91.4	39 31.1	17	98	90.8	39 36.1	16	98	90.2
2	38 21.8	18	98	91.8	38 27.2	18	98	91.2	38 32.4	17	98	90.6	38 37.4	16	98	89.9
3	37 23.1	18	98	91.6	37 28.5	18	98	91.0	37 33.7	17	98	90.4	37 38.7	16	98	89.7
4	36 24.4	18	98	91.4	36 29.8	18	98	90.8	36 35.0	17	98	90.1	36 40.0	16	98	89.5
55	35 25.8	18	98	91.2	35 31.1	18	98	90.5	35 36.3	17	98	89.9	35 41.3	16	98	89.3
6	34 27.1	18	98	90.9	34 32.5	18	98	90.3	34 37.6	17	98	89.7	34 42.6	16	98	89.1
7	33 28.4	18	98	90.7	33 33.8	18	98	90.1	33 38.9	17	98	89.5	33 44.0	16	98	88.9
8	32 29.7	18	98	90.5	32 35.1	18	98	89.9	32 40.3	17	98	89.3	32 45.3	16	98	88.7
9	31 31.0	18	98	90.3	31 36.4	18	98	89.7	31 41.6	17	98	89.1	31 46.6	17	98	88.6
60	30 32.4	18	98	90.1	30 37.7	18	98	89.5	30 42.9	17	98	88.9	30 47.9	17	98	88.4
1	29 33.7	18	98	89.9	29 39.0	18	98	89.3	29 44.2	17	98	88.7	29 49.3	17	98	88.2
2	28 35.0	18	98	89.7	28 40.3	18	98	89.1	28 45.5	17	98	88.5	28 50.6	17	98	88.0
3	27 36.3	18	98	89.5	27 41.6	18	98	88.9	27 46.9	17	98	88.3	27 52.0	17	98	87.8
4	26 37.6	18	98	89.3	26 43.0	18	98	88.7	26 48.2	17	98	88.2	26 53.3	17	98	87.6
65	25 38.9	18	98	89.1	25 44.3	18	98	88.5	25 49.6	17	98	88.0	25 54.7	17	98	87.4
6	24 40.2	18	98	88.9	24 45.6	18	98	88.3	24 50.9	17	98	87.8	24 56.1	17	98	87.2
7	23 41.6	18	98	88.7	23 47.0	18	98	88.1	23 52.3	17	98	87.6	23 57.5	17	98	87.0
8	22 42.9	18	98	88.5	22 48.3	18	98	87.9	22 53.6	18	98	87.4	22 58.9	17	98	86.9
9	21 44.2	18	98	88.3	21 49.7	18	98	87.7	21 55.0	18	98	87.2	22 00.3	17	98	86.7
70	20 45.6	18	98	88.1	20 51.0	18	98	87.5	20 56.4	18	98	87.0	21 01.7	17	98	86.5
1	19 46.9	18	98	87.9	19 52.4	18	98	87.4	19 57.8	18	98	86.8	20 03.1	18	98	86.3
2	18 48.3	19	98	87.7	18 53.8	18	98	87.2	18 59.2	18	98	86.6	19 04.5	18	98	86.1
3	17 49.6	19	98	87.5	17 55.2	18	98	87.0	18 00.6	18	98	86.5	18 06.0	18	98	85.9
4	16 51.0	19	98	87.3	16 56.6	18	98	86.8	17 02.1	18	98	86.3	17 07.5	18	98	85.7
75	15 52.4	19	98	87.1	15 58.0	19	98	86.6	16 03.5	18	98	86.1	16 08.9	18	98	85.6
6	14 53.8	19	98	86.9	14 59.4	19	98	86.4	15 04.9	18	98	85.9	15 10.4	18	98	85.4
7	13 55.2	19	98	86.7	14 09.8	19	98	86.2	14 06.4	19	98	85.7	14 11.9	18	97	85.2
8	12 56.6	19	98	86.5	13 02.3	19	98	86.0	13 07.9	19	98	85.5	13 13.5	18	97	85.0
9	11 58.0	19	98	86.3	12 03.7	19	98	85.8	12 09.4	19	97	85.3	12 15.0	19	97	84.8
80	10 59.5	19	98	86.1	11 05.2	19	98	85.6	11 10.9	19	97	85.1	11 16.6	19	97	84.6
1	10 00.9	19	98	85.9	10 06.7	19	97	85.4	10 12.4	19	97	84.9	10 18.1	19	97	84.4
2	9 02.4	19	98	85.7	9 08.2	19	97	85.2	9 14.0	19	97	84.7	9 19.7	19	97	84.2
3	8 03.9	20	98	85.5	8 09.7	20	97	85.0	8 15.6	19	97	84.5	8 21.4	19	97	84.1
4	7 05.4	20	98	85.3	7 11.3	20	97	84.8	7 17.2	20	97	84.4	7 23.0	19	97	83.9
85	6 06.9	20	97	85.1	6 12.8	20	97	84.6	6 18.8	20	97	84.2	6 24.7	20	97	83.7
6	5 08.4	20	97	84.9	5 14.4	20	97	84.4	5 20.4	20	97	84.0	5 26.3	20	97	83.5

H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	74 00.0	1.0 03	180.0	73 30.0	1.0 03	180.0	73 00.0	1.0 03	180.0	72 30.0	1.0 03	180.0	72 00.0	1.0 03	180.0	71 30.0	1.0 03	180.0	71 00.0	1.0 03	180.0	70 30.0	1.0 03	180.0	00
1	73 58.1	1.0 09	176.4	73 28.2	1.0 09	176.5	72 58.3	1.0 09	176.6	72 28.3	1.0 08	176.7	71 58.4	1.0 08	176.8	71 28.4	1.0 08	176.9	70 58.4	1.0 08	177.0	70 28.5	1.0 08	177.0	1
2	73 52.6	99 15	172.8	73 22.8	99 15	173.0	72 53.0	99 14	173.2	72 23.2	99 14	173.4	71 53.4	99 14	173.6	71 23.6	99 13	173.8	70 53.8	99 13	173.9	70 23.9	99 13	174.1	2
3	73 43.5	98 21	169.3	73 14.0	98 20	169.6	72 44.4	99 20	169.9	72 14.8	99 19	170.2	71 45.3	99 19	170.4	71 15.7	99 18	170.7	70 46.0	99 18	170.9	70 16.4	99 17	171.2	3
4	73 30.8	97 27	165.8	73 01.6	97 26	166.2	72 32.5	97 25	166.6	72 03.2	98 25	167.0	71 33.9	98 24	167.3	71 04.6	98 23	167.7	70 35.3	98 23	168.0	70 05.9	98 22	168.3	4
05	73 14.7	96 32	162.4	72 46.0	96 31	162.9	72 17.3	96 30	163.4	71 48.4	96 30	163.9	71 19.6	96 29	164.3	70 50.6	97 28	164.7	70 21.6	97 28	165.1	69 52.6	97 27	165.5	05
6	72 55.4	94 37	159.2	72 27.3	94 36	159.8	71 59.0	94 35	160.3	71 30.6	95 34	160.8	71 02.2	95 34	161.3	70 33.7	95 33	161.8	70 05.1	95 32	162.3	69 36.5	96 31	162.7	6
7	72 33.1	92 42	156.1	72 05.5	92 41	156.7	71 37.8	93 40	157.3	71 10.0	93 39	157.9	70 42.0	93 38	158.5	70 14.0	94 37	159.0	69 45.9	94 36	159.5	69 17.7	94 36	160.0	7
8	72 07.9	90 46	153.1	71 41.0	90 45	153.8	71 13.8	91 44	154.5	70 46.6	91 43	155.1	70 19.2	91 42	155.7	69 51.7	92 41	156.3	69 24.1	92 40	156.9	68 56.4	93 40	157.4	8
9	71 40.1	87 51	150.3	71 13.8	88 49	151.0	70 47.3	89 48	151.7	70 20.6	89 47	152.4	69 53.9	90 46	153.1	69 26.9	90 45	153.7	68 59.9	90 44	154.3	68 32.7	91 43	154.9	9
10	71 09.7	85 54	147.6	70 44.1	86 53	148.4	70 18.3	86 52	149.1	69 52.3	87 51	149.8	69 26.1	88 50	150.6	68 59.8	88 49	151.2	68 33.3	89 48	151.9	68 06.7	89 47	152.5	10
1	70 37.2	83 58	145.0	70 12.2	83 57	145.8	69 47.1	84 56	146.6	69 21.7	85 54	147.4	68 56.2	85 53	148.1	68 30.5	86 52	148.8	68 04.6	87 51	149.5	67 38.5	87 50	150.2	1
2	70 02.5	80 61	142.6	69 38.3	81 60	143.4	69 13.8	82 59	144.3	68 49.1	83 58	145.1	68 24.2	83 56	145.8	67 59.1	84 55	146.6	67 33.8	85 54	147.3	67 08.3	85 53	148.0	2
3	69 25.9	78 64	140.3	69 02.4	79 63	141.2	68 38.6	80 62	142.0	68 14.6	80 61	142.8	67 50.3	81 59	143.6	67 25.8	82 58	144.4	67 01.2	83 57	145.1	66 36.3	83 56	145.8	3
4	68 47.6	76 67	138.2	68 24.7	77 65	139.0	68 01.6	77 64	139.9	67 38.3	78 63	140.7	67 14.6	79 62	141.5	66 50.8	80 61	142.3	66 26.7	81 60	143.1	66 02.4	81 59	143.8	4
15	68 07.6	73 69	136.1	67 45.5	74 68	137.0	67 23.0	75 67	137.9	67 00.3	76 66	138.7	66 37.3	77 65	139.6	66 14.1	78 64	140.3	65 50.7	79 63	141.1	65 27.0	79 62	141.9	15
6	67 26.3	71 71	134.2	67 04.8	72 70	135.1	66 43.0	73 69	136.0	66 20.9	74 68	136.9	65 58.5	75 67	137.7	65 35.9	76 66	138.5	65 13.1	77 65	139.3	64 50.0	77 64	140.0	6
7	66 43.6	69 73	132.4	66 22.7	70 72	133.3	66 01.5	71 71	134.2	65 40.1	72 70	135.1	65 18.3	73 69	135.9	64 56.3	74 68	136.7	64 34.1	75 67	137.5	64 11.6	75 66	138.3	7
8	65 59.7	67 75	130.7	65 39.4	68 74	131.6	65 18.9	69 73	132.5	64 58.0	70 72	133.4	64 36.9	71 71	134.2	64 15.5	72 70	135.0	63 53.8	73 69	135.8	63 31.9	73 68	136.6	8
9	65 14.7	65 77	129.1	64 55.0	66 76	130.0	64 35.0	67 75	130.9	64 14.8	68 74	131.8	63 54.2	69 73	132.6	63 33.4	70 72	133.4	63 12.3	71 71	134.2	62 50.9	72 70	135.0	9
20	64 28.6	63 78	127.6	64 09.6	64 77	128.5	63 50.2	65 76	129.4	63 30.5	66 75	130.3	63 10.5	67 75	131.1	62 50.2	68 74	131.9	62 29.7	69 73	132.7	62 08.9	70 72	133.5	20
1	63 41.7	61 80	126.2	63 23.2	62 79	127.1	63 04.4	63 78	128.0	62 45.2	64 77	128.8	62 25.8	65 76	129.6	62 06.1	66 75	130.5	61 46.0	67 74	131.2	61 25.8	68 73	132.0	1
2	62 54.0	59 81	124.9	62 36.0	61 80	125.8	62 17.7	62 79	126.6	61 59.1	63 78	127.5	61 40.1	64 77	128.3	61 20.9	64 77	129.1	61 01.5	65 76	129.9	60 41.7	66 75	130.6	2
3	62 05.5	58 82	123.6	61 48.0	59 81	124.5	61 30.2	60 80	125.3	61 12.1	61 80	126.2	60 53.7	62 79	127.0	60 35.0	63 78	127.8	60 16.0	64 77	128.6	59 56.7	65 76	129.3	3
4	61 16.3	56 83	122.4	60 59.3	57 82	123.3	60 41.9	58 82	124.1	60 24.3	59 81	124.9	60 06.4	60 80	125.7	59 48.2	61 79	126.5	59 29.7	62 78	127.3	59 10.9	63 78	128.1	4
25	60 26.4	55 84	121.3	60 09.9	56 83	122.1	59 53.0	57 83	123.0	59 35.9	58 82	123.8	59 18.4	59 81	124.6	59 00.7	60 80	125.4	58 42.6	61 80	126.1	58 24.4	61 79	126.9	25
6	59 36.0	53 85	120.2	59 19.9	54 84	121.0	59 03.5	55 84	121.9	58 46.8	56 83	122.7	58 29.8	57 82	123.5	58 12.5	58 81	124.2	57 54.9	59 81	125.0	57 37.1	60 80	125.8	6
7	58 45.0	52 86	119.2	58 29.3	53 85	120.0	58 13.3	54 84	120.8	57 57.1	55 84	121.6	57 40.5	56 83	122.4	57 23.6	57 82	123.2	57 06.5	58 82	123.9	56 49.1	58 81	124.7	7
8	57 53.5	50 87	118.2	57 38.2	51 86	119.0	57 22.7	52 85	119.8	57 06.8	53 85	120.6	56 50.7	54 84	121.4	56 34.2	55 83	122.1	56 17.5	56 83	122.9	56 00.5	57 82	123.6	8
9	57 01.6	49 87	117.3	56 46.7	50 87	118.1	56 31.5	51 86	118.9	56 16.1	52 85	119.7	56 00.3	53 85	120.4	55 44.3	54 84	121.2	55 28.0	55 83	121.9	55 11.4	56 83	122.6	9
30	56 09.2	48 88	116.4	55 54.7	49 87	117.2	55 39.9	50 87	118.0	55 24.8	51 86	118.7	55 09.5	52 86	119.5	54 53.8	53 85	120.2	54 37.9	53 84	121.0	54 21.7	54 84	121.7	30
1	55 16.5	47 88	115.6	55 02.3	48 88	116.4	54 47.9	49 87	117.1	54 33.2	50 87	117.9	54 18.2	50 86	118.6	54 02.9	51 86	119.4	53 47.3	52 85	120.1	53 31.6	53 84	120.8	1
2	54 23.4	46 89	114.8	54 09.5	47 89	115.5	53 55.5	47 88	116.3	53 41.1	48 87	117.0	53 26.4	49 87	117.8	53 11.5	50 86	118.5	52 56.3	51 86	119.2	52 40.9	52 85	119.9	2
3	53 29.9	44 90	114.0	53 16.4	45 89	114.8	53 02.7	46 89	115.5	52 48.6	47 88	116.2	52 34.3	48 87	117.0	52 19.7	49 87	117.7	52 04.9	50 86	118.4	51 49.8	51 86	119.1	3
4	52 36.2	43 90	113.3	52 23.0	44 90	114.0	52 09.5	45 89	114.8	51 55.8	46 89	115.5	51 41.8	47 88	116.2	51 27.6	48 88	116.9	51 13.1	49 87	117.6	50 58.4	50 86	118.3	4
35	51 42.1	42 91	112.6	51 29.2	43 90	113.3	51 16.1	44 90	114.0	51 02.7	45 89	114.8	50 49.0	46 89	115.5	50 35.1	47 88	116.2	50 20.9	48 88	116.9	50 06.5	48 87	117.5	35
6	50 47.8	42 91	111.9	50 35.2	42 90	112.6	50 22.3	43 90	113.4	50 09.2	44 90	114.1	49 55.9	45 89	114.8	49 42.2	46 89	115.4	49 28.4	47 88	116.1	49 14.3	47 88	116.8	6
7	49 53.2	41 91	111.3	49 40.9	42 91	112.0	49 28.3	42 90	112.7	49 15.5	43 90	113.4	49 02.4	44 90	114.1	48 49.1	45 89	114.8	48 35.5	46 89	115.4	48 21.7	46 88	116.1	7
8	48 58.4	40 92	110.7	48 46.4	41 91	111.4	48 34.1	41 91	112.1	48 21.5	42 90	112.7	48 08.7	43 90	113.4	47 55.7	44 90	114.1	47 42.4	45 89	114.8	47 28.9	45 89	115.4	8
9	48 03.4	39 92	110.1	47 51.6	40 92	110.8	47 39.5	41 91	111.4	47 27.2	41 91	112.1	47 14.7	42 90	112.8	47 02.0	43 90	113.5	46 49.0	44 89	114.1	46 35.7	44 89	114.8	9
40	47 08.2	38 92	109.5	46 56.6	39 92	110.2	46 44.8	40 92	110.9	46 32.8	41 91	111.5	46 20.5	41 91	112.2	46 08.0	42 90	112.8	45 55.3	43 90	113.5	45 42.3	44 89	114.1	40
1	46 12.8	37 93	109.0	46 01.4	38 92	109.6	45 49.9	39 92	110.3	45 38.1	40 92	110.9	45 26.0	40 91	111.6	45 13.8	41 91	112.2	45 01.3	42 90	112.9	44 48.6	43 90	113.5	1
2	45 17.2	37 93	108.4	45 06.1	37 93	109.1	44 54.7	38 92	109.7	44 43.1	39 92	110.4	44 31.4	40 91	111.0	44 19.4	40 91	111.7	44 07.1	41 91	112.3	43 54.7	42 90	112.9	2
3	44 21.4	36 93	107.9	44 10.5	37 93	108.6	43 59.4	37 93	109.2	43 48.0	38 92	109.9	43 36.5	39 92	110.5	43 24.7	40 91	111.1	43 12.7	40 91	111.8	43 00.5	41 91	112.4	3
4	43 25.5	35 93	107.4	43 14.8	36 93	108.1	43 03.9	37 93	108.7	42 52.7	37 92	109.3	42 41.4	38 92	110.0	42 29.9	39 92	110.6	42 18.1	39 91	111.2	42 06.2	40 91	111.8	4
45	42 29.4	35 94	106.9	42 18.9	35 93	107.6	42 08.2	36 93	108.2	41 57.3	37 93	108.8	41 46.2	37 92	109.5	41 34.8	38 92	110.1	41 23.3	39 92	110.7	41 11.6	39 91	111.3	45
6	41 33.2	34 94	106.5	41 22.9	35 94	107.1	41 12.4	35 93	107.7	41 01.7	36 93	108.4	40 50.7	37 93	109.0	40 39.6	37 92	109.6	40 28.3	38 92	110.2	40 16.8	39 92	110.8	6
7	40 36.9	33 94	106.0	40 26.7	34 94	106.7	40 16.4	35 94	107.3	40 05.9	35 93	107.9	39 55.2	36 93	108.5	39 44.2	37 93	109.1	39 33.1	37 92	109.7	39 21.9	38 92	110.3	7
8	39 40.4	33 94	105.6	39 30.4	34 94	106.2	39 20.3	34 94	106.8	39 10.0	35 93	107.4	38 59.4	35 93	108.0	38 48.7	36 93	108.6	38 37.8	37 92	109.2	38 26.7	37 92	109.8	8
9	38 43.8	32 94	105.2	38 34.0	33 94	105.8	38 24.1	34 94	106.4	38 13.9	34 94	107.0	38 03.5	35 93	107.6	37 53.0	35 93	108.2	37 42.3	36 93	108.8	37 31.4	37 92	109.4	9
50	37 47.1	32 95	104.8	37 37.5	32 94	105.4	37 27.7	33 94	106.0	37 17.7	34 94	106.6	37 07.5	34 94	107.2	36 57.2	35 93	107.7	36 46.7	35 93	108.3	36 36.0	36 93	108.9	50
1	36 50.3	31 95	104.4	36 40.9	32 95	105.0	36 31.2	32 94	105.6	36 21.4	33 94	106.1	36 11.4	34 94	106.7	36 01.2	34 94	107.3	35 50.9	35 93	107.9	35 40.4	35 93	108.5	1
2	35 53.4	31 95	104.0	35 44.1	31 95	104.6	35 34.6	32 94	105.2	35 25.0	32 94	105.7	35 15.1	33 94	106.3	35 05.1	34 94	106.9	34 55.0	34 93	107.5	34 44.7	35 93	108.0	2
3	34 56.4	30 95	103.6	34 47.3	31 95	104.2	34 37.9	31 95	104.8	34 28.4	32 94	105.4	34 18.8	32 94	105.9	34 08.9	33 94	106.5	33 58.9	34 94	107.1	33 48.8	34 93	107.6	3
4	33 59.4	30 95	103.3	33 50.3	30 95	103.8	33 41.1	31 95	104.4	33 31.8	31 95	105.0	33 22.3	32 94	105.5	33 12.6	32 94	106.1	33 02.8	33 94	106.7	32 52.8	33 94	107.2	4
55	33 02.2	29 95	102.9	32 53.3	30 95	103.5	32 44.2	30 95	104.0	32 35.0	31 95	104.6	32 25.7	31 94	105.2	32 16.2	32 94	105.7	32 06.5	32 94	106.3	31 56.7	33 94	106.8	55
6	32 04.9	29 96	102.6	31 56.2	29 95	103.1	31 47.3	30 95	103.7	31 38.2	30 95	104.2	31 29.0	31 95	104.8	31 19.6	31 94	105.4	31 10.1	32 94	105.9	31 00.5	32 94	106.5	6
7	31 07.6	29 96	102.2	30 59.0	29 95	102.8	30 50.2	30 95	103.3	30 41.3	30 95	103.9	30 32.2	30 95	104.4	30 23.0	31 95	105.0	30 13.6	31 94	105.5	30 04.1	32 94	106.1	7
8	30 10.2	28 96	101.9	30 01.7	29 96	102.4	29 53.0	29 95	103.0	29 44.2	30 95	103.5	29 35.3	30 95	104.1	29 26.2	30 95	104.6	29 17.0	31 94	105.2	29 07.7	31 94	105.7	8
9	29 12.8	28 96	101.6	29 04.4	28 96	102.1	28 55.8	29 96	102.7	28 47.1	29 95	103.2	28 38.3	30 95	103.8	28 29.4	30 95	104.3	28 20.4	30 95	104.8	28 11.2	31 94	105.4	9
60	28 15.2	27 96	101.3	28 06.9	28 96	101.8	27 58.5	28 96	102.3	27 50.0	29 95	102.9	27 41.3	29 95	103.4	27 32.5	30 95	104.0	27 23.6	30 95	104.5	27 14.5	30 95	105.0	60
1	27 17.6	27 96	100.9	27 09.5	27 96	101.5	27 01.2	28 96	102.0	26 52.7	28 96	102.6	26 44.2	29 95	103.1	26 35.5	29 95	103.6	26 26.7	30 95	104.2	26 17.8	30 95	104.7	1
2	26 20.0	27 96	100.6	26 11.9	27 96	101.2	26 03.7	28 96	101.7	25 55.4	28 96	102.3	25 47.0	28 95	102.8	25 38.4	29 95	103.3	25 29.8	29 95	103.9	25 21.0	29 95	104.4	2
3	25 22.3	26 96	100.4	25 14.3	27 96	100.9	25 06.2	27 96	101.4	24 58.0	28 96	101.9	24 49.7	28 96	102.5	24 41.3	28 95	103.0	24 32.8	29 95	103.5	24 24.1	29 95	104.1	3
4	24 24.5	26 96	100.1	24 16.7	26 96	100.6	24 08.7	27 96	101.1	24 00.6	27 96	101.7	23 52.4	28 96	102.2	23 44.1	28 95	102.7	23 35.7	28 95	103.2	23 27.1	29 95	103.7	4
65	23 26.7	26 96	99.8	23 18.9	26 96	100.3	23 11.1	26 96	100.8	23 03.1	27 96	101.4	22 55.0	27 96	101.9	22 46.8	27 96	102.4	22 38.5	28 95	102.9	22 30.1	28 95	103.4	65
6	22 28.9	25 96	99.5	22 21.2	26 96	100.0	22 13.4	26 96	100.5	22 05.5	26 96	101.1	21 57.5	27 96	101.6	21 49.4	27 96	102.1	21 41.3	27 96	102.6	21 33.0	28 95	103.1	6
7	21 31.0	25 97	99.2	21 23.4	25 96	99.8	21 15.7	26 96	100.3	21 07.9	26 96	100.8	21 00.0	26 96	101.3	20 52.0	27 96	101.8	20 44.0	27 96	102.3	20 35.8	27 95	102.9	7
8	20 33.0	25 97	99.0	20 25.5	25 96	99.5	20 17.9	25 96	100.0	20 10.2	26 96	100.5	20 02.4	26 96	101.0	19 54.5	26 96	101.5	19 46.6	27 96	102.1	19 38.5	27 96	102.6	8
9	19 35.0	25 97	98.7	19 27.6	25 97	99.2	19 20.1	25 96	99.7	19 12.5	25 96	100.2	19 04.8	26 96	100.8	18 57.0	26 96	101.3	18 49.2	26 96	101.8	18 41.2	27 96	102.3	9
70	18 37.0	24 97	98.4	18 29.6	25 97	99.0	18 22.2	25 97	99.5	18 14.7	25 96	100.0	18 07.1	25 96	100.5	17 59.4	26 96	101.0	17 51.7	26 96	101.5	17 43.9	26 96	102.0	70
1	17 38.9	24 97	98.2	17 31.6	24 97	98.7	17 24.3	25 97	99.2	17 16.9	25 96	99.7	17 09.4	25 96	100.2	17 01.8	25 96	100.7	16 54.1	26 96	101.2	16 46.4	26 96	101.7	1
2	16 40.8	24 97	97.9	16 33.6	24 97	98.4	16 26.3	24 97	99.0	16 19.0	25 97	99.5	16 11.6	25 96	100.0	16 04.1	25 96	100.5	15 56.6	25 96	101.0	15 48.9	26 96	101.5	2
3	15 42.7	24 97	97.7	15 35.5	24 97	98.2	15 28.3	24 97	98.7	15 21.1	24 97	99.2	15 13.8	25 96	99.7	15 06.4	25 96	100.2	14 58.9	25 96	100.7	14 51.4	25 96	101.2	3
4	14 44.5	23 97	97.5	14 37.4	24 97	98.0	14 30.3	24 97	98.5	14 23.1	24 97	99.0	14 15.9	24 96	99.5	14 08.6	24 96	100.0	14 01.2	25 96	100.5	13 53.8	25 96	101.0	4
75	13 46.3	23 97	97.2	13 39.3	23 97	97.7	13 32.2	24 97	98.2	13 25.1	24 97	98.7	13 18.0	24 97	99.2	13 10.8	24 96	99.7	13 03.5	24 96	100.2	12 56.1	25 96	100.7	75
6	12 48.0	23 97	97.0	12 41.1	23 97	97.5	12 34.1	23 97	98.0	12 27.1	24 97	98.5	12 20.0	24 97	99.0	12 12.9	24 96	99.5	12 05.7	24 96	100.0	11 58.5	24 96	100.5	6
7	11 49.8	23 97	96.7	11 42.9	23 97	97.2	11 36.0	23 97	97.7	11 29.0	23 97	98.2	11 22.0	23 97	98.7	11 15.0	24 97	99.2	11 07.9	24 96	99.7	11 00.7	24 96	100.2	7
8	10 51.5	23 97	96.5	10 44.7	23 97	97.0	10 37.8	23 97	97.5	10 30.9	23 97	98.0	10 24.0	23 97	98.5	10 17.0	23 97	99.0	10 10.0	23 96	99.5	10 02.9	24 96	100.0	8
9	9 53.1	22 97	96.3	9 46.4	23 97	96.8	9 39.6	23 97	97.3	9 32.8	23 97	97.8	9 25.9	23 97	98.3	9 19.0	23 97	98.8	9 12.1	23 97	99.2	9 05.1	23 96	99.7	9
80	8 54.8	22 97	96.1	8 48.1	22 97	96.6	8 41.4	22 97	97.0	8 34.6	23 97	97.5	8 27.8	23 97	98.0	8 21.0	23 97	98.5	8 14.2	23 97	99.0	8 07.3	23 96	99.5	80
1	7 56.4	22 97	95.8	7 49.8	22 97	96.3	7 43.1	22 97	96.8	7 36.4	22 97	97.3	7 29.7	22 97	97.8	7 23.0	23 97	98.3	7 16.2	23 97	98.8	7 09.4	23 97	99.3	1
2	6 58.0	22 97	95.6	6 51.4	22 97	96.1	6 44.8	22 97	96.6	6 38.2	22 97	97.1	6 31.6	22 97	97.6	6 24.9	22 97	98.1	6 18.2	22 97	98.6	6 11.4	23 97	99.0	2
3	5 59.6	22 97	95.4	5 53.1	22 97	95.9	5 46.5	22 97	96.4	5 40.0	22 97	96.9	5 33.4	22 97	97.4	5 26.7	22 97	97.8	5 20.1	22 97	98.3	5 13.4	22 97	98.8	3
4	5 01.2	22 97	95.2																						4

H.A.	8° 00′				8° 30′				9° 00′				9° 30′				10° 00′				10° 30′				11° 00′				11° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	86 00.0	1.0	12	180.0	86 30.0	1.0	14	180.0	87 00.0	1.0	16	180.0	87 30.0	1.0	19	180.0	88 00.0	1.0	23	180.0	88 30.0	1.0	29	180.0	89 00.0	1.0	40	180.0	89 30.0	1.0	60	180.0	00
1	85 52.8	97	34	166.1	86 21.9	96	38	164.2	86 50.6	95	43	161.8	87 18.8	93	49	158.5	87 46.3	90	57	153.8	88 12.5	84	68	146.7	88 36.0	72	80	135.5	88 54.1	46	92	117.0	1
2	85 32.5	90	51	153.6	85 50.1	87	56	150.5	86 24.8	84	62	146.6	86 49.2	79	68	141.6	87 11.8	72	76	135.3	87 31.8	61	83	127.2	87 48.0	46	90	116.8	87 58.8	25	96	104.1	2
3	85 01.7	81	64	143.3	85 25.3	77	69	139.6	85 47.6	72	74	135.2	86 08.1	65	79	130.0	86 26.4	57	85	123.9	86 41.8	46	90	116.7	86 53.7	33	94	108.5	87 01.2	17	97	99.4	3
4	84 23.2	72	73	135.1	84 44.0	67	77	131.3	85 03.2	61	81	127.0	85 20.6	54	85	122.1	85 35.6	46	89	116.6	85 48.0	36	93	110.5	85 57.3	25	96	103.9	86 03.1	13	97	96.9	4
05	83 39.4	64	79	128.6	83 57.8	59	83	125.0	84 14.5	53	86	120.9	84 29.3	46	89	116.5	84 42.0	38	92	111.7	84 52.3	30	94	106.5	85 00.0	21	96	101.0	85 04.8	11	98	95.3	05
6	82 51.9	57	83	123.5	83 08.2	52	86	120.1	83 22.9	46	89	116.4	83 35.9	40	91	112.4	83 46.8	33	94	108.2	83 55.6	26	95	103.7	84 02.2	18	97	99.0	84 06.3	10	98	94.2	6
7	82 01.9	51	87	119.5	82 16.5	46	89	116.3	82 29.6	41	91	112.9	82 41.0	35	93	109.3	82 50.6	29	95	105.5	82 58.4	22	96	101.6	83 04.1	16	97	97.6	83 07.7	09	98	93.5	7
8	81 10.0	46	89	116.2	81 23.2	42	91	113.2	81 34.9	37	93	110.1	81 45.2	32	94	106.9	81 53.8	26	95	103.5	82 00.7	20	97	100.0	82 05.8	14	97	96.5	82 09.1	08	98	92.8	8
9	80 16.7	42	91	113.5	80 28.7	38	92	110.7	80 39.4	33	94	107.9	80 48.7	29	95	104.9	80 56.6	23	96	101.9	81 02.8	18	97	98.7	81 07.5	13	97	95.6	81 10.5	07	98	92.3	9
10	79 22.4	39	92	111.2	79 33.5	35	93	108.6	79 43.3	31	94	106.0	79 51.8	26	95	103.3	79 59.0	22	96	100.5	80 04.7	17	97	97.7	80 09.0	12	98	94.8	80 11.8	07	98	91.9	10
1	78 27.3	36	93	109.2	78 37.6	32	94	106.9	78 46.7	28	95	104.4	78 54.5	24	96	102.0	79 01.2	20	97	99.4	79 06.5	16	97	96.8	79 10.5	11	98	94.2	79 13.2	07	98	91.5	1
2	77 31.6	34	94	107.6	77 41.2	30	95	105.4	77 49.7	26	96	103.1	77 57.0	23	96	100.8	78 03.2	19	97	98.5	78 08.2	15	97	96.1	78 12.0	11	98	93.6	78 14.5	06	98	91.2	2
3	76 35.4	32	94	106.1	76 44.4	28	95	104.1	76 52.4	25	96	102.0	76 59.3	21	96	99.8	77 05.1	18	97	97.6	77 09.8	14	97	95.4	77 13.4	10	98	93.2	77 15.8	06	98	90.9	3
4	75 38.9	30	95	104.9	75 47.4	27	96	102.9	75 54.8	23	96	101.0	76 01.4	20	97	98.9	76 06.9	17	97	96.9	76 11.3	13	98	94.8	76 14.8	10	98	92.7	76 17.1	06	98	90.6	4
15	74 42.0	28	95	103.8	74 50.0	25	96	101.9	74 57.1	22	96	100.1	75 03.3	19	97	98.2	75 08.6	16	97	96.3	75 12.8	13	98	94.3	75 16.1	09	98	92.4	75 18.5	06	98	90.4	15
6	73 44.9	27	96	102.8	73 52.5	24	96	101.0	73 59.3	21	97	99.3	74 05.2	18	97	97.5	74 10.2	15	97	95.7	74 14.3	12	98	93.9	74 17.5	09	98	92.0	74 19.8	06	98	90.2	6
7	72 47.6	26	96	101.9	72 54.8	23	96	100.2	73 01.3	20	97	98.5	73 07.0	17	97	96.9	73 11.8	15	97	95.2	73 15.7	12	98	93.4	73 18.8	09	98	91.7	73 21.1	06	98	90.0	7
8	71 50.0	25	96	101.0	71 57.0	22	97	99.5	72 03.2	19	97	97.9	72 08.6	17	97	96.3	72 13.3	14	98	94.7	72 17.1	11	98	93.0	72 20.2	09	98	91.4	72 22.4	06	98	89.8	8
9	70 52.4	24	96	100.3	70 59.1	21	97	98.8	71 05.0	19	97	97.3	71 10.3	16	97	95.8	71 14.8	14	98	94.2	71 18.5	11	98	92.7	71 21.5	09	98	91.1	71 23.7	06	98	89.6	9
20	69 54.5	23	97	99.6	70 01.0	20	97	98.2	70 06.8	18	97	96.7	70 11.9	16	97	95.3	70 16.2	13	98	93.8	70 19.9	11	98	92.4	70 22.8	09	98	90.9	70 25.0	06	98	89.4	20
1	68 56.6	22	97	99.0	69 02.9	20	97	97.6	69 08.5	18	97	96.2	69 13.4	15	97	94.9	69 17.7	13	98	93.5	69 21.2	11	98	92.0	69 24.1	08	98	90.6	69 26.3	06	98	89.2	1
2	67 58.6	21	97	98.4	68 04.7	19	97	97.1	68 10.1	17	97	95.8	68 14.9	15	98	94.4	68 19.1	13	98	93.1	68 22.6	11	98	91.8	68 25.4	08	98	90.4	68 27.6	06	98	89.0	2
3	67 00.5	21	97	97.9	67 06.4	19	97	96.6	67 11.7	17	97	95.3	67 16.4	15	98	94.1	67 20.5	13	98	92.8	67 23.9	10	98	91.5	67 26.8	08	98	90.2	67 29.0	06	98	88.9	3
4	66 02.3	20	97	97.4	66 08.1	18	97	96.1	66 13.2	16	97	94.9	66 17.8	14	98	93.7	66 21.8	12	98	92.5	66 25.2	10	98	91.2	66 28.1	08	98	90.0	66 30.3	06	98	88.7	4
25	65 04.1	20	97	96.9	65 09.7	18	97	95.7	65 14.8	16	98	94.5	65 19.3	14	98	93.4	65 23.2	12	98	92.2	65 26.6	10	98	91.0	65 29.4	08	98	89.8	65 31.6	07	98	88.6	25
6	64 05.8	19	97	96.4	64 11.3	17	97	95.3	64 16.2	16	98	94.2	64 20.7	14	98	93.0	64 24.5	12	98	91.9	64 27.9	10	98	90.7	64 30.7	08	98	89.6	64 33.0	07	98	88.4	6
7	63 07.5	19	97	96.0	63 12.8	17	98	94.9	63 17.7	15	98	93.8	63 22.0	14	98	92.7	63 25.9	12	98	91.6	63 29.2	10	98	90.5	63 32.0	08	98	89.4	63 34.3	07	98	88.3	7
8	62 09.1	18	97	95.6	62 14.3	17	98	94.6	62 19.1	15	98	93.5	62 23.4	13	98	92.4	62 27.2	12	98	91.4	62 30.5	10	98	90.3	62 33.3	09	98	89.2	62 35.6	07	98	88.1	8
9	61 10.6	18	97	95.2	61 15.8	16	98	94.2	61 20.5	15	98	93.2	61 24.8	13	98	92.1	61 28.5	12	98	91.1	61 31.8	10	98	90.1	61 34.6	09	98	89.0	61 37.0	07	98	88.0	9
30	60 12.2	18	97	94.9	60 17.3	16	98	93.9	60 21.9	15	98	92.9	60 26.1	13	98	91.9	60 29.9	12	98	90.9	60 33.1	10	98	89.9	60 36.0	09	98	88.8	60 38.3	07	98	87.8	30
1	59 13.7	17	98	94.5	59 18.7	16	98	93.6	59 23.3	15	98	92.6	59 27.5	13	98	91.6	59 31.2	12	98	90.6	59 34.4	10	98	89.7	59 37.3	09	98	88.7	59 39.7	07	98	87.7	1
2	58 15.2	17	98	94.2	58 20.1	16	98	93.3	58 24.7	14	98	92.3	58 28.8	13	98	91.4	58 32.5	12	98	90.4	58 35.8	10	98	89.5	58 38.6	09	98	88.5	58 41.0	07	98	87.5	2
3	57 16.6	17	98	93.9	57 21.5	16	98	93.0	57 26.0	14	98	92.0	57 30.1	13	98	91.1	57 33.8	12	98	90.2	57 37.1	10	98	89.3	57 40.0	09	98	88.3	57 42.4	08	98	87.4	3
4	56 18.1	17	98	93.6	56 22.9	15	98	92.7	56 27.4	14	98	91.8	56 31.4	13	98	90.9	56 35.1	12	98	90.0	56 38.4	10	98	89.1	56 41.3	09	98	88.2	56 43.8	08	98	87.3	4
35	55 19.5	17	98	93.3	55 24.3	15	98	92.4	55 28.7	14	98	91.5	55 32.7	13	98	90.7	55 36.4	12	98	89.8	55 39.7	10	98	88.9	55 42.6	09	98	88.0	55 45.2	08	98	87.1	35
6	54 20.9	16	98	93.0	54 25.6	15	98	92.1	54 30.0	14	98	91.3	54 34.1	13	98	90.4	54 37.7	12	98	89.6	54 41.0	10	98	88.7	54 44.0	09	98	87.9	54 46.6	08	98	87.0	6
7	53 22.3	16	98	92.7	53 27.0	15	98	91.9	53 31.3	14	98	91.1	53 35.4	13	98	90.2	53 39.0	12	98	89.4	53 42.4	10	98	88.5	53 45.3	09	98	87.7	53 48.0	08	98	86.9	7
8	52 23.6	16	98	92.5	52 28.3	15	98	91.6	52 32.7	14	98	90.8	52 36.7	13	98	90.0	52 40.4	12	98	89.2	52 43.7	11	98	88.4	52 46.7	09	98	87.6	52 49.4	08	98	86.7	8
9	51 25.0	16	98	92.2	51 29.7	15	98	91.4	51 34.0	14	98	90.6	51 38.0	13	98	89.8	51 41.7	12	98	89.0	51 45.0	11	98	88.2	51 48.1	10	98	87.4	51 50.8	08	98	86.6	9
40	50 26.3	16	98	91.9	50 31.0	15	98	91.2	50 35.3	14	98	90.4	50 39.3	13	98	89.6	50 43.0	12	98	88.8	50 46.4	11	98	88.0	50 49.4	10	98	87.3	50 52.2	09	98	86.5	40
1	49 27.7	16	98	91.7	49 32.3	15	98	90.9	49 36.6	14	98	90.2	49 40.6	13	98	89.4	49 44.3	12	98	88.6	49 47.7	11	98	87.9	49 50.8	10	98	87.1	49 53.6	09	98	86.3	1
2	48 29.0	16	98	91.5	48 33.6	15	98	90.7	48 37.9	14	98	90.0	48 41.9	13	98	89.2	48 45.7	12	98	88.5	48 49.1	11	98	87.7	48 52.2	10	98	87.0	48 55.0	09	98	86.2	2
3	47 30.3	16	98	91.2	47 34.9	15	98	90.5	47 39.2	14	98	89.8	47 43.3	13	98	89.0	47 47.0	12	98	88.3	47 50.4	11	98	87.5	47 53.6	10	98	86.8	47 56.5	09	98	86.1	3
4	46 31.7	16	98	91.0	46 36.2	15	98	90.3	46 40.5	14	98	89.6	46 44.6	13	98	88.8	46 48.3	12	98	88.1	46 51.8	11	98	87.4	46 55.0	10	98	86.7	46 57.9	09	98	85.9	4
45	45 33.0	16	98	90.8	45 37.6	15	98	90.1	45 41.9	14	98	89.4	45 45.9	13	98	88.6	45 49.7	12	98	87.9	45 53.2	11	98	87.2	45 56.4	10	98	86.5	45 59.4	09	98	85.8	45
6	44 34.3	16	98	90.6	44 38.9	15	98	89.9	44 43.2	14	98	89.2	44 47.2	13	98	88.5	44 51.0	12	98	87.8	44 54.6	11	98	87.1	44 57.9	11	98	86.4	45 00.9	10	98	85.7	6
7	43 35.6	16	98	90.3	43 40.2	15	98	89.7	43 44.5	14	98	89.0	43 48.6	13	98	88.3	43 52.4	12	98	87.6	43 56.0	12	98	86.9	43 59.3	11	98	86.2	44 02.4	10	98	85.5	7
8	42 36.9	16	98	90.1	42 41.5	15	98	89.5	42 45.8	14	98	88.8	42 49.9	13	98	88.1	42 53.8	12	98	87.4	42 57.4	12	98	86.8	43 00.7	11	98	86.1	43 03.9	10	98	85.4	8
9	41 38.2	16	98	89.9	41 42.8	15	98	89.3	41 47.1	14	98	88.6	41 51.3	13	98	87.9	41 55.1	13	98	87.3	41 58.8	12	98	86.6	42 02.2	11	98	85.9	42 05.4	10	97	85.3	9
50	40 39.6	16	98	89.7	40 44.1	15	98	89.1	40 48.5	14	98	88.4	40 52.6	13	98	87.8	40 56.5	13	98	87.1	41 00.2	12	98	86.4	41 03.7	11	98	85.8	41 06.9	10	97	85.1	50
1	39 40.9	16	98	89.5	39 45.4	15	98	88.9	39 49.8	14	98	88.2	39 54.0	13	98	87.6	39 57.9	13	98	86.9	40 01.6	12	98	86.3	40 05.1	11	98	85.6	40 08.4	11	97	85.0	1
2	38 42.2	16	98	89.3	38 46.8	15	98	88.7	38 51.2	14	98	88.0	38 55.3	14	98	87.4	38 59.3	13	98	86.8	39 03.1	12	98	86.1	39 06.6	11	98	85.5	39 10.0	11	97	84.9	2
3	37 43.5	16	98	89.1	37 48.1	15	98	88.5	37 52.5	14	98	87.9	37 56.7	14	98	87.2	38 00.7	13	98	86.6	38 04.5	12	98	86.0	38 08.1	12	97	85.3	38 11.5	11	97	84.7	3
4	36 44.8	16	98	88.9	36 49.4	15	98	88.3	36 53.9	14	98	87.7	36 58.1	14	98	87.1	37 02.1	13	98	86.4	37 06.0	12	98	85.8	37 09.6	12	97	85.2	37 13.1	11	97	84.6	4
55	35 46.1	16	98	88.7	35 50.8	15	98	88.1	35 55.2	15	98	87.5	35 59.5	14	98	86.9	36 03.6	13	98	86.3	36 07.4	13	98	85.7	36 11.1	12	97	85.1	36 14.7	11	97	84.4	55
6	34 47.5	16	98	88.5	34 52.1	15	98	87.9	34 56.6	15	98	87.3	35 00.9	14	98	86.7	35 05.0	13	98	86.1	35 08.9	13	98	85.5	35 12.7	12	97	84.9	35 16.3	12	97	84.3	6
7	33 48.8	16	98	88.3	33 53.5	15	98	87.8	33 58.0	15	98	87.2	34 02.3	14	98	86.6	34 06.4	14	98	86.0	34 10.4	13	98	85.4	34 14.2	12	97	84.8	34 17.9	12	97	84.2	7
8	32 50.1	16	98	88.2	32 54.8	15	98	87.6	32 59.4	15	98	87.0	33 03.7	14	98	86.4	33 07.9	14	98	85.8	33 11.9	13	97	85.2	33 15.8	13	97	84.6	33 19.5	12	97	84.0	8
9	31 51.5	16	98	88.0	31 56.2	15	98	87.4	32 00.8	15	98	86.8	32 05.2	14	98	86.2	32 09.4	14	98	85.6	32 13.5	13	97	85.1	32 17.4	13	97	84.5	32 21.1	12	97	83.9	9
60	30 52.8	16	98	87.8	30 57.6	16	98	87.2	31 02.2	15	98	86.6	31 06.6	15	98	86.1	31 10.9	14	98	85.5	31 15.0	13	97	84.9	31 19.0	13	97	84.3	31 22.8	12	97	83.7	60
1	29 54.2	16	98	87.6	29 59.0	16	98	87.0	30 03.6	15	98	86.5	30 08.1	15	98	85.9	30 12.4	14	98	85.3	30 16.6	14	97	84.7	30 20.6	13	97	84.2	30 24.4	13	97	83.6	1
2	28 55.6	16	98	87.4	29 00.4	16	98	86.9	29 05.0	15	98	86.3	29 09.5	15	98	85.7	29 13.9	14	97	85.2	29 18.1	14	97	84.6	29 22.2	13	97	84.0	29 26.1	13	97	83.4	2
3	27 56.9	16	98	87.2	28 01.8	16	98	86.7	28 06.4	15	98	86.1	28 11.0	15	98	85.6	28 15.4	14	97	85.0	28 19.7	14	97	84.4	28 23.8	14	97	83.9	28 27.8	13	97	83.3	3
4	26 58.3	16	98	87.0	27 03.2	16	98	86.5	27 07.9	16	98	85.9	27 12.5	15	98	85.4	27 17.0	15	97	84.8	27 21.3	14	97	84.3	27 25.5	14	97	83.7	27 29.6	13	97	83.2	4
65	25 59.7	17	98	86.9	26 04.6	16	98	86.3	26 09.4	16	98	85.8	26 14.0	15	97	85.2	26 18.5	15	97	84.7	26 22.9	14	97	84.1	26 27.2	14	97	83.6	26 31.3	14	97	83.0	65
6	25 01.1	17	98	86.7	25 06.0	16	98	86.1	25 10.8	16	98	85.6	25 15.5	15	97	85.1	25 20.1	15	97	84.5	25 24.5	15	97	84.0	25 28.9	14	97	83.4	25 33.1	14	97	82.9	6
7	24 02.5	17	98	86.5	24 07.5	16	98	86.0	24 12.3	16	98	85.4	24 17.1	16	97	84.9	24 21.7	15	97	84.3	24 26.2	15	97	83.8	24 30.6	14	97	83.3	24 34.8	14	97	82.7	7
8	23 04.0	17	98	86.3	23 09.0	16	98	85.8	23 13.8	16	97	85.3	23 18.6	16	97	84.7	23 23.3	15	97	84.2	23 27.8	15	97	83.6	23 32.3	15	97	83.1	23 36.6	14	97	82.6	8
9	22 05.4	17	98	86.1	22 10.4	17	98	85.6	22 15.4	16	97	85.1	22 20.2	16	97	84.5	22 24.9	16	97	84.0	22 29.5	15	97	83.5	22 34.0	15	97	82.9	22 38.4	15	97	82.4	9
70	21 06.8	17	98	86.0	21 11.9	17	98	85.4	21 16.9	16	97	84.9	21 21.8	16	97	84.4	21 26.5	16	97	83.8	21 31.2	15	97	83.3	21 35.8	15	97	82.8	21 40.3	15	97	82.2	70
1	20 08.3	17	98	85.8	20 13.4	17	97	85.3	20 18.4	17	97	84.7	20 23.4	16	97	84.2	20 28.2	16	97	83.7	20 32.9	16	97	83.1	20 37.6	15	97	82.6	20 42.1	15	97	82.1	1
2	19 09.8	17	98	85.6	19 14.9	17	97	85.1	19 20.0	17	97	84.6	19 25.0	16	97	84.0	19 29.9	16	97	83.5	19 34.7	16	97	83.0	19 39.4	16	97	82.5	19 44.0	15	97	81.9	2
3	18 11.3	17	98	85.4	18 16.5	17	97	84.9	18 21.6	17	97	84.4	18 26.6	17	97	83.9	18 31.6	16	97	83.3	18 36.4	16	97	82.8	18 41.2	16	97	82.3	18 45.9	15	97	81.8	3
4	17 12.8	18	97	85.2	17 18.0	17	97	84.7	17 23.2	17	97	84.2	17 28.3	17	97	83.7	17 33.3	17	97	83.2	17 38.2	16	97	82.7	17 43.1	16	97	82.1	17 47.8	16	97	81.6	4
75	16 14.3	18	97	85.0	16 19.6	18	97	84.5	16 24.8	17	97	84.0	16 30.0	17	97	83.5	16 35.0	17	97	83.0	16 40.0	17	97	82.5	16 45.0	16	97	82.0	16 49.8	16	97	81.5	75
6	15 15.8	18	97	84.9	15 21.2	18	97	84.4	15 26.5	17	97	83.8	15 31.7	17	97	83.3	15 36.8	17	97	82.8	15 41.9	17	97	82.3	15 46.9	17	97	81.8	15 51.8	16	97	81.3	6
7	14 17.4	18	97	84.7	14 22.8	18	97	84.2	14 28.1	18	97	83.7	14 33.4	17	97	83.2	14 38.6	17	97	82.6	14 43.7	17	97	82.1	14 48.8	17	97	81.6	14 53.8	17	97	81.1	7
8	13 19.0	18	97	84.5	13 24.4	18	97	84.0	13 29.8	18	97	83.5	13 35.1	18	97	83.0	13 40.4	17	97	82.5	13 45.6	17	97	82.0	13 50.7	17	97	81.5	13 55.8	17	97	81.0	8
9	12 20.6	18	97	84.3	12 26.1	18	97	83.8	12 31.5	18	97	83.3	12 36.9	18	97	82.8	12 42.2	18	97	82.3	12 47.5	17	97	81.8	12 52.7	17	97	81.3	12 57.9	17	97	80.8	9
80	11 22.2	19	97	84.1	11 27.7	18	97	83.6	11 33.2	18	97	83.1	11 38.7	18	97	82.6	11 44.1	18	97	82.1	11 49.4	18	97	81.6	11 54.7	18	97	81.1	11 59.9	17	96	80.6	80
1	10 23.8	19	97	83.9	10 29.4	19	97	83.4	10 35.0	18	97	82.9	10 40.5	18	97	82.4	10 45.9	18	97	81.9	10 51.4	18	97	81.4	10 56.7	18	97	80.9	11 02.1	18	96	80.4	1
2	9 25.5	19	97	83.7	9 31.1	19	97	83.2	9 36.7	19	97	82.7	9 42.3	19	97	82.3	9 47.9	18	97	81.8	9 53.3	18	97	81.3	9 58.8	18	97	80.8	10 04.2	18	96	80.3	2
3	8 27.1	19	97	83.6	8 32.8	19	97	83.1	8 38.5	19	97	82.6	8 44.2	19	97	82.1	8 49.8	19	97	81.6	8 55.4	18	97	81.1	9 00.9	18	96	80.6	9 06.4	18	96	80.1	3
4	7 28.8	19	97	83.4	7 34.6	19	97	82.9	7 40.3	19	97	82.4	7 46.1	19	97	81.9	7 51.7	19	97	81.4	7 57.4	19	97	80.9	8 03.0	19	96	80.4	8 08.6	19	96	79.9	4
85	6 30.5	20	97	83.2	6 36.4	19	97	82.7	6 42.2	19	97	82.2	6 48.0	19	97	81.7	6 53.7	19	97	81.2	6 59.5	19	96	80.7	7 05.2	19	96	80.2	7 10.8	19	96	79.7	85
6	5 32.3	20	97	83.0	5 38.2	20	97	82.5	5 44.1	20	97	82.0	5 49.9	19	97	81.5	5 55.8	19	97	81.0	6 01.6	19	96	80.5	6 07.3	19	96	80.0	6 13.1	19	96	79.5	6
7																					5 03.7	20	96	80.3	5 09.6	20	96	79.8	5 15.4	19	96	79.3	7

H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	70 00.0	1.0 02	180.0	69 30.0	1.0 02	180.0	69 00.0	1.0 02	180.0	68 30.0	1.0 02	180.0	68 00.0	1.0 02	180.0	67 30.0	1.0 02	180.0	67 00.0	1.0 02	180.0	66 30.0	1.0 02	180.0	00
1	69 58.5	1.0 07	177.1	69 28.6	1.0 07	177.2	68 58.6	1.0 07	177.2	68 28.6	1.0 07	177.3	67 58.7	1.0 07	177.4	67 28.7	1.0 07	177.4	66 58.7	1.0 06	177.5	66 28.7	1.0 06	177.5	1
2	69 54.1	1.0 12	174.2	69 24.2	1.0 12	174.4	68 54.4	1.0 12	174.5	68 24.5	1.0 11	174.6	67 54.6	1.0 11	174.8	67 24.7	1.0 11	174.9	66 54.9	1.0 11	175.0	66 25.0	1.0 10	175.1	2
3	69 46.7	99 17	171.4	69 17.0	99 17	171.6	68 47.4	99 16	171.8	68 17.7	99 16	172.0	67 47.9	99 16	172.2	67 18.2	99 15	172.3	66 48.5	99 15	172.5	66 18.7	99 15	172.7	3
4	69 36.5	98 22	168.6	69 07.1	98 21	168.8	68 37.6	98 21	169.1	68 08.1	98 20	169.4	67 38.6	98 20	169.6	67 09.1	98 19	169.8	66 39.6	99 19	170.0	66 10.0	99 19	170.3	4
05	69 23.5	97 26	165.8	68 54.4	97 26	166.1	68 25.2	97 25	166.5	67 56.0	97 24	166.8	67 26.8	97 24	167.1	66 57.5	98 23	167.4	66 28.2	98 23	167.6	65 58.9	98 22	167.9	05
6	69 07.8	96 31	163.1	68 39.0	96 30	163.5	68 10.2	96 29	163.9	67 41.3	96 29	164.2	67 12.4	96 28	164.6	66 43.4	97 27	164.9	66 14.4	97 27	165.2	65 45.4	97 26	165.6	6
7	68 49.4	94 36	160.5	68 21.1	95 34	160.9	67 52.6	95 33	161.4	67 24.1	95 33	161.8	66 55.6	95 32	162.2	66 27.0	95 31	162.5	65 58.3	96 31	162.9	65 29.6	96 30	163.3	7
8	68 28.6	93 39	157.9	68 00.7	93 38	158.4	67 32.7	93 37	158.9	67 04.6	94 36	159.4	66 36.5	94 36	159.8	66 08.3	94 35	160.2	65 40.0	94 34	160.6	65 11.6	95 34	161.0	8
9	68 05.4	91 42	155.5	67 37.9	92 42	156.0	67 10.4	92 41	156.5	66 42.8	92 40	157.0	66 15.1	93 39	157.5	65 47.3	93 38	158.0	65 19.4	93 38	158.4	64 51.5	93 37	158.9	9
10	67 39.9	89 46	153.1	67 13.0	90 45	153.7	66 46.0	90 44	154.2	66 18.8	91 43	154.8	65 51.6	91 43	155.3	65 24.3	91 42	155.8	64 56.8	92 41	156.3	64 29.3	92 40	156.7	10
1	67 12.3	88 49	150.8	66 45.9	88 48	151.4	66 19.4	89 48	152.0	65 52.8	89 47	152.6	65 26.1	89 46	153.1	64 59.2	90 45	153.7	64 32.2	90 44	154.2	64 05.2	90 43	154.7	1
2	66 42.7	86 52	148.6	66 16.9	86 52	149.3	65 50.9	87 51	149.9	65 24.8	87 50	150.5	64 58.6	88 49	151.0	64 32.2	88 48	151.6	64 05.7	89 47	152.2	63 39.1	89 46	152.7	2
3	66 11.2	84 55	146.5	65 46.0	84 54	147.2	65 20.6	85 54	147.8	64 55.0	85 53	148.4	64 29.3	86 52	149.0	64 03.4	86 51	149.6	63 37.4	87 50	150.2	63 11.3	87 49	150.7	3
4	65 38.0	82 58	144.5	65 13.3	83 57	145.2	64 48.5	83 56	145.9	64 23.4	84 55	146.5	63 58.2	84 54	147.1	63 32.9	85 54	147.7	63 07.4	85 53	148.3	62 41.8	86 52	148.9	4
15	65 03.1	80 61	142.6	64 39.0	81 60	143.3	64 14.7	81 59	144.0	63 50.2	82 58	144.6	63 25.6	82 57	145.3	63 00.8	83 56	145.9	62 35.8	84 55	146.5	62 10.7	84 54	147.1	15
6	64 26.7	78 63	140.7	64 03.2	79 62	141.5	63 39.4	79 61	142.2	63 15.5	80 60	142.8	62 51.4	81 59	143.5	62 27.1	81 58	144.1	62 02.6	82 58	144.7	61 38.0	82 57	145.4	6
7	63 48.9	76 65	139.0	63 25.9	77 64	139.7	63 02.7	78 63	140.4	62 39.4	78 62	141.1	62 15.8	79 62	141.8	61 52.0	80 61	142.4	61 28.1	80 60	143.1	61 04.0	81 59	143.7	7
8	63 00.7	74 67	137.3	62 47.3	75 66	138.1	62 24.7	76 65	138.8	62 01.8	76 65	139.5	61 38.8	77 64	140.1	61 15.6	78 63	140.8	60 52.2	78 62	141.5	60 28.5	79 61	142.1	8
9	62 29.3	72 69	135.7	62 07.5	73 68	136.5	61 45.4	74 67	137.2	61 23.1	75 67	137.9	61 00.6	75 66	138.6	60 37.9	76 65	139.3	60 15.0	77 64	139.9	59 51.9	77 63	140.5	9
20	61 47.8	71 71	134.2	61 26.5	71 70	135.0	61 05.0	72 69	135.7	60 43.2	73 68	136.4	60 21.2	74 68	137.1	59 59.0	74 67	137.8	59 36.6	75 66	138.4	59 14.0	76 65	139.1	20
1	61 05.2	69 73	132.8	60 44.4	70 72	133.5	60 23.4	70 71	134.2	60 02.2	71 70	135.0	59 40.7	72 69	135.6	59 19.0	73 68	136.3	58 57.1	73 68	137.0	58 35.0	74 67	137.6	1
2	69 21.7	67 74	131.4	60 01.4	68 73	132.1	59 40.9	69 72	132.9	59 20.1	70 72	133.6	58 59.2	70 71	134.3	58 38.0	71 70	135.0	58 16.5	72 69	135.6	57 54.9	72 68	136.3	2
3	59 37.2	65 76	130.1	59 17.4	66 75	130.8	58 57.4	67 74	131.6	58 37.2	68 73	132.3	58 16.7	69 72	133.0	57 56.0	69 72	133.6	57 35.0	70 71	134.3	57 13.9	71 70	135.0	3
4	58 51.9	64 77	128.8	58 32.6	65 76	129.6	58 13.1	66 75	130.3	57 53.3	66 74	131.0	57 33.3	67 74	131.7	57 13.0	68 73	132.4	56 52.6	69 72	133.1	56 31.9	69 71	133.7	4
25	58 05.8	62 78	127.6	57 47.0	63 77	128.4	57 27.9	64 77	129.1	57 08.6	65 76	129.8	56 49.0	66 75	130.5	56 29.3	66 74	131.2	56 09.3	67 74	131.9	55 49.1	68 73	132.5	25
6	57 19.0	61 79	126.5	57 00.6	62 78	127.2	56 42.0	62 78	127.9	56 23.1	63 77	128.6	56 04.0	64 76	129.3	55 44.7	65 76	130.0	55 25.2	66 75	130.7	55 05.4	66 74	131.4	6
7	56 31.4	59 80	125.4	56 13.5	60 80	126.1	55 55.4	61 79	126.8	55 36.9	62 78	127.5	55 18.3	63 77	128.2	54 59.4	63 77	128.9	54 40.3	64 76	129.6	54 21.0	65 75	130.2	7
8	55 43.3	58 81	124.4	55 25.8	59 81	125.1	55 08.1	60 80	125.8	54 50.1	60 79	126.5	54 31.9	61 78	127.2	54 13.4	62 78	127.9	53 54.7	63 77	128.5	53 35.8	63 76	129.2	8
9	54 54.6	57 82	123.4	54 37.5	57 81	124.1	54 20.2	58 81	124.8	54 02.6	59 80	125.5	53 44.8	60 79	126.2	53 26.7	61 79	126.8	53 08.5	61 78	127.5	52 50.0	62 77	128.2	9
30	54 05.3	55 83	122.4	53 48.6	56 82	123.1	53 31.7	57 82	123.8	53 14.5	58 81	124.5	52 57.1	58 80	125.2	52 39.5	59 80	125.9	52 21.6	60 79	126.5	52 03.5	61 78	127.2	30
1	53 15.5	54 84	121.5	52 59.2	55 83	122.2	52 42.7	56 83	122.9	52 25.9	56 82	123.6	52 08.9	57 81	124.3	51 51.6	58 81	124.9	51 34.2	59 80	125.6	51 16.5	59 79	126.2	1
2	52 25.2	53 85	120.6	52 00.3	53 84	121.3	51 53.1	54 83	122.0	51 36.7	55 83	122.7	51 20.1	56 82	123.4	51 03.2	57 82	124.0	50 46.1	57 81	124.7	50 28.9	58 80	125.3	2
3	51 34.5	51 85	119.8	51 18.9	52 85	120.5	51 03.1	53 84	121.2	50 47.1	54 84	121.8	50 30.8	55 83	122.5	50 14.3	55 82	123.1	49 57.6	56 82	123.8	49 40.7	57 81	124.4	3
4	50 43.4	50 86	119.0	50 28.2	51 85	119.7	50 12.7	52 85	120.3	49 57.0	53 84	121.0	49 41.1	53 84	121.7	49 25.0	54 83	122.3	49 08.6	55 82	123.0	48 52.1	56 82	123.6	4
35	49 51.8	49 86	118.2	49 37.0	50 86	118.9	49 21.8	51 85	119.6	49 06.5	52 85	120.2	48 50.9	52 84	120.9	48 35.1	53 84	121.5	48 19.1	54 83	122.1	48 02.9	54 83	122.8	35
6	49 00.0	48 87	117.5	48 45.4	49 87	118.1	48 30.6	50 86	118.8	48 15.6	50 85	119.5	48 00.3	51 85	120.1	47 44.9	52 84	120.7	47 29.2	53 84	121.4	47 13.4	53 83	122.0	6
7	48 07.7	47 88	116.8	47 53.5	48 87	117.4	47 39.0	49 87	118.1	47 24.3	49 86	118.7	47 00.4	50 86	119.4	46 54.3	51 85	120.0	46 38.9	51 84	120.6	46 23.4	52 84	121.2	7
8	47 15.2	46 88	116.1	47 01.2	47 88	116.7	46 47.0	48 87	117.4	46 32.6	48 87	118.0	46 18.0	49 86	118.6	46 03.2	50 86	119.3	45 48.2	50 85	119.9	45 33.0	51 85	120.5	8
9	46 22.3	45 89	115.4	46 08.6	46 88	116.1	45 54.8	47 88	116.7	45 40.7	47 87	117.3	45 26.4	48 87	118.0	45 11.9	49 86	118.6	44 57.2	49 86	119.2	44 42.3	50 85	119.8	9
40	45 29.1	44 89	114.8	45 15.8	45 89	115.4	45 02.2	46 88	116.0	44 48.4	46 88	116.7	44 34.4	47 87	117.3	44 20.2	48 87	117.9	44 05.8	48 86	118.5	43 51.2	49 86	119.1	40
1	44 35.7	43 89	114.2	44 22.6	44 89	114.8	44 09.3	45 89	115.4	43 55.8	45 88	116.0	43 42.1	46 88	116.7	43 28.2	47 87	117.3	43 14.1	47 87	117.9	42 59.8	48 86	118.5	1
2	43 42.1	42 90	113.6	43 29.2	43 89	114.2	43 16.2	44 89	114.8	43 02.9	44 89	115.4	42 49.5	45 88	116.0	42 35.9	46 88	116.6	42 22.0	46 87	117.3	42 08.0	47 87	117.8	2
3	42 48.2	42 90	113.0	42 35.6	42 90	113.6	42 22.8	43 89	114.2	42 00.8	44 89	114.8	41 56.6	44 89	115.4	41 43.3	45 88	116.0	41 29.7	45 88	116.6	41 16.0	46 87	117.2	3
4	41 54.0	41 91	112.4	41 41.7	41 90	113.1	41 29.1	42 90	113.7	41 16.4	43 89	114.3	41 03.5	43 89	114.9	40 50.4	44 88	115.5	40 37.1	45 88	116.1	40 23.7	45 88	116.6	4
45	40 59.7	40 91	111.9	40 47.6	41 91	112.5	40 35.3	41 90	113.1	40 22.8	42 90	113.7	40 10.1	43 89	114.3	39 57.3	43 89	114.9	39 44.3	44 88	115.5	39 31.1	44 88	116.1	45
6	40 05.1	39 91	111.4	39 53.3	40 91	112.0	39 41.2	40 90	112.6	39 29.0	41 90	113.2	39 16.5	42 90	113.8	39 03.9	42 89	114.4	38 51.2	43 89	114.9	38 38.2	43 88	115.5	6
7	39 10.4	39 92	110.9	38 58.7	39 91	111.5	38 46.9	40 91	112.1	38 34.9	40 90	112.7	38 22.7	41 90	113.3	38 10.4	41 90	113.8	37 57.8	42 89	114.4	37 45.2	43 89	115.0	7
8	38 15.5	38 92	110.4	38 04.0	38 91	111.0	37 52.4	39 91	111.6	37 40.7	40 91	112.2	37 28.7	40 90	112.7	37 16.6	41 90	113.3	37 04.3	41 90	113.9	36 51.8	42 89	114.5	8
9	37 20.4	37 92	109.9	37 09.2	38 92	110.5	36 57.8	38 91	111.1	36 46.2	39 91	111.7	36 34.5	39 91	112.3	36 22.6	40 90	112.8	36 10.5	40 90	113.4	35 58.3	41 90	114.0	9
50	36 25.1	36 92	109.5	36 14.1	37 92	110.1	36 02.9	38 92	110.6	35 51.6	38 91	111.2	35 40.1	39 91	111.8	35 28.4	39 91	112.3	35 16.6	40 90	112.9	35 04.6	40 90	113.5	50
1	35 29.7	36 93	109.0	35 18.9	36 92	109.6	35 07.9	37 92	110.2	34 56.8	37 92	110.8	34 45.5	38 91	111.3	34 34.0	38 91	111.9	34 22.4	39 91	112.4	34 10.7	39 90	113.0	1
2	34 34.2	35 93	108.6	34 23.6	36 92	109.2	34 12.8	36 92	109.8	34 01.8	37 92	110.3	33 50.7	37 92	110.9	33 39.5	38 91	111.4	33 28.1	38 91	112.0	33 16.5	39 90	112.5	2
3	33 38.5	35 93	108.2	33 28.1	35 93	108.8	33 17.5	36 92	109.3	33 06.7	36 92	109.9	32 55.8	37 92	110.4	32 44.8	37 91	111.0	32 33.6	38 91	111.5	32 22.2	38 91	112.1	3
4	32 42.7	34 93	107.8	32 32.4	34 93	108.4	32 22.0	35 93	108.9	32 11.4	35 92	109.5	32 00.7	36 92	110.0	31 49.9	36 92	110.6	31 38.9	37 91	111.1	31 27.8	37 91	111.7	4
55	31 46.8	33 93	107.4	31 36.7	34 93	108.0	31 26.4	34 93	108.5	31 16.0	35 93	109.1	31 05.5	35 92	109.6	30 54.9	36 92	110.1	30 44.1	36 92	110.7	30 33.2	37 91	111.2	55
6	30 50.7	33 94	107.0	30 40.8	33 93	107.6	30 30.7	34 93	108.1	30 20.5	34 93	108.7	30 10.2	35 92	109.2	29 59.7	35 92	109.7	29 49.1	36 92	110.3	29 38.4	36 92	110.8	6
7	29 54.5	32 94	106.6	29 44.8	33 94	107.2	29 34.9	33 93	107.7	29 24.8	34 93	108.3	29 14.7	34 93	108.8	29 04.4	34 92	109.4	28 54.0	35 92	109.9	28 43.4	35 92	110.4	7
8	28 58.2	32 94	106.3	28 48.6	32 94	106.8	28 38.9	33 93	107.4	28 29.0	33 93	107.9	28 19.1	33 93	108.4	28 09.0	34 93	109.0	27 58.7	34 92	109.5	27 48.4	35 92	110.0	8
9	28 01.8	31 94	105.9	27 52.4	32 94	106.5	27 42.8	32 94	107.0	27 33.1	33 93	107.5	27 23.3	33 93	108.1	27 13.4	33 93	108.6	27 03.3	34 92	109.1	26 53.2	34 92	109.7	9
60	27 05.4	31 94	105.6	26 56.1	31 94	106.1	26 46.7	32 94	106.6	26 37.1	32 94	107.2	26 27.5	32 93	107.7	26 17.7	33 93	108.2	26 07.8	33 93	108.8	25 57.8	34 92	109.3	60
1	26 08.8	30 94	105.2	25 59.6	31 94	105.8	25 50.4	31 94	106.3	25 41.0	31 94	106.8	25 31.5	32 93	107.4	25 21.9	32 93	107.9	25 12.2	33 93	108.4	25 02.4	33 93	108.9	1
2	25 12.1	30 95	104.9	25 03.1	30 94	105.4	24 54.0	31 94	106.0	24 44.8	31 94	106.5	24 35.4	31 94	107.0	24 26.0	32 93	107.5	24 16.5	32 93	108.1	24 06.8	32 93	108.6	2
3	24 15.4	29 95	104.6	24 06.5	30 94	105.1	23 57.5	30 94	105.6	23 48.4	30 94	106.2	23 39.3	31 94	106.7	23 30.0	31 94	107.2	23 20.6	31 93	107.7	23 11.1	32 93	108.2	3
4	23 18.5	29 95	104.3	23 09.8	29 96	104.8	23 01.0	30 94	105.3	22 52.0	30 94	105.8	22 43.0	30 94	106.3	22 33.9	31 94	106.9	22 24.6	31 93	107.4	22 15.3	31 93	107.9	4
65	22 21.6	28 95	104.0	22 13.0	29 95	104.5	22 04.3	29 95	105.0	21 55.5	29 94	105.5	21 46.6	30 94	106.0	21 37.7	30 94	106.5	21 28.6	30 94	107.1	21 19.4	31 93	107.6	65
6	21 24.6	28 96	103.7	21 16.1	28 95	104.2	21 07.6	29 95	104.7	20 58.9	29 94	105.2	20 50.2	29 94	105.7	20 41.3	30 94	106.2	20 32.4	30 94	106.7	20 23.4	30 93	107.2	6
7	20 27.5	28 95	103.4	20 19.2	28 96	103.9	20 10.8	28 95	104.4	20 02.3	29 95	104.9	19 53.6	29 94	105.4	19 45.0	29 94	105.9	19 36.2	29 94	106.4	19 27.3	30 94	106.9	7
8	19 30.4	27 95	103.1	19 22.2	28 95	103.6	19 13.9	28 95	104.1	19 05.5	28 95	104.6	18 57.0	28 94	105.1	18 48.5	29 94	105.6	18 39.8	29 94	106.1	18 31.1	29 94	106.6	8
9	18 33.2	27 95	102.8	18 25.1	27 95	103.3	18 16.9	27 95	103.8	18 08.7	28 95	104.3	18 00.3	28 95	104.8	17 51.9	29 94	105.3	17 43.4	28 94	105.8	17 34.8	29 94	106.3	9
70	17 35.9	26 96	102.5	17 28.0	27 95	103.0	17 19.9	27 95	103.5	17 11.8	27 95	104.0	17 03.6	27 95	104.5	16 55.3	28 95	105.0	16 46.9	28 94	105.5	16 38.5	28 94	106.0	70
1	16 38.6	26 96	102.2	16 30.8	26 95	102.7	16 22.8	27 95	103.2	16 14.8	27 95	103.8	16 06.7	27 96	104.3	15 58.6	27 95	104.8	15 50.3	28 94	105.3	15 42.0	28 94	105.8	1
2	15 41.2	26 96	102.0	15 33.5	26 96	102.5	15 25.6	26 95	103.0	15 17.8	26 95	103.5	15 09.8	27 96	104.0	15 01.8	27 95	104.5	14 53.7	27 95	105.0	14 45.5	27 94	105.5	2
3	14 43.8	25 96	101.7	14 36.1	26 96	102.2	14 28.4	26 95	102.7	14 20.6	26 95	103.2	14 12.8	26 95	103.7	14 04.9	26 95	104.2	13 56.9	27 95	104.7	13 48.9	27 94	105.2	3
4	13 46.3	25 96	101.5	13 38.8	25 96	102.0	13 31.1	25 96	102.5	13 23.5	26 95	102.9	13 15.8	26 95	103.4	13 08.0	26 95	103.9	13 00.1	26 95	104.4	12 52.2	26 95	104.9	4
75	12 48.8	25 96	101.2	12 41.3	25 96	101.7	12 33.8	25 96	102.2	12 26.3	25 95	102.7	12 18.6	25 95	103.2	12 11.0	26 95	103.7	12 03.3	26 95	104.2	11 55.5	26 95	104.7	75
6	11 51.2	24 96	101.0	11 43.8	25 96	101.4	11 36.4	25 96	101.9	11 29.0	25 96	102.4	11 21.5	25 95	102.9	11 13.9	25 95	103.4	11 06.3	25 95	103.9	10 58.7	26 95	104.4	6
7	10 53.5	24 96	100.7	10 46.3	24 96	101.2	10 39.0	24 96	101.7	10 31.6	25 96	102.2	10 24.2	25 95	102.7	10 16.8	25 95	103.2	10 09.3	25 95	103.7	10 01.8	25 95	104.2	7
8	9 55.8	24 96	100.5	9 48.7	24 96	101.0	9 41.5	24 96	101.5	9 34.2	24 96	101.9	9 27.0	24 96	102.4	9 19.6	24 95	102.9	9 12.3	25 95	103.4	9 04.9	25 95	103.9	8
9	8 58.1	23 96	100.2	8 51.0	24 96	100.7	8 43.9	24 96	101.2	8 36.8	24 96	101.7	8 29.6	24 96	102.2	8 22.4	24 95	102.7	8 15.2	24 95	103.2	8 07.9	24 95	103.7	9
80	8 00.3	23 96	100.0	7 53.3	23 96	100.5	7 46.3	23 96	101.0	7 39.3	24 96	101.5	7 32.2	24 96	102.0	7 25.1	24 96	102.4	7 18.0	24 95	102.9	7 10.8	24 95	103.4	80
1	7 02.5	23 96	99.8	6 55.6	23 96	100.3	6 48.7	23 96	100.7	6 41.8	23 96	101.2	6 34.8	23 96	101.7	6 27.8	23 96	102.2	6 20.8	23 95	102.7	6 13.7	24 95	103.2	1
2	6 04.6	23 96	99.5	5 57.8	23 96	100.0	5 51.0	23 96	100.5	5 44.2	23 96	101.0	5 37.3	23 96	101.5	5 30.4	23 96	102.0	5 23.5	23 96	102.5	5 16.5	23 95	103.0	2
3	5 06.7	22 97	99.3	5 00.0	22 96	99.8																			3

H.A.	12° 00′			12° 30′			13° 00′			13° 30′			14° 00′			14° 30′			15° 00′			15° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	90 00.0	.. 98	....	89 30.0	1.0 60	00.0	89 00.0	1.0 40	00.0	88 30.0	1.0 29	00.0	88 00.0	1.0 22	00.0	87 30.0	1.0 18	00.0	87 00.0	1.0 15	00.0	86 30.0	1.0 13	00.0	00
1	89 01.3	00 98	89.9	88 54.1	45 92	62.8	88 36.1	71 80	45.2	88 12.6	84 67	32.9	87 46.5	90 57	25.9	87 19.0	93 49	21.2	86 50.8	95 42	17.8	86 22.1	96 37	15.4	1
2	88 02.6	00 98	89.8	87 59.0	24 96	75.4	87 48.4	45 90	62.7	87 32.4	61 83	52.2	87 12.5	71 75	44.0	86 49.9	79 68	37.7	86 25.5	84 61	32.7	85 59.8	87 55	28.8	2
3	87 03.9	01 98	89.7	87 01.6	16 97	80.0	86 54.3	32 94	70.8	86 42.7	45 89	62.5	86 27.5	56 84	55.3	86 09.4	65 78	49.1	85 49.0	71 73	43.9	85 26.8	76 68	39.4	3
4	86 05.2	01 98	89.6	86 03.6	12 97	82.3	85 58.1	24 95	75.2	85 49.2	35 92	68.5	85 37.2	45 89	62.4	85 22.4	53 84	56.8	85 05.3	60 80	51.9	84 46.3	66 76	47.5	4
05	85 06.6	01 98	89.5	85 05.3	09 97	83.6	85 01.0	19 96	77.9	84 53.9	28 94	72.4	84 44.0	37 91	67.1	84 31.7	45 88	62.3	84 17.3	52 85	57.8	84 00.9	58 81	53.6	05
6	84 07.9	01 98	89.4	84 06.9	07 97	84.5	84 03.5	16 96	79.7	83 57.5	24 95	75.0	83 49.3	31 93	70.5	83 38.9	38 90	66.2	83 26.4	45 88	62.1	83 12.2	50 85	58.3	6
7	83 09.2	01 98	89.3	83 08.5	06 97	85.1	83 05.6	13 97	80.9	83 00.6	20 96	76.9	82 53.6	27 94	72.9	82 44.6	33 92	69.1	82 33.8	39 90	65.4	82 21.2	44 88	62.0	7
8	82 10.5	01 98	89.2	82 10.0	05 98	85.5	82 07.6	11 97	81.8	82 03.3	17 96	78.3	81 57.2	23 95	74.7	81 49.4	29 93	71.3	81 39.8	34 91	68.0	81 28.7	39 89	64.8	8
9	81 11.8	02 98	89.1	81 11.5	04 98	85.8	81 09.4	10 97	82.5	81 05.7	15 96	79.3	81 00.4	20 95	76.2	80 53.5	26 94	73.1	80 45.0	31 92	70.1	80 35.1	35 91	67.2	9
10	80 13.1	02 98	89.0	80 12.9	03 98	86.0	80 11.2	08 97	83.1	80 08.0	13 96	80.2	80 03.3	18 96	77.3	79 57.1	23 94	74.5	79 49.6	27 93	71.7	79 40.7	32 92	69.0	10
1	79 14.5	02 98	88.9	79 14.4	03 98	86.2	79 12.9	07 97	83.5	79 10.1	12 97	80.8	79 05.9	16 96	78.2	79 00.4	21 95	75.6	78 53.6	25 94	73.1	78 45.6	29 93	70.6	1
2	78 15.8	02 98	88.7	78 15.8	02 98	86.3	78 14.6	06 97	83.8	78 12.1	10 97	81.4	78 08.4	14 96	79.0	78 03.4	18 95	76.6	77 57.3	22 94	74.2	77 50.0	26 93	71.9	2
3	77 17.1	02 98	88.6	77 17.2	02 98	86.4	77 16.2	05 97	84.1	77 14.0	09 97	81.8	77 10.7	13 96	79.6	77 06.2	17 96	77.4	77 00.7	20 95	75.2	76 54.0	24 94	73.0	3
4	76 18.4	03 98	88.5	76 18.7	01 98	86.4	76 17.8	05 97	84.3	76 15.9	08 97	82.2	76 12.9	12 96	80.1	76 08.9	15 96	78.0	76 03.8	19 95	76.0	75 57.7	22 94	74.0	4
15	75 19.8	03 98	88.4	75 20.1	01 98	86.5	75 19.4	04 97	84.5	75 17.7	07 97	82.5	75 15.1	11 97	80.6	75 11.4	14 96	78.6	75 06.8	17 95	76.7	75 01.2	20 95	74.8	15
6	74 21.1	03 98	88.3	74 21.5	00 98	86.5	74 21.0	03 97	84.6	74 19.5	06 97	82.8	74 17.1	10 97	80.9	74 13.8	13 96	79.1	74 09.6	16 96	77.3	74 04.5	19 95	75.5	6
7	73 22.4	03 98	88.2	73 22.9	00 98	86.5	73 22.6	03 97	84.7	73 21.3	06 97	83.0	73 19.2	09 97	81.2	73 16.2	11 96	79.5	73 12.3	14 96	77.8	73 07.6	17 95	76.1	7
8	72 23.8	03 98	88.1	72 24.4	01 98	86.5	72 24.1	02 97	84.8	72 23.0	05 97	83.2	72 21.1	08 97	81.5	72 18.4	10 96	79.9	72 14.9	13 96	78.2	72 10.6	16 95	76.6	8
9	71 25.1	03 98	88.0	71 25.8	01 98	86.4	71 25.7	02 97	84.9	71 24.8	04 97	83.3	71 23.1	07 97	81.7	71 20.6	09 96	80.2	71 17.4	12 96	78.6	71 13.4	15 95	77.1	9
20	70 26.5	04 98	87.9	70 27.2	01 98	86.4	70 27.2	01 97	84.9	70 26.5	04 97	83.4	70 25.0	06 97	81.9	70 22.8	09 96	80.4	70 19.8	11 96	79.0	70 16.2	13 96	77.5	20
1	69 27.8	04 98	87.8	69 28.6	02 98	86.4	69 28.7	01 97	84.9	69 28.2	03 97	83.5	69 26.9	05 97	82.1	69 24.9	08 97	80.7	69 22.2	10 96	79.3	69 18.8	12 96	77.8	1
2	68 29.2	04 98	87.7	68 30.1	02 98	86.3	68 30.3	00 97	85.0	68 29.8	03 97	83.6	68 28.7	05 97	82.2	68 27.0	07 97	80.9	68 24.5	09 96	79.5	68 21.4	11 96	78.2	2
3	67 30.6	04 98	87.6	67 31.5	02 98	86.3	67 31.8	00 97	85.0	67 31.5	02 97	83.7	67 30.6	04 97	82.3	67 29.0	06 97	81.0	67 26.8	08 96	79.7	67 24.0	10 96	78.4	3
4	66 31.9	04 98	87.5	66 32.9	02 98	86.2	66 33.4	00 97	85.0	66 33.2	02 97	83.7	66 32.4	04 97	82.4	66 31.0	06 97	81.2	66 29.0	08 96	79.9	66 26.4	10 96	78.7	4
25	65 33.3	05 98	87.4	65 34.4	03 98	86.2	65 34.9	01 97	84.9	65 34.8	01 97	83.7	65 34.2	03 97	82.5	65 33.0	05 97	81.3	65 31.2	07 96	80.1	65 28.9	09 96	78.9	25
6	64 34.7	05 98	87.3	64 35.8	03 98	86.1	64 36.4	01 97	84.9	64 36.5	01 97	83.8	64 36.0	03 97	82.6	64 35.0	04 97	81.4	64 33.4	06 96	80.3	64 31.2	08 96	79.1	6
7	63 36.0	05 98	87.1	63 37.3	03 98	86.0	63 38.0	01 97	84.9	63 38.2	00 97	83.8	63 37.8	02 97	82.6	63 36.9	04 97	81.5	63 35.5	06 96	80.4	63 33.6	07 96	79.3	7
8	62 37.4	05 98	87.0	62 38.7	03 98	85.9	62 39.5	02 97	84.9	62 39.8	00 97	83.8	62 39.6	02 97	82.7	62 38.9	03 97	81.6	62 37.6	05 96	80.5	62 35.9	07 96	79.4	8
9	61 38.8	05 98	86.9	61 40.2	04 98	85.9	61 41.1	02 97	84.8	61 41.5	01 97	83.8	61 41.4	01 97	82.7	61 40.8	03 97	81.7	61 39.8	04 97	80.6	61 38.2	06 96	79.5	9
30	60 40.2	06 98	86.8	60 41.7	04 98	85.8	60 42.6	02 97	84.8	60 43.1	01 97	83.7	60 43.2	01 97	82.7	60 42.7	02 97	81.7	60 41.8	04 97	80.7	60 40.5	05 96	79.7	30
1	59 41.6	06 98	86.7	59 43.1	04 98	85.7	59 44.2	03 97	84.7	59 44.8	01 97	83.7	59 45.0	00 97	82.7	59 44.7	02 97	81.7	59 43.9	03 97	80.8	59 42.7	05 96	79.8	1
2	58 43.0	06 98	86.6	58 44.6	05 98	85.6	58 45.8	03 97	84.7	58 46.5	02 97	83.7	58 46.7	00 97	82.7	58 46.6	01 97	81.8	58 46.0	03 97	80.8	58 45.0	04 96	79.8	2
3	57 44.5	06 98	86.5	57 46.1	05 98	85.5	57 47.3	03 97	84.6	57 48.1	02 97	83.7	57 48.5	01 97	82.7	57 48.5	01 97	81.8	57 48.1	02 97	80.8	57 47.2	04 96	79.9	3
4	56 45.9	06 98	86.4	56 47.6	05 98	85.5	56 48.9	04 97	84.5	56 49.8	02 97	83.6	56 50.3	01 97	82.7	56 50.4	00 97	81.8	56 50.1	02 97	80.9	56 49.4	03 96	80.0	4
35	55 47.3	07 98	86.2	55 49.1	05 98	85.4	55 50.5	04 97	84.5	55 51.5	03 97	83.6	55 52.1	01 97	82.7	55 52.3	00 97	81.8	55 52.2	01 97	80.9	55 51.6	02 96	80.0	35
6	54 48.8	07 98	86.1	54 50.6	06 97	85.3	54 52.1	04 97	84.4	54 53.2	03 97	83.5	54 53.9	02 97	82.7	54 54.2	01 97	81.8	54 54.2	01 97	80.9	54 53.8	02 96	80.1	6
7	53 50.2	07 98	86.0	53 52.1	06 97	85.2	53 53.7	05 97	84.3	53 54.8	03 97	83.5	53 55.7	02 97	82.6	53 56.1	01 97	81.8	53 56.3	00 97	80.9	53 56.0	01 96	80.1	7
8	52 51.7	07 98	85.9	52 53.6	06 97	85.1	52 55.3	05 97	84.3	52 56.5	04 97	83.4	52 57.5	03 97	82.6	52 58.1	01 97	81.8	52 58.3	00 97	80.9	52 58.2	01 96	80.1	8
9	51 53.1	07 98	85.8	51 55.2	06 97	85.0	51 56.9	05 97	84.2	51 58.2	04 97	83.4	51 59.3	03 97	82.5	52 00.0	02 97	81.7	52 00.3	01 97	80.9	52 00.4	00 96	80.1	9
40	50 54.6	08 98	85.7	50 56.7	06 97	84.9	50 58.5	05 97	84.1	51 00.0	04 97	83.3	51 01.1	03 97	82.5	51 01.9	02 97	81.7	51 02.4	01 97	80.9	51 02.6	00 96	80.1	40
1	49 56.1	08 98	85.6	49 58.3	07 97	84.8	50 00.1	06 97	84.0	50 01.7	05 97	83.2	50 02.9	04 97	82.4	50 03.8	03 97	81.7	50 04.4	02 97	80.9	50 04.7	00 96	80.1	1
2	48 57.6	08 98	85.4	48 59.8	07 97	84.7	49 01.8	06 97	83.9	49 03.4	05 97	83.2	49 04.7	04 97	82.4	49 05.8	03 97	81.6	49 06.5	02 97	80.9	49 06.9	01 96	80.1	2
3	47 59.1	08 97	85.3	48 01.4	07 97	84.6	48 03.4	06 97	83.8	48 05.1	05 97	83.1	48 06.6	04 97	82.3	48 07.7	03 97	81.6	48 08.6	02 97	80.8	48 09.1	01 96	80.1	3
4	47 00.6	08 97	85.2	47 03.0	07 97	84.5	47 05.1	07 97	83.7	47 06.9	06 97	83.0	47 08.4	05 97	82.3	47 09.7	04 97	81.5	47 10.6	03 97	80.8	47 11.3	02 96	80.1	4
45	46 02.1	09 97	85.1	46 04.6	08 97	84.4	46 06.7	07 97	83.6	46 08.6	06 97	82.9	46 10.3	05 97	82.2	46 11.6	04 97	81.5	46 12.7	03 97	80.8	46 13.5	02 96	80.0	45
6	45 03.7	09 97	85.0	45 06.2	08 97	84.3	45 08.4	07 97	83.5	45 10.4	06 97	82.8	45 12.1	05 97	82.1	45 13.6	04 97	81.4	45 14.8	04 97	80.7	45 15.7	03 96	80.0	6
7	44 05.2	09 97	84.8	44 07.8	08 97	84.1	44 10.1	07 97	83.4	44 12.2	06 97	82.8	44 14.0	06 97	82.1	44 15.5	05 97	81.4	44 16.9	04 96	80.7	44 17.9	03 96	80.0	7
8	43 06.8	09 97	84.7	43 09.4	08 97	84.0	43 11.8	08 97	83.3	43 14.0	07 97	82.7	43 15.9	06 97	82.0	43 17.5	05 97	81.3	43 18.9	04 96	80.6	43 20.1	03 96	79.9	8
9	42 08.3	09 97	84.6	42 11.0	09 97	83.9	42 13.5	08 97	83.2	42 15.7	07 97	82.6	42 17.8	06 97	81.9	42 19.5	05 97	81.2	42 21.0	05 96	80.5	42 22.3	04 96	79.9	9
50	41 09.9	10 97	84.5	41 12.7	09 97	83.8	41 15.2	08 97	83.1	41 17.6	07 97	82.5	41 19.7	07 97	81.8	41 21.5	06 97	81.1	41 23.2	05 96	80.5	41 24.6	04 96	79.8	50
1	40 11.5	10 97	84.3	40 14.3	09 97	83.7	40 17.0	08 97	83.0	40 19.4	08 97	82.4	40 21.6	07 97	81.7	40 23.5	06 97	81.1	40 25.3	05 96	80.4	40 26.8	05 96	79.8	1
2	39 13.1	10 97	84.2	39 16.0	09 97	83.6	39 18.7	09 97	82.9	39 21.2	08 97	82.3	39 23.5	07 97	81.6	39 25.6	07 97	81.0	39 27.4	06 96	80.3	39 29.1	05 96	79.7	2
3	38 14.7	10 97	84.1	38 17.7	10 97	83.4	38 20.5	09 97	82.8	38 23.1	08 97	82.2	38 25.4	08 97	81.5	38 27.6	07 97	80.9	38 29.6	06 96	80.3	38 31.3	06 96	79.6	3
4	37 16.3	11 97	84.0	37 19.4	10 97	83.3	37 22.3	09 97	82.7	37 24.9	09 97	82.1	37 27.4	08 97	81.4	37 29.7	07 97	80.8	37 31.7	07 96	80.2	37 33.6	06 96	79.6	4
55	36 18.0	11 97	83.8	36 21.1	10 97	83.2	36 24.1	09 97	82.6	36 26.8	09 97	82.0	36 29.4	08 97	81.3	36 31.7	08 97	80.7	36 33.9	07 96	80.1	36 35.9	06 96	79.5	55
6	35 19.6	11 97	83.7	35 22.8	10 97	83.1	35 25.9	10 97	82.5	35 28.7	09 97	81.9	35 31.4	09 97	81.2	35 33.8	08 96	80.6	35 36.1	07 96	80.0	35 38.2	07 96	79.4	6
7	34 21.3	11 97	83.6	34 24.6	11 97	83.0	34 27.7	10 97	82.4	34 30.6	09 97	81.8	34 33.4	09 97	81.1	34 35.9	08 96	80.5	34 38.3	08 96	79.9	34 40.5	07 96	79.3	7
8	33 23.0	11 97	83.4	33 26.4	11 97	82.8	33 29.5	10 97	82.2	33 32.5	10 97	81.6	33 35.4	09 97	81.0	33 38.0	09 96	80.4	33 40.5	08 96	79.8	33 42.8	07 96	79.2	8
9	32 24.7	12 97	83.3	32 28.1	11 97	82.7	32 31.4	11 97	82.1	32 34.5	10 97	81.5	32 37.4	09 97	80.9	32 40.2	09 96	80.3	32 42.8	08 96	79.7	32 45.2	08 96	79.2	9
60	31 26.4	12 97	83.2	31 29.9	11 97	82.6	31 33.3	11 97	82.0	31 36.4	10 97	81.4	31 39.5	10 97	80.8	31 42.3	09 96	80.2	31 45.0	09 96	79.7	31 47.6	08 96	79.1	60
1	30 28.2	12 97	83.0	30 31.7	12 97	82.4	30 35.2	11 97	81.9	30 38.4	11 97	81.3	30 41.5	10 96	80.7	30 44.5	10 96	80.1	30 47.3	09 96	79.6	30 50.0	09 96	79.0	1
2	29 29.9	12 97	82.9	29 33.6	12 97	82.3	29 37.1	11 97	81.7	29 40.4	11 97	81.2	29 43.6	10 96	80.6	29 46.7	10 96	80.0	29 49.6	09 96	79.4	29 52.4	09 96	78.9	2
3	28 31.7	13 97	82.7	28 35.4	12 97	82.2	28 39.0	12 97	81.6	28 42.4	11 97	81.0	28 45.7	11 96	80.5	28 48.9	10 96	79.9	28 51.9	10 96	79.3	28 54.8	09 96	78.8	3
4	27 33.5	13 97	82.6	27 37.3	12 97	82.0	27 41.0	12 97	81.5	27 44.5	12 97	80.9	27 47.9	11 96	80.4	27 51.1	11 96	79.8	27 54.2	10 96	79.2	27 57.2	10 96	78.7	4
65	26 35.3	13 97	82.5	26 39.2	13 97	81.9	26 42.9	12 97	81.3	26 46.5	12 97	80.8	26 50.0	11 96	80.2	26 53.4	11 96	79.7	26 56.6	11 96	79.1	26 59.7	10 96	78.6	65
6	25 37.1	13 97	82.3	25 41.1	13 97	81.8	25 44.9	13 97	81.2	25 48.6	12 96	80.7	25 52.2	12 96	80.1	25 55.6	11 96	79.6	25 59.0	11 96	79.0	26 02.2	10 96	78.4	6
7	24 39.0	14 97	82.2	24 43.0	13 97	81.6	24 46.9	13 97	81.1	24 50.7	12 96	80.5	24 54.4	12 96	80.0	24 57.9	12 96	79.4	25 01.4	11 96	78.9	25 04.7	11 96	78.3	7
8	23 40.8	14 97	82.0	23 45.0	14 97	81.5	23 49.0	13 97	80.9	23 52.8	13 96	80.4	23 56.6	12 96	79.8	24 00.3	12 96	79.3	24 03.8	12 96	78.8	24 07.2	11 96	78.2	8
9	22 42.7	14 97	81.9	22 46.9	14 97	81.3	22 51.0	13 97	80.8	22 55.0	13 96	80.3	22 58.8	13 96	79.7	23 02.6	12 96	79.2	23 06.2	12 96	78.6	23 09.8	12 96	78.1	9
70	21 44.6	14 97	81.7	21 48.9	14 97	81.2	21 53.1	14 96	80.7	21 57.2	13 96	80.1	22 01.1	13 96	79.6	22 05.0	13 96	79.0	22 08.7	12 96	78.5	22 12.4	12 96	78.0	70
1	20 46.6	15 97	81.6	20 50.9	14 97	81.0	20 55.2	14 96	80.5	20 59.3	14 96	80.0	21 03.4	13 96	79.4	21 07.4	13 96	78.9	21 11.2	13 96	78.4	21 15.0	12 96	77.8	1
2	19 48.5	15 97	81.4	19 53.0	15 97	80.9	19 57.3	14 96	80.4	20 01.6	14 96	79.8	20 05.7	14 96	79.3	20 09.8	13 96	78.8	20 13.8	13 96	78.2	20 17.6	13 96	77.7	2
3	18 50.5	15 97	81.3	18 55.0	15 97	80.7	18 59.5	15 96	80.2	19 03.8	14 96	79.7	19 08.1	14 96	79.2	19 12.2	14 96	78.6	19 16.3	13 96	78.1	19 20.3	13 96	77.6	3
4	17 52.5	15 97	81.1	17 57.1	15 96	80.6	18 01.7	15 96	80.1	18 06.1	15 96	79.5	18 10.4	14 96	79.0	18 14.7	14 96	78.5	18 18.9	14 96	78.0	18 23.0	14 95	77.5	4
75	16 54.6	16 97	80.9	16 59.2	15 96	80.4	17 03.9	15 96	79.9	17 08.4	15 96	79.4	17 12.8	15 96	78.9	17 17.2	14 96	78.4	17 21.5	14 96	77.8	17 25.7	14 95	77.3	75
6	15 56.6	16 97	80.8	16 01.4	16 96	80.3	16 06.1	16 96	79.7	16 10.7	15 96	79.2	16 15.3	15 96	78.7	16 19.7	15 96	78.2	16 24.2	15 96	77.7	16 28.5	14 95	77.2	6
7	14 58.7	16 96	80.6	15 03.6	16 96	80.1	15 08.4	16 96	79.6	15 13.1	16 96	79.1	15 17.7	15 96	78.6	15 22.3	15 96	78.1	15 26.8	15 96	77.5	15 31.3	15 95	77.0	7
8	14 00.8	17 96	80.4	14 05.8	16 96	79.9	14 10.6	16 96	79.4	14 15.5	16 96	78.9	14 20.2	16 96	78.4	14 24.9	16 96	77.9	14 29.5	15 95	77.4	14 34.1	15 95	76.9	8
9	13 03.0	17 96	80.3	13 08.0	17 96	79.8	13 13.0	16 96	79.3	13 17.9	16 96	78.8	13 22.7	16 96	78.2	13 27.5	16 96	77.7	13 32.3	16 95	77.2	13 37.0	15 95	76.7	9
80	12 05.1	17 96	80.1	12 10.3	17 96	79.6	12 15.3	17 96	79.1	12 20.3	17 96	78.6	12 25.3	16 96	78.1	12 30.2	16 96	77.6	12 35.1	16 95	77.1	12 39.9	16 95	76.6	80
1	11 07.3	17 96	79.9	11 12.5	17 96	79.4	11 17.7	17 96	78.9	11 22.8	17 96	78.4	11 27.9	17 96	77.9	11 32.9	17 95	77.4	11 37.9	16 95	76.9	11 42.8	16 95	76.4	1
2	10 09.6	18 96	79.8	10 14.9	18 96	79.3	10 20.1	17 96	78.8	10 25.4	17 96	78.3	10 30.5	17 96	77.8	10 35.7	17 95	77.3	10 40.7	17 95	76.8	10 45.8	17 95	76.2	2
3	9 11.8	18 96	79.6	9 17.2	18 96	79.1	9 22.6	18 96	78.6	9 27.9	18 96	78.1	9 33.2	18 96	77.6	9 38.4	17 95	77.1	9 43.6	17 95	76.6	9 48.8	17 95	76.1	3
4	8 14.1	18 96	79.4	8 19.6	18 96	78.9	8 25.1	18 96	78.4	8 30.5	18 96	77.9	8 35.9	18 95	77.4	8 41.2	18 95	76.9	8 46.6	18 95	76.4	8 51.8	18 95	75.9	4
85	7 16.4	19 96	79.2	7 22.0	19 96	78.7	7 27.6	18 96	78.2	7 33.1	18 96	77.7	7 38.6	18 95	77.2	7 44.1	18 95	76.7	7 49.5	18 95	76.2	7 54.9	18 95	75.7	85
6	6 18.8	19 96	79.0	6 24.5	19 96	78.5	6 30.2	19 96	78.0	6 35.8	19 95	77.5	6 41.4	19 95	77.1	6 47.0	19 95	76.6	6 52.6	18 95	76.1	6 58.1	18 95	75.6	6
7	5 21.2	19 96	78.8	5 27.0	19 96	78.3	5 32.8	19 96	77.9	5 38.5	19 95	77.4	5 44.2	19 96	76.9	5 49.9	19 95	76.4	5 55.6	19 95	75.9	6 01.3	19 95	75.4	7
8																						5 04.5	19 95	75.2	8

H.A.	12° 00′				12° 30′				13° 00′				13° 30′				14° 00′				14° 30′				15° 00′				15° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	66 00.0	1.0	02	180.0	65 30.0	1.0	02	180.0	65 00.0	1.0	02	180.0	64 30.0	1.0	02	180.0	64 00.0	1.0	02	180.0	63 30.0	1.0	02	180.0	63 00.0	1.0	02	180.0	62 30.0	1.0	02	180.0	00
1	65 58.8	1.0	06	177.6	65 28.8	1.0	06	177.6	64 58.8	1.0	06	177.7	64 28.8	1.0	06	177.7	63 58.9	1.0	06	177.8	63 28.9	1.0	06	177.8	62 58.9	1.0	05	177.9	62 28.9	1.0	05	177.9	1
2	65 55.1	1.0	10	175.2	65 25.2	1.0	10	175.3	64 55.3	1.0	10	175.4	64 25.4	1.0	10	175.5	63 55.5	1.0	09	175.6	63 25.6	1.0	09	175.7	62 55.6	1.0	09	175.8	62 25.7	1.0	09	175.8	2
3	65 49.0	99	14	172.8	65 19.2	99	14	173.0	64 49.4	99	14	173.1	64 19.6	99	13	173.3	63 49.8	99	13	173.4	63 20.0	99	13	173.5	62 50.2	99	13	173.6	62 20.4	99	12	173.8	3
4	65 40.4	99	18	170.5	65 10.8	99	18	170.7	64 41.2	99	17	170.9	64 11.6	99	17	171.0	63 42.0	99	17	171.2	63 12.3	99	16	171.4	62 42.7	99	16	171.5	62 13.0	99	16	171.7	4
05	65 29.5	98	22	168.1	65 00.2	98	22	168.4	64 30.8	98	21	168.6	64 01.4	98	21	168.8	63 31.9	98	20	169.1	63 02.5	98	20	169.3	62 33.0	98	20	169.5	62 03.5	98	19	169.7	05
6	65 16.3	97	26	165.9	64 47.2	97	25	166.1	64 18.1	97	25	166.4	63 48.9	97	24	166.7	63 19.7	97	24	166.9	62 50.5	97	23	167.2	62 21.2	98	23	167.4	61 52.0	98	23	167.7	6
7	65 00.9	96	29	163.6	64 32.1	96	29	163.9	64 03.2	96	28	164.3	63 34.3	96	28	164.6	63 05.4	96	27	164.9	62 36.5	97	27	165.1	62 07.5	97	26	165.4	61 38.4	97	26	165.7	7
8	64 43.2	95	33	161.4	64 14.8	95	32	161.8	63 46.2	95	32	162.1	63 17.7	95	31	162.5	62 49.1	95	31	162.8	62 20.4	96	30	163.1	61 51.7	96	29	163.4	61 23.0	96	29	163.7	8
9	64 23.5	94	36	159.3	63 55.4	94	36	159.7	63 27.2	94	35	160.1	62 59.0	94	34	160.4	62 30.7	94	34	160.8	62 02.4	95	33	161.2	61 34.0	95	33	161.5	61 05.6	95	32	161.8	9
10	64 01.7	92	40	157.2	63 34.0	92	39	157.6	63 06.2	93	38	158.0	62 38.4	93	38	158.4	62 10.5	93	37	158.8	61 42.5	93	36	159.2	61 14.5	94	36	159.6	60 46.4	94	35	160.0	10
1	63 38.0	91	43	155.2	63 10.7	91	42	155.6	62 43.3	91	41	156.1	62 15.9	92	40	156.5	61 48.4	92	40	156.9	61 20.8	92	39	157.3	60 53.1	92	38	157.7	60 25.4	93	38	158.1	1
2	63 12.4	89	46	153.2	62 45.6	90	45	153.7	62 18.6	90	44	154.2	61 51.6	90	43	154.6	61 24.5	91	43	155.1	60 57.3	91	42	155.5	60 30.0	91	41	155.9	60 02.7	91	41	156.3	2
3	62 45.0	88	48	151.3	62 18.7	88	48	151.8	61 52.2	88	47	152.3	61 25.6	89	46	152.8	60 58.9	89	45	153.3	60 32.1	89	45	153.7	60 05.3	90	44	154.2	59 38.3	90	43	154.6	3
4	62 16.0	86	51	149.4	61 50.1	87	50	150.0	61 24.1	87	49	150.5	60 58.0	87	49	151.0	60 31.7	88	48	151.5	60 05.4	88	47	152.0	59 38.9	88	46	152.5	59 12.4	89	46	152.9	4
15	61 45.4	84	54	147.7	61 20.0	85	53	148.2	60 54.4	85	52	148.8	60 28.8	86	51	149.3	60 03.0	86	50	149.8	59 37.0	87	50	150.3	59 11.0	87	49	150.8	58 44.9	87	48	151.3	15
6	61 13.2	83	56	145.9	60 48.3	83	55	146.5	60 23.3	84	54	147.1	59 58.0	84	54	147.6	59 32.7	85	53	148.2	59 07.2	85	52	148.7	58 41.6	85	51	149.2	58 15.9	86	51	149.7	6
7	60 39.7	81	58	144.3	60 15.2	82	57	144.9	59 50.7	82	57	145.5	59 25.9	83	56	146.0	59 01.0	83	55	146.6	58 36.0	84	54	147.1	58 10.9	84	53	147.6	57 45.6	84	53	148.1	7
8	60 04.8	80	60	142.7	59 40.8	80	60	143.3	59 16.7	81	59	143.9	58 52.4	81	58	144.5	58 28.0	82	57	145.0	58 03.5	82	56	145.6	57 38.8	83	56	146.1	57 14.0	83	55	146.6	8
9	59 28.6	78	62	141.2	59 05.1	78	62	141.8	58 41.5	79	61	142.4	58 17.7	80	60	143.0	57 53.8	80	59	143.5	57 29.7	81	58	144.1	57 05.4	81	58	144.6	56 41.1	81	57	145.2	9
20	58 51.2	76	64	139.7	58 28.2	77	63	140.3	58 05.1	77	63	140.9	57 41.8	78	62	141.5	57 18.3	79	61	142.1	56 54.7	79	60	142.7	56 30.9	80	60	143.2	56 07.0	80	59	143.8	20
1	58 12.7	75	66	138.3	57 50.2	75	65	138.9	57 27.5	76	64	139.5	57 04.7	76	64	140.1	56 41.7	77	63	140.7	56 18.5	78	62	141.3	55 55.2	78	61	141.8	55 31.7	79	61	142.4	1
2	57 33.1	73	68	136.9	57 11.1	74	67	137.6	56 48.9	74	66	138.2	56 26.5	75	65	138.8	56 04.0	75	65	139.4	55 41.3	76	64	140.0	55 18.4	77	63	140.5	54 55.4	77	62	141.1	2
3	56 52.5	71	69	135.6	56 31.0	72	68	136.3	56 09.3	73	68	136.9	55 47.4	73	67	137.5	55 25.3	74	66	138.1	55 03.0	74	65	138.7	54 40.6	75	65	139.3	54 18.0	76	64	139.8	3
4	56 11.0	70	71	134.4	55 50.0	71	70	135.0	55 28.7	71	69	135.6	55 07.2	72	68	136.2	54 45.6	72	68	136.8	54 23.8	73	67	137.4	54 01.8	74	66	138.0	53 39.6	74	65	138.6	4
25	55 28.6	68	72	133.2	55 08.0	69	71	133.8	54 47.2	70	71	134.4	54 26.2	70	70	135.0	54 05.0	71	69	135.6	53 43.6	72	68	136.2	53 22.1	72	68	136.8	53 00.4	73	67	137.4	25
6	54 45.4	67	73	132.0	54 25.3	68	73	132.6	54 04.9	68	72	133.3	53 44.3	69	71	133.9	53 23.6	69	70	134.5	53 02.6	70	70	135.1	52 41.5	71	69	135.7	52 20.2	71	68	136.3	6
7	54 01.4	65	75	130.9	53 41.7	66	74	131.5	53 21.8	67	73	132.2	53 01.6	67	72	132.8	52 41.3	68	72	133.4	52 20.8	69	71	134.0	52 00.1	69	70	134.6	51 39.2	70	70	135.2	7
8	53 16.7	64	76	129.8	52 57.4	65	75	130.5	52 37.9	65	74	131.1	52 18.2	66	74	131.7	51 58.3	67	73	132.3	51 38.2	67	72	132.9	51 17.9	68	72	133.5	50 57.5	68	71	134.1	8
9	52 31.3	63	77	128.8	52 12.4	63	76	129.4	51 53.3	64	75	130.1	51 34.0	65	75	130.7	51 14.5	65	74	131.3	50 54.8	66	73	131.9	50 35.0	67	73	132.5	50 14.9	67	72	133.1	9
30	51 45.3	61	78	127.8	51 26.8	62	77	128.4	51 08.1	63	76	129.1	50 49.2	63	76	129.7	50 30.1	64	75	130.3	50 10.8	65	74	130.9	49 51.4	65	74	131.5	49 31.7	66	73	132.1	30
1	50 58.6	60	79	126.9	50 40.5	61	78	127.5	50 22.2	61	77	128.1	50 03.7	62	77	128.7	49 45.0	63	76	129.3	49 26.1	63	76	129.9	49 07.1	64	75	130.5	48 47.8	64	74	131.1	1
2	50 11.3	59	80	125.9	49 53.6	59	79	126.6	49 35.7	60	78	127.2	49 17.6	61	78	127.8	48 59.3	61	77	128.4	48 40.8	62	76	129.0	48 22.1	63	76	129.6	48 03.3	63	75	130.2	2
3	49 23.6	57	80	125.1	49 06.2	58	80	125.7	48 48.7	59	79	126.3	48 31.0	59	79	126.9	48 13.0	60	78	127.5	47 54.9	61	77	128.1	47 36.6	61	77	128.7	47 18.2	62	76	129.3	3
4	48 35.3	56	81	124.2	48 18.3	57	81	124.8	48 01.1	58	80	125.5	47 43.8	58	80	126.1	47 26.2	59	79	126.7	47 08.5	59	78	127.3	46 50.6	60	78	127.8	46 32.5	61	77	128.4	4
35	47 46.5	55	82	123.4	47 29.9	56	81	124.0	47 13.1	56	81	124.6	46 56.1	57	80	125.2	46 38.9	58	80	125.8	46 21.5	58	79	126.4	46 04.0	59	78	127.0	45 46.2	59	78	127.6	35
6	46 57.3	54	83	122.6	46 41.0	55	82	123.2	46 24.6	55	82	123.8	46 07.9	56	81	124.4	45 51.1	56	80	125.0	45 34.0	57	80	125.6	45 16.8	58	79	126.2	44 59.5	58	79	126.8	6
7	46 07.7	53	83	121.9	45 51.7	53	83	122.5	45 35.6	54	82	123.1	45 19.3	55	82	123.7	45 02.8	55	81	124.3	44 46.1	56	81	124.8	44 29.2	56	80	125.4	44 12.2	57	80	126.0	7
8	45 17.6	52	84	121.1	45 02.0	52	84	121.7	44 46.2	53	83	122.3	44 30.2	54	82	122.9	44 14.1	54	82	123.5	43 57.7	55	81	124.1	43 41.2	55	81	124.7	43 24.5	56	80	125.2	8
9	44 27.2	51	85	120.4	44 11.9	51	84	121.0	43 56.4	52	84	121.6	43 40.8	52	83	122.2	43 24.9	53	83	122.8	43 08.9	54	82	123.4	42 52.7	54	81	123.9	42 36.4	55	81	124.5	9
40	43 36.4	50	85	119.7	43 21.4	50	85	120.3	43 06.3	51	84	120.9	42 50.9	51	84	121.5	42 35.4	52	83	122.1	42 19.7	53	83	122.7	42 03.8	53	82	123.2	41 47.8	54	82	123.8	40
1	42 45.3	49	86	119.1	42 30.6	49	85	119.7	42 15.7	50	85	120.3	42 00.7	50	84	120.8	41 45.5	51	84	121.4	41 30.1	52	83	122.0	41 14.6	52	83	122.6	40 58.9	53	82	123.1	1
2	41 53.8	48	86	118.4	41 39.4	48	86	119.0	41 24.9	49	85	119.6	41 10.2	49	85	120.2	40 55.2	50	84	120.8	40 40.2	51	84	121.3	40 24.9	51	83	121.9	40 09.5	52	83	122.5	2
3	41 02.1	47	87	117.8	40 48.0	47	86	118.4	40 33.7	48	86	119.0	40 19.3	48	85	119.6	40 04.7	49	85	120.1	39 49.9	50	84	120.7	39 34.9	50	84	121.3	39 19.8	51	83	121.8	3
4	40 10.0	46	87	117.2	39 56.2	46	87	117.8	39 42.2	47	86	118.4	39 28.1	47	86	119.0	39 13.7	48	85	119.5	38 59.3	49	85	120.1	38 44.6	49	84	120.7	38 29.8	50	84	121.2	4
45	39 17.7	45	88	116.7	39 04.2	45	87	117.2	38 50.4	46	87	117.8	38 36.6	47	86	118.4	38 22.5	47	86	118.9	38 08.3	48	85	119.5	37 54.0	48	85	120.1	37 39.4	49	84	120.6	45
6	38 25.1	44	88	116.1	38 11.8	45	88	116.7	37 58.4	45	87	117.2	37 44.8	46	87	117.8	37 31.0	46	86	118.4	37 17.1	47	86	118.9	37 03.0	47	85	119.5	36 48.8	48	85	120.0	6
7	37 32.3	43	88	115.6	37 19.3	44	88	116.1	37 06.1	44	88	116.7	36 52.7	45	87	117.2	36 39.2	45	87	117.8	36 25.6	46	86	118.4	36 11.8	46	86	118.9	35 57.8	47	85	119.5	7
8	36 39.2	42	89	115.0	36 26.5	43	88	115.6	36 13.5	43	88	116.2	36 00.4	44	88	116.7	35 47.2	44	87	117.3	35 33.8	45	87	117.8	35 20.3	45	86	118.4	35 06.6	46	86	118.9	8
9	35 45.9	42	89	114.5	35 33.4	42	89	115.1	35 20.7	43	88	115.6	35 07.9	43	88	116.2	34 54.9	44	88	116.7	34 41.8	44	87	117.3	34 28.5	45	87	117.8	34 15.1	45	86	118.4	9
50	34 52.4	41	90	114.0	34 40.2	41	89	114.6	34 27.7	42	89	115.1	34 15.1	42	88	115.7	34 02.4	43	88	116.2	33 49.5	43	88	116.8	33 36.5	44	87	117.3	33 23.3	44	87	117.9	50
1	33 58.7	40	90	113.6	33 46.7	40	89	114.1	33 34.5	41	89	114.7	33 22.1	41	89	115.2	33 09.6	42	88	115.7	32 57.0	42	88	116.3	32 44.2	43	87	116.8	32 31.3	43	87	117.4	1
2	33 04.8	39	90	113.1	32 53.0	40	90	113.6	32 41.0	40	89	114.2	32 28.9	41	89	114.7	32 16.7	41	89	115.3	32 04.3	42	88	115.8	31 51.7	42	88	116.3	31 39.1	42	87	116.9	2
3	32 10.8	38	90	112.6	31 59.2	39	90	113.2	31 47.4	39	90	113.7	31 35.5	40	89	114.3	31 23.5	40	89	114.8	31 11.3	41	89	115.3	30 59.0	41	88	115.9	30 46.6	42	88	116.4	3
4	31 16.5	38	91	112.2	31 05.1	38	90	112.7	30 53.6	39	90	113.3	30 41.9	39	90	113.8	30 30.1	40	89	114.3	30 18.2	40	89	114.9	30 06.1	40	89	115.4	29 53.9	41	88	115.9	4
55	30 22.1	37	91	111.8	30 10.9	38	91	112.3	29 59.6	38	90	112.8	29 48.1	38	90	113.4	29 36.5	39	90	113.9	29 24.8	39	89	114.4	29 13.0	40	89	115.0	29 01.0	40	88	115.5	55
6	29 27.5	36	91	111.4	29 16.5	37	91	111.9	29 05.4	37	91	112.4	28 54.2	38	90	113.0	28 42.8	38	90	113.5	28 31.3	38	90	114.0	28 19.7	39	89	114.5	28 08.0	39	89	115.1	6
7	28 32.8	36	91	111.0	28 22.0	36	91	111.5	28 11.1	37	91	112.0	28 00.0	37	90	112.5	27 48.9	37	90	113.1	27 37.6	38	90	113.6	27 26.2	38	89	114.1	27 14.7	39	89	114.6	7
8	27 37.9	35	92	110.6	27 27.3	36	91	111.1	27 16.6	36	91	111.6	27 05.8	36	91	112.1	26 54.8	37	90	112.7	26 43.7	37	90	113.2	26 32.6	37	90	113.7	26 21.3	38	89	114.2	8
9	26 42.9	34	92	110.2	26 32.5	35	92	110.7	26 22.0	35	91	111.2	26 11.3	36	91	111.7	26 00.6	36	91	112.3	25 49.7	36	90	112.8	25 38.7	37	90	113.3	25 27.7	37	90	113.8	9
60	25 47.7	34	92	109.8	25 37.5	34	92	110.3	25 27.2	35	92	110.8	25 16.7	35	91	111.4	25 06.2	35	91	111.9	24 55.5	36	91	112.4	24 44.8	36	90	112.9	24 33.9	36	90	113.4	60
1	24 52.4	33	92	109.4	24 42.4	34	92	110.0	24 32.3	34	92	110.5	24 22.0	34	91	111.0	24 11.7	35	91	111.5	24 01.2	35	91	112.0	23 50.6	35	90	112.5	23 40.0	36	90	113.0	1
2	23 57.0	33	93	109.1	23 47.2	33	92	109.6	23 37.2	33	92	110.1	23 27.1	34	92	110.6	23 17.0	34	91	111.1	23 06.7	34	91	111.7	22 56.4	35	91	112.2	22 45.9	35	90	112.7	2
3	23 01.5	32	93	108.7	22 51.8	32	92	109.3	22 42.0	33	92	109.8	22 32.2	33	92	110.3	22 22.2	33	92	110.8	22 12.1	34	91	111.3	22 01.9	34	91	111.8	21 51.7	34	91	112.3	3
4	22 05.9	32	93	108.4	21 56.4	32	93	108.9	21 46.8	32	92	109.4	21 37.0	33	92	109.9	21 27.2	33	92	110.4	21 17.4	33	91	110.9	21 07.4	33	91	111.5	20 57.3	34	91	112.0	4
65	21 10.1	31	93	108.1	21 00.8	31	93	108.6	20 51.4	32	93	109.1	20 41.8	32	92	109.6	20 32.2	32	92	110.1	20 22.5	33	92	110.6	20 12.7	33	91	111.1	20 02.8	33	91	111.6	65
6	20 14.3	30	93	107.8	20 05.1	31	93	108.3	19 55.8	31	93	108.8	19 46.5	31	92	109.3	19 37.0	32	92	109.8	19 27.5	32	92	110.3	19 17.9	32	92	110.8	19 08.2	32	91	111.3	6
7	19 18.4	30	93	107.4	19 09.3	30	93	107.9	19 00.2	31	93	108.4	18 51.0	31	93	109.0	18 41.7	31	92	109.5	18 32.4	31	92	110.0	18 22.9	32	92	110.5	18 13.4	32	91	111.0	7
8	18 22.3	29	94	107.1	18 13.4	30	93	107.6	18 04.5	30	93	108.1	17 55.5	30	93	108.6	17 46.3	30	92	109.1	17 37.2	31	92	109.6	17 27.9	31	92	110.1	17 18.6	31	92	110.6	8
9	17 26.2	29	94	106.8	17 17.5	29	93	107.3	17 08.7	29	93	107.8	16 59.8	30	93	108.3	16 50.9	30	93	108.8	16 41.8	30	92	109.3	16 32.7	30	92	109.8	16 23.6	31	92	110.3	9
70	16 30.0	28	94	106.5	16 21.4	29	94	107.0	16 12.8	29	93	107.5	16 04.0	29	93	108.0	15 55.3	29	93	108.5	15 46.4	30	93	109.0	15 37.5	30	92	109.5	15 28.5	30	92	110.0	70
1	15 33.7	28	94	106.3	15 25.2	28	94	106.7	15 16.7	28	94	107.2	15 08.2	29	93	107.7	14 59.6	29	93	108.2	14 50.9	29	93	108.7	14 42.1	29	92	109.2	14 33.3	29	92	109.7	1
2	14 37.3	28	94	106.0	14 29.0	28	94	106.5	14 20.7	28	94	107.0	14 12.2	28	93	107.5	14 03.8	28	93	108.0	13 55.2	29	93	108.4	13 46.7	29	93	108.9	13 38.0	29	92	109.4	2
3	13 40.8	27	94	105.7	13 32.7	27	94	106.2	13 24.5	27	94	106.7	13 16.2	28	94	107.2	13 07.9	28	93	107.7	12 59.5	28	93	108.2	12 51.1	28	93	108.7	12 42.6	28	92	109.1	3
4	12 44.3	27	94	105.4	12 36.3	27	94	105.9	12 28.2	27	94	106.4	12 20.1	27	94	106.9	12 11.9	27	93	107.4	12 03.7	27	93	107.9	11 55.4	28	93	108.4	11 47.1	28	93	108.9	4
75	11 47.7	26	94	105.2	11 39.8	26	94	105.7	11 31.9	26	94	106.1	11 23.9	27	94	106.6	11 15.9	27	94	107.1	11 07.8	27	93	107.6	10 59.7	27	93	108.1	10 51.5	27	93	108.6	75
6	10 51.0	26	95	104.9	10 43.3	26	94	105.4	10 35.5	26	94	105.9	10 27.6	26	94	106.4	10 19.8	26	94	106.9	10 11.8	26	93	107.4	10 03.9	27	93	107.8	9 55.9	27	93	108.3	6
7	9 54.2	25	95	104.6	9 46.6	25	94	105.1	9 39.0	26	94	105.6	9 31.3	26	94	106.1	9 23.6	26	94	106.6	9 15.8	26	94	107.1	9 08.0	26	93	107.6	9 00.1	26	93	108.1	7
8	8 57.4	25	95	104.4	8 50.0	25	95	104.9	8 42.4	25	94	105.4	8 34.9	25	94	105.9	8 27.3	25	94	106.4	8 19.7	25	94	106.8	8 12.0	26	93	107.3	8 04.3	26	93	107.8	8
9	8 00.6	24	95	104.2	7 53.2	25	95	104.6	7 45.8	25	94	105.1	7 38.4	25	94	105.6	7 30.9	25	94	106.1	7 23.5	25	94	106.6	7 15.9	25	94	107.1	7 08.4	25	93	107.6	9
80	7 03.6	24	95	103.9	6 56.4	24	95	104.4	6 49.1	24	95	104.9	6 41.8	24	94	105.4	6 34.5	24	94	105.9	6 27.2	25	94	106.4	6 19.8	25	94	106.8	6 12.4	25	93	107.3	80
1	6 06.6	24	95	103.7	5 59.5	24	95	104.2	5 52.4	24	95	104.7	5 45.2	24	94	105.1	5 38.0	24	94	105.6	5 30.8	24	94	106.1	5 23.6	24	94	106.6	5 16.3	24	94	107.1	1
2	5 09.6	23	95	103.5	5 02.6	23	95	103.9																									2

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	86 00.0	1.0 12	00.0	85 30.0	1.0 10	00.0	85 00.0	1.0 09	00.0	84 30.0	1.0 08	00.0	84 00.0	1.0 08	00.0	83 30.0	1.0 07	00.0	83 00.0	1.0 07	00.0	82 30.0	1.0 06	00.0	00
1	85 53.0	97 33	13.5	85 23.8	98 30	12.0	84 54.4	98 27	10.8	84 24.9	98 25	09.8	83 55.4	99 23	09.0	83 25.7	99 21	08.3	82 56.0	99 19	07.7	82 26.3	99 18	07.2	1
2	85 33.3	90 50	25.6	85 06.0	92 46	23.1	84 38.3	93 42	20.9	84 10.2	94 39	19.1	83 41.8	95 36	17.6	83 13.2	96 33	16.3	82 44.4	96 31	15.1	82 15.4	97 29	14.1	2
3	85 03.2	80 63	35.7	84 38.6	84 58	32.5	84 13.1	86 54	29.8	83 46.9	88 51	27.4	83 20.3	90 47	25.4	82 53.1	91 44	23.6	82 25.6	92 42	22.1	81 57.9	93 39	20.7	3
4	84 25.6	71 71	43.7	84 03.7	75 67	40.3	83 40.6	78 63	37.3	83 16.6	81 60	34.6	82 51.9	84 57	32.3	82 26.5	85 53	30.2	82 00.6	87 51	28.3	81 34.3	89 48	26.7	4
05	83 42.8	63 78	49.9	83 23.3	67 74	46.5	83 02.5	71 70	43.5	82 40.7	74 67	40.7	82 18.0	77 64	38.2	81 54.4	80 61	36.0	81 30.3	82 58	33.9	81 05.5	83 55	32.0	05
6	82 56.3	56 82	54.8	82 38.9	60 79	51.6	82 20.2	64 76	48.6	82 00.4	68 73	45.8	81 39.6	71 70	43.3	81 17.9	74 67	40.9	80 55.4	76 64	38.8	80 32.3	78 62	36.8	6
7	82 07.2	49 85	58.7	81 51.6	54 82	55.6	81 34.8	58 80	52.7	81 16.8	62 77	50.1	80 57.8	65 74	47.6	80 37.8	68 72	45.2	80 17.0	71 69	43.1	79 55.4	73 67	41.0	7
8	81 16.2	44 87	61.8	81 02.2	49 85	58.9	80 47.0	53 83	56.2	80 30.7	56 80	53.6	80 13.2	60 78	51.2	79 54.8	63 76	48.9	79 35.5	66 73	46.8	79 15.4	68 71	44.7	8
9	80 23.8	40 89	64.3	80 11.2	44 87	61.7	79 57.4	48 85	59.1	79 42.5	52 83	56.6	79 26.5	55 81	54.3	79 09.5	58 79	52.1	78 51.6	61 76	50.0	78 32.9	64 74	48.0	9
10	79 30.5	36 90	66.4	79 19.0	40 89	63.9	79 06.5	44 87	61.5	78 52.8	47 85	59.2	78 38.0	51 83	56.9	78 22.4	54 81	54.8	78 05.8	57 79	52.7	77 48.3	59 77	50.8	10
1	78 36.3	33 91	68.2	78 25.9	37 90	65.8	78 14.4	40 88	63.5	78 01.8	44 87	61.3	77 48.2	47 85	59.2	77 33.7	50 83	57.2	77 18.3	53 81	55.2	77 02.1	56 80	53.3	1
2	77 41.5	30 92	69.7	77 32.0	34 91	67.4	77 21.4	37 89	65.3	77 09.8	40 88	63.2	76 57.3	43 86	61.2	76 43.8	46 85	59.2	76 29.5	49 83	57.3	76 14.3	52 82	55.5	2
3	76 46.3	27 93	70.9	76 37.5	31 92	68.8	76 27.8	34 90	66.8	76 17.1	37 89	64.8	76 05.5	40 88	62.9	75 53.0	43 86	61.0	75 39.6	46 85	59.2	75 25.4	49 83	57.4	3
4	75 50.7	25 93	72.0	75 42.6	28 92	70.0	75 33.6	32 91	68.1	75 23.7	35 90	66.2	75 12.9	37 89	64.4	75 01.2	40 87	62.6	74 48.8	43 86	60.8	74 35.5	45 85	59.1	4
15	74 54.7	23 94	72.9	74 47.3	26 93	71.0	74 38.9	29 92	69.2	74 29.7	32 91	67.4	74 19.7	35 90	65.7	74 08.8	38 88	64.0	73 57.1	40 87	62.3	73 44.7	43 86	60.6	15
6	73 58.5	21 94	73.7	73 51.6	24 93	71.9	73 43.9	27 92	70.2	73 35.3	30 91	68.5	73 26.0	33 90	66.8	73 15.8	35 89	65.2	73 04.9	38 88	63.6	72 53.2	40 87	62.0	6
7	73 02.1	20 94	74.4	72 55.7	23 94	72.7	72 48.5	25 93	71.1	72 40.5	28 92	69.5	72 31.8	30 91	67.9	72 22.3	33 90	66.3	72 12.1	35 89	64.7	72 01.1	38 88	63.2	7
8	72 05.4	18 95	75.0	71 59.5	21 94	73.4	71 52.9	24 93	71.8	71 45.4	26 92	70.3	71 37.3	28 91	68.8	71 28.4	31 90	67.3	71 18.8	33 90	65.8	71 08.5	35 89	64.3	8
9	71 08.7	17 95	75.6	71 03.2	20 94	74.0	70 57.0	22 93	72.5	70 50.0	24 93	71.0	70 42.4	27 92	69.6	70 34.1	29 91	68.1	70 25.0	31 90	66.7	70 15.4	33 89	65.3	9
20	70 11.8	16 95	76.0	70 06.7	18 94	74.6	70 00.9	20 94	73.1	69 54.4	23 93	71.7	69 47.3	25 92	70.3	69 39.4	27 92	68.9	69 31.0	29 91	67.5	69 21.8	31 90	66.2	20
1	69 14.8	15 95	76.4	69 10.1	17 95	75.1	69 04.7	19 94	73.7	68 58.6	21 93	72.3	68 51.9	23 93	71.0	68 44.6	26 92	69.6	68 36.6	28 91	68.3	68 28.0	30 90	67.0	1
2	68 17.7	14 95	76.8	68 13.3	16 96	75.5	68 08.3	18 94	74.2	68 02.6	20 94	72.8	67 56.3	22 93	71.5	67 49.4	24 92	70.2	67 41.9	26 92	69.0	67 33.8	28 91	67.7	2
3	67 20.5	13 95	77.2	67 16.4	15 95	75.9	67 11.7	17 94	74.6	67 06.5	19 94	73.3	67 00.6	21 93	72.1	66 54.1	23 93	70.8	66 47.0	24 92	69.6	66 39.4	26 91	68.4	3
4	66 23.2	12 96	77.4	66 19.5	14 95	76.2	66 15.1	16 95	75.0	66 10.2	17 94	73.8	66 04.7	19 93	72.5	65 58.6	21 93	71.3	65 51.9	23 92	70.1	65 44.7	25 91	69.0	4
25	65 25.9	11 96	77.7	65 22.4	13 96	76.5	65 18.4	14 95	75.3	65 13.8	16 94	74.2	65 08.6	18 94	73.0	65 02.9	20 93	71.8	64 56.6	22 92	70.7	64 49.9	23 92	69.5	25
6	64 28.6	10 96	77.9	64 25.3	12 95	76.8	64 21.6	13 95	75.6	64 17.3	15 94	74.5	64 12.4	17 94	73.4	64 07.1	19 93	72.2	64 01.2	20 93	71.1	63 54.8	22 92	70.0	6
7	63 31.1	09 96	78.2	63 28.2	11 95	77.0	63 24.7	13 95	75.9	63 20.7	14 94	74.8	63 16.1	16 94	73.7	63 11.1	18 93	72.6	63 05.6	19 93	71.5	62 59.6	21 92	70.5	7
8	62 33.7	08 96	78.3	62 30.9	10 95	77.3	62 27.7	12 95	76.2	62 24.0	13 95	75.1	62 19.8	15 94	74.0	62 15.0	17 94	73.0	62 09.9	18 93	71.9	62 04.2	20 93	70.9	8
9	61 36.2	08 96	78.5	61 33.7	09 96	77.5	61 30.7	11 95	76.4	61 27.2	12 95	75.4	61 23.3	14 94	74.3	61 18.9	15 94	73.3	61 14.0	17 93	72.3	61 08.7	19 93	71.3	9
30	60 38.7	07 96	78.6	60 36.4	08 96	77.6	60 33.6	10 95	76.6	60 30.4	11 95	75.6	60 26.7	13 94	74.6	60 22.6	14 94	73.6	60 18.0	16 93	72.6	60 13.0	17 93	71.6	30
1	59 41.1	06 96	78.8	59 39.0	08 96	77.8	59 36.5	09 95	76.8	59 33.5	11 95	75.8	59 30.1	12 94	74.8	59 26.3	14 94	73.9	59 22.0	15 94	72.9	59 17.3	16 93	71.9	1
2	58 43.5	06 96	78.9	58 41.7	07 96	77.9	58 39.3	08 95	77.0	58 36.6	10 95	76.0	58 33.5	11 95	75.0	58 29.9	13 94	74.1	58 25.9	14 94	73.2	58 21.5	15 93	72.2	2
3	57 45.9	05 96	79.0	57 44.3	06 96	78.0	57 42.2	08 95	77.1	57 39.6	09 95	76.2	57 36.7	10 95	75.2	57 33.4	12 94	74.3	57 29.7	13 94	73.4	57 25.5	14 93	72.5	3
4	56 48.3	04 96	79.1	56 46.8	06 96	78.1	56 44.9	07 95	77.2	56 42.6	08 95	76.3	56 40.0	10 95	75.4	56 36.9	11 94	74.5	56 33.4	12 94	73.6	56 29.5	14 93	72.7	4
35	55 50.7	04 96	79.1	55 49.4	05 96	78.2	55 47.7	06 95	77.3	55 45.6	08 95	76.5	55 43.1	09 95	75.6	55 40.3	10 94	74.7	55 37.1	11 94	73.8	55 33.5	13 94	72.9	35
6	54 53.1	03 96	79.2	54 51.9	04 96	78.3	54 50.4	06 96	77.5	54 48.5	07 95	76.6	54 46.3	08 95	75.7	54 43.7	09 94	74.9	54 40.7	11 94	74.0	54 37.3	12 94	73.1	6
7	53 55.4	03 96	79.2	53 54.4	04 96	78.4	53 53.1	05 96	77.5	53 51.4	06 95	76.7	53 49.4	07 95	75.8	53 47.0	09 94	75.0	53 44.2	10 94	74.2	53 41.1	11 94	73.3	7
8	52 57.7	02 96	79.3	52 56.9	03 96	78.4	52 55.8	04 96	77.6	52 54.3	06 95	76.8	52 52.5	07 95	76.0	52 50.3	08 95	75.1	52 47.8	09 94	74.3	52 44.9	10 94	73.5	8
9	52 00.1	02 96	79.3	51 59.4	03 96	78.5	51 58.5	04 96	77.7	51 57.2	05 95	76.9	51 55.5	06 95	76.1	51 53.5	07 95	75.2	51 51.2	08 94	74.4	51 48.6	09 94	73.6	9
40	51 02.4	01 96	79.3	51 01.9	02 96	78.5	51 01.1	03 96	77.7	51 00.0	04 95	76.9	50 58.5	05 95	76.1	50 56.8	06 95	75.4	50 54.7	08 94	74.6	50 52.3	09 94	73.8	40
1	50 04.7	01 96	79.3	50 04.4	02 96	78.6	50 03.8	03 96	77.8	50 02.8	04 95	77.0	50 01.6	05 95	76.2	50 00.0	06 95	75.4	49 58.1	07 94	74.7	49 55.9	08 94	73.9	1
2	49 07.1	00 96	79.3	49 06.9	01 96	78.6	49 06.4	02 96	77.8	49 05.6	03 95	77.0	49 04.5	04 95	76.3	49 03.2	05 95	75.5	49 01.5	06 94	74.8	48 59.5	07 94	74.0	2
3	48 09.4	00 96	79.3	48 09.4	01 96	78.6	48 09.0	02 96	77.8	48 08.4	03 95	77.1	48 07.5	03 95	76.3	48 06.3	04 95	75.6	48 04.8	05 94	74.8	48 03.1	06 94	74.1	3
4	47 11.7	01 96	79.3	47 11.8	00 96	78.6	47 11.7	01 96	77.9	47 11.2	02 95	77.1	47 10.5	03 95	76.4	47 09.5	04 95	75.6	47 08.2	05 94	74.9	47 06.6	06 94	74.2	4
45	46 14.0	01 96	79.3	46 14.3	00 96	78.6	46 14.3	00 96	77.9	46 14.0	01 95	77.1	46 13.4	02 95	76.4	46 12.6	03 95	75.7	46 11.5	04 94	75.0	46 10.1	05 94	74.3	45
6	45 16.4	02 96	79.3	45 16.8	01 96	78.6	45 16.9	00 96	77.9	45 16.8	01 95	77.2	45 16.4	02 96	76.4	45 15.7	03 95	75.7	45 14.8	03 94	75.0	45 13.6	04 94	74.3	6
7	44 18.7	02 96	79.3	44 19.2	01 96	78.6	44 19.5	01 96	77.9	44 19.6	00 95	77.2	44 19.3	01 95	76.5	44 18.9	02 96	75.8	44 18.1	03 95	75.1	44 17.1	04 94	74.4	7
8	43 21.0	03 96	79.2	43 21.7	02 96	78.5	43 22.2	01 96	77.9	43 22.3	00 95	77.2	43 22.3	01 95	76.5	43 22.0	01 95	75.8	43 21.4	02 95	75.1	43 20.6	03 94	74.4	8
9	42 23.4	03 96	79.2	42 24.2	02 96	78.5	42 24.8	02 96	77.8	42 25.1	01 95	77.2	42 25.2	00 95	76.5	42 25.1	01 95	75.8	42 24.7	02 95	75.1	42 24.1	02 94	74.5	9
50	41 25.7	04 96	79.1	41 26.7	03 96	78.5	41 27.4	02 96	77.8	41 27.9	01 95	77.1	41 28.1	00 95	76.5	41 28.2	00 95	75.8	41 28.0	01 95	75.1	41 27.5	02 94	74.5	50
1	40 28.1	04 96	79.1	40 29.2	03 96	78.4	40 30.0	02 96	77.8	40 30.7	02 95	77.1	40 31.1	01 95	76.5	40 31.3	00 95	75.8	40 31.2	01 95	75.2	40 31.0	01 94	74.5	1
2	39 30.5	04 96	79.0	39 31.7	04 96	78.4	39 32.7	03 96	77.8	39 33.5	02 95	77.1	39 34.0	02 95	76.5	39 34.4	01 95	75.8	39 34.5	00 95	75.2	39 34.4	01 94	74.5	2
3	38 32.9	05 96	79.0	38 34.2	04 96	78.4	38 35.3	03 96	77.7	38 36.3	03 95	77.1	38 37.0	02 95	76.4	38 37.5	01 96	75.8	38 37.8	01 95	75.2	38 37.9	00 94	74.5	3
4	37 35.3	05 96	78.9	37 36.7	05 96	78.3	37 38.0	04 96	77.7	37 39.1	03 95	77.0	37 39.9	03 95	76.4	37 40.6	02 95	75.8	37 41.0	01 96	75.1	37 41.3	01 94	74.5	4
55	36 37.7	06 96	78.9	36 39.3	05 96	78.2	36 40.7	04 96	77.6	36 41.9	04 95	77.0	36 42.9	03 95	76.4	36 43.7	02 95	75.8	36 44.3	02 95	75.1	36 44.7	01 94	74.5	55
6	35 40.1	06 96	78.8	35 41.8	05 96	78.2	35 43.4	05 96	77.6	35 44.7	04 95	77.0	35 45.9	04 95	76.3	35 46.8	03 95	75.7	35 47.6	02 95	75.1	35 48.2	02 94	74.5	6
7	34 42.5	06 96	78.7	34 44.4	06 96	78.1	34 46.0	05 96	77.5	34 47.5	05 95	76.9	34 48.8	04 95	76.3	34 49.9	03 95	75.7	34 50.9	03 94	75.1	34 51.6	02 94	74.5	7
8	33 45.0	07 96	78.6	33 47.0	06 96	78.0	33 48.8	06 95	77.4	33 50.4	05 95	76.8	33 51.8	05 95	76.2	33 53.1	04 95	75.6	33 54.2	03 94	75.0	33 55.1	03 94	74.4	8
9	32 47.5	07 96	78.6	32 49.6	07 96	78.0	32 51.5	06 95	77.4	32 53.2	06 95	76.8	32 54.8	05 95	76.2	32 56.2	04 95	75.6	32 57.5	04 94	75.0	32 58.6	03 94	74.4	9
60	31 49.9	08 96	78.5	31 52.2	07 96	77.9	31 54.2	07 95	77.3	31 56.1	06 95	76.7	31 57.8	05 95	76.1	31 59.4	05 95	75.5	32 00.8	04 94	75.0	32 02.0	04 94	74.4	60
1	30 52.4	08 96	78.4	30 54.8	08 96	77.8	30 57.0	07 95	77.2	30 59.0	06 95	76.6	31 00.9	06 95	76.1	31 02.6	05 95	75.5	31 04.1	05 94	74.9	31 05.5	04 94	74.3	1
2	29 55.0	08 96	78.3	29 57.4	08 96	77.7	29 59.7	07 95	77.1	30 01.9	07 95	76.6	30 03.9	06 95	76.0	30 05.8	06 95	75.4	30 07.5	05 94	74.8	30 09.0	05 94	74.3	2
3	28 57.5	09 96	78.2	29 00.1	08 96	77.6	29 02.5	08 95	77.1	29 04.8	07 95	76.5	29 07.0	07 95	75.9	29 09.0	06 95	75.4	29 10.8	06 94	74.8	29 12.6	06 94	74.2	3
4	28 00.1	09 96	78.1	28 02.8	09 95	77.5	28 05.3	08 95	77.0	28 07.8	08 95	76.4	28 10.1	07 95	75.8	28 12.2	07 95	75.3	28 14.2	06 94	74.7	28 16.1	06 94	74.1	4
65	27 02.7	10 96	78.0	27 05.5	09 95	77.4	27 08.2	09 95	76.9	27 10.7	08 95	76.3	27 13.2	08 95	75.8	27 15.5	07 95	75.2	27 17.6	07 94	74.6	27 19.6	07 94	74.1	65
6	26 05.3	10 96	77.9	26 08.2	10 95	77.3	26 11.0	09 95	76.8	26 13.7	09 95	76.2	26 16.3	08 95	75.7	26 18.7	08 95	75.1	26 21.0	07 94	74.6	26 23.2	07 94	74.0	6
7	25 07.9	10 96	77.8	25 11.0	10 95	77.2	25 13.9	10 95	76.7	25 16.7	09 95	76.1	25 19.4	09 95	75.6	25 22.0	08 94	75.0	25 24.5	08 94	74.5	25 26.8	08 94	73.9	7
8	24 10.5	11 96	77.7	24 13.7	10 95	77.1	24 16.8	10 95	76.6	24 19.8	10 95	76.0	24 22.6	09 95	75.5	24 25.3	09 94	74.9	24 27.9	08 94	74.4	24 30.4	08 94	73.8	8
9	23 13.2	11 96	77.6	23 16.5	11 95	77.0	23 19.7	10 95	76.5	23 22.8	10 95	75.9	23 25.8	10 95	75.4	23 28.7	09 94	74.8	23 31.4	09 94	74.3	23 34.1	09 94	73.8	9
70	22 15.9	12 95	77.4	22 19.4	11 95	76.9	22 22.7	11 95	76.4	22 25.9	11 95	75.8	22 29.0	10 95	75.3	22 32.0	10 94	74.8	22 34.9	09 94	74.2	22 37.7	09 94	73.7	70
1	21 18.6	12 95	77.3	21 22.2	12 96	76.8	21 25.7	11 95	76.3	21 29.0	11 95	75.7	21 32.3	11 95	75.2	21 35.4	10 94	74.6	21 38.5	10 94	74.1	21 41.4	10 94	73.6	1
2	20 21.4	12 95	77.2	20 25.1	12 96	76.7	20 28.7	12 95	76.1	20 32.2	11 95	75.6	20 35.5	11 94	75.1	20 38.8	11 94	74.5	20 42.0	10 94	74.0	20 45.1	10 94	73.5	2
3	19 24.2	13 95	77.1	19 28.0	13 95	76.5	19 31.7	12 95	76.0	19 35.3	12 95	75.5	19 38.9	12 94	75.0	19 42.3	11 94	74.4	19 45.6	11 94	73.9	19 48.9	11 94	73.4	3
4	18 27.0	13 95	76.9	18 30.9	13 95	76.4	18 34.8	13 95	75.9	18 38.5	12 95	75.4	18 42.2	12 94	74.8	18 45.8	12 94	74.3	18 49.3	11 94	73.8	18 52.7	11 94	73.3	4
75	17 29.9	14 95	76.8	17 33.9	13 95	76.3	17 37.9	13 95	75.8	17 41.8	13 95	75.2	17 45.6	13 94	74.7	17 49.3	12 94	74.2	17 52.9	12 94	73.7	17 56.5	12 94	73.1	75
6	16 32.7	14 95	76.7	16 36.9	14 95	76.1	16 41.0	14 95	75.6	16 45.0	13 94	75.1	16 49.0	13 94	74.6	16 52.8	13 94	74.1	16 56.6	12 94	73.5	17 00.3	12 94	73.0	6
7	15 35.6	14 95	76.5	15 39.9	14 95	76.0	15 44.2	14 95	75.5	15 48.3	14 94	75.0	15 52.4	13 94	74.5	15 56.4	13 94	73.9	16 00.4	13 94	73.4	16 04.2	13 93	72.9	7
8	14 38.6	15 95	76.4	14 43.0	15 95	75.9	14 47.4	14 95	75.3	14 51.7	14 94	74.8	14 55.9	14 94	74.3	15 00.0	14 94	73.8	15 04.1	14 94	73.3	15 08.1	13 93	72.8	8
9	13 41.6	15 96	76.2	13 46.1	15 95	75.7	13 50.6	15 95	75.2	13 55.0	15 94	74.7	13 59.4	14 94	74.2	14 03.7	14 94	73.7	14 07.9	14 94	73.2	14 12.1	14 93	72.6	9
80	12 44.6	16 95	76.1	12 49.3	15 95	75.6	12 53.9	15 94	75.1	12 58.5	15 94	74.5	13 03.0	15 94	74.0	13 07.4	15 94	73.5	13 11.8	15 94	73.0	13 16.1	14 93	72.5	80
1	11 47.7	16 95	75.9	11 52.5	16 95	75.4	11 57.2	16 94	74.9	12 01.9	16 94	74.4	12 06.6	15 94	73.9	12 11.1	15 94	73.4	12 15.7	15 93	72.9	12 20.2	15 93	72.4	1
2	10 50.7	17 95	75.7	10 55.7	16 95	75.2	11 00.6	16 94	74.7	11 05.4	16 94	74.2	11 10.2	16 94	73.7	11 14.9	16 94	73.2	11 19.6	16 93	72.7	11 24.2	15 93	72.2	2
3	9 53.9	17 95	75.6	9 59.0	17 94	75.1	10 04.0	17 94	74.6	10 08.9	17 94	74.1	10 13.9	16 94	73.6	10 18.8	16 94	73.1	10 23.6	16 93	72.6	10 28.4	16 93	72.1	3
4	8 57.1	17 95	75.4	9 02.3	17 94	74.9	9 07.4	17 94	74.4	9 12.5	17 94	73.9	9 17.6	17 94	73.4	9 22.6	17 93	72.9	9 27.6	17 93	72.4	9 32.6	16 93	71.9	4
85	8 00.3	18 95	75.2	8 05.6	18 94	74.7	8 10.9	18 94	74.3	8 16.2	17 94	73.8	8 21.4	17 94	73.3	8 26.6	17 93	72.8	8 31.7	17 93	72.3	8 36.8	17 93	71.8	85
6	7 03.6	18 94	75.1	7 09.0	18 94	74.6	7 14.4	18 94	74.1	7 19.8	18 94	73.6	7 25.2	18 94	73.1	7 30.5	18 93	72.6	7 35.8	18 93	72.1	7 41.1	17 93	71.6	6
7	6 06.9	19 94	74.9	6 12.5	19 94	74.4	6 18.0	18 94	73.9	6 23.6	18 94	73.4	6 29.1	18 93	72.9	6 34.6	18 93	72.4	6 40.0	18 93	71.9	6 45.4	18 93	71.4	7
8	5 10.2	19 94	74.7	5 16.0	19 94	74.2	5 21.7	19 94	73.7	5 27.3	19 94	73.2	5 33.0	19 93	72.7	5 38.6	19 93	72.2	5 44.2	19 93	71.8	5 49.8	19 93	71.3	8

10—6472

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	62 00.0	1.0 02	180.0	61 30.0	1.0 02	180.0	61 00.0	1.0 02	180.0	60 30.0	1.0 02	180.0	60 00.0	1.0 02	180.0	59 30.0	1.0 02	180.0	59 00.0	1.0 02	180.0	58 30.0	1.0 02	180.0	00
1	61 59.0	1.0 05	178.0	61 29.0	1.0 05	178.0	60 59.0	1.0 05	178.0	60 29.0	1.0 05	178.1	59 59.0	1.0 05	178.1	59 29.0	1.0 05	178.1	58 59.1	1.0 05	178.2	58 29.1	1.0 05	178.2	1
2	61 55.8	1.0 09	175.9	61 25.9	1.0 09	176.0	60 56.0	1.0 08	176.1	60 26.0	1.0 08	176.1	59 56.1	1.0 08	176.2	59 26.2	1.0 08	176.3	58 56.2	1.0 08	176.3	58 26.3	1.0 08	176.4	2
3	61 50.6	99 12	173.9	61 20.8	99 12	174.0	60 50.9	99 12	174.1	60 21.1	99 12	174.2	59 51.3	99 11	174.3	59 21.4	99 11	174.4	58 51.6	1.0 11	174.5	58 21.7	1.0 11	174.6	3
4	61 43.3	99 16	171.9	61 13.6	99 15	172.0	60 43.9	99 15	172.2	60 14.2	99 15	172.3	59 44.5	99 14	172.4	59 14.8	99 14	172.6	58 45.0	99 14	172.7	58 15.3	99 14	172.8	4
05	61 34.0	98 19	169.9	61 04.5	98 19	170.1	60 34.9	98 18	170.2	60 05.4	99 18	170.4	59 35.8	99 18	170.6	59 06.2	99 17	170.7	58 36.6	99 17	170.9	58 07.0	99 17	171.1	05
6	61 22.7	98 22	167.9	60 53.3	98 22	168.1	60 24.0	98 21	168.3	59 54.6	98 21	168.5	59 25.3	98 21	168.7	58 55.9	98 20	168.9	58 26.5	98 20	169.1	57 57.0	98 20	169.3	6
7	61 09.4	97 25	165.9	60 40.3	97 25	166.2	60 11.2	97 24	166.4	59 42.0	97 24	166.7	59 12.9	97 24	166.9	58 43.7	97 23	167.1	58 14.5	97 23	167.4	57 45.3	97 22	167.6	7
8	60 54.2	96 28	164.0	60 25.4	96 28	164.3	59 56.5	96 27	164.6	59 27.6	96 27	164.9	58 58.7	96 27	165.1	58 29.7	97 26	165.4	58 00.8	97 26	165.6	57 31.8	97 25	165.9	8
9	60 37.1	95 31	162.2	60 08.6	95 31	162.5	59 40.0	95 30	162.8	59 11.4	95 30	163.1	58 42.8	96 29	163.4	58 14.1	96 29	163.6	57 45.3	96 28	163.9	57 16.6	96 28	164.2	9
10	60 18.2	94 34	160.3	59 50.0	94 34	160.7	59 21.8	94 33	161.0	58 53.4	94 33	161.3	58 25.1	95 32	161.6	57 56.7	95 32	161.9	57 28.2	95 31	162.2	56 59.8	95 31	162.5	10
1	59 57.6	93 37	158.5	59 29.7	93 37	158.9	59 01.8	93 36	159.2	58 33.8	93 36	159.6	58 05.8	94 35	159.9	57 37.7	94 34	160.2	57 09.5	94 34	160.6	56 41.3	94 33	160.9	1
2	59 35.2	92 40	156.7	59 07.7	92 39	157.1	58 40.1	92 39	157.5	58 12.5	92 38	157.9	57 44.8	92 38	158.3	57 17.0	93 37	158.6	56 49.2	93 36	158.9	56 21.3	93 36	159.3	2
3	59 11.3	90 43	155.0	58 44.1	91 42	155.4	58 16.9	91 41	155.8	57 49.6	91 41	156.2	57 22.3	91 40	156.6	56 54.9	92 39	157.0	56 27.4	92 39	157.4	55 59.8	92 38	157.7	3
4	58 45.7	89 45	153.4	58 19.0	89 44	153.8	57 52.1	90 44	154.2	57 25.2	90 43	154.6	56 58.2	90 42	155.0	56 31.2	90 42	155.4	56 04.0	91 41	155.8	55 36.8	91 41	156.2	4
15	58 18.6	88 48	151.7	57 52.3	88 47	152.2	57 25.9	88 46	152.6	56 59.4	89 45	153.1	56 32.8	89 45	153.5	56 06.1	89 44	153.9	55 39.3	89 44	154.3	55 12.4	90 43	154.7	15
6	57 50.1	86 50	150.2	57 24.2	87 49	150.6	56 58.2	87 48	151.1	56 32.1	87 48	151.5	56 05.9	88 47	152.0	55 39.5	88 46	152.4	55 13.1	88 46	152.8	54 46.7	88 45	153.2	6
7	57 20.2	85 52	148.6	56 54.7	85 51	149.1	56 29.1	86 51	149.6	56 03.4	86 50	150.0	55 37.6	86 49	150.5	55 11.7	87 49	150.9	54 45.7	87 48	151.4	54 19.6	87 47	151.8	7
8	56 49.0	83 54	147.1	56 24.0	84 53	147.6	55 58.8	84 53	148.1	55 33.5	85 52	148.6	55 08.1	85 51	149.1	54 42.5	85 51	149.5	54 16.9	86 50	150.0	53 51.2	86 49	150.4	8
9	56 16.6	82 56	145.7	55 51.9	82 55	146.2	55 27.2	83 55	146.7	55 02.3	83 54	147.2	54 37.3	84 53	147.7	54 12.2	84 53	148.1	53 46.9	84 52	148.6	53 21.6	85 51	149.1	9
20	55 42.9	80 58	144.3	55 18.7	81 57	144.8	54 54.3	81 57	145.3	54 29.9	82 56	145.8	54 05.3	82 55	146.3	53 40.6	83 54	146.8	53 15.8	83 54	147.3	52 50.9	83 53	147.7	20
1	55 08.1	79 60	142.9	54 44.3	79 59	143.5	54 20.4	80 58	144.0	53 56.4	80 58	144.5	53 32.2	81 57	145.0	53 07.9	81 56	145.5	52 43.5	82 56	146.0	52 19.0	82 55	146.5	1
2	54 32.2	78 62	141.6	54 08.8	78 61	142.2	53 45.4	78 60	142.7	53 21.8	79 59	143.2	52 58.0	79 59	143.7	52 34.1	80 58	144.2	52 10.1	80 57	144.7	51 46.0	81 57	145.2	2
3	53 55.2	76 63	140.4	53 32.3	77 62	140.9	53 09.3	77 62	141.5	52 46.1	78 61	142.0	52 22.8	78 60	142.5	51 59.3	78 60	143.0	51 35.7	79 59	143.5	51 12.0	79 58	144.0	3
4	53 17.3	75 65	139.2	52 54.9	75 64	139.7	52 32.2	76 63	140.2	52 09.5	76 63	140.8	51 46.6	77 62	141.3	51 23.5	77 61	141.8	51 00.3	77 61	142.3	50 37.0	78 60	142.8	4
25	52 38.5	73 66	138.0	52 16.4	74 66	138.5	51 54.2	74 65	139.1	51 31.9	75 64	139.6	51 09.4	75 63	140.1	50 46.8	76 63	140.7	50 24.0	76 62	141.2	50 01.1	77 61	141.7	25
6	51 58.8	72 68	136.8	51 37.1	72 67	137.4	51 15.4	73 66	137.9	50 53.4	73 66	138.5	50 31.4	74 65	139.0	50 09.1	74 64	139.5	49 46.8	75 64	140.1	49 24.3	75 63	140.6	6
7	51 18.2	70 69	135.7	50 57.0	71 68	136.3	50 35.6	71 68	136.9	50 14.1	72 67	137.4	49 52.5	72 66	137.9	49 30.6	73 66	138.5	49 08.7	73 65	139.0	48 46.6	74 64	139.5	7
8	50 36.8	69 70	134.7	50 16.1	70 70	135.2	49 55.1	70 69	135.8	49 34.0	71 68	136.3	49 12.7	71 68	136.9	48 51.3	72 67	137.4	48 29.8	72 66	137.9	48 08.1	73 66	138.5	8
9	49 54.7	68 71	133.6	49 34.3	68 71	134.2	49 13.8	69 70	134.8	48 53.1	69 69	135.3	48 32.2	70 69	135.9	48 11.2	70 68	136.4	47 50.1	71 67	136.9	47 28.8	71 67	137.5	9
30	49 11.9	66 72	132.6	48 51.9	67 72	133.2	48 31.8	67 71	133.8	48 11.5	68 71	134.3	47 51.0	68 70	134.9	47 30.4	69 69	135.4	47 09.6	69 69	136.0	46 48.7	70 68	136.5	30
1	48 28.4	65 74	131.7	48 08.8	66 73	132.3	47 49.1	66 72	132.8	47 29.2	67 72	133.4	47 09.1	67 71	133.9	46 48.8	68 70	134.5	46 28.5	68 70	135.0	46 07.9	69 69	135.5	1
2	47 44.3	64 75	130.8	47 25.1	64 74	131.3	47 05.7	65 73	131.9	46 46.2	65 73	132.4	46 26.5	66 72	133.0	46 06.6	66 71	133.5	45 46.6	67 71	134.1	45 26.5	67 70	134.6	2
3	46 59.5	62 76	129.9	46 40.7	63 75	130.4	46 21.7	64 74	131.0	46 02.6	64 74	131.6	45 43.2	65 73	132.1	45 23.8	65 72	132.6	45 04.2	66 72	133.2	44 44.4	66 71	133.7	3
4	46 14.2	61 76	129.0	45 55.7	62 76	129.6	45 37.1	62 75	130.1	45 18.3	63 75	130.7	44 59.4	63 74	131.2	44 40.3	64 73	131.8	44 21.1	64 73	132.3	44 01.7	65 72	132.9	4
35	45 28.3	60 77	128.2	45 10.2	61 77	128.7	44 52.0	61 76	129.3	44 33.6	62 76	129.8	44 15.0	62 75	130.4	43 56.3	63 74	130.9	43 37.4	63 74	131.5	43 18.3	64 73	132.0	35
6	44 41.9	59 78	127.4	44 24.2	59 78	127.9	44 06.3	60 77	128.5	43 48.2	60 76	129.0	43 30.0	61 76	129.6	43 11.7	61 75	130.1	42 53.1	62 75	130.7	42 34.5	62 74	131.2	6
7	43 55.0	58 79	126.6	43 37.6	58 78	127.1	43 20.1	59 78	127.7	43 02.4	59 77	128.3	42 44.5	60 77	128.8	42 26.5	60 76	129.3	42 08.4	61 75	129.9	41 50.0	61 75	130.4	7
8	43 07.6	56 80	125.8	42 50.6	57 79	126.4	42 33.4	58 79	126.9	42 16.1	58 78	127.5	41 58.6	59 77	128.0	41 40.9	59 77	128.6	41 23.1	60 76	129.1	41 05.1	60 76	129.6	8
9	42 19.8	55 80	125.1	42 03.1	56 80	125.6	41 46.3	56 79	126.2	41 29.3	57 79	126.8	41 12.1	58 78	127.3	40 54.8	58 78	127.8	40 37.3	59 77	128.4	40 19.7	59 76	128.9	9
40	41 31.6	54 81	124.4	41 15.2	55 81	124.9	40 58.7	55 80	125.5	40 42.0	56 79	126.0	40 25.2	56 79	126.6	40 08.2	57 78	127.1	39 51.1	57 78	127.7	39 33.8	58 77	128.2	40
1	40 43.0	53 82	123.7	40 26.9	54 81	124.2	40 10.7	54 81	124.8	39 54.4	55 80	125.3	39 37.8	55 80	125.9	39 21.2	56 79	126.4	39 04.4	56 78	127.0	38 47.4	57 78	127.5	1
2	39 53.9	52 82	123.0	39 38.2	53 82	123.6	39 22.3	53 81	124.1	39 06.3	54 81	124.7	38 50.1	54 80	125.2	38 33.8	55 80	125.8	38 17.3	55 79	126.3	38 00.6	56 79	126.8	2
3	39 04.6	51 83	122.4	38 49.1	52 82	122.9	38 33.6	52 82	123.5	38 17.8	53 81	124.0	38 02.0	53 81	124.6	37 45.9	54 80	125.1	37 29.8	54 80	125.6	37 13.5	55 79	126.2	3
4	38 14.8	50 83	121.8	37 59.7	51 83	122.3	37 44.4	51 82	122.9	37 29.0	52 82	123.4	37 13.4	52 81	123.9	36 57.7	53 81	124.5	36 41.9	53 80	125.0	36 25.9	54 80	125.5	4
45	37 24.8	49 84	121.2	37 09.9	50 83	121.7	36 55.0	50 83	122.2	36 39.8	51 83	122.8	36 24.6	51 82	123.3	36 09.2	52 82	123.9	35 53.6	52 81	124.4	35 37.9	53 80	124.9	45
6	36 34.4	48 84	120.6	36 19.9	49 84	121.1	36 05.2	49 84	121.7	35 50.3	50 83	122.2	35 35.4	50 83	122.7	35 20.3	51 82	123.3	35 05.0	51 82	123.8	34 49.6	52 81	124.3	6
7	35 43.7	47 85	120.0	35 29.5	48 84	120.5	35 15.1	48 84	121.1	35 00.5	49 84	121.6	34 45.8	49 83	122.1	34 31.0	50 83	122.7	34 16.1	50 82	123.2	34 01.0	51 82	123.7	7
8	34 52.7	46 85	119.5	34 38.8	47 85	120.0	34 24.6	47 84	120.5	34 10.4	48 84	121.1	33 56.0	48 84	121.6	33 41.5	49 83	122.1	33 26.8	49 83	122.6	33 12.0	50 82	123.2	8
9	34 01.5	45 86	118.9	33 47.8	46 85	119.5	33 34.0	46 85	120.0	33 20.0	47 84	120.5	33 05.9	47 84	121.0	32 51.6	48 84	121.6	32 37.2	48 83	122.1	32 22.7	49 83	122.6	9
50	33 10.0	45 86	118.4	32 56.6	45 86	118.9	32 43.0	45 85	119.5	32 29.3	46 85	120.0	32 15.4	46 84	120.5	32 01.5	47 84	121.0	31 47.4	47 84	121.6	31 33.1	48 83	122.1	50
1	32 18.3	44 87	117.9	32 05.1	44 86	118.4	31 51.8	45 86	118.9	31 38.3	45 85	119.5	31 24.7	45 85	120.0	31 11.0	46 84	120.5	30 57.2	46 84	121.0	30 43.3	47 84	121.6	1
2	31 26.3	43 87	117.4	31 13.3	43 87	117.9	31 00.3	44 86	118.5	30 47.1	44 86	119.0	30 33.8	45 85	119.5	30 20.3	45 85	120.0	30 06.8	45 84	120.5	29 53.1	46 84	121.0	2
3	30 34.0	42 87	116.9	30 21.4	42 87	117.5	30 08.6	43 87	118.0	29 55.6	43 86	118.5	29 42.6	44 86	119.0	29 29.4	44 85	119.5	29 16.1	45 85	120.0	29 02.7	45 84	120.6	3
4	29 41.6	41 88	116.5	29 29.2	42 87	117.0	29 16.6	42 87	117.5	29 03.9	42 87	118.0	28 51.1	43 86	118.5	28 38.2	43 86	119.1	28 25.2	44 85	119.6	28 12.0	44 85	120.1	4
55	28 49.0	40 88	116.0	28 36.8	41 88	116.5	28 24.5	41 87	117.1	28 12.0	42 87	117.6	27 59.5	42 86	118.1	27 46.8	42 86	118.6	27 34.0	43 86	119.1	27 21.1	43 85	119.6	55
6	27 56.1	40 88	115.6	27 44.2	40 88	116.1	27 32.1	40 88	116.6	27 19.9	41 87	117.1	27 07.6	41 87	117.6	26 55.2	42 86	118.1	26 42.6	42 86	118.7	26 30.0	42 86	119.2	6
7	27 03.1	39 89	115.1	26 51.4	39 88	115.7	26 39.5	40 88	116.2	26 27.6	40 88	116.7	26 15.5	40 87	117.2	26 03.3	41 87	117.7	25 51.0	41 86	118.2	25 38.6	41 86	118.7	7
8	26 09.9	38 89	114.7	25 58.4	39 89	115.2	25 46.7	39 88	115.8	25 35.0	39 88	116.3	25 23.2	40 87	116.8	25 11.3	40 87	117.3	24 59.2	40 87	117.8	24 47.1	41 86	118.3	8
9	25 16.5	37 89	114.3	25 05.2	38 89	114.8	24 53.8	38 89	115.4	24 42.3	39 88	115.9	24 30.7	39 88	116.4	24 19.0	39 87	116.9	24 07.2	40 87	117.4	23 55.3	40 87	117.9	9
60	24 22.9	37 90	113.9	24 11.9	37 89	114.4	24 00.7	37 89	115.0	23 49.4	38 88	115.5	23 38.0	38 88	116.0	23 26.6	38 88	116.5	23 15.0	39 87	117.0	23 03.3	39 87	117.5	60
1	23 29.2	36 90	113.6	23 18.3	36 89	114.1	23 07.4	37 89	114.6	22 56.3	37 89	115.1	22 45.2	37 88	115.6	22 33.9	38 88	116.1	22 22.6	38 88	116.6	22 11.2	38 87	117.1	1
2	22 35.3	35 90	113.2	22 24.7	36 90	113.7	22 13.9	36 89	114.2	22 03.1	36 89	114.7	21 52.2	37 89	115.2	21 41.1	37 88	115.7	21 30.0	37 88	116.2	21 18.8	37 88	116.7	2
3	21 41.3	35 90	112.8	21 30.9	35 90	113.3	21 20.3	35 90	113.8	21 09.7	36 89	114.3	20 59.0	36 89	114.8	20 48.2	36 89	115.3	20 37.3	36 88	115.8	20 26.3	37 88	116.3	3
4	20 47.1	34 90	112.5	20 36.9	34 90	113.0	20 26.6	35 90	113.5	20 16.1	35 90	114.0	20 05.6	35 89	114.5	19 55.0	35 89	115.0	19 44.4	36 88	115.5	19 33.6	36 88	116.0	4
65	19 52.8	33 91	112.1	19 42.8	34 90	112.6	19 32.6	34 90	113.1	19 22.4	34 90	113.6	19 12.1	34 89	114.1	19 01.8	35 89	114.6	18 51.3	35 89	115.1	18 40.8	35 88	115.6	65
6	18 58.4	33 91	111.8	18 48.5	33 91	112.3	18 38.6	33 90	112.8	18 28.6	34 90	113.3	18 18.5	34 90	113.8	18 08.3	34 89	114.3	17 58.1	34 89	114.8	17 47.8	35 89	115.3	6
7	18 03.8	32 91	111.5	17 54.2	32 91	112.0	17 44.4	33 91	112.4	17 34.6	33 90	112.9	17 24.7	33 90	113.4	17 14.7	33 90	113.9	17 04.7	34 89	114.4	16 54.6	34 89	114.9	7
8	17 09.2	31 91	111.1	16 59.7	32 91	111.6	16 50.1	32 91	112.1	16 40.5	32 90	112.6	16 30.8	32 90	113.1	16 21.0	33 90	113.6	16 11.2	33 89	114.1	16 01.3	33 89	114.6	8
9	16 14.4	31 92	110.8	16 05.1	31 91	111.3	15 55.7	31 91	111.8	15 46.3	32 91	112.3	15 36.8	32 90	112.8	15 27.2	32 90	113.3	15 17.6	32 90	113.8	15 07.9	32 89	114.3	9
70	15 19.4	30 92	110.5	15 10.3	30 91	111.0	15 01.1	31 91	111.5	14 51.9	31 91	112.0	14 42.6	31 90	112.5	14 33.2	31 90	113.0	14 23.8	32 90	113.5	14 14.3	32 90	114.0	70
1	14 24.4	30 92	110.2	14 15.5	30 92	110.7	14 06.5	30 91	111.2	13 57.4	30 91	111.7	13 48.3	30 91	112.2	13 39.1	31 90	112.7	13 29.9	31 90	113.2	13 20.6	31 90	113.6	1
2	13 29.3	29 92	109.9	13 20.5	29 92	110.4	13 11.7	29 91	110.9	13 02.8	30 91	111.4	12 53.9	30 91	111.9	12 44.9	30 91	112.4	12 35.9	30 90	112.9	12 26.8	30 90	113.4	2
3	12 34.1	29 92	109.6	12 25.5	29 92	110.1	12 16.8	29 92	110.6	12 08.1	29 91	111.1	11 59.4	29 91	111.6	11 50.6	29 91	112.1	11 41.7	30 90	112.6	11 32.8	30 90	113.1	3
4	11 38.7	28 92	109.4	11 30.3	28 92	109.9	11 21.9	28 92	110.3	11 13.3	28 92	110.8	11 04.8	29 91	111.3	10 56.2	29 91	111.8	10 47.5	29 91	112.3	10 38.8	29 90	112.8	4
75	10 43.3	27 92	109.1	10 35.1	28 92	109.6	10 26.8	28 92	110.1	10 18.4	28 92	110.6	10 10.0	28 91	111.0	10 01.6	28 91	111.5	9 53.1	28 91	112.0	9 44.6	28 90	112.5	75
6	9 47.8	27 93	108.8	9 39.7	27 92	109.3	9 31.6	27 92	109.8	9 23.4	27 92	110.3	9 15.2	27 92	110.8	9 07.0	28 91	111.3	8 58.7	28 91	111.7	8 50.3	28 91	112.2	6
7	8 52.2	26 93	108.6	8 44.3	26 93	109.1	8 36.3	27 92	109.5	8 28.3	27 92	110.0	8 20.3	27 92	110.5	8 12.2	27 91	111.0	8 04.1	27 91	111.5	7 56.0	27 91	112.0	7
8	7 56.6	26 93	108.3	7 48.8	26 93	108.8	7 41.0	26 92	109.3	7 33.2	26 92	109.8	7 25.3	26 92	110.3	7 17.4	26 92	110.7	7 09.5	26 91	111.2	7 01.5	27 91	111.7	8
9	7 00.8	25 93	108.1	6 53.2	25 93	108.6	6 45.6	26 93	109.0	6 37.9	26 92	109.5	6 30.2	26 92	110.0	6 22.5	26 92	110.5	6 14.7	26 91	111.0	6 06.9	26 91	111.5	9
80	6 05.0	25 93	107.8	5 57.5	25 93	108.3	5 50.0	25 93	108.8	5 42.5	25 92	109.3	5 35.0	25 92	109.8	5 27.4	25 92	110.3	5 19.9	25 92	110.7	5 12.3	25 91	111.2	80
1	5 00.1	24 93	107.6	5 01.8	24 93	108.1																			1

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	82 00.0	1.0 06	00.0	81 30.0	1.0 05	00.0	81 00.0	1.0 05	00.0	80 30.0	1.0 05	00.0	80 00.0	1.0 04	00.0	79 30.0	1.0 04	00.0	79 00.0	1.0 04	00.0	78 30.0	1.0 04	00.0	00
1	81 56.6	99 17	06.7	81 26.8	99 16	06.3	80 57.0	99 15	05.9	80 27.1	99 14	05.6	79 57.3	1.0 14	05.3	79 27.4	1.0 13	05.1	78 57.5	1.0 12	04.8	78 27.6	1.0 12	04.6	1
2	81 46.4	97 28	13.2	81 17.2	97 26	12.5	80 47.9	98 24	11.8	80 18.6	98 23	11.1	79 49.2	98 22	10.5	79 19.7	98 21	10.0	78 50.2	98 20	09.6	78 20.6	99 19	09.1	2
3	81 29.8	94 37	19.4	81 01.6	94 35	18.3	80 33.2	95 34	17.3	80 04.6	95 32	16.4	79 35.9	96 30	15.6	79 07.0	96 29	14.8	78 38.1	97 28	14.2	78 09.1	97 26	13.5	3
4	81 07.5	90 46	25.1	80 40.5	91 43	23.8	80 13.1	92 41	22.5	79 45.5	92 39	21.4	79 17.7	93 38	20.4	78 49.7	94 36	19.4	78 21.6	94 34	18.6	77 53.3	95 33	17.8	4
05	80 40.2	85 53	30.3	80 14.5	86 51	28.8	79 48.3	88 48	27.4	79 21.9	89 46	26.1	78 55.1	90 44	24.9	78 28.1	90 43	23.8	78 00.9	91 41	22.7	77 33.4	92 39	21.8	05
6	80 08.5	80 59	35.0	79 44.2	82 57	33.3	79 19.4	83 54	31.8	78 54.1	85 52	30.3	78 28.5	86 50	29.0	78 02.6	87 48	27.8	77 36.4	88 47	26.6	77 09.9	89 45	25.6	6
7	79 33.1	75 64	39.2	79 10.2	77 62	37.4	78 46.7	79 60	35.8	78 22.8	81 58	34.3	77 58.4	82 56	32.8	77 33.6	83 54	31.5	77 08.4	84 52	30.3	76 42.9	85 50	29.1	7
8	78 54.5	71 69	42.8	78 33.0	73 66	41.0	78 10.9	75 64	39.4	77 48.2	76 62	37.8	77 25.0	78 60	36.3	77 01.4	80 58	34.9	76 37.3	81 56	33.6	76 12.9	82 55	32.4	8
9	78 13.4	66 72	46.1	77 53.2	68 70	44.3	77 32.4	71 68	42.6	77 10.9	72 66	41.0	76 49.0	74 64	39.5	76 26.5	76 62	38.1	76 03.5	77 60	36.7	75 40.1	79 59	35.4	9
10	77 30.1	62 75	48.9	77 11.2	64 73	47.2	76 51.6	66 71	45.5	76 31.3	68 69	43.9	76 10.5	70 68	42.4	75 49.1	72 66	40.9	75 27.3	74 64	39.5	75 04.9	75 62	38.2	10
1	76 45.0	58 78	51.5	76 27.2	60 76	49.7	76 08.8	63 74	48.1	75 49.7	65 72	46.5	75 30.0	67 71	45.0	75 09.7	68 69	43.5	74 48.9	70 67	42.1	74 27.6	72 65	40.8	1
2	75 58.4	54 80	53.7	75 41.7	57 78	52.0	75 24.3	59 76	50.4	75 06.3	61 75	48.8	74 47.6	63 73	47.3	74 28.4	65 71	45.9	74 08.6	67 70	44.5	73 48.4	68 68	43.1	2
3	75 10.5	51 82	55.7	74 54.8	53 80	54.1	74 38.4	56 78	52.5	74 21.4	58 77	50.9	74 03.8	60 75	49.4	73 45.5	62 74	48.0	73 26.7	64 72	46.6	73 07.4	65 71	45.3	3
4	74 21.5	48 83	57.5	74 06.7	50 82	55.9	73 51.3	53 80	54.3	73 35.2	55 79	52.8	73 18.5	57 77	51.4	73 01.3	59 76	49.9	72 43.4	60 74	48.6	72 25.0	62 73	47.3	4
15	73 31.6	45 85	59.1	73 17.7	47 83	57.5	73 03.2	50 82	56.0	72 48.0	52 80	54.5	72 32.2	54 79	53.1	72 15.8	56 78	51.7	71 58.8	57 76	50.4	71 41.3	59 75	49.1	15
6	72 40.9	42 86	60.5	72 27.8	45 84	59.0	72 14.1	47 83	57.5	71 59.7	49 82	56.1	71 44.7	51 80	54.7	71 29.2	53 79	53.3	71 13.0	55 78	52.0	70 56.4	56 77	50.7	6
7	71 49.5	40 87	61.7	71 37.2	42 85	60.3	71 24.2	44 84	58.9	71 10.6	46 83	57.5	70 56.4	48 82	56.1	70 41.7	50 81	54.8	70 26.3	52 79	53.5	70 10.5	54 78	52.2	7
8	70 57.5	38 87	62.9	70 45.9	40 86	61.5	70 33.6	42 85	60.1	70 20.8	44 84	58.7	70 07.3	46 83	57.4	69 53.3	48 82	56.1	69 38.7	49 81	54.9	69 23.6	51 79	53.6	8
9	70 05.0	36 88	63.9	69 54.1	38 87	62.5	69 42.5	40 86	61.2	69 30.3	42 85	59.9	69 17.5	43 84	58.6	69 04.2	45 83	57.4	68 50.4	47 82	56.1	68 36.0	49 81	54.9	9
20	69 12.1	34 89	64.8	69 01.7	36 88	63.5	68 50.8	37 87	62.2	68 39.3	39 86	61.0	68 27.2	41 85	59.7	68 14.5	43 84	58.5	68 01.3	45 83	57.3	67 47.6	47 82	56.1	20
1	68 18.8	32 89	65.7	68 09.0	34 88	64.4	67 58.6	36 88	63.2	67 47.7	37 87	61.9	67 36.2	39 86	60.7	67 24.2	41 85	59.5	67 11.6	43 84	58.3	66 58.6	44 83	57.2	1
2	67 25.1	30 90	66.5	67 15.9	32 89	65.2	67 06.1	34 88	64.0	66 55.7	35 87	62.8	66 44.8	37 86	61.6	66 33.4	39 85	60.4	66 21.4	41 84	59.3	66 09.0	42 84	58.2	2
3	66 31.2	28 90	67.2	66 22.4	30 90	66.0	66 13.2	32 89	64.8	66 03.3	34 88	63.6	65 53.0	35 87	62.5	65 42.1	37 86	61.3	65 30.7	39 85	60.2	65 18.9	40 84	59.1	3
4	65 37.0	27 91	67.8	65 28.7	28 90	66.6	65 19.9	30 89	65.5	65 10.6	32 88	64.3	65 00.8	34 88	63.2	64 50.4	35 87	62.1	64 39.6	37 86	61.0	64 28.3	38 85	59.9	4
25	64 42.5	25 91	68.4	64 34.7	27 90	67.2	64 26.4	29 90	66.1	64 17.5	30 89	65.0	64 08.2	32 88	63.9	63 58.4	34 87	62.8	63 48.1	35 86	61.8	63 37.3	37 86	60.7	25
6	63 47.9	24 91	68.9	63 40.5	26 91	67.8	63 32.6	27 90	66.7	63 24.2	29 89	65.6	63 15.3	30 89	64.6	63 06.0	32 88	63.5	62 56.2	33 87	62.5	62 45.9	35 86	61.5	6
7	62 53.0	23 92	69.4	62 46.0	24 91	68.3	62 38.6	26 90	67.3	62 30.6	27 90	66.2	62 22.2	29 89	65.2	62 13.3	30 88	64.2	62 04.0	32 88	63.1	61 54.2	33 87	62.1	7
8	61 58.0	21 92	69.8	61 51.4	23 91	68.8	61 44.3	24 91	67.8	61 36.8	26 90	66.7	61 28.8	27 89	65.7	61 20.4	29 89	64.7	61 11.5	30 88	63.7	61 02.2	32 87	62.8	8
9	61 02.9	20 92	70.2	60 56.6	22 92	69.2	60 49.9	23 91	68.2	60 42.8	25 90	67.2	60 35.2	26 90	66.2	60 27.2	27 89	65.3	60 18.7	29 88	64.3	60 09.9	30 88	63.3	9
30	60 07.6	19 92	70.6	60 01.7	20 92	69.6	59 55.3	22 91	68.7	59 48.6	23 91	67.7	59 41.4	25 90	66.7	59 33.8	26 89	65.8	59 25.7	27 89	64.8	59 17.3	29 88	63.9	30
1	59 12.2	18 93	71.0	59 06.6	19 92	70.0	59 00.6	21 92	69.0	58 54.2	22 91	68.1	58 47.4	23 90	67.2	58 40.1	25 90	66.2	58 32.5	26 89	65.3	58 24.5	27 88	64.4	1
2	58 16.6	17 93	71.3	58 11.4	18 92	70.3	58 05.7	20 92	69.4	57 59.7	21 91	68.5	57 53.2	22 90	67.6	57 46.4	24 90	66.6	57 39.1	25 89	65.7	57 31.5	26 89	64.8	2
3	57 21.0	16 93	71.6	57 16.1	17 92	70.6	57 10.7	18 92	69.7	57 05.0	20 91	68.8	56 58.9	21 91	67.9	56 52.4	22 90	67.0	56 45.5	24 90	66.1	56 38.3	25 89	65.3	3
4	56 25.3	15 93	71.8	56 20.6	16 92	70.9	56 15.6	17 92	70.0	56 10.2	19 92	69.2	56 04.4	20 91	68.3	55 58.3	21 90	67.4	55 51.8	22 90	66.5	55 44.9	24 89	65.7	4
35	55 29.5	14 93	72.1	55 25.1	15 93	71.2	55 20.4	16 92	70.3	55 15.3	18 92	69.5	55 09.9	19 91	68.6	55 04.0	20 91	67.7	54 57.9	21 90	66.9	54 51.3	22 90	66.0	35
6	54 33.6	13 93	72.3	54 29.5	14 93	71.4	54 25.1	15 92	70.6	54 20.3	17 92	69.7	54 15.2	18 91	68.9	54 09.7	19 91	68.0	54 03.8	20 90	67.2	53 57.6	21 90	66.4	6
7	53 37.7	12 93	72.5	53 33.9	13 93	71.6	53 29.7	14 92	70.8	53 25.2	16 92	70.0	53 20.4	17 92	69.2	53 15.2	18 91	68.3	53 09.6	19 90	67.5	53 03.8	20 90	66.7	7
8	52 41.7	11 93	72.7	52 38.1	12 93	71.8	52 34.2	14 92	71.0	52 30.0	15 92	70.2	52 25.5	16 92	69.4	52 20.6	17 91	68.6	52 15.4	18 91	67.8	52 09.8	19 90	67.0	8
9	51 45.6	10 94	72.8	51 42.3	12 93	72.0	51 38.7	13 93	71.2	51 34.8	14 92	70.4	51 30.5	15 92	69.6	51 25.9	16 91	68.8	51 21.0	17 91	68.1	51 15.7	18 90	67.3	9
40	50 49.5	10 94	73.0	50 46.5	11 93	72.2	50 43.1	12 93	71.4	50 39.4	13 92	70.6	50 35.4	14 92	69.8	50 31.1	15 91	69.1	50 26.5	16 91	68.3	50 21.6	17 90	67.5	40
1	49 53.4	09 94	73.1	49 50.6	10 93	72.3	49 47.5	11 93	71.6	49 44.0	12 92	70.8	49 40.3	13 92	70.0	49 36.3	14 92	69.3	49 31.9	15 91	68.5	49 27.3	16 91	67.8	1
2	48 57.2	08 94	73.2	48 54.6	09 93	72.5	48 51.8	10 93	71.7	48 48.6	11 93	71.0	48 45.1	12 92	70.2	48 41.3	13 92	69.5	48 37.3	14 91	68.7	48 32.9	15 91	68.0	2
3	48 01.0	07 94	73.4	47 58.6	08 93	72.6	47 56.0	09 93	71.9	47 53.1	10 93	71.1	47 49.9	11 92	70.4	47 46.3	12 92	69.6	47 42.6	13 91	68.9	47 38.5	14 91	68.2	3
4	47 04.8	07 94	73.4	47 02.6	08 93	72.7	47 00.2	09 93	72.0	46 57.5	09 93	71.3	46 54.5	10 92	70.5	46 51.3	11 92	69.8	46 47.8	12 91	69.1	46 44.0	13 91	68.3	4
45	46 08.5	06 94	73.5	46 06.6	07 93	72.8	46 04.4	08 93	72.1	46 01.9	09 93	71.4	45 59.2	10 92	70.7	45 56.2	10 92	69.9	45 52.9	11 92	69.2	45 49.4	12 91	68.5	45
6	45 12.2	05 94	73.6	45 10.5	06 94	72.9	45 08.5	07 93	72.2	45 06.3	08 93	71.5	45 03.8	09 92	70.8	45 01.0	10 92	70.1	44 58.0	10 92	69.4	44 54.8	11 91	68.7	6
7	44 15.9	05 94	73.7	44 14.4	05 94	73.0	44 12.6	06 93	72.3	44 10.6	07 93	71.6	44 08.4	08 92	70.9	44 05.8	09 92	70.2	44 03.1	10 92	69.5	44 00.1	10 91	68.8	7
8	43 19.6	04 94	73.7	43 18.3	05 94	73.0	43 16.7	06 93	72.4	43 14.9	06 93	71.7	43 12.9	07 92	71.0	43 10.6	08 92	70.3	43 08.1	09 92	69.6	43 05.3	10 91	68.9	8
9	42 23.2	03 94	73.8	42 22.1	04 94	73.1	42 20.8	05 93	72.4	42 19.2	06 93	71.7	42 17.4	06 93	71.1	42 15.3	07 92	70.4	42 13.0	08 92	69.7	42 10.5	09 91	69.1	9
50	41 26.8	03 94	73.8	41 25.9	03 94	73.1	41 24.8	04 93	72.5	41 23.4	05 93	71.8	41 21.9	06 93	71.1	41 20.0	06 92	70.5	41 18.0	07 92	69.8	41 15.7	08 91	69.2	50
1	40 30.5	02 94	73.8	40 29.8	03 94	73.2	40 28.8	03 93	72.5	40 27.7	04 93	71.9	40 26.3	05 93	71.2	40 24.7	05 92	70.6	40 22.9	06 92	69.9	40 20.8	07 92	69.2	1
2	39 34.1	01 94	73.9	39 33.6	02 94	73.2	39 32.9	03 93	72.6	39 31.9	04 93	71.9	39 30.7	04 93	71.3	39 29.3	05 92	70.6	39 27.7	05 92	70.0	39 25.9	06 92	69.3	2
3	38 37.7	01 94	73.9	38 37.4	01 94	73.2	38 36.9	02 93	72.6	38 36.1	03 93	72.0	38 35.1	04 93	71.3	38 34.0	04 92	70.7	38 32.6	05 92	70.0	38 31.0	06 92	69.4	3
4	37 41.4	00 94	73.9	37 41.2	01 94	73.2	37 40.9	02 93	72.6	37 40.3	02 93	72.0	37 39.5	03 93	71.4	37 38.6	04 92	70.7	37 37.4	04 92	70.1	37 36.1	05 92	69.5	4
55	36 45.0	00 94	73.9	36 45.0	00 94	73.3	36 44.8	01 93	72.6	36 44.5	02 93	72.0	36 43.9	02 93	71.4	36 43.2	03 92	70.8	36 42.2	03 92	70.1	36 41.1	04 92	69.5	55
6	35 48.6	01 94	73.9	35 48.8	00 94	73.3	35 48.8	00 93	72.6	35 48.7	01 93	72.0	35 48.3	01 93	71.4	35 47.8	02 92	70.8	35 47.0	03 92	70.2	35 46.1	03 92	69.6	6
7	34 52.2	02 94	73.9	34 52.6	01 94	73.2	34 52.8	00 93	72.6	34 52.8	00 93	72.0	34 52.7	01 93	71.4	34 52.3	01 92	70.8	34 51.8	02 92	70.2	34 51.1	03 92	69.6	7
8	33 55.8	02 94	73.8	33 56.4	02 94	73.2	33 56.8	01 93	72.6	33 57.0	00 93	72.0	33 57.0	00 93	71.4	33 56.9	01 92	70.8	33 56.6	01 92	70.2	33 56.1	02 92	69.6	8
9	32 59.5	03 94	73.8	33 00.2	02 94	73.2	33 00.8	02 93	72.6	33 01.2	01 93	72.0	33 01.4	00 93	71.4	33 01.5	00 92	70.8	33 01.4	01 92	70.2	33 01.1	01 92	69.6	9
60	32 03.1	03 94	73.8	32 04.0	03 94	73.2	32 04.8	02 93	72.6	32 05.4	02 93	72.0	32 05.8	01 93	71.4	32 06.0	01 92	70.8	32 06.1	00 92	70.2	32 06.1	01 92	69.6	60
1	31 06.8	04 94	73.7	31 07.9	03 94	73.1	31 08.8	03 93	72.6	31 09.6	02 93	72.0	31 10.2	02 93	71.4	31 10.6	01 92	70.8	31 10.9	01 92	70.2	31 11.0	00 92	69.6	1
2	30 10.4	04 94	73.7	30 11.7	04 94	73.1	30 12.8	03 93	72.5	30 13.7	03 93	72.0	30 14.5	02 93	71.4	30 15.2	02 92	70.8	30 15.7	01 92	70.2	30 16.0	01 92	69.6	2
3	29 14.1	05 94	73.6	29 15.5	05 94	73.1	29 16.8	04 93	72.5	29 18.0	04 93	71.9	29 18.9	03 93	71.3	29 19.8	03 92	70.8	29 20.5	02 92	70.2	29 21.0	02 92	69.6	3
4	28 17.8	06 94	73.6	28 19.4	05 94	73.0	28 20.9	05 93	72.4	28 22.2	04 93	71.9	28 23.3	04 93	71.3	28 24.4	03 92	70.7	28 25.2	03 92	70.2	28 26.0	02 92	69.6	4
65	27 21.5	06 94	73.5	27 23.3	06 94	73.0	27 24.9	05 93	72.4	27 26.4	05 93	71.8	27 27.7	04 93	71.3	27 29.0	04 92	70.7	27 30.0	03 92	70.1	27 31.0	03 92	69.6	65
6	26 25.3	07 94	73.5	26 27.2	06 93	72.9	26 29.0	06 93	72.3	26 30.6	05 93	71.8	26 32.2	05 93	71.2	26 33.6	04 92	70.7	26 34.8	04 92	70.1	26 36.0	04 92	69.5	6
7	25 29.0	07 94	73.4	25 31.1	07 93	72.8	25 33.1	06 93	72.3	25 34.9	06 93	71.7	25 36.6	06 93	71.2	25 38.2	05 92	70.6	25 39.7	05 92	70.1	25 41.0	04 92	69.5	7
8	24 32.8	08 94	73.3	24 35.0	07 93	72.8	24 37.2	07 93	72.2	24 39.2	07 93	71.7	24 41.1	06 92	71.1	24 42.9	06 92	70.6	24 44.5	05 92	70.0	24 46.0	05 92	69.5	8
9	23 36.6	08 94	73.2	23 39.0	08 93	72.7	23 41.3	07 93	72.1	23 43.5	07 93	71.6	23 45.6	07 92	71.0	23 47.5	06 92	70.5	23 49.4	06 92	70.0	23 51.1	06 92	69.4	9
70	22 40.4	09 94	73.1	22 43.0	08 93	72.6	22 45.5	08 93	72.1	22 47.8	08 93	71.5	22 50.1	07 92	71.0	22 52.2	07 92	70.4	22 54.2	07 92	69.9	22 56.2	06 92	69.3	70
1	21 44.3	09 94	73.0	21 47.0	09 93	72.5	21 49.6	09 93	72.0	21 52.2	08 93	71.4	21 54.6	08 92	70.9	21 56.9	08 92	70.4	21 59.1	07 92	69.8	22 01.3	07 91	69.3	1
2	20 48.1	10 93	72.9	20 51.0	10 93	72.4	20 53.8	09 93	71.9	20 56.6	09 93	71.3	20 59.2	09 92	70.8	21 01.7	08 92	70.3	21 04.1	08 92	69.7	21 06.4	08 91	69.2	2
3	19 52.0	10 93	72.8	19 55.1	10 93	72.3	19 58.1	10 93	71.8	20 01.0	09 93	71.3	20 03.7	09 92	70.7	20 06.4	09 92	70.2	20 09.0	08 92	69.7	20 11.5	08 91	69.1	3
4	18 56.0	11 93	72.7	18 59.2	11 93	72.2	19 02.4	10 93	71.7	19 05.4	10 93	71.2	19 08.4	10 92	70.6	19 11.2	09 92	70.1	19 14.0	09 92	69.6	19 16.7	09 91	69.1	4
75	18 00.0	11 93	72.6	18 03.3	11 93	72.1	18 06.7	11 93	71.6	18 09.9	11 92	71.1	18 13.0	10 92	70.5	18 16.1	10 92	70.0	18 19.0	10 92	69.5	18 21.9	09 91	69.0	75
6	17 04.0	12 93	72.5	17 07.5	12 93	72.0	17 11.0	11 93	71.5	17 14.4	11 92	71.0	17 17.7	11 92	70.4	17 20.9	11 92	69.9	17 24.1	10 92	69.4	17 27.1	10 91	68.9	6
7	16 08.0	13 93	72.4	16 11.7	12 93	71.9	16 15.4	12 93	71.4	16 18.9	12 92	70.8	16 22.4	12 92	70.3	16 25.8	11 92	69.8	16 29.2	11 92	69.3	16 32.4	11 91	68.8	7
8	15 12.1	13 93	72.3	15 16.0	13 93	71.8	15 19.8	13 93	71.2	15 23.5	12 92	70.7	15 27.2	12 92	70.2	15 30.8	12 92	69.7	15 34.3	12 91	69.2	15 37.7	11 91	68.7	8
9	14 16.2	14 93	72.1	14 20.2	13 93	71.6	14 24.2	13 92	71.1	14 28.1	13 92	70.6	14 32.0	13 92	70.1	14 35.7	12 92	69.6	14 39.4	12 91	69.1	14 43.1	12 91	68.6	9
80	13 20.4	14 93	72.0	13 24.6	14 93	71.5	13 28.7	14 92	71.0	13 32.8	13 92	70.5	13 36.8	13 92	70.0	13 40.8	13 92	69.5	13 44.7	13 91	68.9	13 48.5	13 91	68.4	80
1	12 24.6	15 93	71.9	12 28.9	14 93	71.4	12 33.2	14 92	70.9	12 37.5	14 92	70.3	12 41.7	14 92	69.8	12 45.8	14 91	69.3	12 49.9	13 91	68.8	12 53.9	13 91	68.3	1
2	11 28.8	15 93	71.7	11 33.4	15 93	71.2	11 37.8	15 92	70.7	11 42.3	15 92	70.2	11 46.6	14 92	69.7	11 50.9	14 91	69.2	11 55.2	14 91	68.7	11 59.4	14 91	68.2	2
3	10 33.1	16 93	71.6	10 37.8	16 92	71.1	10 42.5	15 92	70.6	10 47.1	15 92	70.1	10 51.6	15 92	69.6	10 56.1	15 91	69.1	11 00.6	15 91	68.6	11 05.0	15 91	68.1	3
4	9 37.5	16 93	71.4	9 42.3	16 92	70.9	9 47.1	16 92	70.4	9 51.9	16 92	69.9	9 56.6	16 91	69.4	10 01.3	16 91	68.9	10 06.0	15 91	68.4	10 10.5	15 91	67.9	4
85	8 41.9	17 93	71.3	8 46.9	17 92	70.8	8 51.9	17 92	70.3	8 56.8	16 92	69.8	9 01.7	16 91	69.3	9 06.6	16 91	68.8	9 11.4	16 91	68.3	9 16.2	16 90	67.8	85
6	7 46.3	17 92	71.1	7 51.5	17 92	70.6	7 56.7	17 92	70.1	8 01.8	17 92	69.6	8 06.9	17 91	69.1	8 11.9	17 91	68.6	8 16.9	17 91	68.1	8 21.9	17 90	67.6	6
7	6 50.8	18 92	70.9	6 56.2	18 92	70.4	7 01.5	18 92	69.9	7 06.8	18 92	69.4	7 12.1	17 91	69.0	7 17.3	17 91	68.5	7 22.5	17 91	68.0	7 27.7	17 90	67.5	7
8	5 55.4	18 92	70.8	6 00.9	18 92	70.3	6 06.4	18 92	69.8	6 11.9	18 91	69.3	6 17.3	18 91	68.8	6 22.7	18 91	68.3	6 28.1	18 90	67.8	6 33.5	18 90	67.3	8
9	5 00.0	19 92	70.6	5 05.7	19 92	70.1	5 11.4	19 92	69.6	5 17.0	19 91	69.1	5 22.6	19 91	68.6	5 28.2	19 91	68.1	5 33.8	19 90	67.6	5 39.4	18 90	67.1	9

H.A.	20° 00′				20° 30′				21° 00′				21° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	58 00.0	1.0	02	180.0	57 30.0	1.0	02	180.0	57 00.0	1.0	02	180.0	56 30.0	1.0	01	180.0
1	57 59.1	1.0	05	178.2	57 29.1	1.0	04	178.3	56 59.1	1.0	04	178.3	56 29.1	1.0	04	178.3
2	57 56.4	1.0	08	176.5	57 26.4	1.0	07	176.5	56 56.5	1.0	07	176.6	56 26.5	1.0	07	176.6
3	57 51.8	1.0	11	174.7	57 22.0	1.0	10	174.8	56 52.1	1.0	10	174.9	56 22.2	1.0	10	175.0
4	57 45.5	99	13	172.9	57 15.8	99	13	173.1	56 46.0	99	13	173.2	56 16.2	99	13	173.3
05	57 37.4	99	16	171.2	57 07.8	99	16	171.3	56 38.2	99	16	171.5	56 08.5	99	16	171.6
6	57 27.6	98	19	169.5	56 58.1	98	19	169.7	56 28.6	98	19	169.8	55 59.2	98	18	170.0
7	57 16.0	98	22	167.8	56 46.7	98	22	168.0	56 17.4	98	21	168.2	55 48.1	98	21	168.4
8	57 02.7	97	25	166.1	56 33.7	97	24	166.3	56 04.6	97	24	166.5	55 35.5	97	24	166.8
9	56 47.8	96	28	164.4	56 19.0	96	27	164.7	55 50.1	96	27	164.9	55 21.2	96	26	165.2
10	56 31.2	95	30	162.8	56 02.7	95	30	163.1	55 34.1	95	29	163.3	55 05.4	95	29	163.6
1	56 13.1	94	33	161.2	55 44.8	94	32	161.5	55 16.5	94	32	161.8	54 48.1	95	31	162.1
2	55 53.4	93	35	159.6	55 25.4	93	35	159.9	54 57.4	94	34	160.2	54 29.3	94	34	160.5
3	55 32.2	92	38	158.1	55 04.5	92	37	158.4	54 36.8	92	37	158.7	54 09.0	93	36	159.1
4	55 09.6	91	40	156.6	54 42.2	91	40	156.9	54 14.8	91	39	157.3	53 47.4	92	38	157.6
15	54 45.5	90	42	155.1	54 18.5	90	42	155.4	53 51.5	90	41	155.8	53 24.3	91	41	156.2
6	54 20.1	89	45	153.6	53 53.5	89	44	154.0	53 26.8	89	43	154.4	53 00.0	89	43	154.8
7	53 53.4	87	47	152.2	53 27.1	88	46	152.6	53 00.8	88	46	153.0	52 34.3	88	45	153.4
8	53 25.4	86	49	150.8	52 59.5	86	48	151.3	52 33.5	87	47	151.7	52 07.4	87	47	152.1
9	52 56.2	85	51	149.5	52 30.7	85	50	149.9	52 05.1	86	49	150.4	51 39.4	86	49	150.8
20	52 25.8	84	52	148.2	52 00.7	84	52	148.6	51 35.5	84	51	149.1	51 10.2	85	51	149.5
1	51 54.4	82	54	146.9	51 29.6	83	54	147.4	51 04.8	83	53	147.8	50 39.8	83	52	148.3
2	51 21.8	81	56	145.7	50 57.4	81	55	146.1	50 33.0	82	55	146.6	50 08.4	82	54	147.1
3	50 48.2	80	58	144.5	50 24.2	80	57	145.0	50 00.2	80	56	145.4	49 36.0	81	56	145.9
4	50 13.6	78	59	143.3	49 50.1	79	59	143.8	49 26.4	79	58	144.3	49 02.6	79	57	144.7
25	49 38.1	77	61	142.2	49 14.9	77	60	142.7	48 51.6	78	59	143.2	48 28.2	78	59	143.6
6	49 01.6	76	62	141.1	48 38.9	76	62	141.6	48 16.0	76	61	142.1	47 53.0	77	60	142.5
7	48 24.4	74	64	140.0	48 02.0	75	63	140.5	47 39.5	75	62	141.0	47 16.9	76	62	141.5
8	47 46.2	73	65	139.0	47 24.3	73	64	139.5	47 02.2	74	64	140.0	46 39.9	74	63	140.5
9	47 07.3	72	66	138.0	46 45.7	72	65	138.5	46 24.0	73	65	139.0	46 02.2	73	64	139.5
30	46 27.7	70	67	137.0	46 06.5	71	67	137.5	45 45.1	71	66	138.0	45 23.7	72	65	138.5
1	45 47.3	69	68	136.0	45 26.5	70	68	136.6	45 05.5	70	67	137.1	44 44.4	70	67	137.6
2	45 06.2	68	70	135.1	44 45.8	68	69	135.6	44 25.2	69	68	136.2	44 04.5	69	68	136.7
3	44 24.5	67	71	134.2	44 04.4	67	70	134.8	43 44.2	68	69	135.3	43 23.9	68	69	135.8
4	43 42.1	65	72	133.4	43 22.4	66	71	133.9	43 02.6	66	70	134.4	42 42.6	67	70	134.9
35	42 59.2	64	73	132.5	42 39.8	65	72	133.1	42 20.4	65	71	133.6	42 00.8	66	71	134.1
6	42 15.6	63	73	131.7	41 56.7	63	73	132.3	41 37.6	64	72	132.8	41 18.3	64	72	133.3
7	41 31.6	62	74	130.9	41 13.0	62	74	131.5	40 54.2	63	73	132.0	40 35.3	63	73	132.5
8	40 47.0	61	75	130.2	40 28.7	61	75	130.7	40 10.3	62	74	131.2	39 51.8	62	73	131.7
9	40 01.9	59	76	129.4	39 44.0	60	75	130.0	39 25.9	60	75	130.5	39 07.7	61	74	131.0
40	39 16.3	58	77	128.7	38 58.8	59	76	129.2	38 41.1	59	76	129.8	38 23.2	60	75	130.3
1	38 30.3	57	77	128.0	38 13.1	58	77	128.5	37 55.7	58	76	129.1	37 38.2	59	76	129.6
2	37 43.9	56	78	127.3	37 27.0	57	78	127.9	37 09.9	57	77	128.4	36 52.7	57	76	128.9
3	36 57.0	55	79	126.7	36 40.4	56	78	127.2	36 23.7	56	78	127.7	36 06.8	56	77	128.2
4	36 09.7	54	79	126.0	35 53.5	54	79	126.6	35 37.1	55	78	127.1	35 20.5	55	78	127.6
45	35 22.1	53	80	125.4	35 06.2	53	79	125.9	34 50.1	54	79	126.5	34 33.8	54	78	127.0
6	34 34.1	52	81	124.8	34 18.5	52	80	125.3	34 02.7	53	80	125.9	33 46.8	53	79	126.4
7	33 45.8	51	81	124.2	33 30.4	51	81	124.8	33 14.9	52	80	125.3	32 59.3	52	80	125.8
8	32 57.1	50	82	123.7	32 42.0	50	81	124.2	32 26.9	51	81	124.7	32 11.6	51	80	125.2
9	32 08.1	49	82	123.1	31 53.3	49	82	123.6	31 38.4	50	81	124.1	31 23.4	50	81	124.7
50	31 18.8	48	83	122.6	31 04.3	48	82	123.1	30 49.7	49	82	123.6	30 35.0	49	81	124.1
1	30 29.2	47	83	122.1	30 15.0	47	83	122.6	30 00.7	48	82	123.1	29 46.3	48	82	123.6
2	29 39.3	46	84	121.6	29 25.4	47	83	122.1	29 11.4	47	83	122.6	28 57.2	47	82	123.1
3	28 49.2	45	84	121.1	28 35.5	46	84	121.6	28 21.8	46	83	122.1	28 07.9	46	83	122.6
4	27 58.8	44	84	120.6	27 45.4	45	84	121.1	27 31.9	45	84	121.6	27 18.3	45	83	122.1
55	27 08.1	44	85	120.1	26 55.0	44	84	120.6	26 41.8	44	84	121.1	26 28.5	45	83	121.6
6	26 17.3	43	85	119.7	26 04.4	43	85	120.2	25 51.5	43	84	120.7	25 38.4	44	84	121.2
7	25 26.1	42	86	119.2	25 13.6	42	85	119.7	25 00.9	42	85	120.2	24 48.1	43	84	120.7
8	24 34.8	41	86	118.8	24 22.5	41	85	119.3	24 10.0	42	85	119.8	23 57.5	42	85	120.3
9	23 43.3	40	86	118.4	23 31.2	40	86	118.9	23 19.0	41	85	119.4	23 06.7	41	85	119.9
60	22 51.6	39	87	118.0	22 39.7	40	86	118.5	22 27.8	40	86	119.0	22 15.7	40	85	119.5
1	21 59.6	39	87	117.6	21 48.0	39	86	118.1	21 36.3	39	86	118.6	21 24.5	39	86	119.1
2	21 07.5	38	87	117.2	20 56.1	38	87	117.7	20 44.7	38	86	118.2	20 33.1	39	86	118.7
3	20 15.2	37	87	116.8	20 04.1	37	87	117.3	19 52.9	38	87	117.8	19 41.5	38	86	118.3
4	19 22.8	36	88	116.5	19 11.8	37	87	116.9	19 00.9	37	87	117.4	18 49.8	37	87	117.9
65	18 30.1	36	88	116.1	18 19.4	36	88	116.6	18 08.7	36	87	117.1	17 57.8	36	87	117.6
6	17 37.4	35	88	115.7	17 26.9	35	88	116.2	17 16.3	35	88	116.7	17 05.7	35	87	117.2
7	16 44.4	34	88	115.4	16 34.2	34	88	115.9	16 23.8	35	88	116.4	16 13.5	35	87	116.9
8	15 51.3	33	89	115.1	15 41.3	34	88	115.6	15 31.2	34	88	116.1	15 21.0	34	88	116.5
9	14 58.1	33	89	114.8	14 48.3	33	89	115.2	14 38.4	33	88	115.7	14 28.5	33	88	116.2
70	14 04.7	32	89	114.4	13 55.1	32	89	114.9	13 45.5	32	88	115.4	13 35.7	33	88	115.9
1	13 11.3	31	89	114.1	13 01.8	31	89	114.6	12 52.4	32	89	115.1	12 42.9	32	88	115.6
2	12 17.6	31	90	113.8	12 08.4	31	89	114.3	11 59.2	31	89	114.8	11 49.9	31	89	115.3
3	11 23.9	30	90	113.5	11 14.9	30	89	114.0	11 05.8	30	89	114.5	10 56.8	30	89	115.0
4	10 30.0	29	90	113.3	10 21.2	29	90	113.8	10 12.4	30	89	114.2	10 03.5	30	89	114.7
75	9 36.1	29	90	113.0	9 27.5	29	90	113.5	9 18.8	29	90	114.0	9 10.1	29	89	114.4
6	8 42.0	28	90	112.7	8 33.6	28	90	113.2	8 25.1	28	90	113.7	8 16.7	28	89	114.2
7	7 47.8	27	90	112.5	7 39.6	27	90	112.9	7 31.3	28	90	113.4	7 23.1	28	90	113.9
8	6 53.5	27	91	112.2	6 45.5	27	90	112.7	6 37.4	27	90	113.2	6 29.4	27	90	113.7
9	5 59.1	26	91	112.0	5 51.3	26	90	112.4	5 43.4	26	90	112.9	5 35.5	26	90	113.4
80	5 04.6	25	91	111.7												

H.A.	22° 00′				22° 30′				23° 00′				23° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	56 00.0	1.0	01	180.0	55 30.0	1.0	01	180.0	55 00.0	1.0	01	180.0	54 30.0	1.0	01	180.0
1	55 59.2	1.0	04	178.3	55 29.2	1.0	04	178.4	54 59.2	1.0	04	178.4	54 29.2	1.0	04	178.4
2	55 56.6	1.0	07	176.7	55 26.7	1.0	07	176.7	54 56.7	1.0	07	176.8	54 26.8	1.0	07	176.8
3	55 52.4	1.0	10	175.0	55 22.5	1.0	10	175.1	54 52.6	1.0	10	175.2	54 22.7	1.0	09	175.3
4	55 46.5	99	13	173.4	55 16.7	99	12	173.5	54 46.9	99	12	173.6	54 17.1	99	12	173.7
05	55 38.9	99	15	171.8	55 09.2	99	15	171.9	54 39.6	99	15	172.0	54 09.9	99	15	172.2
6	55 29.7	98	18	170.1	55 00.1	98	18	170.3	54 30.6	98	18	170.5	54 01.1	98	17	170.6
7	55 18.8	98	21	168.5	54 49.5	98	20	168.7	54 20.1	98	20	168.9	53 50.7	98	20	169.1
8	55 06.4	97	23	167.0	54 37.2	97	23	167.2	54 08.0	97	23	167.4	53 38.9	97	22	167.6
9	54 52.3	96	26	165.4	54 23.4	96	26	165.6	53 54.4	97	25	165.9	53 25.5	97	25	166.1
10	54 36.8	96	28	163.9	54 08.1	96	28	164.1	53 39.4	96	28	164.4	53 10.6	96	27	164.6
1	54 19.7	95	31	162.3	53 51.3	95	30	162.6	53 22.8	95	30	162.9	52 54.3	95	30	163.1
2	54 01.2	94	33	160.8	53 33.0	94	33	161.1	53 04.8	94	32	161.4	52 36.6	94	32	161.7
3	53 41.2	93	36	159.4	53 13.3	93	35	159.7	52 45.4	93	35	160.0	52 17.4	93	34	160.3
4	53 19.9	92	38	157.9	52 52.3	92	37	158.3	52 24.7	92	37	158.6	51 57.0	92	36	158.9
15	52 57.1	91	40	156.5	52 29.9	91	39	156.9	52 02.6	91	39	157.2	51 35.2	91	38	157.5
6	52 33.1	90	42	155.1	52 06.2	90	42	155.5	51 39.2	90	41	155.9	51 12.2	90	40	156.2
7	52 07.8	88	44	153.8	51 41.2	89	44	154.2	51 14.6	89	43	154.5	50 47.9	89	42	154.9
8	51 41.3	87	46	152.5	51 15.1	88	46	152.9	50 48.8	88	45	153.2	50 22.4	88	44	153.6
9	51 13.6	86	48	151.2	50 47.7	86	47	151.6	50 21.8	87	47	152.0	49 55.7	87	46	152.4
20	50 44.7	85	50	149.9	50 19.2	85	49	150.3	49 53.6	85	49	150.7	49 28.0	86	48	151.1
1	50 14.8	84	52	148.7	49 49.6	84	51	149.1	49 24.4	84	50	149.5	48 59.1	85	50	149.9
2	49 43.8	82	54	147.5	49 19.0	83	53	147.9	48 54.1	83	52	148.4	48 29.2	83	52	148.8
3	49 11.7	81	55	146.3	48 47.3	81	54	146.8	48 22.8	82	54	147.2	47 58.3	82	53	147.6
4	48 38.7	80	57	145.2	48 14.7	80	56	145.6	47 50.6	81	55	146.1	47 26.4	81	55	146.5
25	48 04.7	79	58	144.1	47 41.1	79	57	144.6	47 17.4	79	57	145.0	46 53.5	80	56	145.4
6	47 29.9	77	60	143.0	47 06.6	78	59	143.5	46 43.3	78	58	143.9	46 19.8	78	58	144.4
7	46 54.1	76	61	142.0	46 31.3	76	60	142.4	46 08.3	77	60	142.9	45 45.2	77	59	143.4
8	46 17.6	75	62	141.0	45 55.1	75	62	141.4	45 32.5	76	61	141.9	45 09.8	76	60	142.4
9	45 40.2	73	64	140.0	45 18.1	74	63	140.4	44 55.9	74	62	140.9	44 33.6	75	62	141.4
30	45 02.1	72	65	139.0	44 40.4	73	64	139.5	44 18.5	73	64	140.0	43 56.6	73	63	140.4
1	44 23.2	71	66	138.1	44 01.9	71	65	138.6	43 40.4	72	65	139.0	43 18.8	72	64	139.5
2	43 43.6	70	67	137.2	43 22.7	70	66	137.7	43 01.6	71	66	138.1	42 40.4	71	65	138.6
3	43 03.4	68	68	136.3	42 42.8	69	68	136.8	42 22.1	69	67	137.3	42 01.2	70	66	137.8
4	42 22.5	67	69	135.4	42 02.3	68	69	135.9	41 41.9	68	68	136.4	41 21.5	68	67	136.9
35	41 41.0	66	70	134.6	41 21.2	66	70	135.1	41 01.2	67	69	135.6	40 41.1	67	68	136.1
6	40 59.0	65	71	133.8	40 39.5	65	70	134.3	40 19.8	66	70	134.8	40 00.1	66	69	135.3
7	40 16.3	64	72	133.0	39 57.2	64	71	133.5	39 37.9	64	71	134.0	39 18.5	65	70	134.5
8	39 33.1	62	73	132.2	39 14.3	63	72	132.7	38 55.4	63	72	133.2	38 36.3	64	71	133.7
9	38 49.4	61	74	131.5	38 31.0	62	73	132.0	38 12.4	62	72	132.5	37 53.7	63	72	133.0
40	38 05.2	60	74	130.8	37 47.1	61	74	131.3	37 28.9	61	73	131.8	37 10.5	61	73	132.3
1	37 20.6	59	75	130.1	37 02.8	59	75	130.6	36 44.9	60	74	131.1	36 26.8	60	74	131.6
2	36 35.4	58	76	129.4	36 18.0	58	75	129.9	36 00.4	59	75	130.4	35 42.7	59	74	130.9
3	35 49.9	57	77	128.7	35 32.7	57	76	129.3	35 15.5	58	76	129.8	34 58.1	58	75	130.3
4	35 03.9	56	77	128.1	34 47.1	56	77	128.6	34 30.2	57	76	129.1	34 13.1	57	76	129.6
45	34 17.5	55	78	127.5	34 01.0	55	77	128.0	33 44.4	56	77	128.5	33 27.7	56	76	129.0
6	33 30.7	54	78	126.9	33 14.6	54	78	127.4	32 58.3	54	78	127.9	32 41.9	55	77	128.4
7	32 43.6	53	79	126.3	32 27.8	53	79	126.8	32 11.8	53	78	127.3	31 55.7	54	78	127.8
8	31 56.1	52	80	125.7	31 40.6	52	79	126.2	31 24.9	52	79	126.7	31 09.2	53	78	127.2
9	31 08.3	51	80	125.2	30 53.1	51	80	125.7	30 37.7	51	79	126.2	30 22.2	52	79	126.7
50	30 20.2	50	81	124.6	30 05.2	50	80	125.1	29 50.2	50	80	125.6	29 35.0	51	79	126.1
1	29 31.7	49	81	124.1	29 17.1	49	81	124.6	29 02.3	49	80	125.1	28 47.4	50	80	125.6
2	28 43.0	48	82	123.6	28 28.6	48	81	124.1	28 14.1	48	81	124.6	27 59.6	49	80	125.1
3	27 53.9	47	82	123.1	27 39.9	47	82	123.6	27 25.7	47	81	124.1	27 11.4	48	81	124.6
4	27 04.6	46	83	122.6	26 50.8	46	82	123.1	26 36.9	47	82	123.6	26 22.9	47	81	124.1
55	26 15.1	45	83	122.1	26 01.5	45	83	122.6	25 47.9	46	82	123.1	25 34.2	46	82	123.6
6	25 25.2	44	83	121.7	25 12.0	44	83	122.2	24 58.6	45	82	122.7	24 45.2	45	82	123.2
7	24 35.2	43	84	121.2	24 22.2	43	83	121.7	24 09.1	44	83	122.2	23 55.9	44	82	122.7
8	23 44.9	42	84	120.8	23 32.1	43	84	121.3	23 19.3	43	83	121.8	23 06.4	43	83	122.3
9	22 54.3	41	84	120.4	22 41.9	42	84	120.9	22 29.3	42	84	121.4	22 16.7	42	83	121.8
60	22 03.6	41	85	120.0	21 51.4	41	84	120.5	21 39.1	41	84	120.9	21 26.7	41	84	121.4
1	21 12.6	40	85	119.6	21 00.7	40	85	120.0	20 48.6	40	84	120.5	20 36.5	41	84	121.0
2	20 21.5	39	85	119.2	20 09.8	39	85	119.7	19 58.0	39	85	120.1	19 46.1	40	84	120.6
3	19 30.2	38	86	118.8	19 18.7	38	85	119.3	19 07.1	39	85	119.8	18 55.5	39	85	120.3
4	18 38.6	37	86	118.4	18 27.4	38	86	118.9	18 16.1	38	85	119.4	18 04.7	38	85	119.9
65	17 46.9	37	86	118.1	17 35.9	37	86	118.5	17 24.9	37	86	119.0	17 13.7	37	85	119.5
6	16 55.0	36	87	117.7	16 44.3	36	86	118.2	16 33.5	36	86	118.7	16 22.6	36	86	119.2
7	16 03.0	35	87	117.4	15 52.5	35	87	117.9	15 41.9	35	86	118.3	15 31.3	36	86	118.8
8	15 10.8	34	87	117.0	15 00.5	34	87	117.5	14 50.2	35	86	118.0	14 39.8	35	86	118.5
9	14 18.5	33	88	116.7	14 08.4	34	87	117.2	13 58.3	34	87	117.7	13 48.1	34	86	118.2
70	13 26.0	33	88	116.4	13 16.1	33	87	116.9	13 06.2	33	87	117.4	12 56.3	33	87	117.8
1	12 33.3	32	88	116.1	12 23.7	32	88	116.6	12 14.0	32	87	117.1	12 04.3	32	87	117.5
2	11 40.5	31	88	115.8	11 31.1	31	88	116.3	11 21.7	32	88	116.8	11 12.2	32	87	117.2
3	10 47.6	31	88	115.5	10 38.4	31	88	116.0	10 29.2	31	88	116.5	10 19.9	31	87	116.9
4	9 54.6	30	89	115.2	9 45.6	30	88	115.7	9 36.6	30	88	116.2	9 27.6	30	88	116.7
75	9 01.4	29	89	114.9	8 52.7	29	88	115.4	8 43.9	29	88	115.9	8 35.0	29	88	116.4
6	8 08.1	28	89	114.7	7 59.6	29	89	115.1	7 51.0	29	88	115.6	7 42.4	29	88	116.1
7	7 14.8	28	89	114.4	7 06.4	28	89	114.9	6 58.0	28	88	115.4	6 49.7	28	88	115.9
8	6 21.3	27	89	114.1	6 13.1	27	89	114.6	6 05.0	27	89	115.1	5 56.8	27	88	115.6
9	5 27.6	26	90	113.9	5 19.7	26	89	114.4	5 11.8	27	89	114.9	5 03.8	27	88	115.3
80																

H.A.	24° 00′				24° 30′				25° 00′				25° 30′				26° 00′				26° 30′				27° 00′				27° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	78 00.0	1.0	04	00.0	77 30.0	1.0	04	00.0	77 00.0	1.0	04	00.0	76 30.0	1.0	03	00.0	76 00.0	1.0	03	00.0	75 30.0	1.0	03	00.0	75 00.0	1.0	03	00.0	74 30.0	1.0	03	00.0	00
1	77 57.8	1.0	11	04.4	77 27.8	1.0	11	04.2	76 57.9	1.0	10	04.0	76 28.0	1.0	10	03.9	75 58.1	1.0	10	03.7	75 28.2	1.0	09	03.6	74 58.2	1.0	09	03.4	74 28.3	1.0	08	03.3	1
2	77 51.1	99	18	08.7	77 21.4	99	18	08.3	76 51.8	99	17	08.0	76 22.1	99	16	07.7	75 52.4	99	16	07.4	75 22.7	99	15	07.1	74 53.0	99	14	06.8	74 23.2	99	14	06.6	2
3	77 40.0	97	25	12.9	77 10.9	97	24	12.4	76 41.6	97	23	11.9	76 12.4	98	22	11.4	75 43.1	98	22	11.0	75 13.7	98	21	10.6	74 44.3	98	20	10.2	74 14.8	98	19	09.8	3
4	77 24.9	95	32	17.0	76 56.3	95	31	16.3	76 27.7	96	29	15.7	75 58.9	96	28	15.1	75 30.1	96	27	14.5	75 01.2	96	26	14.0	74 32.2	97	26	13.5	74 03.2	97	25	13.0	4
05	77 05.8	92	38	20.9	76 38.0	93	36	20.1	76 10.0	93	35	19.3	75 41.9	94	34	18.6	75 13.7	94	33	17.9	74 45.4	95	32	17.3	74 17.0	95	30	16.7	73 48.4	95	30	16.1	05
6	76 43.1	90	43	24.6	76 16.1	90	42	23.6	75 49.0	91	40	22.7	75 21.6	91	39	21.9	74 54.1	92	38	21.1	74 26.4	92	37	20.4	73 58.6	93	35	19.7	73 30.7	93	34	19.1	6
7	76 17.1	86	48	28.0	75 51.0	87	47	27.0	75 24.7	88	45	26.0	74 58.2	89	44	25.1	74 31.4	89	42	24.2	74 04.5	90	41	23.4	73 37.4	91	40	22.7	73 10.1	91	39	21.9	7
8	75 48.1	83	53	31.2	75 23.0	84	51	30.1	74 57.6	85	50	29.1	74 31.9	86	48	28.1	74 06.0	87	47	27.2	73 39.8	88	45	26.3	73 13.5	88	44	25.4	72 46.9	89	43	24.6	8
9	75 16.4	80	57	34.2	74 52.2	81	55	33.1	74 27.8	82	54	32.0	74 03.0	83	52	30.9	73 37.9	84	51	29.9	73 12.6	85	49	29.0	72 47.0	86	48	28.1	72 21.3	86	47	27.2	9
10	74 42.2	77	60	37.0	74 19.0	78	59	35.8	73 55.5	79	57	34.6	73 31.7	80	56	33.6	73 07.5	81	54	32.5	72 43.0	82	53	31.5	72 18.3	83	52	30.6	71 53.3	84	50	29.7	10
1	74 05.9	73	64	39.5	73 43.7	75	62	38.3	73 21.1	76	61	37.1	72 58.2	77	59	36.0	72 34.9	78	58	35.0	72 11.3	79	56	33.9	71 47.4	80	55	33.0	71 23.2	81	53	32.0	1
2	73 27.6	70	67	41.9	73 06.4	71	65	40.6	72 44.7	73	64	39.4	72 22.7	74	62	38.3	72 00.3	75	61	37.2	71 37.6	76	59	36.2	71 14.5	77	58	35.2	70 51.1	78	56	34.2	2
3	72 47.6	67	69	44.0	72 27.3	68	68	42.8	72 06.6	70	66	41.6	71 45.5	71	65	40.4	71 23.9	72	63	39.3	71 02.0	74	62	38.3	70 39.8	75	60	37.3	70 17.2	76	59	36.3	3
4	72 06.1	64	72	46.0	71 46.7	65	70	44.8	71 26.9	67	68	43.6	71 06.6	68	67	42.4	70 46.0	70	66	41.3	70 24.9	71	64	40.2	70 03.5	72	63	39.2	69 41.7	73	62	38.2	4
15	71 23.3	61	74	47.8	71 04.8	62	72	46.6	70 45.8	64	71	45.4	70 26.4	65	69	44.2	70 06.5	67	68	43.1	69 46.3	68	67	42.1	69 25.7	69	65	41.0	69 04.7	71	64	40.0	15
6	70 39.2	58	75	49.5	70 21.5	60	74	48.3	70 03.4	61	72	47.1	69 44.8	63	71	45.9	69 25.8	64	70	44.8	69 06.3	65	69	43.8	68 46.5	67	67	42.7	68 26.3	68	66	41.7	6
7	69 54.1	55	77	51.0	69 37.2	57	76	49.8	69 19.9	59	74	48.7	69 02.0	60	73	47.5	68 43.8	62	72	46.4	68 25.1	63	70	45.3	68 06.1	64	69	44.3	67 46.6	65	68	43.3	7
8	69 08.0	53	78	52.4	68 51.9	55	77	51.2	68 35.3	56	76	50.1	68 18.2	58	75	49.0	68 00.8	59	73	47.9	67 42.9	60	72	46.8	67 24.5	62	71	45.8	67 05.8	63	70	44.8	8
9	68 21.1	50	80	53.7	68 05.7	52	78	52.6	67 49.8	54	77	51.4	67 33.5	55	76	50.3	67 16.8	57	75	49.3	66 59.6	58	74	48.2	66 42.0	59	72	47.2	66 24.0	61	71	46.2	9
20	67 33.4	48	81	54.9	67 18.7	50	80	53.8	67 03.5	51	78	52.7	66 47.9	53	77	51.6	66 31.9	54	76	50.5	66 15.4	56	75	49.5	65 58.5	57	74	48.5	65 41.2	58	73	47.5	20
1	66 45.0	46	82	56.0	66 31.0	48	81	54.9	66 16.5	49	80	53.8	66 01.6	51	78	52.8	65 46.2	52	77	51.7	65 30.4	53	76	50.7	65 14.1	55	75	49.7	64 57.5	56	74	48.7	1
2	65 56.1	44	82	57.1	65 42.7	45	82	56.0	65 28.8	47	80	54.9	65 14.5	48	79	53.8	64 59.8	50	78	52.8	64 44.6	51	77	51.8	64 29.0	53	76	50.8	64 13.1	54	75	49.8	2
3	65 06.6	42	83	58.0	64 53.8	43	82	56.9	64 40.5	45	81	55.9	64 26.8	46	80	54.8	64 12.7	48	80	53.8	63 58.2	49	78	52.8	63 43.2	50	78	51.8	63 27.9	52	76	50.9	3
4	64 16.5	40	84	58.9	64 04.3	41	83	57.8	63 51.7	43	82	56.8	63 38.6	44	81	55.8	63 25.0	46	80	54.8	63 11.1	47	79	53.8	62 56.8	48	78	52.8	62 42.0	50	77	51.9	4
25	63 26.1	38	85	59.7	63 14.4	40	84	58.7	63 02.3	41	83	57.7	62 49.8	42	82	56.7	62 36.8	44	81	55.7	62 23.5	45	80	54.7	62 09.7	47	79	53.7	61 55.6	48	78	52.8	25
6	62 35.2	36	85	60.4	62 24.1	38	85	59.4	62 12.5	39	84	58.4	62 00.5	41	83	57.5	61 48.1	42	82	56.5	61 35.3	43	81	55.5	61 22.1	45	80	54.6	61 08.5	46	79	53.7	6
7	61 44.0	35	86	61.1	61 33.4	36	85	60.2	61 22.3	38	84	59.2	61 10.8	39	83	58.2	60 59.0	40	83	57.3	60 46.7	42	82	56.3	60 34.0	43	81	55.4	60 21.0	44	80	54.5	7
8	60 52.4	33	86	61.8	60 42.3	35	86	60.8	60 31.7	36	85	59.9	60 20.8	37	84	58.9	60 09.4	39	83	58.0	59 57.6	40	82	57.1	59 45.5	41	82	56.2	59 33.0	42	81	55.3	8
9	60 00.6	32	87	62.4	59 50.9	33	86	61.4	59 40.8	34	85	60.5	59 30.3	36	85	59.6	59 19.4	37	84	58.7	59 08.2	38	83	57.8	58 56.6	39	82	56.9	58 44.6	41	81	56.0	9
30	59 08.4	30	87	62.9	58 59.2	31	87	62.0	58 49.6	33	86	61.1	58 39.6	34	85	60.2	58 29.2	35	84	59.3	58 18.4	37	84	58.4	58 07.2	38	83	57.5	57 55.7	39	82	56.6	30
1	58 16.1	29	88	63.5	58 07.2	30	87	62.5	57 58.1	31	86	61.6	57 48.5	33	86	60.8	57 38.5	34	85	59.9	57 28.2	35	84	59.0	57 17.6	36	83	58.1	57 06.5	37	83	57.3	1
2	57 23.4	27	88	63.9	57 15.1	29	87	63.0	57 06.3	30	87	62.2	56 57.1	31	86	61.3	56 47.6	32	85	60.4	56 37.8	33	85	59.6	56 27.6	35	84	58.7	56 17.0	36	83	57.9	2
3	56 30.6	26	88	64.4	56 22.6	27	88	63.5	56 14.3	28	87	62.6	56 05.5	30	86	61.8	55 56.5	31	86	60.9	55 47.0	32	85	60.1	55 37.3	33	84	59.3	55 27.2	34	84	58.4	3
4	55 37.6	25	89	64.8	55 30.0	26	88	63.9	55 22.0	27	87	63.1	55 13.7	28	87	62.3	55 05.0	29	86	61.4	54 56.0	31	85	60.6	54 46.7	32	85	59.8	54 37.0	33	84	58.9	4
35	54 44.4	24	89	65.2	54 37.2	25	88	64.3	54 29.6	26	88	63.5	54 21.7	27	87	62.7	54 13.4	28	86	61.9	54 04.8	29	86	61.0	53 55.9	30	85	60.2	53 46.6	31	84	59.4	35
6	53 51.1	22	89	65.5	53 44.2	23	89	64.7	53 37.0	25	88	63.9	53 29.4	26	87	63.1	53 21.5	27	87	62.3	53 13.3	28	86	61.5	53 04.8	29	86	60.7	52 56.0	30	85	59.9	6
7	52 57.6	21	89	65.9	52 51.1	22	89	65.1	52 44.2	23	88	64.3	52 37.0	24	88	63.5	52 29.5	26	87	62.7	52 21.7	27	86	61.9	52 13.5	28	86	61.1	52 05.1	29	85	60.3	7
8	52 04.0	20	90	66.2	51 57.8	21	89	65.4	51 51.2	22	88	64.6	51 44.4	23	88	63.8	51 37.3	24	87	63.0	51 29.8	25	87	62.3	51 22.1	26	86	61.5	51 14.0	27	85	60.7	8
9	51 10.2	19	90	66.5	51 04.3	20	89	65.7	50 58.2	21	89	64.9	50 51.7	22	88	64.1	50 44.9	23	88	63.4	50 37.8	24	87	62.6	50 30.4	25	86	61.8	50 22.7	26	86	61.1	9
40	50 16.3	18	90	66.7	50 10.8	19	89	66.0	50 04.9	20	89	65.2	49 58.8	21	88	64.4	49 52.4	22	88	63.7	49 45.6	23	87	62.9	49 38.6	24	87	62.2	49 31.3	25	86	61.4	40
1	49 22.4	17	90	67.0	49 17.1	18	90	66.2	49 11.6	19	89	65.5	49 05.8	20	89	64.7	48 59.7	21	88	64.0	48 53.3	22	87	63.2	48 46.6	23	87	62.5	48 39.6	24	86	61.8	1
2	48 28.3	16	90	67.2	48 23.4	17	90	66.5	48 18.2	18	89	65.7	48 12.7	19	89	65.0	48 06.9	20	88	64.3	48 00.8	21	88	63.5	47 54.5	22	87	62.8	47 47.9	23	87	62.1	2
3	47 34.1	15	90	67.4	47 29.5	16	90	66.7	47 24.6	17	89	66.0	47 19.4	18	89	65.2	47 13.9	19	88	64.5	47 08.2	20	88	63.8	47 02.2	20	87	63.1	46 55.9	21	87	62.4	3
4	46 39.9	14	90	67.6	46 35.6	15	90	66.9	46 30.9	16	90	66.2	46 26.1	17	89	65.5	46 20.9	18	88	64.8	46 15.5	18	88	64.0	46 09.8	19	88	63.3	46 03.9	20	87	62.6	4
45	45 45.6	13	91	67.8	45 41.5	14	90	67.1	45 37.2	15	90	66.4	45 32.6	16	89	65.7	45 27.8	17	89	65.0	45 22.7	17	88	64.3	45 17.3	18	88	63.6	45 11.7	19	87	62.9	45
6	44 51.2	12	91	68.0	44 47.4	13	90	67.3	44 43.4	14	90	66.6	44 39.1	15	89	65.9	44 34.6	16	89	65.2	44 29.8	16	88	64.5	44 24.7	17	88	63.8	44 19.4	18	87	63.1	6
7	43 56.8	11	91	68.1	43 53.3	12	90	67.4	43 49.5	13	90	66.7	43 45.5	14	89	66.1	43 41.2	15	89	65.4	43 36.7	15	88	64.7	43 32.0	16	88	64.0	43 27.0	17	88	63.3	7
8	43 02.3	10	91	68.3	42 59.1	11	90	67.6	42 55.6	12	90	66.9	42 51.8	13	90	66.2	42 47.9	14	89	65.5	42 43.6	14	89	64.9	42 39.2	15	88	64.2	42 34.5	16	88	63.5	8
9	42 07.8	10	91	68.4	42 04.8	10	91	67.7	42 01.5	11	90	67.0	41 58.1	12	90	66.4	41 54.4	13	89	65.7	41 50.5	13	89	65.0	41 46.3	14	88	64.4	41 41.9	15	88	63.7	9
50	41 13.2	09	91	68.5	41 10.4	10	91	67.8	41 07.5	10	90	67.2	41 04.3	11	90	66.5	41 00.9	12	89	65.9	40 57.2	13	89	65.2	40 53.4	13	88	64.5	40 49.3	14	88	63.9	50
1	40 18.6	08	91	68.6	40 16.1	09	91	67.9	40 13.4	09	90	67.3	40 10.4	10	90	66.6	40 07.3	11	89	66.0	40 03.9	12	89	65.3	40 00.3	12	88	64.7	39 56.6	13	88	64.0	1
2	39 23.9	07	91	68.7	39 21.7	08	91	68.0	39 19.2	09	90	67.4	39 16.5	09	90	66.8	39 13.7	10	90	66.1	39 10.6	11	89	65.5	39 07.3	11	89	64.8	39 03.8	12	88	64.2	2
3	38 29.2	06	91	68.8	38 27.2	07	91	68.1	38 25.0	08	90	67.5	38 22.6	08	90	66.9	38 20.0	09	90	66.2	38 17.2	10	89	65.6	38 14.1	10	89	64.9	38 10.9	11	88	64.3	3
4	37 34.5	06	91	68.8	37 32.7	06	91	68.2	37 30.8	07	90	67.6	37 28.6	08	90	66.9	37 26.3	08	90	66.3	37 23.7	09	89	65.7	37 20.9	10	89	65.1	37 18.0	10	88	64.4	4
55	36 39.8	05	91	68.9	36 38.2	05	91	68.3	36 36.5	06	90	67.6	36 34.6	07	90	67.0	36 32.5	07	90	66.4	36 30.2	08	89	65.8	36 27.7	09	89	65.2	36 25.0	09	88	64.5	55
6	35 45.0	04	91	68.9	35 43.7	05	91	68.3	35 42.2	06	90	67.7	35 40.5	06	90	67.1	35 38.7	07	90	66.5	35 36.6	07	89	65.9	35 34.4	08	89	65.3	35 32.0	08	88	64.6	6
7	34 50.2	03	91	69.0	34 49.2	04	91	68.4	34 47.9	04	90	67.8	34 46.5	05	90	67.2	34 44.9	06	90	66.5	34 43.1	06	89	65.9	34 41.1	07	89	65.3	34 38.9	07	88	64.7	7
8	33 55.4	03	91	69.0	33 54.6	03	91	68.4	33 53.6	04	90	67.8	33 52.4	04	90	67.2	33 51.0	05	90	66.6	33 49.5	05	89	66.0	33 47.7	06	89	65.4	33 45.8	07	89	64.8	8
9	33 00.6	02	91	69.0	33 00.0	02	91	68.4	32 59.2	03	90	67.8	32 58.3	03	90	67.2	32 57.1	04	90	66.7	32 55.8	05	89	66.1	32 54.4	05	89	65.5	32 52.7	06	89	64.9	9
60	32 05.8	01	91	69.1	32 05.4	02	91	68.5	32 04.9	02	91	67.9	32 04.1	03	90	67.3	32 03.2	03	90	66.7	32 02.2	04	89	66.1	32 01.0	04	89	65.5	31 59.6	05	89	64.9	60
1	31 11.0	00	91	69.1	31 10.8	01	91	68.5	31 10.5	01	91	67.9	31 10.0	02	90	67.3	31 09.3	02	90	66.7	31 08.5	03	89	66.1	31 07.5	04	89	65.6	31 06.4	04	89	65.0	1
2	30 16.2	00	91	69.1	30 16.2	00	91	68.5	30 16.1	01	91	67.9	30 15.8	01	90	67.3	30 15.4	02	90	66.7	30 14.8	02	89	66.2	30 14.1	03	89	65.6	30 13.2	03	89	65.0	2
3	29 21.4	01	91	69.1	29 21.6	01	91	68.5	29 21.7	00	91	67.9	29 21.7	00	90	67.3	29 21.5	01	90	66.8	29 21.2	01	89	66.2	29 20.7	02	89	65.6	29 20.0	02	89	65.0	3
4	28 26.6	02	91	69.0	28 27.0	01	91	68.5	28 27.4	01	91	67.9	28 27.5	00	90	67.3	28 27.6	00	90	66.8	28 27.5	01	90	66.2	28 27.2	01	89	65.6	28 26.8	02	89	65.1	4
65	27 31.8	02	91	69.0	27 32.5	02	91	68.5	27 33.0	02	91	67.9	27 33.4	01	90	67.3	27 33.6	01	90	66.8	27 33.8	00	90	66.2	27 33.8	00	89	65.6	27 33.6	01	89	65.1	65
6	26 37.0	03	91	69.0	26 37.9	03	91	68.4	26 38.6	02	90	67.9	26 39.2	02	90	67.3	26 39.7	01	90	66.7	26 40.1	01	89	66.2	26 40.3	01	89	65.6	26 40.4	00	89	65.1	6
7	25 42.2	04	91	69.0	25 43.3	03	91	68.4	25 44.3	03	90	67.8	25 45.1	03	90	67.3	25 45.8	02	90	66.7	25 46.4	02	89	66.2	25 46.8	01	89	65.6	25 47.2	01	89	65.1	7
8	24 47.4	05	91	68.9	24 48.7	04	91	68.4	24 49.9	04	90	67.8	24 51.0	03	90	67.3	24 51.9	03	90	66.7	24 52.7	02	89	66.2	24 53.4	02	89	65.6	24 53.9	02	89	65.1	8
9	23 52.7	05	91	68.9	23 54.2	05	91	68.3	23 55.6	04	90	67.8	23 56.8	04	90	67.2	23 58.0	04	90	66.7	23 59.0	03	89	66.1	23 59.9	03	89	65.6	24 00.7	02	89	65.0	9
70	22 58.0	06	91	68.8	22 59.7	05	91	68.3	23 01.3	05	90	67.7	23 02.7	05	90	67.2	23 04.1	04	90	66.6	23 05.4	04	89	66.1	23 06.5	04	89	65.5	23 07.5	03	89	65.0	70
1	22 03.3	07	91	68.7	22 05.2	06	91	68.2	22 07.0	06	90	67.7	22 08.7	05	90	67.1	22 10.2	05	90	66.6	22 11.7	05	89	66.0	22 13.1	04	89	65.5	22 14.4	04	89	65.0	1
2	21 08.6	07	91	68.7	21 10.7	07	91	68.1	21 12.7	07	90	67.6	21 14.6	06	90	67.1	21 16.4	06	90	66.5	21 18.1	05	89	66.0	21 19.7	05	89	65.5	21 21.2	05	89	64.9	2
3	20 13.9	08	91	68.6	20 16.2	08	91	68.1	20 18.4	07	90	67.5	20 20.6	07	90	67.0	20 22.6	07	90	66.5	20 24.5	06	89	65.9	20 26.3	06	89	65.4	20 28.0	06	89	64.9	3
4	19 19.3	09	91	68.5	19 21.8	08	91	68.0	19 24.2	08	90	67.5	19 26.5	08	90	66.9	19 28.8	07	90	66.4	19 30.9	07	89	65.9	19 33.0	07	89	65.4	19 34.9	06	88	64.8	4
75	18 24.7	09	91	68.4	18 27.4	09	91	67.9	18 30.0	09	90	67.4	18 32.6	08	90	66.9	18 35.0	08	90	66.3	18 37.4	08	89	65.8	18 39.6	07	89	65.3	18 41.8	07	88	64.8	75
6	17 30.1	10	91	68.3	17 33.0	10	91	67.8	17 35.9	09	90	67.3	17 38.6	09	90	66.8	17 41.3	09	90	66.3	17 43.8	08	89	65.7	17 46.3	08	89	65.2	17 48.7	08	88	64.7	6
7	16 35.6	10	91	68.3	16 38.7	10	90	67.7	16 41.7	10	90	67.2	16 44.7	10	90	66.7	16 47.6	09	90	66.2	16 50.4	09	89	65.7	16 53.1	09	89	65.1	16 55.7	09	88	64.6	7
8	15 41.1	11	91	68.1	15 44.4	11	90	67.6	15 47.6	11	90	67.1	15 50.8	10	90	66.6	15 53.9	10	89	66.1	15 56.9	10	89	65.6	15 59.8	10	89	65.0	16 02.7	09	88	64.5	8
9	14 46.7	12	91	68.0	14 50.2	12	90	67.5	14 53.6	11	90	67.0	14 57.0	11	90	66.5	15 00.3	11	89	66.0	15 03.5	11	89	65.5	15 06.6	10	89	65.0	15 09.7	10	88	64.4	9
80	13 52.3	12	91	67.9	13 56.0	12	90	67.4	13 59.6	12	90	66.9	14 03.2	12	90	66.4	14 06.7	12	89	65.9	14 10.1	11	89	65.4	14 13.5	11	88	64.9	14 16.8	11	88	64.3	80
1	12 57.9	13	90	67.8	13 01.8	13	90	67.3	13 05.6	13	90	66.8	13 09.4	13	90	66.3	13 13.1	12	89	65.8	13 16.8	12	89	65.3	13 20.4	12	88	64.7	13 23.9	12	88	64.2	1
2	12 03.6	14	90	67.7	12 07.7	14	90	67.2	12 11.7	13	90	66.7	12 15.7	13	89	66.2	12 19.6	13	89	65.7	12 23.5	13	89	65.1	12 27.3	13	88	64.6	12 31.1	12	88	64.1	2
3	11 09.3	14	90	67.5	11 13.6	14	90	67.0	11 17.9	14	90	66.5	11 22.1	14	89	66.0	11 26.2	14	89	65.5	11 30.3	14	89	65.0	11 34.3	13	88	64.5	11 38.3	13	88	64.0	3
4	10 15.1	15	90	67.4	10 19.6	15	90	66.9	10 24.0	15	90	66.4	10 28.5	15	89	65.9	10 32.8	14	89	65.4	10 37.1	14	89	64.9	10 41.4	14	88	64.4	10 45.6	14	88	63.9	4
85	9 20.9	16	90	67.3	9 25.6	16	90	66.8	9 30.3	15	90	66.3	9 34.9	15	89	65.8	9 39.5	15	89	65.3	9 44.0	15	88	64.8	9 48.5	15	88	64.3	9 52.9	15	88	63.8	85
6	8 26.8	16	90	67.1	8 31.7	16	90	66.6	8 36.6	16	89	66.1	8 41.4	16	89	65.6	8 46.2	16	89	65.1	8 50.9	16	88	64.6	8 55.7	16	88	64.1	9 00.3	15	88	63.6	6
7	7 32.8	17	90	67.0	7 37.9	17	90	66.5	7 43.0	17	89	66.0	7 48.0	17	89	65.5	7 53.0	17	89	65.0	7 58.0	16	88	64.5	8 02.9	16	88	64.0	8 07.8	16	87	63.5	7
8	6 38.8	18	90	66.8	6 44.1	18	90	66.3	6 49.4	18	89	65.8	6 54.6	17	89	65.3	6 59.8	17	88	64.8	7 05.0	17	88	64.3	7 10.2	17	88	63.8	7 15.3	17	87	63.3	8
9	5 44.9	18	90	66.6	5 50.4	18	89	66.1	5 55.9	18	89	65.7	6 01.3	18	89	65.2	6 06.8	18	88	64.7	6 12.2	18	88	64.2	6 17.5	18	88	63.7	6 22.9	18	87	63.2	9
90									5 02.5	19	89	65.5	5 08.1	19	89	65.0	5 13.8	19	88	64.5	5 19.4	19	88	64.0	5 25.0	19	88	63.5	5 30.5	19	87	63.0	90

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	54 00.0	1.0 01	180.0	53 30.0	1.0 01	180.0	53 00.0	1.0 01	180.0	52 30.0	1.0 01	180.0	52 00.0	1.0 01	180.0	51 30.0	1.0 01	180.0	51 00.0	1.0 01	180.0	50 30.0	1.0 01	180.0	00
1	53 59.2	1.0 04	178.4	53 29.2	1.0 04	178.5	52 59.2	1.0 04	178.5	52 29.2	1.0 04	178.5	51 59.3	1.0 04	178.5	51 29.3	1.0 04	178.6	50 59.3	1.0 04	178.6	50 29.3	1.0 04	178.6	1
2	53 56.8	1.0 07	176.9	53 26.9	1.0 06	176.9	52 56.9	1.0 06	177.0	52 27.0	1.0 06	177.0	51 57.0	1.0 06	177.1	51 27.1	1.0 06	177.1	50 57.1	1.0 06	177.2	50 27.1	1.0 06	177.2	2
3	53 52.8	1.0 09	175.3	53 23.0	1.0 09	175.4	52 53.1	1.0 09	175.5	52 23.2	1.0 09	175.6	51 53.3	1.0 09	175.6	51 23.4	1.0 09	175.7	50 53.5	1.0 08	175.8	50 23.6	1.0 08	175.8	3
4	53 47.3	99 12	173.8	53 17.5	99 12	173.9	52 47.7	99 12	174.0	52 17.9	99 11	174.1	51 48.1	99 11	174.2	51 18.2	99 11	174.3	50 48.4	99 11	174.4	50 18.6	99 11	174.4	4
05	53 40.2	99 14	172.3	53 10.5	99 14	172.4	52 40.8	99 14	172.5	52 11.1	99 14	172.6	51 41.4	99 14	172.7	51 11.7	99 13	172.9	50 41.9	99 13	173.0	50 12.2	99 13	173.1	05
6	53 31.5	99 17	170.8	53 02.0	99 17	170.9	52 32.4	99 16	171.0	52 02.8	99 16	171.2	51 33.2	99 16	171.3	51 03.6	99 16	171.4	50 34.0	99 16	171.6	50 04.4	99 15	171.7	6
7	53 21.3	98 20	169.2	52 51.9	98 19	169.4	52 22.5	98 19	169.6	51 53.1	98 19	169.7	51 23.7	98 18	169.9	50 54.2	98 18	170.0	50 24.7	98 18	170.2	49 55.3	98 18	170.3	7
8	53 00.6	97 22	167.8	52 40.4	97 22	167.9	52 11.2	98 21	168.1	51 41.9	98 21	168.3	51 12.6	98 21	168.5	50 43.4	98 20	168.7	50 14.0	98 20	168.8	49 44.7	98 20	169.0	8
9	52 56.5	97 24	166.3	52 27.4	97 24	166.5	51 58.4	97 24	166.7	51 29.3	97 23	166.9	51 00.2	97 23	167.1	50 31.1	97 23	167.3	50 02.0	97 22	167.5	49 32.8	97 22	167.7	9
10	52 41.8	96 27	164.8	52 13.0	96 26	165.1	51 44.2	96 26	165.3	51 15.3	96 26	165.5	50 46.4	96 25	165.7	50 17.5	96 25	165.9	49 48.6	96 24	166.1	49 19.6	97 24	166.3	10
1	52 25.7	95 29	163.4	51 57.2	95 29	163.6	51 28.6	95 28	163.9	50 59.9	96 28	164.1	50 31.3	96 28	164.4	50 02.6	96 27	164.6	49 33.9	96 27	164.8	49 05.1	96 26	165.0	1
2	52 08.3	94 31	162.0	51 40.0	94 31	162.2	51 11.6	95 30	162.5	50 43.2	95 30	162.8	50 14.8	95 30	163.0	49 46.3	95 29	163.3	49 17.8	95 29	163.5	48 49.3	95 28	163.7	2
3	51 49.4	93 34	160.6	51 21.4	94 33	160.9	50 53.3	94 33	161.1	50 25.1	94 32	161.4	49 57.0	94 32	161.7	49 28.8	94 31	162.0	49 00.5	94 31	162.2	48 32.2	94 30	162.5	3
4	51 29.3	92 36	159.2	51 01.5	93 35	159.5	50 33.7	93 35	159.8	50 05.8	93 34	160.1	49 37.9	93 34	160.4	49 10.0	93 33	160.7	48 42.0	93 33	160.9	48 13.9	93 32	161.2	4
15	51 07.8	92 38	157.9	50 40.3	92 37	158.2	50 12.8	92 37	158.5	49 45.2	92 36	158.8	49 17.6	92 36	159.1	48 49.9	92 35	159.4	48 22.2	92 35	159.7	47 54.4	93 34	160.0	15
6	50 45.0	90 40	156.5	50 17.9	91 39	156.9	49 50.7	91 39	157.2	49 23.4	91 38	157.5	48 56.0	91 38	157.8	48 28.7	91 37	158.2	48 01.2	92 37	158.5	47 33.8	92 36	158.8	6
7	50 21.1	89 42	155.3	49 54.2	90 41	155.6	49 27.3	90 41	155.9	49 00.4	90 40	156.3	48 33.3	90 40	156.6	48 06.2	90 39	156.9	47 39.1	91 39	157.2	47 11.9	91 38	157.6	7
8	49 55.9	88 44	154.0	49 29.4	89 43	154.3	49 02.8	89 43	154.7	48 36.2	89 42	155.1	48 09.5	89 42	155.4	47 42.7	89 41	155.7	47 15.8	90 41	156.1	46 49.0	90 40	156.4	8
9	49 29.6	87 46	152.7	49 03.4	87 45	153.1	48 37.2	88 44	153.5	48 10.9	88 44	153.9	47 44.5	88 44	154.2	47 18.0	88 43	154.6	46 51.5	88 42	154.9	46 24.9	89 42	155.2	9
20	49 02.2	86 48	151.5	48 36.4	86 47	151.9	48 10.4	87 46	152.3	47 44.4	87 46	152.7	47 18.4	87 45	153.0	46 52.3	87 45	153.4	46 26.1	87 44	153.8	45 59.8	88 44	154.1	20
1	48 33.7	85 49	150.4	48 08.2	85 49	150.7	47 42.6	86 48	151.1	47 17.0	86 47	151.5	46 51.3	86 47	151.9	46 25.5	86 46	152.3	45 59.6	86 46	152.6	45 33.7	87 45	153.0	1
2	48 04.1	84 51	149.2	47 39.0	84 50	149.6	47 13.8	84 50	150.0	46 48.5	84 49	150.4	46 23.1	85 48	150.8	45 57.7	85 48	151.2	45 32.1	85 48	151.5	45 06.5	85 47	151.9	2
3	47 33.6	82 52	148.1	47 08.8	83 52	148.5	46 44.0	83 51	148.9	46 19.0	83 51	149.3	45 54.0	84 50	149.7	45 28.9	84 50	150.1	45 03.7	84 49	150.5	44 38.4	84 48	150.9	3
4	47 02.1	81 54	147.0	46 37.7	82 53	147.4	46 13.2	82 53	147.8	45 48.6	82 52	148.2	45 23.9	82 52	148.6	44 59.1	83 51	149.0	44 34.3	83 50	149.4	44 09.4	83 50	149.8	4
25	46 29.6	80 56	145.9	46 05.6	80 55	146.3	45 41.4	81 54	146.7	45 17.2	81 54	147.2	44 52.9	81 53	147.6	44 28.5	82 53	148.0	44 04.0	82 52	148.4	43 39.4	82 51	148.8	25
6	45 56.2	79 57	144.8	45 32.6	79 56	145.3	45 08.8	79 56	145.7	44 44.9	80 55	146.1	44 21.0	80 55	146.6	43 56.9	80 54	147.0	43 32.8	81 54	147.4	43 08.6	81 53	147.8	6
7	45 22.0	77 58	143.8	44 58.7	78 58	144.3	44 35.3	78 57	144.7	44 11.8	79 57	145.1	43 48.2	79 56	145.6	43 24.5	79 55	146.0	43 00.7	79 55	146.4	42 36.9	80 54	146.8	7
8	44 47.0	76 60	142.8	44 24.0	77 59	143.3	44 01.0	77 58	143.7	43 37.9	77 58	144.2	43 14.6	78 57	144.6	42 51.3	78 57	145.0	42 27.9	78 56	145.5	42 04.3	79 56	145.9	8
9	44 11.1	75 61	141.9	43 48.6	75 60	142.3	43 25.9	76 60	142.8	43 03.1	76 59	143.2	42 40.2	76 58	143.7	42 17.3	77 58	144.1	41 54.2	77 58	144.5	41 31.0	77 57	144.9	9
30	43 34.5	74 62	140.9	43 12.3	74 62	141.4	42 50.0	75 61	141.8	42 27.6	75 60	142.3	42 05.1	75 60	142.7	41 42.5	76 59	143.2	41 19.7	76 59	143.6	40 56.9	76 58	144.0	30
1	42 57.1	73 64	140.0	42 35.3	73 63	140.5	42 13.4	73 62	140.9	41 51.3	74 62	141.4	41 29.2	74 61	141.8	41 06.9	74 60	142.3	40 44.6	75 60	142.7	40 22.1	75 59	143.2	1
2	42 19.0	71 65	139.1	41 57.6	72 64	139.6	41 36.0	72 63	140.0	41 14.3	72 63	140.5	40 52.5	73 62	141.0	40 30.7	73 62	141.4	40 08.7	73 61	141.9	39 46.6	74 60	142.3	2
3	41 40.3	70 66	138.2	41 19.2	70 65	138.7	40 58.0	71 64	139.2	40 36.7	71 64	139.6	40 15.2	72 63	140.1	39 53.7	72 63	140.6	39 32.1	72 62	141.0	39 10.3	73 62	141.5	3
4	41 00.9	69 67	137.4	40 40.1	69 66	137.9	40 19.3	70 66	138.3	39 58.3	70 65	138.8	39 37.3	70 64	139.3	39 16.1	71 64	139.7	38 54.8	71 63	140.2	38 33.4	71 63	140.6	4
35	40 20.8	68 68	136.6	40 00.5	68 67	137.0	39 40.0	68 66	137.5	39 19.4	69 66	138.0	38 58.7	69 65	138.5	38 37.8	70 65	138.9	38 16.9	70 64	139.4	37 55.9	70 64	139.8	35
6	39 40.2	66 69	135.8	39 20.2	67 68	136.2	39 00.0	67 68	136.7	38 39.8	68 67	137.2	38 19.4	68 66	137.7	37 59.0	68 66	138.1	37 38.4	69 65	138.6	37 17.7	69 65	139.1	6
7	38 58.9	65 70	135.0	38 39.3	66 69	135.5	38 19.5	66 68	136.0	37 59.6	66 68	136.4	37 39.6	67 67	136.9	37 19.5	67 67	137.4	36 59.3	68 66	137.8	36 39.0	68 66	138.3	7
8	38 17.2	64 70	134.2	37 57.9	65 70	134.7	37 38.4	65 69	135.2	37 18.9	65 69	135.7	36 59.2	66 68	136.2	36 39.5	66 68	136.6	36 19.6	66 67	137.1	35 59.6	67 66	137.5	8
9	37 34.8	63 71	133.5	37 15.9	63 71	134.0	36 56.8	64 70	134.5	36 37.6	64 70	134.9	36 18.3	65 69	135.4	35 58.9	65 68	135.9	35 39.4	65 68	136.4	35 19.7	66 67	136.8	9
40	36 52.0	62 72	132.8	36 33.4	62 72	133.3	36 14.7	63 71	133.8	35 55.8	63 70	134.2	35 36.9	63 70	134.7	35 17.8	64 69	135.2	34 58.6	64 69	135.7	34 39.3	64 68	136.1	40
1	36 08.7	61 73	132.1	35 50.4	61 72	132.6	35 32.0	61 72	133.1	35 13.5	62 71	133.5	34 54.9	62 71	134.0	34 36.2	63 70	134.5	34 17.3	63 70	135.0	33 58.4	63 69	135.4	1
2	35 24.9	60 74	131.4	35 07.0	60 73	131.9	34 48.9	60 73	132.4	34 30.7	61 72	132.9	34 12.5	61 72	133.3	33 54.1	61 71	133.8	33 35.6	62 70	134.3	33 17.0	62 70	134.8	2
3	34 40.7	58 74	130.7	34 23.1	59 74	131.2	34 05.3	59 73	131.7	33 47.5	60 73	132.2	33 29.6	60 72	132.7	33 11.5	60 72	133.2	32 53.3	61 71	133.6	32 35.1	61 71	134.1	3
4	33 56.0	57 75	130.1	33 38.7	58 75	130.6	33 21.3	58 74	131.1	33 03.8	59 74	131.6	32 46.2	59 73	132.1	32 28.5	59 72	132.5	32 10.6	60 72	133.0	31 52.7	60 71	133.5	4
45	33 10.9	56 76	129.5	32 53.9	57 75	130.0	32 36.9	57 75	130.5	32 19.7	57 74	130.9	32 02.4	58 74	131.4	31 45.0	58 73	131.9	31 27.5	59 73	132.4	31 09.9	59 72	132.9	45
6	32 25.4	55 76	128.9	32 08.8	56 76	129.4	31 52.0	56 75	129.9	31 35.2	56 75	130.3	31 18.2	57 74	130.8	31 01.1	57 74	131.3	30 43.9	57 73	131.8	30 26.7	58 73	132.3	6
7	31 39.5	54 77	128.3	31 23.2	55 77	128.8	31 06.8	55 76	129.3	30 50.2	55 76	129.8	30 33.6	56 75	130.2	30 16.8	56 74	130.7	30 00.0	56 74	131.2	29 43.0	57 73	131.7	7
8	30 53.3	53 78	127.7	30 37.3	54 77	128.2	30 21.2	54 77	128.7	30 04.9	54 76	129.2	29 48.6	55 76	129.7	29 32.2	55 75	130.1	29 15.6	55 74	130.6	28 59.0	56 74	131.1	8
9	30 06.7	52 78	127.2	29 51.0	52 78	127.6	29 35.2	53 77	128.1	29 19.3	53 77	128.6	29 03.2	54 76	129.1	28 47.1	54 76	129.6	28 30.9	54 75	130.1	28 14.6	55 75	130.5	9
50	29 19.7	51 79	126.6	29 04.3	51 78	127.1	28 48.8	52 78	127.6	28 33.2	52 77	128.1	28 17.5	53 77	128.6	28 01.7	53 76	129.0	27 45.8	53 76	129.5	27 29.8	54 75	130.0	50
1	28 32.4	50 79	126.1	28 17.4	50 79	126.6	28 02.2	51 78	127.1	27 46.9	51 78	127.5	27 31.5	52 77	128.0	27 16.0	52 77	128.5	27 00.4	52 76	129.0	26 44.7	52 76	129.5	1
2	27 44.9	49 80	125.6	27 30.1	49 79	126.1	27 15.2	50 79	126.5	27 00.2	50 78	127.0	26 45.1	50 78	127.5	26 29.9	51 77	128.0	26 14.6	51 77	128.5	25 59.2	51 76	129.0	2
3	26 57.0	48 80	125.1	26 42.5	49 80	125.6	26 27.9	49 79	126.0	26 13.2	49 79	126.5	25 58.4	49 78	127.0	25 43.5	50 78	127.5	25 28.5	50 77	128.0	25 13.4	50 77	128.5	3
4	26 08.8	47 81	124.6	25 54.6	48 80	125.1	25 40.3	48 80	125.6	25 25.9	48 79	126.0	25 11.4	49 79	126.5	24 56.8	49 78	127.0	24 42.1	49 78	127.5	24 27.3	49 77	128.0	4
55	25 20.3	46 81	124.1	25 06.4	47 81	124.6	24 52.4	47 80	125.1	24 38.3	47 80	125.6	24 24.1	48 79	126.1	24 09.8	48 79	126.5	23 55.4	48 78	127.0	23 40.9	48 78	127.5	55
6	24 31.6	45 82	123.6	24 18.0	46 81	124.1	24 04.2	46 81	124.6	23 50.4	46 80	125.1	23 36.5	47 80	125.6	23 22.5	47 79	126.1	23 08.4	47 79	126.6	22 54.2	47 78	127.0	6
7	23 42.6	44 82	123.2	23 29.3	45 82	123.7	23 15.8	45 81	124.2	23 02.2	45 81	124.7	22 48.6	46 80	125.1	22 34.9	46 80	125.6	22 21.1	46 79	126.1	22 07.2	46 79	126.6	7
8	22 53.4	44 82	122.8	22 40.3	44 82	123.2	22 27.1	44 82	123.7	22 13.8	44 81	124.2	22 00.5	45 81	124.7	21 47.0	45 80	125.2	21 33.5	45 80	125.7	21 19.9	45 79	126.1	8
9	22 03.9	43 83	122.3	21 51.1	43 82	122.8	21 38.2	43 82	123.3	21 25.2	43 81	123.8	21 12.1	44 81	124.3	20 59.0	44 81	124.8	20 45.7	44 80	125.2	20 32.4	45 80	125.7	9
60	21 14.2	42 83	121.9	21 01.7	42 83	122.4	20 49.0	42 82	122.9	20 36.3	43 82	123.4	20 23.5	43 82	123.9	20 10.6	43 81	124.3	19 57.7	43 80	124.8	19 44.6	44 80	125.3	60
1	20 24.3	41 84	121.5	20 12.0	41 83	122.0	19 59.6	41 83	122.5	19 47.2	42 82	123.0	19 34.6	42 82	123.5	19 22.0	42 81	123.9	19 09.4	42 81	124.4	18 56.6	43 80	124.9	1
2	19 34.2	40 84	121.1	19 22.1	40 83	121.6	19 10.0	40 83	122.1	18 57.8	41 83	122.6	18 45.6	41 82	123.1	18 33.2	41 82	123.5	18 20.8	41 81	124.0	18 08.3	42 81	124.5	2
3	18 43.8	39 84	120.7	18 32.0	39 84	121.2	18 20.2	40 83	121.7	18 08.3	40 83	122.2	17 56.3	40 83	122.7	17 44.2	40 82	123.2	17 32.1	41 82	123.6	17 19.9	41 81	124.1	3
4	17 53.3	38 84	120.4	17 41.8	39 84	120.9	17 30.2	39 84	121.3	17 18.5	39 83	121.8	17 06.8	39 83	122.3	16 55.0	39 82	122.8	16 43.1	40 82	123.3	16 31.2	40 82	123.7	4
65	17 02.5	37 85	120.0	16 51.3	38 84	120.5	16 39.9	38 84	121.0	16 28.5	38 84	121.5	16 17.1	38 83	121.9	16 05.5	39 83	122.4	15 53.9	39 82	122.9	15 42.3	39 82	123.4	65
6	16 11.6	37 85	119.7	16 00.6	37 85	120.1	15 49.5	37 84	120.6	15 38.4	37 84	121.1	15 27.2	37 84	121.6	15 15.9	38 83	122.1	15 04.5	38 83	122.5	14 53.1	38 82	123.0	6
7	15 20.5	36 86	119.3	15 09.8	36 85	119.8	14 58.9	36 85	120.3	14 48.0	36 84	120.8	14 37.1	37 84	121.2	14 26.1	37 83	121.7	14 15.0	37 83	122.2	14 03.8	37 82	122.7	7
8	14 29.3	35 86	119.0	14 18.7	35 85	119.5	14 08.2	35 85	119.9	13 57.5	36 84	120.4	13 46.8	36 84	120.9	13 36.0	36 84	121.4	13 25.2	36 83	121.9	13 14.3	36 83	122.3	8
9	13 37.9	34 86	118.6	13 27.6	34 86	119.1	13 17.2	35 85	119.6	13 06.8	35 85	120.1	12 56.4	35 84	120.6	12 45.8	35 84	121.1	12 35.3	35 84	121.5	12 24.7	35 83	122.0	9
70	12 46.3	33 86	118.3	12 36.2	34 86	118.8	12 26.1	34 86	119.3	12 16.0	34 85	119.8	12 05.7	34 85	120.3	11 55.5	34 84	120.7	11 45.2	34 84	121.2	11 34.8	35 83	121.7	70
1	11 54.5	33 86	118.0	11 44.7	33 86	118.5	11 34.8	33 86	119.0	11 24.9	33 85	119.5	11 15.0	33 85	119.9	11 05.0	33 84	120.4	10 54.9	34 84	120.9	10 44.8	34 84	121.4	1
2	11 02.7	32 87	117.7	10 53.1	32 86	118.2	10 43.4	32 86	118.7	10 33.8	32 86	119.2	10 24.0	32 85	119.6	10 14.3	33 85	120.1	10 04.5	33 84	120.6	9 54.6	33 84	121.1	2
3	10 10.6	31 87	117.4	10 01.3	31 87	117.9	9 51.9	31 86	118.4	9 42.4	32 86	118.9	9 33.0	32 85	119.4	9 23.4	32 85	119.8	9 13.9	32 84	120.3	9 04.3	32 84	120.8	3
4	9 18.5	30 87	117.1	9 09.3	30 87	117.6	9 00.2	31 86	118.1	8 51.0	31 86	118.6	8 41.7	31 86	119.1	8 32.5	31 85	119.6	8 23.1	31 85	120.0	8 13.8	31 84	120.5	4
75	8 26.2	30 87	116.9	8 17.3	30 87	117.3	8 08.3	30 87	117.8	7 59.4	30 86	118.3	7 50.4	30 86	118.8	7 41.3	30 85	119.3	7 32.3	30 85	119.8	7 23.2	30 85	120.2	75
6	7 33.8	29 88	116.6	7 25.1	29 87	117.1	7 16.4	29 87	117.6	7 07.6	29 86	118.0	6 58.9	29 86	118.5	6 50.1	29 86	119.0	6 41.2	29 85	119.5	6 32.4	30 85	120.0	6
7	6 41.2	28 88	116.3	6 32.8	28 87	116.8	6 24.3	28 87	117.3	6 15.8	28 87	117.8	6 07.2	28 86	118.3	5 58.7	29 86	118.7	5 50.1	29 85	119.2	5 41.5	29 85	119.7	7
8	5 48.6	27 88	116.1	5 40.3	27 88	116.6	5 32.1	28 87	117.0	5 23.8	28 87	117.5	5 15.5	28 87	118.0	5 07.2	28 86	118.5							8

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	74 00.0	1.0 03	00.0	73 30.0	1.0 03	00.0	73 00.0	1.0 02	00.0	72 00.0	1.0 02	00.0	70 00.0	1.0 02	00.0	68 00.0	1.0 02	00.0	67 30.0	1.0 02	00.0	66 30.0	1.0 02	00.0	00
1	73 58.4	1.0 08	03.2	73 28.4	1.0 08	03.1	72 58.5	1.0 08	03.0	71 58.6	1.0 07	02.8	69 58.7	1.0 06	02.5	67 58.9	1.0 06	02.2	67 28.9	1.0 06	02.2	66 29.0	1.0 05	02.0	1
2	73 53.5	99 14	06.4	73 23.7	99 13	06.2	72 53.9	99 13	06.0	71 54.3	99 12	05.6	69 54.9	1.0 10	04.9	67 55.5	1.0 09	04.4	67 25.6	1.0 09	04.3	66 25.8	1.0 09	04.1	2
3	73 45.3	98 19	09.5	73 15.8	98 18	09.2	72 46.3	98 18	08.9	71 47.2	99 16	08.3	69 48.6	99 15	07.4	67 49.8	99 13	06.6	67 20.1	99 13	06.4	66 29.6	99 12	06.1	3
4	73 34.1	97 24	12.6	73 05.0	97 23	12.2	72 35.8	97 22	11.8	71 37.3	98 21	11.0	69 39.9	98 19	09.8	67 42.0	98 17	08.8	67 12.5	98 16	08.5	66 13.4	99 15	08.1	4
05	73 19.8	95 29	15.6	72 51.1	96 28	15.1	72 22.4	96 27	14.6	71 24.7	96 25	13.7	69 28.7	97 23	12.2	67 32.0	97 20	10.9	67 02.7	98 20	10.6	66 04.1	98 19	10.1	05
6	73 02.7	94 33	18.4	72 34.5	94 32	17.9	72 06.3	94 31	17.3	71 09.5	95 29	16.3	69 15.1	96 26	14.5	67 19.8	96 24	13.0	66 50.9	97 23	12.7	65 52.8	97 22	12.0	6
7	72 42.7	92 38	21.2	72 15.2	92 36	20.6	71 47.5	92 35	19.9	70 51.8	93 33	18.8	68 59.3	94 30	16.8	67 05.6	95 27	15.0	66 37.0	95 26	14.7	65 39.7	96 25	13.9	7
8	72 20.2	89 42	23.9	71 53.3	90 40	23.2	71 26.3	90 39	22.5	70 31.8	91 37	21.2	68 41.3	93 34	19.0	66 49.4	94 30	17.0	66 21.2	94 30	16.6	65 24.6	94 28	15.8	8
9	71 55.2	87 45	26.4	71 29.1	88 44	25.7	71 02.7	88 43	24.9	70 09.4	89 41	23.5	68 21.2	91 37	21.1	66 31.2	92 33	19.0	66 03.5	93 33	18.5	65 07.7	93 31	17.6	9
10	71 28.0	85 49	28.8	71 02.6	85 48	28.0	70 36.9	86 46	27.2	69 45.0	87 44	25.8	67 59.1	89 40	23.1	66 11.2	91 36	20.9	65 43.9	91 36	20.4	64 49.1	92 34	19.4	10
1	70 58.7	82 52	31.1	70 34.0	83 51	30.3	70 09.0	84 50	29.4	69 18.5	85 47	27.9	67 35.2	87 43	25.1	65 49.4	89 39	22.7	65 22.6	89 38	22.2	64 28.8	90 37	21.1	1
2	70 27.4	79 55	33.3	70 03.4	80 54	32.4	69 39.2	81 53	31.5	68 50.1	83 50	29.9	67 00.4	85 46	27.0	65 25.9	87 42	24.5	64 59.6	88 41	23.9	64 06.8	88 39	22.8	2
3	69 54.3	77 58	35.3	69 31.1	78 57	34.4	69 07.7	79 55	33.5	68 20.0	80 53	31.8	66 41.9	83 48	28.8	65 00.8	85 44	26.2	64 35.1	86 44	25.6	63 43.3	87 42	24.4	3
4	69 19.6	74 60	37.2	68 57.2	75 59	36.3	68 34.5	76 58	35.4	67 48.2	78 56	33.7	66 12.8	81 51	30.6	64 34.1	83 47	27.8	64 09.0	84 46	27.2	63 18.3	85 44	26.0	4
15	68 43.3	72 63	39.0	68 21.7	73 61	38.1	67 59.7	74 60	37.2	67 14.9	76 58	35.4	65 42.2	79 53	32.2	64 06.0	81 49	29.4	63 41.4	82 48	28.8	62 51.8	83 46	27.5	15
6	68 05.7	69 65	40.7	67 44.8	70 64	39.8	67 23.6	71 62	38.8	66 40.2	73 60	37.1	65 10.2	77 56	33.8	63 36.5	80 51	30.9	63 12.5	80 50	30.3	62 24.1	81 48	29.0	6
7	67 26.8	67 67	42.3	67 06.6	68 66	41.3	66 46.2	69 64	40.4	66 04.2	71 62	38.6	64 36.9	74 58	35.3	63 05.6	77 53	32.4	62 42.3	78 52	31.7	61 55.0	79 50	30.4	7
8	66 46.7	64 68	43.8	66 27.3	65 67	42.8	66 07.5	67 66	41.9	65 27.0	69 64	40.1	64 02.3	72 60	36.8	62 33.6	75 55	33.8	62 10.9	76 54	33.1	61 24.7	78 52	31.7	8
9	66 05.6	62 70	45.2	65 46.9	63 69	44.2	65 27.8	64 68	43.3	64 48.6	66 66	41.5	63 26.7	70 61	38.1	62 00.4	73 57	35.1	61 38.3	74 56	34.4	60 53.3	76 54	33.0	9
20	65 23.5	60 72	46.5	65 05.5	61 71	45.5	64 47.1	62 70	44.6	64 09.2	64 67	42.8	62 49.9	68 63	39.4	61 26.1	71 59	36.4	61 04.6	72 58	35.6	60 20.8	74 56	34.2	20
1	64 40.5	57 73	47.7	64 23.1	59 72	46.8	64 05.4	60 71	45.8	63 28.9	62 69	44.0	62 12.1	66 64	40.7	60 50.8	69 60	37.6	60 29.9	70 59	36.9	59 47.3	72 58	35.4	1
2	63 56.7	55 74	48.9	63 40.0	56 73	47.9	63 22.9	58 72	47.0	62 47.7	60 70	45.2	61 33.4	64 66	41.8	60 14.6	67 62	38.7	59 54.2	68 61	38.0	59 12.8	70 59	36.6	2
3	63 12.1	53 75	49.9	62 56.1	54 74	49.0	62 39.6	55 73	48.1	62 05.6	58 71	46.3	60 53.8	62 67	42.9	59 37.4	65 63	39.8	59 17.6	66 62	39.1	58 37.4	68 60	37.7	3
4	62 26.9	51 76	50.9	62 11.4	52 75	50.0	61 55.6	53 74	49.1	61 22.8	56 72	47.3	60 13.5	60 69	44.0	58 59.4	64 65	40.9	58 40.2	64 64	40.1	58 01.1	66 62	38.7	4
25	61 41.0	49 78	51.9	61 26.1	50 76	51.0	61 10.9	51 76	50.1	60 39.3	54 74	48.3	59 32.3	58 70	45.0	58 20.6	62 66	41.9	58 02.0	62 65	41.1	57 24.0	64 63	39.7	25
6	60 54.6	47 78	52.8	60 40.3	48 77	51.9	60 25.6	50 76	51.0	59 55.2	52 75	49.2	58 50.5	56 71	45.9	57 41.0	60 67	42.8	57 23.0	61 66	42.1	56 46.1	62 64	40.6	6
7	60 07.6	45 79	53.6	59 53.8	46 78	52.7	59 39.7	48 77	51.8	59 10.4	50 76	50.1	58 08.0	54 72	46.8	57 00.8	58 68	43.7	56 43.3	59 67	43.0	56 07.6	60 65	41.5	7
8	59 20.1	44 80	54.4	59 06.9	45 79	53.5	58 53.3	46 78	52.6	58 25.1	48 76	50.9	57 24.9	52 73	47.7	56 19.9	56 69	44.6	56 03.0	57 68	43.9	55 28.3	59 66	42.4	8
9	58 32.2	42 80	55.1	58 19.5	43 80	54.2	58 06.5	44 79	53.4	57 39.3	46 77	51.7	56 41.3	50 74	48.5	55 38.4	54 70	45.4	55 22.0	55 69	44.7	54 48.4	57 68	43.2	9
30	57 43.9	40 81	55.8	57 31.7	41 80	54.9	57 19.1	42 80	54.1	56 53.0	45 78	52.4	55 57.1	49 74	49.2	54 56.3	52 71	46.2	54 40.5	53 70	45.4	54 07.9	55 68	44.0	30
1	56 55.2	38 82	56.4	56 43.4	40 81	55.6	56 31.4	41 80	54.8	56 06.3	43 79	53.1	55 12.4	47 75	49.9	54 13.7	51 72	46.9	53 58.4	52 71	46.2	53 26.9	53 69	44.8	1
2	56 06.1	37 82	57.0	55 54.9	38 82	56.2	55 43.3	39 81	55.4	55 19.2	41 79	53.8	54 27.2	45 76	50.6	53 30.6	49 73	47.6	53 15.8	50 72	46.9	52 45.3	52 70	45.5	2
3	55 16.7	35 83	57.6	55 05.9	36 82	56.8	54 54.8	38 81	56.0	54 31.7	40 80	54.4	53 41.6	44 77	51.3	52 47.0	47 73	48.3	52 32.7	48 73	47.6	52 03.2	50 71	46.1	3
4	54 27.0	34 83	58.1	54 16.7	35 83	57.3	54 06.0	36 82	56.5	53 43.8	38 80	54.9	52 55.7	42 77	51.9	52 03.0	46 74	48.9	51 49.2	47 73	48.2	51 20.7	48 72	46.8	4
35	53 37.0	32 84	58.6	53 27.1	34 83	57.8	53 16.9	35 82	57.0	52 55.6	37 81	55.5	52 09.3	40 78	52.5	51 18.6	44 75	49.5	51 05.2	45 74	48.8	50 37.7	47 72	47.4	35
6	52 46.8	31 84	59.1	52 37.3	32 83	58.3	52 27.5	33 83	57.5	52 07.1	35 81	56.0	51 22.6	39 78	53.0	50 33.7	43 75	50.1	50 20.8	43 75	49.4	49 54.3	45 73	48.0	6
7	51 56.3	30 84	59.5	51 47.3	31 84	58.8	51 37.9	32 83	58.0	51 18.3	34 82	56.5	50 35.6	37 79	53.5	49 48.5	41 76	50.6	49 36.1	42 75	49.9	49 10.5	43 74	48.5	7
8	51 05.6	28 85	59.9	50 57.0	29 84	59.2	50 48.0	30 84	58.4	50 29.2	32 82	56.9	49 48.3	36 79	54.0	49 03.0	39 76	51.1	48 51.0	40 76	50.4	48 26.3	42 74	49.1	8
9	50 14.7	27 85	60.3	50 06.5	28 85	59.6	49 57.9	29 84	58.8	49 39.9	31 83	57.4	49 00.6	35 80	54.5	48 17.1	38 77	51.6	48 05.6	39 76	50.9	47 41.8	40 75	49.6	9
40	49 23.6	26 86	60.7	49 15.8	27 85	60.0	49 07.6	28 84	59.2	48 50.4	30 83	57.8	48 12.8	33 80	54.9	47 31.0	37 77	52.1	47 19.9	37 77	51.4	46 57.0	39 75	50.0	40
1	48 32.4	25 86	61.0	48 24.9	26 85	60.3	48 17.1	26 84	59.6	48 00.6	28 83	58.1	47 24.6	32 81	55.3	46 44.5	35 78	52.5	46 33.9	36 77	51.8	46 11.8	37 76	50.5	1
2	47 41.0	23 86	61.4	47 33.8	24 85	60.6	47 26.4	25 85	59.9	47 10.7	27 84	58.5	46 36.3	30 81	55.7	45 57.8	34 78	52.9	45 47.6	34 78	52.3	45 26.4	36 76	50.9	2
3	46 49.4	22 86	61.6	46 42.6	23 86	60.9	46 35.5	24 85	60.2	46 20.6	26 84	58.8	45 47.7	29 81	56.0	45 10.8	32 79	53.3	45 01.0	33 78	52.7	44 40.7	35 77	51.3	3
4	45 57.7	21 86	61.9	45 51.2	22 86	61.2	45 44.5	23 85	60.5	45 30.3	25 84	59.1	44 58.9	28 82	56.4	44 23.6	31 79	53.7	44 14.3	32 78	53.0	43 54.8	33 77	51.7	4
45	45 05.8	20 87	62.2	44 59.7	21 86	61.5	44 53.3	22 86	60.8	44 39.8	23 84	59.4	44 09.9	27 82	56.7	43 36.2	30 79	54.1	43 27.2	30 79	53.4	43 08.6	32 77	52.1	45
6	44 13.9	19 87	62.4	44 08.1	20 86	61.7	44 02.0	21 86	61.1	43 49.2	22 85	59.7	43 20.8	25 82	57.0	42 48.6	28 80	54.4	42 40.0	29 79	53.7	42 22.2	30 78	52.4	6
7	43 21.8	18 87	62.6	43 16.3	19 86	62.0	43 10.6	19 86	61.3	42 58.5	21 85	60.0	42 31.5	24 82	57.3	42 00.8	27 80	54.7	41 52.6	28 79	54.0	41 35.5	29 78	52.8	7
8	42 29.6	17 87	62.9	42 24.5	18 87	62.2	42 19.1	18 86	61.5	42 07.6	20 85	60.2	41 42.0	23 83	57.6	41 12.8	26 80	55.0	41 05.0	26 80	54.3	40 48.7	28 78	53.1	8
9	41 37.3	16 87	63.1	41 32.5	16 87	62.4	41 27.4	17 86	61.7	41 16.6	19 85	60.4	40 52.4	22 83	57.8	40 24.7	24 80	55.3	40 17.2	25 80	54.6	40 01.7	27 79	53.4	9
50	40 45.0	15 87	63.2	40 40.4	15 87	62.6	40 35.7	16 86	61.9	40 25.5	18 85	60.6	40 02.7	20 83	58.1	39 36.4	23 81	55.5	39 29.3	24 80	54.9	39 14.5	25 79	53.6	50
1	39 52.5	14 88	63.4	39 48.3	14 87	62.8	39 43.9	15 86	62.1	39 34.3	17 85	60.8	39 12.8	19 83	58.3	38 47.9	22 81	55.8	38 41.2	23 80	55.1	38 27.2	24 79	53.9	1
2	39 00.0	13 88	63.5	38 56.1	13 87	62.9	38 52.0	14 87	62.3	38 43.1	16 86	61.0	38 22.8	18 83	58.5	37 59.4	21 81	56.0	37 53.0	22 81	55.4	37 39.7	23 79	54.1	2
3	38 07.5	12 88	63.7	38 03.8	12 87	63.1	38 00.0	13 87	62.4	37 51.7	14 86	61.2	37 32.7	17 84	58.7	37 10.7	20 81	56.2	37 04.7	20 81	55.6	36 52.1	22 80	54.4	3
4	37 14.8	11 88	63.8	37 11.5	12 87	63.2	37 07.9	12 87	62.6	37 00.2	13 86	61.3	36 42.6	16 84	58.8	36 21.8	19 82	56.4	36 16.2	19 81	55.8	36 04.3	20 80	54.6	4
55	36 22.1	10 88	63.9	36 19.1	11 87	63.3	36 15.8	11 87	62.7	36 08.7	12 86	61.5	35 52.3	15 84	59.0	35 32.9	17 82	56.6	35 27.6	18 81	56.0	35 16.4	19 80	54.8	55
6	35 29.4	09 88	64.0	35 26.6	10 88	63.4	35 23.6	10 87	62.8	35 17.1	11 86	61.6	35 01.9	14 84	59.2	34 43.9	16 82	56.8	34 38.9	17 81	56.2	34 28.4	18 80	55.0	6
7	34 36.6	08 88	64.1	34 34.1	09 88	63.5	34 31.4	09 87	62.9	34 25.5	10 86	61.7	34 11.5	13 84	59.3	33 54.7	15 82	56.9	33 50.1	16 81	56.3	33 40.3	17 80	55.1	7
8	33 43.8	07 88	64.2	33 41.5	08 88	63.6	33 39.1	08 87	63.0	33 33.8	09 86	61.8	33 21.0	12 84	59.4	33 05.5	14 82	57.1	33 01.2	15 82	56.5	32 52.2	16 80	55.3	8
9	32 50.9	06 88	64.3	32 48.9	07 88	63.7	32 46.8	07 87	63.1	32 42.0	09 86	61.9	32 30.4	11 84	59.5	32 16.2	13 82	57.2	32 12.3	13 82	56.6	32 03.9	15 81	55.4	9
60	31 58.0	05 88	64.3	31 56.3	06 88	63.7	31 54.5	07 87	63.2	31 50.2	08 86	62.0	31 39.8	10 84	59.6	31 26.9	12 82	57.3	31 23.2	12 82	56.7	31 15.5	13 81	55.6	60
1	31 05.1	05 88	64.4	31 03.7	06 88	63.8	31 02.1	06 87	63.2	30 58.4	07 86	62.1	30 49.2	09 85	59.7	30 37.5	11 82	57.4	30 34.1	11 82	56.8	30 27.1	12 81	55.7	1
2	30 12.2	04 88	64.4	30 11.0	04 88	63.9	30 00.7	05 87	63.3	30 06.5	06 86	62.1	29 58.5	08 85	59.8	29 48.0	10 83	57.5	29 45.0	10 82	56.9	29 38.6	11 81	55.8	2
3	29 19.2	03 88	64.5	29 18.3	03 88	63.9	29 17.2	04 87	63.3	29 14.6	05 87	62.2	29 07.7	07 85	59.9	28 58.4	09 83	57.6	28 55.8	09 82	57.0	28 50.0	10 81	55.9	3
4	28 26.3	02 88	64.5	28 25.6	02 88	63.9	28 24.8	03 87	63.4	28 22.7	04 87	62.2	28 16.9	06 85	59.9	28 08.9	08 83	57.7	28 06.5	08 82	57.1	28 01.4	09 81	56.0	4
65	27 33.3	01 88	64.5	27 32.9	02 88	63.9	27 32.3	02 87	63.4	27 30.8	03 87	62.2	27 26.1	05 85	60.0	27 19.3	07 83	57.7	27 17.2	07 82	57.2	27 12.7	08 81	56.1	65
6	26 40.3	00 88	64.5	26 40.2	01 88	64.0	26 39.9	01 87	63.4	26 38.9	02 87	62.3	26 35.3	04 85	60.0	26 29.6	06 83	57.8	26 27.9	06 82	57.2	26 24.0	07 81	56.1	6
7	25 47.4	00 88	64.5	25 47.4	00 88	64.0	25 47.4	00 87	63.4	25 46.9	01 87	62.3	25 44.4	03 85	60.1	25 39.9	05 83	57.9	25 38.5	05 82	57.3	25 35.2	06 81	56.2	7
8	24 54.4	01 88	64.5	24 54.7	01 88	64.0	24 54.9	00 87	63.4	24 54.9	00 87	62.3	24 53.6	02 85	60.1	24 50.2	04 83	57.9	24 49.1	04 82	57.3	24 46.5	05 81	56.2	8
9	24 01.4	02 88	64.5	24 02.0	02 88	63.9	24 02.4	01 87	63.4	24 03.0	01 87	62.3	24 02.7	01 85	60.1	24 00.5	03 83	57.9	23 59.7	03 82	57.4	23 57.7	04 81	56.3	9
70	23 08.5	03 88	64.5	23 09.3	03 88	63.9	23 10.0	02 87	63.4	23 11.0	01 87	62.3	23 11.8	00 85	60.1	23 10.8	02 83	57.9	23 10.2	02 82	57.4	23 08.8	03 81	56.3	70
1	22 15.5	04 88	64.4	22 16.6	03 88	63.9	22 17.5	03 87	63.4	22 19.2	02 87	62.3	22 20.9	01 85	60.1	22 21.0	01 83	57.9	22 20.8	01 82	57.4	22 20.0	02 81	56.3	1
2	21 22.6	04 88	64.4	21 23.9	04 88	63.9	21 25.1	04 87	63.3	21 27.1	03 87	62.2	21 30.0	02 85	60.1	21 31.3	00 83	57.9	21 31.3	00 82	57.4	21 31.2	01 81	56.3	2
3	20 29.7	05 88	64.3	20 31.2	05 88	63.8	20 32.6	05 87	63.3	20 35.2	04 87	62.2	20 39.2	03 85	60.1	20 41.6	01 83	57.9	20 41.9	01 82	57.4	20 42.3	00 81	56.3	3
4	19 36.8	06 88	64.3	19 38.5	06 88	63.8	19 40.2	05 87	63.2	19 43.3	05 86	62.2	19 48.3	04 85	60.0	19 51.8	02 83	57.9	19 52.5	02 82	57.4	19 53.5	01 81	56.3	4
75	18 43.9	07 88	64.2	18 45.9	07 88	63.7	18 47.8	06 87	63.2	18 51.4	06 86	62.1	18 57.5	04 85	60.0	19 02.1	03 83	57.9	19 03.0	03 82	57.4	19 04.6	02 81	56.3	75
6	17 51.1	08 88	64.2	17 53.3	07 88	63.6	17 55.5	07 87	63.1	17 59.5	06 86	62.1	18 06.6	05 85	60.0	18 12.4	04 83	57.9	18 13.6	04 82	57.3	18 15.8	03 81	56.3	6
7	16 58.3	08 88	64.1	17 00.7	08 88	63.6	17 03.1	08 87	63.0	17 07.7	07 86	62.0	17 15.8	06 85	59.9	17 22.7	05 83	57.8	17 24.2	05 82	57.3	17 27.0	04 81	56.3	7
8	16 05.5	09 88	64.0	16 08.2	09 88	63.5	16 10.8	09 87	63.0	16 15.9	08 86	61.9	16 25.1	07 85	59.9	16 33.0	06 83	57.8	16 34.8	06 82	57.3	16 38.2	05 81	56.2	8
9	15 12.8	10 88	63.9	15 15.7	10 87	63.4	15 18.6	09 87	62.9	15 24.1	09 86	61.9	15 34.3	08 84	59.8	15 43.4	07 83	57.7	15 45.5	07 82	57.2	15 49.4	06 81	56.2	9
80	14 20.1	11 88	63.8	14 23.2	10 87	63.3	14 26.4	10 87	62.8	14 32.4	10 86	61.8	14 43.6	09 84	59.7	14 53.8	08 83	57.7	14 56.2	08 82	57.1	15 00.7	07 81	56.1	80
1	13 27.4	11 88	63.7	13 30.8	11 87	63.2	13 34.2	11 87	62.7	13 40.7	11 86	61.7	13 53.0	10 84	59.6	14 04.2	09 83	57.6	14 06.9	09 82	57.1	14 12.0	08 81	56.0	1
2	12 34.8	12 88	63.6	12 38.5	12 87	63.1	12 42.1	12 87	62.6	12 49.1	11 86	61.6	13 02.4	11 84	59.5	13 14.7	10 82	57.5	13 17.7	10 82	57.0	13 23.3	09 81	56.0	2
3	11 42.3	13 88	63.5	11 46.1	13 87	63.0	11 50.0	13 87	62.5	11 57.5	12 86	61.5	12 11.8	12 84	59.4	12 25.2	11 82	57.4	12 28.5	11 82	56.9	12 34.7	10 81	55.9	3
4	10 49.8	14 87	63.4	10 53.9	14 87	62.9	10 57.9	13 87	62.4	11 05.9	13 86	61.4	11 21.3	12 84	59.3	11 35.8	12 82	57.3	11 39.3	12 82	56.8	11 46.2	11 81	55.8	4
85	9 57.3	15 87	63.3	10 01.7	14 87	62.8	10 06.0	14 86	62.3	10 14.4	14 86	61.2	10 30.8	13 84	59.2	10 46.5	13 82	57.2	10 50.2	13 82	56.7	10 57.7	12 81	55.7	85
6	9 04.9	15 87	63.1	9 09.5	15 87	62.6	9 14.1	15 86	62.1	9 23.0	15 86	61.1	9 40.4	14 84	59.1	9 57.1	14 82	57.1	10 01.2	13 82	56.6	10 09.2	13 81	55.6	6
7	8 12.6	16 87	63.0	8 17.4	16 87	62.5	8 22.2	16 86	62.0	8 31.7	16 85	61.0	8 50.1	15 84	59.0	9 07.9	15 82	57.0	9 12.2	14 82	56.5	9 20.8	14 81	55.5	7
8	7 20.4	17 87	62.8	7 25.4	17 87	62.3	7 30.4	17 86	61.8	7 40.4	16 85	60.8	7 59.8	16 84	58.9	8 18.7	15 82	56.9	8 23.3	15 81	56.4	8 32.5	15 80	55.4	8
9	6 28.2	18 87	62.7	6 33.5	18 86	62.2	6 38.7	17 86	61.7	6 49.2	17 85	60.7	7 09.6	17 84	58.7	7 29.6	16 82	56.7	7 34.5	16 81	56.2	7 44.2	16 80	55.2	9
90	5 36.1	18 87	62.5	5 41.6	18 86	62.0	5 47.1	18 86	61.5	5 58.0	18 85	60.5	6 19.5	18 83	58.6	6 40.6	17 82	56.6	6 45.8	17 81	56.1	6 56.1	17 80	55.1	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	28° 00′	28° 30′	29° 00′	30° 00′	32° 00′	34° 00′	34° 30′	35° 30′	H.A.
	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	
°	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	°
00	50 00.0 1.0 01 180.0	49 30.0 1.0 01 180.0	49 00.0 1.0 01 180.0	48 00.0 1.0 01 180.0	46 00.0 1.0 01 180.0	44 00.0 1.0 01 180.0	43 30.0 1.0 01 180.0	42 30.0 1.0 01 180.0	00
1	49 59.3 1.0 04 178.6	49 29.3 1.0 03 178.6	48 59.3 1.0 03 178.7	47 59.3 1.0 03 178.7	45 59.4 1.0 03 178.8	43 59.4 1.0 03 178.8	43 29.4 1.0 03 178.9	42 29.4 1.0 03 178.9	1
2	49 57.2 1.0 06 177.3	49 27.2 1.0 06 177.3	48 57.3 1.0 06 177.3	47 57.4 1.0 06 177.4	45 57.5 1.0 05 177.6	43 57.6 1.0 05 177.7	43 27.7 1.0 05 177.7	42 27.7 1.0 05 177.8	2
3	49 53.7 1.0 08 175.9	49 23.8 1.0 08 175.9	48 53.9 1.0 08 176.0	47 54.0 1.0 08 176.1	45 54.4 1.0 07 176.3	43 54.7 1.0 07 176.5	43 24.8 1.0 07 176.6	42 24.9 1.0 07 176.7	3
4	49 48.8 99 10 174.5	49 18.9 99 10 174.6	48 49.1 99 10 174.7	47 49.4 99 10 174.8	45 50.0 1.0 09 175.1	43 50.6 1.0 09 175.4	43 20.7 1.0 09 175.5	42 21.0 1.0 08 175.6	4
05	49 42.5 99 13 173.2	49 12.7 99 13 173.3	48 43.0 99 12 173.4	47 43.5 99 12 173.6	45 44.4 99 11 173.9	43 45.3 99 11 174.3	43 15.5 99 11 174.3	42 15.9 99 10 174.5	05
6	49 34.8 99 15 171.8	49 05.2 99 15 171.9	48 35.5 99 15 172.1	47 36.2 99 14 172.3	45 37.6 99 13 172.7	43 38.8 99 13 173.1	43 00.1 99 12 173.2	42 00.7 99 12 173.4	6
7	49 25.8 98 17 170.5	48 56.3 98 17 170.6	48 26.8 98 17 170.8	47 27.7 98 16 171.0	45 29.5 99 15 171.5	43 31.2 99 15 172.0	43 01.6 99 14 172.1	42 02.4 99 14 172.3	7
8	49 15.4 98 20 169.1	48 46.0 98 19 169.3	48 16.7 98 19 169.5	47 17.9 98 18 169.8	45 20.3 98 17 170.3	43 22.5 98 16 170.9	42 53.0 98 16 171.0	41 54.0 98 16 171.2	8
9	49 03.7 97 22 167.8	48 34.5 97 21 168.0	48 05.3 97 21 168.2	47 06.9 97 20 168.5	45 09.8 98 19 169.2	43 12.6 98 18 169.8	42 43.3 98 18 169.9	41 44.6 98 18 170.2	9
10	48 50.7 97 24 166.5	48 21.7 97 24 166.7	47 52.6 97 23 166.9	46 54.6 97 23 167.3	44 58.2 97 21 168.0	43 01.6 97 20 168.6	42 32.4 97 20 168.8	41 34.0 97 19 169.1	10
1	48 36.3 96 26 165.2	48 07.5 96 26 165.5	47 38.7 96 25 165.7	46 41.0 96 25 166.1	44 45.4 96 23 166.8	42 49.5 97 22 167.5	42 20.5 97 22 167.7	41 22.4 97 21 168.1	1
2	48 20.8 95 28 164.0	47 52.2 95 28 164.2	47 23.6 95 27 164.4	46 26.3 96 27 164.9	44 31.5 96 25 165.7	42 36.3 96 24 166.5	42 07.4 96 23 166.6	41 00.7 96 23 167.0	2
3	48 03.9 94 30 162.7	47 35.6 95 30 163.0	47 07.2 95 29 163.2	46 10.4 96 28 163.7	44 16.4 95 27 164.5	42 22.0 95 26 165.4	41 53.4 96 25 165.6	40 56.0 96 25 166.0	3
4	47 45.9 94 32 161.5	47 17.8 94 32 161.7	46 49.7 94 31 162.0	45 53.3 94 30 162.5	44 00.2 94 29 163.4	42 06.7 95 27 164.3	41 38.2 95 27 164.5	40 41.3 95 26 164.9	4
15	47 26.6 93 34 160.3	46 58.8 93 34 160.5	46 30.9 93 33 160.8	45 35.1 93 32 161.3	43 42.9 94 31 162.3	41 50.3 94 29 163.3	41 22.1 94 29 163.5	40 25.5 94 28 163.9	15
6	47 06.2 92 36 159.1	46 38.7 92 35 159.3	46 11.0 92 35 159.6	45 15.7 92 34 160.2	43 24.6 93 32 161.2	41 32.9 93 31 162.2	41 04.9 93 30 162.5	40 08.8 94 30 162.9	6
7	46 44.7 91 38 157.9	46 17.4 91 37 158.2	45 50.1 91 37 158.5	44 55.3 91 36 159.0	43 05.2 92 34 160.2	41 14.4 92 32 161.2	40 46.7 93 32 161.4	39 51.1 93 31 161.9	7
8	46 22.0 90 40 156.7	45 55.0 90 39 157.0	45 28.0 90 39 157.3	44 33.7 91 38 157.9	42 44.7 91 36 159.1	40 55.0 92 34 160.2	40 27.5 92 34 160.4	39 32.4 92 33 161.0	8
9	45 58.3 89 41 155.6	45 31.6 89 41 155.9	45 04.8 89 40 156.2	44 11.2 90 39 156.8	42 23.3 90 37 158.0	40 34.7 91 36 159.2	40 07.4 91 35 159.5	39 12.8 91 34 160.0	9
20	45 33.5 88 43 154.5	45 07.1 88 42 154.8	44 40.7 88 42 155.1	43 47.6 89 41 155.8	42 00.8 89 39 157.0	40 13.3 90 37 158.2	39 46.3 90 37 158.5	38 52.2 90 36 159.0	20
1	45 07.7 87 45 153.4	44 41.6 87 44 153.7	44 15.5 87 44 154.0	43 23.0 88 43 154.7	41 37.5 88 41 156.0	39 51.1 89 39 157.2	39 24.4 89 38 157.5	38 30.8 89 37 158.1	1
2	44 40.8 86 46 152.3	44 15.1 86 46 152.6	43 49.3 86 45 153.0	42 57.5 87 44 153.7	41 13.1 87 42 155.0	39 27.9 88 40 156.3	39 01.5 88 40 156.6	38 08.5 88 39 157.2	2
3	44 13.1 85 48 151.2	43 47.7 85 47 151.6	43 22.2 85 47 152.0	42 31.0 86 46 152.7	40 47.9 86 44 154.0	39 03.9 87 42 155.3	38 37.7 87 41 155.7	37 45.3 88 40 156.3	3
4	43 44.4 83 49 150.2	43 19.3 84 49 150.6	42 54.1 84 48 150.9	42 03.6 84 47 151.7	40 21.8 85 45 153.1	38 39.0 86 43 154.4	38 13.1 86 42 154.7	37 21.3 87 41 155.4	4
25	43 14.7 82 51 149.2	42 50.0 83 50 149.6	42 25.2 83 50 150.0	41 35.3 83 49 150.7	39 54.8 84 46 152.1	38 13.2 85 44 153.5	37 47.7 85 44 153.8	36 56.4 86 43 154.5	25
6	42 44.2 81 52 148.2	42 19.8 81 52 148.6	41 55.4 82 51 149.0	41 06.2 82 50 149.7	39 26.9 83 48 151.2	37 46.6 84 46 152.6	37 21.4 84 45 153.0	36 30.7 85 44 153.6	6
7	42 12.9 80 54 147.2	41 48.8 80 53 147.6	41 24.7 81 52 148.0	40 36.2 81 51 148.8	38 58.3 82 49 150.3	37 19.2 83 47 151.8	36 54.3 83 46 152.1	36 04.3 84 45 152.8	7
8	41 40.7 79 55 146.3	41 17.0 79 54 146.7	40 53.2 79 54 147.1	40 05.4 80 53 147.9	38 28.8 81 50 149.4	36 51.1 82 48 150.9	36 26.5 82 48 151.3	35 37.1 83 47 152.0	8
9	41 07.8 78 56 145.4	40 44.4 78 56 145.8	40 21.0 78 55 146.2	39 33.8 79 54 147.0	37 58.6 80 52 148.6	36 22.1 81 49 150.1	35 57.9 81 49 150.4	35 09.1 81 48 151.1	9
30	40 34.0 77 58 144.5	40 11.0 77 57 144.9	39 47.9 77 56 145.3	39 01.5 78 55 146.1	37 27.6 79 53 147.7	35 52.5 80 51 149.2	35 28.5 80 50 149.6	34 40.4 80 49 150.3	30
1	39 59.5 75 59 143.6	39 36.9 76 58 144.0	39 14.2 76 58 144.4	38 28.4 77 56 145.3	36 55.9 78 54 146.9	35 22.1 79 52 148.4	34 58.5 79 51 148.8	34 11.0 79 50 149.5	1
2	39 24.4 74 60 142.7	39 02.1 74 59 143.2	38 39.7 75 59 143.6	37 54.6 75 57 144.4	36 23.5 77 55 146.1	34 51.0 78 53 147.6	34 27.7 78 52 148.0	33 40.9 78 51 148.8	2
3	38 48.5 73 61 141.9	38 26.5 73 60 142.3	38 04.5 74 60 142.8	37 20.1 74 59 143.6	35 50.4 75 56 145.3	34 19.3 76 54 146.9	33 56.3 77 53 147.2	33 10.2 77 52 148.0	3
4	38 11.9 72 62 141.1	37 50.3 72 61 141.5	37 28.6 72 61 142.0	36 45.0 73 60 142.8	35 16.6 74 57 144.5	33 46.9 75 55 146.1	33 24.2 76 54 146.5	32 38.8 76 53 147.3	4
35	37 34.7 71 63 140.3	37 13.5 71 62 140.7	36 52.2 71 62 141.2	36 09.2 72 61 142.0	34 42.2 73 58 143.7	33 13.8 74 56 145.4	32 51.5 74 56 145.8	32 06.7 75 54 146.5	35
6	36 56.9 69 64 139.5	36 36.0 70 63 140.0	36 15.1 70 63 140.4	35 32.8 71 62 141.3	34 07.2 72 59 143.0	32 40.1 73 57 144.6	32 18.2 73 57 145.0	31 34.1 74 55 145.8	6
7	36 18.5 68 65 138.7	35 58.0 69 64 139.2	35 37.3 69 64 139.6	34 55.8 70 63 140.5	33 31.5 71 60 142.3	32 05.9 72 58 143.9	31 44.3 72 58 144.3	31 00.8 73 56 145.1	7
8	35 39.5 67 66 138.0	35 19.3 67 65 138.5	34 59.1 68 65 138.9	34 18.2 68 64 139.8	32 55.3 70 61 141.5	31 31.0 71 59 143.2	31 09.7 71 58 143.6	30 27.0 72 57 144.5	8
9	35 00.0 66 67 137.3	34 40.2 66 66 137.7	34 20.2 67 66 138.2	33 40.0 67 64 139.1	32 18.5 69 62 140.8	30 55.6 70 60 142.5	30 34.7 70 59 143.0	29 52.6 70 58 143.8	9
40	34 19.9 65 68 136.6	34 00.4 65 67 137.0	33 40.8 66 66 137.5	33 01.3 66 65 138.4	31 41.2 67 63 140.2	30 19.6 69 61 141.9	29 59.0 69 60 142.3	29 17.6 69 59 143.1	40
1	33 39.3 64 68 135.9	33 20.2 64 68 136.4	33 00.9 64 67 136.8	32 22.1 65 66 137.7	31 03.3 66 64 139.5	29 43.1 67 62 141.2	29 22.9 68 61 141.6	28 42.1 68 60 142.5	1
2	32 58.2 63 69 135.2	32 39.4 63 69 135.7	32 20.5 63 68 136.2	31 42.4 64 67 137.1	30 25.0 65 65 138.9	29 06.1 66 62 140.6	28 46.2 67 62 141.0	28 06.1 67 61 141.9	2
3	32 16.7 61 70 134.6	31 58.2 62 70 135.0	31 39.6 62 69 135.5	31 02.2 63 68 136.4	29 46.1 64 66 138.2	28 28.6 65 63 140.0	28 09.0 65 63 140.4	27 29.7 66 62 141.3	3
4	31 34.6 60 71 134.0	31 16.5 61 70 134.4	30 58.3 61 70 134.9	30 21.5 62 69 135.8	29 06.8 63 66 137.6	27 50.6 64 64 139.4	27 31.4 64 64 139.8	26 52.7 65 62 140.7	4
45	30 52.2 59 72 133.3	30 34.4 60 71 133.8	30 16.4 60 70 134.3	29 40.3 61 69 135.2	28 27.0 62 67 137.0	27 12.2 63 65 138.8	26 53.3 63 64 139.2	26 15.2 64 63 140.1	45
6	30 09.3 58 72 132.7	29 51.8 58 72 133.2	29 34.2 59 71 133.7	28 58.7 59 70 134.6	27 46.7 61 68 136.4	26 33.3 62 66 138.2	26 14.7 62 65 138.6	25 37.3 63 64 139.5	6
7	29 26.0 57 73 132.1	29 08.8 57 72 132.6	28 51.5 58 72 133.1	28 16.7 58 71 134.0	27 06.0 60 68 135.8	25 53.9 61 66 137.6	25 35.7 61 66 138.1	24 59.0 61 65 138.9	7
8	28 42.3 56 74 131.6	28 25.4 56 73 132.0	28 08.5 57 72 132.5	27 34.3 57 71 133.4	26 24.9 58 69 135.3	25 14.2 60 67 137.1	24 56.3 60 66 137.5	24 20.2 60 65 138.4	8
9	27 58.2 55 74 131.0	27 41.6 55 74 131.5	27 25.0 56 73 132.0	26 51.5 56 72 132.9	25 43.4 57 70 134.7	24 34.0 58 68 136.5	24 16.4 59 67 137.0	23 41.1 59 66 137.9	9
50	27 13.7 54 75 130.5	26 57.5 54 74 131.0	26 41.2 54 74 131.4	26 08.3 55 73 132.4	25 01.5 56 70 134.2	23 53.4 57 68 136.0	23 36.2 58 68 136.5	23 01.5 58 67 137.3	50
1	26 28.9 53 75 129.9	26 13.0 53 75 130.4	25 57.0 53 74 130.9	25 24.8 54 73 131.8	24 19.3 55 71 133.7	23 12.5 56 69 135.5	22 55.6 56 68 135.9	22 21.5 57 67 136.8	1
2	25 43.7 52 76 129.4	25 28.1 52 75 129.9	25 12.5 52 75 130.4	24 40.9 53 74 131.3	23 36.7 54 72 133.2	22 31.1 55 69 135.0	22 14.6 55 69 135.4	21 41.2 56 68 136.3	2
3	24 58.2 51 76 128.9	24 43.0 51 76 129.4	24 27.6 51 75 129.9	23 56.6 52 74 130.8	22 53.7 53 72 132.7	21 49.5 54 70 134.5	21 33.2 54 70 135.0	21 00.5 55 68 135.9	3
4	24 12.4 50 77 128.4	23 57.5 50 76 128.9	23 42.4 50 76 129.4	23 12.1 51 75 130.3	22 10.4 52 73 132.2	21 07.4 53 71 134.0	20 51.5 53 70 134.5	20 19.5 54 69 135.4	4
55	23 26.3 49 77 128.0	23 11.6 49 77 128.4	22 56.9 49 76 128.9	22 27.2 50 75 129.9	21 26.7 51 73 131.7	20 25.1 52 71 133.6	20 09.5 52 71 134.0	19 38.1 53 70 134.9	55
6	22 39.9 48 78 127.5	22 25.5 48 77 128.0	22 11.1 48 77 128.5	21 42.0 49 76 129.4	20 42.8 50 74 131.3	19 42.4 51 72 133.1	19 27.1 51 71 133.6	18 56.4 51 70 134.5	6
7	21 53.2 47 78 127.1	21 39.1 47 78 127.5	21 25.0 47 77 128.0	20 56.5 48 76 129.0	19 58.5 49 74 130.8	18 59.4 50 72 132.7	18 44.4 50 72 133.1	18 14.3 50 71 134.0	7
8	21 06.2 46 79 126.6	20 52.5 46 78 127.1	20 38.6 46 78 127.6	20 10.7 47 77 128.5	19 13.9 48 75 130.4	18 16.1 49 73 132.2	18 01.4 49 72 132.7	17 32.0 49 71 133.6	8
9	20 19.0 45 79 126.2	20 05.5 45 79 126.7	19 52.0 45 78 127.1	19 24.6 46 77 128.1	18 29.1 47 75 130.0	17 32.5 48 73 131.8	17 18.2 48 73 132.3	16 49.3 48 72 133.2	9
60	19 31.5 44 80 125.8	19 18.3 44 79 126.3	19 05.0 44 79 126.7	18 38.3 45 78 127.7	17 44.0 46 76 129.6	16 48.6 47 74 131.4	16 34.6 47 73 131.9	16 06.4 47 72 132.8	60
1	18 43.8 43 80 125.4	18 30.9 43 80 125.8	18 17.9 43 79 126.3	17 51.7 44 78 127.3	16 58.6 45 76 129.1	16 04.4 46 74 131.0	15 50.8 46 74 131.5	15 23.2 46 72 132.4	1
2	17 55.8 42 80 125.0	17 43.2 42 80 125.5	17 30.5 42 79 125.9	17 04.9 43 78 126.9	16 13.0 44 76 128.8	15 20.0 44 74 130.6	15 06.6 45 74 131.1	14 39.7 45 73 132.0	2
3	17 07.6 41 81 124.6	16 55.2 41 80 125.1	16 42.8 41 80 125.5	16 17.8 42 79 126.5	15 27.1 43 77 128.4	14 35.4 43 75 130.2	14 22.3 44 74 130.7	13 56.0 44 73 131.6	3
4	16 19.2 40 81 124.2	16 07.1 40 81 124.7	15 55.0 41 80 125.2	15 30.5 41 79 126.1	14 40.9 42 77 128.0	13 50.4 42 75 129.9	13 37.7 43 75 130.3	13 12.0 43 74 131.3	4
65	15 30.5 39 81 123.9	15 18.7 39 81 124.3	15 06.9 40 80 124.8	14 43.0 40 80 125.8	13 54.6 41 78 127.6	13 05.3 41 76 129.5	12 52.8 42 75 130.0	12 27.8 42 74 130.9	65
6	14 41.7 38 82 123.5	14 30.2 38 81 124.0	14 18.6 39 81 124.5	13 55.3 39 80 125.4	13 08.0 40 78 127.3	12 19.9 40 76 129.2	12 07.7 41 76 129.6	11 43.3 41 74 130.6	6
7	13 52.7 37 82 123.2	13 41.4 38 82 123.6	13 30.1 38 81 124.1	13 07.3 38 80 125.1	12 21.2 39 78 127.0	11 34.3 39 76 128.8	11 22.4 40 76 129.3	10 58.6 40 75 130.2	7
8	13 03.4 37 82 122.8	12 52.4 37 82 123.3	12 41.4 37 82 123.8	12 19.2 37 81 124.7	11 34.2 38 79 126.6	10 48.5 38 77 128.5	10 36.9 39 76 129.0	10 13.7 39 75 129.9	8
9	12 14.0 36 83 122.5	12 03.3 36 82 123.0	11 52.5 36 82 123.4	11 30.9 36 81 124.4	10 47.0 37 79 126.3	10 02.4 37 77 128.2	9 51.2 38 77 128.7	9 28.6 38 76 129.6	9
70	11 24.4 35 83 122.2	11 14.0 35 82 122.7	11 03.5 35 82 123.1	10 42.4 35 81 124.1	9 59.6 36 79 126.0	9 16.2 36 77 127.9	9 05.3 37 77 128.3	8 43.3 37 76 129.3	70
1	10 34.7 34 83 121.9	10 24.5 34 83 122.3	10 14.2 34 82 122.8	9 53.7 34 81 123.8	9 12.0 35 80 125.7	8 29.8 35 78 127.6	8 19.1 36 77 128.0	7 57.7 36 76 129.0	1
2	9 44.7 33 84 121.6	9 34.8 33 83 122.0	9 24.8 33 83 122.5	9 04.8 34 82 123.5	8 24.3 34 80 125.4	7 43.2 34 78 127.3	7 32.8 35 78 127.8	7 12.0 35 76 128.7	2
3	8 54.7 32 84 121.3	8 45.0 32 83 121.8	8 35.3 32 83 122.2	8 15.8 33 82 123.2	7 36.3 33 80 125.1	6 56.4 33 78 127.0	6 46.3 34 78 127.5	6 26.1 34 77 128.4	3
4	8 04.4 31 84 121.0	7 55.0 31 84 121.5	7 45.6 32 83 122.0	7 26.6 32 82 122.9	6 48.2 32 80 124.8	6 09.4 33 79 126.7	5 59.7 33 78 127.2	5 40.1 33 77 128.1	4
75	7 14.0 30 84 120.7	7 04.9 31 84 121.2	6 55.7 31 83 121.7	6 37.2 31 82 122.6	6 00.0 31 81 124.5	5 22.3 32 79 126.5	5 12.8 32 78 126.9		75
6	6 23.5 30 84 120.4	6 14.6 30 84 120.9	6 05.7 30 84 121.4	5 47.7 30 83 122.4	5 11.5 30 81 124.3				6
7	5 32.9 29 85 120.2	5 24.2 29 84 120.7	5 15.5 29 84 121.2						7

DECLINATION SAME NAME AS LATITUDE

H.A.	28° 00′	28° 30′	29° 00′	30° 00′	32° 00′	34° 00′	34° 30′	35° 30′	H.A.
	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	
°	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	°
91				5 07.0 19 85 60.4	5 29.5 19 83 58.4	5 51.6 18 81 56.4	5 57.1 18 81 55.9	6 08.0 18 80 55.0	91
2						5 02.8 19 81 56.3	5 08.5 19 81 55.8	5 20.0 19 80 54.8	2

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	66 00.0	1.0 02	00.0	65 00.0	1.0 02	00.0	63 30.0	1.0 02	00.0	62 00.0	1.0 01	00.0	60 00.0	1.0 01	00.0	59 30.0	1.0 01	00.0	59 00.0	1.0 01	00.0	57 00.0	1.0 01	00.0	00
1	65 59.0	1.0 05	02.0	64 59.0	1.0 05	01.9	63 29.1	1.0 04	01.8	61 59.2	1.0 04	01.6	59 59.2	1.0 04	01.5	59 29.3	1.0 04	01.5	58 59.3	1.0 04	01.4	56 59.3	1.0 03	01.3	1
2	65 55.9	1.0 08	04.0	64 56.1	1.0 08	03.8	63 26.4	1.0 07	03.5	61 56.7	1.0 07	03.3	59 57.0	1.0 06	03.0	59 27.0	1.0 06	02.9	58 57.1	1.0 06	02.8	56 57.3	1.0 06	02.6	2
3	65 50.9	99 12	05.9	64 51.3	99 11	05.6	63 21.9	99 10	05.2	61 52.5	99 10	04.9	59 53.2	99 09	04.4	59 23.3	99 09	04.3	58 53.5	1.0 08	04.2	56 54.0	1.0 08	03.9	3
4	65 43.8	99 15	07.9	64 44.6	99 14	07.5	63 15.7	99 13	07.0	61 46.7	99 12	06.5	59 47.9	99 11	05.9	59 18.1	99 11	05.8	58 48.4	99 11	05.7	56 49.4	99 10	05.2	4
05	65 34.8	98 18	09.8	64 36.0	98 17	09.3	63 07.7	98 16	08.7	61 39.2	98 15	08.1	59 41.1	99 14	07.4	59 11.5	99 13	07.2	58 41.9	99 13	07.0	56 43.4	99 12	06.4	05
6	65 23.8	97 21	11.7	64 25.6	97 20	11.2	62 58.0	97 19	10.4	61 30.2	98 18	09.7	59 32.8	98 16	08.8	59 03.4	98 16	08.6	58 34.0	98 15	08.4	56 36.2	98 14	07.7	6
7	65 10.9	96 24	13.6	64 13.3	96 23	12.9	62 46.6	97 22	12.0	61 19.5	97 20	11.2	59 23.1	97 19	10.2	58 53.9	97 18	10.0	58 24.7	97 18	09.8	56 27.7	98 16	09.0	7
8	64 56.2	95 27	15.4	63 59.3	96 26	14.7	62 33.5	96 24	13.7	61 07.4	96 23	12.8	59 11.9	96 21	11.7	58 43.0	97 20	11.4	58 14.0	97 20	11.1	56 17.9	97 18	10.2	8
9	64 39.8	93 30	17.2	63 43.6	94 29	16.4	62 18.9	94 27	15.3	60 53.6	95 25	14.3	58 59.4	95 23	13.0	58 30.7	96 23	12.8	58 02.0	96 22	12.5	56 06.9	96 20	11.4	9
10	64 21.5	92 33	18.9	63 26.2	93 32	18.1	62 02.6	93 30	16.9	60 38.5	94 28	15.7	58 45.5	94 25	14.4	58 17.1	95 25	14.1	57 48.7	95 24	13.8	55 54.6	95 22	12.7	10
1	64 01.7	90 36	20.6	63 07.2	91 34	19.7	61 44.8	92 32	18.4	60 21.8	93 30	17.2	58 30.2	93 28	15.7	58 02.2	94 27	15.4	57 34.1	94 26	15.1	55 41.2	94 24	13.8	1
2	63 40.2	89 38	22.3	62 46.7	90 37	21.3	61 25.6	91 34	19.9	60 03.8	91 32	18.6	58 13.6	92 30	17.1	57 45.9	92 29	16.7	57 18.2	93 29	16.3	55 26.5	93 26	15.0	2
3	63 17.2	87 41	23.9	62 24.6	88 39	22.8	61 04.9	89 37	21.4	59 44.4	90 35	20.0	57 55.8	91 32	18.4	57 28.4	91 31	18.0	57 01.0	91 31	17.6	55 10.8	92 28	16.2	3
4	62 52.7	85 43	25.4	62 01.1	86 41	24.3	60 42.9	88 39	22.8	59 23.6	89 37	21.3	57 36.7	90 34	19.6	57 09.7	90 33	19.2	56 42.7	90 32	18.8	54 53.9	91 30	17.3	4
15	62 26.8	84 45	26.9	61 36.3	85 44	25.8	60 19.5	86 41	24.2	59 01.7	87 39	22.7	57 16.4	88 36	20.8	56 49.8	89 35	20.4	56 23.2	89 34	20.0	54 35.9	90 32	18.4	15
6	61 59.6	82 48	28.4	61 10.1	83 46	27.2	59 54.9	84 43	25.5	58 38.4	86 41	23.9	56 54.9	87 38	22.0	56 28.8	87 37	21.6	56 02.6	88 36	21.2	54 16.8	89 34	19.5	6
7	61 31.1	80 50	29.7	60 42.7	81 48	28.5	59 29.0	83 45	26.8	58 14.0	84 43	25.2	56 32.4	85 39	23.2	56 06.6	86 39	22.7	55 40.8	86 38	22.3	53 56.7	87 35	20.6	7
8	61 01.4	78 51	31.1	60 14.1	79 50	29.8	59 02.0	81 47	28.0	57 48.5	82 44	26.4	56 08.7	84 41	24.3	55 43.4	84 40	23.9	55 18.1	85 40	23.4	53 35.6	86 37	21.6	8
9	60 30.5	76 53	32.3	59 44.4	78 51	31.1	58 33.9	79 49	29.2	57 21.9	81 46	27.5	55 44.0	82 43	25.4	55 19.2	83 42	25.0	54 54.3	83 41	24.5	53 13.5	85 38	22.6	9
20	59 58.6	74 55	33.6	59 13.6	76 53	32.3	58 04.7	77 50	30.4	56 54.3	79 48	28.7	55 18.3	81 44	26.5	54 53.9	81 44	26.0	54 29.5	82 43	25.5	52 50.4	83 40	23.6	20
1	59 25.6	72 57	34.8	58 41.8	74 55	33.4	57 34.5	76 52	31.5	56 25.6	77 49	29.8	54 51.6	79 46	27.6	54 27.7	80 45	27.0	54 03.7	80 44	26.5	52 26.5	82 41	24.6	1
2	58 51.7	71 58	35.9	58 09.0	72 56	34.5	57 03.3	74 53	32.6	55 56.0	76 51	30.8	54 24.0	78 48	28.6	54 00.6	78 47	28.0	53 37.1	79 46	27.5	52 01.7	80 43	25.5	2
3	58 16.9	69 60	37.0	57 35.2	70 58	35.6	56 31.2	72 55	33.7	55 25.5	74 52	31.8	53 55.5	76 49	29.5	53 32.6	77 48	29.0	53 09.5	77 47	28.5	51 36.0	79 44	26.4	3
4	57 41.2	67 61	38.0	57 00.6	68 59	36.6	55 58.2	70 56	34.7	54 54.1	72 54	32.8	53 26.1	74 50	30.5	53 03.7	75 49	29.9	52 41.1	75 49	29.4	51 09.5	77 46	27.3	4
25	57 04.6	65 62	39.0	56 25.2	66 60	37.6	55 24.5	69 58	35.6	54 21.9	70 55	33.8	52 55.9	73 52	31.4	52 34.0	73 51	30.8	52 11.9	74 50	30.3	50 42.2	76 47	28.2	25
6	56 27.3	63 63	39.9	55 49.0	65 62	38.5	54 49.9	67 59	36.6	53 48.9	69 56	34.7	52 25.0	71 53	32.3	52 03.5	72 52	31.7	51 41.9	72 51	31.1	50 14.1	74 48	29.0	6
7	55 49.3	61 65	40.8	55 12.1	63 63	39.4	54 14.6	65 60	37.4	53 15.1	67 57	35.5	51 53.2	69 54	33.1	51 32.3	70 53	32.6	51 11.2	71 52	32.0	49 45.3	73 49	29.8	7
8	55 10.6	59 66	41.7	54 34.5	61 64	40.3	53 38.5	63 61	38.3	52 40.7	65 59	36.4	51 20.8	68 55	34.0	51 00.4	68 54	33.4	50 39.8	69 54	32.8	49 15.8	71 50	30.6	8
9	54 31.3	58 67	42.5	53 56.2	59 65	41.1	53 01.8	61 62	39.1	52 05.5	64 60	37.2	50 47.7	66 56	34.7	50 27.8	67 55	34.2	50 07.7	67 55	33.6	48 45.6	69 51	31.3	9
30	53 51.3	56 68	43.3	53 17.3	58 66	41.9	52 24.5	60 63	39.9	51 29.7	62 61	38.0	50 13.9	64 57	35.5	49 54.5	65 56	34.9	49 34.9	66 56	34.3	48 14.7	68 52	32.1	30
1	53 10.8	54 68	44.0	52 37.8	56 67	42.7	51 46.5	58 64	40.7	50 53.3	60 62	38.7	49 39.5	63 58	36.2	49 20.6	63 58	35.6	49 01.5	64 57	35.1	47 43.3	66 53	32.8	1
2	52 29.7	52 69	44.8	51 57.7	54 68	43.4	51 08.0	56 65	41.4	50 16.3	59 63	39.4	49 04.5	61 59	37.0	48 46.1	62 58	36.4	48 27.5	62 58	35.8	47 11.2	65 54	33.5	2
3	51 48.1	51 70	45.4	51 17.2	52 68	44.1	50 29.0	55 66	42.1	49 38.8	57 63	40.1	48 29.0	60 60	37.6	48 11.0	60 59	37.0	47 52.9	61 59	36.4	46 38.6	63 55	34.1	3
4	51 06.1	49 71	46.1	50 36.1	51 69	44.7	49 49.4	53 67	42.7	49 00.7	55 64	40.8	47 52.9	58 61	38.3	47 35.4	59 60	37.7	47 17.8	59 59	37.1	46 05.4	61 56	34.8	4
35	50 23.6	47 72	46.7	49 54.6	49 70	45.3	49 09.4	51 68	43.3	48 22.1	54 65	41.4	47 16.2	56 62	38.9	46 59.3	57 61	38.3	46 42.1	58 60	37.7	45 31.6	60 57	35.4	35
6	49 40.6	46 72	47.3	49 12.6	47 71	45.9	48 28.9	50 68	43.9	47 43.1	52 66	42.0	46 39.1	55 63	39.5	46 22.6	55 62	38.9	46 06.0	56 61	38.3	44 57.4	58 58	36.0	6
7	48 57.3	44 73	47.9	48 30.3	46 71	46.5	47 47.9	48 69	44.5	47 03.6	50 67	42.6	46 01.5	53 63	40.1	45 45.5	54 63	39.5	45 29.3	54 62	38.9	44 22.7	57 59	36.5	7
8	48 13.6	43 73	48.4	47 47.5	44 72	47.0	47 06.6	47 70	45.1	46 23.7	49 67	43.1	45 23.5	51 64	40.7	45 08.0	52 63	40.0	44 52.3	53 62	39.4	43 47.5	55 59	37.1	8
9	47 29.6	41 74	48.9	47 04.4	43 72	47.6	46 24.8	45 70	45.6	45 43.3	47 68	43.7	44 45.1	50 65	41.2	44 30.0	51 64	40.6	44 14.8	51 63	40.0	43 11.9	54 60	37.6	9
40	46 45.2	40 74	49.4	46 20.9	41 73	48.0	45 42.7	43 71	46.1	45 02.6	46 68	44.2	44 06.2	48 65	41.7	43 51.6	49 65	41.1	43 36.9	50 64	40.5	42 35.9	52 61	38.1	40
1	46 00.5	38 75	49.8	45 37.1	40 74	48.5	45 00.3	42 71	46.6	44 21.5	44 69	44.7	43 27.0	47 66	42.2	43 12.9	47 65	41.6	42 58.6	48 64	41.0	41 59.5	50 61	38.6	1
2	45 15.5	37 75	50.3	44 53.0	38 74	49.0	44 17.5	40 72	47.0	43 40.1	43 70	45.1	42 47.4	45 67	42.7	42 33.7	46 66	42.1	42 19.9	46 65	41.5	41 22.6	49 62	39.1	2
3	44 30.2	35 76	50.7	44 08.6	37 74	49.4	43 34.4	39 72	47.5	42 58.4	41 70	45.6	42 07.5	44 67	43.1	41 54.3	44 66	42.5	41 40.9	45 66	41.9	40 45.5	47 63	39.5	3
4	43 44.7	34 76	51.1	43 23.9	35 75	49.8	42 51.0	38 73	47.9	42 16.3	40 71	46.0	41 27.2	42 68	43.5	41 14.5	43 67	42.9	41 01.5	43 66	42.3	40 07.9	46 63	40.0	4
45	42 58.9	33 77	51.4	42 38.9	34 75	50.2	42 07.4	36 73	48.3	41 34.0	38 71	46.4	40 46.6	41 68	43.9	40 34.3	41 67	43.3	40 21.8	42 67	42.7	39 30.0	44 64	40.4	45
6	42 12.9	31 77	51.8	41 53.8	33 76	50.5	41 23.5	35 74	48.6	40 51.3	37 71	46.8	40 05.8	39 69	44.3	39 53.9	40 68	43.7	39 41.9	40 67	43.1	38 51.9	43 64	40.8	6
7	41 26.7	30 77	52.1	41 08.4	31 76	50.9	40 39.3	33 74	49.0	40 08.4	35 72	47.1	39 24.6	38 69	44.7	39 13.2	38 68	44.1	39 01.6	39 68	43.5	38 13.4	41 65	41.2	7
8	40 40.3	29 78	52.4	40 22.7	30 76	51.2	39 54.9	32 74	49.3	39 25.3	34 72	47.5	38 43.2	36 69	45.1	38 32.2	37 69	44.5	38 21.0	38 68	43.9	37 34.6	40 65	41.5	8
9	39 53.7	27 78	52.7	39 36.9	29 77	51.5	39 10.3	31 75	49.6	38 41.9	32 73	47.8	38 01.5	35 70	45.4	37 51.0	35 69	44.8	37 40.2	36 68	44.2	36 55.6	38 66	41.9	9
50	39 06.9	26 78	53.0	38 50.9	27 77	51.8	38 25.5	29 75	49.9	37 58.4	31 73	48.1	37 19.6	33 70	45.7	37 09.5	34 70	45.1	36 59.2	35 69	44.5	36 16.3	37 66	42.2	50
1	38 19.9	25 79	53.3	38 04.7	26 77	52.0	37 40.5	28 75	50.2	37 14.6	30 73	48.4	36 37.5	32 71	46.0	36 27.8	33 70	45.4	36 17.9	33 69	44.8	35 36.7	35 66	42.5	1
2	37 32.8	23 79	53.5	37 18.3	25 78	52.3	36 55.3	27 76	50.5	36 30.6	28 74	48.7	35 55.2	31 71	46.3	35 45.9	31 70	45.7	35 36.4	32 69	45.1	34 56.9	34 67	42.8	2
3	36 45.5	22 79	53.8	36 31.8	23 78	52.5	36 00.9	25 76	50.7	35 46.4	27 74	48.9	35 12.6	29 71	46.6	35 03.8	30 71	46.0	34 54.7	30 70	45.4	34 16.9	33 67	43.1	3
4	35 58.1	21 79	54.0	35 45.2	22 78	52.8	35 24.4	24 76	51.0	35 02.1	26 74	49.2	34 29.9	28 72	46.8	34 21.4	28 71	46.3	34 12.8	29 70	45.7	33 36.7	31 67	43.4	4
55	35 10.6	20 79	54.2	34 58.4	21 78	53.0	34 38.8	23 76	51.2	34 17.6	24 74	49.4	33 47.0	27 72	47.1	33 39.0	27 71	46.5	33 30.7	28 70	45.9	32 56.3	30 68	43.6	55
6	34 23.0	19 80	54.4	34 11.5	20 78	53.2	33 53.0	21 77	51.4	33 32.9	23 75	49.6	33 03.9	25 72	47.3	32 56.3	26 71	46.7	32 48.5	26 71	46.2	32 15.7	28 68	43.9	6
7	33 35.2	17 80	54.5	33 24.4	19 79	53.4	33 07.0	20 77	51.6	32 48.1	22 75	49.8	32 20.7	24 72	47.5	32 13.5	24 72	47.0	32 06.1	25 71	46.4	31 34.9	27 68	44.1	7
8	32 47.4	16 80	54.7	32 37.3	17 79	53.5	32 21.0	19 77	51.8	32 03.2	21 75	50.0	31 37.4	23 72	47.7	31 30.5	23 72	47.2	31 23.5	24 71	46.6	30 54.0	26 68	44.3	8
9	31 59.4	15 80	54.8	31 50.1	16 79	53.7	31 34.8	18 77	51.9	31 18.2	19 75	50.2	30 53.9	21 73	47.9	30 47.4	22 72	47.4	30 40.8	22 71	46.8	30 12.9	24 69	44.5	9
60	31 11.4	14 80	55.0	31 02.7	15 79	53.8	30 48.6	17 77	52.1	30 33.0	18 75	50.4	30 10.2	20 73	48.1	30 04.2	20 72	47.5	29 57.9	21 72	47.0	29 31.7	23 69	44.7	60
1	30 23.3	13 80	55.1	30 15.3	14 79	54.0	30 02.2	15 77	52.2	29 47.8	17 76	50.5	29 26.5	19 73	48.3	29 20.8	19 72	47.7	29 15.0	20 72	47.1	28 50.3	21 69	44.9	1
2	29 35.1	12 80	55.2	29 27.8	13 79	54.1	29 15.7	14 78	52.4	29 02.4	16 76	50.7	28 42.6	17 73	48.4	28 37.3	18 73	47.9	28 31.9	18 72	47.3	28 08.8	20 69	45.1	2
3	28 46.9	11 80	55.3	28 40.2	12 79	54.2	28 29.2	13 78	52.5	28 17.0	14 76	50.8	27 58.7	16 73	48.6	27 53.8	17 73	48.0	27 48.7	17 72	47.5	27 27.2	19 70	45.2	3
4	27 58.6	09 81	55.4	27 52.6	10 79	54.3	27 42.6	12 78	52.6	27 31.4	13 76	50.9	27 14.6	15 74	48.7	27 10.1	15 73	48.1	27 05.4	16 72	47.6	26 45.5	17 70	45.4	4
65	27 10.2	08 81	55.5	27 04.9	09 80	54.4	26 56.0	11 78	52.7	26 45.8	12 76	51.0	26 30.5	14 74	48.8	26 26.3	14 73	48.3	26 22.0	14 72	47.7	26 03.6	16 70	45.5	65
6	26 21.8	07 81	55.6	26 17.2	08 80	54.5	26 09.2	09 78	52.8	26 00.2	11 76	51.1	25 46.3	12 74	48.9	25 42.5	13 73	48.4	25 38.6	13 73	47.8	25 21.7	15 70	45.6	6
7	25 33.4	06 81	55.6	25 29.4	07 80	54.5	25 22.5	08 78	52.9	25 14.4	10 76	51.2	25 02.0	11 74	49.0	24 58.6	12 73	48.5	24 55.1	12 73	47.9	24 39.7	14 70	45.7	7
8	24 45.0	05 81	55.7	24 41.6	06 80	54.6	24 35.7	07 78	52.9	24 28.7	08 76	51.3	24 17.7	10 74	49.1	24 14.6	10 73	48.6	24 11.5	11 73	48.0	23 57.7	12 70	45.8	8
9	23 56.5	04 81	55.7	23 53.8	05 80	54.6	23 48.8	06 78	53.0	23 42.8	07 76	51.4	23 33.3	09 74	49.2	23 30.6	09 73	48.6	23 27.8	09 73	48.1	23 15.5	11 70	45.9	9
70	23 08.0	03 81	55.8	23 05.9	04 80	54.7	23 01.9	05 78	53.0	22 57.0	06 76	51.4	22 48.8	08 74	49.3	22 46.5	08 74	48.7	22 44.1	08 73	48.2	22 33.3	10 70	46.0	70
1	22 19.4	02 81	55.8	22 18.0	03 80	54.7	22 15.0	04 78	53.1	22 11.1	05 77	51.5	22 04.3	06 74	49.3	22 02.4	07 74	48.8	22 00.3	07 73	48.2	21 51.1	08 70	46.1	1
2	21 30.9	01 81	55.8	21 30.1	02 80	54.7	21 28.1	03 78	53.1	21 25.2	04 77	51.5	21 19.8	05 74	49.4	21 18.2	05 74	48.8	21 16.5	06 73	48.3	21 08.8	07 71	46.1	2
3	20 42.4	00 81	55.8	20 42.2	01 80	54.7	20 41.1	02 78	53.1	20 39.2	03 77	51.5	20 35.3	04 74	49.4	20 34.1	04 74	48.9	20 32.7	05 73	48.3	20 26.4	06 71	46.2	3
4	19 53.8	01 81	55.8	19 54.2	00 80	54.7	19 54.2	01 78	53.1	19 53.3	01 77	51.5	19 50.7	03 74	49.4	19 49.8	03 74	48.9	19 48.9	03 73	48.4	19 44.1	05 71	46.2	4
75	19 05.3	02 81	55.8	19 06.3	01 80	54.7	19 07.2	01 78	53.1	19 07.3	00 77	51.6	19 06.1	02 74	49.4	19 05.6	02 74	48.9	19 05.0	02 73	48.4	19 01.7	03 71	46.3	75
6	18 16.8	03 81	55.8	18 18.4	02 80	54.7	18 20.3	02 78	53.1	18 21.3	01 77	51.5	18 21.6	00 74	49.4	18 21.4	01 74	48.9	18 21.1	01 73	48.4	18 19.3	02 71	46.3	6
7	17 28.2	04 81	55.7	17 30.5	04 80	54.7	17 33.3	03 78	53.1	17 35.4	02 77	51.5	17 37.0	01 74	49.4	17 37.2	00 74	48.9	17 37.3	00 73	48.4	17 36.8	01 71	46.3	7
8	16 39.8	05 81	55.7	16 42.6	05 80	54.6	16 46.4	04 78	53.1	16 49.4	03 77	51.5	16 52.4	02 74	49.4	16 52.9	02 74	48.9	16 53.4	01 73	48.4	16 54.4	00 71	46.3	8
9	15 51.3	06 81	55.6	15 54.8	06 80	54.6	15 59.5	05 78	53.0	16 03.5	04 77	51.5	16 07.8	03 74	49.4	16 08.7	03 74	48.9	16 09.5	03 73	48.4	16 12.0	02 71	46.3	9
80	15 02.9	07 81	55.6	15 07.0	07 80	54.6	15 12.6	06 78	53.0	15 17.6	05 76	51.5	15 23.3	04 74	49.4	15 24.5	04 74	48.9	15 25.6	04 73	48.3	15 29.6	03 71	46.3	80
1	14 14.5	08 81	55.5	14 19.2	08 80	54.5	14 25.7	07 78	53.0	14 31.7	06 76	51.4	14 38.7	05 74	49.3	14 40.3	05 74	48.8	14 41.8	05 73	48.3	14 47.2	04 71	46.2	1
2	13 26.1	09 81	55.5	13 31.4	09 80	54.4	13 38.9	08 78	52.9	13 45.9	07 76	51.4	13 54.2	07 74	49.3	13 56.1	06 74	48.8	13 58.0	06 73	48.3	14 04.8	05 71	46.2	2
3	12 37.8	10 80	55.4	12 43.7	10 79	54.4	12 52.1	09 78	52.8	13 00.0	08 76	51.3	13 09.7	08 74	49.2	13 12.0	07 74	48.7	13 14.2	07 73	48.2	13 22.4	06 71	46.2	3
4	11 49.5	11 80	55.3	11 56.0	11 79	54.3	12 05.4	10 78	52.7	12 14.3	10 76	51.2	12 25.3	09 74	49.2	12 27.9	09 73	48.7	12 30.5	08 73	48.2	12 40.1	08 70	46.1	4
85	11 01.3	12 80	55.2	11 08.4	12 79	54.2	11 18.7	11 78	52.7	11 28.5	11 76	51.1	11 40.9	10 74	49.1	11 43.9	10 73	48.6	11 46.8	10 73	48.1	11 57.8	09 70	46.1	85
6	10 13.1	13 80	55.1	10 20.8	13 79	54.1	10 32.1	12 78	52.6	10 42.9	12 76	51.1	10 56.6	11 74	49.0	10 59.9	11 73	48.5	11 03.1	11 73	48.0	11 15.6	10 70	46.0	6
7	9 25.0	14 80	55.0	9 33.3	14 79	54.0	9 45.5	13 78	52.5	9 57.2	13 76	51.0	10 12.3	12 74	48.9	10 15.9	12 73	48.4	10 19.5	12 73	47.9	10 33.4	11 70	45.9	7
8	8 37.0	15 80	54.9	8 45.9	15 79	53.9	8 59.0	14 77	52.4	9 11.7	14 76	50.9	9 28.1	13 74	48.8	9 32.0	13 73	48.3	9 36.0	13 72	47.8	9 51.3	12 70	45.8	8
9	7 49.1	16 80	54.7	7 58.6	16 79	53.7	8 12.6	15 77	52.2	8 26.2	15 76	50.7	8 43.9	14 73	48.7	8 48.2	14 73	48.2	8 52.5	14 72	47.7	9 09.2	14 70	45.7	9
90	7 01.2	17 80	54.6	7 11.3	17 79	53.6	7 26.2	16 77	52.1	7 40.8	16 76	50.6	7 59.8	16 73	48.6	8 04.5	15 73	48.1	8 09.1	15 72	47.6	8 27.2	15 70	45.6	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	42 00.0	1.0 01	180.0	41 00.0	1.0 01	180.0	39 30.0	1.0 01	180.0	38 00.0	1.0 01	180.0	36 00.0	1.0 01	180.0	35 30.0	1.0 01	180.0	35 00.0	1.0 01	180.0	33 00.0	1.0 01	180.0	00
1	41 59.4	1.0 03	178.9	40 59.5	1.0 03	178.9	39 29.5	1.0 03	179.0	37 59.5	1.0 02	179.0	35 59.5	1.0 02	179.1	35 29.5	1.0 02	179.1	34 59.5	1.0 02	179.1	32 59.6	1.0 02	179.2	1
2	41 57.8	1.0 05	177.8	40 57.8	1.0 04	177.9	39 27.9	1.0 04	178.0	37 58.0	1.0 04	178.1	35 58.1	1.0 04	178.2	35 28.1	1.0 04	178.2	34 58.2	1.0 04	178.2	32 58.3	1.0 04	178.3	2
3	41 55.0	1.0 06	176.7	40 55.1	1.0 06	176.8	39 25.3	1.0 06	177.0	37 55.5	1.0 06	177.1	35 55.8	1.0 05	177.2	35 25.8	1.0 05	177.3	34 55.9	1.0 05	177.3	32 56.1	1.0 05	177.5	3
4	41 51.1	1.0 08	175.7	40 51.3	1.0 08	175.8	39 21.7	1.0 08	176.0	37 52.0	1.0 07	176.1	35 52.5	1.0 07	176.3	35 22.6	1.0 07	176.4	34 52.7	1.0 07	176.4	32 53.1	1.0 06	176.6	4
05	41 46.1	99 10	174.6	40 46.5	99 10	174.7	39 17.0	99 09	174.9	37 47.6	99 09	175.2	35 48.3	99 09	175.4	35 18.4	99 08	175.5	34 48.6	99 08	175.5	32 49.2	99 08	175.8	05
6	41 40.0	99 12	173.5	40 40.6	99 12	173.7	39 11.4	99 11	173.9	37 42.1	99 11	174.2	35 43.1	99 10	174.5	35 13.3	99 10	174.6	34 43.6	99 10	174.7	32 44.5	99 09	175.0	6
7	41 32.8	99 14	172.4	40 33.6	99 13	172.6	39 04.7	99 13	172.9	37 35.7	99 12	173.2	35 37.0	99 12	173.6	35 07.4	99 12	173.7	34 37.7	99 11	173.8	32 38.9	99 11	174.1	7
8	41 24.5	98 16	171.4	40 25.5	98 15	171.6	38 56.9	98 15	171.9	37 28.3	99 14	172.3	35 30.0	99 13	172.7	35 00.5	99 13	172.8	34 30.9	99 13	172.9	32 32.5	99 12	173.3	8
9	41 15.2	98 17	170.3	40 16.4	98 17	170.6	38 48.2	98 16	171.0	37 19.9	98 16	171.3	35 22.1	98 15	171.8	34 52.7	98 14	171.9	34 23.2	98 14	172.0	32 25.2	98 14	172.5	9
10	41 04.8	97 19	169.3	40 06.3	98 19	169.6	38 38.5	98 18	170.0	37 10.6	98 17	170.4	35 13.3	98 16	170.9	34 44.0	98 16	171.0	34 14.6	98 16	171.2	32 17.1	98 15	171.6	10
1	40 53.3	97 21	168.2	39 55.2	97 20	168.5	38 27.8	97 19	169.0	37 00.3	97 19	169.5	35 03.6	97 18	170.0	34 34.4	97 17	170.2	34 05.1	97 17	170.3	32 08.2	98 16	170.8	1
2	40 40.8	96 23	167.2	39 43.0	96 22	167.5	38 16.1	97 21	168.0	36 49.1	97 20	168.5	34 53.0	97 19	169.1	34 23.9	97 19	169.3	33 54.8	97 19	169.4	31 58.4	97 18	170.0	2
3	40 27.3	96 24	166.2	39 29.8	96 24	166.5	38 03.5	96 23	167.1	36 37.0	96 22	167.6	34 41.5	96 21	168.3	34 12.6	96 20	168.4	33 43.6	96 20	168.6	31 47.8	97 19	169.2	3
4	40 12.8	95 26	165.2	39 15.7	95 25	165.6	37 49.9	95 24	166.1	36 23.9	96 23	166.7	34 29.1	96 22	167.4	34 00.4	96 22	167.6	33 31.6	96 21	167.7	31 36.4	96 20	168.4	4
15	39 57.2	94 28	164.1	39 00.5	95 27	164.6	37 35.3	95 26	165.2	36 10.0	95 25	165.8	34 15.9	95 23	166.5	33 47.3	95 23	166.7	33 18.7	95 23	166.9	31 24.2	95 22	167.6	15
6	39 40.7	94 29	163.2	38 44.4	94 28	163.6	37 19.9	94 27	164.3	35 55.1	94 26	164.9	34 01.8	95 25	165.7	33 33.4	95 25	165.9	33 05.0	95 24	166.1	31 11.3	95 23	166.8	6
7	39 23.2	93 31	162.2	38 27.4	93 30	162.7	37 03.5	93 29	163.3	35 39.4	94 28	164.0	33 46.9	94 26	164.8	33 18.7	94 26	165.1	32 50.5	94 26	165.3	30 57.5	94 24	166.0	7
8	39 04.8	92 32	161.2	38 00.4	92 31	161.7	36 46.2	93 30	162.4	35 22.8	93 29	163.1	33 31.1	93 28	164.0	33 03.1	93 27	164.2	32 35.2	93 27	164.4	30 43.0	94 26	165.3	8
9	38 45.4	91 34	160.3	37 50.6	92 33	160.8	36 28.1	92 32	161.5	35 05.3	92 30	162.3	33 14.5	92 29	163.2	32 46.8	93 29	163.4	32 19.0	93 28	163.6	30 27.7	93 27	164.5	9
20	38 25.1	90 35	159.3	37 30.8	91 34	159.9	36 09.0	91 33	160.6	34 47.0	91 32	161.4	32 57.2	92 30	162.4	32 29.6	92 30	162.6	32 02.1	92 30	162.8	30 11.6	92 28	163.8	20
1	38 04.0	90 37	158.4	37 10.2	90 36	159.0	35 49.2	90 35	159.8	34 27.9	91 33	160.6	32 39.0	91 32	161.6	32 11.7	91 31	161.8	31 44.4	91 31	162.1	29 54.8	91 29	163.0	1
2	37 41.9	89 38	157.5	36 48.7	89 37	158.1	35 28.5	89 36	158.9	34 07.9	90 35	159.7	32 20.0	90 33	160.8	31 53.0	90 32	161.0	31 25.9	90 32	161.3	29 37.3	91 30	162.3	2
3	37 19.0	88 40	156.6	36 26.3	88 39	157.2	35 06.9	88 37	158.0	33 47.2	89 36	158.9	32 00.3	89 34	160.0	31 33.5	89 34	160.2	31 06.7	89 33	160.5	29 19.1	90 32	161.5	3
4	36 55.3	87 41	155.7	36 03.1	87 40	156.3	34 44.6	87 39	157.2	33 25.6	88 37	158.1	31 39.9	88 35	159.2	31 13.3	89 35	159.5	30 46.7	89 34	159.7	29 00.1	89 33	160.8	4
25	36 30.7	86 42	154.8	35 39.2	86 41	155.5	34 21.5	87 40	156.4	33 03.4	87 38	157.3	31 18.6	88 37	158.4	30 52.4	88 36	158.7	30 26.1	88 36	159.0	28 40.5	88 34	160.1	25
6	36 05.3	85 44	154.0	35 14.4	85 43	154.6	33 57.6	86 41	155.6	32 40.3	86 40	156.5	30 56.7	87 38	157.7	30 30.7	87 37	158.0	30 04.7	87 37	158.3	28 20.2	87 35	159.4	6
7	35 39.2	84 45	153.1	34 48.8	84 44	153.8	33 32.9	85 42	154.8	32 16.5	85 41	155.7	30 34.1	86 39	156.9	30 08.3	86 38	157.2	29 42.6	86 38	157.5	27 59.2	86 36	158.7	7
8	35 12.3	83 46	152.3	34 22.6	83 45	153.0	33 07.5	84 44	154.0	31 52.0	84 42	154.9	30 10.7	85 40	156.2	29 45.3	85 40	156.5	29 19.8	85 39	156.8	27 37.5	86 37	158.0	8
9	34 44.6	82 47	151.5	33 55.5	82 46	152.2	32 41.4	83 45	153.2	31 26.8	83 43	154.2	29 46.7	84 41	155.5	29 21.6	84 41	155.8	28 56.4	84 40	156.1	27 15.2	85 38	157.3	9
30	34 16.3	81 48	150.7	33 27.8	81 47	151.4	32 14.6	82 46	152.4	31 00.9	82 44	153.5	29 22.0	83 42	154.8	28 57.2	83 42	155.1	28 32.3	83 41	155.4	26 52.2	84 39	156.6	30
1	33 47.2	80 50	149.9	32 59.3	80 49	150.6	31 47.1	81 47	151.7	30 34.4	81 45	152.7	28 56.7	82 43	154.1	28 32.1	82 43	154.4	28 07.5	82 42	154.7	26 28.7	83 40	156.0	1
2	33 17.4	78 51	149.1	32 30.2	79 50	149.9	31 19.0	79 48	151.0	30 07.2	80 46	152.0	28 30.7	81 44	153.4	28 06.4	81 44	153.7	27 42.1	81 43	154.0	26 04.5	82 41	155.3	2
3	32 47.0	77 52	148.4	32 00.5	78 51	149.1	30 50.1	78 49	150.2	29 39.3	79 47	151.3	28 04.1	80 45	152.7	27 40.1	80 45	153.0	27 16.1	80 44	153.4	25 39.7	81 42	154.7	3
4	32 15.9	76 53	147.7	31 30.0	77 52	148.4	30 20.7	77 50	149.5	29 10.8	78 48	150.6	27 36.8	79 46	152.0	27 13.2	79 46	152.4	26 49.5	79 45	152.7	25 14.3	80 43	154.1	4
35	31 44.2	75 54	146.9	30 59.0	76 53	147.7	29 50.6	76 51	148.8	28 41.7	77 49	149.9	27 09.0	78 47	151.4	26 45.7	78 47	151.7	26 22.3	78 46	152.1	24 48.4	79 44	153.5	35
6	31 11.9	74 55	146.2	30 27.3	75 54	147.0	29 20.0	75 52	148.2	28 12.0	76 50	149.3	26 40.6	77 48	150.7	26 17.6	77 48	151.1	25 54.6	77 47	151.5	24 21.9	78 45	152.9	6
7	30 39.0	73 56	145.5	29 55.1	73 55	146.3	28 48.7	74 53	147.5	27 41.8	75 51	148.6	26 11.6	75 49	150.1	25 49.0	76 49	150.5	25 26.2	76 48	150.8	23 54.8	77 46	152.3	7
8	30 05.5	72 57	144.9	29 22.2	72 56	145.7	28 16.9	73 54	146.8	27 10.9	74 52	148.0	25 42.1	74 50	149.5	25 19.8	75 50	149.9	24 57.4	75 49	150.2	23 27.3	75 47	151.7	8
9	29 31.4	71 58	144.2	28 48.8	71 57	145.0	27 44.5	72 55	146.2	26 39.5	72 53	147.4	25 12.0	73 51	148.9	24 50.0	73 50	149.3	24 28.0	74 50	149.6	22 59.1	74 48	151.1	9
40	28 56.8	70 59	143.5	28 14.9	70 57	144.4	27 11.6	71 56	145.6	26 07.6	71 54	146.7	24 41.4	72 52	148.3	24 19.8	72 51	148.7	23 58.0	73 51	149.0	22 30.5	73 49	150.5	40
1	28 21.7	68 59	142.9	27 40.4	69 58	143.7	26 38.1	70 57	144.9	25 35.2	70 55	146.1	24 10.3	71 53	147.7	23 49.0	71 52	148.1	23 27.6	71 52	148.5	22 01.4	72 49	150.0	1
2	27 46.0	67 60	142.3	27 05.5	68 59	143.1	26 04.1	68 57	144.3	25 02.2	69 56	145.5	23 38.7	70 54	147.1	23 17.7	70 53	147.5	22 56.6	70 52	147.9	21 31.8	71 50	149.4	2
3	27 00.8	66 61	141.7	26 30.0	67 60	142.5	25 29.7	67 58	143.7	24 28.8	68 57	145.0	23 06.6	69 54	146.6	22 45.9	69 54	147.0	22 25.2	69 53	147.3	21 01.7	70 51	148.9	3
4	26 33.2	65 62	141.1	25 54.0	66 61	141.9	24 54.7	66 59	143.2	23 54.8	67 57	144.4	22 34.1	68 55	146.0	22 13.7	68 54	146.4	21 53.3	68 54	146.8	20 31.1	69 52	148.4	4
45	25 56.1	64 63	140.5	25 17.6	64 61	141.3	24 19.3	65 60	142.6	23 20.4	66 58	143.8	22 01.0	67 56	145.5	21 41.0	67 55	145.9	21 20.9	67 55	146.3	20 00.1	68 52	147.9	45
6	25 18.5	63 63	139.9	24 40.7	63 62	140.8	23 43.5	64 61	142.1	22 45.6	65 59	143.3	21 27.5	65 57	144.9	21 07.9	66 56	145.3	20 48.1	66 55	145.8	19 28.7	67 53	147.3	6
7	24 40.5	62 64	139.4	24 03.4	62 63	140.2	23 07.2	63 61	141.5	22 10.3	64 60	142.8	20 53.6	64 57	144.4	20 34.3	65 57	144.8	20 14.9	65 56	145.2	18 56.8	65 54	146.9	7
8	24 02.1	61 65	138.8	23 25.7	61 64	139.7	22 30.4	62 62	141.0	21 34.6	62 60	142.3	20 19.2	63 58	143.9	20 00.3	63 57	144.3	19 41.2	64 57	144.7	18 24.5	64 54	146.4	8
9	23 23.3	59 65	138.3	22 47.5	60 64	139.2	21 53.3	61 63	140.5	20 58.4	61 61	141.7	19 44.5	62 59	143.4	19 25.8	62 58	143.8	19 07.1	62 57	144.3	17 51.8	63 55	145.9	9
50	22 44.0	58 66	137.8	22 08.9	59 65	138.7	21 15.7	59 63	140.0	20 21.9	60 62	141.2	19 09.3	61 59	142.9	18 51.0	61 59	143.4	18 32.7	61 58	143.8	17 18.7	62 56	145.4	50
1	22 04.4	57 67	137.3	21 30.0	58 66	138.2	20 37.8	58 64	139.5	19 45.0	59 62	140.8	18 33.7	60 60	142.5	18 15.8	60 59	142.9	17 57.8	60 59	143.3	16 45.2	61 56	145.0	1
2	21 24.4	56 67	136.8	20 50.6	57 66	137.7	19 59.4	57 64	139.0	19 07.7	58 63	140.3	17 57.8	59 61	142.0	17 40.2	59 60	142.4	17 22.5	59 59	142.9	16 11.3	60 57	144.5	2
3	20 44.0	55 68	136.3	20 10.9	55 67	137.2	19 20.7	56 65	138.5	18 30.0	57 63	139.8	17 21.5	57 61	141.6	17 04.2	58 61	142.0	16 46.9	58 60	142.4	15 37.1	58 58	144.1	3
4	20 03.3	54 68	135.8	19 30.9	54 67	136.7	18 41.7	55 66	138.1	17 51.9	56 64	139.4	16 44.8	56 62	141.1	16 27.9	56 61	141.5	16 10.9	57 61	142.0	15 02.5	57 58	143.7	4
55	19 22.3	53 69	135.4	18 50.5	53 68	136.3	18 02.3	54 66	137.6	17 13.6	54 65	138.9	16 07.8	55 62	140.7	15 51.2	55 62	141.1	15 34.6	56 61	141.5	14 27.6	56 59	143.3	55
6	18 40.9	52 70	134.9	18 00.7	52 68	135.8	17 22.5	53 67	137.2	16 34.8	53 65	138.5	15 30.4	54 63	140.3	15 14.2	54 62	140.7	14 57.9	54 62	141.1	13 52.3	55 59	142.9	6
7	17 59.2	51 70	134.5	17 28.7	51 69	135.4	16 42.5	52 67	136.7	15 55.8	52 66	138.1	14 52.7	53 63	139.8	14 36.9	53 63	140.3	14 20.9	53 62	140.7	13 16.7	54 60	142.5	7
8	17 17.1	50 71	134.1	16 47.3	50 69	135.0	16 02.1	51 68	136.3	15 16.4	51 66	137.7	14 14.7	52 64	139.4	13 59.2	52 63	139.9	13 43.6	52 63	140.3	12 40.8	53 60	142.1	8
9	16 34.8	48 71	133.7	16 05.6	49 70	134.6	15 21.4	49 68	135.9	14 36.7	50 67	137.3	13 36.4	51 64	139.1	13 21.2	51 64	139.5	13 06.0	51 63	139.9	12 04.6	51 61	141.7	9
60	15 52.2	47 71	133.2	15 23.7	48 70	134.2	14 40.5	48 69	135.5	13 56.8	49 67	136.9	12 57.8	49 65	138.7	12 43.0	50 64	139.1	12 28.1	50 64	139.6	11 28.0	50 61	141.3	60
1	15 00.3	46 72	132.9	14 41.4	47 71	133.8	13 59.2	47 69	135.1	13 16.5	48 68	136.5	12 18.9	48 65	138.3	12 04.4	48 65	138.7	11 49.9	49 64	139.2	10 51.2	49 62	141.0	1
2	14 26.2	45 72	132.5	13 58.9	46 71	133.4	13 17.7	46 70	134.8	12 36.0	47 68	136.1	11 39.7	47 66	137.9	11 25.6	47 65	138.4	11 11.4	47 65	138.8	10 14.1	48 62	140.6	2
3	13 42.8	44 73	132.1	13 16.1	45 72	133.0	12 35.9	45 70	134.4	11 55.2	45 68	135.8	11 00.3	46 66	137.6	10 46.5	46 66	138.0	10 32.6	46 65	138.5	9 36.8	47 63	140.3	3
4	12 59.1	43 73	131.7	12 33.1	43 72	132.7	11 53.8	44 71	134.0	11 14.1	44 69	135.4	10 20.6	45 67	137.2	10 07.1	45 66	137.7	9 53.6	45 66	138.1	8 59.1	46 63	140.0	4
65	12 15.2	42 74	131.4	11 49.8	42 73	132.3	11 11.5	43 71	133.7	10 32.8	43 69	135.1	9 40.6	44 67	136.9	9 27.4	44 66	137.4	9 14.3	44 66	137.8	8 21.2	44 64	139.6	65
6	11 31.0	41 74	131.0	11 06.3	41 73	132.0	10 28.9	42 71	133.4	9 51.2	42 70	134.7	9 00.4	43 67	136.6	8 47.6	43 67	137.0	8 34.7	43 66	137.5	7 43.1	43 64	139.3	6
7	10 46.6	40 74	130.7	10 22.6	40 73	131.6	9 46.1	41 72	133.0	9 09.4	41 70	134.4	8 19.9	41 68	136.3	8 07.5	42 67	136.7	7 55.0	42 67	137.2	7 04.7	42 64	139.0	7
8	10 02.0	39 75	130.4	9 38.6	39 74	131.3	9 03.1	40 72	132.7	8 27.4	40 70	134.1	7 39.2	40 68	136.0	7 27.1	40 68	136.4	7 15.0	41 67	136.9	6 26.1	41 65	138.7	8
9	9 17.2	38 75	130.1	8 54.4	38 74	131.0	8 19.9	39 72	132.4	7 45.1	39 71	133.8	6 58.3	39 69	135.7	6 46.5	39 68	136.1	6 34.7	39 67	136.6	5 47.3	40 65	138.4	9
70	8 32.2	37 75	129.8	8 10.0	37 74	130.7	7 36.5	37 73	132.1	7 02.6	38 71	133.5	6 17.2	38 69	135.4	6 05.7	38 68	135.8	5 54.3	38 68	136.3	5 08.2	39 65	138.2	70
1	7 47.0	36 76	129.5	7 25.4	36 75	130.4	6 52.8	36 73	131.8	6 20.0	37 71	133.2	5 35.8	37 70	135.1	5 24.8	37 69	135.6	5 13.6	37 68	136.0				1
2	7 01.6	35 76	129.2	6 40.6	35 75	130.1	6 09.0	35 73	131.5	5 37.1	36 72	132.9													2
3	6 16.0	34 76	128.9	5 55.7	34 75	129.8	5 25.0	34 74	131.3																3
4	5 30.2	33 77	128.6	5 10.5	33 76	129.6																			4

DECLINATION SAME NAME AS LATITUDE

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	6 13.4	18 80	54.5	6 24.1	18 79	53.5	6 39.9	17 77	52.0	6 55.5	17 75	50.5	7 15.8	17 73	48.5	7 20.8	17 73	48.0	7 25.8	17 72	47.5	7 45.3	16 70	45.5	91
2	5 25.7	19 79	54.3	5 37.0	19 78	53.3	5 53.7	18 77	51.8	6 10.2	18 75	50.4	6 31.9	18 73	48.4	6 37.2	18 72	47.9	6 42.5	18 72	47.4	7 03.5	17 70	45.4	2
3							5 07.6	20 77	51.7	5 25.1	19 75	50.2	5 48.1	19 73	48.2	5 53.7	19 72	47.7	5 59.4	19 72	47.3	6 21.7	18 69	45.3	3
4													5 04.3	20 73	48.1	5 10.4	20 72	47.6	5 16.4	20 72	47.1	5 40.1	20 69	45.1	4

H.A.	46° 00′				47° 00′				48° 30′				49° 30′				50° 30′				51° 30′				52° 30′				54° 00′				H.A.
°	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	°
00	56 00.0	1.0	01	00.0	55 00.0	1.0	01	00.0	53 30.0	1.0	01	00.0	52 30.0	1.0	01	00.0	51 30.0	1.0	01	00.0	50 30.0	1.0	01	00.0	49 30.0	1.0	01	00.0	48 00.0	1.0	01	00.0	00
1	55 59.4	1.0	03	01.2	54 59.4	1.0	03	01.2	53 29.4	1.0	03	01.1	52 29.5	1.0	03	01.1	51 29.5	1.0	03	01.0	50 29.5	1.0	02	01.0	49 29.5	1.0	02	00.9	47 59.6	1.0	02	00.9	1
2	55 57.5	1.0	05	02.5	54 57.6	1.0	05	02.4	53 27.7	1.0	05	02.2	52 27.8	1.0	05	02.1	51 27.9	1.0	04	02.0	50 28.0	1.0	04	02.0	49 28.1	1.0	04	01.9	47 58.2	1.0	04	01.8	2
3	55 54.3	1.0	07	03.7	54 54.5	1.0	07	03.6	53 24.9	1.0	07	03.3	52 25.1	1.0	06	03.2	51 25.3	1.0	06	03.1	50 25.5	1.0	06	02.9	49 25.7	1.0	06	02.8	47 56.0	1.0	05	02.6	3
4	55 49.8	99	09	04.9	54 50.3	99	09	04.7	53 20.9	99	08	04.4	52 21.3	99	08	04.3	51 21.6	99	08	04.1	50 22.0	99	08	03.9	49 22.3	99	07	03.7	47 52.8	99	07	03.5	4
05	55 44.2	99	12	06.2	54 44.8	99	11	05.9	53 15.8	99	10	05.5	52 16.4	99	10	05.3	51 17.0	99	10	05.1	50 17.5	99	09	04.9	49 18.0	99	09	04.7	47 48.8	99	08	04.4	05
6	55 37.2	98	14	07.4	54 38.2	98	13	07.1	53 09.6	99	12	06.6	52 10.4	99	12	06.4	51 11.2	99	11	06.1	50 12.0	99	11	05.8	49 12.8	99	10	05.6	47 43.9	99	10	05.2	6
7	55 29.1	98	16	08.6	54 30.4	98	15	08.2	53 02.2	98	14	07.7	52 03.4	98	13	07.4	51 04.5	98	13	07.1	50 05.6	98	12	06.8	49 06.6	98	12	06.5	47 38.1	98	11	06.1	7
8	55 19.7	97	18	09.8	54 21.4	97	17	09.4	52 53.8	97	16	08.8	51 55.3	98	15	08.4	50 56.8	98	15	08.1	49 58.2	98	14	07.7	48 59.5	98	13	07.4	47 31.4	98	13	07.0	8
9	55 09.1	96	20	11.0	54 11.3	97	19	10.5	52 44.3	97	18	09.9	51 46.2	97	17	09.4	50 48.0	97	16	09.1	49 49.8	97	16	08.7	48 51.4	97	15	08.3	47 23.8	97	14	07.8	9
10	54 57.4	96	22	12.1	54 00.0	96	21	11.6	52 33.7	96	19	10.9	51 36.0	96	19	10.5	50 38.3	96	18	10.0	49 40.4	96	17	09.6	48 42.5	97	16	09.2	47 15.4	97	15	08.6	10
1	54 44.5	96	23	13.3	53 47.6	95	22	12.7	52 22.1	95	21	12.0	51 24.9	95	20	11.5	50 27.6	96	19	11.0	49 30.2	96	19	10.5	48 32.6	96	18	10.1	47 06.2	96	17	09.5	1
2	54 30.4	94	25	14.4	53 34.2	94	24	13.8	52 09.4	94	23	13.0	51 12.7	95	22	12.4	50 15.9	95	21	11.9	49 19.0	95	20	11.5	48 21.9	95	19	11.0	46 56.1	95	18	10.3	2
3	54 15.3	93	27	15.5	53 19.6	93	26	14.9	51 55.7	93	24	14.0	50 59.6	94	24	13.4	50 03.3	94	23	12.9	49 06.9	94	22	12.4	48 10.3	94	21	11.8	46 45.2	95	20	11.1	3
4	53 59.0	92	29	16.6	53 04.0	92	28	15.9	51 41.0	92	26	15.0	50 45.5	93	25	14.4	49 49.8	93	24	13.8	48 53.9	93	23	13.2	47 57.8	94	22	12.7	46 33.5	94	21	11.9	4
15	53 41.7	90	31	17.7	52 47.4	91	29	17.0	51 25.4	91	28	16.0	50 30.4	92	27	15.3	49 35.3	92	26	14.7	48 40.0	92	25	14.1	47 44.5	93	24	13.6	46 20.9	93	22	12.7	15
6	53 23.4	89	32	18.7	52 29.8	90	31	18.0	51 08.8	90	29	16.9	50 14.5	91	28	16.3	49 20.0	91	27	15.6	48 25.2	91	26	15.0	47 30.3	92	25	14.4	46 07.6	92	24	13.5	6
7	53 04.1	88	34	19.8	52 11.1	88	33	19.0	50 51.2	89	31	17.9	49 57.6	90	30	17.2	49 03.7	90	28	16.5	48 09.6	90	27	15.8	47 15.3	91	26	15.2	45 53.5	91	25	14.3	7
8	52 43.7	87	35	20.8	51 51.6	87	34	20.0	50 32.8	88	32	18.8	49 39.8	88	31	18.1	48 46.7	89	30	17.4	47 53.2	89	29	16.7	46 59.5	90	28	16.0	45 38.6	90	26	15.1	8
9	52 22.5	86	37	21.7	51 31.1	86	36	20.9	50 13.4	87	34	19.7	49 21.2	87	32	18.9	48 28.7	88	31	18.2	47 36.0	88	30	17.5	46 43.0	89	29	16.8	45 23.0	89	27	15.8	9
20	52 00.3	84	38	22.7	51 09.7	85	37	21.8	49 53.2	85	35	20.6	49 01.7	86	34	19.8	48 10.0	87	33	19.0	47 17.9	87	31	18.3	46 25.6	87	30	17.6	45 06.6	88	28	16.6	20
1	51 37.2	83	40	23.6	50 47.5	83	38	22.7	49 32.1	84	36	21.5	48 41.5	85	35	20.6	47 50.5	85	34	19.9	46 59.1	86	33	19.1	46 07.5	86	31	18.3	44 49.6	87	30	17.3	1
2	51 13.2	81	41	24.5	50 24.3	82	40	23.6	49 10.2	83	38	22.3	48 20.4	83	36	21.5	47 30.1	84	35	20.7	46 39.6	85	34	19.9	45 48.7	85	33	19.1	44 31.8	86	31	18.0	2
3	50 48.4	80	43	25.4	50 00.4	80	41	24.5	48 47.6	81	39	23.1	47 58.5	82	38	22.3	47 09.1	83	36	21.4	46 19.3	83	35	20.6	45 29.1	84	34	19.8	44 13.3	85	32	18.7	3
4	50 22.8	78	44	26.3	49 35.7	79	42	25.3	48 24.1	80	40	24.0	47 35.9	81	39	23.1	46 47.2	81	38	22.2	45 58.2	82	36	21.4	45 08.9	83	35	20.6	43 54.2	83	33	19.4	4
25	49 56.4	77	45	27.1	49 10.2	77	44	26.2	47 59.9	79	42	24.7	47 12.5	79	40	23.8	46 24.7	80	39	22.9	45 36.5	81	37	22.1	44 47.9	81	36	21.3	43 34.4	82	34	20.1	25
6	49 29.3	75	46	28.0	48 43.9	76	45	27.0	47 35.0	77	43	25.5	46 48.5	78	41	24.6	46 01.5	79	40	23.7	45 14.1	79	38	22.8	44 26.3	80	37	21.9	43 13.9	81	35	20.7	6
7	49 01.4	74	48	28.7	48 17.0	74	46	27.7	47 09.4	76	44	26.3	46 23.7	77	42	25.3	45 37.6	77	41	24.4	44 51.0	78	40	23.5	44 04.0	79	38	22.6	42 52.9	80	36	21.4	7
8	48 32.8	72	49	29.5	47 49.3	73	47	28.5	46 43.1	74	45	27.0	45 58.3	75	43	26.0	45 13.0	76	42	25.1	44 27.3	77	41	24.2	43 41.2	77	39	23.3	42 31.2	78	37	22.0	8
9	48 03.6	70	50	30.3	47 21.0	71	48	29.2	46 16.1	73	46	27.7	45 32.2	74	44	26.7	44 47.8	74	43	25.8	44 03.0	75	42	24.8	43 17.7	76	40	23.9	42 08.9	77	38	22.6	9
30	47 33.7	69	51	31.0	46 52.1	70	49	29.9	45 48.6	71	47	28.4	45 05.5	72	45	27.4	44 22.0	73	44	26.4	43 38.0	74	43	25.5	42 53.6	74	41	24.5	41 46.1	76	39	23.2	30
1	47 03.2	67	52	31.7	46 22.5	68	50	30.6	45 20.4	70	48	29.0	44 38.2	71	46	28.0	43 55.6	71	45	27.1	43 12.5	72	44	26.1	42 28.9	73	42	25.2	41 22.7	74	40	23.8	1
2	46 32.1	66	53	32.4	45 52.3	67	51	31.3	44 51.6	68	49	29.7	44 10.4	69	47	28.7	43 28.6	70	46	27.7	42 46.4	71	44	26.7	42 03.7	72	43	25.8	40 58.7	73	41	24.4	2
3	46 00.4	64	54	33.0	45 21.6	65	52	31.9	44 22.2	67	50	30.3	43 41.9	68	48	29.3	43 01.1	68	47	28.3	42 19.8	69	45	27.3	41 37.9	70	44	26.3	40 34.3	71	42	24.9	3
4	45 28.1	63	55	33.6	44 50.3	64	53	32.5	43 52.3	65	51	30.9	43 13.0	66	49	29.9	42 33.0	67	48	28.9	41 52.6	68	46	27.9	41 11.6	69	45	26.9	40 09.3	70	42	25.5	4
35	44 55.4	61	55	34.2	44 18.5	62	54	33.1	43 21.9	64	52	31.5	42 43.4	65	50	30.5	42 04.4	65	48	29.4	41 24.9	66	47	28.4	40 44.8	67	46	27.4	39 43.8	68	43	26.0	35
6	44 22.1	59	56	34.8	43 46.1	61	55	33.7	42 51.0	62	52	32.1	42 13.4	63	51	31.0	41 35.3	64	49	30.0	40 56.7	65	48	29.0	40 17.5	66	46	28.0	39 17.8	67	44	26.5	6
7	43 48.3	58	57	35.4	43 13.3	59	55	34.3	42 19.5	61	53	32.6	41 42.9	61	52	31.6	41 05.8	62	50	30.5	40 28.0	63	49	29.5	39 49.8	64	47	28.5	38 51.4	65	45	27.0	7
8	43 14.1	56	58	35.9	42 40.0	57	56	34.8	41 47.7	59	54	33.2	41 12.0	60	52	32.1	40 35.7	61	51	31.0	39 58.9	62	49	30.0	39 21.5	63	48	29.0	38 24.5	64	46	27.5	8
9	42 39.4	55	58	36.5	42 06.3	56	57	35.3	41 15.3	57	55	33.7	40 40.6	58	53	32.6	40 05.2	59	52	31.5	39 29.3	60	50	30.5	38 52.9	61	48	29.5	37 57.2	62	46	28.0	9
40	42 04.3	53	59	37.0	41 32.1	54	58	35.8	40 42.6	56	55	34.2	40 08.7	57	54	33.1	39 34.3	58	52	32.0	38 59.3	59	51	31.0	38 23.8	60	49	30.0	37 29.4	61	47	28.4	40
1	41 28.8	52	60	37.5	40 57.5	53	58	36.3	40 09.4	54	56	34.7	39 36.5	55	54	33.6	39 03.0	56	53	32.5	38 28.9	57	51	31.4	37 54.3	58	50	30.4	37 01.3	59	48	28.9	1
2	40 53.0	50	60	37.9	40 22.6	51	59	36.8	39 35.8	53	57	35.1	39 03.8	54	55	34.0	38 31.2	55	54	33.0	37 58.1	56	52	31.9	37 24.4	57	50	30.9	36 32.8	58	48	29.3	2
3	40 16.7	49	61	38.4	39 47.2	50	60	37.3	39 01.8	51	57	35.6	38 30.8	52	56	34.5	37 59.1	53	54	33.4	37 26.9	54	53	32.3	36 54.1	55	51	31.3	36 03.8	56	49	29.7	3
4	39 40.1	47	62	38.8	39 11.5	48	60	37.7	38 27.5	50	58	36.0	37 57.4	51	56	34.9	37 26.6	52	55	33.8	36 55.3	53	53	32.7	36 23.4	54	52	31.7	35 34.6	55	49	30.1	4
45	39 03.1	45	62	39.2	38 35.5	47	61	38.1	37 52.8	48	58	36.4	37 23.6	49	57	35.3	36 53.8	50	55	34.2	36 23.4	51	54	33.1	35 52.4	52	52	32.1	35 04.9	53	50	30.5	45
6	38 25.8	44	63	39.6	37 59.1	45	61	38.5	37 17.8	47	59	36.8	36 49.5	48	57	35.7	36 20.6	49	56	34.6	35 51.1	50	54	33.5	35 21.1	51	53	32.5	34 34.9	52	50	30.9	6
7	37 48.2	42	63	40.0	37 22.4	44	62	38.9	36 42.5	45	59	37.2	36 15.1	46	58	36.1	35 47.1	47	56	35.0	35 18.6	48	55	33.9	34 49.4	49	53	32.8	34 04.6	50	51	31.3	7
8	37 10.4	41	64	40.4	36 45.5	42	62	39.2	36 06.9	44	60	37.6	35 40.4	45	58	36.4	35 13.3	46	57	35.4	34 45.7	47	55	34.3	34 17.4	48	54	33.2	33 34.0	49	52	31.6	8
9	36 32.2	39	64	40.7	36 08.2	41	63	39.6	35 31.0	42	60	37.9	35 05.4	43	59	36.8	34 39.2	44	57	35.7	34 12.5	45	56	34.6	33 45.1	46	54	33.5	33 03.1	47	52	32.0	9
50	35 53.8	38	64	41.1	35 30.7	39	63	39.9	34 54.8	41	61	38.2	34 30.1	42	59	37.1	34 04.8	43	58	36.0	33 39.0	44	56	35.0	33 12.6	44	55	33.9	32 31.9	46	52	32.3	50
1	35 15.1	37	65	41.4	34 52.9	38	63	40.2	34 18.3	39	61	38.6	33 54.5	40	60	37.5	33 30.2	41	58	36.4	33 05.2	42	57	35.3	32 39.7	43	55	34.2	32 00.4	44	53	32.6	1
2	34 36.2	35	65	41.7	34 14.8	36	64	40.6	33 41.6	38	62	38.9	33 18.7	39	60	37.8	32 55.3	40	59	36.7	32 31.2	41	57	35.6	32 06.6	41	56	34.5	31 28.7	43	53	32.9	2
3	33 57.0	34	66	42.0	33 36.6	35	64	40.8	33 04.7	36	62	39.2	32 42.7	37	60	38.1	32 20.1	38	59	37.0	31 56.9	39	58	35.9	31 33.2	40	56	34.8	30 56.7	41	54	33.2	3
4	33 17.7	32	66	42.2	32 58.1	33	64	41.1	32 27.5	35	62	39.4	32 06.4	36	61	38.3	31 44.7	37	59	37.2	31 22.4	38	58	36.1	30 59.6	38	56	35.1	30 24.4	40	54	33.5	4
55	32 38.1	31	66	42.5	32 19.4	32	65	41.4	31 50.1	33	63	39.7	31 29.9	34	61	38.6	31 09.1	35	60	37.5	30 47.7	36	58	36.4	30 25.8	37	57	35.3	29 52.0	38	54	33.7	55
6	31 58.4	29	67	42.8	31 40.5	30	65	41.6	31 12.5	32	63	40.0	30 53.1	33	62	38.9	30 33.2	34	60	37.8	30 12.8	35	59	36.7	29 51.8	35	57	35.6	29 19.3	37	55	34.0	6
7	31 18.4	28	67	43.0	31 01.4	29	65	41.9	30 34.7	30	63	40.2	30 16.2	31	62	39.1	29 57.2	32	60	38.0	29 37.6	33	59	36.9	29 17.5	34	57	35.8	28 46.4	35	55	34.2	7
8	30 38.3	27	67	43.2	30 22.1	28	66	42.1	29 56.7	29	64	40.4	29 39.1	30	62	39.3	29 21.0	31	61	38.2	29 02.3	32	59	37.1	28 43.1	32	58	36.1	28 13.3	34	55	34.5	8
9	29 58.1	25	67	43.4	29 42.7	26	66	42.3	29 18.6	27	64	40.6	29 01.8	28	62	39.5	28 44.6	29	61	38.5	28 26.7	30	60	37.4	28 08.4	31	58	36.3	27 40.0	32	56	34.7	9
60	29 17.7	24	68	43.6	29 03.1	25	66	42.5	28 40.3	26	64	40.8	28 24.4	27	63	39.7	28 08.0	28	61	38.7	27 51.0	29	60	37.6	27 33.6	29	58	36.5	27 06.5	31	56	34.9	60
1	28 37.1	22	68	43.8	28 23.4	23	66	42.7	28 01.8	25	64	41.0	27 46.8	25	63	39.9	27 31.2	26	61	38.9	27 15.2	27	60	37.8	26 58.6	28	59	36.7	26 32.9	29	56	35.1	1
2	27 56.4	21	68	44.0	27 43.5	22	67	42.9	27 23.2	23	65	41.2	27 09.0	24	63	40.1	26 54.3	25	62	39.0	26 39.2	26	60	38.0	26 23.5	27	59	36.9	25 59.0	28	57	35.3	2
3	27 15.6	20	68	44.1	27 03.6	21	67	43.0	26 44.5	22	65	41.4	26 31.2	23	63	40.3	26 17.3	23	62	39.2	26 03.0	24	60	38.1	25 48.2	25	59	37.0	25 25.1	26	57	35.4	3
4	26 34.7	18	68	44.3	26 23.5	19	67	43.2	26 05.6	20	65	41.5	25 53.1	21	64	40.5	25 40.2	22	62	39.4	25 26.7	23	61	38.3	25 12.8	24	59	37.2	24 51.0	25	57	35.6	4
65	25 53.7	17	69	44.4	25 43.2	18	67	43.3	25 26.7	19	65	41.7	25 15.0	20	64	40.6	25 02.9	21	62	39.5	24 50.3	21	61	38.4	24 37.2	22	59	37.4	24 16.8	23	57	35.8	65
6	25 12.6	16	69	44.5	25 02.9	16	67	43.4	24 47.6	18	65	41.8	24 36.8	18	64	40.7	24 25.5	19	62	39.7	24 13.7	20	61	38.6	24 01.5	21	60	37.5	23 42.4	22	57	35.9	6
7	24 31.4	14	69	44.7	24 22.5	15	67	43.6	24 08.4	16	65	41.9	23 58.4	17	64	40.9	23 48.0	18	63	39.8	23 37.1	19	61	38.7	23 25.7	19	60	37.6	23 07.9	20	58	36.0	7
8	23 50.1	13	69	44.8	23 42.0	14	68	43.7	23 29.1	15	66	42.1	23 20.0	16	64	41.0	23 10.4	16	63	39.9	23 00.3	17	61	38.8	22 49.8	18	60	37.8	22 33.3	19	58	36.2	8
9	23 08.7	12	69	44.9	23 01.5	12	68	43.8	22 49.8	14	66	42.2	22 41.4	14	64	41.1	22 32.7	15	63	40.0	22 23.5	16	62	38.9	22 13.9	16	60	37.9	21 58.7	17	58	36.3	9
70	22 27.3	10	69	44.9	22 20.8	11	68	43.9	22 10.3	12	66	42.3	22 02.8	13	64	41.2	21 54.9	14	63	40.1	21 46.5	14	62	39.0	21 37.8	15	60	38.0	21 23.9	16	58	36.4	70
1	21 45.8	09	69	45.0	21 40.1	10	68	43.9	21 30.8	11	66	42.3	21 24.1	12	65	41.3	21 17.0	12	63	40.2	21 09.5	13	62	39.1	21 01.6	14	60	38.1	20 49.0	14	58	36.5	1
2	21 04.3	08	69	45.1	20 59.4	08	68	44.0	20 51.3	09	66	42.4	20 45.4	10	65	41.3	20 39.1	11	63	40.3	20 32.5	11	62	39.2	20 25.4	12	60	38.2	20 14.1	13	58	36.6	2
3	20 22.7	07	69	45.1	20 18.6	07	68	44.1	20 11.7	08	66	42.5	20 06.6	09	65	41.4	20 01.2	09	63	40.3	19 55.3	10	62	39.3	19 49.1	11	61	38.2	19 39.1	12	58	36.6	3
4	19 41.1	06	69	45.2	19 37.8	06	68	44.1	19 32.0	07	66	42.5	19 27.8	07	65	41.5	19 23.1	08	63	40.4	19 18.1	09	62	39.3	19 12.8	09	61	38.3	19 04.0	10	58	36.7	4
75	18 59.5	04	69	45.2	18 56.9	05	68	44.1	18 52.4	05	66	42.6	18 48.9	06	65	41.5	18 45.1	07	64	40.5	18 40.9	07	62	39.4	18 36.4	08	61	38.3	18 28.9	09	59	36.8	75
6	18 17.8	03	69	45.2	18 16.0	03	68	44.2	18 12.7	04	66	42.6	18 10.0	05	65	41.5	18 07.0	05	64	40.5	18 03.6	06	62	39.4	17 59.9	06	61	38.4	17 53.8	07	59	36.8	6
7	17 36.1	01	69	45.2	17 35.1	02	68	44.2	17 32.9	03	66	42.6	17 31.1	03	65	41.6	17 28.9	04	64	40.5	17 26.3	04	62	39.5	17 23.5	05	61	38.4	17 18.6	06	59	36.9	7
8	16 54.5	00	69	45.2	16 54.2	01	68	44.2	16 53.2	02	66	42.6	16 52.1	02	65	41.6	16 50.7	03	64	40.5	16 49.0	03	62	39.5	16 47.0	04	61	38.5	16 43.4	04	59	36.9	8
9	16 12.8	01	69	45.2	16 13.3	01	68	44.2	16 13.4	00	66	42.6	16 13.1	01	65	41.6	16 12.6	01	64	40.6	16 11.7	02	62	39.5	16 10.5	02	61	38.5	16 08.1	03	59	36.9	9
80	15 31.1	02	69	45.2	15 32.3	02	68	44.2	15 33.7	01	66	42.6	15 34.2	01	65	41.6	15 34.4	00	64	40.6	15 34.3	00	62	39.5	15 34.0	01	61	38.5	15 32.9	02	59	36.9	80
1	14 49.4	04	69	45.2	14 51.4	03	68	44.2	14 53.9	02	66	42.6	14 55.2	02	65	41.6	14 56.2	01	64	40.6	14 57.0	01	62	39.5	14 57.4	01	61	38.5	14 57.6	00	59	36.9	1
2	14 07.8	05	69	45.2	14 10.6	04	68	44.2	14 14.2	04	66	42.6	14 16.3	03	65	41.6	14 18.1	03	64	40.5	14 19.6	02	62	39.5	14 20.9	02	61	38.5	14 22.3	01	59	36.9	2
3	13 26.2	06	69	45.1	13 29.7	06	68	44.1	13 34.5	05	66	42.6	13 37.3	05	65	41.5	13 39.9	04	64	40.5	13 42.3	04	62	39.5	13 44.4	03	61	38.5	13 47.1	03	59	36.9	3
4	12 44.6	07	69	45.1	12 48.8	07	68	44.1	12 54.8	06	66	42.5	12 58.4	06	65	41.5	13 01.8	05	64	40.5	13 05.0	05	62	39.5	13 07.9	05	61	38.4	13 11.8	04	59	36.9	4
85	12 03.1	08	69	45.0	12 08.0	08	68	44.0	12 15.1	08	66	42.5	12 19.5	07	65	41.5	12 23.7	07	63	40.4	12 27.7	06	62	39.4	12 31.4	06	61	38.4	12 36.6	05	59	36.9	85
6	11 21.5	10	69	45.0	11 27.3	09	68	44.0	11 35.5	09	66	42.4	11 40.7	08	65	41.4	11 45.7	08	63	40.4	11 50.4	08	62	39.4	11 55.0	07	61	38.4	12 01.4	07	59	36.8	6
7	10 40.1	11	69	44.9	10 46.6	11	68	43.9	10 55.9	10	66	42.4	11 01.9	10	65	41.4	11 07.6	09	63	40.3	11 13.2	09	62	39.3	11 18.6	09	61	38.3	11 26.2	08	59	36.8	7
8	9 58.7	12	69	44.8	10 05.9	12	68	43.8	10 16.4	11	66	42.3	10 23.1	11	64	41.3	10 29.7	11	63	40.3	10 36.0	10	62	39.3	10 42.2	10	61	38.3	10 51.1	10	58	36.7	8
9	9 17.4	13	69	44.7	9 25.3	13	68	43.7	9 36.9	13	66	42.2	9 44.4	12	64	41.2	9 51.8	12	63	40.2	9 58.9	12	62	39.2	10 05.9	11	60	38.2	10 16.0	11	58	36.7	9
90	8 36.1	15	69	44.6	8 44.8	14	67	43.6	8 57.5	14	66	42.1	9 05.8	14	64	41.1	9 13.9	13	63	40.1	9 21.9	13	62	39.1	9 29.7	13	60	38.1	9 41.0	12	58	36.6	90

Lat.
12°

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	32 00.0	1.0 01	180.0	31 00.0	1.0 01	180.0	29 30.0	1.0 01	180.0	28 30.0	1.0 01	180.0	27 30.0	1.0 01	180.0	26 30.0	1.0 01	180.0	25 30.0	1.0 01	180.0	24 00.0	1.0 01	180.0	00
1	31 59.6	1.0 02	179.2	30 59.6	1.0 02	179.2	29 29.6	1.0 02	179.2	28 29.6	1.0 02	179.3	27 29.6	1.0 02	179.3	26 29.6	1.0 02	179.3	25 29.7	1.0 02	179.3	23 59.7	1.0 02	179.4	1
2	31 58.3	1.0 03	178.4	30 58.4	1.0 03	178.4	29 28.4	1.0 03	178.5	28 28.5	1.0 03	178.5	27 28.5	1.0 03	178.6	26 28.6	1.0 03	178.6	25 28.6	1.0 03	178.7	23 58.7	1.0 03	178.7	2
3	31 56.2	1.0 05	177.5	30 56.3	1.0 05	177.6	29 26.5	1.0 05	177.7	28 26.6	1.0 04	177.8	27 26.7	1.0 04	177.9	26 26.8	1.0 04	177.9	25 26.9	1.0 04	178.0	23 57.0	1.0 04	178.1	3
4	31 53.3	1.0 06	176.7	30 53.5	1.0 06	176.8	29 23.8	1.0 06	177.0	28 23.9	1.0 06	177.0	27 24.1	1.0 06	177.1	26 24.3	1.0 05	177.2	25 24.5	1.0 05	177.3	23 54.7	1.0 05	177.4	4
05	31 49.5	99 08	175.9	30 49.8	1.0 07	176.0	29 20.3	1.0 07	176.2	28 20.6	1.0 07	176.3	27 20.8	1.0 07	176.4	26 21.1	1.0 06	176.5	25 21.4	1.0 06	176.6	23 51.8	1.0 06	176.8	05
6	31 44.9	99 09	175.1	30 45.4	99 09	175.2	29 16.0	99 08	175.4	28 16.4	99 08	175.6	27 16.8	99 08	175.7	26 17.2	99 08	175.8	25 17.6	99 07	176.0	23 48.2	99 07	176.1	6
7	31 39.5	99 10	174.3	30 40.1	99 10	174.5	29 10.9	99 10	174.7	28 11.5	99 09	174.8	27 12.1	99 09	175.0	26 12.6	99 09	175.1	25 13.1	99 09	175.3	23 43.9	99 08	175.5	7
8	31 33.3	99 12	173.5	30 34.0	99 11	173.7	29 05.1	99 11	173.9	28 05.9	99 11	174.1	27 06.6	99 10	174.3	26 07.3	99 10	174.5	25 08.0	99 10	174.6	23 39.0	99 09	174.9	8
9	31 26.2	98 13	172.7	30 27.2	98 13	172.9	28 58.6	98 12	173.2	27 59.5	98 12	173.4	27 00.4	99 12	173.6	26 01.3	99 11	173.8	25 02.1	99 11	174.0	23 33.4	99 10	174.2	9
10	31 18.3	98 14	171.9	30 19.5	98 14	172.1	28 51.2	98 13	172.5	27 52.4	98 13	172.7	26 53.5	98 13	172.9	25 54.6	98 12	173.1	24 55.6	98 12	173.3	23 27.2	98 11	173.6	10
1	31 09.6	98 16	171.1	30 11.1	98 15	171.3	28 43.1	98 15	171.7	27 44.5	98 14	172.0	26 45.8	98 14	172.2	25 47.2	98 13	172.4	24 48.4	98 13	172.6	23 20.4	98 12	173.0	1
2	31 00.1	97 17	170.3	30 01.8	97 17	170.6	28 34.3	97 16	171.0	27 35.9	97 16	171.2	26 37.5	97 15	171.5	25 39.1	97 15	171.7	24 40.6	97 14	172.0	23 12.9	98 14	172.4	2
3	30 49.8	97 18	169.5	29 51.8	97 18	169.8	28 24.7	97 17	170.2	27 26.6	97 17	170.5	26 28.5	97 16	170.8	25 30.3	97 16	171.1	24 32.1	97 15	171.3	23 04.7	97 15	171.7	3
4	30 38.8	96 20	168.7	29 41.1	96 19	169.1	28 14.4	96 18	169.5	27 16.6	96 18	169.8	26 18.8	96 17	170.1	25 20.9	97 17	170.4	24 22.9	97 16	170.7	22 56.0	97 16	171.1	4
15	30 26.9	96 21	168.0	29 29.5	96 20	168.3	28 03.4	96 20	168.8	27 05.9	96 19	169.1	26 08.3	96 18	169.4	25 10.7	96 18	169.7	24 13.1	96 17	170.1	22 46.6	96 17	170.5	15
6	30 14.3	95 22	167.2	29 17.3	95 22	167.6	27 51.6	95 21	168.1	26 54.4	95 20	168.4	25 57.2	95 20	168.8	25 00.0	95 19	169.1	24 02.7	96 18	169.4	22 36.6	96 18	169.9	6
7	30 00.9	94 24	166.4	29 04.2	94 23	166.8	27 39.1	95 22	167.4	26 42.3	95 21	167.7	25 45.4	95 21	168.1	24 48.5	95 20	168.4	23 51.6	95 20	168.8	22 26.0	95 19	169.3	7
8	29 46.8	94 25	165.7	28 50.5	94 24	166.1	27 25.9	94 23	166.7	26 29.5	94 22	167.0	25 33.0	94 22	167.4	24 36.4	94 21	167.8	23 39.8	94 21	168.1	22 14.8	95 20	168.7	8
9	29 31.9	93 26	164.9	28 36.0	93 25	165.4	27 12.1	93 24	166.0	26 16.0	93 24	166.4	25 19.9	94 23	166.8	24 23.7	94 22	167.1	23 27.5	94 22	167.5	22 03.0	94 21	168.1	9
20	29 16.3	92 27	164.2	28 20.8	92 27	164.6	26 57.5	93 25	165.3	26 01.8	93 25	165.7	25 06.1	93 24	166.1	24 10.3	93 23	166.5	23 14.5	93 23	166.9	21 50.6	93 22	167.5	20
1	28 59.9	92 28	163.5	28 04.9	92 28	163.9	26 42.2	92 27	164.6	25 47.0	92 26	165.0	24 51.7	92 25	165.4	23 56.3	92 24	165.9	23 00.9	92 24	166.3	21 37.6	93 23	166.9	1
2	28 42.9	91 30	162.7	27 48.3	91 29	163.2	26 26.3	91 28	163.9	25 31.5	91 27	164.4	24 36.6	92 26	164.8	23 41.7	92 25	165.2	22 46.6	92 25	165.7	21 24.0	92 24	166.3	2
3	28 25.1	90 31	162.0	27 31.0	90 30	162.5	26 09.7	90 29	163.2	25 15.3	91 28	163.7	24 20.9	91 27	164.2	23 26.4	91 26	164.6	22 31.8	91 26	165.1	21 09.8	91 25	165.7	3
4	28 06.6	89 32	161.3	27 13.0	89 31	161.8	25 52.4	90 30	162.6	24 58.6	90 29	163.1	24 04.6	90 28	163.5	23 10.6	90 27	164.0	22 16.4	90 27	164.5	20 55.1	90 26	165.2	4
25	27 47.5	88 33	160.6	26 54.4	89 32	161.1	25 34.5	89 31	161.9	24 41.1	89 30	162.4	23 47.7	89 29	162.9	22 54.1	89 28	163.4	22 00.4	90 28	163.9	20 39.8	90 26	164.6	25
6	27 27.7	88 34	159.9	26 35.1	88 33	160.5	25 16.0	88 32	161.3	24 23.1	88 31	161.8	23 30.1	88 30	162.3	22 37.0	89 29	162.8	21 43.9	89 29	163.3	20 23.9	89 27	164.0	6
7	27 07.2	87 35	159.2	26 15.2	87 34	159.8	24 56.8	87 33	160.6	24 04.5	87 32	161.2	23 12.0	88 31	161.7	22 19.4	88 30	162.2	21 26.7	88 30	162.7	20 07.5	88 28	163.5	7
8	26 46.1	86 36	158.6	25 54.6	86 35	159.1	24 37.0	86 34	160.0	23 45.2	87 33	160.5	22 53.2	87 32	161.1	22 01.2	87 31	161.6	21 09.0	87 30	162.2	19 50.6	87 29	162.9	8
9	26 24.3	85 37	157.9	25 33.4	85 36	158.5	24 16.7	85 35	159.4	23 25.4	86 34	159.9	22 33.9	86 33	160.5	21 42.4	86 32	161.0	20 56.7	86 31	161.6	19 33.1	86 30	162.4	9
30	26 02.0	84 38	157.3	25 11.6	84 37	157.9	23 55.7	84 36	158.7	23 04.9	85 35	159.3	22 14.0	85 34	159.9	21 23.0	85 33	160.5	20 31.9	85 32	161.0	19 15.1	86 31	161.9	30
1	25 39.0	83 39	156.6	24 49.1	83 38	157.2	23 34.1	84 37	158.1	22 43.9	84 36	158.7	21 53.6	84 35	159.3	21 03.2	84 34	159.9	20 12.6	84 33	160.5	18 56.5	85 32	161.3	1
2	25 15.4	82 40	156.0	24 26.1	82 39	156.6	23 12.0	83 38	157.5	22 22.4	83 37	158.2	21 32.6	83 36	158.8	20 42.7	83 35	159.3	19 52.7	83 34	159.9	18 37.5	84 33	160.8	2
3	24 51.2	81 41	155.4	24 02.6	81 40	156.0	22 49.3	82 39	157.0	22 00.2	82 38	157.6	21 11.1	82 37	158.2	20 21.8	82 36	158.8	19 32.3	82 35	159.4	18 18.0	83 33	160.3	3
4	24 26.5	80 42	154.7	23 38.4	80 41	155.4	22 26.0	81 40	156.4	21 37.6	81 39	157.0	20 49.0	81 38	157.6	20 00.3	81 37	158.3	19 11.4	82 36	158.9	17 57.9	82 34	159.8	4
35	24 01.1	79 43	154.1	23 13.7	79 42	154.8	22 02.2	80 41	155.8	21 14.4	80 40	156.4	20 26.4	80 39	157.1	19 38.3	80 38	157.7	18 50.0	81 36	158.4	17 37.4	81 35	159.3	35
6	23 35.3	78 44	153.5	22 48.4	78 43	154.2	21 37.9	79 41	155.2	20 50.7	79 40	155.9	20 03.3	79 39	156.5	19 15.8	79 38	157.2	18 28.1	80 37	157.8	17 16.4	80 36	158.8	6
7	23 08.8	77 45	153.0	22 22.7	77 44	153.6	21 13.1	78 42	154.7	20 26.5	78 41	155.3	19 39.7	78 40	156.0	18 52.8	78 39	156.7	18 05.7	79 38	157.3	16 54.9	79 37	158.3	7
8	22 41.9	76 46	152.4	21 56.3	76 45	153.1	20 47.7	76 43	154.1	20 01.7	77 42	154.8	19 15.6	77 41	155.5	18 29.3	77 40	156.2	17 42.9	77 39	156.8	16 33.0	78 37	157.8	8
9	22 14.4	75 47	151.8	21 29.5	75 46	152.5	20 21.8	75 44	153.6	19 36.5	76 43	154.3	18 51.0	76 42	155.0	18 05.4	76 41	155.7	17 19.6	76 40	156.3	16 10.6	77 38	157.3	9
40	21 46.5	74 47	151.3	21 02.2	74 46	152.0	19 55.5	74 45	153.1	19 10.8	75 44	153.8	18 25.9	75 43	154.5	17 40.9	75 41	155.2	16 55.8	75 40	155.9	15 47.8	76 39	156.9	40
1	21 18.0	72 48	150.7	20 34.4	73 47	151.5	19 28.7	73 46	152.5	18 44.6	74 44	153.3	18 00.4	74 43	154.0	17 16.1	74 42	154.7	16 31.6	74 41	155.4	15 24.5	75 39	156.4	1
2	20 49.0	71 49	150.2	20 06.1	72 48	150.9	19 01.4	72 46	152.0	18 18.0	72 45	152.8	17 34.4	73 44	153.5	16 50.7	73 43	154.2	16 06.9	73 42	154.9	15 00.9	74 40	156.0	2
3	20 19.6	70 50	149.7	19 37.4	71 49	150.4	18 33.6	71 47	151.5	17 50.9	71 46	152.3	17 08.0	72 45	153.0	16 25.0	72 44	153.7	15 41.8	72 43	154.5	14 36.8	72 41	155.5	3
4	19 49.8	69 51	149.1	19 08.2	69 49	149.9	18 05.4	70 48	151.0	17 23.4	70 47	151.8	16 41.2	70 45	152.5	15 58.8	71 44	153.3	15 16.3	71 43	154.0	14 12.2	71 42	155.1	4
45	19 19.4	68 51	148.6	18 38.5	68 50	149.4	17 36.8	69 48	150.6	16 55.4	69 47	151.3	16 13.9	69 46	152.1	15 32.2	70 45	152.8	14 50.3	70 44	153.6	13 47.3	70 42	154.7	45
6	18 48.7	67 52	148.1	18 08.4	67 51	148.9	17 07.7	68 49	150.1	16 27.0	68 48	150.8	15 46.2	68 47	151.6	15 05.2	68 46	152.4	14 24.0	69 45	153.1	13 22.0	69 43	154.2	6
7	18 17.5	66 53	147.7	17 37.9	66 52	148.4	16 38.2	67 50	149.6	15 58.2	67 49	150.4	15 18.1	67 48	151.2	14 37.8	67 46	151.9	13 57.3	68 45	152.7	12 56.3	68 43	153.8	7
8	17 45.9	65 53	147.2	17 07.0	65 52	148.0	16 08.4	65 50	149.2	15 29.1	66 49	149.9	14 49.6	66 48	150.7	14 09.9	66 47	151.5	13 30.2	66 46	152.3	12 30.2	67 44	153.4	8
9	17 13.8	63 54	146.7	16 35.7	64 53	147.5	15 38.1	64 51	148.7	14 59.5	64 50	149.5	14 20.7	65 49	150.3	13 41.8	65 48	151.1	13 02.7	65 46	151.9	12 03.8	66 45	153.0	9
50	16 41.4	62 55	146.3	16 04.0	63 53	147.1	15 07.4	63 52	148.3	14 29.5	63 51	149.1	13 51.4	64 49	149.9	13 13.2	64 48	150.7	12 34.8	64 47	151.5	11 37.0	64 45	152.6	50
1	16 08.6	61 55	145.8	15 31.9	61 54	146.6	14 36.4	62 52	147.8	13 59.2	62 51	148.7	13 21.8	62 50	149.5	12 44.3	63 49	150.3	12 06.6	63 48	151.1	11 09.8	63 46	152.3	1
2	15 35.5	60 56	145.4	14 59.4	60 55	146.2	14 04.9	61 53	147.4	13 28.4	61 52	148.2	12 51.8	61 51	149.1	12 15.0	61 49	149.9	11 38.0	62 48	150.7	10 42.3	62 46	151.9	2
3	15 01.9	59 56	144.9	14 26.6	59 55	145.8	13 33.2	60 54	147.0	12 57.4	60 52	147.8	12 21.4	60 51	148.7	11 45.3	60 50	149.5	11 09.1	61 49	150.3	10 14.5	61 47	151.5	3
4	14 28.0	58 57	144.5	13 53.4	58 56	145.4	13 01.1	58 54	146.6	12 26.0	59 53	147.4	11 50.7	59 52	148.3	11 15.4	59 50	149.1	10 39.9	59 49	149.9	9 46.4	60 47	151.1	4
55	13 53.8	56 58	144.1	13 19.8	57 56	145.0	12 28.6	57 55	146.2	11 54.2	57 53	147.1	11 19.7	58 52	147.9	10 45.1	58 51	148.7	10 10.3	58 50	149.6	9 17.9	58 48	150.8	55
6	13 19.2	55 58	143.7	12 46.0	56 57	144.6	11 55.8	56 55	145.8	11 22.2	56 54	146.7	10 48.4	56 53	147.5	10 14.4	57 52	148.4	9 40.4	57 50	149.2	8 49.1	57 48	150.5	6
7	12 44.3	54 59	143.3	12 11.8	54 58	144.2	11 22.7	55 56	145.5	10 49.8	55 54	146.3	10 16.7	55 53	147.2	9 43.5	55 52	148.0	9 10.2	56 51	148.9	8 20.0	56 49	150.1	7
8	12 09.1	53 59	142.9	11 37.3	53 58	143.8	10 49.3	54 56	145.1	10 17.1	54 55	146.0	9 44.7	54 54	146.8	9 12.3	54 53	147.7	8 39.7	54 51	148.5	7 50.6	55 49	149.8	8
9	11 33.6	52 60	142.6	11 02.5	52 58	143.4	10 15.5	52 57	144.7	9 44.1	53 55	145.6	9 12.5	53 54	146.5	8 40.7	53 53	147.3	8 08.9	53 52	148.2	7 20.9	53 50	149.5	9
60	10 57.8	51 60	142.2	10 27.4	51 59	143.1	9 41.5	51 57	144.4	9 10.8	51 56	145.3	8 39.9	52 55	146.1	8 08.9	52 54	147.0	7 37.8	52 52	147.9	6 51.0	52 50	149.2	60
1	10 21.7	49 61	141.9	9 52.0	50 59	142.7	9 07.2	50 58	144.1	8 37.2	50 56	144.9	8 07.1	50 55	145.8	7 36.8	51 54	146.7	7 06.5	51 53	147.6	6 20.8	51 51	148.9	1
2	9 45.3	48 61	141.5	9 16.3	48 60	142.4	8 32.6	49 58	143.7	8 03.3	49 57	144.6	7 34.0	49 56	145.5	7 04.4	49 54	146.4	6 34.8	49 53	147.2	5 50.3	50 51	148.6	2
3	9 08.6	47 62	141.2	8 40.4	47 60	142.1	7 57.8	47 59	143.4	7 29.2	48 57	144.3	7 00.6	48 56	145.2	6 31.8	48 55	146.1	6 03.0	48 54	146.9	5 19.5	48 52	148.3	3
4	8 31.7	46 62	140.9	8 04.2	46 61	141.7	7 22.7	46 59	143.1	6 54.8	46 58	144.0	6 26.9	47 56	144.9	5 58.9	47 55	145.8	5 30.8	47 54	146.7				4
65	7 54.5	45 62	140.5	7 27.7	45 61	141.4	6 47.3	45 59	142.8	6 20.2	45 58	143.7	5 53.0	45 57	144.6	5 25.8	45 56	145.5							65
6	7 17.1	43 63	140.2	6 51.0	44 62	141.1	6 11.7	44 60	142.5	5 45.3	44 59	143.4	5 18.9	44 57	144.3										6
7	6 39.5	42 63	139.9	6 14.1	42 62	140.8	5 35.8	43 60	142.2	5 10.2	43 59	143.1													7
8	6 01.6	41 64	139.6	5 36.9	41 62	140.6																			8
9	5 23.4	40 64	139.4																						9

DECLINATION SAME NAME AS LATITUDE

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	7 54.9	16 68	44.5	8 04.3	16 67	43.5	8 18.2	15 65	42.0	8 27.2	15 64	41.0	8 36.1	15 63	40.0	8 44.9	14 62	39.0	8 53.5	14 60	38.0	9 06.0	14 58	36.5	91
2	7 13.8	17 68	44.4	7 23.9	17 67	43.4	7 38.9	16 65	41.9	7 48.7	16 64	40.9	7 58.4	16 63	39.9	8 07.9	16 61	38.9	8 17.3	16 60	37.9	8 31.1	15 58	36.4	2
3	6 32.8	18 68	44.3	6 43.6	18 67	43.3	6 59.7	18 65	41.8	7 10.3	18 64	40.8	7 20.8	17 63	39.8	7 31.1	17 61	38.8	7 41.3	17 60	37.8	7 56.3	17 58	36.3	3
4	5 51.8	19 68	44.2	6 03.4	19 67	43.2	6 20.7	19 65	41.7	6 32.0	19 64	40.7	6 43.2	19 62	39.7	6 54.4	18 61	38.7	7 05.3	18 60	37.7	7 21.6	18 58	36.2	4
95	5 11.0	21 68	44.0	5 23.3	21 67	43.0	5 41.7	20 65	41.6	5 53.8	20 64	40.6	6 05.8	20 62	39.6	6 17.7	20 61	38.6	6 29.5	20 60	37.6	6 46.9	19 58	36.1	95
6							5 02.8	22 65	41.4	5 15.7	21 63	40.4	5 28.4	21 62	39.5	5 41.1	21 61	38.5	5 53.7	21 59	37.5	6 12.4	21 57	36.0	6
7																5 04.7	22 61	38.3	5 18.0	22 59	37.4	5 37.9	22 57	35.9	7
8																						5 03.6	23 57	35.8	8

H.A.	54° 30′				55° 00′				56° 00′				56° 30′				57° 00′				57° 30′				59° 00′				59° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	47 30.0	1.0	01	00.0	47 00.0	1.0	01	00.0	46 00.0	1.0	01	00.0	45 30.0	1.0	01	00.0	45 00.0	1.0	01	00.0	44 30.0	1.0	01	00.0	43 00.0	1.0	01	00.0	42 30.0	1.0	01	00.0	00
1	47 29.6	1.0	02	00.9	46 59.6	1.0	02	00.8	45 59.6	1.0	02	00.8	45 29.6	1.0	02	00.8	44 59.6	1.0	02	00.8	44 29.6	1.0	02	00.8	42 59.6	1.0	02	00.7	42 29.6	1.0	02	00.7	1
2	47 28.2	1.0	04	01.7	46 58.3	1.0	04	01.7	45 58.4	1.0	03	01.6	45 28.4	1.0	03	01.6	44 58.4	1.0	03	01.5	44 28.5	1.0	03	01.5	42 58.6	1.0	03	01.4	42 28.6	1.0	03	01.4	2
3	47 26.0	1.0	05	02.6	46 56.1	1.0	05	02.5	45 56.3	1.0	05	02.4	45 26.4	1.0	05	02.4	44 56.5	1.0	05	02.3	44 26.5	1.0	04	02.3	42 56.8	1.0	04	02.1	42 26.8	1.0	04	02.1	3
4	47 23.0	99	07	03.4	46 53.1	1.0	06	03.4	45 53.4	1.0	06	03.2	45 23.6	1.0	06	03.1	44 53.7	1.0	06	03.1	44 23.8	1.0	06	03.0	42 54.2	1.0	05	02.8	42 24.4	1.0	05	02.7	4
05	47 19.0	99	08	04.3	46 49.3	99	08	04.2	45 49.7	99	08	04.0	45 19.9	99	07	03.9	44 50.2	99	07	03.8	44 20.4	99	07	03.8	42 51.0	99	07	03.5	42 21.2	99	06	03.4	05
6	47 14.2	99	09	05.1	46 44.5	99	09	05.0	45 45.2	99	09	04.8	45 15.5	99	09	04.7	44 45.8	99	08	04.6	44 16.2	99	08	04.5	42 47.0	99	08	04.2	42 17.3	99	08	04.1	6
7	47 08.5	98	11	06.0	46 39.0	98	11	05.8	45 39.9	99	10	05.6	45 10.3	99	10	05.5	44 40.7	99	10	05.4	44 11.2	99	10	05.2	42 42.4	99	09	04.9	42 12.8	99	09	04.8	7
8	47 02.0	98	12	06.8	46 32.6	98	12	06.7	45 33.8	98	12	06.4	45 04.3	98	11	06.2	44 34.9	98	11	06.1	44 05.4	98	11	06.0	42 37.0	98	10	05.6	42 07.5	98	10	05.5	8
9	46 54.6	97	14	07.6	46 25.4	98	13	07.5	45 26.8	98	13	07.2	44 57.6	98	13	07.0	44 28.3	98	12	06.9	43 59.0	98	12	06.7	42 31.0	98	11	06.3	42 01.6	98	11	06.1	9
10	46 46.4	97	15	08.5	46 17.3	97	15	08.3	45 19.1	97	14	07.9	44 50.0	97	14	07.8	44 20.9	97	14	07.6	43 51.7	97	13	07.4	42 24.2	97	12	07.0	41 55.0	97	12	06.8	10
1	46 37.3	96	16	09.3	46 08.5	96	16	09.1	45 10.6	96	15	08.7	44 41.7	96	15	08.5	44 12.7	97	15	08.3	43 43.8	97	14	08.2	42 16.7	97	14	07.6	41 47.7	97	13	07.5	1
2	46 27.5	96	18	10.1	45 58.8	96	17	09.9	45 01.4	96	17	09.5	44 32.6	96	16	09.3	44 03.9	96	16	09.1	43 35.1	96	16	08.9	42 08.6	96	15	08.3	41 39.8	96	14	08.1	2
3	46 16.8	95	19	10.9	45 48.3	95	19	10.7	44 51.3	95	18	10.2	44 22.8	95	18	10.0	43 54.2	95	17	09.8	43 25.7	95	17	09.6	41 59.8	96	16	09.0	41 31.1	96	15	08.8	3
4	46 05.3	94	20	11.7	45 37.1	94	20	11.4	44 40.5	94	19	11.0	44 12.2	94	19	10.7	43 43.9	94	18	10.5	43 15.5	95	18	10.3	41 50.3	95	17	09.6	41 21.9	95	17	09.4	4
15	45 53.0	93	22	12.5	45 25.0	93	21	12.2	44 29.0	93	20	11.7	44 00.9	94	20	11.5	43 32.8	94	20	11.2	43 04.7	94	19	11.0	41 40.2	94	18	10.3	41 11.9	94	18	10.1	15
6	45 39.9	92	23	13.2	45 12.2	92	23	13.0	44 16.7	93	22	12.4	43 48.9	93	21	12.2	43 21.1	93	21	11.9	42 53.2	93	20	11.7	41 29.4	93	19	10.9	41 01.4	93	19	10.7	6
7	45 26.1	91	24	14.0	44 58.7	91	24	13.7	44 03.7	92	23	13.2	43 36.2	92	22	12.9	43 08.6	92	22	12.6	42 41.0	92	21	12.3	41 17.9	92	20	11.6	40 50.2	93	20	11.3	7
8	45 11.5	90	26	14.8	44 44.4	90	25	14.4	43 50.0	91	24	13.9	43 22.8	91	24	13.6	42 55.5	91	23	13.3	42 28.1	91	23	13.0	41 05.8	92	21	12.2	40 38.3	92	21	11.9	8
9	44 56.2	89	27	15.5	44 29.4	89	26	15.2	43 35.6	90	25	14.6	43 08.7	90	25	14.3	42 41.6	90	24	14.0	42 14.6	90	24	13.7	40 53.1	91	22	12.8	40 25.9	91	22	12.5	9
20	44 40.2	88	28	16.2	44 13.7	88	27	15.9	43 20.5	89	26	15.2	42 53.9	89	26	14.9	42 27.2	89	25	14.6	42 00.4	89	25	14.3	40 39.8	90	23	13.4	40 12.9	90	23	13.1	20
1	44 23.5	87	29	16.9	43 57.3	87	28	16.6	43 04.8	88	27	15.9	42 38.4	88	27	15.6	42 12.0	88	26	15.3	41 45.6	88	26	15.0	40 25.9	89	24	14.0	39 59.2	89	24	13.7	1
2	44 06.0	86	30	17.6	43 40.2	86	30	17.3	42 48.3	87	28	16.6	42 22.3	87	28	16.3	41 56.2	87	27	15.9	41 30.1	87	27	15.6	40 11.4	88	25	14.6	39 45.0	88	25	14.3	2
3	43 47.9	85	31	18.3	43 22.4	85	31	18.0	42 31.2	86	30	17.2	42 05.6	86	29	16.9	41 39.8	86	28	16.6	41 14.0	86	28	16.2	39 56.2	87	26	15.2	39 30.2	87	26	14.9	3
4	43 29.1	84	32	19.0	43 04.0	84	32	18.6	42 13.5	84	31	17.9	41 48.2	85	30	17.5	41 22.8	85	29	17.2	40 57.3	85	29	16.8	39 40.6	86	27	15.8	39 14.8	86	27	15.5	4
25	43 09.7	82	33	19.7	42 44.9	83	33	19.3	41 55.2	83	32	18.5	41 30.2	83	31	18.1	41 05.2	84	30	17.8	40 40.0	84	30	17.4	39 24.3	84	28	16.4	38 58.9	85	27	16.0	25
6	42 49.6	81	34	20.3	42 25.3	81	34	19.9	41 36.3	82	33	19.1	41 11.6	82	32	18.8	40 47.0	82	31	18.4	40 22.2	83	31	18.0	39 07.5	83	29	16.9	38 42.5	84	28	16.6	6
7	42 29.0	80	35	20.9	42 05.0	80	35	20.5	41 16.7	81	34	19.7	40 52.5	81	33	19.4	40 28.2	81	32	19.0	40 03.8	81	32	18.6	38 50.1	82	30	17.5	38 25.5	82	29	17.1	7
8	42 07.7	79	36	21.6	41 44.1	79	36	21.2	40 56.6	79	34	20.3	40 32.8	80	34	19.9	40 08.8	80	33	19.5	39 44.8	80	33	19.2	38 32.3	81	31	18.0	38 07.9	81	30	17.6	8
9	41 45.8	77	37	22.2	41 22.6	77	37	21.8	40 35.9	78	35	20.9	40 12.5	78	35	20.5	39 48.9	79	34	20.1	39 25.3	79	33	19.7	38 13.9	80	32	18.5	37 49.9	80	31	18.2	9
30	41 23.4	76	38	22.8	41 00.6	76	38	22.3	40 14.7	77	36	21.5	39 51.6	77	36	21.1	39 28.5	77	35	20.7	39 05.2	78	34	20.2	37 55.0	78	32	19.1	37 31.4	79	32	18.7	30
1	41 00.4	74	39	23.3	40 38.0	75	39	22.9	39 52.9	75	37	22.0	39 30.3	76	36	21.6	39 07.5	76	36	21.2	38 44.6	76	35	20.8	37 35.6	77	33	19.6	37 12.4	77	32	19.2	1
2	40 36.9	73	40	23.9	40 14.9	73	39	23.5	39 30.7	74	38	22.6	39 08.4	74	37	22.2	38 46.0	75	37	21.7	38 23.6	75	36	21.3	37 15.7	76	34	20.1	36 52.9	76	33	19.6	2
3	40 12.8	72	41	24.5	39 51.3	72	40	24.0	39 07.9	73	39	23.1	38 46.0	73	38	22.7	38 24.1	73	37	22.2	38 02.0	74	37	21.8	36 55.3	75	35	20.5	36 32.9	75	34	20.1	3
4	39 48.3	70	42	25.0	39 27.1	71	41	24.5	38 44.6	71	40	23.6	38 23.1	72	39	23.2	38 01.6	72	38	22.7	37 40.0	72	38	22.3	36 34.5	73	35	21.0	36 12.5	74	35	20.6	4
35	39 23.2	69	43	25.5	39 02.5	69	42	25.1	38 20.8	70	40	24.1	37 59.8	70	40	23.7	37 38.7	71	39	23.2	37 17.5	71	38	22.8	36 13.2	72	36	21.5	35 51.6	72	35	21.1	35
6	38 57.7	67	43	26.0	38 37.4	68	43	25.6	37 56.6	68	41	24.6	37 36.0	69	40	24.2	37 15.3	69	40	23.7	36 54.5	69	39	23.3	35 51.5	70	37	21.9	35 30.3	71	36	21.5	6
7	38 31.7	66	44	26.5	38 11.9	66	43	26.1	37 31.9	67	42	25.1	37 11.7	67	41	24.6	36 51.5	68	40	24.2	36 31.1	68	40	23.7	35 29.4	69	38	22.4	35 08.6	69	37	21.9	7
8	38 05.3	64	45	27.0	37 45.9	65	44	26.5	37 06.8	66	43	25.6	36 47.1	66	42	25.1	36 27.2	66	41	24.6	36 07.3	67	40	24.2	35 06.8	68	38	22.8	34 46.5	68	38	22.4	8
9	37 38.4	63	46	27.5	37 19.4	63	45	27.0	36 41.2	64	43	26.0	36 21.9	64	43	25.6	36 02.5	65	42	25.1	35 43.0	65	41	24.6	34 43.9	66	39	23.2	34 23.9	67	38	22.8	9
40	37 11.1	61	46	27.9	36 52.6	62	45	27.4	36 15.3	63	44	26.5	35 56.4	63	43	26.0	35 37.5	63	42	25.5	35 18.4	64	42	25.0	34 20.5	65	40	23.6	34 01.0	65	39	23.2	40
1	36 43.4	60	47	28.4	36 25.4	60	46	27.9	35 48.9	61	45	26.9	35 30.5	62	44	26.4	35 12.0	62	43	25.9	34 53.4	62	42	25.5	33 56.8	63	40	24.0	33 37.8	64	39	23.6	1
2	36 15.3	58	47	28.8	35 57.7	59	47	28.3	35 22.2	60	45	27.3	35 04.2	60	44	26.8	34 46.1	60	44	26.3	34 28.0	61	43	25.9	33 32.7	62	41	24.4	33 14.1	62	40	24.0	2
3	35 46.8	57	48	29.2	35 29.7	57	47	28.7	34 55.1	58	46	27.7	34 37.6	59	45	27.2	34 19.9	59	44	26.7	34 02.2	59	44	26.2	33 08.3	60	41	24.8	32 50.1	61	41	24.3	3
4	35 18.0	55	49	29.6	35 01.3	56	48	29.1	34 27.6	57	46	28.1	34 10.5	57	46	27.6	33 53.4	57	45	27.1	33 36.1	58	44	26.6	32 43.5	59	42	25.2	32 25.8	59	41	24.7	4
45	34 48.8	54	49	30.0	34 32.6	54	48	29.5	33 59.8	55	47	28.5	33 43.2	56	46	28.0	33 26.4	56	45	27.5	33 09.6	56	45	27.0	32 18.4	57	42	25.5	32 01.1	58	42	25.0	45
6	34 19.3	52	50	30.4	34 03.5	53	49	29.9	33 31.6	54	47	28.8	33 15.5	54	47	28.3	32 59.2	54	46	27.8	32 42.8	55	45	27.3	31 52.9	56	43	25.9	31 36.1	56	42	25.4	6
7	33 49.5	51	50	30.7	33 34.1	51	50	30.2	33 03.1	52	48	29.2	32 47.4	53	47	28.7	32 31.6	53	46	28.2	32 15.7	53	46	27.7	31 27.2	54	43	26.2	31 10.8	55	43	25.7	7
8	33 19.3	49	51	31.1	33 04.4	50	50	30.6	32 34.3	51	48	29.5	32 19.1	51	48	29.0	32 03.7	51	47	28.5	31 48.3	52	46	28.0	31 01.1	53	44	26.5	30 45.2	53	43	26.0	8
9	32 48.8	48	51	31.4	32 34.4	48	50	30.9	32 05.2	49	49	29.9	31 50.5	49	48	29.4	31 35.6	50	47	28.9	31 20.5	50	47	28.3	30 34.7	51	44	26.8	30 19.2	52	44	26.3	9
50	32 18.1	46	52	31.8	32 04.1	47	51	31.2	31 35.9	48	49	30.2	31 21.5	48	49	29.7	31 07.1	48	48	29.2	30 52.5	49	47	28.7	30 08.1	50	45	27.1	29 53.1	50	44	26.6	50
1	31 47.1	45	52	32.1	31 33.6	45	51	31.5	31 06.2	46	50	30.5	30 52.4	46	49	30.0	30 38.4	47	48	29.5	30 24.2	47	48	29.0	29 41.2	48	45	27.4	29 26.6	49	44	26.9	1
2	31 15.8	43	53	32.4	31 02.7	44	52	31.8	30 36.3	44	50	30.8	30 22.9	45	50	30.3	30 09.4	45	49	29.8	29 55.7	46	48	29.2	29 14.0	47	46	27.7	28 59.9	47	45	27.2	2
3	30 44.2	42	53	32.7	30 31.7	42	52	32.1	30 06.1	43	51	31.1	29 53.2	43	50	30.6	29 40.1	44	49	30.0	29 26.9	44	48	29.5	28 46.6	45	46	28.0	28 32.9	46	45	27.5	3
4	30 12.5	40	53	32.9	30 00.3	41	53	32.4	29 35.7	41	51	31.4	29 23.2	42	50	30.8	29 10.6	42	50	30.3	28 57.9	43	49	29.8	28 18.9	44	46	28.2	28 05.7	44	46	27.7	4
55	29 40.4	39	54	33.2	29 28.8	39	53	32.7	29 05.1	40	51	31.6	28 53.0	40	51	31.1	28 40.9	41	50	30.6	28 28.6	41	49	30.0	27 51.1	42	47	28.5	27 38.3	43	46	28.0	55
6	29 08.2	37	54	33.4	28 57.0	38	53	32.9	28 34.2	38	52	31.9	28 22.6	39	51	31.3	28 10.9	39	50	30.8	27 59.1	40	50	30.3	27 22.9	41	47	28.7	27 10.7	41	46	28.2	6
7	28 35.7	36	54	33.7	28 25.0	36	54	33.2	28 03.1	37	52	32.1	27 52.0	37	51	31.6	27 40.7	38	51	31.1	27 29.4	38	50	30.5	26 54.6	39	48	29.0	26 42.8	40	47	28.5	7
8	28 03.1	34	55	33.9	27 52.8	35	54	33.4	27 31.8	35	52	32.3	27 21.2	36	52	31.8	27 10.4	36	51	31.3	26 59.5	37	50	30.8	26 26.1	38	48	29.2	26 14.7	38	47	28.7	8
9	27 30.2	33	55	34.1	27 20.4	33	54	33.6	27 00.3	34	53	32.5	26 50.1	34	52	32.0	26 39.8	35	51	31.5	26 29.4	35	50	31.0	25 57.4	36	48	29.4	25 46.5	36	47	28.9	9
60	26 57.2	31	55	34.3	26 47.8	32	55	33.8	26 28.7	32	53	32.8	26 18.9	33	52	32.2	26 09.1	33	52	31.7	25 59.1	33	51	31.2	25 28.5	35	48	29.6	25 18.0	35	48	29.1	60
1	26 24.0	30	56	34.5	26 15.1	30	55	34.0	25 56.8	31	53	33.0	25 47.5	31	53	32.4	25 38.1	32	52	31.9	25 28.6	32	51	31.4	24 59.4	33	49	29.8	24 49.4	33	48	29.3	1
2	25 50.7	28	56	34.7	25 42.2	29	55	34.2	25 24.8	29	54	33.1	25 16.0	30	53	32.6	25 07.0	30	52	32.1	24 58.0	30	51	31.6	24 30.1	31	49	30.0	24 20.6	32	48	29.5	2
3	25 17.2	27	56	34.9	25 09.1	27	55	34.4	24 52.7	28	54	33.3	24 44.3	28	53	32.8	24 35.8	29	52	32.3	24 27.2	29	52	31.7	24 00.7	30	49	30.2	23 51.7	30	48	29.6	3
4	24 43.5	25	56	35.1	24 35.9	26	56	34.5	24 20.4	26	54	33.5	24 12.4	27	53	32.9	24 04.4	27	53	32.4	23 56.3	27	52	31.9	23 31.2	28	50	30.3	23 22.6	29	49	29.8	4
65	24 09.7	24	57	35.2	24 02.6	24	56	34.7	23 47.9	25	54	33.6	23 40.5	25	54	33.1	23 32.9	25	53	32.6	23 25.2	26	52	32.1	23 01.5	27	50	30.5	22 53.4	27	49	30.0	65
6	23 35.8	22	57	35.4	23 29.1	23	56	34.8	23 15.4	23	54	33.8	23 08.3	24	54	33.3	23 01.2	24	53	32.7	22 54.0	24	52	32.2	22 31.6	25	50	30.6	22 24.0	26	49	30.1	6
7	23 01.8	21	57	35.5	22 55.5	21	56	35.0	22 42.7	22	55	33.9	22 36.1	22	54	33.4	22 29.4	22	53	32.9	22 22.6	23	52	32.3	22 01.7	24	50	30.8	21 54.5	24	49	30.2	7
8	22 27.6	19	57	35.6	22 21.8	20	56	35.1	22 09.9	20	55	34.0	22 03.7	21	54	33.5	21 57.5	21	53	33.0	21 51.2	21	53	32.5	21 31.6	22	50	30.9	21 24.9	23	50	30.4	8
9	21 53.4	18	57	35.8	21 48.0	18	56	35.2	21 37.0	19	55	34.2	21 31.3	19	54	33.6	21 25.5	19	54	33.1	21 19.6	20	53	32.6	21 01.4	21	50	31.0	20 55.2	21	50	30.5	9
70	21 19.1	16	57	35.9	21 14.1	17	57	35.3	21 04.0	17	55	34.3	20 58.7	18	54	33.7	20 53.4	18	54	33.2	20 48.0	18	53	32.7	20 31.1	19	51	31.1	20 25.3	19	50	30.6	70
1	20 44.6	15	58	36.0	20 40.1	15	57	35.4	20 30.9	16	55	34.4	20 26.1	16	55	33.8	20 21.2	16	54	33.3	20 16.2	17	53	32.8	20 00.8	18	51	31.2	19 55.4	18	50	30.7	1
2	20 10.1	13	58	36.0	20 06.1	14	57	35.5	19 57.7	14	55	34.5	19 53.4	15	55	33.9	19 48.9	15	54	33.4	19 44.4	15	53	32.9	19 30.3	16	51	31.3	19 25.4	16	50	30.8	2
3	19 35.6	12	58	36.1	19 32.0	12	57	35.6	19 24.5	13	56	34.5	19 20.6	13	55	34.0	19 16.6	13	54	33.5	19 12.5	14	53	33.0	18 59.8	15	51	31.4	18 55.4	15	50	30.9	3
4	19 01.0	10	58	36.2	18 57.8	11	57	35.7	18 51.1	11	56	34.6	18 47.7	12	55	34.1	18 44.2	12	54	33.6	18 40.6	12	53	33.0	18 29.2	13	51	31.5	18 25.2	13	50	30.9	4
75	18 26.3	09	58	36.2	18 23.5	09	57	35.7	18 17.8	10	56	34.7	18 14.8	10	55	34.1	18 11.7	10	54	33.6	18 08.5	11	53	33.1	17 58.5	12	51	31.5	17 55.0	12	50	31.0	75
6	17 51.6	08	58	36.3	17 49.2	08	57	35.8	17 44.4	08	56	34.7	17 41.8	09	55	34.2	17 39.2	09	54	33.7	17 36.5	09	54	33.2	17 27.8	10	51	31.6	17 24.7	10	51	31.1	6
7	17 16.8	06	58	36.3	17 14.9	06	57	35.8	17 10.9	07	56	34.8	17 08.8	07	55	34.2	17 06.6	07	54	33.7	17 04.3	08	54	33.2	16 57.0	09	51	31.6	16 54.4	09	51	31.1	7
8	16 42.0	05	58	36.4	16 40.6	05	57	35.9	16 37.4	05	56	34.8	16 35.8	06	55	34.3	16 34.0	06	54	33.8	16 32.2	06	54	33.2	16 26.2	07	51	31.7	16 24.1	07	51	31.2	8
9	16 07.2	03	58	36.4	16 06.2	04	57	35.9	16 03.9	04	56	34.8	16 02.7	04	55	34.3	16 01.4	05	54	33.8	16 00.0	05	54	33.3	15 55.4	06	51	31.7	15 53.7	06	51	31.2	9
80	15 32.4	02	58	36.4	15 31.8	02	57	35.9	15 30.4	03	56	34.9	15 29.6	03	55	34.3	15 28.7	03	54	33.8	15 27.8	03	54	33.3	15 24.5	04	51	31.7	15 23.3	04	51	31.2	80
1	14 57.5	00	58	36.4	14 57.4	01	57	35.9	14 56.8	01	56	34.9	14 56.5	01	55	34.3	14 56.0	02	54	33.8	14 55.5	02	54	33.3	14 53.6	02	52	31.8	14 52.8	03	51	31.2	1
2	14 22.7	01	58	36.4	14 22.9	01	57	35.9	14 23.3	00	56	34.9	14 23.4	00	55	34.4	14 23.4	00	54	33.8	14 23.3	00	54	33.3	14 22.7	01	52	31.8	14 22.4	01	51	31.3	2
3	13 47.8	02	58	36.4	13 48.5	02	57	35.9	13 49.7	02	56	34.9	13 50.2	02	55	34.3	13 50.7	01	54	33.8	13 51.1	01	54	33.3	13 51.8	01	52	31.8	13 51.9	00	51	31.3	3
4	13 13.0	04	58	36.4	13 14.1	04	57	35.9	13 16.2	03	56	34.8	13 17.1	03	55	34.3	13 18.0	03	54	33.8	13 18.8	03	54	33.3	13 20.9	02	52	31.8	13 21.5	02	51	31.3	4
85	12 38.2	05	58	36.4	12 39.8	05	57	35.8	12 42.7	05	56	34.8	12 44.0	04	55	34.3	12 45.4	04	54	33.8	12 46.6	04	54	33.3	12 50.0	03	51	31.8	12 51.0	03	51	31.2	85
6	12 03.4	07	58	36.3	12 05.4	06	57	35.8	12 09.2	06	56	34.8	12 11.0	06	55	34.3	12 12.7	06	54	33.8	12 14.4	06	54	33.3	12 19.2	05	51	31.7	12 20.6	05	51	31.2	6
7	11 28.7	08	58	36.3	11 31.1	08	57	35.8	11 35.7	08	56	34.8	11 37.9	07	55	34.2	11 40.1	07	54	33.7	11 42.2	07	54	33.2	11 48.3	06	51	31.7	11 50.2	06	51	31.2	7
8	10 54.0	09	58	36.2	10 56.8	09	57	35.7	11 02.3	09	56	34.7	11 04.9	09	55	34.2	11 07.5	09	54	33.7	11 10.1	08	54	33.2	11 17.5	08	51	31.7	11 19.8	08	51	31.2	8
9	10 19.3	11	58	36.2	10 22.5	11	57	35.7	10 28.9	10	56	34.7	10 32.0	10	56	34.1	10 35.0	10	54	33.6	10 38.0	10	53	33.1	10 46.7	09	51	31.6	10 49.5	09	50	31.1	9
90	9 44.7	12	58	36.1	9 48.4	12	57	35.6	9 55.5	12	56	34.6	9 59.0	12	55	34.1	10 02.5	11	54	33.6	10 05.9	11	53	33.1	10 15.9	11	51	31.6	10 19.2	11	50	31.1	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	54° 30′			55° 00′			56° 00′			56° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	23 30.0	1.0 01	180.0	23 00.0	1.0 01	180.0	22 00.0	1.0 01	180.0	21 30.0	1.0 00	180.0
1	23 29.7	1.0 02	179.4	22 59.7	1.0 02	179.4	21 59.7	1.0 02	179.4	21 29.7	1.0 02	179.4
2	23 28.7	1.0 03	178.7	22 58.7	1.0 03	178.8	21 58.8	1.0 03	178.8	21 28.8	1.0 03	178.8
3	23 27.1	1.0 04	178.1	22 57.1	1.0 04	178.1	21 57.2	1.0 04	178.2	21 27.3	1.0 04	178.2
4	23 24.8	1.0 05	177.5	22 54.9	1.0 05	177.5	21 55.1	1.0 05	177.6	21 25.1	1.0 05	177.6
05	23 21.9	1.0 06	176.8	22 52.0	1.0 06	176.9	21 52.3	1.0 06	177.0	21 22.4	1.0 06	177.0
6	23 18.3	99 07	176.2	22 48.5	99 07	176.3	21 48.9	99 07	176.4	21 19.1	99 07	176.4
7	23 14.1	99 08	175.6	22 44.4	99 08	175.7	21 44.9	99 08	175.8	21 15.1	99 08	175.9
8	23 09.3	99 09	175.0	22 39.6	99 09	175.0	21 40.3	99 09	175.2	21 10.6	99 09	175.3
9	23 03.8	99 10	174.3	22 34.2	99 10	174.4	21 35.1	99 10	174.6	21 05.5	99 10	174.7
10	22 57.7	98 11	173.7	22 28.2	98 11	173.8	21 29.2	98 11	174.0	20 59.7	98 11	174.1
1	22 51.0	98 12	173.1	22 21.6	98 12	173.2	21 22.8	98 12	173.4	20 53.4	98 12	173.5
2	22 43.6	98 13	172.5	22 14.3	98 13	172.6	21 15.8	98 13	172.8	20 46.5	98 12	173.0
3	22 35.6	97 14	171.9	22 06.5	97 14	172.0	21 08.2	97 14	172.2	20 39.0	97 13	172.4
4	22 27.0	97 15	171.3	21 58.0	97 15	171.4	21 00.0	97 15	171.7	20 30.9	97 14	171.8
15	22 17.8	96 16	170.7	21 48.9	96 16	170.8	20 51.2	96 16	171.1	20 22.3	96 15	171.2
6	22 07.9	96 17	170.0	21 39.2	96 17	170.2	20 41.8	96 17	170.5	20 13.1	96 16	170.7
7	21 57.5	95 18	169.5	21 28.9	95 18	169.6	20 31.8	95 18	169.9	20 03.3	95 17	170.1
8	21 46.4	95 19	168.9	21 18.1	95 19	169.0	20 21.3	95 18	169.4	19 52.9	95 18	169.6
9	21 34.8	94 20	168.3	21 06.6	94 20	168.5	20 10.2	94 19	168.8	19 42.0	94 19	169.0
20	21 22.6	93 21	167.7	20 54.6	93 21	167.9	19 58.5	93 20	168.3	19 30.5	93 20	168.4
1	21 09.8	93 22	167.1	20 42.0	93 22	167.3	19 46.3	93 21	167.7	19 18.5	93 21	167.9
2	20 56.4	92 23	166.5	20 28.8	92 23	166.7	19 33.5	92 22	167.2	19 05.9	92 22	167.4
3	20 42.4	91 24	166.0	20 15.1	91 24	166.2	19 20.2	91 23	166.6	18 52.8	91 23	166.8
4	20 27.9	91 25	165.4	20 00.8	91 25	165.6	19 06.4	91 24	166.1	18 39.1	91 24	166.3
25	20 12.9	90 26	164.8	19 45.9	90 26	165.1	18 52.0	90 25	165.5	18 25.0	90 24	165.8
6	19 57.2	89 27	164.3	19 30.5	89 27	164.5	18 37.1	89 26	165.0	18 10.3	89 25	165.2
7	19 41.1	88 28	163.7	19 14.6	88 27	164.0	18 21.6	88 27	164.5	17 55.1	88 26	164.7
8	19 24.4	87 29	163.2	18 58.2	87 28	163.5	18 05.7	88 27	164.0	17 39.4	88 27	164.2
9	19 07.1	86 30	162.7	18 41.2	87 29	162.9	17 49.2	87 28	163.5	17 23.2	87 28	163.7
30	18 49.4	86 30	162.1	18 23.7	86 30	162.4	17 32.2	86 29	162.9	17 06.5	86 29	163.2
1	18 31.1	85 31	161.6	18 05.7	85 31	161.9	17 14.8	85 30	162.4	16 49.3	85 29	162.7
2	18 12.4	84 32	161.1	17 47.2	84 32	161.4	16 56.8	84 31	162.0	16 31.6	84 30	162.2
3	17 53.1	83 33	160.6	17 28.2	83 32	160.9	16 38.4	83 31	161.5	16 13.5	83 31	161.8
4	17 33.4	82 34	160.1	17 08.8	82 33	160.4	16 19.5	82 32	161.0	15 54.9	82 32	161.3
35	17 13.1	81 34	159.6	16 48.8	81 34	159.9	16 00.2	81 33	160.5	15 35.8	81 32	160.8
6	16 52.4	80 35	159.1	16 28.4	80 35	159.4	15 40.4	80 34	160.0	15 16.3	80 33	160.3
7	16 31.3	79 36	158.6	16 07.6	79 36	158.9	15 20.1	79 34	159.6	14 56.3	79 34	159.9
8	16 09.7	78 37	158.1	15 46.3	78 36	158.5	14 59.4	78 35	159.1	14 35.9	78 35	159.4
9	15 47.6	77 38	157.7	15 24.5	77 37	158.0	14 38.3	77 36	158.7	14 15.1	77 35	159.0
40	15 25.1	76 38	157.2	15 02.3	76 38	157.6	14 16.7	76 37	158.2	13 53.9	76 36	158.6
1	15 02.1	75 39	156.8	14 39.7	75 38	157.1	13 54.7	75 37	157.8	13 32.2	75 37	158.1
2	14 38.8	74 40	156.3	14 16.7	74 39	156.7	13 32.4	74 38	157.4	13 10.2	74 37	157.7
3	14 15.0	73 40	155.9	13 53.2	73 40	156.2	13 09.6	73 39	156.9	12 47.7	73 38	157.3
4	13 50.8	71 41	155.5	13 29.4	72 40	155.8	12 46.4	72 39	156.5	12 24.9	72 39	156.9
45	13 26.2	70 42	155.0	13 05.1	70 41	155.4	12 22.8	71 40	156.1	12 01.6	71 39	156.5
6	13 01.3	69 42	154.6	12 40.5	69 42	155.0	11 58.9	69 41	155.7	11 38.0	70 40	156.1
7	12 35.9	68 43	154.2	12 15.5	68 42	154.6	11 34.6	68 41	155.3	11 14.1	68 41	155.7
8	12 10.2	67 44	153.8	11 50.1	67 43	154.2	11 09.9	67 42	154.9	10 49.7	67 41	155.3
9	11 44.1	66 44	153.4	11 24.4	66 44	153.8	10 44.8	66 42	154.6	10 25.0	66 42	154.9
50	11 17.7	65 45	153.0	10 58.3	65 44	153.4	10 19.5	65 43	154.2	10 00.0	65 42	154.6
1	10 50.9	63 45	152.6	10 31.8	63 45	153.0	9 53.7	64 43	153.8	9 34.6	64 43	154.2
2	10 23.7	62 46	152.3	10 05.1	62 45	152.7	9 27.7	62 44	153.5	9 09.0	62 43	153.9
3	9 56.3	61 46	151.9	9 38.0	61 46	152.3	9 01.3	61 44	153.1	8 42.9	61 44	153.5
4	9 28.5	60 47	151.6	9 10.5	60 46	152.0	8 34.6	60 45	152.8	8 16.6	60 44	153.2
55	9 00.3	58 47	151.2	8 42.8	59 47	151.6	8 07.6	59 46	152.4	7 50.0	59 45	152.8
6	8 31.9	57 48	150.9	8 14.7	57 47	151.3	7 40.3	57 46	152.1	7 23.0	58 45	152.5
7	8 03.2	56 48	150.5	7 46.4	56 48	151.0	7 12.7	56 46	151.8	6 55.8	56 46	152.2
8	7 34.2	55 49	150.2	7 17.8	55 48	150.6	6 44.8	55 47	151.5	6 28.3	55 46	151.9
9	7 04.9	53 49	149.9	6 48.8	54 49	150.3	6 16.7	54 47	151.2	6 00.5	54 47	151.6
60	6 35.3	52 50	149.6	6 19.6	52 49	150.0	5 48.2	52 48	150.9	5 32.5	53 47	151.3
1	6 05.5	51 50	149.3	5 50.2	51 50	149.7	5 19.5	51 48	150.6	5 04.2	51 48	151.0
2	5 35.4	50 51	149.0	5 20.5	50 50	149.4						
3	5 05.0	48 51	148.7									

H.A.	57° 00′			57° 30′			59° 00′			59° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	21 00.0	1.0 00	180.0	20 30.0	1.0 00	180.0	19 00.0	1.0 00	180.0	18 30.0	1.0 00	180.0
1	20 59.7	1.0 02	179.4	20 29.7	1.0 01	179.4	18 59.7	1.0 01	179.5	18 29.7	1.0 01	179.5
2	20 58.8	1.0 02	178.8	20 28.8	1.0 02	178.9	18 58.9	1.0 02	178.9	18 28.9	1.0 02	178.9
3	20 57.3	1.0 04	178.3	20 27.4	1.0 03	178.3	18 57.5	1.0 03	178.4	18 27.5	1.0 03	178.4
4	20 55.2	1.0 04	177.7	20 25.3	1.0 04	177.7	18 55.5	1.0 04	177.8	18 25.6	1.0 04	177.9
05	20 52.5	1.0 05	177.1	20 22.7	1.0 05	177.1	18 53.0	1.0 05	177.3	18 23.2	1.0 05	177.3
6	20 49.3	99 06	176.5	20 19.4	99 06	176.6	18 50.0	99 06	176.7	18 20.1	99 06	176.8
7	20 45.4	99 07	175.9	20 15.6	99 07	176.0	18 46.4	99 07	176.2	18 16.6	99 07	176.3
8	20 40.9	99 08	175.4	20 11.2	99 08	175.4	18 42.2	99 08	175.7	18 12.5	99 08	175.7
9	20 35.9	99 09	174.8	20 06.3	99 09	174.9	18 37.5	99 09	175.1	18 07.9	99 09	175.2
10	20 30.2	98 10	174.2	20 00.7	98 10	174.3	18 32.2	98 10	174.6	18 02.7	98 10	174.7
1	20 24.0	98 11	173.6	19 54.6	98 11	173.7	18 26.4	98 11	174.1	17 57.0	98 10	174.2
2	20 17.2	98 12	173.1	19 47.9	98 12	173.2	18 20.1	98 11	173.5	17 50.7	98 11	173.6
3	20 09.9	97 13	172.5	19 40.7	97 13	172.6	18 13.2	97 12	173.0	17 44.0	97 12	173.1
4	20 01.9	97 14	171.9	19 32.9	97 14	172.1	18 05.7	97 13	172.5	17 36.7	97 13	172.6
15	19 53.4	96 15	171.4	19 24.5	96 15	171.5	17 57.8	96 14	171.9	17 28.9	96 14	172.1
6	19 44.3	96 16	170.8	19 15.6	96 16	171.0	17 49.3	96 15	171.4	17 20.5	96 15	171.6
7	19 34.7	95 17	170.3	19 06.1	95 17	170.4	17 40.3	95 16	170.9	17 11.7	95 16	171.1
8	19 24.5	95 18	169.7	18 56.1	96 18	169.9	17 30.7	95 17	170.4	17 02.3	95 16	170.6
9	19 13.7	94 19	169.2	18 45.5	94 18	169.4	17 20.7	94 18	169.9	16 52.4	94 17	170.1
20	19 02.4	94 20	168.6	18 34.4	94 19	168.8	17 10.1	94 18	169.4	16 42.0	94 18	169.6
1	18 50.6	93 21	168.1	18 22.7	93 20	168.3	16 59.0	93 19	168.9	16 31.1	93 19	169.1
2	18 38.2	92 22	167.6	18 10.6	92 21	167.8	16 47.5	92 20	168.4	16 19.8	92 20	168.6
3	18 25.3	92 22	167.0	17 57.9	92 22	167.2	16 35.4	92 21	167.9	16 07.9	92 21	168.1
4	18 11.9	91 23	166.5	17 44.7	91 23	166.7	16 22.8	91 22	167.4	15 55.5	91 21	167.6
25	17 58.0	90 24	166.0	17 30.9	90 24	166.2	16 09.8	90 23	166.9	15 42.7	90 22	167.1
6	17 43.5	89 25	165.5	17 16.7	89 26	165.7	15 56.2	90 23	166.4	15 29.4	90 23	166.7
7	17 28.5	89 26	165.0	17 02.0	89 25	165.2	15 42.2	89 24	165.9	15 15.6	89 24	166.2
8	17 13.1	88 27	164.5	16 46.8	88 26	164.7	15 27.7	88 25	165.5	15 01.3	88 24	165.7
9	16 57.1	87 27	164.0	16 31.1	87 27	164.2	15 12.8	87 26	165.0	14 46.6	87 25	165.3
30	16 40.7	86 28	163.5	16 14.9	86 28	163.7	14 57.3	86 26	164.5	14 31.5	86 26	164.8
1	16 23.8	85 29	163.0	15 58.2	85 29	163.3	14 41.5	85 27	164.1	14 15.9	85 27	164.4
2	16 06.4	84 30	162.5	15 41.1	84 29	162.8	14 25.2	84 28	163.6	13 59.8	85 27	163.9
3	15 48.5	83 31	162.0	15 23.5	83 30	162.3	14 08.4	84 29	163.2	13 43.3	84 28	163.5
4	15 30.2	82 31	161.6	15 05.5	82 31	161.9	13 51.2	83 29	162.7	13 26.4	83 29	163.0
35	15 11.4	81 32	161.1	14 47.0	81 32	161.4	13 33.6	82 30	162.3	13 09.1	82 30	162.6
6	14 52.2	80 33	160.7	14 28.1	80 32	161.0	13 15.5	81 31	161.9	12 51.3	81 30	162.2
7	14 32.5	79 33	160.2	14 08.7	79 33	160.5	12 57.1	80 31	161.5	12 33.2	80 31	161.8
8	14 12.4	78 34	159.8	13 48.9	78 34	160.1	12 38.2	79 32	161.0	12 14.6	79 32	161.4
9	13 51.9	77 35	159.3	13 28.7	77 34	159.7	12 18.9	78 33	160.6	11 55.6	78 32	160.9
40	13 31.0	76 36	158.9	13 08.1	76 35	159.2	11 59.3	77 33	160.2	11 36.3	77 33	160.5
1	13 09.7	75 36	158.5	12 47.1	75 36	158.8	11 39.2	76 34	159.8	11 16.5	76 34	160.2
2	12 47.9	74 37	158.1	12 25.7	74 36	158.4	11 18.8	74 35	159.4	10 56.4	75 34	159.8
3	12 25.8	73 38	157.6	12 03.9	73 37	158.0	10 58.0	73 35	159.0	10 35.9	73 35	159.4
4	12 03.3	72 38	157.2	11 41.7	72 38	157.6	10 36.8	72 36	158.7	10 15.1	72 35	159.0
45	11 40.4	71 39	156.8	11 19.2	71 38	157.2	10 15.2	71 36	158.3	9 53.9	71 36	158.6
6	11 17.1	70 39	156.5	10 56.2	70 39	156.8	9 53.3	70 37	157.9	9 32.3	70 36	158.3
7	10 53.5	69 40	156.1	10 32.9	69 39	156.4	9 31.1	69 38	157.5	9 10.4	69 37	157.9
8	10 29.5	67 41	155.7	10 09.3	67 40	156.1	9 08.5	68 38	157.2	8 48.2	68 38	157.6
9	10 05.2	66 41	155.3	9 45.3	66 41	155.7	8 45.6	66 39	156.8	8 25.6	67 38	157.2
50	9 40.5	65 42	155.0	9 21.0	65 41	155.3	8 22.4	65 39	156.5	8 02.8	65 39	156.9
1	9 15.5	64 42	154.6	8 56.4	64 42	155.0	7 58.8	64 40	156.2	7 39.6	64 39	156.5
2	8 50.2	63 43	154.3	8 31.4	63 42	154.7	7 34.9	63 40	155.8	7 16.0	63 40	156.2
3	8 24.5	61 43	153.9	8 06.1	61 43	154.3	7 10.7	62 41	155.5	6 52.2	62 40	155.9
4	7 58.6	60 44	153.6	7 40.5	60 43	154.0	6 46.3	60 41	155.2	6 28.1	60 41	155.6
55	7 32.3	59 44	153.3	7 14.6	59 44	153.7	6 21.5	59 42	154.9	6 03.7	59 41	155.3
6	7 05.8	58 45	152.9	6 48.5	58 44	153.3	5 56.4	58 42	154.6	5 39.1	58 42	155.0
7	6 38.9	56 45	152.6	6 22.0	56 45	153.0	5 31.1	57 43	154.3	5 14.1	57 42	154.7
8	6 11.8	55 46	152.3	5 55.2	55 45	152.7	5 05.5	55 43	154.0			
9	5 44.4	54 46	152.0	5 28.2	54 45	152.4						
60	5 16.7	53 47	151.7	5 00.9	53 46	152.2						
1												
2												
3												

DECLINATION SAME NAME AS LATITUDE

H.A.	54° 30′			55° 00′			56° 00′			56° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
91	9 10.2	14 57	36.0	9 14.2	13 57	35.5	9 22.2	13 55	34.5	9 26.2	13 55	34.0
2	8 35.7	15 57	35.9	8 40.2	15 57	35.4	8 49.0	15 55	34.4	8 53.4	14 55	33.9
3	8 01.3	16 57	35.8	8 06.2	16 57	35.4	8 15.9	16 55	34.4	8 20.7	16 54	33.9
4	7 26.9	18 57	35.7	7 32.2	18 56	35.3	7 42.8	17 55	34.3	7 48.0	17 54	33.8
95	6 52.7	19 57	35.6	6 58.4	19 56	35.1	7 09.8	19 55	34.2	7 15.4	19 54	33.7
6	6 18.5	21 57	35.5	6 24.7	20 56	35.0	6 36.9	20 55	34.0	6 42.9	20 54	33.6
7	5 44.5	22 57	35.4	5 51.0	22 56	34.9	6 04.1	22 55	33.9	6 10.6	22 54	33.4
8	5 10.5	23 56	35.3	5 17.5	23 56	34.8	5 31.4	23 54	33.8	5 38.3	23 54	33.3
9										5 06.1	24 54	33.2
100												

H.A.	57° 00′			57° 30′			59° 00′			59° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
91	9 30.1	13 54	33.5	9 33.9	13 53	33.0	9 45.3	12 51	31.5	9 48.9	12 50	31.0
2	8 57.7	14 54	33.4	9 02.0	14 53	32.9	9 14.6	14 51	31.4	9 18.7	14 50	30.9
3	8 25.4	16 54	33.4	8 30.1	16 53	32.9	8 44.0	15 51	31.4	8 48.6	15 50	30.9
4	7 53.2	17 54	33.3	7 58.3	17 53	32.8	8 13.5	17 51	31.3	8 18.5	17 50	30.8
95	7 21.0	19 53	33.2	7 26.6	19 53	32.7	7 43.1	18 51	31.2	7 48.6	18 50	30.7
6	6 49.0	20 53	33.1	6 55.0	20 53	32.6	7 12.8	20 50	31.1	7 18.6	20 50	30.6
7	6 17.0	21 53	32.9	6 23.4	21 52	32.5	6 42.5	21 50	31.0	6 48.8	21 50	30.5
8	5 45.1	23 53	32.8	5 52.0	23 52	32.3	6 12.4	23 50	30.9	6 19.1	22 49	30.4
9	5 13.4	24 53	32.7	5 20.6	24 52	32.2	5 42.3	24 50	30.7	5 49.5	24 49	30.3
100							5 12.4	25 50	30.6	5 20.0	25 49	30.1

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	42 00.0	1.0 01	00.0	41 30.0	1.0 01	00.0	40 00.0	1.0 01	00.0	39 30.0	1.0 00	00.0	39 00.0	1.0 00	00.0	33 00.0	1.0 00	00.0	32 30.0	1.0 00	00.0	27 30.0	1.0 00	00.0	00
1	41 59.7	1.0 02	00.7	41 29.7	1.0 02	00.7	39 59.7	1.0 02	00.6	39 29.7	1.0 02	00.6	38 59.7	1.0 01	00.6	32 59.8	1.0 01	00.4	32 29.8	1.0 01	00.4	27 29.8	1.0 01	00.3	1
2	41 58.6	1.0 03	01.3	41 28.7	1.0 03	01.3	39 58.7	1.0 03	01.2	39 28.8	1.0 03	01.2	38 58.8	1.0 02	01.2	32 59.1	1.0 02	00.9	32 29.2	1.0 02	00.8	27 29.4	1.0 01	00.6	2
3	41 56.9	1.0 04	02.0	41 27.0	1.0 04	02.0	39 57.2	1.0 04	01.8	39 27.2	1.0 04	01.8	38 57.3	1.0 03	01.8	32 58.0	1.0 03	01.3	32 28.1	1.0 02	01.2	27 28.6	1.0 02	00.9	3
4	41 54.5	1.0 06	02.7	41 24.6	1.0 06	02.6	39 55.0	1.0 06	02.4	39 25.1	1.0 06	02.4	38 55.2	1.0 04	02.3	32 56.5	1.0 03	01.7	32 26.6	1.0 03	01.7	27 27.5	1.0 02	01.2	4
05	41 51.4	99 06	03.4	41 21.6	99 06	03.3	39 52.2	99 06	03.1	39 22.4	99 06	03.0	38 52.5	99 05	02.9	32 54.5	99 04	02.1	32 24.7	99 04	02.1	27 26.1	1.0 03	01.5	05
6	41 47.6	99 07	04.0	41 17.9	99 07	03.9	39 48.7	99 07	03.7	39 19.0	99 07	03.6	38 49.3	99 06	03.5	32 52.1	99 05	02.6	32 22.4	99 05	02.5	27 24.5	99 03	01.8	6
7	41 43.2	99 09	04.7	41 13.6	99 08	04.6	39 44.7	99 08	04.3	39 15.0	99 08	04.2	38 45.4	99 07	04.1	32 49.3	99 05	03.0	32 19.6	99 05	02.9	27 22.5	99 04	02.1	7
8	41 38.0	98 10	05.3	41 08.5	98 09	05.2	39 40.0	98 09	04.9	39 10.5	98 09	04.8	38 40.9	98 08	04.6	32 46.0	99 06	03.4	32 16.4	99 06	03.3	27 20.1	99 04	02.4	8
9	41 32.2	98 11	06.0	41 02.9	98 11	05.9	39 34.7	98 10	05.5	39 05.3	98 10	05.3	38 35.9	98 09	05.2	32 42.3	98 07	03.8	32 12.8	98 07	03.7	27 17.5	99 05	02.7	9
10	41 25.8	97 12	06.6	40 56.6	97 12	06.5	39 28.8	98 11	06.1	38 59.5	98 11	05.9	38 30.3	98 10	05.8	32 38.2	98 08	04.2	32 08.8	98 07	04.1	27 14.6	98 05	03.0	10
1	41 18.7	97 13	07.3	40 49.6	97 13	07.1	39 22.3	97 12	06.7	38 53.2	97 12	06.5	38 24.1	97 11	06.3	32 33.7	98 08	04.7	32 04.4	98 08	04.5	27 11.4	98 06	03.3	1
2	41 10.9	96 14	07.9	40 42.0	96 14	07.8	39 15.2	96 13	07.2	38 46.3	97 13	07.1	38 17.3	97 12	06.9	32 28.7	97 09	05.1	31 59.6	97 09	04.9	27 07.9	97 06	03.6	2
3	41 02.4	96 15	08.6	40 33.7	96 15	08.4	39 07.5	96 14	07.8	38 38.7	96 13	07.6	38 09.9	96 13	07.5	32 23.3	97 10	05.5	31 54.3	97 09	05.3	27 04.1	97 07	03.9	3
4	40 53.4	95 16	09.2	40 24.9	95 16	09.0	38 59.2	95 15	08.4	38 30.6	96 14	08.2	38 02.0	96 14	08.0	32 17.5	96 10	05.9	31 48.7	96 10	05.7	27 00.0	96 07	04.2	4
15	40 43.7	94 17	09.8	40 15.4	94 17	09.6	38 50.4	96 16	09.0	38 22.0	95 15	08.8	37 53.6	95 15	08.6	32 11.3	95 11	06.3	31 42.6	95 11	06.1	26 55.6	96 08	04.4	15
6	40 33.3	93 18	10.5	40 05.3	94 18	10.2	38 40.9	94 17	09.5	38 12.8	94 16	09.3	37 44.6	94 16	09.1	32 04.6	95 12	06.7	31 36.2	95 11	06.5	26 50.9	95 08	04.7	6
7	40 22.4	93 19	11.1	39 54.6	93 19	10.8	38 30.9	93 18	10.1	38 03.0	93 17	09.9	37 35.0	93 17	09.6	31 57.6	94 12	07.1	31 29.3	94 12	06.9	26 45.9	95 09	05.0	7
8	40 10.8	92 20	11.7	39 43.2	92 20	11.4	38 20.3	92 19	10.7	37 52.6	92 18	10.4	37 24.9	92 18	10.2	31 50.1	93 13	07.5	31 22.1	94 13	07.3	26 40.6	94 09	05.3	8
9	39 58.6	91 21	12.3	39 31.3	91 21	12.0	38 09.2	91 19	11.2	37 41.8	92 19	11.0	37 14.3	92 19	10.7	31 42.3	93 14	07.9	31 14.5	93 13	07.7	26 35.0	93 10	05.6	9
20	39 45.9	90 22	12.9	39 18.9	90 22	12.6	37 57.5	91 20	11.8	37 30.3	91 20	11.5	37 03.1	91 19	11.2	31 34.0	92 14	08.3	31 06.4	92 14	08.0	26 29.2	93 10	05.9	20
1	39 32.5	89 23	13.4	39 05.8	89 23	13.1	37 45.3	90 21	12.3	37 18.4	90 21	12.0	36 51.4	90 20	11.7	31 25.4	91 15	08.7	30 58.0	91 15	08.4	26 23.0	92 11	06.1	1
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3	39 04.1	87 25	14.6	38 38.0	87 25	14.3	37 19.3	88 23	13.3	36 52.9	88 22	13.0	36 26.6	88 22	12.7	31 07.0	89 16	09.4	30 40.1	90 16	09.2	26 09.9	90 12	06.7	3
4	38 49.1	86 26	15.1	38 23.3	86 25	14.8	37 05.5	87 24	13.9	36 39.4	87 23	13.5	36 13.4	87 23	13.2	30 57.2	89 17	09.8	30 30.6	89 16	09.5	26 03.0	90 12	06.9	4
25	38 33.5	85 27	15.7	38 08.0	85 26	15.3	36 51.2	86 25	14.4	36 25.5	86 24	14.0	35 59.7	86 24	13.7	30 47.0	88 18	10.2	30 20.7	88 17	09.9	25 55.7	89 12	07.2	25
6	38 17.4	84 28	16.2	37 52.2	84 27	15.9	36 36.4	85 26	14.9	36 11.0	85 25	14.5	35 45.5	85 24	14.2	30 36.5	87 18	10.5	30 10.5	87 18	10.2	25 48.2	88 13	07.5	6
7	38 00.7	83 29	16.7	37 35.9	83 28	16.4	36 21.1	83 26	15.3	35 56.0	84 26	15.0	35 30.9	84 25	14.7	30 25.6	86 19	10.9	29 59.9	86 18	10.6	25 40.5	87 13	07.7	7
8	37 43.5	81 29	17.3	37 19.1	82 29	16.9	36 05.3	82 27	15.8	35 40.6	82 26	15.5	35 15.8	83 26	15.1	30 14.3	85 19	11.2	29 48.9	85 19	10.9	25 32.4	86 14	08.0	8
9	37 25.9	80 30	17.8	37 01.8	80 30	17.4	35 49.1	81 28	16.3	35 24.7	81 27	15.9	35 00.3	82 27	15.6	30 02.7	84 20	11.6	29 37.6	84 19	11.3	25 24.2	85 14	08.2	9
30	37 07.7	79 31	18.3	36 44.0	79 30	17.9	35 32.4	80 29	16.8	35 08.4	80 28	16.4	34 44.3	80 27	16.0	29 50.8	83 20	11.9	29 26.0	83 20	11.6	25 15.6	84 15	08.5	30
1	36 49.1	78 32	18.8	36 25.7	78 31	18.4	35 15.2	79 29	17.2	34 51.6	79 29	16.8	34 27.9	79 28	16.5	29 38.5	81 21	12.3	29 14.0	82 20	11.9	25 06.8	83 15	08.7	1
2	36 30.0	76 33	19.2	36 07.0	77 32	18.8	34 57.6	77 30	17.7	34 34.3	78 29	17.3	34 11.0	78 29	16.9	29 25.9	80 22	12.6	29 01.7	81 21	12.3	24 57.8	82 16	09.0	2
3	36 10.4	75 33	19.7	35 47.8	75 33	19.3	34 39.6	76 31	18.1	34 16.7	76 30	17.7	33 53.7	77 29	17.3	29 12.9	79 22	12.9	28 49.1	79 22	12.6	24 48.5	81 16	09.2	3
4	35 50.4	74 34	20.2	35 28.2	74 33	19.8	34 21.1	75 31	18.5	33 58.6	75 31	18.1	33 36.0	75 30	17.7	28 59.6	78 23	13.2	28 36.2	78 22	12.9	24 38.9	80 16	09.5	4
35	35 29.9	72 35	20.6	35 08.1	73 34	20.2	34 02.3	74 32	19.0	33 40.2	74 31	18.6	33 18.0	74 31	18.2	28 46.0	77 23	13.6	28 22.9	77 23	13.2	24 29.2	79 17	09.7	35
6	35 00.0	71 36	21.1	34 47.7	71 35	20.6	33 43.0	72 33	19.4	33 21.3	73 32	19.0	32 59.5	73 31	18.6	28 32.1	76 24	13.9	28 09.4	76 23	13.5	24 19.2	78 17	09.9	6
7	34 47.7	70 36	21.5	34 26.8	70 35	21.1	33 23.3	71 33	19.8	33 02.0	71 33	19.4	32 40.6	71 32	18.9	28 17.9	74 24	14.2	27 55.5	75 24	13.8	24 08.9	76 17	10.2	7
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9	34 03.9	67 37	22.3	33 43.8	67 37	21.9	32 42.9	68 35	20.6	32 22.4	68 34	20.1	32 01.8	69 33	19.7	27 48.5	72 25	14.8	27 26.9	72 25	14.4	23 47.8	74 18	10.6	9
40	33 41.4	65 38	22.7	33 21.7	66 37	22.3	32 22.1	67 35	20.9	32 02.0	67 35	20.5	31 41.8	67 34	20.1	27 33.4	71 26	15.1	27 12.2	71 25	14.7	23 36.9	73 19	10.8	40
1	33 18.6	64 39	23.1	32 59.3	64 38	22.7	32 00.9	65 36	21.3	31 41.3	66 35	20.9	31 21.5	66 34	20.4	27 18.0	69 26	15.3	26 57.2	69 25	14.9	23 25.8	71 19	11.0	1
2	32 55.4	63 39	23.5	32 36.5	63 39	23.0	31 39.4	64 36	21.7	31 20.2	64 36	21.2	31 00.9	65 35	20.8	27 02.4	68 27	15.6	26 42.0	68 26	15.2	23 14.5	70 19	11.2	2
3	32 31.8	61 40	23.9	32 13.4	61 39	23.4	31 17.6	62 37	22.0	30 58.8	63 36	21.5	30 39.9	63 35	21.1	26 46.4	66 27	15.9	26 26.5	67 26	15.5	23 03.0	69 20	11.4	3
4	32 07.9	60 40	24.2	31 49.9	60 40	23.7	30 55.5	61 37	22.3	30 37.1	61 37	21.9	30 18.6	62 36	21.4	26 30.2	65 27	16.2	26 10.7	65 27	15.7	22 51.2	68 20	11.6	4
45	31 43.7	58 41	24.6	31 26.2	59 40	24.1	30 33.0	60 38	22.7	30 15.1	60 37	22.2	29 57.0	60 36	21.7	26 13.8	64 28	16.4	25 54.6	64 27	16.0	22 39.3	66 20	11.8	45
6	31 19.1	57 41	24.9	31 02.0	57 41	24.4	30 10.2	58 38	23.0	29 52.7	58 38	22.5	29 35.2	59 37	22.1	25 57.1	62 28	16.7	25 38.4	63 28	16.2	22 27.2	65 20	12.0	6
7	30 54.3	55 42	25.2	30 37.6	56 41	24.7	29 47.1	57 39	23.3	29 30.1	57 38	22.8	29 13.0	57 37	22.4	25 40.1	61 29	16.9	25 21.8	61 28	16.5	22 14.9	63 21	12.2	7
8	30 29.1	54 42	25.5	30 12.9	54 42	25.1	29 23.8	55 39	23.6	29 07.2	55 39	23.1	28 50.5	56 38	22.7	25 22.9	59 29	17.1	25 05.1	60 28	16.7	22 02.4	62 21	12.4	8
9	30 03.6	52 43	25.8	29 47.9	53 42	25.4	29 00.1	54 40	23.9	28 44.0	54 39	23.4	28 27.8	54 38	22.9	25 05.5	58 29	17.4	24 48.1	58 29	16.9	21 49.8	61 21	12.5	9
50	29 37.9	51 43	26.1	29 22.7	51 43	25.7	28 36.2	52 40	24.2	28 20.5	52 40	23.7	28 04.8	53 39	23.2	24 47.9	56 30	17.6	24 30.9	57 29	17.1	21 36.9	59 22	12.7	50
1	29 11.9	49 44	26.4	28 57.1	50 43	25.9	28 12.1	51 41	24.5	27 56.8	51 40	24.0	27 41.5	51 39	23.5	24 30.0	55 30	17.8	24 13.5	55 29	17.4	21 23.9	58 22	12.9	1
2	28 45.7	48 44	26.7	28 31.3	48 43	26.2	27 47.6	49 41	24.7	27 32.9	49 40	24.2	27 18.0	50 40	23.7	24 12.0	53 30	18.0	23 55.9	54 30	17.6	21 10.7	56 22	13.1	2
3	28 19.2	46 45	27.0	28 05.3	46 44	26.5	27 23.0	48 42	25.0	27 08.7	48 41	24.5	26 54.2	48 40	24.0	23 53.7	52 31	18.2	23 38.1	52 30	17.8	20 57.4	55 22	13.2	3
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55	27 25.5	43 45	27.5	27 12.5	43 45	27.0	26 33.0	44 42	25.5	26 19.6	45 41	25.0	26 06.1	45 41	24.5	23 16.6	49 31	18.6	23 01.8	49 31	18.2	20 30.3	52 23	13.5	55
6	26 58.3	41 46	27.7	26 45.8	42 45	27.2	26 07.6	43 43	25.7	25 54.7	43 42	25.2	25 41.7	44 41	24.7	22 57.7	47 32	18.8	22 43.5	48 31	18.3	20 16.5	50 23	13.7	6
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8	26 03.3	38 46	28.2	25 51.7	39 46	27.7	25 16.3	40 43	26.1	25 04.3	40 42	25.6	24 52.2	41 42	25.1	22 19.5	44 32	19.2	22 06.2	45 32	18.7	19 48.5	47 24	13.9	8
9	25 35.5	37 47	28.4	25 24.4	37 46	27.9	24 50.4	38 44	26.3	24 38.9	39 43	25.8	24 27.2	39 42	25.3	22 00.1	43 33	19.3	21 47.3	43 32	18.9	19 34.3	46 24	14.1	9
60	25 07.5	35 47	28.6	24 56.9	36 46	28.1	24 24.3	37 44	26.5	24 13.2	37 43	26.0	24 02.1	37 42	25.5	21 40.6	41 33	19.5	21 28.2	41 32	19.0	19 19.9	44 24	14.2	60
1	24 39.3	34 47	28.8	24 29.2	34 46	28.2	23 58.0	35 44	26.7	23 47.4	35 43	26.2	23 36.7	36 43	25.7	21 20.9	40 33	19.7	21 00.0	40 32	19.2	19 05.5	42 24	14.3	1
2	24 11.0	32 47	28.9	24 01.3	33 47	28.4	23 31.5	34 44	26.9	23 21.4	34 44	26.4	23 11.2	34 43	25.9	21 01.1	38 33	19.8	20 49.7	38 32	19.3	18 50.9	41 24	14.4	2
3	23 42.5	31 48	29.1	23 33.3	31 47	28.6	23 04.9	32 45	27.0	22 55.3	32 44	26.5	22 45.5	33 43	26.0	20 41.1	36 34	20.0	20 30.2	37 33	19.5	18 36.2	39 25	14.6	3
4	23 13.9	29 48	29.3	23 05.1	29 47	28.8	22 38.2	30 45	27.2	22 29.0	31 44	26.7	22 19.7	31 43	26.2	20 21.0	35 34	20.1	20 10.6	35 33	19.6	18 21.4	38 25	14.7	4
65	22 45.1	28 48	29.4	22 36.8	28 47	28.9	22 11.3	29 45	27.4	22 02.6	29 44	26.8	21 53.8	30 44	26.3	20 00.8	33 34	20.2	19 50.8	33 33	19.7	18 06.5	36 25	14.8	65
6	22 16.2	26 48	29.6	22 08.4	26 48	29.1	21 44.2	27 45	27.5	21 36.0	28 44	27.0	21 27.7	28 44	26.5	19 40.5	32 34	20.3	19 31.0	32 33	19.8	17 51.5	34 25	14.9	6
7	21 47.2	24 49	29.7	21 39.8	25 48	29.2	21 17.1	26 45	27.6	21 09.3	26 45	27.1	21 01.5	26 44	26.6	19 20.0	30 34	20.5	19 11.0	30 33	20.0	17 36.4	33 25	15.0	7
8	21 18.1	23 49	29.8	21 11.1	23 48	29.3	20 49.8	24 46	27.8	20 42.5	24 45	27.2	20 35.1	25 44	26.7	18 59.4	28 34	20.6	18 50.9	29 34	20.1	17 21.2	31 25	15.0	8
9	20 48.8	21 49	30.0	20 42.3	22 48	29.4	20 22.4	23 46	27.9	20 15.6	23 45	27.4	20 08.7	23 44	26.8	18 38.8	27 35	20.7	18 30.7	27 34	20.2	17 06.0	30 26	15.1	9
70	20 19.4	20 49	30.1	20 13.5	20 48	29.5	19 54.9	21 46	28.0	19 48.6	21 45	27.5	19 42.1	22 44	26.9	18 18.0	25 35	20.8	18 10.4	25 34	20.3	16 50.6	28 26	15.2	70
1	19 50.0	18 49	30.2	19 44.5	19 48	29.6	19 27.4	19 46	28.1	19 21.5	20 45	27.6	19 15.5	20 45	27.0	17 57.1	23 35	20.9	17 50.1	24 34	20.4	16 35.2	26 26	15.3	1
2	19 20.5	17 49	30.3	19 15.4	17 49	29.7	18 59.7	18 46	28.2	18 54.3	18 45	27.7	18 48.8	18 45	27.1	17 36.2	22 35	21.0	17 29.6	22 34	20.4	16 19.6	25 26	15.4	2
3	18 50.8	15 49	30.3	18 46.2	16 49	29.8	18 31.9	16 46	28.3	18 27.0	17 46	27.7	18 22.0	17 45	27.2	17 15.2	20 35	21.0	17 09.1	20 34	20.5	16 04.1	23 26	15.4	3
4	18 21.2	14 50	30.4	18 17.0	14 49	29.9	18 04.1	15 46	28.3	17 59.6	15 46	27.8	17 55.1	15 45	27.3	16 54.1	19 35	21.1	16 48.5	19 34	20.6	15 48.4	21 26	15.5	4
75	17 51.4	12 50	30.5	17 47.7	12 49	30.0	17 36.2	13 47	28.4	17 32.2	13 46	27.9	17 28.1	14 45	27.4	16 32.9	17 35	21.2	16 27.8	17 35	20.7	15 32.7	20 26	15.5	75
6	17 21.6	11 50	30.6	17 18.4	11 49	30.0	17 08.3	12 47	28.5	17 04.7	12 46	27.9	17 01.1	12 45	27.4	16 11.7	15 35	21.2	16 07.1	15 35	20.7	15 17.0	18 26	15.6	6
7	16 51.7	09 50	30.6	16 49.0	09 49	30.1	16 40.3	10 47	28.5	16 37.2	10 46	28.0	16 34.0	11 45	27.5	15 50.4	14 36	21.3	15 46.3	14 35	20.8	15 01.2	16 26	15.6	7
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9	15 51.9	06 50	30.7	15 50.1	06 49	30.2	15 44.1	07 47	28.6	15 42.0	07 46	28.1	15 39.8	07 45	27.6	15 07.7	10 36	21.4	15 04.6	11 35	20.9	14 29.5	13 27	15.7	9
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1	14 52.0	03 50	30.7	14 51.1	03 49	30.2	14 47.9	04 47	28.7	14 46.7	04 46	28.1	14 45.4	04 45	27.6	14 24.9	07 36	21.4	14 22.7	07 35	20.9	13 57.6	09 27	15.8	1
2	14 22.0	01 50	30.7	14 21.5	02 49	30.2	14 19.7	02 47	28.7	14 19.0	03 46	28.2	14 18.2	03 45	27.6	14 03.4	05 36	21.5	14 01.8	06 35	20.9	13 41.6	08 27	15.8	2
3	13 52.0	00 50	30.7	13 52.0	00 49	30.2	13 51.6	01 47	28.7	13 51.3	01 46	28.2	13 51.0	01 45	27.7	13 41.9	04 36	21.5	13 40.8	04 35	21.0	13 25.6	06 27	15.8	3
4	13 22.0	02 50	30.7	13 22.4	01 49	30.2	13 23.4	01 47	28.7	13 23.6	01 46	28.2	13 23.7	00 45	27.7	13 20.5	02 36	21.5	13 19.8	02 35	21.0	13 09.6	04 27	15.8	4
85	12 52.0	03 50	30.7	12 52.9	03 49	30.2	12 55.2	02 47	28.7	12 55.9	02 46	28.2	12 56.5	02 45	27.6	12 59.0	01 36	21.5	12 58.8	01 35	21.0	12 53.6	03 27	15.8	85
6	12 22.0	06 50	30.7	12 23.4	04 49	30.2	12 27.1	04 47	28.7	12 28.2	04 46	28.1	12 29.3	03 45	27.6	12 37.4	01 36	21.5	12 37.8	01 35	21.0	12 37.6	01 27	15.9	6
7	11 52.1	06 50	30.7	11 53.9	06 49	30.2	11 58.9	05 47	28.6	12 00.5	06 46	28.1	12 02.0	06 45	27.6	12 16.0	03 36	21.5	12 16.7	03 35	21.0	12 21.5	01 27	15.9	7
8	11 22.1	08 50	30.6	11 24.4	07 49	30.1	11 30.8	07 47	28.6	11 32.9	07 46	28.1	11 34.8	07 45	27.6	11 54.5	04 36	21.5	11 55.7	04 35	21.0	12 05.5	02 27	15.9	8
9	10 52.2	09 50	30.6	10 54.9	09 49	30.1	11 02.7	08 47	28.6	11 05.2	08 46	28.1	11 07.7	08 45	27.6	11 33.0	06 36	21.5	11 34.8	06 35	20.9	11 49.5	04 27	15.8	9
90	10 22.4	11 50	30.6	10 25.5	10 49	30.0	10 34.7	10 47	28.5	10 37.6	10 46	28.0	10 40.5	10 45	27.5	11 11.5	08 36	21.4	11 13.8	07 35	20.9	11 33.4	06 27	15.8	90

Lat.
12°

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	60° 00′			60° 30′			62° 00′			62° 30′		
°	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °
00	18 00.0	1.0 00	180.0	17 30.0	1.0 00	180.0	16 00.0	1.0 00	180.0	15 30.0	1.0 00	180.0
1	17 59.7	1.0 01	179.5	17 29.7	1.0 01	179.5	15 59.7	1.0 01	179.5	15 29.8	1.0 01	179.5
2	17 58.9	1.0 02	178.9	17 28.9	1.0 02	179.0	15 59.0	1.0 02	179.0	15 29.0	1.0 02	179.0
3	17 57.6	1.0 03	178.4	17 27.6	1.0 03	178.5	15 57.7	1.0 03	178.5	15 27.8	1.0 03	178.6
4	17 55.7	1.0 04	177.9	17 25.8	1.0 04	177.9	15 56.0	1.0 04	178.0	15 26.1	1.0 04	178.1
05	17 53.3	1.0 05	177.4	17 23.4	1.0 05	177.4	15 53.8	1.0 05	177.6	15 23.9	1.0 04	177.6
6	17 50.3	99 06	176.9	17 20.5	99 06	176.9	15 51.0	99 05	177.1	15 21.2	99 05	177.1
7	17 46.8	99 07	176.3	17 17.1	99 07	176.4	15 47.8	99 06	176.6	15 18.0	99 06	176.7
8	17 42.8	99 08	175.8	17 13.1	99 07	175.9	15 44.0	99 07	176.1	15 14.3	99 07	176.2
9	17 38.3	99 08	175.3	17 08.6	99 08	175.4	15 39.8	99 08	175.6	15 10.2	99 08	175.7
10	17 33.2	98 09	174.8	17 03.7	98 09	174.9	15 35.1	98 09	175.1	15 05.5	98 09	175.2
1	17 27.6	98 10	174.3	16 58.1	98 10	174.4	15 29.9	98 10	174.7	15 00.4	98 09	174.8
2	17 21.4	98 11	173.7	16 52.1	98 11	173.9	15 24.2	98 10	174.2	14 54.8	98 10	174.3
3	17 14.8	97 12	173.2	16 45.6	97 12	173.4	15 18.0	97 11	173.7	14 48.8	97 11	173.8
4	17 07.6	97 13	172.7	16 38.5	97 13	172.9	15 11.3	97 12	173.2	14 42.2	97 12	173.4
15	16 59.9	96 14	172.2	16 31.0	96 13	172.4	15 04.2	97 13	172.8	14 35.2	97 12	172.9
6	16 51.7	96 14	171.7	16 22.9	96 14	171.9	14 56.5	96 14	172.3	14 27.7	96 13	172.4
7	16 43.0	95 15	171.2	16 14.4	95 15	171.4	14 48.4	96 14	171.8	14 19.8	96 14	172.0
8	16 33.8	95 16	170.7	16 05.3	95 16	170.9	14 39.9	95 15	171.4	14 11.4	95 15	171.5
9	16 24.1	94 17	170.2	15 55.8	94 17	170.4	14 30.8	94 16	170.9	14 02.5	94 16	171.1
20	16 13.9	94 18	169.7	15 45.8	94 18	169.9	14 21.4	94 17	170.5	13 53.2	94 16	170.6
1	16 03.2	93 19	169.3	15 35.3	93 18	169.4	14 11.4	93 17	170.0	13 43.4	93 17	170.2
2	15 52.0	92 19	168.8	15 24.3	92 19	169.0	14 01.0	93 18	169.6	13 33.2	93 18	169.8
3	15 40.3	92 20	168.3	15 12.8	92 20	168.5	13 50.1	92 19	169.1	13 22.5	92 18	169.3
4	15 28.2	91 21	167.8	15 00.9	91 21	168.0	13 38.8	91 20	168.7	13 11.4	91 19	168.9
25	15 15.6	90 22	167.3	14 48.5	90 21	167.6	13 27.1	91 20	168.2	12 59.9	91 20	168.4
6	15 02.5	90 23	166.9	14 35.6	90 22	167.1	13 14.9	90 21	167.8	12 47.9	90 21	168.0
7	14 48.9	89 23	166.4	14 22.3	89 23	166.7	13 02.2	89 22	167.4	12 35.5	89 21	167.6
8	14 34.9	88 24	166.0	14 08.5	88 24	166.2	12 49.2	88 22	166.9	12 22.7	88 22	167.2
9	14 20.5	87 25	165.5	13 54.3	87 24	165.8	12 35.7	87 23	166.5	12 09.5	87 23	166.8
30	14 05.6	86 26	165.1	13 39.7	86 25	165.3	12 21.8	87 24	166.1	11 55.8	87 23	166.4
1	13 50.2	85 26	164.6	13 24.6	86 26	164.9	12 07.5	86 25	165.7	11 41.8	86 24	165.9
2	13 34.4	85 27	164.2	13 09.1	85 27	164.5	11 52.8	85 25	165.3	11 27.3	85 25	165.5
3	13 18.2	84 28	163.8	12 53.1	84 27	164.0	11 37.7	84 26	164.9	11 12.5	84 25	165.1
4	13 01.6	83 28	163.3	12 36.8	83 28	163.6	11 22.1	83 27	164.5	10 57.2	83 26	164.8
35	12 44.5	82 29	162.9	12 20.0	82 29	163.2	11 06.2	82 27	164.1	10 41.6	82 27	164.4
6	12 27.1	81 30	162.5	12 02.8	81 29	162.8	10 49.9	81 28	163.7	10 25.6	81 27	164.0
7	12 09.2	80 30	162.1	11 45.3	80 30	162.4	10 33.3	80 28	163.3	10 09.2	80 28	163.6
8	11 51.0	79 31	161.7	11 27.3	79 31	162.0	10 16.2	79 29	162.9	9 52.5	79 29	163.2
9	11 32.3	78 32	161.3	11 09.0	78 31	161.6	9 58.8	78 30	162.5	9 35.4	78 29	162.9
40	11 13.3	77 32	160.9	10 50.2	77 32	161.2	9 41.0	77 30	162.2	9 17.9	77 30	162.5
1	10 53.8	76 33	160.5	10 31.1	76 32	160.8	9 22.9	76 31	161.8	9 00.1	76 30	162.1
2	10 34.1	75 34	160.1	10 11.7	75 33	160.4	9 04.4	75 31	161.5	8 41.9	75 31	161.8
3	10 13.9	74 34	159.7	9 51.8	74 34	160.1	8 45.5	74 32	161.1	8 23.4	74 31	161.4
4	9 53.4	72 35	159.4	9 31.7	72 34	159.7	8 26.3	73 33	160.7	8 04.5	73 32	161.1
45	9 32.5	71 35	159.0	9 11.1	71 35	159.3	8 06.8	72 33	160.4	7 45.3	72 32	160.8
6	9 11.3	70 36	158.6	8 50.3	70 35	159.0	7 47.0	70 34	160.1	7 25.8	70 33	160.4
7	8 49.8	69 36	158.3	8 29.0	69 36	158.6	7 26.8	69 34	159.7	7 06.0	69 34	160.1
8	8 27.9	68 37	157.9	8 07.5	68 36	158.3	7 06.3	68 35	159.4	6 45.9	68 34	159.8
9	8 05.7	67 38	157.6	7 45.7	67 37	158.0	6 45.5	67 35	159.1	6 25.5	67 35	159.5
50	7 43.1	65 38	157.3	7 23.5	66 37	157.6	6 24.5	66 36	158.8	6 04.7	66 35	159.2
1	7 20.3	64 39	156.9	7 01.0	64 38	157.3	6 03.1	64 36	158.5	5 43.7	65 36	158.9
2	6 57.2	63 39	156.6	6 38.2	63 38	157.0	5 41.4	63 37	158.2	5 22.4	63 36	158.6
3	6 33.7	62 40	156.3	6 15.2	62 39	156.7	5 19.4	62 37	157.9	5 00.8	62 36	158.3
4	6 10.0	61 40	156.0	5 51.8	61 39	156.4						
55	5 46.0	59 40	155.7	5 28.2	59 40	156.1						
6	5 21.7	58 41	155.4	5 04.2	58 40	155.8						

H.A.	63° 00′			69° 00′			69° 30′			74° 30′		
°	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. °	Δd Δt	Az. °
00	15 00.0	1.0 00	180.0	9 00.0	1.0 00	180.0	8 30.0	1.0 00	180.0			
1	14 59.8	1.0 01	179.5	8 59.8	1.0 01	179.6	8 29.8	1.0 01	179.6			
2	14 59.0	1.0 02	179.1	8 59.3	1.0 02	179.3	8 29.3	1.0 02	179.3			
3	14 57.8	1.0 03	178.6	8 58.3	1.0 02	178.9	8 28.4	1.0 02	178.9			
4	14 56.2	1.0 04	178.1	8 57.0	1.0 03	178.5	8 27.1	1.0 03	178.6			
05	14 54.0	1.0 04	177.7	8 55.4	1.0 03	178.2	8 25.5	1.0 03	178.2			
6	14 51.3	99 05	177.2	8 53.3	99 04	177.8	8 23.5	99 04	177.9			
7	14 48.2	99 06	176.7	8 50.9	99 05	177.5	8 21.1	99 05	177.5			
8	14 44.6	99 07	176.3	8 48.1	99 05	177.1	8 18.4	99 05	177.2			
9	14 40.6	99 08	175.8	8 45.0	99 06	176.7	8 15.3	99 06	176.8			
10	14 36.0	98 08	175.3	8 41.5	99 06	176.4	8 11.9	99 06	176.5			
1	14 31.0	98 09	174.9	8 37.6	98 07	176.0	8 08.1	98 07	176.1			
2	14 25.5	98 10	174.4	8 33.4	98 08	175.7	8 04.0	98 08	175.8			
3	14 19.6	97 11	173.9	8 28.8	97 08	175.3	7 59.5	98 08	175.4			
4	14 13.1	97 11	173.5	8 23.8	97 09	175.0	7 54.7	97 09	175.1			
15	14 06.3	97 12	173.0	8 18.5	97 09	174.6	7 49.5	97 09	174.8			
6	13 58.9	96 13	172.6	8 12.8	96 10	174.3	7 43.9	96 10	174.4			
7	13 51.1	96 14	172.1	8 06.8	96 11	173.9	7 38.0	96 10	174.1			
8	13 42.9	95 14	171.7	8 00.4	95 11	173.6	7 31.8	95 11	173.7			
9	13 34.2	94 15	171.3	7 53.6	95 12	173.2	7 25.2	95 12	173.4			
20	13 25.0	94 16	170.8	7 46.5	94 12	172.9	7 18.3	94 12	173.1			
1	13 15.4	93 17	170.4	7 39.1	94 13	172.6	7 11.0	94 13	172.7			
2	13 05.4	93 17	169.9	7 31.3	93 14	172.2	7 03.5	93 13	172.4			
3	12 54.9	92 18	169.5	7 23.2	92 14	171.9	6 55.5	92 14	172.1			
4	12 44.0	91 19	169.1	7 14.8	92 15	171.6	6 47.3	92 14	171.8			
25	12 32.7	91 20	168.7	7 06.0	91 15	171.2	6 38.7	91 15	171.4			
6	12 21.0	90 20	168.2	6 56.8	90 16	170.9	6 29.8	90 15	171.1			
7	12 08.8	89 21	167.8	6 47.4	89 16	170.6	6 20.6	89 16	170.8			
8	11 56.2	88 22	167.4	6 37.6	89 17	170.2	6 11.0	89 16	170.5			
9	11 43.2	87 22	167.0	6 27.5	88 17	169.9	6 01.1	88 17	170.2			
30	11 29.8	87 23	166.6	6 17.1	87 18	169.6	5 51.0	87 17	169.9			
1	11 16.1	86 24	166.2	6 06.4	86 18	169.3	5 40.5	86 18	169.6			
2	11 01.9	85 24	165.8	5 55.3	85 19	169.0	5 29.7	85 18	169.3			
3	10 47.3	84 25	165.4	5 43.9	84 19	168.7	5 18.6	84 19	169.0			
4	10 32.3	83 26	165.0	5 32.3	84 20	168.4	5 07.2	84 19	168.7			
35	10 17.0	82 26	164.7	5 20.3	83 20	168.1						
6	10 01.3	81 27	164.3	5 08.0	82 21	167.8						
7	9 45.2	80 27	163.9									
8	9 28.7	79 28	163.5									
9	9 11.9	78 29	163.2									
40	8 54.8	77 29	162.8									
1	8 37.2	76 30	162.5									
2	8 19.4	75 30	162.1									
3	8 01.2	74 31	161.8									
4	7 42.7	73 31	161.4									
45	7 23.9	72 32	161.1									
6	7 04.7	71 32	160.8									
7	6 45.2	69 33	160.5									
8	6 25.5	68 33	160.2									
9	6 05.4	67 34	159.8									
50	5 45.0	66 34	159.5									
1	5 24.4	65 35	159.2									
2	5 03.4	63 35	159.0									
3												
4												
55												
6												

DECLINATION SAME NAME AS LATITUDE

H.A.	60° 00′			60° 30′			62° 00′			62° 30′		
°	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °
91	9 52.6	12 50	30.5	9 56.2	12 49	30.0	10 06.7	11 47	28.5	10 10.1	11 46	28.0
2	9 22.8	14 49	30.4	9 26.9	13 49	29.9	9 38.7	13 46	28.4	9 42.6	13 46	27.9
3	8 53.1	15 49	30.4	8 57.6	15 49	29.9	9 10.8	14 46	28.4	9 15.1	14 46	27.9
4	8 23.5	16 49	30.3	8 28.4	16 49	29.8	8 43.0	16 46	28.3	8 47.7	16 46	27.8
95	7 54.0	18 49	30.2	7 59.3	18 48	29.7	8 15.2	17 46	28.2	8 20.4	17 45	27.7
6	7 24.5	19 49	30.1	7 30.3	19 48	29.6	7 47.5	19 46	28.1	7 53.2	19 45	27.6
7	6 55.1	21 49	30.0	7 01.3	21 48	29.5	7 19.9	20 46	28.0	7 26.0	20 45	27.5
8	6 25.8	22 49	29.9	6 32.5	22 48	29.4	6 52.4	22 46	27.9	6 58.9	22 45	27.4
9	5 56.6	24 48	29.8	6 03.7	24 48	29.3	6 24.9	23 46	27.8	6 31.9	23 45	27.3
100	5 27.5	25 48	29.6	5 35.1	25 48	29.2	5 57.6	25 45	27.7	6 05.1	25 45	27.2
1				5 06.5	27 47	29.0	5 30.4	26 45	27.6	5 38.3	26 44	27.1
2							5 03.3	28 45	27.5	5 11.6	28 44	27.0
3												
4												
105												
6												
7												
8												
9												
110												
1												
2												
3												
4												
115												

H.A.	63° 00′			69° 00′			69° 30′			74° 30′		
°	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °
91	10 13.5	11 45	27.5	10 50.1	09 36	21.4	10 52.8	09 35	20.9	11 17.4	07 27	15.8
2	9 46.4	13 45	27.4	10 28.7	11 36	21.4	10 31.9	11 35	20.9	11 01.5	09 27	15.8
3	9 19.4	14 45	27.4	10 07.4	12 36	21.3	10 11.1	12 35	20.8	10 45.5	11 27	15.8
4	8 52.5	16 45	27.3	9 46.0	14 35	21.3	9 50.2	14 35	20.8	10 29.6	12 26	15.7
95	8 25.6	17 45	27.2	9 24.8	16 35	21.2	9 29.4	15 35	20.7	10 13.7	14 26	15.7
6	7 58.8	19 45	27.1	9 03.6	17 35	21.2	9 08.7	17 34	20.7	9 57.8	16 26	15.7
7	7 32.1	20 44	27.0	8 42.4	19 35	21.1	8 48.0	19 34	20.6	9 42.0	17 26	15.6
8	7 05.5	22 44	26.9	8 21.3	20 35	21.0	8 27.4	20 34	20.5	9 26.2	19 26	15.6
9	6 38.9	23 44	26.8	8 00.3	22 35	20.9	8 06.9	22 34	20.5	9 10.5	21 26	15.5
100	6 12.5	25 44	26.7	7 39.4	24 35	20.9	7 46.4	23 34	20.4	8 54.9	22 26	15.4
1	5 46.1	26 44	26.6	7 18.5	25 35	20.8	7 26.0	25 34	20.3	8 39.3	24 26	15.4
2	5 19.9	28 44	26.5	6 57.8	27 34	20.7	7 05.7	27 34	20.2	8 23.7	25 26	15.3
3				6 37.1	28 34	20.6	6 45.5	28 34	20.1	8 08.2	27 26	15.2
4				6 16.5	30 34	20.5	6 25.4	30 33	20.0	7 52.8	29 26	15.2
105				5 56.0	31 34	20.4	6 05.4	31 33	19.9	7 37.5	30 25	15.1
6				5 35.6	33 34	20.3	5 45.5	33 33	19.8	7 22.3	32 25	15.0
7				5 15.4	34 34	20.1	5 25.7	34 33	19.7	7 07.1	33 25	14.9
8							5 06.0	36 33	19.5	6 52.0	35 25	14.8
9										6 37.1	36 25	14.7
110										6 22.2	38 25	14.6
1										6 07.4	40 24	14.5
2										5 52.7	41 24	14.4
3										5 38.2	43 24	14.3
4										5 23.7	44 24	14.2
115										5 09.4	46 24	14.1

STAR IDENTIFICATION TABLE

ALTITUDE

AZ.	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	82	180	86	180	90	...	86	00	82	00	78	00	74	00	70	00	66	00	62	00	58	00	00
4	81	153	84	135	86	90	84	44	81	25	77	17	74	13	70	10	66	08	62	06	58	05	4
8	79	135	81	116	82	89	81	62	79	43	76	31	72	24	69	19	65	15	61	13	57	11	8
12	76	123	78	108	78	89	78	70	76	54	73	42	70	33	67	27	64	22	60	19	56	16	12
16	72	115	74	103	74	88	74	74	73	60	71	49	68	41	65	34	62	28	59	24	55	20	16
20	69	110	70	100	70	88	70	76	69	65	68	55	65	46	63	39	60	34	57	29	54	25	20
24	65	107	66	97	67	87	66	77	66	68	64	59	62	51	60	44	58	38	55	33	52	28	24
28	61	104	62	96	63	87	63	78	62	70	61	62	59	54	57	48	55	42	53	36	50	32	28
32	57	102	58	94	59	87	59	79	58	71	57	64	56	57	54	51	52	45	50	39	48	35	32
36	54	100	54	93	55	86	55	79	55	72	54	66	53	59	51	53	50	47	48	42	46	37	36
40	50	98	50	92	51	86	51	79	51	73	50	67	49	61	48	55	47	49	45	44	43	39	40
44	46	97	47	91	47	85	47	79	47	73	47	68	46	62	45	56	44	51	42	46	41	41	44
48	42	95	43	90	43	85	43	79	43	74	43	68	42	63	42	58	41	52	39	47	38	43	48
52	38	94	39	89	39	84	40	79	40	74	39	69	39	64	38	58	38	54	37	49	35	44	52
56	34	93	35	89	35	84	36	79	36	74	36	69	35	64	35	59	34	54	34	50	33	45	56
60	30	92	31	88	31	83	32	78	32	74	32	69	32	64	32	60	31	55	31	50	30	46	60
64	26	91	27	87	28	83	28	78	28	74	28	69	28	64	28	60	28	55	28	51	27	46	64
68	22	91	23	86	24	82	24	78	25	73	25	69	25	65	25	60	25	56	24	51	24	47	68
72	18	90	19	86	20	81	20	77	21	73	21	69	21	64	22	60	22	56	21	51	21	47	72
76	15	89	15	85	16	81	17	77	17	73	18	68	18	64	18	60	18	56	18	52	18	47	76
80	11	88	11	84	12	80	13	76	13	72	14	68	14	64	15	60	15	56	15	51	15	47	80
84	07	87	07	83	08	79	09	75	10	71	10	67	11	63	11	59	12	55	12	51	13	47	84
88	03	87	04	83	04	79	05	75	06	71	07	67	07	63	08	59	09	55	09	51	10	47	88
92	*01*	86	*00*	82	01	78	01	74	02	70	03	66	04	62	05	58	05	54	06	50	07	46	92
96	*05*	85	*04*	81	*03*	77	*02*	73	*01*	69	*01*	65	00	61	01	58	02	54	03	50	04	46	96
100	*09*	84	*08*	80	*07*	76	*06*	72	*05*	68	*04*	64	*03*	61	*02*	57	*01*	53	00	49	01	45	100
104	*13*	83	*12*	79	*11*	75	*10*	71	*09*	67	*08*	63	*06*	60	*05*	56	*04*	52	*03*	48	*01*	44	104
108	*17*	82	*16*	78	*15*	74	*13*	70	*12*	66	*11*	62	*10*	58	*08*	55	*07*	51	*06*	47	*04*	43	108
112	*21*	81	*20*	77	*18*	73	*17*	69	*16*	65	*14*	61	*13*	57	*12*	53	*10*	50	*08*	46	*07*	42	112
116	*24*	80	*23*	76	*22*	72	*21*	68	*19*	64	*18*	60	*16*	56	*15*	52	*13*	48	*11*	45	*09*	41	116
120	*28*	79	*27*	74	*26*	70	*24*	66	*23*	62	*21*	58	*20*	54	*18*	50	*16*	47	*14*	43	*12*	40	120
124	*32*	77	*31*	73	*29*	69	*28*	64	*26*	60	*25*	56	*23*	52	*21*	49	*19*	45	*17*	42	*14*	38	124
128	*36*	76	*35*	71	*33*	67	*31*	63	*30*	58	*28*	54	*26*	51	*24*	47	*21*	43	*19*	40	*17*	36	128
132	*40*	74	*38*	70	*37*	65	*35*	61	*33*	56	*31*	52	*29*	48	*26*	45	*24*	41	*22*	38	*19*	34	132
136	*43*	73	*42*	68	*40*	63	*38*	58	*36*	54	*34*	50	*32*	46	*29*	42	*27*	39	*24*	36	*21*	32	136
140	*47*	70	*45*	65	*44*	60	*42*	56	*39*	51	*37*	47	*34*	43	*32*	40	*29*	36	*26*	33	*23*	30	140
144	*51*	68	*49*	63	*47*	57	*45*	53	*42*	48	*40*	44	*37*	40	*34*	37	*31*	34	*28*	31	*25*	28	144
148	*54*	65	*52*	59	*50*	54	*48*	49	*45*	45	*42*	41	*39*	37	*36*	34	*33*	31	*30*	28	*27*	25	148
152	*58*	62	*56*	56	*53*	50	*51*	45	*48*	41	*45*	37	*42*	34	*38*	31	*35*	28	*32*	25	*28*	23	152
156	*61*	58	*59*	51	*56*	46	*53*	41	*50*	37	*47*	33	*44*	30	*40*	27	*37*	24	*33*	22	*30*	20	156
160	*64*	52	*62*	46	*59*	40	*56*	36	*52*	32	*49*	28	*46*	26	*42*	23	*38*	21	*35*	19	*31*	17	160
164	*67*	46	*64*	39	*61*	34	*58*	30	*54*	26	*51*	23	*47*	21	*43*	19	*40*	17	*36*	15	*32*	14	164
168	*70*	37	*67*	31	*63*	27	*60*	23	*56*	20	*52*	18	*48*	16	*45*	14	*41*	13	*37*	11	*33*	10	168
172	*72*	27	*68*	22	*65*	19	*61*	16	*57*	14	*53*	12	*49*	11	*45*	10	*41*	09	*37*	08	*34*	07	172
176	*74*	14	*70*	11	*66*	10	*62*	08	*58*	07	*54*	06	*50*	05	*46*	05	*42*	04	*38*	04	*34*	03	176
180	*74*	00	*70*	00	*66*	00	*62*	00	*58*	00	*54*	00	*50*	00	*46*	00	*42*	00	*38*	00	*34*	00	180
	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		

10—8472

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

STAR IDENTIFICATION TABLE

ALTITUDE

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

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

H.A.	0° 00′				0° 30′				1° 00′				1° 30′				2° 00′				2° 30′				3° 00′				8° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	77 00.0	1.0	04	180.0	77 30.0	1.0	04	180.0	78 00.0	1.0	04	180.0	78 30.0	1.0	04	180.0	79 00.0	1.0	04	180.0	79 30.0	1.0	05	180.0	80 00.0	1.0	05	180.0	80 30.0	1.0	05	180.0	00
1	76 57.7	1.0	11	175.6	77 27.6	1.0	12	175.4	77 57.6	1.0	12	175.2	78 27.4	1.0	13	175.0	78 57.3	1.0	13	174.8	79 27.2	1.0	14	174.5	79 57.1	1.0	14	174.3	80 26.9	99	15	174.0	1
2	76 51.0	99	19	171.2	77 20.6	99	19	170.8	77 50.3	99	20	170.5	78 19.8	99	21	170.1	78 49.4	98	22	169.6	79 18.9	98	23	169.2	79 48.4	98	24	168.6	80 17.8	98	25	168.1	2
3	76 39.8	98	26	166.9	77 09.1	97	26	166.4	77 38.2	97	27	165.9	78 07.4	97	29	165.3	78 36.4	97	30	164.6	79 05.3	96	31	164.0	79 34.2	96	32	163.2	80 02.9	96	34	162.4	3
4	76 24.5	96	32	162.7	76 53.2	95	33	162.1	77 21.8	95	34	161.4	77 50.2	96	36	160.7	78 18.5	94	37	159.9	78 46.7	94	39	159.0	79 14.8	93	40	158.1	79 42.6	92	42	157.1	4
05	76 05.2	94	38	158.7	76 33.2	93	40	158.0	77 01.1	93	41	157.2	77 28.8	92	42	156.3	77 56.3	91	44	155.4	78 23.6	91	46	154.4	78 50.7	90	47	153.3	79 17.5	89	49	152.1	05
6	75 42.2	91	44	155.0	76 00.5	90	45	154.1	76 36.5	90	47	153.2	77 03.4	89	48	152.2	77 29.9	88	50	151.1	77 56.3	87	52	150.0	78 22.3	86	53	148.8	78 48.0	85	56	147.5	6
7	75 15.8	88	49	151.4	75 42.2	88	51	150.4	76 08.4	87	52	149.4	76 34.3	86	54	148.4	77 00.0	85	55	147.2	77 25.3	84	57	146.0	77 50.3	83	59	144.7	78 14.8	81	61	143.3	7
8	74 46.3	86	54	148.0	75 11.9	85	55	147.0	75 37.2	84	57	145.9	76 02.1	83	58	144.8	76 26.8	82	60	143.6	76 51.1	80	62	142.3	77 14.9	79	64	141.0	77 38.4	77	65	139.5	8
9	74 14.0	83	58	144.9	74 38.7	82	60	143.8	75 03.0	81	61	142.7	75 27.1	79	63	141.5	75 50.7	78	64	140.3	76 14.0	77	66	139.0	76 36.8	75	68	137.6	76 59.1	74	69	136.1	9
10	73 39.1	80	62	141.9	74 02.9	79	63	140.8	74 26.4	78	65	139.7	74 49.4	76	66	138.5	75 12.1	75	68	137.2	75 34.4	73	70	135.9	75 56.2	72	71	134.5	76 17.4	70	73	133.0	10
1	73 01.9	77	65	139.2	73 24.0	76	67	138.1	73 47.4	75	68	136.9	74 09.6	73	70	135.7	74 31.4	72	71	134.4	74 52.6	70	73	133.1	75 13.4	68	74	131.7	75 33.7	67	76	130.2	1
2	72 22.7	74	68	136.6	72 44.8	73	70	135.5	73 06.5	72	71	134.3	73 27.8	70	73	133.1	73 48.7	69	74	131.8	74 09.0	67	75	130.5	74 28.9	65	77	129.1	74 48.2	63	78	127.7	2
3	71 41.7	72	71	134.3	72 03.0	70	72	133.1	72 23.9	69	74	131.9	72 44.3	67	75	130.7	73 04.3	66	76	129.5	73 23.8	64	78	128.1	73 42.8	62	79	126.8	74 01.2	61	80	125.4	3
4	70 59.0	69	74	132.1	71 19.5	68	75	130.9	71 39.6	66	76	129.8	71 59.3	65	77	128.5	72 18.5	63	79	127.3	72 37.1	61	80	126.0	72 55.3	60	81	124.7	73 12.9	58	82	123.3	4
15	70 14.9	67	76	130.0	70 34.7	65	77	128.9	70 54.0	64	78	127.7	71 12.9	62	79	126.5	71 31.3	61	80	125.3	71 49.3	59	82	124.0	72 06.6	57	83	122.7	72 23.5	55	84	121.4	15
6	69 29.5	64	78	128.1	69 48.6	63	79	127.0	70 07.2	61	80	125.9	70 25.4	60	81	124.7	70 43.1	58	82	123.5	71 00.3	56	83	122.2	71 17.0	55	84	120.9	71 33.1	53	85	119.6	6
7	68 43.0	62	79	126.3	69 01.4	61	80	125.2	69 19.3	59	81	124.1	69 36.8	58	82	123.0	69 53.8	56	84	121.8	70 10.4	54	85	120.6	70 26.4	53	86	119.3	70 41.9	51	87	118.0	7
8	67 55.4	60	81	124.7	68 13.1	58	82	123.6	68 30.5	57	83	122.5	68 47.3	55	84	121.4	69 03.7	54	85	120.2	69 19.6	52	86	119.0	69 35.0	50	87	117.8	69 49.9	49	88	116.5	8
9	67 06.9	58	82	123.2	67 24.0	56	83	122.1	67 40.7	55	84	121.0	67 57.0	53	85	119.9	68 12.8	52	86	118.8	68 28.2	50	87	117.6	68 43.0	49	88	116.4	68 57.3	47	89	115.2	9
20	66 17.5	56	83	121.7	66 34.1	55	84	120.7	66 50.3	53	85	119.6	67 06.0	52	86	118.5	67 21.2	50	87	117.4	67 36.0	48	88	116.3	67 50.3	47	89	115.1	68 04.1	45	89	113.9	20
1	65 27.4	54	85	120.4	65 43.5	53	85	119.3	65 59.1	51	86	118.3	66 14.3	50	87	117.2	66 29.0	48	88	116.2	66 43.3	47	89	115.0	66 57.1	45	89	113.9	67 10.5	44	90	112.8	1
2	64 36.7	52	86	119.1	64 52.2	51	86	118.1	65 07.3	50	87	117.1	65 22.0	48	88	116.0	65 36.3	47	89	115.0	65 50.1	45	89	113.9	66 03.5	44	90	112.8	66 16.3	42	91	111.7	2
3	63 45.3	51	87	117.9	64 00.4	50	87	116.9	64 15.0	48	88	115.9	64 29.3	47	89	114.9	64 43.1	45	89	113.9	64 56.4	44	90	112.8	65 09.4	42	91	111.8	65 21.8	41	91	110.7	3
4	62 53.4	49	87	116.8	63 08.0	48	88	115.8	63 22.2	47	89	114.9	63 36.0	45	89	113.9	63 49.4	44	90	112.9	64 02.4	42	91	111.8	64 14.9	41	91	110.8	64 27.0	39	92	109.7	4
25	62 01.0	48	88	115.8	62 15.2	47	89	114.8	62 29.0	45	89	113.9	62 42.4	44	90	112.9	62 55.4	43	91	111.9	63 07.9	41	91	110.9	63 20.1	40	92	109.9	63 31.8	38	92	108.8	25
6	61 08.1	47	89	114.8	61 21.9	45	89	113.8	61 35.3	44	90	112.9	61 48.3	43	91	112.0	62 00.9	41	91	111.0	62 13.1	40	92	110.0	62 24.9	39	92	109.0	62 36.3	37	93	108.0	6
7	60 14.8	45	89	113.8	60 28.2	44	90	112.9	60 41.3	43	91	112.0	60 53.9	42	91	111.1	61 06.2	40	92	110.1	61 18.1	39	92	109.2	61 29.5	38	93	108.2	61 40.6	36	93	107.2	7
8	59 21.1	44	90	112.9	59 34.2	43	91	112.0	59 46.9	42	91	111.1	59 59.2	40	92	110.2	60 11.2	39	92	109.3	60 22.7	38	93	108.4	60 33.9	37	93	107.4	60 44.6	35	94	106.5	8
9	58 27.1	43	91	112.1	58 39.8	42	91	111.2	58 52.2	41	92	110.3	59 04.2	39	92	109.5	59 15.9	38	93	108.6	59 27.1	37	93	107.6	59 38.0	36	93	106.7	59 48.5	34	94	105.8	9
30	57 32.8	42	91	111.3	57 45.2	41	92	110.4	57 57.3	40	92	109.6	58 09.0	38	92	108.7	58 20.3	37	93	107.8	58 31.3	36	93	106.9	58 41.9	35	94	106.0	58 52.1	33	94	105.1	30
1	56 38.2	41	91	110.5	56 59.3	40	92	109.7	57 02.1	39	92	108.8	57 13.5	38	93	108.0	57 24.6	36	93	107.1	57 35.3	35	94	106.3	57 45.6	34	94	105.4	57 55.6	33	94	104.5	1
2	55 43.3	40	92	109.8	55 55.1	39	92	109.0	56 06.6	38	93	108.2	56 17.8	37	93	107.3	56 28.6	35	94	106.5	56 39.1	34	94	105.6	56 49.2	33	94	104.8	56 59.0	32	95	103.9	2
3	54 48.2	39	92	109.1	54 59.7	38	93	108.3	55 11.0	37	93	107.5	55 21.9	36	94	106.7	55 32.4	35	94	105.9	55 42.7	34	94	105.0	55 52.6	32	95	104.2	56 02.1	31	95	103.3	3
4	53 52.8	38	93	108.4	54 04.1	37	93	107.7	54 15.1	36	93	106.9	54 25.8	35	94	106.1	54 36.1	34	94	105.3	54 46.1	33	94	104.4	54 55.8	32	95	103.6	55 05.2	31	95	102.8	4
35	52 57.3	37	93	107.8	53 08.3	36	93	107.0	53 19.1	35	94	106.3	53 29.5	34	94	105.5	53 39.6	33	94	104.7	53 49.5	32	95	103.9	53 58.9	31	96	103.1	54 08.1	30	95	102.3	35
6	52 01.5	37	93	107.2	52 12.3	36	94	106.4	52 22.9	35	94	105.7	52 33.1	34	94	104.9	52 43.0	33	95	104.1	52 52.6	32	95	103.3	53 01.9	30	95	102.6	53 10.9	29	95	101.8	6
7	51 05.6	36	94	106.6	51 16.2	35	94	105.9	51 26.5	34	94	105.1	51 36.5	33	94	104.4	51 46.3	32	95	103.6	51 55.7	31	95	102.8	52 04.8	30	95	102.1	52 13.6	29	96	101.3	7
8	50 09.5	35	94	106.1	50 19.9	34	94	105.3	50 30.0	33	94	104.6	50 39.8	32	95	103.8	50 49.4	31	95	103.1	50 58.6	30	95	102.3	51 07.6	29	96	101.6	51 16.3	28	96	100.8	8
9	49 13.2	34	94	105.5	49 23.4	34	94	104.8	49 33.4	33	95	104.1	49 43.0	32	95	103.3	49 52.4	31	95	102.6	50 01.5	30	95	101.9	50 10.3	29	96	101.1	50 18.8	28	96	100.4	9
40	48 16.8	34	94	105.0	48 26.8	33	95	104.3	48 36.6	32	95	103.6	48 46.1	31	95	102.9	48 55.3	30	95	102.1	49 04.2	29	96	101.4	49 12.9	28	96	100.7	49 21.3	27	96	99.9	40
1	47 20.3	33	94	104.5	47 30.1	32	95	103.8	47 39.7	31	95	103.1	47 49.0	31	95	102.4	47 58.1	30	95	101.7	48 06.9	29	96	101.0	48 15.4	28	96	100.3	48 23.6	27	96	99.5	1
2	46 23.6	33	95	104.0	46 33.3	32	95	103.3	46 42.7	31	95	102.6	46 51.9	30	95	102.0	47 00.8	29	96	101.3	47 09.4	28	96	100.6	47 17.8	28	96	99.8	47 25.9	27	96	99.1	2
3	45 26.9	32	95	103.6	45 36.4	31	95	102.9	45 45.6	30	95	102.2	45 54.6	30	96	101.5	46 03.4	29	96	100.8	46 11.9	28	96	100.1	46 20.2	27	96	99.4	46 28.2	26	96	98.7	3
4	44 30.0	32	95	103.1	44 39.3	31	95	102.4	44 48.4	30	95	101.8	44 57.3	29	96	101.1	45 05.9	28	96	100.4	45 14.3	28	96	99.7	45 22.5	27	96	99.1	45 30.4	26	96	98.4	4
45	43 33.0	31	95	102.7	43 42.2	30	96	102.0	43 51.2	30	96	101.4	43 59.9	29	96	100.7	44 08.4	28	96	100.0	44 16.7	27	96	99.4	44 24.7	26	96	98.7	44 32.5	26	97	98.0	45
6	42 35.9	31	95	102.3	42 45.0	30	96	101.6	42 53.8	29	96	101.0	43 02.4	28	96	100.3	43 10.8	28	96	99.6	43 19.0	27	96	99.0	43 26.9	26	96	98.3	43 34.6	25	97	97.7	6
7	41 38.7	30	95	101.8	41 47.6	29	96	101.2	41 56.4	29	96	100.6	42 04.9	28	96	99.9	42 13.1	27	96	99.3	42 21.2	26	96	98.6	42 29.0	26	97	98.0	42 36.6	25	97	97.3	7
8	40 41.5	30	96	101.5	40 50.3	29	96	100.8	40 58.9	28	96	100.2	41 07.2	28	96	99.5	41 15.4	27	96	98.9	41 23.4	26	96	98.3	41 31.1	25	97	97.6	41 38.6	25	97	97.0	8
9	39 44.1	29	96	101.1	39 52.8	29	96	100.4	40 01.3	28	96	99.8	40 09.6	27	96	99.2	40 17.6	27	96	98.6	40 25.5	26	97	97.9	40 33.1	25	97	97.3	40 40.6	24	97	96.6	9
50	38 46.7	29	96	100.7	38 55.3	28	96	100.1	39 03.6	28	96	99.5	39 11.8	27	96	98.8	39 19.8	26	96	98.2	39 27.6	26	97	97.6	39 35.1	25	97	97.0	39 42.5	24	97	96.3	50
1	37 49.2	28	96	100.3	37 57.7	28	96	99.7	38 05.9	27	96	99.1	38 14.0	27	96	98.5	38 21.9	26	97	97.9	38 29.6	25	97	97.3	38 37.1	25	97	96.6	38 44.4	24	97	96.0	1
2	36 51.7	28	96	100.0	37 00.0	28	96	99.4	37 08.2	27	96	98.8	37 16.2	26	96	98.2	37 24.0	26	97	97.6	37 31.6	25	97	96.9	37 39.0	24	97	96.3	37 46.2	24	97	95.7	2
3	35 54.1	28	96	99.6	36 02.3	27	96	99.0	36 10.4	27	96	98.4	36 18.3	26	97	97.8	36 26.0	25	97	97.2	36 33.5	25	97	96.6	36 40.9	24	97	96.0	36 48.0	24	97	95.4	3
4	34 56.4	27	96	99.3	35 04.6	27	96	98.7	35 12.5	26	96	98.1	35 20.3	26	97	97.5	35 28.0	25	97	96.9	35 35.4	25	97	96.3	35 42.7	24	97	95.7	35 49.8	23	97	95.1	4
55	33 58.7	27	96	99.0	34 06.7	27	96	98.4	34 14.6	26	97	97.8	34 22.4	25	97	97.2	34 29.9	25	97	96.6	34 37.3	24	97	96.0	34 44.5	24	97	95.4	34 51.6	23	97	94.8	55
6	33 00.9	27	96	98.6	33 08.9	26	97	98.1	33 16.7	26	97	97.5	33 24.3	25	97	96.9	33 31.8	25	97	96.3	33 39.2	24	97	95.7	33 46.3	24	97	95.2	33 53.3	23	97	94.6	6
7	32 03.1	27	96	98.3	32 11.0	26	97	97.7	32 18.7	26	97	97.2	32 26.3	25	97	96.6	32 33.7	24	97	96.0	32 41.0	24	97	95.4	32 48.1	23	97	94.9	32 55.0	23	97	94.3	7
8	31 05.2	26	97	98.0	31 13.0	26	97	97.4	31 20.7	25	97	96.9	31 28.2	25	97	96.3	31 35.5	24	97	95.7	31 42.8	24	97	95.2	31 49.8	23	97	94.6	31 56.7	23	97	94.0	8
9	30 07.3	26	97	97.7	30 15.0	26	97	97.1	30 22.6	25	97	96.6	30 30.1	25	97	96.0	30 37.4	24	97	95.5	30 44.5	24	97	94.9	30 51.5	23	97	94.3	30 58.4	23	97	93.8	9
60	29 09.3	26	97	97.4	29 17.0	25	97	96.8	29 24.5	25	97	96.3	29 31.9	24	97	95.7	29 39.2	24	97	95.2	29 46.3	23	97	94.6	29 53.2	23	97	94.1	30 00.0	22	97	93.5	60
1	28 11.3	26	97	97.1	28 18.9	25	97	96.6	28 26.4	25	97	96.0	28 33.7	24	97	95.5	28 40.9	24	97	94.9	28 48.0	23	97	94.3	28 54.9	23	97	93.8	29 01.7	22	97	93.2	1
2	27 13.3	25	97	96.8	27 20.8	25	97	96.3	27 28.2	24	97	95.7	27 35.5	24	97	95.2	27 42.7	24	97	94.6	27 49.7	23	97	94.1	27 56.5	23	97	93.5	28 03.3	22	97	93.0	2
3	26 15.3	25	97	96.5	26 22.7	25	97	96.0	26 30.1	24	97	95.5	26 37.3	24	97	94.9	26 44.4	23	97	94.4	26 51.3	23	97	93.8	26 58.2	23	97	93.3	27 04.9	22	97	92.7	3
4	25 17.2	25	97	96.3	25 24.6	24	97	95.7	25 31.8	24	97	95.2	25 39.0	24	97	94.6	25 46.1	23	97	94.1	25 53.0	23	97	93.6	25 59.8	23	97	93.0	26 06.5	22	97	92.5	4
65	24 19.0	25	97	96.0	24 26.4	24	97	95.5	24 33.6	24	97	94.9	24 40.7	24	97	94.4	24 47.8	23	97	93.9	24 54.6	23	97	93.3	25 01.4	22	97	92.8	25 08.1	22	97	92.2	65
6	23 20.9	25	97	95.7	23 28.2	24	97	95.2	23 35.4	24	97	94.7	23 42.4	23	97	94.1	23 49.4	23	97	93.6	23 56.3	23	97	93.1	24 03.0	22	97	92.5	24 09.7	22	97	92.0	6
7	22 22.7	24	97	95.5	22 29.9	24	97	94.9	22 37.1	24	97	94.4	22 44.1	23	97	93.9	22 51.1	23	97	93.3	22 57.9	23	97	92.8	23 04.6	22	97	92.3	23 11.2	22	97	91.8	7
8	21 24.5	24	97	95.2	21 31.7	24	97	94.7	21 38.8	24	97	94.1	21 45.8	23	97	93.6	21 52.7	23	97	93.1	21 59.5	23	97	92.6	22 06.2	22	97	92.1	22 12.8	22	97	91.5	8
9	20 26.2	24	97	94.9	20 33.4	24	97	94.4	20 40.5	23	97	93.9	20 47.4	23	97	93.4	20 54.3	23	97	92.9	21 01.1	22	97	92.3	21 07.8	22	97	91.8	21 14.4	22	97	91.3	9
70	19 28.0	24	97	94.7	19 35.1	24	97	94.2	19 42.1	23	97	93.6	19 49.1	23	97	93.1	19 55.9	23	97	92.6	20 02.7	22	97	92.1	20 09.3	22	97	91.6	20 15.9	22	97	91.1	70
1	18 29.7	24	97	94.4	18 36.8	23	97	93.9	18 43.8	23	97	93.4	18 50.7	23	97	92.9	18 57.5	23	97	92.4	19 04.2	22	97	91.9	19 10.9	22	97	91.3	19 17.5	22	97	90.8	1
2	17 31.4	24	97	94.2	17 38.4	23	97	93.7	17 45.4	23	97	93.2	17 52.3	23	97	92.6	17 59.1	23	97	92.1	18 05.8	22	97	91.6	18 12.4	22	97	91.1	18 19.0	22	97	90.6	2
3	16 33.1	23	97	93.9	16 40.1	23	97	93.4	16 47.0	23	97	92.9	16 53.9	23	97	92.4	17 00.7	22	97	91.9	17 07.4	22	97	91.4	17 14.0	22	97	90.9	17 20.5	22	97	90.4	3
4	15 34.8	23	97	93.7	15 41.7	23	97	93.2	15 48.6	23	97	92.7	15 55.5	23	97	92.2	16 02.2	22	97	91.7	16 08.9	22	97	91.2	16 15.5	22	97	90.7	16 22.1	22	97	90.1	4
75	14 36.4	23	97	93.4	14 43.4	23	97	92.9	14 50.2	23	97	92.4	14 57.0	23	97	91.9	15 03.8	22	97	91.4	15 10.5	22	97	90.9	15 17.1	22	97	90.4	15 23.6	22	97	89.9	75
6	13 38.0	23	97	93.2	13 45.0	23	97	92.7	13 51.8	23	97	92.2	13 58.6	23	97	91.7	14 05.3	22	97	91.2	14 12.0	22	97	90.7	14 18.6	22	97	90.2	14 25.2	22	97	89.7	6
7	12 39.7	23	97	93.0	12 46.6	23	97	92.5	12 53.4	23	97	92.0	13 00.2	22	97	91.5	13 06.9	22	97	91.0	13 13.5	22	97	90.5	13 20.1	22	97	90.0	13 26.7	22	97	89.5	7
8	11 41.3	23	97	92.7	11 48.1	23	97	92.2	11 55.0	23	97	91.7	12 01.7	22	97	91.2	12 08.4	22	97	90.7	12 15.1	22	97	90.2	12 21.7	22	97	89.7	12 28.2	22	97	89.2	8
9	10 42.9	23	97	92.5	10 49.7	23	97	92.0	10 56.5	23	97	91.5	11 03.3	22	97	91.0	11 10.0	22	97	90.5	11 16.6	22	97	90.0	11 23.2	22	97	89.5	11 29.8	22	97	89.0	9
80	9 44.5	23	97	92.3	9 51.3	23	97	91.8	9 58.1	23	97	91.3	10 04.8	22	97	90.8	10 11.5	22	97	90.3	10 18.2	22	97	89.8	10 24.8	22	97	89.3	10 31.3	22	97	88.8	80
1	8 46.0	23	97	92.0	8 52.9	23	97	91.5	8 59.6	23	97	91.1	9 06.4	22	97	90.6	9 13.1	22	97	90.1	9 19.7	22	97	89.6	9 26.3	22	97	89.1	9 32.9	22	97	88.6	1
2	7 47.6	23	97	91.8	7 54.4	23	97	91.3	8 01.2	22	97	90.8	8 07.9	22	97	90.3	8 14.6	22	97	89.8	8 21.2	22	97	89.4	8 27.9	22	97	88.9	8 34.4	22	97	88.4	2
3	6 49.2	23	97	91.6	6 56.0	23	97	91.1	7 02.7	22	97	90.6	7 09.4	22	97	90.1	7 16.1	22	97	89.6	7 22.8	22	97	89.1	7 29.4	22	97	88.6	7 36.0	22	97	88.1	3
4	5 50.7	23	97	91.4	5 57.5	23	97	90.9	6 04.3	22	97	90.4	6 11.0	22	97	89.9	6 17.7	22	97	89.4	6 24.3	22	97	88.9	6 31.0	22	97	88.4	6 37.6	22	97	87.9	4
85									5 05.8	22	97	90.1	5 12.5	22	97	89.7	5 19.2	22	97	89.2	5 25.9	22	97	88.7	5 32.5	22	97	88.2	5 39.2	22	97	87.7	85

H.A.	0° 00′				0° 30′				1° 00′				1° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	77 00.0	1.0	04	180.0	76 30.0	1.0	04	180.0	76 00.0	1.0	04	180.0	75 30.0	1.0	03	180.0
1	76 57.7	1.0	11	175.6	76 27.8	1.0	11	175.7	75 57.9	1.0	10	175.9	75 28.0	1.0	10	176.0
2	76 51.0	99	19	171.2	76 21.3	99	18	171.5	75 51.6	99	17	171.8	75 21.9	99	17	172.1
3	76 39.8	98	26	166.9	76 10.6	98	25	167.3	75 41.2	98	24	167.8	75 11.9	98	23	168.2
4	76 24.5	96	32	162.7	75 55.8	96	31	163.3	75 26.9	96	30	163.9	74 58.0	97	29	164.4
05	76 05.2	94	38	158.7	75 37.1	94	37	159.5	75 08.8	94	36	160.1	74 40.5	95	35	160.8
6	75 42.2	91	44	155.0	75 14.8	92	43	155.8	74 47.2	92	41	156.5	74 19.5	93	40	157.2
7	75 15.8	88	49	151.4	74 49.2	89	48	152.3	74 22.4	90	47	153.1	73 55.3	90	45	153.9
8	74 46.3	86	54	148.0	74 20.5	86	52	149.0	73 54.4	87	51	149.9	73 28.2	88	50	150.7
9	74 14.0	83	58	144.9	73 49.0	84	57	145.9	73 23.7	85	55	146.8	72 58.2	85	54	147.7
10	73 39.1	80	62	141.9	73 15.0	81	61	143.0	72 50.5	82	59	143.9	72 25.8	83	58	144.9
1	73 01.9	77	65	139.2	72 38.6	78	64	140.2	72 15.0	79	63	141.3	71 51.1	80	61	142.2
2	72 22.7	74	68	136.6	72 00.2	76	67	137.7	71 37.4	77	66	138.7	71 14.3	78	64	139.7
3	71 41.7	72	71	134.3	71 20.0	73	70	135.3	70 58.0	74	69	136.4	70 35.6	75	67	137.4
4	70 59.0	69	74	132.1	70 38.1	70	72	133.1	70 16.8	72	71	134.2	69 55.2	73	70	135.2
15	70 14.9	67	76	130.0	69 54.8	68	74	131.1	69 34.2	69	73	132.2	69 13.3	70	72	133.2
6	69 29.5	64	78	128.1	69 10.1	66	76	129.2	68 50.2	67	75	130.2	68 30.0	68	74	131.3
7	68 43.0	62	79	126.3	68 24.2	63	78	127.4	68 05.0	65	77	128.4	67 45.4	66	76	129.5
8	67 55.4	60	81	124.7	67 37.2	61	80	125.7	67 18.7	63	79	126.8	66 59.7	64	78	127.8
9	67 06.9	58	82	123.2	66 49.3	59	81	124.2	66 31.4	60	80	125.2	66 13.0	62	79	126.2
20	66 17.5	56	83	121.7	66 00.5	57	83	122.7	65 43.2	59	82	123.7	65 25.4	60	81	124.7
1	65 27.4	54	85	120.4	65 11.0	55	84	121.4	64 54.2	57	83	122.4	64 36.9	58	82	123.3
2	64 36.7	52	86	119.1	64 20.7	54	85	120.1	64 04.4	56	84	121.1	63 47.7	56	83	122.0
3	63 45.3	51	87	117.9	63 29.9	52	86	118.9	63 14.0	53	85	119.8	62 57.8	55	84	120.8
4	62 53.4	49	87	116.8	62 38.4	51	87	117.8	62 23.0	52	86	118.7	62 07.3	53	85	119.6
25	62 01.0	48	88	115.8	61 46.4	49	87	116.7	61 31.5	50	87	117.6	61 16.2	52	86	118.5
6	61 08.1	47	89	114.8	60 53.9	48	88	115.7	60 39.4	49	88	116.6	60 24.5	50	87	117.4
7	60 14.8	45	89	113.8	60 01.0	47	89	114.7	59 46.9	48	88	115.6	59 32.4	49	88	116.5
8	59 21.1	44	90	112.9	59 07.7	45	89	113.8	58 54.0	46	89	114.7	58 39.9	48	88	115.5
9	58 27.1	43	91	112.1	58 14.1	44	90	112.9	58 00.6	45	89	113.8	57 46.9	46	89	114.6
30	57 32.8	42	91	111.3	57 20.1	43	90	112.1	57 07.0	44	90	113.0	56 53.6	45	89	113.8
1	56 38.2	41	91	110.5	56 25.8	42	91	111.4	56 13.0	43	90	112.2	55 59.9	44	90	113.0
2	55 43.3	40	92	109.8	55 31.2	41	91	110.6	55 18.7	42	91	111.4	55 05.9	43	90	112.2
3	54 48.2	39	92	109.1	54 36.3	40	92	109.9	54 24.1	41	91	110.7	54 11.7	42	91	111.5
4	53 52.8	38	93	108.4	53 41.2	39	92	109.2	53 29.3	40	92	110.0	53 17.1	41	91	110.8
35	52 57.3	37	93	107.8	52 45.9	38	93	108.6	52 34.3	39	92	109.3	52 22.3	40	92	110.1
6	52 01.5	37	93	107.2	51 50.4	38	93	108.0	51 39.0	38	92	108.7	51 27.3	39	92	109.4
7	51 05.6	36	94	106.6	50 54.7	37	93	107.4	50 43.5	38	93	108.1	50 32.1	39	92	108.8
8	50 09.5	35	94	106.1	49 58.8	36	93	106.8	49 47.9	37	93	107.5	49 36.7	38	93	108.2
9	49 13.2	34	94	105.5	49 02.8	35	94	106.2	48 52.0	36	93	107.0	48 41.0	37	93	107.7
40	48 16.8	34	94	105.0	48 06.6	35	94	105.7	47 56.0	36	94	106.4	47 45.2	36	93	107.1
1	47 20.3	33	94	104.5	47 10.2	34	94	105.2	46 59.9	35	94	105.9	46 49.3	36	94	106.6
2	46 23.6	33	96	104.0	46 13.7	33	94	104.7	46 03.6	34	94	105.4	45 53.2	35	94	106.1
3	45 26.9	32	95	103.6	45 17.1	33	95	104.2	45 07.1	34	94	104.9	44 56.9	34	94	105.6
4	44 30.0	32	95	103.1	44 20.4	32	95	103.8	44 10.6	33	94	104.4	44 00.6	34	94	105.1
45	43 33.0	31	95	102.7	43 23.6	32	95	103.3	43 13.9	33	95	104.0	43 04.0	33	94	104.6
6	42 35.9	31	95	102.3	42 26.6	31	95	102.9	42 17.1	32	95	103.5	42 07.4	33	95	104.2
7	41 38.7	30	96	101.8	41 29.6	31	95	102.5	41 20.2	32	95	103.1	41 10.7	32	95	103.7
8	40 41.5	30	96	101.5	40 32.5	30	95	102.1	40 23.3	31	95	102.7	40 13.9	32	95	103.3
9	39 44.1	29	96	101.1	39 35.3	30	95	101.7	39 26.2	31	95	102.3	39 16.9	31	95	102.9
50	38 46.7	29	96	100.7	38 38.0	29	96	101.3	38 29.0	30	96	101.9	38 19.9	31	96	102.5
1	37 49.2	28	96	100.3	37 40.6	29	96	100.9	37 31.8	30	96	101.5	37 22.8	30	96	102.1
2	36 51.7	28	96	100.0	36 43.2	29	96	100.6	36 34.5	29	96	101.2	36 25.6	30	95	101.8
3	35 54.1	28	96	99.6	35 45.7	28	96	100.2	35 37.1	29	96	100.8	35 28.3	29	96	101.4
4	34 56.4	27	96	99.3	34 48.1	28	96	99.9	34 39.6	29	96	100.5	34 31.0	29	96	101.0
55	33 58.7	27	96	99.0	33 50.5	28	96	99.5	33 42.1	28	96	100.1	33 33.5	29	96	100.7
6	33 00.9	27	96	98.6	32 52.8	27	96	99.2	32 44.5	28	96	99.8	32 36.1	28	96	100.3
7	32 03.1	27	96	98.3	31 55.0	27	96	98.9	31 46.9	28	96	99.4	31 38.5	28	96	100.0
8	31 05.2	26	97	98.0	30 57.3	27	96	98.6	30 49.2	27	96	99.1	30 40.9	28	96	99.7
9	30 07.3	26	97	97.7	29 59.4	26	96	98.3	29 51.4	27	96	98.8	29 43.3	27	96	99.4
60	29 09.3	26	97	97.4	29 01.5	26	97	98.0	28 53.6	27	96	98.5	28 45.6	27	96	99.1
1	28 11.3	26	97	97.1	28 03.6	26	97	97.7	27 55.8	26	96	98.2	27 47.8	27	96	98.7
2	27 13.3	25	97	96.8	27 05.7	26	97	97.4	26 57.9	26	97	97.9	26 50.0	27	96	98.4
3	26 15.3	25	97	96.5	26 07.7	25	97	97.1	26 00.0	26	97	97.6	25 52.1	26	96	98.2
4	25 17.2	25	97	96.3	25 09.6	25	97	96.8	25 02.0	26	97	97.3	24 54.2	26	97	97.9
65	24 19.0	25	97	96.0	24 11.6	25	97	96.5	24 04.0	25	97	97.0	23 56.3	26	97	97.6
6	23 20.9	25	97	95.7	23 13.5	25	97	96.2	23 06.0	25	97	96.8	22 58.3	26	97	97.3
7	22 22.7	24	97	95.5	22 15.3	25	97	96.0	22 07.9	25	97	96.5	22 00.3	25	97	97.0
8	21 24.5	24	97	95.2	21 17.2	24	97	95.7	21 09.8	25	97	96.2	21 02.3	25	97	96.8
9	20 26.2	24	97	94.9	20 19.0	24	97	95.5	20 11.7	25	97	96.0	20 04.2	25	97	96.5
70	19 28.0	24	97	94.7	19 20.8	24	97	95.2	19 13.5	24	97	95.7	19 06.1	25	97	96.2
1	18 29.7	24	97	94.4	18 22.6	24	97	94.9	18 15.3	24	97	95.5	18 08.0	25	97	96.0
2	17 31.4	24	97	94.2	17 24.3	24	97	94.7	17 17.1	24	97	95.2	17 09.8	24	97	95.7
3	16 33.1	23	97	93.9	16 26.0	24	97	94.4	16 18.9	24	97	94.9	16 11.6	24	97	95.5
4	15 34.8	23	97	93.7	15 27.7	24	97	94.2	15 20.6	24	97	94.7	15 13.4	24	97	95.2
75	14 36.4	23	97	93.4	14 29.4	23	97	94.0	14 22.3	24	97	94.5	14 15.2	24	97	95.0
6	13 38.0	23	97	93.2	13 31.1	23	97	93.7	13 24.0	24	97	94.2	13 16.9	24	97	94.7
7	12 39.7	23	97	93.0	12 32.7	23	97	93.5	12 25.7	23	97	94.0	12 18.7	24	97	94.5
8	11 41.3	23	97	92.7	11 34.4	23	97	93.2	11 27.4	23	97	93.7	11 20.4	23	97	94.2
9	10 42.9	23	97	92.5	10 36.0	23	97	93.0	10 29.1	23	97	93.5	10 22.1	23	97	94.0
80	9 44.5	23	97	92.3	9 37.6	23	97	92.8	9 30.7	23	97	93.3	9 23.7	23	97	93.8
1	8 46.0	23	97	92.0	8 39.2	23	97	92.5	8 32.3	23	97	93.0	8 25.4	23	97	93.5
2	7 47.6	23	97	91.8	7 40.8	23	97	92.3	7 33.9	23	97	92.8	7 27.0	23	97	93.3
3	6 49.2	23	97	91.6	6 42.4	23	97	92.1	6 35.5	23	97	92.6	6 28.7	23	97	93.1
4	5 50.7	23	97	91.4	5 43.9	23	97	91.8	5 37.1	23	97	92.3	5 30.3	23	97	92.8

2° 00′				2° 30′				3° 00′				3° 30′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
75 00.0	1.0	03	180.0	74 30.0	1.0	03	180.0	74 00.0	1.0	03	180.0	73 30.0	1.0	03	180.0	00
74 58.0	1.0	10	176.1	74 28.1	1.0	10	176.3	73 58.2	1.0	09	176.4	73 28.2	1.0	09	176.5	1
74 52.2	99	16	172.3	74 22.4	99	16	172.6	73 52.6	99	15	172.8	73 22.9	99	15	173.0	2
74 42.4	98	22	168.6	74 13.0	98	22	168.9	73 43.5	98	21	169.3	73 14.0	98	20	169.6	3
74 29.0	97	28	164.9	74 00.0	97	27	165.4	73 30.9	97	27	165.8	73 01.7	97	26	166.2	4
74 12.0	96	34	161.3	73 43.5	95	33	161.9	73 14.9	96	32	162.4	72 46.1	96	31	162.9	05
73 51.7	93	39	157.9	73 23.7	93	38	158.6	72 55.6	94	37	159.2	72 27.4	94	36	159.7	6
73 28.2	91	44	154.7	73 00.8	91	43	155.4	72 33.3	92	42	156.0	72 05.7	92	41	156.7	7
73 01.7	89	49	151.5	72 35.0	89	47	152.3	72 08.2	90	46	153.1	71 41.2	90	45	153.8	8
72 32.5	86	53	148.6	72 06.6	87	52	149.4	71 40.4	87	50	150.2	71 14.1	88	49	151.0	9
72 00.8	84	57	145.8	71 35.6	84	55	146.7	71 10.2	85	54	147.5	70 44.5	86	53	148.3	10
71 26.9	81	60	143.2	71 02.4	82	59	144.1	70 37.7	83	58	144.9	70 12.7	84	56	145.8	1
70 50.8	79	63	140.7	70 27.1	80	62	141.6	70 03.1	80	61	142.5	69 38.8	81	60	143.4	2
70 12.9	76	66	138.4	69 49.9	77	65	139.3	69 26.6	78	64	140.2	69 03.0	79	63	141.1	3
69 33.2	74	69	136.2	69 10.9	75	68	137.2	68 48.3	76	66	138.1	68 25.4	77	65	139.0	4
68 52.0	71	71	134.2	68 30.4	73	70	135.1	68 08.5	74	69	136.0	67 46.3	75	68	136.9	15
68 09.4	69	73	132.2	67 48.5	70	72	133.2	67 27.2	71	71	134.1	67 05.6	72	70	135.0	6
67 25.5	67	75	130.4	67 05.2	68	74	131.4	66 44.6	69	73	132.3	66 23.7	70	72	133.2	7
66 40.4	65	77	128.7	66 20.8	66	76	129.7	66 00.8	67	75	130.6	65 40.5	68	74	131.5	8
65 54.3	63	78	127.2	65 35.3	64	77	128.1	65 15.9	65	76	129.0	64 56.1	66	76	129.9	9
65 07.3	61	80	125.7	64 48.8	62	79	126.6	64 30.0	63	78	127.5	64 10.8	64	77	128.4	20
64 19.4	59	81	124.3	64 01.4	60	80	125.2	63 43.1	61	79	126.1	63 24.5	63	79	127.0	1
63 30.7	57	82	122.9	63 13.2	59	82	123.8	62 55.5	60	81	124.7	62 37.4	61	80	125.6	2
62 41.2	56	83	121.7	62 24.3	57	83	122.6	62 07.1	58	82	123.5	61 49.5	59	81	124.3	3
61 51.2	54	84	120.5	61 34.7	55	84	121.4	61 17.9	56	83	122.2	61 00.8	58	82	123.1	4
61 00.5	53	85	119.4	60 44.5	54	85	120.2	60 28.2	55	84	121.1	60 11.5	56	83	121.9	25
60 09.3	51	86	118.3	59 53.7	52	86	119.2	59 37.8	54	85	120.0	59 21.6	55	84	120.8	6
59 17.6	50	87	117.3	59 02.4	51	86	118.2	58 47.0	52	86	119.0	58 31.2	53	85	119.8	7
58 25.4	49	88	116.4	58 10.7	50	87	117.2	57 55.6	51	86	118.0	57 40.2	52	86	118.8	8
57 32.8	47	88	115.5	57 18.4	48	88	116.3	57 03.7	50	87	117.1	56 48.7	51	86	117.9	9
56 39.9	46	89	114.6	56 25.8	47	88	115.4	56 11.5	48	88	116.2	55 56.8	49	87	117.0	30
55 46.5	45	89	113.8	55 32.8	46	89	114.6	55 18.8	47	88	115.3	55 04.5	48	88	116.1	1
54 52.9	44	90	113.0	54 39.5	45	89	113.8	54 25.8	46	89	114.5	54 11.9	47	88	115.3	2
53 58.9	43	90	112.2	53 45.8	44	90	113.0	53 32.5	45	89	113.8	53 18.8	46	89	114.5	3
53 04.6	42	91	111.5	52 51.9	43	90	112.3	52 38.8	44	90	113.0	52 25.5	45	89	113.8	4
52 10.1	41	91	110.8	51 57.6	42	91	111.6	51 44.9	43	90	112.3	51 31.8	44	90	113.0	35
51 15.4	40	92	110.2	51 03.1	41	91	110.9	50 50.6	42	91	111.6	50 37.9	43	90	112.3	6
50 20.4	39	92	109.5	50 08.4	40	92	110.3	49 56.2	41	91	111.0	49 43.7	42	91	111.7	7
49 25.2	39	92	108.9	49 13.5	40	92	109.6	49 01.5	40	92	110.3	48 49.2	41	91	111.0	8
48 29.8	38	93	108.4	48 18.3	39	92	109.1	48 06.5	40	92	109.7	47 54.5	40	92	110.4	9
47 34.2	37	93	107.8	47 22.9	38	93	108.5	47 11.4	39	92	109.2	46 59.7	40	92	109.8	40
46 38.5	36	93	107.3	46 27.4	37	93	107.9	46 16.1	38	92	108.6	46 04.6	39	92	109.3	1
45 42.6	36	93	106.7	45 31.7	37	93	107.4	45 20.6	37	93	108.1	45 09.3	38	92	108.7	2
44 46.5	35	94	106.2	44 35.8	36	93	106.9	44 24.9	37	93	107.5	44 13.8	37	93	108.2	3
43 50.3	35	94	105.7	43 39.8	35	94	106.4	43 29.1	36	93	107.0	43 18.2	37	93	107.7	4
42 54.0	34	94	105.3	42 43.7	35	94	105.9	42 33.2	35	94	106.6	42 22.4	36	93	107.2	45
41 57.5	33	94	104.8	41 47.4	34	94	105.4	41 37.0	35	94	106.1	41 26.5	35	93	106.7	6
41 00.9	33	94	104.4	40 51.0	34	94	105.0	40 40.8	34	94	105.6	40 30.4	35	94	106.2	7
40 04.2	32	95	103.9	39 54.4	33	94	104.6	39 44.4	34	94	105.2	39 34.3	34	94	105.8	8
39 07.5	32	95	103.5	38 57.8	32	95	104.1	38 48.0	33	94	104.7	38 37.9	34	94	105.4	9
38 10.6	31	95	103.1	38 01.1	32	96	103.7	37 51.4	33	94	104.3	37 41.5	33	94	104.9	50
37 13.6	31	95	102.7	37 04.2	32	96	103.3	36 54.7	32	95	103.9	36 45.0	33	94	104.5	1
36 16.5	30	95	102.3	36 07.3	31	95	102.9	35 57.9	32	95	103.5	35 48.3	32	95	104.1	2
35 19.4	30	95	102.0	35 10.3	31	95	102.6	35 01.0	31	96	103.1	34 51.6	32	95	103.7	3
34 22.1	30	96	101.6	34 13.2	30	95	102.2	34 04.0	31	95	102.8	33 54.7	31	95	103.3	4
33 24.8	29	96	101.3	33 16.0	30	95	101.8	33 07.0	30	95	102.4	32 57.8	31	95	103.0	55
32 27.5	29	96	100.9	32 18.7	29	96	101.5	32 09.8	30	96	102.0	32 00.8	30	95	102.6	6
31 30.0	29	96	100.6	31 21.4	29	96	101.1	31 12.6	30	96	101.7	31 03.7	30	96	102.3	7
30 32.5	28	96	100.2	30 24.0	29	96	100.8	30 15.3	29	96	101.4	30 06.5	30	95	101.9	8
29 35.0	28	96	99.9	29 26.5	28	95	100.5	29 18.0	29	96	101.0	29 09.3	29	96	101.6	9
28 37.4	28	96	99.6	28 29.0	28	96	100.1	28 20.6	28	96	100.7	28 12.0	29	96	101.2	60
27 39.7	27	96	99.3	27 31.4	28	96	99.8	27 23.1	28	96	100.4	27 14.6	28	96	100.9	1
26 42.0	27	96	99.0	26 33.8	27	96	99.5	26 25.6	28	96	100.1	26 17.2	28	96	100.6	2
25 44.2	27	96	98.7	25 36.1	27	96	99.2	25 28.0	27	96	99.8	25 19.7	28	96	100.3	3
24 46.4	26	96	98.4	24 38.4	27	96	98.9	24 30.3	27	96	99.5	24 22.1	28	96	100.0	4
23 48.5	26	96	98.1	23 40.6	27	96	98.6	23 32.6	27	96	99.2	23 24.5	27	96	99.7	65
22 50.6	26	97	97.8	22 42.8	26	96	98.3	22 34.9	27	96	98.9	22 26.9	27	96	99.4	6
21 52.7	26	97	97.5	21 44.9	26	97	98.1	21 37.1	26	96	98.6	21 29.2	27	95	99.1	7
20 54.7	25	97	97.3	20 47.0	26	97	97.8	20 39.3	26	96	98.3	20 31.4	26	96	98.8	8
19 56.7	25	97	97.0	19 49.1	26	97	97.5	19 41.4	26	96	98.0	19 33.6	26	96	98.5	9
18 58.7	25	97	96.7	18 51.1	25	97	97.2	18 43.5	26	97	97.8	18 35.8	26	96	98.3	70
18 00.6	25	97	96.5	17 53.1	25	97	97.0	17 45.5	25	97	97.5	17 37.9	26	97	98.0	1
17 02.5	26	97	96.2	16 55.1	25	97	96.7	16 47.6	25	97	97.2	16 40.0	26	97	97.7	2
16 04.4	24	97	96.0	15 57.0	25	97	96.5	15 49.6	25	97	97.0	15 42.0	25	97	97.5	3
15 06.2	24	97	95.7	14 58.9	24	97	96.2	14 51.5	25	97	96.7	14 44.1	25	97	97.2	4
14 08.0	24	97	95.5	14 00.7	24	97	96.0	13 53.4	25	97	96.5	13 46.0	25	97	97.0	75
13 09.8	24	97	95.2	13 02.6	24	97	95.7	12 55.3	24	97	96.2	12 48.0	25	97	96.7	6
12 11.6	24	97	95.0	12 04.4	24	97	95.5	11 57.2	24	97	96.0	11 49.9	24	97	96.5	7
11 13.3	24	97	94.7	11 06.2	24	97	95.2	10 59.0	24	97	95.7	10 51.8	24	97	96.2	8
10 15.0	24	97	94.5	10 08.0	24	97	95.0	10 00.8	24	97	95.5	9 53.7	24	97	96.0	9
9 16.7	23	97	94.2	9 09.7	24	97	94.7	9 02.6	24	97	95.2	8 55.5	24	97	95.7	80
8 18.4	23	97	94.0	8 11.4	23	97	94.5	8 04.4	23	97	95.0	7 57.3	24	97	95.5	1
7 20.1	23	97	93.8	7 13.1	23	97	94.3	7 06.2	23	97	94.8	6 59.1	23	97	95.2	2
6 21.8	23	97	93.5	6 14.8	23	97	94.0	6 07.9	23	97	94.5	6 00.9	23	97	95.0	3
5 23.4	23	97	93.3	5 16.5	23	97	93.8	5 09.6	23	97	94.3	5 02.7	23	97	94.8	4

H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	81 00.0	1.0 05	180.0	81 30.0	1.0 06	180.0	82 00.0	1.0 06	180.0	82 30.0	1.0 06	180.0	83 00.0	1.0 07	180.0	83 30.0	1.0 07	180.0	84 00.0	1.0 08	180.0	84 30.0	1.0 09	180.0	00
1	80 56.8	99 16	173.6	81 26.6	99 17	173.3	81 56.4	99 18	172.9	82 26.1	99 19	172.4	82 55.9	99 20	171.9	83 25.5	99 22	171.3	83 55.2	99 23	170.6	84 24.8	98 25	169.8	1
2	80 47.1	98 26	167.4	81 16.4	97 28	166.7	81 45.6	97 29	166.0	82 14.7	97 31	165.1	82 43.7	96 33	164.1	83 12.5	96 35	163.0	83 41.1	95 37	161.6	84 09.5	94 40	160.1	2
3	80 31.5	95 35	161.5	80 59.9	95 37	160.5	81 28.2	94 39	159.4	81 56.3	93 41	158.2	82 24.1	92 44	156.8	82 51.6	91 46	155.3	83 18.8	90 49	153.5	83 45.5	88 52	151.5	3
4	80 10.2	92 44	155.9	80 37.6	91 46	154.7	81 04.8	90 48	153.4	81 31.5	89 50	151.9	81 58.0	87 53	150.2	82 23.9	86 55	148.4	82 49.4	84 58	146.3	83 14.2	82 62	144.0	4
05	79 44.0	88 51	150.8	80 10.2	87 53	149.4	80 36.0	85 56	147.9	81 01.4	84 58	146.2	81 26.4	82 60	144.4	81 50.7	80 63	142.4	82 14.4	78 66	140.2	82 37.3	75 69	137.7	05
6	79 13.4	84 57	146.1	79 38.4	82 59	144.6	80 02.8	81 62	143.0	80 26.8	79 64	141.2	80 50.2	77 66	139.2	81 12.9	75 69	137.2	81 34.9	72 72	134.9	81 56.0	69 74	132.4	6
7	78 39.0	80 63	141.8	79 02.7	78 65	140.3	79 25.8	76 67	138.6	79 48.4	74 69	136.7	80 10.3	72 72	134.8	80 31.5	69 74	132.6	80 51.8	66 76	130.4	81 11.3	63 79	127.9	7
8	78 01.3	76 67	138.0	78 23.8	74 69	136.4	78 45.6	72 71	134.7	79 06.9	70 73	132.8	79 27.4	67 76	130.9	79 47.1	64 78	128.8	80 06.0	61 80	126.5	80 24.0	58 82	124.2	8
9	77 20.9	72 71	134.6	77 42.2	70 73	132.9	78 02.8	68 75	131.2	78 22.8	65 77	129.4	78 42.0	63 79	127.4	79 00.5	60 81	125.4	79 18.0	57 83	123.2	79 34.7	54 85	121.0	9
10	76 38.2	68 75	131.5	76 58.3	66 76	129.8	77 17.8	64 78	128.1	77 36.6	61 80	126.3	77 54.7	59 82	124.5	78 11.9	56 83	122.5	78 28.4	53 85	120.4	78 43.8	50 87	118.2	10
1	75 53.4	65 77	128.7	76 12.5	63 79	127.1	76 31.0	60 81	125.4	76 48.7	58 82	123.6	77 05.7	55 84	121.8	77 21.9	53 85	119.9	77 37.3	50 87	117.9	77 51.8	47 88	115.9	1
2	75 07.0	61 80	126.2	75 25.1	59 81	124.6	75 42.6	57 83	123.0	75 59.4	55 84	121.3	76 15.4	52 86	119.5	76 30.7	50 87	117.7	76 45.1	47 88	115.8	76 58.7	44 90	113.8	2
3	74 19.1	59 82	123.9	74 36.3	56 83	122.4	74 52.0	54 85	120.8	75 08.8	52 86	119.1	75 24.0	49 87	117.4	75 38.4	47 88	115.7	75 52.1	44 90	113.9	76 04.9	41 91	112.0	3
4	73 30.0	56 84	121.8	73 46.4	54 85	120.3	74 02.2	52 86	118.8	74 17.3	49 87	117.2	74 31.7	47 88	115.6	74 45.4	44 90	113.9	74 58.3	42 91	112.2	75 10.4	39 92	110.4	4
15	72 39.8	53 85	120.0	72 55.5	51 86	118.5	73 10.5	49 87	117.0	73 24.9	47 89	115.5	73 38.6	45 90	113.9	73 51.6	42 91	112.3	74 03.8	40 92	110.7	74 15.3	37 92	109.0	15
6	71 48.7	51 86	118.2	72 03.7	49 88	116.9	72 18.1	47 89	115.4	72 31.8	45 90	113.9	72 44.9	42 90	112.4	72 57.2	40 91	110.9	73 08.9	38 92	109.3	73 19.8	35 93	107.7	6
7	70 56.8	49 88	116.7	71 11.2	47 89	115.3	71 24.9	45 90	114.0	71 38.1	43 90	112.5	71 50.6	41 91	111.1	72 02.4	38 92	109.6	72 13.5	36 93	108.1	72 23.9	34 94	106.5	7
8	70 04.3	47 89	115.3	70 18.0	45 90	113.9	70 31.2	43 90	112.6	70 43.8	41 91	111.2	70 55.8	39 92	109.8	71 07.1	37 93	108.4	71 17.8	34 93	107.0	71 27.7	32 94	105.5	8
9	69 11.1	45 89	113.9	69 24.3	43 90	112.7	69 37.0	41 91	111.4	69 49.1	39 92	110.1	70 00.6	37 93	108.7	70 11.5	35 93	107.3	70 21.7	33 94	106.0	70 31.3	31 95	104.5	9
20	68 17.4	43 90	112.7	68 30.2	42 91	111.5	68 42.4	40 92	110.2	68 54.0	38 92	109.0	69 05.1	36 93	107.7	69 15.5	34 94	106.4	69 25.4	32 94	105.0	69 34.6	30 95	103.7	20
1	67 23.3	42 91	111.6	67 35.6	40 92	110.4	67 47.3	38 92	109.2	67 58.5	36 93	108.0	68 09.2	35 94	106.7	68 19.3	33 94	105.4	68 28.8	31 95	104.2	68 37.7	29 95	102.8	1
2	66 28.7	40 92	110.6	66 40.6	39 92	109.4	66 52.0	37 93	108.2	67 02.8	35 93	107.0	67 13.1	33 94	105.8	67 22.8	32 94	104.6	67 32.0	30 95	103.4	67 40.6	28 96	102.1	2
3	65 33.8	39 92	109.6	65 45.3	37 93	108.5	65 56.3	36 93	107.3	66 06.8	34 94	106.2	66 16.7	32 94	105.0	66 26.1	31 96	103.8	66 35.0	29 95	102.6	66 43.3	27 96	101.4	3
4	64 38.6	38 93	108.7	64 49.7	36 93	107.6	65 00.3	35 94	106.5	65 10.5	33 94	105.4	65 20.1	31 95	104.2	65 29.3	30 95	103.1	65 37.9	28 95	101.9	65 46.0	26 96	100.8	4
25	63 43.0	37 93	107.8	63 53.8	35 94	106.7	64 04.2	34 94	105.7	64 14.0	32 94	104.6	64 23.4	30 95	103.5	64 32.3	29 95	102.4	64 40.6	27 96	101.3	64 48.5	25 96	100.1	25
6	62 47.2	36 93	107.0	62 57.7	34 94	106.0	63 07.8	33 94	104.9	63 17.4	31 95	103.9	63 26.5	30 95	102.8	63 35.1	28 96	101.7	63 43.2	26 96	100.7	63 50.9	25 96	99.6	6
7	61 51.2	35 94	106.2	62 01.4	33 94	105.2	62 11.2	32 95	104.2	62 20.5	30 95	103.2	62 29.4	29 95	102.2	62 37.8	27 96	101.1	62 45.7	26 96	100.1	62 53.2	24 96	99.0	7
8	60 55.0	34 94	105.5	61 04.9	32 94	104.6	61 14.4	31 95	103.6	61 23.5	30 96	102.6	61 32.2	28 96	101.6	61 40.4	27 96	100.6	61 48.1	25 96	99.6	61 55.4	24 96	98.5	8
9	59 58.6	33 94	104.9	60 08.3	32 95	103.9	60 17.5	30 95	103.0	60 26.4	29 95	102.0	60 34.8	27 96	101.0	60 42.8	26 96	100.0	60 50.4	25 96	99.0	60 57.6	23 97	98.0	9
30	59 02.0	32 95	104.2	59 11.4	31 95	103.3	59 20.5	30 96	102.4	59 29.2	28 96	101.4	59 37.4	27 96	100.5	59 45.2	26 96	99.5	59 52.6	24 96	98.6	59 59.6	23 97	97.6	30
1	58 05.2	31 95	103.6	58 14.5	30 96	102.7	58 23.3	29 96	101.8	58 31.8	28 96	100.9	58 39.9	26 96	100.0	58 47.5	25 96	99.0	58 54.8	24 97	98.1	59 01.7	22 97	97.1	1
2	57 08.4	31 95	103.0	57 17.4	30 95	102.1	57 26.1	28 96	101.3	57 34.3	27 96	100.4	57 42.2	26 96	99.5	57 49.8	24 96	98.6	57 56.9	23 97	97.6	58 03.6	22 97	96.7	2
3	56 11.3	30 96	102.5	56 20.2	29 96	101.6	56 28.7	28 96	100.8	56 36.8	26 96	99.9	56 44.5	25 96	99.0	56 51.9	24 96	98.1	56 58.9	23 97	97.2	57 05.5	21 97	96.3	3
4	55 14.2	29 95	102.0	55 22.9	28 96	101.1	55 31.2	27 96	100.3	55 39.2	26 96	99.4	55 46.8	25 96	98.6	55 54.0	24 97	97.7	56 00.9	22 97	96.8	56 07.4	21 97	95.9	4
35	54 16.9	29 96	101.4	54 25.4	28 96	100.6	54 33.6	27 96	99.8	54 41.4	26 96	99.0	54 48.9	24 96	98.1	54 56.0	23 97	97.3	55 02.8	22 97	96.4	55 09.2	21 97	95.6	35
6	53 19.6	28 96	101.0	53 27.9	27 96	100.2	53 36.0	26 96	99.3	53 43.7	25 96	98.5	53 51.0	24 97	97.7	53 58.0	23 97	96.9	54 04.7	22 97	96.1	54 11.0	21 97	95.2	6
7	52 22.2	28 96	100.5	52 30.4	27 96	99.7	52 38.2	26 96	98.9	52 45.8	25 97	98.1	52 53.1	24 97	97.3	53 00.0	23 97	96.5	53 06.6	21 97	95.7	53 12.8	20 97	94.9	7
8	51 24.6	27 96	100.1	51 32.7	26 96	99.3	51 40.5	25 96	98.5	51 47.9	24 97	97.7	51 55.0	23 97	96.9	52 01.9	22 97	96.1	52 08.4	21 97	95.3	52 14.5	20 97	94.5	8
9	50 27.0	27 96	99.6	50 35.0	26 96	98.9	50 42.6	25 96	98.1	50 49.9	24 97	97.3	50 57.0	23 97	96.6	51 03.7	22 97	95.8	51 10.1	21 97	95.0	51 16.2	20 97	94.2	9
40	49 29.4	27 96	99.2	49 37.2	26 96	98.5	49 44.7	25 97	97.7	49 51.9	24 97	97.0	49 58.9	23 97	96.2	50 05.5	22 97	95.4	50 11.9	21 97	94.7	50 17.9	20 97	93.9	40
1	48 31.6	26 96	98.8	48 39.3	25 96	98.1	48 46.7	24 97	97.3	48 53.9	23 97	96.6	49 00.7	22 97	95.9	49 07.3	21 97	95.1	49 13.6	20 97	94.4	49 19.6	19 97	93.6	1
2	47 33.8	26 96	98.4	47 41.4	25 97	97.7	47 48.7	24 97	97.0	47 55.8	23 97	96.3	48 02.6	22 97	95.5	48 09.1	21 97	94.8	48 15.3	20 97	94.1	48 21.2	19 97	93.3	2
3	46 36.0	25 97	98.0	46 43.5	25 97	97.3	46 50.7	24 97	96.6	46 57.7	23 97	95.9	47 04.4	22 97	95.2	47 10.8	21 97	94.5	47 17.0	20 97	93.8	47 22.9	19 97	93.0	3
4	45 38.0	25 97	97.7	45 45.4	24 97	97.0	45 52.6	23 97	96.3	45 59.5	23 97	95.6	46 06.1	22 97	94.9	46 12.5	21 97	94.2	46 18.6	20 97	93.5	46 24.5	19 97	92.8	4
45	44 40.1	25 97	97.3	44 47.4	24 97	96.6	44 54.5	23 97	96.0	45 01.3	22 97	95.3	45 07.9	22 97	94.6	45 14.2	21 97	93.9	45 20.3	20 97	93.2	45 26.1	19 97	92.5	45
6	43 42.1	25 97	97.0	43 49.3	24 97	96.3	43 56.3	23 97	95.6	44 03.1	22 97	95.0	44 09.6	21 97	94.3	44 15.9	21 97	93.6	44 21.9	20 97	92.9	44 27.7	19 97	92.2	6
7	42 44.0	24 97	96.7	42 51.2	23 97	96.0	42 58.1	23 97	95.3	43 04.8	22 97	94.7	43 11.3	21 97	94.0	43 17.5	20 97	93.3	43 23.5	20 97	92.6	43 29.2	19 97	92.0	7
8	41 45.9	24 97	96.3	41 53.0	23 97	95.7	41 59.9	23 97	95.0	42 06.5	22 97	94.4	42 12.9	21 97	93.7	42 19.1	20 97	93.0	42 25.1	19 97	92.4	42 30.8	19 97	91.7	8
9	40 47.8	24 97	96.0	40 54.8	23 97	95.4	41 01.6	22 97	94.7	41 08.2	22 97	94.1	41 14.6	21 97	93.4	41 20.7	20 97	92.8	41 26.7	19 97	92.1	41 32.4	19 97	91.5	9
50	39 49.7	24 97	95.7	39 56.6	23 97	95.1	40 03.4	22 97	94.4	40 09.9	21 97	93.8	40 16.2	21 97	93.2	40 22.3	20 97	92.5	40 28.2	19 97	91.9	40 33.9	19 97	91.2	50
1	38 51.5	23 97	95.4	38 58.4	23 97	94.8	39 05.1	22 97	94.1	39 11.6	21 97	93.5	39 17.8	21 97	92.9	39 23.9	20 97	92.3	39 29.8	19 97	91.6	39 35.5	19 97	91.0	1
2	37 53.2	23 97	95.1	38 00.1	22 97	94.5	38 06.7	22 97	93.9	38 13.2	21 97	93.2	38 19.4	21 97	92.6	38 25.5	20 97	92.0	38 31.4	19 97	91.4	38 37.0	19 97	90.7	2
3	36 55.0	23 97	94.8	37 01.8	22 97	94.2	37 08.4	22 97	93.6	37 14.8	21 97	93.0	37 21.0	20 97	92.4	37 27.1	20 97	91.7	37 32.9	19 97	91.1	37 38.6	18 97	90.5	3
4	35 56.7	23 97	94.5	36 03.5	22 97	93.9	36 10.0	22 97	93.3	36 16.4	21 97	92.7	36 22.6	20 97	92.1	36 28.6	20 97	91.5	36 34.5	19 97	90.9	36 40.1	18 97	90.3	4
55	34 58.4	23 97	94.3	35 05.1	22 97	93.7	35 11.7	21 97	93.1	35 18.0	21 97	92.5	35 24.2	20 97	91.9	35 30.2	20 97	91.3	35 36.0	19 97	90.7	35 41.6	18 97	90.1	55
6	34 00.1	22 97	94.0	34 06.8	22 97	93.4	34 13.3	21 97	92.8	34 19.6	21 97	92.2	34 25.8	20 97	91.6	34 31.7	20 97	91.0	34 37.5	19 97	90.4	34 43.2	18 97	89.8	6
7	33 01.8	22 97	93.7	33 08.4	22 97	93.1	33 14.9	21 97	92.5	33 21.2	21 97	92.0	33 27.3	20 97	91.4	33 33.3	20 97	90.8	33 39.1	19 97	90.2	33 44.7	18 97	89.6	7
8	32 03.5	22 97	93.4	32 10.0	22 97	92.9	32 16.5	21 97	92.3	32 22.8	21 97	91.7	32 28.9	20 97	91.1	32 34.8	20 97	90.6	32 40.6	19 97	90.0	32 46.3	19 97	89.4	8
9	31 05.1	22 97	93.2	31 11.7	22 97	92.6	31 18.1	21 97	92.0	31 24.3	21 97	91.5	31 30.4	20 97	90.9	31 36.4	20 97	90.3	31 42.2	19 97	89.7	31 47.8	19 97	89.2	9
60	30 06.7	22 97	92.9	30 13.2	22 97	92.4	30 19.6	21 97	91.8	30 25.9	21 97	91.2	30 32.0	20 97	90.7	30 37.9	20 97	90.1	30 43.7	19 97	89.5	30 49.3	19 97	89.0	60
1	29 08.3	22 97	92.7	29 14.8	21 97	92.1	29 21.2	21 97	91.6	29 27.4	21 97	91.0	29 33.5	20 97	90.4	29 39.4	20 97	89.9	29 45.2	19 97	89.3	29 50.9	19 97	88.7	1
2	28 09.9	22 97	92.4	28 16.4	21 97	91.9	28 22.7	21 97	91.3	28 29.0	20 97	90.8	28 35.0	20 97	90.2	28 41.0	20 97	89.6	28 46.8	19 97	89.1	28 52.4	19 97	88.5	2
3	27 11.5	22 97	92.2	27 18.0	21 97	91.6	27 24.3	21 97	91.1	27 30.5	20 97	90.5	27 36.6	20 97	90.0	27 42.5	20 97	89.4	27 48.3	19 97	88.9	27 54.0	19 97	88.3	3
4	26 13.1	22 97	91.9	26 19.5	21 97	91.4	26 25.8	21 97	90.9	26 32.0	20 97	90.3	26 38.1	20 97	89.8	26 44.1	20 97	89.2	26 49.9	19 97	88.7	26 55.6	19 97	88.1	4
65	25 14.6	22 97	91.7	25 21.1	21 97	91.2	25 27.4	21 97	90.6	25 33.6	20 97	90.1	25 39.7	20 97	89.5	25 45.6	20 97	89.0	25 51.4	19 97	88.4	25 57.1	19 97	87.9	65
6	24 16.2	22 97	91.5	24 22.6	21 97	90.9	24 28.9	21 97	90.4	24 35.1	20 97	89.9	24 41.2	20 97	89.3	24 47.2	20 97	88.8	24 53.0	19 97	88.2	24 58.7	19 97	87.7	6
7	23 17.8	22 97	91.2	23 24.2	21 97	90.7	23 30.5	21 97	90.2	23 36.7	20 97	89.6	23 42.7	20 97	89.1	23 48.7	20 97	88.6	23 54.6	19 97	88.0	24 00.3	19 97	87.5	7
8	22 19.3	22 97	91.0	22 25.7	21 97	90.5	22 32.0	21 97	89.9	22 38.2	20 97	89.4	22 44.3	20 97	88.9	22 50.3	20 97	88.3	22 56.1	19 97	87.8	23 01.9	19 97	87.3	8
9	21 20.9	21 97	90.8	21 27.2	21 97	90.2	21 33.5	21 97	89.7	21 39.7	20 97	89.2	21 45.8	20 97	88.7	21 51.8	20 97	88.1	21 57.7	19 97	87.6	22 03.5	19 97	87.1	9
70	20 22.4	21 97	90.5	20 28.8	21 97	90.0	20 35.1	21 97	89.5	20 41.3	21 97	89.0	20 47.4	20 97	88.4	20 53.4	20 97	87.9	20 59.3	20 97	87.4	21 05.1	19 97	86.9	70
1	19 23.9	21 97	90.3	19 30.3	21 97	89.8	19 36.6	21 97	89.3	19 42.8	21 97	88.8	19 49.0	20 97	88.2	19 55.0	20 97	87.7	20 00.9	20 97	87.2	20 06.8	19 97	86.7	1
2	18 25.5	21 97	90.1	18 31.9	21 97	89.6	18 38.2	21 97	89.1	18 44.4	21 97	88.5	18 50.5	20 97	88.0	18 56.6	20 97	87.5	19 02.5	20 97	87.0	19 08.4	19 97	86.5	2
3	17 27.0	21 97	89.9	17 33.4	21 97	89.3	17 39.7	21 97	88.8	17 45.9	21 97	88.3	17 52.1	20 97	87.8	17 58.2	20 97	87.3	18 04.2	20 97	86.8	18 10.1	20 97	86.3	3
4	16 28.5	21 97	89.6	16 34.9	21 97	89.1	16 41.3	21 97	88.6	16 47.5	21 97	88.1	16 53.7	20 97	87.6	16 59.8	20 97	87.1	17 05.8	20 97	86.6	17 11.7	20 97	86.1	4
75	15 30.1	21 97	89.4	15 36.5	21 97	88.9	15 42.8	21 97	88.4	15 49.1	21 97	87.9	15 55.3	21 97	87.4	16 01.4	20 97	86.9	16 07.5	20 97	86.4	16 13.4	20 97	85.9	75
6	14 31.6	21 97	89.2	14 38.0	21 97	88.7	14 44.4	21 97	88.2	14 50.7	21 97	87.7	14 56.9	21 97	87.2	15 03.0	20 97	86.7	15 09.1	20 97	86.2	15 15.1	20 97	85.6	6
7	13 33.2	22 97	89.0	13 39.6	21 97	88.5	13 46.0	21 97	88.0	13 52.3	21 97	87.5	13 58.5	21 97	87.0	14 04.7	20 97	86.5	14 10.8	20 97	85.9	14 16.8	20 97	85.4	7
8	12 34.7	22 97	88.7	12 41.2	21 97	88.2	12 47.5	21 97	87.7	12 53.9	21 97	87.2	13 00.1	21 97	86.7	13 06.3	21 97	86.2	13 12.5	20 97	85.7	13 18.6	20 97	85.2	8
9	11 36.3	22 97	88.5	11 42.7	21 97	88.0	11 49.1	21 97	87.5	11 55.5	21 97	87.0	12 01.8	21 97	86.5	12 08.0	21 97	86.0	12 14.2	21 97	85.5	12 20.3	20 97	85.0	9
80	10 37.8	22 97	88.3	10 44.3	21 97	87.8	10 50.7	21 97	87.3	10 57.1	21 97	86.8	11 03.4	21 97	86.3	11 09.7	21 97	85.8	11 15.9	21 97	85.3	11 22.1	20 97	84.8	80
1	9 39.4	22 97	88.1	9 45.9	22 97	87.6	9 52.3	21 97	87.1	9 58.7	21 97	86.6	10 05.1	21 97	86.1	10 11.4	21 97	85.6	10 17.7	21 97	85.1	10 23.9	21 97	84.6	1
2	8 41.0	22 97	87.9	8 47.5	22 97	87.4	8 53.9	21 97	86.9	9 00.4	21 97	86.4	9 06.8	21 97	85.9	9 13.1	21 97	85.4	9 19.4	21 97	84.9	9 25.7	21 97	84.4	2
3	7 42.6	22 97	87.7	7 49.1	22 97	87.2	7 55.6	22 97	86.7	8 02.0	21 97	86.2	8 08.5	21 97	85.7	8 14.8	21 97	85.2	8 21.2	21 97	84.7	8 27.5	21 97	84.2	3
4	6 44.2	22 97	87.4	6 50.7	22 97	86.9	6 57.2	22 97	86.4	7 03.7	22 97	86.0	7 10.2	21 97	85.5	7 16.6	21 97	85.0	7 23.0	21 97	84.5	7 29.4	21 97	84.0	4
85	5 45.8	22 97	87.2	5 52.3	22 97	86.7	5 58.9	22 97	86.2	6 05.4	22 97	85.7	6 11.9	22 97	85.2	6 18.4	22 97	84.8	6 24.8	21 97	84.3	6 31.2	21 97	83.8	85
6							5 00.6	22 97	86.0	5 07.1	22 97	85.5	5 13.6	22 97	85.0	5 20.2	22 97	84.5	5 26.7	22 97	84.1	5 33.1	22 97	83.6	6

H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	73 00.0	1.0 03	180.0	72 30.0	1.0 03	180.0	72 00.0	1.0 03	180.0	71 30.0	1.0 03	180.0	71 00.0	1.0 03	180.0	70 30.0	1.0 03	180.0	70 00.0	1.0 02	180.0	69 30.0	1.0 02	180.0	00
1	72 58.3	1.0 09	176.6	72 28.3	1.0 08	176.7	71 58.4	1.0 08	176.8	71 28.4	1.0 08	176.9	70 58.4	1.0 08	176.9	70 28.5	1.0 08	177.0	69 58.5	1.0 07	177.1	69 28.6	1.0 07	177.2	1
2	72 53.1	99 14	173.2	72 23.3	99 14	173.4	71 53.4	99 14	173.6	71 23.6	99 13	173.7	70 53.8	99 13	173.9	70 23.9	99 13	174.1	69 54.1	1.0 12	174.2	69 24.2	1.0 12	174.4	2
3	72 44.5	99 20	169.9	72 14.9	99 19	170.1	71 45.3	99 19	170.4	71 15.7	99 18	170.7	70 46.1	99 18	170.9	70 16.4	99 17	171.1	69 46.8	99 17	171.4	69 17.1	99 17	171.6	3
4	72 32.5	97 25	166.6	72 03.3	98 25	167.0	71 34.0	98 24	167.3	71 04.7	98 23	167.6	70 35.3	98 23	168.0	70 06.0	98 22	168.3	69 36.5	98 22	168.5	69 07.1	98 21	168.8	4
05	72 17.4	96 30	163.4	71 48.5	96 30	163.8	71 19.6	96 29	164.3	70 50.7	97 28	164.7	70 21.7	97 27	165.1	69 52.6	97 27	165.4	69 23.5	97 26	165.8	68 54.4	97 26	166.1	05
6	71 59.2	94 35	160.3	71 30.8	95 34	160.8	71 02.3	95 34	161.3	70 33.8	95 33	161.8	70 05.2	95 32	162.2	69 36.6	96 31	162.7	69 07.8	96 31	163.1	68 39.1	96 30	163.5	6
7	71 38.0	93 40	157.3	71 10.2	93 39	157.9	70 42.2	93 38	158.4	70 14.2	94 37	159.0	69 46.0	94 36	159.5	69 17.8	94 35	160.0	68 49.5	94 35	160.4	68 21.2	95 34	160.9	7
8	71 14.1	91 44	154.4	70 46.8	91 43	155.1	70 19.4	92 42	155.7	69 51.9	92 41	156.3	69 24.3	92 40	156.8	68 56.5	93 39	157.4	68 28.7	93 39	157.9	68 00.8	93 38	158.4	8
9	70 47.6	89 48	151.7	70 20.9	89 47	152.4	69 54.1	90 46	153.0	69 27.2	90 45	153.7	69 00.1	91 44	154.3	68 32.9	91 43	154.9	68 05.5	91 42	155.4	67 38.1	92 42	155.9	9
10	70 18.7	86 52	149.1	69 52.7	87 51	149.8	69 26.4	88 50	150.5	69 00.1	88 49	151.2	68 33.6	89 48	151.8	68 06.9	89 47	152.4	67 40.1	90 46	153.0	67 13.2	90 45	153.6	10
1	69 47.5	84 55	146.6	69 22.2	85 54	147.3	68 56.6	86 53	148.1	68 30.8	86 52	148.8	68 04.9	87 51	149.4	67 38.8	87 50	150.1	67 12.5	88 49	150.7	66 46.2	88 48	151.3	1
2	69 14.3	82 58	144.2	68 49.6	83 57	145.0	68 24.6	83 56	145.7	67 59.5	84 55	146.5	67 34.2	85 54	147.2	67 08.7	85 53	147.9	66 43.0	86 52	148.5	66 17.1	86 51	149.2	2
3	68 39.2	80 61	141.9	68 15.1	81 60	142.8	67 50.8	81 59	143.5	67 26.3	82 58	144.3	67 01.6	83 57	145.0	66 36.6	83 56	145.7	66 11.5	84 55	146.4	65 46.3	85 54	147.1	3
4	68 02.3	78 64	139.8	67 38.9	78 63	140.6	67 15.2	79 62	141.4	66 51.3	80 61	142.2	66 27.2	81 60	143.0	66 02.9	81 59	143.7	65 38.3	82 58	144.4	65 13.6	83 57	145.1	4
15	67 23.8	75 67	137.8	67 01.0	76 66	138.6	66 38.0	77 65	139.5	66 14.7	78 64	140.2	65 51.2	79 63	141.0	65 27.5	79 62	141.7	65 03.5	80 61	142.5	64 39.4	81 60	143.2	15
6	66 43.8	73 69	135.9	66 21.6	74 68	136.7	65 59.2	75 67	137.6	65 36.6	76 66	138.4	65 13.7	77 65	139.1	64 50.5	78 64	139.9	64 27.2	78 63	140.6	64 03.6	79 62	141.3	6
7	66 02.4	71 71	134.1	65 40.9	72 70	134.9	65 19.1	73 69	135.8	64 57.0	74 68	136.6	64 34.7	75 67	137.4	64 12.2	76 66	138.1	63 49.4	76 65	138.9	63 26.4	77 64	139.6	7
8	65 19.8	69 73	132.4	64 58.9	70 72	133.2	64 37.7	71 71	134.1	64 16.2	72 70	134.9	63 54.5	73 69	135.7	63 32.5	74 68	136.4	63 10.3	74 67	137.2	62 47.8	75 66	137.9	8
9	64 36.1	67 75	130.8	64 15.8	68 74	131.6	63 55.1	69 73	132.5	63 34.2	70 72	133.3	63 13.1	71 71	134.1	62 51.6	72 70	134.8	62 29.9	73 69	135.6	62 08.0	73 68	136.3	9
20	63 51.3	65 76	129.3	63 31.6	66 75	130.1	63 11.5	67 74	130.9	62 51.1	68 74	131.7	62 30.5	69 73	132.5	62 09.6	70 72	133.3	61 48.5	71 71	134.1	61 27.1	72 70	134.8	20
1	63 05.6	64 78	127.8	62 46.4	65 77	128.7	62 26.8	66 76	129.5	62 07.0	67 75	130.3	61 46.9	67 74	131.1	61 26.6	68 73	131.9	61 06.0	69 72	132.6	60 45.1	70 72	133.3	1
2	62 19.0	62 79	126.5	62 00.3	63 78	127.3	61 41.3	64 77	128.1	61 22.0	65 76	128.9	61 02.4	66 76	129.7	60 42.6	67 75	130.5	60 22.4	67 74	131.2	60 02.1	68 73	132.0	2
3	61 31.6	60 80	125.2	61 13.4	61 79	126.0	60 54.9	62 79	126.8	60 36.1	63 78	127.6	60 17.0	64 77	128.4	59 57.6	65 76	129.1	59 38.0	66 75	129.9	59 18.2	67 75	130.6	3
4	60 43.4	59 81	123.9	60 25.7	60 81	124.8	60 07.7	61 80	125.6	59 49.4	62 79	126.4	59 30.8	62 78	127.1	59 11.9	63 78	127.9	58 52.8	64 77	128.6	58 33.4	65 76	129.4	4
25	59 54.6	57 82	122.8	59 37.3	58 82	123.6	59 19.8	59 81	124.4	59 01.9	60 80	125.2	58 43.8	61 79	125.9	58 25.4	62 79	126.7	58 06.7	63 78	127.4	57 47.8	63 77	128.2	25
6	59 05.1	56 83	121.7	58 48.3	57 83	122.5	58 31.2	58 82	123.3	58 13.8	58 81	124.0	57 56.1	59 81	124.8	57 38.2	60 80	125.5	57 19.9	61 79	126.3	57 01.5	62 78	127.0	6
7	58 15.1	54 84	120.6	57 58.7	55 84	121.4	57 42.0	56 83	122.2	57 25.0	57 82	122.9	57 07.8	58 82	123.7	56 50.3	59 81	124.5	56 32.5	60 80	125.2	56 14.5	61 79	125.9	7
8	57 24.5	53 85	119.6	57 08.5	54 84	120.4	56 52.2	55 84	121.2	56 35.7	56 83	121.9	56 18.8	57 82	122.7	56 01.8	57 82	123.4	55 44.4	58 81	124.1	55 26.8	59 80	124.8	8
9	56 33.4	52 86	118.7	56 17.8	52 85	119.4	56 02.0	53 85	120.2	55 45.8	54 84	120.9	55 29.4	55 83	121.7	55 12.7	56 83	122.4	54 55.7	57 82	123.1	54 38.5	58 81	123.8	9
30	55 41.9	50 87	117.7	55 26.7	51 86	118.5	55 11.2	52 85	119.3	54 55.4	53 85	120.0	54 39.4	54 84	120.7	54 23.0	55 84	121.5	54 06.5	56 83	122.2	53 49.7	56 82	122.9	30
1	54 50.0	49 87	116.9	54 35.1	50 87	117.6	54 19.9	51 86	118.4	54 04.5	52 85	119.1	53 48.9	53 85	119.8	53 32.9	54 84	120.5	53 16.7	54 84	121.2	53 00.3	55 83	121.9	1
2	53 57.6	48 88	116.0	53 43.1	49 87	116.8	53 28.3	50 87	117.5	53 13.2	51 86	118.2	52 57.9	51 86	119.0	52 42.4	52 85	119.7	52 26.5	53 84	120.4	52 10.5	54 84	121.1	2
3	53 04.9	47 88	115.2	52 50.7	48 88	116.0	52 36.3	49 87	116.7	52 21.5	49 87	117.4	52 06.6	50 86	118.1	51 51.3	51 86	118.8	51 35.9	52 85	119.5	51 20.2	53 85	120.2	3
4	52 11.9	46 89	114.5	51 58.0	47 88	115.2	51 43.8	48 88	115.9	51 29.5	48 87	116.6	51 14.8	49 87	117.3	50 59.9	50 86	118.0	50 44.8	51 86	118.7	50 29.4	52 85	119.4	4
35	51 18.5	45 89	113.8	51 04.9	46 89	114.5	50 51.1	47 88	115.2	50 37.0	47 88	115.9	50 22.7	48 87	116.6	50 08.1	49 87	117.2	49 53.3	50 86	117.9	49 38.3	51 86	118.6	35
6	50 24.8	44 90	113.1	50 11.6	45 89	113.8	49 58.0	46 89	114.4	49 44.3	46 88	115.1	49 30.2	47 88	115.8	49 16.0	48 87	116.5	49 01.5	49 87	117.2	48 46.8	49 86	117.8	6
7	49 30.9	43 90	112.4	49 17.9	44 90	113.1	49 04.7	45 89	113.8	48 51.2	45 89	114.4	48 37.4	46 88	115.1	48 23.5	47 88	115.8	48 09.3	48 88	116.4	47 54.9	48 87	117.1	7
8	48 36.7	42 91	111.7	48 24.0	43 90	112.4	48 11.0	44 90	113.1	47 57.8	44 89	113.8	47 44.4	45 89	114.4	47 30.7	46 88	115.1	47 16.8	47 88	115.7	47 02.7	47 88	116.4	8
9	47 42.3	41 91	111.1	47 29.8	42 91	111.8	47 17.1	43 90	112.5	47 04.2	44 90	113.1	46 51.0	44 89	113.8	46 37.6	45 89	114.4	46 24.0	46 88	115.1	46 10.2	46 88	115.7	9
40	46 47.7	40 91	110.5	46 35.4	41 91	111.2	46 23.0	42 91	111.8	46 10.3	43 90	112.5	45 57.4	43 90	113.1	45 44.2	44 89	113.8	45 30.9	45 89	114.4	45 17.3	46 88	115.1	40
1	45 52.8	40 92	109.9	45 40.8	40 91	110.6	45 28.6	41 91	111.2	45 16.1	42 91	111.9	45 03.5	43 90	112.5	44 50.6	43 90	113.2	44 37.5	44 89	113.8	44 24.2	45 89	114.4	1
2	44 57.7	39 92	109.4	44 46.0	40 92	110.0	44 34.0	40 91	110.7	44 21.8	41 91	111.3	44 09.4	42 91	111.9	43 56.8	42 90	112.6	43 43.9	43 90	113.2	43 30.9	44 89	113.8	2
3	44 02.5	38 92	108.8	43 51.0	39 92	109.5	43 39.2	40 92	110.1	43 27.2	40 91	110.7	43 15.0	41 91	111.4	43 02.7	42 90	112.0	42 50.1	42 90	112.6	42 37.3	43 90	113.2	3
4	43 07.1	37 93	108.3	42 55.7	38 92	108.9	42 44.2	39 92	109.6	42 32.5	40 92	110.2	42 20.5	40 91	110.8	42 08.3	41 91	111.4	41 56.0	41 90	112.1	41 43.4	42 90	112.7	4
45	42 11.5	37 93	107.8	42 00.4	37 93	108.4	41 49.0	38 92	109.1	41 37.5	39 92	109.7	41 25.8	39 92	110.3	41 13.8	40 91	110.9	41 01.7	41 91	111.5	40 49.4	41 90	112.1	45
6	41 15.8	36 93	107.3	41 04.8	37 93	107.9	40 53.7	37 92	108.6	40 42.4	38 92	109.2	40 30.8	39 92	109.8	40 19.1	39 91	110.4	40 07.2	40 91	111.0	39 55.1	41 91	111.6	6
7	40 19.9	36 93	106.9	40 09.1	36 93	107.5	39 58.2	37 93	108.1	39 47.1	37 92	108.7	39 35.7	38 92	109.3	39 24.2	39 92	109.9	39 12.5	39 91	110.5	39 00.7	40 91	111.1	7
8	39 23.9	35 94	106.4	39 13.3	36 93	107.0	39 02.5	36 93	107.6	38 51.6	37 93	108.2	38 40.5	37 92	108.8	38 29.2	38 92	109.4	38 17.7	39 92	110.0	38 06.0	39 91	110.6	8
9	38 27.7	34 94	106.0	38 17.3	35 94	106.6	38 06.7	36 93	107.1	37 56.0	36 93	107.7	37 45.0	37 93	108.3	37 33.9	37 92	108.9	37 22.7	38 92	109.5	37 11.2	38 92	110.1	9
50	37 31.4	34 94	105.5	37 21.2	34 94	106.1	37 10.8	35 93	106.7	37 00.2	36 93	107.3	36 49.5	36 93	107.9	36 38.6	37 93	108.5	36 27.5	37 92	109.0	36 16.2	38 92	109.6	50
1	36 35.1	33 94	105.1	36 25.0	34 94	105.7	36 14.8	34 94	106.3	36 04.3	35 93	106.9	35 53.8	36 93	107.4	35 43.0	36 93	108.0	35 32.1	37 92	108.6	35 21.1	37 92	109.1	1
2	35 38.6	33 94	104.7	35 28.7	33 94	105.3	35 18.6	34 94	105.9	35 08.3	34 94	106.4	34 57.9	35 93	107.0	34 47.4	35 93	107.6	34 36.6	36 93	108.1	34 25.8	37 92	108.7	2
3	34 42.0	32 94	104.3	34 32.2	33 94	104.9	34 22.3	33 94	105.4	34 12.2	34 94	106.0	34 02.0	34 93	106.6	33 51.6	35 93	107.1	33 41.0	35 93	107.7	33 30.3	36 93	108.3	3
4	33 45.3	32 95	103.9	33 35.6	32 94	104.5	33 25.9	33 94	105.0	33 15.9	33 94	105.6	33 05.9	34 94	106.2	32 55.6	34 93	106.7	32 45.3	35 93	107.3	32 34.7	35 93	107.8	4
55	32 48.5	31 95	103.5	32 39.0	32 95	104.1	32 29.4	32 94	104.7	32 19.6	33 94	105.2	32 09.7	33 94	105.8	31 59.6	34 94	106.3	31 49.4	34 93	106.9	31 39.0	35 93	107.4	55
6	31 51.6	31 95	103.2	31 42.2	31 95	103.7	31 32.8	32 94	104.3	31 23.1	32 94	104.8	31 13.3	33 94	105.4	31 03.4	33 94	105.9	30 53.4	34 94	106.5	30 43.2	34 93	107.0	6
7	30 54.6	30 95	102.8	30 45.4	31 95	103.4	30 36.1	31 95	103.9	30 26.6	32 94	104.5	30 16.9	32 94	105.0	30 07.2	33 94	105.6	29 57.3	33 94	106.1	29 47.2	34 93	106.6	7
8	29 57.6	30 95	102.5	29 48.5	31 95	103.0	29 39.3	31 95	103.6	29 29.9	31 95	104.1	29 20.4	32 94	104.6	29 10.8	32 94	105.2	29 01.0	33 94	105.7	28 51.2	33 94	106.3	8
9	29 00.4	30 95	102.1	28 51.5	30 95	102.7	28 42.4	31 95	103.2	28 33.2	31 95	103.7	28 23.8	31 94	104.3	28 14.3	32 94	104.8	28 04.7	32 94	105.4	27 55.0	33 94	105.9	9
60	28 03.3	29 95	101.8	27 54.4	30 95	102.3	27 45.4	30 95	102.9	27 36.3	31 95	103.4	27 27.1	31 95	103.9	27 17.8	31 94	104.5	27 08.3	32 94	105.0	26 58.7	32 94	105.5	60
1	27 06.0	29 96	101.5	26 57.3	29 95	102.0	26 48.4	30 95	102.5	26 39.4	30 95	103.1	26 30.3	31 95	103.6	26 21.1	31 95	104.1	26 11.8	31 94	104.7	26 02.3	32 94	105.2	1
2	26 08.7	29 96	101.1	26 00.0	29 95	101.7	25 51.3	29 95	102.2	25 42.4	30 95	102.7	25 33.5	30 95	103.3	25 24.4	30 95	103.8	25 15.2	31 94	104.3	25 05.9	31 94	104.8	2
3	25 11.3	28 96	100.8	25 02.7	29 96	101.3	24 54.1	29 95	101.9	24 45.4	29 95	102.4	24 36.5	30 95	102.9	24 27.6	30 95	103.5	24 18.5	30 95	104.0	24 09.3	31 94	104.5	3
4	24 13.8	28 96	100.5	24 05.4	28 96	101.0	23 56.9	29 96	101.6	23 48.2	29 95	102.1	23 39.5	29 95	102.6	23 30.7	30 95	103.1	23 21.7	30 95	103.6	23 12.7	30 95	104.2	4
65	23 16.3	28 96	100.2	23 08.0	28 96	100.7	22 59.6	28 96	101.3	22 51.0	29 95	101.8	22 42.4	29 95	102.3	22 33.7	29 95	102.8	22 24.9	30 95	103.3	22 15.9	30 95	103.8	65
6	22 18.7	27 96	99.9	22 10.5	28 96	100.4	22 02.2	28 96	100.9	21 53.8	28 96	101.5	21 45.3	29 95	102.0	21 36.6	29 95	102.5	21 27.9	29 95	103.0	21 19.1	29 95	103.5	6
7	21 21.1	27 96	99.6	21 13.0	27 96	100.1	21 04.8	28 96	100.7	20 56.4	28 96	101.2	20 48.0	28 95	101.7	20 39.5	28 96	102.2	20 30.9	29 95	102.7	20 22.3	29 95	103.2	7
8	20 23.5	27 96	99.3	20 15.4	27 96	99.8	20 07.3	27 96	100.4	19 59.1	28 96	100.9	19 50.8	28 96	101.4	19 42.4	28 95	101.9	19 33.9	28 95	102.4	19 25.3	29 95	102.9	8
9	19 25.7	26 96	99.1	19 17.8	27 96	99.6	19 09.7	27 96	100.1	19 01.6	27 96	100.6	18 53.4	28 96	101.1	18 45.1	28 96	101.6	18 36.7	28 95	102.1	18 28.3	28 95	102.6	9
70	18 28.0	26 96	98.8	18 20.1	26 96	99.3	18 12.2	27 96	99.8	18 04.1	27 96	100.3	17 56.0	27 96	100.8	17 47.8	27 96	101.3	17 39.6	28 95	101.8	17 31.2	28 95	102.3	70
1	17 30.2	26 96	98.5	17 22.4	26 96	99.0	17 14.5	26 96	99.5	17 06.6	27 96	100.0	16 58.6	27 96	100.5	16 50.5	27 96	101.0	16 42.3	27 96	101.5	16 34.1	28 95	102.0	1
2	16 32.4	26 96	98.2	16 24.6	26 96	98.7	16 16.8	26 96	99.2	16 09.0	26 96	99.7	16 01.1	27 96	100.2	15 53.1	27 96	100.7	15 45.0	27 96	101.2	15 36.9	27 95	101.7	2
3	15 34.5	25 97	98.0	15 26.8	26 96	98.5	15 19.1	26 96	99.0	15 11.3	26 96	99.5	15 03.5	26 96	100.0	14 55.6	26 96	100.5	14 47.6	27 96	101.0	14 39.6	27 96	101.5	3
4	14 36.6	25 97	97.7	14 29.0	25 96	98.2	14 21.4	26 96	98.7	14 13.7	26 96	99.2	14 05.9	26 96	99.7	13 58.1	26 96	100.2	13 50.2	26 96	100.7	13 42.3	27 96	101.2	4
75	13 38.6	25 97	97.5	13 31.1	25 97	98.0	13 23.5	25 96	98.4	13 15.9	25 96	98.9	13 08.3	26 96	99.4	13 00.5	26 96	99.9	12 52.7	26 96	100.4	12 44.9	26 96	100.9	75
6	12 40.6	25 97	97.2	12 33.2	25 97	97.7	12 25.7	25 96	98.2	12 18.2	25 96	98.7	12 10.6	25 96	99.2	12 02.9	26 96	99.7	11 55.2	26 96	100.2	11 47.5	26 96	100.7	6
7	11 42.6	24 97	96.9	11 35.2	25 97	97.4	11 27.8	25 97	97.9	11 20.3	25 96	98.4	11 12.8	25 96	98.9	11 05.3	25 96	99.4	10 57.6	25 96	99.9	10 50.0	26 96	100.4	7
8	10 44.6	24 97	96.7	10 37.3	24 97	97.2	10 29.9	25 97	97.7	10 22.5	25 96	98.2	10 15.1	25 96	98.7	10 07.6	25 96	99.2	10 00.0	25 96	99.7	9 52.5	25 96	100.1	8
9	9 46.5	24 97	96.5	9 39.2	24 97	96.9	9 31.9	24 97	97.4	9 24.6	25 97	97.9	9 17.2	25 96	98.4	9 09.8	25 96	98.9	9 02.4	25 96	99.4	8 54.9	25 96	99.9	9
80	8 48.4	24 97	96.2	8 41.2	24 97	96.7	8 34.0	24 97	97.2	8 26.7	24 97	97.7	8 19.4	24 96	98.2	8 12.1	25 96	98.7	8 04.7	25 96	99.2	7 57.3	25 96	99.6	80
1	7 50.2	24 97	96.0	7 43.1	24 97	96.5	7 35.9	24 97	97.0	7 28.7	24 97	97.4	7 21.5	24 97	97.9	7 14.2	24 96	98.4	7 06.9	24 96	98.9	6 59.6	24 96	99.4	1
2	6 52.1	24 97	95.7	6 45.0	24 97	96.2	6 37.9	24 97	96.7	6 30.8	24 97	97.2	6 23.6	24 97	97.7	6 16.4	24 96	98.2	6 09.2	24 96	98.7	6 01.9	24 96	99.2	2
3	5 53.9	23 97	95.5	5 46.9	23 97	96.0	5 39.8	24 97	96.5	5 32.7	24 97	97.0	5 25.6	24 97	97.5	5 18.5	24 97	97.9	5 11.4	24 96	98.4	5 04.2	24 96	98.9	3

H.A.	8° 00′			8° 30′			9° 00′			9° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	85 00.0	1.0 10	180.0	85 30.0	1.0 11	180.0	86 00.0	1.0 12	180.0	86 30.0	1.0 13	180.0
1	84 54.2	98 28	168.8	85 23.6	98 30	167.6	85 52.9	97 34	166.1	86 21.9	96 38	164.2
2	84 37.6	93 43	158.3	85 05.4	92 47	156.2	85 32.7	90 51	153.7	85 59.3	87 56	150.5
3	84 11.7	86 56	149.2	84 37.3	84 59	146.5	85 02.0	81 64	143.3	85 25.7	77 68	139.6
4	83 38.4	79 65	141.4	84 01.6	76 69	138.5	84 23.7	72 73	135.1	84 44.6	67 77	131.3
05	82 59.4	72 72	135.0	83 20.4	68 75	132.0	83 40.2	64 79	128.7	83 58.6	59 82	125.0
6	82 16.1	65 77	129.7	82 35.1	61 80	126.8	82 52.9	57 83	123.6	83 09.2	52 86	120.1
7	81 29.7	60 81	125.3	81 47.0	56 84	122.5	82 03.0	51 86	119.5	82 17.7	46 88	116.3
8	80 40.9	55 84	121.7	80 56.7	51 86	119.0	81 11.3	47 88	116.2	81 24.6	42 90	113.2
9	79 50.3	50 87	118.6	80 04.9	47 88	116.1	80 18.2	43 90	113.4	80 30.4	38 92	110.7
10	78 58.4	47 88	116.0	79 11.8	43 90	113.6	79 24.2	39 91	111.2	79 35.3	35 93	108.6
1	78 05.3	43 90	113.7	78 17.8	40 91	111.5	78 29.3	36 92	109.2	78 39.6	33 94	106.8
2	77 11.4	41 91	111.8	77 23.1	37 92	109.7	77 33.8	34 93	107.5	77 43.4	30 94	105.3
3	76 16.8	38 92	110.1	76 27.8	35 93	108.1	76 37.8	32 94	106.1	76 46.9	28 96	104.0
4	75 21.6	36 93	108.6	75 32.0	33 94	106.7	75 41.5	30 94	104.8	75 50.0	27 95	102.9
15	74 26.0	34 93	107.2	74 35.8	31 94	105.5	74 44.8	28 95	103.7	74 52.9	26 96	101.8
6	73 30.0	33 94	106.0	73 39.3	30 95	104.4	73 47.9	27 95	102.7	73 55.6	24 96	100.9
7	72 33.6	31 94	105.0	72 42.6	29 96	103.4	72 50.7	26 96	101.7	72 58.1	23 96	100.1
8	71 37.0	30 95	104.0	71 45.6	27 95	102.5	71 53.4	25 96	100.9	72 00.5	22 95	99.4
9	70 40.2	29 95	103.1	70 48.4	26 96	101.6	70 55.9	24 96	100.2	71 02.7	21 96	98.7
20	69 43.1	28 96	102.3	69 51.1	25 96	100.9	69 58.3	23 96	99.5	70 04.9	21 97	98.0
1	68 45.9	27 96	101.5	68 53.6	24 96	100.2	69 00.6	22 96	98.8	69 07.0	20 97	97.5
2	67 48.6	26 96	100.8	67 56.0	24 96	99.5	68 02.8	22 96	98.2	68 09.0	20 97	96.9
3	66 51.1	25 96	100.2	66 58.3	23 96	98.9	67 04.9	21 97	97.7	67 10.9	19 97	96.4
4	65 53.5	24 96	99.6	66 60.5	22 96	98.4	66 06.9	20 97	97.2	66 12.8	19 97	96.0
25	64 55.8	24 96	99.0	65 02.6	22 97	97.8	65 08.9	20 97	96.7	65 14.6	18 97	95.5
6	63 58.0	23 96	98.5	64 04.7	21 97	97.4	64 10.8	20 97	96.2	64 16.4	18 97	95.1
7	63 00.2	22 97	98.0	63 06.7	21 97	96.9	63 12.7	19 97	95.8	63 18.2	17 97	94.7
8	62 02.2	22 97	97.5	62 08.6	20 97	96.4	62 14.5	19 97	95.4	62 19.9	17 97	94.3
9	61 04.2	22 97	97.0	61 10.5	20 97	96.0	61 16.2	18 97	95.0	61 21.6	17 97	94.0
30	60 06.2	21 97	96.6	60 12.3	20 97	95.6	60 18.0	18 97	94.6	60 23.2	17 97	93.6
1	59 08.1	21 97	96.2	59 14.1	19 97	95.2	59 19.7	18 97	94.3	59 24.9	17 97	93.3
2	58 10.0	20 97	95.8	58 15.9	19 97	94.9	58 21.4	18 97	93.9	58 26.5	16 97	93.0
3	57 11.8	20 97	95.4	57 17.6	19 97	94.5	57 23.1	18 97	93.6	57 28.1	16 97	92.7
4	56 13.6	20 97	95.1	56 19.3	19 97	94.2	56 24.7	17 97	93.3	56 29.7	16 97	92.4
35	55 15.3	20 97	94.7	55 21.0	18 97	93.9	55 26.3	17 97	93.0	55 31.3	16 97	92.1
6	54 17.0	19 97	94.4	54 22.7	18 97	93.5	54 27.9	17 97	92.7	54 32.9	16 97	91.8
7	53 18.7	19 97	94.1	53 24.3	18 97	93.2	53 29.5	17 97	92.4	53 34.4	16 97	91.6
8	52 20.4	19 97	93.7	52 25.9	18 97	92.9	52 31.1	17 97	92.1	52 36.0	16 97	91.3
9	51 22.0	19 97	93.4	51 27.5	18 97	92.7	51 32.7	17 97	91.9	51 37.5	16 97	91.1
40	50 23.7	19 97	93.2	50 29.1	18 97	92.4	50 34.3	17 97	91.6	50 39.1	16 97	90.8
1	49 25.3	19 97	92.9	49 30.7	18 97	92.1	49 35.8	17 97	91.3	49 40.6	16 97	90.6
2	48 26.9	18 97	92.6	48 32.3	17 97	91.8	48 37.4	16 97	91.1	48 42.2	16 97	90.4
3	47 28.5	18 97	92.3	47 33.8	17 97	91.6	47 38.9	16 97	90.9	47 43.7	15 97	90.1
4	46 30.1	18 97	92.1	46 35.4	17 97	91.3	46 40.5	16 97	90.6	46 45.2	15 97	89.9
45	45 31.6	18 97	91.8	45 36.9	17 97	91.1	45 42.0	16 97	90.4	45 46.8	16 97	89.7
6	44 33.2	18 97	91.5	44 38.5	17 97	90.8	44 43.5	16 97	90.2	44 48.3	16 97	89.5
7	43 34.8	18 97	91.3	43 40.0	17 97	90.6	43 45.1	16 97	89.9	43 49.9	16 97	89.2
8	42 36.3	18 97	91.0	42 41.6	17 97	90.4	42 46.6	16 97	89.7	42 51.4	16 97	89.0
9	41 37.9	18 97	90.8	41 43.1	17 97	90.1	41 48.1	16 97	89.5	41 52.9	16 97	88.8
50	40 39.4	18 97	90.6	40 44.7	17 97	89.9	40 49.7	16 97	89.3	40 54.5	16 97	88.6
1	39 40.9	18 97	90.3	39 46.2	17 97	89.7	39 51.2	16 97	89.1	39 56.1	16 97	88.4
2	38 42.5	18 97	90.1	38 47.7	17 97	89.5	38 52.8	16 97	88.8	38 57.6	16 97	88.2
3	37 44.0	18 97	89.9	37 49.3	17 97	89.3	37 54.3	17 97	88.6	37 59.2	16 97	88.0
4	36 45.6	18 97	89.7	36 50.8	17 97	89.1	36 55.9	17 97	88.4	37 60.8	16 97	87.8
55	35 47.1	18 97	89.4	35 52.4	17 97	88.8	35 57.5	17 97	88.2	36 02.4	16 97	87.6
6	34 48.6	18 97	89.2	34 53.9	17 97	88.6	34 59.0	17 97	88.0	35 03.9	16 97	87.4
7	33 50.2	18 97	89.0	33 55.5	17 97	88.4	34 00.6	17 97	87.8	34 05.5	16 97	87.2
8	32 51.7	18 97	88.8	32 57.0	17 97	88.2	33 02.2	17 97	87.6	33 07.2	16 97	87.0
9	31 53.3	18 97	88.6	31 58.6	17 97	88.0	32 03.8	17 97	87.4	32 08.8	16 97	86.8
60	30 54.8	18 97	88.4	31 00.2	18 97	87.8	31 05.4	17 97	87.2	31 10.4	17 97	86.7
1	29 56.4	18 97	88.2	30 01.8	18 97	87.6	30 07.0	17 97	87.0	30 12.1	17 97	86.5
2	28 58.0	18 97	88.0	29 03.4	18 97	87.4	29 08.6	17 97	86.8	29 13.7	17 97	86.3
3	27 59.6	18 97	87.8	28 05.0	18 97	87.2	28 10.2	17 97	86.6	28 15.4	17 97	86.1
4	27 01.1	18 97	87.6	27 06.6	18 97	87.0	27 11.9	17 97	86.5	27 17.1	17 97	85.9
65	26 02.7	18 97	87.4	26 08.2	18 97	86.8	26 13.5	18 97	86.3	26 18.8	17 97	85.7
6	25 04.3	19 97	87.2	25 09.8	18 97	86.6	25 15.2	18 97	86.1	25 20.5	17 97	85.5
7	24 06.0	19 97	87.0	24 11.5	18 97	86.4	24 16.9	18 97	85.9	24 22.2	17 97	85.3
8	23 07.6	19 97	86.7	23 13.1	18 97	86.2	23 18.6	18 97	85.7	23 23.9	18 97	85.1
9	22 09.2	19 97	86.5	22 14.8	18 97	86.0	22 20.3	18 97	85.5	22 25.7	18 97	85.0
70	21 10.9	19 97	86.3	21 16.5	19 97	85.8	21 22.0	18 97	85.3	21 27.5	18 97	84.8
1	20 12.5	19 97	86.1	20 18.2	19 97	85.6	20 23.8	18 97	85.1	20 29.2	18 97	84.6
2	19 14.2	19 97	85.9	19 19.9	19 97	85.4	19 25.5	19 97	84.9	19 31.1	18 97	84.4
3	18 15.9	19 97	85.7	18 21.6	19 97	85.2	18 27.3	19 97	84.7	18 32.9	18 97	84.2
4	17 17.6	19 97	85.5	17 23.4	19 97	85.0	17 29.1	19 97	84.5	17 34.7	19 97	84.0
75	16 19.3	20 97	85.3	16 25.2	19 97	84.8	16 30.9	19 97	84.3	16 36.6	19 97	83.8
6	15 21.1	20 97	85.1	15 26.9	19 97	84.6	15 32.8	19 97	84.1	15 38.5	19 97	83.6
7	14 22.8	20 97	84.9	14 28.8	20 97	84.4	14 34.6	19 97	83.9	14 40.4	19 97	83.4
8	13 24.6	20 97	84.7	13 30.6	20 97	84.2	13 36.5	20 97	83.7	13 42.3	19 97	83.2
9	12 26.4	20 97	84.5	12 32.4	20 97	84.0	12 38.4	20 97	83.5	12 44.3	20 97	83.0
80	11 28.2	20 97	84.3	11 34.3	20 97	83.8	11 40.3	20 97	83.3	11 46.3	20 97	82.8
1	10 30.0	20 97	84.1	10 36.2	20 97	83.6	10 42.3	20 97	83.1	10 48.3	20 97	82.6
2	9 31.9	21 97	83.9	9 38.1	21 97	83.4	9 44.2	20 97	82.9	9 50.3	20 97	82.4
3	8 33.8	21 97	83.7	8 40.0	21 97	83.2	8 46.2	21 97	82.7	8 52.4	20 97	82.2
4	7 35.7	21 97	83.5	7 42.0	21 97	83.0	7 48.2	21 97	82.5	7 54.5	21 96	82.0
85	6 37.6	21 97	83.3	6 44.0	21 97	82.8	6 50.3	21 97	82.3	6 56.6	21 96	81.8
6	5 39.6	21 97	83.1	5 46.0	21 97	82.6	5 52.4	21 96	82.1	5 58.7	21 96	81.6
7										5 00.9	21 96	81.4

H.A.	10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	87 00.0	1.0 16	180.0	87 30.0	1.0 18	180.0	88 00.0	1.0 23	180.0	88 30.0	1.0 29	180.0	00
1	86 50.6	95 43	161.8	87 18.9	93 49	158.5	87 46.4	90 57	153.8	88 12.6	84 67	146.8	1
2	86 25.0	84 62	146.6	86 49.5	79 68	141.7	87 12.1	72 75	135.4	87 32.2	61 83	127.3	2
3	85 48.0	72 74	135.3	86 08.6	65 79	130.1	86 26.9	57 84	124.0	86 42.4	46 89	116.8	3
4	85 03.9	61 81	127.0	85 21.3	54 85	122.1	85 36.4	46 89	116.6	85 48.8	37 92	110.6	4
05	84 15.3	53 86	121.0	84 30.2	46 89	116.5	84 43.0	39 92	111.7	84 53.3	30 94	106.5	05
6	83 24.0	46 89	116.4	83 37.0	40 91	112.4	83 48.0	33 93	108.2	83 56.9	26 95	103.7	6
7	82 30.8	41 91	112.9	82 42.3	35 93	109.3	82 52.0	29 94	105.5	82 59.8	23 96	101.6	7
8	81 36.4	37 92	110.1	81 46.8	32 94	106.9	81 55.4	26 95	103.5	82 02.4	20 96	100.0	8
9	80 41.2	34 93	107.8	80 50.5	29 95	104.9	80 58.4	24 96	101.8	81 04.7	18 96	98.7	9
10	79 45.2	31 94	106.0	79 53.8	26 96	103.3	80 01.0	22 96	100.5	80 06.8	17 97	97.6	10
1	78 48.8	29 95	104.4	78 56.7	24 96	101.9	79 03.4	20 96	99.4	79 08.8	16 97	96.7	1
2	77 52.0	27 96	103.1	77 59.4	23 96	100.7	78 05.7	19 96	98.4	78 10.7	15 97	96.0	2
3	76 54.9	25 96	101.9	77 01.9	21 96	99.7	77 07.8	18 97	97.5	77 12.6	14 97	95.3	3
4	75 57.6	24 96	100.9	76 04.2	20 96	98.9	76 09.8	17 97	96.8	76 14.3	13 97	94.7	4
15	75 00.1	22 96	100.0	75 06.4	19 97	98.1	75 11.7	16 97	96.1	75 16.0	13 97	94.2	15
6	74 02.4	21 96	99.2	74 08.4	18 97	97.4	74 13.5	15 97	95.6	74 17.7	12 97	93.7	6
7	73 04.7	21 96	98.4	73 10.4	18 97	96.7	73 15.3	15 97	95.0	73 19.4	12 97	93.3	7
8	72 06.8	20 97	97.8	72 12.3	17 97	96.2	72 17.1	14 97	94.5	72 21.0	12 97	92.9	8
9	71 08.8	19 97	97.2	71 14.2	17 97	95.6	71 18.8	14 97	94.1	71 22.6	12 97	92.5	9
20	70 10.8	18 97	96.6	70 16.0	16 97	95.1	70 20.4	14 97	93.7	70 24.2	11 97	92.2	20
1	69 12.7	18 97	96.1	69 17.7	16 97	94.7	69 22.1	13 97	93.3	69 25.8	11 97	91.9	1
2	68 14.5	17 97	95.6	68 19.4	15 97	94.3	68 23.7	13 97	92.9	68 27.3	11 97	91.6	2
3	67 16.3	17 97	95.2	67 21.1	15 97	93.9	67 25.3	13 97	92.6	67 28.9	11 97	91.3	3
4	66 18.1	17 97	94.7	66 22.8	15 97	93.5	66 26.9	13 97	92.3	66 30.4	11 97	91.0	4
25	65 19.8	16 97	94.3	65 24.4	14 97	93.2	65 28.5	13 97	92.0	65 32.0	11 97	90.8	25
6	64 21.5	16 97	94.0	64 26.0	14 97	92.8	64 30.0	12 97	91.7	64 33.5	11 97	90.5	6
7	63 23.1	16 97	93.6	63 27.6	14 97	92.5	63 31.6	12 97	91.4	63 35.1	11 97	90.3	7
8	62 24.8	16 97	93.3	62 29.2	14 97	92.2	62 33.2	12 97	91.1	62 36.6	11 97	90.0	8
9	61 26.4	15 97	92.9	61 30.8	14 97	91.9	61 34.7	12 97	90.9	61 38.1	11 97	89.8	9
30	60 28.0	15 97	92.6	60 32.4	14 97	91.6	60 36.2	12 97	90.6	60 39.7	11 97	89.6	30
1	59 29.6	15 97	92.3	59 33.9	14 97	91.4	59 37.8	12 97	90.4	59 41.2	11 97	89.4	1
2	58 31.2	15 97	92.0	58 35.5	14 97	91.1	58 39.3	12 97	90.1	58 42.8	11 97	89.2	2
3	57 32.8	15 97	91.8	57 37.0	13 97	90.8	57 40.9	12 97	89.9	57 44.3	11 97	89.0	3
4	56 34.3	15 97	91.5	56 38.6	13 97	90.6	56 42.4	12 97	89.7	56 45.8	11 97	88.8	4
35	55 35.9	15 97	91.2	55 40.1	13 97	90.4	55 43.9	12 97	89.5	55 47.4	11 97	88.6	35
6	54 37.4	15 97	91.0	54 41.6	13 97	90.1	54 45.5	12 97	89.3	54 49.0	11 97	88.4	6
7	53 39.0	15 97	90.7	53 43.2	13 97	89.9	53 47.0	12 97	89.1	53 50.5	11 97	88.2	7
8	52 40.5	15 97	90.5	52 44.7	13 97	89.7	52 48.6	12 97	88.9	52 52.1	11 97	88.0	8
9	51 42.1	15 97	90.3	51 46.2	13 97	89.5	51 50.1	12 97	88.7	51 53.7	11 97	87.9	9
40	50 43.6	15 97	90.0	50 47.8	13 97	89.3	50 51.7	12 97	88.5	50 55.2	11 97	87.7	40
1	49 45.1	15 97	89.8	49 49.3	14 97	89.1	49 53.2	12 97	88.3	49 56.8	11 97	87.5	1
2	48 46.7	15 97	89.6	48 50.9	14 97	88.9	48 54.8	13 97	88.1	48 58.4	12 97	87.3	2
3	47 48.2	15 97	89.4	47 52.4	14 97	88.7	47 56.4	13 97	87.9	48 00.0	12 97	87.2	3
4	46 49.8	15 97	89.2	46 54.0	14 97	88.5	46 58.0	13 97	87.7	47 01.6	12 97	87.0	4
45	45 51.3	15 97	89.0	45 55.6	14 97	88.3	45 59.5	13 97	87.5	46 03.3	12 97	86.8	45
6	44 52.8	15 97	88.8	44 57.1	14 97	88.1	45 01.1	13 97	87.4	45 04.9	12 97	86.7	6
7	43 54.4	15 97	88.6	43 58.7	14 97	87.9	44 02.7	13 97	87.2	44 06.5	12 97	86.5	7
8	42 56.0	15 97	88.4	43 00.3	14 97	87.7	43 04.4	13 97	87.0	43 08.2	12 97	86.3	8
9	41 57.5	15 97	88.2	42 01.9	14 97	87.5	42 06.0	13 97	86.8	42 09.9	13 97	86.2	9
50	40 59.1	15 97	88.0	41 03.5	14 97	87.3	41 07.6	13 97	86.7	41 11.5	13 97	86.0	50
1	40 00.7	15 97	87.8	40 05.1	14 97	87.1	40 09.3	14 97	86.5	40 13.2	13 97	85.8	1
2	39 02.3	15 97	87.6	39 06.7	14 97	86.9	39 10.9	14 97	86.3	39 14.9	13 97	85.7	2
3	38 03.9	15 97	87.4	38 08.3	15 97	86.8	38 12.6	14 97	86.1	38 16.6	13 97	85.5	3
4	37 05.5	15 97	87.2	37 10.0	15 97	86.6	37 14.3	14 97	86.0	37 18.4	13 97	85.3	4
55	36 07.1	15 97	87.0	36 11.6	15 97	86.4	36 15.9	14 97	85.8	36 20.1	14 97	85.2	55
6	35 08.7	16 97	86.8	35 13.3	15 97	86.2	35 17.6	14 97	85.6	35 21.8	14 97	85.0	6
7	34 10.3	16 97	86.6	34 14.9	15 97	86.0	34 19.4	14 97	85.4	34 23.6	14 97	84.8	7
8	33 12.0	16 97	86.5	33 16.6	15 97	85.9	33 21.1	15 97	85.3	33 25.4	14 97	84.7	8
9	32 13.6	16 97	86.3	32 18.3	15 97	85.7	32 22.8	15 97	85.1	32 27.2	14 97	84.5	9
60	31 15.3	16 97	86.1	31 20.0	16 97	85.5	31 24.6	15 97	84.9	31 29.0	14 97	84.3	60
1	30 17.0	16 97	85.9	30 21.7	16 97	85.3	30 26.4	15 97	84.8	30 30.8	15 97	84.2	1
2	29 18.7	16 97	85.7	29 23.5	16 97	85.1	29 28.2	15 97	84.6	29 32.7	15 97	84.0	2
3	28 20.4	16 97	85.5	28 25.2	16 97	85.0	28 30.0	16 97	84.4	28 34.6	15 97	83.8	3
4	27 22.1	17 97	85.3	27 27.0	16 97	84.8	27 31.8	16 97	84.2	27 36.4	15 97	83.7	4
65	26 23.8	17 97	85.2	26 28.8	16 97	84.6	26 33.6	16 97	84.1	26 38.3	15 97	83.5	65
6	25 25.6	17 97	85.0	25 30.6	17 97	84.4	25 35.5	16 97	83.9	25 40.3	16 97	83.3	6
7	24 27.4	17 97	84.8	24 32.4	17 97	84.2	24 37.4	16 97	83.7	24 42.2	16 97	83.2	7
8	23 29.2	17 97	84.6	23 34.3	17 97	84.1	23 39.3	17 97	83.5	23 44.2	16 97	83.0	8
9	22 31.0	17 97	84.4	22 36.1	17 97	83.9	22 41.2	17 97	83.4	22 46.2	16 97	82.8	9
70	21 32.8	18 97	84.2	21 38.0	17 97	83.7	21 43.1	17 97	83.2	21 48.2	17 97	82.6	70
1	20 34.6	18 97	84.0	20 39.9	17 97	83.5	20 45.1	17 97	83.0	20 56.2	17 97	82.5	1
2	19 36.5	18 97	83.9	19 41.8	18 97	83.3	19 47.1	17 97	82.8	19 52.2	17 97	82.3	2
3	18 38.4	18 97	83.7	18 43.8	18 97	83.2	18 49.1	18 97	82.6	18 54.3	17 96	82.1	3
4	17 40.3	18 97	83.5	17 45.7	18 97	83.0	17 51.1	18 97	82.5	17 56.4	18 96	81.9	4
75	16 42.2	19 97	83.3	16 47.7	18 97	82.8	16 53.2	18 97	82.3	16 58.6	18 96	81.8	75
6	15 44.1	19 97	83.1	15 49.7	19 97	82.6	15 55.3	18 96	82.1	16 00.7	18 96	81.6	6
7	14 46.1	19 97	82.9	14 51.8	19 97	82.4	14 57.4	19 96	81.9	15 02.9	18 96	81.4	7
8	13 48.1	19 97	82.7	13 53.8	19 97	82.2	13 59.5	19 96	81.7	14 05.1	19 96	81.2	8
9	12 50.1	19 97	82.5	12 55.9	19 96	82.0	13 01.7	19 96	81.5	13 07.4	19 96	81.0	9
80	11 52.2	20 97	82.3	11 58.1	19 96	81.8	12 03.9	19 96	81.3	12 09.6	19 96	80.8	80
1	10 54.3	20 96	82.1	11 00.2	20 96	81.6	11 06.1	20 96	81.1	11 11.9	19 96	80.6	1
2	9 56.4	20 96	81.9	10 02.4	20 96	81.4	10 08.3	20 96	80.9	10 14.3	20 96	80.4	2
3	8 58.5	20 96	81.7	9 04.6	20 96	81.2	9 10.6	20 96	80.7	9 16.6	20 96	80.2	3
4	8 00.7	21 96	81.5	8 06.8	20 96	81.0	8 12.9	20 96	80.5	8 19.0	20 96	80.0	4
85	7 02.9	21 96	81.3	7 09.1	21 96	80.8	7 15.3	21 96	80.3	7 21.5	21 96	79.8	85
6	6 05.1	21 96	81.1	6 11.4	21 96	80.6	6 17.7	21 96	80.1	6 23.9	21 96	79.6	6
7	5 07.3	21 96	80.9	5 13.7	21 96	80.4	5 20.1	21 96	79.9	5 26.5	21 96	79.4	7

11° 30′			H.A.
Alt.		Az.	
° ′	Δd Δt	°	°
88 30.0	1.0 29	180.0	00
88 12.6	84 67	146.8	1
87 32.2	61 83	127.3	2
86 42.4	46 89	116.8	3
85 48.8	37 92	110.6	4
84 53.3	30 94	106.5	05
83 56.9	26 95	103.7	6
82 59.8	23 96	101.6	7
82 02.4	20 96	100.0	8
81 04.7	18 96	98.7	9
80 06.8	17 97	97.6	10
79 08.8	16 97	96.7	1
78 10.7	15 97	96.0	2
77 12.6	14 97	95.3	3
76 14.3	13 97	94.7	4
75 16.0	13 97	94.2	15
74 17.7	12 97	93.7	6
73 19.4	12 97	93.3	7
72 21.0	12 97	92.9	8
71 22.6	12 97	92.5	9
70 24.2	11 97	92.2	20
69 25.8	11 97	91.9	1
68 27.3	11 97	91.6	2
67 28.9	11 97	91.3	3
66 30.4	11 97	91.0	4
65 32.0	11 97	90.8	25
64 33.5	11 97	90.5	6
63 35.1	11 97	90.3	7
62 36.6	11 97	90.0	8
61 38.1	11 97	89.8	9
60 39.7	11 97	89.6	30
59 41.2	11 97	89.4	1
58 42.8	11 97	89.2	2
57 44.3	11 97	89.0	3
56 45.8	11 97	88.8	4
55 47.4	11 97	88.6	35
54 49.0	11 97	88.4	6
53 50.5	11 97	88.2	7
52 52.1	11 97	88.0	8
51 53.7	11 97	87.9	9
50 55.2	11 97	87.7	40
49 56.8	11 97	87.5	1
48 58.4	12 97	87.3	2
48 00.0	12 97	87.2	3
47 01.6	12 97	87.0	4
46 03.3	12 97	86.8	45
45 04.9	12 97	86.7	6
44 06.5	12 97	86.5	7
43 08.2	12 97	86.3	8
42 09.9	13 97	86.2	9
41 11.5	13 97	86.0	50
40 13.2	13 97	85.8	1
39 14.9	13 97	85.7	2
38 16.6	13 97	85.5	3
37 18.4	13 97	85.3	4
36 20.1	14 97	85.2	55
35 21.8	14 97	85.0	6
34 23.6	14 97	84.8	7
33 25.4	14 97	84.7	8
32 27.2	14 97	84.5	9
31 29.0	14 97	84.3	60
30 30.8	15 97	84.2	1
29 32.7	15 97	84.0	2
28 34.6	15 97	83.8	3
27 36.4	15 97	83.7	4
26 38.3	15 97	83.5	65
25 40.3	16 97	83.3	6
24 42.2	16 97	83.2	7
23 44.2	16 97	83.0	8
22 46.2	16 97	82.8	9
21 48.2	17 97	82.6	70
20 50.2	17 97	82.5	1
19 52.2	17 97	82.3	2
18 54.3	17 96	82.1	3
17 56.4	18 96	81.9	4
16 58.6	18 96	81.8	75
16 00.7	18 96	81.6	6
15 02.9	18 96	81.4	7
14 05.1	19 96	81.2	8
13 07.4	19 96	81.0	9
12 09.6	19 96	80.8	80
11 11.9	19 96	80.6	1
10 14.3	20 96	80.4	2
9 16.6	20 96	80.2	3
8 19.0	20 96	80.0	4
7 21.5	21 96	79.8	85
6 23.9	21 96	79.6	6
5 26.5	21 96	79.4	7

H.A.	8° 00′			8° 30′			9° 00′			9° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	69 00.0	1.0 02	180.0	68 30.0	1.0 02	180.0	68 00.0	1.0 02	180.0	67 30.0	1.0 02	180.0
1	68 58.6	1.0 07	177.2	68 28.6	1.0 07	177.3	67 58.7	1.0 07	177.4	67 28.7	1.0 07	177.4
2	68 54.4	1.0 12	174.5	68 24.5	1.0 11	174.6	67 54.6	1.0 11	174.7	67 24.8	1.0 11	174.9
3	68 47.4	99 16	171.8	68 17.7	99 16	172.0	67 48.0	99 16	172.1	67 18.2	99 15	172.3
4	68 37.6	98 21	169.1	68 08.2	98 20	169.3	67 38.6	98 20	169.6	67 09.1	98 19	169.8
05	68 25.2	97 25	166.4	67 56.0	97 24	166.7	67 26.8	98 24	167.0	66 57.5	98 23	167.3
6	68 10.2	96 29	163.8	67 41.4	96 29	164.2	67 12.4	96 28	164.5	66 43.5	97 27	164.9
7	67 52.7	95 33	161.3	67 24.2	95 32	161.7	66 55.7	95 32	162.1	66 27.0	95 31	162.5
8	67 32.8	93 37	158.8	67 04.7	94 36	159.3	66 36.6	94 36	159.7	66 08.3	94 35	160.2
9	67 10.6	92 41	156.5	66 42.9	92 40	157.0	66 15.2	93 39	157.4	65 47.4	93 38	157.9
10	66 46.1	90 44	154.2	66 19.0	91 43	154.7	65 51.7	91 43	155.2	65 24.4	91 42	155.7
1	66 19.6	89 47	151.9	65 53.0	89 47	152.5	65 26.2	89 46	153.0	64 59.3	90 45	153.6
2	65 51.2	87 51	149.8	65 25.0	87 50	150.4	64 58.7	88 49	151.0	64 32.4	88 48	151.5
3	65 20.8	85 53	147.7	64 55.2	86 53	148.3	64 29.5	86 52	148.9	64 03.6	87 51	149.5
4	64 48.7	83 56	145.7	64 23.7	84 55	146.4	63 58.5	84 54	147.0	63 33.1	85 54	147.6
15	64 15.0	81 59	143.8	63 50.5	82 58	144.5	63 25.8	83 57	145.1	63 01.0	83 56	145.8
6	63 39.8	80 61	142.0	63 15.8	80 60	142.7	62 51.7	81 59	143.4	62 27.3	81 58	144.0
7	63 03.1	78 63	140.3	62 39.7	78 62	141.0	62 16.1	79 62	141.6	61 52.3	80 61	142.3
8	62 25.1	76 65	138.6	62 02.2	77 65	139.3	61 39.1	77 64	140.0	61 15.8	78 63	140.7
9	61 45.9	74 67	137.0	61 23.5	75 66	137.7	61 00.9	76 66	138.4	60 38.2	76 65	139.1
20	61 05.5	72 69	135.5	60 43.6	73 68	136.2	60 21.6	74 67	136.9	59 59.3	75 67	137.6
1	60 24.0	71 71	134.1	60 02.7	71 70	134.8	59 41.1	72 69	135.5	59 19.3	73 68	136.2
2	59 41.5	69 72	132.7	59 20.7	70 72	133.4	58 59.6	71 71	134.1	58 38.3	71 70	134.8
3	58 58.1	67 74	131.4	58 37.7	68 73	132.1	58 17.1	69 72	132.8	57 56.3	70 71	133.4
4	58 13.8	66 75	130.1	57 53.9	67 74	130.8	57 33.8	67 74	131.5	57 13.5	68 73	132.2
25	57 28.6	64 76	128.9	57 09.2	65 76	129.6	56 49.6	66 75	130.3	56 29.7	67 74	131.0
6	56 42.8	63 78	127.7	56 23.8	64 77	128.4	56 04.6	64 76	129.1	55 45.2	65 75	129.8
7	55 56.2	61 79	126.6	55 37.6	62 78	127.3	55 18.9	63 77	128.0	54 59.9	64 77	128.7
8	55 08.9	60 80	125.6	54 50.8	61 79	126.3	54 32.5	61 78	126.9	54 13.9	62 78	127.6
9	54 21.1	59 81	124.5	54 03.4	59 80	125.2	53 45.4	60 79	125.9	53 27.3	61 79	126.6
30	53 32.6	57 82	123.6	53 15.3	58 81	124.2	52 57.8	59 80	124.9	52 40.0	60 80	125.6
1	52 43.6	56 82	122.6	52 26.7	57 82	123.3	52 09.6	58 81	124.0	51 52.2	58 81	124.6
2	51 54.2	55 83	121.7	51 37.6	56 83	122.4	51 20.9	56 82	123.1	51 03.9	57 81	123.7
3	51 04.2	54 84	120.9	50 48.0	54 83	121.5	50 31.6	55 83	122.2	50 15.0	56 82	122.9
4	50 13.8	52 85	120.0	49 58.0	53 84	120.7	49 41.9	54 84	121.4	49 25.6	55 83	122.0
35	49 23.0	51 85	119.2	49 07.5	52 85	119.9	48 51.8	53 84	120.6	48 35.9	53 84	121.2
6	48 31.8	50 86	118.5	48 16.6	51 85	119.1	48 01.2	52 85	119.8	47 45.6	52 84	120.4
7	47 40.2	49 86	117.7	47 25.4	50 86	118.4	47 10.3	51 86	119.0	46 55.0	51 85	119.7
8	46 48.3	48 87	117.0	46 33.8	49 87	117.7	46 19.0	50 86	118.3	46 04.0	50 86	118.9
9	45 56.1	47 88	116.4	45 41.8	48 87	117.0	45 27.4	49 87	117.6	45 12.7	49 86	118.2
40	45 03.6	46 88	115.7	44 49.6	47 88	116.3	44 35.4	48 87	116.9	44 21.0	48 87	117.6
1	44 10.7	45 88	115.1	43 57.0	46 88	115.7	43 43.1	47 88	116.3	43 29.0	47 87	116.9
2	43 17.6	44 89	114.4	43 04.2	45 88	115.1	42 50.6	46 88	115.7	42 36.8	46 88	116.3
3	42 24.3	44 89	113.8	42 11.1	44 89	114.5	41 57.8	45 88	115.1	41 44.2	45 88	115.7
4	41 30.7	43 90	113.3	41 17.8	43 89	113.9	41 04.7	44 89	114.5	40 51.4	45 88	115.1
45	40 36.9	42 90	112.7	40 24.2	43 90	113.3	40 11.3	43 89	113.9	39 58.3	44 89	114.5
6	39 42.9	41 90	112.2	39 30.4	42 90	112.8	39 17.8	42 90	113.4	39 05.0	43 89	113.9
7	38 48.6	40 91	111.7	38 36.4	41 90	112.2	38 24.0	42 90	112.8	38 11.4	42 90	113.4
8	37 54.2	40 91	111.1	37 42.2	40 91	111.7	37 30.0	41 90	112.3	37 17.7	41 90	112.9
9	36 59.6	39 91	110.7	36 47.8	40 91	111.2	36 35.8	40 91	111.8	36 23.7	41 90	112.4
50	36 04.8	38 92	110.2	35 53.2	39 91	110.7	35 41.5	39 91	111.3	35 29.5	40 91	111.9
1	35 09.8	38 92	109.7	34 58.4	38 92	110.3	34 46.9	39 91	110.8	34 35.2	39 91	111.4
2	34 14.7	37 92	109.3	34 03.5	38 92	109.8	33 52.2	38 91	110.4	33 40.7	39 91	110.9
3	33 19.5	36 92	108.8	33 08.5	37 92	109.4	32 57.3	37 92	109.9	32 46.0	38 91	110.5
4	32 24.1	36 93	108.4	32 13.2	36 92	109.0	32 02.3	37 92	109.5	31 51.2	37 92	110.1
55	31 28.5	35 93	108.0	31 17.9	36 92	108.5	31 07.1	36 92	109.1	30 56.2	37 92	109.6
6	30 32.8	35 93	107.6	30 22.4	35 93	108.1	30 11.8	36 92	108.7	30 01.0	36 92	109.2
7	29 37.1	34 93	107.2	29 26.8	35 93	107.7	29 16.3	35 93	108.3	29 05.8	35 92	108.8
8	28 41.1	34 93	106.8	28 31.0	34 93	107.3	28 20.7	34 93	107.9	28 10.4	35 93	108.4
9	27 45.1	33 94	106.4	27 35.1	33 93	107.0	27 25.0	34 93	107.5	27 14.8	34 93	108.0
60	26 49.0	33 94	106.1	26 39.2	33 93	106.6	26 29.2	33 93	107.1	26 19.2	34 93	107.6
1	25 52.8	32 94	105.7	25 43.1	32 94	106.2	25 33.3	33 93	106.8	25 23.4	33 93	107.3
2	24 56.4	32 94	105.4	24 46.9	32 94	105.9	24 37.3	32 94	106.4	24 27.5	33 93	106.9
3	24 00.0	31 94	105.0	23 50.6	31 94	105.5	23 41.1	32 94	106.1	23 31.5	32 93	106.6
4	23 03.5	31 94	104.7	22 54.3	31 94	105.2	22 44.9	31 94	105.7	22 35.5	32 94	106.2
65	22 06.9	30 94	104.4	21 57.8	31 94	104.9	21 48.6	31 94	105.4	21 39.3	31 94	105.9
6	21 10.2	30 95	104.0	21 01.3	30 94	104.6	20 52.2	30 94	105.1	20 43.0	31 94	105.6
7	20 13.5	29 96	103.7	20 04.6	30 95	104.2	19 55.7	30 94	104.7	19 46.6	30 94	105.2
8	19 16.7	29 95	103.4	19 07.9	29 95	103.9	18 59.1	30 94	104.4	18 50.2	30 94	104.9
9	18 19.8	29 95	103.1	18 11.1	29 95	103.6	18 02.4	29 95	104.1	17 53.7	29 94	104.6
70	17 22.8	28 95	102.8	17 14.3	28 95	103.3	17 05.7	29 95	103.8	16 57.1	29 94	104.3
1	16 25.7	28 95	102.5	16 17.4	28 95	103.0	16 08.9	28 95	103.5	16 00.4	29 95	104.0
2	15 28.6	27 95	102.2	15 20.4	28 95	102.7	15 12.0	28 95	103.2	15 03.6	28 95	103.7
3	14 31.5	27 95	102.0	14 23.3	27 95	102.5	14 15.1	28 95	103.0	14 06.8	28 95	103.5
4	13 34.3	27 95	101.7	13 26.2	27 95	102.2	13 18.1	27 95	102.7	13 09.9	27 95	103.2
75	12 37.0	26 96	101.4	12 29.0	27 95	101.9	12 21.0	27 95	102.4	12 13.0	27 95	102.9
6	11 39.7	26 96	101.2	11 31.8	26 95	101.6	11 23.9	26 95	102.1	11 15.9	27 96	102.6
7	10 42.3	26 96	100.9	10 34.5	26 96	101.4	10 26.7	26 95	101.9	10 18.9	26 95	102.4
8	9 44.8	25 96	100.6	9 37.2	26 96	101.1	9 29.5	26 96	101.6	9 21.7	26 95	102.1
9	8 47.4	25 96	100.4	8 39.8	25 96	100.9	8 32.2	25 96	101.4	8 24.5	26 96	101.9
80	7 49.8	25 96	100.1	7 42.4	25 96	100.6	7 34.8	25 96	101.1	7 27.3	25 95	101.6
1	6 52.3	25 96	99.9	6 44.9	25 96	100.4	6 37.5	25 96	100.9	6 30.0	25 96	101.3
2	5 54.6	24 96	99.6	5 47.3	24 96	100.1	5 40.0	24 96	100.6	5 32.7	25 96	101.1

10° 00′			10° 30′			11° 00′			11° 30′			H.A.
Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
67 00.0	1.0 02	180.0	66 30.0	1.0 02	180.0	66 00.0	1.0 02	180.0	65 30.0	1.0 02	180.0	00
66 58.7	1.0 06	177.5	66 28.7	1.0 06	177.5	65 58.8	1.0 06	177.6	65 28.8	1.0 06	177.6	1
66 54.9	1.0 11	175.0	66 25.0	1.0 10	175.1	65 55.1	1.0 10	175.2	65 25.2	1.0 10	175.3	2
66 48.5	99 15	172.5	66 18.7	99 14	172.6	65 49.0	99 14	172.8	65 19.2	99 14	172.9	3
66 39.6	99 19	170.0	66 10.0	99 19	170.2	65 40.4	99 18	170.4	65 10.8	99 18	170.6	4
66 28.2	98 23	167.6	65 58.9	98 22	167.8	65 29.5	98 22	168.1	65 00.2	98 22	168.3	05
66 14.5	97 27	165.2	65 45.4	97 26	165.5	65 16.3	97 26	165.8	64 47.2	97 25	166.1	6
65 58.4	96 31	162.9	65 29.6	96 30	163.2	65 00.9	96 29	163.5	64 32.1	96 29	163.9	7
65 40.0	94 34	160.6	65 11.7	95 34	161.0	64 43.2	95 33	161.3	64 14.8	96 32	161.7	8
65 19.5	93 38	158.3	64 51.5	93 37	158.8	64 23.5	94 36	159.2	63 55.4	94 36	159.6	9
64 56.9	92 41	156.2	64 29.4	92 40	156.6	64 01.7	92 40	157.1	63 34.0	92 39	157.5	10
64 32.3	90 44	154.1	64 05.2	90 43	154.6	63 38.0	91 43	155.1	63 10.7	91 42	155.5	1
64 05.8	89 47	152.0	63 39.2	89 46	152.6	63 12.4	89 46	153.1	62 45.6	90 45	153.6	2
63 37.5	87 50	150.1	63 11.4	87 49	150.6	62 45.1	88 48	151.2	62 18.7	88 48	151.7	3
63 07.6	85 53	148.2	62 41.9	86 52	148.8	62 16.1	86 51	149.3	61 50.2	87 50	149.9	4
62 35.9	84 55	146.4	62 10.8	84 54	147.0	61 45.5	85 54	147.5	61 20.0	85 53	148.1	15
62 02.8	82 58	144.6	61 38.2	82 57	145.2	61 13.3	83 56	145.8	60 48.4	83 55	146.4	6
61 28.3	80 60	142.9	61 04.1	81 59	143.5	60 39.8	81 58	144.1	60 15.3	82 57	144.7	7
60 52.4	79 62	141.3	60 28.7	79 61	141.9	60 04.9	80 60	142.5	59 40.9	80 59	143.1	8
60 15.2	77 64	139.7	59 52.9	78 63	140.4	59 28.7	78 62	141.0	59 05.2	79 62	141.6	9
59 36.8	75 66	138.2	59 14.2	76 65	138.9	58 51.3	76 64	139.5	58 28.3	77 63	140.1	20
58 57.4	74 68	136.8	58 35.2	74 67	137.5	58 12.8	75 66	138.1	57 50.3	75 65	138.7	1
58 16.8	72 69	135.4	57 55.1	73 68	136.1	57 33.3	73 68	136.7	57 11.2	74 67	137.4	2
57 35.3	70 71	134.1	57 14.1	71 70	134.8	56 52.7	72 69	135.4	56 31.1	72 68	136.0	3
56 52.9	69 72	132.9	56 32.2	70 71	133.5	56 11.2	70 71	134.2	55 50.0	71 70	134.8	4
56 09.6	67 74	131.6	55 49.3	68 73	132.3	55 28.8	69 72	132.9	55 08.1	69 71	133.6	25
55 25.5	66 75	130.5	55 05.7	67 74	131.1	54 45.6	67 73	131.8	54 25.3	68 73	132.4	6
54 40.7	64 76	129.4	54 21.3	65 75	130.0	54 01.6	66 74	130.7	53 41.8	66 74	131.3	7
53 55.1	63 77	128.3	53 36.1	64 76	128.9	53 16.9	64 76	129.6	52 57.5	65 75	130.2	8
53 08.9	62 78	127.2	52 50.3	62 77	127.9	52 31.5	63 77	128.5	52 12.5	64 76	129.2	9
52 22.1	60 79	126.3	52 03.9	61 78	126.9	51 45.5	62 78	127.5	51 26.9	62 77	128.2	30
51 34.6	59 80	125.3	51 16.8	60 79	125.9	50 58.8	60 79	126.6	50 40.6	61 78	127.2	1
50 46.7	58 81	124.4	50 29.2	58 80	125.0	50 11.6	59 80	125.7	49 53.8	60 79	126.3	2
49 58.1	57 82	123.5	49 41.1	57 81	124.1	49 23.8	58 80	124.8	49 06.4	59 80	125.4	3
49 09.2	55 82	122.6	48 52.5	56 82	123.3	48 35.6	57 81	123.9	48 18.4	57 81	124.5	4
48 19.7	54 83	121.8	48 03.4	55 83	122.5	47 46.8	56 82	123.1	47 30.0	56 81	123.7	35
47 29.8	53 84	121.0	47 13.8	54 83	121.7	46 57.6	54 83	122.3	46 41.2	55 82	122.9	6
46 39.5	52 84	120.3	46 23.9	53 84	120.9	46 08.0	53 83	121.5	45 51.9	54 83	122.1	7
45 48.9	51 85	119.6	45 33.5	52 85	120.2	45 17.9	52 84	120.8	45 02.2	53 84	121.4	8
44 57.8	50 86	118.8	44 42.8	51 85	119.5	44 27.5	51 85	120.1	44 12.1	52 84	120.7	9
44 06.5	49 86	118.2	43 51.7	50 86	118.8	43 36.7	50 85	119.4	43 21.6	51 85	120.0	40
43 14.8	48 87	117.5	43 00.3	49 86	118.1	42 45.6	49 86	118.7	42 30.8	50 85	119.3	1
42 22.8	47 87	116.9	42 08.6	48 87	117.5	41 54.2	48 86	118.1	41 39.6	49 86	118.6	2
41 30.5	46 88	116.3	41 16.5	47 87	116.8	41 02.4	47 87	117.4	40 48.2	48 86	118.0	3
40 37.9	45 88	115.7	40 24.2	46 88	116.2	40 10.4	46 87	116.8	39 56.4	47 87	117.4	4
39 45.1	44 88	115.1	39 31.7	45 88	115.7	39 18.1	46 88	116.2	39 04.4	46 87	116.8	45
38 52.0	44 89	114.5	38 38.8	44 88	115.1	38 25.5	45 88	115.7	38 12.0	45 88	116.2	6
37 58.7	43 89	114.0	37 45.8	43 89	114.5	37 32.7	44 88	115.1	37 19.5	44 88	115.7	7
37 05.2	42 90	113.4	36 52.5	43 89	114.0	36 39.7	43 89	114.6	36 26.7	44 88	115.1	8
36 11.4	41 90	112.9	35 59.0	42 90	113.5	35 46.4	42 89	114.1	35 33.6	43 89	114.6	9
35 17.5	40 90	112.4	35 05.3	41 90	113.0	34 52.9	41 89	113.6	34 40.4	42 89	114.1	50
34 23.4	40 90	112.0	34 11.4	40 90	112.5	33 59.2	41 90	113.1	33 46.9	41 89	113.6	1
33 29.0	39 91	111.5	33 17.3	40 90	112.0	33 05.3	40 90	112.6	32 53.3	40 90	113.1	2
32 34.6	38 91	111.0	32 23.0	39 91	111.6	32 11.3	39 90	112.1	31 59.4	40 90	112.7	3
31 39.9	38 91	110.6	31 28.5	38 91	111.1	31 17.0	39 91	111.7	31 05.4	39 90	112.2	4
30 45.1	37 92	110.2	30 33.9	38 91	110.7	30 22.6	38 91	111.2	30 11.2	38 91	111.8	55
29 50.2	36 92	109.7	29 39.2	37 92	110.3	29 28.0	37 91	110.8	29 16.8	38 91	111.3	6
28 55.1	36 92	109.3	28 44.3	36 92	109.9	28 33.3	37 91	110.4	28 22.3	37 91	110.9	7
27 59.8	35 92	108.9	27 49.2	36 92	109.5	27 38.5	36 92	110.0	27 27.6	36 91	110.5	8
27 04.5	35 92	108.6	26 54.0	35 92	109.1	26 43.4	35 92	109.6	26 32.8	36 92	110.1	9
26 09.0	34 93	108.2	25 58.7	34 92	108.7	25 48.3	35 92	109.2	25 37.8	35 92	109.7	60
25 13.4	34 93	107.8	25 03.3	34 93	108.3	24 53.0	34 92	108.8	24 42.7	35 92	109.4	1
24 17.7	33 93	107.4	24 07.7	33 93	108.0	23 57.6	34 92	108.5	23 47.5	34 92	109.0	2
23 21.8	32 93	107.1	23 12.0	33 93	107.6	23 02.1	33 93	108.1	22 52.1	33 92	108.6	3
22 25.9	32 93	106.7	22 16.3	32 93	107.3	22 06.5	33 93	107.8	21 56.7	33 93	108.3	4
21 29.9	31 94	106.4	21 20.4	32 93	106.9	21 10.8	32 93	107.4	21 01.1	32 93	107.9	65
20 33.7	31 94	106.1	20 24.4	31 93	106.6	20 15.0	32 93	107.1	20 05.4	32 93	107.6	6
19 37.5	31 94	105.8	19 28.3	31 94	106.3	19 19.0	31 93	106.8	19 09.7	31 93	107.3	7
18 41.2	30 94	105.4	18 32.2	30 94	105.9	18 23.0	31 94	106.4	18 13.8	31 93	106.9	8
17 44.8	30 94	105.1	17 35.9	30 94	105.6	17 26.9	30 94	106.1	17 17.8	30 93	106.6	9
16 48.3	29 94	104.8	16 39.6	29 94	105.3	16 30.7	30 94	105.8	16 21.8	30 94	106.3	70
15 51.8	29 94	104.5	15 43.1	29 94	105.0	15 34.4	29 94	105.5	15 25.6	29 94	106.0	1
14 55.2	28 94	104.2	14 46.6	29 94	104.7	14 38.0	29 94	105.2	14 29.4	29 94	105.7	2
13 58.5	28 95	104.0	13 50.1	28 94	104.4	13 41.6	28 94	104.9	13 33.1	29 94	105.4	3
13 01.7	28 95	103.7	12 53.4	28 95	104.2	12 45.1	28 94	104.7	12 36.7	28 94	105.1	4
12 04.9	27 95	103.4	11 56.7	27 95	103.9	11 48.5	27 94	104.4	11 40.2	28 94	104.9	75
11 07.9	27 95	103.1	10 59.9	27 95	103.6	10 51.8	27 95	104.1	10 43.7	27 94	104.6	6
10 11.0	26 95	102.9	10 03.0	27 95	103.3	9 55.1	27 96	103.8	9 47.1	27 94	104.3	7
9 14.0	26 95	102.6	9 06.1	26 95	103.1	8 58.3	26 95	103.6	8 50.4	26 96	104.1	8
8 16.9	26 95	102.3	8 09.2	26 95	102.8	8 01.4	26 96	103.3	7 53.6	26 95	103.8	9
7 19.7	25 95	102.1	7 12.1	25 95	102.6	7 04.5	26 95	103.1	6 56.8	26 95	103.5	80
6 22.5	25 95	101.8	6 15.0	25 95	102.3	6 07.5	25 95	102.8	6 00.0	25 95	103.3	1
5 25.3	25 95	101.6	5 17.9	25 95	102.1	5 10.5	25 95	102.6	5 03.0	25 95	103.1	2

H.A.	12° 00′			12° 30′			13° 00′			13° 30′			14° 00′			14° 30′			15° 00′			15° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	89 00.0	1.0 40	180.0	89 30.0	1.0 60	180.0	90 00.0	.. 97	....	89 30.0	1.0 59	00.0	89 00.0	1.0 40	00.0	88 30.0	1.0 29	00.0	88 00.0	1.0 22	00.0	87 30.0	1.0 18	00.0	00
1	88 36.1	72 80	135.6	88 54.2	46 92	117.0	89 01.5	00 97	89.9	88 54.3	46 92	62.7	88 36.3	72 79	44.1	88 12.8	84 67	32.8	87 46.6	90 56	25.8	87 19.1	93 48	21.1	1
2	87 48.4	46 90	116.9	87 59.2	26 96	104.2	88 03.1	00 97	89.8	87 59.4	24 95	75.4	87 48.8	45 90	62.6	87 32.8	61 82	52.1	87 12.8	71 75	43.9	86 50.2	79 67	37.5	2
3	86 54.3	33 94	108.5	87 01.9	17 96	99.4	87 04.6	01 97	89.7	87 02.2	16 96	79.9	86 55.0	32 93	70.7	86 43.4	45 80	62.4	86 28.1	56 83	55.2	86 09.9	65 78	49.0	3
4	85 58.1	26 95	103.9	86 04.0	13 97	96.9	86 06.2	01 97	89.5	86 04.5	12 97	82.2	85 59.0	24 95	75.1	85 50.1	35 92	68.4	85 38.0	45 88	62.3	85 23.2	53 84	56.7	4
05	85 01.0	21 96	101.0	85 05.9	11 97	95.3	85 07.7	01 97	89.4	85 06.5	09 97	83.6	85 02.2	19 96	77.8	84 55.0	28 94	72.3	84 45.2	37 91	67.0	84 32.8	45 88	62.1	05
6	84 03.5	18 96	99.0	84 07.6	10 97	94.2	84 09.2	01 97	89.3	84 08.3	07 97	84.4	84 04.9	16 96	79.6	83 58.9	24 94	74.9	83 50.7	31 92	70.3	83 40.2	38 90	66.0	6
7	83 05.6	16 97	97.6	83 09.3	09 97	93.4	83 10.8	01 97	89.2	83 10.1	06 97	85.0	83 07.2	13 96	80.8	83 02.3	20 96	76.7	82 55.2	27 94	72.8	82 46.2	33 92	68.9	7
8	82 07.6	14 97	96.4	82 10.9	08 97	92.8	82 12.3	02 97	89.1	82 11.8	05 97	85.4	82 09.4	11 97	81.8	82 05.2	17 96	78.1	81 59.1	23 94	74.6	81 51.2	29 93	71.2	8
9	81 09.4	13 97	95.5	81 12.5	07 97	92.3	81 13.9	02 97	89.0	81 13.6	04 97	85.7	81 11.5	10 97	82.4	81 07.9	15 96	79.2	81 02.5	20 96	76.0	80 55.6	26 94	72.9	9
10	80 11.2	12 97	94.7	80 14.1	07 97	91.8	80 15.4	02 97	88.9	80 15.2	03 97	85.9	80 13.6	08 97	83.0	80 10.3	13 96	80.1	80 05.7	18 96	77.2	79 59.5	23 94	74.3	10
1	79 12.9	11 97	94.1	79 15.6	07 97	91.4	79 17.0	02 97	88.8	79 16.9	02 97	86.1	79 15.5	07 97	83.4	79 12.7	12 96	80.7	79 08.6	16 95	78.1	79 03.1	20 95	75.5	1
2	78 14.6	11 97	93.6	78 17.2	07 97	91.1	78 18.5	02 97	88.6	78 18.6	02 97	86.2	78 17.4	06 97	83.7	78 15.0	10 96	81.3	78 11.3	14 96	78.8	78 06.4	18 95	76.4	2
3	77 16.2	10 97	93.1	77 18.7	06 97	90.8	77 20.1	03 97	88.5	77 20.3	01 97	86.3	77 19.3	05 97	84.0	77 17.1	09 96	81.7	77 13.9	13 96	79.4	77 09.4	17 95	77.2	3
4	76 17.8	10 97	92.6	76 20.3	06 97	90.5	76 21.6	03 97	88.4	76 21.9	01 97	86.3	76 21.1	04 97	84.2	76 19.3	08 97	82.1	76 16.3	12 96	80.0	76 12.3	15 95	77.9	4
15	75 19.4	10 97	92.3	75 21.8	06 97	90.3	75 23.2	03 97	88.3	75 23.6	00 97	86.3	75 23.0	04 97	84.3	75 21.3	07 97	82.4	75 18.7	10 96	80.4	75 15.1	14 96	78.4	15
6	74 21.0	09 97	91.9	74 23.3	06 97	90.0	74 24.8	03 97	88.2	74 25.2	00 97	86.3	74 24.8	03 97	84.5	74 23.4	06 97	82.6	74 21.0	09 96	80.8	74 17.8	12 96	78.9	6
7	73 22.6	09 97	91.6	73 24.9	06 97	89.8	73 26.3	03 97	88.1	73 26.9	00 97	86.3	73 26.6	03 97	84.6	73 25.4	05 97	82.8	73 23.3	08 96	81.1	73 20.4	11 96	79.3	7
8	72 24.1	09 97	91.3	72 26.4	06 97	89.6	72 27.9	04 97	88.0	72 28.6	01 97	86.3	72 28.4	02 97	84.6	72 27.4	05 97	83.0	72 25.6	07 96	81.3	72 22.9	10 96	79.7	8
9	71 25.7	09 97	91.0	71 28.0	06 97	89.4	71 29.5	04 97	87.8	71 30.2	01 97	86.3	71 30.2	01 97	84.7	71 29.3	04 97	83.1	71 27.7	07 96	81.5	71 25.4	09 96	80.0	9
20	70 27.2	09 97	90.7	70 29.5	06 97	89.2	70 31.1	04 97	87.7	70 31.9	01 97	86.2	70 32.0	01 97	84.7	70 31.3	03 97	83.2	70 29.9	06 96	81.7	70 27.8	08 96	80.2	20
1	69 28.7	09 97	90.5	69 31.0	06 97	89.0	69 32.6	04 97	87.6	69 33.5	02 97	86.2	69 33.7	01 97	84.8	69 33.2	03 97	83.3	69 32.0	05 96	81.9	69 30.1	08 96	80.5	1
2	68 30.3	09 97	90.2	68 32.6	07 97	88.9	68 34.2	04 97	87.5	68 35.2	02 97	86.1	68 35.5	00 97	84.8	68 35.2	02 97	83.4	68 34.1	05 97	82.0	68 32.5	07 96	80.7	2
3	67 31.8	09 97	90.0	67 34.1	07 97	88.7	67 35.8	05 97	87.4	67 36.9	02 97	86.1	67 37.3	00 97	84.8	67 37.1	02 97	83.4	67 36.2	04 97	82.1	67 34.8	06 96	80.8	3
4	66 33.4	09 97	89.8	66 35.7	07 97	88.5	66 37.4	05 97	87.3	66 38.6	03 97	86.0	66 39.1	01 97	84.7	66 39.0	01 97	83.5	66 38.3	03 97	82.2	66 37.0	05 96	81.0	4
25	65 34.9	09 97	89.6	65 37.3	07 97	88.4	65 39.0	05 97	87.1	65 40.2	03 97	85.9	65 40.9	01 97	84.7	65 40.9	01 97	83.5	65 40.4	03 97	82.3	65 39.3	05 96	81.1	25
6	64 36.4	09 97	89.4	64 38.8	07 97	88.2	64 40.7	05 97	87.0	64 41.9	03 97	85.9	64 42.7	01 97	84.7	64 42.8	00 97	83.5	64 42.5	02 97	82.3	64 41.5	04 96	81.2	6
7	63 38.0	09 97	89.2	63 40.4	07 97	88.0	63 42.3	05 97	86.9	63 43.6	04 97	85.8	63 44.5	02 97	84.7	63 44.7	00 97	83.5	63 44.5	02 97	82.4	63 43.7	03 96	81.3	7
8	62 39.5	09 97	89.0	62 42.0	07 97	87.9	62 43.9	06 97	86.8	62 45.3	04 97	85.7	62 46.2	02 97	84.6	62 46.7	01 97	83.5	62 46.6	01 97	82.4	62 46.0	03 96	81.3	8
9	61 41.1	09 97	88.8	61 43.5	07 97	87.7	61 45.5	06 97	86.7	61 47.0	04 97	85.6	61 48.0	03 97	84.6	61 48.6	01 97	83.5	61 48.6	01 97	82.4	61 48.2	02 96	81.4	9
30	60 42.6	09 97	88.6	60 45.1	08 97	87.6	60 47.2	06 97	86.6	60 48.7	04 97	85.5	60 49.9	03 97	84.5	60 50.5	01 97	83.5	60 50.7	00 97	82.4	60 50.3	02 96	81.4	30
1	59 44.2	09 97	88.4	59 46.7	08 97	87.4	59 48.8	06 97	86.4	59 50.5	05 97	85.4	59 51.7	03 97	84.4	59 52.4	02 97	83.4	59 52.7	00 97	82.5	59 52.5	01 96	81.5	1
2	58 45.8	09 97	88.2	58 48.3	08 97	87.3	58 50.5	06 97	86.3	58 52.2	05 97	85.3	58 53.5	04 97	84.4	58 54.3	02 97	83.4	58 54.7	01 97	82.4	58 54.7	01 96	81.5	2
3	57 47.3	09 97	88.1	57 49.9	08 97	87.1	57 52.1	07 97	86.2	57 53.9	05 97	85.2	57 55.3	04 97	84.3	57 56.3	02 97	83.4	57 56.8	01 97	82.4	57 56.9	00 96	81.5	3
4	56 48.9	10 97	87.9	56 51.6	08 97	87.0	56 53.8	07 97	86.1	56 55.7	06 97	85.2	56 57.1	04 97	84.2	56 58.2	03 97	83.3	56 58.8	02 97	82.4	56 59.1	00 96	81.5	4
35	55 50.5	10 97	87.7	55 53.2	08 97	86.8	55 55.5	07 97	85.9	55 57.4	06 97	85.1	55 59.0	05 97	84.2	56 00.1	03 97	83.3	56 00.9	02 97	82.4	56 01.3	01 96	81.5	35
6	54 52.1	10 97	87.6	54 54.8	09 97	86.7	54 57.2	07 97	85.8	54 59.2	06 97	85.0	55 00.8	05 97	84.1	55 02.1	04 97	83.2	55 02.9	02 97	82.3	55 03.5	01 96	81.5	6
7	53 53.7	10 97	87.4	53 56.4	09 97	86.5	53 58.9	08 97	85.7	54 01.0	06 97	84.8	54 02.7	05 97	84.0	54 04.0	04 97	83.1	54 05.0	03 97	82.3	54 05.6	02 96	81.4	7
8	52 55.3	10 97	87.2	52 58.1	09 97	86.4	53 00.6	08 97	85.6	53 02.7	07 97	84.7	53 04.5	05 97	83.9	53 06.0	04 97	83.1	53 07.1	03 97	82.2	53 07.8	02 96	81.4	8
9	51 56.9	10 97	87.1	51 59.8	09 97	86.3	52 02.3	08 97	85.4	52 04.5	07 97	84.6	52 06.4	06 97	83.8	52 07.9	05 97	83.0	52 09.2	03 97	82.2	52 10.0	02 96	81.4	9
40	50 58.5	10 97	86.9	51 01.4	09 97	86.1	51 04.0	08 97	85.3	51 06.3	07 97	84.5	51 08.3	06 97	83.7	51 09.9	05 97	82.9	51 11.2	04 96	82.1	51 12.2	03 96	81.3	40
1	50 00.1	10 97	86.7	50 03.1	09 97	86.0	50 05.8	08 97	85.2	50 08.1	07 97	84.4	50 10.2	06 97	83.6	50 11.9	05 97	82.9	50 13.3	04 96	82.1	50 14.4	03 96	81.3	1
2	49 01.8	11 97	86.6	49 04.8	10 97	85.8	49 07.5	09 97	85.1	49 09.9	08 97	84.3	49 12.1	07 97	83.5	49 13.9	06 97	82.8	49 15.4	05 96	82.0	49 16.7	04 96	81.2	2
3	48 03.4	11 97	86.4	48 06.5	10 97	85.7	48 09.3	09 97	84.9	48 11.8	08 97	84.2	48 14.0	07 97	83.4	48 15.9	06 97	82.7	48 17.5	05 96	81.9	48 18.9	04 96	81.2	3
4	47 05.1	11 97	86.3	47 08.2	10 97	85.5	47 11.1	09 97	84.8	47 13.6	08 97	84.1	47 15.9	07 97	83.3	47 17.9	06 97	82.6	47 19.7	05 96	81.9	47 21.1	04 96	81.1	4
45	46 06.7	11 97	86.1	46 09.9	10 97	85.4	46 12.8	09 97	84.7	46 15.5	08 97	84.0	46 17.9	07 97	83.2	46 20.0	07 97	82.5	46 21.8	06 96	81.8	46 23.3	05 96	81.1	45
6	45 08.4	11 97	86.0	45 11.6	10 97	85.3	45 14.6	10 97	84.5	45 17.4	09 97	83.8	45 19.8	08 97	83.1	45 22.0	07 97	82.4	45 23.9	06 96	81.7	45 25.6	05 96	81.0	6
7	44 10.1	11 97	85.8	44 13.4	11 97	85.1	44 16.4	10 97	84.4	44 19.2	09 97	83.7	44 21.8	08 97	83.0	44 24.1	07 97	82.3	44 26.1	06 96	81.6	44 27.9	05 96	80.9	7
8	43 11.8	12 97	85.6	43 15.1	11 97	85.0	43 18.3	10 97	84.3	43 21.1	09 97	83.6	43 23.8	08 97	82.9	43 26.1	08 97	82.2	43 28.3	07 96	81.5	43 30.1	06 96	80.9	8
9	42 13.5	12 97	85.5	42 16.9	11 97	84.8	42 20.1	10 97	84.1	42 23.0	09 97	83.5	42 25.7	09 97	82.8	42 28.2	08 97	82.1	42 30.4	07 96	81.4	42 32.4	06 96	80.8	9
50	41 15.2	12 97	85.3	41 18.7	11 97	84.7	41 21.9	10 97	84.0	41 25.0	10 97	83.3	41 27.7	09 97	82.7	41 30.3	08 96	82.0	41 32.6	07 96	81.4	41 34.7	07 96	80.7	50
1	40 17.0	12 97	85.2	40 20.5	11 97	84.5	40 23.8	11 97	83.9	40 26.9	10 97	83.2	40 29.8	09 97	82.6	40 32.4	08 96	81.9	40 34.8	08 96	81.3	40 37.0	07 96	80.6	1
2	39 18.7	12 97	85.0	39 22.3	12 97	84.4	39 25.7	11 97	83.7	39 28.9	10 97	83.1	39 31.8	09 97	82.4	39 34.5	09 96	81.8	39 37.1	08 96	81.2	39 39.4	07 96	80.5	2
3	38 20.5	13 97	84.9	38 24.1	12 97	84.2	38 27.6	11 97	83.6	38 30.8	10 97	83.0	38 33.9	10 97	82.3	38 36.7	09 96	81.7	38 39.3	08 96	81.1	38 41.7	08 96	80.4	3
4	37 22.3	13 97	84.7	37 26.0	12 97	84.1	37 29.5	11 97	83.5	37 32.8	11 97	82.8	37 35.9	10 97	82.2	37 38.8	09 96	81.6	37 41.6	09 96	81.0	37 44.1	08 96	80.3	4
55	36 24.1	13 97	84.6	36 27.8	12 97	83.9	36 31.4	12 97	83.3	36 34.8	11 97	82.7	36 38.0	10 96	82.1	36 41.0	10 96	81.5	36 43.8	09 96	80.8	36 46.5	08 96	80.2	55
6	35 25.9	13 97	84.4	35 29.7	12 97	83.8	35 33.4	12 97	83.2	35 36.8	11 97	82.6	35 40.1	11 96	82.0	35 43.2	10 96	81.3	35 46.1	09 96	80.7	35 48.9	09 96	80.1	6
7	34 27.7	13 97	84.2	34 31.6	13 97	83.6	34 35.3	12 97	83.0	34 38.9	12 97	82.4	34 42.2	11 96	81.8	34 45.4	10 96	81.2	34 48.4	10 95	80.6	34 51.3	09 96	80.0	7
8	33 29.5	14 97	84.1	33 33.5	13 97	83.5	33 37.3	12 97	82.9	33 40.9	12 97	82.3	33 44.4	11 96	81.7	33 47.7	11 96	81.1	33 50.8	10 96	80.5	33 53.7	09 96	79.9	8
9	32 31.4	14 97	83.9	32 35.4	13 97	83.3	32 39.3	13 97	82.7	32 43.0	12 96	82.2	32 46.5	12 96	81.6	32 49.9	11 96	81.0	32 53.1	10 96	80.4	32 56.2	10 96	79.8	9
60	31 33.3	14 97	83.8	31 37.4	13 97	83.2	31 41.3	13 97	82.6	31 45.1	12 96	82.0	31 48.7	12 96	81.4	31 52.2	11 96	80.8	31 55.5	11 96	80.3	31 58.6	10 96	79.7	60
1	30 35.2	14 97	83.6	30 39.3	14 97	83.0	30 43.3	13 97	82.5	30 47.2	13 96	81.9	30 50.9	12 96	81.3	30 54.5	12 96	80.7	30 57.9	11 96	80.1	31 01.1	11 96	79.6	1
2	29 37.1	14 97	83.4	29 41.3	14 97	82.9	29 45.4	13 97	82.3	29 49.3	13 96	81.7	29 53.1	12 96	81.2	29 56.8	12 96	80.6	30 00.3	11 96	80.0	30 03.6	11 96	79.4	2
3	28 39.0	15 97	83.3	28 43.3	14 97	82.7	28 47.5	14 97	82.2	28 51.5	13 96	81.6	28 55.4	13 96	81.0	28 59.1	12 96	80.5	29 02.7	12 96	79.9	29 06.2	11 96	79.3	3
4	27 41.0	15 97	83.1	27 45.3	14 97	82.6	27 49.6	14 96	82.0	27 53.7	13 96	81.4	27 57.7	13 96	80.9	28 01.5	13 96	80.3	28 05.2	12 96	79.8	28 08.7	12 96	79.2	4
65	26 42.9	15 97	83.0	26 47.4	15 97	82.4	26 51.7	14 96	81.8	26 55.9	14 96	81.3	26 59.9	13 96	80.7	27 03.9	13 96	80.2	27 07.7	12 96	79.6	27 11.3	12 96	79.1	65
6	25 44.9	15 97	82.8	25 49.4	15 97	82.2	25 53.8	14 96	81.7	25 58.1	14 96	81.1	26 02.3	14 96	80.6	26 06.3	13 96	80.0	26 10.2	13 96	79.5	26 13.9	12 96	78.9	6
7	24 46.9	16 97	82.6	24 51.5	15 96	82.1	24 56.0	15 96	81.5	25 00.4	14 96	81.0	25 04.6	14 96	80.4	25 08.7	14 96	79.9	25 12.7	13 96	79.3	25 16.6	13 96	78.8	7
8	23 49.0	16 97	82.5	23 53.6	15 96	81.9	23 58.2	15 96	81.4	24 02.6	15 96	80.8	24 07.0	14 96	80.3	24 11.2	14 96	79.7	24 15.3	13 96	79.2	24 19.3	13 96	78.7	8
9	22 51.0	16 97	82.3	22 55.8	16 96	81.7	23 00.4	15 96	81.2	23 04.9	15 96	80.7	23 09.3	15 96	80.1	23 13.7	14 96	79.6	23 17.9	14 96	79.1	23 21.9	13 95	78.5	9
70	21 53.1	16 96	82.1	21 57.9	16 96	81.6	22 02.6	16 96	81.0	22 07.2	15 96	80.5	22 11.8	15 96	80.0	22 16.2	15 96	79.4	22 20.5	14 96	78.9	22 24.7	14 95	78.4	70
1	20 55.2	16 96	81.9	21 00.1	16 96	81.4	21 04.9	16 96	80.9	21 09.6	16 96	80.4	21 14.2	15 96	79.8	21 18.7	15 96	79.3	21 23.1	15 96	78.8	21 27.4	14 95	78.2	1
2	19 57.3	17 96	81.8	20 02.3	16 96	81.2	20 07.2	16 96	80.7	20 12.0	16 96	80.2	20 16.7	16 96	79.7	20 21.3	15 96	79.1	20 25.8	15 96	78.6	20 30.2	15 95	78.1	2
3	18 59.5	17 96	81.6	19 04.5	17 96	81.1	19 09.5	16 96	80.5	19 14.4	16 96	80.0	19 19.2	16 96	79.5	19 23.9	16 96	79.0	19 28.5	15 95	78.5	19 33.0	15 95	77.9	3
4	18 01.7	17 96	81.4	18 06.8	17 96	80.9	18 11.8	17 96	80.4	18 16.8	16 96	79.9	18 21.7	16 96	79.3	18 26.5	16 96	78.8	18 31.2	16 95	78.3	18 35.9	15 95	77.8	4
75	17 03.9	18 96	81.2	17 09.1	17 96	80.7	17 14.2	17 96	80.2	17 19.3	17 96	79.7	17 24.3	16 96	79.2	17 29.2	16 96	78.7	17 34.0	16 95	78.1	17 38.7	16 95	77.6	75
6	16 06.1	18 96	81.1	16 11.4	18 96	80.5	16 16.6	17 96	80.0	16 21.8	17 96	79.5	16 26.9	17 96	79.0	16 31.9	17 95	78.5	16 36.8	16 95	78.0	16 41.7	16 95	77.5	6
7	15 08.4	18 96	80.9	15 13.7	18 96	80.4	15 19.1	18 96	79.9	15 24.3	17 96	79.3	15 29.5	17 96	78.8	15 34.6	17 95	78.3	15 39.6	17 95	77.8	15 44.6	16 95	77.3	7
8	14 10.6	18 96	80.7	14 16.1	18 96	80.2	14 21.5	18 96	79.7	14 26.9	18 96	79.2	14 32.2	17 96	78.7	14 37.4	17 95	78.2	14 42.5	17 95	77.6	14 47.6	17 95	77.1	8
9	13 13.0	19 96	80.5	13 18.5	18 96	80.0	13 24.0	18 96	79.5	13 29.5	18 96	79.0	13 34.8	18 95	78.5	13 40.2	18 95	78.0	13 45.4	17 95	77.5	13 50.6	17 95	77.0	9
80	12 15.3	19 96	80.3	12 21.0	19 96	79.8	12 26.6	19 96	79.3	12 32.1	18 96	78.8	12 37.6	18 95	78.3	12 43.0	18 95	77.8	12 48.4	18 95	77.3	12 53.7	18 95	76.8	80
1	11 17.7	19 96	80.1	11 23.4	19 96	79.6	11 29.1	19 96	79.1	11 34.8	19 96	78.6	11 40.4	19 95	78.1	11 45.9	18 95	77.6	11 51.4	18 95	77.1	11 56.8	18 95	76.6	1
2	10 20.1	20 96	79.9	10 26.0	19 96	79.4	10 31.7	19 96	78.9	10 37.5	19 95	78.4	10 43.2	19 95	77.9	10 48.8	19 95	77.4	10 54.4	19 95	76.9	10 59.9	18 95	76.4	2
3	9 22.6	20 96	79.7	9 28.5	20 96	79.2	9 34.4	20 96	78.7	9 40.2	19 95	78.2	9 46.0	19 95	77.7	9 51.8	19 95	77.3	9 57.5	19 95	76.8	10 03.1	19 95	76.3	3
4	8 25.1	20 96	79.5	8 31.1	20 96	79.0	8 37.1	20 95	78.5	8 43.0	20 95	78.1	8 48.9	20 95	77.6	8 54.8	19 95	77.1	9 00.6	19 95	76.6	9 06.4	19 95	76.1	4
85	7 27.6	20 96	79.3	7 33.7	20 96	78.8	7 39.8	20 95	78.4	7 45.8	20 95	77.9	7 51.8	20 95	77.4	7 57.8	20 95	76.9	8 03.7	20 95	76.4	8 09.6	20 94	75.9	85
6	6 30.2	21 96	79.1	6 36.4	21 96	78.6	6 42.5	21 95	78.2	6 48.7	20 95	77.7	6 54.8	20 95	77.2	7 00.9	20 95	76.7	7 06.9	20 95	76.2	7 13.0	20 94	75.7	6
7	5 32.8	21 96	78.9	5 39.1	21 96	78.4	5 45.4	21 95	77.9	5 51.6	21 95	77.5	5 57.8	21 95	77.0	6 04.0	21 95	76.5	6 10.2	21 94	76.0	6 16.3	20 94	75.5	7
8													5 00.9	21 95	76.8	5 07.2	21 95	76.3	5 13.5	21 94	75.8	5 19.8	21 94	75.3	8

H.A.	12° 00′			12° 30′			13° 00′			13° 30′			14° 00′			14° 30′			15° 00′			15° 30′			H.A.
°	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	Alt. ° ′	Δd Δt	Az. °	°
00	65 00.0	1.0 02	180.0	64 30.0	1.0 02	180.0	64 00.0	1.0 02	180.0	63 30.0	1.0 02	180.0	63 00.0	1.0 02	180.0	62 30.0	1.0 02	180.0	62 00.0	1.0 02	180.0	61 30.0	1.0 02	180.0	00
1	64 58.8	1.0 06	177.7	64 28.8	1.0 06	177.7	63 58.9	1.0 06	177.8	63 28.9	1.0 06	177.8	62 58.9	1.0 05	177.9	62 28.9	1.0 05	177.9	61 59.0	1.0 05	177.9	61 29.0	1.0 05	178.0	1
2	64 55.3	1.0 10	175.4	64 25.4	1.0 10	175.5	63 55.5	1.0 09	175.6	63 25.6	1.0 09	175.6	62 55.6	1.0 09	175.7	62 25.7	1.0 09	175.8	61 55.8	1.0 09	175.9	61 25.9	1.0 09	176.0	2
3	64 49.4	99 14	173.1	64 19.6	99 13	173.2	63 49.8	99 13	173.4	63 20.0	99 13	173.5	62 50.2	99 13	173.6	62 20.4	99 12	173.7	61 50.6	99 12	173.9	61 20.8	99 12	174.0	3
4	64 41.2	99 17	170.8	64 11.6	99 17	171.0	63 42.0	99 17	171.2	63 12.3	99 16	171.3	62 42.6	99 16	171.5	62 13.0	99 16	171.7	61 43.3	99 16	171.8	61 13.6	99 15	172.0	4
05	64 30.8	98 21	168.6	64 01.3	98 21	168.8	63 31.9	98 20	169.0	63 02.4	98 20	169.2	62 33.0	98 20	169.4	62 03.5	98 19	169.6	61 34.0	98 19	169.8	61 04.4	98 19	170.0	05
6	64 18.1	97 25	166.4	63 48.9	97 24	166.6	63 19.7	97 24	166.9	62 50.5	97 23	167.1	62 21.2	98 23	167.4	61 51.9	98 23	167.6	61 22.6	98 22	167.8	60 53.3	98 22	168.1	6
7	64 03.2	96 28	164.2	63 34.3	96 28	164.5	63 05.4	96 27	164.8	62 36.4	97 27	165.1	62 07.4	97 26	165.4	61 38.4	97 26	165.6	61 09.3	97 25	165.9	60 40.2	97 25	166.1	7
8	63 46.2	95 32	162.1	63 17.7	95 31	162.4	62 49.0	95 31	162.7	62 20.4	96 30	163.1	61 51.7	96 29	163.4	61 22.9	96 29	163.7	60 54.1	96 28	164.0	60 25.3	96 28	164.2	8
9	63 27.2	94 35	160.0	62 59.0	94 34	160.4	62 30.7	94 34	160.7	62 02.4	95 33	161.1	61 34.0	95 33	161.4	61 05.5	95 32	161.7	60 37.0	95 32	162.1	60 08.5	95 31	162.4	9
10	63 06.2	93 38	157.9	62 38.4	93 38	158.4	62 10.4	93 37	158.7	61 42.5	93 36	159.1	61 14.4	94 36	159.5	60 46.3	94 35	159.9	60 18.1	94 34	160.2	59 49.9	94 34	160.6	10
1	62 43.3	91 41	156.0	62 15.9	92 40	156.4	61 48.3	92 40	156.8	61 20.7	92 39	157.2	60 53.0	92 38	157.6	60 25.3	93 38	158.0	59 57.5	93 37	158.4	59 29.6	93 37	158.8	1
2	62 18.6	90 44	154.0	61 51.6	90 43	154.5	61 24.5	91 43	155.0	60 57.2	91 42	155.4	60 29.9	91 41	155.8	60 02.6	91 41	156.2	59 35.1	92 40	156.6	59 07.6	92 39	157.0	2
3	61 52.2	89 47	152.2	61 25.6	89 46	152.7	60 58.9	89 45	153.1	60 32.1	90 45	153.6	60 05.2	90 44	154.0	59 38.2	90 43	154.5	59 11.1	90 43	154.9	58 43.9	91 42	155.3	3
4	61 24.1	87 49	150.4	60 57.9	87 49	150.9	60 31.7	88 48	151.4	60 05.3	88 47	151.9	59 38.8	88 47	152.3	59 12.2	89 46	152.8	58 45.5	89 45	153.2	58 18.8	89 44	153.7	4
15	60 54.4	85 52	148.6	60 28.7	86 51	149.1	60 02.9	86 50	149.7	59 36.9	87 50	150.2	59 10.9	87 49	150.6	58 44.7	87 48	151.1	58 18.4	88 48	151.6	57 52.1	88 47	152.0	15
6	60 23.3	84 54	146.9	59 58.0	84 54	147.5	59 32.6	85 53	148.0	59 07.1	85 52	148.5	58 41.5	86 51	149.0	58 15.8	86 51	149.5	57 49.9	86 50	150.0	57 24.0	87 49	150.5	6
7	59 50.7	82 57	145.3	59 25.9	83 56	145.9	59 01.0	83 55	146.4	58 35.9	84 54	146.9	58 10.7	84 54	147.5	57 45.4	85 53	148.0	57 20.0	85 52	148.5	56 54.4	85 51	148.9	7
8	59 16.7	81 59	143.7	58 52.4	81 58	144.3	58 27.9	82 57	144.9	58 03.3	82 56	145.4	57 38.6	83 56	145.9	57 13.7	83 55	146.4	56 48.7	84 54	147.0	56 23.6	84 53	147.5	8
9	58 41.5	79 61	142.2	58 17.7	80 60	142.8	57 53.7	80 59	143.4	57 29.5	81 58	143.9	57 05.2	81 58	144.5	56 40.8	82 57	145.0	56 16.2	82 56	145.5	55 51.6	82 55	146.0	9
20	58 05.1	78 63	140.7	57 41.7	78 62	141.3	57 18.2	79 61	141.9	56 54.5	79 60	142.5	56 30.7	80 60	143.0	56 06.7	80 59	143.6	55 42.5	81 58	144.1	55 18.3	81 57	144.6	20
1	57 27.5	76 64	139.3	57 04.6	77 64	139.9	56 41.6	77 63	140.5	56 18.3	78 62	141.1	55 54.9	78 61	141.6	55 31.4	79 61	142.2	55 07.7	79 60	142.7	54 43.9	80 59	143.3	1
2	56 48.9	75 66	138.0	56 26.5	75 65	138.6	56 03.8	76 65	139.2	55 41.1	76 64	139.8	55 18.1	77 63	140.3	54 55.0	77 62	140.9	54 31.8	78 62	141.4	54 08.4	78 61	142.0	2
3	56 09.3	73 68	136.7	55 47.3	74 67	137.3	55 25.1	74 66	137.9	55 02.8	75 65	138.5	54 40.3	75 65	139.0	54 17.6	76 64	139.6	53 54.8	76 63	140.2	53 31.8	77 63	140.7	3
4	55 28.7	71 69	135.4	55 07.2	72 68	136.0	54 45.4	73 68	136.6	54 23.5	73 67	137.2	54 01.5	74 66	137.8	53 39.3	74 66	138.4	53 16.9	75 65	138.9	52 54.3	75 64	139.5	4
25	54 47.2	70 71	134.2	54 26.1	71 70	134.8	54 04.8	71 69	135.4	53 43.4	72 68	136.0	53 21.8	72 68	136.6	53 00.0	73 67	137.2	52 38.0	73 66	137.7	52 15.9	74 66	138.3	25
6	54 04.9	69 72	133.0	53 44.2	69 71	133.7	53 23.4	70 70	134.3	53 02.4	70 70	134.9	52 41.2	71 69	135.4	52 19.8	72 68	136.0	51 58.2	72 68	136.6	51 36.5	73 67	137.1	6
7	53 21.8	67 73	131.9	53 01.5	68 72	132.5	52 41.1	68 72	133.1	52 20.5	69 71	133.7	51 59.7	70 70	134.3	51 38.8	70 70	134.9	51 17.6	71 69	135.5	50 56.4	71 68	136.0	7
8	52 37.9	66 74	130.8	52 18.1	66 74	131.5	51 58.1	67 73	132.1	51 37.9	68 72	132.7	51 17.5	68 72	133.2	50 57.0	69 71	133.8	50 36.3	69 70	134.4	50 15.4	70 70	135.0	8
9	51 53.3	64 75	129.8	51 33.9	65 75	130.4	51 14.3	66 74	131.0	50 54.5	66 73	131.6	50 34.6	67 73	132.2	50 14.4	67 72	132.8	49 54.1	68 71	133.4	49 33.6	69 71	133.9	9
30	51 08.1	63 76	128.8	50 49.1	64 76	129.4	50 29.9	64 75	130.0	50 10.5	65 74	130.6	49 50.9	66 74	131.2	49 31.2	66 73	131.8	49 11.3	67 73	132.4	48 51.2	67 72	132.9	30
1	50 22.2	62 77	127.8	50 03.6	62 77	128.4	49 44.8	63 76	129.0	49 25.8	64 76	129.6	49 06.6	64 75	130.2	48 47.3	65 74	130.8	48 27.7	65 74	131.4	48 08.0	66 73	132.0	1
2	49 35.7	60 78	126.9	49 17.5	61 78	127.5	48 59.1	62 77	128.1	48 40.5	62 76	128.7	48 21.7	63 76	129.3	48 02.7	64 75	129.9	47 43.6	64 75	130.5	47 24.2	65 74	131.0	2
3	48 48.7	59 79	126.0	48 30.8	60 79	126.6	48 12.8	60 78	127.2	47 54.5	61 77	127.8	47 36.1	62 77	128.4	47 17.5	62 76	129.0	46 58.8	63 76	129.5	46 39.8	63 75	130.1	3
4	48 01.1	58 80	125.1	47 43.6	59 80	125.7	47 26.0	59 79	126.3	47 08.1	60 78	126.9	46 50.0	60 78	127.5	46 31.8	61 77	128.1	46 13.4	62 76	128.7	45 54.8	62 76	129.2	4
35	47 13.1	57 81	124.3	46 55.9	57 80	124.9	46 38.6	58 80	125.5	46 21.1	59 79	126.1	46 03.4	59 79	126.7	45 45.5	60 78	127.3	45 27.5	60 77	127.8	45 09.3	61 77	128.4	35
6	46 24.6	56 82	123.5	46 07.8	56 81	124.1	45 50.8	57 80	124.7	45 33.6	58 80	125.3	45 16.3	58 79	125.9	44 58.8	59 79	126.4	44 41.1	59 78	127.0	44 23.2	60 78	127.6	6
7	45 35.6	55 82	122.7	45 19.1	55 82	123.3	45 02.5	56 81	123.9	44 45.7	56 81	124.5	44 28.7	57 80	125.1	44 11.5	58 80	125.6	43 54.1	58 79	126.2	43 36.6	59 78	126.8	7
8	44 46.2	53 83	122.0	44 30.1	54 82	122.6	44 13.8	55 82	123.2	43 57.3	55 81	123.7	43 40.6	56 81	124.3	43 23.7	56 80	124.9	43 06.7	57 80	125.5	42 49.6	58 79	126.0	8
9	43 56.4	52 84	121.3	43 40.6	53 83	121.8	43 24.6	54 83	122.4	43 08.4	54 82	123.0	42 52.1	55 82	123.6	42 35.6	55 81	124.1	42 18.9	56 80	124.7	42 02.0	56 80	125.3	9
40	43 06.3	51 84	120.6	42 50.8	52 84	121.1	42 35.1	53 83	121.7	42 19.2	53 83	122.3	42 03.2	54 82	122.9	41 47.0	54 82	123.4	41 30.6	55 81	124.0	41 14.1	55 81	124.5	40
1	42 15.7	50 85	119.9	42 00.5	51 84	120.5	41 45.2	52 84	121.0	41 29.6	52 83	121.6	41 13.9	53 83	122.2	40 58.0	53 82	122.7	40 42.0	54 82	123.3	40 25.7	54 81	123.8	1
2	41 24.9	49 85	119.2	41 10.0	50 85	119.8	40 54.9	51 84	120.4	40 39.6	51 84	120.9	40 24.2	52 83	121.5	40 08.6	52 83	122.1	39 52.9	53 82	122.6	39 37.0	53 82	123.2	2
3	40 33.7	48 86	118.6	40 19.1	49 85	119.2	40 04.3	50 85	119.7	39 49.3	50 84	120.3	39 34.2	51 84	120.9	39 18.9	51 83	121.4	39 03.5	52 83	122.0	38 47.9	52 82	122.5	3
4	39 42.2	48 86	118.0	39 27.9	48 86	118.5	39 13.4	49 85	119.1	38 58.7	49 85	119.7	38 43.9	50 84	120.2	38 28.9	50 84	120.8	38 13.7	51 83	121.3	37 58.4	51 83	121.9	4
45	38 50.4	47 87	117.4	38 36.4	47 86	117.9	38 22.1	48 86	118.5	38 07.7	48 85	119.1	37 53.2	49 85	119.6	37 38.5	49 84	120.2	37 23.6	50 84	120.7	37 08.6	50 84	121.3	45
6	37 58.4	46 87	116.8	37 44.6	46 87	117.4	37 30.6	47 86	117.9	37 16.5	47 86	118.5	37 02.2	48 85	119.0	36 47.8	48 85	119.6	36 33.2	49 85	120.1	36 18.5	49 84	120.7	6
7	37 06.1	45 88	116.2	36 52.5	45 87	116.8	36 38.8	46 87	117.4	36 25.0	46 86	117.9	36 11.0	47 86	118.5	35 56.8	47 85	119.0	35 42.5	48 85	119.5	35 28.0	48 85	120.1	7
8	36 13.5	44 88	115.7	36 00.2	45 88	116.3	35 46.8	45 87	116.8	35 33.2	46 87	117.4	35 19.4	46 86	117.9	35 05.5	47 86	118.4	34 51.5	47 85	119.0	34 37.3	48 85	119.5	8
9	35 20.7	43 88	115.2	35 07.7	44 88	115.7	34 54.5	44 88	116.3	34 41.1	45 87	116.8	34 27.6	45 87	117.4	34 14.0	46 86	117.9	34 00.2	46 86	118.4	33 46.3	47 85	119.0	9
50	34 27.7	42 89	114.7	34 14.9	43 88	115.2	34 01.9	43 88	115.8	33 48.8	44 88	116.3	33 35.6	44 87	116.8	33 22.2	45 87	117.4	33 08.7	45 86	117.9	32 55.0	46 86	118.4	50
1	33 34.5	42 89	114.2	33 21.9	42 89	114.7	33 09.2	43 88	115.2	32 56.3	43 88	115.8	32 43.3	44 88	116.3	32 30.1	44 87	116.9	32 16.9	44 87	117.4	32 03.5	45 86	117.9	1
2	32 41.0	41 89	113.7	32 28.7	41 89	114.2	32 16.2	42 89	114.8	32 03.5	42 88	115.3	31 50.8	43 88	115.8	31 37.9	43 88	116.4	31 24.8	44 87	116.9	31 11.7	44 87	117.4	2
3	31 47.4	40 90	113.2	31 35.3	41 89	113.7	31 23.0	41 89	114.3	31 10.6	42 89	114.8	30 58.0	42 88	115.3	30 45.4	42 88	115.9	30 32.6	43 87	116.4	30 19.7	43 87	116.9	3
4	30 53.6	40 90	112.8	30 41.7	40 90	113.3	30 29.6	40 89	113.8	30 17.4	41 89	114.4	30 05.1	41 89	114.9	29 52.7	42 88	115.4	29 40.1	42 88	115.9	29 27.4	42 87	116.4	4
55	29 59.6	39 90	112.3	29 47.9	39 90	112.8	29 36.0	40 90	113.4	29 24.1	40 89	113.9	29 12.0	40 89	114.4	28 59.8	41 88	114.9	28 47.4	41 88	115.5	28 35.0	42 88	116.0	55
6	29 05.4	38 91	111.9	28 53.9	39 90	112.4	28 42.3	39 90	112.9	28 30.5	39 90	113.5	28 18.7	40 89	114.0	28 06.7	40 89	114.5	27 54.6	41 88	115.0	27 42.3	41 88	115.5	6
7	28 11.1	37 91	111.5	27 59.8	38 90	112.0	27 48.3	38 90	112.5	27 36.8	39 90	113.0	27 25.1	39 89	113.5	27 13.4	39 89	114.1	27 01.5	40 89	114.6	26 49.5	40 88	115.1	7
8	27 16.6	37 91	111.0	27 05.5	37 91	111.6	26 54.3	38 90	112.1	26 42.9	38 90	112.6	26 31.5	38 90	113.1	26 19.9	39 89	113.6	26 08.2	39 89	114.2	25 56.5	39 89	114.7	8
9	26 22.0	36 91	110.6	26 11.0	37 91	111.2	26 00.0	37 91	111.7	25 48.9	37 90	112.2	25 37.6	38 90	112.7	25 26.3	38 90	113.2	25 14.8	38 89	113.7	25 03.2	39 89	114.2	9
60	25 27.2	36 92	110.3	25 16.4	36 91	110.8	25 05.6	36 91	111.3	24 54.7	37 91	111.8	24 43.6	37 90	112.3	24 32.5	37 90	112.8	24 21.2	38 90	113.3	24 09.8	38 89	113.8	60
1	24 32.3	35 92	109.9	24 21.7	35 91	110.4	24 11.1	36 91	110.9	24 00.3	36 91	111.4	23 49.5	36 90	111.9	23 38.5	37 90	112.4	23 27.4	37 90	112.9	23 16.3	37 90	113.4	1
2	23 37.2	34 92	109.5	23 26.8	35 92	110.0	23 16.4	35 91	110.5	23 05.8	35 91	111.0	22 55.1	36 91	111.5	22 44.4	36 90	112.0	22 33.5	36 90	112.6	22 22.6	37 90	113.1	2
3	22 42.0	34 92	109.1	22 31.9	34 92	109.6	22 21.6	34 92	110.2	22 11.2	35 91	110.7	22 00.7	35 91	111.2	21 50.1	35 91	111.7	21 39.5	36 90	112.2	21 28.7	36 90	112.7	3
4	21 46.8	33 92	108.8	21 36.7	34 92	109.3	21 26.6	34 92	109.8	21 16.4	34 92	110.3	21 06.1	34 91	110.8	20 55.7	35 91	111.3	20 45.3	35 91	111.8	20 34.7	35 90	112.3	4
65	20 51.4	33 93	108.4	20 41.5	33 92	108.9	20 31.5	33 92	109.4	20 21.5	34 92	110.0	20 11.4	34 91	110.5	20 01.2	34 91	111.0	19 50.9	34 91	111.5	19 40.5	35 90	112.0	65
6	19 55.8	32 93	108.1	19 46.1	32 92	108.6	19 36.4	33 92	109.1	19 26.5	33 92	109.6	19 16.6	33 92	110.1	19 06.5	34 91	110.6	18 56.4	34 91	111.1	18 46.2	34 91	111.6	6
7	19 00.2	32 93	107.8	18 50.7	32 93	108.3	18 41.1	32 92	108.8	18 31.4	32 92	109.3	18 21.6	33 92	109.8	18 11.8	33 92	110.3	18 01.8	33 91	110.8	17 51.8	33 91	111.3	7
8	18 04.5	31 93	107.4	17 55.1	31 93	107.9	17 45.7	32 93	108.4	17 36.1	32 92	108.9	17 26.5	32 92	109.4	17 16.9	32 92	109.9	17 07.1	33 91	110.4	16 57.3	33 91	110.9	8
9	17 08.7	31 93	107.1	16 59.4	31 93	107.6	16 50.1	31 93	108.1	16 40.8	31 92	108.6	16 31.3	32 92	109.1	16 21.8	32 92	109.6	16 12.3	32 92	110.1	16 02.6	32 91	110.6	9
70	16 12.8	30 93	106.8	16 03.7	30 93	107.3	15 54.5	31 93	107.8	15 45.3	31 93	108.3	15 36.1	31 92	108.8	15 26.7	31 92	109.3	15 17.3	31 92	109.8	15 07.8	32 92	110.3	70
1	15 16.7	30 94	106.5	15 07.8	30 93	107.0	14 58.8	30 93	107.5	14 49.8	30 93	108.0	14 40.7	30 92	108.5	14 31.5	31 92	109.0	14 22.2	31 92	109.5	14 12.9	31 92	110.0	1
2	14 20.7	29 94	106.2	14 11.9	29 93	106.7	14 03.0	30 93	107.2	13 54.1	30 93	107.7	13 45.2	30 93	108.2	13 36.1	30 92	108.7	13 27.1	30 92	109.2	13 17.9	31 92	109.7	2
3	13 24.5	29 94	105.9	13 15.8	29 94	106.4	13 07.1	29 93	106.9	12 58.4	29 93	107.4	12 49.6	29 93	107.9	12 40.7	30 93	108.4	12 31.8	30 92	108.9	12 22.8	30 92	109.4	3
4	12 28.2	28 94	105.6	12 19.7	28 94	106.1	12 11.2	29 93	106.6	12 02.6	29 93	107.1	11 53.9	29 93	107.6	11 45.2	29 93	108.1	11 36.4	29 92	108.6	11 27.6	29 92	109.1	4
75	11 31.9	28 94	105.4	11 23.5	28 94	105.8	11 15.1	28 94	106.3	11 06.6	28 93	106.8	10 58.1	28 93	107.3	10 49.6	29 93	107.8	10 41.0	29 93	108.3	10 32.3	29 92	108.8	75
6	10 35.5	27 94	105.1	10 27.2	28 94	105.6	10 19.0	28 94	106.1	10 10.6	28 93	106.6	10 02.3	28 93	107.0	9 53.9	28 93	107.5	9 45.4	28 93	108.0	9 36.9	28 92	108.5	6
7	9 39.0	27 94	104.8	9 30.9	27 94	105.3	9 22.7	27 94	105.8	9 14.6	27 94	106.3	9 06.3	27 93	106.8	8 58.1	28 93	107.3	8 49.8	28 93	107.7	8 41.4	28 93	108.2	7
8	8 42.4	27 94	104.6	8 34.5	27 94	105.0	8 26.4	27 94	105.5	8 18.4	27 94	106.0	8 10.3	27 93	106.5	8 02.2	27 93	107.0	7 54.0	27 93	107.5	7 45.9	27 93	108.0	8
9	7 45.8	26 94	104.3	7 38.0	26 94	104.8	7 30.1	26 94	105.3	7 22.2	26 94	105.8	7 14.2	27 94	106.2	7 06.2	27 93	106.7	6 58.2	27 93	107.2	6 50.2	27 93	107.7	9
80	6 49.1	26 95	104.0	6 41.4	26 94	104.5	6 33.6	26 94	105.0	6 25.9	26 94	105.5	6 18.1	26 94	106.0	6 10.2	26 94	106.5	6 02.4	26 93	107.0	5 54.5	26 93	107.4	80
1	5 52.4	25 95	103.8	5 44.8	25 94	104.3	5 37.1	25 94	104.8	5 29.5	26 94	105.2	5 21.8	26 94	105.7	5 14.1	26 94	106.2	5 06.4	26 93	106.7				1

DECLINATION SAME NAME AS LATITUDE

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	87 00.0	1.0 15	00.0	86 30.0	1.0 13	00.0	86 00.0	1.0 12	00.0	85 30.0	1.0 10	00.0	85 00.0	1.0 09	00.0	84 30.0	1.0 08	00.0	84 00.0	1.0 08	00.0	83 30.0	1.0 07	00.0	00
1	86 50.9	96 42	17.8	86 22.1	96 37	15.3	85 53.1	97 33	13.4	85 23.9	98 29	12.0	84 54.5	98 27	10.8	84 25.0	98 24	09.8	83 55.4	99 22	09.0	83 25.8	99 21	08.3	1
2	86 25.8	84 60	32.6	86 00.1	87 55	28.7	85 33.5	90 50	25.5	85 06.2	92 45	23.0	84 38.5	93 42	20.8	84 10.4	94 38	19.0	83 42.0	95 36	17.5	83 13.4	96 33	16.2	2
3	85 49.5	71 72	43.7	85 27.3	77 67	39.3	85 03.7	81 62	35.5	84 39.0	84 58	32.4	84 13.5	86 54	29.6	83 47.3	88 50	27.3	83 20.6	90 47	25.3	82 53.5	91 44	23.5	3
4	85 06.1	61 80	51.7	84 47.0	66 75	47.4	84 26.4	71 71	43.5	84 04.4	75 67	40.1	83 41.3	79 63	37.1	83 17.3	81 59	34.5	82 52.5	84 56	32.1	82 27.1	86 53	30.0	4
05	84 18.3	52 84	57.6	84 01.9	58 81	53.5	83 43.8	63 77	49.7	83 24.2	67 73	46.4	83 03.5	71 70	43.3	82 41.6	74 67	40.5	82 18.8	77 63	38.0	81 55.3	80 60	35.8	05
6	83 27.8	45 87	62.0	83 13.9	50 84	58.2	82 57.6	56 81	54.6	82 40.2	60 78	51.4	82 21.5	64 75	48.4	82 01.6	68 72	45.6	81 40.8	71 69	43.1	81 19.1	74 66	40.7	6
7	82 35.4	39 89	65.3	82 22.8	44 87	61.8	82 08.7	49 84	58.5	81 53.2	54 82	55.4	81 36.4	58 79	52.6	81 18.3	62 76	49.9	80 59.3	65 74	47.4	80 39.2	68 71	45.0	7
8	81 41.7	34 91	67.9	81 30.6	40 89	64.7	81 18.0	44 87	61.6	81 04.1	49 84	58.7	80 48.9	53 82	56.0	80 32.5	56 80	53.4	80 15.0	60 77	51.0	79 56.6	63 75	48.7	8
9	80 47.2	31 92	69.9	80 37.3	35 90	67.0	80 26.0	40 88	64.2	80 13.4	44 87	61.5	79 59.6	48 84	58.9	79 44.6	52 82	56.4	79 28.6	55 80	54.1	79 11.6	58 78	51.9	9
10	79 52.0	27 93	71.6	79 43.1	32 91	68.9	79 32.9	36 90	66.3	79 21.5	40 88	63.7	79 08.9	44 86	61.3	78 55.2	47 84	59.0	78 40.4	51 82	56.7	78 24.7	54 81	54.6	10
1	78 56.3	25 93	72.9	78 48.3	29 92	70.4	78 39.0	33 91	68.0	78 28.6	37 89	65.6	78 17.1	40 88	63.3	78 04.5	44 86	61.1	77 50.9	47 84	59.0	77 36.4	50 83	56.9	1
2	78 00.2	22 94	74.1	77 53.0	26 93	71.7	77 44.5	30 92	69.5	77 35.0	34 90	67.3	77 24.4	37 89	65.1	77 12.9	40 87	63.0	77 00.3	43 86	61.0	76 46.8	46 84	59.0	2
3	77 03.9	20 94	75.0	76 57.3	24 93	72.8	76 49.6	27 92	70.7	76 40.8	31 91	68.6	76 31.1	34 90	66.6	76 20.4	37 89	64.6	76 08.8	40 87	62.7	75 56.2	43 86	60.8	3
4	76 07.3	18 96	75.8	76 01.2	22 94	73.8	75 54.2	25 93	71.8	75 46.2	28 92	69.8	75 37.2	31 91	67.9	75 27.3	35 89	66.0	75 16.5	37 88	64.1	75 04.8	40 87	62.3	4
15	75 10.5	17 96	76.5	75 05.0	20 94	74.6	74 58.5	23 93	72.7	74 51.1	26 92	70.8	74 42.8	29 91	69.0	74 33.6	32 90	67.2	74 23.6	35 89	65.5	74 12.7	38 88	63.7	15
6	74 13.6	15 96	77.1	74 08.5	18 94	75.3	74 02.6	21 94	73.5	73 55.7	24 93	71.7	73 48.0	27 92	70.0	73 39.5	30 91	68.3	73 30.2	32 90	66.6	73 20.0	35 89	65.0	6
7	73 16.6	14 96	77.6	73 11.9	17 95	75.9	73 06.4	20 94	74.2	73 00.1	22 93	72.5	72 53.0	25 92	70.9	72 45.0	28 91	69.2	72 36.3	30 90	67.6	72 26.8	33 89	66.0	7
8	72 19.4	13 96	78.0	72 15.2	16 95	76.4	72 10.1	18 94	74.8	72 04.2	21 93	73.2	71 57.6	23 93	71.6	71 50.2	26 92	70.1	71 42.1	28 91	68.5	71 33.2	31 90	67.0	8
9	71 22.2	12 96	78.4	71 18.3	14 95	76.9	71 13.6	17 94	75.3	71 08.2	19 94	73.8	71 02.0	22 93	72.3	70 55.1	24 92	70.8	70 47.5	27 91	69.3	70 39.2	29 90	67.9	9
20	70 24.9	11 96	78.8	70 21.3	13 95	77.3	70 17.0	16 95	75.8	70 11.9	18 94	74.3	70 06.2	20 93	72.9	69 59.8	23 93	71.5	69 52.7	25 92	70.1	69 44.9	27 91	68.7	20
1	69 27.5	10 96	79.0	69 24.2	12 96	77.6	69 20.2	14 95	76.2	69 15.6	17 94	74.8	69 10.3	19 94	73.4	69 04.3	21 93	72.1	68 57.6	23 92	70.7	68 50.3	25 91	69.4	1
2	68 30.1	09 96	79.3	68 27.1	11 96	77.9	68 23.4	13 95	76.6	68 19.1	15 94	75.2	68 14.1	18 94	73.9	68 08.6	20 93	72.6	68 02.3	22 92	71.3	67 55.5	24 92	70.0	2
3	67 32.6	08 96	79.5	67 29.9	10 95	78.2	67 26.5	12 95	76.9	67 22.5	14 94	75.6	67 17.9	16 94	74.3	67 12.7	18 93	73.1	67 06.9	20 93	71.8	67 00.5	22 92	70.6	3
4	66 35.1	07 96	79.7	66 32.6	09 96	78.5	66 29.5	11 95	77.2	66 25.8	13 95	76.0	66 21.6	15 94	74.7	66 16.7	17 94	73.5	66 11.3	19 93	72.3	66 05.2	21 92	71.1	4
25	65 37.6	07 96	79.9	65 35.3	08 96	78.7	65 32.5	10 95	77.5	65 29.1	12 95	76.3	65 25.1	14 94	75.1	65 20.6	16 94	73.9	65 15.5	18 93	72.7	65 09.9	20 93	71.5	25
6	64 40.0	06 96	80.0	64 38.0	08 95	78.8	64 35.4	10 96	77.7	64 32.3	11 95	76.5	64 28.6	13 94	75.4	64 24.4	15 94	74.2	64 19.6	17 93	73.1	64 14.4	18 93	71.9	6
7	63 42.4	05 96	80.1	63 40.6	07 95	79.0	63 38.3	09 96	77.9	63 35.4	10 95	76.8	63 32.0	12 94	75.6	63 28.1	14 94	74.5	63 23.6	16 93	73.4	63 18.7	17 93	72.3	7
8	62 44.8	05 96	80.2	62 43.2	06 95	79.1	62 41.1	08 95	78.1	62 38.5	10 95	77.0	62 35.3	11 95	75.9	62 31.7	13 94	74.8	62 27.6	15 94	73.7	62 22.9	16 93	72.7	8
9	61 47.2	04 96	80.3	61 45.8	06 96	79.3	61 43.9	07 95	78.2	61 41.5	09 95	77.2	61 38.6	10 95	76.1	61 35.2	12 94	75.1	61 31.4	14 94	74.0	61 27.1	15 93	73.0	9
30	60 49.6	03 96	80.4	60 48.3	05 96	79.4	60 46.6	06 95	78.4	60 44.5	08 95	77.3	60 41.8	10 95	76.3	60 38.7	11 94	75.3	60 35.2	13 94	74.3	60 31.1	14 93	73.3	30
1	59 51.9	03 96	80.5	59 50.9	04 95	79.5	59 49.4	06 95	78.5	59 47.4	07 95	77.5	59 45.0	09 95	76.5	59 42.1	10 94	75.5	59 38.8	12 94	74.5	59 35.1	13 94	73.5	1
2	58 54.3	02 96	80.5	58 53.4	04 95	79.5	58 52.1	05 96	78.6	58 50.3	07 95	77.6	58 48.1	08 95	76.6	58 45.5	09 94	75.7	58 42.5	11 94	74.7	58 39.0	12 94	73.8	2
3	57 56.6	02 96	80.5	57 55.9	03 95	79.6	57 54.8	04 96	78.7	57 53.2	06 95	77.7	57 51.2	07 95	76.8	57 48.8	09 94	75.8	57 46.1	10 94	74.9	57 42.8	11 94	74.0	3
4	56 58.9	01 96	80.6	56 58.4	03 95	79.6	56 57.4	04 96	78.7	56 56.1	05 95	77.8	56 54.3	07 96	76.9	56 52.1	08 95	76.0	56 49.6	09 94	75.1	56 46.6	11 94	74.2	4
35	56 01.3	01 96	80.6	56 00.9	02 96	79.7	56 00.1	03 96	78.8	55 58.9	05 95	77.9	55 57.4	06 95	77.0	55 55.4	07 95	76.1	55 53.1	08 94	75.2	55 50.4	10 94	74.3	35
6	55 03.6	00 96	80.6	55 03.3	01 96	79.7	55 02.7	03 96	78.8	55 01.7	04 96	78.0	55 00.4	05 95	77.1	54 58.6	06 96	76.2	54 56.5	08 94	75.4	54 54.0	09 94	74.5	6
7	54 05.9	00 96	80.6	54 05.8	01 96	79.7	54 05.4	02 95	78.9	54 04.6	03 95	78.0	54 03.4	05 96	77.2	54 01.8	06 96	76.3	53 59.9	07 94	75.5	53 57.7	08 94	74.6	7
8	53 08.2	01 96	80.6	53 08.3	00 95	79.7	53 08.0	02 96	78.9	53 07.4	03 96	78.1	53 06.4	04 95	77.2	53 05.0	05 95	76.4	53 03.3	06 94	75.6	53 01.3	07 94	74.8	8
9	52 10.6	01 96	80.6	52 10.8	00 96	79.7	52 10.6	01 96	78.9	52 10.2	02 95	78.1	52 09.3	03 95	77.3	52 08.2	04 95	76.5	52 06.7	06 94	75.7	52 04.9	07 94	74.9	9
40	51 12.9	02 96	80.5	51 13.2	01 96	79.7	51 13.2	00 96	78.9	51 12.9	02 95	78.1	51 12.3	03 95	77.4	51 11.3	04 95	76.6	51 10.0	05 94	75.8	51 08.4	06 94	75.0	40
1	50 15.2	02 96	80.5	50 15.7	01 96	79.7	50 15.9	00 96	78.9	50 15.7	01 95	78.2	50 15.3	02 96	77.4	50 14.5	03 95	76.6	50 13.4	04 94	75.8	50 12.0	05 94	75.0	1
2	49 17.6	03 96	80.5	49 18.2	02 96	79.7	49 18.5	01 95	78.9	49 18.5	00 95	78.2	49 18.2	02 96	77.4	49 17.6	03 95	76.6	49 16.7	04 94	75.9	49 15.5	05 94	75.1	2
3	48 19.9	03 96	80.4	48 20.7	02 96	79.7	48 21.1	01 96	78.9	48 21.3	00 95	78.2	48 21.1	01 95	77.4	48 20.7	02 95	76.7	48 20.0	03 95	75.9	48 19.0	04 94	75.2	3
4	47 22.3	03 96	80.4	47 23.1	02 96	79.7	47 23.7	02 95	78.9	47 24.1	01 95	78.2	47 24.1	00 95	77.4	47 23.8	01 95	76.7	47 23.3	02 95	76.0	47 22.4	03 94	75.2	4
45	46 24.6	04 96	80.3	46 25.6	03 96	79.6	46 26.4	02 96	78.9	46 26.8	01 95	78.2	46 27.0	00 95	77.4	46 26.9	01 95	76.7	46 26.6	02 95	76.0	46 25.9	03 94	75.3	45
6	45 27.0	04 96	80.3	45 28.1	03 96	79.6	45 29.0	02 96	78.9	45 29.6	02 95	78.1	45 30.0	01 95	77.4	45 30.0	00 95	76.7	45 29.8	01 95	76.0	45 29.4	02 94	75.3	6
7	44 29.4	05 96	80.2	44 30.6	04 96	79.5	44 31.7	03 96	78.8	44 32.4	02 96	78.1	44 32.9	01 96	77.4	44 33.1	00 95	76.7	44 33.1	01 95	76.0	44 32.8	01 94	75.3	7
8	43 31.8	05 96	80.2	43 33.2	04 96	79.5	43 34.3	03 96	78.8	43 35.2	03 95	78.1	43 35.8	02 95	77.4	43 36.2	01 95	76.7	43 36.4	00 95	76.0	43 36.3	01 94	75.3	8
9	42 34.2	05 96	80.1	42 35.7	05 96	79.4	42 37.0	04 96	78.7	42 38.0	03 95	78.1	42 38.8	02 95	77.4	42 39.3	01 95	76.7	42 39.6	01 95	76.0	42 39.7	00 94	75.3	9
50	41 36.6	06 96	80.0	41 38.2	05 96	79.4	41 39.6	04 96	78.7	41 40.8	04 95	78.0	41 41.7	03 95	77.3	41 42.4	02 95	76.7	41 42.9	01 95	76.0	41 43.1	00 94	75.3	50
1	40 39.0	06 96	79.9	40 40.8	05 96	79.3	40 42.3	05 96	78.6	40 43.6	04 95	78.0	40 44.7	03 95	77.3	40 45.6	02 95	76.6	40 46.2	02 95	76.0	40 46.6	01 94	75.3	1
2	39 41.5	07 96	79.9	39 43.3	06 96	79.2	39 45.0	05 96	78.6	39 46.4	04 95	77.9	39 47.7	04 96	77.3	39 48.7	03 95	76.6	39 49.5	02 95	76.0	39 50.0	02 94	75.3	2
3	38 43.9	07 96	79.8	38 45.9	06 96	79.1	38 47.7	06 95	78.5	38 49.3	05 95	77.9	38 50.6	04 96	77.2	38 51.8	04 95	76.6	38 52.8	03 94	75.9	38 53.5	02 94	75.3	3
4	37 46.4	07 96	79.7	37 48.5	07 96	79.1	37 50.4	06 95	78.4	37 52.1	05 95	77.8	37 53.6	05 95	77.2	37 54.9	04 95	76.5	37 56.0	03 94	75.9	37 56.9	03 94	75.3	4
55	36 48.9	08 96	79.6	36 51.1	07 96	79.0	36 53.2	06 95	78.4	36 55.0	06 95	77.7	36 56.6	05 95	77.1	36 58.1	05 95	76.5	36 59.4	04 94	75.9	37 00.4	03 94	75.2	55
6	35 51.4	08 96	79.5	35 53.7	08 96	78.9	35 55.9	07 95	78.3	35 57.9	06 96	77.7	35 59.7	06 95	77.0	36 01.3	05 95	76.4	36 02.7	04 94	75.8	36 03.9	04 94	75.2	6
7	34 53.9	09 96	79.4	34 56.4	08 96	78.8	34 58.7	07 95	78.2	35 00.8	07 95	77.6	35 02.7	06 96	77.0	35 04.4	06 95	76.4	35 06.0	05 94	75.8	35 07.4	04 94	75.1	7
8	33 56.5	09 96	79.3	33 59.1	08 96	78.7	34 01.5	08 95	78.1	34 03.7	07 95	77.5	34 05.8	07 95	76.9	34 07.6	06 95	76.3	34 09.3	05 94	75.7	34 10.9	05 94	75.1	8
9	32 59.0	09 96	79.2	33 01.7	09 96	78.6	33 04.3	08 95	78.0	33 06.6	08 95	77.4	33 08.8	07 95	76.8	33 10.8	06 95	76.2	33 12.7	06 94	75.6	33 14.4	05 94	75.0	9
60	32 01.6	10 96	79.1	32 04.4	09 95	78.5	32 07.1	09 96	77.9	32 09.6	08 95	77.3	32 11.9	07 95	76.7	32 14.1	07 95	76.1	32 16.1	06 94	75.6	32 17.9	06 94	75.0	60
1	31 04.2	10 96	79.0	31 07.2	10 96	78.4	31 09.9	09 95	77.8	31 12.6	08 95	77.2	31 15.0	08 95	76.7	31 17.3	07 95	76.1	31 19.5	07 94	75.5	31 21.5	06 94	74.9	1
2	30 06.8	10 96	78.9	30 09.9	10 95	78.3	30 12.8	09 96	77.7	30 15.5	09 95	77.1	30 18.1	08 95	76.6	30 20.6	08 94	76.0	30 22.9	07 94	75.4	30 25.0	07 94	74.8	2
3	29 09.5	11 96	78.7	29 12.7	10 95	78.2	29 15.7	10 95	77.6	29 18.6	09 96	77.0	29 21.3	09 95	76.5	29 23.9	08 94	75.9	29 26.3	08 94	75.3	29 28.6	07 94	74.7	3
4	28 12.2	11 96	78.6	28 15.5	11 95	78.1	28 18.6	10 95	77.5	28 21.6	10 95	76.9	28 24.5	09 95	76.4	28 27.2	09 94	75.8	28 29.8	08 94	75.2	28 32.2	08 94	74.7	4
65	27 14.9	12 96	78.5	27 18.3	11 95	77.9	27 21.5	11 95	77.4	27 24.7	10 95	76.8	27 27.7	10 95	76.3	27 30.5	09 94	75.7	27 33.3	09 94	75.1	27 35.8	08 94	74.6	65
6	26 17.6	12 96	78.4	26 21.1	12 95	77.8	26 24.5	11 95	77.3	26 27.8	11 95	76.7	26 30.9	10 95	76.2	26 33.9	10 94	75.6	26 36.8	09 94	75.0	26 39.5	09 94	74.5	6
7	25 20.3	12 95	78.2	25 24.0	12 95	77.7	25 27.5	11 95	77.1	25 30.9	11 95	76.6	25 34.1	11 95	76.0	25 37.3	10 94	75.5	25 40.3	10 94	74.9	25 43.2	09 94	74.4	7
8	24 23.1	13 95	78.1	24 26.9	12 95	77.6	24 30.5	12 95	77.0	24 34.0	12 95	76.5	24 37.4	11 94	75.9	24 40.7	11 94	75.4	24 43.9	10 94	74.8	24 46.9	10 94	74.3	8
9	23 25.9	13 95	78.0	23 29.8	13 95	77.4	23 33.5	12 95	76.9	23 37.2	12 95	76.4	23 40.7	12 94	75.8	23 44.1	11 94	75.3	23 47.4	11 94	74.7	23 50.6	10 94	74.2	9
70	22 28.8	13 96	77.8	22 32.7	13 95	77.3	22 36.6	13 95	76.8	22 40.4	12 95	76.2	22 44.1	12 94	75.7	22 47.6	12 94	75.2	22 51.1	11 94	74.6	22 54.4	11 94	74.1	70
1	21 31.6	14 96	77.7	21 35.7	14 95	77.2	21 39.7	13 95	76.6	21 43.6	13 95	76.1	21 47.4	12 94	75.6	21 51.1	12 94	75.0	21 54.7	12 94	74.5	21 58.2	11 94	74.0	1
2	20 34.5	14 96	77.6	20 38.7	14 95	77.0	20 42.9	14 95	76.5	20 46.9	13 94	76.0	20 50.8	13 94	75.4	20 54.7	13 94	74.9	20 58.4	12 94	74.4	21 02.0	12 94	73.8	2
3	19 37.4	15 96	77.4	19 41.8	14 95	76.9	19 46.0	14 95	76.4	19 50.2	14 94	75.8	19 54.3	13 94	75.3	19 58.2	13 94	74.8	20 02.1	13 94	74.2	20 05.9	12 94	73.7	3
4	18 40.4	15 96	77.3	18 44.9	15 95	76.7	18 49.2	14 95	76.2	18 53.5	14 94	75.7	18 57.7	14 94	75.2	19 01.8	14 94	74.6	19 05.9	13 94	74.1	19 09.8	13 93	73.6	4
75	17 43.4	15 96	77.1	17 48.0	15 95	76.6	17 52.5	15 95	76.1	17 56.9	15 94	75.5	18 01.2	14 94	75.0	18 05.5	14 94	74.5	18 09.6	14 94	74.0	18 13.7	13 93	73.5	75
6	16 46.4	16 96	76.9	16 51.1	16 95	76.4	16 55.8	15 94	75.9	17 00.3	15 94	75.4	17 04.8	15 94	74.9	17 09.2	14 94	74.4	17 13.5	14 94	73.8	17 17.7	14 93	73.3	6
7	15 49.5	16 95	76.8	15 54.3	16 95	76.3	15 59.1	16 94	75.8	16 03.7	15 94	75.2	16 08.4	15 94	74.7	16 12.9	15 94	74.2	16 17.3	15 93	73.7	16 21.7	14 93	73.2	7
8	14 52.6	17 95	76.6	14 57.5	16 95	76.1	15 02.4	16 94	75.6	15 07.2	16 94	75.1	15 12.0	16 94	74.6	15 16.6	15 94	74.1	15 21.2	15 93	73.6	15 25.8	15 93	73.0	8
9	13 55.7	17 95	76.5	14 00.8	17 94	75.9	14 05.8	17 94	75.4	14 10.8	16 94	74.9	14 15.6	16 94	74.4	14 20.4	16 94	73.9	14 25.2	16 93	73.4	14 29.9	15 93	72.9	9
80	12 58.9	17 95	76.3	13 04.1	17 94	75.8	13 09.3	17 94	75.3	13 14.3	17 94	74.8	13 19.3	17 94	74.3	13 24.3	16 94	73.8	13 29.2	16 93	73.2	13 34.0	16 93	72.7	80
1	12 02.2	18 95	76.1	12 07.5	18 94	75.6	12 12.7	17 94	75.1	12 17.9	17 94	74.6	12 23.1	17 94	74.1	12 28.2	17 93	73.6	12 33.2	17 93	73.1	12 38.2	17 93	72.6	1
2	11 05.4	18 94	75.9	11 10.9	18 94	75.4	11 16.3	18 94	74.9	11 21.6	18 94	74.4	11 26.9	18 94	73.9	11 32.1	17 93	73.4	11 37.3	17 93	72.9	11 42.5	17 93	72.4	2
3	10 08.7	19 94	75.8	10 14.3	18 94	75.3	10 19.8	18 94	74.8	10 25.3	18 94	74.3	10 30.7	18 94	73.8	10 36.1	18 93	73.3	10 41.5	18 93	72.8	10 46.8	18 93	72.3	3
4	9 12.1	19 94	75.6	9 17.8	19 94	75.1	9 23.5	19 94	74.6	9 29.1	19 94	74.1	9 34.6	19 93	73.6	9 40.2	18 93	73.1	9 45.7	18 93	72.6	9 51.1	18 93	72.1	4
85	8 15.5	19 94	75.4	8 21.3	19 94	74.9	8 27.1	19 94	74.4	8 32.9	19 94	73.9	8 38.6	19 93	73.4	8 44.3	19 93	72.9	8 49.9	19 93	72.4	8 55.5	19 93	71.9	85
6	7 19.0	20 94	75.2	7 24.9	20 94	74.7	7 30.8	20 94	74.2	7 36.7	20 93	73.7	7 42.6	19 93	73.2	7 48.4	19 93	72.7	7 54.2	19 93	72.2	8 00.0	19 92	71.7	6
7	6 22.5	20 94	75.0	6 28.6	20 94	74.5	6 34.6	20 94	74.0	6 40.6	20 93	73.5	6 46.6	20 93	73.0	6 52.6	20 93	72.5	6 58.6	20 93	72.0	7 04.5	20 92	71.5	7
8	5 26.0	21 94	74.8	5 32.2	21 94	74.3	5 38.4	21 94	73.8	5 44.6	21 93	73.3	5 50.8	20 93	72.8	5 56.9	20 93	72.3	6 03.0	20 93	71.8	6 09.0	20 92	71.4	8
9																5 01.2	21 93	72.1	5 07.5	21 92	71.7	5 13.7	21 92	71.2	9

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	16° 00′				16° 30′				17° 00′				17° 30′				18° 00′				18° 30′				19° 00′				19° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	61 00.0	1.0	02	180.0	60 30.0	1.0	02	180.0	60 00.0	1.0	02	180.0	59 30.0	1.0	02	180.0	59 00.0	1.0	02	180.0	58 30.0	1.0	02	180.0	58 00.0	1.0	02	180.0	57 30.0	1.0	02	180.0
1	60 59.0	1.0	05	178.0	60 29.0	1.0	05	178.1	59 59.0	1.0	05	178.1	59 29.0	1.0	05	178.1	58 59.1	1.0	05	178.2	58 29.1	1.0	05	178.2	57 59.1	1.0	05	178.2	57 29.1	1.0	04	178.2
2	60 56.0	1.0	08	176.0	60 26.0	1.0	08	176.1	59 56.1	1.0	08	176.2	59 26.2	1.0	08	176.2	58 56.2	1.0	08	176.3	58 26.3	1.0	08	176.4	57 56.4	1.0	08	176.4	57 26.4	1.0	07	176.5
3	60 50.9	99	12	174.1	60 21.1	99	12	174.2	59 51.2	99	11	174.3	59 21.4	99	11	174.4	58 51.5	1.0	11	174.5	58 21.7	1.0	11	174.6	57 51.8	1.0	11	174.7	57 22.0	1.0	10	174.8
4	60 43.9	99	15	172.1	60 14.2	99	15	172.3	59 44.5	99	14	172.4	59 14.7	99	14	172.5	58 45.0	99	14	172.7	58 15.2	99	14	172.8	57 45.5	99	14	172.9	57 15.7	99	13	173.0
05	60 34.9	98	18	170.2	60 05.3	99	18	170.4	59 35.8	99	18	170.5	59 06.2	99	17	170.7	58 36.6	99	17	170.8	58 07.0	99	17	171.0	57 37.4	99	16	171.1	57 07.8	99	16	171.3
6	60 24.0	98	21	168.3	59 54.6	98	21	168.5	59 25.2	98	21	168.7	58 55.8	98	20	168.9	58 26.4	98	20	169.1	57 57.0	98	20	169.2	57 27.5	98	19	169.4	56 58.0	98	19	169.6
7	60 11.1	97	24	166.4	59 42.0	97	24	166.6	59 12.8	97	24	166.8	58 43.6	97	23	167.1	58 14.4	97	23	167.3	57 45.2	97	23	167.5	57 15.9	98	22	167.7	56 46.6	98	22	167.9
8	59 56.4	96	28	164.5	59 27.5	96	27	164.8	58 58.6	96	27	165.0	58 29.6	97	26	165.3	58 00.7	97	26	165.5	57 31.6	97	25	165.8	57 02.6	97	25	166.0	56 33.5	97	25	166.2
9	59 39.9	95	30	162.7	59 11.3	96	30	163.0	58 42.6	96	30	163.3	58 13.9	96	29	163.5	57 45.2	96	29	163.8	57 16.4	96	28	164.1	56 47.6	96	28	164.3	56 18.8	96	27	164.6
10	59 21.6	94	33	160.9	58 53.3	94	33	161.2	58 24.9	95	32	161.5	57 56.5	95	32	161.8	57 28.1	95	31	162.1	56 59.6	95	31	162.4	56 31.0	95	30	162.7	56 02.5	95	30	163.0
1	59 01.6	93	36	159.1	58 33.6	93	36	159.5	58 05.6	94	35	159.8	57 37.5	94	34	160.1	57 09.3	94	34	160.5	56 41.1	94	33	160.8	56 12.8	94	33	161.1	55 44.6	94	32	161.4
2	58 40.0	92	39	157.4	58 12.3	92	38	157.8	57 44.6	93	38	158.1	57 16.8	93	37	158.5	56 49.0	93	36	158.8	56 21.1	93	36	159.2	55 53.1	93	35	159.5	55 25.1	93	35	159.8
3	58 16.7	91	41	155.7	57 49.4	91	41	156.1	57 22.0	91	40	156.5	56 54.6	92	40	156.9	56 27.1	92	39	157.2	55 59.5	92	38	157.6	55 31.9	92	38	157.9	55 04.2	92	37	158.3
4	57 51.9	90	44	154.1	57 25.0	90	43	154.5	56 58.0	90	43	154.9	56 30.9	90	42	155.3	56 03.7	91	41	155.7	55 36.5	91	41	156.0	55 09.2	91	40	156.4	54 41.8	91	40	156.8
15	57 25.6	88	46	152.5	56 59.1	89	46	152.9	56 32.4	89	45	153.3	56 05.7	89	44	153.7	55 38.9	89	44	154.1	55 12.0	90	43	154.5	54 45.1	90	42	154.9	54 18.1	90	42	155.3
6	56 57.9	87	48	150.9	56 31.7	87	48	151.4	56 05.5	88	47	151.8	55 39.2	88	46	152.2	55 12.7	88	46	152.6	54 46.2	89	45	153.1	54 19.6	89	45	153.5	53 53.0	89	44	153.8
7	56 28.8	86	51	149.4	56 03.1	86	50	149.9	55 37.2	86	49	150.3	55 11.2	87	49	150.8	54 45.2	87	48	151.2	54 19.1	87	47	151.6	53 52.8	88	47	152.0	53 26.5	88	46	152.4
8	55 58.4	84	53	147.9	55 33.1	85	52	148.4	55 07.6	85	51	148.9	54 42.1	85	51	149.3	54 16.4	86	50	149.8	53 50.6	86	49	150.2	53 24.8	86	49	150.6	52 58.9	87	48	151.1
9	55 26.8	83	55	146.5	55 01.8	83	54	147.0	54 36.8	84	53	147.5	54 11.6	84	53	147.9	53 46.4	84	52	148.4	53 21.0	85	51	148.9	52 55.5	85	51	149.3	52 30.0	85	50	149.7
20	54 53.9	81	57	145.1	54 29.4	82	56	145.6	54 04.8	82	55	146.1	53 40.0	83	55	146.6	53 15.2	83	54	147.1	52 50.2	83	53	147.5	52 25.1	84	53	148.0	51 59.9	84	52	148.4
1	54 19.9	80	58	143.8	53 55.8	81	58	144.3	53 31.6	81	57	144.8	53 07.3	81	56	145.3	52 42.8	82	56	145.8	52 18.2	82	55	146.2	51 53.6	82	54	146.7	51 28.8	83	54	147.2
2	53 44.8	79	60	142.5	53 21.2	79	60	143.0	52 57.4	80	59	143.5	52 33.4	80	58	144.0	52 09.4	80	57	144.5	51 45.2	81	57	145.0	51 20.9	81	56	145.5	50 56.5	82	55	145.9
3	53 08.7	77	62	141.2	52 45.5	78	61	141.8	52 22.1	78	60	142.3	51 58.6	79	60	142.8	51 34.9	79	59	143.3	51 11.2	79	58	143.8	50 47.3	80	58	144.2	50 23.3	80	57	144.7
4	52 31.6	76	63	140.0	52 08.8	76	63	140.5	51 45.8	77	62	141.1	51 22.7	77	61	141.6	50 59.5	78	61	142.1	50 36.1	78	60	142.6	50 12.6	79	59	143.1	49 49.0	79	59	143.5
25	51 53.6	74	65	138.8	51 31.2	75	64	139.4	51 08.6	75	64	139.9	50 45.9	76	63	140.4	50 23.1	76	62	140.9	50 00.1	77	62	141.4	49 37.0	77	61	141.9	49 13.8	78	60	142.4
6	51 14.7	73	66	137.7	50 52.7	74	66	138.2	50 30.5	74	65	138.8	50 08.2	75	64	139.3	49 45.8	75	64	139.8	49 23.2	75	63	140.3	49 00.5	76	62	140.8	48 37.7	76	62	141.3
7	50 34.9	72	68	136.6	50 13.3	72	67	137.1	49 51.6	73	66	137.7	49 29.7	73	66	138.2	49 07.6	74	65	138.7	48 45.5	74	64	139.2	48 23.2	75	64	139.7	48 00.7	75	63	140.2
8	49 54.3	70	69	135.5	49 33.1	71	68	136.1	49 11.8	71	68	136.6	48 50.3	72	67	137.1	48 28.7	72	66	137.7	48 06.9	73	66	138.2	47 45.0	73	65	138.7	47 22.9	74	64	139.2
9	49 13.0	69	70	134.5	48 52.2	70	69	135.0	48 31.2	70	69	135.6	48 10.1	71	68	136.1	47 48.9	71	68	136.6	47 27.5	72	67	137.2	47 06.0	72	66	137.7	46 44.3	72	66	138.2
30	48 30.9	68	71	133.5	48 10.5	68	71	134.0	47 50.0	69	70	134.6	47 29.3	69	69	135.1	47 08.4	70	69	135.6	46 47.4	70	68	136.2	46 26.2	71	67	136.7	46 04.9	71	67	137.2
1	47 48.2	66	72	132.5	47 28.2	67	72	133.1	47 08.0	68	71	133.6	46 47.6	68	70	134.2	46 27.2	69	70	134.7	46 06.5	69	69	135.2	45 45.8	69	69	135.7	45 24.9	70	68	136.2
2	47 04.8	65	73	131.6	46 45.1	66	73	132.1	46 25.3	66	72	132.7	46 05.4	67	72	133.2	45 45.3	67	71	133.8	45 25.0	68	70	134.3	45 04.6	68	70	134.8	44 44.1	69	69	135.3
3	46 20.7	64	74	130.7	46 01.5	64	74	131.2	45 42.0	65	73	131.8	45 22.5	66	73	132.3	45 02.7	66	72	132.9	44 42.8	67	71	133.4	44 22.8	67	71	133.9	44 02.7	67	70	134.4
4	45 36.1	63	75	129.8	45 17.2	63	75	130.4	44 58.1	64	74	130.9	44 38.9	64	74	131.4	44 19.6	65	73	132.0	44 00.0	65	72	132.5	43 40.4	66	72	133.0	43 20.6	66	71	133.5
35	44 50.9	62	76	129.0	44 32.4	62	76	129.5	44 13.7	63	75	130.1	43 54.8	63	74	130.6	43 35.8	64	74	131.1	43 16.7	64	73	131.7	42 57.4	65	73	132.2	42 37.9	65	72	132.7
6	44 05.2	60	77	128.1	43 47.0	61	76	128.7	43 28.6	61	76	129.2	43 10.1	62	75	129.8	42 51.5	62	75	130.3	42 32.7	63	74	130.8	42 13.8	63	74	131.4	41 54.7	64	73	131.9
7	43 18.9	59	78	127.3	43 01.1	60	77	127.9	42 43.1	60	77	128.4	42 25.0	61	76	129.0	42 06.6	61	76	129.5	41 48.2	62	75	130.0	41 29.6	62	74	130.6	41 10.9	63	74	131.1
8	42 32.2	58	79	126.6	42 14.7	59	78	127.1	41 57.1	59	78	127.7	41 39.3	60	77	128.2	41 21.3	60	76	128.7	41 03.2	61	76	129.3	40 44.9	61	75	129.8	40 26.5	62	75	130.3
9	41 45.0	57	79	125.8	41 27.9	57	79	126.4	41 10.5	58	78	126.9	40 53.1	58	78	127.5	40 35.4	59	77	128.0	40 17.7	59	77	128.5	39 59.8	60	76	129.0	39 41.7	60	76	129.6
40	40 57.4	56	80	125.1	40 40.6	56	80	125.6	40 23.6	57	79	126.2	40 06.4	57	78	126.7	39 49.1	58	78	127.3	39 31.7	58	77	127.8	39 14.1	59	77	128.3	38 56.4	59	76	128.8
1	40 09.4	55	81	124.4	39 52.9	55	80	124.9	39 36.2	56	80	125.5	39 19.4	56	79	126.0	39 02.4	57	79	126.6	38 45.3	57	78	127.1	38 28.0	58	78	127.6	38 10.6	58	77	128.1
2	39 20.9	54	81	123.7	39 04.7	54	81	124.3	38 48.4	55	80	124.8	38 31.9	55	80	125.3	38 15.2	56	79	125.9	37 58.4	56	79	126.4	37 41.5	57	78	126.9	37 24.4	57	78	127.4
3	38 32.1	53	82	123.1	38 16.2	53	81	123.6	38 00.2	54	81	124.1	37 44.0	54	80	124.7	37 27.6	55	80	125.2	37 11.2	55	79	125.7	36 54.6	56	79	126.2	36 37.8	56	78	126.8
4	37 43.0	52	83	122.4	37 27.4	52	82	123.0	37 11.6	53	82	123.5	36 55.7	53	81	124.0	36 39.7	54	81	124.6	36 23.5	54	80	125.1	36 07.2	55	80	125.6	35 50.8	55	79	126.1
45	36 53.4	51	83	121.8	36 38.1	51	83	122.3	36 22.7	52	82	122.9	36 07.1	52	82	123.4	35 51.4	53	81	123.9	35 35.5	53	81	124.5	35 19.5	54	80	125.0	35 03.4	54	80	125.5
6	36 03.6	50	84	121.2	35 48.6	50	83	121.7	35 33.4	51	83	122.3	35 18.1	51	82	122.8	35 02.7	52	82	123.3	34 47.1	52	81	123.8	34 31.4	53	81	124.4	34 15.6	53	80	124.9
7	35 13.4	49	84	120.6	34 58.7	49	84	121.1	34 43.8	50	83	121.7	34 28.8	50	83	122.2	34 13.7	51	82	122.7	33 58.4	51	82	123.2	33 43.0	52	81	123.8	33 27.4	52	81	124.3
8	34 23.0	48	85	120.1	34 08.5	48	84	120.6	33 53.9	49	84	121.1	33 39.2	49	83	121.6	33 24.3	50	83	122.2	33 09.3	50	82	122.7	32 54.2	51	82	123.2	32 39.0	51	81	123.7
9	33 32.2	47	85	119.5	33 18.0	48	85	120.0	33 03.7	48	84	120.6	32 49.3	48	84	121.1	32 34.7	49	83	121.6	32 20.0	49	83	122.1	32 05.1	50	82	122.6	31 50.2	50	82	123.1
50	32 41.2	46	85	119.0	32 27.3	47	85	119.5	32 13.2	47	85	120.0	31 59.0	47	84	120.5	31 44.7	48	84	121.0	31 30.3	48	83	121.6	31 15.7	49	83	122.1	31 01.0	49	82	122.6
1	31 49.9	45	86	118.4	31 36.3	46	85	119.0	31 22.5	46	85	119.5	31 08.5	47	85	120.0	30 54.5	47	84	120.5	30 40.3	47	84	121.0	30 26.0	48	83	121.5	30 11.6	48	83	122.1
2	30 58.4	45	86	117.9	30 45.0	45	86	118.5	30 31.4	45	85	119.0	30 17.8	46	85	119.5	30 04.0	46	85	120.0	29 50.1	47	84	120.5	29 36.1	47	84	121.0	29 21.9	47	83	121.5
3	30 06.6	44	87	117.4	29 53.5	44	86	118.0	29 40.2	44	86	118.5	29 26.8	45	85	119.0	29 13.2	45	85	119.5	28 59.6	46	85	120.0	28 45.9	46	84	120.5	28 32.0	46	84	121.0
4	29 14.6	43	87	117.0	29 01.7	43	87	117.5	28 48.7	44	86	118.0	28 35.5	44	86	118.5	28 22.2	44	85	119.0	28 08.9	45	85	119.5	27 55.4	45	85	120.0	27 41.8	46	84	120.5
55	28 22.4	42	87	116.5	28 09.7	42	87	117.0	27 56.9	43	87	117.5	27 44.0	43	86	118.0	27 31.0	44	86	118.5	27 17.9	44	85	119.1	27 04.6	44	85	119.6	26 51.3	45	85	120.1
6	27 30.0	41	88	116.0	27 17.6	42	87	116.6	27 05.0	42	87	117.1	26 52.3	42	87	117.6	26 39.5	43	86	118.1	26 26.7	43	86	118.6	26 13.7	43	85	119.1	26 00.6	44	85	119.6
7	26 37.4	41	88	115.6	26 25.2	41	88	116.1	26 12.8	41	87	116.6	26 00.4	42	87	117.1	25 47.9	42	86	117.6	25 35.2	42	86	118.1	25 22.5	43	86	118.6	25 09.6	43	85	119.1
8	25 44.6	40	88	115.2	25 32.6	40	88	115.7	25 20.5	41	88	116.2	25 08.3	41	87	116.7	24 56.0	41	87	117.2	24 43.6	42	86	117.7	24 31.0	42	86	118.2	24 18.4	42	86	118.7
9	24 51.6	39	89	114.8	24 39.8	39	88	115.3	24 27.9	40	88	115.8	24 15.9	40	88	116.3	24 03.9	40	87	116.8	23 51.7	41	87	117.3	23 39.4	41	86	117.8	23 27.1	41	86	118.3
60	23 58.4	38	89	114.3	23 46.8	39	89	114.9	23 35.2	39	88	115.4	23 23.4	39	88	115.9	23 11.6	40	87	116.4	22 59.6	40	87	116.9	22 47.6	40	87	117.4	22 35.5	41	86	117.8
1	23 05.0	38	89	113.9	22 53.7	38	89	114.5	22 42.3	38	88	115.0	22 30.7	39	88	115.5	22 19.1	39	88	116.0	22 07.4	39	87	116.4	21 55.6	40	87	116.9	21 43.7	40	87	117.4
2	22 11.5	37	89	113.6	22 00.4	37	89	114.1	21 49.2	38	89	114.6	21 37.8	38	88	115.1	21 26.4	38	88	115.6	21 14.9	38	88	116.1	21 03.4	39	87	116.5	20 51.7	39	87	117.0
3	21 17.9	36	90	113.2	21 06.9	37	89	113.7	20 55.9	37	89	114.2	20 44.8	37	89	114.7	20 33.6	37	88	115.2	20 22.3	38	88	115.7	20 11.0	38	88	116.2	19 59.5	38	87	116.7
4	20 24.0	36	90	112.8	20 13.3	36	90	113.3	20 02.5	36	89	113.8	19 51.6	36	89	114.3	19 40.6	37	89	114.8	19 29.6	37	88	115.3	19 18.4	37	88	115.8	19 07.2	38	88	116.3
65	19 30.1	35	90	112.4	19 19.5	35	90	112.9	19 08.9	36	90	113.4	18 58.2	36	89	113.9	18 47.5	36	89	114.4	18 36.6	36	88	114.9	18 25.7	37	88	115.4	18 14.7	37	88	115.9
6	18 36.0	34	90	112.1	18 25.6	35	90	112.6	18 15.2	35	90	113.1	18 04.7	35	89	113.6	17 54.2	35	89	114.1	17 43.5	36	89	114.6	17 32.8	36	88	115.1	17 22.0	36	88	115.5
7	17 41.7	34	91	111.8	17 31.6	34	90	112.2	17 21.4	34	90	112.7	17 11.1	34	90	113.2	17 00.7	35	89	113.7	16 50.3	35	89	114.2	16 39.8	35	89	114.7	16 29.2	35	88	115.2
8	16 47.4	33	91	111.4	16 37.4	33	90	111.9	16 27.4	34	90	112.4	16 17.3	34	90	112.9	16 07.1	34	90	113.4	15 56.9	34	89	113.9	15 46.6	34	89	114.4	15 36.2	35	89	114.8
9	15 52.9	32	91	111.1	15 43.1	33	91	111.6	15 33.3	33	90	112.1	15 23.4	33	90	112.6	15 13.4	33	90	113.0	15 03.4	34	89	113.5	14 53.3	34	89	114.0	14 43.1	34	89	114.5
70	14 58.3	32	91	110.8	14 48.7	32	91	111.3	14 39.0	32	91	111.7	14 29.3	33	90	112.2	14 19.5	33	90	112.7	14 09.7	33	90	113.2	13 59.8	33	89	113.7	13 49.8	33	89	114.2
1	14 03.6	31	91	110.5	13 54.2	32	91	110.9	13 44.7	32	91	111.4	13 35.1	32	90	111.9	13 25.5	32	90	112.4	13 15.9	32	90	112.9	13 06.2	32	90	113.4	12 56.4	33	89	113.9
2	13 08.7	31	92	110.1	12 59.5	31	91	110.6	12 50.2	31	91	111.1	12 40.8	31	91	111.6	12 31.4	31	90	112.1	12 22.0	32	90	112.6	12 12.5	32	90	113.1	12 02.9	32	89	113.6
3	12 13.8	30	92	109.8	12 04.7	30	91	110.3	11 55.6	30	91	110.8	11 46.4	31	91	111.3	11 37.2	31	91	111.8	11 27.9	31	90	112.3	11 18.6	31	90	112.8	11 09.2	31	90	113.2
4	11 18.8	30	92	109.6	11 09.9	30	92	110.0	11 00.9	30	91	110.5	10 51.9	30	91	111.0	10 42.9	30	91	111.5	10 33.8	30	90	112.0	10 24.6	31	90	112.5	10 15.5	31	90	113.0
75	10 23.6	29	92	109.3	10 14.9	29	92	109.8	10 06.1	29	92	110.2	9 57.3	29	91	110.7	9 48.4	30	91	111.2	9 39.5	30	91	111.7	9 30.6	30	90	112.2	9 21.6	30	90	112.7
6	9 28.4	29	92	109.0	9 19.8	29	92	109.5	9 11.2	29	92	110.0	9 02.6	29	91	110.4	8 53.9	29	91	110.9	8 45.1	29	91	111.4	8 36.4	29	90	111.9	8 27.6	29	90	112.4
7	8 33.1	28	92	108.7	8 24.6	28	92	109.2	8 16.2	28	92	109.7	8 07.7	28	92	110.2	7 59.2	28	91	110.6	7 50.7	29	91	111.1	7 42.1	29	91	111.6	7 33.5	29	90	112.1
8	7 37.6	27	93	108.4	7 29.4	28	92	108.9	7 21.1	28	92	109.4	7 12.8	28	92	109.9	7 04.5	28	91	110.4	6 56.1	28	91	110.9	6 47.7	28	91	111.3	6 39.2	28	91	111.8
9	6 42.1	27	93	108.2	6 34.0	27	92	108.7	6 25.9	27	92	109.1	6 17.8	27	92	109.6	6 09.6	27	92	110.1	6 01.4	27	91	110.6	5 53.2	27	91	111.1	5 44.9	28	91	111.6
80	5 46.6	26	93	107.9	5 38.6	27	92	108.4	5 30.7	27	92	108.9	5 22.7	27	92	109.4	5 14.7	27	92	109.9	5 06.6	27	91	110.3								

H.A.	20° 00′				20° 30′				21° 00′				21° 30′				22° 00′				22° 30′				23° 00′				23° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	83 00.0	1.0	07	00.0	82 30.0	1.0	06	00.0	82 00.0	1.0	06	00.0	81 30.0	1.0	05	00.0	81 00.0	1.0	05	00.0	80 30.0	1.0	05	00.0	80 00.0	1.0	04	00.0	79 30.0	1.0	04	00.0	00
1	82 56.1	99	19	07.7	82 26.4	99	18	07.1	81 56.6	99	17	06.7	81 26.8	99	16	06.3	80 57.0	99	15	05.9	80 27.2	99	14	05.6	79 57.3	1.0	13	05.3	79 27.4	1.0	13	05.0	1
2	82 44.6	96	31	15.0	82 15.6	97	29	14.0	81 46.5	97	27	13.2	81 17.3	97	26	12.4	80 48.0	98	24	11.7	80 18.7	98	23	11.0	79 49.3	98	22	10.5	79 19.8	98	21	10.0	2
3	82 26.0	92	41	21.9	81 58.2	93	39	20.5	81 30.1	94	37	19.3	81 01.9	94	35	18.2	80 33.4	95	33	17.2	80 04.8	96	31	16.3	79 36.1	96	30	15.5	79 07.3	96	29	14.7	3
4	82 01.2	87	50	28.2	81 34.8	89	48	26.5	81 08.1	90	45	25.0	80 41.0	91	43	23.6	80 13.6	92	41	22.4	79 46.0	92	39	21.3	79 18.2	93	37	20.2	78 50.2	94	36	19.3	4
05	81 31.1	82	58	33.7	81 06.3	84	55	31.9	80 41.0	85	52	30.2	80 15.2	87	50	28.6	79 49.1	88	48	27.2	79 22.6	89	46	25.9	78 55.8	90	44	24.7	78 28.8	91	42	23.6	05
6	80 56.5	76	64	38.6	80 33.3	78	61	36.6	80 09.5	80	58	34.8	79 45.2	82	56	33.1	79 20.3	83	54	31.6	78 55.1	85	52	30.2	78 29.5	86	50	28.8	78 03.5	87	48	27.6	6
7	80 18.4	71	69	42.9	79 56.7	73	66	40.8	79 34.4	75	64	39.0	79 11.5	77	61	37.2	78 48.0	79	59	35.6	78 24.0	81	57	34.1	77 59.6	82	55	32.6	77 34.8	83	53	31.3	7
8	79 37.2	66	73	46.5	79 17.1	68	70	44.5	78 56.2	71	68	42.6	78 34.6	73	66	40.8	78 12.5	75	64	39.2	77 49.8	77	62	37.6	77 26.6	78	60	36.1	77 02.9	80	58	34.7	8
9	78 53.7	61	76	49.7	78 34.9	64	74	47.7	78 15.4	66	72	45.9	77 55.2	69	70	44.1	77 34.3	71	68	42.4	77 12.8	73	66	40.8	76 50.8	74	64	39.3	76 28.3	76	62	37.8	9
10	78 08.1	57	79	52.5	77 50.7	60	77	50.6	77 32.4	62	75	48.7	77 13.5	64	73	46.9	76 53.8	67	71	45.3	76 33.5	69	69	43.6	76 12.7	70	67	42.1	75 51.3	72	65	40.7	10
1	77 21.0	53	81	55.0	77 04.7	56	79	53.1	76 47.6	58	77	51.2	76 29.8	60	75	49.5	76 11.4	63	74	47.8	75 52.2	65	72	46.2	75 32.5	67	70	44.7	75 12.2	69	68	43.2	1
2	76 32.5	49	83	57.1	76 17.3	52	81	55.2	76 01.3	54	79	53.5	75 44.6	57	78	51.8	75 27.2	59	76	50.1	75 09.2	61	74	48.6	74 50.5	63	72	47.0	74 31.3	65	71	45.6	2
3	75 42.9	46	84	58.9	75 28.7	49	83	57.2	75 13.8	51	81	55.5	74 58.1	53	80	53.8	74 41.7	56	78	52.2	74 24.6	58	76	50.7	74 07.0	60	75	49.2	73 48.7	62	73	47.7	3
4	74 52.4	43	86	60.6	74 39.1	45	84	58.9	74 25.1	48	83	57.2	74 10.3	50	81	55.6	73 54.9	53	80	54.1	73 38.8	55	78	52.5	73 22.1	57	77	51.1	73 04.8	59	75	49.7	4
15	74 01.1	40	87	62.0	73 48.7	43	85	60.4	73 35.5	45	84	58.8	73 21.6	47	83	57.2	73 07.1	50	81	55.7	72 51.9	52	80	54.3	72 36.1	54	78	52.8	72 19.7	56	77	51.4	15
6	73 00.1	38	88	63.3	72 57.5	40	86	61.8	72 45.1	42	85	60.2	72 32.1	45	84	58.7	72 18.3	47	82	57.2	72 04.0	49	81	55.8	71 49.0	51	80	54.4	71 33.4	53	79	53.0	6
7	72 16.6	35	88	64.5	72 05.7	38	87	63.0	71 54.1	40	86	61.5	71 41.8	42	85	60.0	71 28.8	44	84	58.6	71 15.2	46	82	57.2	71 01.0	48	81	55.8	70 46.3	50	80	54.5	7
8	71 23.6	33	89	65.5	71 13.4	35	88	64.1	71 02.4	38	87	62.6	70 50.8	40	86	61.2	70 38.6	42	85	59.8	70 25.7	44	84	58.5	70 12.3	46	82	57.1	69 58.3	48	81	55.8	8
9	70 30.2	31	90	66.4	70 20.6	33	89	65.0	70 10.3	35	88	63.6	69 59.3	38	87	62.3	69 47.8	40	86	60.9	69 35.6	42	84	59.6	69 22.9	43	83	58.3	69 09.6	46	82	57.1	9
20	69 36.5	29	90	67.3	69 27.4	31	89	65.9	69 17.7	33	88	64.6	69 07.3	35	87	63.2	68 56.4	37	86	61.9	68 44.9	39	85	60.7	68 32.8	41	84	59.4	68 20.2	43	83	58.2	20
1	68 42.4	27	91	68.0	68 33.8	30	90	66.7	68 24.7	32	89	65.4	68 14.9	33	88	64.1	68 04.6	35	87	62.9	67 53.7	37	86	61.6	67 42.2	39	85	60.4	67 30.2	41	84	59.2	1
2	67 48.0	26	91	68.7	67 40.0	28	90	67.4	67 31.4	30	90	66.2	67 22.1	32	89	64.9	67 12.4	34	88	63.7	67 02.0	35	87	62.5	66 51.2	37	86	61.3	66 39.8	39	85	60.1	2
3	66 53.5	24	91	69.3	66 45.9	26	91	68.1	66 37.7	28	90	66.9	66 29.0	30	89	65.7	66 19.8	32	88	64.5	66 10.0	34	87	63.3	65 59.7	35	86	62.1	65 48.9	37	86	61.0	3
4	65 58.7	23	92	69.9	65 51.5	25	91	68.7	65 43.8	27	90	67.5	65 35.6	28	89	66.3	65 26.9	30	89	65.2	65 17.6	32	88	64.0	65 07.8	33	87	62.9	64 57.5	35	86	61.8	4
25	65 03.7	21	92	70.4	64 57.0	23	91	69.2	64 49.7	25	90	68.1	64 42.0	27	90	66.9	64 33.7	28	89	65.8	64 24.9	30	88	64.7	64 15.6	32	88	63.6	64 05.8	33	87	62.5	25
6	64 08.5	20	92	70.8	64 02.2	22	92	69.7	63 55.4	24	91	68.6	63 48.1	25	90	67.5	63 40.2	27	90	66.4	63 31.9	29	89	65.3	63 23.1	30	88	64.3	63 13.8	32	87	63.2	6
7	63 13.3	19	92	71.2	63 07.3	21	92	70.2	63 00.9	22	91	69.1	62 53.9	24	90	68.0	62 46.5	25	90	66.9	62 38.6	27	89	65.9	62 30.3	29	88	64.8	62 21.5	30	88	63.8	7
8	62 17.8	18	93	71.6	62 12.3	19	92	70.6	62 06.2	21	91	69.5	61 59.6	23	91	68.5	61 52.6	24	90	67.4	61 45.2	26	89	66.4	61 37.3	27	89	65.4	61 28.9	29	88	64.4	8
9	61 22.3	17	93	72.0	61 17.1	18	92	70.9	61 11.4	20	92	69.9	61 05.2	21	91	68.9	60 58.6	23	90	67.9	60 51.5	24	90	66.9	60 44.0	26	89	65.9	60 36.0	27	88	64.9	9
30	60 26.7	16	93	72.3	60 21.7	17	92	71.3	60 16.4	19	92	70.3	60 10.6	20	91	69.3	60 04.3	22	91	68.3	59 57.6	23	90	67.3	59 50.5	24	89	66.4	59 43.0	26	89	65.4	30
1	59 30.9	15	93	72.6	59 26.3	16	93	71.6	59 21.3	18	92	70.6	59 15.8	19	91	69.7	59 09.9	20	91	68.7	59 03.6	22	90	67.7	58 56.9	23	90	66.8	58 49.7	24	89	65.9	1
2	58 35.1	14	93	72.8	58 30.8	15	93	71.9	58 26.1	16	92	70.9	58 20.9	18	92	70.0	58 15.4	19	91	69.0	58 09.4	21	91	68.1	58 03.1	22	90	67.2	57 56.3	23	89	66.3	2
3	57 39.2	13	93	73.1	57 35.2	14	93	72.1	57 30.8	15	92	71.2	57 26.0	17	92	70.3	57 20.7	18	91	69.4	57 15.1	19	91	68.5	57 09.1	21	90	67.6	57 02.7	22	90	66.7	3
4	56 43.3	12	93	73.3	56 39.5	13	93	72.4	56 35.4	14	92	71.5	56 30.9	16	92	70.6	56 26.0	17	92	69.7	56 20.7	18	91	68.8	56 15.0	20	90	67.9	56 08.9	21	90	67.0	4
35	55 47.3	11	93	73.5	55 43.8	12	93	72.6	55 39.9	13	92	71.7	55 35.7	15	92	70.8	55 31.1	16	92	69.9	55 26.1	17	91	69.1	55 20.8	18	91	68.2	55 15.1	20	90	67.3	35
6	54 51.2	10	94	73.6	54 48.0	11	93	72.8	54 44.4	13	93	71.9	54 40.4	14	92	71.0	54 36.1	15	92	70.2	54 31.5	16	91	69.3	54 26.4	17	91	68.5	54 21.1	19	90	67.6	6
7	53 55.1	09	94	73.8	53 52.1	10	93	72.9	53 48.8	12	93	72.1	53 45.1	13	92	71.3	53 41.1	14	92	70.4	53 36.7	15	91	69.6	53 32.0	16	91	68.8	53 26.9	17	90	67.9	7
8	52 58.9	09	94	73.9	52 56.2	10	93	73.1	52 53.1	11	93	72.3	52 49.7	12	92	71.5	52 46.0	13	92	70.6	52 41.9	14	92	69.8	52 37.5	15	91	69.0	52 32.7	16	91	68.2	8
9	52 02.7	08	94	74.1	52 00.2	09	93	73.2	51 57.4	10	93	72.4	51 54.3	11	92	71.6	51 50.8	12	92	70.8	51 47.0	13	92	70.0	51 42.8	14	91	69.2	51 38.4	15	91	68.4	9
40	51 06.5	07	94	74.2	51 04.2	08	93	73.4	51 01.7	09	93	72.6	50 58.8	10	93	71.8	50 55.5	11	92	71.0	50 52.0	12	92	70.2	50 48.1	13	91	69.4	50 44.0	14	91	68.6	40
1	50 10.2	06	94	74.3	50 08.2	07	93	73.5	50 05.9	08	93	72.7	50 03.2	09	93	71.9	50 00.2	10	92	71.2	49 57.0	11	92	70.4	49 53.4	12	91	69.6	49 49.5	13	91	68.8	1
2	49 14.0	06	94	74.3	49 12.1	07	93	73.6	49 10.0	08	93	72.8	49 07.6	09	93	72.1	49 04.9	10	92	71.3	49 01.9	11	92	70.5	48 58.5	12	92	69.8	48 54.9	13	91	69.0	2
3	48 17.7	05	94	74.4	48 16.0	06	94	73.7	48 14.2	07	93	72.9	48 12.0	08	93	72.2	48 09.5	09	92	71.4	48 06.7	10	92	70.7	48 03.7	11	92	69.9	48 00.3	12	91	69.2	3
4	47 21.3	04	94	74.5	47 19.9	05	94	73.7	47 18.3	06	93	73.0	47 16.3	07	93	72.3	47 14.0	08	92	71.5	47 11.5	09	92	70.8	47 08.7	10	92	70.1	47 05.6	11	91	69.3	4
45	46 25.0	04	94	74.5	46 23.8	04	94	73.8	46 22.3	05	93	73.1	46 20.6	06	93	72.4	46 18.6	07	92	71.6	46 16.3	08	92	70.9	46 13.7	09	92	70.2	46 10.9	10	91	69.5	45
6	45 28.6	03	94	74.6	45 27.6	04	94	73.9	45 26.4	05	93	73.2	45 24.9	06	93	72.4	45 23.1	06	93	71.7	45 21.0	07	92	71.0	45 18.7	08	92	70.3	45 16.1	09	91	69.6	6
7	44 32.3	02	94	74.6	44 31.5	03	94	73.9	44 30.4	04	93	73.2	44 29.1	05	93	72.5	44 27.5	06	93	71.8	44 25.7	07	92	71.1	44 23.6	07	92	70.4	44 21.3	08	91	69.7	7
8	43 35.9	02	94	74.6	43 35.3	02	94	74.0	43 34.4	03	93	73.3	43 33.3	04	93	72.6	43 32.0	05	93	71.9	43 30.4	06	92	71.2	43 28.5	07	92	70.5	43 26.4	07	91	69.8	8
9	42 39.5	01	94	74.7	42 39.1	02	94	74.0	42 38.5	03	93	73.3	42 37.6	03	93	72.6	42 36.4	04	93	71.9	42 35.0	05	92	71.3	42 33.4	06	92	70.6	42 31.6	07	92	69.9	9
50	41 43.1	00	94	74.7	41 42.9	01	94	74.0	41 42.5	02	93	73.3	41 41.8	03	93	72.7	41 40.8	03	93	72.0	41 39.7	04	92	71.3	41 38.3	05	92	70.7	41 36.6	06	92	70.0	50
1	40 46.8	00	94	74.7	40 46.7	01	94	74.0	40 46.4	01	93	73.3	40 45.9	02	93	72.7	40 45.2	03	93	72.0	40 44.3	04	92	71.4	40 43.1	04	92	70.7	40 41.7	05	92	70.0	1
2	39 50.4	01	94	74.7	39 50.5	00	94	74.0	39 50.4	01	93	73.4	39 50.1	01	93	72.7	39 49.6	02	93	72.1	39 48.9	03	92	71.4	39 47.9	04	92	70.8	39 46.7	04	92	70.1	2
3	38 54.0	01	94	74.6	38 54.3	01	94	74.0	38 54.4	00	93	73.4	38 54.3	01	93	72.7	38 54.0	01	93	72.1	38 53.5	02	92	71.4	38 52.7	03	92	70.8	38 51.8	04	92	70.2	3
4	37 57.6	02	94	74.6	37 58.1	01	94	74.0	37 58.4	01	93	73.4	37 58.5	00	93	72.7	37 58.4	01	93	72.1	37 58.0	01	92	71.5	37 57.5	02	92	70.8	37 56.8	03	92	70.2	4
55	37 01.3	03	94	74.6	37 01.9	02	94	74.0	37 02.4	01	93	73.3	37 02.7	01	93	72.7	37 02.7	00	93	72.1	37 02.6	01	92	71.5	37 02.3	01	92	70.8	37 01.8	02	92	70.2	55
6	36 04.9	03	94	74.6	36 05.7	02	94	73.9	36 06.4	02	93	73.3	36 06.8	01	93	72.7	36 07.1	01	93	72.1	36 07.2	00	92	71.5	36 07.0	01	92	70.9	36 06.7	01	92	70.2	6
7	35 08.6	04	94	74.5	35 09.6	03	94	73.9	35 10.4	02	93	73.3	35 11.0	02	93	72.7	35 11.5	01	93	72.1	35 11.7	01	92	71.5	35 11.8	00	92	70.9	35 11.7	01	92	70.2	7
8	34 12.2	04	94	74.5	34 13.4	04	94	73.9	34 14.4	03	93	73.3	34 15.2	02	93	72.7	34 15.8	02	93	72.1	34 16.3	01	92	71.5	34 16.6	01	92	70.9	34 16.7	00	92	70.3	8
9	33 15.9	05	94	74.4	33 17.2	04	94	73.8	33 18.4	04	93	73.2	33 19.4	03	93	72.6	33 20.2	02	93	72.0	33 20.9	02	92	71.4	33 21.4	01	92	70.8	33 21.7	01	92	70.2	9
60	32 19.6	06	94	74.4	32 21.1	05	94	73.8	32 22.4	04	93	73.2	32 23.6	04	93	72.6	32 24.6	03	93	72.0	32 25.5	03	92	71.4	32 26.1	02	92	70.8	32 26.6	01	92	70.2	60
1	31 23.3	06	94	74.3	31 25.0	05	94	73.7	31 26.5	05	93	73.1	31 27.8	04	93	72.6	31 29.0	04	93	72.0	31 30.0	03	92	71.4	31 30.9	03	92	70.8	31 31.6	02	92	70.2	1
2	30 27.0	06	94	74.2	30 28.8	06	94	73.7	30 30.5	05	93	73.1	30 32.1	05	93	72.5	30 33.4	04	93	71.9	30 34.7	04	92	71.4	30 35.7	03	92	70.8	30 36.6	03	92	70.2	2
3	29 30.8	07	94	74.2	29 32.8	06	93	73.6	29 34.6	06	93	73.0	29 36.3	05	93	72.5	29 37.9	05	93	71.9	29 39.3	04	92	71.3	29 40.5	04	92	70.7	29 41.6	03	92	70.2	3
4	28 34.5	07	94	74.1	28 36.7	07	93	73.5	28 38.7	06	93	73.0	28 40.6	06	93	72.4	28 42.3	06	93	71.8	28 43.9	05	92	71.3	28 45.3	05	92	70.7	28 46.6	04	92	70.1	4
65	27 38.3	08	94	74.0	27 40.6	08	93	73.5	27 42.8	07	93	72.9	27 44.9	07	93	72.3	27 46.8	06	92	71.8	27 48.5	06	92	71.2	27 50.2	05	92	70.6	27 51.7	05	92	70.1	65
6	26 42.1	08	94	73.9	26 44.6	08	93	73.4	26 46.9	08	93	72.8	26 49.2	07	93	72.3	26 51.3	07	92	71.7	26 53.2	06	92	71.1	26 55.0	06	92	70.6	26 56.7	05	92	70.0	6
7	25 46.0	09	94	73.8	25 48.6	09	93	73.3	25 51.1	08	93	72.7	25 53.5	08	93	72.2	25 55.8	07	92	71.6	25 57.9	07	92	71.1	25 59.9	06	92	70.5	26 01.8	06	92	70.0	7
8	24 49.8	10	94	73.7	24 52.6	09	93	73.2	24 55.3	09	93	72.6	24 57.9	08	93	72.1	25 00.3	08	92	71.5	25 02.6	08	92	71.0	25 04.8	07	92	70.4	25 06.9	07	91	69.9	8
9	23 53.7	10	93	73.6	23 56.7	10	93	73.1	23 59.5	09	93	72.6	24 02.2	09	93	72.0	24 04.8	09	92	71.5	24 07.3	08	92	70.9	24 09.7	08	92	70.4	24 12.0	07	91	69.8	9
70	22 57.6	11	93	73.5	23 00.7	10	93	73.0	23 03.7	10	93	72.5	23 06.6	09	93	71.9	23 09.4	09	92	71.4	23 12.1	09	92	70.8	23 14.7	08	92	70.3	23 17.1	08	91	69.7	70
1	22 01.6	11	93	73.4	22 04.8	11	93	72.9	22 08.0	10	93	72.4	22 11.1	10	93	71.8	22 14.1	10	92	71.3	22 16.9	09	92	70.7	22 19.7	09	92	70.2	22 22.3	09	91	69.7	1
2	21 05.6	12	93	73.3	21 09.0	11	93	72.8	21 12.3	11	93	72.2	21 15.6	11	92	71.7	21 18.7	10	92	71.2	21 21.7	10	92	70.6	21 24.7	10	92	70.1	21 27.5	09	91	69.6	2
3	20 09.6	12	93	73.2	20 13.2	12	93	72.7	20 16.7	12	93	72.1	20 20.1	11	92	71.6	20 23.4	11	92	71.1	20 26.6	11	92	70.5	20 29.7	10	92	70.0	20 32.7	10	91	69.5	3
4	19 13.6	13	93	73.1	19 17.4	12	93	72.5	19 21.0	12	93	72.0	19 24.6	12	92	71.5	19 28.1	11	92	71.0	19 31.5	11	92	70.4	19 34.8	11	92	69.9	19 38.0	11	91	69.4	4
75	18 17.7	13	93	72.9	18 21.6	13	93	72.4	18 25.5	13	93	71.9	18 29.2	12	92	71.4	18 32.8	12	92	70.8	18 36.4	12	92	70.3	18 39.9	11	92	69.8	18 43.3	11	91	69.3	75
6	17 21.8	14	93	72.8	17 25.9	13	93	72.3	17 29.9	13	92	71.8	17 33.8	13	92	71.2	17 37.6	13	92	70.7	17 41.4	12	92	70.2	17 45.0	12	91	69.7	17 48.6	12	91	69.2	6
7	16 26.0	14	93	72.7	16 30.2	14	93	72.2	16 34.4	14	92	71.6	16 38.5	13	92	71.1	16 42.5	13	92	70.6	16 46.4	13	92	70.1	16 50.2	13	91	69.6	16 54.0	12	91	69.0	7
8	15 30.2	15	93	72.5	15 34.6	15	93	72.0	15 38.9	14	92	71.5	15 43.2	14	92	71.0	15 47.4	14	92	70.5	15 51.5	14	92	70.0	15 55.5	13	91	69.4	15 59.4	13	91	68.9	8
9	14 34.5	15	93	72.4	14 39.0	15	93	71.9	14 43.5	15	92	71.4	14 47.9	15	92	70.8	14 52.3	14	92	70.3	14 56.6	14	91	69.8	15 00.8	14	91	69.3	15 04.9	14	91	68.8	9
80	13 38.8	16	93	72.2	13 43.5	16	92	71.7	13 48.1	15	92	71.2	13 52.7	15	92	70.7	13 57.2	15	92	70.2	14 01.7	15	91	69.7	14 06.1	15	91	69.2	14 10.4	14	91	68.7	80
1	12 43.1	16	93	72.1	12 48.0	16	92	71.6	12 52.8	16	92	71.1	12 57.6	16	92	70.6	13 02.3	16	92	70.1	13 06.9	15	91	69.5	13 11.5	15	91	69.0	13 16.0	15	91	68.5	1
2	11 47.5	17	93	71.9	11 52.6	17	92	71.4	11 57.6	16	92	70.9	12 02.5	16	92	70.4	12 07.3	16	92	69.9	12 12.2	16	91	69.4	12 16.9	16	91	68.9	12 21.6	16	91	68.4	2
3	10 52.0	17	92	71.8	10 57.2	17	92	71.3	11 02.3	17	92	70.8	11 07.4	17	92	70.2	11 12.5	17	91	69.7	11 17.5	17	91	69.2	11 22.4	16	91	68.7	11 27.3	16	90	68.2	3
4	9 56.5	18	92	71.6	10 01.9	18	92	71.1	10 07.2	18	92	70.6	10 12.4	17	92	70.1	10 17.6	17	91	69.6	10 22.8	17	91	69.1	10 27.9	17	91	68.6	10 33.0	17	90	68.1	4
85	9 01.1	18	92	71.4	9 06.6	18	92	70.9	9 12.1	18	92	70.4	9 17.5	18	91	69.9	9 22.9	18	91	69.4	9 28.2	18	91	68.9	9 33.6	18	90	68.4	9 38.8	17	90	67.9	85
6	8 05.7	19	92	71.2	8 11.4	19	92	70.7	8 17.0	19	92	70.2	8 22.6	19	91	69.7	8 28.2	19	91	69.2	8 33.7	18	91	68.8	8 39.2	18	90	68.3	8 44.7	18	90	67.8	6
7	7 10.4	20	92	71.1	7 16.2	19	92	70.6	7 22.0	19	92	70.1	7 27.8	19	91	69.6	7 33.5	19	91	69.1	7 39.3	19	91	68.6	7 44.9	19	90	68.1	7 50.6	19	90	67.6	7
8	6 15.1	20	92	70.9	6 21.1	20	92	70.4	6 27.1	20	92	69.9	6 33.0	20	91	69.4	6 39.0	20	91	68.9	6 44.9	20	91	68.4	6 50.7	20	90	67.9	6 56.6	19	90	67.4	8
9	5 19.9	21	92	70.7	5 26.1	21	92	70.2	5 32.2	20	92	69.7	5 38.4	20	91	69.2	5 44.5	20	91	68.7	5 50.6	20	90	68.2	5 56.6	20	90	67.7	6 02.6	20	90	67.2	9
90																									5 02.6	21	90	67.5	5 08.8	21	90	67.0	90

H.A.	20° 00′				20° 30′				21° 00′				21° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	57 09.0	1.0	01	180.0	56 30.0	1.0	01	180.0	56 00.0	1.0	01	180.0	55 30.0	1.0	01	180.0
1	56 59.1	1.0	04	178.3	56 29.1	1.0	04	178.3	55 59.1	1.0	04	178.3	55 29.2	1.0	04	178.4
2	56 56.5	1.0	07	176.6	56 26.5	1.0	07	176.6	55 56.6	1.0	07	176.7	55 26.7	1.0	07	176.7
3	56 52.1	1.0	10	174.8	56 22.2	1.0	10	174.9	55 52.3	1.0	10	175.0	55 22.5	1.0	10	175.1
4	56 46.0	99	13	173.1	56 16.2	99	13	173.2	55 46.4	99	13	173.4	55 16.6	99	12	173.5
05	56 38.1	99	16	171.4	56 08.5	99	16	171.6	55 38.8	99	15	171.7	55 09.2	99	15	171.8
6	56 28.6	98	19	169.8	55 59.1	98	18	169.9	55 29.6	98	18	170.1	55 00.0	98	18	170.2
7	56 17.3	98	21	168.1	55 48.0	98	21	168.3	55 18.7	98	21	168.5	54 49.3	98	20	168.6
8	56 04.4	97	24	166.4	55 35.3	97	24	166.7	55 06.2	97	24	166.9	54 37.0	97	23	167.1
9	55 49.9	96	27	164.8	55 21.1	96	26	165.1	54 52.1	96	26	165.3	54 23.2	97	26	165.5
10	55 33.9	96	29	163.2	55 05.2	96	29	163.5	54 36.5	96	28	163.7	54 07.8	96	28	164.0
1	55 16.2	95	32	161.7	54 47.8	95	31	161.9	54 19.4	95	31	162.2	53 51.0	95	31	162.5
2	54 57.1	94	34	160.1	54 29.0	94	34	160.4	54 00.8	94	33	160.7	53 32.7	94	33	161.0
3	54 36.4	93	37	158.6	54 08.7	93	36	158.9	53 40.8	93	36	159.2	53 12.9	93	35	159.5
4	54 14.4	92	39	157.1	53 46.9	92	38	157.4	53 19.4	92	38	157.8	52 51.8	92	37	158.1
15	53 51.0	90	41	155.7	53 23.8	91	41	156.0	52 56.6	91	40	156.4	52 29.3	91	40	156.7
6	53 26.2	89	43	154.2	52 59.4	89	43	154.6	52 32.5	90	42	155.0	52 05.6	90	42	155.3
7	53 00.2	88	46	152.8	52 33.7	88	45	153.2	52 07.2	89	44	153.6	51 40.5	89	44	154.0
8	52 32.8	87	48	151.5	52 06.7	87	47	151.9	51 40.6	87	46	152.3	51 14.3	88	46	152.7
9	52 04.3	86	49	150.1	51 38.6	86	49	150.6	51 12.8	86	48	151.0	50 46.9	87	48	151.4
20	51 34.7	84	51	148.9	51 09.3	85	51	149.3	50 43.8	85	50	149.7	50 18.3	85	49	150.1
1	51 03.9	83	53	147.6	50 38.9	83	52	148.0	50 13.8	84	52	148.5	49 48.6	84	51	148.9
2	50 32.0	82	55	146.4	50 07.4	82	54	146.8	49 42.7	83	54	147.3	49 17.9	83	53	147.7
3	49 59.1	81	56	145.2	49 34.9	81	56	145.6	49 10.6	81	55	146.1	48 46.1	82	55	146.5
4	49 25.3	79	58	144.0	49 01.4	80	57	144.5	48 37.5	80	57	144.9	48 13.4	80	56	145.4
25	48 50.5	78	60	142.9	48 27.0	78	59	143.4	48 03.4	79	58	143.8	47 39.7	79	58	144.3
6	48 14.7	77	61	141.8	47 51.7	77	60	142.3	47 28.5	78	60	142.7	47 05.2	78	59	143.2
7	47 38.1	75	62	140.7	47 15.4	76	62	141.2	46 52.6	76	61	141.7	46 29.7	77	60	142.2
8	47 00.7	74	64	139.7	46 38.4	75	63	140.2	46 16.0	75	62	140.7	45 53.4	75	62	141.1
9	46 22.5	73	65	138.7	46 00.6	73	64	139.2	45 38.5	74	64	139.7	45 16.3	74	63	140.1
30	45 43.5	72	66	137.7	45 22.0	72	66	138.2	45 00.3	72	65	138.7	44 38.5	73	64	139.2
1	45 03.8	70	67	136.7	44 42.6	71	67	137.2	44 21.3	71	66	137.7	43 59.9	72	65	138.2
2	44 23.4	69	68	135.8	44 02.6	70	68	136.3	43 41.7	70	67	136.8	43 20.6	70	67	137.3
3	43 42.3	68	70	134.9	43 21.9	68	69	135.4	43 01.3	69	68	135.9	42 40.6	69	68	136.4
4	43 00.6	67	71	134.1	42 40.6	67	70	134.6	42 20.4	68	69	135.1	42 00.0	68	69	135.6
35	42 18.3	65	71	133.2	41 58.6	66	71	133.7	41 38.8	66	70	134.2	41 18.8	67	70	134.7
6	41 35.4	64	72	132.4	41 16.1	65	72	132.9	40 56.6	65	71	133.4	40 37.0	66	71	133.9
7	40 52.0	63	73	131.6	40 33.0	64	73	132.1	40 13.8	64	72	132.6	39 54.6	64	72	133.1
8	40 08.0	62	74	130.8	39 49.3	62	74	131.3	39 30.5	63	73	131.8	39 11.6	63	72	132.3
9	39 23.5	61	75	130.1	39 05.2	61	74	130.6	38 46.7	62	74	131.1	38 28.1	62	73	131.6
40	38 38.5	60	76	129.3	38 20.6	60	75	129.9	38 02.4	61	75	130.4	37 44.2	61	74	130.9
1	37 53.1	59	76	128.6	37 35.4	59	76	129.1	37 17.7	60	76	129.7	36 59.7	60	75	130.2
2	37 07.2	58	77	127.9	36 49.9	58	77	128.5	36 32.4	58	76	129.0	36 14.8	59	76	129.5
3	36 20.9	57	78	127.3	36 03.9	57	77	127.8	35 46.7	57	77	128.3	35 29.5	58	76	128.8
4	35 34.2	55	79	126.6	35 17.5	56	78	127.1	35 00.7	56	78	127.6	34 43.7	57	77	128.1
45	34 47.1	54	79	126.0	34 30.7	55	79	126.5	34 14.2	55	78	127.0	33 57.5	56	78	127.5
6	33 59.6	53	80	125.4	33 43.5	54	79	125.9	33 27.3	54	79	126.4	33 11.0	55	78	126.9
7	33 11.8	52	80	124.8	32 56.0	53	80	125.3	32 40.1	53	79	125.8	32 24.0	54	79	126.3
8	32 23.6	51	81	124.2	32 08.1	52	80	124.7	31 52.5	52	80	125.2	31 36.7	53	79	125.7
9	31 35.1	50	81	123.6	31 19.9	51	81	124.1	31 04.5	51	80	124.7	30 49.1	52	80	125.2
50	30 46.2	50	82	123.1	30 31.3	50	81	123.6	30 16.3	50	81	124.1	30 01.1	51	80	124.6
1	29 57.1	49	82	122.6	29 42.5	49	82	123.1	29 27.7	49	81	123.6	29 12.9	50	81	124.1
2	29 07.7	48	83	122.0	28 53.3	48	82	122.5	28 38.9	48	82	123.0	28 24.3	49	81	123.5
3	28 18.0	47	83	121.5	28 03.9	47	83	122.0	27 49.7	48	82	122.5	27 35.4	48	82	123.0
4	27 28.0	46	84	121.0	27 14.2	46	83	121.5	27 00.3	47	83	122.0	26 46.3	47	82	122.5
55	26 37.8	45	84	120.6	26 24.3	45	84	121.1	26 10.6	46	83	121.6	25 56.8	46	83	122.0
6	25 47.4	44	84	120.1	25 34.1	45	84	120.6	25 20.7	45	84	121.1	25 07.2	45	83	121.6
7	24 56.7	43	85	119.6	24 43.6	44	84	120.1	24 30.5	44	84	120.6	24 17.2	44	84	121.1
8	24 05.7	43	85	119.2	23 52.9	43	85	119.7	23 40.1	43	84	120.2	23 27.1	43	84	120.7
9	23 14.6	42	86	118.8	23 02.0	42	85	119.3	22 49.4	42	85	119.7	22 36.7	43	84	120.2
60	22 23.2	41	86	118.3	22 10.9	41	86	118.8	21 58.5	41	85	119.3	21 46.0	42	85	119.8
1	21 31.7	40	86	117.9	21 19.6	40	86	118.4	21 07.5	41	86	118.9	20 55.2	41	85	119.4
2	20 39.9	39	87	117.5	20 28.1	40	86	118.0	20 16.2	40	86	118.5	20 04.2	40	85	119.0
3	19 48.0	39	87	117.1	19 36.4	39	86	117.6	19 24.7	39	86	118.1	19 13.0	39	86	118.6
4	18 55.9	38	87	116.8	18 44.5	38	87	117.3	18 33.1	38	86	117.7	18 21.5	39	86	118.2
65	18 03.6	37	87	116.4	17 52.5	37	87	116.9	17 41.2	38	87	117.4	17 29.9	38	86	117.9
6	17 11.2	36	88	116.0	17 00.2	37	87	116.5	16 49.2	37	87	117.0	16 38.2	37	87	117.5
7	16 18.5	36	88	115.7	16 07.8	36	88	116.2	15 57.1	36	87	116.6	15 46.2	36	87	117.1
8	15 25.8	35	88	115.3	15 15.3	35	88	115.8	15 04.7	35	88	116.3	14 54.1	36	87	116.8
9	14 32.9	34	88	115.0	14 22.6	34	88	115.5	14 12.2	35	88	116.0	14 01.8	35	87	116.4
70	13 39.8	33	89	114.7	13 29.7	34	88	115.2	13 19.6	34	88	115.6	13 09.4	34	88	116.1
1	12 46.6	33	89	114.3	12 36.7	33	89	114.8	12 26.8	33	88	115.3	12 16.9	33	88	115.8
2	11 53.3	32	89	114.0	11 43.6	32	89	114.5	11 33.9	32	88	115.0	11 24.2	33	88	115.5
3	10 59.8	31	89	113.7	10 50.4	32	89	114.2	10 40.9	32	89	114.7	10 31.3	32	88	115.2
4	10 06.2	31	90	113.4	9 57.0	31	89	113.9	9 47.7	31	89	114.4	9 38.3	31	88	114.9
75	9 12.5	30	90	113.1	9 03.5	30	89	113.6	8 54.4	30	89	114.1	8 45.2	31	89	114.6
6	8 18.7	30	90	112.9	8 09.9	30	90	113.3	8 01.0	30	89	113.8	7 52.0	30	89	114.3
7	7 24.8	29	90	112.6	7 16.1	29	90	113.1	7 07.4	29	89	113.5	6 58.7	29	89	114.0
8	6 30.8	28	90	112.3	6 22.3	28	90	112.8	6 13.8	28	90	113.3	6 05.2	29	89	113.8
9	5 36.6	28	90	112.0	5 28.3	28	90	112.5	5 20.0	28	90	113.0	5 11.7	28	90	113.5

22° 00′				22° 30′				23° 00′				23° 30′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
55 00.0	1.0	01	180.0	54 30.0	1.0	01	180.0	54 00.0	1.0	01	180.0	53 30.0	1.0	01	180.0	00
54 59.2	1.0	04	178.4	54 29.2	1.0	04	178.4	53 59.2	1.0	04	178.4	53 29.2	1.0	04	178.5	1
54 56.7	1.0	07	176.8	54 26.8	1.0	07	176.8	53 56.8	1.0	07	176.9	53 26.9	1.0	07	176.9	2
54 52.6	1.0	10	175.2	54 22.7	1.0	09	175.2	53 52.8	1.0	09	175.3	53 22.9	1.0	09	175.4	3
54 46.8	99	12	173.6	54 17.1	99	12	173.7	53 47.3	99	12	173.8	53 17.4	99	12	173.9	4
54 39.5	99	15	172.0	54 09.8	99	15	172.1	53 40.1	99	14	172.2	53 10.4	99	14	172.3	05
54 30.5	98	18	170.4	54 01.0	98	17	170.5	53 31.4	99	17	170.7	53 01.9	99	17	170.8	6
54 20.0	98	20	168.8	53 50.6	98	20	169.0	53 21.2	98	20	169.2	52 51.8	98	19	169.3	7
54 07.9	97	23	167.3	53 38.7	97	22	167.5	53 09.5	97	22	167.7	52 40.2	97	22	167.9	8
53 54.2	97	25	165.7	53 25.2	97	25	166.0	52 56.2	97	24	166.2	52 27.2	97	24	166.4	9
53 39.1	96	28	164.2	53 10.3	96	27	164.5	52 41.5	96	27	164.7	52 12.7	96	26	164.9	10
53 22.5	95	30	162.7	52 54.0	95	30	163.0	52 25.4	96	29	163.3	51 56.8	95	29	163.5	1
53 04.4	94	32	161.3	52 36.2	94	32	161.6	52 07.9	94	32	161.8	51 39.5	95	31	162.1	2
52 45.0	93	35	159.8	52 17.0	93	34	160.1	51 49.0	94	34	160.4	51 20.9	94	33	160.7	3
52 24.2	92	37	158.4	51 56.5	92	36	158.7	51 28.7	93	36	159.0	51 00.9	93	35	159.4	4
52 02.0	91	39	157.0	51 34.6	91	39	157.4	51 07.2	92	38	157.7	50 39.7	92	38	158.0	15
51 38.6	90	41	155.7	51 11.5	90	41	156.0	50 44.3	91	40	156.4	50 17.2	91	40	156.7	6
51 13.9	89	43	154.3	50 47.1	89	43	154.7	50 20.3	89	42	155.1	49 53.4	90	42	155.4	7
50 48.0	88	45	153.0	50 21.5	88	45	153.4	49 55.1	88	44	153.8	49 28.5	89	43	154.1	8
50 20.9	87	47	151.8	49 54.8	87	46	152.2	49 28.7	87	46	152.5	49 02.4	88	45	152.9	9
49 52.7	86	49	150.5	49 26.9	86	48	150.9	49 01.1	86	48	151.3	48 35.3	86	47	151.7	20
49 23.3	84	51	149.3	48 58.0	85	50	149.7	48 32.5	85	49	150.1	48 07.0	85	49	150.5	1
48 53.0	83	52	148.1	48 28.0	83	52	148.5	48 02.9	84	51	148.9	47 37.7	84	50	149.4	2
48 21.6	82	54	147.0	47 57.0	82	53	147.4	47 32.2	83	53	147.8	47 07.4	83	52	148.2	3
47 49.2	81	56	145.8	47 25.0	81	55	146.3	47 00.6	81	54	146.7	46 36.2	82	54	147.1	4
47 15.9	79	57	144.7	46 52.0	80	56	145.2	46 28.0	80	56	145.6	46 04.0	80	55	146.0	25
46 41.7	78	58	143.7	46 18.2	79	58	144.1	45 54.6	79	57	144.6	45 30.8	79	57	145.0	6
46 06.7	77	60	142.6	45 43.5	77	59	143.1	45 20.2	78	59	143.5	44 56.9	78	58	144.0	7
45 30.8	76	61	141.6	45 08.0	76	61	142.1	44 45.1	76	60	142.5	44 22.1	77	59	143.0	8
44 54.0	75	62	140.6	44 31.6	75	62	141.1	44 09.1	75	61	141.5	43 46.5	76	61	142.0	9
44 16.6	73	64	139.6	43 54.5	74	63	140.1	43 32.4	74	62	140.6	43 10.1	74	62	141.0	30
43 38.3	72	65	138.7	43 16.7	72	64	139.2	42 54.9	73	64	139.7	42 33.0	73	63	140.1	1
42 59.4	71	66	137.8	42 38.1	71	65	138.3	42 16.7	72	65	138.8	41 55.1	72	64	139.2	2
42 19.8	70	67	136.9	41 58.9	70	66	137.4	41 37.8	70	66	137.9	41 16.6	71	65	138.3	3
41 39.6	68	68	136.1	41 19.0	69	68	136.5	40 58.3	69	67	137.0	40 37.4	70	66	137.5	4
40 58.7	67	69	135.2	40 38.5	68	69	135.7	40 18.1	68	68	136.2	39 57.6	68	67	136.7	35
40 17.2	66	70	134.4	39 57.3	66	70	134.9	39 37.3	67	69	135.4	39 17.2	67	68	135.9	6
39 35.2	65	71	133.6	39 15.6	65	70	134.1	38 56.0	66	70	134.6	38 36.2	66	69	135.1	7
38 52.6	64	72	132.8	38 33.4	64	71	133.3	38 14.1	65	71	133.8	37 54.6	65	70	134.3	8
38 09.4	63	73	132.1	37 50.6	63	72	132.6	37 31.6	63	72	133.1	37 12.5	64	71	133.6	9
37 25.8	61	74	131.4	37 07.3	62	73	131.9	36 48.7	62	72	132.3	36 29.9	63	72	132.8	40
36 41.7	60	74	130.7	36 23.5	61	74	131.2	36 05.2	61	73	131.6	35 46.8	62	73	132.1	1
35 57.1	59	75	130.0	35 39.3	60	74	130.5	35 21.3	60	74	131.0	35 03.2	60	73	131.4	2
35 12.1	58	76	129.3	34 54.6	59	75	129.8	34 36.9	59	75	130.3	34 19.2	59	74	130.8	3
34 26.6	57	76	128.6	34 09.4	58	76	129.1	33 52.1	58	75	129.6	33 34.7	58	75	130.1	4
33 40.8	56	77	128.0	33 23.9	56	77	128.5	33 06.9	57	76	129.0	32 49.8	57	76	129.5	45
32 54.5	55	78	127.4	32 37.9	55	77	127.9	32 21.3	56	77	128.4	32 04.5	56	76	128.9	6
32 07.9	54	78	126.8	31 51.6	54	78	127.3	31 35.2	55	77	127.8	31 18.7	55	77	128.3	7
31 20.9	53	79	126.2	31 04.9	53	78	126.7	30 48.9	54	78	127.2	30 32.7	54	77	127.7	8
30 33.6	52	79	125.6	30 17.9	52	79	126.1	30 02.1	53	78	126.6	29 46.2	53	78	127.1	9
29 45.9	51	80	125.1	29 30.5	51	80	125.6	29 15.0	52	79	126.1	28 59.4	52	79	126.6	50
28 57.9	50	80	124.6	28 42.8	50	80	125.0	28 27.6	51	80	125.5	28 12.3	51	79	126.0	1
28 09.6	49	81	124.0	27 54.8	49	81	124.5	27 39.9	50	80	125.0	27 24.9	50	80	125.5	2
27 21.0	48	81	123.5	27 06.5	49	81	124.0	26 51.9	49	80	124.5	26 37.1	49	80	125.0	3
26 32.1	47	82	123.0	26 17.9	48	81	123.5	26 03.5	48	81	124.0	25 49.1	48	81	124.5	4
25 43.0	46	82	122.5	25 29.0	47	82	123.0	25 14.9	47	82	123.5	25 00.8	47	81	124.0	55
24 53.6	45	83	122.1	24 39.9	46	82	122.6	24 26.1	46	82	123.0	24 12.2	46	81	123.5	6
24 03.9	45	83	121.6	23 50.5	45	83	122.1	23 36.9	45	82	122.6	23 23.3	46	82	123.1	7
23 14.0	44	84	121.2	23 00.8	44	83	121.7	22 47.6	44	83	122.1	22 34.2	45	82	122.6	8
22 23.8	43	84	120.7	22 10.9	43	84	121.2	21 57.9	43	83	121.7	21 44.8	44	83	122.2	9
21 33.5	42	84	120.3	21 20.8	42	84	120.8	21 08.1	43	84	121.3	20 55.3	43	83	121.8	60
20 42.9	41	85	119.9	20 30.5	41	84	120.4	20 18.0	42	84	120.9	20 05.4	42	83	121.3	1
19 52.1	40	85	119.5	19 39.9	41	85	120.0	19 27.7	41	84	120.5	19 15.4	41	84	120.9	2
19 01.1	40	85	119.1	18 49.2	40	85	119.6	18 37.2	40	84	120.1	18 25.2	40	84	120.5	3
18 09.9	39	86	118.7	17 58.3	39	85	119.2	17 46.5	39	85	119.7	17 34.7	40	84	120.2	4
17 18.6	38	86	118.3	17 07.1	38	86	118.8	16 55.6	38	85	119.3	16 44.1	39	85	119.8	65
16 27.0	37	86	118.0	16 15.8	37	86	118.5	16 04.6	38	86	118.9	15 53.2	38	85	119.4	6
15 35.3	36	86	117.6	15 24.3	37	86	118.1	15 13.3	37	86	118.6	15 02.2	37	85	119.1	7
14 43.4	36	87	117.3	14 32.7	36	86	117.8	14 21.9	36	86	118.2	14 11.0	36	86	118.7	8
13 51.4	35	87	116.9	13 40.9	35	87	117.4	13 30.3	35	86	117.9	13 19.7	36	86	118.4	9
12 59.2	34	87	116.6	12 48.9	34	87	117.1	12 38.5	35	86	117.6	12 28.2	35	86	118.0	70
12 06.8	33	87	116.3	11 56.8	34	87	116.8	11 46.6	34	87	117.2	11 36.5	34	86	117.7	1
11 14.3	33	88	116.0	11 04.5	33	87	116.4	10 54.6	33	87	116.9	10 44.7	33	87	117.4	2
10 21.7	32	88	115.7	10 12.1	32	88	116.1	10 02.4	32	87	116.6	9 52.7	32	87	117.1	3
9 29.0	31	88	115.4	9 19.5	31	88	115.8	9 10.1	32	88	116.3	9 00.6	32	87	116.8	4
8 36.1	31	88	115.1	8 26.9	31	88	115.6	8 17.6	31	88	116.0	8 08.3	31	87	116.5	75
7 43.1	30	88	114.8	7 34.0	30	88	115.3	7 25.0	30	88	115.8	7 15.9	30	88	116.2	6
6 49.9	29	89	114.5	6 41.1	29	88	115.0	6 32.3	29	88	115.5	6 23.4	30	88	116.0	7
5 56.7	29	89	114.2	5 48.1	29	88	114.7	5 39.5	29	88	115.2	5 30.8	29	88	115.7	8
5 03.3	28	89	114.0													9

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	79 00.0	1.0 04	00.0	78 30.0	1.0 04	00.0	78 00.0	1.0 04	00.0	77 30.0	1.0 04	00.0	77 60.0	1.0 03	00.0	76 30.0	1.0 03	00.0	76 00.0	1.0 03	00.0	75 30.0	1.0 03	00.0	00
1	78 57.6	1.0 12	04.8	78 27.7	1.0 12	04.6	77 57.8	1.0 11	04.4	77 27.9	1.0 11	04.2	76 58.0	1.0 10	04.0	76 28.0	1.0 10	03.8	75 58.1	1.0 09	03.7	75 28.2	1.0 09	03.5	1
2	78 50.3	98 20	09.5	78 20.8	99 19	09.0	77 51.2	99 18	08.6	77 21.5	99 17	08.3	76 51.9	99 17	07.9	76 22.2	99 16	07.6	75 52.5	99 16	07.3	75 22.8	99 15	07.0	2
3	78 38.4	97 27	14.0	78 09.4	97 26	13.4	77 40.3	97 26	12.8	77 11.1	97 24	12.3	76 41.9	98 23	11.8	76 12.6	98 22	11.3	75 43.3	98 21	10.9	75 13.9	98 21	10.5	3
4	78 22.0	94 34	18.4	77 53.7	95 33	17.6	77 25.3	95 31	16.9	76 56.7	95 30	16.2	76 28.0	96 29	15.5	75 59.3	96 28	14.9	75 30.5	96 27	14.4	75 01.5	96 26	13.9	4
05	78 01.5	91 40	22.6	77 34.1	92 39	21.6	77 06.4	92 37	20.7	76 38.6	93 36	19.9	76 10.6	93 35	19.1	75 42.5	94 33	18.4	75 14.3	94 32	17.7	74 45.9	95 31	17.1	05
6	77 37.3	88 46	26.5	77 10.7	89 44	25.4	76 44.0	90 43	24.4	76 17.0	90 41	23.4	75 49.8	91 40	22.6	75 22.4	92 39	21.7	74 54.9	92 37	21.0	74 27.2	92 36	20.2	6
7	77 09.6	85 51	30.1	76 44.0	86 50	28.9	76 18.2	87 48	27.8	75 52.1	87 46	26.8	75 25.8	88 45	25.8	74 59.3	89 43	24.9	74 32.5	90 42	24.0	74 05.6	90 41	23.2	7
8	76 38.8	81 56	33.4	76 14.3	82 54	32.2	75 49.5	83 52	31.0	75 24.4	84 51	29.9	74 59.0	85 49	28.9	74 33.3	86 48	27.9	74 07.3	87 46	27.0	73 41.2	88 45	26.1	8
9	76 05.3	77 60	36.5	75 41.9	79 58	35.2	75 18.1	80 56	34.0	74 53.9	81 55	32.8	74 29.5	82 53	31.7	74 04.7	83 52	30.7	73 39.6	84 50	29.7	73 14.2	85 49	28.8	9
10	75 29.4	74 63	39.3	75 07.1	75 62	38.0	74 44.3	77 60	36.7	74 21.1	78 58	35.5	73 57.6	79 57	34.4	73 33.7	80 55	33.3	73 09.5	81 54	32.3	72 45.0	82 52	31.3	10
1	74 51.4	70 66	41.9	74 30.1	72 65	40.5	74 08.3	73 63	39.3	73 46.1	75 62	38.0	73 23.5	76 60	36.9	73 00.5	77 58	35.8	72 37.2	78 57	34.7	72 13.6	79 56	33.7	1
2	74 11.5	67 69	44.2	73 51.2	69 68	42.9	73 30.4	70 66	41.6	73 09.1	72 64	40.4	72 47.5	73 63	39.2	72 25.4	74 61	38.0	72 03.0	75 60	36.9	71 40.2	76 59	35.9	2
3	73 29.9	64 72	46.3	73 10.6	65 70	45.0	72 50.8	67 68	43.7	72 30.4	68 67	42.5	72 09.7	70 66	41.3	71 48.5	71 64	40.2	71 27.0	72 63	39.1	71 05.1	74 61	38.0	3
4	72 46.9	60 74	48.3	72 28.5	62 72	47.0	72 09.6	64 71	45.7	71 50.2	65 69	44.5	71 30.4	67 68	43.3	71 10.1	68 66	42.1	70 49.4	70 65	41.0	70 28.3	71 64	39.9	4
15	72 02.7	58 76	50.1	71 45.2	59 74	48.8	71 27.1	61 73	47.5	71 08.6	63 71	46.3	70 49.6	64 70	45.1	70 30.2	66 69	43.9	70 10.3	67 67	42.8	69 50.0	68 66	41.8	15
6	71 17.3	55 77	51.7	71 00.6	56 76	50.4	70 43.4	58 75	49.2	70 25.7	60 73	48.0	70 07.6	61 72	46.8	69 49.0	63 71	45.6	69 29.9	64 69	44.5	69 10.5	66 68	43.4	6
7	70 30.9	52 79	53.2	70 15.1	54 77	51.9	69 58.7	55 76	50.7	69 41.8	57 75	49.5	69 24.4	59 74	48.3	69 06.6	60 72	47.2	68 48.4	62 71	46.1	68 29.7	63 70	45.0	7
8	69 43.7	49 80	54.6	69 28.6	51 79	53.3	69 13.0	53 78	52.1	68 56.9	55 76	50.9	68 40.3	56 75	49.8	68 23.2	58 74	48.7	68 05.7	59 73	47.6	67 47.8	60 71	46.5	8
9	68 55.7	47 81	55.8	68 41.3	49 80	54.6	68 26.4	50 79	53.4	68 11.0	52 78	52.3	67 55.2	54 76	51.1	67 38.9	55 75	50.0	67 22.1	57 74	48.9	67 04.9	58 73	47.9	9
20	68 07.0	45 82	57.0	67 53.3	46 81	55.8	67 39.1	48 80	54.6	67 24.4	50 79	53.5	67 09.3	51 78	52.4	66 53.7	53 77	51.3	66 37.6	54 76	50.2	66 21.1	56 74	49.1	20
1	67 17.7	43 83	58.0	67 04.7	44 82	56.9	66 51.1	46 81	55.7	66 37.1	48 80	54.6	66 22.6	49 79	53.5	66 07.7	51 78	52.4	65 52.3	52 77	51.4	65 36.5	53 76	50.3	1
2	66 27.9	41 84	59.0	66 15.4	42 83	57.8	66 02.5	44 82	56.7	65 49.2	45 81	55.6	65 35.3	47 80	54.6	65 21.0	48 79	53.5	65 06.3	50 78	52.5	64 51.1	51 77	51.4	2
3	65 37.5	39 85	59.9	65 25.7	40 84	58.8	65 13.4	42 83	57.7	65 00.6	43 82	56.6	64 47.4	45 81	55.5	64 33.7	46 80	54.5	64 19.6	48 79	53.5	64 05.1	49 78	52.5	3
4	64 46.7	37 85	60.7	64 35.5	38 84	59.6	64 23.8	40 84	58.5	64 11.6	41 83	57.5	63 58.9	43 82	56.4	63 45.8	44 81	55.4	63 32.3	46 80	54.4	63 18.4	47 79	53.4	4
25	63 55.6	35 86	61.5	63 44.8	37 85	60.4	63 33.7	38 84	59.3	63 22.0	40 83	58.3	63 10.0	41 82	57.3	62 57.5	42 81	56.3	62 44.5	44 80	55.3	62 31.2	45 80	54.3	25
6	63 04.0	33 86	62.1	62 53.8	35 86	61.1	62 43.2	36 85	60.1	62 32.1	38 84	59.1	62 20.5	39 83	58.1	62 08.6	41 82	57.1	61 56.2	42 81	56.1	61 43.5	43 80	55.2	6
7	62 12.2	32 87	62.8	62 02.5	33 86	61.8	61 52.3	35 85	60.8	61 41.7	36 84	59.8	61 30.7	37 84	58.8	61 19.3	39 83	57.8	61 07.5	40 82	56.9	60 55.2	41 81	56.0	7
8	61 20.1	30 87	63.4	61 10.8	32 87	62.4	61 01.1	33 86	61.4	60 51.0	34 85	60.5	60 40.5	36 84	59.5	60 29.6	37 83	58.5	60 18.3	38 83	57.6	60 06.6	40 82	56.7	8
9	60 27.7	29 88	63.9	60 18.9	30 87	63.0	60 09.7	31 86	62.0	60 00.0	33 86	61.1	59 50.0	34 85	60.1	59 39.6	35 84	59.2	59 28.7	37 83	58.3	59 17.5	38 82	57.4	9
30	59 35.0	27 88	64.5	59 26.7	29 87	63.5	59 17.9	30 87	62.6	59 08.7	31 86	61.6	58 59.2	33 85	60.7	58 49.2	34 84	59.8	58 38.9	35 84	58.9	58 28.1	36 83	58.0	30
1	58 42.2	26 88	64.9	58 34.2	27 88	64.0	58 25.9	28 87	63.1	58 17.2	30 86	62.2	58 08.0	31 86	61.3	57 58.5	32 85	60.4	57 48.6	34 84	59.5	57 38.4	35 83	58.6	1
2	57 49.1	25 89	65.4	57 41.6	26 88	64.5	57 33.7	27 87	63.6	57 25.3	28 87	62.7	57 16.6	30 86	61.8	57 07.6	31 85	60.9	56 58.1	32 85	60.0	56 48.3	33 84	59.2	2
3	56 55.9	23 89	65.8	56 48.8	25 88	64.9	56 41.2	26 88	64.0	56 33.3	27 87	63.1	56 25.0	28 86	62.2	56 16.4	29 86	61.4	56 07.4	31 85	60.5	55 58.0	32 84	59.7	3
4	56 02.5	22 89	66.1	55 55.7	23 89	65.3	55 48.6	24 88	64.4	55 41.1	26 87	63.5	55 33.2	27 87	62.7	55 24.9	28 86	61.8	55 16.4	29 85	61.0	55 07.4	30 85	60.2	4
35	55 09.0	21 90	66.5	55 02.6	22 89	65.6	54 55.8	23 88	64.8	54 48.6	24 88	63.9	54 41.1	26 87	63.1	54 33.3	27 86	62.3	54 25.1	28 86	61.4	54 16.6	29 85	60.6	35
6	54 15.3	20 90	66.8	54 09.2	21 89	66.0	54 02.8	22 88	65.1	53 56.0	23 88	64.3	53 48.9	24 87	63.5	53 41.4	25 87	62.7	53 33.7	27 86	61.9	53 25.5	28 85	61.0	6
7	53 21.5	19 90	67.1	53 15.8	20 89	66.3	53 09.7	21 89	65.5	53 03.3	22 88	64.7	52 56.5	23 88	63.8	52 49.4	24 87	63.0	52 42.0	25 86	62.2	52 34.3	26 86	61.4	7
8	52 27.6	18 90	67.4	52 22.2	19 90	66.6	52 16.4	20 89	65.8	52 10.4	21 88	65.0	52 04.0	22 88	64.2	51 57.2	23 87	63.4	51 50.2	24 87	62.6	51 42.9	25 86	61.8	8
9	51 33.6	16 90	67.6	51 28.5	18 90	66.8	51 23.1	19 89	66.0	51 17.3	20 89	65.3	51 11.3	21 88	64.5	51 04.9	22 87	63.7	50 58.2	23 87	62.9	50 51.2	24 86	62.2	9
40	50 39.5	15 90	67.9	50 34.7	17 90	67.1	50 29.6	18 89	66.3	50 24.2	19 89	65.5	50 18.4	20 88	64.8	50 12.4	21 88	64.0	50 06.1	22 87	63.2	49 59.5	23 87	62.5	40
1	49 45.3	14 90	68.1	49 40.8	15 90	67.3	49 36.0	16 90	66.6	49 30.9	17 89	65.8	49 25.5	18 88	65.0	49 19.8	19 88	64.3	49 13.8	20 87	63.5	49 07.6	21 87	62.8	1
2	48 51.0	14 91	68.3	48 46.8	15 90	67.5	48 42.3	15 90	66.8	48 37.5	16 89	66.0	48 32.4	17 88	65.3	48 27.1	18 88	64.5	48 21.4	19 88	63.8	48 15.5	20 87	63.1	2
3	47 56.7	13 91	68.5	47 52.8	14 90	67.7	47 48.5	14 90	67.0	47 44.1	15 89	66.2	47 39.3	16 89	65.5	47 34.2	17 88	64.8	47 28.9	18 88	64.0	47 23.3	19 87	63.3	3
4	47 02.3	12 91	68.6	46 58.6	13 90	67.9	46 54.7	14 90	67.2	46 50.5	14 89	66.4	46 46.0	15 89	65.7	46 41.3	16 88	65.0	46 36.3	17 88	64.3	46 31.0	18 87	63.6	4
45	46 07.8	11 91	68.8	46 04.4	12 90	68.0	46 00.8	13 90	67.3	45 56.9	13 90	66.6	45 52.7	14 89	65.9	45 48.3	15 89	65.2	45 43.6	16 88	64.5	45 38.6	17 87	63.8	45
6	45 13.3	10 91	68.9	45 10.2	11 91	68.2	45 06.8	12 90	67.5	45 03.2	13 90	66.8	44 59.3	13 89	66.1	44 55.2	14 89	65.4	44 50.8	15 88	64.7	44 46.1	16 88	64.0	6
7	44 18.7	09 91	69.0	44 15.9	10 91	68.3	44 12.8	11 90	67.6	44 09.4	12 90	66.9	44 05.8	12 89	66.2	44 02.0	13 89	65.6	43 57.9	14 88	64.9	43 53.5	15 88	64.2	7
8	43 24.1	08 91	69.1	43 21.5	09 91	68.4	43 18.7	10 90	67.8	43 15.6	11 90	67.1	43 12.3	11 89	66.4	43 08.7	12 89	65.7	43 04.9	13 88	65.0	43 00.9	14 88	64.4	8
9	42 29.5	07 91	69.2	42 27.1	08 91	68.6	42 24.5	09 90	67.9	42 21.7	10 90	67.2	42 18.7	11 90	66.5	42 15.4	11 89	65.9	42 11.9	12 88	65.2	42 08.1	13 88	64.5	9
50	41 34.8	07 91	69.3	41 32.7	07 91	68.6	41 30.4	08 90	68.0	41 27.8	09 90	67.3	41 25.0	10 90	66.7	41 22.0	10 89	66.0	41 18.8	11 89	65.3	41 15.3	12 88	64.7	50
1	40 40.1	06 91	69.4	40 38.2	07 91	68.7	40 36.2	07 90	68.1	40 33.9	08 90	67.4	40 31.3	09 90	66.8	40 28.6	10 89	66.1	40 25.6	10 89	65.5	40 22.5	11 88	64.8	1
2	39 45.3	05 91	69.5	39 43.7	06 91	68.8	39 41.9	06 90	68.2	39 39.9	07 90	67.5	39 37.6	08 90	66.9	39 35.1	09 89	66.2	39 32.4	09 89	65.6	39 29.5	10 88	64.9	2
3	38 50.6	04 91	69.5	38 49.2	05 91	68.9	38 47.6	06 90	68.2	38 45.8	06 90	67.6	38 43.8	07 90	66.9	38 41.6	08 89	66.3	38 39.2	08 89	65.7	38 36.6	09 88	65.0	3
4	37 55.8	03 91	69.6	37 54.7	04 91	68.9	37 53.3	05 90	68.3	37 51.8	06 90	67.7	37 50.0	06 90	67.0	37 48.1	07 89	66.4	37 45.9	08 89	65.8	37 43.5	08 88	65.1	4
55	37 01.0	03 91	69.6	37 00.1	03 91	69.0	36 59.0	04 90	68.3	36 57.7	05 90	67.7	36 56.2	05 90	67.1	36 54.5	06 89	66.5	36 52.6	07 89	65.8	36 50.5	07 88	65.2	55
6	36 06.2	02 91	69.6	36 05.5	03 91	69.0	36 04.7	03 90	68.4	36 03.6	04 90	67.8	36 02.3	05 90	67.1	36 00.9	05 89	66.5	35 59.2	06 89	65.9	35 57.4	06 89	65.3	6
7	35 11.4	01 91	69.6	35 11.0	02 91	69.0	35 10.3	02 91	68.4	35 09.5	03 90	67.8	35 08.4	04 90	67.2	35 07.2	04 89	66.6	35 05.8	05 89	66.0	35 04.3	06 89	65.4	7
8	34 16.6	01 91	69.6	34 16.4	01 91	69.0	34 15.9	02 91	68.4	34 15.3	02 90	67.8	34 14.5	03 90	67.2	34 13.6	04 89	66.6	34 12.4	04 89	66.0	34 11.1	05 89	65.4	8
9	33 21.8	00 91	69.6	33 21.8	00 91	69.0	33 21.6	01 91	68.5	33 21.2	02 90	67.9	33 20.6	02 90	67.3	33 19.9	03 89	66.7	33 19.0	03 89	66.1	33 17.9	04 89	65.5	9
60	32 27.0	01 91	69.6	32 27.2	00 91	69.0	32 27.2	00 91	68.5	32 27.0	01 90	67.9	32 26.7	01 90	67.3	32 26.2	02 89	66.7	32 25.6	02 89	66.1	32 24.7	03 89	65.5	60
1	31 32.2	02 91	69.6	31 32.6	01 91	69.0	31 32.8	00 91	68.5	31 32.9	00 90	67.9	31 32.8	01 90	67.3	31 32.5	01 89	66.7	31 32.1	02 89	66.1	31 31.5	02 89	65.5	1
2	30 37.4	02 91	69.6	30 38.0	02 91	69.0	30 38.4	01 91	68.4	30 38.7	01 90	67.9	30 38.9	00 90	67.3	30 38.8	00 90	66.7	30 38.7	01 89	66.1	30 38.3	01 89	65.5	2
3	29 42.6	03 91	69.6	29 43.4	02 91	69.0	29 44.1	02 91	68.4	29 44.6	01 90	67.9	29 44.9	01 90	67.3	29 45.1	00 90	66.7	29 45.2	00 89	66.1	29 45.1	01 89	65.6	3
4	28 47.8	04 91	69.5	28 48.8	03 91	69.0	28 49.7	03 91	68.4	28 50.4	02 90	67.8	28 51.0	02 90	67.3	28 51.4	01 90	66.7	28 51.7	01 89	66.1	28 51.9	00 89	65.6	4
65	27 53.0	04 91	69.5	27 54.3	04 91	68.9	27 55.3	03 90	68.4	27 56.3	03 90	67.8	27 57.1	02 90	67.2	27 57.8	02 89	66.7	27 58.3	02 89	66.1	27 58.7	01 89	65.5	65
6	26 58.3	05 91	69.5	26 59.7	05 91	68.9	27 01.0	04 90	68.3	27 02.2	04 90	67.8	27 03.2	03 90	67.2	27 04.1	03 89	66.7	27 04.8	02 89	66.1	27 05.5	02 89	65.5	6
7	26 03.5	06 91	69.4	26 05.2	05 91	68.8	26 06.7	05 90	68.3	26 08.0	04 90	67.7	26 09.3	04 90	67.2	26 10.4	04 89	66.6	26 11.4	03 89	66.1	26 12.2	03 89	65.5	7
8	25 08.8	06 91	69.3	25 10.7	06 91	68.8	25 12.4	05 90	68.2	25 14.0	05 90	67.7	25 15.4	05 90	67.1	25 16.7	04 89	66.6	25 18.0	04 89	66.0	25 19.1	03 89	65.5	8
9	24 14.1	07 91	69.3	24 16.2	07 91	68.7	24 18.1	06 90	68.2	24 19.9	06 90	67.6	24 21.6	05 90	67.1	24 23.1	05 89	66.5	24 24.6	05 89	66.0	24 25.9	04 89	65.4	9
70	23 19.5	08 91	69.2	23 21.7	07 91	68.7	23 23.8	07 90	68.1	23 25.8	06 90	67.6	23 27.7	06 90	67.0	23 29.5	06 89	66.5	23 31.2	05 89	65.9	23 32.7	05 89	65.4	70
1	22 24.8	08 91	69.1	22 27.3	08 91	68.6	22 29.6	08 90	68.0	22 31.8	07 90	67.5	22 33.9	07 90	67.0	22 35.9	06 89	66.4	22 37.8	06 89	65.9	22 39.6	06 89	65.3	1
2	21 30.2	09 91	69.0	21 32.8	09 91	68.5	21 35.4	08 90	68.0	21 37.8	08 90	67.4	21 40.1	08 90	66.9	21 42.3	07 89	66.4	21 44.4	07 89	65.8	21 46.4	07 88	65.3	2
3	20 35.6	10 91	69.0	20 38.5	09 91	68.4	20 41.2	09 90	67.9	20 43.8	09 90	67.4	20 46.4	08 90	66.8	20 48.8	08 89	66.3	20 51.1	08 89	65.8	20 53.3	07 88	65.2	3
4	19 41.1	10 91	68.9	19 44.1	10 90	68.3	19 47.1	10 90	67.8	19 49.9	09 90	67.3	19 52.6	09 90	66.7	19 55.3	09 89	66.2	19 57.8	08 89	65.7	20 00.3	08 88	65.1	4
75	18 46.6	11 91	68.8	18 49.8	11 90	68.2	18 52.9	10 90	67.7	18 56.0	10 90	67.2	18 58.9	10 89	66.6	19 01.8	09 89	66.1	19 04.6	09 89	65.6	19 07.3	09 88	65.1	75
6	17 52.1	12 91	68.6	17 55.5	11 90	68.1	17 58.9	11 90	67.6	18 02.1	11 90	67.1	18 05.3	10 89	66.6	18 08.4	10 89	66.0	18 11.3	10 89	65.5	18 14.3	10 88	65.0	6
7	16 57.7	12 91	68.5	17 01.3	12 90	68.0	17 04.8	12 90	67.5	17 08.3	11 90	67.0	17 11.7	11 89	66.5	17 15.0	11 89	65.9	17 18.2	11 88	65.4	17 21.3	10 88	64.9	7
8	16 03.3	13 90	68.4	16 07.1	13 90	67.9	16 10.9	12 90	67.4	16 14.5	12 90	66.9	16 18.1	12 89	66.3	16 21.6	12 89	65.8	16 25.0	11 88	65.3	16 28.4	11 88	64.8	8
9	15 09.0	13 90	68.3	15 13.0	13 90	67.8	15 16.9	13 90	67.3	15 20.8	13 89	66.7	15 24.6	13 89	66.2	15 28.3	12 89	65.7	15 31.9	12 88	65.2	15 35.5	12 88	64.7	9
80	14 14.7	14 90	68.2	14 18.9	14 90	67.6	14 23.0	14 90	67.1	14 27.1	13 89	66.6	14 31.1	13 89	66.1	14 35.0	13 89	65.6	14 38.9	13 88	65.1	14 42.7	13 88	64.6	80
1	13 20.4	15 90	68.0	13 24.8	15 90	67.5	13 29.2	14 90	67.0	13 33.4	14 89	66.5	13 37.7	14 89	66.0	13 41.8	14 89	65.5	13 45.9	14 88	65.0	13 49.9	13 88	64.5	1
2	12 26.3	15 90	67.9	12 30.9	15 90	67.4	12 35.4	15 90	66.9	12 39.9	15 89	66.4	12 44.3	15 89	65.9	12 48.6	14 89	65.3	12 52.9	14 88	64.8	12 57.2	14 88	64.3	2
3	11 32.1	16 90	67.7	11 36.9	16 90	67.2	11 41.7	16 90	66.7	11 46.3	16 89	66.2	11 51.0	15 89	65.7	11 55.5	15 88	65.2	12 00.1	15 88	64.7	12 04.5	15 88	64.2	3
4	10 38.1	17 90	67.6	10 43.0	17 90	67.1	10 48.0	16 89	66.6	10 52.9	16 89	66.1	10 57.7	16 89	65.6	11 02.5	16 88	65.1	11 07.2	16 88	64.6	11 11.9	16 88	64.1	4
85	9 44.0	17 90	67.4	9 49.2	17 90	66.9	9 54.4	17 89	66.4	9 59.5	17 89	65.9	10 04.5	17 88	65.4	10 09.5	17 88	64.9	10 14.5	16 88	64.4	10 19.4	16 87	63.9	85
6	8 50.1	18 90	67.3	8 55.5	18 90	66.8	9 00.8	18 89	66.3	9 06.1	18 89	65.8	9 11.4	17 88	65.3	9 16.6	17 88	64.8	9 21.8	17 88	64.3	9 26.9	17 87	63.8	6
7	7 56.2	19 90	67.1	8 01.8	19 89	66.6	8 07.3	18 89	66.1	8 12.8	18 89	65.6	8 18.3	18 88	65.1	8 23.7	18 88	64.6	8 29.1	18 88	64.1	8 34.5	18 87	63.6	7
8	7 02.4	19 90	66.9	7 08.2	19 89	66.4	7 13.9	19 89	65.9	7 19.6	19 89	65.4	7 25.3	19 88	64.9	7 31.0	19 88	64.4	7 36.6	19 88	63.9	7 42.2	19 87	63.4	8
9	6 08.7	20 90	66.7	6 14.6	20 89	66.2	6 20.6	20 89	65.7	6 26.5	20 88	65.3	6 32.4	20 88	64.8	6 38.3	20 88	64.3	6 44.1	19 87	63.8	6 49.9	19 87	63.3	9
90	5 15.0	21 90	66.5	5 21.2	21 89	66.1	5 27.3	20 89	65.6	5 33.4	20 88	65.1	5 39.6	20 88	64.6	5 45.6	20 88	64.1	5 51.7	20 87	63.6	5 57.7	20 87	63.1	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	24° 00′				24° 30′				25° 00′				25° 30′				26° 00′				26° 30′				27° 00′				27° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	53 00.0	1.0	01	180.0	52 30.0	1.0	01	180.0	52 00.0	1.0	01	180.0	51 30.0	1.0	01	180.0	51 00.0	1.0	01	180.0	50 30.0	1.0	01	180.0	50 00.0	1.0	01	180.0	49 30.0	1.0	01	180.0	00
1	52 59.2	1.0	04	178.5	52 29.2	1.0	04	178.5	51 59.2	1.0	04	178.5	51 29.3	1.0	04	178.6	50 59.3	1.0	04	178.6	50 29.3	1.0	04	178.6	49 59.3	1.0	04	178.6	49 29.3	1.0	03	178.6	1
2	52 56.9	1.0	06	177.0	52 27.0	1.0	06	177.0	51 57.0	1.0	06	177.1	51 27.0	1.0	06	177.1	50 57.1	1.0	06	177.1	50 27.1	1.0	06	177.2	49 57.2	1.0	06	177.2	49 27.2	1.0	06	177.3	2
3	52 53.0	1.0	09	175.5	52 23.1	1.0	09	175.5	51 53.2	1.0	09	175.6	51 23.4	1.0	09	175.7	50 53.5	1.0	08	175.7	50 23.5	1.0	08	175.8	49 53.6	1.0	08	175.8	49 23.7	1.0	08	175.9	3
4	52 47.6	99	12	174.0	52 17.8	99	11	174.0	51 48.0	99	11	174.1	51 18.2	99	11	174.2	50 48.4	99	11	174.3	50 18.5	99	11	174.4	49 48.7	99	10	174.5	49 18.9	99	10	174.6	4
05	52 40.7	99	14	172.5	52 11.0	99	14	172.6	51 41.3	99	14	172.7	51 11.6	99	13	172.8	50 41.9	99	13	172.9	50 12.1	99	13	173.0	49 42.4	99	13	173.1	49 12.6	99	13	173.2	05
6	52 32.3	99	16	171.0	52 02.7	99	16	171.1	51 33.1	99	16	171.2	51 03.5	99	16	171.4	50 33.9	99	16	171.5	50 04.3	99	15	171.6	49 34.7	99	15	171.7	49 05.0	99	15	171.9	6
7	52 22.4	98	19	169.5	51 52.9	98	19	169.7	51 23.5	98	18	169.8	50 54.0	98	18	170.0	50 24.6	98	18	170.1	49 55.1	98	18	170.2	49 25.6	98	17	170.4	48 56.1	98	17	170.5	7
8	52 11.0	98	22	168.0	51 41.7	98	21	168.2	51 12.4	98	21	168.4	50 43.1	98	20	168.6	50 13.8	98	20	168.7	49 44.5	98	20	168.9	49 15.2	98	20	169.0	48 45.8	98	19	169.2	8
9	51 58.1	97	24	166.6	51 29.1	97	23	166.8	51 00.0	97	23	167.0	50 30.8	97	23	167.2	50 01.7	97	22	167.4	49 32.6	97	22	167.5	49 03.4	97	22	167.7	48 34.2	97	22	167.9	9
10	51 43.9	96	26	165.2	51 15.0	96	26	165.4	50 46.1	96	25	165.6	50 17.2	96	25	165.8	49 48.2	97	25	166.0	49 19.3	97	24	166.2	48 50.3	97	24	166.4	48 21.3	97	24	166.6	10
1	51 28.2	95	28	163.7	50 59.5	96	28	164.0	50 30.9	96	28	164.2	50 02.2	96	27	164.4	49 33.4	96	27	164.7	49 04.7	96	26	164.9	48 35.9	96	26	165.1	48 07.1	96	26	165.3	1
2	51 11.2	95	31	162.4	50 42.7	95	30	162.6	50 14.3	95	30	162.9	49 45.8	95	29	163.1	49 17.3	95	29	163.4	48 48.8	95	29	163.6	48 20.2	95	28	163.8	47 51.7	95	28	164.0	2
3	50 52.8	94	33	161.0	50 24.6	94	32	161.3	49 56.4	94	32	161.5	49 28.2	94	32	161.8	49 00.0	94	31	162.1	48 31.7	94	31	162.3	48 03.3	94	30	162.6	47 35.0	95	30	162.8	3
4	50 33.1	93	35	159.6	50 05.2	93	34	159.9	49 37.3	93	34	160.2	49 09.3	93	34	160.5	48 41.3	93	33	160.8	48 13.3	94	33	161.0	47 45.2	94	32	161.3	47 17.1	94	32	161.6	4
15	50 12.1	92	37	158.3	49 44.5	92	37	158.6	49 16.9	92	36	158.9	48 49.2	92	36	159.2	48 21.4	93	35	159.5	47 53.7	93	35	159.8	47 25.9	93	34	160.1	46 58.0	93	34	160.3	15
6	49 49.9	91	39	157.0	49 22.6	91	39	157.3	48 55.2	91	38	157.7	48 27.8	91	38	158.0	48 00.4	92	37	158.3	47 32.9	92	37	158.6	47 05.3	92	36	158.9	46 37.8	92	36	159.1	6
7	49 26.5	90	41	155.7	48 59.5	90	40	156.1	48 32.4	90	40	156.4	48 05.3	90	39	156.7	47 38.2	91	39	157.0	47 11.0	91	38	157.4	46 43.7	91	38	157.7	46 16.4	91	37	158.0	7
8	49 01.9	89	43	154.5	48 35.2	89	42	154.8	48 08.5	89	42	155.2	47 41.7	89	41	155.5	47 14.8	90	41	155.8	46 47.9	90	40	156.2	46 20.9	90	40	156.5	45 53.9	90	39	156.8	8
9	48 36.2	88	45	153.3	48 09.8	88	44	153.6	47 43.4	88	44	154.0	47 16.9	88	43	154.3	46 50.3	89	42	154.7	46 23.7	89	42	155.0	45 57.1	89	42	155.3	45 30.3	89	41	155.7	9
20	48 09.3	87	46	152.1	47 43.3	87	46	152.4	47 17.2	87	45	152.8	46 51.0	87	45	153.2	46 24.8	88	44	153.5	45 58.5	88	44	153.9	45 32.1	88	43	154.2	45 05.7	88	43	154.5	20
1	47 41.4	85	48	150.9	47 15.7	86	48	151.3	46 50.0	86	47	151.7	46 24.1	86	47	152.0	45 58.2	86	46	152.4	45 32.2	87	45	152.7	45 06.2	87	45	153.1	44 40.1	87	44	153.5	1
2	47 12.5	84	50	149.8	46 47.1	85	49	150.1	46 21.7	85	49	150.5	45 56.2	85	48	150.9	45 30.6	85	48	151.3	45 05.0	86	47	151.7	44 39.3	86	46	152.0	44 13.5	86	46	152.4	2
3	46 42.5	83	52	148.6	46 17.5	83	51	149.0	45 52.4	84	50	149.4	45 27.3	84	50	149.8	45 02.0	84	49	150.2	44 36.7	84	49	150.6	44 11.3	85	48	151.0	43 45.9	85	48	151.3	3
4	46 11.6	82	53	147.5	45 47.0	82	52	147.9	45 22.2	83	52	148.4	44 57.4	83	51	148.7	44 32.5	83	51	149.1	44 07.6	83	50	149.5	43 42.5	84	50	149.9	43 17.4	84	49	150.3	4
25	45 39.8	81	54	146.5	45 15.5	81	54	146.9	44 51.1	81	53	147.3	44 26.6	82	53	147.7	44 02.1	82	52	148.1	43 37.5	82	52	148.5	43 12.7	83	51	148.9	42 47.9	83	50	149.3	25
6	45 07.0	80	56	145.4	44 43.1	80	55	145.8	44 19.1	80	55	146.3	43 55.0	81	54	146.7	43 30.8	81	54	147.1	43 06.5	81	53	147.5	42 42.1	81	52	147.9	42 17.6	82	52	148.3	6
7	44 33.4	78	57	144.4	44 09.8	79	57	144.8	43 46.2	79	56	145.3	43 22.4	79	56	145.7	42 58.6	80	55	146.1	42 34.6	80	54	146.5	42 10.6	80	54	146.9	41 46.5	81	53	147.3	7
8	43 59.0	77	59	143.4	43 35.8	78	58	143.9	43 12.5	78	58	144.3	42 49.1	78	57	144.7	42 25.6	78	56	145.1	42 02.0	79	56	145.6	41 38.3	79	55	146.0	41 14.5	79	55	146.4	8
9	43 23.7	76	60	142.4	43 00.9	76	59	142.9	42 37.9	77	59	143.3	42 14.9	77	58	143.8	41 51.7	77	58	144.2	41 28.5	78	57	144.6	41 05.2	78	56	145.0	40 41.7	78	56	145.4	9
30	42 47.7	75	61	141.5	42 25.2	75	61	142.0	42 02.6	75	60	142.4	41 39.9	76	59	142.8	41 17.2	76	59	143.3	40 54.3	76	58	143.7	40 31.3	77	58	144.1	40 08.2	77	57	144.5	30
1	42 11.0	74	62	140.6	41 48.8	74	62	141.0	41 26.6	74	61	141.5	41 04.3	75	61	141.9	40 41.8	75	60	142.4	40 19.3	75	60	142.8	39 56.7	76	59	143.2	39 33.9	76	58	143.7	1
2	41 33.5	72	64	139.7	41 11.7	73	63	140.1	40 49.8	73	62	140.6	40 27.9	73	62	141.0	40 05.8	74	61	141.5	39 43.6	74	61	141.9	39 21.3	74	60	142.4	38 58.9	75	60	142.8	2
3	40 55.3	71	65	138.8	40 33.9	72	64	139.3	40 12.4	72	64	139.7	39 50.8	72	63	140.2	39 29.0	73	62	140.6	39 07.2	73	62	141.1	38 45.3	73	61	141.5	38 23.2	74	61	142.0	3
4	40 16.5	70	66	138.0	39 55.4	70	65	138.4	39 34.3	71	65	138.9	39 13.0	71	64	139.3	38 51.6	71	63	139.8	38 30.1	72	63	140.2	38 08.6	72	62	140.7	37 46.9	72	62	141.1	4
35	39 37.0	69	67	137.1	39 16.3	69	66	137.6	38 55.5	70	66	138.1	38 34.6	70	65	138.5	38 13.6	70	64	139.0	37 52.4	71	64	139.4	37 31.2	71	63	139.9	37 09.9	71	63	140.3	35
6	38 57.0	68	68	136.3	38 36.6	68	67	136.8	38 16.2	68	67	137.3	37 55.6	69	66	137.7	37 34.9	69	65	138.2	37 14.1	69	65	138.6	36 53.2	70	64	139.1	36 32.2	70	64	139.5	6
7	38 16.3	66	69	135.5	37 56.3	67	68	136.0	37 36.2	67	68	136.5	37 16.0	68	67	137.0	36 55.6	68	66	137.4	36 35.2	68	66	137.9	36 14.6	69	65	138.3	35 54.0	69	65	138.8	7
8	37 35.1	65	70	134.8	37 15.4	66	69	135.3	36 55.7	66	68	135.7	36 35.8	66	68	136.2	36 15.8	67	67	136.7	35 55.7	67	67	137.1	35 35.5	68	66	137.6	35 15.2	68	66	138.0	8
9	36 53.3	64	70	134.0	36 34.0	65	70	134.5	36 14.6	65	69	135.0	35 55.0	65	69	135.5	35 35.4	66	68	135.9	35 15.6	66	68	136.4	34 55.8	66	67	136.8	34 35.8	67	67	137.3	9
40	36 11.1	63	71	133.3	35 52.1	63	71	133.8	35 33.0	64	70	134.3	35 13.8	64	70	134.7	34 54.5	65	69	135.2	34 35.0	65	68	135.7	34 15.5	65	68	136.1	33 55.9	66	67	136.6	40
1	35 28.3	62	72	132.6	35 09.6	62	72	133.1	34 50.9	63	71	133.6	34 32.0	63	70	134.0	34 13.0	63	70	134.5	33 53.9	64	69	135.0	33 34.8	64	69	135.4	33 15.5	64	68	135.9	1
2	34 45.0	61	73	131.9	34 26.7	61	72	132.4	34 08.3	62	72	132.9	33 49.7	62	71	133.4	33 31.1	62	71	133.8	33 12.3	63	70	134.3	32 53.5	63	70	134.8	32 34.5	63	69	135.2	2
3	34 01.3	60	74	131.3	33 43.3	60	73	131.7	33 25.2	61	72	132.2	33 07.0	61	72	132.7	32 48.7	61	72	133.2	32 30.3	62	71	133.6	32 11.7	62	70	134.1	31 53.1	62	70	134.6	3
4	33 17.1	59	74	130.6	32 59.5	59	74	131.1	32 41.7	59	73	131.6	32 23.8	60	73	132.0	32 05.8	60	72	132.5	31 47.7	60	72	133.0	31 29.5	61	71	133.5	31 11.2	61	71	133.9	4
45	32 32.5	58	75	130.0	32 15.2	58	74	130.5	31 57.7	58	74	130.9	31 40.2	59	73	131.4	31 22.5	59	73	131.9	31 04.8	59	72	132.4	30 46.9	60	72	132.8	30 28.9	60	71	133.3	45
6	31 47.5	57	76	129.4	31 30.5	57	75	129.8	31 13.4	57	75	130.3	30 56.1	58	74	130.8	30 38.8	58	74	131.3	30 21.3	58	73	131.8	30 03.8	59	72	132.2	29 46.1	59	72	132.7	6
7	31 02.1	56	76	128.8	30 45.4	56	76	129.2	30 28.6	56	75	129.7	30 11.7	57	75	130.2	29 54.7	57	74	130.7	29 37.5	57	74	131.2	29 20.3	58	73	131.6	29 03.0	58	73	132.1	7
8	30 16.4	55	77	128.2	30 00.0	55	76	128.7	29 43.5	55	76	129.1	29 26.8	56	75	129.6	29 10.1	56	75	130.1	28 53.3	56	74	130.6	28 36.4	57	74	131.0	28 19.4	57	73	131.5	8
9	29 30.2	53	78	127.6	29 14.1	54	77	128.1	28 57.9	54	76	128.6	28 41.6	55	76	129.1	28 25.2	55	75	129.5	28 08.7	56	75	130.0	27 52.1	56	74	130.5	27 35.4	56	74	130.9	9
50	28 43.7	52	78	127.1	28 28.0	53	78	127.5	28 12.1	53	77	128.0	27 56.1	54	77	128.5	27 40.0	54	76	129.0	27 23.8	54	76	129.5	27 07.5	54	75	129.9	26 51.1	55	74	130.4	50
1	27 56.9	51	79	126.5	27 41.4	52	78	127.0	27 25.8	52	78	127.5	27 10.1	52	77	128.0	26 54.3	53	76	128.4	26 38.4	53	76	128.9	26 22.5	53	76	129.4	26 06.4	54	75	129.9	1
2	27 09.8	51	79	126.0	26 54.6	51	79	126.5	26 39.3	51	78	127.0	26 23.9	51	78	127.4	26 08.4	52	77	127.9	25 52.8	52	77	128.4	25 37.1	52	76	128.9	25 21.3	53	76	129.3	2
3	26 22.3	50	80	125.5	26 07.4	50	79	126.0	25 52.4	50	79	126.4	25 37.3	51	78	126.9	25 22.1	51	78	127.4	25 06.8	51	77	127.9	24 51.4	51	77	128.3	24 35.9	52	76	128.8	3
4	25 34.6	49	80	125.0	25 19.9	49	80	125.5	25 05.2	49	79	125.9	24 50.4	50	79	126.4	24 35.5	50	78	126.9	24 20.5	50	78	127.4	24 05.4	50	77	127.9	23 50.2	51	77	128.3	4
55	24 46.5	48	80	124.5	24 32.2	48	80	125.0	24 17.7	48	80	125.5	24 03.2	49	79	125.9	23 48.6	49	79	126.4	23 33.9	49	78	126.9	23 19.1	49	78	127.4	23 04.2	50	77	127.8	55
6	23 58.2	47	81	124.0	23 44.1	47	81	124.5	23 30.0	47	80	125.0	23 15.7	48	80	125.5	23 01.4	48	79	125.9	22 47.0	48	79	126.4	22 32.5	48	78	126.9	22 17.9	49	78	127.4	6
7	23 09.6	46	82	123.6	22 55.8	46	81	124.0	22 41.9	46	80	124.5	22 28.0	47	80	125.0	22 13.9	47	80	125.5	21 59.8	47	79	126.0	21 45.6	48	79	126.4	21 31.3	48	78	126.9	7
8	22 20.8	45	82	123.1	22 07.3	45	81	123.6	21 53.6	45	81	124.1	21 40.0	46	80	124.6	21 26.2	46	80	125.0	21 12.3	46	80	125.5	20 58.4	47	79	126.0	20 44.4	47	79	126.5	8
9	21 31.7	44	82	122.7	21 18.4	44	82	123.2	21 05.1	45	81	123.6	20 51.7	45	81	124.1	20 38.2	45	80	124.6	20 24.6	45	80	125.1	20 11.0	46	80	125.5	19 57.2	46	79	126.0	9
60	20 42.3	43	83	122.2	20 29.4	43	82	122.7	20 16.3	44	82	123.2	20 03.2	44	81	123.7	19 49.9	44	81	124.2	19 36.6	44	80	124.6	19 23.3	45	80	125.1	19 09.8	45	79	125.6	60
1	19 52.8	42	83	121.8	19 40.1	43	83	122.3	19 27.3	43	82	122.8	19 14.4	43	82	123.3	19 01.4	43	81	123.7	18 48.4	44	81	124.2	18 35.3	44	80	124.7	18 22.2	44	80	125.2	1
2	19 03.0	41	83	121.4	18 50.5	42	83	121.9	18 38.0	42	82	122.4	18 25.4	42	82	122.9	18 12.7	42	82	123.3	18 00.0	43	81	123.8	17 47.1	43	81	124.3	17 34.2	43	80	124.8	2
3	18 13.0	41	84	121.0	18 00.8	41	83	121.5	17 48.5	41	83	122.0	17 36.2	41	82	122.5	17 23.8	42	82	122.9	17 11.3	42	82	123.4	16 58.7	42	81	123.9	16 46.1	42	81	124.4	3
4	17 22.8	40	84	120.6	17 10.9	40	84	121.1	16 58.8	40	83	121.6	16 46.7	40	83	122.1	16 34.6	41	82	122.6	16 22.4	41	82	123.0	16 10.1	41	81	123.5	15 57.7	41	81	124.0	4
65	16 32.4	39	84	120.3	16 20.7	39	84	120.7	16 08.9	39	84	121.2	15 57.1	40	83	121.7	15 45.2	40	83	122.2	15 33.3	40	82	122.7	15 21.2	40	82	123.1	15 09.1	40	81	123.6	65
6	15 41.8	38	85	119.9	15 30.4	38	84	120.4	15 18.9	39	84	120.9	15 07.3	39	83	121.3	14 55.6	39	83	121.8	14 43.9	39	83	122.3	14 32.2	39	82	122.8	14 20.4	39	82	123.2	6
7	14 51.1	37	85	119.5	14 39.8	37	85	120.0	14 28.6	38	84	120.5	14 17.2	38	84	121.0	14 05.9	38	83	121.5	13 54.4	38	83	121.9	13 42.9	38	82	122.4	13 31.4	39	82	122.9	7
8	14 00.1	36	85	119.2	13 49.1	37	85	119.7	13 38.1	37	84	120.2	13 27.0	37	84	120.6	13 15.9	37	84	121.1	13 04.7	37	83	121.6	12 53.5	38	83	122.1	12 42.2	38	82	122.5	8
9	13 09.0	36	85	118.9	12 58.3	36	85	119.3	12 47.5	36	85	119.8	12 36.6	36	84	120.3	12 25.7	36	84	120.8	12 14.8	37	83	121.2	12 03.8	37	83	121.7	11 52.8	37	83	122.2	9
70	12 17.7	35	86	118.5	12 07.2	35	85	119.0	11 56.7	35	85	119.5	11 46.1	35	85	120.0	11 35.4	36	84	120.4	11 24.7	36	84	120.9	11 14.0	36	83	121.4	11 03.2	36	83	121.9	70
1	11 26.3	34	86	118.2	11 16.0	34	86	118.7	11 05.7	34	85	119.2	10 55.3	35	85	119.6	10 44.9	35	84	120.1	10 34.5	35	84	120.6	10 24.0	35	84	121.1	10 13.5	35	83	121.5	1
2	10 34.7	33	86	117.9	10 24.6	34	86	118.4	10 14.6	34	86	118.8	10 04.4	34	85	119.3	9 54.3	34	85	119.8	9 44.1	34	84	120.3	9 33.9	34	84	120.8	9 23.6	34	83	121.2	2
3	9 42.9	33	86	117.6	9 33.1	33	86	118.1	9 23.3	33	86	118.5	9 13.4	33	85	119.0	9 03.5	33	85	119.5	8 53.5	33	85	120.0	8 43.5	33	84	120.5	8 33.5	33	84	120.9	3
4	8 51.0	32	87	117.3	8 41.5	32	86	117.8	8 31.8	32	86	118.2	8 22.2	32	86	118.7	8 12.5	32	85	119.2	8 02.8	32	85	119.7	7 53.1	33	84	120.2	7 43.3	33	84	120.6	4
75	7 59.0	31	87	117.0	7 49.7	31	87	117.5	7 40.3	31	86	118.0	7 30.9	31	86	118.4	7 21.4	32	85	118.9	7 11.9	32	85	119.4	7 02.4	32	85	119.9	6 52.9	32	84	120.3	75
6	7 06.8	30	87	116.7	6 57.7	30	87	117.2	6 48.6	31	86	117.7	6 39.4	31	86	118.1	6 30.2	31	86	118.6	6 20.9	31	85	119.1	6 11.7	31	85	119.6	6 02.4	31	84	120.1	6
7	6 14.6	30	87	116.4	6 05.7	30	87	116.9	5 56.7	30	87	117.4	5 47.8	30	86	117.9	5 38.8	30	86	118.4	5 29.8	30	86	118.8	5 20.8	30	85	119.3	5 11.7	30	85	119.8	7
8	5 22.2	29	88	116.2	5 13.5	29	87	116.6	5 04.8	29	87	117.1																					8

DECLINATION SAME NAME AS LATITUDE

H.A.	24° 00′				24° 30′				25° 00′				25° 30′				26° 00′				26° 30′				27° 00′				27° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
91																													5 05.6	21	87	62.9	91

H.A.	28° 00′				28° 30′				29° 00′				30° 00′				32° 00′				34° 00′				34° 30′				35° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	75 00.0	1.0	03	00.0	74 30.0	1.0	03	00.0	74 00.0	1.0	03	00.0	73 00.0	1.0	03	00.0	71 00.0	1.0	02	00.0	69 00.0	1.0	02	00.0	68 30.0	1.0	02	00.0	67 30.0	1.0	02	00.0	00
1	74 58.3	1.0	09	03.4	74 28.3	1.0	08	03.3	73 58.4	1.0	08	03.2	72 58.5	1.0	08	03.0	70 58.7	1.0	07	02.6	68 58.8	1.0	06	02.3	68 28.9	1.0	06	02.2	67 28.9	1.0	05	02.1	1
2	74 53.1	99	14	06.8	74 23.3	99	14	06.5	73 53.5	99	13	06.3	72 54.0	99	13	05.9	70 54.7	99	11	05.2	68 55.3	1.0	10	04.6	68 25.4	1.0	10	04.5	67 25.7	1.0	09	04.2	2
3	74 44.5	98	20	10.1	74 15.0	98	19	09.8	73 45.5	98	18	09.4	72 46.5	99	17	08.8	70 48.1	99	15	07.8	68 49.4	99	14	06.9	68 19.7	99	13	06.7	67 20.3	99	13	06.3	3
4	74 32.6	97	25	13.4	74 03.5	97	24	12.9	73 34.4	97	24	12.5	72 36.1	97	22	11.7	70 38.9	98	19	10.3	68 41.3	98	17	09.2	68 11.8	98	17	08.9	67 12.7	98	16	08.4	4
05	74 17.5	95	30	16.5	73 49.0	96	29	16.0	73 20.4	96	28	15.4	72 22.9	96	27	14.4	70 27.2	97	24	12.8	68 30.8	97	21	11.4	68 01.6	97	20	11.1	67 03.1	98	19	10.5	05
6	73 59.4	93	35	19.6	73 31.5	93	34	18.9	73 03.4	94	33	18.3	72 07.0	94	31	17.1	70 13.1	95	27	15.2	68 18.2	96	25	13.6	67 49.4	96	24	13.2	66 51.5	97	23	12.5	6
7	73 38.4	91	39	22.5	73 11.1	91	38	21.7	72 43.7	92	37	21.0	71 48.5	92	35	19.8	69 56.7	94	31	17.5	68 03.4	95	28	15.7	67 35.0	95	27	15.3	66 37.8	95	26	14.5	7
8	73 14.8	88	44	25.2	72 48.2	89	42	24.4	72 21.5	89	41	23.7	71 27.5	90	39	22.3	69 37.9	92	35	19.8	67 46.6	93	31	17.8	67 18.6	94	31	17.3	66 22.3	94	29	16.4	8
9	72 48.6	86	47	27.9	72 22.8	86	46	27.0	71 56.8	87	45	26.2	71 04.2	88	42	24.7	69 17.0	90	38	22.0	67 27.8	92	35	19.8	67 00.2	92	34	19.3	66 04.8	93	32	18.3	9
10	72 20.2	83	51	30.4	71 55.2	84	50	29.5	71 29.9	85	48	28.6	70 38.7	86	46	27.0	68 54.1	88	41	24.1	67 07.1	90	38	21.7	66 40.0	90	37	21.2	65 45.6	91	35	20.1	10
1	71 49.6	80	54	32.7	71 25.4	81	53	31.8	71 00.9	82	52	30.9	70 11.2	84	49	29.2	68 29.2	86	44	26.2	66 44.5	88	40	23.6	66 18.0	89	40	23.0	65 24.6	89	38	21.9	1
2	71 17.1	78	57	34.9	70 53.7	79	56	33.9	70 30.0	79	54	33.0	69 41.8	81	52	31.3	68 02.6	84	47	28.1	66 20.3	86	43	25.4	65 54.3	87	42	24.8	65 01.9	88	40	23.6	2
3	70 42.8	75	60	37.0	70 20.2	76	59	36.0	69 57.3	77	57	35.0	69 10.6	79	55	33.2	67 34.1	82	50	30.0	65 54.4	84	46	27.2	65 29.0	85	45	26.5	64 37.7	86	43	25.3	3
4	70 06.8	72	62	38.9	69 45.0	73	61	37.9	69 22.9	74	60	36.9	68 37.7	76	57	35.1	67 04.1	80	53	31.8	65 26.9	82	48	28.9	65 02.1	83	47	28.2	64 12.0	84	45	26.9	4
15	69 29.4	69	65	40.7	69 08.4	71	63	39.7	68 47.0	72	62	38.7	68 03.4	74	60	36.9	66 32.6	77	55	33.5	64 58.0	80	51	30.5	64 33.8	81	50	29.8	63 44.8	82	48	28.4	15
6	68 50.6	67	67	42.4	68 30.4	68	65	41.4	68 09.8	69	64	40.4	67 27.6	71	62	38.5	65 59.7	75	57	35.1	64 27.6	78	53	32.0	64 04.1	79	52	31.3	63 16.3	80	50	29.9	6
7	68 10.6	64	68	44.0	67 51.1	65	67	43.0	67 31.3	67	66	42.0	66 50.6	69	64	40.1	65 25.5	73	59	36.6	63 56.0	76	55	33.5	63 33.1	77	54	32.8	62 46.5	78	52	31.4	7
8	67 29.5	62	70	45.5	67 10.7	63	69	44.4	66 51.6	64	68	43.5	66 12.4	67	66	41.6	64 50.0	71	61	38.0	63 23.2	74	57	34.9	63 00.8	75	56	34.1	62 15.5	76	54	32.7	8
9	66 47.3	59	72	46.8	66 29.3	61	71	45.8	66 10.9	62	70	44.8	65 33.1	64	67	42.9	64 13.4	68	63	39.4	62 49.2	72	58	36.2	62 27.5	73	57	35.5	61 43.3	74	55	34.0	9
20	66 04.2	57	73	48.1	65 46.9	58	72	47.1	65 29.2	60	71	46.1	64 52.8	62	69	44.2	63 35.8	66	64	40.7	62 14.1	70	60	37.5	61 53.0	71	59	36.7	61 10.1	72	57	35.3	20
1	65 20.3	55	74	49.3	65 03.6	56	73	48.3	64 46.6	57	72	47.4	64 11.5	60	70	45.5	62 57.2	64	66	41.9	61 38.0	68	62	38.7	61 17.5	69	61	37.9	60 35.8	70	59	36.5	1
2	64 35.6	53	76	50.4	64 19.6	54	75	49.5	64 03.2	55	74	48.5	63 29.4	58	71	46.6	62 17.7	62	67	43.1	61 01.0	66	63	39.9	60 41.1	67	62	39.1	60 00.6	68	60	37.6	2
3	63 50.2	50	77	51.5	63 34.8	52	76	50.5	63 19.1	53	75	49.6	62 46.6	55	73	47.7	61 37.3	60	69	44.2	60 23.1	64	65	41.0	60 03.8	65	64	40.2	59 24.5	66	62	38.7	3
4	63 04.1	48	78	52.5	62 49.4	50	77	51.5	62 34.3	51	76	50.6	62 03.0	53	74	48.7	60 56.2	58	70	45.2	59 44.4	62	66	42.0	59 25.7	63	65	41.2	58 47.6	64	63	39.7	4
25	62 17.5	46	79	53.4	62 03.3	48	78	52.4	61 48.8	49	77	51.5	61 18.7	51	75	49.7	60 14.3	56	71	46.2	59 04.9	60	67	43.0	58 46.8	61	66	42.2	58 09.8	62	64	40.7	25
6	61 30.3	45	80	54.2	61 16.7	46	79	53.3	61 02.8	47	78	52.4	60 33.8	49	76	50.6	59 31.8	54	72	47.1	58 24.7	58	68	43.9	58 07.2	59	67	43.2	57 31.3	61	65	41.7	6
7	60 42.6	43	80	55.0	60 29.6	44	79	54.1	60 16.2	45	78	53.2	59 48.4	48	77	51.4	58 48.6	52	73	48.0	57 43.8	56	69	44.8	57 26.8	57	68	44.1	56 52.1	59	66	42.5	7
8	59 54.5	41	81	55.8	59 42.0	42	80	54.9	59 29.2	43	79	54.0	59 02.4	46	77	52.2	58 04.9	50	74	48.9	57 02.2	54	70	45.7	56 45.9	55	69	44.9	56 12.3	57	67	43.4	8
9	59 06.0	39	82	56.5	58 54.0	40	81	55.6	58 41.7	42	80	54.7	58 16.0	44	78	53.0	57 20.6	48	75	49.6	56 20.1	52	71	46.5	56 04.3	53	70	45.7	55 31.8	55	68	44.2	9
30	58 17.0	38	82	57.1	58 05.6	39	81	56.2	57 53.8	40	80	55.4	57 29.1	42	79	53.7	56 35.8	47	75	50.4	55 37.5	51	72	47.2	55 22.2	51	71	46.5	54 50.7	53	69	45.0	30
1	57 27.8	36	83	57.7	57 16.8	37	82	56.9	57 05.5	38	81	56.0	56 41.8	41	79	54.3	55 50.5	45	76	51.1	54 54.3	49	73	48.0	54 39.5	50	72	47.2	54 09.1	52	70	45.7	1
2	56 38.2	34	83	58.3	56 27.7	36	82	57.4	56 16.8	37	82	56.6	55 54.1	39	80	54.9	55 04.8	43	77	51.7	54 10.7	47	74	48.6	53 56.4	48	73	47.9	53 27.0	50	71	46.4	2
3	55 48.3	33	84	58.8	55 38.3	34	83	58.0	55 27.9	35	82	57.2	55 06.1	37	81	55.5	54 18.7	42	77	52.3	53 26.6	45	74	49.3	53 12.8	46	73	48.6	52 44.4	48	72	47.1	3
4	54 58.2	31	84	59.3	54 48.5	33	83	58.5	54 38.6	34	82	57.7	54 17.8	36	81	56.1	53 32.3	40	78	52.9	52 42.0	44	75	49.9	52 28.8	45	74	49.2	52 01.4	46	72	47.7	4
35	54 07.7	30	84	59.8	53 58.6	31	84	59.0	53 49.1	32	83	58.2	53 29.1	34	82	56.6	52 45.5	38	79	53.5	51 57.1	42	75	50.5	51 44.3	43	75	49.8	51 18.0	45	73	48.3	35
6	53 17.1	29	85	60.2	53 08.3	30	84	59.4	52 59.3	31	83	58.6	52 40.2	33	82	57.1	51 58.3	37	79	54.0	51 11.8	41	76	51.0	50 59.5	41	75	50.3	50 34.1	43	74	48.9	6
7	52 26.2	27	85	60.6	52 17.9	28	84	59.9	52 09.2	29	84	59.1	51 51.0	31	82	57.5	51 10.9	35	80	54.5	50 26.2	39	77	51.6	50 14.4	40	76	50.8	49 49.9	42	74	49.4	7
8	51 35.2	26	85	61.0	51 27.2	27	85	60.3	51 19.0	28	84	59.5	51 01.5	30	83	58.0	50 23.1	34	80	55.0	49 40.2	38	77	52.1	49 28.9	38	76	51.3	49 05.3	40	75	49.9	8
9	50 44.0	25	86	61.4	50 36.4	26	85	60.6	50 28.5	27	84	59.9	50 11.8	29	83	58.4	49 35.1	32	80	55.4	48 54.0	36	78	52.5	48 43.0	37	77	51.8	48 20.4	39	75	50.4	9
40	49 52.6	24	86	61.7	49 45.3	25	85	61.0	49 37.8	25	85	60.2	49 22.0	27	83	58.7	48 46.9	31	81	55.8	48 07.5	35	78	53.0	47 56.9	35	77	52.3	47 35.2	37	76	50.9	40
1	49 01.0	22	86	62.0	48 54.1	23	86	61.3	48 47.0	24	85	60.6	48 31.9	26	84	59.1	47 58.4	30	81	56.2	47 20.7	33	78	53.4	47 10.6	34	78	52.7	46 49.7	36	76	51.3	1
2	48 09.3	21	86	62.3	48 02.8	22	86	61.6	47 56.0	23	85	60.9	47 41.7	25	84	59.4	47 09.7	28	81	56.6	46 33.6	32	79	53.8	46 24.0	33	78	53.1	46 03.9	34	77	51.7	2
3	47 17.4	20	87	62.6	47 11.3	21	86	61.9	47 04.9	22	86	61.2	46 51.2	24	84	59.7	46 20.8	27	82	56.9	45 46.3	30	79	54.2	45 37.1	31	78	53.5	45 17.9	33	77	52.1	3
4	46 25.5	19	87	62.8	46 19.7	20	86	62.1	46 13.6	21	86	61.4	46 00.7	22	84	60.0	45 31.7	26	82	57.2	44 58.8	29	80	54.5	44 50.0	30	79	53.8	44 31.6	31	77	52.5	4
45	45 33.4	18	87	63.1	45 27.9	19	86	62.4	45 22.2	20	86	61.7	45 10.0	21	85	60.3	44 42.5	25	82	57.5	44 11.1	28	80	54.8	44 02.7	28	79	54.2	43 45.1	30	78	52.8	45
6	44 41.2	17	87	63.3	44 36.1	18	87	62.6	44 30.7	18	86	61.9	44 19.1	20	85	60.5	43 53.1	23	83	57.8	43 23.2	26	80	55.1	43 15.2	27	79	54.5	42 58.4	29	78	53.2	6
7	43 49.0	16	87	63.5	43 44.1	17	87	62.8	43 39.0	17	86	62.1	43 28.2	19	85	60.8	43 03.5	22	83	58.1	42 35.2	25	80	55.4	42 27.5	26	80	54.8	42 11.6	27	78	53.5	7
8	42 56.6	15	87	63.7	42 52.1	15	87	63.0	42 47.3	16	86	62.3	42 37.1	18	85	61.0	42 13.8	21	83	58.3	41 47.0	24	81	55.7	41 39.7	25	80	55.1	41 24.5	26	79	53.8	8
9	42 04.2	14	88	63.9	41 59.9	14	87	63.2	41 55.5	15	86	62.5	41 45.9	17	85	61.2	41 24.0	20	83	58.6	40 58.6	23	81	56.0	40 51.7	23	80	55.3	40 37.2	25	79	54.0	9
50	41 11.6	13	88	64.0	41 07.7	13	87	63.3	41 03.6	14	87	62.7	40 54.6	16	86	61.4	40 34.1	19	83	58.8	40 10.1	21	81	56.2	40 03.5	22	80	55.6	39 49.8	24	79	54.3	50
1	40 19.1	12	88	64.2	40 15.4	12	87	63.5	40 11.6	13	87	62.8	40 03.3	15	86	61.6	39 44.0	17	84	59.0	39 21.4	20	81	56.4	39 15.2	21	81	55.8	39 02.3	22	79	54.5	1
2	39 26.4	11	88	64.3	39 23.1	11	87	63.6	39 19.5	12	87	63.0	39 11.8	14	86	61.7	38 53.9	16	84	59.2	38 32.6	19	81	56.6	38 26.8	20	81	56.0	38 14.6	21	80	54.8	2
3	38 33.7	10	88	64.4	38 30.7	10	87	63.8	38 27.4	11	87	63.1	38 20.3	13	86	61.9	38 03.6	15	84	59.3	37 43.8	18	82	56.8	37 38.3	19	81	56.2	37 26.8	20	80	55.0	3
4	37 41.0	09	88	64.5	37 38.2	10	88	63.9	37 35.2	10	87	63.2	37 28.7	12	86	62.0	37 13.3	14	84	59.5	36 54.8	17	82	57.0	36 49.6	17	81	56.4	36 38.8	19	80	55.2	4
55	36 48.2	08	88	64.6	36 45.7	09	88	64.0	36 43.0	09	87	63.4	36 37.1	11	86	62.1	36 22.9	13	84	59.6	36 05.7	16	82	57.2	36 00.9	16	81	56.6	35 50.8	17	80	55.4	55
6	35 55.4	07	88	64.7	35 53.1	08	88	64.1	35 50.7	08	87	63.4	35 45.4	10	86	62.2	35 32.4	12	84	59.8	35 16.5	14	82	57.3	35 12.1	15	82	56.7	35 02.7	16	80	55.5	6
7	35 02.5	06	88	64.7	35 00.6	07	88	64.1	34 58.4	07	87	63.5	34 53.6	09	86	62.3	34 41.9	11	84	59.9	34 27.2	13	82	57.5	34 23.1	14	82	56.9	34 14.4	15	81	55.7	7
8	34 09.6	05	88	64.8	34 07.9	06	88	64.2	34 06.1	06	87	63.6	34 01.8	08	86	62.4	33 51.3	10	84	60.0	33 37.9	12	82	57.6	33 34.1	13	82	57.0	33 26.1	14	81	55.8	8
9	33 16.7	04	88	64.9	33 15.3	05	88	64.3	33 13.7	06	87	63.7	33 10.0	07	86	62.5	33 00.6	09	84	60.1	32 48.5	11	82	57.7	32 45.1	12	82	57.1	32 37.7	13	81	56.0	9
60	32 23.8	04	88	64.9	32 22.6	04	88	64.3	32 21.3	05	87	63.7	32 18.2	06	86	62.5	32 09.9	08	85	60.2	31 59.1	10	83	57.8	31 55.9	11	82	57.2	31 49.2	12	81	56.1	60
1	31 30.8	03	88	64.9	31 29.9	03	88	64.4	31 28.9	04	87	63.8	31 26.3	05	87	62.6	31 19.2	07	85	60.3	31 09.5	09	83	57.9	31 06.7	10	82	57.3	31 00.7	11	81	56.2	1
2	30 37.8	02	88	65.0	30 37.2	02	88	64.4	30 36.4	03	87	63.8	30 34.4	04	87	62.6	30 28.4	06	85	60.3	30 20.0	08	83	58.0	30 17.5	09	82	57.4	30 12.1	10	81	56.3	2
3	29 44.9	01	88	65.0	29 44.5	02	88	64.4	29 43.9	02	87	63.8	29 42.4	03	87	62.7	29 37.6	05	85	60.4	29 30.4	07	83	58.1	29 28.2	07	82	57.5	29 23.4	08	81	56.4	3
4	28 51.9	00	88	65.0	28 51.8	01	88	64.4	28 51.5	01	87	63.8	28 50.5	02	87	62.7	28 46.8	04	85	60.4	28 40.7	06	83	58.1	28 38.9	06	82	57.6	28 34.7	07	81	56.4	4
65	27 58.9	01	88	65.0	27 59.0	00	88	64.4	27 59.0	00	87	63.8	27 58.5	01	87	62.7	27 55.9	03	85	60.5	27 51.1	05	83	58.2	27 49.5	05	82	57.6	27 46.0	06	81	56.5	65
6	27 05.9	01	88	65.0	27 06.3	01	88	64.4	27 06.5	01	87	63.8	27 06.6	00	87	62.7	27 05.0	02	85	60.5	27 01.4	04	83	58.2	27 00.1	04	82	57.7	26 57.2	05	81	56.5	6
7	26 13.0	02	88	65.0	26 13.6	02	88	64.4	26 14.0	01	87	63.8	26 14.6	00	87	62.7	26 14.2	01	85	60.5	26 11.7	03	83	58.3	26 10.7	03	82	57.7	26 08.4	04	81	56.6	7
8	25 20.0	03	88	64.9	25 20.9	03	88	64.4	25 21.6	02	87	63.8	25 22.6	01	87	62.7	25 23.3	00	85	60.5	25 21.9	02	83	58.3	25 21.3	02	82	57.7	25 19.6	03	81	56.6	8
9	24 27.1	04	88	64.9	24 28.2	03	88	64.3	24 29.1	03	87	63.8	24 30.7	02	87	62.7	24 32.4	01	85	60.5	24 32.2	01	83	58.3	24 31.9	01	82	57.8	24 30.8	02	81	56.7	9
70	23 34.1	05	88	64.9	23 35.5	04	88	64.3	23 36.7	04	87	63.8	23 38.8	03	87	62.7	23 41.5	02	85	60.5	23 42.5	00	83	58.3	23 42.4	00	82	57.8	23 42.0	01	81	56.7	70
1	22 41.2	05	88	64.8	22 42.8	05	88	64.3	22 44.2	05	87	63.7	22 46.8	04	86	62.6	22 50.7	02	85	60.5	22 52.7	01	83	58.3	22 53.0	01	82	57.8	22 53.1	00	81	56.7	1
2	21 48.3	06	88	64.7	21 50.1	06	88	64.2	21 51.8	05	87	63.7	21 54.9	05	86	62.6	21 59.8	03	85	60.4	22 03.0	02	83	58.3	22 03.5	02	82	57.7	22 04.3	01	81	56.7	2
3	20 55.5	07	88	64.7	20 57.5	07	88	64.2	20 59.4	06	87	63.6	21 03.0	06	86	62.5	21 08.9	04	85	60.4	21 13.3	03	83	58.3	21 14.1	03	82	57.7	21 15.4	02	81	56.7	3
4	20 02.6	08	88	64.6	20 04.9	07	88	64.1	20 07.1	07	87	63.6	20 11.2	06	86	62.5	20 18.1	05	85	60.4	20 23.5	04	83	58.2	20 24.7	04	82	57.7	20 26.6	03	81	56.6	4
75	19 09.8	08	88	64.5	19 12.3	08	88	64.0	19 14.8	08	87	63.5	19 19.3	07	86	62.4	19 27.3	06	85	60.3	19 33.8	05	83	58.2	19 35.3	05	82	57.7	19 37.8	04	81	56.6	75
6	18 17.1	09	88	64.5	18 19.8	09	88	63.9	18 22.5	09	87	63.4	18 27.5	08	86	62.4	18 36.5	07	85	60.3	18 44.2	06	83	58.1	18 45.9	05	82	57.6	18 49.0	05	81	56.6	6
7	17 24.3	10	88	64.4	17 27.3	10	87	63.8	17 30.2	09	87	63.3	17 35.7	09	86	62.3	17 45.8	08	84	60.2	17 54.5	07	83	58.1	17 56.5	06	82	57.6	18 00.2	06	81	56.5	7
8	16 31.7	11	88	64.3	16 34.9	11	87	63.8	16 38.0	10	87	63.2	16 44.0	10	86	62.2	16 55.1	09	84	60.1	17 04.9	08	83	58.0	17 07.2	07	82	57.5	17 11.5	07	81	56.5	8
9	15 39.0	12	88	64.2	15 42.4	11	87	63.7	15 45.8	11	87	63.1	15 52.3	11	86	62.1	16 04.4	10	84	60.0	16 15.3	09	83	58.0	16 17.9	08	82	57.4	16 22.7	08	81	56.4	9
80	14 46.4	12	88	64.1	14 50.1	12	87	63.5	14 53.7	12	87	63.0	15 00.7	11	86	62.0	15 13.8	10	84	59.9	15 25.8	10	82	57.9	15 28.6	09	82	57.4	15 34.1	09	81	56.3	80
1	13 53.9	13	88	63.9	13 57.8	13	87	63.4	14 01.6	13	87	62.9	14 09.1	12	86	61.9	14 23.2	11	84	59.9	14 36.3	10	82	57.8	14 39.4	10	82	57.3	14 45.4	10	81	56.3	1
2	13 01.4	14	87	63.8	13 05.5	14	87	63.3	13 09.6	13	87	62.8	13 17.5	13	86	61.8	13 32.7	12	84	59.7	13 46.9	11	82	57.7	13 50.3	11	82	57.2	13 56.8	11	81	56.2	2
3	12 08.9	15	87	63.7	12 13.3	14	87	63.2	12 17.6	14	86	62.7	12 26.0	14	86	61.7	12 42.2	13	84	59.6	12 57.5	12	82	57.6	13 01.1	12	82	57.1	13 08.3	12	81	56.1	3
4	11 16.6	15	87	63.6	11 21.1	15	87	63.1	11 25.7	15	86	62.6	11 34.6	15	86	61.5	11 51.8	14	84	59.5	12 08.1	13	82	57.5	12 12.1	13	82	57.0	12 19.8	13	81	56.0	4
85	10 24.2	16	87	63.4	10 29.1	16	87	62.9	10 33.8	16	86	62.4	10 43.2	16	86	61.4	11 01.5	15	84	59.4	11 18.9	14	82	57.4	11 23.1	14	82	56.9	11 31.4	14	81	55.9	85
6	9 32.0	17	87	63.3	9 37.0	17	87	62.8	9 42.1	17	86	62.3	9 51.9	16	85	61.3	10 11.2	16	84	59.3	10 29.7	15	82	57.3	10 34.2	15	81	56.8	10 43.0	15	80	55.7	6
7	8 39.8	18	87	63.1	8 45.1	18	86	62.6	8 50.3	17	86	62.1	9 00.7	17	85	61.1	9 21.0	17	84	59.1	9 40.5	16	82	57.1	9 45.3	16	81	56.6	9 54.8	16	80	55.6	7
8	7 47.7	18	87	63.0	7 53.2	18	86	62.5	7 58.7	18	86	62.0	8 09.6	18	85	61.0	8 30.8	17	83	59.0	8 51.5	17	82	57.0	8 56.5	17	81	56.5	9 06.5	17	80	55.5	8
9	6 55.7	19	87	62.8	7 01.4	19	86	62.3	7 07.1	19	86	61.8	7 18.5	19	85	60.8	7 40.8	18	83	58.8	8 02.5	18	82	56.8	8 07.8	18	81	56.3	8 18.4	18	80	55.3	9
90	6 03.7	20	86	62.6	6 09.7	20	86	62.1	6 15.7	20	86	61.6	6 27.5	20	85	60.6	6 50.8	19	83	58.7	7 13.6	19	81	56.7	7 19.2	19	81	56.2	7 30.4	18	80	55.2	90

DECLINATION **CONTRARY** NAME TO LATITUDE

H.A.	28° 00′				28° 30′				29° 00′				30° 00′				32° 00′				34° 00′				34° 30′				35° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	49 00.0	1.0	01	180.0	48 30.0	1.0	01	180.0	48 00.0	1.0	01	180.0	47 00.0	1.0	01	180.0	45 00.0	1.0	01	180.0	43 00.0	1.0	01	180.0	42 30.0	1.0	01	180.0	41 30.0	1.0	01	180.0	00
1	48 59.3	1.0	04	178.7	48 29.3	1.0	03	178.7	47 59.3	1.0	03	178.7	46 59.4	1.0	03	178.7	44 59.4	1.0	03	178.8	42 59.4	1.0	03	178.9	42 29.4	1.0	03	178.9	41 29.4	1.0	03	178.9	1
2	48 57.3	1.0	06	177.3	48 27.3	1.0	06	177.3	47 57.3	1.0	06	177.4	46 57.4	1.0	05	177.5	44 57.6	1.0	05	177.6	42 57.7	1.0	05	177.7	42 27.7	1.0	05	177.8	41 27.8	1.0	05	177.8	2
3	48 53.8	1.0	08	176.0	48 23.9	1.0	08	176.0	47 54.0	1.0	08	176.1	46 54.2	1.0	08	176.2	44 54.5	1.0	07	176.4	42 54.8	1.0	07	176.6	42 24.9	1.0	07	176.7	41 25.0	1.0	06	176.7	3
4	48 49.0	99	10	174.6	48 19.2	99	10	174.7	47 49.4	99	10	174.8	46 49.7	1.0	10	174.9	44 50.2	1.0	09	175.2	42 50.8	1.0	09	175.5	42 20.9	1.0	08	175.5	41 21.1	1.0	08	175.7	4
05	48 42.9	99	12	173.3	48 13.1	99	12	173.4	47 43.4	99	12	173.5	46 43.9	99	12	173.7	44 44.7	99	11	174.0	42 45.6	99	11	174.4	42 15.8	99	10	174.4	41 16.2	99	10	174.6	05
6	48 35.4	99	15	172.0	48 05.8	99	14	172.1	47 36.1	99	14	172.2	46 36.8	99	14	172.4	44 38.1	99	13	172.8	42 39.3	99	12	173.2	42 09.5	99	12	173.3	41 10.1	99	12	173.5	6
7	48 26.6	98	17	170.7	47 57.1	98	17	170.8	47 27.5	98	16	170.9	46 28.4	99	16	171.2	44 30.2	99	15	171.7	42 31.8	99	14	172.1	42 02.2	99	14	172.2	41 03.0	99	14	172.4	7
8	48 16.4	98	19	169.4	47 47.1	98	19	169.5	47 17.7	98	18	169.7	46 18.9	98	18	170.0	44 21.1	98	17	170.5	42 23.2	98	16	171.0	41 53.7	98	16	171.1	40 54.7	98	16	171.4	8
9	48 05.0	97	21	168.1	47 35.8	97	21	168.2	47 06.6	97	21	168.4	46 08.1	98	20	168.7	44 10.9	98	19	169.3	42 13.5	98	18	169.9	41 44.2	98	18	170.1	40 45.4	98	17	170.3	9
10	47 52.3	97	23	166.8	47 23.2	97	23	167.0	46 54.2	97	23	167.2	45 56.0	97	22	167.5	43 59.5	97	21	168.2	42 02.8	97	20	168.8	41 33.5	97	20	169.0	40 35.1	97	19	169.3	10
1	47 38.3	96	25	165.5	47 09.4	96	25	165.7	46 40.6	96	25	165.9	45 42.8	96	24	166.3	43 47.0	97	23	167.0	41 50.9	97	22	167.7	41 21.8	97	21	167.9	40 23.7	97	21	168.2	1
2	47 23.0	96	28	164.3	46 54.4	96	27	164.5	46 25.7	96	27	164.7	45 28.4	96	26	165.1	43 33.3	96	25	165.9	41 37.9	96	23	166.7	41 09.0	96	23	166.8	40 11.2	96	22	167.2	2
3	47 06.6	95	30	163.0	46 38.2	95	29	163.3	46 09.7	96	29	163.5	45 12.8	95	28	163.9	43 18.5	95	26	164.8	41 23.9	96	25	165.6	40 55.2	96	25	165.8	39 57.8	96	24	166.2	3
4	46 48.9	94	31	161.8	46 20.8	94	31	162.1	45 52.5	94	30	162.3	44 56.0	94	30	162.8	43 02.6	95	28	163.7	41 08.9	95	27	164.6	40 40.4	95	26	164.8	39 43.3	95	26	165.2	4
15	46 30.1	93	33	160.6	46 02.2	93	33	160.9	45 34.2	93	32	161.1	44 38.2	94	32	161.6	42 45.7	94	30	162.6	40 52.8	94	28	163.5	40 24.5	94	28	163.7	39 27.8	95	27	164.2	15
6	46 10.1	92	35	159.4	45 42.5	92	35	159.7	45 14.7	92	34	160.0	44 19.2	93	33	160.5	42 27.7	93	32	161.5	40 35.7	94	30	162.5	40 07.6	94	30	162.7	39 11.4	94	29	163.2	6
7	45 49.0	91	37	158.3	45 21.6	91	37	158.6	44 54.2	92	36	158.8	43 59.2	92	35	159.4	42 08.7	92	33	160.5	40 17.6	93	32	161.5	39 49.8	93	31	161.7	38 54.0	93	31	162.2	7
8	45 26.8	90	39	157.1	44 59.7	90	38	157.4	44 32.5	91	38	157.7	43 38.1	91	37	158.3	41 48.6	91	35	159.4	39 58.5	92	33	160.5	39 30.9	92	33	160.7	38 35.6	92	32	161.2	8
9	45 03.6	89	40	156.0	44 36.7	90	40	156.3	44 09.8	90	40	156.6	43 15.9	90	39	157.2	41 27.6	91	37	158.4	39 38.5	91	35	159.5	39 11.2	91	34	159.7	38 16.4	91	34	160.3	9
20	44 39.3	88	42	154.9	44 12.7	89	42	155.2	43 46.1	89	41	155.5	42 52.8	89	40	156.2	41 05.5	90	38	157.4	39 17.6	90	36	158.5	38 50.5	90	36	158.8	37 56.2	91	35	159.3	20
1	44 13.9	87	44	153.8	43 47.7	88	43	154.1	43 21.4	88	43	154.5	42 28.7	88	42	155.1	40 42.6	89	40	156.4	38 55.7	89	38	157.5	38 28.9	90	38	157.8	37 35.1	90	37	158.4	1
2	43 47.6	86	46	152.7	43 21.7	86	45	153.1	42 55.7	87	44	153.4	42 03.6	87	43	154.1	40 18.7	88	41	155.4	38 32.9	88	39	156.6	38 06.4	89	39	156.9	37 13.1	89	38	157.5	2
3	43 20.4	85	47	151.7	42 54.8	85	46	152.0	42 29.1	86	46	152.4	41 37.6	86	45	153.1	39 53.9	87	43	154.4	38 09.3	87	41	155.7	37 43.0	88	40	156.0	36 50.3	88	39	156.6	3
4	42 52.2	84	48	150.7	42 26.9	84	48	151.0	42 01.6	85	47	151.4	41 10.7	85	46	152.1	39 28.2	86	44	153.5	37 44.8	87	42	154.8	37 18.8	87	42	155.1	36 26.7	87	41	155.7	4
25	42 23.1	83	50	149.7	41 58.1	83	49	150.0	41 33.1	83	49	150.4	40 42.9	84	48	151.1	39 01.6	85	46	152.5	37 19.4	86	44	153.9	36 53.7	86	43	154.2	36 02.2	86	42	154.8	25
6	41 53.1	82	51	148.7	41 28.5	82	51	149.1	41 03.8	82	50	149.4	40 14.2	83	49	150.2	38 34.2	84	47	151.6	36 53.2	85	45	153.0	36 27.9	85	44	153.3	35 36.9	85	43	154.0	6
7	41 22.3	81	53	147.7	40 58.0	81	52	148.1	40 33.7	81	52	148.5	39 44.7	82	50	149.2	38 06.0	83	48	150.7	36 26.3	84	46	152.1	36 01.2	84	46	152.4	35 10.9	84	45	153.1	7
8	40 50.7	80	54	146.8	40 26.7	80	53	147.2	40 02.7	80	53	147.6	39 14.5	81	52	148.3	37 37.0	82	50	149.8	35 58.6	82	47	151.3	35 33.8	83	47	151.6	34 44.0	83	46	152.3	8
9	40 18.2	79	55	145.9	39 54.6	79	55	146.3	39 31.0	79	54	146.7	38 43.4	80	53	147.4	37 07.3	81	51	149.0	35 30.1	81	49	150.4	35 05.6	82	48	150.8	34 16.5	82	47	151.5	9
30	39 45.0	77	56	145.0	39 21.8	78	56	145.4	38 58.5	78	55	145.8	38 11.5	78	54	146.6	36 36.8	79	52	148.1	35 00.8	80	50	149.6	34 36.7	81	49	150.0	33 48.2	81	48	150.7	30
1	39 11.1	76	58	144.1	38 48.2	77	57	144.5	38 25.2	77	57	144.9	37 39.0	77	56	145.7	36 05.5	78	53	147.3	34 30.9	79	51	148.8	34 07.1	80	51	149.2	33 19.2	80	49	149.9	1
2	38 36.5	75	59	143.2	38 13.9	75	58	143.6	37 51.2	76	58	144.1	37 05.7	76	57	144.9	35 33.6	77	54	146.5	34 00.2	78	52	148.0	33 36.7	78	52	148.4	32 49.5	79	51	149.1	2
3	38 01.1	74	60	142.4	37 38.9	74	59	142.8	37 16.6	75	59	143.2	36 21.7	75	58	144.1	35 00.9	76	56	145.7	33 28.9	77	53	147.2	33 05.8	77	53	147.6	32 19.2	78	52	148.4	3
4	37 25.1	73	61	141.6	37 03.2	73	61	142.0	36 41.2	73	60	142.4	35 57.0	74	59	143.3	34 27.6	75	57	144.9	32 57.0	76	54	146.5	32 34.1	76	54	146.8	31 48.2	77	53	147.6	4
35	36 48.4	72	62	140.8	36 26.9	72	62	141.2	36 05.3	72	61	141.6	35 21.8	73	60	142.5	33 53.7	74	58	144.1	32 24.3	75	55	145.7	32 01.8	75	55	146.1	31 16.6	76	54	146.9	35
6	36 11.1	70	63	140.0	35 50.0	71	63	140.4	35 28.7	71	62	140.9	34 45.8	72	61	141.7	33 19.1	73	59	143.4	31 51.1	74	56	145.0	31 28.9	74	56	145.4	30 44.3	75	55	146.2	6
7	35 33.2	69	64	139.2	35 12.4	70	64	139.7	34 51.5	70	63	140.1	34 09.3	71	62	141.0	32 43.9	72	60	142.6	31 17.3	73	57	144.3	30 55.4	73	57	144.7	30 11.5	73	56	145.5	7
8	34 54.8	68	65	138.5	34 34.3	69	64	138.9	34 13.7	69	64	139.4	33 32.2	69	63	140.2	32 08.2	71	61	141.9	30 42.9	72	58	143.6	30 21.3	72	58	144.0	29 38.0	72	57	144.8	8
9	34 15.7	67	66	137.8	33 55.6	67	65	138.2	33 35.3	68	65	138.6	32 54.5	68	64	139.5	31 31.9	69	61	141.2	30 07.9	71	59	142.9	29 46.7	71	59	143.3	29 04.1	71	58	144.1	9
40	33 36.2	66	67	137.0	33 16.3	66	66	137.5	32 56.4	67	66	137.9	32 16.3	67	65	138.8	30 55.0	68	62	140.6	29 32.3	69	60	142.2	29 11.5	70	60	142.6	28 29.5	70	58	143.5	40
1	32 56.1	65	68	136.4	32 36.6	65	67	136.8	32 17.0	65	66	137.3	31 37.6	66	65	138.1	30 17.6	67	63	139.9	28 56.2	68	61	141.6	28 35.7	69	60	142.0	27 54.4	69	59	142.8	1
2	32 15.5	64	68	135.7	31 56.3	64	68	136.1	31 37.1	64	67	136.6	30 58.3	65	66	137.5	29 39.6	66	64	139.2	28 19.7	67	62	140.9	27 59.5	67	61	141.4	27 18.9	68	60	142.2	2
3	31 34.4	63	69	135.0	31 15.6	63	69	135.5	30 56.7	63	68	135.9	30 18.5	64	67	136.8	29 01.2	65	65	138.6	27 42.6	66	63	140.3	27 22.7	66	62	140.7	26 42.8	67	61	141.6	3
4	30 52.8	61	70	134.4	30 34.4	62	69	134.8	30 15.8	62	69	135.3	29 38.3	63	68	136.2	28 22.3	64	66	138.0	27 05.0	65	63	139.7	26 45.5	65	63	140.1	26 06.2	66	62	141.0	4
45	30 10.8	60	71	133.8	29 52.7	61	70	134.2	29 34.4	61	70	134.7	28 57.6	62	69	135.6	27 42.9	63	66	137.4	26 26.9	64	64	139.1	26 07.7	64	64	139.5	25 29.1	65	63	140.4	45
6	29 28.4	59	71	133.2	29 10.6	60	71	133.6	28 52.6	60	70	134.1	28 16.5	61	69	135.0	27 03.1	62	67	136.8	25 48.4	63	65	138.5	25 29.6	63	64	138.9	24 51.6	64	63	139.8	6
7	28 45.5	58	72	132.6	28 28.0	59	72	133.0	28 10.4	59	71	133.5	27 34.9	59	70	134.4	26 22.9	61	68	136.2	25 09.5	62	66	137.9	24 51.0	62	65	138.4	24 13.7	62	64	139.2	7
8	28 02.3	57	73	132.0	27 45.1	57	72	132.4	27 27.8	58	72	132.9	26 52.9	58	71	133.8	25 42.2	60	68	135.6	24 30.1	61	66	137.4	24 11.9	61	66	137.8	23 35.3	61	65	138.7	8
9	27 18.6	56	73	131.4	27 01.7	56	73	131.9	26 44.8	57	72	132.3	26 10.5	57	71	133.3	25 01.1	58	69	135.1	23 50.3	59	67	136.8	23 32.5	60	66	137.3	22 56.5	60	65	138.1	9
50	26 34.6	55	74	130.9	26 18.0	55	73	131.3	26 01.4	56	73	131.8	25 27.8	56	72	132.7	24 19.6	57	70	134.5	23 10.1	58	68	136.3	22 52.6	59	67	136.7	22 17.3	59	66	137.6	50
1	25 50.2	54	75	130.3	25 33.9	54	74	130.8	25 17.6	55	74	131.3	24 44.6	55	72	132.2	23 37.7	56	70	134.0	22 29.6	57	68	135.8	22 12.3	58	68	136.2	21 37.7	58	67	137.1	1
2	25 05.5	53	75	129.8	24 49.5	53	75	130.3	24 33.5	54	74	130.7	24 01.1	54	73	131.7	22 55.5	55	71	133.5	21 48.6	56	69	135.3	21 31.7	56	68	135.7	20 57.7	57	67	136.6	2
3	24 20.4	52	76	129.3	24 04.7	52	75	129.8	23 49.0	53	75	130.2	23 17.3	53	74	131.2	22 12.9	54	72	133.0	21 07.3	55	69	134.8	20 50.7	55	69	135.2	20 17.4	56	68	136.1	3
4	23 35.0	51	76	128.8	23 19.6	51	76	129.3	23 04.2	52	75	129.7	22 33.1	52	74	130.7	21 30.0	53	72	132.5	20 25.6	54	70	134.3	20 09.4	54	69	134.7	19 36.7	55	68	135.6	4
55	22 49.2	50	77	128.3	22 34.2	50	76	128.8	22 19.1	51	76	129.2	21 48.6	51	75	130.2	20 46.7	52	73	132.0	19 43.6	53	71	133.8	19 27.7	53	70	134.3	18 55.6	54	69	135.2	55
6	22 03.2	49	77	127.8	21 48.5	49	77	128.3	21 33.6	50	76	128.8	21 03.8	50	75	129.7	20 03.1	51	73	131.5	19 01.3	52	71	133.4	18 45.7	52	71	133.8	18 14.2	53	70	134.7	6
7	21 16.9	48	78	127.4	21 02.5	48	77	127.8	20 47.9	49	77	128.3	20 18.6	49	76	129.2	19 19.2	50	74	131.1	18 18.6	51	72	132.9	18 03.3	51	71	133.4	17 32.5	52	70	134.3	7
8	20 30.3	47	78	126.9	20 16.1	47	78	127.4	20 01.9	48	77	127.9	19 33.2	48	76	128.8	18 35.0	49	74	130.6	17 35.6	50	72	132.5	17 20.7	50	72	132.9	16 50.5	50	71	133.8	8
9	19 43.4	46	78	126.5	19 29.6	46	78	127.0	49 15.6	47	78	127.4	18 47.5	47	77	128.4	17 50.5	48	75	130.2	16 52.4	49	73	132.0	16 37.7	49	72	132.5	16 08.2	49	71	133.4	9
60	18 56.3	45	79	126.1	18 42.7	45	79	126.5	18 29.1	46	78	127.0	18 01.5	46	77	127.9	17 05.7	47	75	129.8	16 08.8	48	73	131.6	15 54.5	48	73	132.1	15 25.6	48	72	133.0	60
1	18 08.9	44	79	125.6	17 55.6	44	79	126.1	17 42.2	45	78	126.6	17 15.3	45	78	127.5	16 20.6	46	76	129.4	15 25.0	47	74	131.2	15 10.9	47	73	131.7	14 42.7	47	72	132.6	1
2	17 21.3	43	80	125.2	17 08.3	44	79	125.7	16 55.2	44	79	126.2	16 28.8	44	78	127.1	15 35.3	45	76	129.0	14 40.9	46	74	130.8	14 27.1	46	73	131.3	13 59.5	46	72	132.2	2
3	16 33.4	42	80	124.8	16 20.7	43	80	125.3	16 07.9	43	79	125.8	15 42.1	43	78	126.7	14 49.7	44	76	128.6	13 56.5	45	74	130.4	13 43.1	45	74	130.9	13 16.1	45	73	131.8	3
4	15 45.3	41	80	124.5	15 32.8	42	80	124.9	15 20.3	42	80	125.4	14 55.1	42	79	126.3	14 03.9	43	77	128.2	13 11.9	44	75	130.1	12 58.8	44	74	130.5	12 32.4	44	73	131.4	4
65	14 57.0	41	81	124.1	14 44.8	41	80	124.6	14 32.6	41	80	125.0	14 07.9	41	79	126.0	13 17.9	42	77	127.8	12 27.0	43	75	129.7	12 14.2	43	75	130.2	11 48.4	43	74	131.1	65
6	14 08.5	40	81	123.7	13 56.6	40	81	124.2	13 44.6	40	80	124.7	13 20.4	40	79	125.6	12 31.6	41	78	127.5	11 41.9	42	76	129.3	11 29.4	42	75	129.8	11 04.2	42	74	130.7	6
7	13 19.7	39	82	123.4	13 08.1	39	81	123.8	12 56.4	39	81	124.3	12 32.8	39	80	125.2	11 45.1	40	78	127.1	10 56.6	41	76	129.0	10 44.4	41	75	129.5	10 19.8	41	74	130.4	7
8	12 30.8	38	82	123.0	12 19.4	38	81	123.5	12 08.0	38	81	124.0	11 45.0	39	80	124.9	10 58.3	39	78	126.8	10 11.0	40	76	128.6	9 59.1	40	76	129.1	9 35.2	40	75	130.0	8
9	11 41.7	37	82	122.7	11 30.6	37	82	123.1	11 19.4	37	81	123.6	10 56.9	38	80	124.6	10 11.4	38	79	126.4	9 25.3	39	77	128.3	9 13.7	39	76	128.8	8 50.3	39	75	129.7	9
70	10 52.4	36	82	122.3	10 41.5	36	82	122.8	10 30.6	36	82	123.3	10 08.7	37	81	124.2	9 24.3	37	79	126.1	8 39.3	38	77	128.0	8 28.0	38	76	128.5	8 05.2	38	75	129.4	70
1	10 02.9	35	83	122.0	9 52.3	35	82	122.5	9 41.7	36	82	123.0	9 20.2	36	81	123.9	8 37.0	36	79	125.8	7 53.1	37	77	127.7	7 42.1	37	77	128.2	7 19.9	37	76	129.1	1
2	9 13.3	34	83	121.7	9 02.9	35	83	122.2	8 52.5	35	82	122.7	8 31.6	35	81	123.6	7 49.5	35	79	125.5	7 06.8	36	78	127.4	6 56.0	36	77	127.9	6 34.5	36	76	128.8	2
3	8 23.4	34	83	121.4	8 13.4	34	83	121.9	8 03.2	34	82	122.4	7 42.9	34	82	123.3	7 01.8	34	80	125.2	6 20.2	35	78	127.1	6 09.8	35	77	127.6	5 48.8	35	76	128.5	3
4	7 33.5	33	84	121.1	7 23.6	33	83	121.6	7 13.8	33	83	122.1	6 53.9	33	82	123.0	6 13.9	34	80	124.9	5 33.5	34	78	126.8	5 23.4	34	78	127.3	5 03.0	34	77	128.2	4
75	6 43.3	32	84	120.8	6 33.8	32	83	121.3	6 24.1	32	83	121.8	6 04.8	32	82	122.7	5 25.9	33	80	124.6													75
6	5 53.1	31	84	120.5	5 43.7	31	84	121.0	5 34.4	31	83	121.5	5 15.6	31	82	122.5																	6
7	5 02.6	30	84	120.3																													7

DECLINATION **SAME** NAME AS LATITUDE

H.A.	28° 00′				28° 30′				29° 00′				30° 00′				32° 00′				34° 00′				34° 30′				35° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
91	5 11.9	21	86	62.4	5 18.1	21	86	61.9	5 24.3	21	86	61.4	5 36.6	20	85	60.5	6 00.9	20	83	58.5	6 24.8	20	81	56.5	6 30.7	20	81	56.0	6 42.4	19	80	55.0	91
2																	5 11.1	21	83	58.3	5 36.1	21	81	56.4	5 42.2	21	81	55.9	5 54.5	20	80	54.9	2
3																													5 06.8	21	80	54.7	3

DECLINATION SAME NAME AS LATITUDE

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	67 00.0	1.0 02	00.0	66 00.0	1.0 02	00.0	64 30.0	1.0 02	00.0	63 00.0	1.0 01	00.0	61 00.0	1.0 01	00.0	60 30.0	1.0 01	00.0	60 00.0	1.0 01	00.0	58 00.0	1.0 01	00.0	00
1	66 58.9	1.0 05	02.1	65 59.0	1.0 05	02.0	64 29.1	1.0 05	01.8	62 59.1	1.0 04	01.7	60 59.2	1.0 04	01.5	60 29.2	1.0 04	01.5	59 59.3	1.0 04	01.5	57 59.3	1.0 03	01.3	1
2	66 55.8	1.0 09	04.1	65 56.0	1.0 08	03.9	64 26.3	1.0 08	03.6	62 56.6	1.0 07	03.4	60 56.9	1.0 06	03.1	60 26.9	1.0 05	03.0	59 57.0	1.0 06	02.9	57 57.3	1.0 06	02.7	2
3	66 50.5	99 12	06.2	65 51.0	99 12	05.9	64 21.7	99 11	05.4	62 52.3	99 10	05.0	60 53.0	99 09	04.6	60 23.1	99 09	04.5	59 53.3	99 09	04.4	57 53.9	1.0 08	04.0	3
4	66 43.2	99 16	08.2	65 44.1	99 15	07.8	64 15.2	99 14	07.2	62 46.3	99 13	06.7	60 47.5	99 12	06.1	60 17.8	99 11	06.0	59 48.1	99 11	05.8	57 49.1	99 10	05.3	4
05	66 33.8	98 19	10.2	65 35.2	98 18	09.7	64 07.0	98 17	09.0	62 38.6	98 16	08.4	60 40.6	98 14	07.6	60 11.0	99 14	07.4	59 41.4	99 13	07.3	57 43.1	99 12	06.6	05
6	66 22.5	97 22	12.2	65 24.4	97 21	11.6	63 57.0	97 20	10.7	62 29.3	98 18	10.0	60 32.1	98 17	09.1	60 02.7	98 16	08.9	59 33.3	98 16	08.7	57 35.7	98 15	07.9	6
7	66 09.2	96 25	14.1	65 11.7	96 24	13.4	63 45.2	96 22	12.5	62 18.4	97 21	11.6	60 22.1	97 19	10.6	59 53.0	97 19	10.3	59 23.8	97 18	10.1	57 26.9	98 17	09.2	7
8	65 54.0	94 28	16.0	64 57.3	95 27	15.2	63 31.8	95 25	14.1	62 05.8	96 24	13.2	60 10.7	96 21	12.0	59 41.8	96 21	11.7	59 12.9	96 21	11.5	57 16.9	97 19	10.5	8
9	65 37.0	93 31	17.9	64 41.1	93 30	17.0	63 16.7	94 28	15.8	61 51.7	95 26	14.7	59 57.8	95 24	13.4	59 29.2	95 23	13.1	59 00.6	96 23	12.8	57 05.7	96 21	11.7	9
10	65 18.2	91 34	19.6	64 23.1	92 33	18.7	63 00.0	93 30	17.4	61 36.1	93 28	16.2	59 43.5	94 26	14.8	59 15.2	94 26	14.5	58 46.9	95 25	14.2	56 53.1	95 23	13.0	10
1	64 57.7	90 37	21.4	64 03.6	91 35	20.4	62 41.7	91 33	19.0	61 19.1	92 31	17.7	59 27.9	93 28	16.2	58 59.9	93 28	15.9	58 31.9	93 27	15.5	56 39.4	94 25	14.2	1
2	64 35.5	88 39	23.1	63 42.4	89 38	22.0	62 21.9	90 35	20.5	61 00.5	91 33	19.2	59 10.9	92 30	17.6	58 43.3	92 30	17.2	58 15.7	92 29	16.8	56 24.4	93 27	15.4	2
3	64 11.9	86 42	24.7	63 19.8	87 40	23.6	62 00.7	88 38	22.0	60 40.6	89 35	20.6	58 52.6	91 33	18.9	58 25.4	91 32	18.5	57 58.1	91 31	18.1	56 08.3	92 29	16.6	3
4	63 46.7	85 44	26.3	62 55.6	86 42	25.1	61 38.1	87 40	23.5	60 19.4	88 38	22.0	58 33.1	89 35	20.2	58 06.3	89 34	19.7	57 39.4	90 33	19.3	55 51.1	91 31	17.7	4
15	63 20.1	83 47	27.8	62 30.1	84 45	26.6	61 14.1	85 42	24.9	59 56.9	86 40	23.3	58 12.4	88 37	21.4	57 46.0	88 36	21.0	57 19.5	88 35	20.5	55 32.7	90 32	18.9	15
6	62 52.2	81 49	29.3	62 03.3	82 47	28.0	60 48.9	83 44	26.3	59 33.1	85 42	24.6	57 50.4	86 38	22.6	57 24.5	87 38	22.2	56 58.4	87 37	21.7	55 13.3	88 34	20.0	6
7	62 22.9	79 51	30.7	61 35.2	80 49	29.4	60 22.4	82 46	27.6	59 08.2	83 43	25.9	57 27.4	85 40	23.8	57 01.9	85 40	23.3	56 36.2	86 39	22.9	54 52.8	87 36	21.1	7
8	61 52.5	77 53	32.0	61 06.0	78 51	30.7	59 54.8	80 48	28.8	58 42.1	81 45	27.1	57 03.2	83 42	25.0	56 38.2	84 41	24.5	56 13.0	84 40	24.0	54 31.3	85 37	22.1	8
9	61 21.0	75 54	33.3	60 35.6	76 52	32.0	59 26.0	78 50	30.1	58 14.9	80 47	28.3	56 38.0	82 44	26.1	56 13.4	82 43	25.6	55 48.7	83 42	25.1	54 08.8	84 39	23.1	9
20	60 48.3	73 56	34.6	60 04.1	74 54	33.2	58 56.2	76 51	31.2	57 46.7	78 49	29.4	56 11.8	80 45	27.2	55 47.7	81 44	26.7	55 23.5	81 44	26.1	53 45.3	83 41	24.1	20
1	60 14.6	71 58	35.7	59 31.6	73 56	34.4	58 25.4	75 53	32.4	57 17.5	76 50	30.5	55 44.6	78 47	28.2	55 21.0	79 46	27.7	54 57.3	79 45	27.2	53 20.9	81 42	25.1	1
2	59 40.0	69 59	36.9	58 58.1	71 57	35.5	57 53.6	73 54	33.5	56 47.3	75 52	31.6	55 16.5	77 48	29.3	54 53.4	77 48	28.7	54 30.1	78 47	28.2	52 55.7	80 44	26.1	2
3	59 04.5	67 61	38.0	58 23.7	69 59	36.5	57 20.9	71 56	34.5	56 16.2	73 53	32.6	54 47.5	75 50	30.2	54 24.9	76 49	29.7	54 02.1	76 48	29.1	52 29.6	78 45	27.0	3
4	58 28.1	65 62	39.0	57 48.5	67 60	37.6	56 47.3	69 57	35.5	55 44.3	71 55	33.6	54 17.6	73 51	31.2	53 55.5	74 50	30.6	53 33.2	74 49	30.0	52 02.6	76 46	27.9	4
25	57 50.9	63 63	40.0	57 12.4	65 61	38.6	56 13.0	67 59	36.5	55 11.5	69 56	34.6	53 46.9	72 52	32.1	53 25.3	72 52	31.5	53 03.6	73 51	31.0	51 34.9	75 47	28.7	25
6	57 13.0	61 64	40.9	56 35.6	63 63	39.5	55 37.8	65 60	37.4	54 38.0	67 57	35.5	53 15.5	70 54	33.0	52 54.4	71 53	32.4	52 33.1	71 52	31.8	51 06.4	73 49	29.6	6
7	56 34.4	60 66	41.8	55 58.1	61 64	40.4	55 01.9	64 61	38.3	54 03.7	66 58	36.3	52 43.3	68 55	33.8	52 22.7	69 54	33.3	52 01.9	70 53	32.7	50 37.2	72 50	30.4	7
8	55 55.1	58 67	42.7	55 19.9	59 65	41.2	54 25.3	62 62	39.2	53 28.7	64 59	37.2	52 10.4	67 56	34.7	51 50.3	67 55	34.1	51 30.0	68 54	33.5	50 07.3	70 51	31.2	8
9	55 15.1	56 68	43.5	54 41.1	58 66	42.1	53 48.1	60 63	40.0	52 53.1	62 60	38.0	51 36.8	65 57	35.5	51 17.2	66 56	34.9	50 57.4	66 55	34.3	49 36.7	68 52	31.9	9
30	54 34.6	54 68	44.3	54 01.6	56 67	42.8	53 10.2	58 64	40.8	52 16.8	60 62	38.8	51 02.5	63 58	36.2	50 43.5	64 57	35.6	50 24.2	64 56	35.0	49 05.4	67 53	32.7	30
1	53 53.5	52 69	45.0	53 21.6	54 68	43.6	52 31.8	57 65	41.5	51 39.9	59 62	39.5	50 27.7	62 59	37.0	50 09.1	62 58	36.3	49 50.4	63 57	35.7	48 33.5	65 54	33.4	1
2	53 12.0	51 70	45.7	52 41.0	52 68	44.3	51 52.8	55 66	42.2	51 02.4	57 63	40.2	49 52.2	60 60	37.7	49 34.2	61 59	37.0	49 15.9	61 58	36.4	48 01.1	64 55	34.1	2
3	52 29.9	49 71	46.4	52 00.0	51 69	45.0	51 13.2	53 67	42.9	50 24.4	55 64	40.9	49 16.2	58 61	38.3	48 58.7	59 60	37.7	48 40.9	59 59	37.1	47 28.1	62 56	34.7	3
4	51 47.3	47 72	47.0	51 18.4	49 70	45.6	50 33.2	51 67	43.5	49 45.9	54 65	41.5	48 39.7	57 62	39.0	48 22.7	57 61	38.4	48 05.4	58 60	37.8	46 54.5	60 57	35.4	4
35	51 04.4	46 72	47.6	50 36.4	47 71	46.2	49 52.7	50 68	44.2	49 06.9	52 66	42.2	48 02.7	55 62	39.6	47 46.1	56 62	39.0	47 29.4	56 61	38.4	46 20.4	59 58	36.0	35
6	50 21.0	44 73	48.2	49 54.0	46 71	46.8	49 11.8	48 69	44.7	48 27.4	50 66	42.8	47 25.2	53 63	40.2	47 09.1	54 62	39.6	46 52.8	55 62	39.0	45 45.8	57 58	36.6	6
7	49 37.2	43 74	48.7	49 11.2	44 72	47.3	48 30.4	47 70	45.3	47 47.5	49 67	43.3	46 47.2	52 64	40.8	46 31.6	52 63	40.2	46 15.8	53 62	39.5	45 10.7	55 59	37.1	7
8	48 53.1	41 74	49.2	48 28.1	43 73	47.9	47 48.7	45 70	45.8	47 07.2	47 68	43.9	46 08.8	50 65	41.3	45 53.7	51 64	40.7	45 38.4	51 63	40.1	44 35.2	54 60	37.7	8
9	48 08.7	39 75	49.7	47 44.5	41 73	48.4	47 06.5	43 71	46.4	46 26.5	46 68	44.4	45 30.0	48 65	41.9	45 15.4	49 65	41.2	45 00.5	50 64	40.6	43 59.3	52 61	38.2	9
40	47 23.9	38 75	50.2	47 00.7	40 74	48.8	46 24.1	42 71	46.8	45 45.4	44 69	44.9	44 50.8	47 66	42.4	44 36.6	48 65	41.7	44 22.3	48 64	41.1	43 22.9	51 61	38.7	40
1	46 38.9	36 76	50.6	46 16.5	38 74	49.3	45 41.2	40 72	47.3	45 04.0	43 70	45.4	44 11.2	45 67	42.8	43 57.5	46 66	42.2	43 43.6	47 65	41.6	42 46.2	49 62	39.2	1
2	45 53.5	35 76	51.1	45 32.1	37 75	49.7	44 58.1	39 72	47.7	44 22.2	41 70	45.8	43 31.3	44 67	43.3	43 18.1	44 66	42.7	43 04.7	45 66	42.1	42 09.0	48 62	39.7	2
3	45 07.9	34 76	51.5	44 47.3	35 75	50.1	44 14.7	37 73	48.2	43 40.1	40 71	46.2	42 51.1	42 68	43.7	42 38.3	43 67	43.1	42 25.3	44 66	42.5	41 31.5	46 63	40.1	3
4	44 22.1	32 77	51.8	44 02.3	34 75	50.5	43 31.0	36 73	48.6	42 57.7	38 71	46.6	42 10.5	41 68	44.2	41 58.2	41 67	43.5	41 45.7	42 67	42.9	40 53.7	45 64	40.5	4
45	43 36.0	31 77	52.2	43 17.1	32 76	50.9	42 47.1	34 74	48.9	42 15.1	37 72	47.0	41 29.6	39 69	44.6	41 17.7	40 68	43.9	41 05.7	41 67	43.3	40 15.6	43 64	40.9	45
6	42 49.7	29 78	52.5	42 31.6	31 76	51.2	42 02.9	33 74	49.3	41 32.2	35 72	47.4	40 48.5	38 69	44.9	40 37.0	38 68	44.3	40 25.4	39 68	43.7	39 37.1	41 65	41.3	6
7	42 03.2	28 78	52.8	41 45.9	30 76	51.5	41 18.4	32 74	49.6	40 49.0	34 72	47.8	40 07.0	36 69	45.3	39 56.1	37 69	44.7	39 44.9	38 68	44.1	38 58.4	40 65	41.7	7
8	41 16.6	27 78	53.1	41 00.1	28 77	51.9	40 33.8	30 75	50.0	40 05.6	32 73	48.1	39 25.4	35 70	45.6	39 14.8	35 69	45.0	39 04.1	36 68	44.4	38 19.3	38 65	42.1	8
9	40 29.7	25 78	53.4	40 14.0	27 77	52.1	39 48.9	29 75	50.3	39 22.0	31 73	48.4	38 43.5	33 70	46.0	38 33.3	34 70	45.4	38 23.0	35 69	44.8	37 40.1	37 66	42.4	9
50	39 42.7	24 79	53.7	39 27.8	26 77	52.4	39 03.9	28 75	50.5	38 38.2	29 73	48.7	38 01.3	32 71	46.3	37 51.6	33 70	45.7	37 41.8	33 69	45.1	37 00.5	36 66	42.7	50
1	38 55.5	23 79	53.9	38 41.3	24 78	52.7	38 18.6	26 76	50.8	37 54.2	28 74	49.0	37 19.0	31 71	46.6	37 09.7	31 70	46.0	37 00.3	32 70	45.4	36 20.7	34 67	43.0	1
2	38 08.2	22 79	54.1	37 54.8	23 78	52.9	37 33.2	25 76	51.1	37 10.0	27 74	49.2	36 36.4	29 71	46.8	36 27.6	30 71	46.3	36 18.6	30 70	45.7	35 40.7	33 67	43.3	2
3	37 20.7	20 79	54.4	37 08.1	22 78	53.1	36 47.7	24 76	51.3	36 25.6	25 74	49.5	35 53.7	28 72	47.1	35 45.2	28 71	46.5	35 36.6	29 70	45.9	35 00.5	31 67	43.6	3
4	36 33.2	19 79	54.6	36 21.2	20 78	53.3	36 02.0	22 76	51.5	35 41.1	24 74	49.7	35 10.8	26 72	47.4	35 02.7	27 71	46.8	34 54.6	28 70	46.2	34 20.1	30 68	43.9	4
55	35 45.5	18 80	54.8	35 34.3	19 78	53.5	35 16.1	21 77	51.7	34 56.4	23 75	49.9	34 27.7	25 72	47.6	34 20.1	26 71	47.0	34 12.3	26 71	46.4	33 39.5	28 68	44.1	55
6	34 57.7	17 80	54.9	34 47.2	18 79	53.7	34 30.2	20 77	51.9	34 11.6	22 75	50.2	33 44.4	24 72	47.8	33 37.2	24 72	47.2	33 29.9	25 71	46.6	32 58.8	27 68	44.3	6
7	34 09.8	16 80	55.1	34 00.0	17 79	53.9	33 44.1	19 77	52.1	33 26.6	20 75	50.3	33 01.0	22 73	48.0	32 54.2	23 72	47.4	32 47.3	23 71	46.9	32 17.8	26 68	44.6	7
8	33 21.8	15 80	55.2	33 12.7	16 79	54.0	32 57.9	17 77	52.3	32 41.6	19 75	50.5	32 17.5	21 73	48.2	32 11.1	22 72	47.6	32 04.6	22 71	47.1	31 36.7	24 69	44.8	8
9	32 33.7	13 80	55.4	32 25.4	14 79	54.2	32 11.6	16 77	52.4	31 56.4	18 75	50.7	31 33.9	20 73	48.4	31 27.9	20 72	47.8	31 21.7	21 72	47.2	30 55.5	23 69	45.0	9
60	31 45.6	12 80	55.5	31 37.9	13 79	54.3	31 25.2	15 77	52.6	31 11.1	16 76	50.8	30 50.1	18 73	48.5	30 44.5	19 72	48.0	30 38.7	19 72	47.4	30 14.1	21 69	45.1	60
1	30 57.4	11 80	55.6	30 50.4	12 79	54.4	30 38.7	14 78	52.7	30 25.7	15 76	51.0	30 06.2	17 73	48.7	30 01.0	18 73	48.1	29 55.6	18 72	47.6	29 32.6	20 69	45.3	1
2	30 09.1	10 81	55.7	30 02.8	11 79	54.6	29 52.2	13 78	52.8	29 40.2	14 76	51.1	29 22.3	16 73	48.8	29 17.4	16 73	48.3	29 12.4	17 72	47.7	28 51.0	19 70	45.5	2
3	29 20.8	09 81	55.8	29 15.1	10 80	54.6	29 05.6	11 78	52.9	28 54.7	13 76	51.2	28 38.2	15 74	49.0	28 33.7	15 73	48.4	28 29.1	16 72	47.8	28 09.3	17 70	45.6	3
4	28 32.4	08 81	55.9	28 27.4	09 80	54.7	28 18.9	10 78	53.0	28 09.1	12 76	51.3	27 54.1	13 74	49.1	27 50.0	14 73	48.5	27 45.7	14 72	48.0	27 27.5	16 70	45.7	4
65	27 44.0	07 81	55.9	27 39.7	08 80	54.8	27 32.1	09 78	53.1	27 23.4	10 76	51.4	27 09.8	12 74	49.2	27 06.1	13 73	48.6	27 02.3	13 73	48.1	26 45.6	15 70	45.9	65
6	26 55.6	06 81	56.0	26 51.9	07 80	54.9	26 45.4	08 78	53.2	26 37.7	09 76	51.5	26 25.5	11 74	49.3	26 22.2	11 73	48.7	26 18.7	12 73	48.2	26 03.6	13 70	46.0	6
7	26 07.1	05 81	56.0	26 04.1	06 80	54.9	25 58.5	07 78	53.3	25 51.9	08 76	51.6	25 41.2	10 74	49.4	25 38.2	10 73	48.8	25 35.1	11 73	48.3	25 21.5	12 70	46.1	7
8	25 18.6	04 81	56.1	25 16.2	04 80	55.0	25 11.7	06 78	53.3	25 06.0	07 76	51.7	24 56.8	08 74	49.5	24 54.2	09 73	48.9	24 51.5	09 73	48.4	24 39.3	11 70	46.2	8
9	24 30.1	03 81	56.1	24 28.3	03 80	55.0	24 24.8	05 78	53.4	24 20.2	06 76	51.7	24 12.3	07 74	49.5	24 10.1	08 74	49.0	24 07.7	08 73	48.4	23 57.1	10 70	46.2	9
70	23 41.6	02 81	56.1	23 40.4	02 80	55.0	23 37.9	03 78	53.4	23 34.3	05 77	51.8	23 27.9	06 74	49.6	23 26.0	06 74	49.0	23 24.0	07 73	48.5	23 14.9	08 70	46.3	70
1	22 53.0	00 81	56.1	22 52.5	01 80	55.0	22 50.9	02 78	53.4	22 48.3	03 77	51.8	22 43.3	05 74	49.6	22 41.8	05 74	49.1	22 40.2	06 73	48.5	22 32.6	07 71	46.4	1
2	22 04.5	01 81	56.1	22 04.6	00 80	55.0	22 04.0	01 78	53.4	22 02.4	02 77	51.8	21 58.8	04 74	49.7	21 57.6	04 74	49.1	21 56.4	04 73	48.6	21 50.2	06 71	46.4	2
3	21 15.9	02 81	56.1	21 16.7	01 80	55.0	21 17.0	00 78	53.4	21 16.4	01 77	51.8	21 14.2	03 74	49.7	21 13.4	03 74	49.1	21 12.5	03 73	48.6	21 07.9	05 71	46.5	3
4	20 27.4	03 81	56.1	20 28.8	02 80	55.0	20 30.1	01 78	53.4	20 30.5	00 77	51.8	20 29.6	01 74	49.7	20 29.2	02 74	49.2	20 28.6	02 73	48.6	20 25.5	03 71	46.5	4
75	19 38.9	04 81	56.1	19 40.9	03 80	55.0	19 43.1	02 78	53.4	19 44.5	01 77	51.8	19 45.1	00 74	49.7	19 45.0	00 74	49.2	19 44.8	01 73	48.6	19 43.1	02 71	46.5	75
6	18 50.4	05 81	56.0	18 53.0	04 80	55.0	18 56.2	03 78	53.4	18 58.5	02 77	51.8	19 00.5	01 74	49.7	19 00.7	01 74	49.2	19 00.9	00 73	48.6	19 00.6	01 71	46.5	6
7	18 01.9	06 81	56.0	18 05.1	05 80	54.9	18 09.2	04 78	53.4	18 12.6	03 77	51.8	18 15.9	02 74	49.7	18 16.5	02 74	49.2	18 17.0	02 73	48.6	18 18.2	00 71	46.5	7
8	17 13.5	07 81	55.9	17 17.3	06 80	54.9	17 22.3	05 78	53.3	17 26.7	04 77	51.8	17 31.3	03 74	49.7	17 32.3	03 74	49.1	17 33.1	03 73	48.6	17 35.8	02 71	46.5	8
9	16 25.0	08 81	55.9	16 29.4	07 80	54.8	16 35.5	06 78	53.3	16 40.8	06 76	51.7	16 46.8	04 74	49.6	16 48.1	04 74	49.1	16 49.3	04 73	48.6	16 53.4	03 71	46.5	9
80	15 36.7	09 81	55.8	15 41.7	08 80	54.8	15 48.6	07 78	53.2	15 54.9	07 76	51.7	16 02.2	06 74	49.6	16 03.9	05 74	49.1	16 05.4	05 73	48.6	16 11.0	04 71	46.5	80
1	14 48.3	10 80	55.7	14 53.9	09 79	54.7	15 01.8	08 78	53.2	15 09.0	08 76	51.6	15 17.7	07 74	49.5	15 19.7	07 74	49.0	15 21.6	06 73	48.5	15 28.6	05 71	46.4	1
2	14 00.0	11 80	55.7	14 06.2	10 79	54.6	14 15.0	09 78	53.1	14 23.2	09 76	51.5	14 33.3	08 74	49.5	14 35.6	08 73	49.0	14 37.9	07 73	48.5	14 46.2	07 71	46.4	2
3	13 11.8	12 80	55.6	13 18.6	11 79	54.5	13 28.3	11 78	53.0	13 37.5	10 76	51.5	13 48.8	09 74	49.4	13 51.5	09 73	48.9	13 54.1	09 73	48.4	14 03.9	08 70	46.3	3
4	12 23.6	13 80	55.5	12 31.0	12 79	54.4	12 41.6	12 78	52.9	12 51.8	11 76	51.4	13 04.4	10 74	49.4	13 07.5	10 73	48.8	13 10.4	10 73	48.3	13 21.6	09 70	46.3	4
85	11 35.5	13 80	55.4	11 43.5	13 79	54.3	11 55.0	13 78	52.8	12 06.1	12 76	51.3	12 20.1	11 74	49.3	12 23.5	11 73	48.8	12 26.8	11 73	48.3	12 39.4	10 70	46.2	85
6	10 47.4	14 80	55.2	10 56.0	14 79	54.2	11 08.5	14 77	52.7	11 20.5	13 76	51.2	11 35.8	12 74	49.2	11 39.5	12 73	48.7	11 43.2	12 73	48.2	11 57.2	11 70	46.1	6
7	9 59.4	15 80	55.1	10 08.6	15 79	54.1	10 22.0	15 77	52.6	10 35.0	14 76	51.1	10 51.6	14 74	49.1	10 55.7	13 73	48.6	10 59.7	13 72	48.1	11 15.1	13 70	46.1	7
8	9 11.5	16 80	55.0	9 21.2	16 79	54.0	9 35.6	16 77	52.5	9 49.5	15 76	51.0	10 07.5	15 73	49.0	10 11.9	15 73	48.5	10 16.2	14 72	48.0	10 33.1	14 70	46.0	8
9	8 23.6	17 80	54.8	8 34.0	17 79	53.9	8 49.2	17 77	52.4	9 04.1	16 76	50.9	9 23.4	16 73	48.9	9 28.1	16 73	48.4	9 32.8	16 72	47.9	9 51.1	15 70	45.9	9
90	7 35.9	18 79	54.7	7 46.8	18 78	53.7	8 03.0	18 77	52.2	8 18.8	17 75	50.7	8 39.4	17 73	48.7	8 44.5	17 73	48.2	8 49.5	17 72	47.7	9 09.2	16 70	45.7	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	36° 00′				37° 00′				38° 30′				40° 00′				42° 00′				42° 30′				43° 00′				45° 00′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	41 00.0	1.0	01	180.0	40 00.0	1.0	01	180.0	38 30.0	1.0	01	180.0	37 00.0	1.0	01	180.0	35 00.0	1.0	01	180.0	34 30.0	1.0	01	180.0	34 00.0	1.0	01	180.0	32 00.0	1.0	01	180.0	*00*
1	40 59.5	1.0	03	178.9	39 59.5	1.0	03	179.0	38 29.5	1.0	03	179.0	36 59.5	1.0	02	179.0	34 59.5	1.0	02	179.1	34 29.5	1.0	02	179.1	33 59.5	1.0	02	179.1	31 59.6	1.0	02	179.2	*1*
2	40 57.8	1.0	05	177.9	39 57.9	1.0	04	177.9	38 28.0	1.0	04	178.0	36 58.0	1.0	04	178.1	34 58.1	1.0	04	178.2	34 28.2	1.0	04	178.2	33 58.2	1.0	04	178.2	31 58.3	1.0	04	178.3	*2*
3	40 55.1	1.0	06	176.8	39 55.2	1.0	06	176.9	38 25.4	1.0	06	177.0	36 55.6	1.0	06	177.1	34 55.8	1.0	05	177.3	34 25.9	1.0	05	177.3	33 56.0	1.0	05	177.4	31 56.2	1.0	05	177.5	*3*
4	40 51.3	1.0	08	175.7	39 51.5	1.0	08	175.8	38 21.8	1.0	08	176.0	36 52.2	1.0	07	176.2	34 52.6	1.0	07	176.4	34 22.7	1.0	07	176.4	33 52.8	1.0	07	176.5	31 53.2	1.0	06	176.7	*4*
05	40 46.4	99	10	174.7	39 46.7	99	10	174.8	38 17.3	99	09	175.0	36 47.8	99	09	175.2	34 48.4	99	08	175.5	34 18.6	99	08	175.5	33 48.8	99	08	175.6	31 49.4	99	08	175.8	*05*
6	40 40.4	99	12	173.6	39 40.9	99	11	173.8	38 11.7	99	11	174.0	36 42.4	99	11	174.3	34 43.4	99	10	174.6	34 13.6	99	10	174.7	33 43.8	99	10	174.7	31 44.7	99	09	175.0	*6*
7	40 33.3	99	14	172.5	39 34.1	99	13	172.7	38 05.1	99	13	173.0	36 36.1	99	12	173.3	34 37.4	99	11	173.7	34 07.7	99	11	173.8	33 38.0	99	11	173.9	31 39.2	99	11	174.2	*7*
8	40 25.2	98	15	171.5	39 26.2	98	15	171.7	37 57.5	99	14	172.1	36 28.8	99	14	172.4	34 30.5	99	13	172.8	34 00.9	99	13	172.9	33 31.3	99	13	173.0	31 32.9	99	12	173.4	*8*
9	40 16.0	98	17	170.5	39 17.2	98	17	170.7	37 49.0	98	16	171.1	36 20.6	98	15	171.4	34 22.7	98	14	171.9	33 53.2	98	14	172.0	33 23.7	98	14	172.1	31 25.7	98	13	172.6	*9*
10	40 05.8	98	19	169.4	39 07.3	98	18	169.7	37 39.4	98	18	170.1	36 11.4	98	17	170.5	34 14.0	98	16	171.0	33 44.7	98	16	171.1	33 15.3	98	16	171.3	31 17.7	98	15	171.7	*10*
1	39 54.6	97	20	168.4	38 56.3	97	20	168.7	37 28.9	97	19	169.2	36 01.3	97	18	169.6	34 04.5	97	17	170.1	33 35.2	97	17	170.3	33 06.0	98	17	170.4	31 08.9	98	16	170.9	*1*
2	39 42.3	96	22	167.4	38 44.4	97	22	167.7	37 17.4	97	21	168.2	35 50.3	97	20	168.7	33 54.0	97	19	169.3	33 24.9	97	19	169.4	32 55.8	97	18	169.6	30 59.3	97	17	170.1	*2*
3	39 29.0	96	24	166.4	38 31.4	96	23	166.7	37 05.0	96	22	167.3	35 38.4	96	21	167.8	33 42.7	96	20	168.4	33 13.8	97	20	168.6	32 44.8	97	20	168.7	30 48.9	97	19	169.3	*3*
4	39 14.7	95	25	165.4	38 17.5	95	25	165.7	36 51.6	96	24	166.3	35 25.5	96	23	166.9	33 30.5	96	22	167.5	33 01.8	96	21	167.7	32 33.0	96	21	167.9	30 37.6	96	20	168.5	*4*
15	38 59.5	95	27	164.4	38 02.7	95	26	164.8	36 37.3	95	25	165.4	35 11.8	96	24	166.0	33 17.5	95	23	166.7	32 48.9	95	23	166.9	32 20.3	95	22	167.1	30 25.6	96	21	167.7	*15*
6	38 43.2	94	29	163.4	37 46.8	94	28	163.8	36 22.1	94	27	164.5	34 57.2	94	26	165.1	33 03.6	95	24	165.9	32 35.2	95	24	166.0	32 06.8	96	24	166.2	30 12.8	95	23	167.0	*6*
7	38 26.0	93	30	162.4	37 30.1	93	29	162.9	36 06.0	94	28	163.5	34 41.7	94	27	164.2	32 48.9	94	26	165.0	32 20.7	94	26	165.2	31 52.4	94	25	165.4	29 59.3	94	24	166.2	*7*
8	38 07.9	92	32	161.5	37 12.4	93	31	161.9	35 49.0	93	30	162.6	34 25.3	93	29	163.3	32 33.4	93	27	164.2	32 05.4	93	27	164.4	31 37.3	94	27	164.6	29 44.9	94	25	165.4	*8*
9	37 48.9	92	33	160.5	36 53.9	92	32	161.0	35 31.1	92	31	161.8	34 08.1	92	30	162.5	32 17.1	93	29	163.4	31 49.3	93	28	163.6	31 21.4	93	28	163.8	29 29.8	93	26	164.7	*9*
20	37 29.0	91	35	159.6	36 34.4	91	34	160.1	35 12.4	91	33	160.9	33 50.1	92	31	161.6	32 00.0	92	30	162.6	31 32.4	92	29	162.8	31 04.7	92	29	163.0	29 14.0	92	28	163.9	*20*
1	37 08.1	90	36	158.7	36 14.1	90	35	159.2	34 52.8	90	34	160.0	33 31.2	91	33	160.8	31 42.0	91	31	161.8	31 14.7	91	31	162.0	30 47.3	91	30	162.2	28 57.4	92	29	163.2	*1*
2	36 46.4	89	38	157.8	35 52.9	89	37	158.3	34 32.4	90	35	159.2	33 11.6	90	34	159.9	31 23.4	90	32	161.0	30 56.2	90	32	161.2	30 29.1	91	32	161.5	28 40.1	91	30	162.4	*2*
3	36 23.9	88	39	156.9	35 30.9	88	38	157.5	34 11.2	89	37	158.3	32 51.2	89	35	159.1	31 03.9	90	34	160.2	30 37.0	90	33	160.4	30 10.1	90	33	160.7	28 22.1	90	31	161.7	*3*
4	36 00.5	87	40	156.0	35 08.1	87	39	156.6	33 49.2	88	38	157.5	32 29.9	88	37	158.3	30 43.7	89	35	159.4	30 17.1	89	34	159.7	29 50.4	89	34	159.9	28 03.4	89	32	161.0	*4*
25	35 36.3	86	42	155.1	34 44.5	87	41	155.7	33 26.4	87	39	156.6	32 08.0	87	38	157.5	30 22.8	88	36	158.7	29 56.4	88	36	158.9	29 30.0	88	35	159.2	27 44.0	89	33	160.3	*25*
6	35 11.4	85	43	154.3	34 20.1	86	42	154.9	33 02.9	86	40	155.8	31 45.2	86	39	156.7	30 01.2	87	37	157.9	29 35.1	87	37	158.2	29 08.9	87	36	158.5	27 24.0	88	35	159.6	*6*
7	34 45.6	84	44	153.4	33 54.9	85	43	154.1	32 38.6	85	42	155.0	31 21.8	86	40	156.0	29 38.8	86	38	157.2	29 13.0	86	38	157.4	28 47.1	86	37	157.7	27 03.2	87	36	158.9	*7*
8	34 19.1	83	45	152.6	33 29.0	84	44	153.3	32 13.5	84	43	154.3	30 57.6	85	41	155.2	29 15.8	85	40	156.4	28 50.2	85	39	156.7	28 24.6	85	39	157.0	26 41.8	86	37	158.2	*8*
9	33 51.8	82	47	151.8	33 02.4	83	46	152.5	31 47.8	83	44	153.5	30 32.8	84	43	154.5	28 52.1	84	41	155.7	28 26.8	84	40	156.0	28 01.5	84	40	156.3	26 19.8	85	38	157.5	*9*
30	33 23.9	81	48	151.0	32 35.0	82	47	151.7	31 21.4	82	45	152.7	30 07.2	83	44	153.7	28 27.7	83	42	155.0	28 02.7	83	41	155.3	27 37.6	84	41	155.6	25 57.1	84	39	156.8	*30*
1	32 55.2	80	49	150.2	32 07.0	81	48	150.9	30 54.2	81	46	152.0	29 41.0	82	45	153.0	28 02.6	82	43	154.3	27 37.9	82	42	154.6	27 13.2	83	42	154.9	25 33.8	83	40	156.2	*1*
2	32 25.8	79	50	149.5	31 38.3	80	49	150.2	30 26.4	80	47	151.2	29 14.1	81	46	152.3	27 37.0	81	44	153.6	27 12.6	81	43	153.9	26 48.1	82	43	154.3	25 09.9	82	41	155.5	*2*
3	31 55.8	78	51	148.7	31 08.9	78	50	149.5	29 58.0	79	48	150.5	28 46.6	80	47	151.6	27 10.7	80	45	152.9	26 46.6	80	44	153.3	26 22.4	81	44	153.6	24 45.4	81	42	154.9	*3*
4	31 25.1	77	52	148.0	30 38.8	77	51	148.7	29 28.9	78	49	149.8	28 18.5	79	48	150.9	26 43.8	79	46	152.3	26 20.0	79	45	152.6	25 56.1	80	45	153.0	24 20.3	80	43	154.3	*4*
35	30 53.8	76	53	147.3	30 08.2	76	52	148.0	28 59.2	77	50	149.1	27 49.7	78	49	150.2	26 16.3	78	47	151.6	25 52.8	78	46	152.0	25 29.3	79	46	152.3	23 54.7	79	44	153.7	*35*
6	30 21.9	75	54	146.6	29 36.9	75	53	147.3	28 28.9	76	51	148.4	27 20.4	76	50	149.5	25 48.2	77	48	151.0	25 25.0	77	47	151.3	25 01.8	77	47	151.7	23 28.4	78	45	153.1	*6*
7	29 49.4	74	55	145.9	29 05.0	74	54	146.6	27 58.0	75	52	147.8	26 50.5	75	51	148.9	25 19.6	76	49	150.3	24 56.7	76	48	150.7	24 33.8	76	48	151.1	23 01.7	77	46	152.5	*7*
8	29 16.3	73	56	145.2	28 32.6	73	55	146.0	27 26.6	74	53	147.1	26 20.0	74	52	148.2	24 50.4	75	50	149.7	24 27.8	75	49	150.1	24 05.2	75	48	150.4	22 34.4	76	46	151.9	*8*
9	28 42.6	71	57	144.5	27 59.6	72	56	145.3	26 54.6	73	54	146.5	25 48.9	73	53	147.6	24 20.6	74	50	149.1	23 58.4	74	50	149.5	23 36.1	74	49	149.8	22 06.6	75	47	151.3	*9*
40	28 08.4	70	58	143.9	27 26.1	71	57	144.7	26 22.0	72	55	145.8	25 17.4	72	54	147.0	23 50.3	73	51	148.5	23 28.5	73	51	148.9	23 06.5	73	50	149.3	21 38.2	74	48	150.7	*40*
1	27 33.7	69	59	143.2	26 52.0	70	58	144.0	25 48.9	70	56	145.2	24 45.3	71	54	146.4	23 19.6	72	52	147.9	22 58.0	72	52	148.3	22 36.4	72	51	148.7	21 09.4	73	49	150.2	*1*
2	26 58.4	68	60	142.6	26 17.4	69	58	143.4	25 15.3	69	57	144.6	24 12.6	70	55	145.8	22 48.3	71	53	147.4	22 27.0	71	52	147.7	22 05.7	71	52	148.1	20 40.1	72	50	149.6	*2*
3	26 22.7	67	60	142.0	25 42.3	68	59	142.8	24 41.2	68	58	144.0	23 39.5	69	56	145.2	22 16.5	70	54	146.8	21 55.6	70	53	147.2	21 34.6	70	53	147.6	20 10.3	71	50	149.1	*3*
4	25 46.4	66	61	141.4	25 06.7	66	60	142.2	24 06.6	67	58	143.4	23 06.0	68	57	144.7	21 44.2	68	55	146.2	21 23.7	69	54	146.6	21 03.0	69	53	147.0	19 40.0	70	51	148.6	*4*
45	25 09.7	65	62	140.8	24 30.7	65	61	141.6	23 31.6	66	59	142.9	22 31.9	67	58	144.1	21 11.5	67	55	145.7	20 51.3	68	55	146.1	20 31.0	68	54	146.5	19 09.3	68	52	148.0	*45*
6	24 32.5	64	63	140.2	23 54.1	64	62	141.1	22 56.1	65	60	142.3	21 57.4	65	58	143.5	20 38.3	66	56	145.2	20 18.4	66	55	145.6	19 58.5	67	55	146.0	18 38.1	67	53	147.5	*6*
7	23 54.9	63	63	139.7	23 17.2	63	62	140.5	22 20.1	64	61	141.8	21 22.4	64	59	143.0	20 04.7	65	57	144.6	19 45.2	65	56	145.0	19 25.5	66	56	145.4	18 06.5	66	53	147.0	*7*
8	23 16.9	62	64	139.1	22 39.8	62	63	140.0	21 43.7	63	61	141.2	20 47.1	63	60	142.5	19 30.7	64	57	144.1	19 11.5	64	57	144.5	18 52.2	64	56	144.9	17 34.5	65	54	146.6	*8*
9	22 38.4	60	65	138.6	22 02.0	61	64	139.4	21 06.9	62	62	140.7	20 11.3	62	60	142.0	18 56.2	63	58	143.6	18 37.3	63	58	144.0	18 18.4	63	57	144.5	17 02.1	64	55	146.1	*9*
50	21 59.5	59	65	138.1	21 23.8	60	64	138.9	20 29.7	60	63	140.2	19 35.0	61	61	141.5	18 21.4	62	59	143.1	18 02.8	62	58	143.6	17 44.2	62	58	144.0	16 29.2	63	55	145.6	*50*
1	21 20.2	58	66	137.5	20 45.2	59	65	138.4	19 52.1	59	63	139.7	18 58.4	60	62	141.0	17 46.1	61	59	142.7	17 27.9	61	59	143.1	17 09.6	61	58	143.5	15 56.0	62	56	145.1	*1*
2	20 40.6	57	67	137.0	20 06.2	58	66	137.9	19 14.1	58	64	139.2	18 21.4	59	62	140.5	17 10.5	60	60	142.2	16 52.6	60	59	142.6	16 34.6	60	59	143.0	15 22.4	60	57	144.7	*2*
3	20 00.6	56	67	136.6	19 26.8	56	66	137.4	18 35.7	57	65	138.7	17 44.1	58	63	140.0	16 34.4	58	61	141.7	16 16.9	59	60	142.2	15 59.3	59	60	142.6	14 48.5	59	57	144.3	*3*
4	19 20.2	55	68	136.1	18 47.1	55	67	137.0	17 57.0	56	65	138.3	17 06.3	57	63	139.6	15 58.1	57	61	141.3	15 40.9	57	61	141.7	15 23.6	58	60	142.1	14 14.1	58	58	143.8	*4*
55	18 39.5	54	68	135.6	18 07.0	54	67	136.5	17 17.9	55	66	137.8	16 28.3	55	64	139.1	15 21.3	56	62	140.9	15 04.5	56	61	141.3	14 47.6	56	61	141.7	13 39.5	57	58	143.4	*55*
6	17 58.4	53	69	135.2	17 26.6	53	68	136.1	16 38.5	54	66	137.4	15 49.8	54	65	138.7	14 44.2	55	62	140.4	14 27.7	55	62	140.9	14 11.2	55	61	141.3	13 04.4	56	59	143.0	*6*
7	17 17.0	52	70	134.7	16 45.9	52	68	135.6	15 58.7	53	67	136.9	15 11.1	53	65	138.3	14 06.8	54	63	140.0	13 50.7	54	62	140.4	13 34.4	54	62	140.9	12 29.1	55	59	142.6	*7*
8	16 35.3	51	70	134.3	16 04.8	51	69	135.2	15 18.6	52	67	136.5	14 32.0	52	66	137.8	13 29.1	53	63	139.6	13 13.3	53	63	140.0	12 57.4	53	62	140.5	11 53.4	54	60	142.2	*8*
9	15 53.3	50	70	133.9	15 23.5	50	69	134.8	14 38.3	50	68	136.1	13 52.6	51	66	137.4	12 51.1	52	64	139.2	12 35.6	52	63	139.6	12 20.0	52	63	140.1	11 17.4	52	60	141.8	*9*
60	15 11.0	49	71	133.5	14 41.8	49	70	134.4	13 57.6	49	68	135.7	13 12.9	50	67	137.0	12 12.7	50	64	138.8	11 57.6	51	64	139.3	11 42.4	51	63	139.7	10 41.2	51	61	141.5	*60*
1	14 28.5	47	71	133.0	13 59.9	48	70	134.0	13 16.6	48	69	135.3	12 32.9	49	67	136.7	11 34.1	49	65	138.4	11 19.3	49	64	138.9	11 04.4	50	64	139.3	10 04.6	50	61	141.1	*1*
2	13 45.6	46	72	132.7	13 17.6	47	71	133.6	12 35.4	47	69	134.9	11 52.7	48	68	136.3	10 55.1	48	65	138.1	10 40.7	48	65	138.5	10 26.1	48	64	139.0	9 27.7	49	62	140.7	*2*
3	13 02.5	45	72	132.3	12 35.1	46	71	133.2	11 53.8	46	70	134.6	11 12.1	47	68	135.9	10 15.9	47	66	137.7	10 01.8	47	65	138.2	9 47.6	47	65	138.6	8 50.6	48	62	140.4	*3*
4	12 19.1	44	73	131.9	11 52.4	45	72	132.8	11 12.0	45	70	134.2	10 31.3	45	68	135.6	9 36.5	46	66	137.4	9 22.7	46	66	137.8	9 08.8	46	65	138.3	8 13.2	47	63	140.0	*4*
65	11 35.4	43	73	131.5	11 09.4	44	72	132.5	10 30.0	44	70	133.8	9 50.2	44	69	135.2	8 56.7	45	67	137.0	8 43.3	45	66	137.5	8 29.8	45	66	137.9	7 35.5	45	63	139.7	*65*
6	10 51.6	42	74	131.2	10 26.1	43	72	132.1	9 47.7	43	71	133.5	9 08.9	43	69	134.9	8 16.7	44	67	136.7	8 03.6	44	66	137.1	7 50.5	44	66	137.6	6 57.6	44	64	139.4	*6*
7	10 07.5	41	74	130.8	9 42.6	41	73	131.8	9 05.2	42	71	133.2	8 27.4	42	70	134.5	7 36.5	43	67	136.4	7 23.7	43	67	136.8	7 10.9	43	66	137.3	6 19.4	43	64	139.1	*7*
8	9 23.1	40	74	130.5	8 58.9	40	73	131.4	8 22.4	41	72	132.8	7 45.6	41	70	134.2	6 56.1	41	68	136.0	6 43.6	42	67	136.5	6 31.1	42	67	137.0	5 41.0	42	64	138.8	*8*
9	8 38.6	39	75	130.2	8 15.0	39	74	131.1	7 39.4	40	72	132.5	7 03.5	40	70	133.9	6 15.4	40	68	135.7	6 03.3	40	68	136.2	5 51.1	40	67	136.7	5 02.4	41	65	138.5	*9*
70	7 53.8	38	75	129.9	7 30.8	38	74	130.8	6 56.2	39	72	132.2	6 21.3	39	71	133.6	5 34.5	39	68	135.4	5 22.7	39	68	135.9	5 10.9	39	67	136.4					*70*
1	7 08.8	37	75	129.6	6 46.5	37	74	130.5	6 12.8	38	73	131.9	5 38.9	38	71	133.3																	*1*
2	6 23.7	36	76	129.3	6 01.9	36	75	130.2	5 29.2	37	73	131.6																					*2*
3	5 38.3	35	76	129.0	5 17.2	35	75	129.9																									*3*

DECLINATION SAME NAME AS LATITUDE

H.A.	36° 00′				37° 00′				38° 30′				40° 00′				42° 00′				42° 30′				43° 00′				45° 00′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
91	6 48.2	19	79	54.6	6 59.8	19	78	53.6	7 16.8	19	77	52.1	7 33.6	18	75	50.6	7 55.5	18	73	48.6	8 00.9	18	72	48.1	8 06.3	18	72	47.6	8 27.3	17	70	45.6	**91**
2	6 00.6	20	79	54.4	6 12.8	20	78	53.4	6 30.8	20	77	51.9	6 48.5	20	75	50.4	7 11.7	19	73	48.5	7 17.4	19	72	48.0	7 23.1	19	72	47.5	7 45.6	18	69	45.5	**2**
3	5 13.2	21	79	54.2	5 25.9	21	78	53.2	5 44.8	21	76	51.8	6 03.5	21	75	50.3	6 28.0	20	73	48.3	6 34.1	20	72	47.8	6 40.1	20	72	47.3	7 03.9	20	69	45.4	**3**
4													5 18.5	22	75	50.1	5 44.4	21	73	48.2	5 50.8	21	72	47.7	5 57.2	21	71	47.2	6 22.4	21	69	45.2	**4**
95																	5 00.9	22	72	48.0	5 07.6	22	72	47.5	5 14.3	22	71	47.0	5 40.9	22	69	45.1	**95**

H.A.	46° 00′				47° 00′				48° 30′				49° 30′				50° 30′				51° 30′				52° 30′				54° 00′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	57 00.0	1.0	01	00.0	56 00.0	1.0	01	00.0	54 30.0	1.0	01	00.0	53 30.0	1.0	01	00.0	52 30.0	1.0	01	00.0	51 30.0	1.0	01	00.0	50 30.0	1.0	01	00.0	49 00.0	1.0	01	00.0	00
1	56 59.3	1.0	03	01.3	55 59.4	1.0	03	01.2	54 29.4	1.0	03	01.1	53 29.4	1.0	03	01.1	52 29.5	1.0	03	01.0	51 29.5	1.0	03	01.0	50 29.5	1.0	02	01.0	48 59.5	1.0	02	00.9	1
2	56 57.4	1.0	05	02.5	55 57.5	1.0	05	02.4	54 27.7	1.0	05	02.3	53 27.8	1.0	05	02.2	52 27.9	1.0	04	02.1	51 28.0	1.0	04	02.0	50 28.0	1.0	04	01.9	48 58.2	1.0	04	01.8	2
3	56 54.2	1.0	08	03.8	55 54.4	1.0	07	03.7	54 24.8	1.0	07	03.4	53 25.0	1.0	06	03.3	52 25.2	1.0	06	03.1	51 25.4	1.0	06	03.0	50 25.6	1.0	06	02.9	48 55.9	1.0	05	02.7	3
4	56 49.6	99	10	05.1	55 50.1	99	09	04.9	54 20.7	99	09	04.5	53 21.1	99	08	04.4	52 21.5	99	08	04.2	51 21.9	99	08	04.0	50 22.2	99	07	03.8	48 52.7	99	07	03.6	4
05	56 43.8	99	12	06.3	55 44.5	99	11	06.1	54 15.5	99	11	05.7	53 16.1	99	10	05.4	52 16.7	99	10	05.2	51 17.3	99	09	05.0	50 17.8	99	09	04.8	48 48.6	99	08	04.5	05
6	56 36.7	98	14	07.6	55 37.7	98	13	07.3	54 09.2	98	12	06.8	53 10.0	99	12	06.5	52 10.9	99	11	06.2	51 11.7	99	11	06.0	50 12.5	99	10	05.7	48 43.6	99	10	05.3	6
7	56 28.4	98	16	08.8	55 29.7	98	15	08.4	54 01.7	98	14	07.9	53 02.9	98	14	07.6	52 04.0	98	13	07.2	51 05.1	98	13	06.9	50 06.2	98	12	06.6	48 37.7	98	11	06.2	7
8	56 18.8	97	18	10.0	55 20.6	97	17	09.6	53 53.1	97	16	09.0	52 54.7	97	15	08.6	51 56.2	98	15	08.3	50 57.6	98	14	07.9	49 59.0	98	14	07.6	48 30.9	98	13	07.1	8
9	56 08.0	96	20	11.2	55 10.2	96	19	10.8	53 43.4	97	18	10.1	52 45.4	97	17	09.7	51 47.3	97	16	09.3	50 49.1	97	16	08.9	49 50.8	97	15	08.5	48 23.3	97	14	08.0	9
10	55 56.0	96	22	12.4	54 58.7	96	21	11.9	53 32.6	96	20	11.2	52 35.0	96	19	10.7	51 37.4	96	18	10.2	50 39.6	96	17	09.8	49 41.7	97	17	09.4	48 14.7	97	16	08.8	10
1	55 42.8	94	24	13.6	54 46.1	95	23	13.0	53 20.8	95	22	12.2	52 23.7	95	21	11.7	51 26.5	96	20	11.2	50 29.1	96	19	10.8	49 31.7	96	18	10.3	48 05.4	96	17	09.7	1
2	55 28.5	93	26	14.8	54 32.4	94	25	14.1	53 07.8	94	23	13.3	52 11.3	94	22	12.7	51 14.6	95	21	12.2	50 17.8	95	20	11.7	49 20.8	95	20	11.2	47 55.1	95	18	10.5	2
3	55 13.0	92	28	15.9	54 17.5	93	26	15.2	52 53.9	93	25	14.3	51 57.9	93	24	13.7	51 01.8	94	23	13.2	50 05.4	94	22	12.6	49 09.0	94	21	12.1	47 44.0	95	20	11.3	3
4	54 56.5	91	29	17.0	54 01.6	92	28	16.3	52 39.0	92	27	15.3	51 43.6	92	26	14.7	50 48.0	93	24	14.1	49 52.2	93	24	13.5	48 56.3	93	23	13.0	47 32.1	94	21	12.2	4
15	54 38.8	90	31	18.1	53 44.7	90	30	17.4	52 23.0	91	28	16.3	51 28.3	91	27	15.7	50 33.3	92	26	15.0	49 38.1	92	25	14.4	48 42.8	92	24	13.8	47 19.4	93	23	13.0	15
6	54 20.2	89	33	19.2	53 26.8	89	32	18.4	52 06.1	90	30	17.3	51 12.0	90	29	16.6	50 17.7	91	27	15.9	49 23.2	91	26	15.3	48 28.4	91	25	14.7	47 05.9	92	24	13.8	6
7	54 00.5	87	34	20.2	53 07.8	88	33	19.4	51 48.3	89	31	18.3	50 54.9	89	30	17.5	50 01.2	90	29	16.8	49 07.3	90	28	16.1	48 13.2	90	27	15.5	46 51.6	91	25	14.6	7
8	53 39.8	86	36	21.2	52 47.9	87	35	20.4	51 29.5	88	33	19.2	50 36.8	88	32	18.4	49 43.9	88	30	17.7	48 50.6	89	29	17.0	47 57.2	89	28	16.3	46 36.5	90	26	15.3	8
9	53 18.1	85	38	22.2	52 27.1	85	36	21.4	51 09.8	86	34	20.1	50 17.9	87	33	19.3	49 25.7	87	32	18.6	48 33.1	88	30	17.8	47 40.4	88	29	17.1	46 20.7	89	28	16.1	9
20	52 55.5	83	39	23.2	52 05.3	84	38	22.3	50 49.3	85	36	21.0	49 58.1	86	34	20.2	49 06.6	86	33	19.4	48 14.8	87	32	18.6	47 22.8	87	31	17.9	46 04.1	88	29	16.8	20
1	52 32.0	82	41	24.2	51 42.7	83	39	23.2	50 27.9	84	37	21.9	49 37.5	84	36	21.1	48 46.8	85	34	20.2	47 55.8	85	33	19.4	47 04.4	86	32	18.7	45 46.8	87	30	17.6	1
2	52 07.7	80	42	25.1	51 19.2	81	40	24.1	50 05.7	82	38	22.8	49 16.1	83	37	21.9	48 26.2	84	36	21.0	47 35.9	84	34	20.2	46 45.3	85	33	19.4	45 28.8	85	31	18.3	2
3	51 42.5	79	43	26.0	50 54.9	80	42	25.0	49 42.6	81	40	23.6	48 53.9	82	38	22.7	48 04.8	82	37	21.8	47 15.3	83	36	21.0	46 25.5	83	34	20.2	45 10.1	84	32	19.0	3
4	51 16.5	77	45	26.8	50 29.8	78	43	25.9	49 18.9	79	41	24.4	48 31.0	80	39	23.5	47 42.7	81	38	22.6	46 54.0	81	37	21.8	46 05.0	82	35	20.9	44 50.7	83	33	19.7	4
25	50 49.7	76	46	27.7	50 03.9	77	44	26.7	48 54.3	78	42	25.2	48 07.3	79	41	24.3	47 19.9	79	39	23.4	46 32.0	80	38	22.5	45 43.8	81	36	21.6	44 30.7	82	34	20.4	25
6	50 22.1	74	47	28.5	49 37.3	75	46	27.5	48 29.1	76	43	26.0	47 42.9	77	42	25.0	46 56.3	78	40	24.1	46 09.3	79	39	23.2	45 21.9	79	38	22.3	44 10.0	80	36	21.1	6
7	49 53.9	73	48	29.3	49 10.0	74	47	28.3	48 03.1	75	44	26.7	47 17.9	76	43	25.8	46 32.1	77	41	24.8	45 46.0	77	40	23.9	44 59.4	78	39	23.0	43 48.7	79	37	21.7	7
8	49 24.9	71	49	30.1	48 41.9	72	48	29.0	47 36.4	73	46	27.5	46 52.1	74	44	26.5	46 07.3	75	42	25.5	45 22.0	76	41	24.6	44 36.2	77	40	23.7	43 26.8	78	38	22.3	8
9	48 55.3	70	50	30.8	48 13.3	71	49	29.8	47 09.1	72	47	28.2	46 25.7	73	45	27.2	45 41.8	74	44	26.2	44 57.3	74	42	25.2	44 12.4	75	41	24.3	43 04.2	76	38	23.0	9
30	48 25.0	68	51	31.6	47 43.9	69	50	30.5	46 41.2	70	48	28.9	45 58.7	71	46	27.9	45 15.7	72	44	26.9	44 32.1	73	43	25.9	43 48.1	74	42	24.9	42 41.2	75	39	23.6	30
1	47 54.1	66	52	32.3	47 14.0	67	51	31.2	46 12.7	69	49	29.5	45 31.1	70	47	28.5	44 48.9	71	45	27.5	44 06.3	72	44	26.5	43 23.1	72	42	25.6	42 17.5	73	40	24.2	1
2	47 22.6	65	53	32.9	46 43.5	66	52	31.8	45 43.6	67	49	30.2	45 02.9	68	48	29.2	44 21.7	69	46	28.1	43 39.9	70	45	27.1	42 57.6	71	43	26.2	41 53.3	72	41	24.7	2
3	46 50.5	63	54	33.6	46 12.4	64	53	32.5	45 13.9	66	50	30.8	44 34.1	67	49	29.8	43 53.8	68	47	28.7	43 13.0	69	46	27.7	42 31.6	69	44	26.7	41 28.6	71	42	25.3	3
4	46 17.9	61	55	34.2	45 40.7	63	54	33.1	44 43.6	64	51	31.4	44 04.8	65	50	30.4	43 25.5	66	48	29.3	42 45.5	67	47	28.3	42 05.0	68	45	27.3	41 03 4	69	43	25.8	4
35	45 44.8	60	56	34.8	45 08.5	61	54	33.7	44 12.9	63	52	32.0	43 35.0	64	51	30.9	42 56.6	65	49	29.9	42 17.5	66	47	28.9	41 38.0	66	46	27.9	40 37.6	68	44	26.4	35
6	45 11.2	58	57	35.4	44 35.9	59	55	34.3	43 41.7	61	53	32.6	43 04.7	62	51	31.5	42 27.2	63	50	30.4	41 49.1	64	48	29.4	41 10.4	65	47	28.4	40 11.4	66	44	26.9	6
7	44 37.1	57	58	36.0	44 02.7	58	56	34.8	43 09.9	59	54	33.1	42 33.9	61	52	32.1	41 57.3	62	51	31.0	41 20.1	62	49	29.9	40 42.4	63	47	28.9	39 44.8	65	45	27.4	7
8	44 02.5	55	58	36.5	43 29.1	56	57	35.4	42 37.7	58	54	33.7	42 02.7	59	53	32.6	41 27.0	60	51	31.5	40 50.7	61	50	30.4	40 13.9	62	48	29.4	39 17.6	63	46	27.9	8
9	43 27.5	54	59	37.0	42 55.1	55	57	35.9	42 05.1	56	55	34.2	41 31.0	57	54	33.1	40 56.2	58	52	32.0	40 20.9	59	50	30.9	39 45.0	60	49	29.9	38 50.1	62	47	28.4	9
40	42 52.1	52	60	37.5	42 20.6	53	58	36.4	41 32.0	55	56	34.7	40 58.9	56	54	33.6	40 25.1	57	53	32.5	39 50.6	58	51	31.4	39 15.7	59	50	30.4	38 22.1	60	47	28.8	40
1	42 16.3	50	60	38.0	41 45.7	52	59	36.9	40 58.6	53	56	35.2	40 26.3	54	55	34.0	39 53.5	56	53	32.9	39 20.0	56	52	31.9	38 45.9	57	50	30.8	37 53.7	59	48	29.3	1
2	41 40.1	49	61	38.5	41 10.5	50	59	37.3	40 24.7	52	57	35.6	39 53.4	53	56	34.5	39 21.5	54	54	33.4	38 48.9	55	52	32.3	38 15.8	56	51	31.3	37 25.0	57	49	29.7	2
3	41 03.5	47	62	38.9	40 34.8	48	60	37.8	39 50.5	50	58	36.1	39 20.1	51	56	34.9	38 49.1	52	55	33.8	38 17.5	53	53	32.7	37 45.2	54	51	31.7	36 55.8	56	49	30.1	3
4	40 26.6	46	62	39.4	39 58.9	47	61	38.2	39 15.9	49	58	36.5	38 46.5	50	57	35.4	38 16.4	51	55	34.3	37 45.7	52	54	33.2	37 14.4	53	52	32.1	36 26.4	54	50	30.5	4
45	39 49.4	44	63	39.8	39 22.6	45	61	38.6	38 41.0	47	59	36.9	38 12.5	48	57	35.8	37 43.3	49	56	34.7	37 13.5	50	54	33.6	36 43.1	51	53	32.5	35 56.5	53	50	30.9	45
6	39 11.9	43	63	40.2	38 45.9	44	62	39.0	38 05.7	45	59	37.3	37 38.1	47	58	36.2	37 09.9	48	56	35.0	36 41.0	49	55	33.9	36 11.6	50	53	32.9	35 26.3	51	51	31.3	6
7	38 34.0	41	64	40.5	38 09.0	42	62	39.4	37 30.2	44	60	37.7	37 03.5	45	58	36.5	36 36.2	46	57	35.4	36 08.2	47	55	34.3	35 39.7	48	54	33.2	34 55.8	49	51	31.6	7
8	37 55.9	40	64	40.9	37 31.8	41	62	39.7	36 54.3	42	60	38.0	36 28.5	43	59	36.9	36 02.1	45	57	35.8	35 35.1	46	56	34.7	35 07.5	46	54	33.6	34 25.0	48	52	32.0	8
9	37 17.5	38	64	41.2	36 54.3	39	63	40.1	36 18.2	41	61	38.4	35 53.3	42	59	37.2	35 27.8	43	58	36.1	35 01.7	44	56	35.0	34 35.0	45	55	33.9	33 53.9	46	52	32.3	9
50	36 38.8	37	65	41.5	36 16.5	38	63	40.4	35 41.8	39	61	38.7	35 17.8	40	60	37.6	34 53.2	41	58	36.4	34 28.0	42	57	35.3	34 02.3	43	55	34.2	33 22.5	45	53	32.6	50
1	36 00.0	35	65	41.9	35 38.5	36	64	40.7	35 05.1	38	62	39.0	34 42.0	39	60	37.9	34 18.4	40	58	36.8	33 54.1	41	57	35.7	33 29.2	42	55	34.6	32 50.9	43	53	32.9	1
2	35 20.8	34	66	42.2	35 00.3	35	64	41.0	34 28.2	36	62	39.3	34 06.0	37	60	38.2	33 43.3	38	59	37.1	33 19.9	39	57	36.0	32 56.0	40	56	34.9	32 19.0	42	54	33.2	2
3	34 41.5	32	66	42.4	34 21.8	33	64	41.3	33 51.0	35	62	39.6	33 29.8	36	61	38.5	33 07.9	37	59	37.3	32 45.5	38	58	36.2	32 22.4	39	56	35.1	31 46.8	40	54	33.5	3
4	34 01.9	31	66	42.7	33 43.1	32	65	41.6	33 13.7	33	63	39.9	32 53.3	34	61	38.7	32 32.3	35	60	37.6	32 10.8	36	58	36.5	31 48.6	37	57	35.4	31 14.4	39	54	33.8	4
55	33 22.2	29	67	43.0	33 04.2	30	65	41.8	32 36.1	32	63	40.1	32 16.6	33	61	39.0	31 56.5	34	60	37.9	31 35.9	35	58	36.8	31 14.7	36	57	35.7	30 41.8	37	55	34.1	55
6	32 42.3	28	67	43.2	32 25.2	29	65	42.1	31 58.4	31	63	40.4	31 39.7	32	62	39.2	31 20.5	32	60	38.1	31 00.8	33	59	37.0	30 40.5	34	57	35.9	30 08.9	36	55	34.3	6
7	32 02.2	27	67	43.4	31 45.9	28	66	42.3	31 20.4	29	64	40.6	31 02.7	30	62	39.5	30 44.4	31	61	38.4	30 25.5	32	59	37.3	30 06.0	33	58	36.2	29 35.9	34	55	34.5	7
8	31 21.9	25	67	43.6	31 06.5	26	66	42.5	30 42.3	28	64	40.8	30 25.4	29	62	39.7	30 08.0	30	61	38.6	29 50.0	30	59	37.5	29 31.5	31	58	36.4	29 02.7	33	56	34.8	8
9	30 41.5	24	68	43.8	30 26.9	25	66	42.7	30 04.0	26	64	41.0	29 48.0	27	63	39.9	29 31.4	28	61	38.8	29 14.3	29	60	37.7	28 56.7	30	58	36.6	28 29.2	31	56	35.0	9
60	30 01.0	22	68	44.0	29 47.2	23	66	42.9	29 25.6	25	64	41.2	29 10.4	26	63	40.1	28 54.7	27	61	39.0	28 38.5	27	60	37.9	28 21.7	28	58	36.8	27 55.6	30	56	35.2	60
1	29 20.3	21	68	44.2	29 07.4	22	67	43.1	28 47.0	23	65	41.4	28 32.7	24	63	40.3	28 17.9	25	62	39.2	28 02.5	26	60	38.1	27 46.6	27	59	37.0	27 21.9	28	57	35.4	1
2	28 39.5	20	68	44.3	28 27.4	21	67	43.2	28 08.2	22	65	41.6	27 54.8	23	63	40.5	27 40.8	24	62	39.4	27 26.4	25	60	38.3	27 11.4	25	59	37.2	26 48.0	27	57	35.6	2
3	27 58.6	18	68	44.5	27 47.3	19	67	43.4	27 29.4	21	65	41.7	27 16.8	21	64	40.6	27 03.7	22	62	39.5	26 50.1	23	61	38.4	26 36.0	24	59	37.3	26 13.9	25	57	35.7	3
4	27 17.5	17	69	44.6	27 07.1	18	67	43.5	26 50.4	19	65	41.9	26 38.7	20	64	40.8	26 26.4	21	62	39.7	26 13.7	22	61	38.6	26 00.5	22	59	37.5	25 39.7	24	57	35.9	4
65	26 36.4	16	69	44.8	26 26.8	17	67	43.7	26 11.4	18	65	42.0	26 00.4	19	64	40.9	25 49.1	19	62	39.8	25 37.2	20	61	38.7	25 24.8	21	60	37.6	25 05.4	22	57	36.0	65
6	25 55.2	14	69	44.9	25 46.4	15	67	43.8	25 32.2	16	65	42.1	25 22.1	17	64	41.0	25 11.6	18	63	40.0	25 00.5	19	61	38.9	24 49.0	20	60	37.8	24 30.9	21	58	36.2	6
7	25 13.9	13	69	45.0	25 05.9	14	68	43.9	24 52.9	15	66	42.2	24 43.7	16	64	41.2	24 34.0	17	63	40.1	24 23.8	17	61	39.0	24 13.2	18	60	37.9	23 56.4	19	58	36.3	7
8	24 32.6	12	69	45.1	24 25.3	12	68	44.0	24 13.6	14	66	42.4	24 05.2	14	64	41.3	23 56.3	15	63	40.2	23 47.0	16	62	39.1	23 37.2	17	60	38.0	23 21.7	18	58	36.4	8
9	23 51.1	10	69	45.2	23 44.7	11	68	44.1	23 34.1	12	66	42.4	23 26.6	13	64	41.4	23 18.5	14	63	40.3	23 10.0	14	62	39.2	23 01.1	15	60	38.1	22 46.9	16	58	36.5	9
70	23 09.7	09	69	45.2	23 04.0	10	68	44.2	22 54.7	11	66	42.5	22 47.9	12	65	41.5	22 40.7	12	63	40.4	22 33.1	13	62	39.3	22 25.0	14	60	38.2	22 12.1	15	58	36.6	70
1	22 28.1	08	69	45.3	22 23.2	08	68	44.2	22 15.1	10	66	42.6	22 09.2	10	65	41.5	22 02.8	11	63	40.5	21 56.0	12	62	39.4	21 48.8	12	60	38.3	21 37.2	13	58	36.7	1
2	21 46.5	06	69	45.4	21 42.4	07	68	44.3	21 35.5	08	66	42.7	21 30.4	09	65	41.6	21 24.8	10	63	40.5	21 18.9	10	62	39.5	21 12.5	11	61	38.4	21 02.2	12	58	36.8	2
3	21 04.9	05	69	45.4	21 01.6	06	68	44.3	20 55.9	07	66	42.7	20 51.5	08	65	41.7	20 46.8	08	63	40.6	20 41.7	09	62	39.5	20 36.2	10	61	38.5	20 27.2	10	58	36.9	3
4	20 23.3	04	69	45.4	20 20.7	05	68	44.4	20 16.2	06	66	42.8	20 12.7	06	65	41.7	20 08.8	07	63	40.6	20 04.5	07	62	39.6	19 59.8	08	61	38.5	19 52.1	09	59	36.9	4
75	19 41.6	03	69	45.5	19 39.9	03	68	44.4	19 36.5	04	66	42.8	19 33.8	05	65	41.7	19 30.7	05	64	40.7	19 27.2	06	62	39.6	19 23.4	07	61	38.6	19 16.9	08	59	37.0	75
6	19 00.0	01	69	45.5	18 59.0	02	68	44.4	18 56.7	03	66	42.8	18 54.8	04	65	41.8	18 52.5	04	64	40.7	18 49.9	05	62	39.7	18 46.9	05	61	38.6	18 41.7	06	59	37.0	6
7	18 18.3	00	69	45 5	18 18.0	01	68	44.4	18 17.0	02	66	42.8	18 15.9	02	65	41.8	18 14.4	03	64	40.7	18 12.6	03	62	39.7	18 10.4	04	61	38.6	18 06.5	05	59	37.1	7
8	17 36.6	01	69	45.5	17 37.1	01	68	44.4	17 37.2	00	66	42.8	17 36.9	01	65	41.8	17 36.2	01	64	40.7	17 35.2	02	62	39.7	17 33.9	02	61	38.7	17 31.3	03	59	37.1	8
9	16 54.9	02	69	45.5	16 56.2	02	68	44.4	16 57.5	01	66	42.8	16 57.9	00	65	41.8	16 58.1	00	64	40.8	16 57.9	01	62	39.7	16 57.4	01	61	38.7	16 56.0	02	59	37.1	9
80	16 13.3	04	69	45.4	16 15.3	03	68	44.4	16 17.7	02	66	42.8	16 19.0	02	65	41.8	16 19.9	01	64	40.7	16 20.5	01	62	39.7	16 20.9	00	61	38.7	16 20.8	00	59	37.1	80
1	15 31.6	05	69	45.4	15 34.4	04	68	44.4	15 38.0	04	66	42.8	15 40.0	03	65	41.8	15 41.8	03	64	40.7	15 43.2	02	62	39.7	15 44.3	02	61	38.7	15 45.5	01	59	37.1	1
2	14 50.0	06	69	45.4	14 53.5	06	68	44.3	14 58.3	05	66	42.8	15 01.1	04	65	41.7	15 03.6	04	64	40.7	15 05.9	04	62	39.7	15 07.8	03	61	38.6	15 10.2	02	59	37.1	2
3	14 08.4	07	69	45.3	14 12.7	07	68	44.3	14 18.6	06	66	42.7	14 22.2	06	65	41.7	14 25.5	05	63	40.7	14 28.5	05	62	39.7	14 31.3	04	61	38.6	14 35.0	04	59	37.1	3
4	13 26.9	09	69	45.3	13 31.9	08	68	44.2	13 38.9	07	66	42.7	13 43.3	07	65	41.7	13 47.4	07	63	40.6	13 51.2	06	62	39.6	13 54.8	06	61	38.6	13 59.8	05	59	37.0	4
85	12 45.4	10	69	45.2	12 51.1	09	68	44.2	12 59.3	09	66	42.6	13 04.4	08	65	41.6	13 09.3	08	63	40.6	13 14.0	08	62	39.6	13 18.4	07	61	38.5	13 24.6	07	59	37.0	85
6	12 03.9	11	69	45.1	12 10.4	11	68	44.1	12 19.7	10	66	42.6	12 25.6	10	65	41.6	12 31.3	09	63	40.5	12 36.8	09	62	39.5	12 42.0	09	61	38.5	12 49.4	08	59	37.0	6
7	11 22.5	12	69	45.0	11 29.8	12	68	44.0	11 40.2	11	66	42.5	11 46.9	11	64	41.5	11 53.3	11	63	40.5	11 59.6	10	62	39.5	12 05.6	10	61	38.4	12 14.2	09	58	36.9	7
8	10 41.2	13	69	45.0	10 49.2	13	68	43.9	11 00.7	13	66	42.4	11 08.2	12	64	41.4	11 15.4	12	63	40.4	11 22.5	12	62	39.4	11 29.3	11	60	38.4	11 39.2	11	58	36.9	8
9	9 59.9	15	69	44.9	10 08.6	14	67	43.8	10 21.3	14	66	42.3	10 29.5	14	64	41.3	10 37.5	13	63	40.3	10 45.4	13	62	39.3	10 53.0	13	60	38.3	11 04.1	12	58	36.8	9
90	9 18.7	16	68	44.7	9 28.2	16	67	43.7	9 42.0	15	65	42.2	9 50.9	15	64	41.2	9 59.8	15	63	40.2	10 08.4	14	62	39.2	10 16.8	14	60	38.2	10 29.1	13	58	36.7	90

16—8472

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	31 00.0	1.0 01	180.0	30 00.0	1.0 01	180.0	28 30.0	1.0 01	180.0	27 30.0	1.0 01	180.0	26 30.0	1.0 01	180.0	25 30.0	1.0 01	180.0	24 30.0	1.0 01	180.0	23 00.0	1.0 01	180.0	00
1	30 59.6	1.0 02	179.2	29 59.6	1.0 02	179.2	28 29.6	1.0 02	179.2	27 29.6	1.0 02	179.3	26 29.6	1.0 02	179.3	25 29.6	1.0 02	179.3	24 29.7	1.0 02	179.3	22 59.7	1.0 02	179.4	1
2	30 58.3	1.0 03	178.4	29 58.4	1.0 03	178.4	28 28.5	1.0 03	178.5	27 28.5	1.0 03	178.5	26 28.5	1.0 03	178.6	25 28.6	1.0 03	178.6	24 28.6	1.0 03	178.7	22 58.7	1.0 03	178.7	2
3	30 56.3	1.0 05	177.6	29 56.4	1.0 05	177.6	28 26.5	1.0 04	177.7	27 26.6	1.0 04	177.8	26 26.7	1.0 04	177.9	25 26.8	1.0 04	177.9	24 26.9	1.0 04	178.0	22 57.1	1.0 04	178.1	3
4	30 53.4	1.0 06	176.8	29 53.6	1.0 06	176.9	28 23.9	1.0 06	177.0	27 24.0	1.0 06	177.1	26 24.2	1.0 05	177.2	25 24.4	1.0 05	177.2	24 24.5	1.0 05	177.3	22 54.8	1.0 05	177.4	4
05	30 49.7	1.0 08	176.0	29 50.0	1.0 07	176.1	28 20.4	1.0 07	176.2	27 20.7	1.0 07	176.3	26 20.9	1.0 07	176.5	25 21.2	1.0 06	176.6	24 21.5	1.0 06	176.7	22 51.9	1.0 06	176.8	05
6	30 45.1	99 09	175.2	29 45.6	99 09	175.3	28 16.2	99 08	175.5	27 16.6	99 08	175.6	26 17.0	99 08	175.7	25 17.4	99 08	175.9	24 17.7	99 07	176.0	22 48.3	99 07	176.2	6
7	30 39.8	99 10	174.4	29 40.4	99 10	174.5	28 11.2	99 10	174.7	27 11.7	99 09	174.9	26 12.3	99 09	175.0	25 12.8	99 09	175.2	24 13.3	99 08	175.3	22 44.1	99 08	175.5	7
8	30 33.6	99 12	173.6	29 34.4	99 11	173.7	28 05.5	99 11	174.0	27 06.2	99 10	174.2	26 06.9	99 10	174.3	25 07.6	99 10	174.5	24 08.2	99 10	174.7	22 39.2	99 09	174.9	8
9	30 26.7	98 13	172.8	29 27.6	98 13	173.0	27 59.0	98 12	173.3	26 59.9	99 12	173.5	26 00.8	99 11	173.6	25 01.6	99 11	173.8	24 02.5	99 11	174.0	22 33.7	99 10	174.3	9
10	30 18.9	98 14	172.0	29 20.1	98 14	172.2	27 51.7	98 13	172.5	26 52.8	98 13	172.7	25 53.9	98 13	172.9	24 55.0	98 12	173.2	23 56.0	98 12	173.4	22 27.6	98 11	173.7	10
1	30 10.3	98 16	171.2	29 11.7	98 15	171.4	27 43.8	98 15	171.8	26 45.1	98 14	172.0	25 46.4	98 14	172.3	24 47.7	98 13	172.5	23 48.9	98 13	172.7	22 20.8	98 12	173.0	1
2	30 01.0	97 17	170.4	29 02.6	97 16	170.7	27 35.0	97 16	171.1	26 36.6	97 15	171.3	25 38.2	97 15	171.6	24 39.7	97 14	171.8	23 41.2	98 14	172.1	22 13.4	98 13	172.4	2
3	29 50.8	97 18	169.6	28 52.8	97 18	169.9	27 25.6	97 17	170.3	26 27.4	97 16	170.6	25 29.2	97 16	170.9	24 31.0	97 16	171.1	23 32.8	97 15	171.4	22 05.4	97 14	171.8	3
4	29 39.9	96 19	168.8	28 42.1	96 19	169.2	27 15.4	96 18	169.6	26 17.5	96 18	169.9	25 19.6	97 17	170.2	24 21.7	97 17	170.5	23 23.7	[illegible] 16	170.8	21 56.7	97 15	171.2	4
15	29 28.2	96 21	168.1	28 30.8	96 20	168.4	27 04.5	96 19	168.9	26 06.9	96 19	169.2	25 09.3	96 18	169.5	24 11.7	96 18	169.8	23 14.0	96 17	170.1	21 47.4	96 16	170.6	15
6	29 15.8	95 22	167.3	28 18.7	95 21	167.7	26 52.9	95 21	168.2	25 55.7	95 20	168.5	24 58.4	96 19	168.8	24 01.0	96 19	169.2	23 03.7	96 18	169.5	21 37.6	96 17	170.0	6
7	29 02.6	95 23	166.6	28 05.8	95 23	166.9	26 40.6	95 22	167.5	25 43.7	96 21	167.8	24 46.7	95 21	168.2	23 49.7	96 20	168.5	22 52.7	96 19	168.9	21 27.1	95 18	169.4	7
8	28 48.6	94 24	165.8	27 52.2	94 24	166.2	26 27.5	94 23	166.8	25 31.0	94 22	167.2	24 34.4	94 22	167.5	23 37.8	94 21	167.9	22 41.1	95 20	168.2	21 16.0	95 19	168.8	8
9	28 33.9	93 26	165.1	27 37.9	93 25	165.5	26 13.8	94 24	166.1	25 17.7	94 23	166.5	24 21.5	94 23	166.9	23 25.2	94 22	167.2	22 28.9	94 21	167.6	21 04.3	94 20	168.2	9
20	28 18.5	93 27	164.3	27 22.9	93 26	164.8	25 59.4	93 25	165.4	25 03.7	93 24	165.8	24 07.8	93 24	166.2	23 12.0	93 23	166.6	22 16.0	93 22	167.0	20 52.0	93 21	167.6	20
1	28 02.4	92 28	163.6	27 07.2	92 27	164.1	25 44.4	92 26	164.7	24 49.0	92 26	165.1	23 53.6	92 25	165.6	22 58.1	93 24	166.0	22 02.6	93 23	166.4	20 39.1	93 22	167.0	1
2	27 45.5	91 29	162.9	26 50.8	91 28	163.4	25 28.6	91 27	164.0	24 33.7	92 27	164.5	23 38.7	92 26	164.9	22 43.6	92 25	165.4	21 48.5	92 24	165.8	20 25.7	92 23	166.4	2
3	27 28.0	90 30	162.2	26 33.8	90 30	162.7	25 12.2	91 28	163.4	24 17.7	91 28	163.8	23 23.2	91 27	164.3	22 28.5	91 26	164.7	21 33.8	91 25	165.2	20 11.7	91 24	165.8	3
4	27 09.8	90 32	161.5	26 16.0	90 31	162.0	24 55.2	90 29	162.7	24 01.1	90 29	163.2	23 07.0	90 28	163.7	22 12.9	90 27	164.1	21 18.6	91 26	164.6	19 57.1	91 25	165.3	4
25	26 50.9	89 33	160.8	25 57.6	89 32	161.3	24 37.5	89 31	162.1	23 43.9	89 30	162.6	22 50.3	89 29	163.0	21 56.6	90 28	163.5	21 02.8	90 27	164.0	19 41.9	90 26	164.7	25
6	26 31.3	88 34	160.1	25 38.5	88 33	160.6	24 19.1	88 32	161.4	23 26.1	89 31	161.9	22 32.9	89 30	162.4	21 39.7	89 29	162.9	20 46.4	89 28	163.4	19 26.2	89 27	164.1	6
7	26 11.1	87 35	159.4	25 18.8	87 34	160.0	24 00.2	87 33	160.8	23 07.6	88 32	161.3	22 15.0	88 31	161.8	21 22.2	88 30	162.3	20 29.4	88 29	162.8	19 10.0	88 28	163.6	7
8	25 50.2	86 36	158.8	24 58.5	86 35	159.3	23 40.6	87 34	160.1	22 48.6	87 33	160.7	21 56.5	87 32	161.2	21 04.2	87 31	161.7	20 11.9	87 30	162.3	18 53.2	88 29	163.0	8
9	25 28.7	85 37	158.1	24 37.5	85 36	158.7	23 20.5	86 35	159.5	22 29.0	86 34	160.1	21 37.4	86 33	160.6	20 45.6	86 32	161.2	19 53.8	86 31	161.7	18 35.9	87 30	162.5	9
30	25 06.6	84 38	157.4	24 16.0	85 37	158.0	22 59.7	85 36	158.9	22 08.8	85 35	159.5	21 17.7	85 34	160.0	20 26.5	85 33	160.6	19 35.2	86 32	161.2	18 18.0	86 31	162.0	30
1	24 43.9	83 39	156.8	23 53.8	84 38	157.4	22 38.4	84 36	158.3	21 48.0	84 36	158.9	20 57.4	84 35	159.5	20 06.8	85 34	160.0	19 16.0	85 33	160.6	17 59.7	85 31	161.4	1
2	24 20.5	82 40	156.2	23 31.0	83 39	156.8	22 16.5	83 37	157.7	21 26.6	83 36	158.3	20 36.7	83 36	158.9	19 46.6	84 35	159.5	18 56.3	84 34	160.1	17 40.8	84 32	160.9	2
3	23 56.6	81 41	155.5	23 07.7	82 40	156.2	21 54.0	82 38	157.1	21 04.8	82 37	157.7	20 15.3	82 36	158.3	19 25.8	83 35	158.9	18 36.1	83 35	159.5	17 21.5	83 33	160.4	3
4	23 32.1	80 42	154.9	22 43.8	81 41	155.6	21 31.0	81 39	156.5	20 42.3	81 38	157.2	19 53.5	82 37	157.8	19 04.5	82 36	158.4	18 15.4	82 35	159.0	17 01.6	82 34	159.9	4
35	23 07.1	79 43	154.3	22 19.4	80 42	155.0	21 07.5	80 40	156.0	20 19.4	80 39	156.6	19 31.1	81 38	157.2	18 42.7	81 37	157.9	17 54.2	81 36	158.5	16 41.3	81 35	159.4	35
6	22 41.5	78 44	153.7	21 54.4	79 43	154.4	20 43.4	79 41	155.4	19 55.9	79 40	156.0	19 08.2	90 39	156.7	18 20.4	80 38	157.3	17 32.5	80 37	158.0	16 20.5	80 35	158.9	6
7	22 15.4	77 44	153.1	21 28.8	78 43	153.8	20 18.8	78 42	154.8	19 31.9	78 41	155.5	18 44.8	79 40	156.2	17 57.7	79 39	156.8	17 10.4	79 38	157.5	15 59.2	79 36	158.4	7
8	21 48.7	76 45	152.6	21 02.8	77 44	153.3	19 53.7	77 43	154.3	19 07.4	77 42	155.0	18 21.0	77 41	155.6	17 34.4	78 40	156.3	16 47.7	78 39	157.0	15 37.4	78 37	157.9	8
9	21 21.5	75 46	152.0	20 36.2	76 45	152.7	19 28.1	76 44	153.8	18 42.4	76 42	154.4	17 56.6	76 41	155.1	17 10.7	77 40	155.8	16 24.6	77 39	156.5	15 15.2	77 38	157.5	9
40	20 53.8	74 47	151.4	20 09.2	74 46	152.2	19 02.0	75 44	153.2	18 16.9	75 43	153.9	17 31.8	75 42	154.6	16 46.5	76 41	155.3	16 01.0	76 40	156.0	14 52.6	76 38	157.0	40
1	20 25.6	73 48	150.9	19 41.7	73 47	151.6	18 35.4	74 45	152.7	17 51.0	74 44	153.4	17 06.5	74 43	154.1	16 21.8	75 42	154.8	15 37.0	75 41	155.5	14 29.5	75 39	156.5	1
2	19 56.9	72 49	150.4	19 13.6	72 47	151.1	18 08.3	73 46	152.2	17 24.6	73 45	152.9	16 40.7	73 44	153.6	15 56.7	74 43	154.3	15 12.5	74 42	155.0	14 06.0	74 40	156.1	2
3	19 27.8	71 49	149.8	18 45.1	71 48	150.6	17 40.8	72 47	151.7	16 57.8	72 46	152.4	16 14.5	72 44	153.1	15 31.2	72 43	153.9	14 47.6	73 42	154.6	13 42.1	73 41	155.6	3
4	18 58.2	70 50	149.3	18 16.2	70 49	150.1	17 12.9	71 47	151.2	16 30.5	71 46	151.9	15 47.9	71 45	152.7	15 05.2	71 44	153.4	14 22.3	72 43	154.1	13 17.8	72 41	155.2	4
45	18 28.1	69 51	148.8	17 46.8	69 50	149.6	16 44.5	69 48	150.7	16 02.7	70 47	151.5	15 20.8	70 46	152.2	14 38.8	70 45	152.9	13 56.6	70 44	153.7	12 53.1	71 42	154.8	45
6	17 57.6	68 52	148.3	17 17.0	68 50	149.1	16 15.7	68 49	150.2	15 34.6	69 48	151.0	14 53.4	69 46	151.7	14 12.0	69 45	152.5	13 30.5	69 44	153.2	12 27.9	70 43	154.3	6
7	17 26.7	66 52	147.8	16 46.7	67 51	148.6	15 46.4	67 49	149.8	15 06.0	67 48	150.5	14 25.5	68 47	151.3	13 44.8	68 46	152.1	13 03.9	68 45	152.8	12 02.4	68 43	153.9	7
8	16 55.4	65 53	147.3	16 16.1	66 52	148.1	15 16.8	66 50	149.3	14 37.1	66 49	150.1	13 57.2	67 48	150.9	13 17.2	67 47	151.6	12 37.0	67 46	152.4	11 36.6	67 44	153.5	8
9	16 23.6	64 54	146.9	15 45.0	65 52	147.7	14 46.8	65 51	148.9	14 07.7	65 50	149.6	13 28.5	65 48	150.4	12 49.2	66 47	151.2	12 09.7	66 46	152.0	11 10.3	66 44	153.1	9
50	15 51.5	63 54	146.4	15 13.6	63 53	147.2	14 16.3	64 51	148.4	13 38.0	64 50	149.2	12 59.5	64 49	150.0	12 20.9	65 48	150.8	11 42.1	65 47	151.6	10 43.7	65 45	152.7	50
1	15 19.0	62 55	146.0	14 41.7	62 54	146.8	13 45.5	63 52	148.0	13 07.9	63 51	148.8	12 30.1	63 50	149.6	11 52.1	63 48	150.4	11 14.1	64 47	151.2	10 16.7	64 46	152.3	1
2	14 46.0	61 55	145.5	14 09.5	61 54	146.3	13 14.3	61 53	147.6	12 37.4	62 51	148.4	12 00.3	62 50	149.2	11 23.1	62 49	150.0	10 45.7	62 48	150.8	9 49.4	63 46	152.0	2
3	14 12.8	60 56	145.1	13 36.9	60 55	145.9	12 42.8	60 53	147.1	12 06.6	61 52	148.0	11 30.2	61 51	148.8	10 53.6	61 50	149.6	10 17.0	61 48	150.4	9 21.8	61 47	151.6	3
4	13 39.1	58 57	144.7	13 04.0	59 55	145.5	12 10.9	59 54	146.7	11 35.4	59 53	147.6	10 59.7	60 51	148.4	10 23.9	60 50	149.2	9 47.9	60 49	150.0	8 53.8	60 47	151.2	4
55	13 05.2	57 57	144.3	12 30.7	58 56	145.1	11 38.7	58 54	146.3	11 03.8	58 53	147.2	10 28.9	58 52	148.0	9 53.8	59 51	148.8	9 18.5	59 50	149.6	8 25.5	59 48	150.9	55
6	12 30.8	56 58	143.8	11 57.1	56 57	144.7	11 06.1	57 55	146.0	10 32.0	57 54	146.8	9 57.7	57 52	147.6	9 23.3	57 51	148.5	8 48.8	58 50	149.3	7 56.9	58 48	150.5	6
7	11 56.2	55 58	143.5	11 23.1	55 57	144.3	10 33.2	56 55	145.6	9 59.8	56 54	146.4	9 26.3	56 53	147.3	8 52.6	56 52	148.1	8 18.8	56 51	148.9	7 28.0	57 49	150.2	7
8	11 21.2	54 59	143.1	10 48.8	54 58	143.9	10 00.0	54 56	145.2	9 27.3	55 55	146.1	8 54.5	55 53	146.9	8 21.6	55 52	147.8	7 48.5	55 51	148.6	6 58.7	55 49	149.9	8
9	10 45.9	53 59	142.7	10 14.3	53 58	143.6	9 26.5	53 56	144.8	8 54.5	53 55	145.7	8 22.4	54 54	146.6	7 50.2	54 53	147.4	7 17.9	54 52	148.3	6 29.2	54 50	149.5	9
60	10 10.3	51 60	142.3	9 39.4	52 59	143.2	8 52.7	52 57	144.5	8 21.4	52 56	145.4	7 50.1	52 54	146.2	7 18.6	53 53	147.1	6 47.0	53 52	147.9	5 59.5	53 50	149.2	60
1	9 34.5	50 60	142.0	9 04.2	51 59	142.8	8 18.6	51 57	144.1	7 48.1	51 56	145.0	7 17.4	51 55	145.9	6 46.7	51 54	146.8	6 15.8	51 52	147.6	5 29.4	52 51	148.9	1
2	8 58.3	49 61	141.6	8 28.8	49 60	142.5	7 44.2	50 58	143.8	7 14.4	50 57	144.7	6 44.5	50 55	145.6	6 14.5	50 54	146.4	5 44.4	50 53	147.3				2
3	8 21.9	48 61	141.3	7 53.0	48 60	142.2	7 09.6	48 58	143.5	6 40.5	49 57	144.4	6 11.3	49 56	145.2	5 42.0	49 55	146.1	5 12.7	49 53	147.0				3
4	7 45.2	47 62	140.9	7 17.0	47 60	141.8	6 34.7	47 59	143.2	6 06.3	47 57	144.1	5 37.8	47 56	144.9	5 09.3	48 55	145.8							4
65	7 08.2	46 62	140.6	6 40.8	46 61	141.5	5 59.5	46 59	142.9	5 31.8	46 58	143.7	5 04.1	46 56	144.6										65
6	6 31.0	44 62	140.3	6 04.3	45 61	141.2	5 24.1	45 59	142.6																6
7	5 53.5	43 63	140.0	5 27.5	43 62	140.9																			7
8	5 15.8	42 63	139.7																						8

DECLINATION SAME NAME AS LATITUDE

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	8 37.6	17 68	44.6	8 47.8	17 67	43.6	9 02.7	16 65	42.1	9 12.4	16 64	41.1	9 22.0	16 63	40.1	9 31.4	16 61	39.1	9 40.7	15 60	38.1	9 54.2	15 58	36.6	91
2	7 56.6	18 68	44.5	8 07.5	18 67	43.5	8 23.5	18 65	42.0	8 34.0	17 64	41.0	8 44.4	17 63	40.0	8 54.6	17 61	39.0	9 04.6	17 60	38.0	9 19.4	16 58	36.5	2
3	7 15.7	19 68	44.4	7 27.3	19 67	43.4	7 44.4	19 65	41.9	7 55.7	19 64	40.9	8 06.8	18 62	39.9	8 17.8	18 61	38.9	8 28.7	18 60	37.9	8 44.6	18 58	36.4	3
4	6 34.8	21 68	44.2	6 47.2	20 67	43.2	7 05.4	20 65	41.8	7 17.5	20 64	40.8	7 29.4	20 62	39.8	7 41.1	19 61	38.8	7 52.8	19 60	37.8	8 09.9	19 58	36.3	4
95	5 54.1	22 68	44.1	6 07.2	22 66	43.1	6 26.6	21 65	41.6	6 39.3	21 63	40.6	6 52.0	21 62	39.7	7 04.6	21 61	38.7	7 17.0	21 59	37.7	7 35.4	20 57	36.2	95
6	5 13.5	23 68	43.9	5 27.3	23 66	42.9	5 47.8	23 64	41.5	6 01.3	22 63	40.5	6 14.7	22 62	39.5	6 28.1	22 61	38.5	6 41.3	22 59	37.6	7 00.9	22 57	36.1	6
7							5 09.1	24 64	41.3	5 23.4	24 63	40.4	5 37.6	24 62	39.4	5 51.7	23 60	38.4	6 05.7	23 59	37.4	6 26.5	23 57	36.0	7
8													5 00.6	25 62	39.2	5 15.4	25 60	38.2	5 30.2	25 59	37.3	5 52.2	24 57	35.8	8
9																						5 18.1	26 57	35.7	9

Lat. 13°

H.A.	54° 30′				55° 00′				56° 00′				56° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	48 30.0	1.0	01	00.0	48 00.0	1.0	01	00.0	47 00.0	1.0	01	00.0	46 30.0	1.0	01	00.0
1	48 29.6	1.0	02	00.9	47 59.6	1.0	02	00.9	46 59.6	1.0	02	00.8	46 29.6	1.0	02	00.8
2	48 28.2	1.0	04	01.8	47 58.3	1.0	04	01.7	46 58.3	1.0	04	01.6	46 28.4	1.0	03	01.6
3	48 26.0	1.0	05	02.6	47 56.1	1.0	05	02.6	46 56.2	1.0	05	02.5	46 26.3	1.0	05	02.4
4	48 22.9	99	07	03.5	47 53.0	99	07	03.4	46 53.3	1.0	06	03.3	46 23.5	1.0	06	03.2
05	48 18.9	99	08	04.4	47 49.1	99	08	04.3	46 49.6	99	08	04.1	46 19.8	99	07	04.0
6	48 14.0	99	10	05.2	47 44.3	99	09	05.1	46 45.0	99	09	04.9	46 15.3	99	09	04.8
7	48 08.2	98	11	06.1	47 38.7	98	11	06.0	46 39.6	98	10	05.7	46 10.0	99	10	05.6
8	48 01.6	98	12	06.9	47 32.2	98	12	06.8	46 33.4	98	12	06.5	46 04.0	98	11	06.4
9	47 54.1	97	14	07.8	47 24.8	97	14	07.6	46 26.4	98	13	07.3	45 57.1	98	13	07.1
10	47 45.7	97	15	08.6	47 16.7	97	15	08.4	46 18.5	97	14	08.1	45 49.4	97	14	07.9
1	47 36.5	96	17	09.5	47 07.7	96	16	09.3	46 09.9	96	16	08.9	45 41.0	96	15	08.7
2	47 26.5	96	18	10.3	46 57.9	95	18	10.1	46 00.5	96	17	09.6	45 31.8	96	17	09.4
3	47 15.7	95	19	11.1	46 47.3	95	19	10.9	45 50.4	95	18	10.4	45 21.9	95	18	10.2
4	47 04.0	94	21	11.9	46 35.8	94	20	11.7	45 39.4	94	19	11.2	45 11.2	94	19	10.9
15	46 51.6	93	22	12.7	46 23.7	93	22	12.4	45 27.7	93	21	11.9	44 59.7	93	20	11.7
6	46 38.3	92	23	13.5	46 10.7	92	23	13.2	45 15.3	92	22	12.6	44 47.6	93	21	12.4
7	46 24.3	91	25	14.3	45 57.0	91	24	14.0	45 02.1	92	23	13.4	44 34.7	92	23	13.1
8	46 09.5	90	26	15.0	45 42.5	90	25	14.7	44 48.3	91	24	14.1	44 21.1	91	24	13.8
9	45 54.0	89	27	15.8	45 27.3	89	27	15.4	44 33.7	90	25	14.8	44 06.8	90	25	14.5
20	45 37.8	88	28	16.5	45 11.4	88	28	16.2	44 18.4	88	27	15.5	43 51.8	89	26	15.2
1	45 20.8	87	29	17.2	44 54.7	87	29	16.9	44 02.4	87	28	16.2	43 36.2	88	27	15.9
2	45 03.2	86	31	17.9	44 37.4	86	30	17.6	43 45.8	86	29	16.9	43 19.9	86	28	16.5
3	44 44.8	84	32	18.6	44 19.4	85	31	18.3	43 28.5	85	30	17.5	43 02.9	85	29	17.2
4	44 25.8	83	33	19.3	44 00.8	83	32	18.9	43 10.6	84	31	18.2	42 45.4	84	30	17.8
25	44 06.1	82	34	20.0	43 41.5	82	33	19.6	42 52.0	83	32	18.8	42 27.2	83	31	18.4
6	43 45.8	81	35	20.6	43 21.6	81	34	20.2	42 32.9	81	33	19.4	42 08.4	82	32	19.0
7	43 24.9	79	36	21.3	43 01.1	80	35	20.9	42 13.1	80	34	20.0	41 49.0	80	33	19.6
8	43 03.4	78	37	21.9	42 40.0	78	36	21.5	41 52.8	79	35	20.6	41 29.1	79	34	20.2
9	42 41.3	77	38	22.5	42 18.3	77	37	22.1	41 31.9	78	36	21.2	41 08.6	78	35	20.8
30	42 18.6	75	39	23.1	41 56.0	76	38	22.7	41 10.5	76	37	21.8	40 47.6	77	36	21.4
1	41 55.4	74	40	23.7	41 33.2	74	39	23.3	40 48.5	75	38	22.4	40 26.0	75	37	21.9
2	41 31.6	72	40	24.3	41 09.9	73	40	23.8	40 26.0	73	38	22.9	40 03.9	74	38	22.5
3	41 07.4	71	41	24.8	40 46.0	71	41	24.4	40 03.0	72	39	23.4	39 41.3	72	38	23.0
4	40 42.6	70	42	25.4	40 21.6	70	41	24.9	39 39.5	71	40	24.0	39 18.2	71	39	23.5
35	40 17.3	68	43	25.9	39 56.8	68	42	25.4	39 15.5	69	41	24.5	38 54.7	70	40	24.0
6	39 51.5	67	44	26.4	39 31.5	67	43	25.9	38 51.0	68	42	25.0	38 30.7	68	41	24.5
7	39 25.3	65	44	26.9	39 05.7	66	44	26.4	38 26.2	66	42	25.4	38 06.2	67	41	25.0
8	38 58.6	64	45	27.4	38 39.5	64	44	26.9	38 00.8	65	43	25.9	37 41.3	65	42	25.4
9	38 31.5	62	46	27.8	38 12.8	63	45	27.3	37 35.1	63	44	26.4	37 16.0	64	43	25.9
40	38 04.0	61	47	28.3	37 45.8	61	46	27.8	37 08.9	62	44	26.8	36 50.3	62	44	26.3
1	37 36.1	59	47	28.7	37 18.3	60	46	28.2	36 42.3	60	45	27.2	36 24.2	61	44	26.7
2	37 07.8	58	48	29.2	36 50.5	58	47	28.7	36 15.4	59	46	27.6	35 57.7	59	45	27.1
3	36 39.1	56	48	29.6	36 22.2	56	48	29.1	35 48.1	57	46	28.0	35 30.8	58	45	27.5
4	36 10.1	55	49	30.0	35 53.7	55	48	29.5	35 20.4	56	47	28.4	35 03.6	56	46	27.9
45	35 40.7	53	50	30.4	35 24.7	53	49	29.8	34 52.4	54	47	28.8	34 36.1	55	46	28.3
6	35 11.0	51	50	30.7	34 55.5	52	49	30.2	34 24.1	53	48	29.2	34 08.2	53	47	28.7
7	34 40.9	50	51	31.1	34 25.9	50	50	30.6	33 55.4	51	48	29.5	33 40.0	52	48	29.0
8	34 10.6	48	51	31.4	33 56.0	49	50	30.9	33 26.5	50	49	29.9	33 11.5	50	48	29.3
9	33 39.9	47	52	31.8	33 25.8	47	51	31.2	32 57.2	48	49	30.2	32 42.7	49	48	29.7
50	33 09.0	45	52	32.1	32 55.4	46	51	31.6	32 27.6	47	50	30.5	32 13.6	47	49	30.0
1	32 37.8	44	52	32.4	32 24.6	44	52	31.9	31 57.8	45	50	30.8	31 44.2	46	49	30.3
2	32 06.4	42	53	32.7	31 53.6	43	52	32.2	31 27.8	44	51	31.1	31 14.6	44	50	30.6
3	31 34.7	41	53	33.0	31 22.4	41	52	32.4	30 57.4	42	51	31.4	30 44.8	42	50	30.9
4	31 02.7	39	54	33.3	30 50.9	40	53	32.7	30 26.9	40	51	31.7	30 14.7	41	51	31.1
55	30 30.6	38	54	33.5	30 19.2	38	53	33.0	29 56.1	39	52	31.9	29 44.3	39	51	31.4
6	29 58.2	36	54	33.8	29 47.3	37	54	33.2	29 25.1	37	52	32.2	29 13.8	38	51	31.6
7	29 25.6	35	55	34.0	29 15.1	35	54	33.5	28 53.9	36	52	32.4	28 43.0	36	52	31.9
8	28 52.8	33	55	34.2	28 42.8	34	54	33.7	28 22.4	34	53	32.6	28 12.1	35	52	32.1
9	28 19.8	32	55	34.4	28 10.3	32	54	33.9	27 50.8	33	53	32.8	27 40.9	33	52	32.3
60	27 46.7	30	56	34.6	27 37.6	30	55	34.1	27 19.1	31	53	33.0	27 09.6	32	52	32.5
1	27 13.4	29	56	34.8	27 04.7	29	55	34.3	26 47.1	30	54	33.2	26 38.1	30	53	32.7
2	26 39.9	27	56	35.0	26 31.7	27	55	34.5	26 15.0	28	54	33.4	26 06.5	29	53	32.9
3	26 06.3	26	56	35.2	25 58.6	26	56	34.6	25 42.7	27	54	33.6	25 34.7	27	53	33.0
4	25 32.5	24	56	35.3	25 25.3	24	56	34.8	25 10.3	25	54	33.7	25 02.7	26	53	33.2
65	24 58.6	23	57	35.5	24 51.8	23	56	35.0	24 37.8	24	54	33.9	24 30.6	24	54	33.4
6	24 24.6	21	57	35.6	24 18.3	21	56	35.1	24 05.2	22	55	34.0	23 58.4	23	54	33.5
7	23 50.5	20	57	35.8	23 44.6	20	56	35.2	23 32.4	21	55	34.2	23 26.1	21	54	33.6
8	23 16.3	18	57	35.9	23 10.8	18	56	35.3	22 59.5	19	55	34.3	22 53.7	20	54	33.7
9	22 42.0	17	57	36.0	22 37.0	17	57	35.5	22 26.5	18	55	34.4	22 21.2	18	54	33.9
70	22 07.6	15	57	36.1	22 03.0	16	57	35.6	21 53.5	16	55	34.5	21 48.6	17	54	34.0
1	21 33.1	14	58	36.2	21 29.0	14	57	35.6	21 20.3	15	55	34.6	21 15.9	15	55	34.1
2	20 58.6	12	58	36.3	20 54.9	13	57	35.7	20 47.1	13	55	34.7	20 43.1	14	55	34.1
3	20 24.0	11	58	36.3	20 20.7	11	57	35.8	20 13.8	12	56	34.7	20 10.2	12	55	34.2
4	19 49.3	09	58	36.4	19 46.5	10	57	35.9	19 40.5	10	56	34.8	19 37.3	11	55	34.3
75	19 14.6	08	58	36.4	19 12.2	08	57	35.9	19 07.1	09	56	34.9	19 04.4	09	55	34.3
6	18 39.8	06	58	36.5	18 37.9	07	57	36.0	18 33.6	07	56	34.9	18 31.4	08	55	34.4
7	18 05.1	05	58	36.5	18 03.5	05	57	36.0	18 00.2	06	56	35.0	17 58.3	06	55	34.4
8	17 30.3	04	58	36.6	17 29.1	04	57	36.0	17 26.6	04	56	35.0	17 25.3	05	55	34.5
9	16 55.4	02	58	36.6	16 54.7	02	57	36.0	16 53.1	03	56	35.0	16 52.2	03	55	34.5
80	16 20.6	01	58	36.6	16 20.3	01	57	36.1	16 19.6	02	56	35.0	16 19.1	02	55	34.5
1	15 45.7	01	58	36.6	15 45.9	00	57	36.1	15 46.0	00	56	35.0	15 46.0	00	55	34.5
2	15 10.9	02	58	36.6	15 11.5	02	57	36.1	15 12.5	01	56	35.0	15 12.9	01	55	34.5
3	14 36.1	04	58	36.6	14 37.1	03	57	36.0	14 38.9	03	56	35.0	14 39.7	03	55	34.5
4	14 01.3	05	58	36.5	14 02.7	05	57	36.0	14 05.4	04	56	35.0	14 06.6	04	55	34.5
85	13 26.5	06	58	36.5	13 28.3	06	57	36.0	13 31.9	06	56	35.0	13 33.6	05	55	34.4
6	12 51.7	08	58	36.5	12 54.0	08	57	35.9	12 58.4	07	56	34.9	13 00.5	07	55	34.4
7	12 17.0	09	58	36.4	12 19.7	09	57	35.9	12 25.0	09	56	34.9	12 27.5	08	55	34.4
8	11 42.3	11	58	36.3	11 45.5	10	57	35.8	11 51.6	10	56	34.8	11 54.5	10	55	34.3
9	11 07.7	12	58	36.3	11 11.3	12	57	35.8	11 18.2	11	56	34.8	11 21.6	11	55	34.3
90	10 33.1	13	58	36.2	10 37.1	13	57	35.7	10 44.9	13	56	34.7	10 48.7	13	55	34.2

57° 00′				57° 30′				59° 00′				59° 30′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
46 00.0	1.0	01	00.0	45 30.0	1.0	01	00.0	44 00.0	1.0	01	00.0	43 30.0	1.0	01	00.0	00
45 59.6	1.0	02	00.8	45 29.6	1.0	02	00.8	43 59.6	1.0	02	00.7	43 29.6	1.0	02	00.7	1
45 58.4	1.0	03	01.6	45 28.4	1.0	03	01.5	43 58.5	1.0	03	01.4	43 28.6	1.0	03	01.4	2
45 56.4	1.0	05	02.3	45 26.5	1.0	05	02.3	43 56.7	1.0	04	02.1	43 26.8	1.0	04	02.1	3
45 53.6	1.0	06	03.1	45 23.8	1.0	06	03.1	43 54.2	1.0	05	02.9	43 24.3	1.0	05	02.8	4
45 50.0	99	07	03.9	45 20.2	99	07	03.8	43 50.9	99	07	03.6	43 21.1	99	07	03.5	05
45 45.6	99	09	04.7	45 16.0	99	08	04.6	43 46.9	99	08	04.3	43 17.2	99	08	04.2	6
45 40.5	99	10	05.5	45 10.9	99	10	05.3	43 42.2	99	09	05.0	43 12.6	99	09	04.9	7
45 34.5	98	11	06.2	45 05.1	98	11	06.1	43 36.7	98	10	05.7	43 07.3	98	10	05.6	8
45 27.8	98	12	07.0	44 58.5	98	12	06.8	43 30.6	98	11	06.4	43 01.3	98	11	06.2	9
45 20.3	97	14	07.7	44 51.2	97	13	07.6	43 23.7	97	13	07.1	42 54.6	97	12	06.9	10
45 12.1	96	15	08.5	44 43.1	97	15	08.3	43 16.2	97	14	07.8	42 47.2	97	13	07.6	1
45 03.1	96	16	09.2	44 34.3	96	16	09.0	43 08.0	96	15	08.4	42 39.1	96	15	08.2	2
44 53.4	95	17	10.0	44 24.8	95	17	09.7	42 59.0	95	16	09.1	42 30.4	95	16	08.9	3
44 42.9	94	19	10.7	44 14.6	94	18	10.5	42 49.5	95	17	09.8	42 21.0	95	17	09.6	4
44 31.7	94	20	11.4	44 03.6	94	19	11.2	42 39.2	94	18	10.4	42 11.0	94	18	10.2	15
44 19.8	93	21	12.1	43 51.9	93	21	11.9	42 28.3	93	19	11.1	42 00.3	93	19	10.9	6
44 07.1	92	22	12.8	43 39.6	92	22	12.5	42 16.7	92	20	11.7	41 49.0	92	20	11.5	7
43 53.8	91	23	13.5	43 26.6	91	23	13.2	42 04.5	91	21	12.4	41 37.0	92	21	12.1	8
43 39.8	90	24	14.2	43 12.9	90	24	13.9	41 51.6	90	22	13.0	41 24.5	91	22	12.7	9
43 25.2	89	26	14.9	42 58.5	89	25	14.5	41 38.2	90	23	13.6	41 11.3	90	23	13.3	20
43 09.9	88	27	15.5	42 43.5	88	26	15.2	41 24.1	89	24	14.2	40 57.5	89	24	13.9	1
42 53.9	87	28	16.2	42 27.9	87	27	15.8	41 09.4	87	25	14.8	40 43.1	88	25	14.5	2
42 37.3	86	29	16.8	42 11.6	86	28	16.5	40 54.1	86	26	15.4	40 28.2	87	26	15.1	3
42 20.1	84	30	17.4	41 54.7	85	29	17.1	40 38.3	85	27	16.0	40 12.6	85	27	15.7	4
42 02.3	83	31	18.1	41 37.3	83	30	17.7	40 21.8	84	28	16.6	39 56.6	84	28	16.2	25
41 43.8	82	32	18.7	41 19.2	82	31	18.3	40 04.9	83	29	17.2	39 39.9	83	29	16.8	6
41 24.9	81	33	19.3	41 00.6	81	32	18.9	39 47.3	82	30	17.7	39 22.8	82	29	17.3	7
41 05.3	79	34	19.8	40 41.4	80	33	19.4	39 29.3	81	31	18.3	39 05.1	81	30	17.9	8
40 45.2	78	34	20.4	40 21.7	78	34	20.0	39 10.7	79	32	18.8	38 46.9	80	31	18.4	9
40 24.6	77	35	21.0	40 01.5	77	35	20.5	38 51.6	78	33	19.3	38 28.2	78	32	18.9	30
40 03.4	76	36	21.5	39 40.7	76	35	21.1	38 32.0	77	33	19.8	38 09.0	77	33	19.4	1
39 41.7	74	37	22.0	39 19.4	74	36	21.6	38 12.0	75	34	20.3	37 49.3	76	34	19.9	2
39 19.5	73	38	22.5	38 57.7	73	37	22.1	37 51.4	74	35	20.8	37 29.2	74	34	20.4	3
38 56.9	71	39	23.1	38 35.4	72	38	22.6	37 30.4	73	36	21.3	37 08.6	73	35	20.9	4
38 33.7	70	39	23.5	38 12.7	70	39	23.1	37 09.0	71	36	21.8	36 47.6	72	36	21.3	35
38 10.2	69	40	24.0	37 49.6	69	39	23.6	36 47.1	70	37	22.2	36 26.1	70	36	21.8	6
37 46.1	67	41	24.5	37 26.0	67	40	24.0	36 24.8	68	38	22.7	36 04.2	69	37	22.2	7
37 21.7	66	41	25.0	37 02.0	66	41	24.5	36 02.1	67	39	23.1	35 41.9	67	38	22.6	8
36 56.8	64	42	25.4	36 37.5	65	41	24.9	35 39.0	66	39	23.5	35 19.2	66	38	23.0	9
36 31.5	63	43	25.8	36 12.7	63	42	25.3	35 15.4	64	40	23.9	34 56.1	65	39	23.4	40
36 05.9	61	43	26.2	35 47.5	62	43	25.8	34 51.6	63	40	24.3	34 32.7	63	40	23.8	1
35 39.8	60	44	26.7	35 21.9	60	43	26.2	34 27.3	61	41	24.7	34 08.9	62	40	24.2	2
35 13.4	58	45	27.0	34 55.9	59	44	26.5	34 02.7	60	42	25.1	33 44.7	60	41	24.6	3
34 46.7	57	45	27.4	34 29.6	57	44	26.9	33 37.7	58	42	25.4	33 20.2	59	41	25.0	4
34 19.6	55	46	27.8	34 03.0	56	45	27.3	33 12.5	57	43	25.8	32 55.4	57	42	25.3	45
33 52.2	54	46	28.2	33 36.0	54	45	27.6	32 46.8	55	43	26.1	32 30.2	56	42	25.7	6
33 24.4	52	47	28.5	33 08.7	53	46	28.0	32 20.9	54	44	26.5	32 04.8	54	43	26.0	7
32 56.4	51	47	28.8	32 41.1	51	46	28.3	31 54.7	52	44	26.8	31 39.0	53	43	26.3	8
32 28.0	49	48	29.2	32 13.3	49	47	28.6	31 28.2	51	45	27.1	31 13.0	51	44	26.6	9
31 59.4	47	48	29.5	31 45.1	48	47	28.9	31 01.4	49	45	27.4	30 46.6	50	44	26.9	50
31 30.5	46	49	29.8	31 16.7	46	48	29.2	30 34.4	48	46	27.7	30 20.0	48	45	27.2	1
31 01.4	44	49	30.1	30 48.0	45	48	29.5	30 07.1	46	46	28.0	29 53.2	46	45	27.5	2
30 32.0	43	49	30.3	30 19.0	43	49	29.8	29 39.5	45	46	28.3	29 26.1	45	46	27.7	3
30 02.3	41	50	30.6	29 49.9	42	49	30.1	29 11.7	43	47	28.5	28 58.8	43	46	28.0	4
29 32.5	40	50	30.9	29 20.5	40	49	30.3	28 43.7	41	47	28.8	28 31.2	42	46	28.2	55
29 02.4	38	50	31.1	28 50.8	39	50	30.6	28 15.5	40	47	29.0	28 03.5	40	47	28.5	6
28 32.1	37	51	31.3	28 21.0	37	50	30.8	27 47.0	38	48	29.2	27 35.5	39	47	28.7	7
28 01.6	35	51	31.5	27 51.0	36	50	31.0	27 18.4	37	48	29.4	27 07.3	37	47	28.9	8
27 30.9	34	51	31.8	27 20.7	34	51	31.2	26 49.6	35	48	29.7	26 39.0	36	48	29.1	9
27 00.0	32	52	32.0	26 50.3	33	51	31.4	26 20.6	34	49	29.8	26 10.4	34	48	29.3	60
26 29.0	31	52	32.2	26 19.8	31	51	31.6	25 51.4	32	49	30.0	25 41.7	32	48	29.5	1
25 57.8	29	52	32.3	25 49.0	29	51	31.8	25 22.0	31	49	30.2	25 12.8	31	48	29.7	2
25 26.5	28	52	32.5	25 18.2	28	52	32.0	24 52.5	29	49	30.4	24 43.8	29	49	29.9	3
24 55.0	26	53	32.7	24 47.1	26	52	32.1	24 22.9	27	50	30.5	24 14.6	28	49	30.0	4
24 23.4	24	53	32.8	24 16.0	25	52	32.3	23 53.1	26	50	30.7	23 45.3	26	49	30.2	65
23 51.6	23	53	33.0	23 44.7	23	52	32.4	23 23.2	24	50	30.8	23 15.8	25	49	30.3	6
23 19.8	21	53	33.1	23 13.3	22	53	32.6	22 53.2	23	50	31.0	22 46.3	23	49	30.4	7
22 47.8	20	53	33.2	22 41.8	20	53	32.7	22 23.0	21	50	31.1	22 16.6	22	50	30.6	8
22 15.7	18	54	33.3	22 10.1	19	53	32.8	21 52.8	20	51	31.2	21 46.8	20	50	30.7	9
21 43.5	17	54	33.4	21 38.4	17	53	32.9	21 22.5	18	51	31.3	21 16.9	19	50	30.8	70
21 11.3	15	54	33.5	21 06.6	16	53	33.0	20 52.0	17	51	31.4	20 47.0	17	50	30.9	1
20 39.0	14	54	33.6	20 34.7	14	53	33.1	20 21.5	15	51	31.5	20 16.9	15	50	31.0	2
20 06.6	12	54	33.7	20 02.8	13	53	33.2	19 50.9	14	51	31.6	19 46.8	14	50	31.1	3
19 34.1	11	54	33.8	19 30.8	11	53	33.2	19 20.3	12	51	31.6	19 16.6	12	50	31.1	4
19 01.6	09	54	33.8	18 58.7	10	54	33.3	18 49.6	11	51	31.7	18 46.4	11	50	31.2	75
18 29.1	08	54	33.9	18 26.6	08	54	33.3	18 18.8	09	51	31.8	18 16.1	09	51	31.2	6
17 56.5	06	54	33.9	17 54.5	07	54	33.4	17 48.1	08	51	31.8	17 45.7	08	51	31.3	7
17 23.8	05	54	33.9	17 22.3	05	54	33.4	17 17.2	06	51	31.8	17 15.4	06	51	31.3	8
16 51.2	03	54	34.0	16 50.1	04	54	33.4	16 46.4	05	51	31.9	16 45.0	05	51	31.4	9
16 18.5	02	54	34.0	16 17.9	02	54	33.5	16 15.5	03	52	31.9	16 14.5	03	51	31.4	80
15 45.8	01	54	34.0	15 45.6	01	54	33.5	15 44.6	02	52	31.9	15 44.1	02	51	31.4	1
15 13.2	01	54	34.0	15 13.4	01	54	33.5	15 13.7	00	52	31.9	15 13.6	00	51	31.4	2
14 40.5	02	54	34.0	14 41.2	02	54	33.5	14 42.8	01	51	31.9	14 43.2	01	51	31.4	3
14 07.8	04	54	34.0	14 08.9	04	54	33.4	14 11.9	03	51	31.9	14 12.7	03	51	31.4	4
13 35.2	05	54	33.9	13 36.7	05	54	33.4	13 41.0	04	51	31.9	13 42.3	04	51	31.4	85
13 02.6	07	54	33.9	13 04.6	07	54	33.4	13 10.2	06	51	31.8	13 11.9	06	51	31.3	6
12 30.0	08	54	33.9	12 32.4	08	54	33.3	12 39.3	07	51	31.8	12 41.5	07	51	31.3	7
11 57.4	10	54	33.8	12 00.3	09	53	33.3	12 08.5	09	51	31.8	12 11.2	09	51	31.3	8
11 24.9	11	54	33.7	11 28.2	11	53	33.2	11 37.8	10	51	31.7	11 40.8	10	50	31.2	9
10 52.5	12	54	33.7	10 56.2	12	53	33.2	11 07.0	12	51	31.7	11 10.6	12	50	31.2	90

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	22 30.0	1.0 01	180.0	22 00.0	1.0 01	180.0	21 00.0	1.0 00	180.0	20 30.0	1.0 00	180.0	20 00.0	1.0 00	180.0	19 30.0	1.0 00	180.0	18 00.0	1.0 00	180.0	17 30.0	1.0 00	180.0	00
1	22 29.7	1.0 02	179.4	21 59.7	1.0 02	179.4	20 59.7	1.0 02	179.4	20 29.7	1.0 02	179.4	19 59.7	1.0 01	179.4	19 29.7	1.0 01	179.4	17 59.7	1.0 01	179.5	17 29.7	1.0 01	179.5	1
2	22 28.7	1.0 03	178.7	21 58.7	1.0 03	178.8	20 58.8	1.0 03	178.8	20 28.8	1.0 02	178.8	19 58.8	1.0 02	178.8	19 28.8	1.0 02	178.9	17 58.9	1.0 02	178.9	17 28.9	1.0 02	178.9	2
3	22 27.1	1.0 04	178.1	21 57.2	1.0 04	178.1	20 57.3	1.0 04	178.2	20 27.3	1.0 04	178.2	19 57.3	1.0 03	178.3	19 27.4	1.0 03	178.3	17 57.5	1.0 03	178.4	17 27.6	1.0 03	178.4	3
4	22 24.9	1.0 05	177.5	21 55.0	1.0 05	177.5	20 55.1	1.0 05	177.6	20 25.2	1.0 05	177.6	19 55.3	1.0 04	177.7	19 25.4	1.0 04	177.7	17 55.6	1.0 04	177.8	17 25.7	1.0 04	177.9	4
05	22 22.0	1.0 06	176.9	21 52.1	1.0 06	176.9	20 52.4	1.0 06	177.0	20 22.5	1.0 06	177.1	19 52.6	1.0 06	177.1	19 22.7	1.0 05	177.2	17 53.1	1.0 05	177.3	17 23.2	1.0 05	177.3	05
6	22 18.5	99 07	176.2	21 48.7	99 07	176.3	20 49.0	99 07	176.4	20 19.2	99 06	176.5	19 49.4	99 06	176.5	19 19.5	99 06	176.6	17 50.1	99 06	176.8	17 20.2	99 06	176.8	6
7	22 14.3	99 08	175.6	21 44.6	99 08	175.7	20 45.1	99 08	175.8	20 15.3	99 07	175.9	19 45.5	99 07	176.0	19 15.8	99 07	176.0	17 46.5	99 07	176.2	17 16.7	99 07	176.3	7
8	22 09.5	99 09	175.0	21 39.9	99 09	175.1	20 40.5	99 09	175.2	20 10.8	99 08	175.3	19 41.1	99 08	175.4	19 11.4	99 08	175.5	17 42.4	99 08	175.7	17 12.7	99 08	175.8	8
9	22 04.1	99 10	174.4	21 34.5	99 10	174.5	20 35.3	99 10	174.6	20 05.7	99 09	174.7	19 36.1	99 09	174.8	19 06.5	99 09	174.9	17 37.7	99 09	175.2	17 08.1	99 09	175.2	9
10	21 58.1	98 11	173.8	21 28.6	98 11	173.9	20 29.6	98 11	174.0	20 00.1	98 10	174.1	19 30.6	98 10	174.2	19 01.0	98 10	174.3	17 32.5	98 10	174.6	17 03.0	98 09	174.7	10
1	21 51.4	98 12	173.1	21 22.0	98 12	173.3	20 23.2	98 12	173.5	19 53.8	98 11	173.6	19 24.4	98 11	173.7	18 55.0	98 11	173.8	17 26.7	98 10	174.1	16 57.3	98 10	174.2	1
2	21 44.1	98 13	172.5	21 14.8	98 13	172.6	20 16.3	98 13	172.9	19 47.0	98 12	173.0	19 17.7	98 12	173.1	18 48.4	98 12	173.2	17 20.4	98 11	173.6	16 51.1	98 11	173.7	2
3	21 36.2	97 14	171.9	21 07.1	97 14	172.0	20 08.7	97 14	172.3	19 39.5	97 13	172.4	19 10.4	97 13	172.5	18 41.2	97 13	172.7	17 13.6	97 12	173.0	16 44.4	97 12	173.2	3
4	21 27.7	97 15	171.3	20 58.7	97 15	171.5	20 00.6	97 15	171.7	19 31.6	97 14	171.9	19 02.5	97 14	172.0	18 33.4	97 14	172.1	17 06.3	97 13	172.5	16 37.2	97 13	172.6	4
15	21 18.6	96 16	170.7	20 49.7	96 16	170.9	19 51.9	96 15	171.1	19 23.0	96 15	171.3	18 54.1	96 15	171.4	18 25.2	96 15	171.6	16 58.4	96 14	172.0	16 29.4	96 14	172.1	15
6	21 08.8	96 17	170.1	20 40.1	96 17	170.3	19 42.6	96 16	170.6	19 13.8	96 16	170.7	18 45.1	96 16	170.9	18 16.3	96 16	171.0	16 50.0	96 15	171.5	16 21.2	96 15	171.6	6
7	20 58.5	96 18	169.5	20 29.9	95 18	169.7	19 32.7	95 17	170.0	19 04.1	96 17	170.2	18 35.5	95 17	170.3	18 06.9	95 17	170.5	16 41.0	95 16	171.0	16 12.4	95 16	171.1	7
8	20 47.6	96 19	168.9	20 19.2	95 19	169.1	19 22.3	95 18	169.4	18 53.9	95 18	169.6	18 25.4	95 18	169.8	17 57.0	95 17	169.9	16 31.6	95 17	170.4	16 03.1	96 16	170.6	8
9	20 36.1	94 20	168.3	20 07.8	94 20	168.5	19 11.3	94 19	168.9	18 43.1	94 19	169.1	18 14.8	94 19	169.2	17 46.5	94 18	169.4	16 21.6	94 17	169.9	15 53.3	94 17	170.1	9
20	20 24.0	93 21	167.8	19 55.9	94 21	168.0	18 59.8	94 20	168.3	18 31.7	94 20	168.5	18 03.6	94 20	168.7	17 35.5	94 19	168.9	16 11.1	94 18	169.4	15 43.0	94 18	169.6	20
1	20 11.3	93 22	167.2	19 43.4	93 22	167.4	18 47.7	93 21	167.8	18 19.8	93 21	168.0	17 51.9	93 20	168.2	17 24.0	93 20	168.4	16 00.2	93 19	168.9	15 32.2	93 19	169.1	1
2	19 58.0	92 23	166.6	19 30.4	92 23	166.8	18 35.0	92 22	167.2	18 07.3	92 22	167.4	17 39.6	92 21	167.6	17 11.9	92 21	167.8	15 48.7	93 20	168.4	15 20.9	93 20	168.6	2
3	19 44.2	91 24	166.1	19 16.8	92 24	166.3	18 21.8	92 23	166.7	17 54.4	92 22	166.9	17 26.9	92 22	167.1	16 59.3	92 22	167.3	15 36.7	92 21	167.9	15 09.2	92 20	168.1	3
4	19 29.9	91 25	165.5	19 02.6	91 24	165.7	18 08.1	91 24	166.2	17 40.8	91 23	166.4	17 13.6	91 23	166.6	16 46.3	91 23	166.8	15 24.3	91 22	167.4	14 56.9	91 21	167.7	4
25	19 14.9	90 26	164.9	18 47.9	90 25	165.2	17 53.9	90 25	165.6	17 26.8	90 24	165.8	16 59.7	90 24	166.1	16 32.7	90 23	166.3	15 11.3	90 22	167.0	14 44.2	90 22	167.2	25
6	18 59.5	89 27	164.4	18 32.7	89 26	164.6	17 39.1	89 26	165.1	17 12.3	89 25	165.3	16 45.4	89 25	165.6	16 18.6	90 24	165.8	14 57.9	90 23	166.5	14 31.0	90 23	166.7	6
7	18 43.5	88 28	163.8	18 16.9	88 27	164.1	17 23.8	89 26	164.6	16 57.2	89 26	164.8	16 30.6	89 26	165.1	16 04.0	89 25	165.3	14 44.0	89 24	166.0	14 17.3	89 24	166.2	7
8	18 26.9	88 28	163.3	18 00.6	88 28	163.6	17 08.0	88 27	164.1	16 41.6	88 27	164.3	16 15.3	88 26	164.6	15 48.9	88 26	164.8	14 29.6	88 25	165.5	14 03.2	88 24	165.8	8
9	18 09.9	87 29	162.8	17 43.8	87 29	163.0	16 51.7	87 28	163.5	16 25.6	87 28	163.8	15 59.4	87 27	164.1	15 33.3	87 27	164.3	14 14.8	87 25	165.1	13 48.6	87 25	165.3	9
30	17 52.3	86 30	162.2	17 26.5	86 30	162.5	16 34.9	86 29	163.0	16 09.0	86 28	163.3	15 43.2	86 28	163.6	15 17.3	86 28	163.8	13 59.5	86 26	164.6	13 33.6	87 26	164.9	30
1	17 34.2	85 31	161.7	17 08.7	85 31	162.0	16 17.6	85 30	162.5	15 52.0	85 29	162.8	15 26.4	85 29	163.1	15 00.8	85 28	163.4	13 43.8	86 27	164.2	13 18.1	86 27	164.4	1
2	17 15.6	84 32	161.2	16 50.3	84 31	161.5	15 59.8	84 30	162.0	15 34.5	84 30	162.3	15 09.1	84 30	162.6	14 43.8	85 29	162.9	13 27.6	85 28	163.7	13 02.2	85 27	164.0	2
3	16 56.5	83 33	160.7	16 31.5	83 32	161.0	15 41.5	83 31	161.6	15 16.5	84 31	161.8	14 51.4	84 30	162.1	14 26.3	84 30	162.4	13 11.0	84 28	163.3	12 45.8	84 28	163.5	3
4	16 36.9	82 33	160.2	16 12.2	82 33	160.5	15 22.8	83 32	161.1	14 58.0	83 32	161.4	14 33.2	83 31	161.7	14 08.4	83 31	162.0	12 53.9	83 29	162.8	12 29.0	83 29	163.1	4
35	16 16.9	81 34	159.7	15 52.5	81 34	160.0	15 03.6	82 33	160.6	14 39.1	82 32	160.9	14 14.6	82 32	161.2	13 50.1	82 31	161.5	12 36.4	82 30	162.4	12 11.8	82 29	162.7	35
6	15 56.4	80 35	159.2	15 32.3	80 34	159.5	14 44.0	81 34	160.1	14 19.8	81 33	160.4	13 55.6	81 32	160.7	13 31.3	81 32	161.0	12 18.5	81 31	161.9	11 54.2	81 30	162.2	6
7	15 35.4	79 36	158.7	15 11.6	79 35	159.0	14 23.9	80 34	159.7	14 00.0	80 34	160.0	13 36.1	80 33	160.3	13 12.1	80 33	160.6	12 00.2	80 31	161.5	11 36.2	80 31	161.8	7
8	15 13.9	78 36	158.3	14 50.4	78 36	158.6	14 03.3	79 35	159.2	13 39.7	79 34	159.5	13 16.1	79 34	159.8	12 52.5	79 33	160.2	11 41.5	79 32	161.1	11 17.7	79 31	161.4	8
9	14 52.1	77 37	157.8	14 28.9	77 37	158.1	13 42.4	78 36	158.8	13 19.1	78 35	159.1	12 55.8	78 35	159.4	12 32.5	78 34	159.7	11 22.3	78 33	160.7	10 58.9	78 32	161.0	9
40	14 29.7	76 38	157.3	14 06.8	76 37	157.7	13 21.0	77 36	158.3	12 58.0	77 36	158.6	12 35.0	77 35	159.0	12 12.0	77 35	159.3	11 02.8	77 33	160.3	10 39.7	77 33	160.6	40
1	14 07.0	75 39	156.9	13 44.4	75 38	157.2	12 59.2	75 37	157.9	12 36.5	76 36	158.2	12 13.8	76 36	158.6	11 51.1	76 35	158.9	10 42.9	76 34	159.9	10 20.1	76 33	160.2	1
2	13 43.8	74 39	156.4	13 21.6	74 39	156.8	12 37.0	74 38	157.5	12 14.6	74 37	157.8	11 52.3	75 37	158.1	11 29.9	75 36	158.5	10 22.6	75 34	159.5	10 00.1	75 34	159.8	2
3	13 20.2	73 40	156.0	12 58.3	73 39	156.3	12 14.4	73 38	157.0	11 52.3	73 38	157.4	11 30.3	73 37	157.7	11 08.2	74 37	158.1	10 01.9	74 35	159.1	9 39.8	74 35	159.4	3
4	12 56.2	72 41	155.6	12 34.6	72 40	155.9	11 51.3	72 39	156.6	11 29.7	72 38	157.0	11 08.0	72 38	157.3	10 46.2	72 37	157.7	9 40.9	73 36	158.7	9 19.1	73 35	159.1	4
45	12 31.8	71 41	155.1	12 10.6	71 41	155.5	11 27.9	71 40	156.2	11 06.6	71 39	156.6	10 45.2	71 38	156.9	10 23.8	71 38	157.3	9 19.5	72 36	158.3	8 58.0	72 36	158.7	45
6	12 07.0	70 42	154.7	11 46.1	70 41	155.1	11 04.2	70 40	155.8	10 43.2	70 40	156.2	10 22.1	70 39	156.5	10 01.1	70 39	156.9	8 57.7	70 37	158.0	8 36.6	71 36	158.3	6
7	11 41.9	69 43	154.3	11 21.3	69 42	154.7	10 40.0	69 41	155.4	10 19.4	69 40	155.8	9 58.7	69 40	156.1	9 37.9	69 39	156.5	8 35.6	69 37	157.6	8 14.8	69 37	158.0	7
8	11 16.3	67 43	153.9	10 56.1	68 43	154.3	10 15.5	68 41	155.0	9 55.2	68 41	155.4	9 34.8	68 40	155.8	9 14.5	68 40	156.1	8 13.2	68 38	157.2	7 52.7	68 37	157.6	8
9	10 50.4	66 44	153.5	10 30.5	66 43	153.9	9 50.6	67 42	154.6	9 30.7	67 41	155.0	9 10.7	67 41	155.4	8 50.6	67 40	155.8	7 50.4	67 38	156.9	7 30.3	67 38	157.3	9
50	10 24.2	65 44	153.1	10 04.6	65 44	153.5	9 25.4	65 43	154.3	9 05.8	65 42	154.6	8 46.2	66 41	155.0	8 26.5	66 41	155.4	7 27.3	66 39	156.6	7 07.6	66 38	156.9	50
1	9 57.5	64 45	152.7	9 38.4	64 44	153.1	8 59.9	64 43	153.9	8 40.6	64 43	154.3	8 21.3	64 42	154.7	8 02.0	64 41	155.1	7 03.9	65 40	156.2	6 44.5	65 39	156.6	1
2	9 30.6	63 45	152.4	9 11.7	63 45	152.8	8 34.0	63 44	153.5	8 15.1	63 43	153.9	7 56.1	63 42	154.3	7 37.2	63 42	154.7	6 40.2	63 40	155.9	6 21.1	63 39	156.3	2
3	9 03.3	62 46	152.0	8 44.8	62 45	152.4	8 07.8	62 44	153.2	7 49.2	62 44	153.6	7 30.6	62 43	154.0	7 12.0	62 42	154.4	6 16.1	62 41	155.6	5 57.5	62 40	155.9	3
4	8 35.7	60 47	151.6	8 17.6	60 46	152.0	7 41.2	61 45	152.8	7 23.1	61 44	153.2	7 04.8	61 4	153.6	6 46.6	61 43	154.0	5 51.8	61 41	155.2	5 33.5	61 40	155.6	4
55	8 07.7	59 47	151.3	7 50.0	59 46	151.7	7 14.4	59 45	152.5	6 56.6	59 45	152.9	6 38.7	60 44	153.3	6 20.9	60 43	153.7	5 27.2	60 42	154.9	5 09.2	60 41	155.3	55
6	7 39.5	58 48	150.9	7 22.1	58 47	151.3	6 47.3	58 46	152.2	6 29.8	58 45	152.6	6 12.3	58 44	153.0	5 54.8	58 44	153.4	5 02.2	59 42	154.6				6
7	7 11.0	57 48	150.6	6 53.9	57 47	151.0	6 19.8	57 46	151.8	6 02.7	57 46	152.3	5 45.6	57 45	152.7	5 28.5	57 44	153.1							7
8	6 42.1	55 49	150.3	6 25.5	56 48	150.7	5 52.1	56 47	151.5	5 35.4	56 46	151.9	5 18.6	56 45	152.4	5 01.9	56 45	152.8							8
9	6 13.0	54 49	150.0	5 56.7	54 48	150.4	5 24.1	54 47	151.2	5 07.7	54 46	151.6													9
60	5 43.6	53 49	149.6	5 27.7	53 49	150.1																			60
1	5 13.9	52 50	149.3																						1

DECLINATION SAME NAME AS LATITUDE

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	9 58.6	15 57	36.1	10 03.0	15 57	35.6	10 11.6	14 55	34.6	10 15.9	14 55	34.1	10 20.1	14 54	33.6	10 24.2	14 53	33.1	10 36.4	13 51	31.6	10 40.3	13 50	31.1	91
2	9 24.2	16 57	36.0	9 29.0	16 57	35.5	9 38.5	16 55	34.5	9 43.1	15 54	34.0	9 47.8	15 54	33.5	9 52.3	15 53	33.0	10 05.8	15 51	31.5	10 10.2	15 50	31.0	2
3	8 49.9	17 57	35.9	8 55.1	17 56	35.4	9 05.4	17 55	34.4	9 10.5	17 54	33.9	9 15.5	17 54	33.4	9 20.5	17 53	32.9	9 35.3	16 51	31.4	9 40.1	16 50	30.9	3
4	8 15.6	19 57	35.8	8 21.2	19 56	35.3	8 32.3	18 55	34.3	8 37.9	18 54	33.8	8 43.3	18 53	33.3	8 48.8	18 53	32.8	9 04.8	18 51	31.4	9 10.1	17 50	30.9	4
95	7 41.4	20 57	35.7	7 47.5	20 56	35.2	7 59.4	20 55	34.2	8 05.3	20 54	33.7	8 11.2	20 53	33.2	8 17.1	19 53	32.7	8 34.4	19 50	31.3	8 40.1	19 50	30.8	95
6	7 07.4	22 57	35.6	7 13.8	21 56	35.1	7 26.6	21 55	34.1	7 32.9	21 54	33.6	7 39.2	21 53	33.1	7 45.5	21 52	32.6	8 04.1	21 50	31.2	8 10.3	20 50	30.7	6
7	6 33.4	23 56	35.5	6 40.2	23 56	35.0	6 53.8	23 54	34.0	7 00.6	22 54	33.5	7 07.3	22 53	33.0	7 14.0	22 52	32.5	7 33.9	22 50	31.0	7 40.5	22 49	30.6	7
8	5 59.5	24 56	35.3	6 06.8	24 56	34.8	6 21.2	24 54	33.9	6 28.4	24 54	33.4	6 35.5	24 53	32.9	6 42.7	24 52	32.4	7 03.8	23 50	30.9	7 10.8	23 49	30.4	8
9	5 25.8	26 56	35.2	5 33.4	26 55	34.7	5 48.7	25 54	33.7	5 56.3	25 53	33.2	6 03.9	25 53	32.7	6 11.4	25 52	32.3	6 33.9	25 50	30.8	6 41.3	25 49	30.3	9
100				5 00.2	27 55	34.5	5 16.3	27 54	33.6	5 24.3	27 53	33.1	5 32.3	27 52	32.6	5 40.2	26 52	32.1	6 04.0	26 50	30.7	6 11.8	26 49	30.2	100
1													5 00.8	28 52	32.5	5 09.2	28 52	32.0	5 34.2	28 49	30.5	5 42.5	28 49	30.0	1
2																			5 04.6	29 49	30.4	5 13.3	29 48	29.9	2

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	43 00.0	1.0 01	00.0	42 30.0	1.0 01	00.0	41 00.0	1.0 01	00.0	40 30.0	1.0 01	00.0	40 00.0	1.0 00	00.0	34 00.0	1.0 00	00.0	33 30.0	1.0 00	00.0	28 30.0	1.0 00	00.0	00
1	42 59.7	1.0 02	00.7	42 29.7	1.0 02	00.7	40 59.7	1.0 02	00.6	40 29.7	1.0 02	00.6	39 59.7	1.0 02	00.6	33 59.8	1.0 01	00.4	33 29.8	1.0 01	00.4	28 29.8	1.0 01	00.3	1
2	42 58.6	1.0 03	01.4	42 28.6	1.0 03	01.3	40 58.7	1.0 03	01.2	40 28.8	1.0 03	01.2	39 58.8	1.0 03	01.2	33 59.1	1.0 02	00.9	33 29.1	1.0 02	00.8	28 29.4	1.0 01	00.6	2
3	42 56.9	1.0 04	02.0	42 26.9	1.0 04	02.0	40 57.1	1.0 04	01.9	40 27.2	1.0 04	01.8	39 57.3	1.0 04	01.8	33 58.0	1.0 03	01.3	33 28.1	1.0 02	01.3	28 28.6	1.0 02	00.9	3
4	42 54.4	1.0 05	02.7	42 24.6	1.0 05	02.7	40 54.9	1.0 05	02.5	40 25.0	1.0 05	02.4	39 55.2	1.0 05	02.4	33 56.5	1.0 03	01.7	33 26.6	1.0 03	01.7	28 27.5	1.0 02	01.2	4
05	42 51.3	99 06	03.4	42 21.5	99 06	03.3	40 52.1	99 06	03.1	40 22.3	99 06	03.0	39 52.5	99 06	03.0	33 54.5	99 04	02.2	33 24.6	99 04	02.1	28 26.1	1.0 03	01.5	05
6	42 47.5	99 08	04.1	42 17.8	99 07	04.0	40 48.6	99 07	03.7	40 18.9	99 07	03.6	39 49.1	99 06	03.5	33 52.1	99 05	02.6	33 22.3	99 05	02.5	28 24.4	99 03	01.8	6
7	42 43.0	99 09	04.8	42 13.4	99 08	04.6	40 44.5	99 08	04.3	40 14.9	99 08	04.2	39 45.2	99 08	04.1	33 49.2	99 05	03.0	33 19.5	99 05	02.9	28 22.4	99 04	02.1	7
8	42 37.8	98 10	05.4	42 08.3	98 10	05.3	40 39.8	98 09	04.9	40 10.3	98 09	04.8	39 40.7	98 08	04.7	33 45.9	99 06	03.4	33 16.3	99 06	03.3	28 20.1	99 04	02.4	8
9	42 31.9	98 11	06.1	42 02.6	98 11	06.0	40 34.4	98 10	05.5	40 05.0	98 10	05.4	39 35.6	98 09	05.3	33 42.2	98 07	03.9	33 12.7	98 07	03.8	28 17.5	98 05	02.7	9
10	42 25.4	97 12	06.8	41 56.2	97 12	06.6	40 28.5	97 11	06.2	39 59.2	98 11	06.0	39 30.0	98 10	05.9	33 38.0	98 08	04.3	33 08.7	98 07	04.2	28 14.5	98 05	03.0	10
1	42 18.2	97 13	07.4	41 49.1	97 13	07.2	40 21.9	97 12	06.8	39 52.8	97 12	06.6	39 23.7	97 11	06.4	33 33.5	97 08	04.7	33 04.2	98 08	04.6	28 11.3	98 06	03.3	1
2	42 10.3	96 14	08.1	41 41.4	96 14	07.9	40 14.7	96 13	07.3	39 45.8	96 13	07.2	39 16.8	97 12	07.0	33 28.5	97 09	05.1	32 59.3	97 09	05.0	28 07.8	97 06	03.6	2
3	42 01.8	96 15	08.7	41 33.1	96 15	08.5	40 06.9	96 14	07.9	39 38.2	96 14	07.8	39 09.4	96 13	07.6	33 23.0	96 10	05.5	32 54.1	97 09	05.4	28 03.9	97 07	03.9	3
4	41 52.6	95 16	09.3	41 24.1	95 16	09.1	39 58.6	95 15	08.5	39 30.0	95 15	08.3	39 01.4	95 14	08.1	33 17.2	96 10	06.0	32 48.4	96 10	05.8	27 59.8	96 07	04.2	4
15	41 42.8	94 17	10.0	41 14.5	94 17	09.8	39 49.6	94 16	09.1	39 21.3	95 16	08.9	38 52.9	95 15	08.7	33 10.9	95 11	06.4	32 42.3	95 11	06.2	27 55.4	96 08	04.5	15
6	41 32.3	93 18	10.6	41 04.3	93 18	10.4	39 40.1	94 17	09.7	39 12.0	94 16	09.5	38 43.8	94 16	09.2	33 04.2	95 12	06.8	32 35.8	95 12	06.6	27 50.7	95 08	04.8	6
7	41 21.2	93 20	11.2	40 53.5	93 19	11.0	39 30.0	93 18	10.2	39 02.1	93 17	10.0	38 34.1	93 17	09.8	32 57.1	94 12	07.2	32 28.9	94 12	07.0	27 45.6	95 09	05.1	7
8	41 09.6	92 20	11.8	40 42.0	92 20	11.6	39 19.3	92 19	10.8	38 51.6	92 18	10.6	38 24.0	92 18	10.3	32 49.6	93 13	07.6	32 21.6	93 13	07.4	27 40.3	94 09	05.4	8
9	40 57.3	91 22	12.4	40 30.0	91 21	12.2	39 08.0	91 20	11.4	38 40.6	91 19	11.1	38 13.2	91 19	10.8	32 41.7	93 14	08.0	32 13.9	93 13	07.7	27 34.7	93 10	05.6	9
20	40 44.4	90 22	13.0	40 17.4	90 22	12.8	38 56.2	90 21	11.9	38 29.1	90 20	11.6	38 02.0	91 20	11.4	32 33.4	92 14	08.4	32 05.8	92 14	08.1	27 28.9	93 10	05.9	20
1	40 30.9	89 23	13.6	40 04.2	89 23	13.3	38 43.9	89 21	12.5	38 17.1	90 21	12.2	37 50.2	90 20	11.9	32 24.7	91 15	08.8	31 57.4	91 15	08.5	27 22.7	92 11	06.2	1
2	40 16.8	88 24	14.2	39 50.4	88 24	13.9	38 31.0	88 22	13.0	38 04.5	89 22	12.7	37 37.9	89 21	12.4	32 15.6	90 16	09.1	31 48.5	90 15	08.9	27 16.3	91 11	06.5	2
3	40 02.2	87 25	14.8	39 36.1	87 25	14.5	38 17.6	87 23	13.5	37 51.4	88 23	13.2	37 25.1	88 22	12.9	32 06.1	89 16	09.5	31 39.3	89 16	09.3	27 09.5	90 12	06.7	3
4	39 47.0	86 26	15.3	39 21.2	86 26	15.0	38 03.7	86 24	14.0	37 37.8	87 24	13.7	37 11.8	87 23	13.4	31 56.3	88 17	09.9	31 29.7	89 17	09.6	27 02.5	90 12	07.0	4
25	39 31.2	85 27	15.9	39 05.8	85 27	15.6	37 49.3	85 25	14.5	37 23.6	86 24	14.2	36 58.0	86 24	13.9	31 46.1	87 18	10.3	31 19.8	88 17	10.0	26 55.3	89 13	07.3	25
6	39 14.9	83 28	16.4	38 49.9	84 27	16.1	37 34.3	84 26	15.0	37 09.0	84 25	14.7	36 43.7	85 25	14.4	31 35.5	87 18	10.6	31 09.5	87 18	10.3	26 47.7	88 13	07.5	6
7	38 58.1	82 29	17.0	38 33.4	82 28	16.6	37 18.9	83 26	15.5	36 54.0	83 26	15.2	36 28.9	84 25	14.9	31 24.5	86 19	11.0	30 58.8	86 18	10.7	26 39.9	87 13	07.8	7
8	38 40.8	81 30	17.5	38 16.5	81 29	17.1	37 03.0	82 27	16.0	36 38.4	82 27	15.7	36 13.7	82 26	15.3	31 13.2	84 19	11.3	30 47.8	85 19	11.0	26 31.9	86 14	08.1	8
9	38 23.0	80 31	18.0	37 59.0	80 30	17.6	36 46.6	81 28	16.5	36 22.4	81 27	16.1	35 58.0	81 27	15.8	31 01.5	83 20	11.7	30 36.4	84 20	11.4	26 23.5	85 14	08.3	9
30	38 04.7	79 31	18.5	37 41.1	79 31	18.1	36 29.8	80 29	17.0	36 05.9	80 28	16.6	35 41.9	80 28	16.2	30 49.5	82 21	12.0	30 24.7	83 20	11.7	26 14.9	84 15	08.6	30
1	37 45.8	77 32	19.0	37 22.6	78 32	18.6	36 12.5	78 30	17.4	35 49.0	79 29	17.1	35 25.4	79 28	16.7	30 37.1	81 21	12.4	30 12.7	81 21	12.0	26 06.1	83 15	08.8	1
2	37 26.6	76 33	19.5	37 03.7	76 32	19.1	35 54.8	77 30	17.9	35 31.6	77 30	17.5	35 08.4	78 29	17.1	30 24.4	80 22	12.7	30 00.3	80 21	12.4	25 57.0	82 16	09.1	2
3	37 06.8	75 34	20.0	36 44.4	75 33	19.6	35 36.6	76 31	18.3	35 13.8	76 30	17.9	34 51.0	76 30	17.5	30 11.4	79 22	13.1	29 47.7	79 22	12.7	25 47.7	81 16	09.3	3
4	36 46.6	73 34	20.4	36 24.6	74 34	20.0	35 18.0	74 32	18.8	34 55.6	75 31	18.4	34 33.2	75 30	18.0	29 58.0	78 23	13.4	29 34.6	78 22	13.0	25 38.1	80 16	09.5	4
35	36 26.0	72 35	20.9	36 04.4	72 34	20.5	34 59.0	73 32	19.2	34 37.0	73 32	18.8	34 14.9	74 31	18.4	29 44.3	77 23	13.7	29 21.3	77 23	13.3	25 28.3	79 17	09.8	35
6	36 05.0	71 36	21.3	35 43.8	71 35	20.9	34 39.6	72 33	19.6	34 18.0	72 32	19.2	33 56.3	72 32	18.8	29 30.3	75 24	14.0	29 07.7	76 23	13.6	25 18.3	77 17	10.0	6
7	35 43.5	69 36	21.8	35 22.7	69 36	21.3	34 19.8	70 34	20.0	33 58.6	71 33	19.6	33 37.3	71 32	19.2	29 16.0	74 24	14.3	28 53.8	74 24	13.9	25 08.0	76 18	10.2	7
8	35 21.6	68 37	22.2	35 01.3	68 36	21.7	33 59.6	69 34	20.4	33 38.8	69 34	20.0	33 18.0	70 33	19.5	29 01.4	73 25	14.6	28 39.6	73 24	14.2	24 57.5	75 18	10.5	8
9	34 59.4	66 38	22.6	34 39.4	67 37	22.1	33 39.0	68 35	20.8	33 18.7	68 34	20.3	32 58.2	68 33	19.9	28 46.5	71 25	14.9	28 25.0	72 25	14.5	24 46.8	74 18	10.7	9
40	34 36.7	65 38	23.0	34 17.2	65 38	22.5	33 18.1	66 35	21.2	32 58.2	67 35	20.7	32 38.1	67 34	20.3	28 31.3	70 26	15.2	28 10.3	70 25	14.8	24 35.8	72 19	10.9	40
1	34 13.7	63 39	23.4	33 54.6	64 38	22.9	32 56.8	65 36	21.5	32 37.3	65 35	21.1	32 17.7	65 35	20.6	28 15.9	69 26	15.5	27 55.2	69 26	15.1	24 24.7	71 19	11.1	1
2	33 50.3	62 40	23.8	33 31.7	62 39	23.3	32 35.2	63 37	21.9	32 16.1	64 36	21.4	31 57.0	64 35	21.0	28 00.1	67 27	15.8	27 39.9	68 26	15.3	24 13.3	70 19	11.3	2
3	33 26.6	60 40	24.1	33 08.4	61 39	23.6	32 13.2	62 37	22.2	31 54.6	62 36	21.8	31 35.9	63 36	21.3	27 44.1	66 27	16.0	27 24.3	66 26	15.6	24 01.8	69 20	11.5	3
4	33 02.6	59 41	24.5	32 44.8	59 40	24.0	31 50.9	60 38	22.6	31 32.7	61 37	22.1	31 14.4	61 36	21.6	27 27.8	65 28	16.3	27 08.4	65 27	15.9	23 50.0	67 20	11.7	4
45	32 38.2	57 41	24.8	32 20.9	58 40	24.3	31 28.3	59 38	22.9	31 10.6	59 37	22.4	30 52.7	60 37	22.0	27 11.3	63 28	16.6	26 52.3	64 27	16.1	23 38.0	66 20	11.9	45
6	32 13.5	56 42	25.2	31 56.6	56 41	24.7	31 05.4	57 39	23.2	30 48.1	58 38	22.7	30 30.7	58 37	22.3	26 54.5	62 28	16.8	26 35.9	62 28	16.4	23 25.9	65 21	12.1	6
7	31 48.5	54 42	25.5	31 32.1	55 41	25.0	30 42.2	56 39	23.5	30 25.4	56 38	23.1	30 08.4	57 38	22.6	26 37.5	60 29	17.0	26 19.4	61 28	16.6	23 13.5	63 21	12.3	7
8	31 23.2	53 43	25.8	31 07.2	53 42	25.3	30 18.7	54 40	23.8	30 02.3	55 39	23.4	29 45.8	55 38	22.9	26 20.3	59 29	17.3	26 02.5	59 28	16.8	23 01.0	62 21	12.5	8
9	30 57.6	51 43	26.1	30 42.1	52 42	25.6	29 54.9	53 40	24.1	29 39.0	53 39	23.6	29 23.0	54 39	23.2	26 02.8	57 30	17.5	25 45.5	58 29	17.1	22 48.3	60 21	12.6	9
50	30 31.7	50 44	26.4	30 16.7	50 43	25.9	29 30.9	51 40	24.4	29 15.4	52 40	23.9	28 59.9	52 39	23.4	25 45.1	56 30	17.7	25 28.2	56 29	17.3	22 35.4	59 22	12.8	50
1	30 05.6	48 44	26.7	29 51.0	49 43	26.2	29 06.6	50 41	24.7	28 51.6	50 40	24.2	28 36.5	51 39	23.7	25 27.1	54 30	18.0	25 10.7	55 29	17.5	22 22.4	57 22	13.0	1
2	29 39.2	47 44	27.0	29 25.1	47 44	26.5	28 42.1	48 41	24.9	28 27.5	49 41	24.4	28 12.9	49 40	24.0	25 09.0	53 31	18.2	24 53.1	53 30	17.7	22 09.2	56 22	13.1	2
3	29 12.6	45 45	27.2	28 58.9	46 44	26.7	28 17.3	47 42	25.2	28 03.2	47 41	24.7	27 49.0	48 40	24.2	24 50.7	51 31	18.4	24 35.2	52 30	17.9	21 55.8	54 23	13.3	3
4	28 45.7	44 45	27.5	28 32.5	44 44	27.0	27 52.3	45 42	25.4	27 38.7	46 41	24.9	27 24.9	46 40	24.4	24 32.1	50 31	18.6	24 17.1	50 30	18.1	21 42.3	53 23	13.5	4
55	28 18.6	42 46	27.7	28 05.9	43 45	27.2	27 27.1	44 42	25.7	27 13.9	44 42	25.2	27 00.6	44 41	24.7	24 13.4	48 32	18.8	23 58.8	49 31	18.3	21 28.6	51 23	13.6	55
6	27 51.3	41 46	28.0	27 39.1	41 45	27.4	27 01.6	42 43	25.9	26 48.9	43 42	25.4	26 36.1	43 41	24.9	23 54.5	47 32	19.0	23 40.4	47 31	18.5	21 14.8	50 23	13.8	6
7	27 23.8	39 46	28.2	27 12.0	39 45	27.7	26 36.0	41 43	26.1	26 23.8	41 42	25.6	26 11.4	41 42	25.1	23 35.4	45 32	19.1	23 21.8	46 31	18.7	21 00.8	48 24	13.9	7
8	26 56.1	38 46	28.4	26 44.8	38 46	27.9	26 10.2	39 43	26.3	25 58.4	39 43	25.8	25 46.5	40 42	25.3	23 16.1	44 32	19.3	23 03.0	44 32	18.8	20 46.7	47 24	14.0	8
9	26 28.2	36 47	28.6	26 17.4	36 46	28.1	25 44.1	37 44	26.5	25 32.8	38 43	26.0	25 21.4	38 42	25.5	22 56.7	42 33	19.5	22 44.0	42 32	19.0	20 32.5	45 24	14.2	9
60	26 00.1	34 47	28.8	25 49.7	35 46	28.3	25 17.9	36 44	26.7	25 07.1	36 43	26.2	24 56.2	37 42	25.7	22 37.1	41 33	19.6	22 24.9	41 32	19.2	20 18.1	44 24	14.3	60
1	25 31.9	33 47	29.0	25 22.0	33 47	28.5	24 51.6	34 44	26.9	24 41.2	35 43	26.4	24 30.7	35 43	25.9	22 17.4	39 33	19.8	22 05.7	39 32	19.3	20 03.6	42 24	14.4	1
2	25 03.5	31 48	29.2	24 54.0	32 47	28.6	24 25.0	33 44	27.1	24 15.1	33 44	26.6	24 05.2	33 43	26.0	21 57.5	37 33	19.9	21 46.3	38 33	19.4	19 49.0	40 25	14.5	2
3	24 34.9	30 48	29.3	24 25.9	30 47	28.8	23 58.3	31 45	27.2	23 48.9	32 44	26.7	23 39.4	32 43	26.2	21 37.5	36 34	20.1	21 26.7	36 33	19.6	19 34.3	39 25	14.6	3
4	24 06.2	28 48	29.5	23 57.7	29 47	29.0	23 31.5	30 45	27.4	23 22.6	30 44	26.9	23 13.5	30 43	26.4	21 17.4	34 34	20.2	21 07.1	34 33	19.7	19 19.5	37 25	14.7	4
65	23 37.3	27 48	29.6	23 29.3	27 48	29.1	23 04.5	28 45	27.5	22 56.1	28 44	27.0	22 47.5	29 44	26.5	20 57.1	33 34	20.4	20 47.3	33 33	19.8	19 04.5	36 25	14.8	65
6	23 08.4	25 48	29.8	23 00.8	26 48	29.3	22 37.4	26 45	27.7	22 29.4	27 45	27.2	22 21.3	27 44	26.6	20 36.7	31 34	20.5	20 27.4	31 33	20.0	18 49.5	34 25	14.9	6
7	22 39.3	24 49	29.9	22 32.2	24 48	29.4	22 10.2	25 46	27.8	22 02.7	25 45	27.3	21 55.1	26 44	26.8	20 16.2	29 34	20.6	20 07.4	30 34	20.1	18 34.4	32 25	15.0	7
8	22 10.1	22 49	30.0	22 03.4	22 48	29.5	21 42.9	23 46	27.9	21 35.8	24 45	27.4	21 28.7	24 44	26.9	19 55.6	28 35	20.7	19 47.3	28 34	20.2	18 19.2	31 26	15.1	8
9	21 40.7	20 49	30.2	21 34.6	21 48	29.6	21 15.4	22 46	28.1	21 08.8	22 45	27.5	21 02.2	22 44	27.0	19 34.9	26 35	20.8	19 27.0	26 34	20.3	18 03.9	29 26	15.2	9
70	21 11.3	19 49	30.3	21 05.6	19 48	29.7	20 47.9	20 46	28.2	20 41.8	20 45	27.6	20 35.6	21 44	27.1	19 14.1	24 35	20.9	19 06.7	25 34	20.4	17 48.5	27 26	15.3	70
1	20 41.8	17 49	30.4	20 36.6	18 49	29.8	20 20.2	19 46	28.3	20 14.6	19 45	27.7	20 08.9	19 45	27.2	18 53.2	23 35	21.0	18 46.3	23 34	20.5	17 33.0	26 26	15.4	1
2	20 12.2	16 49	30.4	20 07.4	16 49	29.9	19 52.5	17 46	28.3	19 47.4	17 46	27.8	19 42.1	18 45	27.3	18 32.2	21 35	21.1	18 25.8	21 34	20.6	17 17.5	24 26	15.4	2
3	19 42.6	14 50	30.5	19 38.3	15 49	30.0	19 24.7	15 46	28.4	19 20.0	16 46	27.9	19 15.3	16 45	27.4	18 11.2	20 35	21.1	18 05.3	20 34	20.6	17 01.9	22 26	15.5	3
4	19 12.8	13 50	30.6	19 09.0	13 49	30.1	18 56.9	14 47	28.5	18 52.7	14 46	28.0	18 48.4	14 45	27.5	17 50.0	18 35	21.2	17 44.6	18 34	20.7	16 46.2	21 26	15.6	4
75	18 43.1	11 50	30.7	18 39.7	11 49	30.1	18 28.9	12 47	28.6	18 25.2	13 46	28.0	18 21.4	13 45	27.5	17 28.8	16 35	21.3	17 23.9	16 35	20.8	16 30.5	19 26	15.6	75
6	18 13.2	10 50	30.7	18 10.3	10 49	30.2	18 01.0	11 47	28.6	17 57.7	11 46	28.1	17 54.3	11 45	27.6	17 07.6	15 36	21.3	17 03.2	15 35	20.8	16 14.8	17 26	15.7	6
7	17 43.3	08 50	30.8	17 40.9	08 49	30.2	17 32.9	09 47	28.7	17 30.1	09 46	28.1	17 27.2	10 45	27.6	16 46.3	13 36	21.4	16 42.4	13 35	20.9	15 59.0	16 26	15.7	7
8	17 13.4	07 50	30.8	17 11.4	07 49	30.3	17 04.9	08 47	28.7	17 02.5	08 46	28.2	17 00.1	08 45	27.7	16 25.0	11 36	21.4	16 21.5	12 35	20.9	15 43.1	14 26	15.8	8
9	16 43.5	05 50	30.8	16 41.9	06 49	30.3	16 36.8	06 47	28.7	16 34.9	06 46	28.2	16 33.0	07 45	27.7	16 03.6	10 36	21.5	16 00.6	10 35	21.0	15 27.2	12 27	15.8	9
80	16 13.5	04 50	30.9	16 12.4	04 49	30.3	16 08.6	05 47	28.8	16 07.2	05 46	28.3	16 05.8	05 45	27.7	15 42.2	08 36	21.5	15 39.7	08 35	21.0	15 11.3	11 27	15.8	80
1	15 43.5	02 50	30.9	15 42.9	02 49	30.3	15 40.5	03 47	28.8	15 39.6	03 46	28.3	15 38.5	03 45	27.8	15 20.7	06 36	21.5	15 18.8	07 35	21.0	14 55.3	09 27	15.9	1
2	15 13.5	01 50	30.9	15 13.3	01 49	30.4	15 12.3	01 47	28.8	15 11.9	02 46	28.3	15 11.3	02 45	27.8	14 59.2	05 36	21.6	14 57.8	05 35	21.0	14 39.3	07 27	15.9	2
3	14 43.5	01 50	30.9	14 43.8	01 49	30.4	14 44.2	00 47	28.8	14 44.2	00 46	28.3	14 44.1	00 45	27.8	14 37.8	03 36	21.6	14 36.8	03 35	21.1	14 23.3	06 27	15.9	3
4	14 13.5	03 50	30.9	14 14.2	02 49	30.3	14 16.0	02 47	28.8	14 16.5	01 46	28.3	14 16.8	01 45	27.8	14 16.3	01 36	21.6	14 15.8	02 35	21.1	14 07.3	04 27	15.9	4
85	13 43.5	04 50	30.8	13 44.7	04 49	30.3	13 47.8	03 47	28.8	13 48.8	03 46	28.3	13 49.6	03 45	27.8	13 54.8	00 36	21.6	13 54.8	00 35	21.1	13 51.3	02 27	15.9	85
6	13 13.6	06 50	30.8	13 15.2	05 49	30.3	13 19.7	05 47	28.8	13 21.1	04 46	28.3	13 22.4	04 45	27.7	13 33.3	02 36	21.6	13 33.8	02 35	21.1	13 35.3	01 27	15.9	6
7	12 43.6	07 50	30.8	12 45.7	07 49	30.3	12 51.6	06 47	28.7	12 53.4	06 46	28.2	12 55.2	06 45	27.7	13 11.8	03 36	21.6	13 12.8	03 35	21.1	13 19.2	01 27	15.9	7
8	12 13.7	08 50	30.8	12 16.2	08 49	30.2	12 23.5	08 47	28.7	12 25.8	08 46	28.2	12 28.0	07 45	27.7	12 50.3	05 36	21.6	12 51.8	05 35	21.0	13 03.2	03 27	15.9	8
9	11 43.9	10 50	30.7	11 46.8	10 49	30.2	11 55.4	09 47	28.7	11 58.2	09 46	28.2	12 00.8	09 45	27.7	12 28.8	07 36	21.5	12 30.8	06 35	21.0	12 47.2	04 27	15.9	9
90	11 14.0	11 50	30.6	11 17.4	11 49	30.1	11 27.4	11 47	28.6	11 30.6	11 46	28.1	11 33.7	10 45	27.6	12 07.4	08 36	21.5	12 09.8	08 35	21.0	12 31.2	06 27	15.9	90

H.A.	60° 00′	60° 30′	62° 00′	62° 30′	63° 00′	69° 00′	69° 30′	74° 30′	H.A.
	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	
°	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	°
00	17 00.0 1.0 00 180.0	16 30.0 1.0 00 180.0	15 00.0 1.0 00 180.0	14 30.0 1.0 00 180.0	14 00.0 1.0 00 180.0	8 00.0 1.0 00 180.0	7 30.0 1.0 00 180.0		00
1	16 59.7 1.0 01 179.5	16 29.7 1.0 01 179.5	14 59.8 1.0 01 179.5	14 29.8 1.0 01 179.5	13 59.8 1.0 01 179.5	7 59.8 1.0 01 179.6	7 29.8 1.0 01 179.6		1
2	16 58.9 1.0 02 179.0	16 29.0 1.0 02 179.0	14 59.0 1.0 02 179.0	14 29.0 1.0 02 179.0	13 59.0 1.0 02 179.1	7 59.3 1.0 02 179.3	7 29.3 1.0 02 179.3		2
3	16 57.6 1.0 03 178.4	16 27.6 1.0 03 178.5	14 57.8 1.0 03 178.5	14 27.8 1.0 03 178.6	13 57.9 1.0 03 178.6	7 58.3 1.0 02 178.9	7 28.4 1.0 02 178.9		3
4	16 55.7 1.0 04 177.9	16 25.8 1.0 04 177.9	14 56.0 1.0 04 178.1	14 26.1 1.0 04 178.1	13 56.2 1.0 04 178.1	7 57.0 1.0 03 178.6	7 27.1 1.0 03 178.6		4
05	16 53.3 1.0 05 177.4	16 23.5 1.0 05 177.4	14 53.8 1.0 05 177.6	14 23.9 1.0 04 177.6	13 54.0 1.0 04 177.7	7 55.4 1.0 03 178.2	7 25.5 1.0 03 178.2		05
6	16 50.4 99 06 176.9	16 20.6 99 06 176.9	14 51.1 99 05 177.1	14 21.3 99 05 177.1	13 51.4 99 05 177.2	7 53.4 99 04 177.8	7 23.5 99 04 177.9		6
7	16 47.0 99 07 176.4	16 17.2 99 07 176.4	14 47.9 99 06 176.6	14 18.1 99 06 176.7	13 48.3 99 06 176.7	7 51.0 99 05 177.5	7 21.2 99 04 177.5		7
8	16 43.0 99 08 175.8	16 13.3 99 07 175.9	14 44.2 99 07 176.1	14 14.5 99 07 176.2	13 44.8 99 07 176.3	7 48.2 99 05 177.1	7 18.5 99 05 177.2		8
9	16 38.5 99 08 175.3	16 08.8 99 08 175.4	14 40.0 99 08 175.6	14 10.3 99 08 175.7	13 40.7 99 08 175.8	7 45.1 99 06 176.8	7 15.4 99 06 176.8		9
10	16 33.4 98 09 174.8	16 03.9 98 09 174.9	14 35.3 98 09 175.2	14 05.8 98 08 175.3	13 36.2 98 08 175.3	7 41.6 99 06 176.4	7 12.0 99 06 176.5		10
1	16 27.9 98 10 174.3	15 58.4 98 10 174.4	14 30.1 98 09 174.7	14 00.7 98 09 174.8	13 31.2 98 09 174.9	7 37.7 98 07 176.0	7 08.3 98 07 176.1		1
2	16 21.8 98 11 173.8	15 52.5 98 11 173.9	14 24.5 98 10 174.2	13 55.1 98 10 174.3	13 25.8 98 10 174.4	7 33.5 98 08 175.7	7 04.2 98 07 175.8		2
3	16 15.2 97 12 173.3	15 46.0 97 12 173.4	14 18.3 97 11 173.7	13 49.1 97 11 173.9	13 19.9 97 11 174.0	7 29.0 98 08 175.3	6 59.7 98 08 175.4		3
4	16 08.1 97 13 172.8	15 39.0 97 12 172.9	14 11.7 97 12 173.3	13 42.6 97 12 173.4	13 13.5 97 11 173.5	7 24.0 97 09 175.0	6 54.9 97 09 175.1		4
15	16 00.5 96 14 172.3	15 31.5 97 13 172.4	14 04.6 97 13 172.8	13 35.7 97 12 172.9	13 06.7 97 12 173.1	7 18.7 97 09 174.6	6 49.7 97 09 174.8		15
6	15 52.4 96 14 171.8	15 23.5 96 14 171.9	13 57.1 96 13 172.3	13 28.3 96 13 172.5	12 59.4 96 13 172.6	7 13.1 96 10 174.3	6 44.2 96 10 174.4		6
7	15 43.7 96 15 171.3	15 15.1 96 15 171.4	13 49.1 96 14 171.9	13 20.4 96 14 172.0	12 51.7 96 14 172.2	7 07.1 96 11 173.9	6 38.3 96 10 174.1		7
8	15 34.6 95 16 170.8	15 06.1 95 16 170.9	13 40.6 95 15 171.4	13 12.0 95 15 171.6	12 43.5 95 14 171.7	7 00.7 95 11 173.6	6 32.2 95 11 173.7		8
9	15 25.0 94 17 170.3	14 56.6 94 17 170.4	13 31.6 95 16 171.0	13 03.2 95 15 171.1	12 34.9 95 15 171.3	6 54.0 95 12 173.3	6 25.6 95 11 173.4		9
20	15 14.9 94 18 169.8	14 46.7 94 17 170.0	13 22.2 94 16 170.5	12 54.0 94 16 170.7	12 25.8 94 16 170.9	6 47.0 94 12 172.9	6 18.7 94 12 173.1		20
1	15 04.3 93 18 169.3	14 36.3 93 18 169.5	13 12.3 93 17 170.0	12 44.3 93 17 170.2	12 16.3 93 17 170.4	6 39.6 94 13 172.6	6 11.5 94 13 172.7		1
2	14 53.2 93 19 168.8	14 25.4 93 19 169.0	13 02.0 93 18 169.6	12 34.2 93 18 169.8	12 06.3 93 17 170.0	6 31.9 93 13 172.2	6 04.0 93 13 172.4		2
3	14 41.6 92 20 168.3	14 14.0 92 20 168.6	12 51.2 92 19 169.2	12 23.6 92 18 169.4	11 55.9 92 18 169.6	6 23.8 92 14 171.9	5 56.1 92 14 172.1		3
4	14 29.5 91 21 167.9	14 02.2 91 20 168.1	12 40.0 91 19 168.7	12 12.6 91 19 168.9	11 45.1 91 19 169.1	6 15.4 92 15 171.6	5 47.9 92 14 171.8		4
25	14 17.0 91 22 167.4	13 49.9 91 21 167.6	12 28.3 91 20 168.3	12 01.1 91 20 168.5	11 33.9 91 19 168.7	6 06.7 91 15 171.2	5 39.4 91 15 171.4		25
6	14 04.1 90 22 166.9	13 37.1 90 22 167.2	12 16.2 90 21 167.8	11 49.2 90 20 168.1	11 22.2 90 20 168.3	5 57.6 90 16 170.9	5 30.5 90 15 171.1		6
7	13 50.6 89 23 166.5	13 23.9 89 23 166.7	12 03.7 89 22 167.4	11 36.9 89 21 167.6	11 10.2 89 21 167.9	5 48.2 90 16 170.6	5 21.3 90 16 170.8		7
8	13 36.7 88 24 166.0	13 10.2 88 24 166.3	11 50.7 88 22 167.0	11 24.2 88 22 167.2	10 57.7 88 22 167.5	5 38.5 89 17 170.3	5 11.8 89 16 170.5		8
9	13 22.4 87 25 165.6	12 56.1 87 24 165.8	11 37.4 88 23 166.6	11 11.1 88 23 166.8	10 44.8 88 22 167.1	5 28.4 88 17 169.9	5 02.0 88 17 170.2		9
30	13 07.6 87 25 165.1	12 41.6 87 25 165.4	11 23.6 87 24 166.1	10 57.5 87 23 166.4	10 31.5 87 23 166.7	5 18.1 87 18 169.6			30
1	12 52.4 86 26 164.7	12 26.6 86 26 164.9	11 09.4 86 24 165.7	10 43.6 86 24 166.0	10 17.8 86 24 166.3	5 07.4 86 18 169.3			1
2	12 36.7 85 27 164.2	12 11.2 85 26 164.5	10 54.8 85 25 165.3	10 29.2 85 25 165.6	10 03.7 85 24 165.9				2
3	12 20.6 84 28 163.8	11 55.4 84 27 164.1	10 39.7 84 26 164.9	10 14.5 84 25 165.2	9 49.2 84 25 165.5				3
4	12 04.1 83 28 163.4	11 39.2 83 28 163.7	10 24.3 83 26 164.5	9 59.3 83 26 164.8	9 34.4 83 25 165.1				4
35	11 47.2 82 29 163.0	11 22.6 82 28 163.3	10 08.5 82 27 164.1	9 43.8 82 26 164.4	9 19.1 82 26 164.7				35
6	11 29.9 81 30 162.5	11 05.5 81 29 162.8	9 52.3 81 28 163.7	9 27.9 81 27 164.0	9 03.5 81 27 164.3				6
7	11 12.1 80 30 162.1	10 48.1 80 30 162.4	9 35.8 80 28 163.3	9 11.7 80 28 163.7	8 47.5 80 27 164.0				7
8	10 54.0 79 31 161.7	10 30.2 79 30 162.0	9 18.8 79 29 163.0	8 55.0 79 28 163.3	8 31.2 80 28 163.6				8
9	10 35.5 78 32 161.3	10 12.0 78 31 161.6	9 01.5 78 29 162.6	8 38.0 78 29 162.9	8 14.5 78 28 163.2				9
40	10 16.6 77 32 160.9	9 53.4 77 32 161.3	8 43.9 77 30 162.2	8 20.7 77 30 162.5	7 57.4 77 29 162.9				40
1	9 57.3 76 33 160.5	9 34.4 76 32 160.9	8 25.8 76 31 161.9	8 02.9 76 30 162.2	7 40.0 76 30 162.5				1
2	9 37.6 75 33 160.2	9 15.1 75 33 160.5	8 07.5 75 31 161.5	7 44.9 75 31 161.8	7 22.3 75 30 162.2				2
3	9 17.6 74 34 159.8	8 55.4 74 33 160.1	7 48.7 74 32 161.1	7 26.5 74 31 161.5	7 04.2 74 31 161.8				3
4	8 57.2 73 35 159.4	8 35.4 73 34 159.8	7 29.7 73 32 160.8	7 07.8 73 32 161.1	6 45.8 73 31 161.5				4
45	8 36.5 72 35 159.0	8 15.0 72 35 159.4	7 10.3 72 33 160.5	6 48.7 72 32 160.8	6 27.1 72 32 161.2				45
6	8 15.4 71 36 158.7	7 54.2 71 35 159.0	6 50.6 71 33 160.1	6 29.3 71 33 160.5	6 08.0 71 32 160.8				6
7	7 54.0 69 36 158.3	7 33.2 70 36 158.7	6 30.5 70 34 159.8	6 09.6 70 33 160.1	5 48.7 70 33 160.5				7
8	7 32.3 68 37 158.0	7 11.8 68 36 158.4	6 10.2 69 34 159.5	5 49.6 69 34 159.8	5 29.0 69 33 160.2				8
9	7 10.2 67 37 157.6	6 50.0 67 37 158.0	5 49.5 67 35 159.1	5 29.3 67 34 159.5	5 09.0 67 34 159.9				9
50	6 47.8 66 38 157.3	6 28.0 66 37 157.7	5 28.5 66 35 158.8	5 08.7 66 35 159.2					50
1	6 25.1 65 38 157.0	6 05.6 65 38 157.4	5 07.2 65 36 158.5						1
2	6 02.1 64 39 156.7	5 43.0 64 38 157.0							2
3	5 38.8 62 39 156.3	5 20.1 62 39 156.7							3
4	5 15.2 61 40 156.0								4

DECLINATION SAME NAME AS LATITUDE

H.A.	60° 00′	60° 30′	62° 00′	62° 30′	63° 00′	69° 00′	69° 30′	74° 30′	H.A.
	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	
°	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	°
91	10 44.3 13 50 30.6	10 48.1 13 49 30.1	10 59.4 12 47 28.6	11 03.1 12 46 28.1	11 06.7 12 45 27.6	11 46.0 10 36 21.5	11 48.9 10 35 21.0	12 15.2 08 27 15.9	91
2	10 14.5 14 49 30.5	10 18.8 14 49 30.0	10 31.5 14 46 28.5	10 35.6 14 46 28.0	10 39.7 13 45 27.5	11 24.6 11 36 21.4	11 28.0 11 35 20.9	11 59.2 09 27 15.8	2
3	9 44.9 16 49 30.4	9 49.6 16 49 29.9	10 03.6 15 46 28.4	10 08.2 15 46 27.9	10 12.7 15 45 27.4	11 03.2 13 36 21.4	11 07.1 13 35 20.9	11 43.2 11 27 15.8	3
4	9 15.3 17 49 30.4	9 20.5 17 48 29.9	9 35.8 17 46 28.4	9 40.8 17 45 27.9	9 45.8 17 45 27.4	10 41.9 15 35 21.3	10 46.3 14 35 20.8	11 27.3 13 26 15.8	4
95	8 45.8 19 49 30.3	8 51.4 19 48 29.8	9 08.1 18 46 28.3	9 13.5 18 45 27.8	9 19.0 18 45 27.3	10 20.7 16 35 21.3	10 25.6 16 35 20.8	11 11.4 14 26 15.7	95
6	8 16.4 20 49 30.2	8 22.4 20 48 29.7	8 40.4 20 46 28.2	8 46.3 20 45 27.7	8 52.2 20 44 27.2	9 59.5 18 35 21.2	10 04.8 18 34 20.7	10 55.6 16 26 15.7	6
7	7 47.0 22 49 30.1	7 53.5 22 48 29.6	8 12.8 21 46 28.1	8 19.2 21 45 27.6	8 25.5 21 44 27.1	9 38.4 19 35 21.1	9 44.2 19 34 20.7	10 39.8 18 26 15.7	7
8	7 17.8 23 49 29.9	7 24.7 23 48 29.5	7 45.4 23 46 28.0	7 52.2 23 45 27.5	7 58.9 23 44 27.0	9 17.3 21 35 21.1	9 23.6 21 34 20.6	10 24.0 19 26 15.6	8
9	6 48.7 25 48 29.8	6 56.1 25 48 29.3	7 18.0 24 45 27.9	7 25.2 24 45 27.4	7 32.5 24 44 26.9	8 56.3 23 35 21.0	9 03.1 22 34 20.5	10 08.3 21 26 15.6	9
100	6 19.7 26 48 29.7	6 27.5 26 47 29.2	6 50.7 26 45 27.8	6 58.4 26 45 27.3	7 06.1 25 44 26.8	8 35.4 24 35 20.9	8 42.7 24 34 20.4	9 52.7 23 26 15.5	100
1	5 50.8 27 48 29.6	5 59.0 27 47 29.1	6 23.5 27 45 27.6	6 31.7 27 44 27.1	6 39.8 27 44 26.7	8 14.6 26 35 20.8	8 22.3 26 34 20.3	9 37.1 24 26 15.4	1
2	5 22.0 29 48 29.4	5 30.6 29 47 28.9	5 56.5 29 45 27.5	6 05.1 29 44 27.0	6 13.6 28 43 26.5	7 53.9 27 34 20.7	8 02.0 27 34 20.2	9 21.6 26 26 15.4	2
3		5 02.4 30 47 28.8	5 29.6 30 45 27.4	5 38.6 30 44 26.9	5 47.5 30 43 26.4	7 33.2 29 34 20.6	7 41.9 29 33 20.1	9 06.1 27 26 15.3	3
4			5 02.8 31 44 27.2	5 12.2 31 44 26.7	5 21.6 31 43 26.3	7 12.7 30 34 20.5	7 21.8 30 33 20.0	8 50.7 29 26 15.2	4
105						6 52.3 32 34 20.4	7 01.8 32 33 19.9	8 35.4 31 25 15.1	105
6						6 31.9 33 34 20.3	6 41.9 33 33 19.8	8 20.2 32 25 15.0	6
7						6 11.7 35 33 20.2	6 22.2 35 33 19.7	8 05.1 34 25 15.0	7
8						5 51.6 36 33 20.0	6 02.5 36 33 19.6	7 50.0 35 25 14.9	8
9						5 31.7 38 33 19.9	5 43.0 38 32 19.4	7 35.1 37 25 14.8	9
110						5 11.8 39 33 19.8	5 23.6 39 32 19.3	7 20.2 38 25 14.7	110
1							5 04.4 41 32 19.2	7 05.5 40 24 14.6	1
2								6 50.8 41 24 14.5	2
3								6 36.3 43 24 14.3	3
4								6 21.9 44 24 14.2	4
115								6 07.6 46 24 14.1	115
6								5 53.4 47 23 14.0	6
7								5 39.4 49 23 13.8	7
8								5 25.4 50 23 13.7	8
9								5 11.6 52 23 13.6	9

Lat. 13°

STAR IDENTIFICATION TABLE

ALTITUDE

AZ.	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	81	180	85	180	89	180	87	00	83	00	79	00	75	00	71	00	67	00	63	00	59	00	00
4	80	156	84	141	86	104	85	52	82	28	78	18	75	13	71	10	67	08	63	07	59	06	4
8	78	138	81	122	82	96	82	68	80	47	77	33	73	25	70	20	66	16	62	13	58	11	8
12	75	126	77	112	78	94	78	74	77	57	74	44	71	35	68	28	65	23	61	19	57	16	12
16	72	118	73	106	74	92	74	77	73	63	71	52	69	42	66	35	63	29	60	25	56	21	16
20	68	113	70	102	70	91	70	79	70	67	68	57	66	48	64	41	61	35	58	29	55	25	20
24	65	109	66	100	67	90	67	80	66	70	65	61	63	52	61	45	58	39	56	34	53	29	24
28	61	106	62	97	63	89	63	80	62	72	61	63	60	56	58	49	56	43	53	37	51	32	28
32	57	103	58	96	59	88	59	81	59	73	58	65	57	58	55	52	53	46	51	40	49	35	32
36	53	101	54	94	55	88	55	81	55	74	54	67	53	60	52	54	50	48	48	43	46	38	36
40	49	99	50	93	51	87	51	81	51	74	51	68	50	62	49	56	47	50	46	45	44	40	40
44	46	98	47	92	47	86	47	80	47	74	47	69	46	63	46	57	44	52	43	47	41	42	44
48	42	96	43	91	43	86	44	80	44	75	43	69	43	64	42	58	41	53	40	48	39	43	48
52	38	95	39	90	39	85	40	80	40	75	40	69	39	64	39	59	38	54	37	49	36	44	52
56	34	94	35	89	35	84	36	80	36	75	36	70	36	65	36	60	35	55	34	50	33	45	56
60	30	93	31	88	32	84	32	79	32	74	32	70	32	65	32	60	32	55	31	51	30	46	60
64	26	92	27	88	28	83	28	79	29	74	29	70	29	65	29	60	29	56	28	51	28	47	64
68	22	91	23	87	24	82	24	78	25	74	25	69	25	65	25	60	25	56	25	52	25	47	68
72	18	90	19	86	20	82	21	78	21	73	22	69	22	65	22	60	22	56	22	52	22	48	72
76	15	89	15	85	16	81	17	77	17	73	18	69	18	64	19	60	19	56	19	52	19	48	76
80	11	88	11	84	12	80	13	76	14	72	14	68	15	64	15	60	16	56	16	52	16	48	80
84	07	87	08	83	08	80	09	76	10	72	11	68	11	64	12	60	12	55	13	51	13	47	84
88	03	87	04	83	05	79	05	75	06	71	07	67	08	63	09	59	09	55	10	51	10	47	88
92	*01*	86	*00*	82	01	78	02	74	03	70	03	66	04	62	05	58	06	54	07	50	08	46	92
96	*05*	85	*04*	81	*03*	77	*02*	73	*01*	69	*00*	65	01	61	02	58	03	54	04	50	05	46	96
100	*09*	84	*08*	80	*07*	76	*06*	72	*05*	68	*04*	64	*03*	61	*01*	57	*00*	53	01	49	02	45	100
104	*13*	83	*12*	79	*11*	75	*09*	71	*08*	67	*07*	63	*06*	59	*05*	56	*03*	52	*02*	48	*01*	44	104
108	*17*	82	*15*	78	*14*	74	*13*	70	*12*	66	*11*	62	*09*	58	*08*	55	*06*	51	*05*	47	*03*	43	108
112	*20*	81	*19*	77	*18*	73	*17*	69	*15*	65	*14*	61	*13*	57	*11*	53	*09*	49	*08*	46	*06*	42	112
116	*24*	79	*23*	75	*22*	71	*20*	67	*19*	63	*17*	59	*16*	56	*14*	52	*12*	48	*11*	44	*09*	41	116
120	*28*	78	*27*	74	*25*	70	*24*	66	*22*	62	*21*	58	*19*	54	*17*	50	*15*	47	*13*	43	*11*	39	120
124	*32*	77	*31*	72	*29*	68	*28*	64	*26*	60	*24*	56	*22*	52	*20*	48	*18*	45	*16*	41	*14*	38	124
128	*36*	75	*34*	71	*33*	66	*31*	62	*29*	58	*27*	54	*25*	50	*23*	47	*21*	43	*18*	39	*16*	36	128
132	*39*	74	*38*	69	*36*	64	*34*	60	*32*	56	*30*	52	*28*	48	*26*	44	*23*	41	*21*	38	*18*	34	132
136	*43*	72	*42*	67	*40*	62	*38*	58	*36*	53	*33*	49	*31*	46	*28*	42	*26*	39	*23*	35	*20*	32	136
140	*47*	69	*45*	64	*43*	59	*41*	55	*39*	51	*36*	47	*34*	43	*31*	39	*28*	36	*25*	33	*22*	30	140
144	*50*	67	*49*	62	*46*	56	*44*	52	*42*	48	*39*	44	*36*	40	*33*	37	*30*	33	*27*	30	*24*	28	144
148	*54*	64	*52*	58	*50*	53	*47*	48	*44*	44	*42*	40	*39*	37	*36*	34	*32*	31	*29*	28	*26*	25	148
152	*57*	60	*55*	54	*53*	49	*50*	44	*47*	40	*44*	37	*41*	33	*38*	30	*34*	27	*31*	25	*28*	22	152
156	*61*	56	*58*	50	*55*	45	*53*	40	*49*	36	*46*	32	*43*	29	*39*	27	*36*	24	*32*	22	*29*	20	156
160	*64*	51	*61*	44	*58*	39	*55*	35	*52*	31	*48*	28	*45*	25	*41*	23	*37*	20	*34*	18	*30*	17	160
164	*67*	44	*64*	38	*60*	33	*57*	29	*53*	26	*50*	23	*46*	21	*42*	18	*39*	17	*35*	15	*31*	13	164
168	*69*	36	*66*	30	*62*	26	*59*	23	*55*	20	*51*	18	*47*	16	*44*	14	*40*	13	*36*	11	*32*	10	168
172	*71*	26	*68*	21	*64*	18	*60*	15	*56*	14	*52*	12	*48*	11	*44*	10	*40*	09	*36*	08	*33*	07	172
176	*73*	13	*69*	11	*65*	09	*61*	08	*57*	07	*53*	06	*49*	05	*45*	05	*41*	04	*37*	04	*33*	03	176
180	*73*	00	*69*	00	*65*	00	*61*	00	*57*	00	*53*	00	*49*	00	*45*	00	*41*	00	*37*	00	*33*	00	180
	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		

16—8473

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

STAR IDENTIFICATION TABLE

ALTITUDE

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

16—6472

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

Lat. 14°

H.A.	0° 00′				0° 30′				1° 00′				1° 30′				2° 00′				2° 30′				3° 00′				3° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	76 00.0	1.0	04	180.0	76 30.0	1.0	04	180.0	77 00.0	1.0	04	180.0	77 30.0	1.0	04	180.0	78 00.0	1.0	04	180.0	78 30.0	1.0	04	180.0	79 00.0	1.0	04	180.0	79 30.0	1.0	05	180.0	00
1	75 57.9	1.0	10	175.9	76 27.8	1.0	11	175.7	76 57.7	1.0	11	175.6	77 27.7	1.0	12	175.4	77 57.6	1.0	12	175.2	78 27.5	1.0	13	175.0	78 57.3	1.0	13	174.8	79 27.2	1.0	14	174.5	1
2	75 51.6	99	17	171.8	76 21.3	99	18	171.5	76 51.0	99	18	171.2	77 20.7	99	19	170.8	77 50.3	99	20	170.5	78 19.9	99	21	170.1	78 49.4	98	22	169.6	79 19.0	98	23	169.2	2
3	75 41.3	98	24	167.8	76 10.6	98	25	167.3	76 39.9	98	25	166.9	77 09.2	97	26	166.4	77 38.3	97	27	165.9	78 07.5	97	28	165.3	78 36.5	97	30	164.7	79 05.4	96	31	164.0	3
4	75 27.0	96	30	163.9	75 55.9	96	31	163.3	76 24.7	96	32	162.7	76 53.4	95	33	162.1	77 21.9	95	34	161.4	77 50.4	95	36	160.7	78 18.7	94	37	159.9	78 46.9	94	38	159.0	4
05	75 09.0	94	36	160.1	75 37.3	94	37	159.5	76 05.5	94	38	158.7	76 33.5	93	39	158.0	77 01.3	93	41	157.2	77 29.0	92	42	156.3	77 56.6	91	44	155.4	78 23.9	91	45	154.4	05
6	74 47.5	92	41	156.5	75 15.1	92	43	155.8	75 42.6	91	44	155.0	76 09.8	91	45	154.1	76 36.9	90	47	153.2	77 03.7	89	48	152.2	77 30.4	88	50	151.2	77 56.7	87	51	150.0	6
7	74 22.7	90	46	153.1	74 49.6	89	48	152.3	75 16.3	89	49	151.4	75 42.7	88	50	150.4	76 08.9	87	52	149.4	76 34.9	86	53	148.4	77 00.5	85	55	147.2	77 25.9	84	57	146.0	7
8	73 54.9	87	51	149.8	74 21.0	87	52	148.9	74 46.8	86	54	148.0	75 12.4	85	55	147.0	75 37.8	84	57	145.9	76 02.8	83	58	144.8	76 27.5	82	60	143.6	76 51.8	80	62	142.3	8
9	73 24.3	85	55	146.8	73 49.6	84	57	145.8	74 14.6	83	58	144.8	74 39.4	82	59	143.8	75 03.8	81	61	142.7	75 27.8	80	62	141.5	75 51.5	78	64	140.3	76 14.8	77	66	138.9	9
10	72 51.2	82	59	143.9	73 15.7	81	60	142.9	73 39.9	80	62	141.9	74 03.7	79	63	140.8	74 27.2	78	65	139.6	74 50.4	76	66	138.4	75 13.1	75	68	137.2	75 35.4	74	69	135.9	10
1	72 15.8	79	62	141.2	72 39.5	78	64	140.2	73 02.8	77	65	139.1	73 25.8	76	66	138.0	73 48.5	75	68	136.9	74 10.7	73	69	135.6	74 32.5	72	71	134.4	74 53.8	70	72	133.0	1
2	71 38.4	77	66	138.7	72 01.2	76	67	137.7	72 23.8	75	68	136.6	72 45.9	73	70	135.5	73 07.7	72	71	134.3	73 29.1	70	72	133.1	73 50.0	69	74	131.8	74 10.4	67	75	130.5	2
3	70 59.0	74	68	136.3	71 21.1	73	70	135.3	71 42.9	72	71	134.2	72 04.2	71	72	133.1	72 25.2	69	73	131.9	72 45.7	68	75	130.7	73 05.8	66	76	129.4	73 25.3	64	78	128.1	3
4	70 18.0	72	71	134.1	70 39.4	71	72	133.1	71 00.4	69	73	132.0	71 20.9	68	74	130.9	71 41.1	66	76	129.7	72 00.8	65	77	128.5	72 20.1	63	78	127.2	72 38.8	62	80	125.9	4
15	69 35.5	69	73	132.1	69 56.2	68	74	131.0	70 16.4	67	75	129.9	70 36.2	65	77	128.8	70 55.6	64	78	127.7	71 14.6	62	79	126.5	71 33.1	61	80	125.2	71 51.1	59	81	124.0	15
6	68 51.7	67	75	130.2	69 11.6	66	76	129.1	69 31.1	64	77	128.0	69 50.3	63	78	126.9	70 09.0	62	80	125.8	70 27.2	60	81	124.6	70 45.0	58	82	123.4	71 02.3	57	83	122.1	6
7	68 06.6	65	77	128.4	68 25.8	64	78	127.3	68 44.7	62	79	126.3	69 03.2	61	80	125.2	69 21.2	59	81	124.0	69 38.8	58	82	122.9	69 55.9	56	83	121.7	70 12.6	55	84	120.5	7
8	67 20.4	63	79	126.7	67 39.0	62	80	125.6	67 57.3	60	81	124.6	68 15.1	59	82	123.5	68 32.5	57	83	122.4	68 49.5	56	84	121.3	69 06.0	54	85	120.1	69 22.0	53	86	118.9	8
9	66 33.2	61	80	125.1	66 51.3	60	81	124.1	67 08.9	58	82	123.0	67 26.2	57	83	122.0	67 43.0	55	84	120.9	67 59.3	54	85	119.8	68 15.2	52	86	118.7	68 30.7	51	87	117.5	9
20	65 45.1	59	81	123.6	66 02.6	58	82	122.6	66 19.7	56	83	121.6	66 36.4	55	84	120.6	66 52.6	53	85	119.5	67 08.5	52	86	118.4	67 23.8	50	87	117.3	67 38.7	49	88	116.2	20
1	64 56.3	57	83	122.2	65 13.2	56	84	121.2	65 29.8	55	84	120.2	65 45.9	53	85	119.2	66 01.6	52	86	118.2	66 16.9	50	87	117.1	66 31.8	49	88	116.0	66 46.2	47	88	114.9	1
2	64 06.7	55	84	120.9	64 23.1	54	85	120.0	64 39.1	53	85	119.0	64 54.8	51	86	118.0	65 10.0	50	87	116.9	65 24.8	49	88	115.9	65 39.2	47	88	114.8	65 53.2	46	89	113.8	2
3	63 16.4	54	85	119.7	63 32.3	53	86	118.7	63 47.9	51	86	117.8	64 03.1	50	87	116.8	64 17.9	49	88	115.8	64 32.2	47	88	114.8	64 46.2	46	89	113.7	64 59.7	44	90	112.7	3
4	62 25.5	52	86	118.5	62 41.0	51	86	117.6	62 56.1	50	87	116.6	63 10.9	48	88	115.7	63 25.2	47	88	114.7	63 39.1	46	89	113.7	63 52.7	44	90	112.7	64 05.7	43	90	111.7	4
25	61 34.1	51	87	117.4	61 49.2	50	87	116.5	62 03.9	48	88	115.6	62 18.2	47	89	114.6	62 32.1	46	89	113.7	62 45.6	44	90	112.7	62 58.8	43	90	111.7	63 11.5	42	91	110.7	25
6	60 42.2	49	87	116.4	60 56.8	48	88	115.5	61 11.1	47	89	114.6	61 25.1	46	89	113.7	61 38.6	44	90	112.7	61 51.7	43	90	111.8	62 04.5	42	91	110.8	62 16.9	40	92	109.8	6
7	59 49.8	48	88	115.4	60 04.1	47	89	114.5	60 18.0	46	89	113.6	60 31.5	45	90	112.7	60 44.7	43	90	111.8	60 57.5	42	91	110.9	61 09.9	41	91	109.9	61 21.9	39	92	109.0	7
8	58 57.0	47	89	114.5	59 10.9	46	89	113.6	59 24.5	45	90	112.7	59 37.7	43	90	111.8	59 50.5	42	91	110.9	60 03.0	41	91	110.0	60 15.1	40	92	109.1	60 26.8	38	92	108.2	8
9	58 03.8	46	89	113.6	58 17.4	45	90	112.7	58 30.6	43	90	111.9	58 43.5	42	91	111.0	58 56.0	41	91	110.1	59 08.1	40	92	109.2	59 19.9	39	92	108.3	59 31.3	37	93	107.4	9
30	57 10.3	45	90	112.7	57 23.5	44	90	111.9	57 36.4	42	91	111.1	57 49.0	41	91	110.2	58 01.2	40	92	109.4	58 13.0	39	92	108.5	58 24.5	38	93	107.6	58 35.7	36	93	106.7	30
1	56 16.5	44	90	111.9	56 29.4	43	91	111.1	56 42.0	41	91	110.3	56 54.2	40	92	109.5	57 06.1	39	92	108.6	57 17.7	38	93	107.8	57 28.9	37	93	106.9	57 39.8	36	93	106.0	1
2	55 22.3	43	91	111.2	55 34.9	42	91	110.4	55 47.2	40	92	109.6	55 59.2	39	92	108.7	56 10.9	38	92	107.9	56 22.2	37	93	107.1	56 33.1	36	93	106.2	56 43.8	35	94	105.4	2
3	54 27.9	42	91	110.4	54 40.2	41	92	109.6	54 52.2	40	92	108.9	55 04.0	39	92	108.0	55 15.4	37	93	107.2	55 26.4	36	93	106.4	55 37.2	35	94	105.6	55 47.6	34	94	104.8	3
4	53 33.2	41	92	109.7	53 45.3	40	92	109.0	53 57.0	39	92	108.2	54 08.5	38	93	107.4	54 19.7	37	93	106.6	54 30.5	36	94	105.8	54 41.0	35	94	105.0	54 51.2	33	94	104.2	4
35	52 38.3	40	92	109.1	52 50.1	39	92	108.3	53 01.6	38	93	107.5	53 12.9	37	93	106.8	53 23.8	36	93	106.0	53 34.4	35	94	105.2	53 44.7	34	94	104.4	53 54.7	33	94	103.6	35
6	51 43.2	39	92	108.4	51 54.7	38	93	107.7	52 06.0	37	93	106.9	52 17.0	36	93	106.2	52 27.7	35	94	105.4	52 38.1	34	94	104.6	52 48.2	33	94	103.8	52 58.0	32	95	103.1	6
7	50 47.8	38	93	107.8	50 59.2	37	93	107.1	51 10.2	36	93	106.3	51 21.0	35	94	105.6	51 31.5	35	94	104.8	51 41.7	34	94	104.1	51 51.6	33	95	103.3	52 01.3	32	95	102.5	7
8	49 52.3	38	93	107.2	50 03.4	37	93	106.5	50 14.3	36	94	105.8	50 24.9	35	94	105.0	50 35.2	34	94	104.3	50 45.2	33	94	103.5	50 54.9	32	95	102.8	51 04.4	31	95	102.0	8
9	48 56.6	37	93	106.6	49 07.5	36	93	105.9	49 18.2	35	94	105.2	49 28.6	34	94	104.5	49 38.7	33	94	103.8	49 48.5	32	95	103.0	49 58.1	31	95	102.3	50 07.4	30	95	101.6	9
40	48 00.7	36	93	106.1	48 11.5	35	94	105.4	48 21.9	34	94	104.7	48 32.1	34	94	104.0	48 42.1	33	95	103.3	48 51.8	32	95	102.5	49 01.2	31	95	101.8	49 10.3	30	96	101.1	40
1	47 04.7	36	94	105.6	47 15.3	35	94	104.9	47 25.5	34	94	104.2	47 35.6	33	94	103.5	47 45.4	32	96	102.8	47 54.9	31	96	102.1	48 04.1	30	95	101.4	48 13.1	30	95	100.6	1
2	46 08.6	35	94	105.0	46 18.9	34	94	104.4	46 29.0	33	94	103.7	46 38.9	32	95	103.0	46 48.5	32	96	102.3	46 57.9	31	96	101.6	47 07.0	30	95	100.9	47 15.9	29	96	100.2	2
3	45 12.3	34	94	104.5	45 22.5	34	94	103.9	45 32.4	33	95	103.2	45 42.1	32	95	102.5	45 51.6	31	96	101.8	46 00.8	30	95	101.2	46 09.8	30	95	100.5	46 18.5	29	96	99.8	3
4	44 15.9	34	94	104.1	44 25.9	33	94	103.4	44 35.7	32	95	102.7	44 45.2	31	95	102.1	44 54.6	31	95	101.4	45 03.7	30	95	100.7	45 12.5	29	96	100.1	45 21.1	28	96	99.4	4
45	43 19.3	33	94	103.6	43 29.2	33	95	103.0	43 38.9	32	95	102.3	43 48.3	31	95	101.6	43 57.5	30	95	101.0	44 06.4	29	96	100.3	44 15.2	29	96	99.6	44 23.7	28	96	99.0	45
6	42 22.7	33	95	103.2	42 32.4	32	95	102.5	42 41.9	31	95	101.9	42 51.2	31	95	101.2	43 00.3	30	95	100.6	43 09.1	29	96	99.9	43 17.7	28	96	99.3	43 26.1	28	96	98.6	6
7	41 26.0	32	96	102.7	41 35.5	32	95	102.1	41 44.9	31	95	101.4	41 54.1	30	95	100.8	42 03.0	29	96	100.2	42 11.7	29	96	99.5	42 20.2	28	96	98.9	42 28.5	27	96	98.2	7
8	40 29.1	32	95	102.3	40 38.6	31	96	101.7	40 47.8	30	95	101.0	40 56.8	30	95	100.4	41 05.7	29	96	99.8	41 14.3	28	96	99.1	41 22.7	28	96	98.5	41 30.9	27	96	97.9	8
9	39 32.2	31	95	101.9	39 41.5	31	96	101.3	39 50.6	30	96	100.6	39 59.5	29	96	100.0	40 08.3	29	96	99.4	40 16.8	28	96	98.8	40 25.1	27	96	98.1	40 33.2	27	96	97.5	9
50	38 35.2	31	96	101.5	38 44.4	30	96	100.9	38 53.4	30	96	100.3	39 02.2	29	96	99.6	39 10.8	28	96	99.0	39 19.2	28	96	98.4	39 27.4	27	96	97.8	39 35.4	26	96	97.2	50
1	37 38.1	31	95	101.1	37 47.2	30	95	100.5	37 56.1	29	96	99.9	38 04.8	29	96	99.3	38 13.3	28	96	98.7	38 21.6	27	96	98.0	38 29.7	27	96	97.4	38 37.7	26	96	96.8	1
2	36 40.9	30	95	100.7	36 49.9	30	96	100.1	36 58.7	29	96	99.5	37 07.3	28	96	98.9	37 15.7	28	96	98.3	37 23.9	27	96	97.7	37 32.0	27	96	97.1	37 39.8	26	96	96.5	2
3	35 43.7	30	96	100.3	35 52.5	29	96	99.7	36 01.2	29	96	99.2	36 09.7	28	96	98.6	36 18.1	27	96	98.0	36 26.2	27	95	97.4	36 34.2	26	96	96.8	36 42.0	26	96	96.2	3
4	34 46.4	29	96	100.0	34 55.1	29	96	99.4	35 03.7	28	96	98.8	35 12.1	28	96	98.2	35 20.4	27	96	97.6	35 28.4	27	96	97.0	35 36.3	26	96	96.4	35 44.1	25	97	95.8	4
55	33 49.0	29	96	99.6	33 57.7	29	96	99.0	34 06.2	28	96	98.5	34 14.5	27	96	97.9	34 22.6	27	96	97.3	34 30.6	26	96	96.7	34 38.5	26	96	96.1	34 46.1	25	97	95.5	55
6	32 51.6	29	96	99.3	33 00.1	28	96	98.7	33 08.5	28	96	98.1	33 16.8	27	96	97.5	33 24.9	27	96	97.0	33 32.8	26	96	96.4	33 40.6	26	97	95.8	33 48.2	25	97	95.2	6
7	31 54.1	28	96	98.9	32 02.6	28	96	98.4	32 10.9	27	96	97.8	32 19.1	27	96	97.2	32 27.1	26	96	96.7	32 34.9	26	96	96.1	32 42.6	25	97	95.5	32 50.2	25	97	94.9	7
8	30 56.6	28	96	98.6	31 04.9	28	96	98.0	31 13.2	27	96	97.5	31 21.3	27	96	96.9	31 29.2	26	96	96.3	31 37.0	26	97	95.8	31 44.7	25	97	95.2	31 52.2	25	97	94.6	8
9	29 59.0	28	96	98.3	30 07.3	27	96	97.7	30 15.4	27	96	97.2	30 23.5	27	96	96.6	30 31.4	26	96	96.0	30 39.1	26	97	95.5	30 46.7	25	97	94.9	30 54.1	25	97	94.4	9
60	29 01.3	28	96	98.0	29 09.6	27	96	97.4	29 17.7	27	96	96.8	29 25.6	26	96	96.3	29 33.4	26	97	95.7	29 41.1	25	97	95.2	29 48.7	25	97	94.6	29 56.1	24	97	94.1	60
1	28 03.6	27	96	97.6	28 11.8	27	96	97.1	28 19.8	27	96	96.5	28 27.7	26	97	96.0	28 35.5	26	97	95.4	28 43.1	25	97	94.9	28 50.6	25	97	94.3	28 58.0	24	97	93.8	1
2	27 05.9	27	96	97.3	27 14.0	27	96	96.8	27 22.0	26	96	96.2	27 29.8	26	97	95.7	27 37.5	25	97	95.2	27 45.1	25	97	94.6	27 52.6	25	97	94.1	27 59.9	24	97	93.5	2
3	26 08.2	27	96	97.0	26 16.2	27	96	96.5	26 24.1	26	97	96.0	26 31.9	26	97	95.4	26 39.5	25	97	94.9	26 47.1	25	97	94.3	26 54.5	25	97	93.8	27 01.8	24	97	93.2	3
4	25 10.4	27	96	96.7	25 18.3	26	96	96.2	25 26.2	26	97	95.7	25 33.9	26	97	95.1	25 41.5	25	97	94.6	25 49.0	25	97	94.1	25 56.4	24	97	93.5	26 03.7	24	97	93.0	4
65	24 12.5	27	96	96.4	24 20.4	26	97	95.9	24 28.2	26	97	95.4	24 35.9	25	97	94.8	24 43.5	25	97	94.3	24 50.9	25	97	93.8	24 58.3	24	97	93.2	25 05.5	24	97	92.7	65
6	23 14.7	26	96	96.1	23 22.5	26	97	95.6	23 30.3	26	97	95.1	23 37.9	25	97	94.6	23 45.4	25	97	94.0	23 52.8	25	97	93.5	24 00.1	24	97	93.0	24 07.3	24	97	92.4	6
7	22 16.8	26	97	95.9	22 24.6	26	97	95.3	22 32.3	25	97	94.8	22 39.8	25	97	94.3	22 47.3	25	97	93.8	22 54.7	24	97	93.2	23 02.0	24	97	92.7	23 09.2	24	97	92.2	7
8	21 18.8	26	97	95.6	21 26.6	26	97	95.1	21 34.2	25	97	94.5	21 41.8	25	97	94.0	21 49.2	25	97	93.5	21 56.6	24	97	93.0	22 03.8	21	97	92.5	22 11.0	24	97	91.9	8
9	20 20.9	26	97	95.3	20 28.6	25	97	94.8	20 36.2	25	97	94.3	20 43.7	25	97	93.8	20 51.1	25	97	93.2	20 58.4	24	97	92.7	21 05.7	24	97	92.2	21 12.8	24	97	91.7	9
70	19 22.9	26	97	95.0	19 30.6	25	97	94.5	19 38.1	25	97	94.0	19 45.6	25	97	93.5	19 53.0	24	97	93.0	20 00.3	24	97	92.5	20 07.5	24	97	91.9	20 14.6	24	97	91.4	70
1	18 24.9	25	97	94.8	18 32.5	25	97	94.3	18 40.0	25	97	93.7	18 47.5	25	97	93.2	18 54.8	24	97	92.7	19 02.1	24	97	92.2	19 09.3	24	97	91.7	19 16.4	24	97	91.2	1
2	17 26.9	25	97	94.5	17 34.4	25	97	94.0	17 41.9	25	97	93.5	17 49.3	25	97	93.0	17 56.7	24	97	92.5	18 03.9	24	97	92.0	18 11.1	24	97	91.4	18 18.2	24	97	90.9	2
3	16 28.8	25	97	94.2	16 36.4	25	97	93.7	16 43.8	25	97	93.2	16 51.2	24	97	92.7	16 58.5	24	97	92.2	17 05.7	24	97	91.7	17 12.9	24	97	91.2	17 20.0	23	97	90.7	3
4	15 30.8	25	97	94.0	15 38.3	25	97	93.5	15 45.7	25	97	93.0	15 53.0	24	97	92.5	16 00.3	24	97	92.0	16 07.5	24	97	91.4	16 14.7	24	97	90.9	16 21.8	23	97	90.4	4
75	14 32.7	25	97	93.7	14 40.1	25	97	93.2	14 47.5	25	97	92.7	14 54.9	24	97	92.2	15 02.1	24	97	91.7	15 09.3	24	97	91.2	15 16.5	24	97	90.7	15 23.6	23	97	90.2	75
6	13 34.6	25	97	93.5	13 42.0	25	97	93.0	13 49.4	24	97	92.5	13 56.7	24	97	92.0	14 03.9	24	97	91.5	14 11.1	24	97	91.0	14 18.3	24	97	90.5	14 25.3	23	97	90.0	6
7	12 36.4	25	97	93.2	12 43.9	25	97	92.7	12 51.2	24	97	92.2	12 58.5	24	97	91.7	13 05.7	24	97	91.2	13 12.9	24	97	90.7	13 20.1	24	97	90.2	13 27.1	23	97	89.7	7
8	11 38.3	25	97	92.9	11 45.7	25	97	92.4	11 53.0	24	97	92.0	12 00.3	24	97	91.5	12 07.5	24	97	91.0	12 14.7	24	97	90.5	12 21.8	24	97	90.0	12 28.9	23	97	89.5	8
9	10 40.2	25	97	92.7	10 47.5	24	97	92.2	10 54.8	24	97	91.7	11 02.1	24	97	91.2	11 09.3	24	97	90.7	11 16.5	24	97	90.2	11 23.6	24	97	89.7	11 30.7	23	97	89.2	9
80	9 42.0	25	97	92.4	9 49.3	24	97	92.0	9 56.6	24	97	91.5	10 03.9	24	97	91.0	10 11.1	24	97	90.5	10 18.3	24	97	90.0	10 25.4	24	97	89.5	10 32.5	24	97	89.0	80
1	8 43.8	24	97	92.2	8 51.2	24	97	91.7	8 58.4	24	97	91.2	9 05.7	24	97	90.7	9 12.9	24	97	90.2	9 20.1	24	97	89.7	9 27.2	24	97	89.2	9 34.3	24	97	88.8	1
2	7 45.7	24	97	91.9	7 53.0	24	97	91.5	8 00.2	24	97	91.0	8 07.5	24	97	90.5	8 14.7	24	97	90.0	8 21.8	24	97	89.5	8 29.0	24	97	89.0	8 36.1	24	97	88.5	2
3	6 47.5	24	97	91.7	6 54.8	24	97	91.2	7 02.0	24	97	90.7	7 09.3	24	97	90.2	7 16.5	24	97	89.7	7 23.6	24	97	89.3	7 30.8	24	97	88.8	7 37.9	24	97	88.3	3
4	5 49.3	24	97	91.5	5 56.6	24	97	91.0	6 03.8	24	97	90.5	6 11.0	24	97	90.0	6 18.2	24	97	89.5	6 25.4	24	97	89.0	6 32.6	24	97	88.5	6 39.7	24	97	88.0	4
85									5 05.6	24	97	90.2	5 12.8	24	97	89.8	5 20.0	24	97	89.3	5 27.2	24	97	88.8	5 34.4	24	97	88.3	5 41.5	24	97	87.8	85

Lat. 14°

H.A.	0° 00′			0° 30′			1° 00′			1° 30′			2° 00′			2° 30′			3° 00′			3° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	76 00.0	1.0 04	180.0	75 30.0	1.0 03	180.0	75 00.0	1.0 03	180.0	74 30.0	1.0 03	180.0	74 00.0	1.0 03	180.0	73 30.0	1.0 03	180.0	73 00.0	1.0 03	180.0	72 30.0	1.0 03	180.0	00
1	75 57.9	1.0 10	175.9	75 28.0	1.0 10	176.0	74 58.0	1.0 10	176.1	74 28.1	1.0 09	176.3	73 58.2	1.0 09	176.4	73 28.2	1.0 09	176.5	72 58.3	1.0 09	176.6	72 28.3	1.0 08	176.7	1
2	75 51.6	99 17	171.8	75 21.9	99 17	172.1	74 52.2	99 16	172.3	74 22.4	99 16	172.6	73 52.7	99 15	172.8	73 22.9	99 15	173.0	72 53.1	99 14	173.2	72 23.3	99 14	173.4	2
3	75 41.3	98 24	167.8	75 11.9	98 23	168.2	74 42.5	98 22	168.6	74 13.1	98 22	168.9	73 43.6	98 21	169.2	73 14.0	98 20	169.6	72 44.5	99 20	169.9	72 14.9	99 19	170.1	3
4	75 27.0	96 30	163.9	74 58.1	97 29	164.4	74 29.1	97 28	164.9	74 00.1	97 27	165.3	73 31.0	97 27	165.8	73 01.8	97 26	166.2	72 32.6	97 25	166.6	72 03.4	98 24	166.9	4
05	75 09.0	94 36	160.1	74 40.7	95 35	160.7	74 12.2	95 34	161.3	73 43.6	95 33	161.9	73 15.0	96 32	162.4	72 46.3	96 31	162.9	72 17.5	96 30	163.4	71 48.7	96 30	163.8	05
6	74 47.5	92 41	156.5	74 19.8	93 40	157.2	73 51.9	93 39	157.9	73 23.9	93 38	158.5	72 55.8	94 37	159.2	72 27.6	94 36	159.7	71 59.3	94 35	160.3	71 31.0	95 34	160.8	6
7	74 22.7	90 46	153.1	73 55.7	90 45	153.9	73 28.5	91 44	154.6	73 01.1	91 43	155.3	72 33.6	92 42	156.0	72 06.0	92 41	156.7	71 38.2	93 40	157 3	71 10.4	93 39	157.9	7
8	73 54.9	87 51	149.8	73 28.6	88 50	150.7	73 02.1	89 48	151.5	72 35.4	89 47	152.3	72 08.6	90 46	153.0	71 41.6	90 45	153.7	71 14.4	91 44	154.4	70 47.1	91 43	155.0	8
9	73 24.3	85 55	146.8	72 58.8	86 54	147.7	72 33.0	86 53	148.6	72 07.1	87 51	149.4	71 40.9	88 50	150.2	71 14.5	88 49	150.9	70 48.0	89 48	151.6	70 21.3	89 47	152.3	9
10	72 51.2	82 59	143.9	72 26.5	83 58	144.9	72 01.5	84 56	145.8	71 36.2	85 55	146.6	71 10.7	85 54	147.5	70 45.0	86 53	148.3	70 19.2	87 52	149.0	69 53.1	87 51	149.7	10
1	72 15.8	79 62	141.2	71 51.8	80 61	142.2	71 27.6	81 60	143.1	71 03.1	82 59	144.0	70 38.3	83 57	144.9	70 13.3	84 56	145.7	69 48.1	84 55	146.5	69 22.7	85 54	147.3	1
2	71 38.4	77 66	138.7	71 15.2	78 64	139.7	70 51.7	79 63	140.7	70 27.9	80 62	141.6	70 03.8	81 61	142.5	69 39.5	81 60	143.3	69 15.0	82 58	144.1	68 50.2	83 57	144.9	2
3	70 59.0	74 68	136.3	70 36.6	75 67	137.3	70 13.8	76 66	138.3	69 50.8	77 65	139.3	69 27.4	78 64	140.2	69 03.8	79 62	141.0	68 39.9	80 61	141.9	68 15.8	81 60	142.7	3
4	70 18.0	72 71	134.1	69 56.3	73 70	135.2	69 34.3	74 68	136.1	69 11.9	75 67	137.1	68 49.3	76 66	138.0	68 26.3	77 65	138.9	68 03.1	78 64	139.7	67 39.6	79 63	140.6	4
15	69 35.5	69 73	132.1	69 14.5	71 72	133.1	68 53.2	72 71	134.1	68 31.5	73 70	135.0	68 09.5	74 69	136.0	67 47.3	75 68	136.8	67 24.7	76 66	137.7	67 01.9	77 65	138.5	15
6	68 51.7	67 75	130.2	68 31.4	68 74	131.2	68 10.7	69 73	132.1	67 49.7	71 72	133.1	67 28.4	72 71	134.0	67 06.7	73 70	134.9	66 44.8	74 69	135.8	66 22.6	74 68	136.6	6
7	68 06.6	65 77	128.4	67 46.9	66 76	129.4	67 26.9	67 75	130.3	67 06.6	68 74	131.3	66 45.9	69 73	132.2	66 24.9	71 72	133.1	66 03.6	72 71	134.0	65 42.0	72 70	134.8	7
8	67 20.4	63 79	126.7	67 01.4	64 78	127.7	66 42.0	65 77	128.6	66 22.2	66 76	129.6	66 02.2	67 75	130.5	65 41.8	69 74	131.4	65 21.1	70 73	132.3	65 00.1	70 72	133.1	8
9	66 33.2	61 80	125.1	66 14.8	62 79	126.1	65 56.0	63 78	127.0	65 36.8	64 77	128.0	65 17.4	65 76	128.9	64 57.6	67 75	129.8	64 37.4	68 74	130.7	64 17.0	69 74	131.5	9
20	65 45.1	59 81	123.6	65 27.3	60 81	124.6	65 09.1	61 80	125.5	64 50.5	63 79	126.5	64 31.6	64 78	127.4	64 12.3	65 77	128.3	63 52.8	66 76	129.1	63 32.9	67 75	130.0	20
1	64 56.3	57 83	122.2	64 39.0	58 82	123.2	64 21.3	60 81	124.1	64 03.2	61 80	125.0	63 44.9	62 79	125.9	63 26.2	63 78	126.8	63 07.1	64 78	127.7	62 47.8	65 77	128.5	1
2	64 06.7	55 84	120.9	63 49.9	57 83	121.9	63 32.7	58 82	122.8	63 15.2	59 81	123.7	62 57.3	60 81	124.6	62 39.1	61 80	125.4	62 20.6	62 79	126.3	62 01.8	63 78	127.1	2
3	63 16.4	54 85	119.7	63 00.1	55 84	120.6	62 43.4	56 83	121.5	62 26.4	57 82	122.4	62 09.0	58 82	123.3	61 51.3	59 81	124.2	61 33.3	61 80	125.0	61 15.0	62 79	125.8	3
4	62 25.5	52 86	118.5	62 09.7	53 85	119.4	61 53.5	55 84	120.3	61 36.9	56 83	121.2	61 20.0	57 83	122.1	61 02.8	58 82	122.9	60 45.3	59 81	123.8	60 27.4	60 80	124.6	4
25	61 34.1	51 87	117.4	61 18.7	52 86	118.3	61 02.9	53 85	119.2	60 46.8	54 84	120.1	60 30.4	55 84	120.9	60 13.6	56 83	121.8	59 56.5	57 82	122.6	59 39.2	58 82	123.4	25
6	60 42.2	49 87	116.4	60 27.2	51 87	117.3	60 11.8	52 86	118.1	59 56.1	53 85	119.0	59 40.1	54 85	119.8	59 23.8	55 84	120.7	59 07.2	56 83	121.5	58 50.2	57 83	122.3	6
7	59 49.8	48 88	115.4	59 35.2	49 87	116.3	59 20.2	50 87	117.1	59 05.0	51 86	118.0	58 49.4	53 85	118.8	58 33.5	54 85	119.6	58 17.2	55 84	120.4	58 00.7	56 83	121.2	7
8	58 57.0	47 89	114.5	58 42.8	48 88	115.3	58 28.2	49 87	116.2	58 13.3	50 87	117.0	57 58.1	51 86	117.8	57 42.6	52 86	118.6	57 26.8	53 85	119.4	57 10.6	54 84	120.2	8
9	58 03.8	46 89	113.6	57 50.0	47 89	114.4	57 35.7	48 88	115.2	57 21.2	49 88	116.1	57 06.4	50 87	116.9	56 51.2	51 86	117.6	56 35.8	52 86	118.4	56 20.1	53 85	119.2	9
30	57 10.3	45 90	112.7	56 56.8	46 89	113.6	56 42.9	47 89	114.4	56 28.7	48 88	115.2	56 14.2	49 88	116.0	55 59.5	50 87	116.7	55 44.4	51 86	117.5	55 29.0	52 86	118.3	30
1	56 16.5	44 90	111.9	56 03.2	45 90	112.7	55 49.7	46 89	113.5	55 35.8	47 89	114.3	55 21.7	48 88	115.1	55 07.3	49 88	115.9	54 52.5	50 87	116.6	54 37.5	50 86	117.4	1
2	55 22.3	43 91	111.2	55 09.4	44 90	112.0	54 56.2	45 90	112.7	54 42.6	46 89	113.5	54 28.8	47 89	114.3	54 14.7	48 88	115.0	54 00.3	48 88	115.8	53 45.6	49 87	116.5	2
3	54 27.9	42 91	110.4	54 15.2	43 91	111.2	54 02.3	44 90	112.0	53 49.1	45 90	112.7	53 35.6	46 89	113.5	53 21.8	46 89	114.2	53 07.7	47 88	115.0	52 53.4	48 88	115.7	3
4	53 33.2	41 92	109.7	53 20.8	42 91	110.5	53 08.2	43 91	111.3	52 55.2	44 90	112.0	52 42.0	45 90	112.7	52 28.5	45 89	113.5	52 14.8	46 89	114.2	52 00.7	47 88	114.9	4
35	52 38.3	40 92	109.1	52 26.2	41 91	109.8	52 13.8	42 91	110.6	52 01.1	43 91	111.3	51 48.2	44 90	112.0	51 35.0	44 90	112.8	51 21.5	45 89	113.5	51 07.8	46 89	114.2	35
6	51 43.2	39 92	108.4	51 31.3	40 92	109.2	51 19.2	41 91	109.9	51 06.8	42 91	110.6	50 54.1	43 91	111.3	50 41.2	44 90	112.1	50 28.0	44 90	112.8	50 14.5	45 89	113.5	6
7	50 47.8	38 93	107.8	50 36.2	39 92	108.5	50 24.3	40 92	109.2	50 12.2	41 91	110.0	49 59.7	42 91	110.7	49 47.1	43 91	111.4	49 34.2	44 90	112.1	49 21.0	44 90	112.8	7
8	49 52.3	38 93	107.2	49 40.9	38 92	107.9	49 29.3	39 92	108.6	49 17.3	40 92	109.3	49 05.2	41 91	110.0	48 52.7	42 91	110.7	48 40.1	43 90	111.4	48 27.2	43 90	112.1	8
9	48 56.6	37 93	106.6	48 45.4	38 93	107.3	48 34.0	39 92	108.0	48 22.3	39 92	108.7	48 10.4	40 92	109.4	47 58.2	41 91	110.1	47 45.8	42 91	110.8	47 33.1	43 90	111.5	9
40	48 00.7	36 93	106.1	47 49.8	37 93	106.8	47 38.5	38 93	107.5	47 27.1	39 92	108.2	47 15.4	39 92	108.8	47 03.4	40 92	109.5	46 51.2	41 91	110.2	46 38.8	42 91	110.8	40
1	47 04.7	36 94	105.6	46 54.0	36 93	106.2	46 42.9	37 93	106.9	46 31.7	38 93	107.6	46 20.2	39 92	108.3	46 08.4	39 92	108.9	45 56.5	40 92	109.6	45 44.3	41 91	110.2	1
2	46 08.6	35 94	105.0	45 58.0	36 94	105.7	45 47.2	36 93	106.4	45 36.1	37 93	107.0	45 24.8	38 93	107.7	45 13.3	39 92	108.4	45 01.5	40 92	109.0	44 49.6	40 92	109.7	2
3	45 12.3	34 94	104.5	45 01.9	35 94	105.2	44 51.2	36 93	105.9	44 40.3	37 93	106.5	44 29.3	37 93	107.2	44 17.9	38 92	107.8	44 06.4	39 92	108.5	43 54.6	40 92	109.1	3
4	44 15.9	34 94	104.1	44 05.6	35 94	104.7	43 55.2	35 94	105.4	43 44.5	36 93	106.0	43 33.6	37 93	106.7	43 22.4	37 93	107.3	43 11.1	38 92	107.9	42 59.5	39 92	108.6	4
45	43 19.3	33 94	103.6	43 09.3	34 94	104.2	42 59.0	35 94	104.9	42 48.4	35 94	105.5	42 37.7	36 93	106.2	42 26.8	37 93	106.8	42 15.6	37 93	107.4	42 04.3	38 92	108.0	45
6	42 22.7	33 95	103.2	42 12.8	33 94	103.8	42 02.6	34 94	104.4	41 52.3	35 94	105.1	41 41.7	36 94	105.7	41 31.0	36 93	106.3	41 20.0	37 93	106.9	41 08.8	38 93	107.5	6
7	41 26.0	32 95	102.7	41 16.2	33 94	103.3	41 06.2	34 94	104.0	40 56.0	34 94	104.6	40 45.6	35 94	105.2	40 35.0	36 93	105.8	40 24.2	36 93	106.4	40 13.3	37 93	107.1	7
8	40 29.1	32 95	102.3	40 19.5	32 95	102.9	40 09.6	33 94	103.5	39 59.6	34 94	104.1	39 49.4	34 94	104.8	39 38.9	35 94	105.4	39 28.3	36 93	106.0	39 17.5	36 93	106.6	8
9	39 32.2	31 95	101.9	39 22.7	32 95	102.5	39 13.0	33 95	103.1	39 03.1	33 94	103.7	38 53.0	34 94	104.3	38 42.8	35 94	104.9	38 32.3	35 94	105.5	38 21.7	36 93	106.1	9
50	38 35.2	31 95	101.5	38 25.8	32 95	102.1	38 16.2	32 95	102.7	38 06.5	33 94	103.3	37 56.6	33 94	103.9	37 46.4	34 94	104.5	37 36.1	35 94	105.1	37 25.7	35 94	105.7	50
1	37 38.1	31 95	101.1	37 28.8	31 95	101.7	37 19.4	32 95	102.3	37 09.8	32 95	102.9	37 00.0	33 94	103.5	36 50.0	34 94	104.1	36 39.9	34 94	104.6	36 29.6	35 94	105.2	1
2	36 40.9	30 95	100.7	36 31.8	31 95	101.3	36 22.5	31 95	101.9	36 13.0	32 95	102.5	36 03.3	32 95	103.1	35 53.5	33 94	103.6	35 43.5	34 94	104.2	35 33.3	34 94	104.8	2
3	35 43.7	30 96	100.3	35 34.7	30 95	100.9	35 25.5	31 95	101.5	35 16.1	31 95	102.1	35 06.6	32 95	102.7	34 56.9	33 95	103.2	34 47.0	33 94	103.8	34 37.0	34 94	104.4	3
4	34 46.4	29 96	100.0	34 37.5	30 95	100.5	34 28.4	31 95	101.1	34 19.1	31 95	101.7	34 09.7	32 95	102.3	34 00.2	32 96	102.9	33 50.4	33 94	103.4	33 40.5	33 94	104.0	4
55	33 49.0	29 96	99.6	33 40.2	30 96	100.2	33 31.2	30 95	100.8	33 22.1	31 95	101.3	33 12.8	31 95	101.9	33 03.4	32 95	102.5	32 53.8	32 95	103.0	32 44.0	33 94	103.6	55
6	32 51.6	29 96	99.3	32 42.9	29 96	99.8	32 34.0	30 95	100.4	32 25.0	30 95	101.0	32 15.8	31 95	101.5	32 06.5	31 95	102.1	31 57.0	32 96	102.7	31 47.4	32 95	103.2	6
7	31 54.1	28 96	98.9	31 45.5	29 96	99.5	31 36.7	29 96	100.1	31 27.8	30 95	100.6	31 18.7	30 95	101.2	31 09.5	31 95	101.7	31 00.2	31 95	102.3	30 50.7	32 95	102.8	7
8	30 56.6	28 96	98.6	30 48.0	29 96	99.2	30 39.3	29 96	99.7	30 30.5	30 96	100.3	30 21.6	30 95	100.8	30 12.5	31 95	101.4	30 03.2	31 95	101.9	29 53.9	31 96	102.5	8
9	29 59.0	28 96	98.3	29 50.5	28 96	98.8	29 41.9	29 96	99.4	29 33.2	29 96	99.9	29 24.3	30 95	100.5	29 15.4	30 95	101.0	29 06.2	31 95	101.6	28 57.0	31 95	102.1	9
60	29 01.3	28 96	98.0	28 53.0	28 96	98.5	28 44.5	29 96	99.0	28 35.8	29 96	99.6	28 27.1	29 96	100.1	28 18.2	30 95	100.7	28 09.2	30 95	101.2	28 00.0	31 95	101.8	60
1	28 03.6	27 96	97.6	27 55.4	28 96	98.2	27 46.9	28 96	98.7	27 38.4	29 96	99.3	27 29.7	29 96	99.8	27 20.9	30 96	100.3	27 12.0	30 95	100.9	27 03.0	30 95	101.4	1
2	27 05.9	27 96	97.3	26 57.7	28 96	97.9	26 49.4	28 96	98.4	26 40.9	28 96	98.9	26 32.3	29 96	99.5	26 23.6	29 96	100.0	26 14.8	30 95	100.5	26 05.9	30 95	101.1	2
3	26 08.2	27 96	97.0	26 00.0	27 96	97.6	25 51.8	28 96	98.1	25 43.4	28 96	98.6	25 34.9	29 96	99.2	25 26.3	29 96	99.7	25 17.6	29 96	100.2	25 08.7	30 95	100.8	3
4	25 10.4	27 96	96.7	25 02.3	27 96	97.3	24 54.1	27 96	97.8	24 45.8	28 96	98.3	24 37.4	28 96	98.8	24 28.9	29 96	99.4	24 20.2	29 96	99.9	24 11.5	29 95	100.4	4
65	24 12.5	27 96	96.4	24 04.5	27 96	97.0	23 56.4	27 96	97.5	23 48.2	28 96	98.0	23 39.8	28 96	98.5	23 31.4	28 96	99.1	23 22.9	29 96	99.6	23 14.2	29 96	100.1	65
6	23 14.7	26 96	96.1	23 06.7	27 96	96.7	22 58.7	27 96	97.2	22 50.5	27 96	97.7	22 42.2	28 96	98.2	22 33.9	28 96	98.8	22 25.4	28 96	99.3	22 16.9	29 96	99.8	6
7	22 16.8	26 97	95.9	22 08.9	26 96	96.4	22 00.9	27 96	96.9	21 52.8	27 96	97.4	21 44.6	27 96	97.9	21 36.3	28 96	98.5	21 27.9	28 96	99.0	21 19.5	28 96	99.5	7
8	21 18.8	26 97	95.6	21 11.0	26 96	96.1	21 03.1	27 96	96.6	20 55.0	27 96	97.1	20 46.9	27 96	97.6	20 38.7	28 96	98.2	20 30.4	28 96	98.7	20 22.0	28 96	99.2	8
9	20 20.9	26 97	95.3	20 13.1	26 97	95.8	20 05.2	26 96	96.3	19 57.3	27 96	96.8	19 49.2	27 96	97.4	19 41.1	27 96	97.9	19 32.8	28 96	98.4	19 24.5	28 96	98.9	9
70	19 22.9	26 97	95.0	19 15.2	26 97	95.5	19 07.3	26 97	96.1	18 59.4	26 96	96.6	18 51.4	27 96	97.1	18 43.4	27 96	97.6	18 35.2	27 96	98.1	18 27.0	28 96	98.6	70
1	18 24.9	25 97	94.8	18 17.2	26 97	95.3	18 09.4	26 97	95.8	18 01.6	26 96	96.3	17 53.7	27 96	96.8	17 45.6	27 96	97.3	17 37.6	27 96	97.8	17 29.4	27 96	98.3	1
2	17 26.9	25 97	94.5	17 19.2	26 97	95.0	17 11.5	26 97	95.5	17 03.7	26 96	96.0	16 55.8	26 96	96.5	16 47.9	27 96	97.0	16 39.9	27 96	97.5	16 31.8	27 96	98.0	2
3	16 28.8	25 97	94.2	16 21.2	25 97	94.7	16 13.5	26 97	95.2	16 05.8	26 97	95.7	15 58.0	26 96	96.2	15 50.1	26 96	96.7	15 42.1	27 96	97.2	15 34.1	27 96	97.7	3
4	15 30.8	25 97	94.0	15 23.2	25 97	94.5	15 15.6	26 97	95.0	15 07.9	26 97	95.5	15 00.1	26 97	96.0	14 52.3	26 96	96.5	14 44.4	26 96	97.0	14 36.4	27 96	97.5	4
75	14 32.7	25 97	93.7	14 25.1	25 97	94.2	14 17.5	25 97	94.7	14 09.9	26 97	95.2	14 02.2	26 97	95.7	13 54.4	26 96	96.2	13 46.6	26 96	96.7	13 38.7	26 96	97.2	75
6	13 34.6	25 97	93.5	13 27.1	25 97	93.9	13 19.5	25 97	94.4	13 11.9	25 97	94.9	13 04.2	26 97	95.4	12 56.5	26 97	95.9	12 48.7	26 96	96.4	12 40.9	26 96	96.9	6
7	12 36.4	25 97	93.2	12 29.0	25 97	93.7	12 21.5	25 97	94.2	12 13.9	25 97	94.7	12 06.3	26 97	95.2	11 58.6	26 97	95.7	11 50.9	26 96	96.2	11 43.1	26 96	96.7	7
8	11 38.3	25 97	92.9	11 30.9	25 97	93.4	11 23.4	25 97	93.9	11 15.9	25 97	94.4	11 08.3	25 97	94.9	11 00.6	26 97	95.4	10 53.0	26 97	95.9	10 45.2	26 96	96.4	8
9	10 40.2	25 97	92.7	10 32.8	25 97	93.2	10 25.3	25 97	93.7	10 17.8	25 97	94.2	10 10.3	25 97	94.7	10 02.7	25 97	95.2	9 55.0	26 97	95.6	9 47.4	26 96	96.1	9
80	9 42.0	25 97	92.4	9 34.6	25 97	92.9	9 27.2	25 97	93.4	9 19.7	25 97	93.9	9 12.2	25 97	94.4	9 04.7	25 97	94.9	8 57.1	25 97	95.4	8 49.5	25 97	95.9	80
1	8 43.8	24 97	92.2	8 36.5	25 97	92.7	8 29.1	25 97	93.2	8 21.6	25 97	93.7	8 14.2	25 97	94.2	8 06.7	25 97	94.6	7 59.1	25 97	95.1	7 51.5	25 97	95.6	1
2	7 45.7	24 97	91.9	7 38.3	25 97	92.4	7 30.9	25 97	92.9	7 23.5	25 97	93.4	7 16.1	25 97	93.9	7 08.6	25 97	94.4	7 01.1	25 97	94.9	6 53.6	25 97	95.4	2
3	6 47.5	24 97	91.7	6 40.1	24 97	92.2	6 32.8	25 97	92.7	6 25.4	25 97	93.2	6 18.0	25 97	93.7	6 10.6	25 97	94.1	6 03.1	25 97	94.6	5 55.6	25 97	95.1	3
4	5 49.3	24 97	91.5	5 42.0	24 97	91.9	5 34.6	24 97	92.4	5 27.3	25 97	92.9	5 19.9	25 97	93.4	5 12.5	25 97	93.9	5 05.1	25 97	94.4				4

Lat. 14°

H.A.	4° 00′				4° 30′				5° 00′				5° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	80 00.0	1.0	05	180.0	80 30.0	1.0	05	180.0	81 00.0	1.0	06	180.0	81 30.0	1.0	06	180.0
1	79 57.1	1.0	14	174.3	80 26.9	99	15	174.0	80 56.8	99	16	173.7	81 26.6	99	17	173.3
2	79 48.4	98	24	168.7	80 17.9	98	25	168.1	80 47.2	98	26	167.5	81 16.5	97	27	166.8
3	79 34.3	96	32	163.2	80 03.0	96	34	162.4	80 31.6	95	35	161.5	81 00.1	95	37	160.5
4	79 15.0	93	40	158.1	79 42.8	93	42	157.1	80 10.5	92	43	156.0	80 37.9	91	45	154.8
05	78 51.0	90	47	153.3	79 17.8	89	49	152.1	79 44.4	88	51	150.8	80 10.6	87	53	149.4
6	78 22.8	86	53	148.8	78 48.6	85	55	147.5	79 14.0	84	57	146.1	79 38.9	83	59	144.6
7	77 50.9	83	59	144.7	78 15.5	81	60	143.3	78 39.7	80	62	141.9	79 03.4	78	65	140.3
8	77 15.7	79	63	141.0	77 39.2	78	65	139.5	78 02.2	76	67	138.0	78 24.7	74	69	136.4
9	76 37.7	75	67	137.6	77 00.1	74	69	136.1	77 22.0	72	71	134.6	77 43.3	70	73	132.9
10	75 57.3	72	71	134.5	76 18.6	70	73	133.0	76 39.4	68	74	131.4	76 59.6	66	76	129.8
1	75 14.7	69	74	131.6	75 35.0	67	76	130.2	75 54.8	65	77	128.6	76 14.0	63	79	127.1
2	74 30.3	66	77	129.1	74 49.7	64	78	127.6	75 08.5	62	80	126.1	75 26.7	60	81	124.6
3	73 44.4	63	79	126.7	74 02.9	61	80	125.3	74 20.8	59	82	123.8	74 38.2	57	83	122.3
4	72 57.1	60	81	124.6	73 14.8	58	82	123.2	73 31.9	56	83	121.8	73 48.4	54	85	120.3
15	72 08.6	57	83	122.6	72 25.5	56	84	121.3	72 41.9	54	85	119.9	72 57.7	52	86	118.5
6	71 19.1	55	84	120.9	71 35.3	53	85	119.5	71 51.0	51	86	118.2	72 06.1	49	87	116.8
7	70 28.7	53	85	119.2	70 44.3	51	86	117.9	70 59.3	49	87	116.6	71 13.8	47	88	115.3
8	69 37.5	51	86	117.7	69 52.5	49	87	116.4	70 06.9	47	88	115.2	70 20.8	45	89	113.9
9	68 45.6	49	87	116.3	69 00.0	47	88	115.1	69 13.9	45	89	113.8	69 27.3	44	90	112.6
20	67 53.1	47	88	115.0	68 07.0	46	89	113.8	68 20.4	44	90	112.6	68 33.3	42	91	111.4
1	67 00.1	46	89	113.8	67 13.6	44	90	112.6	67 26.5	42	91	111.5	67 38.9	40	91	110.3
2	66 06.6	44	90	112.7	66 19.6	42	91	111.6	66 32.1	41	91	110.4	66 44.1	39	92	109.3
3	65 12.7	43	90	111.6	65 25.3	41	91	110.5	65 37.4	40	92	109.4	65 49.0	38	92	108.3
4	64 18.4	41	91	110.6	64 30.6	40	92	109.6	64 42.3	38	92	108.5	64 53.6	37	93	107.4
25	63 23.7	40	92	109.7	63 35.6	39	92	108.7	63 47.0	37	93	107.6	63 57.9	36	93	106.6
6	62 28.8	39	92	108.8	62 40.3	38	93	107.8	62 51.4	36	93	106.8	63 02.0	35	94	105.8
7	61 33.6	38	92	108.0	61 44.7	37	93	107.0	61 55.5	35	93	106.1	62 05.9	34	94	105.1
8	60 38.1	37	93	107.2	60 49.0	36	93	106.3	60 59.5	34	94	105.3	61 09.6	33	94	104.4
9	59 42.4	36	93	106.5	59 53.0	35	94	105.6	60 03.2	33	94	104.6	60 13.1	32	94	103.7
30	58 46.4	35	94	105.8	58 56.8	34	94	104.9	59 06.8	33	94	104.0	59 16.4	31	95	103.1
1	57 50.3	34	94	105.2	58 00.5	33	94	104.3	58 10.3	32	95	103.4	58 19.7	31	95	102.5
2	56 54.1	34	94	104.5	57 04.0	32	94	103.7	57 13.6	31	95	102.8	57 22.7	30	95	101.9
3	55 57.6	33	94	103.9	56 07.3	32	95	103.1	56 16.7	31	95	102.2	56 25.7	29	95	101.4
4	55 01.1	32	94	103.4	55 10.6	31	95	102.5	55 19.8	30	95	101.7	55 28.6	29	95	100.8
35	54 04.3	32	95	102.8	54 13.7	31	95	102.0	54 22.7	29	95	101.2	54 31.4	28	96	100.3
6	53 07.5	31	95	102.3	53 16.7	30	95	101.5	53 25.5	29	95	100.7	53 34.1	28	96	99.9
7	52 10.6	31	95	101.8	52 19.6	30	95	101.0	52 28.3	28	96	100.2	52 36.7	27	96	99.4
8	51 13.5	30	95	101.3	51 22.4	29	95	100.5	51 30.9	28	96	99.7	51 39.2	27	96	99.0
9	50 16.4	30	95	100.8	50 25.1	29	96	100.1	50 33.5	28	96	99.3	50 41.7	27	96	98.5
40	49 19.2	29	96	100.4	49 27.7	28	96	99.6	49 36.0	27	96	98.9	49 44.1	26	96	98.1
1	48 21.9	29	96	99.9	48 30.3	28	96	99.2	48 38.5	27	96	98.5	48 46.4	26	96	97.7
2	47 24.5	28	96	99.5	47 32.8	27	96	98.8	47 40.9	26	96	98.1	47 48.7	26	96	97.4
3	46 27.0	28	96	99.1	46 35.2	27	96	98.4	46 43.2	26	96	97.7	46 50.9	25	96	97.0
4	45 29.5	27	96	98.7	45 37.6	27	96	98.0	45 45.5	26	96	97.3	45 53.1	25	96	96.6
45	44 31.9	27	96	98.3	44 39.9	26	96	97.6	44 47.7	26	96	96.9	44 55.3	25	96	96.3
6	43 34.3	27	96	97.9	43 42.2	26	96	97.3	43 49.9	25	96	96.6	43 57.4	24	97	95.9
7	42 36.6	27	96	97.6	42 44.4	26	96	96.9	42 52.1	25	96	96.3	42 59.4	24	97	95.6
8	41 38.9	26	96	97.2	41 46.6	26	96	96.6	41 54.2	25	97	95.9	42 01.5	24	97	95.3
9	40 41.1	26	96	96.9	40 48.8	25	96	96.2	40 56.2	25	97	95.6	41 03.5	24	97	94.9
50	39 43.3	26	96	96.5	39 50.9	25	97	95.9	39 58.3	24	97	95.3	40 05.5	24	97	94.6
1	38 45.4	25	96	96.2	38 53.0	25	97	95.6	39 00.3	24	97	95.0	39 07.4	23	97	94.3
2	37 47.5	25	97	95.9	37 55.0	25	97	95.3	38 02.3	24	97	94.6	38 09.4	23	97	94.0
3	36 49.6	25	97	95.6	36 57.0	24	97	95.0	37 04.2	24	97	94.3	37 11.3	23	97	93.7
4	35 51.6	25	97	95.3	35 59.0	24	97	94.7	36 06.2	24	97	94.1	36 13.2	23	97	93.4
55	34 53.6	25	97	94.9	35 01.0	24	97	94.4	35 08.1	24	97	93.8	35 15.1	23	97	93.2
6	33 55.6	25	97	94.7	34 02.9	24	97	94.1	34 10.0	23	97	93.5	34 16.9	23	97	92.9
7	32 57.6	24	97	94.4	33 04.8	24	97	93.8	33 11.9	23	97	93.2	33 18.8	23	97	92.6
8	31 59.5	24	97	94.1	32 06.7	24	97	93.5	32 13.7	23	97	92.9	32 20.6	23	97	92.3
9	31 01.4	24	97	93.8	31 08.6	24	97	93.2	31 15.6	23	97	92.7	31 22.5	23	97	92.1
60	30 03.3	24	97	93.5	30 10.5	23	97	92.9	30 17.4	23	97	92.4	30 24.3	23	97	91.8
1	29 05.2	24	97	93.2	29 12.3	23	97	92.7	29 19.3	23	97	92.1	29 26.1	22	97	91.6
2	28 07.1	24	97	93.0	28 14.2	23	97	92.4	28 21.1	23	97	91.9	28 27.9	22	97	91.3
3	27 08.9	24	97	92.7	27 16.0	23	97	92.2	27 22.9	23	97	91.6	27 29.7	22	97	91.1
4	26 10.8	24	97	92.4	26 17.8	23	97	91.9	26 24.7	23	97	91.3	26 31.5	22	97	90.8
65	25 12.6	24	97	92.2	25 19.6	23	97	91.6	25 26.5	23	97	91.1	25 33.2	22	97	90.6
6	24 14.4	23	97	91.9	24 21.4	23	97	91.4	24 28.3	23	97	90.8	24 35.0	22	97	90.3
7	23 16.2	23	97	91.7	23 23.2	23	97	91.1	23 30.1	23	97	90.6	23 36.8	22	97	90.1
8	22 18.0	23	97	91.4	22 25.0	23	97	90.9	22 31.9	23	97	90.4	22 38.6	22	97	89.8
9	21 19.8	23	97	91.2	21 26.8	23	97	90.6	21 33.6	23	97	90.1	21 40.4	22	97	89.6
70	20 21.6	23	97	90.9	20 28.6	23	97	90.4	20 35.4	23	97	89.9	20 42.2	22	97	89.3
1	19 23.4	23	97	90.7	19 30.4	23	97	90.1	19 37.2	23	97	89.6	19 44.0	22	97	89.1
2	18 25.2	23	97	90.4	18 32.1	23	97	89.9	18 39.0	23	97	89.4	18 45.7	22	97	88.9
3	17 27.0	23	97	90.2	17 33.9	23	97	89.7	17 40.8	23	97	89.2	17 47.5	22	97	88.6
4	16 28.8	23	97	89.9	16 35.7	23	97	89.4	16 42.6	23	97	88.9	16 49.3	22	97	88.4
75	15 30.6	23	97	89.7	15 37.5	23	97	89.2	15 44.4	23	97	88.7	15 51.2	23	97	88.2
6	14 32.3	23	97	89.4	14 39.3	23	97	88.9	14 46.2	23	97	88.4	14 53.0	23	97	87.9
7	13 34.1	23	97	89.2	13 41.1	23	97	88.7	13 48.0	23	97	88.2	13 54.8	23	97	87.7
8	12 35.9	23	97	89.0	12 42.9	23	97	88.5	12 49.8	23	97	88.0	12 56.6	23	97	87.5
9	11 37.7	23	97	88.7	11 44.7	23	97	88.2	11 51.6	23	97	87.7	11 58.5	23	97	87.2
80	10 39.5	23	97	88.5	10 46.5	23	97	88.0	10 53.4	23	97	87.5	11 00.3	23	97	87.0
1	9 41.3	23	97	88.3	9 48.3	23	97	87.8	9 55.3	23	97	87.3	10 02.2	23	97	86.8
2	8 43.1	23	97	88.0	8 50.1	23	97	87.5	8 57.1	23	97	87.0	9 04.1	23	97	86.5
3	7 45.0	24	97	87.8	7 52.0	23	97	87.3	7 59.0	23	97	86.8	8 06.0	23	97	86.3
4	6 46.8	24	97	87.5	6 53.8	23	97	87.1	7 00.9	23	97	86.6	7 07.9	23	97	86.1
85	5 48.6	24	97	87.3	5 55.7	24	97	86.8	6 02.8	23	97	86.3	6 09.8	23	97	85.8
6									5 04.7	24	97	86.1	5 11.7	24	97	85.6

6° 00′				6° 30′				7° 00′				7° 30′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
82 00.0	1.0	06	180.0	82 30.0	1.0	06	180.0	83 00.0	1.0	07	180.0	83 30.0	1.0	07	180.0	00
81 56.4	99	18	172.9	82 26.1	99	19	172.4	82 55.9	99	20	171.9	83 25.6	99	22	171.3	1
81 45.7	97	29	166.0	82 14.8	97	31	165.1	82 43.8	96	32	164.1	83 12.6	96	35	163.0	2
81 28.4	94	39	159.4	81 56.4	93	41	158.2	82 24.3	92	43	156.9	82 51.8	91	46	155.3	3
81 05.1	90	48	153.4	81 31.9	89	50	151.9	81 58.3	87	52	150.3	82 24.3	86	55	148.4	4
80 36.5	86	55	147.9	81 01.9	84	57	146.3	81 26.9	82	60	144.4	81 51.3	80	63	142.4	05
80 03.5	81	61	143.0	80 27.5	79	64	141.2	80 50.9	77	66	139.3	81 13.7	75	69	137.2	6
79 26.6	76	67	138.6	79 49.2	74	69	136.8	80 11.2	72	71	134.8	80 32.4	69	74	132.7	7
78 46.6	72	71	134.7	79 07.9	70	73	132.8	79 28.5	67	75	130.9	79 48.3	65	77	128.8	8
78 04.0	68	75	131.2	78 24.0	66	77	129.4	78 43.3	63	79	127.4	79 01.8	60	81	125.4	9
77 19.1	64	78	128.1	77 38.0	62	80	126.3	77 56.2	59	81	124.4	78 13.5	56	83	122.5	10
76 32.5	61	80	125.4	76 50.3	58	82	123.6	77 07.4	56	84	121.8	77 23.7	53	85	119.9	1
75 44.3	57	82	122.9	76 01.2	55	84	121.2	76 17.3	53	85	119.5	76 32.7	50	87	117.6	2
74 54.8	54	84	120.7	75 10.8	52	86	119.1	75 26.1	50	87	117.4	75 40.6	47	88	115.6	3
74 04.3	52	86	118.8	74 19.5	50	87	117.2	74 34.0	47	88	115.5	74 47.7	45	89	113.9	4
73 12.8	49	87	117.0	73 27.3	47	88	115.4	73 41.1	45	89	113.9	73 54.2	42	90	112.3	15
72 20.5	47	88	115.3	72 34.4	45	89	113.9	72 47.5	43	90	112.4	73 00.0	40	91	110.8	6
71 27.6	45	89	113.9	71 40.8	43	90	112.4	71 53.4	41	91	111.0	72 05.4	39	92	109.5	7
70 34.1	43	90	112.5	70 46.8	41	91	111.1	70 58.9	39	92	109.7	71 10.3	37	92	108.3	8
69 40.1	42	91	111.3	69 52.3	40	92	110.0	70 03.9	38	92	108.6	70 14.8	36	93	107.2	9
68 45.6	40	91	110.1	68 57.4	38	92	108.9	69 08.5	36	93	107.6	69 19.1	34	93	106.2	20
67 50.8	39	92	109.1	68 02.1	37	93	107.8	68 12.9	35	93	106.6	68 23.1	33	94	105.3	1
66 55.6	37	92	108.1	67 06.5	36	93	106.9	67 16.9	34	94	105.7	67 26.8	32	94	104.5	2
66 00.1	36	93	107.2	66 10.7	34	93	106.0	66 20.8	33	94	104.8	66 30.3	31	94	103.7	3
65 04.3	35	93	106.3	65 14.6	33	94	105.2	65 24.4	32	94	104.1	65 33.7	30	95	102.9	4
64 08.4	34	94	105.5	64 18.3	32	94	104.4	64 27.8	31	95	103.3	64 36.8	29	95	102.2	25
63 12.2	33	94	104.8	63 21.9	32	94	103.7	63 31.1	30	95	102.6	63 39.9	28	95	101.6	6
62 15.8	32	94	104.0	62 25.2	31	95	103.0	62 34.2	29	95	102.0	62 42.8	28	95	100.9	7
61 19.2	31	94	103.4	61 28.4	30	95	102.4	61 37.2	29	95	101.4	61 45.6	27	96	100.4	8
60 22.5	31	95	102.7	60 31.5	29	95	101.8	60 40.1	28	95	100.8	60 48.2	26	96	99.8	9
59 25.6	30	95	102.1	59 34.5	29	95	101.2	59 42.8	27	96	100.2	59 50.8	26	96	99.3	30
58 28.7	29	95	101.6	58 37.3	28	95	100.6	58 45.5	27	96	99.7	58 53.3	25	96	98.8	1
57 31.6	29	95	101.0	57 40.0	28	96	100.1	57 48.1	26	96	99.2	57 55.8	25	96	98.3	2
56 34.4	28	96	100.5	56 42.7	27	96	99.6	56 50.6	26	96	98.7	56 58.1	25	96	97.9	3
55 37.1	28	96	100.0	55 45.2	27	96	99.1	55 53.0	25	96	98.3	56 00.4	24	96	97.4	4
54 39.7	27	96	99.5	54 47.7	26	96	98.7	54 55.4	25	96	97.8	55 02.7	24	96	97.0	35
53 42.3	27	96	99.1	53 50.1	26	96	98.2	53 57.7	25	96	97.4	54 04.9	23	96	96.6	6
52 44.7	26	96	98.6	52 52.5	25	96	97.8	52 59.9	24	96	97.0	53 07.0	23	96	96.2	7
51 47.1	26	96	98.2	51 54.8	25	96	97.4	52 02.1	24	96	96.6	52 09.1	23	97	95.8	8
50 49.5	26	96	97.8	50 57.0	25	96	97.0	51 04.3	24	96	96.2	51 11.2	23	97	95.5	9
49 51.8	25	96	97.4	49 59.2	24	96	96.6	50 06.4	23	97	95.9	50 13.2	22	97	95.1	40
48 54.0	25	96	97.0	49 01.4	24	96	96.3	49 08.4	23	97	95.5	49 15.2	22	97	94.8	1
47 56.2	25	96	96.6	48 03.5	24	97	95.9	48 10.5	23	97	95.2	48 17.2	22	97	94.4	2
46 58.4	24	96	96.3	47 05.6	24	97	95.6	47 12.5	23	97	94.8	47 19.1	22	97	94.1	3
46 00.5	24	97	95.9	46 07.6	23	97	95.2	46 14.4	22	97	94.5	46 21.0	22	97	93.8	4
45 02.6	24	97	95.6	45 09.6	23	97	94.9	45 16.4	22	97	94.2	45 22.9	21	97	93.5	45
44 04.6	24	97	95.2	44 11.6	23	97	94.6	44 18.3	22	97	93.9	44 24.8	21	97	93.2	6
43 06.6	23	97	94.9	43 13.5	23	97	94.3	43 20.2	22	97	93.6	43 26.7	21	97	92.9	7
42 08.6	23	97	94.6	42 15.5	23	97	94.0	42 22.1	22	97	93.3	42 28.5	21	97	92.6	8
41 10.5	23	97	94.3	41 17.4	22	97	93.7	41 24.0	22	97	93.0	41 30.4	21	97	92.4	9
40 12.5	23	97	94.0	40 19.3	22	97	93.4	40 25.8	22	97	92.7	40 32.2	21	97	92.1	50
39 14.4	23	97	93.7	39 21.1	22	97	93.1	39 27.7	21	97	92.4	39 34.0	21	97	91.8	1
38 16.3	23	97	93.4	38 23.0	22	97	92.8	38 29.5	21	97	92.2	38 35.8	21	97	91.5	2
37 18.2	23	97	93.1	37 24.8	22	97	92.5	37 31.3	21	97	91.9	37 37.6	21	97	91.3	3
36 20.0	22	97	92.8	36 26.7	22	97	92.2	36 33.1	21	97	91.6	36 39.4	21	97	91.0	4
35 21.9	22	97	92.6	35 28.5	22	97	92.0	35 34.9	21	97	91.4	35 41.2	21	97	90.8	55
34 23.7	22	97	92.3	34 30.3	22	97	91.7	34 36.7	21	97	91.1	34 43.0	21	97	90.5	6
33 25.5	22	97	92.0	33 32.1	22	97	91.4	33 38.5	21	97	90.9	33 44.8	21	97	90.3	7
32 27.4	22	97	91.8	32 33.9	22	97	91.2	32 40.3	21	97	90.6	32 46.6	21	97	90.0	8
31 29.2	22	97	91.5	31 35.7	22	97	90.9	31 42.1	21	97	90.4	31 48.3	21	97	89.8	9
30 31.0	22	97	91.3	30 37.5	22	97	90.7	30 43.9	21	97	90.1	30 50.1	21	97	89.6	60
29 32.7	22	97	91.0	29 39.3	22	97	90.4	29 45.7	21	97	89.9	29 51.9	21	97	89.3	1
28 34.5	22	97	90.8	28 41.1	22	97	90.2	28 47.5	21	97	89.6	28 53.7	21	97	89.1	2
27 36.3	22	97	90.5	27 42.8	22	97	90.0	27 49.2	21	97	89.4	27 55.5	21	97	88.8	3
26 38.1	22	97	90.3	26 44.6	22	97	89.7	26 51.0	21	97	89.2	26 57.3	21	97	88.6	4
25 39.9	22	97	90.0	25 46.4	22	97	89.5	25 52.8	21	97	88.9	25 59.1	21	97	88.4	65
24 41.7	22	97	89.8	24 48.2	22	97	89.2	24 54.6	21	97	88.7	25 00.9	21	97	88.2	6
23 43.5	22	97	89.5	23 50.0	22	97	89.0	23 56.4	21	97	88.5	24 02.7	21	97	87.9	7
22 45.2	22	97	89.3	22 51.8	22	97	88.8	22 58.2	21	97	88.2	23 04.5	21	97	87.7	8
21 47.0	22	97	89.1	21 53.6	22	97	88.5	22 00.0	21	97	88.0	22 06.4	21	97	87.5	9
20 48.8	22	97	88.8	20 55.4	22	97	88.3	21 01.8	21	97	87.8	21 08.2	21	97	87.3	70
19 50.6	22	97	88.6	19 57.2	22	97	88.1	20 03.7	21	97	87.6	20 10.1	21	97	87.0	1
18 52.4	22	97	88.4	18 59.0	22	97	87.8	19 05.5	22	97	87.3	19 11.9	21	97	86.8	2
17 54.2	22	97	88.1	18 00.8	22	97	87.6	18 07.4	22	97	87.1	18 13.8	21	97	86.6	3
16 56.0	22	97	87.9	17 02.7	22	97	87.4	17 09.2	22	97	86.9	17 15.7	21	97	86.4	4
15 57.9	22	97	87.7	16 04.5	22	97	87.2	16 11.1	22	97	86.7	16 17.6	22	97	86.1	75
14 59.7	22	97	87.4	15 06.4	22	97	86.9	15 13.0	22	97	86.4	15 19.5	22	97	85.9	6
14 01.6	22	97	87.2	14 08.3	22	97	86.7	14 14.9	22	97	86.2	14 21.5	22	97	85.7	7
13 03.4	23	97	87.0	13 10.1	22	97	86.5	13 16.8	22	97	86.0	13 23.4	22	97	85.5	8
12 05.3	23	97	86.7	12 12.0	22	97	86.2	12 18.8	22	97	85.7	12 25.4	22	97	85.2	9
11 07.2	23	97	86.5	11 14.0	23	97	86.0	11 20.7	22	97	85.5	11 27.4	22	97	85.0	80
10 09.1	23	97	86.3	10 15.9	23	97	85.8	10 22.7	23	97	85.3	10 29.4	22	97	84.8	1
9 11.0	23	97	86.1	9 17.8	23	97	85.6	9 24.7	23	97	85.1	9 31.4	23	97	84.6	2
8 12.9	23	97	85.8	8 19.8	23	97	85.3	8 26.7	23	97	84.8	8 33.5	23	97	84.3	3
7 14.8	23	97	85.6	7 21.8	23	97	85.1	7 28.7	23	97	84.6	7 35.6	23	96	84.1	4
6 16.8	23	97	85.4	6 23.8	23	97	84.9	6 30.7	23	97	84.4	6 37.7	23	96	83.9	85
5 18.8	23	97	85.1	5 25.8	23	97	84.6	5 32.8	23	97	84.1	5 39.8	23	96	83.7	6

H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	72 00.0	1.0 03	180.0	71 30.0	1.0 03	180.0	71 00.0	1.0 03	180.0	70 30.0	1.0 03	180.0	70 00.0	1.0 02	180.0	69 30.0	1.0 02	180.0	69 00.0	1.0 02	180.0	68 30.0	1.0 02	180.0	00
1	71 58.4	1.0 08	176.8	71 28.4	1.0 08	176.9	70 58.4	1.0 08	176.9	70 28.5	1.0 08	177.0	69 58.5	1.0 07	177.1	69 28.6	1.0 07	177.2	68 58.6	1.0 07	177.2	68 28.6	1.0 07	177.3	1
2	71 53.5	99 14	173.6	71 23.6	99 13	173.7	70 53.8	99 13	173.9	70 24.0	99 13	174.1	69 54.1	1.0 12	174.2	69 24.2	1.0 12	174.3	68 54.4	1.0 12	174.5	68 24.5	1.0 11	174.6	2
3	71 45.3	99 19	170.4	71 15.7	99 18	170.7	70 46.1	99 18	170.9	70 16.4	99 17	171.1	69 46.8	99 17	171.3	69 17.1	99 17	171.5	68 47.4	99 16	171.7	68 17.7	99 16	171.9	3
4	71 34.1	98 24	167.3	71 04.8	98 23	167.6	70 35.4	98 23	167.9	70 06.0	98 22	168.2	69 36.6	98 22	168.5	69 07.2	98 21	168.8	68 37.7	98 21	169.0	68 08.2	98 20	169.3	4
05	71 19.8	96 29	164.2	70 50.8	97 28	164.6	70 21.8	97 27	165.0	69 52.7	97 27	165.4	69 23.6	97 26	165.7	68 54.5	97 26	166.1	68 25.3	97 25	166.4	67 56.1	97 24	166.7	05
6	71 02.5	95 33	161.3	70 34.0	95 33	161.7	70 05.3	95 32	162.2	69 36.7	96 31	162.6	69 07.9	96 30	163.0	68 39.2	96 30	163.4	68 10.3	96 29	163.8	67 41.4	96 28	164.2	6
7	70 42.4	93 38	158.4	70 14.4	94 37	158.9	69 46.2	94 36	159.4	69 18.0	94 35	159.9	68 49.7	94 35	160.4	68 21.3	95 34	160.8	67 52.8	95 33	161.3	67 24.3	95 32	161.7	7
8	70 19.7	92 42	155.6	69 52.2	92 41	156.2	69 24.5	92 40	156.8	68 56.8	93 39	157.3	68 28.9	93 39	157.8	68 01.0	93 38	158.3	67 33.0	94 37	158.8	67 04.9	94 36	159.2	8
9	69 54.5	90 46	153.0	69 27.5	90 45	153.6	69 00.4	91 44	154.2	68 33.1	91 43	154.8	68 05.8	91 42	155.4	67 38.3	92 41	155.9	67 10.8	92 41	156.4	66 43.1	92 40	156.9	9
10	69 26.9	88 50	150.4	69 00.5	88 49	151.1	68 33.9	89 48	151.7	68 07.2	89 47	152.4	67 40.4	90 46	153.0	67 13.4	90 45	153.5	66 46.4	90 44	154.1	66 19.2	91 43	154.6	10
1	68 57.1	86 53	148.0	68 31.3	86 52	148.7	68 05.3	87 51	149.4	67 39.2	87 50	150.0	67 12.9	88 49	150.7	66 46.5	88 48	151.3	66 19.9	89 47	151.9	65 53.2	89 47	152.4	1
2	68 25.2	84 56	145.7	68 00.0	84 55	146.4	67 34.6	85 54	147.1	67 09.1	85 53	147.8	66 43.4	86 52	148.4	66 17.5	87 51	149.1	65 51.5	87 50	149.7	65 25.3	87 50	150.3	2
3	67 51.4	82 59	143.5	67 26.9	82 58	144.2	67 02.1	83 57	144.9	66 37.2	84 56	145.7	66 12.0	84 55	146.3	65 46.7	85 54	147.0	65 21.2	85 53	147.6	64 55.6	86 52	148.2	3
4	67 15.9	79 62	141.4	66 52.0	80 61	142.1	66 27.8	81 60	142.9	66 03.4	82 59	143.6	65 38.9	82 58	144.3	65 14.1	83 57	145.0	64 49.2	83 56	145.6	64 24.1	84 55	146.3	4
15	66 38.8	77 64	139.4	66 15.4	78 63	140.1	65 51.9	79 62	140.9	65 28.1	80 61	141.6	65 04.1	80 60	142.4	64 39.9	81 60	143.1	64 15.5	82 59	143.7	63 51.0	82 58	144.4	15
6	66 00.1	75 67	137.5	65 37.4	76 66	138.3	65 14.4	77 65	139.0	64 51.2	78 64	139.8	64 27.8	78 63	140.5	64 04.2	79 62	141.2	63 40.3	80 61	141.9	63 16.3	80 60	142.6	6
7	65 20.1	73 69	135.7	64 58.0	74 68	136.5	64 35.6	75 67	137.2	64 13.0	76 66	138.0	63 50.1	77 65	138.7	63 27.0	77 64	139.5	63 03.7	78 63	140.2	62 40.2	79 62	140.8	7
8	64 38.8	71 71	134.0	64 17.2	72 70	134.8	63 55.4	73 69	135.5	63 33.4	74 68	136.3	63 11.1	75 67	137.1	62 48.5	75 66	137.8	62 25.8	76 65	138.5	62 02.8	77 64	139.2	8
9	63 56.3	69 73	132.3	63 35.3	70 72	133.1	63 14.1	71 71	133.9	62 52.6	72 70	134.7	62 30.8	73 69	135.4	62 08.8	74 68	136.2	61 46.6	74 67	136.9	61 24.2	75 66	137.6	9
20	63 12.7	68 74	130.8	62 52.3	69 73	131.6	62 31.6	69 72	132.4	62 10.6	70 72	133.2	61 49.4	71 71	133.9	61 27.9	72 70	134.7	61 06.3	73 69	135.4	60 44.3	73 68	136.1	20
1	62 28.2	66 76	129.3	62 08.3	67 75	130.1	61 48.1	68 74	130.9	61 27.7	69 73	131.7	61 07.0	69 72	132.5	60 46.0	70 72	133.2	60 24.8	71 71	133.9	60 03.4	72 70	134.6	1
2	61 42.7	64 77	128.0	61 23.3	65 76	128.8	61 03.7	66 76	129.5	60 43.7	67 75	130.3	60 23.5	68 74	131.1	60 03.1	69 73	131.8	59 42.4	69 72	132.5	59 21.5	70 71	133.2	2
3	60 56.4	63 78	126.6	60 37.5	63 78	127.4	60 18.3	64 77	128.2	59 58.9	65 76	129.0	59 39.2	66 75	129.7	59 19.2	67 75	130.5	58 59.0	68 74	131.2	58 38.6	68 73	131.9	3
4	60 09.3	61 80	125.4	59 50.9	62 79	126.2	59 32.2	63 78	126.9	59 13.2	64 77	127.7	58 54.0	65 77	128.5	58 34.5	65 76	129.2	58 14.8	66 75	129.9	57 54.8	67 74	130.6	4
25	59 21.5	59 81	124.2	59 03.5	60 80	125.0	58 45.3	61 79	125.7	58 26.8	62 79	126.5	58 08.0	63 78	127.2	57 49.0	64 77	128.0	57 29.7	65 76	128.7	57 10.2	65 76	129.4	25
6	58 33.0	58 82	123.1	58 15.5	59 81	123.8	57 57.7	60 80	124.6	57 39.6	61 80	125.3	57 21.3	62 79	126.1	57 02.7	62 78	126.8	56 43.9	63 78	127.5	56 24.8	64 77	128.2	6
7	57 43.9	56 83	122.0	57 26.8	57 82	122.7	57 09.5	58 81	123.5	56 51.8	59 81	124.2	56 33.9	60 80	125.0	56 15.8	61 79	125.7	55 57.4	62 79	126.4	55 38.8	63 78	127.1	7
8	56 54.2	55 84	120.9	56 37.6	56 83	121.7	56 20.6	57 82	122.4	56 03.4	58 82	123.2	55 45.9	59 81	123.9	55 28.2	60 80	124.6	55 10.2	60 80	125.3	54 52.0	61 79	126.0	8
9	56 04.1	54 84	120.0	55 47.8	55 84	120.7	55 31.2	56 83	121.4	55 14.4	57 83	122.2	54 57.3	57 82	122.9	54 40.0	58 81	123.6	54 22.4	59 81	124.3	54 04.6	60 80	125.0	9
30	55 13.4	53 85	119.0	54 57.5	53 85	119.8	54 41.3	54 84	120.5	54 24.9	55 83	121.2	54 08.2	56 83	121.9	53 51.2	57 82	122.6	53 34.0	58 82	123.3	53 16.6	58 81	124.0	30
1	54 22.2	51 86	118.1	54 06.7	52 85	118.8	53 50.9	53 85	119.6	53 34.8	54 84	120.3	53 18.5	55 84	121.0	53 01.9	56 83	121.7	52 45.1	56 82	122.4	52 28.1	57 82	123.0	1
2	53 30.7	50 87	117.3	53 15.5	51 86	118.0	53 00.0	52 85	118.7	52 44.3	53 85	119.4	52 28.4	54 84	120.1	52 12.1	54 84	120.8	51 55.7	55 83	121.5	51 39.0	56 83	122.1	2
3	52 38.8	49 87	116.4	52 23.9	50 87	117.1	52 08.8	51 86	117.9	51 53.4	52 86	118.5	51 37.8	52 85	119.2	51 21.9	53 84	119.9	51 05.8	54 84	120.6	50 49.5	55 83	121.3	3
4	51 46.4	48 88	115.6	51 31.9	49 87	116.3	51 17.1	50 87	117.0	51 02.0	51 86	117.7	50 46.8	51 86	118.4	50 31.2	52 85	119.1	50 15.5	53 85	119.8	49 59.5	54 84	120.4	4
35	50 53.8	47 88	114.9	50 39.5	48 88	115.6	50 25.1	49 87	116.3	50 10.3	49 87	116.9	49 55.4	50 86	117.6	49 40.2	51 86	118.3	49 24.7	52 85	119.0	49 09.1	53 85	119.6	35
6	50 00.8	46 89	114.2	49 46.9	47 88	114.8	49 32.7	48 88	115.5	49 18.3	48 87	116.2	49 03.6	49 87	116.9	48 48.7	50 86	117.5	48 33.6	51 86	118.2	48 18.3	51 85	118.8	6
7	49 07.6	45 89	113.5	48 53.9	46 89	114.1	48 40.0	47 88	114.8	48 25.9	47 88	115.5	48 11.5	48 87	116.1	47 56.9	49 87	116.8	47 42.1	50 86	117.4	47 27.1	50 86	118.1	7
8	48 14.0	44 90	112.8	48 00.6	45 89	113.4	47 47.0	46 89	114.1	47 33.2	47 88	114.8	47 19.1	47 88	115.4	47 04.8	48 87	116.1	46 50.3	49 87	116.7	46 35.6	49 86	117.3	8
9	47 20.2	43 90	112.1	47 07.1	44 90	112.8	46 53.7	45 89	113.4	46 40.1	46 89	114.1	46 26.3	46 88	114.7	46 12.3	47 88	115.4	45 58.1	48 87	116.0	45 43.7	48 87	116.6	9
40	46 26.2	43 90	111.5	46 13.3	43 90	112.2	46 00.2	44 90	112.8	45 46.9	45 89	113.4	45 33.3	45 89	114.1	45 19.6	46 88	114.7	45 05.6	47 88	115.3	44 51.5	48 87	116.0	40
1	45 31.9	42 91	110.9	45 19.2	42 90	111.5	45 06.4	43 90	112.2	44 53.3	44 90	112.8	44 40.1	45 89	113.4	44 26.6	45 89	114.1	44 12.9	46 88	114.7	43 59.0	47 88	115.3	1
2	44 37.4	41 91	110.3	44 25.0	42 91	110.9	44 12.4	42 90	111.6	43 59.5	43 90	112.2	43 46.5	44 90	112.8	43 33.3	44 89	113.5	43 19.9	45 89	114.1	43 06.2	46 88	114.7	2
3	43 42.7	40 92	109.7	43 30.5	41 91	110.4	43 18.1	42 91	111.0	43 05.5	42 90	111.6	42 52.7	43 90	112.2	42 39.8	44 90	112.9	42 26.6	44 89	113.5	42 13.2	45 89	114.1	3
4	42 47.8	40 92	109.2	42 35.8	40 91	109.8	42 23.7	41 91	110.4	42 11.3	42 91	111.1	41 58.8	42 90	111.7	41 46.0	43 90	112.3	41 33.1	43 90	112.9	41 19.9	44 89	113.5	4
45	41 52.7	39 92	108.7	41 41.0	40 92	109.3	41 29.0	40 91	109.9	41 16.9	41 91	110.5	41 04.5	41 91	111.1	40 52.0	42 90	111.7	40 39.3	43 90	112.3	40 26.4	43 90	112.9	45
6	40 57.5	38 92	108.2	40 45.9	39 92	108.8	40 34.2	39 92	109.4	40 22.3	40 91	110.0	40 10.1	41 91	110.6	39 57.8	41 91	111.2	39 45.3	42 90	111.8	39 32.7	43 90	112.4	6
7	40 02.1	38 93	107.7	39 50.7	38 92	108.3	39 39.2	39 92	108.9	39 27.5	39 92	109.5	39 15.5	40 91	110.1	39 03.4	41 91	110.6	38 51.2	41 91	111.2	38 38.7	42 90	111.8	7
8	39 06.5	37 93	107.2	38 55.4	38 93	107.8	38 44.0	38 92	108.4	38 32.5	39 92	109.0	38 20.8	39 92	109.5	38 08.9	40 91	110.1	37 56.8	40 91	110.7	37 44.6	41 91	111.3	8
9	38 10.8	36 93	106.7	37 59.9	37 93	107.3	37 48.7	38 92	107.9	37 37.3	38 92	108.5	37 25.8	39 92	109.1	37 14.1	39 92	109.6	37 02.3	40 91	110.2	36 50.3	40 91	110.8	9
50	37 15.0	36 93	106.3	37 04.2	36 93	106.8	36 53.2	37 93	107.4	36 42.0	37 92	108.0	36 30.7	38 92	108.6	36 19.2	39 92	109.2	36 07.6	39 91	109.7	35 55.7	40 91	110.3	50
1	36 19.1	35 93	105.8	36 08.4	36 93	106.4	35 57.6	36 93	107.0	35 46.6	37 93	107.5	35 35.5	37 92	108.1	35 24.1	38 92	108.7	35 12.7	38 92	109.2	35 01.0	39 91	109.8	1
2	35 23.0	35 94	105.4	35 12.5	35 93	106.0	35 01.8	36 93	106.5	34 51.0	36 93	107.1	34 40.1	37 93	107.7	34 28.9	37 92	108.2	34 17.6	38 92	108.8	34 06.2	38 92	109.3	2
3	34 26.8	34 94	105.0	34 16.5	35 94	105.5	34 06.0	35 93	106.1	33 55.3	36 93	106.7	33 44.5	36 93	107.2	33 33.6	37 92	107.8	33 22.4	37 92	108.3	33 11.2	38 92	108.9	3
4	33 30.5	34 94	104.6	33 20.3	34 94	105.1	33 10.0	35 94	105.7	32 59.5	35 93	106.2	32 48.8	36 93	106.8	32 38.0	36 93	107.3	32 27.1	37 92	107.9	32 16.0	37 92	108.5	4
55	32 34.1	33 94	104.2	32 24.1	34 94	104.7	32 13.9	34 94	105.3	32 03.5	35 93	105.8	31 53.0	35 93	106.4	31 42.4	36 93	106.9	31 31.6	36 93	107.5	31 20.7	37 92	108.0	55
6	31 37.6	33 94	103.8	31 27.7	33 94	104.3	31 17.7	34 94	104.9	31 07.5	34 94	105.4	30 57.1	35 93	106.0	30 46.7	35 93	106.5	30 36.1	36 93	107.1	30 25.3	36 93	107.6	6
7	30 41.0	32 94	103.4	30 31.2	33 94	103.9	30 21.3	33 94	104.5	30 11.3	34 94	105.0	30 01.1	34 94	105.6	29 50.8	35 93	106.1	29 40.3	35 93	106.7	29 29.8	35 93	107.2	7
8	29 44.3	32 95	103.0	29 34.7	32 94	103.6	29 24.9	33 94	104.1	29 15.0	33 94	104.6	29 05.0	34 94	105.2	28 54.8	34 93	105.7	28 44.5	35 93	106.3	28 34.1	35 93	106.8	8
9	28 47.6	32 95	102.7	28 38.1	32 95	103.2	28 28.4	32 94	103.7	28 18.6	33 94	104.3	28 08.7	33 94	104.8	27 58.7	34 94	105.3	27 48.6	34 93	105.9	27 38.3	34 93	106.4	9
60	27 50.7	31 95	102.3	27 41.3	32 95	102.8	27 31.8	32 94	103.4	27 22.2	32 94	103.9	27 12.4	33 94	104.4	27 02.5	33 94	105.0	26 52.5	34 94	105.5	26 42.4	34 93	106.0	60
1	26 53.8	31 95	102.0	26 44.5	31 95	102.5	26 35.1	32 95	103.0	26 25.6	32 94	103.5	26 16.0	32 94	104.1	26 06.2	33 94	104.6	25 56.4	33 94	105.1	25 46.4	33 94	105.6	1
2	25 56.8	30 95	101.6	25 47.7	31 95	102.1	25 38.4	31 95	102.7	25 29.0	32 95	103.2	25 19.5	32 94	103.7	25 09.8	32 94	104.2	25 00.1	33 94	104.8	24 50.3	33 94	105.3	2
3	24 59.8	30 95	101.3	24 50.7	30 95	101.8	24 41.5	31 95	102.3	24 32.3	31 95	102.9	24 22.9	31 94	103.4	24 13.4	32 94	103.9	24 03.8	32 94	104.4	23 54.1	53 94	104.9	3
4	24 02.6	30 95	101.0	23 53.7	30 95	101.5	23 44.6	30 95	102.0	23 35.5	31 95	102.5	23 26.2	31 95	103.0	23 16.8	31 94	103.5	23 07.3	32 94	104.1	22 57.8	32 94	104.6	4
65	23 05.5	29 95	100.6	22 56.6	30 95	101.1	22 47.6	30 95	101.7	22 38.6	30 95	102.2	22 29.4	31 95	102.7	22 20.2	31 95	103.2	22 10.8	31 94	103.7	22 01.4	32 94	104.2	65
6	22 08.2	29 96	100.3	21 59.4	29 95	100.8	21 50.6	30 95	101.3	21 41.6	30 95	101.9	21 32.6	30 95	102.4	21 23.5	31 95	102.9	21 14.2	31 94	103.4	21 04.9	31 94	103.9	6
7	21 10.9	29 96	100.0	21 02.2	29 95	100.5	20 53.5	29 95	101.0	20 44.6	30 95	101.5	20 35.7	30 95	102.1	20 26.7	30 95	102.6	20 17.6	31 95	103.1	20 08.4	31 94	103.6	7
8	20 13.5	28 96	99.7	20 05.0	29 96	100.2	19 56.3	29 95	100.7	19 47.6	29 95	101.2	19 38.7	30 95	101.7	19 29.8	30 95	102.2	19 20.8	30 95	102.7	19 11.7	30 94	103.3	8
9	19 16.1	28 96	99.4	19 07.6	28 96	99.9	18 59.1	29 95	100.4	18 50.4	29 95	100.9	18 41.7	29 95	101.4	18 32.9	30 95	101.9	18 24.0	30 95	102.4	18 15.0	30 95	102.9	9
70	18 18.7	28 96	99.1	18 10.3	28 96	99.6	18 01.8	28 96	100.1	17 53.2	29 95	100.6	17 44.6	29 95	101.1	17 35.9	29 95	101.6	17 27.1	29 95	102.1	17 18.3	30 95	102.6	70
1	17 21.2	28 96	98.8	17 12.8	28 96	99.3	17 04.5	28 96	99.8	16 56.0	28 96	100.3	16 47.5	29 95	100.8	16 38.8	29 95	101.3	16 30.2	29 95	101.8	16 21.4	29 95	102.3	1
2	16 23.6	27 96	98.5	16 15.4	28 96	99.0	16 07.1	28 96	99.5	15 58.7	28 96	100.0	15 50.2	28 95	100.5	15 41.7	28 95	101.0	15 33.1	29 95	101.5	15 24.5	29 95	102.0	2
3	15 26.0	27 96	98.2	15 17.9	27 96	98.7	15 09.6	28 96	99.2	15 01.3	28 96	99.7	14 53.0	28 96	100.2	14 44.6	28 95	100.7	14 36.1	28 95	101.2	14 27.5	29 95	101.7	3
4	14 28.4	27 96	98.0	14 20.3	27 96	98.5	14 12.1	27 96	99.0	14 03.9	27 96	99.5	13 55.7	28 96	100.0	13 47.3	28 95	100.4	13 38.9	28 95	100.9	13 30.5	28 95	101.4	4
75	13 30.7	27 96	97.7	13 22.7	27 96	98.2	13 14.6	27 96	98.7	13 06.5	27 96	99.2	12 58.3	27 96	99.7	12 50.1	28 96	100.2	12 41.8	28 95	100.7	12 33.4	28 95	101.1	75
6	12 33.0	26 96	97.4	12 25.0	27 96	97.9	12 17.0	27 96	98.4	12 09.0	27 96	98.9	12 00.9	27 96	99.4	11 52.7	27 96	99.9	11 44.5	27 96	100.4	11 36.3	28 95	100.9	6
7	11 35.2	26 96	97.2	11 27.4	26 96	97.6	11 19.4	27 96	98.1	11 11.4	27 96	98.6	11 03.4	27 96	99.1	10 55.3	27 96	99.6	10 47.2	27 96	100.1	10 39.1	27 95	100.6	7
8	10 37.5	26 96	96.9	10 29.6	26 96	97.4	10 21.8	26 96	97.9	10 13.9	26 96	98.4	10 05.9	27 96	98.8	9 57.9	27 96	99.3	9 49.9	27 96	99.8	9 41.8	27 96	100.3	8
9	9 39.6	26 96	96.6	9 31.9	26 96	97.1	9 24.1	26 96	97.6	9 16.3	26 96	98.1	9 08.4	26 96	98.6	9 60.5	26 96	99.1	8 52.5	27 96	99.6	8 44.5	27 96	100.0	9
80	8 41.8	26 96	96.4	8 34.1	26 96	96.9	8 26.4	26 96	97.3	8 18.6	26 96	97.8	8 10.8	26 96	98.3	8 02.9	26 96	98.8	7 55.1	26 96	99.3	7 47.2	26 96	99.8	80
1	7 43.9	25 96	96.1	7 36.3	26 96	96.6	7 28.6	26 96	97.1	7 20.9	26 96	97.6	7 13.2	26 96	98.1	7 05.4	26 96	98.5	6 57.6	26 96	99.0	6 49.8	26 96	99.5	1
2	6 46.0	25 97	95.9	6 38.4	25 96	96.3	6 30.8	25 96	96.8	6 23.2	26 96	97.3	6 15.5	26 96	97.8	6 07.8	26 96	98.3	6 00.1	26 96	98.8	5 52.3	26 96	99.3	2
3	5 48.1	25 97	95.6	5 40.6	25 96	96.1	5 33.0	25 96	96.6	5 25.4	25 96	97.1	5 17.8	25 96	97.5	5 10.2	25 96	98.0	5 02.5	26 96	98.5				3

Lat. 14°

H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	84 00.0	1.0 08	180.0	84 30.0	1.0 09	180.0	85 00.0	1.0 10	180.0	85 30.0	1.0 11	180.0	86 00.0	1.0 12	180.0	86 30.0	1.0 13	180.0	87 00.0	1.0 15	180.0	87 30.0	1.0 18	180.0	00
1	83 55.2	99 23	170.6	84 24.8	98 25	169.8	84 54.3	98 28	168.8	85 23.7	98 30	167.6	85 52.9	97 34	166.2	86 22.0	96 37	164.3	86 50.7	95 42	161.9	87 19.0	93 49	158.6	1
2	83 41.2	95 37	161.7	84 09.7	94 40	160.2	84 37.8	93 43	158.4	85 05.6	92 47	156.3	85 32.8	90 51	153.7	85 59.5	87 56	150.6	86 25.2	84 61	146.7	86 49.8	79 68	141.8	2
3	83 19.0	90 49	153.6	83 45.8	88 52	151.5	84 12.0	86 55	149.2	84 37.6	84 59	146.5	85 02.4	81 63	143.4	85 26.1	77 68	139.7	85 48.4	72 73	135.4	86 09.1	65 78	130.2	3
4	82 49.8	84 58	146.4	83 14.7	82 61	144.1	83 38.9	79 65	141.5	84 02.1	76 68	138.5	84 24.3	72 72	135.2	84 45.2	67 76	131.4	85 04.6	61 80	127.1	85 22.0	55 85	122.2	4
05	82 15.0	78 66	140.2	82 38.0	75 69	137.8	83 00.0	72 72	135.1	83 21.1	68 75	132.1	83 41.0	64 78	128.7	83 59.4	59 82	125.1	84 16.3	53 85	121.0	84 31.2	46 88	116.6	05
6	81 35.7	72 71	134.9	81 56.8	69 74	132.4	82 17.0	66 77	129.7	82 36.1	62 80	126.8	82 53.9	57 83	123.6	83 10.3	52 86	120.2	83 25.2	47 88	116.4	83 38.2	40 91	112.4	6
7	80 52.8	67 76	130.4	81 12.3	63 78	128.0	81 30.8	60 81	125.3	81 48.2	56 83	122.5	82 04.3	51 86	119.5	82 19.0	47 88	116.3	82 32.2	41 90	112.9	82 43.8	36 92	109.3	7
8	80 07.2	62 80	126.6	80 25.3	58 82	124.2	80 42.3	55 84	121.7	80 58.2	51 86	119.0	81 12.8	47 88	116.2	81 26.2	42 90	113.2	81 38.1	37 92	110.1	81 48.4	32 93	106.9	8
9	79 19.5	57 82	123.3	79 36.2	54 84	121.0	79 51.9	51 86	118.6	80 06.5	47 88	116.1	80 20.0	43 90	113.4	80 32.2	38 91	110.7	80 43.0	34 93	107.8	80 52.4	29 94	104.9	9
10	78 30.0	53 85	120.4	78 45.6	50 86	118.2	79 00.1	47 88	116.0	79 13.7	43 90	113.6	79 26.1	39 91	111.1	79 37.3	35 92	108.6	79 47.3	31 94	106.0	79 56.0	27 95	103.2	10
1	77 39.1	50 87	117.9	77 53.7	47 88	115.9	78 07.3	44 90	113.7	78 19.9	40 91	111.5	78 31.4	37 92	109.2	78 41.9	33 93	106.8	78 51.1	29 94	104.4	78 59.1	26 95	101.9	1
2	76 47.2	47 88	115.7	77 00.8	44 89	113.8	77 13.6	41 91	111.8	77 25.4	38 92	109.7	77 36.2	34 93	107.5	77 45.9	31 94	105.3	77 54.5	27 95	103.0	78 02.0	23 96	100.7	2
3	75 54.3	44 89	113.8	76 07.2	41 91	112.0	76 19.2	38 92	110.0	76 30.3	35 93	108.1	76 40.4	32 94	106.0	76 49.6	29 94	104.0	76 57.7	26 95	101.8	77 04.7	22 96	99.7	3
4	75 00.7	42 90	112.1	75 12.9	39 91	110.3	75 24.2	36 92	108.5	75 34.7	33 93	106.7	75 44.3	30 94	104.7	75 52.9	27 95	102.8	76 00.6	24 95	100.8	76 07.3	21 96	98.8	4
15	74 06.5	40 91	110.6	74 18.1	37 92	108.9	74 28.8	35 93	107.2	74 38.8	32 94	105.4	74 47.8	29 94	103.6	74 56.0	26 95	101.8	75 03.3	23 96	99.9	75 09.7	20 96	98.0	15
6	73 11.8	38 92	109.2	73 22.8	35 93	107.6	73 33.0	33 94	106.0	73 42.5	30 94	104.3	73 51.1	27 96	102.6	73 58.9	26 95	100.8	74 05.9	22 96	99.1	74 12.0	19 96	97.3	6
7	72 16.6	36 93	108.0	72 27.1	34 93	106.5	72 36.9	31 94	104.9	72 45.9	29 95	103.3	72 54.2	26 95	101.6	73 01.7	24 96	100.0	73 08.3	21 96	98.3	73 14.2	18 96	96.6	7
8	71 21.1	35 93	106.9	71 31.1	32 94	105.4	71 40.5	30 94	103.9	71 49.2	28 95	102.4	71 57.1	25 95	100.8	72 04.3	23 96	99.2	72 10.7	20 96	97.6	72 16.3	17 97	96.0	8
9	70 25.2	33 94	105.8	70 34.9	31 94	104.4	70 43.9	29 95	103.0	70 52.2	27 95	101.5	70 59.8	24 96	100.0	71 06.8	22 96	98.5	71 12.9	19 96	97.0	71 18.4	17 97	95.5	9
20	69 29.0	32 94	104.9	69 38.4	30 94	103.5	69 47.1	28 95	102.2	69 55.1	26 95	100.8	70 02.5	23 96	99.3	70 09.1	21 96	97.9	70 15.1	19 96	96.5	70 20.4	16 97	95.0	20
1	68 32.7	31 94	104.0	68 41.7	29 95	102.7	68 50.1	27 95	101.4	68 57.8	25 96	100.0	69 05.0	23 96	98.7	69 11.4	20 96	97.3	69 17.2	18 97	95.9	69 22.4	16 97	94.5	1
2	67 36.1	30 95	103.2	67 44.8	28 95	102.0	67 52.9	26 95	100.7	68 00.5	24 96	99.4	68 07.4	22 96	98.1	68 13.7	20 96	96.8	68 19.3	18 97	95.4	68 24.3	16 97	94.1	2
3	66 39.3	29 95	102.5	66 47.8	27 95	101.2	66 55.7	25 96	100.0	67 03.0	23 96	98.8	67 09.7	21 96	97.5	67 15.8	19 96	96.3	67 21.3	17 97	95.0	67 26.3	15 97	93.7	3
4	65 42.4	28 95	101.8	65 50.6	26 95	100.6	65 58.3	25 96	99.4	66 05.4	23 96	98.2	66 11.9	21 96	97.0	66 17.9	19 97	95.8	66 23.3	17 97	94.6	66 28.2	15 97	93.3	4
25	64 45.3	27 96	101.1	64 53.3	26 96	100.0	65 00.8	24 96	98.8	65 07.7	22 96	97.7	65 14.1	20 96	96.5	65 20.0	19 97	95.3	65 25.3	17 97	94.1	65 30.0	15 97	93.0	25
6	63 48.2	27 96	100.5	63 55.9	25 96	99.4	64 03.2	23 96	98.3	64 10.0	22 96	97.2	64 16.3	20 97	96.0	64 22.0	18 97	94.9	64 27.2	16 97	93.8	64 31.9	15 97	92.6	6
7	62 50.9	26 96	99.9	62 58.5	25 96	98.8	63 05.6	23 96	97.8	63 12.2	21 96	96.7	63 18.3	20 97	95.6	63 24.0	18 97	94.5	63 29.1	16 97	93.4	63 33.7	15 97	92.3	7
8	61 53.5	26 96	99.3	62 00.9	24 96	98.3	62 07.9	22 96	97.3	62 14.3	21 96	96.2	62 20.4	19 97	95.2	62 25.9	18 97	94.1	62 31.0	16 97	93.0	62 35.5	14 97	92.0	8
9	60 56.0	25 96	98.8	61 03.2	24 96	97.8	61 10.1	22 96	96.8	61 16.5	21 97	95.8	61 22.4	19 97	94.8	61 27.8	17 97	93.7	61 32.8	16 97	92.7	61 37.3	14 97	91.7	9
30	59 58.4	25 96	98.3	60 05.5	23 96	97.4	60 12.2	22 96	96.4	60 18.5	20 97	95.4	60 24.3	19 97	94.4	60 29.7	17 97	93.4	60 34.7	16 97	92.4	60 39.1	14 97	91.4	30
1	59 00.8	24 96	97.8	59 07.8	23 96	96.9	59 14.4	21 97	96.0	59 20.5	20 97	95.0	59 26.3	18 97	94.0	59 31.6	17 97	93.1	59 36.5	16 97	92.1	59 40.9	14 97	91.1	1
2	58 03.1	24 96	97.4	58 09.9	22 96	96.5	58 16.4	21 97	95.5	58 22.5	20 97	94.6	58 28.2	18 97	93.7	58 33.5	17 97	92.7	58 38.3	15 97	91.8	58 42.7	14 97	90.8	2
3	57 05.3	23 96	97.0	57 12.1	22 96	96.1	57 18.5	21 97	95.2	57 24.5	19 97	94.3	57 30.1	18 97	93.3	57 35.3	17 97	92.4	57 40.1	15 97	91.5	57 44.5	14 97	90.6	3
4	56 07.5	23 96	96.5	56 14.2	22 97	95.7	56 20.5	20 97	94.8	56 26.4	19 97	93.9	56 32.0	18 97	93.0	56 37.1	17 97	92.1	56 41.9	15 97	91.2	56 46.3	14 97	90.3	4
35	55 09.6	23 96	96.2	55 16.2	21 97	95.3	55 22.4	20 97	94.4	55 28.3	19 97	93.6	55 33.8	18 97	92.7	55 38.9	16 97	91.8	55 43.7	15 97	91.0	55 48.1	14 97	90.1	35
6	54 11.7	22 97	95.8	54 18.2	21 97	94.9	54 24.4	20 97	94.1	54 30.2	19 97	93.2	54 35.7	18 97	92.4	54 40.8	16 97	91.5	54 45.5	15 97	90.7	54 49.9	14 97	89.8	6
7	53 13.8	22 97	95.4	53 20.2	21 97	94.6	53 26.3	20 97	93.8	53 32.1	19 97	92.9	53 37.5	17 97	92.1	53 42.6	16 97	91.3	53 47.3	15 97	90.4	53 51.7	14 97	89.6	7
8	52 15.8	22 97	95.0	52 22.2	21 97	94.2	52 28.2	20 97	93.4	52 33.9	18 97	92.6	52 39.3	17 97	91.8	52 44.3	16 97	91.0	52 49.1	15 97	90.2	52 53.4	14 97	89.4	8
9	51 17.8	22 97	94.7	51 24.1	20 97	93.9	51 30.1	19 97	93.1	51 35.8	18 97	92.3	51 41.1	17 97	91.5	51 46.1	16 97	90.7	51 50.8	15 97	89.9	51 55.2	14 97	89.1	9
40	50 19.8	21 97	94.4	50 26.0	20 97	93.6	50 31.9	19 97	92.8	50 37.6	18 97	92.0	50 42.9	17 97	91.3	50 47.9	16 97	90.5	50 52.6	15 97	89.7	50 57.0	14 97	88.9	40
1	49 21.7	21 97	94.0	49 27.9	20 97	93.3	49 33.8	19 97	92.5	49 39.4	18 97	91.8	49 44.7	17 97	91.0	49 49.7	16 97	90.2	49 54.4	15 97	89.5	49 58.8	14 97	88.7	1
2	48 23.6	21 97	93.7	48 29.8	20 97	93.0	48 35.6	19 97	92.2	48 41.2	18 97	91.5	48 46.5	17 97	90.7	48 51.5	16 97	90.0	48 56.2	15 97	89.2	49 00.6	14 97	88.5	2
3	47 25.5	21 97	93.4	47 31.6	20 97	92.7	47 37.4	19 97	92.0	47 43.0	18 97	91.2	47 48.3	17 97	90.5	47 53.3	16 97	89.8	47 58.0	15 97	89.0	48 02.4	14 97	88.3	3
4	46 27.4	21 97	93.1	46 33.4	20 97	92.4	46 39.3	19 97	91.7	46 44.8	18 97	91.0	46 50.1	17 97	90.2	46 55.1	16 97	89.5	46 59.8	15 97	88.8	47 04.2	14 97	88.1	4
45	45 29.2	21 97	92.8	45 35.3	20 97	92.1	45 41.1	19 97	91.4	45 46.6	18 97	90.7	45 51.8	17 97	90.0	45 56.8	16 97	89.3	46 01.6	15 97	88.6	46 06.0	14 97	87.9	45
6	44 31.1	20 97	92.5	44 37.1	20 97	91.8	44 42.9	19 97	91.1	44 48.4	18 97	90.5	44 53.6	17 97	89.8	44 58.6	16 97	89.1	45 03.4	15 97	88.4	45 07.9	15 97	87.7	6
7	43 32.9	20 97	92.2	43 38.9	20 97	91.6	43 44.6	19 97	90.9	43 50.1	18 97	90.2	43 55.4	17 97	89.5	44 00.4	16 97	88.8	44 05.2	15 97	88.2	44 09.7	15 97	87.5	7
8	42 34.7	20 97	92.0	42 40.7	19 97	91.3	42 46.4	19 97	90.6	42 51.9	18 97	90.0	42 57.2	17 97	89.3	43 02.2	16 97	88.6	43 07.0	16 97	87.9	43 11.6	15 97	87.3	8
9	41 36.5	20 97	91.7	41 42.5	19 97	91.0	41 48.2	19 97	90.4	41 53.7	18 97	89.7	41 59.0	17 97	89.1	42 04.0	16 97	88.4	42 08.8	16 97	87.7	42 13.4	15 97	87.1	9
50	40 38.4	20 97	91.4	40 44.3	19 97	90.8	40 50.0	19 97	90.1	40 55.5	18 97	89.5	41 00.8	17 97	88.8	41 05.8	16 97	88.2	41 10.7	16 97	87.5	41 15.3	15 97	86.9	50
1	39 40.1	20 97	91.2	39 46.1	19 97	90.5	39 51.8	19 97	89.9	39 57.3	18 97	89.3	40 02.6	17 97	88.6	40 07.6	17 97	88.0	40 12.5	16 97	87.3	40 17.1	15 97	86.7	1
2	38 41.9	20 97	90.9	38 47.9	19 97	90.3	38 53.6	19 97	89.7	38 59.1	18 97	89.0	39 04.4	17 97	88.4	39 09.5	17 97	87.8	39 14.4	16 97	87.1	39 19.0	15 97	86.5	2
3	37 43.7	20 97	90.7	37 49.6	19 97	90.0	37 55.3	19 97	89.4	38 00.9	18 97	88.8	38 06.2	17 97	88.2	38 11.3	17 97	87.5	38 16.2	16 97	86.9	38 20.9	15 97	86.3	3
4	36 45.5	20 97	90.4	36 51.4	19 97	89.8	36 57.1	19 97	89.2	37 02.7	18 97	88.6	37 08.0	17 97	88.0	37 13.1	17 97	87.3	37 18.1	16 97	86.7	37 22.8	16 97	86.1	4
55	35 47.3	20 97	90.2	35 53.2	19 97	89.6	35 58.9	19 97	89.0	36 04.5	18 97	88.3	36 09.8	18 97	87.7	36 15.0	17 97	87.1	36 20.0	16 97	86.5	36 24.8	16 97	85.9	55
6	34 49.1	20 97	89.9	34 55.0	19 97	89.3	35 00.7	19 97	88.7	35 06.3	18 97	88.1	35 11.6	18 97	87.5	35 16.8	17 97	86.9	35 21.9	16 97	86.3	35 26.7	16 97	85.7	6
7	33 50.9	20 97	89.7	33 56.8	19 97	89.1	34 02.5	19 97	88.5	34 08.1	18 97	87.9	34 13.5	18 97	87.3	34 18.7	17 97	86.7	34 23.8	17 97	86.1	34 28.7	16 97	85.5	7
8	32 52.6	20 97	89.4	32 58.6	19 97	88.9	33 04.3	19 97	88.3	33 09.9	18 97	87.7	33 15.3	18 97	87.1	33 20.6	17 97	86.5	33 25.7	17 97	85.9	33 30.6	16 97	85.3	8
9	31 54.4	20 97	89.2	32 00.4	20 97	88.6	32 06.1	19 97	88.1	32 11.7	18 97	87.5	32 17.2	18 97	86.9	32 22.5	17 97	86.3	32 27.6	17 97	85.7	32 32.6	16 97	85.1	9
60	30 56.2	20 97	89.0	31 02.2	20 97	88.4	31 08.0	19 97	87.8	31 13.6	19 97	87.3	31 19.1	18 97	86.7	31 24.4	18 97	86.1	31 29.6	17 97	85.5	31 34.6	16 97	85.0	60
1	29 58.0	20 97	88.8	30 04.0	20 97	88.2	30 09.8	19 97	87.6	30 15.4	19 97	87.0	30 21.0	18 97	86.5	30 26.3	18 97	85.9	30 31.6	17 97	85.3	30 36.6	17 97	84.8	1
2	28 59.8	20 97	88.5	29 05.8	20 97	88.0	29 11.6	19 97	87.4	29 17.3	19 97	86.8	29 22.9	18 97	86.3	29 28.3	18 97	85.7	29 33.5	17 97	85.1	29 38.7	17 97	84.6	2
3	28 01.6	20 97	88.3	28 07.6	20 97	87.7	28 13.5	19 97	87.2	28 19.2	19 97	86.6	28 24.8	18 97	86.1	28 30.2	18 97	85.5	28 35.5	17 97	84.9	28 40.7	17 97	84.4	3
4	27 03.4	20 97	88.1	27 09.4	20 97	87.5	27 15.3	19 97	87.0	27 21.1	19 97	86.4	27 26.7	19 97	85.9	27 32.2	18 97	85.3	27 37.6	18 97	84.8	27 42.8	17 97	84.2	4
65	26 05.2	20 97	87.8	26 11.3	20 97	87.3	26 17.2	19 97	86.8	26 23.0	19 97	86.2	26 28.6	19 97	85.7	26 34.2	18 97	85.1	26 39.6	18 97	84.6	26 44.9	17 96	84.0	65
6	25 07.1	20 97	87.6	25 13.1	20 97	87.1	25 19.1	20 97	86.5	25 24.9	19 97	86.0	25 30.6	19 97	85.5	25 36.2	18 97	84.9	25 41.6	18 97	84.4	25 47.0	18 96	83.8	6
7	24 08.9	20 97	87.4	24 15.0	20 97	86.9	24 21.0	20 97	86.3	24 26.8	19 97	85.8	24 32.6	19 97	85.2	24 38.2	19 97	84.7	24 43.7	18 97	84.2	24 49.1	18 96	83.6	7
8	23 10.8	21 97	87.2	23 16.9	20 97	86.6	23 22.9	20 97	86.1	23 28.8	19 97	85.6	23 34.6	19 97	85.0	23 40.2	19 97	84.5	23 45.8	18 96	84.0	23 51.3	18 96	83.4	8
9	22 12.6	21 97	87.0	22 18.8	20 97	86.4	22 24.8	20 97	85.9	22 30.7	20 97	85.4	22 36.6	19 97	84.8	22 42.3	19 97	84.3	22 47.9	19 96	83.8	22 53.4	18 96	83.2	9
70	21 14.5	21 97	86.7	21 20.7	20 97	86.2	21 26.7	20 97	85.7	21 32.7	20 97	85.2	21 38.6	19 97	84.6	21 44.4	19 96	84.1	21 50.1	19 96	83.6	21 55.6	18 96	83.0	70
1	20 16.4	21 97	86.5	20 22.6	21 97	86.0	20 28.7	20 97	85.5	20 34.7	20 97	84.9	20 40.6	20 97	84.4	20 46.5	19 96	83.9	20 52.2	19 96	83.4	20 57.9	19 96	82.8	1
2	19 18.3	21 97	86.3	19 24.5	21 97	85.8	19 30.7	20 97	85.3	19 36.7	20 97	84.7	19 42.7	20 97	84.2	19 48.6	19 96	83.7	19 54.4	19 96	83.2	20 00.1	19 96	82.7	2
3	18 20.2	21 97	86.1	18 26.5	21 97	85.6	18 32.7	21 97	85.0	18 38.8	20 97	84.5	18 44.8	20 96	84.0	18 50.8	20 96	83.5	18 56.6	19 96	83.0	19 02.4	19 96	82.5	3
4	17 22.1	21 97	85.9	17 28.4	21 97	85.3	17 34.7	21 97	84.8	17 40.8	20 97	84.3	17 46.9	20 96	83.8	17 52.9	20 96	83.3	17 58.8	20 96	82.8	18 04.7	19 96	82.3	4
75	16 24.1	21 97	85.6	16 30.4	21 97	85.1	16 36.7	21 97	84.6	16 42.9	21 96	84.1	16 49.1	20 96	83.6	16 55.1	20 96	83.1	17 01.1	20 96	82.6	17 07.0	20 96	82.1	75
6	15 26.0	21 97	85.4	15 32.4	21 97	84.9	15 38.8	21 97	84.4	15 45.0	21 96	83.9	15 51.2	21 96	83.4	15 57.3	20 96	82.9	16 03.4	20 96	82.4	16 09.4	20 96	81.9	6
7	14 28.0	22 97	85.2	14 34.4	21 97	84.7	14 40.8	21 96	84.2	14 47.1	21 96	83.7	14 53.4	21 96	83.2	14 59.6	21 96	82.7	15 05.7	20 96	82.2	15 11.7	20 96	81.7	7
8	13 30.0	22 97	85.0	13 36.5	22 97	84.5	13 42.9	21 96	84.0	13 49.3	21 96	83.5	13 55.6	21 96	83.0	14 01.9	21 96	82.5	14 08.0	21 96	82.0	14 14.2	20 96	81.4	8
9	12 32.0	22 97	84.7	12 38.5	22 97	84.2	12 45.0	22 96	83.7	12 51.5	21 96	83.2	12 57.8	21 96	82.7	13 04.2	21 96	82.2	13 10.4	21 96	81.7	13 16.6	21 96	81.2	9
80	11 34.0	22 97	84.5	11 40.6	22 96	84.0	11 47.2	22 96	83.5	11 53.7	22 96	83.0	12 00.1	21 96	82.5	12 06.5	21 96	82.0	12 12.8	21 96	81.5	12 19.1	21 96	81.0	80
1	10 36.1	22 97	84.3	10 42.7	22 96	83.8	10 49.3	22 96	83.3	10 55.9	22 96	82.8	11 02.4	22 96	82.3	11 08.8	21 96	81.8	11 15.2	21 96	81.3	11 21.6	21 96	80.8	1
2	9 38.2	22 96	84.1	9 44.9	22 96	83.6	9 51.5	22 96	83.1	9 58.1	22 96	82.6	10 04.7	22 96	82.1	10 11.2	22 96	81.6	10 17.7	22 96	81.1	10 24.1	21 96	80.6	2
3	8 40.3	23 96	83.9	8 47.0	22 96	83.4	8 53.7	22 96	82.9	9 00.4	22 96	82.4	9 07.1	22 96	81.9	9 13.7	22 96	81.4	9 20.2	22 96	80.9	9 26.7	22 96	80.4	3
4	7 42.4	23 96	83.6	7 49.2	23 96	83.1	7 56.0	23 96	82.6	8 02.7	22 96	82.2	8 09.4	22 96	81.7	8 16.1	22 96	81.2	8 22.7	22 96	80.7	8 29.3	22 96	80.2	4
85	6 44.6	23 96	83.4	6 51.4	23 96	82.9	6 58.3	23 96	82.4	7 05.1	23 96	81.9	7 11.9	23 96	81.4	7 18.6	22 96	80.9	7 25.3	22 96	80.5	7 32.0	22 96	80.0	85
6	5 46.8	23 96	83.2	5 53.7	23 96	82.7	6 00.6	23 96	82.2	6 07.5	23 96	81.7	6 14.3	23 96	81.2	6 21.1	23 96	80.7	6 27.9	23 96	80.2	6 34.7	23 95	79.7	6
7							5 02.9	23 96	82.0	5 09.9	23 96	81.5	5 16.8	23 96	81.0	5 23.7	23 96	80.5	5 30.6	23 96	80.0	5 37.4	23 95	79.5	7

Lat. 14°

H.A.	8° 00′				8° 30′				9° 00′				9° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	68 00.0	1.0	02	180.0	67 30.0	1.0	02	180.0	67 00.0	1.0	02	180.0	66 30.0	1.0	02	180.0
1	67 58.7	1.0	07	177.4	67 28.7	1.0	07	177.4	66 58.7	1.0	06	177.5	66 28.7	1.0	06	177.5
2	67 54.6	1.0	11	174.7	67 24.8	1.0	11	174.8	66 54.9	1.0	11	175.0	66 25.0	1.0	10	175.1
3	67 48.0	99	15	172.1	67 18.2	99	15	172.3	66 48.5	99	15	172.5	66 18.7	99	14	172.6
4	67 38.7	98	20	169.5	67 09.2	98	19	169.8	66 39.6	99	19	170.0	66 10.0	99	18	170.2
05	67 26.8	98	24	167.0	66 57.6	98	23	167.3	66 28.3	98	23	167.5	65 58.9	98	22	167.8
6	67 12.5	97	28	164.5	66 43.5	97	27	164.8	66 14.5	97	27	165.2	65 45.5	97	26	165.5
7	66 55.8	96	32	162.1	66 27.1	96	31	162.4	65 58.4	96	31	162.8	65 29.7	96	30	163.2
8	66 36.7	94	36	159.7	66 08.4	94	35	160.1	65 40.1	94	34	160.5	65 11.7	95	34	160.9
9	66 15.4	93	39	157.4	65 47.5	93	38	157.8	65 19.6	93	38	158.3	64 51.6	93	37	158.7
10	65 51.9	91	42	155.1	65 24.5	91	42	155.6	64 57.1	92	41	156.1	64 29.5	92	40	156.6
1	65 26.4	90	46	153.0	64 59.5	90	45	153.5	64 32.5	90	44	154.0	64 05.4	91	43	154.5
2	64 59.0	88	49	150.9	64 32.6	88	48	151.4	64 06.0	89	47	152.0	63 39.4	89	46	152.5
3	64 29.8	86	52	148.8	64 03.8	87	51	149.4	63 37.8	87	50	150.0	63 11.6	88	49	150.5
4	63 58.8	84	54	146.9	63 33.4	85	53	147.5	63 07.8	85	53	148.1	62 42.1	86	52	148.6
15	63 26.2	83	57	145.0	63 01.3	83	56	145.6	62 36.3	84	55	146.3	62 11.0	84	54	146.8
6	62 52.1	81	59	143.2	62 27.7	82	58	143.9	62 03.2	82	58	144.5	61 38.5	83	57	145.1
7	62 16.6	79	62	141.5	61 52.7	80	61	142.2	61 28.6	80	60	142.8	61 04.4	81	59	143.4
8	61 39.7	78	64	139.9	61 16.3	78	63	140.5	60 52.8	79	62	141.2	60 29.1	79	61	141.8
9	61 01.5	76	66	138.3	60 38.7	76	65	138.9	60 15.6	77	64	139.6	59 52.4	78	63	140.2
20	60 22.2	74	67	136.8	59 59.9	75	67	137.4	59 37.3	75	66	138.1	59 14.6	76	65	138.7
1	59 41.8	72	69	135.3	59 19.9	73	68	136.0	58 57.9	74	67	136.6	58 35.6	74	67	137.3
2	59 00.3	71	71	133.9	58 39.0	72	70	134.6	58 17.4	72	69	135.3	57 55.6	73	68	135.9
3	58 17.9	69	72	132.6	57 57.0	70	71	133.3	57 36.0	71	71	133.9	57 14.6	71	70	134.6
4	57 34.6	68	74	131.3	57 14.2	68	73	132.0	56 53.6	69	72	132.7	56 32.7	70	71	133.3
25	56 50.5	66	75	130.1	56 30.5	67	74	130.8	56 10.3	68	73	131.4	55 49.9	68	73	132.1
6	56 05.6	65	76	128.9	55 46.0	65	75	129.6	55 26.3	66	75	130.3	55 06.3	67	74	130.9
7	55 19.9	63	77	127.8	55 00.8	64	77	128.5	54 41.5	65	76	129.1	54 22.0	65	75	129.8
8	54 33.5	62	78	126.7	54 14.9	63	78	127.4	53 56.0	63	77	128.0	53 36.9	64	76	128.7
9	53 46.6	61	79	125.7	53 28.3	61	79	126.3	53 09.8	62	78	127.0	52 51.1	63	77	127.6
30	52 59.0	59	80	124.7	52 41.1	60	80	125.3	52 23.0	61	79	126.0	52 04.7	61	78	126.6
1	52 10.8	58	81	123.7	51 53.3	59	81	124.4	51 35.6	59	80	125.0	51 17.7	60	79	125.7
2	51 22.1	57	82	122.8	51 05.0	57	81	123.5	50 47.7	58	81	124.1	50 30.1	59	80	124.7
3	50 32.9	56	83	121.9	50 16.2	56	82	122.6	49 59.2	57	82	123.2	49 42.0	58	81	123.8
4	49 43.3	54	83	121.1	49 26.9	55	83	121.7	49 10.3	56	82	122.4	48 53.4	56	82	123.0
35	48 53.2	53	84	120.3	48 37.1	54	84	120.9	48 20.8	55	83	121.5	48 04.3	55	82	122.2
6	48 02.7	52	85	119.5	47 47.0	53	84	120.1	47 31.0	54	84	120.7	47 14.8	54	83	121.4
7	47 11.9	51	85	118.7	46 56.4	52	85	119.3	46 40.8	52	84	120.0	46 24.9	53	84	120.6
8	46 20.6	50	86	118.0	46 05.5	51	85	118.6	45 50.1	51	85	119.2	45 34.6	52	84	119.8
9	45 29.0	49	86	117.3	45 14.2	50	86	117.9	44 59.2	50	86	118.5	44 43.9	51	85	119.1
40	44 37.1	48	87	116.6	44 22.6	49	87	117.2	44 07.8	49	86	117.8	43 52.9	50	86	118.4
1	43 44.9	47	88	115.9	43 30.6	48	87	116.5	43 16.2	49	87	117.1	43 01.5	49	86	117.7
2	42 52.4	46	88	115.3	42 38.4	47	88	115.9	42 24.2	48	87	116.5	42 09.8	48	87	117.1
3	41 59.6	46	88	114.7	41 45.9	46	88	115.3	41 32.0	47	88	115.9	41 17.8	47	87	116.5
4	41 06.6	45	89	114.1	40 53.1	45	88	114.7	40 39.4	46	88	115.3	40 25.6	46	88	115.8
45	40 13.3	44	89	113.5	40 00.1	44	89	114.1	39 46.7	45	88	114.7	39 33.1	46	88	115.2
6	39 19.8	43	90	112.9	39 06.8	44	89	113.5	38 53.6	44	89	114.1	38 40.3	45	88	114.7
7	38 26.1	42	90	112.4	38 13.3	43	90	113.0	38 00.4	43	89	113.5	37 47.3	44	89	114.1
8	37 32.2	42	90	111.9	37 19.6	42	90	112.4	37 06.9	43	90	113.0	36 54.0	43	89	113.6
9	36 38.1	41	91	111.4	36 25.7	41	90	111.9	36 13.2	42	90	112.5	36 00.5	42	89	113.0
50	35 43.8	40	91	110.9	35 31.6	41	90	111.4	35 19.3	41	90	112.0	35 06.9	42	90	112.5
1	34 49.3	40	91	110.4	34 37.3	40	91	110.9	34 25.2	41	90	111.5	34 13.0	41	90	112.0
2	33 54.6	39	91	109.9	33 42.9	39	91	110.5	33 31.0	40	91	111.0	33 18.9	40	90	111.6
3	32 59.8	38	92	109.4	32 48.2	39	91	110.0	32 36.5	39	91	110.5	32 24.7	40	91	111.1
4	32 04.8	38	92	109.0	31 53.5	38	92	109.5	31 41.9	39	91	110.1	31 30.3	39	91	110.6
55	31 09.7	37	92	108.6	30 58.5	38	92	109.1	30 47.2	38	92	109.6	30 35.7	38	91	110.2
6	30 14.4	36	92	108.1	30 03.4	37	92	108.7	29 52.3	37	92	109.2	29 41.0	38	91	109.8
7	29 19.1	36	93	107.7	29 08.2	36	92	108.3	28 57.2	37	92	108.8	28 46.2	37	92	109.3
8	28 23.5	35	93	107.3	28 12.9	36	92	107.9	28 02.1	36	92	108.4	27 51.2	37	92	108.9
9	27 27.9	35	93	106.9	27 17.4	35	93	107.5	27 06.8	36	92	108.0	26 56.0	36	92	108.5
60	26 32.1	34	93	106.5	26 21.8	35	93	107.1	26 11.3	35	93	107.6	26 00.7	35	92	108.1
1	25 36.3	34	93	106.2	25 26.1	34	93	106.7	25 15.8	35	93	107.2	25 05.4	35	93	107.7
2	24 40.3	33	93	105.8	24 30.3	34	93	106.3	24 20.1	34	93	106.8	24 09.8	34	93	107.4
3	23 44.3	33	94	105.4	23 34.3	33	93	106.0	23 24.3	34	93	106.5	23 14.2	34	93	107.0
4	22 48.1	32	94	105.1	22 38.3	33	94	105.6	22 28.5	33	93	106.1	22 18.5	33	93	106.6
65	21 51.8	32	94	104.8	21 42.2	32	94	105.3	21 32.5	33	93	105.8	21 22.7	33	93	106.3
6	20 55.5	32	94	104.4	20 46.0	32	94	104.9	20 36.4	32	94	105.4	20 26.7	32	93	105.9
7	19 59.1	31	94	104.1	19 49.7	31	94	104.6	19 40.2	32	94	105.1	19 30.7	32	94	105.6
8	19 02.6	31	94	103.8	18 53.3	31	94	104.3	18 44.0	31	94	104.8	18 34.6	32	94	105.3
9	18 06.0	30	94	103.4	17 56.8	31	94	103.9	17 47.6	31	94	104.4	17 38.4	31	94	104.9
70	17 09.3	30	95	103.1	17 00.3	30	94	103.6	16 51.2	30	94	104.1	16 42.1	31	94	104.6
1	16 12.6	30	95	102.8	16 03.7	30	94	103.3	15 54.7	30	94	103.8	15 45.7	30	94	104.3
2	15 15.8	29	95	102.5	15 07.0	29	95	103.0	14 58.2	30	94	103.5	14 49.2	30	94	104.0
3	14 18.9	29	95	102.2	14 10.2	29	95	102.7	14 01.5	29	95	103.2	13 52.7	29	94	103.7
4	13 22.0	28	95	101.9	13 13.4	29	95	102.4	13 04.8	29	95	102.9	12 56.1	29	94	103.4
75	12 25.0	28	95	101.6	12 16.5	28	95	102.1	12 08.0	28	95	102.6	11 59.5	29	95	103.1
6	11 27.9	28	95	101.4	11 19.6	28	95	101.8	11 11.2	28	95	102.3	11 02.7	28	95	102.8
7	10 30.8	27	95	101.1	10 22.6	28	95	101.6	10 14.3	28	95	102.1	10 05.9	28	95	102.5
8	9 33.7	27	95	100.8	9 25.5	27	95	101.3	9 17.3	27	95	101.8	9 09.1	28	95	102.3
9	8 36.5	27	95	100.5	8 28.4	27	95	101.0	8 20.3	27	95	101.5	8 12.2	27	95	102.0
80	7 39.2	27	96	100.3	7 31.2	27	95	100.8	7 23.2	27	95	101.2	7 15.2	27	95	101.7
1	6 41.9	26	96	100.0	6 34.0	26	95	100.5	6 26.1	26	95	101.0	6 18.1	27	95	101.5
2	5 44.5	26	96	99.7	5 36.7	26	96	100.2	5 28.9	26	95	100.7	5 21.1	26	95	101.2

10° 00′				10° 30′				11° 00′				11° 30′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
66 00.0	1.0	02	180.0	65 30.0	1.0	02	180.0	65 00.0	1.0	02	180.0	64 30.0	1.0	02	180.0	00
65 58.8	1.0	06	177.6	65 28.8	1.0	06	177.6	64 58.8	1.0	06	177.7	64 28.8	1.0	06	177.7	1
65 55.1	1.0	10	175.2	65 25.2	1.0	10	175.3	64 55.3	1.0	10	175.4	64 25.4	1.0	10	175.5	2
65 49.0	99	14	172.8	65 19.2	99	14	172.9	64 49.4	99	14	173.1	64 19.6	99	13	173.2	3
65 40.5	99	18	170.4	65 10.9	99	18	170.6	64 41.2	99	17	170.8	64 11.6	99	17	171.0	4
65 29.6	98	22	168.1	65 00.2	98	22	168.3	64 30.8	98	21	168.5	64 01.4	98	21	168.8	05
65 16.4	97	26	165.8	64 47.3	97	25	166.0	64 18.1	97	25	166.3	63 48.9	97	24	166.6	6
65 00.9	96	29	163.5	64 32.1	96	29	163.8	64 03.3	96	28	164.1	63 34.4	96	28	164.4	7
64 43.3	95	33	161.3	64 14.8	95	32	161.6	63 46.3	95	32	162.0	63 17.7	95	31	162.3	8
64 23.6	94	36	159.1	63 55.5	94	36	159.5	63 27.3	94	35	159.9	62 59.0	94	34	160.3	9
64 01.8	92	39	157.0	63 34.1	93	39	157.4	63 06.3	93	38	157.9	62 38.4	93	37	158.3	10
63 38.1	91	43	155.0	63 10.8	91	42	155.4	62 43.4	91	41	155.9	62 15.9	92	40	156.3	1
63 12.6	89	46	153.0	62 45.7	90	45	153.5	62 18.7	90	44	153.9	61 51.7	90	43	154.4	2
62 45.3	88	48	151.1	62 18.9	88	48	151.6	61 52.3	89	47	152.1	61 25.7	89	46	152.6	3
62 16.3	86	51	149.2	61 50.3	87	50	149.7	61 24.2	87	49	150.3	60 58.0	88	49	150.8	4
61 45.7	85	54	147.4	61 20.2	85	53	148.0	60 54.6	86	52	148.5	60 28.8	86	51	149.0	15
61 13.6	83	56	145.7	60 48.6	84	55	146.2	60 23.4	84	54	146.8	59 58.1	85	54	147.3	6
60 40.1	82	58	144.0	60 15.5	82	57	144.6	59 50.8	83	57	145.2	59 26.0	83	56	145.7	7
60 05.2	80	60	142.4	59 41.1	80	59	143.0	59 16.9	81	59	143.6	58 52.5	81	58	144.1	8
59 29.0	78	62	140.8	59 05.5	79	61	141.5	58 41.7	79	61	142.0	58 17.8	80	60	142.6	9
58 51.7	77	64	139.4	58 28.6	77	63	140.0	58 05.3	78	63	140.6	57 41.9	78	62	141.2	20
58 13.2	75	66	137.9	57 50.6	76	65	138.5	57 27.8	76	64	139.2	57 04.8	77	64	139.7	1
57 33.7	74	68	136.5	57 11.5	74	67	137.2	56 49.2	75	66	137.8	56 26.7	75	65	138.4	2
56 53.1	72	69	135.2	56 31.5	73	68	135.9	56 09.6	73	68	136.5	55 47.5	74	67	137.1	3
56 11.7	70	71	134.0	55 50.4	71	70	134.6	55 29.0	72	69	135.2	55 07.4	72	68	135.8	4
55 29.3	69	72	132.7	55 08.5	70	71	133.4	54 47.5	70	70	134.0	54 26.4	71	70	134.6	25
54 46.2	68	73	131.6	54 25.8	68	73	132.2	54 05.2	69	72	132.8	53 44.5	69	71	133.4	6
54 02.2	66	74	130.4	53 42.3	67	74	131.1	53 22.1	67	73	131.7	53 01.8	68	72	132.3	7
53 17.5	65	76	129.3	52 58.0	65	75	130.0	52 38.3	66	74	130.6	52 18.4	67	74	131.2	8
52 32.2	63	77	128.3	52 13.1	64	76	128.9	51 53.7	65	75	129.5	51 34.2	65	75	130.2	9
51 46.2	62	78	127.3	51 27.4	63	77	127.9	51 08.5	63	76	128.5	50 49.4	64	76	129.1	30
50 59.5	61	79	126.3	50 41.2	61	78	126.9	50 22.7	62	77	127.6	50 03.9	63	77	128.2	1
50 12.3	60	80	125.4	49 54.4	60	79	126.0	49 36.2	61	78	126.6	49 17.9	62	78	127.2	2
49 24.6	58	80	124.5	49 07.0	59	80	125.1	48 49.2	60	79	125.7	48 31.2	60	79	126.3	3
48 36.4	57	81	123.6	48 19.1	58	81	124.2	48 01.7	58	80	124.8	47 44.0	59	79	125.4	4
47 47.6	56	82	122.8	47 30.7	57	81	123.4	47 13.6	57	81	124.0	46 56.4	58	80	124.6	35
46 58.5	55	83	122.0	46 41.9	56	82	122.6	46 25.2	56	82	123.2	46 08.2	57	81	123.8	6
46 08.9	54	83	121.2	45 52.6	54	83	121.8	45 36.2	55	82	122.4	45 19.6	56	82	123.0	7
45 18.9	53	84	120.4	45 02.9	53	83	121.0	44 46.8	54	83	121.6	44 30.5	55	82	122.2	8
44 28.5	52	85	119.7	44 12.9	52	84	120.3	43 57.1	53	84	120.9	43 41.1	54	83	121.5	9
43 37.8	51	85	119.0	43 22.4	51	85	119.6	43 06.9	52	84	120.2	42 51.3	53	84	120.8	40
42 46.7	50	86	118.3	42 31.6	50	85	118.9	42 16.4	51	85	119.5	42 01.1	52	84	120.1	1
41 55.3	49	86	117.7	41 40.5	49	86	118.3	41 25.6	50	85	118.8	41 10.5	51	85	119.4	2
41 03.6	48	87	117.0	40 49.1	49	86	117.6	40 34.4	49	86	118.2	40 19.6	50	85	118.8	3
40 11.6	47	87	116.4	39 57.4	48	87	117.0	39 43.0	48	86	117.6	39 28.4	49	86	118.1	4
39 19.3	46	88	115.8	39 05.3	47	87	116.4	38 51.2	47	87	117.0	38 37.0	48	86	117.5	45
38 26.8	45	88	115.2	38 13.1	46	88	115.8	37 59.2	46	87	116.4	37 45.2	47	87	116.9	6
37 34.0	45	88	114.7	37 20.5	45	88	115.2	37 06.9	46	88	115.8	36 53.2	46	87	116.4	7
36 41.0	44	89	114.1	36 27.7	44	88	114.7	36 14.4	45	88	115.3	36 00.9	45	88	115.8	8
35 47.7	43	89	113.6	35 34.7	44	89	114.2	35 21.6	44	88	114.7	35 08.3	45	88	115.3	9
34 54.3	42	89	113.1	34 41.5	43	89	113.6	34 28.6	43	89	114.2	34 15.6	44	88	114.7	50
34 00.6	42	90	112.6	33 48.1	42	89	113.1	33 35.4	42	89	113.7	33 22.6	43	89	114.2	1
33 06.8	41	90	112.1	32 54.4	41	90	112.6	32 42.0	42	89	113.2	32 29.4	42	89	113.7	2
32 12.7	40	90	111.6	32 00.6	41	90	112.2	31 48.4	41	90	112.7	31 36.0	42	89	113.2	3
31 18.5	39	91	111.2	31 06.6	40	90	111.7	30 54.6	40	90	112.2	30 42.4	41	90	112.8	4
30 24.2	39	91	110.7	30 12.4	39	91	111.3	30 00.6	40	90	111.8	29 48.6	40	90	112.3	55
29 29.6	38	91	110.3	29 18.1	39	91	110.8	29 06.5	39	91	111.3	28 54.7	39	90	111.9	6
28 34.9	38	91	109.9	28 23.6	38	91	110.4	28 12.2	38	91	110.9	28 00.6	39	90	111.4	7
27 40.1	37	92	109.4	27 29.0	37	91	110.0	27 17.7	38	91	110.5	27 06.3	38	91	111.0	8
26 45.2	36	92	109.0	26 34.2	37	92	109.6	26 23.1	37	91	110.1	26 11.9	38	91	110.6	9
25 50.1	36	92	108.6	25 39.2	36	92	109.2	25 28.3	37	91	109.7	25 17.3	37	91	110.2	60
24 54.8	35	92	108.2	24 44.2	36	92	108.8	24 33.4	36	92	109.3	24 22.6	36	91	109.8	1
23 59.5	35	92	107.9	23 49.0	35	92	108.4	23 38.4	35	92	108.9	23 27.8	36	92	109.4	2
23 04.0	34	93	107.5	22 53.7	35	92	108.0	22 43.3	35	92	108.5	22 32.8	35	92	109.0	3
22 08.4	34	93	107.1	21 58.3	34	93	107.6	21 48.0	34	92	108.2	21 37.7	35	92	108.7	4
21 12.7	33	93	106.8	21 02.7	33	93	107.3	20 52.6	34	92	107.8	20 42.5	34	92	108.3	65
20 17.0	33	93	106.4	20 07.1	33	93	106.9	19 57.2	33	93	107.4	19 47.1	34	92	107.9	6
19 21.1	32	93	106.1	19 11.4	33	93	106.6	19 01.6	33	93	107.1	18 51.7	33	93	107.6	7
18 25.1	32	93	105.8	18 15.5	32	93	106.3	18 05.9	32	93	106.8	17 56.1	33	93	107.3	8
17 29.0	31	94	105.4	17 19.6	32	93	105.9	17 10.1	32	93	106.4	17 00.5	32	93	106.9	9
16 32.8	31	94	105.1	16 23.6	31	94	105.6	16 14.2	31	93	106.1	16 04.8	32	93	106.6	70
15 36.6	30	94	104.8	15 27.4	31	94	105.3	15 18.2	31	93	105.8	15 08.9	31	93	106.3	1
14 40.3	30	94	104.5	14 31.2	30	94	105.0	14 22.1	30	94	105.5	14 13.0	31	93	106.0	2
13 43.9	30	94	104.2	13 35.0	30	94	104.7	13 26.0	30	94	105.2	13 17.0	30	94	105.7	3
12 47.4	29	94	103.9	12 38.6	29	94	104.4	12 29.8	30	94	104.9	12 20.9	30	94	105.4	4
11 50.8	29	94	103.6	11 42.2	29	94	104.1	11 33.5	29	94	104.6	11 24.7	29	94	105.1	75
10 54.2	28	94	103.3	10 45.7	29	94	103.8	10 37.1	29	94	104.3	10 28.4	29	94	104.8	6
9 57.5	28	95	103.0	9 49.1	28	94	103.5	9 40.6	28	94	104.0	9 32.1	28	94	104.5	7
9 00.8	28	95	102.8	8 52.5	28	94	103.2	8 44.1	28	94	103.7	8 35.7	28	94	104.2	8
8 04.0	27	95	102.5	7 55.8	27	95	103.0	7 47.5	28	94	103.5	7 39.2	28	94	103.9	9
7 07.1	27	95	102.2	6 59.0	27	95	102.7	6 50.9	27	95	103.2	6 42.7	27	94	103.7	80
6 10.2	27	95	101.9	6 02.2	27	95	102.4	5 54.2	27	95	102.9	5 46.1	27	94	103.4	1
5 13.2	26	95	101.7	5 05.3	26	95	102.2									2

Lat. 14°

H.A.	12° 00′				12° 30′				13° 00′				13° 30′				14° 00′				14° 30′				15° 00′				15° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	88 00.0	1.0	22	180.0	88 30.0	1.0	29	180.0	89 00.0	1.0	40	180.0	89 30.0	1.0	59	180.0	90 00.0	..	97	. . . .	89 30.0	1.0	59	00.0	89 00.0	1.0	39	00.0	88 30.0	1.0	28	00.0	00
1	87 46.5	90	57	153.9	88 12.7	84	67	146.9	88 36.3	72	79	135.7	88 54.4	46	91	117.1	89 01.8	00	97	89.9	88 54.6	46	91	62.6	88 36.5	72	79	43.9	88 12.9	84	66	32.7	1
2	87 12.5	72	75	135.5	87 32.6	61	83	127.4	87 48.8	46	90	117.0	87 59.6	25	95	104.2	88 03.6	00	97	89.8	87 59.9	25	96	75.3	87 49.2	45	89	62.4	87 33.2	61	82	52.0	2
3	86 27.5	57	84	124.0	86 43.0	46	89	116.8	86 55.0	33	93	108.6	87 02.6	18	96	99.4	87 05.4	01	97	89.6	87 03.0	16	96	79.9	86 55.7	32	93	70.6	86 44.0	45	88	62.3	3
4	85 37.2	46	89	116.7	85 49.7	37	92	110.6	85 59.0	26	95	103.9	86 05.0	14	96	96.9	86 07.1	01	97	89.5	86 05.5	12	96	82.2	86 00.0	24	94	75.0	85 51.1	35	91	68.3	4
05	84 44.0	30	91	111.7	84 54.4	30	94	106.5	85 02.2	21	96	101.0	85 07.1	11	97	95.3	85 08.9	01	97	89.4	85 07.7	09	96	83.5	85 03.4	19	95	77.7	84 56.3	29	93	72.1	05
6	83 49.3	33	93	108.2	83 58.2	26	95	103.7	84 04.9	18	96	99.0	84 09.0	10	97	94.2	84 10.7	01	97	89.3	84 09.8	07	97	84.4	84 06.4	16	96	79.5	84 00.4	24	94	74.8	6
7	82 53.6	29	94	105.5	83 01.4	23	95	101.6	83 07.2	16	96	97.5	83 11.0	09	97	93.4	83 12.5	01	97	89.2	83 11.8	06	97	84.9	83 09.0	13	96	80.7	83 04.0	20	95	76.6	7
8	81 57.2	26	95	103.5	82 04.2	20	96	100.0	82 09.4	14	97	96.4	82 12.8	08	97	92.7	82 14.3	02	97	89.0	82 13.8	05	97	85.3	82 11.5	11	96	81.7	82 07.2	17	95	78.0	8
9	81 00.4	24	95	101.8	81 06.8	19	96	98.7	81 11.5	13	97	95.5	81 14.6	08	97	92.2	81 16.1	02	97	88.9	81 15.8	04	97	85.6	81 13.8	09	96	82.3	81 10.1	15	95	79.1	9
10	80 03.3	22	96	100.4	80 09.1	17	96	97.6	80 13.6	12	97	94.7	80 16.5	07	97	91.7	80 17.9	02	97	88.8	80 17.7	03	97	85.8	80 16.1	08	96	82.9	80 12.9	13	96	79.9	10
1	79 05.9	20	96	99.3	79 11.4	16	96	96.7	79 15.5	12	97	94.0	79 18.3	07	97	91.4	79 19.7	02	97	88.7	79 19.7	02	97	86.0	79 18.3	07	96	83.3	79 15.5	11	96	80.6	1
2	78 08.4	19	96	98.3	78 13.5	15	97	95.9	78 17.4	11	97	93.5	78 20.1	07	97	91.0	78 21.5	03	97	88.5	78 21.6	02	97	86.1	78 20.4	06	96	83.6	78 18.0	10	96	81.1	2
3	77 10.7	18	96	97.5	77 15.6	14	97	95.2	77 19.3	11	97	93.0	77 21.9	07	97	90.7	77 23.3	03	97	88.4	77 23.5	01	97	86.1	77 22.6	05	96	83.8	77 20.5	09	96	81.6	3
4	76 12.9	17	96	96.7	76 17.6	14	97	94.6	76 21.1	10	97	92.5	76 23.6	07	97	90.4	76 25.1	03	97	88.3	76 25.4	01	97	86.2	76 24.7	04	97	84.0	76 22.9	08	96	81.9	4
15	75 15.1	16	97	96.1	75 19.5	13	97	94.1	75 23.0	10	97	92.1	75 25.4	07	97	90.2	75 26.9	03	97	88.2	75 27.3	00	97	86.2	75 26.8	04	97	84.2	75 25.2	07	96	82.2	15
6	74 17.1	16	97	95.5	74 21.4	13	97	93.6	74 24.8	10	97	91.8	74 27.2	07	97	89.9	74 28.7	03	97	88.1	74 29.2	00	97	86.2	74 28.8	03	97	84.3	74 27.5	06	96	82.4	6
7	73 19.2	15	97	94.9	73 23.3	12	97	93.2	73 26.6	09	97	91.4	73 29.0	07	97	89.7	73 30.5	04	97	87.9	73 31.2	01	97	86.2	73 30.9	02	97	84.4	73 29.8	05	96	82.6	7
8	72 21.1	15	97	94.4	72 25.2	12	97	92.8	72 28.4	09	97	91.1	72 30.8	07	97	89.5	72 32.3	04	97	87.8	72 33.1	01	97	86.1	72 33.0	02	97	84.5	72 32.0	04	96	82.8	8
9	71 23.1	14	97	94.0	71 27.0	12	97	92.4	71 30.2	09	97	90.8	71 32.6	07	97	89.3	71 34.2	04	97	87.7	71 35.0	01	97	86.1	71 35.0	01	97	84.5	71 34.3	04	96	82.9	9
20	70 25.0	14	97	93.5	70 28.8	12	97	92.0	70 32.0	09	97	90.6	70 34.3	07	97	89.1	70 36.0	04	97	87.6	70 36.9	02	97	86.1	70 37.1	01	97	84.5	70 36.5	03	96	83.0	20
1	69 26.9	14	97	93.1	69 30.6	11	97	91.7	69 33.7	09	97	90.3	69 36.1	07	97	88.9	69 37.8	04	97	87.4	69 38.8	02	97	86.0	69 39.1	00	97	84.6	69 38.7	03	96	83.1	1
2	68 28.7	14	97	92.8	68 32.5	11	97	91.4	68 35.5	09	97	90.0	68 37.9	07	97	88.7	68 39.7	05	97	87.3	68 40.8	02	97	85.9	68 41.2	00	97	84.6	68 40.9	02	96	83.2	2
3	67 30.6	13	97	92.4	67 34.2	11	97	91.1	67 37.3	09	97	89.8	67 39.7	07	97	88.5	67 41.5	05	97	87.2	67 42.7	03	97	85.9	67 43.2	01	97	84.5	67 43.1	01	96	83.2	3
4	66 32.4	13	97	92.1	66 36.0	11	97	90.8	66 39.1	09	97	89.6	66 41.5	07	97	88.3	66 43.4	05	97	87.1	66 44.6	03	97	85.8	66 45.2	01	97	84.5	66 45.3	01	96	83.3	4
25	65 34.2	13	97	91.8	65 37.8	11	97	90.6	65 40.9	09	97	89.4	65 43.3	07	97	88.1	65 45.2	05	97	86.9	65 46.6	03	97	85.7	65 47.3	01	97	84.5	65 47.4	00	96	83.3	25
6	64 36.0	13	97	91.5	64 39.6	11	97	90.3	64 42.7	09	97	89.1	64 45.2	07	97	88.0	64 47.1	06	97	86.8	64 48.5	04	97	85.6	64 49.3	02	97	84.5	64 49.6	00	96	83.3	6
7	63 37.8	13	97	91.2	63 41.4	11	97	90.1	63 44.5	09	97	88.9	63 47.0	08	97	87.8	63 49.0	06	97	86.7	63 50.5	04	97	85.5	63 51.4	02	97	84.4	63 51.8	00	96	83.3	7
8	62 39.6	13	97	90.9	62 43.2	11	97	89.8	62 46.2	09	97	88.7	62 48.8	08	97	87.6	62 50.9	06	97	86.5	62 52.4	04	97	85.5	62 53.5	03	97	84.4	62 54.0	01	96	83.3	8
9	61 41.4	13	97	90.6	61 45.0	11	97	89.6	61 48.0	09	97	88.5	61 50.6	08	97	87.5	61 52.8	06	97	86.4	61 54.4	05	97	85.4	61 55.5	03	97	84.3	61 56.2	01	96	83.2	9
30	60 43.2	13	97	90.4	60 46.7	11	97	89.4	60 49.9	10	97	88.3	60 52.5	08	97	87.3	60 54.7	06	97	86.3	60 56.4	05	97	85.3	60 57.6	03	97	84.2	60 58.4	02	96	83.2	30
1	59 45.0	13	97	90.1	59 48.5	11	97	89.1	59 51.7	10	97	88.1	59 54.3	08	97	87.2	59 56.6	07	97	86.2	59 58.4	06	97	85.2	59 59.7	04	97	84.2	60 00.6	02	96	83.2	1
2	58 46.7	13	97	89.9	58 50.3	11	97	88.9	58 53.5	10	97	88.0	58 56.2	08	97	87.0	58 58.5	07	97	86.0	59 00.4	06	97	85.1	59 01.8	04	97	84.1	59 02.8	03	96	83.1	2
3	57 48.5	13	97	89.6	57 52.1	11	97	88.7	57 55.3	10	97	87.8	57 58.1	09	97	86.8	58 00.4	07	97	85.9	58 02.4	06	97	85.0	58 03.9	04	96	84.0	58 05.0	03	96	83.1	3
4	56 50.3	13	97	89.4	56 53.9	11	97	88.5	56 57.1	10	97	87.6	56 59.9	09	97	86.7	57 02.4	07	97	85.8	57 04.4	06	97	84.9	57 06.0	05	96	83.9	57 07.2	03	96	83.0	4
35	55 52.1	13	97	89.2	55 55.7	11	97	88.3	55 59.0	10	97	87.4	56 01.8	09	97	86.5	56 04.3	08	97	85.6	56 06.4	06	97	84.7	56 08.1	05	96	83.8	56 09.4	04	96	83.0	35
6	54 53.9	13	97	89.0	54 57.5	12	97	88.1	55 00.8	10	97	87.2	55 03.7	09	97	86.4	55 06.3	08	97	85.5	55 08.4	07	97	84.6	55 10.2	05	96	83.8	55 11.6	04	96	82.9	6
7	53 55.7	13	97	88.8	53 59.3	12	97	87.9	54 02.7	10	97	87.1	54 05.6	09	97	86.2	54 08.2	08	97	85.4	54 10.5	07	97	84.5	54 12.3	06	96	83.7	54 13.9	04	96	82.8	7
8	52 57.5	13	97	88.5	53 01.2	12	97	87.7	53 04.5	11	97	86.9	53 07.5	09	97	86.1	53 10.2	08	97	85.2	53 12.5	07	97	84.4	53 14.5	06	96	83.6	53 16.1	05	96	82.7	8
9	51 59.3	13	97	88.3	52 03.0	12	97	87.5	52 06.4	11	97	86.7	52 09.5	10	97	85.9	52 12.2	09	97	85.1	52 14.6	07	97	84.3	52 16.6	06	96	83.5	52 18.4	05	96	82.7	9
40	51 01.1	13	97	88.1	51 04.8	12	97	87.3	51 08.3	11	97	86.6	51 11.4	10	97	85.8	51 14.2	09	97	85.0	51 16.7	08	97	84.2	51 18.8	07	96	83.4	51 20.6	06	96	82.6	40
1	50 02.9	13	97	87.9	50 06.7	12	97	87.2	50 10.2	11	97	86.4	50 13.3	10	97	85.6	50 16.2	09	97	84.8	50 18.7	08	96	84.1	50 21.0	07	96	83.3	50 22.9	06	96	82.5	1
2	49 04.7	13	97	87.7	49 08.6	12	97	87.0	49 12.1	11	97	86.2	49 15.3	10	97	85.5	49 18.2	09	97	84.7	49 20.9	08	96	83.9	49 23.2	07	96	83.2	49 25.2	06	96	82.4	2
3	48 06.6	13	97	87.5	48 10.4	12	97	86.8	48 14.0	11	97	86.1	48 17.3	10	97	85.3	48 20.3	09	97	84.6	48 23.0	09	96	83.8	48 25.4	08	96	83.1	48 27.5	07	96	82.3	3
4	47 08.4	13	97	87.3	47 12.3	13	97	86.6	47 15.9	12	97	85.9	47 19.3	11	97	85.2	47 22.3	10	97	84.4	47 25.1	09	96	83.7	47 27.6	08	96	82.9	47 29.8	07	96	82.2	4
45	46 10.3	14	97	87.2	46 14.2	13	97	86.4	46 17.9	12	97	85.7	46 21.3	11	97	85.0	46 24.4	10	97	84.3	46 27.2	09	96	83.6	46 29.8	08	96	82.8	46 32.1	07	96	82.1	45
6	45 12.1	14	97	87.0	45 16.1	13	97	86.3	45 19.8	12	97	85.6	45 23.3	11	97	84.8	45 26.5	10	97	84.1	45 29.4	09	96	83.4	45 32.1	08	96	82.7	45 34.5	08	96	82.0	6
7	44 14.0	14	97	86.8	44 18.0	13	97	86.1	44 21.8	12	97	85.4	44 25.3	11	97	84.7	44 28.6	10	96	84.0	44 31.6	10	96	83.3	44 34.3	09	96	82.6	44 36.8	08	96	81.9	7
8	43 15.9	14	97	86.6	43 19.9	13	97	85.9	43 23.8	12	97	85.2	43 27.3	12	97	84.5	43 30.7	11	96	83.9	43 33.8	10	96	83.2	43 36.6	09	96	82.5	43 39.2	08	96	81.8	8
9	42 17.8	14	97	86.4	42 21.9	13	97	85.7	42 25.7	13	97	85.1	42 29.4	12	97	84.4	42 32.8	11	96	83.7	42 36.0	10	96	83.0	42 38.9	09	96	82.4	42 41.6	09	96	81.7	9
50	41 19.7	14	97	86.2	41 23.8	13	97	85.6	41 27.7	13	97	84.9	41 31.5	12	97	84.2	41 34.9	11	96	83.6	41 38.2	10	96	82.9	41 41.2	10	96	82.2	41 44.0	09	96	81.6	50
1	40 21.6	14	97	86.0	40 25.8	14	97	85.4	40 29.8	13	97	84.7	40 33.5	12	96	84.1	40 37.1	11	96	83.4	40 40.4	11	96	82.8	40 43.5	10	96	82.1	40 46.4	09	96	81.4	1
2	39 23.5	15	97	85.8	39 27.8	14	97	85.2	39 31.8	13	97	84.6	39 35.6	12	96	83.9	39 39.3	12	96	83.3	39 42.7	11	96	82.6	39 45.9	10	96	82.0	39 48.8	10	96	81.3	2
3	38 25.4	15	97	85.7	38 29.8	14	97	85.0	38 33.9	13	97	84.4	38 37.8	13	96	83.8	38 41.5	12	96	83.1	38 44.9	11	96	82.5	38 48.2	11	96	81.8	38 51.3	10	96	81.2	3
4	37 27.4	15	97	85.5	37 31.8	14	97	84.9	37 35.9	14	97	84.2	37 39.9	13	96	83.6	37 43.7	12	96	83.0	37 47.2	12	96	82.3	37 50.6	11	96	81.7	37 53.8	10	96	81.1	4
55	36 29.4	15	97	85.3	36 33.8	14	97	84.7	36 38.0	14	96	84.1	36 42.1	13	96	83.4	36 45.9	12	96	82.8	36 49.5	12	96	82.2	36 53.0	11	96	81.6	36 56.3	11	96	81.0	55
6	35 31.4	15	97	85.1	35 35.8	15	97	84.5	35 40.1	14	96	83.9	35 44.2	13	96	83.3	35 48.1	13	96	82.7	35 51.9	12	96	82.1	35 55.4	12	96	81.4	35 58.8	11	96	80.8	6
7	34 33.4	15	97	84.9	34 37.9	15	97	84.3	34 42.2	14	96	83.7	34 46.4	14	96	83.1	34 50.4	13	96	82.5	34 54.2	12	96	81.9	34 57.9	12	96	81.3	35 01.3	11	96	80.7	7
8	33 35.4	16	97	84.7	33 40.0	15	96	84.1	33 44.4	14	96	83.6	33 48.6	14	96	83.0	33 52.7	13	96	82.4	33 56.6	13	96	81.8	34 00.3	12	96	81.2	34 03.9	12	96	80.6	8
9	32 37.4	16	97	84.6	32 42.1	15	96	84.0	32 46.5	15	96	83.4	32 50.9	14	96	82.8	32 55.0	14	96	82.2	32 59.0	13	96	81.6	33 02.8	12	96	81.0	33 06.5	12	96	80.4	9
60	31 39.5	16	97	84.4	31 44.2	15	96	83.8	31 48.7	15	96	83.2	31 53.1	14	96	82.6	31 57.3	14	96	82.0	32 01.4	13	96	81.5	32 05.3	13	96	80.9	32 09.1	12	96	80.3	60
1	30 41.5	16	96	84.2	30 46.3	16	96	83.6	30 50.9	15	96	83.0	30 55.4	15	96	82.5	30 59.7	14	96	81.9	31 03.8	14	96	81.3	31 07.8	13	96	80.7	31 11.7	13	96	80.2	1
2	29 43.6	16	96	84.0	29 48.5	16	96	83.4	29 53.1	15	96	82.9	29 57.7	15	96	82.3	30 02.1	14	96	81.7	30 06.3	14	96	81.2	30 10.4	13	96	80.6	30 14.3	13	96	80.0	2
3	28 45.7	17	96	83.8	28 50.6	16	96	83.3	28 55.4	16	96	82.7	29 00.0	15	96	82.1	29 04.5	15	96	81.6	29 08.8	14	96	81.0	29 13.0	14	96	80.4	29 17.0	13	95	79.9	3
4	27 47.9	17	96	83.6	27 52.8	16	96	83.1	27 57.7	16	96	82.5	28 02.3	15	96	82.0	28 06.9	15	96	81.4	28 11.3	14	96	80.8	28 15.6	14	96	80.3	28 19.7	14	95	79.7	4
65	26 50.0	17	96	83.5	26 55.0	17	96	82.9	26 59.9	16	96	82.3	27 04.7	16	96	81.8	27 09.3	15	96	81.2	27 13.8	15	96	80.7	27 18.2	14	96	80.1	27 22.5	14	95	79.6	65
6	25 52.2	17	96	83.3	25 57.3	17	96	82.7	26 02.3	16	96	82.2	26 07.1	16	96	81.6	26 11.8	16	96	81.1	26 16.4	15	96	80.5	26 20.9	15	96	80.0	26 25.2	14	95	79.4	6
7	24 54.4	17	96	83.1	24 59.5	17	96	82.5	25 04.6	17	96	82.0	25 09.5	16	96	81.4	25 14.3	16	96	80.9	25 19.0	15	96	80.4	25 23.6	15	95	79.8	25 28.0	15	96	79.3	7
8	23 56.6	18	96	82.9	24 01.8	17	96	82.4	24 07.0	17	96	81.8	24 12.0	16	96	81.3	24 16.8	16	96	80.7	24 21.6	16	96	80.2	24 26.3	15	96	79.6	24 30.8	15	95	79.1	8
9	22 58.8	18	96	82.7	23 04.1	17	96	82.2	23 09.3	17	96	81.6	23 14.4	17	96	81.1	23 19.4	16	96	80.6	23 24.3	16	96	80.0	23 29.0	16	95	79.5	23 33.7	15	95	78.9	9
70	22 01.1	18	96	82.5	22 06.5	18	96	82.0	22 11.8	17	96	81.5	22 16.9	17	96	80.9	22 22.0	17	96	80.4	22 26.9	16	96	79.9	22 31.8	16	95	79.3	22 36.5	16	96	78.8	70
1	21 03.4	18	96	82.3	21 08.9	18	96	81.8	21 14.2	18	96	81.3	21 19.5	17	96	80.7	21 24.6	17	96	80.2	21 29.7	17	95	79.7	21 34.6	16	95	79.1	21 39.5	16	96	78.6	1
2	20 05.7	19	96	82.1	20 11.2	18	96	81.6	20 16.7	18	96	81.1	20 22.0	18	96	80.6	20 27.2	17	96	80.0	20 32.4	17	95	79.5	20 37.4	17	95	79.0	20 42.4	16	95	78.5	2
3	19 08.1	19	96	81.9	19 13.7	19	96	81.4	19 19.2	18	96	80.9	19 24.6	18	96	80.4	19 29.9	18	96	79.9	19 35.2	17	95	79.3	19 40.3	17	95	78.8	19 45.4	17	95	78.3	3
4	18 10.4	19	96	81.7	18 16.1	19	96	81.2	18 21.7	18	96	80.7	18 27.2	18	96	80.2	18 32.6	18	95	79.7	18 38.0	18	95	79.1	18 43.2	17	95	78.6	18 48.4	17	95	78.1	4
75	17 12.8	19	96	81.5	17 18.6	19	96	81.0	17 24.3	19	96	80.5	17 29.9	19	96	80.0	17 35.4	18	95	79.5	17 40.8	18	95	79.0	17 46.2	18	95	78.5	17 51.4	17	95	77.9	75
6	16 15.3	20	96	81.3	16 21.1	19	96	80.8	16 26.9	19	96	80.3	16 32.5	19	95	79.8	16 38.2	19	95	79.3	16 43.7	18	95	78.8	16 49.1	18	95	78.3	16 54.5	18	95	77.8	6
7	15 17.7	20	96	81.1	15 23.6	20	96	80.6	15 29.5	19	96	80.1	15 35.3	19	95	79.6	15 41.0	19	95	79.1	15 46.6	19	95	78.6	15 52.2	18	95	78.1	15 57.7	18	95	77.6	7
8	14 20.2	20	96	80.9	14 26.2	20	96	80.4	14 32.2	20	96	79.9	14 38.0	19	95	79.4	14 43.8	19	95	78.9	14 49.6	19	95	78.4	14 55.2	19	95	77.9	15 00.8	19	95	77.4	8
9	13 22.7	20	96	80.7	13 28.8	20	96	80.2	13 34.8	20	95	79.7	13 40.8	20	95	79.2	13 46.7	20	95	78.7	13 52.5	19	95	78.2	13 58.3	19	95	77.7	14 04.0	19	95	77.2	9
80	12 25.3	21	96	80.5	12 31.5	20	96	80.0	12 37.6	20	95	79.5	12 43.6	20	95	79.0	12 49.6	20	95	78.5	12 55.6	20	95	78.0	13 01.5	20	95	77.5	13 07.3	19	95	77.0	80
1	11 27.9	21	96	80.3	11 34.2	21	95	79.8	11 40.4	21	95	79.3	11 46.5	20	95	78.8	11 52.6	20	95	78.3	11 58.6	20	95	77.8	12 04.6	20	95	77.3	12 10.6	20	94	76.8	1
2	10 30.5	21	96	80.1	10 36.9	21	95	79.6	10 43.2	21	95	79.1	10 49.4	21	95	78.6	10 55.6	21	95	78.1	11 01.8	20	95	77.6	11 07.9	20	95	77.1	11 13.9	20	94	76.6	2
3	9 33.2	22	96	79.9	9 39.6	21	95	79.4	9 46.0	21	95	78.9	9 52.4	21	95	78.4	9 58.7	21	95	77.9	10 04.9	21	95	77.4	10 11.1	21	94	76.9	10 17.3	20	94	76.4	3
4	8 35.9	22	95	79.7	8 42.4	22	95	79.2	8 48.9	22	95	78.7	8 55.3	21	95	78.2	9 01.7	21	95	77.7	9 08.1	21	95	77.2	9 14.4	21	94	76.7	9 20.7	21	94	76.2	4
85	7 38.6	22	95	79.5	7 45.3	22	95	79.0	7 51.8	22	95	78.5	7 58.4	22	95	78.0	8 04.9	22	95	77.5	8 11.4	22	94	77.0	8 17.8	21	94	76.5	8 24.2	21	94	76.0	85
6	6 41.4	22	95	79.3	6 48.1	22	95	78.8	6 54.8	22	95	78.3	7 01.5	22	95	77.8	7 08.1	22	95	77.3	7 14.7	22	94	76.8	7 21.2	22	94	76.3	7 27.7	22	94	75.8	6
7	5 44.2	23	95	79.0	5 51.1	23	95	78.5	5 57.8	23	95	78.0	6 04.6	22	95	77.6	6 11.3	22	95	77.1	6 18.0	22	94	76.6	6 24.7	22	94	76.1	6 31.3	22	94	75.6	7
8									5 00.9	23	95	77.8	5 07.8	23	95	77.3	5 14.6	23	94	76.8	5 21.4	23	94	76.4	5 28.2	23	94	75.9	5 35.0	23	94	75.4	8

H.A.	12° 00′			12° 30′			13° 00′			13° 30′			14° 00′			14° 30′			15° 00′			15° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	64 00.0	1.0 02	180.0	63 30.0	1.0 02	180.0	63 00.0	1.0 02	180.0	62 30.0	1.0 02	180.0	62 00.0	1.0 02	180.0	61 30.0	1.0 02	180.0	61 00.0	1.0 02	180.0	60 30.0	1.0 02	180.0	00
1	63 58.9	1.0 06	177.8	63 28.9	1.0 06	177.8	62 58.9	1.0 05	177.9	62 28.9	1.0 05	177.9	61 59.0	1.0 05	177.9	61 29.0	1.0 05	178.0	60 59.0	1.0 05	178.0	60 29.0	1.0 05	178.0	1
2	63 55.5	1.0 09	175.5	63 25.6	1.0 09	175.6	62 55.6	1.0 09	175.7	62 25.7	1.0 09	175.8	61 55.8	1.0 09	175.9	61 25.9	1.0 09	175.9	60 56.0	1.0 08	176.0	60 26.0	1.0 08	176.1	2
3	63 49.8	99 13	173.3	63 20.0	99 13	173.5	62 50.2	99 13	173.6	62 20.4	99 12	173.7	61 50.6	99 12	173.8	61 20.7	99 12	173.9	60 50.9	99 12	174.0	60 21.1	99 12	174.1	3
4	63 42.0	99 17	171.1	63 12.3	99 16	171.3	62 42.6	99 16	171.5	62 13.0	99 16	171.6	61 43.3	99 16	171.8	61 13.6	99 15	171.9	60 43.9	99 15	172.1	60 14.2	99 15	172.2	4
05	63 31.9	98 20	169.0	63 02.4	98 20	169.2	62 33.0	98 20	169.4	62 03.5	98 19	169.6	61 34.0	98 19	169.8	61 04.4	98 19	170.0	60 34.9	99 18	170.1	60 05.3	99 18	170.3	05
6	63 19.7	97 24	166.8	62 50.5	98 23	167.1	62 21.2	98 23	167.3	61 51.9	98 23	167.6	61 22.6	98 22	167.8	60 53.3	98 22	168.0	60 23.9	98 21	168.2	59 54.6	98 21	168.4	6
7	63 05.4	97 27	164.7	62 36.4	97 27	165.0	62 07.4	97 26	165.3	61 38.4	97 26	165.6	61 09.3	97 25	165.8	60 40.2	97 25	166.1	60 11.1	97 24	166.3	59 41.9	97 24	166.5	7
8	62 49.1	96 31	162.7	62 20.4	96 30	163.0	61 51.7	96 29	163.3	61 22.9	96 29	163.6	60 54.1	96 28	163.9	60 25.3	96 28	164.2	59 56.4	96 28	164.4	59 27.5	96 27	164.7	8
9	62 30.7	94 34	160.6	62 02.4	95 33	161.0	61 34.0	95 33	161.3	61 05.5	95 32	161.7	60 37.0	95 32	162.0	60 08.4	95 31	162.3	59 39.9	95 30	162.6	59 11.2	96 30	162.9	9
10	62 10.5	93 37	158.7	61 42.5	93 36	159.0	61 14.4	94 36	159.4	60 46.3	94 35	159.8	60 18.1	94 34	160.1	59 49.9	94 34	160.5	59 21.6	94 33	160.8	58 53.2	95 33	161.1	10
1	61 48.4	92 40	156.7	61 20.7	92 39	157.1	60 53.0	92 38	157.5	60 25.3	93 38	157.9	59 57.4	93 37	158.3	59 29.5	93 37	158.7	59 01.6	93 36	159.0	58 33.5	93 36	159.4	1
2	61 24.5	91 43	154.9	60 57.3	91 42	155.3	60 29.9	91 41	155.7	60 02.5	91 41	156.1	59 35.1	92 40	156.5	59 07.5	92 39	156.9	58 39.9	92 39	157.3	58 12.2	92 38	157.7	2
3	60 58.9	89 45	153.0	60 32.1	90 45	153.5	60 05.2	90 44	153.9	59 38.1	90 43	154.4	59 11.0	90 43	154.8	58 43.9	91 42	155.2	58 16.6	91 41	155.6	57 49.3	91 41	156.0	3
4	60 31.7	88 48	151.3	60 05.3	88 47	151.7	59 38.8	89 47	152.2	59 12.2	89 46	152.6	58 45.5	89 45	153.1	58 18.7	89 44	153.5	57 51.8	90 44	153.9	57 24.8	90 43	154.4	4
15	60 03.0	86 50	149.5	59 37.0	87 50	150.0	59 10.9	87 49	150.5	58 44.7	88 48	151.0	58 18.4	88 48	151.4	57 52.0	88 47	151.9	57 25.5	88 46	152.3	56 58.9	89 46	152.8	15
6	59 32.7	85 53	147.9	59 07.2	85 52	148.4	58 41.5	86 51	148.9	58 15.7	86 51	149.4	57 49.8	86 50	149.8	57 23.8	87 49	150.3	56 57.7	87 49	150.8	56 31.6	87 48	151.2	6
7	59 01.0	83 55	146.3	58 35.9	84 54	146.8	58 10.7	84 54	147.3	57 45.4	85 53	147.8	57 19.9	85 52	148.3	56 54.3	85 51	148.8	56 28.6	86 51	149.2	56 02.8	86 50	149.7	7
8	58 28.0	82 57	144.7	58 03.4	82 56	145.2	57 38.6	83 56	145.8	57 13.7	83 55	146.3	56 48.7	84 54	146.8	56 23.5	84 53	147.3	55 58.2	84 53	147.8	55 32.8	85 52	148.2	8
9	57 53.8	80 59	143.2	57 29.6	81 58	143.7	57 05.2	81 58	144.3	56 40.8	82 57	144.8	56 16.1	82 56	145.3	55 51.4	83 55	145.8	55 26.6	83 55	146.3	55 01.6	83 54	146.8	9
20	57 18.3	79 61	141.7	56 54.5	79 60	142.3	56 30.7	80 60	142.8	56 06.6	80 59	143.4	55 42.4	81 58	143.9	55 18.1	81 57	144.4	54 53.7	82 57	144.9	54 29.1	82 56	145.4	20
1	56 41.7	77 63	140.3	56 18.4	78 62	140.9	55 54.9	78 61	141.5	55 31.3	79 61	142.0	55 07.6	79 60	142.5	54 43.7	80 59	143.1	54 19.7	80 58	143.6	53 55.5	81 58	144.1	1
2	56 04.0	76 65	139.0	55 41.1	76 64	139.6	55 18.1	77 63	140.1	54 55.0	77 62	140.7	54 31.6	78 62	141.2	54 08.2	78 61	141.8	53 44.6	79 60	142.3	53 20.9	79 60	142.8	2
3	55 25.3	74 66	137.7	55 02.9	75 65	138.3	54 40.3	76 65	138.8	54 17.6	76 64	139.4	53 54.7	77 63	139.9	53 31.6	77 63	140.5	53 08.5	77 62	141.0	52 45.1	78 61	141.5	3
4	54 45.6	73 68	136.4	54 23.6	74 67	137.0	54 01.5	74 66	137.6	53 39.2	75 66	138.1	53 16.7	75 65	138.7	52 54.1	76 64	139.2	52 31.3	76 63	139.8	52 08.4	77 63	140.3	4
25	54 05.0	72 69	135.2	53 43.5	72 68	135.8	53 21.8	73 68	136.4	52 59.9	73 67	136.9	52 37.8	74 66	137.5	52 15.6	74 66	138.0	51 53.3	75 65	138.6	51 30.8	75 64	139.1	25
6	53 23.6	70 70	134.0	53 02.4	71 70	134.6	52 41.2	71 69	135.2	52 19.7	72 68	135.8	51 58.1	72 68	136.3	51 36.3	73 67	136.9	51 14.3	73 66	137.4	50 52.3	74 66	138.0	6
7	52 41.3	69 72	132.9	52 20.6	69 71	133.5	51 59.7	70 70	134.1	51 38.7	70 70	134.7	51 17.5	71 69	135.2	50 56.1	72 68	135.8	50 34.6	72 68	136.3	50 12.9	73 67	136.9	7
8	51 58.3	67 73	131.8	51 38.0	68 72	132.4	51 17.5	69 72	133.0	50 56.9	69 71	133.6	50 36.1	70 70	134.1	50 15.1	70 70	134.7	49 54.0	71 69	135.3	49 32.7	71 68	135.8	8
9	51 14.5	66 74	130.8	50 54.6	67 73	131.4	50 34.6	67 73	131.9	50 14.3	68 72	132.5	49 53.9	68 71	133.1	49 33.3	69 71	133.7	49 12.6	69 70	134.2	48 51.7	70 70	134.8	9
30	50 30.1	65 75	129.7	50 10.6	65 74	130.3	49 50.9	66 74	130.9	49 31.1	66 73	131.5	49 11.0	67 73	132.1	48 50.9	68 72	132.6	48 30.5	68 71	133.2	48 10.0	69 71	133.7	30
1	49 45.0	63 76	128.8	49 25.9	64 76	129.4	49 06.6	65 75	129.9	48 47.1	65 74	130.5	48 27.5	66 74	131.1	48 07.7	66 73	131.7	47 47.7	67 72	132.2	47 27.6	67 72	132.8	1
2	48 59.3	62 77	127.8	48 40.6	63 76	128.4	48 21.7	63 76	129.0	48 02.6	64 75	129.6	47 43.3	64 75	130.2	47 23.9	65 74	130.7	47 04.3	66 73	131.3	46 44.5	66 73	131.8	2
3	48 13.0	61 78	126.9	47 54.7	62 77	127.5	47 36.1	62 77	128.1	47 17.4	63 76	128.7	46 58.5	63 76	129.2	46 39.5	64 75	129.8	46 20.2	64 74	130.4	46 00.8	65 74	130.9	3
4	47 26.2	60 79	126.0	47 08.2	60 78	126.6	46 50.0	61 78	127.2	46 31.7	61 77	127.8	46 13.1	62 77	128.4	45 54.4	63 76	128.9	45 35.6	63 75	129.5	45 16.6	64 75	130.0	4
35	46 38.9	59 80	125.2	46 21.2	59 79	125.8	46 03.4	60 79	126.4	45 45.4	60 78	126.9	45 27.2	61 77	127.5	45 08.9	61 77	128.1	44 50.4	62 76	128.6	44 31.7	62 76	129.2	35
6	45 51.1	57 80	124.4	45 33.8	58 80	125.0	45 16.3	59 79	125.5	44 58.6	59 79	126.1	44 40.8	60 78	126.7	44 22.8	60 78	127.2	44 04.6	61 77	127.8	43 46.3	61 77	128.3	6
7	45 02.8	56 81	123.6	44 45.8	57 81	124.2	44 28.7	57 80	124.7	44 11.3	58 80	125.3	43 53.8	59 79	125.9	43 36.2	59 78	126.4	43 18.4	60 78	127.0	43 00.4	60 77	127.5	7
8	44 14.1	55 82	122.8	43 57.4	56 81	123.4	43 40.6	56 81	124.0	43 23.6	57 80	124.5	43 06.4	57 80	125.1	42 49.1	58 79	125.6	42 31.6	59 79	126.2	42 14.0	59 78	126.7	8
9	43 24.9	54 83	122.1	43 08.6	55 82	122.6	42 52.1	55 82	123.2	42 35.4	56 81	123.8	42 18.6	56 80	124.3	42 01.6	57 80	124.9	41 44.4	57 79	125.4	41 27.1	58 79	126.0	9
40	42 35.4	53 83	121.3	42 19.4	54 83	121.9	42 03.2	54 82	122.5	41 46.8	55 82	123.1	41 30.3	55 81	123.6	41 13.6	56 81	124.2	40 56.8	56 80	124.7	40 39.8	57 80	125.3	40
1	41 45.5	52 84	120.7	41 29.8	53 83	121.2	41 13.9	53 83	121.8	40 57.8	54 82	122.3	40 41.6	54 82	122.9	40 25.2	55 81	123.5	40 08.7	55 81	124.0	39 52.0	56 80	124.5	1
2	40 55.2	51 84	120.0	40 39.8	52 84	120.5	40 24.2	52 83	121.1	40 08.5	53 83	121.7	39 52.5	53 82	122.2	39 36.5	54 82	122.8	39 20.2	54 81	123.3	39 03.9	55 81	123.9	2
3	40 04.7	50 85	119.3	39 49.5	51 84	119.9	39 34.2	51 84	120.5	39 18.7	52 83	121.0	39 03.1	52 83	121.6	38 47.3	53 82	122.1	38 31.4	53 82	122.6	38 15.3	54 82	123.2	3
4	39 13.7	49 85	118.7	38 58.9	50 85	119.3	38 43.9	50 84	119.8	38 28.7	51 84	120.4	38 13.3	51 84	120.9	37 57.8	52 83	121.5	37 42.2	52 83	122.0	37 26.4	53 82	122.5	4
45	38 22.5	48 86	118.1	38 07.9	49 85	118.6	37 53.2	49 85	119.2	37 38.3	50 84	119.7	37 23.2	50 84	120.3	37 08.0	51 84	120.8	36 52.7	51 83	121.4	36 37.2	52 83	121.9	45
6	37 31.0	48 86	117.5	37 16.7	48 86	118.0	37 02.2	49 85	118.6	36 47.6	49 85	119.1	36 32.8	50 85	119.7	36 17.9	50 84	120.2	36 02.8	50 84	120.8	35 47.6	51 83	121.3	6
7	36 39.2	47 87	116.9	36 25.2	47 86	117.5	36 11.0	48 86	118.0	35 56.6	48 85	118.6	35 42.1	49 85	119.1	35 27.4	49 85	119.6	35 12.6	50 84	120.2	34 57.7	50 84	120.7	7
8	35 47.2	46 87	116.4	35 33.4	46 87	116.9	35 19.4	47 86	117.4	35 05.3	47 86	118.0	34 51.1	48 85	118.5	34 36.7	48 85	119.1	34 22.1	49 85	119.6	34 07.5	49 84	120.1	8
9	34 54.9	45 88	115.8	34 41.3	45 87	116.4	34 27.6	46 87	116.9	34 13.8	46 86	117.4	33 59.8	47 86	118.0	33 45.6	47 86	118.5	33 31.4	48 85	119.0	33 17.0	48 85	119.5	9
50	34 02.4	44 88	115.3	33 49.0	45 88	115.8	33 35.6	45 87	116.4	33 22.0	46 87	116.9	33 08.2	46 86	117.4	32 54.3	46 86	117.9	32 40.3	47 86	118.5	32 26.2	47 85	119.0	50
1	33 09.6	43 88	114.8	32 56.5	44 88	115.3	32 43.3	44 88	115.8	32 29.9	45 87	116.4	32 16.4	45 87	116.9	32 02.8	46 86	117.4	31 49.0	46 86	117.9	31 35.1	47 86	118.5	1
2	32 16.7	43 89	114.3	32 03.8	43 88	114.8	31 50.8	44 88	115.3	31 37.6	44 88	115.9	31 24.4	44 87	116.4	31 11.0	45 87	116.9	30 57.5	45 86	117.4	30 43.8	46 86	117.9	2
3	31 23.5	42 89	113.8	31 10.8	42 89	114.3	30 58.0	43 88	114.8	30 45.1	43 88	115.4	30 32.1	44 88	115.9	30 18.9	44 87	116.4	30 05.7	44 87	116.9	29 52.3	45 86	117.4	3
4	30 30.1	41 89	113.3	30 17.7	42 89	113.8	30 05.1	42 89	114.4	29 52.4	42 88	114.9	29 39.6	43 88	115.4	29 26.7	43 87	115.9	29 13.6	44 87	116.4	29 00.5	44 87	116.9	4
55	29 36.5	41 90	112.8	29 24.3	41 89	113.4	29 12.0	41 89	113.9	28 59.5	42 89	114.4	28 46.9	42 88	114.9	28 34.2	43 88	115.4	28 21.4	43 87	116.0	28 08.5	43 87	116.5	55
6	28 42.8	40 90	112.4	28 30.8	40 90	112.9	28 18.7	41 89	113.4	28 06.4	41 89	113.9	27 54.0	41 88	114.5	27 41.6	42 88	115.0	27 29.0	42 88	115.5	27 16.3	43 87	116.0	6
7	27 48.9	39 90	112.0	27 37.1	40 90	112.5	27 25.1	40 89	113.0	27 13.1	40 89	113.5	27 01.0	41 89	114.0	26 48.7	41 88	114.5	26 36.3	41 88	115.0	26 23.8	42 88	115.5	7
8	26 54.8	39 90	111.5	26 43.2	39 90	112.0	26 31.5	39 90	112.6	26 19.6	40 89	113.1	26 07.7	40 89	113.6	25 55.6	40 89	114.1	25 43.5	41 88	114.6	25 31.2	41 88	115.1	8
9	26 00.6	38 91	111.1	25 49.1	38 90	111.6	25 37.6	39 90	112.1	25 26.0	39 90	112.6	25 14.2	39 89	113.2	25 02.4	40 89	113.7	24 50.4	40 89	114.2	24 38.4	40 88	114.7	9
60	25 06.2	37 91	110.7	24 54.9	38 91	111.2	24 43.6	38 90	111.7	24 32.2	38 90	112.2	24 20.6	39 90	112.7	24 09.0	39 89	113.2	23 57.2	39 89	113.7	23 45.4	40 89	114.2	60
1	24 11.7	37 91	110.3	24 00.6	37 91	110.8	23 49.5	37 90	111.3	23 38 2	38 90	111.8	23 26.9	38 90	112.3	23 15.4	38 90	112.8	23 03.9	39 89	113.3	22 52.2	39 89	113.8	1
2	23 17.0	36 91	109.9	23 06.1	36 91	110.4	22 55.1	37 91	110.9	22 44.1	37 90	111.4	22 32.9	37 90	111.9	22 21.7	38 90	112.4	22 10.3	38 90	112.9	21 58.9	38 89	113.4	2
3	22 22.2	35 92	109.5	22 11.5	36 91	110.0	22 00.7	36 91	110.5	21 49.8	36 91	111.0	21 38.8	37 90	111.5	21 27.8	37 90	112.0	21 16.6	37 90	112.5	21 05.4	38 89	113.0	3
4	21 27.2	35 92	109.2	21 16.7	35 92	109.7	21 06.1	36 91	110.2	20 55.4	36 91	110.7	20 44.6	36 91	111.2	20 33.7	36 90	111.7	20 22.8	37 90	112.2	20 11.7	37 90	112.7	4
65	20 32.2	34 92	108.8	20 21.8	35 92	109.3	20 11.4	35 91	109.8	20 00.9	35 91	110.3	19 50.3	36 91	110.8	19 39.6	36 90	111.3	19 28.8	36 90	111.8	19 17.9	36 90	112.3	65
6	19 37.0	34 92	108.4	19 26.8	34 92	108.9	19 16.6	34 92	109.4	19 06.2	35 91	109.9	18 55.8	35 91	110.4	18 45.3	35 91	110.9	18 34.7	35 90	111.4	18 24.0	36 90	111.9	6
7	18 41.7	33 92	108.1	18 31.7	34 92	108.6	18 21.6	34 92	109.1	18 11.4	34 92	109.6	18 01.2	34 91	110.1	17 50.8	35 91	110.6	17 40.4	35 91	111.1	17 29.9	35 90	111.6	7
8	17 46.3	33 92	107.8	17 36.5	33 92	108.2	17 26.5	33 92	108.7	17 16.5	34 92	109.2	17 06.4	34 91	109.7	16 56.3	34 91	110.2	16 46.0	34 91	110.7	16 35.7	34 91	111.2	8
9	16 50.9	32 93	107.4	16 41.1	33 92	107.9	16 31.3	33 92	108.4	16 21.5	33 92	108.9	16 11.6	33 92	109.4	16 01.6	33 91	109.9	15 51.5	34 91	110.4	15 41.4	34 91	110.9	9
70	15 55.3	32 93	107.1	15 45.7	32 93	107.6	15 36.1	32 92	108.1	15 26.4	32 92	108.6	15 16.6	33 92	109.1	15 06.8	33 92	109.5	14 56.9	33 91	110.0	14 46.9	33 91	110.5	70
1	14 59.6	31 93	106.8	14 50.1	32 93	107.3	14 40.7	32 92	107.8	14 31.1	32 92	108.2	14 21.5	32 92	108.7	14 11.8	32 92	109.2	14 02.1	33 91	109.7	13 52.3	33 91	110.2	1
2	14 03.8	31 93	106.5	13 54.5	31 93	107.0	13 45.2	31 93	107.4	13 35.8	31 92	107.9	13 26.3	32 92	108.4	13 16.8	32 92	108.9	13 07.3	32 92	109.4	12 57.6	32 91	109.9	2
3	13 07.9	30 93	106.2	12 58.8	31 93	106.6	12 49.6	31 93	107.1	12 40.3	31 93	107.6	12 31.0	31 92	108.1	12 21.7	31 92	108.6	12 12.3	31 92	109.1	12 02.8	32 92	109.6	3
4	12 11.9	30 93	105.9	12 02.9	30 93	106.3	11 53.9	30 93	106.8	11 44.8	30 93	107.3	11 35.7	31 92	107.8	11 26.5	31 92	108.3	11 17.2	31 92	108.8	11 07.9	31 92	109.3	4
75	11 15.9	29 94	105.6	11 07.0	30 93	106.0	10 58.1	30 93	106.5	10 49.2	30 93	107.0	10 40.2	30 93	107.5	10 31.1	30 92	108.0	10 22.0	30 92	108.5	10 12.9	31 92	109.0	75
6	10 19.8	29 94	105.3	10 11.0	29 93	105.7	10 02.3	29 93	106.2	9 53.5	29 93	106.7	9 44.6	30 93	107.2	9 35.7	30 93	107.7	9 26.8	30 92	108.2	9 17.8	30 92	108.7	6
7	9 23.6	29 94	105.0	9 15.0	29 94	105.5	9 06.3	29 93	105.9	8 57.7	29 93	106.4	8 49.0	29 93	106.9	8 40.2	29 93	107.4	8 31.4	29 92	107.9	8 22.6	29 92	108.4	7
8	8 27.3	28 94	104.7	8 18.8	28 94	105.2	8 10.3	28 93	105.7	8 01.8	29 93	106.1	7 53.2	29 93	106.6	7 44.6	29 93	107.1	7 36.0	29 93	107.6	7 27.3	29 92	108.1	8
9	7 30.9	28 94	104.4	7 22.6	28 94	104.9	7 14.2	28 94	105.4	7 05.8	28 93	105.9	6 57.4	28 93	106.4	6 48.9	28 93	106.8	6 40.4	28 93	107.3	6 31.9	28 92	107.8	9
80	6 34.5	27 94	104.1	6 26.3	27 94	104.6	6 18.1	28 94	105.1	6 09.8	28 94	105.6	6 01.5	28 93	106.1	5 53.2	28 93	106.6	5 44.8	28 93	107.0	5 36.4	28 93	107.5	80
1	5 38.0	27 94	103.9	5 29.9	27 94	104.4	5 21.8	27 94	104.8	5 13.7	27 94	105.3	5 05.5	27 93	105.8										1

H.A.	16° 00′				16° 30′				17° 00′				17° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	88 00.0	1.0	22	00.0	87 30.0	1.0	18	00.0	87 00.0	1.0	15	00.0	86 30.0	1.0	13	00.0
1	87 46.7	90	56	25.7	87 19.2	93	48	21.0	86 50.9	95	41	17.7	86 22.2	96	36	15.2
2	87 13.2	72	74	43.8	86 50.5	79	67	37.4	86 26.1	84	60	32.5	86 00.4	87	54	28.5
3	86 28.8	56	83	55.0	86 10.5	65	77	48.8	85 50.0	72	72	43.5	85 27.8	77	67	39.1
4	85 39.0	45	88	62.1	85 24.1	54	83	56.6	85 07.0	61	79	51.6	84 47.8	67	75	47.2
05	84 46.4	37	90	66.9	84 34.0	45	87	62.0	84 19.5	52	84	57.4	84 03.0	58	80	53.3
6	83 52.2	31	92	70.2	83 41.7	38	90	65.9	83 29.2	45	87	61.8	83 14.9	51	84	58.0
7	82 57.0	27	93	72.6	82 48.0	33	91	68.8	82 37.1	39	89	65.1	82 24.6	45	87	61.6
8	82 01.1	23	94	74.5	81 53.3	29	92	71.0	81 43.8	34	90	67.7	81 32.6	40	88	64.5
9	81 04.8	20	94	75.9	80 57.9	26	93	72.8	80 49.5	31	92	69.8	80 39.6	35	90	66.8
10	80 08.2	18	95	77.0	80 02.1	23	94	74.2	79 54.6	27	92	71.4	79 45.7	32	91	68.7
1	79 11.4	16	95	77.9	79 05.9	20	94	75.3	78 59.2	25	93	72.8	78 51.1	29	92	70.3
2	78 14.4	14	95	78.7	78 09.5	18	94	76.3	78 03.4	22	93	73.9	77 56.1	26	92	71.6
3	77 17.2	13	95	79.3	77 12.8	17	95	77.1	77 07.3	20	94	74.8	77 00.7	24	93	72.7
4	76 20.0	11	96	79.8	76 16.0	15	95	77.7	76 11.0	18	94	75.6	76 05.0	22	93	73.6
15	75 22.6	10	96	80.2	75 19.1	14	95	78.3	75 14.5	17	94	76.3	75 09.0	20	94	74.4
6	74 25.2	09	96	80.6	74 22.0	12	95	78.7	74 17.9	15	95	76.9	74 12.9	18	94	75.1
7	73 27.8	08	96	80.9	73 24.9	11	95	79.1	73 21.1	14	95	77.4	73 16.5	17	94	75.7
8	72 30.3	07	96	81.1	72 27.7	10	95	79.5	72 24.3	13	95	77.8	72 20.1	15	94	76.2
9	71 32.7	06	96	81.4	71 30.4	09	96	79.8	71 27.3	12	95	78.2	71 23.5	14	94	76.7
20	70 35.2	06	96	81.5	70 33.1	08	96	80.0	70 30.3	11	95	78.5	70 26.8	13	95	77.1
1	69 37.6	05	96	81.7	69 35.7	07	96	80.3	69 33.2	10	95	78.8	69 30.0	12	95	77.4
2	68 40.0	04	96	81.8	68 38.3	06	96	80.4	68 36.1	09	95	79.1	68 33.1	11	95	77.7
3	67 42.3	04	96	81.9	67 40.9	06	96	80.6	67 38.9	08	95	79.3	67 36.2	10	95	78.0
4	66 44.7	03	96	82.0	66 43.5	05	96	80.7	66 41.7	07	95	79.5	66 39.3	09	95	78.2
25	65 47.0	02	96	82.1	65 46.0	04	96	80.8	65 44.4	06	95	79.6	65 42.2	08	95	78.4
6	64 49.4	02	96	82.1	64 48.5	04	96	80.9	64 47.1	06	96	79.8	64 45.2	07	95	78.6
7	63 51.7	01	96	82.1	63 51.0	03	96	81.0	63 49.8	05	96	79.9	63 48.1	07	95	78.7
8	62 54.0	01	96	82.2	62 53.5	02	96	81.1	62 52.5	04	96	80.0	62 51.0	06	95	78.9
9	61 56.3	00	96	82.2	61 56.0	02	96	81.1	61 55.2	04	96	80.0	61 53.9	05	95	79.0
30	60 58.7	00	96	82.2	60 58.5	01	96	81.1	60 57.8	03	96	80.1	60 56.7	05	95	79.1
1	60 01.0	01	96	82.2	60 01.0	01	96	81.2	60 00.5	02	96	80.2	59 59.5	04	95	79.2
2	59 03.3	01	96	82.1	59 03.4	00	96	81.2	59 03.1	02	96	80.2	59 02.4	03	95	79.2
3	58 05.6	02	96	82.1	58 05.9	00	96	81.2	58 05.7	01	96	80.2	58 05.2	03	95	79.3
4	57 08.0	02	96	82.1	57 08.4	01	96	81.2	57 08.4	01	96	80.2	57 08.0	02	95	79.3
35	56 10.3	02	96	82.1	56 10.8	01	96	81.2	56 11.0	00	96	80.3	56 10.7	01	95	79.4
6	55 12.7	03	96	82.0	55 13.3	02	96	81.1	55 13.6	00	96	80.3	55 13.5	01	95	79.4
7	54 15.0	03	96	82.0	54 15.8	02	96	81.1	54 16.2	01	96	80.2	54 16.3	00	95	79.4
8	53 17.4	04	96	81.9	53 18.3	02	96	81.1	53 18.9	01	96	80.2	53 19.1	00	95	79.4
9	52 19.7	04	96	81.8	52 20.8	03	96	81.0	52 21.5	02	96	80.2	52 21.9	01	95	79.4
40	51 22.1	04	96	81.8	51 23.3	03	96	81.0	51 24.1	02	96	80.2	51 24.6	01	95	79.4
1	50 24.5	05	96	81.7	50 25.8	04	96	80.9	50 26.8	03	96	80.1	50 27.4	02	95	79.4
2	49 26.9	05	96	81.6	49 28.3	04	96	80.9	49 29.4	03	96	80.1	49 30.2	02	95	79.3
3	48 29.3	06	96	81.6	48 30.8	05	96	80.8	48 32.1	04	96	80.0	48 33.0	03	95	79.3
4	47 31.7	06	96	81.5	47 33.4	05	96	80.7	47 34.7	04	96	80.0	47 35.8	03	95	79.2
45	46 34.2	06	96	81.4	46 35.9	05	96	80.7	46 37.4	04	96	79.9	46 38.6	04	95	79.2
6	45 36.6	07	96	81.3	45 38.5	06	96	80.6	45 40.1	05	96	79.9	45 41.4	04	95	79.1
7	44 39.1	07	96	81.2	44 41.1	06	96	80.5	44 42.8	05	96	79.8	44 44.3	04	95	79.1
8	43 41.5	07	96	81.1	43 43.6	07	96	80.4	43 45.5	06	95	79.7	43 47.1	05	95	79.0
9	42 44.0	08	96	81.0	42 46.2	07	96	80.3	42 48.2	06	95	79.6	42 49.9	05	95	79.0
50	41 46.5	08	96	80.9	41 48.9	07	96	80.2	41 51.0	07	95	79.6	41 52.8	06	95	78.9
1	40 49.1	08	96	80.8	40 51.5	08	96	80.1	40 53.7	07	95	79.5	40 55.7	06	95	78.8
2	39 51.6	09	96	80.7	39 54.2	08	96	80.0	39 56.5	07	95	79.4	39 58.6	07	95	78.7
3	38 54.2	09	96	80.6	38 56.8	09	96	79.9	38 59.3	08	95	79.3	39 01.5	07	95	78.6
4	37 56.7	10	96	80.5	37 59.5	09	96	79.8	38 02.1	08	95	79.2	38 04.4	08	95	78.6
55	36 59.3	10	96	80.3	37 02.2	09	95	79.7	37 04.9	09	95	79.1	37 07.4	08	95	78.5
6	36 02.0	10	96	80.2	36 04.9	10	95	79.6	36 07.7	09	95	79.0	36 10.3	08	95	78.4
7	35 04.6	11	96	80.1	35 07.7	10	95	79.5	35 10.6	09	95	78.9	35 13.3	09	95	78.3
8	34 07.3	11	96	80.0	34 10.5	10	95	79.4	34 13.5	10	95	78.8	34 16.3	09	95	78.2
9	33 09.9	11	96	79.8	33 13.3	11	95	79.2	33 16.4	10	95	78.7	33 19.4	10	95	78.1
60	32 12.7	12	95	79.7	32 16.1	11	95	79.1	32 19.3	11	95	78.5	32 22.4	10	95	77.9
1	31 15.4	12	95	79.6	31 18.9	12	95	79.0	31 22.3	11	95	78.4	31 25.5	10	95	77.8
2	30 18.1	12	95	79.4	30 21.8	12	96	78.9	30 25.3	11	95	78.3	30 28.6	11	95	77.7
3	29 20.9	13	95	79.3	29 24.7	12	95	78.7	29 28.3	12	95	78.2	29 31.7	11	95	77.6
4	28 23.7	13	95	79.2	28 27.6	13	95	78.6	28 31.3	12	95	78.0	28 34.9	12	95	77.5
65	27 26.6	13	95	79.0	27 30.5	13	95	78.5	27 34.4	13	95	77.9	27 38.1	12	95	77.3
6	26 29.4	14	95	78.9	26 33.5	13	95	78.3	26 37.5	13	95	77.8	26 41.3	13	95	77.2
7	25 32.3	14	95	78.7	25 36.5	14	95	78.2	25 40.6	13	95	77.6	25 44.5	13	95	77.1
8	24 35.2	15	95	78.6	24 39.6	14	96	78.0	24 43.7	14	96	77.5	24 47.8	13	94	76.9
9	23 38.2	15	95	78.4	23 42.6	15	95	77.9	23 46.9	14	95	77.3	23 51.1	14	94	76.8
70	22 41.2	15	95	78.2	22 45.7	15	95	77.7	22 50.1	15	95	77.2	22 54.5	14	94	76.6
1	21 44.2	16	95	78.1	21 48.9	15	95	77.6	21 53.4	15	95	77.0	21 57.8	15	94	76.5
2	20 47.3	16	95	77.9	20 52.0	16	95	77.4	20 56.7	15	94	76.9	21 01.3	15	94	76.3
3	19 50.3	16	95	77.8	19 55.2	16	95	77.2	20 00.0	16	94	76.7	20 04.7	15	94	76.2
4	18 53.5	17	95	77.6	18 58.5	16	95	77.1	19 03.4	16	94	76.5	19 08.2	16	94	76.0
75	17 56.6	17	95	77.4	18 01.7	17	94	76.9	18 06.8	17	94	76.4	18 11.7	16	94	75.9
6	16 59.8	18	95	77.2	17 05.1	17	94	76.7	17 10.2	17	94	76.2	17 15.3	17	94	75.7
7	16 03.1	18	96	77.1	16 08.4	18	94	76.6	16 13.7	17	94	76.0	16 18.9	17	94	75.5
8	15 06.4	18	94	76.9	15 11.8	18	94	76.4	15 17.2	18	94	75.9	15 22.5	18	94	75.4
9	14 09.7	19	94	76.7	14 15.3	19	94	76.2	14 20.8	18	94	75.7	14 26.2	18	94	75.2
80	13 13.0	19	94	76.5	13 18.7	19	94	76.0	13 24.4	19	94	75.5	13 30.0	19	94	75.0
1	12 16.5	20	94	76.3	12 22.3	19	94	75.8	12 28.1	19	94	75.3	12 33.8	19	94	74.8
2	11 19.9	20	94	76.1	11 25.9	20	94	75.6	11 31.8	20	94	75.1	11 37.6	19	94	74.6
3	10 23.4	20	94	75.9	10 29.5	20	94	75.4	10 35.5	20	94	74.9	10 41.5	20	93	74.4
4	9 27.0	21	94	75.7	9 33.2	21	94	75.2	9 39.3	20	94	74.7	9 45.4	20	93	74.2
85	8 30.6	21	94	75.5	8 36.9	21	94	75.0	8 43.2	21	93	74.5	8 49.4	21	93	74.0
6	7 34.2	22	94	75.3	7 40.7	21	94	74.8	7 47.1	21	93	74.3	7 53.5	21	93	73.8
7	6 37.9	22	94	75.1	6 44.5	22	94	74.6	6 51.1	22	93	74.1	6 57.6	22	93	73.6
8	5 41.7	22	94	74.9	5 48.4	22	93	74.4	5 55.1	22	93	73.9	6 01.8	22	93	73.4
9													5 06.0	23	93	73.2

18° 00′				18° 30′				19° 00′				19° 30′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
86 00.0	1.0	11	00.0	85 30.0	1.0	10	00.0	85 00.0	1.0	09	00.0	84 30.0	1.0	08	00.0	00
85 53.2	97	32	13.4	85 23.9	98	29	11.9	84 54.5	98	26	10.7	84 25.0	98	24	09.7	1
85 33.7	90	49	25.4	85 06.5	92	45	22.8	84 38.7	93	41	20.7	84 10.6	94	38	18.9	2
85 04.2	81	62	35.4	84 39.5	84	57	32.2	84 13.9	86	53	29.5	83 47.7	88	50	27.2	3
84 27.1	71	70	43.3	84 05.1	75	66	39.9	83 42.0	79	62	36.9	83 17.9	81	59	34.3	4
83 44.9	63	77	49.6	83 25.3	67	73	46.2	83 04.5	71	69	43.1	82 42.6	75	66	40.3	05
82 59.0	56	81	54.5	82 41.5	60	78	51.2	82 22.8	64	75	48.2	82 02.9	68	72	45.4	6
82 10.4	50	84	58.3	81 54.9	54	81	55.3	81 38.0	58	79	52.4	81 19.9	62	76	49.7	7
81 20.0	44	86	61.5	81 06.1	49	84	58.6	80 50.8	53	82	55.8	80 34.4	57	79	53.2	8
80 28.3	40	88	64.0	80 15.7	44	86	61.3	80 01.8	48	84	58.7	79 46.8	52	82	56.2	9
79 35.5	36	89	66.1	79 24.0	40	88	63.5	79 11.4	44	86	61.1	78 57.7	47	84	58.8	10
78 41.9	33	90	67.8	78 31.5	37	89	65.4	78 20.0	40	87	63.1	78 07.4	44	86	60.9	1
77 47.7	30	91	69.3	77 38.2	34	90	67.1	77 27.6	37	88	64.9	77 16.0	40	87	62.8	2
76 53.0	27	92	70.5	76 44.3	31	91	68.4	76 34.6	34	89	66.4	76 23.9	37	88	64.4	3
75 58.0	25	92	71.6	75 50.0	28	91	69.6	75 41.0	31	90	67.7	75 31.1	34	89	65.8	4
75 02.6	23	93	72.5	74 55.2	26	92	70.6	74 46.9	29	91	68.8	74 37.8	32	90	67.0	15
74 06.9	21	93	73.3	74 00.1	24	92	71.5	73 52.5	27	91	69.8	73 44.0	30	90	68.1	6
73 11.1	20	93	74.0	73 04.8	22	93	72.3	72 57.7	25	92	70.6	72 49.8	28	91	69.0	7
72 15.0	18	94	74.6	72 09.2	21	93	73.0	72 02.6	23	92	71.4	71 55.3	26	91	69.8	8
71 18.8	17	94	75.1	71 13.5	19	93	73.6	71 07.3	22	92	72.1	71 00.5	24	92	70.6	9
70 22.5	15	94	75.6	70 17.5	18	93	74.1	70 11.9	20	93	72.7	70 05.5	22	92	71.2	20
69 26.1	14	94	76.0	69 21.5	16	94	74.6	69 16.2	19	93	73.2	69 10.3	21	92	71.8	1
68 29.5	13	94	76.4	68 25.3	15	94	75.0	68 20.4	17	93	73.7	68 14.9	19	93	72.3	2
67 32.9	12	94	76.7	67 29.0	14	94	75.4	67 24.5	16	93	74.1	67 19.3	18	93	72.8	3
66 36.2	11	95	77.0	66 32.6	13	94	75.7	66 28.4	15	94	74.5	66 23.6	17	93	73.2	4
65 39.5	10	95	77.2	65 36.2	12	94	76.0	65 32.3	14	94	74.8	65 27.8	16	93	73.6	25
64 42.7	09	95	77.4	64 39.7	11	94	76.3	64 36.1	13	94	75.1	64 31.9	15	93	73.9	6
63 45.9	08	95	77.6	63 43.1	10	94	76.5	63 39.8	12	94	75.4	63 36.0	14	93	74.2	7
62 49.0	08	95	77.8	62 46.5	09	94	76.7	62 43.4	11	94	75.6	62 39.9	13	94	74.5	8
61 52.1	07	95	77.9	61 49.8	08	95	76.9	61 47.0	10	94	75.8	61 43.7	12	94	74.8	9
60 55.1	06	95	78.1	60 53.1	08	95	77.0	60 50.5	09	94	76.0	60 47.5	11	94	75.0	30
59 58.2	05	95	78.2	59 56.3	07	95	77.2	59 54.0	08	94	76.2	59 51.3	10	94	75.2	1
59 01.2	05	95	78.3	58 59.5	06	95	77.3	58 57.5	08	94	76.3	58 55.0	09	94	75.4	2
58 04.2	04	95	78.3	58 02.7	05	95	77.4	58 00.9	07	94	76.5	57 58.6	08	94	75.5	3
57 07.1	03	95	78.4	57 05.9	05	95	77.5	57 04.3	06	94	76.6	57 02.2	07	94	75.7	4
56 10.1	03	95	78.5	56 09.1	04	95	77.6	56 07.6	05	94	76.7	56 05.8	07	94	75.8	35
55 13.1	02	95	78.5	55 12.2	03	95	77.6	55 11.0	05	94	76.8	55 09.4	06	94	75.9	6
54 16.0	02	95	78.5	54 15.3	03	95	77.7	54 14.3	04	94	76.8	54 12.9	05	94	76.0	7
53 18.9	01	95	78.6	53 18.5	02	95	77.7	53 17.6	03	94	76.9	53 16.4	05	94	76.0	8
52 21.9	00	95	78.6	52 21.6	02	95	77.7	52 20.9	03	95	76.9	52 19.9	04	94	76.1	9
51 24.8	00	95	78.6	51 24.7	01	95	77.8	51 24.2	02	95	77.0	51 23.4	03	94	76.2	40
50 27.8	01	95	78.6	50 27.8	00	95	77.8	50 27.5	02	95	77.0	50 26.9	03	94	76.2	1
49 30.7	01	95	78.6	49 30.9	00	95	77.8	49 30.7	01	95	77.0	49 30.3	02	94	76.2	2
48 33.6	02	95	78.5	48 34.0	01	95	77.8	48 34.0	00	95	77.0	48 33.8	01	94	76.3	3
47 36.6	02	95	78.5	47 37.1	01	95	77.8	47 37.3	00	95	77.0	47 37.2	01	94	76.3	4
46 39.5	03	95	78.5	46 40.2	02	95	77.7	46 40.6	01	95	77.0	46 40.7	00	94	76.3	45
45 42.5	03	95	78.4	45 43.3	02	95	77.7	45 43.8	01	95	77.0	45 44.1	00	94	76.3	6
44 45.5	04	95	78.4	44 46.4	03	95	77.7	44 47.1	02	95	77.0	44 47.5	01	94	76.3	7
43 48.4	04	95	78.3	43 49.5	03	95	77.6	43 50.4	02	94	77.0	43 51.0	02	94	76.3	8
42 51.4	05	95	78.3	42 52.7	04	95	77.6	42 53.7	03	94	76.9	42 54.4	02	94	76.2	9
41 54.4	05	95	78.2	41 55.8	04	95	77.5	41 57.0	03	94	76.9	41 57.9	03	94	76.2	50
40 57.4	05	95	78.2	40 59.0	05	95	77.5	41 00.3	04	94	76.8	41 01.4	03	94	76.2	1
40 00.5	06	95	78.1	40 02.2	05	95	77.4	40 03.6	04	94	76.8	40 04.8	04	94	76.1	2
39 03.5	06	95	78.0	39 05.3	06	95	77.4	39 06.9	05	94	76.7	39 08.3	04	94	76.1	3
38 06.6	07	95	77.9	38 08.5	06	95	77.3	38 10.3	05	94	76.7	38 11.8	05	94	76.0	4
37 09.7	07	95	77.8	37 11.8	07	95	77.2	37 13.6	06	94	76.6	37 15.3	05	94	76.0	55
36 12.8	08	95	77.8	36 15.0	07	95	77.1	36 17.0	06	94	76.5	36 18.9	06	94	75.9	6
35 15.9	08	95	77.7	35 18.2	08	95	77.0	35 20.4	07	94	76.4	35 22.4	06	94	75.8	7
34 19.0	09	95	77.6	34 21.5	08	94	77.0	34 23.8	07	94	76.4	34 26.0	07	94	75.7	8
33 22.2	09	95	77.5	33 24.8	08	94	76.9	33 27.3	08	94	76.3	33 29.6	07	94	75.7	9
32 25.4	09	95	77.4	32 28.1	09	94	76.8	32 30.7	08	94	76.2	32 33.2	08	94	75.6	60
31 28.6	10	95	77.2	31 31.5	09	94	76.7	31 34.2	09	94	76.1	31 36.8	08	94	75.5	1
30 31.8	10	95	77.1	30 34.8	10	94	76.6	30 37.7	09	94	76.0	30 40.4	09	94	75.4	2
29 35.1	11	95	77.0	29 38.2	10	94	76.4	29 41.2	10	94	75.9	29 44.1	09	94	75.3	3
28 38.3	11	94	76.9	28 41.6	11	94	76.3	28 44.8	10	94	75.8	28 47.8	10	94	75.2	4
27 41.7	12	94	76.8	27 45.1	11	94	76.2	27 48.4	11	94	75.6	27 51.5	10	94	75.1	65
26 45.0	12	94	76.6	26 48.6	12	94	76.1	26 52.0	11	94	75.5	26 55.3	11	94	75.0	6
25 48.4	13	94	76.5	25 52.1	12	94	76.0	25 55.6	12	94	75.4	25 59.1	11	94	74.9	7
24 51.8	13	94	76.4	24 55.6	13	94	75.8	24 59.3	12	94	75.3	25 02.9	12	94	74.7	8
23 55.2	13	94	76.2	23 59.2	13	94	75.7	24 03.0	13	94	75.2	24 06.8	12	94	74.6	9
22 58.7	14	94	76.1	23 02.8	13	94	75.6	23 06.8	13	94	75.0	23 10.6	13	93	74.5	70
22 02.2	14	94	76.0	22 06.4	14	94	75.4	22 10.5	14	94	74.9	22 14.6	13	93	74.4	1
21 05.7	15	94	75.8	21 10.1	14	94	75.3	21 14.4	14	94	74.7	21 18.5	14	93	74.2	2
20 09.3	15	94	75.7	20 13.8	15	94	75.1	20 18.2	15	94	74.6	20 22.5	14	93	74.1	3
19 12.9	16	94	75.5	19 17.6	15	94	75.0	19 22.1	15	93	74.5	19 26.6	15	93	73.9	4
18 16.6	16	94	75.3	18 21.3	16	94	74.8	18 26.0	15	93	74.3	18 30.6	15	93	73.8	75
17 20.3	17	94	75.2	17 25.2	16	94	74.7	17 30.0	16	93	74.1	17 34.8	16	93	73.6	6
16 24.0	17	94	75.0	16 29.1	17	93	74.5	16 34.0	16	93	74.0	16 38.9	16	93	73.5	7
15 27.8	17	94	74.8	15 33.0	17	93	74.3	15 38.1	17	93	73.8	15 43.1	17	93	73.3	8
14 31.6	18	94	74.7	14 36.9	18	93	74.2	14 42.2	17	93	73.7	14 47.4	17	93	73.1	9
13 35.5	18	93	74.5	13 41.0	18	93	74.0	13 46.4	18	93	73.5	13 51.7	18	93	73.0	80
12 39.4	19	93	74.3	12 45.0	19	93	73.8	12 50.6	18	93	73.3	12 56.1	18	93	72.8	1
11 43.4	19	93	74.1	11 49.2	19	93	73.6	11 54.8	19	93	73.1	12 00.5	19	93	72.6	2
10 47.4	20	93	73.9	10 53.3	20	93	73.4	10 59.2	19	93	72.9	11 04.9	19	92	72.4	3
9 51.5	20	93	73.7	9 57.5	20	93	73.2	10 03.5	20	93	72.7	10 09.5	20	92	72.3	4
8 55.7	21	93	73.5	9 01.8	21	93	73.1	9 08.0	20	93	72.6	9 14.1	20	92	72.1	85
7 59.8	21	93	73 3	8 06.2	21	93	72.9	8 12.5	21	92	72.4	8 18.7	21	92	71.9	6
7 04.1	22	93	73.1	7 10.6	21	93	72.7	7 17.0	21	92	72.2	7 23.4	21	92	71.7	7
6 08.4	22	93	72.9	6 15.0	22	92	72.4	6 21.6	22	92	72.0	6 28.2	22	92	71.5	8
5 12.8	23	93	72.7	5 19.6	23	92	72.2	5 26.3	22	92	71.7	5 33.0	22	92	71.3	9

H.A.	16° 00′				16° 30′				17° 00′				17° 30′				18° 00′				18° 30′				19° 00′				19° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	60 00.0	1.0	02	180.0	59 30.0	1.0	02	180.0	59 00.0	1.0	02	180.0	58 30.0	1.0	02	180.0	58 00.0	1.0	02	180.0	57 30.0	1.0	02	180.0	57 00.0	1.0	01	180.0	56 30.0	1.0	01	180.0	00
1	59 59.0	1.0	05	178.1	59 29.0	1.0	05	178.1	58 59.1	1.0	05	178.1	58 29.1	1.0	05	178.2	57 59.1	1.0	05	178.2	57 29.1	1.0	04	178.2	56 59.1	1.0	04	178.3	56 29.1	1.0	04	178.3	1
2	59 56.1	1.0	08	176.2	59 26.2	1.0	08	176.2	58 56.2	1.0	08	176.3	58 26.3	1.0	08	176.4	57 56.4	1.0	08	176.4	57 26.4	1.0	07	176.5	56 56.5	1.0	07	176.5	56 26.5	1.0	07	176.6	2
3	59 51.2	99	11	174.3	59 21.4	1.0	11	174.4	58 51.5	1.0	11	174.4	58 21.7	1.0	11	174.5	57 51.8	1.0	11	174.6	57 21.9	1.0	10	174.7	56 52.1	1.0	10	174.8	56 22.2	1.0	10	174.9	3
4	59 44.4	99	14	172.4	59 14.7	99	14	172.5	58 45.0	99	14	172.6	58 15.2	99	14	172.7	57 45.5	99	14	172.9	57 15.7	99	13	173.0	56 45.9	99	13	173.1	56 16.2	99	13	173.2	4
05	59 35.7	99	18	170.5	59 06.2	99	17	170.6	58 36.6	99	17	170.8	58 07.0	99	17	170.9	57 37.3	99	16	171.1	57 07.7	99	16	171.2	56 38.1	99	16	171.4	56 08.4	99	16	171.5	05
6	59 25.2	98	21	168.6	58 55.8	98	20	168.8	58 26.3	98	20	169.0	57 56.9	98	20	169.2	57 27.5	98	19	169.3	56 58.0	98	19	169.5	56 28.5	98	19	169.7	55 59.0	98	18	169.9	6
7	59 12.8	97	24	166.8	58 43.6	97	23	167.0	58 14.3	97	23	167.2	57 45.1	98	23	167.4	57 15.8	98	22	167.6	56 46.5	98	22	167.8	56 17.2	98	22	168.0	55 47.9	98	21	168.2	7
8	58 58.5	97	27	165.0	58 29.6	97	26	165.2	58 00.6	97	26	165.5	57 31.6	97	25	165.7	57 02.5	97	25	165.9	56 33.4	97	25	166.1	56 04.3	97	24	166.4	55 35.2	97	24	166.6	8
9	58 42.6	96	30	163.2	58 13.8	96	29	163.4	57 45.1	96	29	163.7	57 16.3	96	28	164.0	56 47.5	96	28	164.2	56 18.7	96	27	164.5	55 49.8	96	27	164.7	55 20.9	96	26	165.0	9
10	58 24.8	95	32	161.4	57 56.4	95	32	161.7	57 27.9	95	31	162.0	56 59.4	95	31	162.3	56 30.9	95	30	162.6	56 02.3	95	30	162.9	55 33.7	95	29	163.1	55 05.0	96	29	163.4	10
1	58 05.5	94	35	159.7	57 37.3	94	34	160.0	57 09.2	94	34	160.3	56 40.9	94	33	160.7	56 12.7	94	33	161.0	55 44.4	94	32	161.3	55 16.0	95	32	161.5	54 47.6	95	32	161.8	1
2	57 44.5	93	38	158.0	57 16.7	93	37	158.4	56 48.8	93	36	158.7	56 20.9	93	36	159.0	55 52.9	93	35	159.4	55 24.9	93	35	159.7	54 56.8	94	34	160.0	54 28.7	94	34	160.3	2
3	57 21.9	91	40	156.4	56 54.4	92	40	156.7	56 26.9	92	39	157.1	55 59.3	92	38	157.4	55 31.6	92	38	157.8	55 03.9	92	37	158.1	54 36.2	93	37	158.5	54 08.4	93	36	158.8	3
4	56 57.8	90	43	154.8	56 30.7	90	42	155.1	56 03.5	91	41	155.5	55 36.2	91	41	155.9	55 08.9	91	40	156.3	54 41.5	91	40	156.6	54 14.1	92	39	157.0	53 46.6	92	39	157.3	4
15	56 32.2	89	45	153.2	56 05.5	89	44	153.6	55 38.7	90	44	154.0	55 11.8	90	43	154.4	54 44.8	90	42	154.8	54 17.7	90	42	155.1	53 50.6	90	41	155.5	53 23.4	91	41	155.9	15
6	56 05.3	88	47	151.6	55 38.9	88	47	152.1	55 12.4	88	46	152.5	54 45.9	89	45	152.9	54 19.3	89	45	153.3	53 52.6	89	44	153.7	53 25.8	89	44	154.1	52 59.0	90	43	154.4	6
7	55 37.0	86	49	150.2	55 11.0	87	49	150.6	54 44.9	87	48	151.0	54 18.7	87	47	151.4	53 52.5	88	47	151.9	53 26.1	88	46	152.3	52 59.7	88	46	152.7	52 33.2	88	45	153.0	7
8	55 07.3	85	51	148.7	54 41.7	85	51	149.2	54 16.1	86	50	149.6	53 50.3	86	49	150.0	53 24.4	86	49	150.5	52 58.4	87	48	150.9	52 32.3	87	48	151.3	52 06.2	87	47	151.7	8
9	54 36.5	84	53	147.3	54 11.3	84	53	147.8	53 46.0	85	52	148.2	53 20.6	85	51	148.7	52 55.1	85	51	149.1	52 29.5	85	50	149.5	52 03.8	86	50	150.0	51 38.0	86	49	150.4	9
20	54 04.4	82	55	145.9	53 39.6	83	55	146.4	53 14.7	83	54	146.9	52 49.7	84	53	147.3	52 24.6	84	53	147.8	51 59.4	84	52	148.2	51 34.1	85	51	148.7	51 08.6	85	51	149.1	20
1	53 31.3	81	57	144.6	53 06.9	82	56	145.1	52 42.4	82	56	145.6	52 17.7	82	55	146.0	51 53.0	83	54	146.5	51 28.2	83	54	146.9	51 03.2	83	53	147.4	50 38.2	84	53	147.8	1
2	52 57.0	80	59	143.3	52 33.0	80	58	143.8	52 08.9	81	58	144.3	51 44.7	81	57	144.8	51 20.3	81	56	145.2	50 55.9	82	56	145.7	50 31.3	82	55	146.1	50 06.6	82	54	146.6	2
3	52 21.7	78	60	142.0	51 58.1	79	60	142.5	51 34.4	79	59	143.0	51 10.6	80	58	143.5	50 46.6	80	58	144.0	50 22.5	80	57	144.5	49 58.4	81	57	144.9	49 34.1	81	56	145.4	3
4	51 45.4	77	62	140.8	51 22.2	77	61	141.3	50 58.9	78	61	141.8	50 35.5	78	60	142.3	50 11.9	79	59	142.8	49 48.2	79	59	143.3	49 24.4	80	58	143.8	49 00.5	80	58	144.2	4
25	51 08.2	76	64	139.7	50 45.4	76	63	140.2	50 22.5	77	62	140.7	49 59.4	77	62	141.2	49 36.3	77	61	141.7	49 13.0	78	60	142.2	48 49.6	78	60	142.6	48 26.0	79	59	143.1	25
6	50 30.0	74	65	138.5	50 07.7	75	64	139.0	49 45.1	75	64	139.5	49 22.5	76	63	140.1	48 59.7	76	62	140.5	48 36.8	77	62	141.0	48 13.8	77	61	141.5	47 50.6	77	60	142.0	6
7	49 51.0	73	66	137.4	49 29.1	74	66	137.9	49 06.9	74	65	138.4	48 44.7	74	64	139.0	48 22.3	75	64	139.5	47 59.8	75	63	140.0	47 37.1	76	62	140.4	47 14.4	76	62	140.9	7
8	49 11.2	72	68	136.3	48 49.6	72	67	136.9	48 27.9	73	66	137.4	48 06.1	73	66	137.9	47 44.0	74	65	138.4	47 21.9	74	64	138.9	46 59.6	74	64	139.4	46 37.3	75	63	139.9	8
9	48 30.7	70	69	135.3	48 09.5	71	68	135.8	47 48.1	71	68	136.4	47 26.6	72	67	136.9	47 05.0	72	66	137.4	46 43.3	73	66	137.9	46 21.4	73	65	138.4	45 59.3	74	64	138.9	9
30	47 49.3	69	70	134.3	47 28.5	70	69	134.8	47 07.6	70	69	135.4	46 46.5	71	68	135.9	46 25.2	71	68	136.4	46 03.8	71	67	136.9	45 42.3	72	66	137.4	45 20.7	72	66	137.9	30
1	47 07.3	68	71	133.3	46 46.9	68	71	133.9	46 26.3	69	70	134.4	46 05.6	69	69	134.9	45 44.7	70	69	135.4	45 23.7	70	68	135.9	45 02.6	71	67	136.4	44 41.3	71	67	136.9	1
2	46 24.6	67	72	132.4	46 04.6	67	72	132.9	45 44.4	68	71	133.4	45 24.0	68	70	134.0	45 03.5	69	70	134.5	44 42.9	69	69	135.0	44 22.1	69	69	135.5	44 01.2	70	68	136.0	2
3	45 41.3	65	73	131.5	45 21.6	66	73	132.0	45 01.8	66	72	132.5	44 41.8	67	71	133.1	44 21.6	67	71	133.6	44 01.4	68	70	134.1	43 41.0	68	70	134.6	43 20.4	69	69	135.1	3
4	44 57.4	64	74	130.6	44 38.0	65	74	131.1	44 18.6	65	73	131.6	43 58.9	66	72	132.2	43 39.2	66	72	132.7	43 19.2	67	71	133.2	42 59.2	67	71	133.7	42 39.0	68	70	134.2	4
35	44 12.9	63	75	129.7	43 53.9	64	75	130.3	43 34.8	64	74	130.8	43 15.5	64	73	131.3	42 56.1	65	73	131.8	42 36.5	65	72	132.3	42 16.8	66	72	132.9	41 57.0	66	71	133.4	35
6	43 27.8	62	76	128.9	43 09.2	62	75	129.4	42 50.4	63	75	130.0	42 31.5	63	74	130.5	42 12.4	64	74	131.0	41 53.2	64	73	131.5	41 33.8	65	73	132.0	41 14.4	65	72	132.5	6
7	42 42.2	61	77	128.1	42 24.0	61	76	128.6	42 05.5	62	76	129.1	41 46.9	62	75	129.7	41 28.2	63	75	130.2	41 09.3	63	74	130.7	40 50.3	64	73	131.2	40 31.2	64	73	131.7	7
8	41 56.2	60	78	127.3	41 38.2	60	77	127.8	41 20.1	61	76	128.4	41 01.9	61	76	128.9	40 43.5	62	75	129.4	40 24.9	62	75	129.9	40 06.3	62	74	130.4	39 47.5	63	74	130.9	8
9	41 09.6	58	78	126.5	40 52.0	59	78	127.1	40 34.2	59	77	127.6	40 16.3	60	77	128.1	39 58.2	60	76	128.6	39 40.1	61	76	129.2	39 21.7	61	75	129.7	39 03.2	62	75	130.2	9
40	40 22.6	57	79	125.8	40 05.3	58	79	126.3	39 47.9	58	78	126.9	39 30.3	59	77	127.4	39 12.5	59	77	127.9	38 54.7	60	76	128.4	38 36.7	60	76	128.9	38 18.5	61	75	129.4	40
1	39 35.2	56	80	125.1	39 18.2	57	79	125.6	39 01.1	57	79	126.1	38 43.8	58	78	126.7	38 26.4	58	78	127.2	38 08.8	59	77	127.7	37 51.2	59	77	128.2	37 33.3	60	76	128.7	1
2	38 47.3	55	80	124.4	38 30.7	56	80	124.9	38 13.9	56	79	125.5	37 56.9	57	79	126.0	37 39.8	57	78	126.5	37 22.6	58	78	127.0	37 05.2	58	77	127.5	36 47.7	59	77	128.0	2
3	37 59.1	54	81	123.7	37 42.7	55	80	124.2	37 26.2	55	80	124.8	37 09.6	56	80	125.3	36 52.8	56	79	125.8	36 35.9	57	78	126.3	36 18.8	57	78	126.8	36 01.6	57	77	127.4	3
4	37 10.5	53	82	123.1	36 54.4	54	81	123.6	36 38.2	54	81	124.1	36 21.9	55	80	124.6	36 05.4	55	80	125.2	35 48.8	56	79	125.7	35 32.0	56	79	126.2	35 15.2	56	78	126.7	4
45	36 21.5	52	82	122.4	36 05.8	53	82	123.0	35 49.8	53	81	123.5	35 33.8	54	81	124.0	35 17.6	54	80	124.5	35 01.3	55	80	125.0	34 44.8	55	79	125.5	34 28.3	55	79	126.0	45
6	35 32.2	51	83	121.8	35 16.7	52	82	122.3	35 01.1	52	82	122.9	34 45.4	53	81	123.4	34 29.5	53	81	123.9	34 13.4	54	80	124.4	33 57.3	54	80	124.9	33 41.0	54	79	125.4	6
7	34 42.6	50	83	121.2	34 27.4	51	83	121.7	34 12.0	51	82	122.3	33 56.6	52	82	122.8	33 41.0	52	81	123.3	33 25.2	53	81	123.8	33 09.4	53	80	124.3	32 53.4	53	80	124.8	7
8	33 52.7	50	84	120.6	33 37.7	50	83	121.2	33 22.7	50	83	121.7	33 07.5	51	82	122.2	32 52.1	51	82	122.7	32 36.7	52	81	123.2	32 21.1	52	81	123.7	32 05.4	52	80	124.2	8
9	33 02.4	49	84	120.1	32 47.8	49	84	120.6	32 33.0	50	83	121.1	32 18.0	50	83	121.6	32 03.0	50	82	122.1	31 47.8	51	82	122.6	31 32.5	51	82	123.1	31 17.1	52	81	123.6	9
50	32 11.9	48	85	119.5	31 57.5	48	84	120.0	31 43.0	49	84	120.6	31 28.3	49	83	121.1	31 13.5	49	83	121.6	30 58.6	50	82	122.1	30 43.6	50	82	122.6	30 28.5	51	82	123.1	50
1	31 21.1	47	86	119.0	31 07.0	47	85	119.5	30 52.7	48	84	120.0	30 38.3	48	84	120.5	30 23.8	49	83	121.0	30 09.2	49	83	121.5	29 54.4	49	82	122.0	29 39.6	50	82	122.5	1
2	30 30.0	46	86	118.5	30 16.2	47	85	119.0	30 02.1	47	85	119.5	29 48.0	47	84	120.0	29 33.8	48	84	120.5	29 19.4	48	83	121.0	29 04.9	48	83	121.5	28 50.4	49	82	122.0	2
3	29 38.7	45	86	118.0	29 25.1	46	86	118.5	29 11.3	46	85	119.0	28 57.5	46	85	119.5	28 43.5	47	84	120.0	28 29.4	47	84	120.5	28 15.2	48	83	121.0	28 00.8	48	83	121.5	3
4	28 47.2	44	86	117.5	28 33.8	45	86	118.0	28 20.3	45	85	118.5	28 06.7	46	85	119.0	27 52.9	46	85	119.5	27 39.1	46	84	120.0	27 25.1	47	84	120.5	27 11.1	47	83	121.0	4
55	27 55.4	44	87	117.0	27 42.3	44	86	117.5	27 29.0	44	86	118.0	27 15.6	45	85	118.5	27 02.1	45	85	119.0	26 48.5	45	85	119.5	26 34.8	46	84	120.0	26 21.0	46	84	120.5	55
6	27 03.4	43	87	116.5	26 50.5	43	87	117.0	26 37.5	44	86	117.5	26 24.3	44	86	118.0	26 11.1	44	85	118.5	25 57.7	45	85	119.0	25 44.3	45	85	119.5	25 30.7	45	84	120.0	6
7	26 11.2	42	87	116.1	25 58.5	42	87	116.6	25 45.7	43	87	117.1	25 32.8	43	86	117.6	25 19.8	44	86	118.1	25 06.7	44	85	118.6	24 53.5	44	85	119.1	24 40.2	45	85	119.5	7
8	25 18.8	41	88	115.6	25 06.4	42	87	116.1	24 53.8	42	87	116.6	24 41.1	42	87	117.1	24 28.3	43	86	117.6	24 15.5	43	86	118.1	24 02.5	43	85	118.6	23 49.4	44	85	119.1	8
9	24 26.2	41	88	115.2	24 14.0	41	88	115.7	24 01.6	41	87	116.2	23 49.2	42	87	116.7	23 36.7	42	86	117.2	23 24.0	42	86	117.7	23 11.3	43	86	118.2	22 58.5	43	85	118.6	9
60	23 33.5	40	88	114.7	23 21.4	40	88	115.2	23 09.3	41	88	115.7	22 57.1	41	87	116.2	22 44.8	41	87	116.7	22 32.3	42	86	117.2	22 19.9	42	86	117.7	22 07.3	42	86	118.2	60
1	22 40.5	39	89	114.3	22 28.7	40	88	114.8	22 16.8	40	88	115.3	22 04.8	40	87	115.8	21 52.7	40	87	116.3	21 40.5	41	87	116.8	21 28.2	41	86	117.3	21 15.9	41	86	117.8	1
2	21 47.4	39	89	113.9	21 35.8	39	88	114.4	21 24.1	39	88	114.9	21 12.3	39	88	115.4	21 00.4	40	87	115.9	20 48.4	40	87	116.4	20 36.4	40	87	116.9	20 24.3	41	86	117.4	2
3	20 54.1	38	89	113.5	20 42.7	38	89	114.0	20 31.2	38	88	114.5	20 19.6	39	88	115.0	20 07.9	39	88	115.5	19 56.2	39	87	116.0	19 44.4	40	87	116.5	19 32.5	40	87	117.0	3
4	20 00.6	37	89	113.1	19 49.4	37	89	113.6	19 38.1	38	89	114.1	19 26.8	38	88	114.6	19 15.3	38	88	115.1	19 03.8	39	88	115.6	18 52.2	39	87	116.1	18 40.5	39	87	116.6	4
65	19 07.0	37	90	112.8	18 56.0	37	89	113.3	18 44.9	37	89	113.8	18 33.7	37	89	114.2	18 22.5	38	88	114.7	18 11.2	38	88	115.2	17 59.8	38	88	115.7	17 48.3	38	87	116.2	65
6	18 13.3	36	90	112.4	18 02.4	36	90	112.9	17 51.6	36	89	113.4	17 40.6	37	89	113.9	17 29.6	37	89	114.4	17 18.4	37	88	114.8	17 07.3	37	88	115.3	16 56.0	38	87	115.8	6
7	17 19.4	35	90	112.0	17 08.7	36	90	112.5	16 58.0	36	89	113.0	16 47.3	36	89	113.5	16 36.4	36	89	114.0	16 25.5	36	88	114.5	16 14.6	37	88	115.0	16 03.5	37	88	115.5	7
8	16 25.3	35	90	111.7	16 14.9	35	90	112.2	16 04.4	35	90	112.7	15 53.8	35	89	113.2	15 43.2	36	89	113.6	15 32.5	36	89	114.1	15 21.7	36	88	114.6	15 10.9	36	88	115.1	8
9	15 31.2	34	90	111.4	15 20.9	34	90	111.8	15 10.6	35	90	112.3	15 00.2	35	90	112.8	14 49.8	35	89	113.3	14 39.3	35	89	113.8	14 28.7	35	89	114.3	14 18.1	36	88	114.7	9
70	14 36.9	33	91	111.0	14 26.8	34	90	111.5	14 16.7	34	90	112.0	14 06.5	34	90	112.5	13 56.2	34	89	113.0	13 45.9	34	89	113.4	13 35.6	35	89	113.9	13 25.1	35	88	114.4	70
1	13 42.5	33	91	110.7	13 32.6	33	91	111.2	13 22.6	33	90	111.7	13 12.6	33	90	112.1	13 02.6	34	90	112.6	12 52.4	34	89	113.1	12 42.3	34	89	113.6	12 32.1	34	89	114.1	1
2	12 48.0	32	91	110.4	12 38.2	32	91	110.8	12 28.5	33	90	111.3	12 18.6	33	90	111.8	12 08.8	33	90	112.3	11 58.8	33	90	112.8	11 48.9	33	89	113.3	11 38.8	34	89	113.7	2
3	11 53.3	32	91	110.0	11 43.8	32	91	110.5	11 34.2	32	91	111.0	11 24.5	32	90	111.5	11 14.8	32	90	112.0	11 05.1	33	90	112.5	10 55.3	33	89	112.9	10 45.5	33	89	113.4	3
4	10 58.6	31	91	109.7	10 49.2	31	91	110.2	10 39.8	31	91	110.7	10 30.3	32	91	111.2	10 20.8	32	90	111.7	10 11.2	32	90	112.2	10 01.6	32	90	112.6	9 52.0	32	89	113.1	4
75	10 03.7	31	92	109.4	9 54.5	31	91	109.9	9 45.3	31	91	110.4	9 36.0	31	91	110.9	9 26.6	31	90	111.4	9 17.3	31	90	111.8	9 07.8	31	90	112.3	8 58.4	32	90	112.8	75
6	9 08.8	30	92	109.1	8 59.7	30	91	109.6	8 50.7	30	91	110.1	8 41.5	30	91	110.6	8 32.4	31	91	111.1	8 23.2	31	90	111.5	8 13.9	31	90	112.0	8 04.7	31	90	112.5	6
7	8 13.7	30	92	108.8	8 04.9	30	92	109.3	7 55.9	30	91	109.8	7 47.0	30	91	110.3	7 38.0	30	91	110.8	7 29.0	30	91	111.3	7 19.9	30	90	111.7	7 10.8	30	90	112.2	7
8	7 18.6	29	92	108.6	7 09.9	29	92	109.0	7 01.1	29	92	109.5	6 52.3	29	91	110.0	6 43.5	29	91	110.5	6 34.7	30	91	111.0	6 25.8	30	90	111.5	6 16.9	30	90	111.9	8
9	6 23.4	29	92	108.3	6 14.8	29	92	108.8	6 06.2	29	92	109.3	5 57.6	29	91	109.7	5 48.9	29	91	110.2	5 40.2	29	91	110.7	5 31.5	29	90	111.2	5 22.8	29	90	111.7	9
80	5 28.0	28	92	108.0	5 19.6	28	92	108.5	5 11.2	28	92	109.0	5 02.7	28	92	109.5																	80

H.A.	20° 00′				20° 30′				21° 00′				21° 30′				22° 00′				22° 30′				23° 00′				23° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	84 00.0	1.0	08	00.0	83 30.0	1.0	07	00.0	83 00.0	1.0	06	00.0	82 30.0	1.0	06	00.0	82 00.0	1.0	06	00.0	81 30.0	1.0	05	00.0	81 00.0	1.0	05	00.0	80 30.0	1.0	05	00.0	00
1	83 55.5	99	22	08.9	83 25.8	99	20	08.2	82 56.1	99	19	07.6	82 26.4	99	18	07.1	81 56.6	99	17	06.6	81 26.8	99	16	06.2	80 57.0	99	15	05.9	80 27.2	99	14	05.5	1
2	83 42.2	95	35	17.4	83 13.5	96	33	16.1	82 44.7	96	31	15.0	82 15.7	97	29	14.0	81 46.6	97	27	13.1	81 17.5	97	25	12.3	80 48.2	98	24	11.6	80 18.8	98	23	11.0	2
3	83 21.0	90	46	25.1	82 53.8	91	44	23.4	82 26.3	92	41	21.8	81 58.5	93	39	20.4	81 30.4	94	36	19.2	81 02.2	95	34	18.1	80 33.7	95	33	17.1	80 05.1	96	31	16.2	3
4	82 53.1	84	56	32.0	82 27.7	86	53	29.9	82 01.8	87	50	28.0	81 35.4	89	47	26.3	81 08.6	90	45	24.8	80 41.5	91	43	23.5	80 14.1	92	40	22.2	79 46.5	92	39	21.1	4
05	82 19.8	77	63	37.8	81 56.2	80	60	35.6	81 31.9	82	57	33.5	81 07.1	84	54	31.7	80 41.8	85	52	30.0	80 16.0	87	50	28.4	79 49.8	88	47	27.0	79 23.3	89	45	25.7	05
6	81 42.0	71	69	42.9	81 20.3	74	66	40.5	80 57.7	76	63	38.4	80 34.5	79	60	36.4	80 10.6	80	58	34.6	79 46.2	82	56	32.9	79 21.4	84	53	31.4	78 56.1	85	51	30.0	6
7	81 00.8	65	73	47.2	80 40.8	68	71	44.8	80 19.9	71	68	42.6	79 58.2	73	66	40.6	79 35.8	76	63	38.7	79 12.9	78	61	37.0	78 49.3	79	59	35.4	78 25.3	81	56	33.8	7
8	80 16.9	60	77	50.8	79 58.4	63	74	48.5	79 39.0	66	72	46.3	79 18.9	69	70	44.3	78 57.9	71	68	42.4	78 36.4	73	65	40.6	78 14.2	75	63	38.9	77 51.4	77	61	37.4	8
9	79 30.8	55	80	53.9	79 13.8	58	78	51.6	78 55.8	61	75	49.5	78 37.0	64	73	47.5	78 17.5	66	71	45.6	77 57.2	69	69	43.8	77 36.3	71	67	42.1	77 14.8	73	65	40.5	9
10	78 43.0	51	82	56.5	78 27.2	54	80	54.4	78 10.6	57	78	52.3	77 53.1	60	76	50.3	77 34.8	62	74	48.5	77 15.8	64	72	46.7	76 56.2	67	70	45.0	76 35.9	69	68	43.4	10
1	77 53.8	47	84	58.8	77 39.2	50	82	56.7	77 23.8	53	80	54.7	77 07.5	56	78	52.8	76 50.4	58	76	51.0	76 32.6	61	75	49.2	76 14.1	63	73	47.6	75 54.9	65	71	46.0	1
2	77 03.5	43	85	60.7	76 50.0	46	84	58.8	76 35.6	49	82	56.8	76 20.4	52	80	55.0	76 04.5	55	79	53.2	75 47.7	57	77	51.5	75 30.3	59	75	49.9	75 12.2	61	74	48.3	2
3	76 12.3	40	87	62.4	75 59.8	43	85	60.5	75 46.4	46	84	58.7	75 32.2	49	82	56.9	75 17.2	51	80	55.2	75 01.5	54	79	53.5	74 45.1	56	77	51.9	74 28.1	58	76	50.4	3
4	75 20.3	37	88	63.9	75 08.7	40	86	62.1	74 56.2	43	85	60.3	74 42.9	46	84	58.6	74 28.9	48	82	57.0	74 14.2	50	81	55.4	73 58.7	53	79	53.8	73 42.6	55	78	52.3	4
15	74 27.7	35	88	65.2	74 16.9	38	87	63.5	74 05.2	40	86	61.8	73 52.8	43	85	60.1	73 39.7	45	83	58.5	73 25.8	47	82	57.0	73 11.2	50	81	55.5	72 56.0	52	79	54.0	15
6	73 34.6	32	89	66.4	73 24.5	35	88	64.7	73 13.6	38	87	63.1	73 02.0	40	86	61.5	72 49.6	42	84	59.9	72 36.6	45	83	58.4	72 22.8	47	82	57.0	72 08.5	49	81	55.5	6
7	72 41.1	30	90	67.4	72 31.6	33	89	65.8	72 21.4	35	88	64.2	72 10.5	38	87	62.7	71 58.9	40	86	61.2	71 46.6	42	84	59.7	71 33.7	44	83	58.3	71 20.1	46	82	56.9	7
8	71 47.2	28	90	68.3	71 38.3	31	89	66.8	71 28.8	33	88	65.3	71 18.5	35	87	63.8	71 07.6	38	86	62.3	70 56.0	40	85	60.9	70 43.8	42	84	59.5	70 31.0	44	83	58.2	8
9	70 52.9	26	91	69.1	70 44.7	29	90	67.6	70 35.7	31	89	66.2	70 26.1	33	88	64.8	70 15.8	35	87	63.4	70 04.9	37	86	62.0	69 53.3	39	85	60.6	69 41.2	41	84	59.3	9
20	69 58.4	25	91	69.8	69 50.7	27	90	68.4	69 42.3	29	90	67.0	69 33.2	31	89	65.6	69 23.5	33	88	64.3	69 13.2	35	87	63.0	69 02.3	37	86	61.7	68 50.8	39	85	60.4	20
1	69 03.7	23	92	70.4	68 56.4	25	91	69.1	68 48.5	27	90	67.8	68 40.0	29	89	66.4	68 30.9	31	88	65.1	68 21.2	33	87	63.8	68 10.9	35	86	62.6	68 00.0	37	85	61.3	1
2	68 08.7	22	92	71.0	68 01.9	24	91	69.7	67 54.5	26	90	68.4	67 46.5	28	90	67.1	67 37.9	30	89	65.9	67 28.8	32	88	64.6	67 19.0	33	87	63.4	67 08.7	35	86	62.2	2
3	67 13.6	20	92	71.5	67 07.2	22	92	70.3	67 00.3	24	91	69.0	66 52.7	26	90	67.8	66 44.6	28	89	66.6	66 36.0	30	88	65.4	66 26.8	32	88	64.2	66 17.0	33	87	63.0	3
4	66 18.3	19	92	72.0	66 12.3	21	92	70.8	66 05.8	23	91	69.6	65 58.7	25	90	68.4	65 51.1	26	90	67.2	65 42.9	28	89	66.0	65 34.2	30	88	64.9	65 25.0	32	87	63.7	4
25	65 22.8	18	93	72.4	65 17.3	19	92	71.2	65 11.2	21	91	70.1	65 04.5	23	91	68.9	64 57.3	25	90	67.8	64 49.6	27	89	66.6	64 41.4	28	88	65.5	64 32.6	30	88	64.4	25
6	64 27.3	16	93	72.8	64 22.1	18	92	71.7	64 16.4	20	92	70.5	64 10.1	22	91	69.4	64 03.3	23	90	68.3	63 56.1	25	90	67.2	63 48.3	27	89	66.1	63 40.0	28	88	65.0	6
7	63 31.6	15	93	73.1	63 26.8	17	92	72.0	63 21.4	19	92	70.9	63 15.5	20	91	69.8	63 09.2	22	91	68.8	63 02.3	24	90	67.7	62 55.0	25	89	66.6	62 47.1	27	89	65.6	7
8	62 35.9	14	93	73.4	62 31.3	16	93	72.4	62 26.3	18	92	71.3	62 20.8	19	91	70.2	62 14.8	21	91	69.2	62 08.4	22	90	68.1	62 01.4	24	90	67.1	61 54.0	25	89	66.1	8
9	61 40.0	13	93	73.7	61 35.8	15	93	72.7	61 31.1	16	92	71.6	61 25.9	18	92	70.6	61 20.3	20	91	69.6	61 14.2	21	90	68.6	61 07.7	23	90	67.6	61 00.7	24	89	66.5	9
30	60 44.1	12	93	74.0	60 40.2	14	93	73.0	60 35.8	15	92	71.9	60 31.0	17	92	70.9	60 25.7	18	91	69.9	60 20.0	20	91	69.0	60 13.8	21	90	68.0	60 07.2	23	89	67.0	30
1	59 48.1	11	93	74.2	59 44.5	13	93	73.2	59 40.4	14	92	72.2	59 35.9	16	92	71.2	59 31.0	17	91	70.3	59 25.6	19	91	69.3	59 19.8	20	90	68.3	59 13.5	21	90	67.4	1
2	58 52.1	10	93	74.4	58 48.7	12	93	73.4	58 44.9	13	92	72.5	58 40.7	15	92	71.5	58 36.1	16	92	70.6	58 31.1	17	91	69.6	58 25.6	19	90	68.7	58 19.7	20	90	67.8	2
3	57 56.0	10	94	74.6	57 52.9	11	93	73.6	57 49.4	12	93	72.7	57 45.5	14	92	71.8	57 41.1	15	92	70.8	57 36.4	16	91	69.9	57 31.3	18	91	69.0	57 25.8	19	90	68.1	3
4	56 59.8	09	94	74.7	56 57.0	10	93	73.8	56 53.8	11	93	72.9	56 50.1	13	92	72.0	56 46.1	14	92	71.1	56 41.7	15	91	70.2	56 36.9	17	91	69.3	56 31.7	18	90	68.4	4
35	56 03.6	08	94	74.9	56 01.0	09	93	74.0	55 58.1	11	93	73.1	55 54.7	12	92	72.2	55 51.0	13	92	71.3	55 46.9	14	92	70.4	55 42.4	16	91	69.6	55 37.5	17	90	68.7	35
6	55 07.4	07	94	75.0	55 05.1	08	93	74.1	55 02.4	10	93	73.3	54 59.3	11	93	72.4	54 55.8	12	92	71.5	54 52.0	13	92	70.7	54 47.8	15	91	69.8	54 43.2	16	91	69.0	6
7	54 11.2	06	94	75.1	54 09.1	08	93	74.3	54 06.6	09	93	73.4	54 03.7	10	93	72.6	54 00.6	11	92	71.7	53 57.0	12	92	70.9	53 53.1	14	91	70.0	53 48.9	15	91	69.2	7
8	53 14.9	06	94	75.2	53 13.0	07	93	74.4	53 10.8	08	93	73.5	53 08.2	09	93	72.7	53 05.2	10	92	71.9	53 02.0	11	92	71.1	52 58.4	13	91	70.2	52 54.4	14	91	69.4	8
9	52 18.6	05	94	75.3	52 16.9	06	94	74.5	52 14.9	07	93	73.7	52 12.6	08	93	72.9	52 09.9	09	92	72.0	52 06.9	11	92	71.2	52 03.5	12	92	70.4	51 59.9	13	91	69.6	9
40	51 22.3	04	94	75.4	51 20.8	05	94	74.6	51 19.0	06	93	73.8	51 16.9	08	93	73.0	51 14.5	09	92	72.2	51 11.7	10	92	71.4	51 08.7	11	92	70.6	51 05.3	12	91	69.8	40
1	50 25.9	04	94	75.4	50 24.7	05	94	74.6	50 23.1	06	93	73.9	50 21.2	07	93	73.1	50 19.0	08	92	72.3	50 16.5	09	92	71.5	50 13.7	10	92	70.7	50 10.6	11	91	70.0	1
2	49 29.6	03	94	75.5	49 28.5	04	94	74.7	49 27.2	05	93	73.9	49 25.5	06	93	73.2	49 23.6	07	92	72.4	49 21.3	08	92	71.6	49 18.7	09	92	70.9	49 15.9	10	91	70.1	2
3	48 33.2	02	94	75.5	48 32.4	03	94	74.8	48 31.2	04	93	74.0	48 29.8	05	93	73.2	48 28.1	06	92	72.5	48 26.0	07	92	71.7	48 23.7	08	92	71.0	48 21.1	09	91	70.2	3
4	47 36.8	02	94	75.5	47 36.2	03	94	74.8	47 35.3	04	93	74.1	47 34.0	05	93	73.3	47 32.5	06	93	72.6	47 30.7	06	92	71.8	47 28.7	07	92	71.1	47 26.3	08	91	70.4	4
45	46 40.5	01	94	75.6	46 40.0	02	94	74.8	46 39.3	03	93	74.1	46 38.3	04	93	73.4	46 37.0	05	93	72.6	46 35.4	06	92	71.9	46 33.6	07	92	71.2	46 31.4	08	91	70.5	45
6	45 44.1	00	94	75.6	45 43.8	01	94	74.9	45 43.3	02	93	74.1	45 42.5	03	93	73.4	45 41.4	04	93	72.7	45 40.0	05	92	72.0	45 38.4	06	92	71.3	45 36.6	07	92	70.6	6
7	44 47.7	00	94	75.6	44 47.6	01	94	74.9	44 47.3	02	93	74.2	44 46.7	02	93	73.5	44 45.8	03	93	72.8	44 44.7	04	92	72.1	44 43.3	05	92	71.3	44 41.6	06	92	70.6	7
8	43 51.3	01	94	75.6	43 51.4	00	94	74.9	43 51.3	01	93	74.2	43 50.9	02	93	73.5	43 50.2	03	93	72.8	43 49.3	03	92	72.1	43 48.1	04	92	71.4	43 46.7	05	92	70.7	8
9	42 55.0	01	94	75.6	42 55.2	01	94	74.9	42 55.3	00	93	74.2	42 55.0	01	93	73.5	42 54.6	02	93	72.8	42 53.9	03	92	72.1	42 52.9	04	92	71.5	42 51.7	04	92	70.8	9
50	41 58.6	02	94	75.5	41 59.0	01	94	74.9	41 59.2	00	93	74.2	41 59.2	00	93	73.5	41 59.0	01	93	72.8	41 58.5	02	92	72.2	41 57.7	03	92	71.5	41 56.8	04	92	70.8	50
1	41 02.2	02	94	75.5	41 02.8	02	94	74.8	41 03.2	01	93	74.2	41 03.4	00	93	73.5	41 03.3	01	93	72.9	41 03.0	01	92	72.2	41 02.5	02	92	71.5	41 01.8	03	92	70.9	1
2	40 05.8	03	94	75.5	40 06.6	02	94	74.8	40 07.2	02	93	74.2	40 07.6	01	93	73.5	40 07.7	00	93	72.9	40 07.6	01	92	72.2	40 07.3	01	92	71.5	40 06.8	02	92	70.9	2
3	39 09.5	04	94	75.4	39 10.5	03	94	74.8	39 11.2	02	93	74.1	39 11.7	01	93	73.5	39 12.1	01	93	72.9	39 12.2	00	92	72.2	39 12.1	01	92	71.6	39 11.7	01	92	70.9	3
4	38 13.2	04	94	75.4	38 14.3	03	94	74.7	38 15.2	03	93	74.1	38 15.9	02	93	73.5	38 16.4	01	93	72.8	38 16.7	01	92	72.2	38 16.8	00	92	71.6	38 16.7	01	92	70.9	4
55	37 16.8	05	94	75.3	37 18.1	04	94	74.7	37 19.2	03	93	74.1	37 20.1	03	93	73.4	37 20.8	02	93	72.8	37 21.3	01	92	72.2	37 21.6	01	92	71.6	37 21.7	00	92	70.9	55
6	36 20.5	05	94	75.3	36 22.0	05	94	74.7	36 23.2	04	93	74.0	36 24.3	03	93	73.4	36 25.2	03	93	72.8	36 25.9	02	92	72.2	36 26.4	01	92	71.6	36 26.7	01	92	70.9	6
7	35 24.2	06	94	75.2	35 25.8	05	94	74.6	35 27.3	04	93	74.0	35 28.5	04	93	73.4	35 29.6	03	93	72.8	35 30.5	03	92	72.1	35 31.2	02	92	71.5	35 31.7	01	92	70.9	7
8	34 27.9	06	94	75.1	34 29.7	06	94	74.5	34 31.3	05	93	73.9	34 32.7	04	93	73.3	34 34.0	04	93	72.7	34 35.1	03	92	72.1	34 35.9	03	92	71.5	34 36.6	02	92	70.9	8
9	33 31.7	07	94	75.1	33 33.6	06	93	74.5	33 35.4	06	93	73.9	33 37.0	05	93	73.3	33 38.4	04	93	72.7	33 39.7	04	92	72.1	33 40.7	03	92	71.5	33 41.6	03	92	70.9	9
60	32 35.4	07	94	75.0	32 37.5	07	93	74.4	32 39.5	06	93	73.8	32 41.2	06	93	73.2	32 42.8	05	93	72.6	32 44.3	04	92	72.0	32 45.5	04	92	71.4	32 46.6	03	92	70.8	60
1	31 39.2	08	94	74.9	31 41.5	07	93	74.3	31 43.6	07	93	73.7	31 45.5	06	93	73.1	31 47.3	06	93	72.6	31 48.9	05	92	72.0	31 50.4	05	92	71.4	31 51.7	04	92	70.8	1
2	30 43.0	08	94	74.8	30 45.4	08	93	74.2	30 47.7	07	93	73.7	30 49.8	07	93	73.1	30 51.8	06	93	72.5	30 53.6	06	92	71.9	30 55.2	05	92	71.3	30 56.7	05	92	70.8	2
3	29 46.8	09	94	74.7	29 49.4	08	93	74.2	29 51.8	08	93	73.6	29 54.1	07	93	73.0	29 56.2	07	92	72.4	29 58.2	06	92	71.9	30 00.1	06	92	71.3	30 01.7	05	92	70.7	3
4	28 50.7	09	94	74.6	28 53.4	09	93	74.1	28 56.0	08	93	73.5	28 58.5	08	93	72.9	29 00.8	07	92	72.4	29 02.9	07	92	71.8	29 04.9	06	92	71.2	29 06.8	06	92	70.6	4
65	27 54.6	10	93	74.5	27 57.5	09	93	74.0	28 00.2	09	93	73.4	28 02.8	08	93	72.8	28 05.3	08	92	72.3	28 07.6	08	92	71.7	28 09.8	07	92	71.1	28 11.9	07	92	70.6	65
6	26 58.5	10	93	74.4	27 01.5	10	93	73.9	27 04.4	09	93	73.3	27 07.2	09	93	72.7	27 09.9	09	92	72.2	27 12.4	08	92	71.6	27 14.7	08	92	71.1	27 17.0	07	91	70.5	6
7	26 02.4	11	93	74.3	26 05.6	10	93	73.8	26 08.7	10	93	73.2	26 11.6	10	93	72.6	26 14.4	09	92	72.1	26 17.1	09	92	71.5	26 19.7	08	92	71.0	26 22.1	08	91	70.4	7
8	25 06.4	11	93	74.2	25 09.7	11	93	73.6	25 13.0	11	93	73.1	25 16.1	10	93	72.5	25 19.1	10	92	72.0	25 21.9	09	92	71.4	25 24.7	09	92	70.9	25 27.3	09	91	70.3	8
9	24 10.4	12	93	74.1	24 13.9	11	93	73.5	24 17.3	11	93	73.0	24 20.6	11	92	72.4	24 23.7	10	92	71.9	24 26.8	10	92	71.3	24 29.7	10	92	70.8	24 32.5	09	91	70.2	9
70	23 14.4	12	93	73.9	23 18.1	12	93	73.4	23 21.6	12	93	72.9	23 25.1	11	92	72.3	23 28.4	11	92	71.8	23 31.6	11	92	71.2	23 34.7	10	92	70.7	23 37.7	10	91	70.2	70
1	22 18.5	13	93	73.8	22 22.3	13	93	73.3	22 26.0	12	93	72.7	22 29.6	12	92	72.2	22 33.1	11	92	71.7	22 36.5	11	92	71.1	22 39.8	11	92	70.6	22 43.0	10	91	70.1	1
2	21 22.6	13	93	73.7	21 26.6	13	93	73.2	21 30.4	13	92	72.6	21 34.2	12	92	72.1	21 37.9	12	92	71.6	21 41.4	12	92	71.0	21 44.9	11	92	70.5	21 48.3	11	91	69.9	2
3	20 26.7	14	93	73.5	20 30.9	14	93	73.0	20 34.9	13	92	72.5	20 38.8	13	92	72.0	20 42.7	13	92	71.4	20 46.4	12	92	70.9	20 50.0	12	91	70.4	20 53.6	12	91	69.8	3
4	19 30.9	14	93	73.4	19 35.2	14	93	72.9	19 39.4	14	92	72.4	19 43.5	13	92	71.8	19 47.5	13	92	71.3	19 51.4	13	92	70.8	19 55.2	13	91	70.2	19 59.0	12	91	69.7	4
75	18 35.2	15	93	73.3	18 39.6	15	93	72.7	18 43.9	14	92	72.2	18 48.2	14	92	71.7	18 52.4	14	92	71.2	18 56.5	13	92	70.6	19 00.5	13	91	70.1	19 04.4	13	91	69.6	75
6	17 39.4	15	93	73.1	17 44.0	15	93	72.6	17 48.5	15	92	72.1	17 53.0	15	92	71.6	17 57.3	14	92	71.0	18 01.6	14	91	70.5	18 05.7	14	91	70.0	18 09.8	13	91	69.5	6
7	16 43.7	16	93	73.0	16 48.5	16	92	72.4	16 53.2	15	92	71.9	16 57.8	15	92	71.4	17 02.3	15	92	70.9	17 06.7	15	91	70.4	17 11.1	14	91	69.9	17 15.3	14	91	69.3	7
8	15 48.1	16	93	72.8	15 53.0	16	92	72.3	15 57.8	16	92	71.8	16 02.6	16	92	71.3	16 07.3	15	92	70.7	16 11.9	15	91	70.2	16 16.4	15	91	69.7	16 20.9	15	91	69.2	8
9	14 52.5	17	93	72.6	14 57.6	17	92	72.1	15 02.6	17	92	71.6	15 07.5	16	92	71.1	15 12.3	16	91	70.6	15 17.1	16	91	70.1	15 21.8	16	91	69.6	15 26.5	15	91	69.1	9
80	13 57.0	17	92	72.5	14 02.2	17	92	72.0	14 07.4	17	92	71.5	14 12.4	17	92	70.9	14 17.5	17	91	70.4	14 22.4	16	91	69.9	14 27.3	16	91	69.4	14 32.1	16	90	68.9	80
1	13 01.5	18	92	72.3	13 06.9	18	92	71.8	13 12.2	18	92	71.3	13 17.4	17	92	70.8	13 22.6	17	91	70.3	13 27.8	17	91	69.8	13 32.8	17	91	69.3	13 37.8	17	90	68.8	1
2	12 06.1	19	92	72.1	12 11.6	18	92	71.6	12 17.1	18	92	71.1	12 22.5	18	92	70.6	12 27.9	18	91	70.1	12 33.2	18	91	69.6	12 38.4	17	91	69.1	12 43.6	17	90	68.6	2
3	11 10.7	19	92	71.9	11 16.4	19	92	71.4	11 22.0	19	92	70.9	11 27.6	19	91	70.4	11 33.1	18	91	69.9	11 38.6	18	91	69.4	11 44.1	18	90	68.9	11 49.4	18	90	68.4	3
4	10 15.4	20	92	71.8	10 21.2	19	92	71.3	10 27.0	19	92	70.8	10 32.8	19	91	70.3	10 38.5	19	91	69.8	10 44.2	19	91	69.3	10 49.8	19	90	68.8	10 55.3	18	90	68.3	4
85	9 20.1	20	92	71.6	9 26.1	20	92	71.1	9 32.1	20	92	70.6	9 38.0	20	91	70.1	9 43.9	20	91	69.6	9 49.7	19	91	69.1	9 55.5	19	90	68.6	10 01.3	19	90	68.1	85
6	8 24.9	21	92	71.4	8 31.1	21	92	70.9	8 37.2	20	91	70.4	8 43.3	20	91	69.9	8 49.4	20	91	69.4	8 55.4	20	90	68.9	9 01.4	20	90	68.4	9 07.3	20	90	67.9	6
7	7 29.8	21	92	71.2	7 36.1	21	92	70.7	7 42.4	21	91	70.2	7 48.7	21	91	69.7	7 54.9	21	91	69.2	8 01.1	21	90	68.7	8 07.3	20	90	68.2	8 13.4	20	90	67.7	7
8	6 34.7	22	92	71.0	6 41.2	22	91	70.5	6 47.7	22	91	70.0	6 54.1	21	91	69.5	7 60.5	21	90	69.0	7 06.9	21	90	68.5	7 13.3	21	90	68.0	7 19.6	21	90	67.5	8
9	5 39.7	22	92	70.8	5 46.4	22	91	70.3	5 53.0	22	91	69.8	5 59.6	22	91	69.3	6 06.2	22	90	68.8	6 12.8	22	90	68.3	6 19.3	22	90	67.8	6 25.8	22	89	67.3	9
90													5 05.2	23	91	69.1	5 12.0	23	90	68.6	5 18.7	22	90	68.1	5 25.4	22	90	67.6	5 32.1	22	89	67.1	90

Lat. 14°

H.A.	20° 00′				20° 30′				21° 00′				21° 30′				22° 00′				22° 30′				23° 00′				23° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	56 00.0	1.0	01	180.0	55 30.0	1.0	01	180.0	55 00.0	1.0	01	180.0	54 30.0	1.0	01	180.0	54 00.0	1.0	01	180.0	53 30.0	1.0	01	180.0	53 00.0	1.0	01	180.0	52 30.0	1.0	01	180.0	00
1	55 59.1	1.0	04	178.3	55 29.2	1.0	04	178.3	54 59.2	1.0	04	178.4	54 29.2	1.0	04	178.4	53 59.2	1.0	04	178.4	53 29.2	1.0	04	178.4	52 59.2	1.0	04	178.5	52 29.2	1.0	04	178.5	1
2	55 56.6	1.0	07	176.6	55 26.6	1.0	07	176.7	54 56.7	1.0	07	176.7	54 26.7	1.0	07	176.8	53 56.8	1.0	07	176.8	53 26.8	1.0	07	176.9	52 56.9	1.0	06	176.9	52 26.9	1.0	06	177.0	2
3	55 52.3	1.0	10	175.0	55 22.5	1.0	10	175.1	54 52.6	1.0	10	175.1	54 22.7	1.0	09	175.2	53 52.8	1.0	09	175.3	53 22.9	1.0	09	175.4	52 53.0	1.0	09	175.4	52 23.1	1.0	09	175.5	3
4	55 46.4	99	13	173.3	55 16.6	99	12	173.4	54 46.8	99	12	173.5	54 17.0	99	12	173.6	53 47.2	99	12	173.7	53 17.4	99	12	173.8	52 47.6	99	12	173.9	52 17.8	99	11	174.0	4
05	55 38.8	99	15	171.7	55 09.1	99	15	171.8	54 39.4	99	15	171.9	54 09.7	99	15	172.0	53 40.1	99	14	172.2	53 10.4	99	14	172.3	52 40.7	99	14	172.4	52 10.9	99	14	172.5	05
6	55 29.5	98	18	170.0	55 00.0	98	18	170.2	54 30.4	98	18	170.3	54 00.9	98	17	170.5	53 31.3	99	17	170.6	53 01.8	99	17	170.8	52 32.2	99	17	170.9	52 02.6	99	16	171.0	6
7	55 18.6	98	21	168.4	54 49.2	98	21	168.6	54 19.9	98	20	168.7	53 50.5	98	20	168.9	53 21.1	98	20	169.1	52 51.7	98	19	169.3	52 22.2	98	19	169.4	51 52.8	98	19	169.6	7
8	55 06.1	97	23	166.8	54 36.9	97	23	167.0	54 07.7	97	23	167.2	53 38.5	97	22	167.4	53 09.3	97	22	167.6	52 40.1	97	22	167.8	52 10.8	98	22	167.9	51 41.5	98	21	168.1	8
9	54 52.0	96	26	165.2	54 23.0	97	26	165.4	53 54.1	97	25	165.6	53 25.1	97	25	165.9	52 56.0	97	24	166.1	52 27.0	97	24	166.3	51 57.9	97	24	166.5	51 28.8	97	24	166.7	9
10	54 36.3	96	29	163.6	54 07.6	96	28	163.9	53 38.9	96	28	164.1	53 10.1	96	27	164.4	52 41.3	96	27	164.6	52 12.5	96	27	164.8	51 43.6	96	26	165.0	51 14.7	96	26	165.3	10
1	54 19.2	95	31	162.1	53 50.7	95	31	162.4	53 22.2	95	30	162.6	52 53.7	95	30	162.9	52 25.1	95	29	163.1	51 56.5	95	29	163.4	51 27.9	95	28	163.6	50 59.2	96	28	163.9	1
2	54 00.6	94	33	160.6	53 32.4	94	33	160.9	53 04.1	94	32	161.2	52 35.8	94	32	161.4	52 07.5	94	32	161.7	51 39.2	95	31	162.0	51 10.8	95	31	162.2	50 42.4	95	30	162.5	2
3	53 40.5	93	36	159.1	53 12.6	93	35	159.4	52 44.6	93	35	159.7	52 16.6	93	34	160.0	51 48.6	94	34	160.3	51 20.5	94	33	160.6	50 52.4	94	33	160.8	50 24.2	94	32	161.1	3
4	53 19.0	92	38	157.6	52 51.4	92	38	158.0	52 23.7	92	37	158.3	51 56.0	92	37	158.6	51 28.3	93	36	158.9	51 00.5	93	36	159.2	50 32.6	93	35	159.5	50 04.7	93	35	159.8	4
15	52 56.2	91	40	156.2	52 28.9	91	40	156.5	52 01.5	91	39	156.9	51 34.1	91	39	157.2	51 06.7	92	38	157.5	50 39.1	92	38	157.8	50 11.6	92	37	158.2	49 43.9	92	37	158.5	15
6	52 32.1	90	42	154.8	52 05.1	90	42	155.2	51 38.0	90	41	155.5	51 10.9	90	41	155.9	50 43.8	91	40	156.2	50 16.6	91	40	156.5	49 49.3	91	39	156.8	49 22.0	91	39	157.2	6
7	52 06.6	89	44	153.4	51 40.0	89	44	153.8	51 13.3	89	43	154.2	50 46.5	89	43	154.5	50 19.7	90	42	154.9	49 52.7	90	42	155.2	49 25.8	90	41	155.6	48 58.8	90	41	155.9	7
8	51 40.0	88	46	152.1	51 13.7	88	46	152.5	50 47.3	88	45	152.8	50 20.9	88	45	153.2	49 54.3	89	44	153.6	49 27.8	89	44	153.9	49 01.1	89	43	154.3	48 34.4	89	42	154.6	8
9	51 12.1	86	48	150.8	50 46.2	87	48	151.2	50 20.2	87	47	151.6	49 54.0	87	47	151.9	49 27.9	87	46	152.3	49 01.6	88	45	152.7	48 35.3	88	45	153.1	48 08.9	88	44	153.4	9
20	50 43.1	85	50	149.5	50 17.6	85	50	149.9	49 51.9	86	49	150.3	49 26.1	86	48	150.7	49 00.3	86	48	151.1	48 34.4	87	47	151.5	48 08.4	87	47	151.8	47 42.3	87	46	152.2	20
1	50 13.0	84	52	148.2	49 47.8	84	51	148.7	49 22.5	85	51	149.1	48 57.1	85	50	149.5	48 31.6	85	50	149.9	48 06.0	85	49	150.3	47 40.4	86	48	150.7	47 14.6	86	48	151.0	1
2	49 41.9	83	54	147.0	49 17.0	83	53	147.5	48 52.1	83	52	147.9	48 27.0	84	52	148.3	48 01.9	84	51	148.7	47 36.6	84	51	149.1	47 11.3	84	50	149.5	46 45.9	85	50	149.9	2
3	49 09.7	81	55	145.8	48 45.2	82	55	146.3	48 20.6	82	54	146.7	47 55.9	82	53	147.1	47 31.1	83	53	147.6	47 06.3	83	52	148.0	46 41.3	83	52	148.4	46 16.3	84	51	148.8	3
4	48 36.5	80	57	144.7	48 12.4	81	56	145.1	47 48.2	81	56	145.6	47 23.8	81	55	146.0	46 59.4	82	54	146.4	46 34.9	82	54	146.9	46 10.3	82	53	147.3	45 45.6	82	53	147.7	4
25	48 02.4	79	58	143.6	47 38.6	79	58	144.0	47 14.8	80	57	144.5	46 50.8	80	57	144.9	46 26.8	80	56	145.3	46 02.6	81	55	145.8	45 38.4	81	55	146.2	45 14.0	81	54	146.6	25
6	47 27.4	78	60	142.5	47 04.0	78	59	142.9	46 40.5	78	58	143.4	46 16.9	79	58	143.8	45 53.2	79	57	144.3	45 29.4	79	57	144.7	45 05.5	80	56	145.1	44 41.5	80	56	145.6	6
7	46 51.5	76	61	141.4	46 28.5	77	61	141.9	46 05.4	77	60	142.3	45 42.1	78	59	142.8	45 18.8	78	59	143.2	44 55.4	78	58	143.7	44 31.8	79	58	144.1	44 08.2	79	57	144.5	7
8	46 14.7	75	63	140.4	45 52.1	76	62	140.8	45 29.4	76	61	141.3	45 06.5	76	61	141.8	44 43.5	77	60	142.2	44 20.5	77	60	142.7	43 57.3	77	59	143.1	43 34.0	78	58	143.5	8
9	45 37.2	74	64	139.4	45 14.9	74	63	139.8	44 52.6	75	63	140.3	44 30.1	75	62	140.8	44 07.5	76	61	141.2	43 44.8	76	61	141.7	43 21.9	76	60	142.1	42 59.0	77	60	142.6	9
30	44 58.9	73	65	138.4	44 37.0	73	64	138.9	44 15.0	74	64	139.3	43 52.9	74	63	139.8	43 30.6	74	63	140.3	43 08.3	75	62	140.7	42 45.8	75	62	141.2	42 23.2	75	61	141.6	30
1	44 19.9	72	66	137.4	43 58.3	72	66	137.9	43 36.7	72	65	138.4	43 14.9	73	64	138.9	42 53.1	73	64	139.3	42 31.1	74	63	139.8	42 08.9	74	63	140.2	41 46.7	74	62	140.7	1
2	43 40.1	70	67	136.5	43 19.0	71	67	137.0	42 57.7	71	66	137.5	42 36.3	72	66	137.9	42 14.8	72	65	138.4	41 53.1	72	64	138.9	41 31.4	73	64	139.3	41 09.5	73	63	139.8	2
3	42 59.7	69	68	135.6	42 38.9	70	68	136.1	42 18.0	70	67	136.6	41 56.9	70	67	137.1	41 35.8	71	66	137.5	41 14.5	71	65	138.0	40 53.1	72	65	138.5	40 31.6	72	64	138.9	3
4	42 18.7	68	69	134.7	41 58.2	68	69	135.2	41 37.7	69	68	135.7	41 17.0	69	68	136.2	40 56.1	70	67	136.7	40 35.2	70	67	137.1	40 14.2	70	66	137.6	39 53.0	71	65	138.1	4
35	41 37.0	67	70	133.9	41 16.9	67	70	134.4	40 56.7	68	69	134.9	40 36.3	68	69	135.3	40 15.9	68	68	135.8	39 55.3	69	68	136.3	39 34.6	69	67	136.8	39 13.8	70	66	137.2	35
6	40 54.7	66	71	133.0	40 35.0	66	71	133.5	40 15.1	66	70	134.0	39 55.1	67	70	134.5	39 35.0	67	69	135.0	39 14.8	68	69	135.5	38 54.4	68	68	135.9	38 33.9	68	67	136.4	6
7	40 11.9	64	72	132.2	39 52.5	65	72	132.7	39 33.0	65	71	133.2	39 13.3	66	71	133.7	38 53.5	66	70	134.2	38 33.7	67	69	134.7	38 13.6	67	69	135.2	37 53.5	67	68	135.6	7
8	39 28.5	63	73	131.5	39 09.5	64	73	132.0	38 50.3	64	72	132.4	38 31.0	65	71	132.9	38 11.5	65	71	133.4	37 52.0	65	70	133.9	37 32.3	66	70	134.4	37 12.5	66	69	134.9	8
9	38 44.6	62	74	130.7	38 25.9	63	73	131.2	38 07.1	63	73	131.7	37 48.1	63	72	132.2	37 29.0	64	72	132.7	37 09.8	64	71	133.1	36 50.4	65	71	133.6	36 31.0	65	70	134.1	9
40	38 00.3	61	75	130.0	37 41.9	62	74	130.5	37 23.3	62	74	130.9	37 04.7	62	73	131.4	36 45.9	63	73	131.9	36 27.0	63	72	132.4	36 08.0	64	72	132.9	35 48.9	64	71	133.4	40
1	37 15.4	60	76	129.2	36 57.3	60	75	129.7	36 39.1	61	74	130.2	36 20.8	61	74	130.7	36 02.4	62	73	131.2	35 43.8	62	73	131.7	35 25.1	62	72	132.2	35 06.4	63	72	132.7	1
2	36 30.1	59	76	128.5	36 12.3	59	76	129.0	35 54.5	60	75	129.5	35 36.5	60	75	130.0	35 18.3	61	74	130.5	35 00.1	61	74	131.0	34 41.8	61	73	131.5	34 23.3	62	73	132.0	2
3	35 44.3	58	77	127.9	35 26.9	58	76	128.4	35 09.3	59	76	128.9	34 51.7	59	75	129.3	34 33.9	60	75	129.8	34 15.9	60	74	130.3	33 57.9	60	74	130.8	33 39.8	61	73	131.3	3
4	34 58.2	57	78	127.2	34 41.0	57	77	127.7	34 23.8	58	77	128.2	34 06.4	58	76	128.7	33 48.9	58	76	129.2	33 31.3	59	75	129.7	33 13.6	59	74	130.1	32 55.8	60	74	130.6	4
45	34 11.6	56	78	126.6	33 54.8	56	78	127.1	33 37.8	57	77	127.5	33 20.8	57	77	128.0	33 03.6	57	76	128.5	32 46.3	58	76	129.0	32 28.9	58	75	129.5	32 11.4	59	75	130.0	45
6	33 24.6	55	79	125.9	33 08.1	55	78	126.4	32 51.5	56	78	126.9	32 34.7	56	77	127.4	32 17.9	56	77	127.9	32 00.9	57	76	128.4	31 43.8	57	76	128.9	31 26.6	58	75	129.4	6
7	32 37.3	54	79	125.3	32 21.1	54	79	125.8	32 04.8	55	78	126.3	31 48.3	55	78	126.8	31 31.7	55	78	127.3	31 15.1	56	77	127.8	30 58.3	56	76	128.3	30 41.4	56	76	128.7	7
8	31 49.6	53	80	124.7	31 33.7	53	80	125.2	31 17.7	54	79	125.7	31 01.5	54	79	126.2	30 45.2	54	78	126.7	30 28.9	55	78	127.2	30 12.4	55	77	127.7	29 55.8	55	77	128.2	8
9	31 01.6	52	81	124.1	30 46.0	52	80	124.6	30 30.2	53	80	125.1	30 14.4	53	79	125.6	29 58.4	53	79	126.1	29 42.3	54	78	126.6	29 26.1	54	78	127.1	29 09.8	54	77	127.6	9
50	30 13.3	51	81	123.6	29 57.9	51	81	124.1	29 42.4	52	80	124.6	29 26.9	52	80	125.1	29 11.2	52	79	125.6	28 55.4	53	79	126.0	28 39.5	53	78	126.5	28 23.5	53	78	127.0	50
1	29 24.6	50	82	123.0	29 09.5	50	81	123.5	28 54.4	51	81	124.0	28 39.1	51	80	124.5	28 23.7	52	80	125.0	28 08.2	52	79	125.5	27 52.6	52	79	126.0	27 36.9	53	78	126.5	1
2	28 35.7	49	82	122.5	28 20.9	50	82	123.0	28 06.0	50	81	123.5	27 50.9	50	81	124.0	27 35.8	51	80	124.5	27 20.6	51	80	125.0	27 05.3	51	79	125.4	26 49.9	52	79	125.9	2
3	27 46.4	48	83	122.0	27 31.9	49	82	122.5	27 17.3	49	82	123.0	27 02.5	49	81	123.5	26 47.7	50	81	123.9	26 32.7	50	80	124.4	26 17.7	50	80	124.9	26 02.6	51	79	125.4	3
4	26 56.9	47	83	121.5	26 42.6	48	83	122.0	26 28.3	48	82	122.5	26 13.8	48	82	123.0	25 59.2	49	81	123.4	25 44.6	49	81	123.9	25 29.8	49	80	124.4	25 15.0	50	80	124.9	4
55	26 07.1	47	83	121.0	25 53.1	47	83	121.5	25 39.0	47	82	122.0	25 24.8	48	82	122.5	25 10.5	48	82	122.9	24 56.1	48	81	123.4	24 41.6	48	81	123.9	24 27.1	49	80	124.4	55
6	25 17.1	46	84	120.5	25 03.3	46	83	121.0	24 49.5	46	83	121.5	24 35.6	47	82	122.0	24 21.5	47	82	122.5	24 07.4	47	82	122.9	23 53.2	48	81	123.4	23 38.9	48	81	123.9	6
7	24 26.8	45	84	120.0	24 13.3	45	84	120.5	23 59.7	45	83	121.0	23 46.0	46	83	121.5	23 32.3	46	82	122.0	23 18.4	46	82	122.5	23 04.5	47	82	123.0	22 50.4	47	81	123.4	7
8	23 36.3	44	85	119.6	23 23.0	44	84	120.1	23 09.7	45	84	120.6	22 56.3	45	83	121.0	22 42.8	45	83	121.5	22 29.2	45	82	122.0	22 15.5	46	82	122.5	22 01.7	46	82	123.0	8
9	22 45.6	43	85	119.1	22 32.6	43	85	119.6	22 19.5	44	84	120.1	22 06.3	44	84	120.6	21 53.0	44	83	121.1	21 39.7	45	83	121.6	21 26.2	45	82	122.0	21 12.7	45	82	122.5	9
60	21 54.6	42	85	118.7	21 41.8	43	85	119.2	21 29.0	43	84	119.7	21 16.1	43	84	120.2	21 03.0	44	84	120.6	20 50.0	44	83	121.1	20 36.8	44	83	121.6	20 23.5	44	82	122.1	60
1	21 03.4	42	86	118.3	20 50.9	42	85	118.8	20 38.3	42	85	119.2	20 25.6	42	84	119.7	20 12.8	43	84	120.2	20 00.0	43	84	120.7	19 47.1	43	83	121.2	19 34.1	43	83	121.7	1
2	20 12.1	41	86	117.9	19 59.8	41	86	118.3	19 47.4	41	85	118.8	19 35.0	42	85	119.3	19 22.4	42	84	119.8	19 09.8	42	84	120.3	18 57.2	42	84	120.8	18 44.4	43	83	121.2	2
3	19 20.5	40	86	117.5	19 08.4	40	86	117.9	18 56.3	41	86	118.4	18 44.1	41	85	118.9	18 31.8	41	85	119.4	18 19.5	41	84	119.9	18 07.0	42	84	120.3	17 54.5	42	84	120.8	3
4	18 28.7	39	87	117.1	18 16.9	40	86	117.5	18 05.0	40	86	118.0	17 53.0	40	85	118.5	17 41.0	40	85	119.0	17 28.9	40	85	119.5	17 16.7	41	84	120.0	17 04.4	41	84	120.4	4
65	17 36.8	39	87	116.7	17 25.2	39	86	117.2	17 13.5	39	86	117.6	17 01.8	39	86	118.1	16 50.0	39	85	118.6	16 38.1	40	85	119.1	16 26.1	40	84	119.6	16 14.1	40	84	120.0	65
6	16 44.7	38	87	116.3	16 33.3	38	87	116.8	16 21.9	38	86	117.3	16 10.3	38	86	117.7	15 58.8	39	86	118.2	15 47.1	39	85	118.7	15 35.4	39	85	119.2	15 23.6	39	84	119.7	6
7	15 52.4	37	87	115.9	15 41.3	37	87	116.4	15 30.0	38	87	116.9	15 18.7	38	86	117.4	15 07.4	38	86	117.9	14 56.0	38	86	118.3	14 44.5	38	85	118.8	14 33.0	39	85	119.3	7
8	15 00.0	36	88	115.6	14 49.0	37	87	116.1	14 38.0	37	87	116.5	14 27.0	37	87	117.0	14 15.8	37	86	117.5	14 04.6	37	86	118.0	13 53.4	38	86	118.5	13 42.1	38	85	118.9	8
9	14 07.4	36	88	115.2	13 56.7	36	88	115.7	13 45.9	36	87	116.2	13 35.0	36	87	116.7	13 24.1	36	86	117.1	13 13.1	37	86	117.6	13 02.1	37	86	118.1	12 51.1	37	85	118.6	9
70	13 14.7	35	88	114.9	13 04.1	35	88	115.4	12 53.5	35	87	115.8	12 42.9	36	87	116.3	12 32.2	36	87	116.8	12 21.5	36	86	117.3	12 10.7	36	86	117.8	11 59.9	36	86	118.2	70
1	12 21.8	34	88	114.6	12 11.5	35	88	115.0	12 01.1	35	88	115.5	11 50.7	35	87	116.0	11 40.2	35	87	116.5	11 29.7	35	87	116.9	11 19.1	35	86	117.4	11 08.5	35	86	117.9	1
2	11 28.8	34	89	114.2	11 18.6	34	88	114.7	11 08.5	34	88	115.2	10 58.3	34	88	115.7	10 48.0	34	87	116.1	10 37.7	34	87	116.6	10 27.3	35	86	117.1	10 17.0	35	86	117.6	2
3	10 35.6	33	89	113.9	10 25.7	33	88	114.4	10 15.7	33	88	114.9	10 05.7	33	88	115.3	9 55.7	34	88	115.8	9 45.6	34	87	116.3	9 35.4	34	87	116.8	9 25.3	34	86	117.3	3
4	9 42.3	32	89	113.6	9 32.6	32	89	114.1	9 22.8	33	88	114.6	9 13.0	33	88	115.0	9 03.2	33	88	115.5	8 53.3	33	87	116.0	8 43.4	33	87	116.5	8 33.4	33	87	116.9	4
75	8 48.9	32	89	113.3	8 39.4	32	89	113.8	8 29.8	32	88	114.2	8 20.2	32	88	114.7	8 10.6	32	88	115.2	8 00.9	32	88	115.7	7 51.2	32	87	116.2	7 41.5	32	87	116.6	75
6	7 55.4	31	89	113.0	7 46.0	31	89	113.5	7 36.7	31	89	113.9	7 27.3	31	88	114.4	7 17.8	31	88	114.9	7 08.4	32	88	115.4	6 58.9	32	87	115.9	6 49.4	32	87	116.3	6
7	7 01.7	30	90	112.7	6 52.6	31	89	113.2	6 43.4	31	89	113.7	6 34.2	31	89	114.1	6 25.0	31	88	114.6	6 15.7	31	88	115.1	6 06.4	31	88	115.6	5 57.1	31	87	116.1	7
8	6 07.9	30	90	112.4	5 59.0	30	90	112.9	5 50.0	30	89	113.4	5 41.0	30	89	113.9	5 32.0	30	88	114.3	5 22.9	30	88	114.8	5 13.9	30	88	115.3	5 04.8	30	88	115.8	8
9	5 14.1	29	90	112.1	5 05.3	29	90	112.6																									9

DECLINATION SAME NAME AS LATITUDE

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	80 00.0	1.0 04	00.0	79 30.0	1.0 04	00.0	79 00.0	1.0 04	00.0	78 30.0	1.0 04	00.0	78 00.0	1.0 04	00.0	77 30.0	1.0 04	00.0	77 00.0	1.0 03	00.0	76 30.0	1.0 03	00.0	00
1	79 57.3	1.0 13	05.2	79 27.5	1.0 13	05.0	78 57.6	1.0 12	04.7	78 27.7	1.0 11	04.5	77 57.8	1.0 11	04.3	77 27.9	1.0 10	04.1	76 58.0	1.0 10	04.0	76 28.1	1.0 10	03.8	1
2	79 49.4	98 22	10.4	79 19.9	98 21	09.9	78 50.4	98 20	09.4	78 20.9	99 19	09.0	77 51.3	99 18	08.6	77 21.6	99 17	08.2	76 52.0	99 16	07.9	76 22.3	99 16	07.5	2
3	79 36.4	96 30	15.4	79 07.6	96 28	14.6	78 38.6	97 27	13.9	78 09.6	97 26	13.3	77 40.5	97 25	12.7	77 11.3	97 24	12.2	76 42.1	98 23	11.7	76 12.8	98 22	11.2	3
4	79 18.7	93 37	20.1	78 50.6	94 35	19.2	78 22.5	94 34	18.3	77 54.1	95 32	17.5	77 25.7	95 31	16.7	76 57.1	95 30	16.1	76 28.4	96 29	15.4	75 59.7	96 28	14.8	4
05	78 56.5	90 44	24.5	78 29.5	91 42	23.4	78 02.2	91 40	22.4	77 34.7	92 38	21.5	77 07.0	93 37	20.6	76 39.2	93 36	19.7	76 11.2	94 34	19.0	75 43.1	94 33	18.3	05
6	78 30.5	86 49	28.6	78 04.5	87 47	27.4	77 38.2	88 46	26.3	77 11.7	89 44	25.2	76 44.9	90 42	24.2	76 17.9	90 41	23.3	75 50.6	91 40	22.4	75 23.3	92 38	21.6	6
7	78 00.9	82 54	32.4	77 36.0	83 53	31.1	77 10.8	85 51	29.9	76 45.3	86 49	28.7	76 19.4	87 47	27.6	75 53.3	87 46	26.6	75 27.0	88 44	25.6	75 00.4	89 43	24.7	7
8	77 28.2	78 59	35.9	77 04.5	80 57	34.5	76 40.4	81 55	33.2	76 15.9	82 54	31.9	75 51.0	83 52	30.8	75 25.9	84 50	29.7	75 00.4	85 49	28.6	74 34.7	86 47	27.7	8
9	76 52.8	74 63	39.0	76 30.2	76 61	37.6	76 07.2	77 59	36.2	75 43.8	79 58	34.9	75 19.9	80 56	33.7	74 55.7	81 54	32.6	74 31.2	82 53	31.5	74 06.4	83 51	30.4	9
10	76 15.0	71 66	41.9	75 53.6	72 65	40.4	75 31.6	74 63	39.0	75 09.3	75 61	37.7	74 46.5	77 60	36.5	74 23.2	78 58	35.3	73 59.7	79 56	34.1	73 35.8	80 55	33.1	10
1	75 35.2	67 69	44.4	75 14.8	69 68	43.0	74 54.0	70 66	41.6	74 32.6	72 64	40.3	74 10.8	73 62	39.0	73 48.6	75 61	37.8	73 26.0	76 59	36.6	73 03.0	77 58	35.5	1
2	74 53.5	63 72	46.8	74 34.3	65 70	45.3	74 14.4	67 69	43.9	73 54.1	69 67	42.6	73 33.3	70 66	41.3	73 12.0	72 64	40.1	72 50.3	73 62	38.9	72 28.2	74 61	37.8	2
3	74 10.4	60 74	48.9	73 52.1	62 73	47.5	73 33.3	64 71	46.1	73 13.9	65 69	44.7	72 54.0	67 68	43.4	72 33.7	69 66	42.2	72 12.9	70 65	41.0	71 51.7	71 63	39.9	3
4	73 25.9	57 76	50.8	73 08.5	59 75	49.4	72 50.6	61 73	48.0	72 32.2	62 72	46.7	72 13.3	64 70	45.4	71 53.8	66 69	44.2	71 34.0	67 67	43.0	71 13.7	68 66	41.8	4
15	72 40.2	54 78	52.5	72 23.8	56 76	51.1	72 06.8	58 75	49.8	71 49.2	59 74	48.5	71 31.2	61 72	47.2	71 12.6	63 71	46.0	70 53.6	64 69	44.8	70 34.1	66 68	43.6	15
6	71 53.5	51 79	54.1	71 37.9	53 78	52.7	71 21.8	55 77	51.4	71 05.1	57 75	50.1	70 47.9	58 74	48.9	70 30.2	60 73	47.7	70 12.0	61 71	46.5	69 53.4	63 70	45.3	6
7	71 05.9	48 81	55.5	70 51.1	50 79	54.2	70 35.8	52 78	52.9	70 19.9	54 77	51.6	70 03.5	56 76	50.4	69 46.6	57 74	49.2	69 29.2	59 73	48.0	69 11.4	60 72	46.9	7
8	70 17.5	46 82	56.8	70 03.5	48 81	55.5	69 48.9	49 79	54.3	69 33.8	51 78	53.0	69 18.2	53 77	51.8	69 02.1	55 76	50.6	68 45.5	56 74	49.5	68 28.4	58 73	48.3	8
9	69 28.5	43 83	58.0	69 15.2	45 82	56.8	69 01.3	47 80	55.5	68 46.9	49 79	54.3	68 32.0	50 78	53.1	68 16.6	52 77	51.9	68 00.8	54 76	50.8	67 44.4	55 75	49.7	9
20	68 38.8	41 84	59.1	68 26.2	43 83	57.9	68 13.0	45 82	56.6	67 59.3	46 80	55.5	67 45.1	48 79	54.3	67 30.4	50 78	53.1	67 15.3	51 77	52.0	66 59.7	53 76	50.9	20
1	67 48.6	39 84	60.1	67 36.6	41 83	58.9	67 24.1	43 82	57.7	67 11.0	44 81	56.5	66 57.5	46 80	55.4	66 43.5	47 79	54.3	66 29.0	49 78	53.2	66 14.1	51 77	52.1	1
2	66 57.9	37 85	61.0	66 46.5	39 84	59.8	66 34.6	40 83	58.7	66 22.2	42 82	57.5	66 09.3	44 81	56.4	65 56.0	45 80	55.3	65 42.1	47 79	54.2	65 27.8	48 78	53.1	2
3	66 06.8	35 86	61.8	65 56.0	37 85	60.7	65 44.6	39 84	59.5	65 32.8	40 83	58.4	65 20.6	42 82	57.3	65 07.8	43 81	56.2	64 54.6	45 80	55.2	64 40.9	46 79	54.1	3
4	65 15.2	33 86	62.6	65 05.0	35 86	61.5	64 54.3	37 85	60.4	64 43.0	38 84	59.3	64 31.3	40 83	58.2	64 19.2	41 82	57.1	64 06.5	43 81	56.1	63 53.5	44 80	55.1	4
25	64 23.4	32 87	63.3	64 13.7	33 86	62.2	64 03.5	35 85	61.1	63 52.8	36 84	60.0	63 41.6	38 84	59.0	63 30.0	39 83	58.0	63 18.0	41 82	56.9	63 05.5	42 81	55.9	25
6	63 31.3	30 87	63.9	63 22.0	32 87	62.9	63 12.3	33 86	61.8	63 02.2	35 85	60.8	62 51.5	36 84	59.7	62 40.5	38 83	58.7	62 29.0	39 82	57.7	62 17.1	40 81	56.7	6
7	62 38.8	28 88	64.5	62 30.1	30 87	63.5	62 20.9	31 86	62.4	62 11.2	33 85	61.4	62 01.1	34 85	60.4	61 50.5	36 84	59.4	61 39.6	37 83	58.4	61 28.2	39 82	57.5	7
8	61 46.2	27 88	65.1	61 37.9	28 87	64.0	61 29.1	30 87	63.0	61 19.9	31 86	62.0	61 10.3	33 85	61.1	61 00.2	34 84	60.1	60 49.8	36 84	59.1	60 38.9	37 83	58.2	8
9	60 53.3	26 88	65.6	60 45.4	27 88	64.6	60 37.1	28 87	63.6	60 28.4	30 86	62.6	60 19.2	31 86	61.6	60 09.6	33 85	60.7	59 59.6	34 84	59.7	59 49.3	35 83	58.8	9
30	60 00.2	24 89	66.0	59 52.7	26 88	65.0	59 44.8	27 88	64.1	59 36.5	28 87	63.1	59 27.8	30 86	62.2	59 18.7	31 85	61.3	59 09.2	32 84	60.3	58 59.3	34 84	59.4	30
1	59 06.9	23 89	66.4	58 59.8	24 88	65.5	58 52.4	26 88	64.6	58 44.5	27 87	63.6	58 36.2	28 86	62.7	58 27.5	30 86	61.8	58 18.5	31 85	60.9	58 09.0	32 84	60.0	1
2	58 13.5	22 89	66.8	58 06.8	23 89	65.9	57 59.7	24 88	65.0	57 52.2	26 87	64.1	57 44.4	27 87	63.2	57 36.1	28 86	62.3	57 27.5	29 85	61.4	57 18.5	31 85	60.5	2
3	57 19.9	20 90	67.2	57 13.6	22 89	66.3	57 06.9	23 88	65.4	56 59.8	24 88	64.5	56 52.3	25 87	63.6	56 44.5	27 86	62.7	56 36.3	28 86	61.8	56 27.7	29 85	61.0	3
4	56 26.1	19 90	67.5	56 20.2	20 89	66.6	56 13.9	22 89	65.8	56 07.2	23 88	64.9	56 00.1	24 87	64.0	55 52.7	25 87	63.1	55 44.9	27 86	62.3	55 36.7	28 85	61.4	4
35	55 32.3	18 90	67.8	55 26.7	19 89	67.0	55 20.7	21 89	66.1	55 14.4	22 88	65.2	55 07.7	23 88	64.4	55 00.6	24 87	63.5	54 53.2	25 86	62.7	54 45.5	26 86	61.8	35
6	54 38.3	17 90	68.1	54 33.0	18 90	67.3	54 27.4	19 89	66.4	54 21.4	21 88	65.6	54 15.1	22 88	64.7	54 08.4	23 87	63.9	54 01.4	24 87	63.1	53 54.0	25 86	62.2	6
7	53 44.3	16 90	68.4	53 39.3	17 90	67.5	53 34.0	18 89	66.7	53 28.4	19 89	65.9	53 22.4	20 88	65.0	53 16.1	22 87	64.2	53 09.4	23 87	63.4	53 02.4	24 86	62.6	7
8	52 50.1	15 90	68.6	52 45.5	16 90	67.8	52 40.5	17 89	67.0	52 35.2	18 89	66.2	52 29.5	19 88	65.3	52 23.6	20 88	64.5	52 17.3	22 87	63.7	52 10.7	23 87	62.9	8
9	51 55.9	14 90	68.8	51 51.5	15 90	68.0	51 46.9	16 90	67.2	51 41.9	17 89	66.4	51 36.6	18 88	65.6	51 31.0	19 88	64.8	51 25.0	20 87	64.0	51 18.8	21 87	63.3	9
40	51 01.5	13 91	69.0	50 57.5	14 90	68.2	50 53.1	15 90	67.4	50 48.5	16 89	66.7	50 43.5	17 89	65.9	50 38.2	18 88	65.1	50 32.6	19 88	64.3	50 26.7	20 87	63.5	40
1	50 07.2	12 91	69.2	50 03.4	13 90	68.4	49 59.3	14 90	67.6	49 55.0	15 89	66.9	49 50.3	16 89	66.1	49 45.3	17 88	65.3	49 40.1	18 88	64.6	49 34.5	19 87	63.8	1
2	49 12.7	11 91	69.3	49 09.2	12 90	68.6	49 05.5	13 90	67.8	49 01.4	14 89	67.1	48 57.0	15 89	66.3	48 52.4	16 88	65.6	48 47.4	17 88	64.8	48 42.2	18 87	64.1	2
3	48 18.2	10 91	69.5	48 15.0	11 90	68.7	48 11.5	12 90	68.0	48 07.7	13 90	67.3	48 03.7	14 89	66.5	47 59.3	15 89	65.8	47 54.7	16 88	65.0	47 49.8	17 88	64.3	3
4	47 23.6	09 91	69.6	47 20.7	10 91	68.9	47 17.5	11 90	68.2	47 14.0	12 90	67.4	47 10.3	13 89	66.7	47 06.2	14 89	66.0	47 01.9	15 88	65.2	46 57.3	16 88	64.5	4
45	46 29.1	08 91	69.7	46 26.4	09 91	69.0	46 23.4	10 90	68.3	46 20.2	11 90	67.6	46 16.8	12 89	66.9	46 13.0	13 89	66.1	46 09.0	14 88	65.4	46 04.7	15 88	64.7	45
6	45 34.4	08 91	69.8	45 32.0	08 91	69.1	45 29.3	09 90	68.4	45 26.4	10 90	67.7	45 23.2	11 89	67.0	45 19.7	12 89	66.3	45 16.0	13 88	65.6	45 12.0	14 88	64.9	6
7	44 39.7	07 91	69.9	44 37.6	08 91	69.2	44 35.2	08 90	68.5	44 32.5	09 90	67.8	44 29.6	10 90	67.1	44 26.4	11 89	66.4	44 22.9	12 88	65.8	44 19.3	13 88	65.1	7
8	43 45.0	06 91	70.0	43 43.1	07 91	69.3	43 41.0	08 90	68.6	43 38.6	08 90	68.0	43 35.9	09 90	67.3	43 33.0	10 89	66.6	43 29.8	11 89	65.9	43 26.4	12 88	65.2	8
9	42 50.3	05 91	70.1	42 48.6	06 91	69.4	42 46.7	07 90	68.7	42 44.6	08 90	68.1	42 42.2	08 90	67.4	42 39.5	09 89	66.7	42 36.7	10 89	66.0	42 33.6	11 88	65.3	9
50	41 55.6	04 91	70.2	41 54.1	05 91	69.5	41 52.5	06 90	68.8	41 50.6	07 90	68.1	41 48.4	08 90	67.5	41 46.1	08 89	66.8	41 43.5	09 89	66.1	41 40.6	10 88	65.5	50
1	41 00.8	04 91	70.2	40 59.6	04 91	69.5	40 58.2	06 90	68.9	40 56.5	06 90	68.2	40 54.6	07 90	67.6	40 52.5	07 89	66.9	40 50.2	08 89	66.2	40 47.6	09 88	65.6	1
2	40 06.0	03 91	70.2	40 05.0	04 91	69.6	40 03.8	04 90	68.9	40 02.4	06 90	68.3	40 00.8	06 90	67.6	39 59.0	07 89	67.0	39 56.9	07 89	66.3	39 54.6	08 88	65.7	2
3	39 11.2	02 91	70.3	39 10.5	03 91	69.6	39 09.5	04 91	69.0	39 08.3	04 90	68.3	39 07.0	05 90	67.7	39 05.4	06 89	67.0	39 03.6	06 89	66.4	39 01.5	07 88	65.8	3
4	38 16.4	01 91	70.3	38 15.9	02 91	69.7	38 15.2	03 91	69.0	38 14.2	03 90	68.4	38 13.1	04 90	67.7	38 11.7	05 89	67.1	38 10.2	06 89	66.5	38 08.4	06 89	65.8	4
55	37 21.6	01 91	70.3	37 21.3	01 91	69.7	37 20.8	02 91	69.0	37 20.1	03 90	68.4	37 19.2	03 90	67.8	37 18.1	04 89	67.2	37 16.8	05 89	66.5	37 15.3	05 89	65.9	55
6	36 26.8	00 91	70.3	36 26.7	01 91	69.7	36 26.4	01 91	69.1	36 26.0	02 90	68.4	36 25.3	03 90	67.8	36 24.4	03 89	67.2	36 23.4	04 89	66.6	36 22.1	04 89	66.0	6
7	35 32.0	01 91	70.3	35 32.1	00 91	69.7	35 32.1	01 91	69.1	35 31.8	01 90	68.5	35 31.4	02 90	67.8	35 30.8	02 89	67.2	35 30.0	03 89	66.6	35 29.0	04 89	66.0	7
8	34 37.2	01 91	70.3	34 37.5	01 91	69.7	34 37.7	00 91	69.1	34 37.7	00 90	68.5	34 37.5	01 90	67.9	34 37.1	02 89	67.3	34 36.5	02 89	66.6	34 35.8	03 89	66.0	8
9	33 42.4	02 91	70.3	33 42.9	02 91	69.7	33 43.3	01 91	69.1	33 43.5	00 90	68.5	33 43.5	00 90	67.9	33 43.4	01 89	67.3	33 43.1	01 89	66.7	33 42.6	02 89	66.1	9
60	32 47.6	03 91	70.2	32 48.3	02 91	69.6	32 48.9	02 91	69.1	32 49.3	01 90	68.5	32 49.6	01 90	67.9	32 49.7	00 89	67.3	32 49.6	01 89	66.7	32 49.4	01 89	66.1	60
1	31 52.8	03 91	70.2	31 53.8	03 91	69.6	31 54.6	02 91	69.0	31 55.2	02 90	68.4	31 55.7	01 90	67.9	31 56.0	01 89	67.3	31 56.1	00 89	66.7	31 56.1	00 89	66.1	1
2	30 58.0	04 91	70.2	30 59.2	04 91	69.6	31 00.2	03 91	69.0	31 01.1	03 90	68.4	31 01.8	02 90	67.8	31 02.3	02 89	67.3	31 02.7	01 89	66.7	31 02.9	00 89	66.1	2
3	30 03.3	05 91	70.1	30 04.6	04 91	69.5	30 05.9	04 90	69.0	30 06.9	03 90	68.4	30 07.8	03 90	67.8	30 08.6	02 89	67.2	30 09.2	02 89	66.7	30 09.7	01 89	66.1	3
4	29 08.5	05 91	70.1	29 10.1	05 91	69.5	29 11.5	05 90	68.9	29 12.8	04 90	68.4	29 13.9	04 90	67.8	29 14.9	03 89	67.2	29 15.8	03 89	66.6	29 16.5	02 89	66.1	4
65	28 13.8	06 91	70.0	28 15.6	06 91	69.4	28 17.2	05 90	68.9	28 18.7	05 90	68.3	28 20.1	04 90	67.7	28 21.3	04 89	67.2	28 22.3	03 89	66.6	28 23.3	03 89	66.0	65
6	27 19.1	07 91	69.9	27 21.1	06 91	69.4	27 22.9	06 90	68.8	27 24.6	05 90	68.3	27 26.2	05 90	67.7	27 27.6	05 89	67.1	27 28.9	04 89	66.6	27 30.1	04 89	66.0	6
7	26 24.4	07 91	69.9	26 26.6	07 91	69.3	26 28.6	07 90	68.8	26 30.6	06 90	68.2	26 32.3	06 90	67.6	26 34.0	05 89	67.1	26 35.5	05 89	66.5	26 36.9	04 89	66.0	7
8	25 29.8	08 91	69.8	25 32.1	08 91	69.2	25 34.4	07 90	68.7	25 36.5	07 90	68.1	25 38.5	06 90	67.6	25 40.4	06 89	67.0	25 42.1	06 89	66.5	25 43.7	05 89	65.9	8
9	24 35.2	09 91	69.7	24 37.7	08 91	69.2	24 40.2	08 90	68.6	24 42.5	08 90	68.1	24 44.7	07 90	67.5	24 46.8	07 89	67.0	24 48.8	06 89	66.4	24 50.6	06 89	65.9	9
70	23 40.6	09 91	69.6	23 43.3	09 91	69.1	23 46.0	09 90	68.5	23 48.5	08 90	68.0	23 50.9	08 90	67.4	23 53.2	07 89	66.9	23 55.4	07 89	66.3	23 57.5	07 88	65.8	70
1	22 46.0	10 91	69.5	22 49.0	10 91	69.0	22 51.8	09 90	68.4	22 54.6	09 90	67.9	22 57.2	09 90	67.4	22 59.7	08 89	66.8	23 02.1	08 89	66.3	23 04.4	07 88	65.7	1
2	21 51.5	11 91	69.4	21 54.7	10 90	68.9	21 57.7	10 90	68.3	22 00.6	10 90	67.8	22 03.5	09 90	67.3	22 06.2	09 89	66.7	22 08.8	09 89	66.2	22 11.4	08 88	65.7	2
3	20 57.0	11 91	69.3	21 00.4	11 90	68.8	21 03.6	11 90	68.2	21 06.8	10 90	67.7	21 09.8	10 89	67.2	21 12.7	10 89	66.6	21 15.6	09 89	66.1	21 18.3	09 88	65.6	3
4	20 02.6	12 91	69.2	20 06.1	12 90	68.7	20 09.6	11 90	68.1	20 12.9	11 90	67.6	20 16.2	11 89	67.1	20 19.3	10 89	66.5	20 22.4	10 89	66.0	20 25.3	10 88	65.5	4
75	19 08.2	13 91	69.1	19 11.9	12 90	68.5	19 15.6	12 90	68.0	19 19.1	12 90	67.5	19 22.6	11 89	67.0	19 25.9	11 89	66.4	19 29.2	11 88	65.9	19 32.4	10 88	65.4	75
6	18 13.8	13 90	68.9	18 17.8	13 90	68.4	18 21.6	13 90	67.9	18 25.3	12 90	67.4	18 29.0	12 89	66.9	18 32.6	12 89	66.3	18 36.1	11 88	65.8	18 39.5	11 88	65.3	6
7	17 19.5	14 90	68.8	17 23.6	14 90	68.3	17 27.7	13 90	67.8	17 31.6	13 89	67.3	17 35.5	13 89	66.7	17 39.3	12 89	66.2	17 43.0	12 88	65.7	17 46.6	12 88	65.2	7
8	16 25.3	14 90	68.7	16 29.6	14 90	68.2	16 33.8	14 90	67.7	16 38.0	14 89	67.1	16 42.0	13 89	66.6	16 46.0	13 89	66.1	16 50.0	13 88	65.6	16 53.8	13 88	65.1	8
9	15 31.1	15 90	68.5	15 35.6	15 90	68.0	15 40.0	15 90	67.5	15 44.3	14 89	67.0	15 48.6	14 89	66.5	15 52.8	14 89	66.0	15 57.0	14 88	65.5	16 01.0	13 88	64.9	9
80	14 36.9	16 90	68.4	14 41.6	16 90	67.9	14 46.2	15 90	67.4	14 50.8	15 89	66.9	14 55.3	15 89	66.4	14 59.7	15 88	65.8	15 04.0	14 88	65.3	15 08.3	14 88	64.8	80
1	13 42.8	16 90	68.2	13 47.7	16 90	67.7	13 52.5	16 89	67.2	13 57.3	16 89	66.7	14 02.0	16 89	66.2	14 06.6	15 88	65.7	14 11.2	15 88	65.2	14 15.7	15 88	64.7	1
2	12 48.8	17 90	68.1	12 53.8	17 90	67.6	12 58.9	17 89	67.1	13 03.8	16 89	66.6	13 08.7	16 89	66.1	13 13.6	16 88	65.6	13 18.4	16 88	65.1	13 23.1	16 88	64.5	2
3	11 54.8	18 90	67.9	12 00.0	17 90	67.4	12 05.3	17 89	66.9	12 10.4	17 89	66.4	12 15.5	17 88	65.9	12 20.6	17 88	65.4	12 25.6	17 88	64.9	12 30.5	16 87	64.4	3
4	11 00.9	18 90	67.8	11 06.3	18 89	67.3	11 11.7	18 89	66.8	11 17.1	18 89	66.3	11 22.4	18 88	65.8	11 27.7	17 88	65.2	11 32.9	17 88	64.7	11 38.1	17 87	64.2	4
85	10 07.0	19 90	67.6	10 12.7	19 89	67.1	10 18.3	19 89	66.6	10 23.9	18 89	66.1	10 29.4	18 88	65.6	10 34.9	18 88	65.1	10 40.3	18 88	64.6	10 45.7	18 87	64.1	85
6	9 13.2	20 90	67.4	9 19.1	19 89	66.9	9 24.9	19 89	66.4	9 30.7	19 88	65.9	9 36.4	19 88	65.4	9 42.1	19 88	64.9	9 47.7	19 88	64.4	9 53.4	19 87	63.9	6
7	8 19.5	20 89	67.2	8 25.6	20 89	66.7	8 31.6	20 89	66.2	8 37.6	20 88	65.7	8 43.5	20 88	65.2	8 49.4	20 88	64.7	8 55.3	19 87	64.2	9 01.1	19 87	63.8	7
8	7 25.9	21 89	67.0	7 32.1	21 89	66.5	7 38.3	21 89	66.0	7 44.5	21 88	65.6	7 50.7	20 88	65.1	7 56.8	20 88	64.6	8 02.9	20 87	64.1	8 08.9	20 87	63.6	8
9	6 32.3	22 89	66.8	6 38.8	21 89	66.3	6 45.2	21 88	65.9	6 51.6	21 88	65.4	6 57.9	21 88	64.9	7 04.3	21 87	64.4	7 10.6	21 87	63.9	7 16.8	21 87	63.4	9
90	5 38.8	22 89	66.6	5 45.5	22 89	66.1	5 52.1	22 88	65.7	5 58.7	22 88	65.2	6 05.3	22 88	64.7	6 11.8	22 87	64.2	6 18.3	22 87	63.7	6 24.8	22 87	63.2	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	24° 00′				24° 30′				25° 00′				25° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	52 00.0	1.0	01	180.0	51 30.0	1.0	01	180.0	51 00.0	1.0	01	180.0	50 30.0	1.0	01	180.0
1	51 59.2	1.0	04	178.5	51 29.3	1.0	04	178.5	50 59.3	1.0	04	178.6	50 29.3	1.0	04	178.6
2	51 57.0	1.0	06	177.0	51 27.0	1.0	06	177.1	50 57.1	1.0	06	177.1	50 27.1	1.0	06	177.2
3	51 53.2	1.0	09	175.6	51 23.3	1.0	09	175.6	50 53.4	1.0	08	175.7	50 23.5	1.0	08	175.8
4	51 48.0	99	11	174.1	51 18.1	99	11	174.2	50 48.3	99	11	174.3	50 18.5	99	11	174.3
05	51 41.2	99	14	172.6	51 11.5	99	14	172.7	50 41.8	99	13	172.8	50 12.0	99	13	172.9
6	51 33.0	99	16	171.2	51 03.4	99	16	171.3	50 33.8	99	16	171.4	50 04.2	99	15	171.5
7	51 23.4	98	18	169.7	50 53.9	98	18	169.9	50 24.4	98	18	170.0	49 54.9	98	18	170.2
8	51 12.3	98	21	168.3	50 43.0	98	21	168.5	50 13.6	98	20	168.6	49 44.3	98	20	168.8
9	50 59.7	97	23	166.9	50 30.6	97	23	167.1	50 01.5	97	22	167.3	49 32.3	97	22	167.4
10	50 45.8	96	26	165.5	50 16.9	96	25	165.7	49 47.9	97	25	165.9	49 19.0	97	24	166.1
1	50 30.5	96	28	164.1	50 01.8	96	27	164.3	49 33.1	96	27	164.5	49 04.3	96	27	164.8
2	50 13.9	95	30	162.7	49 45.4	95	30	163.0	49 16.9	95	29	163.2	48 48.4	95	29	163.4
3	49 56.0	94	32	161.4	49 27.7	94	32	161.6	48 59.5	94	31	161.9	48 31.2	94	31	162.1
4	49 36.8	93	34	160.1	49 08.8	93	34	160.3	48 40.8	93	33	160.6	48 12.7	94	33	160.9
15	49 16.3	92	36	158.8	48 48.6	92	36	159.0	48 20.8	93	35	159.3	47 53.0	93	35	159.6
6	48 54.6	91	38	157.5	48 27.1	92	38	157.8	47 59.7	92	37	158.1	47 32.1	92	37	158.4
7	48 31.7	90	40	156.2	48 04.5	91	40	156.5	47 37.4	91	39	156.8	47 10.1	91	39	157.2
8	48 07.6	89	42	155.0	47 40.8	90	41	155.3	47 13.9	90	41	155.6	46 47.0	90	40	156.0
9	47 42.4	88	44	153.8	47 15.9	89	43	154.1	46 49.3	89	43	154.5	46 22.7	89	42	154.8
20	47 16.2	87	46	152.6	46 50.0	87	45	152.9	46 23.7	88	44	153.3	45 57.4	88	44	153.6
1	46 48.8	86	47	151.4	46 23.0	86	47	151.8	45 57.0	87	46	152.2	45 31.0	87	46	152.5
2	46 20.5	85	49	150.3	45 54.9	85	48	150.7	45 29.3	86	48	151.0	45 03.6	86	47	151.4
3	45 51.1	84	50	149.2	45 25.9	84	50	149.6	45 00.6	84	49	149.9	44 35.3	85	49	150.3
4	45 20.8	83	52	148.1	44 56.0	83	51	148.5	44 31.0	83	51	148.9	44 06.0	84	50	149.3
25	44 49.6	82	54	147.0	44 25.1	82	53	147.4	44 00.5	82	52	147.8	43 35.8	82	52	148.2
6	44 17.5	80	55	146.0	43 53.3	81	54	146.4	43 29.0	81	54	146.8	43 04.7	81	53	147.2
7	43 44.5	79	56	145.0	43 20.6	80	56	145.4	42 56.7	80	55	145.8	42 32.7	80	55	146.2
8	43 10.6	78	58	144.0	42 47.1	78	57	144.4	42 23.6	79	56	144.8	41 59.9	79	56	145.2
9	42 36.0	77	59	143.0	42 12.9	77	58	143.4	41 49.6	78	58	143.9	41 26.3	78	57	144.3
30	42 00.6	76	60	142.1	41 37.8	76	60	142.5	41 14.9	76	59	142.9	40 52.0	77	59	143.4
1	41 24.4	75	62	141.1	41 02.0	75	61	141.6	40 39.5	75	60	142.0	40 16.9	76	60	142.5
2	40 47.5	73	63	140.3	40 25.5	74	62	140.7	40 03.3	74	62	141.1	39 41.0	74	61	141.6
3	40 10.0	72	64	139.4	39 48.2	73	63	139.8	39 26.4	73	63	140.3	39 04.5	73	62	140.7
4	39 31.7	71	65	138.5	39 10.4	71	64	139.0	38 48.9	72	64	139.4	38 27.3	72	63	139.9
35	38 52.9	70	66	137.7	38 31.8	70	65	138.1	38 10.7	71	65	138.6	37 49.5	71	64	139.0
6	38 13.4	69	67	136.9	37 52.7	69	66	137.3	37 31.9	69	66	137.8	37 11.0	70	65	138.2
7	37 33.3	68	68	136.1	37 12.9	68	67	136.6	36 52.5	68	67	137.0	36 31.9	69	66	137.5
8	36 52.6	67	69	135.3	36 32.6	67	68	135.8	36 12.5	67	68	136.2	35 52.3	68	67	136.7
9	36 11.4	65	70	134.6	35 51.8	66	69	135.0	35 32.0	66	68	135.5	35 12.1	66	68	136.0
40	35 29.7	64	70	133.8	35 10.4	65	70	134.3	34 50.9	65	69	134.8	34 31.4	65	69	135.2
1	34 47.5	63	71	133.1	34 28.4	64	71	133.6	34 09.3	64	70	134.1	33 50.1	64	70	134.5
2	34 04.7	62	72	132.4	33 46.0	62	71	132.9	33 27.3	63	71	133.4	33 08.4	63	70	133.8
3	33 21.5	61	73	131.8	33 03.2	61	72	132.2	32 44.7	62	72	132.7	32 26.1	62	71	133.2
4	32 37.9	60	74	131.1	32 19.8	60	73	131.6	32 01.7	61	72	132.0	31 43.4	61	72	132.5
45	31 53.8	59	74	130.5	31 36.1	59	74	130.9	31 18.2	60	73	131.4	31 00.3	60	73	131.9
6	31 09.3	58	75	129.8	30 51.9	58	74	130.3	30 34.4	59	74	130.8	30 16.8	59	73	131.3
7	30 24.4	57	76	129.2	30 07.3	57	75	129.7	29 50.1	58	74	130.2	29 32.8	58	74	130.6
8	29 39.1	56	76	128.6	29 22.3	56	76	129.1	29 05.4	56	75	129.6	28 48.4	57	75	130.1
9	28 53.4	55	77	128.1	28 36.9	55	76	128.5	28 20.3	55	76	129.0	28 03.7	56	75	129.5
50	28 07.4	54	77	127.5	27 51.2	54	77	128.0	27 34.9	54	76	128.4	27 18.5	55	76	128.9
1	27 21.0	53	78	126.9	27 05.1	53	77	127.4	26 49.1	53	77	127.9	26 33.1	54	76	128.4
2	26 34.3	52	78	126.4	26 18.7	52	78	126.9	26 03.0	53	77	127.4	25 47.2	53	77	127.8
3	25 47.3	51	79	125.9	25 32.0	51	78	126.4	25 16.6	52	78	126.8	25 01.1	52	77	127.3
4	25 00.0	50	79	125.4	24 45.0	50	79	125.8	24 29.8	51	78	126.3	24 14.6	51	78	126.8
55	24 12.4	49	80	124.9	23 57.6	49	79	125.3	23 42.8	50	79	125.8	23 27.8	50	78	126.3
6	23 24.5	48	80	124.4	23 10.0	48	80	124.9	22 55.4	49	79	125.3	22 40.8	49	79	125.8
7	22 36.3	47	81	123.9	22 22.1	48	80	124.4	22 07.8	48	80	124.9	21 53.4	48	79	125.3
8	21 47.8	46	81	123.4	21 33.9	47	81	123.9	21 19.9	47	80	124.4	21 05.8	47	80	124.9
9	20 59.1	45	82	123.0	20 45.5	46	81	123.5	20 31.7	46	81	123.9	20 17.9	46	80	124.4
60	20 10.2	45	82	122.6	19 56.8	45	82	123.0	19 43.3	45	81	123.5	19 29.7	45	81	124.0
1	19 21.0	44	82	122.1	19 07.9	44	82	122.6	18 54.6	44	82	123.1	18 41.4	44	81	123.6
2	18 31.6	43	83	121.7	18 18.7	43	82	122.2	18 05.7	43	82	122.7	17 52.7	44	81	123.1
3	17 42.0	42	83	121.3	17 29.3	42	83	121.8	17 16.6	42	82	122.3	17 03.9	43	82	122.7
4	16 52.1	41	83	120.9	16 39.7	41	83	121.4	16 27.3	42	82	121.9	16 14.8	42	82	122.3
65	16 02.1	40	84	120.5	15 49.9	41	83	121.0	15 37.7	41	83	121.5	15 25.5	41	82	121.9
6	15 11.8	40	84	120.1	14 59.9	40	84	120.6	14 48.0	40	83	121.1	14 36.0	40	83	121.6
7	14 21.4	39	84	119.8	14 09.7	39	84	120.2	13 58.0	39	84	120.7	13 46.3	39	83	121.2
8	13 30.7	38	85	119.4	13 19.3	38	84	119.9	13 07.9	38	84	120.4	12 56.4	38	83	120.8
9	12 39.9	37	85	119.1	12 28.8	37	85	119.5	12 17.6	37	84	120.0	12 06.3	38	84	120.5
70	11 49.0	36	85	118.7	11 38.0	37	85	119.2	11 27.1	37	84	119.7	11 16.0	37	84	120.1
1	10 57.8	36	86	118.4	10 47.1	36	85	118.9	10 36.4	36	85	119.3	10 25.6	36	84	119.8
2	10 06.5	35	86	118.1	9 56.1	35	85	118.5	9 45.5	35	85	119.0	9 35.0	35	85	119.5
3	9 15.1	34	86	117.7	9 04.8	34	86	118.2	8 54.5	34	85	118.7	8 44.2	34	85	119.2
4	8 23.5	33	86	117.4	8 13.4	33	86	117.9	8 03.4	34	86	118.4	7 53.3	34	85	118.8
75	7 31.7	33	86	117.1	7 21.9	33	86	117.6	7 12.1	33	86	118.1	7 02.2	33	85	118.5
6	6 39.8	32	87	116.8	6 30.3	32	86	117.3	6 20.7	32	86	117.8	6 11.0	32	86	118.2
7	5 47.8	31	87	116.5	5 38.5	31	86	117.0	5 29.1	31	86	117.5	5 19.7	31	86	118.0

26° 00′				26° 30′				27° 00′				27° 30′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
50 00.0	1.0	01	180.0	49 30.0	1.0	01	180.0	49 00.0	1.0	01	180.0	48 30.0	1.0	01	180.0	00
49 59.3	1.0	04	178.6	49 29.3	1.0	04	178.6	48 59.3	1.0	04	178.6	48 29.3	1.0	03	178.7	1
49 57.2	1.0	06	177.2	49 27.2	1.0	06	177.2	48 57.2	1.0	06	177.3	48 27.3	1.0	06	177.3	2
49 53.6	1.0	08	175.8	49 23.7	1.0	08	175.9	48 53.8	1.0	08	175.9	48 23.9	1.0	08	176.0	3
49 48.7	99	11	174.4	49 18.8	99	10	174.5	48 49.0	99	10	174.6	48 19.1	99	10	174.7	4
49 42.3	99	13	173.0	49 12.6	99	13	173.1	48 42.8	99	12	173.2	48 13.1	99	12	173.3	05
49 34.6	99	15	171.7	49 04.9	99	15	171.8	48 35.3	99	15	171.9	48 05.6	99	15	172.0	6
49 25.4	98	17	170.3	48 55.9	98	17	170.4	48 26.4	98	17	170.6	47 56.9	98	17	170.7	7
49 15.0	98	20	169.0	48 45.6	98	19	169.1	48 16.2	98	19	169.3	47 46.8	98	19	169.4	8
49 03.1	97	22	167.6	48 33.9	97	22	167.8	48 04.7	97	21	168.0	47 35.5	97	21	168.1	9
48 50.0	97	24	166.3	48 21.0	97	24	166.5	47 51.9	97	24	166.7	47 22.9	97	23	166.9	10
48 35.5	96	26	165.0	48 06.7	96	26	165.2	47 37.9	96	26	165.4	47 09.0	96	25	165.6	1
48 19.8	95	28	163.7	47 51.2	95	28	163.9	47 22.6	95	28	164.1	46 53.9	96	27	164.3	2
48 02.8	95	30	162.4	47 34.4	95	30	162.6	47 06.0	95	30	162.9	46 37.6	95	29	163.1	3
47 44.6	94	32	161.1	47 16.5	94	32	161.4	46 48.3	94	32	161.6	46 20.1	94	31	161.9	4
47 25.2	93	34	159.9	46 57.3	93	34	160.2	46 29.4	93	34	160.4	46 01.4	93	33	160.7	15
47 04.6	92	36	158.7	46 37.0	92	36	159.0	46 09.3	92	35	159.2	45 41.6	92	35	159.5	6
46 42.8	91	38	157.5	46 15.5	91	38	157.8	45 48.1	91	37	158.1	45 20.7	91	37	158.3	7
46 20.0	90	40	156.3	45 52.9	90	39	156.6	45 25.8	90	39	156.9	44 58.7	91	38	157.2	8
45 56.0	89	42	155.1	45 29.2	89	41	155.4	45 02.4	89	41	155.8	44 35.6	90	40	156.1	9
45 31.0	88	44	154.0	45 04.5	88	43	154.3	44 38.0	88	42	154.6	44 11.5	89	42	155.0	20
45 04.9	87	45	152.9	44 38.8	87	45	153.2	44 12.6	87	44	153.5	43 46.3	88	44	153.9	1
44 37.9	86	47	151.8	44 12.1	86	46	152.1	43 46.2	86	46	152.5	43 20.2	87	45	152.8	2
44 09.9	85	48	150.7	43 44.3	85	48	151.1	43 18.8	85	47	151.4	42 53.1	86	47	151.8	3
43 40.9	84	50	149.6	43 15.7	84	49	150.0	42 50.5	84	49	150.4	42 25.1	85	48	150.7	4
43 11.0	83	51	148.6	42 46.2	83	51	149.0	42 21.2	83	50	149.4	41 56.2	83	50	149.7	25
42 40.2	82	53	147.6	42 15.7	82	52	148.0	41 51.1	82	52	148.4	41 26.5	82	51	148.8	6
42 08.6	80	54	146.6	41 44.4	81	54	147.0	41 20.2	81	53	147.4	40 55.9	81	52	147.8	7
41 36.2	79	56	145.6	41 12.3	80	55	146.1	40 48.4	80	54	146.5	40 24.4	80	54	146.8	8
41 02.9	78	57	144.7	40 39.4	78	56	145.1	40 15.9	79	56	145.5	39 52.2	79	55	145.9	9
40 28.9	77	58	143.8	40 05.8	77	57	144.2	39 42.5	78	57	144.6	39 19.2	78	56	145.0	30
39 54.1	76	59	142.9	39 31.3	76	59	143.3	39 08.4	76	58	143.7	38 45.4	77	57	144.1	1
39 18.7	75	60	142.0	38 56.2	75	60	142.4	38 33.6	75	59	142.9	38 11.0	76	59	143.3	2
38 42.5	74	61	141.1	38 20.4	74	61	141.6	37 58.1	74	60	142.0	37 35.8	75	60	142.4	3
38 05.6	72	62	140.3	37 43.8	73	62	140.7	37 22.0	73	61	141.2	37 00.0	73	61	141.6	4
37 28.1	71	63	139.5	37 06.7	72	63	139.9	36 45.1	72	62	140.4	36 23.5	72	62	140.8	35
36 50.0	70	64	138.7	36 28.9	70	64	139.1	36 07.7	71	63	139.6	35 46.4	71	63	140.0	6
36 11.3	69	65	137.9	35 50.5	69	65	138.4	35 29.7	70	64	138.8	35 08.7	70	64	139.2	7
35 32.0	68	66	137.2	35 11.5	68	66	137.6	34 51.0	69	65	138.1	34 30.4	69	65	138.5	8
34 52.1	67	67	136.4	34 32.0	67	67	136.9	34 11.8	67	66	137.3	33 51.6	68	66	137.8	9
34 11.7	66	68	135.7	33 52.0	66	68	136.1	33 32.1	66	67	136.6	33 12.1	67	67	137.0	40
33 30.8	65	69	135.0	33 11.4	65	68	135.4	32 51.8	65	68	135.9	32 32.2	66	67	136.3	1
32 49.4	63	70	134.3	32 30.3	64	69	134.8	32 11.1	64	69	135.2	31 51.8	64	68	135.7	2
32 07.5	62	71	133.6	31 48.7	63	70	134.1	31 29.8	63	70	134.5	31 10.9	63	69	135.0	3
31 25.1	61	71	133.0	31 06.6	62	71	133.4	30 48.1	62	70	133.9	30 29.5	62	70	134.4	4
30 42.3	60	72	132.3	30 24.2	61	72	132.8	30 05.9	61	71	133.3	29 47.6	61	70	133.7	45
29 59.0	59	73	131.7	29 41.2	60	72	132.2	29 23.3	60	72	132.6	29 05.3	60	71	133.1	6
29 15.4	58	74	131.1	28 57.9	58	73	131.6	28 40.3	59	72	132.0	28 22.6	59	72	132.5	7
28 31.3	57	74	130.5	28 14.1	57	74	131.0	27 56.8	58	73	131.4	27 39.5	58	73	131.9	8
27 46.9	56	75	129.9	27 30.0	56	74	130.4	27 13.0	57	74	130.9	26 55.9	57	73	131.3	9
27 02.0	55	75	129.4	26 45.5	55	75	129.8	26 28.8	56	74	130.3	26 12.0	56	74	130.8	50
26 16.9	54	76	128.8	26 00.6	54	75	129.3	25 44.2	55	75	129.8	25 27.8	55	74	130.2	1
25 31.3	53	76	128.3	25 15.4	53	76	128.8	24 59.3	54	76	129.2	24 43.1	54	75	129.7	2
24 45.5	52	77	127.8	24 29.8	52	76	128.2	24 14.0	53	76	128.7	23 58.2	53	76	129.2	3
23 59.3	51	77	127.3	23 43.9	51	77	127.7	23 28.4	52	76	128.2	23 12.9	52	76	128.7	4
23 12.8	50	78	126.8	22 57.7	50	78	127.2	22 42.5	51	77	127.7	22 27.3	51	77	128.2	55
22 26.0	49	78	126.3	22 11.2	50	78	126.7	21 56.3	50	78	127.2	21 41.3	50	77	127.7	6
21 39.0	48	79	125.8	21 24.4	49	78	126.3	21 09.8	49	78	126.7	20 55.1	49	78	127.2	7
20 51.6	47	79	125.3	20 37.4	48	79	125.8	20 23.0	48	78	126.3	20 08.6	48	78	126.8	8
20 04.0	46	80	124.9	19 50.0	47	79	125.4	19 36.0	47	79	125.8	19 21.8	47	78	126.3	9
19 16.1	46	80	124.5	19 02.4	46	80	124.9	18 48.6	46	79	125.4	18 34.8	46	79	125.9	60
18 28.0	45	81	124.0	18 14.6	45	80	124.5	18 01.0	45	80	125.0	17 47.5	45	79	125.4	1
17 39.6	44	81	123.6	17 26.5	44	81	124.1	17 13.2	44	80	124.6	16 59.9	44	80	125.0	2
16 51.0	43	81	123.2	16 38.1	43	81	123.7	16 25.2	43	80	124.1	16 12.1	44	80	124.6	3
16 02.2	42	82	122.8	15 49.6	42	81	123.3	15 36.9	42	81	123.7	15 24.1	43	80	124.2	4
15 13.2	41	82	122.4	15 00.8	41	82	122.9	14 48.3	42	81	123.4	14 35.8	42	81	123.8	65
14 23.9	40	82	122.0	14 11.8	40	82	122.5	13 59.6	41	82	123.0	13 47.4	41	81	123.4	6
13 34.4	39	83	121.7	13 22.6	40	82	122.1	13 10.7	40	82	122.6	12 58.7	40	81	123.1	7
12 44.8	39	83	121.3	12 33.2	39	83	121.8	12 21.5	39	82	122.3	12 09.8	39	82	122.7	8
11 55.0	38	83	121.0	11 43.6	38	83	121.4	11 32.2	38	82	121.9	11 20.7	38	82	122.4	9
11 05.0	37	84	120.6	10 53.8	37	83	121.1	10 42.7	37	83	121.6	10 31.5	37	82	122.0	70
10 14.8	36	84	120.3	10 03.9	36	84	120.8	9 53.0	36	83	121.2	9 42.0	37	83	121.7	1
9 24.4	35	84	120.0	9 13.8	35	84	120.4	9 03.1	36	83	120.9	8 52.4	36	83	121.4	2
8 33.9	35	84	119.6	8 23.5	35	84	120.1	8 13.1	35	84	120.6	8 02.6	35	83	121.1	3
7 43.2	34	85	119.3	7 33.0	34	84	119.8	7 22.9	34	84	120.3	7 12.7	34	84	120.7	4
6 52.4	33	85	119.0	6 42.4	33	85	119.5	6 32.5	33	84	120.0	6 22.5	33	84	120.4	75
6 01.4	32	85	118.7	5 51.7	32	85	119.2	5 42.0	32	84	119.7	5 32.3	32	84	120.2	6
5 10.3	31	85	118.4	5 00.8	32	85	118.9									7

DECLINATION SAME NAME AS LATITUDE

H.A.	24° 00′				24° 30′				25° 00′				25° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
91													5 05.9	23	88	65.0

26° 00′				26° 30′				27° 00′				27° 30′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
5 12.7	23	88	64.5	5 19.4	23	87	64.0	5 26.2	22	87	63.5	5 32.9	22	86	63.0	91

Lat. 14°

H.A.	28° 00′				28° 30′				29° 00′				30° 00′				32° 00′				34° 00′				34° 30′				35° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	76 00.0	1.0	03	00.0	75 30.0	1.0	03	00.0	75 00.0	1.0	03	00.0	74 00.0	1.0	03	00.0	72 00.0	1.0	02	00.0	70 00.0	1.0	02	00.0	69 30.0	1.0	02	00.0	68 30.0	1.0	02	00.0	00
1	75 58.1	1.0	09	03.6	75 28.2	1.0	09	03.5	74 58.3	1.0	08	03.4	73 58.4	1.0	08	03.1	71 58.6	1.0	07	02.7	69 58.8	1.0	06	02.4	69 28.8	1.0	06	02.4	68 28.9	1.0	06	02.2	1
2	75 52.6	99	15	07.3	75 22.9	99	15	07.0	74 53.2	99	14	06.7	73 53.6	99	13	06.3	71 54.4	99	12	05.5	69 55.1	1.0	10	04.8	69 25.2	1.0	10	04.7	68 25.5	1.0	09	04.4	2
3	75 43.5	98	21	10.8	75 14.1	98	20	10.4	74 44.7	98	20	10.0	73 45.7	98	18	09.3	71 47.5	99	16	08.2	69 49.0	99	14	07.2	69 19.3	99	14	07.0	68 19.9	99	13	06.6	3
4	75 30.8	96	27	14.3	75 01.9	97	26	13.7	74 32.9	97	25	13.2	73 34.8	97	23	12.3	71 37.9	98	20	10.8	69 40.5	98	18	09.6	69 11.0	98	18	09.3	68 12.1	98	17	08.8	4
05	75 14.9	94	32	17.6	74 46.5	95	31	17.0	74 18.1	95	30	16.4	73 20.9	96	28	15.3	71 25.7	96	25	13.4	69 29.6	97	22	11.9	69 00.5	97	21	11.6	68 02.1	97	20	10.9	05
6	74 55.7	92	37	20.8	74 28.0	93	36	20.1	74 00.2	93	34	19.4	73 04.2	94	32	18.1	71 10.9	95	29	16.0	69 16.5	96	26	14.2	68 47.7	96	25	13.8	67 50.0	96	24	13.0	6
7	74 33.6	90	42	23.8	74 06.6	90	40	23.0	73 39.5	91	39	22.3	72 44.7	92	37	20.8	70 53.7	93	33	18.4	69 01.1	94	29	16.4	68 32.8	95	28	15.9	67 35.8	95	27	15.1	7
8	74 08.7	87	46	26.7	73 42.5	88	44	25.8	73 16.1	88	43	25.0	72 22.8	89	41	23.5	70 34.2	91	36	20.8	68 43.6	93	33	18.5	68 15.7	93	32	18.0	67 19.7	94	30	17.1	8
9	73 41.3	84	50	29.5	73 15.9	85	48	28.5	72 50.3	86	47	27.6	71 58.4	87	44	26.0	70 12.5	89	40	23.1	68 24.1	91	36	20.6	67 56.7	91	35	20.1	67 01.6	92	33	19.0	9
10	73 11.5	81	53	32.0	72 47.0	82	52	31.0	72 22.2	83	50	30.1	71 31.9	85	48	28.3	69 48.6	87	43	25.3	68 02.6	89	39	22.6	67 35.8	90	38	22.1	66 41.7	90	36	20.9	10
1	72 39.6	78	56	34.4	72 16.0	79	55	33.4	71 52.0	80	54	32.4	71 03.2	82	51	30.6	69 22.8	85	46	27.4	67 39.3	87	42	24.6	67 13.0	88	41	24.0	66 20.1	89	39	22.8	1
2	72 05.8	75	59	36.7	71 43.0	77	58	35.6	71 19.8	78	56	34.6	70 32.7	80	54	32.7	68 55.2	83	49	29.4	67 14.2	85	45	26.5	66 48.5	86	44	25.8	65 56.7	87	42	24.5	2
3	71 30.2	73	62	38.8	71 08.2	74	61	37.7	70 45.9	75	59	36.7	70 00.3	77	57	34.7	68 25.8	80	52	31.3	66 47.5	83	47	28.2	66 22.4	84	46	27.6	65 31.7	85	44	26.2	3
4	70 52.9	70	64	40.7	70 31.8	71	63	39.6	70 10.3	72	62	38.6	69 26.4	74	59	36.6	67 54.8	78	54	33.1	66 19.2	81	50	30.0	65 54.7	82	49	29.2	65 05.3	83	47	27.9	4
15	70 14.3	67	67	42.5	69 54.0	68	65	41.4	69 33.3	70	64	40.4	68 50.9	72	61	38.4	67 22.3	76	56	34.8	65 49.4	79	52	31.6	65 25.6	80	51	30.9	64 37.3	81	49	29.4	15
6	69 34.3	64	69	44.2	69 14.8	66	67	43.1	68 54.9	67	66	42.1	68 14.1	69	64	40.1	66 48.4	73	59	36.4	65 18.2	77	54	33.2	64 55.0	78	53	32.4	64 08.0	79	51	31.0	6
7	68 53.1	62	70	45.8	68 34.4	63	69	44.7	68 15.3	64	68	43.6	67 36.0	67	65	41.6	66 13.2	71	61	37.9	64 45.7	75	56	34.6	64 23.2	75	55	33.9	63 37.5	77	53	32.4	7
8	68 10.9	59	72	47.2	67 52.9	60	71	46.2	67 34.6	62	70	45.1	66 56.7	64	67	43.1	65 36.8	69	62	39.4	64 12.0	72	58	36.1	63 50.2	73	57	35.3	63 05.7	75	55	33.8	8
9	67 27.7	57	74	48.6	67 10.5	58	72	47.5	66 52.8	59	71	46.5	66 16.4	62	69	44.5	64 59.3	66	64	40.8	63 37.2	70	60	37.4	63 16.0	71	59	36.6	62 32.8	73	57	35.1	9
20	66 43.6	54	75	49.8	66 27.1	56	74	48.8	66 10.2	57	72	47.8	65 35.2	60	70	45.8	64 20.8	64	66	42.1	63 01.3	68	61	38.7	62 40.7	69	60	37.9	61 58.8	71	58	36.3	20
1	65 58.7	52	76	51.0	65 42.9	53	75	50.0	65 26.7	55	74	49.0	64 53.0	57	72	47.0	63 41.4	62	67	43.3	62 24.4	66	63	39.9	62 04.5	67	62	39.1	61 23.8	69	60	37.5	1
2	65 13.1	50	77	52.1	64 58.0	51	76	51.1	64 42.4	53	75	50.1	64 10.1	55	73	48.1	63 01.0	60	69	44.4	61 46.7	64	64	41.1	61 27.3	65	63	40.2	60 47.8	67	61	38.7	2
3	64 26.9	48	78	53.1	64 12.3	49	77	52.1	63 57.4	50	76	51.1	63 26.4	53	74	49.2	62 19.8	58	70	45.5	61 08.0	62	66	42.1	60 49.3	63	65	41.3	60 11.0	65	63	39.8	3
4	63 40.0	46	79	54.1	63 26.1	47	78	53.1	63 11.8	48	77	52.1	62 42.0	51	75	50.2	61 37.9	56	71	46.6	60 28.5	60	67	43.2	60 10.4	61	66	42.4	59 33.4	63	64	40.8	4
25	62 52.6	44	80	54.9	62 39.3	45	79	54.0	62 25.6	46	78	53.0	61 57.0	49	76	51.1	60 55.3	54	72	47.5	59 48.3	58	68	44.2	59 30.8	59	67	43.4	58 54.9	61	65	41.8	25
6	62 04.7	42	81	55.8	61 52.0	43	80	54.8	61 38.8	44	79	53.8	61 11.4	47	77	52.0	60 12.1	52	73	48.4	59 07.4	56	69	45.1	58 50.5	57	68	44.3	58 15.8	59	66	42.7	6
7	61 16.4	40	81	56.5	61 04.2	41	80	55.6	60 51.6	43	80	54.6	60 25.3	45	78	52.8	59 28.2	50	74	49.3	58 25.9	54	70	46 0	58 09.5	55	69	45.2	57 36.0	57	67	43.6	7
8	60 27.6	38	82	57.2	60 15.9	40	81	56.3	60 03.9	41	80	55.4	59 38.6	43	78	53.6	58 43.9	48	75	50.1	57 43.8	52	71	46.8	57 28.0	53	70	46.0	56 55.5	55	68	44.5	8
9	59 38.5	37	82	57.9	59 27.3	38	82	57.0	59 15.8	39	81	56.1	58 51.6	42	79	54.3	57 59.0	46	76	50.8	57 01.0	50	72	47.6	56 45.8	51	71	46.8	56 14.4	53	69	45.3	9
30	58 49.0	35	83	58.5	58 38.3	36	82	57.6	58 27.3	37	81	56.7	58 04.1	40	80	55.0	57 13.6	44	76	51.6	56 17.8	49	73	48.3	56 03.1	50	72	47.6	55 32.8	51	70	46.0	30
1	57 59.2	33	84	59.1	57 49.0	35	83	58.2	57 38.5	36	82	57.3	57 16.3	38	80	55.6	56 27.8	43	77	52.2	55 34.1	47	74	49.0	55 19.9	48	73	48.3	54 50.7	50	71	46.7	1
2	57 09.1	32	84	59.6	56 59.4	33	83	58.7	56 49.3	34	82	57.9	56 28.1	37	81	56.2	55 41.5	41	78	52.9	54 49.9	45	74	49.7	54 36.2	46	74	48.9	54 08.0	48	72	47.4	2
3	56 18.8	30	84	60.1	56 09.5	32	84	59.3	55 59.9	33	83	58.4	55 39.6	35	81	56.7	54 54.9	39	78	53.5	54 05.3	43	75	50.3	53 52.1	44	74	49.6	53 24.9	46	73	48.1	3
4	55 28.2	29	85	60.6	55 19.3	30	84	59.7	55 10.1	31	83	58.9	54 50.7	33	82	57.3	54 08.0	38	79	54.0	53 20.3	42	76	50.9	53 07.6	43	75	50.2	52 41.4	45	73	48.7	4
35	54 37.4	28	85	61.0	54 28.9	29	84	60.2	54 20.2	30	84	59.4	54 01.6	32	82	57.7	53 20.7	36	79	54.6	52 34.9	40	76	51.5	52 22.7	41	75	50.7	51 57.5	43	74	49.3	35
6	53 46.4	26	85	61.4	53 38.3	27	85	60.6	53 30.0	28	84	59.8	53 12.3	31	83	58.2	52 33.1	35	80	55.1	51 49.1	39	77	52.0	51 37.4	40	76	51.3	51 13.2	41	74	49.8	6
7	52 55.1	25	86	61.8	52 47.5	26	85	61.0	52 39.5	27	84	60.2	52 22.7	29	83	58.6	51 45.3	33	80	55.5	51 03.1	37	77	52.5	50 51.8	38	76	51.8	50 28.5	40	75	50.3	7
8	52 03.7	24	86	62.2	51 56.5	25	85	61.4	51 48.9	26	85	60.6	51 32.9	28	83	59.0	50 57.1	32	81	56.0	50 16.7	36	78	53.0	50 05.9	36	77	52.3	49 43.6	38	75	50.8	8
9	51 12.2	22	86	62.5	51 05.3	23	86	61.7	50 58.1	24	85	60.9	50 42.9	26	84	59.4	50 08.8	30	81	56.4	49 30.1	34	78	53.5	49 19.8	35	77	52.7	48 58.3	37	76	51.3	9
40	50 20.5	21	86	62.8	50 14.0	22	86	62.0	50 07.2	23	85	61.3	49 52.7	25	84	59.7	49 20.2	29	81	56.8	48 43.2	33	79	53.9	48 33.3	33	78	53.2	48 12.7	35	76	51.7	40
1	49 28.6	20	87	63.1	49 22.5	21	86	62.3	49 16.0	22	85	61.6	49 02.3	24	84	60.1	48 31.4	28	82	57.1	47 56.1	31	79	54.3	47 46.6	32	78	53.6	47 26.8	34	77	52.2	1
2	48 36.7	19	87	63.3	48 30.9	20	86	62.6	48 24.8	21	86	61.8	48 11.7	23	84	60.4	47 42.4	26	82	57.5	47 08.7	30	79	54.6	46 59.6	31	79	53.9	46 40.7	32	77	52.6	2
3	47 44.6	18	87	63.6	47 39.1	19	86	62.8	47 33.4	20	86	62.1	47 21.1	21	85	60.7	46 53.2	25	82	57.8	46 21.1	28	80	55.0	46 12.4	29	79	54.3	45 54.4	31	78	52.9	3
4	46 52.4	17	87	63.8	46 47.3	18	87	63.1	46 41.9	18	86	62.4	46 30.2	20	85	60.9	46 03.8	24	82	58.1	45 33.3	27	80	55.3	45 25.1	28	79	54.6	45 07.8	30	78	53.3	4
45	46 00.1	16	87	64.0	45 55.3	16	87	63.3	45 50.2	17	86	62.6	45 39.3	19	85	61.2	45 14.3	22	83	58.4	44 45.3	26	80	55.6	44 37.5	27	80	55.0	44 21.1	28	78	53.6	45
6	45 07.8	15	88	64.2	45 03.3	16	87	63.5	44 58.5	16	86	62.8	44 48.2	18	85	61.4	44 24.7	21	83	58.6	43 57.2	24	80	55.9	43 49.7	25	80	55.3	43 34.1	27	79	53.9	6
7	44 15.3	14	88	64.4	44 11.1	14	87	63.7	44 06.7	15	86	63.0	43 57.1	17	85	61.6	43 34.9	20	83	58.9	43 08.9	23	81	56.2	43 01.8	24	80	55.5	42 47.0	26	79	54.2	7
8	43 22.8	13	88	64.5	43 18.9	13	87	63.8	43 14.8	14	87	63.2	43 05.8	16	86	61.8	42 45.0	19	83	59.1	42 20.4	22	81	56.5	42 13.7	23	80	55.8	41 59.6	24	79	54.5	8
9	42 30.2	12	88	64.7	42 26.6	12	87	64.0	42 22.8	13	87	63.3	42 14.4	15	86	62.0	41 55.0	18	84	59.3	41 31.8	21	81	56.7	41 25.5	21	81	56.0	41 12.2	23	79	54.7	9
50	41 37.6	11	88	64.8	41 34.3	11	87	64.1	41 30.7	12	87	63.5	41 23.0	14	86	62.2	41 04.8	17	84	59.5	40 43.1	20	81	56.9	40 37.2	20	81	56.3	40 24.6	22	80	55.0	50
1	40 44.9	10	88	64.9	40 41.8	10	87	64.3	40 38.6	11	87	63.6	40 31.5	13	86	62.3	40 14.6	16	84	59.7	39 54.3	18	82	57.1	39 48.7	19	81	56.5	39 36.8	20	80	55.2	1
2	39 52.1	09	88	65.0	39 49.4	09	88	64.4	39 46.4	10	87	63.7	39 39.9	12	86	62.4	39 24.3	14	84	59.9	39 05.3	17	82	57.3	39 00.1	18	81	56.7	38 48.9	19	80	55.4	2
3	38 59.3	08	88	65.1	38 56.9	08	88	64.5	38 54.2	09	87	63.8	38 48.3	11	86	62.6	38 33.9	13	84	60.0	38 16.3	16	82	57.5	38 11.4	17	81	56.9	38 00.9	18	80	55.6	3
4	38 06.5	07	88	65.2	38 04.3	08	88	64.6	38 01.9	08	87	63.9	37 56.6	10	86	62.7	37 43.5	12	84	60.2	37 27.1	15	82	57.7	37 22.6	16	81	57.0	37 12.8	17	80	55.8	4
55	37 13.6	06	88	65.3	37 11.7	07	88	64.7	37 09.6	07	87	64.0	37 04.8	09	86	62.8	36 52.9	11	84	60.3	36 37.9	14	82	57.8	36 33.7	14	82	57.2	36 24.7	16	80	56.0	55
6	36 20.7	05	88	65.3	36 19.1	06	88	64.7	36 17.3	06	87	64.1	36 13.0	08	86	62.9	36 02.3	10	84	60.4	35 48.6	13	82	57.9	35 44.7	13	82	57.3	35 36.4	15	81	56.1	6
7	35 27.8	04	88	65.4	35 26.4	05	88	64.8	35 24.9	05	87	64.2	35 21.2	07	86	62.9	35 11.7	09	84	60.5	34 59.2	12	82	58.1	34 55.7	12	82	57.5	34 48.0	13	81	56.3	7
8	34 34.8	03	88	65.4	34 33.7	04	88	64.8	34 32.5	05	87	64.2	34 29.4	06	86	63.0	34 21.0	08	85	60.6	34 09.8	11	82	58.2	34 06.6	11	82	57.6	33 59.6	12	81	56.4	8
9	33 41.9	03	88	65.5	33 41.1	03	88	64.9	33 40.0	04	87	64.3	33 37.5	05	86	63.1	33 30.3	07	85	60.7	33 20.3	09	83	58.3	33 17.4	10	82	57.7	33 11.0	11	81	56.5	9
60	32 48.9	02	88	65.5	32 48.3	02	88	64.9	32 47.6	03	87	64.3	32 45.6	04	87	63.1	32 39.5	06	85	60.7	32 30.8	08	83	58.4	32 28.2	09	82	57.8	32 22.5	10	81	56.6	60
1	31 56.0	01	88	65.5	31 55.6	01	88	64.9	31 55.1	02	87	64.3	31 53.6	03	87	63.1	31 48.7	05	85	60.8	31 41.2	07	83	58.4	31 38.9	08	82	57.9	31 33.8	09	81	56.7	1
2	31 03.0	00	88	65.5	31 02.9	01	88	64.9	31 02.6	01	87	64.3	31 01.7	02	87	63.2	30 57.9	04	85	60.8	30 51.5	06	83	58.5	30 49.6	07	82	57.9	30 45.2	08	81	56.8	2
3	30 10.0	01	88	65.5	30 10.2	00	88	64.9	30 10.2	00	87	64.3	30 09.7	01	87	63.2	30 07.0	03	85	60.9	30 01.9	05	83	58.6	30 00.2	06	82	58.0	29 56.5	07	81	56.8	3
4	29 17.0	02	88	65.5	29 17.4	01	88	64.9	29 17.7	01	87	64.3	29 17.8	00	87	63.2	29 16.2	02	85	60.9	29 12.2	04	83	58.6	29 10.9	05	82	58.0	29 07.7	06	81	56.9	4
65	28 24.1	02	88	65.5	28 24.7	02	88	64.9	28 25.2	01	87	64.3	28 25.8	01	87	63.2	28 25.3	01	85	60.9	28 22.5	03	83	58.6	28 21.4	04	82	58.1	28 18.9	05	81	56.9	65
6	27 31.1	03	88	65.4	27 32.0	03	88	64.9	27 32.8	02	87	64.3	27 33.9	01	87	63.2	27 34.4	00	85	60.9	27 32.8	02	83	58.7	27 32.0	03	82	58.1	27 30.1	04	81	57.0	6
7	26 38.2	04	88	65.4	26 39.3	04	88	64.8	26 40.3	03	87	64.3	26 41.9	02	87	63.2	26 43.5	00	85	60.9	26 43.0	01	83	58.7	26 42.6	02	82	58.1	26 41.3	03	81	57.0	7
8	25 45.2	05	88	65.4	25 46.6	04	88	64.8	25 47.9	04	87	64.2	25 50.0	03	87	63.1	25 52.6	01	85	60.9	25 53.3	00	83	58.7	25 53.1	01	82	58.1	25 52.5	02	81	57.0	8
9	24 52.3	06	88	65.3	24 53.9	05	88	64.8	24 55.4	05	87	64.2	24 58.0	04	87	63.1	25 01.8	02	85	60.9	25 03.6	01	83	58.7	25 03.7	00	82	58.1	25 03.6	01	81	57.0	9
70	23 59.5	06	88	65.3	24 01.3	06	88	64.7	24 03.0	06	87	64.2	24 06.1	05	86	63.1	24 10.9	03	85	60.9	24 13.8	02	83	58.7	24 14.3	01	82	58.1	24 14.8	00	81	57.0	70
1	23 06.6	07	88	65.2	23 08.7	07	88	64.6	23 10.6	06	87	64.1	23 14.2	06	86	63.0	23 20.1	04	85	60.8	23 24.1	03	83	58.7	23 24.8	02	82	58.1	23 25.9	01	81	57.0	1
2	22 13.8	08	88	65.1	22 16.1	08	88	64.6	22 18.3	07	87	64.0	22 22.4	06	86	63.0	22 29.2	05	85	60.8	22 34.4	04	83	58.6	22 35.4	03	82	58.1	22 37.1	02	81	57.0	2
3	21 21.0	09	88	65.0	21 23.5	08	88	64.5	21 25.9	08	87	64.0	21 30.5	07	86	62.9	21 38.4	06	85	60.7	21 44.7	05	83	58.6	21 46.0	04	82	58.1	21 48.3	03	81	57.0	3
4	20 28.2	09	88	65.0	20 31.0	09	88	64.4	20 33.7	09	87	63.9	20 38.7	08	86	62.8	20 47.6	07	85	60.7	20 55.0	05	83	58.6	20 56.6	05	82	58.0	20 59.5	04	81	57.0	4
75	19 35.5	10	88	64.9	19 38.5	10	87	64.3	19 41.4	10	87	63.8	19 46.9	09	86	62.7	19 56.9	08	84	60.6	20 05.3	06	83	58.5	20 07.2	06	82	58.0	20 10.7	05	81	56.9	75
6	18 42.8	11	88	64.8	18 46.0	11	87	64.2	18 49.2	10	87	63.7	18 55.2	10	86	62.7	19 06.2	09	84	60.6	19 15.7	07	83	58.4	19 17.9	07	82	57.9	19 21.9	06	81	56.9	6
7	17 50.2	12	88	64.7	17 53.6	11	87	64.1	17 57.0	11	87	63.6	18 03.5	11	86	62.6	18 15.5	09	84	60.5	18 26.1	08	83	58.4	18 28.6	08	82	57.8	18 33.2	07	81	56.8	7
8	16 57.6	12	88	64.5	17 01.3	12	87	64.0	17 04.9	12	87	63.5	17 11.9	11	86	62.5	17 24.9	10	84	60.4	17 36.6	09	82	58.3	17 39.3	09	82	57.8	17 44.5	08	81	56.7	8
9	16 05.0	13	88	64.4	16 09.0	13	87	63.9	16 12.8	13	87	63.4	16 20.3	12	86	62.4	16 34.3	11	84	60.3	16 47.1	10	82	58.2	16 50.1	10	82	57.7	16 55.8	09	81	56.7	9
80	15 12.5	14	87	64.3	15 16.7	14	87	63.8	15 20.8	13	87	63.3	15 28.7	13	86	62.2	15 43.7	12	84	60.2	15 57.6	11	82	58.1	16 00.9	11	82	57.6	16 07.2	10	81	56.6	80
1	14 20.1	15	87	64.2	14 24.5	14	87	63.7	14 28.8	14	86	63.2	14 37.2	14	86	62.1	14 53.3	13	84	60.1	15 08.2	12	82	58.0	15 11.7	12	82	57.5	15 18.7	11	81	56.5	1
2	13 27.7	15	87	64.0	13 32.3	15	87	63.5	13 36.9	15	86	63.0	13 45.8	15	86	62.0	14 02.8	14	84	60.0	14 18.8	13	82	57.9	14 22.7	13	82	57.4	14 30.1	12	81	56.4	2
3	12 35.4	16	87	63.9	12 40.3	16	87	63.4	12 45.0	16	86	62.9	12 54.4	15	86	61.9	13 12.5	15	84	59.8	13 29.5	14	82	57.8	13 33.7	14	82	57.3	13 41.7	13	81	56.3	3
4	11 43.2	17	87	63.7	11 48.3	17	87	63.2	11 53.3	17	86	62.7	12 03.1	16	85	61.7	12 22.2	16	84	59.7	12 40.3	15	82	57.7	12 44.7	15	81	57.2	12 53.3	14	81	56.2	4
85	10 51.0	18	87	63.6	10 56.3	18	86	63.1	11 01.5	17	86	62.6	11 11.9	17	85	61.6	11 31.9	16	84	59.6	11 51.1	16	82	57.6	11 55.8	15	81	57.0	12 05.0	15	80	56.0	85
6	9 58.9	18	87	63.4	10 04.4	18	86	62.9	10 09.9	18	86	62.4	10 20.7	18	85	61.4	10 41.8	17	83	59.4	11 02.0	17	82	57.4	11 07.0	16	81	56.9	11 16.7	16	80	55.9	6
7	9 06.9	19	87	63.3	9 12.6	19	86	62.8	9 18.3	19	86	62.3	9 29.6	19	85	61.3	9 51.7	18	83	59.3	10 13.0	17	82	57.3	10 18.3	17	81	56.8	10 28.6	17	80	55.8	7
8	8 14.9	20	86	63.1	8 20.9	20	86	62.6	8 26.9	20	86	62.1	8 38.6	19	85	61.1	9 01.7	19	83	59.1	9 24.1	18	81	57.1	9 29.6	18	81	56.6	9 40.5	18	80	55.6	8
9	7 23.1	21	86	62.9	7 29.3	21	86	62.4	7 35.4	21	86	61.9	7 47.7	20	85	60.9	8 11.8	20	83	58.9	8 35.3	19	81	57.0	8 41.0	19	81	56.5	8 52.5	19	80	55.5	9
90	6 31.3	22	86	62.7	6 37.7	21	86	62.2	6 44.1	21	85	61.7	6 56.9	21	85	60.7	7 21.9	21	83	58.8	7 46.5	20	81	56.8	7 52.5	20	81	56.3	8 04.6	20	80	55.3	90

Lat.
14°

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	48 00.0	1.0 01	180.0	47 30.0	1.0 01	180.0	47 00.0	1.0 01	180.0	46 00.0	1.0 01	180.0	44 00.0	1.0 01	180.0	42 00.0	1.0 01	180.0	41 30.0	1.0 01	180.0	40 30.0	1.0 01	180.0	00
1	47 59.3	1.0 03	178.7	47 29.3	1.0 03	178.7	46 59.3	1.0 03	178.7	45 59.4	1.0 03	178.8	43 59.4	1.0 03	178.8	41 59.4	1.0 03	178.9	41 29.4	1.0 03	178.9	40 29.5	1.0 03	178.9	1
2	47 57.3	1.0 06	177.4	47 27.4	1.0 06	177.4	46 57.4	1.0 05	177.4	45 57.5	1.0 05	177.5	43 57.6	1.0 05	177.6	41 57.7	1.0 05	177.8	41 27.8	1.0 05	177.8	40 27.8	1.0 05	177.9	2
3	47 54.0	1.0 08	176.0	47 24.1	1.0 08	176.1	46 54.1	1.0 08	176.2	45 54.3	1.0 07	176.3	43 54.6	1.0 07	176.5	41 54.9	1.0 07	176.7	41 25.0	1.0 06	176.7	40 25.1	1.0 06	176.8	3
4	47 49.3	99 10	174.7	47 19.4	1.0 10	174.8	46 49.6	1.0 10	174.9	45 49.9	1.0 09	175.0	43 50.4	1.0 09	175.3	41 50.9	1.0 08	175.5	41 21.1	1.0 08	175.6	40 21.3	1.0 08	175.7	4
05	47 43.3	99 12	173.4	47 13.5	99 12	173.5	46 43.8	99 12	173.6	45 44.2	99 12	173.8	43 45.1	99 11	174.1	41 45.9	99 10	174.4	41 16.1	99 10	174.5	40 16.4	99 10	174.7	05
6	47 36.0	99 14	172.1	47 06.3	99 14	172.2	46 36.6	99 14	172.4	45 37.3	99 14	172.6	43 38.5	99 13	173.0	41 39.7	99 12	173.3	41 09.9	99 12	173.4	40 10.5	99 12	173.6	6
7	47 27.4	98 16	170.8	46 57.8	98 16	171.0	46 28.3	99 16	171.1	45 29.1	99 16	171.3	43 30.8	99 15	171.8	41 32.4	99 14	172.2	41 02.7	99 14	172.3	40 03.5	99 13	172.6	7
8	47 17.5	98 19	169.6	46 48.1	98 18	169.7	46 18.6	98 18	169.9	45 19.8	98 18	170.1	43 21.9	98 17	170.7	41 24.0	98 16	171.2	40 54.4	98 16	171.3	39 55.4	98 15	171.5	8
9	47 06.3	97 21	168.3	46 37.0	98 20	168.5	46 07.8	98 20	168.6	45 09.2	98 20	168.9	43 11.9	98 19	169.5	41 14.5	98 18	170.1	40 45.1	98 17	170.2	39 46.3	98 17	170.5	9
10	46 53.8	97 23	167.0	46 24.8	97 22	167.2	45 55.7	97 22	167.4	44 57.4	97 22	167.7	43 00.7	97 20	168.4	41 03.9	97 19	169.0	40 34.6	98 19	169.1	39 36.1	98 19	169.4	10
1	46 40.2	96 25	165.8	46 11.3	96 24	166.0	45 42.3	96 24	166.2	44 44.5	97 24	166.5	42 48.5	97 22	167.3	40 52.2	97 21	167.9	40 23.1	97 21	168.1	39 24.9	97 20	168.4	1
2	46 25.3	96 27	164.6	45 56.6	96 26	164.8	45 27.8	96 26	165.0	44 30.3	96 25	165.4	42 35.1	96 24	166.1	40 39.5	96 23	166.9	40 10.6	96 23	167.0	39 12.7	97 22	167.4	2
3	46 09.2	95 29	163.3	45 40.7	95 28	163.6	45 12.2	95 28	163.8	44 15.1	95 27	164.2	42 20.6	96 26	165.0	40 25.8	96 25	165.8	39 57.0	96 24	166.0	38 59.5	96 24	166.4	3
4	45 51.9	94 31	162.1	45 23.6	94 30	162.4	44 55.3	94 30	162.6	43 58.7	95 29	163.1	42 05.0	95 28	164.0	40 11.0	95 26	164.8	39 42.4	95 26	165.0	38 45.3	95 25	165.4	4
15	45 33.4	93 33	161.0	45 05.4	93 32	161.2	44 37.4	94 32	161.5	43 41.2	94 31	161.9	41 48.4	94 29	162.9	39 55.2	94 28	163.8	39 26.9	95 28	164.0	38 30.1	95 27	164.4	15
6	45 13.9	93 34	159.8	44 46.1	93 34	160.1	44 18.3	93 34	160.3	43 22.6	93 33	160.8	41 30.7	93 31	161.8	39 38.4	94 30	162.7	39 10.3	94 29	163.0	38 13.9	94 28	163.4	6
7	44 53.2	92 36	158.6	44 25.7	92 36	158.9	43 58.2	92 35	159.2	43 02.9	92 34	159.7	41 12.1	93 33	160.8	39 20.7	93 31	161.7	38 52.7	93 31	162.0	37 56.8	93 30	162.4	7
8	44 31.5	91 38	157.5	44 04.2	91 38	157.8	43 36.9	91 37	158.1	42 42.2	91 36	158.6	40 52.4	92 34	159.7	39 01.9	92 33	160.7	38 34.3	92 32	161.0	37 38.8	93 32	161.5	8
9	44 08.7	90 40	156.4	43 41.7	90 39	156.7	43 14.7	90 39	157.0	42 20.5	90 38	157.6	40 31.7	91 36	158.7	38 42.3	91 34	159.8	38 14.8	92 34	160.0	37 19.8	92 33	160.5	9
20	43 44.8	89 41	155.3	43 18.2	89 41	155.6	42 51.4	89 40	155.9	41 57.8	89 39	156.5	40 10.1	90 38	157.7	38 21.7	91 36	158.8	37 54.5	91 35	159.1	37 00.0	91 35	159.6	20
1	43 20.0	88 43	154.2	42 53.6	88 42	154.5	42 27.2	88 42	154.9	41 34.2	89 41	155.5	39 47.5	89 39	156.7	38 00.2	90 37	157.8	37 33.2	90 37	158.1	36 39.2	90 36	158.7	1
2	42 54.2	87 45	153.2	42 28.1	87 44	153.5	42 02.0	87 44	153.8	41 09.5	88 43	154.5	39 24.0	88 41	155.7	37 37.8	89 39	156.9	37 11.1	89 38	157.2	36 17.6	89 37	157.8	2
3	42 27.4	86 46	152.1	42 01.7	86 46	152.5	41 35.8	86 45	152.8	40 44.0	87 44	153.5	38 59.7	87 42	154.8	37 14.5	88 40	156.0	36 48.1	88 40	156.3	35 55.2	88 39	156.9	3
4	41 59.8	85 48	151.1	41 34.3	85 47	151.5	41 08.8	85 47	151.8	40 17.6	86 46	152.5	38 34.4	86 44	153.8	36 50.4	87 42	155.1	36 24.3	87 41	155.4	35 31.9	87 40	156.0	4
25	41 31.2	84 49	150.1	41 06.0	84 49	150.5	40 40.8	84 48	150.8	39 50.2	85 47	151.5	38 08.3	85 45	152.9	36 25.5	86 43	154.2	35 59.6	86 42	154.5	35 07.8	87 41	155.1	25
6	41 01.7	83 50	149.1	40 36.9	83 50	149.5	40 12.0	83 49	149.9	39 22.1	84 48	150.6	37 41.4	84 46	152.0	35 59.7	85 44	153.3	35 34.2	85 44	153.6	34 42.9	86 43	154.3	6
7	40 31.4	81 52	148.2	40 07.0	82 51	148.6	39 42.4	82 51	148.9	38 53.1	82 50	149.7	37 13.6	83 48	151.1	35 33.2	84 46	152.4	35 07.9	84 45	152.8	34 17.3	85 44	153.4	7
8	40 00.3	80 53	147.2	39 36.2	81 53	147.6	39 12.0	81 52	148.0	38 23.3	81 51	148.8	36 45.1	82 49	150.2	35 05.9	83 47	151.6	34 40.9	83 46	151.9	33 50.9	84 45	152.6	8
9	39 28.4	79 54	146.3	39 04.6	80 54	146.7	38 40.7	80 53	147.1	37 52.7	80 52	147.9	36 15.8	81 50	149.3	34 37.8	82 48	150.8	34 13.2	82 47	151.1	33 23.7	83 46	151.8	9
30	38 55.8	78 56	145.4	38 32.3	78 55	145.8	38 08.7	79 54	146.2	37 21.3	79 53	147.0	35 45.7	80 51	148.5	34 09.0	81 49	149.9	33 44.7	81 49	150.3	32 55.8	82 48	151.0	30
1	38 22.4	77 57	144.5	37 59.2	77 56	145.0	37 36.0	78 56	145.4	36 49.3	78 55	146.1	35 14.9	79 52	147.7	33 39.5	80 50	149.1	33 15.5	80 50	149.5	32 27.2	81 49	150.2	1
2	37 48.2	76 58	143.7	37 25.4	76 57	144.1	37 02.5	76 57	144.5	36 16.5	77 56	145.3	34 43.4	78 54	146.9	33 09.3	79 51	148.3	32 45.6	79 51	148.7	31 58.0	80 50	149.4	2
3	37 13.4	75 59	142.8	36 50.9	75 59	143.3	36 28.4	75 58	143.7	35 43.0	76 57	144.5	34 11.3	77 55	146.1	32 38.4	78 53	147.6	32 15.0	78 52	147.9	31 28.0	78 51	148.7	3
4	36 37.9	74 60	142.0	36 15.8	74 60	142.4	35 53.6	74 59	142.9	35 08.8	75 58	143.7	33 38.4	76 56	145.3	32 06.8	77 54	146.8	31 43.8	77 53	147.2	30 57.4	77 52	147.9	4
35	36 01.8	73 61	141.2	35 40.0	73 61	141.7	35 18.1	73 60	142.1	34 34.0	74 59	142.9	33 05.0	75 57	144.5	31 34.7	76 55	146.1	31 11.9	76 54	146.5	30 26.2	76 53	147.2	35
6	35 25.0	71 62	140.4	35 03.6	72 62	140.9	34 42.0	72 61	141.3	33 58.6	73 60	142.1	32 30.8	74 58	143.8	31 01.9	75 56	145.3	30 39.4	75 55	145.7	29 54.4	75 54	146.5	6
7	34 47.7	70 63	139.7	34 26.5	71 63	140.1	34 05.3	71 62	140.5	33 22.6	71 61	141.4	31 56.1	73 59	143.0	30 28.5	74 57	144.6	30 06.4	74 56	145.0	29 21.9	74 55	145.8	7
8	34 09.7	69 64	138.9	33 48.9	70 64	139.4	33 28.0	70 63	139.8	32 45.9	70 62	140.6	31 20.8	71 60	142.3	29 54.5	72 58	143.9	29 32.7	73 57	144.3	28 48.9	73 56	145.1	8
9	33 31.2	68 65	138.2	33 10.7	68 65	138.6	32 50.1	69 64	139.1	32 08.7	69 63	139.9	30 45.0	70 61	141.6	29 19.9	71 59	143.2	28 58.5	72 58	143.6	28 15.3	72 57	144.4	9
40	32 52.1	67 66	137.5	32 32.0	67 65	137.9	32 11.7	68 65	138.4	31 31.0	68 64	139.2	30 08.5	69 62	140.9	28 44.8	70 59	142.6	28 23.7	71 59	143.0	27 41.2	71 58	143.8	40
1	32 12.5	66 67	136.8	31 52.7	66 66	137.2	31 32.8	66 66	137.7	30 52.7	67 65	138.5	29 31.6	68 62	140.3	28 09.1	69 60	141.9	27 48.3	69 60	142.3	27 06.5	70 59	143.1	1
2	31 32.4	65 68	136.1	31 12.9	65 67	136.6	30 53.3	65 66	137.0	30 13.9	66 66	137.9	28 54.1	67 63	139.6	27 33.0	68 61	141.3	27 12.5	68 61	141.7	26 31.4	69 60	142.5	2
3	30 51.8	64 68	135.5	30 32.6	64 68	135.9	30 13.4	64 67	136.3	29 34.6	65 66	137.2	28 16.1	66 64	139.0	26 56.3	67 62	140.6	26 36.1	67 61	141.1	25 55.7	68 60	141.9	3
4	30 10.7	63 69	134.8	29 51.9	63 69	135.3	29 33.0	63 68	135.7	28 54.9	64 67	136.6	27 37.6	65 65	138.3	26 19.1	66 63	140.0	25 59.3	66 62	140.4	25 19.5	67 61	141.3	4
45	29 29.2	62 70	134.2	29 10.7	62 69	134.6	28 52.1	62 69	135.1	28 14.6	63 68	136.0	26 58.7	64 66	137.7	25 41.5	65 64	139.4	25 22.0	65 63	139.8	24 42.8	66 62	140.7	45
6	28 47.2	60 71	133.6	28 29.0	61 70	134.0	28 10.7	61 70	134.5	27 33.9	62 69	135.4	26 19.3	63 66	137.1	25 03.4	64 64	138.8	24 44.2	64 64	139.3	24 05.7	64 63	140.1	6
7	28 04.8	59 71	133.0	27 46.9	60 71	133.4	27 29.0	60 70	133.9	26 52.8	61 69	134.8	25 39.4	62 67	136.5	24 24.8	63 65	138.3	24 06.0	63 64	138.7	23 28.1	63 63	139.5	7
8	27 22.0	58 72	132.4	27 04.4	59 72	132.8	26 46.8	59 71	133.3	26 11.2	60 70	134.2	24 59.2	61 68	135.9	23 45.9	62 66	137.7	23 27.3	62 65	138.1	22 50.1	62 64	139.0	8
9	26 38.8	57 73	131.8	26 21.5	58 72	132.3	26 04.2	58 72	132.7	25 29.3	58 71	133.6	24 18.5	60 68	135.4	23 06.5	61 66	137.1	22 48.3	61 66	137.6	22 11.7	61 65	138.4	9
50	25 55.2	56 73	131.2	25 38.3	57 73	131.7	25 21.2	57 72	132.1	24 46.9	57 71	133.1	23 37.4	58 69	134.8	22 26.7	59 67	136.6	22 08.8	60 66	137.0	21 32.9	60 65	137.9	50
1	25 11.2	55 74	130.7	24 54.6	56 73	131.1	24 37.9	56 73	131.6	24 04.2	56 72	132.5	22 55.9	57 70	134.3	21 46.5	58 68	136.1	21 28.9	59 67	136.5	20 53.6	59 66	137.4	1
2	24 26.9	54 74	130.2	24 10.6	55 74	130.6	23 54.2	55 74	131.1	23 21.1	55 72	132.0	22 14.1	56 70	133.8	21 05.9	57 68	135.6	20 48.7	58 68	136.0	20 14.0	58 67	136.9	2
3	23 42.2	53 75	129.6	23 26.2	54 74	130.1	23 10.1	54 74	130.6	22 37.7	54 73	131.5	21 31.9	55 71	133.3	20 24.9	56 69	135.1	20 08.0	56 68	135.5	19 34.0	57 67	136.4	3
4	22 57.2	52 76	129.1	22 41.5	53 75	129.6	22 25.7	53 74	130.0	21 53.9	53 74	131.0	20 49.3	54 72	132.8	19 43.6	55 69	134.6	19 27.0	55 69	135.0	18 53.7	56 68	135.9	4
55	22 11.9	51 76	128.6	21 56.5	52 76	129.1	21 41.0	52 75	129.6	21 09.8	52 74	130.5	20 06.4	53 72	132.3	19 02.0	54 70	134.1	18 45.7	54 69	134.5	18 13.0	55 68	135.4	55
6	21 26.3	50 76	128.1	21 11.2	51 76	128.6	20 55.9	51 76	129.1	20 25.3	51 75	130.0	19 23.2	52 73	131.8	18 20.0	53 71	133.6	18 04.0	53 70	134.1	17 31.9	54 69	134.9	6
7	20 40.4	49 77	127.7	20 25.5	50 77	128.1	20 10.6	50 76	128.6	19 40.6	50 75	129.5	18 39.6	51 73	131.3	17 37.7	52 71	133.2	17 22.0	52 71	133.6	16 50.6	53 69	134.5	7
8	19 54.1	48 78	127.2	19 39.6	49 77	127.7	19 25.0	49 76	128.1	18 55.5	49 76	129.1	17 55.8	50 74	130.9	16 55.0	51 72	132.7	16 39.7	51 71	133.2	16 08.9	52 70	134.0	8
9	19 07.6	47 78	126.8	18 53.4	48 77	127.2	18 39.0	48 77	127.7	18 10.2	48 76	128.6	17 11.6	49 74	130.5	16 12.1	50 72	132.3	15 57.1	50 72	132.7	15 26.9	51 70	133.6	9
60	18 20.9	47 78	126.3	18 06.9	47 78	126.8	17 52.8	47 78	127.3	17 24.5	47 76	128.2	16 27.2	48 75	130.0	15 28.9	49 73	131.8	15 14.2	49 72	132.3	14 44.6	49 71	133.2	60
1	17 33.8	46 79	125.9	17 20.1	46 78	126.4	17 06.4	46 78	126.8	16 38.6	46 77	127.8	15 42.5	47 75	129.6	14 45.4	48 73	131.4	14 31.0	48 72	131.9	14 02.0	48 71	132.8	1
2	16 46.6	45 79	125.5	16 33.1	45 79	126.0	16 19.6	45 78	126.4	15 52.5	45 77	127.3	14 57.5	46 75	129.2	14 01.6	47 73	131.0	13 47.5	47 73	131.5	13 19.1	47 72	132.4	2
3	15 59.0	44 80	125.1	15 45.9	44 79	125.5	15 32.7	44 79	126.0	15 06.1	45 78	126.9	14 12.2	45 76	128.8	13 17.5	46 74	130.6	13 03.7	46 73	131.1	12 36.0	46 72	132.0	3
4	15 11.3	43 80	124.7	14 58.4	43 80	125.2	14 45.5	43 79	125.6	14 19.4	44 78	126.5	13 26.7	44 76	128.4	12 33.2	45 74	130.2	12 19.7	45 74	130.7	11 52.6	45 73	131.6	4
65	14 23.3	42 80	124.3	14 10.7	42 80	124.8	13 58.0	42 80	125.2	13 32.5	43 79	126.2	12 41.0	43 77	128.0	11 48.6	44 75	129.9	11 35.4	44 74	130.3	11 08.9	44 73	131.2	65
6	13 35.1	41 81	123.9	13 22.8	41 80	124.4	13 10.4	41 80	124.9	12 45.4	42 79	125.8	11 55.0	42 77	127.6	11 03.8	43 75	129.5	10 50.9	43 75	130.0	10 25.0	43 74	130.9	6
7	12 46.7	40 81	123.6	12 34.6	40 81	124.0	12 22.5	40 80	124.5	11 58.1	41 79	125.4	11 08.8	41 77	127.3	10 18.8	42 75	129.1	10 06.2	42 75	129.6	9 40.9	42 74	130.5	7
8	11 58.1	39 81	123.2	11 46.2	39 81	123.7	11 34.4	40 80	124.1	11 10.6	40 80	125.1	10 22.4	40 78	126.9	9 33.5	41 76	128.8	9 21.2	41 75	129.2	8 56.5	41 74	130.2	8
9	11 09.2	38 82	122.8	10 57.7	39 81	123.3	10 46.1	39 81	123.8	10 22.8	39 80	124.7	9 35.7	39 78	126.6	8 48.0	40 76	128.4	8 36.0	40 76	128.9	8 11.9	40 75	129.8	9
70	10 20.2	38 82	122.5	10 08.9	38 82	123.0	9 57.6	38 81	123.4	9 34.8	38 80	124.4	8 48.9	39 78	126.3	8 02.3	39 77	128.1	7 50.6	39 76	128.6	7 27.1	39 75	129.5	70
1	9 31.0	37 82	122.2	9 20.0	37 82	122.6	9 08.9	37 81	123.1	8 46.7	37 81	124.1	8 01.8	38 79	125.9	7 16.4	38 77	127.8	7 05.0	38 76	128.3	6 42.1	38 75	129.2	1
2	8 41.7	36 82	121.8	8 30.9	36 82	122.3	8 20.1	36 82	122.8	7 58.4	36 81	123.7	7 14.6	37 79	125.6	6 30.3	37 77	127.5	6 19.2	37 77	127.9	5 56.9	37 76	128.9	2
3	7 52.1	35 83	121.5	7 41.6	35 82	122.0	7 31.1	35 82	122.5	7 09.9	35 81	123.4	6 27.2	36 79	125.3	5 44.0	36 77	127.2	5 33.2	36 77	127.6	5 11.4	36 76	128.6	3
4	7 02.4	34 83	121.2	6 52.2	34 83	121.7	6 41.9	34 82	122.2	6 21.2	35 81	123.1	5 39.6	35 80	125.0										4
75	6 12.6	33 83	120.9	6 02.5	33 83	121.4	5 52.5	34 82	121.9	5 32.3	34 82	122.8													75
6	5 22.5	33 84	120.6	5 12.8	33 83	121.1	5 03.0	33 83	121.6																6

DECLINATION SAME NAME AS LATITUDE

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	5 39.6	22 86	62.5	5 46.3	22 86	62.0	5 52.9	22 85	61.5	6 06.1	22 84	60.6	6 32.2	22 83	58.6	6 57.8	21 81	56.6	7 04.2	21 80	56.1	7 16.7	21 80	55.1	91
2							5 01.8	23 85	61.3	5 15.5	23 84	60.4	5 42.6	22 83	58.4	6 09.3	22 81	56.4	6 15.9	22 80	56.0	6 29.0	22 79	55.0	2
3																5 20.8	23 81	56.3	5 27.7	23 80	55.8	5 41.4	23 79	54.8	3

H.A.	36° 00′				37° 00′				38° 30′				40° 00′				42° 00′				42° 30′				43° 00′				45° 00′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	68 00.0	1.0	02	00.0	67 00.0	1.0	02	00.0	65 30.0	1.0	02	00.0	64 00.0	1.0	01	00.0	62 00.0	1.0	01	00.0	61 30.0	1.0	01	00.0	61 00.0	1.0	01	00.0	59 00.0	1.0	01	00.0	00
1	67 58.9	1.0	05	02.2	66 59.0	1.0	05	02.0	65 29.0	1.0	05	01.9	63 59.1	1.0	04	01.7	61 59.2	1.0	04	01.6	61 29.2	1.0	04	01.5	60 59.2	1.0	04	01.5	58 59.3	1.0	03	01.4	1
2	67 55.6	1.0	09	04.3	66 55.9	1.0	09	04.1	65 26.2	1.0	08	03.8	63 56.5	1.0	07	03.5	61 56.8	1.0	07	03.2	61 26.9	1.0	07	03.1	60 56.9	1.0	06	03.0	58 57.2	1.0	06	02.7	2
3	67 50.2	99	13	06.4	66 50.7	99	12	06.1	65 21.4	99	11	05.6	63 52.0	99	10	05.2	61 52.8	99	09	04.7	61 23.0	99	09	04.6	60 53.1	99	09	04.5	58 53.7	1.0	08	04.1	3
4	67 42.6	98	16	08.6	66 43.5	99	15	08.1	65 14.7	99	14	07.5	63 45.9	99	13	06.9	61 47.2	99	12	06.3	61 17.5	99	12	06.1	60 47.8	99	11	06.0	58 48.9	99	10	05.5	4
05	67 32.9	98	20	10.6	66 34.3	98	19	10.1	65 06.2	98	17	09.3	63 38.0	98	16	08.6	61 40.0	98	15	07.8	61 10.5	98	14	07.7	60 40.9	98	14	07.5	58 42.6	99	13	06.8	05
6	67 21.1	96	23	12.7	66 23.1	97	22	12.0	64 55.9	97	20	11.1	63 28.4	97	19	10.3	61 31.3	98	17	09.4	61 02.0	98	17	09.2	60 32.6	98	16	08.9	58 35.1	98	15	08.2	6
7	67 07.3	95	26	14.7	66 10.0	96	25	13.9	64 43.8	96	23	12.9	63 17.1	96	22	12.0	61 21.1	97	20	10.9	60 52.0	97	19	10.6	60 22.9	97	19	10.4	58 26.1	97	17	09.5	7
8	66 51.6	94	29	16.6	65 55.1	94	28	15.8	64 29.9	96	26	14.7	63 04.2	95	24	13.6	61 09.3	96	22	12.4	60 40.5	96	22	12.1	60 11.6	96	21	11.8	58 15.9	97	19	10.8	8
9	66 34.0	92	32	18.6	65 38.3	93	31	17.6	64 14.3	94	29	16.4	62 49.7	94	27	15.2	60 56.1	96	24	13.8	60 27.6	95	24	13.5	59 59.0	95	23	13.2	58 04.4	96	21	12.1	9
10	66 14.5	91	35	20.4	65 19.8	91	34	19.4	63 57.1	92	31	18.0	62 33.7	93	29	16.8	60 41.5	94	27	15.3	60 13.3	94	26	14.9	59 45.0	94	26	14.6	57 51.6	95	23	13.3	10
1	65 53.4	89	38	22.2	64 59.7	90	36	21.1	63 38.3	91	34	19.7	62 16.1	92	32	18.3	60 25.4	93	29	16.7	59 57.6	93	28	16.3	59 29.7	93	28	16.0	57 37.5	94	25	14.6	1
2	65 30.6	87	41	23.9	64 37.9	88	39	22.8	63 18.0	89	36	21.2	61 57.1	90	34	19.8	60 08.0	91	31	18.1	59 40.6	92	31	17.7	59 13.0	92	30	17.3	57 22.2	93	27	15.8	2
3	65 06.2	86	43	25.6	64 14.6	86	41	24.4	62 56.2	88	39	22.8	61 36.7	89	36	21.2	59 49.3	90	33	19.4	59 22.2	90	33	19.0	58 55.1	91	32	18.6	57 05.8	92	29	17.0	3
4	64 40.3	84	46	27.2	63 49.8	85	44	26.0	62 32.9	86	41	24.2	61 14.9	87	38	22.7	59 29.3	89	35	20.7	59 02.7	89	35	20.3	58 35.9	89	34	19.9	56 48.1	90	31	18.2	4
15	64 12.9	82	48	28.8	63 23.6	83	46	27.5	62 08.4	84	43	25.7	60 51.8	86	41	24.0	59 08.1	87	37	22.0	58 41.9	88	37	21.5	58 15.6	88	36	21.1	56 29.4	89	33	19.4	15
6	63 44.2	80	50	30.3	62 56.1	81	48	28.9	61 42.5	83	45	27.1	60 27.5	84	43	25.4	58 45.7	86	39	23.3	58 19.9	86	38	22.8	57 54.0	86	38	22.3	56 09.6	88	35	20.5	6
7	63 14.3	78	52	31.7	62 27.3	79	50	30.3	61 15.4	81	47	28.4	60 02.0	82	44	26.6	58 22.1	84	41	24.5	57 56.8	85	40	24.0	57 31.4	85	40	23.5	55 48.7	86	37	21.6	7
8	62 43.1	76	54	33.1	61 57.3	77	52	31.7	60 47.1	79	49	29.7	59 35.3	81	46	27.9	57 57.5	82	43	25.6	57 32.6	83	42	25.1	57 07.7	83	41	24.6	55 26.7	85	38	22.7	8
9	62 10.8	74	56	34.4	61 26.2	75	54	32.9	60 17.7	77	51	30.9	59 07.6	79	48	29.1	57 31.7	81	45	26.8	57 07.4	81	44	26.2	56 42.9	82	43	25.7	55 03.8	83	40	23.7	9
20	61 37.4	72	57	35.6	60 54.0	73	55	34.2	59 47.3	75	52	32.1	58 38.8	77	50	30.2	57 05.0	79	46	27.9	56 41.2	80	45	27.3	56 17.2	80	45	26.8	54 39.9	82	41	24.7	20
1	61 03.0	70	59	36.8	60 20.8	71	57	35.3	59 15.8	73	54	33.3	58 09.0	75	51	31.3	56 37.3	77	48	29.0	56 14.0	78	47	28.4	55 50.5	79	46	27.8	54 15.1	80	43	25.7	1
2	60 27.7	68	60	37.9	59 46.7	69	58	36.5	58 43.4	71	56	34.4	57 38.2	73	53	32.4	56 08.6	76	49	30.0	55 45.8	76	48	29.4	55 22.9	77	48	28.8	53 49.4	79	44	26.7	2
3	59 51.5	66	62	39.0	59 11.6	67	60	37.5	58 10.1	70	57	35.4	57 06.5	72	54	33.4	55 39.1	74	51	31.0	55 16.8	75	50	30.4	54 54.3	75	49	29.8	53 22.9	77	46	27.6	3
4	59 14.4	64	63	40.0	58 35.7	65	61	38.6	57 35.9	68	58	36.4	56 34.0	70	56	34.4	55 08.7	72	52	31.9	54 47.0	73	51	31.3	54 25.0	73	50	30.7	52 55.5	76	47	28.5	4
25	58 36.6	62	64	41.0	57 59.0	63	62	39.5	57 00.9	66	60	37.4	56 00.7	68	57	35.4	54 37.5	71	53	32.9	54 16.3	71	52	32.2	53 54.8	72	52	31.7	52 27.4	74	48	29.4	25
6	57 58.0	60	65	42.0	57 21.6	61	64	40.5	56 25.2	64	61	38.3	55 26.6	66	58	36.3	54 05.6	69	54	33.7	53 44.8	69	54	33.1	53 23.9	70	53	32.5	51 58.4	72	49	30.2	6
7	57 18.7	58	67	42.8	56 43.5	60	65	41.4	55 48.7	62	62	39.2	54 51.8	64	59	37.2	53 32.9	67	56	34.6	53 12.7	68	55	34.0	52 52.2	68	54	33.4	51 28.8	71	51	31.0	7
8	56 38.8	56	68	43.7	56 04.7	58	66	42.2	55 11.6	60	63	40.1	54 16.3	63	60	38.0	52 59.5	65	57	35.4	52 39.8	66	56	34.8	52 19.9	67	55	34.2	50 58.4	69	52	31.8	8
9	55 58.3	54	68	44.5	55 25.3	56	67	43.0	54 33.8	58	64	40.9	53 40.1	61	61	38.8	52 25.4	64	58	36.2	52 06.2	64	57	35.6	51 46.8	65	56	35.0	50 27.4	67	53	32.6	9
30	55 17.2	52	69	45.3	54 45.3	54	68	43.8	53 55.4	57	65	41.6	53 03.3	59	62	39.6	51 50.7	62	59	37.0	51 32.0	63	58	36.3	51 13.1	63	57	35.7	49 55.7	66	54	33.3	30
1	54 35.6	51	70	46.0	54 04.7	52	68	44.5	53 16.4	55	66	42.4	52 25.9	57	63	40.3	51 15.4	60	60	37.7	50 57.2	61	59	37.1	50 38.9	62	58	36.4	49 23.5	64	55	34.0	1
2	53 53.5	49	71	46.7	53 23.6	51	69	45.2	52 36.9	53	67	43.1	51 48.0	56	64	41.0	50 39.5	58	61	38.4	50 21.8	59	60	37.8	50 04.0	60	59	37.1	48 50.6	62	56	34.7	2
3	53 10.9	47	72	47.3	52 42.1	49	70	45.9	51 56.9	51	68	43.8	51 09.5	54	65	41.7	50 03.1	57	62	39.1	49 45.9	58	61	38.4	49 28.6	58	60	37.8	48 17.2	61	57	35.4	3
4	52 27.9	45	72	48.0	52 00.1	47	71	46.5	51 16.4	50	68	44.4	50 30.5	52	66	42.3	49 26.1	55	62	39.7	49 09.5	56	62	39.1	48 52.6	57	61	38.5	47 43.2	59	57	36.0	4
35	51 44.5	44	73	48.5	51 17.6	46	71	47.1	50 35.5	48	69	45.0	49 51.1	50	66	43.0	48 48.7	53	63	40.3	48 32.5	54	62	39.7	48 16.2	55	62	39.1	47 08.7	57	58	36.6	35
6	51 00.6	42	74	49.1	50 34.8	44	72	47.7	49 54.1	46	70	45.6	49 11.2	49	67	43.5	48 10.8	52	64	40.9	47 55.1	53	63	40.3	47 39.2	53	62	39.7	46 33.8	56	59	37.2	6
7	50 16.5	41	74	49.6	49 51.6	42	73	48.2	49 12.3	45	70	46.1	48 30.9	47	68	44.1	47 32.4	50	65	41.5	47 17.2	51	64	40.9	47 01.9	52	63	40.2	45 58.4	54	60	37.8	7
8	49 32.0	39	75	50.1	49 08.0	41	73	48.7	48 30.2	43	71	46.7	47 50.2	46	68	44.6	46 53.6	49	65	42.0	46 39.0	49	64	41.4	46 24.1	50	64	40.8	45 22.5	53	60	38.3	8
9	48 47.1	38	75	50.6	48 24.1	39	74	49.2	47 47.6	42	71	47.1	47 09.1	44	69	45.1	46 14.5	47	66	42.5	46 00.3	48	65	41.9	45 45.9	48	64	41.3	44 46.2	51	61	38.8	9
40	48 02.0	36	76	51.0	47 39.8	38	74	49.7	47 04.8	40	72	47.6	46 27.6	42	70	45.6	45 34.9	45	66	43.0	45 21.2	46	66	42.4	45 07.3	47	65	41.8	44 09.5	49	62	39.3	40
1	47 16.6	35	76	51.5	46 55.3	36	75	50.1	46 21.6	39	72	48.1	45 45.8	41	70	46.1	44 55.0	44	67	43.5	44 41.7	45	66	42.9	44 28.3	45	66	42.3	43 32.5	48	62	39.8	1
2	46 30.9	33	76	51.9	46 10.5	35	75	50.5	45 38.2	37	73	48.5	45 03.7	39	71	46.5	44 14.7	42	68	44.0	44 02.0	43	67	43.3	43 49.0	44	66	42.7	42 55.0	46	63	40.2	2
3	45 45.0	32	77	52.3	45 25.5	33	76	50.9	44 54.4	36	73	48.9	44 21.3	38	71	46.9	43 34.2	41	68	44.4	43 21.9	41	67	43.8	43 09.3	42	67	43.1	42 17.2	45	64	40.7	3
4	44 58.8	30	77	52.6	44 40.2	32	76	51.3	44 10.4	34	74	49.3	43 38.7	36	72	47.3	42 53.3	39	69	44.8	42 41.4	40	68	44.2	42 29.4	41	67	43.5	41 39.1	43	64	41.1	4
45	44 12.5	29	78	52.9	43 54.7	30	76	51.6	43 26.2	33	74	49.6	42 55.7	35	72	47.7	42 12.1	38	69	45.2	42 00.7	38	68	44.6	41 49.1	39	68	43.9	41 00.7	42	65	41.5	45
6	43 25.9	28	78	53.3	43 08.9	29	77	51.9	42 41.7	31	74	50.0	42 12.5	33	72	48.1	41 30.7	36	69	45.6	41 19.7	37	69	44.9	41 08.6	38	68	44.3	40 22.0	40	65	41.9	6
7	42 39.2	26	78	53.6	42 23.0	28	77	52.3	41 57.0	30	75	50.3	41 29.1	32	73	48.4	40 49.0	35	70	45.9	40 38.5	35	69	45.3	40 27.8	36	68	44.7	39 43.0	39	65	42.2	7
8	41 52.3	25	78	53.8	41 36.8	26	77	52.5	41 12.1	29	75	50.6	40 45.5	31	73	48.7	40 07.1	33	70	46.2	39 57.0	34	70	45.6	39 46.7	35	69	45.0	39 03.7	37	66	42.6	8
9	41 05.2	24	79	54.1	40 50.5	25	77	52.8	40 27.0	27	75	50.9	40 01.6	29	73	49.0	39 24.9	32	71	46.5	39 15.3	33	70	45.9	39 05.4	33	69	45.3	38 24.2	36	66	42.9	9
50	40 17.9	22	79	54.3	40 04.1	24	78	53.1	39 41.7	26	76	51.2	39 17.6	28	74	49.3	38 42.6	30	71	46.8	38 33.3	31	70	46.2	38 23.9	32	70	45.6	37 44.4	34	67	43.2	50
1	39 30.6	21	79	54.6	39 17.5	23	78	53.3	38 56.3	25	76	51.4	38 33.3	26	74	49.6	38 00.0	29	71	47.1	37 51.2	30	71	46.5	37 42.2	30	70	45.9	37 04.4	33	67	43.5	1
2	38 43.1	20	79	54.8	38 30.7	21	78	53.5	38 10.7	23	76	51.7	37 48.9	25	74	49.8	37 17.2	28	72	47.4	37 08.9	28	71	46.8	37 00.3	29	70	46.2	36 24.2	31	67	43.8	2
3	37 55.4	19	80	55.0	37 43.8	20	78	53.8	37 24.9	22	76	51.9	37 04.4	24	75	50.1	36 34.3	26	72	47.6	36 26.3	27	71	47.0	36 18.2	27	70	46.4	35 43.8	30	68	44.1	3
4	37 07.7	17	80	55.2	36 56.8	19	79	53.9	36 39.1	21	77	52.1	36 19.6	23	75	50.3	35 51.2	25	72	47.9	35 43.6	25	71	47.3	35 35.9	26	71	46.7	35 03.2	28	68	44.3	4
55	36 19.9	16	80	55.3	36 09.7	18	79	54.1	35 53.1	19	77	52.3	35 34.8	21	75	50.5	35 07.9	24	72	48.1	35 00.8	24	72	47.5	34 53.5	25	71	46.9	34 22.5	27	68	44.6	55
6	35 31.9	15	80	55.5	35 22.5	16	79	54.3	35 06.9	18	77	52.5	34 49.8	20	75	50.7	34 24.5	22	73	48.3	34 17.8	23	72	47.7	34 10.9	23	71	47.1	33 41.5	26	68	44.8	6
7	34 43.9	14	80	55.6	34 35.1	15	79	54.4	34 20.7	17	77	52.6	34 04.7	19	75	50.9	33 41.0	21	73	48.5	33 34.6	21	72	47.9	33 28.1	22	71	47.3	33 00.4	24	69	45.0	7
8	33 55.8	13	80	55.8	33 47.7	14	79	54.6	33 34.4	16	77	52.8	33 19.5	17	76	51.0	32 57.3	20	73	48.7	32 51.4	20	72	48.1	32 45.3	21	72	47.5	32 19.2	23	69	45.2	8
9	33 07.6	12	80	55.9	33 00.3	13	79	54.7	32 48.0	14	78	52.9	32 34.2	16	76	51.2	32 13.5	18	73	48.8	32 08.0	19	72	48.3	32 02.3	19	72	47.7	31 37.8	21	69	45.4	9
60	32 19.4	11	80	56.0	32 12.7	12	79	54.8	32 01.5	13	78	53.1	31 48.8	15	76	51.3	31 29.7	17	73	49.0	31 24.5	18	73	48.4	31 19.2	18	72	47.9	30 56.3	20	69	45.6	60
1	31 31.1	09	81	56.1	31 25.1	11	79	54.9	31 14.9	12	78	53.2	31 03.3	14	76	51.5	30 45.7	16	73	49.1	30 40.9	16	73	48.6	30 35.9	17	72	48.0	30 14.7	19	70	45.7	1
2	30 42.7	08	81	56.2	30 37.4	09	80	55.0	30 28.2	11	78	53.3	30 17.7	12	76	51.6	30 01.6	14	74	49.3	29 57.2	15	73	48.7	29 52.6	15	72	48.1	29 33.0	17	70	45.9	2
3	29 54.3	07	81	56.3	29 49.7	08	80	55.1	29 41.5	10	78	53.4	29 32.1	11	76	51.7	29 17.4	13	74	49.4	29 13.4	14	73	48.8	29 09.2	14	72	48.3	28 51.1	16	70	46.0	3
4	29 05.9	06	81	56.3	29 01.9	07	80	55.2	28 54.8	09	78	53.5	28 46.4	10	76	51.8	28 33.2	12	74	49.5	28 29.5	12	73	48.9	28 25.7	13	73	48.4	28 09.2	15	70	46.1	4
65	28 17.5	05	81	56.4	28 14.1	06	80	55.2	28 08.0	07	78	53.5	28 00.6	09	76	51.8	27 48.9	11	74	49.6	27 45.6	11	73	49.0	27 42.2	12	73	48.5	27 27.2	13	70	46.2	65
6	27 29.0	04	81	56.4	27 26.2	05	80	55.3	27 21.1	06	78	53.6	27 14.8	08	76	51.9	27 04.5	09	74	49.7	27 01.6	10	73	49.1	26 58.6	10	73	48.6	26 45.1	12	70	46.3	6
7	26 40.5	03	81	56.4	26 38.4	04	80	55.3	26 34.3	05	78	53.7	26 29.0	07	76	52.0	26 20.1	08	74	49.8	26 17.6	09	73	49.2	26 14.9	09	73	48.6	26 03.0	11	70	46.4	7
8	25 51.9	02	81	56.5	25 50.5	03	80	55.4	25 47.4	04	78	53.7	25 43.1	05	77	52.0	25 35.7	07	74	49.8	25 33.5	07	74	49.3	25 31.2	08	73	48.7	25 20.8	10	70	46.5	8
9	25 03.4	01	81	56.5	25 02.6	02	80	55.4	25 00.4	03	78	53.7	24 57.2	04	77	52.1	24 51.2	06	74	49.9	24 49.3	06	74	49.3	24 47.4	07	73	48.8	24 38.5	08	70	46.6	9
70	24 14.8	00	81	56.5	24 14.7	01	80	55.4	24 13.5	02	78	53.7	24 11.3	03	77	52.1	24 06.6	05	74	49.9	24 05.2	05	74	49.4	24 03.6	05	73	48.8	23 56.2	07	71	46.6	70
1	23 26.3	01	81	56.5	23 26.7	00	80	55.4	23 26.5	01	78	53.8	23 25.3	02	77	52.1	23 22.1	03	74	49.9	23 21.0	04	74	49.4	23 19.8	04	73	48.9	23 13.9	06	71	46.7	1
2	22 37.8	02	81	56.5	22 38.8	01	80	55.4	22 39.6	00	78	53.8	22 39.3	01	77	52.1	22 37.5	02	74	50.0	22 36.8	03	74	49.4	22 35.9	03	73	48.9	22 31.5	04	71	46.7	2
3	21 49.3	03	81	56.4	21 50.9	02	80	55.4	21 52.6	01	78	53.8	21 53.4	00	77	52.1	21 52.9	01	74	50.0	21 52.5	01	74	49.4	21 52.1	02	73	48.9	21 49.1	03	71	46.8	3
4	21 00.7	04	81	56.4	21 03.0	03	80	55.3	21 05.7	02	78	53.7	21 07.4	01	77	52.1	21 08.3	00	74	50.0	21 08.3	00	74	49.5	21 08.2	01	73	48.9	21 06.7	02	71	46.8	4
75	20 12.3	05	81	56.4	20 15.1	04	80	55.3	20 18.7	04	78	53.7	20 21.5	03	77	52.1	20 23.8	01	74	50.0	20 24.1	01	74	49.4	20 24.3	01	73	48.9	20 24.3	01	71	46.8	75
6	19 23.8	06	81	56.3	19 27.3	06	80	55.3	19 31.8	05	78	53.7	19 35.5	04	77	52.1	19 39.2	02	74	50.0	19 39.8	02	74	49.4	19 40.4	02	73	48.9	19 41.8	01	71	46.8	6
7	18 35.4	07	81	56.3	18 39.4	07	80	55.2	18 44.9	06	78	53.6	18 49.6	05	76	52.1	18 54.6	04	74	49.9	18 55.6	03	74	49.4	18 56.6	03	73	48.9	18 59.4	02	71	46.8	7
8	17 47.0	08	81	56.2	17 51.6	08	80	55.2	17 58.1	07	78	53.6	18 03.7	06	76	52.0	18 10.1	05	74	49.9	18 11.4	04	74	49.4	18 12.7	04	73	48.9	18 17.0	03	71	46.8	8
9	16 58.6	09	81	56.1	17 03.9	09	80	55.1	17 11.2	08	78	53.5	17 17.8	07	76	52.0	17 25.5	06	74	49.9	17 27.2	06	74	49.3	17 28.9	05	73	48.8	17 34.6	04	71	46.7	9
80	16 10.3	10	80	56.1	16 16.2	10	79	55.0	16 24.4	09	78	53.5	16 32.0	08	76	51.9	16 41.0	07	74	49.8	16 43.1	07	74	49.3	16 45.1	06	73	48.8	16 52.2	05	71	46.7	80
1	15 22.0	11	80	56.0	15 28.5	11	79	54.9	15 37.7	10	78	53.4	15 46.2	09	76	51.8	15 56.6	08	74	49.8	15 59.0	08	73	49.2	16 01.3	08	73	48.7	16 09.9	07	71	46.6	1
2	14 33.8	12	80	55.9	14 40.9	12	79	54.8	14 51.0	11	78	53.3	15 00.5	10	76	51.8	15 12.1	09	74	49.7	15 14.9	09	73	49.2	15 17.6	09	73	48.7	15 27.6	08	70	46.6	2
3	13 45.6	13	80	55.8	13 53.3	13	79	54.7	14 04.3	12	78	53.2	14 14.8	11	76	51.7	14 27.8	10	74	49.6	14 30.9	10	73	49.1	14 33.9	10	73	48.6	14 45.3	09	70	46.5	3
4	12 57.5	14	80	55.7	13 05.8	14	79	54.6	13 17.7	13	78	53.1	13 29.1	12	76	51.6	13 43.5	12	74	49.5	13 46.9	11	73	49.0	13 50.2	11	73	48.5	14 03.0	10	70	46.5	4
85	12 09.5	15	80	55.5	12 18.4	15	79	54.5	12 31.2	14	77	53.0	12 43.6	13	76	51.5	12 59.2	13	74	49.4	13 03.0	12	73	48.9	13 06.7	12	73	48.4	13 20.9	11	70	46.4	85
6	11 21.5	16	80	55.4	11 31.0	16	79	54.4	11 44.7	15	77	52.9	11 58.0	14	76	51.4	12 15.0	14	74	49.3	12 19.1	14	73	48.8	12 23.1	13	72	48.3	12 38.8	13	70	46.3	6
7	10 33.7	17	80	55.3	10 43.7	17	79	54.3	10 58.4	16	77	52.8	11 12.6	16	76	51.2	11 30.9	15	73	49.2	11 35.3	15	73	48.7	11 39.7	15	72	48.2	11 56.7	14	70	46.2	7
8	9 45.9	18	80	55.1	9 56.5	18	79	54.1	10 12.1	17	77	52.6	10 27.2	17	75	51.1	10 46.8	16	73	49.1	10 51.6	16	73	48.6	10 56.3	16	72	48.1	11 14.7	15	70	46.1	8
9	8 58.1	19	79	55.0	9 09.3	19	78	54.0	9 25.8	18	77	52.5	9 42.0	18	75	51.0	10 02.8	17	73	49.0	10 08.0	17	73	48.5	10 13.0	17	72	48.0	10 32.8	16	70	46.0	9
90	8 10.5	20	79	54.8	8 22.3	20	78	53.8	8 39.7	19	77	52.3	8 56.8	19	75	50.8	9 19.0	18	73	48.9	9 24.4	18	72	48.4	9 29.8	18	72	47.9	9 51.0	17	70	45.9	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	40 00.0	1.0 01	180.0	39 00.0	1.0 01	180.0	37 30.0	1.0 01	180.0	36 00.0	1.0 01	180.0	34 00.0	1.0 01	180.0	33 30.0	1.0 01	180.0	33 00.0	1.0 01	180.0	31 00.0	1.0 01	180.0	00
1	39 59.5	1.0 03	178.9	38 59.5	1.0 03	179.0	37 29.5	1.0 02	179.0	35 59.5	1.0 02	179.1	33 59.5	1.0 02	179.1	33 29.6	1.0 02	179.1	32 59.6	1.0 02	179.1	30 59.6	1.0 02	179.2	1
2	39 57.9	1.0 04	177.9	38 57.9	1.0 04	177.9	37 28.0	1.0 04	178.0	35 58.1	1.0 04	178.1	33 58.2	1.0 04	178.2	33 28.2	1.0 04	178.2	32 58.2	1.0 04	178.3	30 58.3	1.0 03	178.4	2
3	39 55.2	1.0 06	176.8	38 55.3	1.0 06	176.9	37 25.5	1.0 06	177.0	35 55.7	1.0 06	177.2	33 55.9	1.0 05	177.3	33 26.0	1.0 05	177.3	32 56.0	1.0 05	177.4	30 56.2	1.0 06	177.5	3
4	39 51.4	1.0 08	175.8	38 51.7	1.0 08	175.9	37 22.0	1.0 08	176.1	35 52.3	1.0 07	176.2	33 52.7	1.0 07	176.4	33 22.8	1.0 07	176.5	32 52.9	1.0 07	176.5	30 53.3	1.0 06	176.7	4
05	39 46.6	99 10	174.7	38 47.0	99 10	174.9	37 17.5	99 09	175.1	35 48.0	99 09	175.3	33 48.6	99 08	175.5	33 18.8	99 08	175.6	32 48.9	99 08	175.7	30 49.5	1.0 08	175.9	05
6	39 40.7	99 12	173.7	38 41.3	99 11	173.9	37 12.0	99 11	174.1	35 42.7	99 10	174.3	33 43.6	99 10	174.6	33 13.9	99 10	174.7	32 44.1	99 10	174.8	30 44.9	99 09	175.1	6
7	39 33.8	99 13	172.7	38 34.5	99 13	172.8	37 05.5	99 12	173.1	35 36.5	99 12	173.4	33 37.8	99 11	173.8	33 08.1	99 11	173.8	32 38.4	99 11	173.9	30 39.5	99 10	174.3	7
8	39 25.9	98 15	171.6	38 26.8	99 15	171.8	36 58.1	99 14	172.2	35 29.4	99 14	172.5	33 31.0	99 13	172.9	33 01.4	99 13	173.0	32 31.8	99 12	173.1	30 33.3	99 12	173.4	8
9	39 16.9	98 17	170.6	38 18.0	98 16	170.8	36 49.7	98 16	171.2	35 21.3	98 15	171.6	33 23.3	98 14	172.0	32 53.8	98 14	172.1	32 24.3	98 14	172.2	30 26.2	98 13	172.6	9
10	39 06.8	98 18	169.6	38 08.2	98 18	169.8	36 40.3	98 17	170.2	35 12.3	98 17	170.6	33 14.8	98 16	171.1	32 45.4	98 15	171.2	32 16.0	98 15	171.4	30 18.3	98 14	171.8	10
1	38 55.8	97 20	168.6	37 57.5	97 20	168.9	36 29.9	97 19	169.3	35 02.3	97 18	169.7	33 05.4	98 17	170.3	32 36.1	98 17	170.4	32 06.8	98 17	170.5	30 09.7	98 16	171.0	1
2	38 43.7	97 22	167.5	37 45.7	97 21	167.9	36 18.7	97 20	168.4	34 51.5	97 20	168.8	32 55.1	97 19	169.4	32 25.9	97 18	169.5	31 56.8	97 18	169.7	30 00.2	97 17	170.2	2
3	38 30.7	96 23	166.6	37 33.0	96 23	166.9	36 06.4	96 22	167.4	34 39.7	96 21	167.9	32 43.9	97 20	168.5	32 14.9	97 20	168.7	31 46.0	97 19	168.8	29 49.9	97 18	169.4	3
4	38 16.6	95 25	165.6	37 19.4	95 24	165.9	35 53.3	96 23	166.5	34 27.1	96 23	167.0	32 31.9	96 21	167.7	32 03.1	96 21	167.9	31 34.3	96 21	168.0	29 38.8	96 20	168.6	4
15	38 01.7	95 27	164.6	37 04.7	96 26	165.0	35 39.2	95 25	165.6	34 13.6	95 24	166.1	32 19.1	95 23	166.8	31 50.4	96 22	167.0	31 21.8	96 22	167.2	29 27.0	96 21	167.9	15
6	37 45.7	94 28	163.6	36 49.2	94 27	164.0	35 24.3	94 26	164.7	33 59.2	95 25	165.2	32 05.4	95 24	166.0	31 37.0	95 24	166.2	31 08.5	95 24	166.4	29 14.4	95 22	167.1	6
7	37 28.8	93 30	162.7	36 32.7	94 29	163.1	35 08.4	94 28	163.8	33 43.9	94 27	164.4	31 51.0	94 25	165.2	31 22.7	94 25	165.4	30 54.4	94 25	165.6	29 01.0	95 24	166.3	7
8	37 11.0	93 31	161.7	36 15.4	93 30	162.2	34 51.7	93 29	162.9	33 27.8	93 28	163.5	31 35.7	94 27	164.4	31 07.6	94 26	164.6	30 39.5	94 26	164.8	28 46.8	94 25	165.6	8
9	36 52.3	92 33	160.8	35 57.1	92 32	161.3	34 34.1	92 31	162.0	33 10.9	93 30	162.7	31 19.6	93 28	163.5	30 51.7	93 28	163.8	30 23.8	93 27	164.0	28 32.0	93 26	164.8	9
20	36 32.7	91 34	159.9	35 38.0	91 33	160.4	34 15.7	92 32	161.1	32 53.1	92 31	161.8	31 02.7	92 29	162.7	30 35.0	92 29	163.0	30 07.3	92 29	163.2	28 16.3	93 27	164.1	20
1	36 12.2	90 36	158.9	35 18.0	90 35	159.5	33 56.4	91 33	160.2	32 34.6	91 32	161.0	30 45.0	91 31	161.9	30 17.6	92 30	162.2	29 50.1	92 30	162.4	28 00.0	92 28	163.3	1
2	35 50.8	89 37	158.0	34 57.1	90 36	158.6	33 36.3	90 35	159.4	32 15.2	90 34	160.2	30 26.6	91 32	161.2	29 59.4	91 32	161.4	29 32.1	91 31	161.6	27 42.9	91 30	162.6	2
3	35 28.7	89 38	157.2	34 35.5	89 37	157.7	33 15.4	89 36	158.6	31 55.0	89 35	159.4	30 07.4	90 33	160.4	29 40.5	90 33	160.6	29 13.4	90 32	160.9	27 25.1	90 31	161.9	3
4	35 05.6	88 40	156.3	34 13.0	88 39	156.9	32 53.7	88 37	157.7	31 34.1	89 36	158.6	29 47.5	89 34	159.6	29 20.8	89 34	159.9	28 54.0	89 34	160.1	27 06.7	90 32	161.1	4
25	34 41.8	87 41	155.4	33 49.7	87 40	156.0	32 31.3	87 39	156.9	31 12.5	88 37	157.8	29 26.9	88 36	158.9	29 00.4	88 35	159.1	28 33.9	88 35	159.4	26 47.5	89 33	160.4	25
6	34 17.2	86 42	154.6	33 25.7	86 41	155.2	32 08.1	86 40	156.1	30 50.1	87 39	157.0	29 05.5	87 37	158.1	28 39.3	87 36	158.4	28 13.1	88 36	158.7	26 27.7	88 34	159.7	6
7	33 51.9	85 44	153.7	33 00.9	85 43	154.4	31 44.1	86 41	155.3	30 26.9	86 40	156.2	28 43.5	86 38	157.4	28 17.5	87 37	157.7	27 51.5	87 37	157.9	26 07.2	87 35	159.1	7
8	33 25.7	84 45	152.9	32 35.4	84 44	153.6	31 19.4	85 42	154.5	30 03.1	85 41	155.5	28 20.7	86 39	156.6	27 55.1	86 39	156.9	27 29.3	86 38	157.2	25 46.1	86 36	158.4	8
9	32 58.9	83 46	152.1	32 09.1	83 45	152.8	30 54.0	84 44	153.8	29 38.6	84 42	154.7	27 57.3	85 40	155.9	27 31.9	85 40	156.2	27 06.5	85 39	156.5	25 24.3	85 37	157.7	9
30	32 31.3	82 47	151.3	31 42.1	82 46	152.0	30 28.0	83 45	153.0	29 13.4	83 43	154.0	27 33.3	84 41	155.2	27 08.1	84 41	155.5	26 43.0	84 40	155.8	25 01.9	84 38	157.0	30
1	32 03.0	81 48	150.6	31 14.5	81 47	151.2	30 01.2	82 46	152.3	28 47.5	82 44	153.2	27 08.5	83 42	154.5	26 43.7	83 42	154.8	26 18.8	83 41	155.2	24 38.9	84 39	156.4	1
2	31 34.1	80 49	149.8	30 46.1	80 48	150.5	29 33.8	81 47	151.5	28 20.9	81 45	152.5	26 43.2	82 43	153.8	26 18.6	82 43	154.2	25 54.0	82 42	154.5	24 15.2	83 40	155.7	2
3	31 04.4	79 50	149.0	30 17.1	79 49	149.8	29 05.7	80 48	150.8	27 53.8	80 46	151.8	26 17.2	81 44	153.2	25 52.9	81 44	153.5	25 28.6	81 43	153.8	23 51.0	82 41	155.1	3
4	30 34.2	78 52	148.3	29 47.5	78 50	149.0	28 37.0	79 49	150.1	27 26.0	79 47	151.1	25 50.6	80 45	152.5	25 26.7	80 45	152.8	25 02.7	80 44	153.2	23 26.2	81 42	154.5	4
35	30 03.3	77 52	147.6	29 17.2	77 51	148.3	28 07.6	78 50	149.4	26 57.6	78 48	150.5	25 23.4	79 46	151.8	24 59.8	79 46	152.2	24 36.1	79 45	152.5	23 00.8	80 43	153.9	35
6	29 31.8	76 54	146.9	28 46.3	76 52	147.6	27 37.7	77 51	148.7	26 28.6	77 49	149.8	24 55.7	78 47	151.2	24 32.3	78 47	151.5	24 08.9	78 46	151.9	22 34.9	79 44	153.2	6
7	28 59.6	74 54	146.2	28 14.8	75 53	146.9	27 07.2	75 52	148.1	25 59.0	76 50	149.1	24 27.4	77 48	150.6	24 04.3	77 48	150.9	23 41.2	77 47	151.3	22 08.4	78 45	152.7	7
8	28 27.0	73 55	145.5	27 42.8	74 54	146.3	26 36.1	74 53	147.4	25 28.9	75 51	148.5	23 58.5	76 49	150.0	23 35.8	76 49	150.3	23 13.0	76 48	150.7	21 41.4	77 46	152.1	8
9	27 53.7	72 56	144.8	27 10.2	73 55	145.6	26 04.5	73 54	146.7	24 58.2	74 52	147.9	23 29.1	75 50	149.3	23 06.7	75 49	149.7	22 44.2	75 49	150.1	21 13.9	76 47	151.5	9
40	27 19.9	71 57	144.2	26 37.0	72 56	145.0	25 32.3	72 55	146.1	24 27.0	73 53	147.3	22 59.1	74 51	148.7	22 37.0	74 50	149.1	22 14.9	74 50	149.5	20 45.8	75 48	150.9	40
1	26 45.5	70 58	143.5	26 03.3	71 57	144.3	24 59.5	71 55	145.5	23 55.2	72 54	146.6	22 28.7	72 52	148.2	22 06.9	73 51	148.5	21 45.1	73 51	148.9	20 17.3	73 48	150.4	1
2	26 10.7	69 59	142.9	25 29.1	69 58	143.7	24 26.3	70 56	144.9	23 22.9	71 55	146.1	21 57.7	71 52	147.6	21 36.2	72 52	148.0	21 14.7	72 51	148.3	19 48.3	72 49	149.8	2
3	25 35.3	68 60	142.3	24 54.4	68 59	143.1	23 52.6	69 57	144.3	22 50.2	70 55	145.5	21 26.2	70 53	147.0	21 05.1	70 53	147.4	20 43.9	71 52	147.8	19 18.7	71 50	149.3	3
4	24 59.4	67 61	141.7	24 19.2	67 59	142.5	23 18.3	68 58	143.7	22 17.0	69 56	144.9	20 54.3	69 54	146.5	20 33.5	69 53	146.8	20 12.6	70 53	147.2	18 48.8	70 51	148.7	4
45	24 23.1	66 61	141.1	23 43.5	66 60	141.9	22 43.7	67 59	143.1	21 43.2	67 57	144.3	20 21.9	68 55	145.9	20 01.4	68 54	146.3	19 40.9	68 54	146.7	18 18.3	69 51	148.2	45
6	23 46.3	65 62	140.5	23 07.4	65 61	141.3	22 08.5	66 59	142.6	21 09.1	66 58	143.8	19 49.0	67 56	145.4	19 28.9	67 55	145.8	19 08.7	67 54	146.2	17 47.4	68 52	147.7	6
7	23 09.1	64 63	139.9	22 30.8	64 62	140.8	21 32.9	65 60	142.0	20 34.4	65 58	143.2	19 15.7	66 56	144.8	18 55.9	66 56	145.2	18 36.1	66 55	145.6	17 16.1	67 53	147.2	7
8	22 31.4	63 64	139.4	21 53.8	63 62	140.2	20 56.8	64 61	141.5	19 59.4	64 59	142.7	18 42.0	65 57	144.3	18 22.5	65 56	144.7	18 03.0	65 56	145.1	16 44.4	66 54	146.7	8
9	21 53.3	61 64	138.9	21 16.3	62 63	139.7	20 20.4	62 61	141.0	19 23.9	63 60	142.2	18 07.8	64 58	143.8	17 48.7	64 57	144.2	17 29.5	64 56	144.6	16 12.2	65 54	146.2	9
50	21 14.8	60 65	138.3	20 38.5	61 64	139.2	19 43.5	61 62	140.4	18 48.0	62 60	141.7	17 33.3	63 58	143.3	17 14.5	63 58	143.7	16 55.6	63 57	144.2	15 39.7	64 55	145.8	50
1	20 35.9	59 66	137.8	20 00.2	60 64	138.7	19 06.2	60 63	139.9	18 11.7	61 61	141.2	16 58.3	62 59	142.9	16 39.8	62 58	143.3	16 21.3	62 58	143.7	15 06.7	62 56	145.3	1
2	19 56.6	58 66	137.3	19 21.6	59 65	138.2	18 28.6	59 63	139.4	17 35.1	60 62	140.7	16 23.0	60 60	142.4	16 04.8	61 59	142.8	15 46.6	61 58	143.2	14 33.4	61 56	144.9	2
3	19 16.9	57 67	136.8	18 42.5	58 66	137.7	17 50.5	58 64	139.0	16 58.0	59 62	140.2	15 47.3	59 60	141.9	15 29.5	59 60	142.3	15 11.6	60 59	142.8	13 59.7	60 57	144.4	3
4	18 36.9	56 67	136.3	18 03.2	56 66	137.2	17 12.1	57 65	138.5	16 20.6	58 63	139.8	15 11.2	58 61	141.5	14 53.7	58 60	141.9	14 36.2	58 60	142.3	13 25.7	59 57	144.0	4
55	17 56.5	55 68	135.8	17 23.4	55 67	136.7	16 33.4	56 65	138.0	15 42.8	56 64	139.3	14 34.7	57 61	141.0	14 17.6	57 61	141.4	14 00.4	57 60	141.9	12 51.2	58 58	143.6	55
6	17 15.8	54 68	135.4	16 43.3	54 67	136.3	15 54.3	55 66	137.6	15 04.7	55 64	138.9	13 57.9	56 62	140.6	13 41.1	56 61	141.0	13 24.3	56 61	141.4	12 16.5	57 58	143.1	6
7	16 34.7	53 69	134.9	16 02.9	53 68	135.8	15 14.8	54 66	137.1	14 26.2	54 65	138.4	13 20.8	55 62	140.2	13 04.3	55 62	140.6	12 47.8	55 61	141.0	11 41.4	56 59	142.7	7
8	15 53.4	52 69	134.5	15 22.2	52 68	135.4	14 35.0	53 67	136.7	13 47.5	53 65	138.0	12 43.4	54 63	139.8	12 27.2	54 62	140.2	12 11.1	54 62	140.6	11 06.0	54 60	142.3	8
9	15 11.7	51 70	134.1	14 41.1	51 69	135.0	13 55.0	52 67	136.3	13 08.4	52 66	137.6	12 05.6	53 63	139.3	11 49.8	53 63	139.8	11 34.0	53 62	140.2	10 30.2	53 60	141.9	9
60	14 29.7	50 70	133.6	13 59.8	50 69	134.5	13 14.6	50 68	135.9	12 28.9	51 66	137.2	11 27.5	51 64	139.0	11 12.0	52 63	139.4	10 56.6	52 63	139.8	9 54.2	52 61	141.6	60
1	13 47.4	49 71	133.2	13 18.2	49 70	134.1	12 33.9	49 68	135.5	11 49.2	50 67	136.8	10 49.1	50 64	138.6	10 34.0	50 64	139.0	10 18.8	51 63	139.4	9 17.9	51 61	141.2	1
2	13 04.9	48 71	132.8	12 36.2	48 70	133.7	11 52.9	48 69	135.1	11 09.2	49 67	136.4	10 10.5	49 65	138.2	9 55.7	49 64	138.6	9 40.9	49 64	139.1	8 41.2	50 62	140.8	2
3	12 22.0	47 72	132.4	11 54.0	47 71	133.3	11 11.7	47 69	134.7	10 29.0	48 68	136.0	9 31.5	48 65	137.8	9 17.1	48 65	138.3	9 02.6	48 64	138.7	8 04.3	49 62	140.5	3
4	11 38.9	46 72	132.1	11 11.6	46 71	133.0	10 30.2	46 70	134.3	9 48.4	47 68	135.7	8 52.3	47 66	137.5	8 38.2	47 65	137.9	8 24.0	47 65	138.4	7 27.1	48 62	140.1	4
65	10 55.6	44 73	131.7	10 28.8	45 72	132.6	9 48.4	45 70	134.0	9 07.6	45 68	135.3	8 12.8	46 66	137.1	7 59.0	46 66	137.6	7 45.2	46 65	138.0	6 49.7	46 63	139.8	65
6	10 12.0	43 73	131.3	9 45.8	44 72	132.2	9 06.4	44 70	133.6	8 26.6	44 69	135.0	7 33.1	45 67	136.8	7 19.6	45 66	137.2	7 06.1	45 66	137.7	6 12.0	45 63	139.5	6
7	9 28.2	42 73	131.0	9 02.6	43 72	131.9	8 24.1	43 71	133.3	7 45.2	43 69	134.6	6 53.1	44 67	136.4	6 40.0	44 66	136.9	6 26.8	44 66	137.4	5 34.0	44 64	139.2	7
8	8 44.1	41 74	130.6	8 19.2	42 73	131.6	7 41.6	42 71	132.9	7 03.7	42 70	134.3	6 12.8	43 67	136.1	6 00.1	43 67	136.6	5 47.3	43 66	137.0				8
9	7 59.8	40 74	130.3	7 35.5	41 73	131.2	6 58.8	41 72	132.6	6 21.9	41 70	134.0	5 32.4	41 68	135.8	5 19.9	42 67	136.3	5 07.5	42 67	136.7				9
70	7 15.3	39 75	130.0	6 51.6	40 74	130.9	6 15.9	40 72	132.3	5 39.9	40 70	133.7													70
1	6 30.6	38 75	129.7	6 07.5	39 74	130.6	5 32.7	39 72	132.0																1
2	5 45.6	37 75	129.3	5 23.2	38 74	130.3																			2
3	5 00.5	36 76	129.0																						3

DECLINATION SAME NAME AS LATITUDE

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	7 23.0	21 79	54.7	7 35.3	21 78	53.7	7 53.7	20 77	52.2	8 11.7	20 75	50.7	8 35.2	19 73	48.7	8 40.9	19 72	48.2	8 46.7	19 72	47.7	9 09.2	19 69	45.7	91
2	6 35.5	22 79	54.5	6 48.5	22 78	53.5	7 07.7	21 76	52.0	7 26.7	21 75	50.5	7 51.5	20 73	48.6	7 57.6	20 72	48.1	8 03.7	20 72	47.6	8 27.6	20 69	45.6	2
3	5 48.2	23 79	54.3	6 01.8	23 78	53.3	6 21.9	22 76	51.8	6 41.8	22 75	50.4	7 07.9	22 72	48.4	7 14.3	21 72	47.9	7 20.7	21 71	47.4	7 46.1	21 69	45.5	3
4	5 01.0	24 79	54.1	5 15.1	23 78	53.1	5 36.2	23 76	51.7	5 57.0	23 74	50.2	6 24.4	23 72	48.2	6 31.2	23 72	47.8	6 37.9	22 71	47.3	7 04.6	22 69	45.3	4
95										5 12.3	24 74	50.0	5 41.0	24 72	48.1	5 48.1	24 72	47.6	5 55.2	24 71	47.1	6 23.3	23 69	45.1	95
6																5 05.2	25 71	47.4	5 12.6	25 71	46.9	5 42.1	24 68	45.0	6
7																						5 01.0	26 68	44.8	7

Lat. 14°

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	58 60.0	1.0 01	00.0	57 00.0	1.0 01	00.0	55 30.0	1.0 01	00.0	54 30.0	1.0 01	00.0	53 30.0	1.0 01	00.0	52 30.0	1.0 01	00.0	51 30.0	1.0 01	00.0	50 00.0	1.0 01	00.0	00
1	57 59.3	1.0 03	01.3	56 59.4	1.0 03	01.3	55 29.4	1.0 03	01.2	54 29.4	1.0 03	01.1	53 29.5	1.0 03	01.1	52 29.5	1.0 03	01.0	51 29.5	1.0 02	01.0	49 59.5	1.0 02	00.9	1
2	57 57.3	1.0 06	02.6	56 57.5	1.0 05	02.5	55 27.6	1.0 05	02.3	54 27.7	1.0 05	02.2	53 27.8	1.0 05	02.1	52 27.9	1.0 04	02.0	51 28.0	1.0 04	02.0	49 58.1	1.0 04	01.8	2
3	57 54.0	1.0 08	03.9	56 54.3	1.0 07	03.7	55 24.7	1.0 07	03.5	54 24.9	1.0 07	03.3	53 25.1	1.0 06	03.2	52 25.3	1.0 06	03.1	51 25.5	1.0 06	02.9	49 55.8	1.0 05	02.7	3
4	57 49.4	99 10	05.2	56 49.8	99 09	05.0	55 20.5	99 09	04.7	54 20.9	99 08	04.5	53 21.3	99 08	04.3	52 21.7	99 08	04.1	51 22.1	99 07	03.9	49 52.6	99 07	03.6	4
05	57 43.4	99 12	06.5	56 44.2	99 12	06.2	55 15.2	99 11	05.8	54 15.8	99 10	05.6	53 16.5	99 10	05.3	52 17.1	99 09	05.1	51 17.6	99 09	04.9	49 48.4	99 08	04.6	05
6	57 36.2	98 14	07.8	56 37.2	98 14	07.4	55 08.7	98 13	07.0	54 09.6	98 12	06.7	53 10.5	99 12	06.4	52 11.4	99 11	06.1	51 12.2	99 11	05.8	49 43.3	99 10	05.5	6
7	57 27.7	98 16	09.1	56 29.1	98 16	08.7	55 01.1	98 15	08.1	54 02.3	98 14	07.7	53 03.5	98 13	07.4	52 04.7	98 13	07.1	51 05.8	98 12	06.8	49 37.4	98 11	06.3	7
8	57 17.9	97 18	10.3	56 19.7	97 18	09.9	54 52.3	97 16	09.2	53 54.0	97 16	08.8	52 55.5	97 15	08.4	51 57.0	98 14	08.1	50 58.4	98 14	07.7	49 30.5	98 13	07.2	8
9	57 06.8	96 20	11.5	56 09.2	96 20	11.0	54 42.4	96 18	10.3	53 44.5	97 18	09.9	52 46.5	97 17	09.5	51 48.3	97 16	09.1	50 50.1	97 15	08.7	49 22.7	97 14	08.1	9
10	56 54.6	95 22	12.8	55 57.4	96 21	12.2	54 31.4	96 20	11.4	53 34.0	96 19	10.9	52 36.4	96 18	10.5	51 38.7	96 18	10.0	50 40.9	96 17	09.6	49 14.0	97 16	09.0	10
1	56 41.1	94 24	14.0	55 44.5	94 23	13.4	54 19.4	95 22	12.5	53 22.4	95 21	12.0	52 25.3	95 20	11.5	51 28.1	95 19	11.0	50 30.7	96 18	10.5	49 04.5	96 17	09.9	1
2	56 26.5	93 26	15.1	55 30.5	93 25	14.5	54 06.2	94 24	13.6	53 09.8	94 23	13.0	52 13.2	94 22	12.5	51 16.5	95 21	11.9	50 19.6	95 20	11.4	48 54.1	95 19	10.7	2
3	56 10.7	92 28	16.3	55 15.4	92 27	15.6	53 52.0	93 25	14.6	52 56.2	93 24	14.0	52 00.2	94 23	13.4	51 04.0	94 22	12.9	50 07.6	94 21	12.3	48 42.8	94 20	11.6	3
4	55 53.8	91 30	17.4	54 59.2	91 29	16.7	53 36.8	92 27	15.7	52 41.6	92 26	15.0	51 46.1	93 25	14.4	50 50.5	93 24	13.8	49 54.8	93 23	13.2	48 30.8	94 22	12.4	4
15	55 35.8	90 32	18.6	54 41.9	90 30	17.8	53 20.5	91 29	16.7	52 26.0	91 28	16.0	51 31.2	91 26	15.3	50 36.2	92 25	14.7	49 41.0	92 24	14.1	48 17.9	93 23	13.2	15
6	55 16.8	88 33	19.6	54 23.6	89 32	18.8	53 03.3	90 30	17.7	52 09.5	90 29	17.0	51 15.4	90 28	16.3	50 21.0	91 27	15.6	49 26.4	91 26	15.0	48 04.1	92 24	14.0	6
7	54 56.7	87 35	20.7	54 04.3	88 34	19.9	52 45.2	88 32	18.7	51 52.0	89 31	17.9	50 58.6	89 29	17.2	50 04.9	90 28	16.5	49 11.0	90 27	15.8	47 49.6	91 25	14.8	7
8	54 35.6	86 37	21.7	53 44.1	86 35	20.9	52 26.1	87 33	19.6	51 33.7	88 32	18.8	50 41.0	88 31	18.1	49 48.0	89 30	17.3	48 54.7	89 28	16.6	47 34.3	90 27	15.6	8
9	54 13.5	84 38	22.8	53 22.8	85 37	21.9	52 06.1	86 35	20.6	51 14.4	86 33	19.7	50 22.5	87 32	18.9	49 30.2	87 31	18.2	48 37.6	88 30	17.4	47 18.3	88 28	16.4	9
20	53 50.6	83 40	23.7	53 00.7	83 38	22.8	51 45.2	84 36	21.5	50 54.4	85 35	20.6	50 03.2	86 34	19.8	49 11.6	86 32	19.0	48 19.8	87 31	18.2	47 01.5	87 29	17.2	20
1	53 26.7	81 41	24.7	52 37.7	82 40	23.7	51 23.5	83 38	22.4	50 33.4	84 36	21.5	49 43.0	84 35	20.6	48 52.3	85 34	19.8	48 01.2	85 32	19.0	46 44.0	86 30	17.9	1
2	53 01.9	80 43	25.6	52 13.9	80 41	24.7	51 00.9	82 39	23.2	50 11.7	82 38	22.3	49 22.1	83 36	21.5	48 32.2	84 35	20.6	47 41.8	84 34	19.8	46 25.7	85 32	18.6	2
3	52 36.3	78 44	26.5	51 49.2	79 42	25.5	50 37.5	80 40	24.1	49 49.2	81 39	23.2	49 00.4	82 37	22.3	48 11.3	82 36	21.4	47 21.7	83 35	20.6	46 06.8	84 33	19.3	3
4	52 09.9	77 45	27.4	51 23.7	77 44	26.4	50 13.4	79 42	24.9	49 25.9	79 40	24.0	48 38.0	80 39	23.0	47 49.7	81 37	22.2	47 00.9	82 36	21.3	45 47.1	82 34	20.0	4
25	51 42.7	75 47	28.3	50 57.4	76 45	27.2	49 48.5	77 43	25.7	49 01.9	78 41	24.7	48 14.9	79 40	23.8	47 27.4	80 38	22.9	46 39.5	80 37	22.0	45 26.9	81 35	20.7	25
6	51 14.7	73 48	29.1	50 30.4	74 46	28.0	49 22.9	76 44	26.5	48 37.2	77 42	25.5	47 51.0	77 41	24.6	47 04.4	78 39	23.6	46 17.3	79 38	22.7	45 05.9	80 36	21.4	6
7	50 46.0	72 49	29.9	50 02.7	73 47	28.8	48 56.5	74 45	27.3	48 11.8	75 43	26.3	47 26.5	76 42	25.3	46 40.7	77 40	24.3	45 54.5	77 39	23.4	44 44.4	78 37	22.1	7
8	50 16.7	70 50	30.7	49 34.3	71 48	29.6	48 29.5	73 46	28.0	47 45.7	74 45	27.0	47 01.3	74 43	26.0	46 16.4	75 42	25.0	45 31.1	76 40	24.1	44 22.2	77 38	22.7	8
9	49 46.6	69 51	31.4	49 05.2	70 50	30.3	48 01.9	71 47	28.7	47 19.0	72 46	27.7	46 35.5	73 44	26.7	45 51.5	74 43	25.7	45 07.0	75 41	24.7	43 59.4	76 39	23.3	9
30	49 16.0	67 52	32.2	48 35.5	68 51	31.0	47 33.6	70 48	29.4	46 51.6	70 47	28.4	46 09.1	71 45	27.3	45 26.0	72 44	26.3	44 42.4	73 42	25.4	43 36.1	74 40	23.9	30
1	48 44.7	65 53	32.9	48 05.2	66 52	31.7	47 04.7	68 49	30.1	46 23.7	69 48	29.0	45 42.0	70 46	28.0	44 59.9	71 44	27.0	44 17.2	72 43	26.0	43 12.2	73 41	24.5	1
2	48 12.8	64 54	33.5	47 34.3	65 52	32.4	46 35.3	66 50	30.7	45 55.2	67 48	29.7	45 14.5	68 47	28.6	44 33.2	69 45	27.6	43 51.4	70 44	26.6	42 47.7	71 42	25.1	2
3	47 40.4	62 55	34.2	47 02.8	63 53	33.0	46 05.3	65 51	31.4	45 26.1	66 49	30.3	44 46.3	67 48	29.2	44 06.0	68 46	28.2	43 25.1	69 45	27.2	42 22.8	70 42	25.7	3
4	47 07.4	60 56	34.8	46 30.8	62 54	33.7	45 34.7	63 52	32.0	44 56.5	64 50	30.9	44 17.6	65 49	29.8	43 38.2	66 47	28.8	42 58.2	67 46	27.7	41 57.3	68 43	26.2	4
35	46 33.9	59 57	35.4	45 58.3	60 55	34.3	45 03.6	62 53	32.6	44 26.4	63 51	31.4	43 48.5	64 49	30.4	43 10.0	65 48	29.3	42 30.9	66 46	28.3	41 31.3	67 44	26.8	35
6	45 59.9	57 57	36.0	45 25.3	58 56	34.8	44 32.1	60 53	33.1	43 55.7	61 52	32.0	43 18.8	62 50	30.9	42 41.2	63 49	29.9	42 03.1	64 47	28.8	41 04.8	65 45	27.3	6
7	45 25.5	55 58	36.6	44 51.8	57 57	35.4	44 00.0	58 54	33.7	43 24.6	59 53	32.5	42 48.6	61 51	31.5	42 12.0	62 49	30.4	41 34.8	62 48	29.3	40 37.9	64 46	27.8	7
8	44 50.6	54 59	37.1	44 17.9	55 57	35.9	43 27.5	57 55	34.2	42 53.1	58 53	33.1	42 18.0	59 52	32.0	41 42.4	60 50	30.9	41 06.1	61 49	29.8	40 10.6	62 46	28.3	8
9	44 15.2	52 60	37.6	43 43.5	53 58	36.4	42 54.6	55 56	34.7	42 21.1	56 54	33.6	41 47.0	57 52	32.5	41 12.3	58 51	31.4	40 36.9	59 49	30.3	39 42.8	61 47	28.7	9
40	43 39.5	51 60	38.1	43 08.7	52 59	36.9	42 21.2	54 56	35.2	41 48.7	55 55	34.1	41 15.5	56 53	32.9	40 41.7	57 52	31.9	40 07.3	58 50	30.8	39 14.6	59 48	29.2	40
1	43 03.4	49 61	38.6	42 33.6	50 59	37.4	41 47.5	52 57	35.7	41 15.9	53 55	34.5	40 43.7	54 54	33.4	40 10.8	55 52	32.3	39 37.3	56 51	31.2	38 46.0	58 48	29.6	1
2	42 26.9	48 61	39.0	41 58.0	49 60	37.9	41 13.3	50 58	36.1	40 42.7	52 56	35.0	40 11.4	53 54	33.9	39 39.5	54 53	32.8	39 06.9	55 51	31.7	38 17.0	56 49	30.1	2
3	41 50.0	46 62	39.5	41 22.1	47 60	38.3	40 38.8	49 58	36.6	40 09.2	50 57	35.4	39 38.8	51 55	34.3	39 07.8	52 53	33.2	38 36.2	53 52	32.1	37 47.7	55 50	30.5	3
4	41 12.9	44 62	39.9	40 45.8	46 61	38.7	40 04.0	47 59	37.0	39 35.2	48 57	35.8	39 05.8	50 56	34.7	38 35.8	51 54	33.6	38 05.1	52 52	32.5	37 18.0	53 50	30.9	4
45	40 35.4	43 63	40.3	40 09.3	44 61	39.1	39 28.8	46 59	37.4	39 01.0	47 58	36.2	38 32.5	48 56	35.1	38 03.4	49 55	34.0	37 33.6	50 53	32.9	36 47.9	52 51	31.3	45
6	39 57.5	41 64	40.7	39 32.4	43 62	39.5	38 53.3	44 60	37.8	38 26.4	45 58	36.6	37 58.9	46 57	35.5	37 30.7	48 55	34.4	37 01.9	49 53	33.3	36 17.5	50 51	31.6	6
7	39 19.4	40 64	41.1	38 55.2	41 62	39.9	38 17.5	43 60	38.1	37 51.6	44 59	37.0	37 24.9	45 57	35.9	36 57.7	46 56	34.7	36 29.8	47 54	33.6	35 46.8	48 52	32.0	7
8	38 41.1	38 64	41.4	38 17.7	39 63	40.2	37 41.4	41 61	38.5	37 16.4	42 59	37.3	36 50.7	43 58	36.2	36 24.3	44 56	35.1	35 57.4	45 54	34.0	35 15.8	47 52	32.3	8
9	38 02.5	37 65	41.7	37 40.0	38 63	40.6	37 05.1	40 61	38.8	36 40.9	41 60	37.7	36 16.2	42 58	36.5	35 50.7	43 56	35.4	35 24.7	44 55	34.3	34 44.5	45 53	32.7	9
50	37 23.6	35 65	42.1	37 02.0	36 64	40.9	36 28.5	38 61	39.1	36 05.2	39 60	38.0	35 41.4	40 58	36.9	35 16.9	41 57	35.7	34 51.8	42 55	34.6	34 13.0	44 53	33.0	50
1	36 44.5	34 66	42.4	36 23.8	35 64	41.2	35 51.6	37 62	39.4	35 29.3	38 60	38.3	35 06.3	39 59	37.2	34 42.7	40 57	36.1	34 18.5	41 56	34.9	33 41.1	42 53	33.3	1
2	36 05.1	32 66	42.6	35 45.4	34 64	41.5	35 14.5	35 62	39.7	34 53.1	36 61	38.6	34 31.0	37 59	37.5	34 08.3	38 58	36.3	33 45.1	39 56	35.2	33 09.1	41 54	33.6	2
3	35 25.6	31 66	42.9	35 06.7	32 65	41.7	34 37.1	34 63	40.0	34 16.6	35 61	38.9	33 55.5	36 60	37.7	33 33.7	37 58	36.6	33 11.4	38 57	35.5	32 36.7	39 54	33.9	3
4	34 45.9	29 67	43.2	34 27.9	31 65	42.0	33 59.6	32 63	40.3	33 40.0	33 61	39.1	33 19.7	34 60	38.0	32 58.9	35 58	36.9	32 37.4	36 57	35.8	32 04.2	38 55	34.1	4
55	34 06.0	28 67	43.4	33 48.8	29 65	42.3	33 21.9	31 63	40.5	33 03.1	32 62	39.4	32 43.8	33 60	38.3	32 23.8	34 59	37.2	32 03.3	35 57	36.0	31 31.4	36 55	34.4	55
6	33 25.9	27 67	43.6	33 09.6	28 66	42.5	32 43.9	29 64	40.8	32 26.1	30 62	39.6	32 07.6	31 61	38.5	31 48.6	32 59	37.4	31 28.9	33 58	36.3	30 58.4	35 55	34.6	6
7	32 45.6	25 67	43.8	32 30.2	26 66	42.7	32 05.8	28 64	41.0	31 48.9	29 62	39.9	31 31.3	30 61	38.7	31 13.1	31 59	37.6	30 54.4	32 58	36.5	30 25.2	33 56	34.9	7
8	32 05.2	24 68	44.1	31 50.6	25 66	42.9	31 27.6	26 64	41.2	31 11.5	27 63	40.1	30 54.8	28 61	39.0	30 37.5	29 60	37.8	30 19.6	30 58	36.7	29 51.8	32 56	35.1	8
9	31 24.7	22 68	44.2	31 10.9	23 66	43.1	30 49.1	25 64	41.4	30 33.9	26 63	40.3	30 18.1	27 61	39.2	30 01.7	28 60	38.0	29 44.7	29 58	36.9	29 18.3	30 56	35.3	9
60	30 44.0	21 68	44.4	30 31.0	22 67	43.3	30 10.6	23 65	41.6	29 56.2	24 63	40.5	29 41.2	25 62	39.4	29 25.7	26 60	38.2	29 09.7	27 59	37.1	28 44.6	29 56	35.5	60
1	30 03.2	20 68	44.6	29 51.1	21 67	43.5	29 31.8	22 65	41.8	29 18.3	23 63	40.6	29 04.2	24 62	39.5	28 49.6	25 60	38.4	28 34.5	26 59	37.3	28 10.7	27 57	35.7	1
2	29 22.2	18 68	44.7	29 11.0	19 67	43.6	28 53.0	21 65	41.9	28 40.3	22 64	40.8	28 27.1	22 62	39.7	28 13.4	23 61	38.6	27 59.1	24 59	37.5	27 36.7	26 57	35.9	2
3	28 41.2	17 69	44.9	28 30.8	18 67	43.8	28 14.1	19 65	42.1	28 02.2	20 64	41.0	27 49.9	21 62	39.9	27 37.0	22 61	38.8	27 23.6	23 59	37.7	27 02.5	24 57	36.0	3
4	28 00.1	16 69	45.0	27 50.5	17 67	43.9	27 35.0	18 65	42.2	27 24.0	19 64	41.1	27 12.5	20 62	40.0	27 00.5	20 61	38.9	26 48.0	21 60	37.8	26 28.2	23 57	36.2	4
65	27 18.9	14 69	45.1	27 10.1	15 67	44.0	26 55.8	16 65	42.3	26 45.7	17 64	41.2	26 35.0	18 63	40.1	26 23.9	19 61	39.0	26 12.2	20 60	37.9	25 53.8	21 58	36.3	65
6	26 37.6	13 69	45.2	26 29.6	14 68	44.1	26 16.6	15 66	42.5	26 07.3	16 64	41.4	25 57.4	17 63	40.3	25 47.1	18 61	39.2	25 36.4	18 60	38.1	25 19.3	20 58	36.4	6
7	25 56.2	12 69	45.3	25 49.0	12 68	44.2	25 37.2	14 66	42.6	25 28.7	15 64	41.5	25 19.8	15 63	40.4	25 10.3	16 62	39.3	25 00.4	17 60	38.2	24 44.6	18 58	36.6	7
8	25 14.8	10 69	45.4	25 08.4	11 68	44.3	24 57.8	12 66	42.7	24 50.2	13 64	41.6	24 42.0	14 63	40.5	24 33.4	15 62	39.4	24 24.4	15 60	38.3	24 09.9	17 58	36.7	8
9	24 33.3	09 69	45.5	24 27.7	10 68	44.4	24 18.3	11 66	42.7	24 11.5	12 65	41.7	24 04.2	13 63	40.6	23 56.4	13 62	39.5	23 48.2	14 60	38.4	23 35.1	15 58	36.8	9
70	23 51.8	08 69	45.5	23 46.9	08 68	44.5	23 38.8	10 66	42.8	23 32.8	10 65	41.7	23 26.3	11 63	40.7	23 19.4	12 62	39.6	23 12.0	13 60	38.5	23 00.2	14 58	36.9	70
1	23 10.2	06 69	45.6	23 06.1	07 68	44.5	22 59.2	08 66	42.9	22 54.0	09 65	41.8	22 48.3	10 63	40.7	22 42.3	10 62	39.6	22 35.8	11 61	38.6	22 25.2	12 58	37.0	1
2	22 28.6	05 69	45.6	22 25.3	06 68	44.6	22 19.5	07 66	42.9	22 15.1	08 65	41.9	22 10.3	08 63	40.8	22 05.1	09 62	39.7	21 59.5	10 61	38.6	21 50.2	11 58	37.0	2
3	21 47.0	04 69	45.7	21 44.4	05 68	44.6	21 39.8	06 66	43.0	21 36.3	06 65	41.9	21 32.3	07 63	40.8	21 27.9	08 62	39.8	21 23.1	08 61	38.7	21 15.1	09 59	37.1	3
4	21 05.3	03 69	45.7	21 03.5	03 68	44.6	21 00.1	04 66	43.0	20 57.4	05 65	42.0	20 54.2	06 64	40.9	20 50.6	06 62	39.8	20 46.7	07 61	38.7	20 40.0	08 59	37.1	4
75	20 23.6	01 69	45.7	20 22.6	02 68	44.6	20 20.4	03 66	43.0	20 18.4	04 65	42.0	20 16.1	04 64	40.9	20 13.3	05 62	39.9	20 10.2	06 61	38.8	20 04.8	06 59	37.2	75
6	19 42.0	00 69	45.7	19 41.7	01 68	44.7	19 40.7	02 66	43.1	19 39.5	02 65	42.0	19 37.9	03 64	40.9	19 36.0	04 62	39.9	19 33.7	04 61	38.8	19 29.6	05 59	37.2	6
7	19 00.3	01 69	45.7	19 00.8	01 68	44.7	19 00.9	00 66	43.1	19 00.5	01 65	42.0	18 59.8	02 64	41.0	18 58.7	02 62	39.9	18 57.2	03 61	38.8	18 54.4	04 59	37.3	7
8	18 18.6	02 69	45.7	18 19.9	02 68	44.6	18 21.2	01 66	43.1	18 21.6	00 65	42.0	18 21.6	00 64	41.0	18 21.3	01 62	39.9	18 20.7	01 61	38.9	18 19.1	02 59	37.3	8
9	17 37.0	04 69	45.7	17 39.0	03 68	44.6	17 41.4	02 66	43.1	17 42.6	02 65	42.0	17 43.5	01 64	41.0	17 44.0	01 62	39.9	17 44.2	00 61	38.9	17 43.8	01 59	37.3	9
80	16 55.3	05 69	45.6	16 58.1	04 68	44.6	17 01.7	04 66	43.0	17 03.6	03 65	42.0	17 05.3	02 64	40.9	17 06.6	02 62	39.9	17 07.7	01 61	38.9	17 08.6	01 59	37.3	80
1	16 13.7	06 69	45.6	16 17.2	06 68	44.6	16 21.9	05 66	43.0	16 24.7	04 65	42.0	16 27.2	04 64	40.9	16 29.3	03 62	39.9	16 31.1	03 61	38.8	16 33.3	02 59	37.3	1
2	15 32.1	07 69	45.6	15 36.4	07 68	44.5	15 42.2	06 66	43.0	15 45.8	06 65	41.9	15 49.0	05 64	40.9	15 52.0	05 62	39.9	15 54.6	04 61	38.8	15 58.1	03 59	37.3	2
3	14 50.6	09 69	45.5	14 55.6	08 68	44.5	15 02.6	07 66	42.9	15 06.9	07 65	41.9	15 10.9	06 63	40.9	15 14.7	06 62	39.8	15 18.2	06 61	38.8	15 22.8	05 59	37.2	3
4	14 09.1	10 69	45.4	14 14.8	09 68	44.4	14 23.0	09 66	42.9	14 28.0	08 65	41.8	14 32.9	08 63	40.8	14 37.4	07 62	39.8	14 41.7	07 61	38.7	14 47.6	06 59	37.2	4
85	13 27.6	11 69	45.4	13 34.1	11 68	44.3	13 43.4	10 66	42.8	13 49.2	10 65	41.8	13 54.8	09 63	40.8	14 00.2	09 62	39.7	14 05.3	08 61	38.7	14 12.4	08 59	37.2	85
6	12 46.2	12 69	45.3	12 53.4	12 68	44.3	13 03.8	11 66	42.7	13 10.5	11 65	41.7	13 16.9	10 63	40.7	13 23.0	10 62	39.7	13 28.9	10 61	38.6	13 37.3	09 59	37.1	6
7	12 04.9	13 69	45.2	12 12.8	13 68	44.2	12 24.4	13 66	42.7	12 31.8	12 64	41.6	12 38.9	12 63	40.6	12 45.9	11 62	39.6	12 52.6	11 60	38.6	13 02.2	10 58	37.0	7
8	11 23.6	15 69	45.1	11 32.3	14 67	44.1	11 44.9	14 66	42.6	11 53.1	13 64	41.6	12 01.1	13 63	40.5	12 08.8	13 62	39.5	12 16.3	12 60	38.5	12 27.1	12 58	37.0	8
9	10 42.4	16 68	45.0	10 51.8	16 67	44.0	11 05.6	15 65	42.5	11 14.5	15 64	41.5	11 23.3	14 63	40.4	11 31.8	14 62	39.4	11 40.1	14 60	38.4	11 52.1	13 58	36.9	9
90	10 01.3	17 68	44.9	10 11.5	17 67	43.9	10 26.3	16 65	42.4	10 36.0	16 64	41.4	10 45.5	16 63	40.4	10 54.8	15 61	39.3	11 03.9	15 60	38.3	11 17.2	14 58	36.8	90

H.A.	46° 00′				47° 00′				48° 30′				49° 30′				50° 30′				51° 30′				52° 30′				54° 00′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	30 00.0	1.0	01	180.0	29 00.0	1.0	01	180.0	27 30.0	1.0	01	180.0	26 30.0	1.0	01	180.0	25 30.0	1.0	01	180.0	24 30.0	1.0	01	180.0	23 30.0	1.0	01	180.0	22 00.0	1.0	01	180.0	00
1	29 59.6	1.0	02	179.2	28 59.6	1.0	02	179.2	27 29.6	1.0	02	179.3	26 29.6	1.0	02	179.3	25 29.6	1.0	02	179.3	24 29.7	1.0	02	179.3	23 29.7	1.0	02	179.3	21 59.7	1.0	02	179.4	1
2	29 58.4	1.0	03	178.4	28 58.4	1.0	03	178.4	27 28.5	1.0	03	178.5	26 28.5	1.0	03	178.5	25 28.6	1.0	03	178.6	24 28.6	1.0	03	178.6	23 28.7	1.0	03	178.7	21 58.7	1.0	03	178.7	2
3	29 56.3	1.0	05	177.6	28 56.4	1.0	05	177.7	27 26.6	1.0	04	177.8	26 26.7	1.0	04	177.8	25 26.8	1.0	04	177.9	24 26.9	1.0	04	177.9	23 27.0	1.0	04	178.0	21 57.1	1.0	04	178.1	3
4	29 53.5	1.0	06	176.8	28 53.7	1.0	06	176.9	27 23.9	1.0	06	177.0	26 24.1	1.0	06	177.1	25 24.3	1.0	05	177.2	24 24.4	1.0	05	177.3	23 24.6	1.0	05	177.3	21 54.9	1.0	05	177.5	4
05	29 49.8	1.0	07	176.0	28 50.1	1.0	07	176.1	27 20.5	1.0	07	176.3	26 20.8	1.0	07	176.4	25 21.1	1.0	07	176.5	24 21.3	1.0	06	176.6	23 21.6	1.0	06	176.7	21 52.0	1.0	06	176.8	05
6	29 45.4	99	09	175.2	28 45.8	99	09	175.3	27 16.4	99	08	175.5	26 16.8	99	08	175.7	25 17.1	99	08	175.8	24 17.5	99	08	175.9	23 17.9	99	07	176.0	21 48.4	99	07	176.2	6
7	29 40.1	99	10	174.4	28 40.6	99	10	174.6	27 11.5	99	09	174.8	26 12.0	99	09	174.9	25 12.5	99	09	175.1	24 13.0	99	09	175.2	23 13.5	99	08	175.4	21 44.3	99	08	175.6	7
8	29 34.0	99	11	173.6	28 34.7	99	11	173.8	27 05.8	99	11	174.1	26 06.5	99	10	174.2	25 07.2	99	10	174.4	24 07.8	99	10	174.6	23 08.5	99	10	174.7	21 39.4	99	09	175.0	8
9	29 27.1	98	13	172.8	28 28.1	98	12	173.0	26 59.4	99	12	173.3	26 00.3	99	12	173.5	25 01.1	99	11	173.7	24 02.0	99	11	173.9	23 02.8	99	11	174.1	21 34.0	99	10	174.3	9
10	29 19.5	98	14	172.0	28 20.6	98	14	172.3	26 52.3	98	13	172.6	25 53.3	98	13	172.8	24 54.4	98	12	173.0	23 55.4	98	12	173.2	22 56.4	98	12	173.4	21 27.9	98	11	173.7	10
1	29 11.0	98	15	171.3	28 12.4	98	15	171.5	26 44.4	98	14	171.9	25 45.7	98	14	172.1	24 46.9	98	14	172.3	23 48.2	98	13	172.5	22 49.4	98	13	172.8	21 21.2	98	12	173.1	1
2	29 01.8	97	17	170.5	28 03.4	97	16	170.8	26 35.8	97	16	171.1	25 37.3	97	15	171.4	24 38.8	98	15	171.6	23 40.3	98	14	171.9	22 41.8	98	14	172.1	21 13.9	98	13	172.5	2
3	28 51.8	97	18	169.7	27 53.7	97	17	170.0	26 26.4	97	17	170.4	25 28.2	97	16	170.7	24 30.0	97	16	171.0	23 31.7	97	15	171.2	22 33.4	97	15	171.5	21 06.0	97	14	171.9	3
4	28 41.0	96	19	169.0	27 43.2	96	19	169.3	26 16.4	97	18	169.7	25 18.5	97	17	170.0	24 20.5	97	17	170.3	23 22.5	97	16	170.6	22 24.5	97	16	170.8	20 57.4	97	15	171.2	4
15	28 29.5	96	20	168.2	27 32.0	96	20	168.5	26 05.6	96	19	169.0	25 08.0	96	19	169.3	24 10.3	96	18	169.6	23 12.6	96	18	169.9	22 14.9	96	17	170.2	20 48.2	96	16	170.6	15
6	28 17.2	95	22	167.4	27 20.0	95	21	167.8	25 54.2	95	20	168.3	24 56.8	96	20	168.6	23 59.5	96	19	168.9	23 02.1	96	19	169.3	22 04.7	96	18	169.6	20 38.5	96	17	170.0	6
7	28 04.2	95	23	166.7	27 07.4	95	22	167.1	25 42.0	95	21	167.6	24 45.0	95	21	167.9	23 48.0	95	20	168.3	22 50.9	95	20	168.6	21 53.8	95	19	168.9	20 28.1	95	18	169.4	7
8	27 50.4	94	24	166.0	26 53.9	94	24	166.3	25 29.1	94	23	166.9	24 32.5	94	22	167.3	23 35.8	94	21	167.6	22 39.1	95	21	168.0	21 42.3	95	20	168.3	20 17.1	95	19	168.8	8
9	27 35.9	93	25	165.2	26 39.8	94	25	165.6	25 15.6	94	24	166.2	24 19.3	94	23	166.6	23 23.0	94	22	167.0	22 26.7	94	22	167.3	21 30.2	94	21	167.7	20 05.5	94	20	168.2	9
20	27 20.7	93	27	164.5	26 25.0	93	26	164.9	25 01.4	93	25	165.5	24 05.5	93	24	165.9	23 09.6	93	24	166.3	22 13.6	93	23	166.7	21 17.5	93	22	167.1	19 53.4	94	21	167.7	20
1	27 04.8	92	28	163.8	26 09.5	92	27	164.2	24 46.5	92	26	164.8	23 51.0	92	25	165.3	22 55.5	93	25	165.7	21 59.9	93	24	166.1	21 04.2	93	23	166.5	19 40.7	93	22	167.1	1
2	26 48.2	91	29	163.0	25 53.3	91	28	163.5	24 30.9	92	27	164.2	23 35.9	92	26	164.6	22 40.7	92	26	165.0	21 45.6	92	25	165.5	20 50.3	92	24	165.9	19 27.3	92	23	166.5	2
3	26 30.8	91	30	162.3	25 36.5	91	29	162.8	24 14.7	91	28	163.5	23 20.1	91	27	164.0	22 25.4	91	27	164.4	21 30.6	91	26	164.8	20 35.8	91	25	165.3	19 13.5	92	24	165.9	3
4	26 12.8	90	31	161.6	25 18.9	90	30	162.1	23 57.8	90	29	162.8	23 03.7	90	28	163.3	22 09.4	90	28	163.8	21 15.1	91	27	164.2	20 20.7	91	26	164.7	18 59.0	91	25	165.4	4
25	25 54.2	89	32	161.0	25 00.7	89	31	161.5	23 40.4	89	30	162.2	22 46.7	90	29	162.7	21 52.9	90	29	163.2	20 59.0	90	28	163.6	20 05.1	90	27	164.1	18 44.0	90	26	164.8	25
6	25 34.9	88	33	160.3	24 41.9	88	32	160.8	23 22.2	89	31	161.6	22 29.0	89	30	162.1	21 35.7	89	30	162.5	20 42.3	89	29	163.0	19 48.8	89	28	163.5	18 28.5	89	27	164.2	6
7	25 14.9	87	34	159.6	24 22.4	88	34	160.1	23 03.5	88	32	160.9	22 10.8	88	31	161.4	21 18.0	88	31	161.9	20 25.1	88	30	162.4	19 32.0	88	29	162.9	18 12.4	89	28	163.7	7
8	24 54.3	86	35	158.9	24 02.3	87	35	159.5	22 44.2	87	33	160.3	21 52.0	87	32	160.8	20 59.6	87	32	161.3	20 07.2	87	31	161.9	19 14.7	88	30	162.4	17 55.8	88	29	163.1	8
9	24 33.0	86	36	158.3	23 41.6	86	36	158.8	22 24.2	86	34	159.7	21 32.5	86	33	160.2	20 40.7	86	32	160.8	19 48.8	87	32	161.3	18 56.8	87	31	161.8	17 38.6	87	29	162.6	9
30	24 11.2	85	37	157.6	23 20.3	85	36	158.2	22 03.7	85	35	159.1	21 12.5	85	34	159.6	20 21.3	86	33	160.2	19 29.9	86	32	160.7	18 38.4	86	32	161.3	17 21.0	86	30	162.1	30
1	23 48.7	84	38	157.0	22 58.4	84	38	157.6	21 42.6	84	36	158.4	20 52.0	84	35	159.0	20 01.2	85	34	159.6	19 10.4	85	33	160.2	18 19.4	85	32	160.7	17 02.8	85	31	161.5	1
2	23 25.6	83	39	156.3	22 35.9	83	38	157.0	21 21.0	83	37	157.9	20 30.9	84	36	158.4	19 40.7	84	35	159.0	18 50.3	84	34	159.6	17 59.9	84	33	160.2	16 44.1	84	32	161.0	2
3	23 02.0	82	40	155.7	22 12.8	82	39	156.3	20 58.7	82	38	157.3	20 09.2	83	37	157.9	19 19.6	83	36	158.5	18 29.8	83	35	159.1	17 39.9	83	34	159.6	16 24.9	83	33	160.5	3
4	22 37.8	81	41	155.1	21 49.1	81	40	155.7	20 36.0	81	39	156.7	19 47.0	82	38	157.3	18 57.9	82	37	157.9	18 08.7	82	36	158.5	17 19.4	82	35	159.1	16 05.2	83	34	160.0	4
35	22 13.0	80	42	154.5	21 25.0	80	41	155.2	20 12.6	81	40	156.1	19 24.3	81	39	156.7	18 35.8	81	38	157.4	17 47.1	81	37	158.0	16 58.4	81	36	158.6	15 45.1	82	34	159.5	35
6	21 47.6	79	43	153.9	21 00.2	79	42	154.6	19 48.8	80	41	155.5	19 01.0	80	40	156.2	18 13.1	80	39	156.8	17 25.1	80	38	157.4	16 36.9	80	37	158.1	15 24.5	81	35	159.0	6
7	21 21.8	78	44	153.3	20 35.0	78	43	154.0	19 24.4	79	41	155.0	18 37.3	79	40	155.6	17 49.9	79	39	156.3	17 02.5	79	38	156.9	16 14.9	79	37	157.6	15 03.4	80	36	158.5	7
8	20 55.4	77	45	152.8	20 09.2	77	44	153.4	18 59.6	78	42	154.4	18 13.0	78	41	155.1	17 26.3	78	40	155.8	16 39.4	78	39	156.4	15 52.5	78	38	157.1	14 41.8	79	37	158.0	8
9	20 28.5	76	46	152.2	19 42.9	76	45	152.9	18 34.2	76	43	153.9	17 48.3	77	42	154.6	17 02.1	77	41	155.2	16 15.9	77	40	155.9	15 29.6	77	39	156.6	14 19.8	78	37	157.6	9
40	20 01.1	75	46	151.6	19 16.1	75	45	152.3	18 08.4	75	44	153.4	17 23.0	76	43	154.1	16 37.5	76	42	154.7	15 51.9	76	41	155.4	15 06.2	76	40	156.1	13 57.4	77	38	157.1	40
1	19 33.1	74	47	151.1	18 48.8	74	46	151.8	17 42.0	74	45	152.9	16 57.3	75	44	153.5	16 12.5	75	43	154.2	15 27.5	75	42	154.9	14 42.4	75	40	155.6	13 34.5	76	39	156.6	1
2	19 04.7	73	48	150.5	18 21.1	73	47	151.3	17 15.2	73	45	152.3	16 31.2	74	44	153.0	15 46.9	74	43	153.7	15 02.6	74	42	154.4	14 18.1	74	41	155.1	13 11.2	75	40	156.2	2
3	18 35.9	72	49	150.0	17 52.8	72	48	150.7	16 48.0	72	46	151.8	16 04.5	73	45	152.6	15 21.0	73	44	153.3	14 37.3	73	43	154.0	13 53.4	73	42	154.7	12 47.4	73	40	155.7	3
4	18 06.5	71	50	149.5	17 24.2	71	49	150.2	16 20.3	71	47	151.3	15 37.5	71	46	152.1	14 54.6	72	45	152.8	14 11.5	72	44	153.5	13 28.3	72	43	154.2	12 23.3	72	41	155.3	4
45	17 36.8	69	50	149.0	16 55.0	70	49	149.7	15 52.1	70	48	150.8	15 10.0	70	46	151.6	14 27.7	71	45	152.3	13 45.3	71	44	153.1	13 02.8	71	43	153.8	11 58.8	71	42	154.9	45
6	17 06.5	68	51	148.5	16 25.5	69	50	149.2	15 23.6	69	48	150.4	14 42.1	69	47	151.1	14 00.5	69	46	151.9	13 18.7	70	45	152.6	12 36.9	70	44	153.3	11 33.8	70	42	154.4	6
7	16 35.9	67	52	148.0	15 55.5	67	51	148.8	14 54.6	68	49	149.9	14 13.8	68	48	150.7	13 32.8	68	47	151.4	12 51.8	69	46	152.2	12 10.5	69	45	152.9	11 08.5	69	43	154.0	7
8	16 04.8	66	52	147.5	15 25.1	66	51	148.3	14 25.2	67	50	149.4	13 45.0	67	49	150.2	13 04.8	67	47	151.0	12 24.4	67	46	151.7	11 43.8	68	45	152.5	10 42.8	68	43	153.6	8
9	15 33.3	65	53	147.0	14 54.3	65	52	147.8	13 55.4	66	50	149.0	13 15.9	66	49	149.8	12 36.3	66	48	150.5	11 56.6	66	47	151.3	11 16.8	67	46	152.1	10 16.8	67	44	153.2	9
50	15 01.5	64	54	146.6	14 23.1	64	53	147.4	13 25.2	65	51	148.5	12 46.4	65	50	149.3	12 07.5	65	49	150.1	11 28.5	65	48	150.9	10 49.3	65	46	151.7	9 50.3	66	45	152.8	50
1	14 29.2	63	54	146.1	13 51.5	63	53	146.9	12 54.6	63	52	148.1	12 16.5	64	50	148.9	11 38.3	64	49	149.7	10 59.9	64	48	150.5	10 21.5	64	47	151.3	9 23.6	64	45	152.4	1
2	13 56.5	62	55	145.7	13 19.5	62	54	146.5	12 23.7	62	52	147.7	11 46.3	62	51	148.5	11 08.7	63	50	149.3	10 31.1	63	49	150.1	9 53.3	63	48	150.9	8 56.4	63	46	152.0	2
3	13 23.5	60	56	145.2	12 47.2	61	54	146.0	11 52.4	61	53	147.3	11 15.7	61	52	148.1	10 38.8	62	50	148.9	10 01.9	62	49	149.7	9 24.8	62	48	150.5	8 29.0	62	46	151.7	3
4	12 50.1	59	56	144.8	12 14.5	60	55	145.6	11 20.7	60	53	146.9	10 44.7	60	52	147.7	10 08.6	60	51	148.5	9 32.3	61	50	149.3	8 55.9	61	49	150.1	8 01.2	61	47	151.3	4
55	12 16.4	58	57	144.4	11 41.4	58	56	145.2	10 48.7	59	54	146.5	10 13.4	59	53	147.3	9 38.0	59	52	148.1	9 02.4	59	50	148.9	8 26.7	60	49	149.7	7 33.1	60	47	150.9	55
6	11 42.3	57	57	144.0	11 08.1	57	56	144.8	10 16.4	58	54	146.1	9 41.8	58	53	146.9	9 07.0	58	52	147.7	8 32.2	58	51	148.5	7 57.2	58	50	149.4	7 04.6	59	48	150.6	6
7	11 07.9	56	58	143.6	10 34.3	56	57	144.4	9 43.7	56	55	145.7	9 09.8	57	54	146.5	8 35.8	57	53	147.3	8 01.6	57	51	148.2	7 27.4	57	50	149.0	6 35.9	57	48	150.2	7
8	10 33.2	55	58	143.2	10 00.3	55	57	144.0	9 10.7	55	56	145.3	8 37.5	55	54	146.1	8 04.2	56	53	147.0	7 30.8	56	52	147.8	6 57.3	56	51	148.7	6 06.8	56	49	149.9	8
9	9 58.2	54	59	142.8	9 26.0	54	58	143.7	8 37.4	54	56	144.9	8 04.9	54	55	145.8	7 32.3	54	54	146.6	6 59.6	55	52	147.5	6 26.8	55	51	148.3	5 37.5	55	49	149.6	9
60	9 22.8	52	59	142.4	8 51.3	53	58	143.3	8 03.8	53	56	144.6	7 32.1	53	55	145.4	7 00.2	53	54	146.3	6 28.2	53	53	147.1	5 56.1	54	52	148.0	5 07.9	54	50	149.3	60
1	8 47.2	51	60	142.1	8 16.4	51	59	142.9	7 30.0	52	57	144.2	6 58.9	52	56	145.1	6 27.7	52	55	146.0	5 56.5	52	53	146.8	5 25.1	52	52	147.7					1
2	8 11.2	50	60	141.7	7 41.1	50	59	142.6	6 55.8	51	57	143.9	6 25.4	51	56	144.8	5 55.0	51	55	145.6	5 24.5	51	54	146.5									2
3	7 35.0	49	61	141.4	7 05.6	49	60	142.2	6 21.3	49	58	143.6	5 51.7	49	57	144.4	5 22.0	50	55	145.3													3
4	6 58.5	48	61	141.0	6 29.8	48	60	141.9	5 46.6	48	58	143.2	5 17.7	48	57	144.1																	4
65	6 21.8	47	62	140.7	5 53.8	47	60	141.6	5 11.6	47	59	142.9																					65
6	5 44.8	45	62	140.4	5 17.5	46	61	141.3																									6
7	5 07.5	44	63	140.1																													7

DECLINATION SAME NAME AS LATITUDE

H.A.	46° 00′				47° 00′				48° 30′				49° 30′				50° 30′				51° 30′				52° 30′				54° 00′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
91	9 20.3	18	68	44.7	9 31.2	18	67	43.7	9 47.2	18	65	42.2	9 57.6	17	64	41.2	10 07.9	17	63	40.2	10 18.0	17	61	39.2	10 27.9	16	60	38.2	10 42.3	16	58	36.7	91
2	8 39.4	19	68	44.6	8 51.0	19	67	43.6	9 08.1	19	65	42.1	9 19.3	19	64	41.1	9 30.3	18	62	40.1	9 41.2	18	61	39.1	9 51.9	18	60	38.1	10 07.6	17	58	36.6	2
3	7 58.5	21	68	44.5	8 10.8	20	67	43.5	8 29.1	20	65	42.0	8 41.0	20	64	41.0	8 52.8	20	62	40.0	9 04.5	19	61	39.0	9 16.0	19	60	38.0	9 32.9	19	58	36.5	3
4	7 17.8	22	68	44.3	7 30.8	22	66	43.3	7 50.2	21	65	41.9	8 02.9	21	63	40.9	8 15.4	21	62	39.9	8 27.9	21	61	38.9	8 40.1	20	60	37.9	8 58.3	20	58	36.4	4
95	6 37.2	23	68	44.2	6 51.0	23	66	43.2	7 11.4	23	64	41.7	7 24.8	22	63	40.7	7 38.2	22	62	39.7	7 51.4	22	61	38.8	8 04.4	22	59	37.8	8 23.8	21	57	36.3	95
6	5 56.7	24	67	44.0	6 11.2	24	66	43.0	6 32.7	24	64	41.6	6 46.9	24	63	40.6	7 01.0	23	62	39.6	7 15.0	23	60	38.6	7 28.8	23	59	37.6	7 49.3	23	57	36.2	6
7	5 16.3	26	67	43.8	5 31.5	25	66	42.8	5 54.1	25	64	41.4	6 09.1	25	63	40.4	6 24.0	25	62	39.4	6 38.7	24	60	38.5	6 53.3	24	59	37.5	7 15.1	24	57	36.0	7
8									5 15.7	26	64	41.2	5 31.4	26	63	40.3	5 47.0	26	61	39.3	6 02.6	26	60	38.3	6 18.0	26	59	37.3	6 40.9	25	57	35.9	8
9																	5 10.2	27	61	39.1	5 26.5	27	60	38.1	5 42.7	27	59	37.2	6 06.8	27	57	35.7	9
100																									5 07.6	28	58	37.0	5 32.9	28	56	35.6	100

Lat. 14°

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	49 30.0	1.0 01	00.0	49 00.0	1.0 01	00.0	48 00.0	1.0 01	00.0	47 30.0	1.0 01	00.0	47 00.0	1.0 01	00.0	46 30.0	1.0 01	00.0	45 00.0	1.0 01	00.0	44 30.0	1.0 01	00.0	00
1	49 29.5	1.0 02	00.9	48 59.6	1.0 02	00.9	47 59.6	1.0 02	00.8	47 29.6	1.0 02	00.8	46 59.6	1.0 02	00.8	46 29.6	1.0 02	00.8	44 59.6	1.0 02	00.7	44 29.6	1.0 02	00.7	1
2	49 28.2	1.0 04	01.8	48 58.2	1.0 04	01.7	47 58.3	1.0 04	01.7	47 28.3	1.0 03	01.6	46 58.4	1.0 03	01.6	46 28.4	1.0 03	01.6	44 58.5	1.0 03	01.5	44 28.6	1.0 03	01.4	2
3	49 25.9	1.0 05	02.7	48 56.0	1.0 05	02.6	47 56.2	1.0 05	02.5	47 26.3	1.0 05	02.4	46 56.4	1.0 05	02.4	46 26.4	1.0 05	02.3	44 56.7	1.0 04	02.2	44 26.7	1.0 04	02.1	3
4	49 22.7	99 07	03.6	48 52.9	99 07	03.5	47 53.2	99 06	03.3	47 23.4	99 06	03.3	46 53.5	1.0 06	03.2	46 23.7	1.0 06	03.1	44 54.1	1.0 06	02.9	44 24.2	1.0 05	02.8	4
05	49 18.7	99 08	04.5	48 48.9	99 08	04.4	47 49.4	99 08	04.2	47 19.6	99 08	04.1	46 49.9	99 07	04.0	46 20.1	99 07	03.9	44 50.8	99 07	03.6	44 21.0	99 07	03.5	05
6	49 13.7	99 10	05.3	48 44.1	99 10	05.2	47 44.8	99 09	05.0	47 15.1	99 09	04.9	46 45.4	99 09	04.8	46 15.8	99 09	04.7	44 46.7	99 08	04.3	44 17.0	99 08	04.2	6
7	49 07.9	98 11	06.2	48 38.3	98 11	06.1	47 39.3	98 10	05.8	47 09.8	98 10	05.7	46 40.2	99 10	05.6	46 10.6	99 10	05.4	44 41.9	99 09	05.1	44 12.4	99 09	05.0	7
8	49 01.1	98 13	07.1	48 31.8	98 12	06.9	47 33.0	98 12	06.6	47 03.6	98 12	06.5	46 34.2	98 11	06.3	46 04.8	98 11	06.2	44 36.4	98 10	05.8	44 07.0	98 10	05.6	8
9	48 53.5	97 14	07.9	48 24.3	97 14	07.8	47 25.9	97 13	07.4	46 56.6	97 13	07.3	46 27.4	98 13	07.1	45 58.1	98 12	06.9	44 30.2	98 12	06.5	44 00.9	98 11	06.3	9
10	48 45.0	97 16	08.8	48 16.0	97 15	08.6	47 17.9	97 15	08.2	46 48.9	97 14	08.1	46 19.8	97 14	07.9	45 50.7	97 14	07.7	44 23.3	97 13	07.2	43 54.1	97 12	07.0	10
1	48 35.7	96 17	09.6	48 06.9	96 17	09.4	47 09.2	96 16	09.0	46 40.3	96 16	08.8	46 11.4	96 15	08.6	45 42.5	96 15	08.4	44 15.6	97 14	07.9	43 46.7	97 14	07.7	1
2	48 25.5	96 18	10.5	47 56.9	95 18	10.3	46 59.7	96 17	09.8	46 31.0	96 17	09.6	46 02.3	96 16	09.4	45 33.6	96 16	09.2	44 07.3	96 15	08.6	43 38.5	96 15	08.4	2
3	48 14.5	94 20	11.3	47 46.2	96 19	11.1	46 49.4	96 18	10.6	46 20.9	95 18	10.4	45 52.4	96 18	10.1	45 23.9	96 17	09.9	43 58.3	95 16	09.3	43 29.7	95 16	09.1	3
4	48 02.7	94 21	12.1	47 34.6	94 21	11.9	46 38.3	94 20	11.4	46 10.1	94 19	11.1	45 41.8	94 19	10.9	45 13.6	94 18	10.6	43 48.6	95 17	09.9	43 20.2	95 17	09.7	4
15	47 50.1	93 22	12.9	47 22.2	93 22	12.7	46 26.4	93 21	12.1	45 58.5	93 21	11.9	45 30.5	93 20	11.6	45 02.4	93 20	11.4	43 38.2	94 18	10.6	43 10.0	94 18	10.4	15
6	47 36.6	92 24	13.7	47 09.1	92 23	13.4	46 13.8	92 22	12.9	45 46.1	92 22	12.6	45 18.4	92 21	12.3	44 50.6	93 21	12.1	43 27.1	93 20	11.3	42 59.2	93 19	11.0	6
7	47 22.4	91 25	14.5	46 55.2	91 24	14.2	46 00.5	91 23	13.6	45 33.1	91 23	13.3	45 05.6	92 22	13.0	44 38.1	92 22	12.8	43 15.4	92 21	11.9	42 47.8	92 20	11.7	7
8	47 07.4	90 26	15.3	46 40.5	90 26	15.0	45 46.4	90 25	14.3	45 19.3	90 24	14.0	44 52.1	91 24	13.7	44 24.9	91 23	13.4	43 03.1	91 22	12.6	42 35.7	91 21	12.3	8
9	46 51.7	89 27	16.1	46 25.1	89 27	15.7	45 31.6	89 26	15.1	45 04.8	89 25	14.7	44 38.0	90 25	14.4	44 11.1	90 24	14.1	42 50.1	90 23	13.2	42 23.0	90 22	12.9	9
20	46 35.3	88 29	16.8	46 09.0	88 28	16.4	45 16.2	88 27	15.8	44 49.7	88 26	15.4	44 23.1	89 26	15.1	43 56.5	89 25	14.8	42 36.4	89 24	13.8	42 09.6	89 23	13.5	20
1	46 18.1	86 30	17.5	45 52.1	87 29	17.2	45 00.0	87 28	16.5	44 33.8	87 28	16.1	44 07.6	87 27	15.8	43 41.4	88 26	15.4	42 22.2	88 25	14.5	41 55.7	88 24	14.2	1
2	46 00.2	85 31	18.3	45 34.6	85 30	17.9	44 43.2	86 29	17.1	44 17.4	86 29	16.8	43 51.5	86 28	16.4	43 25.5	87 27	16.1	42 07.4	87 26	15.1	41 41.2	87 25	14.7	2
3	45 41.6	84 32	19.0	45 16.4	84 31	18.6	44 25.7	85 30	17.8	44 00.2	85 30	17.4	43 34.7	85 29	17.1	43 09.1	85 28	16.7	41 51.9	86 27	15.7	41 26.1	86 26	15.3	3
4	45 22.4	83 33	19.6	44 57.5	83 33	19.2	44 07.5	84 31	18.5	43 42.5	84 31	18.1	43 17.3	84 30	17.7	42 52.0	84 29	17.3	41 35.9	85 28	16.3	41 10.4	85 27	15.9	4
25	45 02.5	81 34	20.3	44 38.0	82 34	19.9	43 48.8	82 32	19.1	43 24.1	83 32	18.7	42 59.3	83 31	18.3	42 34.4	83 30	18.0	41 19.3	84 29	16.8	40 54.1	84 28	16.5	25
6	44 41.9	80 35	21.0	44 17.9	80 35	20.6	43 29.4	81 33	19.7	43 05.1	81 33	19.3	42 40.6	82 32	19.0	42 16.1	82 31	18.6	41 02.1	83 30	17.4	40 37.3	83 29	17.0	6
7	44 20.8	79 36	21.6	43 57.1	79 36	21.2	43 09.5	80 34	20.4	42 45.5	80 34	20.0	42 21.5	80 33	19.5	41 57.3	81 32	19.1	40 44.5	81 30	18.0	40 20.0	82 30	17.6	7
8	43 59.0	77 37	22.3	43 35.7	78 37	21.8	42 48.9	78 35	21.0	42 25.3	79 35	20.5	42 01.7	79 34	20.1	41 38.0	79 33	19.7	40 26.2	80 31	18.5	40 02.1	80 31	18.1	8
9	43 36.7	76 38	22.9	43 13.8	76 38	22.4	42 27.8	77 36	21.6	42 04.6	77 35	21.1	41 41.4	78 35	20.7	41 18.0	78 34	20.3	40 07.5	79 32	19.1	39 43.8	79 31	18.7	9
30	43 13.7	75 39	23.5	42 51.3	75 38	23.0	42 06.1	76 37	22.1	41 43.4	76 36	21.7	41 20.5	76 36	21.3	40 57.6	77 35	20.8	39 48.2	78 33	19.6	39 24.9	78 32	19.2	30
1	42 50.3	73 40	24.1	42 28.3	74 39	23.6	41 43.9	74 38	22.7	41 21.6	75 37	22.3	40 59.1	75 36	21.8	40 36.6	75 36	21.4	39 28.4	76 34	20.1	39 05.5	77 33	19.7	1
2	42 26.3	72 41	24.6	42 04.7	72 40	24.2	41 21.2	73 39	23.3	40 59.3	73 38	22.8	40 37.3	74 37	22.3	40 15.1	74 37	21.9	39 08.2	75 35	20.6	38 45.7	75 34	20.2	2
3	42 01.7	70 42	25.2	41 40.6	71 41	24.7	40 58.0	71 40	23.8	40 36.5	72 39	23.3	40 14.9	72 38	22.9	39 53.2	73 37	22.4	38 47.5	74 35	21.1	38 25.4	74 35	20.7	3
4	41 36.7	69 43	25.7	41 16.0	69 42	25.3	40 34.2	70 40	24.3	40 13.2	70 40	23.8	39 52.0	71 39	23.4	39 30.7	71 38	22.9	38 26.3	72 36	21.6	38 04.6	72 35	21.1	4
35	41 11.2	67 43	26.3	40 50.9	68 43	25.8	40 10.0	69 41	24.8	39 49.4	69 40	24.3	39 28.7	69 40	23.9	39 07.8	70 39	23.4	38 04.7	71 37	22.0	37 43.4	71 36	21.6	35
6	40 45.2	66 44	26.8	40 25.4	66 43	26.3	39 45.4	67 42	25.3	39 25.2	67 41	24.8	39 04.9	68 40	24.4	38 44.5	68 40	23.9	37 42.6	69 37	22.5	37 21.8	70 37	22.0	6
7	40 18.7	64 45	27.3	39 59.3	65 44	26.8	39 20.3	66 43	25.8	39 00.5	66 42	25.3	38 40.7	66 41	24.8	38 20.7	67 40	24.3	37 20.1	68 38	22.9	36 59.7	68 37	22.5	7
8	39 51.8	63 46	27.8	39 32.9	63 45	27.3	38 54.7	64 43	26.3	38 35.4	64 43	25.8	38 16.0	65 42	25.3	37 56.5	65 41	24.8	36 57.2	66 39	23.4	36 37.2	67 38	22.9	8
9	39 24.5	61 46	28.2	39 06.0	62 45	27.7	38 28.7	63 44	26.7	38 09.9	63 43	26.2	37 50.9	63 42	25.7	37 31.9	64 42	25.2	36 33.9	65 39	23.8	36 14.4	65 39	23.3	9
40	38 56.7	60 47	28.7	38 38.7	60 46	28.2	38 02.4	61 45	27.2	37 44.0	61 44	26.7	37 25.5	62 43	26.2	37 06.8	62 42	25.7	36 10.2	63 40	24.2	35 51.1	64 39	23.7	40
1	38 28.6	58 48	29.1	38 11.1	59 47	28.6	37 35.6	60 45	27.6	37 17.7	60 44	27.1	36 59.6	60 44	26.6	36 41.4	61 43	26.1	35 46.2	62 41	24.6	35 27.5	62 40	24.1	1
2	38 00.1	57 48	29.5	37 43.0	57 47	29.0	37 08.5	58 46	28.0	36 51.0	58 45	27.5	36 33.4	59 44	27.0	36 15.7	59 44	26.5	35 21.7	61 41	25.0	35 03.5	61 41	24.5	2
3	37 31.2	55 49	30.0	37 14.6	56 48	29.4	36 41.0	56 46	28.4	36 23.9	57 46	27.9	36 06.8	57 45	27.4	35 49.5	58 44	26.9	34 57.0	59 42	25.4	34 39.2	59 41	24.9	3
4	37 01.9	54 49	30.4	36 45.8	54 49	29.8	36 13.1	55 47	28.8	35 56.5	55 46	28.3	35 39.9	56 45	27.8	35 23.0	56 45	27.2	34 31.9	57 42	25.7	34 14.5	58 42	25.2	4
45	36 32.4	52 50	30.7	36 16.7	53 49	30.2	35 44.9	53 48	29.2	35 28.8	54 47	28.6	35 12.6	54 46	28.1	34 56.2	55 45	27.6	34 06.4	56 43	26.1	33 49.6	56 42	25.6	45
6	36 02.4	50 50	31.1	35 47.2	51 50	30.6	35 16.4	52 48	29.5	35 00.7	52 47	29.0	34 45.0	53 47	28.5	34 29.1	53 46	28.0	33 40.6	54 43	26.4	33 24.2	55 43	25.9	6
7	35 32.2	49 51	31.5	35 17.5	49 50	30.9	34 47.5	50 49	29.9	34 32.4	51 48	29.3	34 17.1	51 47	28.8	34 01.6	52 46	28.3	33 14.6	53 44	26.8	32 58.6	53 43	26.3	7
8	35 01.7	47 51	31.8	34 47.4	48 51	31.3	34 18.4	49 49	30.2	34 03.7	49 48	29.7	33 48.9	50 48	29.2	33 33.9	50 47	28.6	32 48.2	51 44	27.1	32 32.7	52 44	26.6	8
9	34 30.9	46 52	32.1	34 17.0	46 51	31.6	33 49.0	47 50	30.5	33 34.7	48 49	30.0	33 20.4	48 48	29.5	33 05.8	49 47	28.9	32 21.6	50 45	27.4	32 06.5	50 44	26.9	9
50	33 59.8	44 52	32.4	33 46.4	45 52	31.9	33 19.3	46 50	30.8	33 05.5	46 49	30.3	32 51.6	47 48	29.8	32 37.5	47 48	29.3	31 54.6	48 45	27.7	31 40.1	49 45	27.2	50
1	33 28.4	43 53	32.8	33 15.5	43 52	32.2	32 49.3	44 50	31.1	32 36.0	45 50	30.6	32 22.5	45 49	30.1	32 08.9	45 48	29.5	31 27.4	47 46	28.0	31 13.4	47 45	27.5	1
2	32 56.8	41 53	33.0	32 44.3	42 52	32.5	32 19.0	43 51	31.4	32 06.2	43 50	30.9	31 53.2	43 49	30.4	31 40.1	44 48	29.8	31 00.0	45 46	28.3	30 46.4	46 45	27.7	2
3	32 24.9	40 54	33.3	32 12.9	40 53	32.8	31 48.6	41 51	31.7	31 36.2	41 50	31.2	31 23.7	42 50	30.6	31 11.0	42 49	30.1	30 32.3	44 47	28.5	30 19.2	44 46	28.0	3
4	31 52.8	38 54	33.6	31 41.3	39 53	33.0	31 17.9	40 52	32.0	31 05.9	40 51	31.4	30 53.9	40 50	30.9	30 41.7	41 49	30.4	30 04.4	42 47	28.8	29 51.7	43 46	28.3	4
55	31 20.5	37 54	33.8	31 09.4	37 53	33.3	30 46.9	38 52	32.2	30 35.5	38 51	31.7	30 23.9	39 50	31.1	30 12.2	39 50	30.6	29 36.3	41 47	29.0	29 24.0	41 46	28.5	55
6	30 48.0	35 55	34.1	30 37.4	36 54	33.5	30 15.8	36 52	32.5	30 04.8	37 51	31.9	29 53.7	37 51	31.4	29 42.4	38 50	30.9	29 07.9	39 48	29.3	28 56.1	39 47	28.7	6
7	30 15.2	34 55	34.3	30 05.1	34 54	33.8	29 44.4	35 53	32.7	29 33.9	35 52	32.2	29 23.2	36 51	31.6	29 12.5	36 50	31.1	28 39.3	37 48	29.5	28 28.1	38 47	29.0	7
8	29 42.3	32 55	34.5	29 32.6	32 54	34.0	29 12.9	33 53	32.9	29 02.8	34 52	32.4	28 52.6	34 51	31.8	28 42.3	35 51	31.3	28 10.6	36 48	29.7	27 59.8	36 47	29.2	8
9	29 09.2	30 55	34.7	29 00.0	31 55	34.2	28 41.2	32 53	33.1	28 31.6	32 52	32.6	28 21.8	33 52	32.0	28 12.0	33 51	31.5	27 41.7	34 49	29.9	27 31.3	35 48	29.4	9
60	28 36.0	29 56	34.9	28 27.2	29 55	34.4	28 09.3	30 53	33.3	28 00.1	31 53	32.8	27 50.9	31 52	32.2	27 41.5	32 51	31.7	27 12.5	33 49	30.1	27 02.7	33 48	29.6	60
1	28 02.5	27 56	35.1	27 54.2	28 55	34.6	27 37.2	29 54	33.5	27 28.5	29 53	33.0	27 19.7	30 52	32.4	27 10.8	30 51	31.9	26 43.3	31 49	30.3	26 33.8	32 48	29.8	1
2	27 29.0	26 56	35.3	27 21.1	26 55	34.8	27 05.0	27 54	33.7	26 56.8	28 53	33.1	26 48.4	28 52	32.6	26 40.0	28 52	32.1	26 13.8	30 49	30.5	26 04.9	30 49	29.9	2
3	26 55.2	24 56	35.5	26 47.8	25 56	34.9	26 32.7	26 54	33.8	26 24.9	26 53	33.3	26 17.0	27 53	32.8	26 09.0	27 52	32.2	25 44.2	28 50	30.6	25 35.8	28 49	30.1	3
4	26 21.4	23 57	35.6	26 14.4	23 56	35.1	26 00.2	24 54	34.0	25 52.9	25 54	33.5	25 45.4	25 53	32.9	25 37.9	26 52	32.4	25 14.5	27 50	30.8	25 06.5	27 49	30.2	4
65	25 47.4	21 57	35.8	25 40.9	22 56	35.2	25 27.5	23 55	34.1	25 20.7	23 54	33.6	25 13.7	23 53	33.1	25 06.6	24 52	32.5	24 44.6	25 50	30.9	24 37.1	25 49	30.4	65
6	25 13.3	20 57	35.9	25 07.3	20 56	35.4	24 54.8	21 55	34.3	24 48.4	22 54	33.7	24 41.9	22 53	33.2	24 35.3	22 52	32.7	24 14.7	23 50	31.1	24 07.6	24 49	30.5	6
7	24 39.1	19 57	36.0	24 33.5	19 56	35.5	24 22.0	20 55	34.4	24 16.0	20 54	33.9	24 09.9	20 53	33.3	24 03.8	21 53	32.8	23 44.6	22 50	31.2	23 37.9	22 50	30.7	7
8	24 04.9	17 57	36.1	23 59.7	17 57	35.6	23 49.0	18 55	34.5	23 43.5	19 54	34.0	23 37.9	19 54	33.5	23 32.2	19 53	32.9	23 14.4	20 51	31.3	23 08.2	21 50	30.8	8
9	23 30.5	16 57	36.2	23 25.8	16 57	35.7	23 16.0	17 55	34.6	23 10.9	17 54	34.1	23 05.8	17 54	33.6	23 00.5	18 53	33.0	22 44.1	19 51	31.4	22 38.4	19 50	30.9	9
70	22 56.0	14 58	36.3	22 51.7	14 57	35.8	22 42.9	15 55	34.7	22 38.3	16 55	34.2	22 33.5	16 54	33.7	22 28.7	16 53	33.1	22 13.7	17 51	31.5	22 08.4	18 50	31.0	70
1	22 21.5	13 58	36.4	22 17.7	13 57	35.9	22 09.7	14 55	34.8	22 05.5	14 55	34.3	22 01.2	14 54	33.7	21 56.9	15 53	33.2	21 43.2	16 51	31.6	21 38.4	16 50	31.1	1
2	21 46.9	11 58	36.5	21 43.5	12 57	36.0	21 36.4	12 56	34.9	21 32.7	13 55	34.4	21 28.9	13 54	33.8	21 25.0	13 53	33.3	21 12.6	14 51	31.7	21 08.3	15 50	31.2	2
3	21 12.2	10 58	36.6	21 09.3	10 57	36.0	21 03.1	11 56	35.0	20 59.8	11 55	34.4	20 56.4	11 54	33.9	20 53.0	12 53	33.4	20 42.0	13 51	31.8	20 38.2	13 50	31.2	3
4	20 37.5	08 58	36.6	20 35.0	09 57	36.1	20 29.7	09 56	35.0	20 26.9	10 55	34.5	20 23.9	10 54	34.0	20 20.9	10 54	33.4	20 11.3	11 51	31.8	20 07.9	11 50	31.3	4
75	20 02.8	07 58	36.7	20 00.7	07 57	36.1	19 56.2	08 56	35.1	19 53.9	08 55	34.5	19 51.4	08 54	34.0	19 48.8	09 54	33.5	19 40.6	10 51	31.9	19 37.7	10 51	31.4	75
6	19 28.0	05 58	36.7	19 26.4	06 57	36.2	19 22.8	06 56	35.1	19 20.8	07 55	34.6	19 18.8	07 54	34.1	19 16.7	07 54	33.5	19 09.8	08 51	31.9	19 07.3	08 51	31.4	6
7	18 53.2	04 58	36.7	18 52.0	04 57	36.2	18 49.3	05 56	35.1	18 47.8	05 55	34.6	18 46.2	05 54	34.1	18 44.5	06 54	33.6	18 39.0	07 51	32.0	18 37.0	07 51	31.5	7
8	18 18.4	03 58	36.7	18 17.6	03 57	36.2	18 15.8	03 56	35.2	18 14.7	04 55	34.6	18 13.6	04 54	34.1	18 12.3	04 54	33.6	18 08.1	05 51	32.0	18 06.6	05 51	31.5	8
9	17 43.6	01 58	36.8	17 43.2	01 57	36.2	17 42.2	02 56	35.2	17 41.6	02 55	34.7	17 40.9	02 54	34.1	17 40.1	03 54	33.6	17 37.3	04 51	32.0	17 36.2	04 51	31.5	9
80	17 08.7	00 58	36.8	17 08.8	00 57	36.2	17 08.7	00 56	35.2	17 08.5	01 55	34.7	17 08.2	01 54	34.1	17 07.9	01 54	33.6	17 06.4	02 52	32.1	17 05.7	02 51	31.5	80
1	16 33.9	02 58	36.8	16 34.4	02 57	36.2	16 35.1	01 56	35.2	16 35.4	01 55	34.7	16 35.5	00 54	34.1	16 35.6	00 54	33.6	16 35.5	01 52	32.1	16 35.3	01 51	31.5	1
2	15 59.0	03 58	36.7	16 00.0	03 57	36.2	16 01.6	02 56	35.2	16 02.3	02 55	34.7	16 02.9	02 54	34.1	16 03.4	02 54	33.6	16 04.6	01 52	32.1	16 04.8	01 51	31.5	2
3	15 24.2	05 58	36.7	15 25.6	04 57	36.2	15 28.0	04 56	35.2	15 29.2	04 55	34.6	15 30.2	03 54	34.1	15 31.2	03 54	33.6	15 33.7	02 51	32.0	15 34.4	02 51	31.5	3
4	14 49.4	06 58	36.7	14 51.2	06 57	36.2	14 54.5	05 56	35.1	14 56.1	05 55	34.6	14 57.6	05 54	34.1	14 59.0	05 54	33.6	15 02.8	04 51	32.0	15 03.9	04 51	31.5	4
85	14 14.7	07 58	36.6	14 16.9	07 57	36.1	14 21.0	07 56	35.1	14 23.0	07 55	34.6	14 24.9	06 54	34.1	14 26.8	06 54	33.6	14 31.9	05 51	32.0	14 33.5	05 51	31.5	85
6	13 39.9	09 58	36.6	13 42.5	09 57	36.1	13 47.6	08 56	35.1	13 50.0	08 55	34.5	13 52.3	08 54	34.0	13 54.6	08 54	33.5	14 01.1	07 51	32.0	14 03.1	07 51	31.5	6
7	13 05.3	10 58	36.5	13 08.3	10 57	36.0	13 14.1	10 56	35.0	13 17.0	09 55	34.5	13 19.8	09 54	34.0	13 22.5	09 53	33.5	13 30.3	08 51	31.9	13 32.7	08 51	31.4	7
8	12 30.6	12 58	36.5	12 34.1	11 57	36.0	12 40.8	11 56	34.9	12 44.0	11 55	34.4	12 47.2	11 54	33.9	12 50.4	10 53	33.4	12 59.5	10 51	31.9	13 02.4	10 50	31.4	8
9	11 56.0	13 58	36.4	11 59.9	13 57	35.9	12 07.5	12 55	34.9	12 11.1	12 55	34.4	12 14.8	12 54	33.9	12 18.4	12 53	33.4	12 28.8	11 51	31.8	12 32.1	11 50	31.3	9
90	11 21.5	14 57	36.3	11 25.8	14 57	35.8	11 34.2	14 55	34.8	11 38.3	14 55	34.3	11 42.4	13 54	33.8	11 46.4	13 53	33.3	11 58.1	13 51	31.8	12 01.9	13 50	31.3	90

H.A.	54° 30′				55° 00′				56° 00′				56° 30′				57° 00′				57° 30′				59° 00′				59° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	21 30.0	1.0	01	180.0	21 00.0	1.0	01	180.0	20 00.0	1.0	00	180.0	19 30.0	1.0	00	180.0	19 00.0	1.0	00	180.0	18 30.0	1.0	00	180.0	17 00.0	1.0	00	180.0	16 30.0	1.0	00	180.0	00
1	21 29.7	1.0	02	179.4	20 59.7	1.0	02	179.4	19 59.7	1.0	02	179.4	19 29.7	1.0	01	179.4	18 59.7	1.0	01	179.4	18 29.7	1.0	01	179.4	16 59.7	1.0	01	179.5	16 29.7	1.0	01	179.5	1
2	21 28.7	1.0	03	178.8	20 58.8	1.0	03	178.8	19 58.8	1.0	02	178.8	19 28.8	1.0	02	178.8	18 58.8	1.0	02	178.8	18 28.8	1.0	02	178.9	16 58.9	1.0	02	178.9	16 28.9	1.0	02	178.9	2
3	21 27.1	1.0	04	178.1	20 57.2	1.0	04	178.2	19 57.3	1.0	04	178.2	19 27.3	1.0	03	178.2	18 57.4	1.0	03	178.3	18 27.4	1.0	03	178.3	16 57.5	1.0	03	178.4	16 27.6	1.0	03	178.4	3
4	21 24.9	1.0	05	177.5	20 55.0	1.0	05	177.5	19 55.2	1.0	05	177.6	19 25.2	1.0	04	177.7	18 55.3	1.0	04	177.7	18 25.4	1.0	04	177.7	16 55.6	1.0	04	177.8	16 25.7	1.0	04	177.9	4
05	21 22.1	1.0	06	176.9	20 52.2	1.0	06	176.9	19 52.4	1.0	06	177.0	19 22.6	1.0	05	177.1	18 52.7	1.0	05	177.1	18 22.8	1.0	05	177.2	16 53.2	1.0	05	177.3	16 23.3	1.0	05	177.4	05
6	21 18.6	99	07	176.3	20 48.8	99	07	176.3	19 49.1	99	07	176.4	19 19.3	99	06	176.5	18 49.5	99	06	176.6	18 19.7	99	06	176.6	16 50.2	99	06	176.8	16 20.3	99	06	176.8	6
7	21 14.5	99	08	175.6	20 44.7	99	08	175.7	19 45.2	99	08	175.8	19 15.5	99	07	175.9	18 45.7	99	07	176.0	18 15.9	99	07	176.0	16 46.6	99	07	176.2	16 16.8	99	07	176.3	7
8	21 09.8	99	09	175.0	20 40.1	99	09	175.1	19 40.7	99	08	175.3	19 11.0	99	08	175.3	18 41.3	99	08	175.4	18 11.6	99	08	175.5	16 42.5	99	08	175.7	16 12.8	99	08	175.8	8
9	21 04.4	99	10	174.4	20 34.8	99	10	174.5	19 35.6	99	10	174.7	19 06.0	99	09	174.8	18 36.4	99	09	174.8	18 06.8	99	09	174.9	16 37.9	99	09	175.2	16 08.3	99	08	175.3	9
10	20 58.4	98	11	173.8	20 28.9	98	11	173.9	19 29.9	98	10	174.1	19 00.4	98	10	174.2	18 30.9	98	10	174.3	18 01.3	98	10	174.4	16 32.7	98	09	174.6	16 03.2	98	09	174.7	10
1	20 51.8	98	12	173.2	20 22.4	98	12	173.3	19 23.6	98	11	173.5	18 54.2	98	11	173.6	18 24.8	98	11	173.7	17 55.3	98	11	173.8	16 27.0	98	10	174.1	15 57.6	98	10	174.2	1
2	20 44.6	98	13	172.6	20 15.3	98	13	172.7	19 16.7	98	12	172.9	18 47.4	98	12	173.0	18 18.1	98	12	173.1	17 48.8	98	12	173.3	16 20.8	98	11	173.6	15 51.5	98	11	173.7	2
3	20 36.8	97	14	172.0	20 07.6	97	14	172.1	19 09.3	97	13	172.3	18 40.1	97	13	172.5	18 10.9	97	13	172.6	17 41.7	97	13	172.7	16 14.0	97	12	173.1	15 44.8	97	12	173.2	3
4	20 28.4	97	15	171.4	19 59.3	97	15	171.5	19 01.2	97	14	171.8	18 32.2	97	14	171.9	18 03.1	97	14	172.0	17 34.0	97	14	172.2	16 06.8	97	13	172.5	15 37.7	97	13	172.7	4
15	20 19.3	96	16	170.8	19 50.4	96	16	170.9	18 52.6	96	15	171.2	18 23.7	96	15	171.3	17 54.7	96	15	171.5	17 25.8	96	15	171.6	15 58.9	97	14	172.0	15 30.0	97	14	172.2	15
6	20 09.7	96	17	170.2	19 41.0	96	17	170.3	18 43.4	96	16	170.6	18 14.6	96	16	170.8	17 45.8	96	16	170.9	17 17.0	96	15	171.1	15 50.6	96	15	171.5	15 21.8	96	14	171.7	6
7	19 59.5	95	18	169.6	19 30.9	95	18	169.8	18 33.7	95	17	170.1	18 05.0	96	17	170.2	17 36.4	95	17	170.4	17 07.7	95	16	170.5	15 41.8	96	16	171.0	15 13.1	96	15	171.2	7
8	19 48.7	95	19	169.0	19 20.2	95	19	169.2	18 23.3	96	18	169.5	17 54.9	96	18	169.7	17 26.4	95	18	169.8	16 57.9	95	17	170.0	15 32.4	95	16	170.5	15 03.9	96	16	170.7	8
9	19 37.3	94	20	168.4	19 09.0	94	20	168.6	18 12.5	94	19	169.0	17 44.2	94	19	169.1	17 15.8	94	18	169.3	16 47.5	94	18	169.5	15 22.5	94	17	170.0	14 54.2	95	17	170.2	9
20	19 25.3	94	21	167.8	18 57.2	94	21	168.0	18 01.0	94	20	168.4	17 32.9	94	20	168.6	17 04.8	94	19	168.8	16 36.6	94	19	168.9	15 12.2	94	18	169.5	14 44.0	94	18	169.7	20
1	19 12.8	93	22	167.3	18 44.9	93	22	167.5	17 49.0	93	21	167.8	17 21.1	93	21	168.0	16 53.2	93	20	168.2	16 25.2	93	20	168.4	15 01.3	93	19	169.0	14 33.3	93	19	169.2	1
2	18 59.7	92	23	166.7	18 32.0	92	22	166.9	17 36.5	92	22	167.3	17 08.8	92	21	167.5	16 41.0	93	21	167.7	16 13.3	93	21	167.9	14 49.9	93	20	168.5	14 22.1	93	19	168.7	2
3	18 46.0	92	24	166.1	18 18.5	92	23	166.3	17 23.4	92	23	166.8	16 55.9	92	22	167.0	16 28.4	92	22	167.2	16 00.8	92	22	167.4	14 38.0	92	21	168.0	14 10.4	92	20	168.2	3
4	18 31.8	91	25	165.6	18 04.5	91	24	165.8	17 09.9	91	24	166.2	16 42.5	91	23	166.4	16 15.2	91	23	166.7	15 47.8	91	22	166.9	14 25.7	91	21	167.5	13 58.3	91	21	167.7	4
25	18 17.0	90	26	165.0	17 49.9	90	25	165.2	16 55.7	90	24	165.7	16 28.6	90	24	165.9	16 01.5	90	24	166.1	15 34.4	90	23	166.4	14 12.9	91	22	167.0	13 45.7	91	22	167.2	25
6	18 01.7	89	26	164.5	17 34.8	89	26	164.7	16 41.1	90	25	165.2	16 14.2	90	25	165.4	15 47.3	90	24	165.6	15 20.4	90	24	165.9	13 59.6	90	23	166.5	13 32.6	90	23	166.8	6
7	17 45.8	89	27	163.9	17 19.2	89	27	164.2	16 25.9	89	26	164.7	15 59.3	89	26	164.9	15 32.6	89	25	165.1	15 05.9	89	25	165.4	13 45.8	89	24	166.1	13 19.0	89	23	166.3	7
8	17 29.4	88	28	163.4	17 03.1	88	28	163.6	16 10.3	88	27	164.1	15 43.9	88	27	164.4	15 17.4	88	26	164.6	14 51.0	88	26	164.9	13 31.5	88	24	165.6	13 05.0	88	24	165.8	8
9	17 12.5	87	29	162.9	16 46.4	87	29	163.1	15 54.1	87	28	163.6	15 27.9	87	27	163.9	15 01.7	87	27	164.1	14 35.5	87	26	164.4	13 16.8	88	25	165.1	12 50.5	88	25	165.4	9
30	16 55.1	86	30	162.3	16 29.2	86	29	162.6	15 37.5	86	29	163.1	15 11.5	86	28	163.4	14 45.6	87	28	163.6	14 19.6	87	27	163.9	13 01.7	87	26	164.7	12 35.6	87	26	164.9	30
1	16 37.2	85	31	161.8	16 11.6	85	30	162.1	15 20.3	86	29	162.6	14 54.6	86	29	162.9	14 29.0	86	28	163.2	14 03.3	86	28	163.4	12 46.0	86	27	164.2	12 20.3	86	26	164.5	1
2	16 18.8	84	32	161.3	15 53.4	85	31	161.6	15 02.7	85	30	162.1	14 37.3	85	30	162.4	14 11.9	85	29	162.7	13 46.4	85	29	163.0	12 30.0	85	27	163.8	12 04.5	85	27	164.0	2
3	15 59.9	84	32	160.8	15 34.8	84	32	161.1	14 44.6	84	31	161.6	14 19.5	84	30	161.9	13 54.3	84	30	162.2	13 29.1	84	30	162.5	12 13.5	84	28	163.3	11 48.2	84	28	163.6	3
4	15 40.5	83	33	160.3	15 15.7	83	33	160.6	14 26.0	83	32	161.2	14 01.2	83	31	161.5	13 36.3	83	31	161.7	13 11.4	83	30	162.0	11 56.6	83	29	162.9	11 31.6	83	28	163.2	4
35	15 20.6	82	34	159.8	14 56.1	82	33	160.1	14 07.0	82	32	160.7	13 42.4	82	32	161.0	13 17.8	82	32	161.3	12 53.2	82	31	161.6	11 39.2	82	30	162.4	11 14.5	82	29	162.7	35
6	15 00.3	81	35	159.3	14 36.0	81	34	159.6	13 47.5	81	33	160.2	13 23.2	81	33	160.5	12 58.9	81	32	160.8	12 34.6	81	32	161.1	11 21.4	81	30	162.0	10 57.0	81	30	162.3	6
7	14 39.5	80	35	158.8	14 15.5	80	35	159.1	13 27.6	80	34	159.8	13 03.6	80	33	160.1	12 39.6	80	33	160.4	12 15.5	80	32	160.7	11 03.3	80	31	161.6	10 39.1	80	30	161.9	7
8	14 18.2	79	36	158.3	13 54.6	79	36	158.7	13 07.2	79	35	159.3	12 43.5	79	34	159.6	12 19.8	79	34	159.9	11 56.0	79	33	160.2	10 44.7	79	32	161.2	10 20.9	79	31	161.5	8
9	13 56.5	78	37	157.9	13 33.2	78	36	158.2	12 46.4	78	35	158.8	12 23.0	78	35	159.2	11 59.6	78	34	159.5	11 36.2	78	34	159.8	10 25.7	78	32	160.8	10 02.2	78	32	161.1	9
40	13 34.4	77	38	157.4	13 11.3	77	37	157.7	12 25.2	77	36	158.4	12 02.1	77	36	158.7	11 39.0	77	35	159.1	11 15.9	77	34	159.4	10 06.3	77	33	160.3	9 43.1	77	32	160.7	40
1	13 11.8	76	38	157.0	12 49.1	76	38	157.3	12 03.6	76	37	158.0	11 40.8	76	36	158.3	11 18.0	76	36	158.6	10 55.2	76	35	159.0	9 46.5	76	34	159.9	9 23.6	76	33	160.3	1
2	12 48.8	75	39	156.5	12 26.4	75	38	156.9	11 41.5	75	37	157.5	11 19.1	75	37	157.9	10 56.6	75	36	158.2	10 34.1	75	36	158.5	9 26.4	75	34	159.6	9 03.8	75	34	159.9	2
3	12 25.4	74	40	156.1	12 03.3	74	39	156.4	11 19.1	74	38	157.1	10 56.9	74	38	157.5	10 34.8	74	37	157.8	10 12.6	74	36	158.1	9 05.9	74	35	159.2	8 43.6	74	34	159.5	3
4	12 01.6	72	40	155.6	11 39.8	73	40	156.0	10 56.3	73	39	156.7	10 34.4	73	38	157.0	10 12.6	73	38	157.4	9 50.7	73	37	157.7	8 45.0	73	35	158.8	8 23.0	73	35	159.1	4
45	11 37.4	71	41	155.2	11 16.0	71	40	155.6	10 33.0	72	39	156.3	10 11.5	72	39	156.6	9 50.0	72	38	157.0	9 28.5	72	38	157.3	8 23.7	72	36	158.4	8 02.1	72	35	158.7	45
6	11 12.8	70	42	154.8	10 51.7	70	41	155.2	10 09.4	71	40	155.9	9 48.3	71	39	156.2	9 27.1	71	39	156.6	9 05.9	71	38	157.0	8 02.1	71	37	158.0	7 40.8	71	36	158.4	6
7	10 47.8	69	42	154.4	10 27.0	69	42	154.8	9 45.4	69	41	155.5	9 24.6	69	40	155.8	9 03.8	70	39	156.2	8 42.9	70	39	156.6	7 40.2	70	37	157.7	7 19.2	70	37	158.0	7
8	10 22.4	68	43	154.0	10 02.0	68	42	154.4	9 21.1	68	41	155.1	9 00.6	68	41	155.5	8 40.1	68	40	155.8	8 19.6	68	39	156.2	7 17.9	69	38	157.3	6 57.2	69	37	157.7	8
9	9 56.7	67	43	153.6	9 36.6	67	43	154.0	8 56.4	67	42	154.7	8 36.3	67	41	155.1	8 16.1	67	41	155.5	7 55.9	67	40	155.8	6 55.2	68	38	156.9	6 35.0	68	38	157.3	9
50	9 30.6	66	44	153.2	9 10.9	66	43	153.6	8 31.4	66	42	154.3	8 11.6	66	42	154.7	7 51.7	66	41	155.1	7 31.9	66	41	155.5	6 32.3	66	39	156.6	6 12.4	66	38	157.0	50
1	9 04.2	65	45	152.8	8 44.8	65	44	153.2	8 06.0	65	43	154.0	7 46.5	65	42	154.3	7 27.1	65	42	154.7	7 07.6	65	41	155.1	6 09.0	65	39	156.3	5 49.4	65	39	156.6	1
2	8 37.4	63	45	152.4	8 18.4	63	45	152.8	7 40.3	64	43	153.6	7 21.2	64	43	154.0	7 02.0	64	42	154.4	6 42.9	64	42	154.8	5 45.4	64	40	155.9	5 26.2	64	39	156.3	2
3	8 10.3	62	46	152.1	7 51.6	62	45	152.5	7 14.2	62	44	153.2	6 55.5	63	43	153.6	6 36.7	63	43	154.0	6 17.9	63	42	154.4	5 21.5	63	40	155.6	5 02.7	63	40	156.0	3
4	7 42.9	61	46	151.7	7 24.6	61	46	152.1	6 47.8	61	44	152.9	6 29.5	61	44	153.3	6 11.1	61	43	153.7	5 52.6	61	43	154.1									4
55	7 15.1	60	47	151.3	6 57.2	60	46	151.7	6 21.2	60	45	152.6	6 03.1	60	44	153.0	5 45.1	60	44	153.4	5 27.1	60	43	153.8									55
6	6 47.0	59	47	151.0	6 29.4	59	47	151.4	5 54.2	59	45	152.2	5 36.5	59	45	152.6	5 18.9	59	44	153.0	5 01.2	59	44	153.4									6
7	6 18.7	57	48	150.7	6 01.4	57	47	151.1	5 26.9	58	46	151.9	5 09.6	58	45	152.3																	7
8	5 50.0	56	48	150.3	5 33.1	56	48	150.7																									8
9	5 21.0	55	49	150.0	5 04.5	55	48	150.4																									9
60																																	60

DECLINATION SAME NAME AS LATITUDE

H.A.	54° 30′				55° 00′				56° 00′				56° 30′				57° 00′				57° 30′				59° 00′				59° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
91	10 47.1	16	57	36.2	10 51.8	16	57	35.7	11 01.0	15	55	34.7	11 05.5	15	54	34.2	11 10.0	15	54	33.7	11 14.5	15	53	33.2	11 27.5	14	51	31.7	11 31.7	14	50	31.2	91
2	10 12.7	17	57	36.1	10 17.8	17	56	35.6	10 27.9	17	55	34.6	10 32.8	16	54	34.1	10 37.7	16	54	33.6	10 42.6	16	53	33.1	10 56.9	16	51	31.6	11 01.6	15	50	31.1	2
3	9 38.4	18	57	36.0	9 43.9	18	56	35.5	9 54.8	18	55	34.5	10 00.2	18	54	34.0	10 05.5	18	54	33.5	10 10.8	18	53	33.0	10 26.4	17	51	31.5	10 31.5	17	50	31.0	3
4	9 04.2	20	57	35.9	9 10.1	20	56	35.4	9 21.9	19	55	34.4	9 27.7	19	54	33.9	9 33.4	19	53	33.4	9 39.1	19	53	32.9	9 56.0	19	51	31.4	10 01.6	18	50	30.9	4
95	8 30.1	21	57	35.8	8 36.5	21	56	35.3	8 49.0	21	55	34.3	8 55.2	21	54	33.8	9 01.4	21	53	33.3	9 07.5	20	53	32.8	9 25.7	20	50	31.3	9 31.7	20	50	30.8	95
6	7 56.1	23	56	35.7	8 02.9	22	56	35.2	8 16.2	22	54	34.2	8 22.9	22	54	33.7	8 29.5	22	53	33.2	8 36.0	22	52	32.7	8 55.5	21	50	31.2	9 01.9	21	50	30.7	6
7	7 22.2	24	56	35.5	7 29.4	24	56	35.0	7 43.6	24	54	34.1	7 50.6	23	54	33.6	7 57.6	23	53	33.1	8 04.6	23	52	32.6	8 25.3	23	50	31.1	8 32.2	23	49	30.6	7
8	6 48.5	25	56	35.4	6 56.0	25	55	34.9	7 11.0	25	54	33.9	7 18.5	25	53	33.4	7 25.9	25	53	33.0	7 33.3	25	52	32.5	7 55.3	24	50	31.0	8 02.6	24	49	30.5	8
9	6 14.8	27	56	35.2	6 22.8	26	55	34.8	6 38.6	26	54	33.8	6 46.5	26	53	33.3	6 54.3	26	52	32.8	7 02.1	26	52	32.3	7 25.4	26	50	30.9	7 33.1	26	49	30.4	9
100	5 41.3	28	56	35.1	5 49.6	28	55	34.6	6 06.3	28	54	33.6	6 14.6	28	53	33.1	6 22.8	27	52	32.7	6 31.0	27	52	32.2	6 55.6	27	49	30.7	7 03.7	27	49	30.2	100
1	5 07.9	29	56	34.9	5 16.6	29	55	34.4	5 34.1	29	53	33.5	5 42.8	29	53	33.0	5 51.5	29	52	32.5	6 00.1	29	51	32.0	6 25.9	29	49	30.6	6 34.4	28	49	30.1	1
2									5 02.1	30	53	33.3	5 11.2	30	52	32.8	5 20.2	30	52	32.3	5 29.3	30	51	31.9	5 56.3	30	49	30.4	6 05.3	30	48	30.0	2
3																									5 26.9	31	49	30.3	5 36.3	31	48	29.8	3
4																													5 07.4	33	48	29.6	4

Lat. 14°

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	44 00.0	1.0 01	00.0	43 30.0	1.0 01	00.0	42 00.0	1.0 01	00.0	41 30.0	1.0 01	00.0	41 00.0	1.0 00	00.0	35 00.0	1.0 00	00.0	34 30.0	1.0 00	00.0	29 30.0	1.0 00	00.0	00
1	43 59.6	1.0 02	00.7	43 29.7	1.0 02	00.7	41 59.7	1.0 02	00.6	41 29.7	1.0 02	00.6	40 59.7	1.0 02	00.6	34 59.8	1.0 01	00.4	34 29.8	1.0 01	00.4	29 29.8	1.0 01	00.3	1
2	43 58.6	1.0 03	01.4	43 28.6	1.0 03	01.4	41 58.7	1.0 03	01.3	41 28.7	1.0 03	01.2	40 58.8	1.0 03	01.2	34 59.1	1.0 02	00.9	34 29.1	1.0 02	00.8	29 29.4	1.0 01	00.6	2
3	43 56.8	1.0 04	02.1	43 26.9	1.0 04	02.0	41 57.1	1.0 04	01.9	41 27.2	1.0 04	01.8	40 57.3	1.0 04	01.8	34 58.0	1.0 03	01.3	34 28.1	1.0 02	01.3	29 28.6	1.0 02	00.9	3
4	43 54.4	1.0 05	02.8	43 24.5	1.0 05	02.7	41 54.9	1.0 05	02.5	41 25.0	1.0 05	02.5	40 55.1	1.0 05	02.4	34 56.4	1.0 03	01.7	34 26.5	1.0 03	01.7	29 27.5	1.0 02	01.2	4
05	43 51.2	99 06	03.5	43 21.4	99 06	03.4	41 52.0	99 06	03.1	41 22.2	99 06	03.1	40 52.4	99 06	03.0	34 54.5	99 04	02.2	34 24.6	99 04	02.1	29 26.1	1.0 03	01.5	05
6	43 47.3	99 08	04.2	43 17.6	99 07	04.1	41 48.5	99 07	03.8	41 18.8	99 07	03.7	40 49.0	99 07	03.6	34 52.0	99 05	02.6	34 22.2	99 05	02.5	29 24.4	99 03	01.8	6
7	43 42.8	99 09	04.8	43 13.2	99 09	04.7	41 44.3	99 08	04.4	41 14.7	99 08	04.3	40 45.1	99 08	04.2	34 49.1	99 06	03.0	34 19.4	99 05	03.0	29 22.4	99 04	02.1	7
8	43 37.5	98 10	05.5	43 08.0	98 10	05.4	41 39.5	98 09	05.0	41 10.0	98 09	04.9	40 40.5	98 09	04.8	34 45.8	99 06	03.5	34 16.2	99 06	03.4	29 20.0	99 04	02.4	8
9	43 31.6	98 11	06.2	43 02.2	98 11	06.0	41 34.1	98 10	05.6	41 04.8	98 10	05.5	40 35.4	98 10	05.4	34 42.1	98 07	03.9	34 12.6	98 07	03.8	29 17.4	98 05	02.7	9
10	43 24.9	97 12	06.9	42 55.8	97 12	06.7	41 28.1	97 11	06.2	40 58.9	97 11	06.1	40 29.6	98 11	06.0	34 37.9	98 08	04.3	34 08.5	98 08	04.2	29 14.5	98 05	03.0	10
1	43 17.7	97 13	07.5	42 48.6	97 13	07.4	41 21.5	97 12	06.9	40 52.4	97 12	06.7	40 23.3	97 12	06.5	34 33.3	97 08	04.8	34 04.0	97 08	04.6	29 11.2	98 06	03.3	1
2	43 09.7	96 14	08.2	42 40.8	96 14	08.0	41 14.2	96 13	07.5	40 45.3	96 13	07.3	40 16.4	96 12	07.1	34 28.2	97 09	05.2	33 59.1	97 09	05.0	29 07.7	97 06	03.6	2
3	43 01.1	95 15	08.8	42 32.4	96 15	08.6	41 06.4	96 14	08.1	40 37.6	96 14	07.9	40 08.9	96 13	07.7	34 22.7	96 10	05.6	33 53.8	96 10	05.4	29 03.8	97 07	03.9	3
4	42 51.8	95 17	09.5	42 23.3	95 16	09.3	40 57.9	95 15	08.7	40 29.4	95 15	08.4	40 00.8	95 14	08.2	34 16.8	96 11	06.0	33 48.1	96 10	05.9	28 59.7	96 07	04.2	4
15	42 41.8	94 18	10.1	42 13.6	94 17	09.9	40 48.9	94 16	09.2	40 20.5	94 16	09.0	39 52.2	94 15	08.8	34 10.5	95 11	06.4	33 41.9	95 11	06.3	28 55.2	96 08	04.5	15
6	42 31.3	93 19	10.8	42 03.3	93 18	10.5	40 39.2	94 17	09.8	40 11.1	94 17	09.6	39 43.0	94 16	09.4	34 03.8	95 12	06.8	33 35.4	95 12	06.7	28 50.5	95 08	04.8	6
7	42 20.1	92 20	11.4	41 52.4	92 19	11.1	40 29.0	93 18	10.4	40 01.1	93 18	10.2	39 33.3	93 17	09.9	33 56.6	94 13	07.3	33 28.4	94 12	07.1	28 45.4	95 09	05.1	7
8	42 08.3	91 21	12.0	41 40.8	92 20	11.8	40 18.2	92 19	11.0	39 50.6	92 18	10.7	39 23.0	92 18	10.5	33 49.1	93 13	07.7	33 21.1	93 13	07.4	28 40.1	94 09	05.4	8
9	41 55.8	91 22	12.6	41 28.6	91 21	12.4	40 06.9	91 20	11.5	39 39.5	91 19	11.3	39 12.1	91 19	11.0	33 41.1	93 14	08.1	33 13.4	93 14	07.8	28 34.5	93 10	05.7	9
20	41 42.8	90 23	13.2	41 15.9	90 22	12.9	39 54.9	90 21	12.1	39 27.9	90 20	11.8	39 00.8	90 20	11.5	33 32.8	92 15	08.5	33 05.2	92 14	08.2	28 28.5	93 10	06.0	20
1	41 29.2	89 24	13.8	41 02.6	89 23	13.5	39 42.5	89 22	12.6	39 15.7	89 21	12.3	38 48.9	89 21	12.1	33 24.0	91 15	08.8	32 56.7	91 15	08.6	28 22.3	92 11	06.2	1
2	41 14.9	88 25	14.4	40 48.6	88 24	14.1	39 29.5	88 23	13.2	39 03.0	88 22	12.9	38 36.5	89 22	12.6	33 14.8	90 16	09.2	32 47.8	90 15	09.0	28 15.9	91 11	06.5	2
3	41 00.1	86 26	15.0	40 34.2	87 25	14.7	39 15.9	87 23	13.7	38 49.8	87 23	13.4	38 23.5	88 22	13.1	33 05.3	89 17	09.6	32 38.5	89 16	09.4	28 09.1	90 12	06.8	3
4	40 44.8	85 26	15.6	40 19.2	86 26	15.2	39 01.9	86 24	14.2	38 36.0	86 24	13.9	38 10.1	86 23	13.6	32 55.4	88 17	10.0	32 28.9	88 17	09.7	28 02.1	89 12	07.1	4
25	40 28.9	84 27	16.1	40 03.6	84 27	15.8	38 47.3	85 25	14.7	38 21.8	85 25	14.4	37 56.2	85 24	14.1	32 45.1	87 18	10.4	32 18.9	87 17	10.1	27 54.8	89 13	07.3	25
6	40 12.5	83 28	16.7	39 47.5	83 28	16.3	38 32.3	84 26	15.3	38 07.1	84 25	14.9	37 41.8	84 25	14.6	32 34.4	86 18	10.7	32 08.5	86 18	10.4	27 47.2	88 13	07.6	6
7	39 55.5	82 29	17.2	39 30.9	82 29	16.8	38 16.7	83 27	15.8	37 51.8	83 26	15.4	37 26.9	83 26	15.0	32 23.4	85 19	11.1	31 57.8	85 18	10.8	27 39.4	87 14	07.9	7
8	39 38.0	81 30	17.7	39 13.8	81 29	17.4	38 00.6	82 28	16.2	37 36.1	82 27	15.9	37 11.6	82 26	15.5	32 12.0	84 20	11.5	31 46.7	84 19	11.2	27 31.3	86 14	08.1	8
9	39 20.0	79 31	18.3	38 56.1	80 30	17.9	37 44.1	80 28	16.7	37 20.0	81 28	16.4	36 55.8	81 27	16.0	32 00.2	83 20	11.8	31 35.3	83 20	11.5	27 22.9	85 14	08.4	9
30	39 01.5	78 32	18.8	38 38.0	78 31	18.4	37 27.1	79 29	17.2	37 03.4	79 28	16.8	36 39.5	80 28	16.4	31 48.1	82 21	12.2	31 23.5	82 20	11.8	27 14.3	84 15	08.6	30
1	38 42.5	77 32	19.3	38 19.4	77 32	18.9	37 09.7	78 30	17.7	36 46.3	78 29	17.3	36 22.8	78 29	16.9	31 35.7	81 21	12.5	31 11.4	81 21	12.2	27 05.4	83 15	08.9	1
2	38 23.1	75 33	19.8	38 00.4	76 32	19.3	36 51.8	77 31	18.1	36 28.8	77 30	17.7	36 05.7	77 29	17.3	31 22.9	80 22	12.9	30 58.9	80 21	12.5	26 56.3	82 16	09.1	2
3	38 03.2	74 34	20.2	37 40.9	74 33	19.8	36 33.5	75 31	18.6	36 10.9	76 31	18.2	35 48.1	76 30	17.7	31 09.8	79 22	13.2	30 46.2	79 22	12.8	26 46.9	81 16	09.4	3
4	37 42.8	73 35	20.7	37 20.9	73 34	20.3	36 14.8	74 32	19.0	35 52.5	74 31	18.6	35 30.2	75 31	18.2	30 56.4	77 23	13.5	30 33.1	78 22	13.1	26 37.3	79 16	09.6	4
35	37 22.0	71 35	21.2	37 00.6	72 35	20.7	35 55.6	73 33	19.4	35 33.8	73 32	19.0	35 11.8	73 31	18.6	30 42.6	76 23	13.8	30 19.7	76 23	13.5	26 27.4	78 17	09.9	35
6	37 00.8	70 36	21.6	36 39.8	70 35	21.2	35 36.0	71 33	19.8	35 14.6	72 33	19.4	34 53.1	72 32	19.0	30 28.5	75 24	14.1	30 06.0	75 23	13.8	26 17.4	77 17	10.1	6
7	36 39.2	69 37	22.0	36 18.6	69 36	21.6	35 16.1	70 34	20.2	34 55.1	70 33	19.8	34 34.0	71 32	19.4	30 14.1	74 24	14.5	29 52.0	74 24	14.1	26 07.0	76 18	10.3	7
8	36 17.1	67 37	22.5	35 56.9	67 37	22.0	34 55.8	68 34	20.6	34 35.2	69 34	20.2	34 14.5	69 33	19.8	29 59.5	72 25	14.8	29 37.7	73 24	14.4	25 56.5	75 18	10.5	8
9	35 54.7	66 38	22.9	35 35.0	66 37	22.4	34 35.0	67 35	21.0	34 14.9	67 34	20.6	33 54.6	68 34	20.1	29 44.5	71 25	15.1	29 23.1	71 25	14.7	25 45.7	74 18	10.8	9
40	35 31.9	64 39	23.3	35 12.6	65 38	22.8	34 14.0	66 36	21.4	33 54.2	66 35	21.0	33 34.4	66 34	20.5	29 29.2	70 26	15.3	29 08.2	70 25	14.9	25 34.8	72 19	11.0	40
1	35 08.7	63 39	23.7	34 49.9	63 38	23.2	33 52.5	64 36	21.8	33 33.2	65 36	21.3	33 13.8	65 35	20.9	29 13.7	68 26	15.6	28 53.1	69 26	15.2	25 23.6	71 19	11.2	1
2	34 45.2	61 40	24.0	34 26.8	62 39	23.5	33 30.8	63 37	22.1	33 11.9	63 36	21.7	32 52.9	63 35	21.2	28 57.8	67 27	15.9	28 37.7	67 26	15.5	25 12.2	70 19	11.4	2
3	34 21.3	60 40	24.4	34 03.3	60 40	23.9	33 08.7	61 37	22.5	32 50.2	62 37	22.0	32 31.7	62 36	21.5	28 41.8	66 27	16.2	28 22.0	66 27	15.7	25 00.6	68 20	11.6	3
4	33 57.1	58 41	24.8	33 39.6	59 40	24.3	32 46.3	60 38	22.8	32 28.3	60 37	22.3	32 10.2	60 36	21.9	28 25.4	64 28	16.4	28 06.1	65 27	16.0	24 48.7	67 20	11.8	4
45	33 32.6	57 41	25.1	33 15.5	57 41	24.6	32 23.5	58 38	23.1	32 06.0	59 38	22.7	31 48.3	59 37	22.2	28 08.8	63 28	16.7	27 49.9	63 27	16.3	24 36.7	66 20	12.0	45
6	33 07.7	55 42	25.4	32 51.1	56 41	24.9	32 00.5	57 39	23.5	31 43.4	57 38	23.0	31 26.2	58 37	22.5	27 51.9	61 28	17.0	27 33.5	62 28	16.5	24 24.5	64 21	12.2	6
7	32 42.6	54 42	25.8	32 26.4	54 42	25.3	31 37.2	55 39	23.8	31 20.5	56 39	23.3	31 03.8	56 38	22.8	27 34.9	60 29	17.2	27 16.8	60 28	16.7	24 12.2	63 21	12.4	7
8	32 17.1	52 43	26.1	32 01.4	53 42	25.6	31 13.5	54 40	24.1	30 57.4	54 39	23.6	30 41.1	54 38	23.1	27 17.5	58 29	17.4	26 59.9	59 28	17.0	23 59.6	61 21	12.6	8
9	31 51.4	51 43	26.4	31 36.1	51 43	25.9	30 49.7	52 40	24.4	30 33.9	53 40	23.9	30 18.1	53 39	23.4	27 00.0	57 30	17.7	26 42.8	57 29	17.2	23 46.9	60 22	12.7	9
50	31 25.4	49 44	26.7	31 10.6	50 43	26.2	30 25.5	51 41	24.6	30 10.2	51 40	24.2	29 54.9	51 39	23.7	26 42.2	55 30	17.9	26 25.5	56 29	17.4	23 33.9	59 22	12.9	50
1	30 59.1	48 44	27.0	30 44.8	48 43	26.4	30 01.1	49 41	24.9	29 46.3	50 40	24.4	29 31.4	50 40	23.9	26 24.2	54 30	18.1	26 07.9	54 30	17.6	23 20.8	57 22	13.1	1
2	30 32.6	46 45	27.2	30 18.8	46 44	26.7	29 36.4	48 42	25.2	29 22.1	48 41	24.7	29 07.7	48 40	24.2	26 06.0	52 31	18.3	25 50.2	53 30	17.9	23 07.6	56 22	13.2	2
3	30 05.9	44 45	27.5	29 52.5	45 44	27.0	29 11.6	46 42	25.4	28 57.7	46 41	24.9	28 43.7	47 40	24.4	25 47.6	51 31	18.5	25 32.2	51 30	18.1	22 54.2	54 23	13.4	3
4	29 38.9	43 45	27.7	29 26.0	43 45	27.2	28 46.4	44 42	25.7	28 33.0	45 41	25.2	28 19.5	45 41	24.7	25 29.0	49 31	18.7	25 14.1	50 31	18.3	22 40.6	53 23	13.6	4
55	29 11.7	41 46	28.0	28 59.2	42 45	27.5	28 21.1	43 43	25.9	28 08.2	43 42	25.4	27 55.1	44 41	24.9	25 10.2	48 32	18.9	24 55.8	48 31	18.4	22 26.9	51 23	13.7	55
6	28 44.3	40 46	28.2	28 32.3	40 45	27.7	27 55.6	41 43	26.1	27 43.1	42 42	25.6	27 30.5	42 41	25.1	24 51.2	46 32	19.1	24 37.3	47 31	18.6	22 13.0	49 23	13.8	6
7	28 16.6	38 46	28.4	28 05.1	39 46	27.9	27 29.8	40 43	26.4	27 17.8	40 42	25.8	27 05.7	41 42	25.3	24 32.1	45 32	19.3	24 18.6	45 31	18.8	21 59.0	48 24	14.0	7
8	27 48.8	37 47	28.6	27 37.8	37 46	28.1	27 03.9	38 44	26.6	26 52.4	39 43	26.0	26 40.7	39 42	25.5	24 12.7	43 32	19.5	23 59.8	43 32	19.0	21 44.9	46 24	14.1	8
9	27 20.8	35 47	28.8	27 10.2	36 46	28.3	26 37.8	37 44	26.8	26 26.7	37 43	26.2	26 15.5	37 42	25.7	23 53.3	42 33	19.6	23 40.7	42 32	19.1	21 30.6	45 24	14.3	9
60	26 52.6	34 47	29.0	26 42.5	34 46	28.5	26 11.5	35 44	26.9	26 00.9	35 43	26.4	25 50.2	36 43	25.9	23 33.6	40 33	19.8	23 21.6	40 32	19.3	21 16.2	43 24	14.4	60
1	26 24.3	32 48	29.2	26 14.7	32 47	28.7	25 45.0	34 44	27.1	25 34.9	34 44	26.6	25 24.7	34 43	26.1	23 13.8	38 33	19.9	23 02.3	39 32	19.4	21 01.7	42 24	14.5	1
2	25 55.8	30 48	29.4	25 46.6	31 47	28.9	25 18.4	32 45	27.3	25 08.8	32 44	26.8	24 59.0	33 43	26.2	22 53.9	37 33	20.1	22 42.8	37 33	19.6	20 47.1	40 25	14.6	2
3	25 27.2	29 48	29.6	25 18.4	29 47	29.0	24 51.6	30 45	27.5	24 42.5	31 44	26.9	24 33.2	31 43	26.4	22 33.8	35 34	20.2	22 23.3	35 33	19.7	20 32.3	38 25	14.7	3
4	24 58.4	27 48	29.7	24 50.1	28 47	29.2	24 24.7	29 45	27.6	24 16.0	29 44	27.1	24 07.2	29 43	26.6	22 13.7	34 34	20.4	22 03.5	34 33	19.9	20 17.5	37 25	14.8	4
65	24 29.4	26 48	29.9	24 21.7	26 48	29.3	23 57.7	27 45	27.7	23 49.5	28 44	27.2	23 41.1	28 44	26.7	21 53.3	32 34	20.5	21 43.7	32 33	20.0	20 02.5	35 25	14.9	65
6	24 00.4	24 49	30.0	23 53.1	25 48	29.5	23 30.5	26 45	27.9	23 22.8	26 45	27.4	23 14.9	26 44	26.8	21 32.9	30 34	20.6	21 23.8	31 33	20.1	19 47.5	34 25	15.0	6
7	23 31.2	23 49	30.1	23 24.4	23 48	29.6	23 03.2	24 46	28.0	22 56.0	24 45	27.5	22 48.6	25 44	27.0	21 12.4	29 34	20.7	21 03.7	29 34	20.2	19 32.3	32 25	15.1	7
8	23 01.9	21 49	30.2	22 55.6	21 48	29.7	22 35.8	22 46	28.1	22 29.0	23 45	27.6	22 22.1	23 44	27.1	20 51.7	27 35	20.8	20 43.5	27 34	20.3	19 17.1	30 26	15.2	8
9	22 32.6	20 49	30.4	22 26.7	20 48	29.8	22 08.3	21 46	28.2	22 02.0	21 45	27.7	21 55.6	22 44	27.2	20 31.0	25 35	20.9	20 23.3	26 34	20.4	19 01.7	29 26	15.3	9
70	22 03.1	18 49	30.5	21 57.7	18 48	29.9	21 40.7	19 46	28.3	21 34.9	20 45	27.8	21 28.9	20 45	27.3	20 10.1	24 35	21.0	20 02.9	24 34	20.5	18 46.3	27 26	15.4	70
1	21 33.5	16 49	30.6	21 28.6	17 49	30.0	21 13.0	18 46	28.4	21 07.7	18 46	27.9	21 02.2	18 45	27.4	19 49.2	22 35	21.1	19 42.5	22 34	20.6	18 30.9	25 26	15.5	1
2	21 03.9	15 50	30.6	20 59.4	15 49	30.1	20 45.3	16 46	28.5	20 40.4	16 46	28.0	20 35.4	17 45	27.5	19 28.2	20 35	21.2	19 22.0	21 34	20.7	18 15.3	24 26	15.5	2
3	20 34.2	13 50	30.7	20 30.2	14 49	30.2	20 17.5	15 46	28.6	20 13.0	15 46	28.1	20 08.5	15 45	27.5	19 07.1	19 35	21.3	19 01.4	19 34	20.7	17 59.7	22 26	15.6	3
4	20 04.4	12 50	30.8	20 00.9	12 49	30.2	19 49.6	13 47	28.7	19 45.6	13 46	28.1	19 41.6	14 45	27.6	18 45.9	17 35	21.3	18 40.7	18 35	20.8	17 44.0	20 26	15.6	4
75	19 34.6	10 50	30.8	19 31.5	11 49	30.3	19 21.6	11 47	28.7	19 18.1	12 46	28.2	19 14.5	12 45	27.7	18 24.7	16 35	21.4	18 20.0	16 35	20.9	17 28.3	19 26	15.7	75
6	19 04.8	09 50	30.9	19 02.1	09 49	30.4	18 53.6	10 47	28.8	18 50.6	10 46	28.3	18 47.5	10 45	27.7	18 03.5	14 36	21.5	17 59.2	14 35	20.9	17 12.5	17 26	15.8	6
7	18 34.9	07 50	30.9	18 32.7	07 49	30.4	18 25.5	08 47	28.8	18 23.0	09 46	28.3	18 20.4	09 45	27.8	17 42.1	12 36	21.5	17 38.4	13 35	21.0	16 56.7	15 26	15.8	7
8	18 04.9	06 50	31.0	18 03.2	06 49	30.4	17 57.5	07 47	28.9	17 55.4	07 46	28.3	17 53.2	07 45	27.8	17 20.8	11 36	21.5	17 17.6	11 35	21.0	16 40.8	14 26	15.8	8
9	17 35.0	04 50	31.0	17 33.7	04 49	30.5	17 29.3	05 47	28.9	17 27.7	06 46	28.4	17 26.0	06 45	27.8	16 59.4	09 36	21.6	16 56.6	09 35	21.1	16 24.9	12 27	15.9	9
80	17 05.0	03 50	31.0	17 04.2	03 49	30.5	17 01.2	04 47	28.9	17 00.1	04 46	28.4	16 58.8	04 45	27.9	16 38.0	07 36	21.6	16 35.7	08 35	21.1	16 09.0	10 27	15.9	80
1	16 35.0	01 50	31.0	16 34.6	01 49	30.5	16 33.0	02 47	28.9	16 32.4	02 46	28.4	16 31.6	03 45	27.9	16 16.5	06 36	21.6	16 14.7	06 35	21.1	15 53.0	08 27	15.9	1
2	16 05.0	00 50	31.0	16 05.1	00 49	30.5	16 04.9	01 47	28.9	16 04.7	01 46	28.4	16 04.4	01 45	27.9	15 55.0	04 36	21.7	15 53.8	04 35	21.1	15 37.0	07 27	15.9	2
3	15 35.0	02 50	31.0	15 35.5	02 49	30.5	15 36.7	01 47	28.9	15 37.0	01 46	28.4	15 37.1	00 45	27.9	15 33.5	02 36	21.7	15 32.8	03 35	21.1	15 21.0	05 27	16.0	3
4	15 05.0	03 50	31.0	15 06.0	03 49	30.5	15 08.5	02 47	28.9	15 09.3	02 46	28.4	15 09.9	02 45	27.9	15 12.0	01 36	21.7	15 11.8	01 35	21.2	15 05.0	03 27	16.0	4
85	14 35.0	05 50	31.0	14 36.5	05 49	30.5	14 40.4	04 47	28.9	14 41.6	04 46	28.4	14 42.7	04 45	27.9	14 50.5	01 36	21.7	14 50.7	01 35	21.2	14 49.0	02 27	16.0	85
6	14 05.1	06 50	30.9	14 07.0	06 49	30.4	14 12.3	06 47	28.9	14 13.9	06 46	28.4	14 15.5	05 45	27.9	14 29.0	02 36	21.7	14 29.7	02 35	21.2	14 33.0	00 27	16.0	6
7	13 35.1	08 50	30.9	13 37.5	08 49	30.4	13 44.1	07 47	28.9	13 46.2	07 46	28.3	13 48.3	07 45	27.8	14 07.5	04 36	21.7	14 08.7	04 35	21.1	14 16.9	02 27	16.0	7
8	13 05.3	09 50	30.9	13 08.1	09 49	30.4	13 16.1	09 47	28.8	13 18.6	08 46	28.3	13 21.1	08 45	27.8	13 46.1	06 36	21.6	13 47.7	05 35	21.1	14 00.9	03 27	16.0	8
9	12 35.4	11 50	30.8	12 38.7	11 49	30.3	12 48.0	10 47	28.8	12 51.0	10 46	28.3	12 54.0	10 45	27.8	13 24.6	07 36	21.6	13 26.8	07 35	21.1	13 44.9	05 27	16.0	9
90	12 05.6	12 50	30.8	12 09.3	12 49	30.2	12 20.0	12 47	28.7	12 23.5	11 46	28.2	12 26.9	11 45	27.7	13 03.2	09 36	21.6	13 05.8	09 35	21.1	13 28.9	07 27	16.0	90

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	16 00.0	1.0 00	180.0	15 30.0	1.0 00	180.0	14 00.0	1.0 00	180.0	13 30.0	1.0 00	180.0	13 00.0	1.0 00	180.0	7 00.0	1.0 00	180.0	6 30.0	1.0 00	180.0				00
1	15 59.7	1.0 01	179.5	15 29.7	1.0 01	179.5	13 59.8	1.0 01	179.5	13 29.8	1.0 01	179.5	12 59.8	1.0 01	179.5	6 59.8	1.0 01	179.6	6 29.8	1.0 01	179.6				1
2	15 58.9	1.0 02	179.0	15 29.0	1.0 02	179.0	13 59.0	1.0 02	179.0	13 29.0	1.0 02	179.1	12 59.1	1.0 02	179.1	6 59.3	1.0 02	179.3	6 29.3	1.0 02	179.3				2
3	15 57.6	1.0 03	178.4	15 27.7	1.0 03	178.5	13 57.8	1.0 03	178.5	13 27.8	1.0 03	178.6	12 57.9	1.0 03	178.6	6 58.4	1.0 02	178.9	6 28.4	1.0 02	178.9				3
4	15 55.8	1.0 04	177.9	15 25.8	1.0 04	178.0	13 56.1	1.0 04	178.1	13 26.1	1.0 04	178.1	12 56.2	1.0 04	178.1	6 57.1	1.0 03	178.6	6 27.1	1.0 03	178.6				4
05	15 53.4	1.0 06	177.4	15 23.5	1.0 05	177.4	13 53.9	1.0 04	177.6	13 24.0	1.0 04	177.6	12 54.1	1.0 04	177.7	6 55.4	1.0 03	178.2	6 25.5	1.0 03	178.2				05
6	15 50.5	99 06	176.9	15 20.7	99 06	176.9	13 51.2	99 05	177.1	13 21.3	99 05	177.2	12 51.5	99 05	177.2	6 53.4	99 04	177.8	6 23.6	99 04	177.9				6
7	15 47.1	99 07	176.4	15 17.3	99 06	176.4	13 48.0	99 06	176.6	13 18.2	99 06	176.7	12 48.4	99 06	176.7	6 51.0	99 05	177.5	6 21.2	99 04	177.5				7
8	15 43.1	99 07	175.9	15 13.4	99 07	175.9	13 44.3	99 07	176.1	13 14.6	99 07	176.2	12 44.9	99 07	176.3	6 48.3	99 05	177.1	6 18.6	99 05	177.2				8
9	15 38.7	99 08	175.3	15 09.0	99 08	175.4	13 40.1	99 08	175.7	13 10.5	99 08	175.7	12 40.9	99 07	175.8	6 45.2	99 06	176.8	6 15.5	99 06	176.8				9
10	15 33.7	98 09	174.8	15 04.1	98 09	174.9	13 35.5	98 09	175.2	13 06.0	98 08	175.3	12 36.4	98 08	175.4	6 41.7	99 06	176.4	6 12.1	99 06	176.5				10
1	15 28.2	98 10	174.3	14 58.7	98 10	174.4	13 30.4	98 09	174.7	13 00.9	98 09	174.8	12 31.5	98 09	174.9	6 37.9	98 07	176.1	6 08.4	98 07	176.1				1
2	15 22.1	98 11	173.8	14 52.8	98 11	173.9	13 24.8	98 10	174.2	12 55.4	98 10	174.3	12 26.1	98 10	174.5	6 33.7	98 08	175.7	6 04.3	98 07	175.8				2
3	15 15.6	97 12	173.3	14 46.4	97 12	173.4	13 18.7	97 11	173.8	12 49.5	97 11	173.9	12 20.2	97 11	174.0	6 29.1	98 08	175.3	5 59.9	98 08	175.5				3
4	15 08.6	97 13	172.8	14 39.5	97 12	172.9	13 12.1	97 12	173.3	12 43.0	97 11	173.4	12 13.9	97 11	173.5	6 24.2	97 09	175.0	5 55.1	97 09	175.1				4
15	15 01.0	97 13	172.3	14 32.1	97 13	172.4	13 05.1	97 12	172.8	12 36.1	97 12	173.0	12 07.1	97 12	173.1	6 19.0	97 09	174.6	5 50.0	97 09	174.8				15
6	14 53.0	96 14	171.8	14 24.1	96 14	171.9	12 57.6	96 13	172.4	12 28.8	96 13	172.5	11 59.9	96 13	172.6	6 13.4	96 10	174.3	5 44.5	96 10	174.4				6
7	14 44.4	96 15	171.3	14 15.7	96 15	171.5	12 49.7	96 14	171.9	12 20.9	96 14	172.1	11 52.2	96 14	172.2	6 07.4	96 10	174.0	5 38.7	96 10	174.1				7
8	14 35.4	95 16	170.8	14 06.8	95 16	171.0	12 41.2	95 15	171.4	12 12.7	95 15	171.6	11 44.1	95 14	171.8	6 01.1	95 11	173.6	5 32.5	95 11	173.8				8
9	14 25.8	95 17	170.3	13 57.5	95 16	170.5	12 32.3	95 16	171.0	12 04.0	95 15	171.2	11 35.6	95 15	171.3	5 54.5	95 12	173.3	5 26.0	95 11	173.4				9
20	14 15.8	94 18	169.8	13 47.6	94 17	170.0	12 23.0	94 16	170.5	11 54.8	94 16	170.7	11 26.6	94 16	170.9	5 47.5	94 12	172.9	5 19.2	94 12	173.1				20
1	14 05.3	93 18	169.4	13 37.3	93 18	169.5	12 13.2	93 17	170.1	11 45.2	93 17	170.3	11 17.1	94 16	170.5	5 40.1	94 13	172.6	5 12.0	94 12	172.8				1
2	13 54.3	93 19	168.9	13 26.5	93 19	169.1	12 03.0	93 18	169.6	11 35.1	93 18	169.8	11 07.2	93 17	170.0	5 32.4	93 13	172.2	5 04.5	93 13	172.4				2
3	13 42.8	92 20	168.4	13 15.2	92 20	168.6	11 52.3	92 19	169.2	11 24.6	92 18	169.4	10 56.9	92 18	169.6	5 24.4	92 14	171.9							3
4	13 30.9	91 21	167.9	13 03.5	91 20	168.1	11 41.1	92 19	168.8	11 13.7	92 19	169.0	10 46.2	92 19	169.2	5 16.1	92 14	171.6							4
25	13 18.5	91 21	167.5	12 51.3	91 21	167.7	11 29.6	91 20	168.3	11 02.3	91 20	168.5	10 35.0	91 19	168.7	5 07.4	91 15	171.3							25
6	13 05.6	90 22	167.0	12 38.6	90 22	167.2	11 17.6	90 21	167.9	10 50.5	90 20	168.1	10 23.5	90 20	168.3										6
7	12 52.3	89 23	166.5	12 25.5	89 23	166.8	11 05.1	89 21	167.5	10 38.3	89 21	167.7	10 11.5	89 21	167.9										7
8	12 38.5	88 24	166.1	12 12.0	88 23	166.3	10 52.3	89 22	167.0	10 25.7	89 22	167.3	9 59.1	89 21	167.5										8
9	12 24.3	88 24	165.6	11 58.0	88 24	165.9	10 39.0	88 23	166.6	10 12.6	88 22	166.9	9 46.3	88 22	167.1										9
30	12 09.6	87 25	165.2	11 43.5	87 25	165.4	10 25.3	87 24	166.2	9 59.2	87 23	166.4	9 33.1	87 23	166.7										30
1	11 54.5	86 26	164.7	11 28.7	86 25	165.0	10 11.2	86 24	165.8	9 45.4	86 24	166.0	9 19.5	86 23	166.3										1
2	11 38.9	85 27	164.3	11 13.4	85 26	164.6	9 56.7	85 25	165.4	9 31.1	85 24	165.6	9 05.5	85 24	165.9										2
3	11 23.0	84 27	163.9	10 57.7	84 27	164.1	9 41.8	84 26	165.0	9 16.5	84 25	165.2	8 51.1	84 25	165.5										3
4	11 06.6	83 28	163.4	10 41.6	83 28	163.7	9 26.5	84 26	164.6	9 01.4	84 26	164.8	8 36.4	84 25	165.1										4
35	10 49.8	82 29	163.0	10 25.1	82 28	163.3	9 10.8	83 27	164.2	8 46.0	83 26	164.5	8 21.2	83 26	164.7										35
6	10 32.6	81 29	162.6	10 08.2	82 29	162.9	8 54.7	82 27	163.8	8 30.2	82 27	164.1	8 05.7	82 26	164.4										6
7	10 15.0	80 30	162.2	9 50.9	81 30	162.5	8 38.3	81 28	163.4	8 14.1	81 28	163.7	7 49.9	81 27	164.0										7
8	9 57.0	80 31	161.8	9 33.1	80 30	162.1	8 21.5	80 29	163.0	7 57.5	80 28	163.3	7 33.6	80 28	163.6										8
9	9 38.6	79 31	161.4	9 15.1	79 31	161.7	8 04.3	79 29	162.6	7 40.7	79 29	162.9	7 17.0	79 28	163.3										9
40	9 19.8	77 32	161.0	8 56.6	78 31	161.3	7 46.7	78 30	162.3	7 23.4	78 29	162.6	7 00.1	78 29	162.9										40
1	9 00.7	76 33	160.6	8 37.8	77 32	160.9	7 28.8	77 30	161.9	7 05.8	77 30	162.2	6 42.8	77 29	162.5										1
2	8 41.2	75 33	160.2	8 18.5	75 33	160.5	7 10.6	76 31	161.5	6 47.9	76 30	161.9	6 25.2	76 30	162.2										2
3	8 21.3	74 34	159.8	7 59.0	74 33	160.2	6 52.0	75 32	161.2	6 29.6	75 31	161.5	6 07.2	75 30	161.9										3
4	8 01.0	73 34	159.5	7 39.1	73 34	159.8	6 33.0	73 32	160.8	6 11.0	74 32	161.2	5 48.9	74 31	161.5										4
45	7 40.5	72 35	159.1	7 18.8	72 34	159.4	6 13.7	72 33	160.5	5 52.0	72 32	160.8	5 30.3	72 32	161.2										45
6	7 19.5	71 35	158.7	6 58.2	71 35	159.1	5 54.1	71 33	160.2	5 32.8	71 33	160.5	5 11.4	71 32	160.9										6
7	6 58.2	70 36	158.4	6 37.2	70 35	158.7	5 34.2	70 34	159.8	5 13.2	70 33	160.2													7
8	6 36.6	69 37	158.0	6 16.0	69 36	158.4	5 14.0	69 34	159.5																8
9	6 14.7	68 37	157.7	5 54.4	68 36	158.1																			9
50	5 52.4	66 38	157.4	5 32.5	67 37	157.7																			
1	5 29.9	65 38	157.0	5 10.3	65 38	157.4																			
2	5 07.0	64 39	156.7																						

DECLINATION SAME NAME AS LATITUDE

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	11 35.9	14 49	30.7	11 40.0	14 49	30.2	11 52.1	13 46	28.7	11 56.0	13 46	28.2	11 59.8	13 45	27.6	12 41.8	11 36	21.5	12 44.9	10 35	21.0	13 12.9	08 27	15.9	91
2	11 06.2	15 49	30.6	11 10.8	15 49	30.1	11 24.2	15 46	28.6	11 28.5	14 46	28.1	11 32.9	14 45	27.6	12 20.4	12 36	21.5	12 24.0	12 35	21.0	12 56.9	10 27	15.9	2
3	10 36.6	17 49	30.5	10 41.6	17 48	30.0	10 56.3	16 46	28.5	11 01.2	16 46	28.0	11 05.9	16 45	27.5	11 59.1	14 35	21.5	12 03.2	14 35	21.0	12 41.0	12 27	15.9	3
4	10 07.1	18 49	30.4	10 12.5	18 48	29.9	10 28.6	18 46	28.4	10 33.8	17 45	27.9	10 39.1	17 45	27.4	11 37.8	15 35	21.4	11 42.4	15 35	20.9	12 25.1	13 26	15.8	4
95	9 37.6	20 49	30.3	9 43.5	20 48	29.8	10 00.9	19 46	28.4	10 06.6	19 45	27.9	10 12.3	19 45	27.4	11 16.6	17 35	21.3	11 21.6	17 34	20.8	12 09.2	15 26	15.8	95
6	9 08.2	21 49	30.2	9 14.6	21 48	29.7	9 33.3	21 46	28.3	9 39.4	20 45	27.8	9 45.6	20 44	27.3	10 55.4	18 35	21.3	11 01.0	18 34	20.8	11 53.3	17 26	15.8	6
7	8 39.0	23 49	30.1	8 45.7	22 48	29.6	9 05.8	22 46	28.2	9 12.4	22 45	27.7	9 18.9	22 44	27.2	10 34.3	20 35	21.2	10 40.3	20 34	20.7	11 37.6	18 26	15.7	7
8	8 09.8	24 48	30.0	8 17.0	24 48	29.5	8 38.3	24 46	28.0	8 45.4	23 45	27.6	8 52.4	23 44	27.1	10 13.3	22 35	21.1	10 19.8	21 34	20.6	11 21.8	20 26	15.7	8
9	7 40.7	25 48	29.9	7 48.3	25 48	29.4	8 11.0	25 45	27.9	8 18.5	25 45	27.4	8 25.9	25 44	27.0	9 52.4	23 35	21.1	9 59.3	23 34	20.6	11 06.1	21 26	15.6	9
100	7 11.8	27 48	29.8	7 19.8	27 47	29.3	7 43.8	26 45	27.8	7 51.7	26 44	27.3	7 59.6	26 44	26.8	9 31.5	25 35	21.0	9 38.9	25 34	20.5	10 50.5	23 26	15.5	100
1	6 42.9	28 48	29.6	6 51.4	28 47	29.1	7 16.7	28 45	27.7	7 25.1	28 44	27.2	7 33.4	28 44	26.7	9 10.7	26 34	20.9	9 18.6	26 34	20.4	10 34.9	25 26	15.5	1
2	6 14.2	30 48	29.5	6 23.1	30 47	29.0	6 49.7	29 45	27.5	6 58.5	29 44	27.1	7 07.3	29 43	26.6	8 50.0	28 34	20.8	8 58.3	28 34	20.3	10 19.4	26 26	15.4	2
3	5 45.6	31 47	29.3	5 55.0	31 47	28.8	6 22.8	31 45	27.4	6 32.1	31 44	26.9	6 41.3	31 43	26.4	8 29.4	29 34	20.7	8 38.2	29 33	20.2	10 04.0	28 26	15.3	3
4	5 17.2	33 47	29.2	5 27.0	32 46	28.7	5 56.1	32 44	27.3	6 05.8	32 44	26.8	6 15.4	32 43	26.3	8 08.9	31 34	20.6	8 18.1	31 33	20.1	9 48.6	30 25	15.3	4
105							5 29.5	34 44	27.1	5 39.6	34 43	26.6	5 49.7	34 43	26.2	7 48.5	32 34	20.5	7 58.2	32 33	20.0	9 33.4	31 25	15.2	105
6							5 03.1	35 44	26.9	5 13.6	35 43	26.5	5 24.1	35 42	26.0	7 28.2	34 34	20.3	7 38.4	34 33	19.9	9 18.2	33 25	15.1	6
7																7 08.0	35 33	20.2	7 18.7	35 33	19.7	9 03.1	34 25	15.0	7
8																6 48.0	37 33	20.1	6 59.1	37 32	19.6	8 48.0	36 25	14.9	8
9																6 28.1	38 33	19.9	6 39.6	38 32	19.5	8 33.1	37 25	14.8	9
110																6 08.3	40 33	19.8	6 20.2	40 32	19.3	8 18.3	39 25	14.7	110
1																5 48.6	41 32	19.7	6 01.0	41 32	19.2	8 03.6	40 24	14.6	1
2																5 29.1	43 32	19.5	5 42.0	43 32	19.0	7 48.9	42 24	14.5	2
3																5 09.8	44 32	19.3	5 23.0	44 31	18.9	7 34.4	43 24	14.4	3
4																						7 20.1	45 24	14.2	4
115																						7 05.8	46 24	14.1	115
6																						6 51.6	48 23	14.0	6
7																						6 37.6	49 23	13.9	7
8																						6 23.7	51 23	13.7	8
9																						6 10.0	52 23	13.6	9
120																						5 56.4	54 22	13.5	120
1																						5 42.9	55 22	13.3	1
2																						5 29.5	56 22	13.2	2
3																						5 16.4	58 22	13.0	3
4																						5 03.3	59 21	12.9	4

STAR IDENTIFICATION TABLE

Lat. 14°

ALTITUDE

AZ.	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	80	180	84	180	88	180	88	00	84	00	80	00	76	00	72	00	68	00	64	00	60	00	00
4	79	158	83	146	86	117	86	62	83	32	79	20	76	14	72	10	68	09	64	07	60	06	4
8	77	141	80	127	82	103	82	74	80	51	77	36	74	27	71	21	67	17	63	14	59	11	8
12	75	129	77	116	78	98	78	79	77	61	75	47	72	37	69	29	66	24	62	20	58	17	12
16	71	121	73	109	74	95	74	81	74	66	72	54	70	44	67	36	64	30	60	25	57	21	16
20	68	115	69	105	70	94	71	82	70	70	69	59	67	50	64	42	62	36	59	30	55	26	20
24	64	111	66	102	67	92	67	82	66	72	65	63	64	54	62	47	59	40	57	34	54	30	24
28	61	107	62	99	63	91	63	82	63	73	62	65	60	57	59	50	57	44	54	38	52	33	28
32	57	105	58	97	59	90	59	82	59	74	58	67	57	60	56	53	54	47	52	41	49	36	32
36	53	102	54	96	55	89	55	82	55	75	55	68	54	61	53	55	51	49	49	44	47	38	36
40	49	100	50	94	51	88	51	82	51	75	51	69	50	63	49	57	48	51	46	46	45	41	40
44	45	99	46	93	47	87	48	81	48	76	47	70	47	64	46	58	45	53	44	47	42	42	44
48	42	97	43	92	43	87	44	81	44	76	44	70	43	65	43	59	42	54	41	49	39	44	48
52	38	96	39	91	39	86	40	81	40	75	40	70	40	65	39	60	39	55	38	50	37	45	52
56	34	95	35	90	36	85	36	80	36	75	36	70	36	65	36	60	36	56	35	51	34	46	56
60	30	94	31	89	32	84	32	80	33	75	33	70	33	65	33	61	32	56	32	51	31	47	60
64	26	92	27	88	28	84	28	79	29	75	29	70	29	65	29	61	29	56	29	52	28	47	64
68	22	91	23	87	24	83	25	79	25	74	25	70	26	65	26	61	26	56	26	52	25	48	68
72	18	90	19	86	20	82	21	78	21	74	22	69	22	65	22	61	23	56	23	52	23	48	72
76	15	89	15	85	16	81	17	77	18	73	18	69	19	65	19	61	19	56	20	52	20	48	76
80	11	88	12	85	12	81	13	77	14	72	15	68	15	64	16	60	16	56	17	52	17	48	80
84	07	88	08	84	09	80	09	76	10	72	11	68	12	64	12	60	13	56	13	52	14	47	84
88	03	87	04	83	05	79	06	75	07	71	07	67	08	63	09	59	10	55	10	51	11	47	88
92	*01*	86	00	82	01	78	02	74	03	70	04	66	05	62	06	58	07	54	07	51	08	47	92
96	*05*	85	*04*	81	*03*	77	*02*	73	*01*	69	00	65	01	61	02	58	03	54	04	50	05	46	96
100	*09*	84	*08*	80	*07*	76	*05*	72	*04*	68	*03*	64	*02*	60	*01*	57	00	53	02	49	03	45	100
104	*13*	83	*11*	79	*10*	75	*09*	71	*08*	67	*07*	63	*05*	59	*04*	56	*03*	52	*01*	48	*00*	44	104
108	*16*	81	*15*	77	*14*	74	*13*	70	*11*	66	*10*	62	*09*	58	*07*	54	*06*	51	*04*	47	*03*	43	108
112	*20*	80	*19*	76	*18*	72	*16*	68	*15*	64	*14*	61	*12*	57	*10*	53	*09*	49	*07*	46	*05*	42	112
116	*24*	79	*23*	75	*21*	71	*20*	67	*18*	63	*17*	59	*15*	55	*13*	52	*12*	48	*10*	44	*08*	41	116
120	*28*	78	*27*	73	*25*	69	*24*	65	*22*	61	*20*	57	*18*	54	*16*	50	*14*	46	*12*	43	*10*	39	120
124	*32*	76	*30*	72	*29*	68	*27*	63	*25*	59	*23*	56	*21*	52	*19*	48	*17*	45	*15*	41	*13*	38	124
128	*35*	75	*34*	70	*32*	66	*30*	62	*29*	57	*27*	54	*24*	50	*22*	46	*20*	43	*18*	39	*15*	36	128
132	*39*	73	*38*	68	*36*	64	*34*	59	*32*	55	*30*	51	*27*	48	*25*	44	*23*	41	*20*	37	*17*	34	132
136	*43*	71	*41*	66	*39*	61	*37*	57	*35*	53	*33*	49	*30*	45	*28*	42	*25*	38	*22*	35	*20*	32	136
140	*46*	69	*45*	63	*43*	59	*40*	54	*38*	50	*35*	46	*33*	43	*30*	39	*27*	36	*24*	33	*22*	30	140
144	*50*	66	*48*	61	*46*	56	*43*	51	*41*	47	*38*	43	*35*	40	*33*	36	*30*	33	*26*	30	*23*	27	144
148	*54*	63	*51*	57	*49*	52	*46*	48	*44*	44	*41*	40	*38*	36	*35*	33	*32*	30	*28*	27	*25*	25	148
152	*57*	59	*55*	53	*52*	48	*49*	44	*46*	40	*43*	36	*40*	33	*37*	30	*33*	27	*30*	25	*27*	22	152
156	*60*	55	*58*	49	*55*	44	*52*	39	*49*	35	*45*	32	*42*	29	*39*	26	*35*	24	*32*	21	*28*	19	156
160	*63*	49	*60*	43	*57*	38	*54*	34	*51*	31	*47*	27	*44*	25	*40*	22	*37*	20	*33*	18	*29*	16	160
164	*66*	43	*63*	37	*60*	32	*56*	28	*53*	25	*49*	23	*45*	20	*42*	18	*38*	16	*34*	15	*30*	13	164
168	*68*	34	*65*	29	*61*	25	*58*	22	*54*	19	*50*	17	*46*	15	*43*	14	*39*	12	*35*	11	*31*	10	168
172	*70*	24	*67*	20	*63*	17	*59*	15	*55*	13	*51*	12	*47*	10	*43*	09	*39*	08	*35*	08	*32*	07	172
176	*72*	13	*68*	10	*64*	09	*60*	08	*56*	07	*52*	06	*48*	05	*44*	05	*40*	04	*36*	04	*32*	03	176
180	*72*	00	*68*	00	*64*	00	*60*	00	*56*	00	*52*	00	*48*	00	*44*	00	*40*	00	*36*	00	*32*	00	180
	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		

16—8473

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

STAR IDENTIFICATION TABLE

ALTITUDE

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

10—8473

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

H.A.	0° 00′				0° 30′				1° 00′				1° 30′				2° 00′				2° 30′				3° 00′				3° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	75 00.0	1.0	03	180.0	75 30.0	1.0	03	180.0	76 00.0	1.0	03	180.0	76 30.0	1.0	04	180.0	77 00.0	1.0	04	180.0	77 30.0	1.0	04	180.0	78 00.0	1.0	04	180.0	78 30.0	1.0	04	180.0	00
1	74 58.0	1.0	10	176.1	75 28.0	1.0	10	176.0	75 57.9	1.0	10	175.9	76 27.8	1.0	11	175.7	76 57.8	1.0	11	175.6	77 27.7	1.0	12	175.4	77 57.6	1.0	12	175.2	78 27.5	1.0	13	175.0	1
2	74 52.2	99	16	172.3	75 22.0	99	17	172.1	75 51.7	99	17	171.8	76 21.4	99	18	171.5	76 51.1	99	18	171.2	77 20.7	99	19	170.8	77 50.3	99	20	170.5	78 19.9	99	21	170.1	2
3	74 42.6	98	22	168.6	75 12.0	98	23	168.2	75 41.4	98	24	167.8	76 10.7	98	24	167.3	76 40.0	98	25	166.9	77 09.3	97	26	166.4	77 38.5	97	27	165.9	78 07.6	97	28	165.3	3
4	74 29.3	97	28	164.9	74 58.3	97	29	164.4	75 27.2	96	30	163.9	75 56.1	96	31	163.3	76 24.8	96	32	162.7	76 53.5	95	33	162.1	77 22.1	95	34	161.4	77 50.6	95	35	160.7	4
05	74 12.4	95	34	161.3	74 40.9	95	35	160.7	75 09.3	94	36	160.1	75 37.6	94	37	159.5	76 05.7	94	38	158.7	76 33.7	93	39	158.0	77 01.6	93	41	157.2	77 29.4	92	42	156.3	05
6	73 52.2	93	39	157.9	74 20.1	93	40	157.2	74 47.8	92	41	156.5	75 15.5	92	42	155.8	75 42.9	91	44	155.0	76 10.2	91	45	154.1	76 37.3	90	46	153.2	77 04.2	89	48	152.2	6
7	73 28.9	91	44	154.6	73 56.1	91	45	153.9	74 23.2	90	46	153.1	74 50.0	89	47	152.2	75 16.7	89	49	151.4	75 43.2	88	50	150.4	76 09.5	87	52	149.4	76 35.4	86	53	148.4	7
8	73 02.6	89	48	151.5	73 29.1	88	50	150.7	73 55.5	87	51	149.8	74 21.6	87	52	148.9	74 47.5	86	53	148.0	75 13.1	85	55	147.0	75 38.4	84	56	145.9	76 03.5	83	58	144.8	8
9	72 33.6	86	52	148.5	72 59.4	86	54	147.7	73 25.0	85	55	146.8	73 50.3	84	56	145.8	74 15.4	83	58	144.8	74 40.1	82	59	143.8	75 04.6	81	61	142.7	75 28.7	80	62	141.5	9
10	72 02.2	84	56	145.7	72 27.2	83	57	144.8	72 52.0	82	59	143.9	73 16.5	81	60	142.9	73 40.8	80	61	141.9	74 04.7	79	63	140.8	74 28.2	78	64	139.6	74 51.4	77	66	138.4	10
1	71 28.4	81	60	143.1	71 52.7	81	61	142.2	72 16.8	80	62	141.2	72 40.5	79	64	140.2	73 03.9	77	65	139.1	73 26.9	76	66	138.0	73 49.6	75	68	136.8	74 11.9	74	69	135.6	1
2	70 52.6	79	63	140.6	71 16.2	78	64	139.7	71 39.4	77	65	138.7	72 02.4	76	67	137.6	72 25.0	75	68	136.5	72 47.2	73	69	135.4	73 09.0	72	71	134.2	73 30.4	71	72	133.0	2
3	70 14.9	77	66	138.3	70 37.8	76	67	137.3	71 00.3	74	68	136.3	71 22.4	73	69	135.2	71 44.2	72	71	134.2	72 05.6	71	72	133.0	72 26.7	69	73	131.9	72 47.3	68	74	130.6	3
4	69 35.5	74	68	136.1	69 57.6	73	69	135.1	70 19.4	72	71	134.1	70 40.8	71	72	133.0	71 01.9	70	73	131.9	71 22.5	68	74	130.8	71 42.8	67	75	129.7	72 02.6	65	77	128.4	4
15	68 54.6	72	71	134.0	69 16.0	71	72	133.0	69 37.0	70	73	132.0	69 57.7	68	74	131.0	70 18.1	67	75	129.9	70 38.0	66	76	128.8	70 57.5	64	78	127.6	71 16.5	63	79	126.4	15
6	68 12.2	70	73	132.1	68 32.9	69	74	131.1	68 53.3	67	75	130.1	69 13.3	66	76	129.0	69 33.0	65	77	128.0	69 52.2	63	78	126.9	70 11.0	62	79	125.7	70 29.3	60	80	124.5	6
7	67 28.6	68	75	130.2	67 48.7	66	76	129.3	68 08.4	65	77	128.3	68 27.8	64	78	127.2	68 46.7	63	79	126.2	69 05.3	61	80	125.1	69 23.4	60	81	124.0	69 41.1	58	82	122.8	7
8	66 43.8	66	76	128.5	67 03.2	64	77	127.6	67 22.4	63	78	126.6	67 41.1	62	79	125.6	67 59.4	60	80	124.5	68 17.4	59	81	123.4	68 34.9	58	82	122.3	68 51.9	56	83	121.2	8
9	65 57.9	64	78	126.9	66 16.8	62	79	126.0	66 35.3	61	80	125.0	66 53.5	60	81	124.0	67 11.2	58	82	122.9	67 28.6	57	83	121.9	67 45.5	56	84	120.8	68 02.0	54	84	119.7	9
20	65 11.1	62	79	125.4	65 29.5	60	80	124.5	65 47.4	59	81	123.5	66 05.0	58	82	122.5	66 22.2	57	83	121.5	66 39.0	55	84	120.4	66 55.3	54	85	119.4	67 11.3	52	86	118.3	20
1	64 23.5	60	81	124.0	64 41.3	59	82	123.1	64 58.7	57	82	122.1	65 15.8	56	83	121.1	65 32.4	55	84	120.1	65 48.7	54	85	119.1	66 04.5	52	86	118.1	66 19.9	51	87	117.0	1
2	63 35.1	58	82	122.6	63 52.3	57	83	121.7	64 09.3	56	84	120.8	64 25.8	55	84	119.8	64 42.0	53	85	118.8	64 57.7	52	86	117.8	65 13.1	50	87	116.8	65 28.0	49	87	115.8	2
3	62 45.9	57	83	121.4	63 02.7	55	84	120.5	63 19.1	54	85	119.5	63 35.2	53	85	118.6	63 50.9	52	86	117.6	64 06.2	50	87	116.6	64 21.1	49	87	115.6	64 35.6	48	88	114.6	3
4	61 56.1	55	84	120.2	62 12.4	54	85	119.3	62 28.4	53	85	118.4	62 44.0	51	86	117.4	62 59.3	50	87	116.5	63 14.1	49	88	115.5	63 28.6	48	88	114.6	63 42.7	46	89	113.6	4
25	61 05.7	54	85	119.0	61 21.6	52	86	118.2	61 37.2	51	86	117.3	61 52.4	50	87	116.3	62 07.2	49	88	115.4	62 21.6	48	88	114.5	62 35.7	46	89	113.5	62 49.3	45	90	112.6	25
6	60 14.8	52	86	118.0	60 30.3	51	86	117.1	60 45.4	50	87	116.2	61 00.2	49	88	115.3	61 14.6	47	88	114.4	61 28.7	46	89	113.5	61 42.3	45	90	112.5	61 55.6	44	90	111.6	6
7	59 23.4	51	86	116.9	59 38.4	50	87	116.1	59 53.2	49	88	115.2	60 07.6	47	88	114.3	60 21.6	46	89	113.4	60 35.3	45	90	112.5	60 48.6	44	90	111.6	61 01.6	42	91	110.7	7
8	58 31.5	50	87	116.0	58 46.2	48	88	115.1	59 00.5	47	88	114.3	59 14.6	46	89	113.4	59 28.3	45	90	112.5	59 41.6	44	90	111.6	59 54.6	43	91	110.8	60 07.2	41	91	109.8	8
9	57 39.1	48	88	115.0	57 53.5	47	88	114.2	58 07.5	46	89	113.4	58 21.2	45	89	112.5	58 34.6	44	90	111.7	58 47.6	43	91	110.8	59 00.3	42	91	109.9	59 12.6	40	92	109.0	9
30	56 46.4	47	88	114.1	57 00.5	46	89	113.3	57 14.2	45	89	112.5	57 27.5	44	90	111.7	57 40.6	43	90	110.8	57 53.3	42	91	110.0	58 05.6	41	91	109.1	58 17.6	39	92	108.3	30
1	55 53.4	46	89	113.3	56 07.1	45	90	112.5	56 20.5	44	90	111.7	56 33.5	43	90	110.9	56 46.3	42	91	110.1	56 58.7	41	91	109.2	57 10.8	40	92	108.4	57 22.5	39	92	107.5	1
2	55 00.0	45	90	112.5	55 13.4	44	90	111.7	55 26.5	43	90	110.9	55 39.2	42	91	110.1	55 51.7	41	91	109.3	56 03.8	40	92	108.5	56 15.6	39	92	107.7	56 27.1	38	93	106.8	2
3	54 06.3	44	90	111.7	54 19.4	43	90	111.0	54 32.2	42	91	110.2	54 44.7	41	91	109.4	54 56.9	40	92	108.6	55 08.8	39	92	107.8	55 20.3	38	93	107.0	55 31.6	37	93	106.2	3
4	53 12.3	43	90	111.0	53 25.2	42	91	110.2	53 37.7	41	91	109.5	53 49.9	40	92	108.7	54 01.9	39	92	107.9	54 13.5	38	92	107.1	54 24.8	37	93	106.3	54 35.8	36	93	105.5	4
35	52 18.1	42	91	110.3	52 30.6	41	91	109.5	52 42.9	40	92	108.8	52 54.9	39	92	108.0	53 06.6	38	92	107.3	53 18.0	37	93	106.5	53 29.1	36	93	105.7	53 39.9	35	93	104.9	35
6	51 23.6	41	91	109.6	51 35.9	41	92	108.9	51 48.0	40	92	108.1	51 59.7	39	92	107.4	52 11.2	38	93	106.6	52 22.3	37	93	105.9	52 33.2	36	93	105.1	52 43.8	35	94	104.3	6
7	50 28.9	41	92	109.0	50 41.0	40	92	108.2	50 52.8	39	92	107.5	51 04.3	38	93	106.8	51 15.6	37	93	106.0	51 26.5	36	93	105.3	51 37.2	35	94	104.5	51 47.6	34	94	103.8	7
8	49 34.0	40	92	108.3	49 45.8	39	92	107.6	49 57.4	38	93	106.9	50 08.7	37	93	106.2	50 19.8	36	93	105.5	50 30.5	35	94	104.7	50 41.0	35	94	104.0	50 51.2	34	94	103.2	8
9	48 38.9	39	92	107.7	48 50.5	38	93	107.0	49 01.9	37	93	106.3	49 13.0	37	93	105.6	49 23.8	36	93	104.9	49 34.4	35	94	104.2	49 44.7	34	94	103.5	49 54.8	33	94	102.7	9
40	47 43.6	38	92	107.1	47 55.0	38	93	106.5	48 06.2	37	93	105.8	48 17.1	36	93	105.1	48 27.8	35	94	104.4	48 38.2	34	94	103.6	48 48.3	33	94	102.9	48 58.2	32	94	102.2	40
1	46 48.1	38	93	106.6	46 59.3	37	93	105.9	47 10.3	36	93	105.2	47 21.1	35	94	104.5	47 31.6	35	94	103.8	47 41.8	34	94	103.1	47 51.8	33	94	102.4	48 01.5	32	95	101.7	1
2	45 52.5	37	93	106.0	46 03.5	36	93	105.4	46 14.3	36	94	104.7	46 24.9	35	94	104.0	46 35.2	34	94	103.3	46 45.3	33	94	102.6	46 55.1	32	95	102.0	47 04.7	31	95	101.3	2
3	44 56.7	37	93	105.5	45 07.6	36	93	104.9	45 18.2	35	94	104.2	45 28.6	34	94	103.5	45 38.8	33	94	102.8	45 48.7	33	94	102.2	45 58.4	32	95	101.5	46 07.8	31	95	100.8	3
4	44 00.8	36	93	105.0	44 11.5	35	94	104.4	44 22.0	35	94	103.7	44 32.2	34	94	103.0	44 42.2	33	94	102.4	44 52.0	32	95	101.7	45 01.5	31	95	101.0	45 10.8	31	95	100.4	4
45	43 04.8	35	94	104.5	43 15.3	35	94	103.9	43 25.6	34	94	103.2	43 35.7	33	94	102.6	43 45.6	33	95	101.9	43 55.2	32	95	101.3	44 04.6	31	95	100.6	44 13.8	30	95	99.9	45
6	42 08.6	35	94	104.0	42 19.0	34	94	103.4	42 29.1	34	94	102.8	42 39.1	33	94	102.1	42 48.8	32	95	101.5	42 58.3	31	95	100.8	43 07.6	31	95	100.2	43 16.7	30	95	99.5	6
7	41 12.3	34	94	103.6	41 22.5	34	94	102.9	41 32.6	33	94	102.3	41 42.4	32	95	101.7	41 52.0	32	95	101.0	42 01.4	31	95	100.4	42 10.5	30	95	99.8	42 19.5	30	95	99.1	7
8	40 15.9	34	94	103.1	40 26.0	33	94	102.5	40 35.9	33	95	101.9	40 45.6	32	95	101.3	40 55.0	31	95	100.6	41 04.3	31	95	100.0	41 13.4	30	95	99.4	41 22.2	29	96	98.7	8
9	39 19.4	33	94	102.7	39 29.4	33	95	102.1	39 39.1	32	95	101.5	39 48.7	32	95	100.8	39 58.0	31	95	100.2	40 07.2	30	95	99.6	40 16.2	30	95	99.0	40 24.9	29	96	98.3	9
50	38 22.8	33	94	102.3	38 32.7	32	95	101.6	38 42.3	32	95	101.0	38 51.7	31	95	100.4	39 01.0	31	95	99.8	39 10.0	30	95	99.2	39 18.9	29	96	98.6	39 27.5	29	96	98.0	50
1	37 26.2	33	95	101.8	37 35.9	32	95	101.2	37 45.4	31	95	100.6	37 54.7	31	95	100.0	38 03.8	30	95	99.4	38 12.8	30	96	98.8	38 21.6	29	96	98.2	38 30.1	28	96	97.6	1
2	36 29.4	32	95	101.4	36 39.0	32	95	100.8	36 48.4	31	95	100.2	36 57.6	30	95	99.7	37 06.6	30	95	99.1	37 15.5	29	96	98.5	37 24.2	29	96	97.9	37 32.7	28	96	97.3	2
3	35 32.6	32	95	101.0	35 42.0	31	95	100.5	35 51.3	31	95	99.9	36 00.4	30	95	99.3	36 09.4	30	96	98.7	36 18.1	29	96	98.1	36 26.7	28	96	97.5	36 35.1	28	96	96.9	3
4	34 35.6	31	95	100.6	34 45.0	31	95	100.1	34 54.2	30	95	99.5	35 03.2	30	95	98.9	35 12.0	29	96	98.3	35 20.7	29	96	97.7	35 29.2	28	96	97.2	35 37.6	28	96	96.6	4
55	33 38.6	31	95	100.3	33 47.9	31	95	99.7	33 57.0	30	95	99.1	34 05.9	29	96	98.6	34 14.7	29	96	98.0	34 23.3	28	96	97.4	34 31.7	28	96	96.8	34 40.0	27	96	96.2	55
6	32 41.6	31	95	99.9	32 50.7	30	95	99.3	32 59.7	30	96	98.8	33 08.6	29	96	98.2	33 17.3	29	96	97.6	33 25.8	28	96	97.1	33 34.2	28	96	96.5	33 42.4	27	96	95.9	6
7	31 44.5	30	95	99.5	31 53.5	30	95	99.0	32 02.4	29	96	98.4	32 11.2	29	96	97.9	32 19.8	28	96	97.3	32 28.2	28	96	96.7	32 36.6	27	96	96.1	32 44.7	27	96	95.6	7
8	30 47.3	30	95	99.2	30 56.2	30	96	98.6	31 05.1	29	96	98.1	31 13.8	29	96	97.5	31 22.3	28	96	97.0	31 30.7	28	96	96.4	31 38.9	27	96	95.8	31 47.0	27	96	95.3	8
9	29 50.0	30	95	98.8	29 58.9	29	96	98.3	30 07.7	29	96	97.7	30 16.3	28	96	97.2	30 24.7	28	96	96.6	30 33.1	28	96	96.1	30 41.2	27	96	95.5	30 49.3	27	96	94.9	9
60	28 52.7	30	96	98.5	29 01.5	29	96	98.0	29 10.2	29	96	97.4	29 18.7	28	96	96.9	29 27.1	28	96	96.3	29 35.4	27	96	95.8	29 43.5	27	96	95.2	29 51.5	26	96	94.6	60
1	27 55.4	29	96	98.2	28 04.1	29	96	97.6	28 12.7	28	96	97.1	28 21.2	28	96	96.5	28 29.5	28	96	96.0	28 37.7	27	96	95.4	28 45.8	27	96	94.9	28 53.7	26	96	94.3	1
2	26 58.0	29	96	97.8	27 06.7	29	96	97.3	27 15.2	28	96	96.8	27 23.6	28	96	96.2	27 31.9	27	96	95.7	27 40.0	27	96	95.1	27 48.0	27	96	94.6	27 55.9	26	96	94.0	2
3	26 00.6	29	96	97.5	26 09.2	28	96	97.0	26 17.6	28	96	96.4	26 26.0	28	96	95.9	26 34.2	27	96	95.4	26 42.3	27	96	94.8	26 50.3	26	96	94.3	26 58.1	26	96	93.8	3
4	25 03.1	29	96	97.2	25 11.6	28	96	96.7	25 20.0	28	96	96.1	25 28.3	27	96	95.6	25 36.5	27	96	95.1	25 44.5	27	96	94.5	25 52.5	26	96	94.0	26 00.3	26	96	93.5	4
65	24 05.6	28	96	96.9	24 14.0	28	96	96.4	24 22.4	28	96	95.8	24 30.6	27	96	95.3	24 38.7	27	96	94.8	24 46.7	27	96	94.2	24 54.6	26	96	93.7	25 02.4	26	96	93.2	65
6	23 08.0	28	96	96.6	23 16.4	28	96	96.1	23 24.7	27	96	95.5	23 32.9	27	96	95.0	23 41.0	27	96	94.5	23 48.9	26	96	94.0	23 56.8	26	96	93.4	24 04.5	26	96	92.9	6
7	22 10.4	28	96	96.3	22 18.8	28	96	95.8	22 27.0	27	96	95.2	22 35.1	27	96	94.7	22 43.2	27	96	94.2	22 51.1	26	96	93.7	22 58.9	26	96	93.1	23 06.7	26	96	92.6	7
8	21 12.8	28	96	96.0	21 21.1	27	96	95.5	21 29.3	27	96	94.9	21 37.4	27	96	94.4	21 45.4	26	96	93.9	21 53.3	26	96	93.4	22 01.1	26	96	92.9	22 08.8	26	97	92.3	8
9	20 15.1	28	96	95.7	20 23.4	27	96	95.2	20 31.5	27	96	94.6	20 39.6	27	96	94.1	20 47.5	26	96	93.6	20 55.4	26	96	93.1	21 03.2	26	96	92.6	21 10.8	25	97	92.1	9
70	19 17.5	27	96	95.4	19 25.6	27	96	94.9	19 33.7	27	96	94.4	19 41.8	27	96	93.8	19 49.7	26	96	93.3	19 57.5	26	96	92.8	20 05.3	26	97	92.3	20 12.9	25	97	91.8	70
1	18 19.7	27	96	95.1	18 27.9	27	96	94.6	18 35.9	27	96	94.1	18 43.9	26	96	93.6	18 51.8	26	96	93.1	18 59.6	26	96	92.5	19 07.4	26	97	92.0	19 15.0	25	97	91.5	1
2	17 22.0	27	96	94.8	17 30.1	27	96	94.3	17 38.1	27	96	93.8	17 46.1	26	96	93.3	17 53.9	26	96	92.8	18 01.7	26	97	92.3	18 09.4	26	97	91.8	18 17.1	25	97	91.3	2
3	16 24.2	27	96	94.5	16 32.3	27	96	94.0	16 40.3	26	96	93.5	16 48.2	26	96	93.0	16 56.0	26	96	92.5	17 03.8	26	97	92.0	17 11.5	26	97	91.5	17 19.1	25	97	91.0	3
4	15 26.5	27	96	94.2	15 34.5	27	96	93.7	15 42.4	26	96	93.2	15 50.3	26	96	92.7	15 58.1	26	97	92.2	16 05.9	26	97	91.7	16 13.6	25	97	91.2	16 21.2	25	97	90.7	4
75	14 28.7	27	96	94.0	14 36.6	27	96	93.5	14 44.6	26	96	93.0	14 52.4	26	96	92.5	15 00.2	26	97	92.0	15 07.9	26	97	91.5	15 15.6	25	97	91.0	15 23.2	25	97	90.5	75
6	13 30.8	27	96	93.7	13 38.8	26	96	93.2	13 46.7	26	96	92.7	13 54.5	26	97	92.2	14 02.3	26	97	91.7	14 10.0	26	97	91.2	14 17.7	25	97	90.7	14 25.3	25	97	90.2	6
7	12 33.0	27	96	93.4	12 40.9	26	96	92.9	12 48.8	26	97	92.4	12 56.6	26	97	91.9	13 04.4	26	97	91.4	13 12.1	26	97	90.9	13 19.7	25	97	90.4	13 27.3	25	97	89.9	7
8	11 35.1	26	96	93.1	11 43.0	26	96	92.7	11 50.9	26	97	92.2	11 58.7	26	97	91.7	12 06.4	26	97	91.2	12 14.1	26	97	90.7	12 21.8	25	97	90.2	12 29.3	25	97	89.7	8
9	10 37.2	26	96	92.9	10 45.1	26	96	92.4	10 53.0	26	97	91.9	11 00.7	26	97	91.4	11 08.5	26	97	90.9	11 16.2	26	97	90.4	11 23.8	25	97	89.9	11 31.4	25	97	89.4	9
80	9 39.4	26	96	92.6	9 47.2	26	97	92.1	9 55.0	26	97	91.6	10 02.8	26	97	91.1	10 10.5	26	97	90.7	10 18.2	26	97	90.2	10 25.8	25	97	89.7	10 33.4	25	97	89.2	80
1	8 41.5	26	96	92.3	8 49.3	26	97	91.9	8 57.1	26	97	91.4	9 04.8	26	97	90.9	9 12.6	26	97	90.4	9 20.3	26	97	89.9	9 27.9	25	97	89.4	9 35.5	25	97	88.9	1
2	7 43.5	26	97	92.1	7 51.4	26	97	91.6	7 59.1	26	97	91.1	8 06.9	26	97	90.6	8 14.6	26	97	90.1	8 22.3	26	97	89.6	8 29.9	25	97	89.2	8 37.5	25	97	88.7	2
3	6 45.6	26	97	91.8	6 53.4	26	97	91.3	7 01.2	26	97	90.8	7 08.9	26	97	90.4	7 16.7	26	97	89.9	7 24.3	26	97	89.4	7 32.0	25	97	88.9	7 39.6	25	97	88.4	3
4	5 47.7	26	97	91.6	5 55.5	26	97	91.1	6 03.2	26	97	90.6	6 11.0	26	97	90.1	6 18.7	26	97	89.6	6 26.4	26	97	89.1	6 34.1	25	97	88.6	6 41.7	25	97	88.2	4
85									5 05.3	26	97	90.3	5 13.0	26	97	89.8	5 20.8	26	97	89.4	5 28.4	26	97	88.9	5 36.1	26	97	88.4	5 43.8	25	97	87.9	85

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	0° 00′				0° 30′				1° 00′				1° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	75 00.0	1.0	03	180.0	74 30.0	1.0	03	180.0	74 00.0	1.0	03	180.0	73 30.0	1.0	03	180.0
1	74 58.0	1.0	10	176.1	74 28.1	1.0	09	176.3	73 58.2	1.0	09	176.4	73 28.2	1.0	09	176.5
2	74 52.2	99	16	172.3	74 22.5	99	16	172.6	73 52.7	99	15	172.8	73 22.9	99	15	173.0
3	74 42.6	98	22	168.6	74 13.1	98	22	168.9	73 43.6	98	21	169.2	73 14.1	98	20	169.6
4	74 29.3	97	28	164.9	74 00.2	97	27	165.3	73 31.1	97	26	165.8	73 01.9	97	26	166.2
05	74 12.4	95	34	161.3	73 43.8	95	33	161.9	73 15.2	96	32	162.4	72 46.5	96	31	162.9
6	73 52.2	93	39	157.9	73 24.2	94	38	158.5	72 56.1	94	37	159.1	72 27.9	94	36	159.7
7	73 28.9	91	44	154.6	73 01.5	92	43	155.3	72 34.0	92	42	156.0	72 06.3	92	41	156.6
8	73 02.6	89	48	151.5	72 35.9	89	47	152.3	72 09.0	90	46	153.0	71 42.0	90	45	153.7
9	72 33.6	86	52	148.5	72 07.6	87	51	149.4	71 41.4	88	50	150.1	71 15.0	88	49	150.9
10	72 02.2	84	56	145.7	71 36.9	85	55	146.6	71 11.4	85	54	147.4	70 45.6	86	53	148.2
1	71 28.4	81	60	143.1	71 03.9	82	58	144.0	70 39.1	83	57	144.8	70 14.0	84	56	145.7
2	70 52.6	79	63	140.6	70 28.8	80	62	141.5	70 04.7	81	60	142.4	69 40.3	82	59	143.3
3	70 14.9	77	66	138.3	69 51.8	78	64	139.2	69 28.4	78	63	140.1	69 04.7	79	62	141.0
4	69 35.5	74	68	136.1	69 13.1	75	67	137.0	68 50.4	76	66	137.9	68 27.4	77	65	138.8
15	68 54.6	72	71	134.0	68 32.8	73	70	135.0	68 10.8	74	68	135.9	67 48.4	75	67	136.8
6	68 12.2	70	73	132.1	67 51.1	71	72	133.0	67 29.7	72	71	133.9	67 08.0	73	70	134.8
7	67 28.6	68	75	130.2	67 08.1	69	74	131.2	66 47.4	70	73	132.1	66 26.3	71	72	133.0
8	66 43.8	66	76	128.5	66 23.9	67	75	129.5	66 03.8	68	74	130.4	65 43.3	69	73	131.3
9	65 57.9	64	78	126.9	65 38.7	65	77	127.9	65 19.1	66	76	128.8	64 59.2	67	75	129.7
20	65 11.1	62	79	125.4	64 52.5	63	78	126.3	64 33.5	64	78	127.2	64 14.1	65	77	128.1
1	64 23.5	60	81	124.0	64 05.4	61	80	124.9	63 46.9	62	79	125.8	63 28.1	63	78	126.7
2	63 35.1	58	82	122.6	63 17.4	59	81	123.5	62 59.5	60	80	124.4	62 41.2	61	79	125.3
3	62 45.9	57	83	121.4	62 28.8	58	82	122.3	62 11.3	59	81	123.1	61 53.5	60	81	124.0
4	61 55.1	55	84	120.2	61 39.4	56	83	121.0	61 22.4	57	82	121.9	61 05.1	58	82	122.8
25	61 05.7	54	85	119.0	60 49.5	55	84	119.9	60 32.9	56	83	120.8	60 16.1	57	83	121.6
6	60 14.8	52	86	118.0	59 59.0	53	85	118.8	59 42.8	54	84	119.6	59 26.4	55	84	120.5
7	59 23.4	51	86	116.9	59 07.9	52	86	117.8	58 52.2	53	85	118.6	58 36.2	54	85	119.4
8	58 31.5	50	87	116.0	58 16.4	51	87	116.8	58 01.1	52	86	117.6	57 45.4	53	85	118.4
9	57 39.1	48	88	115.0	57 24.5	49	87	115.8	57 09.5	50	87	116.6	56 54.2	51	86	117.4
30	56 46.4	47	88	114.1	56 32.1	48	88	114.9	56 17.5	49	87	115.7	56 02.6	50	87	116.5
1	55 53.4	46	89	113.3	55 39.4	47	88	114.1	55 25.1	48	88	114.9	55 10.5	49	87	115.6
2	55 00.0	45	90	112.5	54 46.3	46	89	113.3	54 32.3	47	88	114.0	54 18.1	48	88	114.8
3	54 06.3	44	90	111.7	53 52.9	45	90	112.5	53 39.2	46	89	113.2	53 25.3	47	88	114.0
4	53 12.3	43	90	111.0	52 59.2	44	90	111.7	52 45.8	45	89	112.5	52 32.2	46	89	113.2
35	52 18.1	42	91	110.3	52 05.3	43	90	111.0	51 52.1	44	90	111.8	51 38.8	45	89	112.5
6	51 23.6	41	91	109.6	51 11.0	42	91	110.3	50 58.2	43	90	111.1	50 45.1	44	90	111.8
7	50 28.9	41	92	109.0	50 16.6	42	91	109.7	50 04.0	42	91	110.4	49 51.1	43	90	111.1
8	49 34.0	40	92	108.3	49 21.9	41	92	109.0	49 09.5	42	91	109.7	48 56.9	42	91	110.4
9	48 38.9	39	92	107.7	48 27.0	40	92	108.4	48 14.9	41	91	109.1	48 02.5	42	91	109.8
40	47 43.6	38	92	107.1	47 31.9	39	92	107.8	47 20.0	40	92	108.5	47 07.9	41	91	109.2
1	46 48.1	38	93	106.6	46 36.7	39	92	107.3	46 25.0	39	92	107.9	46 13.0	40	92	108.6
2	45 52.5	37	93	106.0	45 41.2	38	93	106.7	45 29.7	39	92	107.4	45 18.0	39	92	108.0
3	44 56.7	37	93	105.5	44 45.6	37	93	106.2	44 34.3	38	93	106.8	44 22.8	39	92	107.5
4	44 00.8	36	93	105.0	43 49.9	37	93	105.7	43 38.8	37	93	106.3	43 27.4	38	93	106.9
45	43 04.8	35	94	104.5	42 54.0	36	93	105.1	42 43.1	37	93	105.8	42 31.9	38	93	106.4
6	42 08.6	35	94	104.0	41 58.0	36	94	104.7	41 47.2	36	93	105.3	41 36.3	37	93	105.9
7	41 12.3	34	94	103.6	41 01.9	35	94	104.2	40 51.3	36	94	104.8	40 40.5	36	93	105.4
8	40 15.9	34	94	103.1	40 05.7	35	94	103.7	39 55.2	35	94	104.3	39 44.5	36	93	105.0
9	39 19.4	33	94	102.7	39 09.3	34	94	103.3	38 59.0	35	94	103.9	38 48.5	35	94	104.5
50	38 22.8	33	94	102.3	38 12.9	34	94	102.9	38 02.7	34	94	103.5	37 52.3	35	94	104.0
1	37 26.2	33	95	101.8	37 16.3	33	94	102.4	37 06.3	34	94	103.0	36 56.0	34	94	103.6
2	36 29.4	32	95	101.4	36 19.7	33	95	102.0	36 09.7	33	94	102.6	35 59.7	34	94	103.2
3	35 32.6	32	95	101.0	35 22.9	32	95	101.6	35 13.1	33	94	102.2	35 03.2	33	94	102.8
4	34 35.6	31	95	100.6	34 26.1	32	95	101.2	34 16.4	33	95	101.8	34 06.6	33	94	102.4
55	33 38.6	31	95	100.3	33 29.2	32	95	100.8	33 19.7	32	95	101.4	33 10.0	33	95	102.0
6	32 41.6	31	95	99.9	32 32.3	31	95	100.5	32 22.8	32	95	101.0	32 13.2	32	95	101.6
7	31 44.5	30	95	99.5	31 35.3	31	95	100.1	31 25.9	31	95	100.7	31 16.4	32	95	101.2
8	30 47.3	30	95	99.2	30 38.2	31	95	99.7	30 28.9	31	95	100.3	30 19.5	32	95	100.8
9	29 50.0	30	95	98.8	29 41.0	30	95	99.4	29 31.9	31	95	99.9	29 22.6	31	95	100.5
60	28 52.7	30	96	98.5	28 43.8	30	95	99.0	28 34.7	30	95	99.6	28 25.6	31	95	100.1
1	27 55.4	29	96	98.2	27 46.6	30	95	98.7	27 37.6	30	95	99.2	27 28.5	31	95	99.8
2	26 58.0	29	96	97.8	26 49.2	29	96	98.4	26 40.3	30	95	98.9	26 31.3	30	95	99.4
3	26 00.6	29	96	97.5	25 51.9	29	96	98.0	25 43.1	30	96	98.6	25 34.1	30	95	99.1
4	25 03.1	29	96	97.2	24 54.5	29	96	97.7	24 45.7	29	96	98.3	24 36.9	30	96	98.8
65	24 05.6	28	96	96.9	23 57.0	29	96	97.4	23 48.4	29	96	97.9	23 39.6	29	96	98.5
6	23 08.0	28	96	96.6	22 59.5	28	96	97.1	22 50.9	29	96	97.6	22 42.2	29	96	98.1
7	22 10.4	28	96	96.3	22 02.0	28	96	96.8	21 53.5	29	96	97.3	21 44.8	29	96	97.8
8	21 12.8	28	96	96.0	21 04.4	28	96	96.5	20 56.0	28	96	97.0	20 47.4	29	96	97.5
9	20 15.1	28	96	95.7	20 06.8	28	96	96.2	19 58.4	28	96	96.7	19 49.9	28	96	97.2
70	19 17.5	27	96	95.4	19 09.2	28	96	95.9	19 00.8	28	96	96.4	18 52.4	28	96	96.9
1	18 19.7	27	96	95.1	18 11.5	28	96	95.6	18 03.2	28	96	96.1	17 54.8	28	96	96.6
2	17 22.0	27	96	94.8	17 13.8	27	96	95.3	17 05.6	28	96	95.8	16 57.3	28	96	96.3
3	16 24.2	27	96	94.5	16 16.1	27	96	95.0	16 07.9	27	96	95.5	15 59.6	28	96	96.0
4	15 26.5	27	96	94.2	15 18.4	27	96	94.7	15 10.2	27	96	95.2	15 02.0	28	96	95.7
75	14 28.7	27	96	94.0	14 20.6	27	96	94.5	14 12.5	27	96	95.0	14 04.3	27	96	95.5
6	13 30.8	27	96	93.7	13 22.8	27	96	94.2	13 14.7	27	96	94.7	13 06.6	27	96	95.2
7	12 33.0	27	96	93.4	12 25.0	27	96	93.9	12 17.0	27	96	94.4	12 08.9	27	96	94.9
8	11 35.1	26	96	93.1	11 27.2	27	96	93.6	11 19.2	27	96	94.1	11 11.1	27	96	94.6
9	10 37.2	26	96	92.9	10 29.3	26	96	93.4	10 21.4	27	96	93.9	10 13.3	27	96	94.4
80	9 39.4	26	96	92.6	9 31.5	26	96	93.1	9 23.5	27	96	93.6	9 15.5	27	96	94.1
1	8 41.5	26	96	92.3	8 33.6	26	96	92.8	8 25.7	26	96	93.3	8 17.7	27	96	93.8
2	7 43.5	26	97	92.1	7 35.7	26	96	92.6	7 27.8	26	96	93.1	7 19.9	26	96	93.5
3	6 45.6	26	97	91.8	6 37.8	26	97	92.3	6 29.9	26	96	92.8	6 22.0	26	96	93.3
4	5 47.7	26	97	91.6	5 39.9	26	97	92.0	5 32.0	26	97	92.5	5 24.2	26	96	93.0

H.A.	2° 00′				2° 30′				3° 00′				3° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	73 00.0	1.0	03	180.0	72 30.0	1.0	03	180.0	72 00.0	1.0	03	180.0	71 30.0	1.0	03	180.0
1	72 58.3	1.0	09	176.6	72 28.3	1.0	08	176.7	71 58.4	1.0	08	176.8	71 28.4	1.0	08	176.9
2	72 53.1	99	14	173.2	72 23.3	99	14	173.4	71 53.5	99	14	173.6	71 23.7	99	13	173.7
3	72 44.6	99	20	169.8	72 15.0	99	19	170.1	71 45.4	99	19	170.4	71 15.8	99	18	170.6
4	72 32.7	97	25	166.6	72 03.5	98	24	166.9	71 34.2	98	24	167.3	71 04.8	98	23	167.6
05	72 17.7	96	30	163.4	71 48.8	96	29	163.8	71 19.9	96	29	164.2	70 50.9	97	28	164.6
6	71 59.6	95	35	160.2	71 31.2	95	34	160.8	71 02.7	95	33	161.3	70 34.1	95	33	161.7
7	71 38.5	93	40	157.2	71 10.7	93	39	157.8	70 42.7	93	38	158.4	70 14.6	94	37	158.9
8	71 14.8	91	44	154.4	70 47.5	91	43	155.0	70 20.0	92	42	155.6	69 52.5	92	41	156.2
9	70 48.5	89	48	151.6	70 21.7	89	47	152.3	69 54.9	90	46	152.9	69 27.9	90	45	153.6
10	70 19.7	87	52	149.0	69 53.6	87	51	149.7	69 27.4	88	50	150.4	69 00.9	88	49	151.1
1	69 48.8	85	55	146.5	69 23.3	85	54	147.2	68 57.6	86	53	147.9	68 31.8	86	52	148.6
2	69 15.7	82	58	144.1	68 50.9	83	57	144.9	68 25.9	84	56	145.6	68 00.7	84	55	146.3
3	68 40.8	80	61	141.8	68 16.6	81	60	142.6	67 52.2	82	59	143.4	67 27.6	82	58	144.1
4	68 04.1	78	64	139.7	67 40.6	79	63	140.5	67 16.8	80	62	141.3	66 52.8	80	61	142.1
15	67 25.8	76	66	137.6	67 02.9	77	65	138.5	66 39.8	78	64	139.3	66 16.4	78	63	140.1
6	66 46.0	74	69	135.7	66 23.8	75	68	136.6	66 01.2	76	67	137.4	65 38.4	76	66	138.2
7	66 04.9	72	71	133.9	65 43.2	73	70	134.7	65 21.3	74	69	135.6	64 59.1	74	68	136.4
8	65 22.5	70	73	132.2	65 01.5	71	72	133.0	64 40.1	72	71	133.8	64 18.5	73	70	134.6
9	64 39.0	68	74	130.5	64 18.5	69	73	131.4	63 57.7	70	72	132.2	63 36.7	71	72	133.0
20	63 54.5	66	76	129.0	63 34.5	67	75	129.8	63 14.3	68	74	130.7	62 53.8	69	73	131.5
1	63 09.0	64	77	127.5	62 49.5	65	76	128.4	62 29.8	66	76	129.2	62 09.8	67	75	130.0
2	62 22.6	63	79	126.2	62 03.7	64	78	127.0	61 44.5	64	77	127.8	61 25.0	65	76	128.6
3	61 35.4	61	80	124.8	61 17.0	62	79	125.7	60 58.3	63	78	126.5	60 39.3	64	78	127.3
4	60 47.5	59	81	123.6	60 29.5	60	80	124.4	60 11.3	61	80	125.2	59 52.8	62	79	126.0
25	59 58.9	58	82	122.4	59 41.4	59	81	123.2	59 23.6	60	81	124.0	59 05.5	61	80	124.8
6	59 09.6	56	83	121.3	58 52.6	57	82	122.1	58 35.2	58	82	122.9	58 17.6	59	81	123.6
7	58 19.8	55	84	120.2	58 03.2	56	83	121.0	57 46.2	57	83	121.8	57 29.0	58	82	122.5
8	57 29.5	54	85	119.2	57 13.2	55	84	120.0	55 56.7	56	83	120.7	56 39.9	56	83	121.5
9	56 38.6	52	85	118.2	55 22.8	53	85	119.0	56 06.6	54	84	119.7	55 50.2	55	84	120.5
30	55 47.3	51	86	117.3	55 31.8	52	86	118.0	55 16.1	53	85	118.8	55 00.0	54	84	119.5
1	54 55.6	50	87	116.4	54 40.5	51	86	117.1	54 25.1	52	86	117.9	54 09.4	53	85	118.6
2	54 03.5	49	87	115.5	53 48.7	50	87	116.3	53 33.6	51	86	117.0	53 18.3	52	86	117.7
3	53 11.1	48	88	114.7	52 56.6	49	88	115.5	52 41.8	50	87	116.2	52 26.8	50	86	116.9
4	52 18.3	47	89	113.9	52 04.1	48	88	114.7	51 49.6	49	88	115.4	51 34.9	49	87	116.1
35	51 25.1	46	89	113.2	51 11.2	47	89	113.9	50 57.1	48	88	114.6	50 42.7	48	88	115.3
6	50 31.7	45	89	112.5	50 18.1	46	89	113.2	50 04.2	47	89	113.9	49 50.1	47	88	114.5
7	49 38.0	44	90	111.8	49 24.7	45	89	112.5	49 11.1	46	89	113.2	48 57.2	47	89	113.8
8	48 44.1	43	90	111.1	48 31.0	44	90	111.8	48 17.7	45	89	112.5	48 04.1	46	89	113.1
9	47 49.9	42	91	110.5	47 37.1	43	90	111.1	47 24.0	44	90	111.8	47 10.7	45	89	112.5
40	46 55.5	42	91	109.8	46 42.9	42	91	110.5	46 30.0	43	90	111.2	46 17.0	44	90	111.8
1	46 00.9	41	91	109.2	45 48.5	42	91	109.9	45 35.9	42	91	110.6	45 23.1	43	90	111.2
2	45 06.1	40	92	108.7	44 53.9	41	91	109.3	44 41.5	42	91	110.0	44 28.9	42	91	110.6
3	44 11.1	40	92	108.1	43 59.1	40	92	108.7	43 46.9	41	91	109.4	43 34.6	42	91	110.0
4	43 15.9	39	92	107.6	43 04.1	40	92	108.2	42 52.2	40	92	108.8	42 40.0	41	91	109.4
45	42 20.6	38	92	107.0	42 09.0	39	92	107.7	41 57.2	40	92	108.3	41 45.3	40	92	108.9
6	41 25.1	38	93	106.5	41 13.7	38	92	107.1	41 02.1	39	92	107.8	40 50.3	40	92	108.4
7	40 29.4	37	93	106.0	40 18.2	38	93	106.6	40 06.8	38	92	107.3	39 55.3	39	92	107.9
8	39 33.7	36	93	105.6	39 22.6	37	93	106.2	39 11.4	38	93	106.8	39 00.0	38	92	107.4
9	38 37.8	36	93	105.1	38 26.9	37	93	105.7	38 15.9	37	93	106.3	38 04.6	38	93	106.9
50	37 41.8	35	94	104.6	37 31.1	36	93	105.2	37 20.2	37	93	105.8	37 09.1	37	93	106.4
1	36 45.6	35	94	104.2	36 35.1	36	93	104.8	36 24.3	36	93	105.4	36 13.4	37	93	105.9
2	35 49.4	34	94	103.8	35 39.0	35	94	104.3	35 28.4	36	93	104.9	35 17.6	36	93	105.5
3	34 53.1	34	94	103.3	34 42.8	35	94	103.9	34 32.3	35	94	104.5	34 21.7	36	93	105.1
4	33 56.6	34	94	102.9	33 46.5	34	94	103.5	33 36.2	35	94	104.1	33 25.7	35	94	104.6
55	33 00.1	33	94	102.5	32 50.1	34	94	103.1	32 39.9	34	94	103.7	32 29.6	35	94	104.2
6	32 03.5	33	94	102.1	31 53.6	33	94	102.7	31 43.5	34	94	103.3	31 33.4	34	94	103.8
7	31 06.8	32	95	101.8	30 57.0	33	94	102.3	30 47.1	33	94	102.9	30 37.0	34	94	103.4
8	30 10.0	32	95	101.4	30 00.3	32	95	101.9	29 50.5	33	94	102.5	29 40.6	33	94	103.0
9	29 13.2	32	95	101.0	29 03.6	32	95	101.6	28 53.9	32	94	102.1	28 44.1	33	94	102.6
60	28 16.2	31	95	100.7	28 06.8	32	95	101.2	27 57.2	32	95	101.7	27 47.5	33	94	102.3
1	27 19.2	31	95	100.3	27 09.9	31	95	100.9	27 00.4	32	95	101.4	26 50.8	32	95	101.9
2	26 22.2	31	95	100.0	26 12.9	31	95	100.5	26 03.6	31	95	101.0	25 54.1	32	95	101.6
3	25 25.1	30	95	99.6	25 15.9	31	95	100.2	25 06.7	31	95	100.7	24 57.3	31	95	101.2
4	24 27.9	30	95	99.3	24 18.9	30	95	99.8	24 09.7	31	95	100.3	24 00.4	31	95	100.9
65	23 30.7	30	95	99.0	23 21.7	30	95	99.5	23 12.6	30	95	100.0	23 03.5	31	95	100.5
6	22 33.4	29	96	98.7	22 24.5	30	95	99.2	22 15.5	30	95	99.7	22 06.4	30	95	100.2
7	21 36.1	29	96	98.3	21 27.3	30	96	98.8	21 18.4	30	95	99.4	21 09.4	30	95	99.9
8	20 38.7	29	96	98.0	20 30.0	29	96	98.5	20 21.2	30	95	99.0	20 12.3	30	95	99.6
9	19 41.3	29	96	97.7	19 32.7	29	96	98.2	19 23.9	29	96	98.7	19 15.1	30	95	99.2
70	18 43.9	29	96	97.4	18 35.3	29	96	97.9	18 26.6	29	96	98.4	18 17.8	29	95	98.9
1	17 46.4	28	96	97.1	17 37.9	29	96	97.6	17 29.3	29	96	98.1	17 20.6	29	96	98.6
2	16 48.9	28	96	96.8	16 40.4	28	96	97.3	16 31.9	29	96	97.8	16 23.2	29	96	98.3
3	15 51.3	28	96	96.5	15 42.9	28	96	97.0	15 34.4	28	96	97.5	15 25.9	29	96	98.0
4	14 53.7	28	96	96.2	14 45.4	28	96	96.7	14 36.9	28	96	97.2	14 28.5	28	96	97.7
75	13 56.1	28	96	96.0	13 47.8	28	96	96.4	13 39.4	28	96	96.9	13 31.0	28	96	97.4
6	12 58.4	27	96	95.7	12 50.2	28	96	96.2	12 41.9	28	96	96.7	12 33.5	28	96	97.1
7	12 00.7	27	96	95.4	11 52.5	27	96	95.9	11 44.3	28	96	96.4	11 36.0	28	96	96.9
8	11 03.0	27	96	95.1	10 54.9	27	96	95.6	10 46.7	27	96	96.1	10 38.5	28	96	96.6
9	10 05.3	27	96	94.8	9 57.2	27	96	95.3	9 49.0	27	96	95.8	9 40.9	27	96	96.3
80	9 07.5	27	96	94.6	8 59.5	27	96	95.1	8 51.4	27	96	95.5	8 43.2	27	96	96.0
1	8 09.7	27	96	94.3	8 01.7	27	96	94.8	7 53.7	27	96	95.3	7 45.6	27	96	95.8
2	7 11.9	27	96	94.0	7 04.0	27	96	94.5	6 56.0	27	96	95.0	6 47.9	27	96	95.5
3	6 14.1	26	96	93.8	6 06.2	27	96	94.2	5 58.2	27	96	94.7	5 50.2	27	96	95.2
4	5 16.3	26	96	93.5	5 08.4	26	96	94.0	5 00.4	26	96	94.5				

H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	79 00.0	1.0 04	180.0	79 30.0	1.0 05	180.0	80 00.0	1.0 05	180.0	80 30.0	1.0 05	180.0	81 00.0	1.0 05	180.0	81 30.0	1.0 06	180.0	82 00.0	1.0 06	180.0	82 30.0	1.0 06	180.0	00
1	78 57.4	1.0 13	174.8	79 27.2	1.0 14	174.5	79 57.1	1.0 14	174.3	80 27.0	99 15	174.0	80 56.8	99 16	173.7	81 26.6	99 17	173.3	81 56.4	99 18	172.9	82 26.2	99 19	172.4	1
2	78 49.5	98 21	169.7	79 19.0	98 22	169.2	79 48.5	98 23	168.7	80 17.9	98 25	168.1	80 47.3	98 26	167.5	81 16.6	97 27	166.8	81 45.8	97 29	166.0	82 14.9	97 30	165.1	2
3	78 36.6	97 29	164.7	79 05.6	96 31	164.0	79 34.4	96 32	163.3	80 03.2	96 33	162.4	80 31.8	95 35	161.6	81 00.3	95 37	160.6	81 28.6	94 39	159.5	81 56.7	93 41	158.3	3
4	78 19.0	94 37	159.9	78 47.2	94 38	159.0	79 15.2	93 40	158.1	79 43.1	93 41	157.1	80 10.8	92 43	156.0	80 38.2	91 45	154.8	81 05.4	90 47	153.4	81 32.2	89 50	152.0	4
05	77 56.9	92 43	155.4	78 24.3	91 45	154.4	78 51.4	90 47	153.3	79 18.3	89 49	152.1	79 44.8	88 50	150.9	80 11.1	87 53	149.5	80 37.0	86 55	148.0	81 02.5	84 57	146.3	05
6	77 30.8	88 49	151.2	77 57.2	88 51	150.0	78 23.3	87 53	148.8	78 49.1	85 55	147.5	79 14.6	84 57	146.2	79 39.6	83 59	144.6	80 04.1	81 61	143.0	80 28.2	79 63	141.2	6
7	77 01.1	85 55	147.2	77 26.5	84 57	146.0	77 51.6	83 58	144.7	78 16.2	82 60	143.4	78 40.5	80 62	141.9	79 04.2	78 64	140.3	79 27.5	77 66	138.6	79 50.2	74 69	136.8	7
8	76 28.2	82 60	143.6	76 52.6	81 61	142.3	77 16.6	79 63	141.0	77 40.1	78 65	139.6	78 03.2	76 67	138.0	78 25.7	74 69	136.4	78 47.7	72 71	134.7	79 09.0	70 73	132.9	8
9	75 52.5	79 64	140.2	76 15.8	77 65	138.9	76 38.7	76 67	137.6	77 01.2	74 69	136.1	77 23.1	72 71	134.6	77 44.5	70 72	132.9	78 05.3	68 74	131.2	78 25.4	66 76	129.4	9
10	75 14.2	75 67	137.2	75 36.6	74 69	135.8	75 58.5	72 71	134.5	76 19.9	70 72	133.0	76 40.7	69 74	131.5	77 01.0	67 76	129.8	77 20.6	64 77	128.1	77 39.6	62 79	126.3	10
1	74 33.8	72 71	134.3	74 55.2	71 72	133.0	75 16.1	69 74	131.6	75 36.5	67 75	130.2	75 56.4	65 77	128.6	76 15.6	63 78	127.0	76 34.2	61 80	125.4	76 52.1	58 82	123.6	1
2	73 51.4	69 73	131.8	74 11.9	68 75	130.4	74 31.9	66 76	129.0	74 51.4	64 78	127.6	75 10.3	62 79	126.1	75 28.6	60 81	124.5	75 46.2	58 82	122.9	76 03.2	55 84	121.2	2
3	73 07.4	66 76	129.4	73 27.0	65 77	128.1	73 46.2	63 78	126.7	74 04.8	61 80	125.3	74 22.8	59 81	123.8	74 40.2	57 83	122.3	74 57.0	55 84	120.7	75 13.0	52 85	119.1	3
4	72 21.9	64 78	127.2	72 40.7	62 79	125.9	72 59.1	60 80	124.6	73 16.8	58 82	123.2	73 34.0	56 83	121.7	73 50.6	54 84	120.2	74 06.6	52 85	118.7	74 21.9	50 87	117.1	4
15	71 35.1	61 80	125.2	71 53.2	59 81	123.9	72 10.8	58 82	122.6	72 27.8	56 83	121.2	72 44.3	54 84	119.8	73 00.1	52 86	118.4	73 15.3	50 87	116.9	73 29.9	47 88	115.4	15
6	70 47.2	59 82	123.3	71 04.6	57 83	122.1	71 21.5	55 84	120.8	71 37.8	54 85	119.5	71 53.6	52 86	118.1	72 08.7	50 87	116.7	72 23.3	48 88	115.3	72 37.2	45 89	113.8	6
7	69 58.3	57 83	121.6	70 15.0	55 84	120.4	70 31.2	53 85	119.1	70 46.9	51 86	117.9	71 02.1	49 87	116.5	71 16.6	48 88	115.2	71 30.6	46 89	113.8	71 43.9	43 90	112.4	7
8	69 08.5	55 84	120.0	69 24.6	53 85	118.8	69 40.2	51 86	117.6	69 55.3	49 87	116.4	70 09.9	48 88	115.1	70 23.9	46 89	113.8	70 37.3	44 90	112.4	70 50.1	42 90	111.1	8
9	68 18.0	53 85	118.6	68 33.5	51 86	117.4	68 48.6	49 87	116.2	69 03.1	48 88	115.0	69 17.1	46 89	113.7	69 30.6	44 90	112.5	69 43.5	42 90	111.2	69 55.8	40 91	109.9	9
20	67 26.7	51 86	117.2	67 41.8	49 87	116.1	67 56.3	48 88	114.9	68 10.3	46 89	113.7	68 23.8	44 90	112.5	68 36.8	42 90	111.3	68 49.2	40 91	110.0	69 01.1	39 92	108.7	20
1	66 34.9	49 87	115.9	66 49.4	48 88	114.8	67 03.4	46 89	113.7	67 17.0	44 90	112.5	67 30.0	43 90	111.4	67 42.6	41 91	110.2	67 54.6	39 92	108.9	68 66.0	37 92	107.7	1
2	65 42.5	48 88	114.7	65 56.5	46 89	113.6	66 10.1	44 90	112.5	66 23.2	43 90	111.4	66 35.9	41 91	110.3	66 48.0	40 92	109.1	66 59.6	38 92	108.0	67 10.7	36 93	106.8	2
3	64 49.6	46 89	113.6	65 03.2	45 90	112.5	65 16.4	43 90	111.5	65 29.1	42 91	110.4	65 41.3	40 91	109.3	65 53.1	38 92	108.2	66 04.3	37 93	107.0	66 15.0	35 93	105.9	3
4	63 56.3	45 90	112.6	64 09.5	43 90	111.5	64 22.3	42 91	110.5	64 34.6	40 91	109.4	64 46.5	39 92	108.4	64 57.9	37 92	107.3	65 08.8	36 93	106.2	65 19.2	34 93	105.0	4
25	63 02.6	43 90	111.6	63 15.4	42 91	110.6	63 27.8	41 91	109.5	63 39.8	39 92	108.5	63 51.3	38 92	107.5	64 02.4	36 93	106.4	64 13.0	35 93	105.3	64 23.1	33 94	104.3	25
6	62 08.5	42 91	110.6	62 21.0	41 91	109.7	62 33.1	40 92	108.7	62 44.7	38 92	107.7	62 55.9	37 93	106.6	63 06.7	35 93	105.6	63 17.0	34 94	104.6	63 26.8	32 94	103.5	6
7	61 14.1	41 91	109.8	61 26.3	40 92	108.8	61 38.0	38 92	107.8	61 49.4	37 93	106.9	62 00.3	36 93	105.9	62 10.8	34 94	104.9	62 20.8	33 94	103.9	62 30.4	31 94	102.8	7
8	60 19.4	40 92	108.9	69 31.3	39 92	108.0	60 42.7	38 93	107.1	60 53.8	36 93	106.1	61 04.4	35 93	105.1	61 14.7	33 94	104.2	61 24.5	32 94	103.2	61 33.8	31 95	102.2	8
9	59 24.5	39 92	108.1	59 36.0	38 92	107.2	59 47.2	37 93	106.3	59 58.0	35 93	105.4	60 08.4	34 94	104.4	60 18.4	33 94	103.5	60 28.0	31 94	102.5	60 37.1	30 95	101.6	9
30	58 29.3	38 92	107.4	58 40.6	37 93	106.5	58 51.5	36 93	105.6	59 02.0	34 94	104.7	59 12.2	33 94	103.8	59 22.0	32 94	102.9	59 31.3	31 95	101.9	59 40.3	29 95	101.0	30
1	57 33.9	37 93	106.7	57 44.9	36 93	105.8	57 55.6	35 93	104.9	58 05.9	34 94	104.0	58 15.8	32 94	103.2	58 25.4	31 94	102.2	58 34.5	30 95	101.3	58 43.3	29 95	100.4	1
2	56 38.3	37 93	106.0	56 49.1	35 93	105.1	56 59.5	34 94	104.3	57 09.6	33 94	103.4	57 19.3	32 94	102.5	57 28.7	31 95	101.7	57 37.7	29 96	100.8	57 46.3	28 95	99.9	2
3	55 42.5	36 93	105.4	55 53.0	35 94	104.5	56 03.3	34 94	103.7	56 13.2	32 94	102.8	56 22.7	31 95	102.0	56 31.9	30 95	101.1	56 40.7	29 95	100.2	56 49.1	28 96	99.4	3
4	54 46.5	35 94	104.7	54 56.9	34 94	103.9	55 06.9	33 94	103.1	55 16.6	32 94	102.3	55 25.9	31 95	101.4	55 34.9	29 95	100.6	55 43.6	28 96	99.7	55 51.9	27 96	98.9	4
35	53 50.4	34 94	104.1	54 00.5	33 94	103.3	54 10.4	32 94	102.5	54 19.9	31 95	101.7	54 29.1	30 96	100.9	54 37.9	29 95	100.1	54 46.4	28 95	99.2	54 54.6	27 96	98.4	35
6	52 54.1	34 94	103.6	53 04.1	33 94	102.8	53 13.7	32 96	102.0	53 23.1	31 95	101.2	53 32.1	30 96	100.4	53 40.8	28 95	99.6	53 49.2	27 96	98.8	53 57.3	26 96	98.0	6
7	51 57.7	33 94	103.0	52 07.5	32 94	102.3	52 17.0	31 95	101.5	52 26.2	30 95	100.7	52 35.1	29 95	99.9	52 43.6	28 95	99.1	52 51.9	27 96	98.3	52 59.8	26 96	97.5	7
8	51 01.2	33 94	102.5	51 10.8	32 96	101.7	51 20.2	31 95	101.0	51 29.2	30 95	100.2	51 37.9	29 95	99.4	51 46.4	28 96	98.7	51 54.5	27 96	97.9	52 02.3	26 96	97.1	8
9	50 04.5	32 95	102.0	50 14.0	31 95	101.2	50 23.2	30 95	100.5	50 32.1	29 95	99.7	50 40.7	28 95	99.0	50 49.1	27 96	98.2	50 57.1	26 96	97.5	51 04.8	25 96	96.7	9
40	49 07.8	32 95	101.5	49 17.1	31 95	100.8	49 26.2	30 95	100.0	49 35.0	29 95	99.3	49 43.5	28 96	98.6	49 51.7	27 96	97.8	49 59.6	26 96	97.1	50 07.2	25 96	96.3	40
1	48 10.9	31 95	101.0	48 20.1	30 95	100.3	48 29.1	29 95	99.6	48 37.7	28 96	98.9	48 46.1	27 96	98.1	48 54.2	27 96	97.4	49 02.1	26 96	96.7	49 09.6	25 96	95.9	1
2	47 14.0	31 95	100.6	47 23.1	30 95	99.9	47 31.9	29 95	99.2	47 40.4	28 96	98.4	47 48.7	27 96	97.7	47 56.7	26 96	97.0	48 04.5	25 95	96.3	48 11.9	24 96	95.6	2
3	46 17.0	30 95	100.1	46 25.9	29 95	99.4	46 34.6	29 96	98.7	46 43.1	28 96	98.0	46 51.3	27 96	97.3	46 59.2	26 96	96.6	47 06.8	25 96	95.9	47 14.2	24 96	95.2	3
4	45 19.9	30 95	99.7	45 28.7	29 95	99.0	45 37.3	28 96	98.3	45 45.7	27 96	97.6	45 53.8	27 96	96.9	46 01.6	26 96	96.3	46 09.2	25 96	95.6	46 16.5	24 96	94.9	4
45	44 22.7	29 95	99.3	44 31.5	29 96	98.6	44 40.0	28 96	97.9	44 48.2	27 96	97.3	44 56.2	26 96	96.6	45 04.0	25 96	95.9	45 11.5	25 96	95.2	45 18.7	24 96	94.5	45
6	43 25.5	29 96	98.9	43 34.1	28 96	98.2	43 42.5	28 96	97.5	43 50.7	27 96	96.9	43 58.6	26 96	96.2	44 06.3	25 96	95.5	44 13.7	24 96	94.9	44 21.0	24 96	94.2	6
7	42 28.2	29 96	98.5	42 36.7	28 96	97.8	42 45.0	27 96	97.2	42 53.1	27 96	96.5	43 01.0	26 96	95.9	43 08.6	25 96	95.2	43 16.0	24 96	94.5	43 23.1	23 96	93.9	7
8	41 30.9	28 96	98.1	41 39.3	28 96	97.4	41 47.5	27 96	96.8	41 55.5	26 96	96.2	42 03.3	26 96	95.5	42 10.9	25 96	94.9	42 18.2	24 96	94.2	42 25.3	23 96	93.5	8
9	40 33.5	28 96	97.7	49 41.8	27 96	97.1	40 50.0	27 96	96.4	40 57.9	26 96	95.8	41 05.6	25 96	95.2	41 13.1	25 96	94.5	41 20.4	24 96	93.9	41 27.5	23 96	93.2	9
50	39 36.0	28 96	97.4	39 44.3	27 96	96.7	39 52.3	27 96	96.1	40 00.2	26 96	95.5	40 07.9	25 96	94.8	40 15.3	24 96	94.2	40 22.6	24 96	93.6	40 29.6	23 96	92.9	50
1	38 38.5	28 96	97.0	38 46.7	27 96	96.4	38 54.7	26 96	95.8	39 02.5	26 96	95.1	39 10.1	25 96	94.5	39 17.5	24 96	93.9	39 24.7	24 96	93.3	39 31.7	23 96	92.6	1
2	37 41.0	27 96	96.6	37 49.1	27 96	96.0	37 57.0	26 96	95.4	38 04.8	25 96	94.8	38 12.3	25 96	94.2	38 19.7	24 96	93.6	38 26.8	24 96	93.0	38 33.8	23 97	92.3	2
3	36 43.4	27 96	96.3	36 51.4	27 96	95.7	36 59.3	26 96	95.1	37 07.0	25 96	94.5	37 14.5	25 96	93.9	37 21.8	24 96	93.3	37 28.9	23 96	92.7	37 35.9	23 97	92.1	3
4	35 45.8	27 96	96.0	35 53.8	26 96	95.4	36 01.6	26 96	94.8	36 09.2	25 96	94.2	36 16.7	25 96	93.6	36 23.9	24 96	93.0	36 31.0	23 97	92.4	36 38.0	23 97	91.8	4
55	34 48.1	27 96	95.6	34 56.0	26 96	95.1	35 03.8	26 96	94.5	35 11.4	25 96	93.9	35 18.8	24 96	93.3	35 26.1	24 96	92.7	35 33.1	23 97	92.1	35 40.0	23 97	91.5	55
6	33 50.4	27 96	95.3	33 58.3	26 96	94.7	34 06.0	25 96	94.2	34 13.6	25 96	93.6	34 20.9	24 96	93.0	34 28.2	24 97	92.4	34 35.2	23 97	91.8	34 42.1	23 97	91.2	6
7	32 52.7	26 96	95.0	33 00.5	26 96	94.4	33 08.2	25 96	93.9	33 15.7	25 96	93.3	33 23.1	24 96	92.7	33 30.3	24 97	92.1	33 37.3	23 97	91.5	33 44.1	23 97	90.9	7
8	31 54.9	26 96	94.7	32 02.7	26 96	94.1	32 10.4	25 96	93.6	32 17.8	25 96	93.0	32 25.2	24 97	92.4	32 32.3	24 97	91.8	32 39.3	23 97	91.3	32 46.2	23 97	90.7	8
9	30 57.2	26 96	94.4	31 04.9	26 96	93.8	31 12.5	25 96	93.3	31 20.0	25 96	92.7	31 27.3	24 97	92.1	31 34.4	24 97	91.6	31 41.4	23 97	91.0	31 48.2	23 97	90.4	9
60	29 59.4	26 96	94.1	30 07.1	25 96	93.5	30 14.6	25 96	93.0	30 22.1	24 96	92.4	30 29.3	24 97	91.8	30 36.5	24 97	91.3	30 43.4	23 97	90.7	30 50.3	23 97	90.1	60
1	29 01.5	26 96	93.8	29 09.2	25 96	93.2	29 16.8	25 96	92.7	29 24.1	24 97	92.1	29 31.4	24 97	91.6	29 38.5	23 97	91.0	29 45.5	23 97	90.5	29 52.3	23 97	89.9	1
2	28 03.7	26 96	93.5	28 11.3	25 96	92.9	28 18.9	25 96	92.4	28 26.2	24 97	91.8	28 33.5	24 97	91.3	28 40.6	23 97	90.7	28 47.5	23 97	90.2	28 54.4	23 97	89.6	2
3	27 05.9	26 96	93.2	27 13.5	25 96	92.7	27 20.9	25 97	92.1	27 28.3	24 97	91.6	27 35.5	24 97	91.0	27 42.6	23 97	90.5	27 49.6	23 97	89.9	27 56.4	23 97	89.4	3
4	26 08.0	25 96	92.9	26 15.6	25 97	92.4	26 23.0	25 97	91.8	26 30.4	24 97	91.3	26 37.6	24 97	90.8	26 44.7	23 97	90.2	26 51.6	23 97	89.7	26 58.5	23 97	89.1	4
65	25 10.1	25 96	92.6	25 17.7	25 97	92.1	25 25.1	25 97	91.6	25 32.4	24 97	91.0	25 39.6	24 97	90.5	25 46.7	23 97	90.0	25 53.7	23 97	89.4	26 00.5	23 97	88.9	65
6	24 12.2	25 97	92.4	24 19.7	25 97	91.8	24 27.2	25 97	91.3	24 34.5	24 97	90.8	24 41.7	24 97	90.2	24 48.8	23 97	89.7	24 55.7	23 97	89.2	25 02.6	23 97	88.6	6
7	23 14.3	25 97	92.1	23 21.8	25 97	91.6	23 29.2	25 97	91.0	23 36.5	24 97	90.5	23 43.7	24 97	90.0	23 50.8	23 97	89.4	23 57.8	23 97	88.9	24 04.6	23 97	88.4	7
8	22 16.4	25 97	91.8	22 23.9	25 97	91.3	22 31.3	24 97	90.8	22 38.6	24 97	90.2	22 45.8	24 97	89.7	22 52.8	23 97	89.2	22 59.8	23 97	88.7	23 06.7	23 97	88.1	8
9	21 18.4	25 97	91.5	21 25.9	25 97	91.0	21 33.3	24 97	90.5	21 40.6	24 97	90.0	21 47.8	24 97	89.5	21 54.9	23 97	88.9	22 01.9	23 97	88.4	22 08.8	23 97	87.9	9
70	20 20.5	25 97	91.3	20 28.0	25 97	90.8	20 35.4	24 97	90.2	20 42.7	24 97	89.7	20 49.9	24 97	89.2	20 57.0	24 97	88.7	21 04.0	23 97	88.2	21 10.9	23 96	87.6	70
1	19 22.5	25 97	91.0	19 30.0	25 97	90.5	19 37.4	24 97	90.0	19 44.7	24 97	89.5	19 51.9	24 97	89.0	19 59.0	24 97	88.4	20 06.0	23 97	87.9	20 13.0	23 96	87.4	1
2	18 24.6	25 97	90.7	18 32.1	25 97	90.2	18 39.4	24 97	89.7	18 46.7	24 97	89.2	18 54.0	24 97	88.7	19 01.1	24 97	88.2	19 08.1	23 96	87.7	19 15.1	23 96	87.2	2
3	17 26.6	25 97	90.5	17 34.1	25 97	90.0	17 41.5	24 97	89.5	17 48.8	24 97	89.0	17 56.0	24 97	88.5	18 03.2	24 97	87.9	18 10.2	23 96	87.4	18 17.2	23 96	86.9	3
4	16 28.7	25 97	90.2	16 36.2	25 97	89.7	16 43.5	24 97	89.2	16 50.9	24 97	88.7	16 58.1	24 97	88.2	17 05.3	24 96	87.7	17 12.3	23 96	87.2	17 19.4	23 96	86.7	4
75	15 30.7	25 97	90.0	15 38.2	25 97	89.5	15 45.6	25 97	89.0	15 52.9	24 97	88.5	16 00.2	24 97	88.0	16 07.4	24 96	87.4	16 14.5	24 96	86.9	16 21.5	23 96	86.4	75
6	14 32.8	25 97	89.7	14 40.2	25 97	89.2	14 47.6	25 97	88.7	14 55.0	24 97	88.2	15 02.3	24 96	87.7	15 09.5	24 96	87.2	15 16.6	24 96	86.7	15 23.7	23 96	86.2	6
7	13 34.8	25 97	89.5	13 42.3	25 97	89.0	13 49.7	25 97	88.5	13 57.1	24 97	88.0	14 04.4	24 96	87.5	14 11.6	24 96	87.0	14 18.7	24 96	86.5	14 25.8	24 96	86.0	7
8	12 36.9	25 97	89.2	12 44.4	25 97	88.7	12 51.8	25 97	88.2	12 59.1	24 96	87.7	13 06.5	24 96	87.2	13 13.7	24 96	86.7	13 20.9	24 96	86.2	13 28.0	24 96	85.7	8
9	11 38.9	25 97	88.9	11 46.4	25 97	88.4	11 53.9	25 97	88.0	12 01.2	25 96	87.5	12 08.6	24 96	87.0	12 15.9	24 96	86.5	12 23.1	24 96	86.0	12 30.3	24 96	85.5	9
80	10 41.0	25 97	88.7	10 48.5	25 97	88.2	10 55.9	25 97	87.7	11 03.4	25 96	87.2	11 10.7	24 96	86.7	11 18.0	24 96	86.2	11 25.3	24 96	85.7	11 32.5	24 96	85.2	80
1	9 43.0	25 97	88.4	9 50.6	25 97	87.9	9 58.0	25 96	87.4	10 05.5	25 96	87.0	10 12.9	25 96	86.5	10 20.2	24 96	86.0	10 27.5	24 96	85.5	10 34.8	24 96	85.0	1
2	8 45.1	25 97	88.2	8 52.7	25 96	87.7	9 00.1	25 96	87.2	9 07.6	25 96	86.7	9 15.0	25 96	86.2	9 22.4	25 96	85.7	9 29.7	24 96	85.2	9 37.0	24 96	84.7	2
3	7 47.2	25 97	87.9	7 54.7	25 96	87.4	8 02.3	25 96	86.9	8 09.8	25 96	86.5	8 17.2	25 96	86.0	8 24.6	25 96	85.5	8 32.0	25 96	85.0	8 39.3	24 96	84.5	3
4	6 49.3	25 96	87.7	6 56.9	25 96	87.2	7 04.4	25 96	86.7	7 11.9	25 96	86.2	7 19.4	25 96	85.7	7 26.8	25 96	85.2	7 34.3	25 96	84.7	7 41.7	25 96	84.3	4
85	5 51.4	25 96	87.4	5 59.0	25 96	86.9	6 06.6	25 96	86.4	6 14.1	25 96	86.0	6 21.6	25 96	85.5	6 29.1	25 96	85.0	6 36.6	25 96	84.5	6 44.0	25 96	84.0	85
6				5 01.1	25 96	86.7	5 08.7	25 96	86.2	5 16.3	25 96	85.7	5 23.8	25 96	85.2	5 31.4	25 96	84.7	5 38.9	25 96	84.2	5 46.4	25 96	83.8	6

H.A.	4° 00′				4° 30′				5° 00′				5° 30′				6° 00′				6° 30′				7° 00′				7° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	71 00.0	1.0	03	180.0	70 30.0	1.0	03	180.0	70 00.0	1.0	02	180.0	69 30.0	1.0	02	180.0	69 00.0	1.0	02	180.0	68 30.0	1.0	02	180.0	68 00.0	1.0	02	180.0	67 30.0	1.0	02	180.0	00
1	70 58.5	1.0	08	176.9	70 28.5	1.0	08	177.0	69 58.5	1.0	07	177.1	69 28.6	1.0	07	177.2	68 58.6	1.0	07	177.2	68 28.6	1.0	07	177.3	67 58.7	1.0	07	177.4	67 28.7	1.0	07	177.4	1
2	70 53.8	99	13	173.9	70 24.0	99	12	174.0	69 54.1	1.0	12	174.2	69 24.3	1.0	12	174.3	68 54.4	1.0	12	174.5	68 24.5	1.0	11	174.6	67 54.6	1.0	11	174.7	67 24.8	1.0	11	174.8	2
3	70 46.1	99	18	170.9	70 16.5	99	17	171.1	69 46.8	99	17	171.3	69 17.1	99	17	171.5	68 47.4	99	16	171.7	68 17.7	99	16	171.9	67 48.0	99	15	172.1	67 18.3	99	15	172.3	3
4	70 35.5	98	23	167.9	70 06.1	98	22	168.2	69 36.7	98	22	168.5	69 07.2	98	21	168.8	68 37.7	98	21	169.0	68 08.2	98	20	169.3	67 38.7	98	20	169.5	67 09.2	98	19	169.7	4
05	70 21.9	97	27	165.0	69 52.8	97	27	165.4	69 23.7	97	26	165.7	68 54.6	97	25	166.0	68 25.4	97	25	166.4	67 56.2	97	24	166.7	67 26.9	98	24	167.0	66 57.6	98	23	167.2	05
6	70 05.5	96	32	162.2	69 36.8	96	31	162.6	69 08.1	96	30	163.0	68 39.3	96	30	163.4	68 10.4	96	29	163.8	67 41.6	96	28	164.1	67 12.6	97	28	164.5	66 43.6	97	27	164.8	6
7	69 46.4	94	36	159.4	69 18.2	94	35	159.9	68 49.9	95	34	160.4	68 21.5	95	34	160.8	67 53.0	95	33	161.2	67 24.5	95	32	161.6	66 55.9	95	32	162.0	66 27.3	96	31	162.4	7
8	69 24.8	92	40	156.7	68 57.0	93	39	157.3	68 29.2	93	38	157.8	68 01.2	93	38	158.3	67 33.2	94	37	158.7	67 05.0	94	36	159.2	66 36.9	94	35	159.6	66 08.6	94	35	160.1	8
9	69 00.7	91	44	154.2	68 33.5	91	43	154.7	68 06.1	91	42	155.3	67 38.6	92	41	155.8	67 11.0	92	41	156.3	66 43.4	92	40	156.8	66 15.6	93	39	157.3	65 47.7	93	38	157.8	9
10	68 34.3	89	48	151.7	68 07.6	89	47	152.3	67 40.8	90	46	152.9	67 13.8	90	45	153.5	66 46.7	91	44	154.0	66 19.5	91	43	154.6	65 52.2	91	42	155.1	65 24.8	92	42	155.6	10
1	68 05.8	87	51	149.3	67 39.6	87	50	150.0	67 13.3	88	49	150.6	66 46.9	88	48	151.2	66 20.3	89	47	151.8	65 53.6	89	46	152.3	65 26.8	90	46	152.9	64 59.8	90	45	153.4	1
2	67 35.2	85	54	147.0	67 09.7	86	53	147.7	66 43.9	86	52	148.4	66 18.0	87	51	149.0	65 51.9	87	50	149.6	65 25.7	88	50	150.2	64 59.4	88	49	150.8	64 32.9	88	48	151.3	2
3	67 02.8	83	57	144.9	66 37.8	84	56	145.6	66 12.6	84	55	146.3	65 47.2	85	54	146.9	65 21.7	85	53	147.5	64 56.0	86	52	148.2	64 30.2	86	52	148.8	64 04.2	87	51	149.3	3
4	66 28.6	81	60	142.8	66 04.2	82	59	143.5	65 39.6	82	58	144.2	65 14.7	83	57	144.9	64 49.8	84	56	145.5	64 24.6	84	55	146.2	63 59.3	85	54	146.8	63 33.8	85	53	147.4	4
15	65 52.8	79	62	140.8	65 28.9	80	61	141.6	65 04.9	80	60	142.3	64 40.6	81	59	143.0	64 16.2	82	59	143.6	63 51.6	82	58	144.3	63 26.8	83	57	144.9	63 01.8	83	56	145.5	15
6	65 15.4	77	65	138.9	64 52.1	78	64	139.7	64 28.7	79	63	140.4	64 05.0	79	62	141.1	63 41.1	80	61	141.8	63 17.0	81	60	142.5	62 52.7	81	59	143.1	62 28.3	82	58	143.8	6
7	64 36.6	75	67	137.1	64 13.9	76	66	137.9	63 51.0	77	65	138.6	63 27.9	77	64	139.4	63 04.5	78	63	140.0	62 41.0	79	62	140.7	62 17.2	79	61	141.4	61 53.3	80	60	142.0	7
8	63 56.6	73	69	135.4	63 34.5	74	68	136.2	63 12.1	75	67	136.9	62 49.5	76	66	137.7	62 26.7	76	65	138.4	62 03.7	77	64	139.1	61 40.4	78	63	139.7	61 17.0	78	63	140.4	8
9	63 15.3	72	71	133.8	62 53.7	72	70	134.6	62 31.9	73	69	135.3	62 09.9	74	68	136.0	61 47.6	75	67	136.8	61 25.1	75	66	137.5	61 02.4	76	65	138.1	60 39.4	77	65	138.8	9
20	62 33.0	70	72	132.3	62 11.9	71	71	133.0	61 50.6	71	71	133.8	61 29.1	72	70	134.5	61 07.3	73	69	135.2	60 45.3	74	68	135.9	60 23.1	74	67	136.6	60 00.7	75	66	137.3	20
1	61 49.6	68	74	130.8	61 29.0	69	73	131.6	61 08.2	70	72	132.3	60 47.2	70	71	133.0	60 26.0	71	71	133.8	60 04.5	72	70	134.5	59 42.8	73	69	135.1	59 20.8	73	68	135.8	1
2	61 05.2	66	75	129.4	60 45.2	67	75	130.1	60 24.9	68	74	130.9	60 04.4	69	73	131.6	59 43.6	70	72	132.4	59 22.6	70	71	133.1	59 01.4	71	71	133.7	58 39.9	72	70	134.4	2
3	60 20.0	65	77	128.0	60 00.5	66	76	128.8	59 40.7	66	75	129.6	59 20.6	67	74	130.3	59 00.3	68	74	131.0	58 39.8	69	73	131.7	58 19.0	70	72	132.4	57 58.1	70	71	133.1	3
4	59 34.0	63	78	126.8	59 14.9	64	77	127.5	58 55.6	65	76	128.3	58 36.0	66	76	129.0	58 16.2	66	75	129.7	57 56.1	67	74	130.4	57 35.8	68	73	131.1	57 15.3	69	73	131.8	4
25	58 47.2	62	79	125.6	58 28.6	62	78	126.3	58 09.7	63	78	127.1	57 50.6	64	77	127.8	57 31.2	65	76	128.5	57 11.6	66	75	129.2	56 51.7	67	75	129.9	56 31.7	67	74	130.6	25
6	57 59.7	60	80	124.4	57 41.5	61	80	125.1	57 23.1	62	79	125.9	57 04.4	63	78	126.6	56 45.5	64	77	127.3	56 26.3	64	77	128.0	56 06.9	65	76	128.7	55 47.3	66	75	129.4	6
7	57 11.5	59	81	123.3	56 53.8	60	81	124.0	56 35.8	60	80	124.8	56 17.5	61	79	125.5	55 59.0	62	78	126.2	55 40.3	63	78	126.9	55 21.3	64	77	127.6	55 02.1	64	76	128.2	7
8	56 22.8	57	82	122.2	56 05.5	58	82	123.0	55 47.9	59	81	123.7	55 30.0	60	80	124.4	55 11.9	61	80	125.1	54 53.6	62	79	125.8	54 35.0	62	78	126.5	54 16.2	63	78	127.1	8
9	55 33.5	56	83	121.2	55 16.6	57	82	122.0	54 59.4	58	82	122.7	54 41.9	59	81	123.4	54 24.2	59	80	124.1	54 06.3	60	80	124.8	53 48.1	61	79	125.4	53 29.7	62	79	126.1	9
30	54 43.7	55	84	120.3	54 27.1	56	83	121.0	54 10.3	57	83	121.7	53 53.2	57	82	122.4	53 35.9	58	81	123.1	53 18.4	59	81	123.8	53 00.6	60	80	124.4	52 42.6	60	80	125.1	30
1	53 53.4	54	85	119.3	53 37.2	54	84	120.0	53 20.7	55	83	120.7	53 04.0	56	83	121.4	52 47.1	57	82	122.1	52 29.9	58	82	122.8	52 12.5	58	81	123.5	51 54.9	59	80	124.1	1
2	53 02.7	52	85	118.4	52 46.8	53	85	119.1	52 30.7	54	84	119.8	52 14.4	55	84	120.5	51 57.8	56	83	121.2	51 40.9	56	82	121.9	51 23.9	57	82	122.5	51 06.6	58	81	123.2	2
3	52 11.5	51	86	117.6	51 56.0	52	85	118.3	51 40.2	53	85	119.0	51 24.2	54	84	119.7	51 08.0	55	84	120.3	50 51.5	55	83	121.0	50 34.8	56	83	121.6	50 17.9	57	82	122.3	3
4	51 19.9	50	87	116.8	51 04.7	51	86	117.5	50 49.3	52	86	118.1	50 33.6	53	85	118.8	50 17.7	53	84	119.5	50 01.6	54	84	120.1	49 45.2	55	83	120.8	49 28.7	56	83	121.4	4
35	50 28.0	49	87	116.0	50 13.1	50	87	116.7	49 58.0	51	86	117.3	49 42.6	52	86	118.0	49 27.1	52	85	118.7	49 11.3	53	85	119.3	48 55.2	54	84	120.0	48 39.0	54	83	120.6	35
6	49 35.8	48	88	115.2	49 21.2	49	87	115.9	49 06.3	50	87	116.6	48 51.3	51	86	117.2	48 36.0	51	86	117.9	48 20.5	52	85	118.5	48 04.8	53	85	119.2	47 48.9	53	84	119.8	6
7	48 43.2	47	88	114.5	48 28.9	48	88	115.2	48 14.3	49	87	115.8	47 59.6	50	87	116.5	47 44.6	50	86	117.1	47 29.4	51	86	117.8	47 14.0	52	85	118.4	46 58.4	52	85	119.0	7
8	47 50.3	46	89	113.8	47 36.3	47	88	114.5	47 22.0	48	88	115.1	47 07.5	49	87	115.8	46 52.9	49	87	116.4	46 38.0	50	86	117.0	46 22.9	51	86	117.7	46 07.6	51	85	118.3	8
9	46 57.1	45	89	113.1	46 43.4	46	89	113.8	46 29.4	47	88	114.4	46 15.2	48	88	115.1	46 00.8	48	87	115.7	45 46.2	49	87	116.3	45 31.4	50	86	116.9	45 16.3	50	86	117.6	9
40	46 03.7	45	89	112.5	45 50.2	45	89	113.1	45 36.5	46	89	113.7	45 22.5	47	88	114.4	45 08.4	47	88	115.0	44 54.1	48	87	115.6	44 39.5	49	87	116.2	44 24.8	49	86	116.9	40
1	45 10.0	44	90	111.8	44 56.8	45	89	112.5	44 43.3	45	89	113.1	44 29.6	46	89	113.7	44 15.7	47	88	114.3	44 01.7	47	88	115.0	43 47.4	48	87	115.6	43 32.9	49	87	116.2	1
2	44 16.1	43	90	111.2	44 03.1	44	90	111.9	43 49.9	44	89	112.5	43 36.4	45	89	113.1	43 22.8	46	89	113.7	43 09.0	46	88	114.3	42 55.0	47	88	114.9	42 40.8	48	87	115.5	2
3	43 22.0	42	91	110.6	43 09.2	43	90	111.3	42 56.2	44	90	111.9	42 43.0	44	89	112.5	42 29.6	45	89	113.1	42 16.1	46	89	113.7	42 02.3	46	88	114.3	41 48.3	47	88	114.9	3
4	42 27.6	42	91	110.1	42 15.1	42	91	110.7	42 02.3	43	90	111.3	41 49.3	44	90	111.9	41 36.2	44	89	112.5	41 22.9	45	89	113.1	41 09.3	45	89	113.7	40 55.6	46	88	114.3	4
45	41 33.1	41	91	109.5	41 20.7	42	91	110.1	41 08.2	42	91	110.7	40 55.5	43	90	111.3	40 42.5	43	90	111.9	40 29.4	44	89	112.5	40 16.2	45	89	113.1	40 02.7	45	89	113.7	45
6	40 38.4	40	92	109.0	40 26.2	41	91	109.6	40 13.9	41	91	110.2	40 01.4	42	90	110.8	39 48.7	43	90	111.4	39 35.8	43	90	111.9	39 22.7	44	89	112.5	39 09.5	44	89	113.1	6
7	39 43.5	40	92	108.5	39 31.5	40	91	109.0	39 19.4	41	91	109.6	39 07.1	41	91	110.2	38 54.6	42	90	110.8	38 41.9	43	90	111.4	38 29.1	43	90	112.0	38 16.1	44	89	112.6	7
8	38 48.4	39	92	107.9	38 36.7	40	92	108.5	38 24.7	40	91	109.1	38 12.6	41	91	109.7	38 00.3	41	91	110.3	37 47.9	42	90	110.9	37 35.2	42	90	111.4	37 22.5	43	90	112.0	8
9	37 53.2	38	92	107.5	37 41.6	39	92	108.0	37 29.9	39	92	108.6	37 18.0	40	91	109.2	37 05.9	41	91	109.8	36 53.6	41	91	110.3	36 41.2	42	90	110.9	36 28.6	42	90	111.5	9
50	36 57.9	38	92	107.0	36 46.5	38	92	107.6	36 34.9	39	92	108.1	36 23.2	39	92	108.7	36 11.3	40	91	109.3	35 59.2	40	91	109.8	35 47.0	41	91	110.4	35 34.6	42	90	111.0	50
1	36 02.4	37	93	106.5	35 51.1	38	92	107.1	35 39.7	38	92	107.7	35 28.2	39	92	108.2	35 16.5	39	92	108.8	35 04.6	40	91	109.4	34 52.6	40	91	109.9	34 40.4	41	91	110.5	1
2	35 06.7	37	93	106.1	34 55.7	37	93	106.6	34 44.4	38	92	107.2	34 33.1	38	92	107.8	34 21.5	39	92	108.3	34 09.8	39	92	108.9	33 58.0	40	91	109.4	33 46.0	40	91	110.0	2
3	34 11.0	36	93	105.6	34 00.1	37	93	106.2	33 49.0	37	93	106.7	33 37.8	38	92	107.3	33 26.4	38	92	107.9	33 14.9	39	92	108.4	33 03.3	39	91	109.0	32 51.5	40	91	109.5	3
4	33 15.1	36	93	105.2	33 04.4	36	93	105.7	32 53.4	37	93	106.3	32 42.4	37	93	106.9	32 31.2	38	92	107.4	32 19.9	38	92	108.0	32 08.4	39	92	108.5	31 56.7	39	91	109.0	4
55	32 19.1	35	93	104.8	32 08.5	36	93	105.3	31 57.8	36	93	105.9	31 46.9	37	93	106.4	31 35.8	37	92	107.0	31 24.7	37	92	107.5	31 13.3	38	92	108.1	31 01.9	38	92	108.6	55
6	31 23.0	35	94	104.4	31 12.6	35	93	104.9	31 02.0	36	93	105.5	30 51.2	36	93	106.0	30 40.3	36	93	106.5	30 29.3	37	92	107.1	30 18.2	37	92	107.6	30 06.9	38	92	108.2	6
7	30 26.8	34	94	104.0	30 16.5	35	94	104.5	30 06.0	35	93	105.0	29 55.4	36	93	105.6	29 44.7	36	93	106.1	29 33.9	36	93	106.7	29 22.9	37	92	107.2	29 11.8	37	92	107.7	7
8	29 30.5	34	94	103.6	29 20.3	34	94	104.1	29 10.0	35	94	104.6	28 59.6	35	93	105.2	28 49.0	35	93	105.7	28 38.3	36	93	106.3	28 27.4	36	93	106.8	28 16.5	37	92	107.3	8
9	28 34.2	33	94	103.2	28 24.1	34	94	103.7	28 13.9	34	94	104.3	28 03.6	35	93	104.8	27 53.1	35	93	105.3	27 42.6	35	93	105.8	27 31.9	36	93	106.4	27 21.1	36	93	106.9	9
60	27 37.7	33	94	102.8	27 27.7	33	94	103.3	27 17.7	34	94	103.9	27 07.5	34	94	104.4	26 57.2	35	93	104.9	26 46.8	35	93	105.5	26 36.2	35	93	106.0	26 25.6	36	93	106.5	60
1	26 41.1	33	94	102.4	26 31.3	33	94	103.0	26 21.4	33	94	103.5	26 11.3	34	94	104.0	26 01.1	34	94	104.5	25 50.9	34	93	105.1	25 40.5	35	93	105.6	25 30.0	35	93	106.1	1
2	25 44.5	32	94	102.1	25 34.8	33	94	102.6	25 25.0	33	94	103.1	25 15.0	33	94	103.7	25 05.0	34	94	104.2	24 54.9	34	94	104.7	24 44.6	34	93	105.2	24 34.2	35	93	105.7	2
3	24 47.8	32	95	101.7	24 38.2	32	94	102.3	24 28.5	33	94	102.8	24 18.7	33	94	103.3	24 08.8	33	94	103.8	23 58.7	34	94	104.3	23 48.6	34	93	104.8	23 38.4	34	93	105.4	3
4	23 51.0	31	95	101.4	23 41.5	32	95	101.9	23 31.9	32	94	102.4	23 22.2	32	94	102.9	23 12.4	33	94	103.5	23 02.5	33	94	104.0	22 52.6	33	94	104.5	22 42.5	34	93	105.0	4
65	22 54.2	31	95	101.0	22 44.8	31	95	101.6	22 35.3	32	95	102.1	22 25.7	32	94	102.6	22 16.0	32	94	103.1	22 06.3	33	94	103.6	21 56.4	33	94	104.1	21 46.4	33	94	104.6	65
6	21 57.3	31	95	100.7	21 48.0	31	95	101.2	21 38.6	31	95	101.7	21 29.1	32	94	102.2	21 19.5	32	94	102.8	21 09.9	32	94	103.3	21 00.1	33	94	103.8	20 50.3	33	94	104.3	6
7	21 00.3	30	96	100.4	20 51.1	31	95	100.9	20 41.8	31	95	101.4	20 32.4	31	95	101.9	20 23.0	32	94	102.4	20 13.4	32	94	102.9	20 03.8	32	94	103.4	19 54.1	33	94	103.9	7
8	20 03.2	30	95	100.1	19 54.1	30	95	100.6	19 45.0	31	95	101.1	19 35.7	31	95	101.6	19 26.4	31	94	102.1	19 16.9	32	94	102.6	19 07.4	32	94	103.1	18 57.8	32	94	103.6	8
9	19 06.2	30	95	99.7	18 57.1	30	95	100.2	18 48.1	30	95	100.8	18 38.9	31	95	101.3	18 29.6	31	95	101.8	18 20.3	31	94	102.3	18 10.9	31	94	102.8	18 01.4	32	94	103.3	9
70	18 09.0	30	95	99.4	18 00.1	30	95	99.9	17 51.1	30	95	100.4	17 42.0	30	95	100.9	17 32.9	31	95	101.4	17 23.6	31	95	101.9	17 14.4	31	94	102.4	17 05.0	31	94	102.9	70
1	17 11.8	29	96	99.1	17 03.0	30	95	99.6	16 54.1	30	95	100.1	16 45.1	30	95	100.6	16 36.0	30	95	101.1	16 26.9	31	95	101.6	16 17.7	31	94	102.1	16 08.5	31	94	102.6	1
2	16 14.6	29	96	98.8	16 05.8	29	95	99.3	15 57.0	30	95	99.8	15 48.1	30	95	100.3	15 39.1	30	95	100.8	15 30.1	30	95	101.3	15 21.0	30	95	101.8	15 11.9	31	94	102.3	2
3	15 17.3	29	96	98.5	15 08.6	29	95	99.0	14 59.9	29	95	99.5	14 51.0	29	95	100.0	14 42.2	30	95	100.5	14 33.2	30	95	101.0	14 24.3	30	95	101.5	14 15.2	30	95	102.0	3
4	14 19.9	29	96	98.2	14 11.3	29	96	98.7	14 02.7	29	95	99.2	13 53.9	29	95	99.7	13 45.2	29	95	100.2	13 36.3	30	95	100.7	13 27.4	30	95	101.2	13 18.5	30	95	101.7	4
75	13 22.5	28	96	97.9	13 14.0	29	96	98.4	13 05.4	29	95	98.9	12 56.8	29	95	99.4	12 48.1	29	95	99.9	12 39.3	29	95	100.4	12 30.5	29	95	100.9	12 21.7	30	95	101.4	75
6	12 25.1	28	96	97.6	12 16.7	28	96	98.1	12 08.2	28	96	98.6	11 59.6	29	95	99.1	11 51.0	29	95	99.6	11 42.3	29	95	100.1	11 33.6	29	95	100.6	11 24.8	29	95	101.1	6
7	11 27.7	28	96	97.4	11 19.3	28	96	97.8	11 10.8	28	96	98.3	11 02.3	28	96	98.8	10 53.8	29	95	99.3	10 45.2	29	95	99.8	10 36.6	29	95	100.3	10 27.9	29	95	100.8	7
8	10 30.2	28	96	97.1	10 21.8	28	96	97.6	10 13.5	28	96	98.0	10 05.1	28	96	98.5	9 56.6	28	95	99.0	9 48.1	28	95	99.5	9 39.6	29	95	100.0	9 31.0	29	95	100.5	8
9	9 32.6	27	96	96.8	9 24.4	28	96	97.3	9 16.1	28	96	97.8	9 07.7	28	96	98.3	8 59.3	28	96	98.7	8 50.9	28	95	99.2	8 42.5	28	95	99.7	8 34.0	28	95	100.2	9
80	8 35.1	27	96	96.5	8 26.9	27	96	97.0	8 18.6	28	96	97.5	8 10.3	28	96	98.0	8 02.0	28	96	98.5	7 53.7	28	95	98.9	7 45.3	28	95	99.4	7 36.9	28	95	99.9	80
1	7 37.5	27	96	96.2	7 29.3	27	96	96.7	7 21.1	27	96	97.2	7 12.9	27	96	97.7	7 04.7	28	96	98.2	6 56.4	28	96	98.7	6 48.1	28	95	99.2	6 39.8	28	95	99.6	1
2	6 39.8	27	96	96.0	6 31.8	27	96	96.5	6 23.6	27	96	96.9	6 15.5	27	96	97.4	6 07.3	27	96	97.9	5 59.1	27	96	98.4	5 50.9	27	95	98.9	5 42.6	28	95	99.4	2
3	5 42.2	27	96	95.7	5 34.1	27	96	96.2	5 26.1	27	96	96.7	5 18.0	27	96	97.2	5 09.9	27	96	97.6	5 01.7	27	96	98.1									3

Lat. 15°

H.A.	8° 00′			8° 30′			9° 00′			9° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	83 00.0	1.0 07	180.0	83 30.0	1.0 07	180.0	84 00.0	1.0 08	180.0	84 30.0	1.0 09	180.0
1	82 55.9	99 20	171.9	83 25.6	99 22	171.3	83 55.2	99 23	170.6	84 24.8	98 25	169.8
2	82 43.9	96 32	164.1	83 12.7	96 34	163.0	83 41.4	95 37	161.7	84 09.8	94 40	160.2
3	82 24.5	92 43	156.9	82 52.1	91 46	155.4	83 19.3	90 48	153.6	83 46.1	88 51	151.6
4	81 58.7	88 52	150.3	82 24.8	86 55	148.5	82 50.3	84 58	146.5	83 15.2	82 61	144.2
05	81 27.5	82 60	144.5	81 51.9	80 62	142.5	82 15.7	78 65	140.3	82 38.7	75 68	137.8
6	80 51.7	77 66	139.3	81 14.5	75 68	137.2	81 36.6	72 71	135.0	81 57.8	69 74	132.5
7	80 12.2	72 71	134.8	80 33.5	70 73	132.7	80 53.9	67 76	130.4	81 13.5	64 78	128.0
8	79 29.7	68 75	130.9	79 49.5	65 77	128.8	80 08.6	62 79	126.6	80 26.7	59 81	124.2
9	78 44.7	63 78	127.5	79 03.3	61 80	125.4	79 21.0	58 82	123.3	79 37.8	54 84	121.0
10	77 57.8	59 81	124.5	78 15.2	57 83	122.5	78 31.8	54 84	120.4	78 47.4	51 86	118.2
1	77 09.3	56 83	121.8	77 25.6	53 85	119.9	77 41.2	50 86	117.9	77 55.8	47 88	115.8
2	76 19.4	53 85	119.5	76 34.8	50 86	117.6	76 49.4	47 88	115.7	77 03.2	44 89	113.8
3	75 28.4	50 86	117.4	75 43.0	47 88	115.6	75 56.8	45 89	113.8	76 09.8	42 90	111.9
4	74 36.5	47 88	115.5	74 50.3	45 89	113.8	75 03.4	42 90	112.1	75 15.7	40 91	110.3
15	73 43.8	45 89	113.8	73 57.0	43 90	112.2	74 09.4	40 91	110.5	74 21.1	38 92	108.8
6	72 50.5	43 90	112.3	73 03.1	41 91	110.8	73 14.9	38 92	109.2	73 26.0	36 92	107.5
7	71 56.6	41 91	110.9	72 08.6	39 91	109.4	72 20.0	37 92	107.9	72 30.6	34 93	106.4
8	71 02.2	40 91	109.7	71 13.8	37 92	108.2	71 24.6	35 93	106.8	71 34.8	33 93	105.3
9	70 07.5	38 92	108.5	70 18.6	36 93	107.1	70 29.0	34 93	105.7	70 38.8	32 94	104.3
20	69 12.3	37 92	107.4	69 23.0	35 93	106.1	69 33.1	33 94	104.8	69 42.5	30 94	103.4
1	68 16.9	35 93	106.5	68 27.2	33 93	105.2	68 36.9	31 94	103.9	68 46.1	29 94	102.6
2	67 21.2	34 93	105.5	67 31.2	32 94	104.3	67 40.6	30 94	103.1	67 49.4	28 95	101.8
3	66 25.2	33 94	104.7	66 34.9	31 94	103.5	66 44.0	30 94	102.3	66 52.6	28 95	101.1
4	65 29.1	32 94	103.9	65 38.5	30 94	102.8	65 47.3	29 95	101.6	65 55.7	27 95	100.4
25	64 32.7	31 94	103.2	64 41.9	30 95	102.0	64 50.5	28 95	100.9	64 58.6	26 95	99.8
6	63 36.2	30 94	102.5	63 45.1	29 95	101.4	63 53.5	27 95	100.3	64 01.5	26 95	99.2
7	62 39.6	30 95	101.8	62 48.2	28 95	100.8	62 56.5	27 95	99.7	63 04.2	25 96	98.6
8	61 42.8	29 95	101.2	61 51.3	28 95	100.2	61 59.3	26 95	99.1	62 06.9	24 96	98.1
9	60 45.8	28 95	100.6	60 54.2	27 95	99.6	61 02.0	25 96	98.6	61 09.4	24 96	97.6
30	59 48.8	28 95	100.0	59 57.0	26 95	99.1	60 04.7	25 96	98.1	60 12.0	24 96	97.1
1	58 51.7	27 95	99.5	58 59.7	26 96	98.6	59 07.3	25 96	97.6	59 14.4	23 96	96.7
2	57 54.5	27 95	99.0	58 02.3	25 96	98.1	58 09.8	24 96	97.2	58 16.8	23 96	96.2
3	56 57.2	26 96	98.5	57 04.9	25 96	97.6	57 12.3	24 96	96.7	57 19.2	23 96	95.8
4	55 59.9	26 96	98.0	56 07.5	25 96	97.2	56 14.7	23 96	96.3	56 21.5	22 96	95.4
35	55 02.4	26 96	97.6	55 09.9	24 96	96.7	55 17.0	23 96	95.9	55 23.8	22 96	95.0
6	54 05.0	25 96	97.1	54 12.3	24 96	96.3	54 19.4	23 96	95.5	54 26.1	22 96	94.6
7	53 07.4	25 96	96.7	53 14.7	24 96	95.9	53 21.7	23 96	95.1	53 28.3	21 96	94.3
8	52 09.9	25 96	96.3	52 17.1	23 96	95.5	52 23.9	22 96	94.7	52 30.5	21 96	93.9
9	51 12.2	24 96	95.9	51 19.4	23 96	95.2	51 26.2	22 96	94.4	51 32.7	21 96	93.6
40	50 14.6	24 96	95.6	50 21.6	23 96	94.8	50 28.4	22 96	94.0	50 34.8	21 96	93.3
1	49 16.9	24 96	95.2	49 23.8	23 96	94.4	49 30.5	22 96	93.7	49 36.9	21 96	92.9
2	48 19.1	24 96	94.8	48 26.1	23 96	94.1	48 32.7	22 96	93.4	48 39.0	21 96	92.6
3	47 21.4	23 96	94.5	47 28.2	22 96	93.8	47 34.8	22 96	93.0	47 41.1	21 96	92.3
4	46 23.6	23 96	94.2	46 30.4	22 96	93.4	46 36.9	21 96	92.7	46 43.2	21 97	92.0
45	45 25.8	23 96	93.8	45 32.5	22 96	93.1	45 39.0	21 97	92.4	45 45.3	20 97	91.7
6	44 27.9	23 96	93.5	44 34.7	22 96	92.8	44 41.1	21 97	92.1	44 47.4	20 97	91.4
7	43 30.1	23 96	93.2	43 36.8	22 97	92.5	43 43.2	21 97	91.8	43 49.4	20 97	91.2
8	42 32.2	23 96	92.9	42 38.9	22 97	92.2	42 45.3	21 97	91.6	42 51.5	20 97	90.9
9	41 34.3	22 96	92.6	41 40.9	22 97	91.9	41 47.3	21 97	91.3	41 53.5	20 97	90.6
50	40 36.4	22 97	92.3	40 43.0	22 97	91.6	40 49.4	21 97	91.0	40 55.6	20 97	90.4
1	39 38.5	22 97	92.0	39 45.1	22 97	91.4	39 51.5	21 97	90.7	39 57.6	20 97	90.1
2	38 40.6	22 97	91.7	38 47.1	22 97	91.1	38 53.5	21 97	90.5	38 59.7	20 97	89.8
3	37 42.6	22 97	91.4	37 49.2	22 97	90.8	37 55.5	21 97	90.2	38 01.7	20 97	89.6
4	36 44.7	22 97	91.2	36 51.2	22 97	90.6	36 57.6	21 97	89.9	37 03.8	20 97	89.3
55	35 46.7	22 97	90.9	35 53.3	21 97	90.3	35 59.6	21 97	89.7	36 05.8	20 97	89.1
6	34 48.8	22 97	90.6	34 55.3	21 97	90.0	35 01.7	21 97	89.4	35 07.9	20 97	88.8
7	33 50.8	22 97	90.4	33 57.4	21 97	89.8	34 03.7	21 97	89.2	34 09.9	20 97	88.6
8	32 52.9	22 97	90.1	32 59.4	21 97	89.5	33 05.8	21 97	88.9	33 12.0	20 97	88.3
9	31 54.9	22 97	89.8	32 01.5	22 97	89.3	32 07.8	21 97	88.7	32 14.1	20 97	88.1
60	30 57.0	22 97	89.6	31 03.5	22 97	89.0	31 09.9	21 97	88.4	31 16.1	21 96	87.9
1	29 59.0	22 97	89.3	30 05.6	22 97	88.8	30 12.0	21 97	88.2	30 18.2	21 96	87.6
2	29 01.1	22 97	89.1	29 07.6	22 97	88.5	29 14.0	21 97	88.0	29 20.3	21 96	87.4
3	28 03.1	22 97	88.8	28 09.7	22 97	88.3	28 16.1	21 96	87.7	28 22.4	21 96	87.2
4	27 05.2	22 97	88.6	27 11.8	22 97	88.0	27 18.2	21 96	87.5	27 24.6	21 96	86.9
65	26 07.3	22 97	88.3	26 13.9	22 96	87.8	26 20.3	21 96	87.2	26 26.7	21 96	86.7
6	25 09.3	22 97	88.1	25 15.9	22 96	87.6	25 22.5	21 96	87.0	25 28.8	21 96	86.5
7	24 11.4	22 96	87.8	24 18.0	22 96	87.3	24 24.6	22 96	86.8	24 31.0	21 96	86.2
8	23 13.5	22 96	87.6	23 20.2	22 96	87.1	23 26.7	22 96	86.5	23 33.2	21 96	86.0
9	22 15.6	22 96	87.4	22 22.3	22 96	86.8	22 28.9	22 96	86.3	22 35.4	21 96	85.8
70	21 17.7	23 96	87.1	21 24.4	22 96	86.6	21 31.1	22 96	86.1	21 37.6	22 96	85.6
1	20 19.8	23 96	86.9	20 26.6	22 96	86.4	20 33.2	22 96	85.8	20 39.8	22 96	85.3
2	19 22.0	23 96	86.6	19 28.8	22 96	86.1	19 35.4	22 96	85.6	19 42.1	22 96	85.1
3	18 24.1	23 96	86.4	18 30.9	23 96	85.9	18 37.7	22 96	85.4	18 44.3	22 96	84.9
4	17 26.3	23 96	86.2	17 33.1	23 96	85.7	17 39.9	22 96	85.1	17 46.6	22 96	84.6
75	16 28.5	23 96	85.9	16 35.4	23 96	85.4	16 42.2	23 96	84.9	16 48.9	22 96	84.4
6	15 30.7	23 96	85.7	15 37.6	23 96	85.2	15 44.5	23 96	84.7	15 51.3	23 96	84.2
7	14 32.9	23 96	85.5	14 39.9	23 96	84.9	14 46.8	23 96	84.4	14 53.6	23 96	83.9
8	13 35.1	23 96	85.2	13 42.1	23 96	84.7	13 49.1	23 96	84.2	13 56.0	23 96	83.7
9	12 37.4	24 96	85.0	12 44.4	23 96	84.5	12 51.4	23 96	84.0	12 58.4	23 96	83.5
80	11 39.7	24 96	84.7	11 46.8	24 96	84.2	11 53.8	23 96	83.7	12 00.8	23 96	83.2
1	10 42.0	24 96	84.5	10 49.1	24 96	84.0	10 56.2	24 96	83.5	11 03.3	23 96	83.0
2	9 44.3	24 96	84.2	9 51.5	24 96	83.8	9 58.7	24 96	83.3	10 05.8	24 96	82.8
3	8 46.6	24 96	84.0	8 53.9	24 96	83.5	9 01.1	24 96	83.0	9 08.3	24 96	82.5
4	7 49.0	24 96	83.8	7 56.3	24 96	83.3	8 03.6	24 96	82.8	8 10.9	24 96	82.3
85	6 51.4	25 96	83.5	6 58.8	25 96	83.0	7 06.1	24 96	82.5	7 13.4	24 96	82.1
6	5 53.8	25 96	83.3	6 01.3	25 96	82.8	6 08.7	25 96	82.3	6 16.1	25 96	81.8
7				5 03.8	25 96	82.5	5 11.3	25 96	82.1	5 18.7	25 96	81.6

10° 00′			10° 30′			11° 00′			11° 30′			H.A.
Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
85 00.0	1.0 09	180.0	85 30.0	1.0 10	180.0	86 00.0	1.0 12	180.0	86 30.0	1.0 13	180.0	00
84 54.3	98 27	168.8	85 23.7	98 30	167.7	85 53.0	97 33	166.2	86 22.0	96 37	164.3	1
84 38.0	93 43	158.4	85 05.7	92 46	156.3	85 33.0	90 50	153.8	85 59.7	88 55	150.7	2
84 12.4	87 55	149.3	84 38.0	84 59	146.6	85 02.8	81 63	143.5	85 26.5	77 68	139.8	3
83 39.4	79 64	141.6	84 02.7	76 68	138.6	84 24.9	72 72	135.3	84 45.9	67 76	131.5	4
83 00.8	72 71	135.1	83 21.9	68 75	132.1	83 41.8	64 78	128.8	84 00.4	59 81	125.1	05
82 18.0	66 77	129.8	82 37.2	62 79	126.9	82 55.1	57 82	123.7	83 11.5	52 85	120.2	6
81 32.1	60 81	125.4	81 49.5	56 83	122.6	82 05.7	52 85	119.6	82 20.5	47 88	116.4	7
80 43.7	55 84	121.7	80 59.7	51 86	119.0	81 14.4	47 88	116.2	81 27.8	42 90	113.2	8
79 53.6	51 86	118.6	80 08.3	47 88	116.1	80 21.8	43 89	113.5	80 34.1	39 91	110.7	9
79 02.1	47 88	116.0	79 15.7	44 89	113.6	79 28.2	40 91	111.1	79 39.5	36 92	108.6	10
78 09.5	44 89	113.7	78 22.2	41 90	111.5	78 33.8	37 92	109.2	78 44.3	33 93	106.8	1
77 16.0	41 90	111.7	77 27.9	38 91	109.6	77 38.8	34 92	107.5	77 48.6	31 94	105.2	2
76 21.9	39 91	110.0	76 33.0	36 92	108.0	76 43.2	32 93	106.0	76 52.5	29 94	103.9	3
75 27.1	37 92	108.5	75 37.7	34 93	106.6	75 47.4	31 94	104.7	75 56.1	27 94	102.7	4
74 31.9	35 93	107.1	74 42.0	32 93	105.3	74 51.1	29 94	103.5	74 59.4	26 95	101.7	15
73 36.4	33 93	105.9	73 45.9	31 94	104.2	73 54.7	28 94	102.5	74 02.6	25 95	100.7	6
72 40.5	32 94	104.8	72 49.6	29 94	103.2	72 58.0	27 95	101.6	73 05.6	24 95	99.9	7
71 44.3	30 94	103.8	71 53.1	28 95	102.3	72 01.1	26 95	100.7	72 08.4	23 95	99.1	8
70 47.9	29 94	102.9	70 56.4	27 95	101.4	71 04.1	25 95	99.9	71 11.1	22 96	98.4	9
69 51.3	28 95	102.0	69 59.5	26 95	100.6	70 06.9	24 95	99.2	70 13.7	21 96	97.8	20
68 54.6	27 95	101.3	69 02.4	25 95	99.9	69 09.7	23 96	98.5	69 16.3	21 96	97.2	1
67 57.7	26 95	100.5	68 05.3	24 95	99.2	68 12.3	22 96	97.9	68 18.7	20 96	96.6	2
67 00.6	26 95	99.9	67 08.0	24 96	98.6	67 14.9	22 96	97.4	67 21.1	20 96	96.1	3
66 03.5	25 95	99.2	66 10.7	23 96	98.0	66 17.4	21 96	96.8	66 23.5	19 96	95.6	4
65 06.2	24 96	98.6	65 13.3	23 96	97.5	65 19.8	21 96	96.3	65 25.8	19 96	95.1	25
64 08.9	24 96	98.1	64 15.8	22 96	97.0	64 22.2	20 96	95.8	64 28.0	19 96	94.7	6
63 11.5	23 96	97.6	63 18.2	22 96	96.5	63 24.5	20 96	95.4	63 30.3	18 96	94.3	7
62 14.0	23 96	97.1	62 20.6	21 96	96.0	62 26.8	20 96	95.0	62 32.5	18 96	93.9	8
61 16.4	23 96	96.6	61 23.0	21 96	95.6	61 29.0	19 96	94.6	61 34.6	18 96	93.5	9
60 18.8	22 96	96.1	60 25.3	21 96	95.2	60 31.2	19 96	94.2	60 36.8	18 96	93.2	30
59 21.2	22 96	95.7	59 27.5	20 96	94.8	59 33.4	19 96	93.8	59 38.9	18 96	92.8	1
58 23.5	21 96	95.3	58 29.7	20 96	94.4	58 35.6	19 96	93.4	58 41.0	17 97	92.5	2
57 25.8	21 96	94.9	57 31.9	20 96	94.0	57 37.7	19 96	93.1	57 43.1	17 97	92.2	3
56 28.0	21 96	94.5	56 34.1	20 96	93.6	56 39.8	18 96	92.7	56 45.2	17 97	91.8	4
55 30.2	21 96	94.2	55 36.3	20 96	93.3	55 41.9	18 96	92.4	55 47.2	17 97	91.5	35
54 32.4	21 96	93.8	54 38.4	19 96	93.0	54 44.0	18 97	92.1	54 49.3	17 97	91.3	6
53 34.6	20 96	93.5	53 40.5	19 96	92.6	53 46.1	18 97	91.8	53 51.4	17 97	91.0	7
52 36.7	20 96	93.1	52 42.6	19 96	92.3	52 48.2	18 97	91.5	52 53.4	17 97	90.7	8
51 38.8	20 96	92.8	51 44.7	19 97	92.0	51 50.2	18 97	91.2	51 55.5	17 97	90.4	9
50 40.9	20 96	92.5	50 46.8	19 97	91.7	50 52.3	18 97	90.9	50 57.5	17 97	90.2	40
49 43.0	20 97	92.2	49 48.8	19 97	91.4	49 54.3	18 97	90.7	49 59.5	17 97	89.9	1
48 45.1	20 97	91.9	48 50.9	19 97	91.1	48 56.4	18 97	90.4	49 01.6	17 97	89.6	2
47 47.2	20 97	91.6	47 52.9	19 97	90.9	47 58.4	18 97	90.1	48 03.6	17 97	89.4	3
46 49.2	20 97	91.3	46 55.0	19 97	90.6	47 00.5	18 97	89.9	47 05.7	17 97	89.1	4
45 51.3	20 97	91.0	45 57.0	19 97	90.3	46 02.5	18 97	89.6	46 07.7	17 97	88.9	45
44 53.4	20 97	90.8	44 59.1	19 97	90.1	45 04.6	18 97	89.4	45 09.8	17 97	88.7	6
43 55.4	20 97	90.5	44 01.1	19 97	89.8	44 06.6	18 97	89.1	44 11.9	17 97	88.4	7
42 57.4	19 97	90.2	43 03.2	19 97	89.6	43 08.7	18 97	88.9	43 13.9	17 97	88.2	8
41 59.5	19 97	90.0	42 05.2	19 97	89.3	42 10.7	18 97	88.6	42 16.0	17 97	88.0	9
41 01.5	19 97	89.7	41 07.3	19 97	89.1	41 12.8	18 97	88.4	41 18.1	17 96	87.7	50
40 03.6	20 97	89.5	40 09.3	19 97	88.8	40 14.9	18 97	88.2	40 20.2	17 96	87.5	1
39 05.6	20 97	89.2	39 11.4	19 97	88.6	39 16.9	18 97	87.9	39 22.3	17 96	87.3	2
38 07.7	20 97	89.0	38 13.5	19 97	88.3	38 19.0	18 96	87.7	38 24.4	18 96	87.1	3
37 09.7	20 97	88.7	37 15.5	19 97	88.1	37 21.1	18 96	87.5	37 26.5	18 96	86.9	4
36 11.8	20 97	88.5	36 17.6	19 96	87.9	36 23.2	18 96	87.3	36 28.7	18 96	86.6	55
35 13.9	20 97	88.2	35 19.7	19 96	87.6	35 25.3	19 96	87.0	35 30.8	18 96	86.4	6
34 15.9	20 97	88.0	34 21.8	19 96	87.4	34 27.5	19 96	86.8	34 33.0	18 96	86.2	7
33 18.0	20 97	87.8	33 23.9	19 96	87.2	33 29.6	19 96	86.6	33 35.2	18 96	86.0	8
32 20.1	20 96	87.5	32 26.0	19 96	86.9	32 31.8	19 96	86.4	32 37.4	18 96	85.8	9
31 22.2	20 96	87.3	31 28.2	20 96	86.7	31 33.9	19 96	86.1	31 39.6	18 96	85.6	60
30 24.3	20 96	87.1	30 30.3	20 96	86.5	30 36.1	19 96	85.9	30 41.8	19 96	85.4	1
29 26.5	20 96	86.8	29 32.5	20 96	86.3	29 38.3	19 96	85.7	29 44.0	19 96	85.1	2
28 28.6	20 96	86.6	28 34.6	20 96	86.0	28 40.5	19 96	85.5	28 46.3	19 96	84.9	3
27 30.8	20 96	86.4	27 36.8	20 96	85.8	27 42.8	20 96	85.3	27 48.6	19 96	84.7	4
26 32.9	21 96	86.2	26 39.0	20 96	85.6	26 45.0	20 96	85.1	26 50.9	19 96	84.5	65
25 35.1	21 96	85.9	25 41.3	20 96	85.4	25 47.3	20 96	84.8	25 53.2	19 96	84.3	6
24 37.3	21 96	85.7	24 43.5	20 96	85.2	24 49.6	20 96	84.6	24 55.5	20 96	84.1	7
23 39.5	21 96	85.5	23 45.8	21 96	84.9	23 51.9	20 96	84.4	23 57.9	20 96	83.9	8
22 41.8	21 96	85.3	22 48.0	21 96	84.7	22 54.2	20 96	84.2	23 00.3	20 96	83.7	9
21 44.0	21 96	85.0	21 50.3	21 96	84.5	21 56.6	21 96	84.0	22 02.7	20 96	83.4	70
20 46.3	21 96	84.8	20 52.7	21 96	84.3	20 58.9	21 96	83.8	21 05.1	20 96	83.2	1
19 48.6	22 96	84.6	19 55.0	21 96	84.1	20 01.3	21 96	83.5	20 07.6	21 96	83.0	2
18 50.9	22 96	84.3	18 57.4	21 96	83.8	19 03.8	21 96	83.3	19 10.1	21 96	82.8	3
17 53.2	22 96	84.1	17 59.8	22 96	83.6	18 06.2	21 96	83.1	18 12.6	21 96	82.6	4
16 55.6	22 96	83.9	17 02.2	22 96	83.4	17 08.7	22 96	82.9	17 15.1	21 96	82.4	75
15 58.0	22 96	83.7	16 04.6	22 96	83.2	16 11.2	22 96	82.7	16 17.7	22 96	82.1	6
15 00.4	22 96	83.4	15 07.1	22 96	82.9	15 13.7	22 96	82.4	15 20.3	22 96	81.9	7
14 02.8	23 96	83.2	14 09.6	22 96	82.7	14 16.3	22 96	82.2	14 23.0	22 96	81.7	8
13 05.3	23 96	83.0	13 12.1	23 96	82.5	13 18.9	22 96	82.0	13 25.6	22 95	81.5	9
12 07.8	23 96	82.7	12 14.7	23 96	82.2	12 21.5	23 96	81.7	12 28.3	23 95	81.3	80
11 10.3	23 96	82.5	11 17.3	23 96	82.0	11 24.2	23 96	81.5	11 31.1	23 95	81.0	1
10 12.9	24 96	82.3	10 19.9	23 96	81.8	10 26.9	23 95	81.3	10 33.8	23 96	80.8	2
9 15.5	24 96	82.0	9 22.6	24 96	81.5	9 29.6	23 95	81.1	9 36.6	23 95	80.6	3
8 18.1	24 96	81.8	8 25.2	24 95	81.3	8 32.4	24 95	80.8	8 39.5	24 95	80.3	4
7 20.7	24 96	81.6	7 28.0	24 95	81.1	7 35.2	24 95	80.6	7 42.4	24 95	80.1	85
6 23.4	24 95	81.3	6 30.7	24 95	80.8	6 38.0	24 95	80.3	6 45.3	24 95	79.9	6
5 26.1	25 95	81.1	5 33.5	25 95	80.6	5 40.9	25 95	80.1	5 48.3	24 95	79.6	7

Lat. 15°

H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	67 00.0	1.0 02	180.0	66 30.0	1.0 02	180.0	66 00.0	1.0 02	180.0	65 30.0	1.0 02	180.0	65 00.0	1.0 02	180.0	64 30.0	1.0 02	180.0	64 00.0	1.0 02	180.0	63 30.0	1.0 02	180.0	00
1	66 58.7	1.0 06	177.5	66 28.7	1.0 06	177.5	65 58.8	1.0 06	177.6	65 28.8	1.0 06	177.6	64 58.8	1.0 06	177.7	64 28.8	1.0 06	177.7	63 58.9	1.0 06	177.8	63 28.9	1.0 06	177.8	1
2	66 54.9	1.0 11	174.9	66 25.0	1.0 10	175.1	65 55.1	1.0 10	175.2	65 25.2	1.0 10	175.3	64 55.3	1.0 10	175.3	64 25.4	1.0 10	175.4	63 55.5	1.0 09	175.5	63 25.6	1.0 09	175.6	2
3	66 48.5	99 15	172.4	66 18.8	99 14	172.6	65 49.0	99 14	172.8	65 19.2	99 14	172.9	64 49.4	99 14	173.0	64 19.6	99 13	173.2	63 49.8	99 13	173.3	63 20.0	99 13	173.4	3
4	66 39.6	99 19	170.0	66 10.1	99 18	170.2	65 40.5	99 18	170.4	65 10.9	99 18	170.6	64 41.3	99 17	170.8	64 11.6	99 17	170.9	63 42.0	99 17	171.1	63 12.3	99 16	171.3	4
05	66 28.3	98 23	167.5	65 59.0	98 22	167.8	65 29.6	98 22	168.0	65 00.2	98 22	168.3	64 30.8	98 21	168.5	64 01.4	98 21	168.7	63 31.9	98 20	168.9	63 02.5	98 20	169.1	05
6	66 14.6	97 27	165.1	65 45.5	97 26	165.4	65 16.4	97 26	165.7	64 47.3	97 25	166.0	64 18.2	97 25	166.3	63 49.0	97 24	166.5	63 19.7	97 24	166.8	62 50.5	98 23	167.0	6
7	65 58.6	96 30	162.8	65 29.8	96 30	163.1	65 01.0	96 29	163.4	64 32.2	96 29	163.8	64 03.3	96 28	164.1	63 34.4	96 28	164.4	63 05.5	97 27	164.7	62 36.5	97 27	165.0	7
8	65 40.3	96 34	160.5	65 11.9	96 33	160.8	64 43.4	95 33	161.2	64 14.9	96 32	161.6	63 46.4	96 32	161.9	63 17.8	95 31	162.3	62 49.1	96 31	162.6	62 20.4	96 30	162.9	8
9	65 19.8	93 38	158.2	64 51.8	93 37	158.6	64 23.7	94 36	159.1	63 55.6	94 36	159.4	63 27.4	94 35	159.8	62 59.1	94 34	160.2	62 30.8	94 34	160.6	62 02.4	95 33	160.9	9
10	64 57.3	92 41	156.0	64 29.7	92 40	156.5	64 02.0	92 39	156.9	63 34.3	93 39	157.4	63 06.4	93 38	157.8	62 38.5	93 37	158.2	62 10.6	93 37	158.6	61 42.6	94 36	159.0	10
1	64 32.8	90 44	153.9	64 05.6	91 43	154.4	63 38.4	91 43	154.9	63 11.0	91 42	155.3	62 43.6	92 41	155.8	62 16.1	92 40	156.2	61 48.5	92 40	156.6	61 20.8	92 39	157.0	1
2	64 06.4	89 47	151.9	63 39.7	89 46	152.4	63 12.9	90 45	152.9	62 45.9	90 45	153.4	62 18.9	90 44	153.9	61 51.8	90 43	154.3	61 24.7	91 43	154.8	60 57.4	91 42	155.2	2
3	63 38.1	87 50	149.9	63 11.9	88 49	150.4	62 45.6	88 48	151.0	62 19.1	88 48	151.5	61 52.5	89 47	152.0	61 25.9	89 46	152.4	60 59.1	89 45	152.9	60 32.2	90 45	153.4	3
4	63 08.2	86 53	148.0	62 42.5	86 52	148.5	62 16.6	86 51	149.1	61 50.6	87 50	149.6	61 24.5	87 49	150.1	60 58.3	88 49	150.6	60 31.9	88 48	151.1	60 05.5	88 47	151.6	4
15	62 36.7	84 55	146.1	62 11.5	84 54	146.7	61 46.1	85 53	147.3	61 20.5	85 53	147.8	60 54.9	86 52	148.4	60 29.1	86 51	148.9	60 03.2	87 50	149.4	59 37.1	87 50	149.9	15
6	62 03.7	82 57	144.4	61 38.9	83 57	145.0	61 14.0	83 56	145.5	60 48.9	84 55	146.1	60 23.7	84 54	146.7	59 58.4	85 53	147.2	59 32.9	85 53	147.7	59 07.4	85 52	148.2	6
7	61 29.2	81 60	142.7	61 05.0	81 59	143.3	60 40.5	82 58	143.9	60 15.9	82 57	144.5	59 51.2	83 56	145.0	59 26.3	83 56	145.6	59 01.3	84 55	146.1	58 36.2	84 54	146.6	7
8	60 53.4	79 62	141.0	60 29.6	80 61	141.6	60 05.7	80 60	142.3	59 41.6	81 59	142.8	59 17.3	81 59	143.4	58 52.9	82 58	144.0	58 28.3	82 57	144.5	58 03.6	83 56	145.1	8
9	60 16.3	77 64	139.4	59 53.1	78 63	140.1	59 29.6	79 62	140.7	59 06.0	79 61	141.3	58 42.2	80 61	141.9	58 18.2	80 60	142.5	57 54.1	81 59	143.0	57 29.8	81 58	143.6	9
20	59 38.1	76 66	137.9	59 15.3	76 65	138.6	58 52.3	77 64	139.2	58 29.1	77 63	139.8	58 05.8	78 62	140.4	57 42.3	79 62	141.0	57 18.6	79 61	141.6	56 54.8	80 60	142.1	20
1	58 58.7	74 67	136.5	58 36.4	75 67	137.1	58 13.9	75 66	137.8	57 51.2	76 65	138.4	57 28.3	77 64	139.0	57 05.3	77 64	139.6	56 42.1	78 63	140.2	56 18.7	78 62	140.7	1
2	58 18.3	73 69	135.1	57 56.4	73 68	135.7	57 34.4	74 67	136.4	57 12.2	74 67	137.0	56 49.7	75 66	137.6	56 27.2	76 65	138.2	56 04.4	76 64	138.8	55 41.5	77 64	139.4	2
3	57 36.9	71 71	133.7	57 15.5	72 70	134.4	56 53.9	72 69	135.0	56 32.1	73 68	135.7	56 10.2	74 68	136.3	55 48.0	74 67	136.9	55 25.7	75 66	137.5	55 03.2	75 65	138.1	3
4	56 54.6	69 72	132.5	56 33.6	70 71	133.1	56 12.5	71 70	133.8	55 51.2	71 70	134.4	55 29.6	72 69	135.0	55 07.9	73 68	135.6	54 46.1	73 68	136.2	54 24.0	74 67	136.8	4
25	56 11.4	68 73	131.2	55 50.9	69 73	131.9	55 30.2	69 72	132.5	55 09.3	70 71	133.2	54 48.2	71 70	133.8	54 27.0	71 70	134.4	54 05.5	72 69	135.0	53 43.9	72 68	135.6	25
6	55 27.4	67 75	130.0	55 07.4	67 74	130.7	54 47.1	68 73	131.3	54 26.6	69 72	132.0	54 06.0	69 72	132.6	53 45.1	70 71	133.2	53 24.1	70 70	133.8	53 02.9	71 70	134.4	6
7	54 42.7	65 76	128.9	54 23.0	66 75	129.6	54 03.2	66 74	130.2	53 43.1	67 74	130.8	53 22.9	68 73	131.4	53 02.5	68 72	132.1	52 41.9	69 72	132.7	52 21.1	70 71	133.3	7
8	53 57.2	64 77	127.8	53 38.0	64 76	128.5	53 18.6	65 76	129.1	52 58.9	66 75	129.7	52 39.1	66 74	130.3	52 19.1	67 74	131.0	51 58.9	68 73	131.6	51 38.5	68 72	132.2	8
9	53 11.1	62 78	126.8	52 52.3	63 77	127.4	52 33.2	64 77	128.0	52 14.0	64 76	128.7	51 54.6	65 75	129.3	51 35.0	66 75	129.9	51 15.1	66 74	130.5	50 55.2	67 73	131.1	9
30	52 24.4	61 79	125.7	52 05.9	62 78	126.4	51 47.3	62 78	127.0	51 28.4	63 77	127.7	51 09.4	64 76	128.3	50 50.2	64 76	128.9	50 30.7	65 75	129.5	50 11.1	66 74	130.1	30
1	51 37.0	60 80	124.8	51 19.0	61 79	125.4	51 00.7	61 79	126.0	50 42.3	62 78	126.7	50 23.6	63 77	127.3	50 04.7	63 77	127.9	49 45.7	64 76	128.5	49 26.5	64 75	129.1	1
2	50 49.2	59 81	123.8	50 31.5	59 80	124.5	50 13.6	60 79	125.1	49 55.5	61 79	125.7	49 37.2	61 78	126.3	49 18.7	62 78	126.9	49 00.0	63 77	127.5	48 41.2	63 76	128.1	2
3	50 09.8	57 81	122.9	49 43.4	58 81	123.6	49 25.9	59 80	124.2	49 08.2	59 80	124.8	48 50.2	60 79	125.4	48 32.1	61 79	126.0	48 13.8	61 78	126.6	47 55.3	62 77	127.2	3
4	49 11.9	56 82	122.1	48 54.9	57 82	122.7	48 37.7	58 81	123.3	48 20.3	58 81	123.9	48 02.7	59 80	124.5	47 45.0	60 79	125.1	47 27.0	60 79	125.7	47 08.9	61 78	126.3	4
35	48 22.6	55 83	121.2	48 05.9	56 82	121.9	47 49.1	57 82	122.5	47 32.0	57 81	123.1	47 14.8	58 81	123.7	46 57.3	58 80	124.3	46 39.7	59 80	124.9	46 21.9	60 79	125.5	35
6	47 32.8	54 84	120.4	47 16.5	55 83	121.0	46 59.9	55 83	121.7	46 43.2	56 82	122.3	46 26.3	57 82	122.9	46 09.2	57 81	123.5	45 51.9	58 80	124.0	45 34.5	58 80	124.6	6
7	46 42.6	53 84	119.6	46 26.6	54 84	120.3	46 10.4	54 83	120.9	45 54.0	55 83	121.5	45 37.4	56 82	122.1	45 20.6	56 82	122.7	45 03.7	57 81	123.2	44 46.6	57 81	123.8	7
8	45 52.1	52 85	118.9	45 36.3	53 84	119.5	45 20.4	53 84	120.1	45 04.4	54 83	120.7	44 48.1	55 83	121.3	44 31.6	55 82	121.9	44 15.0	56 82	122.5	43 58.2	56 81	123.0	8
9	45 01.1	51 85	118.2	44 45.7	52 85	118.8	44 30.1	52 84	119.4	44 14.3	53 84	120.0	43 58.4	54 83	120.6	43 42.2	54 83	121.1	43 25.9	55 82	121.7	43 09.4	55 82	122.3	9
40	44 09.9	50 86	117.5	43 54.7	51 86	118.1	43 39.4	51 85	118.7	43 23.9	52 85	119.2	43 08.3	53 84	119.8	42 52.4	53 84	120.4	42 36.4	54 83	121.0	42 20.2	54 83	121.6	40
1	43 18.3	49 86	116.8	43 03.4	50 86	117.4	42 48.4	50 86	118.0	42 33.2	51 85	118.6	42 17.8	52 85	119.1	42 02.3	52 84	119.7	41 46.5	53 84	120.3	41 30.6	53 83	120.8	1
2	42 26.4	48 87	116.1	42 11.8	49 87	116.7	41 57.1	49 86	117.3	41 42.1	50 86	117.9	41 27.0	51 85	118.5	41 11.8	51 85	119.0	40 56.3	52 84	119.6	40 40.7	52 84	120.2	2
3	41 34.2	47 87	115.5	41 19.9	48 87	116.1	41 05.4	49 87	116.7	40 50.8	49 86	117.2	40 35.9	50 86	117.8	40 20.9	50 85	118.4	40 05.8	51 85	118.9	39 50.4	51 84	119.5	3
4	40 41.8	47 88	114.9	40 27.7	47 87	115.4	40 13.5	48 87	116.0	39 59.1	48 87	116.6	39 44.5	49 86	117.2	39 29.8	49 86	117.7	39 14.9	50 85	118.3	38 59.8	50 85	118.9	4
45	39 49.1	46 88	114.3	39 35.2	46 88	114.8	39 21.3	47 87	115.4	39 07.1	47 87	116.0	38 52.8	48 87	116.6	38 38.3	49 86	117.1	38 23.7	49 86	117.7	38 08.9	50 85	118.2	45
6	38 56.1	45 89	113.7	38 42.5	46 88	114.3	38 28.8	46 88	114.8	38 14.9	47 87	115.4	38 00.8	47 87	116.0	37 46.6	48 87	116.5	37 32.2	48 86	117.1	37 17.7	49 86	117.6	6
7	38 02.9	44 89	113.1	37 49.6	45 89	113.7	37 36.1	45 88	114.3	37 22.4	46 88	114.8	37 08.6	46 87	115.4	36 54.6	47 87	115.9	36 40.5	47 87	116.5	36 26.2	48 86	117.0	7
8	37 09.5	43 89	112.6	36 56.4	44 89	113.1	36 43.1	45 89	113.7	36 29.7	45 88	114.3	36 16.1	46 88	114.8	36 02.4	46 88	115.4	35 48.5	47 87	115.9	35 34.4	47 87	116.4	8
9	36 15.9	43 90	112.0	36 03.0	43 89	112.6	35 49.9	44 89	113.2	35 36.7	44 89	113.7	35 23.4	45 88	114.3	35 09.9	45 88	114.8	34 56.2	46 88	115.4	34 42.4	46 87	115.9	9
50	35 22.1	42 90	111.5	35 09.4	43 90	112.1	34 56.5	43 89	112.6	34 43.6	44 89	113.2	34 30.4	44 89	113.7	34 17.2	44 88	114.3	34 03.7	45 88	114.8	33 50.2	45 87	115.3	50
1	34 28.1	41 90	111.0	34 15.6	42 90	111.6	34 03.0	42 90	112.1	33 50.2	43 89	112.7	33 37.3	43 89	113.2	33 24.2	44 89	113.7	33 11.0	44 88	114.3	32 57.7	45 88	114.8	1
2	33 33.9	41 91	110.5	33 21.6	41 90	111.1	33 09.2	42 90	111.6	32 56.6	42 90	112.2	32 43.9	43 89	112.7	32 31.1	43 89	113.2	32 18.1	43 89	113.8	32 05.0	44 88	114.3	2
3	32 39.5	40 91	110.1	32 27.4	41 91	110.6	32 15.2	41 90	111.1	32 02.8	41 90	111.7	31 50.3	42 90	112.2	31 37.7	42 89	112.7	31 24.9	43 89	113.3	31 12.0	43 89	113.8	3
4	31 45.0	39 91	109.6	31 33.1	40 91	110.1	31 21.1	40 90	110.7	31 08.9	41 90	111.2	30 56.6	41 90	111.7	30 44.2	42 90	112.3	30 31.6	42 89	112.8	30 18.9	42 89	113.3	4
55	30 50.3	39 91	109.1	30 38.6	39 91	109.7	30 26.7	40 91	110.2	30 14.8	40 90	110.7	30 02.7	41 90	111.3	29 50.4	41 90	111.8	29 38.1	41 90	112.3	29 25.6	42 89	112.8	55
6	29 55.5	38 92	108.7	29 43.9	39 91	109.2	29 32.3	39 91	109.8	29 20.5	40 91	110.3	29 08.6	40 90	110.8	28 56.5	40 90	111.3	28 44.4	41 90	111.9	28 32.1	41 89	112.4	6
7	29 00.5	38 92	108.3	28 49.1	38 92	108.8	28 37.7	39 91	109.3	28 26.0	39 91	109.8	28 14.3	39 91	110.4	28 02.5	40 90	110.9	27 50.5	40 90	111.4	27 38.4	40 90	111.9	7
8	28 05.4	37 92	107.8	27 54.2	38 92	108.4	27 42.9	38 92	108.9	27 31.5	38 91	109.4	27 19.9	39 91	109.9	27 08.2	39 91	110.4	26 56.5	39 90	111.0	26 44.6	40 90	111.5	8
9	27 10.2	37 92	107.4	26 59.1	37 92	107.9	26 48.0	37 92	108.5	26 36.7	38 91	109.0	26 25.4	38 91	109.5	26 13.9	38 91	110.0	26 02.3	39 91	110.5	25 50.6	39 90	111.0	9
60	26 14.8	36 92	107.0	26 03.9	36 92	107.5	25 53.0	37 92	108.1	25 41.9	37 92	108.6	25 30.7	38 91	109.1	25 19.3	38 91	109.6	25 07.9	38 91	110.1	24 56.4	39 91	110.6	60
1	25 19.3	36 93	106.6	25 08.6	36 92	107.1	24 57.8	36 92	107.7	24 46.9	37 92	108.2	24 35.8	37 92	108.7	24 24.7	37 91	109.2	24 13.4	38 91	109.7	24 02.1	38 91	110.2	1
2	24 23.8	35 93	106.2	24 13.2	35 93	106.8	24 02.5	36 92	107.3	23 51.7	36 92	107.8	23 40.9	36 92	108.3	23 29.9	37 92	108.8	23 18.8	37 91	109.3	23 07.6	37 91	109.8	2
3	23 28.1	35 93	105.9	23 17.6	35 93	106.4	23 07.1	35 93	106.9	22 56.5	36 92	107.4	22 45.8	36 92	107.9	22 34.9	36 92	108.4	22 24.0	37 91	108.9	22 13.0	37 91	109.4	3
4	22 32.3	34 93	105.5	22 22.0	34 93	106.0	22 11.6	35 93	106.5	22 01.1	25 92	107.0	21 50.6	35 92	107.5	21 39.9	36 92	108.0	21 29.1	36 92	108.5	21 18.3	36 91	109.0	4
65	21 36.4	34 93	105.1	21 26.2	34 93	105.6	21 16.0	34 93	106.1	21 05.7	35 93	106.6	20 55.2	35 92	107.2	20 44.7	35 92	107.7	20 34.1	35 92	108.2	20 23.5	36 92	108.7	65
6	20 40.4	33 93	104.8	20 30.4	34 93	105.3	20 20.3	34 93	105.8	20 10.1	34 93	106.3	19 59.8	34 93	106.8	19 49.4	35 92	107.3	19 39.0	35 92	107.8	19 28.5	35 92	108.3	6
7	19 44.3	33 94	104.4	19 34.4	33 93	104.9	19 24.4	33 93	105.4	19 14.4	34 93	105.9	19 04.3	34 93	106.4	18 54.1	34 92	106.9	18 43.8	34 92	107.4	18 33.4	35 92	107.9	7
8	18 48.1	32 94	104.1	18 38.4	33 94	104.6	18 28.5	33 93	105.1	18 18.6	33 93	105.6	18 08.6	33 93	106.1	17 58.6	34 93	106.6	17 48.4	34 92	107.1	17 38.2	34 92	107.6	8
9	17 51.9	32 94	103.8	17 42.2	32 94	104.3	17 32.5	32 94	104.7	17 22.7	33 93	105.2	17 12.9	33 93	105.7	17 03.0	33 93	106.2	16 53.0	33 93	106.7	16 42.9	34 92	107.2	9
70	16 55.5	32 94	103.4	16 46.0	32 94	103.9	16 36.4	32 94	104.4	16 26.8	32 93	104.9	16 17.1	33 93	105.4	16 07.3	33 93	105.9	15 57.4	33 93	106.4	15 47.5	33 93	106.9	70
1	15 59.1	31 94	103.1	15 49.7	31 94	103.6	15 40.3	32 94	104.1	15 30.7	32 94	104.6	15 21.1	32 93	105.1	15 11.5	32 93	105.6	15 01.8	33 93	106.0	14 52.0	33 93	106.5	1
2	15 02.6	31 94	102.8	14 53.4	31 94	103.3	14 44.0	31 94	103.8	14 34.6	31 94	104.3	14 25.1	32 93	104.7	14 15.6	32 93	105.2	14 06.0	32 93	105.7	13 56.4	32 93	106.2	2
3	14 06.1	30 94	102.5	13 56.9	31 94	103.0	13 47.7	31 94	103.4	13 38.4	31 94	103.9	13 29.0	31 94	104.4	13 19.6	31 93	104.9	13 10.2	32 93	105.4	13 00.7	32 93	105.9	3
4	13 09.5	30 94	102.2	13 00.4	30 94	102.6	12 51.3	30 94	103.1	12 42.1	31 94	103.6	12 32.9	31 94	104.1	12 23.6	31 94	104.6	12 14.3	31 93	105.1	12 04.9	31 93	105.6	4
75	12 12.8	30 95	101.9	12 03.8	30 94	102.3	11 54.8	30 94	102.8	11 45.7	30 94	103.3	11 36.6	30 94	103.8	11 27.5	31 94	104.3	11 18.3	31 93	104.8	11 09.0	31 93	105.3	75
6	11 16.0	29 95	101.6	11 07.2	30 94	102.0	10 58.3	30 94	102.5	10 49.3	30 94	103.0	10 40.3	30 94	103.5	10 31.3	30 94	104.0	10 22.2	30 94	104.5	10 13.1	31 93	105.0	6
7	10 19.2	29 95	101.3	10 10.5	29 95	101.7	10 01.7	29 94	102.2	9 52.8	30 94	102.7	9 43.9	30 94	103.2	9 35.0	30 94	103.7	9 26.0	30 94	104.2	9 17.0	30 94	104.7	7
8	9 22.3	29 95	101.0	9 13.7	29 95	101.5	9 05.0	29 95	101.9	8 56.2	29 94	102.4	8 47.5	29 94	102.9	8 38.7	29 94	103.4	8 29.8	30 94	103.9	8 20.9	30 94	104.4	8
9	8 25.4	29 95	100.7	8 16.9	29 95	101.2	8 08.3	29 95	101.6	7 59.6	29 94	102.1	7 50.9	29 94	102.6	7 42.2	29 94	103.1	7 33.5	29 94	103.6	7 24.7	29 94	104.1	9
80	7 28.4	28 95	100.4	7 20.0	28 95	100.9	7 11.5	28 95	101.4	7 02.9	29 95	101.8	6 54.4	29 94	102.3	6 45.8	29 94	102.8	6 37.1	29 94	103.3	6 28.5	29 94	103.8	80
1	6 31.4	28 95	100.1	6 23.0	28 95	100.6	6 14.6	28 95	101.1	6 06.2	28 95	101.6	5 57.7	28 94	102.0	5 49.2	28 94	102.5	5 40.7	28 94	103.0	5 32.2	29 94	103.5	1
2	5 34.3	28 95	99.8	5 26.0	28 95	100.3	5 17.7	28 95	100.8	5 09.4	28 95	101.3	5 01.0	28 95	101.8										2

DECLINATION SAME NAME AS LATITUDE

Lat. 15°

H.A.	12° 00′				12° 30′				13° 00′				13° 30′				14° 00′				14° 30′				15° 00′				15° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	87 00.0	1.0	15	180.0	87 30.0	1.0	18	180.0	88 00.0	1.0	22	180.0	88 30.0	1.0	29	180.0	89 00.0	1.0	39	180.0	89 30.0	1.0	59	180.0	90 00.0	..	97	....	89 30.0	1.0	59	00.0	00
1	86 50.8	96	42	161.9	87 19.1	93	48	158.6	87 46.6	90	56	154.0	88 12.8	84	67	147.0	88 36.5	72	79	135.8	88 54.7	46	91	117.2	89 02.0	00	97	89.9	88 54.8	46	91	62.5	1
2	86 25.5	84	61	146.8	86 50.0	79	67	141.9	87 12.8	72	75	135.6	87 32.9	62	82	127.5	87 49.2	46	89	117.1	88 00.2	25	95	104.2	88 04.1	00	97	89.7	88 00.4	25	94	75.2	2
3	85 49.0	72	73	135.4	86 09.6	66	78	130.3	86 28.1	57	83	124.1	86 43.7	46	89	116.9	86 55.7	33	93	108.6	87 03.4	18	96	99.4	87 06.2	01	97	89.6	87 03.8	16	95	79.8	3
4	85 05.3	62	80	127.2	85 22.8	55	84	122.3	85 38.0	47	88	116.8	85 50.6	37	92	110.7	86 00.0	26	94	104.0	86 06.0	14	96	96.9	86 08.2	01	97	89.5	86 06.5	12	96	82.1	4
05	84 17.3	53	85	121.1	84 32.3	47	88	116.6	84 45.2	39	91	111.8	84 55.6	31	93	106.6	85 03.4	21	95	101.0	85 08.3	11	96	95.3	85 10.2	01	97	89.4	85 09.0	00	96	83.4	05
6	83 26.4	47	88	116.5	83 39.5	41	90	112.5	83 50.7	34	92	108.2	83 59.7	26	94	103.7	84 06.4	18	96	99.0	84 10.6	10	96	94.2	84 12.3	01	97	89.2	84 11.4	07	96	84.3	6
7	82 33.8	42	90	112.9	82 45.4	36	92	109.3	82 55.2	30	94	105.5	83 03.1	23	95	101.6	83 09.0	16	96	97.5	83 12.8	09	96	93.3	83 14.3	02	97	89.1	83 13.7	06	96	84.8	7
8	81 39.8	37	91	110.1	81 50.3	32	93	106.9	81 59.1	27	94	103.5	82 06.2	21	95	99.9	82 11.5	15	96	96.3	82 14.9	08	97	92.7	82 16.4	02	97	89.0	82 16.0	05	96	85.2	8
9	80 45.0	34	92	107.8	80 54.5	29	94	104.9	81 02.5	24	95	101.8	81 09.0	19	96	98.6	81 13.8	13	96	95.4	81 17.0	08	97	92.1	81 18.4	02	97	88.8	81 18.2	04	96	85.5	9
10	79 49.6	31	93	105.9	79 58.3	27	94	103.2	80 05.7	22	96	100.4	80 11.6	17	96	97.5	80 16.1	12	96	94.6	80 19.0	07	97	91.7	80 20.5	02	97	88.7	80 20.4	03	96	85.7	10
1	78 53.6	29	94	104.3	79 01.7	26	96	101.8	79 08.6	21	95	99.2	79 14.1	16	96	96.6	79 18.3	12	96	94.0	79 21.1	07	97	91.3	79 22.6	02	97	88.6	79 22.6	02	96	85.9	1
2	77 57.3	27	94	103.0	78 04.9	23	96	100.6	78 11.3	19	96	98.3	78 16.5	15	96	95.8	78 20.4	11	96	93.4	78 23.2	07	97	90.9	78 24.6	03	97	88.4	78 24.8	02	96	86.0	2
3	77 00.7	26	95	101.8	77 07.8	22	96	99.6	77 13.9	18	95	97.4	77 18.8	15	96	95.2	77 22.6	11	96	92.9	77 25.2	07	97	90.6	77 26.7	03	97	88.3	77 27.0	01	96	86.0	3
4	76 03.8	24	95	100.7	76 10.6	21	96	98.7	76 16.3	17	96	96.6	76 21.0	14	96	94.5	76 24.7	10	97	92.4	76 27.3	07	97	90.3	76 28.8	03	97	88.2	76 29.2	00	96	86.0	4
15	75 06.8	23	95	99.8	75 13.2	20	96	97.9	75 18.7	17	96	96.0	75 23.2	13	96	94.0	75 26.8	10	97	92.0	75 29.3	07	97	90.0	75 30.8	03	97	88.0	75 31.3	00	96	86.0	15
6	74 09.6	22	96	99.0	74 15.8	19	96	97.2	74 21.0	16	96	95.3	74 25.4	13	96	93.5	74 28.8	10	97	91.7	74 31.4	07	97	89.8	74 32.9	04	97	87.9	74 33.5	00	96	86.0	6
7	73 12.3	21	96	98.2	73 18.2	18	96	96.5	73 23.3	16	96	94.8	73 27.6	13	96	93.1	73 30.9	10	97	91.3	73 33.4	07	97	89.6	73 35.0	04	97	87.8	73 35.7	01	96	86.0	7
8	72 14.9	20	96	97.5	72 20.6	18	96	95.9	72 25.6	15	96	94.3	72 29.7	12	96	92.6	72 33.0	10	97	91.0	72 35.4	07	97	89.3	72 37.1	04	96	87.7	72 37.9	01	96	86.0	8
9	71 17.4	20	96	96.9	71 22.9	17	96	95.4	71 27.7	15	96	93.8	71 31.8	12	97	92.3	71 35.0	10	97	90.7	71 37.5	07	97	89.1	71 39.2	04	96	87.5	71 40.1	02	96	85.9	9
20	70 19.8	19	96	96.3	70 25.2	17	96	94.9	70 29.9	14	96	93.4	70 33.8	12	97	91.9	70 37.1	10	97	90.4	70 39.5	07	97	88.9	70 41.3	05	96	87.4	70 42.3	02	96	85.9	20
1	69 22.2	19	96	95.8	69 27.5	16	96	94.4	69 32.0	14	96	93.0	69 35.9	12	97	91.6	69 39.1	09	97	90.1	69 41.6	07	97	88.7	69 43.4	05	96	87.3	69 44.5	02	96	85.8	1
2	68 24.5	18	96	95.3	68 29.6	16	96	93.9	68 34.1	14	97	92.6	68 38.0	12	97	91.2	68 41.2	09	97	89.9	68 43.7	07	97	88.5	68 45.5	05	96	87.1	68 46.7	03	96	85.7	2
3	67 26.8	18	96	94.8	67 31.8	16	96	93.5	67 36.2	14	97	92.2	67 40.0	12	97	90.9	67 43.2	10	97	89.6	67 45.7	07	97	88.3	67 47.6	05	96	87.0	67 48.9	03	96	85.7	3
4	66 29.0	17	96	94.4	66 34.0	16	96	93.1	66 38.3	14	97	91.9	66 42.1	12	97	90.6	66 45.2	10	97	89.4	66 47.8	08	97	88.1	66 49.8	05	96	86.9	66 51.1	03	96	85.6	4
25	65 31.2	17	96	94.0	65 36.1	15	96	92.8	65 40.4	13	97	91.6	65 44.1	12	97	90.4	65 47.3	10	97	89.2	65 49.9	08	97	87.9	65 51.9	06	96	86.7	65 53.3	04	96	85.5	25
6	64 33.4	17	96	93.6	64 38.2	15	96	92.4	64 42.5	13	97	91.3	64 46.2	11	97	90.1	64 49.3	10	97	88.9	64 52.0	08	96	87.8	64 54.0	06	96	86.6	64 55.6	04	96	85.4	6
7	63 35.5	17	96	93.2	63 40.3	15	97	92.1	63 44.5	13	97	91.0	63 48.2	11	97	89.8	63 51.4	10	97	88.7	63 54.1	08	96	87.6	63 56.2	06	96	86.4	63 57.8	04	96	85.3	7
8	62 37.6	16	96	92.8	62 42.4	15	97	91.8	62 46.6	13	97	90.7	62 50.3	12	97	89.6	62 53.5	10	97	88.5	62 56.2	08	96	87.4	62 58.4	06	96	86.3	63 00.0	05	96	85.2	8
9	61 39.8	16	97	92.5	61 44.4	15	97	91.4	61 48.6	13	97	90.4	61 52.3	12	97	89.3	61 55.5	10	97	88.3	61 58.3	08	96	87.2	62 00.5	07	96	86.2	62 02.3	05	96	85.1	9
30	60 41.8	16	97	92.2	60 46.5	15	97	91.1	60 50.7	13	97	90.1	60 54.4	12	97	89.1	60 57.6	10	97	88.1	61 00.4	08	96	87.1	61 02.7	07	96	86.0	61 04.5	05	96	85.0	30
1	59 43.9	16	97	91.8	59 48.5	15	97	90.9	59 52.7	13	97	89.9	59 56.4	12	97	88.9	59 59.7	10	97	87.9	60 02.5	09	96	86.9	60 04.9	07	96	85.9	60 06.8	06	96	84.9	1
2	58 46.0	16	97	91.5	58 50.6	15	97	90.6	58 54.7	13	97	89.6	58 58.5	12	97	88.7	59 01.8	10	97	87.7	59 04.6	09	96	86.7	59 07.1	07	96	85.8	59 09.1	06	96	84.8	2
3	57 48.1	16	97	91.2	57 52.6	15	97	90.3	57 56.8	13	97	89.4	58 00.5	12	97	88.4	58 03.9	10	96	87.5	58 06.8	09	96	86.6	58 09.3	08	96	85.6	58 11.4	06	96	84.7	3
4	56 50.1	16	97	90.9	56 54.7	15	97	90.0	56 58.8	13	97	89.1	57 02.6	12	97	88.2	57 06.0	11	96	87.3	57 08.9	09	96	86.4	57 11.5	08	96	85.5	57 13.7	07	96	84.6	4
35	55 52.2	16	97	90.7	55 56.7	15	97	89.8	56 00.9	13	97	88.9	56 04.7	12	97	88.0	56 08.1	11	96	87.1	56 11.1	09	96	86.2	56 13.7	08	96	85.3	56 16.0	07	96	84.4	35
6	54 54.2	16	97	90.4	54 58.8	15	97	89.5	55 02.9	13	97	88.7	55 06.8	12	97	87.8	55 10.2	11	96	86.9	55 13.3	10	96	86.1	55 16.0	08	96	85.2	55 18.3	07	96	84.3	6
7	53 56.3	16	97	90.1	54 00.8	15	97	89.3	54 05.0	13	97	88.4	54 08.9	12	96	87.6	54 12.3	11	96	86.8	54 15.5	10	96	85.9	54 18.2	09	96	85.1	54 20.6	07	96	84.2	7
8	52 58.3	16	97	89.9	53 02.9	15	97	89.1	53 07.1	13	97	88.2	53 11.0	12	96	87.4	53 14.5	11	96	86.6	53 17.7	10	96	85.7	53 20.5	09	96	84.9	53 23.0	08	96	84.1	8
9	52 00.3	16	97	89.6	52 04.9	15	97	88.8	52 09.2	14	97	88.0	52 13.1	12	96	87.2	52 16.6	11	96	86.4	52 19.9	10	96	85.6	52 22.8	09	96	84.8	52 25.4	08	96	83.9	9
40	51 02.4	16	97	89.4	51 07.0	15	97	88.6	51 11.2	14	96	87.8	51 15.2	13	96	87.0	51 18.8	12	96	86.2	51 22.1	10	96	85.4	51 25.1	09	96	84.6	51 27.7	08	96	83.8	40
1	50 04.4	16	97	89.1	50 09.0	15	97	88.4	50 13.3	14	96	87.6	50 17.3	13	96	86.8	50 21.0	12	96	86.0	50 24.3	11	96	85.3	50 27.4	10	96	84.5	50 30.1	09	96	83.7	1
2	49 06.5	16	97	88.9	49 11.1	15	97	88.1	49 15.4	14	96	87.4	49 19.4	13	96	86.6	49 23.2	12	96	85.9	49 26.6	11	96	85.1	49 29.7	10	96	84.3	49 32.5	09	96	83.6	2
3	48 08.6	16	97	88.7	48 13.2	15	97	87.9	48 17.5	14	96	87.2	48 21.6	13	96	86.4	48 25.4	12	96	85.7	48 28.9	11	96	84.9	48 32.0	10	96	84.2	48 34.9	09	96	83.4	3
4	47 10.6	16	97	88.4	47 15.3	15	97	87.7	47 19.7	14	96	87.0	47 23.8	13	96	86.2	47 27.6	12	96	85.5	47 31.1	11	96	84.8	47 34.4	10	96	84.0	47 37.4	09	96	83.3	4
45	46 12.7	16	97	88.2	46 17.4	15	96	87.5	46 21.8	14	95	86.8	46 25.9	13	96	86.0	46 29.8	12	96	85.3	46 33.4	12	96	84.6	46 36.8	11	96	83.9	46 39.8	10	96	83.2	45
6	45 14.8	16	97	88.0	45 19.5	15	96	87.3	45 23.9	14	96	86.6	45 28.1	14	96	85.9	45 32.1	13	96	85.1	45 35.7	12	96	84.4	45 39.1	11	96	83.7	45 42.3	10	96	83.0	6
7	44 16.9	16	96	87.7	44 21.6	15	96	87.1	44 26.1	15	96	86.4	44 30.3	14	96	85.7	44 34.3	13	96	85.0	44 38.1	12	96	84.3	44 41.5	11	96	83.6	44 44.8	10	96	82.9	7
8	43 18.9	16	96	87.5	43 23.7	16	96	86.8	43 28.3	15	96	86.2	43 32.6	14	96	85.5	43 36.6	13	96	84.8	43 40.4	12	96	84.1	43 44.0	11	96	83.4	43 47.3	11	96	82.7	8
9	42 21.0	16	96	87.3	42 25.9	16	96	86.6	42 30.4	15	96	86.0	42 34.8	14	96	85.3	42 38.9	13	96	84.6	42 42.8	13	96	83.9	42 46.4	12	96	83.3	42 49.8	11	96	82.6	9
50	41 23.2	17	96	87.1	41 28.0	16	96	86.4	41 32.6	15	96	85.8	41 37.0	14	96	85.1	41 41.2	14	96	84.4	41 45.1	13	96	83.8	41 48.8	12	96	83.1	41 52.3	11	96	82.5	50
1	40 25.3	17	96	86.9	40 30.2	16	96	86.2	40 34.8	15	96	85.6	40 39.3	14	96	84.9	40 43.5	14	96	84.3	40 47.5	13	96	83.6	40 51.3	12	96	83.0	40 54.9	12	96	82.3	1
2	39 27.4	17	96	86.7	39 32.4	16	96	86.0	39 37.1	15	96	85.4	39 41.6	15	96	84.7	39 45.9	14	96	84.1	39 49.9	13	96	83.5	39 53.8	13	96	82.8	39 57.5	12	96	82.2	2
3	38 29.6	17	96	86.4	38 34.5	16	96	85.8	38 39.3	16	96	85.2	38 43.9	15	96	84.6	38 48.2	14	96	83.9	38 52.4	13	96	83.3	38 56.3	13	96	82.6	39 00.1	12	96	82.0	3
4	37 31.7	17	96	86.2	37 36.7	16	96	85.6	37 41.6	16	96	85.0	37 46.2	15	96	84.4	37 50.6	14	96	83.7	37 54.8	14	96	83.1	37 58.9	13	96	82.5	38 02.7	12	96	81.9	4
55	36 33.9	17	96	86.0	36 39.0	17	96	85.4	36 43.8	16	96	84.8	36 48.5	15	96	84.2	36 53.0	15	96	83.6	36 57.3	14	96	82.9	37 01.4	13	96	82.3	37 05.3	13	96	81.7	55
6	35 36.1	17	96	85.8	35 41.2	17	96	85.2	35 46.1	16	96	84.6	35 50.9	15	96	84.0	35 55.4	15	96	83.4	35 59.8	14	96	82.8	36 04.0	14	96	82.2	36 08.0	13	96	81.6	6
7	34 38.3	17	96	85.6	34 43.5	17	96	85.0	34 48.4	16	96	84.4	34 53.2	16	96	83.8	34 57.9	15	96	83.2	35 02.3	15	96	82.6	35 06.6	14	96	82.0	35 10.7	13	96	81.4	7
8	33 40.5	18	96	85.4	33 45.7	17	96	84.8	33 50.8	17	96	84.2	33 55.6	16	96	83.6	34 00.3	15	96	83.0	34 04.8	15	96	82.4	34 09.2	14	96	81.8	34 13.4	14	95	81.2	8
9	32 42.8	18	96	85.2	32 48.0	17	96	84.6	32 53.1	17	96	84.0	32 58.0	16	96	83.4	33 02.8	16	96	82.8	33 07.4	15	96	82.3	33 11.8	14	96	81.7	33 16.1	14	95	81.1	9
60	31 45.0	18	96	85.0	31 50.3	17	96	84.4	31 55.5	17	96	83.8	32 00.5	16	96	83.3	32 05.3	16	96	82.7	32 10.0	15	96	82.1	32 14.5	15	96	81.5	32 18.9	14	95	80.9	60
1	30 47.3	18	96	84.8	30 52.7	18	96	84.2	30 57.9	17	96	83.6	31 02.9	17	96	83.1	31 07.8	16	96	82.5	31 12.6	16	96	81.9	31 17.2	15	95	81.3	31 21.6	15	95	80.8	1
2	29 49.6	18	96	84.6	29 55.0	18	96	84.0	30 00.3	17	96	83.4	30 05.4	17	96	82.9	30 10.4	16	96	82.3	30 15.2	16	96	81.7	30 19.9	15	96	81.2	30 24.5	15	96	80.6	2
3	28 51.9	18	96	84.4	28 57.4	18	96	83.8	29 02.7	18	96	83.2	29 07.9	17	96	82.7	29 13.0	17	96	82.1	29 17.9	16	96	81.6	29 22.7	16	95	81.0	29 27.3	15	95	80.4	3
4	27 54.2	19	96	84.2	27 59.8	18	96	83.6	28 05.2	18	96	83.1	28 10.5	17	96	82.5	28 15.6	17	96	81.9	28 20.6	16	95	81.4	28 25.4	16	95	80.8	28 30.2	16	95	80.3	4
65	26 56.6	19	96	84.0	27 02.2	18	96	83.4	27 07.7	18	96	82.9	27 13.0	18	96	82.3	27 18.2	17	96	81.7	27 23.3	17	95	81.2	27 28.2	16	95	80.6	27 33.1	16	95	80.1	65
6	25 59.0	19	96	83.8	26 04.6	19	96	83.2	26 10.2	18	96	82.7	26 15.6	18	96	82.1	26 20.9	17	96	81.6	26 26.0	17	95	81.0	26 31.1	17	95	80.5	26 36.0	16	95	79.9	6
7	25 01.4	19	96	83.5	25 07.1	19	96	83.0	25 12.7	18	96	82.5	25 18.2	18	96	81.9	25 23.6	18	95	81.4	25 28.8	17	95	80.8	25 33.9	17	95	80.3	25 38.9	16	95	79.7	7
8	24 03.8	19	96	83.3	24 09.6	19	96	82.8	24 15.3	19	96	82.3	24 20.8	18	96	81.7	24 26.3	18	95	81.2	24 31.6	18	95	80.6	24 36.8	17	95	80.1	24 41.9	17	95	79.6	8
9	23 06.2	20	96	83.1	23 12.1	19	96	82.6	23 17.9	19	96	82.1	23 23.5	19	96	81.5	23 29.0	18	95	81.0	23 34.4	18	95	80.5	23 39.8	18	95	79.9	23 45.0	17	95	79.4	9
70	22 08.7	20	96	82.9	22 14.6	20	96	82.4	22 20.5	19	96	81.9	22 26.2	19	95	81.3	22 31.8	19	95	80.8	22 37.3	18	95	80.3	22 42.7	18	95	79.7	22 48.0	17	95	79.2	70
1	21 11.2	20	96	82.7	21 17.2	20	96	82.2	21 23.1	19	96	81.7	21 28.9	19	95	81.1	21 34.6	19	95	80.6	21 40.2	18	95	80.1	21 45.7	18	95	79.5	21 51.1	18	95	79.0	1
2	20 13.8	20	96	82.5	20 19.8	20	96	82.0	20 25.8	20	96	81.4	20 31.7	19	95	80.9	20 37.4	19	95	80.4	20 43.1	19	95	79.9	20 48.7	18	95	79.4	20 54.2	18	95	78.8	2
3	19 16.3	21	96	82.3	19 22.4	20	96	81.8	19 28.5	20	95	81.2	19 34.4	20	95	80.7	19 40.3	19	95	80.2	19 46.1	19	95	79.7	19 51.8	19	95	79.2	19 57.4	19	95	78.6	3
4	18 18.9	21	96	82.1	18 25.1	21	96	81.6	18 31.2	20	95	81.0	18 37.3	20	95	80.5	18 43.2	20	95	80.0	18 49.1	19	95	79.5	18 54.9	19	95	79.0	19 00.6	19	95	78.4	4
75	17 21.5	21	96	81.9	17 27.8	21	95	81.3	17 34.0	21	95	80.8	17 40.1	20	95	80.3	17 46.2	20	95	79.8	17 52.1	20	95	79.3	17 58.0	19	95	78.8	18 03.8	19	95	78.3	75
6	16 24.2	21	96	81.6	16 30.5	21	95	81.1	16 36.8	21	95	80.6	16 43.0	21	95	80.1	16 49.1	20	95	79.6	16 55.2	20	95	79.1	17 01.2	20	95	78.6	17 07.1	20	94	78.1	6
7	15 26.8	22	96	81.4	15 33.3	21	95	80.9	15 39.6	21	95	80.4	15 45.9	21	95	79.9	15 52.2	21	95	79.4	15 58.3	20	95	78.9	16 04.4	20	95	78.4	16 10.4	20	94	77.9	7
8	14 29.5	22	96	81.2	14 36.1	22	95	80.7	14 42.5	21	95	80.2	14 48.9	21	95	79.7	14 55.2	21	95	79.2	15 01.5	21	95	78.7	15 07.7	21	94	78.2	15 13.8	20	94	77.7	8
9	13 32.3	22	95	81.0	13 38.9	22	95	80.5	13 45.4	22	95	80.0	13 51.9	21	95	79.5	13 58.3	21	95	79.0	14 04.7	21	95	78.5	14 11.0	21	94	78.0	14 17.2	21	94	77.5	9
80	12 35.1	22	95	80.8	12 41.7	22	95	80.3	12 48.4	22	95	79.8	12 54.9	22	95	79.3	13 01.5	22	95	78.8	13 07.9	21	95	78.2	13 14.3	21	94	77.7	13 20.6	21	94	77.2	80
1	11 37.9	23	96	80.5	11 44.6	22	95	80.0	11 51.4	22	95	79.5	11 58.0	22	95	79.0	12 04.6	22	95	78.5	12 11.2	22	94	78.0	12 17.7	22	94	77.5	12 24.1	21	94	77.0	1
2	10 40.7	23	95	80.3	10 47.6	23	95	79.8	10 54.4	23	95	79.3	11 01.1	22	95	78.8	11 07.9	22	95	78.3	11 14.5	22	94	77.8	11 21.1	22	94	77.3	11 27.7	22	94	76.8	2
3	9 43.6	23	95	80.1	9 50.6	23	95	79.6	9 57.5	23	95	79.1	10 04.3	23	95	78.6	10 11.1	23	94	78.1	10 17.9	22	94	77.6	10 24.6	22	94	77.1	10 31.3	22	94	76.6	3
4	8 46.6	23	95	79.8	8 53.6	23	95	79.3	9 00.6	23	95	78.9	9 07.5	23	95	78.4	9 14.4	23	94	77.9	9 21.3	23	94	77.4	9 28.1	23	94	76.9	9 34.9	23	94	76.4	4
85	7 49.5	24	95	79.6	7 56.7	24	95	79.1	8 03.7	24	95	78.6	8 10.8	23	94	78.1	8 17.8	23	94	77.6	8 24.8	23	94	77.2	8 31.7	23	94	76.7	8 38.6	23	94	76.2	85
6	6 52.6	24	95	79.4	6 59.8	24	95	78.9	7 06.9	24	95	78.4	7 14.1	24	94	77.9	7 21.2	24	94	77.4	7 28.3	24	94	76.9	7 35.4	23	94	76.4	7 42.4	23	94	75.9	6
7	5 55.6	24	95	79.1	6 02.9	24	95	78.6	6 10.2	24	94	78.2	6 17.5	24	94	77.7	6 24.7	24	94	77.2	6 31.9	24	94	76.7	6 39.0	24	94	76.2	6 46.2	24	94	75.7	7
8					5 06.1	25	95	78.4	5 13.5	25	94	77.9	5 20.9	24	94	77.4	5 28.2	24	94	76.9	5 35.5	24	94	76.5	5 42.8	24	94	76.0	5 50.1	24	93	75.5	8

H.A.	12° 00′				12° 30′				13° 00′				13° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	63 09.0	1.0	02	180.0	62 30.0	1.0	02	180.0	62 00.0	1.0	02	180.0	61 30.0	1.0	02	180.0
1	62 58.9	1.0	05	177.8	62 28.9	1.0	05	177.9	61 59.0	1.0	05	177.9	61 29.0	1.0	05	178.0
2	62 55.6	1.0	09	175.7	62 25.7	1.0	09	175.8	61 55.8	1.0	09	175.9	61 25.9	1.0	09	175.9
3	62 50.2	99	13	173.6	62 20.4	99	12	173.7	61 50.6	99	12	173.8	61 20.7	99	12	173.9
4	62 42.7	99	16	171.4	62 13.0	99	16	171.6	61 43.3	99	16	171.8	61 13.6	99	15	171.9
05	62 33.0	98	20	169.3	62 03.5	98	19	169.5	61 34.0	98	19	169.7	61 04.4	98	19	169.9
6	62 21.2	98	23	167.3	61 51.9	98	23	167.5	61 22.6	98	22	167.7	69 53.3	98	22	167.9
7	62 07.5	97	26	165.2	61 38.4	97	26	165.5	61 09.3	97	25	165.8	60 40.2	97	25	166.0
8	61 51.7	96	29	163.2	61 22.9	96	29	163.5	60 54.1	96	28	163.8	60 25.3	96	28	164.1
9	61 34.0	95	33	161.3	61 05.5	95	32	161.6	60 37.0	95	32	161.9	60 08.5	95	31	162.2
10	61 14.5	94	36	159.3	60 46.3	94	35	159.7	60 18.1	94	34	160.0	59 49.9	94	34	160.4
1	60 53.1	93	38	157.4	60 25.3	93	38	157.8	59 57.5	93	37	158.2	59 29.5	93	37	158.6
2	60 30.0	91	41	155.6	60 02.6	92	41	156.0	59 35.1	92	40	156.4	59 07.5	92	39	156.8
3	60 05.3	90	44	153.8	59 38.2	90	43	154.2	59 11.1	91	43	154.7	58 43.9	91	42	155.1
4	59 38.9	89	46	152.1	59 12.3	89	46	152.5	58 45.5	89	45	153.0	58 18.7	90	44	153.4
15	59 11.0	87	49	150.4	58 44.8	88	48	150.9	58 18.4	88	48	151.3	57 52.0	88	47	151.8
6	58 41.6	86	51	148.7	58 15.8	86	51	149.2	57 49.9	87	50	149.7	57 23.9	87	49	150.2
7	58 10.9	84	53	147.2	57 45.5	85	53	147.7	57 20.0	85	52	148.1	56 54.4	86	51	148.6
8	57 38.8	83	56	145.6	57 13.8	83	55	146.1	56 48.7	84	54	146.6	56 23.5	84	53	147.1
9	57 05.4	82	58	144.1	56 40.9	82	57	144.6	56 16.2	82	56	145.2	55 51.5	83	55	145.7
20	56 30.9	80	60	142.7	56 06.8	81	59	143.2	55 42.5	81	58	143.7	55 18.2	81	57	144.3
1	55 55.2	79	61	141.3	55 31.5	79	61	141.8	55 07.7	80	60	142.4	54 43.8	80	59	142.9
2	55 18.4	77	63	139.9	54 55.2	78	62	140.5	54 31.8	78	62	141.0	54 08.3	79	61	141.6
3	54 40.6	76	65	138.6	54 17.8	76	64	139.2	53 54.8	77	63	139.7	53 31.7	77	63	140.3
4	54 01.8	74	66	137.4	53 39.4	75	65	137.9	53 16.9	75	65	138.5	52 54.2	76	64	139.0
25	53 22.1	73	68	136.1	53 00.1	73	67	136.7	52 38.0	74	66	137.3	52 15.7	75	66	137.8
6	52 41.5	72	69	135.0	52 20.0	72	68	135.5	51 58.2	73	68	136.1	51 36.4	73	67	136.7
7	52 00.1	70	70	133.8	51 39.0	71	70	134.4	51 17.6	71	69	135.0	50 56.2	72	68	135.5
8	51 17.9	69	72	132.7	50 57.2	69	71	133.3	50 36.3	70	70	133.9	50 15.2	70	70	134.4
9	50 35.0	68	73	131.7	50 14.6	68	72	132.3	49 54.1	69	71	132.8	49 33.4	69	71	133.4
30	49 51.4	66	74	130.7	49 31.4	67	73	131.2	49 11.3	67	73	131.8	48 51.0	68	72	132.4
1	49 07.1	65	75	129.7	48 47.5	66	74	130.2	48 27.7	66	74	130.8	48 07.8	67	73	131.4
2	48 22.1	64	76	128.7	48 02.9	64	75	129.3	47 43.6	65	75	129.9	47 24.0	65	74	130.4
3	47 36.6	63	77	127.8	47 17.8	63	76	128.4	46 58.8	64	76	128.9	46 39.6	64	75	129.5
4	46 50.6	61	78	126.9	46 32.1	62	77	127.5	46 13.4	62	76	128.0	45 54.6	63	76	128.6
35	46 04.0	60	78	126.0	45 45.8	61	78	126.6	45 27.5	61	77	127.2	45 09.0	62	77	127.7
6	45 16.8	59	79	125.2	44 59.0	60	79	125.8	44 41.1	60	78	126.3	44 22.9	61	78	126.9
7	44 29.2	58	80	124.4	44 11.8	59	80	125.0	43 54.1	59	79	125.5	43 36.3	60	78	126.1
8	43 41.2	57	81	123.6	43 24.1	57	80	124.2	43 06.7	58	80	124.7	42 49.3	59	79	125.3
9	42 52.7	56	81	122.9	42 35.9	56	81	123.4	42 18.9	57	80	124.0	42 01.7	57	80	124.5
40	42 03.8	55	82	122.1	41 47.3	55	82	122.7	41 30.6	56	81	123.2	41 13.8	56	81	123.8
1	41 14.6	54	83	121.4	40 58.3	54	82	122.0	40 42.0	55	82	122.5	40 25.4	55	81	123.1
2	40 24.9	53	83	120.7	40 09.0	53	83	121.3	39 52.9	54	82	121.8	39 36.6	54	82	122.4
3	39 34.9	52	84	120.1	39 19.3	52	83	120.6	39 03.5	53	83	121.2	38 47.5	53	82	121.7
4	38 44.6	51	84	119.4	38 29.2	51	84	120.0	38 13.7	52	83	120.5	37 58.0	52	83	121.0
45	37 54.0	50	85	118.8	37 38.9	51	84	119.3	37 23.6	51	84	119.9	37 08.2	52	84	120.4
6	37 03.0	49	85	118.2	36 48.2	50	85	118.7	36 33.2	50	85	119.2	36 18.1	51	84	119.8
7	36 11.8	48	86	117.6	35 57.2	49	85	118.1	35 42.5	49	85	118.6	35 27.6	50	85	119.2
8	35 20.3	48	86	117.0	35 05.9	48	86	117.5	34 51.5	48	85	118.1	34 36.9	49	85	118.6
9	34 28.5	47	87	116.4	34 14.4	47	86	117.0	34 00.2	48	86	117.5	33 45.8	48	86	118.0
50	33 36.5	46	87	115.9	33 22.6	46	87	116.4	33 08.7	47	86	116.9	32 54.6	47	86	117.5
1	32 44.2	45	87	115.4	32 30.6	46	87	115.9	32 16.9	46	87	116.4	32 03.0	46	86	116.9
2	31 51.7	44	88	114.8	31 38.4	45	87	115.4	31 24.8	45	87	115.9	31 11.2	46	87	116.4
3	30 59.0	44	88	114.3	30 45.9	44	88	114.9	30 32.6	44	87	115.4	30 19.2	45	87	115.9
4	30 06.1	43	89	113.8	29 53.2	43	88	114.4	29 40.1	44	88	114.9	29 26.9	44	87	115.4
55	29 13.0	42	89	113.4	29 00.3	43	88	113.9	28 47.4	43	88	114.4	28 34.5	43	88	114.9
6	28 19.7	42	89	112.9	28 07.2	42	89	113.4	27 54.6	42	88	113.9	27 41.8	43	88	114.4
7	27 26.2	41	89	112.4	27 13.9	41	89	112.9	27 01.5	42	89	113.5	26 49.0	42	88	114.0
8	26 32.6	40	90	112.0	26 20.5	41	89	112.5	26 08.2	41	89	113.0	25 55.9	41	89	113.5
9	25 38.7	40	90	111.6	25 26.8	40	90	112.1	25 14.8	40	89	112.6	25 02.7	41	89	113.1
60	24 44.8	39	90	111.1	24 33.0	39	90	111.6	24 21.2	40	90	112.1	24 09.3	40	89	112.6
1	23 50.6	38	90	110.7	23 39.1	39	90	111.2	23 27.4	39	90	111.7	23 15.7	39	90	112.2
2	22 56.4	38	91	110.3	22 45.0	38	90	110.8	22 33.5	38	90	111.3	22 22.0	39	90	111.8
3	22 01.9	37	91	109.9	21 50.7	37	91	110.4	21 39.5	38	90	110.9	21 28.1	38	90	111.4
4	21 07.4	37	91	109.5	20 56.4	37	91	110.0	20 45.3	37	91	110.5	20 34.1	37	90	111.0
65	20 12.7	36	91	109.1	20 01.8	36	91	109.6	19 50.9	37	91	110.1	19 39.9	37	91	110.6
6	19 17.9	35	92	108.8	19 07.2	36	91	109.3	18 56.4	36	91	109.8	18 45.6	36	91	110.3
7	18 22.9	35	92	108.4	18 12.4	35	91	108.9	18 01.8	35	91	109.4	17 51.2	36	91	109.9
8	17 27.9	34	92	108.1	17 17.5	35	92	108.5	17 07.1	35	91	109.0	16 56.6	35	91	109.5
9	16 32.7	34	92	107.7	16 22.5	34	92	108.2	16 12.3	34	92	108.7	16 01.9	35	91	109.2
70	15 37.5	33	92	107.4	15 27.4	34	92	107.9	15 17.3	34	92	108.3	15 07.1	34	92	108.8
1	14 42.1	33	92	107.0	14 32.2	33	92	107.5	14 22.2	33	92	108.0	14 12.2	34	92	108.5
2	13 46.7	32	93	106.7	13 36.9	33	92	107.2	13 27.1	33	92	107.7	13 17.2	33	92	108.2
3	12 51.1	32	93	106.4	12 41.5	32	92	106.9	12 31.8	32	92	107.3	12 22.1	33	92	107.8
4	11 55.4	32	93	106.1	11 46.0	32	93	106.5	11 36.4	32	92	107.0	11 26.8	32	92	107.5
75	10 59.7	31	93	105.7	10 50.4	31	93	106.2	10 41.0	31	93	106.7	10 31.5	32	92	107.2
6	10 03.9	31	93	105.4	9 54.7	31	93	105.9	9 45.4	31	93	106.4	9 36.1	31	92	106.9
7	9 08.0	30	93	105.1	8 58.9	30	93	105.6	8 49.8	30	93	106.1	8 40.6	31	93	106.6
8	8 12.0	30	93	104.8	8 03.0	30	93	105.3	7 54.0	30	93	105.8	7 45.0	30	93	106.3
9	7 15.9	29	94	104.5	7 07.1	29	93	105.0	6 58.2	30	93	105.5	6 49.4	30	93	106.0
80	6 19.8	29	94	104.3	6 11.1	29	93	104.7	6 02.4	29	93	105.2	5 53.6	29	93	105.7
1	5 23.6	29	94	104.0	5 15.0	29	94	104.5	5 06.4	29	93	104.9				

14° 00′				14° 30′				15° 00′				15° 30′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
61 00.0	1.0	02	180.0	60 30.0	1.0	02	180.0	60 00.0	1.0	02	180.0	59 30.0	1.0	02	180.0	00
60 59.0	1.0	05	178.0	60 29.0	1.0	05	178.0	59 59.0	1.0	05	178.1	59 29.0	1.0	05	178.1	1
60 56.0	1.0	08	176.0	60 26.0	1.0	08	176.1	59 56.1	1.0	08	176.1	59 26.2	1.0	08	176.2	2
60 50.9	99	12	174.0	60 21.1	99	12	174.1	59 51.2	99	11	174.2	59 21.4	1.0	11	174.3	3
60 43.9	99	15	172.0	60 14.2	99	15	172.2	59 44.4	99	14	172.3	59 14.7	99	14	172.4	4
60 34.9	99	18	170.1	60 05.3	99	18	170.3	59 35.7	99	18	170.4	59 06.1	99	17	170.6	05
60 23.9	98	21	168.2	59 54.6	98	21	168.4	59 25.2	98	21	168.6	58 55.8	98	20	168.7	6
60 11.1	97	24	166.2	59 41.9	97	24	166.5	59 12.7	97	24	166.7	58 43.5	97	23	166.9	7
59 56.4	96	28	164.4	59 27.5	96	27	164.6	58 58.5	97	27	164.9	58 29.5	97	26	165.1	8
59 39.9	95	30	162.5	59 11.2	96	30	162.8	58 42.5	96	30	163.1	58 13.8	96	29	163.4	9
59 21.6	94	33	160.7	58 53.2	95	33	161.0	58 24.8	95	32	161.3	57 56.4	95	32	161.6	10
59 01.6	93	36	158.9	58 33.5	94	36	159.3	58 05.4	94	35	159.6	57 37.3	94	34	159.9	1
58 39.9	92	39	157.2	58 12.2	92	38	157.5	57 44.4	93	38	157.9	57 16.6	93	37	158.2	2
58 16.6	91	41	155.5	57 49.3	91	41	155.9	57 21.8	92	40	156.2	56 54.3	92	40	156.6	3
57 51.8	90	44	153.8	57 24.8	90	43	154.2	56 57.7	90	43	154.6	56 30.6	91	42	155.0	4
57 25.5	89	46	152.2	56 58.9	89	46	152.6	56 32.2	89	45	153.0	56 05.4	89	44	153.4	15
56 57.7	87	49	150.6	56 31.5	88	48	151.1	56 05.2	88	47	151.5	55 38.8	88	47	151.9	6
56 28.6	86	51	149.1	56 02.8	86	50	149.5	55 36.9	87	49	150.0	55 10.8	87	49	150.4	7
55 58.2	85	53	147.6	55 32.8	85	52	148.1	55 07.3	85	51	148.5	54 41.6	86	51	149.0	8
55 26.6	83	55	146.2	55 01.5	84	54	146.6	54 36.4	84	53	147.1	54 11.1	84	53	147.6	9
54 53.7	82	57	144.8	54 29.1	82	56	145.2	54 04.3	83	55	145.7	53 39.5	83	55	146.2	20
54 19.7	80	58	143.4	53 55.5	81	58	143.9	53 31.1	81	57	144.4	53 06.7	82	56	144.9	1
53 44.6	79	60	142.1	53 28.8	80	60	142.6	52 56.9	80	59	143.1	52 32.8	80	58	143.6	2
53 08.5	78	62	140.8	52 45.1	78	61	141.3	52 21.6	79	60	141.8	51 57.9	79	60	142.3	3
52 31.3	76	63	139.6	52 08.4	77	63	140.1	51 45.3	77	62	140.6	51 22.0	78	61	141.1	4
51 53.3	75	65	138.4	51 30.7	75	64	138.9	51 08.0	76	64	139.4	50 45.2	76	63	139.9	25
51 14.3	74	66	137.2	50 52.2	74	66	137.7	50 29.9	75	65	138.3	50 07.4	75	64	138.8	6
50 34.6	72	68	136.1	50 12.8	73	67	136.6	49 50.9	73	66	137.2	49 28.8	74	66	137.7	7
49 54.0	71	69	135.0	49 32.6	72	68	135.5	49 11.0	72	68	136.1	48 49.4	72	67	136.6	8
49 12.6	70	70	133.9	48 51.6	70	70	134.5	48 30.5	71	69	135.0	48 09.2	71	68	135.6	9
48 30.5	68	71	132.9	48 09.9	69	71	133.5	47 49.1	69	70	134.0	47 28.2	70	69	134.5	30
47 47.7	67	72	131.9	47 27.5	68	72	132.5	47 07.1	68	71	133.0	46 46.6	69	71	133.6	1
47 04.3	66	73	131.0	46 44.4	66	73	131.5	46 24.4	67	72	132.1	46 04.2	68	72	132.6	2
46 20.2	65	74	130.1	46 00.7	65	74	130.6	45 41.1	66	73	131.1	45 21.3	66	73	131.7	3
45 35.6	64	75	129.2	45 16.4	64	75	129.7	44 57.1	65	74	130.2	44 37.7	65	74	130.8	4
44 50.4	62	76	128.3	44 31.6	63	76	128.8	44 12.6	63	75	129.4	43 53.5	64	75	129.9	35
44 04.6	61	77	127.5	43 46.2	62	77	128.0	43 27.5	62	76	128.5	43 08.8	63	75	129.1	6
43 18.4	60	78	126.6	43 00.2	61	77	127.2	42 42.0	61	77	127.7	42 23.5	62	76	128.3	7
42 31.6	59	79	125.8	42 13.8	60	78	126.4	41 55.9	60	78	126.9	41 37.8	61	77	127.5	8
41 44.4	58	79	125.1	41 26.9	59	79	125.6	41 09.3	59	78	126.2	40 51.5	60	78	126.7	9
40 56.8	57	80	124.3	40 39.6	57	80	124.9	40 22.3	58	79	125.4	40 04.8	58	79	125.9	40
40 08.7	56	81	123.6	39 51.9	56	80	124.2	39 34.9	57	80	124.7	39 17.7	57	79	125.2	1
39 20.2	55	81	122.9	39 03.7	55	81	123.5	38 47.0	56	80	124.0	38 30.2	56	80	124.5	2
38 31.4	54	82	122.2	38 15.2	54	82	122.8	37 58.8	55	81	123.3	37 42.2	55	81	123.8	3
37 42.2	53	83	121.6	37 26.2	53	82	122.1	37 10.1	54	82	122.6	36 53.9	54	81	123.2	4
36 52.7	52	83	120.9	36 37.0	53	83	121.5	36 21.2	53	82	122.0	36 05.2	53	82	122.5	45
36 02.8	51	84	120.3	35 47.4	52	83	120.8	35 31.8	52	83	121.4	35 16.2	53	82	121.9	6
35 12.6	50	84	119.7	34 57.5	51	84	120.2	34 42.2	51	83	120.8	34 26.8	52	83	121.3	7
34 22.1	49	85	119.1	34 07.3	50	84	119.6	33 52.2	50	84	120.2	33 37.1	51	83	120.7	8
33 31.4	49	85	118.6	33 16.7	49	85	119.1	33 02.0	49	84	119.6	32 47.1	50	84	120.1	9
32 40.3	48	86	118.0	32 25.9	48	85	118.5	32 11.5	49	85	119.0	31 56.8	49	84	119.5	50
31 49.0	47	86	117.5	31 34.9	47	86	118.0	31 20.6	48	85	118.5	31 06.3	48	85	119.0	1
30 57.5	46	86	116.9	30 43.6	46	86	117.4	30 29.6	47	86	118.0	30 15.5	47	85	118.5	2
30 05.7	45	87	116.4	29 52.0	46	86	116.9	29 38.3	46	86	117.4	29 24.4	46	86	117.9	3
29 13.6	45	87	115.9	29 00.2	45	87	116.4	28 46.7	45	86	116.9	28 33.1	46	86	117.4	4
28 21.4	44	87	115.4	28 08.2	44	87	115.9	27 54.9	45	87	116.4	27 41.5	45	86	116.9	55
27 29.0	43	88	114.9	27 16.0	43	87	115.4	27 02.9	44	87	116.0	26 49.7	44	87	116.5	6
26 36.3	42	88	114.5	26 23.6	43	88	115.0	26 10.7	43	87	115.5	25 57.7	43	87	116.0	7
25 43.5	42	88	114.0	25 30.9	42	88	114.5	25 18.3	42	88	115.0	25 05.5	43	87	115.5	8
24 50.4	41	89	113.6	24 38.1	41	88	114.1	24 25.7	42	88	114.6	24 13.2	42	88	115.1	9
23 57.2	40	89	113.1	23 45.1	41	89	113.6	23 32.9	41	88	114.1	23 20.6	41	88	114.6	60
23 03.9	40	89	112.7	22 51.9	40	89	113.2	22 39.9	40	89	113.7	22 27.8	41	88	114.2	1
22 10.3	39	90	112.3	21 58.6	39	89	112.8	21 46.8	40	89	113.3	21 34.9	40	88	113.8	2
21 16.6	38	90	111.9	21 05.1	39	89	112.4	20 53.5	39	89	112.9	20 41.7	39	89	113.4	3
20 22.8	38	90	111.5	20 11.4	38	90	112.0	20 00.0	38	89	112.5	19 48.5	39	89	113.0	4
19 28.8	37	90	111.1	19 17.6	37	90	111.6	19 06.4	38	90	112.1	18 55.0	38	89	112.6	65
18 34.7	37	90	110.7	18 23.7	37	90	111.2	18 12.6	37	90	111.7	18 01.5	37	90	112.2	6
17 40.4	36	91	110.4	17 29.6	36	90	110.9	17 18.7	36	90	111.4	17 07.7	37	90	111.8	7
16 46.0	35	91	110.0	16 35.4	36	91	110.5	16 24.7	36	90	111.0	16 13.9	36	90	111.5	8
15 51.5	35	91	109.7	15 41.0	35	91	110.1	15 30.5	35	90	110.6	15 19.9	35	90	111.1	9
14 56.9	34	91	109.3	14 46.6	34	91	109.8	14 36.2	35	91	110.3	14 25.8	35	90	110.8	70
14 02.1	34	91	109.0	13 52.0	34	91	109.5	13 41.8	34	91	109.9	13 31.5	34	91	110.4	1
13 07.3	33	92	108.6	12 57.3	33	91	109.1	12 47.2	34	91	109.6	12 37.1	34	91	110.1	2
12 12.3	33	92	108.3	12 02.5	33	92	108.8	11 52.6	33	91	109.3	11 42.6	33	91	109.8	3
11 17.2	32	92	108.0	11 07.5	32	92	108.5	10 57.8	32	91	109.0	10 48.1	33	91	109.4	4
10 22.0	32	92	107.7	10 12.5	32	92	108.2	10 03.0	32	92	108.6	9 53.3	32	91	109.1	75
9 26.8	31	92	107.4	9 17.4	31	92	107.8	9 08.0	31	92	108.3	8 58.5	32	92	108.8	6
8 31.4	31	92	107.1	8 22.2	31	92	107.5	8 12.9	31	92	108.0	8 03.6	31	92	108.5	7
7 36.0	30	93	106.8	7 26.9	30	92	107.2	7 17.8	30	92	107.7	7 08.6	31	92	108.2	8
6 40.4	30	93	106.5	6 31.5	30	92	107.0	6 22.5	30	92	107.4	6 13.5	30	92	107.9	9
5 44.8	29	93	106.2	5 36.0	29	93	106.7	5 27.2	29	92	107.1	5 18.3	30	92	107.6	80
																1

Lat. 15°

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	89 00.0	1.0 39	00.0	88 30.0	1.0 28	00.0	88 00.0	1.0 22	00.0	87 30.0	1.0 18	00.0	87 00.0	1.0 15	00.0	86 30.0	1.0 13	00.0	86 00.0	1.0 11	00.0	85 30.0	1.0 10	00.0	00
1	88 36.7	72 78	43.8	88 13.1	84 66	32.6	87 46.9	90 56	25.5	87 19.3	93 47	20.9	86 51.0	95 41	17.6	86 22.3	96 36	15.2	85 53.2	97 32	13.3	85 24.0	98 29	11.8	1
2	87 49.7	46 89	62.3	87 33.6	61 81	51.8	87 13.6	72 78	43.6	86 50.9	79 66	37.3	86 26.4	84 60	32.3	86 00.6	87 54	28.4	85 34.0	90 49	25.3	85 06.7	92 45	22.7	2
3	86 56.5	32 92	70.5	86 44.8	45 88	62.1	86 29.5	56 82	54.9	86 11.2	65 77	48.6	85 50.6	72 71	43.4	85 28.4	77 66	39.0	85 04.7	81 61	35.2	84 40.0	84 57	32.1	3
4	86 01.1	24 94	74.9	85 52.1	35 91	68.2	85 40.0	45 87	62.0	85 25.1	54 83	56.4	85 07.9	61 79	51.4	84 48.7	67 74	47.0	84 28.0	72 70	43.2	84 05.9	76 66	39.8	4
05	85 04.8	19 96	77.6	84 57.6	29 93	72.0	84 47.7	37 90	66.7	84 35.3	45 87	61.8	84 20.7	52 83	57.3	84 04.2	58 80	53.1	83 46.0	63 76	49.4	83 26.4	68 72	46.0	05
6	84 08.0	16 96	79.4	84 02.0	24 94	74.6	83 53.8	31 92	70.1	83 43.3	38 89	65.7	83 30.8	45 86	61.6	83 16.4	51 83	57.8	83 00.4	56 80	54.3	82 43.0	60 77	51.0	6
7	83 10.9	13 96	80.6	83 05.9	20 94	76.5	82 58.9	27 93	72.5	82 49.8	33 91	68.6	82 39.0	39 88	65.0	82 26.4	45 86	61.5	82 12.2	50 83	58.2	81 56.6	54 81	55.1	7
8	82 13.6	11 96	81.6	82 09.4	17 95	77.9	82 03.3	23 93	74.3	81 55.4	29 92	70.9	81 45.9	35 90	67.5	81 34.8	40 88	64.3	81 22.2	44 86	61.3	81 08.1	49 83	58.4	8
9	81 16.2	09 96	82.2	81 12.6	15 95	79.0	81 07.3	20 94	75.8	81 00.4	26 93	72.6	80 52.0	31 91	69.6	80 42.0	35 89	66.6	80 30.7	40 87	63.8	80 18.1	44 85	61.1	9
10	80 18.8	08 96	82.8	80 15.6	13 95	79.8	80 11.0	18 94	76.9	80 04.9	23 93	74.0	79 57.3	27 92	71.2	79 48.4	32 90	68.5	79 38.2	36 89	65.9	79 26.8	40 87	63.3	10
1	79 21.3	07 96	83.2	79 18.5	11 95	80.5	79 14.4	16 95	77.8	79 09.0	20 94	75.2	79 02.2	25 92	72.6	78 54.2	29 91	70.1	78 45.0	33 90	67.6	78 34.6	37 88	65.2	1
2	78 23.7	06 96	83.5	78 21.3	10 95	81.0	78 17.7	14 95	78.5	78 12.8	18 94	76.1	78 06.8	22 93	73.7	77 59.5	26 92	71.4	77 51.1	30 91	69.1	77 41.6	34 89	66.9	2
3	77 26.1	05 96	83.7	77 24.1	09 96	81.4	77 20.8	13 95	79.1	77 16.5	16 94	76.9	77 11.0	20 93	74.7	77 04.4	24 92	72.5	76 56.7	27 91	70.3	76 48.0	31 90	68.2	3
4	76 28.5	04 96	83.9	76 26.7	08 96	81.8	76 23.9	11 95	79.6	76 20.0	15 94	77.5	76 15.0	18 94	75.5	76 09.0	22 93	73.4	76 02.0	25 92	71.4	75 54.0	28 91	69.4	4
15	75 30.8	03 96	84.0	75 29.3	07 96	82.1	75 26.8	10 95	80.1	75 23.3	13 95	78.1	75 18.8	17 94	76.1	75 13.3	20 93	74.2	75 06.9	23 92	72.3	74 59.6	26 91	70.4	15
6	74 33.2	03 96	84.2	74 31.9	06 96	82.3	74 29.7	09 95	80.4	74 26.6	12 95	78.6	74 22.5	15 94	76.7	74 17.5	18 93	74.9	74 11.6	21 93	73.1	74 04.8	24 92	71.3	6
7	73 35.5	02 96	84.2	73 34.5	05 96	82.5	73 32.5	08 95	80.7	73 29.7	11 96	79.0	73 26.0	14 94	77.2	73 21.4	17 94	75.5	73 16.0	19 93	73.8	73 09.8	22 92	72.1	7
8	72 37.9	01 96	84.3	72 37.0	04 96	82.6	72 35.3	07 95	81.0	72 32.8	10 95	79.3	72 29.4	13 94	77.6	72 25.3	15 94	76.0	72 20.3	18 93	74.4	72 14.5	21 92	72.8	8
9	71 40.2	01 96	84.3	71 39.5	04 96	82.8	71 38.1	06 95	81.2	71 35.8	09 95	79.6	71 32.8	11 95	78.0	71 29.0	14 94	76.4	71 24.4	17 93	74.9	71 19.1	19 93	73.4	9
20	70 42.5	00 96	84.4	70 42.0	03 96	82.8	70 40.8	05 96	81.3	70 38.8	08 95	79.8	70 36.1	10 95	78.3	70 32.6	13 94	76.8	70 28.4	15 94	75.4	70 23.5	18 93	73.9	20
1	69 44.9	00 96	84.4	69 44.5	02 96	82.9	69 43.5	05 96	81.5	69 41.7	07 95	80.0	69 39.3	09 95	78.6	69 36.1	12 94	77.2	69 32.3	14 94	75.8	69 27.7	16 93	74.3	1
2	68 47.2	01 96	84.4	68 47.0	02 96	83.0	68 46.2	04 96	81.6	68 44.6	06 95	80.2	68 42.4	08 95	78.8	68 39.6	11 94	77.5	68 36.0	13 94	76.1	68 31.9	15 93	74.8	2
3	67 49.5	01 96	84.3	67 49.5	01 96	83.0	67 48.8	03 96	81.7	67 47.5	05 95	80.4	67 45.6	08 95	79.0	67 43.0	10 94	77.7	67 39.8	12 94	76.4	67 35.9	14 93	75.1	3
4	66 51.8	01 96	84.3	66 52.0	01 96	83.0	66 51.5	03 96	81.8	66 50.4	05 95	80.5	66 48.6	07 95	79.2	66 46.3	09 94	78.0	66 43.4	11 94	76.7	66 39.8	13 94	75.4	4
25	65 54.2	02 96	84.3	65 54.4	00 96	83.0	65 54.1	02 96	81.8	65 53.2	04 95	80.6	65 51.7	06 95	79.4	65 49.6	08 95	78.2	65 47.0	10 94	76.9	65 43.7	12 94	75.7	25
6	64 56.5	02 96	84.2	64 56.9	00 96	83.0	64 56.7	01 96	81.9	64 56.0	03 95	80.7	64 54.7	05 95	79.5	64 52.9	07 95	78.3	64 50.5	09 94	77.2	64 47.5	11 94	76.0	6
7	63 58.8	03 96	84.2	63 59.4	01 96	83.0	63 59.4	01 96	81.9	63 58.8	03 95	80.7	63 57.7	05 95	79.6	63 56.1	06 95	78.5	63 53.9	08 94	77.3	63 51.3	10 94	76.2	7
8	63 01.2	03 96	84.1	63 01.8	01 96	83.0	63 02.0	00 96	81.9	63 01.6	02 95	80.8	63 00.7	04 95	79.7	62 59.3	06 95	78.6	62 57.4	07 94	77.5	62 55.0	09 94	76.4	8
9	62 03.5	03 96	84.0	62 04.3	02 96	83.0	62 04.6	00 96	81.9	62 04.4	02 95	80.8	62 03.7	03 95	79.8	62 02.5	05 95	78.7	62 00.8	06 94	77.6	61 58.6	08 94	76.6	9
30	61 05.9	04 96	84.0	61 06.8	02 96	82.9	61 07.2	01 96	81.9	61 07.2	01 95	80.9	61 06.6	03 95	79.8	61 05.6	04 96	78.8	61 04.2	06 94	77.8	61 02.2	07 94	76.7	30
1	60 08.3	04 96	83.9	60 09.3	03 96	82.9	60 09.8	01 96	81.9	60 09.9	00 95	80.9	60 09.6	02 96	79.9	60 08.8	03 95	78.9	60 07.5	05 94	77.9	60 05.8	06 94	76.9	1
2	59 10.7	04 96	83.8	59 11.8	03 96	82.8	59 12.5	02 96	81.9	59 12.7	00 95	80.9	59 12.5	01 95	79.9	59 11.9	03 95	78.9	59 10.8	04 94	78.0	59 09.3	06 94	77.0	2
3	58 13.0	05 96	83.7	58 14.3	03 96	82.8	58 15.1	02 96	81.8	58 15.5	01 95	80.9	58 15.5	01 95	79.9	58 15.0	02 96	79.0	58 14.1	04 94	78.0	58 12.9	05 94	77.1	3
4	57 15.4	05 96	83.6	57 16.8	04 96	82.7	57 17.7	02 96	81.8	57 18.3	01 95	80.9	57 18.4	00 95	79.9	57 18.1	02 95	79.0	57 17.4	03 95	78.1	57 16.4	04 94	77.2	4
35	56 17.8	06 96	83.5	56 19.3	04 96	82.6	56 20.4	03 96	81.7	56 21.1	02 95	80.8	56 21.3	00 95	79.9	56 21.2	01 95	79.0	56 20.7	02 95	78.1	56 19.8	04 94	77.2	35
6	55 20.3	06 96	83.4	55 21.8	05 96	82.6	55 23.0	03 96	81.7	55 23.8	02 95	80.8	55 24.3	01 95	79.9	55 24.3	00 95	79.0	55 24.0	02 95	78.2	55 23.3	03 94	77.3	6
7	54 22.7	06 96	83.3	54 24.4	05 96	82.5	54 25.7	04 96	81.6	54 26.6	03 95	80.8	54 27.2	01 95	79.9	54 27.4	00 95	79.0	54 27.3	01 95	78.2	54 26.8	02 94	77.3	7
8	53 25.1	07 96	83.2	53 26.9	05 96	82.4	53 28.4	04 96	81.6	53 29.4	03 95	80.7	53 30.2	02 95	79.9	53 30.5	01 95	79.0	53 30.6	01 95	78.2	53 30.2	02 94	77.4	8
9	52 27.6	07 96	83.1	52 29.5	06 96	82.3	52 31.0	05 96	81.5	52 32.2	03 95	80.7	52 33.1	02 95	79.8	52 33.6	01 95	79.0	52 33.8	00 95	78.2	52 33.7	01 94	77.4	9
40	51 30.1	07 96	83.0	51 32.1	06 96	82.2	51 33.7	05 96	81.4	51 35.1	04 95	80.6	51 36.1	03 95	79.8	51 36.8	02 95	79.0	51 37.1	01 95	78.2	51 37.1	00 94	77.4	40
1	50 32.5	08 96	82.9	50 34.6	06 96	82.1	50 36.4	05 95	81.3	50 37.9	04 95	80.5	50 39.0	03 95	79.8	50 39.9	02 95	79.0	50 40.4	01 95	78.2	50 40.6	00 94	77.4	1
2	49 35.0	08 96	82.8	49 37.2	07 96	82.0	49 39.1	06 95	81.3	49 40.7	05 95	80.5	49 42.0	04 95	79.7	49 43.0	03 95	78.9	49 43.6	02 95	78.2	49 44.0	01 94	77.4	2
3	48 37.5	08 96	82.7	48 39.8	07 96	81.9	48 41.9	06 95	81.2	48 43.6	05 95	80.4	48 45.0	04 95	79.6	48 46.1	03 95	78.9	48 46.9	02 95	78.1	48 47.4	01 94	77.4	3
4	47 40.1	09 96	82.6	47 42.5	08 96	81.8	47 44.6	07 95	81.1	47 46.4	06 95	80.3	47 48.0	05 95	79.6	47 49.2	04 95	78.8	47 50.2	03 95	78.1	47 50.9	02 94	77.4	4
45	46 42.6	09 96	82.4	46 45.1	08 96	81.7	46 47.4	07 95	81.0	46 49.3	06 95	80.2	46 51.0	05 95	79.5	46 52.4	04 95	78.8	46 53.5	03 94	78.1	46 54.3	02 94	77.3	45
6	45 45.2	09 96	82.3	45 47.8	08 96	81.6	45 50.1	07 95	80.9	45 52.2	06 95	80.2	45 54.0	06 95	79.4	45 55.5	05 95	78.7	45 56.8	04 94	78.0	45 57.8	03 94	77.3	6
7	44 47.7	09 96	82.2	44 50.5	09 96	81.5	44 52.9	08 95	80.8	44 55.1	07 95	80.1	44 57.0	06 95	79.4	44 58.7	05 95	78.7	45 00.1	04 94	78.0	45 01.3	03 94	77.2	7
8	43 50.3	10 96	82.0	43 53.1	09 95	81.4	43 55.7	08 95	80.7	43 58.0	07 95	80.0	44 00.1	06 95	79.3	44 01.9	06 95	78.6	44 03.5	05 94	77.9	44 04.8	04 94	77.2	8
9	42 52.9	10 96	81.9	42 55.9	09 95	81.2	42 58.5	09 95	80.6	43 01.0	08 95	79.9	43 03.2	07 95	79.2	43 05.1	06 95	78.5	43 06.8	05 94	77.8	43 08.3	04 94	77.1	9
50	41 55.6	10 96	81.8	41 58.6	10 95	81.1	42 01.4	09 95	80.4	42 03.9	08 95	79.8	42 06.2	07 95	79.1	42 08.3	07 95	78.4	42 10.1	06 94	77.8	42 11.8	05 94	77.1	50
1	40 58.2	11 96	81.6	41 01.3	10 95	81.0	41 04.2	09 95	80.3	41 06.9	09 95	79.7	41 09.3	08 95	79.0	41 11.5	07 95	78.3	41 13.5	06 94	77.7	41 15.3	05 94	77.0	1
2	40 00.9	11 96	81.5	40 04.1	10 95	80.9	40 07.1	10 95	80.2	40 09.9	09 95	79.6	40 12.4	08 95	78.9	40 14.8	07 95	78.3	40 16.9	07 94	77.6	40 18.8	06 94	76.9	2
3	39 03.6	11 96	81.4	39 06.9	11 95	80.7	39 10.0	10 95	80.1	39 12.9	09 95	79.4	39 15.6	09 95	78.8	39 18.1	08 94	78.2	39 20.3	07 94	77.5	39 22.4	06 94	76.9	3
4	38 06.3	12 96	81.2	38 09.7	11 95	80.6	38 12.9	10 95	80.0	38 15.9	10 95	79.3	38 18.7	09 95	78.7	38 21.3	08 94	78.1	38 23.7	08 94	77.4	38 25.9	07 94	76.8	4
55	37 09.0	12 95	81.1	37 12.5	11 95	80.5	37 15.9	11 95	79.8	37 19.0	10 95	79.2	37 21.9	09 95	78.6	37 24.7	09 94	78.0	37 27.2	08 94	77.3	37 29.5	07 94	76.7	55
6	36 11.8	12 96	80.9	36 15.4	12 95	80.3	36 18.8	11 95	79.7	36 22.1	10 95	79.1	36 25.1	10 95	78.5	36 28.0	09 94	77.9	36 30.6	09 94	77.2	36 33.1	08 94	76.6	6
7	35 14.6	13 96	80.8	35 18.3	12 96	80.2	35 21.8	11 95	79.6	35 25.2	11 95	79.0	35 28.4	10 95	78.4	35 31.3	10 94	77.7	35 34.1	09 94	77.1	35 36.8	08 94	76.5	7
8	34 17.4	13 96	80.6	34 21.2	12 95	80.0	34 24.8	12 95	79.4	34 28.3	11 95	78.8	34 31.6	11 95	78.2	34 34.7	10 94	77.6	34 37.7	09 94	77.0	34 40.4	09 94	76.4	8
9	33 20.2	13 96	80.5	33 24.1	13 95	79.9	33 27.9	12 95	79.3	33 31.5	12 95	78.7	33 34.9	11 94	78.1	33 38.1	11 94	77.5	33 41.2	10 94	76.9	33 44.1	09 94	76.3	9
60	32 23.1	14 96	80.3	32 27.1	13 95	79.7	32 30.9	13 95	79.2	32 34.6	12 95	78.6	32 38.2	12 94	78.0	32 41.5	11 94	77.4	32 44.8	10 94	76.8	32 47.8	10 94	76.2	60
1	31 25.9	14 95	80.2	31 30.1	14 95	79.6	31 34.0	13 95	79.0	31 37.9	12 95	78.4	31 41.5	12 94	77.8	31 45.0	11 94	77.3	31 48.3	11 94	76.7	31 51.5	10 94	76.1	1
2	30 28.8	14 96	80.0	30 33.1	14 96	79.4	30 37.2	13 95	78.9	30 41.1	13 95	78.3	30 44.9	12 94	77.7	30 48.5	12 94	77.1	30 52.0	11 94	76.6	30 55.3	11 94	76.0	2
3	29 31.8	15 96	79.9	29 36.1	14 95	79.3	29 40.3	14 95	78.7	29 44.4	13 94	78.1	29 48.3	13 94	77.6	29 52.0	12 94	77.0	29 55.6	12 94	76.4	29 59.1	11 94	75.9	3
4	28 34.7	15 96	79.7	28 39.2	15 96	79.1	28 43.5	14 95	78.6	28 47.7	14 94	78.0	28 51.7	13 94	77.4	28 55.5	13 94	76.9	28 59.3	12 94	76.3	29 02.9	12 94	75.7	4
65	27 37.7	15 95	79.5	27 42.3	15 95	79.0	27 46.7	14 95	78.4	27 51.0	14 94	77.8	27 55.1	14 94	77.3	27 59.1	13 94	76.7	28 03.0	13 94	76.2	28 06.7	12 94	75.6	65
6	26 40.8	16 96	79.4	26 45.4	15 95	78.8	26 49.9	15 95	78.2	26 54.3	14 94	77.7	26 58.6	14 94	77.1	27 02.7	14 94	76.6	27 06.7	13 94	76.0	27 10.6	13 94	75.5	6
7	25 43.8	16 96	79.2	25 48.6	16 95	78.6	25 53.2	15 94	78.1	25 57.7	15 94	77.5	26 02.1	14 94	77.0	26 06.4	14 94	76.4	26 10.5	14 94	75.9	26 14.5	13 93	75.3	7
8	24 46.9	16 96	79.0	24 51.8	16 95	78.5	24 56.5	16 94	77.9	25 01.2	15 94	77.4	25 05.7	15 94	76.8	25 10.1	14 94	76.3	25 14.3	14 94	75.7	25 18.5	14 93	75.2	8
9	23 50.0	17 96	78.8	23 55.0	16 95	78.3	23 59.9	16 94	77.8	24 04.6	16 94	77.2	24 09.3	15 94	76.7	24 13.8	15 94	76.1	24 18.2	14 94	75.6	24 22.5	14 93	75.0	9
70	22 53.2	17 96	78.7	22 58.3	17 94	78.1	23 03.3	16 94	77.6	23 08.1	16 94	77.1	23 12.9	16 94	76.5	23 17.5	15 94	76.0	23 22.1	15 93	75.4	23 26.5	15 93	74.9	70
1	21 56.4	17 95	78.5	22 01.6	17 94	77.9	22 06.7	17 94	77.4	22 11.7	16 94	76.9	22 16.5	16 94	76.4	22 21.3	16 94	75.8	22 26.0	15 93	75.3	22 30.6	15 93	74.7	1
2	20 59.6	18 96	78.3	21 04.9	18 94	77.8	21 10.1	17 94	77.2	21 15.2	17 94	76.7	21 20.2	17 94	76.2	21 25.1	16 94	75.7	21 30.0	16 93	75.1	21 34.7	16 93	74.6	2
3	20 02.9	18 94	78.1	20 08.3	18 94	77.6	20 13.6	18 94	77.1	20 18.8	17 94	76.5	20 24.0	17 94	76.0	20 29.0	17 93	75.5	20 34.0	16 93	75.0	20 38.8	16 93	74.4	3
4	19 06.2	19 94	77.9	19 11.7	18 94	77.4	19 17.2	18 94	76.9	19 22.5	18 94	76.4	19 27.8	17 94	75.8	19 32.9	17 93	75.3	19 38.0	17 93	74.8	19 43.0	16 93	74.3	4
75	18 09.5	19 94	77.7	18 15.2	19 94	77.2	18 20.7	18 94	76.7	18 26.2	18 94	76.2	18 31.6	18 94	75.7	18 36.9	18 93	75.1	18 42.1	17 93	74.6	18 47.2	17 93	74.1	75
6	17 12.9	19 94	77.5	17 18.7	19 94	77.0	17 24.4	19 94	76.5	17 29.9	19 94	76.0	17 35.5	18 93	75.5	17 40.9	18 93	75.0	17 46.3	18 93	74.5	17 51.5	17 93	73.9	6
7	16 16.4	20 94	77.3	16 22.2	19 94	76.8	16 28.0	19 94	76.3	16 33.7	19 94	75.8	16 39.4	19 93	75.3	16 44.9	18 93	74.8	16 50.4	18 93	74.3	16 55.9	18 93	73.8	7
8	15 19.8	20 94	77.1	15 25.8	20 94	76.6	15 31.7	20 94	76.1	15 37.6	19 94	75.6	15 43.3	19 93	75.1	15 49.0	19 93	74.6	15 54.7	19 93	74.1	16 00.2	18 93	73.6	8
9	14 23.4	20 94	76.9	14 29.5	20 94	76.4	14 35.5	20 94	75.9	14 41.5	20 93	75.4	14 47.4	20 93	74.9	14 53.2	19 93	74.4	14 59.0	19 93	73.9	15 04.7	19 92	73.4	9
80	13.26.9	21 94	76.7	13 33.1	21 94	76.2	13 39.3	20 94	75.7	13 45.4	20 93	75.2	13 51.4	20 93	74.7	13 57.4	20 93	74.2	14 03.3	20 93	73.7	14 09.2	19 92	73.2	80
1	12 30.5	21 94	76.5	12 36.9	21 94	76.0	12 43.2	21 93	75.5	12 49.4	21 93	75.0	12 55.5	20 93	74.5	13 01.7	20 93	74.0	13 07.7	20 93	73.5	13 13.7	20 92	73.0	1
2	11 34.2	22 94	76.3	11 40.7	21 94	75.8	11 47.1	21 93	75.3	11 53.4	21 93	74.8	11 59.7	21 93	74.3	12 06.0	21 93	73.8	12 12.2	21 92	73.3	12 18.3	20 92	72.8	2
3	10 37.9	22 94	76.1	10 44.5	22 94	75.6	10 51.0	22 93	75.1	10 57.5	22 93	74.6	11 03.9	21 93	74.1	11 10.3	21 93	73.6	11 16.7	21 92	73.1	11 23.0	21 92	72.6	3
4	9 41.7	22 94	75.9	9 48.4	22 93	75.4	9 55.0	22 93	74.9	10 01.7	22 93	74.4	10 08.2	22 93	73.9	10 14.8	22 93	73.4	10 21.2	22 92	72.9	10 27.7	21 92	72.4	4
85	8 45.5	23 94	75.7	8 52.3	23 93	75.2	8 59.1	23 93	74.7	9 05.9	22 93	74.2	9 12.6	22 93	73.7	9 19.2	22 92	73.2	9 25.9	22 92	72.7	9 32.5	22 92	72.2	85
6	7 49.4	23 93	75.4	7 56.3	23 93	75.0	8 03.2	23 93	74.5	8 10.1	23 93	74.0	8 17.0	23 93	73.5	8 23.8	23 92	73.0	8 30.6	23 92	72.5	8 37.3	22 92	72.0	6
7	6 53.3	24 93	75.2	7 00.4	24 93	74.7	7 07.4	23 93	74.2	7 14.5	23 93	73.8	7 21.4	23 92	73.3	7 28.4	23 92	72.8	7 35.3	23 92	72.3	7 42.2	23 92	71.8	7
8	5 57.3	24 93	75.0	6 04.5	24 93	74.5	6 11.7	24 93	74.0	6 18.8	24 93	73.5	6 26.0	24 92	73.0	6 33.1	24 92	72.5	6 40.2	24 92	72.1	6 47.2	23 92	71.6	8
9	5 01.3	25 93	74.8	5 08.7	24 93	74.3	5 16.0	24 93	73.8	5 23.3	24 92	73.3	5 30.6	24 92	72.8	5 37.8	24 92	72.3	5 45.1	24 92	71.8	5 52.3	24 92	71.3	9

H.A.	16° 00′			16° 30′			17° 00′			17° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	59 00.0	1.0 02	180.0	58 30.0	1.0 02	180.0	58 00.0	1.0 02	180.0	57 30.0	1.0 02	180.0
1	58 59.1	1.0 05	178.1	58 29.1	1.0 05	178.2	57 59.1	1.0 05	178.2	57 29.1	1.0 04	178.2
2	58 56.2	1.0 08	176.3	58 26.3	1.0 08	176.3	57 56.4	1.0 08	176.4	57 26.4	1.0 07	176.5
3	58 51.5	1.0 11	174.4	58 21.7	1.0 11	174.5	57 51.8	1.0 11	174.6	57 21.9	1.0 10	174.7
4	58 45.0	99 14	172.6	58 15.2	99 14	172.7	57 45.5	99 14	172.8	57 15.7	99 13	172.9
05	58 36.5	99 17	170.7	58 06.9	99 17	170.9	57 37.3	99 16	171.0	57 07.7	99 16	171.2
6	58 26.3	98 20	168.9	57 56.9	98 20	169.1	57 27.4	98 19	169.3	56 57.9	98 19	169.5
7	58 14.3	97 23	167.1	57 45.1	98 23	167.4	57 15.8	98 22	167.6	56 46.5	98 22	167.8
8	58 00.5	97 26	165.4	57 31.5	97 25	165.6	57 02.5	97 25	165.8	56 33.4	97 25	166.1
9	57 45.1	96 29	163.6	57 16.3	96 28	163.9	56 47.4	96 28	164.1	56 18.6	96 27	164.4
10	57 27.9	95 31	161.9	56 59.4	95 31	162.2	56 30.8	95 30	162.5	56 02.2	95 30	162.8
1	57 09.1	94 34	160.2	56 40.9	94 33	160.5	56 12.6	94 33	160.8	55 44.2	94 32	161.1
2	56 48.7	93 37	158.6	56 20.8	93 36	158.9	55 52.8	93 35	159.2	55 24.8	94 35	159.6
3	56 26.8	92 39	157.0	55 59.2	92 38	157.3	55 31.5	92 38	157.7	55 03.8	93 37	158.0
4	56 03.4	91 41	155.4	55 36.1	91 41	155.8	55 08.8	91 40	156.1	54 41.3	91 40	156.5
15	55 38.5	90 44	153.8	55 11.6	90 43	154.2	54 44.6	90 43	154.6	54 17.5	90 42	155.0
6	55 12.3	88 46	152.3	54 45.7	89 45	152.7	54 19.1	89 45	153.1	53 52.3	89 44	153.5
7	54 44.7	87 48	150.9	54 18.5	88 47	151.3	53 52.2	88 47	151.7	53 25.8	88 46	152.1
8	54 15.9	86 50	149.4	53 50.0	86 50	149.9	53 24.1	87 49	150.3	52 58.1	87 48	150.7
9	53 45.8	85 52	148.0	53 20.3	85 51	148.5	52 54.8	85 51	148.9	52 29.1	86 50	149.3
20	53 14.5	83 54	146.7	52 49.5	84 53	147.1	52 24.3	84 53	147.6	51 59.0	84 52	148.0
1	52 42.1	82 56	145.4	52 17.4	82 55	145.8	51 52.7	83 54	146.3	51 27.8	83 54	146.7
2	52 08.6	81 58	144.1	51 44.4	81 57	144.5	51 20.0	82 56	145.0	50 55.4	82 56	145.5
3	51 34.1	79 59	142.8	51 10.2	80 59	143.3	50 46.2	80 58	143.8	50 22.1	81 57	144.3
4	50 58.6	78 61	141.6	50 35.1	79 60	142.1	50 11.5	79 59	142.6	49 47.7	79 59	143.1
25	50 22.2	77 62	140.4	49 59.1	77 62	140.9	49 35.8	78 61	141.4	49 12.4	78 60	141.9
6	49 44.8	76 64	139.3	49 22.1	76 63	139.8	48 59.2	76 62	140.3	48 36.2	77 62	140.8
7	49 06.6	74 65	138.2	48 44.2	75 64	138.7	48 21.8	75 64	139.2	47 59.2	76 63	139.7
8	48 27.6	73 66	137.1	48 05.6	73 66	137.6	47 43.5	74 65	138.1	47 21.3	74 64	138.6
9	47 47.7	72 68	136.1	47 26.1	72 67	136.6	47 04.4	73 66	137.1	46 42.6	73 66	137.6
30	47 07.2	70 69	135.1	46 45.9	71 68	135.6	46 24.6	71 68	136.1	46 03.1	72 67	136.6
1	46 25.9	69 70	134.1	46 05.0	70 69	134.6	45 44.1	70 69	135.1	45 22.9	71 68	135.6
2	45 43.9	68 71	133.1	45 23.4	68 70	133.7	45 02.8	69 70	134.2	44 42.1	69 69	134.7
3	45 01.3	67 72	132.2	44 41.2	67 71	132.7	44 20.9	68 71	133.3	44 00.5	68 70	133.8
4	44 18.1	66 73	131.3	43 58.3	66 72	131.8	43 38.4	67 72	132.4	43 18.4	67 71	132.9
35	43 34.2	64 74	130.4	43 14.8	65 73	131.0	42 55.3	65 73	131.5	42 35.6	66 72	132.0
6	42 49.9	63 75	129.6	42 30.8	64 74	130.1	42 11.6	64 74	130.7	41 52.3	65 73	131.2
7	42 04.9	62 76	128.8	41 46.2	63 75	129.3	41 27.4	63 75	129.8	41 08.4	64 74	130.3
8	41 19.5	61 77	128.0	41 01.1	62 76	128.5	40 42.6	62 75	129.0	40 23.9	62 75	129.6
9	40 33.6	60 77	127.2	40 15.5	60 77	127.7	39 57.3	61 76	128.3	39 39.0	61 76	128.8
40	39 47.2	59 78	126.5	39 29.5	59 78	127.0	39 11.6	60 77	127.5	38 53.6	60 76	128.0
1	39 00.4	58 79	125.8	38 43.0	58 78	126.3	38 25.4	59 78	126.8	38 07.7	59 77	127.3
2	38 13.2	57 79	125.0	37 56.0	57 79	125.6	37 38.8	58 78	126.1	37 21.4	58 78	126.6
3	37 25.5	56 80	124.4	37 08.7	56 80	124.9	36 51.7	57 79	125.4	36 34.6	57 79	125.9
4	36 37.5	55 81	123.7	36 21.0	55 80	124.2	36 04.3	56 80	124.7	35 47.5	56 79	125.2
45	35 49.1	54 81	123.0	35 32.8	54 81	123.6	35 16.5	55 80	124.1	35 00.0	55 80	124.6
6	35 00.3	53 82	122.4	34 44.4	53 81	122.9	34 28.3	54 81	123.4	34 12.1	54 80	124.0
7	34 11.2	52 82	121.8	33 55.6	52 82	122.3	33 39.8	53 81	122.8	33 23.8	53 81	123.3
8	33 21.8	51 83	121.2	33 06.4	52 82	121.7	32 50.9	52 82	122.2	32 35.3	52 82	122.7
9	32 32.1	50 83	120.6	32 17.0	51 83	121.1	32 01.7	51 82	121.6	31 46.3	51 82	122.2
50	31 42.1	49 84	120.1	31 27.2	50 83	120.6	31 12.2	50 83	121.1	30 57.1	51 83	121.6
1	30 51.8	49 84	119.5	30 37.2	49 84	120.0	30 22.4	49 83	120.5	30 07.6	50 83	121.0
2	30 01.2	48 85	119.0	29 46.9	48 84	119.5	29 32.4	48 84	120.0	29 17.8	49 83	120.5
3	29 10.4	47 85	118.5	28 56.3	47 85	119.0	28 42.1	48 84	119.5	28 27.7	48 84	120.0
4	28 19.3	46 86	117.9	28 05.4	46 85	118.4	27 51.5	47 85	118.9	27 37.4	47 84	119.4
55	27 28.0	45 86	117.4	27 14.4	46 86	117.9	27 00.6	46 85	118.4	26 46.8	46 85	118.9
6	26 36.4	44 86	117.0	26 23.0	45 86	117.5	26 09.5	45 86	118.0	25 55.9	46 85	118.5
7	25 44.7	44 87	116.5	25 31.5	44 86	117.0	25 18.2	44 86	117.5	25 04.9	45 86	118.0
8	24 52.7	43 87	116.0	24 39.8	43 87	116.5	24 26.7	44 86	117.0	24 13.6	44 86	117.5
9	24 00.5	42 87	115.6	23 47.8	43 87	116.1	23 35.0	43 87	116.6	23 22.1	43 86	117.1
60	23 08.2	42 88	115.1	22 55.6	42 87	115.6	22 43.1	42 87	116.1	22 30.4	42 87	116.6
1	22 15.6	41 88	114.7	22 03.3	41 88	115.2	21 50.9	41 87	115.7	21 38.5	42 87	116.2
2	21 22.9	40 88	114.3	21 10.8	40 88	114.8	20 58.6	41 88	115.3	20 46.3	41 87	115.8
3	20 29.9	39 88	113.9	20 18.1	40 88	114.4	20 06.1	40 88	114.9	19 54.1	40 87	115.3
4	19 36.9	39 89	113.5	19 25.2	39 88	114.0	19 13.4	39 88	114.5	19 01.6	40 88	114.9
65	18 43.6	38 89	113.1	18 32.2	38 89	113.6	18 20.6	39 88	114.1	18 09.0	39 88	114.5
6	17 50.2	38 89	112.7	17 39.0	38 89	113.2	17 27.6	38 89	113.7	17 16.2	38 88	114.2
7	16 56.7	37 89	112.3	16 45.6	37 89	112.8	16 34.4	37 89	113.3	16 23.2	38 89	113.8
8	16 03.0	36 90	112.0	15 52.1	36 89	112.4	15 41.1	37 89	112.9	15 30.1	37 89	113.4
9	15 09.2	36 90	111.6	14 58.5	36 90	112.1	14 47.7	36 89	112.6	14 36.8	36 89	113.1
70	14 15.3	35 90	111.3	14 04.7	35 90	111.7	13 54.1	35 90	112.2	13 43.4	36 89	112.7
1	13 21.2	34 90	110.9	13 10.8	35 90	111.4	13 00.4	35 90	111.9	12 49.9	35 89	112.4
2	12 27.0	34 91	110.6	12 16.8	34 90	111.1	12 06.5	34 90	111.5	11 56.2	34 90	112.0
3	11 32.7	33 91	110.2	11 22.6	33 90	110.7	11 12.6	34 90	111.2	11 02.5	34 90	111.7
4	10 38.2	33 91	109.9	10 28.4	33 91	110.4	10 18.5	33 90	110.9	10 08.5	33 90	111.4
75	9 43.7	32 91	109.6	9 34.0	32 91	110.1	9 24.3	32 91	110.6	9 14.5	33 90	111.0
6	8 49.0	32 91	109.3	8 39.5	32 91	109.8	8 30.0	32 91	110.2	8 20.4	32 90	110.7
7	7 54.3	31 91	109.0	7 44.9	31 91	109.5	7 35.5	31 91	109.9	7 26.1	31 91	110.4
8	6 59.4	31 92	108.7	6 50.2	31 91	109.2	6 41.0	31 91	109.6	6 31.7	31 91	110.1
9	6 04.5	30 92	108.4	5 55.4	30 91	108.9	5 46.4	30 91	109.3	5 37.3	30 91	109.8
80	5 09.4	30 92	108.1	5 00.6	30 92	108.6						

18° 00′			18° 30′			19° 00′			19° 30′			H.A.
Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
57 00.0	1.0 01	180.0	56 30.0	1.0 01	180.0	56 00.0	1.0 01	180.0	55 30.0	1.0 01	180.0	00
56 59.1	1.0 04	178.3	56 29.1	1.0 04	178.3	55 59.1	1.0 04	178.3	55 29.2	1.0 04	178.3	1
56 56.5	1.0 07	176.5	56 26.5	1.0 07	176.6	55 56.6	1.0 07	176.6	55 26.6	1.0 07	176.7	2
56 52.1	1.0 10	174.8	56 22.2	1.0 10	174.9	55 52.3	1.0 10	174.9	55 22.4	1.0 10	175.0	3
56 45.9	99 13	173.0	56 16.1	99 13	173.2	55 46.4	99 13	173.3	55 16.6	99 13	173.4	4
56 38.0	99 16	171.3	56 08.4	99 16	171.5	55 38.7	99 15	171.6	55 09.1	99 15	171.7	05
56 28.5	98 19	169.6	55 59.0	98 18	169.8	55 29.4	98 18	170.0	54 59.9	98 18	170.1	6
56 17.2	98 22	167.9	55 47.9	98 21	168.1	55 18.5	98 21	168.3	54 49.2	98 21	168.5	7
56 04.3	97 24	166.3	55 35.1	97 24	166.5	55 06.0	97 24	166.7	54 36.8	97 23	166.9	8
55 49.7	96 27	164.6	55 20.8	96 26	164.9	54 51.9	96 26	165.1	54 22.9	97 26	165.3	9
55 33.6	96 29	163.0	55 04.9	96 29	163.3	54 36.2	96 29	163.5	54 07.5	96 28	163.8	10
55 15.9	95 32	161.4	54 47.5	95 32	161.7	54 19.0	95 31	162.0	53 50.5	95 31	162.3	1
54 56.7	94 34	159.9	54 28.5	94 34	160.2	54 00.4	94 34	160.5	53 32.2	94 33	160.7	2
54 36.0	93 37	158.3	54 08.2	93 36	158.6	53 40.3	93 36	159.0	53 12.3	93 35	159.3	3
54 13.9	92 39	156.8	53 46.3	92 39	157.2	53 18.8	92 38	157.5	52 51.1	92 38	157.8	4
53 50.4	91 41	155.3	53 23.2	91 41	155.7	52 55.9	91 40	156.0	52 28.6	91 40	156.4	15
53 25.5	89 44	153.9	52 58.7	90 43	154.3	52 31.7	90 42	154.6	52 04.7	90 42	155.0	6
52 59.4	88 46	152.5	52 32.9	89 45	152.9	52 06.3	89 44	153.3	51 39.6	89 44	153.6	7
52 32.0	87 48	151.1	52 05.8	87 47	151.5	51 39.6	88 46	151.9	51 13.2	88 46	152.3	8
52 03.4	86 50	149.8	51 37.6	86 49	150.2	51 11.7	86 48	150.6	50 45.7	87 48	151.0	9
51 33.7	85 51	148.5	51 08.2	85 51	148.9	50 42.6	85 50	149.3	50 17.0	86 50	149.7	20
51 02.8	83 53	147.2	50 37.7	84 53	147.6	50 12.5	84 52	148.0	49 47.2	84 51	148.5	1
50 30.8	82 55	145.9	50 06.1	83 54	146.4	49 41.3	83 54	146.8	49 16.4	83 53	147.2	2
49 57.8	81 57	144.7	49 33.5	81 56	145.2	49 09.1	82 55	145.6	48 44.5	82 55	146.0	3
49 23.9	80 58	143.5	48 59.9	80 58	144.0	48 35.8	80 57	144.4	48 11.6	81 56	144.9	4
48 49.0	78 60	142.4	48 25.4	79 59	142.8	48 01.7	79 58	143.3	47 37.8	80 58	143.8	25
48 13.1	77 61	141.3	47 49.9	78 61	141.7	47 26.6	78 60	142.2	47 03.1	78 59	142.7	6
47 36.5	76 63	140.2	47 13.6	76 62	140.7	46 50.6	77 61	141.1	46 27.6	77 61	141.6	7
46 58.9	75 64	139.1	46 36.5	75 63	139.6	46 13.9	76 63	140.1	45 51.1	76 62	140.6	8
46 20.6	73 65	138.1	45 58.5	74 65	138.6	45 36.3	74 64	139.1	45 13.9	75 63	139.5	9
45 41.5	72 66	137.1	45 19.8	73 66	137.6	44 57.9	73 65	138.1	44 35.9	73 65	138.6	30
45 01.7	71 68	136.1	44 40.3	71 67	136.6	44 18.8	72 66	137.1	43 57.2	72 66	137.6	1
44 21.2	70 69	135.2	44 00.2	70 68	135.7	43 39.0	71 67	136.2	43 17.8	71 67	136.7	2
43 40.0	69 70	134.3	43 19.4	69 69	134.8	42 58.6	69 69	135.3	42 37.7	70 68	135.8	3
42 58.2	67 71	133.4	42 37.9	68 70	133.9	42 17.5	68 70	134.4	41 56.9	69 69	134.9	4
42 15.8	66 72	132.5	41 55.8	67 71	133.0	41 35.7	67 71	133.5	41 15.5	68 70	134.0	35
41 32.8	65 73	131.7	41 13.2	66 72	132.2	40 53.4	66 71	132.7	40 33.5	66 71	133.2	6
40 49.2	64 74	130.9	40 29.9	64 73	131.4	40 10.5	65 72	131.9	39 51.0	65 72	132.4	7
40 05.1	63 74	130.1	39 46.2	63 74	130.6	39 27.1	64 73	131.1	39 07.9	64 73	131.6	8
39 20.5	62 75	129.3	39 01.9	62 75	129.8	38 43.2	63 74	130.3	38 24.3	63 74	130.8	9
38 35.4	61 76	128.5	38 17.1	61 75	129.1	37 58.7	62 75	129.6	37 40.2	62 74	130.0	40
37 49.9	60 77	127.8	37 31.9	60 76	128.3	37 13.8	61 76	128.8	36 55.6	61 75	129.3	1
37 03.9	59 77	127.1	36 46.2	59 77	127.6	36 28.4	59 76	128.1	36 10.5	60 76	128.6	2
36 17.4	58 78	126.4	36 00.1	58 78	126.9	35 42.6	58 77	127.4	35 25.0	59 77	127.9	3
35 30.6	57 79	125.7	35 13.5	57 78	126.3	34 56.4	57 78	126.8	34 39.1	58 77	127.2	4
34 43.4	56 79	125.1	34 26.6	56 79	125.6	34 09.7	56 78	126.1	33 52.7	57 78	126.6	45
33 55.8	55 80	124.5	33 39.3	55 79	125.0	33 22.7	55 79	125.5	33 06.0	56 78	126.0	6
33 07.8	54 80	123.8	32 51.6	54 80	124.3	32 35.3	54 80	124.8	32 18.9	55 79	125.3	7
32 19.5	53 81	123.2	32 03.6	53 81	123.7	31 47.6	54 80	124.2	31 31.5	54 80	124.7	8
31 30.8	52 82	122.7	31 15.2	52 81	123.2	30 59.5	53 81	123.7	30 43.7	53 80	124.1	9
30 41.9	51 82	122.1	30 26.6	51 82	122.6	30 11.1	52 81	123.1	29 55.5	52 81	123.6	50
29 52.6	50 83	121.5	29 37.6	50 82	122.0	29 22.4	51 82	122.5	29 07.1	51 81	123.0	1
29 03.1	49 83	121.0	28 48.3	50 83	121.5	28 33.4	50 82	122.0	28 18.3	50 82	122.5	2
28 13.3	48 84	120.5	27 58.7	49 83	121.0	27 44.1	49 83	121.4	27 29.3	49 82	121.9	3
27 23.2	47 84	119.9	27 08.9	48 84	120.4	26 54.5	48 83	120.9	26 40.0	49 83	121.4	4
26 32.8	47 84	119.4	26 18.8	47 84	119.9	26 04.6	47 84	120.4	25 50.4	48 83	120.9	55
25 42.2	46 85	118.9	25 28.4	46 84	119.4	25 14.5	46 84	119.9	25 00.5	47 84	120.4	6
24 51.4	45 85	118.5	24 37.9	45 85	119.0	24 24.2	46 84	119.5	24 10.4	46 84	119.9	7
24 00.4	44 85	118.0	23 47.0	45 85	118.5	23 33.6	45 85	119.0	23 20.1	45 84	119.5	8
23 09.1	43 86	117.5	22 56.0	44 85	118.0	22 42.8	44 85	118.5	22 29.5	44 85	119.0	9
22 17.6	43 86	117.1	22 04.7	43 86	117.6	21 51.8	43 85	118.1	21 38.7	44 85	118.6	60
21 25.9	42 86	116.7	21 13.3	42 86	117.2	21 00.5	43 86	117.6	20 47.7	43 85	118.1	1
20 34.0	41 87	116.2	20 21.6	42 86	116.7	20 09.1	42 86	117.2	19 56.5	42 86	117.7	2
19 41.9	41 87	115.8	19 29.7	41 87	116.3	19 17.5	41 86	116.8	19 05.1	41 86	117.3	3
18 49.7	40 87	115.4	18 37.7	40 87	115.9	18 25.6	40 87	116.4	18 13.5	41 86	116.9	4
17 57.3	39 88	115.0	17 45.5	39 87	115.5	17 33.6	40 87	116.0	17 21.7	40 87	116.5	65
17 04.7	38 88	114.6	16 53.1	39 88	115.1	16 41.5	39 87	115.6	16 29.8	39 87	116.1	6
16 11.9	38 88	114.3	16 00.5	38 88	114.7	15 49.1	38 88	115.2	15 37.6	38 87	115.7	7
15 19.0	37 88	113.9	15 07.8	37 88	114.4	14 56.6	38 88	114.9	14 45.3	38 87	115.3	8
14 25.9	36 89	113.5	14 15.0	37 88	114.0	14 03.9	37 88	114.5	13 52.9	37 88	115.0	9
13 32.7	36 89	113.2	13 22.0	36 89	113.7	13 11.1	36 88	114.1	13 00.2	36 88	114.6	70
12 39.4	35 89	112.8	12 28.8	35 89	113.3	12 18.2	36 88	113.8	12 07.5	36 88	114.3	1
11 45.9	35 89	112.5	11 35.5	35 89	113.0	11 25.1	35 89	113.5	11 14.6	35 88	113.9	2
10 52.3	34 90	112.2	10 42.1	34 89	112.6	10 31.8	34 89	113.1	10 21.5	34 89	113.6	3
9 58.6	33 90	111.8	9 48.5	33 89	112.3	9 38.5	34 89	112.8	9 28.4	34 89	113.3	4
9 04.7	33 90	111.5	8 54.9	33 90	112.0	8 45.0	33 89	112.5	8 35.1	33 89	113.0	75
8 10.7	32 90	111.2	8 01.1	32 90	111.7	7 51.4	32 90	112.2	7 41.6	32 89	112.6	6
7 16.6	32 90	110.9	7 07.1	32 90	111.4	6 57.6	32 90	111.9	6 48.1	32 89	112.3	7
6 22.4	31 91	110.6	6 13.1	31 90	111.1	6 03.8	31 90	111.6	5 54.4	31 90	112.0	8
5 28.1	30 91	110.3	5 19.0	31 90	110.8	5 09.8	31 90	111.3	5 00.6	31 90	111.7	9
												80

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	85 00.0	1.0 09	00.0	84 30.0	1.0 08	00.0	84 00.0	1.0 08	00.0	83 30.0	1.0 07	00.0	83 00.0	1.0 06	00.0	82 30.0	1.0 06	00.0	82 00.0	1.0 06	00.0	81 30.0	1.0 05	00.0	00
1	84 54.6	98 26	10.7	84 25.1	98 24	09.7	83 55.5	99 22	08.9	83 25.9	99 20	08.2	82 56.2	99 19	07.6	82 26.4	99 18	07.0	81 56.7	99 16	06.6	81 26.9	99 15	06.2	1
2	84 38.9	93 41	20.6	84 10.8	94 38	18.8	83 42.4	95 35	17.3	83 13.7	96 32	16.0	82 44.9	96 30	14.9	82 15.9	97 28	13.9	81 46.8	97 27	13.0	81 17.6	97 25	12.2	2
3	84 14.4	86 53	29.3	83 48.2	88 49	27.0	83 21.4	90 46	25.0	82 54.2	91 43	23.2	82 26.7	92 40	21.7	81 58.9	93 38	20.3	81 30.8	94 36	19.1	81 02.5	96 34	18.0	3
4	83 42.7	79 62	36.8	83 18.6	82 58	34.1	82 53.8	84 55	31.8	82 28.4	86 52	29.7	82 02.4	87 49	27.8	81 36.0	89 47	26.2	81 09.2	90 44	24.7	80 42.0	91 42	23.3	4
05	83 05.5	71 69	42.9	82 43.6	75 66	40.2	82 20.8	77 62	37.7	81 57.1	80 59	35.4	81 32.8	82 56	33.4	81 08.0	84 54	31.5	80 42.6	85 51	29.8	80 16.8	87 49	28.3	05
6	82 24.2	65 74	48.0	82 04.3	68 71	45.2	81 43.3	71 68	42.7	81 21.5	74 65	40.3	80 58.9	76 62	38.2	80 35.7	79 60	36.2	80 11.8	81 58	34.4	79 47.4	82 55	32.7	6
7	81 39.7	58 78	52.2	81 21.6	62 75	49.5	81 02.5	65 73	46.9	80 42.4	68 70	44.6	80 21.4	71 67	42.4	79 59.7	74 65	40.4	79 37.3	76 62	38.5	79 14.3	78 60	36.8	7
8	80 52.9	53 81	55.6	80 36.4	57 79	53.0	80 18.9	60 76	50.6	80 00.4	63 74	48.3	79 41.0	66 72	46.1	79 20.7	69 69	44.1	78 59.8	71 67	42.2	78 38.2	73 65	40.4	8
9	80 04.2	48 83	58.5	79 49.2	52 81	56.0	79 33.1	55 79	53.6	79 16.0	58 77	51.4	78 58.1	61 75	49.3	78 39.3	64 73	47.3	78 19.7	66 70	45.4	77 59.4	69 68	43.6	9
10	79 14.2	44 85	60.9	79 00.4	48 83	58.5	78 45.6	51 81	56.3	78 29.9	54 79	54.1	78 13.2	57 77	52.1	77 55.7	60 75	50.1	77 37.4	62 74	48.2	77 18.4	65 71	46.4	10
1	78 23.0	40 87	62.9	78 10.4	44 85	60.7	77 56.8	47 83	58.5	77 42.2	50 81	56.5	77 26.8	53 80	54.5	77 10.4	56 78	52.6	76 53.3	58 76	50.7	76 35.5	61 74	49.0	1
2	77 31.0	37 88	64.7	77 19.4	40 86	62.6	77 06.8	43 85	60.5	76 53.3	46 83	58.5	76 39.0	49 82	56.6	76 23.8	52 80	54.8	76 07.7	55 78	53.0	75 51.0	57 76	51.3	2
3	76 38.3	34 89	66.2	76 27.6	37 87	64.2	76 16.0	40 86	62.2	76 03.4	43 85	60.3	75 50.1	46 83	58.5	75 35.9	49 82	56.7	75 20.9	51 80	54.9	75 05.2	54 78	53.3	3
4	75 45.0	31 90	67.5	75 35.1	34 88	65.5	75 24.4	37 87	63.7	75 12.7	40 86	61.9	75 00.2	43 84	60.1	74 47.0	46 83	58.4	74 32.9	48 82	56.7	74 18.1	50 80	55.1	4
15	74 51.3	29 90	68.6	74 42.1	32 89	66.8	74 32.1	35 88	65.0	74 21.3	38 87	63.2	74 09.6	40 85	61.5	73 57.2	43 84	59.9	73 44.0	45 83	58.3	73 30.2	47 81	56.7	15
6	73 57.2	27 91	69.6	73 48.7	30 90	67.8	73 39.3	32 89	66.1	73 29.2	35 88	64.5	73 18.4	38 86	62.8	73 06.7	40 85	61.2	72 54.4	42 84	59.7	72 41.3	45 83	58.2	6
7	73 02.7	25 91	70.4	72 54.8	28 90	68.8	72 46.1	30 89	67.1	72 36.7	33 88	65.5	72 26.5	35 87	64.0	72 15.6	38 86	62.4	72 04.0	40 85	60.9	71 51.7	42 84	59.5	7
8	72 08.0	23 92	71.2	72 00.6	26 91	69.6	71 52.6	28 90	68.0	71 43.8	31 89	66.5	71 34.2	33 88	65.0	71 24.0	35 87	63.5	71 13.1	37 86	62.1	71 01.5	40 85	60.6	8
9	71 13.0	21 92	71.8	71 06.2	24 91	70.3	70 58.7	26 90	68.8	70 50.4	29 89	67.4	70 41.5	31 88	65.9	70 31.9	33 88	64.5	70 21.6	35 86	63.1	70 10.7	37 85	61.7	9
20	70 17.8	20 92	72.4	70 11.5	22 91	71.0	70 04.5	25 91	69.5	69 56.8	27 90	68.1	69 48.4	29 89	66.7	69 39.4	31 88	65.4	69 29.7	33 87	64.0	69 19.5	35 86	62.7	20
1	69 22.5	19 92	72.9	69 16.6	21 92	71.6	69 10.1	23 91	70.2	69 02.9	25 90	68.8	68 55.0	27 89	67.5	68 46.6	29 89	66.1	68 37.5	31 88	64.8	68 27.8	33 87	63.5	1
2	68 27.0	17 93	73.4	68 21.6	19 92	72.1	68 15.5	21 91	70.8	68 08.7	23 91	69.4	68 01.4	26 90	68.1	67 53.4	28 89	66.9	67 44.9	29 88	65.6	67 35.7	31 87	64.3	2
3	67 31.4	16 93	73.8	67 26.3	18 92	72.5	67 20.7	20 92	71.3	67 14.4	22 91	70.0	67 07.5	24 90	68.7	67 00.0	26 89	67.5	66 51.9	28 89	66.3	66 43.3	30 88	65.1	3
4	66 35.7	15 93	74.2	66 31.0	17 92	73.0	66 25.7	19 92	71.7	66 19.8	21 91	70.5	66 13.4	22 90	69.3	66 06.3	24 90	68.1	65 58.7	26 89	66.9	65 50.6	28 88	65.7	4
25	65 39.9	14 93	74.5	65 35.5	16 93	73.3	65 30.6	17 92	72.1	65 25.1	19 91	71.0	65 19.1	21 91	69.8	65 12.5	23 90	68.6	65 05.3	25 89	67.5	64 57.7	26 89	66.3	25
6	64 44.0	13 93	74.8	64 40.0	14 93	73.7	64 35.4	16 92	72.5	64 30.2	18 92	71.4	64 24.6	20 91	70.2	64 18.4	21 90	69.1	64 11.7	23 90	68.0	64 04.5	25 89	66.9	6
7	63 48.0	12 93	75.1	63 44.3	13 93	74.0	63 40.1	15 92	72.8	63 35.3	17 92	71.7	63 30.0	18 91	70.6	63 24.2	20 91	69.5	63 17.9	22 90	68.4	63 11.1	23 89	67.4	7
8	62 52.0	11 94	75.3	62 48.6	12 93	74.2	62 44.6	14 92	73.1	62 40.2	16 92	72.1	62 35.3	17 91	71.0	62 29.8	19 91	69 9	62 23.9	21 90	68.9	62 17.5	22 90	67.8	8
9	61 55.9	10 94	75.5	61 52.8	11 93	74.5	61 49.1	13 93	73.4	61 45.0	15 92	72.4	61 40.4	16 92	71.3	61 35.3	18 91	70.3	61 29.8	19 90	69.3	61 23.8	21 90	68.2	9
30	60 59.8	09 94	75.7	60 56.9	10 93	74.7	60 53.5	12 93	73.7	60 49.7	13 92	72.6	60 45.4	15 92	71.6	60 40.7	17 91	70.6	60 35.5	18 91	69.6	60 29.9	20 90	68.6	30
1	60 03.6	08 94	75.9	60 01.0	10 93	74.9	59 57.9	11 93	73.9	59 54.4	12 92	72.9	59 50.4	14 92	71.9	59 46.0	15 91	70.9	59 41.1	17 91	69.9	59 35.9	18 90	69.0	1
2	59 07.4	07 94	76.0	59 05.0	09 93	75.0	59 02.2	10 93	74.1	58 59.0	12 92	73.1	58 55.3	13 92	72.1	58 51.2	14 92	71.2	58 46.6	16 91	70.2	58 41.7	17 90	69.3	2
3	58 11.1	06 94	76.1	58 09.0	08 93	75.2	58 06.4	09 93	74.2	58 03.5	11 93	73.3	58 00.1	12 92	72.4	57 56.3	13 92	71.4	57 52.1	15 91	70.5	57 47.5	16 91	69.6	3
4	57 14.9	06 94	76.2	57 13.0	07 93	75.3	57 10.6	08 93	74.4	57 07.9	10 93	73.5	57 04.8	11 92	72.6	57 01.3	12 92	71.6	56 57.4	14 91	70.7	56 53.1	15 91	69.8	4
35	56 18.6	05 94	76.3	56 16.9	06 94	75.4	56 14.8	08 93	74.5	56 12.4	09 93	73.6	56 09.5	10 92	72.7	56 06.3	11 92	71.8	56 02.7	13 91	71.0	55 58.7	14 91	70.1	35
6	55 22.2	04 94	76.4	55 20.8	05 94	75.5	55 18.9	07 93	74.6	55 16.7	08 93	73.8	55 14.1	09 92	72.9	55 11.2	10 92	72.0	55 07.8	12 92	71.2	55 04.1	13 91	70.3	6
7	54 25.9	04 94	76.5	54 24.6	05 94	75.6	54 23.0	06 93	74.7	54 21.1	07 93	73.9	54 18.7	08 92	73.0	54 16.0	10 92	72.2	54 13.0	11 92	71.3	54 09.5	12 91	70.5	7
8	53 29.5	03 94	76.5	53 28.5	04 94	75.7	53 27.1	05 93	74.8	53 25.4	06 93	74.0	53 23.3	08 92	73.2	53 20.8	09 92	72.3	53 18.0	10 92	71.5	53 14.9	11 91	70.7	8
9	52 33.2	02 94	76.6	52 32.3	03 94	75.7	52 31.2	04 93	74.9	52 29.6	06 93	74.1	52 27.8	07 92	73.3	52 25.6	08 92	72.5	52 23.0	09 92	71.6	52 20.2	10 91	70.8	9
40	51 36.8	02 94	76.6	51 36.2	03 94	75.8	51 35.2	04 93	75.0	51 33.9	05 93	74.2	51 32.3	06 93	73.4	51 30.3	07 92	72.6	51 28.0	08 92	71.8	51 25.4	09 91	71.0	40
1	50 40.4	01 94	76.6	50 40.0	02 94	75.8	50 39.2	03 93	75.0	50 38.1	04 93	74.2	50 36.7	05 93	73.5	50 35.0	06 92	72.7	50 33.0	07 92	71.9	50 30.6	08 91	71.1	1
2	49 44.1	00 94	76.6	49 43.8	01 94	75.8	49 43.2	02 93	75.1	49 42.3	03 93	74.3	49 41.2	04 93	73.5	49 39.7	05 92	72.8	49 37.9	07 92	72.0	49 35.7	08 91	71.2	2
3	48 47.7	00 94	76.6	48 47.6	01 94	75.9	48 47.2	02 93	75.1	48 46.5	03 93	74.3	48 45.6	04 93	73.6	48 44.3	05 92	72.8	48 42.7	06 92	72.1	48 40.9	07 92	71.3	3
4	47 51.3	01 94	76.6	47 51.4	00 94	75.9	47 51.2	01 93	75.1	47 50.7	02 93	74.4	47 50.0	03 93	73.6	47 48.9	04 92	72.9	47 47.6	05 92	72.1	47 45.9	06 92	71.4	4
45	46 54.9	01 94	76.6	46 55.2	00 94	75.9	46 55.2	00 93	75.1	46 54.9	01 93	74.4	46 54.4	02 93	73.7	46 53.5	03 92	72.9	46 52.4	04 92	72.2	46 51.0	05 92	71.5	45
6	45 58.5	02 94	76.6	45 59.0	01 94	75.8	45 59.2	00 93	75.1	45 59.1	01 93	74.4	45 58.7	02 93	73.7	45 58.1	03 92	73.0	45 57.2	03 92	72.3	45 56.0	04 92	71.5	6
7	45 02.2	03 94	76.5	45 02.8	02 94	75.8	45 03.2	01 93	75.1	45 03.3	00 93	74.4	45 03.1	01 93	73.7	45 02.7	02 92	73.0	45 02.0	03 92	72.3	45 01.1	04 92	71.6	7
8	44 05.8	03 94	76.5	44 06.6	02 94	75.8	44 07.2	01 93	75.1	44 07.4	01 93	74.4	44 07.5	00 93	73.7	44 07.3	01 92	73.0	44 06.8	02 92	72.3	44 06.1	03 92	71.6	8
9	43 09.5	04 94	76.5	43 10.4	03 94	75.8	43 11.1	02 93	75.1	43 11.6	01 93	74.4	43 11.9	00 93	73.7	43 11.8	00 92	73.0	43 11.6	01 92	72.3	43 11.1	02 92	71.7	9
50	42 13.1	04 94	76.4	42 14.3	03 94	75.7	42 15.1	03 93	75.1	42 15.8	02 93	74.4	42 16.2	01 93	73.7	42 16.4	00 92	73.0	42 16.3	01 92	72.4	42 16.0	01 92	71.7	50
1	41 16.8	05 94	76.4	41 18.1	04 94	75.7	41 19.2	03 93	75.0	41 20.0	02 93	74.4	41 20.6	02 93	73.7	41 21.0	01 92	73.0	41 21.1	00 92	72.4	41 21.0	01 92	71.7	1
2	40 20.5	05 94	76.3	40 21.9	04 94	75.6	40 23.2	04 93	75.0	40 24.2	03 93	74.3	40 25.0	02 93	73.7	40 25.5	02 92	73.0	40 25.9	01 92	72.4	40 26.0	00 92	71.7	2
3	39 24.2	06 94	76.2	39 25.8	05 94	75.6	39 27.2	04 93	74.9	39 28.4	04 93	74.3	39 29.4	03 93	73.6	39 30.1	02 92	73.0	39 30.7	01 92	72.3	39 31.0	01 92	71.7	3
4	38 27.9	06 94	76.2	38 29.7	06 94	75.5	38 31.3	05 93	74.9	38 32.6	04 93	74.2	38 33.8	03 93	73.6	38 34.7	03 92	73.0	38 35.4	02 92	72.3	38 36.0	01 92	71.7	4
55	37 31.6	07 94	76.1	37 33.6	06 93	75.4	37 35.3	05 93	74.8	37 36.8	05 93	74.2	37 38.2	04 93	73.6	37 39.3	03 92	72.9	37 40.2	03 92	72.3	37 40.9	02 92	71.7	55
6	36 35.4	07 94	76.0	36 37.5	07 93	75.4	36 39.4	06 93	74.7	36 41.1	05 93	74.1	36 42.6	05 93	73.5	36 43.9	04 92	72.9	36 45.0	03 92	72.3	36 45.9	03 92	71.6	6
7	35 39.2	08 94	75.9	35 41.4	07 93	75.3	35 43.5	07 93	74.7	35 45.4	06 93	74.1	35 47.0	05 92	73.4	35 48.5	05 92	72.8	35 49.8	04 92	72.2	35 50.9	03 92	71.6	7
8	34 43.0	08 94	75.8	34 45.4	08 93	75.2	34 47.6	07 93	74.6	34 49.6	06 93	74.0	34 51.5	06 92	73.4	34 53.2	05 92	72.8	34 54.6	05 92	72.2	34 56.0	04 92	71.6	8
9	33 46.8	09 94	75.7	33 49.4	08 93	75.1	33 51.7	08 93	74.5	33 53.9	07 93	73.9	33 56.0	06 92	73.3	33 57.8	06 92	72.7	33 59.5	05 92	72.1	34 01.0	05 92	71.5	9
60	32 50.7	09 94	75.6	32 53.4	09 93	75.0	32 55.9	08 93	74.4	32 58.3	08 93	73.8	33 00.5	07 92	73.2	33 02.5	06 92	72.6	33 04.3	06 92	72.0	33 06.0	05 92	71.5	60
1	31 54.5	10 94	75.5	31 57.4	09 93	74.9	32 00.1	09 93	74.3	32 02.6	08 93	73.7	32 05.0	08 92	73.2	32 07.2	07 92	72.6	32 09.2	07 92	72.0	32 11.1	06 92	71.4	1
2	30 58.4	10 93	75.4	31 01.4	10 93	74.8	31 04.3	09 93	74.2	31 07.0	09 93	73.7	31 09.5	08 92	73.1	31 11.9	08 92	72.5	31 14.1	07 92	71.9	31 16.2	07 91	71.3	2
3	30 02.4	11 93	75.3	30 05.5	10 93	74.7	30 08.5	10 93	74.1	30 11.4	09 93	73.6	30 14.1	09 92	73.0	30 16.6	08 92	72.4	30 19.0	08 92	71.8	30 21.3	07 91	71.2	3
4	29 06.3	11 93	75.2	29 09.6	11 93	74.6	29 12.8	10 93	74.0	29 15.8	10 93	73.5	29 18.7	09 92	72.9	29 21.4	09 92	72.3	29 24.0	08 92	71.7	29 26.4	08 91	71.2	4
65	28 10.3	12 93	75.0	28 13.8	11 93	74.5	28 17.1	11 93	73.9	28 20.3	10 92	73.3	28 23.3	10 92	72.8	28 26.2	09 92	72.2	28 29.0	09 92	71.6	28 31.6	08 91	71.1	65
6	27 14.3	12 93	74.9	27 18.0	12 93	74.4	27 21.4	11 93	73.8	27 24.8	11 92	73.2	27 28.0	10 92	72.7	27 31.0	10 92	72.1	27 34.0	10 92	71.6	27 36.8	09 91	71.0	6
7	26 18.4	13 93	74.8	26 22.2	12 93	74.2	26 25.8	12 93	73.7	26 29.3	11 92	73.1	26 32.7	11 92	72.6	26 35.9	11 92	72.0	26 39.0	10 92	71.5	26 42.0	10 91	70.9	7
8	25 22.5	13 93	74.6	25 26.4	13 93	74.1	25 30.2	12 93	73.5	25 33.9	12 92	73.0	25 37.4	12 92	72.4	25 40.8	11 92	71.9	25 44.1	11 92	71.3	25 47.3	10 91	70.8	8
9	24 26.6	14 93	74.5	24 30.7	13 93	74.0	24 34.6	13 92	73.4	24 38.4	13 92	72.9	24 42.1	12 92	72.3	24 45.7	12 92	71.8	24 49.2	11 92	71.2	24 52.5	11 91	70.7	9
70	23 30.8	14 93	74.4	23 35.0	14 93	73.8	23 39.1	13 92	73.3	23 43.1	13 92	72.7	23 46.9	13 92	72.2	23 50.7	12 92	71.7	23 54.3	12 91	71.1	23 57.9	12 91	70.6	70
1	22 35.0	15 93	74.2	22 39.4	14 93	73.7	22 43.6	14 92	73.1	22 47.8	14 92	72.6	22 51.8	13 92	72.1	22 55.7	13 92	71.5	22 59.5	13 91	71.0	23 03.2	12 91	70.5	1
2	21 39.3	15 93	74.1	21 43.8	15 93	73.5	21 48.2	15 92	73.0	21 52.5	14 92	72.5	21 56.7	14 92	71.9	22 00.8	13 92	71.4	22 04.8	13 91	70.9	22 08.6	13 91	70.3	2
3	20 43.6	16 93	73.9	20 48.2	15 93	73.4	20 52.8	15 92	72.8	20 57.2	15 92	72.3	21 01.6	14 92	71.8	21 05.9	14 91	71.3	21 10.0	14 91	70.7	21 14.1	13 91	70.2	3
4	19 47.9	16 93	73.7	19 52.7	16 92	73.2	19 57.4	16 92	72.7	20 02.0	15 92	72.2	20 06.6	15 92	71.6	20 11.0	15 91	71.1	20 15.3	14 91	70.6	20 19.6	14 91	70.1	4
75	18 52.3	17 93	73.6	18 57.2	16 92	73.1	19 02.1	16 92	72.5	19 06.9	16 92	72.0	19 11.6	15 92	71.5	19 16.2	15 91	71.0	19 20.7	15 91	70.4	19 25.1	15 91	69.9	75
6	17 56.7	17 93	73.4	18 01.8	17 92	72.9	18 06.8	17 92	72.4	18 11.8	16 92	71.9	18 16.6	16 92	71.3	18 21.4	16 91	70.8	18 26.1	15 91	70.3	18 30.7	15 91	69.8	6
7	17 01.2	18 92	73.2	17 06.5	17 92	72.7	17 11.6	17 92	72.2	17 16.7	17 92	71.7	17 21.8	17 91	71.2	17 26.7	16 91	70.7	17 31.6	16 91	70.1	17 36.4	16 90	69.6	7
8	16 05.7	18 92	73.1	16 11.1	18 92	72.6	16 16.5	18 92	72.0	16 21.7	17 92	71.5	16 26.9	17 91	71.0	16 32.0	17 91	70.5	16 37.1	17 91	70.0	16 42.1	16 90	69.5	8
9	15 10.3	19 92	72.9	15 15.9	18 92	72.4	15 21.4	18 92	71.9	15 26.8	18 91	71.4	15 32.2	18 91	70.9	15 37.4	18 91	70.3	15 42.6	17 91	69.8	15 47.8	17 90	69.3	9
80	14 14.9	19 92	72.7	14 20.7	19 92	72.2	14 26.3	19 92	71.7	14 31.9	19 91	71.2	14 37.4	18 91	70.7	14 42.9	18 91	70.2	14 48.3	18 90	69.7	14 53.6	18 90	69.2	80
1	13 19.6	20 92	72.5	13 25.5	19 92	72.0	13 31.3	19 92	71.5	13 37.1	19 91	71.0	13 42.8	19 91	70.5	13 48.4	19 91	70.0	13 54.0	18 90	69.5	13 59.5	18 90	69.0	1
2	12 24.4	20 92	72.3	12 30.4	20 92	71.8	12 36.4	20 92	71.3	12 42.3	20 91	70.8	12 48.2	19 91	70.3	12 54.0	19 91	69.8	12 59.7	19 90	69.3	13 05.4	19 90	68.8	2
3	11 29.2	21 92	72.1	11 35.4	21 92	71.6	11 41.5	20 91	71.1	11 47.6	20 91	70.6	11 53.6	20 91	70.1	11 59.6	20 90	69.6	12 05.5	20 90	69.1	12 11.4	19 90	68.6	3
4	10 34.1	21 92	71.9	10 40.4	21 92	71.4	10 46.7	21 91	70.9	10 53.0	21 91	70.4	10 59.2	21 91	69.9	11 05.3	20 90	69.4	11 11.4	20 90	68.9	11 17.5	20 90	68.4	4
85	9 39.0	22 92	71.7	9 45.5	22 91	71.2	9 52.0	21 91	70.7	9 58.4	21 91	70.2	10 04.8	21 91	69.7	10 11.1	21 90	69.2	10 17.4	21 90	68.7	10 23.6	21 90	68.2	85
6	8 44.0	22 92	71.5	8 50.7	22 91	71.0	8 57.3	22 91	70.5	9 03.9	22 91	70.0	9 10.4	22 90	69.5	9 16.9	22 90	69.0	9 23.4	21 90	68.5	9 29.8	21 90	68.1	6
7	7 49.1	23 91	71.3	7 55.9	23 91	70.8	8 02.7	23 91	70.3	8 09.4	22 91	69.8	8 16.2	22 90	69.3	8 22.8	22 90	68.8	8 29.5	22 90	68.3	8 36.1	22 89	67.9	7
8	6 54.2	23 91	71.1	7 01.2	23 91	70.6	7 08.2	23 91	70.1	7 15.1	23 90	69.6	7 22.0	23 90	69.1	7 28.8	23 90	68.6	7 35.7	23 90	68.1	7 42.5	23 89	67.6	8
9	5 59.4	24 91	70.9	6 06.6	24 91	70.4	6 13.7	24 91	69.9	6 20.8	24 90	69.4	6 27.9	24 90	68.9	6 34.9	23 90	68.4	6 41.9	23 90	67.9	6 48.9	23 89	67.4	9
90	5 04.7	24 91	70.6	5 12.0	24 91	70.1	5 19.3	24 91	69.7	5 26.6	24 90	69.2	5 33.8	24 90	68.7	5 41.1	24 90	68.2	5 48.2	24 90	67.7	5 55.4	24 89	67.2	90

16—8472

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	20° 00′				20° 30′				21° 00′				21° 30′				22° 00′				22° 30′				23° 00′				23° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	55 09.0	1.0	01	180.0	54 30.0	1.0	01	180.0	54 00.0	1.0	01	180.0	53 30.0	1.0	01	180.0	53 00.0	1.0	01	180.0	52 30.0	1.0	01	180.0	52 00.0	1.0	01	180.0	51 30.0	1.0	01	180.0	00
1	54 59.2	1.0	04	178.4	54 29.2	1.0	04	178.4	53 59.2	1.0	04	178.4	53 29.2	1.0	04	178.4	52 59.2	1.0	04	178.5	52 29.2	1.0	04	178.5	51 59.2	1.0	04	178.5	51 29.3	1.0	04	178.5	1
2	54 56.7	1.0	07	176.7	54 26.7	1.0	07	176.8	53 56.8	1.0	07	176.8	53 26.8	1.0	07	176.9	52 56.9	1.0	06	176.9	52 26.9	1.0	06	177.0	51 57.0	1.0	06	177.0	51 27.0	1.0	06	177.1	2
3	54 52.6	1.0	10	175.1	54 22.7	1.0	09	175.2	53 52.8	1.0	09	175.2	53 22.9	1.0	09	175.3	52 53.0	1.0	09	175.4	52 23.1	1.0	09	175.5	51 53.2	1.0	09	175.5	51 23.3	1.0	09	175.6	3
4	54 46.8	99	12	173.5	54 17.0	99	12	173.6	53 47.2	99	12	173.7	53 17.4	99	12	173.8	52 47.6	99	12	173.9	52 17.8	99	11	174.0	51 47.9	99	11	174.0	51 18.1	99	11	174.1	4
05	54 39.4	99	15	171.9	54 09.7	99	15	172.0	53 40.0	99	14	172.1	53 10.3	99	14	172.2	52 40.6	99	14	172.3	52 10.9	99	14	172.5	51 41.2	99	14	172.6	51 11.4	99	14	172.7	05
6	54 30.4	98	18	170.3	54 00.8	99	17	170.4	53 31.3	99	17	170.6	53 01.7	99	17	170.7	52 32.1	99	17	170.8	52 02.5	99	16	171.0	51 32.9	99	16	171.1	51 03.3	99	16	171.2	6
7	54 19.8	98	20	168.7	53 50.4	98	20	168.8	53 21.0	98	20	169.0	52 51.6	98	19	169.2	52 22.1	98	19	169.3	51 52.7	98	19	169.5	51 23.2	98	19	169.6	50 53.8	98	18	169.8	7
8	54 07.6	97	23	167.1	53 38.4	97	22	167.3	53 09.2	97	22	167.5	52 39.9	98	22	167.7	52 10.7	98	22	167.9	51 41.4	98	21	168.0	51 12.1	98	21	168.2	50 42.8	98	21	168.4	8
9	53 53.9	97	25	165.6	53 24.9	97	25	165.8	52 55.9	97	25	166.0	52 26.8	97	24	166.2	51 57.8	97	24	166.4	51 28.7	97	24	166.6	50 59.6	97	23	166.8	50 30.4	97	23	167.0	9
10	53 38.7	96	28	164.0	53 09.9	96	27	164.3	52 41.1	96	27	164.5	52 12.3	96	27	164.7	51 43.4	96	26	164.9	51 14.5	96	26	165.2	50 45.6	96	26	165.4	50 16.7	96	26	165.6	10
1	53 22.0	95	30	162.5	52 53.5	95	30	162.8	52 24.9	95	29	163.0	51 56.3	95	29	163.3	51 27.6	96	28	163.5	50 59.0	96	28	163.7	50 30.3	96	28	164.0	50 01.5	96	27	164.2	1
2	53 03.9	94	33	161.0	52 35.6	94	32	161.3	52 07.3	94	32	161.6	51 38.9	95	31	161.8	51 10.5	95	31	162.1	50 42.1	95	30	162.3	50 13.6	96	30	162.6	49 45.1	95	30	162.8	2
3	52 44.4	93	35	159.6	52 16.3	93	34	159.9	51 48.3	94	34	160.1	51 20.2	94	33	160.4	50 52.0	94	33	160.7	50 23.8	94	33	161.0	49 55.6	94	32	161.2	49 27.3	94	32	161.5	3
4	52 23.4	92	37	158.1	51 55.7	93	37	158.4	51 27.9	93	36	158.7	51 00.1	93	36	159.0	50 32.2	93	35	159.3	50 04.3	93	35	159.6	49 36.3	93	34	159.9	49 08.3	93	34	160.2	4
15	52 01.2	91	39	156.7	51 33.8	92	39	157.0	51 06.3	92	38	157.4	50 38.7	92	38	157.7	50 11.1	92	37	158.0	49 43.5	92	37	158.3	49 15.8	92	36	158.6	48 48.1	93	36	158.9	15
6	51 37.6	90	41	155.3	51 10.5	91	41	155.7	50 43.3	91	40	156.0	50 16.1	91	40	156.3	49 48.8	91	39	156.7	49 21.4	91	39	157.0	48 54.0	91	38	157.3	48 26.6	92	38	157.6	6
7	51 12.8	89	43	154.0	50 46.0	89	43	154.3	50 19.2	90	42	154.7	49 52.2	90	42	155.0	49 25.2	90	41	155.4	48 58.2	90	41	155.7	48 31.1	90	40	156.0	48 03.9	91	40	156.3	7
8	50 46.8	88	45	152.7	50 20.3	88	45	153.0	49 53.8	89	44	153.4	49 27.2	89	44	153.8	49 00.5	89	43	154.1	48 33.7	89	43	154.4	48 06.9	89	42	154.8	47 40.1	90	42	155.1	8
9	50 19.6	87	47	151.4	49 53.5	87	47	151.7	49 27.3	88	46	152.1	49 01.0	88	46	152.5	48 34.6	88	45	152.9	48 08.2	88	44	153.2	47 41.7	88	44	153.6	47 15.1	89	43	153.9	9
20	49 51.3	86	49	150.1	49 25.5	86	48	150.5	48 59.6	86	48	150.9	48 33.6	87	47	151.3	48 07.6	87	47	151.6	47 41.5	87	46	152.0	47 15.3	87	46	152.4	46 49.1	88	45	152.7	20
1	49 21.9	85	51	148.9	48 56.4	85	50	149.3	48 30.9	85	50	149.7	48 05.2	86	49	150.1	47 39.5	86	48	150.4	47 13.8	86	48	150.8	46 47.9	86	47	151.2	46 22.0	87	47	151.6	1
2	48 51.4	84	53	147.7	48 26.3	84	52	148.1	48 01.1	84	51	148.5	47 35.8	84	51	148.9	47 10.4	85	50	149.3	46 45.0	85	50	149.7	46 19.5	85	49	150.0	45 53.9	85	48	150.4	2
3	48 19.9	82	54	146.5	47 55.1	83	54	146.9	47 30.3	83	53	147.3	47 05.3	83	52	147.7	46 40.3	84	52	148.1	46 15.2	84	51	148.5	45 50.1	84	51	148.9	45 24.8	84	50	149.3	3
4	47 47.4	81	56	145.3	47 23.0	81	55	145.8	46 58.5	82	54	146.2	46 33.9	82	54	146.6	46 09.3	82	53	147.0	45 44.5	83	53	147.4	45 19.7	83	52	147.8	44 54.7	83	52	148.2	4
25	47 13.9	80	57	144.2	46 49.9	80	57	144.6	46 25.8	81	56	145.1	46 01.6	81	55	145.5	45 37.2	81	55	145.9	45 12.8	81	54	146.3	44 48.3	82	54	146.7	44 23.8	82	53	147.2	25
6	46 39.6	79	59	143.1	46 15.9	79	58	143.6	45 52.2	79	58	144.0	45 28.3	80	57	144.4	45 04.3	80	56	144.9	44 40.3	80	56	145.3	44 16.1	81	55	145.7	43 51.9	81	55	146.1	6
7	46 04.4	77	60	142.1	45 41.1	78	59	142.5	45 17.7	78	59	143.0	44 54.2	79	58	143.4	44 30.5	79	58	143.8	44 06.8	79	57	144.3	43 43.0	79	56	144.7	43 19.1	80	56	145.1	7
8	45 28.3	76	61	141.0	45 05.4	77	61	141.5	44 42.3	77	60	141.9	44 19.2	77	60	142.4	43 55.9	78	59	142.8	43 32.6	78	58	143.2	43 09.1	78	58	143.7	42 45.6	79	57	144.1	8
9	44 51.5	75	63	140.0	44 28.9	75	62	140.5	44 06.2	76	62	140.9	43 43.4	76	61	141.4	43 20.5	77	60	141.8	42 57.5	77	60	142.3	42 34.4	77	59	142.7	42 11.2	77	59	143.1	9
30	44 13.8	74	64	139.0	43 51.6	74	63	139.5	43 29.3	75	63	140.0	43 06.8	75	62	140.4	42 44.3	75	62	140.9	42 21.6	76	61	141.3	41 58.9	76	60	141.7	41 36.0	76	60	142.2	30
1	43 35.5	73	65	138.1	43 13.6	73	65	138.5	42 51.6	73	64	139.0	42 29.5	74	63	139.5	42 07.3	74	63	139.9	41 45.0	75	62	140.4	41 22.6	75	62	140.8	41 00.1	75	61	141.3	1
2	42 56.4	71	66	137.1	42 34.9	72	66	137.6	42 13.3	72	65	138.1	41 51.5	73	64	138.5	41 29.7	73	64	139.0	41 07.7	73	63	139.5	40 45.7	74	63	139.9	40 23.5	74	62	140.4	2
3	42 16.6	70	67	136.2	41 55.5	71	67	136.7	41 34.2	71	66	137.2	41 12.8	71	66	137.7	40 51.3	72	65	138.1	40 29.7	72	64	138.6	40 08.0	73	64	139.0	39 46.2	73	63	139.5	3
4	41 36.2	69	68	135.4	41 15.4	70	68	135.8	40 54.5	70	67	136.3	40 33.4	70	67	136.8	40 12.3	71	66	137.2	39 51.0	71	66	137.7	39 29.7	71	65	138.2	39 08.2	72	64	138.6	4
35	40 55.2	68	69	134.5	40 34.7	68	69	135.0	40 14.1	69	68	135.5	39 53.4	69	68	135.9	39 32.6	70	67	136.4	39 11.7	70	67	136.9	38 50.7	70	66	137.3	38 29.5	71	65	137.8	35
6	40 13.5	67	70	133.7	39 53.4	67	70	134.1	39 33.2	68	69	134.6	39 12.8	68	69	135.1	38 52.4	68	68	135.6	38 31.8	69	68	136.0	38 11.1	69	67	136.5	37 50.3	70	66	137.0	6
7	39 31.3	66	71	132.8	39 11.6	66	71	133.3	38 51.7	67	70	133.8	38 31.6	67	70	134.3	38 11.5	67	69	134.8	37 51.3	68	68	135.2	37 30.9	68	68	135.7	37 10.4	68	67	136.2	7
8	38 48.6	65	72	132.1	38 29.1	65	72	132.5	38 09.6	65	71	133.0	37 49.9	66	70	133.5	37 30.1	66	70	134.0	37 10.2	67	69	134.5	36 50.1	67	69	134.9	36 30.0	67	68	135.4	8
9	38 05.3	64	73	131.3	37 46.2	64	72	131.8	37 26.9	64	72	132.3	37 07.6	65	71	132.7	36 48.1	65	71	133.2	36 28.5	65	70	133.7	36 08.8	66	70	134.2	35 49.0	66	69	134.6	9
40	37 21.5	62	74	130.5	37 02.7	63	73	131.0	36 43.8	63	73	131.5	36 24.8	64	72	132.0	36 05.6	64	72	132.5	35 46.4	64	71	133.0	35 27.0	65	71	133.4	35 07.5	65	70	133.9	40
1	36 37.2	61	75	129.8	36 18.7	62	74	130.3	36 00.2	62	74	130.8	35 41.4	63	73	131.3	35 22.6	63	72	131.8	35 03.7	63	72	132.2	34 44.7	64	71	132.7	34 25.5	64	71	133.2	1
2	35 52.5	60	75	129.1	35 34.3	61	75	129.6	35 16.0	61	74	130.1	34 57.7	61	74	130.6	34 39.2	62	73	131.0	34 20.5	62	73	131.5	34 01.8	63	72	132.0	33 43.0	63	72	132.5	2
3	35 07.3	59	76	128.4	34 49.4	60	76	128.9	34 31.5	60	75	129.4	34 13.4	60	74	129.9	33 55.2	61	74	130.4	33 36.9	61	73	130.8	33 18.5	62	73	131.3	33 00.0	62	72	131.8	3
4	34 21.7	58	77	127.7	34 04.1	59	76	128.2	33 46.5	59	76	128.7	33 28.7	59	75	129.2	33 10.8	60	75	129.7	32 52.8	60	74	130.2	32 34.8	60	74	130.6	32 16.6	61	73	131.1	4
45	33 35.6	57	77	127.1	33 18.4	58	77	127.6	33 01.0	58	76	128.1	32 43.6	58	76	128.6	32 26.0	59	75	129.0	32 08.3	59	75	129.5	31 50.6	59	74	130.0	31 32.7	60	74	130.5	45
6	32 49.2	56	78	126.5	32 32.3	57	78	126.9	32 15.2	57	77	127.4	31 58.1	57	77	127.9	31 40.8	58	76	128.4	31 23.4	58	76	128.9	31 05.9	58	75	129.3	30 48.4	59	75	129.8	6
7	32 02.4	55	79	125.8	31 45.8	56	78	126.3	31 29.0	56	78	126.8	31 12.2	56	77	127.3	30 55.2	57	77	127.8	30 38.1	57	76	128.3	30 20.9	57	76	128.7	30 03.6	58	75	129.2	7
8	31 15.2	54	79	125.2	30 58.9	55	79	125.7	30 42.4	55	78	126.2	30 25.9	55	78	126.7	30 09.2	56	77	127.2	29 52.4	56	77	127.6	29 35.5	56	76	128.1	29 18.5	57	76	128.6	8
9	30 27.7	53	80	124.6	30 11.7	54	79	125.1	29 55.5	54	79	125.6	29 39.2	54	78	126.1	29 22.8	55	78	126.6	29 06.3	55	77	127.1	28 49.7	55	77	127.5	28 33.1	56	76	128.0	9
50	29 39.9	52	80	124.1	29 24.1	53	80	124.6	29 08.2	53	79	125.0	28 52.2	53	79	125.5	28 36.1	54	78	126.0	28 19.9	54	78	126.5	28 03.6	54	78	127.0	27 47.2	55	77	127.4	50
1	28 51.7	52	81	123.5	28 36.2	52	80	124.0	28 20.6	52	80	124.5	28 04.9	53	79	125.0	27 49.1	53	79	125.4	27 33.1	53	78	125.9	27 17.1	54	78	126.4	27 01.0	54	78	126.9	1
2	28 03.2	51	81	123.0	27 48.0	51	81	123.4	27 32.7	51	80	123.9	27 17.2	52	80	124.4	27 01.7	52	79	124.9	26 46.0	52	79	125.4	26 30.3	53	78	125.8	26 14.5	53	78	126.3	2
3	27 14.4	50	82	122.4	26 59.5	50	81	122.9	26 44.4	50	81	123.4	26 29.2	51	80	123.9	26 14.0	51	80	124.4	25 58.6	51	80	124.8	25 43.2	52	79	125.3	25 27.6	52	79	125.8	3
4	26 25.4	49	82	121.9	26 10.7	49	82	122.4	25 55.9	49	81	122.9	25 41.0	50	81	123.4	25 26.0	50	80	123.8	25 10.9	50	80	124.3	24 55.7	51	80	124.8	24 40.5	51	79	125.3	4
55	25 36.0	48	83	121.4	25 21.6	48	82	121.9	25 07.1	49	82	122.4	24 52.4	49	81	122.9	24 37.7	49	81	123.3	24 22.9	50	80	123.8	24 08.0	50	80	124.3	23 53.0	50	80	124.8	55
6	24 46.5	47	88	120.9	24 32.3	47	83	121.4	24 18.0	48	82	121.9	24 03.6	48	82	122.4	23 49.2	48	81	122.8	23 34.6	49	81	123.3	23 20.0	49	80	123.8	23 05.2	49	80	124.3	6
7	23 56.6	46	84	120.4	23 42.7	47	83	120.9	23 28.6	47	83	121.4	23 14.5	47	82	121.9	23 00.3	47	82	122.4	22 46.0	48	81	122.8	22 31.7	48	81	123.3	22 17.2	48	81	123.8	7
8	23 06.5	45	84	120.0	22 52.8	46	83	120.4	22 39.0	46	83	120.9	22 25.2	46	83	121.4	22 11.2	47	82	121.9	21 57.2	47	82	122.4	21 43.1	47	81	122.8	21 28.9	47	81	123.3	8
9	22 16.2	45	84	119.5	22 02.7	45	84	120.0	21 49.2	45	84	120.5	21 35.6	46	83	120.9	21 21.9	46	83	121.4	21 08.1	46	82	121.9	20 54.3	46	82	122.4	20 40.3	47	81	122.8	9
60	21 25.6	44	85	119.0	21 12.4	44	84	119.5	20 59.1	44	84	120.0	20 45.8	45	83	120.5	20 32.3	45	83	121.0	20 18.8	45	83	121.4	20 05.2	45	82	121.9	19 51.5	46	82	122.4	60
1	20 34.8	43	85	118.6	20 21.9	43	85	119.1	20 08.8	44	84	119.6	19 55.7	44	84	120.0	19 42.5	44	83	120.5	19 29.2	44	83	121.0	19 15.9	45	82	121.5	19 02.5	45	82	122.0	1
2	19 43.9	42	85	118.2	19 31.1	43	85	118.7	19 18.3	43	84	119.1	19 05.4	43	84	119.6	18 52.5	43	84	120.1	18 39.4	44	83	120.6	18 26.3	44	83	121.0	18 13.2	44	82	121.5	2
3	18 52.7	42	86	117.8	18 40.2	42	85	118.2	18 27.6	42	85	118.7	18 15.0	42	84	119.2	18 02.2	43	84	119.7	17 49.4	43	84	120.2	17 36.6	43	83	120.6	17 23.7	43	83	121.1	3
4	18 01.3	41	86	117.4	17 49.0	41	86	117.8	17 36.7	41	85	118.3	17 24.3	42	85	118.8	17 11.8	42	84	119.3	16 59.2	42	84	119.7	16 46.6	42	84	120.2	16 33.9	42	83	120.7	4
65	17 09.7	40	86	117.0	16 57.7	40	86	117.4	16 45.6	41	86	117.9	16 33.4	41	85	118.4	16 21.1	41	85	118.9	16 08.8	41	84	119.3	15 56.4	41	84	119.8	15 44.0	42	84	120.3	65
6	16 18.0	39	87	116.6	16 06.2	40	86	117.0	15 54.3	40	86	117.5	15 42.3	40	85	118.0	15 30.3	40	85	118.5	15 18.2	40	85	119.0	15 06.0	41	84	119.4	14 53.8	41	84	119.9	6
7	15 26.1	39	87	116.2	15 14.4	39	86	116.7	15 02.8	39	86	117.1	14 51.0	39	86	117.6	14 39.2	39	85	118.1	14 27.4	40	85	118.6	14 15.5	40	85	119.0	14 03.5	40	84	119.5	7
8	14 34.0	38	87	115.8	14 22.6	38	87	116.3	14 11.1	38	86	116.8	13 59.6	38	86	117.2	13 48.0	39	86	117.7	13 36.4	39	85	118.2	13 24.7	39	85	118.7	13 13.0	39	85	119.1	8
9	13 41.7	37	87	115.5	13 30.5	37	87	115.9	13 19.3	38	87	116.4	13 08.0	38	86	116.9	12 56.6	38	86	117.4	12 45.2	38	86	117.8	12 33.8	38	85	118.3	12 22.3	38	85	118.8	9
70	12 49.3	37	88	115.1	12 38.3	37	87	115.6	12 27.3	37	87	116.0	12 16.2	37	87	116.5	12 05.1	37	86	117.0	11 53.9	37	86	117.5	11 42.7	38	86	117.9	11 31.4	38	85	118.4	70
1	11 56.8	36	88	114.7	11 46.0	36	88	115.2	11 35.1	36	87	115.7	11 24.3	36	87	116.2	11 13.4	36	86	116.7	11 02.4	37	86	117.1	10 51.4	37	86	117.6	10 40.3	37	85	118.1	1
2	11 64.0	35	88	114.4	10 53.5	35	88	114.9	10 42.9	35	88	115.4	10 32.2	36	87	115.8	10 21.5	36	87	116.3	10 10.7	36	86	116.8	9 59.9	36	86	117.3	9 49.1	36	86	117.7	2
3	10 11.2	35	88	114.1	10 00.8	35	88	114.5	9 50.4	35	88	115.0	9 39.9	35	87	115.5	9 29.5	35	87	116.0	9 18.9	35	87	116.5	9 08.3	35	86	116.9	8 57.7	35	86	117.4	3
4	9 18.2	34	89	113.7	9 08.0	34	88	114.2	8 57.8	34	88	114.7	8 47.6	34	88	115.2	8 37.3	34	87	115.7	8 27.0	34	87	116.1	8 16.6	35	86	116.6	8 06.2	35	86	117.1	4
75	8 25.1	33	89	113.4	8 15.1	33	88	113.9	8 05.1	33	88	114.4	7 55.0	34	88	114.9	7 45.0	34	87	115.3	7 34.8	34	87	115.8	7 24.7	34	87	116.3	7 14.5	34	86	116.8	75
6	7 31.9	33	89	113.1	7 22.1	33	89	113.6	7 12.2	33	88	114.1	7 02.4	33	88	114.5	6 52.5	33	88	115.0	6 42.6	33	87	115.5	6 32.7	33	87	116.0	6 22.7	33	87	116.4	6
7	6 38.5	32	89	112.8	6 28.9	32	89	113.3	6 19.3	32	88	113.8	6 09.6	32	88	114.2	5 59.9	32	88	114.7	5 50.2	32	88	115.2	5 40.5	32	87	115.7	5 30.7	33	87	116.1	7
8	5 45.0	31	89	112.5	5 35.6	31	89	113.0	5 26.2	32	88	113.5	5 16.7	32	88	113.9	5 07.2	32	88	114.4													8

DECLINATION SAME NAME AS LATITUDE

H.A.	20° 00′				20° 30′				21° 00′				21° 30′				22° 00′				22° 30′				23° 00′				23° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
91																													5 02.0	25	89	67.0	91

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	81 00.0	1.0 05	00.0	80 30.0	1.0 05	00.0	80 00.0	1.0 04	00.0	79 30.0	1.0 04	00.0	79 00.0	1.0 04	00.0	78 30.0	1.0 04	00.0	78 00.0	1.0 04	00.0	77 30.0	1.0 03	00.0	00
1	80 57.1	99 14	05.8	80 27.2	99 14	05.5	79 57.4	1.0 13	05.2	79 27.5	1.0 12	04.9	78 57.6	1.0 12	04.7	78 27.7	1.0 11	04.5	77 57.8	1.0 11	04.3	77 27.9	1.0 10	04.1	1
2	80 48.3	98 24	11.5	80 19.0	98 23	10.9	79 49.5	98 21	10.3	79 20.1	98 20	09.8	78 50.5	98 19	09.3	78 21.0	99 19	08.9	77 51.4	99 18	08.5	77 21.8	99 17	08.1	2
3	80 34.0	95 32	17.0	80 05.4	96 31	16.1	79 36.7	96 29	15.3	79 07.8	96 28	14.5	78 38.9	97 27	13.8	78 09.9	97 25	13.2	77 40.8	97 24	12.6	77 11.6	97 23	12.1	3
4	80 14.7	92 40	22.1	79 47.0	93 38	21.0	79 19.2	93 36	19.9	78 51.1	94 35	19.0	78 22.9	94 33	18.1	77 54.6	95 32	17.3	77 26.1	95 31	16.6	76 57.5	95 29	15.9	4
05	79 50.6	88 47	26.8	79 24.1	89 45	25.5	78 57.3	90 43	24.3	78 30.2	91 41	23.2	78 02.9	91 40	22.2	77 35.4	92 38	21.3	77 07.7	93 36	20.4	76 39.9	93 35	19.6	05
6	79 22.5	84 53	31.2	78 57.2	85 51	29.8	78 31.5	86 49	28.4	78 05.5	87 47	27.2	77 39.2	88 45	26.1	77 12.6	89 43	25.0	76 45.8	90 42	24.0	76 18.8	90 40	23.1	6
7	78 50.8	79 58	35.1	78 26.7	81 56	33.6	78 02.2	82 54	32.2	77 37.4	84 52	30.9	77 12.1	85 50	29.6	76 46.5	86 48	28.5	76 20.7	87 47	27.4	75 54.5	88 45	26.4	7
8	78 15.9	75 62	38.7	77 53.2	77 60	37.1	77 29.9	78 58	35.6	77 06.1	80 56	34.2	76 42.0	81 55	32.9	76 17.5	82 53	31.7	75 52.6	83 51	30.5	75 27.4	84 50	29.4	8
9	77 38.4	71 66	41.9	77 16.9	73 64	40.3	76 54.8	74 62	38.8	76 32.2	76 60	37.3	76 09.2	78 59	36.0	75 45.7	79 57	34.7	75 21.9	80 55	33.5	74 57.6	81 54	32.3	9
10	76 58.7	67 70	44.8	76 38.3	69 68	43.1	76 17.4	71 66	41.6	75 55.9	72 64	40.2	75 34.0	74 62	38.8	75 11.6	75 60	37.4	74 48.7	77 59	36.2	74 25.5	78 57	35.0	10
1	76 16.9	63 72	47.3	75 57.7	65 71	45.7	75 37.9	67 69	44.2	75 17.6	69 67	42.7	74 56.7	70 65	41.3	74 35.3	72 64	40.0	74 13.5	74 62	38.7	73 51.2	75 60	37.5	1
2	75 33.5	59 75	49.6	75 15.4	61 73	48.0	74 56.7	63 71	46.5	74 37.4	65 70	45.0	74 17.5	67 68	43.6	73 57.2	69 66	42.3	73 36.3	70 65	41.0	73 15.0	72 63	39.8	2
3	74 48.7	56 77	51.7	74 31.6	58 75	50.1	74 13.9	60 74	48.6	73 55.6	62 72	47.2	73 36.8	64 70	45.8	73 17.4	65 69	44.4	72 57.5	67 67	43.1	72 37.1	69 66	41.9	3
4	74 02.7	53 78	53.5	73 46.6	55 77	52.0	73 29.8	57 76	50.5	73 12.5	59 74	49.1	72 54.5	61 72	47.7	72 36.1	62 71	46.4	72 17.1	64 70	45.1	71 57.7	66 68	43.9	4
15	73 15.6	50 80	55.2	73 00.4	52 79	53.7	72 44.5	54 77	52.2	72 28.1	56 76	50.8	72 11.1	58 74	49.5	71 53.5	59 73	48.2	71 35.4	61 72	46.9	71 16.8	63 70	45.7	15
6	72 27.6	47 81	56.7	72 13.2	49 80	55.2	71 58.2	51 79	53.8	71 42.6	53 77	52.4	71 26.5	55 76	51.1	71 09.7	57 75	49.8	70 52.5	58 73	48.6	70 34.8	60 72	47.3	6
7	71 38.8	44 82	58.0	71 25.2	46 81	56.6	71 11.0	48 80	55.2	70 56.2	50 79	53.9	70 40.9	52 78	52.6	70 25.0	54 76	51.3	70 08.6	56 75	50.1	69 51.6	57 74	48.9	7
8	70 49.3	42 84	59.2	70 36.5	44 82	57.9	70 23.0	46 81	56.5	70 09.0	48 80	55.2	69 54.4	50 79	53.9	69 39.3	51 77	52.7	69 23.7	53 76	51.5	69 07.5	55 75	50.3	8
9	69 59.2	39 84	60.3	69 47.1	41 83	59.0	69 34.3	43 82	57.7	69 21.0	45 81	56.4	69 07.2	47 80	55.2	68 52.8	49 79	54.0	68 37.9	51 78	52.8	68 22.5	52 76	51.6	9
20	69 08.6	37 85	61.4	68 57.1	39 84	60.1	68 45.1	41 83	58.8	68 32.4	43 82	57.5	68 19.3	45 81	56.3	68 05.6	46 80	55.1	67 51.4	48 79	53.9	67 36.7	50 78	52.8	20
1	68 17.5	35 86	62.3	68 06.6	37 85	61.0	67 55.2	39 84	59.8	67 43.3	41 83	58.6	67 30.8	43 82	57.4	67 17.7	44 81	56.2	67 04.2	46 80	55.0	66 50.2	47 79	53.9	1
2	67 26.0	33 86	63.1	67 15.7	35 86	61.9	67 04.9	37 84	60.7	66 53.6	39 84	59.5	66 41.7	40 83	58.3	66 29.3	42 82	57.2	66 16.4	44 80	56.1	66 03.1	45 80	54.9	2
3	66 34.1	31 87	63.9	66 24.4	33 86	62.7	66 14.2	35 85	61.5	66 03.4	37 84	60.3	65 52.1	38 83	59.2	65 40.4	40 82	58.1	65 28.1	42 81	57.0	65 15.3	43 80	55.9	3
4	65 42.0	30 88	64.5	65 32.8	32 87	63.4	65 23.1	33 86	62.3	65 12.8	35 85	61.1	65 02.1	37 84	60.0	64 50.9	38 83	58.9	64 39.3	40 82	57.8	64 27.1	41 81	56.8	4
25	64 49.5	28 88	65.2	64 40.8	30 87	64.1	64 31.6	31 86	62.9	64 21.9	33 85	61.8	64 11.7	35 84	60.8	64 01.1	36 84	59.7	63 50.0	38 83	58.6	63 38.4	39 82	57.6	25
6	63 56.8	27 88	65.8	63 48.6	28 88	64.7	63 39.9	30 87	63.6	63 30.7	31 86	62.5	63 21.0	33 85	61.5	63 10.9	35 84	60.4	63 00.3	36 83	59.4	62 49.3	38 83	58.4	6
7	63 03.8	25 89	66.3	62 56.1	27 88	65.2	62 47.8	28 87	64.2	62 39.1	30 86	63.1	62 29.9	31 86	62.1	62 20.3	33 85	61.1	62 10.2	34 84	60.1	61 59.7	36 83	59.1	7
8	62 10.7	24 89	66.8	62 03.3	25 88	65.7	61 55.5	27 88	64.7	61 47.3	28 87	63.7	61 38.6	30 86	62.7	61 29.4	31 85	61.7	61 19.9	33 84	60.7	61 09.9	34 84	59.7	8
9	61 17.3	22 89	67.2	61 10.4	24 89	66.2	61 03.0	25 88	65.2	60 55.2	27 87	64.2	60 47.0	28 86	63.2	60 38.3	30 86	62.2	60 29.2	31 85	61.3	60 19.7	32 84	60.3	9
30	60 23.8	21 89	67.6	60 17.3	22 89	66.6	60 10.3	24 88	65.7	60 02.9	25 87	64.7	59 55.1	27 87	63.7	59 46.9	28 86	62.8	59 38.2	30 85	61.8	59 29.2	31 85	60.9	30
1	59 30.1	20 90	68.0	59 24.0	21 89	67.0	59 17.4	23 88	66.1	59 10.4	24 88	65.1	59 03.1	26 87	64.2	58 55.2	27 86	63.2	58 47.0	28 86	62.3	58 38.4	29 85	61.4	1
2	58 36.3	19 90	68.3	58 30.6	20 89	67.4	58 24.4	21 89	66.5	58 17.8	23 88	65.5	58 10.8	24 87	64.6	58 03.4	25 87	63.7	57 55.6	27 86	62.8	57 47.4	28 85	61.9	2
3	57 42.4	17 90	68.6	57 37.0	19 89	67.7	57 31.2	20 89	66.8	57 25.0	21 88	65.9	57 18.4	23 88	65.0	57 11.4	24 87	64.1	57 04.0	25 86	63.2	56 56.2	26 86	62.3	3
4	56 48.4	16 90	68.9	56 43.3	18 90	68.0	56 37.8	19 89	67.1	56 32.0	20 88	66.2	56 25.8	21 88	65.4	56 19.1	23 87	64.5	56 12.2	24 87	63.6	56 04.8	25 86	62.7	4
35	55 54.3	15 90	69.2	55 49.5	16 90	68.3	55 44.4	18 89	67.4	55 38.9	19 89	66.6	55 33.0	20 88	65.7	55 26.8	21 88	64.8	55 20.2	23 87	64.0	55 13.2	24 86	63.1	35
6	55 00.1	14 90	69.4	54 55.6	15 90	68.6	54 50.8	17 90	67.7	54 45.6	18 89	66.8	54 40.1	19 88	66.0	54 34.2	20 88	65.2	54 28.0	21 87	64.3	54 21.4	23 87	63.5	6
7	54 05.8	13 91	69.6	54 01.6	14 90	68.8	53 57.1	16 90	68.0	53 52.3	17 89	67.1	53 47.1	18 88	66.3	53 41.6	19 88	65.5	53 35.7	20 87	64.6	53 29.5	21 87	63.8	7
8	53 11.4	12 91	69.8	53 07.6	13 90	69.0	53 03.4	14 90	68.2	52 58.9	16 89	67.4	52 54.0	17 89	66.5	52 48.8	18 88	65.7	52 43.3	19 88	64.9	52 37.4	20 87	64.1	8
9	52 17.0	11 91	70.0	52 13.4	12 90	69.2	52 09.5	13 90	68.4	52 05.3	15 89	67.6	52 00.8	16 89	66.8	51 55.9	17 88	66.0	51 50.7	18 88	65.2	51 45.2	19 87	64.4	9
40	51 22.5	10 91	70.2	51 19.2	11 90	69.4	51 15.6	12 90	68.6	51 11.7	14 90	67.8	51 07.5	15 89	67.0	51 02.9	16 88	66.2	50 58.1	17 88	65.4	50 52.9	18 87	64.6	40
1	50 27.9	09 91	70.3	50 24.9	10 91	69.5	50 21.6	12 90	68.8	50 18.0	13 90	68.0	50 14.1	14 89	67.2	50 09.9	15 89	66.4	50 05.3	16 88	65.7	50 00.5	17 88	64.9	1
2	49 33.3	09 91	70.4	49 30.6	10 91	69.7	49 27.6	11 90	68.9	49 24.3	12 90	68.1	49 20.6	13 89	67.4	49 16.7	14 89	66.6	49 12.5	15 88	65.9	49 08.0	16 88	65.1	2
3	48 38.7	08 91	70.6	48 36.2	09 91	69.8	48 33.5	10 90	69.0	48 30.4	11 90	68.3	48 27.1	12 89	67.5	48 23.5	13 89	66.8	48 19.6	14 88	66.1	48 15.3	15 88	65.3	3
4	47 44.0	07 91	70.7	47 41.8	08 91	69.9	47 39.3	09 90	69.2	47 36.6	10 90	68.4	47 33.5	11 89	67.7	47 30.2	12 89	67.0	47 26.5	13 88	66.2	47 22.6	13 88	65.5	4
45	46 49.3	06 91	70.7	46 47.4	07 91	70.0	46 45.2	08 90	69.3	46 42.6	09 90	68.6	46 39.9	10 90	67.8	46 36.8	11 89	67.1	46 33.5	12 88	66.4	46 29.9	12 88	65.7	45
6	45 54.6	05 91	70.8	45 52.9	06 91	70.1	45 50.9	07 90	69.4	45 48.7	08 90	68.7	45 46.2	09 90	68.0	45 43.4	10 89	67.2	45 40.3	11 89	66.5	45 37.0	11 88	65.8	6
7	44 59.9	04 91	70.9	44 58.4	05 91	70.2	44 56.7	06 90	69.5	44 54.7	07 90	68.8	44 52.4	08 90	68.1	44 49.9	09 89	67.4	44 47.2	10 89	66.7	44 44.1	11 88	66.0	7
8	44 05.1	04 91	70.9	44 03.9	05 91	70.2	44 02.4	05 90	69.5	44 00.6	06 90	68.8	43 58.7	07 90	68.2	43 56.4	08 89	67.5	43 53.9	09 89	66.8	43 51.2	10 88	66.1	8
9	43 10.3	03 91	71.0	43 09.3	04 91	70.3	43 08.1	05 90	69.6	43 06.6	05 90	68.9	43 04.8	06 90	68.2	43 02.9	07 89	67.6	43 00.6	08 89	66.9	42 58.2	09 88	66.2	9
50	42 15.5	02 91	71.0	42 14.7	03 91	70.3	42 13.7	04 91	69.7	42 12.5	05 90	69.0	42 11.0	06 90	68.3	42 09.3	06 89	67.6	42 07.3	07 89	67.0	42 05.1	08 88	66.3	50
1	41 20.7	01 91	71.0	41 20.2	02 91	70.4	41 19.4	03 91	69.7	41 18.4	04 90	69.0	41 17.1	05 90	68.4	41 15.7	05 89	67.7	41 14.0	06 89	67.0	41 12.1	07 89	66.4	1
2	40 25.9	01 91	71.0	40 25.6	01 91	70.4	40 25.0	02 91	69.7	40 24.3	03 90	69.1	40 23.3	04 90	68.4	40 22.0	04 89	67.8	40 20.6	05 89	67.1	40 18.9	06 89	66.4	2
3	39 31.1	00 91	71.0	39 31.0	01 91	70.4	39 30.7	01 91	69.7	39 30.1	02 90	69.1	39 29.4	03 90	68.5	39 28.4	04 89	67.8	39 27.2	04 89	67.2	39 25.8	05 89	66.5	3
4	38 36.3	01 91	71.0	38 36.4	00 91	70.4	38 36.3	01 91	69.8	38 36.0	01 90	69.1	38 35.5	02 90	68.5	38 34.7	03 89	67.8	38 33.8	03 89	67.2	38 32.6	04 89	66.6	4
55	37 41.5	01 91	71.0	37 41.8	01 91	70.4	37 41.9	00 91	69.8	37 41.8	01 90	69.1	37 41.5	01 90	68.5	37 41.0	02 90	67.9	37 40.4	03 89	67.2	37 39.5	03 89	66.6	55
6	36 46.7	02 91	71.0	36 47.2	01 91	70.4	36 47.5	01 91	69.8	36 47.7	00 90	69.1	36 47.6	01 90	68.5	36 47.4	01 90	67.9	36 46.9	02 89	67.3	36 46.3	02 89	66.6	6
7	35 51.9	03 91	71.0	35 52.6	02 91	70.4	35 53.2	02 91	69.7	35 53.5	01 90	69.1	35 53.7	00 90	68.5	35 53.7	00 90	67.9	35 53.4	01 89	67.3	35 53.1	02 89	66.7	7
8	34 57.1	03 91	70.9	34 58.0	03 91	70.3	34 58.8	02 91	69.7	34 59.4	02 90	69.1	34 59.8	01 90	68.5	35 00.0	00 90	67.9	35 00.0	00 89	67.3	34 59.8	01 89	66.7	8
9	34 02.3	04 91	70.9	34 03.5	04 91	70.3	34 04.4	03 90	69.7	34 05.2	02 90	69.1	34 05.8	02 90	68.5	34 06.3	01 89	67.9	34 06.5	01 89	67.3	34 06.6	00 89	66.7	9
60	33 07.6	05 91	70.9	33 08.9	04 91	70.3	33 10.1	04 90	69.7	33 11.1	03 90	69.1	33 11.9	02 90	68.5	33 12.6	02 89	67.9	33 13.1	01 89	67.3	33 13.4	01 89	66.7	60
1	32 12.8	05 91	70.8	32 14.4	05 91	70.2	32 15.7	04 90	69.6	32 17.0	04 90	69.0	32 18.0	03 90	68.4	32 18.9	03 89	67.8	32 19.6	02 89	67.3	32 20.2	02 89	66.7	1
2	31 18.1	06 91	70.7	31 19.8	06 91	70.2	31 21.4	06 90	69.6	31 22.8	04 90	69.0	31 24.1	04 90	68.4	31 25.2	03 89	67.8	31 26.2	03 89	67.2	31 27.0	02 89	66.6	2
3	30 23.4	07 91	70.7	30 25.3	06 91	70.1	30 27.1	06 90	69.5	30 28.8	05 90	68.9	30 30.2	05 90	68.4	30 31.6	04 89	67.8	30 32.7	04 89	67.2	30 33.8	03 89	66.6	3
4	29 28.7	07 91	70.6	29 30.9	07 91	70.0	29 32.8	06 90	69.4	29 34.7	06 90	68.9	29 36.4	05 90	68.3	29 37.9	05 89	67.7	29 39.3	04 89	67.2	29 40.6	04 89	66.6	4
65	28 34.1	08 91	70.5	28 36.4	08 91	69.9	28 38.6	07 90	69.4	28 40.6	07 90	68.8	28 42.5	06 90	68.2	28 44.3	06 89	67.7	28 45.9	05 89	67.1	28 47.4	05 89	66.5	65
6	27 39.4	09 91	70.4	27 42.0	08 91	69.9	27 44.4	08 90	69.3	27 46.6	07 90	68.7	27 48.7	07 90	68.2	27 50.7	06 89	67.6	27 52.6	06 89	67.0	27 54.3	05 89	66.5	6
7	26 44.8	09 91	70.3	26 47.6	09 91	69.8	26 50.2	08 90	69.2	26 52.6	08 90	68.7	26 54.9	08 90	68.1	26 57.1	07 89	67.5	26 59.2	07 89	67.0	27 01.1	06 89	66.4	7
8	25 50.3	10 91	70.2	25 53.2	09 91	69.7	25 56.0	09 90	69.1	25 58.6	09 90	68.6	26 01.2	08 90	68.0	26 03.6	08 89	67.5	26 05.9	07 89	66.9	26 08.0	07 88	66.4	8
9	24 55.8	11 91	70.1	24 58.9	10 90	69.6	25 01.9	10 90	69.0	25 04.7	09 90	68.5	25 07.5	09 90	67.9	25 10.1	09 89	67.4	25 12.6	08 89	66.8	25 14.9	08 88	66.3	9
70	24 01.3	11 91	70.0	24 04.6	11 90	69.5	24 07.7	10 90	68.9	24 10.8	10 90	68.4	24 13.8	10 90	67.8	24 16.6	09 89	67.3	24 19.3	09 89	66.8	24 21.9	08 88	66.2	70
1	23 06.8	12 91	69.9	23 10.3	11 90	69.4	23 13.7	11 90	68.8	23 16.9	11 90	68.3	23 20.1	10 89	67.7	23 23.1	10 89	67.2	23 26.1	10 89	66.7	23 28.9	09 88	66.1	1
2	22 12.4	12 91	69.8	22 16.1	12 90	69.3	22 19.7	12 90	68.7	22 23.1	11 90	68.2	22 26.5	11 89	67.6	22 29.7	11 89	67.1	22 32.9	10 89	66.6	22 35.9	10 88	66.0	2
3	21 18.1	13 90	69.7	21 21.9	13 90	69.1	21 25.7	12 90	68.6	21 29.3	12 90	68.1	21 32.9	12 89	67.5	21 36.4	11 89	67.0	21 39.7	11 88	66.5	21 43.0	11 88	65.9	3
4	20 23.7	14 90	69.5	20 27.8	13 90	69.0	20 31.7	13 90	68.5	20 35.6	13 89	67.9	20 39.4	12 89	67.4	20 43.0	12 89	66.9	20 46.6	12 88	66.4	20 50.1	11 88	65.8	4
75	19 29.5	14 90	69.4	19 33.7	14 90	68.9	19 37.9	14 90	68.3	19 41.9	13 89	67.8	19 45.9	13 89	67.3	19 49.8	13 89	66.8	19 53.5	12 88	66.2	19 57.2	12 88	65.7	75
6	18 35.2	15 90	69.3	18 39.7	15 90	68.7	18 44.0	14 90	68.2	18 48.3	14 89	67.7	18 52.4	14 89	67.2	18 56.5	13 89	66.6	19 00.5	13 88	66.1	19 04.4	13 88	65.6	6
7	17 41.1	16 90	69.1	17 45.7	15 90	68.6	17 50.2	15 90	68.1	17 54.7	15 89	67.6	17 59.1	14 89	67.0	18 03.3	14 89	66.5	18 07.5	14 88	66.0	18 11.7	14 88	65.5	7
8	16 46.9	16 90	69.0	16 51.7	16 90	68.4	16 56.5	16 90	67.9	17 01.1	15 89	67.4	17 05.7	15 89	66.9	17 10.2	15 88	66.4	17 14.6	15 88	65.9	17 19.0	14 88	65.3	8
9	15 52.9	17 90	68.8	15 57.9	17 90	68.3	16 02.8	16 89	67.8	16 07.7	16 89	67.3	16 12.4	16 89	66.8	16 17.1	16 88	66.2	16 21.8	15 88	65.7	16 26.3	15 88	65.2	9
80	14 58.9	17 90	68.6	15 04.1	17 90	68.1	15 09.2	17 89	67.6	15 14.2	17 89	67.1	15 19.2	16 88	66.6	15 24.1	16 88	66.1	15 29.0	16 88	65.6	15 33.7	16 88	65.1	80
1	14 04.9	18 90	68.5	14 10.3	18 89	68.0	14 15.6	18 89	67.5	14 20.9	17 89	67.0	14 26.1	17 88	66.4	14 31.2	17 88	65.9	14 36.2	17 88	65.4	14 41.2	17 87	64.9	1
2	13 11.0	19 90	68.3	13 16.6	18 89	67.8	13 22.1	18 89	67.3	13 27.6	18 89	66.8	13 33.0	18 88	66.3	13 38.3	18 88	65.8	13 43.6	17 88	65.3	13 48.8	17 87	64.8	2
3	12 17.2	19 90	68.1	12 23.0	19 89	67.6	12 28.7	19 89	67.1	12 34.3	19 89	66.6	12 39.9	19 88	66.1	12 45.5	18 88	65.6	12 51.0	18 88	65.1	12 56.4	18 87	64.6	3
4	11 23.5	20 90	67.9	11 29.4	20 89	67.4	11 35.3	20 89	66.9	11 41.2	19 88	66.4	11 47.0	19 88	65.9	11 52.7	19 88	65.4	11 58.4	19 88	64.9	12 04.1	19 87	64.4	4
85	10 29.8	21 89	67.8	10 35.9	20 89	67.3	10 42.0	20 89	66.8	10 48.1	20 88	66.3	10 54.1	20 88	65.8	11 00.1	20 88	65.3	11 06.0	20 87	64.8	11 11.8	19 87	64.3	85
6	9 36.2	21 89	67.6	9 42.5	21 89	67.1	9 48.8	21 88	66.6	9 55.1	21 88	66.1	10 01.3	21 88	65.6	10 07.5	20 88	65.1	10 13.6	20 87	64.6	10 19.7	20 87	64.1	6
7	8 42.7	22 89	67.4	8 49.2	22 89	66.9	8 55.7	22 88	66.4	9 02.2	21 88	65.9	9 08.6	21 88	65.4	9 14.9	21 87	64.9	9 21.3	21 87	64.4	9 27.6	21 87	63.9	7
8	7 49.2	22 89	67.2	7 55.9	22 89	66.7	8 02.6	22 88	66.2	8 09.3	22 88	65.7	8 15.9	22 88	65.2	8 22.5	22 87	64.7	8 29.1	22 87	64.2	8 35.6	22 87	63.7	8
9	6 55.9	23 89	66.9	7 02.8	23 88	66.5	7 09.7	23 88	66.0	7 16.5	23 88	65.5	7 23.4	23 88	65.0	7 30.2	23 87	64.5	7 36.9	22 87	64.0	7 43.7	22 86	63.5	9
90	6 02.6	24 89	66.7	6 09.7	24 88	66.2	6 16.8	24 88	65.8	6 23.8	24 88	65.3	6 30.9	23 87	64.8	6 37.9	23 87	64.3	6 44.9	23 87	63.8	6 51.8	23 86	63.3	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	51 00.0	1.0 01	180.0	50 30.0	1.0 01	180.0	50 00.0	1.0 01	180.0	49 30.0	1.0 01	180.0	49 00.0	1.0 01	180.0	48 30.0	1.0 01	180.0	48 00.0	1.0 01	180.0	47 30.0	1.0 01	180.0	00
1	50 59.3	1.0 04	178.5	50 29.3	1.0 04	178.6	49 59.3	1.0 04	178.6	49 29.3	1.0 04	178.6	48 59.3	1.0 04	178.6	48 29.3	1.0 03	178.6	47 59.3	1.0 03	178.7	47 29.3	1.0 03	178.7	1
2	50 57.1	1.0 06	177.1	50 27.1	1.0 06	177.1	49 57.2	1.0 06	177.2	49 27.2	1.0 06	177.2	48 57.2	1.0 06	177.3	48 27.3	1.0 06	177.3	47 57.3	1.0 06	177.3	47 27.3	1.0 06	177.4	2
3	50 53.4	1.0 08	175.7	50 23.5	1.0 08	175.7	49 53.6	1.0 08	175.8	49 23.7	1.0 08	175.8	48 53.8	1.0 08	175.9	48 23.9	1.0 08	176.0	47 53.9	1.0 08	176.0	47 24.0	1.0 08	176.1	3
4	50 48.3	99 11	174.2	50 18.5	99 11	174.3	49 48.6	99 11	174.4	49 18.8	99 10	174.5	48 48.9	99 10	174.5	48 19.1	99 10	174.6	47 49.2	99 10	174.7	47 19.4	1.0 10	174.8	4
05	50 41.7	99 13	172.8	50 12.0	99 13	172.9	49 42.2	99 13	173.0	49 12.5	99 13	173.1	48 42.7	99 12	173.2	48 13.0	99 12	173.3	47 43.2	99 12	173.4	47 13.5	99 12	173.5	05
6	50 33.7	99 16	171.4	50 04.1	99 16	171.5	49 34.5	99 15	171.6	49 04.8	99 15	171.7	48 35 2	99 15	171.8	48 05.5	99 15	171.9	47 35.9	99 14	172.1	47 06.2	99 14	172.2	6
7	50 24.3	98 18	169.9	49 54.8	98 18	170.1	49 25.3	98 18	170.2	48 55.8	98 17	170.4	48 26.3	98 17	170.5	47 56.8	98 17	170.6	47 27.2	98 16	170.8	46 57.7	99 16	170.9	7
8	50 13.5	98 20	168.5	49 44.1	98 20	168.7	49 14.8	98 20	168.9	48 45.4	98 20	169.0	48 16.0	98 19	169.2	47 46.7	98 19	169.3	47 17.3	98 19	169.5	46 47.9	98 18	169.6	8
9	50 01.3	97 23	167.1	49 32.1	97 22	167.3	49 02.9	97 22	167.5	48 33.7	97 22	167.7	48 04.5	97 21	167.9	47 35.3	97 21	168.0	47 06.0	98 21	168.2	46 36.8	98 21	168.3	9
10	49 47.7	97 25	165.8	49 18.7	97 24	166.0	48 49.7	97 24	166.2	48 20.7	97 24	166.4	47 51.7	97 24	166.5	47 22.6	97 23	166.7	46 53.5	97 23	166.9	46 24.4	97 23	167.1	10
1	49 32.8	96 27	164.4	49 04.0	96 27	164.6	48 35.2	96 26	164.8	48 06.4	96 26	165.1	47 37.5	96 26	165.3	47 08.7	96 25	165.5	46 39.8	96 25	165.7	46 10.9	96 25	165.9	1
2	49 16.6	95 29	163.1	48 48.0	95 29	163.3	48 19.4	95 28	163.5	47 50.8	95 28	163.8	47 22.2	96 28	164.0	46 53.5	96 27	164.2	46 24.8	96 27	164.4	45 56.1	96 27	164.6	2
3	48 59.1	94 31	161.8	48 30.7	94 31	162.0	48 02.4	95 30	162.2	47 34.0	95 30	162.5	47 05.6	95 30	162.7	46 37.1	95 29	163.0	46 08.7	95 29	163.2	45 40.2	95 29	153.4	3
4	48 40.3	94 33	160.4	48 12.2	94 33	160.7	47 44.1	94 32	161.0	47 15.9	94 32	161.2	46 47.8	94 32	161.5	46 19.5	94 31	161.7	45 51.3	94 31	162.0	45 23.0	94 30	162.2	4
15	48 20.3	93 35	159.2	47 52.5	93 35	159.4	47 24.6	93 34	159.7	46 56.7	93 34	160.0	46 28.8	93 34	160.3	46 00.8	93 33	160.5	45 32.8	93 33	160.8	45 04.8	94 32	161.0	15
6	47 59.1	92 37	157.9	47 31.5	92 37	158.2	47 03.9	92 36	158.5	46 36.3	92 36	158.8	46 08.6	92 36	159.0	45 40.9	92 35	159.3	45 13.1	93 35	159.6	44 45.4	93 34	159.9	6
7	47 36.7	91 39	156.7	47 09.4	91 39	157.0	46 42.1	91 38	157.3	46 14.7	91 38	157.6	45 47.3	91 37	157.9	45 19.9	92 37	158.1	44 52.4	92 36	158.4	44 24.8	92 36	158.7	7
8	47 13.2	90 41	155.4	46 46.2	90 41	155.8	46 19.1	90 40	156.1	45 52.1	90 40	156.4	45 24.9	91 39	156.7	44 57.8	91 39	157.0	44 30.5	91 38	157.3	44 03.3	91 38	157.6	8
9	46 48.5	89 43	154.2	46 21.8	89 42	154.6	45 55.1	89 42	154.9	45 28.3	89 41	155.2	45 01.5	90 41	155.5	44 34.6	90 40	155.9	44 07.6	90 40	156.2	43 40.6	90 39	156.5	9
20	46 22.8	88 45	153.1	45 56.4	88 44	153.4	45 30.0	88 44	153.8	45 03.5	88 43	154.1	44 37.0	89 43	154.4	44 10.4	89 42	154.7	43 43.7	89 42	155.1	43 17.0	89 41	155.4	20
1	45 56.0	87 46	151.9	45 30.0	87 46	152.3	45 03.9	87 45	152.6	44 37.7	87 45	153.0	44 11.4	88 44	153.3	43 45.1	88 44	153.6	43 18.8	88 43	154.0	42 52.4	88 43	154.3	1
2	45 28.2	86 48	150.8	45 02.5	86 47	151.2	44 36.7	86 47	151.5	44 10.8	86 46	151.9	43 44.9	87 46	152.2	43 18.9	87 45	152.6	42 52.9	87 45	152.9	42 26.7	87 44	153.2	2
3	44 59.5	85 50	149.7	44 34.1	85 49	150.1	44 08.6	85 48	150.4	43 43.0	85 48	150.8	43 17.4	86 47	151.2	42 51.7	86 47	151.5	42 26.0	86 46	151.9	42 00.2	86 46	152.2	3
4	44 29.7	83 51	148.6	44 04.7	84 51	149.0	43 39.5	84 50	149.4	43 14.3	84 49	149.7	42 49.0	84 49	150.1	42 23.6	85 48	150.5	41 58.2	85 48	150.8	41 32.7	85 47	151.2	4
25	43 59.1	82 52	147.5	43 34.4	83 52	147.9	43 09.5	83 52	148.3	42 44.6	83 51	148.7	42 19.7	83 50	149.1	41 54.6	84 50	149.5	41 29.5	84 49	149.8	41 04.3	84 49	150.2	25
6	43 27.6	81 54	146.5	43 03.2	81 53	146.9	42 38.7	82 53	147.3	42 14.1	82 52	147.7	41 49.4	82 52	148.1	41 24.7	83 51	148.5	40 59.9	83 51	148.8	40 35.1	83 50	149.2	6
7	42 55.2	80 56	145.5	42 31.1	80 55	145.9	42 06.9	81 54	146.3	41 42.7	81 54	146.7	41 18.4	81 53	147.1	40 54.0	81 53	147.5	40 29.5	82 52	147.9	40 05.0	82 52	148.2	7
8	42 21.9	79 57	144.5	41 58.2	79 56	144.9	41 34.4	80 56	145.3	41 10.5	80 55	145.7	40 46.5	80 54	146.1	40 22.4	80 54	146.5	39 58.3	81 53	146.9	39 34.1	81 53	147.3	8
9	41 47.9	78 58	143.6	41 24.5	78 57	144.0	41 01.0	78 57	144.4	40 37.5	79 56	144.8	40 13.8	79 56	145.2	39 50.1	79 55	145.6	39 26.3	80 55	146.0	39 02.4	80 54	146.4	9
30	41 13.1	77 59	142.6	40 50.0	77 59	143.0	40 26.9	77 58	143.5	40 03.7	78 58	143.9	39 40.3	78 57	144.3	39 16.9	78 56	144.7	38 53.5	78 56	145.1	38 29.9	79 55	145.5	30
1	40 37.5	76 60	141.7	40 14.8	76 60	142.1	39 52.0	76 59	142.5	39 29.1	76 59	143.0	39 06.1	77 58	143.4	38 43.1	77 58	143.8	38 19.9	77 57	144.2	37 56.7	78 57	144.6	1
2	40 01.2	74 62	140.8	39 38.9	75 61	141.2	39 16.4	75 60	141.7	38 53.9	75 60	142.1	38 31.2	76 59	142.5	38 08.5	76 59	142.9	37 45.7	76 58	143.3	37 22.8	76 58	143.7	2
3	39 24.2	73 63	139.9	39 02.2	74 62	140.4	38 40.1	74 62	140.8	38 17.9	74 61	141.2	37 55.6	75 60	141.6	37 33.2	75 60	142.1	37 10.7	75 59	142.5	36 48.1	75 59	142.9	3
4	38 46.6	72 64	139.1	38 24.9	72 63	139.5	38 03.1	73 63	139.9	37 41.3	73 62	140.4	37 19.3	73 62	140.8	36 57.2	74 61	141.2	36 35.1	74 60	141.6	36 12.8	74 60	142.1	4
35	38 08.3	71 65	138.2	37 47.0	71 64	138.7	37 25.5	72 64	139.1	37 04.0	72 63	139.5	36 42.3	72 62	140.0	36 20.6	73 62	140.4	35 58.8	73 62	140.8	35 36.9	73 61	141.3	35
6	37 29.4	70 66	137.4	37 08.4	70 65	137.9	36 47.3	71 65	138.3	36 26.1	71 64	138.7	36 04.8	71 64	139.2	35 43.4	71 63	139.6	35 21.9	72 62	140.0	35 00.3	72 62	140.5	6
7	36 49.9	69 67	136.6	36 29.2	69 66	137.1	36 08.4	69 66	137.5	35 47.5	70 65	138.0	35 26.6	70 65	138.4	35 05.5	70 64	138.8	34 44.3	71 64	139.3	34 23.1	71 63	139.7	7
8	36 09.8	68 68	135.8	35 49.4	68 67	136.3	35 29.0	68 67	136.7	35 08.4	69 66	137.2	34 47.8	69 66	137.6	34 27.1	69 65	138.1	34 06.2	70 64	138.5	33 45.3	70 64	138.9	8
9	35 29.1	67 69	135.1	35 09.1	67 68	135.5	34 49.0	67 68	136.0	34 28.8	68 67	136.4	34 08.5	68 66	136.9	33 48.1	68 66	137.3	33 27.6	68 65	137.8	33 07.0	69 65	138.2	9
40	34 47.9	65 70	134.3	34 28.3	66 69	134.8	34 08.5	66 68	135.3	33 48.6	66 68	135.7	33 28.6	67 67	136.2	33 08.5	67 67	136.6	32 48.3	67 66	137.0	32 28.1	68 66	137.5	40
1	34 06.2	64 70	133.6	33 46.9	65 70	134.1	33 27.4	65 69	134.5	33 07.9	65 69	135.0	32 48.2	66 68	135.4	32 28.4	66 68	135.9	32 08.6	66 67	136.3	31 48.6	67 67	136.8	1
2	33 24.0	63 71	132.9	33 05.0	64 71	133.4	32 45.9	64 70	133.8	32 26.6	64 70	134.3	32 07.3	65 69	134.8	31 47.9	65 68	135.2	31 28.3	65 68	135.7	31 08.7	66 67	136.1	2
3	32 41.4	62 72	132.2	32 22.7	63 71	132.7	32 03.8	63 71	133.2	31 44.9	63 70	133.6	31 25.9	64 70	134.1	31 06.8	64 69	134.5	30 47.6	64 69	135.0	30 28.3	64 68	135.4	3
4	31 58.2	61 73	131.6	31 39.8	62 72	132.0	31 21.3	62 72	132.5	31 02.7	62 71	133.0	30 44.0	62 70	133.4	30 25.2	63 70	133.9	30 06.3	63 70	134.3	29 47.4	63 69	134.8	4
45	31 14.7	60 73	130.9	30 56.6	60 73	131.4	30 38.4	61 72	131.9	30 20.1	61 72	132.3	30 01.7	61 71	132.8	29 43.2	62 71	133.2	29 24.6	62 70	133.7	29 06.0	62 70	134.1	45
6	30 30.7	59 74	130.3	30 12.9	59 74	130.8	29 55.0	60 73	131.2	29 37.0	60 72	131.7	29 18.9	60 72	132.1	29 00.8	61 71	132.6	28 42.5	61 71	133.0	28 24.2	61 70	133.5	6
7	29 46.3	58 75	129.7	29 28.8	58 74	130.1	29 11.2	59 74	130.6	28 53.5	59 73	131.1	28 35.8	59 73	131.5	28 17.9	60 72	132.0	27 59.9	60 72	132.4	27 41.9	60 71	132.9	7
8	29 01.5	57 75	129.1	28 44.3	57 75	129.5	28 27.0	58 74	130.0	28 09.6	58 74	130.5	27 52.2	58 73	130.9	27 34.6	59 73	131.4	27 17.0	59 72	131.8	26 59.2	59 72	132.3	8
9	28 16.3	56 76	128.5	27 59.4	56 75	128.9	27 42.4	57 75	129.4	27 25.3	57 74	129.9	27 08.2	57 74	130.3	26 50.9	58 73	130.8	26 33.6	58 73	131.3	26 16.2	58 72	131.7	9
50	27 30.7	55 76	127.9	27 14.1	55 76	128.4	26 57.5	56 76	128.8	26 40.7	56 75	129.3	26 23.8	56 74	129.8	26 06.9	57 74	130.2	25 49.8	57 74	130.7	25 32.7	57 73	131.1	50
1	26 44.8	54 77	127.3	26 28.5	54 77	127.8	26 12.1	55 76	128.3	25 55.7	55 76	128.7	25 39.1	55 75	129.2	25 22.4	56 75	129.7	25 05.7	56 74	130.1	24 48.9	56 74	130.6	1
2	25 58.6	53 78	126.8	25 42.6	54 77	127.3	25 26.5	54 77	127.7	25 10.3	54 76	128.2	24 54.0	54 76	128.7	24 37.7	55 75	129.1	24 21.2	55 75	129.6	24 04.7	55 74	130.0	2
3	25 12.0	52 78	126.3	24 56.3	53 78	126.7	24 40.5	53 77	127.2	24 24.6	53 77	127.7	24 08.6	53 76	128.1	23 52.5	54 76	128.6	23 36.4	54 75	129.1	23 20.1	54 75	129.5	3
4	24 25.1	51 79	125.7	24 09.7	52 78	126 2	23 54.1	52 78	126.7	23 38.5	52 77	127.1	23 22.8	52 77	127.6	23 07.1	53 76	128.1	22 51.2	53 76	128.5	22 35.3	53 75	129.0	4
55	23 37.9	50 79	125.2	23 22.8	51 79	125.7	23 07.5	51 78	126.2	22 52.2	51 78	126.6	22 36.8	52 77	127.1	22 21.3	52 77	127.6	22 05.7	52 76	128.0	21 50.1	52 76	128.5	55
6	22 50.4	49 80	124.7	22 35.6	50 79	125.2	22 20.6	50 79	125.7	22 05.5	50 78	126.1	21 50.4	51 78	126.6	21 35.2	51 77	127.1	21 19.9	51 77	127.5	21 04.5	51 76	128.0	6
7	22 02.7	49 80	124.2	21 48.1	49 80	124.7	21 33.4	49 79	125.2	21 18.6	49 79	125.7	21 03.7	50 78	126.1	20 48.8	50 78	126.6	20 33.8	50 77	127.1	20 18.7	50 77	127.5	7
8	21 14.6	48 80	123.8	21 00.3	48 80	124.2	20 45.9	48 80	124.7	20 31.4	48 79	125.2	20 16.8	49 79	125.7	20 02.1	49 78	126.1	19 47.4	49 78	126.6	19 32.6	49 77	127.0	8
9	20 26.3	47 81	123.3	20 12.2	47 80	123.8	19 58.1	47 80	124.3	19 43.8	48 80	124.7	19 29.5	48 79	125.2	19 15.2	48 79	125.7	19 00.7	48 78	126.1	18 46.2	49 78	126.6	9
60	19 37.8	46 81	122.9	19 23.9	46 81	123.3	19 10.1	46 80	123.8	18 56.1	47 80	124.3	18 42.0	47 80	124.7	18 27.9	47 79	125.2	18 13.8	47 79	125.7	17 59.5	48 78	126.1	60
1	18 49.0	45 82	122.4	18 35.4	45 81	122.9	18 21.8	46 81	123.4	18 08.1	46 80	123.8	17 54.3	46 80	124.3	17 40.5	46 80	124.8	17 26.5	46 79	125.2	17 12.6	47 79	125.7	1
2	17 59.9	44 82	122.0	17 46.6	44 82	122.5	17 33.2	45 81	122.9	17 19.8	45 81	123.4	17 06.3	45 80	123.9	16 52.7	45 80	124.3	16 39.1	46 80	124.8	16 25.4	46 79	125.3	2
3	17 10.7	43 82	121.6	16 57.6	44 82	122.0	16 44.5	44 82	122.5	16 31.3	44 81	123.0	16 18.1	44 81	123.4	16 04.7	44 80	123.9	15 51.4	45 80	124.4	15 37.9	45 79	124.8	3
4	16 21.2	43 83	121.2	16 08.4	43 82	121.6	15 55.5	43 82	122.1	15 42.6	43 82	122.6	15 29.6	43 81	123.0	15 16.5	44 81	123.5	15 03.4	44 80	124.0	14 50.3	44 80	124.4	4
65	15 31.5	42 83	120.8	15 18.9	42 83	121.2	15 06.3	42 82	121.7	14 53.6	42 82	122.2	14 40.9	43 81	122.6	14 28.1	43 81	123.1	14 15.2	43 81	123.6	14 02.3	43 80	124.0	65
6	14 41.6	41 84	120.4	14 29.3	41 83	120.8	14 16.9	41 83	121.3	14 04.5	42 82	121.8	13 52.0	42 82	122.2	13 39.4	42 81	122.7	13 26.9	42 81	123.2	13 14.2	42 81	123.6	6
7	13 51.5	40 84	120.0	13 39.4	40 83	120.5	13 27.3	41 83	120.9	13 15.1	41 83	121.4	13 02.9	41 82	121.9	12 50.6	41 82	122.3	12 38.2	41 81	122.8	12 25.9	41 81	123.3	7
8	13 01.2	39 84	119.6	12 49.4	40 84	120.1	12 37.5	40 83	120.6	12 25.5	40 83	121.0	12 13.5	40 82	121.5	12 01.5	40 82	122.0	11 49.4	40 82	122.4	11 37.3	40 81	122.9	8
9	12 10.7	39 84	119.2	11 59.1	39 84	119.7	11 47.5	39 84	120.2	11 35.8	39 83	120.7	11 24.0	39 83	121.1	11 12.2	39 82	121.6	11 00.4	40 82	122.1	10 48.5	40 82	122.5	9
70	11 20.1	38 85	118.9	11 08.7	38 84	119.4	10 57.3	38 84	119.8	10 45.8	38 84	120.3	10 34.3	38 83	120.8	10 22.8	39 83	121.2	10 11.2	39 82	121.7	9 59.6	39 82	122.2	70
1	10 29.2	37 85	118.5	10 18.1	37 85	119.0	10 06.9	37 84	119.5	9 55.7	37 84	120.0	9 44.4	38 83	120.4	9 33.1	38 83	120.9	9 21.8	38 83	121.4	9 10.4	38 82	121.8	1
2	9 38.2	36 85	118.2	9 27.3	36 85	118.7	9 16.4	37 84	119.1	9 05.4	37 84	119.6	8 54.4	37 84	120.1	8 43.3	37 83	120.6	8 32.2	37 83	121.0	8 21.1	37 82	121.5	2
3	8 47.1	36 86	117.9	8 36.4	36 85	118.3	8 25.7	36 85	118.8	8 14.9	36 84	119.3	8 04.2	36 84	119.8	7 53.3	36 84	120.2	7 42.5	36 83	120.7	7 31.6	36 83	121.2	3
4	7 55.8	35 86	117.5	7 45.3	35 85	118.0	7 34.8	35 85	118.5	7 24.3	35 85	119.0	7 13.8	35 84	119.4	7 03.2	35 84	119.9	6 52.6	35 84	120.4	6 41.9	35 83	120.9	4
75	7 04.3	34 86	117.2	6 54.1	34 86	117.7	6 43.8	34 85	118.2	6 33.5	34 85	118.6	6 23.2	34 84	119.1	6 12.9	35 84	119.6	6 02.5	35 84	120.1	5 52.1	35 83	120.5	75
6	6 12.7	33 86	116.9	6 02.7	33 86	117.4	5 52.7	34 86	117.9	5 42.6	34 85	118.3	5 32.5	34 85	118.8	5 22.4	34 84	119.3	5 12.3	34 84	119.8	5 02.1	34 84	120.2	6
7	5 21.0	33 86	116.6	5 11.2	33 86	117.1	5 01.3	33 86	117.6																7

DECLINATION SAME NAME AS LATITUDE

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	5 09.4	24 88	66.5	5 16.7	24 88	66.0	5 24.0	24 88	65.5	5 31.3	24 88	65.0	5 38.5	24 87	64.6	5 45.7	24 87	64.1	5 52.9	24 86	63.6	6 00.1	24 86	63.1	91
2																			5 01.1	25 86	63.4	5 08.5	25 86	62.9	2

Lat. 15°

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	77 00.0	1.0 03	00.0	76 30.0	1.0 03	00.0	76 00.0	1.0 03	00.0	75 00.0	1.0 03	00.0	73 00.0	1.0 02	00.0	71 00.0	1.0 02	00.0	70 30.0	1.0 02	00.0	69 30.0	1.0 02	00.0	00
1	76 58.0	1.0 10	03.9	76 28.1	1.0 09	03.8	75 58.2	1.0 09	03.6	74 58.3	1.0 08	03.3	72 58.5	1.0 07	02.9	70 58.7	1.0 06	02.5	70 28.8	1.0 06	02.5	69 28.8	1.0 06	02.3	1
2	76 52.1	99 16	07.8	76 22.4	99 16	07.5	75 52.7	99 15	07.2	74 53.3	99 14	06.7	72 54.1	99 12	05.8	70 54.9	99 11	05.1	70 25.0	99 10	04.9	69 25.3	1.0 10	04.6	2
3	76 42.3	98 22	11.6	76 13.0	98 22	11.1	75 43.7	98 21	10.7	74 44.9	98 19	09.9	72 46.9	99 17	08.6	70 48.5	99 15	07.6	70 18.8	99 14	07.4	69 19.5	99 14	06.9	3
4	76 28.9	96 28	15.3	76 00.1	96 27	14.7	75 31.2	96 26	14.1	74 33.3	97 24	13.1	72 36.8	97 21	11.4	70 39.6	98 19	10.1	70 10.2	98 18	09.8	69 11.3	98 17	09.2	4
05	76 11.9	94 34	18.8	75 43.7	94 33	18.1	75 15.5	94 32	17.4	74 18.6	95 29	16.2	72 24.0	96 26	14.1	70 28.2	97 23	12.5	69 59.2	97 22	12.1	69 01.0	97 21	11.4	05
6	75 51.5	91 39	22.2	75 24.1	92 38	21.4	74 56.6	92 36	20.6	74 01.0	93 34	19.2	72 08.5	94 30	16.8	70 14.6	96 27	14.9	69 45.9	96 26	14.4	68 48.4	96 24	13.6	6
7	75 28.2	88 44	25.4	75 01.6	89 42	24.5	74 34.7	90 41	23.6	73 40.6	91 38	22.1	71 50.5	93 34	19.4	69 58.6	94 30	17.2	69 30.4	94 29	16.7	68 33.7	95 28	15.8	7
8	75 01.9	85 48	28.4	74 36.2	86 47	27.4	74 10.2	87 45	26.5	73 17.5	88 42	24.8	71 30.1	91 38	21.8	69 40.4	92 34	19.4	69 12.7	93 33	18.9	68 16.9	93 31	17.8	8
9	74 33.1	82 52	31.2	74 08.2	83 50	30.2	73 43.1	84 49	29.2	72 52.1	86 46	27.4	71 07.4	88 41	24.2	69 20.1	90 37	21.6	68 52.9	91 36	21.0	67 58.2	92 34	19.8	9
10	74 01.9	79 56	33.9	73 37.9	80 54	32.8	73 13.7	81 52	31.8	72 24.3	83 50	29.8	70 42.6	86 45	26.5	68 57.8	88 40	23.6	68 31.2	89 39	23.0	67 37.6	90 37	21.8	10
1	73 28.6	76 59	36.3	73 05.5	77 57	35.2	72 42.2	78 56	34.1	71 54.5	80 53	32.1	70 15.8	84 48	28.6	68 33.6	86 43	25.6	68 07.7	87 42	25.0	67 15.2	88 40	23.7	1
2	72 53.3	73 62	38.6	72 31.2	74 60	37.5	72 08.7	76 59	36.4	71 22.7	78 56	34.3	69 47.1	81 51	30.7	68 07.7	84 46	27.6	67 42.3	85 45	26.9	66 51.1	86 43	25.5	2
3	72 16.3	70 64	40.7	71 55.1	71 63	39.6	71 33.5	73 61	38.5	70 49.1	75 59	36.4	69 16.7	79 53	32.6	67 40.0	82 49	29.4	67 15.3	83 48	28.7	66 25.3	84 46	27.2	3
4	71 37.8	67 67	42.7	71 17.4	69 65	41.5	70 56.7	70 64	40.4	70 14.0	72 61	38.3	68 44.7	76 56	34.5	67 10.8	80 51	31.1	66 46.8	81 50	30.4	65 58.0	82 48	28.9	4
15	70 57.8	64 69	44.5	70 38.3	66 67	43.3	70 18.4	67 66	42.2	69 37.4	70 63	40.1	68 11.1	74 58	36.2	66 40.1	78 53	32.8	66 16.8	78 52	32.0	65 29.3	80 50	30.5	15
6	70 16.6	61 70	46.1	69 57.9	63 69	45.0	69 38.8	64 68	43.9	68 59.4	67 65	41.7	67 36.2	72 60	37.8	66 08.1	75 56	34.4	65 45.4	76 54	33.6	64 59.2	78 52	32.1	6
7	69 34.2	59 72	47.7	69 16.4	60 71	46.6	68 58.1	62 70	45.4	68 20.2	64 67	43.3	67 00.1	69 62	39.4	65 34.7	73 58	35.9	65 12.7	74 56	35.1	64 27.8	76 54	33.5	7
8	68 50.9	56 74	49.1	68 33.8	58 73	48.0	68 16.3	59 71	46.9	67 40.0	62 69	44.8	66 22.7	67 64	40.8	65 00.1	71 59	37.3	64 38.8	72 58	36.5	63 55.2	73 56	34.9	8
9	68 06.6	54 75	50.4	67 50.3	55 74	49.3	67 33.5	57 73	48.2	66 58.6	59 70	46.1	65 44.3	64 66	42.2	64 24.5	69 61	38.7	64 03.8	70 60	37.8	63 21.5	71 58	36.2	9
20	67 21.6	51 76	51.7	67 05.9	53 75	50.6	66 49.8	54 74	49.5	66 16.4	57 72	47.4	65 04.9	62 67	43.5	63 47.7	66 63	40.0	63 27.7	67 62	39.1	62 46.7	69 60	37.5	20
1	66 35.7	49 78	52.8	66 20.8	51 76	51.7	66 05.4	52 75	50.7	65 33.4	55 73	48.6	64 24.5	60 69	44.7	63 10.1	64 64	41.2	62 50.6	65 63	40.3	62 11.0	67 61	38.7	1
2	65 49.2	47 78	53.9	65 35.0	48 77	52.8	65 20.2	50 76	51.7	64 49.5	53 74	49.7	63 43.3	58 70	45.9	62 31.5	62 66	42.3	62 12.7	63 65	41.5	61 34.3	65 63	39.8	2
3	65 02.1	45 79	54.8	64 48.5	46 78	53.8	64 34.4	48 77	52.7	64 05.0	50 75	50.7	63 01.4	55 71	46.9	61 52.1	60 67	43.4	61 33.9	61 66	42.6	60 56.7	63 64	40.9	3
4	64 14.5	43 80	55.7	64 01.5	44 79	54.7	63 48.0	46 78	53.7	63 19.8	48 76	51.7	62 18.7	53 72	47.9	61 11.9	58 68	44.4	60 54.3	59 67	43.6	60 18.4	61 65	41.9	4
25	63 26.4	41 81	56.6	63 13.9	42 80	55.6	63 01.0	44 79	54.6	62 34.0	46 77	52.6	61 35.3	51 73	48.9	60 30.9	56 69	45.4	60 14.0	57 68	44.6	59 39.3	59 66	42.9	25
6	62 37.8	39 82	57.3	62 25.9	40 81	56.3	62 13.6	42 80	55.4	61 47.7	44 78	53.4	60 51.4	49 74	49.8	59 49.4	54 70	46.3	59 33.0	55 69	45.5	58 59.5	57 67	43.8	6
7	61 48.8	37 82	58.1	61 37.4	39 81	57.1	61 25.7	40 80	56.1	61 00.9	43 79	54.2	60 06.9	47 75	50.6	59 07.2	52 71	47.2	58 51.4	53 70	46.3	58 19.0	55 68	44.7	7
8	60 59.4	35 83	58.7	60 48.6	37 82	57.8	60 37.4	38 81	56.8	60 13.7	41 79	55.0	59 21.8	46 76	51.4	58 24.4	50 72	48.0	58 09.2	51 71	47.2	57 37.9	53 69	45.6	8
9	60 09.7	34 83	59.4	59 59.4	35 83	58.4	59 48.7	36 82	57.5	59 26.0	39 80	55.7	58 36.3	44 77	52.1	57 41.1	48 73	48.8	57 26.4	49 72	47.9	56 56.3	51 70	46.3	9
30	59 19.7	32 84	59.9	59 09.9	33 83	59.0	58 59.6	35 82	58.1	58 38.0	37 81	56.3	57 50.4	42 77	52.8	56 57.2	46 74	49.5	56 43.2	47 73	48.7	56 14.1	49 71	47.1	30
1	58 29.4	31 84	60.5	58 20.0	32 84	59.6	58 10.3	33 83	58.7	57 49.6	36 81	56.9	57 04.0	40 78	53.5	56 13.0	45 75	50.2	55 59.4	46 74	49.4	55 31.4	48 72	47.8	1
2	57 38.9	29 85	61.0	57 29.9	30 84	60.1	57 20.6	32 83	59.2	57 00.9	34 82	57.5	56 17.2	39 78	54.1	55 28.2	43 75	50.8	55 15.2	44 74	50.0	54 48.2	46 73	48.5	2
3	56 48.1	28 85	61.4	56 39.6	29 84	60.6	56 30.7	30 84	59.7	56 11.9	33 82	58.0	55 30.2	37 79	54.6	54 43.1	41 76	51.4	54 30.6	42 75	50.6	54 04.6	44 73	49.1	3
4	55 57.1	26 85	61.9	55 49.0	28 85	61.0	55 40.6	29 84	60.2	55 22.6	31 83	58.5	54 42.7	35 80	55.2	53 57.6	40 76	52.0	53 45.6	41 76	51.2	53 20.6	43 74	49.7	4
35	55 05.9	25 86	62.3	54 58.2	26 85	61.4	54 50.2	27 84	60.6	54 33.1	30 83	58.9	53 55.0	34 80	55.7	53 11.8	38 77	52.5	53 00.2	39 76	51.8	52 36.2	41 75	50.3	35
6	54 14.5	24 86	62.6	54 07.2	25 85	61.8	53 59.6	26 85	61.0	53 43.4	28 83	59.4	53 07.0	32 80	56.2	52 25.6	36 77	53.0	52 14.6	37 77	52.3	51 51.5	39 75	50.8	6
7	53 22.9	22 86	63.0	53 16.1	24 86	62.2	53 08.8	25 85	61.4	52 53.4	27 84	59.7	52 18.7	31 81	56.6	51 39.2	35 78	53.5	51 28.6	36 77	52.8	51 06.4	38 76	51.3	7
8	52 31.2	21 86	63.3	52 24.7	22 86	62.5	52 17.9	23 85	61.7	52 03.3	25 84	60.1	51 30.3	30 81	57.0	50 52.4	33 78	54.0	50 42.3	34 78	53.2	50 21.1	36 76	51.8	8
9	51 39.4	20 87	63.6	51 33.2	21 86	62.8	51 26.8	22 86	62.0	51 12.9	24 84	60.5	50 41.5	28 82	57.4	50 05.4	32 79	54.4	49 55.7	33 78	53.7	49 35.4	35 77	52.2	9
40	50 47.4	19 87	63.9	50 41.6	20 86	63.1	50 35.5	21 86	62.3	50 22.4	23 84	60.8	49 52.6	27 82	57.8	49 18.2	31 79	54.8	49 08.9	31 78	54.1	48 49.5	33 77	52.6	40
1	49 55.3	18 87	64.1	49 49.9	19 86	63.4	49 44.1	20 86	62.6	49 31.7	22 85	61.1	49 03.5	25 82	58.1	48 30.7	29 79	55.2	48 21.8	30 79	54.5	48 03.3	32 77	53.0	1
2	49 03.1	17 87	64.4	48 58.0	18 87	63.6	48 52.6	18 86	62.9	48 40.9	20 85	61.4	48 14.2	24 82	58.4	47 43.0	28 80	55.5	47 34.6	29 79	54.8	47 16.8	30 78	53.4	2
3	48 10.8	15 87	64.6	48 06.1	16 87	63.8	48 01.0	17 86	63.1	47 50.0	19 85	61.6	47 24.7	23 83	58.7	46 55.1	26 80	55.9	46 47.1	27 79	55.2	46 30.2	29 78	53.8	3
4	47 18.5	14 88	64.8	47 14.0	15 87	64.0	47 09.3	16 86	63.3	46 59.0	18 85	61.9	46 35.1	22 83	59.0	46 07.1	25 80	56.2	45 59.4	26 80	55.5	45 43.4	28 78	54.1	4
45	46 26.0	13 88	64.9	46 21.9	14 87	64.2	46 17.4	15 86	63.5	46 07.8	17 85	62.1	45 45.4	20 83	59.3	45 18.8	24 81	56.5	45 11.6	25 80	55.8	44 56.3	26 79	54.4	45
6	45 33.5	12 88	65.1	45 29.6	13 87	64.4	45 25.5	14 87	63.7	45 16.6	16 86	62.3	44 55.5	19 83	59.5	44 30.5	23 81	56.7	44 23.6	23 80	56.1	44 09.1	25 79	54.7	6
7	44 40.9	11 88	65.3	44 37.3	12 87	64.6	44 33.5	13 87	63.9	44 25.2	15 86	62.5	44 05.5	18 84	59.7	43 41.9	21 81	57.0	43 35.4	22 80	56.3	43 21.7	24 79	55.0	7
8	43 48.2	10 88	65.4	43 45.0	11 87	64.7	43 41.5	12 87	64.0	43 33.8	14 86	62.6	43 15.4	17 84	59.9	42 53.3	20 81	57.2	42 47.1	21 81	56.6	42 34.2	22 79	55.2	8
9	42 55.5	09 88	65.5	42 52.5	10 87	64.8	42 49.3	11 87	64.2	42 42.3	13 86	62.8	42 25.2	16 84	60.1	42 04.5	19 82	57.4	41 58.7	20 81	56.8	41 46.5	21 80	55.5	9
50	42 02.7	08 88	65.6	42 00.1	09 88	64.9	41 57.2	10 87	64.3	41 50.7	12 86	62.9	41 34.9	15 84	60.3	41 15.6	18 82	57.7	41 10.1	18 81	57.0	40 58.7	20 80	55.7	50
1	41 09.9	08 88	65.7	41 07.5	08 88	65.0	41 04.9	09 87	64.4	40 59.0	11 86	63.1	40 44.6	14 84	60.4	40 26.5	16 82	57.8	40 21.5	17 81	57.2	40 10.7	19 80	55.9	1
2	40 17.1	07 88	65.8	40 15.0	07 88	65.1	40 12.6	08 87	64.5	40 07.3	10 86	63.2	39 54.1	12 84	60.6	39 37.4	15 82	58.0	39 32.7	16 81	57.4	39 22.7	17 80	56.1	2
3	39 24.2	06 88	65.9	39 22.4	06 88	65.2	39 20.3	07 87	64.6	39 15.6	09 86	63.3	39 03.6	11 84	60.7	38 48.2	14 82	58.2	38 43.9	15 82	57.5	38 34.5	16 80	56.3	3
4	38 31.3	05 88	65.9	38 29.7	06 88	65.3	38 28.0	06 87	64.6	38 23.8	08 86	63.4	38 13.0	10 84	60.8	37 59.0	13 82	58.3	37 54.9	14 82	57.7	37 46.3	15 81	56.4	4
55	37 38.4	04 88	66.0	37 37.1	05 88	65.3	37 35.6	05 87	64.7	37 32.0	07 86	63.5	37 22.4	09 84	60.9	37 09.6	12 82	58.4	37 05.9	13 82	57.8	36 58.0	14 81	56.6	55
6	36 45.4	03 88	66.0	36 44.4	04 88	65.4	36 43.2	04 87	64.8	36 40.1	06 86	63.5	36 31.7	08 85	61.0	36 20.2	11 82	58.6	36 16.8	11 82	57.9	36 09.6	13 81	56.7	6
7	35 52.5	02 88	66.0	35 51.7	03 88	65.4	35 50.7	04 87	64.8	35 48.2	05 87	63.6	35 41.0	07 85	61.1	35 30.7	10 83	58.7	35 27.7	10 82	58.1	35 21.1	12 81	56.8	7
8	34 59.5	01 88	66.1	34 59.0	02 88	65.5	34 58.3	03 87	64.8	34 56.3	04 87	63.6	34 50.2	06 85	61.2	34 41.2	09 83	58.8	34 38.5	09 82	58.2	34 32.5	11 81	56.9	8
9	34 06.5	01 88	66.1	34 06.3	01 88	65.5	34 05.8	02 87	64.9	34 04.4	03 87	63.7	33 59.4	05 85	61.2	33 51.6	08 83	58.8	33 49.2	08 82	58.2	33 43.9	09 81	57.0	9
60	33 13.5	00 88	66.1	33 13.5	00 88	65.5	33 13.3	01 87	64.9	33 12.4	02 87	63.7	33 08.6	04 85	61.3	33 02.0	07 83	58.9	32 59.9	07 82	58.3	32 55.3	08 81	57.1	60
1	32 20.6	01 88	66.1	32 20.8	00 88	65.5	32 20.9	00 87	64.9	32 20.5	01 87	63.7	32 17.7	03 85	61.3	32 12.3	06 83	59.0	32 10.6	06 82	58.4	32 06.6	07 81	57.2	1
2	31 27.6	02 88	66.1	31 28.1	01 88	65.5	31 28.4	01 87	64.9	31 28.5	00 87	63.7	31 26.9	02 85	61.4	31 22.7	05 83	59.0	31 21.2	05 82	58.4	31 17.8	06 81	57.3	2
3	30 34.6	03 88	66.0	30 35.3	02 88	65.5	30 35.9	02 87	64.9	30 36.6	01 87	63.7	30 36.0	01 85	61.4	30 33.0	04 83	59.1	30 31.8	04 82	58.5	30 29.1	05 81	57.3	3
4	29 41.7	03 88	66.0	29 42.6	03 88	65.4	29 43.4	02 87	64.9	29 44.6	01 87	63.7	29 45.1	01 85	61.4	29 43.2	03 83	59.1	29 42.4	03 82	58.5	29 40.3	04 81	57.4	4
65	28 48.7	04 88	66.0	28 49.9	04 88	65.4	28 51.0	03 87	64.8	28 52.6	02 87	63.7	28 54.2	00 85	61.4	28 53.5	02 83	59.1	28 53.0	02 82	58.5	28 51.5	03 81	57.4	65
6	27 55.8	05 88	65.9	27 57.2	05 88	65.4	27 58.5	04 87	64.8	28 00.7	03 87	63.7	28 03.4	01 85	61.4	28 03.8	01 83	59.1	28 03.5	01 82	58.6	28 02.6	02 81	57.4	6
7	27 02.9	06 88	65.9	27 04.6	05 88	65.3	27 06.1	05 87	64.7	27 08.8	04 86	63.6	27 12.5	02 85	61.4	27 14.0	00 83	59.1	27 14.1	00 82	58.6	27 13.8	01 81	57.4	7
8	26 10.0	07 88	65.8	26 11.9	06 88	65.2	26 13.7	06 87	64.7	26 16.9	05 86	63.6	26 21.6	03 85	61.3	26 24.3	01 83	59.1	26 24.6	01 82	58.6	26 24.9	00 81	57.4	8
9	25 17.2	07 88	65.7	25 19.3	07 88	65.2	25 21.3	06 87	64.6	25 25.0	06 86	63.5	25 30.8	04 85	61.3	25 34.6	02 83	59.1	25 35.2	02 82	58.5	25 36.1	01 81	57.4	9
70	24 24.4	08 88	65.7	24 26.7	08 88	65.1	24 29.0	07 87	64.6	24 33.1	06 86	63.5	24 39.9	05 85	61.3	24 44.8	03 83	59.1	24 45.8	03 82	58.5	24 47.2	02 81	57.4	70
1	23 31.6	09 88	65.6	23 34.2	08 88	65.0	23 36.7	08 87	64.5	23 41.3	07 86	63.4	23 49.1	06 85	61.2	23 55.1	04 83	59.0	23 56.3	04 82	58.5	23 58.4	03 81	57.4	1
2	22 38.8	10 88	65.5	22 41.7	09 87	65.0	22 44.4	09 87	64.4	22 49.5	08 86	63.3	22 58.3	07 85	61.2	23 05.4	05 83	59.0	23 06.9	05 82	58.5	23 09.6	04 81	57.4	2
3	21 46.1	10 88	65.4	21 49.2	10 87	64.9	21 52.1	10 87	64.3	21 57.7	09 86	63.3	22 07.6	08 85	61.1	22 15.8	06 83	58.9	22 17.6	06 82	58.4	22 20.8	05 81	57.3	3
4	20 53.5	11 88	65.3	20 56.7	11 87	64.8	20 59.9	10 87	64.2	21 06.0	10 86	63.2	21 16.9	08 84	61.0	21 26.1	07 83	58.9	21 28.2	07 82	58.4	21 32.0	06 81	57.3	4
75	20 00.8	12 88	65.2	20 04.3	12 87	64.7	20 07.7	11 87	64.1	20 14.3	11 86	63.1	20 26.2	09 84	60.9	20 36.5	08 83	58.8	20 38.9	08 82	58.3	20 43.3	07 81	57.2	75
6	19 08.2	13 88	65.1	19 12.0	12 87	64.5	19 15.6	12 87	64.0	19 22.6	11 86	63.0	19 35.5	10 84	60.9	19 47.0	09 83	58.7	19 49.6	09 82	58.2	19 54.6	08 81	57.2	6
7	18 15.7	13 88	65.0	18 19.7	13 87	64.4	18 23.5	13 87	63.9	18 31.0	12 86	62.9	18 44.9	11 84	60.8	18 57.5	10 82	58.7	19 00.4	10 82	58.1	19 05.9	09 81	57.1	7
8	17 23.2	14 87	64.8	17 27.4	14 87	64.3	17 31.5	14 87	63.8	17 39.5	13 86	62.7	17 54.4	12 84	60.7	18 08.0	11 82	58.6	18 11.2	10 82	58.0	18 17.3	10 81	57.0	8
9	16 30.8	15 87	64.7	16 35.2	15 87	64.2	16 39.5	14 86	63.7	16 48.0	14 86	62.6	17 03.9	13 84	60.6	17 18.5	12 82	58.5	17 22.0	11 82	58.0	17 28.7	11 81	56.9	9
80	15 38.4	16 87	64.6	15 43.1	15 87	64.0	15 47.6	15 86	63.5	15 56.5	15 86	62.5	16 13.5	14 84	60.4	16 29.2	13 82	58.4	16 32.9	12 82	57.9	16 40.2	12 81	56.8	80
1	14 46.1	16 87	64.4	14 51.0	16 87	63.9	14 55.8	16 86	63.4	15 05.2	15 86	62.4	15 23.1	14 84	60.3	15 39.9	14 82	58.3	15 43.9	13 82	57.7	15 51.7	13 81	56.7	1
2	13 53.9	17 87	64.3	13 59.0	17 87	63.7	14 04.0	17 86	63.2	14 13.9	16 85	62.2	14 32.8	15 84	60.2	14 50.6	14 82	58.1	14 54.9	14 82	57.6	15 03.3	14 81	56.6	2
3	13 01.7	18 87	64.1	13 07.1	18 86	63.6	13 12.3	17 86	63.1	13 22.6	17 85	62.1	13 42.5	16 84	60.0	14 01.4	15 82	58.0	14 06.0	15 81	57.5	14 14.9	15 80	56.5	3
4	12 09.6	19 87	63.9	12 15.2	18 86	63.4	12 20.7	18 86	62.9	12 31.4	18 85	61.9	12 52.3	17 84	59.9	13 12.3	16 82	57.9	13 17.1	16 81	57.4	13 26.6	16 80	56.4	4
85	11 17.6	19 87	63.8	11 23.4	19 86	63.3	11 29.1	19 86	62.8	11 40.3	19 85	61.8	12 02.2	18 83	59.7	12 23.3	17 82	57.7	12 28.4	17 81	57.2	12 38.4	17 80	56.2	85
6	10 25.7	20 86	63.6	10 31.7	20 86	63.1	10 37.6	20 86	62.6	10 49.3	19 85	61.6	11 12.2	19 83	59.6	11 34.3	18 81	57.6	11 39.7	18 81	57.1	11 50.3	18 80	56.1	6
7	9 33.8	21 86	63.4	9 40.0	21 86	62.9	9 46.2	20 86	62.4	9 58.4	20 85	61.4	10 22.3	20 83	59.4	10 45.4	19 81	57.4	10 51.1	19 81	56.9	11 02.3	18 80	55.9	7
8	8 42.0	22 86	63.2	8 48.5	21 86	62.7	8 54.9	21 85	62.2	9 07.6	21 85	61.2	9 32.4	20 83	59.3	9 56.6	20 81	57.3	10 02.5	20 81	56.8	10 14.3	19 80	55.8	8
9	7 50.3	22 86	63.0	7 57.0	22 86	62.5	8 03.6	22 85	62.0	8 16.8	22 84	61.0	8 42.7	21 83	59.1	9 07.9	21 81	57.1	9 14.1	21 81	56.6	9 26.4	20 80	55.6	9
90	6 58.7	23 86	62.8	7 05.6	23 85	62.3	7 12.5	23 85	61.8	7 26.1	23 84	60.9	7 53.0	22 83	58.9	8 19.3	22 81	56.9	8 25.8	22 80	56.4	8 38.6	21 79	55.4	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	28° 00′				28° 30′				29° 00′				30° 00′				32° 00′				34° 00′				34° 30′				35° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	47 00.0	1.0	01	180.0	46 30.0	1.0	01	180.0	46 00.0	1.0	01	180.0	45 00.0	1.0	01	180.0	43 00.0	1.0	01	180.0	41 00.0	1.0	01	180.0	40 30.0	1.0	01	180.0	39 30.0	1.0	01	180.0	00
1	46 59.3	1.0	03	178.7	46 29.4	1.0	03	178.7	45 59.4	1.0	03	178.7	44 59.4	1.0	03	178.8	42 59.4	1.0	03	178.8	40 59.4	1.0	03	178.9	40 29.5	1.0	03	178.9	39 29.5	1.0	03	178.9	1
2	46 57.4	1.0	06	177.4	46 27.4	1.0	06	177.4	45 57.5	1.0	05	177.5	44 57.5	1.0	05	177.6	42 57.7	1.0	05	177.7	40 57.8	1.0	05	177.8	40 27.8	1.0	05	177.8	39 27.9	1.0	04	177.9	2
3	46 54.1	1.0	08	176.1	46 24.2	1.0	08	176.2	45 54.3	1.0	07	176.2	44 54.4	1.0	07	176.3	42 54.7	1.0	07	176.5	40 55.0	1.0	06	176.7	40 25.1	1.0	06	176.8	39 25.2	1.0	06	176.8	3
4	46 49.5	1.0	10	174.8	46 19.7	1.0	10	174.9	45 49.8	1.0	10	175.0	44 50.1	1.0	09	175.1	42 50.6	1.0	09	175.4	40 51.1	1.0	08	175.6	40 21.2	1.0	08	175.7	39 21.5	1.0	08	175.8	4
05	46 43.7	99	12	173.6	46 13.9	99	12	173.6	45 44.1	99	12	173.7	44 44.6	99	11	173.9	42 45.4	99	11	174.2	40 46.1	99	10	174.5	40 16.3	99	10	174.6	39 16.7	99	10	174.7	05
6	46 36.5	99	14	172.3	46 06.9	99	14	172.4	45 37.2	99	14	172.5	44 37.8	99	13	172.7	42 39.0	99	13	173.1	40 40.1	99	12	173.4	40 10.3	99	12	173.5	39 10.9	99	11	173.7	6
7	46 28.1	99	16	171.0	45 58.6	99	16	171.1	45 29.0	99	16	171.3	44 29.8	99	15	171.5	42 31.4	99	14	171.9	40 32.9	99	14	172.4	40 03.3	99	14	172.5	39 04.0	99	13	172.7	7
8	46 18.4	98	18	169.8	45 49.0	98	18	169.9	45 19.6	98	18	170.0	44 20.6	98	17	170.3	42 22.7	98	16	170.8	40 24.7	98	16	171.3	39 55.1	98	15	171.4	38 56.0	98	15	171.6	8
9	46 07.5	98	20	168.5	45 38.2	98	20	168.7	45 08.9	98	20	168.8	44 10.3	98	19	169.1	42 12.9	98	18	169.7	40 15.3	98	17	170.2	39 45.9	98	17	170.3	38 47.1	98	17	170.6	9
10	45 55.3	97	22	167.3	45 26.2	97	22	167.4	44 57.1	97	22	167.6	43 58.8	97	21	167.9	42 02.0	97	20	168.6	40 05.0	98	19	169.2	39 35.7	98	19	169.3	38 37.1	98	18	169.6	10
1	45 42.0	96	24	166.0	45 13.0	97	24	166.2	44 44.0	97	24	166.4	43 46.1	97	23	166.8	41 49.9	97	22	167.5	39 53.5	97	21	168.1	39 24.4	97	21	168.3	38 26.1	97	20	168.6	1
2	45 27.4	96	26	164.8	44 58.6	96	26	165.0	44 29.9	96	26	165.2	43 32.2	96	25	165.6	41 36.8	96	24	166.4	39 41.1	97	22	167.1	39 12.1	97	22	167.2	38 14.1	97	22	167.6	2
3	45 11.6	96	28	163.6	44 43.1	95	28	163.8	44 14.5	95	28	164.1	43 17.3	95	27	164.5	41 22.6	96	25	165.3	39 27.6	96	24	166.0	38 58.8	96	24	166.2	38 01.1	96	23	166.6	3
4	44 54.7	94	30	162.4	44 26.4	94	30	162.7	43 58.0	95	29	162.9	43 01.2	95	29	163.3	41 07.3	95	27	164.2	39 13.1	95	26	165.0	38 44.5	95	26	165.2	37 47.2	96	25	165.6	4
15	44 36.7	94	32	161.3	44 08.6	94	32	161.5	43 40.4	94	31	161.8	42 44.1	94	30	162.2	40 51.0	94	29	163.1	38 57.6	95	27	164.0	38 29.2	95	27	164.2	37 32.3	95	26	164.6	15
6	44 17.5	93	34	160.1	43 49.7	93	33	160.4	43 21.8	93	33	160.6	42 25.9	93	32	161.1	40 33.7	94	31	162.1	38 41.1	94	29	163.0	38 12.9	94	29	163.2	37 16.4	94	28	163.6	6
7	43 57.3	92	36	159.0	43 29.7	92	35	159.3	43 02.0	92	35	159.5	42 06.6	92	34	160.0	40 15.4	93	32	161.0	38 23.7	93	31	162.0	37 55.7	93	30	162.2	36 59.6	94	30	162.7	7
8	43 36.0	91	37	157.9	43 08.6	91	37	158.1	42 41.2	91	36	158.4	41 46.3	92	35	159.0	39 56.0	92	34	160.0	38 05.3	93	32	161.0	37 37.5	93	32	161.2	36 41.9	93	31	161.7	8
9	43 13.6	90	39	156.8	42 46.5	90	38	157.1	42 19.4	91	38	157.3	41 25.0	91	37	157.9	39 35.8	91	35	159.0	37 45.9	92	34	160.0	37 18.4	92	33	160.3	36 23.2	92	33	160.8	9
20	42 50.2	89	41	155.7	42 23.4	89	40	156.0	41 56.6	90	40	156.3	41 02.7	90	39	156.9	39 14.5	90	37	158.0	37 25.7	91	35	159.1	36 58.4	91	35	159.3	36 03.7	91	34	159.9	20
1	42 25.9	88	42	154.6	41 59.4	88	42	154.9	41 32.8	89	41	155.2	40 39.5	89	40	155.9	38 52.4	90	38	157.0	37 04.5	90	37	158.1	36 37.5	90	36	158.4	35 43.3	90	35	158.9	1
2	42 00.6	87	44	153.6	41 34.3	88	43	153.9	41 08.0	88	43	154.2	40 15.3	88	42	154.8	38 29.3	89	40	156.1	36 42.5	89	38	157.2	36 15.7	89	38	157.5	35 22.0	90	37	158.0	2
3	41 34.3	86	45	152.5	41 08.4	87	45	152.9	40 42.4	87	44	153.2	39 50.2	87	43	153.9	38 05.3	88	41	155.1	36 19.7	88	40	156.3	35 53.1	88	39	156.6	35 00.0	89	38	157.2	3
4	41 07.1	85	47	151.5	40 41.5	86	46	151.9	40 15.8	86	46	152.2	39 24.2	86	45	152.9	37 40.5	87	43	154.2	35 55.9	87	41	155.4	35 29.7	88	40	155.7	34 37.0	88	40	156.3	4
25	40 39.0	84	48	150.5	40 13.7	85	48	150.9	39 48.3	85	47	151.2	38 57.4	85	46	151.9	37 14.8	86	44	153.2	35 31.4	87	42	154.5	35 05.4	87	42	154.8	34 13.3	87	41	155.4	25
6	40 10.1	83	50	149.6	39 45.1	83	49	149.9	39 20.0	84	48	150.3	38 29.7	84	48	151.0	36 48.3	85	46	152.3	35 06.0	86	44	153.6	34 40.3	86	43	153.9	33 48.8	86	42	154.6	6
7	39 40.3	82	51	148.6	39 15.7	82	50	149.0	38 50.9	83	50	149.3	38 01.2	83	49	150.1	36 21.0	84	47	151.4	34 39.9	85	45	152.8	34 14.5	85	44	153.1	33 23.5	85	43	153.7	7
8	39 09.8	81	52	147.7	38 45.4	81	52	148.1	38 20.9	82	51	148.4	37 31.9	82	50	149.2	35 52.9	83	48	150.6	34 13.0	84	46	151.9	33 47.9	84	46	152.3	32 57.5	84	45	152.9	8
9	38 38.4	80	54	146.8	38 14.3	80	53	147.1	37 50.2	81	52	147.5	37 01.8	81	51	148.3	35 24.0	82	49	149.7	33 45.4	83	47	151.1	33 20.5	83	47	151.4	32 30.7	83	46	152.1	9
30	38 06.2	79	55	145.9	37 42.5	79	54	146.3	37 18.7	79	54	146.6	36 30.9	80	53	147.4	34 54.4	81	51	148.9	33 17.0	82	48	150.3	32 52.5	82	48	150.6	32 03.3	82	47	151.3	30
1	37 33.4	78	56	145.0	37 10.0	78	55	145.4	36 46.5	78	55	145.8	35 59.3	79	54	146.5	34 24.1	80	52	148.0	32 47.9	81	50	149.5	32 23.7	81	49	149.8	31 35.1	81	48	150.5	1
2	36 59.8	77	57	144.1	36 36.7	77	57	144.5	36 13.5	77	56	144.9	35 27.0	78	55	145.7	33 53.1	79	53	147.2	32 18.1	80	51	148.7	31 54.2	80	50	149.0	31 06.2	80	49	149.7	2
3	36 25.5	76	58	143.3	36 02.7	76	58	143.7	35 39.9	76	57	144.1	34 54.0	77	56	144.9	33 21.4	78	54	146.4	31 47.6	79	52	147.9	31 24.1	79	51	148.3	30 36.7	79	50	149.0	3
4	35 50.5	75	59	142.5	35 28.1	75	59	142.9	35 05.6	75	58	143.3	34 20.4	76	57	144.1	32 49.0	77	55	145.6	31 16.5	77	53	147.2	30 53.3	78	52	147.5	30 06.5	78	51	148.2	4
35	35 14.9	73	60	141.7	34 52.8	74	60	142.1	34 30.6	74	59	142.5	33 46.1	75	58	143.3	32 16.0	76	56	144.9	30 44.8	76	54	146.4	30 21.8	77	53	146.8	29 35.7	77	52	147.5	35
6	34 38.6	72	61	140.9	34 16.9	73	61	141.3	33 55.0	73	60	141.7	33 11.1	73	59	142.5	31 42.3	74	57	144.1	30 12.4	75	55	145.7	29 49.8	76	54	146.1	29 04.3	76	53	146.8	6
7	34 01.8	71	62	140.1	33 40.3	72	62	140.5	33 18.8	72	61	141.0	32 35.6	72	60	141.8	31 08.1	73	58	143.4	29 39.4	74	56	145.0	29 17.1	75	55	145.3	28 32.2	75	54	146.1	7
8	33 24.3	70	63	139.4	33 03.2	70	63	139.8	32 42.0	71	62	140.2	31 59.4	71	61	141.0	30 33.2	72	59	142.7	29 05.9	73	57	144.3	28 43.8	73	56	144.6	27 59.6	74	55	145.4	8
9	32 46.3	69	64	138.6	32 25.5	69	64	139.1	32 04.7	70	63	139.5	31 22.7	70	62	140.3	29 57.8	71	60	142.0	28 31.7	72	58	143.6	28 10.0	72	57	144.0	27 26.4	73	56	144.7	9
40	32 07.7	68	65	137.9	31 47.3	68	65	138.4	31 26.7	69	64	138.8	30 45.4	69	63	139.6	29 21.8	70	61	141.3	27 57.0	71	59	142.9	27 35.7	71	58	143.3	26 52.7	72	57	144.1	40
1	31 28.6	67	66	137.2	31 08.5	67	66	137.7	30 48.3	68	65	138.1	30 07.6	68	64	138.9	28 45.3	69	62	140.6	27 21.8	70	60	142.2	27 00.8	70	59	142.6	26 18.4	71	58	143.4	1
2	30 49.0	66	67	136.5	30 29.2	66	66	137.0	30 09.3	66	66	137.4	29 29.3	67	65	138.3	28 08.3	68	63	139.9	26 46.1	69	60	141.6	26 25.3	69	60	142.0	25 43.7	70	59	142.8	2
3	30 08.9	65	68	135.9	29 49.4	65	67	136.3	29 29.8	65	67	136.7	28 50.5	66	66	137.6	27 30.7	67	63	139.3	26 09.8	68	61	141.0	25 49.4	68	61	141.4	25 08.4	69	60	142.2	3
4	29 28.3	64	68	135.2	29 09.1	64	68	135.7	28 49.9	64	67	136.1	28 11.1	65	66	137.0	26 52.7	66	64	138.7	25 33.0	67	62	140.3	25 13.0	67	62	140.7	24 32.6	68	60	141.6	4
45	28 47.2	63	69	134.6	28 28.4	63	69	135.0	28 09.5	63	68	135.5	27 31.3	64	67	136.3	26 14.2	65	65	138.0	24 55.8	66	63	139.7	24 36.0	66	62	140.1	23 56.3	66	61	141.0	45
6	28 05.7	62	70	133.9	27 47.2	62	69	134.4	27 28.6	62	69	134.8	26 51.1	63	68	135.7	25 35.2	64	66	137.4	24 18.1	65	64	139.1	23 58.7	65	63	139.5	23 19.6	65	62	140.4	6
7	27 23.8	61	71	133.3	27 05.6	61	70	133.8	26 47.3	61	70	134.2	26 10.4	62	69	135.1	24 55.8	63	66	136.8	23 40.0	64	64	138.5	23 20.8	64	64	139.0	22 42.4	64	63	139.8	7
8	26 41.4	60	71	132.7	26 23.5	60	71	133.2	26 05.5	60	70	133.6	25 29.3	61	69	134.5	24 15.9	62	67	136.3	23 01.4	63	65	138.0	22 42.6	63	64	138.4	22 04.8	63	63	139.2	8
9.	25 58.7	59	72	132.2	25 41.1	59	71	132.6	25 23.4	59	71	133.1	24 47.8	60	70	133.9	23 35.7	61	68	135.7	22 22.4	62	66	137.4	22 03.9	62	65	137.8	21 26.7	62	64	138.7	9
50	25 15.5	57	72	131.6	24 58.2	58	72	132.0	24 40.8	58	72	132.5	24 05.9	59	70	133.4	22 55.0	60	68	135.1	21 43.0	60	66	136.9	21 24.8	61	66	137.3	20 48.3	61	65	138.2	50
1	24 32.0	56	73	131.0	24 15.0	57	73	131.5	23 57.9	57	72	131.9	23 23.5	58	71	132.8	22 13.9	59	69	134.6	21 03.1	59	67	136.3	20 45.3	60	66	136.8	20 09.4	60	65	137.6	1
2	23 48.1	55	74	130.5	23 31.4	56	73	131.0	23 14.6	56	73	131.4	22 40.9	57	72	132.3	21 32.5	57	70	134.1	20 22.9	58	68	135.8	20 05.4	59	67	136.3	19 30.1	59	66	137.1	2
3	23 03.8	54	74	130.0	22 47.4	55	74	130.4	22 31.0	55	73	130.9	21 57.8	56	72	131.8	20 50.6	56	70	133.6	19 42.4	57	68	135.3	19 25.1	58	68	135.7	18 50.5	58	67	136.6	3
4	22 19.2	54	75	129.5	22 03.2	54	74	129.9	21 47.0	54	74	130.4	21 14.4	55	73	131.3	20 08.5	55	71	133.0	19 01.4	56	69	134.8	18 44.5	56	68	135.2	18 10.5	57	67	136.1	4
55	21 34.3	53	75	128.9	21 18.5	53	75	129.4	21 02.7	53	74	129.9	20 30.7	54	73	130.8	19 25.9	54	71	132.6	18 20.1	55	69	134.3	18 03.5	55	69	134.8	17 30.2	56	68	135.6	55
6	20 49.1	52	76	128.5	20 33.6	52	75	128.9	20 18.0	52	75	129.4	19 46.6	53	74	130.3	18 43.1	53	72	132.1	17 38.5	54	70	133.8	17 22.2	54	69	134.3	16 49.5	55	68	135.2	6
7	20 03.6	51	76	128.0	19 48.3	51	76	128.4	19 33.0	51	76	128.9	19 02.3	52	74	129.8	17 59.9	52	72	131.6	16 56.5	53	70	133.4	16 40.6	53	70	133.8	16 08.4	54	69	134.7	7
8	19 17.7	50	77	127.5	19 02.8	50	76	128.0	18 47.8	50	76	128.4	18 17.6	51	75	129.3	17 16.4	51	73	131.1	16 14.3	52	71	132.9	15 58.6	52	70	133.4	15 27.1	53	69	134.3	8
9	18 31.6	49	77	127.0	18 17.0	49	77	127.5	18 02.2	49	76	128.0	17 32.6	50	75	128.9	16 32.6	50	73	130.7	15 31.7	51	71	132.5	15 16.3	51	71	132.9	14 45.4	52	70	133.8	9
60	17 45.2	48	78	126.6	17 30.8	48	77	127.1	17 16.4	48	77	127.5	16 47.3	49	76	128.4	15 48.5	49	74	130.2	14 48.8	50	72	132.0	14 33.7	50	71	132.5	14 03.4	51	70	133.4	60
1	16 58.5	47	78	126.2	16 44.5	47	78	126.6	16 30.3	47	77	127.1	16 01.8	48	76	128.0	15 04.1	48	74	129.8	14 05.6	49	72	131.6	13 50.8	49	72	132.1	13 21.2	50	71	133.0	1
2	16 11.6	46	79	125.7	15 57.8	46	78	126.2	15 43.9	46	78	126.7	15 16.0	47	77	127.6	14 19.5	47	75	129.4	13 22.1	48	73	131.2	13 07.7	48	72	131.7	12 38.6	49	71	132.6	2
3	15 24.5	45	79	125.3	15 10.9	45	79	125.8	14 57.3	45	78	126.2	14 29.9	46	77	127.2	13 34.6	46	75	129.0	12 38.4	47	73	130.8	12 24.2	47	73	131.2	11 55.8	48	72	132.2	3
4	14 37.0	44	79	124.9	14 23.8	44	79	125.4	14 10.4	45	78	125.8	13 43.6	45	78	126.7	12 49.4	46	76	128.6	11 54.4	46	74	130.4	11 40.5	46	73	130.9	11 12.7	47	72	131.8	4
65	13 49.4	43	80	124.5	13 36.4	43	79	125.0	13 23.3	44	79	125.4	12 57.1	44	78	126.4	12 03.9	45	76	128.2	11 10.1	45	74	130.0	10 56.6	45	74	130.5	10 29.3	46	73	131.4	65
6	13 01.5	42	80	124.1	12 48.8	43	80	124.6	12 36.0	43	79	125.0	12 10.3	43	78	126.0	11 18.3	44	76	127.8	10 25.6	44	75	129.6	10 12.3	44	74	130.1	9 45.7	45	73	131.0	6
7	12 13.4	42	80	123.7	12 01.0	42	80	124.2	11 48.4	42	80	124.7	11 23.2	42	79	125.6	10 32.4	43	77	127.4	9 40.9	43	75	129.3	9 27.9	43	74	129.7	9 01.8	44	74	130.6	7
8	11 25.1	41	81	123.4	11 12.9	41	80	123.8	11 00.7	41	80	124.3	10 36.0	41	79	125.2	9 46.2	42	77	127.1	8 55.9	42	75	128.9	8 43.2	42	75	129.4	8 17.8	43	74	130.3	8
9	10 36.6	40	81	123.0	10 24.7	40	81	123.5	10 12.7	40	80	123.9	9 48.6	40	79	124.9	8 59.9	41	78	126.7	8 10.7	41	76	128.6	7 58.3	41	75	129.0	7 33.4	42	74	129.9	9
70	9 47.9	39	82	122.6	9 36.2	39	81	123.1	9 24.5	39	81	123.6	9 00.9	39	80	124.5	8 13.3	40	78	126.4	7 25.2	40	76	128.2	7 13.2	40	76	128.7	6 48.9	41	75	129.6	70
1	8 59.0	38	82	122.3	8 47.6	38	81	122.8	8 36.1	38	81	123.2	8 13.1	39	80	124.2	7 26.6	39	78	126.0	6 39.6	39	76	127.9	6 27.8	39	76	128.4	6 04.1	40	75	129.3	1
2	8 10.0	37	82	122.0	7 58.8	37	82	122.4	7 47.5	37	81	122.9	7 25.0	38	80	123.8	6 39.6	38	79	125.7	5 53.8	38	77	127.6	5 42.3	38	76	128.0	5 19.2	39	75	129.0	2
3	7 20.7	36	82	121.6	7 09.8	37	82	122.1	6 58.8	37	82	122.6	6 36.8	37	81	123.5	5 52.4	37	79	125.4	5 07.7	37	77	127.3									3
4	6 31.3	36	83	121.3	6 20.6	36	82	121.8	6 09.9	36	82	122.3	5 48.4	36	81	123.2	5 05.1	36	79	125.1													4
75	5 41.7	35	83	121.0	5 31.2	35	82	121.5	5 20.8	35	82	122.0																					75

DECLINATION SAME NAME AS LATITUDE

H.A.	28° 00′				28° 30′				29° 00′				30° 00′				32° 00′				34° 00′				34° 30′				35° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
91	6 07.2	24	86	62.6	6 14.4	24	85	62.1	6 21.5	24	85	61.6	6 35.6	23	84	60.7	7 03.4	23	82	58.7	7 30.8	23	81	56.7	7 37.6	22	80	56.2	7 51.0	22	79	55.3	91
2	5 15.8	25	86	62.4	5 23.2	24	85	61.9	5 30.5	24	85	61.4	5 45.1	24	84	60.4	6 14.0	24	82	58.5	6 42.4	24	80	56.5	6 49.4	23	80	56.0	7 03.4	23	79	55.1	2
3																	5 24.6	25	82	58.3	5 54.1	24	80	56.3	6 01.4	24	80	55.8	6 15.9	24	79	54.9	3
4																					5 05.9	25	80	56.1	5 13.5	25	80	55.6	5 28.6	25	79	54.7	4

Lat. 15°

H.A.	36° 00′				37° 00′				38° 30′				40° 00′				42° 00′				42° 30′				43° 00′				45° 00′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	69 00.0	1.0	02	00.0	68 00.0	1.0	02	00.0	66 30.0	1.0	02	00.0	65 00.0	1.0	02	00.0	63 00.0	1.0	01	00.0	62 30.0	1.0	01	00.0	62 00.0	1.0	01	00.0	60 00.0	1.0	01	00.0	00
1	68 58.9	1.0	06	02.3	67 58.9	1.0	05	02.1	66 29.0	1.0	05	02.0	64 59.1	1.0	05	01.8	62 59.2	1.0	04	01.6	62 29.2	1.0	04	01.6	61 59.2	1.0	04	01.6	59 59.3	1.0	04	01.4	1
2	68 55.4	1.0	09	04.5	67 55.7	1.0	09	04.3	66 26.0	1.0	08	03.9	64 56.3	1.0	08	03.6	62 56.7	1.0	07	03.3	62 26.8	1.0	07	03.2	61 56.9	1.0	07	03.1	59 57.1	1.0	06	02.8	2
3	68 49.8	99	13	06.7	67 50.3	99	12	06.4	66 21.1	99	12	05.9	64 51.8	99	11	05.4	62 52.6	99	10	04.9	62 22.8	99	09	04.8	61 52.9	99	09	04.7	59 53.6	99	08	04.2	3
4	68 41.9	98	17	08.9	67 42.9	98	16	08.4	66 14.2	99	15	07.8	64 45.4	99	14	07.2	62 46.8	99	12	06.5	62 17.1	99	12	06.3	61 47.4	99	12	06.2	59 48.6	99	11	05.6	4
05	68 31.8	97	20	11.1	67 33.3	98	19	10.5	66 05.4	98	18	09.7	64 37.3	98	16	09.0	62 39.4	98	15	08.1	62 09.9	98	15	07.9	61 40.4	98	14	07.7	59 42.2	99	13	07.0	05
6	68 19.6	96	24	13.2	67 21.7	96	23	12.5	65 54.7	97	21	11.6	64 27.4	97	19	10.7	62 30.5	98	18	09.7	62 01.2	98	17	09.5	61 31.9	98	17	09.2	59 34.4	98	15	08.4	6
7	68 05.3	96	27	15.3	67 08.2	96	26	14.5	65 42.2	96	24	13.4	64 15.7	96	22	12.4	62 19.9	97	20	11.2	61 50.9	97	20	11.0	61 21.8	97	19	10.7	59 25.3	97	17	09.8	7
8	67 49.0	93	30	17.3	66 52.7	94	29	16.4	65 27.9	96	27	15.2	64 02.5	96	25	14.1	62 07.9	96	23	12.8	61 39.1	96	22	12.5	61 10.3	96	22	12.2	59 14.8	96	20	11.1	8
9	67 30.7	92	33	19.3	66 35.4	92	32	18.3	65 11.8	93	30	17.0	63 47.5	94	28	15.7	61 54.3	95	25	14.3	61 25.9	95	24	14.0	60 57.1	95	24	13.6	59 03.0	96	22	12.4	9
10	67 10.6	90	36	21.2	66 16.3	91	35	20.2	64 54.1	92	32	18.7	63 31.0	93	30	17.4	61 39.3	94	27	15.8	61 11.2	94	27	15.4	60 43.0	94	26	15.0	58 49.9	95	24	13.7	10
1	66 48.8	88	39	23.1	65 55.5	89	37	21.9	64 34.7	90	35	20.4	63 13.0	91	33	18.9	61 22.8	92	30	17.2	60 55.1	93	29	16.8	60 27.3	93	28	16.4	58 35.5	94	26	15.0	1
2	66 25.2	86	42	24.9	65 33.0	87	40	23.7	64 13.8	89	37	22.0	62 53.4	90	35	20.5	61 05.0	91	32	18.6	60 37.6	91	31	18.2	60 10.2	91	31	17.8	58 19.9	92	28	16.3	2
3	66 00.1	85	44	26.6	65 09.0	86	43	25.3	63 51.3	87	40	23.5	62 32.5	88	37	21.9	60 45.8	90	34	20.0	60 18.9	90	33	19.6	59 51.9	90	33	19.1	58 03.1	91	30	17.5	3
4	65 33.4	83	47	28.2	64 43.5	84	45	26.9	63 27.5	85	42	25.1	62 10.1	87	39	23.4	60 25.3	88	36	21.4	59 58.8	88	35	20.9	59 32.3	89	35	20.4	57 45.1	90	32	18.7	4
15	65 05.3	80	49	29.8	64 16.6	82	47	28.4	63 02.2	83	44	26.5	61 46.5	85	42	24.8	60 03.6	87	38	22.7	59 37.6	87	37	22.2	59 11.4	87	37	21.7	57 25.9	89	34	19.9	15
6	64 35.8	78	51	31.3	63 48.3	80	49	29.9	62 35.7	82	46	27.9	61 21.6	83	44	26.1	59 40.7	85	40	23.9	59 15.1	85	39	23.4	58 49.4	86	39	22.9	57 05.7	87	36	21.0	6
7	64 05.0	76	53	32.8	63 18.8	78	51	31.3	62 07.9	80	48	29.3	60 55.4	81	45	27.4	59 16.6	83	42	25.2	58 51.5	84	41	24.6	58 26.3	84	40	24.1	56 44.3	86	37	22.1	7
8	63 33.1	74	55	34.1	62 48.1	76	53	32.7	61 39.0	78	50	30.6	60 28.2	80	47	28.7	58 51.4	82	44	26.4	58 26.8	82	43	25.8	58 02.1	83	42	25.3	56 22.0	84	39	23.2	8
9	63 00.0	72	57	35.5	62 16.2	74	55	34.0	61 08.9	76	52	31.9	59 59.8	78	49	29.9	58 25.1	80	45	27.5	58 01.1	80	45	26.9	57 36.8	81	44	26.4	55 58.6	83	41	24.3	9
20	62 25.9	70	59	36.7	61 43.3	72	56	35.2	60 37.8	74	54	33.1	59 30.4	76	51	31.1	57 57.9	78	47	28.6	57 34.3	79	46	28.1	57 10.6	79	45	27.5	55 34.3	81	42	25.3	20
1	61 50.7	68	60	37.9	61 09.4	70	58	36.4	60 05.7	72	55	34.2	59 00.0	74	52	32.2	57 29.6	76	49	29.7	57 06.6	77	48	29.1	56 43.4	78	47	28.5	55 09.1	80	44	26.3	1
2	61 14.7	66	62	39.0	60 34.6	68	60	37.5	59 32.6	70	57	35.3	58 28.6	72	54	33.3	57 00.4	75	50	30.7	56 37.9	75	49	30.1	56 15.2	76	48	29.5	54 42.9	78	45	27.3	2
3	60 37.7	64	63	40.1	59 58.9	66	61	38.6	58 58.7	68	58	36.4	57 56.4	70	55	34.3	56 30.4	73	52	31.7	56 08.4	74	51	31.1	55 46.2	74	50	30.5	54 15.9	76	46	28.2	3
4	60 00.0	62	64	41.2	59 22.3	64	62	39.6	58 23.9	66	59	37.4	57 23.3	68	56	35.3	55 59.4	71	53	32.7	55 38.0	72	52	32.1	55 16.4	72	51	31.5	53 48.1	75	48	29.1	4
25	59 21.5	60	65	42.1	58 45.0	62	63	40.6	57 48.3	64	61	38.4	56 49.4	67	58	36.3	55 27.7	69	54	33.6	55 06.8	70	53	33.0	54 45.7	71	52	32.4	53 19.5	73	49	30.0	25
6	58 42.2	58	66	43.1	58 06.9	60	65	41.5	57 11.9	62	62	39.3	56 14.7	65	59	37.2	54 55.2	68	55	34.5	54 34.9	68	54	33.9	54 14.3	69	54	33.3	52 50.1	71	50	30.9	6
7	58 02.3	56	68	43.9	57 28.2	58	66	42.4	56 34.9	61	63	40.2	55 39.3	63	60	38.1	54 22.0	66	56	35.4	54 02.2	67	56	34.7	53 42.1	67	55	34.1	52 20.0	70	51	31.7	7
8	57 21.8	54	68	44.8	56 48.8	56	67	43.2	55 57.2	59	64	41.0	55 03.3	61	61	38.9	53 48.1	64	58	36.2	53 28.8	65	57	35.6	53 09.3	65	56	34.9	51 49.2	68	52	32.5	8
9	56 40.7	52	69	45.6	56 08.8	54	68	44.0	55 18.8	57	65	41.8	54 26.6	59	62	39.7	53 13.6	62	59	37.0	52 54.8	63	58	36.4	52 35.8	64	57	35.7	51 17.8	66	53	33.2	9
30	55 59.1	50	70	46.3	55 28.2	52	68	44.8	54 39.9	55	66	42.6	53 49.2	58	63	40.5	52 38.4	61	60	37.8	52 20.1	61	59	37.1	52 01.6	62	58	36.5	50 45.7	65	54	34.0	30
1	55 16.9	49	71	47.0	54 47.1	51	69	45.5	54 00.4	53	67	43.3	53 11.4	56	64	41.2	52 02.6	59	61	38.5	51 44.9	60	60	37.8	51 26.9	60	59	37.2	50 13.0	63	55	34.7	1
2	54 34.3	47	72	47.7	54 05.5	49	70	46.2	53 20.4	51	68	44.0	52 32.9	54	65	41.9	51 26.3	57	61	39.2	51 09.0	58	61	38.5	50 51.6	59	60	37.9	49 39.7	61	56	35.4	2
3	53 51.2	45	72	48.3	53 23.5	47	71	46.8	52 39.9	50	68	44.7	51 54.0	52	66	42.5	50 49.4	55	62	39.8	50 32.7	56	61	39.2	50 15.7	57	61	38.5	49 05.9	60	57	36.0	3
4	53 07.7	44	73	48.9	52 41.0	45	72	47.4	51 58.9	48	69	45.3	51 14.6	51	66	43.2	50 12.0	54	63	40.5	49 55.8	54	62	39.8	49 39.4	55	61	39.2	48 31.6	58	58	36.7	4
35	52 23.8	42	74	49.5	51 58.1	44	72	48.0	51 17.6	46	70	45.9	50 34.7	49	67	43.8	49 34.2	52	64	41.1	49 18.4	53	63	40.4	49 02.5	53	62	39.8	47 56.7	56	59	37.3	35
6	51 39.6	40	74	50.0	51 14.8	42	73	48.6	50 35.8	45	70	46.4	49 54.4	47	68	44.4	48 55.8	50	65	41.7	48 40.6	51	64	41.0	48 25.2	52	63	40.4	47 21.4	55	60	37.8	6
7	50 55.0	39	75	50.6	50 31.2	41	73	49.1	49 53.6	43	71	47.0	49 13.7	46	68	44.9	48 17.1	49	65	42.2	48 02.4	49	64	41.6	47 47.4	50	64	40.9	46 45.6	53	60	38.4	7
8	50 10.1	37	75	51.0	49 47.2	39	74	49.6	49 11.0	42	71	47.5	48 32.6	44	69	45.4	47 37.9	47	66	42.8	47 23.7	48	65	42.1	47 09.3	49	64	41.5	46 09.4	51	61	38.9	8
9	49 24.8	36	76	51.5	49 02.9	37	74	50.1	48 28.1	40	72	48.0	47 51.1	42	70	45.9	46 58.4	45	66	43.3	46 44.7	46	66	42.6	46 30.7	47	65	42.0	45 32.8	50	62	39.4	9
40	48 39.4	34	76	51.9	48 18.3	36	75	50.5	47 44.9	38	72	48.4	47 09.3	41	70	46.4	46 18.5	44	67	43.8	46 05.2	45	66	43.1	45 51.8	45	66	42.5	44 55.7	48	62	39.9	40
1	47 53.6	33	77	52.3	47 33.5	34	75	50.9	47 01.4	37	73	48.9	46 27.2	39	71	46.8	45 38.3	42	68	44.2	45 25.5	43	67	43.6	45 12.5	44	66	42.9	44 18.4	46	63	40.4	1
2	47 07.6	31	77	52.7	46 48.4	33	76	51.3	46 17.6	35	73	49.3	45 44.7	38	71	47.3	44 57.7	41	68	44.6	44 45.4	41	67	44.0	44 32.8	42	67	43.4	43 40.6	45	63	40.9	2
3	46 21.4	30	77	53.1	46 03.0	31	76	51.7	45 33.6	34	74	49.7	45 02.0	36	72	47.7	44 16.8	39	69	45.1	44 04.9	40	68	44.4	43 52.9	41	67	43.8	43 02.5	43	64	41.3	3
4	45 34.9	28	78	53.4	45 17.4	30	76	52.1	44 49.3	32	74	50.0	44 19.1	35	72	48.1	43 35.6	38	69	45.5	43 24.2	38	68	44.8	43 12.6	39	68	44.2	42 24.1	42	64	41.7	4
45	44 48.3	27	78	53.7	44 31.6	29	77	52.4	44 04.7	31	75	50.4	43 35.8	33	72	48.4	42 54.2	36	70	45.8	42 43.2	37	69	45.2	42 32.1	38	68	44.6	41 45.4	40	65	42.1	45
6	44 01.5	26	78	54.0	43 45.6	27	77	52.7	43 20.0	30	75	50.7	42 52.4	32	73	48.8	42 12.5	35	70	46.2	42 02.0	35	69	45.6	41 51.3	36	68	44.9	41 06.4	39	65	42.5	6
7	43 14.5	24	79	54.3	42 59.4	26	77	53.0	42 35.0	28	75	51.0	42 08.7	30	73	49.1	41 30.5	33	70	46.5	41 20.5	34	70	45.9	41 10.2	35	69	45.3	40 27.2	37	66	42.8	7
8	42 27.4	23	79	54.6	42 13.0	25	78	53.3	41 49.9	27	76	51.3	41 24.8	29	73	49.4	40 48.4	32	71	46.9	40 38.7	32	70	46.2	40 28.9	33	69	45.6	39 47.7	36	66	43.2	8
9	41 40.1	22	79	54.8	41 26.5	23	78	53.5	41 04.6	25	76	51.6	40 40.7	28	74	49.7	40 06.0	30	71	47.2	39 56.8	31	70	46.5	39 47.4	32	70	45.9	39 07.9	34	67	43.5	9
50	40 52.6	21	79	55.0	40 39.8	22	78	53.8	40 19.1	24	76	51.8	39 56.4	26	74	49.9	39 23.4	29	71	47.4	39 14.6	30	71	46.8	39 05.7	30	70	46.2	38 27.9	33	67	43.8	50
1	40 05.1	19	79	55.3	39 53.0	21	78	54.0	39 33.4	23	76	52.1	39 12.0	25	74	50.2	38 40.6	27	72	47.7	38 32.3	28	71	47.1	38 23.7	29	70	46.5	37 47.7	31	67	44.1	1
2	39 17.4	18	80	55.5	39 06.1	19	78	54.2	38 47.6	22	77	52.3	38 27.4	23	75	50.4	37 57.6	26	72	48.0	37 49.7	27	71	47.4	37 41.6	27	70	46.7	37 07.3	30	68	44.3	2
3	38 29.6	17	80	55.6	38 19.0	18	79	54.4	38 01.7	20	77	52.5	37 42.6	22	75	50.7	37 14.5	25	72	48.2	37 07.0	25	71	47.6	36 59.3	26	71	47.0	36 26.7	28	68	44.6	3
4	37 41.7	16	80	55.8	37 31.9	17	79	54.6	37 15.7	19	77	52.7	36 57.8	21	75	50.9	36 31.2	23	72	48.4	36 24.1	24	72	47.8	36 16.9	25	71	47.2	35 46.0	27	68	44.8	4
55	36 53.7	15	80	56.0	36 44.6	16	79	54.7	36 29.5	18	77	52.9	36 12.7	20	75	51.1	35 47.8	22	73	48.6	35 41.1	23	72	48.0	35 34.2	23	71	47.4	35 05.0	26	68	45.1	55
6	36 05.6	13	80	56.1	35 57.2	15	79	54.9	35 43.2	16	77	53.0	35 27.6	18	75	51.2	35 04.2	21	73	48.8	34 58.0	21	72	48.2	34 51.5	22	71	47.6	34 23.9	24	69	45.3	6
7	35 17.5	12	80	56.2	35 09.8	13	79	55.0	34 56.9	15	77	53.2	34 42.4	17	76	51.4	34 20.5	19	73	49.0	34 14.7	20	72	48.4	34 08.6	20	72	47.8	33 42.7	23	69	45.5	7
8	34 29.3	11	80	56.3	34 22.3	12	79	55.1	34 10.4	14	78	53.3	33 57.0	16	76	51.5	33 36.7	18	73	49.2	33 31.3	19	73	48.6	33 25.6	19	72	48.0	33 01.3	21	69	45.7	8
9	33 41.0	10	81	56.4	33 34.7	11	79	55.3	33 23.9	13	78	53.5	33 11.6	15	76	51.7	32 52.8	17	73	49.3	32 47.7	17	73	48.7	32 42.5	18	72	48.2	32 19.8	20	69	45.8	9
60	32 52.7	09	81	56.5	32 47.0	10	80	55.4	32 37.3	12	78	53.6	32 26.1	13	76	51.8	32 08.8	15	74	49.5	32 04.1	16	73	48.9	31 59.2	17	72	48.3	31 38.2	19	70	46.0	60
1	32 04.3	08	81	56.6	31 59.3	09	80	55.4	31 50.6	10	78	53.7	31 40.5	12	76	51.9	31 24.7	14	74	49.6	31 20.4	15	73	49.0	31 15.9	15	72	48.4	30 56.4	17	70	46.1	1
2	31 15.9	07	81	56.7	31 11.6	08	80	55.5	31 03.9	09	78	53.8	30 54.8	11	76	52.0	30 40.6	13	74	49.7	30 36.6	13	73	49.1	30 32.5	14	72	48.6	30 14.6	16	70	46.3	2
3	30 27.5	06	81	56.7	30 23.8	07	80	55.6	30 17.1	08	78	53.9	30 09.1	10	76	52.1	29 56.3	12	74	49.8	29 52.7	12	73	49.3	29 49.0	13	73	48.7	29 32.6	15	70	46.4	3
4	29 39.0	05	81	56.8	29 36.0	06	80	55.6	29 30.3	07	78	53.9	29 23.3	08	76	52.2	29 12.0	10	74	49.9	29 08.8	11	73	49.4	29 05.4	11	73	48.8	28 50.6	13	70	46.5	4
65	28 50.5	03	81	56.8	28 48.1	04	80	55.7	28 43.4	06	78	54.0	28 37.5	07	76	52.3	28 27.6	09	74	50.0	28 24.8	10	73	49.4	28 21.8	10	73	48.9	28 08.6	12	70	46.6	65
6	28 02.0	02	81	56.9	28 00.2	03	80	55.7	27 56.6	05	78	54.0	27 51.7	06	76	52.3	27 43.2	08	74	50.1	27 40.7	08	74	49.5	27 38.1	09	73	49.0	27 26.4	11	70	46.7	6
7	27 13.4	01	81	56.9	27 12.3	02	80	55.8	27 09.6	04	78	54.1	27 05.8	05	77	52.4	26 58.7	07	74	50.1	26 56.6	07	74	49.6	26 54.4	08	73	49.0	26 44.2	09	70	46.8	7
8	26 24.9	00	81	56.9	26 24.4	01	80	55.8	26 22.7	03	78	54.1	26 19.8	04	77	52.4	26 14.2	06	74	50.2	26 12.5	06	74	49.6	26 10.6	06	73	49.1	26 01.9	08	70	46.9	8
9	25 36.3	01	81	56.9	25 36.5	00	80	55.8	25 35.8	01	78	54.1	25 33.9	03	77	52.4	25 29.7	04	74	50.2	25 28.3	05	74	49.7	25 26.8	05	73	49.1	25 19.6	07	71	46.9	9
70	24 47.8	02	81	56.9	24 48.6	01	80	55.8	24 48.8	00	78	54.1	24 48.0	02	77	52.5	24 45.1	03	74	50.3	24 44.1	04	74	49.7	24 43.0	04	73	49.2	24 37.3	05	71	47.0	70
1	23 59.3	03	81	56.9	24 00.7	02	80	55.8	24 01.9	01	78	54.1	24 02.0	00	77	52.5	24 00.6	02	74	50.3	23 59.9	02	74	49.7	23 59.1	03	73	49.2	23 54.9	04	71	47.0	1
2	23 10.8	04	81	56.8	23 12.8	03	80	55.7	23 14.9	02	78	54.1	23 16.0	01	77	52.5	23 16.0	01	74	50.3	23 15.7	01	74	49.8	23 15.3	02	73	49.2	23 12.5	03	71	47.0	2
3	22 22.3	05	81	56.8	22 24.9	04	80	55.7	22 28.0	03	78	54.1	22 30.1	02	77	52.5	22 31.4	00	74	50.3	22 31.4	00	74	49.8	22 31.4	00	73	49.2	22 30.1	02	71	47.0	3
4	21 33.8	06	81	56.7	21 37.0	05	80	55.7	21 41.0	04	78	54.1	21 44.1	03	77	52.4	21 46.8	02	74	50.3	21 47.2	01	74	49.8	21 47.5	01	73	49.2	21 47.7	01	71	47.1	4
75	20 45.3	07	81	56.7	20 49.2	06	80	55.6	20 54.1	05	78	54.0	20 58.2	04	77	52.4	21 02.2	03	74	50.3	21 03.0	02	74	49.7	21 03.6	02	73	49.2	21 05.2	01	71	47.1	75
6	19 56.9	08	81	56.6	20 01.3	07	80	55.6	20 07.2	06	78	54.0	20 12.3	05	76	52.4	20 17.7	04	74	50.2	20 18.8	04	74	49.7	20 19.8	03	73	49.2	20 22.8	02	71	47.0	6
7	19 08.5	09	81	56.6	19 13.6	08	80	55.5	19 20.4	07	78	53.9	19 26.4	06	76	52.3	19 33.1	05	74	50.2	19 34.6	05	74	49.7	19 35.9	04	73	49.2	19 40.4	03	71	47.0	7
8	18 20.2	10	80	56.5	18 25.8	09	80	55.4	18 33.6	08	78	53.9	18 40.5	07	76	52.3	18 48.6	06	74	50.2	18 50.4	06	74	49.6	18 52.1	05	73	49.1	18 58.0	04	71	47.0	8
9	17 31.9	11	80	56.4	17 38.1	10	79	55.3	17 46.8	09	78	53.8	17 54.7	08	76	52.2	18 04.1	07	74	50.1	18 06.2	07	74	49.6	18 08.3	07	73	49.1	18 15.6	05	71	47.0	9
80	16 43.7	12	80	56.3	16 50.5	11	79	55.3	17 00.1	10	78	53.7	17 08.9	09	76	52.1	17 19.6	08	74	50.1	17 22.1	08	73	49.5	17 24.5	08	73	49.0	17 33.3	07	71	46.9	80
1	15 55.5	13	80	56.2	16 02.9	12	79	55.2	16 13.4	11	78	53.6	16 23.2	11	76	52.1	16 35.2	10	74	50.0	16 38.1	09	73	49.5	16 40.8	09	73	48.9	16 51.0	08	70	46.9	1
2	15 07.4	14	80	56.1	15 15.3	13	79	55.1	15 26.7	12	78	53.5	15 37.5	12	76	52.0	15 50.9	11	74	49.9	15 54.0	10	73	49.4	15 57.1	10	73	48.9	16 08.7	09	70	46.8	2
3	14 19.3	14	80	56.0	14 27.8	14	79	54.9	14 40.2	13	78	53.4	14 51.9	13	76	51.9	15 06.6	12	74	49.8	15 10.1	12	73	49.3	15 13.5	11	73	48.8	15 26.5	10	70	46.7	3
4	13 31.3	15	80	55.8	13 40.4	15	79	54.8	13 53.7	14	77	53.3	14 06.3	14	76	51.8	14 22.3	13	74	49.7	14 26.2	13	73	49.2	14 29.9	12	72	48.7	14 44.3	12	70	46.6	4
85	12 43.4	16	80	55.7	12 53.1	16	79	54.7	13 07.2	15	77	53.2	13 20.8	15	76	51.7	13 38.1	14	74	49.6	13 42.3	14	73	49.1	13 46.4	14	72	48.6	14 02.2	13	70	46.6	85
6	11 55.5	17	80	55.6	12 05.8	17	79	54.6	12 20.9	16	77	53.1	12 35.4	16	76	51.5	12 54.0	15	73	49.5	12 58.5	15	73	49.0	13 03.0	15	72	48.5	13 20.1	14	70	46.5	6
7	11 07.8	18	79	55.4	11 18.7	18	78	54.4	11 34.6	17	77	52.9	11 50.1	17	75	51.4	12 10.0	16	73	49.4	12 14.8	16	73	48.9	12 19.6	16	72	48.4	12 38.2	15	70	46.4	7
8	10 20.1	19	79	55.3	10 31.6	19	78	54.3	10 48.4	18	77	52.8	11 04.8	18	75	51.3	11 26.0	17	73	49.3	11 31.2	17	73	48.8	11 36.3	17	72	48.3	11 56.3	16	70	46.2	8
9	9 32.5	20	79	55.1	9 44.6	20	78	54.1	10 02.3	20	77	52.6	10 19.7	19	75	51.1	10 42.2	18	73	49.1	10 47.7	18	72	48.6	10 53.1	18	72	48.1	11 14.4	17	70	46.1	9
90	8 45.0	21	79	54.9	8 57.7	21	78	54.0	9 16.3	21	77	52.5	9 34.6	20	75	51.0	9 58.4	20	73	49.0	10 04.2	19	72	48.5	10 10.0	19	72	48.0	10 32.7	19	69	46.0	90

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	39 00.0	1.0 01	180.0	38 00.0	1.0 01	180.0	36 30.0	1.0 01	180.0	35 00.0	1.0 01	180.0	33 00.0	1.0 01	180.0	32 30.0	1.0 01	180.0	32 00.0	1.0 01	180.0	30 00.0	1.0 01	180.0	00
1	38 59.5	1.0 03	179.0	37 59.5	1.0 03	179.0	36 29.5	1.0 02	179.0	34 59.5	1.0 02	179.1	32 59.6	1.0 02	179.1	32 29.6	1.0 02	179.1	31 59.6	1.0 02	179.1	29 59.6	1.0 02	179.2	1
2	38 57.9	1.0 04	177.9	37 58.0	1.0 04	178.0	36 28.0	1.0 04	178.1	34 58.1	1.0 04	178.1	32 58.2	1.0 04	178.2	32 28.2	1.0 04	178.3	31 58.3	1.0 04	178.3	29 58.3	1.0 03	178.4	2
3	38 55.3	1.0 06	176.9	37 55.4	1.0 06	177.0	36 25.6	1.0 06	177.1	34 55.7	1.0 06	177.2	32 56.0	1.0 05	177.3	32 26.0	1.0 05	177.4	31 56.1	1.0 05	177.4	29 56.3	1.0 05	177.6	3
4	38 51.6	1.0 08	175.8	37 51.8	1.0 08	176.0	36 22.1	1.0 07	176.1	34 52.4	1.0 07	176.3	32 52.8	1.0 07	176.5	32 22.9	1.0 07	176.5	31 53.0	1.0 07	176.6	29 53.4	1.0 06	176.7	4
05	38 46.9	99 10	174.8	37 47.2	99 09	174.9	36 17.7	99 09	175.1	34 48.2	99 09	175.3	32 48.8	99 08	175.6	32 19.0	1.0 08	175.6	31 49.1	1.0 08	175.7	29 49.7	1.0 08	175.9	05
6	38 41.1	99 11	173.8	37 41.6	99 11	173.9	36 12.3	99 11	174.2	34 43.0	99 10	174.4	32 43.9	99 10	174.7	32 14.1	99 10	174.8	31 44.3	99 09	174.8	29 45.2	99 09	175.1	6
7	38 34.3	99 13	172.8	37 35.0	99 13	172.9	36 06.0	99 12	173.2	34 36.9	99 12	173.5	32 38.1	99 11	173.8	32 08.4	99 11	173.9	31 38.7	99 11	174.0	29 39.8	99 10	174.3	7
8	38 26.5	99 15	171.7	37 27.4	99 14	172.0	35 58.6	99 14	172.3	34 29.9	99 13	172.6	32 31.4	99 13	173.0	32 01.8	99 12	173.0	31 32.2	99 12	173.1	29 33.7	99 12	173.5	8
9	38 17.7	98 16	170.7	37 18.8	98 16	171.0	35 50.4	98 15	171.3	34 21.9	98 15	171.7	32 23.9	98 14	172.1	31 54.4	98 14	172.2	31 24.9	98 14	172.3	29 26.7	98 13	172.7	9
10	38 07.8	98 18	169.7	37 09.2	98 18	170.0	35 41.1	98 17	170.4	34 13.0	98 16	170.7	32 15.5	98 15	171.2	31 46.1	98 15	171.3	31 16.7	98 15	171.5	29 18.9	98 14	171.9	10
1	37 57.0	97 20	168.7	36 58.6	97 19	169.0	35 31.0	97 18	169.4	34 03.3	97 18	169.8	32 06.2	98 17	170.4	31 36.9	98 17	170.5	31 07.6	98 16	170.6	29 10.4	98 16	171.1	1
2	37 45.1	97 21	167.7	36 47.1	97 21	168.0	35 19.9	97 20	168.5	33 52.6	97 19	168.9	31 56.1	97 18	169.5	31 26.9	97 18	169.6	30 57.8	97 18	169.8	29 01.0	97 17	170.3	2
3	37 32.3	96 23	166.7	36 34.6	96 22	167.1	35 07.9	96 22	167.6	33 41.0	97 21	168.0	31 45.1	97 20	168.7	31 16.1	97 19	168.8	30 47.1	97 19	169.0	28 50.9	97 18	169.5	3
4	37 18.5	96 25	165.8	36 21.1	96 24	166.1	34 54.9	96 23	166.7	33 28.6	96 22	167.2	31 33.3	96 21	167.8	31 04.4	96 21	168.0	30 35.6	96 21	168.1	28 40.0	96 19	168.8	4
15	37 03.8	95 26	164.8	36 06.8	95 25	165.2	34 41.1	95 25	165.7	33 15.3	95 24	166.3	31 20.7	96 22	167.0	30 52.0	96 22	167.2	30 23.3	96 22	167.3	28 28.3	96 21	168.0	15
6	36 48.1	94 28	163.8	35 51.5	94 27	164.2	34 26.4	95 26	164.8	33 01.1	95 25	165.4	31 07.2	95 24	166.2	30 38.7	95 24	166.3	30 10.1	95 23	166.5	28 15.9	95 22	167.2	6
7	36 31.5	94 29	162.9	35 35.3	94 28	163.3	34 10.8	94 27	163.9	32 46.1	94 26	164.6	30 52.9	94 25	165.3	30 24.6	94 25	165.5	29 56.2	95 24	165.7	28 02.7	95 23	166.5	7
8	36 14.0	93 31	161.9	35 18.2	93 30	162.4	33 54.3	93 29	163.1	32 30.3	94 28	163.7	30 37.9	94 26	164.5	30 09.7	94 26	164.7	29 41.5	94 26	164.9	27 48.7	94 24	165.7	8
9	35 55.6	92 32	161.0	35 00.2	92 31	161.5	33 37.0	93 30	162.2	32 13.6	93 29	162.9	30 22.0	93 28	163.7	29 54.0	93 27	163.9	29 26.1	93 27	164.1	27 34.0	93 26	164.9	9
20	35 36.3	91 34	160.1	34 41.4	92 33	160.6	33 18.9	92 32	161.3	31 56.1	92 30	162.0	30 05.4	92 29	162.9	29 37.6	92 29	163.1	29 09.9	93 28	163.4	27 18.6	93 27	164.2	20
1	35 16.1	91 35	159.2	34 21.7	91 34	159.7	32 59.9	91 33	160,5	31 37.8	91 32	161.2	29 48.0	92 30	162.1	29 20.4	92 30	162.4	28 52.9	92 30	162.6	27 02.5	92 28	163.5	1
2	34 55.1	90 36	158.3	34 01.2	90 36	158.8	32 40.1	90 34	159.6	31 18.7	91 33	160.4	29 29.8	91 32	161.3	29 02.5	91 31	161.6	28 35.2	91 31	161.8	26 45.6	91 29	162.7	2
3	34 33.3	89 38	157.4	33 39.9	89 37	158.0	32 19.5	89 36	158.8	30 58.9	90 34	159.6	29 10.9	90 33	160.6	28 43.8	90 32	160.8	28 16.7	90 32	161.1	26 28.1	91 30	162.0	3
4	34 10.7	88 39	156.6	33 17.8	88 38	157.1	31 58.2	89 37	158.0	30 38.3	89 36	158.8	28 51.2	89 34	159.8	28 24.4	89 34	160.1	27 57.6	90 33	160.3	26 09.9	90 32	161.3	4
25	33 47.2	87 40	155.7	32 54.9	87 39	156.3	31 36.0	88 38	157.1	30 16.9	88 37	158.0	28 30.9	89 35	159.1	28 04.3	89 35	159.3	27 37.7	89 34	159.6	25 51.0	89 33	160.6	25
6	33 23.0	86 42	154.9	32 31.2	86 41	155.5	31 13.2	87 39	156.3	29 54.8	87 38	157.2	28 09.8	88 36	158.3	27 43.5	88 36	158.6	27 17.1	88 35	158.9	25 31.4	88 34	159.9	6
7	32 58.0	85 43	154.0	32 06.7	86 42	154.7	30 49.6	86 41	155.6	29 32.0	86 39	156.4	27 48.1	87 37	157.6	27 22.0	87 37	157.9	26 55.9	87 37	158.1	25 11.2	87 35	159.2	7
8	32 32.2	84 44	153.2	31 41.6	85 43	153.9	30 25.2	85 42	154.8	29 08.5	85 40	155.7	27 25.6	86 39	156.9	26 59.8	86 38	157.1	26 34.0	86 38	157.4	24 50.3	87 36	158.5	8
9	32 05.8	83 45	152.4	31 15.7	84 44	153.1	30 00.2	84 43	154.0	28 44.3	85 41	154.9	27 02.5	85 40	156.1	26 37.0	85 39	156.4	26 11.4	85 39	156.7	24 28.8	86 37	157.9	9
30	31 38.6	82 46	151.6	30 49.1	83 45	152.3	29 34.4	83 44	153.3	28 19.4	84 43	154.2	26 38.7	84 41	155.4	26 13.5	84 40	155.7	25 48.2	84 40	156.0	24 06.6	85 38	157.2	30
1	31 10.7	81 48	150.9	30 21.8	82 47	151.5	29 06.0	82 45	152.5	27 53.8	83 44	153.5	26 14.3	83 42	154.7	25 49.3	83 41	155.0	25 24.3	83 41	155.4	23 43.9	84 39	156.6	1
2	30 42.1	80 49	150.1	29 53.8	81 48	150.8	28 41.0	81 46	151.8	27 27.6	82 45	152.8	25 49.3	82 43	154.1	25 24.6	82 42	154.4	24 59.8	83 42	154.7	23 20.5	83 40	155.9	2
3	30 12.9	79 50	149.3	29 25.2	80 49	150.0	28 13.2	80 47	151.1	27 00.8	81 46	152.1	25 23.6	81 44	153.4	24 59.2	81 43	153.7	24 34.8	82 43	154.0	22 56.6	82 41	155.3	3
4	29 43.0	78 51	148.6	28 55.9	79 50	149.3	27 44.9	79 48	150.4	26 33.4	80 47	151.4	24 57.3	80 45	152.7	24 33.2	80 44	153.0	24 09.1	81 44	153.4	22 32.0	81 42	154.7	4
35	29 12.5	77 52	147.9	28 26.1	78 51	148.6	27 15.9	78 49	149.7	26 05.3	79 48	150.7	24 30.5	79 46	152.1	24 06.7	79 45	152.4	23 42.8	80 45	152.7	22 06.9	80 43	154.0	35
6	28 41.4	76 53	147.2	27 55.6	77 52	147.9	26 46.4	77 50	149.0	25 36.7	78 49	150.0	24 03.0	78 47	151.4	23 39.5	78 46	151.8	23 16.0	79 46	152.1	21 41.3	79 44	153.4	6
7	28 09.7	75 54	146.5	27 24.5	76 53	147.2	26 16.2	76 51	148.3	25 07.4	77 50	149.4	23 35.0	77 48	150.8	23 11.8	77 47	151.1	22 48.6	78 47	151.5	21 15.1	78 45	152.8	7
8	27 37.4	74 55	145.8	26 52.8	75 54	146.5	25 45.5	75 52	147.7	24 37.6	76 51	148.7	23 06.5	76 48	150.2	22 43.6	76 48	150.5	22 20.6	77 47	150.9	20 48.4	77 45	152.2	8
9	27 04.6	73 56	145.1	26 20.6	73 55	145.9	25 14.2	74 53	147.0	24 07.3	75 51	148.1	22 37.4	75 49	149.6	22 14.8	75 49	149.9	21 52.1	76 48	150.3	20 21.1	76 46	151.7	9
40	26 31.1	72 57	144.5	25 47.8	72 56	145.2	24 42.4	73 54	146.4	23 36.4	74 52	147.5	22 07.8	74 50	149.0	21 45.5	74 50	149.3	21 23.1	75 49	149.7	19 53.4	75 47	151.1	40
1	25 57.2	71 57	143.8	25 14.5	71 56	144.6	24 10.0	72 55	145.8	23 05.0	72 53	146.9	21 37.6	73 51	148.4	21 15.7	73 51	148.7	20 53.6	73 50	149.1	19 25.1	74 48	150.5	1
2	25 22.7	70 58	143.2	24 40.7	70 57	144.0	23 37.1	71 56	145.1	22 33.1	71 54	146.3	21 07.0	72 52	147.8	20 45.3	72 51	148.2	20 23.6	72 51	148.5	18 56.4	73 49	150.0	2
3	24 47.8	69 59	142.6	24 06.3	69 58	143.4	23 03.8	70 56	144.5	22 00.7	70 55	145.7	20 35.8	71 53	147.2	20 14.5	71 52	147.6	19 53.1	71 52	148.0	18 27.1	72 49	149.4	3
4	24 12.3	68 60	142.0	23 31.5	68 59	142.8	22 29.9	69 57	144.0	21 27.8	69 56	145.1	20 04.2	70 53	146.7	19 43.2	70 53	147.0	19 22.1	70 52	147.4	17 57.4	71 50	148.9	4
45	23 36.3	67 61	141.4	22 56.2	67 60	142.2	21 55.6	68 58	143.4	20 54.4	68 56	144.6	19 32.1	69 54	146.1	19 11.4	69 54	146.5	18 50.7	69 53	146.9	17 27.3	70 51	148.4	45
6	22 59.9	66 61	140.8	22 20.4	66 60	141.6	21 20.8	67 59	142.8	20 20.6	67 57	144.0	18 59.6	68 55	145.6	18 39.2	68 54	146.0	18 18.8	68 54	146.3	16 56.7	69 52	147.9	6
7	22 23.1	65 62	140.2	21 44.2	65 61	141.0	20 45.5	66 59	142.3	19 46.3	66 58	143.5	18 26.6	67 56	145.0	18 06.6	67 55	145.4	17 46.5	67 55	145.8	16 25.6	68 52	147.4	7
8	21 45.8	63 63	139.7	21 07.6	64 62	140.5	20 09.8	64 60	141.7	19 11.6	65 59	142.9	17 53.2	66 56	144.5	17 33.5	66 56	144.9	17 13.7	66 55	145.3	15 54.2	67 53	146.9	8
9	21 08.0	62 64	139.1	20 30.5	63 62	139.9	19 33.7	63 61	141.2	18 36.4	64 59	142.4	17 19.4	65 57	144.0	17 00.0	65 57	144.4	16 40.5	65 56	144.8	15 22.3	65 54	146.4	9
50	20 29.9	61 64	138.6	19 53.0	62 63	139.4	18 57.2	62 62	140.7	18 00.9	63 60	141.9	16 45.1	63 58	143.5	16 26.0	64 57	143.9	16 06.9	64 57	144.3	14 50.0	64 54	145.9	50
1	19 51.3	60 65	138.1	19 15.1	61 64	138.9	18 20.2	61 62	140.2	17 24.9	62 61	141.4	16 10.4	62 58	143.0	15 51.7	63 58	143.4	15 32.9	63 57	143.8	14 17.4	63 55	145.5	1
2	19 12.4	59 66	137.5	18 36.8	60 64	138.4	17 42.9	60 63	139.7	16 48.6	61 61	140.9	15 35.4	61 59	142.6	15 17.0	61 58	143.0	14 58.5	62 58	143.4	13 44.3	62 56	145.0	2
3	18 33.1	58 66	137.0	17 58.1	59 65	137.9	17 05.2	59 63	139.2	16 11.8	60 62	140.4	15 00.0	60 60	142.1	14 41.9	60 59	142.5	14 23.8	60 59	142.9	13 10.9	61 56	144.5	3
4	17 53.4	57 67	136.5	17 19.1	57 66	137.4	16 27.1	58 64	138.7	15 34.7	58 62	140.0	14 24.2	59 60	141.6	14 06.4	59 60	142.0	13 48.7	59 59	142.5	12 37.1	60 57	144.1	4
55	17 13.4	56 67	136.1	16 39.7	56 66	136.9	15 48.7	57 65	138.2	14 57.3	57 63	139.5	13 48.0	58 61	141.2	13 30.6	58 60	141.6	13 13.2	58 60	142.0	12 02.9	59 58	143.7	55
6	16 33.0	55 68	135.6	15 59.9	55 67	136.5	15 09.9	56 65	137.8	14 19.4	56 64	139.0	13 11.5	57 61	140.7	12 54.4	57 61	141.2	12 37.3	57 60	141.6	11 28.4	58 58	143.3	6
7	15 52.3	54 68	135.1	15 19.8	54 67	136.0	14 30.8	55 66	137.3	13 41.3	55 64	138.6	12 34.7	56 62	140.3	12 17.9	56 61	140.7	12 01.1	56 61	141.2	10 53.6	57 59	142.9	7
8	15 11.2	53 69	134.7	14 39.4	53 68	135.6	13 51.3	54 66	136.9	13 02.8	54 65	138.2	11 57.5	55 62	139.9	11 41.1	55 62	140.3	11 24.6	55 61	140.7	10 18.4	55 59	142.4	8
9	14 29.9	52 69	134.3	13 58.7	52 68	135.1	13 11.5	53 67	136.4	12 24.0	53 65	137.8	11 20.0	54 63	139.5	11 03.9	54 62	139.9	10 47.8	54 62	140.3	9 43.0	54 60	142.1	9
60	13 48.2	51 70	133.8	13 17.6	51 69	134.7	12 31.5	52 67	136.0	11 44.9	52 66	137.3	10 42.2	52 64	139.1	10 26.5	53 63	139.5	10 10.7	53 62	139.9	9 07.2	53 60	141.7	60
1	13 06.3	50 70	133.4	12 36.3	50 69	134.3	11 51.1	50 68	135.6	11 05.5	51 66	136.9	10 04.1	51 64	138.7	9 48.7	51 63	139.1	9 33.2	52 63	139.6	8 31.1	52 61	141.3	1
2	12 24.0	49 71	133.0	11 54.7	49 70	133.9	11 10.4	49 68	135.2	10 25.7	50 67	136.5	9 25.7	50 64	138.3	9 10.6	50 64	138.7	8 55.5	50 63	139.2	7 54.7	51 61	140.9	2
3	11 41.5	48 71	132.6	11 12.8	48 70	133.5	10 29.4	48 69	134.8	9 45.7	49 67	136.2	8 47.0	49 65	137.9	8 32.2	49 64	138.4	8 17.5	49 64	138.8	7 18.0	50 62	140.6	3
4	10 58.7	47 72	132.2	10 30.6	47 71	133.1	9 48.2	47 69	134.5	9 05.5	48 68	135.8	8 08.0	48 65	137.6	7 53.6	48 65	138.0	7 39.2	48 64	138.5	6 41.1	49 62	140.2	4
65	10 15.6	46 72	131.8	9 48.2	46 71	132.7	9 06.7	46 70	134.1	8 24.9	47 68	135.4	7 28.8	47 66	137.2	7 14.7	47 65	137.7	7 00.6	47 65	138.1	6 03.8	47 62	139.9	65
6	9 32.3	45 73	131.5	9 05.5	45 72	132.4	8 24.9	45 70	133.7	7 44.1	45 68	135.1	6 49.3	46 66	136.9	6 35.5	46 66	137.3	6 21.7	46 65	137.8	5 26.4	46 63	139.5	6
7	8 48.8	44 73	131.1	8 22.5	44 72	132.0	7 42.9	44 70	133.4	7 03.1	44 69	134.7	6 09.6	45 67	136.5	5 56.1	45 66	137.0	5 42.7	45 66	137.4				7
8	8 05.0	43 73	130.7	7 39.3	43 72	131.7	7 00.7	43 71	133.0	6 21.8	43 69	134.4	5 29.6	44 67	136.2	5 16.5	44 66	136.6	5 03.3	44 66	137.1				8
9	7 21.0	42 74	130.4	6 55.9	42 73	131.3	6 18.2	42 71	132.7	5 40.2	42 70	134.1													9
70	6 36.7	41 74	130.1	6 12.3	41 73	131.0	5 35.5	41 72	132.4																70
1	5 52.2	40 74	129.7	5 28.4	40 73	130.7																			1
2	5 07.6	39 75	129.4																						2

DECLINATION SAME NAME AS LATITUDE

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	7 57.6	22 79	54.8	8 10.9	22 78	53.8	8 30.4	22 76	52.3	8 49.6	21 75	50.8	9 14.7	21 73	48.8	9 20.9	20 72	48.3	9 27.0	20 72	47.8	9 51.1	20 69	45.9	91
2	7 10.4	23 79	54.6	7 24.2	23 78	53.6	7 44.6	23 76	52.1	8 04.8	22 75	50.6	8 31.1	22 72	48.7	8 37.6	22 72	48.2	8 44.1	21 71	47.7	9 09.5	21 69	45.7	2
3	6 23.2	24 78	54.4	6 37.6	24 77	53.4	6 58.9	24 76	51.9	7 20.0	23 74	50.5	7 47.7	23 72	48.5	7 54.5	23 72	48.0	8 01.3	23 71	47.5	8 28.1	22 69	45.6	3
4	5 36.1	25 78	54.2	5 51.1	25 77	53.2	6 13.3	25 76	51.8	6 35.4	24 74	50.3	7 04.3	24 72	48.3	7 11.5	24 72	47.8	7 18.6	24 71	47.4	7 46.8	23 69	45.4	4
95				5 04.7	26 77	53.0	5 27.9	26 76	51.6	5 50.8	25 74	50.1	6 21.1	25 72	48.1	6 28.6	25 71	47.7	6 36.0	25 71	47.2	7 05.6	24 68	45.2	95
6										5 06.4	26 74	49.9	5 38.0	26 72	48.0	5 45.8	26 71	47.5	5 53.6	26 71	47.0	6 24.5	26 68	45.0	6
7																5 03.1	27 71	47.3	5 11.3	27 70	46.8	5 43.6	27 68	44.9	7
8																						5 02.8	28 68	44.7	8

H.A.	46° 00′				47° 00′				48° 30′				49° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	59 00.0	1.0	01	00.0	58 00.0	1.0	01	00.0	56 30.0	1.0	01	00.0	55 30.0	1.0	01	00.0
1	58 59.3	1.0	03	01.3	57 59.3	1.0	03	01.3	56 29.4	1.0	03	01.2	55 29.4	1.0	03	01.1
2	58 57.3	1.0	06	02.7	57 57.4	1.0	05	02.6	56 27.6	1.0	05	02.4	55 27.7	1.0	05	02.3
3	58 53.9	1.0	08	04.0	57 54.2	1.0	08	03.9	56 24.5	1.0	07	03.6	55 24.8	1.0	07	03.4
4	58 49.1	99	10	05.4	57 49.6	99	10	05.1	56 20.3	99	09	04.8	55 20.7	99	09	04.6
05	58 43.0	99	12	06.7	57 43.8	99	12	06.4	56 14.9	99	11	06.0	55 15.6	99	11	05.7
6	58 35.6	98	15	08.0	57 36.7	98	14	07.6	56 08.3	98	13	07.1	55 09.2	98	12	06.8
7	58 26.9	97	17	09.3	57 28.4	98	16	08.9	56 00.5	98	15	08.3	55 01.8	98	14	07.9
8	58 16.9	97	19	10.6	57 18.8	97	18	10.1	55 51.5	97	17	09.5	54 53.2	97	16	09.0
9	58 05.6	96	21	11.9	57 08.0	96	20	11.3	55 41.4	96	19	10.6	54 43.6	97	18	10.1
10	57 53.0	95	23	13.1	56 56.0	95	22	12.5	55 30.2	96	21	11.7	54 32.8	96	20	11.2
1	57 39.3	94	25	14.3	56 42.9	94	24	13.7	55 17.9	95	22	12.8	54 21.0	95	21	12.3
2	57 24.3	93	27	15.6	56 28.5	93	26	14.9	55 04.5	94	24	13.9	54 08.2	94	23	13.3
3	57 08.2	92	29	16.7	56 13.1	92	28	16.0	54 50.0	93	26	15.0	53 54.3	93	25	14.4
4	56 51.0	90	31	17.9	55 56.6	91	29	17.1	54 34.5	92	28	16.1	53 39.5	92	26	15.4
15	56 32.6	89	32	19.0	55 39.0	90	31	18.2	54 18.0	90	29	17.1	53 23.6	91	28	16.4
6	56 13.2	88	34	20.1	55 20.3	88	33	19.3	54 00.4	89	31	18.1	53 06.8	90	30	17.4
7	55 52.7	86	36	21.2	55 00.7	87	34	20.3	53 41.9	88	32	19.1	52 49.1	88	31	18.3
8	55 31.2	85	37	22.3	54 40.0	86	36	21.4	53 22.5	87	34	20.1	52 30.4	87	33	19.3
9	55 08.8	83	39	23.3	54 18.4	84	38	22.4	53 02.2	85	35	21.0	52 10.8	86	34	20.2
20	54 45.4	82	41	24.3	53 55.9	83	39	23.3	52 40.9	84	37	22.0	51 50.4	85	35	21.1
1	54 21.0	80	42	25.3	53 32.5	81	40	24.3	52 18.8	82	38	22.9	51 29.2	83	37	21.9
2	53 55.9	79	43	26.2	53 08.3	80	42	25.2	51 55.9	81	40	23.7	51 07.1	82	38	22.8
3	53 29.8	77	45	27.1	52 43.2	78	43	26.1	51 32.2	79	41	24.6	50 44.3	80	39	23.6
4	53 03.0	76	46	28.0	52 17.3	77	44	27.0	51 07.7	78	42	25.4	50 20.6	79	41	24.5
25	52 35.4	74	47	28.9	51 50.6	75	46	27.8	50 42.4	76	43	26.2	49 56.3	77	42	25.2
6	52 07.0	72	48	29.7	51 23.2	73	47	28.6	50 16.4	75	44	27.0	49 31.2	76	43	26.0
7	51 37.9	71	50	30.5	50 55.1	72	48	29.4	49 49.8	73	46	27.8	49 05.5	74	44	26.8
8	51 08.1	69	51	31.3	50 26.3	70	49	30.2	49 22.4	72	47	28.5	48 39.0	73	45	27.5
9	50 37.7	67	52	32.1	49 56.8	69	50	30.9	48 54.4	70	48	29.3	48 12.0	71	46	28.2
30	50 06.6	66	53	32.8	49 26.7	67	51	31.6	48 25.8	69	49	30.0	47 44.3	70	47	28.9
1	49 34.9	64	54	33.5	48 56.1	65	52	32.3	47 56.5	67	50	30.6	47 16.0	68	48	29.5
2	49 02.6	62	55	34.2	48 24.8	64	53	33.0	47 26.7	65	51	31.3	46 47.2	66	49	30.2
3	48 29.8	61	56	34.8	47 52.9	62	54	33.6	46 56.3	64	52	31.9	46 17.8	65	50	30.8
4	47 56.5	59	56	35.4	47 20.6	60	55	34.3	46 25.5	62	52	32.5	45 47.8	63	51	31.4
35	47 22.6	58	57	36.0	46 47.7	59	56	34.8	45 54.0	61	53	33.1	45 17.4	62	52	32.0
6	46 48.3	56	58	36.6	46 14.4	57	56	35.4	45 22.2	59	54	33.7	44 46.5	60	52	32.5
7	46 13.5	54	59	37.2	45 40.5	55	57	36.0	44 49.8	57	55	34.2	44 15.1	58	53	33.1
8	45 38.2	53	59	37.7	45 06.3	54	58	36.5	44 17.0	56	55	34.7	43 43.2	57	54	33.6
9	45 02.6	51	60	38.2	44 31.6	52	58	37.0	43 43.7	54	56	35.2	43 11.0	55	54	34.1
40	44 26.5	49	61	38.7	43 56.5	51	59	37.5	43 10.1	52	57	35.7	42 38.3	54	55	34.6
1	43 50.1	48	61	39.2	43 21.0	49	60	38.0	42 36.1	51	57	36.2	42 05.2	52	56	35.0
2	43 13.3	46	62	39.6	42 45.2	47	60	38.4	42 01.7	49	58	36.6	41 31.7	50	56	35.5
3	42 36.2	45	62	40.1	42 09.0	46	61	38.9	41 26.9	48	58	37.1	40 57.9	49	57	35.9
4	41 58.7	43	63	40.5	41 32.5	44	61	39.3	40 51.8	46	59	37.5	40 23.7	47	58	36.3
45	41 20.9	41	63	40.9	40 55.6	43	62	39.7	40 16.3	45	60	37.9	39 49.2	46	58	36.7
6	40 42.9	40	64	41.2	40 18.5	41	62	40.0	39 40.6	43	60	38.3	39 14.4	44	59	37.1
7	40 04.5	38	64	41.6	39 41.1	40	63	40.4	39 04.6	41	61	38.6	38 39.3	43	59	37.5
8	39 25.9	37	65	41.9	39 03.4	38	63	40.7	38 28.2	40	61	39.0	38 03.9	41	59	37.8
9	38 47.0	35	65	42.3	38 25.4	37	64	41.1	37 51.7	38	61	39.3	37 28.3	40	60	38.1
50	38 07.9	34	66	42.6	37 47.2	35	64	41.4	37 14.8	37	62	39.6	36 52.4	38	60	38.5
1	37 28.6	32	66	42.9	37 08.8	34	64	41.7	36 37.8	35	62	39.9	36 16.2	36	61	38.8
2	36 49.1	31	66	43.1	36 30.2	32	65	42.0	36 00.5	34	63	40.2	35 39.8	35	61	39.0
3	36 09.4	30	67	43.4	35 51.3	31	65	42.2	35 22.9	32	63	40.5	35 03.2	33	61	39.3
4	35 29.5	28	67	43.6	35 12.3	29	65	42.5	34 45.2	31	63	40.7	34 26.4	32	62	39.6
55	34 49.4	27	67	43.9	34 33.1	28	66	42.7	34 07.3	29	63	41.0	33 49.4	30	62	39.8
6	34 09.1	25	67	44.1	33 53.7	26	66	42.9	33 29.2	28	64	41.2	33 12.2	29	62	40.0
7	33 28.7	24	68	44.3	33 14.1	25	66	43.1	32 51.0	26	64	41.4	32 34.8	28	63	40.3
8	32 48.2	22	68	44.5	32 34.4	23	66	43.3	32 12.6	25	64	41.6	31 57.2	26	63	40.5
9	32 07.5	21	68	44.7	31 54.6	22	67	43.5	31 34.0	24	64	41.8	31 19.5	25	63	40.7
60	31 26.7	20	68	44.8	31 14.6	21	67	43.7	30 55.3	22	65	42.0	30 41.7	23	63	40.8
1	30 45.8	18	68	45.0	30 34.5	19	67	43.9	30 16.5	21	65	42.1	30 03.7	22	63	41.0
2	30 04.7	17	69	45.1	29 54.3	18	67	44.0	29 37.5	19	65	42.3	29 25.6	20	64	41.2
3	29 23.6	16	69	45.3	29 14.0	17	67	44.1	28 58.5	18	65	42.4	28 47.4	19	64	41.3
4	28 42.4	14	69	45.4	28 33.6	15	67	44.3	28 19.3	17	65	42.6	28 09.1	17	64	41.5
65	28 01.1	13	69	45.5	27 53.1	14	68	44.4	27 40.0	15	66	42.7	27 30.7	16	64	41.6
6	27 19.7	12	69	45.6	27 12.5	12	68	44.5	27 00.7	14	66	42.8	26 52.2	15	64	41.7
7	26 38.3	10	69	45.7	26 31.9	11	68	44.6	26 21.3	12	66	42.9	26 13.6	13	64	41.8
8	25 56.8	09	69	45.7	25 51.2	10	68	44.6	25 41.8	11	66	43.0	25 34.9	12	65	41.9
9	25 15.3	08	69	45.8	25 10.4	08	68	44.7	25 02.3	10	66	43.1	24 56.2	10	65	42.0
70	24 33.7	06	69	45.9	24 29.6	07	68	44.8	24 22.7	08	66	43.1	24 17.4	09	65	42.0
1	23 52.1	05	69	45.9	23 48.8	06	68	44.8	23 43.0	07	66	43.2	23 38.6	08	65	42.1
2	23 10.4	04	69	45.9	23 07.9	05	68	44.9	23 03.3	06	66	43.2	22 59.7	06	65	42.1
3	22 28.8	03	69	46.0	22 27.1	03	68	44.9	22 23.6	04	66	43.3	22 20.8	05	65	42.2
4	21 47.1	01	69	46.0	21 46.1	02	68	44.9	21 43.9	03	66	43.3	21 41.9	04	65	42.2
75	21 05.4	00	69	46.0	21 05.2	01	68	44.9	21 04.2	02	66	43.3	21 03.0	02	65	42.2
6	20 23.8	01	69	46.0	20 24.3	01	68	44.9	20 24.4	00	66	43.3	20 24.0	01	65	42.2
7	19 42.1	02	69	46.0	19 43.4	02	68	44.9	19 44.7	01	66	43.3	19 45.0	00	65	42.2
8	19 00.4	04	69	45.9	19 02.5	03	68	44.9	19 04.9	02	66	43.3	19 06.1	02	65	42.2
9	18 18.8	05	69	45.9	18 21.6	04	68	44.9	18 25.2	04	66	43.3	18 27.1	03	65	42.2
80	17 37.2	06	69	45.9	17 40.7	06	68	44.8	17 45.4	05	66	43.3	17 48.2	04	65	42.2
1	16 55.6	07	69	45.8	16 59.9	07	68	44.8	17 05.7	06	66	43.2	17 09.2	06	65	42.2
2	16 14.0	09	69	45.8	16 19.1	08	68	44.7	16 26.1	07	66	43.2	16 30.4	07	65	42.1
3	15 32.5	10	69	45.7	15 38.3	09	68	44.7	15 46.4	09	66	43.1	15 51.5	08	65	42.1
4	14 51.1	11	69	45.6	14 57.6	11	68	44.6	15 06.9	10	66	43.0	15 12.7	09	65	42.0
85	14 09.7	12	69	45.5	14 16.9	12	68	44.5	14 27.3	11	66	43.0	14 33.9	11	65	41.9
6	13 28.4	14	69	45.4	13 36.3	13	68	44.4	13 47.8	12	66	42.9	13 55.2	12	64	41.9
7	12 47.1	15	69	45.3	12 55.8	14	67	44.3	13 08.4	14	66	42.8	13 16.5	13	64	41.8
8	12 05.9	16	68	45.2	12 15.4	16	67	44.2	12 29.1	15	65	42.7	12 38.0	15	64	41.7
9	11 24.8	17	68	45.1	11 35.0	17	67	44.1	11 49.8	16	65	42.6	11 59.5	16	64	41.6
90	10 43.8	18	68	45.0	10 54.7	18	67	44.0	11 10.6	17	65	42.5	11 21.0	17	64	41.5

50° 30′				51° 30′				52° 30′				54° 00′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
54 30.0	1.0	01	00.0	53 30.0	1.0	01	00.0	52 30.0	1.0	01	00.0	51 00.0	1.0	01	00.0	00
54 29.4	1.0	03	01.1	53 29.5	1.0	03	01.0	52 29.5	1.0	03	01.0	50 59.5	1.0	02	00.9	1
54 27.8	1.0	05	02.2	53 27.9	1.0	04	02.1	52 28.0	1.0	04	02.0	50 58.1	1.0	04	01.9	2
54 25.0	1.0	06	03.3	53 25.2	1.0	06	03.1	52 25.5	1.0	06	03.0	50 55.8	1.0	06	02.8	3
54 21.2	99	08	04.4	53 21.5	99	08	04.2	52 21.9	99	08	04.0	50 52.5	99	07	03.7	4
54 16.2	99	10	05.4	53 16.8	99	10	05.2	52 17.4	99	09	05.0	50 48.2	99	09	04.6	05
54 10.2	99	12	06.5	53 11.0	99	11	06.2	52 11.9	99	11	06.0	50 43.1	99	10	05.6	6
54 03.0	98	14	07.6	53 04.2	98	13	07.3	52 05.4	98	12	06.9	50 37.0	98	12	06.5	7
53 54.9	97	15	08.6	52 56.4	97	15	08.3	51 57.9	98	14	07.9	50 30.0	98	13	07.4	8
53 45.6	97	17	09.7	52 47.6	97	16	09.3	51 49.4	97	16	08.9	50 22.1	97	15	08.3	9
53 35.3	96	19	10.7	52 37.7	96	18	10.3	51 40.0	96	17	09.8	50 13.3	97	16	09.2	10
53 24.1	95	20	11.7	52 26.9	95	20	11.2	51 29.7	96	19	10.8	50 03.6	96	18	10.1	1
53 11.8	94	22	12.8	52 15.2	94	21	12.2	51 18.4	95	20	11.7	49 53.0	95	19	10.9	2
52 58.5	93	24	13.7	52 02.4	94	23	13.2	51 06.2	94	22	12.6	49 41.6	94	20	11.8	3
52 44.2	92	25	14.7	51 48.8	93	24	14.1	50 53.1	93	23	13.5	49 29.3	93	22	12.6	4
52 29.0	91	27	15.7	51 34.2	92	26	15.0	50 39.2	92	25	14.4	49 16.2	92	23	13.5	15
52 12.9	90	28	16.6	51 18.7	90	27	15.9	50 24.3	91	26	15.3	49 02.3	91	25	14.3	6
51 55.9	89	30	17.6	51 02.4	89	29	16.8	50 08.7	90	28	16.1	48 47.6	90	26	15.1	7
51 37.9	88	31	18.5	50 45.2	88	30	17.7	49 52.1	89	29	17.0	48 32.1	89	27	15.9	8
51 19.2	86	33	19.4	50 27.2	87	31	18.6	49 34.8	87	30	17.8	48 15.8	88	28	16.7	9
50 59.5	85	34	20.2	50 08.3	86	33	19.4	49 16.7	86	31	18.6	47 58.8	87	30	17.5	20
50 39.1	84	35	21.1	49 48.7	84	34	20.2	48 57.8	85	33	19.4	47 41.0	86	31	18.2	1
50 17.9	82	37	21.9	49 28.2	83	35	21.0	48 38.2	84	34	20.2	47 22.5	85	32	19.0	2
49 55.9	81	38	22.7	49 07.1	82	36	21.8	48 17.8	82	35	20.9	47 03.3	83	33	19.7	3
49 33.1	80	39	23.5	48 45.2	80	38	22.6	47 56.8	81	36	21.7	46 43.4	82	34	20.4	4
49 09.7	78	40	24.3	48 22.6	79	39	23.3	47 35.0	80	37	22.4	46 22.9	81	35	21.1	25
48 45.5	77	41	25.0	47 59.3	77	40	24.1	47 12.6	78	38	23.1	46 01.7	79	36	21.8	6
48 20.6	75	43	25.8	47 35.3	76	41	24.8	46 49.5	77	40	23.8	45 39.9	78	37	22.4	7
47 55.1	74	44	26.5	47 10.7	74	42	25.5	46 25.8	75	41	24.5	45 17.5	76	38	23.1	8
47 29.0	72	45	27.1	46 45.5	73	43	26.1	46 01.4	74	42	25.2	44 54.4	75	39	23.7	9
47 02.3	71	46	27.8	46 19.6	71	44	26.8	45 36.5	72	42	25.8	44 30.8	74	40	24.3	30
46 34.9	69	46	28.5	45 53.2	70	45	27.4	45 11.0	71	43	26.4	44 06.7	72	41	24.9	1
46 07.0	67	47	29.1	45 26.3	68	46	28.0	44 44.9	69	44	27.0	43 42.0	71	42	25.5	2
45 38.6	66	48	29.7	44 58.7	67	47	28.6	44 18.4	68	45	27.6	43 16.7	69	43	26.1	3
45 09.6	64	49	30.3	44 30.7	65	48	29.2	43 51.2	66	46	28.2	42 51.0	68	44	26.6	4
44 40.1	63	50	30.9	44 02.2	64	48	29.8	43 23.6	65	47	28.7	42 24.8	66	44	27.2	35
44 10.1	61	51	31.4	43 33.1	62	49	30.3	42 55.6	63	48	29.3	41 58.1	65	45	27.7	6
43 39.7	60	51	31.9	43 03.7	61	50	30.8	42 27.0	62	48	29.8	41 30.9	63	46	28.2	7
43 08.8	58	52	32.5	42 33.7	59	51	31.4	41 58.0	60	49	30.3	41 03.3	61	47	28.7	8
42 37.5	56	53	33.0	42 03.3	57	51	31.8	41 28.6	58	50	30.8	40 35.3	60	47	29.2	9
42 05.7	55	54	33.4	41 32.6	56	52	32.3	40 58.7	57	50	31.2	40 06.9	58	48	29.6	40
41 33.6	53	54	33.9	41 01.4	54	53	32.8	40 28.5	55	51	31.7	39 38.0	57	49	30.0	1
41 01.1	52	55	34.3	40 29.8	53	53	33.2	39 57.9	54	52	32.1	39 08.8	55	49	30.5	2
40 28.2	50	55	34.8	39 57.9	51	54	33.6	39 26.9	52	52	32.5	38 39.3	54	50	30.9	3
39 55.0	48	56	35.2	39 25.6	50	54	34.0	38 55.6	51	53	32.9	38 09.3	52	50	31.3	4
39 21.5	47	56	35.6	38 53.0	48	55	34.4	38 23.9	49	53	33.3	37 39.1	51	51	31.7	45
38 47.6	45	57	35.9	38 20.1	46	55	34.8	37 51.9	47	54	33.7	37 08.5	49	52	32.0	6
38 13.4	44	57	36.3	37 46.8	45	56	35.2	37 19.6	46	54	34.0	36 37.6	47	52	32.4	7
37 39.0	42	58	36.7	37 13.3	43	56	35.5	36 47.0	44	55	34.4	36 06.4	46	52	32.7	8
37 04.2	41	58	37.0	36 39.5	42	57	35.8	36 14.1	43	55	34.7	35 34.9	44	53	33.1	9
36 29.2	39	59	37.3	36 05.4	40	57	36.2	35 41.0	41	56	35.0	35 03.2	43	53	33.4	50
35 54.0	38	59	37.6	35 31.1	39	58	36.5	35 07.6	40	56	35.3	34 31.2	41	54	33.7	1
35 18.5	36	60	37.9	34 56.5	37	58	36.8	34 34.0	38	56	35.6	33 58.9	40	54	34.0	2
34 42.8	35	60	38.2	34 21.8	36	58	37.0	34 00.1	37	57	35.9	33 26.4	38	54	34.2	3
34 06.9	33	60	38.4	33 46.7	34	59	37.3	33 26.0	35	57	36.2	32 53.7	37	55	34.5	4
33 30.8	32	61	38.7	33 11.5	33	59	37.5	32 51.7	34	58	36.4	32 20.8	35	55	34.7	55
32 54.4	30	61	38.9	32 36.1	31	59	37.8	32 17.2	32	58	36.7	31 47.7	34	56	35.0	6
32 17.9	29	61	39.1	32 00.5	30	60	38.0	31 42.5	31	58	36.9	31 14.4	32	56	35.2	7
31 41.3	27	61	39.3	31 24.8	28	60	38.2	31 07.6	29	58	37.1	30 40.8	30	56	35.4	8
31 04.5	26	62	39.5	30 48.8	27	60	38.4	30 32.6	28	59	37.3	30 07.2	29	56	35.6	9
30 27.5	24	62	39.7	30 12.7	25	60	38.6	29 57.4	26	59	37.5	29 33.3	27	57	35.8	60
29 50.4	23	62	39.9	29 36.5	24	61	38.8	29 22.1	25	59	37.7	28 59.3	26	57	36.0	1
29 13.2	21	62	40.1	29 00.2	22	61	38.9	28 46.6	23	59	37.8	28 25.2	24	57	36.2	2
28 35.8	20	62	40.2	28 23.7	21	61	39.1	28 11.0	22	60	38.0	27 50.9	23	57	36.3	3
27 58.4	18	63	40.3	27 47.1	19	61	39.2	27 35.3	20	60	38.1	27 16.6	21	58	36.5	4
27 20.8	17	63	40.5	27 10.4	18	61	39.4	26 59.4	19	60	38.3	26 42.1	20	58	36.6	65
26 43.1	16	63	40.6	26 33.6	16	61	39.5	26 23.5	17	60	38.4	26 07.4	18	58	36.7	6
26 05.4	14	63	40.7	25 56.7	15	62	39.6	25 47.5	16	60	38.5	25 32.7	17	58	36.8	7
25 27.6	13	63	40.8	25 19.7	14	62	39.7	25 11.4	14	60	38.6	24 57.9	16	58	37.0	8
24 49.7	11	63	40.9	24 42.7	12	62	39.8	24 35.2	13	60	38.7	24 23.1	14	58	37.0	9
24 11.7	10	63	40.9	24 05.6	11	62	39.9	23 58.9	11	61	38.8	23 48.1	13	58	37.1	70
23 33.7	09	63	41.0	23 28.4	09	62	39.9	23 22.6	10	61	38.8	23 13.1	11	58	37.2	1
22 55.7	07	63	41.1	22 51.2	08	62	40.0	22 46.2	09	61	38.9	22 38.0	10	59	37.3	2
22 17.6	06	64	41.1	22 13.9	06	62	40.0	22 09.8	07	61	38.9	22 02.9	08	59	37.3	3
21 39.5	04	64	41.1	21 36.6	05	62	40.1	21 33.4	06	61	39.0	21 27.7	07	59	37.4	4
21 01.3	03	64	41.2	20 59.3	04	62	40.1	20 56.9	04	61	39.0	20 52.5	05	59	37.4	75
20 23.2	02	64	41.2	20 22.0	02	62	40.1	20 20.4	03	61	39.0	20 17.3	04	59	37.4	6
19 45.0	00	64	41.2	19 44.6	01	62	40.1	19 43.9	02	61	39.1	19 42.0	03	59	37.5	7
19 06.9	01	64	41.2	19 07.3	00	62	40.1	19 07.4	00	61	39.1	19 06.8	01	59	37.5	8
18 28.7	02	64	41.2	18 29.9	02	62	40.1	18 30.8	01	61	39.1	18 31.5	00	59	37.5	9
17 50.5	04	64	41.2	17 52.6	03	62	40.1	17 54.3	03	61	39.1	17 56.2	02	59	37.5	80
17 12.4	05	64	41.1	17 15.3	04	62	40.1	17 17.8	04	61	39.0	17 21.0	03	59	37.5	1
16 34.3	06	63	41.1	16 38.0	06	62	40.0	16 41.3	05	61	39.0	16 45.8	05	59	37.4	2
15 56.2	08	63	41.0	16 00.7	07	62	40.0	16 04.9	07	61	39.0	16 10.5	06	59	37.4	3
15 18.2	09	63	41.0	15 23.5	09	62	40.0	15 28.4	08	61	38.9	15 35.3	07	59	37.4	4
14 40.2	10	63	40.9	14 46.3	10	62	39.9	14 52.0	09	61	38.9	15 00.2	09	58	37.3	85
14 02.3	12	63	40.8	14 09.1	11	62	39.8	14 15.7	11	60	38.8	14 25.1	10	58	37.3	6
13 24.4	13	63	40.8	13 32.0	13	62	39.7	13 39.4	12	60	38.7	13 50.0	11	58	37.2	7
12 46.6	14	63	40.7	12 55.0	14	62	39.7	13 03.2	13	60	38.6	13 15.0	13	58	37.1	8
12 08.9	16	63	40.6	12 18.1	15	61	39.6	12 27.0	15	60	38.6	12 40.1	14	58	37.0	9
11 31.2	17	63	40.5	11 41.2	16	61	39.5	11 50.9	16	60	38.5	12 05.2	16	58	36.9	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	29 00.0	1.0 01	180.0	28 00.0	1.0 01	180.0	26 30.0	1.0 01	180.0	25 30.0	1.0 01	180.0	24 30.0	1.0 01	180.0	23 30.0	1.0 01	180.0	22 30.0	1.0 01	180.0	21 00.0	1.0 01	180.0	00
1	28 59.6	1.0 02	179.2	27 59.6	1.0 02	179.2	26 29.6	1.0 02	179.3	25 29.6	1.0 02	179.3	24 29.6	1.0 02	179.3	23 29.7	1.0 02	179.3	22 29.7	1.0 02	179.3	20 59.7	1.0 02	179.4	1
2	28 58.4	1.0 03	178.4	27 58.4	1.0 03	178.5	26 28.5	1.0 03	178.5	25 28.5	1.0 03	178.6	24 28.6	1.0 03	178.6	23 28.6	1.0 03	178.6	22 28.7	1.0 03	178.7	20 58.7	1.0 03	178.7	2
3	28 56.4	1.0 05	177.6	27 56.5	1.0 05	177.7	26 26.6	1.0 04	177.8	25 26.7	1.0 04	177.8	24 26.8	1.0 04	177.9	23 26.9	1.0 04	178.0	22 27.0	1.0 04	178.0	20 57.1	1.0 04	178.1	3
4	28 53.6	1.0 06	176.8	27 53.8	1.0 06	176.9	26 24.0	1.0 06	177.0	25 24.2	1.0 05	177.1	24 24.3	1.0 05	177.2	23 24.5	1.0 05	177.3	22 24.7	1.0 05	177.4	20 54.9	1.0 05	177.5	4
05	28 50.0	1.0 07	176.0	27 50.2	1.0 07	176.1	26 20.7	1.0 07	176.3	25 20.9	1.0 07	176.4	24 21.2	1.0 06	176.5	23 21.4	1.0 06	176.6	22 21.7	1.0 06	176.7	20 52.0	1.0 06	176.9	05
6	28 45.6	99 09	175.2	27 46.0	99 08	175.4	26 16.5	99 08	175.6	25 16.9	99 08	175.7	24 17.3	99 08	175.8	23 17.7	99 07	175.9	22 18.0	99 07	176.1	20 48.6	99 07	176.2	6
7	28 40.4	99 10	174.5	27 40.9	99 10	174.6	26 11.7	99 09	174.8	25 12.2	99 09	175.0	24 12.7	99 09	175.1	23 13.2	99 09	175.3	22 13.7	99 08	175.4	20 44.4	99 08	175.6	7
8	28 34.4	99 11	173.7	27 35.1	99 11	173.9	26 06.1	99 11	174.1	25 06.8	99 10	174.3	24 07.4	99 10	174.4	23 08.1	99 10	174.6	22 08.7	99 09	174.8	20 39.7	99 09	175.0	8
9	28 27.6	99 13	172.9	27 28.5	99 12	173.1	25 59.8	99 12	173.4	25 00.6	99 11	173.6	24 01.5	99 11	173.7	23 02.3	99 11	173.9	22 03.1	99 10	174.1	20 34.3	99 10	174.4	9
10	28 20.1	98 14	172.1	27 21.1	98 14	172.3	25 52.7	98 13	172.7	24 53.8	98 13	172.9	23 54.8	98 12	173.1	22 55.8	98 12	173.3	21 56.8	98 12	173.5	20 28.3	98 11	173.7	10
1	28 11.7	98 15	171.4	27 13.0	98 15	171.6	25 45.0	98 14	171.9	24 46.2	98 14	172.2	23 47.5	98 13	172.4	22 48.7	98 13	172.6	21 49.9	98 13	172.8	20 21.7	98 12	173.1	1
2	28 02.6	97 16	170.6	27 04.2	97 16	170.8	25 36.5	97 15	171.2	24 38.0	98 15	171.5	23 39.4	98 15	171.7	22 40.9	98 14	171.9	21 42.3	98 14	172.2	20 14.4	98 13	172.5	2
3	27 52.8	97 18	169.8	26 54.6	97 17	170.1	25 27.3	97 17	170.5	24 29.0	97 16	170.8	23 30.7	97 16	171.0	22 32.4	97 15	171.3	21 34.1	97 15	171.5	20 06.6	97 14	171.9	3
4	27 42.1	96 19	169.1	26 44.2	97 18	169.4	25 17.3	97 18	169.8	24 19.4	97 17	170.1	23 21.4	97 17	170.4	22 23.3	97 16	170.6	21 25.3	97 16	170.9	19 58.1	97 15	171.3	4
15	27 30.8	96 20	168.3	26 33.2	96 20	168.6	25 06.7	96 19	169.1	24 09.0	96 18	169.4	23 11.3	96 18	169.7	22 13.6	96 17	170.0	21 15.8	96 17	170.3	19 49.0	96 16	170.7	15
6	27 18.6	95 21	167.6	26 21.4	95 21	167.9	24 55.4	96 20	168.4	23 58.0	96 19	168.7	23 00.6	96 19	169.0	22 03.1	96 18	169.3	21 05.7	96 18	169.6	19 39.4	96 17	170.1	6
7	27 05.8	95 23	166.8	26 08.9	95 22	167.2	24 43.4	95 21	167.7	23 46.3	95 21	168.0	22 49.2	95 20	168.4	21 52.1	95 19	168.7	20 54.9	95 19	169.0	19 29.1	95 18	169.5	7
8	26 52.2	94 24	166.1	25 55.6	94 23	166.4	24 30.7	94 22	167.0	23 34.0	95 22	167.4	22 37.2	95 21	167.7	21 40.4	95 21	168.1	20 43.6	95 20	168.4	19 18.2	95 19	168.9	8
9	26 37.9	94 25	165.3	25 41.7	94 24	165.7	24 17.3	94 23	166.3	23 21.0	94 23	166.7	22 24.6	94 22	167.1	21 28.1	94 22	167.4	20 31.6	94 21	167.8	19 06.8	94 20	168.3	9
20	26 22.9	93 26	164.6	25 27.1	93 26	165.0	24 03.2	93 25	165.6	23 07.3	93 24	166.0	22 11.3	93 23	166.4	21 15.2	94 23	166.8	20 19.0	94 22	167.2	18 54.8	94 21	167.7	20
1	26 07.2	92 27	163.9	25 11.8	92 27	164.3	23 48.5	93 26	165.0	22 53.0	93 25	165.4	21 57.3	93 24	165.8	21 01.6	93 24	166.2	20 05.9	93 23	166.6	18 42.2	93 22	167.2	1
2	25 50.7	92 28	163.2	24 55.8	92 28	163.6	23 33.2	92 27	164.3	22 38.0	92 26	164.7	21 42.8	92 25	165.1	20 47.5	92 25	165.6	19 52.1	92 24	166.0	18 29.0	92 23	166.6	2
3	25 33.7	91 30	162.5	24 39.1	91 29	163.0	23 17.1	91 28	163.6	22 22.4	91 27	164.1	21 27.6	91 26	164.5	20 32.7	92 26	164.9	19 37.8	92 25	165.4	18 15.3	92 24	166.0	3
4	25 15.9	90 31	161.8	24 21.8	90 30	162.3	23 00.5	90 29	163.0	22 06.2	91 28	163.4	21 11.8	91 27	163.9	20 17.4	91 27	164.3	19 22.9	91 26	164.8	18 01.0	91 25	165.4	4
25	24 57.4	89 32	161.1	24 03.8	89 31	161.6	22 43.2	90 30	162.3	21 49.4	90 29	162.8	20 55.4	90 28	163.3	20 01.4	90 28	163.7	19 07.4	90 27	164.2	17 46.1	90 26	164.9	25
6	24 38.3	88 33	160.4	23 45.2	89 32	160.9	22 25.3	89 31	161.7	21 31.9	89 30	162.2	20 38.5	89 29	162.7	19 44.9	89 28	163.1	18 51.3	89 28	163.6	17 30.7	90 27	164.3	6
7	24 18.6	88 34	159.8	23 26.0	88 33	160.3	22 06.8	88 32	161.1	21 13.9	88 31	161.6	20 20.9	88 30	162.1	19 27.8	89 29	162.6	18 34.7	89 29	163.0	17 14.8	89 27	163.8	7
8	23 58.2	87 35	159.1	23 06.1	87 34	159.6	21 47.7	87 33	160.4	20 55.3	87 32	160.9	20 02.8	88 31	161.5	19 10.2	88 30	162.0	18 17.5	88 30	162.5	16 58.3	88 28	163.2	8
9	23 37.2	86 36	158.4	22 45.6	86 35	159.0	21 28.0	86 34	159.8	20 36.1	87 33	160.3	19 44.1	87 32	160.9	18 52.0	87 31	161.4	17 59.8	87 30	161.9	16 41.4	87 29	162.7	9
30	23 15.6	85 37	157.8	22 24.5	85 36	158.4	21 07.7	86 35	159.2	20 16.3	86 34	159.7	19 24.8	86 33	160.3	18 33.2	86 32	160.8	17 41.5	86 31	161.4	16 23.9	86 30	162.2	30
1	22 53.4	84 38	157.1	22 02.9	84 37	157.7	20 46.8	85 36	158.6	19 55.9	85 35	159.2	19 05.0	85 34	159.7	18 13.9	85 33	160.3	17 22.8	85 32	160.8	16 05.9	86 31	161.6	1
2	22 30.6	83 39	156.5	21 40.6	83 38	157.1	20 25.4	84 37	158.0	19 35.0	84 36	158.6	18 44.6	84 35	159.1	17 54.1	84 34	159.7	17 03.5	84 33	160.3	15 47.3	85 32	161.1	2
3	22 07.2	82 40	155.9	21 17.8	83 39	156.5	20 03.4	83 38	157.4	19 13.6	83 37	158.0	18 23.7	83 36	158.6	17 33.7	83 35	159.2	16 43.6	84 34	159.7	15 28.3	84 32	160.6	3
4	21 43.3	81 41	155.3	20 54.4	82 40	155.9	19 40.8	82 38	156.8	18 51.6	82 38	157.4	18 02.3	82 37	158.0	17 12.9	82 36	158.6	16 23.3	83 35	159.2	15 08.8	83 33	160.1	4
35	21 18.8	80 42	154.7	20 30.5	81 41	155.3	19 17.8	81 39	156.3	18 29.1	81 38	156.9	17 40.4	81 37	157.5	16 51.5	82 36	158.1	16 02.5	82 36	158.7	14 48.9	82 34	159.6	35
6	20 53.7	79 43	154.1	20 06.0	80 42	154.7	18 54.2	80 40	155.7	18 06.1	80 39	156.3	17 17.9	80 38	156.9	16 29.6	81 37	157.6	15 41.2	81 36	158.2	14 28.4	81 35	159.1	6
7	20 28.1	78 44	153.5	19 41.0	79 43	154.2	18 30.0	79 41	155.1	17 42.6	79 40	155.8	16 55.0	79 39	156.4	16 07.3	80 38	157.0	15 19.4	80 37	157.7	14 07.5	80 36	158.6	7
8	20 02.0	77 44	152.9	19 15.5	78 43	153.6	18 05.4	78 42	154.6	17 18.5	78 41	155.2	16 31.5	78 40	155.9	15 44.4	79 39	156.5	14 57.2	79 38	157.2	13 46.1	79 36	158.1	8
9	19 35.4	76 45	152.4	18 49.4	77 44	153.0	17 40.3	77 43	154.0	16 54.0	77 42	154.7	16 07.6	77 41	155.4	15 21.1	78 40	156.0	14 34.5	78 39	156.7	13 24.3	78 37	157.6	9
40	19 08.2	75 46	151.8	18 22.9	76 45	152.5	17 14.7	76 43	153.5	16 29.0	76 42	154.2	15 43.2	76 41	154.9	14 57.3	77 40	155.5	14 11.3	77 39	156.2	13 02.1	77 38	157.2	40
1	18 40.6	74 47	151.2	17 55.9	75 46	151.9	16 48.6	75 44	153.0	16 03.6	75 43	153.7	15 18.4	75 42	154.4	14 33.1	76 41	155.0	13 47.7	76 40	155.7	12 39.4	76 39	156.7	1
2	18 12.5	73 48	150.7	17 28.4	74 47	151.4	16 22.1	74 45	152.5	15 37.6	74 44	153.2	14 53.1	74 43	153.9	14 08.4	75 42	154.6	13 23.6	75 41	155.2	12 16.3	75 39	156.3	2
3	17 43.9	72 48	150.2	17 00.5	72 47	150.9	15 55.1	73 46	152.0	15 11.3	73 45	152.7	14 27.4	73 44	153.4	13 43.3	73 43	154.1	12 59.2	74 42	154.8	11 52.7	74 40	155.8	3
4	17 14.8	71 49	149.7	16 32.0	71 48	150.4	15 27.6	72 46	151.5	14 44.5	72 45	152.2	14 01.2	72 44	152.9	13 17.8	72 43	153.6	12 34.3	73 42	154.3	11 28.8	73 41	155.4	4
45	16 45.3	70 50	149.1	16 03.2	70 49	149.9	14 59.7	71 47	151.0	14 17.2	71 46	151.7	13 34.6	71 45	152.4	12 51.8	71 44	153.2	12 08.9	72 43	153.9	11 04.4	72 41	154.9	45
6	16 15.4	69 51	148.6	15 33.9	69 50	149.4	14 31.4	70 48	150.5	13 49.5	70 47	151.2	13 07.5	70 46	152.0	12 25.4	70 45	152.7	11 43.2	70 44	153.4	10 39.7	71 42	154.5	6
7	15 45.0	68 51	148.1	15 04.1	68 50	148.9	14 02.6	69 49	150.0	13 21.4	69 47	150.8	12 40.1	69 46	151.5	11 58.7	69 45	152.3	11 17.1	69 44	153.0	10 14.6	70 42	154.1	7
8	15 14.2	67 52	147.7	14 34.0	67 51	148.4	13 33.5	67 49	149.6	12 52.9	68 48	150.3	12 12.3	68 47	151.1	11 31.5	68 46	151.8	10 50.6	68 45	152.6	9 49.1	69 43	153.7	8
9	14 43.0	66 53	147.2	14 03.5	66 52	148.0	13 03.9	66 50	149.1	12 24.1	67 49	149.9	11 44.1	67 48	150.6	11 03.9	67 47	151.4	10 23.7	67 45	152.2	9 23.2	67 44	153.3	9
50	14 11.4	65 53	146.7	13 32.5	65 52	147.5	12 34.0	65 51	148.7	11 54.8	65 49	149.4	11 15.5	66 48	150.2	10 36.0	66 47	151.0	9 56.5	66 46	151.7	8 57.0	66 44	152.9	50
1	13 39.3	64 54	146.3	13 01.2	64 53	147.0	12 03.6	64 51	148.2	11 25.1	64 50	149.0	10 46.5	65 49	149.8	10 07.7	65 48	150.6	9 28.8	65 47	151.3	8 30.4	65 45	152.5	1
2	13 07.0	62 55	145.8	12 29.5	63 53	146.6	11 32.9	63 52	147.8	10 55.1	63 51	148.6	10 17.1	63 50	149.4	9 39.1	64 48	150.2	9 00.9	64 47	150.9	8 03.4	64 45	152.1	2
3	12 34.2	61 55	145.4	11 57.4	61 54	146.2	11 01.9	62 52	147.4	10 24.7	62 51	148.2	9 47.4	62 50	149.0	9 10.0	62 49	149.8	8 32.6	63 48	150.6	7 36.1	63 46	151.7	3
4	12 01.1	60 56	144.9	11 24.9	60 55	145.7	10 30.4	61 53	147.0	9 54.0	61 52	147.8	9 17.4	61 51	148.6	8 40.7	61 49	149.4	8 03.9	61 48	150.2	7 08.5	62 47	151.4	4
55	11 27.6	59 56	144.5	10 52.1	59 55	145.3	9 58.7	60 54	146.6	9 22.9	60 52	147.4	8 47.0	60 51	148.2	8 11.0	60 50	149.0	7 34.9	60 49	149.8	6 40.6	60 47	151.0	55
6	10 53.8	58 57	144.1	10 19.0	58 56	144.9	9 26.6	58 54	146.2	8 51.5	59 53	147.0	8 16.3	59 52	147.8	7 41.0	59 51	148.6	7 05.6	59 49	149.4	6 12.3	59 48	150.6	6
7	10 19.6	57 57	143.7	9 45.5	57 56	144.5	8 54.1	57 55	145.8	8 19.7	57 53	146.6	7 45.2	58 52	147.4	7 10.6	58 51	148.3	6 36.0	58 50	149.1	5 43.8	58 48	150.3	7
8	9 45.1	56 58	143.3	9 11.7	56 57	144.1	8 21.4	56 55	145.4	7 47.7	56 54	146.2	7 13.9	56 53	147.1	6 40.0	57 52	147.9	6 06.0	57 50	148.7	5 14.9	57 49	150.0	8
9	9 10.3	54 59	142.9	8 37.6	55 57	143.8	7 48.3	55 56	145.0	7 15.3	55 54	145.9	6 42.2	55 53	146.7	6 09.0	55 52	147.5	5 35.8	55 51	148.4				9
60	8 35.2	53 59	142.5	8 03.2	54 58	143.4	7 14.9	54 56	144.7	6 42.6	54 55	145.5	6 10.2	54 54	146.4	5 37.8	54 53	147.2	5 05.2	54 51	148.0				60
1	7 59.8	52 60	142.2	7 28.5	52 58	143.0	6 41.3	53 57	144.3	6 09.7	53 55	145.2	5 38.0	53 54	146.0	5 06.2	53 53	146.9							1
2	7 24.1	51 60	141.8	6 53.5	51 59	142.7	6 07.3	51 57	144.0	5 36.4	52 56	144.8	5 05.4	52 54	145.7										2
3	6 48.1	50 60	141.4	6 18.2	50 59	142.3	5 33.1	50 58	143.6	5 02.9	50 56	144.5													3
4	6 11.9	49 61	141.1	5 42.6	49 60	142.0																			4
65	5 35.3	48 61	140.8	5 06.8	48 60	141.6																			65

DECLINATION SAME NAME AS LATITUDE

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	10 02.9	19 68	44.9	10 14.5	19 67	43.9	10 31.5	19 65	42.4	10 42.7	18 64	41.4	10 53.6	18 62	40.4	11 04.4	18 61	39.4	11 14.9	17 60	38.4	11 30.4	17 58	36.9	91
2	9 22.0	21 68	44.7	9 34.4	20 67	43.7	9 52.5	20 65	42.2	10 04.4	20 64	41.2	10 16.1	19 62	40.2	10 27.7	19 61	39.2	10 39.0	19 60	38.2	10 55.7	18 58	36.7	2
3	8 41.3	22 68	44.6	8 54.4	22 66	43.6	9 13.6	21 65	42.1	9 26.3	21 63	41.1	9 38.7	21 62	40.1	9 51.1	20 61	39.1	10 03.2	20 60	38.1	10 21.0	20 58	36.6	3
4	8 00.7	23 68	44.4	8 14.5	23 66	43.4	8 34.8	22 64	42.0	8 48.2	22 63	41.0	9 01.5	22 62	40.0	9 14.5	22 61	39.0	9 27.5	21 59	38.0	9 46.5	21 57	36.5	4
95	7 20.2	24 67	44.2	7 34.7	24 66	43.3	7 56.1	24 64	41.8	8 10.3	23 63	40.8	8 24.3	23 62	39.8	8 38.1	23 60	38.8	8 51.8	23 59	37.9	9 12.1	22 57	36.4	95
6	6 39.8	25 67	44.1	6 55.0	25 66	43.1	7 17.6	25 64	41.6	7 32.5	25 63	40.7	7 47.2	24 62	39.7	8 01.8	24 60	38.7	8 16.3	24 59	37.7	8 37.8	24 57	36.2	6
7	5 59.6	27 67	43.9	6 15.5	26 66	42.9	6 39.1	26 64	41.5	6 54.8	26 63	40.5	7 10.3	26 61	39.5	7 25.7	26 60	38.5	7 40.9	25 59	37.6	8 03.6	25 57	36.1	7
8	5 19.5	28 67	43.7	5 36.1	28 66	42.7	6 00.8	27 64	41.3	6 17.2	27 62	40.3	6 33.5	27 61	39.3	6 49.6	27 60	38.4	7 05.6	27 59	37.4	7 29.5	26 57	35.9	8
9							5 22.7	29 64	41.1	5 39.8	28 62	40.1	5 56.8	28 61	39.2	6 13.7	28 60	38.2	6 30.5	28 58	37.2	6 55.5	28 56	35.8	9
100										5 02.5	30 62	39.9	5 20.2	30 61	39.0	5 37.9	29 59	38.0	5 55.5	29 58	37.1	6 21.7	29 56	35.6	100
1																5 02.3	31 59	37.8	5 20.6	31 58	36.9	5 48.0	30 56	35.4	1
2																						5 14.5	32 56	35.3	2

DECLINATION SAME NAME AS LATITUDE

A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
0	50 30.0	1.0 01	00.0	50 00.0	1.0 01	00.0	49 00.0	1.0 01	00.0	48 30.0	1.0 01	00.0	48 00.0	1.0 01	00.0	47 30.0	1.0 01	00.0	46 00.0	1.0 01	00.0	45 30.0	1.0 01	00.0	00
1	50 29.5	1.0 02	00.9	49 59.5	1.0 02	00.9	48 59.6	1.0 02	00.9	48 29.6	1.0 02	00.8	47 59.6	1.0 02	00.8	47 29.6	1.0 02	00.8	45 59.6	1.0 02	00.7	45 29.6	1.0 02	00.7	1
2	50 28.2	1.0 04	01.8	49 58.2	1.0 04	01.8	48 58.3	1.0 04	01.7	48 28.3	1.0 04	01.7	47 58.4	1.0 03	01.6	47 28.4	1.0 03	01.6	45 58.5	1.0 03	01.5	45 28.5	1.0 03	01.4	2
3	50 25.8	1.0 05	02.7	49 55.9	1.0 05	02.7	48 56.1	1.0 05	02.6	48 26.2	1.0 05	02.5	47 56.3	1.0 05	02.4	47 26.4	1.0 05	02.4	45 56.6	1.0 04	02.2	45 26.7	1.0 04	02.2	3
4	50 22.6	99 07	03.6	49 52.8	99 07	03.6	48 53.1	99 06	03.4	48 23.3	99 06	03.3	47 53.4	99 06	03.2	47 23.6	1.0 06	03.2	45 54.0	1.0 06	03.0	45 24.1	1.0 05	02.9	4
5	50 18.5	99 08	04.5	49 48.7	99 08	04.4	48 49.2	99 08	04.2	48 19.5	99 08	04.1	47 49.7	99 08	04.1	47 20.0	99 07	04.0	45 50.6	99 07	03.7	45 20.9	99 07	03.6	05
6	50 13.4	99 10	05.4	49 43.8	99 10	05.3	48 44.5	99 09	05.1	48 14.9	99 09	05.0	47 45.2	99 09	04.9	47 15.6	99 09	04.7	45 46.5	99 08	04.4	45 16.9	99 08	04.3	6
7	50 07.5	98 11	06.3	49 38.0	98 11	06.2	48 39.0	98 11	05.9	48 09.5	98 10	05.8	47 39.9	98 10	05.7	47 10.4	98 10	05.5	45 41.7	99 09	05.2	45 12.1	99 09	05.0	7
8	50 00.6	98 13	07.2	49 31.3	98 13	07.1	48 32.6	98 12	06.8	48 03.2	98 12	06.6	47 33.8	98 12	06.4	47 04.4	98 11	06.3	45 36.1	98 11	05.9	45 06.7	98 10	05.7	8
9	49 52.9	97 14	08.1	49 23.7	97 14	07.9	48 25.4	97 13	07.6	47 56.1	97 13	07.4	47 26.9	97 13	07.2	46 57.7	98 13	07.1	45 29.8	98 12	06.6	45 00.5	98 11	06.4	9
10	49 44.3	97 16	09.0	49 15.3	97 15	08.8	48 17.3	97 15	08.4	47 48.3	97 14	08.2	47 19.2	97 14	08.0	46 50.1	97 14	07.8	45 22.8	97 13	07.3	44 53.7	97 13	07.1	10
1	49 34.8	96 17	09.8	49 06.1	96 17	09.6	48 08.4	96 16	09.2	47 39.6	96 16	09.0	47 10.7	96 15	08.8	46 41.8	96 15	08.6	45 15.1	97 14	08.0	44 46.1	97 14	07.8	1
2	49 24.5	95 19	10.7	48 56.0	95 18	10.5	47 58.8	95 17	10.0	47 30.1	95 17	09.8	47 01.5	96 17	09.6	46 32.8	96 16	09.3	45 06.6	96 15	08.7	44 37.9	96 15	08.5	2
3	49 13.3	94 20	11.5	48 45.0	94 20	11.3	47 48.3	95 19	10.8	47 19.9	95 18	10.6	46 51.5	95 18	10.3	46 23.0	95 18	10.1	44 57.5	95 16	09.4	44 28.9	95 16	09.2	3
4	49 01.3	93 21	12.4	48 33.3	94 21	12.1	47 37.1	94 20	11.6	47 08.9	94 20	11.3	46 40.7	94 19	11.1	46 12.5	94 19	10.8	44 47.7	94 18	10.1	44 19.3	95 17	09.9	4
15	48 48.5	93 23	13.2	48 20.7	93 22	12.9	47 25.1	93 21	12.4	46 57.2	93 21	12.1	46 29.2	93 20	11.8	46 01.3	93 20	11.6	44 37.1	94 19	10.8	44 09.0	94 18	10.5	15
6	48 34.9	92 24	14.0	48 07.4	92 24	13.7	47 12.3	92 23	13.1	46 44.7	92 22	12.8	46 17.0	92 22	12.5	45 49.3	92 21	12.3	44 25.9	93 20	11.5	43 58.1	93 19	11.2	6
7	48 20.5	91 25	14.8	47 53.3	91 25	14.5	46 58.8	91 24	13.9	46 31.4	91 23	13.6	46 04.0	91 23	13.3	45 36.6	91 22	13.0	44 14.1	92 21	12.1	43 46.5	92 20	11.9	7
8	48 05.3	89 27	15.6	47 38.4	90 26	15.3	46 44.5	90 25	14.6	46 17.5	90 24	14.3	45 50.4	90 24	14.0	45 23.3	91 23	13.7	44 01.6	91 22	12.8	43 34.3	91 21	12.5	8
9	47 49.3	88 28	16.4	47 22.8	89 27	16.0	46 29.5	89 26	15.3	46 02.8	89 26	15.0	45 36.1	89 25	14.7	45 09.2	90 25	14.4	43 48.4	90 23	13.4	43 21.4	90 22	13.1	9
20	47 32.6	87 29	17.1	47 06.5	87 28	16.8	46 13.9	88 27	16.1	45 47.5	88 27	15.7	45 21.0	88 26	15.4	44 54.5	88 26	15.0	43 34.7	89 24	14.1	43 07.9	89 23	13.8	20
1	47 15.2	86 30	17.9	46 49.4	86 30	17.5	45 57.5	87 28	16.8	45 31.4	87 28	16.4	45 05.3	87 27	16.0	44 39.2	87 27	15.7	43 20.3	88 25	14.7	42 53.8	88 24	14.4	1
2	46 57.1	85 31	18.6	46 31.6	85 31	18.2	45 40.5	86 30	17.4	45 14.8	86 29	17.1	44 49.0	86 28	16.7	44 23.1	86 28	16.4	43 05.2	87 26	15.3	42 39.2	87 25	15.0	2
3	46 38.3	84 32	19.3	46 13.2	84 32	18.9	45 22.8	84 31	18.1	44 57.4	85 30	17.7	44 32.0	85 29	17.4	44 06.5	85 29	17.0	42 49.6	86 27	15.9	42 23.9	86 26	15.6	3
4	46 18.8	82 34	20.0	45 54.1	83 33	19.6	45 04.4	83 32	18.8	44 39.4	83 31	18.4	44 14.4	84 30	18.0	43 49.3	84 30	17.6	42 33.4	85 28	16.5	42 08.0	85 27	16.2	4
25	45 58.7	81 35	20.7	45 34.3	81 34	20.3	44 45.4	82 33	19.4	44 20.8	82 32	19.0	43 56.2	82 31	18.6	43 31.4	83 31	18.3	42 16.7	83 29	17.1	41 51.6	84 28	16.7	25
6	45 37.9	80 36	21.3	45 14.0	80 35	20.9	44 25.8	81 34	20.1	44 01.6	81 33	19.7	43 37.3	81 32	19.3	43 13.0	81 32	18.9	41 59.4	82 30	17.7	41 34.7	82 29	17.3	6
7	45 16.5	78 37	22.0	44 53.0	79 36	21.6	44 05.6	79 35	20.7	43 41.8	80 34	20.3	43 17.9	80 33	19.9	42 54.0	80 33	19.4	41 41.5	81 31	18.2	41 17.2	81 30	17.9	7
8	44 54.5	77 38	22.6	44 31.4	77 37	22.2	43 44.9	78 36	21.3	43 21.5	78 35	20.9	42 58.0	78 34	20.5	42 34.4	79 34	20.0	41 23.1	80 32	18.8	40 59.1	80 31	18.4	8
9	44 31.9	75 39	23.3	44 09.2	76 38	22.8	43 23.5	76 36	21.9	43 00.5	77 36	21.5	42 37.4	77 35	21.0	42 14.3	77 34	20.6	41 04.1	78 32	19.3	40 40.6	79 32	18.9	9
30	44 08.7	74 40	23.9	43 46.5	74 39	23.4	43 01.6	75 37	22.5	42 39.1	75 37	22.0	42 16.4	76 36	21.6	41 53.6	76 35	21.2	40 44.7	77 33	19.9	40 21.5	77 33	19.5	30
1	43 45.0	73 40	24.5	43 23.2	73 40	24.0	42 39.2	74 38	23.1	42 17.0	74 38	22.6	41 54.8	74 37	22.1	41 32.4	75 36	21.7	40 24.7	76 34	20.4	40 02.0	76 33	20.0	1
2	43 20.7	71 41	25.0	42 59.3	71 41	24.6	42 16.2	72 39	23.6	41 54.5	73 38	23.1	41 32.7	73 38	22.7	41 10.7	73 37	22.2	40 04.3	74 35	20.9	39 42.0	75 34	20.5	2
3	42 55.9	70 42	25.6	42 35.0	70 41	25.1	41 52.8	71 40	24.1	41 31.5	71 39	23.7	41 10.1	72 38	23.2	40 48.6	72 38	22.7	39 43.4	73 36	21.4	39 21.5	73 35	20.9	3
4	42 30.6	68 43	26.1	42 10.2	68 42	25.6	41 28.8	69 41	24.7	41 08.0	70 40	24.2	40 47.0	70 39	23.7	40 25.9	70 38	23.2	39 22.0	72 36	21.9	39 00.5	72 36	21.4	4
35	42 04.9	67 44	26.7	41 44.8	67 43	26.2	41 04.4	68 42	25.2	40 44.0	68 41	24.7	40 23.5	69 40	24.2	40 02.8	69 39	23.7	39 00.2	70 37	22.3	38 39.1	70 36	21.9	35
6	41 38.6	65 44	27.2	41 19.1	65 44	26.7	40 39.5	66 42	25.7	40 19.6	67 41	25.2	39 59.5	67 41	24.7	39 39.3	68 40	24.2	38 38.0	69 38	22.8	38 17.3	69 37	22.3	6
7	41 11.9	63 45	27.7	40 52.8	64 44	27.2	40 14.2	65 43	26.2	39 54.7	65 42	25.7	39 35.0	66 41	25.2	39 15.3	66 41	24.7	38 15.3	67 38	23.2	37 55.1	68 38	22.8	7
8	40 44.8	62 46	28.2	40 26.1	62 45	27.6	39 48.4	63 44	26.6	39 29.4	64 43	26.1	39 10.2	64 42	25.6	38 50.9	65 41	25.1	37 52.2	66 39	23.7	37 32.4	66 38	23.2	8
9	40 17.2	60 47	28.6	39 59.1	61 46	28.1	39 22.3	62 44	27.1	39 03.7	62 44	26.6	38 44.9	63 43	26.1	38 26.1	63 42	25.6	37 28.7	64 40	24.1	37 09.4	65 39	23.6	9
40	39 49.3	59 47	29.1	39 31.5	59 46	28.6	38 55.7	60 45	27.5	38 37.5	61 44	27.0	38 19.3	61 43	26.5	38 00.9	62 43	26.0	37 04.9	63 40	24.5	36 46.0	63 40	24.0	40
1	39 20.9	57 48	29.5	39 03.7	58 47	29.0	38 28.7	59 46	27.9	38 11.0	59 45	27.4	37 53.2	60 44	26.9	37 35.3	60 43	26.4	36 40.7	61 41	24.9	36 22.2	62 40	24.4	1
2	38 52.2	56 49	29.9	38 35.4	56 48	29.4	38 01.4	57 46	28.4	37 44.1	58 45	27.8	37 26.8	58 45	27.3	37 09.3	59 44	26.8	36 16.1	60 42	25.3	35 58.1	60 41	24.8	2
3	38 23.1	54 49	30.3	38 06.7	55 48	29.8	37 33.6	56 47	28.8	37 16.9	56 46	28.2	37 00.0	57 45	27.7	36 43.0	57 44	27.2	35 51.1	58 42	25.7	35 33.6	59 41	25.2	3
4	37 53.6	53 50	30.7	37 37.8	53 49	30.2	37 05.6	54 47	29.1	36 49.3	55 47	28.6	36 32.9	55 46	28.1	36 16.3	55 45	27.6	35 25.8	57 43	26.0	35 08.7	57 42	25.5	4
45	37 23.8	51 50	31.1	37 08.4	52 49	30.6	36 37.2	53 48	29.5	36 21.4	53 47	29.0	36 05.4	53 46	28.5	35 49.3	54 46	27.9	35 00.2	55 43	26.4	34 43.6	56 42	25.9	45
6	36 53.7	50 51	31.5	36 38.8	50 50	30.9	36 08.5	51 48	29.9	35 53.1	51 48	29.3	35 37.6	52 47	28.8	35 22.0	52 46	28.3	34 34.3	54 44	26.7	34 18.1	54 43	26.2	6
7	36 23.3	48 51	31.8	36 08.8	48 50	31.3	35 39.5	49 49	30.2	35 24.6	50 48	29.7	35 09.6	50 47	29.2	34 54.4	51 47	28.6	34 08.1	52 44	27.1	33 52.4	53 43	26.6	7
8	35 52.6	46 52	32.2	35 38.6	47 51	31.6	35 10.2	48 49	30.6	34 55.7	48 49	30.0	34 41.2	49 48	29.5	34 26.5	49 47	29.0	33 41.6	51 45	27.4	33 26.3	51 44	26.9	8
9	35 21.6	45 52	32.5	35 08.0	45 51	32.0	34 40.6	46 50	30.9	34 26.6	47 49	30.3	34 12.5	47 48	29.8	33 58.3	48 47	29.3	33 14.8	49 45	27.7	33 00.0	49 44	27.2	9
50	34 50.3	43 53	32.8	34 37.2	44 52	32.3	34 10.7	45 50	31.2	33 57.2	45 49	30.6	33 43.6	46 49	30.1	33 29.8	46 48	29.6	32 47.7	47 46	28.0	32 33.4	48 45	27.5	50
1	34 18.7	42 53	33.1	34 06.2	42 52	32.6	33 40.5	43 51	31.5	33 27.5	44 50	30.9	33 14.4	44 49	30.4	33 01.1	45 48	29.9	32 20.4	46 46	28.3	32 06.5	46 45	27.8	1
2	33 47.0	40 53	33.4	33 34.8	41 53	32.9	33 10.2	42 51	31.8	32 57.6	42 50	31.2	32 44.9	43 49	30.7	32 32.1	43 49	30.1	31 52.8	44 46	28.6	31 39.4	45 46	28.0	2
3	33 14.9	39 54	33.7	33 03.3	39 53	33.1	32 39.5	40 51	32.0	32 27.4	41 51	31.5	32 15.2	41 50	31.0	32 02.9	41 49	30.4	31 25.0	43 47	28.8	31 12.1	43 46	28.3	3
4	32 42.7	37 54	33.9	32 31.5	38 53	33.4	32 08.7	38 52	32.3	31 57.1	39 51	31.8	31 45.3	39 50	31.2	31 33.4	40 49	30.7	30 56.9	41 47	29.1	30 44.5	42 46	28.5	4
55	32 10.2	36 54	34.2	31 59.5	36 54	33.6	31 37.6	37 52	32.5	31 26.4	37 51	32.0	31 15.2	38 51	31.5	31 03.7	38 50	30.9	30 28.6	40 47	29.3	30 16.7	40 47	28.8	55
6	31 37.5	34 55	34.4	31 27.3	34 54	33.9	31 06.3	35 52	32.8	30 55.6	36 52	32.2	30 44.8	36 51	31.7	30 33.8	37 50	31.2	30 00.2	38 48	29.5	29 48.7	39 47	29.0	6
7	31 04.7	32 55	34.7	30 54.9	33 54	34.1	30 34.8	34 53	33.0	30 24.6	34 52	32.5	30 14.3	35 51	31.9	30 03.8	35 50	31.4	29 31.5	37 48	29.8	29 20.5	37 47	29.2	7
8	30 31.6	31 55	34.9	30 22.3	31 55	34.3	30 03.2	32 53	33.2	29 53.4	33 52	32.7	29 43.5	33 52	32.1	29 33.5	34 51	31.6	29 02.6	35 48	30.0	28 52.1	36 48	29.4	8
9	29 58.4	29 56	35.1	29 49.5	30 55	34.5	29 31.3	31 53	33.4	29 22.0	31 53	32.9	29 12.6	32 52	32.3	29 03.1	32 51	31.8	28 33.6	33 49	30.2	28 23.5	34 48	29.6	9
60	29 25.0	28 56	35.3	29 16.6	28 55	34.7	28 59.3	29 54	33.6	28 50.5	30 53	33.1	28 41.5	30 52	32.5	28 32.4	31 51	32.0	28 04.4	32 49	30.4	27 54.8	32 48	29.8	60
1	28 51.5	26 56	35.4	28 43.5	27 55	34.9	28 27.2	28 54	33.8	28 18.8	28 53	33.3	28 10.3	29 52	32.7	28 01.7	29 52	32.2	27 35.0	30 49	30.5	27 25.9	31 48	30.0	1
2	28 17.8	25 56	35.6	28 10.3	25 56	35.1	27 54.9	26 54	34.0	27 46.9	27 53	33.4	27 38.9	27 53	32.9	27 30.7	27 52	32.3	27 05.5	29 49	30.7	26 56.8	29 49	30.2	2
3	27 44.0	23 57	35.8	27 36.9	24 56	35.2	27 22.4	25 54	34.1	27 15.0	25 54	33.6	27 07.4	25 53	33.0	26 59.7	26 52	32.5	26 35.8	27 50	30.9	26 27.6	28 49	30.3	3
4	27 10.1	22 57	35.9	27 03.4	22 56	35.4	26 49.8	23 54	34.3	26 42.8	24 54	33.7	26 35.7	24 53	33.2	26 28.5	24 52	32.6	26 06.0	26 50	31.0	25 58.3	26 49	30.5	4
65	26 36.0	20 57	36.1	26 29.8	21 56	35.5	26 17.1	22 55	34.4	26 10.6	22 54	33.9	26 03.9	22 53	33.3	25 57.1	23 52	32.8	25 36.1	24 50	31.2	25 28.8	24 49	30.6	65
6	26 01.8	19 57	36.2	25 56.1	19 56	35.6	25 44.3	20 55	34.5	25 38.2	20 54	34.0	25 32.0	21 53	33.5	25 25.7	21 53	32.9	25 06.0	22 50	31.3	24 59.2	23 50	30.8	6
7	25 27.6	17 57	36.3	25 22.3	18 56	35.8	25 11.4	19 55	34.7	25 05.8	19 54	34.1	25 00.0	19 54	33.6	24 54.1	20 53	33.0	24 35.8	21 50	31.4	24 29.5	21 50	30.9	7
8	24 53.2	16 57	36.4	24 48.4	16 57	35.9	24 38.4	17 55	34.8	24 33.2	17 54	34.2	24 27.9	18 54	33.7	24 22.5	18 53	33.2	24 05.6	19 51	31.5	23 59.7	20 50	31.0	8
9	24 18.8	14 58	36.5	24 14.4	15 57	36.0	24 05.3	16 55	34.9	24 00.5	16 55	34.3	23 55.7	16 54	33.8	23 50.7	17 53	33.3	23 35.2	18 51	31.6	23 29.8	18 50	31.1	9
70	23 44.3	13 58	36.6	23 40.3	13 57	36.1	23 32.1	14 55	35.0	23 27.8	14 55	34.4	23 23.4	15 54	33.9	23 18.9	15 53	33.4	23 04.7	16 51	31.7	22 59.8	17 50	31.2	70
1	23 09.7	11 58	36.7	23 06.2	12 57	36.1	22 58.8	13 56	35.1	22 55.0	13 55	34.5	22 51.1	13 54	34.0	22 47.0	14 53	33.4	22 34.2	15 51	31.8	22 29.7	15 50	31.3	1
2	22 35.1	10 58	36.7	22 32.0	10 57	36.2	22 25.5	11 56	35.1	22 22.1	11 55	34.6	22 18.7	12 54	34.0	22 15.1	12 53	33.5	22 03.6	13 51	31.9	21 59.6	14 50	31.4	2
3	22 00.4	09 58	36.8	21 57.7	09 57	36.3	21 52.2	10 56	35.2	21 49.2	10 55	34.6	21 46.2	10 54	34.1	21 43.0	11 53	33.6	21 33.0	12 51	32.0	21 29.4	12 50	31.4	3
4	21 25.6	07 58	36.8	21 23.4	07 57	36.3	21 18.7	08 56	35.2	21 16.2	08 55	34.7	21 13.6	09 54	34.2	21 10.9	09 54	33.6	21 02.2	10 51	32.0	20 59.1	11 51	31.5	4
75	20 50.9	06 58	36.9	20 49.1	06 57	36.4	20 45.3	07 56	35.3	20 43.2	07 55	34.8	20 41.1	07 54	34.2	20 38.8	08 54	33.7	20 31.5	09 51	32.1	20 28.8	09 51	31.6	75
6	20 16.1	04 58	36.9	20 14.7	05 57	36.4	20 11.8	05 56	35.3	20 10.2	06 55	34.8	20 08.5	06 54	34.3	20 06.7	06 54	33.7	20 00.7	07 51	32.1	19 58.5	07 51	31.6	6
7	19 41.2	03 58	36.9	19 40.3	03 57	36.4	19 38.3	04 56	35.3	19 37.1	04 55	34.8	19 35.8	04 54	34.3	19 34.5	05 54	33.8	19 29.8	06 51	32.2	19 28.1	06 51	31.6	7
8	19 06.4	01 58	37.0	19 05.9	02 57	36.4	19 04.7	02 56	35.4	19 04.0	03 55	34.8	19 03.2	03 54	34.3	19 02.3	03 54	33.8	18 59.0	04 51	32.2	18 57.7	04 51	31.7	8
9	18 31.6	00 58	37.0	18 31.5	00 57	36.4	18 31.2	01 56	35.4	18 30.9	01 55	34.8	18 30.5	01 54	34.3	18 30.0	02 54	33.8	18 28.1	03 52	32.2	18 27.3	03 51	31.7	9
80	17 56.7	01 58	37.0	17 57.1	01 57	36.4	17 57.6	01 56	35.4	17 57.8	00 55	34.8	17 57.8	00 54	34.3	17 57.8	00 54	33.8	17 57.2	01 52	32.2	17 56.8	01 51	31.7	80
1	17 21.9	03 58	36.9	17 22.7	03 57	36.4	17 24.1	02 56	35.4	17 24.7	02 55	34.8	17 25.2	01 54	34.3	17 25.6	01 54	33.8	17 26.3	00 52	32.2	17 26.4	00 51	31.7	1
2	16 47.1	04 58	36.9	16 48.3	04 57	36.4	16 50.6	03 56	35.4	16 51.6	03 55	34.8	16 52.5	03 54	34.3	16 53.3	03 54	33.8	16 55.4	02 51	32.2	16 55.9	02 51	31.7	2
3	16 12.3	06 58	36.9	16 13.9	05 57	36.4	16 17.0	05 56	35.3	16 18.5	05 55	34.8	16 19.8	04 54	34.3	16 21.1	04 54	33.8	16 24.5	03 51	32.2	16 25.5	03 51	31.7	3
4	15 37.5	07 58	36.8	15 39.6	07 57	36.3	15 43.5	06 56	35.3	15 45.4	06 55	34.8	15 47.2	06 54	34.3	15 48.9	06 54	33.7	15 53.6	05 51	32.2	15 55.0	05 51	31.7	4
85	15 02.8	08 58	36.8	15 05.3	08 57	36.3	15 10.1	08 56	35.3	15 12.4	08 55	34.7	15 14.6	07 54	34.2	15 16.7	07 54	33.7	15 22.8	06 51	32.2	15 24.6	06 51	31.6	85
6	14 28.1	10 58	36.7	14 31.0	10 57	36.2	14 36.6	09 56	35.2	14 39.4	09 55	34.7	14 42.0	09 54	34.2	14 44.6	09 54	33.7	14 51.9	08 51	32.1	14 54.3	08 51	31.6	6
7	13 53.4	11 58	36.7	13 56.8	11 57	36.2	14 03.3	11 56	35.1	14 06.4	10 55	34.6	14 09.5	10 54	34.1	14 12.5	10 53	33.6	14 21.2	09 51	32.1	14 23.9	09 50	31.6	7
8	13 18.8	13 58	36.6	13 22.6	12 57	36.1	13 29.9	12 55	35.1	13 33.5	12 55	34.6	13 37.0	12 54	34.1	13 40.4	11 53	33.5	13 50.4	11 51	32.0	13 53.6	11 50	31.5	8
9	12 44.3	14 57	36.5	12 48.5	14 57	36.0	12 56.6	13 55	35.0	13 00.6	13 55	34.5	13 04.6	13 54	34.0	13 08.4	13 53	33.5	13 19.7	12 51	32.0	13 23.3	12 50	31.4	9
90	12 09.8	15 57	36.4	12 14.4	15 57	35.9	12 23.4	15 55	34.9	12 27.8	15 55	34.4	12 32.2	14 54	33.9	12 36.5	14 53	33.4	12 49.1	14 51	31.9	12 53.1	13 50	31.4	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	54° 30′				55° 00′				56° 00′				56° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	20 30.0	1.0	01	180.0	20 00.0	1.0	01	180.0	19 00.0	1.0	00	180.0	18 30.0	1.0	00	180.0
1	20 29.7	1.0	02	179.4	19 59.7	1.0	02	179.4	18 59.7	1.0	02	179.4	18 29.7	1.0	01	179.4
2	20 28.7	1.0	03	178.8	19 58.8	1.0	03	178.8	18 58.8	1.0	02	178.8	18 28.8	1.0	02	178.8
3	20 27.2	1.0	04	178.1	19 57.2	1.0	04	178.2	18 57.3	1.0	03	178.2	18 27.4	1.0	03	178.3
4	20 25.0	1.0	05	177.5	19 55.1	1.0	05	177.6	18 55.2	1.0	04	177.6	18 25.3	1.0	04	177.7
05	20 22.2	1.0	06	176.9	19 52.3	1.0	06	177.0	18 52.5	1.0	05	177.0	18 22.6	1.0	05	177.1
6	20 18.7	99	07	176.3	19 48.9	99	07	176.3	18 49.2	99	06	176.5	18 19.4	99	06	176.5
7	20 14.7	99	08	175.7	19 44.9	99	08	175.7	18 45.4	99	07	175.9	18 15.6	99	07	175.9
8	20 10.0	99	09	175.1	19 40.3	99	09	175.1	18 40.9	99	08	175.3	18 11.2	99	08	175.4
9	20 04.7	99	10	174.4	19 35.1	99	10	174.5	18 35.9	99	09	174.7	18 06.2	99	09	174.8
10	19 58.8	98	11	173.8	19 29.3	98	11	173.9	18 30.2	98	10	174.1	18 00.7	98	10	174.2
1	19 52.3	98	12	173.2	19 22.8	98	12	173.3	18 24.0	98	11	173.5	17 54.6	98	11	173.6
2	19 45.1	98	13	172.6	19 15.8	98	13	172.7	18 17.2	98	12	173.0	17 47.9	98	12	173.1
3	19 37.4	97	14	172.0	19 08.2	97	14	172.2	18 09.8	97	13	172.4	17 40.6	97	13	172.5
4	19 29.0	97	15	171.4	19 00.0	97	15	171.6	18 01.8	97	14	171.8	17 32.7	97	14	172.0
15	19 20.1	96	16	170.8	18 51.2	96	16	171.0	17 53.3	96	15	171.3	17 24.4	97	15	171.4
6	19 10.6	96	17	170.2	18 41.8	96	17	170.4	17 44.2	96	16	170.7	17 15.4	96	16	170.8
7	19 00.5	95	18	169.7	18 31.8	95	18	169.8	17 34.5	96	17	170.1	17 05.9	96	17	170.3
8	18 49.8	95	19	169.1	18 21.3	95	18	169.2	17 24.3	95	18	169.6	16 55.8	95	18	169.7
9	18 38.5	94	20	168.5	18 10.2	94	19	168.7	17 13.6	94	19	169.0	16 45.2	94	19	169.2
20	18 26.6	94	21	167.9	17 58.5	94	20	168.1	17 02.2	94	20	168.5	16 34.1	94	19	168.6
1	18 14.2	93	22	167.3	17 46.3	93	21	167.5	16 50.4	93	21	167.9	16 22.4	93	20	168.1
2	18 01.3	92	23	166.8	17 33.5	93	22	167.0	16 38.0	93	22	167.4	16 10.2	93	21	167.6
3	17 47.7	92	23	166.2	17 20.2	92	23	166.4	16 25.0	92	22	166.8	15 57.4	92	22	167.0
4	17 33.6	91	24	165.7	17 06.3	91	24	165.9	16 11.6	91	23	166.3	15 44.2	91	23	166.5
25	17 19.0	90	25	165.1	16 51.9	90	25	165.3	15 57.6	91	24	165.8	15 30.4	91	24	166.0
6	17 03.8	90	26	164.6	16 36.9	90	26	164.8	15 43.1	90	25	165.2	15 16.1	90	25	165.5
7	16 48.1	89	27	164.0	16 21.5	89	27	164.3	15 28.1	89	26	164.7	15 01.3	89	25	165.0
8	16 31.9	88	28	163.5	16 05.5	88	28	163.7	15 12.6	88	27	164.2	14 46.1	88	26	164.5
9	16 15.2	87	29	162.9	15 49.0	87	28	163.2	14 56.5	87	28	163.7	14 30.3	88	27	164.0
30	15 57.9	86	30	162.4	15 32.0	87	29	162.7	14 40.0	87	28	163.2	14 14.0	87	28	163.5
1	15 40.2	86	30	161.9	15 14.5	86	30	162.2	14 23.0	86	29	162.7	13 57.3	86	29	163.0
2	15 21.9	85	31	161.4	14 56.5	85	31	161.7	14 05.6	85	30	162.2	13 40.1	85	29	162.5
3	15 03.2	84	32	160.9	14 38.0	84	32	161.2	13 47.6	84	31	161.7	13 22.4	84	30	162.0
4	14 44.0	83	33	160.4	14 19.1	83	32	160.7	13 29.2	83	31	161.2	13 04.3	83	31	161.5
35	14 24.3	82	34	159.9	13 59.7	82	33	160.2	13 10.4	82	32	160.8	12 45.7	82	32	161.1
6	14 04.1	81	34	159.4	13 39.8	81	34	159.7	12 51.0	81	33	160.3	12 26.6	81	32	160.6
7	13 43.5	80	35	158.9	13 19.4	80	35	159.2	12 31.3	80	34	159.8	12 07.2	80	33	160.1
8	13 22.4	79	36	158.4	12 58.7	79	35	158.8	12 11.1	79	34	159.4	11 47.3	79	34	159.7
9	13 00.9	78	37	158.0	12 37.4	78	36	158.3	11 50.5	78	35	158.9	11 26.9	78	35	159.2
40	12 38.9	77	37	157.5	12 15.8	77	37	157.8	11 29.4	77	36	158.5	11 06.2	77	35	158.8
1	12 16.6	76	38	157.1	11 53.7	76	38	157.4	11 07.9	76	36	158.0	10 45.0	76	36	158.4
2	11 53.8	75	39	156.6	11 31.2	75	38	156.9	10 46.1	75	37	157.6	10 23.5	75	37	157.9
3	11 30.5	74	39	156.2	11 08.3	74	39	156.5	10 23.8	74	38	157.2	10 01.5	74	37	157.5
4	11 06.9	73	40	155.7	10 45.0	73	40	156.1	10 01.1	73	38	156.8	9 39.2	73	38	157.1
45	10 42.9	72	41	155.3	10 21.3	72	40	155.7	9 38.1	72	39	156.4	9 16.4	72	38	156.7
6	10 18.5	71	41	154.9	9 57.2	71	41	155.2	9 14.6	71	40	155.9	8 53.3	71	39	156.3
7	9 53.7	70	42	154.5	9 32.8	70	41	154.8	8 50.8	70	40	155.6	8 29.9	70	40	155.9
8	9 28.5	69	43	154.1	9 07.9	69	42	154.4	8 26.7	69	41	155.2	8 06.0	69	40	155.5
9	9 03.0	67	43	153.7	8 42.7	68	43	154.0	8 02.2	68	41	154.8	7 41.8	68	41	155.1
50	8 37.1	66	44	153.3	8 17.2	66	43	153.6	7 37.3	67	42	154.4	7 17.3	67	41	154.8
1	8 10.8	65	44	152.9	7 51.2	65	44	153.3	7 12.1	65	43	154.0	6 52.4	65	42	154.4
2	7 44.2	64	45	152.5	7 25.0	64	44	152.9	6 46.5	64	43	153.7	6 27.2	64	43	154.0
3	7 17.3	63	45	152.1	6 58.4	63	45	152.5	6 20.6	63	44	153.3	6 01.7	63	43	153.7
4	6 50.0	62	46	151.8	6 31.5	62	45	152.2	5 54.4	62	44	152.9	5 35.9	62	44	153.3
55	6 22.4	61	46	151.4	6 04.3	61	46	151.8	5 27.9	61	45	152.6	5 09.7	61	44	153.0
6	5 54.5	59	47	151.1	5 36.7	59	46	151.5	5 01.1	59	45	152.3				
7	5 26.3	58	48	150.7	5 08.9	58	47	151.1								
8																

H.A.	57° 00′				57° 30′				59° 00′				59° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	18 00.0	1.0	00	180.0	17 30.0	1.0	00	180.0	16 00.0	1.0	00	180.0	15 30.0	1.0	00	180.0	00
1	17 59.7	1.0	01	179.4	17 29.7	1.0	01	179.4	15 59.7	1.0	01	179.5	15 29.7	1.0	01	179.5	1
2	17 58.8	1.0	02	178.9	17 28.9	1.0	02	178.9	15 58.9	1.0	02	178.9	15 28.9	1.0	02	178.9	2
3	17 57.4	1.0	03	178.3	17 27.4	1.0	03	178.3	15 57.6	1.0	03	178.4	15 27.6	1.0	03	178.4	3
4	17 55.4	1.0	04	177.7	17 25.4	1.0	04	177.7	15 55.7	1.0	04	177.9	15 25.7	1.0	04	177.9	4
05	17 52.8	1.0	05	177.1	17 22.9	1.0	05	177.2	15 53.2	1.0	05	177.3	15 23.3	1.0	05	177.4	05
6	17 49.6	99	06	176.6	17 19.8	99	06	176.6	15 50.3	99	06	176.8	15 20.4	99	06	176.8	6
7	17 45.8	99	07	176.0	17 16.1	99	07	176.1	15 46.7	99	07	176.3	15 17.0	99	07	176.3	7
8	17 41.5	99	08	175.4	17 11.8	99	08	175.5	15 42.7	99	08	175.7	15 13.0	99	08	175.8	8
9	17 36.6	99	09	174.9	17 07.0	99	09	175.0	15 38.1	99	09	175.2	15 08.5	99	08	175.3	9
10	17 31.1	98	10	174.3	17 01.6	98	10	174.4	15 33.0	98	09	174.7	15 03.5	98	09	174.8	10
1	17 25.1	98	11	173.7	16 55.7	98	11	173.8	15 27.4	98	10	174.1	14 57.9	98	10	174.2	1
2	17 18.5	98	12	173.2	16 49.2	98	12	173.3	15 21.2	98	11	173.6	14 51.8	98	11	173.7	2
3	17 11.4	97	13	172.6	16 42.2	97	13	172.8	15 14.5	97	12	173.1	14 45.3	97	12	173.2	3
4	17 03.7	97	14	172.1	16 34.6	97	14	172.2	15 07.3	97	13	172.6	14 38.2	97	13	172.7	4
15	16 55.4	97	15	171.5	16 26.4	97	14	171.7	14 59.5	97	14	172.1	14 30.5	97	14	172.2	15
6	16 46.6	96	16	171.0	16 17.8	96	15	171.1	14 51.3	96	15	171.6	14 22.4	96	14	171.7	6
7	16 37.2	96	16	170.4	16 08.6	96	16	170.6	14 42.5	96	15	171.0	14 13.8	96	15	171.2	7
8	16 27.3	95	17	169.9	15 58.8	96	17	170.1	14 33.2	95	16	170.5	14 04.7	95	16	170.7	8
9	16 16.9	94	18	169.4	15 48.5	95	18	169.5	14 23.4	95	17	170.0	13 55.1	95	17	170.2	9
20	16 05.9	94	19	168.8	15 37.7	94	19	169.0	14 13.2	94	18	169.5	13 45.0	94	18	169.7	20
1	15 54.4	93	20	168.3	15 26.4	93	20	168.5	14 02.4	93	19	169.0	13 34.4	93	18	169.2	1
2	15 42.4	93	21	167.8	15 14.6	93	21	168.0	13 51.1	93	20	168.5	13 23.3	93	19	168.7	2
3	15 29.8	92	22	167.2	15 02.2	92	21	167.4	13 39.4	92	20	168.0	13 11.7	92	20	168.2	3
4	15 16.8	91	23	166.7	14 49.4	91	22	166.9	13 27.1	91	21	167.6	12 59.7	92	21	167.8	4
25	15 03.2	91	23	166.2	14 36.0	91	23	166.4	13 14.4	91	22	167.1	12 47.1	91	22	167.3	25
6	14 49.2	90	24	165.7	14 22.2	90	24	165.9	13 01.2	90	23	166.6	12 34.2	90	22	166.8	6
7	14 34.6	89	25	165.2	14 07.9	89	25	165.4	12 47.5	89	24	166.1	12 20.7	89	23	166.4	7
8	14 19.6	88	26	164.7	13 53.0	88	25	164.9	12 33.4	89	24	165.7	12 06.8	89	24	165.9	8
9	14 04.0	88	27	164.2	13 37.7	88	26	164.5	12 18.8	88	25	165.2	11 52.5	88	25	165.4	9
30	13 48.0	87	27	163.7	13 22.0	87	27	164.0	12 03.8	87	26	164.7	11 37.7	87	25	165.0	30
1	13 31.5	86	28	163.2	13 05.7	86	28	163.5	11 48.3	86	27	164.3	11 22.5	86	26	164.5	1
2	13 14.6	85	29	162.8	12 49.0	85	29	163.0	11 32.4	85	27	163.8	11 06.8	85	27	164.1	2
3	12 57.2	84	30	162.3	12 31.9	84	29	162.6	11 16.0	84	28	163.4	10 50.7	84	28	163.7	3
4	12 39.3	83	30	161.8	12 14.3	83	30	162.1	10 59.2	84	29	162.9	10 34.2	84	28	163.2	4
35	12 21.0	82	31	161.4	11 56.3	82	31	161.6	10 42.0	83	29	162.5	10 17.2	83	29	162.8	35
6	12 02.2	81	32	160.9	11 37.8	81	32	161.2	10 24.4	82	30	162.1	9 59.9	82	30	162.4	6
7	11 43.0	80	33	160.4	11 18.9	81	32	160.7	10 06.3	81	31	161.6	9 42.1	81	30	161.9	7
8	11 23.4	79	33	160.0	10 59.6	80	33	160.3	9 47.9	80	31	161.2	9 24.0	80	31	161.5	8
9	11 03.4	79	34	159.6	10 39.8	79	34	159.9	9 29.0	79	32	160.8	9 05.4	79	32	161.1	9
40	10 42.9	78	35	159.1	10 19.7	78	34	159.4	9 09.8	78	33	160.4	8 46.5	78	32	160.7	40
1	10 22.1	76	35	158.7	9 59.1	77	35	159.0	8 50.2	77	33	160.0	8 27.1	77	33	160.3	1
2	10 00.8	75	36	158.3	9 38.2	76	36	158.6	8 30.2	76	34	159.6	8 07.4	76	33	159.9	2
3	9 39.2	74	37	157.9	9 16.9	74	36	158.2	8 09.8	75	35	159.2	7 47.4	75	34	159.6	3
4	9 17.2	73	37	157.5	8 55.2	73	37	157.8	7 49.0	74	35	158.8	7 26.9	74	35	159.2	4
45	8 54.8	72	38	157.1	8 33.1	72	37	157.4	7 27.9	72	36	158.5	7 06.2	73	35	158.8	45
6	8 32.0	71	39	156.7	8 10.6	71	38	157.0	7 06.5	71	36	158.1	6 45.0	71	36	158.4	6
7	8 08.9	70	39	156.3	7 47.8	70	39	156.6	6 44.6	70	37	157.7	6 23.6	70	36	158.1	7
8	7 45.4	69	40	155.9	7 24.7	69	39	156.3	6 22.5	69	38	157.3	6 01.7	69	37	157.7	8
9	7 21.5	68	40	155.5	7 01.2	68	40	155.9	6 00.0	68	38	157.0	5 39.6	68	37	157.4	9
50	6 57.3	67	41	155.1	6 37.3	67	40	155.5	5 37.2	67	39	156.6	5 17.1	67	38	157.0	50
1	6 32.8	66	41	154.8	6 13.1	66	41	155.2	5 14.1	66	39	156.3					1
2	6 07.9	64	42	154.4	5 48.6	64	41	154.8									2
3	5 42.8	63	42	154.1	5 23.8	63	42	154.5									3
4	5 17.3	62	43	153.7													4
55																	55
6																	6
7																	7
8																	8

DECLINATION SAME NAME AS LATITUDE

H.A.	54° 30′				55° 00′				56° 00′				56° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
91	11 35.4	17	57	36.3	11 40.4	17	56	35.8	11 50.3	16	55	34.8	11 55.1	16	54	34.3
2	11 01.1	18	57	36.2	11 06.5	18	56	35.7	11 17.2	18	55	34.7	11 22.5	17	54	34.2
3	10 26.9	19	57	36.1	10 32.7	19	56	35.6	10 44.2	19	55	34.6	10 49.9	19	54	34.1
4	9 52.8	21	57	36.0	9 59.0	21	56	35.5	10 11.3	20	55	34.5	10 17.4	20	54	34.0
95	9 18.8	22	57	35.9	9 25.4	22	56	35.4	9 38.5	22	54	34.4	9 45.0	22	54	33.9
6	8 44.8	24	56	35.8	8 51.9	23	56	35.3	9 05.8	23	54	34.3	9 12.8	23	54	33.8
7	8 11.0	25	56	35.6	8 18.5	25	55	35.1	8 33.2	25	54	34.1	8 40.6	24	53	33.7
8	7 37.3	26	56	35.5	7 45.2	26	55	35.0	8 00.8	26	54	34.0	8 08.5	26	53	33.5
9	7 03.8	28	56	35.3	7 12.0	27	55	34.8	7 28.4	27	54	33.9	7 36.6	27	53	33.4
100	6 30.4	29	55	35.1	6 39.0	29	55	34.7	6 56.2	29	53	33.7	7 04.8	28	53	33.2
1	5 57.1	30	55	35.0	6 06.1	30	55	34.5	6 24.1	30	53	33.5	6 33.1	30	53	33.0
2	5 23.9	32	55	34.8	5 33.4	31	54	34.3	5 52.2	31	53	33.4	6 01.6	31	52	32.9
3					5 00.8	33	54	34.1	5 20.4	33	53	33.2	5 30.2	33	52	32.7
4																
105																
6																

H.A.	57° 00′				57° 30′				59° 00′				59° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
91	11 59.9	16	54	33.8	12 04.6	16	53	33.3	12 18.5	15	51	31.8	12 23.0	15	50	31.3	91
2	11 27.7	17	54	33.7	11 32.8	17	53	33.2	11 48.0	17	51	31.7	11 52.9	16	50	31.2	2
3	10 55.5	19	53	33.6	11 01.1	19	53	33.1	11 17.5	18	51	31.6	11 22.9	18	50	31.1	3
4	10 23.5	20	53	33.5	10 29.5	20	53	33.0	10 47.2	19	50	31.5	10 53.0	19	50	31.0	4
95	9 51.5	21	53	33.4	9 57.9	21	52	32.9	10 16.9	21	50	31.4	10 23.2	21	50	30.9	95
6	9 19.6	23	53	33.3	9 26.5	23	52	32.8	9 46.7	22	50	31.3	9 53.4	22	49	30.8	6
7	8 47.9	24	53	33.2	8 55.1	24	52	32.7	9 16.7	24	50	31.2	9 23.8	24	49	30.7	7
8	8 16.2	26	53	33.0	8 23.9	26	52	32.5	8 46.7	25	50	31.1	8 54.2	25	49	30.6	8
9	7 44.7	27	52	32.9	7 52.8	27	52	32.4	8 16.9	27	50	30.9	8 24.8	26	49	30.4	9
100	7 13.3	28	52	32.7	7 21.8	28	51	32.2	7 47.1	28	49	30.8	7 55.5	28	49	30.3	100
1	6 42.0	30	52	32.6	6 51.0	30	51	32.1	7 17.5	29	49	30.6	7 26.3	29	48	30.2	1
2	6 10.9	31	52	32.4	6 20.2	31	51	31.9	6 48.0	31	49	30.5	6 57.3	31	48	30.0	2
3	5 39.9	32	51	32.2	5 49.7	32	51	31.8	6 18.7	32	49	30.3	6 28.3	32	48	29.8	3
4	5 09.1	34	51	32.0	5 19.2	34	50	31.6	5 49.5	34	48	30.2	5 59.6	33	48	29.7	4
105									5 20.5	35	48	30.0	5 31.0	35	47	29.5	105
6													5 02.5	36	47	29.3	6

DECLINATION SAME NAME AS LATITUDE

A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
0	45 00.0	1.0 01	00.0	44 30.0	1.0 01	00.0	43 00.0	1.0 01	00.0	42 30.0	1.0 01	00.0	42 00.0	1.0 00	00.0	36 00.0	1.0 00	00.0	35 30.0	1.0 00	00.0	30 30.0	1.0 00	00.0	00
1	44 59.6	1.0 02	00.7	44 29.7	1.0 02	00.7	42 59.7	1.0 02	00.6	42 29.7	1.0 02	00.6	41 59.7	1.0 02	00.6	35 59.8	1.0 01	00.4	35 29.8	1.0 01	00.4	30 29.8	1.0 01	00.3	1
2	44 58.6	1.0 03	01.4	44 28.6	1.0 03	01.4	42 58.7	1.0 03	01.3	42 28.7	1.0 03	01.3	41 58.8	1.0 03	01.2	35 59.1	1.0 02	00.9	35 29.1	1.0 02	00.9	30 29.4	1.0 01	00.6	2
3	44 56.8	1.0 04	02.1	44 26.9	1.0 04	02.1	42 57.1	1.0 04	01.9	42 27.2	1.0 04	01.9	41 57.2	1.0 04	01.8	35 58.0	1.0 03	01.3	35 28.0	1.0 03	01.3	30 28.6	1.0 02	00.9	3
4	44 54.3	1.0 05	02.8	44 24.4	1.0 05	02.8	42 54.8	1.0 05	02.6	42 24.9	1.0 05	02.5	41 55.1	1.0 05	02.4	35 56.4	1.0 03	01.8	35 26.5	1.0 03	01.7	30 27.5	1.0 02	01.2	4
5	44 51.1	99 07	03.5	44 21.3	99 06	03.4	42 51.9	99 06	03.2	42 22.1	99 06	03.1	41 52.3	99 06	03.0	35 54.4	99 04	02.2	35 24.6	99 04	02.1	30 26.1	1.0 03	01.5	05
6	44 47.2	99 08	04.2	44 17.5	99 08	04.1	42 48.3	99 07	03.8	42 18.6	99 07	03.7	41 48.9	99 07	03.7	35 51.9	99 05	02.6	35 22.2	99 05	02.6	30 24.4	99 03	01.9	6
7	44 42.5	99 09	04.9	44 13.0	99 09	04.8	42 44.1	99 08	04.5	42 14.5	99 08	04.4	41 44.9	99 08	04.3	35 49.0	99 06	03.1	35 19.4	99 05	03.0	30 22.3	99 04	02.2	7
8	44 37.2	98 10	05.6	44 07.8	98 10	05.5	42 39.3	98 09	05.1	42 09.8	98 09	05.0	41 40.3	98 09	04.9	35 45.7	99 06	03.5	35 16.1	99 06	03.4	30 20.0	99 04	02.5	8
9	44 31.2	98 11	06.3	44 01.9	98 11	06.2	42 33.8	98 10	05.7	42 04.5	98 10	05.6	41 35.1	98 10	05.4	35 41.9	98 07	04.0	35 12.4	98 07	03.8	30 17.3	98 05	02.8	9
10	44 24.5	97 12	07.0	43 55.3	97 12	06.8	42 27.8	97 11	06.3	41 58.5	97 11	06.2	41 29.3	97 11	06.0	35 37.7	98 08	04.4	35 08.3	98 08	04.3	30 14.4	98 05	03.1	10
1	44 17.1	97 13	07.7	43 48.1	97 13	07.5	42 21.0	97 12	07.0	41 52.0	97 12	06.8	41 22.9	97 12	06.6	35 33.1	97 08	04.8	35 03.8	97 08	04.7	30 11.1	98 06	03.4	1
2	44 09.1	96 15	08.3	43 40.3	96 14	08.1	42 13.7	96 13	07.6	41 44.8	96 13	07.4	41 15.9	96 13	07.2	35 28.0	97 09	05.2	34 58.9	97 09	05.1	30 07.5	97 06	03.7	2
3	44 00.3	96 16	09.0	43 31.7	96 15	08.8	42 05.8	96 14	08.2	41 37.1	96 14	08.0	41 08.4	96 14	07.8	35 22.4	96 10	05.7	34 53.5	96 10	05.5	30 03.7	97 07	04.0	3
4	43 50.9	95 17	09.7	43 22.5	95 16	09.4	41 57.2	95 15	08.8	41 28.7	95 15	08.6	41 00.2	95 15	08.4	35 16.5	96 11	06.1	34 47.8	96 10	05.9	29 59.5	96 07	04.3	4
15	43 40.9	94 18	10.3	43 12.7	94 17	10.1	41 48.1	94 16	09.4	41 19.8	94 16	09.2	40 51.5	94 15	08.9	35 10.1	95 11	06.5	34 41.6	95 11	06.3	29 55.0	96 08	04.6	15
6	43 30.2	93 19	11.0	43 02.3	93 18	10.7	41 38.3	93 17	10.0	41 10.3	94 17	09.7	40 42.2	94 16	09.5	35 03.4	95 12	06.9	34 35.0	95 12	06.7	29 50.2	96 08	04.9	6
7	43 18.9	92 20	11.6	42 51.2	92 20	11.3	41 28.0	93 18	10.6	41 00.2	93 18	10.3	40 32.4	93 17	10.1	34 56.2	94 13	07.3	34 28.0	94 12	07.1	29 45.2	95 09	05.2	7
8	43 06.9	91 21	12.2	42 39.5	91 20	11.9	41 17.1	92 19	11.1	40 49.5	92 19	10.9	40 22.0	92 18	10.6	34 48.5	93 13	07.8	34 20.6	93 13	07.5	29 39.8	94 09	05.5	8
9	42 54.3	90 22	12.8	42 27.2	90 22	12.5	41 05.6	91 20	11.7	40 38.3	91 20	11.4	40 11.0	91 19	11.2	34 40.5	92 14	08.2	34 12.8	92 14	07.9	29 34.2	93 10	05.7	9
20	42 41.2	89 23	13.5	42 14.3	89 22	13.1	40 53.6	90 21	12.3	40 26.6	90 20	12.0	39 59.5	90 20	11.7	34 32.1	92 15	08.6	34 04.6	92 14	08.3	29 28.2	93 10	06.0	20
1	42 27.4	88 24	14.1	42 00.9	88 23	13.7	40 41.0	89 22	12.8	40 14.3	89 21	12.5	39 47.5	89 21	12.2	34 23.3	91 15	09.0	33 56.0	91 15	08.7	29 22.0	92 11	06.3	1
2	42 13.0	87 25	14.6	41 46.8	87 24	14.3	40 27.9	88 23	13.4	40 01.5	88 22	13.1	39 35.0	88 22	12.7	34 14.1	90 16	09.3	33 47.1	90 16	09.1	29 15.5	91 11	06.6	2
3	41 58.1	86 26	15.2	41 32.2	86 25	14.9	40 14.2	87 24	13.9	39 48.1	87 23	13.6	39 22.0	87 23	13.3	34 04.5	89 17	09.7	33 37.7	89 16	09.5	29 08.7	90 12	06.9	3
4	41 42.6	85 27	15.8	41 17.0	85 26	15.5	40 00.0	86 25	14.4	39 34.2	86 24	14.1	39 08.4	86 23	13.8	33 54.5	88 17	10.1	33 28.0	88 17	09.8	29 01.6	89 12	07.1	4
25	41 26.5	84 28	16.4	41 01.3	84 27	16.0	39 45.3	85 25	15.0	39 19.9	85 25	14.6	38 54.4	85 24	14.3	33 44.1	87 18	10.5	33 17.9	87 17	10.2	28 54.3	88 13	07.4	25
6	41 09.9	83 29	16.9	40 45.1	83 28	16.6	39 30.1	84 26	15.5	39 05.0	84 26	15.1	38 39.8	84 25	14.8	33 33.4	86 19	10.9	33 07.5	86 18	10.6	28 46.7	88 13	07.7	6
7	40 52.8	81 29	17.5	40 28.3	82 29	17.1	39 14.4	82 27	16.0	38 49.6	83 26	15.6	38 24.8	83 26	15.3	33 22.3	85 19	11.2	32 56.7	85 19	10.9	28 38.8	87 14	07.9	7
8	40 35.1	80 30	18.0	40 11.0	80 30	17.6	38 58.2	81 28	16.5	38 33.8	81 27	16.1	38 09.3	82 27	15.7	33 10.8	84 20	11.6	32 45.5	84 19	11.3	28 30.6	86 14	08.2	8
9	40 16.9	79 31	18.5	39 53.2	79 30	18.1	38 41.6	80 29	17.0	38 17.5	80 28	16.6	37 53.4	80 27	16.2	32 59.0	83 20	12.0	32 34.0	83 20	11.6	28 22.2	85 14	08.5	9
30	39 58.3	78 32	19.0	39 34.9	78 31	18.6	38 24.4	79 29	17.4	38 00.8	79 29	17.0	37 37.0	79 28	16.7	32 46.8	82 21	12.3	32 22.2	82 20	12.0	28 13.6	84 15	08.7	30
1	39 39.1	76 33	19.5	39 16.2	77 32	19.1	38 06.8	77 30	17.9	37 43.6	78 29	17.5	37 20.2	78 29	17.1	32 34.3	81 21	12.7	32 10.0	81 21	12.3	28 04.7	83 15	09.0	1
2	39 19.5	75 33	20.0	38 57.0	75 33	19.6	37 48.8	76 31	18.4	37 25.9	76 30	17.9	37 02.9	77 29	17.5	32 21.4	80 22	13.0	31 57.5	80 21	12.6	27 55.5	82 16	09.2	2
3	38 59.4	74 34	20.5	38 37.3	74 34	20.1	37 30.3	75 31	18.8	37 07.8	75 31	18.4	36 45.3	75 30	18.0	32 08.2	78 23	13.3	31 44.7	79 22	13.0	27 46.1	80 16	09.5	3
4	38 38.9	72 35	21.0	38 17.2	73 34	20.5	37 11.4	74 32	19.2	36 49.4	74 32	18.8	36 27.2	74 31	18.4	31 54.7	77 23	13.7	31 31.5	77 22	13.3	27 36.4	79 16	09.7	4
35	38 17.9	71 36	21.4	37 56.6	71 35	21.0	36 52.1	72 33	19.7	36 30.5	72 32	19.2	36 08.7	73 31	18.8	31 40.8	76 24	14.0	31 18.0	76 23	13.6	27 26.5	78 17	09.9	35
6	37 56.5	69 36	21.9	37 35.7	70 36	21.4	36 32.4	71 34	20.1	36 11.2	71 33	19.7	35 49.8	71 32	19.2	31 26.7	75 24	14.3	31 04.3	75 23	13.9	27 16.4	77 17	10.2	6
7	37 34.7	68 37	22.3	37 14.3	68 36	21.9	36 12.3	69 34	20.5	35 51.5	70 33	20.1	35 30.5	70 33	19.6	31 12.2	73 25	14.6	30 50.2	74 24	14.2	27 06.1	76 18	10.4	7
8	37 12.5	67 38	22.7	36 52.5	67 37	22.3	35 51.9	68 35	20.9	35 31.4	68 34	20.4	35 10.9	69 33	20.0	30 57.5	72 25	14.9	30 35.8	72 24	14.5	26 55.5	75 18	10.6	8
9	36 49.9	65 38	23.1	36 30.4	65 38	22.7	35 31.0	67 35	21.3	35 11.0	67 35	20.8	34 50.9	67 34	20.4	30 42.4	71 26	15.2	30 21.1	71 25	14.8	26 44.7	73 18	10.9	9
40	36 27.0	64 39	23.6	36 07.8	64 38	23.1	35 09.8	65 36	21.7	34 50.2	65 35	21.2	34 30.5	66 34	20.7	30 27.1	69 26	15.5	30 06.2	70 25	15.1	26 33.6	72 19	11.1	40
1	36 03.6	62 39	23.9	35 45.0	62 39	23.5	34 48.2	64 36	22.0	34 29.1	64 36	21.6	34 09.8	64 35	21.1	30 11.4	68 26	15.8	29 51.0	68 26	15.4	26 22.4	71 19	11.3	1
2	35 39.9	61 40	24.3	35 21.7	61 39	23.8	34 26.3	62 37	22.4	34 07.6	62 36	21.9	33 48.8	63 36	21.4	29 55.5	67 27	16.1	29 35.5	67 26	15.6	26 11.0	69 19	11.5	2
3	35 15.9	59 41	24.7	34 58.1	59 40	24.2	34 04.1	61 38	22.7	33 45.8	61 37	22.3	33 27.5	61 36	21.8	29 39.4	65 27	16.3	29 19.8	66 27	15.9	25 59.3	68 20	11.7	3
4	34 51.5	58 41	25.0	34 34.2	58 40	24.5	33 41.5	59 38	23.1	33 23.7	60 37	22.6	33 05.8	60 37	22.1	29 22.9	64 28	16.6	29 03.7	64 27	16.2	25 47.5	67 20	11.9	4
45	34 26.8	56 42	25.4	34 10.0	56 41	24.9	33 18.6	58 39	23.4	33 01.3	58 38	22.9	32 43.8	58 37	22.4	29 06.2	62 28	16.9	28 47.5	63 28	16.4	25 35.4	65 20	12.1	45
6	34 01.8	55 42	25.7	33 45.4	55 41	25.2	32 55.5	56 39	23.7	32 38.6	56 38	23.2	32 21.6	57 38	22.7	28 49.3	61 29	17.1	28 31.0	61 28	16.7	25 23.2	64 21	12.3	6
7	33 36.5	53 43	26.0	33 20.6	53 42	25.5	32 32.0	55 40	24.0	32 15.6	55 39	23.5	31 59.0	55 38	23.0	28 32.1	59 29	17.4	28 14.3	60 28	16.9	25 10.8	63 21	12.5	7
8	33 11.0	51 43	26.4	32 55.5	52 42	25.8	32 08.3	53 40	24.3	31 52.3	53 39	23.8	31 36.2	54 38	23.3	28 14.7	58 29	17.6	27 57.3	58 29	17.1	24 58.1	61 21	12.7	8
9	32 45.1	50 44	26.7	32 30.1	50 43	26.1	31 44.3	52 40	24.6	31 28.7	52 40	24.1	31 13.1	52 39	23.6	27 57.1	56 30	17.8	27 40.1	57 29	17.4	24 45.4	60 22	12.8	9
50	32 19.0	48 44	27.0	32 04.4	49 43	26.4	31 20.0	50 41	24.9	31 04.9	50 40	24.4	30 49.8	51 39	23.9	27 39.3	55 30	18.1	27 22.7	55 29	17.6	24 32.4	58 22	13.0	50
1	31 52.6	47 44	27.2	31 38.5	47 44	26.7	30 55.5	48 41	25.2	30 40.9	49 40	24.7	30 26.2	49 40	24.2	27 21.2	53 30	18.3	27 05.1	54 30	17.8	24 19.3	57 22	13.2	1
2	31 25.9	45 45	27.5	31 12.3	46 44	27.0	30 30.7	47 42	25.4	30 16.6	47 41	24.9	30 02.3	48 40	24.4	27 02.9	52 31	18.5	26 47.3	52 30	18.0	24 06.0	55 22	13.3	2
3	30 59.0	44 45	27.8	30 45.9	44 44	27.2	30 05.7	45 42	25.7	29 52.0	46 41	25.2	29 38.3	46 40	24.7	26 44.4	50 31	18.7	26 29.3	51 30	18.2	23 52.5	54 23	13.5	3
4	30 31.9	42 46	28.0	30 19.2	42 45	27.5	29 40.5	44 42	25.9	29 27.3	44 42	25.4	29 14.0	45 41	24.9	26 25.8	49 31	18.9	26 11.1	49 31	18.4	23 38.9	52 23	13.7	4
55	30 04.6	40 46	28.2	29 52.4	41 45	27.7	29 15.0	42 43	26.2	29 02.3	43 42	25.6	28 49.5	43 41	25.1	26 06.9	47 32	19.1	25 52.7	48 31	18.6	23 25.2	51 23	13.8	55
6	29 37.1	39 46	28.5	29 25.3	39 45	27.9	28 49.4	41 43	26.4	28 37.1	41 42	25.9	28 24.8	41 42	25.3	25 47.9	46 32	19.3	25 34.1	46 31	18.8	23 11.3	49 23	13.9	6
7	29 09.3	37 47	28.7	28 58.1	38 46	28.2	28 23.5	39 43	26.6	28 11.8	39 43	26.1	27 59.9	40 42	25.5	25 28.7	44 32	19.4	25 15.4	44 32	19.0	22 57.3	48 24	14.1	7
8	28 41.4	36 47	28.9	28 30.6	36 46	28.4	27 57.5	37 44	26.8	27 46.2	38 43	26.3	27 34.8	38 42	25.7	25 09.3	43 33	19.6	24 56.5	43 32	19.1	22 43.1	46 24	14.2	8
9	28 13.3	34 47	29.1	28 03.0	35 46	28.6	27 31.3	36 44	27.0	27 20.5	36 43	26.5	27 09.6	37 42	25.9	24 49.7	41 33	19.8	24 37.4	41 32	19.3	22 28.8	44 24	14.4	9
60	27 45.0	33 47	29.3	27 35.2	33 47	28.8	27 04.9	34 44	27.2	26 54.6	35 43	26.6	26 44.1	35 43	26.1	24 30.1	39 33	19.9	24 18.2	40 32	19.4	22 14.3	43 24	14.5	60
1	27 16.6	31 48	29.5	27 07.2	31 47	28.9	26 38.4	33 44	27.3	26 28.5	33 44	26.8	26 18.5	33 43	26.3	24 10.2	38 33	20.1	23 58.8	38 32	19.6	21 59.8	41 24	14.6	1
2	26 48.0	30 48	29.6	26 39.1	30 47	29.1	26 11.7	31 45	27.5	26 02.3	31 44	27.0	25 52.8	32 43	26.5	23 50.2	36 34	20.2	23 39.3	36 33	19.7	21 45.1	40 25	14.7	2
3	26 19.3	28 48	29.8	26 10.8	28 47	29.3	25 44.8	29 45	27.7	25 35.9	30 44	27.1	25 26.9	30 43	26.6	23 30.1	35 34	20.4	23 19.7	35 33	19.9	21 30.3	38 25	14.8	3
4	25 50.4	26 48	30.0	25 42.4	27 48	29.4	25 17.8	28 45	27.8	25 09.4	28 44	27.3	25 00.9	29 44	26.8	23 09.9	33 34	20.5	23 00.0	33 33	20.0	21 15.5	36 25	14.9	4
65	25 21.4	25 49	30.1	25 13.9	25 48	29.6	24 50.7	26 45	28.0	24 42.8	27 45	27.4	24 34.7	27 44	26.9	22 49.5	31 34	20.6	22 40.1	32 33	20.1	21 00.5	35 25	15.0	65
6	24 52.3	23 49	30.2	24 45.3	24 48	29.7	24 23.5	25 46	28.1	24 16.0	25 45	27.6	24 08.4	25 44	27.0	22 29.0	30 34	20.8	22 20.1	30 34	20.2	20 45.4	33 25	15.1	6
7	24 23.0	22 49	30.4	24 16.5	22 48	29.8	23 56.1	23 46	28.2	23 49.1	24 45	27.7	23 42.0	24 44	27.2	22 08.4	28 34	20.9	22 00.0	28 34	20.3	20 30.2	31 25	15.2	7
8	23 53.7	20 49	30.5	23 47.6	20 48	29.9	23 28.7	22 46	28.3	23 22.2	22 45	27.8	23 15.5	22 44	27.3	21 47.8	26 35	21.0	21 39.8	27 34	20.4	20 15.0	30 26	15.3	8
9	23 24.3	19 49	30.6	23 18.7	19 48	30.0	23 01.1	20 46	28.4	22 55.1	20 45	27.9	22 48.9	21 44	27.4	21 27.0	25 35	21.1	21 19.5	25 34	20.5	19 59.6	28 26	15.4	9
70	22 54.8	17 49	30.7	22 49.6	17 49	30.1	22 33.5	18 46	28.5	22 27.9	19 45	28.0	22 22.2	19 45	27.5	21 06.1	23 35	21.2	20 59.1	23 34	20.6	19 44.2	26 26	15.5	70
1	22 25.2	15 49	30.8	22 20.5	16 49	30.2	22 05.8	17 46	28.6	22 00.7	17 46	28.1	21 55.4	18 45	27.6	20 45.1	21 35	21.2	20 38.6	22 34	20.7	19 28.7	25 26	15.5	1
2	21 55.5	14 50	30.8	21 51.3	14 49	30.3	21 38.0	15 46	28.7	21 33.3	16 46	28.2	21 28.6	16 45	27.6	20 24.1	20 35	21.3	20 18.1	20 34	20.8	19 13.1	23 26	15.6	2
3	21 25.7	12 50	30.9	21 22.0	13 49	30.4	21 10.1	14 47	28.8	21 05.9	14 46	28.2	21 01.7	14 45	27.7	20 03.0	18 35	21.4	19 57.5	18 34	20.9	18 57.5	21 26	15.7	3
4	20 55.9	11 50	31.0	20 52.6	11 49	30.4	20 42.2	12 47	28.8	20 38.5	12 46	28.3	20 34.7	13 45	27.8	19 41.8	17 35	21.5	19 36.8	17 35	20.9	18 41.8	20 26	15.7	4
75	20 26.1	09 50	31.0	20 23.3	10 49	30.5	20 14.2	11 47	28.9	20 11.0	11 46	28.4	20 07.6	11 45	27.8	19 20.6	15 35	21.5	19 16.1	15 35	21.0	18 26.1	18 26	15.8	75
6	19 56.2	08 50	31.1	19 53.8	08 49	30.5	19 46.1	09 47	29.0	19 43.4	09 46	28.4	19 40.5	10 45	27.9	18 59.3	13 36	21.6	18 55.3	14 35	21.1	18 10.3	16 26	15.8	6
7	19 26.3	06 50	31.1	19 24.4	07 49	30.6	19 18.1	07 47	29.0	19 15.8	08 46	28.5	19 13.4	08 45	27.9	18 38.0	12 36	21.6	18 34.4	12 35	21.1	17 54.4	15 26	15.9	7
8	18 56.3	05 50	31.1	18 54.9	05 49	30.6	18 50.0	06 47	29.0	18 48.2	06 46	28.5	18 46.2	06 45	28.0	18 16.6	10 36	21.7	18 13.5	10 35	21.1	17 38.5	13 27	15.9	8
9	18 26.3	03 50	31.2	18 25.4	03 49	30.6	18 21.8	04 47	29.0	18 20.5	05 46	28.5	18 19.1	05 45	28.0	17 55.2	08 36	21.7	17 52.6	09 35	21.2	17 22.6	11 27	16.0	9
80	17 56.4	02 50	31.2	17 55.8	02 49	30.6	17 53.7	03 47	29.1	17 52.8	03 46	28.5	17 51.8	03 45	28.0	17 33.7	07 36	21.7	17 31.7	07 35	21.2	17 06.7	10 27	16.0	80
1	17 26.4	00 50	31.2	17 26.3	00 49	30.6	17 25.5	01 47	29.1	17 25.1	02 46	28.6	17 24.6	02 45	28.0	17 12.3	05 36	21.7	17 10.7	05 35	21.2	16 50.7	08 27	16.0	1
2	16 56.4	01 50	31.2	16 56.7	01 49	30.6	16 57.4	00 47	29.1	16 57.4	00 46	28.6	16 57.4	00 45	28.0	16 50.8	03 36	21.8	16 49.7	04 35	21.2	16 34.7	06 27	16.0	2
3	16 26.4	03 50	31.2	16 27.2	03 49	30.6	16 29.2	02 47	29.1	16 29.7	02 46	28.6	16 30.1	01 45	28.0	16 29.3	02 36	21.8	16 28.7	02 35	21.3	16 18.7	05 27	16.0	3
4	15 56.4	04 50	31.1	15 57.7	04 49	30.6	16 01.0	03 47	29.1	16 02.0	03 46	28.5	16 02.9	03 45	28.0	16 07.8	00 36	21.8	16 07.7	00 35	21.3	16 02.7	03 27	16.1	4
85	15 26.4	06 50	31.1	15 28.2	06 49	30.6	15 32.9	05 47	29.0	15 34.3	05 46	28.5	15 35.7	04 45	28.0	15 46.3	01 36	21.8	15 46.7	01 35	21.3	15 46.7	01 27	16.1	85
6	14 56.5	07 50	31.1	14 58.7	07 49	30.6	15 04.8	06 47	29.0	15 06.7	06 46	28.5	15 08.5	06 45	28.0	15 24.8	03 36	21.8	15 25.7	03 35	21.2	15 30.6	00 27	16.1	6
7	14 26.6	09 50	31.0	14 29.2	09 49	30.5	14 36.7	08 47	29.0	14 39.0	08 46	28.5	14 41.3	07 45	27.9	15 03.3	05 36	21.8	15 04.7	04 35	21.2	15 14.6	02 27	16.1	7
8	13 56.7	10 50	31.0	13 59.8	10 49	30.5	14 08.6	09 47	28.9	14 11.4	09 46	28.4	14 14.2	09 45	27.9	14 41.8	06 36	21.7	14 43.7	06 35	21.2	14 58.6	04 27	16.0	8
9	13 26.9	12 50	30.9	13 30.4	12 49	30.4	13 40.6	11 47	28.9	13 43.8	11 46	28.4	13 47.0	11 45	27.9	14 20.4	08 36	21.7	14 22.7	08 35	21.2	14 42.5	06 27	16.0	9
90	12 57.2	13 50	30.9	13 01.1	13 49	30.4	13 12.6	12 47	28.8	13 16.3	12 46	28.3	13 20.0	12 45	27.8	13 59.0	10 36	21.7	14 01.8	09 35	21.2	14 26.5	07 27	16.0	90

10—8472

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	15 00.0	1.0 00	180.0	14 30.0	1.0 00	180.0	13 00.0	1.0 00	180.0	12 30.0	1.0 00	180.0	12 00.0	1.0 00	180.0	6 00.0	1.0 00	180.0	5 30.0	1.0 00	180.0				00
1	14 59.7	1.0 01	179.5	14 29.7	1.0 01	179.5	12 59.8	1.0 01	179.5	12 29.8	1.0 01	179.5	11 59.8	1.0 01	179.5	5 59.8	1.0 01	179.6	5 29.8	1.0 01	179.6				1
2	14 59.0	1.0 02	179.0	14 29.0	1.0 02	179.0	12 59.0	1.0 02	179.0	12 29.0	1.0 02	179.1	11 59.1	1.0 02	179.1	5 59.3	1.0 02	179.3	5 29.3	1.0 01	179.3				2
3	14 57.6	1.0 03	178.4	14 27.7	1.0 03	178.5	12 57.8	1.0 03	178.6	12 27.8	1.0 03	178.6	11 57.9	1.0 03	178.6	5 58.4	1.0 02	178.9	5 28.4	1.0 02	178.9				3
4	14 55.8	1.0 04	177.9	14 25.9	1.0 04	178.0	12 56.1	1.0 04	178.1	12 26.2	1.0 04	178.1	11 56.2	1.0 04	178.1	5 57.1	1.0 03	178.6	5 27.2	1.0 03	178.6				4
05	14 53.5	1.0 05	177.4	14 23.6	1.0 05	177.5	12 53.9	1.0 04	177.6	12 24.0	1.0 04	177.6	11 54.1	1.0 04	177.7	5 55.4	1.0 03	178.2	5 25.6	1.0 03	178.2				05
6	14 50.6	99 06	176.9	14 20.8	99 06	177.0	12 51.2	99 05	177.1	12 21.4	99 05	177.2	11 51.6	99 05	177.2	5 53.4	99 04	177.8	5 23.6	99 04	177.9				6
7	14 47.2	99 07	176.4	14 17.4	99 06	176.4	12 48.1	99 06	176.6	12 18.3	99 06	176.7	11 48.5	99 06	176.8	5 51.1	99 05	177.5	5 21.3	99 04	177.5				7
8	14 43.3	99 07	175.9	14 13.6	99 07	175.9	12 44.4	99 07	176.2	12 14.7	99 07	176.2	11 45.0	99 07	176.3	5 48.4	99 05	177.1	5 18.6	99 05	177.2				8
9	14 38.9	99 08	175.4	14 09.2	99 08	175.4	12 40.3	99 08	175.7	12 10.7	99 08	175.8	11 41.0	99 07	175.8	5 45.3	99 06	176.8	5 15.6	99 06	176.8				9
10	14 33.9	98 09	174.9	14 04.4	98 09	174.9	12 35.7	99 08	175.2	12 06.2	99 08	175.3	11 36.6	99 08	175.4	5 41.8	99 06	176.4	5 12.3	99 06	176.5				10
1	14 28.5	98 10	174.3	13 59.0	98 10	174.4	12 30.6	98 09	174.7	12 01.2	98 09	174.8	11 31.7	98 09	174.9	5 38.0	98 07	176.1	5 08.5	98 07	176.2				1
2	14 22.5	98 11	173.8	13 53.1	98 11	173.9	12 25.1	98 10	174.3	11 55.7	98 10	174.4	11 26.4	98 10	174.5	5 33.9	98 08	175.7	5 04.5	98 07	175.8				2
3	14 16.0	97 12	173.3	13 46.8	97 11	173.5	12 19.0	97 11	173.8	11 49.8	98 11	173.9	11 20.5	98 10	174.0	5 29.3	98 08	175.4	5 00.1	98 08	175.5				3
4	14 09.0	97 12	172.8	13 39.9	97 12	173.0	12 12.5	97 12	173.3	11 43.4	97 11	173.4	11 14.3	97 11	173.6	5 24.5	97 09	175.0							4
15	14 01.6	97 13	172.3	13 32.6	97 13	172.5	12 05.6	97 12	172.9	11 36.6	97 12	173.0	11 07.6	97 12	173.1	5 19.3	97 09	174.7							15
6	13 53.6	96 14	171.8	13 24.7	96 14	172.0	11 58.1	96 13	172.4	11 29.3	96 13	172.5	11 00.4	96 13	172.7	5 13.7	96 10	174.3							6
7	13 45.1	96 15	171.3	13 16.4	96 15	171.5	11 50.2	96 14	171.9	11 21.5	96 14	172.1	10 52.8	96 13	172.2	5 07.8	96 10	174.0							7
8	13 36.1	95 16	170.9	13 07.6	95 16	171.0	11 41.9	95 15	171.5	11 13.3	95 14	171.6	10 44.7	95 14	171.8	5 01.5	95 11	173.6							8
9	13 26.7	95 17	170.4	12 58.3	95 16	170.5	11 33.1	95 15	171.0	11 04.7	95 15	171.2	10 36.2	95 15	171.4										9
20	13 16.7	94 17	169.9	12 48.5	94 17	170.1	11 23.8	94 16	170.6	10 55.6	94 16	170.7	10 27.3	94 16	170.9										20
1	13 06.3	93 18	169.4	12 38.3	93 18	169.6	11 14.1	94 17	170.1	10 46.0	94 17	170.3	10 17.9	94 16	170.5										1
2	12 55.4	93 19	168.9	12 27.6	93 19	169.1	11 03.9	93 18	169.7	10 36.0	93 17	169.9	10 08.1	93 17	170.1										2
3	12 44.0	92 20	168.4	12 16.4	92 19	168.6	10 53.3	92 18	169.2	10 25.6	92 18	169.4	9 57.9	92 18	169.6										3
4	12 32.2	92 20	168.0	12 04.7	92 20	168.2	10 42.3	92 19	168.8	10 14.8	92 19	169.0	9 47.3	92 18	169.2										4
25	12 19.9	91 21	167.5	11 52.6	91 21	167.7	10 30.8	91 20	168.4	10 03.5	91 20	168.6	9 36.2	91 19	168.8										25
6	12 07.1	90 22	167.0	11 40.1	90 22	167.3	10 18.9	90 21	167.9	9 51.8	90 20	168.1	9 24.7	90 20	168.4										6
7	11 53.9	89 23	166.6	11 27.1	89 22	166.8	10 06.6	90 21	167.5	9 39.7	90 21	167.7	9 12.8	90 20	167.9										7
8	11 40.2	89 24	166.1	11 13.6	89 23	166.4	9 53.8	89 22	167.1	9 27.2	89 22	167.3	9 00.5	89 21	167.5										8
9	11 26.1	88 24	165.7	10 59.8	88 24	165.9	9 40.6	88 23	166.7	9 14.2	88 22	166.9	8 47.8	88 22	167.1										9
30	11 11.6	87 25	165.2	10 45.5	87 25	165.5	9 27.0	87 23	166.2	9 00.9	87 23	166.5	8 34.7	87 22	166.7										30
1	10 56.6	86 26	164.8	10 30.7	86 25	165.1	9 13.0	86 24	165.8	8 47.1	86 24	166.1	8 21.2	86 23	166.3										1
2	10 41.2	85 26	164.4	10 15.6	85 26	164.6	8 58.6	86 25	165.4	8 33.0	86 24	165.7	8 07.3	86 24	165.9										2
3	10 25.3	84 27	163.9	10 00.0	85 27	164.2	8 43.8	85 25	165.0	8 18.4	85 25	165.3	7 53.0	85 24	165.5										3
4	10 09.1	84 28	163.5	9 44.0	84 27	163.8	8 28.7	84 26	164.6	8 03.5	84 26	164.9	7 38.4	84 25	165.2										4
35	9 52.4	83 28	163.1	9 27.6	83 28	163.4	8 13.1	83 27	164.2	7 48.2	83 26	164.5	7 23.3	83 26	164.8										35
6	9 35.3	82 29	162.7	9 10.8	82 29	163.0	7 57.1	82 27	163.8	7 32.5	82 27	164.1	7 07.9	82 26	164.4										6
7	9 17.9	81 30	162.2	8 53.6	81 29	162.5	7 40.8	81 28	163.4	7 16.5	81 27	163.7	6 52.2	81 27	164.0										7
8	9 00.0	80 30	161.8	8 36.0	80 30	162.1	7 24.1	80 28	163.1	7 00.1	80 28	163.4	6 36.0	80 27	163.7										8
9	8 41.7	79 31	161.4	8 18.1	79 31	161.7	7 07.0	79 29	162.7	6 43.3	79 29	163.0	6 19.6	79 28	163.3										9
40	8 23.1	78 32	161.0	7 59.7	78 31	161.4	6 49.6	78 30	162.3	6 26.2	78 29	162.6	6 02.7	78 29	162.9										40
1	8 04.1	77 32	160.7	7 41.0	77 32	161.0	6 31.8	77 30	161.9	6 08.7	77 30	162.3	5 45.5	77 29	162.6										1
2	7 44.7	76 33	160.3	7 22.0	76 32	160.6	6 13.6	76 31	161.6	5 50.8	76 30	161.9	5 28.0	76 30	162.2										2
3	7 25.0	75 34	159.9	7 02.5	75 33	160.2	5 55.2	75 31	161.2	5 32.7	75 31	161.6	5 10.2	75 30	161.9										3
4	7 04.9	74 34	159.5	6 42.7	74 34	159.9	5 36.3	74 32	160.9	5 14.2	74 31	161.2													4
45	6 44.4	73 35	159.1	6 22.6	73 34	159.5	5 17.2	73 33	160.5																45
6	6 23.6	71 35	158.8	6 02.1	72 35	159.1																			6
7	6 02.4	70 36	158.4	5 41.3	70 35	158.8																			7
8	5 41.0	69 36	158.1	5 20.2	69 36	158.4																			
9	5 19.2	68 37	157.7																						

DECLINATION SAME NAME AS LATITUDE

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	12 27.4	15 49	30.8	12 31.8	15 49	30.3	12 44.7	14 46	28.8	12 48.9	14 46	28.3	12 53.0	14 45	27.8	13 37.6	11 36	21.6	13 40.9	11 35	21.1	14 10.6	09 27	16.0	91
2	11 57.8	16 49	30.7	12 02.6	16 49	30.2	12 16.8	15 46	28.7	12 21.4	15 46	28.2	12 26.0	16 45	27.7	13 16.2	13 36	21.6	13 20.0	13 35	21.1	13 54.6	10 27	16.0	2
3	11 28.2	18 49	30.6	11 33.5	17 48	30.1	11 49.0	17 46	28.6	11 54.1	17 45	28.1	11 59.1	17 45	27.6	12 54.9	14 35	21.5	12 59.2	14 35	21.0	13 38.7	12 26	15.9	3
4	10 58.8	19 49	30.5	11 04.5	19 48	30.0	11 21.3	18 46	28.5	11 26.8	18 45	28.0	11 32.3	18 45	27.5	12 33.7	16 35	21.5	12 38.4	16 35	21.0	13 22.8	14 26	15.9	4
95	10 29.4	21 49	30.4	10 35.5	20 48	29.9	10 53.7	20 46	28.4	10 59.6	20 45	27.9	11 05.5	20 44	27.4	12 12.5	18 35	21.4	12 17.7	17 34	20.9	13 06.9	15 26	15.9	95
6	10 00.0	22 49	30.3	10 06.6	22 48	29.8	10 26.1	21 46	28.3	10 32.5	21 45	27.8	10 38.9	21 44	27.3	11 51.3	19 35	21.4	11 57.0	19 34	20.9	12 51.1	17 26	15.8	6
7	9 30.8	23 49	30.2	9 37.8	23 48	29.7	9 58.6	23 46	28.2	10 05.5	23 45	27.7	10 12.3	23 44	27.2	11 30.3	21 35	21.3	11 36.4	21 34	20.8	12 35.3	19 26	15.8	7
8	9 01.7	25 48	30.1	9 09.2	25 48	29.6	9 31.3	24 45	28.1	9 38.6	24 45	27.6	9 45.8	24 44	27.1	11 09.3	22 35	21.2	11 15.9	22 34	20.7	12 19.6	20 26	15.7	8
9	8 32.7	26 48	30.0	8 40.6	26 47	29.5	9 04.0	26 45	28.0	9 11.7	26 45	27.5	9 19.4	26 44	27.0	10 48.3	24 35	21.1	10 55.5	24 34	20.6	12 03.9	22 26	15.7	9
100	8 03.8	28 48	29.8	8 12.1	28 47	29.3	8 36.8	27 45	27.9	8 45.0	27 44	27.4	8 53.1	27 44	26.9	10 27.5	25 35	21.0	10 35.1	25 34	20.5	11 48.3	24 26	15.6	100
1	7 35.1	29 48	29.7	7 43.8	29 47	29.2	8 09.8	29 45	27.7	8 18.4	29 44	27.3	8 27.0	28 43	26.8	10 06.7	27 34	20.9	10 14.8	27 34	20.4	11 32.8	25 26	15.5	1
2	7 06.4	31 48	29.5	7 15.6	30 47	29.0	7 42.9	30 45	27.6	7 51.9	30 44	27.1	8 00.9	30 43	26.6	9 46.1	28 34	20.8	9 54.6	28 34	20.3	11 17.3	27 26	15.5	2
3	6 38.0	32 47	29.4	6 47.5	32 47	28.9	7 16.1	32 44	27.5	7 25.6	31 44	27.0	7 35.0	31 43	26.5	9 25.5	30 34	20.7	9 34.5	30 33	20.2	11 01.9	28 26	15.4	3
4	6 09.6	33 47	29.2	6 19.6	33 46	28.7	6 49.4	33 44	27.3	6 59.3	33 43	26.8	7 09.2	33 43	26.4	9 05.1	31 34	20.6	9 14.5	31 33	20.1	10 46.5	30 25	15.3	4
105	5 41.4	35 47	29.0	5 51.8	35 46	28.6	6 22.9	34 44	27.1	6 33.2	34 43	26.7	6 43.5	34 43	26.2	8 44.7	33 34	20.5	8 54.6	33 33	20.0	10 31.3	32 25	15.2	105
6	5 13.3	36 47	28.9	5 24.2	36 46	28.4	5 56.5	36 44	27.0	6 07.3	36 43	26.5	6 18.0	36 42	26.0	8 24.5	35 34	20.4	8 34.8	34 33	19.9	10 16.1	33 25	15.1	6
7							5 30.3	37 43	26.8	5 41.5	37 43	26.3	5 52.6	37 42	25.9	8 04.3	36 33	20.3	8 15.1	36 33	19.8	10 01.0	35 25	15.0	7
8							5 04.3	39 43	26.6	5 15.9	39 43	26.2	5 27.4	39 42	25.7	7 44.3	37 33	20.1	7 55.6	37 32	19.6	9 46.0	36 25	14.9	8
9													5 02.4	40 42	25.5	7 24.5	39 33	20.0	7 36.1	39 32	19.5	9 31.1	38 25	14.8	9
110																7 04.7	40 33	19.8	7 16.8	40 32	19.4	9 16.3	39 24	14.7	110
1																6 45.1	42 32	19.7	6 57.7	42 32	19.2	9 01.6	41 24	14.6	1
2																6 25.7	43 32	19.5	6 38.7	43 31	19.1	8 47.0	42 24	14.5	2
3																6 06.4	45 32	19.4	6 19.8	45 31	18.9	8 32.6	44 24	14.4	3
4																5 47.2	46 32	19.2	6 01.1	46 31	18.8	8 18.2	45 24	14.3	4
115																5 28.2	48 31	19.0	5 42.5	48 31	18.6	8 04.0	47 24	14.2	115
6																5 09.4	49 31	18.9	5 24.1	49 30	18.4	7 49.8	48 23	14.0	6
7																			5 05.9	50 30	18.3	7 35.9	50 23	13.9	7
8																						7 22.0	51 23	13.8	8
9																						7 08.3	52 23	13.6	9
120																						6 54.7	54 22	13.5	120
1																						6 41.3	55 22	13.3	1
2																						6 28.0	57 22	13.2	2
3																						6 14.8	58 22	13.0	3
4																						6 01.8	59 21	12.9	4
125																						5 49.0	61 21	12.7	125
6																						5 36.3	62 21	12.5	6
7																						5 23.8	63 21	12.4	7
8																						5 11.5	64 20	12.2	8

STAR IDENTIFICATION TABLE

ALTITUDE

Lat.
15°

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

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

STAR IDENTIFICATION TABLE

Lat. 15°

ALTITUDE

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

Lat
16°

L
1

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

Lat. 16°

H.A.	0° 00′				0° 30′				1° 00′				1° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	74 00.0	1.0	03	180.0	74 30.0	1.0	03	180.0	75 00.0	1.0	03	180.0	75 30.0	1.0	03	180.0
1	73 58.2	1.0	09	176.4	74 28.1	1.0	09	176.3	74 58.1	1.0	10	176.1	75 28.0	1.0	10	176.0
2	73 52.7	99	15	172.8	74 22.5	99	16	172.6	74 52.3	99	16	172.3	75 22.0	99	16	172.1
3	73 43.7	98	21	169.2	74 13.2	98	21	168.9	74 42.7	98	22	168.6	75 12.1	98	23	168.2
4	73 31.2	97	26	165.8	74 00.3	97	27	165.3	74 29.4	97	28	164.9	74 58.4	97	29	164.4
05	73 15.4	96	32	162.4	73 44.1	95	33	161.9	74 12.6	95	34	161.3	74 41.1	95	34	160.7
6	72 56.4	94	37	159.1	73 24.5	94	38	158.5	73 52.5	93	39	157.9	74 20.4	93	40	157.2
7	72 34.4	92	41	156.0	73 01.9	92	42	155.3	73 29.3	91	44	154.6	73 56.6	91	45	153.9
8	72 09.5	90	46	153.0	72 36.4	89	47	152.3	73 03.2	89	48	151.5	73 29.7	88	49	150.7
9	71 42.0	88	50	150.1	72 08.3	87	51	149.3	72 34.3	86	52	148.5	73 00.1	86	53	147.7
10	71 12.1	86	54	147.4	71 37.6	85	55	146.6	72 03.0	84	56	145.7	72 28.1	83	57	144.8
1	70 39.9	83	57	144.8	71 04.8	82	58	144.0	71 29.4	82	59	143.1	71 53.7	81	61	142.1
2	70 05.7	81	60	142.4	70 29.8	80	61	141.5	70 53.7	79	63	140.6	71 17.3	78	64	139.6
3	69 29.5	79	63	140.1	69 53.0	78	64	139.2	70 16.2	77	65	138.2	70 39.1	76	67	137.3
4	68 51.7	76	66	137.9	69 14.4	75	67	137.0	69 36.9	74	68	136.0	69 59.1	73	69	135.0
15	68 12.2	74	68	135.8	68 34.3	73	69	134.9	68 56.1	72	70	133.9	69 17.6	71	71	133.0
6	67 31.3	72	70	133.9	67 52.8	71	71	132.9	68 13.9	70	72	132.0	68 34.7	69	74	131.0
7	66 49.1	70	72	132.0	67 09.9	69	73	131.1	67 30.5	68	74	130.2	67 50.6	67	75	129.2
8	66 05.7	68	74	130.3	66 25.9	67	75	129.4	66 45.8	66	76	128.5	67 05.4	65	77	127.5
9	65 21.1	66	76	128.7	65 40.8	65	77	127.8	66 00.1	64	78	126.8	66 19.1	63	79	125.9
20	64 35.6	64	77	127.1	64 54.8	63	78	126.2	65 13.5	62	79	125.3	65 32.0	61	80	124.4
1	63 49.2	62	79	125.7	64 07.8	61	80	124.8	64 26.0	60	80	123.9	64 43.9	59	81	122.9
2	63 02.0	61	80	124.3	63 20.0	60	81	123.4	63 37.8	59	82	122.5	63 55.2	57	82	121.6
3	62 14.0	59	81	123.0	62 31.5	58	82	122.1	62 48.8	57	83	121.2	63 05.7	56	83	120.3
4	61 25.2	58	82	121.8	61 42.4	57	83	120.9	61 59.2	55	84	120.0	62 15.6	54	84	119.1
25	60 35.9	56	83	120.6	60 52.6	55	84	119.7	61 08.9	54	85	118.9	61 25.0	53	85	118.0
6	59 46.0	55	84	119.5	60 02.2	54	85	118.6	60 18.2	53	85	117.8	60 33.8	51	86	116.9
7	58 55.5	53	85	118.4	59 11.4	52	86	117.6	59 26.9	51	86	116.7	59 42.1	50	87	115.9
8	58 04.5	52	86	117.4	58 20.0	51	86	116.6	58 35.2	50	87	115.8	58 50.0	49	88	114.9
9	57 13.1	51	86	116.4	57 28.2	50	87	115.6	57 43.0	49	88	114.8	57 57.5	48	88	114.0
30	56 21.2	50	87	115.5	56 36.0	49	88	114.7	56 50.5	48	88	113.9	57 04.7	47	89	113.1
1	55 29.0	49	88	114.6	55 43.5	48	88	113.9	55 57.6	47	89	113.1	56 11.4	46	89	112.3
2	54 36.4	48	88	113.8	54 50.5	47	89	113.0	55 04.4	46	89	112.3	55 17.9	45	90	111.5
3	53 43.5	47	89	113.0	53 57.3	46	89	112.2	54 10.9	45	90	111.5	54 24.1	44	90	110.7
4	52 50.2	46	89	112.2	53 03.8	45	90	111.5	53 17.1	44	90	110.7	53 30.0	43	91	110.0
35	51 56.7	45	90	111.5	52 10.0	44	90	110.8	52 23.0	43	90	110.0	52 35.7	42	91	109.3
6	51 02.9	44	90	110.8	51 15.9	43	90	110.1	51 28.7	42	91	109.3	51 41.2	41	91	108.6
7	50 08.9	43	90	110.1	50 21.6	42	91	109.4	50 34.1	41	91	108.7	50 46.4	40	92	108.0
8	49 14.6	42	91	109.4	49 27.1	41	91	108.7	49 39.4	41	92	108.0	49 51.4	40	92	107.3
9	48 20.1	41	91	108.8	48 32.4	41	92	108.1	48 44.5	40	92	107.4	48 56.3	39	92	106.7
40	47 25.4	41	91	108.2	47 37.5	40	92	107.5	47 49.3	39	92	106.8	48 01.0	38	92	106.1
1	46 30.5	40	92	107.6	46 42.4	39	92	106.9	46 54.1	38	92	106.3	47 05.5	38	93	105.6
2	45 35.4	39	92	107.0	45 47.1	39	92	106.4	45 58.6	38	93	105.7	46 09.8	37	93	105.0
3	44 40.2	39	92	106.5	44 51.7	38	93	105.8	45 03.0	37	93	105.2	45 14.1	37	93	104.5
4	43 44.8	38	93	105.9	43 56.2	37	93	105.3	44 07.3	37	93	104.6	44 18.2	36	93	104.0
45	42 49.3	38	93	105.4	43 00.4	37	93	104.8	43 11.4	36	93	104.1	43 22.2	35	94	103.5
6	41 53.6	37	93	104.9	42 04.6	36	93	104.3	42 15.4	36	94	103.7	42 26.0	35	94	103.0
7	40 57.8	37	93	104.4	41 08.7	36	93	103.8	41 19.3	35	94	103.2	41 29.8	34	94	102.6
8	40 01.9	36	93	103.9	40 12.6	35	94	103.3	40 23.1	35	94	102.7	40 33.4	34	94	102.1
9	39 05.9	36	94	103.5	39 16.4	35	94	102.9	39 26.8	34	94	102.3	39 37.0	34	94	101.7
50	38 09.7	35	94	103.0	38 20.1	34	94	102.4	38 30.4	34	94	101.8	38 40.4	33	94	101.2
1	37 13.5	35	94	102.6	37 23.8	34	94	102.0	37 33.9	33	94	101.4	37 43.8	33	94	100.8
2	36 17.1	34	94	102.2	36 27.3	34	94	101.6	36 37.3	33	94	101.0	36 47.1	32	95	100.4
3	35 20.7	34	94	101.7	35 30.8	33	94	101.2	35 40.7	33	95	100.6	35 50.4	32	95	100.0
4	34 24.2	33	94	101.3	34 34.1	33	94	100.8	34 43.9	32	95	100.2	34 53.5	32	95	99.6
55	33 27.6	33	94	100.9	33 37.4	33	95	100.4	33 47.1	32	95	99.8	33 56.6	31	95	99.2
6	32 30.9	33	95	100.5	32 40.7	32	95	100.0	32 50.3	32	95	99.4	32 59.7	31	95	98.8
7	31 34.2	32	95	100.1	31 43.8	32	95	99.6	31 53.3	31	95	99.0	32 02.7	31	95	98.5
8	30 37.4	32	95	99.8	30 46.9	32	95	99.2	30 56.3	31	95	98.7	31 05.6	31	95	98.1
9	29 40.5	32	95	99.4	29 50.0	31	95	98.9	29 59.3	31	95	98.3	30 08.5	30	95	97.8
60	28 43.6	31	95	99.0	28 53.0	31	95	98.5	29 02.2	31	95	98.0	29 11.3	30	95	97.4
1	27 46.6	31	95	98.7	27 55.9	31	95	98.1	28 05.1	30	95	97.6	28 14.1	30	95	97.1
2	26 49.6	31	95	98.3	26 58.8	30	95	97.8	27 07.9	30	95	97.3	27 16.8	30	95	96.7
3	25 52.5	31	95	98.0	26 01.6	30	95	97.5	26 10.6	30	95	96.9	26 19.5	29	96	96.4
4	24 55.3	30	95	97.7	25 04.4	30	95	97.1	25 13.4	30	96	96.6	25 22.2	29	96	96.1
65	23 58.2	30	95	97.3	24 07.2	30	95	96.8	24 16.0	29	96	96.3	24 24.8	29	96	95.8
6	23 00.9	30	95	97.0	23 09.9	30	96	96.5	23 18.7	29	96	96.0	23 27.4	29	96	95.4
7	22 03.7	30	96	96.7	22 12.5	29	96	96.2	22 21.3	29	96	95.6	22 30.0	29	96	95.1
8	21 06.4	30	96	96.4	21 15.2	29	96	95.8	21 23.9	29	96	95.3	21 32.5	29	96	94.8
9	20 09.0	29	96	96.0	20 17.8	29	96	95.5	20 26.5	29	96	95.0	20 35.0	28	96	94.5
70	19 11.7	29	96	95.7	19 20.4	29	96	95.2	19 29.0	29	96	94.7	19 37.5	28	96	94.2
1	18 14.2	29	96	95.4	18 22.9	29	96	94.9	18 31.5	28	96	94.4	18 40.0	28	96	93.9
2	17 16.8	29	96	95.1	17 25.4	29	96	94.6	17 34.0	28	96	94.1	17 42.5	28	96	93.6
3	16 19.4	29	96	94.8	16 27.9	28	96	94.3	16 36.4	28	96	93.8	16 44.9	28	96	93.3
4	15 21.9	29	96	94.5	15 30.4	28	96	94.0	15 38.9	28	96	93.5	15 47.3	28	96	93.0
75	14 24.4	28	96	94.2	14 32.9	28	96	93.7	14 41.3	28	96	93.2	14 49.7	28	96	92.7
6	13 26.8	28	96	93.9	13 35.3	28	96	93.4	13 43.7	28	96	92.9	13 52.1	28	96	92.4
7	12 29.3	28	96	93.6	12 37.7	28	96	93.1	12 46.1	28	96	92.7	12 54.5	28	96	92.2
8	11 31.7	28	96	93.4	11 40.1	28	96	92.9	11 48.5	28	96	92.4	11 56.8	28	96	91.9
9	10 34.1	28	96	93.1	10 42.5	28	96	92.6	10 50.9	28	96	92.1	10 59.2	28	96	91.6
80	9 36.5	28	96	92.8	9 44.9	28	96	92.3	9 53.2	28	96	91.8	10 01.5	28	96	91.3
1	8 38.9	28	96	92.5	8 47.3	28	96	92.0	8 55.6	28	96	91.5	9 03.8	28	96	91.0
2	7 41.3	28	96	92.2	7 49.6	28	96	91.7	7 57.9	28	96	91.2	8 06.2	27	96	90.8
3	6 43.7	28	96	91.9	6 52.0	28	96	91.5	7 00.2	28	96	91.0	7 08.5	27	96	90.5
4	5 46.0	28	96	91.7	5 54.3	28	96	91.2	6 02.6	28	96	90.7	6 10.8	27	96	90.2
85									5 04.9	28	96	90.4	5 13.2	27	96	89.9

H.A.	2° 00′				2° 30′				3° 00′				3° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	76 00.0	1.0	03	180.0	76 30.0	1.0	04	180.0	77 00.0	1.0	04	180.0	77 30.0	1.0	04	180.0	00
1	75 57.9	1.0	10	175.9	76 27.9	1.0	11	175.7	76 57.8	1.0	11	175.6	77 27.7	1.0	12	175.4	1
2	75 51.7	99	17	171.8	76 21.4	99	18	171.5	76 51.1	99	18	171.2	77 20.8	99	19	170.9	2
3	75 41.5	98	24	167.8	76 10.8	98	24	167.4	76 40.1	98	25	166.9	77 09.4	97	26	166.4	3
4	75 27.4	96	30	163.9	75 56.2	96	31	163.3	76 25.0	96	32	162.7	76 53.7	96	33	162.1	4
05	75 09.5	94	36	160.1	75 37.8	94	37	159.5	76 06.0	94	38	158.8	76 34.1	93	39	158.0	05
6	74 48.2	92	41	156.5	75 15.8	92	42	155.8	75 43.3	91	43	155.0	76 10.6	91	45	154.1	6
7	74 23.6	90	46	153.1	74 50.6	89	47	152.2	75 17.3	89	49	151.4	75 43.8	88	50	150.4	7
8	73 56.1	88	51	149.8	74 22.2	87	52	148.9	74 48.1	86	53	148.0	75 13.8	85	55	147.0	8
9	73 25.8	85	55	146.8	73 51.1	84	56	145.8	74 16.2	83	57	144.8	74 41.0	82	59	143.8	9
10	72 52.9	82	58	143.9	73 17.5	81	60	142.9	73 41.8	80	61	141.9	74 05.7	79	63	140.8	10
1	72 17.8	80	62	141.2	72 41.6	79	63	140.1	73 05.0	78	65	139.1	73 28.2	76	66	138.0	1
2	71 40.7	77	65	138.6	72 03.6	76	66	137.6	72 26.3	75	68	136.5	72 48.6	74	69	135.4	2
3	71 01.6	75	68	136.3	71 23.9	74	69	135.2	71 45.7	72	70	134.1	72 07.2	71	72	133.0	3
4	70 21.0	72	70	134.0	70 42.4	71	72	133.0	71 03.6	70	73	131.9	71 24.3	68	74	130.8	4
15	69 38.8	70	73	132.0	69 59.5	69	74	130.9	70 19.9	67	75	129.8	70 39.9	66	76	128.7	15
6	68 55.2	68	75	130.0	69 15.3	66	76	129.0	69 35.0	65	77	127.9	69 54.3	64	78	126.8	6
7	68 10.5	65	76	128.2	68 29.9	64	77	127.2	68 49.0	63	78	126.1	69 07.6	61	80	125.0	7
8	67 24.6	63	78	126.5	67 43.4	62	79	125.5	68 01.9	61	80	124.4	68 19.9	59	81	123.3	8
9	66 37.7	61	80	124.9	66 56.0	60	80	123.9	67 13.8	59	81	122.9	67 31.3	57	82	121.8	9
20	65 50.0	60	81	123.4	66 07.7	58	82	122.4	66 25.0	57	83	121.4	66 41.9	56	84	120.3	20
1	65 01.5	58	82	122.0	65 18.6	57	83	121.0	65 35.4	55	84	120.0	65 51.8	54	85	119.0	1
2	64 12.2	56	83	120.7	64 28.8	55	84	119.7	64 45.1	54	85	118.7	65 01.0	52	86	117.7	2
3	63 22.3	55	84	119.4	63 38.4	53	85	118.5	63 54.2	52	86	117.5	64 09.7	51	86	116.5	3
4	62 31.7	53	85	118.2	62 47.5	52	86	117.3	63 02.8	51	87	116.3	63 17.8	49	87	115.4	4
25	61 40.6	52	86	117.1	61 55.9	50	87	116.2	62 10.9	49	87	115.3	62 25.5	48	88	114.3	25
6	60 49.0	50	87	116.0	61 04.0	49	87	115.1	61 18.5	48	88	114.2	61 32.7	47	89	113.3	6
7	59 57.0	49	87	115.0	60 11.5	48	88	114.2	60 25.7	47	89	113.3	60 39.5	45	89	112.4	7
8	59 04.5	48	88	114.1	59 18.7	47	89	113.2	59 32.6	46	89	112.3	59 46.0	44	90	111.5	8
9	58 11.7	47	89	113.2	58 25.5	46	89	112.3	58 39.0	44	90	111.5	58 52.2	43	90	110.6	9
30	57 18.5	46	89	112.3	57 32.0	45	90	111.5	57 45.2	43	90	110.6	57 58.1	42	91	109.8	30
1	56 25.0	45	90	111.5	56 38.2	44	90	110.7	56 51.1	42	91	109.8	57 03.7	41	91	109.0	1
2	55 31.2	44	90	110.7	55 44.1	43	91	109.9	55 56.7	42	91	109.1	56 09.0	40	91	108.3	2
3	54 37.1	43	91	109.9	54 49.7	42	91	109.2	55 02.1	41	91	108.4	55 14.1	40	92	107.6	3
4	53 42.7	42	91	109.2	53 55.1	41	91	108.4	54 07.3	40	92	107.7	54 19.1	39	92	106.9	4
35	52 48.2	41	91	108.5	53 00.3	40	92	107.8	53 12.2	39	92	107.0	53 23.8	38	92	106.2	35
6	51 53.4	40	92	107.9	52 05.3	39	92	107.1	52 17.0	38	92	106.4	52 28.3	37	93	105.6	6
7	50 58.4	39	92	107.2	51 10.1	39	92	106.5	51 21.5	38	93	105.8	51 32.7	37	93	105.0	7
8	50 03.2	39	92	106.6	50 14.7	38	93	105.9	50 25.9	37	93	105.2	50 36.9	36	93	104.4	8
9	49 07.8	38	93	106.0	49 19.2	37	93	105.3	49 30.2	36	93	104.6	49 41.0	35	93	103.9	9
40	48 12.3	37	93	105.4	48 23.4	37	93	104.7	48 34.3	36	93	104.0	48 44.9	35	94	103.3	40
1	47 16.7	37	93	104.9	47 27.6	36	93	104.2	47 38.3	35	94	103.5	47 48.7	34	94	102.8	1
2	46 20.9	36	93	104.4	46 31.6	35	94	103.7	46 42.2	35	94	103.0	46 52.4	34	94	102.3	2
3	45 24.9	36	93	103.8	45 35.5	35	94	103.2	45 45.9	34	94	102.5	45 56.0	33	94	101.8	3
4	44 28.9	35	94	103.3	44 39.3	34	94	102.7	44 49.5	34	94	102.0	44 59.5	33	94	101.4	4
45	43 32.7	35	94	102.9	43 43.0	34	94	102.2	43 53.1	33	94	101.6	44 02.9	33	94	100.9	45
6	42 36.4	34	94	102.4	42 46.6	34	94	101.7	42 56.5	33	94	101.1	43 06.3	32	95	100.5	6
7	41 40.0	34	94	101.9	41 50.1	33	94	101.3	41 59.9	32	95	100.7	42 09.5	32	95	100.0	7
8	40 43.5	33	94	101.5	40 53.5	33	94	100.9	41 03.2	32	95	100.2	41 12.7	31	95	99.6	8
9	39 47.0	33	94	101.0	39 56.8	32	95	100.4	40 06.4	32	95	99.8	40 15.8	31	95	99.2	9
50	38 50.3	33	95	100.6	39 00.0	32	96	100.0	39 09.5	31	95	99.4	39 18.8	31	95	98.8	50
1	37 53.6	32	95	100.2	38 03.2	32	96	99.6	38 12.6	31	95	99.0	38 21.8	30	95	98.4	1
2	36 56.8	32	95	99.8	37 06.3	31	95	99.2	37 15.6	31	95	98.6	37 24.7	30	95	98.0	2
3	35 59.9	32	95	99.4	36 09.3	31	95	98.8	36 18.5	30	95	98.2	36 27.6	30	95	97.6	3
4	35 03.0	31	95	99.0	35 12.3	31	95	98.4	35 21.4	30	95	97.9	35 30.4	30	95	97.3	4
55	34 06.0	31	95	98.6	34 15.2	30	95	98.1	34 24.3	30	95	97.5	34 33.1	29	95	96.9	55
6	33 09.0	31	95	98.3	33 18.1	30	95	97.7	33 27.0	30	95	97.1	33 35.9	29	96	96.6	6
7	32 11.9	30	95	97.9	32 20.9	30	95	97.3	32 29.8	29	96	96.8	32 38.5	29	96	96.2	7
8	31 14.7	30	95	97.6	31 23.7	30	95	97.0	31 32.5	29	96	96.4	31 41.2	29	96	95.9	8
9	30 17.5	30	95	97.2	30 26.4	29	96	96.7	30 35.2	29	96	96.1	30 43.8	28	96	95.5	9
60	29 20.3	30	95	96.9	29 29.1	29	96	96.3	29 37.8	29	96	95.8	29 46.4	28	96	95.2	60
1	28 23.0	29	96	96.5	28 31.8	29	96	96.0	28 40.4	29	96	95.4	28 48.9	28	96	94.9	1
2	27 25.7	29	96	96.2	27 34.4	29	96	95.7	27 43.0	28	96	95.1	27 51.4	28	96	94.6	2
3	26 28.3	29	96	95.9	26 37.0	29	96	95.3	26 45.5	28	96	94.8	26 53.9	28	96	94.3	3
4	25 30.9	29	96	95.5	25 39.5	29	96	95.0	25 48.0	28	96	94.5	25 56.4	28	96	93.9	4
65	24 33.5	29	96	95.2	24 42.1	28	96	94.7	24 50.5	28	96	94.2	24 58.9	28	96	93.6	65
6	23 36.0	29	96	94.9	23 44.6	28	96	94.4	23 53.0	28	96	93.9	24 01.3	28	96	93.3	6
7	22 38.6	28	96	94.6	22 47.0	28	96	94.1	22 55.4	28	96	93.6	23 03.7	27	96	93.0	7
8	21 41.1	28	96	94.3	21 49.5	28	96	93.8	21 57.9	28	96	93.3	22 06.1	27	96	92.7	8
9	20 43.5	28	96	94.0	20 51.9	28	96	93.5	21 00.3	28	96	93.0	21 08.5	27	96	92.5	9
70	19 46.0	28	96	93.7	19 54.4	28	96	93.2	20 02.7	27	96	92.7	20 10.9	27	96	92.2	70
1	18 48.4	28	96	93.4	18 56.8	28	96	92.9	19 05.0	27	96	92.4	19 13.2	27	96	91.9	1
2	17 50.9	28	96	93.1	17 59.2	28	96	92.6	18 07.4	27	96	92.1	18 15.6	27	96	91.6	2
3	16 53.3	28	96	92.8	17 01.5	28	96	92.3	17 09.8	27	96	91.8	17 17.9	27	96	91.3	3
4	15 55.6	28	96	92.5	16 03.9	27	96	92.0	16 12.1	27	96	91.5	16 20.2	27	96	91.0	4
75	14 58.0	28	96	92.2	15 06.3	27	96	91.7	15 14.5	27	96	91.2	15 22.6	27	96	90.7	75
6	14 00.4	28	96	92.0	14 08.6	27	96	91.5	14 16.8	27	96	91.0	14 24.9	27	96	90.5	6
7	13 02.7	28	96	91.7	13 11.0	27	96	91.2	13 19.1	27	96	90.7	13 27.2	27	96	90.2	7
8	12 05.1	27	96	91.4	12 13.3	27	96	90.9	12 21.4	27	96	90.4	12 29.6	27	96	89.9	8
9	11 07.4	27	96	91.1	11 15.6	27	96	90.6	11 23.8	27	96	90.1	11 31.9	27	96	89.6	9
80	10 09.7	27	96	90.8	10 17.9	27	96	90.3	10 26.1	27	96	89.9	10 34.2	27	96	89.4	80
1	9 12.1	27	96	90.6	9 20.3	27	96	90.1	9 28.4	27	96	89.6	9 36.5	27	96	89.1	1
2	8 14.4	27	96	90.3	8 22.6	27	96	89.8	8 30.7	27	96	89.3	8 38.9	27	96	88.8	2
3	7 16.7	27	96	90.0	7 24.9	27	96	89.5	7 33.1	27	96	89.0	7 41.2	27	96	88.5	3
4	6 19.0	27	96	89.7	6 27.2	27	96	89.2	6 35.4	27	96	88.8	6 43.6	27	96	88.3	4
85	5 21.4	27	96	89.5	5 29.6	27	96	89.0	5 37.8	27	96	88.5	5 45.9	27	96	88.0	85

H.A.	0° 00′			0° 30′			1° 00′			1° 30′			2° 00′			2° 30′			3° 00′			3° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	74 00.0	1.0 03	180.0	73 30.0	1.0 03	180.0	73 00.0	1.0 03	180.0	72 30.0	1.0 03	180.0	72 00.0	1.0 03	180.0	71 30.0	1.0 03	180.0	71 00.0	1.0 03	180.0	70 30.0	1.0 02	180.0	00
1	73 58.2	1.0 09	176.4	73 28.2	1.0 09	176.5	72 58.3	1.0 09	176.6	72 28.3	1.0 08	176.7	71 58.4	1.0 08	176.8	71 28.4	1.0 08	176.9	70 58.5	1.0 08	176.9	70 28.5	1.0 08	177.0	1
2	73 52.7	99 15	172.8	73 22.9	99 15	173.0	72 53.1	99 14	173.2	72 23.3	99 14	173.4	71 53.5	99 13	173.6	71 23.7	99 13	173.7	70 53.8	99 13	173.9	70 24.0	99 12	174.0	2
3	73 43.7	98 21	169.2	73 14.2	98 20	169.5	72 44.6	99 20	169.8	72 15.0	99 19	170.1	71 45.4	99 19	170.4	71 15.8	99 18	170.6	70 46.2	99 18	170.9	70 16.5	99 17	171.1	3
4	73 31.2	97 26	165.8	73 02.0	97 26	166.2	72 32.8	97 25	166.6	72 03.6	98 24	166.9	71 34.3	98 24	167.3	71 04.9	98 23	167.6	70 35.6	98 23	167.9	70 06.2	98 22	168.2	4
05	73 15.4	96 32	162.4	72 46.6	96 31	162.9	72 17.8	96 30	163.3	71 49.0	96 29	163.8	71 20.0	97 29	164.2	70 51.1	97 28	164.6	70 22.0	97 27	165.0	69 53.0	97 27	165.3	05
6	72 56.4	94 37	159.1	72 28.1	94 36	159.7	71 59.8	95 35	160.2	71 31.4	95 34	160.7	71 02.9	95 33	161.2	70 34.3	95 32	161.7	70 05.7	96 32	162.1	69 37.0	96 31	162.6	6
7	72 34.4	92 41	156.0	72 06.7	92 40	156.6	71 38.9	93 39	157.2	71 11.0	93 38	157.8	70 43.0	93 38	158.4	70 14.9	94 37	158.9	69 46.7	94 36	159.4	69 18.4	94 35	159.9	7
8	72 09.5	90 46	153.0	71 42.4	90 45	153.7	71 15.2	91 44	154.3	70 47.9	91 43	155.0	70 20.4	92 42	155.6	69 52.8	92 41	156.2	69 25.1	92 40	156.7	68 57.4	93 39	157.2	8
9	71 42.0	88 50	150.1	71 15.6	88 49	150.9	70 49.0	89 48	151.6	70 22.2	89 47	152.3	69 55.3	90 46	152.9	69 28.3	90 45	153.5	69 01.1	91 44	154.1	68 33.9	91 43	154.7	9
10	71 12.1	86 54	147.4	70 46.3	86 52	148.2	70 20.4	87 51	148.9	69 54.2	87 50	149.7	69 27.9	88 49	150.3	69 01.5	88 48	151.0	68 34.9	89 47	151.7	68 08.1	89 46	152.3	10
1	70 39.9	83 57	144.8	70 14.8	84 56	145.6	69 49.5	85 55	146.4	69 24.0	85 54	147.2	68 58.3	86 53	147.9	68 32.5	87 52	148.6	68 06.4	87 51	149.3	67 40.2	88 50	149.9	1
2	70 05.7	81 60	142.4	69 41.3	82 59	143.2	69 16.6	83 58	144.0	68 51.8	83 57	144.8	68 26.7	84 56	145.6	68 01.4	85 55	146.3	67 36.0	85 54	147.0	67 10.3	86 53	147.7	2
3	69 29.5	79 63	140.1	69 05.8	80 62	140.9	68 41.8	80 61	141.8	68 17.6	81 60	142.6	67 53.1	82 59	143.3	67 28.5	83 58	144.1	67 03.6	83 57	144.8	66 38.6	84 56	145.5	3
4	68 51.7	76 66	137.9	68 28.6	77 65	138.7	68 05.3	78 64	139.6	67 41.7	79 63	140.4	67 17.8	80 62	141.2	66 53.8	81 61	142.0	66 29.5	81 60	142.7	66 05.0	82 59	143.4	4
15	68 12.2	74 68	135.8	67 49.8	75 67	136.7	67 27.1	76 66	137.6	67 04.1	77 65	138.4	66 40.9	78 64	139.2	66 17.5	79 63	140.0	65 53.8	79 62	140.7	65 29.9	80 61	141.5	15
6	67 31.3	72 70	133.9	67 09.5	73 69	134.8	66 47.5	74 68	135.6	66 25.1	75 67	136.5	66 02.5	76 66	137.3	65 39.6	77 65	138.1	65 16.6	77 64	138.8	64 53.2	78 63	139.6	6
7	66 49.1	70 72	132.0	66 27.9	71 71	132.9	66 06.5	72 70	133.8	65 44.7	73 69	134.6	65 22.7	74 68	135.5	65 00.4	75 68	136.3	64 37.9	75 67	137.0	64 15.2	76 66	137.8	7
8	66 05.7	68 74	130.3	65 45.1	69 73	131.2	65 24.2	70 72	132.1	65 03.1	71 71	132.9	64 41.6	72 70	133.7	64 19.9	73 69	134.5	63 58.0	74 69	135.3	63 35.8	74 68	136.1	8
9	65 21.1	66 76	128.7	65 01.2	67 75	129.6	64 40.9	68 74	130.4	64 20.3	69 73	131.3	63 59.4	70 72	132.1	63 38.2	71 71	132.9	63 16.8	72 70	133.7	62 55.2	73 70	134.5	9
20	64 35.6	64 77	127.1	64 16.2	65 76	128.0	63 56.5	66 76	128.9	63 36.4	67 75	129.7	63 16.1	68 74	130.5	62 55.5	69 73	131.3	62 34.6	70 72	132.1	62 13.5	71 71	132.9	20
1	63 49.2	62 79	125.7	63 30.3	64 78	126.6	63 11.1	65 77	127.4	62 51.6	66 76	128.2	62 31.8	67 75	129.1	62 11.7	67 75	129.9	61 51.3	68 74	130.7	61 30.7	69 73	131.4	1
2	63 02.0	61 80	124.3	62 43.6	62 79	125.2	62 24.9	63 78	126.0	62 05.9	64 78	126.8	61 46.5	65 77	127.7	61 27.0	66 76	128.5	61 07.1	67 75	129.2	60 47.0	68 74	130.0	2
3	62 14.0	59 81	123.0	61 56.0	60 80	123.9	61 37.8	61 80	124.7	61 19.3	62 79	125.5	61 00.5	63 78	126.3	60 41.4	64 77	127.1	60 22.0	65 77	127.9	60 02.4	66 76	128.7	3
4	61 25.2	58 82	121.8	61 07.8	59 82	122.6	60 50.0	60 81	123.4	60 32.0	61 80	124.3	60 13.6	62 79	125.1	59 55.0	63 79	125.8	59 36.1	63 78	126.6	59 16.9	64 77	127.4	4
25	60 35.9	56 83	120.6	60 18.9	57 83	121.4	60 01.6	58 82	122.2	59 44.0	59 81	123.1	59 26.1	60 80	123.8	59 07.9	61 80	124.6	58 49.4	62 79	125.4	58 30.7	63 78	126.1	25
6	59 46.0	55 84	119.5	59 29.4	56 83	120.3	59 12.5	57 83	121.1	58 55.3	58 82	121.9	58 37.8	59 81	122.7	58 20.1	60 81	123.5	58 02.1	61 80	124.2	57 43.8	61 79	125.0	6
7	58 55.5	53 85	118.4	58 39.3	54 84	119.2	58 22.8	55 84	120.0	58 06.1	56 83	120.8	57 49.0	57 82	121.6	57 31.7	58 82	122.4	57 14.1	59 81	123.1	56 56.2	60 80	123.8	7
8	58 04.5	52 86	117.4	57 48.7	53 85	118.2	57 32.6	54 84	119.0	57 16.3	55 84	119.8	56 59.6	56 83	120.5	56 42.7	57 83	121.3	56 25.5	58 82	122.0	56 08.0	59 81	122.8	8
9	57 13.1	51 86	116.4	56 57.7	52 86	117.2	56 42.0	53 85	118.0	56 26.0	54 85	118.8	56 09.7	55 84	119.5	55 53.1	56 83	120.3	55 36.3	57 83	121.0	55 19.2	57 82	121.7	9
30	56 21.2	50 87	115.5	56 06.2	51 86	116.3	55 50.8	52 86	117.1	55 35.2	53 85	117.8	55 19.2	54 85	118.6	55 03.1	54 84	119.3	54 46.6	55 84	120.0	54 29.9	56 83	120.8	30
1	55 29.0	49 88	114.6	55 14.3	50 87	115.4	54 59.2	51 87	116.2	54 43.9	51 86	116.9	54 28.4	52 85	117.7	54 12.5	53 85	118.4	53 56.4	54 84	119.1	53 40.1	55 84	119.8	1
2	54 36.4	48 88	113.8	54 22.0	49 88	114.6	54 07.3	49 87	115.3	53 52.3	50 87	116.0	53 37.1	51 86	116.8	53 21.6	52 86	117.5	53 05.8	53 85	118.2	52 49.8	54 85	118.9	2
3	53 43.5	47 89	113.0	53 29.4	48 88	113.7	53 15.0	48 88	114.5	53 00.3	49 87	115.2	52 45.4	50 87	115.9	52 30.2	51 86	116.6	52 14.8	52 86	117.3	51 59.1	53 85	118.0	3
4	52 50.2	46 89	112.2	52 36.4	47 89	113.0	52 22.3	47 88	113.7	52 08.0	48 88	114.4	51 53.3	49 87	115.1	51 38.5	50 87	115.8	51 23.4	51 86	116.5	51 08.0	52 86	117.2	4
35	51 56.7	45 90	111.5	51 43.2	46 89	112.2	51 29.3	46 89	112.9	51 15.3	47 88	113.6	51 01.0	48 88	114.3	50 46.4	49 87	115.0	50 31.6	50 87	115.7	50 16.5	51 86	116.4	35
6	51 02.9	44 90	110.8	50 49.6	45 90	111.5	50 36.1	46 89	112.2	50 22.3	46 89	112.9	50 08.2	47 88	113.6	49 54.0	48 88	114.3	49 39.4	49 87	114.9	49 24.7	50 87	115.6	6
7	50 08.9	43 90	110.1	49 55.8	44 90	110.8	49 42.5	45 90	111.5	49 29.0	46 89	112.2	49 15.2	46 89	112.9	49 01.2	47 88	113.5	48 47.0	48 88	114.2	48 32.5	49 87	114.9	7
8	49 14.6	42 91	109.4	49 01.8	43 90	110.1	48 48.8	44 90	110.8	48 35.5	45 90	111.5	48 22.0	45 89	112.2	48 08.2	46 89	112.8	47 54.2	47 88	113.5	47 40.0	48 88	114.1	8
9	48 20.1	41 91	108.8	48 07.5	42 91	109.5	47 54.7	43 90	110.2	47 41.7	44 90	110.8	47 28.4	45 90	111.5	47 14.9	45 89	112.1	47 01.2	46 89	112.8	46 47.3	47 88	113.5	9
40	47 25.4	41 91	108.2	47 13.0	42 91	108.9	47 00.5	42 91	109.5	46 47.7	43 90	110.2	46 34.6	44 90	110.8	46 21.4	45 90	111.5	46 07.9	45 89	112.1	45 54.2	46 89	112.8	40
1	46 30.5	40 92	107.6	46 18.4	41 91	108.3	46 06.0	42 91	108.9	45 53.4	42 91	109.6	45 40.6	43 90	110.2	45 27.6	44 90	110.9	45 14.4	44 90	111.5	45 00.9	45 89	112.1	1
2	45 35.4	39 92	107.0	45 23.5	40 92	107.7	45 11.3	41 91	108.3	44 59.0	42 91	109.0	44 46.4	42 91	109.6	44 33.6	43 90	110.2	44 20.6	44 90	110.9	44 07.4	44 90	111.5	2
3	44 40.2	39 92	106.5	44 28.5	39 92	107.1	44 16.5	40 92	107.8	44 04.3	41 91	108.4	43 52.0	42 91	109.0	43 39.4	42 91	109.7	43 26.6	43 90	110.3	43 13.6	44 90	110.9	3
4	43 44.8	38 93	105.9	43 33.3	39 92	106.6	43 21.5	40 92	107.2	43 09.5	40 92	107.8	42 57.3	41 91	108.5	42 45.0	42 91	109.1	42 32.4	42 91	109.7	42 19.6	43 90	110.3	4
45	42 49.3	38 93	105.4	42 37.9	38 92	106.0	42 26.3	39 92	106.7	42 14.5	40 92	107.3	42 02.5	40 92	107.9	41 50.4	41 91	108.5	41 38.0	42 91	109.1	41 25.4	42 91	109.7	45
6	41 53.6	37 93	104.9	41 42.4	38 93	105.5	41 31.0	38 92	106.1	41 19.4	39 92	106.8	41 07.6	40 92	107.4	40 55.6	40 92	108.0	40 43.4	41 91	108.6	40 31.0	42 91	109.2	6
7	40 57.8	37 93	104.4	40 46.8	37 93	105.0	40 35.5	38 93	105.6	40 24.1	38 92	106.2	40 12.5	39 92	106.9	40 00.6	40 92	107.5	39 48.6	40 92	108.1	39 36.5	41 91	108.6	7
8	40 01.9	36 93	103.9	39 51.0	37 93	104.5	39 39.9	37 93	105.2	39 28.6	38 93	105.8	39 17.2	38 92	106.3	39 05.6	39 92	106.9	38 53.7	40 92	107.5	38 41.7	40 91	108.1	8
9	39 05.9	36 94	103.5	38 55.1	36 93	104.1	38 44.2	37 93	104.7	38 33.1	37 93	105.3	38 21.8	38 93	105.9	38 10.3	39 92	106.4	37 58.7	39 92	107.0	37 46.8	40 92	107.6	9
50	38 09.7	35 94	103.0	37 59.1	36 94	103.6	37 48.3	36 93	104.2	37 37.4	37 93	104.8	37 26.2	37 93	105.4	37 14.9	38 93	106.0	37 03.4	39 92	106.5	36 51.8	39 92	107.1	50
1	37 13.5	35 94	102.6	37 03.0	35 94	103.2	36 52.4	36 93	103.8	36 41.5	36 93	104.3	36 30.6	37 93	104.9	36 19.4	37 93	105.5	36 08.1	38 92	106.1	35 56.6	39 92	106.6	1
2	36 17.1	34 94	102.2	36 06.8	35 94	102.7	35 56.3	35 94	103.3	35 45.6	36 93	103.9	35 34.8	36 93	104.5	35 23.8	37 93	105.0	35 12.6	37 93	105.6	35 01.3	38 92	106.2	2
3	35 20.7	34 94	101.7	35 10.5	34 94	102.3	35 00.1	35 94	102.9	34 49.6	35 94	103.5	34 38.9	36 93	104.0	34 28.0	36 93	104.6	34 17.0	37 93	105.2	34 05.8	37 93	105.7	3
4	34 24.2	33 94	101.3	34 14.1	34 94	101.9	34 03.8	34 94	102.5	33 53.4	35 94	103.0	33 42.9	35 94	103.6	33 32.1	36 93	104.2	33 21.3	36 93	104.7	33 10.2	37 93	105.3	4
55	33 27.6	33 94	100.9	33 17.6	34 94	101.5	33 07.5	34 94	102.1	32 57.2	35 94	102.6	32 46.7	35 94	103.2	32 36.2	36 93	103.7	32 25.4	36 93	104.3	32 14.5	37 93	104.8	55
6	32 30.9	33 95	100.5	32 21.1	33 94	101.1	32 11.0	34 94	101.6	32 00.9	34 94	102.2	31 50.5	35 94	102.8	31 40.1	35 94	103.3	31 29.5	36 93	103.9	31 18.7	36 93	104.4	6
7	31 34.2	32 95	100.1	31 24.4	33 95	100.7	31 14.5	33 94	101.3	31 04.4	34 94	101.8	30 54.2	34 94	102.4	30 43.9	35 94	102.9	30 33.4	35 94	103.4	30 22.8	36 93	104.0	7
8	30 37.4	32 95	99.8	30 27.7	32 95	100.3	30 17.9	33 94	100.9	30 07.9	33 94	101.4	29 57.9	34 94	102.0	29 47.6	34 94	102.5	29 37.3	35 94	103.0	29 26.8	35 94	103.6	8
9	29 40.5	32 95	99.4	29 30.9	32 95	99.9	29 21.2	33 95	100.5	29 11.4	33 94	101.0	29 01.4	33 94	101.6	28 51.3	34 94	102.1	28 41.1	34 94	102.6	28 30.7	35 94	103.2	9
60	28 43.6	31 95	99.0	28 34.1	32 95	99.6	28 24.5	32 95	100.1	28 14.7	33 95	100.7	28 04.9	33 94	101.2	27 54.9	34 94	101.7	27 44.7	34 94	102.3	27 34.5	34 94	102.8	60
1	27 46.6	31 95	98.7	27 37.2	32 95	99.2	27 27.7	32 95	99.8	27 18.0	32 95	100.3	27 08.2	33 94	100.8	26 58.3	33 94	101.4	26 48.3	34 94	101.9	26 38.2	34 94	102.4	1
2	26 49.6	31 95	98.3	26 40.2	31 95	98.9	26 30.8	32 95	99.4	26 21.2	32 95	99.9	26 11.6	32 95	100.5	26 01.8	33 94	101.0	25 51.9	33 94	101.5	25 41.8	34 94	102.0	2
3	25 52.5	31 95	98.0	25 43.2	31 95	98.5	25 33.9	31 95	99.0	25 24.4	32 95	99.6	25 14.8	32 95	100.1	25 05.1	33 95	100.6	24 55.3	33 94	101.1	24 45.4	33 94	101.7	3
4	24 55.3	30 95	97.7	24 46.2	31 95	98.2	24 36.9	31 95	98.7	24 27.5	31 95	99.2	24 18.0	32 95	99.7	24 08.4	32 95	100.3	23 58.7	33 94	100.8	23 48.9	33 94	101.3	4
65	23 58.2	30 95	97.3	23 49.1	31 95	97.8	23 39.8	31 95	98.4	23 30.5	31 95	98.9	23 21.1	32 95	99.4	23 11.6	32 95	99.9	23 02.0	32 95	100.4	22 52.3	33 94	100.9	65
6	23 00.9	30 95	97.0	22 51.9	30 95	97.5	22 42.8	31 95	98.0	22 33.5	31 95	98.5	22 24.2	31 95	99.1	22 14.8	32 95	99.6	22 05.2	32 95	100.1	21 55.6	32 95	100.6	6
7	22 03.7	30 96	96.7	21 54.7	30 96	97.2	21 45.6	30 95	97.7	21 36.5	31 95	98.2	21 27.2	31 95	98.7	21 17.9	31 95	99.2	21 08.4	32 95	99.7	20 58.9	32 95	100.3	7
8	21 06.4	30 96	96.4	20 57.5	30 95	96.9	20 48.5	30 95	97.4	20 39.4	30 95	97.9	20 30.2	31 95	98.4	20 20.9	31 95	98.9	20 11.6	31 95	99.4	20 02.1	32 95	99.9	8
9	20 09.0	29 96	96.0	20 00.2	30 96	96.5	19 51.2	30 95	97.1	19 42.2	30 95	97.6	19 33.1	31 95	98.1	19 23.9	31 95	98.6	19 14.6	31 95	99.1	19 05.3	31 95	99.6	9
70	19 11.7	29 96	95.7	19 02.9	29 96	96.2	18 54.0	30 95	96.7	18 45.0	30 95	97.2	18 36.0	30 95	97.7	18 26.8	31 95	98.2	18 17.6	31 95	98.8	18 08.4	31 95	99.3	70
1	18 14.2	29 96	95.4	18 05.5	29 96	95.9	17 56.7	30 96	96.4	17 47.8	30 95	96.9	17 38.8	30 95	97.4	17 29.7	30 95	97.9	17 20.6	31 96	98.4	17 11.4	31 95	98.9	1
2	17 16.8	29 96	95.1	17 08.1	29 96	95.6	16 59.3	29 96	96.1	16 50.5	30 96	96.6	16 41.6	30 95	97.1	16 32.6	30 95	97.6	16 23.5	30 95	98.1	16 14.4	31 95	98.6	2
3	16 19.4	29 96	94.8	16 10.7	29 96	95.3	16 02.0	29 96	95.8	15 53.2	29 96	96.3	15 44.3	30 95	96.8	15 35.4	30 95	97.3	15 26.4	30 95	97.8	15 17.4	30 95	98.3	3
4	15 21.9	29 96	94.5	15 13.3	29 96	95.0	15 04.6	29 96	95.5	14 55.9	29 96	96.0	14 47.0	29 96	96.5	14 38.2	30 95	97.0	14 29.3	30 95	97.5	14 20.3	30 95	98.0	4
75	14 24.4	28 96	94.2	14 15.8	29 96	94.7	14 07.2	29 96	95.2	13 58.5	29 96	95.7	13 49.7	29 96	96.2	13 40.9	29 96	96.7	13 32.1	30 95	97.2	13 23.1	30 95	97.7	75
6	13 26.8	28 96	93.9	13 18.3	29 96	94.4	13 09.7	29 96	94.9	13 01.1	29 96	95.4	12 52.4	29 96	95.9	12 43.6	29 96	96.4	12 34.8	29 95	96.9	12 26.0	30 95	97.4	6
7	12 29.3	28 96	93.6	12 20.8	28 96	94.1	12 12.2	29 96	94.6	12 03.6	29 96	95.1	11 55.0	29 96	95.6	11 46.3	29 96	96.1	11 37.5	29 96	96.6	11 28.7	29 95	97.1	7
8	11 31.7	28 96	93.4	11 23.3	28 96	93.8	11 14.7	28 96	94.3	11 06.2	29 96	94.8	10 57.6	29 96	95.3	10 48.9	29 96	95.8	10 40.2	29 96	96.3	10 31.5	29 96	96.8	8
9	10 34.1	28 96	93.1	10 25.7	28 96	93.6	10 17.2	28 96	94.0	10 08.7	28 96	94.5	10 00.1	29 96	95.0	9 51.5	29 96	95.5	9 42.9	29 96	96.0	9 34.2	29 96	96.5	9
80	9 36.5	28 96	92.8	9 28.1	28 96	93.3	9 19.7	28 96	93.8	9 11.2	28 96	94.2	9 02.7	28 96	94.7	8 54.1	29 96	95.2	8 45.5	29 96	95.7	8 36.9	29 96	96.2	80
1	8 38.9	28 96	92.5	8 30.5	28 96	93.0	8 22.1	28 96	93.5	8 13.7	28 96	94.0	8 05.2	28 96	94.4	7 56.7	28 96	94.9	7 48.1	29 96	95.4	7 39.5	29 96	95.9	1
2	7 41.3	28 96	92.2	7 32.9	28 96	92.7	7 24.5	28 96	93.2	7 16.1	28 96	93.7	7 07.7	28 96	94.2	6 59.2	28 96	94.6	6 50.7	28 96	95.1	6 42.1	29 96	95.6	2
3	6 43.7	28 96	91.9	6 35.3	28 96	92.4	6 26.9	28 96	92.9	6 18.5	28 96	93.4	6 10.1	28 96	93.9	6 01.7	28 96	94.4	5 53.2	28 96	94.8	5 44.7	28 96	95.3	3
4	5 46.0	28 96	91.7	5 37.7	28 96	92.1	5 29.3	28 96	92.6	5 21.0	28 96	93.1	5 12.6	28 96	93.6	5 04.2	28 96	94.1							4

H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	78 00.0	1.0 04	180.0	78 30.0	1.0 04	180.0	79 00.0	1.0 04	180.0	79 30.0	1.0 05	180.0	80 00.0	1.0 05	180.0	80 30.0	1.0 05	180.0	81 00.0	1.0 05	180.0	81 30.0	1.0 06	180.0	00
1	77 57.6	1.0 12	175.2	78 27.5	1.0 12	175.0	78 57.4	1.0 13	174.8	79 27.3	1.0 14	174.6	79 57.1	1.0 14	174.3	80 27.0	99 15	174.0	80 56.8	99 16	173.7	81 26.6	99 17	173.3	1
2	77 50.4	99 20	170.5	78 20.0	99 20	170.1	78 49.6	98 21	169.7	79 19.1	98 22	169.2	79 48.6	98 23	168.7	80 18.0	98 24	168.1	80 47.4	98 26	167.5	81 16.7	98 27	166.8	2
3	77 38.6	97 27	165.9	78 07.7	97 28	165.3	78 36.8	97 29	164.7	79 05.7	96 30	164.0	79 34.6	96 32	163.3	80 03.4	96 33	162.5	80 32.0	95 35	161.6	81 00.5	95 36	160.6	3
4	77 22.3	95 34	161.4	77 50.8	96 35	160.7	78 19.2	94 37	159.9	78 47.4	94 38	159.1	79 15.5	93 40	158.1	79 43.4	93 41	157.1	80 11.1	92 43	156.0	80 38.6	91 45	154.8	4
05	77 02.0	93 40	157.2	77 29.7	92 42	156.3	77 57.3	92 43	155.4	78 24.7	91 45	154.4	78 51.8	90 46	153.3	79 18.7	89 48	152.2	79 45.3	88 50	150.9	80 11.6	87 52	149.5	05
6	76 37.8	90 46	153.2	77 04.7	89 48	152.2	77 31.4	89 49	151.2	77 57.8	88 51	150.1	78 23.9	87 53	148.9	78 49.7	85 54	147.6	79 15.2	84 56	146.2	79 40.3	83 59	144.7	6
7	76 10.1	87 51	149.4	76 36.1	86 53	148.4	77 01.8	85 55	147.3	77 27.3	84 56	146.1	77 52.3	83 58	144.8	78 17.0	82 60	143.4	78 41.3	80 62	141.9	79 05.2	79 64	140.3	7
8	75 39.2	84 56	145.9	76 04.3	83 58	144.8	76 29.1	82 59	143.6	76 53.5	81 61	142.4	77 17.5	79 63	141.0	77 41.1	78 65	139.6	78 04.2	76 66	138.1	78 26.8	74 68	136.5	8
9	75 05.5	81 60	142.7	75 29.7	80 62	141.5	75 53.5	79 63	140.3	76 16.9	77 65	139.0	76 39.9	76 67	137.6	77 02.4	74 68	136.1	77 24.4	72 70	134.6	77 45.8	70 72	133.0	9
10	74 29.3	78 64	139.6	74 52.6	77 66	138.4	75 15.4	75 67	137.2	75 37.9	74 69	135.9	75 59.8	72 70	134.5	76 21.3	71 72	133.0	76 42.2	69 74	131.5	77 02.6	67 75	129.8	10
1	73 50.9	75 67	136.8	74 13.3	74 69	135.6	74 35.2	72 70	134.3	74 56.7	71 72	133.0	75 17.7	69 73	131.6	75 38.1	67 75	130.2	75 58.1	65 76	128.6	76 17.4	63 78	127.0	1
2	73 10.5	72 70	134.2	73 32.0	71 72	133.0	73 53.0	69 73	131.7	74 13.6	68 74	130.4	74 33.7	66 76	129.0	74 53.2	64 77	127.6	75 12.2	62 79	126.1	75 30.6	60 80	124.5	2
3	72 28.3	70 73	131.8	72 49.0	68 74	130.6	73 09.2	67 76	129.4	73 28.9	65 77	128.0	73 48.1	63 78	126.7	74 06.8	61 80	125.3	74 24.9	59 81	123.8	74 42.4	57 82	122.3	3
4	71 44.6	67 75	129.6	72 04.5	66 76	128.4	72 23.9	64 78	127.2	72 42.8	62 79	125.9	73 01.2	60 80	124.5	73 19.1	59 81	123.1	73 36.4	57 83	121.7	73 53.1	55 84	120.2	4
15	70 59.5	65 77	127.6	71 18.7	63 78	126.4	71 37.3	61 80	125.1	71 55.5	60 81	123.9	72 13.2	58 82	122.6	72 30.3	56 83	121.2	72 46.8	54 84	119.8	73 02.8	52 85	118.4	15
6	70 13.2	62 79	125.7	70 31.7	61 80	124.5	70 49.6	59 81	123.3	71 07.1	57 82	122.0	71 24.1	56 83	120.7	71 40.5	54 84	119.4	71 56.4	52 85	118.1	72 11.6	50 86	116.7	6
7	69 25.8	60 81	123.9	69 43.6	58 82	122.7	70 00.9	57 83	121.5	70 17.7	55 84	120.3	70 34.1	54 85	119.1	70 49.8	52 86	117.8	71 05.1	50 87	116.5	71 19.7	48 88	115.1	7
8	68 37.5	58 82	122.2	68 54.7	56 83	121.1	69 11.4	55 84	119.9	69 27.6	53 85	118.8	69 43.3	52 86	117.5	69 58.5	50 87	116.3	70 13.1	48 88	115.0	70 27.2	46 88	113.7	8
9	67 48.3	56 83	120.7	68 04.9	55 84	119.6	68 21.0	53 85	118.5	68 36.7	51 86	117.3	68 51.8	50 87	116.1	69 06.5	48 88	114.9	69 20.6	46 88	113.7	69 34.1	44 89	112.4	9
20	66 58.4	54 84	119.3	67 14.4	53 85	118.2	67 30.0	51 86	117.1	67 45.1	50 87	116.0	67 59.7	48 88	114.8	68 13.9	46 88	113.6	68 27.5	45 89	112.4	68 40.6	43 90	111.2	20
1	66 07.7	52 85	117.9	66 23.2	51 86	116.9	66 38.3	50 87	115.8	66 53.0	48 88	114.7	67 07.1	46 88	113.6	67 20.8	45 89	112.4	67 33.9	43 90	111.2	67 46.6	41 91	110.0	1
2	65 16.5	51 86	116.7	65 31.5	49 87	115.7	65 46.1	48 88	114.6	66 00.3	46 88	113.5	66 14.0	45 89	112.4	66 27.2	43 90	111.3	66 40.0	42 91	110.2	66 52.2	40 91	109.0	2
3	64 24.7	49 87	115.5	64 39.3	48 88	114.5	64 53.5	47 89	113.5	65 07.2	45 89	112.4	65 20.5	44 90	111.3	65 33.3	42 90	110.3	65 45.7	40 91	109.2	65 57.5	39 92	108.0	3
4	63 32.4	48 88	114.4	63 46.6	47 89	113.4	64 00.3	45 89	112.4	64 13.7	44 90	111.4	64 26.6	42 90	110.3	64 39.0	41 91	109.3	64 51.0	39 92	108.2	65 02.6	38 92	107.1	4
25	62 39.7	47 89	113.4	62 53.4	45 89	112.4	63 06.8	44 90	111.4	63 19.8	43 90	110.4	63 32.3	41 91	109.4	63 44.4	40 91	108.4	63 56.1	38 92	107.3	64 07.3	37 92	106.3	25
6	61 46.5	45 89	112.4	61 59.9	44 90	111.4	62 13.0	43 90	110.5	62 25.6	41 91	109.5	62 37.8	40 91	108.5	62 49.6	39 92	107.5	63 00.9	37 92	106.5	63 11.8	36 93	105.5	6
7	60 53.0	44 90	111.5	61 06.1	43 90	110.5	61 18.8	42 91	109.6	61 31.1	40 91	108.6	61 43.0	39 92	107.7	61 54.4	38 92	106.7	62 05.5	36 93	105.7	62 16.1	35 93	104.7	7
8	59 59.2	43 90	110.6	60 11.9	42 91	109.7	60 24.3	41 91	108.7	60 36.3	39 92	107.8	60 47.9	38 92	106.9	60 59.1	37 93	105.9	61 09.9	35 93	104.9	61 20.3	34 93	104.0	8
9	59 05.0	42 91	109.7	59 17.5	41 91	108.8	59 29.5	40 92	107.9	59 41.3	38 92	107.0	59 52.6	37 93	106.1	60 03.5	36 93	105.2	60 14.1	34 93	104.2	60 24.2	33 94	103.3	9
30	58 10.6	41 91	108.9	58 22.8	40 92	108.1	58 34.6	39 92	107.2	58 46.0	38 92	106.3	58 57.1	36 93	105.4	59 07.8	35 93	104.5	59 18.1	34 94	103.6	59 28.0	32 94	102.6	30
1	57 15.9	40 92	108.2	57 27.8	39 92	107.3	57 39.4	38 92	106.5	57 50.5	37 93	105.6	58 01.4	36 93	104.7	58 11.8	34 93	103.8	58 21.9	33 94	102.9	58 31.6	32 94	102.0	1
2	56 21.0	39 92	107.4	56 32.6	38 92	106.6	56 43.9	37 93	105.8	56 54.9	36 93	104.9	57 05.5	35 93	104.1	57 15.8	34 94	103.2	57 25.7	32 94	102.3	57 35.2	31 94	101.4	2
3	55 25.9	39 92	106.8	55 37.3	37 93	105.9	55 48.3	36 93	105.1	55 59.1	35 93	104.3	56 09.5	34 94	103.4	56 19.5	33 94	102.6	56 29.2	32 94	101.7	56 38.6	31 94	100.9	3
4	54 30.5	38 92	106.1	54 41.7	37 93	105.3	54 52.6	36 93	104.5	55 03.1	35 94	103.7	55 13.3	33 94	102.8	55 23.2	32 94	102.0	55 32.7	31 94	101.2	55 41.9	30 95	100.3	4
35	53 35.0	37 93	105.5	53 46.0	36 93	104.7	53 56.7	35 93	103.9	54 07.0	34 94	103.1	54 17.0	33 94	102.3	54 26.7	32 94	101.5	54 36.1	31 95	100.6	54 45.1	30 96	99.8	35
6	52 39.4	36 93	104.8	52 50.1	35 93	104.1	53 00.6	34 94	103.3	53 10.8	33 94	102.5	53 20.6	32 94	101.7	53 30.1	31 94	100.9	53 39.4	30 96	100.1	53 48.2	29 96	99.3	6
7	51 43.5	36 93	104.3	51 54.1	35 94	103.5	52 04.4	34 94	102.7	52 14.4	33 94	102.0	52 24.1	32 94	101.2	52 33.5	31 95	100.4	52 42.5	30 95	99.6	52 51.3	29 96	98.8	7
8	50 47.6	35 94	103.7	50 58.0	34 94	102.9	51 08.1	33 94	102.2	51 17.9	32 94	101.4	51 27.5	31 95	100.7	51 36.7	30 96	99.9	51 45.6	29 96	99.2	51 54.3	28 95	98.4	8
9	49 51.5	35 94	103.1	50 01.7	34 94	102.4	50 11.7	33 94	101.7	50 21.3	32 94	100.9	50 30.7	31 95	100.2	50 39.8	30 95	99.4	50 48.6	29 95	98.7	50 57.2	28 95	97.9	9
40	48 55.3	34 94	102.6	49 05.3	33 94	101.9	49 15.1	32 94	101.2	49 24.7	31 96	100.5	49 33.9	30 95	99.7	49 42.9	29 95	99.0	49 51.6	29 95	98.2	50 00.0	28 95	97.5	40
1	47 58.9	34 94	102.1	48 08.8	33 94	101.4	48 18.5	32 95	100.7	48 27.9	31 95	100.0	48 37.0	30 95	99.3	48 45.9	29 96	98.5	48 54.5	28 96	97.8	49 02.8	27 95	97.1	1
2	47 02.5	33 94	101.6	47 12.3	32 94	100.9	47 21.8	31 95	100.2	47 31.1	30 95	99.5	47 40.1	30 95	98.8	47 48.8	29 95	98.1	47 57.3	28 95	97.4	48 05.5	27 96	96.7	2
3	46 05.9	33 94	101.1	46 15.6	32 95	100.5	46 25.0	31 95	99.8	46 34.1	30 95	99.1	46 43.1	29 96	98.4	46 51.7	28 96	97.7	47 00.1	28 95	97.0	47 08.2	27 96	96.3	3
4	45 09.3	32 95	100.7	45 18.8	31 96	100.0	45 28.1	31 96	99.3	45 37.2	30 95	98.7	45 46.0	29 95	98.0	45 54.5	28 95	97.3	46 02.8	27 96	96.6	46 10.9	26 96	95.9	4
45	44 12.6	32 96	100.2	44 22.0	31 96	99.6	44 31.2	30 95	98.9	44 40.1	29 95	98.2	44 48.8	29 95	97.6	44 57.3	28 95	96.9	45 05.5	27 96	96.2	45 13.5	26 96	95.5	45
6	43 15.8	31 96	99.8	43 25.1	31 95	99.1	43 34.2	30 95	98.5	43 43.0	29 95	97.8	43 51.6	28 95	97.2	44 00.0	28 96	96.5	44 08.2	27 96	95.8	44 16.1	26 96	95.2	6
7	42 18.9	31 95	99.4	42 28.1	30 95	98.7	42 37.1	30 95	98.1	42 45.8	29 95	97.4	42 54.4	28 96	96.8	43 02.7	27 96	96.1	43 10.8	27 96	95.5	43 18.6	26 96	94.8	7
8	41 22.0	31 95	99.0	41 31.1	30 95	98.3	41 40.0	29 95	97.7	41 48.6	29 95	97.0	41 57.1	28 96	96.4	42 05.3	27 96	95.8	42 13.3	26 96	95.1	42 21.1	26 96	94.5	8
9	40 25.0	30 95	98.6	40 34.0	30 95	97.9	40 42.8	29 95	97.3	40 51.4	28 96	96.7	40 59.7	28 96	96.0	41 07.9	27 96	95.4	41 15.9	26 96	94.8	41 23.6	25 96	94.1	9
50	39 27.9	30 95	98.2	39 36.8	29 95	97.5	39 45.5	29 95	96.9	39 54.1	28 96	96.3	40 02.4	27 96	95.7	40 10.5	27 96	95.0	40 18.4	26 96	94.4	40 26.1	25 96	93.8	50
1	38 30.8	30 95	97.8	38 39.6	29 95	97.2	38 48.3	28 96	96.6	38 56.7	28 96	95.9	39 05.0	27 96	95.3	39 13.0	27 96	94.7	39 20.9	26 96	94.1	39 28.5	25 96	93.5	1
2	37 33.6	29 95	97.4	37 42.4	29 96	96.8	37 50.9	28 96	96.2	37 59.3	28 95	95.6	38 07.5	27 96	95.0	38 15.5	26 96	94.4	38 23.3	26 96	93.8	38 30.9	25 96	93.1	2
3	36 36.4	29 95	97.0	36 45.1	29 96	96.4	36 53.6	28 96	95.8	37 01.9	27 96	95.2	37 10.0	27 96	94.6	37 18.0	26 96	94.0	37 25.8	26 96	93.4	37 33.3	25 96	92.8	3
4	35 39.1	29 96	96.7	35 47.8	28 96	96.1	35 56.2	28 96	95.5	36 04.5	27 96	94.9	36 12.5	27 96	94.3	36 20.4	26 96	93.7	36 28.2	25 96	93.1	36 35.7	25 96	92.5	4
55	34 41.8	29 96	96.3	34 50.4	28 96	95.7	34 58.8	28 96	95.2	35 07.0	27 96	94.6	35 15.0	27 96	94.0	35 22.9	26 96	93.4	35 30.6	25 96	92.8	35 38.1	25 96	92.2	55
6	33 44.5	29 96	96.0	33 53.0	28 96	95.4	34 01.3	27 96	94.8	34 09.5	27 96	94.2	34 17.5	26 96	93.7	34 25.3	26 96	93.1	34 33.0	25 96	92.5	34 40.5	25 96	91.9	6
7	32 47.1	28 96	95.6	32 55.5	28 96	95.1	33 03.8	27 96	94.5	33 11.9	27 96	93.9	33 19.9	26 96	93.4	33 27.7	26 96	92.8	33 35.3	25 96	92.2	33 42.8	25 96	91.6	7
8	31 49.7	28 96	95.3	31 58.1	28 96	94.7	32 06.3	27 96	94.2	32 14.4	27 96	93.6	32 22.3	26 96	93.0	32 30.1	26 96	92.5	32 37.7	25 96	91.9	32 45.2	25 96	91.3	8
9	30 52.3	28 96	95.0	31 00.6	28 96	94.4	31 08.8	27 96	93.9	31 16.8	27 96	93.3	31 24.7	26 96	92.7	31 32.5	26 96	92.2	31 40.0	25 96	91.6	31 47.5	25 96	91.0	9
60	29 54.8	28 96	94.7	30 03.1	27 96	94.1	30 11.2	27 96	93.5	30 19.2	26 96	93.0	30 27.1	26 96	92.4	30 34.8	25 96	91.9	30 42.4	25 96	91.3	30 49.8	25 96	90.7	60
1	28 57.3	28 96	94.3	29 05.5	27 96	93.8	29 13.7	27 96	93.2	29 21.6	26 96	92.7	29 29.5	26 96	92.1	29 37.2	25 96	91.6	29 44.7	25 96	91.0	29 52.1	24 96	90.5	1
2	27 59.8	28 96	94.0	28 08.0	27 96	93.5	28 16.1	27 96	92.9	28 24.0	26 96	92.4	28 31.8	26 96	91.8	28 39.5	25 96	91.3	28 47.1	25 96	90.7	28 54.5	24 96	90.2	2
3	27 02.2	27 96	93.7	27 10.4	27 96	93.2	27 18.5	27 96	92.6	27 26.4	26 96	92.1	27 34.2	26 96	91.5	27 41.8	25 96	91.0	27 49.4	25 96	90.5	27 56.8	24 96	89.9	3
4	26 04.7	27 96	93.4	26 12.8	27 96	92.9	26 20.8	27 96	92.3	26 28.7	26 96	91.8	26 36.5	26 96	91.3	26 44.2	25 96	90.7	26 51.7	25 96	90.2	26 59.1	24 96	89.6	4
65	25 07.1	27 96	93.1	25 15.2	27 96	92.6	25 23.2	26 96	92.0	25 31.1	26 96	91.5	25 38.9	26 96	91.0	25 46.5	25 96	90.4	25 54.0	25 96	89.9	26 01.4	25 96	89.4	65
6	24 09.5	27 96	92.8	24 17.6	27 96	92.3	24 25.6	26 96	91.8	24 33.4	26 96	91.2	24 41.2	26 96	90.7	24 48.8	25 96	90.2	24 56.4	25 96	89.6	25 03.8	25 96	89.1	6
7	23 11.9	27 96	92.5	23 19.9	27 96	92.0	23 27.9	26 96	91.5	23 35.8	26 96	90.9	23 43.5	26 96	90.4	23 51.2	25 96	89.9	23 58.7	25 96	89.4	24 06.1	25 96	88.8	7
8	22 14.2	27 96	92.2	22 22.3	27 96	91.7	22 30.2	26 96	91.2	22 38.1	26 96	90.7	22 45.8	26 96	90.1	22 53.5	25 96	89.6	23 01.0	25 96	89.1	23 08.4	25 96	88.6	8
9	21 16.6	27 96	91.9	21 24.6	27 96	91.4	21 32.6	26 96	90.9	21 40.4	26 96	90.4	21 48.2	26 96	89.9	21 55.8	25 96	89.3	22 03.3	25 96	88.8	22 10.8	25 96	88.3	9
70	20 19.0	27 96	91.6	20 27.0	27 96	91.1	20 34.9	26 96	90.6	20 42.7	26 96	90.1	20 50.5	26 96	89.6	20 58.1	25 96	89.1	21 05.7	25 96	88.6	21 13.1	25 96	88.0	70
1	19 21.3	27 96	91.4	19 29.3	27 96	90.9	19 37.2	26 96	90.3	19 45.1	26 96	89.8	19 52.8	26 96	89.3	20 00.5	25 96	88.8	20 08.0	25 96	88.3	20 15.5	25 96	87.8	1
2	18 23.6	27 96	91.1	18 31.6	27 96	90.6	18 39.6	26 96	90.1	18 47.4	26 96	89.6	18 55.1	26 96	89.0	19 02.8	25 96	88.5	19 10.4	25 96	88.0	19 17.9	25 96	87.5	2
3	17 26.0	27 96	90.8	17 34.0	27 96	90.3	17 41.9	26 96	89.8	17 49.7	26 96	89.3	17 57.5	26 96	88.8	18 05.2	25 96	88.3	18 12.8	25 96	87.8	18 20.3	25 96	87.2	3
4	16 28.3	27 96	90.5	16 36.3	27 96	90.0	16 44.2	26 96	89.5	16 52.0	26 96	89.0	16 59.8	26 96	88.5	17 07.5	26 96	88.0	17 15.1	25 96	87.5	17 22.7	25 96	87.0	4
75	15 30.6	27 96	90.2	15 38.6	27 96	89.7	15 46.5	26 96	89.2	15 54.4	26 96	88.7	16 02.2	26 96	88.2	16 09.9	26 96	87.7	16 17.5	25 96	87.2	16 25.1	25 96	86.7	75
6	14 33.0	27 96	90.0	14 40.9	27 96	89.5	14 48.9	26 96	89.0	14 56.7	26 96	88.5	15 04.5	26 96	88.0	15 12.2	26 96	87.5	15 19.9	25 96	87.0	15 27.5	25 96	86.5	6
7	13 35.3	27 96	89.7	13 43.3	27 96	89.2	13 51.2	26 96	88.7	13 59.1	26 96	88.2	14 06.9	26 96	87.7	14 14.6	26 96	87.2	14 22.3	26 96	86.7	14 29.9	25 96	86.2	7
8	12 37.6	27 96	89.4	12 45.6	27 96	88.9	12 53.5	26 96	88.4	13 01.4	26 96	87.9	13 09.3	26 96	87.4	13 17.0	26 96	86.9	13 24.7	26 96	86.4	13 32.4	25 96	86.0	8
9	11 39.9	27 96	89.1	11 47.9	27 96	88.7	11 55.9	26 96	88.2	12 03.8	26 96	87.7	12 11.6	26 96	87.2	12 19.4	26 96	86.7	12 27.2	26 96	86.2	12 34.9	26 96	85.7	9
80	10 42.3	27 96	88.9	10 50.3	27 96	88.4	10 58.3	26 96	87.9	11 06.2	26 96	87.4	11 14.0	26 96	86.9	11 21.9	26 96	86.4	11 29.7	26 96	85.9	11 37.4	26 96	85.4	80
1	9 44.6	27 96	88.6	9 52.6	27 96	88.1	10 00.6	27 96	87.6	10 08.6	26 96	87.1	10 16.5	26 96	86.6	10 24.3	26 96	86.2	10 32.1	26 96	85.7	10 39.9	26 96	85.2	1
2	8 46.9	27 96	88.3	8 55.0	27 96	87.8	9 03.0	27 96	87.4	9 11.0	26 96	86.9	9 18.9	26 96	86.4	9 26.8	26 96	85.9	9 34.6	26 96	85.4	9 42.4	26 96	84.9	2
3	7 49.3	27 96	88.1	7 57.4	27 96	87.6	8 05.4	27 96	87.1	8 13.4	27 96	86.6	8 21.3	26 96	86.1	8 29.3	26 96	85.6	8 37.2	26 96	85.1	8 45.0	26 96	84.6	3
4	6 51.7	27 96	87.8	6 59.7	27 96	87.3	7 07.8	27 96	86.8	7 15.8	27 96	86.3	7 23.8	27 96	85.8	7 31.8	26 96	85.4	7 39.7	26 96	84.9	7 47.6	26 96	84.4	4
85	5 54.0	27 96	87.5	6 02.1	27 96	87.0	6 10.2	27 96	86.5	6 18.3	27 96	86.1	6 26.3	27 96	85.6	6 34.3	27 96	85.1	6 42.3	27 96	84.6	6 50.2	26 96	84.1	85
6				5 04.5	27 96	86.8	5 12.7	27 96	86.3	5 20.7	27 96	85.8	5 28.8	27 96	85.3	5 36.8	27 96	84.8	5 44.9	27 96	84.3	5 52.8	27 96	83.9	6

Lat. 16°

H.A.	4° 00′				4° 30′				5° 00′				5° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	70 00.0	1.0	02	180.0	69 30.0	1.0	02	180.0	69 00.0	1.0	02	180.0	68 30.0	1.0	02	180.0
1	69 58.5	1.0	07	177.1	69 28.6	1.0	07	177.2	68 58.6	1.0	07	177.2	68 28.6	1.0	07	177.3
2	69 54.1	1.0	12	174.2	69 24.3	1.0	12	174.3	68 54.4	1.0	12	174.5	68 24.5	1.0	11	174.6
3	69 46.9	99	17	171.3	69 17.2	99	16	171.5	68 47.5	99	16	171.7	68 17.8	99	16	171.9
4	69 36.7	98	21	168.5	69 07.3	98	21	168.7	68 37.8	98	20	169.0	68 08.3	98	20	169.3
05	69 23.8	97	26	165.7	68 54.7	97	25	166.0	68 25.5	97	25	166.3	67 56.3	97	24	166.6
6	69 08.3	96	30	163.0	68 39.5	96	30	163.4	68 10.6	96	29	163.7	67 41.7	96	28	164.1
7	68 50.1	95	34	160.3	68 21.7	95	34	160.8	67 53.2	95	33	161.2	67 24.7	95	32	161.6
8	68 29.5	93	38	157.7	68 01.5	93	38	158.2	67 33.4	94	37	158.7	67 05.3	94	36	159.2
9	68 06.5	92	42	155.3	67 39.0	92	41	155.8	67 11.4	92	40	156.3	66 43.7	92	40	156.8
10	67 41.2	90	46	152.9	67 14.2	90	45	153.4	66 47.1	91	44	154.0	66 19.9	91	43	154.5
1	67 13.9	88	49	150.5	66 47.4	89	48	151.1	66 20.8	89	47	151.7	65 54.0	89	46	152.3
2	66 44.5	86	52	148.3	66 18.6	87	51	148.9	65 52.5	87	50	149.6	65 26.2	88	49	150.1
3	66 13.3	84	55	146.2	65 47.9	85	54	146.8	65 22.4	85	53	147.5	64 56.6	86	52	148.1
4	65 40.4	83	58	144.1	65 15.5	83	57	144.8	64 50.5	84	56	145.5	64 25.3	84	55	146.1
15	65 05.8	81	60	142.2	64 41.5	81	59	142.9	64 17.0	82	58	143.5	63 52.3	83	57	144.2
6	64 29.7	79	63	140.3	64 05.9	80	62	141.0	63 42.0	80	61	141.7	63 17.8	81	60	142.4
7	63 52.2	77	65	138.5	63 29.0	78	64	139.2	63 05.5	78	63	139.9	62 41.9	79	62	140.6
8	63 13.3	75	67	136.8	62 50.7	76	66	137.5	62 27.8	77	65	138.3	62 04.7	77	64	138.9
9	62 33.3	73	69	135.2	62 11.1	74	68	135.9	61 48.8	75	67	136.6	61 26.2	76	66	137.3
20	61 52.1	72	70	133.6	61 30.5	72	70	134.4	61 08.6	73	69	135.1	60 46.5	74	68	135.8
1	61 09.8	70	72	132.2	60 48.7	71	71	132.9	60 27.4	72	70	133.6	60 05.8	72	70	134.3
2	60 26.6	68	74	130.8	60 06.0	69	73	131.5	59 45.1	70	72	132.2	59 24.0	71	71	132.9
3	59 42.5	67	75	129.4	59 22.3	68	74	130.1	59 01.9	68	73	130.8	58 41.3	69	73	131.5
4	58 57.5	65	76	128.1	58 37.8	66	76	128.8	58 17.9	67	75	129.6	57 57.7	68	74	130.3
25	58 11.7	64	78	126.9	57 52.5	65	77	127.6	57 33.0	65	76	128.3	57 13.3	66	75	129.0
6	57 25.2	62	79	125.7	57 06.4	63	78	126.4	56 47.4	64	77	127.1	56 28.1	65	77	127.8
7	56 38.1	61	80	124.6	56 19.7	62	79	125.3	56 01.0	62	78	126.0	55 42.2	63	78	126.7
8	55 50.3	60	81	123.5	55 32.3	60	80	124.2	55 14.1	61	79	124.9	54 55.6	62	79	125.6
9	55 01.9	58	82	122.5	54 44.3	59	81	123.2	54 26.5	60	80	123.9	54 08.4	61	80	124.5
30	54 12.9	57	82	121.5	53 55.7	58	82	122.2	53 38.3	59	81	122.8	53 20.6	59	81	123.5
1	53 23.5	56	83	120.5	53 06.6	57	83	121.2	52 49.6	57	82	121.9	52 32.2	58	81	122.6
2	52 33.6	55	84	119.6	52 17.1	55	83	120.3	52 00.3	56	83	121.0	51 43.4	57	82	121.6
3	51 43.2	53	85	118.7	51 27.0	54	84	119.4	51 10.6	55	84	120.1	50 54.0	56	83	120.7
4	50 52.4	52	85	117.9	50 36.6	53	85	118.5	50 20.5	54	84	119.2	50 04.2	55	84	119.9
35	50 01.2	51	86	117.1	49 45.7	52	85	117.7	49 30.0	53	85	118.4	49 14.0	54	84	119.0
6	49 09.7	50	86	116.3	48 54.5	51	86	116.9	48 39.0	52	86	117.6	48 23.4	53	85	118.2
7	48 17.8	49	87	115.5	48 02.9	50	87	116.2	47 47.7	51	86	116.8	47 32.4	52	86	117.5
8	47 25.6	48	88	114.8	47 11.0	49	87	115.4	46 56.1	50	87	116.1	46 41.0	51	86	116.7
9	46 33.1	48	88	114.1	46 18.7	48	88	114.7	46 04.1	49	87	115.4	45 49.3	50	87	116.0
40	45 40.3	47	88	113.4	45 26.2	47	88	114.0	45 11.9	48	88	114.7	44 57.3	49	87	115.3
1	44 47.2	46	89	112.8	44 33.4	47	88	113.4	44 19.3	47	88	114.0	44 05.1	48	88	114.6
2	43 53.9	45	89	112.1	43 40.3	46	89	112.7	43 26.5	46	88	113.4	43 12.5	47	88	114.0
3	43 00.4	44	90	111.5	42 47.0	45	89	112.1	42 33.4	46	89	112.7	42 19.6	46	88	113.3
4	42 06.6	44	90	110.9	41 53.5	44	90	111.5	41 40.1	45	89	112.1	41 26.6	45	89	112.7
45	41 12.6	43	90	110.3	40 59.7	43	90	110.9	40 46.6	44	90	111.5	40 33.2	45	89	112.1
6	40 18.5	42	91	109.8	40 05.7	43	90	110.4	39 52.8	43	90	111.0	39 39.7	44	90	111.5
7	39 24.1	42	91	109.2	39 11.6	42	91	109.8	38 58.9	43	90	110.4	38 46.0	43	90	111.0
8	38 29.6	41	91	108.7	38 17.2	41	91	109.3	38 04.7	42	91	109.9	37 52.0	43	90	110.4
9	37 34.9	40	91	108.2	37 22.7	41	91	108.8	37 10.4	41	91	109.3	36 57.9	42	91	109.9
50	36 40.0	40	92	107.7	36 28.0	40	91	108.3	36 15.9	41	91	108.8	36 03.6	41	91	109.4
1	35 45.0	39	92	107.2	35 33.2	40	92	107.8	35 21.2	40	91	108.3	35 09.1	41	91	108.9
2	34 49.8	39	92	106.7	34 38.2	39	92	107.3	34 26.4	40	92	107.9	34 14.4	40	91	108.4
3	33 54.5	38	92	106.3	33 43.0	38	92	106.8	33 31.4	39	92	107.4	33 19.6	39	92	107.9
4	32 59.1	37	93	105.8	32 47.8	38	92	106.4	32 36.3	38	92	106.9	32 24.7	39	92	107.5
55	32 03.5	37	93	105.4	31 52.4	37	93	105.9	31 41.0	38	92	106.5	31 29.6	38	92	107.0
6	31 07.8	37	93	104.9	30 56.8	37	93	105.5	30 45.7	37	92	106.0	30 34.4	38	92	106.6
7	30 12.1	36	93	104.5	30 01.2	36	93	105.1	29 50.2	37	93	105.6	29 39.0	37	92	106.1
8	29 16.2	36	93	104.1	29 05.4	36	93	104.7	28 54.6	36	93	105.2	28 43.6	37	93	105.7
9	28 20.2	35	93	103.7	28 09.6	36	93	104.2	27 58.9	36	93	104.8	27 48.0	36	93	105.3
60	27 24.1	35	94	103.3	27 13.6	35	93	103.8	27 03.0	36	93	104.4	26 52.3	36	93	104.9
1	26 28.0	34	94	102.9	26 17.6	35	94	103.5	26 07.1	35	93	104.0	25 56.5	35	93	104.5
2	25 31.7	34	94	102.6	25 21.5	34	94	103.1	25 11.1	35	94	103.6	25 00.6	35	93	104.1
3	24 35.4	34	94	102.2	24 25.2	34	94	102.7	24 15.0	34	94	103.2	24 04.7	35	93	103.7
4	23 39.0	33	94	101.8	23 28.9	34	94	102.3	23 18.8	34	94	102.8	23 08.6	34	94	103.4
65	22 42.5	33	94	101.5	22 32.5	33	94	102.0	22 22.5	34	94	102.5	22 12.4	34	94	103.0
6	21 45.9	33	94	101.1	21 36.1	33	94	101.6	21 26.2	33	94	102.1	21 16.2	33	94	102.6
7	20 49.3	32	94	100.8	20 39.6	33	94	101.3	20 29.8	33	94	101.8	20 19.9	33	94	102.3
8	19 52.6	32	95	100.4	19 43.0	32	94	100.9	19 33.3	32	94	101.4	19 23.5	33	94	101.9
9	18 55.8	32	95	100.1	18 46.3	32	95	100.6	18 36.7	32	94	101.1	18 27.0	32	94	101.6
70	17 59.0	31	95	99.8	17 49.6	32	95	100.2	17 40.1	32	94	100.7	17 30.5	32	94	101.2
1	17 02.1	31	95	99.4	16 52.8	31	95	99.9	16 43.4	32	95	100.4	16 33.9	32	94	100.9
2	16 05.2	31	95	99.1	15 55.9	31	95	99.6	15 46.6	31	95	100.1	15 37.2	31	95	100.6
3	15 08.2	31	95	98.8	14 59.1	31	95	99.3	14 49.8	31	95	99.8	14 40.5	31	95	100.3
4	14 11.2	30	95	98.5	14 02.1	30	95	99.0	13 52.9	31	95	99.5	13 43.7	31	95	99.9
75	13 14.1	30	95	98.2	13 05.1	30	95	98.7	12 56.0	30	95	99.1	12 46.9	31	95	99.6
6	12 17.0	30	95	97.9	12 08.1	30	95	98.3	11 59.1	30	95	98.8	11 50.0	30	95	99.3
7	11 19.9	30	95	97.6	11 11.0	30	95	98.0	11 02.0	30	95	98.5	10 53.0	30	95	99.0
8	10 22.7	29	95	97.3	10 13.9	30	95	97.7	10 05.0	30	95	98.2	9 56.1	30	95	98.7
9	9 25.5	29	95	97.0	9 16.7	29	95	97.4	9 07.9	29	95	97.9	8 59.0	30	95	98.4
80	8 28.2	29	96	96.7	8 19.5	29	95	97.1	8 10.7	29	95	97.6	8 01.9	29	95	98.1
1	7 30.9	29	96	96.4	7 22.2	29	95	96.9	7 13.5	29	95	97.3	7 04.8	29	95	97.8
2	6 33.5	29	96	96.1	6 24.9	29	96	96.6	6 16.3	29	95	97.0	6 07.7	29	95	97.5
3	5 36.2	28	96	95.8	5 27.6	29	96	96.3	5 19.1	29	95	96.8	5 10.5	29	95	97.2

6° 00′				6° 30′				7° 00′				7° 30′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
68 00.0	1.0	02	180.0	67 30.0	1.0	02	180.0	67 00.0	1.0	02	180.0	66 30.0	1.0	02	180.0	00
67 58.7	1.0	07	177.3	67 28.7	1.0	07	177.4	66 58.7	1.0	06	177.5	66 28.8	1.0	06	177.5	1
67 54.7	1.0	11	174.7	67 24.8	1.0	11	174.8	66 54.9	1.0	11	174.9	66 25.0	1.0	10	175.0	2
67 48.0	99	15	172.1	67 18.3	99	15	172.3	66 48.5	99	15	172.4	66 18.8	99	14	172.6	3
67 38.8	98	20	169.5	67 09.2	98	19	169.7	66 39.7	99	19	169.9	66 10.1	99	18	170.1	4
67 27.0	98	24	166.9	66 57.7	98	23	167.2	66 28.4	98	23	167.5	65 59.1	98	22	167.7	05
67 12.7	97	28	164.4	66 43.7	97	27	164.8	66 14.7	97	27	165.1	65 45.6	97	26	165.4	6
66 56.1	95	32	162.0	66 27.4	96	31	162.4	65 58.7	96	30	162.7	65 30.0	96	30	163.1	7
66 37.1	94	35	159.6	66 08.8	94	35	160.0	65 40.5	95	34	160.4	65 12.1	95	33	160.8	8
66 15.9	93	39	157.3	65 48.0	93	38	157.7	65 20.1	93	37	158.2	64 52.0	94	37	158.6	9
65 52.5	91	42	155.0	65 25.1	92	42	155.5	64 57.6	92	41	156.0	64 30.0	92	40	156.4	10
65 27.2	90	45	152.8	65 00.2	90	45	153.3	64 33.1	90	44	153.8	64 05.9	91	43	154.3	1
64 59.9	88	49	150.7	64 33.4	89	48	151.3	64 06.8	89	47	151.8	63 40.0	89	46	152.3	2
64 30.8	86	51	148.7	64 04.8	87	51	149.2	63 38.6	87	50	149.8	63 12.4	88	49	150.3	3
63 59.9	85	54	146.7	63 34.4	85	53	147.3	63 08.8	86	52	147.9	62 43.0	86	52	148.5	4
63 27.5	83	57	144.8	63 02.5	84	56	145.4	62 37.3	84	55	146.0	62 12.0	85	54	146.6	15
62 53.5	81	59	143.0	62 29.0	82	58	143.6	62 04.4	82	57	144.3	61 39.6	83	56	144.9	6
62 18.1	80	61	141.3	61 54.1	80	60	141.9	61 30.0	81	60	142.5	61 05.7	81	59	143.2	7
61 41.4	78	63	139.6	61 17.9	79	62	140.3	60 54.3	79	62	140.9	60 30.4	80	61	141.5	8
61 03.4	76	65	138.0	60 40.4	77	64	138.7	60 17.3	78	64	139.3	59 53.9	78	63	139.9	9
60 24.2	75	67	136.5	60 01.8	75	66	137.1	59 39.1	76	65	137.8	59 16.2	77	65	138.4	20
59 44.0	73	69	135.0	59 22.0	74	68	135.7	58 59.8	74	67	136.3	58 37.4	75	66	137.0	1
59 02.7	71	70	133.6	58 41.2	72	70	134.3	58 19.4	73	69	134.9	57 57.5	73	68	135.6	2
58 20.5	70	72	132.2	57 59.4	71	71	132.9	57 38.1	71	70	133.6	57 16.6	72	70	134.2	3
57 37.3	68	73	130.9	57 16.7	69	73	131.6	56 55.9	70	72	132.3	56 34.9	70	71	132.9	4
56 53.3	67	75	129.7	56 33.2	68	74	130.4	56 12.8	68	73	131.0	55 52.2	69	72	131.7	25
56 08.6	65	76	128.5	55 48.8	66	75	129.2	55 28.9	67	74	129.8	55 08.7	68	74	130.5	6
55 23.1	64	77	127.4	55 03.8	65	76	128.0	54 44.2	65	76	128.7	54 24.5	66	75	129.3	7
54 36.9	63	78	126.3	54 18.0	63	77	126.9	53 58.9	64	77	127.6	53 39.5	65	76	128.2	8
53 50.1	61	79	125.2	53 31.6	62	78	125.9	53 12.9	63	78	126.5	52 53.9	63	77	127.2	9
53 02.7	60	80	124.2	52 44.6	61	79	124.9	52 26.2	62	79	125.5	52 07.6	62	78	126.1	30
52 14.7	59	81	123.2	51 56.9	60	80	123.9	51 39.0	60	80	124.5	51 20.8	61	79	125.2	1
51 26.2	58	82	122.3	51 08.8	58	81	122.9	50 51.2	59	81	123.6	50 33.4	60	80	124.2	2
50 37.2	56	82	121.4	50 20.1	57	82	122.0	50 02.9	58	81	122.7	49 45.4	59	81	123.3	3
49 47.7	55	83	120.5	49 31.0	56	83	121.2	49 14.1	57	82	121.8	48 56.9	57	82	122.4	4
48 57.8	54	84	119.7	48 41.4	55	83	120.3	48 24.8	56	83	120.9	48 08.0	56	82	121.6	35
48 07.5	53	84	118.9	47 51.4	54	84	119.5	47 35.2	55	83	120.1	47 18.7	55	83	120.7	6
47 16.8	52	85	118.1	47 01.0	53	85	118.7	46 45.1	54	84	119.3	46 28.9	54	84	119.9	7
46 25.8	51	86	117.3	46 10.3	52	85	118.0	45 54.6	53	85	118.6	45 38.7	53	84	119.2	8
45 34.3	50	86	116.6	45 19.2	51	86	117.2	45 03.8	52	85	117.8	44 48.2	52	85	118.4	9
44 42.6	49	87	115.9	44 27.7	50	86	116.5	44 12.6	51	86	117.1	43 57.3	51	85	117.7	40
43 50.6	49	87	115.2	43 35.9	49	87	115.8	43 21.1	50	86	116.4	43 06.1	50	86	117.0	1
42 58.3	48	88	114.6	42 43.9	48	87	115.2	42 29.3	49	87	115.8	42 14.5	50	86	116.3	2
42 05.7	47	88	113.9	41 51.5	47	88	114.5	41 37.2	48	87	115.1	41 22.7	49	87	115.7	3
41 12.8	46	88	113.3	40 58.9	47	88	113.9	40 44.9	47	88	114.5	40 30.6	48	87	115.1	4
40 19.8	45	89	112.7	40 06.1	46	88	113.3	39 52.2	46	88	113.9	39 38.2	47	88	114.4	45
39 26.4	45	89	112.1	39 13.0	45	89	112.7	38 59.4	46	88	113.3	38 45.6	46	88	113.9	6
38 32.9	44	90	111.6	38 19.7	44	89	112.1	38 06.3	45	89	112.7	37 52.7	45	88	113.3	7
37 39.2	43	90	111.0	37 26.1	44	90	111.6	37 13.0	44	89	112.1	36 59.6	45	89	112.7	8
36 45.2	42	90	110.5	36 32.4	43	90	111.0	36 19.4	43	90	111.6	36 06.3	44	89	112.2	9
35 51.1	42	90	110.0	35 38.5	42	90	110.5	35 25.7	43	90	111.1	35 12.8	43	90	111.6	50
34 56.8	41	91	109.5	34 44.4	42	90	110.0	34 31.8	42	90	110.6	34 19.1	43	90	111.1	1
34 02.3	41	91	109.0	33 50.1	41	91	109.5	33 37.7	42	90	110.1	33 25.2	42	90	110.6	2
33 07.7	40	91	108.5	32 55.7	40	91	109.0	32 43.5	41	91	109.6	32 31.1	41	90	110.1	3
32 12.9	39	92	108.0	32 01.1	40	91	108.6	31 49.0	40	91	109.1	31 36.9	41	91	109.6	4
31 18.0	39	92	107.6	31 06.3	39	91	108.1	30 54.5	40	91	108.6	30 42.5	40	91	109.2	55
30 23.0	38	92	107.1	30 11.4	39	92	107.6	29 59.7	39	91	108.2	29 47.9	40	91	108.7	6
29 27.8	38	92	106.7	29 16.4	38	92	107.2	29 04.9	39	92	107.7	28 53.2	39	91	108.3	7
28 32.5	37	92	106.2	28 21.2	38	92	106.8	28 09.9	38	92	107.3	27 58.4	38	92	107.8	8
27 37.0	37	93	105.8	27 25.9	37	92	106.4	27 14.7	38	92	106.9	27 03.4	38	92	107.4	9
26 41.5	36	93	105.4	26 30.5	37	92	105.9	26 19.5	37	92	106.5	26 08.3	37	92	107.0	60
25 45.8	36	93	105.0	25 35.0	36	93	105.5	25 24.1	37	92	106.1	25 13.1	37	92	106.6	1
24 50.1	35	93	104.6	24 39.4	36	93	105.1	24 28.6	36	93	105.7	24 17.7	36	92	106.2	2
23 54.2	35	93	104.2	23 43.7	35	93	104.8	23 33.0	36	93	105.3	23 22.3	36	93	105.8	3
22 58.3	35	93	103.9	22 47.9	35	93	104.4	22 37.3	35	93	104.9	22 26.7	36	93	105.4	4
22 02.2	34	94	103.5	21 51.9	34	93	104.0	21 41.6	35	93	104.5	21 31.1	35	93	105.0	65
21 06.1	34	94	103.1	20 55.9	34	93	103.6	20 45.7	34	93	104.1	20 35.3	35	93	104.6	6
20 09.9	33	94	102.8	19 59.8	34	94	103.3	19 49.7	34	93	103.8	19 39.5	34	93	104.3	7
19 13.6	33	94	102.4	19 03.7	33	94	102.9	18 53.6	34	94	103.4	18 43.5	34	93	103.9	8
18 17.3	33	94	102.1	18 07.4	33	94	102.6	17 57.5	33	94	103.1	17 47.5	33	94	103.6	9
17 20.8	32	94	101.7	17 11.1	33	94	102.2	17 01.3	33	94	102.7	16 51.4	33	94	103.2	70
16 24.3	32	94	101.4	16 14.7	32	94	101.9	16 05.0	32	94	102.4	15 55.2	33	94	102.9	1
15 27.7	32	94	101.1	15 18.2	32	94	101.6	15 08.6	32	94	102.1	14 59.0	32	94	102.6	2
14 31.1	31	94	100.8	14 21.7	32	94	101.2	14 12.2	32	94	101.7	14 02.6	32	94	102.2	3
13 34.4	31	95	100.4	13 25.1	31	94	100.9	13 15.7	31	94	101.4	13 06.2	32	94	101.9	4
12 37.7	31	95	100.1	12 28.4	31	95	100.6	12 19.1	31	94	101.1	12 09.8	31	94	101.6	75
11 40.9	30	95	99.8	11 31.7	31	95	100.3	11 22.5	31	94	100.8	11 13.2	31	94	101.3	6
10 44.0	30	95	99.5	10 34.9	30	95	100.0	10 25.8	30	95	100.5	10 16.6	31	94	101.0	7
9 47.1	30	95	99.2	9 38.1	30	95	99.7	9 29.1	30	95	100.2	9 20.0	30	94	100.6	8
8 50.1	30	95	98.9	8 41.2	30	95	99.4	8 32.3	30	95	99.9	8 23.3	30	95	100.3	9
7 53.1	29	95	98.6	7 44.3	30	95	99.1	7 35.4	30	95	99.6	7 26.5	30	95	100.0	80
6 56.1	29	95	98.3	6 47.3	29	95	98.8	6 38.5	29	95	99.3	6 29.7	29	95	99.7	1
5 59.0	29	95	98.0	5 50.3	29	95	98.5	5 41.6	29	95	99.0	5 32.8	29	95	99.5	2
5 01.9	29	95	97.7													3

DECLINATION SAME NAME AS LATITUDE

H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	82 00.0	1.0 06	180.0	82 30.0	1.0 06	180.0	83 00.0	1.0 07	180.0	83 30.0	1.0 07	180.0	84 00.0	1.0 08	180.0	84 30.0	1.0 09	180.0	85 00.0	1.0 09	180.0	85 30.0	1.0 10	180.0	00
1	81 56.4	99 18	172.9	82 26.2	99 19	172.5	82 55.9	99 20	171.9	83 25.6	99 21	171.4	83 55.3	99 23	170.7	84 24.9	99 25	169.8	84 54.4	98 27	168.9	85 23.8	98 30	167.7	1
2	81 45.9	97 28	166.0	82 15.0	97 30	165.2	82 44.0	96 32	164.2	83 12.8	96 34	163.1	83 41.5	95 36	161.8	84 10.0	94 39	160.3	84 38.1	93 42	158.5	85 05.9	92 46	156.4	2
3	81 28.8	94 38	159.5	81 56.9	93 40	158.3	82 24.8	92 43	157.0	82 52.4	91 45	155.4	83 19.6	90 48	153.7	83 46.4	89 51	151.7	84 12.7	87 55	149.4	84 38.4	84 58	146.7	3
4	81 05.8	90 47	153.5	81 32.6	89 49	152.0	81 59.1	88 52	150.4	82 25.2	86 54	148.6	82 50.8	84 57	146.5	83 15.7	82 60	144.2	83 40.0	79 64	141.6	84 03.3	76 68	138.7	4
05	80 37.6	86 54	148.0	81 03.1	84 57	146.3	81 28.1	83 59	144.5	81 52.6	81 62	142.5	82 16.4	78 65	140.3	82 39.4	76 68	137.9	83 01.6	72 71	135.2	83 22.8	69 74	132.2	05
6	80 04.9	81 61	143.1	80 29.0	79 63	141.3	80 52.5	77 65	139.4	81 15.4	75 68	137.3	81 37.5	72 71	135.0	81 58.8	69 73	132.6	82 19.1	66 76	129.9	82 38.3	62 79	126.9	6
7	79 28.4	77 66	138.7	79 51.2	75 68	136.8	80 13.2	72 70	134.9	80 34.6	70 73	132.8	80 55.1	67 75	130.5	81 14.8	64 78	128.1	81 33.4	60 80	125.4	81 50.9	56 83	122.6	7
8	78 48.9	72 70	134.7	79 10.3	70 72	132.9	79 31.0	68 74	130.9	79 50.9	65 77	128.8	80 10.0	62 79	126.6	80 28.2	59 81	124.3	80 45.3	55 83	121.7	81 01.4	51 85	119.1	8
9	78 06.7	68 74	131.2	78 26.8	66 76	129.4	78 46.3	64 78	127.5	79 04.9	61 80	125.5	79 22.7	58 82	123.3	79 39.6	55 84	121.0	79 55.5	51 85	118.6	80 10.2	47 87	116.1	9
10	77 22.3	65 77	128.1	77 41.3	62 79	126.3	77 59.6	60 81	124.5	78 17.1	57 82	122.5	78 33.7	54 84	120.4	78 49.4	51 86	118.2	79 04.2	47 87	116.0	79 17.9	44 89	113.6	10
1	76 36.0	61 80	125.4	76 54.0	59 81	123.6	77 11.3	56 83	121.8	77 27.7	53 84	119.9	77 43.3	51 86	117.9	77 58.1	48 87	115.8	78 11.8	44 89	113.7	78 24.6	41 90	111.5	1
2	75 48.3	58 82	122.9	76 05.3	56 83	121.2	76 21.6	53 85	119.4	76 37.2	50 86	117.6	76 51.9	48 87	115.7	77 05.7	45 89	113.7	77 18.6	42 90	111.7	77 30.6	38 91	109.6	2
3	74 59.3	55 84	120.7	75 15.4	53 85	119.0	75 30.9	50 86	117.3	75 45.6	48 87	115.6	75 59.5	45 89	113.8	76 12.5	42 90	111.9	76 24.7	39 91	110.0	76 36.0	36 92	108.0	3
4	74 09.2	52 85	118.7	74 24.5	50 86	117.1	74 39.2	48 87	115.5	74 53.2	45 88	113.8	75 06.4	43 90	112.0	75 18.7	40 91	110.3	75 30.2	37 92	108.4	75 40.9	34 92	106.5	4
15	73 18.1	50 86	116.9	73 32.8	48 87	115.3	73 46.8	45 88	113.8	74 00.1	43 90	112.2	74 12.6	41 90	110.5	74 24.4	38 91	108.8	74 35.3	35 92	107.1	74 45.4	32 93	105.3	15
6	72 26.3	48 88	115.2	72 40.3	46 88	113.8	72 53.7	43 89	112.2	73 06.4	41 90	110.7	73 18.3	39 91	109.1	73 29.5	36 92	107.5	73 40.0	34 93	105.8	73 49.6	31 93	104.1	6
7	71 33.8	46 88	113.7	71 47.2	44 89	112.3	72 00.0	42 90	110.8	72 12.2	39 91	109.4	72 23.6	37 92	107.8	72 34.4	35 93	106.3	72 44.4	32 93	104.7	72 53.6	30 94	103.1	7
8	70 40.7	44 89	112.4	70 53.6	42 90	111.0	71 05.9	40 91	109.6	71 17.6	38 92	108.1	71 28.5	35 92	106.7	71 38.8	33 93	105.2	71 48.4	31 94	103.7	71 57.3	28 94	102.2	8
9	69 47.1	42 90	111.1	69 59.6	40 91	109.8	70 11.4	38 91	108.4	70 22.6	36 92	107.0	70 33.1	34 93	105.6	70 43.1	32 93	104.2	70 52.3	30 94	102.8	71 00.8	27 94	101.3	9
20	68 53.1	41 91	109.9	69 05.1	39 91	108.6	69 16.5	37 92	107.3	69 27.3	35 93	106.0	69 37.5	33 93	104.7	69 47.0	31 94	103.3	69 55.9	29 94	101.9	70 04.2	26 95	100.5	20
1	67 58.7	39 91	108.8	68 10.3	38 92	107.6	68 21.3	36 92	106.3	68 31.7	34 93	105.1	68 41.6	32 94	103.8	68 50.8	30 94	102.5	68 59.4	28 94	101.1	69 07.4	26 95	99.8	1
2	67 04.0	38 92	107.8	67 15.2	36 92	106.6	67 25.8	35 93	105.4	67 35.9	33 93	104.2	67 45.4	31 94	102.9	67 54.4	29 94	101.7	68 02.8	27 95	100.4	68 10.5	25 95	99.1	2
3	66 08.9	37 92	106.9	66 19.8	35 93	105.7	66 30.1	34 93	104.6	66 39.9	32 94	103.4	66 49.2	30 94	102.2	66 57.8	28 94	100.9	67 06.0	26 95	99.7	67 13.5	24 95	98.5	3
4	65 13.6	36 93	106.0	65 24.1	34 93	104.9	65 34.2	33 94	103.8	65 43.7	31 94	102.6	65 52.7	29 94	101.4	66 01.2	27 95	100.3	66 09.1	25 95	99.1	66 16.4	24 95	97.9	4
25	64 18.0	35 93	105.2	64 28.3	33 93	104.1	64 38.1	32 94	103.0	64 47.3	30 94	101.9	64 56.1	28 95	100.8	65 04.4	27 95	99.6	65 12.1	25 95	98.5	65 19.3	23 95	97.3	25
6	63 22.3	34 93	104.4	63 32.3	33 94	103.4	63 41.8	31 94	102.3	63 50.8	29 94	101.2	63 59.4	28 95	100.1	64 07.4	26 95	99.0	64 15.0	24 95	97.9	64 22.0	23 96	96.8	6
7	62 26.3	33 94	103.7	62 36.1	32 94	102.7	62 45.4	30 94	101.6	62 54.2	29 95	100.6	63 02.5	27 95	99.5	63 10.4	25 95	98.4	63 17.8	24 95	97.4	63 24.7	22 96	96.3	7
8	61 30.2	32 94	103.0	61 39.7	31 94	102.0	61 48.8	30 94	101.0	61 57.4	28 95	100.0	62 05.6	27 95	98.9	62 13.3	25 95	97.9	62 20.6	23 95	96.9	62 27.4	22 95	95.8	8
9	60 33.9	32 94	102.3	60 43.2	30 94	101.4	60 52.1	29 95	100.4	61 00.6	27 95	99.4	61 08.6	26 95	98.4	61 16.2	25 95	97.4	61 23.3	23 96	96.4	61 30.0	21 95	95.4	9
30	59 37.5	31 94	101.7	59 46.6	30 95	100.8	59 55.3	28 95	99.8	60 03.6	27 95	98.8	60 11.5	26 95	97.9	60 18.9	24 95	96.9	60 26.0	23 96	95.9	60 32.5	21 96	94.9	30
1	58 41.0	30 94	101.1	58 49.9	29 95	100.2	58 58.5	28 95	99.3	59 06.6	26 95	98.3	59 14.3	25 95	97.4	59 21.7	24 96	96.4	59 28.6	22 96	95.5	59 35.1	21 96	94.5	1
2	57 44.3	30 95	100.5	57 53.1	29 95	99.6	58 01.5	27 95	98.7	58 09.5	26 95	97.8	58 17.1	25 95	96.9	58 24.3	23 96	96.0	58 31.1	22 96	95.1	58 37.5	21 96	94.1	2
3	56 47.6	29 96	100.0	56 56.2	28 95	99.1	57 04.5	27 95	98.2	57 12.3	26 95	97.4	57 19.8	24 96	96.5	57 26.9	23 96	95.6	57 33.7	22 96	94.7	57 40.0	20 95	93.7	3
4	55 50.7	29 96	99.5	55 59.2	28 95	98.6	56 07.3	26 95	97.8	56 15.1	25 95	96.9	56 22.5	24 96	96.0	56 29.5	23 96	95.1	56 36.2	22 96	94.3	56 42.4	20 96	93.4	4
35	54 53.8	28 95	99.0	55 02.2	27 96	98.1	55 10.2	26 95	97.3	55 17.8	25 96	96.5	55 25.1	24 96	95.6	55 32.1	23 96	94.7	55 38.6	21 96	93.9	55 44.8	20 96	93.0	35
6	53 56.8	28 95	98.5	54 05.0	27 96	97.7	54 12.9	26 96	96.9	54 20.5	25 96	96.0	54 27.7	23 96	95.2	54 34.6	22 96	94.4	54 41.1	21 96	93.5	54 47.2	20 96	92.7	6
7	52 59.7	28 96	98.0	53 07.8	27 95	97.2	53 15.6	25 95	96.4	53 23.1	24 96	95.6	53 30.2	23 96	94.8	53 37.0	22 96	94.0	53 43.5	21 96	93.2	53 49.6	20 96	92.3	7
8	52 02.6	27 96	97.6	52 10.6	26 95	96.8	52 18.3	25 96	96.0	52 25.7	24 96	95.2	52 32.8	23 96	94.4	52 39.5	22 96	93.6	52 45.9	21 96	92.8	52 52.0	20 96	92.0	8
9	51 05.4	27 95	97.2	51 13.3	26 96	96.4	51 20.9	25 96	95.6	51 28.2	24 96	94.8	51 35.2	23 96	94.1	51 41.9	22 96	93.3	51 48.3	21 96	92.5	51 54.3	20 95	91.7	9
40	50 08.1	27 96	96.7	50 16.0	26 96	96.0	50 23.5	25 96	95.2	50 30.8	24 96	94.5	50 37.7	23 96	93.7	50 44.3	22 96	92.9	50 50.7	21 95	92.2	50 56.7	20 96	91.4	40
1	49 10.8	26 96	96.3	49 18.6	25 96	95.6	49 26.1	24 96	94.9	49 33.2	23 96	94.1	49 40.1	22 96	93.4	49 46.7	21 96	92.6	49 53.0	21 96	91.8	49 59.0	20 96	91.1	1
2	48 13.5	26 96	96.0	48 21.2	25 96	95.2	48 28.6	24 96	94.5	48 35.7	23 96	93.8	48 42.5	22 96	93.0	48 49.1	21 96	92.3	48 55.4	20 96	91.5	49 01.4	19 96	90.8	2
3	47 16.1	26 96	95.6	47 23.7	25 96	94.9	47 31.1	24 96	94.1	47 38.1	23 96	93.4	47 44.9	22 95	92.7	47 51.5	21 96	92.0	47 57.7	20 96	91.2	48 03.7	19 96	90.5	3
4	46 18.7	26 96	95.2	46 26.2	25 96	94.5	46 33.5	24 96	93.8	46 40.6	23 96	93.1	46 47.3	22 96	92.4	46 53.8	21 96	91.7	47 00.0	20 96	90.9	47 06.0	19 96	90.2	4
45	45 21.2	25 96	94.8	45 28.7	25 96	94.1	45 36.0	24 96	93.5	45 43.0	23 96	92.8	45 49.7	22 96	92.1	45 56.2	21 96	91.4	46 02.4	20 96	90.7	46 08.3	19 96	89.9	45
6	44 23.7	25 96	94.5	44 31.2	24 96	93.8	44 38.4	24 96	93.1	44 45.3	23 96	92.4	44 52.0	22 96	91.8	44 58.5	21 96	91.1	45 04.7	20 96	90.4	45 10.7	19 96	89.7	6
7	43 26.2	25 96	94.1	43 33.6	24 96	93.5	43 40.8	23 96	92.8	43 47.7	23 96	92.1	43 54.4	22 96	91.4	44 00.8	21 96	90.8	44 07.0	20 96	90.1	44 13.0	19 96	89.4	7
8	42 28.7	25 96	93.8	42 36.0	24 96	93.1	42 43.2	23 96	92.5	42 50.1	23 96	91.8	42 56.7	22 96	91.2	43 03.2	21 96	90.5	43 09.4	20 96	89.8	43 15.3	19 95	89.1	8
9	41 31.1	25 96	93.5	41 38.5	24 96	92.8	41 45.5	23 96	92.2	41 52.4	23 96	91.5	41 59.1	22 96	90.9	42 05.5	21 96	90.2	42 11.7	20 96	89.5	42 17.7	20 96	88.9	9
50	40 33.6	25 96	93.1	40 40.8	24 96	92.5	40 47.9	23 96	91.9	40 54.8	22 96	91.2	41 01.4	22 96	90.6	41 07.8	21 96	89.9	41 14.0	20 96	89.3	41 20.0	20 96	88.6	50
1	39 36.0	24 96	92.8	39 43.2	24 96	92.2	39 50.3	23 96	91.6	39 57.1	22 96	90.9	40 03.7	22 95	90.3	40 10.1	21 95	89.7	40 16.3	20 96	89.0	40 22.3	20 96	88.4	1
2	38 38.4	24 96	92.5	38 45.6	24 96	91.9	38 52.6	23 96	91.3	38 59.4	22 96	90.6	39 06.0	22 96	90.0	39 12.5	21 96	89.4	39 18.7	20 96	88.8	39 24.7	20 96	88.1	2
3	37 40.7	24 96	92.2	37 47.9	24 96	91.6	37 54.9	23 96	91.0	38 01.7	22 96	90.4	38 08.4	22 96	89.7	38 14.8	21 96	89.1	38 21.0	20 96	88.5	38 27.0	20 96	87.9	3
4	36 43.1	24 96	91.9	36 50.3	24 96	91.3	36 57.3	23 96	90.7	37 04.1	22 96	90.1	37 10.7	22 96	89.5	37 17.1	21 96	88.9	37 23.4	20 96	88.2	37 29.4	20 96	87.6	4
55	35 45.4	24 96	91.6	35 52.6	24 96	91.0	35 59.6	23 96	90.4	36 06.4	22 96	89.8	36 13.0	22 96	89.2	36 19.5	21 96	88.6	36 25.7	21 96	88.0	36 31.8	20 96	87.4	55
6	34 47.8	24 96	91.3	34 54.9	24 96	90.7	35 01.9	23 96	90.1	35 08.7	22 96	89.5	35 15.4	22 96	88.9	35 21.8	21 96	88.3	35 28.1	21 96	87.7	35 34.2	20 96	87.1	6
7	33 50.1	24 96	91.0	33 57.3	24 96	90.4	34 04.2	23 96	89.9	34 11.0	22 96	89.3	34 17.7	22 96	88.7	34 24.2	21 96	88.1	34 30.5	21 96	87.5	34 36.6	20 96	86.9	7
8	32 52.4	24 96	90.7	32 59.6	24 96	90.2	33 06.6	23 96	89.6	33 13.4	22 96	89.0	33 20.0	22 96	88.4	33 26.5	21 96	87.8	33 32.8	21 96	87.2	33 39.0	20 96	86.7	8
9	31 54.8	24 96	90.5	32 01.9	24 96	89.9	32 08.9	23 96	89.3	32 15.7	22 96	88.7	32 22.4	22 96	88.2	32 28.9	21 96	87.6	32 35.2	21 96	87.0	32 41.4	20 96	86.4	9
60	30 57.1	24 96	90.2	31 04.2	24 96	89.6	31 11.2	23 96	89.0	31 18.1	23 96	88.5	31 24.7	22 96	87.9	31 31.3	22 96	87.3	31 37.6	21 96	86.8	31 43.9	20 96	86.2	60
1	29 59.4	24 96	89.9	30 06.6	24 96	89.3	30 13.6	23 96	88.8	30 20.4	23 96	88.2	30 27.1	22 96	87.7	30 33.7	22 96	87.1	30 40.1	21 96	86.5	30 46.3	21 96	85.9	1
2	29 01.7	24 96	89.6	29 08.9	24 96	89.1	29 15.9	23 96	88.5	29 22.8	23 96	88.0	29 29.5	22 96	87.4	29 36.1	22 96	86.8	29 42.5	21 96	86.3	29 48.8	21 96	85.7	2
3	28 04.1	24 96	89.4	28 11.2	24 96	88.8	28 18.2	23 96	88.3	28 25.1	23 96	87.7	28 31.9	22 96	87.1	28 38.5	22 96	86.6	28 45.0	21 96	86.0	28 51.3	21 96	85.5	3
4	27 06.4	24 96	89.1	27 13.6	24 96	88.5	27 20.6	23 96	88.0	27 27.5	23 96	87.4	27 34.3	22 96	86.9	27 40.9	22 96	86.4	27 47.4	21 96	85.8	27 53.8	21 96	85.2	4
65	26 08.7	24 96	88.8	26 15.9	24 96	88.3	26 23.0	23 96	87.7	26 29.9	23 96	87.2	26 36.7	22 96	86.7	26 43.4	22 96	86.1	25 49.9	22 96	85.6	26 56.4	21 96	85.0	65
6	25 11.1	24 96	88.6	25 18.3	24 96	88.0	25 25.3	23 96	87.5	25 32.3	23 96	86.9	25 39.1	23 96	86.4	25 45.8	22 96	85.9	25 52.4	22 96	85.3	25 58.9	21 96	84.8	6
7	24 13.4	24 96	88.3	24 20.6	24 96	87.8	24 27.7	23 96	87.2	24 34.7	23 96	86.7	24 41.6	23 96	86.2	24 48.3	22 96	85.6	24 55.0	22 96	85.1	25 01.5	22 96	84.5	7
8	23 15.8	24 96	88.0	23 23.0	24 96	87.5	23 30.1	24 96	87.0	23 37.1	23 96	86.4	23 44.0	23 96	85.9	23 50.8	22 96	85.4	23 57.5	22 96	84.8	24 04.1	22 96	84.3	8
9	22 18.1	24 96	87.8	22 25.4	24 96	87.2	22 32.5	24 96	86.7	22 39.6	23 96	86.2	22 46.5	23 96	85.7	22 53.3	23 96	85.1	23 00.1	22 96	84.6	23 06.7	22 96	84.1	9
70	21 20.5	24 96	87.5	21 27.8	24 96	87.0	21 35.0	24 96	86.5	21 42.0	23 96	85.9	21 49.0	23 96	85.4	21 55.9	23 96	84.9	22 02.7	22 96	84.4	22 09.3	22 96	83.8	70
1	20 22.9	24 96	87.3	20 30.2	24 96	86.7	20 37.4	24 96	86.2	20 44.5	24 96	85.7	20 51.5	23 96	85.2	20 58.4	23 96	84.7	21 05.3	23 96	84.1	21 12.0	22 96	83.6	1
2	19 25.3	26 96	87.0	19 32.6	24 96	86.5	19 39.9	24 96	86.0	19 47.0	24 96	85.5	19 54.1	23 96	84.9	20 01.0	23 96	84.4	20 07.9	23 96	83.9	20 14.7	22 95	83.4	2
3	18 27.7	25 96	86.7	18 35.1	24 96	86.2	18 42.3	24 96	85.7	18 49.5	24 96	85.2	18 56.6	24 96	84.7	19 03.6	23 96	84.2	19 10.6	23 96	83.7	19 17.4	22 96	83.1	3
4	17 30.1	25 96	86.5	17 37.5	24 96	86.0	17 44.8	24 96	85.5	17 52.1	24 96	85.0	17 59.2	24 96	84.4	18 06.3	23 96	83.9	18 13.3	23 95	83.4	18 20.2	23 96	82.9	4
75	16 32.6	25 96	86.2	16 40.0	25 96	85.7	16 47.3	24 96	85.2	16 54.6	24 96	84.7	17 01.8	24 96	84.2	17 08.9	24 96	83.7	17 16.0	23 95	83.2	17 23.0	23 96	82.7	75
6	15 35.0	25 96	86.0	15 42.5	25 96	85.5	15 49.9	25 96	85.0	15 57.2	24 96	84.5	16 04.4	24 96	84.0	16 11.6	24 95	83.4	16 18.7	24 95	82.9	16 25.8	23 95	82.4	6
7	14 37.5	25 96	85.7	14 45.0	25 96	85.2	14 52.4	25 96	84.7	14 59.8	24 96	84.2	15 07.1	24 96	83.7	15 14.3	24 95	83.2	15 21.5	24 95	82.7	15 28.6	24 95	82.2	7
8	13 40.0	26 96	85.5	13 47.5	25 96	85.0	13 55.0	25 96	84.5	14 02.4	25 96	84.0	14 09.8	24 96	83.5	14 17.1	24 95	83.0	14 24.3	24 95	82.5	14 31.5	24 95	82.0	8
9	12 42.5	25 96	85.2	12 50.1	25 96	84.7	12 57.6	25 96	84.2	13 05.1	25 96	83.7	13 12.5	25 95	83.2	13 19.9	24 95	82.7	13 27.2	24 95	82.2	13 34.4	24 95	81.7	9
80	11 45.1	26 96	84.9	11 52.7	25 96	84.4	12 00.3	25 96	83.9	12 07.8	25 95	83.5	12 15.3	25 95	83.0	12 22.7	25 95	82.5	12 30.0	24 95	82.0	12 37.3	24 95	81.5	80
1	10 47.6	26 96	84.7	10 55.3	26 96	84.2	11 02.9	25 96	83.7	11 10.5	25 95	83.2	11 18.0	25 95	82.7	11 25.5	25 95	82.2	11 32.9	25 96	81.7	11 40.3	25 96	81.2	1
2	9 50.2	26 96	84.4	9 57.9	26 96	83.9	10 05.6	26 95	83.4	10 13.2	25 96	82.9	10 20.8	25 95	82.5	10 28.4	25 95	82.0	10 35.9	25 95	81.5	10 43.3	25 96	81.0	2
3	8 52.8	26 96	84.2	9 00.6	26 96	83.7	9 08.3	26 95	83.2	9 16.0	26 95	82.7	9 23.7	25 95	82.2	9 31.3	25 95	81.7	9 38.9	25 95	81.2	9 46.4	25 96	80.7	3
4	7 55.5	26 96	83.9	8 03.3	26 95	83.4	8 11.1	26 95	82.9	8 18.8	26 95	82.4	8 26.5	26 95	81.9	8 34.2	26 95	81.5	8 41.9	25 95	81.0	8 49.5	25 96	80.5	4
85	6 58.1	26 96	83.6	7 06.0	26 95	83.2	7 13.9	26 95	82.7	7 21.7	26 95	82.2	7 29.5	26 95	81.7	7 37.2	26 96	81.2	7 44.9	26 95	80.7	7 52.6	26 95	80.2	85
6	6 00.8	27 95	83.4	6 08.8	26 95	82.9	6 16.7	26 95	82.4	6 24.6	26 95	81.9	6 32.4	26 95	81.4	6 40.2	26 95	80.9	6 48.0	26 95	80.5	6 55.8	26 95	80.0	6
7	5 03.5	27 96	83.1	5 11.5	27 95	82.6	5 19.5	27 95	82.1	5 27.5	26 95	81.7	5 35.4	26 95	81.2	5 43.3	26 95	80.7	5 51.2	26 95	80.2	5 59.0	26 95	79.7	7
8																						5 02.3	26 94	79.5	8

Lat. 16°

H.A.	8° 00′				8° 30′				9° 00′				9° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	66 00.0	1.0	02	180.0	65 30.0	1.0	02	180.0	65 00.0	1.0	02	180.0	64 30.0	1.0	02	180.0
1	65 58.8	1.0	06	177.6	65 28.8	1.0	06	177.6	64 58.8	1.0	06	177.7	64 28.8	1.0	06	177.7
2	65 55.1	1.0	10	175.1	65 25.2	1.0	10	175.2	64 55.3	1.0	10	175.3	64 25.4	1.0	10	175.4
3	65 49.0	99	14	172.7	65 19.2	99	14	172.9	64 49.4	99	14	173.0	64 19.7	99	13	173.2
4	65 40.5	99	18	170.3	65 10.9	99	18	170.5	64 41.3	99	17	170.7	64 11.7	99	17	170.9
05	65 29.7	98	22	168.0	65 00.3	98	22	168.2	64 30.9	98	21	168.5	64 01.4	98	21	168.7
6	65 16.5	97	26	165.7	64 47.4	97	25	166.0	64 18.2	97	25	166.2	63 49.0	97	24	166.5
7	65 01.2	96	29	163.4	64 32.3	96	29	163.7	64 03.4	96	28	164.0	63 34.5	96	28	164.3
8	64 43.6	95	33	161.2	64 15.1	95	32	161.5	63 46.5	95	32	161.9	63 17.9	95	31	162.2
9	64 23.9	94	36	159.0	63 55.8	94	35	159.4	63 27.6	94	35	159.8	62 59.3	94	34	160.1
10	64 02.3	92	39	156.9	63 34.5	93	39	157.3	63 06.7	93	38	157.7	62 38.7	93	37	158.1
1	63 38.7	91	42	154.8	63 11.3	91	42	155.3	62 43.9	92	41	155.7	62 16.3	92	40	156.1
2	63 13.2	90	45	152.8	62 46.3	90	45	153.3	62 19.2	90	44	153.8	61 52.1	91	43	154.2
3	62 46.0	88	48	150.9	62 19.5	89	47	151.4	61 52.9	89	47	151.9	61 26.2	89	46	152.4
4	62 17.1	87	51	149.0	61 51.0	87	50	149.5	61 24.9	87	49	150.0	60 58.6	88	49	150.5
15	61 46.6	85	53	147.2	61 21.0	85	53	147.7	60 55.3	86	52	148.3	60 29.5	86	51	148.8
6	61 14.6	83	56	145.4	60 49.5	84	55	146.0	60 24.2	84	54	146.5	59 58.9	85	53	147.1
7	60 41.2	82	58	143.7	60 16.5	82	57	144.3	59 51.7	83	56	144.9	59 26.8	83	56	145.4
8	60 06.4	80	60	142.1	59 42.2	81	59	142.7	59 17.9	81	58	143.3	58 53.4	82	58	143.9
9	59 30.4	79	62	140.6	59 06.7	79	61	141.2	58 42.8	80	60	141.7	58 18.8	80	60	142.3
20	58 53.1	77	64	139.0	58 29.9	78	63	139.7	58 06.5	78	62	140.3	57 42.9	79	62	140.8
1	58 14.8	76	66	137.6	57 52.0	76	65	138.2	57 29.1	77	64	138.8	57 06.0	77	63	139.4
2	57 35.4	74	67	136.2	57 13.1	75	67	136.8	56 50.6	75	66	137.4	56 27.9	76	65	138.0
3	56 55.0	73	69	134.9	56 33.1	73	68	135.5	56 11.1	74	67	136.1	55 48.8	74	67	136.7
4	56 13.6	71	70	133.6	55 52.2	72	70	134.2	55 30.6	72	69	134.8	55 08.8	73	68	135.4
25	55 31.4	70	72	132.3	55 10.4	70	71	133.0	54 49.2	71	70	133.6	54 27.9	72	70	134.2
6	54 48.4	68	73	131.1	54 27.8	69	72	131.8	54 07.0	70	72	132.4	53 46.1	70	71	133.0
7	54 04.5	67	74	130.0	53 44.4	67	74	130.6	53 24.1	68	73	131.2	53 03.5	69	72	131.8
8	53 20.0	65	75	128.9	53 00.2	66	75	129.5	52 40.3	67	74	130.1	52 20.2	67	73	130.7
9	52 34.8	64	76	127.8	52 15.4	65	76	128.4	51 55.9	65	75	129.1	51 36.1	66	75	129.7
30	51 48.9	63	77	126.8	51 29.9	64	77	127.4	51 10.7	64	76	128.0	50 51.4	65	76	128.6
1	51 02.4	62	78	125.8	50 43.8	62	78	126.4	50 25.0	63	77	127.0	50 06.0	64	77	127.6
2	50 15.3	60	79	124.8	49 57.1	61	79	125.5	49 38.7	62	78	126.1	49 20.0	62	78	126.7
3	49 27.7	59	80	123.9	49 09.8	60	80	124.5	48 51.8	61	79	125.1	48 33.5	61	78	125.7
4	48 39.6	58	81	123.0	48 22.1	59	80	123.6	48 04.4	59	80	124.3	47 46.4	60	79	124.9
35	47 51.0	57	82	122.2	47 33.8	58	81	122.8	47 16.4	58	81	123.4	46 58.9	59	80	124.0
6	47 02.0	56	82	121.4	46 45.1	57	82	122.0	46 28.0	57	81	122.6	46 10.8	58	81	123.1
7	46 12.5	55	83	120.6	45 56.0	56	83	121.2	45 39.2	56	82	121.7	45 22.3	57	82	122.3
8	45 22.7	54	84	119.8	45 06.4	54	83	120.4	44 50.0	55	83	121.0	44 33.3	56	82	121.6
9	44 32.4	53	84	119.0	44 16.5	53	84	119.6	44 00.3	54	83	120.2	43 44.0	55	83	120.8
40	43 41.8	52	85	118.3	43 26.1	53	84	118.9	43 10.3	53	84	119.5	42 54.3	54	84	120.1
1	42 50.9	51	85	117.6	42 35.5	52	85	118.2	42 19.9	52	85	118.8	42 04.2	53	84	119.3
2	41 59.6	50	86	116.9	41 44.5	51	86	117.5	41 29.2	51	85	118.1	41 13.7	52	85	118.7
3	41 08.0	49	86	116.3	40 53.2	50	86	116.8	40 38.1	50	86	117.4	40 23.0	51	85	118.0
4	40 16.2	48	87	115.6	40 01.6	49	86	116.2	39 46.8	50	86	116.8	39 31.9	50	86	117.3
45	39 24.0	48	87	115.0	39 09.7	48	87	115.6	38 55.2	49	86	116.1	38 40.5	49	86	116.7
6	38 31.6	47	88	114.4	38 17.5	47	87	115.0	38 03.3	48	87	115.5	37 48.8	48	87	116.1
7	37 39.0	46	88	113.8	37 25.1	47	88	114.4	37 11.1	47	87	114.9	36 56.9	48	87	115.5
8	36 46.1	45	88	113.3	36 32.5	46	88	113.8	36 18.7	46	88	114.4	36 04.7	47	87	114.9
9	35 53.0	45	89	112.7	35 39.6	45	88	113.3	35 26.0	46	88	113.8	35 12.3	46	88	114.4
50	34 59.7	44	89	112.2	34 46.5	44	89	112.7	34 33.1	45	88	113.3	34 19.6	45	88	113.8
1	34 06.2	43	89	111.7	33 53.2	44	89	112.2	33 40.1	44	89	112.7	33 26.8	45	88	113.3
2	33 12.5	42	90	111.1	32 59.7	43	89	111.7	32 46.8	43	89	112.2	32 33.7	44	89	112.8
3	32 18.6	42	90	110.6	32 06.0	42	90	111.2	31 53.3	43	89	111.7	31 40.4	43	89	112.3
4	31 24.6	41	90	110.2	31 12.2	42	90	110.7	30 59.6	42	90	111.2	30 46.9	42	89	111.8
55	30 30.4	41	91	109.7	30 18.1	41	90	110.2	30 05.8	41	90	110.7	29 53.3	42	90	111.3
6	29 36.0	40	91	109.2	29 23.9	40	91	109.8	29 11.7	41	90	110.3	28 59.4	41	90	110.8
7	28 41.5	39	91	108.8	28 29.6	40	91	109.3	28 17.6	40	91	109.8	28 05.4	41	90	110.3
8	27 46.8	39	91	108.3	27 35.1	39	91	108.9	27 23.2	40	91	109.4	27 11.3	40	91	109.9
9	26 52.0	38	92	107.9	26 40.4	39	91	108.4	26 28.7	39	91	108.9	26 17.0	39	91	109.5
60	25 57.0	38	92	107.5	25 45.6	38	92	108.0	25 34.1	39	91	108.5	25 22.5	39	91	109.0
1	25 01.9	37	92	107.1	24 50.7	38	92	107.6	24 39.4	38	91	108.1	24 27.9	38	91	108.6
2	24 06.8	37	92	106.7	23 55.7	37	92	107.2	23 44.5	37	92	107.7	23 33.2	38	91	108.2
3	23 11.5	36	92	106.3	23 00.5	37	92	106.8	22 49.5	37	92	107.3	22 38.3	37	92	107.8
4	22 16.0	36	93	105.9	22 05.2	36	92	106.4	21 54.3	36	92	106.9	21 43.4	37	92	107.4
65	21 20.5	35	93	105.5	21 09.9	36	92	106.0	20 59.1	36	92	106.5	20 48.3	36	92	107.0
6	20 24.9	35	93	105.1	20 14.4	35	93	105.6	20 03.8	35	92	106.1	19 53.1	36	92	106.6
7	19 29.2	34	93	104.8	19 18.8	35	93	105.3	19 08.3	35	93	105.8	18 57.8	35	92	106.3
8	18 33.4	34	93	104.4	18 23.1	34	93	104.9	18 12.8	35	93	105.4	18 02.3	35	93	105.9
9	17 37.4	34	93	104.1	17 27.3	34	93	104.6	17 17.1	34	93	105.1	17 06.8	34	93	105.5
70	16 41.5	33	93	103.7	16 31.4	34	93	104.2	16 21.4	34	93	104.7	16 11.2	34	93	105.2
1	15 45.4	33	94	103.4	15 35.5	33	93	103.9	15 25.5	33	93	104.4	15 15.5	34	93	104.8
2	14 49.2	33	94	103.0	14 39.5	33	94	103.5	14 29.6	33	93	104.0	14 19.7	33	93	104.5
3	13 53.0	32	94	102.7	13 43.3	32	94	103.2	13 33.6	33	93	103.7	13 23.8	33	93	104.2
4	12 56.7	32	94	102.4	12 47.2	32	94	102.9	12 37.5	32	94	103.4	12 27.9	32	93	103.8
75	12 00.3	31	94	102.1	11 50.9	32	94	102.5	11 41.4	32	94	103.0	11 31.8	32	94	103.5
6	11 03.9	31	94	101.7	10 54.6	31	94	102.2	10 45.2	31	94	102.7	10 35.7	32	94	103.2
7	10 07.4	31	94	101.4	9 58.2	31	94	101.9	9 48.9	31	94	102.4	9 39.5	31	94	102.9
8	9 10.9	30	94	101.1	9 01.7	31	94	101.6	8 52.5	31	94	102.1	8 43.3	31	94	102.6
9	8 14.2	30	94	100.8	8 05.2	30	94	101.3	7 56.1	30	94	101.8	7 46.9	30	94	102.3
80	7 17.6	30	95	100.5	7 08.6	30	94	101.0	6 59.6	30	94	101.5	6 50.5	30	94	102.0
1	6 20.8	30	95	100.2	6 11.9	30	94	100.7	6 03.0	30	94	101.2	5 54.1	30	94	101.7
2	5 24.0	29	95	99.9	5 15.2	29	95	100.4	5 06.4	29	94	100.9				

H.A.	10° 00′				10° 30′				11° 00′				11° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	64 00.0	1.0	02	180.0	63 30.0	1.0	02	180.0	63 00.0	1.0	02	180.0	62 30.0	1.0	02	180.0
1	63 58.9	1.0	06	177.8	63 28.9	1.0	06	177.8	62 58.9	1.0	05	177.8	62 28.9	1.0	05	177.9
2	63 55.5	1.0	09	175.5	63 25.6	1.0	09	175.6	62 55.7	1.0	09	175.7	62 25.7	1.0	09	175.8
3	63 49.9	99	13	173.3	63 20.0	99	13	173.4	62 50.2	99	13	173.5	62 20.4	99	12	173.7
4	63 42.0	99	17	171.1	63 12.4	99	16	171.2	62 42.7	99	16	171.4	62 13.0	99	16	171.6
05	63 32.0	98	20	168.9	63 02.5	98	20	169.1	62 33.0	98	20	169.3	62 03.5	98	19	169.5
6	63 19.8	97	24	166.7	62 50.6	98	23	167.0	62 21.3	98	23	167.2	61 52.0	98	23	167.5
7	63 05.5	97	27	164.6	62 36.6	97	27	164.9	62 07.5	97	26	165.2	61 38.5	97	26	165.4
8	62 49.2	96	30	162.5	62 20.5	96	30	162.9	61 51.8	96	29	163.2	61 23.0	96	29	163.5
9	62 31.0	95	34	160.5	62 02.6	95	33	160.8	61 34.1	95	33	161.2	61 05.6	95	32	161.5
10	62 10.8	93	37	158.5	61 42.7	94	36	158.9	61 14.6	94	36	159.2	60 46.4	94	35	159.6
1	61 48.7	92	40	156.6	61 21.0	92	39	157.0	60 53.3	93	38	157.4	60 25.5	93	38	157.7
2	61 24.9	91	43	154.7	60 57.6	91	42	155.1	60 30.2	91	41	155.5	60 02.8	92	41	155.9
3	60 59.4	90	45	152.8	60 32.5	90	45	153.3	60 05.5	90	44	153.7	59 38.4	90	43	154.1
4	60 32.2	88	48	151.0	60 05.7	88	47	151.5	59 39.2	89	46	152.0	59 12.5	89	46	152.4
15	60 03.5	87	50	149.3	59 37.5	87	50	149.8	59 11.3	87	49	150.3	58 45.0	88	48	150.7
6	59 33.3	85	53	147.6	59 07.7	86	52	148.1	58 42.0	86	51	148.6	58 16.1	86	50	149.1
7	59 01.8	84	55	146.0	58 36.6	84	54	146.5	58 11.2	85	53	147.0	57 45.8	85	53	147.5
8	58 28.8	82	57	144.4	58 04.1	83	56	144.9	57 39.2	83	56	145.5	57 14.2	84	55	146.0
9	57 54.6	81	59	142.9	57 30.3	81	58	143.4	57 05.9	82	58	144.0	56 41.3	82	57	144.5
20	57 19.2	79	61	141.4	56 55.4	80	60	142.0	56 31.3	80	59	142.5	56 07.2	81	59	143.0
1	56 42.7	78	63	140.0	56 19.3	78	62	140.5	55 55.7	79	61	141.1	55 31.9	79	61	141.6
2	56 05.1	76	64	138.6	55 42.1	77	64	139.2	55 18.9	77	63	139.7	54 55.6	78	62	140.3
3	55 26.4	75	66	137.3	55 03.9	75	65	137.9	54 41.2	76	65	138.4	54 18.3	77	64	139.0
4	54 46.8	74	68	136.0	54 24.7	74	67	136.6	54 02.4	75	66	137.2	53 39.9	75	65	137.7
25	54 06.3	72	69	134.8	53 44.6	73	68	135.4	53 22.7	73	68	135.9	53 00.7	74	67	136.5
6	53 25.0	71	70	133.6	53 03.7	71	70	134.2	52 42.2	72	69	134.8	52 20.6	72	68	135.3
7	52 42.8	69	72	132.4	52 21.9	70	71	133.0	52 00.8	71	70	133.6	51 39.6	71	70	134.2
8	51 59.9	68	73	131.3	51 39.4	69	72	131.9	51 18.7	69	71	132.5	50 57.8	70	71	133.1
9	51 16.2	67	74	130.3	50 56.1	67	73	130.9	50 35.8	68	73	131.4	50 15.4	68	72	132.0
30	50 31.8	65	75	129.2	50 12.1	66	74	129.8	49 52.2	67	74	130.4	49 32.1	67	73	131.0
1	49 46.9	64	76	128.2	49 27.5	65	75	128.8	49 08.0	65	75	129.4	48 48.3	66	74	130.0
2	49 01.2	63	77	127.3	48 42.3	64	76	127.9	48 23.1	64	76	128.4	48 03.8	65	75	129.0
3	48 15.1	62	78	126.3	47 56.4	62	77	126.9	47 37.6	63	77	127.5	47 18.7	64	76	128.1
4	47 28.3	61	79	125.4	47 10.1	61	78	126.0	46 51.6	62	78	126.6	46 33.0	62	77	127.2
35	46 41.1	60	80	124.6	46 23.2	60	79	125.2	46 05.0	61	78	125.7	45 46.8	61	78	126.3
6	45 53.4	58	80	123.7	45 35.8	59	80	124.3	45 18.0	60	79	124.9	45 00.0	60	79	125.5
7	45 05.2	57	81	122.9	44 47.9	58	81	123.5	44 30.4	58	80	124.1	44 12.8	59	79	124.6
8	44 16.5	56	82	122.1	43 59.6	57	81	122.7	43 42.4	57	81	123.3	43 25.1	58	80	123.8
9	43 27.5	55	82	121.4	43 10.8	56	82	121.9	42 54.0	56	81	122.5	42 37.0	57	81	123.1
40	42 38.1	54	83	120.6	42 21.7	55	83	121.2	42 05.2	55	82	121.8	41 48.5	56	82	122.3
1	41 48.3	53	84	119.9	41 32.2	54	83	120.5	41 15.9	54	83	121.0	40 59.5	55	82	121.6
2	40 58.1	52	84	119.2	40 42.3	53	84	119.8	40 26.3	53	83	120.3	40 10.2	54	83	120.9
3	40 07.6	51	85	118.6	39 52.1	52	84	119.1	39 36.4	53	84	119.7	39 20.6	53	83	120.2
4	39 16.8	51	85	117.9	39 01.5	51	85	118.5	38 46.1	52	84	119.0	38 30.5	52	84	119.6
45	38 25.7	50	86	117.3	38 10.7	50	85	117.8	37 55.5	51	85	118.4	37 40.2	51	84	118.9
6	37 34.2	49	86	116.6	37 19.5	49	86	117.2	37 04.6	50	85	117.7	36 49.6	50	85	118.3
7	36 42.6	48	87	116.0	36 28.1	49	86	116.6	36 13.4	49	86	117.1	35 58.6	50	85	117.7
8	35 50.6	47	87	115.5	35 36.4	48	87	116.0	35 22.0	48	86	116.5	35 07.4	49	86	117.1
9	34 58.4	46	87	114.9	34 44.4	47	87	115.4	34 30.2	47	87	116.0	34 15.9	48	86	116.5
50	34 06.0	46	88	114.3	33 52.2	46	87	114.9	33 38.3	47	87	115.4	33 24.2	47	87	115.9
1	33 13.3	45	88	113.8	32 59.8	45	88	114.3	32 46.1	46	87	114.9	32 32.2	46	87	115.4
2	32 20.5	44	88	113.3	32 07.1	45	88	113.8	31 53.6	45	88	114.3	31 40.0	46	87	114.9
3	31 27.4	44	89	112.8	31 14.2	44	88	113.3	31 01.0	44	88	113.8	30 47.6	45	88	114.4
4	30 34.1	43	89	112.3	30 21.2	43	89	112.8	30 08.1	44	88	113.3	29 54.9	44	88	113.8
55	29 40.6	42	89	111.8	29 27.9	43	89	112.3	29 15.0	43	89	112.8	29 02.1	43	88	113.4
6	28 47.0	42	90	111.3	28 34.5	42	89	111.8	28 21.8	42	89	112.4	28 09.0	43	89	112.9
7	27 53.2	41	90	110.9	27 40.8	41	90	111.4	27 28.4	42	89	111.9	27 15.8	42	89	112.4
8	26 59.2	40	90	110.4	26 47.0	41	90	110.9	26 34.8	41	90	111.4	26 22.4	41	89	111.9
9	26 05.1	40	90	110.0	25 53.1	40	90	110.5	25 41.0	41	90	111.0	25 28.8	41	90	111.5
60	25 10.8	39	91	109.5	24 59.0	40	90	110.0	24 47.1	40	90	110.6	24 35.0	40	90	111.1
1	24 16.4	39	91	109.1	24 04.7	39	91	109.6	23 53.0	39	90	110.1	23 41.1	40	90	110.6
2	23 21.8	38	91	108.7	23 10.3	38	91	109.2	22 58.8	39	91	109.7	22 47.1	39	90	110.2
3	22 27.1	38	91	108.3	22 15.8	38	91	108.8	22 04.4	38	91	109.3	21 52.9	38	91	109.8
4	21 32.3	37	92	107.9	21 21.1	37	91	108.4	21 09.9	38	91	108.9	20 58.6	38	91	109.4
65	20 37.4	37	92	107.5	20 26.4	37	92	108.0	20 15.3	37	91	108.5	20 04.1	37	91	109.0
6	19 42.3	36	92	107.1	19 31.4	36	92	107.6	19 20.5	37	91	108.1	19 09.5	37	91	108.6
7	18 47.1	36	92	106.8	18 36.4	36	92	107.3	18 25.6	36	92	107.7	18 14.8	36	91	108.2
8	17 51.8	35	92	106.4	17 41.3	35	92	106.9	17 30.6	36	92	107.4	17 19.9	36	92	107.9
9	16 56.5	35	92	106.0	16 46.0	35	92	106.5	16 35.5	35	92	107.0	16 25.0	35	92	107.5
70	16 01.0	34	93	105.7	15 50.7	34	92	106.2	15 40.3	35	92	106.7	15 29.9	35	92	107.1
1	15 05.4	34	93	105.3	14 55.3	34	93	105.8	14 45.0	34	92	106.3	14 34.8	34	92	106.8
2	14 09.7	33	93	105.0	13 59.7	34	93	105.5	13 49.6	34	92	106.0	13 39.5	34	92	106.4
3	13 14.0	33	93	104.7	13 04.1	33	93	105.1	12 54.1	33	93	105.6	12 44.1	33	92	106.1
4	12 18.1	32	93	104.3	12 08.4	33	93	104.8	11 58.5	33	93	105.3	11 48.7	33	93	105.8
75	11 22.2	32	93	104.0	11 12.6	32	93	104.5	11 02.9	32	93	105.0	10 53.1	33	93	105.4
6	10 26.2	32	93	103.7	10 16.7	32	93	104.2	10 07.1	32	93	104.6	9 57.5	32	93	105.1
7	9 30.1	31	94	103.4	9 20.7	31	93	103.8	9 11.3	32	93	104.3	9 01.8	32	93	104.8
8	8 34.0	31	94	103.1	8 24.7	31	94	103.5	8 15.3	31	93	104.0	8 06.0	31	93	104.5
9	7 37.8	31	94	102.7	7 28.6	31	94	103.2	7 19.3	31	93	103.7	7 10.1	31	93	104.2
80	6 41.5	30	94	102.4	6 32.4	30	94	102.9	6 23.3	30	94	103.4	6 14.1	31	93	103.9
1	5 45.1	30	94	102.1	5 36.1	30	94	102.6	5 27.1	30	94	103.1	5 18.1	30	93	103.6
2																

Lat. 16°

H.A.	12° 00′				12° 30′				13° 00′				13° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	86 00.0	1.0	12	180.0	86 30.0	1.0	13	180.0	87 00.0	1.0	15	180.0	87 30.0	1.0	18	180.0
1	85 53.0	97	33	166.2	86 22.1	96	37	164.4	86 50.9	95	42	162.0	87 19.2	93	48	158.7
2	85 33.3	90	50	153.9	86 00.0	88	55	150.8	86 25.8	84	60	146.9	86 50.4	79	67	142.0
3	85 03.2	81	63	143.6	85 27.0	77	67	139.9	85 49.5	72	72	135.5	86 10.2	66	78	130.4
4	84 25.6	72	71	135.4	84 46.6	68	75	131.6	85 06.1	62	80	127.2	85 23.7	55	84	122.4
05	83 42.8	64	78	128.9	84 01.4	59	81	125.2	84 18.3	54	84	121.1	84 33.4	47	87	116.7
6	82 56.3	58	82	123.7	83 12.8	53	85	120.3	83 27.8	47	87	116.5	83 41.0	41	90	112.5
7	82 07.2	52	85	119.6	82 22.0	47	87	116.4	82 35.4	42	89	113.0	82 47.1	36	91	109.4
8	81 16.2	47	87	116.3	81 29.7	43	89	113.3	81 41.7	38	91	110.1	81 52.2	32	92	106.9
9	80 23.8	43	89	113.5	80 36.2	39	91	110.7	80 47.2	34	92	107.8	80 56.8	29	93	104.8
10	79 30.5	40	90	111.1	79 41.8	36	92	108.6	79 52.0	32	93	105.9	80 00.8	27	94	103.2
1	78 36.3	37	91	109.1	78 46.9	33	92	106.8	78 56.3	29	93	104.3	79 04.5	25	94	101.8
2	77 41.5	35	92	107.4	77 51.4	31	93	105.2	78 00.2	27	94	102.9	78 07.9	24	95	100.6
3	76 46.3	33	93	105.9	76 55.6	29	94	103.9	77 03.9	26	94	101.7	77 11.1	22	95	99.5
4	75 50.7	31	93	104.6	75 59.5	28	94	102.7	76 07.3	24	95	100.7	76 14.2	21	95	98.6
15	74 54.7	29	94	103.5	75 03.1	26	94	101.6	75 10.5	23	95	99.7	75 17.1	20	95	97.8
6	73 58.5	28	94	102.4	74 06.5	25	96	100.7	74 13.6	22	95	98.9	74 19.9	19	95	97.1
7	73 02.1	27	94	101.5	73 09.7	24	95	99.8	73 16.6	21	95	98.1	73 22.6	19	96	96.4
8	72 05.4	26	95	100.6	72 12.8	23	96	99.0	72 19.4	21	96	97.4	72 25.3	18	96	95.8
9	71 08.7	25	96	99.8	71 15.8	23	96	98.3	71 22.2	20	96	96.8	71 27.8	18	96	95.2
20	70 11.8	24	95	99.1	70 18.7	22	96	97.6	70 24.9	20	96	96.2	70 30.4	17	96	94.7
1	69 14.8	23	95	98.4	69 21.5	21	96	97.0	69 27.5	19	96	95.6	69 32.9	17	96	94.2
2	68 17.7	23	95	97.8	68 24.2	21	96	96.5	68 30.1	19	96	95.1	68 35.4	16	96	93.8
3	67 20.5	22	95	97.2	67 26.9	20	96	95.9	67 32.6	18	96	94.7	67 37.8	16	96	93.4
4	66 23.2	22	96	96.7	66 29.5	20	96	95.4	66 35.1	18	96	94.2	66 40.2	16	96	93.0
25	65 25.9	21	96	96.1	65 32.0	19	96	95.0	65 37.6	18	96	93.8	65 42.6	16	96	92.6
6	64 28.6	21	96	95.7	64 34.6	19	96	94.5	64 40.0	17	96	93.4	64 45.0	16	96	92.2
7	63 31.1	21	96	95.2	63 37.0	19	96	94.1	63 42.4	17	96	93.0	63 47.3	15	96	91.9
8	62 33.7	20	96	94.8	62 39.5	19	96	93.7	62 44.8	17	96	92.6	62 49.7	15	96	91.5
9	61 36.2	20	96	94.3	61 41.9	18	96	93.3	61 47.2	17	96	92.3	61 52.0	15	96	91.2
30	60 38.7	20	96	93.9	60 44.3	18	96	92.9	60 49.6	17	96	91.9	60 54.4	15	96	90.9
1	59 41.1	19	96	93.5	59 46.7	18	96	92.6	59 51.9	17	96	91.6	59 56.7	15	96	90.6
2	58 43.5	19	96	93.2	58 49.1	18	96	92.2	58 54.3	16	96	91.3	58 59.0	15	96	90.3
3	57 45.9	19	96	92.8	57 51.5	18	96	91.9	57 56.6	16	96	91.0	58 01.3	15	96	90.0
4	56 48.3	19	96	92.5	56 53.8	18	96	91.6	56 58.9	16	96	90.7	57 03.7	15	96	89.8
35	55 50.7	19	96	92.1	55 56.2	18	96	91.3	56 01.3	16	96	90.4	56 06.0	15	96	89.5
6	54 53.1	19	96	91.8	54 58.5	18	96	91.0	55 03.6	16	96	90.1	55 08.3	15	96	89.2
7	53 55.4	19	96	91.5	54 00.8	18	96	90.7	54 05.9	16	96	89.8	54 10.6	15	96	89.0
8	52 57.7	19	96	91.2	53 03.2	17	96	90.4	53 08.2	16	96	89.6	53 13.0	15	96	88.7
9	52 00.1	19	96	90.9	52 05.5	17	96	90.1	52 10.6	16	96	89.3	52 15.3	15	96	88.5
40	51 02.4	19	96	90.6	51 07.8	17	96	89.8	51 12.9	16	96	89.0	51 17.7	15	96	88.3
1	50 04.7	19	96	90.3	50 10.1	17	96	89.6	50 15.2	16	96	88.8	50 20.0	15	96	88.0
2	49 07.1	19	96	90.0	49 12.5	18	96	89.3	49 17.6	17	96	88.5	49 22.4	16	96	87.8
3	48 09.4	19	96	89.8	48 14.8	18	96	89.0	48 19.9	17	96	88.3	48 24.8	16	96	87.5
4	47 11.7	19	96	89.5	47 17.1	18	96	88.8	47 22.3	17	96	88.1	47 27.1	16	96	87.3
45	46 14.0	19	96	89.2	46 19.5	18	96	88.5	46 24.6	17	96	87.8	46 29.5	16	96	87.1
6	45 16.4	19	96	89.0	45 21.8	18	96	88.3	45 27.0	17	96	87.6	45 31.9	16	96	86.9
7	44 18.7	19	96	88.7	44 24.2	18	96	88.0	44 29.4	17	96	87.3	44 34.4	16	96	86.7
8	43 21.0	19	96	88.5	43 26.5	18	96	87.8	43 31.8	17	96	87.1	43 36.8	16	96	86.4
9	42 23.4	19	96	88.2	42 28.9	18	96	87.6	42 34.2	17	96	86.9	42 39.2	16	96	86.2
50	41 25.7	19	96	88.0	41 31.3	18	96	87.3	41 36.6	17	96	86.7	41 41.7	17	96	86.0
1	40 28.1	19	96	87.7	40 33.7	18	96	87.1	40 39.0	17	96	86.4	40 44.2	17	96	85.8
2	39 30.5	19	96	87.5	39 36.1	18	96	86.8	39 41.5	18	96	86.2	39 46.6	17	96	85.6
3	38 32.9	19	96	87.2	38 38.5	18	96	86.6	38 43.9	18	96	86.0	38 49.1	17	96	85.4
4	37 35.3	19	96	87.0	37 40.9	19	96	86.4	37 46.4	18	96	85.8	37 51.7	17	96	85.1
55	36 37.7	19	96	86.8	36 43.4	19	96	86.2	36 48.9	18	96	85.5	36 54.2	17	96	84.9
6	35 40.1	19	96	86.5	35 45.8	19	96	85.9	35 51.4	18	96	85.3	35 56.8	18	96	84.7
7	34 42.5	20	96	86.3	34 48.3	19	96	85.7	34 53.9	18	96	85.1	34 59.3	18	96	84.5
8	33 45.0	20	96	86.1	33 50.8	19	96	85.5	33 56.5	19	96	84.9	34 01.9	18	96	84.3
9	32 47.5	20	96	85.8	32 53.3	19	96	85.3	32 59.0	19	96	84.7	33 04.6	18	96	84.1
60	31 49.9	20	96	85.6	31 55.9	19	96	85.0	32 01.6	19	96	84.5	32 07.2	18	96	83.9
1	30 52.4	20	96	85.4	30 58.4	20	96	84.8	31 04.2	19	96	84.2	31 09.9	19	96	83.7
2	29 55.0	20	96	85.2	30 01.0	20	96	84.6	30 06.8	19	96	84.0	30 12.6	19	95	83.5
3	28 57.5	20	96	84.9	29 03.6	20	96	84.4	29 09.5	20	96	83.8	29 15.3	19	95	83.2
4	28 00.1	21	96	84.7	28 06.2	20	96	84.1	28 12.2	20	96	83.6	28 18.0	19	95	83.0
65	27 02.7	21	96	84.5	27 08.8	20	96	83.9	27 14.9	20	95	83.4	27 20.8	19	95	82.8
6	26 05.3	21	96	84.2	26 11.5	21	96	83.7	26 17.6	20	95	83.1	26 23.6	20	95	82.6
7	25 07.9	21	96	84.0	25 14.2	21	95	83.5	25 20.3	20	95	82.9	25 26.4	20	95	82.4
8	24 10.5	21	96	83.8	24 16.9	21	95	83.2	24 23.1	21	95	82.7	24 29.2	20	95	82.2
9	23 13.2	22	96	83.6	23 19.6	21	95	83.0	23 25.9	21	95	82.5	23 32.1	20	95	82.0
70	22 15.9	22	95	83.3	22 22.4	21	95	82.8	22 28.8	21	95	82.3	22 35.0	21	95	81.7
1	21 18.6	22	95	83.1	21 25.2	22	95	82.6	21 31.6	21	95	82.0	21 38.0	21	95	81.5
2	20 21.4	22	95	82.9	20 28.0	22	95	82.3	20 34.5	22	95	81.8	20 40.9	21	95	81.3
3	19 24.2	22	95	82.6	19 30.9	22	95	82.1	19 37.4	22	95	81.6	19 43.9	22	95	81.1
4	18 27.0	23	95	82.4	18 33.7	22	95	81.9	18 40.4	22	95	81.4	18 47.0	22	95	80.9
75	17 29.9	23	95	82.2	17 36.7	23	95	81.7	17 43.4	22	95	81.1	17 50.1	22	95	80.6
6	16 32.7	23	96	81.9	16 39.6	23	95	81.4	16 46.4	23	95	80.9	16 53.2	22	95	80.4
7	15 35.6	23	95	81.7	15 42.6	23	95	81.2	15 49.5	23	95	80.7	15 56.3	23	95	80.2
8	14 38.6	24	95	81.5	14 45.6	23	95	81.0	14 52.6	23	95	80.4	14 59.5	23	95	79.9
9	13 41.6	24	95	81.2	13 48.7	24	95	80.7	13 55.7	23	95	80.2	14 02.7	23	95	79.7
80	12 44.6	24	95	81.0	12 51.8	24	95	80.5	12 58.9	24	95	80.0	13 06.0	24	94	79.5
1	11 47.7	24	95	80.7	11 54.9	24	95	80.2	12 02.2	24	95	79.7	12 09.3	24	94	79.2
2	10 50.7	25	95	80.5	10 58.1	24	95	80.0	11 05.4	24	94	79.5	11 12.7	24	94	79.0
3	9 53.9	25	95	80.2	10 01.3	25	95	79.7	10 08.7	25	94	79.3	10 16.1	24	94	78.8
4	8 57.1	25	95	80.0	9 04.6	25	94	79.5	9 12.1	25	94	79.0	9 19.6	25	94	78.5
85	8 00.3	25	95	79.7	8 07.9	25	94	79.3	8 15.5	25	94	78.8	8 23.1	25	94	78.3
6	7 03.6	26	94	79.5	7 11.3	26	94	79.0	7 19.0	26	94	78.5	7 26.6	25	94	78.0
7	6 06.9	26	94	79.2	6 14.7	26	94	78.7	6 22.5	26	94	78.3	6 30.2	26	94	77.8
8	5 10.2	26	94	79.0	5 18.1	26	94	78.5	5 26.0	26	94	78.0	5 33.9	26	94	77.5
9																

14° 00′				14° 30′				15° 00′				15° 30′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
88 00.0	1.0	22	180.0	88 30.0	1.0	28	180.0	89 00.0	1.0	39	180.0	89 30.0	1.0	58	180.0	00
87 46.7	90	56	154.1	88 13.0	84	66	147.1	88 36.7	72	78	135.9	88 54.9	46	90	117.3	1
87 13.2	72	74	135.7	87 33.4	62	82	127.6	87 49.7	46	89	117.2	88 00.7	26	94	104.3	2
86 28.8	57	83	124.2	86 44.4	47	88	117.0	86 56.5	33	92	108.7	87 04.2	18	96	99.4	3
85 39.0	47	88	116.8	85 51.6	37	91	110.7	86 01.1	26	94	104.0	86 07.1	14	96	96.9	4
84 46.4	39	90	111.8	84 56.9	31	93	106.6	85 04.8	21	95	101.0	85 09.7	12	96	95.2	05
83 52.2	34	92	108.2	84 01.2	26	94	103.7	84 08.0	18	96	99.0	84 12.2	10	96	94.1	6
82 57.0	30	93	105.6	83 05.0	23	94	101.6	83 10.9	16	95	97.5	83 14.7	09	96	93.3	7
82 01.1	27	94	103.5	82 08.3	21	95	99.9	82 13.6	15	96	96.3	82 17.1	08	96	92.6	8
81 04.8	24	94	101.8	81 11.4	19	95	98.6	81 16.2	14	96	95.4	81 19.4	08	96	92.1	9
80 08.2	22	95	100.4	80 14.2	18	95	97.5	80 18.8	13	96	94.6	80 21.8	08	96	91.6	10
79 11.4	21	95	99.2	79 17.0	16	96	96.6	79 21.3	12	96	93.9	79 24.1	07	96	91.2	1
78 14.4	20	95	98.2	78 19.7	16	96	95.8	78 23.7	11	96	93.3	78 26.5	07	96	90.8	2
77 17.2	19	95	97.3	77 22.2	15	96	95.1	77 26.1	11	96	92.8	77 28.8	07	96	90.5	3
76 20.0	18	96	96.6	76 24.8	14	96	94.5	76 28.5	11	96	92.3	76 31.1	07	96	90.2	4
75 22.6	17	96	95.9	75 27.2	14	96	93.9	75 30.8	10	96	91.9	75 33.5	07	96	89.9	15
74 25.2	16	96	95.2	74 29.7	13	96	93.4	74 33.2	10	96	91.5	74 35.8	07	96	89.7	6
73 27.8	16	96	94.7	73 32.1	13	96	92.9	73 35.5	10	96	91.2	73 38.1	07	96	89.4	7
72 30.3	15	96	94.2	72 34.5	13	96	92.5	72 37.9	10	96	90.8	72 40.4	07	96	89.2	8
71 32.7	15	96	93.7	71 36.9	12	96	92.1	71 40.2	10	96	90.5	71 42.8	07	96	89.0	9
70 35.2	15	96	93.2	70 39.2	12	96	91.7	70 42.5	10	96	90.2	70 45.1	07	96	88.7	20
69 37.6	14	96	92.8	69 41.6	12	96	91.4	69 44.9	10	96	90.0	69 47.4	07	96	88.5	1
68 40.0	14	96	92.4	68 43.9	12	96	91.1	68 47.2	10	96	89.7	68 49.8	08	96	88.3	2
67 42.3	14	96	92.1	67 46.2	12	96	90.8	67 49.5	10	96	89.4	67 52.1	08	96	88.1	3
66 44.7	14	96	91.7	66 48.6	12	96	90.5	66 51.8	10	96	89.2	66 54.5	08	96	87.9	4
65 47.0	14	96	91.4	65 50.9	12	96	90.2	65 54.2	10	96	88.9	65 56.9	08	96	87.7	25
64 49.4	14	96	91.1	64 53.2	12	96	89.9	64 56.5	10	96	88.7	64 59.2	08	96	87.5	6
63 51.7	14	96	90.7	63 55.5	12	96	89.6	63 58.8	10	96	88.5	64 01.6	08	96	87.4	7
62 54.0	14	96	90.5	62 57.9	12	96	89.4	63 01.2	10	96	88.3	63 04.0	09	95	87.2	8
61 56.3	14	96	90.2	62 00.2	12	96	89.1	62 03.5	10	96	88.1	62 06.4	09	96	87.0	9
60 58.7	14	96	89.9	61 02.5	12	96	88.9	61 05.9	11	95	87.8	61 08.8	09	96	86.8	30
60 01.0	14	96	89.6	60 04.9	12	96	88.6	60 08.3	11	95	87.6	60 11.2	09	96	86.6	1
59 03.3	14	96	89.4	59 07.2	12	96	88.4	59 10.7	11	96	87.4	59 13.7	09	96	86.5	2
58 05.6	14	96	89.1	58 09.6	12	96	88.2	58 13.0	11	96	87.2	58 16.1	10	96	86.3	3
57 08.0	14	96	88.9	57 11.9	12	96	87.9	57 15.4	11	96	87.0	57 18.6	10	96	86.1	4
56 10.3	14	96	88.6	56 14.3	13	96	87.7	56 17.8	11	96	86.8	56 21.0	10	96	85.9	35
55 12.7	14	96	88.4	55 16.6	13	96	87.5	55 20.3	11	96	86.6	55 23.5	10	96	85.8	6
54 15.0	14	96	88.1	54 19.0	13	96	87.3	54 22.7	12	95	86.4	54 26.0	10	96	85.6	7
53 17.4	14	96	87.9	53 21.4	13	96	87.1	53 25.1	12	96	86.2	53 28.5	11	96	85.4	8
52 19.7	14	96	87.7	52 23.8	13	96	86.9	52 27.6	12	96	86.1	52 31.0	11	96	85.2	9
51 22.1	14	96	87.5	51 26.2	13	96	86.7	51 30.1	12	96	85.9	51 33.5	11	96	85.1	40
50 24.5	14	96	87.2	50 28.7	13	96	86.5	50 32.5	12	96	85.7	50 36.1	11	96	84.9	1
49 26.9	15	96	87.0	49 31.1	14	96	86.3	49 35.0	13	96	85.5	49 38.6	12	96	84.7	2
48 29.3	15	96	86.8	48 33.6	14	96	86.1	48 37.5	13	96	85.3	48 41.2	12	96	84.6	3
47 31.7	15	96	86.6	47 36.0	14	96	85.9	47 40.1	13	96	85.1	47 43.8	12	96	84.4	4
46 34.2	15	96	86.4	46 38.5	14	96	85.7	46 42.6	13	96	84.9	46 46.4	12	96	84.2	45
45 36.6	15	96	86.2	45 41.0	14	96	85.5	45 45.2	13	96	84.8	45 49.1	13	96	84.0	6
44 39.1	15	96	86.0	44 43.5	14	96	85.3	44 47.7	14	96	84.6	44 51.7	13	96	83.9	7
43 41.5	15	96	85.7	43 46.1	15	96	85.1	43 50.3	14	96	84.4	43 54.4	13	96	83.7	8
42 44.0	16	96	85.5	42 48.6	15	96	84.9	42 52.9	14	96	84.2	42 57.0	13	96	83.5	9
41 46.5	16	96	85.3	41 51.2	15	96	84.7	41 55.6	14	96	84.0	41 59.7	14	95	83.3	50
40 49.1	16	96	85.1	40 53.8	15	96	84.5	40 58.2	15	96	83.8	41 02.5	14	95	83.2	1
39 51.6	16	96	84.9	39 56.4	15	96	84.3	40 00.9	15	96	83.6	40 05.2	14	95	83.0	2
38 54.2	16	96	84.7	38 59.0	16	96	84.1	39 03.6	15	95	83.5	39 08.0	14	95	82.8	3
37 56.7	17	96	84.5	38 01.6	16	96	83.9	38 06.3	15	95	83.3	38 10.8	15	95	82.6	4
36 59.3	17	96	84.3	37 04.3	16	96	83.7	37 09.0	16	95	83.1	37 13.6	15	95	82.5	55
36 02.0	17	96	84.1	36 07.0	16	96	83.5	36 11.8	16	95	82.9	36 16.4	15	95	82.3	6
35 04.6	17	96	83.9	35 09.7	17	95	83.3	35 14.6	16	95	82.7	35 19.3	15	95	82.1	7
34 07.3	17	96	83.7	34 12.4	17	95	83.1	34 17.4	16	95	82.5	34 22.2	16	95	81.9	8
33 09.9	18	96	83.5	33 15.2	17	95	82.9	33 20.2	17	95	82.3	33 25.1	16	95	81.7	9
32 12.7	18	95	83.3	32 17.9	17	95	82.7	32 23.1	17	95	82.1	32 28.0	16	95	81.5	60
31 15.4	18	95	83.1	31 20.7	18	95	82.5	31 25.9	17	95	81.9	31 31.0	17	95	81.4	1
30 18.1	18	95	82.9	30 23.6	18	95	82.3	30 28.8	17	95	81.7	30 34.0	17	95	81.2	2
29 20.9	19	95	82.7	29 26.4	18	95	82.1	29 31.8	18	95	81.5	29 37.0	17	95	81.0	3
28 23.7	19	95	82.5	28 29.3	18	95	81.9	28 34.7	18	95	81.3	28 40.0	17	95	80.8	4
27 26.6	19	95	82.3	27 32.2	19	95	81.7	27 37.7	18	95	81.2	27 43.1	18	95	80.6	65
26 29.4	19	95	82.1	26 35.2	19	95	81.5	26 40.8	18	95	81.0	26 46.2	18	95	80.4	6
25 32.3	20	95	81.8	25 38.1	19	95	81.3	25 43.8	19	95	80.8	25 49.4	18	95	80.2	7
24 35.2	20	95	81.6	24 41.1	19	95	81.1	24 46.9	19	96	80.6	24 52.6	19	95	80.0	8
23 38.2	20	95	81.4	23 44.2	20	95	80.9	23 50.0	19	95	80.3	23 55.8	19	95	79.8	9
22 41.2	20	95	81.2	22 47.2	20	95	80.7	22 53.2	20	95	80.1	22 59.0	19	94	79.6	70
21 44.2	21	95	81.0	21 50.3	20	95	80.5	21 56.4	20	95	79.9	22 02.3	20	94	79.4	1
20 47.3	21	95	80.8	20 53.5	21	95	80.2	20 59.6	20	95	79.7	21 05.7	20	94	79.2	2
19 50.3	21	95	80.6	19 56.7	21	95	80.0	20 02.9	21	94	79.5	20 09.0	20	94	79.0	3
18 53.5	21	95	80.3	18 59.9	21	95	79.8	19 06.2	21	94	79.3	19 12.4	21	94	78.8	4
17 56.6	22	95	80.1	18 03.1	22	95	79.6	18 09.5	21	94	79.1	18 15.9	21	94	78.6	75
16 59.8	22	95	79.9	17 06.4	22	94	79.4	17 12.9	22	94	78.9	17 19.4	21	94	78.4	6
16 03.1	22	95	79.7	16 09.8	22	94	79.2	16 16.4	22	94	78.7	16 22.9	22	94	78.1	7
15 06.4	23	94	79.4	15 13.1	22	94	78.9	15 19.8	22	94	78.4	15 26.5	22	94	77.9	8
14 09.7	23	94	79.2	14 16.5	23	94	78.7	14 23.4	23	94	78.2	14 30.1	22	94	77.7	9
13 13.0	23	94	79.0	13 20.0	23	94	78.5	13 26.9	23	94	78.0	13 33.8	23	94	77.5	80
12 16.5	24	94	78.7	12 23.5	23	94	78.2	12 30.5	23	94	77.7	12 37.5	23	94	77.3	1
11 19.9	24	94	78.5	11 27.1	24	94	78.0	11 34.2	24	94	77.5	11 41.3	23	94	77.0	2
10 23.4	24	94	78.3	10 30.7	24	94	77.8	10 37.9	24	94	77.3	10 45.1	24	94	76.8	3
9 27.0	25	94	78.0	9 34.3	25	94	77.5	9 41.7	24	94	77.0	9 49.0	24	93	76.6	4
8 30.6	25	94	77.8	8 38.1	25	94	77.3	8 45.5	25	94	76.8	8 52.9	25	93	76.3	85
7 34.2	25	94	77.5	7 41.8	25	94	77.1	7 49.4	25	93	76.6	7 56.9	25	93	76.1	6
6 37.9	26	94	77.3	6 45.6	26	94	76.8	6 53.3	26	93	76.3	7 00.9	25	93	75.8	7
5 41.7	26	94	77.0	5 49.5	26	93	76.6	5 57.3	26	93	76.1	6 05.0	26	93	75.6	8
								5 01.3	26	93	75.8	5 09.2	26	93	75.3	9

H.A.	12° 00′			12° 30′			13° 00′			13° 30′			14° 00′			14° 30′			15° 00′			15° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	62 00.0	1.0 02	180.0	61 30.0	1.0 02	180.0	61 00.0	1.0 02	180.0	60 30.0	1.0 02	180.0	60 00.0	1.0 02	180.0	59 30.0	1.0 02	180.0	59 00.0	1.0 02	180.0	58 30.0	1.0 02	180.0	00
1	61 59.0	1.0 05	177.9	61 29.0	1.0 05	178.0	60 59.0	1.0 05	178.0	60 29.0	1.0 05	178.0	59 59.0	1.0 05	178.1	59 29.0	1.0 05	178.1	58 59.1	1.0 05	178.1	58 29.1	1.0 05	178.2	1
2	61 55.8	1.0 09	175.8	61 25.9	1.0 09	175.9	60 56.0	1.0 08	176.0	60 26.0	1.0 08	176.1	59 56.1	1.0 08	176.1	59 26.2	1.0 08	176.2	58 56.2	1.0 08	176.3	58 26.3	1.0 08	176.3	2
3	61 50.6	99 12	173.8	61 20.8	99 12	173.9	60 50.9	99 12	174.0	60 21.1	99 12	174.1	59 51.2	99 11	174.2	59 21.4	1.0 11	174.3	58 51.5	1.0 11	174.4	58 21.7	1.0 11	174.5	3
4	61 43.3	99 16	171.7	61 13.6	99 15	171.9	60 43.9	99 15	172.0	60 14.2	99 15	172.1	59 44.4	99 14	172.3	59 14.7	99 14	172.4	58 45.0	99 14	172.5	58 15.2	99 14	172.7	4
05	61 34.0	98 19	169.7	61 04.4	98 19	169.9	60 34.9	99 18	170.0	60 05.3	99 18	170.2	59 35.7	99 18	170.4	59 06.2	99 17	170.5	58 36.5	99 17	170.7	58 06.9	99 17	170.9	05
6	61 22.7	98 22	167.7	60 53.3	98 22	167.9	60 24.0	98 21	168.1	59 54.6	98 21	168.3	59 25.2	98 21	168.5	58 55.8	98 20	168.7	58 26.3	98 20	168.9	57 56.9	98 20	169.1	6
7	61 09.4	97 25	165.7	60 40.3	97 25	165.9	60 11.1	97 24	166.2	59 42.0	97 24	166.4	59 12.8	97 24	166.6	58 43.5	97 23	166.9	58 14.3	97 23	167.1	57 45.0	98 23	167.3	7
8	60 54.2	96 28	163.7	60 25.3	96 28	164.0	59 56.4	96 28	164.3	59 27.5	96 27	164.6	58 58.5	97 27	164.8	58 29.6	97 26	165.1	58 00.5	97 26	165.3	57 31.5	97 25	165.5	8
9	60 37.1	95 31	161.8	60 08.5	95 31	162.1	59 39.9	95 30	162.4	59 11.2	96 30	162.7	58 42.6	96 30	163.0	58 13.8	96 29	163.3	57 45.1	96 29	163.6	57 16.3	96 28	163.8	9
10	60 18.2	94 34	159.9	59 49.9	94 34	160.3	59 21.6	94 33	160.6	58 53.3	95 33	160.9	58 24.8	95 32	161.2	57 56.4	95 32	161.5	57 27.9	95 31	161.8	56 59.4	95 31	162.1	10
1	59 57.6	93 37	158.1	59 29.6	93 37	158.5	59 01.6	93 36	158.8	58 33.6	94 36	159.2	58 05.5	94 35	159.5	57 37.3	94 34	159.8	57 09.1	94 34	160.1	56 40.8	94 33	160.4	1
2	59 35.2	92 40	156.3	59 07.6	92 39	156.7	58 40.0	92 39	157.1	58 12.2	93 38	157.4	57 44.5	93 38	157.8	57 16.6	93 37	158.1	56 48.7	93 37	158.5	56 20.8	93 36	158.8	2
3	59 11.3	91 43	154.6	58 44.0	91 42	155.0	58 16.7	91 41	155.4	57 49.3	91 41	155.7	57 21.9	92 40	156.1	56 54.4	92 40	156.5	56 26.8	92 39	156.9	55 59.1	92 38	157.2	3
4	58 45.7	89 45	152.9	58 18.8	90 44	153.3	57 51.9	90 44	153.7	57 24.9	90 43	154.1	56 57.8	90 43	154.5	56 30.6	91 42	154.9	56 03.4	91 41	155.3	55 36.1	91 41	155.6	4
15	58 18.6	88 48	151.2	57 52.2	88 47	151.6	57 25.6	89 46	152.1	56 59.0	89 46	152.5	56 32.2	89 45	152.9	56 05.4	90 44	153.3	55 38.5	90 44	153.7	55 11.6	90 43	154.1	15
6	57 50.1	87 50	149.6	57 24.1	87 49	150.0	56 57.9	87 48	150.5	56 31.6	88 48	150.9	56 05.3	88 47	151.4	55 38.8	88 47	151.8	55 12.3	89 46	152.2	54 45.7	89 45	152.6	6
7	57 20.2	85 52	148.0	56 54.6	86 51	148.5	56 28.8	86 51	148.9	56 02.9	86 50	149.4	55 37.0	87 49	149.8	55 10.9	87 49	150.3	54 44.7	87 48	150.7	54 18.5	88 47	151.1	7
8	56 49.0	84 54	146.5	56 23.8	84 53	147.0	55 58.4	85 53	147.4	55 32.9	85 52	147.9	55 07.3	85 51	148.4	54 41.7	86 51	148.8	54 15.9	86 50	149.3	53 50.0	86 50	149.7	8
9	56 16.6	83 56	145.0	55 51.7	83 55	145.5	55 26.8	83 55	146.0	55 01.7	84 54	146.5	54 36.5	84 53	146.9	54 11.2	84 53	147.4	53 45.8	85 52	147.9	53 20.3	85 52	148.3	9
20	55 42.9	81 58	143.6	55 18.5	82 57	144.1	54 53.9	82 57	144.6	54 29.2	82 56	145.1	54 04.4	83 55	145.6	53 39.5	83 55	146.0	53 14.5	84 54	146.5	52 49.4	84 53	146.9	20
1	55 08.1	80 60	142.2	54 44.1	80 59	142.7	54 19.9	81 58	143.2	53 55.7	81 58	143.7	53 31.3	82 57	144.2	53 06.8	82 56	144.7	52 42.1	82 56	145.2	52 17.4	83 55	145.6	1
2	54 32.2	78 62	140.8	54 08.6	79 61	141.4	53 44.8	79 60	141.9	53 21.0	80 60	142.4	52 57.0	80 59	142.9	52 32.9	81 58	143.4	52 08.6	81 58	143.9	51 44.3	81 57	144.3	2
3	53 55.2	77 63	139.5	53 32.1	78 63	140.1	53 08.7	78 62	140.6	52 45.3	78 61	141.1	52 21.7	79 60	141.6	51 58.0	79 60	142.1	51 34.1	80 59	142.6	51 10.2	80 59	143.1	3
4	53 17.3	76 65	138.3	52 54.6	76 64	138.8	52 31.6	77 63	139.4	52 08.6	77 63	139.9	51 45.4	78 62	140.4	51 22.1	78 61	140.9	50 58.6	78 61	141.4	50 35.0	79 60	141.9	4
25	52 38.5	74 66	137.1	52 16.1	75 66	137.6	51 53.6	75 65	138.1	51 31.0	76 64	138.7	51 08.2	76 64	139.2	50 45.2	77 63	139.7	50 22.2	77 62	140.2	49 59.0	78 62	140.7	25
6	51 58.8	73 68	135.9	51 36.8	73 67	136.4	51 14.7	74 66	137.0	50 52.4	74 66	137.5	50 30.0	75 65	138.0	50 07.5	75 64	138.5	49 44.8	76 64	139.1	49 22.0	76 63	139.6	6
7	51 18.2	72 69	134.7	50 56.6	72 68	135.3	50 34.9	73 68	135.8	50 13.1	73 67	136.4	49 51.0	74 66	136.9	49 28.9	74 66	137.4	49 06.6	75 65	137.9	48 44.2	75 64	138.4	7
8	50 36.8	70 70	133.6	50 15.7	71 70	134.2	49 54.3	71 69	134.7	49 32.9	72 68	135.3	49 11.2	72 68	135.8	48 49.5	73 67	136.3	48 27.6	73 66	136.9	48 05.5	74 66	137.4	8
9	49 54.7	69 71	132.6	49 33.9	70 71	133.1	49 13.0	70 70	133.7	48 51.9	71 69	134.2	48 30.7	71 69	134.8	48 09.3	72 68	135.3	47 47.7	72 68	135.8	47 26.0	72 67	136.3	9
30	49 11.9	68 72	131.5	48 51.5	68 72	132.1	48 30.9	69 71	132.7	48 10.2	69 71	133.2	47 49.3	70 70	133.7	47 28.3	70 69	134.3	47 07.2	71 69	134.8	46 45.8	71 68	135.3	30
1	48 28.4	67 74	130.5	48 08.4	67 73	131.1	47 48.2	68 72	131.7	47 27.8	68 72	132.2	47 07.3	69 71	132.7	46 46.7	69 71	133.3	46 25.9	70 70	133.8	46 04.9	70 69	134.3	1
2	47 44.3	65 75	129.6	47 24.6	66 74	130.1	47 04.8	66 73	130.7	46 44.8	67 73	131.2	46 24.6	67 72	131.8	46 04.3	68 72	132.3	45 43.9	68 71	132.8	45 23.3	69 70	133.4	2
3	46 59.5	64 76	128.6	46 40.2	65 75	129.2	46 20.7	65 74	129.8	46 01.1	66 74	130.3	45 41.3	66 73	130.8	45 21.4	67 73	131.4	45 01.3	67 72	131.9	44 41.1	68 71	132.4	3
4	46 14.2	63 76	127.7	45 55.2	63 76	128.3	45 36.1	64 75	128.9	45 16.8	65 75	129.4	44 57.4	65 74	129.9	44 37.8	66 74	130.5	44 18.1	66 73	131.0	43 58.2	66 72	131.5	4
35	45 28.3	62 77	126.9	45 09.7	62 77	127.4	44 50.9	63 76	128.0	44 32.0	63 76	128.5	44 12.9	64 75	129.1	43 53.6	64 75	129.6	43 34.2	65 74	130.1	43 14.7	65 73	130.6	35
6	44 41.9	61 78	126.0	44 23.6	61 78	126.6	44 05.2	62 77	127.1	43 46.6	62 76	127.7	43 27.8	63 76	128.2	43 08.9	63 75	128.7	42 49.9	64 75	129.3	42 30.7	64 74	129.8	6
7	43 55.0	60 79	125.2	43 37.1	60 78	125.8	43 18.9	61 78	126.3	43 00.7	61 77	126.8	42 42.2	62 77	127.4	42 23.7	62 76	127.9	42 04.9	63 76	128.4	41 46.1	63 75	129.0	7
8	43 07.6	59 80	124.4	42 50.0	59 79	125.0	42 32.2	60 79	125.5	42 14.3	60 78	126.0	41 56.2	61 78	126.6	41 37.9	61 77	127.1	41 19.5	62 77	127.6	41 01.0	62 76	128.2	8
9	42 19.8	57 80	123.6	42 02.5	58 80	124.2	41 45.0	59 79	124.7	41 27.4	59 79	125.3	41 09.6	60 78	125.8	40 51.7	60 78	126.3	40 33.6	60 77	126.9	40 15.4	61 77	127.4	9
40	41 31.6	56 81	122.9	41 14.6	57 81	123.4	40 57.4	57 80	124.0	40 40.1	58 80	124.5	40 22.6	58 79	125.0	40 05.0	59 79	125.6	39 47.2	59 78	126.1	39 29.3	60 78	126.6	40
1	40 43.0	55 82	122.2	40 26.2	56 81	122.7	40 09.4	56 81	123.2	39 52.4	57 80	123.8	39 35.2	57 80	124.3	39 17.9	58 79	124.8	39 00.4	58 79	125.4	38 42.8	59 78	125.9	1
2	39 53.9	55 82	121.4	39 37.5	55 82	122.0	39 20.9	56 81	122.5	39 04.2	56 81	123.1	38 47.3	56 80	123.6	38 30.3	57 80	124.1	38 13.2	57 79	124.6	37 55.9	58 79	125.2	2
3	39 04.6	54 83	120.8	38 48.4	54 82	121.3	38 32.1	55 82	121.8	38 15.7	55 81	122.4	37 59.1	56 81	122.9	37 42.4	56 81	123.4	37 25.5	56 80	124.0	37 08.5	57 80	124.5	3
4	38 14.8	53 83	120.1	37 59.0	53 83	120.6	37 43.0	54 83	121.2	37 26.8	54 82	121.7	37 10.5	55 82	122.2	36 54.1	55 81	122.8	36 37.5	55 81	123.3	36 20.8	56 80	123.8	4
45	37 24.8	52 84	119.4	37 09.2	52 84	120.0	36 53.4	53 83	120.5	36 37.6	53 83	121.0	36 21.5	54 82	121.6	36 05.4	54 82	122.1	35 49.1	55 81	122.6	35 32.7	55 81	123.1	45
6	36 34.4	51 84	118.8	36 19.1	51 84	119.4	36 03.6	52 84	119.9	35 48.0	52 83	120.4	35 32.2	53 83	120.9	35 16.3	53 82	121.5	35 00.3	54 82	122.0	34 44.2	54 81	122.5	6
7	35 43.7	50 85	118.2	35 28.6	50 85	118.7	35 13.4	51 84	119.3	34 58.1	51 84	119.8	34 42.6	52 83	120.3	34 27.0	52 83	120.8	34 11.2	53 82	121.4	33 55.4	53 82	121.9	7
8	34 52.7	49 85	117.6	34 37.9	50 85	118.1	34 23.0	50 85	118.7	34 07.9	51 84	119.2	33 52.7	51 84	119.7	33 37.3	51 83	120.2	33 21.8	52 83	120.7	33 06.2	52 82	121.3	8
9	34 01.5	48 86	117.0	33 46.9	49 85	117.6	33 32.2	49 85	118.1	33 17.4	50 85	118.6	33 02.4	50 84	119.1	32 47.3	51 84	119.6	32 32.1	51 83	120.2	32 16.8	51 83	120.7	9
50	33 10.0	48 86	116.5	32 55.7	48 86	117.0	32 41.2	48 85	117.5	32 26.6	49 85	118.0	32 11.9	49 85	118.6	31 57.1	50 84	119.1	31 42.1	50 84	119.6	31 27.0	50 83	120.1	50
1	32 18.3	47 87	115.9	32 04.2	47 86	116.4	31 49.9	48 86	117.0	31 35.6	48 86	117.5	31 21.1	48 85	118.0	31 06.5	49 85	118.5	30 51.8	49 84	119.0	30 37.0	50 84	119.5	1
2	31 26.3	46 87	115.4	31 12.4	46 87	115.9	30 58.4	47 86	116.4	30 44.3	47 86	116.9	30 30.0	48 86	117.5	30 15.7	48 85	118.0	30 01.2	48 85	118.5	29 46.6	49 84	119.0	2
3	30 34.0	45 87	114.9	30 20.4	46 87	115.4	30 06.6	46 87	115.9	29 52.7	46 86	116.4	29 38.7	47 86	116.9	29 24.6	47 86	117.4	29 10.4	48 85	117.9	28 56.0	48 85	118.4	3
4	29 41.6	45 88	114.4	29 28.2	45 87	114.9	29 14.6	45 87	115.4	29 01.0	46 87	115.9	28 47.2	46 86	116.4	28 33.3	46 86	116.9	28 19.3	47 86	117.4	28 05.2	47 85	117.9	4
55	28 49.0	44 88	113.9	28 35.8	44 88	114.4	28 22.4	45 87	114.9	28 09.0	45 87	115.4	27 55.4	45 87	115.9	27 41.8	46 86	116.4	27 28.0	46 86	116.9	27 14.1	46 86	117.4	55
6	27 56.1	43 88	113.4	27 43.1	44 88	113.9	27 30.0	44 88	114.4	27 16.8	44 87	114.9	27 03.4	45 87	115.4	26 50.0	45 87	115.9	26 36.4	45 86	116.4	26 22.8	46 86	116.9	6
7	27 03.1	42 89	112.9	26 50.3	43 88	113.4	26 37.4	43 88	113.9	26 24.4	44 88	114.4	26 11.2	44 87	114.9	25 58.0	44 87	115.4	25 44.7	45 87	115.9	25 31.2	45 86	116.4	7
8	26 09.9	42 89	112.4	25 57.3	42 89	113.0	25 44.6	43 88	113.5	25 31.7	43 88	114.0	25 18.8	43 88	114.5	25 05.8	44 87	115.0	24 52.7	44 87	115.5	24 39.5	44 87	115.9	8
9	25 16.5	41 89	112.0	25 04.1	42 89	112.5	24 51.6	42 89	113.0	24 39.0	42 88	113.5	24 26.2	43 88	114.0	24 13.4	43 88	114.5	24 00.5	43 87	115.0	23 47.5	43 87	115.5	9
60	24 22.9	41 90	111.6	24 10.7	41 89	112.1	23 58.4	41 89	112.6	23 46.0	42 89	113.1	23 33.5	42 88	113.6	23 20.9	42 88	114.0	23 08.2	42 88	114.5	22 55.4	43 87	115.0	60
1	23 29.2	40 90	111.1	23 17.2	40 90	111.6	23 05.0	41 89	112.1	22 52.8	41 89	112.6	22 40.5	41 89	113.1	22 28.1	42 88	113.6	22 15.6	42 88	114.1	22 03.0	42 88	114.6	1
2	22 35.3	39 90	110.7	22 23.5	40 90	111.2	22 11.5	40 89	111.7	21 59.5	40 89	112.2	21 47.4	41 89	112.7	21 35.2	41 88	113.2	21 22.9	41 88	113.7	21 10.5	41 88	114.2	2
3	21 41.3	39 90	110.3	21 29.6	39 90	110.8	21 17.9	39 90	111.3	21 06.0	40 89	111.8	20 54.1	40 89	112.3	20 42.1	40 89	112.8	20 29.9	40 88	113.2	20 17.8	41 88	113.7	3
4	20 47.1	38 90	109.9	20 35.6	38 90	110.4	20 24.0	39 90	110.9	20 12.4	39 90	111.4	20 00.6	39 89	111.9	19 48.8	40 89	112.3	19 36.9	40 89	112.8	19 24.9	40 88	113.3	4
65	19 52.8	38 91	109.5	19 41.5	38 90	110.0	19 30.1	38 90	110.5	19 18.6	38 90	111.0	19 07.0	39 90	111.5	18 55.4	39 89	111.9	18 43.6	39 89	112.4	18 31.8	39 89	112.9	65
6	18 58.4	37 91	109.1	18 47.2	37 91	109.6	18 36.0	38 90	110.1	18 24.7	38 90	110.6	18 13.3	38 90	111.1	18 01.8	38 90	111.5	17 50.2	39 89	112.0	17 38.6	39 89	112.5	6
7	18 03.8	37 91	108.7	17 52.8	37 91	109.2	17 41.7	37 91	109.7	17 30.6	37 90	110.2	17 19.4	38 90	110.7	17 08.1	38 90	111.2	16 56.7	38 89	111.6	16 45.3	38 89	112.1	7
8	17 09.2	36 91	108.4	16 58.3	36 91	108.8	16 47.4	37 91	109.3	16 36.4	37 91	109.8	16 25.3	37 90	110.3	16 14.2	37 90	110.8	16 03.0	37 90	111.3	15 51.8	38 89	111.7	8
9	16 14.4	36 92	108.0	16 03.7	36 91	108.5	15 52.9	36 91	109.0	15 42.1	36 91	109.4	15 31.2	36 90	109.9	15 20.2	37 90	110.4	15 09.2	37 90	110.9	14 58.1	37 90	111.4	9
70	15 19.4	35 92	107.6	15 08.9	35 91	108.1	14 58.3	35 91	108.6	14 47.6	36 91	109.1	14 36.9	36 91	109.6	14 26.1	36 90	110.0	14 15.3	36 90	110.5	14 04.4	36 90	111.0	70
1	14 24.4	35 92	107.3	14 14.0	35 92	107.8	14 03.6	35 91	108.2	13 53.1	35 91	108.7	13 42.5	35 91	109.2	13 31.9	36 91	109.7	13 21.2	36 90	110.2	13 10.5	36 90	110.6	1
2	13 29.3	34 92	106.9	13 19.0	34 92	107.4	13 08.7	34 92	107.9	12 58.4	35 91	108.4	12 48.0	35 91	108.9	12 37.5	35 91	109.3	12 27.0	35 91	109.8	12 16.4	35 90	110.3	2
3	12 34.1	34 92	106.6	12 24.0	34 92	107.1	12 13.8	34 92	107.6	12 03.6	34 92	108.0	11 53.3	34 91	108.5	11 43.0	34 91	109.0	11 32.7	35 91	109.5	11 22.3	35 90	110.0	3
4	11 38.7	33 92	106.3	11 28.8	33 92	106.7	11 18.8	33 92	107.2	11 08.7	34 92	107.7	10 58.6	34 91	108.2	10 48.4	34 91	108.7	10 38.2	34 91	109.1	10 28.0	34 91	109.6	4
75	10 43.3	33 92	105.9	10 33.5	33 92	106.4	10 23.6	33 92	106.9	10 13.7	33 92	107.4	10 03.7	33 92	107.8	9 53.7	33 91	108.3	9 43.7	34 91	108.8	9 33.6	34 91	109.3	75
6	9 47.8	32 93	105.6	9 38.1	32 92	106.1	9 28.4	33 92	106.6	9 18.6	33 92	107.0	9 08.8	33 92	107.5	8 58.9	33 92	108.0	8 49.0	33 91	108.5	8 39.1	33 91	109.0	6
7	8 52.2	32 93	105.3	8 42.7	32 93	105.8	8 33.1	32 92	106.2	8 23.4	32 92	106.7	8 13.7	32 92	107.2	8 04.0	32 92	107.7	7 54.3	33 91	108.2	7 44.5	33 91	108.6	7
8	7 56.6	31 93	105.0	7 47.1	32 93	105.5	7 37.6	32 93	105.9	7 28.1	32 92	106.4	7 18.6	32 92	106.9	7 09.0	32 92	107.4	6 59.4	32 92	107.8	6 49.8	32 91	108.3	8
9	7 00.8	31 93	104.7	6 51.5	31 93	105.1	6 42.1	31 93	105.6	6 32.8	31 92	106.1	6 23.4	31 92	106.6	6 13.9	31 92	107.1	6 04.5	32 92	107.5	5 55.0	32 92	108.0	9
80	6 05.0	31 93	104.4	5 55.8	31 93	104.8	5 46.6	31 93	105.3	5 37.3	31 93	105.8	5 28.0	31 92	106.3	5 18.8	31 92	106.8	5 09.4	31 92	107.2	5 00.1	31 92	107.7	80
1	5 09.1	30 93	104.1	5 00.0	30 93	104.5																			1

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	90 00.0	.. 96	....	89 30.0	1.0 68	00.0	89 00.0	1.0 39	00.0	88 30.0	1.0 28	00.0	88 00.0	1.0 22	00.0	87 30.0	1.0 18	00.0	87 00.0	1.0 15	00.0	86 30.0	1.0 13	00.0	00
1	89 02.3	00 96	89.9	88 55.1	46 90	62.3	88 36.9	72 78	43.7	88 13.2	84 65	32.4	87 47.0	90 55	25.4	87 19.4	93 47	20.8	86 51.1	95 41	17.5	86 22.4	96 36	15.1	1
2	88 04.7	00 96	89.7	88 01.0	25 94	75.1	87 50.2	46 88	62.2	87 34.0	61 81	51.6	87 14.0	72 73	43.4	86 51.2	79 66	37.1	86 26.7	84 59	32.2	86 00.9	88 53	28.3	2
3	87 07.0	01 96	89.6	87 04.6	16 95	79.7	86 57.3	32 92	70.4	86 45.6	46 87	62.0	86 30.2	57 82	54.7	86 11.9	65 76	48.5	85 51.3	72 71	43.2	85 28.9	77 66	38.8	3
4	86 09.3	01 96	89.4	86 07.6	12 95	82.0	86 02.2	24 93	74.8	85 53.2	36 90	68.0	85 41.0	45 87	61.8	85 26.1	54 82	56.2	85 08.8	61 78	51.2	84 49.6	67 74	46.8	4
05	85 11.6	01 96	89.3	85 10.4	09 96	83.4	85 06.2	19 94	77.5	84 59.0	29 92	71.9	84 49.0	37 89	66.6	84 36.6	45 86	61.6	84 22.0	52 83	57.1	84 05.5	58 79	52.9	05
6	84 14.0	01 96	89.2	84 13.1	07 96	84.2	84 09.7	16 95	79.3	84 03.7	24 93	74.5	83 55.4	31 91	69.9	83 44.9	39 89	65.6	83 32.4	45 86	61.5	83 18.0	51 83	57.6	6
7	83 16.3	02 96	89.0	83 15.7	06 96	84.8	83 12.9	13 95	80.5	83 07.9	20 94	76.4	83 00.8	27 92	72.4	82 51.8	33 90	68.5	82 40.9	39 88	64.8	82 28.3	45 85	61.3	7
8	82 18.6	02 96	88.9	82 18.2	05 96	85.2	82 15.9	11 96	81.4	82 11.7	17 94	77.8	82 05.6	23 93	74.2	81 57.8	29 91	70.7	81 48.2	35 89	67.4	81 37.0	40 87	64.1	8
9	81 21.0	02 96	88.8	81 20.8	04 96	85.4	81 18.8	09 95	82.1	81 15.2	15 94	78.8	81 09.9	20 93	75.6	81 03.0	26 92	72.5	80 54.6	31 90	69.4	80 44.6	35 89	66.5	9
10	80 23.3	02 96	88.6	80 23.2	03 96	85.6	80 21.7	08 96	82.6	80 18.5	13 96	79.7	80 13.9	18 94	76.8	80 07.8	23 93	73.9	80 00.3	27 91	71.1	79 51.4	32 90	68.3	10
1	79 25.6	03 96	88.5	79 25.7	02 96	85.8	79 24.4	07 95	83.0	79 21.7	11 95	80.3	79 17.6	16 94	77.7	79 12.2	20 93	75.0	79 05.5	25 92	72.4	78 57.5	29 91	69.9	1
2	78 28.0	03 96	88.3	78 28.2	01 96	85.8	78 27.2	06 96	83.3	78 24.8	10 95	80.9	78 21.2	14 94	78.4	78 16.4	18 93	76.0	78 10.3	22 92	73.6	78 03.1	26 91	71.2	2
3	77 30.3	03 96	88.2	77 30.7	01 96	85.9	77 29.9	05 96	83.6	77 27.9	09 95	81.3	77 24.7	13 94	79.0	77 20.3	16 94	76.7	77 14.9	20 93	74.5	77 08.3	24 92	72.3	3
4	76 32.7	03 96	88.1	76 33.2	00 96	85.9	76 32.5	04 96	83.8	76 30.8	08 95	81.6	76 28.0	11 95	79.5	76 24.1	15 94	77.4	76 19.2	18 93	75.3	76 13.2	22 92	73.2	4
15	75 35.1	04 96	87.9	75 35.6	00 96	85.9	75 35.2	03 96	83.9	75 33.7	07 96	81.9	75 31.3	10 96	79.9	75 27.8	13 94	77.9	75 23.3	17 93	76.0	75 17.9	20 93	74.0	15
6	74 37.4	04 96	87.8	74 38.1	01 96	85.9	74 37.8	02 96	84.0	74 36.6	06 95	82.1	74 34.5	09 96	80.2	74 31.3	12 94	78.4	74 27.3	15 94	76.5	74 22.3	18 93	74.7	6
7	73 39.8	04 96	87.6	73 40.6	01 96	85.9	73 40.5	02 96	84.1	73 39.5	05 95	82.3	73 37.6	08 96	80.5	73 34.8	11 94	78.8	73 31.2	14 94	77.0	73 26.6	17 93	75.3	7
8	72 42.2	04 96	87.5	72 43.1	02 96	85.8	72 43.1	01 96	84.1	72 42.3	04 95	82.5	72 40.7	07 96	80.8	72 38.2	10 94	79.1	72 34.9	12 94	77.4	72 30.8	15 93	75.8	8
9	71 44.5	05 96	87.4	71 45.5	02 96	85.8	71 45.7	01 96	84.2	71 45.1	03 95	82.6	71 43.7	06 96	81.0	71 41.5	09 94	79.4	71 38.6	11 94	77.8	71 34.8	14 93	76.2	9
20	70 46.9	05 96	87.2	70 48.0	02 96	85.7	70 48.3	00 96	84.2	70 47.9	03 95	82.7	70 46.8	05 96	81.1	70 44.8	08 95	79.6	70 42.2	10 94	78.1	70 38.8	13 94	76.6	20
1	69 49.3	05 96	87.1	69 50.5	03 96	85.6	69 51.0	00 96	84.2	69 50.7	02 96	82.7	69 49.8	04 95	81.3	69 48.1	07 95	79.8	69 45.7	09 94	78.4	69 42.6	11 94	76.9	1
2	68 51.7	05 96	86.9	68 53.0	03 96	85.5	68 53.6	01 96	84.2	68 53.5	01 95	82.8	68 52.7	04 95	81.4	68 51.3	06 95	80.0	68 49.2	08 94	78.6	68 46.4	10 94	77.2	2
3	67 54.1	06 96	86.8	67 55.5	03 96	85.5	67 56.2	01 96	84.1	67 56.3	01 95	82.8	67 55.7	03 95	81.5	67 54.5	06 95	80.1	67 52.6	07 94	78.8	67 50.1	09 94	77.5	3
4	66 56.6	06 96	86.6	66 58.0	04 96	85.4	66 58.8	02 96	84.1	66 59.1	00 95	82.8	66 58.7	02 95	81.5	66 57.6	04 95	80.3	66 56.0	06 94	79.0	66 53.8	08 94	77.7	4
25	65 59.0	06 96	86.5	66 00.5	04 96	85.3	66 01.5	02 96	84.0	66 01.8	00 95	82.8	66 01.6	02 95	81.6	66 00.8	04 95	80.4	65 59.4	06 94	79.1	65 57.4	08 94	77.9	25
6	65 01.4	06 96	86.4	65 03.1	04 96	85.2	65 04.1	03 96	84.0	65 04.6	01 95	82.8	65 04.6	01 95	81.6	65 03.9	03 95	80.4	65 02.7	05 94	79.2	65 01.0	07 94	78.1	6
7	64 03.9	07 96	86.2	64 05.6	05 96	85.1	64 06.8	03 96	83.9	64 07.4	01 95	82.8	64 07.5	01 95	81.6	64 07.0	02 95	80.5	64 06.1	04 94	79.3	64 04.5	06 94	78.2	7
8	63 06.3	07 96	86.1	63 08.1	06 96	85.0	63 09.4	03 96	83.9	63 10.2	02 95	82.8	63 10.4	00 95	81.6	63 10.2	02 95	80.5	63 09.4	03 95	79.4	63 08.1	05 94	78.3	8
9	62 08.8	07 96	85.9	62 10.7	05 96	84.9	62 12.1	04 96	83.8	62 13.0	02 95	82.7	62 13.4	01 95	81.6	62 13.3	01 95	80.6	62 12.7	03 95	79.5	62 11.6	04 94	78.4	9
30	61 11.3	07 96	85.8	61 13.2	06 96	84.7	61 14.7	04 96	83.7	61 15.8	03 95	82.7	61 16.3	01 95	81.6	61 16.4	01 95	80.6	61 16.0	02 95	79.5	61 15.1	04 94	78.5	30
1	60 13.8	08 96	85.6	60 15.8	06 96	84.6	60 17.4	05 96	83.6	60 18.6	03 95	82.6	60 19.2	02 95	81.6	60 19.5	00 96	80.6	60 19.2	02 95	79.6	60 18.5	03 94	78.6	1
2	59 16.3	08 96	85.5	59 18.4	06 96	84.5	59 20.1	05 96	83.5	59 21.4	03 95	82.5	59 22.2	02 95	81.6	59 22.6	01 95	80.6	59 22.5	01 95	79.6	59 22.0	02 94	78.6	2
3	58 18.8	08 96	85.3	58 21.0	07 96	84.4	58 22.8	05 96	83.4	58 24.2	04 95	82.5	58 25.1	02 95	81.5	58 25.7	01 95	80.6	58 25.8	00 95	79.6	58 25.5	02 94	78.7	3
4	57 21.3	08 96	85.2	57 23.6	07 96	84.3	57 25.5	06 95	83.3	57 27.0	04 95	82.4	57 28.1	03 95	81.5	57 28.8	02 95	80.5	57 29.1	00 95	79.6	57 28.9	01 94	78.7	4
35	56 23.8	09 96	85.0	56 26.2	07 96	84.1	56 28.2	06 95	83.2	56 29.8	05 95	82.3	56 31.1	03 95	81.4	56 31.9	02 95	80.5	56 32.3	01 95	79.6	56 32.4	01 94	78.7	35
6	55 26.4	09 96	84.9	55 28.9	08 96	84.0	55 31.0	06 95	83.1	55 32.7	06 95	82.2	55 34.0	04 95	81.4	55 35.0	03 95	80.5	55 35.6	01 95	79.6	55 35.8	00 94	78.7	6
7	54 28.9	09 96	84.7	54 31.5	08 96	83.9	54 33.7	07 95	83.0	54 35.6	06 95	82.2	54 37.0	04 95	81.3	54 38.1	03 95	80.4	54 38.9	02 95	79.6	54 39.2	01 94	78.7	7
8	53 31.5	09 96	84.6	53 34.2	08 96	83.7	53 36.5	07 95	82.9	53 38.4	06 95	82.1	53 40.0	05 95	81.2	53 41.3	04 95	80.4	53 42.2	02 95	79.5	53 42.7	01 94	78.7	8
9	52 34.1	10 96	84.4	52 36.8	09 96	83.6	52 39.2	07 95	82.8	52 41.3	06 95	82.0	52 43.0	05 95	81.1	52 44.4	04 95	80.3	52 45.4	03 94	79.5	52 46.1	02 94	78.7	9
40	51 36.7	10 96	84.3	51 39.5	09 96	83.5	51 42.0	08 95	82.7	51 44.2	07 95	81.9	51 46.0	06 95	81.1	51 47.6	04 95	80.2	51 48.7	03 94	79.4	51 49.6	02 94	78.6	40
1	50 39.3	10 96	84.1	50 42.2	09 96	83.3	50 44.8	08 95	82.5	50 47.1	07 95	81.8	50 49.1	06 95	81.0	50 50.7	05 95	80.2	50 52.0	04 94	79.4	50 53.0	03 94	78.6	1
2	49 42.0	11 96	84.0	49 45.0	10 95	83.2	49 47.7	08 95	82.4	49 50.0	07 95	81.6	49 52.1	06 95	80.9	49 53.9	05 95	80.1	49 55.4	04 94	79.3	49 56.5	03 94	78.5	2
3	48 44.6	11 96	83.8	48 47.7	10 95	83.0	48 50.5	09 95	82.3	48 53.0	08 95	81.5	48 55.2	07 95	80.8	48 57.1	06 95	80.0	48 58.7	05 94	79.3	49 00.0	04 94	78.5	3
4	47 47.3	11 96	83.6	47 50.5	10 96	82.9	47 53.3	09 95	82.2	47 56.0	08 95	81.4	47 58.3	07 95	80.7	48 00.3	06 95	79.9	48 02.0	05 94	79.2	48 03.5	04 94	78.4	4
45	46 50.0	11 96	83.5	46 53.2	10 96	82.8	46 56.2	09 95	82.0	46 58.9	09 95	81.3	47 01.4	08 95	80.6	47 03.5	07 95	79.8	47 05.4	06 94	79.1	47 07.0	05 94	78.4	45
6	45 52.7	12 95	83.3	45 56.0	11 96	82.6	45 59.1	10 96	81.9	46 01.9	09 95	81.2	46 04.5	08 96	80.5	46 06.8	07 95	79.7	46 08.8	06 94	79.0	46 10.5	06 94	78.3	6
7	44 55.4	12 95	83.2	44 58.8	11 96	82.5	45 02.0	10 96	81.8	45 04.9	09 96	81.1	45 07.6	08 96	80.4	45 10.0	08 95	79.6	45 12.1	07 94	78.9	45 14.0	06 94	78.2	7
8	43 58.1	12 95	83.0	44 01.7	11 96	82.3	44 04.9	11 95	81.6	44 08.0	10 96	80.9	44 10.8	09 96	80.2	44 13.3	08 95	79.5	44 15.6	07 94	78.8	44 17.6	06 94	78.1	8
9	43 00.9	12 95	82.8	43 04.5	12 95	82.2	43 07.9	11 95	81.5	43 11.0	10 95	80.8	43 13.9	09 95	80.1	43 16.6	08 94	79.4	43 19.0	08 94	78.7	43 21.1	07 94	78.1	9
50	42 03.7	13 95	82.7	42 07.4	12 95	82.0	42 10.9	11 95	81.3	42 14.1	10 95	80.7	42 17.1	10 95	80.0	42 19.9	09 94	79.3	42 22.4	08 94	78.6	42 24.7	07 94	78.0	50
1	41 06.5	13 95	82.5	41 10.3	12 95	81.9	41 13.9	12 95	81.2	41 17.2	11 95	80.5	41 20.3	10 95	79.9	41 23.2	09 94	79.2	41 25.9	08 94	78.5	41 28.3	08 94	77.9	1
2	40 09.3	13 95	82.3	40 13.2	13 95	81.7	40 16.9	12 95	81.0	40 20.3	11 96	80.4	40 23.6	10 95	79.7	40 26.6	10 94	79.1	40 29.4	09 94	78.4	40 31.9	08 94	77.8	2
3	39 12.2	14 95	82.2	39 16.1	13 95	81.5	39 19.9	12 95	80.9	39 23.5	12 95	80.3	39 26.8	11 95	79.6	39 30.0	10 94	79.0	39 32.9	09 94	78.3	39 35.6	09 94	77.7	3
4	38 15.0	14 95	82.0	38 19.1	13 95	81.4	38 23.0	13 95	80.7	38 26.6	12 95	80.1	38 30.1	11 94	79.5	38 33.4	10 94	78.8	38 36.4	10 94	78.2	38 39.2	09 94	77.6	4
55	37 17.9	14 95	81.8	37 22.1	14 95	81.2	37 26.1	13 95	80.6	37 29.8	12 95	80.0	37 33.4	12 94	79.3	37 36.8	11 94	78.7	37 40.0	10 94	78.1	37 42.9	10 94	77.5	55
6	36 20.9	15 95	81.7	36 25.1	14 95	81.0	36 29.2	13 95	80.4	36 33.1	13 95	79.8	36 36.7	12 94	79.2	36 40.2	11 94	78.6	36 43.5	11 94	78.0	36 46.6	10 94	77.3	6
7	35 23.8	15 95	81.5	35 28.2	14 95	80.9	35 32.3	14 95	80.3	35 36.3	13 96	79.7	35 40.1	12 94	79.1	35 43.7	12 94	78.4	35 47.1	11 94	77.8	35 50.4	10 94	77.2	7
8	34 26.8	15 95	81.3	34 31.2	15 95	80.7	34 35.5	14 95	80.1	34 39.6	13 94	79.5	34 43.5	13 94	78.9	34 47.2	12 94	78.3	34 50.8	12 94	77.7	34 54.2	11 94	77.1	8
9	33 29.8	15 95	81.1	33 34.3	15 95	80.5	33 38.7	14 95	79.9	33 42.9	14 94	79.4	33 46.9	13 94	78.8	33 50.8	13 94	78.2	33 54.4	12 94	77.6	33 58.0	11 94	77.0	9
60	32 32.8	16 95	81.0	32 37.4	15 95	80.4	32 41.9	15 95	79.8	32 46.2	14 94	79.2	32 50.4	14 94	78.6	32 54.3	13 94	78.0	32 58.1	12 94	77.4	33 01.8	12 94	76.8	60
1	31 35.9	16 95	80.8	31 40.6	16 95	80.2	31 45.2	15 95	79.6	31 49.6	14 94	79.0	31 53.8	14 94	78.5	31 57.9	13 94	77.9	32 01.9	13 94	77.3	32 05.6	12 94	76.7	1
2	30 38.9	16 95	80.6	30 43.8	16 95	80.0	30 48.4	15 94	79.4	30 53.0	15 94	78.9	30 57.3	14 94	78.3	31 01.6	14 94	77.7	31 05.6	13 94	77.1	31 09.5	13 93	76.6	2
3	29 42.1	17 95	80.4	29 47.0	16 95	79.8	29 51.8	16 94	79.3	29 56.4	15 94	78.7	30 00.9	15 94	78.1	30 05.2	14 94	77.6	30 09.4	14 94	77.0	30 13.4	13 93	76.4	3
4	28 45.2	17 95	80.2	28 50.2	17 95	79.7	28 55.1	16 94	79.1	28 59.9	16 94	78.5	29 04.5	15 94	78.0	29 08.9	15 94	77.4	29 13.2	14 94	76.8	29 17.4	14 93	76.3	4
65	27 48.4	17 95	80.0	27 53.5	17 94	79.5	27 58.5	16 94	78.9	28 03.3	16 94	78.4	28 08.1	15 94	77.8	28 12.6	15 94	77.2	28 17.1	15 94	76.7	28 21.4	14 93	76.1	65
6	26 51.6	18 95	79.9	26 56.8	17 94	79.3	27 01.9	17 94	78.7	27 06.9	16 94	78.2	27 11.7	16 94	77.6	27 16.4	15 94	77.1	27 21.0	15 93	76.5	27 25.4	15 93	76.0	6
7	25 54.8	18 95	79.7	26 00.2	18 94	79.1	26 05.4	17 94	78.6	26 10.4	17 94	78.0	26 15.4	16 94	77.5	26 20.2	16 94	76.9	26 24.9	15 93	76.4	26 29.5	15 93	75.8	7
8	24 58.1	18 94	79.5	25 03.5	18 94	78.9	25 08.8	17 94	78.4	25 14.0	17 94	77.8	25 19.1	17 94	77.3	25 24.0	16 94	76.7	25 28.9	16 93	76.2	25 33.6	15 93	75.7	8
9	24 01.4	19 94	79.3	24 07.0	18 94	78.7	24 12.4	18 94	78.2	24 17.7	17 94	77.7	24 22.9	17 94	77.1	24 27.9	17 93	76.6	24 32.9	16 93	76.0	24 37.7	16 93	75.5	9
70	23 04.8	19 94	79.1	23 10.4	19 94	78.5	23 15.9	18 94	78.0	23 21.3	18 94	77.5	23 26.7	18 94	76.9	23 31.8	17 93	76.4	23 36.9	17 93	75.9	23 41.9	16 93	75.3	70
1	22 08.2	19 94	78.9	22 13.9	19 94	78.3	22 19.5	19 94	77.8	22 25.1	18 94	77.3	22 30.5	18 94	76.8	22 35.8	18 93	76.2	22 41.0	17 93	75.7	22 46.1	17 93	75.2	1
2	21 11.6	20 94	78.7	21 17.4	19 94	78.1	21 23.2	19 94	77.6	21 28.8	19 94	77.1	21 34.4	18 93	76.6	21 39.8	18 93	76.0	21 45.2	18 93	75.5	21 50.4	17 93	75.0	2
3	20 15.1	20 94	78.5	20 21.0	20 94	77.9	20 26.9	19 94	77.4	20 32.6	19 94	76.9	20 38.3	19 93	76.4	20 43.9	18 93	75.9	20 49.3	18 93	75.3	20 54.7	18 93	74.8	3
4	19 18.6	20 94	78.3	19 24.6	20 94	77.7	19 30.6	20 94	77.2	19 36.5	19 94	76.7	19 42.3	19 93	76.2	19 48.0	19 93	75.7	19 53.6	19 93	75.1	19 59.1	18 93	74.6	4
75	18 22.1	21 94	78.1	18 28.3	20 94	77.5	18 34.4	20 94	77.0	18 40.4	20 93	76.5	18 46.3	20 93	76.0	18 52.1	19 93	75.5	18 57.9	19 93	75.0	19 03.5	19 93	74.4	75
6	17 25.7	21 94	77.8	17 32.0	21 94	77.3	17 38.2	21 94	76.8	17 44.3	20 93	76.3	17 50.3	20 93	75.8	17 56.3	20 93	75.3	18 02.2	19 93	74.8	18 08.0	19 92	74.2	6
7	16 29.4	21 94	77.6	16 35.7	21 94	77.1	16 42.1	21 94	76.6	16 48.3	21 93	76.1	16 54.5	20 93	75.6	17 00.5	20 93	75.1	17 06.6	20 93	74.6	17 12.5	20 92	74.1	7
8	15 33.0	22 94	77.4	15 39.5	22 94	76.9	15 46.0	21 93	76.4	15 52.3	21 93	75.9	15 58.6	21 93	75.4	16 04.8	21 93	74.9	16 11.0	20 93	74.4	16 17.1	20 92	73.9	8
9	14 36.8	22 94	77.2	14 43.4	22 94	76.7	14 49.9	22 93	76.2	14 56.4	21 93	75.7	15 02.8	21 93	75.2	15 09.2	21 93	74.7	15 15.5	21 92	74.2	15 21.7	21 92	73.7	9
80	13 40.6	23 94	77.0	13 47.3	22 93	76.5	13 54.0	22 93	76.0	14 00.6	22 93	75.5	14 07.1	22 93	75.0	14 13.6	22 93	74.5	14 20.0	21 92	74.0	14 26.4	21 92	73.5	80
1	12 44.4	23 94	76.8	12 51.2	23 93	76.3	12 58.0	23 93	75.8	13 04.8	22 93	75.3	13 11.4	22 93	74.8	13 18.1	22 92	74.3	13 24.6	22 92	73.8	13 31.1	22 92	73.2	1
2	11 48.3	23 93	76.5	11 55.2	23 93	76.0	12 02.2	23 93	75.5	12 09.0	23 93	75.0	12 15.8	23 93	74.5	12 22.6	22 92	74.0	12 29.3	22 92	73.5	12 35.9	22 92	73.0	2
3	10 52.2	24 93	76.3	10 59.3	24 93	75.8	11 06.3	23 93	75.3	11 13.3	23 93	74.8	11 20.3	23 92	74.3	11 27.2	23 92	73.8	11 34.0	23 92	73.3	11 40.8	23 92	72.8	3
4	9 56.2	24 93	76.1	10 03.4	24 93	75.6	10 10.6	24 93	75.1	10 17.7	24 93	74.6	10 24.8	23 92	74.1	10 31.8	23 92	73.6	10 38.8	23 92	73.1	10 45.7	23 92	72.6	4
85	9 00.3	24 93	75.8	9 07.6	24 93	75.3	9 14.9	24 93	74.8	9 22.1	24 92	74.4	9 29.3	24 92	73.9	9 36.5	24 92	73.4	9 43.6	24 92	72.9	9 50.7	24 92	72.4	85
6	8 04.4	25 93	75.6	8 11.8	25 93	75.1	8 19.2	25 93	74.6	8 26.6	25 92	74.1	8 34.0	24 92	73.6	8 41.3	24 92	73.1	8 48.5	24 92	72.6	8 55.8	24 91	72.2	6
7	7 08.5	25 93	75.3	7 16.1	25 93	74.9	7 23.7	25 93	74.4	7 31.2	25 92	73.9	7 38.7	25 92	73.4	7 46.1	25 92	72.9	7 53.5	25 92	72.4	8 00.9	25 91	71.9	7
8	6 12.8	26 93	75.1	6 20.5	26 93	74.6	6 28.2	26 92	74.1	6 35.8	25 92	73.6	6 43.4	25 92	73.1	6 51.0	25 92	72.7	6 58.6	25 91	72.2	7 06.1	25 91	71.7	8
9	5 17.1	26 93	74.8	5 24.9	26 93	74.4	5 32.7	26 92	73.9	5 40.5	26 92	73.4	5 48.3	26 92	72.9	5 56.0	26 92	72.4	6 03.7	26 91	71.9	6 11.4	26 91	71.4	9
90																5 01.1	26 91	72.2	5 08.9	26 91	71.7	5 16.8	26 91	71.2	90

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	58 00.0	1.0 02	180.0	57 30.0	1.0 02	180.0	57 00.0	1.0 01	180.0	56 30.0	1.0 01	180.0	56 00.0	1.0 01	180.0	55 30.0	1.0 01	180.0	55 00.0	1.0 01	180.0	54 30.0	1.0 01	180.0	00
1	57 59.1	1.0 05	178.2	57 29.1	1.0 04	178.2	56 59.1	1.0 04	178.2	56 29.1	1.0 04	178.3	55 59.1	1.0 04	178.3	55 29.2	1.0 04	178.3	54 59.2	1.0 04	178.4	54 29.2	1.0 04	178.4	1
2	57 56.4	1.0 08	176.4	57 26.4	1.0 07	176.4	56 56.5	1.0 07	176.5	56 26.5	1.0 07	176.5	55 56.6	1.0 07	176.6	55 26.6	1.0 07	176.7	54 56.7	1.0 07	176.7	54 26.7	1.0 07	176.8	2
3	57 51.8	1.0 11	174.6	57 21.9	1.0 10	174.7	56 52.1	1.0 10	174.7	56 22.2	1.0 10	174.8	55 52.3	1.0 10	174.9	55 22.4	1.0 10	175.0	54 52.5	1.0 10	175.1	54 22.7	1.0 10	175.1	3
4	57 45.4	99 14	172.8	57 15.7	99 13	172.9	56 45.9	99 13	173.0	56 16.1	99 13	173.1	55 46.3	99 13	173.2	55 16.6	99 13	173.3	54 46.8	99 12	173.4	54 17.0	99 12	173.5	4
05	57 37.3	99 17	171.0	57 07.7	99 16	171.1	56 38.0	99 16	171.3	56 08.4	99 16	171.4	55 38.7	99 16	171.6	55 09.0	99 15	171.7	54 39.4	99 15	171.8	54 09.7	99 15	171.9	05
6	57 27.4	98 19	169.2	56 57.9	98 19	169.4	56 28.4	98 19	169.6	55 58.9	98 18	169.7	55 29.4	98 18	169.9	54 59.9	98 18	170.0	54 30.3	98 18	170.2	54 00.8	99 17	170.3	6
7	57 15.8	98 22	167.5	56 46.5	98 22	167.7	56 17.2	98 22	167.9	55 47.8	98 21	168.1	55 18.5	98 21	168.3	54 49.1	98 21	168.4	54 19.7	98 20	168.6	53 50.3	98 20	168.8	7
8	57 02.4	97 25	165.8	56 33.3	97 25	166.0	56 04.2	97 24	166.2	55 35.1	97 24	166.4	55 05.9	97 24	166.6	54 36.8	97 23	166.8	54 07.6	97 23	167.0	53 38.3	97 23	167.2	8
9	56 47.4	96 28	164.1	56 18.6	96 27	164.3	55 49.7	96 27	164.6	55 20.7	96 27	164.8	54 51.8	97 26	165.0	54 22.8	97 26	165.2	53 53.8	97 25	165.5	53 24.8	97 25	165.7	9
10	56 30.8	95 30	162.4	56 02.2	95 30	162.7	55 33.5	96 30	162.9	55 04.8	96 29	163.2	54 36.1	96 29	163.4	54 07.4	96 28	163.7	53 38.6	96 28	163.9	53 09.8	96 27	164.2	10
1	56 12.5	94 33	160.7	55 44.2	95 33	161.0	55 15.8	95 32	161.3	54 47.4	95 32	161.6	54 18.9	95 31	161.9	53 50.4	95 31	162.1	53 21.9	95 30	162.4	52 53.3	95 30	162.7	1
2	55 52.7	93 36	159.1	55 24.7	94 35	159.4	54 56.6	94 34	159.7	54 28.4	94 34	160.0	54 00.2	94 34	160.3	53 32.0	94 33	160.6	53 03.7	94 33	160.9	52 35.4	94 32	161.2	2
3	55 31.5	92 38	157.5	55 03.7	93 37	157.9	54 35.9	93 37	158.2	54 08.0	93 36	158.5	53 40.1	93 36	158.8	53 12.2	93 35	159.1	52 44.2	93 35	159.4	52 16.1	94 34	159.7	3
4	55 08.7	91 40	156.0	54 41.3	92 40	156.3	54 13.8	92 39	156.7	53 46.2	92 39	157.0	53 18.6	92 38	157.4	52 50.9	92 38	157.7	52 23.2	92 37	158.0	51 55.5	93 37	158.3	4
15	54 44.5	90 43	154.5	54 17.4	90 42	154.8	53 50.3	91 41	155.2	53 23.0	91 41	155.6	52 55.7	91 40	155.9	52 28.4	91 40	156.2	52 01.0	91 39	156.6	51 33.5	92 39	156.9	15
6	54 19.0	89 45	153.0	53 52.2	89 44	153.4	53 25.4	90 44	153.7	52 58.5	90 43	154.1	52 31.5	90 42	154.5	52 04.5	90 42	154.8	51 37.4	90 41	155.2	51 10.2	91 41	155.5	6
7	53 52.2	88 47	151.5	53 25.7	88 46	151.9	52 59.2	88 46	152.3	52 32.7	89 45	152.7	52 06.0	89 45	153.1	51 39.3	89 44	153.5	51 12.5	89 43	153.8	50 45.7	90 43	154.2	7
8	53 24.0	87 49	150.1	52 58.0	87 48	150.5	52 31.8	87 48	150.9	52 05.6	88 47	151.3	51 39.3	88 47	151.7	51 12.9	88 46	152.1	50 46.5	88 45	152.5	50 20.0	89 45	152.8	8
9	52 54.7	85 51	148.7	52 29.0	86 50	149.2	52 03.2	86 50	149.6	51 37.4	86 49	150.0	51 11.4	87 48	150.4	50 45.4	87 48	150.8	50 19.3	87 47	151.2	49 53.1	87 47	151.6	9
20	52 24.2	84 53	147.4	51 58.9	85 52	147.8	51 33.4	85 52	148.3	51 07.9	85 51	148.7	50 42.3	85 50	149.1	50 16.7	86 50	149.5	49 50.9	86 49	149.9	49 25.0	86 49	150.3	20
1	51 52.6	83 55	146.1	51 27.6	83 54	146.5	51 02.6	84 53	147.0	50 37.4	84 53	147.4	50 12.2	84 52	147.8	49 46.8	85 51	148.2	49 21.4	85 51	148.7	48 55.9	85 50	149.1	1
2	51 19.8	82 56	144.8	50 55.3	82 56	145.3	50 30.6	82 55	145.7	50 05.8	83 54	146.2	49 40.9	83 54	146.6	49 16.0	83 53	147.0	48 50.9	84 53	147.4	48 25.7	84 52	147.8	2
3	50 46.1	80 58	143.6	50 21.9	81 57	144.0	49 57.6	81 57	144.5	49 33.2	82 56	144.9	49 08.7	82 55	145.4	48 44.1	82 55	145.8	48 19.4	83 54	146.2	47 54.5	83 54	146.7	3
4	50 11.3	79 59	142.4	49 47.5	80 59	142.8	49 23.6	80 58	143.3	48 59.6	80 58	143.8	48 35.4	81 57	144.2	48 11.2	81 56	144.7	47 46.8	81 56	145.1	47 22.4	82 55	145.5	4
25	49 35.7	78 61	141.2	49 12.2	78 60	141.7	48 48.7	79 60	142.1	48 25.0	79 59	142.6	48 01.2	79 58	143.1	47 37.3	80 58	143.5	47 13.3	80 57	144.0	46 49.3	80 57	144.4	25
6	48 59.1	77 62	140.1	48 36.0	77 62	140.5	48 12.8	77 61	141.0	47 49.5	78 61	141.5	47 26.1	78 60	142.0	47 02.6	79 59	142.4	46 39.0	79 59	142.9	46 15.2	79 58	143.3	6
7	48 21.6	75 64	138.9	47 58.9	76 63	139.4	47 36.1	76 63	139.9	47 13.2	77 62	140.4	46 50.1	77 61	140.9	46 27.0	77 61	141.3	46 03.7	78 60	141.8	45 40.3	78 60	142.2	7
8	47 43.3	74 65	137.9	47 21.0	75 64	138.4	46 58.6	75 64	138.9	46 36.0	75 63	139.3	46 13.3	76 63	139.8	45 50.5	76 62	140.3	45 27.6	77 62	140.7	45 04.6	77 61	141.2	8
9	47 04.2	73 66	136.8	46 42.3	73 66	137.3	46 20.2	74 65	137.8	45 58.0	74 65	138.3	45 35.7	75 64	138.8	45 13.3	75 63	139.3	44 50.7	75 63	139.7	44 28.1	76 62	140.2	9
30	46 24.4	72 68	135.8	46 02.8	72 67	136.3	45 41.1	73 66	136.8	45 19.3	73 66	137.3	44 57.3	73 65	137.8	44 35.2	74 65	138.3	44 13.0	74 64	138.7	43 50.7	75 63	139.2	30
1	45 43.8	70 69	134.8	45 22.6	71 68	135.3	45 01.3	71 68	135.8	44 39.8	72 67	136.3	44 18.2	72 66	136.8	43 56.5	73 66	137.3	43 34.6	73 65	137.8	43 12.7	73 65	138.2	1
2	45 02.6	69 70	133.9	44 41.7	70 69	134.4	44 20.7	70 69	134.9	43 59.6	71 68	135.4	43 38.4	71 68	135.9	43 17.0	71 67	136.3	42 55.5	72 66	136.8	42 33.9	72 66	137.3	2
3	44 20.7	68 71	132.9	44 00.2	69 70	133.4	43 39.6	69 70	134.0	43 18.8	69 69	134.4	42 57.9	70 69	134.9	42 36.9	70 68	135.4	42 15.7	71 67	135.9	41 54.5	71 67	136.4	3
4	43 38.2	67 72	132.0	43 18.0	67 71	132.5	42 57.7	68 71	133.1	42 37.3	68 70	133.6	42 16.7	69 70	134.0	41 56.1	69 69	134.5	41 35.3	70 68	135.0	41 14.3	70 68	135.5	4
35	42 55.0	66 73	131.2	42 35.2	66 72	131.7	42 15.3	67 72	132.2	41 55.2	67 71	132.7	41 35.0	68 71	133.2	41 14.6	68 70	133.7	40 54.2	68 69	134.1	40 33.6	69 69	134.6	35
6	42 11.3	65 74	130.3	41 51.8	65 73	130.8	41 32.2	66 73	131.3	41 12.5	66 72	131.8	40 52.6	66 72	132.3	40 32.6	67 71	132.8	40 12.5	67 70	133.3	39 52.3	68 70	133.8	6
7	41 27.1	64 75	129.5	41 07.9	64 74	130.0	40 48.7	64 74	130.5	40 29.2	65 73	131.0	40 09.7	65 72	131.5	39 50.0	66 72	132.0	39 30.2	66 71	132.5	39 10.3	67 71	133.0	7
8	40 42.3	62 75	128.7	40 23.5	63 75	129.2	40 04.5	63 74	129.7	39 45.5	64 74	130.2	39 26.2	64 73	130.7	39 06.9	65 73	131.2	38 47.4	65 72	131.7	38 27.9	65 72	132.2	8
9	39 57.0	61 76	127.9	39 38.5	62 76	128.4	39 19.9	62 75	128.9	39 01.1	63 75	129.4	38 42.3	63 74	129.9	38 23.2	64 74	130.4	38 04.1	64 73	130.9	37 44.8	64 73	131.4	9
40	39 11.3	60 77	127.1	38 53.1	61 76	127.6	38 34.8	61 76	128.2	38 16.3	62 75	128.7	37 57.8	62 75	129.2	37 39.1	63 74	129.7	37 20.3	63 74	130.1	37 01.3	63 73	130.6	40
1	38 25.1	59 78	126.4	38 07.2	60 77	126.9	37 49.2	60 77	127.4	37 31.1	61 76	127.9	37 12.8	61 76	128.4	36 54.4	61 75	128.9	36 35.9	62 75	129.4	36 17.3	62 74	129.9	1
2	37 38.4	58 78	125.7	37 20.9	59 78	126.2	37 03.2	59 77	126.7	36 45.4	60 77	127.2	36 27.4	60 76	127.7	36 09.3	60 76	128.2	35 51.1	61 75	128.7	35 32.8	61 75	129.2	2
3	36 51.4	57 79	125.0	36 34.1	58 79	125.5	36 16.7	58 78	126.0	35 59.2	59 78	126.5	35 41.6	59 77	127.0	35 23.8	59 77	127.5	35 05.9	60 76	128.0	34 47.9	60 76	128.5	3
4	36 03.9	56 80	124.3	35 47.0	57 79	124.8	35 29.9	57 79	125.3	35 12.6	58 78	125.8	34 55.3	58 78	126.3	34 37.8	58 77	126.8	34 20.2	59 77	127.3	34 02.5	59 76	127.8	4
45	35 16.1	55 80	123.6	34 59.4	56 80	124.1	34 42.6	56 79	124.7	34 25.7	57 79	125.2	34 08.6	57 78	125.7	33 51.4	57 78	126.1	33 34.2	58 77	126.6	33 16.7	58 77	127.1	45
6	34 27.9	54 81	123.0	34 11.5	55 80	123.5	33 55.0	55 80	124.0	33 38.3	56 80	124.5	33 21.6	56 79	125.0	33 04.7	56 79	125.5	32 47.7	57 78	126.0	32 30.6	57 78	126.5	6
7	33 39.4	54 81	122.4	33 23.2	54 81	122.9	33 07.0	54 81	123.4	32 50.6	55 80	123.9	32 34.1	55 80	124.4	32 17.5	56 79	124.9	32 00.8	56 79	125.4	31 44.0	56 78	125.8	7
8	32 50.5	53 82	121.8	32 34.6	53 82	122.3	32 18.7	53 81	122.8	32 02.6	54 81	123.3	31 46.4	54 80	123.8	31 30.0	55 80	124.3	31 13.6	55 79	124.7	30 57.1	55 79	125.2	8
9	32 01.3	52 83	121.2	31 45.7	52 82	121.7	31 30.0	53 82	122.2	31 14.2	53 81	122.7	30 58.3	53 81	123.2	30 42.2	54 80	123.7	30 26.0	54 80	124.1	30 09.8	54 79	124.6	9
50	31 11.8	51 83	120.6	30 56.5	51 83	121.1	30 41.0	52 82	121.6	30 25.5	52 82	122.1	30 09.8	52 81	122.6	29 54.0	53 81	123.1	29 38.1	53 80	123.6	29 22.2	53 80	124.0	50
1	30 22.0	50 83	120.0	30 06.9	50 83	120.5	29 51.7	51 83	121.0	29 36.5	51 82	121.5	29 21.1	52 82	122.0	29 05.5	52 81	122.5	28 49.9	52 81	123.0	28 34.2	53 80	123.5	1
2	29 31.9	49 84	119.5	29 17.1	50 84	120.0	29 02.2	50 83	120.5	28 47.1	50 83	121.0	28 32.0	51 82	121.5	28 16.8	51 82	121.9	28 01.4	51 81	122.4	27 45.9	52 81	122.9	2
3	28 41.6	48 84	118.9	28 27.0	49 84	119.4	28 12.3	49 84	119.9	27 57.5	49 83	120.4	27 42.7	50 83	120.9	27 27.7	50 82	121.4	27 12.6	50 82	121.9	26 57.4	51 81	122.4	3
4	27 51.0	48 85	118.4	27 36.6	48 84	118.9	27 22.2	48 84	119.4	27 07.7	49 84	119.9	26 53.0	49 83	120.4	26 38.3	49 83	120.9	26 23.5	50 82	121.4	26 08.5	50 82	121.8	4
55	27 00.1	47 85	117.9	26 46.0	47 85	118.4	26 31.8	47 84	118.9	26 17.5	48 84	119.4	26 03.2	48 84	119.9	25 48.7	48 83	120.4	25 34.1	49 83	120.8	25 19.4	49 82	121.3	55
6	26 09.0	46 86	117.4	25 55.2	46 85	117.9	25 41.2	47 85	118.4	25 27.2	47 84	118.9	25 13.0	47 84	119.4	24 58.8	48 84	119.9	24 44.4	48 83	120.3	24 30.0	48 83	120.8	6
7	25 17.7	45 86	116.9	25 04.1	46 86	117.4	24 50.4	46 85	117.9	24 36.5	46 85	118.4	24 22.6	47 84	118.9	24 08.6	47 84	119.4	23 54.5	47 84	119.8	23 40.3	47 83	120.3	7
8	24 26.2	45 86	116.4	24 12.8	45 86	116.9	23 59.3	45 86	117.4	23 45.7	45 85	117.9	23 32.0	46 85	118.4	23 18.2	46 84	118.9	23 04.4	46 84	119.4	22 50.4	47 84	119.8	8
9	23 34.4	44 87	116.0	23 21.2	44 86	116.5	23 08.0	44 86	117.0	22 54.6	45 85	117.4	22 41.2	45 85	117.9	22 27.6	45 85	118.4	22 14.0	46 84	118.9	22 00.3	46 84	119.4	9
60	22 42.5	43 87	115.5	22 29.5	43 87	116.0	22 16.5	44 86	116.5	22 03.3	44 86	117.0	21 50.1	44 85	117.5	21 36.8	45 85	117.9	21 23.4	45 85	118.4	21 09.9	45 84	118.9	60
1	21 50.3	42 87	115.1	21 37.6	43 87	115.6	21 24.7	43 86	116.0	21 11.8	43 86	116.5	20 58.8	44 86	117.0	20 45.7	44 85	117.5	20 32.5	44 85	118.0	20 19.3	44 85	118.5	1
2	20 58.0	42 88	114.6	20 45.5	42 87	115.1	20 32.8	42 87	115.6	20 20.1	43 86	116.1	20 07.3	43 86	116.6	19 54.5	43 86	117.1	19 41.5	43 85	117.5	19 28.5	44 85	118.0	2
3	20 05.5	41 88	114.2	19 53.2	41 87	114.7	19 40.7	42 87	115.2	19 28.2	42 87	115.7	19 15.6	42 86	116.2	19 03.0	42 86	116.6	18 50.3	43 86	117.1	18 37.5	43 85	117.6	3
4	19 12.8	40 88	113.8	19 00.7	41 88	114.3	18 48.4	41 87	114.8	18 36.1	41 87	115.3	18 23.8	41 87	115.7	18 11.3	42 86	116.2	17 58.8	42 86	116.7	17 46.2	42 86	117.2	4
65	18 20.0	40 88	113.4	18 08.0	40 88	113.9	17 56.0	40 88	114.4	17 43.9	40 87	114.8	17 31.7	41 87	115.3	17 19.5	41 87	115.8	17 07.2	41 86	116.3	16 54.8	41 86	116.8	65
6	17 26.9	39 89	113.0	17 15.2	39 88	113.5	17 03.4	40 88	114.0	16 51.5	40 88	114.4	16 39.5	40 87	114.9	16 27.5	40 87	115.4	16 15.4	40 87	115.9	16 03.2	41 86	116.4	6
7	16 33.8	38 89	112.6	16 22.2	39 89	113.1	16 10.6	39 88	113.6	15 58.9	39 88	114.0	15 47.1	39 88	114.5	15 35.3	40 87	115.0	15 23.4	40 87	115.5	15 11.5	40 87	116.0	7
8	15 40.5	38 89	112.2	15 29.1	38 89	112.7	15 17.6	38 88	113.2	15 06.1	38 88	113.7	14 54.6	39 88	114.1	14 43.0	39 88	114.6	14 31.3	39 87	115.1	14 19.5	39 87	115.6	8
9	14 47.0	37 89	111.9	14 35.8	37 89	112.3	14 24.5	38 89	112.8	14 13.2	38 88	113.3	14 01.9	38 88	113.8	13 50.4	38 88	114.2	13 39.0	38 87	114.7	13 27.4	39 87	115.2	9
70	13 53.4	37 90	111.5	13 42.4	37 89	112.0	13 31.3	37 89	112.4	13 20.2	37 89	112.9	13 09.0	37 88	113.4	12 57.8	38 88	113.9	12 46.5	38 88	114.3	12 35.2	38 87	114.8	70
1	12 59.7	36 90	111.1	12 48.8	36 90	111.6	12 37.9	36 89	112.1	12 27.0	37 89	112.6	12 16.0	37 89	113.0	12 05.0	37 88	113.5	11 53.9	37 88	114.0	11 42.7	37 88	114.5	1
2	12 05.8	35 90	110.8	11 55.1	36 90	111.3	11 44.4	36 89	111.7	11 33.7	36 89	112.2	11 22.9	36 89	112.7	11 12.0	36 88	113.2	11 01.1	36 88	113.6	10 50.2	37 88	114.1	2
3	11 11.8	35 90	110.4	11 01.3	35 90	110.9	10 50.8	35 90	111.4	10 40.2	35 89	111.9	10 29.6	35 89	112.3	10 18.9	36 89	112.8	10 08.2	36 88	113.3	9 57.4	36 88	113.8	3
4	10 17.7	34 90	110.1	10 07.4	34 90	110.6	9 57.0	35 90	111.0	9 46.6	35 90	111.5	9 36.2	35 89	112.0	9 25.7	35 89	112.5	9 15.1	35 89	112.9	9 04.6	35 88	113.4	4
75	9 23.5	34 91	109.8	9 13.3	34 90	110.2	9 03.1	34 90	110.7	8 52.9	34 90	111.2	8 42.6	34 89	111.7	8 32.3	34 89	112.1	8 22.0	35 89	112.6	8 11.6	35 89	113.1	75
6	8 29.2	33 91	109.4	8 19.2	33 90	109.9	8 09.1	33 90	110.4	7 59.1	34 90	110.9	7 49.0	34 90	111.3	7 38.8	34 89	111.8	7 28.7	34 89	112.3	7 18.5	34 89	112.8	6
7	7 34.7	33 91	109.1	7 24.9	33 91	109.6	7 15.0	33 90	110.1	7 05.1	33 90	110.5	6 55.2	33 90	111.0	6 45.2	33 90	111.5	6 35.2	33 89	112.0	6 25.2	33 89	112.4	7
8	6 40.2	32 91	108.8	6 30.5	32 91	109.3	6 20.8	32 91	109.8	6 11.0	32 90	110.2	6 01.3	33 90	110.7	5 51.5	33 90	111.2	5 41.7	33 89	111.7	5 31.9	33 89	112.1	8
9	5 45.5	32 91	108.5	5 36.0	32 91	109.0	5 26.4	32 91	109.4	5 16.9	32 90	109.9	5 07.3	32 90	110.4										9

Lat. 16°

H.A.	20° 00′				20° 30′				21° 00′				21° 30′				22° 00′				22° 30′				23° 00′				23° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	86 00.0	1.0	11	00.0	85 30.0	1.0	10	00.0	85 00.0	1.0	09	00.0	84 30.0	1.0	08	00.0	84 00.0	1.0	07	00.0	83 30.0	1.0	07	00.0	83 00.0	1.0	06	00.0	82 30.0	1.0	06	00.0	00
1	85 53.3	97	32	13.2	85 24.1	98	28	11.8	84 54.7	98	26	10.6	84 25.2	99	24	09.6	83 55.6	99	22	08.8	83 25.9	99	20	08.1	82 56.2	99	19	07.5	82 26.5	99	17	07.0	1
2	85 34.3	90	48	25.1	85 07.0	92	44	22.6	84 39.2	93	40	20.5	84 11.0	94	37	18.7	83 42.6	95	35	17.2	83 13.9	96	32	15.9	82 45.1	96	30	14.7	82 16.1	97	28	13.8	2
3	85 05.2	81	61	35.0	84 40.5	84	56	31.9	84 14.9	86	52	29.2	83 48.6	88	49	26.8	83 21.8	90	46	24.8	82 54.6	91	43	23.1	82 27.1	92	40	21.5	81 59.2	93	38	20.1	3
4	84 28.8	72	69	43.0	84 06.7	76	65	39.6	83 43.5	79	62	36.6	83 19.4	82	58	33.9	82 54.5	84	54	31.6	82 29.0	86	52	29.5	82 03.0	87	49	27.7	81 36.6	89	46	26.0	4
05	83 47.2	63	75	49.2	83 27.6	68	72	45.8	83 06.6	72	68	42.7	82 44.7	75	65	39.9	82 21.8	78	62	37.5	81 58.1	80	59	35.2	81 33.8	82	56	33.1	81 08.9	84	53	31.3	05
6	83 02.0	56	80	54.1	82 44.5	61	77	50.8	82 25.6	65	74	47.8	82 05.7	68	70	45.0	81 44.7	71	68	42.5	81 22.9	74	65	40.1	81 00.2	77	62	38.0	80 36.9	79	59	36.0	6
7	82 14.1	50	83	58.0	81 58.5	54	80	54.8	81 41.5	59	78	51.9	81 23.4	62	75	49.2	81 04.2	66	72	46.7	80 44.1	69	69	44.4	80 23.1	71	67	42.2	80 01.3	74	64	40.2	7
8	81 24.4	45	85	61.1	81 10.4	49	83	58.2	80 55.0	53	80	55.4	80 38.5	57	78	52.8	80 21.0	60	76	50.3	80 02.4	63	73	48.0	79 43.0	66	71	45.9	79 22.7	69	68	43.8	8
9	80 33.3	40	87	63.6	80 20.6	44	85	60.9	80 06.7	48	83	58.3	79 51.7	52	81	55.8	79 35.6	55	78	53.4	79 18.5	59	76	51.2	79 00.5	61	74	49.0	78 41.6	64	72	47.0	9
10	79 41.2	36	88	65.7	79 29.7	40	86	63.1	79 17.0	44	85	60.7	79 03.3	48	83	58.3	78 48.5	51	81	56.0	78 32.7	54	79	53.9	78 16.0	57	77	51.8	77 58.4	60	75	49.8	10
1	78 48.2	33	89	67.4	78 37.8	37	88	65.0	78 26.2	40	86	62.7	78 13.6	44	84	60.5	78 00.0	47	83	58.3	77 45.4	50	81	56.2	77 29.9	53	79	54.2	77 13.5	56	77	52.3	1
2	77 54.7	30	90	68.9	77 45.2	34	89	66.6	77 34.6	37	87	64.5	77 23.0	40	86	62.3	77 10.4	44	84	60.3	76 56.9	47	83	58.3	76 42.5	49	81	56.3	76 27.2	52	79	54.5	2
3	77 00.7	27	91	70.1	76 51.9	31	90	68.0	76 42.2	34	88	65.9	76 31.5	37	87	63.9	76 19.9	40	86	62.0	76 07.3	43	84	60.1	75 53.9	46	82	58.2	75 39.7	49	81	56.4	3
4	76 06.2	25	91	71.2	75 58.2	28	90	69.2	75 49.3	31	89	67.2	75 39.4	34	88	65.3	75 28.6	37	86	63.4	75 17.0	40	85	61.6	75 04.5	43	84	59.8	74 51.2	46	82	58.1	4
15	75 11.5	23	92	72.1	75 04.2	26	91	70.2	74 55.9	29	90	68.3	74 46.8	32	89	66.5	74 36.7	35	87	64.7	74 25.9	38	86	63.0	74 14.2	40	85	61.3	74 01.8	43	84	59.6	15
6	74 16.5	21	92	72.9	74 09.7	24	91	71.1	74 02.1	27	90	69.3	73 53.6	30	89	67.6	73 44.3	32	88	65.9	73 34.2	35	87	64.2	73 23.4	38	86	62.6	73 11.7	40	85	61.0	6
7	73 21.3	19	92	73.6	73 15.0	22	92	71.9	73 08.0	25	91	70.2	73 00.1	28	90	68.5	72 51.5	30	89	66.9	72 42.1	33	88	65.3	72 31.9	35	86	63.7	72 21.0	38	85	62.2	7
8	72 25.9	18	93	74.2	72 20.1	20	92	72.5	72 13.6	23	91	70.9	72 06.3	26	90	69.3	71 58.3	28	89	67.8	71 49.5	31	88	66.2	71 40.0	33	87	64.7	71 29.7	35	86	63.2	8
9	71 30.3	16	93	74.7	71 25.0	19	92	73.1	71 19.0	21	91	71.6	71 12.2	24	91	70.1	71 04.7	26	90	68.6	70 56.5	29	89	67.1	70 47.6	31	88	65.6	70 38.0	33	87	64.2	9
20	70 34.6	15	93	75.1	70 29.8	17	92	73.6	70 24.2	20	92	72.2	70 17.9	22	91	70.7	70 10.9	24	90	69.3	70 03.2	27	89	67.9	69 54.9	29	88	66.5	69 45.9	31	87	65.1	20
1	69 38.8	14	93	75.5	69 34.3	16	93	74.1	69 29.2	18	92	72.7	69 23.3	21	91	71.3	69 16.8	23	90	69.9	69 09.7	25	90	68.5	69 01.9	27	89	67.2	68 53.4	29	88	65.9	1
2	68 42.9	13	93	75.9	68 38.8	15	93	74.5	68 34.0	17	92	73.2	68 28.6	19	91	71.8	68 22.6	21	91	70.5	68 15.9	23	90	69.2	68 08.6	25	89	67.9	68 00.7	27	88	66.6	2
3	67 47.0	12	93	76.2	67 43.2	14	93	74.9	67 38.8	16	92	73.6	67 33.8	18	92	72.3	67 28.1	20	91	71.0	67 21.9	22	90	69.7	67 15.0	24	90	68.4	67 07.6	26	89	67.2	3
4	66 50.9	11	94	76.4	66 47.5	13	93	75.2	66 43.4	15	92	73.9	66 38.8	16	92	72.7	66 33.5	18	91	71.4	66 27.7	20	91	70.2	66 21.3	22	90	69.0	66 14.3	24	89	67.8	4
25	65 54.8	10	94	76.7	65 51.7	11	93	75.5	65 47.9	13	92	74.3	65 43.6	15	92	73.0	65 38.8	17	92	71.8	65 33.4	19	91	70.7	65 27.4	21	90	69.5	65 20.8	23	89	68.3	25
6	64 58.7	09	94	76.9	64 55.8	10	93	75.7	64 52.4	12	93	74.5	64 48.4	14	92	73.4	64 43.9	16	92	72.2	64 38.9	18	91	71.1	64 33.3	20	90	69.9	64 27.2	21	90	68.8	6
7	64 02.5	08	94	77.1	63 59.9	10	93	75.9	63 56.8	11	93	74.8	63 53.1	13	92	73.7	63 48.9	15	92	72.5	63 44.2	17	91	71.4	63 39.0	18	91	70.3	63 33.3	20	90	69.2	7
8	63 06.3	07	94	77.2	63 03.9	09	93	76.1	63 01.1	10	93	75.0	62 57.7	12	92	73.9	62 53.9	14	92	72.8	62 49.5	15	91	71.8	62 44.7	17	91	70.7	62 39.3	19	90	69.6	8
9	62 10.0	06	94	77.4	62 07.9	08	93	76.3	62 05.3	09	93	75.2	62 02.3	11	93	74.2	61 58.7	13	92	73.1	61 54.7	14	92	72.0	61 50.2	16	91	71.0	61 45.2	17	90	70.0	9
30	61 13.7	05	94	77.5	61 11.9	07	93	76.4	61 09.6	09	93	75.4	61 06.8	10	93	74.4	61 03.5	12	92	73.3	60 59.8	13	92	72.3	60 55.6	15	91	71.3	60 51.0	16	91	70.3	30
1	60 17.4	05	94	77.6	60 15.8	06	94	76.6	60 13.7	08	93	75.5	60 11.2	09	93	74.5	60 08.2	11	92	73.5	60 04.8	12	92	72.5	60 00.9	14	91	71.6	59 56.6	15	91	70.6	1
2	59 21.1	04	94	77.6	59 19.7	05	94	76.7	59 17.9	07	93	75.7	59 15.6	08	93	74.7	59 12.9	10	92	73.7	59 09.8	11	92	72.8	59 06.2	13	91	71.8	59 02.2	14	91	70.8	2
3	58 24.7	03	94	77.7	58 23.6	05	94	76.8	58 22.0	06	93	75.8	58 19.9	07	93	74.8	58 17.5	09	92	73.9	58 14.6	10	92	73.0	58 11.4	12	92	72.0	58 07.7	13	91	71.1	3
4	57 28.4	03	94	77.8	57 27.4	04	94	76.8	57 26.0	05	93	75.9	57 24.2	07	93	75.0	57 22.1	08	92	74.0	57 19.5	09	92	73.1	57 16.5	11	92	72.2	57 13.1	12	91	71.3	4
35	56 32.0	02	94	77.8	56 31.2	03	94	76.9	56 30.1	05	93	76.0	56 28.5	06	93	75.1	56 26.6	07	92	74.2	56 24.3	08	92	73.3	56 21.5	10	92	72.4	56 18.4	11	91	71.5	35
6	55 35.6	01	94	77.8	55 35.1	03	94	76.9	55 34.1	04	93	76.1	55 32.8	05	93	75.2	55 31.1	06	92	74.3	55 29.0	08	92	73.4	55 26.5	09	92	72.5	55 23.7	10	91	71.6	6
7	54 39.2	01	94	77.8	54 38.9	02	94	77.0	54 38.1	03	93	76.1	54 37.0	04	93	75.2	54 35.6	06	93	74.4	54 33.7	07	92	73.5	54 31.5	08	92	72.7	54 28.9	09	91	71.8	7
8	53 42.9	00	94	77.8	53 42.7	01	94	77.0	53 42.1	02	93	76.2	53 41.2	04	93	75.3	53 40.0	05	93	74.5	53 38.4	06	92	73.6	53 36.4	07	92	72.8	53 34.1	08	91	71.9	8
9	52 46.5	01	94	77.8	52 46.5	01	94	77.0	52 46.1	02	93	76.2	52 45.4	03	93	75.4	52 44.4	04	93	74.5	52 43.0	05	92	73.7	52 41.3	06	92	72.9	52 39.3	07	91	72.1	9
40	51 50.1	01	94	77.8	51 50.3	00	94	77.0	51 50.1	01	93	76.2	51 49.6	02	93	75.4	51 48.8	03	93	74.6	51 47.7	04	92	73.8	51 46.2	05	92	73.0	51 44.4	07	92	72.2	40
1	50 53.7	02	94	77.8	50 54.1	01	94	77.0	50 54.1	00	93	76.2	50 53.8	01	93	75.4	50 53.2	03	93	74.6	50 52.3	04	92	73.8	50 51.0	05	92	73.0	50 49.5	06	92	72.3	1
2	49 57.4	02	94	77.8	49 57.9	01	94	77.0	49 58.1	00	93	76.2	49 58.0	01	93	75.4	49 57.6	02	93	74.7	49 56.9	03	92	73.9	49 55.9	04	92	73.1	49 54.5	05	92	72.3	2
3	49 01.0	03	94	77.7	49 01.7	02	94	77.0	49 02.1	01	93	76.2	49 02.2	00	93	75.4	49 02.0	01	93	74.7	49 01.5	02	92	73.9	49 00.7	03	92	73.2	48 59.6	04	92	72.4	3
4	48 04.6	03	94	77.7	48 05.5	02	94	76.9	48 06.1	01	93	76.2	48 06.4	00	93	75.4	48 06.3	01	93	74.7	48 06.0	01	92	73.9	48 05.5	02	92	73.2	48 04.6	03	92	72.4	4
45	47 08.3	04	94	77.6	47 09.3	03	94	76.9	47 10.1	02	93	76.2	47 10.5	01	93	75.4	47 10.7	00	93	74.7	47 10.6	01	92	74.0	47 10.2	02	92	73.2	47 09.6	03	92	72.5	45
6	46 12.0	04	94	77.6	46 13.2	04	94	76.9	46 14.1	03	93	76.1	46 14.7	02	93	75.4	46 15.1	01	93	74.7	46 15.2	00	92	74.0	46 15.0	01	92	73.2	46 14.6	02	92	72.5	6
7	45 15.6	05	94	77.5	45 17.0	04	94	76.8	45 18.1	03	93	76.1	45 18.9	02	93	75.4	45 19.5	01	93	74.7	45 19.8	01	92	74.0	45 19.8	00	92	73.3	45 19.5	01	92	72.5	7
8	44 19.3	05	94	77.4	44 20.8	05	94	76.8	44 22.1	04	93	76.1	44 23.1	03	93	75.4	44 23.8	02	93	74.7	44 24.3	01	92	74.0	44 24.5	00	92	73.3	44 24.5	01	92	72.6	8
9	43 23.0	06	94	77.4	43 24.7	05	94	76.7	43 26.1	04	93	76.0	43 27.3	03	93	75.3	43 28.2	03	93	74.6	43 28.9	02	92	73.9	43 29.3	01	92	73.2	43 29.5	00	92	72.6	9
50	42 26.8	06	94	77.3	42 28.6	06	94	76.6	42 30.2	05	93	75.9	42 31.5	04	93	75.3	42 32.6	03	93	74.6	42 33.5	02	92	73.9	42 34.1	02	92	73.2	42 34.5	01	92	72.6	50
1	41 30.5	07	94	77.2	41 32.5	06	93	76.5	41 34.2	05	93	75.9	41 35.7	05	93	75.2	41 37.0	04	93	74.5	41 38.1	03	92	73.9	41 38.9	02	92	73.2	41 39.5	02	92	72.5	1
2	40 34.3	07	94	77.1	40 36.4	07	93	76.5	40 38.3	06	93	75.8	40 40.0	05	93	75.1	40 41.4	04	93	74.5	40 42.7	04	92	73.8	40 43.7	03	92	73.2	40 44.4	02	92	72.5	2
3	39 38.1	08	94	77.0	39 40.3	07	93	76.4	39 42.4	07	93	75.7	39 44.2	06	93	75.1	39 45.9	05	93	74.4	39 47.3	04	92	73.8	39 48.5	04	92	73.1	39 49.4	03	92	72.5	3
4	38 41.9	08	94	76.9	38 44.3	08	93	76.3	38 46.5	07	93	75.6	38 48.5	06	93	75.0	38 50.3	06	93	74.4	38 51.9	05	92	73.7	38 53.3	04	92	73.1	38 54.4	04	92	72.4	4
55	37 45.7	09	94	76.8	37 48.3	08	93	76.2	37 50.6	08	93	75.6	37 52.8	07	93	74.9	37 54.8	06	92	74.3	37 56.5	06	92	73.7	37 58.1	05	92	73.0	37 59.5	04	92	72.4	55
6	36 49.6	09	94	76.7	36 52.3	09	93	76.1	36 54.8	08	93	75.5	36 57.1	07	93	74.8	36 59.3	07	92	74.2	37 01.2	06	92	73.6	37 02.9	05	92	73.0	37 04.5	05	92	72.3	6
7	35 53.4	10	93	76.6	35 56.3	09	93	76.0	35 59.0	09	93	75.4	36 01.5	08	93	74.8	36 03.8	07	92	74.1	36 05.9	07	92	73.5	36 07.8	06	92	72.9	36 09.5	05	92	72.3	7
8	34 57.3	10	93	76.5	35 00.4	10	93	75.9	35 03.2	09	93	75.3	35 05.8	09	93	74.7	35 08.3	08	92	74.1	35 10.6	07	92	73.4	35 12.7	07	92	72.8	35 14.6	06	92	72.2	8
9	34 01.3	11	93	76.4	34 04.4	10	93	75.8	34 07.4	10	93	75.2	34 10.2	09	93	74.6	34 12.9	08	92	74.0	34 15.3	08	92	73.4	34 17.6	07	92	72.8	34 19.7	07	91	72.2	9
60	33 05.2	11	93	76.2	33 08.6	11	93	75.6	33 11.7	10	93	75.1	33 14.7	10	93	74.5	33 17.4	09	92	73.9	33 20.1	08	92	73.3	33 22.5	08	92	72.7	33 24.8	07	91	72.1	60
1	32 09.2	12	93	76.1	32 12.7	11	93	75.5	32 16.0	11	93	74.9	32 19.1	10	93	74.4	32 22.1	10	92	73.8	32 24.9	09	92	73.2	32 27.5	08	92	72.6	32 29.9	08	91	72.0	1
2	31 13.3	12	93	76.0	31 16.9	12	93	75.4	31 20.3	11	93	74.8	31 23.6	11	92	74.2	31 26.7	10	92	73.7	31 29.7	10	92	73.1	31 32.5	09	92	72.5	31 35.1	09	91	71.9	2
3	30 17.3	13	93	75.8	30 21.1	12	93	75.3	30 24.7	12	93	74.7	30 28.1	11	92	74.1	30 31.4	11	92	73.5	30 34.5	10	92	73.0	30 37.5	10	92	72.4	30 40.3	09	91	71.8	3
4	29 21.4	13	93	75.7	29 25.3	13	93	75.1	29 29.0	12	93	74.6	29 32.6	12	92	74.0	29 36.1	11	92	73.4	29 39.4	11	92	72.9	29 42.5	10	92	72.3	29 45.5	10	91	71.7	4
65	28 25.5	14	93	75.6	28 29.6	13	93	75.0	28 33.5	13	93	74.4	28 37.2	12	92	73.9	28 40.8	12	92	73.3	28 44.3	11	92	72.7	28 47.6	11	92	72.2	28 50.8	10	91	71.6	65
6	27 29.7	14	93	75.4	27 33.9	14	93	74.9	27 37.9	13	92	74.3	27 41.8	13	92	73.7	27 45.6	12	92	73.2	27 49.2	12	92	72.6	27 52.7	11	91	72.1	27 56.1	11	91	71.5	6
7	26 33.9	15	93	75.3	26 38.2	14	93	74.7	26 42.4	14	92	74.2	26 46.5	13	92	73.6	26 50.4	13	92	73.0	26 54.2	12	92	72.5	26 57.9	12	91	71.9	27 01.4	12	91	71.4	7
8	25 38.2	15	93	75.1	25 42.6	15	93	74.6	25 47.0	14	92	74.0	25 51.2	14	92	73.5	25 55.3	13	92	72.9	25 59.2	13	92	72.4	26 03.1	13	91	71.8	26 06.8	12	91	71.3	8
9	24 42.4	16	93	74.9	24 47.0	15	93	74.4	24 51.5	15	92	73.9	24 55.9	14	92	73.3	25 00.1	14	92	72.8	25 04.3	14	91	72.2	25 08.3	13	91	71.7	25 12.2	13	91	71.1	9
70	23 46.8	16	93	74.8	23 51.5	16	92	74.2	23 56.2	15	92	73.7	24 00.7	15	92	73.2	24 05.1	15	92	72.6	24 09.4	14	91	72.1	24 13.6	14	91	71.5	24 17.6	13	91	71.0	70
1	22 51.1	16	93	74.6	22 56.0	16	92	74.1	23 00.8	16	92	73.5	23 05.5	15	92	73.0	23 10.1	15	92	72.5	23 14.5	15	91	71.9	23 18.9	14	91	71.4	23 23.1	14	91	70.9	1
2	21 55.5	17	93	74.4	22 00.6	17	92	73.9	22 05.5	16	92	73.4	22 10.4	16	92	72.9	22 15.1	16	92	72.3	22 19.7	15	91	71.8	22 24.2	15	91	71.2	22 28.6	15	91	70.7	2
3	21 00.0	17	92	74.3	21 05.2	17	92	73.7	21 10.3	17	92	73.2	21 15.3	16	92	72.7	21 20.2	16	92	72.2	21 25.0	16	91	71.6	21 29.6	15	91	71.1	21 34.2	15	91	70.6	3
4	20 04.5	18	92	74.1	20 09.8	18	92	73.6	20 15.1	17	92	73.0	20 20.2	17	92	72.5	20 25.3	17	91	72.0	20 30.2	16	91	71.5	20 35.1	16	91	70.9	20 39.9	16	91	70.4	4
75	19 09.1	18	92	73.9	19 14.6	18	92	73.4	19 19.9	18	92	72.9	19 25.2	18	92	72.4	19 30.5	17	91	71.8	19 35.6	17	91	71.3	19 40.6	17	91	70.8	19 45.6	16	90	70.3	75
6	18 13.7	19	92	73.7	18 19.3	19	92	73.2	18 24.9	18	92	72.7	18 30.3	18	91	72.2	18 35.7	18	91	71.7	18 41.0	17	91	71.1	18 46.2	17	91	70.6	18 51.3	17	90	70.1	6
7	17 18.3	19	92	73.5	17 24.1	19	92	73.0	17 29.8	19	92	72.5	17 35.4	19	91	72.0	17 41.0	18	91	71.5	17 46.4	18	91	71.0	17 51.8	18	90	70.4	17 57.1	18	90	69.9	7
8	16 23.1	20	92	73.3	16 29.0	20	92	72.8	16 34.8	19	92	72.3	16 40.6	19	91	71.8	16 46.3	19	91	71.3	16 51.9	19	91	70.8	16 57.5	18	90	70.3	17 02.9	18	90	69.8	8
9	15 27.8	20	92	73.2	15 33.9	20	92	72.6	15 39.9	20	92	72.1	15 45.8	20	91	71.6	15 51.7	19	91	71.1	15 57.5	19	91	70.6	16 03.2	19	90	70.1	16 08.9	19	90	69.6	9
80	14 32.7	21	92	73.0	14 38.9	21	92	72.4	14 45.0	20	91	71.9	14 51.1	20	91	71.4	14 57.2	20	91	70.9	15 03.1	20	91	70.4	15 09.0	20	90	69.9	15 14.8	19	90	69.4	80
1	13 37.5	21	92	72.7	13 43.9	21	91	72.2	13 50.2	21	91	71.7	13 56.5	21	91	71.2	14 02.7	21	91	70.7	14 08.8	20	90	70.2	14 14.9	20	90	69.7	14 20.9	20	90	69.2	1
2	12 42.5	22	92	72.5	12 49.0	22	91	72.0	12 55.5	21	91	71.5	13 01.9	21	91	71.0	13 08.3	21	91	70.5	13 14.6	21	90	70.0	13 20.8	21	90	69.5	13 27.0	21	90	69.0	2
3	11 47.5	22	92	72.3	11 54.2	22	91	71.8	12 00.8	22	91	71.3	12 07.4	22	91	70.8	12 13.9	22	90	70.3	12 20.4	21	90	69.8	12 26.8	21	90	69.3	12 33.2	21	90	68.8	3
4	10 52.6	23	91	72.1	10 59.4	23	91	71.6	11 06.2	23	91	71.1	11 13.0	22	91	70.6	11 19.7	22	90	70.1	11 26.3	22	90	69.6	11 32.9	22	90	69.1	11 39.4	22	89	68.6	4
85	9 57.7	23	91	71.9	10 04.7	23	91	71.4	10 11.7	23	91	70.9	10 18.6	23	90	70.4	10 25.5	23	90	69.9	10 32.3	23	90	69.4	10 39.0	22	90	68.9	10 45.8	22	89	68.4	85
6	9 03.0	24	91	71.7	9 10.1	24	91	71.2	9 17.2	24	91	70.7	9 24.3	24	90	70.2	9 31.3	23	90	69.7	9 38.3	23	90	69.2	9 45.3	23	90	68.7	9 52.2	23	89	68.2	6
7	8 08.2	24	91	71.4	8 15.6	24	91	70.9	8 22.8	24	90	70.5	8 30.1	24	90	70.0	8 37.3	24	90	69.5	8 44.4	24	90	69.0	8 51.6	24	89	68.5	8 58.6	24	89	68.0	7
8	7 13.6	25	91	71.2	7 21.1	25	91	70.7	7 28.5	25	90	70.2	7 35.9	25	90	69.7	7 43.3	25	90	69.2	7 50.6	24	90	68.8	7 57.9	24	89	68.3	8 05.2	24	89	67.8	8
9	6 19.1	25	91	71.0	6 26.7	25	91	70.5	6 34.3	25	90	70.0	6 41.9	25	90	69.5	6 49.4	25	90	69.0	6 56.9	25	89	68.5	7 04.4	25	89	68.0	7 11.9	25	89	67.5	9
90	5 24.6	26	91	70.7	5 32.4	26	90	70.2	5 40.1	26	90	69.7	5 47.9	26	90	69.3	5 55.6	26	90	68.8	6 03.3	26	89	68.3	6 11.0	26	89	67.8	6 18.6	25	89	67.3	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	54 00.0	1.0 01	180.0	53 30.0	1.0 01	180.0	53 00.0	1.0 01	180.0	52 30.0	1.0 01	180.0	52 00.0	1.0 01	180.0	51 30.0	1.0 01	180.0	51 00.0	1.0 01	180.0	50 30.0	1.0 01	180.0	00
1	53 59.2	1.0 04	178.4	53 29.2	1.0 04	178.4	52 59.2	1.0 04	178.4	52 29.2	1.0 04	178.5	51 59.2	1.0 04	178.5	51 29.3	1.0 04	178.5	50 59.3	1.0 04	178.5	50 29.3	1.0 04	178.6	1
2	53 56.8	1.0 07	176.8	53 26.8	1.0 07	176.9	52 56.9	1.0 07	176.9	52 26.9	1.0 06	176.9	51 57.0	1.0 06	177.0	51 27.0	1.0 06	177.0	50 57.1	1.0 06	177.1	50 27.1	1.0 06	177.1	2
3	53 52.8	1.0 09	175.2	53 22.9	1.0 09	175.3	52 53.0	1.0 09	175.4	52 23.1	1.0 09	175.4	51 53.2	1.0 09	175.5	51 23.3	1.0 09	175.6	50 53.4	1.0 08	175.6	50 23.5	1.0 08	175.7	3
4	53 47.2	99 12	173.6	53 17.4	99 12	173.7	52 47.5	99 12	173.8	52 17.7	99 11	173.9	51 47.9	99 11	174.0	51 18.1	99 11	174.1	50 48.2	99 11	174.2	50 18.4	99 11	174.3	4
05	53 40.0	99 15	172.1	53 10.3	99 14	172.2	52 40.6	99 14	172.3	52 10.8	99 14	172.4	51 41.1	99 14	172.5	51 11.4	99 14	172.6	50 41.7	99 13	172.7	50 11.9	99 13	172.8	05
6	53 31.2	99 17	170.5	53 01.7	99 17	170.6	52 32.1	99 17	170.8	52 02.5	99 16	170.9	51 32.9	99 16	171.0	51 03.3	99 16	171.2	50 33.6	99 16	171.3	50 04.0	99 16	171.4	6
7	53 20.9	98 20	168.9	52 51.5	98 19	169.1	52 22.1	98 19	169.3	51 52.6	98 19	169.4	51 23.2	98 19	169.6	50 53.7	98 18	169.7	50 24.2	98 18	169.9	49 54.7	98 18	170.0	7
8	53 09.1	97 22	167.4	52 39.8	98 22	167.6	52 10.6	98 22	167.8	51 41.3	98 21	167.9	51 12.0	98 21	168.1	50 42.7	98 21	168.3	50 13.3	98 20	168.4	49 44.0	98 20	168.6	8
9	52 55.8	97 25	165.9	52 26.7	97 24	166.1	51 57.6	97 24	166.3	51 28.5	97 24	166.5	50 59.4	97 23	166.7	50 30.3	97 23	166.9	50 01.1	97 23	167.0	49 31.9	97 22	167.2	9
10	52 41.0	96 27	164.4	52 12.1	96 27	164.6	51 43.3	96 26	164.8	51 14.3	96 26	165.0	50 45.4	96 26	165.3	50 16.5	97 25	165.5	49 47.5	97 25	165.7	49 18.5	97 25	165.9	10
1	52 24.7	95 29	162.9	51 56.1	96 29	163.1	51 27.5	96 29	163.4	50 58.8	96 28	163.6	50 30.1	96 28	163.9	50 01.3	96 27	164.1	49 32.6	96 27	164.3	49 03.8	96 27	164.5	1
2	52 07.1	95 32	161.4	51 38.7	95 31	161.7	51 10.3	95 31	162.0	50 41.8	95 30	162.2	50 13.3	95 30	162.5	49 44.8	95 30	162.7	49 16.3	95 29	162.9	48 47.7	95 29	163.2	2
3	51 48.0	94 34	160.0	51 19.9	94 34	160.3	50 51.8	94 33	160.6	50 23.6	94 33	160.8	49 55.3	94 32	161.1	49 27.0	94 32	161.4	48 58.7	94 31	161.6	48 30.4	95 31	161.9	3
4	51 27.7	93 36	158.6	50 59.8	93 36	158.9	50 31.9	93 35	159.2	50 04.0	93 35	159.5	49 36.0	93 34	159.8	49 08.0	93 34	160.0	48 39.9	94 33	160.3	48 11.8	94 33	160.6	4
15	51 06.0	92 38	157.2	50 38.4	92 38	157.5	50 10.8	92 37	157.8	49 43.1	92 37	158.1	49 15.4	92 36	158.4	48 47.6	93 36	158.7	48 19.8	93 36	159.0	47 52.0	93 35	159.3	15
6	50 43.0	91 40	155.9	50 15.7	91 40	156.2	49 48.4	91 39	156.5	49 21.0	91 39	156.8	48 53.6	92 38	157.1	48 26.1	92 38	157.4	47 58.6	92 38	157.7	47 31.0	92 37	158.0	6
7	50 18.8	90 42	154.5	49 51.8	90 42	154.9	49 24.8	90 41	155.2	48 57.7	90 41	155.5	48 30.6	91 40	155.8	48 03.4	91 40	156.2	47 36.1	91 39	156.5	47 08.8	91 39	156.8	7
8	49 53.4	89 44	153.2	49 26.7	89 44	153.6	49 00.0	89 43	153.9	48 33.2	89 43	154.3	48 06.4	90 42	154.6	47 39.5	90 42	154.9	47 12.6	90 41	155.2	46 45.5	90 41	155.6	8
9	49 26.8	88 46	151.9	49 00.5	88 46	152.3	48 34.1	88 45	152.7	48 07.6	88 45	153.0	47 41.1	89 44	153.4	47 14.5	89 44	153.7	46 47.8	89 43	154.0	46 21.1	89 42	154.4	9
20	48 59.1	87 48	150.7	48 33.1	87 47	151.1	48 07.0	87 47	151.4	47 40.9	87 46	151.8	47 14.7	87 46	152.2	46 48.4	88 45	152.5	46 22.1	88 45	152.9	45 55.7	88 44	153.2	20
1	48 30.3	85 50	149.5	48 04.7	86 49	149.8	47 38.9	86 48	150.2	47 13.1	86 48	150.6	46 47.2	86 48	151.0	46 21.3	87 47	151.3	45 55.2	87 46	151.7	45 29.1	87 46	152.0	1
2	48 00.5	84 51	148.3	47 35.2	85 51	148.7	47 09.8	85 50	149.0	46 44.3	85 50	149.4	46 18.7	85 49	149.8	45 53.1	86 49	150.2	45 27.4	86 48	150.6	45 01.6	86 48	150.9	2
3	47 29.7	83 53	147.1	47 04.7	83 52	147.5	46 39.6	84 52	147.9	46 14.5	84 51	148.3	45 49.2	84 51	148.7	45 23.9	84 50	149.1	44 58.5	85 50	149.4	44 33.1	85 49	149.8	3
4	46 57.8	82 55	145.9	46 33.2	82 54	146.4	46 08.5	83 54	146.8	45 43.7	83 53	147.2	45 18.8	83 52	147.6	44 53.8	83 52	148.0	44 28.7	84 51	148.4	44 03.6	84 51	148.7	4
25	46 25.1	81 56	144.8	46 00.8	81 56	145.2	45 36.4	81 55	145.7	45 11.9	82 54	146.1	44 47.4	82 54	146.5	44 22.7	82 53	146.9	43 58.0	83 53	147.3	43 33.2	83 52	147.7	25
6	45 51.4	80 58	143.7	45 27.5	80 57	144.2	45 03.4	80 56	144.6	44 39.3	81 56	145.0	44 15.1	81 55	145.4	43 50.8	81 55	145.8	43 26.4	81 54	146.2	43 01.9	82 54	146.6	6
7	45 16.9	78 59	142.7	44 53.3	79 58	143.1	44 29.6	79 58	143.5	44 05.8	79 57	144.0	43 41.9	80 57	144.4	43 18.0	80 56	144.8	42 53.9	80 56	145.2	42 29.8	81 55	145.6	7
8	44 41.5	77 60	141.6	44 18.2	78 60	142.1	43 54.9	78 59	142.5	43 31.5	78 59	143.0	43 07.9	79 58	143.4	42 44.3	79 57	143.8	42 20.6	79 57	144.2	41 56.8	79 56	144.6	8
9	44 05.3	76 62	140.6	43 42.4	76 61	141.1	43 19.4	77 60	141.5	42 56.3	77 60	142.0	42 33.1	77 59	142.4	42 09.9	78 59	142.8	41 46.5	78 58	143.2	41 23.0	78 58	143.7	9
30	43 28.3	75 63	139.7	43 05.8	75 62	140.1	42 43.1	76 62	140.6	42 20.4	76 61	141.0	41 57.6	76 61	141.4	41 34.6	77 60	141.9	41 11.6	77 60	142.3	40 48.5	77 59	142.7	30
1	42 50.6	74 64	138.7	42 28.4	74 63	139.2	42 06.1	74 63	139.6	41 43.7	75 62	140.1	41 21.2	75 62	140.5	40 58.6	75 61	140.9	40 35.9	76 61	141.4	40 13.1	76 60	141.8	1
2	42 12.2	73 65	137.8	41 50.3	73 65	138.2	41 28.4	73 64	138.7	41 06.3	74 63	139.1	40 44.2	74 63	139.6	40 21.9	74 62	140.0	39 59.6	75 62	140.5	39 37.1	75 61	140.9	2
3	41 33.1	71 66	136.9	41 11.6	72 66	137.3	40 50.0	72 65	137.8	40 28.3	73 65	138.2	40 06.4	73 64	138.7	39 44.5	73 63	139.1	39 22.5	74 63	139.6	39 00.4	74 62	140.0	3
4	40 53.3	70 67	136.0	40 32.2	71 67	136.4	40 10.9	71 66	136.9	39 49.5	71 66	137.4	39 28.0	72 65	137.8	39 06.5	72 65	138.3	38 44.8	72 64	138.7	38 23.0	73 63	139.1	4
35	40 12.9	69 68	135.1	39 52.1	70 68	135.6	39 31.2	70 67	136.0	39 10.1	70 67	136.5	38 49.0	71 66	137.0	38 27.7	71 66	137.4	38 06.4	71 65	137.9	37 44.9	72 64	138.3	35
6	39 31.9	68 69	134.3	39 11.4	68 69	134.7	38 50.8	69 68	135.2	38 30.1	69 68	135.7	38 09.3	70 67	136.1	37 48.4	70 67	136.6	37 27.4	70 66	137.0	37 06.3	71 65	137.5	6
7	38 50.3	67 70	133.4	38 30.2	67 70	133.9	38 09.9	68 69	134.4	37 49.5	68 69	134.9	37 29.0	68 68	135.3	37 08.5	69 68	135.8	36 47.8	69 67	136.2	36 27.0	69 66	136.7	7
8	38 08.2	66 71	132.6	37 48.3	66 71	133.1	37 28.4	67 70	133.6	37 08.4	67 70	134.1	36 48.2	67 69	134.5	36 27.9	68 68	135.0	36 07.6	68 68	135.4	35 47.1	68 67	135.9	8
9	37 25.5	65 72	131.9	37 06.0	65 71	132.3	36 46.4	66 71	132.8	36 26.6	66 70	133.3	36 06.8	66 70	133.8	35 46.9	67 69	134.2	35 26.8	67 69	134.7	35 06.7	67 68	135.1	9
40	36 42.3	64 73	131.1	36 23.1	64 72	131.6	36 03.8	64 72	132.1	35 44.4	65 71	132.5	35 24.9	65 71	133.0	35 05.3	66 70	133.5	34 45.6	66 70	133.9	34 25.7	66 69	134.4	40
1	35 58.6	63 74	130.4	35 39.7	63 73	130.9	35 20.7	63 72	131.3	35 01.7	64 72	131.8	34 42.5	64 72	132.3	34 23.2	65 71	132.7	34 03.8	65 70	133.2	33 44.3	65 70	133.7	1
2	35 14.4	62 74	129.7	34 55.9	62 74	130.1	34 37.2	62 73	130.6	34 18.4	63 73	131.1	33 59.5	63 72	131.6	33 40.6	63 72	132.0	33 21.5	64 71	132.5	33 02.3	64 71	132.9	2
3	34 29.8	61 75	129.0	34 11.5	61 75	129.4	33 53.2	61 74	129.9	33 34.7	62 74	130.4	33 16.2	62 73	130.9	32 57.5	62 73	131.3	32 38.7	63 72	131.8	32 19.8	63 72	132.3	3
4	33 44.7	60 76	128.3	33 26.8	60 75	128.8	33 08.7	60 75	129.2	32 50.6	61 74	129.7	32 32.3	61 74	130.2	32 14.0	61 73	130.7	31 55.5	62 73	131.1	31 36.9	62 72	131.6	4
45	32 59.2	59 76	127.6	32 41.6	59 76	128.1	32 23.8	59 76	128.6	32 06.0	60 75	129.0	31 48.0	60 74	129.5	31 30.0	60 74	130.0	31 11.8	61 74	130.5	30 53.6	61 73	130.9	45
6	32 13.3	58 77	127.0	31 56.0	58 77	127.4	31 38.5	58 76	127.9	31 21.0	59 76	128.4	31 03.3	59 75	128.9	30 45.6	59 75	129.3	30 27.7	60 74	129.8	30 09.8	60 74	130.3	6
7	31 27.1	57 78	126.3	31 10.0	57 77	126.8	30 52.9	57 77	127.3	30 35.6	58 76	127.8	30 18.2	58 76	128.2	30 00.8	58 75	128.7	29 43.2	59 75	129.2	29 25.5	59 74	129.6	7
8	30 40.4	56 78	125.7	30 23.7	56 78	126.2	30 06.8	56 77	126.7	29 49.8	57 77	127.2	29 32.7	57 76	127.6	29 15.6	57 76	128.1	28 58.3	58 76	128.6	28 40.9	58 75	129.0	8
9	29 53.4	55 79	125.1	29 36.9	55 78	125.6	29 20.4	55 78	126.1	29 03.7	56 78	126.6	28 46.9	56 77	127.0	28 30.0	56 77	127.5	28 13.0	57 76	128.0	27 55.9	57 76	128.4	9
50	29 06.1	54 79	124.5	28 49.9	54 79	125.0	28 33.6	55 79	125.5	28 17.2	55 78	126.0	28 00.7	55 78	126.4	27 44.1	55 77	126.9	27 27.4	56 77	127.4	27 10.6	56 76	127.8	50
1	28 18.4	53 80	124.0	28 02.5	53 80	124.4	27 46.4	54 79	124.9	27 30.3	54 79	125.4	27 14.1	54 78	125.9	26 57.8	55 78	126.3	26 41.4	55 77	126.8	26 24.9	55 77	127.3	1
2	27 30.4	52 80	123.4	27 14.7	52 80	123.9	26 59.0	53 80	124.4	26 43.1	53 79	124.8	26 27.2	53 79	125.3	26 11.1	54 78	125.8	25 55.0	54 78	126.2	25 38.8	54 77	126.7	2
3	26 42.1	51 81	122.9	26 26.7	51 81	123.3	26 11.2	52 80	123.8	25 55.6	52 80	124.3	25 40.0	52 79	124.8	25 24.2	53 79	125.2	25 08.3	53 78	125.7	24 52.4	53 78	126.2	3
4	25 53.5	50 81	122.3	25 38.4	51 81	122.8	25 23.1	51 80	123.3	25 07.8	51 80	123.8	24 52.4	51 80	124.2	24 36.9	52 79	124.7	24 21.3	52 79	125.2	24 05.7	52 78	125.6	4
55	25 04.6	49 82	121.8	24 49.7	50 82	122.3	24 34.8	50 81	122.8	24 19.7	50 81	123.2	24 04.6	51 80	123.7	23 49.4	51 80	124.2	23 34.0	51 79	124.6	23 18.6	51 79	125.1	55
6	24 15.5	49 82	121.3	24 00.8	49 82	121.8	23 46.1	49 82	122.3	23 31.3	49 81	122.7	23 16.5	50 81	123.2	23 01.5	50 80	123.7	22 46.4	50 80	124.1	22 31.3	51 79	124.6	6
7	23 26.0	48 83	120.8	23 11.7	48 82	121.3	22 57.2	48 82	121.8	22 42.7	49 82	122.2	22 28.1	49 81	122.7	22 13.4	49 81	123.2	21 58.6	49 80	123.6	21 43.7	50 80	124.1	7
8	22 36.4	47 83	120.3	22 22.3	47 83	120.8	22 08.1	47 82	121.3	21 53.8	48 82	121.7	21 39.4	48 82	122.2	21 25.0	48 81	122.7	21 10.4	49 81	123.2	20 55.8	49 80	123.6	8
9	21 46.5	46 84	119.8	21 32.6	46 83	120.3	21 18.6	47 83	120.8	21 04.6	47 82	121.3	20 50.5	47 82	121.7	20 36.3	47 82	122.2	20 22.0	48 81	122.7	20 07.7	48 81	123.2	9
60	20 56.3	45 84	119.4	20 42.7	46 84	119.9	20 29.0	46 83	120.3	20 15.2	46 83	120.8	20 01.3	46 82	121.3	19 47.4	47 82	121.8	19 33.3	47 82	122.2	19 19.2	47 81	122.7	60
1	20 06.0	45 84	118.9	19 52.6	45 84	119.4	19 39.1	45 84	119.9	19 25.5	45 83	120.4	19 11.9	46 83	120.8	18 58.2	46 82	121.3	18 44.4	46 82	121.8	18 30.6	46 82	122.2	1
2	19 15.4	44 85	118.5	19 02.2	44 84	119.0	18 49.0	44 84	119.4	18 35.6	45 84	119.9	18 22.3	45 83	120.4	18 08.8	45 83	120.9	17 55.3	45 82	121.3	17 41.7	45 82	121.8	2
3	18 24.6	43 85	118.1	18 11.6	43 85	118.5	17 58.6	43 84	119.0	17 45.5	44 84	119.5	17 32.4	44 83	120.0	17 19.2	44 83	120.4	17 05.9	44 83	120.9	16 52.5	45 82	121.4	3
4	17 33.6	42 85	117.6	17 20.9	43 85	118.1	17 08.1	43 85	118.6	16 55.2	43 84	119.1	16 42.3	43 84	119.5	16 29.3	43 83	120.0	16 16.3	44 83	120.5	16 03.2	44 83	120.9	4
65	16 42.4	42 86	117.2	16 29.9	42 85	117.7	16 17.3	42 85	118.2	16 04.7	42 84	118.6	15 52.0	42 84	119.1	15 39.3	43 84	119.6	15 26.5	43 83	120.1	15 13.6	43 83	120.5	65
6	15 51.0	41 86	116.8	15 38.7	41 86	117.3	15 26.4	41 85	117.8	15 14.0	41 85	118.2	15 01.6	42 84	118.7	14 49.0	42 84	119.2	14 36.5	42 84	119.7	14 23.8	42 83	120.1	6
7	14 59.5	40 86	116.4	14 47.4	40 86	116.9	14 35.3	40 86	117.4	14 23.1	41 85	117.8	14 10.9	41 85	118.3	13 58.6	41 84	118.8	13 46.2	41 84	119.3	13 33.8	41 84	119.7	7
8	14 07.7	39 86	116.0	13 55.9	40 86	116.5	13 44.0	40 86	117.0	13 32.0	40 85	117.5	13 20.0	40 85	117.9	13 07.9	40 85	118.4	12 55.8	40 84	118.9	12 43.7	41 84	119.3	8
9	13 15.8	39 87	115.7	13 04.2	39 86	116.1	12 52.5	39 86	116.6	12 40.8	39 86	117.1	12 29.0	39 85	117.6	12 17.1	40 85	118.0	12 05.2	40 85	118.5	11 53.3	40 84	119.0	9
70	12 23.8	38 87	115.3	12 12.3	38 87	115.8	12 00.9	38 86	116.2	11 49.3	39 86	116.7	11 37.7	39 86	117.2	11 26.1	39 85	117.7	11 14.5	39 85	118.1	11 02.7	39 85	118.6	70
1	11 31.5	37 87	114.9	11 20.3	38 87	115.4	11 09.0	38 86	115.9	10 57.7	38 86	116.4	10 46.4	38 86	116.8	10 35.0	38 86	117.3	10 23.5	38 85	117.8	10 12.0	38 85	118.2	1
2	10 39.2	37 88	114.6	10 28.1	37 87	115.1	10 17.1	37 87	115.5	10 06.0	37 87	116.0	9 54.8	37 86	116.5	9 43.6	37 86	116.9	9 32.4	37 86	117.4	9 21.1	38 85	117.9	2
3	9 46.7	36 88	114.2	9 35.8	36 87	114.7	9 25.0	36 87	115.2	9 14.0	36 87	115.7	9 03.1	37 86	116.1	8 52.1	37 86	116.6	8 41.1	37 86	117.1	8 30.1	37 85	117.5	3
4	8 54.0	35 88	113.9	8 43.4	36 88	114.4	8 32.7	36 87	114.8	8 22.0	36 87	115.3	8 11.2	36 87	115.8	8 00.5	36 86	116.3	7 49.7	36 86	116.7	7 38.8	36 86	117.2	4
75	8 01.2	35 88	113.6	7 50.7	35 88	114.0	7 40.3	35 88	114.5	7 29.8	35 87	115.0	7 19.2	35 87	115.5	7 08.7	35 87	115.9	6 58.1	35 86	116.4	6 47.5	35 86	116.9	75
6	7 08.3	34 88	113.2	6 58.0	34 88	113.7	6 47.7	34 88	114.2	6 37.4	34 87	114.7	6 27.1	34 87	115.1	6 16.7	35 87	115.6	6 06.3	35 86	116.1	5 55.9	35 86	116.5	6
7	6 15.2	33 89	112.9	6 05.1	34 88	113.4	5 55.0	34 88	113.9	5 44.9	34 88	114.3	5 34.8	34 87	114.8	5 24.6	34 87	115.3	5 14.5	34 87	115.8	5 04.3	34 86	116.2	7
8	5 22.0	33 89	112.6	5 12.1	33 88	113.1	5 02.2	33 88	113.5																8

DECLINATION SAME NAME AS LATITUDE

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91													5 01.9	26 90	68.5	5 09.8	26 89	68.0	5 17.6	26 89	67.6	5 25.4	26 88	67.1	91

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	82 00.0	1.0 06	00.0	81 30.0	1.0 05	00.0	81 00.0	1.0 06	00.0	80 30.0	1.0 05	00.0	80 00.0	1.0 04	00.0	79 30.0	1.0 04	00.0	79 00.0	1.0 04	00.0	78 30.0	1.0 04	00.0	00
1	81 56.7	99 16	06.5	81 26.9	99 15	06.1	80 57.1	99 14	05.8	80 27.3	99 14	05.5	79 57.4	1.0 13	05.2	79 27.5	1.0 12	04.9	78 57.7	1.0 12	04.7	78 27.8	1.0 11	04.4	1
2	81 47.0	97 26	12.9	81 17.8	98 25	12.1	80 48.5	98 24	11.4	80 19.1	98 22	10.8	79 49.7	98 21	10.2	79 20.2	98 20	09.7	78 50.7	98 19	09.2	78 21.1	99 18	08.8	2
3	81 31.1	94 36	18.9	81 02.8	95 34	17.8	80 34.4	95 32	16.8	80 05.7	96 30	15.9	79 37.0	96 29	15.1	79 08.1	96 28	14.4	78 39.2	97 26	13.7	78 10.1	97 25	13.1	3
4	81 09.8	90 44	24.5	80 42.6	91 42	23.2	80 15.2	92 40	21.9	79 47.5	93 38	20.8	79 19.7	93 36	19.8	78 51.6	94 34	18.9	78 23.4	94 33	18.0	77 55.1	95 32	17.2	4
05	80 43.5	85 51	29.6	80 17.7	87 49	28.1	79 51.5	88 46	26.7	79 24.9	89 44	25.4	78 58.1	90 42	24.2	78 31.0	91 41	23.1	78 03.7	91 39	22.0	77 36.1	92 38	21.1	05
6	80 13.0	81 57	34.2	79 48.6	82 55	32.5	79 23.6	84 52	31.0	78 58.3	85 50	29.6	78 32.6	86 48	28.2	78 06.6	87 46	27.0	77 40.2	88 45	25.9	77 13.6	89 43	24.8	6
7	79 38.9	76 62	38.3	79 15.8	78 60	36.5	78 52.2	79 58	34.9	78 28.2	81 55	33.4	78 03.7	82 53	32.0	77 38.7	84 51	30.6	77 13.5	85 50	29.4	76 47.9	86 48	28.2	7
8	79 01.7	71 66	41.9	78 40.0	73 64	40.1	78 17.8	75 62	38.4	77 55.0	77 60	36.9	77 31.6	79 58	35.4	77 07.9	80 56	34.0	76 43.7	81 54	32.7	76 19.1	82 52	31.5	8
9	78 22.0	67 70	45.1	78 01.6	69 68	43.3	77 40.7	71 66	41.6	77 19.1	73 64	40.0	76 57.0	75 62	38.5	76 34.3	76 60	37.1	76 11.2	78 58	35.7	75 47.7	79 56	34.4	9
10	77 40.1	62 73	48.0	77 21.0	65 71	46.2	77 01.3	67 69	44.5	76 40.9	69 67	42.9	76 19.9	71 65	41.3	75 58.4	73 63	39.9	75 36.4	74 62	38.5	75 14.0	76 60	37.2	10
1	76 56.4	58 75	50.5	76 38.5	61 74	48.7	76 19.9	63 72	47.0	76 00.7	65 70	45.4	75 40.9	67 68	43.9	75 20.5	69 66	42.4	74 59.5	71 65	41.0	74 38.1	72 63	39.7	1
2	76 11.2	55 78	52.7	75 54.4	57 76	51.0	75 36.9	59 74	49.3	75 18.8	62 72	47.7	75 00.0	64 71	46.2	74 40.7	65 69	44.8	74 20.8	67 67	43.4	74 00.4	69 66	42.0	2
3	75 24.7	51 79	54.7	75 09.0	54 78	53.0	74 52.5	56 76	51.4	74 35.4	58 74	49.8	74 17.6	60 73	48.3	73 59.3	62 71	46.9	73 40.4	64 70	45.5	73 21.0	66 68	44.1	3
4	74 37.1	48 81	56.4	74 22.4	50 79	54.8	74 06.9	53 78	53.2	73 50.7	55 76	51.7	73 33.9	57 75	50.2	73 16.6	59 73	48.8	72 58.6	61 72	47.4	72 40.1	62 70	46.1	4
15	73 48.6	45 82	58.0	73 34.7	47 81	56.4	73 20.2	50 79	54.9	73 04.9	52 78	53.4	72 49.0	54 76	51.9	72 32.6	56 75	50.5	72 15.5	58 74	49.2	71 57.9	60 72	47.9	15
6	72 59.4	42 83	59.4	72 46.3	45 82	57.9	72 32.6	47 81	56.4	72 18.2	49 79	54.9	72 03.1	51 78	53.5	71 47.5	53 77	52.1	71 31.4	55 75	50.8	71 14.6	57 74	49.5	6
7	72 09.4	40 84	60.7	71 57.1	42 83	59.2	71 44.1	44 82	57.7	71 30.6	46 81	56.3	71 16.4	48 79	54.9	71 01.6	50 78	53.6	70 46.2	52 77	52.3	70 30.3	54 75	51.0	7
8	71 18.8	37 85	61.8	71 07.3	40 84	60.3	70 55.0	42 83	58.9	70 42.2	44 82	57.6	70 28.8	46 80	56.2	70 14.7	48 79	54.9	70 00.2	50 78	53.6	69 45.0	51 77	52.4	8
9	70 27.8	35 86	62.8	70 16.9	37 85	61.4	70 05.4	39 84	60.0	69 53.2	41 83	58.7	69 40.5	43 82	57.4	69 27.2	45 80	56.1	69 13.3	47 79	54.9	68 59.0	49 78	53.6	9
20	69 36.3	33 86	63.7	69 26.0	35 86	62.4	69 15.1	37 84	61.0	69 03.7	39 83	59.7	68 51.6	41 82	58.5	68 39.0	43 81	57.2	68 25.9	45 80	56.0	68 12.2	46 79	54.8	20
1	68 44.4	31 87	64.5	68 34.7	33 86	63.2	68 24.4	35 85	62.0	68 13.6	37 84	60.7	68 02.2	39 83	59.5	67 50.2	41 82	58.2	67 37.7	43 81	57.0	67 24.7	44 80	55.9	1
2	67 52.1	29 88	65.3	67 43.0	31 87	64.0	67 33.3	33 86	62.8	67 23.1	35 85	61.6	67 12.3	37 84	60.3	67 01.0	39 83	59.2	66 49.1	40 82	58.0	66 36.7	42 81	56.8	2
3	66 59.6	28 88	66.0	66 51.0	30 87	64.7	66 41.9	31 86	63.5	66 32.2	33 85	62.3	66 22.0	35 84	61.2	66 11.2	37 84	60.0	66 00.0	38 83	58.9	65 48.2	40 82	57.7	3
4	66 06.8	26 88	66.6	65 58.7	28 88	65.4	65 50.1	30 87	64.2	65 40.9	31 86	63.1	65 31.3	33 85	61.9	65 21.1	35 84	60.8	65 10.4	36 83	59.7	64 59.2	38 82	58.6	4
25	65 13.8	24 89	67.1	65 06.1	26 88	66.0	64 58.0	28 87	64.8	64 49.4	30 86	63.7	64 40.2	31 86	62.6	64 30.6	33 85	61.5	64 20.4	35 84	60.4	64 09.8	36 83	59.3	25
6	64 20.5	23 89	67.6	64 13.4	25 88	66.5	64 05.7	26 88	65.4	63 57.5	28 87	64.3	63 48.9	30 86	63.2	63 39.7	31 85	62.2	63 30.1	33 84	61.1	63 20.0	34 84	60.0	6
7	63 27.1	22 89	68.1	63 20.3	23 89	67.0	63 13.1	25 88	65.9	63 05.4	27 87	64.9	62 57.2	28 86	63.8	62 48.6	30 86	62.8	62 39.4	31 85	61.7	62 29.9	33 84	60.7	7
8	62 33.5	20 90	68.5	62 27.2	22 89	67.5	62 20.4	23 88	66.4	62 13.1	25 88	65.4	62 05.4	27 87	64.3	61 57.2	28 86	63.3	61 48.5	30 85	62.3	61 39.4	31 85	61.3	8
9	61 39.7	19 90	68.9	61 33.8	21 89	67.9	61 27.4	22 88	66.9	61 20.6	24 88	65.8	61 13.3	25 87	64.8	61 05.5	27 86	63.8	60 57.3	28 86	62.8	60 48.7	29 85	61.9	9
30	60 45.9	18 90	69.3	60 40.3	19 89	68.3	60 34.3	21 89	67.3	60 27.8	22 88	66.3	60 21.0	24 88	65.3	60 13.6	25 87	64.3	60 05.9	27 86	63.3	59 57.7	28 85	62.4	30
1	59 51.9	17 90	69.6	59 46.7	18 90	68.6	59 41.0	19 89	67.6	59 35.0	21 88	66.7	59 28.5	22 88	65.7	59 21.6	24 87	64.7	59 14.2	25 86	63.8	59 06.5	26 86	62.8	1
2	58 57.8	15 90	69.9	58 52.9	17 90	68.9	58 47.6	18 89	68.0	58 41.9	20 89	67.0	58 35.8	21 88	66.1	58 29.3	22 87	65.1	58 22.4	24 87	64.2	58 15.1	25 86	63.3	2
3	58 03.6	14 90	70.1	57 59.0	16 90	69.2	57 54.1	17 89	68.3	57 48.8	18 89	67.3	57 43.0	20 88	66.4	57 36.9	21 88	65.5	57 30.4	22 87	64.6	57 23.5	24 86	63.7	3
4	57 09.3	13 91	70.4	57 05.1	15 90	69.5	57 00.5	16 90	68.5	56 55.5	17 89	67.6	56 50.1	19 88	66.7	56 44.3	20 88	65.8	56 38.2	21 87	65.0	56 31.7	22 87	64.1	4
35	56 14.9	12 91	70.6	56 11.0	14 90	69.7	56 06.7	15 90	68.8	56 02.1	16 89	67.9	55 57.1	17 89	67.0	55 51.7	19 88	66.2	55 45.9	20 87	65.3	55 39.7	21 87	64.4	35
6	55 20.5	11 91	70.8	55 16.9	13 90	69.9	55 12.9	14 90	69.0	55 08.6	15 89	68.2	55 03.9	16 89	67.3	54 58.8	17 88	66.4	54 53.4	19 88	65.6	54 47.6	20 87	64.7	6
7	54 26.0	10 91	70.9	54 22.7	12 90	70.1	54 19.0	13 90	69.2	54 15.0	14 89	68.4	54 10.6	15 89	67.5	54 05.9	16 88	66.7	54 00.8	18 88	65.9	53 55.4	19 87	65.0	7
8	53 31.5	09 91	71.1	53 28.4	11 91	70.3	53 25.1	12 90	69.4	53 21.4	13 90	68.6	53 17.3	14 89	67.8	53 12.9	15 89	66.9	53 08.2	16 88	66.1	53 03.1	18 87	65.3	8
9	52 36.9	09 91	71.2	52 34.1	10 91	70.4	52 31.0	11 90	69.6	52 27.6	12 90	68.8	52 23.9	13 89	68.0	52 19.8	14 89	67.2	52 15.4	15 88	66.4	52 10.6	16 88	65.5	9
40	51 42.2	08 91	71.4	51 39.8	09 91	70.6	51 37.0	10 90	69.8	51 33.8	11 90	69.0	51 30.4	12 89	68.2	51 26.6	13 89	67.4	51 22.5	14 88	66.6	51 18.1	15 88	65.8	40
1	50 47.6	07 91	71.5	50 45.4	08 91	70.7	50 42.8	09 90	69.9	50 40.0	10 90	69.1	50 36.8	11 89	68.3	50 33.3	12 89	67.5	50 29.5	13 88	66.8	50 25.4	14 88	66.0	1
2	49 52.9	06 91	71.6	49 50.9	07 91	70.8	49 48.6	08 90	70.0	49 46.1	09 90	69.2	49 43.2	10 90	68.5	49 40.0	11 89	67.7	49 36.5	12 88	66.9	49 32.7	13 88	66.2	2
3	48 58.1	06 91	71.6	48 56.4	06 91	70.9	48 54.4	07 90	70.1	48 52.1	08 90	69.4	48 49.5	09 90	68.6	48 46.6	10 89	67.8	48 43.4	11 89	67.1	48 39.9	12 88	66.3	3
4	48 03.4	04 91	71.7	48 01.9	05 91	71.0	48 00.2	06 90	70.2	47 58.1	07 90	69.5	47 55.8	08 90	68.7	47 53.2	09 89	68.0	47 50.2	10 89	67.2	47 47.1	11 88	66.5	4
45	47 08.6	04 91	71.8	47 07.4	05 91	71.0	47 05.9	06 90	70.3	47 04.1	06 90	69.6	47 02.0	07 90	68.8	46 59.7	08 89	68.1	46 57.0	09 89	67.4	46 54.1	10 88	66.6	45
6	46 13.8	03 91	71.8	46 12.8	04 91	71.1	46 11.6	05 90	70.4	46 10.0	06 90	69.6	46 08.2	06 90	68.9	46 06.1	07 89	68.2	46 03.8	08 89	67.5	46 01.2	09 88	66.8	6
7	45 19.0	02 91	71.8	45 18.3	03 91	71.1	45 17.2	04 91	70.4	45 16.0	05 90	69.7	45 14.4	06 90	69.0	45 12.6	07 89	68.3	45 10.5	07 89	67.6	45 08.1	08 88	66.9	7
8	44 24.2	01 91	71.9	44 23.7	02 91	71.2	44 22.9	03 91	70.5	44 21.8	04 90	69.8	44 20.5	05 90	69.1	44 19.0	06 89	68.4	44 17.2	06 89	67.7	44 15.1	07 88	67.0	8
9	43 29.4	01 91	71.9	43 29.1	01 91	71.2	43 28.5	02 91	70.5	43 27.7	03 90	69.8	43 26.7	04 90	69.1	43 25.4	05 89	68.4	43 23.8	06 89	67.7	43 22.0	06 89	67.1	9
50	42 34.6	00 91	71.9	42 34.5	01 91	71.2	42 34.2	02 91	70.5	42 33.6	02 90	69.8	42 32.8	03 90	69.2	42 31.7	04 89	68.5	42 30.4	05 89	67.8	42 28.9	06 89	67.1	50
1	41 39.8	01 91	71.9	41 39.9	00 91	71.2	41 39.8	01 91	70.5	41 39.4	02 90	69.9	41 38.9	02 90	69.2	41 38.0	03 89	68.5	41 37.0	04 89	67.9	41 35.7	06 89	67.2	1
2	40 45.0	01 91	71.9	40 45.3	01 91	71.2	40 45.4	00 91	70.5	40 45.3	01 90	69.9	40 45.0	02 90	69.2	40 44.4	02 89	68.6	40 43.6	03 89	67.9	40 42.5	04 89	67.2	2
3	39 50.2	02 91	71.8	39 50.7	01 91	71.2	39 51.0	01 91	70.5	39 51.1	00 90	69.9	39 51.0	01 90	69.2	39 50.7	01 89	68.6	39 50.1	02 89	67.9	39 49.4	03 89	67.3	3
4	38 55.4	03 91	71.8	38 56.1	02 91	71.2	38 56.7	01 91	70.5	38 57.0	01 90	69.9	38 57.1	00 90	69.2	38 57.0	01 89	68.6	38 56.7	01 89	67.9	38 56.2	02 89	67.3	4
55	38 00.6	03 91	71.8	38 01.6	03 91	71.1	38 02.3	02 91	70.5	38 02.8	01 90	69.9	38 03.2	01 90	69.2	38 03.3	00 89	68.6	38 03.2	01 89	68.0	38 02.9	01 89	67.3	55
6	37 05.8	04 91	71.7	37 07.0	03 91	71.1	37 07.9	03 91	70.5	37 08.7	02 90	69.8	37 09.2	02 90	69.2	37 09.6	01 89	68.6	37 09.8	00 89	68.0	37 09.7	00 89	67.3	6
7	36 11.1	05 91	71.7	36 12.4	04 91	71.1	36 13.6	04 90	70.4	36 14.6	03 90	69.8	36 15.3	02 90	69.2	36 15.9	02 89	68.6	36 16.3	01 89	68.0	36 16.5	00 89	67.3	7
8	35 16.3	05 91	71.6	35 17.9	05 91	71.0	35 19.3	04 90	70.4	35 20.4	04 90	69.8	35 21.4	03 90	69.2	35 22.2	02 89	68.6	35 22.8	02 89	67.9	35 23.3	01 89	67.3	8
9	34 21.6	06 91	71.5	34 23.4	06 91	70.9	34 24.9	05 90	70.3	34 26.3	04 90	69.7	34 27.5	04 90	69.1	34 28.6	03 89	68.5	34 29.4	03 89	67.9	34 30.1	02 89	67.3	9
60	33 26.9	07 91	71.5	33 28.9	06 91	70.9	33 30.6	06 90	70.3	33 32.2	05 90	69.7	33 33.6	04 90	69.1	33 34.9	04 89	68.5	33 36.0	03 89	67.9	33 36.9	03 89	67.3	60
1	32 32.2	07 91	71.4	32 34.4	07 91	70.8	32 36.3	06 90	70.2	32 38.1	06 90	69.6	32 39.8	05 90	69.0	32 41.2	06 89	68.4	32 42.5	04 89	67.8	32 43.7	03 89	67.2	1
2	31 37.6	08 91	71.3	31 39.9	07 91	70.7	31 42.1	07 90	70.1	31 44.1	06 90	69.6	31 45.9	06 90	69.0	31 47.6	05 89	68.4	31 49.1	05 89	67.8	31 50.5	04 89	67.2	2
3	30 43.0	09 91	71.2	30 45.5	08 91	70.6	30 47.9	08 90	70.1	30 50.1	07 90	69.5	30 52.1	07 90	68.9	30 54.0	06 89	68.3	30 55.7	06 89	67.7	30 57.3	06 89	67.2	3
4	29 48.4	09 91	71.1	29 51.1	09 91	70.6	29 53.6	08 90	70.0	29 56.1	08 90	69.4	29 58.3	07 90	68.8	30 00.4	07 89	68.3	30 02.4	06 89	67.7	30 04.2	06 89	67.1	4
65	28 53.8	10 91	71.0	28 56.7	09 91	70.5	28 59.5	09 90	69.9	29 02.1	08 90	69.3	29 04.5	08 90	68.8	29 06.9	07 89	68.2	29 09.0	07 89	67.6	29 11.1	07 88	67.0	65
6	27 59.3	11 91	70.9	28 02.4	10 91	70.4	28 05.3	10 90	69.8	28 08.1	09 90	69.2	28 10.8	09 90	68.7	28 13.3	08 89	68.1	28 15.7	08 89	67.5	28 18.0	07 88	67.0	6
7	27 04.8	11 91	70.8	27 08.1	11 90	70.3	27 11.2	10 90	69.7	27 14.2	10 90	69.1	27 17.1	09 90	68.6	27 19.8	09 89	68.0	27 22.4	08 89	67.5	27 24.9	08 88	66.9	7
8	26 10.3	12 91	70.7	26 13.8	11 90	70.1	26 17.1	11 90	69.6	26 20.3	10 90	69.0	26 23.4	10 89	68.5	26 26.4	10 89	67.9	26 29.2	09 89	67.4	26 31.9	09 88	66.8	8
9	25 15.9	12 91	70.6	25 19.6	12 90	70.0	25 23.1	12 90	69.5	25 26.5	11 90	68.9	25 29.8	11 89	68.4	25 32.9	10 89	67.8	25 36.0	10 89	67.3	25 38.9	09 88	66.7	9
70	24 21.6	13 90	70.4	24 25.4	13 90	69.9	24 29.1	12 90	69.4	24 32.7	12 90	68.8	24 36.2	11 89	68.3	24 39.5	11 89	67.7	24 42.8	11 88	67.2	24 45.9	10 88	66.6	70
1	23 27.2	14 90	70.3	23 31.3	13 90	69.8	23 35.2	13 90	69.2	23 38.9	12 90	68.7	23 42.6	12 89	68.2	23 46.2	12 89	67.6	23 49.6	11 88	67.1	23 53.0	11 88	66.5	1
2	22 33.0	14 90	70.2	22 37.2	14 90	69.6	22 41.2	13 90	69.1	22 45.2	13 89	68.6	22 49.1	13 89	68.0	22 52.9	12 89	67.5	22 56.5	12 88	67.0	23 00.1	12 88	66.4	2
3	21 38.7	15 90	70.0	21 43.1	14 90	69.5	21 47.4	14 90	69.0	21 51.6	14 89	68.4	21 55.7	13 89	67.9	21 59.6	13 89	67.4	22 03.5	13 88	66.8	22 07.3	12 88	66.3	3
4	20 44.5	15 90	69.9	20 49.1	15 90	69.4	20 53.6	15 90	68.8	20 58.0	14 89	68.3	21 02.2	14 89	67.8	21 06.4	14 89	67.2	21 10.5	13 88	66.7	21 14.5	13 88	66.2	4
75	19 50.4	16 90	69.7	19 55.2	16 90	69.2	19 59.8	15 90	68.7	20 04.4	15 89	68.2	20 08.9	15 89	67.6	20 13.3	14 89	67.1	20 17.5	14 88	66.6	20 21.7	14 88	66.0	75
6	18 56.3	17 90	69.6	19 01.3	16 90	69.1	19 06.1	16 89	68.5	19 10.9	16 89	68.0	19 15.6	15 89	67.5	19 20.2	15 88	67.0	19 24.7	15 88	66.4	19 29.1	15 88	65.9	6
7	18 02.3	17 90	69.4	18 07.4	17 90	68.9	18 12.5	17 89	68.4	18 17.4	16 89	67.9	18 22.3	16 89	67.3	18 27.1	16 88	66.8	18 31.8	16 88	66.3	18 36.4	15 88	65.8	7
8	17 08.3	18 90	69.2	17 13.7	18 90	68.7	17 18.9	17 89	68.2	17 24.0	17 89	67.7	17 29.1	17 88	67.2	17 34.1	17 88	66.7	17 39.0	16 88	66.1	17 43.9	16 88	65.6	8
9	16 14.4	18 90	69.1	16 19.9	18 89	68.6	16 25.4	18 89	68.0	16 30.7	18 89	67.5	16 36.0	17 88	67.0	16 41.2	17 88	66.5	16 46.3	17 88	66.0	16 51.4	17 87	65.5	9
80	15 20.6	19 90	68.9	15 26.3	19 89	68.4	15 31.9	19 89	67.9	15 37.4	18 89	67.4	15 42.9	18 88	66.9	15 48.3	18 88	66.3	15 53.7	18 88	65.8	15 58.9	17 87	65.3	80
1	14 26.8	20 89	68.7	14 32.7	19 89	68.2	14 38.5	19 89	67.7	14 44.2	19 89	67.2	14 49.9	19 88	66.7	14 55.5	19 88	66.2	15 01.1	18 88	65.7	15 06.5	18 87	65.2	1
2	13 33.1	20 89	68.5	13 39.2	20 89	68.0	13 45.2	20 89	67.5	13 51.1	20 88	67.0	13 57.0	19 88	66.5	14 02.8	19 88	66.0	14 08.6	19 87	65.5	14 14.2	19 87	65.0	2
3	12 39.5	21 89	68.3	12 45.7	21 89	67.8	12 51.9	21 89	67.3	12 58.1	20 88	66.8	13 04.1	20 88	66.3	13 10.2	20 88	65.8	13 16.1	20 87	65.3	13 22.0	20 87	64.8	3
4	11 45.9	22 89	68.1	11 52.4	21 89	67.6	11 58.7	21 88	67.1	12 05.1	21 88	66.6	12 11.4	21 88	66.1	12 17.6	21 88	65.6	12 23.8	20 87	65.1	12 29.9	20 87	64.6	4
85	10 52.4	22 89	67.9	10 59.1	22 89	67.4	11 05.6	22 88	66.9	11 12.2	22 88	66.4	11 18.7	22 88	65.9	11 25.1	21 87	65.4	11 31.5	21 87	64.9	11 37.8	21 87	64.4	85
6	9 59.0	23 89	67.7	10 05.8	23 89	67.2	10 12.6	23 88	66.7	10 19.3	22 88	66.2	10 26.0	22 88	65.7	10 32.7	22 87	65.2	10 39.3	22 87	64.7	10 45.8	22 86	64.2	6
7	9 05.7	23 89	67.5	9 12.7	23 88	67.0	9 19.7	23 88	66.5	9 26.6	23 88	66.0	9 33.5	23 88	65.5	9 40.3	23 87	65.0	9 47.1	23 87	64.5	9 53.9	22 86	64.1	7
8	8 12.5	24 89	67.3	8 19.7	24 88	66.8	8 26.8	24 88	66.3	8 33.9	24 88	65.8	8 41.0	24 87	65.3	8 48.1	23 87	64.8	8 55.1	23 86	64.3	9 02.1	23 86	63.8	8
9	7 19.3	25 88	67.1	7 26.7	25 88	66.6	7 34.0	24 88	66.1	7 41.4	24 87	65.6	7 48.7	24 87	65.1	7 55.9	24 87	64.6	8 03.2	24 86	64.1	8 10.4	24 86	63.6	9
90	6 26.2	25 88	66.8	6 33.8	25 88	66.3	6 41.4	25 88	65.9	6 48.9	25 87	65.4	6 56.4	25 87	64.9	7 03.9	25 87	64.4	7 11.3	25 86	63.9	7 18.7	25 86	63.4	90

Lat. 16°

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	50 00.0	1.0 01	180.0	49 30.0	1.0 01	180.0	49 00.0	1.0 01	180.0	48 30.0	1.0 01	180.0	48 00.0	1.0 01	180.0	47 30.0	1.0 01	180.0	47 00.0	1.0 01	180.0	46 30.0	1.0 01	180.0	00
1	49 59.3	1.0 04	178.6	49 29.3	1.0 04	178.6	48 59.3	1.0 04	178.6	48 29.3	1.0 03	178.6	47 59.3	1.0 03	178.7	47 29.3	1.0 03	178.7	46 59.3	1.0 03	178.7	46 29.4	1.0 03	178.7	1
2	49 57.1	1.0 06	177.2	49 27.2	1.0 06	177.2	48 57.2	1.0 06	177.2	48 27.3	1.0 06	177.3	47 57.3	1.0 06	177.3	47 27.3	1.0 06	177.4	46 57.4	1.0 06	177.4	46 27.4	1.0 06	177.4	2
3	49 53.6	1.0 08	175.7	49 23.7	1.0 08	175.8	48 53.8	1.0 08	175.9	48 23.8	1.0 08	175.9	47 53.9	1.0 08	176.0	47 24.0	1.0 08	176.0	46 54.1	1.0 08	176.1	46 24.2	1.0 08	176.1	3
4	49 48.6	99 11	174.3	49 18.7	99 11	174.4	48 48.9	99 10	174.5	48 19.1	99 10	174.6	47 49.2	1.0 10	174.6	47 19.4	1.0 10	174.7	46 49.5	1.0 10	174.8	46 19.6	1.0 10	174.9	4
05	49 42.2	99 13	172.9	49 12.4	99 13	173.0	48 42.7	99 13	173.1	48 12.9	99 12	173.2	47 43.2	99 12	173.3	47 13.4	99 12	173.4	46 43.6	99 12	173.5	46 13.8	99 12	173.6	05
6	49 34.4	99 15	171.5	49 04.7	99 15	171.7	48 35.1	99 15	171.8	48 05.4	99 15	171.9	47 35.8	99 14	172.0	47 06.1	99 14	172.1	46 36.4	99 14	172.2	46 06.8	99 14	172.3	6
7	49 25.2	98 18	170.1	48 55.7	98 17	170.3	48 26.2	98 17	170.4	47 56.6	98 17	170.5	47 27.1	98 17	170.7	46 57.5	99 16	170.8	46 28.0	99 16	170.9	45 58.4	99 16	171.1	7
8	49 14.6	98 20	168.8	48 45.3	98 20	168.9	48 15.9	98 19	169.1	47 46.5	98 19	169.2	47 17.1	98 19	169.4	46 47.7	98 19	169.5	46 18.3	98 18	169.7	45 48.8	98 18	169.8	8
9	49 02.7	97 22	167.4	48 33.5	97 22	167.6	48 04.3	97 22	167.8	47 35.1	97 21	167.9	47 05.8	98 21	168.1	46 36.6	98 21	168.2	46 07.3	98 20	168.4	45 38.0	98 20	168.6	9
10	48 49.5	97 24	166.1	48 20.5	97 24	166.2	47 51.4	97 24	166.4	47 22.4	97 23	166.6	46 53.3	97 23	166.8	46 24.2	97 23	167.0	45 55.1	97 22	167.2	45 25.9	97 22	167.3	10
1	48 35.0	96 26	164.7	48 06.1	96 26	164.9	47 37.3	96 26	165.1	47 08.4	96 25	165.3	46 39.5	96 25	165.5	46 10.6	96 25	165.7	45 41.6	96 24	165.9	45 12.7	97 24	166.1	1
2	48 19.1	96 28	163.4	47 50.5	96 28	163.6	47 21.8	96 28	163.8	46 53.2	96 27	164.1	46 24.5	96 27	164.3	45 55.7	96 27	164.5	45 27.0	96 26	164.7	44 58.2	96 26	164.9	2
3	48 02.0	95 30	162.1	47 33.6	95 30	162.3	47 05.2	95 30	162.6	46 36.7	95 29	162.8	46 08.2	95 29	163.0	45 39.7	95 29	163.3	45 11.2	95 28	163.5	44 42.6	95 28	163.7	3
4	47 43.7	94 32	160.8	47 15.5	94 32	161.1	46 47.3	94 32	161.3	46 19.1	94 31	161.6	45 50.8	94 31	161.8	45 22.5	94 31	162.0	44 54.2	94 30	162.3	44 25.8	95 30	162.5	4
15	47 24.1	93 34	159.6	46 56.2	93 34	159.8	46 28.3	93 34	160.1	46 00.3	93 33	160.3	45 32.2	93 33	160.6	45 04.2	94 32	160.9	44 36.1	94 32	161.1	44 08.0	94 32	161.3	15
6	47 03.4	92 36	158.3	46 35.7	92 36	158.6	46 08.0	92 36	158.9	45 40.3	93 35	159.1	45 12.5	93 35	159.4	44 44.7	93 34	159.7	44 16.8	93 34	159.9	43 49.0	93 33	160.2	6
7	46 41.5	91 38	157.1	46 14.1	91 38	157.4	45 46.7	92 38	157.7	45 19.2	92 37	158.0	44 51.7	92 36	158.2	44 24.1	92 36	158.5	43 56.5	92 36	158.8	43 28.9	92 35	159.1	7
8	46 18.5	90 40	155.9	45 51.4	90 40	156.2	45 24.2	91 39	156.5	44 57.0	91 39	156.8	44 29.8	91 38	157.1	44 02.5	91 38	157.4	43 35.1	91 37	157.7	43 07.7	91 37	157.9	8
9	45 54.4	89 42	154.7	45 27.5	89 41	155.0	45 00.7	90 41	155.3	44 33.7	90 40	155.6	44 06.8	90 40	155.9	43 39.7	90 40	156.2	43 12.7	90 39	156.5	42 45.6	90 39	156.8	9
20	45 29.2	88 44	153.5	45 02.7	89 43	153.9	44 36.1	89 43	154.2	44 09.4	89 42	154.5	43 42.8	89 42	154.8	43 16.0	89 41	155.1	42 49.2	89 41	155.5	42 22.4	90 40	155.8	20
1	45 03.0	87 45	152.4	44 36.7	88 45	152.7	44 10.5	88 44	153.1	43 44.1	88 44	153.4	43 17.7	88 43	153.7	42 51.3	88 43	154.1	42 24.8	88 42	154.4	41 58.2	89 42	154.7	1
2	44 35.7	86 47	151.3	44 09.8	86 46	151.6	43 43.9	87 46	152.0	43 17.8	87 45	152.3	42 51.7	87 45	152.7	42 25.6	87 44	153.0	41 59.3	87 44	153.3	41 33.1	88 43	153.6	2
3	44 07.5	85 49	150.2	43 41.9	85 48	150.5	43 16.3	86 48	150.9	42 50.5	86 47	151.3	42 24.7	86 46	151.6	41 58.9	86 46	151.9	41 33.0	86 46	152.3	41 07.0	87 45	152.6	3
4	43 38.4	84 50	149.1	43 13.1	84 50	149.5	42 47.8	85 49	149.8	42 22.3	85 48	150.2	41 56.9	85 48	150.6	41 31.3	85 47	150.9	41 05.7	85 47	151.3	40 40.0	86 46	151.6	4
25	43 08.3	83 52	148.1	42 43.4	83 51	148.4	42 18.3	84 50	148.8	41 53.2	84 50	149.2	41 28.1	84 50	149.5	41 02.8	84 49	149.9	40 37.5	84 48	150.3	40 12.1	85 48	150.6	25
6	42 37.4	82 53	147.0	42 12.7	82 52	147.4	41 48.0	82 52	147.8	41 23.2	83 51	148.2	40 58.4	83 51	148.5	40 33.5	83 50	148.9	40 08.5	83 50	149.3	39 43.4	84 49	149.6	6
7	42 05.6	81 54	146.0	41 41.3	81 54	146.4	41 16.9	81 53	146.8	40 52.4	82 53	147.2	40 27.9	82 52	147.6	40 03.3	82 52	147.9	39 38.6	82 51	148.3	39 13.8	83 51	148.7	7
8	41 32.9	80 56	145.0	41 08.9	80 55	145.4	40 44.9	80 55	145.8	40 20.7	81 54	146.2	39 56.5	81 54	146.6	39 32.2	81 53	147.0	39 07.9	81 52	147.4	38 43.4	82 52	147.7	8
9	40 59.5	79 57	144.1	40 35.8	79 56	144.5	40 12.1	79 56	144.9	39 48.3	79 55	145.3	39 24.4	80 55	145.7	39 00.4	80 54	146.1	38 36.4	80 54	146.4	38 12.3	81 53	146.8	9
30	40 25.2	78 58	143.1	40 01.9	78 58	143.5	39 38.5	78 57	144.0	39 15.0	78 57	144.4	38 51.5	79 56	144.8	38 27.8	79 56	145.1	38 04.1	79 55	145.5	37 40.3	79 54	145.9	30
1	39 50.3	76 60	142.2	39 27.3	77 59	142.6	39 04.2	77 58	143.0	38 41.1	77 58	143.4	38 17.8	78 57	143.9	37 54.5	78 57	144.3	37 31.1	78 56	144.6	37 07.6	78 56	145.0	1
2	39 14.6	75 61	141.3	38 51.9	76 60	141.7	38 29.2	76 60	142.2	38 06.4	76 59	142.6	37 43.5	77 58	143.0	37 20.5	77 58	143.4	36 57.4	77 57	143.8	36 34.2	77 57	144.2	2
3	38 38.2	74 62	140.4	38 15.9	75 61	140.9	37 53.5	75 61	141.3	37 31.0	75 60	141.7	37 08.4	75 60	142.1	36 45.7	76 59	142.5	36 23.0	76 58	142.9	36 00.1	76 58	143.3	3
4	38 01.1	73 63	139.6	37 39.1	73 62	140.0	37 17.0	74 62	140.4	36 54.9	74 61	140.9	36 32.6	74 61	141.3	36 10.3	75 60	141.7	35 47.9	75 60	142.1	35 25.4	75 59	142.5	4
35	37 23.4	72 64	138.7	37 01.7	72 63	139.2	36 40.0	73 63	139.6	36 18.2	73 62	140.0	35 56.2	73 62	140.5	35 34.2	74 61	140.9	35 12.1	74 61	141.3	34 49.9	74 60	141.7	35
6	36 45.0	71 65	137.9	36 23.7	71 64	138.4	36 02.3	72 64	138.8	35 40.8	72 63	139.2	35 19.2	72 63	139.6	34 57.5	72 62	140.1	34 35.7	73 62	140.5	34 13.9	73 61	140.9	6
7	36 06.1	70 66	137.1	35 45.1	70 65	137.6	35 24.0	70 65	138.0	35 02.8	71 64	138.4	34 41.5	71 64	138.9	34 20.2	71 63	139.3	33 58.7	72 63	139.7	33 37.2	72 62	140.1	7
8	35 26.5	69 67	136.3	35 05.9	69 66	136.8	34 45.1	69 66	137.2	34 24.3	70 65	137.7	34 03.3	70 65	138.1	33 42.3	70 64	138.5	33 21.1	71 64	139.0	32 59.9	71 63	139.4	8
9	34 46.5	68 68	135.6	34 26.1	68 67	136.0	34 05.7	68 67	136.5	33 45.1	69 66	136.9	33 24.5	69 66	137.3	33 03.8	69 65	137.8	32 43.0	70 64	138.2	32 22.1	70 64	138.6	9
40	34 05.8	67 69	134.8	33 45.8	67 68	135.3	33 25.7	67 68	135.7	33 05.5	68 67	136.2	32 45.2	68 66	136.6	32 24.8	68 66	137.0	32 04.3	68 65	137.5	31 43.7	69 65	137.9	40
1	33 24.7	66 70	134.1	33 05.0	66 69	134.6	32 45.2	66 68	135.0	32 25.3	66 68	135.5	32 05.3	67 67	135.9	31 45.2	67 67	136.3	31 25.0	67 66	136.8	31 04.8	68 66	137.2	1
2	32 43.0	64 70	133.4	32 23.6	65 70	133.9	32 04.1	65 69	134.3	31 44.6	65 69	134.8	31 24.9	66 68	135.2	31 05.1	66 68	135.6	30 45.3	66 67	136.1	30 25.3	67 67	136.5	2
3	32 00.9	63 71	132.7	31 41.8	64 70	133.2	31 22.6	64 70	133.6	31 03.3	64 69	134.1	30 44.0	65 69	134.5	30 24.5	65 68	135.0	30 05.0	65 68	135.4	29 45.4	66 67	135.8	3
4	31 18.2	62 72	132.0	30 59.5	63 71	132.5	30 40.6	63 71	132.9	30 21.7	63 70	133.4	30 02.6	64 70	133.8	29 43.5	64 69	134.3	29 24.3	64 69	134.7	29 05.0	65 68	135.2	4
45	30 35.2	61 72	131.4	30 16.7	62 72	131.8	29 58.2	62 72	132.3	29 39.5	62 71	132.7	29 20.8	63 70	133.2	29 02.0	63 70	133.6	28 43.1	63 70	134.1	28 24.1	63 69	134.5	45
6	29 51.7	60 73	130.7	29 33.5	61 73	131.2	29 15.3	61 72	131.6	28 57.0	61 72	132.1	28 38.5	62 71	132.6	28 20.0	62 71	133.0	28 01.4	62 70	133.4	27 42.7	62 70	133.9	6
7	29 07.8	59 74	130.1	28 49.9	60 73	130.6	28 32.0	60 73	131.0	28 14.0	60 72	131.5	27 55.8	61 72	131.9	27 37.6	61 71	132.4	27 19.3	61 71	132.8	27 00.9	61 70	133.3	7
8	28 23.5	58 74	129.5	28 05.9	59 74	130.0	27 48.3	59 74	130.4	27 30.5	59 73	130.9	27 12.7	60 72	131.3	26 54.8	60 72	131.8	26 36.8	60 72	132.2	26 18.7	60 71	132.7	8
9	27 38.8	57 75	128.9	27 21.5	58 75	129.4	27 04.2	58 74	129.8	26 46.7	58 74	130.3	26 29.2	59 73	130.7	26 11.6	59 73	131.2	25 53.9	59 72	131.6	25 36.1	59 72	132.1	9
50	26 53.7	56 76	128.3	26 36.7	57 75	128.8	26 19.7	57 75	129.2	26 02.5	57 74	129.7	25 45.3	58 74	130.1	25 28.0	58 73	130.6	25 10.6	58 73	131.0	24 53.1	58 72	131.5	50
1	26 08.3	55 76	127.7	25 51.6	56 76	128.2	25 34.8	56 75	128.7	25 18.0	56 75	129.1	25 01.0	57 74	129.6	24 44.0	57 74	130.0	24 26.9	57 73	130.5	24 09.7	57 73	130.9	1
2	25 22.5	55 77	127.2	25 06.1	55 76	127.6	24 49.6	55 76	128.1	24 33.0	55 75	128.6	24 16.4	56 75	129.0	23 59.7	56 74	129.5	23 42.8	56 74	129.9	23 25.9	56 74	130.4	2
3	24 36.4	54 77	126.6	24 20.2	54 77	127.1	24 04.0	54 76	127.6	23 47.8	54 76	128.0	23 31.4	55 76	128.5	23 15.0	55 75	128.9	22 58.4	55 75	129.4	22 41.8	55 74	129.8	3
4	23 49.9	53 78	126.1	23 34.1	53 77	126.6	23 18.2	53 77	127.0	23 02.2	53 77	127.5	22 46.1	54 76	127.9	22 29.9	54 76	128.4	22 13.7	54 75	128.9	21 57.4	54 75	129.3	4
55	23 03.2	52 78	125.6	22 47.6	52 78	126.0	22 32.0	52 78	126.5	22 16.2	53 77	127.0	22 00.4	53 76	127.4	21 44.6	53 76	127.9	21 28.6	53 76	128.3	21 12.6	54 75	128.8	55
6	22 16.1	51 79	125.1	22 00.8	51 78	125.5	21 45.4	51 78	126.0	21 30.0	52 78	126.5	21 14.5	52 77	126.9	20 58.9	52 77	127.4	20 43.2	52 76	127.8	20 27.5	53 76	128.3	6
7	21 28.8	50 79	124.6	21 13.7	50 79	125.0	20 58.6	50 78	125.5	20 43.5	51 78	126.0	20 28.2	51 78	126.4	20 12.9	51 77	126.9	19 57.5	51 77	127.3	19 42.1	52 76	127.8	7
8	20 41.1	49 80	124.1	20 26.4	49 79	124.6	20 11.6	50 79	125.0	19 56.6	50 78	125.5	19 41.7	50 78	125.9	19 26.6	50 78	126.4	19 11.5	50 77	126.9	18 56.3	51 77	127.3	8
9	19 53.2	48 80	123.6	19 38.7	48 80	124.1	19 24.2	49 79	124.6	19 09.5	49 79	125.0	18 54.8	49 79	125.5	18 40.1	49 78	125.9	18 25.2	50 78	126.4	18 10.3	50 77	126.8	9
60	19 05.1	47 81	123.2	18 50.9	48 80	123.6	18 36.5	48 80	124.1	18 22.2	48 79	124.5	18 07.7	48 79	125.0	17 53.2	48 78	125.5	17 38.7	49 78	125.9	17 24.0	49 78	126.4	60
1	18 16.7	46 81	122.7	18 02.7	47 81	123.2	17 48.7	47 80	123.6	17 34.5	47 80	124.1	17 20.4	47 79	124.6	17 06.1	48 79	125.0	16 51.8	48 78	125.5	16 37.5	48 78	125.9	1
2	17 28.0	46 82	122.3	17 14.3	46 81	122.7	17 00.5	46 81	123.2	16 46.7	46 80	123.7	16 32.8	46 80	124.1	16 18.8	47 79	124.6	16 04.7	47 79	125.0	15 50.6	47 78	125.5	2
3	16 39.1	45 82	121.8	16 25.7	45 81	122.3	16 12.1	45 81	122.8	15 58.5	45 81	123.2	15 44.9	46 80	123.7	15 31.2	46 80	124.2	15 17.4	46 79	124.6	15 03.6	46 79	125.1	3
4	15 50.0	44 82	121.4	15 36.8	44 82	121.9	15 23.5	44 81	122.3	15 10.2	45 81	122.8	14 56.8	45 81	123.3	14 43.3	45 80	123.7	14 29.8	45 80	124.2	14 16.2	45 79	124.7	4
65	15 00.7	43 82	121.0	14 47.7	43 82	121.5	14 34.7	44 82	121.9	14 21.6	44 81	122.4	14 08.4	44 81	122.9	13 55.2	44 81	123.3	13 42.0	44 80	123.8	13 28.7	44 80	124.2	65
6	14 11.1	42 83	120.6	13 58.4	43 82	121.1	13 45.6	43 82	121.5	13 32.8	43 82	122.0	13 19.9	43 81	122.5	13 06.9	43 81	122.9	12 53.9	43 80	123.4	12 40.9	44 80	123.8	6
7	13 21.4	42 83	120.2	13 08.9	42 83	120.7	12 56.3	42 82	121.1	12 43.7	42 82	121.6	12 31.1	42 82	122.1	12 18.4	42 81	122.5	12 05.7	43 81	123.0	11 52.9	43 80	123.4	7
8	12 31.4	41 84	119.8	12 19.2	41 83	120.3	12 06.9	41 83	120.7	11 54.5	41 82	121.2	11 42.1	41 82	121.7	11 29.7	42 82	122.1	11 17.2	42 81	122.6	11 04.6	42 81	123.1	8
9	11 41.3	40 84	119.4	11 29.3	40 84	119.9	11 17.2	40 83	120.4	11 05.1	40 83	120.8	10 52.9	41 82	121.3	10 40.7	41 82	121.8	10 28.5	41 82	122.2	10 16.2	41 81	122.7	9
70	10 51.0	39 84	119.1	10 39.2	39 84	119.5	10 27.4	40 83	120.0	10 15.5	40 83	120.5	10 03.6	40 83	120.9	9 51.6	40 82	121.4	9 39.6	40 82	121.9	9 27.6	40 81	122.3	70
1	10 00.5	38 84	118.7	9 48.9	39 84	119.2	9 37.3	39 84	119.6	9 25.7	39 83	120.1	9 14.0	39 83	120.6	9 02.3	39 82	121.0	8 50.5	39 82	121.5	8 38.7	39 82	122.0	1
2	9 09.8	38 85	118.3	8 58.5	38 84	118.8	8 47.1	38 84	119.3	8 35.7	38 84	119.8	8 24.2	38 83	120.2	8 12.8	38 83	120.7	8 01.3	38 82	121.2	7 49.7	39 82	121.6	2
3	8 19.0	37 85	118.0	8 07.9	37 85	118.5	7 56.7	37 84	118.9	7 45.5	37 84	119.4	7 34.3	37 84	119.9	7 23.1	38 83	120.3	7 11.8	38 83	120.8	7 00.5	38 82	121.3	3
4	7 28.0	36 85	117.7	7 17.1	36 85	118.1	7 06.2	36 84	118.6	6 55.2	37 84	119.1	6 44.2	37 84	119.5	6 33.2	37 83	120.0	6 22.2	37 83	120.5	6 11.1	37 83	120.9	4
75	6 36.8	36 86	117.3	6 26.1	36 85	117.8	6 15.4	36 85	118.3	6 04.7	36 84	118.7	5 54.0	36 84	119.2	5 43.2	36 84	119.7	5 32.4	36 83	120.2	5 21.6	36 83	120.6	75
6	5 45.5	35 86	117.0	5 35.0	35 85	117.5	5 24.6	35 85	118.0	5 14.1	35 85	118.4	5 03.5	35 84	118.9										6

DECLINATION SAME NAME AS LATITUDE

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	5 33.2	26 88	66.6	5 41.0	26 88	66.1	5 48.8	26 88	65.6	5 56.5	26 87	65.1	6 04.2	26 87	64.7	6 11.9	26 86	64.2	6 19.6	25 86	63.7	6 27.2	25 86	63.2	91
2										5 04.2	26 87	64.9	5 12.2	26 86	64.4	5 20.1	26 86	63.9	5 27.9	26 86	63.4	5 35.8	26 86	63.0	2

H.A.	28° 00′				28° 30′				29° 00′				30° 00′				32° 00′				34° 00′				34° 30′				35° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	78 00.0	1.0	04	00.0	77 30.0	1.0	03	00.0	77 00.0	1.0	03	00.0	76 00.0	1.0	03	00.0	74 00.0	1.0	03	00.0	72 00.0	1.0	02	00.0	71 30.0	1.0	02	00.0	70 30.0	1.0	02	00.0	00
1	77 57.9	1.0	11	04.2	77 28.0	1.0	10	04.1	76 58.0	1.0	10	03.9	75 58.2	1.0	09	03.6	73 58.5	1.0	08	03.1	71 58.6	1.0	07	02.7	71 28.7	1.0	07	02.6	70 28.8	1.0	06	02.4	1
2	77 51.5	99	18	08.4	77 21.9	99	17	08.1	76 52.2	99	16	07.7	75 52.8	99	15	07.1	73 53.8	99	13	06.1	71 54.6	99	11	05.3	71 24.8	99	11	05.2	70 25.1	99	10	04.9	2
3	77 41.0	97	24	12.5	77 11.8	97	23	12.0	76 42.6	98	22	11.5	75 43.9	98	20	10.6	73 46.2	98	18	09.1	71 47.9	99	16	08.0	71 18.3	99	15	07.7	70 19.0	99	14	07.3	3
4	77 26.6	95	30	16.5	76 58.0	95	29	15.8	76 29.3	96	28	15.1	75 31.6	96	26	14.0	73 35.5	97	22	12.1	71 38.6	98	20	10.6	71 09.3	98	19	10.3	70 10.5	98	18	09.6	4
05	77 08.4	93	36	20.2	76 40.5	93	35	19.4	76 12.5	94	34	18.6	75 16.1	94	31	17.3	73 22.0	96	27	15.0	71 26.8	96	24	13.1	70 57.8	97	23	12.7	69 59.7	97	22	12.0	05
6	76 46.8	90	41	23.8	76 19.7	91	40	22.9	75 52.5	91	38	22.0	74 57.5	92	36	20.4	73 05.8	94	31	17.8	71 12.4	95	28	15.6	70 43.9	95	27	15.1	69 46.6	96	25	14.3	6
7	76 22.0	87	46	27.2	75 55.8	88	45	26.1	75 29.4	88	43	25.2	74 35.9	90	40	23.4	72 46.9	92	36	20.4	70 55.8	93	32	18.0	70 27.7	94	31	17.5	69 31.3	94	29	16.5	7
8	75 54.2	84	51	30.3	75 29.0	85	49	29.2	75 03.5	85	48	28.2	74 11.7	87	45	26.3	72 25.6	90	39	23.0	70 36.8	92	35	20.3	70 09.3	92	34	19.7	69 13.9	93	32	18.6	8
9	75 23.8	80	54	33.2	74 59.6	81	53	32.1	74 35.0	82	51	31.0	73 45.0	84	48	29.0	72 01.9	87	43	25.5	70 15.7	90	39	22.6	69 48.8	90	38	21.9	68 54.5	91	36	20.7	9
10	74 51.1	77	58	35.9	74 27.8	78	56	34.7	74 04.2	79	55	33.6	73 15.9	81	52	31.5	71 36.0	85	46	27.8	69 52.6	87	42	24.7	69 26.2	88	41	24.0	68 33.1	89	39	22.7	10
1	74 16.2	74	61	38.4	73 54.0	75	60	37.2	73 31.3	76	58	36.0	72 44.8	79	55	33.9	71 08.1	82	50	30.0	69 27.5	85	45	26.8	69 01.8	86	44	26.1	68 09.9	87	42	24.7	1
2	73 39.5	70	64	40.7	73 18.2	72	63	39.5	72 56.4	73	61	38.3	72 11.7	76	58	36.1	70 38.3	80	53	32.1	69 00.6	83	48	28.8	68 35.6	84	46	28.0	67 45.0	85	44	26.6	2
3	73 01.1	67	66	42.8	72 40.7	69	65	41.6	72 19.8	70	64	40.4	71 36.9	73	61	38.1	70 06.8	77	55	34.1	68 32.0	81	50	30.6	68 07.7	81	49	29.8	67 18.4	83	47	28.3	3
4	72 21.1	64	69	44.8	72 01.6	66	67	43.6	71 41.7	67	66	42.4	71 00.5	70	63	40.1	69 33.7	75	58	36.0	68 01.8	78	53	32.4	67 38.2	79	52	31.6	66 50.3	81	49	30.0	4
15	71 39.8	61	71	46.6	71 21.2	63	69	45.4	71 02.2	64	68	44.2	70 22.7	67	65	41.9	68 59.1	72	60	37.7	67 30.2	76	55	34.1	67 07.3	77	54	33.3	66 20.7	78	52	31.7	15
6	70 57.4	58	72	48.2	70 39.6	60	71	47.0	70 21.4	62	70	45.8	69 43.6	64	67	43.5	68 23.1	69	62	39.4	66 57.2	74	57	35.7	66 35.0	75	56	34.9	65 49.7	76	54	33.2	6
7	70 13.8	56	74	49.7	69 56.9	57	73	48.5	69 39.5	59	72	47.4	69 03.3	62	69	45.1	67 45.9	67	64	40.9	66 22.9	71	59	37.2	66 01.4	72	58	36.4	65 17.5	74	56	34.7	7
8	69 29.4	53	76	51.1	69 13.2	55	74	49.9	68 56.6	56	73	48.8	68 21.9	59	71	46.5	67 07.6	64	66	42.4	65 47.4	69	61	38.7	65 26.6	70	60	37.8	64 44.1	72	58	36.1	8
9	68 44.0	51	77	52.4	68 28.6	52	76	51.2	68 12.7	54	74	50.1	67 39.6	57	72	47.9	66 28.2	62	67	43.8	65 10.9	67	63	40.0	64 50.7	68	62	39.1	64 09.5	70	59	37.5	9
20	67 58.0	48	78	53.6	67 43.3	50	77	52.5	67 28.1	51	76	51.3	66 56.4	54	73	49.1	65 47.8	60	69	45.0	64 33.3	64	64	41.3	64 13.8	65	63	40.4	63 34.0	67	61	38.7	20
1	67 11.2	46	79	54.7	66 57.2	48	78	53.6	66 42.7	49	77	52.4	66 12.4	52	75	50.3	65 06.6	57	70	46.2	63 54.8	62	66	42.5	63 36.0	63	65	41.6	62 57.4	65	62	39.9	1
2	66 23.9	44	80	55.7	66 10.5	45	79	54.6	65 56.7	47	78	53.5	65 27.7	50	76	51.4	64 24.6	55	71	47.3	63 15.4	60	67	43.6	62 57.2	61	66	42.8	62 20.0	63	64	41.1	2
3	65 35.9	42	81	56.6	65 23.2	43	80	55.5	65 10.0	45	79	54.5	64 42.3	48	77	52.4	63 41.8	53	72	48.4	62 35.2	58	68	44.7	62 17.7	59	67	43.8	61 41.7	61	65	42.1	3
4	64 47.5	40	81	57.5	64 35.4	41	80	56.4	64 22.8	43	80	55.4	63 56.3	46	78	53.3	62 58.3	51	73	49.4	61 54.2	56	69	45.7	61 37.3	57	68	44.9	61 02.6	59	66	43.2	4
25	63 58.7	38	82	58.3	63 47.1	39	81	57.2	63 35.1	41	80	56.2	63 09.8	44	78	54.2	62 14.2	49	74	50.3	61 12.6	54	70	46.7	60 56.3	55	69	45.8	60 22.8	57	67	44.1	25
6	63 09.4	36	83	59.0	62 58.4	37	82	58.0	62 47.0	39	81	57.0	62 22.8	42	79	55.0	61 29.6	47	75	51.2	60 30.3	52	71	47.6	60 14.6	53	70	46.7	59 42.3	55	69	45.0	6
7	62 19.8	34	83	59.7	62 09.4	36	82	58.7	61 58.4	37	82	57.7	61 35.4	40	80	55.7	60 44.4	45	76	52.0	59 47.5	50	72	48.4	59 32.4	51	71	47.6	59 01.2	53	69	45.9	7
8	61 29.9	32	84	60.3	61 19.9	34	83	59.3	61 09.5	35	82	58.3	60 47.5	38	80	56.4	59 58.7	43	77	52.7	59 04.1	48	73	49.2	58 49.5	49	72	48.4	58 19.5	51	70	46.7	8
9	60 39.6	31	84	60.9	60 30.2	32	83	59.9	60 20.3	34	83	59.0	59 59.3	36	81	57.1	59 12.6	41	78	53.4	58 20.1	46	74	50.0	58 06.2	47	73	49.1	57 37.2	49	71	47.5	9
30	59 49.1	29	85	61.4	59 40.1	31	84	60.5	59 30.7	32	83	59.5	59 10.7	35	82	57.7	58 26.1	40	78	54.1	57 35.8	44	75	50.7	57 22.3	45	74	49.8	56 54.5	47	72	48.2	30
1	58 58.3	28	85	61.9	58 49.8	29	84	61.0	58 40.8	30	84	60.1	58 21.8	33	82	58.3	57 39.2	38	79	54.7	56 50.9	42	75	51.3	56 38.0	44	75	50.5	56 11.3	46	73	48.9	1
2	58 07.4	26	85	62.4	57 59.2	28	85	61.5	57 50.7	29	84	60.6	57 32.6	31	82	58.8	56 51.9	36	79	55.3	56 05.7	41	76	52.0	55 53.3	42	75	51.1	55 27.6	44	73	49.5	2
3	57 16.2	25	86	62.8	57 08.5	26	85	61.9	57 00.4	28	84	61.0	56 43.2	30	83	59.3	56 04.4	35	80	55.8	55 20.1	39	77	52.5	55 08.2	40	76	51.7	54 43.5	42	74	50.2	3
4	56 24.8	24	86	63.2	56 17.5	25	85	62.3	56 09.8	26	85	61.4	55 53.5	28	83	59.7	55 16.5	33	80	56.4	54 34.1	37	77	53.1	54 22.7	38	76	52.3	53 59.0	41	75	50.7	4
35	55 33.2	22	86	63.6	55 26.3	24	86	62.7	55 19.1	25	85	61.8	55 03.6	27	84	60.1	54 28.3	32	81	56.8	53 47.9	36	78	53.6	53 36.9	37	77	52.8	53 14.2	39	75	51.3	35
6	54 41.5	21	86	63.9	54 35.0	22	86	63.0	54 28.2	23	85	62.2	54 13.4	26	84	60.5	53 39.9	30	81	57.3	53 01.3	34	78	54.1	52 50.8	35	77	53.3	52 29.0	37	76	51.8	6
7	53 49.6	20	87	64.2	53 43.5	21	86	63.4	53 37.1	22	86	62.5	53 23.1	24	84	60.9	52 51.3	29	81	57.7	52 14.4	33	79	54.6	52 04.4	34	78	53.8	51 43.6	36	76	52.3	7
8	52 57.6	19	87	64.5	52 51.9	20	86	63.7	52 45.8	21	86	62.9	52 32.6	23	84	61.2	52 02.4	27	82	58.1	51 27.3	31	79	55.0	51 17.8	32	78	54.2	50 57.8	34	77	52.7	8
9	52 05.5	17	87	64.7	52 00.1	19	86	63.9	51 54.4	20	86	63.1	51 42.0	22	85	61.6	51 13.4	26	82	58.4	50 39.9	30	79	55.4	50 30.8	31	79	54.6	50 11.8	33	77	53.2	9
40	51 13.3	16	87	65.0	51 08.3	17	87	64.2	51 02.9	18	86	63.4	50 51.2	21	85	61.9	50 24.2	25	82	58.8	49 52.3	28	80	55.8	49 43.7	29	79	55.0	49 25.5	31	78	53.6	40
1	50 21.0	15	87	65.2	50 16.3	16	87	64.4	50 11.3	17	86	63.7	50 00.3	19	85	62.1	49 34.7	23	83	59.1	49 04.6	27	80	56.1	48 56.3	28	79	55.4	48 39.0	30	78	53.9	1
2	49 28.6	14	88	65.4	49 24.2	15	87	64.6	49 19.5	16	86	63.9	49 09.2	18	85	62.4	48 45.2	22	83	59.4	48 16.6	26	80	56.5	48 08.7	27	80	55.7	47 52.2	28	78	54.3	2
3	48 36.1	13	88	65.6	48 32.1	14	87	64.8	48 27.7	15	86	64.1	48 18.1	17	85	62.6	47 55.5	21	83	59.7	47 28.4	24	81	56.8	47 21.0	25	80	56.1	47 05.3	27	79	54.6	3
4	47 43.6	12	88	65.8	47 39.8	13	87	65.0	47 35.8	14	87	64.3	47 26.8	16	86	62.8	47 05.6	19	83	59.9	46 40.1	23	81	57.1	46 33.0	24	80	56.4	46 18.2	26	79	54.9	4
45	46 51.0	11	88	65.9	46 47.5	12	87	65.2	46 43.8	13	87	64.5	46 35.5	15	86	63.0	46 15.7	18	83	60.2	45 51.6	22	81	57.3	45 45.0	23	80	56.6	45 30.9	24	79	55.2	45
6	45 58.3	10	88	66.0	45 55.1	11	87	65.3	45 51.7	12	87	64.6	45 44.0	14	86	63.2	45 25.6	17	84	60.4	45 03.0	21	81	57.6	44 56.7	21	81	56.9	44 43.4	23	79	55.5	6
7	45 05.5	09	88	66.2	45 02.7	10	88	65.5	44 59.5	11	87	64.8	44 52.5	13	86	63.4	44 35.4	16	84	60.6	44 14.2	19	81	57.8	44 08.3	20	81	57.1	43 55.8	22	80	55.8	7
8	44 12.8	08	88	66.3	44 10.2	09	88	65.6	44 07.4	10	87	64.9	44 00.9	12	86	63.5	43 45.1	15	84	60.7	43 25.4	18	82	58.0	43 19.8	19	81	57.3	43 08.1	20	80	56.0	8
9	43 19.9	07	88	66.4	43 17.6	08	88	65.7	43 15.1	09	87	65.0	43 09.3	11	86	63.6	42 54.8	14	84	60.9	42 36.4	17	82	58.2	42 31.2	18	81	57.6	42 20.2	19	80	56.2	9
50	42 27.1	06	88	66.4	42 25.1	07	88	65.8	42 22.8	08	87	65.1	42 17.6	09	86	63.7	42 04.3	13	84	61.1	41 47.3	16	82	58.4	41 42.5	16	81	57.7	41 32.2	18	80	56.4	50
1	41 34.2	05	88	66.5	41 32.5	06	88	65.8	41 30.5	07	87	65.2	41 25.8	09	86	63.9	41 13.8	12	84	61.2	40 58.2	15	82	58.6	40 53.7	15	82	57.9	40 44.1	17	80	56.6	1
2	40 41.3	05	88	66.6	40 39.8	05	88	65.9	40 38.1	06	87	65.3	40 34.0	08	86	63.9	40 23.2	10	84	61.3	40 08.9	13	82	58.7	40 04.8	14	82	58.1	39 55.9	16	80	56.8	2
3	39 48.4	04	88	66.6	39 47.2	04	88	66.0	39 45.7	05	87	65.3	39 42.2	07	86	64.0	39 32.6	09	84	61.4	39 19.6	12	82	58.9	39 15.8	13	82	58.2	39 07.6	14	81	56.9	3
4	38 55.4	03	88	66.7	38 54.5	04	88	66.0	38 53.3	04	87	65.4	38 50.4	06	86	64.1	38 41.9	08	85	61.5	38 30.2	11	82	59.0	38 26.7	12	82	58.4	38 19.2	13	81	57.1	4
55	38 02.5	02	88	66.7	38 01.8	03	88	66.1	38 00.9	03	87	65.4	37 58.5	05	86	64.1	37 51.2	07	85	61.6	37 40.7	10	83	59.1	37 37.6	11	82	58.5	37 30.7	12	81	57.2	55
6	37 09.5	01	88	66.7	37 09.0	02	88	66.1	37 08.4	02	87	65.4	37 06.5	04	87	64.2	37 00.4	06	85	61.7	36 51.2	09	83	59.2	36 48.4	10	82	58.6	36 42.2	11	81	57.3	6
7	36 16.5	00	88	66.7	36 16.3	01	88	66.1	36 15.9	02	87	65.5	36 14.6	03	87	64.2	36 09.6	05	85	61.8	36 01.6	08	83	59.3	35 59.2	09	82	58.7	35 53.6	10	81	57.4	7
8	35 23.5	01	88	66.7	35 23.6	00	88	66.1	35 23.5	01	87	65.5	35 22.7	02	87	64.3	35 18.8	04	85	61.8	35 12.0	07	83	59.4	35 09.9	08	82	58.8	35 05.0	09	81	57.5	8
9	34 30.6	01	88	66.7	34 30.9	01	88	66.1	34 31.0	00	87	65.5	34 30.7	01	87	64.3	34 28.0	03	85	61.8	34 22.4	06	83	59.4	34 20.5	06	82	58.8	34 16.3	08	81	57.6	9
60	33 37.6	02	88	66.7	33 38.1	02	88	66.1	33 38.5	01	87	65.5	33 38.7	00	87	64.3	33 37.1	03	85	61.9	33 32.7	05	83	59.5	33 31.2	05	82	58.9	33 27.6	07	81	57.7	60
1	32 44.6	03	88	66.7	32 45.4	02	88	66.1	32 46.0	02	87	65.5	32 46.8	01	87	64.3	32 46.3	02	85	61.9	32 43.0	04	83	59.5	32 41.8	04	82	58.9	32 38.8	05	81	57.7	1
2	31 51.7	04	88	66.6	31 52.7	03	88	66.0	31 53.6	03	87	65.4	31 54.8	02	87	64.3	31 55.4	01	85	61.9	31 53.3	03	83	59.6	31 52.4	03	82	59.0	31 50.0	04	81	57.8	2
3	30 58.7	04	88	66.6	31 00.0	04	88	66.0	31 01.1	03	87	65.4	31 02.9	02	87	64.2	31 04.5	00	85	61.9	31 03.6	02	83	59.6	31 03.0	02	82	59.0	31 01.2	03	81	57.8	3
4	30 05.8	05	88	66.5	30 07.3	05	88	66.0	30 08.7	04	87	65.4	30 10.9	03	87	64.2	30 13.6	01	85	61.9	30 13.8	01	83	59.6	30 13.5	01	82	59.0	30 12.4	02	81	57.9	4
65	29 12.9	06	88	66.5	29 14.7	06	88	65.9	29 16.3	05	87	65.3	29 19.0	04	87	64.2	29 22.7	02	85	61.9	29 24.1	00	83	59.6	29 24.1	00	82	59.0	29 23.6	01	81	57.9	65
6	28 20.1	07	88	66.4	28 22.0	06	88	65.8	28 23.9	06	87	65.3	28 27.1	05	86	64.1	28 31.9	03	85	61.9	28 34.4	01	83	59.6	28 34.6	01	82	59.0	28 34.7	00	81	57.9	6
7	27 27.2	08	88	66.3	27 29.4	07	88	65.8	27 31.5	07	87	65.2	27 35.2	06	86	64.1	27 41.0	04	85	61.8	27 44.6	02	83	59.6	27 45.2	02	82	59.0	27 45.9	01	81	57.9	7
8	26 34.4	08	88	66.3	26 36.9	08	88	65.7	26 39.1	07	87	65.1	26 43.4	07	86	64.0	26 50.2	05	85	61.8	26 54.9	03	83	59.5	26 55.7	03	82	59.0	26 57.0	02	81	57.9	8
9	25 41.6	09	88	66.2	25 44.3	09	88	65.6	25 46.8	08	87	65.1	25 51.5	07	86	64.0	25 59.4	06	85	61.7	26 05.2	04	83	59.5	26 06.3	04	82	59.0	26 08.2	03	81	57.8	9
70	24 48.9	10	88	66.1	24 51.8	09	87	65.5	24 54.6	09	87	65.0	24 59.7	08	86	63.9	25 08.6	07	85	61.7	25 15.5	05	83	59.5	25 16.9	05	82	58.9	25 19.4	04	81	57.8	70
1	23 56.2	11	88	66.0	23 59.3	10	87	65.4	24 02.3	10	87	64.9	24 07.9	09	86	63.8	24 17.8	07	85	61.6	24 25.8	06	83	59.4	24 27.5	05	82	58.9	24 30.6	05	81	57.8	1
2	23 03.5	11	88	65.9	23 06.9	11	87	65.3	23 10.1	11	87	64.8	23 16.2	10	86	63.7	23 27.1	08	84	61.5	23 36.2	07	83	59.4	23 38.2	06	82	58.8	23 41.8	06	81	57.7	2
3	22 10.9	12	88	65.8	22 14.5	12	87	65.2	22 17.9	11	87	64.7	22 24.5	11	86	63.6	22 36.4	09	84	61.5	22 46.6	08	83	59.3	22 48.8	07	82	58.8	22 53.0	07	81	57.7	3
4	21 18.4	13	88	65.6	21 22.1	12	87	65.1	21 25.8	12	87	64.6	21 32.9	11	86	63.5	21 45.8	10	84	61.4	21 57.0	09	83	59.2	21 59.5	08	82	58.7	22 04.3	08	81	57.6	4
75	20 25.8	14	88	65.5	20 29.8	13	87	65.0	20 33.8	13	87	64.5	20 41.3	12	86	63.4	20 55.2	11	84	61.3	21 07.5	10	82	59.1	21 10.3	09	82	58.6	21 15.6	09	81	57.5	75
6	19 33.4	14	87	65.4	19 37.6	14	87	64.9	19 41.7	14	87	64.3	19 49.7	13	86	63.3	20 04.6	12	84	61.2	20 18.0	10	82	59.1	20 21.1	10	82	58.5	20 27.0	10	81	57.5	6
7	18 41.0	15	87	65.3	18 45.4	15	87	64.7	18 49.8	14	86	64.2	18 58.2	14	86	63.2	19 14.1	13	84	61.1	19 28.5	11	82	59.0	19 31.9	11	82	58.4	19 38.4	10	81	57.4	7
8	17 48.6	16	87	65.1	17 53.3	15	87	64.6	17 57.9	15	86	64.1	18 06.8	15	86	63.0	18 23.7	13	84	60.9	18 39.1	12	82	58.9	18 42.8	12	82	58.3	18 49.8	11	81	57.3	8
9	16 56.3	16	87	65.0	17 01.2	16	87	64.4	17 06.0	16	86	63.9	17 15.4	15	86	62.9	17 33.3	14	84	60.8	17 49.8	13	82	58.7	17 53.7	13	82	58.2	18 01.3	12	81	57.2	9
80	16 04.1	17	87	64.8	16 09.2	17	87	64.3	16 14.3	17	86	63.8	16 24.1	16	85	62.8	16 42.9	15	84	60.7	17 00.5	14	82	58.6	17 04.7	14	82	58.1	17 12.9	13	81	57.1	80
1	15 12.0	18	87	64.6	15 17.3	18	86	64.1	15 22.6	17	86	63.6	15 32.9	17	85	62.6	15 52.7	16	84	60.6	16 11.3	15	82	58.5	16 15.8	15	81	58.0	16 24.5	14	81	57.0	1
2	14 19.9	19	87	64.5	14 25.4	18	86	64.0	14 30.9	18	86	63.5	14 41.7	18	85	62.4	15 02.5	17	84	60.4	15 22.2	16	82	58.4	15 26.9	16	81	57.9	15 36.2	15	80	56.8	2
3	13 27.9	19	87	64.3	13 33.6	19	86	63.8	13 39.4	19	86	63.3	13 50.6	19	85	62.3	14 12.4	18	83	60.3	14 33.1	17	82	58.2	14 38.1	17	81	57.7	14 48.0	16	80	56.7	3
4	12 35.9	20	86	64.1	12 41.9	20	86	63.6	12 47.9	20	86	63.1	12 59.6	19	85	62.1	13 22.3	19	83	60.1	13 44.1	18	82	58.1	13 49.4	18	81	57.6	13 59.8	17	80	56.6	4
85	11 44.1	21	86	63.9	11 50.3	21	86	63.4	11 56.5	20	86	62.9	12 08.7	20	85	61.9	12 32.4	19	83	59.9	12 55.2	19	81	57.9	13 00.8	18	81	57.4	13 11.7	18	80	56.4	85
6	10 52.3	22	86	63.8	10 58.7	21	86	63.3	11 05.1	21	85	62.8	11 17.8	21	85	61.8	11 42.5	20	83	59.8	12 06.4	20	81	57.8	12 12.2	19	81	57.3	12 23.7	19	80	56.3	6
7	10 00.6	22	86	63.6	10 07.3	22	86	63.1	10 13.9	22	85	62.6	10 27.0	22	84	61.6	10 52.7	21	83	59.6	11 17.6	20	81	57.6	11 23.7	20	81	57.1	11 35.8	20	80	56.1	7
8	9 09.0	23	86	63.4	9 15.9	23	85	62.9	9 22.8	23	85	62.4	9 36.4	23	84	61.4	10 03.0	22	83	59.4	10 29.0	21	81	57.4	10 35.4	21	80	56.9	10 48.0	21	80	55.9	8
9	8 17.5	24	86	63.1	8 24.6	24	85	62.7	8 31.7	24	85	62.2	8 45.8	23	84	61.2	9 13.4	23	82	59.2	9 40.4	22	81	57.2	9 47.1	22	80	56.7	10 00.3	22	79	55.7	9
90	7 26.1	25	86	62.9	7 33.5	24	85	62.4	7 40.8	24	85	61.9	7 55.3	24	84	61.0	8 23.9	24	82	59.0	8 52.0	23	81	57.0	8 58.9	23	80	56.5	9 12.6	23	79	55.6	90

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	46 00.0	1.0 01	180.0	45 30.0	1.0 01	180.0	45 00.0	1.0 01	180.0	44 00.0	1.0 01	180.0	42 00.0	1.0 01	180.0	40 00.0	1.0 01	180.0	39 30.0	1.0 01	180.0	38 30.0	1.0 01	180.0	00
1	45 59.4	1.0 03	178.7	45 29.4	1.0 03	178.7	44 59.4	1.0 03	178.8	43 59.4	1.0 03	178.8	41 59.4	1.0 03	178.9	39 59.5	1.0 03	178.9	39 29.5	1.0 03	178.9	38 29.5	1.0 03	179.0	1
2	45 57.4	1.0 05	177.5	45 27.5	1.0 05	177.5	44 57.5	1.0 05	177.5	43 57.6	1.0 05	177.6	41 57.7	1.0 05	177.7	39 57.8	1.0 05	177.8	39 27.9	1.0 04	177.9	38 27.9	1.0 04	177.9	2
3	45 54.2	1.0 08	176.2	45 24.3	1.0 07	176.2	44 54.4	1.0 07	176.3	43 54.6	1.0 07	176.4	41 54.8	1.0 07	176.6	39 55.1	1.0 06	176.8	39 25.2	1.0 06	176.8	38 25.3	1.0 06	176.9	3
4	45 49.8	1.0 10	174.9	45 19.9	1.0 09	175.0	44 50.1	1.0 09	175.1	43 50.3	1.0 09	175.2	41 50.8	1.0 09	175.4	39 51.3	1.0 08	175.7	39 21.4	1.0 08	175.7	38 21.6	1.0 08	175.8	4
05	45 44.1	99 12	173.7	45 14.3	99 11	173.8	44 44.5	99 11	173.8	43 44.9	99 11	174.0	41 45.7	99 10	174.3	39 46.4	99 10	174.6	39 16.6	99 10	174.7	38 16.9	99 10	174.8	05
6	45 37.1	99 14	172.4	45 07.4	99 14	172.5	44 37.7	99 13	172.6	43 38.3	99 13	172.8	41 39.4	99 12	173.2	39 40.5	99 12	173.5	39 10.7	99 12	173.6	38 11.2	99 11	173.8	6
7	45 28.8	99 16	171.2	44 59.3	99 16	171.3	44 29.7	99 15	171.4	43 30.5	99 15	171.6	41 32.0	99 14	172.1	39 33.4	99 14	172.5	39 03.8	99 13	172.6	38 04.5	99 13	172.8	7
8	45 19.4	98 18	169.9	44 49.9	98 18	170.1	44 20.4	98 17	170.2	43 21.5	98 17	170.5	41 23.5	98 16	170.9	39 25.3	98 15	171.4	38 55.8	99 15	171.5	37 56.7	99 15	171.7	8
9	45 08.7	98 20	168.7	44 39.4	98 20	168.9	44 10.0	98 19	169.0	43 11.3	98 19	169.3	41 13.8	98 18	169.8	39 16.2	98 17	170.4	38 46.8	98 17	170.5	37 47.9	98 16	170.7	9
10	44 56.8	97 22	167.5	44 27.6	97 22	167.7	43 58.5	97 21	167.8	43 00.1	97 21	168.1	41 03.1	98 20	168.7	39 06.0	98 19	169.3	38 36.7	98 18	169.4	37 38.1	98 18	169.7	10
1	44 43.7	97 24	166.3	44 14.7	97 23	166.5	43 45.7	97 23	166.6	42 47.6	97 23	167.0	40 51.3	97 21	167.6	38 54.8	97 20	168.3	38 25.6	97 20	168.4	37 27.3	97 20	168.7	1
2	44 29.4	96 26	165.1	44 00.6	96 25	165.3	43 31.8	96 25	165.5	42 34.1	96 24	165.8	40 38.5	96 23	166.6	38 42.6	97 22	167.2	38 13.6	97 22	167.4	37 15.5	97 21	167.7	2
3	44 14.0	95 28	163.9	43 45.4	95 27	164.1	43 16.8	95 27	164.3	42 19.4	96 26	164.7	40 24.5	96 25	165.5	38 29.3	96 24	166.2	38 00.5	96 23	166.4	37 02.8	96 23	166.7	3
4	43 57.5	95 30	162.7	43 29.1	95 29	163.0	43 00.6	95 29	163.2	42 03.7	95 28	163.6	40 09.6	95 27	164.4	38 15.1	96 25	165.2	37 46.4	96 25	165.4	36 49.1	96 24	165.8	4
15	43 39.8	94 31	161.6	43 11.6	94 31	161.8	42 43.4	94 30	162.1	41 46.9	94 30	162.5	39 53.6	95 28	163.4	37 59.9	95 27	164.2	37 31.4	95 27	164.4	36 34.4	95 26	164.8	15
6	43 21.0	93 33	160.4	42 53.1	93 33	160.7	42 25.1	93 32	160.9	41 29.0	94 31	161.4	39 36.6	94 30	162.3	37 43.7	94 29	163.2	37 15.4	94 28	163.4	36 18.8	94 28	163.8	6
7	43 01.2	92 35	159.3	42 33.5	92 34	159.6	42 05.7	93 34	159.8	41 10.1	93 33	160.3	39 18.6	93 32	161.3	37 26.6	94 30	162.2	36 58.5	94 30	162.4	36 02.3	94 29	162.9	7
8	42 40.3	91 36	158.2	42 12.9	92 36	158.5	41 45.4	92 36	158.8	40 50.2	92 35	159.3	38 59.6	92 33	160.3	37 08.5	93 32	161.3	36 40.6	93 31	161.5	35 44.8	93 31	161.9	8
9	42 18.4	91 38	157.1	41 51.2	91 38	157.4	41 24.0	91 37	157.7	40 29.3	91 36	158.2	38 39.7	92 35	159.3	36 49.5	92 33	160.3	36 21.9	92 33	160.5	35 26.5	92 32	161.0	9
20	41 55.5	90 40	156.1	41 28.6	90 39	156.3	41 01.6	90 39	156.6	40 07.5	90 38	157.2	38 18.8	91 36	158.3	36 29.6	91 35	159.3	36 02.2	91 34	159.6	35 07.3	92 33	160.1	20
1	41 31.6	89 42	155.0	41 04.9	89 41	155.3	40 38.2	89 40	155.6	39 44.7	89 40	156.2	37 57.1	90 38	157.3	36 08.8	90 36	158.4	35 41.7	91 36	158.7	34 47.3	91 35	159.2	1
2	41 06.7	88 43	154.0	40 40.4	88 42	154.3	40 13.9	88 42	154.6	39 20.9	88 41	155.2	37 34.4	89 39	156.4	35 47.2	90 38	157.5	35 20.3	90 37	157.8	34 26.3	90 36	158.3	2
3	40 41.0	87 44	152.9	40 14.9	87 44	153.3	39 48.7	87 44	153.6	38 56.3	88 43	154.2	37 10.8	88 41	155.4	35 24.7	89 39	156.6	34 58.0	89 38	156.9	34 04.6	89 38	157.4	3
4	40 14.3	86 46	151.9	39 48.5	86 45	152.3	39 22.6	86 45	152.6	38 30.8	87 44	153.2	36 46.4	87 42	154.5	35 01.3	88 40	155.7	34 34.9	88 40	156.0	33 42.1	88 39	156.5	4
25	39 46.7	85 47	151.0	39 21.2	85 47	151.3	38 55.6	85 46	151.6	38 04.4	86 45	152.3	36 21.2	86 43	153.6	34 37.2	87 42	154.8	34 11.1	87 41	155.1	33 18.7	87 40	155.7	25
6	39 18.3	84 49	150.0	38 53.1	84 48	150.3	38 27.8	84 48	150.7	37 37.1	85 47	151.4	35 55.1	85 45	152.7	34 12.2	86 43	153.9	33 46.4	86 42	154.2	32 54.6	86 42	154.8	6
7	38 49.0	83 50	149.0	38 24.1	83 50	149.4	37 59.2	83 49	149.7	37 09.1	84 48	150.4	35 28.2	84 46	151.8	33 46.5	85 44	153.1	33 20.9	85 44	153.4	32 29.7	86 43	154.0	7
8	38 18.9	82 52	148.1	37 54.4	82 51	148.5	37 29.7	82 50	148.8	36 40.2	83 49	149.5	35 00.6	83 47	150.9	33 20.0	84 45	152.2	32 54.7	84 45	152.6	32 04.0	85 44	153.2	8
9	37 48.1	81 53	147.2	37 23.8	81 52	147.6	36 59.5	81 52	147.9	36 10.6	82 51	148.7	34 32.1	82 49	150.1	32 52.8	83 47	151.4	32 27.8	83 46	151.7	31 37.7	84 45	152.4	9
30	37 16.5	80 54	146.3	36 52.5	80 53	146.7	36 28.5	80 53	147.1	35 40.2	81 52	147.8	34 03.0	81 50	149.2	32 24.8	82 48	150.6	32 00.1	82 47	150.9	31 10.6	83 46	151.6	30
1	36 44.1	79 55	145.4	36 20.5	79 55	145.8	35 56.8	79 54	146.2	35 09.1	80 53	146.9	33 33.1	80 51	148.4	31 56.1	81 49	149.8	31 31.7	81 48	150.1	30 42.8	82 47	150.8	1
2	36 11.0	78 56	144.6	35 47.7	78 56	145.0	35 24.3	78 55	145.3	34 37.3	79 54	146.1	33 02.5	79 52	147.6	31 26.8	80 50	149.0	31 02.7	80 50	149.4	30 14.3	81 49	150.0	2
3	35 37.2	76 58	143.7	35 14.2	77 57	144.1	34 51.2	77 56	144.5	34 04.8	77 55	145.3	32 31.3	78 53	146.8	30 56.7	79 51	148.2	30 32.9	79 51	148.6	29 45.2	80 50	149.3	3
4	35 02.8	75 58	142.9	34 40.1	76 58	143.3	34 17.4	76 58	143.7	33 31.6	76 56	144.5	31 59.4	77 54	146.0	30 26.0	78 52	147.5	30 02.5	78 52	147.8	29 15.4	79 51	148.5	4
35	34 27.7	74 60	142.1	34 05.3	75 59	142.5	33 42.9	75 58	142.9	32 57.8	75 57	143.7	31 26.8	76 55	145.2	29 54.7	77 53	146.7	29 31.5	77 53	147.1	28 45.0	78 52	147.8	35
6	33 51.9	73 61	141.3	33 29.9	74 60	141.7	33 07.8	74 60	142.1	32 23.4	74 58	142.9	30 53.6	75 56	144.5	29 22.8	76 54	146.0	28 59.9	76 54	146.4	28 14.0	77 53	147.1	6
7	33 15.6	72 62	140.5	32 53.9	72 61	141.0	32 32.1	73 60	141.4	31 48.3	73 59	142.2	30 19.8	74 57	143.8	28 50.2	75 55	145.3	28 27.6	75 55	145.7	27 42.3	76 54	146.4	7
8	32 38.6	71 62	139.8	32 17.2	71 62	140.2	31 55.8	72 62	140.6	31 12.6	72 60	141.4	29 45.4	73 58	143.0	28 17.1	74 56	144.6	27 54.8	74 56	145.0	27 10.1	75 55	145.7	8
9	32 01.1	70 64	139.1	31 40.1	70 63	139.5	31 18.9	71 62	139.9	30 36.4	71 61	140.7	29 10.4	72 59	142.3	27 43.4	73 57	143.9	27 21.4	73 57	144.3	26 37.4	74 56	145.0	9
40	31 23.0	69 64	138.3	31 02.3	69 64	138.8	30 41.5	70 63	139.2	29 59.6	70 62	140.0	28 34.9	71 60	141.6	27 09.1	72 58	143.2	26 47.5	72 58	143.6	26 04.0	73 56	144.4	40
1	30 44.4	68 65	137.6	30 24.0	68 65	138.1	30 03.5	68 64	138.5	29 22.2	69 63	139.3	27 58.8	70 61	140.9	26 34.3	71 59	142.5	26 13.0	71 58	142.9	25 30.2	72 57	143.7	1
2	30 05.3	67 66	136.9	29 45.2	67 66	137.4	29 25.0	67 65	137.8	28 44.4	68 64	138.6	27 22.2	69 62	140.3	25 58.9	70 60	141.9	25 38.0	70 59	142.3	24 55.8	70 58	143.1	2
3	29 25.7	66 67	136.3	29 05.9	66 66	136.7	28 46.0	66 66	137.1	28 06.0	67 65	138.0	26 45.1	68 63	139.6	25 23.1	69 61	141.3	25 02.4	69 60	141.7	24 20.9	69 59	142.5	3
4	28 45.6	65 68	135.6	28 26.1	65 67	136.0	28 06.5	65 67	136.5	27 27.2	66 66	137.3	26 07.5	67 63	139.0	24 46.8	68 61	140.6	24 26.4	68 61	141.0	23 45.5	68 60	141.8	4
45	28 05.0	64 68	135.0	27 45.8	64 68	135.4	27 26.6	64 67	135.8	26 47.8	65 66	136.7	25 29.4	66 64	138.4	24 09.9	67 62	140.0	23 49.9	67 62	140.4	23 09.6	67 61	141.2	45
6	27 23.9	63 69	134.3	27 05.1	63 69	134.8	26 46.1	63 68	135.2	26 08.0	64 67	136.1	24 50.9	65 65	137.8	23 32.6	66 63	139.4	23 12.9	66 62	139.8	22 33.3	66 61	140.6	6
7	26 42.5	62 70	133.7	26 23.9	62 69	134.1	26 05.3	62 69	134.6	25 27.8	63 68	135.5	24 11.9	64 66	137.2	22 54.9	65 64	138.8	22 35.5	65 63	139.2	21 56.5	65 62	140.1	7
8	26 00.6	61 70	133.1	25 42.3	61 70	133.5	25 24.0	61 70	134.0	24 47.1	62 68	134.9	23 32.5	63 66	136.6	22 16.7	64 64	138.3	21 57.6	64 64	138.7	21 19.2	64 63	139.5	8
9	25 18.2	60 71	132.5	25 00.3	60 71	133.0	24 42.3	60 70	133.4	24 06.0	61 69	134.3	22 52.6	62 67	136.0	21 38.1	63 65	137.7	21 19.3	63 65	138.1	20 41.6	63 63	138.9	9
50	24 35.5	59 72	131.9	24 17.9	59 71	132.4	24 00.2	59 71	132.8	23 24.5	60 70	133.7	22 12.3	61 68	135.4	20 59.1	61 66	137.1	20 40.6	62 65	137.6	20 03.5	62 64	138.4	50
1	23 52.4	58 72	131.4	23 35.1	58 72	131.8	23 17.7	58 72	132.3	22 42.6	59 70	133.1	21 31.7	60 68	134.9	20 19.6	60 66	136.6	20 01.5	61 66	137.0	19 25.0	61 65	137.9	1
2	23 09.0	57 73	130.8	22 51.9	57 73	131.3	22 34.8	57 72	131.7	22 00.4	58 71	132.6	20 50.6	59 69	134.4	19 39.8	59 67	136.1	19 22.0	60 66	136.5	18 46.1	60 65	137.3	2
3	22 25.2	56 74	130.3	22 08.4	56 73	130.7	21 51.6	56 73	131.2	21 17.7	57 72	132.1	20 09.2	58 70	133.8	18 59.6	58 68	135.6	18 42.1	59 67	136.0	18 06.8	59 66	136.8	3
4	21 41.0	55 74	129.8	21 24.5	55 74	130.2	21 08.0	55 73	130.7	20 34.7	56 72	131.5	19 27.4	57 70	133.3	18 19.1	57 68	135.0	18 01.8	58 68	135.5	17 27.2	58 67	136.3	4
55	20 56.5	54 75	129.2	20 40.3	54 74	129.7	20 24.1	54 74	130.1	19 51.4	55 73	131.0	18 45.3	56 71	132.8	17 38.1	56 69	134.6	17 21.2	57 68	135.0	16 47.2	57 67	135.8	55
6	20 11.7	53 75	128.7	19 55.8	53 75	129.2	19 39.8	53 74	129.6	19 07.7	54 73	130.5	18 02.8	55 71	132.3	16 56.9	55 69	134.1	16 40.2	55 69	134.5	16 06.8	56 68	135.4	6
7	19 26.5	52 76	128.3	19 10.9	52 75	128.7	18 55.3	52 75	129.2	18 23.8	53 74	130.1	17 20.0	54 72	131.8	16 15.3	54 70	133.6	15 58.9	54 69	134.0	15 26.2	55 68	134.9	7
8	18 41.1	51 76	127.8	18 25.8	51 76	128.2	18 10.4	51 75	128.7	17 39.5	52 74	129.6	16 36.8	53 72	131.4	15 33.3	53 70	133.1	15 17.3	53 70	133.6	14 45.1	54 69	134.4	8
9	17 55.4	50 77	127.3	17 40.3	50 76	127.8	17 25.2	50 76	128.2	16 54.8	51 75	129.1	15 53.4	52 73	130.9	14 51.1	52 71	132.7	14 35.4	52 70	133.1	14 03.8	53 69	134.0	9
60	17 09.3	49 77	126.8	16 54.6	49 77	127.3	16 39.8	49 76	127.8	16 10.0	50 75	128.7	15 09.7	51 73	130.5	14 08.5	51 71	132.2	13 53.1	51 71	132.7	13 22.2	52 70	133.6	60
1	16 23.0	48 78	126.4	16 08.6	48 77	126.9	15 54.0	49 77	127.3	15 24.8	49 76	128.2	14 25.6	50 74	130.0	13 25.7	50 72	131.8	13 10.6	50 71	132.2	12 40.2	51 70	133.1	1
2	15 36.5	47 78	126.0	15 22.3	47 78	126.4	15 08.0	48 77	126.9	14 39.3	48 76	127.8	13 41.3	49 74	129.6	12 42.5	49 72	131.4	12 27.7	49 72	131.8	11 58.0	50 71	132.7	2
3	14 49.7	46 78	125.5	14 35.7	47 78	126.0	14 21.7	47 78	126.4	13 53.6	47 77	127.4	12 56.7	48 75	129.2	11 59.1	48 73	131.0	11 44.6	48 72	131.4	11 15.5	49 71	132.3	3
4	14 02.6	45 79	125.1	13 48.9	46 78	125.6	13 35.2	46 78	126.0	13 07.6	46 77	126.9	12 11.9	47 75	128.8	11 15.4	47 73	130.6	11 01.2	47 73	131.0	10 32.7	48 72	131.9	4
65	13 15.3	45 79	124.7	13 01.9	45 79	125.2	12 48.5	45 78	125.6	12 21.4	45 77	126.5	11 26.8	46 76	128.4	10 31.5	46 74	130.2	10 17.6	46 73	130.6	9 49.6	47 72	131.5	65
6	12 27.8	44 80	124.3	12 14.6	44 79	124.8	12 01.5	44 79	125.2	11 35.0	44 78	126.1	10 41.4	45 76	128.0	9 47.3	45 74	129.8	9 33.6	45 74	130.2	9 06.3	46 73	131.1	6
7	11 40.0	43 80	123.9	11 27.2	43 80	124.4	11 14.2	43 79	124.8	10 48.3	43 78	125.8	9 55.8	44 76	127.6	9 02.8	44 74	129.4	8 49.5	45 74	129.9	8 22.7	45 73	130.8	7
8	10 52.1	42 80	123.5	10 39.4	42 80	124.0	10 26.8	42 80	124.5	10 01.3	43 79	125.4	9 10.0	43 77	127.2	8 18.1	43 75	129.0	8 05.1	44 74	129.5	7 38.9	44 73	130.4	8
9	10 03.9	41 81	123.2	9 51.5	41 80	123.6	9 39.1	41 80	124.1	9 14.2	42 79	125.0	8 24.0	42 77	126.8	7 33.2	42 75	128.7	7 20.5	43 75	129.1	6 54.9	43 74	130.0	9
70	9 15.5	40 81	122.8	9 03.4	40 81	123.3	8 51.2	41 80	123.7	8 26.9	41 79	124.6	7 37.7	41 77	126.5	6 48.1	42 76	128.3	6 35.6	42 75	128.8	6 10.6	42 74	129.7	70
1	8 26.9	39 81	122.4	8 15.1	40 81	122.9	8 03.2	40 80	123.4	7 39.3	40 80	124.3	6 51.2	40 78	126.1	6 02.7	41 76	128.0	5 50.5	41 75	128.4	5 26.1	41 74	129.4	1
2	7 38.1	39 82	122.1	7 26.5	39 81	122.6	7 14.9	39 81	123.0	6 51.6	39 80	123.9	6 04.5	39 78	125.8	5 17.2	40 76	127.6	5 05.3	40 76	128.1				2
3	6 49.2	38 82	121.7	6 37.8	38 82	122.2	6 26.4	38 81	122.7	6 03.6	38 80	123.6	5 17.7	38 78	125.5										3
4	6 00.0	37 82	121.4	5 48.9	37 82	121.9	5 37.8	37 81	122.3	5 15.5	37 80	123.3													4
75	5 10.7	36 82	121.1																						75

DECLINATION SAME NAME AS LATITUDE

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	6 34.8	25 85	62.7	6 42.4	25 85	62.2	6 49.9	25 84	61.7	7 04.9	25 84	60.8	7 34.6	24 82	58.8	8 03.7	24 80	56.8	8 10.8	24 80	56.4	8 25.1	24 79	55.4	91
2	5 43.6	26 85	62.5	5 51.4	26 85	62.0	5 59.2	26 84	61.5	6 14.6	26 84	60.5	6 45.3	25 82	58.6	7 15.4	25 80	56.6	7 22.9	25 80	56.2	7 37.7	25 79	55.2	2
3				5 00.5	27 85	61.8	5 08.5	27 84	61.3	5 24.5	27 84	60.3	5 56.1	26 82	58.4	6 27.3	26 80	56.4	6 35.0	26 80	55.9	6 50.4	26 79	55.0	3
4													5 07.1	27 82	58.1	5 39.3	27 80	56.2	5 47.3	27 79	55.7	6 03.3	26 78	54.8	4
95																						5 16.2	27 78	54.5	95

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	70 00.0	1.0 02	00.0	69 00.0	1.0 02	00.0	67 30.0	1.0 02	00.0	66 00.0	1.0 02	00.0	64 00.0	1.0 01	00.0	63 30.0	1.0 01	00.0	63 00.0	1.0 01	00.0	61 00.0	1.0 01	00.0	00
1	69 58.8	1.0 06	02.4	68 58.9	1.0 06	02.2	67 29.0	1.0 06	02.0	65 59.1	1.0 06	01.9	63 59.1	1.0 04	01.7	63 29.2	1.0 04	01.7	62 59.2	1.0 04	01.6	60 59.3	1.0 04	01.5	1
2	69 55.2	1.0 10	04.7	68 55.5	1.0 09	04.4	67 25.9	1.0 09	04.1	65 56.2	1.0 08	03.8	63 56.6	1.0 07	03.4	63 26.7	1.0 07	03.3	62 56.8	1.0 07	03.2	60 57.1	1.0 06	02.9	2
3	69 49.3	99 14	07.1	68 49.9	99 13	06.6	67 20.8	99 12	06.1	65 51.5	99 11	05.6	63 52.3	99 10	05.1	63 22.5	99 10	04.9	62 52.7	99 09	04.8	60 53.4	99 08	04.4	3
4	69 41.1	98 18	09.4	68 42.2	98 17	08.8	67 13.6	98 15	08.1	65 44.9	99 14	07.5	63 46.4	99 13	06.7	63 16.7	99 12	06.6	62 47.1	99 12	06.4	60 48.3	99 11	05.8	4
05	69 30.6	97 21	11.6	68 32.3	97 20	11.0	67 04.5	98 18	10.1	65 36.5	98 17	09.3	63 38.8	98 15	08.4	63 09.3	98 15	08.2	62 39.9	98 15	08.0	60 41.7	99 13	07.2	05
6	69 17.9	96 25	13.8	68 20.3	96 23	13.1	66 53.4	97 22	12.0	65 26.3	97 20	11.1	63 29.6	97 18	10.0	63 00.3	98 18	09.8	62 31.1	98 17	09.5	60 33.8	98 16	08.6	6
7	69 03.0	94 28	16.0	68 06.2	95 27	15.1	66 40.5	96 25	13.9	65 14.3	96 23	12.9	63 18.7	97 21	11.6	62 49.8	97 20	11.3	62 20.8	97 20	11.1	60 24.4	97 18	10.0	7
8	68 46.1	93 32	18.1	67 50.2	94 30	17.1	66 25.7	94 28	15.8	65 00.6	95 26	14.6	63 06.3	96 23	13.2	62 37.7	96 23	12.9	62 08.9	96 22	12.6	60 13.7	96 20	11.4	8
9	68 27.2	91 35	20.2	67 32.2	92 33	19.1	66 09.1	93 31	17.6	64 45.2	94 28	16.3	62 52.4	94 26	14.8	62 24.0	95 25	14.4	61 55.6	95 25	14.1	60 01.6	95 22	12.8	9
10	68 06.4	89 38	22.1	67 12.5	90 36	21.0	65 50.8	91 33	19.4	64 28.2	92 31	18.0	62 36.9	93 28	16.3	62 09.0	93 28	15.9	61 40.9	94 27	15.5	59 48.1	94 26	14.1	10
1	67 43.8	88 41	24.0	66 51.0	88 39	22.8	65 30.8	90 36	21.1	64 09.6	91 34	19.6	62 20.0	92 30	17.8	61 52.4	92 30	17.4	61 24.8	92 29	17.0	59 33.4	93 27	15.4	1
2	67 19.4	86 43	25.9	66 27.8	87 41	24.6	65 09.2	88 38	22.8	63 49.5	89 36	21.2	62 01.7	90 33	19.2	61 34.5	91 32	18.8	61 07.3	91 31	18.4	59 17.4	92 29	16.7	2
3	66 53.5	83 46	27.6	66 03.0	85 44	26.3	64 46.2	86 41	24.4	63 28.0	88 38	22.7	61 42.1	89 35	20.6	61 15.3	89 34	20.2	60 48.5	90 33	19.7	59 00.2	91 31	18.0	3
4	66 26.0	81 48	29.3	65 36.8	83 46	27.9	64 21.6	84 43	25.9	63 05.0	86 40	24.2	61 21.1	87 37	22.0	60 54.8	88 36	21.5	60 28.4	88 36	21.0	58 41.8	89 33	19.2	4
15	65 57.0	79 50	30.9	65 09.1	81 48	29.5	63 55.7	82 45	27.4	62 40.8	84 43	25.6	60 58.8	86 39	23.4	60 33.0	86 38	22.8	60 07.1	87 37	22.3	58 22.2	88 34	20.4	15
6	65 26.7	77 53	32.5	64 40.1	79 50	31.0	63 28.5	80 47	28.9	62 15.2	82 45	27.0	60 35.4	84 41	24.7	60 10.0	85 40	24.1	59 44.6	85 39	23.6	58 01.6	87 36	21.6	6
7	64 55.2	75 55	33.9	64 09.8	76 52	32.4	63 00.0	79 49	30.3	61 48.5	80 47	28.3	60 10.7	82 43	25.9	59 45.9	83 42	25.3	59 20.9	83 41	24.8	57 39.8	85 38	22.7	7
8	64 22.4	73 56	35.3	63 38.3	74 54	33.8	62 30.4	77 51	31.6	61 20.6	79 48	29.6	59 45.0	81 45	27.1	59 20.7	81 44	26.5	58 56.2	82 43	26.0	57 17.0	84 40	23.8	8
9	63 48.5	71 58	36.6	63 05.7	72 56	35.1	61 59.6	75 53	32.9	60 51.6	77 50	30.8	59 18.2	79 46	28.3	58 54.4	80 46	27.7	58 30.4	80 45	27.1	56 53.2	82 41	24.9	9
20	63 13.6	68 60	37.9	62 32.0	70 58	36.3	61 27.8	73 55	34.1	60 21.5	75 52	32.0	58 50.3	77 48	29.4	58 27.1	78 47	28.8	58 03.6	78 46	28.2	56 28.4	80 43	26.0	20
1	62 37.7	66 61	39.1	61 57.4	68 59	37.5	60 55.0	71 56	35.2	59 50.5	73 53	33.1	58 21.5	75 50	30.5	57 58.8	76 49	29.9	57 35.9	77 48	29.3	56 02.7	79 44	27.0	1
2	62 00.9	64 63	40.2	61 21.8	66 61	38.6	60 21.3	69 58	36.3	59 18.5	71 55	34.2	57 51.8	74 51	31.6	57 29.6	74 50	30.9	57 07.2	75 49	30.3	55 36.1	77 46	28.0	2
3	61 23.2	62 64	41.3	60 45.4	64 62	39.7	59 46.6	67 59	37.4	58 45.6	69 56	35.2	57 21.2	72 52	32.6	56 59.5	72 52	31.9	56 37.7	73 51	31.3	55 08.6	75 47	28.9	3
4	60 44.7	60 65	42.3	60 08.2	62 63	40.7	59 11.2	65 60	38.4	58 11.9	67 57	36.2	56 49.7	70 54	33.5	56 28.6	71 53	32.9	56 07.3	71 52	32.3	54 40.3	74 48	29.8	4
25	60 05.5	58 66	43.3	59 30.2	60 65	41.7	58 35.0	63 62	39.4	57 37.4	65 59	37.2	56 17.4	68 55	34.5	55 56.9	69 54	33.8	55 36.2	69 53	33.2	54 11.2	72 50	30.7	25
6	59 25.7	56 68	44.2	58 51.5	58 66	42.6	57 58.0	61 63	40.3	57 02.2	63 60	38.1	55 44.4	66 56	35.4	55 24.4	67 55	34.7	55 04.2	68 54	34.1	53 41.4	70 51	31.6	6
7	58 45.1	54 69	45.1	58 12.1	56 67	43.5	57 20.4	59 64	41.2	56 26.3	61 61	39.0	55 10.7	64 57	36.2	54 51.2	65 56	35.6	54 31.6	66 56	34.9	53 10.9	69 52	32.4	7
8	58 04.0	52 70	45.9	57 32.1	54 68	44.3	56 42.1	57 65	42.0	55 49.7	60 62	39.8	54 36.3	63 58	37.0	54 17.4	63 58	36.4	53 58.2	64 57	35.7	52 39.6	67 53	33.2	8
9	57 22.3	50 70	46.7	56 51.5	52 69	45.1	56 03.2	55 66	42.8	55 12.4	58 63	40.6	54 01.2	61 59	37.8	53 42.9	62 59	37.2	53 24.3	62 58	36.5	52 07.8	65 54	33.9	9
30	56 40.1	48 71	47.4	56 10.4	50 69	45.8	55 23.7	53 67	43.6	54 34.6	56 64	41.4	53 25.6	59 60	38.6	53 07.7	60 60	37.9	52 49.6	61 59	37.2	51 35.2	63 55	34.7	30
1	55 57.4	47 72	48.1	55 28.8	49 70	46.5	54 43.7	51 68	44.3	53 56.2	54 65	42.1	52 49.3	57 61	39.3	52 32.0	58 60	38.6	52 14.5	59 60	38.0	51 02.1	62 56	35.4	1
2	55 14.3	45 73	48.8	54 46.7	47 71	47.2	54 03.2	50 68	44.9	53 17.3	52 66	42.8	52 12.5	56 62	40.0	51 55.7	56 61	39.3	51 38.7	57 60	38.6	50 28.4	60 57	36.1	2
3	54 30.7	43 73	49.4	54 04.2	45 72	47.8	53 22.2	48 69	45.6	52 37.9	51 66	43.4	51 35.2	54 63	40.6	51 18.9	55 62	40.0	51 02.4	55 61	39.3	49 54.2	58 58	36.7	3
4	53 46.7	42 74	50.0	53 21.2	43 72	48.4	52 40.8	46 70	46.2	51 58.0	49 67	44.0	50 57.4	52 64	41.3	50 41.6	53 63	40.6	50 25.6	54 62	39.9	49 19.5	57 59	37.3	4
35	53 02.4	40 74	50.5	52 37.9	42 73	49.0	51 59.0	45 70	46.8	51 17.7	47 68	44.6	50 19.1	50 65	41.9	50 03.9	51 64	41.2	49 48.4	52 63	40.5	48 44.2	55 60	37.9	35
6	52 17.7	38 75	51.0	51 54.2	40 73	49.5	51 16.8	43 71	47.3	50 37.0	46 69	45.2	49 40.4	49 65	42.5	49 25.6	50 64	41.8	49 10.7	50 64	41.1	48 08.5	53 60	38.5	6
7	51 32.7	37 76	51.5	51 10.1	39 74	50.0	50 34.2	41 72	47.9	49 55.8	44 69	45.7	49 01.2	47 66	43.0	48 47.0	48 65	42.3	48 32.5	49 64	41.7	47 32.4	52 61	39.1	7
8	50 47.4	35 76	52.0	50 25.7	37 74	50.5	49 51.2	40 72	48.4	49 14.4	42 70	46.2	48 21.7	45 66	43.5	48 08.0	46 66	42.9	47 54.0	47 65	42.2	46 55.8	50 62	39.6	8
9	50 01.8	34 76	52.4	49 41.1	35 75	51.0	49 08.0	38 73	48.8	48 32.5	41 70	46.7	47 41.8	44 67	44.0	47 28.6	45 66	43.4	47 15.1	45 65	42.7	46 18.9	48 62	40.1	9
40	49 16.0	32 77	52.8	48 56.1	34 75	51.4	48 24.4	37 73	49.3	47 50.4	39 71	47.2	47 01.6	42 68	44.5	46 48.8	43 67	43.8	46 35.8	44 66	43.2	45 41.5	47 63	40.6	40
1	48 29.9	31 77	53.2	48 10.9	32 76	51.8	47 40.6	35 74	49.7	47 07.9	38 71	47.6	46 21.0	41 68	44.9	46 08.7	41 67	44.3	45 56.2	42 67	43.6	45 03.8	45 63	41.1	1
2	47 43.6	29 78	53.6	47 25.5	31 76	52.2	46 56.5	34 74	50.1	46 25.2	36 72	48.0	45 40.1	39 69	45.4	45 28.3	40 68	44.7	45 16.2	41 67	44.1	44 25.8	43 64	41.5	2
3	46 57.1	28 78	53.9	46 39.8	30 76	52.5	46 12.1	32 74	50.5	45 42.1	34 72	48.4	44 58.9	38 69	45.8	44 47.5	38 68	45.1	44 35.9	39 68	44.5	43 47.4	42 64	41.9	3
4	46 10.4	26 78	54.2	45 54.0	28 77	52.9	45 27.5	31 75	50.8	44 58.9	33 73	48.8	44 17.5	36 70	46.2	44 06.5	37 69	45.5	43 55.4	37 68	44.9	43 08.7	40 65	42.3	4
45	45 23.5	25 78	54.5	45 07.9	27 77	53.2	44 42.7	29 75	51.1	44 15.4	32 73	49.1	43 35.7	35 70	46.5	43 25.3	35 69	45.9	43 14.6	36 68	45.2	42 29.7	39 65	42.7	45
6	44 36.4	24 79	54.8	44 21.6	25 77	53.5	43 57.7	28 75	51.5	43 31.6	30 73	49.5	42 53.8	33 70	46.9	42 43.8	34 70	46.2	42 33.5	34 69	45.6	41 50.5	37 66	43.1	6
7	43 49.2	23 79	55.1	43 35.2	24 78	53.7	43 12.5	26 76	51.7	42 47.7	29 74	49.8	42 11.6	32 71	47.2	42 02.0	32 70	46.5	41 52.2	33 69	45.9	41 11.0	36 66	43.4	7
8	43 01.8	21 79	55.3	42 48.6	23 78	54.0	42 27.1	25 76	52.0	42 03.6	27 74	50.1	41 29.2	30 71	47.5	41 20.0	31 70	46.9	41 10.7	31 70	46.2	40 31.2	34 67	43.7	8
9	42 14.3	20 79	55.6	42 01.9	21 78	54.2	41 41.6	24 76	52.3	41 19.3	26 74	50.3	40 46.5	29 71	47.8	40 37.8	29 71	47.2	40 28.9	30 70	46.5	39 51.3	33 67	44.0	9
50	41 26.7	19 80	55.8	41 15.0	20 78	54.5	40 55.9	22 76	52.5	40 34.8	24 74	50.6	40 03.7	27 72	48.1	39 55.4	28 71	47.4	39 47.0	29 70	46.8	39 11.1	31 67	44.3	50
1	40 38.9	17 80	56.0	40 28.0	19 78	54.7	40 10.0	21 77	52.7	39 50.1	23 75	50.8	39 20.7	26 72	48.3	39 12.9	27 71	47.7	39 04.8	27 70	47.1	38 30.7	30 68	44.6	1
2	39 51.1	16 80	56.1	39 40.9	18 79	54.9	39 24.1	20 77	52.9	39 05.4	22 75	51.1	38 37.6	24 72	48.6	38 30.1	25 72	47.9	38 22.5	26 71	47.3	37 50.1	28 68	44.9	2
3	39 03.2	15 80	56.3	38 53.7	16 79	55.0	38 38.0	18 77	53.1	38 20.4	20 75	51.3	37 54.3	23 72	48.8	37 47.2	24 72	48.2	37 40.0	24 71	47.6	37 09.3	27 68	45.1	3
4	38 15.1	14 80	56.5	38 06.4	15 79	55.2	37 51.8	17 77	53.3	37 35.4	19 75	51.5	37 10.8	22 73	49.0	37 04.2	22 72	48.4	36 57.4	23 71	47.8	36 28.3	25 69	45.3	4
55	37 27.0	13 80	56.6	37 19.0	14 79	55.3	37 05.5	16 77	53.5	36 50.2	18 75	51.6	36 27.2	20 73	49.2	36 21.0	21 72	48.6	36 14.6	22 71	48.0	35 47.2	24 69	45.6	55
6	36 38.8	12 80	56.7	36 31.5	13 79	55.5	36 19.1	15 77	53.6	36 04.9	17 76	51.8	35 43.5	19 73	49.4	35 37.7	20 72	48.8	35 31.7	20 72	48.2	35 06.0	23 69	45.8	6
7	35 50.6	10 80	56.8	35 43.9	12 79	55.6	35 32.6	14 78	53.8	35 19.6	15 76	51.9	34 59.7	18 73	49.5	34 54.3	18 73	48.9	34 48.7	19 72	48.3	34 24.6	21 69	46.0	7
8	35 02.3	09 81	56.9	34 56.3	11 79	55.7	34 46.0	12 78	53.9	34 34.1	14 76	52.1	34 15.8	16 73	49.7	34 10.7	17 73	49.1	34 05.5	18 72	48.5	33 43.1	20 69	46.1	8
9	34 13.9	08 81	57.0	34 08.6	09 80	55.8	33 59.4	11 78	54.0	33 48.6	13 76	52.2	33 31.7	15 74	49.8	33 27.1	16 73	49.2	33 22.3	16 72	48.6	33 01.4	19 70	46.3	9
60	33 25.5	07 81	57.1	33 20.9	08 80	55.9	33 12.7	10 78	54.1	33 03.0	12 76	52.3	32 47.6	14 74	50.0	32 43.4	14 73	49.4	32 39.0	15 72	48.8	32 19.7	17 70	46.4	60
1	32 37.1	06 81	57.1	32 33.1	07 80	56.0	32 26.0	09 78	54.2	32 17.3	10 76	52.4	32 03.4	13 74	50.1	31 59.6	13 73	49.5	31 55.5	14 73	48.9	31 37.8	16 70	46.6	1
2	31 48.6	06 81	57.2	31 45.3	06 80	56.0	31 39.2	08 78	54.3	31 31.5	09 76	52.5	31 19.2	11 74	50.2	31 15.7	12 73	49.6	31 12.0	12 73	49.0	30 55.9	14 70	46.7	2
3	31 00.1	04 81	57.2	30 57.5	05 80	56.1	30 52.3	07 78	54.3	30 45.8	08 76	52.6	30 34.8	10 74	50.3	30 31.7	11 73	49.7	30 28.4	11 73	49.1	30 13.9	13 70	46.8	3
4	30 11.6	03 81	57.3	30 09.6	04 80	56.1	30 05.4	05 78	54.4	29 59.9	07 76	52.7	29 50.4	09 74	50.4	29 47.7	09 73	49.8	29 44.8	10 73	49.2	29 31.8	12 70	46.9	4
65	29 23.1	02 81	57.3	29 21.7	03 80	56.1	29 18.5	04 78	54.4	29 14.0	06 76	52.7	29 06.0	08 74	50.4	29 03.6	08 74	49.9	29 01.1	09 73	49.3	28 49.6	11 70	47.0	65
6	28 34.6	01 81	57.3	28 33.8	02 80	56.2	28 31.6	03 78	54.5	28 28.1	05 77	52.8	28 21.5	06 74	50.5	28 19.5	07 74	49.9	28 17.4	07 73	49.4	28 07.4	09 70	47.1	6
7	27 46.0	00 81	57.3	27 45.9	01 80	56.2	27 44.7	02 78	54.5	27 42.2	03 77	52.8	27 37.0	05 74	50.5	27 35.4	06 74	50.0	27 33.6	06 73	49.4	27 25.1	08 71	47.2	7
8	26 57.5	01 81	57.3	26 58.0	00 80	56.2	26 57.7	01 78	54.5	26 56.3	02 77	52.8	26 52.5	04 74	50.6	26 51.2	04 74	50.0	26 49.8	05 73	49.5	26 42.8	07 71	47.2	8
9	26 09.0	02 81	57.3	26 10.1	01 80	56.2	26 10.8	00 78	54.5	26 10.3	01 77	52.8	26 07.9	03 74	50.6	26 07.0	03 74	50.0	26 05.9	04 73	49.5	26 00.5	05 71	47.3	9
70	25 20.4	03 81	57.3	25 22.2	02 80	56.2	25 23.8	01 78	54.5	25 24.4	00 77	52.8	25 23.3	02 74	50.6	25 22.8	02 74	50.1	25 22.1	03 73	49.5	25 18.1	04 71	47.3	70
1	24 31.9	04 81	57.2	24 34.3	03 80	56.1	24 36.9	02 78	54.5	24 38.4	01 77	52.8	24 38.8	01 74	50.6	24 38.5	01 74	50.1	24 38.2	01 73	49.5	24 35.7	03 71	47.3	1
2	23 43.4	05 81	57.2	23 46.4	05 80	56.1	23 49.9	03 78	54.5	23 52.4	02 77	52.8	23 54.2	01 74	50.6	23 54.3	00 74	50.1	23 54.3	00 73	49.5	23 53.3	02 71	47.3	2
3	22 55.0	06 81	57.1	22 58.5	06 80	56.1	23 03.0	04 78	54.4	23 06.5	03 77	52.8	23 09.6	02 74	50.6	23 10.1	01 74	50.1	23 10.5	01 73	49.5	23 10.8	00 71	47.4	3
4	22 06.5	07 81	57.1	22 10.7	07 80	56.0	22 16.1	05 78	54.4	22 20.6	04 76	52.8	22 25.0	03 74	50.6	22 25.8	03 74	50.1	22 26.6	02 73	49.5	22 28.4	01 71	47.4	4
75	21 18.2	08 81	57.0	21 22.9	08 80	55.9	21 29.2	07 78	54.3	21 34.7	06 76	52.7	21 40.4	04 74	50.6	21 41.6	04 74	50.0	21 42.7	03 73	49.5	21 46.0	02 71	47.3	75
6	20 29.8	09 81	56.9	20 35.1	09 80	55.9	20 42.4	08 78	54.3	20 48.8	07 76	52.7	20 55.9	05 74	50.5	20 57.4	05 74	50.0	20 58.9	05 73	49.5	21 03.6	03 71	47.3	6
7	19 41.5	10 80	56.8	19 47.4	10 79	55.8	19 55.6	09 78	54.2	20 02.9	08 76	52.6	20 11.4	06 74	50.5	20 13.3	06 74	50.0	20 15.0	06 73	49.4	20 21.2	04 71	47.3	7
8	18 53.2	11 80	56.8	18 59.7	11 79	55.7	19 08.8	10 78	54.1	19 17.1	09 76	52.5	19 26.9	08 74	50.4	19 29.1	07 74	49.9	19 31.3	07 73	49.4	19 38.8	06 71	47.3	8
9	18 05.0	12 80	56.7	18 12.1	12 79	55.6	18 22.1	11 78	54.0	18 31.4	10 76	52.5	18 42.5	09 74	50.4	18 45.0	08 73	49.8	18 47.5	08 73	49.3	18 56.5	07 70	47.2	9
80	17 16.9	13 80	56.6	17 24.5	13 79	55.5	17 35.5	12 78	54.0	17 45.7	11 76	52.4	17 58.1	10 74	50.3	18 01.0	10 73	49.8	18 03.8	09 73	49.3	18 14.2	08 70	47.2	80
1	16 28.8	14 80	56.4	16 37.0	14 79	55.4	16 48.9	13 78	53.9	17 00.0	12 76	52.3	17 13.7	11 74	50.2	17 17.0	11 73	49.7	17 20.1	10 73	49.2	17 31.9	09 70	47.1	1
2	15 40.7	15 80	56.3	15 49.6	15 79	55.3	16 02.3	14 77	53.7	16 14.4	13 76	52.2	16 29.4	12 74	50.1	16 33.0	12 73	49.6	16 36.5	12 73	49.1	16 49.7	10 70	47.0	2
3	14 52.8	16 80	56.2	15 02.2	15 79	55.2	15 15.8	15 77	53.6	15 28.9	14 76	52.1	15 45.2	13 74	50.0	15 49.1	13 73	49.5	15 52.9	13 72	49.0	16 07.5	12 70	46.9	3
4	14 04.9	17 80	56.0	14 14.9	16 79	55.0	14 29.4	16 77	53.5	14 43.4	15 76	52.0	15 01.0	14 74	49.9	15 05.3	14 73	49.4	15 09.4	14 72	48.9	15 25.4	13 70	46.8	4
85	13 17.1	18 80	55.9	13 27.7	17 79	54.9	13 43.1	17 77	53.4	13 58.0	16 76	51.8	14 16.9	15 73	49.8	14 21.5	15 73	49.3	14 26.0	15 72	48.8	14 43.4	14 70	46.7	85
6	12 29.4	19 79	55.8	12 40.5	18 78	54.7	12 56.9	18 77	53.2	13 12.7	17 75	51.7	13 32.9	16 73	49.7	13 37.8	16 73	49.2	13 42.7	16 72	48.7	14 01.4	15 70	46.6	6
7	11 41.7	20 79	55.6	11 53.5	19 78	54.6	12 10.7	19 77	53.1	12 27.4	18 75	51.6	12 49.0	18 73	49.6	12 54.2	17 73	49.1	12 59.4	17 72	48.5	13 19.5	16 70	46.5	7
8	10 54.2	21 79	55.4	11 06.5	20 78	54.4	11 24.7	20 77	52.9	11 42.3	19 75	51.4	12 05.1	19 73	49.4	12 10.7	18 72	48.9	12 16.2	18 72	48.4	12 37.7	18 70	46.4	8
9	10 06.8	22 79	55.3	10 19.7	21 78	54.3	10 38.7	21 76	52.8	10 57.3	20 75	51.3	11 21.4	20 73	49.3	11 27.3	20 72	48.8	11 33.1	19 72	48.3	11 56.0	19 69	46.3	9
90	9 19.4	23 79	55.1	9 32.9	22 78	54.1	9 52.8	22 76	52.6	10 12.3	21 75	51.1	10 37.7	21 73	49.1	10 43.9	21 72	48.6	10 50.1	21 71	48.1	11 14.4	20 69	46.1	90

DECLINATION CONTRARY NAME TO LATITUDE

Lat.
16°

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	38 00.0	1.0 01	180.0	37 00.0	1.0 01	180.0	35 30.0	1.0 01	180.0	34 00.0	1.0 01	180.0	32 00.0	1.0 01	180.0	31 30.0	1.0 01	180.0	31 00.0	1.0 01	180.0	29 00.0	1.0 01	180.0	00
1	37 59.5	1.0 03	179.0	36 59.5	1.0 03	179.0	35 29.5	1.0 02	179.0	33 59.5	1.0 02	179.1	31 59.6	1.0 02	179.1	31 29.6	1.0 02	179.1	30 59.6	1.0 02	179.1	28 59.6	1.0 02	179.2	1
2	37 57.9	1.0 04	177.9	36 58.0	1.0 04	178.0	35 28.1	1.0 04	178.1	33 58.1	1.0 04	178.2	31 58.2	1.0 04	178.2	31 28.3	1.0 04	178.3	30 58.3	1.0 04	178.3	28 58.4	1.0 03	178.4	2
3	37 55.4	1.0 06	176.9	36 55.5	1.0 06	177.0	35 25.6	1.0 06	177.1	33 55.8	1.0 05	177.2	31 56.0	1.0 05	177.4	31 26.1	1.0 05	177.4	30 56.1	1.0 05	177.4	28 56.3	1.0 06	177.6	3
4	37 51.7	1.0 08	175.9	36 52.0	1.0 08	176.0	35 22.3	1.0 07	176.2	33 52.6	1.0 07	176.3	31 53.0	1.0 07	176.5	31 23.0	1.0 07	176.5	30 53.1	1.0 06	176.6	28 53.5	1.0 06	176.8	4
05	37 47.1	99 09	174.9	36 47.4	99 09	175.0	35 17.9	99 09	175.2	33 48.4	99 08	175.4	31 49.0	1.0 08	175.6	31 19.1	1.0 08	175.7	30 49.3	1.0 08	175.7	28 49.8	1.0 07	176.0	05
6	37 41.5	99 11	173.9	36 41.9	99 11	174.0	35 12.6	99 10	174.3	33 43.3	99 10	174.5	31 44.2	99 10	174.8	31 14.4	99 09	174.8	30 44.6	99 09	174.9	28 45.4	99 09	175.2	6
7	37 34.8	99 13	172.9	36 35.4	99 12	173.0	35 06.4	99 12	173.3	33 37.3	99 12	173.6	31 38.5	99 11	173.9	31 08.7	99 11	174.0	30 39.0	99 11	174.1	28 40.1	99 10	174.4	7
8	37 27.1	99 14	171.8	36 28.0	99 14	172.1	34 59.2	99 14	172.4	33 30.4	99 13	172.7	31 31.9	99 12	173.0	31 02.3	99 12	173.1	30 32.6	99 12	173.2	28 34.1	99 11	173.6	8
9	37 18.4	98 16	170.8	36 19.5	98 16	171.1	34 51.0	98 15	171.4	33 22.5	98 15	171.7	31 24.5	98 14	172.2	30 54.9	98 14	172.3	30 25.4	98 13	172.4	28 27.2	99 13	172.8	9
10	37 08.8	98 18	169.8	36 10.1	98 17	170.1	34 42.0	98 17	170.5	33 13.8	98 16	170.8	31 16.2	98 15	171.3	30 46.8	98 15	171.4	30 17.3	98 15	171.5	28 19.5	98 14	172.0	10
1	36 58.1	97 19	168.9	35 59.7	97 19	169.1	34 32.0	97 18	169.6	33 04.2	98 18	170.0	31 07.0	98 17	170.5	30 37.7	98 16	170.6	30 08.4	98 16	170.7	28 11.1	98 15	171.2	1
2	36 46.5	97 21	167.9	35 48.3	97 20	168.2	34 21.1	97 20	168.6	32 53.7	97 19	169.1	30 57.1	97 18	169.6	30 27.9	97 18	169.8	29 58.7	97 18	169.9	28 01.9	97 17	170.4	2
3	36 33.9	96 23	166.9	35 36.1	96 22	167.2	34 09.3	97 21	167.7	32 42.3	97 20	168.2	30 46.3	97 19	168.8	30 17.2	97 19	168.9	29 48.2	97 19	169.1	27 51.9	97 18	169.6	3
4	36 20.3	96 24	165.9	35 22.9	96 24	166.3	33 56.5	96 23	166.8	32 30.1	96 22	167.3	30 34.6	96 21	167.9	30 05.7	96 20	168.1	29 36.8	96 20	168.3	27 41.1	96 19	168.9	4
15	36 05.9	95 26	165.0	35 08.7	95 25	165.4	33 42.9	95 24	165.9	32 17.0	96 23	166.4	30 22.2	96 22	167.1	29 53.5	96 22	167.3	29 24.7	96 22	167.4	27 29.6	96 20	168.1	15
6	35 50.5	95 27	164.0	34 53.7	95 27	164.4	33 28.4	95 26	165.0	32 03.0	95 25	165.6	30 08.9	95 23	166.3	29 40.4	95 23	166.5	29 11.8	95 23	166.6	27 17.3	95 22	167.3	6
7	35 34.1	94 29	163.1	34 37.8	94 28	163.5	33 13.1	94 27	164.1	31 48.2	94 26	164.7	29 54.9	95 25	165.5	29 26.5	95 24	165.7	28 58.1	95 24	165.9	27 04.3	95 23	166.6	7
8	35 16.9	93 30	162.2	34 21.0	93 29	162.6	32 56.9	94 28	163.3	31 32.6	94 27	163.9	29 40.0	94 26	164.7	29 11.8	94 26	164.9	28 43.6	94 25	165.1	26 50.6	94 24	165.8	8
9	34 58.8	92 32	161.2	34 03.3	93 31	161.7	32 39.9	93 30	162.4	31 16.2	93 29	163.0	29 24.4	93 27	163.9	28 56.4	93 27	164.1	28 28.3	93 27	164.3	26 36.1	94 25	165.1	9
20	34 39.8	92 33	160.3	33 44.8	92 32	160.8	32 22.0	92 31	161.5	30 59.0	92 30	162.2	29 08.0	93 29	163.1	28 40.2	93 28	163.3	28 12.4	93 28	163.5	26 20.9	93 27	164.3	20
1	34 20.0	91 34	159.4	33 25.4	91 34	159.9	32 03.3	91 32	160.7	30 41.0	92 31	161.4	28 50.8	92 30	162.3	28 23.2	92 30	162.5	27 55.6	92 29	162.7	26 04.9	92 28	163.6	1
2	33 59.3	90 36	158.6	33 05.2	90 35	159.1	31 43.8	91 34	159.8	30 22.2	91 33	160.6	28 32.9	91 31	161.5	28 05.5	91 31	161.8	27 38.1	91 30	162.0	25 48.3	92 29	162.9	2
3	33 37.9	89 37	157.7	32 44.2	89 36	158.2	31 23.6	90 35	159.0	30 02.6	90 34	159.8	28 14.3	90 32	160.8	27 47.1	91 32	161.0	27 19.9	91 32	161.2	25 31.0	91 30	162.2	3
4	33 15.6	88 38	156.8	32 22.4	89 38	157.4	31 02.5	89 36	158.2	29 42.3	89 35	159.0	27 54.9	90 33	160.0	27 28.0	90 33	160.2	27 01.0	90 33	160.5	25 13.0	90 31	161.5	4
25	32 52.5	88 40	156.0	31 59.9	88 39	156.5	30 40.7	88 38	157.4	29 21.2	88 36	158.2	27 34.8	89 35	159.2	27 08.1	89 34	159.5	26 41.4	89 34	159.8	24 54.3	89 32	160.8	25
6	32 28.6	87 41	155.1	31 36.5	87 40	155.7	30 18.2	87 39	156.6	28 59.4	88 38	157.4	27 14.0	88 36	158.5	26 47.6	88 35	158.8	26 21.1	88 35	159.0	24 35.0	89 33	160.1	6
7	32 04.0	86 42	154.3	31 12.5	86 41	154.9	29 54.9	86 40	155.8	28 36.9	87 39	156.7	26 52.6	87 37	157.8	26 26.4	87 36	158.0	26 00.2	87 36	158.3	24 15.0	88 34	159.4	7
8	31 38.6	85 44	153.5	30 47.6	85 43	154.1	29 30.9	86 41	155.0	28 13.7	86 40	155.9	26 30.4	86 38	157.1	26 04.5	86 38	157.3	25 38.5	87 37	157.6	23 54.4	87 35	158.7	8
9	31 12.5	84 45	152.7	30 22.1	84 44	153.3	29 06.2	85 42	154.3	27 49.9	85 41	155.2	26 07.6	85 39	156.3	25 41.9	86 39	156.6	25 16.2	86 38	156.9	23 33.1	86 36	158.0	9
30	30 45.7	83 46	151.9	29 55.9	83 45	152.6	28 40.8	84 43	153.5	27 25.3	84 42	154.4	25 44.1	85 40	155.6	25 18.7	85 40	155.9	24 53.3	85 39	156.2	23 11.3	85 37	157.4	30
1	30 18.2	82 47	151.1	29 29.0	82 46	151.8	28 14.7	83 45	152.8	27 00.1	83 43	153.7	25 20.0	84 41	154.9	24 54.9	84 41	155.2	24 29.7	84 40	155.5	22 48.8	84 38	156.7	1
2	29 50.1	81 48	150.4	29 01.4	81 47	151.1	27 48.0	82 46	152.0	26 34.2	82 44	153.0	24 55.3	83 42	154.3	24 30.4	83 42	154.6	24 05.6	83 41	154.9	22 25.7	83 39	156.1	2
3	29 21.2	80 49	149.6	28 33.1	80 48	150.3	27 20.7	81 47	151.3	26 07.7	81 45	152.3	24 29.9	82 43	153.6	24 05.4	82 43	153.9	23 40.8	82 42	154.2	22 02.0	83 40	155.5	3
4	28 51.7	79 50	148.9	28 04.3	79 49	149.6	26 52.7	80 48	150.6	25 40.6	80 46	151.6	24 04.0	81 44	152.9	23 39.7	81 44	153.2	23 15.4	81 43	153.6	21 37.8	82 41	154.8	4
35	28 21.6	78 51	148.2	27 34.8	78 50	148.9	26 24.1	79 49	149.9	25 12.9	79 47	150.9	23 37.4	80 45	152.3	23 13.4	80 45	152.6	22 49.4	80 44	152.9	21 13.0	81 42	154.2	35
6	27 50.9	77 52	147.5	27 04.7	77 51	148.2	25 54.9	78 50	149.2	24 44.6	78 48	150.3	23 10.3	79 46	151.6	22 46.6	79 46	152.0	22 22.9	79 45	152.3	20 47.6	80 43	153.6	6
7	27 19.6	76 53	146.8	26 34.0	76 52	147.5	25 25.1	77 51	148.6	24 15.7	77 49	149.6	22 42.6	78 47	151.0	22 19.2	78 47	151.3	21 55.8	78 46	151.7	20 21.7	79 44	153.0	7
8	26 47.7	75 54	146.1	26 02.7	75 53	146.8	24 54.7	76 52	147.9	23 46.3	76 50	149.0	22 14.4	77 48	150.4	21 51.3	77 47	150.7	21 28.2	77 47	151.1	19 55.2	78 45	152.4	8
9	26 15.2	74 55	145.4	25 30.8	74 54	146.2	24 23.8	75 52	147.3	23 16.3	75 51	148.3	21 45.6	76 49	149.8	21 22.8	76 48	150.1	21 00.0	76 48	150.5	19 28.3	77 46	151.8	9
40	25 42.2	73 56	144.8	24 58.4	73 55	145.5	23 52.3	74 53	146.6	22 45.8	74 52	147.7	21 16.3	75 50	149.2	20 53.8	75 49	149.5	20 31.3	75 49	149.9	19 00.8	76 47	151.3	40
1	25 08.7	72 57	144.1	24 25.5	72 56	144.9	23 20.3	73 54	146.0	22 14.7	73 53	147.1	20 46.5	74 51	148.6	20 24.3	74 50	148.9	20 02.1	74 50	149.3	18 32.8	75 47	150.7	1
2	24 34.6	71 58	143.5	23 52.1	71 57	144.2	22 47.8	72 55	145.4	21 43.1	72 53	146.5	20 16.2	73 51	148.0	19 54.3	73 51	148.4	19 32.4	73 50	148.7	18 04.4	74 48	150.2	2
3	24 00.0	70 58	142.8	23 18.1	70 57	143.6	22 14.8	71 56	144.8	21 11.1	71 54	145.9	19 45.3	72 52	147.4	19 23.8	72 52	147.8	19 02.2	72 51	148.2	17 35.4	73 49	149.6	3
4	23 24.9	69 59	142.2	22 43.7	69 58	143.0	21 41.3	70 57	144.2	20 38.5	70 55	145.3	19 14.0	71 53	146.9	18 52.8	71 52	147.2	18 31.5	71 52	147.6	17 06.0	72 50	149.1	4
45	22 49.4	68 60	141.6	22 08.7	68 59	142.4	21 07.3	68 57	143.6	20 05.5	69 56	144.8	18 42.3	70 54	146.3	18 21.4	70 53	146.7	18 00.4	70 53	147.1	16 36.1	70 51	148.6	45
6	22 13.3	66 61	141.0	21 33.3	67 60	141.9	20 32.9	67 58	143.0	19 32.0	68 57	144.2	18 10.1	69 54	145.8	17 49.5	69 54	146.1	17 28.8	69 53	146.5	16 05.8	69 51	148.0	6
7	21 36.9	65 62	140.5	20 57.5	66 60	141.3	19 58.0	66 59	142.5	18 58.0	67 57	143.7	17 37.4	68 55	145.2	17 17.1	68 55	145.6	16 56.8	68 54	146.0	15 35.1	68 52	147.5	7
8	20 59.9	64 62	139.9	20 21.2	65 61	140.7	19 22.7	65 60	141.9	18 23.6	66 58	143.1	17 04.3	66 56	144.7	16 44.3	67 55	145.1	16 24.3	67 55	145.5	15 03.9	67 53	147.0	8
9	20 22.6	63 63	139.4	19 44.5	64 62	140.2	18 46.9	64 60	141.4	17 48.8	65 59	142.6	16 30.7	65 57	144.2	16 11.1	66 56	144.6	15 51.4	66 56	145.0	14 32.3	66 53	146.5	9
50	19 44.8	62 64	138.8	19 07.3	63 63	139.6	18 10.7	63 61	140.9	17 13.6	64 59	142.1	15 56.8	64 57	143.7	15 37.5	64 57	144.1	15 18.1	65 56	144.5	14 00.3	65 54	146.1	50
1	19 06.6	61 64	138.3	18 29.8	62 63	139.1	17 34.1	62 62	140.4	16 38.0	63 60	141.6	15 22.5	63 58	143.2	15 03.5	63 57	143.6	14 44.4	64 57	144.0	13 27.9	64 55	145.6	1
2	18 28.1	60 65	137.8	17 51.8	61 64	138.6	16 57.1	61 62	139.9	16 01.9	62 61	141.1	14 47.7	62 59	142.7	14 29.0	62 58	143.1	14 10.3	62 57	143.5	12 55.1	63 55	145.1	2
3	17 49.1	59 66	137.3	17 13.5	59 64	138.1	16 19.7	60 63	139.4	15 25.5	60 61	140.6	14 12.6	61 59	142.2	13 54.2	61 59	142.7	13 35.9	61 58	143.1	12 22.0	62 56	144.7	3
4	17 09.8	58 66	136.8	16 34.8	58 65	137.6	15 42.0	59 64	138.9	14 48.7	59 62	140.1	13 37.1	60 60	141.8	13 19.1	60 59	142.2	13 01.0	60 59	142.6	11 48.4	61 56	144.2	4
55	16 30.1	57 67	136.3	15 55.8	57 66	137.1	15 03.9	58 64	138.4	14 11.6	58 63	139.7	13 01.2	59 60	141.3	12 43.5	59 60	141.7	12 25.8	59 59	142.2	11 14.6	60 57	143.8	55
6	15 50.1	56 67	135.8	15 16.3	56 66	136.7	14 25.4	57 65	137.9	13 34.1	57 63	139.2	12 25.0	58 61	140.9	12 07.7	58 60	141.3	11 50.3	58 60	141.7	10 40.3	59 58	143.4	6
7	15 09.7	55 68	135.3	14 36.6	55 67	136.2	13 46.6	56 65	137.5	12 56.2	56 64	138.8	11 48.5	57 61	140.5	11 31.4	57 61	140.9	11 14.4	57 60	141.3	10 05.7	57 58	143.0	7
8	14 29.0	54 68	134.9	13 56.5	54 67	135.7	13 07.5	55 66	137.0	12 18.0	55 64	138.3	11 11.6	56 62	140.0	10 54.9	56 61	140.4	10 38.1	56 61	140.9	9 30.8	56 59	142.6	8
9	13 47.9	53 69	134.4	13 16.1	53 68	135.3	12 28.0	54 66	136.6	11 39.5	54 65	137.9	10 34.4	55 63	139.6	10 18.0	55 62	140.0	10 01.6	55 61	140.5	8 55.6	55 59	142.2	9
60	13 06.6	52 69	134.0	12 35.4	52 68	134.9	11 48.2	53 67	136.2	11 00.7	53 65	137.5	9 56.8	53 63	139.2	9 40.8	54 63	139.6	9 24.7	54 62	140.1	8 20.1	54 60	141.8	60
1	12 25.0	51 70	133.6	11 54.4	51 69	134.4	11 08.1	52 67	135.8	10 21.6	52 66	137.1	9 19.0	52 64	138.8	9 03.3	52 63	139.2	8 47.5	53 62	139.7	7 44.2	53 60	141.4	1
2	11 43.0	50 70	133.2	11 13.0	50 69	134.0	10 27.7	51 68	135.4	9 42.1	51 66	136.7	8 40.9	51 64	138.4	8 25.5	51 64	138.8	8 10.0	51 63	139.3	7 08.1	52 61	141.0	2
3	11 00.8	49 71	132.7	10 31.4	49 70	133.6	9 47.1	49 68	135.0	9 02.4	50 67	136.3	8 02.4	50 65	138.0	7 47.4	50 64	138.5	7 32.3	50 63	138.9	6 31.6	51 61	140.6	3
4	10 18.3	48 71	132.3	9 49.5	48 70	133.2	9 06.1	48 69	134.6	8 22.4	49 67	135.9	7 23.7	49 65	137.7	7 09.0	49 64	138.1	6 54.2	49 64	138.5	5 54.9	50 62	140.3	4
65	9 35.6	47 72	132.0	9 07.4	47 71	132.9	8 24.9	47 69	134.2	7 42.1	48 68	135.5	6 44.7	48 65	137.3	6 30.3	48 65	137.7	6 15.9	48 64	138.2	5 17.9	48 62	139.9	65
6	8 52.6	46 72	131.6	8 25.0	46 71	132.5	7 43.4	46 70	133.8	7 01.6	47 68	135.2	6 05.5	47 66	136.9	5 51.4	47 65	137.4	5 37.3	47 65	137.8				6
7	8 09.3	45 73	131.2	7 42.3	45 72	132.1	7 01.7	45 70	133.5	6 20.8	46 68	134.8	5 26.0	46 66	136.6	5 12.2	46 66	137.0							7
8	7 25.8	44 73	130.8	6 59.4	44 72	131.8	6 19.7	44 70	133.1	5 39.8	44 69	134.5													8
9	6 42.0	43 73	130.5	6 16.3	43 72	131.4	5 37.5	43 71	132.8																9
70	5 58.1	42 74	130.1	5 32.9	42 73	131.1																			70
1	5 13.9	41 74	129.8																						1

DECLINATION SAME NAME AS LATITUDE

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	8 32.2	24 79	54.9	8 46.3	23 78	53.9	9 07.0	23 76	52.4	9 27.5	22 75	50.9	9 54.1	22 72	49.0	10 00.7	22 72	48.5	10 07.2	22 71	48.0	10 32.8	21 69	46.0	91
2	7 45.1	24 78	54.7	7 59.7	24 77	53.7	8 21.4	24 76	52.2	8 42.8	24 74	50.8	9 10.7	23 72	48.8	9 17.6	23 72	48.3	9 24.4	23 71	47.8	9 51.4	22 69	45.8	2
3	6 58.1	25 78	54.5	7 13.3	25 77	53.5	7 35.9	25 76	52.0	7 58.1	25 74	50.6	8 27.4	24 72	48.6	8 34.6	24 71	48.1	8 41.8	24 71	47.6	9 10.1	23 69	45.7	3
4	6 11.2	26 78	54.3	6 27.0	26 77	53.3	6 50.4	26 75	51.8	7 13.7	26 74	50.4	7 44.2	25 72	48.4	7 51.7	25 71	47.9	7 59.2	25 71	47.5	8 28.9	24 68	45.5	4
95	5 24.4	27 78	54.1	5 40.8	27 77	53.1	6 05.2	27 75	51.6	6 29.3	27 74	50.2	7 01.1	26 72	48.2	7 08.9	26 71	47.8	7 16.8	26 70	47.3	7 47.8	26 68	45.3	95
6							5 20.0	28 75	51.4	5 45.1	28 73	50.0	6 18.1	27 71	48.0	6 26.3	27 71	47.6	6 34.5	27 70	47.1	7 06.9	27 68	45.1	6
7										5 01.0	29 73	49.8	5 35.3	28 71	47.8	5 43.8	28 71	47.3	5 52.3	28 70	46.9	6 26.1	28 68	44.9	7
8																5 01.5	29 70	47.1	5 10.3	29 70	46.7	5 45.4	29 68	44.7	8
9																						5 04.9	30 67	44.5	9

Lat.
16°

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	60 00.0	1.0 01	00.0	59 00.0	1.0 01	00.0	57 30.0	1.0 01	00.0	56 30.0	1.0 01	00.0	55 30.0	1.0 01	00.0	54 30.0	1.0 01	00.0	53 30.0	1.0 01	00.0	52 00.0	1.0 01	00.0	00
1	59 59.3	1.0 04	01.4	58 59.3	1.0 03	01.3	57 29.4	1.0 03	01.2	56 29.4	1.0 03	01.2	55 29.4	1.0 03	01.1	54 29.5	1.0 03	01.1	53 29.5	1.0 03	01.0	51 59.5	1.0 02	01.0	1
2	59 57.2	1.0 06	02.8	58 57.3	1.0 06	02.6	57 27.5	1.0 05	02.5	56 27.6	1.0 05	02.4	55 27.7	1.0 05	02.2	54 27.8	1.0 04	02.1	53 27.9	1.0 04	02.0	51 58.1	1.0 04	01.9	2
3	59 53.7	99 08	04.2	58 54.0	1.0 08	04.0	57 24.4	1.0 07	03.7	56 24.7	1.0 07	03.5	55 24.9	1.0 07	03.4	54 25.2	1.0 06	03.2	53 25.4	1.0 06	03.1	51 55.7	1.0 06	02.9	3
4	59 48.8	99 10	05.5	58 49.4	99 10	05.3	57 20.1	99 09	04.9	56 20.5	99 09	04.7	55 21.0	99 08	04.5	54 21.4	99 08	04.3	53 21.8	99 08	04.1	51 52.3	99 07	03.8	4
05	59 42.6	99 13	06.9	58 43.4	99 12	06.6	57 14.5	99 11	06.1	56 15.3	99 11	05.8	55 15.9	99 10	05.6	54 16.6	99 10	05.3	53 17.2	99 09	05.1	51 48.0	99 09	04.8	05
6	59 35.0	98 15	08.2	58 36.2	98 14	07.9	57 07.8	98 13	07.3	56 08.8	98 13	07.0	55 09.8	98 12	06.7	54 10.7	99 12	06.4	53 11.5	99 11	06.1	51 42.8	99 10	05.7	6
7	59 26.1	97 17	09.6	58 27.6	97 16	09.1	56 59.8	98 15	08.5	56 01.2	98 15	08.1	55 02.5	98 14	07.8	54 03.7	98 13	07.4	53 04.9	98 13	07.1	51 36.6	98 12	06.6	7
8	50 15.8	97 19	10.9	58 17.8	97 18	10.4	56 50.7	97 17	09.7	55 52.5	97 16	09.3	54 54.2	97 16	08.9	53 55.8	97 15	08.5	52 57.3	98 14	08.1	51 29.5	98 13	07.5	8
9	59 04.3	96 21	12.2	58 06.8	96 20	11.7	56 40.4	96 19	10.9	55 42.6	96 18	10.4	54 44.7	97 17	09.9	53 46.8	97 17	09.5	52 48.7	97 16	09.1	51 21.4	97 15	08.5	9
10	58 51.4	95 23	13.5	57 54.6	96 22	12.9	56 28.9	96 21	12.0	55 31.7	96 20	11.5	54 34.3	96 19	11.0	53 36.8	96 18	10.5	52 39.1	96 18	10.0	51 12.5	96 16	09.4	10
1	58 37.4	94 25	14.7	57 41.1	94 24	14.1	56 16.4	94 23	13.2	55 19.6	95 22	12.6	54 22.8	95 21	12.0	53 25.8	95 20	11.5	52 28.6	95 19	11.0	51 02.6	96 18	10.3	1
2	58 22.1	92 27	16.0	57 26.5	93 26	15.3	56 02.7	93 25	14.3	55 06.6	94 24	13.7	54 10.2	94 23	13.1	53 13.8	94 22	12.5	52 17.1	95 21	11.9	50 51.9	95 19	11.2	2
3	58 05.6	91 29	17.2	57 10.7	92 28	16.4	55 47.9	92 26	15.4	54 52.4	93 25	14.7	53 56.7	93 24	14.1	53 00.8	93 23	13.5	52 04.7	94 22	12.9	50 40.3	94 21	12.0	3
4	57 48.0	90 31	18.4	56 53.8	90 30	17.6	55 32.1	91 28	16.5	54 37.3	92 27	15.7	53 42.2	92 26	15.1	52 46.9	92 25	14.4	51 51.4	93 24	13.8	50 27.9	93 22	12.9	4
15	57 29.2	89 33	19.5	56 35.9	89 32	18.7	55 15.2	90 30	17.5	54 21.1	90 29	16.8	53 26.7	91 27	16.0	52 32.1	91 26	15.4	51 37.2	92 26	14.7	50 14.6	92 24	13.8	15
6	57 09.4	87 35	20.7	56 16.9	88 33	19.8	54 57.4	89 31	18.5	54 04.0	89 30	17.8	53 10.3	90 29	17.0	52 16.4	90 28	16.3	51 22.2	91 27	15.6	50 00.4	91 25	14.6	6
7	56 48.5	86 36	21.8	55 56.8	86 35	20.9	54 38.6	87 33	19.6	53 45.9	88 32	18.7	52 53.0	88 30	17.9	51 59.8	89 29	17.2	51 06.2	89 28	16.5	49 45.5	90 26	15.4	7
8	56 26.6	84 38	22.9	55 35.8	85 37	21.9	54 18.8	86 34	20.5	53 27.0	87 33	19.7	52 34.8	87 32	18.9	51 42.3	88 31	18.1	50 49.5	88 29	17.3	49 29.7	89 28	16.2	8
9	56 03.7	83 40	23.9	55 13.8	84 38	22.9	53 58.1	85 36	21.5	53 07.1	85 35	20.6	52 15.7	86 33	19.8	51 24.0	87 32	19.0	50 31.9	87 31	18.2	49 13.2	88 29	17.0	9
20	55 39.9	81 41	24.9	54 50.9	82 40	23.9	53 36.5	83 37	22.5	52 46.3	84 36	21.5	51 55.8	85 35	20.7	51 04.8	85 33	19.8	50 13.5	86 32	19.0	48 56.0	87 30	17.8	20
1	55 15.2	80 43	25.9	54 27.1	81 41	24.9	53 14.0	82 39	23.4	52 24.7	83 37	22.4	51 35.0	83 36	21.5	50 44.9	84 35	20.6	49 54.4	84 33	19.8	48 37.9	85 31	18.6	1
2	54 49.5	78 44	26.9	54 02.4	79 42	25.8	52 50.7	80 40	24.3	52 02.3	81 39	23.3	51 13.5	82 37	22.4	50 24.2	83 36	21.5	49 34.5	83 34	20.6	48 19.2	84 32	19.3	2
3	54 23.1	76 45	27.8	53 36.9	77 44	26.7	52 26.6	79 41	25.1	51 39.1	80 40	24.1	50 51.1	80 38	23.2	50 02.7	81 37	22.3	49 13.8	82 36	21.4	47 59.7	83 34	20.1	3
4	53 55.8	75 47	28.7	53 10.6	76 45	27.6	52 01.8	77 43	26.0	51 15.2	78 41	25.0	50 28.1	79 40	24.0	49 40.5	80 38	23.0	48 52.4	80 37	22.1	47 39.6	81 35	20.8	4
25	53 27.7	73 48	29.5	52 43.5	74 46	28.4	51 36.1	76 44	26.8	50 50.5	77 42	25.8	50 04.3	77 41	24.8	49 17.6	78 39	23.8	48 30.4	79 38	22.8	47 18.8	80 36	21.5	25
6	52 58.9	71 49	30.4	52 15.7	73 48	29.2	51 09.8	74 45	27.6	50 25.0	75 44	26.5	49 39.8	76 42	25.5	48 54.0	77 40	24.5	48 07.7	78 39	23.6	46 57.4	79 37	22.2	6
7	52 29.4	70 50	31.2	51 47.2	71 49	30.0	50 42.7	72 46	28.4	49 58.9	73 45	27.3	49 14.6	74 43	26.3	48 29.7	75 42	25.2	47 44.3	76 40	24.3	46 35.3	77 38	22.8	7
8	51 59.2	68 51	32.0	51 18.0	69 50	30.8	50 15.0	71 47	29.1	49 32.1	72 46	28.0	48 48.7	73 44	27.0	48 04.8	74 43	25.9	47 20.3	75 41	24.9	46 12.6	76 39	23.5	8
9	51 28.3	66 52	32.7	50 48.1	68 51	31.5	49 46.6	69 48	29.8	49 04.7	70 47	28.7	48 22.3	71 45	27.7	47 39.2	72 44	26.6	46 55.6	73 42	25.6	45 49.3	74 40	24.1	9
30	50 56.8	65 53	33.5	50 17.7	66 52	32.3	49 17.6	68 49	30.5	48 36.7	69 48	29.4	47 55.2	70 46	28.3	47 13.1	71 45	27.3	46 30.4	72 43	26.2	45 25.4	73 41	24.8	30
1	50 24.7	63 54	34.2	49 46.6	64 53	33.0	48 48.0	66 50	31.2	48 08.1	67 49	30.1	47 27.5	68 47	29.0	46 46.4	69 45	27.9	46 04.6	70 44	26.9	45 01.0	71 42	25.4	1
2	49 52.1	61 55	34.8	49 14.9	63 54	33.6	48 17.8	64 51	31.9	47 38.9	65 50	30.7	46 59.3	67 48	29.6	46 19.1	68 46	28.5	45 38.3	68 45	27.5	44 36.0	70 42	25.9	2
3	49 18.9	60 56	35.5	48 42.7	61 55	34.3	47 47.1	63 52	32.5	47 09.2	64 50	31.3	46 30.5	65 49	30.2	45 51.3	66 47	29.1	45 11.4	67 46	28.1	44 10.5	68 43	26.5	3
4	48 45.1	58 57	36.1	48 10.0	59 55	34.9	47 15.9	61 53	33.1	46 38.9	62 51	31.9	46 01.3	63 50	30.8	45 23.0	64 48	29.7	44 44.0	65 46	28.6	43 44.5	67 44	27.1	4
35	48 10.9	56 58	36.7	47 36.8	58 56	35.5	46 44.1	59 54	33.7	46 08.1	61 52	32.5	45 31.5	62 50	31.4	44 54.1	63 49	30.3	44 16.1	64 47	29.2	43 18.0	65 45	27.6	35
6	47 36.2	55 59	37.3	47 03.1	56 57	36.0	46 11.9	58 54	34.2	45 36.9	59 53	33.1	45 01.2	60 51	31.9	44 24.8	61 50	30.8	43 47.8	62 48	29.7	42 51.1	64 46	28.1	6
7	47 01.1	53 59	37.8	46 28.9	54 58	36.6	45 39.2	56 55	34.8	45 05.2	57 54	33.6	44 30.5	58 52	32.5	43 55.0	60 50	31.3	43 19.0	61 49	30.2	42 23.7	62 46	28.6	7
8	46 25.5	51 60	38.3	45 54.3	53 58	37.1	45 06.1	54 56	35.3	44 33.1	56 54	34.1	43 59.3	57 53	33.0	43 24.8	58 51	31.8	42 49.7	59 49	30.7	41 55.9	61 47	29.1	8
9	45 49.5	50 61	38.9	45 19.3	51 59	37.6	44 32.6	53 57	35.8	44 00.5	54 55	34.6	43 27.7	55 53	33.5	42 54.2	56 52	32.3	42 20.0	57 50	31.2	41 27.6	59 48	29.6	9
40	45 13.1	48 61	39.3	44 43.9	49 60	38.1	43 58.6	51 57	36.3	43 27.5	52 56	35.1	42 55.7	54 54	33.9	42 23.1	55 52	32.8	41 49.9	56 51	31.7	40 58.9	57 48	30.0	40
1	44 36.4	46 62	39.8	44 08.1	48 60	38.6	43 24.3	50 58	36.8	42 54.2	51 56	35.6	42 23.3	52 55	34.4	41 51.7	53 53	33.3	41 19.4	54 51	32.1	40 29.9	56 49	30.5	1
2	43 59.3	45 62	40.2	43 32.0	46 61	39.0	42 49.6	48 58	37.2	42 20.4	49 57	36.0	41 50.5	50 55	34.8	41 19.9	52 54	33.7	40 48.6	53 52	32.6	40 00.4	54 50	30.9	2
3	43 21.9	43 63	40.7	42 55.5	45 61	39.4	42 14.6	46 59	37.6	41 46.3	48 57	36.4	41 17.4	49 56	35.3	40 47.7	50 54	34.1	40 17.4	51 53	33.0	39 30.6	53 50	31.3	3
4	42 44.1	42 63	41.1	42 18.7	43 62	39.8	41 39.2	45 59	38.0	41 11.9	46 58	36.8	40 43.9	47 56	35.7	40 15.2	48 55	34.5	39 45.8	50 53	33.4	39 00.5	51 51	31.7	4
45	42 06.1	40 64	41.5	41 41.6	41 62	40.2	41 03.5	43 60	38.4	40 37.2	45 58	37.2	40 10.1	46 57	36.1	39 42.4	47 55	34.9	39 13.9	48 54	33.8	38 30.0	50 51	32.1	45
6	41 27.8	39 64	41.8	41 04.3	40 63	40.6	40 27.5	42 60	38.8	40 02.1	43 59	37.6	39 36.0	44 57	36.4	39 09.2	45 56	35.3	38 41.7	46 54	34.1	37 59.2	48 52	32.4	6
7	40 49.2	37 65	42.2	40 26.6	38 63	40.9	39 51.3	40 61	39.1	39 26.8	41 59	38.0	39 01.6	43 58	36.8	38 35.8	44 56	35.6	38 09.2	45 55	34.5	37 28.2	46 52	32.8	7
8	40 10.3	35 65	42.5	39 48.7	37 64	41.3	39 14.7	39 61	39.5	38 51.2	40 60	38.3	38 27.0	41 58	37.1	38 02.0	42 57	36.0	37 36.4	43 55	34.8	36 56.8	45 53	33.1	8
9	39 31.3	34 66	42.8	39 10.5	35 64	41.6	38 37.9	37 62	39.8	38 15.3	38 60	38.6	37 52.0	39 59	37.5	37 28.0	41 57	36.3	37 03.3	42 56	35.1	36 25.1	43 53	33.5	9
50	38 51.9	32 66	43.1	38 32.1	34 64	41.9	38 00.9	36 62	40.1	37 39.2	37 61	38.9	37 16.8	38 59	37.8	36 53.7	39 58	36.6	36 30.0	40 56	35.5	35 53.2	42 54	33.8	50
1	38 12.4	31 66	43.4	37 53.4	32 65	42.2	37 23.6	34 62	40.4	37 02.8	35 61	39.2	36 41.4	36 59	38.1	36 19.2	37 58	36.9	35 56.4	39 56	35.8	35 21.0	40 54	34.1	1
2	37 32.7	30 67	43.7	37 14.6	31 65	42.5	36 46.1	33 63	40.7	36 26.3	34 61	39.5	36 05.7	35 60	38.3	35 44.5	36 58	37.2	35 22.6	37 57	36.0	34 48.6	39 54	34.3	2
3	36 52.8	28 67	43.9	36 35.6	29 65	42.7	36 08.4	31 63	40.9	35 49.5	32 62	39.8	35 29.8	33 60	38.6	35 09.5	34 59	37.5	34 48.6	35 57	36.3	34 15.9	37 55	34.6	3
4	36 12.7	27 67	44.1	35 56.4	28 66	43.0	35 30.5	30 63	41.2	35 12.5	31 62	40.0	34 53.7	32 60	38.9	34 34.3	33 59	37.7	34 14.3	34 57	36.6	33 43.1	35 55	34.9	4
55	35 32.4	25 67	44.4	35 17.0	26 66	43.2	34 52.5	28 64	41.4	34 35.3	29 62	40.3	34 17.5	30 61	39.1	33 59.0	31 59	37.9	33 39.8	32 58	36.8	33 10.0	34 55	35.1	55
6	34 52.0	24 68	44.6	34 37.4	25 66	43.4	34 14.2	27 64	41.6	33 57.9	28 63	40.5	33 41.0	29 61	39.3	33 23.4	30 60	38.2	33 05.2	31 58	37.0	32 36.7	32 56	35.3	6
7	34 11.5	22 68	44.8	33 57.7	24 66	43.6	33 35.8	25 64	41.8	33 20.4	26 63	40.7	33 04.4	27 61	39.5	32 47.7	28 60	38.4	32 30.4	29 58	37.3	32 03.3	31 56	35.6	7
8	33 30.8	21 68	45.0	33 17.9	22 67	43.8	32 57.3	24 64	42.0	32 42.7	25 63	40.9	32 27.6	26 62	39.7	32 11.8	27 60	38.6	31 55.4	28 59	37.5	31 29.6	29 56	35.8	8
9	32 50.0	20 68	45.1	32 37.9	21 67	44.0	32 18.6	22 65	42.2	32 04.9	23 63	41.1	31 50.6	24 62	39.9	31 35.7	25 60	38.8	31 20.2	26 59	37.7	30 55.8	28 57	36.0	9
60	32 09.1	18 68	45.3	31 57.8	19 67	44.1	31 39.8	21 65	42.4	31 26.9	22 63	41.2	31 13.5	23 62	40.1	30 59.5	24 61	39.0	30 44.9	25 59	37.8	30 21.9	26 57	36.2	60
1	31 28.0	17 69	45.4	31 17.6	18 67	44.3	31 00.8	19 65	42.5	30 48.9	20 64	41.4	30 36.3	21 62	40.3	30 23.2	22 61	39.1	30 09.4	23 59	38.0	29 47.8	25 57	36.3	1
2	30 46.9	15 69	45.6	30 37.3	17 67	44.4	30 21.8	18 65	42.7	30 10.7	19 64	41.6	29 59.0	20 62	40.4	29 46.7	21 61	39.3	29 33.9	22 60	38.2	29 13.6	23 57	36.5	2
3	30 05.7	14 69	45.7	29 56.9	15 67	44.5	29 42.6	17 65	42.8	29 32.3	18 64	41.7	29 21.5	19 63	40.6	29 10.1	19 61	39.4	28 58.2	20 60	38.3	28 39.2	22 57	36.6	3
4	29 24.4	13 69	45.8	29 16.4	14 68	44.6	29 03.3	15 66	42.9	28 53.9	16 64	41.8	28 44.0	17 63	40.7	28 33.4	18 61	39.6	28 22.4	19 60	38.5	28 04.7	20 58	36.8	4
65	28 43.0	11 69	45.9	28 35.8	12 68	44.7	28 24.0	14 66	43.1	28 15.4	15 64	41.9	28 06.3	16 63	40.8	27 56.6	17 61	39.7	27 46.4	17 60	38.6	27 30.1	19 58	36.9	65
6	28 01.6	10 69	46.0	27 55.2	11 68	44.8	27 44.6	12 66	43.2	27 36.9	13 64	42.0	27 28.6	14 63	40.9	27 19.8	15 62	39.8	27 10.4	16 60	38.7	26 55.4	17 58	37.0	6
7	27 20.1	09 69	46.0	27 14.5	10 68	44.9	27 05.1	11 66	43.2	26 58.2	12 65	42.1	26 50.8	13 63	41.0	26 42.8	14 62	39.9	26 34.3	15 60	38.8	26 20.7	16 58	37.1	7
8	26 38.5	08 69	46.1	26 33.7	08 68	45.0	26 25.6	10 66	43.3	26 19.5	11 65	42.2	26 12.9	11 63	41.1	26 05.8	12 62	40.0	25 58.2	13 60	38.9	25 45.8	14 58	37.2	8
9	25 57.0	06 69	46.2	25 53.0	07 68	45.0	25 46.0	08 66	43.4	25 40.7	09 65	42.3	25 34.9	10 63	41.2	25 28.7	11 62	40.1	25 21.9	12 60	39.0	25 10.9	13 58	37.3	9
70	25 15.3	05 69	46.2	25 12.1	06 68	45.1	25 06.3	07 66	43.4	25 01.9	08 65	42.3	24 56.9	09 63	41.2	24 51.5	09 62	40.1	24 45.6	10 61	39.0	24 35.9	11 58	37.4	70
1	24 33.7	04 69	46.2	24 31.2	04 68	45.1	24 26.7	06 66	43.5	24 23.0	06 65	42.4	24 18.9	07 63	41.3	24 14.3	08 62	40.2	24 09.3	09 61	39.1	24 00.8	10 59	37.5	1
2	23 52.0	02 69	46.3	23 50.4	03 68	45.2	23 47.0	04 66	43.5	23 44.1	05 65	42.4	23 40.8	06 64	41.3	23 37.1	07 62	40.3	23 32.8	07 61	39.2	23 25.7	09 59	37.5	2
3	23 10.4	01 69	46.3	23 09.5	02 68	45.2	23 07.2	03 66	43.6	23 05.2	04 65	42.5	23 02.7	05 64	41.4	22 59.8	05 62	40.3	22 56.4	06 61	39.2	22 50.5	07 59	37.6	3
4	22 28.7	00 69	46.3	22 28.5	01 68	45.2	22 27.5	02 66	43.6	22 26.2	02 65	42.5	22 24.6	03 64	41.4	22 22.5	04 62	40.3	22 19.9	05 61	39.2	22 15.3	06 59	37.6	4
75	21 47.0	01 69	46.3	21 47.6	01 68	45.2	21 47.7	00 66	43.6	21 47.3	01 65	42.5	21 46.4	02 64	41.4	21 45.1	02 62	40.3	21 43.4	03 61	39.3	21 40.1	04 59	37.7	75
6	21 05.3	03 69	46.3	21 06.7	02 68	45.2	21 08.0	01 66	43.6	21 08.3	00 65	42.5	21 08.3	00 64	41.4	21 07.8	01 62	40.4	21 06.9	02 61	39.3	21 04.9	03 59	37.7	6
7	20 23.7	04 69	46.2	20 25.8	03 68	45.2	20 28.2	02 66	43.6	20 29.4	02 65	42.5	20 30.1	01 64	41.4	20 30.4	00 62	40.4	20 30.4	00 61	39.3	20 29.6	01 59	37.7	7
8	19 42.1	05 69	46.2	19 44.9	04 68	45.1	19 48.5	04 66	43.5	19 50.4	03 65	42.5	19 51.9	02 64	41.4	19 53.1	02 62	40.4	19 53.9	01 61	39.3	19 54.3	00 59	37.7	8
9	19 00.4	06 69	46.2	19 04.0	06 68	45.1	19 08.8	05 66	43.5	19 11.5	04 65	42.5	19 13.8	04 64	41.4	19 15.7	03 62	40.3	19 17.3	02 61	39.3	19 19.1	01 59	37.7	9
80	18 18.9	08 69	46.1	18 23.2	07 68	45.1	18 29.1	06 66	43.5	18 32.5	05 65	42.4	18 35.7	05 64	41.4	18 38.4	04 62	40.3	18 40.8	04 61	39.3	18 43.8	03 59	37.7	80
1	17 37.3	09 69	46.0	17 42.4	08 68	45.0	17 49.4	07 66	43.4	17 53.6	07 65	42.4	17 57.5	06 63	41.3	18 01.1	06 62	40.3	18 04.3	05 61	39.2	18 08.6	04 59	37.7	1
2	16 55.8	10 69	46.0	17 01.6	09 68	44.9	17 09.8	09 66	43.4	17 14.8	08 65	42.3	17 19.5	08 63	41.3	17 23.8	07 62	40.2	17 27.9	06 61	39.2	17 33.3	06 59	37.6	2
3	16 14.4	11 69	45.9	16 20.9	11 68	44.9	16 30.2	10 66	43.3	16 36.0	09 65	42.3	16 41.4	09 63	41.2	16 46.6	08 62	40.2	16 51.5	08 61	39.2	16 58.1	07 59	37.6	3
4	15 33.0	12 69	45.8	15 40.3	12 68	44.8	15 50.6	11 66	43.2	15 57.2	11 65	42.2	16 03.4	10 63	41.2	16 09.4	10 62	40.1	16 15.1	09 61	39.1	16 23.0	08 59	37.5	4
85	14 51.7	14 69	45.7	14 59.7	13 68	44.7	15 11.2	12 66	43.2	15 18.5	12 64	42.1	15 25.5	11 63	41.1	15 32.3	11 62	40.1	15 38.7	11 60	39.0	15 47.9	10 58	37.5	85
6	14 10.4	15 69	45.6	14 19.1	14 67	44.6	14 31.7	14 66	43.1	14 39.8	13 64	42.0	14 47.6	13 63	41.0	14 55.2	12 62	40.0	15 02.4	12 60	39.0	15 12.8	11 58	37.4	6
7	13 29.2	16 68	45.5	13 38.7	16 67	44.5	13 52.4	15 65	43.0	14 01.2	15 64	41.9	14 09.8	14 63	40.9	14 18.1	14 62	39.9	14 26.2	13 60	38.9	14 37.8	13 58	37.3	7
8	12 48.1	17 68	45.4	12 58.3	17 67	44.4	13 13.1	16 65	42.9	13 22.7	16 64	41.8	13 32.1	15 63	40.8	13 41.2	15 61	39.8	13 50.0	15 60	38.8	14 02.8	14 58	37.3	8
9	12 07.1	18 68	45.3	12 18.0	18 67	44.3	12 33.9	17 65	42.7	12 44.3	17 64	41.7	12 54.4	17 63	40.7	13 04.3	16 61	39.7	13 13.9	16 60	38.7	13 27.9	15 58	37.2	9
90	11 26.2	20 68	45.1	11 37.8	19 67	44.1	11 54.8	19 65	42.6	12 05.9	18 64	41.6	12 16.8	18 62	40.6	12 27.5	18 61	39.6	12 37.9	17 60	38.6	12 53.1	17 58	37.1	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	28 00.0	1.0 01	180.0	27 00.0	1.0 01	180.0	25 30.0	1.0 01	180.0	24 30.0	1.0 01	180.0	23 30.0	1.0 01	180.0	22 30.0	1.0 01	180.0	21 30.0	1.0 01	180.0	20 00.0	1.0 01	180.0	00
1	27 59.6	1.0 02	179.2	26 59.6	1.0 02	179.2	25 29.6	1.0 02	179.3	24 29.6	1.0 02	179.3	23 29.7	1.0 02	179.3	22 29.7	1.0 02	179.3	21 29.7	1.0 02	179.3	19 59.7	1.0 02	179.4	1
2	27 58.4	1.0 03	178.4	26 58.5	1.0 03	178.5	25 28.5	1.0 03	178.5	24 28.6	1.0 03	178.6	23 28.6	1.0 03	178.6	22 28.6	1.0 03	178.7	21 28.7	1.0 03	178.7	19 58.7	1.0 03	178.7	2
3	27 56.4	1.0 05	177.6	26 56.5	1.0 04	177.7	25 26.7	1.0 04	177.8	24 26.8	1.0 04	177.9	23 26.9	1.0 04	177.9	22 26.9	1.0 04	178.0	21 27.0	1.0 04	178.0	19 57.2	1.0 04	178.1	3
4	27 53.7	1.0 06	176.9	26 53.8	1.0 06	176.9	25 24.1	1.0 06	177.1	24 24.3	1.0 05	177.1	23 24.4	1.0 05	177.2	22 24.6	1.0 05	177.3	21 24.7	1.0 05	177.4	19 55.0	1.0 05	177.5	4
05	27 50.1	1.0 07	176.1	26 50.4	1.0 07	176.2	25 20.8	1.0 07	176.3	24 21.0	1.0 07	176.4	23 21.3	1.0 06	176.5	22 21.5	1.0 06	176.6	21 21.8	1.0 06	176.7	19 52.1	1.0 06	176.9	05
6	27 45.8	99 09	175.3	26 46.2	99 08	175.4	25 16.7	99 08	175.6	24 17.1	99 08	175.7	23 17.5	99 08	175.8	22 17.8	99 07	176.0	21 18.2	99 07	176.1	19 48.7	99 07	176.3	6
7	27 40.7	99 10	174.5	26 41.2	99 10	174.7	25 11.9	99 09	174.9	24 12.4	99 09	175.0	23 12.9	99 09	175.2	22 13.4	99 08	175.3	21 13.9	99 08	175.4	19 44.6	99 08	175.6	7
8	27 34.7	99 11	173.7	26 35.4	99 11	173.9	25 06.4	99 10	174.2	24 07.1	99 10	174.3	23 07.7	99 10	174.5	22 08.4	99 10	174.6	21 09.0	99 09	174.8	19 39.9	99 09	175.0	8
9	27 28.1	99 12	173.0	26 28.9	99 12	173.2	25 00.2	99 12	173.4	24 01.0	99 11	173.6	23 01.8	99 11	173.8	22 02.6	99 11	174.0	21 03.4	99 10	174.1	19 34.6	99 10	174.4	9
10	27 20.6	98 14	172.2	26 21.7	98 13	172.4	24 53.2	98 13	172.7	23 54.3	98 12	172.9	22 55.3	98 12	173.1	21 56.2	98 12	173.3	20 57.2	98 11	173.5	19 28.6	98 11	173.8	10
1	27 12.4	98 15	171.4	26 13.7	98 15	171.7	24 45.6	98 14	172.0	23 46.8	98 14	172.2	22 48.0	98 13	172.4	21 49.2	98 13	172.6	20 50.4	98 12	172.9	19 22.1	98 12	173.2	1
2	27 03.4	97 16	170.7	26 04.9	97 16	170.9	24 37.2	98 15	171.3	23 38.6	98 15	171.5	22 40.1	98 14	171.8	21 41.5	98 14	172.0	20 42.9	98 14	172.2	19 14.9	98 13	172.6	2
3	26 53.7	97 17	169.9	25 55.5	97 17	170.2	24 28.1	97 16	170.6	23 29.8	97 16	170.8	22 31.5	97 15	171.1	21 33.1	97 15	171.3	20 34.8	97 15	171.6	19 07.2	97 14	172.0	3
4	26 43.2	97 19	169.2	25 45.3	97 18	169.4	24 18.3	97 17	169.9	23 20.3	97 17	170.1	22 22.2	97 17	170.4	21 24.1	97 16	170.7	20 26.0	97 16	171.0	18 58.8	97 15	171.4	4
15	26 32.0	96 20	168.4	25 34.3	96 19	168.7	24 07.8	96 19	169.2	23 10.1	96 18	169.5	22 12.3	96 18	169.8	21 14.5	96 17	170.0	20 16.6	96 17	170.3	18 49.8	96 16	170.8	15
6	26 20.0	96 21	167.7	25 22.7	96 21	168.0	23 56.6	96 20	168.5	22 59.2	96 19	168.8	22 01.7	96 19	169.1	21 04.2	96 18	169.4	20 06.6	96 18	169.7	18 40.3	96 17	170.2	6
7	26 07.4	95 22	166.9	25 10.3	95 22	167.3	23 44.7	95 21	167.8	22 47.6	95 20	168.1	21 50.5	95 20	168.4	20 53.3	95 19	168.8	19 56.0	95 19	169.1	18 30.1	96 18	169.6	7
8	25 54.0	94 24	166.2	24 57.3	94 23	166.6	23 32.2	95 22	167.1	22 35.4	95 21	167.4	21 38.6	95 21	167.8	20 41.7	95 20	168.1	19 44.8	95 20	168.5	18 19.4	95 19	169.0	8
9	25 39.8	94 25	165.5	24 43.5	94 24	165.9	23 19.0	94 23	166.4	22 22.6	94 22	166.8	21 26.1	94 22	167.1	20 29.5	94 21	167.5	19 33.0	94 21	167.9	18 08.0	94 20	168.4	9
20	25 25.0	93 26	164.7	24 29.1	93 25	165.1	23 05.1	93 24	165.7	22 09.0	93 24	166.1	21 12.9	94 23	166.5	20 16.8	94 22	166.9	19 20.5	94 22	167.3	17 56.1	94 21	167.8	20
1	25 09.5	92 27	164.0	24 14.0	93 26	164.5	22 50.6	93 25	165.1	21 54.9	93 25	165.5	20 59.2	93 24	165.9	20 03.4	93 23	166.3	19 07.5	93 23	166.6	17 43.7	93 22	167.2	1
2	24 53.3	92 28	163.3	23 58.2	92 27	163.8	22 35.4	92 26	164.4	21 40.1	92 26	164.8	20 44.8	92 25	165.2	19 49.4	92 24	165.6	18 53.9	92 24	166.1	17 30.6	93 23	166.7	2
3	24 36.4	91 29	162.6	23 41.7	91 29	163.1	22 19.6	91 27	163.7	21 24.7	92 27	164.2	20 29.8	92 26	164.6	19 34.8	92 25	165.0	18 39.7	92 25	165.5	17 17.0	92 24	166.1	3
4	24 18.9	90 30	161.9	23 24.6	90 30	162.4	22 03.1	91 28	163.1	21 08.7	91 28	163.5	20 14.2	91 27	164.0	19 19.6	91 26	164.4	18 24.9	91 26	164.9	17 02.9	91 24	165.5	4
25	24 00.6	90 31	161.3	23 06.9	90 31	161.7	21 46.0	90 29	162.5	20 52.0	90 29	162.9	19 58.0	90 28	163.4	19 03.8	90 27	163.8	18 09.6	90 26	164.3	16 48.2	91 25	165.0	25
6	23 41.8	89 32	160.6	22 48.5	89 32	161.1	21 28.3	89 31	161.8	20 34.8	89 30	162.3	19 41.2	89 29	162.8	18 47.5	90 28	163.2	17 53.7	90 27	163.7	16 32.9	90 26	164.4	6
7	23 22.3	88 34	159.9	22 29.5	88 33	160.4	21 10.0	88 32	161.2	29 17.0	89 31	161.7	19 23.8	89 30	162.2	18 30.6	89 29	162.7	17 37.3	89 28	163.1	16 17.2	89 27	163.9	7
8	23 02.2	87 35	159.2	22 09.8	87 34	159.8	20 51.1	88 32	160.6	19 58.5	88 32	161.1	19 05.9	88 31	161.6	18 13.1	88 30	162.1	17 20.3	88 29	162.6	16 00.9	88 28	163.3	8
9	22 41.4	86 36	158.6	21 49.6	86 35	159.1	20 31.6	87 33	159.9	19 39.5	87 33	160.5	18 47.4	87 32	161.0	17 55.1	87 31	161.5	17 02.7	87 30	162.0	15 44.1	87 29	162.8	9
30	22 20.1	85 37	157.9	21 28.7	86 36	158.5	20 11.6	86 34	159.3	19 20.0	86 34	159.9	18 28.3	86 33	160.4	17 36.5	86 32	160.9	16 44.7	86 31	161.5	15 26.7	87 30	162.2	30
1	21 58.1	85 38	157.3	21 07.3	85 37	157.9	19 50.9	85 35	158.7	18 59.8	85 34	159.3	18 08.7	85 34	159.8	17 17.4	86 33	160.4	16 26.1	86 32	160.9	15 08.9	86 31	161.7	1
2	21 35.6	84 39	156.7	20 45.3	84 38	157.3	19 29.7	84 36	158.1	18 39.2	84 35	158.7	17 48.5	84 34	159.3	16 57.8	85 34	159.8	16 07.0	85 33	160.4	14 50.6	85 31	161.2	2
3	21 12.4	83 39	156.1	20 22.7	83 39	156.7	19 07.9	83 37	157.5	18 17.9	83 36	158.1	17 27.8	84 35	158.7	16 37.6	84 34	159.3	15 47.3	84 34	159.8	14 31.7	84 32	160.7	3
4	20 48.8	82 40	155.4	19 59.6	82 39	156.1	18 45.6	82 38	157.0	17 56.2	83 37	157.6	17 06.6	83 36	158.2	16 17.0	83 35	158.7	15 27.2	83 34	159.3	14 12.4	83 33	160.2	4
35	20 24.5	81 41	154.8	19 35.9	81 40	155.5	18 22.8	81 39	156.4	17 33.9	82 38	157.0	16 44.9	82 37	157.6	15 55.8	82 36	158.2	15 06.6	82 35	158.8	13 52.6	82 34	159.7	35
6	19 59.7	80 42	154.2	19 11.7	80 41	154.9	17 59.4	80 40	155.8	17 11.1	81 39	156.4	16 22.7	81 38	157.1	15 34.1	81 37	157.7	14 45.5	81 36	158.3	13 32.4	81 35	159.2	6
7	19 34.4	79 43	153.7	18 47.0	79 42	154.3	17 35.6	79 41	155.3	16 47.8	80 40	155.9	16 00.0	80 39	156.5	15 12.0	80 38	157.2	14 23.9	80 37	157.8	13 11.6	80 35	158.7	7
8	19 08.5	78 44	153.1	18 21.7	78 43	153.7	17 11.2	79 41	154.7	16 24.0	79 40	155.4	15 36.8	79 39	156.0	14 49.4	79 38	156.6	14 01.9	79 38	157.3	12 50.4	79 36	158.2	8
9	18 42.2	77 45	152.5	17 55.9	77 44	153.2	16 46.3	78 42	154.2	15 59.8	78 41	154.8	15 13.1	78 40	155.5	14 26.3	78 39	156.1	13 39.4	78 38	156.8	12 28.8	78 37	157.7	9
40	18 15.3	76 46	152.0	17 29.7	76 45	152.6	16 21.0	77 43	153.6	15 35.0	77 42	154.3	14 48.9	77 41	155.0	14 02.7	77 40	155.6	13 16.4	77 39	156.3	12 06.7	78 38	157.3	40
1	17 47.9	75 46	151.4	17 02.9	75 45	152.1	15 55.1	75 44	153.1	15 09.8	76 43	153.8	14 24.3	76 42	154.5	13 38.7	76 41	155.1	12 53.0	76 40	155.8	11 44.2	76 38	156.8	1
2	17 20.1	74 47	150.9	16 35.7	74 46	151.6	15 28.8	74 45	152.6	14 44.1	75 44	153.3	13 59.2	75 43	154.0	13 14.2	75 42	154.7	12 29.1	75 40	155.3	11 21.3	75 39	156.3	2
3	16 51.8	73 48	150.3	16 08.0	73 47	151.0	15 02.1	73 45	152.1	14 17.9	74 44	152.8	13 33.7	74 43	153.5	12 49.3	74 42	154.2	12 04.9	74 41	154.9	10 58.0	74 40	155.9	3
4	16 23.0	72 49	149.8	15 39.8	72 48	150.5	14 34.8	72 46	151.6	13 51.4	73 45	152.3	13 07.7	73 44	153.0	12 24.0	73 43	153.7	11 40.2	73 42	154.4	10 34.2	73 40	155.5	4
45	15 53.8	71 49	149.3	15 11.2	71 48	150.0	14 07.2	71 47	151.1	13 24.3	72 46	151.8	12 41.4	72 45	152.5	11 58.3	72 44	153.3	11 15.1	72 43	154.0	10 10.1	72 41	155.0	45
6	15 24.1	70 50	148.8	14 42.2	70 49	149.5	13 39.1	70 48	150.6	12 56.9	70 46	151.4	12 14.6	71 45	152.1	11 32.1	71 44	152.8	10 49.5	71 43	153.5	9 45.5	71 42	154.6	6
7	14 54.0	69 51	148.3	14 12.7	69 50	149.0	13 10.6	69 48	150.2	12 29.0	69 47	150.9	11 47.4	70 46	151.6	11 05.5	70 45	152.4	10 23.6	70 44	153.1	9 20.6	70 42	154.2	7
8	14 23.4	68 52	147.8	13 42.9	68 50	148.6	12 41.7	68 49	149.7	12 00.8	68 48	150.4	11 19.7	68 47	151.2	10 38.6	69 46	151.9	9 57.3	69 44	152.7	8 55.3	69 43	153.8	8
9	13 52.5	66 52	147.3	13 12.6	67 51	148.1	12 12.4	67 50	149.2	11 32.1	67 48	150.0	10 51.7	67 47	150.7	10 11.2	68 46	151.5	9 30.7	68 45	152.2	8 29.6	68 43	153.4	9
50	13 21.2	65 53	146.8	12 41.9	66 52	147.6	11 42.7	66 50	148.8	11 03.1	66 49	149.5	10 23.4	66 48	150.3	9 43.5	66 47	151.1	9 03.6	67 46	151.8	8 03.5	67 44	153.0	50
1	12 49.4	64 54	146.4	12 10.8	64 52	147.2	11 12.6	65 51	148.3	10 33.7	65 50	149.1	9 54.6	65 49	149.9	9 15.4	65 47	150.6	8 36.2	66 46	151.4	7 37.1	66 45	152.6	1
2	12 17.3	63 54	145.9	11 39.3	63 53	146.7	10 42.1	64 51	147.9	10 03.9	64 50	148.7	9 25.5	64 49	149.5	8 47.0	64 48	150.2	8 08.4	64 47	151.0	7 10.4	65 45	152.2	2
3	11 44.8	62 55	145.5	11 07.5	62 54	146.3	10 11.3	63 52	147.5	9 33.7	63 51	148.3	8 56.0	63 50	149.1	8 18.2	63 49	149.8	7 40.3	63 47	150.6	6 43.3	63 46	151.8	3
4	11 11.9	61 55	145.0	10 35.3	61 54	145.9	9 40.1	61 53	147.1	9 03.2	62 51	147.9	8 26.2	62 50	148.7	7 49.0	62 49	149.4	7 11.8	62 48	150.2	6 15.8	62 46	151.4	4
55	10 38.7	60 56	144.6	10 02.8	60 55	145.4	9 08.6	60 53	146.6	8 32.3	60 52	147.5	7 56.0	61 51	148.3	7 19.5	61 50	149.1	6 43.0	61 49	149.9	5 48.1	61 47	151.1	55
6	10 05.2	59 56	144.2	9 29.9	59 55	145.0	8 36.7	59 54	146.2	8 01.1	59 53	147.1	7 25.5	60 51	147.9	6 49.7	60 50	148.7	6 13.9	60 49	149.5	5 20.0	60 47	150.7	6
7	9 31.2	58 57	143.8	8 56.6	58 56	144.6	8 04.5	58 54	145.9	7 29.6	58 53	146.7	6 54.6	58 52	147.5	6 19.6	58 51	148.3	5 44.5	59 50	149.1				7
8	8 57.0	56 58	143.4	8 23.1	57 56	144.2	7 32.0	57 55	145.5	6 57.8	57 54	146.3	6 23.5	57 52	147.1	5 49.1	57 51	148.0	5 14.7	57 50	148.8				8
9	8 22.5	55 58	143.0	7 49.2	56 57	143.8	6 59.1	56 55	145.1	6 25.6	56 54	145.9	5 52.0	56 53	146.8	5 18.4	56 52	147.6							9
60	7 47.6	54 59	142.6	7 15.0	54 57	143.5	6 26.0	55 56	144.7	5 53.2	55 55	145.6	5 20.3	55 53	146.4										60
1	7 12.4	53 59	142.2	6 40.5	53 58	143.1	5 52.5	53 56	144.4	5 20.4	54 55	145.2													1
2	6 37.0	52 60	141.9	6 05.7	52 58	142.7	5 18.8	52 56	144.0																2
3	6 01.2	51 60	141.5	5 30.7	51 59	142.4																			3
4	5 25.2	50 61	141.2																						4

DECLINATION SAME NAME AS LATITUDE

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	10 45.3	21 68	45.0	10 57.7	20 67	44.0	11 15.8	20 65	42.5	11 27.7	20 64	41.5	11 39.3	19 62	40.5	11 50.7	19 61	39.5	12 01.9	19 60	38.5	12 18.4	18 58	37.0	91
2	10 04.6	22 68	44.8	10 17.7	22 66	43.8	10 36.9	21 65	42.4	10 49.5	21 63	41.4	11 01.9	20 62	40.4	11 14.1	20 61	39.4	11 26.1	20 60	38.4	11 43.7	19 58	36.9	2
3	9 24.0	23 68	44.7	9 37.8	23 66	43.7	9 58.1	22 64	42.2	10 11.4	22 63	41.2	10 24.6	22 62	40.2	10 37.6	21 61	39.2	10 50.3	21 59	38.2	11 09.2	21 57	36.7	3
4	8 43.5	24 67	44.5	8 58.0	24 66	43.5	9 19.4	24 64	42.1	9 33.5	23 63	41.1	9 47.4	23 62	40.1	10 01.1	23 61	39.1	10 14.7	22 59	38.1	10 34.7	22 57	36.6	4
95	8 03.1	25 67	44.3	8 18.3	25 66	43.4	8 40.8	25 64	41.9	8 55.7	25 63	40.9	9 10.3	24 62	39.9	9 24.8	24 60	38.9	9 39.2	24 59	38.0	10 00.4	23 57	36.5	95
6	7 22.9	27 67	44.2	7 38.8	26 66	43.2	8 02.4	26 64	41.7	8 17.9	26 63	40.7	8 33.4	26 61	39.8	8 48.6	25 60	38.8	9 03.7	25 59	37.8	9 26.1	25 57	36.3	6
7	6 42.8	28 67	44.0	6 59.4	28 65	43.0	7 24.1	27 64	41.5	7 40.4	27 62	40.6	7 56.5	27 61	39.6	8 12.6	27 60	38.6	8 28.4	26 59	37.7	8 52.0	26 57	36.2	7
8	6 02.8	29 66	43.8	6 20.1	29 65	42.8	6 45.9	28 63	41.4	7 02.9	28 62	40.4	7 19.8	28 61	39.4	7 36.6	28 60	38.5	7 53.3	28 58	37.5	8 18.0	27 56	36.0	8
9	5 23.0	30 66	43.6	5 41.0	30 65	42.6	6 07.8	30 63	41.2	6 25.6	30 62	40.2	6 43.3	29 61	39.2	7 00.8	29 59	38.3	7 18.2	29 58	37.3	7 44.2	29 56	35.9	9
100				5 02.0	31 65	42.4	5 30.0	31 63	41.0	5 48.5	31 62	40.0	6 06.9	31 60	39.0	6 25.2	30 59	38.1	6 43.4	30 58	37.1	7 10.4	30 56	35.7	100
1										5 11.5	32 62	39.8	5 30.6	32 60	38.8	5 49.7	32 59	37.9	6 08.6	32 58	36.9	6 36.9	31 56	35.5	1
2																5 14.3	33 59	37.7	5 34.0	33 57	36.7	6 03.4	33 55	35.3	2
3																						5 30.2	34 55	35.1	3

Lat. 16°

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	51 30.0	1.0 01	00.0	51 00.0	1.0 01	00.0	50 00.0	1.0 01	00.0	49 30.0	1.0 01	00.0	49 00.0	1.0 01	00.0	48 30.0	1.0 01	00.0	47 00.0	1.0 01	00.0	46 30.0	1.0 01	00.0	00
1	51 29.5	1.0 02	00.9	50 59.5	1.0 02	00.9	49 59.6	1.0 02	00.9	49 29.6	1.0 02	00.8	48 59.6	1.0 02	00.8	48 29.6	1.0 02	00.8	46 59.6	1.0 02	00.8	46 29.6	1.0 02	00.7	1
2	51 28.1	1.0 04	01.9	50 58.2	1.0 04	01.8	49 58.2	1.0 04	01.7	49 28.3	1.0 04	01.7	48 58.3	1.0 03	01.7	48 28.4	1.0 03	01.6	46 58.5	1.0 03	01.5	46 28.5	1.0 03	01.5	2
3	51 25.8	1.0 05	02.8	50 55.9	1.0 05	02.7	49 56.1	1.0 05	02.6	49 26.2	1.0 05	02.5	48 56.2	1.0 05	02.5	48 26.3	1.0 05	02.4	46 56.6	1.0 04	02.3	46 26.7	1.0 04	02.2	3
4	51 22.5	99 07	03.7	50 52.7	99 07	03.6	49 53.0	99 07	03.5	49 23.2	99 06	03.4	48 53.3	99 06	03.3	48 23.5	99 06	03.2	46 53.9	1.0 06	03.0	46 24.1	1.0 06	02.9	4
05	51 18.3	99 09	04.6	50 48.6	99 08	04.5	49 49.1	99 08	04.3	49 19.3	99 08	04.2	48 49.6	99 08	04.1	48 19.8	99 07	04.0	46 50.5	99 07	03.8	46 20.7	99 07	03.7	05
6	51 13.2	99 10	05.6	50 43.5	99 10	05.4	49 44.3	99 09	05.2	49 14.7	99 09	05.1	48 45.0	99 09	05.0	48 15.4	99 09	04.8	46 46.4	99 08	04.5	46 16.7	99 08	04.4	6
7	51 07.1	98 12	06.5	50 37.6	98 11	06.3	49 38.6	98 11	06.0	49 09.1	98 11	05.9	48 39.6	98 10	05.8	48 10.1	98 10	05.6	46 41.5	99 09	05.3	46 11.9	99 09	05.1	7
8	51 00.2	98 13	07.4	50 30.8	98 13	07.2	49 32.2	98 12	06.9	49 02.8	98 12	06.7	48 33.4	98 12	06.6	48 04.0	98 11	06.4	46 35.8	98 11	06.0	46 06.4	98 10	05.8	8
9	50 52.3	97 15	08.3	50 23.2	97 14	08.1	49 24.8	97 14	07.7	48 55.6	97 13	07.6	48 26.4	97 13	07.4	47 57.2	97 13	07.2	46 29.4	98 12	06.7	46 00.1	98 12	06.6	9
10	50 43.6	96 16	09.2	50 14.6	97 16	09.0	49 16.6	97 15	08.6	48 47.6	97 15	08.4	48 18.6	97 14	08.2	47 49.6	97 14	08.0	46 22.3	97 13	07.4	45 53.2	97 13	07.3	10
1	50 33.9	96 17	10.0	50 05.2	96 17	09.8	49 07.7	96 16	09.4	48 38.8	96 16	09.2	48 10.0	96 16	09.0	47 41.2	96 15	08.8	46 14.5	96 14	08.2	45 45.5	96 14	08.0	1
2	50 23.4	95 19	10.9	49 54.9	95 18	10.7	48 57.8	95 18	10.2	48 29.3	95 17	10.0	48 00.6	95 17	09.7	47 32.0	96 17	09.5	46 05.9	96 15	08.9	45 37.2	96 15	08.7	2
3	50 12.1	94 20	11.8	49 43.8	94 20	11.5	48 47.2	94 19	11.0	48 18.9	95 19	10.8	47 50.5	95 18	10.5	47 22.1	95 18	10.3	45 56.7	95 17	09.6	45 28.1	95 16	09.4	3
4	49 59.9	93 22	12.6	49 31.9	93 21	12.3	48 35.8	94 20	11.8	48 07.7	94 20	11.5	47 39.6	94 19	11.3	47 11.4	94 19	11.0	45 46.7	94 18	10.3	45 18.4	94 17	10.1	4
15	49 46.9	92 23	13.5	49 19.2	92 23	13.2	48 23.6	93 22	12.6	47 55.8	93 21	12.3	47 27.9	93 21	12.0	47 00.0	93 20	11.8	45 36.1	93 19	11.0	45 08.0	94 18	10.7	15
6	49 33.1	91 24	14.3	49 05.7	91 24	14.0	48 10.7	92 23	13.4	47 43.1	92 22	13.1	47 15.5	92 22	12.8	46 47.9	92 21	12.5	45 24.7	93 20	11.7	44 56.9	93 20	11.4	6
7	49 18.4	90 26	15.1	48 51.3	90 25	14.8	47 57.0	91 24	14.1	47 29.7	91 24	13.8	47 02.4	91 23	13.5	46 35.1	91 23	13.2	45 12.7	92 21	12.3	44 45.2	92 21	12.1	7
8	49 03.0	89 27	15.9	48 36.3	89 26	15.5	47 42.5	90 25	14.9	47 15.6	90 25	14.6	46 48.6	90 24	14.2	46 21.5	90 24	13.9	45 00.1	91 22	13.0	44 32.8	91 22	12.7	8
9	48 46.9	88 28	16.7	48 20.4	88 28	16.3	47 27.4	89 26	15.6	47 00.7	89 26	15.3	46 34.1	89 25	14.9	46 07.3	89 25	14.6	44 46.8	90 23	13.7	44 19.8	90 23	13.4	9
20	48 29.9	87 29	17.4	48 03.9	87 29	17.1	47 11.5	88 28	16.3	46 45.2	88 27	16.0	46 18.8	88 26	15.6	45 52.4	88 26	15.3	44 32.8	89 24	14.3	44 06.2	89 24	14.0	20
1	48 12.3	86 31	18.2	47 46.6	86 30	17.8	46 54.9	86 29	17.1	46 29.0	87 28	16.7	46 03.0	87 28	16.3	45 36.9	87 27	16.0	44 18.3	88 25	14.9	43 51.9	88 25	14.6	1
2	47 53.9	84 32	18.9	47 28.6	85 31	18.5	46 37.6	85 30	17.8	46 12.1	85 29	17.4	45 46.4	86 29	17.0	45 20.7	86 28	16.6	44 03.1	87 26	15.6	43 37.1	87 26	15.2	2
3	47 34.9	83 33	19.7	47 09.9	83 32	19.2	46 19.7	84 31	18.4	45 54.5	84 30	18.1	45 29.2	84 30	17.7	45 03.8	85 29	17.3	43 47.3	85 27	16.2	43 21.6	86 27	15.8	3
4	47 15.1	82 34	20.4	46 50.6	82 33	19.9	46 01.2	83 32	19.1	45 36.3	83 31	18.7	45 11.4	83 31	18.3	44 46.4	83 30	17.9	43 30.9	84 28	16.8	43 05.6	84 28	16.4	4
25	46 54.7	80 35	21.1	46 30.6	81 34	20.6	45 41.9	81 33	19.8	45 17.5	82 32	19.4	44 53.0	82 32	19.0	44 28.3	82 31	18.6	43 14.0	83 29	17.4	42 49.0	83 29	17.0	25
6	46 33.7	79 36	21.7	46 09.9	79 35	21.3	45 22.1	80 34	20.4	44 58.1	80 33	20.0	44 33.9	81 33	19.6	44 09.7	81 32	19.2	42 56.5	82 30	18.0	42 31.9	82 29	17.6	6
7	46 12.0	78 37	22.4	45 48.7	78 36	21.9	45 01.7	79 35	21.1	44 38.1	79 34	20.6	44 14.3	79 34	20.2	43 50.5	80 33	19.8	42 38.4	81 31	18.5	42 14.2	81 30	18.1	7
8	45 49.8	76 38	23.0	45 26.9	77 37	22.6	44 40.7	77 36	21.7	44 17.5	78 35	21.2	43 54.1	78 35	20.8	43 30.7	78 34	20.4	42 19.8	79 32	19.1	41 56.0	79 31	18.7	8
9	45 26.9	75 39	23.7	45 04.4	75 38	23.2	44 19.1	76 37	22.3	43 56.3	76 36	21.8	43 33.4	77 35	21.4	43 10.4	77 35	20.9	42 00.7	78 33	19.6	41 37.3	78 32	19.2	9
30	45 03.5	73 40	24.3	44 41.4	74 39	23.8	43 57.0	74 38	22.9	43 34.6	75 37	22.4	43 12.1	75 36	21.9	42 49.5	76 36	21.5	41 41.1	77 34	20.2	41 18.0	77 33	19.7	30
1	44 39.5	72 41	24.9	44 17.9	72 40	24.4	43 34.3	73 39	23.4	43 12.4	73 38	23.0	42 50.3	74 37	22.5	42 28.1	74 36	22.0	41 20.9	75 34	20.7	40 58.3	76 34	20.3	1
2	44 15.0	70 42	25.4	43 53.8	71 41	24.9	43 11.1	72 40	24.0	42 49.6	72 39	23.5	42 28.0	72 38	23.0	42 06.2	73 37	22.6	41 00.3	74 35	21.2	40 38.1	74 34	20.8	2
3	43 50.0	69 43	26.0	43 29.2	69 42	25.5	42 47.5	70 40	24.5	42 26.4	70 40	24.0	42 05.2	71 39	23.6	41 43.8	71 38	23.1	40 39.2	72 36	21.7	40 17.4	73 35	21.2	3
4	43 24.4	67 43	26.5	43 04.2	68 43	26.0	42 23.3	69 41	25.0	42 02.6	69 40	24.6	41 41.9	69 40	24.1	41 21.0	70 39	23.6	40 17.7	71 37	22.2	39 56.3	71 36	21.7	4
35	42 58.4	66 44	27.1	42 38.6	66 43	26.6	41 58.6	67 42	25.6	41 38.4	68 41	25.1	41 18.1	68 40	24.6	40 57.7	68 40	24.1	39 55.7	70 37	22.7	39 34.7	70 37	22.2	35
6	42 31.9	64 45	27.6	42 12.6	65 44	27.1	41 33.5	66 43	26.1	41 13.8	66 42	25.6	40 53.9	66 41	25.1	40 33.9	67 40	24.6	39 33.2	68 38	23.1	39 12.7	68 37	22.6	6
7	42 05.0	63 46	28.1	41 46.1	63 45	27.6	41 08.0	64 43	26.5	40 48.7	64 43	26.0	40 29.3	65 42	25.5	40 09.7	65 41	25.0	39 10.4	67 39	23.6	38 50.3	67 38	23.1	7
8	41 37.6	61 46	28.6	41 19.2	62 46	28.0	40 42.0	63 44	27.0	40 23.2	63 43	26.5	40 04.2	63 42	26.0	39 45.1	64 42	25.5	38 47.1	65 39	24.0	38 27.5	65 39	23.5	8
9	41 09.8	60 47	29.0	40 51.9	60 46	28.5	40 15.6	61 45	27.5	39 57.2	61 44	26.9	39 38.7	62 43	26.4	39 20.1	62 42	25.9	38 23.4	64 40	24.4	38 04.3	64 39	23.9	9
40	40 41.6	58 48	29.5	40 24.1	58 47	29.0	39 48.8	59 45	27.9	39 30.9	60 45	27.4	39 12.9	60 44	26.9	38 54.7	61 43	26.4	37 59.4	62 41	24.8	37 40.7	62 40	24.3	40
1	40 13.0	56 48	29.9	39 56.0	57 47	29.4	39 21.6	58 46	28.3	39 04.2	58 45	27.8	38 46.6	59 44	27.3	38 28.9	59 44	26.8	37 35.0	61 41	25.2	37 16.8	61 41	24.7	1
2	39 44.1	55 49	30.3	30 27.5	55 48	29.8	38 54.1	56 47	28.7	38 37.1	57 46	28.2	38 20.0	57 45	27.7	38 02.8	58 44	27.2	37 10.2	59 42	25.6	36 52.5	59 41	25.1	2
3	39 14.7	53 49	30.8	38 58.7	54 49	30.2	38 26.2	55 47	29.1	38 09.7	55 46	28.6	37 53.0	56 46	28.1	37 36.3	56 45	27.6	36 45.1	57 42	26.0	36 27.8	58 42	25.5	3
4	38 45.1	52 50	31.1	38 29.5	52 49	30.6	37 57.9	53 48	29.5	37 41.9	54 47	29.0	37 25.7	54 46	28.5	37 09.4	55 45	27.9	36 19.7	56 43	26.4	36 02.8	56 42	25.9	4
45	38 15.1	50 51	31.5	38 00.0	51 50	31.0	37 29.3	52 48	29.9	37 13.8	52 47	29.4	36 58.1	53 47	28.8	36 42.2	53 46	28.3	35 53.9	54 43	26.7	35 37.5	55 43	26.2	45
6	37 44.8	49 51	31.9	37 30.1	49 50	31.3	37 00.4	50 49	30.2	36 45.3	51 48	29.7	36 30.1	51 47	29.2	36 14.8	51 46	28.6	35 27.8	53 44	27.1	35 11.9	53 43	26.5	6
7	37 14.2	47 52	32.2	37 00.0	47 51	31.7	36 31.2	48 49	30.6	36 16.6	49 48	30.0	36 01.9	49 48	29.5	35 47.0	50 47	29.0	35 01.4	51 44	27.4	34 46.0	52 44	26.9	7
8	36 43.2	45 52	32.6	36 29.6	46 51	32.0	36 01.7	47 50	30.9	35 47.6	47 49	30.4	35 33.3	48 48	29.8	35 18.9	48 47	29.3	34 34.8	50 45	27.7	34 19.8	50 44	27.2	8
9	36 12.1	44 52	32.9	35 58.8	44 52	32.3	35 32.0	45 50	31.2	35 18.3	46 49	30.7	35 04.5	46 48	30.1	34 50.5	47 48	29.6	34 07.8	48 45	28.0	33 53.3	49 45	27.5	9
50	35 40.6	42 53	33.2	35 27.9	43 52	32.6	35 01.9	44 50	31.5	34 48.7	44 50	31.0	34 35.4	45 49	30.5	34 21.9	45 48	29.9	33 40.6	47 46	28.3	33 26.5	47 45	27.8	50
1	35 08.9	41 53	33.5	34 56.6	41 52	32.9	34 31.6	42 51	31.8	34 18.9	43 50	31.3	34 06.0	43 49	30.7	33 53.0	44 49	30.2	33 13.1	45 46	28.6	32 59.5	45 45	28.1	1
2	34 36.9	39 54	33.8	34 25.1	40 53	33.2	34 01.1	41 51	32.1	33 48.8	41 50	31.6	33 36.4	42 50	31.0	33 23.9	42 49	30.5	32 45.4	43 47	28.9	32 32.3	44 46	28.3	2
3	34 04.8	38 54	34.0	33 53.4	38 53	33.5	33 30.3	39 52	32.4	33 18.5	40 51	31.8	33 06.6	40 50	31.3	32 54.5	40 49	30.7	32 17.5	42 47	29.1	32 04.8	42 46	28.6	3
4	33 32.4	36 54	34.3	33 21.5	36 54	33.7	32 59.3	37 52	32.6	32 48.0	38 51	32.1	32 36.5	38 50	31.5	32 24.9	39 50	31.0	31 49.3	40 47	29.4	31 37.1	41 47	28.8	4
55	32 59.7	34 55	34.6	32 49.3	35 54	34.0	32 28.1	36 52	32.9	32 17.2	36 52	32.3	32 06.2	37 51	31.8	31 55.1	37 50	31.2	31 20.9	39 48	29.6	31 09.2	39 47	29.1	55
6	32 26.9	33 55	34.8	32 17.0	33 54	34.2	31 56.7	34 53	33.1	31 46.3	35 52	32.6	31 35.8	35 51	32.0	31 25.1	36 50	31.5	30 52.3	37 48	29.8	30 41.1	38 47	29.3	6
7	31 53.9	31 55	35.0	31 44.5	32 54	34.4	31 25.1	33 53	33.3	31 15.2	33 52	32.8	31 05.1	34 51	32.2	30 54.9	34 51	31.7	30 23.5	36 48	30.0	30 12.8	36 48	29.5	7
8	31 20.8	30 56	35.2	31 11.7	30 55	34.7	30 53.3	31 53	33.5	30 43.8	32 52	33.0	30 34.2	32 52	32.4	30 24.5	33 51	31.9	29 54.5	34 49	30.3	29 44.3	34 48	29.7	8
9	30 47.4	28 56	35.4	30 38.9	29 55	34.9	30 21.3	30 54	33.7	30 12.3	30 53	33.2	30 03.2	31 52	32.6	29 54.0	31 51	32.1	29 25.4	32 49	30.5	29 15.6	33 48	29.9	9
60	30 13.9	27 56	35.6	30 05.8	27 55	35.0	29 49.2	28 54	33.9	29 40.7	29 53	33.4	29 32.0	29 52	32.8	29 23.2	30 51	32.3	28 56.1	31 49	30.6	28 46.8	31 48	30.1	60
1	29 40.3	25 56	35.8	29 32.6	26 56	35.2	29 16.9	27 54	34.1	29 08.9	27 53	33.6	29 00.7	28 52	33.0	28 52.4	28 52	32.5	28 26.6	29 49	30.8	28 17.8	30 49	30.3	1
2	29 06.5	24 56	35.9	28 59.3	24 56	35.4	28 44.5	25 54	34.3	28 36.9	26 53	33.7	28 29.2	26 53	33.2	28 21.3	26 52	32.6	27 57.0	28 50	31.0	27 48.6	28 49	30.4	2
3	28 32.6	22 57	36.1	28 25.9	23 56	35.5	28 12.0	24 54	34.4	28 04.9	24 54	33.9	27 57.6	24 53	33.3	27 50.2	25 52	32.8	27 27.2	26 50	31.1	27 19.3	27 49	30.6	3
4	27 58.6	21 57	36.2	27 52.3	21 56	35.7	27 39.3	22 55	34.6	27 32.6	22 54	34.0	27 25.8	23 53	33.5	27 18.9	23 52	32.9	26 57.3	25 50	31.3	26 49.9	25 49	30.7	4
65	27 24.4	19 57	36.4	27 18.6	20 56	35.8	27 06.5	21 55	34.7	27 00.3	21 54	34.2	26 54.0	21 53	33.6	26 47.5	22 53	33.1	26 27.3	23 50	31.4	26 20.3	23 49	30.9	65
6	26 50.2	18 57	36.5	26 44.8	18 56	35.9	26 33.6	19 55	34.8	26 27.9	19 54	34.3	26 22.0	20 53	33.7	26 16.0	20 53	33.2	25 57.2	21 50	31.6	25 50.7	22 50	31.0	6
7	26 15.8	16 57	36.6	26 10.9	17 57	36.0	26 00.7	17 55	34.9	25 55.3	18 54	34.4	25 49.9	18 54	33.8	25 44.4	19 53	33.3	25 27.0	20 51	31.7	25 20.9	20 50	31.1	7
8	25 41.4	15 58	36.7	25 36.9	15 57	36.1	25 27.6	16 55	35.0	25 22.7	16 54	34.5	25 17.7	17 54	34.0	25 12.6	17 53	33.4	24 56.6	18 51	31.8	24 51.1	19 50	31.2	8
9	25 06.9	13 58	36.8	25 02.9	14 57	36.2	24 54.4	14 55	35.1	24 50.0	15 55	34.6	24 45.5	15 54	34.1	24 40.8	16 53	33.5	24 26.2	17 51	31.9	24 21.1	17 50	31.3	9
70	24 32.4	12 58	36.9	24 28.8	12 57	36.3	24 21.2	13 55	35.2	24 17.2	13 55	34.7	24 13.2	14 54	34.1	24 09.0	14 53	33.6	23 55.7	15 51	32.0	23 51.1	16 50	31.4	70
1	23 57.7	10 58	36.9	23 54.6	11 57	36.4	23 47.9	12 56	35.3	23 44.4	12 55	34.8	23 40.8	12 54	34.2	23 37.0	13 53	33.7	23 25.1	14 51	32.1	23 21.0	14 50	31.5	1
2	23 23.1	09 58	37.0	23 20.3	09 57	36.4	23 14.5	10 56	35.4	23 11.5	10 55	34.8	23 08.3	11 54	34.3	23 05.0	11 53	33.7	22 54.5	12 51	32.1	22 50.8	13 50	31.6	2
3	22 48.3	07 58	37.0	22 46.0	08 57	36.5	22 41.1	09 56	35.4	22 38.5	09 55	34.9	22 35.8	09 54	34.3	22 32.9	10 54	33.8	22 23.8	11 51	32.2	22 20.5	11 50	31.7	3
4	22 13.6	06 58	37.1	22 11.7	06 57	36.5	22 07.7	07 56	35.5	22 05.5	07 55	34.9	22 03.2	08 54	34.4	22 00.8	08 54	33.9	21 53.1	09 51	32.2	21 50.2	10 51	31.7	4
75	21 38.8	05 58	37.1	21 37.4	05 57	36.6	21 34.2	06 56	35.5	21 32.5	06 55	35.0	21 30.6	06 54	34.4	21 28.7	07 54	33.9	21 22.3	08 51	32.3	21 19.9	08 51	31.8	75
6	21 04.0	03 58	37.1	21 03.0	03 57	36.6	21 00.7	04 56	35.5	20 59.4	04 55	35.0	20 58.0	05 54	34.5	20 56.5	05 54	33.9	20 51.4	06 51	32.3	20 49.5	06 51	31.8	6
7	20 29.1	02 58	37.2	20 28.6	02 57	36.6	20 27.2	03 56	35.6	20 26.3	03 55	35.0	20 25.3	03 54	34.5	20 24.3	04 54	34.0	20 20.6	05 51	32.4	20 19.1	05 51	31.8	7
8	19 54.3	00 58	37.2	19 54.2	01 57	36.6	19 53.6	01 56	35.6	19 53.2	02 55	35.0	19 52.7	02 54	34.5	19 52.1	02 54	34.0	19 49.7	03 52	32.4	19 48.7	03 51	31.8	8
9	19 19.4	01 58	37.2	19 19.7	01 57	36.6	19 20.1	00 56	35.6	19 20.1	00 55	35.0	19 20.0	00 54	34.5	19 19.8	01 54	34.0	19 18.8	02 52	32.4	19 18.3	02 51	31.9	9
80	18 44.6	03 58	37.2	18 45.3	02 57	36.6	18 46.5	02 56	35.6	18 47.0	01 55	35.0	18 47.3	01 54	34.5	18 47.6	01 54	34.0	18 47.9	00 52	32.4	18 47.8	00 51	31.9	80
1	18 09.8	04 58	37.1	18 10.9	04 57	36.6	18 13.0	03 56	35.6	18 13.9	03 55	35.0	18 14.7	03 54	34.5	18 15.4	02 54	34.0	18 17.0	01 52	32.4	18 17.4	01 51	31.9	1
2	17 35.0	05 58	37.1	17 36.6	05 57	36.6	17 39.4	05 56	35.5	17 40.8	04 55	35.0	17 42.0	04 54	34.5	17 43.1	04 54	34.0	17 46.1	03 51	32.4	17 46.9	03 51	31.9	2
3	17 00.2	07 58	37.1	17 02.2	06 57	36.5	17 05.9	06 56	35.5	17 07.7	06 55	35.0	17 09.4	05 54	34.5	17 10.9	05 54	33.9	17 15.2	04 51	32.4	17 16.5	04 51	31.8	3
4	16 25.5	08 58	37.0	16 27.9	08 57	36.5	16 32.5	07 56	35.5	16 34.6	07 55	34.9	16 36.7	07 54	34.4	16 38.8	07 54	33.9	16 44.4	06 51	32.3	16 46.1	06 51	31.8	4
85	15 50.8	10 58	37.0	15 53.6	09 57	36.4	15 59.0	09 56	35.4	16 01.6	09 55	34.9	16 04.2	08 54	34.4	16 06.6	08 54	33.9	16 13.5	07 51	32.3	16 15.7	07 51	31.8	85
6	15 16.1	11 58	36.9	15 19.3	11 57	36.4	15 25.6	10 56	35.4	15 28.6	10 55	34.8	15 31.6	10 54	34.3	15 34.5	10 53	33.8	15 42.7	09 51	32.3	15 45.3	09 51	31.7	6
7	14 41.5	12 58	36.8	14 45.2	12 57	36.3	14 52.3	12 56	35.3	14 55.7	11 55	34.8	14 59.1	11 54	34.3	15 02.4	11 53	33.8	15 12.0	10 51	32.2	15 15.0	10 50	31.7	7
8	14 06.9	14 57	36.8	14 11.0	13 57	36.2	14 19.0	13 55	35.2	14 22.9	13 55	34.7	14 26.7	13 54	34.2	14 30.4	12 53	33.7	14 41.2	12 51	32.1	14 44.7	11 50	31.6	8
9	13 32.5	15 57	36.7	13 37.0	15 57	36.2	13 45.7	14 55	35.1	13 50.0	14 55	34.6	13 54.3	14 54	34.1	13 58.4	14 53	33.6	14 10.6	13 51	32.1	14 14.5	13 50	31.6	9
90	12 58.1	16 57	36.6	13 03.0	16 57	36.1	13 12.6	16 55	35.1	13 17.3	16 54	34.5	13 22.0	15 54	34.0	13 26.6	15 53	33.5	13 40.0	15 51	32.0	13 44.3	14 50	31.5	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	54° 30′				55° 00′				56° 00′				56° 30′				57° 00′				57° 30′				59° 00′				59° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	19 30.0	1.0	01	180.0	19 00.0	1.0	00	180.0	18 00.0	1.0	00	180.0	17 30.0	1.0	00	180.0	17 00.0	1.0	00	180.0	16 30.0	1.0	00	180.0	15 00.0	1.0	00	180.0	14 30.0	1.0	00	180.0	00
1	19 29.7	1.0	02	179.4	18 59.7	1.0	02	179.4	17 59.7	1.0	01	179.4	17 29.7	1.0	01	179.4	16 59.7	1.0	01	179.4	16 29.7	1.0	01	179.4	14 59.7	1.0	01	179.5	14 29.7	1.0	01	179.5	1
2	19 28.8	1.0	03	178.8	18 58.8	1.0	03	178.8	17 58.8	1.0	02	178.8	17 28.8	1.0	02	178.8	16 58.9	1.0	02	178.9	16 28.9	1.0	02	178.9	14 58.9	1.0	02	178.9	14 28.9	1.0	02	179.0	2
3	19 27.2	1.0	04	178.2	18 57.3	1.0	04	178.2	17 57.3	1.0	03	178.2	17 27.4	1.0	03	178.3	16 57.4	1.0	03	178.3	16 27.5	1.0	03	178.3	14 57.6	1.0	03	178.4	14 27.6	1.0	03	178.4	3
4	19 25.0	1.0	06	177.5	18 55.1	1.0	05	177.6	17 55.3	1.0	04	177.7	17 25.3	1.0	04	177.7	16 55.4	1.0	04	177.7	16 25.5	1.0	04	177.8	14 55.7	1.0	04	177.9	14 25.8	1.0	04	177.9	4
05	19 22.3	1.0	06	176.9	18 52.4	1.0	06	177.0	17 52.6	1.0	05	177.1	17 22.7	1.0	05	177.1	16 52.8	1.0	05	177.2	16 23.0	1.0	05	177.2	14 53.3	1.0	05	177.3	14 23.4	1.0	05	177.4	05
6	19 18.9	99	07	176.3	18 49.0	99	07	176.4	17 49.4	99	06	176.5	17 19.5	99	06	176.5	16 49.7	99	06	176.6	16 19.9	99	06	176.6	14 50.4	99	06	176.8	14 20.5	99	06	176.9	6
7	19 14.8	99	08	175.7	18 45.1	99	08	175.8	17 45.5	99	07	175.9	17 15.8	99	07	176.0	16 46.0	99	07	176.0	16 16.2	99	07	176.1	14 46.9	99	07	176.3	14 17.1	99	07	176.3	7
8	19 10.2	99	09	175.1	18 40.5	99	09	175.2	17 41.1	99	08	175.3	17 11.4	99	08	175.4	16 41.7	99	08	175.5	16 12.0	99	08	175.5	14 42.9	99	08	175.8	14 13.2	99	07	175.8	8
9	19 05.0	99	10	174.5	18 35.3	99	10	174.6	17 36.1	99	09	174.7	17 06.5	99	09	174.8	16 36.9	99	09	174.9	16 07.2	99	09	175.0	14 38.3	99	08	175.2	14 08.7	99	08	175.3	9
10	18 59.1	98	11	173.9	18 29.6	98	11	174.0	17 30.5	98	10	174.2	17 01.0	98	10	174.2	16 31.4	98	10	174.3	16 01.9	98	10	174.4	14 33.3	99	09	174.7	14 03.7	99	09	174.8	10
1	18 52.7	98	12	173.3	18 23.2	98	12	173.4	17 24.4	98	11	173.6	16 54.9	98	11	173.7	16 25.5	98	11	173.8	15 56.0	98	11	173.9	14 27.7	98	10	174.2	13 58.2	98	10	174.3	1
2	18 45.6	98	13	172.7	18 16.3	98	13	172.8	17 17.6	98	12	173.0	16 48.3	98	12	173.1	16 18.9	98	12	173.2	15 49.6	98	12	173.3	14 21.6	98	11	173.7	13 52.2	98	11	173.8	2
3	18 38.0	97	14	172.1	18 08.8	97	14	172.2	17 10.3	97	13	172.4	16 41.1	97	13	172.6	16 11.9	97	13	172.7	15 42.6	97	13	172.8	14 14.9	97	12	173.1	13 45.7	97	12	173.2	3
4	18 29.7	97	15	171.5	18 00.6	97	15	171.6	17 02.4	97	14	171.9	16 33.3	97	14	172.0	16 04.2	97	14	172.1	15 35.1	97	13	172.2	14 07.8	97	13	172.6	13 38.6	97	13	172.7	4
15	18 20.9	97	16	170.9	17 51.9	97	15	171.0	16 54.0	97	15	171.3	16 25.0	97	15	171.4	15 56.0	97	15	171.6	15 27.1	97	14	171.7	14 00.1	97	14	172.1	13 31.1	97	13	172.2	15
6	18 11.4	96	17	170.3	17 42.6	96	16	170.4	16 45.0	96	16	170.7	16 16.2	96	16	170.9	15 47.3	96	15	171.0	15 18.5	96	15	171.2	13 51.9	96	14	171.6	13 23.1	96	14	171.7	6
7	18 01.4	96	18	169.7	17 32.8	96	17	169.9	16 35.4	96	17	170.2	16 06.7	96	17	170.3	15 38.1	96	16	170.5	15 09.4	96	16	170.6	13 43.2	96	15	171.1	13 14.5	96	15	171.2	7
8	17 50.9	95	19	169.1	17 22.3	95	18	169.3	16 25.3	95	18	169.6	15 56.8	95	18	169.8	15 28.2	95	17	169.9	14 59.7	95	17	170.1	13 34.0	95	16	170.6	13 05.5	95	16	170.7	8
9	17 39.7	94	20	168.6	17 11.4	94	19	168.7	16 14.7	95	19	169.1	15 46.3	95	18	169.2	15 17.9	95	18	169.4	14 49.5	95	18	169.6	13 24.3	95	17	170.1	12 55.9	95	17	170.2	9
20	17 28.0	94	20	168.0	16 59.8	94	20	168.2	16 03.4	94	20	168.5	15 35.2	94	19	168.7	15 07.0	94	19	168.9	14 38.8	94	19	169.1	13 14.2	94	18	169.6	12 45.9	94	18	169.7	20
1	17 15.7	93	21	167.4	16 47.7	93	21	167.6	15 51.7	93	20	168.0	15 23.7	93	20	168.2	14 55.7	93	20	168.3	14 27.6	93	20	168.5	13 03.5	94	19	169.1	12 35.4	94	18	169.3	1
2	17 02.8	93	22	166.8	16 35.0	93	22	167.0	15 39.4	93	21	167.4	15 11.6	93	21	167.6	14 43.7	93	21	167.8	14 15.9	93	20	168.0	12 52.3	93	19	168.6	12 24.4	93	19	168.8	2
3	16 49.4	92	23	166.3	16 21.8	92	23	166.5	15 26.6	92	22	166.9	14 59.0	92	22	167.1	14 31.3	92	22	167.3	14 03.7	92	21	167.5	12 40.6	92	20	168.1	12 13.0	92	20	168.3	3
4	16 35.5	91	24	165.7	16 08.1	91	24	165.9	15 13.3	91	23	166.4	14 45.8	91	23	166.6	14 18.4	91	22	166.8	13 50.9	92	22	167.0	12 28.5	92	21	167.6	12 01.0	92	21	167.8	4
25	16 21.0	91	25	165.2	15 53.8	91	25	165.4	14 59.4	91	24	165.8	14 32.2	91	24	166.1	14 05.0	91	23	166.3	13 37.7	91	23	166.5	12 15.9	91	22	167.1	11 48.6	91	21	167.3	25
6	16 06.0	90	26	164.6	15 39.0	90	26	164.9	14 45.0	90	25	165.3	14 18.0	90	24	165.5	13 51.0	90	24	165.8	13 24.0	90	24	166.0	12 02.8	90	23	166.7	11 35.7	90	22	166.9	6
7	15 59.5	89	27	164.1	15 23.7	89	26	164.3	14 30.2	89	26	164.8	14 03.4	89	25	165.0	13 36.6	89	25	165.3	13 09.8	89	24	165.5	11 49.3	90	23	166.2	11 22.4	90	23	166.4	7
8	15 34.4	88	28	163.6	15 07.9	88	27	163.8	14 14.8	88	26	164.3	13 48.2	89	26	164.5	13 21.7	89	26	164.8	12 55.1	89	25	165.0	11 35.3	89	24	165.7	11 08.6	89	24	165.9	8
9	15 17.8	88	28	163.0	14 51.5	88	28	163.3	13 58.9	88	27	163.8	13 32.6	88	27	164.0	13 06.3	88	26	164.3	12 39.9	88	26	164.5	11 20.8	88	25	165.2	10 54.4	88	24	165.5	9
30	15 00.7	87	29	162.5	14 34.7	87	29	162.8	13 42.6	87	28	163.3	13 16.5	87	28	163.5	12 50.4	87	27	163.8	12 24.3	87	27	164.0	11 05.9	87	26	164.8	10 39.7	87	25	165.0	30
1	14 43.1	86	30	162.0	14 17.4	86	30	162.3	13 25.7	86	29	162.8	12 59.9	86	28	163.0	12 34.1	86	28	163.3	12 08.2	86	28	163.6	10 50.5	86	26	164.3	10 24.6	86	26	164.6	1
2	14 25.1	85	31	161.5	13 59.5	85	31	161.7	13 08.4	85	30	162.3	12 42.8	85	29	162.6	12 17.3	85	29	162.8	11 51.6	85	28	163.1	10 34.7	86	27	163.9	10 09.1	86	27	164.1	2
3	14 06.5	84	32	161.0	13 41.2	84	31	161.2	12 50.6	84	30	161.8	12 25.3	84	30	162.1	12 00.0	84	30	162.3	11 34.6	85	29	162.6	10 18.5	85	28	163.4	9 53.1	85	27	163.7	3
4	13 47.4	83	33	160.5	13 22.4	83	32	160.8	12 32.4	83	31	161.3	12 07.3	84	31	161.6	11 42.3	84	30	161.9	11 17.2	84	30	162.2	10 01.8	84	28	163.0	9 36.7	84	28	163.3	4
35	13 27.9	82	33	160.0	13 03.2	82	33	160.3	12 13.7	83	32	160.8	11 48.9	83	31	161.1	11 24.1	83	31	161.4	10 59.3	83	31	161.7	9 44.8	83	29	162.6	9 19.9	83	29	162.8	35
6	13 07.9	81	34	159.5	12 43.5	82	34	159.8	11 54.5	82	33	160.4	11 30.0	82	32	160.7	11 05.5	82	32	161.0	10 41.0	82	31	161.3	9 27.3	82	30	162.1	9 02.7	82	29	162.4	6
7	12 47.5	81	35	159.0	12 23.3	81	34	159.3	11 34.9	81	33	159.9	11 10.7	81	33	160.2	10 46.5	81	32	160.5	10 22.2	81	32	160.8	9 09.4	81	30	161.7	8 45.1	81	30	162.0	7
8	12 26.6	80	36	158.5	12 02.7	80	35	158.8	11 14.9	80	34	159.5	10 51.0	80	34	159.8	10 27.0	80	33	160.1	10 03.1	80	33	160.4	8 51.1	80	31	161.3	8 27.0	80	31	161.6	8
9	12 05.3	79	36	158.1	11 41.7	79	36	158.4	10 54.5	79	35	159.0	10 30.8	79	34	159.3	10 07.2	79	34	159.6	9 43.5	79	33	159.9	8 32.4	79	32	160.9	8 08.6	79	31	161.2	9
40	11 43.5	78	37	157.6	11 20.2	78	36	157.9	10 33.6	78	36	158.6	10 10.2	78	35	158.9	9 46.9	78	34	159.2	9 23.5	78	34	159.5	8 13.3	78	32	160.5	7 49.8	78	32	160.8	40
1	11 21.3	77	38	157.1	10 58.3	77	37	157.5	10 12.3	77	36	158.1	9 49.2	77	36	158.4	9 26.2	77	35	158.8	9 03.1	77	35	159.1	7 53.8	77	33	160.1	7 30.6	77	33	160.4	1
2	10 58.7	76	38	156.7	10 36.0	76	38	157.0	9 50.6	76	37	157.7	9 27.8	76	36	158.0	9 05.1	76	36	158.3	8 42.3	76	35	158.7	7 33.9	76	34	159.7	7 11.1	76	33	160.0	2
3	10 35.6	75	39	156.2	10 13.3	75	39	156.6	9 28.5	75	38	157.3	9 06.1	75	37	157.6	8 43.6	75	36	157.9	8 21.2	75	36	158.3	7 13.7	75	34	159.3	6 51.1	75	34	159.6	3
4	10 12.2	73	40	155.8	9 50.1	74	39	156.1	9 06.0	74	38	156.8	8 43.9	74	38	157.2	8 21.7	74	37	157.5	7 59.6	74	37	157.9	6 53.1	74	35	158.9	6 30.9	74	34	159.2	4
45	9 48.4	72	40	155.4	9 26.6	72	40	155.7	8 43.1	73	39	156.4	8 21.3	73	38	156.8	7 59.5	73	38	157.1	7 37.7	73	37	157.5	6 32.1	73	36	158.5	6 10.2	73	35	158.8	45
6	9 24.1	71	41	155.0	9 02.7	71	40	155.3	8 19.8	72	39	156.0	7 58.4	72	39	156.4	7 36.9	72	38	156.7	7 15.4	72	38	157.1	6 10.8	72	36	158.1	5 49.2	72	36	158.5	6
7	8 59.5	70	42	154.5	8 38.4	70	41	154.9	7 56.2	70	40	155.6	7 35.1	70	39	156.0	7 13.9	71	39	156.3	6 52.7	71	38	156.7	5 49.1	71	37	157.8	5 27.9	71	36	158.1	7
8	8 34.5	69	42	154.1	8 13.8	69	42	154.5	7 32.2	69	41	155.2	7 11.4	69	40	155.6	6 50.6	69	40	155.9	6 29.7	70	39	156.3	5 27.1	70	37	157.4	5 06.2	70	37	157.7	8
9	8 09.2	68	43	153.7	7 48.8	68	42	154.1	7 07.9	68	41	154.8	6 47.4	68	41	155.2	6 26.9	68	40	155.6	6 06.4	68	39	155.9	5 04.8	69	38	157.0					9
50	7 43.5	67	43	153.3	7 23.4	67	43	153.7	6 43.2	67	42	154.4	6 23.0	67	41	154.8	6 02.9	67	41	155.2	5 42.7	67	40	155.6									50
1	7 17.4	66	44	152.9	6 57.7	66	43	153.3	6 18.1	66	42	154.1	5 58.3	66	42	154.5	5 38.5	66	41	154.8	5 18.7	66	40	155.2									1
2	6 51.0	65	45	152.6	6 31.6	65	44	152.9	5 52.7	65	43	153.7	5 33.3	65	42	154.1	5 13.8	65	42	154.5													2
3	6 24.2	63	45	152.2	6 05.2	64	45	152.6	5 27.0	64	43	153.3	5 07.9	64	43	153.7																	3
4	5 57.2	62	46	151.8	5 38.4	62	45	152.2	5 01.0	62	44	153.0																					4
55	5 29.8	61	46	151.5	5 11.4	61	46	151.8																									55
6	5 02.0	60	47	151.1																													6

DECLINATION SAME NAME AS LATITUDE

H.A.	54° 30′				55° 00′				56° 00′				56° 30′				57° 00′				57° 30′				59° 00′				59° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
91	12 23.7	18	57	36.5	12 29.0	18	56	36.0	12 39.5	17	55	35.0	12 44.6	17	54	34.5	12 49.7	17	54	34.0	12 54.7	17	53	33.4	13 09.4	16	51	31.9	13 14.2	16	50	31.4	91
2	11 49.5	19	57	36.4	11 55.2	19	56	35.9	12 06.5	19	55	34.9	12 12.0	18	54	34.4	12 17.5	18	53	33.9	12 23.0	18	53	33.4	12 39.0	17	51	31.8	12 44.2	17	50	31.3	2
3	11 15.3	20	57	36.2	11 21.5	20	56	35.7	11 33.6	20	55	34.7	11 39.5	20	54	34.2	11 45.4	20	53	33.7	11 51.3	19	53	33.2	12 08.6	19	50	31.7	12 14.2	19	50	31.2	3
4	10 41.3	22	57	36.1	10 47.8	22	56	35.6	11 00.7	21	55	34.6	11 07.1	21	54	34.1	11 13.5	21	53	33.6	11 19.7	21	52	33.1	11 38.3	20	50	31.6	11 44.4	20	50	31.1	4
95	10 07.3	23	56	36.0	10 14.3	23	56	35.5	10 28.0	23	54	34.5	10 34.8	23	54	34.0	10 41.6	22	53	33.5	10 48.3	22	52	33.0	11 08.1	22	50	31.5	11 14.6	22	49	31.0	95
6	9 33.5	25	56	35.8	9 40.8	24	56	35.4	9 55.4	24	54	34.4	10 02.6	24	54	33.9	10 09.8	24	53	33.4	10 16.9	24	52	32.9	10 38.0	23	50	31.4	10 44.9	23	49	30.9	6
7	8 59.8	26	56	35.7	9 07.5	26	55	35.2	9 22.9	25	54	34.2	9 30.5	25	53	33.7	9 38.1	25	53	33.3	9 45.6	25	52	32.8	10 08.0	25	50	31.3	10 15.3	24	49	30.8	7
8	8 26.2	27	56	35.5	8 34.3	27	55	35.1	8 50.5	27	54	34.1	8 58.5	27	53	33.6	9 06.5	27	52	33.1	9 14.5	26	52	32.6	9 38.1	26	50	31.2	9 45.9	26	49	30.7	8
9	7 52.7	29	56	35.4	8 01.3	28	55	34.9	8 18.2	28	54	33.9	8 26.7	28	53	33.4	8 35.1	28	52	33.0	8 43.4	28	52	32.5	9 08.3	27	49	31.0	9 16.5	27	49	30.5	9
100	7 19.4	30	55	35.2	7 28.3	30	55	34.7	7 46.1	30	53	33.8	7 55.0	29	53	33.3	8 03.8	29	52	32.8	8 12.5	29	51	32.3	8 38.6	29	49	30.9	8 47.3	29	49	30.4	100
1	6 46.2	31	55	35.0	6 55.6	31	54	34.6	7 14.1	31	53	33.6	7 23.4	31	52	33.1	7 32.6	31	52	32.6	7 41.8	31	51	32.2	8 09.1	30	49	30.7	8 18.2	30	48	30.2	1
2	6 13.2	32	55	34.8	6 22.9	32	54	34.4	6 42.3	32	53	33.4	6 51.9	32	52	32.9	7 01.6	32	51	32.5	7 11.1	32	51	32.0	7 39.7	32	49	30.6	7 49.2	32	48	30.1	2
3	5 40.3	34	55	34.7	5 50.4	34	54	34.2	6 10.6	34	53	33.2	6 20.7	33	52	32.8	6 30.7	33	51	32.3	6 40.7	33	51	31.8	7 10.5	33	48	30.4	7 20.4	33	48	29.9	3
4	5 07.6	35	54	34.5	5 18.1	35	54	34.0	5 39.1	35	52	33.0	5 49.5	35	52	32.6	5 59.9	35	51	32.1	6 10.3	35	50	31.6	6 41.4	34	48	30.2	6 51.7	34	48	29.7	4
105									5 07.7	36	52	32.8	5 18.6	36	52	32.4	5 29.4	36	51	31.9	5 40.2	36	50	31.4	6 12.5	36	48	30.0	6 23.2	36	47	29.6	105
6																					5 10.2	37	50	31.2	5 43.7	37	48	29.8	5 54.8	37	47	29.4	6
7																									5 15.1	38	47	29.6	5 26.6	38	47	29.2	7

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	46 00.0	1.0 01	00.0	45 30.0	1.0 01	00.0	44 00.0	1.0 01	00.0	43 30.0	1.0 01	00.0	43 00.0	1.0 01	00.0	37 00.0	1.0 00	00.0	36 30.0	1.0 00	00.0	31 30.0	1.0 00	00.0	00
1	45 59.6	1.0 02	00.7	45 29.6	1.0 02	00.7	43 59.7	1.0 02	00.7	43 29.7	1.0 02	00.6	42 59.7	1.0 02	00.6	36 59.8	1.0 01	00.4	36 29.8	1.0 01	00.4	31 29.8	1.0 01	00.3	1
2	45 58.6	1.0 03	01.4	45 28.6	1.0 03	01.4	43 58.7	1.0 03	01.3	43 28.7	1.0 03	01.3	42 58.8	1.0 03	01.2	36 59.1	1.0 02	00.9	36 29.1	1.0 02	00.9	31 29.4	1.0 01	00.6	2
3	45 56.7	1.0 04	02.2	45 26.8	1.0 04	02.1	43 57.0	1.0 04	02.0	43 27.1	1.0 04	01.9	42 57.2	1.0 04	01.9	36 58.0	1.0 03	01.3	36 28.0	1.0 03	01.3	31 28.6	1.0 02	00.9	3
4	45 54.2	1.0 05	02.9	45 24.3	1.0 05	02.8	43 54.7	1.0 05	02.6	43 24.9	1.0 05	02.5	42 55.0	1.0 05	02.5	36 56.4	1.0 03	01.8	36 26.5	1.0 03	01.7	31 27.5	1.0 02	01.3	4
05	45 51.0	99 07	03.6	45 21.2	99 06	03.5	43 51.8	99 06	03.3	43 22.0	99 06	03.2	42 52.2	99 06	03.1	36 54.4	99 04	02.2	36 24.5	99 04	02.2	31 26.1	1.0 03	01.6	05
6	45 47.0	99 08	04.3	45 17.3	99 08	04.2	43 48.2	99 07	03.9	43 18.5	99 07	03.8	42 48.8	99 07	03.7	36 51.9	99 05	02.7	36 22.1	99 05	02.6	31 24.3	99 03	01.9	6
7	45 42.3	99 09	05.0	45 12.7	99 09	04.9	43 44.0	99 08	04.5	43 14.4	99 08	04.4	42 44.7	99 08	04.3	36 49.0	99 06	03.1	36 19.3	99 05	03.0	31 22.3	99 04	02.2	7
8	45 36.9	98 10	05.7	45 07.5	98 10	05.6	43 39.1	98 09	05.2	43 09.6	98 09	05.1	42 40.1	98 09	04.9	36 45.6	99 06	03.6	36 16.0	99 06	03.5	31 19.9	99 04	02.5	8
9	45 30.8	98 11	06.4	45 01.5	98 11	06.3	43 33.5	98 10	05.8	43 04.2	98 10	05.7	42 34.8	98 10	05.5	36 41.8	98 07	04.0	36 12.3	98 07	03.9	31 17.3	98 05	02.8	9
10	45 24.1	97 12	07.1	44 54.9	97 12	06.9	43 27.4	97 11	06.4	42 58.2	97 11	06.3	42 29.0	97 11	06.1	36 37.5	98 08	04.4	36 08.2	98 08	04.3	31 14.3	98 05	03.1	10
1	45 16.6	97 14	07.8	44 47.6	97 13	07.6	43 20.6	97 12	07.1	42 51.6	97 12	06.9	42 22.5	97 12	06.7	36 32.8	97 09	04.9	36 03.6	97 08	04.7	31 11.0	98 06	03.4	1
2	45 08.4	96 15	08.5	44 39.6	96 14	08.3	43 13.2	96 13	07.7	42 44.3	96 13	07.5	42 15.4	96 13	07.3	36 27.7	97 09	05.3	35 58.6	97 09	05.2	31 07.4	97 06	03.7	2
3	44 59.6	95 16	09.2	44 31.0	95 16	08.9	43 05.1	96 14	08.3	42 36.5	96 14	08.1	42 07.8	96 14	07.9	36 22.2	96 10	05.7	35 53.2	96 10	05.6	31 03.5	97 07	04.0	3
4	44 50.1	94 17	09.8	44 21.7	95 17	09.6	42 56.5	95 15	08.9	42 28.0	95 15	08.7	41 59.6	95 15	08.5	36 16.2	96 11	06.2	35 47.4	96 10	06.0	30 59.3	96 08	04.3	4
15	44 39.9	94 18	10.5	44 11.8	94 18	10.2	42 47.2	94 16	09.5	42 19.0	94 16	09.3	41 50.7	94 16	09.1	36 09.7	95 11	06.6	35 41.2	95 11	06.4	30 54.8	96 08	04.6	15
6	44 29.1	93 19	11.1	44 01.2	93 19	10.9	42 37.4	93 17	10.1	42 09.4	93 17	09.9	41 41.4	93 17	09.6	36 02.9	94 12	07.0	35 34.6	95 12	06.8	30 50.0	95 08	04.9	6
7	44 17.6	92 20	11.8	43 50.0	92 20	11.5	42 27.0	92 18	10.7	41 59.2	93 18	10.5	41 31.4	93 18	10.2	35 55.7	94 13	07.4	35 27.5	94 12	07.2	30 44.9	95 09	05.2	7
8	44 05.5	91 21	12.4	43 38.2	91 21	12.1	42 15.9	92 19	11.3	41 48.5	92 19	11.0	41 20.9	92 18	10.8	35 48.0	93 13	07.8	35 20.1	93 13	07.6	30 39.5	94 09	05.5	8
9	43 52.8	90 22	13.1	43 25.8	90 22	12.8	42 04.4	91 20	11.9	41 37.1	91 20	11.6	41 09.9	91 19	11.3	35 39.9	92 14	08.3	35 12.2	92 14	08.0	30 33.8	93 10	05.8	9
20	43 39.5	89 23	13.7	43 12.7	89 23	13.4	41 52.2	90 21	12.5	41 25.3	90 21	12.2	40 58.3	90 20	11.9	35 31.4	91 15	08.7	35 04.0	92 14	08.4	30 27.9	92 10	06.1	20
1	43 25.6	88 24	14.3	42 59.1	88 24	14.0	41 39.5	89 22	13.0	41 12.8	89 22	12.7	40 46.1	89 21	12.4	35 22.5	91 15	09.1	34 55.3	91 15	08.8	30 21.6	92 11	06.4	1
2	43 11.0	87 25	14.9	42 44.9	87 25	14.5	41 26.2	88 23	13.6	40 59.9	88 22	13.2	40 33.5	88 22	12.9	35 13.3	90 16	09.5	34 46.3	90 16	09.2	30 15.1	91 11	06.7	2
3	42 55.9	86 26	15.5	42 30.1	86 26	15.1	41 12.4	87 24	14.1	40 46.4	87 23	13.8	40 20.3	87 23	13.5	35 03.6	89 17	09.8	34 36.9	89 16	09.6	30 08.3	90 12	06.9	3
4	42 40.3	85 27	16.1	42 14.8	85 26	15.7	40 58.1	86 25	14.6	40 32.4	86 24	14.3	40 06.7	86 24	14.0	34 53.5	88 17	10.2	34 27.1	88 17	09.9	30 01.2	89 12	07.2	4
25	42 24.0	84 28	16.6	41 58.9	84 27	16.3	40 43.3	84 26	15.2	40 17.9	85 25	14.8	39 52.5	85 24	14.5	34 43.1	87 18	10.6	34 17.0	87 18	10.3	29 53.8	88 13	07.5	25
6	42 07.3	82 29	17.2	41 42.5	83 28	16.8	40 27.9	83 26	15.7	40 02.9	83 26	15.3	39 37.8	84 25	15.0	34 32.3	86 19	11.0	34 06.5	86 18	10.7	29 46.1	87 13	07.8	6
7	41 49.9	81 30	17.7	41 25.6	81 29	17.3	40 12.1	82 27	16.2	39 47.4	82 27	15.8	39 22.7	83 26	15.5	34 21.1	85 19	11.4	33 55.6	85 19	11.0	29 38.2	86 14	08.0	7
8	41 32.1	80 31	18.3	41 08.1	80 30	17.9	39 55.7	81 28	16.7	39 31.4	81 27	16.3	39 07.1	81 27	15.9	34 09.5	84 20	11.7	33 44.4	84 19	11.4	29 30.0	86 14	08.3	8
9	41 13.8	78 31	18.8	40 50.2	79 31	18.4	39 38.9	80 29	17.2	39 15.0	80 28	16.8	38 51.0	80 28	16.4	33 57.6	83 20	12.1	33 32.8	83 20	11.8	29 21.6	85 14	08.5	9
30	40 54.9	77 32	19.3	40 31.7	77 32	18.9	39 21.6	78 30	17.7	38 58.1	79 29	17.3	38 34.5	79 28	16.9	33 45.4	82 21	12.4	33 20.9	82 20	12.1	29 12.9	83 15	08.8	30
1	40 35.6	76 33	19.8	40 12.8	76 32	19.4	39 03.9	77 30	18.1	38 40.7	77 30	17.7	38 17.5	78 29	17.3	33 32.8	80 22	12.8	33 08.6	81 21	12.4	29 03.9	82 15	09.1	1
2	40 15.8	74 34	20.3	39 53.4	75 33	19.9	38 45.7	76 31	18.6	38 23.0	76 30	18.2	38 00.1	76 30	17.8	33 19.8	79 22	13.1	32 56.0	79 22	12.8	28 54.7	81 16	09.3	2
3	39 55.6	73 34	20.8	39 33.6	73 34	20.4	38 27.1	74 32	19.1	38 04.7	75 31	18.6	37 42.3	75 30	18.2	33 06.6	78 23	13.5	32 43.1	78 22	13.1	28 45.3	80 16	09.6	3
4	39 34.9	72 35	21.3	39 13.3	72 35	20.8	38 08.1	73 32	19.5	37 46.1	73 32	19.1	37 24.1	74 31	18.6	32 53.0	77 23	13.8	32 29.9	77 23	13.4	28 35.6	79 17	09.8	4
35	39 13.7	70 36	21.7	38 52.6	71 35	21.3	37 48.6	72 33	19.9	37 27.1	72 32	19.5	37 05.4	72 32	19.1	32 39.0	76 24	14.1	32 16.3	76 23	13.7	28 25.6	78 17	10.0	35
6	38 52.2	69 37	22.2	38 31.5	69 36	21.7	37 28.7	70 34	20.3	37 07.6	71 33	19.9	36 46.4	71 32	19.5	32 24.8	74 24	14.4	32 02.5	75 24	14.1	28 15.5	77 17	10.3	6
7	38 30.2	67 37	22.6	38 09.9	68 37	22.1	37 08.5	69 34	20.8	36 47.8	69 34	20.3	36 27.0	69 33	19.9	32 10.3	73 25	14.8	31 48.3	73 24	14.4	28 05.1	76 18	10.5	7
8	38 07.8	66 38	23.0	37 48.0	66 37	22.6	36 47.9	67 35	21.2	36 27.6	68 34	20.7	36 07.2	68 34	20.2	31 55.4	72 25	15.1	31 33.9	72 25	14.7	27 54.4	74 18	10.7	8
9	37 45.1	64 39	23.5	37 25.7	65 38	23.0	36 26.9	66 36	21.5	36 07.0	66 35	21.1	35 47.1	67 34	20.6	31 40.3	70 26	15.4	31 19.1	71 25	15.0	27 43.6	73 18	11.0	9
40	37 21.9	63 39	23.9	37 03.0	63 38	23.4	36 05.5	64 36	21.9	35 46.1	65 35	21.5	35 26.6	65 35	21.0	31 24.9	69 26	15.7	31 04.1	69 26	15.2	27 32.5	72 19	11.2	40
1	36 58.4	61 40	24.2	36 39.9	62 39	23.7	35 43.8	63 37	22.3	35 24.8	63 36	21.8	35 05.8	64 35	21.3	31 09.1	68 27	15.9	30 48.8	68 26	15.5	27 21.2	70 19	11.4	1
2	36 34.6	60 40	24.6	36 16.5	60 40	24.1	35 21.7	61 37	22.7	35 03.2	62 37	22.2	34 44.6	62 36	21.7	30 53.2	66 27	16.2	30 33.3	66 26	15.8	27 09.8	69 20	11.6	2
3	36 10.4	58 41	25.0	35 52.8	59 40	24.5	34 59.4	60 38	23.0	34 41.3	60 37	22.5	34 23.1	61 36	22.0	30 36.9	65 28	16.5	30 17.4	65 27	16.1	26 58.1	68 20	11.8	3
4	35 45.8	57 41	25.3	35 28.7	57 41	24.8	34 36.7	58 38	23.3	34 19.1	59 38	22.9	34 01.3	59 37	22.4	30 20.4	63 28	16.8	30 01.4	64 27	16.3	26 46.2	66 20	12.0	4
45	35 21.0	55 42	25.7	35 04.3	56 41	25.2	34 13.6	57 39	23.7	33 56.5	57 38	23.2	33 39.2	58 37	22.7	30 03.6	62 28	17.0	29 45.0	62 28	16.6	26 34.1	65 20	12.2	45
6	34 55.8	54 42	26.0	34 39.7	54 42	25.5	33 50.3	55 39	24.0	33 33.7	56 39	23.5	33 16.9	56 38	23.0	29 46.6	60 29	17.3	29 28.5	61 28	16.8	26 21.8	64 21	12.4	6
7	34 30.4	52 43	26.3	34 14.7	53 42	25.8	33 26.8	54 40	24.3	33 10.5	54 39	23.8	32 54.2	55 38	23.3	29 29.4	59 29	17.5	29 11.6	59 28	17.1	26 09.3	62 21	12.6	7
8	34 04.6	51 43	26.7	33 49.4	51 43	26.1	33 02.9	52 40	24.6	32 47.1	53 39	24.1	32 31.2	53 39	23.6	29 11.9	57 30	17.8	28 54.6	58 29	17.3	25 56.7	61 21	12.8	8
9	33 38.6	49 44	27.0	33 23.9	49 43	26.4	32 38.7	51 41	24.9	32 23.5	51 40	24.4	32 08.0	52 39	23.9	28 54.2	56 30	18.0	28 37.4	56 29	17.5	25 43.9	59 22	12.9	9
50	33 12.4	47 44	27.2	32 58.1	48 43	26.7	32 14.3	49 41	25.2	31 59.5	50 40	24.6	31 44.6	50 40	24.1	28 36.3	54 30	18.2	28 19.9	55 29	17.7	25 30.9	58 22	13.1	50
1	32 45.8	46 45	27.5	32 32.0	46 44	27.0	31 49.7	48 41	25.4	31 35.3	48 41	24.9	31 20.9	48 40	24.4	28 18.1	53 31	18.4	28 02.2	53 30	18.0	25 17.7	56 22	13.3	1
2	32 19.1	44 45	27.8	32 05.7	45 44	27.3	31 24.8	46 42	25.7	31 10.9	46 41	25.2	30 56.9	47 40	24.7	27 59.8	51 31	18.7	27 44.3	52 30	18.2	25 04.4	55 22	13.4	2
3	31 52.1	43 45	28.0	31 39.2	43 45	27.5	30 59.7	44 42	25.9	30 46.3	45 41	25.4	30 32.8	45 41	24.9	27 41.2	50 31	18.9	27 26.2	50 30	18.4	24 50.9	53 23	13.6	3
4	31 24.8	41 46	28.3	31 12.4	42 45	27.8	30 34.4	43 43	26.2	30 21.4	43 42	25.7	30 08.4	44 41	25.1	27 22.5	48 32	19.1	27 08.0	49 31	18.6	24 37.2	52 23	13.8	4
55	30 57.4	40 46	28.5	30 45.4	40 45	28.0	30 08.8	41 43	26.4	29 56.4	42 42	25.9	29 43.8	42 41	25.4	27 03.6	47 32	19.2	26 49.5	47 31	18.8	24 23.4	50 23	13.9	55
6	30 29.7	38 46	28.8	30 18.3	38 46	28.2	29 43.1	40 43	26.6	29 31.1	40 42	26.1	29 19.0	41 42	25.6	26 44.5	45 32	19.4	26 30.9	45 31	18.9	24 09.5	49 23	14.1	6
7	30 01.9	36 47	29.0	29 50.9	37 46	28.4	29 17.1	38 44	26.8	29 05.6	39 43	26.3	28 54.0	39 42	25.8	26 25.2	44 32	19.6	26 12.1	44 32	19.1	23 55.4	47 24	14.2	7
8	29 33.9	35 47	29.2	29 23.3	35 46	28.6	28 51.0	37 44	27.0	28 40.0	37 43	26.5	28 28.8	37 42	26.0	26 05.8	42 33	19.8	25 53.1	42 32	19.3	23 41.2	46 24	14.3	8
9	29 05.7	33 47	29.4	28 55.6	34 46	28.8	28 24.7	35 44	27.2	28 14.1	35 43	26.7	28 03.5	36 43	26.2	25 46.2	40 33	19.9	25 34.0	41 32	19.4	23 26.9	44 24	14.5	9
60	28 37.3	32 48	29.6	28 27.7	32 47	29.0	27 58.2	33 44	27.4	27 48.1	34 44	26.9	27 37.9	34 43	26.3	25 26.4	39 33	20.1	25 14.7	39 32	19.6	23 12.4	42 24	14.6	60
1	28 08.8	30 48	29.7	27 59.7	31 47	29.2	27 31.6	32 45	27.6	27 22.0	32 44	27.0	27 12.3	33 43	26.5	25 06.5	37 33	20.3	24 55.3	37 33	19.7	22 57.8	41 24	14.7	1
2	27 40.1	29 48	29.9	27 31.5	29 47	29.4	27 04.8	30 45	27.7	26 55.7	31 44	27.2	26 46.4	31 43	26.7	24 46.5	36 34	20.4	24 35.8	36 33	19.9	22 43.1	39 25	14.8	2
3	27 11.3	27 48	30.1	27 03.1	27 47	29.5	26 37.9	29 45	27.9	26 29.2	29 44	27.4	26 20.5	29 44	26.8	24 26.3	34 34	20.5	24 16.1	34 33	20.0	22 28.3	38 25	14.9	3
4	26 42.3	25 48	30.2	26 34.6	26 48	29.7	26 10.8	27 45	28.0	26 02.7	27 44	27.5	25 54.4	28 44	27.0	24 06.0	32 34	20.7	23 56.3	33 33	20.1	22 13.4	36 25	15.0	4
65	26 13.3	24 49	30.3	26 06.0	24 48	29.8	25 43.7	25 46	28.2	25 36.0	26 45	27.6	25 28.2	26 44	27.1	23 45.6	31 34	20.8	23 36.4	31 33	20.3	21 58.4	34 25	15.1	65
6	25 44.1	22 49	30.5	25 37.3	23 48	29.9	25 16.4	24 46	28.3	25 09.1	24 45	27.8	25 01.8	25 44	27.2	23 25.1	29 34	20.9	23 16.4	29 34	20.4	21 43.3	33 25	15.2	6
7	25 14.8	21 49	30.6	25 08.5	21 48	30.0	24 49.0	22 46	28.4	24 42.2	23 45	27.9	24 35.4	23 44	27.4	23 04.5	27 35	21.0	22 56.2	28 34	20.5	21 28.1	31 25	15.3	7
8	24 45.4	19 49	30.7	24 39.6	20 48	30.2	24 21.4	21 46	28.5	24 15.2	21 45	28.0	24 08.8	21 44	27.5	22 43.8	26 35	21.1	22 36.0	26 34	20.6	21 12.8	29 26	15.4	8
9	24 15.9	18 49	30.8	24 10.5	18 48	30.3	23 53.8	19 46	28.6	23 48.1	19 45	28.1	23 42.2	20 45	27.6	22 22.9	24 35	21.2	22 15.6	24 34	20.7	20 57.4	28 26	15.5	9
70	23 46.3	16 49	30.9	23 41.4	16 49	30.4	23 26.2	18 46	28.7	23 20.8	18 46	28.2	23 15.4	18 45	27.7	22 02.0	22 35	21.3	21 55.2	23 34	20.8	20 42.0	26 26	15.6	70
1	23 16.7	15 50	31.0	23 12.3	15 49	30.4	22 58.4	16 46	28.8	22 53.5	16 46	28.3	22 48.6	17 45	27.8	21 41.0	21 35	21.4	21 34.7	21 34	20.9	20 26.5	24 26	15.6	1
2	22 46.9	13 50	31.0	22 43.0	13 49	30.5	22 30.5	14 46	28.9	22 26.2	15 46	28.4	22 21.7	15 45	27.8	21 20.0	19 35	21.5	21 14.2	19 34	20.9	20 10.9	23 26	15.7	2
3	22 17.2	11 50	31.1	22 13.7	12 49	30.6	22 02.6	13 47	29.0	21 58.7	13 46	28.4	21 54.7	14 45	27.9	20 58.8	18 35	21.5	20 53.5	18 34	21.0	19 55.2	21 26	15.8	3
4	21 47.3	10 50	31.2	21 44.3	10 49	30.6	21 34.7	11 47	29.0	21 31.2	12 46	28.5	21 27.7	12 45	28.0	20 37.6	16 35	21.6	20 32.8	16 35	21.1	19 39.5	19 26	15.8	4
75	21 17.5	08 50	31.2	21 14.9	09 49	30.7	21 06.7	10 47	29.1	21 03.7	10 46	28.6	21 00.6	10 45	28.0	20 16.4	14 36	21.7	20 12.0	15 35	21.1	19 23.8	18 26	15.9	75
6	20 47.5	07 50	31.3	20 45.5	07 49	30.7	20 38.6	08 47	29.1	20 36.1	08 46	28.6	20 33.5	09 45	28.1	19 55.1	13 36	21.7	19 51.2	13 35	21.2	19 08.0	16 26	15.9	6
7	20 17.6	05 50	31.3	20 16.0	06 49	30.8	20 10.5	07 47	29.2	20 08.5	07 46	28.6	20 06.4	07 45	28.1	19 33.7	11 36	21.8	19 30.4	11 35	21.2	18 52.1	14 26	16.0	7
8	19 47.6	04 50	31.3	19 46.5	04 49	30.8	19 42.4	05 47	29.2	19 40.8	05 46	28.7	19 39.2	06 45	28.1	19 12.3	09 36	21.8	19 09.5	10 35	21.3	18 36.2	13 27	16.0	8
9	19 17.6	02 50	31.3	19 16.9	03 49	30.8	19 14.2	03 47	29.2	19 13.2	04 46	28.7	19 12.0	04 45	28.2	18 50.9	08 36	21.8	18 48.5	08 35	21.3	18 20.3	11 27	16.0	9
80	18 47.7	01 50	31.3	18 47.4	01 49	30.8	18 46.1	02 47	29.2	18 45.5	02 46	28.7	18 44.8	02 45	28.2	18 29.4	06 36	21.8	18 27.6	06 35	21.3	18 04.4	09 27	16.1	80
1	18 17.7	01 50	31.3	18 17.8	01 49	30.8	18 17.9	00 47	29.2	18 17.8	01 46	28.7	18 17.5	01 45	28.2	18 08.0	04 36	21.9	18 06.6	05 35	21.3	17 48.4	07 27	16.1	1
2	17 47.7	02 50	31.3	17 48.3	02 49	30.8	17 49.8	01 47	29.2	17 50.1	01 46	28.7	17 50.3	01 45	28.2	17 46.5	03 36	21.9	17 45.6	03 35	21.4	17 32.4	06 27	16.1	2
3	17 17.7	04 50	31.3	17 18.8	04 49	30.8	17 21.6	03 47	29.2	17 22.4	02 46	28.7	17 23.1	02 45	28.2	17 25.0	01 36	21.9	17 24.6	01 35	21.4	17 16.4	04 27	16.1	3
4	16 47.7	05 50	31.3	16 49.3	05 49	30.8	16 53.4	04 47	29.2	16 54.7	04 46	28.7	16 55.8	04 45	28.2	17 03.5	01 36	21.9	17 03.6	00 35	21.4	17 00.3	02 27	16.1	4
85	16 17.8	07 50	31.3	16 19.8	07 49	30.7	16 25.3	06 47	29.2	16 27.0	06 46	28.7	16 28.6	05 45	28.1	16 42.0	02 36	21.9	16 42.6	02 35	21.4	16 44.3	01 27	16.1	85
6	15 47.8	08 50	31.2	15 50.3	08 49	30.7	15 57.2	07 47	29.1	15 59.3	07 46	28.6	16 01.4	07 45	28.1	16 20.5	04 36	21.9	16 21.6	04 35	21.4	16 28.3	01 27	16.1	6
7	15 18.0	10 50	31.2	15 20.9	10 49	30.7	15 29.1	09 47	29.1	15 31.7	09 46	28.6	15 34.3	08 45	28.1	15 59.0	05 36	21.9	16 00.6	05 35	21.3	16 12.2	03 27	16.1	7
8	14 48.1	11 50	31.1	14 51.5	11 49	30.6	15 01.1	10 47	29.1	15 04.1	10 46	28.5	15 07.1	10 45	28.0	15 37.5	07 36	21.8	15 39.6	07 35	21.3	15 56.2	04 27	16.1	8
9	14 18.3	13 50	31.1	14 22.1	13 49	30.5	14 33.1	12 47	29.0	14 36.6	12 46	28.5	14 40.1	11 45	28.0	15 16.1	09 36	21.8	15 18.7	08 35	21.3	15 40.2	06 27	16.1	9
90	13 48.6	14 49	31.0	13 52.8	14 49	30.5	14 05.1	13 46	28.9	14 09.1	13 46	28.4	14 13.0	13 45	27.9	14 54.7	10 36	21.8	14 57.7	10 35	21.3	15 24.2	08 27	16.1	90

16—8472

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	13 19.0	16 49	30.9	13 23.6	15 49	30.4	13 37.3	15 46	28.9	13 41.7	15 46	28.4	13 46.0	14 45	27.9	14 33.3	12 36	21.7	14 36.8	12 35	21.2	15 08.2	09 27	16.1	91
2	12 49.4	17 49	30.8	12 54.5	17 48	30.3	13 09.4	16 46	28.8	13 14.3	16 46	28.3	13 19.1	16 45	27.8	14 12.0	13 35	21.7	14 16.0	13 35	21.2	14 52.3	11 27	16.0	2
3	12 19.8	19 49	30.7	12 25.4	18 48	30.2	12 41.7	18 46	28.7	12 47.0	18 45	28.2	12 52.3	17 45	27.7	13 50.7	15 35	21.6	13 55.2	15 35	21.1	14 36.4	13 26	16.0	3
4	11 50.4	20 49	30.6	11 56.4	20 48	30.1	12 14.0	19 46	28.6	12 19.8	19 45	28.1	12 25.5	19 44	27.6	13 29.5	17 35	21.6	13 34.4	16 34	21.1	14 20.5	14 26	16.0	4
95	11 21.1	21 49	30.5	11 27.5	21 48	30.0	11 46.4	21 46	28.5	11 52.6	21 45	28.0	11 58.8	20 44	27.5	13 08.3	18 35	21.5	13 13.7	18 34	21.0	14 04.6	16 26	15.9	95
6	10 51.8	23 49	30.4	10 58.7	23 48	29.9	11 18.9	22 46	28.4	11 25.5	22 45	27.9	11 32.1	22 44	27.4	12 47.2	20 35	21.4	12 53.1	20 34	20.9	13 48.8	18 26	15.9	6
7	10 22.7	24 48	30.3	10 29.9	24 48	29.8	10 51.5	24 46	28.3	10 58.6	24 45	27.8	11 05.6	23 44	27.3	12 26.2	21 35	21.4	12 32.5	21 34	20.9	13 33.0	19 26	15.8	7
8	9 53.6	26 48	30.2	10 01.3	26 48	29.7	10 24.2	25 46	28.2	10 31.7	25 45	27.7	10 39.2	25 44	27.2	12 05.2	23 35	21.3	12 12.0	23 34	20.8	13 17.3	21 26	15.8	8
9	9 24.7	27 48	30.0	9 32.8	27 47	29.6	9 57.0	27 45	28.1	10 04.9	26 44	27.6	10 12.8	26 44	27.1	11 44.3	24 35	21.2	11 51.6	24 34	20.7	13 01.7	22 26	15.7	9
100	8 55.9	29 48	29.9	9 04.4	28 47	29.4	9 29.9	28 45	28.0	9 38.3	28 44	27.5	9 46.6	28 44	27.0	11 23.5	26 35	21.1	11 31.3	26 34	20.6	12 46.1	24 26	15.7	100
1	8 27.2	30 48	29.7	8 36.2	30 47	29.3	9 02.9	30 45	27.8	9 11.7	29 44	27.3	9 20.5	29 43	26.8	11 02.8	28 34	21.0	11 11.0	27 34	20.5	12 30.6	26 26	15.6	1
2	7 58.6	31 47	29.6	8 08.0	31 47	29.1	8 36.0	31 45	27.7	8 45.3	31 44	27.2	8 54.5	31 43	26.7	10 42.1	29 34	20.9	10 50.8	29 33	20.4	12 15.1	27 26	15.5	2
3	7 30.2	33 47	29.4	7 40.0	33 46	29.0	8 09.3	32 44	27.5	8 19.0	32 44	27.0	8 28.7	32 43	26.6	10 21.6	31 34	20.8	10 30.8	30 33	20.3	11 59.7	29 26	15.4	3
4	7 02.0	34 47	29.3	7 12.2	34 46	28.8	7 42.7	34 44	27.4	7 52.9	34 43	26.9	8 02.9	34 43	26.4	10 01.2	32 34	20.7	10 10.8	32 33	20.2	11 44.4	30 25	15.4	4
105	6 33.8	36 47	29.1	6 44.5	35 46	28.6	7 16.3	35 44	27.2	7 26.8	35 43	26.7	7 37.3	35 42	26.3	9 40.9	34 34	20.6	9 50.9	33 33	20.1	11 29.1	32 25	15.3	105
6	6 05.9	37 46	28.9	6 16.9	37 46	28.4	6 50.0	37 44	27.0	7 01.0	37 43	26.6	7 11.9	36 42	26.1	9 20.7	35 33	20.4	9 31.2	35 33	20.0	11 14.0	34 25	15.2	6
7	5 38.1	38 46	28.7	5 49.6	38 45	28.3	6 23.9	38 43	26.9	6 35.3	38 43	26.4	6 46.6	38 42	25.9	9 00.6	37 33	20.3	9 11.6	36 32	19.8	10 58.9	35 25	15.1	7
8	5 10.5	40 46	28.5	5 22.3	40 45	28.1	5 57.9	39 43	26.7	6 09.7	39 42	26.2	6 21.5	39 42	25.8	8 40.7	38 33	20.2	8 52.1	38 32	19.7	10 44.0	37 25	15.0	8
9							5 32.1	41 43	26.5	5 44.3	41 42	26.0	5 56.5	41 41	25.6	8 20.8	40 33	20.0	8 32.7	39 32	19.6	10 29.1	38 25	14.9	9
110							5 06.5	42 42	26.3	5 19.1	42 42	25.8	5 31.7	42 41	25.4	8 01.2	41 33	19.9	8 13.4	41 32	19.4	10 14.3	40 24	14.8	110
1													5 07.1	43 41	25.2	7 41.6	42 32	19.7	7 54.3	42 32	19.3	9 59.7	41 24	14.7	1
2																7 22.2	44 32	19.6	7 35.4	44 31	19.1	9 45.1	43 24	14.6	2
3																7 03.0	45 32	19.4	7 16.5	45 31	19.0	9 30.7	44 24	14.4	3
4																6 43.9	47 32	19.2	6 57.9	47 31	18.8	9 16.3	46 24	14.3	4
115																6 25.0	48 31	19.1	6 39.4	48 31	18.6	9 02.1	47 23	14.2	115
6																6 06.2	49 31	18.9	6 21.0	49 30	18.5	8 48.1	49 23	14.1	6
7																5 47.6	51 31	18.7	6 02.8	51 30	18.3	8 34.1	50 23	13.9	7
8																5 29.2	52 30	18.5	5 44.8	52 30	18.1	8 20.3	51 23	13.8	8
9																5 10.9	54 30	18.3	5 27.0	54 29	17.9	8 06.6	53 23	13.7	9
120																			5 09.3	55 29	17.7	7 53.0	54 22	13.5	120
1																						7 39.6	56 22	13.4	1
2																						7 26.4	57 22	13.2	2
3																						7 13.3	58 22	13.1	3
4																						7 00.3	60 21	12.9	4
125																						6 47.5	61 21	12.7	125
6																						6 34.9	62 21	12.6	6
7																						6 22.4	64 20	12.4	7
8																						6 10.1	65 20	12.2	8
9																						5 58.0	66 20	12.1	9
130																						5 46.0	67 20	11.9	130
1																						5 34.3	68 19	11.7	1
2																						5 22.7	70 19	11.5	2
3																						5 11.3	71 19	11.3	3
4																						5 00.0	72 18	11.1	4

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	14 00.0	1.0 00	180.0	13 30.0	1.0 00	180.0	12 00.0	1.0 00	180.0	11 30.0	1.0 00	180.0	11 00.0	1.0 00	180.0	5 00.0	1.0 00	180.0
1	13 59.7	1.0 01	179.5	13 29.7	1.0 01	179.5	11 59.8	1.0 01	179.5	11 29.8	1.0 01	179.5	10 59.8	1.0 01	179.5			
2	13 59.0	1.0 02	179.0	13 29.0	1.0 02	179.0	11 59.0	1.0 02	179.0	11 29.1	1.0 02	179.1	10 59.1	1.0 02	179.1			
3	13 57.7	1.0 03	178.5	13 27.7	1.0 03	178.5	11 57.8	1.0 03	178.6	11 27.9	1.0 03	178.6	10 57.9	1.0 03	178.6			
4	13 55.9	1.0 04	177.9	13 25.9	1.0 04	178.0	11 56.1	1.0 04	178.1	11 26.2	1.0 04	178.1	10 56.3	1.0 04	178.2			
05	13 53.5	1.0 05	177.4	13 23.6	1.0 05	177.5	11 54.0	1.0 04	177.6	11 24.1	1.0 04	177.6	10 54.2	1.0 04	177.7			
6	13 50.7	99 06	176.9	13 20.8	99 06	177.0	11 51.3	99 05	177.1	11 21.5	99 05	177.2	10 51.6	99 05	177.2			
7	13 47.3	99 06	176.4	13 17.5	99 06	176.5	11 48.2	99 06	176.6	11 18.4	99 06	176.7	10 48.6	99 06	176.8			
8	13 43.4	99 07	175.9	13 13.7	99 07	176.0	11 44.6	99 07	176.2	11 14.9	99 07	176.2	10 45.1	99 07	176.3			
9	13 39.1	99 08	175.4	13 09.4	99 08	175.5	11 40.5	99 08	175.7	11 10.8	99 07	175.8	10 41.2	99 07	175.9			
10	13 34.2	99 09	174.9	13 04.6	99 09	175.0	11 35.9	99 08	175.2	11 06.4	99 08	175.3	10 36.8	99 08	175.4			
1	13 28.7	98 10	174.4	12 59.3	98 10	174.5	11 30.9	98 09	174.8	11 01.4	98 09	174.8	10 31.9	98 09	174.9			
2	13 22.8	98 11	173.9	12 53.5	98 11	174.0	11 25.4	98 10	174.3	10 56.0	98 10	174.4	10 26.6	98 10	174.5			
3	13 16.4	98 12	173.4	12 47.2	98 11	173.5	11 19.4	98 11	173.8	10 50.1	98 11	173.9	10 20.9	98 10	174.0			
4	13 09.5	97 12	172.9	12 40.4	97 12	173.0	11 13.0	97 12	173.4	10 43.8	97 11	173.5	10 14.7	97 11	173.6			
15	13 02.1	97 13	172.4	12 33.1	97 13	172.5	11 06.0	97 12	172.9	10 37.0	97 12	173.0	10 08.0	97 12	173.1			
6	12 54.2	96 14	171.9	12 25.3	96 14	172.0	10 58.7	96 13	172.4	10 29.8	96 13	172.6	10 00.9	96 13	172.7			
7	12 45.8	96 15	171.4	12 17.1	96 15	171.5	10 50.8	96 14	172.0	10 22.1	96 14	172.1	9 53.3	96 13	172.3			
8	12 36.9	95 16	170.9	12 08.3	95 15	171.0	10 42.6	95 15	171.5	10 14.0	95 14	171.7	9 45.3	95 14	171.8			
9	12 27.5	95 16	170.4	11 59.1	95 16	170.6	10 33.8	95 15	171.1	10 05.4	95 15	171.2	9 36.9	95 15	171.4			
20	12 17.7	94 17	169.9	11 49.4	94 17	170.1	10 24.6	94 16	170.6	9 56.3	94 16	170.8	9 28.1	94 16	170.9			
1	12 07.3	94 18	169.4	11 39.3	94 18	169.6	10 15.0	94 17	170.2	9 46.9	94 17	170.3	9 18.8	94 16	170.5			
2	11 56.5	93 19	169.0	11 28.6	93 18	169.2	10 04.9	93 18	169.7	9 37.0	93 17	169.9	9 09.0	93 17	170.1			
3	11 45.3	92 20	168.5	11 17.5	92 19	168.7	9 54.4	92 18	169.3	9 26.6	92 18	169.5	8 58.9	92 18	169.7			
4	11 33.5	92 20	168.0	11 06.0	92 20	168.2	9 43.4	92 19	168.8	9 15.9	92 19	169.0	8 48.3	92 18	169.2			
25	11 21.3	91 21	167.6	10 54.0	91 21	167.8	9 32.0	91 20	168.4	9 04.7	91 19	168.6	8 37.3	91 19	168.8			
6	11 08.7	90 22	167.1	10 41.6	90 21	167.3	9 20.2	90 20	168.0	8 53.1	90 20	168.2	8 25.9	90 20	168.4			
7	10 55.5	90 23	166.6	10 28.7	90 22	166.9	9 08.0	90 21	167.5	8 41.1	90 21	167.8	8 14.1	90 20	168.0			
8	10 42.0	89 23	166.2	10 15.3	89 23	166.4	8 55.3	89 22	167.1	8 28.6	89 21	167.3	8 01.9	89 21	167.6			
9	10 28.0	88 24	165.7	10 01.6	88 24	166.0	8 42.2	88 22	166.7	8 15.8	88 22	166.9	7 49.3	88 22	167.2			
30	10 13.6	87 25	165.3	9 47.4	87 24	165.5	8 28.8	87 23	166.3	8 02.5	87 23	166.5	7 36.3	87 22	166.8			
1	9 58.7	86 25	164.8	9 32.7	86 25	165.1	8 14.9	87 24	165.9	7 48.9	87 23	166.1	7 22.9	87 23	166.4			
2	9 43.4	86 26	164.4	9 17.7	86 26	164.7	8 00.6	86 24	165.4	7 34.8	86 24	165.7	7 09.1	86 24	166.0			
3	9 27.7	85 27	164.0	9 02.2	85 26	164.2	7 45.9	85 25	165.0	7 20.4	85 25	165.3	6 54.9	85 24	165.6			
4	9 11.5	84 28	163.5	8 46.4	84 27	163.8	7 30.8	84 26	164.6	7 05.6	84 25	164.9	6 40.4	84 25	165.2			
35	8 55.0	83 28	163.1	8 30.1	83 28	163.4	7 15.3	83 26	164.2	6 50.4	83 26	164.5	6 25.4	83 26	164.8			
6	8 38.1	82 29	162.7	8 13.4	82 28	163.0	6 59.5	82 27	163.9	6 34.8	82 27	164.1	6 10.1	82 26	164.4			
7	8 20.7	81 30	162.3	7 56.4	81 29	162.6	6 43.3	81 28	163.5	6 18.9	81 27	163.8	5 54.5	81 27	164.1			
8	8 03.0	80 30	161.9	7 38.9	80 30	162.2	6 26.7	80 28	163.1	6 02.6	80 28	163.4	5 38.5	80 27	163.7			
9	7 44.9	79 31	161.5	7 21.1	79 30	161.8	6 09.7	79 29	162.7	5 45.9	79 28	163.0	5 22.1	79 28	163.3			
40	7 26.4	78 31	161.1	7 02.9	78 31	161.4	5 52.4	78 29	162.3	5 28.9	78 29	162.7	5 05.4	78 28	163.0			
1	7 07.5	77 32	160.7	6 44.3	77 32	161.0	5 34.7	77 30	162.0	5 11.5	77 30	162.3						
2	6 48.2	76 33	160.3	6 25.4	76 32	160.6	5 16.7	76 30	161.6									
3	6 28.6	75 33	159.9	6 06.1	75 33	160.3												
4	6 08.6	74 34	159.6	5 46.4	74 33	159.9												
45	5 48.3	73 34	159.2	5 26.4	73 34	159.5												
6	5 27.6	72 35	158.8	5 06.1	72 34	159.2												
7	5 06.6	71 36	158.5															

STAR IDENTIFICATION TABLE

ALTITUDE

Lat. 16°

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

16—8472

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

STAR IDENTIFICATION TABLE

ALTITUDE

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

10—8472

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

A.	0° 00′				0° 30′				1° 00′				1° 30′				2° 00′				2° 30′				3° 00′				3° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	73 00.0	1.0	03	180.0	73 30.0	1.0	03	180.0	74 00.0	1.0	03	180.0	74 30.0	1.0	03	180.0	75 00.0	1.0	03	180.0	75 30.0	1.0	03	180.0	76 00.0	1.0	03	180.0	76 30.0	1.0	04	180.0	00
1	72 58.3	1.0	09	176.6	73 28.2	1.0	09	176.5	73 58.2	1.0	09	176.4	74 28.1	1.0	09	176.3	74 58.1	1.0	10	176.1	75 28.0	1.0	10	176.0	75 57.9	1.0	10	175.9	76 27.9	1.0	11	175.7	1
2	72 53.2	99	14	173.2	73 23.0	99	14	173.0	73 52.8	99	15	172.8	74 22.5	99	15	172.6	74 52.3	99	16	172.3	75 22.0	99	16	172.1	75 51.8	99	17	171.8	76 21.5	99	18	171.5	2
3	72 44.7	99	20	169.8	73 14.3	98	20	169.5	73 43.8	98	21	169.2	74 13.3	98	21	168.9	74 42.8	98	22	168.6	75 12.2	98	23	168.2	75 41.6	98	23	167.8	76 11.0	98	24	167.4	3
4	72 33.0	97	25	166.5	73 02.2	97	26	166.2	73 31.4	97	26	165.8	74 00.5	97	27	165.3	74 29.6	97	28	164.9	74 58.6	97	29	164.4	75 27.6	96	30	163.9	75 56.4	96	30	163.3	4
05	72 18.0	96	30	163.3	72 46.9	96	31	162.9	73 15.6	96	32	162.4	73 44.3	95	32	161.9	74 12.9	95	33	161.3	74 41.4	95	34	160.7	75 09.8	95	35	160.1	75 38.1	94	36	159.5	05
6	72 00.1	95	35	160.2	72 28.4	94	36	159.7	72 56.7	94	37	159.1	73 24.9	94	38	158.5	73 52.9	93	39	157.9	74 20.8	93	40	157.2	74 48.6	92	41	156.5	75 16.3	92	42	155.8	6
7	71 39.3	93	39	157.2	72 07.1	93	40	156.6	72 34.8	92	41	156.0	73 02.4	92	42	155.3	73 29.8	91	43	154.6	73 57.1	91	44	153.9	74 24.2	90	46	153.1	74 51.1	90	47	152.3	7
8	71 15.7	91	44	154.3	71 43.0	91	45	153.7	72 10.0	90	46	153.0	72 37.0	90	47	152.2	73 03.8	89	48	151.5	73 30.4	88	49	150.7	73 56.8	88	50	149.8	74 23.0	87	52	148.9	8
9	70 49.6	89	48	151.6	71 16.2	88	49	150.8	71 42.7	88	50	150.1	72 09.0	87	51	149.3	72 35.1	87	52	148.5	73 00.9	86	53	147.7	73 26.6	85	54	146.8	73 52.0	84	56	145.8	9
10	70 21.1	87	51	148.9	70 47.1	86	52	148.2	71 12.9	86	53	147.4	71 38.5	85	55	146.6	72 03.9	84	56	145.7	72 29.0	83	57	144.8	72 53.9	83	58	143.9	73 18.6	82	60	142.9	10
1	69 50.4	85	55	146.4	70 15.8	84	56	145.6	70 40.9	83	57	144.8	71 05.8	83	58	143.9	71 30.5	82	59	143.0	71 54.9	81	60	142.1	72 19.0	80	62	141.1	72 42.8	79	63	140.1	1
2	69 17.6	83	58	144.0	69 42.3	82	59	143.2	70 06.8	81	60	142.3	70 31.0	80	61	141.5	70 55.0	79	62	140.5	71 18.6	78	63	139.6	71 42.0	77	65	138.6	72 05.1	76	66	137.6	2
3	68 43.0	81	61	141.7	69 07.0	80	62	140.9	69 30.8	79	63	140.0	69 54.3	78	64	139.1	70 17.6	77	65	138.2	70 40.5	76	66	137.2	71 03.2	75	68	136.2	71 25.5	74	69	135.2	3
4	68 06.6	78	63	139.5	68 30.0	78	64	138.7	68 53.1	77	65	137.8	69 16.0	76	67	136.9	69 38.5	75	68	136.0	70 00.8	74	69	135.0	70 22.7	72	70	134.0	70 44.2	71	71	133.0	4
15	67 28.6	76	66	137.5	67 51.3	75	67	136.6	68 13.8	74	68	135.8	68 36.0	73	69	134.8	68 57.9	72	70	133.9	69 19.5	71	71	132.9	69 40.7	70	72	131.9	70 01.5	69	73	130.9	15
6	66 49.1	74	68	135.6	67 11.2	73	69	134.7	67 33.1	72	70	133.8	67 54.6	71	71	132.9	68 15.9	70	72	131.9	68 36.8	69	73	131.0	68 57.3	68	74	130.0	69 17.5	67	75	128.9	6
7	66 08.2	72	70	133.7	66 29.8	71	71	132.9	66 51.0	70	72	132.0	67 12.0	69	73	131.0	67 32.6	68	74	130.1	67 52.8	67	75	129.1	68 12.8	66	76	128.1	68 32.3	65	77	127.1	7
8	65 26.2	70	72	132.0	65 47.1	69	73	131.1	66 07.8	68	74	130.2	66 28.1	67	75	129.3	66 48.1	66	76	128.4	67 07.8	65	77	127.4	67 27.1	64	78	126.4	67 46.0	62	79	125.4	8
9	64 43.0	68	74	130.3	65 03.4	67	75	129.5	65 23.4	66	76	128.6	65 43.2	65	76	127.7	66 02.6	64	77	126.7	66 21.7	63	78	125.8	66 40.4	62	79	124.8	66 58.8	61	80	123.8	9
20	63 58.7	67	75	128.8	64 18.6	66	76	127.9	64 38.1	65	77	127.0	64 57.3	63	78	126.1	65 16.2	62	79	125.2	65 34.7	61	80	124.3	65 52.9	60	81	123.3	66 10.7	59	81	122.3	20
1	63 13.5	65	77	127.3	63 32.9	64	78	126.4	63 51.9	63	78	125.6	64 10.5	62	79	124.7	64 28.9	61	80	123.8	64 46.9	59	81	122.8	65 04.5	58	82	121.9	65 21.8	57	83	120.9	1
2	62 27.5	63	78	125.9	62 46.3	62	79	125.0	63 04.8	61	80	124.2	63 23.0	60	81	123.3	63 40.8	59	81	122.4	63 58.3	58	82	121.5	64 15.5	57	83	120.5	64 32.2	55	84	119.6	2
3	61 40.6	62	79	124.6	61 58.9	61	80	123.7	62 17.0	60	81	122.9	62 34.7	58	82	122.0	62 52.0	57	82	121.1	63 09.0	56	83	120.2	63 25.7	55	84	119.3	63 42.0	54	85	118.3	3
4	60 53.0	60	80	123.3	61 10.9	59	81	122.5	61 28.4	58	82	121.6	61 45.7	57	83	120.8	62 02.6	56	83	119.9	62 19.2	55	84	119.0	62 35.4	53	85	118.1	62 51.2	52	86	117.2	4
25	60 04.7	59	82	122.1	60 22.1	58	82	121.3	60 39.2	57	83	120.4	60 56.1	55	84	119.6	61 12.5	54	84	118.7	61 28.7	53	85	117.8	61 44.5	52	86	116.9	61 59.9	51	86	116.0	25
6	59 15.8	57	82	120.9	59 32.8	56	83	120.1	59 49.5	55	84	119.3	60 05.9	54	84	118.5	60 22.0	53	85	117.6	60 37.7	52	86	116.8	60 53.1	51	86	115.9	61 08.2	50	87	115.0	6
7	58 26.3	56	83	119.8	58 42.9	55	84	119.0	58 59.2	54	85	118.2	59 15.2	53	85	117.4	59 30.9	52	86	116.6	59 46.2	51	86	115.7	60 01.3	50	87	114.9	60 15.9	48	88	114.0	7
8	57 36.2	55	84	118.8	57 52.5	54	85	118.0	58 08.4	53	85	117.2	58 24.0	52	86	116.4	58 39.3	51	87	115.6	58 54.3	49	87	114.7	59 09.0	48	88	113.9	59 23.3	47	88	113.0	8
9	56 45.7	53	85	117.8	57 01.6	52	86	117.0	57 17.2	51	86	116.2	57 32.4	50	87	115.4	57 47.4	49	87	114.6	58 02.0	48	88	113.8	58 16.3	47	88	113.0	58 30.3	46	89	112.1	9
30	55 54.8	52	86	116.9	56 10.3	51	86	116.1	56 25.5	50	87	115.3	56 40.4	49	87	114.5	56 55.0	48	88	113.7	57 09.4	47	88	112.9	57 23.4	46	89	112.1	57 37.0	45	89	111.3	30
1	55 03.4	51	86	115.9	55 18.5	50	87	115.2	55 33.4	49	87	114.4	55 48.0	48	88	113.7	56 02.3	47	88	112.9	56 16.3	46	89	112.1	56 30.0	45	89	111.3	56 43.4	44	90	110.5	1
2	54 11.6	50	87	115.1	54 26.4	49	87	114.3	54 41.0	48	88	113.6	54 55.3	47	88	112.8	55 09.3	46	89	112.0	55 23.0	45	89	111.3	55 36.4	44	90	110.5	55 49.5	43	90	109.7	2
3	53 19.4	49	87	114.2	53 34.0	48	88	113.5	53 48.3	47	88	112.8	54 02.3	46	89	112.0	54 16.0	45	89	111.3	54 29.4	44	90	110.5	54 42.5	43	90	109.7	54 55.4	42	91	108.9	3
4	52 26.9	48	88	113.4	52 41.2	47	88	112.7	52 55.2	46	89	112.0	53 08.9	45	89	111.2	53 22.4	44	90	110.5	53 35.5	43	90	109.7	53 48.4	42	91	109.0	54 01.0	41	91	108.2	4
35	51 34.1	47	88	112.7	51 48.1	46	89	111.9	52 01.9	45	89	111.2	52 15.3	44	90	110.5	52 28.5	43	90	109.8	52 41.4	43	91	109.0	52 54.0	42	91	108.3	53 06.4	41	91	107.5	35
6	50 41.1	46	89	111.9	50 54.8	45	89	111.2	51 08.2	44	90	110.5	51 21.4	44	90	109.8	51 34.4	43	91	109.1	51 47.0	42	91	108.3	51 59.4	41	91	107.6	52 11.5	40	92	106.9	6
7	49 47.7	45	89	111.2	50 01.2	44	90	110.5	50 14.4	44	90	109.8	50 27.3	43	91	109.1	50 40.0	42	91	108.4	50 52.5	41	91	107.7	51 04.6	40	92	106.9	51 16.5	39	92	106.2	7
8	48 54.1	44	90	110.5	49 07.3	44	90	109.8	49 20.3	43	91	109.1	49 33.0	42	91	108.4	49 45.5	41	91	107.7	49 57.7	40	92	107.0	50 09.7	39	92	106.3	50 21.4	39	92	105.6	8
9	48 00.2	44	90	109.9	48 13.2	43	90	109.2	48 26.0	42	91	108.5	48 38.5	41	91	107.8	48 50.7	40	92	107.1	49 02.8	40	92	106.4	49 14.5	39	92	105.7	49 26.0	38	92	105.0	9
40	47 06.1	43	90	109.2	47 18.9	42	91	108.5	47 31.5	41	91	107.9	47 43.8	41	92	107.2	47 55.8	40	92	106.5	48 07.6	39	92	105.8	48 19.2	38	92	105.1	48 30.5	37	93	104.4	40
1	46 11.9	42	91	108.6	46 24.4	41	91	107.9	46 36.8	41	91	107.3	46 48.9	40	92	106.6	47 00.7	39	92	105.9	47 12.3	38	92	105.3	47 23.7	38	93	104.6	47 34.9	37	93	103.9	1
2	45 17.4	42	91	108.0	45 29.7	41	91	107.3	45 41.9	40	92	106.7	45 53.8	39	92	106.0	46 05.5	39	92	105.4	46 16.9	38	93	104.7	46 28.1	37	93	104.0	46 39.1	36	93	103.3	2
3	44 22.7	41	91	107.4	44 34.9	40	92	106.8	44 46.8	39	92	106.1	44 58.6	39	92	105.5	45 10.1	38	93	104.8	45 21.3	37	93	104.2	45 32.4	36	93	103.5	45 43.2	36	93	102.8	3
4	43 27.9	40	92	106.8	43 39.9	40	92	106.2	43 51.6	39	92	105.6	44 03.2	38	92	104.9	44 14.5	37	93	104.3	44 25.7	37	93	103.6	44 36.6	36	93	103.0	44 47.2	35	94	102.3	4
45	42 32.9	40	92	106.3	42 44.7	39	92	105.7	42 56.3	38	92	105.0	43 07.7	38	93	104.4	43 18.9	37	93	103.8	43 29.8	36	93	103.1	43 40.6	35	93	102.5	43 51.1	35	94	101.8	45
6	41 37.7	39	92	105.8	41 49.4	38	92	105.1	42 00.8	38	93	104.5	42 12.0	37	93	103.9	42 23.1	36	93	103.3	42 33.9	36	93	102.6	42 44.5	35	94	102.0	42 54.9	34	94	101.4	6
7	40 42.5	39	92	105.3	40 53.9	38	93	104.6	41 05.2	37	93	104.0	41 16.3	37	93	103.4	41 27.2	36	93	102.8	41 37.9	35	94	102.2	41 48.3	35	94	101.5	41 58.6	34	94	100.9	7
8	39 47.0	38	93	104.7	39 58.4	37	93	104.1	40 09.5	37	93	103.5	40 20.4	36	93	102.9	40 31.2	36	94	102.3	40 41.7	35	94	101.7	40 52.1	34	94	101.1	41 02.2	34	94	100.5	8
9	38 51.5	38	93	104.3	39 02.7	37	93	103.7	39 13.6	36	93	103.1	39 24.4	36	93	102.5	39 35.1	35	94	101.9	39 45.5	34	94	101.2	39 55.7	34	94	100.6	40 05.8	33	94	100.0	9
50	37 55.8	37	93	103.8	38 06.8	36	93	103.2	38 17.7	36	93	102.6	38 28.4	35	94	102.0	38 38.9	35	94	101.4	38 49.2	34	94	100.8	38 59.3	33	94	100.2	39 09.2	33	94	99.6	50
1	37 00.0	37	93	103.3	37 10.9	36	93	102.7	37 21.7	35	94	102.1	37 32.2	35	94	101.6	37 42.6	34	94	101.0	37 52.8	34	94	100.4	38 02.8	33	94	99.8	38 12.6	32	94	99.2	1
2	36 04.1	36	93	102.9	36 14.9	36	94	102.3	36 25.5	35	94	101.7	36 35.9	34	94	101.1	36 46.2	34	94	100.5	36 56.3	33	94	100.0	37 06.2	33	94	99.4	37 15.9	32	95	98.8	2
3	35 08.2	36	93	102.4	35 18.8	35	94	101.9	35 29.3	35	94	101.3	35 39.6	34	94	100.7	35 49.8	34	94	100.1	35 59.7	33	94	99.5	36 09.6	32	94	99.0	36 19.2	32	95	98.4	3
4	34 12.1	35	94	102.0	34 22.6	35	94	101.4	34 33.0	34	94	100.9	34 43.2	34	94	100.3	34 53.2	33	94	99.7	35 03.1	33	94	99.1	35 12.8	32	95	98.6	35 22.4	32	95	98.0	4
55	33 15.9	35	94	101.6	33 26.3	34	94	101.0	33 36.6	34	94	100.4	33 46.7	33	94	99.9	33 56.6	33	94	99.3	34 06.4	32	95	98.7	34 16.1	32	95	98.2	34 25.6	31	95	97.6	55
6	32 19.7	35	94	101.2	32 30.0	34	94	100.6	32 40.1	34	94	100.0	32 50.1	33	94	99.5	33 00.0	33	94	98.9	33 09.7	32	95	98.4	33 19.3	32	95	97.8	33 28.7	31	96	97.2	6
7	31 23.3	34	94	100.8	31 33.5	34	94	100.2	31 43.6	33	94	99.6	31 53.5	33	94	99.1	32 03.3	32	95	98.5	32 12.9	32	95	98.0	32 22.4	31	95	97.4	32 31.7	31	96	96.9	7
8	30 26.9	34	94	100.4	30 37.0	33	94	99.8	30 47.0	33	94	99.3	30 56.8	33	95	98.7	31 06.5	32	95	98.2	31 16.1	32	95	97.6	31 25.5	31	95	97.0	31 34.7	31	95	96.5	8
9	29 30.4	34	94	100.0	29 40.4	33	94	99.4	29 50.3	33	95	98.9	30 00.1	32	95	98.3	30 09.7	32	95	97.8	30 19.2	31	95	97.2	30 28.5	31	95	96.7	30 37.7	30	95	96.1	9
60	28 33.9	33	94	99.6	28 43.8	33	94	99.0	28 53.6	32	95	98.5	29 03.3	32	95	98.0	29 12.8	32	95	97.4	29 22.2	31	95	96.9	29 31.5	31	95	96.3	29 40.6	30	95	95.8	60
1	27 37.3	33	94	99.2	27 47.1	33	95	98.7	27 56.8	32	95	98.1	28 06.4	32	95	97.6	28 15.9	31	95	97.1	28 25.2	31	95	96.5	28 34.4	30	95	96.0	28 43.5	30	96	95.4	1
2	26 40.6	33	95	98.8	26 50.4	32	95	98.3	27 00.0	32	95	97.8	27 09.5	32	95	97.2	27 18.9	31	95	96.7	27 28.2	31	95	96.2	27 37.4	30	95	95.6	27 46.4	30	95	95.1	2
3	25 43.9	32	95	98.5	25 53.6	32	95	97.9	26 03.1	32	95	97.4	26 12.6	31	95	96.9	26 21.9	31	95	96.4	26 31.1	31	95	95.8	26 40.2	30	95	95.3	26 49.2	30	95	94.8	3
4	24 47.1	32	95	98.1	24 56.7	32	95	97.6	25 06.2	31	95	97.1	25 15.6	31	95	96.5	25 24.9	31	95	96.0	25 34.0	30	95	95.5	25 43.1	30	95	95.0	25 52.0	30	95	94.4	4
65	23 50.3	32	95	97.8	23 59.8	32	95	97.2	24 09.2	31	95	96.7	24 18.6	31	95	96.2	24 27.8	31	95	95.7	24 36.9	30	95	95.2	24 45.9	30	95	94.6	24 54.8	29	95	94.1	65
6	22 53.4	32	95	97.4	23 02.9	31	95	96.9	23 12.2	31	95	96.4	23 21.5	31	95	95.9	23 30.7	30	95	95.3	23 39.7	30	95	94.8	23 48.7	30	95	94.3	23 57.6	29	95	93.8	6
7	21 56.5	32	95	97.1	22 05.9	31	95	96.6	22 15.2	31	95	96.0	22 24.4	31	95	95.5	22 33.5	30	96	95.0	22 42.6	30	95	94.5	22 51.5	30	95	94.0	23 00.3	29	95	93.5	7
8	20 59.5	31	95	96.7	21 08.9	31	95	96.2	21 18.1	31	95	95.7	21 27.3	30	95	95.2	21 36.4	30	95	94.7	21 45.3	30	95	94.2	21 54.2	29	95	93.7	22 03.0	29	96	93.2	8
9	20 02.5	31	95	96.4	20 11.8	31	95	95.9	20 21.0	31	95	95.4	20 30.1	30	95	94.9	20 39.2	30	95	94.4	20 48.1	30	95	93.9	20 57.0	29	95	93.4	21 05.7	29	96	92.8	9
70	19 05.5	31	95	96.1	19 14.7	31	95	95.6	19 23.9	30	95	95.1	19 33.0	30	95	94.6	19 41.9	30	95	94.1	19 50.8	30	95	93.5	19 59.7	29	96	93.0	20 08.4	29	96	92.5	70
1	18 08.4	31	95	95.7	18 17.6	31	95	95.2	18 26.7	30	95	94.7	18 35.7	30	95	94.2	18 44.7	30	95	93.7	18 53.6	29	96	93.2	19 02.4	29	96	92.7	19 11.1	29	96	92.2	1
2	17 11.3	31	95	95.4	17 20.4	30	95	94.9	17 29.5	30	95	94.4	17 38.5	30	95	93.9	17 47.4	30	95	93.4	17 56.3	29	96	92.9	18 05.0	29	96	92.4	18 13.7	29	96	91.9	2
3	16 14.2	30	95	95.1	16 23.3	30	95	94.6	16 32.3	30	95	94.1	16 41.3	30	96	93.6	16 50.1	30	96	93.1	16 59.0	29	96	92.6	17 07.7	29	96	92.1	17 16.4	29	96	91.6	3
4	15 17.0	30	95	94.8	15 26.1	30	95	94.3	15 35.1	30	95	93.8	15 44.0	30	95	93.3	15 52.8	29	96	92.8	16 01.6	29	96	92.3	16 10.4	29	96	91.8	16 19.0	29	96	91.3	4
75	14 19.8	30	95	94.5	14 28.8	30	95	94.0	14 37.8	30	95	93.5	14 46.7	30	96	93.0	14 55.5	29	96	92.5	15 04.3	29	96	92.0	15 13.0	29	96	91.5	15 21.7	29	96	91.0	75
6	13 22.6	30	95	94.2	13 31.6	30	95	93.7	13 40.5	30	96	93.2	13 49.4	29	96	92.7	13 58.2	29	96	92.2	14 07.0	29	96	91.7	14 15.6	29	96	91.2	14 24.3	29	96	90.7	6
7	12 25.4	30	95	93.9	12 34.3	30	95	93.4	12 43.2	30	96	92.9	12 52.1	29	96	92.4	13 00.9	29	96	91.9	13 09.6	29	96	91.4	13 18.3	29	96	90.9	13 26.9	29	96	90.4	7
8	11 28.1	30	95	93.6	11 37.0	30	96	93.1	11 45.9	30	96	92.6	11 54.7	29	96	92.1	12 03.5	29	96	91.6	12 12.2	29	96	91.1	12 20.9	29	96	90.6	12 29.5	29	96	90.1	8
9	10 30.8	30	96	93.3	10 39.7	30	96	92.8	10 48.6	29	96	92.3	10 57.4	29	96	91.8	11 06.1	29	96	91.3	11 14.9	29	96	90.8	11 23.5	29	96	90.3	11 32.1	29	96	89.8	9
80	9 33.5	30	96	93.0	9 42.4	30	96	92.5	9 51.2	29	96	92.0	10 00.0	29	96	91.5	10 08.8	29	96	91.0	10 17.5	29	96	90.5	10 26.2	29	96	90.0	10 34.8	29	96	89.6	80
1	8 36.2	30	96	92.7	8 45.1	29	96	92.2	8 53.9	29	96	91.7	9 02.7	29	96	91.2	9 11.4	29	96	90.7	9 20.1	29	96	90.2	9 28.8	29	96	89.7	9 37.4	29	96	89.3	1
2	7 38.9	29	96	92.4	7 47.7	29	96	91.9	7 56.5	29	96	91.4	8 05.3	29	96	90.9	8 14.0	29	96	90.4	8 22.7	29	96	89.9	8 31.4	29	96	89.5	8 40.0	29	96	89.0	2
3	6 41.6	29	96	92.1	6 50.4	29	96	91.6	6 59.2	29	96	91.1	7 07.9	29	96	90.6	7 16.7	29	96	90.1	7 25.4	29	96	89.6	7 34.0	29	96	89.2	7 42.7	29	96	88.7	3
4	5 44.2	29	96	91.8	5 53.0	29	96	91.3	6 01.8	29	96	90.8	6 10.6	29	96	90.3	6 19.3	29	96	89.8	6 28.0	29	96	89.4	6 36.7	29	96	88.9	6 45.3	29	96	88.4	4
85									5 04.4	29	96	90.5	5 13.2	29	96	90.0	5 21.9	29	96	89.5	5 30.6	29	96	89.1	5 39.3	29	96	88.6	5 47.9	29	96	88.1	85

Lat. 17°

H.A.	0° 00′				0° 30′				1° 00′				1° 30′				2° 00′				2° 30′				3° 00′				3° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	73 00.0	1.0	03	180.0	72 30.0	1.0	03	180.0	72 00.0	1.0	03	180.0	71 30.0	1.0	03	180.0	71 00.0	1.0	03	180.0	70 30.0	1.0	02	180.0	70 00.0	1.0	02	180.0	69 30.0	1.0	02	180.0	00
1	72 58.3	1.0	09	176.6	72 28.3	1.0	08	176.7	71 58.4	1.0	08	176.8	71 28.4	1.0	08	176.9	70 58.5	1.0	08	176.9	70 28.5	1.0	07	177.0	69 58.5	1.0	07	177.1	69 28.6	1.0	07	177.2	1
2	72 53.2	99	14	173.2	72 23.4	99	14	173.4	71 53.5	99	13	173.6	71 23.7	99	13	173.7	70 53.9	99	13	173.9	70 24.0	1.0	12	174.0	69 54.2	1.0	12	174.2	69 24.3	1.0	12	174.3	2
3	72 44.7	99	20	169.8	72 15.1	99	19	170.1	71 45.5	99	19	170.4	71 15.9	99	18	170.6	70 46.2	99	18	170.9	70 16.6	99	17	171.1	69 46.9	99	17	171.3	69 17.2	99	16	171.5	3
4	72 33.0	97	25	166.5	72 03.7	98	24	166.9	71 34.4	98	24	167.3	71 05.0	98	23	167.6	70 35.7	98	22	167.9	70 06.3	98	22	168.2	69 36.8	98	21	168.5	69 07.4	98	21	168.7	4
05	72 18.0	96	30	163.3	71 49.2	96	29	163.8	71 20.2	97	28	164.2	70 51.2	97	28	164.6	70 22.2	97	27	165.0	69 53.1	97	26	165.3	69 24.0	97	26	165.7	68 54.8	97	25	166.0	05
6	72 00.1	95	35	160.2	71 31.7	95	34	160.7	71 03.2	95	33	161.2	70 34.6	95	32	161.7	70 05.9	96	32	162.1	69 37.2	96	31	162.5	69 08.5	96	30	163.0	68 39.7	96	30	163.3	6
7	71 39.3	93	39	157.2	71 11.4	93	38	157.8	70 43.3	94	37	158.3	70 15.2	94	37	158.9	69 47.0	94	36	159.4	69 18.7	94	35	159.8	68 50.4	95	34	160.3	68 22.0	95	34	160.7	7
8	71 15.7	91	44	154.3	70 48.4	91	43	155.0	70 20.9	92	42	155.6	69 53.3	92	41	156.1	69 25.5	93	40	156.7	68 57.7	93	39	157.2	68 29.8	93	38	157.7	68 01.8	93	37	158.2	8
9	70 49.6	89	48	151.6	70 22.8	90	46	152.2	69 55.9	90	45	152.9	69 28.8	90	45	153.5	69 01.6	91	44	154.1	68 34.3	91	43	154.7	68 06.9	92	42	155.2	67 39.4	92	41	155.7	9
10	70 21.1	87	51	148.9	69 55.0	88	50	149.6	69 28.6	88	49	150.3	69 02.1	89	48	151.0	68 35.5	89	47	151.6	68 08.7	89	46	152.2	67 41.8	90	45	152.8	67 14.7	90	45	153.4	10
1	69 50.4	85	55	146.4	69 24.9	85	54	147.1	68 59.1	86	53	147.9	68 33.2	87	52	148.6	68 07.1	87	51	149.2	67 40.9	88	50	149.9	67 14.5	88	49	150.5	66 48.0	89	48	151.1	1
2	69 17.6	83	58	144.0	68 52.7	83	57	144.8	68 27.6	84	56	145.5	68 02.3	85	55	146.2	67 36.8	85	54	146.9	67 11.1	86	53	147.6	66 45.3	86	52	148.3	66 19.3	87	51	148.9	2
3	68 43.0	81	61	141.7	68 18.7	81	60	142.5	67 54.2	82	59	143.3	67 29.5	83	58	144.0	67 04.6	83	57	144.7	66 39.5	84	56	145.4	66 14.2	85	55	146.1	65 48.7	85	54	146.8	3
4	68 06.6	78	63	139.5	67 42.9	79	62	140.4	67 19.0	80	61	141.2	66 54.9	81	60	141.9	66 30.6	81	59	142.7	66 06.1	82	58	143.4	65 41.3	83	57	144.1	65 16.4	83	57	144.7	4
15	67 28.6	76	66	137.5	67 05.5	77	65	138.3	66 42.3	78	64	139.1	66 18.7	79	63	139.9	65 55.0	80	62	140.7	65 31.0	80	61	141.4	65 06.9	81	60	142.1	64 42.5	82	59	142.8	15
6	66 49.1	74	68	135.6	66 26.7	75	67	136.4	66 04.0	76	66	137.2	65 41.1	77	65	138.0	65 17.9	78	64	138.8	64 54.5	78	63	139.5	64 30.9	79	62	140.2	64 07.1	80	61	140.9	6
7	66 08.2	72	70	133.7	65 46.4	73	69	134.6	65 24.3	74	68	135.4	65 02.0	75	67	136.2	64 39.4	76	66	137.0	64 16.6	76	65	137.7	63 53.5	77	64	138.4	63 30.2	78	64	139.1	7
8	65 26.2	70	72	132.0	65 04.9	71	71	132.8	64 43.4	72	70	133.6	64 21.6	73	69	134.4	63 59.6	74	68	135.2	63 37.3	75	67	136.0	63 14.8	75	67	136.7	62 52.1	76	66	137.4	8
9	64 43.0	68	74	130.3	64 22.3	69	73	131.2	64 01.3	70	72	132.0	63 40.1	71	71	132.8	63 18.6	72	70	133.6	62 56.8	73	69	134.3	62 34.9	74	68	135.1	62 12.6	74	68	135.8	9
20	63 58.7	67	75	128.8	63 38.6	68	74	129.6	63 18.2	69	74	130.4	62 57.5	69	73	131.2	62 36.5	70	72	132.0	62 15.3	71	71	132.8	61 53.8	72	70	133.5	61 32.1	73	69	134.3	20
1	63 13.5	65	77	127.3	62 53.9	66	76	128.1	62 34.0	67	75	128.9	62 13.8	68	74	129.7	61 53.4	69	73	130.5	61 32.6	69	73	131.3	61 11.7	70	72	132.0	60 50.5	71	71	132.8	1
2	62 27.5	63	78	125.9	62 08.3	64	77	126.7	61 48.9	65	76	127.5	61 29.3	66	76	128.3	61 09.3	67	75	129.1	60 49.1	68	74	129.9	60 28.6	69	73	130.6	60 07.9	69	73	131.3	2
3	61 40.6	62	79	124.6	61 22.0	63	79	125.4	61 03.0	64	78	126.2	60 43.8	64	77	127.0	60 24.3	65	76	127.7	60 04.6	66	76	128.5	59 44.6	67	75	129.3	59 24.3	68	74	130.0	3
4	60 53.0	60	80	123.3	60 34.8	61	80	124.1	60 16.3	62	79	124.9	59 57.6	63	78	125.7	59 38.6	64	78	126.5	59 19.3	65	77	127.2	58 59.7	66	76	128.0	58 40.0	66	75	128.7	4
25	60 04.7	59	82	122.1	59 47.0	60	81	122.9	59 28.9	61	80	123.7	59 10.6	61	79	124.5	58 52.1	62	79	125.2	58 33.2	63	78	126.0	58 14.1	64	77	126.7	57 54.8	65	77	127.4	25
6	59 15.8	57	82	120.9	58 58.5	58	82	121.7	58 40.9	59	81	122.5	58 23.0	60	80	123.3	58 04.8	61	80	124.0	57 46.4	62	79	124.8	57 27.8	63	78	125.5	57 08.8	63	78	126.2	6
7	58 26.3	56	83	119.8	58 09.4	57	83	120.6	57 52.2	58	82	121.4	57 34.7	59	81	122.2	57 17.0	60	81	122.9	56 59.0	60	80	123.7	56 40.7	61	79	124.4	56 22.2	62	79	125.1	7
8	57 36.2	55	84	118.8	57 19.7	56	84	119.6	57 02.9	56	83	120.3	56 45.9	57	82	121.1	56 28.5	58	82	121.8	56 10.9	59	81	122.6	55 53.1	60	80	123.3	55 35.0	61	80	124.0	8
9	56 45.7	53	85	117.8	56 29.6	54	84	118.6	56 13.2	55	84	119.3	55 56.5	56	83	120.1	55 39.5	57	83	120.8	55 22.3	58	82	121.5	55 04.8	59	81	122.2	54 47.1	59	81	122.9	9
30	55 54.8	52	86	116.9	55 39.0	53	85	117.6	55 22.9	54	84	118.4	55 06.6	55	84	119.1	54 50.0	56	83	119.8	54 33.1	57	83	120.5	54 16.0	57	82	121.2	53 58.7	58	82	121.9	30
1	55 03.4	51	86	115.9	54 47.9	52	86	116.7	54 32.2	53	85	117.4	54 16.2	54	85	118.2	54 00.0	55	84	118.9	53 43.5	55	84	119.6	53 26.7	56	83	120.3	53 09.7	57	82	121.0	1
2	54 11.6	50	87	115.1	53 56.5	51	86	115.8	53 41.1	52	86	116.5	53 25.4	53	85	117.3	53 09.5	53	85	118.0	52 53.3	54	84	118.7	52 36.9	55	84	119.4	52 20.3	56	83	120.0	2
3	53 19.4	49	87	114.2	53 04.6	50	87	115.0	52 49.5	51	86	115.7	52 34.2	52	86	116.4	52 18.6	52	85	117.1	52 02.8	53	85	117.8	51 46.7	54	84	118.5	51 30.4	55	84	119.1	3
4	52 26.9	48	88	113.4	52 12.4	49	88	114.2	51 57.6	50	87	114.9	51 42.6	51	87	115.6	51 27.3	51	86	116.3	51 11.8	52	86	116.9	50 56.1	53	85	117.6	50 40.1	54	85	118.3	4
35	51 34.1	47	88	112.7	51 19.9	48	88	113.4	51 05.4	49	88	114.1	50 50.7	50	87	114.8	50 35.7	50	87	115.4	50 20.5	51	86	116.1	50 05.0	52	86	116.8	49 49.3	53	85	117.5	35
6	50 41.1	46	89	111.9	50 27.1	47	88	112.6	50 12.9	48	88	113.3	49 58.4	49	88	114.0	49 43.7	49	87	114.7	49 28.8	50	87	115.3	49 13.6	51	86	116.0	48 58.2	52	86	116.7	6
7	49 47.7	45	89	111.2	49 34.0	46	89	111.9	49 20.0	47	89	112.6	49 05.8	48	88	113.2	48 51.4	48	88	113.9	48 36.8	49	87	114.6	48 21.9	50	87	115.2	48 06.8	51	86	115.9	7
8	48 54.1	44	90	110.5	48 40.6	45	89	111.2	48 26.9	46	89	111.9	48 13.0	47	89	112.5	47 58.8	48	88	113.2	47 44.4	48	88	113.8	47 29.8	49	87	114.5	47 15.0	50	87	115.1	8
9	48 00.2	44	90	109.9	47 47.0	44	90	110.5	47 33.5	45	89	111.2	47 19.9	46	89	111.8	47 05.9	47	89	112.5	46 51.8	47	88	113.1	46 37.5	48	88	113.8	46 22.9	49	87	114.4	9
40	47 06.1	43	90	109.2	46 53.1	44	90	109.9	46 39.9	44	90	110.5	46 26.5	45	89	111.2	46 12.8	46	89	111.8	45 58.9	47	89	112.5	45 44.8	47	88	113.1	45 30.5	48	88	113.7	40
1	46 11.9	42	91	108.6	45 59.1	43	90	109.2	45 46.1	44	90	109.9	45 32.9	44	90	110.5	45 19.4	45	89	111.2	45 05.8	46	89	111.8	44 51.9	47	89	112.4	44 37.9	47	88	113.0	1
2	45 17.4	42	91	108.0	45 04.8	42	91	108.6	44 52.0	43	90	109.3	44 39.0	44	90	109.9	44 25.8	44	90	110.5	44 12.4	45	89	111.2	43 58.8	46	89	111.8	43 44.9	46	89	112.4	2
3	44 22.7	41	91	107.4	44 10.3	42	91	108.0	43 57.8	42	91	108.7	43 45.0	43	90	109.3	43 32.0	44	90	109.9	43 18.8	44	90	110.5	43 05.4	45	89	111.2	42 51.8	46	89	111.8	3
4	43 27.9	40	92	106.8	43 15.7	41	91	107.5	43 03.3	42	91	108.1	42 50.7	42	91	108.7	42 37.9	43	90	109.3	42 24.9	44	90	109.9	42 11.7	44	90	110.6	41 58.4	45	89	111.2	4
45	42 32.9	40	92	106.3	42 20.9	40	92	106.9	42 08.7	41	91	107.5	41 56.3	42	91	108.1	41 43.7	42	91	108.8	41 30.9	43	90	109.4	41 17.9	44	90	110.0	41 04.7	44	90	110.6	45
6	41 37.7	39	92	105.8	41 25.9	40	92	106.4	41 13.9	40	92	107.0	41 01.7	41	91	107.6	40 49.3	42	91	108.2	40 36.7	42	91	108.8	40 23.9	43	90	109.4	40 10.9	44	90	110.0	6
7	40 42.5	39	92	105.3	40 30.8	39	92	105.9	40 18.9	40	92	106.5	40 06.9	40	92	107.1	39 54.7	41	91	107.7	39 42.3	42	91	108.2	39 29.7	42	91	108.8	39 16.9	43	90	109.4	7
8	39 47.0	38	93	104.7	39 35.5	39	92	105.3	39 23.8	39	92	105.9	39 12.0	40	92	106.5	38 59.9	40	92	107.1	38 47.7	41	91	107.7	38 35.3	42	91	108.3	38 22.7	42	91	108.9	8
9	38 51.5	38	93	104.3	38 40.1	38	93	104.9	38 28.6	39	92	105.4	38 16.9	39	92	106.0	38 05.0	40	92	106.6	37 52.9	40	91	107.2	37 40.7	41	91	107.8	37 28.3	42	91	108.3	9
50	37 55.8	37	93	103.8	37 44.6	38	93	104.4	37 33.2	38	92	105.0	37 21.7	39	92	105.5	37 09.9	39	92	106.1	36 58.1	40	92	106.7	36 46.0	40	91	107.3	36 33.8	41	91	107.8	50
1	37 00.0	37	93	103.3	36 49.0	37	93	103.9	36 37.7	38	93	104.5	36 26.3	38	92	105.1	36 14.8	39	92	105.6	36 03.0	39	92	106.2	35 51.1	40	92	106.8	35 39.1	40	91	107.3	1
2	36 04.1	36	93	102.9	35 53.2	37	93	103.4	35 42.1	37	93	104.0	35 30.9	38	93	104.6	35 19.4	38	92	105.2	35 07.9	39	92	105.7	34 56.1	39	92	106.3	34 44.2	40	92	106.8	2
3	35 08.2	36	93	102.4	34 57.4	36	93	103.0	34 46.4	37	93	103.6	34 35.3	37	93	104.1	34 24.0	38	93	104.7	34 12.6	38	92	105.2	34 01.0	39	92	105.8	33 49.2	39	92	106.4	3
4	34 12.1	35	94	102.0	34 01.4	36	93	102.6	33 50.6	36	93	103.1	33 39.6	37	93	103.7	33 28.4	37	93	104.2	33 17.1	38	93	104.8	33 05.7	38	92	105.3	32 54.1	39	92	105.9	4
55	33 15.9	35	94	101.6	33 05.3	35	94	102.1	32 54.6	36	93	102.7	32 43.8	36	93	103.2	32 32.8	37	93	103.8	32 21.6	37	93	104.3	32 10.3	38	93	104.9	31 58.9	38	92	105.4	55
6	32 19.7	35	94	101.2	32 09.2	35	94	101.7	31 58.6	36	94	102.3	31 47.9	36	93	102.8	31 37.0	37	93	103.4	31 26.0	37	93	103.9	31 14.8	37	93	104.4	31 03.5	38	92	105.0	6
7	31 23.3	34	94	100.8	31 13.0	35	94	101.3	31 02.5	35	94	101.8	30 51.9	36	93	102.4	30 41.1	36	93	102.9	30 30.2	37	93	103.5	30 19.2	37	93	104.0	30 08.0	37	93	104.6	7
8	30 26.9	34	94	100.4	30 16.7	34	94	100.9	30 06.3	35	94	101.4	29 55.8	35	94	102.0	29 45.1	36	93	102.5	29 34.4	36	93	103.1	29 23.5	37	93	103.6	29 12.4	37	93	104.1	8
9	29 30.4	34	94	100.0	29 20.3	34	94	100.5	29 10.0	34	94	101.0	28 59.6	35	94	101.6	28 49.1	35	94	102.1	28 38.4	36	93	102.6	28 27.6	36	93	103.2	28 16.7	37	93	103.7	9
60	28 33.9	33	94	99.6	28 23.8	34	94	100.1	28 13.7	34	94	100.7	28 03.4	35	94	101.2	27 52.9	35	94	101.7	27 42.4	35	94	102.2	27 31.7	36	93	102.8	27 20.9	36	93	103.3	60
1	27 37.3	33	94	99.2	27 27.3	33	94	99.7	27 17.2	34	94	100.3	27 07.0	34	94	100.8	26 56.7	35	94	101.3	26 46.3	35	94	101.8	26 35.7	35	93	102.4	26 25.1	36	93	102.9	1
2	26 40.6	33	95	98.8	26 30.7	33	94	99.4	26 20.7	33	94	99.9	26 10.6	34	94	100.4	26 00.4	34	94	100.9	25 50.1	35	94	101.5	25 39.6	35	94	102.0	25 29.1	35	93	102.5	2
3	25 43.9	32	95	98.5	25 34.1	33	94	99.0	25 24.2	33	94	99.5	25 14.2	34	94	100.0	25 04.0	34	94	100.6	24 53.8	34	94	101.1	24 43.5	35	94	101.6	24 33.0	35	94	102.1	3
4	24 47.1	32	95	98.1	24 37.4	33	95	98.6	24 27.6	33	94	99.2	24 17.6	33	94	99.7	24 07.6	34	94	100.2	23 57.5	34	94	100.7	23 47.2	34	94	101.2	23 36.9	35	94	101.7	4
65	23 50.3	32	95	97.8	23 40.6	32	96	98.3	23 30.9	33	95	98.8	23 21.0	33	94	99.3	23 11.1	33	94	99.8	23 01.1	34	94	100.3	22 50.9	34	94	100.8	22 40.7	34	94	101.4	65
6	22 53.4	32	95	97.4	22 43.8	32	96	97.9	22 34.2	32	95	98.4	22 24.4	33	94	99.0	22 14.5	33	94	99.5	22 04.6	33	94	100.0	21 54.5	34	94	100.5	21 44.4	34	94	101.0	6
7	21 56.5	32	95	97.1	21 47.0	32	96	97.6	21 37.4	32	95	98.1	21 27.7	32	95	98.6	21 17.9	33	94	99.1	21 08.0	33	94	99.6	20 58.1	33	94	100.1	20 48.0	34	94	100.6	7
8	20 59.5	31	95	96.7	20 50.1	32	95	97.2	20 40.6	32	95	97.8	20 30.9	32	95	98.3	20 21.2	32	95	98.8	20 11.4	33	94	99.3	20 01.6	33	94	99.8	19 51.6	33	94	100.3	8
9	20 02.5	31	95	96.4	19 53.1	31	95	96.9	19 43.7	32	95	97.4	19 34.1	32	95	97.9	19 24.5	32	95	98.4	19 14.8	33	95	98.9	19 05.0	33	94	99.4	18 55.1	33	94	99.9	9
70	19 05.5	31	95	96.1	18 56.2	31	95	96.6	18 46.8	31	95	97.1	18 37.3	32	95	97.6	18 27.7	32	95	98.1	18 18.1	32	95	98.6	18 08.3	33	94	99.1	17 58.6	33	94	99.6	70
1	18 08.4	31	95	95.7	17 59.1	31	95	96.2	17 49.8	31	95	96.7	17 40.4	32	95	97.2	17 30.9	32	95	97.7	17 21.3	32	95	98.2	17 11.7	32	95	98.7	17 01.9	33	94	99.2	1
2	17 11.3	31	95	95.4	17 02.1	31	95	95.9	16 52.8	31	95	96.4	16 43.4	31	95	96.9	16 34.0	32	95	97.4	16 24.5	32	95	97.9	16 14.9	32	95	98.4	16 05.3	32	95	98.9	2
3	16 14.2	30	95	95.1	16 05.0	31	95	95.6	15 55.8	31	95	96.1	15 46.5	31	95	96.6	15 37.1	31	95	97.1	15 27.6	32	95	97.6	15 18.1	32	95	98.1	15 08.6	32	95	98.6	3
4	15 17.0	30	95	94.8	15 07.9	31	95	95.3	14 58.7	31	95	95.8	14 49.4	31	95	96.3	14 40.1	31	95	96.8	14 30.7	31	95	97.3	14 21.3	32	95	97.7	14 11.8	32	95	98.2	4
75	14 19.8	30	95	94.5	14 10.7	30	95	95.0	14 01.6	31	95	95.5	13 52.4	31	95	96.0	13 43.1	31	95	96.4	13 33.8	31	95	96.9	13 24.4	31	95	97.4	13 15.0	32	95	97.9	75
6	13 22.6	30	95	94.2	13 13.6	30	95	94.7	13 04.5	30	95	95.1	12 55.3	31	95	95.6	12 46.1	31	95	96.1	12 36.8	31	95	96.6	12 27.5	31	95	97.1	12 18.1	31	95	97.6	6
7	12 25.4	30	95	93.9	12 16.4	30	95	94.3	12 07.3	30	95	94.8	11 58.2	30	95	95.3	11 49.0	31	95	95.8	11 39.8	31	95	96.3	11 30.6	31	95	96.8	11 21.2	31	95	97.3	7
8	11 28.1	30	95	93.6	11 19.1	30	95	94.0	11 10.1	30	95	94.5	11 01.0	30	95	95.0	10 51.9	30	95	95.5	10 42.8	31	95	96.0	10 33.6	31	95	96.5	10 24.3	31	95	97.0	8
9	10 30.8	30	96	93.3	10 21.9	30	95	93.7	10 12.9	30	95	94.2	10 03.9	30	95	94.7	9 54.8	30	95	95.2	9 45.7	30	95	95.7	9 36.5	31	95	96.2	9 27.3	31	95	96.6	9
80	9 33.5	30	96	93.0	9 24.6	30	95	93.4	9 15.7	30	95	93.9	9 06.7	30	95	94.4	8 57.6	30	95	94.9	8 48.6	30	95	95.4	8 39.5	30	95	95.8	8 30.3	31	96	96.3	80
1	8 36.2	30	96	92.7	8 27.3	30	96	93.1	8 18.4	30	95	93.6	8 09.4	30	95	94.1	8 00.5	30	95	94.6	7 51.4	30	95	95.1	7 42.4	30	95	95.5	7 33.3	30	95	96.0	1
2	7 38.9	29	96	92.4	7 30.0	30	96	92.8	7 21.1	30	95	93.3	7 12.2	30	95	93.8	7 03.2	30	95	94.3	6 54.3	30	95	94.8	6 45.2	30	95	95.2	6 36.2	30	95	95.7	2
3	6 41.6	29	96	92.1	6 32.7	30	96	92.5	6 23.8	30	96	93.0	6 14.9	30	95	93.5	6 06.0	30	95	94.0	5 57.1	30	96	94.5	5 48.1	30	95	94.9	5 39.1	30	95	95.4	3
4	5 44.2	29	96	91.8	5 35.4	29	96	92.2	5 26.5	30	96	92.7	5 17.7	30	96	93.2	5 08.8	30	95	93.7													4

DECLINATION SAME NAME AS LATITUDE

A.	4° 00′				4° 30′				5° 00′				5° 30′				6° 00′				6° 30′				7° 00′				7° 30′				H.A.
	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	°
0	77 00.0	1.0	04	180.0	77 30.0	1.0	04	180.0	78 00.0	1.0	04	180.0	78 30.0	1.0	04	180.0	79 00.0	1.0	04	180.0	79 30.0	1.0	05	180.0	80 00.0	1.0	05	180.0	80 30.0	1.0	05	180.0	00
1	76 57.8	1.0	11	175.6	77 27.7	1.0	11	175.4	77 57.6	1.0	12	175.2	78 27.5	1.0	12	175.0	78 57.4	1.0	13	174.8	79 27.3	1.0	14	174.6	79 57.1	1.0	14	174.3	80 27.0	99	15	174.0	1
2	76 51.2	99	18	171.2	77 20.8	99	19	170.9	77 50.5	99	20	170.5	78 20.1	99	20	170.1	78 49.6	99	21	169.7	79 19.2	98	22	169.2	79 48.7	98	23	168.7	80 18.1	98	24	168.1	2
3	76 40.3	98	25	166.9	77 09.5	97	26	166.4	77 38.7	97	27	165.9	78 07.9	97	28	165.3	78 36.9	97	29	164.7	79 05.9	96	30	164.0	79 34.8	96	32	163.3	80 03.5	96	33	162.5	3
4	76 25.2	96	32	162.8	76 54.0	96	33	162.1	77 22.6	95	34	161.5	77 51.1	95	35	160.7	78 19.5	94	36	160.0	78 47.7	94	38	159.1	79 15.8	93	39	158.2	79 43.8	93	41	157.2	4
5	76 06.3	94	38	158.8	76 34.4	93	39	158.0	77 02.3	93	40	157.2	77 30.1	92	41	156.4	77 57.7	92	43	155.4	78 25.1	91	45	154.4	78 52.3	90	46	153.4	79 19.2	89	48	152.2	05
6	75 43.8	91	43	155.0	76 11.1	91	44	154.1	76 38.3	90	46	153.2	77 05.2	89	47	152.3	77 31.9	89	49	151.2	77 58.4	88	51	150.1	78 24.6	87	52	148.9	78 50.4	86	54	147.6	6
7	75 17.9	89	48	151.4	75 44.4	88	50	150.4	76 10.7	87	51	149.5	76 36.8	86	53	148.4	77 02.6	85	54	147.3	77 28.0	84	56	146.1	77 53.2	83	58	144.8	78 17.9	82	60	143.4	7
8	74 48.9	86	53	148.0	75 14.6	85	54	147.0	75 40.1	84	56	145.9	76 05.2	83	57	144.8	76 30.0	82	59	143.6	76 54.5	81	61	142.4	77 18.6	80	62	141.0	77 42.2	78	64	139.6	8
9	74 17.2	83	57	144.8	74 42.0	82	59	143.8	75 06.6	81	60	142.7	75 30.8	80	62	141.5	75 54.7	79	63	140.3	76 18.1	78	65	139.0	76 41.2	76	66	137.6	77 03.7	74	68	136.2	9
0	73 42.9	81	61	141.8	74 06.9	79	62	140.8	74 30.6	78	64	139.6	74 53.9	77	65	138.4	75 16.8	76	67	137.2	75 39.3	74	68	135.9	76 01.3	73	70	134.5	76 22.8	71	72	133.0	10
1	73 06.3	78	64	139.1	73 29.5	77	66	138.0	73 52.3	75	67	136.8	74 14.8	74	68	135.6	74 36.8	73	70	134.3	74 58.3	71	71	133.0	75 19.4	69	73	131.6	75 39.9	68	74	130.2	1
2	72 27.8	75	67	136.5	72 50.1	74	69	135.4	73 12.1	73	70	134.2	73 33.7	71	71	133.0	73 54.8	70	73	131.7	74 15.5	68	74	130.4	74 35.6	66	76	129.0	74 55.2	64	77	127.6	2
3	71 47.4	73	70	134.1	72 09.0	71	71	133.0	72 30.2	70	73	131.8	72 50.9	68	74	130.6	73 11.2	67	75	129.3	73 31.0	65	76	128.0	73 50.3	63	78	126.7	74 09.1	62	79	125.2	3
4	71 05.4	70	72	131.9	71 26.3	69	74	130.7	71 46.6	67	75	129.6	72 06.6	66	76	128.4	72 26.1	64	77	127.1	72 45.1	63	78	125.8	73 03.6	61	80	124.5	73 21.6	59	81	123.1	4
5	70 22.0	68	75	129.8	70 42.1	66	76	128.7	71 01.8	65	77	127.5	71 21.0	63	78	126.3	71 39.8	62	79	125.1	71 58.0	60	80	123.8	72 15.8	58	81	122.5	72 33.0	56	83	121.2	15
6	69 37.3	65	76	127.8	69 56.7	64	78	126.7	70 15.7	63	79	125.6	70 34.2	61	80	124.4	70 52.3	59	81	123.2	71 09.8	58	82	122.0	71 26.9	56	83	120.7	71 43.4	54	84	119.4	6
7	68 51.4	63	78	126.0	69 10.2	62	79	124.9	69 28.5	60	80	123.8	69 46.4	59	81	122.7	70 03.8	57	82	121.5	70 20.7	56	83	120.3	70 37.1	54	84	119.0	70 53.0	52	85	117.7	7
8	68 04.6	61	80	124.4	68 22.7	60	81	123.3	68 40.4	58	82	122.2	68 57.6	57	83	121.0	69 14.5	55	84	119.9	69 30.8	54	84	118.7	69 46.6	52	85	117.5	70 01.9	50	86	116.2	8
9	67 16.7	59	81	122.8	67 34.3	58	82	121.7	67 51.4	56	83	120.6	68 08.1	55	84	119.5	68 24.3	53	85	118.4	68 40.1	52	86	117.2	68 55.4	50	86	116.0	69 10.1	48	87	114.8	9
20	66 28.1	57	82	121.3	66 45.1	56	83	120.3	67 01.7	55	84	119.2	67 17.8	53	85	118.1	67 33.5	52	86	117.0	67 48.8	50	86	115.9	68 03.5	48	87	114.7	68 17.8	47	88	113.5	20
1	65 38.7	56	83	119.9	65 55.2	54	84	118.9	66 11.3	53	85	117.8	66 26.9	51	86	116.8	66 42.1	50	87	115.7	66 56.8	48	87	114.6	67 11.1	47	88	113.5	67 24.9	45	89	112.3	1
2	64 48.6	54	84	118.6	65 04.6	53	85	117.6	65 20.2	51	86	116.6	65 35.4	50	87	115.5	65 50.1	48	87	114.5	66 04.4	47	88	113.4	66 18.3	45	89	112.3	66 31.6	44	90	111.2	2
3	63 58.0	52	85	117.4	64 13.5	51	86	116.4	64 28.6	50	87	115.4	64 43.4	48	87	114.4	64 57.7	47	88	113.3	65 11.5	45	89	112.3	65 25.0	44	89	111.2	65 37.9	42	90	110.1	3
4	63 06.7	51	86	116.2	63 21.9	50	87	115.3	63 36.6	48	88	114.3	63 50.9	47	88	113.3	64 04.8	46	89	112.3	64 18.3	44	89	111.2	64 31.3	43	90	110.2	64 43.9	41	91	109.1	4
25	62 15.0	50	87	115.1	62 29.7	48	88	114.2	62 44.0	47	88	113.2	62 58.0	46	89	112.2	63 11.5	44	89	111.3	63 24.6	43	90	110.3	63 37.3	42	91	109.2	63 49.5	40	91	108.2	25
6	61 22.8	48	88	114.1	61 37.2	47	88	113.2	61 51.1	46	89	112.2	62 04.7	45	89	111.3	62 17.9	43	90	110.3	62 30.6	42	90	109.3	62 43.0	40	91	108.3	62 54.9	39	92	107.3	6
7	60 30.3	47	88	113.1	60 44.2	46	89	112.2	60 57.8	45	89	111.3	61 11.1	43	90	110.4	61 23.9	42	90	109.4	61 36.3	41	91	108.5	61 48.4	39	91	107.5	62 00.0	38	92	106.5	7
8	59 37.3	46	89	112.2	59 50.9	45	89	111.3	60 04.2	44	90	110.4	60 17.1	42	90	109.5	60 29.6	41	91	108.6	60 41.8	40	91	107.6	60 53.5	39	92	106.7	61 04.9	37	92	105.7	8
9	58 44.0	45	89	111.3	58 57.3	44	90	110.4	59 10.3	43	90	109.5	59 22.9	41	91	108.7	59 35.1	40	91	107.8	59 47.0	39	92	106.8	59 58.4	38	92	105.9	60 09.5	36	93	105.0	9
30	57 50.4	44	90	110.4	58 03.4	43	90	109.6	58 16.1	42	91	108.7	58 28.4	40	91	107.9	58 40.3	39	92	107.0	58 51.9	38	92	106.1	59 03.2	37	92	105.2	59 14.0	36	93	104.3	30
1	56 56.5	43	90	109.6	57 09.2	42	91	108.8	57 21.6	41	91	108.0	57 33.7	40	92	107.1	57 45.4	38	92	106.2	57 56.7	37	92	105.4	58 07.7	36	93	104.5	58 18.3	35	93	103.6	1
2	56 02.3	42	91	108.9	56 14.8	41	91	108.0	56 26.9	40	92	107.2	56 38.7	39	92	106.4	56 50.2	38	92	105.5	57 01.3	37	93	104.7	57 12.1	35	93	103.8	57 22.5	34	93	103.0	2
3	55 07.9	41	91	108.1	55 20.1	40	91	107.3	55 32.0	39	92	106.5	55 43.6	38	92	105.7	55 54.8	37	93	104.9	56 05.7	36	93	104.0	56 16.3	35	93	103.2	56 26.5	34	94	102.4	3
4	54 13.2	40	91	107.4	54 25.2	39	92	106.6	54 36.9	38	92	105.8	54 48.2	37	92	105.0	54 59.3	36	93	104.2	55 10.0	35	93	103.4	55 20.4	34	93	102.6	55 30.4	33	94	101.8	4
35	53 18.4	40	92	106.8	53 30.2	39	92	106.0	53 41.6	38	92	105.2	53 52.7	37	93	104.4	54 03.6	36	93	103.6	54 14.1	35	93	102.8	54 24.3	33	94	102.0	54 34.2	32	94	101.2	35
6	52 23.4	39	92	106.1	52 34.9	38	92	105.3	52 46.2	37	93	104.6	52 57.1	36	93	103.8	53 07.7	35	93	103.0	53 18.1	34	94	102.2	53 28.1	33	94	101.5	53 37.8	32	94	100.7	6
7	51 28.2	38	92	105.5	51 39.5	37	93	104.7	51 50.5	36	93	104.0	52 01.3	35	93	103.2	52 11.8	34	93	102.5	52 22.0	33	94	101.7	52 31.8	32	94	100.9	52 41.4	31	94	100.1	7
8	50 32.8	38	93	104.9	50 43.9	37	93	104.1	50 54.8	36	93	103.4	51 05.4	35	93	102.7	51 15.7	34	94	101.9	51 25.7	33	94	101.2	51 35.4	32	94	100.4	51 44.9	31	94	99.6	8
9	49 37.2	37	93	104.3	49 48.2	36	93	103.6	49 58.9	35	93	102.8	50 09.3	34	94	102.1	50 19.5	33	94	101.4	50 29.4	32	94	100.6	50 39.0	31	94	99.9	50 48.3	31	94	99.1	9
40	48 41.6	36	93	103.7	48 52.4	36	93	103.0	49 02.9	35	94	102.3	49 13.2	34	94	101.6	49 23.2	33	94	100.9	49 32.9	32	94	100.1	49 42.4	31	94	99.4	49 51.6	30	95	98.7	40
1	47 45.8	36	93	103.2	47 56.4	35	93	102.5	48 06.8	34	94	101.8	48 16.9	33	94	101.1	48 26.8	32	94	100.4	48 36.4	32	94	99.7	48 45.8	31	95	98.9	48 54.8	30	95	98.2	1
2	46 49.8	35	93	102.7	47 00.3	35	94	102.0	47 10.6	34	94	101.3	47 20.6	33	94	100.6	47 30.3	32	94	99.9	47 39.8	31	94	99.2	47 49.0	30	95	98.5	47 58.0	29	95	97.8	2
3	45 53.8	35	94	102.2	46 04.2	34	94	101.5	46 14.3	33	94	100.8	46 24.1	32	94	100.1	46 33.8	32	94	99.4	46 43.1	31	95	98.7	46 52.3	30	95	98.0	47 01.1	29	95	97.3	3
4	44 57.7	34	94	101.7	45 07.9	34	94	101.0	45 17.9	33	94	100.3	45 27.6	32	94	99.7	45 37.1	31	94	99.0	45 46.4	30	95	98.3	45 55.4	30	95	97.6	46 04.2	29	95	96.9	4
45	44 01.4	34	94	101.2	44 11.5	33	94	100.5	44 21.4	32	94	99.9	44 31.0	32	94	99.2	44 40.4	31	95	98.5	44 49.6	30	95	97.9	44 58.5	29	95	97.2	45 07.2	29	95	96.5	45
6	43 05.1	34	94	100.7	43 15.1	33	94	100.1	43 24.8	32	94	99.4	43 34.3	31	95	98.8	43 43.6	31	95	98.1	43 52.7	30	95	97.5	44 01.6	29	95	96.8	44 10.2	28	95	96.1	6
7	42 08.7	33	94	100.3	42 18.5	32	94	99.6	42 28.2	32	94	99.0	42 37.6	31	95	98.3	42 46.8	30	95	97.7	42 55.8	30	95	97.0	43 04.6	29	95	96.4	43 13.1	28	95	95.7	7
8	41 12.2	33	94	99.8	41 21.9	32	94	99.2	41 31.5	31	95	98.6	41 40.8	31	95	97.9	41 49.9	30	95	97.3	41 58.8	29	95	96.7	42 07.5	29	95	96.0	42 16.0	28	95	95.4	8
9	40 15.6	32	94	99.4	40 25.3	32	95	98.8	40 34.7	31	95	98.2	40 43.9	30	95	97.5	40 53.0	30	95	96.9	41 01.8	29	95	96.3	41 10.4	28	95	95.6	41 18.8	28	95	95.0	9
50	39 19.0	32	94	99.0	39 28.5	32	95	98.4	39 37.9	31	95	97.8	39 47.0	30	95	97.1	39 56.0	30	95	96.5	40 04.8	29	95	95.9	40 13.3	28	95	95.3	40 21.7	28	95	94.6	50
1	38 22.3	32	95	98.6	38 31.7	31	96	98.0	38 41.0	31	96	97.4	38 50.1	30	95	96.7	38 59.0	29	95	96.1	39 07.7	29	95	95.5	39 16.2	28	95	94.9	39 24.5	27	95	94.3	1
2	37 25.5	32	95	98.2	37 34.9	31	95	97.6	37 44.1	30	96	97.0	37 53.1	30	95	96.4	38 01.9	29	95	95.8	38 10.5	28	95	95.2	38 19.0	28	95	94.5	38 27.2	27	96	93.9	2
3	36 28.7	31	95	97.8	36 38.0	31	95	97.2	36 47.1	30	95	96.6	36 56.0	30	95	96.0	37 04.8	29	95	95.4	37 13.4	28	95	94.8	37 21.8	28	95	94.2	37 30.0	27	96	93.6	3
4	35 31.8	31	95	97.4	35 41.0	30	95	96.8	35 50.1	30	95	96.2	35 58.9	29	95	95.6	36 07.6	29	95	95.0	36 16.2	28	95	94.4	36 24.5	28	95	93.8	36 32.7	27	96	93.3	4
55	34 34.9	31	95	97.0	34 44.0	30	95	96.4	34 53.0	30	95	95.9	35 01.8	29	95	95.3	35 10.5	29	95	94.7	35 19.0	28	95	94.1	35 27.3	27	95	93.5	35 35.4	27	96	92.9	55
6	33 37.9	31	96	96.6	33 47.0	30	95	96.1	33 55.9	29	95	95.5	34 04.7	29	95	94.9	34 13.3	28	95	94.3	34 21.7	28	95	93.8	34 30.0	27	95	93.2	34 38.1	27	96	92.6	6
7	32 40.9	30	96	96.3	32 49.9	30	95	95.7	32 58.8	29	95	95.1	33 07.5	29	95	94.6	33 16.1	28	95	94.0	33 24.5	28	96	93.4	33 32.7	27	96	92.9	33 40.8	27	96	92.3	7
8	31 43.8	30	95	95.9	31 52.8	30	95	95.4	32 01.6	29	95	94.8	32 10.3	29	95	94.2	32 18.8	28	95	93.7	32 27.2	28	96	93.1	32 35.4	27	96	92.5	32 43.4	27	96	92.0	8
9	30 46.7	30	95	95.6	30 55.7	29	95	95.0	31 04.4	29	95	94.5	31 13.1	29	96	93.9	31 21.5	28	96	93.3	31 29.9	28	96	92.8	31 38.0	27	96	92.2	31 46.1	27	96	91.6	9
60	29 49.6	30	95	95.2	29 58.5	29	95	94.7	30 07.2	29	95	94.1	30 15.8	28	95	93.6	30 24.2	28	96	93.0	30 32.5	27	96	92.5	30 40.7	27	96	91.9	30 48.7	26	96	91.3	60
1	28 52.5	30	95	94.9	29 01.3	29	95	94.3	29 10.0	29	96	93.8	29 18.5	28	96	93.2	29 26.9	28	96	92.7	29 35.2	27	96	92.1	29 43.4	27	96	91.6	29 51.4	26	96	91.0	1
2	27 55.3	29	95	94.6	28 04.1	29	95	94.0	28 12.7	29	95	93.5	28 21.2	28	96	92.9	28 29.6	28	96	92.4	28 37.9	27	96	91.8	28 46.0	27	96	91.3	28 54.0	26	96	90.7	2
3	26 58.1	29	95	94.2	27 06.8	29	95	93.7	27 15.4	29	96	93.2	27 23.9	28	96	92.6	27 32.3	28	96	92.1	27 40.5	27	96	91.5	27 48.6	27	96	91.0	27 56.6	26	96	90.4	3
4	26 00.8	29	95	93.9	26 09.5	29	95	93.4	26 18.1	28	96	92.8	26 26.6	28	96	92.3	26 34.9	28	96	91.8	26 43.2	27	96	91.2	26 51.3	27	96	90.7	26 59.2	26	96	90.1	4
65	25 03.6	29	95	93.6	25 12.3	29	96	93.1	25 20.8	28	96	92.5	25 29.2	28	96	92.0	25 37.6	28	96	91.5	25 45.8	27	96	90.9	25 53.9	27	96	90.4	26 01.9	26	96	89.9	65
6	24 06.3	29	95	93.3	24 14.9	29	96	92.7	24 23.5	28	96	92.2	24 31.9	28	96	91.7	24 40.2	28	96	91.2	24 48.4	27	96	90.6	24 56.5	27	96	90.1	25 04.5	26	96	89.6	6
7	23 09.0	29	96	92.9	23 17.6	29	96	92.4	23 26.1	28	96	91.9	23 34.5	28	96	91.4	23 42.8	27	96	90.9	23 51.0	27	96	90.3	23 59.1	27	96	89.8	24 07.1	26	96	89.3	7
8	22 11.7	29	96	92.6	22 20.3	28	96	92.1	22 28.8	28	96	91.6	22 37.2	28	96	91.1	22 45.5	27	96	90.6	22 53.7	27	96	90.0	23 01.7	27	96	89.5	23 09.7	26	96	89.0	8
9	21 14.4	29	96	92.3	21 22.9	28	96	91.8	21 31.4	28	96	91.3	21 39.8	28	96	90.8	21 48.1	27	96	90.3	21 56.3	27	96	89.7	22 04.4	27	96	89.2	22 12.4	26	96	88.7	9
70	20 17.0	29	96	92.0	20 25.6	28	96	91.5	20 34.1	28	96	91.0	20 42.4	28	96	90.5	20 50.7	27	96	90.0	20 58.9	27	96	89.5	21 07.0	27	96	88.9	21 15.0	27	96	88.4	70
1	19 19.7	29	96	91.7	19 28.2	28	96	91.2	19 36.7	28	96	90.7	19 45.1	28	96	90.2	19 53.3	27	96	89.7	20 01.5	27	96	89.2	20 09.6	27	96	88.7	20 17.7	27	96	88.1	1
2	18 22.3	29	96	91.4	18 30.9	28	96	90.9	18 39.3	28	96	90.4	18 47.7	28	96	89.9	18 56.0	27	96	89.4	19 04.2	27	96	88.9	19 12.3	27	96	88.4	19 20.3	27	96	87.9	2
3	17 25.0	29	96	91.1	17 33.5	28	96	90.6	17 41.9	28	96	90.1	17 50.3	28	96	89.6	17 58.6	27	96	89.1	18 06.8	27	96	88.6	18 14.9	27	96	88.1	18 23.0	27	96	87.6	3
4	16 27.6	28	96	90.8	16 36.1	28	96	90.3	16 44.6	28	96	89.8	16 52.9	28	96	89.3	17 01.2	28	96	88.8	17 09.4	27	96	88.3	17 17.6	27	96	87.8	17 25.7	27	96	87.3	4
75	15 30.2	28	96	90.5	15 38.7	28	96	90.0	15 47.2	28	96	89.5	15 55.6	28	96	89.0	16 03.9	28	96	88.5	16 12.1	27	96	88.0	16 20.3	27	96	87.5	16 28.3	27	96	87.0	75
6	14 32.8	28	96	90.2	14 41.4	28	96	89.7	14 49.8	28	96	89.2	14 58.2	28	96	88.7	15 06.5	28	96	88.2	15 14.8	27	96	87.7	15 22.9	27	96	87.2	15 31.1	27	95	86.7	6
7	13 35.5	28	96	89.9	13 44.0	28	96	89.4	13 52.4	28	96	88.9	14 00.8	28	96	88.5	14 09.2	28	96	88.0	14 17.4	27	96	87.5	14 25.6	27	96	87.0	14 33.8	27	95	86.5	7
8	12 38.1	28	96	89.6	12 46.6	28	96	89.2	12 55.1	28	96	88.7	13 03.5	28	96	88.2	13 11.8	28	96	87.7	13 20.1	28	96	87.2	13 28.3	27	95	86.7	13 36.5	27	95	86.2	8
9	11 40.7	28	96	89.4	11 49.2	28	96	88.9	11 57.7	28	96	88.4	12 06.1	28	96	87.9	12 14.5	28	96	87.4	12 22.8	28	95	86.9	12 31.1	27	95	86.4	12 39.3	27	95	85.9	9
80	10 43.3	29	96	89.1	10 51.9	28	96	88.6	11 00.4	28	96	88.1	11 08.8	28	96	87.6	11 17.2	28	96	87.1	11 25.5	28	95	86.6	11 33.8	28	95	86.1	11 42.1	27	95	85.6	80
1	9 46.0	29	96	88.8	9 54.5	28	96	88.3	10 03.0	28	96	87.8	10 11.5	28	96	87.3	10 19.9	28	95	86.8	10 28.2	28	95	86.3	10 36.6	28	95	85.8	10 44.9	28	95	85.4	1
2	8 48.6	29	96	88.5	8 57.2	28	96	88.0	9 05.7	28	96	87.5	9 14.2	28	96	87.0	9 22.6	28	95	86.5	9 31.0	28	95	86.1	9 39.4	28	95	85.6	9 47.7	28	95	85.1	2
3	7 51.3	29	96	88.2	7 59.8	29	96	87.7	8 08.4	28	96	87.2	8 16.9	28	95	86.7	8 25.3	28	95	86.3	8 33.8	28	95	85.8	8 42.2	28	95	85.3	8 50.5	28	95	84.8	3
4	6 53.9	29	96	87.9	7 02.5	29	96	87.4	7 11.1	28	96	86.9	7 19.6	28	95	86.5	7 28.1	28	95	86.0	7 36.6	28	95	85.5	7 45.0	28	95	85.0	7 53.4	28	95	84.5	4
85	5 56.6	29	96	87.6	6 05.2	29	96	87.1	6 13.8	29	95	86.7	6 22.3	28	95	86.2	6 30.9	28	95	85.7	6 39.4	28	95	85.2	6 47.8	28	95	84.7	6 56.3	28	95	84.2	85
6					5 07.9	29	95	86.9	5 16.5	29	95	86.4	5 25.1	29	95	85.9	5 33.7	29	95	85.4	5 42.2	28	95	84.9	5 50.7	28	95	84.4	5 59.2	28	95	84.0	6
7																													5 02.2	28	95	83.7	7

H.A.	4° 00′				4° 30′				5° 00′				5° 30′				6° 00′				6° 30′				7° 00′				7° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	69 00.0	1.0	02	180.0	68 30.0	1.0	02	180.0	68 00.0	1.0	02	180.0	67 30.0	1.0	02	180.0	67 00.0	1.0	02	180.0	66 30.0	1.0	02	180.0	66 00.0	1.0	02	180.0	65 30.0	1.0	02	180.0	00
1	68 58.6	1.0	07	177.2	68 28.6	1.0	07	177.3	67 58.7	1.0	07	177.3	67 28.7	1.0	06	177.4	66 58.7	1.0	06	177.5	66 28.8	1.0	06	177.5	65 58.8	1.0	06	177.6	65 28.8	1.0	06	177.6	1
2	68 54.4	1.0	12	174.4	68 24.6	1.0	11	174.6	67 54.7	1.0	11	174.7	67 24.8	1.0	11	174.8	66 54.9	1.0	11	174.9	66 25.0	1.0	10	175.0	65 55.1	1.0	10	175.1	65 25.2	1.0	10	175.2	2
3	68 47.5	99	16	171.7	68 17.8	99	16	171.9	67 48.1	99	15	172.1	67 18.3	99	15	172.2	66 48.6	99	15	172.4	66 18.8	99	14	172.6	65 49.0	99	14	172.7	65 19.3	99	14	172.9	3
4	68 37.9	98	20	169.0	68 08.4	98	20	169.2	67 38.9	98	20	169.5	67 09.3	99	19	169.7	66 39.8	99	19	169.9	66 10.2	99	18	170.1	65 40.6	99	18	170.3	65 11.0	99	18	170.5	4
05	68 25.6	97	25	166.3	67 56.4	98	24	166.6	67 27.1	98	24	166.9	66 57.8	98	23	167.2	66 28.5	98	23	167.5	65 59.1	98	22	167.7	65 29.8	98	22	168.0	65 00.4	98	21	168.2	05
6	68 10.8	96	29	163.7	67 41.9	96	28	164.1	67 12.9	97	28	164.4	66 43.9	97	27	164.7	66 14.9	97	27	165.0	65 45.8	97	26	165.3	65 16.7	97	26	165.6	64 47.5	97	25	165.9	6
7	67 53.5	95	33	161.2	67 24.9	95	32	161.6	66 56.3	95	32	161.9	66 27.6	96	31	162.3	65 58.9	96	30	162.7	65 30.1	96	30	163.0	65 01.3	96	29	163.4	64 32.5	96	29	163.7	7
8	67 33.8	94	37	158.7	67 05.6	94	36	159.1	66 37.4	94	35	159.5	66 09.1	94	35	160.0	65 40.7	95	34	160.4	65 12.3	95	33	160.7	64 43.8	95	33	161.1	64 15.3	95	32	161.5	8
9	67 11.8	92	40	156.3	66 44.0	93	40	156.7	66 16.2	93	39	157.2	65 48.3	93	38	157.7	65 20.4	93	37	158.1	64 52.3	94	37	158.5	64 24.2	94	36	158.9	63 56.0	94	35	159.3	9
10	66 47.6	91	44	153.9	66 20.3	91	43	154.4	65 53.0	91	42	155.0	65 25.5	92	41	155.4	64 58.0	92	41	155.9	64 30.3	92	40	156.4	64 02.6	93	39	156.8	63 34.8	93	39	157.2	10
1	66 21.3	89	47	151.7	65 54.6	89	46	152.2	65 27.7	90	45	152.8	65 00.7	90	45	153.3	64 33.6	91	44	153.8	64 06.4	91	43	154.3	63 39.1	91	42	154.7	63 11.7	91	42	155.2	1
2	65 53.2	87	50	149.5	65 26.9	88	49	150.1	65 00.5	88	48	150.6	64 33.9	89	48	151.2	64 07.3	89	47	151.7	63 40.5	89	46	152.2	63 13.7	90	45	152.7	62 46.7	90	45	153.2	2
3	65 23.1	86	53	147.4	64 57.4	86	52	148.0	64 31.5	87	51	148.6	64 05.4	87	50	149.2	63 39.2	87	50	149.7	63 12.9	88	49	150.3	62 46.5	88	48	150.8	62 20.0	89	47	151.3	3
4	64 51.4	84	56	145.4	64 26.1	84	55	146.0	64 00.7	85	54	146.6	63 35.2	85	53	147.2	63 09.5	86	52	147.8	62 43.6	86	51	148.4	62 17.7	87	51	148.9	61 51.6	87	50	149.4	4
15	64 18.0	82	58	143.5	63 53.3	83	57	144.1	63 28.4	83	56	144.7	63 03.3	84	56	145.4	62 38.1	84	55	145.9	62 12.8	85	54	146.5	61 47.3	85	53	147.1	61 21.6	86	52	147.6	15
6	63 43.1	80	61	141.6	63 18.9	81	60	142.3	62 54.5	82	59	142.9	62 30.0	82	58	143.5	62 05.2	83	57	144.2	61 40.4	83	56	144.7	61 15.4	84	56	145.3	60 50.2	84	55	145.9	6
7	63 06.8	79	63	139.8	62 43.1	79	62	140.5	62 19.2	80	61	141.2	61 55.2	80	60	141.8	61 30.9	81	59	142.4	61 06.6	82	59	143.0	60 42.0	82	58	143.6	60 17.3	83	57	144.2	7
8	62 29.1	77	65	138.1	62 05.9	78	64	138.8	61 42.6	78	63	139.5	61 19.0	79	62	140.1	60 55.3	79	62	140.8	60 31.4	80	61	141.4	60 07.3	81	60	142.0	59 43.1	81	59	142.6	8
9	61 50.2	75	67	136.5	61 27.6	76	66	137.2	61 04.7	77	65	137.9	60 41.6	77	64	138.5	60 18.4	78	63	139.2	59 55.0	78	63	139.8	59 31.4	79	62	140.4	59 07.6	79	61	141.0	9
20	61 10.2	73	69	135.0	60 48.0	74	68	135.7	60 25.6	75	67	136.3	60 03.1	76	66	137.0	59 40.3	76	65	137.7	59 17.4	77	65	138.3	58 54.2	77	64	138.9	58 30.9	78	63	139.5	20
1	60 29.0	72	70	133.5	60 07.4	73	69	134.2	59 45.5	73	69	134.9	59 23.4	74	68	135.5	59 01.1	75	67	136.2	58 38.6	75	66	136.8	58 16.0	76	66	137.4	57 53.1	76	65	138.1	1
2	59 46.9	70	72	132.1	59 25.7	71	71	132.8	59 04.3	72	70	133.4	58 42.7	72	69	134.1	58 20.9	73	69	134.8	57 58.9	74	68	135.4	57 36.7	74	67	136.0	57 14.3	75	66	136.7	2
3	59 03.9	69	73	130.7	58 43.1	69	72	131.4	58 22.2	70	72	132.1	58 01.0	71	71	132.8	57 39.7	72	70	133.4	57 18.1	72	69	134.1	56 56.3	73	69	134.7	56 34.4	73	68	135.3	3
4	58 19.9	67	75	129.4	57 59.7	68	74	130.1	57 39.2	69	73	130.8	57 18.5	69	72	131.4	56 57.5	70	72	132.1	56 36.4	71	71	132.8	56 15.1	71	70	133.4	55 53.6	72	70	134.0	4
25	57 35.2	66	76	128.1	57 15.4	66	75	128.8	56 55.3	67	74	129.5	56 35.0	68	74	130.2	56 14.6	69	73	130.9	55 53.9	69	72	131.5	55 33.0	70	72	132.1	55 11.9	71	71	132.8	25
6	56 49.7	64	77	126.9	56 30.3	65	76	127.6	56 10.7	66	76	128.3	55 50.8	67	75	129.0	55 30.8	67	74	129.6	55 10.5	68	74	130.3	54 50.0	69	73	130.9	54 29.3	69	72	131.6	6
7	56 03.5	63	78	125.8	55 44.5	64	77	126.5	55 25.3	64	77	127.2	55 05.9	65	76	127.8	54 46.2	66	75	128.5	54 26.4	67	75	129.1	54 06.3	67	74	129.8	53 46.0	68	73	130.4	7
8	55 16.6	62	79	124.7	54 58.0	62	78	125.4	54 39.2	63	78	126.1	54 20.2	64	77	126.7	54 01.0	65	77	127.4	53 41.5	65	76	128.0	53 21.8	66	75	128.7	53 02.0	67	75	129.3	8
9	54 29.1	60	80	123.6	54 11.0	61	79	124.3	53 52.5	62	79	125.0	53 33.9	62	78	125.7	53 15.0	63	78	126.3	52 56.0	64	77	127.0	52 36.7	65	76	127.6	52 17.2	65	76	128.2	9
30	53 41.1	59	81	122.6	53 23.3	60	80	123.3	53 05.2	61	80	124.0	52 47.0	61	79	124.6	52 28.5	62	79	125.3	52 09.8	63	78	125.9	51 50.9	63	77	126.5	51 31.8	64	77	127.2	30
1	52 52.5	58	82	121.7	52 35.1	59	81	122.3	52 17.4	59	81	123.0	51 59.5	60	80	123.6	51 41.4	61	79	124.3	51 23.0	61	79	124.9	51 04.5	62	78	125.5	50 45.8	63	78	126.2	1
2	52 03.4	57	83	120.7	51 46.3	57	82	121.4	51 29.0	58	81	122.0	51 11.4	59	81	122.7	50 53.7	60	80	123.3	50 35.7	60	80	124.0	50 17.6	61	79	124.6	49 59.2	62	79	125.2	2
3	51 13.9	56	83	119.8	50 57.1	56	83	120.5	50 40.1	57	82	121.1	50 22.9	58	82	121.8	50 05.5	58	81	122.4	49 47.9	59	81	123.0	49 30.0	60	80	123.7	49 12.0	60	79	124.3	3
4	50 23.9	54	84	118.9	50 07.4	55	84	119.6	49 50.8	56	83	120.2	49 33.9	57	82	120.9	49 16.8	57	82	121.5	48 59.5	58	81	122.1	48 42.0	59	81	122.8	48 24.4	59	80	123.4	4
35	49 33.4	53	85	118.1	49 17.3	54	84	118.8	49 01.0	55	84	119.4	48 44.4	56	83	120.0	48 27.7	56	83	120.7	48 10.7	57	82	121.3	47 53.6	58	82	121.9	47 36.2	58	81	122.5	35
6	48 42.6	52	85	117.3	48 26.8	53	85	117.9	48 10.8	54	84	118.6	47 54.5	54	84	119.2	47 38.1	55	83	119.8	47 21.5	56	83	120.4	47 04.6	56	82	121.1	46 47.6	57	82	121.7	6
7	47 51.5	51	86	116.5	47 35.9	52	85	117.2	47 20.2	53	85	117.8	47 04.3	53	84	118.4	46 48.1	54	84	119.0	46 31.8	55	83	119.6	46 15.3	55	83	120.2	45 58.5	56	82	120.8	7
8	47 00.0	50	86	115.8	46 44.7	51	86	116.4	46 29.3	52	85	117.0	46 13.6	53	85	117.6	45 57.8	53	85	118.3	45 41.7	54	84	118.9	45 25.5	54	84	119.5	45 09.1	55	83	120.1	8
9	46 08.1	50	87	115.0	45 53.2	50	86	115.7	45 38.0	51	86	116.3	45 22.6	52	86	116.9	45 07.1	52	85	117.5	44 51.3	53	85	118.1	44 35.3	53	84	118.7	44 19.2	54	84	119.3	9
40	45 16.0	49	87	114.3	45 01.3	49	87	115.0	44 46.4	50	87	115.6	44 31.3	51	86	116.2	44 16.0	51	86	116.8	44 00.5	52	85	117.4	43 44.8	53	85	118.0	43 29.0	53	84	118.6	40
1	44 23.6	48	88	113.7	44 09.1	49	87	114.3	43 54.5	49	87	114.9	43 39.6	50	87	115.5	43 24.6	50	86	116.1	43 09.4	51	86	116.7	42 54.0	52	85	117.3	42 38.4	52	85	117.8	1
2	43 30.9	47	88	113.0	43 16.7	48	88	113.6	43 02.3	48	87	114.2	42 47.7	49	87	114.8	42 32.9	50	87	115.4	42 18.0	50	86	116.0	42 02.8	51	86	116.6	41 47.5	51	85	117.2	2
3	42 38.0	46	89	112.4	42 24.0	47	88	113.0	42 09.8	48	88	113.6	41 55.5	48	87	114.2	41 41.0	49	87	114.7	41 26.3	49	87	115.3	41 11.4	50	86	115.9	40 56.3	50	86	116.5	3
4	41 44.8	46	89	111.8	41 31.0	46	89	112.3	41 17.1	47	88	112.9	41 03.0	47	88	113.5	40 48.7	48	88	114.1	40 34.3	48	87	114.7	40 19.6	49	87	115.3	40 04.8	50	86	115.8	4
45	40 51.4	45	89	111.2	40 37.9	45	89	111.7	40 24.2	46	89	112.3	40 10.3	47	88	112.9	39 56.2	47	88	113.5	39 42.0	48	88	114.1	39 27.6	48	87	114.6	39 13.0	49	87	115.2	45
6	39 57.8	44	90	110.6	39 44.5	45	89	111.2	39 31.0	45	89	111.7	39 17.3	46	89	112.3	39 03.5	46	88	112.9	38 49.5	47	88	113.5	38 35.3	47	88	114.0	38 21.0	48	87	114.6	6
7	39 04.0	43	90	110.0	38 50.8	44	90	110.6	38 37.6	45	89	111.2	38 24.1	45	89	111.7	38 10.5	46	89	112.3	37 56.7	46	88	112.9	37 42.8	47	88	113.4	37 28.7	47	88	114.0	7
8	38 09.9	43	90	109.5	37 57.0	43	90	110.0	37 44.0	44	90	110.6	37 30.7	44	89	111.2	37 17.3	45	89	111.7	37 03.7	45	89	112.3	36 50.0	46	88	112.8	36 36.1	47	88	113.4	8
9	37 15.8	42	91	108.9	37 03.0	43	90	109.5	36 50.1	43	90	110.1	36 37.1	44	90	110.6	36 23.9	44	89	111.2	36 10.5	45	89	111.7	35 57.0	45	89	112.3	35 43.4	46	88	112.8	9
50	36 21.4	42	91	108.4	36 08.9	42	91	109.0	35 56.2	43	90	109.5	35 43.3	43	90	110.1	35 30.3	44	90	110.6	35 17.1	44	89	111.2	35 03.8	45	89	111.7	34 50.4	45	89	112.3	50
1	35 26.9	41	91	107.9	35 14.5	41	91	108.4	35 02.0	42	91	109.0	34 49.3	42	90	109.6	34 36.5	43	90	110.1	34 23.5	43	90	110.7	34 10.4	44	89	111.2	33 57.2	44	89	111.7	1
2	34 32.2	40	91	107.4	34 20.0	41	91	107.9	34 07.7	41	91	108.5	33 55.2	42	91	109.0	33 42.5	42	90	109.6	33 29.8	43	90	110.1	33 16.8	43	90	110.7	33 03.8	44	89	111.2	2
3	33 37.4	40	92	106.9	33 25.3	40	91	107.5	33 13.2	41	91	108.0	33 00.8	41	91	108.6	32 48.4	42	90	109.1	32 35.8	42	90	109.6	32 23.1	43	90	110.2	32 10.2	43	90	110.7	3
4	32 42.4	39	92	106.4	32 30.5	40	92	107.0	32 18.5	40	91	107.5	32 06.4	41	91	108.1	31 54.1	41	91	108.6	31 41.7	42	90	109.1	31 29.1	42	90	109.7	31 16.4	42	90	110.2	4
55	31 47.3	39	92	106.0	31 35.6	39	92	106.5	31 23.7	40	92	107.1	31 11.8	40	91	107.6	30 59.6	41	91	108.1	30 47.4	41	91	108.7	30 35.0	41	90	109.2	30 22.5	42	90	109.7	55
6	30 52.1	38	92	105.5	30 40.5	39	92	106.1	30 28.8	39	92	106.6	30 17.0	40	91	107.1	30 05.0	40	91	107.7	29 53.0	40	91	108.2	29 40.7	41	91	108.7	29 28.4	41	90	109.2	6
7	29 56.7	38	92	105.1	29 45.3	38	92	105.6	29 33.8	39	92	106.2	29 22.1	39	92	106.7	29 10.3	40	91	107.2	28 58.4	40	91	107.7	28 46.3	40	91	108.3	28 34.2	41	91	108.8	7
8	29 01.3	37	93	104.7	28 50.0	38	92	105.2	28 38.6	38	92	105.7	28 27.1	39	92	106.2	28 15.4	39	92	106.8	28 03.7	39	91	107.3	27 51.8	40	91	107.8	27 39.8	40	91	108.3	8
9	28 05.7	37	93	104.2	27 54.6	37	93	104.8	27 43.3	38	92	105.3	27 31.9	38	92	105.8	27 20.4	39	92	106.3	27 08.8	39	92	106.8	26 57.1	39	91	107.4	26 45.2	40	91	107.9	9
60	27 10.0	37	93	103.8	26 59.0	37	93	104.3	26 47.9	37	93	104.9	26 36.7	38	92	105.4	26 25.3	38	92	105.9	26 13.8	38	92	106.4	26 02.2	39	92	106.9	25 50.6	39	91	107.4	60
1	26 14.3	36	93	103.4	26 03.4	36	93	103.9	25 52.4	37	93	104.5	25 41.3	37	92	105.0	25 30.1	38	92	105.5	25 18.7	38	92	106.0	25 07.3	38	92	106.5	24 55.7	39	92	107.0	1
2	25 18.4	36	93	103.0	25 07.7	36	93	103.5	24 56.8	36	93	104.0	24 45.8	37	93	104.6	24 34.7	37	92	105.1	24 23.5	37	92	105.6	24 12.2	38	92	106.1	24 00.8	38	92	106.6	2
3	24 22.5	35	93	102.6	24 11.8	36	93	103.1	24 01.1	36	93	103.7	23 50.2	36	93	104.2	23 39.2	37	93	104.7	23 28.2	37	92	105.2	23 17.0	37	92	105.7	23 05.8	38	92	106.2	3
4	23 26.4	35	94	102.2	23 15.9	35	93	102.8	23 05.3	36	93	103.3	22 54.5	36	93	103.8	22 43.7	36	93	104.3	22 32.8	37	93	104.8	22 21.7	37	92	105.3	22 10.6	37	92	105.8	4
65	22 30.3	35	94	101.9	22 19.9	35	93	102.4	22 09.4	35	93	102.9	21 58.7	36	93	103.4	21 48.0	36	93	103.9	21 37.2	36	93	104.4	21 26.3	36	92	104.9	21 15.3	37	92	105.4	65
6	21 34.1	34	94	101.5	21 23.8	35	94	102.0	21 13.4	35	93	102.5	21 02.9	35	93	103.0	20 52.3	35	93	103.5	20 41.6	36	93	104.0	20 30.8	36	93	104.5	20 20.0	36	92	105.0	6
7	20 37.9	34	94	101.1	20 27.6	34	94	101.6	20 17.3	35	94	102.1	20 06.9	35	93	102.6	19 56.5	35	93	103.1	19 45.9	35	93	103.6	19 35.2	36	93	104.1	19 24.5	36	93	104.6	7
8	19 41.5	34	94	100.8	19 31.4	34	94	101.3	19 21.2	34	94	101.8	19 10.9	34	94	102.3	19 00.5	35	93	102.8	18 50.1	35	93	103.3	18 39.5	35	93	103.8	18 28.9	35	93	104.2	8
9	18 45.1	33	94	100.4	18 35.1	34	94	100.9	18 25.0	34	94	101.4	18 14.8	34	94	101.9	18 04.5	34	93	102.4	17 54.2	35	93	102.9	17 43.8	35	93	103.4	17 33.3	35	93	103.9	9
70	17 48.7	33	94	100.1	17 38.7	33	94	100.6	17 28.7	34	94	101.1	17 18.6	34	94	101.6	17 08.5	34	94	102.0	16 58.2	34	93	102.5	16 47.9	34	93	103.0	16 37.5	35	93	103.5	70
1	16 52.2	33	94	99.7	16 42.3	33	94	100.2	16 32.4	33	94	100.7	16 22.4	33	94	101.2	16 12.3	34	94	101.7	16 02.2	34	94	102.2	15 52.0	34	93	102.7	15 41.7	34	93	103.2	1
2	15 55.6	32	94	99.4	15 45.8	33	94	99.9	15 36.0	33	94	100.4	15 26.1	33	94	100.9	15 16.1	33	94	101.3	15 06.0	34	94	101.8	14 55.9	34	94	102.3	14 45.8	34	93	102.8	2
3	14 58.9	32	94	99.1	14 49.2	32	94	99.5	14 39.5	33	94	100.0	14 29.7	33	94	100.5	14 19.8	33	94	101.0	14 09.9	33	94	101.5	13 59.9	33	94	102.0	13 49.8	34	93	102.5	3
4	14 02.2	32	96	98.7	13 52.6	32	94	99.2	13 43.0	32	94	99.7	13 33.2	33	94	100.2	13 23.4	33	94	100.7	13 13.6	33	94	101.2	13 03.7	33	94	101.6	12 53.7	33	94	102.1	4
75	13 05.5	32	96	98.4	12 56.0	32	95	98.9	12 46.4	32	94	99.4	12 36.7	32	94	99.9	12 27.0	32	94	100.3	12 17.3	33	94	100.8	12 07.5	33	94	101.3	11 57.6	33	94	101.8	75
6	12 08.7	31	96	98.1	11 59.3	32	95	98.6	11 49.7	32	94	99.0	11 40.2	32	94	99.5	11 30.5	32	94	100.0	11 20.9	32	94	100.5	11 11.2	32	94	101.0	11 01.4	33	94	101.5	6
7	11 11.9	31	96	97.8	11 02.5	31	95	98.2	10 53.0	32	95	98.7	10 43.5	32	94	99.2	10 34.0	32	94	99.7	10 24.4	32	94	100.2	10 14.8	32	94	100.6	10 05.1	32	94	101.1	7
8	10 15.0	31	96	97.4	10 05.7	31	95	97.9	9 56.3	31	96	98.4	9 46.9	31	95	98.9	9 37.4	32	94	99.4	9 27.9	32	94	99.8	9 18.4	32	94	100.3	9 08.8	32	94	100.8	8
9	9 18.1	31	96	97.1	9 08.8	31	95	97.6	8 59.5	31	96	98.1	8 50.2	31	95	98.6	8 40.8	31	94	99.0	8 31.4	31	94	99.5	8 21.9	32	94	100.0	8 12.4	32	94	100.5	9
80	8 21.1	31	96	96.8	8 11.9	31	95	97.3	8 02.7	31	95	97.8	7 53.4	31	95	98.3	7 44.1	31	95	98.7	7 34.7	31	94	99.2	7 25.4	31	94	99.7	7 16.0	31	94	100.2	80
1	7 24.2	30	96	96.5	7 15.0	31	95	97.0	7 05.8	31	95	97.5	6 56.6	31	95	97.9	6 47.4	31	95	98.4	6 38.1	31	94	98.9	6 28.8	31	94	99.4	6 19.5	31	94	99.9	1
2	6 27.1	30	96	96.2	6 18.0	30	95	96.7	6 08.9	30	95	97.2	5 59.8	31	95	97.6	5 50.6	31	95	98.1	5 41.4	31	95	98.6	5 32.2	31	94	99.1	5 22.9	31	94	99.5	2
3	5 30.1	30	96	95.9	5 21.0	30	95	96.4	5 12.0	30	95	96.9	5 02.9	30	95	97.3																	3

Lat. 17°

H.A.	8° 00′				8° 30′				9° 00′				9° 30′				10° 00′				10° 30′				11° 00′				11° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	81 00.0	1.0	05	180.0	81 30.0	1.0	06	180.0	82 00.0	1.0	06	180.0	82 30.0	1.0	06	180.0	83 00.0	1.0	07	180.0	83 30.0	1.0	07	180.0	84 00.0	1.0	08	180.0	84 30.0	1.0	08	180.0	00
1	80 56.8	99	16	173.7	81 26.7	99	16	173.3	81 56.5	99	17	172.9	82 26.2	99	19	172.5	82 56.0	99	20	172.0	83 25.7	99	21	171.4	83 55.3	99	23	170.7	84 24.9	99	25	169.9	1
2	80 47.5	98	25	167.5	81 16.8	98	27	166.8	81 46.0	97	28	166.1	82 15.1	97	30	165.2	82 44.1	96	32	164.2	83 13.0	96	34	163.1	83 41.7	95	36	161.8	84 10.1	94	39	160.3	2
3	80 32.2	95	35	161.6	81 00.7	95	36	160.7	81 29.0	94	38	159.6	81 57.2	93	40	158.4	82 25.0	93	42	157.0	82 52.6	91	45	155.5	83 19.9	90	48	153.7	83 46.8	89	51	151.8	3
4	80 11.5	92	43	156.1	80 39.0	91	45	154.9	81 06.2	90	47	153.5	81 33.1	89	49	152.1	81 59.6	88	51	150.4	82 25.7	86	54	148.6	82 51.3	84	57	146.6	83 16.3	82	60	144.3	4
05	79 45.8	88	50	150.9	80 12.2	87	52	149.6	80 38.1	86	54	148.1	81 03.7	84	56	146.4	81 28.8	83	59	144.6	81 53.3	81	62	142.6	82 17.1	78	64	140.4	82 40.3	76	67	138.0	05
6	79 15.9	84	56	146.2	79 41.0	83	58	144.7	80 05.7	81	60	143.1	80 29.8	80	63	141.4	80 53.4	78	65	139.4	81 16.3	75	68	137.4	81 38.5	73	70	135.1	81 59.9	70	73	132.6	6
7	78 42.3	80	61	142.0	79 06.1	79	63	140.4	79 29.5	77	66	138.7	79 52.3	75	68	136.9	80 14.4	73	70	134.9	80 35.8	70	72	132.8	80 56.4	67	75	130.6	81 16.1	64	77	128.1	7
8	78 05.4	76	66	138.1	78 28.0	75	68	136.5	78 50.1	73	70	134.8	79 11.6	70	72	132.9	79 32.4	68	74	131.0	79 52.4	65	76	128.9	80 11.6	62	78	126.7	80 29.8	59	80	124.3	8
9	77 25.8	73	70	134.6	77 47.3	71	72	133.0	78 08.2	69	74	131.3	78 28.4	66	75	129.5	78 47.9	64	77	127.5	79 06.7	61	79	125.5	79 24.5	58	81	123.3	79 41.5	55	83	121.1	9
10	76 43.8	69	73	131.5	77 04.2	67	75	129.9	77 24.0	65	77	128.2	77 43.1	62	78	126.4	78 01.5	60	80	124.5	78 19.1	57	82	122.5	78 35.8	54	84	120.4	78 51.6	51	85	118.3	10
1	75 59.9	66	76	128.7	76 19.3	64	78	127.1	76 38.1	61	79	125.4	76 56.1	59	81	123.6	77 13.5	56	82	121.8	77 30.0	54	84	119.9	77 45.7	51	85	117.9	78 00.5	48	87	115.8	1
2	75 14.3	63	78	126.1	75 32.8	60	80	124.5	75 50.6	58	81	122.9	76 07.7	56	83	121.2	76 24.1	53	84	119.4	76 39.7	51	86	117.6	76 54.5	48	87	115.7	77 08.4	45	88	113.7	2
3	74 27.3	60	80	123.8	74 44.8	58	82	122.3	75 01.8	55	83	120.7	75 18.0	53	84	119.0	75 33.6	51	86	117.3	75 48.4	48	87	115.6	76 02.4	45	88	113.8	76 15.5	42	89	111.9	3
4	73 39.0	57	82	121.7	73 55.8	55	83	120.2	74 11.9	53	85	118.7	74 27.4	50	86	117.1	74 42.2	48	87	115.4	74 56.2	46	88	113.8	75 09.5	43	89	112.0	75 22.0	40	90	110.2	4
15	72 49.6	55	84	119.8	73 05.7	52	85	118.3	73 21.1	50	86	116.8	73 35.9	48	87	115.3	73 50.0	46	88	113.7	74 03.4	43	89	112.1	74 16.0	41	90	110.5	74 27.9	38	91	108.7	15
6	71 59.4	52	85	118.0	72 14.8	50	86	116.6	72 29.6	48	87	115.2	72 43.7	46	88	113.7	72 57.2	44	89	112.2	73 09.9	41	90	110.6	73 22.0	39	91	109.0	73 33.3	36	92	107.4	6
7	71 08.4	50	86	116.4	71 23.1	48	87	115.1	71 37.3	46	88	113.7	71 50.9	44	89	112.2	72 03.8	42	90	110.8	72 16.0	40	91	109.3	72 27.6	37	91	107.8	72 38.4	35	92	106.2	7
8	70 16.7	48	87	114.9	70 30.9	46	88	113.6	70 44.5	44	89	112.3	70 57.5	42	90	110.9	71 09.9	40	90	109.5	71 21.7	38	91	108.1	71 32.7	36	92	106.6	71 43.2	34	93	105.1	8
9	69 24.3	47	88	113.6	69 38.0	45	89	112.3	69 51.1	43	90	111.0	70 03.7	41	90	109.7	70 15.6	39	91	108.3	70 26.9	37	92	106.9	70 37.6	35	92	105.5	70 47.6	32	93	104.1	9
20	68 31.5	45	89	112.3	68 44.7	43	90	111.1	68 57.4	41	90	109.8	69 09.5	39	91	108.5	69 21.0	37	92	107.2	69 31.9	35	92	105.9	69 42.2	33	93	104.6	69 51.9	31	93	103.2	20
1	67 38.2	43	90	111.1	67 51.0	42	90	109.9	68 03.2	40	91	108.7	68 14.9	38	91	107.5	68 26.0	36	92	106.2	68 36.6	34	93	105.0	68 46.6	32	93	103.7	68 55.9	30	94	102.3	1
2	66 44.5	42	90	110.0	66 56.8	40	91	108.9	67 08.7	39	91	107.7	67 20.0	37	92	106.5	67 30.8	35	92	105.3	67 41.0	33	93	104.1	67 50.7	31	93	102.8	67 59.8	29	94	101.5	2
3	65 50.4	41	91	109.0	66 02.4	39	91	107.9	66 13.9	37	92	106.8	66 24.9	36	92	105.6	66 35.4	34	93	104.4	66 45.3	32	93	103.2	66 54.7	30	94	102.0	67 03.5	28	94	100.8	3
4	64 56.0	40	91	108.1	65 07.7	38	92	107.0	65 18.8	36	92	105.9	65 29.5	35	93	104.7	65 39.7	33	93	103.6	65 49.3	31	94	102.5	65 58.5	30	94	101.3	66 07.1	28	94	100.1	4
25	64 01.3	39	92	107.2	64 12.7	37	92	106.1	64 23.5	35	93	105.0	64 33.9	34	93	103.9	64 43.8	32	93	102.8	64 53.2	31	94	101.7	65 02.1	29	94	100.6	65 10.5	27	94	99.5	25
6	63 06.4	38	92	106.3	63 17.4	36	92	105.3	63 28.0	35	93	104.2	63 38.1	33	93	103.2	63 47.8	31	94	102.1	63 57.0	30	94	101.0	64 05.7	28	94	99.9	64 13.9	26	95	98.8	6
7	62 11.2	37	92	105.5	62 22.0	35	93	104.5	62 32.3	34	93	103.5	62 42.2	32	94	102.5	62 51.6	31	94	101.4	63 00.6	29	94	100.4	63 09.1	28	94	99.3	63 17.1	26	95	98.3	7
8	61 15.8	36	93	104.8	61 26.3	34	93	103.8	61 36.4	33	93	102.8	61 46.1	31	94	101.8	61 55.3	30	94	100.8	62 04.1	29	94	99.8	62 12.4	27	95	98.8	62 20.3	25	95	97.7	8
9	60 20.2	35	93	104.0	60 30.5	34	93	103.1	60 40.4	32	94	102.1	60 49.9	31	94	101.2	60 58.9	29	94	100.2	61 07.5	28	94	99.2	61 15.7	26	95	98.2	61 23.4	25	95	97.2	9
30	59 24.5	34	93	103.4	59 34.6	33	94	102.4	59 44.2	32	94	101.5	59 53.5	30	94	100.6	60 02.4	29	94	99.6	60 10.8	27	95	98.6	60 18.9	26	95	97.7	60 26.5	25	95	96.7	30
1	58 28.6	34	93	102.7	58 38.5	32	94	101.8	58 48.0	31	94	100.9	58 57.1	30	94	100.0	59 05.8	28	94	99.0	59 14.1	27	95	98.1	59 22.0	26	95	97.2	59 29.4	24	95	96.2	1
2	57 32.6	33	94	102.1	57 42.2	32	94	101.2	57 51.6	30	94	100.3	58 00.5	29	94	99.4	58 09.1	28	95	98.5	58 17.2	27	95	97.6	58 25.0	25	95	96.7	58 32.4	24	95	95.8	2
3	56 36.4	32	94	101.5	56 45.9	31	94	100.6	56 55.1	30	94	99.8	57 03.9	29	95	98.9	57 12.3	27	95	98.0	57 20.3	26	95	97.1	57 28.0	25	95	96.2	57 35.3	24	95	95.3	3
4	55 40.1	32	94	100.9	55 49.5	31	94	100.1	55 58.5	29	94	99.2	56 07.1	28	95	98.4	56 15.4	27	95	97.5	56 23.4	26	95	96.6	56 30.9	25	95	95.8	56 38.1	23	95	94.9	4
35	54 43.7	31	94	100.4	54 52.9	30	94	99.6	55 01.8	29	95	98.7	55 10.3	28	95	97.9	55 18.5	27	95	97.0	55 26.3	26	95	96.2	55 33.8	24	95	95.3	55 40.9	23	95	94.5	35
6	53 47.2	31	94	99.9	53 56.3	30	94	99.0	54 05.0	29	95	98.2	54 13.5	27	95	97.4	54 21.5	26	95	96.6	54 29.3	25	95	95.8	54 36.7	24	95	94.9	54 43.7	23	95	94.1	6
7	52 50.7	30	94	99.4	52 59.6	29	95	98.6	53 08.2	28	95	97.8	53 16.5	27	95	97.0	53 24.5	26	95	96.2	53 32.2	25	95	95.3	53 39.5	24	95	94.5	53 46.5	23	95	93.7	7
8	51 54.0	30	95	98.9	52 02.8	29	95	98.1	52 11.3	28	95	97.3	52 19.5	27	95	96.5	52 27.4	26	95	95.7	52 35.0	25	95	94.9	52 42.3	24	95	94.1	52 49.2	23	96	93.3	8
9	50 57.3	30	95	98.4	51 06.0	29	95	97.6	51 14.4	28	95	96.9	51 22.5	27	95	96.1	51 30.3	26	95	95.3	51 37.8	24	95	94.5	51 45.0	23	95	93.8	51 51.9	22	96	93.0	9
40	50 00.5	29	95	97.9	50 09.1	28	95	97.2	50 17.4	27	96	96.4	50 25.4	26	95	95.7	50 33.2	25	95	94.9	50 40.6	24	95	94.2	50 47.8	23	95	93.4	50 54.6	22	96	92.6	40
1	49 03.6	29	95	97.5	49 12.1	28	95	96.8	49 20.4	27	95	96.0	49 28.3	26	96	95.3	49 36.0	25	95	94.5	49 43.4	24	95	93.8	49 50.5	23	96	93.0	49 57.3	22	96	92.3	1
2	48 06.7	29	95	97.1	48 15.1	28	95	96.3	48 23.3	27	95	95.6	48 31.2	26	95	94.9	48 38.8	25	95	94.2	48 46.1	24	95	93.4	48 53.2	23	96	92.7	48 59.9	22	96	91.9	2
3	47 09.7	28	96	96.6	47 18.1	27	96	95.9	47 26.2	27	96	95.2	47 34.0	26	95	94.5	47 41.5	25	95	93.8	47 48.8	24	96	93.1	47 55.8	23	96	92.3	48 02.6	22	96	91.6	3
4	46 12.7	28	95	96.2	46 21.0	27	95	95.5	46 29.0	26	95	94.8	46 36.8	25	95	94.1	46 44.3	25	95	93.4	46 51.5	24	96	92.7	46 58.5	23	96	92.0	47 05.2	22	96	91.3	4
45	45 15.7	28	95	95.8	45 23.9	27	95	95.2	45 31.8	26	95	94.5	45 39.5	25	95	93.8	45 47.0	24	96	93.1	45 54.2	24	96	92.4	46 01.2	23	96	91.7	46 07.8	22	96	91.0	45
6	44 18.6	28	95	95.5	44 26.7	27	95	94.8	44 34.6	26	96	94.1	44 42.3	25	95	93.4	44 49.7	24	96	92.7	44 56.9	24	96	92.1	45 03.8	23	96	91.4	45 10.5	22	96	90.7	6
7	43 21.4	27	95	95.1	43 29.5	27	95	94.4	43 37.4	26	95	93.7	43 45.0	25	96	93.1	43 52.4	24	96	92.4	43 59.5	23	96	91.7	44 06.4	23	96	91.1	44 13.1	22	96	90.4	7
8	42 24.2	27	95	94.7	42 32.3	26	95	94.1	42 40.1	26	95	93.4	42 47.7	25	96	92.7	42 55.0	24	96	92.1	43 02.2	23	96	91.4	43 09.1	23	96	90.8	43 15.7	22	96	90.1	8
9	41 27.0	27	95	94.4	41 35.0	26	95	93.7	41 42.8	26	96	93.1	41 59.4	25	96	92.4	41 57.7	24	96	91.8	42 04.8	23	96	91.1	42 11.7	23	96	90.4	42 18.3	22	96	89.8	9
50	40 29.8	27	95	94.0	40 37.8	26	96	93.4	40 45.5	25	96	92.7	40 53.0	25	96	92.1	41 00.3	24	96	91.4	41 07.4	23	96	90.8	41 14.3	23	96	90.2	41 21.0	22	96	89.5	50
1	39 32.6	27	95	93.7	39 40.5	26	96	93.0	39 48.2	25	96	92.4	39 55.7	25	96	91.8	40 03.0	24	96	91.1	40 10.1	23	96	90.5	40 16.9	23	96	89.9	40 23.6	22	96	89.2	1
2	38 35.3	27	96	93.3	38 43.2	26	96	92.7	38 50.8	25	96	92.1	38 58.3	25	96	91.5	39 05.6	24	96	90.8	39 12.7	23	96	90.2	39 19.6	23	96	89.6	39 26.2	22	96	88.9	2
3	37 38.0	26	96	93.0	37 45.8	26	96	92.4	37 53.5	25	96	91.8	38 01.0	25	96	91.1	38 08.2	24	96	90.5	38 15.3	23	96	89.9	38 22.2	23	96	89.3	38 28.9	22	96	88.7	3
4	36 40.7	26	96	92.7	36 48.5	26	96	92.0	36 56.1	25	96	91.4	37 03.6	25	96	90.8	37 10.8	24	96	90.2	37 17.9	23	96	89.6	37 24.8	23	96	89.0	37 31.5	22	96	88.4	4
55	35 43.4	26	96	92.3	35 51.2	26	96	91.7	35 58.8	25	96	91.1	36 06.2	24	96	90.5	36 13.5	24	96	89.9	36 20.5	23	96	89.3	36 27.4	23	96	88.7	36 34.1	22	96	88.1	55
6	34 46.0	26	96	92.0	34 53.8	26	96	91.4	35 01.4	25	96	90.8	35 08.8	24	96	90.2	35 16.1	24	96	89.6	35 23.2	23	96	89.1	35 30.1	23	96	88.5	35 36.8	22	96	87.9	6
7	33 48.7	26	96	91.7	33 56.4	26	96	91.1	34 04.0	25	96	90.5	34 11.5	24	96	89.9	34 18.7	24	96	89.4	34 25.8	23	96	88.8	34 32.7	23	96	88.2	34 39.5	22	96	87.6	7
8	32 51.3	26	96	91.4	32 59.1	26	96	90.8	33 06.7	25	96	90.2	33 14.1	24	96	89.7	33 21.3	24	96	89.1	33 28.4	23	96	88.5	33 35.4	23	96	87.9	33 42.1	22	96	87.3	8
9	31 54.0	26	96	91.1	32 01.7	26	96	90.5	32 09.3	25	96	89.9	32 16.7	24	96	89.4	32 24.0	24	96	88.8	32 31.1	23	96	88.2	32 38.0	23	96	87.6	32 44.8	22	95	87.1	9
60	30 56.6	26	96	90.8	31 04.3	26	96	90.2	31 11.9	25	96	89.7	31 19.3	25	96	89.1	31 26.6	24	96	88.5	31 33.7	24	96	87.9	31 40.7	23	96	87.4	31 47.5	22	95	86.8	60
1	29 59.2	26	96	90.5	30 06.9	26	96	89.9	30 14.5	25	96	89.4	30 22.0	25	96	88.8	30 29.3	24	96	88.2	30 36.4	24	96	87.7	30 43.4	23	96	87.1	30 50.3	23	95	86.5	1
2	29 01.8	26	96	90.2	29 09.6	26	96	89.6	29 17.2	25	96	89.1	29 24.6	25	96	88.5	29 31.9	24	96	88.0	29 39.1	24	96	87.4	29 46.1	23	96	86.8	29 53.0	23	95	86.3	2
3	28 04.5	26	96	89.9	28 12.2	26	96	89.3	28 19.8	25	96	88.8	28 27.2	25	96	88.2	28 34.6	24	96	87.7	28 41.8	24	96	87.1	28 48.8	23	95	86.6	28 55.7	23	95	86.0	3
4	27 07.1	26	96	89.6	27 14.8	26	96	89.1	27 22.4	25	96	88.5	27 29.9	25	96	88.0	27 37.2	24	96	87.4	27 44.5	24	95	86.9	27 51.6	23	95	86.3	27 58.5	23	96	85.8	4
65	26 09.7	26	96	89.3	26 17.5	26	96	88.8	26 25.1	25	96	88.2	26 32.6	25	96	87.7	26 39.9	24	96	87.2	26 47.2	24	95	86.6	26 54.3	24	95	86.1	27 01.3	23	95	85.5	65
6	25 12.3	26	96	89.0	25 20.1	26	96	88.5	25 27.7	25	96	88.0	25 35.2	25	96	87.4	25 42.6	24	95	86.9	25 49.9	24	95	86.3	25 57.1	24	95	85.8	26 04.1	23	96	85.3	6
7	24 15.0	26	96	88.7	24 22.7	26	96	88.2	24 30.4	25	96	87.7	24 37.9	25	96	87.2	24 45.3	25	95	86.6	24 52.7	24	95	86.1	24 59.9	24	95	85.5	25 06.9	23	95	85.0	7
8	23 17.6	26	96	88.5	23 25.4	26	96	87.9	23 33.1	25	96	87.4	23 40.6	25	95	86.9	23 48.1	25	95	86.4	23 55.4	24	95	85.8	24 02.7	24	95	85.3	24 09.8	24	95	84.8	8
9	22 20.3	26	96	88.2	22 28.1	26	96	87.7	22 35.7	25	96	87.1	22 43.3	25	95	86.6	22 50.8	25	95	86.1	22 58.2	24	95	85.6	23 05.5	24	95	85.0	23 12.7	24	95	84.5	9
70	21 22.9	26	96	87.9	21 30.7	26	96	87.4	21 38.4	26	95	86.9	21 46.1	25	95	86.3	21 53.6	25	95	85.8	22 01.0	25	95	85.3	22 08.3	24	95	84.8	22 15.6	24	95	84.3	70
1	20 25.6	26	96	87.6	20 33.4	26	96	87.1	20 41.2	26	95	86.6	20 48.8	25	95	86.1	20 56.4	25	95	85.6	21 03.8	25	95	85.0	21 11.2	24	95	84.5	21 18.5	24	95	84.0	1
2	19 28.3	26	96	87.3	19 36.1	26	95	86.8	19 43.9	26	95	86.3	19 51.6	25	95	85.8	19 59.2	25	95	85.3	20 06.7	25	95	84.8	20 14.1	25	95	84.3	20 21.4	24	95	83.7	2
3	18 30.9	26	96	87.1	18 38.8	26	95	86.6	18 46.6	26	95	86.1	18 54.4	26	95	85.5	19 02.0	25	96	85.0	19 09.6	25	95	84.5	19 17.0	25	95	84.0	19 24.4	24	96	83.5	3
4	17 33.6	27	95	86.8	17 41.6	26	95	86.3	17 49.4	26	95	85.8	17 57.2	26	95	85.3	18 04.8	25	95	84.8	18 12.5	25	95	84.3	18 20.0	25	95	83.7	18 27.4	25	95	83.2	4
75	16 36.4	27	95	86.5	16 44.3	26	95	86.0	16 52.2	26	95	85.5	17 00.0	26	95	85.0	17 07.7	26	95	84.5	17 15.4	25	95	84.0	17 23.0	25	95	83.5	17 30.4	25	96	83.0	75
6	15 39.1	27	96	86.2	15 47.1	26	96	85.7	15 55.0	26	95	85.2	16 02.8	26	95	84.7	16 10.6	26	95	84.2	16 18.3	26	95	83.7	16 26.0	25	95	83.2	16 33.5	25	95	82.7	6
7	14 41.9	27	96	86.0	14 49.9	27	96	85.5	14 57.8	26	95	85.0	15 05.7	26	95	84.5	15 13.5	26	95	84.0	15 21.3	26	95	83.5	15 29.0	26	95	83.0	15 36.6	25	96	82.5	7
8	13 44.6	27	96	85.7	13 52.7	27	95	85.2	14 00.7	27	95	84.7	14 08.6	26	95	84.2	14 16.5	26	95	83.7	14 24.3	26	95	83.2	14 32.1	26	95	82.7	14 39.8	26	95	82.2	8
9	12 47.4	27	95	85.4	12 55.5	27	95	84.9	13 03.6	27	95	84.4	13 11.6	27	95	83.9	13 19.5	26	95	83.4	13 27.4	26	95	82.9	13 35.2	26	95	82.5	13 42.9	26	95	82.0	9
80	11 50.2	27	96	85.1	11 58.4	27	95	84.7	12 06.5	27	95	84.2	12 14.5	27	95	83.7	12 22.5	27	95	83.2	12 30.4	26	95	82.7	12 38.3	26	95	82.2	12 46.1	26	95	81.7	80
1	10 53.1	27	95	84.9	11 01.3	27	95	84.4	11 09.4	27	95	83.9	11 17.5	27	95	83.4	11 25.5	27	95	82.9	11 33.5	27	95	82.4	11 41.5	26	95	81.9	11 49.4	26	96	81.4	1
2	9 55.9	28	96	84.6	10 04.2	27	95	84.1	10 12.4	27	95	83.6	10 20.5	27	95	83.1	10 28.6	27	95	82.6	10 36.7	27	95	82.1	10 44.7	27	95	81.7	10 52.6	26	94	81.2	2
3	8 58.8	28	96	84.3	9 07.1	28	96	83.8	9 15.4	27	95	83.3	9 23.6	27	95	82.9	9 31.7	27	95	82.4	9 39.9	27	95	81.9	9 47.9	27	95	81.4	9 56.0	27	94	80.9	3
4	8 01.8	28	95	84.0	8 10.1	28	95	83.6	8 18.4	28	96	83.1	8 26.6	27	95	82.6	8 34.9	27	95	82.1	8 43.1	27	95	81.6	8 51.2	27	94	81.1	8 59.3	27	94	80.6	4
85	7 04.7	28	95	83.8	7 13.1	28	95	83.3	7 21.4	28	95	82.8	7 29.8	28	95	82.3	7 38.1	28	95	81.8	7 46.3	27	94	81.3	7 54.6	27	94	80.9	8 02.7	27	94	80.4	85
6	6 07.7	28	95	83.5	6 16.1	28	96	83.0	6 24.5	28	95	82.5	6 32.9	28	95	82.0	6 41.3	28	95	81.5	6 49.6	28	94	81.1	6 57.9	28	94	80.6	7 06.2	28	94	80.1	6
7	5 10.7	28	95	83.2	5 19.2	28	96	82.7	5 27.7	28	95	82.2	5 36.1	28	95	81.8	5 44.6	28	95	81.3	5 53.0	28	94	80.8	6 01.3	28	94	80.3	6 09.7	28	94	79.8	7
8																									5 04.8	28	94	80.0	5 13.2	28	94	79.5	8

H.A.	8° 00′			8° 30′			9° 00′			9° 30′			10° 00′			10° 30′			11° 00′			11° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	65 00.0	1.0 02	180.0	64 30.0	1.0 02	180.0	64 00.0	1.0 02	180.0	63 30.0	1.0 02	180.0	63 00.0	1.0 02	180.0	62 30.0	1.0 02	180.0	62 00.0	1.0 02	180.0	61 30.0	1.0 02	180.0	*00*
1	64 58.8	1.0 06	177.7	64 28.8	1.0 06	177.7	63 58.9	1.0 06	177.7	63 28.9	1.0 06	177.8	62 58.9	1.0 05	177.8	62 28.9	1.0 05	177.9	61 59.0	1.0 05	177.9	61 29.0	1.0 05	177.9	*1*
2	64 55.3	1.0 10	175.3	64 25.4	1.0 10	175.4	63 55.5	1.0 09	175.5	63 25.6	1.0 09	175.6	62 55.7	1.0 09	175.7	62 25.7	1.0 09	175.7	61 55.8	1.0 09	175.8	61 25.9	1.0 09	175.9	*2*
3	64 49.5	99 14	173.0	64 19.7	99 13	173.1	63 49.9	99 13	173.3	63 20.1	99 13	173.4	62 50.3	99 13	173.5	62 20.4	99 12	173.6	61 50.6	99 12	173.8	61 20.8	99 12	173.9	*3*
4	64 41.3	99 17	170.7	64 11.7	99 17	170.9	63 42.1	99 17	171.1	63 12.4	99 16	171.2	62 42.7	99 16	171.4	62 13.0	99 16	171.5	61 43.3	99 16	171.7	61 13.6	99 15	171.8	*4*
05	64 31.0	98 21	168.4	64 01.5	98 21	168.6	63 32.0	98 20	168.9	63 02.6	98 20	169.1	62 33.1	98 20	169.3	62 03.6	98 19	169.5	61 34.0	98 19	169.6	61 04.5	99 19	169.8	*05*
6	64 18.3	97 25	166.2	63 49.1	97 24	166.4	63 19.9	97 24	166.7	62 50.6	98 23	166.9	62 21.4	98 23	167.2	61 52.1	98 22	167.4	61 22.7	98 22	167.6	60 53.4	98 22	167.8	*6*
7	64 03.6	96 28	164.0	63 34.6	97 28	164.3	63 05.7	97 27	164.6	62 36.7	97 27	164.9	62 07.6	97 26	165.1	61 38.6	97 26	165.4	61 09.5	97 25	165.6	60 40.3	97 25	165.9	*7*
8	63 46.7	95 32	161.8	63 18.1	96 31	162.2	62 49.4	96 30	162.5	62 20.7	96 30	162.8	61 51.9	96 29	163.1	61 23.1	96 29	163.4	60 54.3	96 28	163.7	60 25.4	96 28	164.0	*8*
9	63 27.8	94 35	159.7	62 59.5	94 34	160.1	62 31.2	95 34	160.4	62 02.7	95 33	160.8	61 34.3	95 32	161.1	61 05.8	95 32	161.4	60 37.2	95 31	161.8	60 08.6	95 31	162.1	*9*
10	63 06.9	93 38	157.6	62 39.0	93 37	158.0	62 11.0	93 37	158.4	61 42.9	94 36	158.8	61 14.8	94 35	159.2	60 46.6	94 35	159.5	60 18.4	94 34	159.9	59 50.1	94 34	160.2	*10*
1	62 44.2	92 41	155.6	62 16.6	92 40	156.1	61 49.0	92 40	156.5	61 21.3	92 39	156.9	60 53.5	93 38	157.3	60 25.7	93 38	157.7	59 57.8	93 37	158.0	59 29.8	93 37	158.4	*1*
2	62 19.6	90 44	153.7	61 52.5	91 43	154.1	61 25.2	91 42	154.6	60 57.9	91 42	155.0	60 30.5	91 41	155.4	60 03.0	92 41	155.8	59 35.5	92 40	156.2	59 07.8	92 39	156.6	*2*
3	61 53.3	89 47	151.8	61 26.6	89 46	152.3	60 59.8	90 45	152.7	60 32.8	90 44	153.2	60 05.8	90 44	153.6	59 38.7	90 43	154.0	59 11.5	91 43	154.5	58 44.3	91 42	154.9	*3*
4	61 25.4	88 49	149.9	60 59.1	88 48	150.4	60 32.7	88 48	150.9	60 06.1	89 47	151.4	59 39.5	89 46	151.9	59 12.8	89 46	152.3	58 46.0	89 45	152.7	58 19.1	90 44	153.2	*4*
15	60 55.9	86 52	148.2	60 30.0	86 51	148.7	60 04.0	87 50	149.2	59 37.9	87 50	149.7	59 11.7	88 49	150.2	58 45.4	88 48	150.6	58 19.0	88 47	151.1	57 52.5	89 47	151.5	*15*
6	60 24.9	85 54	146.4	59 59.5	85 53	147.0	59 33.9	85 53	147.5	59 08.2	86 52	148.0	58 42.4	86 51	148.5	58 16.5	87 50	149.0	57 50.5	87 50	149.4	57 24.4	87 49	149.9	*6*
7	59 52.5	83 56	144.8	59 27.5	84 56	145.3	59 02.4	84 55	145.9	58 37.1	84 54	146.4	58 11.8	85 53	146.9	57 46.3	85 53	147.4	57 20.7	86 52	147.9	56 55.0	86 51	148.3	*7*
8	59 18.7	82 58	143.2	58 54.2	82 58	143.7	58 29.5	82 57	144.3	58 04.7	83 56	144.8	57 39.8	83 55	145.3	57 14.7	84 55	145.8	56 49.5	84 54	146.3	56 24.2	85 53	146.8	*8*
9	58 43.7	80 60	141.6	58 19.6	81 60	142.2	57 55.4	81 59	142.7	57 31.0	81 58	143.3	57 06.5	82 57	143.8	56 41.8	82 57	144.3	56 17.1	83 56	144.8	55 52.2	83 55	145.3	*9*
20	58 07.5	79 62	140.1	57 43.8	79 62	140.7	57 20.0	80 61	141.3	56 56.1	80 60	141.8	56 32.0	81 59	142.4	56 07.8	81 59	142.9	55 43.4	81 58	143.4	55 19.0	82 57	143.9	*20*
1	57 30.1	77 64	138.7	57 06.9	78 63	139.2	56 43.6	78 63	139.8	56 20.1	79 62	140.4	55 56.4	79 61	140.9	55 32.6	80 60	141.5	55 08.7	80 60	142.0	54 44.6	80 59	142.5	*1*
2	56 51.7	76 66	137.3	56 28.9	76 65	137.9	56 06.0	77 64	138.4	55 43.0	77 64	139.0	55 19.7	78 63	139.6	54 56.3	78 62	140.1	54 32.8	79 61	140.7	54 09.2	79 61	141.2	*2*
3	56 12.3	74 67	135.9	55 49.9	75 67	136.5	55 27.5	75 66	137.1	55 04.8	76 65	137.7	54 42.0	76 64	138.2	54 19.1	77 64	138.8	53 55.9	77 63	139.3	53 32.7	78 62	139.9	*3*
4	55 31.9	73 69	134.6	55 10.0	73 68	135.2	54 47.9	74 67	135.8	54 25.7	74 67	136.4	54 03.3	75 66	137.0	53 40.8	75 65	137.5	53 18.1	76 65	138.1	52 55.2	76 64	138.6	*4*
25	54 50.6	71 70	133.4	54 29.1	72 70	134.0	54 07.5	72 69	134.6	53 45.7	73 68	135.2	53 23.7	74 67	135.7	53 01.6	74 67	136.3	52 39.3	75 66	136.9	52 16.8	75 65	137.4	*25*
6	54 08.5	70 72	132.2	53 47.4	70 71	132.8	53 26.2	71 70	133.4	53 04.8	72 70	134.0	52 43.2	72 69	134.5	52 21.5	73 68	135.1	51 59.6	73 68	135.7	51 37.6	74 67	136.2	*6*
7	53 25.6	68 73	131.0	53 04.9	69 72	131.6	52 44.1	70 71	132.2	52 23.1	70 71	132.8	52 01.9	71 70	133.4	51 40.6	71 69	134.0	51 19.1	72 69	134.5	50 57.4	72 68	135.1	*7*
8	52 41.9	67 74	129.9	52 21.7	68 73	130.5	52 01.2	68 73	131.1	51 40.6	69 72	131.7	51 19.9	70 71	132.3	50 58.9	70 71	132.8	50 37.8	71 70	133.4	50 16.5	71 69	134.0	*8*
9	51 57.6	66 75	128.8	51 37.7	66 74	129.4	51 17.7	67 74	130.0	50 57.4	68 73	130.6	50 37.0	68 73	131.2	50 16.5	69 72	131.8	49 55.7	69 71	132.3	49 34.9	70 71	132.9	*9*
30	51 12.5	65 76	127.8	50 53.1	65 75	128.4	50 33.4	66 75	129.0	50 13.5	66 74	129.6	49 53.5	67 74	130.2	49 33.3	68 73	130.7	49 13.0	68 72	131.3	48 52.5	69 72	131.8	*30*
1	50 26.9	63 77	126.8	50 07.8	64 76	127.4	49 48.5	65 76	128.0	49 29.0	65 75	128.6	49 09.3	66 75	129.1	48 49.5	66 74	129.7	48 29.5	67 73	130.3	48 09.4	67 73	130.8	*1*
2	49 40.6	62 78	125.8	49 21.9	63 77	126.4	49 02.9	63 77	127.0	48 43.8	64 76	127.6	48 24.5	65 76	128.2	48 05.1	65 75	128.7	47 45.4	66 74	129.3	47 25.6	66 74	129.9	*2*
3	48 53.8	61 79	124.9	48 35.4	62 78	125.5	48 16.8	62 78	126.1	47 58.1	63 77	126.7	47 39.1	63 77	127.2	47 20.0	64 76	127.8	47 00.7	65 75	128.4	46 41.3	65 75	128.9	*3*
4	48 06.5	60 80	124.0	47 48.4	61 79	124.6	47 30.2	61 79	125.2	47 11.8	62 78	125.7	46 53.2	62 77	126.3	46 34.4	63 77	126.9	46 15.5	63 76	127.4	45 56.4	64 76	128.0	*4*
35	47 18.7	59 80	123.1	47 00.9	59 80	123.7	46 43.0	60 79	124.3	46 24.9	61 79	124.9	46 06.7	61 78	125.4	45 48.2	62 78	126.0	45 29.7	62 77	126.6	45 10.9	63 77	127.1	*35*
6	46 30.4	58 81	122.3	46 13.0	58 81	122.8	45 55.4	59 80	123.4	45 37.6	59 80	124.0	45 19.7	60 79	124.6	45 01.6	61 79	125.1	44 43.3	61 78	125.7	44 24.9	62 78	126.3	*6*
7	45 41.6	57 82	121.4	45 24.5	57 81	122.0	45 07.3	58 81	122.6	44 49.8	58 80	123.2	44 32.2	59 80	123.8	44 14.4	60 79	124.3	43 56.5	60 79	124.9	43 38.4	61 78	125.4	*7*
8	44 52.5	56 83	120.6	44 35.7	56 82	121.2	44 18.7	57 82	121.8	44 01.6	57 81	122.4	43 44.3	58 81	122.9	43 26.8	59 80	123.5	43 09.2	59 80	124.1	42 51.4	60 79	124.6	*8*
9	44 02.9	55 83	119.9	43 46.4	55 83	120.5	43 29.7	56 82	121.0	43 12.9	56 82	121.6	42 55.9	57 81	122.2	42 38.7	57 81	122.7	42 21.4	58 80	123.3	42 03.9	59 80	123.8	*9*
40	43 13.0	54 84	119.1	42 56.8	54 83	119.7	42 40.4	55 83	120.3	42 23.8	55 82	120.9	42 07.1	56 82	121.4	41 50.3	57 81	122.0	41 33.2	57 81	122.5	41 16.1	58 80	123.1	*40*
1	42 22.7	53 84	118.4	42 06.8	53 84	119.0	41 50.7	54 83	119.6	41 34.4	54 83	120.1	41 18.0	55 83	120.7	41 01.4	56 82	121.2	40 44.7	56 82	121.8	40 27.8	57 81	122.3	*1*
2	41 32.0	52 85	117.7	41 16.4	52 84	118.3	41 00.6	53 84	118.9	40 44.6	54 84	119.4	40 28.5	54 83	120.0	40 12.2	55 83	120.5	39 55.7	55 82	121.1	39 39.1	56 82	121.6	*2*
3	40 41.1	51 85	117.0	40 25.7	52 85	117.6	40 10.2	52 85	118.2	39 54.4	53 84	118.7	39 38.6	53 84	119.3	39 22.6	54 83	119.8	39 06.4	54 83	120.4	38 50.0	55 82	120.9	*3*
4	39 49.8	50 86	116.4	39 34.7	51 85	117.0	39 19.4	51 85	117.5	39 04.0	52 85	118.1	38 48.4	52 84	118.6	38 32.6	53 84	119.2	38 16.7	53 83	119.7	38 00.6	54 83	120.2	*4*
45	38 58.3	49 86	115.8	38 43.4	50 86	116.3	38 28.4	50 86	116.9	38 13.2	51 85	117.4	37 57.8	51 85	118.0	37 42.3	52 84	118.5	37 26.7	52 84	119.0	37 10.9	53 83	119.6	*45*
6	38 06.5	49 87	115.1	37 51.9	49 86	115.7	37 37.1	50 86	116.2	37 22.1	50 86	116.8	37 07.0	51 85	117.3	36 51.8	51 85	117.9	36 36.4	52 84	118.4	36 20.8	52 84	118.9	*6*
7	37 14.4	48 87	114.5	37 00.0	48 87	115.1	36 45.5	49 86	115.6	36 30.8	49 86	116.2	36 15.9	50 86	116.7	36 00.9	50 85	117.2	35 45.8	51 85	117.8	35 30.5	51 84	118.3	*7*
8	36 22.1	47 88	113.9	36 07.9	48 87	114.5	35 53.6	48 87	115.0	35 39.1	48 86	115.6	35 24.5	49 86	116.1	35 09.7	49 86	116.6	34 54.9	50 85	117.2	34 39.8	50 85	117.7	*8*
9	35 29.6	46 88	113.4	35 15.6	47 88	113.9	35 01.5	47 87	114.5	34 47.2	48 87	115.0	34 32.9	48 86	115.5	34 18.3	49 86	116.1	34 03.7	49 86	116.6	33 48.9	50 85	117.1	*9*
50	34 36.8	46 88	112.8	34 23.0	46 88	113.4	34 09.1	47 88	113.9	33 55.1	47 87	114.4	33 41.0	47 87	115.0	33 26.7	48 87	115.5	33 12.2	48 86	116.0	32 57.7	49 86	116.5	*50*
1	33 43.8	45 89	112.3	33 30.2	45 88	112.8	33 16.6	46 88	113.3	33 02.8	46 88	113.9	32 48.8	47 87	114.4	32 34.7	47 87	114.9	32 20.5	48 87	115.5	32 06.2	48 86	116.0	*1*
2	32 50.6	44 89	111.8	32 37.3	45 89	112.3	32 23.8	45 88	112.8	32 10.2	46 88	113.3	31 56.5	46 88	113.9	31 42.6	46 87	114.4	31 28.6	47 87	114.9	31 14.5	47 87	115.4	*2*
3	31 57.2	44 89	111.2	31 44.1	44 89	111.8	31 30.8	44 89	112.3	31 17.4	45 88	112.8	31 03.9	45 88	113.3	30 50.2	46 88	113.9	30 36.5	46 87	114.4	30 22.6	47 87	114.9	*3*
4	31 03.6	43 90	110.7	30 50.7	43 89	111.3	30 37.6	44 89	111.8	30 24.4	44 89	112.3	30 11.1	45 88	112.8	29 57.7	45 88	113.3	29 44.1	45 88	113.9	29 30.4	46 87	114.4	*4*
55	30 09.9	42 90	110.2	29 57.1	43 90	110.8	29 44.2	43 89	111.3	29 31.2	44 89	111.8	29 18.1	44 89	112.3	29 04.9	44 88	112.8	28 51.5	45 88	113.3	28 38.0	45 88	113.9	*55*
6	29 16.0	42 90	109.8	29 03.4	42 90	110.3	28 50.7	43 90	110.8	28 37.9	43 89	111.3	28 24.9	43 89	111.8	28 11.9	44 89	112.3	27 58.7	44 88	112.9	27 45.5	44 88	113.4	*6*
7	28 21.9	41 90	109.3	28 09.5	42 90	109.8	27 57.0	42 90	110.3	27 44.3	42 90	110.8	27 31.6	43 89	111.4	27 18.7	43 89	111.9	27 05.8	43 89	112.4	26 52.7	44 88	112.9	*7*
8	27 27.7	41 91	108.8	27 15.4	41 90	109.4	27 03.1	41 90	109.9	26 50.6	42 90	110.4	26 38.1	42 90	110.9	26 25.4	42 89	111.4	26 12.6	43 89	111.9	25 59.7	43 89	112.4	*8*
9	26 33.3	40 91	108.4	26 21.2	40 91	108.9	26 09.0	41 90	109.4	25 56.8	41 90	109.9	25 44.4	41 90	110.4	25 31.9	42 89	110.9	25 19.3	42 89	111.4	25 06.6	42 89	111.9	*9*
60	25 38.8	39 91	108.0	25 26.9	40 91	108.5	25 14.8	40 91	109.0	25 02.7	41 90	109.5	24 50.5	41 90	110.0	24 38.2	41 90	110.5	24 25.8	42 89	111.0	24 13.3	42 89	111.5	*60*
1	24 44.1	39 91	107.5	24 32.4	39 91	108.0	24 20.5	40 91	108.5	24 08.6	40 91	109.0	23 56.5	40 90	109.5	23 44.4	41 90	110.0	23 32.1	41 90	110.5	23 19.8	41 89	111.0	*1*
2	23 49.3	38 92	107.1	23 37.7	39 91	107.6	23 26.0	39 91	108.1	23 14.3	39 91	108.6	23 02.4	40 90	109.1	22 50.4	40 90	109.6	22 38.3	40 90	110.1	22 26.2	41 90	110.6	*2*
3	22 54.4	38 92	106.7	22 43.0	38 91	107.2	22 31.4	39 91	107.7	22 19.8	39 91	108.2	22 08.1	39 91	108.7	21 56.3	40 90	109.2	21 44.4	40 90	109.7	21 32.4	40 90	110.2	*3*
4	21 59.4	38 92	106.3	21 48.1	38 92	106.8	21 36.7	38 91	107.3	21 25.2	38 91	107.8	21 13.7	39 91	108.3	21 02.0	39 91	108.8	20 50.3	39 90	109.3	20 38.5	40 90	109.8	*4*
65	21 04.3	37 92	105.9	20 53.1	37 92	106.4	20 41.9	38 92	106.9	20 30.5	38 91	107.4	20 19.1	38 91	107.9	20 07.6	38 91	108.4	19 56.0	39 91	108.9	19 44.4	39 90	109.3	*65*
6	20 09.0	37 92	105.5	19 58.0	37 92	106.0	19 46.9	37 92	106.5	19 35.7	37 92	107.0	19 24.5	38 91	107.5	19 13.1	38 91	108.0	19 01.7	38 91	108.5	18 50.2	38 91	108.9	*6*
7	19 13.7	36 92	105.1	19 02.8	36 92	105.6	18 51.8	37 92	106.1	18 40.8	37 92	106.6	18 29.7	37 92	107.1	18 18.5	37 91	107.6	18 07.2	38 91	108.1	17 55.8	38 91	108.5	*7*
8	18 18.2	36 93	104.7	18 07.5	36 92	105.2	17 56.7	36 92	105.7	17 45.7	36 92	106.2	17 34.8	37 92	106.7	17 23.7	37 91	107.2	17 12.6	37 91	107.7	17 01.4	37 91	108.2	*8*
9	17 22.7	35 93	104.4	17 12.1	36 93	104.9	17 01.4	36 92	105.3	16 50.6	36 92	105.8	16 39.7	36 92	106.3	16 28.8	36 92	106.8	16 17.9	37 91	107.3	16 06.8	37 91	107.8	*9*
70	16 27.1	35 93	104.0	16 16.6	35 93	104.5	16 06.0	35 92	105.0	15 55.3	36 92	105.5	15 44.6	36 92	106.0	15 33.9	36 92	106.4	15 23.0	36 92	106.9	15 12.1	36 91	107.4	*70*
1	15 31.4	35 93	103.6	15 21.0	35 93	104.1	15 10.5	35 93	104.6	15 00.0	35 92	105.1	14 49.4	35 92	105.6	14 38.8	36 92	106.1	14 28.1	36 92	106.6	14 17.3	36 92	107.0	*1*
2	14 35.6	34 93	103.3	14 25.3	34 93	103.8	14 14.9	35 93	104.3	14 04.6	35 93	104.7	13 54.1	35 92	105.2	13 43.6	35 92	105.7	13 33.0	35 92	106.2	13 22.4	36 92	106.7	*2*
3	13 39.7	34 93	102.9	13 29.5	34 93	103.4	13 19.3	34 93	103.9	13 09.0	34 93	104.4	12 58.7	35 92	104.9	12 48.3	35 92	105.4	12 37.9	35 92	105.8	12 27.4	35 92	106.3	*3*
4	12 43.7	33 93	102.6	12 33.7	34 93	103.1	12 23.6	34 93	103.6	12 13.4	34 93	104.1	12 03.2	34 93	104.5	11 52.9	34 92	105.0	11 42.6	34 92	105.5	11 32.3	35 92	106.0	*4*
75	11 47.7	33 94	102.3	11 37.7	33 93	102.8	11 27.7	33 93	103.2	11 17.7	34 93	103.7	11 07.6	34 93	104.2	10 57.5	34 93	104.7	10 47.3	34 92	105.2	10 37.0	34 92	105.6	*75*
6	10 51.6	33 94	101.9	10 41.7	33 93	102.4	10 31.9	33 93	102.9	10 21.9	33 93	103.4	10 11.9	33 93	103.9	10 01.9	33 93	104.3	9 51.9	34 93	104.8	9 41.7	34 92	105.3	*6*
7	9 55.4	32 94	101.6	9 45.7	33 94	102.1	9 35.9	33 93	102.6	9 26.1	33 93	103.0	9 16.2	33 93	103.5	9 06.3	33 93	104.0	8 56.3	33 93	104.5	8 46.4	33 92	105.0	*7*
8	8 59.2	32 94	101.3	8 49.5	32 94	101.8	8 39.8	32 94	102.2	8 30.1	32 93	102.7	8 20.4	33 93	103.2	8 10.6	33 93	103.7	8 00.7	33 93	104.2	7 50.9	33 93	104.6	*8*
9	8 02.9	32 94	101.0	7 53.3	32 94	101.4	7 43.7	32 94	101.9	7 34.1	32 93	102.4	7 24.5	32 93	102.9	7 14.8	32 93	103.4	7 05.1	32 93	103.8	6 55.3	33 93	104.3	*9*
80	7 06.5	32 94	100.6	6 57.1	32 94	101.1	6 47.6	32 94	101.6	6 38.0	32 94	102.1	6 28.5	32 93	102.6	6 18.9	32 93	103.0	6 09.3	32 93	103.5	5 59.7	32 93	104.0	*80*
1	6 10.1	31 94	100.3	6 00.7	31 94	100.8	5 51.3	31 94	101.3	5 41.9	31 94	101.8	5 32.5	32 93	102.2	5 23.0	32 93	102.7	5 13.5	32 93	103.2	5 04.0	32 93	103.7	*1*
2	5 13.6	31 94	100.0	5 04.3	31 94	100.5																			*2*

H.A.	12° 00′			12° 30′			13° 00′			13° 30′			14° 00′			14° 30′			15° 00′			15° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	85 00.0	1.0 09	180.0	85 30.0	1.0 10	180.0	86 00.0	1.0 12	180.0	86 30.0	1.0 13	180.0	87 00.0	1.0 15	180.0	87 30.0	1.0 18	180.0	88 00.0	1.0 22	180.0	88 30.0	1.0 28	180.0	00
1	84 54.4	98 27	168.9	85 23.8	98 30	167.7	85 53.1	97 33	166.3	86 22.2	96 37	164.5	86 50.9	95 41	162.1	87 19.3	93 48	158.8	87 46.9	90 56	154.2	88 13.2	84 66	147.2	1
2	84 38.3	98 42	158.6	85 06.1	92 46	156.5	85 33.5	90 50	154.0	86 00.2	88 54	150.9	86 26.1	84 60	147.0	86 50.7	80 66	142.1	87 13.6	72 73	135.9	87 33.8	62 81	127.7	2
3	84 13.1	87 54	149.5	84 38.8	84 58	146.8	85 03.7	81 62	143.7	85 27.5	77 67	140.0	85 50.0	72 72	135.7	86 10.9	66 77	130.5	86 29.5	58 82	124.3	86 45.2	47 88	117.1	3
4	83 40.6	80 63	141.7	84 04.0	76 67	138.8	84 26.4	73 71	135.5	84 47.4	68 75	131.7	85 07.0	62 79	127.3	85 24.6	55 83	122.4	85 40.0	47 87	116.9	85 52.6	37 91	110.8	4
05	83 02.5	73 70	135.3	83 23.8	69 74	132.3	83 43.8	65 77	129.0	84 02.5	60 80	125.3	84 19.5	54 84	121.2	84 34.7	47 87	116.8	84 47.7	40 90	111.9	84 58.3	31 92	106.6	05
6	82 20.2	66 76	129.9	82 39.5	62 79	127.0	82 57.6	58 81	123.8	83 14.2	53 84	120.3	83 29.2	47 87	116.6	83 42.5	41 89	112.6	83 53.8	34 92	108.3	84 02.9	27 93	103.7	6
7	81 34.8	61 80	125.5	81 52.4	57 82	122.7	82 08.7	52 84	119.7	82 23.7	47 87	116.4	82 37.1	42 89	113.0	82 48.9	36 91	109.4	82 58.9	30 93	105.6	83 06.9	23 94	101.6	7
8	80 47.0	56 83	121.8	81 03.1	52 85	119.1	81 18.0	48 87	116.3	81 31.6	43 89	113.3	81 43.8	38 90	110.2	81 54.4	33 92	106.9	82 03.3	27 93	103.5	82 10.5	21 94	99.9	8
9	79 57.4	51 85	118.7	80 12.3	48 87	116.1	80 26.0	44 88	113.5	80 38.4	39 90	110.7	80 49.5	35 92	107.8	80 59.2	30 93	104.8	81 07.3	25 94	101.7	81 13.9	19 95	98.6	9
10	79 06.5	48 87	116.0	79 20.2	44 88	113.6	79 32.9	40 90	111.1	79 44.4	36 91	108.6	79 54.6	32 92	105.9	80 03.5	27 93	103.2	80 11.0	23 94	100.3	80 17.1	18 95	97.5	10
1	78 14.4	45 88	113.7	78 27.2	41 90	111.5	78 39.0	37 91	109.1	78 49.7	34 92	106.7	78 59.2	30 93	104.3	79 07.4	26 94	101.7	79 14.4	21 95	99.2	79 20.1	17 95	96.5	1
2	77 21.4	42 89	111.7	77 33.5	39 91	109.6	77 44.5	35 92	107.4	77 54.5	31 93	105.2	78 03.4	28 93	102.9	78 11.1	24 94	100.5	78 17.7	20 95	98.1	78 23.0	16 95	95.7	2
3	76 27.8	39 90	109.9	76 39.2	36 91	107.9	76 49.6	33 92	105.9	76 59.0	30 93	103.8	77 07.3	26 94	101.7	77 14.6	23 94	99.5	77 20.8	19 95	97.3	77 25.9	15 95	95.0	3
4	75 33.6	37 91	108.4	75 44.4	34 92	106.5	75 54.2	31 93	104.6	76 03.1	28 94	102.6	76 11.0	25 94	100.6	76 18.0	21 95	98.5	76 23.9	18 95	96.5	76 28.7	14 95	94.4	4
15	74 38.9	35 92	107.0	74 49.2	33 93	105.2	74 58.5	30 93	103.4	75 07.0	27 94	101.5	75 14.5	24 94	99.6	75 21.2	20 95	97.7	75 26.8	17 95	95.8	75 31.5	14 95	93.8	15
6	73 43.9	34 92	105.8	73 53.6	31 93	104.1	74 02.6	28 94	102.3	74 10.7	26 94	100.6	74 17.9	23 95	98.8	74 24.3	20 95	97.0	74 29.7	17 95	95.1	74 34.2	14 96	93.3	6
7	72 48.5	32 93	104.6	72 57.8	30 93	103.0	73 06.4	27 94	101.4	73 14.2	25 94	99.7	73 21.1	22 95	98.0	73 27.3	19 95	96.3	73 32.5	16 95	94.6	73 36.9	13 96	92.8	7
8	71 52.9	31 93	103.6	72 01.8	29 94	102.1	72 10.1	26 94	100.5	72 17.6	24 95	98.9	72 24.3	21 95	97.3	72 30.2	18 95	95.7	72 35.3	16 95	94.0	72 39.6	13 96	92.4	8
9	70 57.0	30 93	102.7	71 05.6	28 94	101.2	71 13.6	25 94	99.7	71 20.8	23 95	98.2	71 27.3	20 95	96.7	71 33.1	18 95	95.1	71 38.1	15 95	93.6	71 42.3	13 96	92.0	9
20	70 00.9	29 94	101.8	70 09.3	27 94	100.4	70 17.0	25 95	99.0	70 24.0	22 95	97.5	70 30.3	20 95	96.1	70 35.9	17 95	94.6	70 40.8	15 96	93.1	70 44.9	13 96	91.6	20
1	69 04.7	28 94	101.0	69 12.8	26 94	99.7	69 20.2	24 95	98.3	69 27.1	22 95	96.9	69 33.2	19 95	95.5	69 38.7	17 95	94.1	69 43.5	15 96	92.7	69 47.6	12 96	91.2	1
2	68 08.3	27 94	100.3	68 16.2	25 95	99.0	68 23.4	23 95	97.6	68 30.1	21 95	96.3	68 36.1	19 95	95.0	68 41.4	17 95	93.6	68 46.2	15 96	92.3	68 50.2	12 96	90.9	2
3	67 11.7	27 94	99.6	67 19.4	25 95	98.3	67 26.5	23 95	97.1	67 33.0	21 95	95.8	67 38.9	19 95	94.5	67 44.2	17 96	93.2	67 48.8	14 96	91.9	67 52.8	12 96	90.6	3
4	66 15.1	26 95	98.9	66 22.6	24 95	97.7	66 29.5	22 95	96.5	66 35.9	20 95	95.3	66 41.7	18 95	94.0	66 46.9	16 96	92.8	66 51.5	14 96	91.5	66 55.5	12 96	90.3	4
25	65 18.4	25 95	98.3	65 25.7	24 95	97.1	65 32.5	22 95	96.0	65 38.7	20 95	94.8	65 44.4	18 95	93.6	65 49.5	16 96	92.4	65 54.1	14 96	91.2	65 58.1	12 96	90.0	25
6	64 21.6	25 95	97.7	64 28.7	23 95	96.6	64 35.4	21 95	95.5	64 41.5	20 95	94.3	64 47.1	18 96	93.2	64 52.2	16 96	92.0	64 56.7	14 96	90.9	65 00.7	12 96	89.7	6
7	63 24.7	24 95	97.2	63 31.7	23 95	96.1	63 38.3	21 95	95.0	63 44.3	19 95	93.9	63 49.8	18 96	92.8	63 54.9	16 96	91.7	63 59.4	14 96	90.5	64 03.3	12 96	89.4	7
8	62 27.7	24 95	96.7	62 34.6	22 95	95.6	62 41.1	21 95	94.6	62 47.0	19 95	93.5	62 52.5	17 96	92.4	62 57.5	16 96	91.3	63 02.0	14 96	90.2	63 05.9	12 96	89.1	8
9	61 30.7	23 95	96.2	61 37.5	22 95	95.2	61 43.9	20 95	94.1	61 49.8	19 96	93.1	61 55.2	17 96	92.0	62 00.1	16 96	91.0	62 04.6	14 96	89.9	62 08.6	12 96	88.9	9
30	60 33.6	23 95	95.7	60 40.3	22 95	94.7	60 46.6	20 95	93.7	60 52.5	19 96	92.7	60 57.8	17 96	91.7	61 02.8	16 96	90.7	61 07.2	14 96	89.7	61 11.2	13 96	88.6	30
1	59 36.5	23 95	95.3	59 43.1	21 95	94.3	59 49.4	20 95	93.3	59 55.1	19 96	92.3	60 00.5	17 96	91.4	60 05.4	16 96	90.4	60 09.8	14 96	89.4	60 13.9	13 96	88.4	1
2	58 39.3	23 95	94.8	58 45.9	21 95	93.9	58 52.1	20 96	92.9	58 57.8	18 96	92.0	59 03.1	17 96	91.0	59 08.0	16 96	90.1	59 12.5	14 96	89.1	59 16.5	13 96	88.1	2
3	57 42.2	22 95	94.4	57 48.7	21 95	93.5	57 54.8	20 96	92.6	58 00.5	18 96	91.6	58 05.7	17 96	90.7	58 10.6	16 96	89.8	58 15.1	14 96	88.8	58 19.2	13 96	87.9	3
4	56 44.9	22 95	94.0	56 51.4	21 96	93.1	56 57.4	20 96	92.2	57 03.1	18 96	91.3	57 08.4	17 96	90.4	57 13.2	16 96	89.5	57 17.7	14 96	88.6	57 21.8	13 96	87.7	4
35	55 47.7	22 95	93.6	55 54.1	21 96	92.7	56 00.1	19 96	91.9	56 05.7	18 96	91.0	56 11.0	17 96	90.1	56 15.9	16 96	89.2	56 20.4	14 96	88.3	56 24.5	13 96	87.4	35
6	54 50.4	22 96	93.2	54 56.7	21 96	92.4	55 02.7	19 96	91.5	55 08.4	18 96	90.7	55 13.6	17 96	89.8	55 18.5	16 96	88.9	55 23.0	14 96	88.1	55 27.2	13 96	87.2	6
7	53 53.1	22 96	92.9	53 59.4	20 96	92.0	54 05.4	19 96	91.2	54 11.0	18 96	90.4	54 16.2	17 96	89.5	54 21.1	16 95	88.7	54 25.7	15 96	87.8	54 29.9	13 96	87.0	7
8	52 55.8	21 96	92.5	53 02.1	20 96	91.7	53 08.0	19 96	90.9	53 13.6	18 96	90.1	53 18.9	17 96	89.3	53 23.8	16 96	88.4	53 28.4	15 96	87.6	53 32.6	14 95	86.8	8
9	51 58.5	21 96	92.2	52 04.7	20 96	91.4	52 10.6	19 96	90.6	52 16.2	18 96	89.8	52 21.5	17 96	89.0	52 26.4	16 96	88.2	52 31.0	15 96	87.4	52 35.3	14 95	86.5	9
40	51 01.1	21 96	91.8	51 07.3	20 96	91.1	51 13.2	19 96	90.3	51 18.8	18 96	89.5	51 24.1	17 96	88.7	51 29.1	16 96	87.9	51 33.7	15 96	87.1	51 38.0	14 95	86.3	40
1	50 03.8	21 96	91.5	50 10.0	20 96	90.8	50 15.9	19 96	90.0	50 21.5	18 96	89.2	50 26.8	17 96	88.4	50 31.7	16 96	87.7	50 36.4	15 95	86.9	50 40.8	14 95	86.1	1
2	49 06.4	21 96	91.2	49 12.6	20 96	90.5	49 18.5	19 96	89.7	49 24.1	18 96	88.9	49 29.4	17 96	88.2	49 34.4	16 96	87.4	49 39.1	15 95	86.7	49 43.5	14 95	85.9	2
3	48 09.0	21 96	90.9	48 15.2	20 96	90.2	48 21.1	19 96	89.4	48 26.7	18 96	88.7	48 32.1	17 96	87.9	48 37.1	16 96	87.2	48 41.9	15 95	86.4	48 46.3	14 95	85.7	3
4	47 11.7	21 96	90.6	47 17.8	20 96	89.9	47 23.7	19 96	89.1	47 29.4	18 96	88.4	47 34.7	17 96	87.7	47 39.8	16 95	87.0	47 44.6	16 95	86.2	47 49.1	15 96	85.5	4
45	46 14.3	21 96	90.3	46 20.5	20 96	89.6	46 26.4	19 96	88.9	46 32.0	18 96	88.1	46 37.4	17 96	87.4	46 42.5	17 95	86.7	46 47.4	16 95	86.0	46 51.9	15 96	85.3	45
6	45 16.9	21 96	90.0	45 23.1	20 96	89.3	45 29.0	19 96	88.6	45 34.7	18 96	87.9	45 40.1	18 96	87.2	45 45.2	17 95	86.5	45 50.1	16 95	85.8	45 54.7	15 95	85.1	6
7	44 19.5	21 96	89.7	44 25.7	20 96	89.0	44 31.7	19 96	88.3	44 37.3	19 96	87.6	44 42.8	18 96	86.9	44 48.0	17 95	86.3	44 52.9	16 95	85.6	44 57.6	15 95	84.9	7
8	43 22.2	21 96	89.4	43 28.3	20 96	88.7	43 34.3	19 96	88.1	43 40.0	19 96	87.4	43 45.5	18 95	86.7	43 50.7	17 95	86.0	43 55.7	16 95	85.3	44 00.5	15 95	84.7	8
9	42 24.8	21 96	89.1	42 31.0	20 96	88.5	42 37.0	20 96	87.8	42 42.7	19 96	87.1	42 48.2	18 95	86.5	42 53.5	17 95	85.8	42 58.5	16 95	85.1	43 03.3	16 96	84.4	9
50	41 27.4	21 96	88.9	41 33.6	20 96	88.2	41 39.6	20 96	87.5	41 45.4	19 95	86.9	41 51.0	18 95	86.2	41 56.3	17 95	85.6	42 01.4	17 95	84.9	42 06.2	16 95	84.2	50
1	40 30.0	21 96	88.6	40 36.3	20 96	87.9	40 42.3	20 96	87.3	40 48.1	19 96	86.6	40 53.7	18 95	86.0	40 59.1	18 95	85.3	41 04.2	17 95	84.7	41 09.2	16 95	84.0	1
2	39 32.7	21 96	88.3	39 38.9	21 96	87.7	39 45.0	20 96	87.0	39 50.8	19 95	86.4	39 56.5	18 95	85.8	40 01.9	18 95	85.1	40 07.1	17 95	84.5	40 12.1	16 95	83.8	2
3	38 35.3	21 96	88.0	38 41.6	21 96	87.4	38 47.7	20 95	86.8	38 53.6	19 95	86.2	38 59.3	19 95	85.5	39 04.7	18 95	84.9	39 10.0	17 95	84.3	39 15.1	17 95	83.6	3
4	37 38.0	21 96	87.8	37 44.3	21 96	87.2	37 50.4	20 95	86.5	37 56.3	19 95	85.9	38 02.1	19 95	85.3	38 07.6	18 95	84.7	38 12.9	17 95	84.0	38 18.1	17 95	83.4	4
55	36 40.7	21 96	87.5	36 47.0	21 96	86.9	36 53.2	20 95	86.3	36 59.1	20 95	85.7	37 04.9	19 95	85.1	37 10.5	18 95	84.4	37 15.9	18 95	83.8	37 21.1	17 95	83.2	55
6	35 43.4	22 96	87.3	35 49.7	21 95	86.7	35 55.9	20 95	86.0	36 01.9	20 95	85.4	36 07.7	19 95	84.8	36 13.4	18 95	84.2	36 18.8	18 95	83.6	36 24.1	17 95	83.0	6
7	34 46.0	22 96	87.0	34 52.4	21 95	86.4	34 58.7	20 95	85.8	35 04.7	20 95	85.2	35 10.6	19 95	84.6	35 16.3	19 95	84.0	35 21.8	18 95	83.4	35 27.2	17 95	82.8	7
8	33 48.8	22 95	86.7	33 55.2	21 95	86.2	34 01.5	21 95	85.6	34 07.6	20 95	85.0	34 13.5	19 95	84.4	34 19.3	19 95	83.8	34 24.8	18 95	83.2	34 30.3	18 95	82.6	8
9	32 51.5	22 95	86.5	32 58.0	21 95	85.9	33 04.3	21 95	85.3	33 10.4	20 95	84.7	33 16.4	20 95	84.1	33 22.2	19 95	83.6	33 27.9	19 95	83.0	33 33.4	18 95	82.4	9
60	31 54.2	22 95	86.2	32 00.7	21 95	85.7	32 07.1	21 95	85.1	32 13.3	20 95	84.5	32 19.3	20 95	83.9	32 25.2	19 95	83.3	32 30.9	19 95	82.8	32 36.5	18 96	82.2	60
1	30 57.0	22 95	86.0	31 03.5	22 95	85.4	31 09.9	21 95	84.8	31 16.2	21 95	84.3	31 22.3	20 95	83.7	31 28.2	20 95	83.1	31 34.0	19 95	82.5	31 39.7	19 96	82.0	1
2	29 59.7	22 95	85.7	30 06.3	22 95	85.2	30 12.8	21 96	84.6	30 19.1	21 96	84.0	30 25.3	20 95	83.5	30 31.3	20 95	82.9	30 37.2	19 95	82.3	30 42.9	19 95	81.8	2
3	29 02.5	22 95	85.5	29 09.2	22 95	84.9	29 15.7	21 95	84.4	29 22.1	21 95	83.8	29 28.3	21 95	83.2	29 34.4	20 95	82.7	29 40.3	20 95	82.1	29 46.1	19 95	81.5	3
4	28 05.3	23 95	85.2	28 12.0	22 95	84.7	28 18.6	22 95	84.1	28 25.0	21 95	83.6	28 31.3	21 95	83.0	28 37.5	20 95	82.4	28 43.5	20 95	81.9	28 49.4	19 94	81.3	4
65	27 08.2	23 95	85.0	27 14.9	22 95	84.4	27 21.5	22 95	83.9	27 28.0	21 95	83.3	27 34.4	21 95	82.8	27 40.6	21 95	82.2	27 46.7	20 95	81.7	27 52.7	20 94	81.1	65
6	26 11.0	23 95	84.7	26 17.8	22 95	84.2	26 24.5	22 95	83.6	26 31.0	22 95	83.1	26 37.5	21 95	82.5	26 43.8	21 95	82.0	26 49.9	20 95	81.5	26 56.0	20 94	80.9	6
7	25 13.9	23 95	84.5	25 20.8	23 95	83.9	25 27.5	22 95	83.4	25 34.1	22 95	82.9	25 40.6	21 95	82.3	25 47.0	21 95	81.8	25 53.2	21 94	81.2	25 59.3	20 94	80.7	7
8	24 16.8	23 95	84.2	24 23.7	23 95	83.7	24 30.5	22 95	83.2	24 37.2	22 95	82.6	24 43.7	22 95	82.1	24 50.2	21 95	81.5	24 56.5	21 94	81.0	25 02.7	21 94	80.5	8
9	23 19.7	23 95	84.0	23 26.7	23 96	83.4	23 33.5	23 95	82.9	23 40.3	22 95	82.4	23 46.9	22 95	81.9	23 53.5	22 94	81.3	23 59.9	21 94	80.8	24 06.2	21 94	80.2	9
70	22 22.7	24 95	83.7	22 29.7	23 95	83.2	22 36.6	23 95	82.7	22 43.4	23 95	82.1	22 50.1	22 95	81.6	22 56.8	22 94	81.1	23 03.3	21 94	80.6	23 09.6	21 94	80.0	70
1	21 25.7	24 95	83.5	21 32.7	23 96	83.0	21 39.7	23 95	82.4	21 46.6	23 95	81.9	21 53.4	22 95	81.4	22 00.1	22 94	80.9	22 06.7	22 94	80.3	22 13.2	21 94	79.8	1
2	20 28.7	24 96	83.2	20 35.8	24 95	82.7	20 42.9	23 95	82.2	20 49.8	23 95	81.7	20 56.7	23 94	81.1	21 03.5	22 94	80.6	21 10.1	22 94	80.1	21 16.7	22 94	79.6	2
3	19 31.7	24 95	83.0	19 38.9	24 95	82.5	19 46.0	24 95	81.9	19 53.1	23 95	81.4	20 00.0	23 94	80.9	20 06.9	23 94	80.4	20 13.6	22 94	79.9	20 20.3	22 94	79.4	3
4	18 34.8	24 95	82.7	18 42.0	24 95	82.2	18 49.2	24 95	81.7	18 56.3	24 94	81.2	19 03.4	23 94	80.7	19 10.3	23 94	80.2	19 17.2	23 94	79.6	19 23.9	22 94	79.1	4
75	17 37.9	25 95	82.5	17 45.2	24 95	82.0	17 52.5	24 95	81.5	17 59.7	24 94	80.9	18 06.8	24 94	80.4	18 13.8	23 94	79.9	18 20.7	23 94	79.4	18 27.6	23 94	78.9	75
6	16 41.0	25 95	82.2	16 48.4	25 95	81.7	16 55.8	24 94	81.2	17 03.0	24 94	80.7	17 10.2	24 94	80.2	17 17.3	24 94	79.7	17 24.4	23 94	79.2	17 31.3	23 94	78.7	6
7	15 44.2	25 95	82.0	15 51.7	25 95	81.5	15 59.1	25 94	81.0	16 06.4	24 94	80.5	16 13.7	24 94	80.0	16 20.9	24 94	79.4	16 28.0	24 94	78.9	16 35.1	23 94	78.4	7
8	14 47.4	25 95	81.7	14 54.9	25 94	81.2	15 02.4	25 94	80.7	15 09.9	25 94	80.2	15 17.2	24 94	79.7	15 24.5	24 94	79.2	15 31.7	24 94	78.7	15 38.9	24 94	78.2	8
9	13 50.6	26 95	81.5	13 58.2	25 94	81.0	14 05.8	25 94	80.5	14 13.3	25 94	80.0	14 20.8	25 94	79.5	14 28.2	25 94	79.0	14 35.5	24 94	78.5	14 42.7	24 94	78.0	9
80	12 53.9	26 94	81.2	13 01.6	26 94	80.7	13 09.3	25 94	80.2	13 16.9	25 94	79.7	13 24.4	25 94	79.2	13 31.9	25 94	78.7	13 39.3	25 94	78.2	13 46.7	24 93	77.7	80
1	11 57.2	26 94	80.9	12 05.0	26 94	80.4	12 12.7	26 94	80.0	12 20.4	26 94	79.5	12 28.1	25 94	79.0	12 35.6	25 94	78.5	12 43.2	25 93	78.0	12 50.6	25 93	77.5	1
2	11 00.6	26 94	80.7	11 08.4	26 94	80.2	11 16.3	26 94	79.7	11 24.0	26 94	79.2	11 31.8	26 94	78.7	11 39.4	25 94	78.2	11 47.1	25 93	77.7	11 54.6	25 93	77.2	2
3	10 04.0	27 94	80.4	10 11.9	26 94	79.9	10 19.8	26 94	79.4	10 27.7	26 94	78.9	10 35.5	26 94	78.5	10 43.3	26 94	78.0	10 51.0	26 93	77.5	10 58.7	26 93	77.0	3
4	9 07.4	27 94	80.1	9 15.5	27 94	79.7	9 23.5	27 94	79.2	9 31.4	26 94	78.7	9 39.3	26 94	78.2	9 47.2	26 93	77.7	9 55.0	26 93	77.2	10 02.8	26 93	76.7	4
85	8 10.9	27 94	79.9	8 19.0	27 94	79.4	8 27.1	27 94	78.9	8 35.2	27 94	78.4	8 43.2	27 93	77.9	8 51.2	27 93	77.4	8 59.1	26 93	77.0	9 07.0	26 93	76.5	85
6	7 14.4	27 94	79.6	7 22.7	27 94	79.1	7 30.8	27 94	78.6	7 39.0	27 94	78.2	7 47.1	27 93	77.7	7 55.2	27 93	77.2	8 03.2	27 93	76.7	8 11.3	27 93	76.2	6
7	6 18.0	28 94	79.3	6 26.3	28 94	78.9	6 34.6	28 94	78.4	6 42.9	27 93	77.9	6 51.1	27 93	77.4	6 59.3	27 93	76.9	7 07.4	27 93	76.4	7 15.6	27 93	76.0	7
8	5 21.7	28 94	79.1	5 30.1	28 94	78.6	5 38.4	28 94	78.1	5 46.8	28 93	77.6	5 55.1	28 93	77.1	6 03.4	28 93	76.7	6 11.7	28 93	76.2	6 19.9	27 93	75.7	8
9																5 07.6	28 93	76.4	5 16.0	28 93	75.9	5 24.4	28 92	75.4	9

H.A.	12° 00′				12° 30′				13° 00′				13° 30′				14° 00′				14° 30′				15° 00′				15° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	61 00.0	1.0	02	180.0	60 30.0	1.0	02	180.0	60 00.0	1.0	02	180.0	59 30.0	1.0	02	180.0	59 00.0	1.0	02	180.0	58 30.0	1.0	02	180.0	58 00.0	1.0	02	180.0	57 30.0	1.0	02	180.0	00
1	60 59.0	1.0	05	178.0	60 29.0	1.0	05	178.0	59 59.0	1.0	05	178.1	59 29.0	1.0	05	178.1	58 59.1	1.0	05	178.1	58 29.1	1.0	05	178.1	57 59.1	1.0	05	178.2	57 29.1	1.0	04	178.2	1
2	60 56.0	1.0	08	176.0	60 26.0	1.0	08	176.0	59 56.1	1.0	08	176.1	59 26.2	1.0	08	176.2	58 56.2	1.0	08	176.2	58 26.3	1.0	08	176.3	57 56.4	1.0	08	176.4	57 26.4	1.0	07	176.4	2
3	60 50.9	99	12	174.0	60 21.1	99	12	174.1	59 51.2	1.0	11	174.2	59 21.4	1.0	11	174.3	58 51.5	1.0	11	174.4	58 21.7	1.0	11	174.5	57 51.8	1.0	11	174.5	57 21.9	1.0	10	174.6	3
4	60 43.9	99	15	172.0	60 14.2	99	15	172.1	59 44.5	99	14	172.2	59 14.7	99	14	172.4	58 45.0	99	14	172.5	58 15.2	99	14	172.6	57 45.5	99	14	172.7	57 15.7	99	13	172.9	4
05	60 34.9	99	18	170.0	60 05.4	99	18	170.2	59 35.8	99	18	170.3	59 06.2	99	17	170.5	58 36.6	99	17	170.7	58 06.9	99	17	170.8	57 37.3	99	16	171.0	57 07.7	99	16	171.1	05
6	60 24.0	98	21	168.1	59 54.6	98	21	168.3	59 25.2	98	21	168.5	58 55.8	98	20	168.6	58 26.3	98	20	168.8	57 56.9	98	20	169.0	57 27.4	98	19	169.2	56 57.9	98	19	169.4	6
7	60 11.2	97	24	166.1	59 42.0	97	24	166.4	59 12.8	97	24	166.6	58 43.6	97	23	166.8	58 14.3	98	23	167.0	57 45.1	98	23	167.2	57 15.8	98	22	167.4	56 46.5	98	22	167.6	7
8	59 56.5	96	27	164.2	59 27.6	97	27	164.5	58 58.6	97	27	164.7	58 29.6	97	26	165.0	58 00.6	97	26	165.2	57 31.5	97	25	165.5	57 02.5	97	25	165.7	56 33.4	97	25	165.9	8
9	59 40.0	96	30	162.4	59 11.3	96	30	162.7	58 42.6	96	30	162.9	58 13.9	96	29	163.2	57 45.1	96	29	163.5	57 16.3	96	28	163.7	56 47.4	96	28	164.0	56 18.6	96	27	164.2	9
10	59 21.8	95	33	160.5	58 53.4	95	33	160.8	58 24.9	95	32	161.2	57 56.5	95	32	161.5	57 27.9	95	31	161.7	56 59.4	95	31	162.0	56 30.8	95	30	162.3	56 02.2	95	30	162.6	10
1	59 01.8	94	36	158.7	58 33.7	94	36	159.1	58 05.6	94	35	159.4	57 37.4	94	34	159.7	57 09.2	94	34	160.0	56 40.9	94	33	160.3	56 12.6	94	33	160.6	55 44.2	95	32	160.9	1
2	58 40.1	92	39	157.0	58 12.4	93	38	157.3	57 44.6	93	38	157.7	57 16.7	93	37	158.0	56 48.8	93	36	158.4	56 20.8	93	36	158.7	55 52.8	94	35	159.0	55 24.7	94	35	159.3	2
3	58 16.9	91	41	155.3	57 49.5	91	41	155.6	57 22.0	92	40	156.0	56 54.5	92	40	156.4	56 26.9	92	39	156.7	55 59.2	92	38	157.1	55 31.5	92	38	157.4	55 03.7	93	37	157.8	3
4	57 52.1	90	44	153.6	57 25.1	90	43	154.0	56 58.0	91	43	154.4	56 30.8	91	42	154.8	56 03.5	91	41	155.1	55 36.2	91	41	155.5	55 08.8	91	40	155.9	54 41.3	92	40	156.2	4
15	57 25.9	89	46	151.9	56 59.2	89	46	152.4	56 32.4	89	45	152.8	56 05.6	90	44	153.2	55 38.7	90	44	153.6	55 11.7	90	43	154.0	54 44.6	90	43	154.3	54 17.5	91	42	154.7	15
6	56 58.2	88	48	150.4	56 31.9	88	48	150.8	56 05.5	88	47	151.2	55 39.0	88	47	151.6	55 12.4	89	46	152.0	54 45.8	89	45	152.4	54 19.1	89	45	152.8	53 52.3	89	44	153.2	6
7	56 29.1	86	51	148.8	56 03.2	87	50	149.3	55 37.2	87	49	149.7	55 11.1	87	49	150.1	54 44.9	87	48	150.6	54 18.6	88	47	151.0	53 52.2	88	47	151.4	53 25.8	88	46	151.8	7
8	55 58.8	85	53	147.3	55 33.2	85	52	147.8	55 07.6	86	51	148.2	54 41.9	86	51	148.7	54 16.1	86	50	149.1	53 50.1	87	50	149.5	53 24.1	87	49	150.0	52 58.0	87	48	150.4	8
9	55 27.2	84	55	145.8	55 02.0	84	54	146.3	54 36.8	84	53	146.8	54 11.4	85	53	147.2	53 46.0	85	52	147.7	53 20.4	85	51	148.1	52 54.8	86	51	148.6	52 29.1	86	50	149.0	9
20	54 54.3	82	57	144.4	54 29.6	83	56	144.9	54 04.8	83	55	145.4	53 39.8	83	55	145.9	53 14.7	84	54	146.3	52 49.6	84	53	146.8	52 24.3	84	53	147.2	51 58.9	85	52	147.6	20
1	54 20.4	81	58	143.0	53 56.1	81	58	143.5	53 31.6	82	57	144.0	53 07.0	82	56	144.5	52 42.4	82	56	145.0	52 17.6	83	55	145.4	51 52.7	83	54	145.9	51 27.7	84	54	146.3	1
2	53 45.4	80	60	141.7	53 21.4	80	59	142.2	52 57.4	80	59	142.7	52 33.2	81	58	143.2	52 08.9	81	58	143.7	51 44.5	82	57	144.1	51 20.0	82	56	144.6	50 55.3	82	56	145.1	2
3	53 09.3	78	62	140.4	52 45.8	79	61	140.9	52 22.1	79	60	141.4	51 58.3	80	60	141.9	51 34.4	80	59	142.4	51 10.4	80	58	142.9	50 46.2	81	58	143.4	50 22.0	81	57	143.8	3
4	52 32.2	77	63	139.1	52 09.1	77	63	139.7	51 45.8	78	62	140.2	51 22.4	78	61	140.7	50 58.9	79	61	141.2	50 35.3	79	60	141.7	50 11.5	79	59	142.1	49 47.6	80	59	142.6	4
25	51 54.2	76	65	137.9	51 31.5	76	64	138.5	51 08.6	76	64	139.0	50 45.6	77	63	139.5	50 22.5	77	62	140.0	49 59.2	78	62	140.5	49 35.8	78	61	141.0	49 12.3	79	60	141.4	25
6	51 15.4	74	66	136.8	50 53.0	75	66	137.3	50 30.5	75	65	137.8	50 07.9	76	64	138.3	49 45.1	76	64	138.8	49 22.2	77	63	139.3	48 59.2	77	62	139.8	48 36.1	77	62	140.3	6
7	50 35.6	73	68	135.6	50 13.7	73	67	136.1	49 51.6	74	66	136.7	49 29.3	74	66	137.2	49 06.9	75	65	137.7	48 44.4	75	64	138.2	48 21.8	76	64	138.7	47 59.0	76	63	139.2	7
8	49 55.1	72	69	134.5	49 33.5	72	68	135.0	49 11.8	73	68	135.6	48 49.9	73	67	136.1	48 27.9	74	66	136.6	48 05.8	74	66	137.1	47 43.5	74	65	137.6	47 21.1	75	65	138.1	8
9	49 13.8	70	70	133.4	48 52.6	71	69	134.0	48 31.2	71	69	134.5	48 09.8	72	68	135.0	47 48.1	72	68	135.5	47 26.3	73	67	136.1	47 04.4	73	66	136.6	46 42.4	74	66	137.1	9
30	48 31.8	69	71	132.4	48 10.9	70	71	132.9	47 50.0	70	70	133.5	47 28.8	71	69	134.0	47 07.6	71	69	134.5	46 46.2	72	68	135.0	46 24.6	72	68	135.5	46 02.9	72	67	136.0	30
1	47 49.1	68	72	131.4	47 28.6	68	72	131.9	47 08.0	69	71	132.5	46 47.2	69	70	133.0	46 26.3	70	70	133.5	46 05.2	70	69	134.0	45 44.1	71	69	134.5	45 22.7	71	68	135.0	1
2	47 05.7	67	73	130.4	46 45.6	67	73	131.0	46 25.3	68	72	131.5	46 04.9	68	72	132.0	45 44.4	69	71	132.5	45 23.7	69	70	133.1	45 02.8	70	70	133.6	44 41.9	70	69	134.1	2
3	46 21.7	66	74	129.5	46 01.9	66	74	130.0	45 42.0	67	73	130.6	45 22.0	67	73	131.1	45 01.8	68	72	131.6	44 41.4	68	71	132.1	44 20.9	69	71	132.6	44 00.3	69	70	133.1	3
4	45 37.1	64	75	128.6	45 17.7	65	75	129.1	44 58.1	65	74	129.6	44 38.4	66	74	130.2	44 18.6	66	73	130.7	43 58.6	67	72	131.2	43 38.4	67	72	131.7	43 18.1	68	71	132.2	4
35	44 52.0	63	76	127.7	44 32.9	64	76	128.2	44 13.7	64	75	128.7	43 54.3	65	74	129.3	43 34.8	65	74	129.8	43 15.1	66	73	130.3	42 55.3	66	73	130.8	42 35.3	67	72	131.3	35
6	44 06.3	62	77	126.8	43 47.5	63	76	127.3	43 28.6	63	76	127.9	43 09.6	64	75	128.4	42 50.4	64	75	128.9	42 31.1	65	74	129.5	42 11.6	65	74	130.0	41 52.0	66	73	130.5	6
7	43 20.1	61	78	126.0	43 01.7	62	77	126.5	42 43.1	62	77	127.0	42 24.4	63	76	127.6	42 05.5	63	76	128.1	41 46.5	64	75	128.6	41 27.4	64	75	129.1	41 08.1	65	74	129.6	7
8	42 33.4	60	79	125.2	42 15.3	61	78	125.7	41 57.1	61	78	126.2	41 38.7	62	77	126.8	41 20.1	62	76	127.3	41 01.4	63	76	127.8	40 42.6	63	75	128.3	40 23.6	63	75	128.8	8
9	41 46.3	59	79	124.4	41 28.5	60	79	124.9	41 10.5	60	78	125.4	40 52.5	61	78	126.0	40 34.2	61	77	126.5	40 15.8	61	77	127.0	39 57.3	62	76	127.5	39 38.7	62	76	128.0	9
40	40 58.7	58	80	123.6	40 41.2	59	79	124.1	40 23.6	59	79	124.7	40 05.8	60	78	125.2	39 47.9	60	78	125.7	39 29.8	60	78	126.2	39 11.6	61	77	126.8	38 53.3	61	76	127.3	40
1	40 10.7	57	81	122.9	39 53.5	58	80	123.4	39 36.2	58	80	123.9	39 18.7	59	79	124.5	39 01.1	59	79	125.0	38 43.3	59	78	125.5	38 25.4	60	78	126.0	38 07.4	60	77	126.5	1
2	39 22.3	56	81	122.1	39 05.4	57	81	122.7	38 48.4	57	80	123.2	38 31.2	58	80	123.7	38 13.9	58	79	124.3	37 56.4	58	79	124.8	37 38.8	59	78	125.3	37 21.0	59	78	125.8	2
3	38 33.6	55	82	121.4	38 16.9	56	81	122.0	38 00.2	56	81	122.5	37 43.3	57	80	123.0	37 26.2	57	80	123.6	37 09.1	57	80	124.1	36 51.7	58	79	124.6	36 34.3	58	79	125.1	3
4	37 44.4	54	82	120.8	37 28.1	55	82	121.3	37 11.6	55	82	121.8	36 55.0	56	81	122.3	36 38.2	56	81	122.9	36 21.3	57	80	123.4	36 04.3	57	80	123.9	35 47.1	57	79	124.4	4
45	36 55.0	53	83	120.1	36 38.9	54	83	120.6	36 22.7	54	82	121.2	36 06.3	55	82	121.7	35 49.8	55	81	122.2	35 33.2	56	81	122.7	35 16.5	56	80	123.2	34 59.6	56	80	123.7	45
6	36 05.2	52	84	119.5	35 49.4	53	83	120.0	35 33.4	53	83	120.5	35 17.3	54	82	121.0	35 01.1	54	82	121.5	34 44.8	55	81	122.1	34 28.3	55	81	122.6	34 11.7	56	80	123.1	6
7	35 15.1	52	84	118.8	34 59.5	52	84	119.4	34 43.8	53	83	119.9	34 28.0	53	83	120.4	34 12.0	53	82	120.9	33 56.0	54	82	121.4	33 39.8	54	81	121.9	33 23.4	55	81	122.4	7
8	34 24.6	51	84	118.2	34 09.3	51	84	118.7	33 53.9	52	84	119.3	33 38.3	52	83	119.8	33 22.7	53	83	120.3	33 06.8	53	82	120.8	32 50.9	53	82	121.3	32 34.8	54	82	121.8	8
9	33 34.0	50	85	117.6	33 18.9	50	85	118.1	33 03.7	51	84	118.7	32 48.4	51	84	119.2	32 33.0	52	83	119.7	32 17.4	52	83	120.2	32 01.7	52	82	120.7	31 45.9	53	82	121.2	9
50	32 43.0	49	85	117.1	32 28.2	50	85	117.6	32 13.2	50	85	118.1	31 58.2	50	84	118.6	31 43.0	51	84	119.1	31 27.7	51	83	119.6	31 12.2	52	83	120.1	30 56.7	52	83	120.6	50
1	31 51.8	48	86	116.5	31 37.2	49	85	117.0	31 22.5	49	85	117.5	31 07.6	50	85	118.0	30 52.7	50	84	118.5	30 37.6	50	84	119.0	30 22.4	51	83	119.5	30 07.2	51	83	120.0	1
2	31 00.3	48	86	115.9	30 45.9	48	86	116.4	30 31.4	48	85	117.0	30 16.9	49	85	117.5	30 02.1	49	85	118.0	29 47.3	50	84	118.5	29 32.4	50	84	119.0	29 17.3	50	83	119.5	2
3	30 08.6	47	87	115.4	29 54.4	47	86	115.9	29 40.2	48	86	116.4	29 25.8	48	85	116.9	29 11.3	48	85	117.4	28 56.8	49	85	117.9	28 42.1	49	84	118.4	28 27.2	50	84	118.9	3
4	29 16.6	46	87	114.9	29 02.7	47	87	115.4	28 48.7	47	86	115.9	28 34.5	47	86	116.4	28 20.3	48	85	116.9	28 05.9	48	85	117.4	27 51.5	48	85	117.9	27 36.9	49	84	118.4	4
55	28 24.5	45	87	114.4	28 10.8	46	87	114.9	27 56.9	46	87	115.4	27 43.0	47	86	115.9	27 29.0	47	86	116.4	27 14.9	47	86	116.9	27 00.6	48	85	117.4	26 46.3	48	85	117.9	55
6	27 32.1	45	88	113.9	27 18.6	45	87	114.4	27 05.0	46	87	114.9	26 51.3	46	87	115.4	26 37.5	46	86	115.9	26 23.6	47	86	116.4	26 09.5	47	86	116.9	25 55.4	47	85	117.3	6
7	26 39.5	44	88	113.4	26 26.2	44	88	113.9	26 12.8	45	87	114.4	25 59.3	45	87	114.9	25 45.7	45	87	115.4	25 32.0	46	86	115.9	25 18.2	46	86	116.4	25 04.4	46	86	116.8	7
8	25 46.7	43	88	112.9	25 33.7	44	88	113.4	25 20.5	44	88	113.9	25 07.2	44	87	114.4	24 53.8	45	87	114.9	24 40.3	45	87	115.4	24 26.7	45	86	115.9	24 13.0	46	86	116.4	8
9	24 53.8	43	89	112.4	24 40.9	43	88	112.9	24 27.9	43	88	113.4	24 14.8	44	88	113.9	24 01.6	44	87	114.4	23 48.4	44	87	114.9	23 35.0	45	87	115.4	23 21.5	45	86	115.9	9
60	24 00.7	42	89	112.0	23 48.0	43	88	112.5	23 35.2	43	88	113.0	23 22.3	43	88	113.5	23 09.3	43	88	113.9	22 56.2	44	87	114.4	22 43.1	44	87	114.9	22 29.8	44	87	115.4	60
1	23 07.4	42	89	111.5	22 54.9	42	89	112.0	22 42.3	42	88	112.5	22 29.6	42	88	113.0	22 16.8	43	88	113.5	22 03.9	43	88	114.0	21 50.9	43	87	114.5	21 37.9	44	87	115.0	1
2	22 13.9	41	89	111.1	22 01.6	41	89	111.6	21 49.2	42	89	112.1	21 36.6	42	88	112.6	21 24.1	42	88	113.1	21 11.4	42	88	113.5	20 58.6	43	88	114.0	20 45.8	43	87	114.5	2
3	21 20.3	40	90	110.7	21 08.2	41	89	111.2	20 55.9	41	89	111.6	20 43.6	41	89	112.1	20 31.2	42	88	112.6	20 18.7	42	88	113.1	20 06.1	42	88	113.6	19 53.5	42	87	114.1	3
4	20 26.6	40	90	110.2	20 14.6	40	90	110.7	20 02.5	40	89	111.2	19 50.3	41	89	111.7	19 38.1	41	89	112.2	19 25.8	41	88	112.7	19 13.4	41	88	113.2	19 01.0	42	88	113.6	4
65	19 32.6	39	90	109.8	19 20.8	40	90	110.3	19 08.9	40	90	110.8	18 57.0	40	89	111.3	18 44.9	40	89	111.8	18 32.8	41	89	112.3	18 20.6	41	88	112.7	18 08.3	41	88	113.2	65
6	18 38.6	39	90	109.4	18 27.0	39	90	109.9	18 15.2	39	90	110.4	18 03.4	39	89	110.9	17 51.6	40	89	111.4	17 39.6	40	89	111.8	17 27.6	40	89	112.3	17 15.5	40	88	112.8	6
7	17 44.4	38	91	109.0	17 32.9	38	90	109.5	17 21.4	39	90	110.0	17 09.7	39	90	110.5	16 58.0	39	89	111.0	16 46.3	39	89	111.4	16 34.4	40	89	111.9	16 22.5	40	89	112.4	7
8	16 50.1	38	91	108.6	16 38.8	38	90	109.1	16 27.4	38	90	109.6	16 15.9	38	90	110.1	16 04.4	39	90	110.6	15 52.8	39	89	111.0	15 41.1	39	89	111.5	15 29.4	39	89	112.0	8
9	15 55.7	37	91	108.3	15 44.5	37	91	108.7	15 33.3	38	90	109.2	15 22.0	38	90	109.7	15 10.6	38	90	110.2	14 59.2	38	90	110.7	14 47.7	38	89	111.1	14 36.2	39	89	111.6	9
70	15 01.1	37	91	107,9	14 50.1	37	91	108.4	14 39.0	37	91	108.8	14 27.9	37	90	109.3	14 16.7	37	90	109.8	14 05.4	38	90	110.3	13 54.1	38	90	110.8	13 42.7	38	89	111.2	70
1	14 06.5	36	91	107.5	13 55.6	36	91	108.0	13 44.7	37	91	108.5	13 33.7	37	91	109.0	13 22.6	37	90	109.4	13 11.5	37	90	109.9	13 00.4	37	90	110.4	12 49.2	37	89	110.9	1
2	13 11.7	36	91	107.2	13 01.0	36	91	107.6	12 50.2	36	91	108.1	12 39.4	36	91	108.6	12 28.5	36	90	109.1	12 17.5	37	90	109.5	12 06.5	37	90	110.0	11 55.5	37	90	110.5	2
3	12 16.8	35	92	106.8	12 06.2	35	91	107.3	11 55.6	36	91	107.8	11 44.9	36	91	108.2	11 34.2	36	91	108.7	11 23.4	36	90	109.2	11 12.6	36	90	109.7	11 01.7	36	90	110.1	3
4	11 21.9	35	92	106.5	11 11.4	35	92	106.9	11 00.9	35	91	107.4	10 50.4	35	91	107.9	10 39.8	35	91	108.4	10 29.2	35	91	108.8	10 18.5	36	90	109.3	10 07.8	36	90	109.8	4
75	10 26.8	34	92	106.1	10 16.5	34	92	106.6	10 06.1	35	92	107.1	9 55.7	35	91	107.5	9 45.3	35	91	108.0	9 34.8	35	91	108.5	9 24.3	35	91	109.0	9 13.7	35	90	109.4	75
6	9 31.6	34	92	105.8	9 21.4	34	92	106.2	9 11.2	34	92	106.7	9 00.9	34	91	107.2	8 50.7	34	91	107.7	8 40.3	34	91	108.1	8 30.0	35	91	108.6	8 19.6	35	90	109.1	6
7	8 36.3	33	92	105.4	8 26.3	34	92	105.9	8 16.2	34	92	106.4	8 06.1	34	92	106.9	7 55.9	34	91	107.3	7 45.7	34	91	107.8	7 35.5	34	91	108.3	7 25.3	34	91	108.8	7
8	7 41.0	33	92	105.1	7 31.1	33	92	105.6	7 21.1	33	92	106.1	7 11.1	33	92	106.5	7 01.1	33	92	107.0	6 51.1	34	91	107.5	6 41.0	34	91	108.0	6 30.9	34	91	108.4	8
9	6 45.6	33	93	104.8	6 35.8	33	92	105.3	6 25.9	33	92	105.7	6 16.1	33	92	106.2	6 06.2	33	92	106.7	5 56.3	33	91	107.2	5 46.4	33	91	107.6	5 36.4	33	91	108.1	9
80	5 50.0	32	93	104.5	5 40.4	32	92	104.9	5 30.7	32	92	105.4	5 20.9	32	92	105.9	5 11.2	33	92	106.4	5 01.4	33	92	106.8									80

DECLINATION SAME NAME AS LATITUDE

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	89 00.0	1.0 39	180.0	89 30.0	1.0 58	180.0	90 00.0	.. 96	....	89 30.0	1.0 58	00.0	89 00.0	1.0 38	00.0	88 30.0	1.0 28	00.0	88 00.0	1.0 21	00.0	87 30.0	1.0 17	00.0	00
1	88 36.9	72 78	136.1	88 55.2	47 90	117.4	89 02.6	00 96	89.9	88 55.3	46 90	62.2	88 37.1	72 77	43.5	88 13.4	84 65	32.3	87 47.1	90 55	25.3	87 19.6	93 47	20.6	1
2	87 50.2	47 88	117.3	88 01.2	26 94	104.3	88 05.2	01 96	89.7	88 01.5	25 93	75.0	87 50.8	46 88	62.0	87 34.5	61 80	51.5	87 14.4	72 72	43.3	86 51.6	79 65	36.9	2
3	86 57.3	34 92	108.7	87 05.0	18 95	99.4	87 07.9	01 96	89.6	87 05.5	16 94	79.7	86 58.2	32 91	70.3	86 46.4	46 87	61.8	86 31.0	57 81	54.5	86 12.6	65 76	48.3	3
4	86 02.2	26 93	104.0	86 08.2	14 95	96.9	86 10.5	01 96	89.4	86 08.8	12 95	82.0	86 03.4	24 93	74.7	85 54.4	36 90	67.9	85 42.1	46 86	61.7	85 27.2	54 82	56.0	4
05	85 06.2	22 94	101.1	85 11.2	12 95	95.2	85 13.1	01 96	89.3	85 11.9	09 95	83.3	85 07.7	19 94	77.4	85 00.5	29 92	71.8	84 50.5	37 89	66.4	84 38.0	45 86	61.5	05
6	84 09.7	19 95	99.0	84 14.0	10 95	94.1	84 15.7	02 96	89.1	84 14.9	07 95	84.1	84 11.5	16 94	79.2	84 05.6	24 93	74.4	83 57.2	32 90	69.8	83 46.7	39 88	65.4	6
7	83 12.9	16 95	97.5	83 16.7	09 96	93.3	83 18.4	02 96	89.0	83 17.8	06 95	84.7	83 15.0	13 94	80.4	83 10.0	20 93	76.3	83 03.0	27 92	72.2	82 53.9	33 90	68.3	7
8	82 15.9	15 95	96.3	82 19.4	09 96	92.6	82 21.0	02 96	88.8	82 20.6	04 95	85.1	82 18.3	11 95	81.3	82 14.1	17 94	77.7	82 08.0	23 92	74.1	82 00.2	29 91	70.6	8
9	81 18.8	14 95	95.3	81 22.1	08 96	92.0	81 23.6	02 96	88.7	81 23.5	03 95	85.3	81 21.6	09 95	82.0	81 18.0	15 94	78.7	81 12.7	20 93	75.5	81 05.8	26 91	72.3	9
10	80 21.7	13 95	94.5	80 24.7	08 96	91.5	80 26.3	03 96	88.5	80 26.3	03 95	85.5	80 24.7	08 95	82.5	80 21.6	13 94	79.5	80 17.0	18 93	76.6	80 10.9	23 92	73.7	10
1	79 24.4	12 95	93.8	79 27.4	07 95	91.1	79 28.9	03 96	88.4	79 29.1	02 95	85.6	79 27.8	07 95	82.9	79 25.1	11 94	80.2	79 21.1	16 94	77.5	79 15.7	20 93	74.9	1
2	78 27.2	12 96	93.2	78 30.0	07 96	90.7	78 31.6	03 96	88.2	78 31.8	01 95	85.7	78 30.8	06 95	83.2	78 28.5	10 94	80.7	78 25.0	14 94	78.2	78 20.1	18 93	75.8	2
3	77 29.9	11 96	92.7	77 32.6	07 96	90.4	77 34.2	03 96	88.1	77 34.6	01 95	85.8	77 33.8	05 95	83.4	77 31.9	09 95	81.1	77 28.7	12 94	78.8	77 24.4	16 93	76.6	3
4	76 32.5	11 96	92.2	76 35.3	07 96	90.1	76 36.9	04 96	87.9	76 37.4	00 95	85.8	76 36.8	04 95	83.6	76 35.2	07 95	81.5	76 32.4	11 94	79.3	76 28.6	15 93	77.2	4
15	75 35.2	11 96	91.8	75 37.9	07 96	89.8	75 39.5	04 96	87.8	75 40.2	00 95	85.8	75 39.8	03 95	83.8	75 38.4	06 95	81.7	75 36.0	10 94	79.7	75 32.5	13 94	77.7	15
6	74 37.8	10 96	91.4	74 40.5	07 96	89.5	74 42.2	04 96	87.6	74 43.0	01 95	85.8	74 42.8	02 95	83.9	74 41.6	05 95	82.0	74 39.5	09 94	80.1	74 36.4	12 94	78.2	6
7	73 40.5	10 96	91.1	73 43.1	07 96	89.3	73 44.9	04 96	87.5	73 45.7	01 95	85.7	73 45.7	02 95	83.9	73 44.8	05 95	82.1	73 42.9	08 94	80.4	73 40.2	11 94	78.6	7
8	72 43.1	10 96	90.7	72 45.7	07 96	89.0	72 47.6	05 96	87.3	72 48.5	02 95	85.7	72 48.6	01 95	84.0	72 47.9	04 95	82.3	72 46.3	07 94	80.6	72 43.9	09 94	78.9	8
9	71 45.7	10 96	90.4	71 48.4	08 96	88.8	71 50.2	05 96	87.2	71 51.3	02 95	85.6	71 51.6	00 95	84.0	71 51.0	03 95	82.4	71 49.7	06 94	80.8	71 47.6	08 94	79.2	9
20	70 48.3	10 96	90.1	70 51.0	08 96	88.6	70 52.9	05 96	87.0	70 54.1	03 95	85.5	70 54.5	00 95	84.0	70 54.2	02 95	82.5	70 53.1	05 94	80.9	70 51.2	07 94	79.4	20
1	69 51.0	10 96	89.8	69 53.7	08 96	88.4	69 55.6	05 95	86.9	69 56.9	03 95	85.4	69 57.5	01 95	84.0	69 57.3	02 95	82.5	69 56.4	04 94	81.1	69 54.8	07 94	79.6	1
2	68 53.6	10 96	89.5	68 56.3	08 96	88.1	68 58.3	06 95	86.7	68 59.7	03 95	85.4	69 00.4	01 95	84.0	69 00.4	01 95	82.6	68 59.7	03 94	81.2	68 58.3	06 94	79.8	2
3	67 56.2	10 96	89.3	67 59.0	08 96	87.9	68 01.1	06 95	86.6	68 02.5	04 95	85.3	68 03.3	02 95	83.9	68 03.5	01 95	82.6	68 03.0	03 95	81.2	68 01.9	05 94	79.9	3
4	66 58.8	10 96	89.0	67 01.6	08 96	87.7	67 03.8	06 95	86.4	67 05.3	04 95	85.2	67 06.3	02 95	83.9	67 06.6	00 95	82.6	67 06.3	02 95	81.3	67 05.4	04 94	80.0	4
25	66 01.5	10 96	88.7	66 04.3	08 96	87.5	66 06.5	06 95	86.3	66 08.2	05 95	85.1	66 09.2	03 95	83.8	66 09.7	01 95	82.6	66 09.6	01 95	81.3	66 08.8	03 94	80.1	25
6	65 04.1	10 96	88.5	65 07.0	09 96	87.3	65 09.3	07 95	86.1	65 11.0	05 95	84.9	65 12.2	03 95	83.8	65 12.8	01 95	82.6	65 12.8	01 95	81.4	65 12.3	03 94	80.2	6
7	64 06.8	11 96	88.3	64 09.7	09 96	87.1	64 12.0	07 95	86.0	64 13.9	05 95	84.8	64 15.2	03 95	83.7	64 15.9	02 95	82.5	64 16.1	00 95	81.4	64 15.8	02 94	80.2	7
8	63 09.4	11 96	88.0	63 12.4	09 95	86.9	63 14.8	07 95	85.8	63 16.7	06 95	84.7	63 18.1	04 95	83.6	63 19.0	02 95	82.5	63 19.4	00 95	81.4	63 19.2	01 94	80.3	8
9	62 12.1	11 96	87.8	62 15.1	09 95	86.7	62 17.6	08 95	85.7	62 19.6	06 95	84.6	62 21.1	04 95	83.5	62 22.1	03 95	82.4	62 22.6	01 95	81.4	62 22.7	01 94	80.3	9
30	61 14.7	11 96	87.6	61 17.8	09 95	86.6	61 20.4	08 95	85.5	61 22.5	06 95	84.5	61 24.1	05 95	83.4	61 25.3	03 95	82.4	61 25.9	01 95	81.3	61 26.1	00 94	80.3	30
1	60 17.4	11 96	87.4	60 20.5	10 95	86.4	60 23.2	08 95	85.4	60 25.4	07 95	84.4	60 27.1	05 95	83.3	60 28.4	03 95	82.3	60 29.2	02 95	81.3	60 29.6	00 94	80.3	1
2	59 20.1	11 96	87.2	59 23.3	10 95	86.2	59 26.0	08 95	85.2	59 28.3	07 95	84.2	59 30.1	05 95	83.2	59 31.5	04 95	82.3	59 32.5	02 95	81.3	59 33.0	01 94	80.3	2
3	58 22.8	11 95	87.0	58 26.0	10 95	86.0	58 28.8	09 95	85.1	58 31.2	07 95	84.1	58 33.2	06 95	83.1	58 34.7	04 95	82.2	58 35.8	03 94	81.2	58 36.4	02 94	80.3	3
4	57 25.5	12 96	86.7	57 28.8	10 95	85.8	57 31.7	09 95	84.9	57 34.1	08 95	84.0	57 36.2	06 95	83.0	57 37.8	05 95	82.1	57 39.1	03 94	81.2	57 39.9	02 94	80.2	4
35	56 28.2	12 96	86.5	56 31.6	10 95	85.6	56 34.5	09 95	84.7	56 37.1	08 95	83.8	56 39.2	07 95	82.9	56 41.0	05 95	82.0	56 42.4	04 94	81.1	56 43.3	03 94	80.2	35
6	55 31.0	12 96	86.3	55 34.4	11 95	85.5	55 37.4	09 95	84.6	55 40.0	08 95	83.7	55 42.3	07 95	82.8	55 44.2	06 95	81.9	55 45.7	04 94	81.0	55 46.8	03 94	80.1	6
7	54 33.7	12 96	86.1	54 37.2	11 95	85.3	54 40.3	10 95	84.4	54 43.0	09 95	83.6	54 45.4	07 95	82.7	54 47.4	06 95	81.8	54 49.0	05 94	81.0	54 50.3	04 94	80.1	7
8	53 36.5	12 96	85.9	53 40.0	11 95	85.1	53 43.2	10 95	84.3	53 46.0	09 95	83.4	53 48.5	08 95	82.6	53 50.6	06 95	81.7	53 52.4	05 94	80.9	53 53.8	04 94	80.0	8
9	52 39.2	13 95	85.7	52 42.8	11 95	84.9	52 46.1	10 95	84.1	52 49.0	09 95	83.3	52 51.6	08 95	82.4	52 53.8	07 95	81.6	52 55.7	06 94	80.8	52 57.3	05 94	80.0	9
40	51 42.0	13 96	85.5	51 45.7	12 95	84.7	51 49.0	11 95	83.9	51 52.0	09 95	83.1	51 54.7	08 95	82.3	51 57.1	07 95	81.5	51 59.1	06 94	80.7	52 00.8	05 94	79.9	40
1	50 44.8	13 95	85.3	50 48.6	12 95	84.5	50 52.0	11 95	83.8	50 55.1	10 95	83.0	50 57.9	09 95	82.2	51 00.3	08 95	81.4	51 02.5	07 94	80.6	51 04.3	06 94	79.8	1
2	49 47.7	13 96	85.1	49 51.5	12 95	84.4	49 55.0	11 95	83.6	49 58.2	10 95	82.8	50 01.0	09 95	82.0	50 03.6	08 95	81.3	50 05.9	07 94	80.5	50 07.8	06 94	79.7	2
3	48 50.5	13 96	84.9	48 54.4	12 95	84.2	48 57.9	11 95	83.4	49 01.2	10 95	82.7	49 04.2	09 95	81.9	49 06.9	08 94	81.2	49 09.3	07 94	80.4	49 11.4	06 94	79.6	3
4	47 53.3	14 95	84.7	47 57.3	13 95	84.0	48 01.0	12 95	83.3	48 04.3	11 95	82.5	48 07.4	10 95	81.8	48 10.2	09 94	81.0	48 12.7	08 94	80.3	48 14.9	07 94	79.5	4
45	46 56.2	14 95	84.5	47 00.2	13 95	83.8	47 04.0	12 95	83.1	47 07.5	11 95	82.4	47 10.6	10 95	81.6	47 13.6	09 94	80.9	47 16.2	08 94	80.2	47 18.5	07 94	79.4	45
6	45 59.1	14 96	84.4	46 03.2	13 95	83.6	46 07.0	12 95	82.9	46 10.6	11 95	82.2	46 13.9	11 95	81.5	46 16.9	10 94	80.8	46 19.7	09 94	80.1	46 22.1	08 94	79.3	6
7	45 02.0	14 96	84.2	45 06.2	13 95	83.5	45 10.1	13 95	82.8	45 13.8	12 95	82.1	45 17.1	11 95	81.3	45 20.3	10 94	80.6	45 23.2	09 94	79.9	45 25.8	08 94	79.2	7
8	44 04.9	15 96	84.0	44 09.2	14 95	83.3	44 13.2	13 95	82.6	44 16.9	12 95	81.9	44 20.4	11 94	81.2	44 23.7	10 94	80.5	44 26.7	10 94	79.8	44 29.4	09 94	79.1	8
9	43 07.9	15 95	83.8	43 12.2	14 95	83.1	43 16.3	13 95	82.4	43 20.1	12 95	81.7	43 23.7	12 94	81.0	43 27.1	11 94	80.4	43 30.2	10 94	79.7	43 33.1	09 94	79.0	9
50	42 10.9	15 95	83.6	42 15.3	14 95	82.9	42 19.4	14 95	82.2	42 23.4	13 95	81.6	42 27.1	12 94	80.9	42 30.5	11 94	80.2	42 33.8	10 94	79.5	42 36.8	10 94	78.9	50
1	41 13.9	15 96	83.4	41 18.3	15 95	82.7	41 22.6	14 95	82.1	41 26.6	13 95	81.4	41 30.4	12 94	80.7	41 34.0	12 94	80.1	41 37.4	11 94	79.4	41 40.5	10 94	78.7	1
2	40 16.9	16 95	83.2	40 21.4	15 95	82.5	40 25.8	14 95	81.9	40 29.9	13 94	81.2	40 33.8	13 94	80.6	40 37.5	12 94	79.9	40 41.0	11 94	79.3	40 44.2	10 94	78.6	2
3	39 19.9	16 95	83.0	39 24.6	15 95	82.3	39 29.0	14 95	81.7	39 33.2	14 94	81.1	39 37.2	13 94	80.4	39 41.0	12 94	79.8	39 44.6	12 94	79.1	39 48.0	11 94	78.5	3
4	38 23.0	16 95	82.8	38 27.7	15 95	82.2	38 32.2	15 95	81.5	38 36.5	14 94	80.9	38 40.7	13 94	80.3	38 44.6	13 94	79.6	38 48.3	12 94	79.0	38 51.8	11 94	78.4	4
55	37 26.1	16 95	82.6	37 30.9	16 95	82.0	37 35.5	15 94	81.3	37 39.9	14 94	80.7	37 44.1	14 94	80.1	37 48.1	13 94	79.5	37 52.0	12 94	78.8	37 55.6	12 94	78.2	55
6	36 29.2	17 96	82.4	36 34.1	16 95	81.8	36 38.8	15 94	81.2	36 43.3	15 94	80.5	36 47.6	14 94	79.9	36 51.7	13 94	79.3	36 55.7	13 94	78.7	36 59.4	12 94	78.1	6
7	35 32.3	17 96	82.2	35 37.3	16 95	81.6	35 42.1	16 94	81.0	35 46.7	15 94	80.4	35 51.1	14 94	79.8	35 55.4	14 94	79.2	35 59.4	13 94	78.5	36 03.3	13 94	77.9	7
8	34 35.5	17 96	82.0	34 40.6	17 95	81.4	34 45.4	16 94	80.8	34 50.2	15 94	80.2	34 54.7	15 94	79.6	34 59.0	14 94	79.0	35 03.2	14 94	78.4	35 07.2	13 93	77.8	8
9	33 38.7	17 96	81.8	33 43.8	17 94	81.2	33 48.8	16 94	80.6	33 53.6	16 94	80.0	33 58.3	15 94	79.4	34 02.7	15 94	78.8	34 07.0	14 94	78.2	34 11.1	13 93	77.6	9
60	32 41.9	18 95	81.6	32 47.1	17 94	81.0	32 52.2	17 94	80.4	32 57.1	16 94	79.8	33 01.9	16 94	79.2	33 06.5	15 94	78.7	33 10.9	14 94	78.1	33 15.1	14 93	77.5	60
1	31 45.2	18 95	81.4	31 50.5	17 94	80.8	31 55.7	17 94	80.2	32 00.7	16 94	79.6	32 05.5	16 94	79.1	32 10.2	15 94	78.5	32 14.8	15 93	77.9	32 19.1	14 93	77.3	1
2	30 48.4	18 94	81.2	30 53.9	18 94	80.6	30 59.1	17 94	80.0	31 04.2	17 94	79.5	31 09.2	16 94	78.9	31 14.0	16 94	78.3	31 18.7	15 93	77.7	31 23.2	15 93	77.2	2
3	29 51.8	19 94	81.0	29 57.3	18 94	80.4	30 02.6	18 94	79.8	30 07.9	17 94	79.3	30 12.9	17 94	78.7	30 17.8	16 94	78.1	30 22.6	16 93	77.6	30 27.2	15 93	77.0	3
4	28 55.1	19 94	80.8	29 00.7	18 94	80.2	29 06.2	18 94	79.6	29 11.5	18 94	79.1	29 16.7	17 94	78.5	29 21.7	17 94	78.0	29 26.6	16 93	77.4	29 31.4	16 93	76.8	4
65	27 58.5	19 94	80.6	28 04.2	19 94	80.0	28 09.7	18 94	79.4	28 15.2	18 94	78.9	28 20.5	17 94	78.3	28 25.6	17 93	77.8	28 30.6	16 93	77.2	28 35.5	16 93	76.6	65
6	27 01.9	20 94	80.4	27 07.7	19 94	79.8	27 13.4	19 94	79.2	27 18.9	18 94	78.7	27 24.3	18 94	78.1	27 29.6	17 93	77.6	27 34.7	17 93	77.0	27 39.7	16 93	76.5	6
7	26 05.4	20 94	80.1	26 11.2	19 94	79.6	26 17.0	19 94	79.0	26 22.6	19 94	78.5	26 28.2	18 93	78.0	26 33.5	18 93	77.4	26 38.8	17 93	76.9	26 43.9	17 93	76.3	7
8	25 08.8	20 94	79.9	25 14.8	20 94	79.4	25 20.7	19 94	78.8	25 26.4	19 94	78.3	25 32.1	19 93	77.8	25 37.6	18 93	77.2	25 42.9	18 93	76.7	25 48.2	17 93	76.1	8
9	24 12.4	20 94	79.7	24 18.5	20 94	79.2	24 24.4	20 94	78.6	24 30.3	19 94	78.1	24 36.0	19 93	77.6	24 41.6	19 93	77.0	24 47.1	18 93	76.5	24 52.5	18 93	75.9	9
70	23 15.9	21 94	79.5	23 22.1	20 94	79.0	23 28.2	20 94	78.4	23 34.1	20 93	77.9	23 40.0	19 93	77.4	23 45.7	19 93	76.8	23 51.4	19 93	76.3	23 56.9	18 93	75.8	70
1	22 19.5	21 94	79.3	22 25.8	21 94	78.7	22 32.0	20 94	78.2	22 38.1	20 93	77.7	22 44.0	20 93	77.2	22 49.9	19 93	76.6	22 55.7	19 93	76.1	23 01.3	19 93	75.6	1
2	21 23.2	21 94	79.1	21 29.6	21 94	78.5	21 35.8	21 94	78.0	21 42.0	20 93	77.5	21 48.1	20 93	77.0	21 54.1	20 93	76.4	22 00.0	19 93	75.9	22 05.8	19 92	75.4	2
3	20 26.9	22 94	78.8	20 33.4	21 94	78.3	20 39.7	21 93	77.8	20 46.0	21 93	77.3	20 52.2	21 93	76.7	20 58.3	20 93	76.2	21 04.4	20 93	75.7	21 10.3	20 92	75.2	3
4	19 30.6	22 94	78.6	19 37.2	22 94	78.1	19 43.7	22 93	77.6	19 50.1	21 93	77.1	19 56.4	21 93	76.5	20 02.6	21 93	76.0	20 08.8	20 93	75.5	20 14.8	20 92	75.0	4
75	18 34.4	22 94	78.4	18 41.1	22 93	77.9	18 47.7	22 93	77.4	18 54.2	22 93	76.8	19 00.6	21 93	76.3	19 07.0	21 93	75.8	19 13.3	21 92	75.3	19 19.4	20 92	74.8	75
6	17 38.2	23 94	78.2	17 45.0	23 93	77.6	17 51.7	22 93	77.1	17 58.4	22 93	76.6	18 04.9	22 93	76.1	18 11.4	21 93	75.6	18 17.8	21 92	75.1	18 24.1	21 92	74.6	6
7	16 42.1	23 94	77.9	16 49.0	23 93	77.4	16 55.8	23 93	76.9	17 02.6	22 93	76.4	17 09.2	22 93	75.9	17 15.8	22 92	75.4	17 22.4	22 92	74.9	17 28.8	21 92	74.4	7
8	15 46.0	24 93	77.7	15 53.0	23 93	77.2	15 59.9	23 93	76.7	16 06.8	23 93	76.2	16 13.6	23 93	75.7	16 20.4	22 92	75.2	16 27.0	22 92	74.7	16 33.6	22 92	74.1	8
9	14 49.9	24 93	77.5	14 57.1	24 93	77.0	15 04.1	23 93	76.4	15 11.1	23 93	75.9	15 18.1	23 92	75.4	15 24.9	23 92	74.9	15 31.7	23 92	74.4	15 38.4	22 92	73.9	9
80	13 54.0	24 93	77.2	14 01.2	24 93	76.7	14 08.4	24 93	76.2	14 15.5	24 93	75.7	14 22.5	23 92	75.2	14 29.5	23 92	74.7	14 36.5	23 92	74.2	14 43.3	23 92	73.7	80
1	12 58.0	25 93	77.0	13 05.4	24 93	76.5	13 12.7	24 93	76.0	13 19.9	24 93	75.5	13 27.1	24 92	75.0	13 34.2	24 92	74.5	13 41.3	23 92	74.0	13 48.3	23 92	73.5	1
2	12 02.2	25 93	76.7	12 09.6	25 93	76.2	12 17.0	25 93	75.7	12 24.4	24 92	75.2	12 31.7	24 92	74.7	12 39.0	24 92	74.2	12 46.2	24 92	73.8	12 53.3	24 92	73.3	2
3	11 06.3	25 93	76.5	11 13.9	25 93	76.0	11 21.5	25 93	75.5	11 28.9	25 92	75.0	11 36.4	25 92	74.5	11 43.8	25 92	74.0	11 51.1	24 92	73.5	11 58.4	24 91	73.0	3
4	10 10.6	26 93	76.2	10 18.3	26 93	75.7	10 25.9	25 92	75.3	10 33.6	25 92	74.8	10 41.1	25 92	74.3	10 48.6	25 92	73.8	10 56.1	25 92	73.3	11 03.6	25 91	72.8	4
85	9 14.9	26 93	76.0	9 22.7	26 93	75.5	9 30.5	26 92	75.0	9 38.2	26 92	74.5	9 45.9	26 92	74.0	9 53.6	25 92	73.5	10 01.2	25 91	73.0	10 08.8	25 91	72.5	85
6	8 19.2	27 93	75.7	8 27.2	26 92	75.2	8 35.1	26 92	74.7	8 43.0	26 92	74.3	8 50.8	26 92	73.8	8 58.6	26 92	73.3	9 06.4	26 91	72.8	9 14.1	26 91	72.3	6
7	7 23.7	27 93	75.5	7 31.7	27 92	75.0	7 39.8	27 92	74.5	7 47.8	27 92	74.0	7 55.7	27 92	73.5	8 03.7	26 91	73.0	8 11.6	26 91	72.5	8 19.5	26 91	72.1	7
8	6 28.2	27 92	75.2	6 36.3	27 92	74.7	6 44.5	27 92	74.2	6 52.7	27 92	73.7	7 00.8	27 92	73.3	7 08.8	27 91	72.8	7 16.9	27 91	72.3	7 24.9	27 91	71.8	8
9	5 32.7	28 92	74.9	5 41.0	28 92	74.5	5 49.3	28 92	74.0	5 57.6	28 92	73.5	6 05.9	27 91	73.0	6 14.1	27 91	72.5	6 22.3	27 91	72.0	6 30.4	27 91	71.6	9
90										5 02.6	28 92	73.2	5 11.0	28 91	72.7	5 19.4	28 91	72.3	5 27.7	28 91	71.8	5 36.0	28 90	71.3	90

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	57 00.0	1.0 01	180.0	56 30.0	1.0 01	180.0	56 00.0	1.0 01	180.0	55 30.0	1.0 01	180.0	55 00.0	1.0 01	180.0	54 30.0	1.0 01	180.0	54 00.0	1.0 01	180.0	53 30.0	1.0 01	180.0	00
1	56 59.1	1.0 04	178.2	56 29.1	1.0 04	178.3	55 59.1	1.0 04	178.3	55 29.2	1.0 04	178.3	54 59.2	1.0 04	178.3	54 29.2	1.0 04	178.4	53 59.2	1.0 04	178.4	53 29.2	1.0 04	178.4	1
2	56 56.5	1.0 07	176.5	56 26.5	1.0 07	176.5	55 56.6	1.0 07	176.6	55 26.6	1.0 07	176.6	54 56.7	1.0 07	176.7	54 26.7	1.0 07	176.7	53 56.8	1.0 07	176.8	53 26.8	1.0 07	176.8	2
3	56 52.1	1.0 10	174.7	56 22.2	1.0 10	174.8	55 52.3	1.0 10	174.9	55 22.4	1.0 10	175.0	54 52.5	1.0 10	175.0	54 22.7	1.0 10	175.1	53 52.8	1.0 09	175.2	53 22.9	1.0 09	175.3	3
4	56 45.9	99 13	173.0	56 16.1	99 13	173.1	55 46.3	99 13	173.2	55 16.6	99 13	173.3	54 46.8	99 12	173.4	54 17.0	99 12	173.5	53 47.2	99 12	173.6	53 17.3	99 12	173.7	4
05	56 38.0	99 16	171.2	56 08.4	99 16	171.4	55 38.7	99 16	171.5	55 09.0	99 15	171.6	54 39.3	99 15	171.8	54 09.7	99 15	171.9	53 40.0	99 15	172.0	53 10.3	99 14	172.1	05
6	56 28.4	98 19	169.5	55 58.9	98 19	169.7	55 29.4	98 18	169.8	54 59.9	98 18	170.0	54 30.3	99 18	170.1	54 00.8	99 17	170.3	53 31.2	99 17	170.4	53 01.6	99 17	170.6	6
7	56 17.2	98 22	167.8	55 47.8	98 21	168.0	55 18.5	98 21	168.2	54 49.1	98 21	168.4	54 19.7	98 20	168.5	53 50.3	98 20	168.7	53 20.9	98 20	168.9	52 51.5	98 19	169.0	7
8	56 04.2	97 24	166.1	55 35.1	97 24	166.3	55 05.9	97 24	166.5	54 36.7	97 23	166.8	54 07.5	97 23	166.9	53 38.3	97 23	167.1	53 09.1	98 22	167.3	52 39.8	98 22	167.5	8
9	55 49.7	96 27	164.5	55 20.7	96 27	164.7	54 51.8	97 26	164.9	54 22.8	97 26	165.2	53 53.8	97 25	165.4	53 24.8	97 25	165.6	52 55.7	97 25	165.8	52 26.6	97 24	166.0	9
10	55 33.5	96 30	162.8	55 04.8	96 29	163.1	54 36.1	96 29	163.3	54 07.3	96 28	163.6	53 38.6	96 28	163.8	53 09.7	96 28	164.1	52 40.9	96 27	164.3	52 12.0	96 27	164.5	10
1	55 15.8	95 32	161.2	54 47.4	95 32	161.5	54 18.9	95 31	161.8	53 50.4	95 31	162.0	53 21.8	95 30	162.3	52 53.3	95 30	162.5	52 24.6	95 29	162.8	51 56.0	96 29	163.0	1
2	54 56.6	94 34	159.6	54 28.4	94 34	159.9	54 00.2	94 34	160.2	53 32.0	94 33	160.5	53 03.7	94 33	160.8	52 35.3	94 32	161.1	52 07.0	95 32	161.3	51 38.6	95 31	161.6	2
3	54 35.9	93 37	158.1	54 08.0	93 36	158.4	53 40.1	93 36	158.7	53 12.1	93 35	159.0	52 44.1	93 35	159.3	52 16.0	94 34	159.6	51 47.9	94 34	159.9	51 19.8	94 34	160.2	3
4	54 13.8	92 39	156.6	53 46.2	92 39	156.9	53 18.6	92 38	157.2	52 50.9	92 38	157.5	52 23.1	93 37	157.9	51 55.4	93 37	158.2	51 27.5	93 36	158.5	50 59.6	93 36	158.8	4
15	53 50.3	91 41	155.1	53 23.0	91 41	155.4	52 55.7	91 40	155.8	52 28.3	91 40	156.1	52 00.8	92 39	156.4	51 33.3	92 39	156.7	51 05.8	92 38	157.1	50 38.2	92 38	157.4	15
6	53 25.4	90 44	153.6	52 58.5	90 43	154.0	52 31.5	90 42	154.3	52 04.4	90 42	154.7	51 37.3	91 41	155.0	51 10.1	91 41	155.4	50 42.8	91 40	155.7	50 15.5	91 40	156.0	6
7	52 59.2	89 46	152.2	52 32.6	89 45	152.6	52 06.0	89 45	152.9	51 39.2	89 44	153.3	51 12.4	89 43	153.7	50 45.5	90 43	154.0	50 18.6	90 42	154.4	49 51.6	90 42	154.7	7
8	52 31.8	87 48	150.8	52 05.6	88 47	151.2	51 39.2	88 47	151.6	51 12.8	88 46	151.9	50 46.3	88 45	152.3	50 19.8	89 45	152.7	49 53.1	89 44	153.0	49 26.5	89 44	153.4	8
9	52 03.2	86 50	149.4	51 37.3	87 49	149.8	51 11.3	87 48	150.2	50 45.2	87 48	150.6	50 19.1	87 47	151.0	49 52.9	88 47	151.4	49 26.6	88 46	151.7	49 00.2	88 46	152.1	9
20	51 33.4	85 52	148.1	51 07.9	85 51	148.5	50 42.2	86 50	148.9	50 16.5	86 50	149.3	49 50.7	86 49	149.7	49 24.8	86 49	150.1	48 58.8	87 48	150.5	48 32.8	87 47	150.9	20
1	51 02.6	84 53	146.8	50 37.4	84 53	147.2	50 12.1	84 52	147.6	49 46.7	85 52	148.0	49 21.2	85 51	148.5	48 55.7	85 50	148.9	48 30.0	86 50	149.2	48 04.3	86 49	149.6	1
2	50 30.6	83 55	145.5	50 05.8	83 54	146.0	49 40.8	83 54	146.4	49 15.8	84 53	146.8	48 50.7	84 53	147.2	48 25.5	84 52	147.6	48 00.2	84 51	148.0	47 34.8	85 51	148.4	2
3	49 57.6	81 57	144.3	49 33.1	82 56	144.7	49 08.5	82 55	145.2	48 43.9	82 55	145.6	48 19.1	83 54	146.0	47 54.2	83 54	146.4	47 29.3	83 53	146.9	47 04.2	84 53	147.3	3
4	49 23.6	80 58	143.1	48 59.5	81 58	143.5	48 35.3	81 57	144.0	48 11.0	81 56	144.4	47 46.6	82 56	144.9	47 22.0	82 55	145.3	46 57.4	82 55	145.7	46 32.7	82 54	146.1	4
25	48 48.7	79 60	141.9	48 24.9	79 59	142.4	48 01.1	80 59	142.8	47 37.1	80 58	143.3	47 13.1	80 57	143.7	46 48.9	81 57	144.2	46 24.6	81 56	144.6	46 00.3	81 56	145.0	25
6	48 12.8	78 61	140.8	47 49.4	78 61	141.2	47 26.0	78 60	141.7	47 02.4	79 59	142.2	46 38.7	79 59	142.6	46 14.8	80 58	143.0	45 50.9	80 58	143.5	45 26.9	80 57	143.9	6
7	47 36.1	77 63	139.7	47 13.1	77 62	140.1	46 50.0	77 61	140.6	46 26.7	78 61	141.1	46 03.4	78 60	141.5	45 39.9	78 60	142.0	45 16.4	79 59	142.4	44 52.7	79 58	142.8	7
8	46 58.6	75 64	138.6	46 35.9	76 63	139.1	46 13.1	76 63	139.5	45 50.3	76 62	140.0	45 27.3	77 62	140.5	45 04.2	77 61	140.9	44 41.0	78 60	141.4	44 17.6	78 60	141.8	8
9	46 20.2	74 65	137.5	45 57.9	75 65	138.0	45 35.5	75 64	138.5	45 13.0	75 63	139.0	44 50.3	76 63	139.4	44 27.6	76 62	139.9	44 04.7	76 62	140.4	43 41.8	77 61	140.8	9
30	45 41.1	73 66	136.5	45 19.2	73 66	137.0	44 57.1	74 65	137.5	44 35.0	74 65	138.0	44 12.7	74 64	138.4	43 50.3	75 63	138.9	43 27.7	75 63	139.4	43 05.1	76 62	139.8	30
1	45 01.3	72 68	135.5	44 39.7	72 67	136.0	44 18.0	73 66	136.5	43 56.2	73 66	137.0	43 34.2	73 65	137.5	43 12.2	74 65	137.9	42 50.0	74 64	138.4	42 27.7	74 64	138.8	1
2	44 20.7	71 69	134.6	43 59.5	71 68	135.1	43 38.2	71 68	135.6	43 16.7	72 67	136.0	42 55.1	72 66	136.5	42 33.4	73 66	137.0	42 11.5	73 65	137.4	41 49.6	73 65	137.9	2
3	43 39.6	69 70	133.6	43 18.7	70 69	134.1	42 57.7	70 69	134.6	42 36.5	71 68	135.1	42 15.3	71 67	135.6	41 53.9	71 67	136.1	41 32.4	72 66	136.5	41 10.8	72 66	137.0	3
4	42 57.7	68 71	132.7	42 37.2	69 70	133.2	42 16.5	69 70	133.7	41 55.7	70 69	134.2	41 34.8	70 68	134.7	41 13.7	70 68	135.2	40 52.6	71 67	135.6	40 31.3	71 67	136.1	4
35	42 15.3	67 72	131.8	41 55.1	68 71	132.3	41 34.7	68 71	132.8	41 14.3	68 70	133.3	40 53.7	69 70	133.8	40 33.0	69 69	134.3	40 12.2	70 68	134.8	39 51.2	70 68	135.2	35
6	41 32.2	66 73	131.0	41 12.4	66 72	131.5	40 52.4	67 72	132.0	40 32.2	67 71	132.5	40 12.0	68 70	133.0	39 51.6	68 70	133.4	39 31.1	68 69	133.9	39 10.5	69 69	134.4	6
7	40 48.7	65 74	130.2	40 29.1	65 73	130.7	40 09.4	66 72	131.1	39 49.6	66 72	131.6	39 29.7	67 71	132.1	39 09.7	67 71	132.6	38 49.5	67 70	133.1	38 29.2	68 70	133.6	7
8	40 04.5	64 74	129.3	39 45.3	64 74	129.8	39 26.0	65 73	130.3	39 06.5	65 73	130.8	38 46.9	66 72	131.3	38 27.1	66 72	131.8	38 07.3	66 71	132.3	37 47.4	67 71	132.7	8
9	39 19.9	63 75	128.5	39 01.0	63 75	129.0	38 42.0	64 74	129.5	38 22.8	64 74	130.0	38 03.5	64 73	130.5	37 44.1	65 73	131.0	37 24.6	65 72	131.5	37 05.0	66 72	132.0	9
40	38 34.8	62 76	127.8	38 16.2	62 75	128.3	37 57.5	63 75	128.8	37 38.6	63 74	129.3	37 19.6	63 74	129.8	37 00.6	64 73	130.2	36 41.4	64 73	130.7	36 22.0	65 72	131.2	40
1	37 49.2	61 77	127.0	37 30.9	61 76	127.5	37 12.5	62 76	128.0	36 54.0	62 75	128.5	36 35.3	62 75	129.0	36 16.5	63 74	129.5	35 57.6	63 74	130.0	35 38.6	64 73	130.4	1
2	37 03.2	60 77	126.3	36 45.2	60 77	126.8	36 27.1	61 76	127.3	36 08.8	61 76	127.8	35 50.5	61 75	128.3	35 32.0	62 75	128.8	35 13.4	62 74	129.2	34 54.7	63 74	129.7	2
3	36 16.7	59 78	125.6	35 59.0	59 78	126.1	35 41.2	60 77	126.6	35 23.3	60 77	127.1	35 05.2	60 76	127.6	34 47.0	61 76	128.1	34 28.7	61 75	128.5	34 10.3	62 75	129.0	3
4	35 29.9	58 79	124.9	35 12.5	58 78	125.4	34 54.9	59 78	125.9	34 37.3	59 77	126.4	34 19.5	59 77	126.9	34 01.6	60 76	127.4	33 43.6	60 76	127.8	33 25.5	61 75	128.3	4
45	34 42.6	57 79	124.2	34 25.5	57 79	124.7	34 08.3	58 78	125.2	33 50.9	58 78	125.7	33 33.4	58 78	126.2	33 15.8	59 77	126.7	32 58.1	59 77	127.2	32 40.3	60 76	127.6	45
6	33 55.0	56 80	123.6	33 38.1	56 80	124.1	33 21.2	57 79	124.6	33 04.1	57 79	125.0	32 46.9	57 78	125.5	32 29.6	58 78	126.0	32 12.2	58 77	126.5	31 54.7	59 77	127.0	6
7	33 07.0	55 81	122.9	32 50.4	55 80	123.4	32 33.7	56 80	123.9	32 17.0	56 79	124.4	32 00.0	57 79	124.9	31 43.0	57 78	125.4	31 25.9	57 78	125.9	31 08.7	58 77	126.3	7
8	32 18.7	54 81	122.3	32 02.4	55 81	122.8	31 46.0	55 80	123.3	31 29.4	55 80	123.8	31 12.8	56 79	124.3	30 56.1	56 79	124.8	30 39.2	56 78	125.2	30 22.2	57 78	125.7	8
9	31 30.0	53 82	121.7	31 14.0	54 81	122.2	30 57.8	54 81	122.7	30 41.6	54 80	123.2	30 25.2	55 80	123.7	30 08.7	55 79	124.1	29 52.2	55 79	124.6	29 35.5	56 79	125.1	9
50	30 41.0	52 82	121.1	30 25.3	53 82	121.6	30 09.4	53 81	122.1	29 53.4	53 81	122.6	29 37.3	54 80	123.1	29 21.1	54 80	123.5	29 04.8	55 80	124.0	28 48.4	55 79	124.5	50
1	29 51.7	52 83	120.5	29 36.2	52 82	121.0	29 20.6	52 82	121.5	29 04.9	53 81	122.0	28 49.0	53 81	122.5	28 33.1	53 80	123.0	28 17.1	54 80	123.4	28 00.9	54 80	123.9	1
2	29 02.2	51 83	120.0	28 46.9	51 83	120.5	28 31.5	51 82	120.9	28 16.1	52 82	121.4	28 00.5	52 81	121.9	27 44.8	52 81	122.4	27 29.0	53 81	122.9	27 13.1	53 80	123.4	2
3	28 12.3	50 84	119.4	27 57.3	50 83	119.9	27 42.2	51 83	120.4	27 27.0	51 82	120.9	27 11.6	51 82	121.4	26 56.2	52 81	121.8	26 40.7	52 81	122.3	26 25.1	52 81	122.8	3
4	27 22.2	49 84	118.9	27 07.4	49 84	119.4	26 52.6	50 83	119.8	26 37.6	50 83	120.3	26 22.5	50 82	120.8	26 07.3	51 82	121.3	25 52.0	51 82	121.8	25 36.7	51 81	122.3	4
55	26 31.8	48 84	118.3	26 17.3	49 84	118.8	26 02.7	49 84	119.3	25 47.9	49 83	119.8	25 33.1	50 83	120.3	25 18.2	50 82	120.8	25 03.1	50 82	121.2	24 48.0	51 82	121.7	55
6	25 41.2	48 85	117.8	25 26.9	48 84	118.3	25 12.5	48 84	118.8	24 58.0	48 84	119.3	24 43.4	49 83	119.8	24 28.7	49 83	120.2	24 13.9	49 82	120.7	23 59.1	50 82	121.2	6
7	24 50.4	47 85	117.3	24 36.3	47 85	117.8	24 22.1	47 84	118.3	24 07.8	48 84	118.8	23 53.5	48 84	119.3	23 39.0	48 83	119.7	23 24.5	49 83	120.2	23 09.9	49 82	120.7	7
8	23 59.3	46 86	116.8	23 45.4	46 85	117.3	23 31.5	47 85	117.8	23 17.4	47 84	118.3	23 03.3	47 84	118.8	22 49.1	48 84	119.2	22 34.8	48 83	119.7	22 20.4	48 83	120.2	8
9	23 08.0	45 86	116.4	22 54.3	46 86	116.8	22 40.6	46 85	117.3	22 26.8	46 85	117.8	22 12.9	46 84	118.3	21 58.9	47 84	118.8	21 44.8	47 84	119.2	21 30.7	47 83	119.7	9
60	22 16.5	45 86	115.9	22 03.0	45 86	116.4	21 49.5	45 85	116.9	21 35.9	45 85	117.3	21 22.2	46 85	117.8	21 08.5	46 84	118.3	20 54.7	46 84	118.8	20 40.7	47 84	119.2	60
1	21 24.7	44 86	115.4	21 11.5	44 86	115.9	20 58.2	44 86	116.4	20 44.8	45 85	116.9	20 31.4	45 85	117.4	20 17.9	45 85	117.8	20 04.2	46 84	118.3	19 50.6	46 84	118.8	1
2	20 32.8	43 87	115.0	20 19.8	43 86	115.5	20 06.7	44 86	115.9	19 53.6	44 86	116.4	19 40.3	44 85	116.9	19 27.0	45 85	117.4	19 13.6	45 85	117.9	19 00.2	45 84	118.3	2
3	19 40.7	43 87	114.5	19 27.9	43 87	115.0	19 15.0	43 86	115.5	19 02.1	43 86	116.0	18 49.1	44 86	116.5	18 36.0	44 85	116.9	18 22.8	44 85	117.4	18 09.5	44 85	117.9	3
4	18 48.4	42 87	114.1	18 35.8	42 87	114.6	18 23.2	42 87	115.1	18 10.4	43 86	115.6	17 57.6	43 86	116.0	17 44.7	43 86	116.5	17 31.7	43 85	117.0	17 18.7	44 85	117.4	4
65	17 56.0	41 88	113.7	17 43.6	41 87	114.2	17 31.1	42 87	114.7	17 18.6	42 87	115.1	17 05.9	42 86	115.6	16 53.3	42 86	116.1	16 40.5	43 86	116.5	16 27.7	43 85	117.0	65
6	17 03.4	41 88	113.3	16 51.1	41 88	113.8	16 38.9	41 87	114.2	16 26.5	41 87	114.7	16 14.1	41 87	115.2	16 01.6	42 86	115.7	15 49.1	42 86	116.1	15 36.5	42 86	116.6	6
7	16 10.6	40 88	112.9	15 58.6	40 88	113.4	15 46.5	40 88	113.8	15 34.3	41 87	114.3	15 22.1	41 87	114.8	15 09.8	41 87	115.3	14 57.5	41 86	115.7	14 45.1	41 86	116.2	7
8	15 17.6	39 88	112.5	15 05.8	40 88	113.0	14 53.9	40 88	113.4	14 41.9	40 88	113.9	14 29.9	40 87	114.4	14 17.8	40 87	114.9	14 05.7	41 87	115.3	13 53.5	41 86	115.8	8
9	14 24.5	39 89	112.1	14 12.9	39 88	112.6	14 01.2	39 88	113.0	13 49.4	39 88	113.5	13 37.6	40 88	114.0	13 25.7	40 87	114.5	13 13.8	40 87	114.9	13 01.8	40 87	115.4	9
70	13 31.3	38 89	111.7	13 19.8	38 89	112.2	13 08.3	39 88	112.7	12 56.7	39 88	113.1	12 45.1	39 88	113.6	12 33.4	39 87	114.1	12 21.7	39 87	114.6	12 09.9	39 87	115.0	70
1	12 37.9	38 89	111.3	12 26.6	38 89	111.8	12 15.3	38 89	112.3	12 03.9	38 88	112.8	11 52.4	38 88	113.2	11 40.9	38 88	113.7	11 29.4	39 87	114.2	11 17.8	39 87	114.6	1
2	11 44.4	37 89	111.0	11 33.3	37 89	111.4	11 22.1	37 89	111.9	11 10.9	37 89	112.4	10 59.6	38 88	112.9	10 48.3	38 88	113.3	10 37.0	38 88	113.8	10 25.6	38 87	114.3	2
3	10 50.8	36 90	110.6	10 39.8	37 89	111.1	10 28.8	37 89	111.6	10 17.8	37 89	112.0	10 06.7	37 88	112.5	9 55.6	37 88	113.0	9 44.4	37 88	113.4	9 33.2	37 88	113.9	3
4	9 57.0	36 90	110.3	9 46.2	36 90	110.7	9 35.4	36 89	111.2	9 24.5	36 89	111.7	9 13.6	36 89	112.2	9 02.7	37 88	112.6	8 51.7	37 88	113.1	8 40.7	37 88	113.6	4
75	9 03.1	35 90	109.9	8 52.5	35 90	110.4	8 41.8	36 89	110.9	8 31.1	36 89	111.3	8 20.4	36 89	111.8	8 09.6	36 89	112.3	7 58.8	36 88	112.7	7 48.0	36 88	113.2	75
6	8 09.1	35 90	109.6	7 58.7	35 90	110.0	7 48.2	35 90	110.5	7 37.6	35 89	111.0	7 27.1	35 89	111.5	7 16.5	35 89	111.9	7 05.9	35 88	112.4	6 55.2	36 88	112.9	6
7	7 15.0	34 90	109.2	7 04.7	34 90	109.7	6 54.4	34 90	110.2	6 44.0	35 90	110.7	6 33.6	35 89	111.1	6 23.2	35 89	111.6	6 12.7	35 89	112.1	6 02.3	35 88	112.5	7
8	6 20.8	34 91	108.9	6 10.6	34 90	109.4	6 00.4	34 90	109.9	5 50.2	34 90	110.3	5 40.0	34 90	110.8	5 29.8	34 89	111.3	5 19.5	34 89	111.7	5 09.2	34 89	112.2	8
9	5 26.4	33 91	108.6	5 16.4	33 90	109.1	5 06.4	33 90	109.5																9

H.A.	20° 00′				20° 30′				21° 00′				21° 30′				22° 00′				22° 30′				23° 00′				23° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	87 00.0	1.0	15	00.0	86 30.0	1.0	13	00.0	86 00.0	1.0	11	00.0	85 30.0	1.0	10	00.0	85 00.0	1.0	09	00.0	84 30.0	1.0	08	00.0	84 00.0	1.0	07	00.0	83 30.0	1.0	07	00.0	00
1	86 51.2	95	40	17.4	86 22.5	96	35	15.0	85 53.4	97	31	13.1	85 24.1	98	28	11.7	84 54.7	98	26	10.5	84 25.2	99	23	09.5	83 55.6	99	21	08.7	83 26.0	99	20	08.0	1
2	86 27.1	84	59	32.0	86 01.2	88	53	28.1	85 34.5	90	48	25.0	85 07.2	92	44	22.4	84 39.4	93	40	20.3	84 11.2	94	37	18.6	83 42.8	95	34	17.1	83 14.1	96	32	15.8	2
3	85 52.0	72	70	43.0	85 29.6	77	65	38.6	85 05.8	81	60	34.9	84 41.0	84	56	31.7	84 15.4	87	52	29.0	83 49.1	89	48	26.7	83 22.3	90	45	24.7	82 55.1	91	42	22.9	3
4	85 09.9	61	77	51.0	84 50.6	67	73	46.6	84 29.8	72	69	42.8	84 07.6	76	65	39.4	83 44.3	79	61	36.4	83 20.2	82	57	33.7	82 55.3	84	54	31.4	82 29.8	86	51	29.3	4
05	84 23.4	52	82	56.9	84 06.8	58	78	52.7	83 48.5	63	75	49.0	83 28.8	68	71	45.6	83 07.8	72	68	42.5	82 45.8	75	64	39.7	82 22.9	78	61	37.2	81 59.2	80	58	35.0	05
6	83 34.1	45	85	61.3	83 19.7	51	82	57.4	83 03.6	56	79	53.9	82 46.0	61	76	50.6	82 27.2	65	73	47.6	82 07.2	68	70	44.8	81 46.2	72	67	42.2	81 24.3	74	64	39.9	6
7	82 43.0	39	87	64.6	82 30.4	45	85	61.1	82 16.1	50	82	57.7	82 00.4	55	80	54.6	81 43.4	59	77	51.7	81 25.2	62	74	49.0	81 06.0	66	72	46.5	80 45.8	69	69	44.1	7
8	81 50.6	35	89	67.2	81 39.4	40	87	64.0	81 26.7	45	84	60.9	81 12.7	49	82	57.9	80 57.3	53	80	55.2	80 40.8	57	77	52.6	80 23.2	60	75	50.1	80 04.6	64	73	47.8	8
9	80 57.3	31	90	69.2	80 47.4	36	88	66.3	80 36.0	40	86	63.4	80 23.3	44	84	60.7	80 09.4	48	82	58.0	79 54.3	52	80	55.5	79 38.2	56	78	53.2	79 21.0	59	76	50.9	9
10	80 03.4	27	91	70.9	79 54.5	32	89	68.2	79 44.2	36	88	65.5	79 32.7	40	86	62.9	79 20.1	44	84	60.5	79 06.3	48	82	58.1	78 51.4	51	80	55.8	78 35.6	54	78	53.6	10
1	79 08.9	25	91	72.3	79 00.9	29	90	69.7	78 51.7	33	89	67.2	78 41.2	37	87	64.8	78 29.6	40	85	62.5	78 17.0	44	84	60.2	78 03.3	47	82	58.1	77 48.7	50	80	56.0	1
2	78 14.1	22	92	73.4	78 06.9	26	91	71.0	77 58.5	30	90	68.7	77 48.9	34	88	66.4	77 38.4	37	87	64.2	77 26.7	40	85	62.1	77 14.1	44	84	60.0	77 00.6	47	82	58.0	2
3	77 19.0	20	92	74.3	77 12.4	24	91	72.1	77 04.8	27	90	69.9	76 56.1	31	89	67.8	76 46.4	34	88	65.7	76 35.6	37	86	63.7	76 24.0	40	85	61.7	76 11.4	43	83	59.8	3
4	76 23.6	18	93	75.1	76 17.7	22	92	73.0	76 10.7	25	91	71.0	76 02.7	28	90	69.0	75 53.8	31	88	67.0	75 43.9	34	87	65.1	75 33.1	37	86	63.2	75 21.4	40	84	61.4	4
15	75 28.1	16	93	75.8	75 22.7	20	92	73.8	75 16.3	23	91	71.9	75 09.0	26	90	70.0	75 00.7	29	89	68.1	74 51.6	32	88	66.3	74 41.6	35	87	64.5	74 30.8	38	85	62.7	15
6	74 32.4	15	93	76.3	74 27.5	18	92	74.5	74 21.7	21	92	72.7	74 14.9	24	91	70.9	74 07.3	27	90	69.1	73 58.9	30	89	67.3	73 49.6	32	88	65.6	73 39.5	35	86	63.9	6
7	73 36.6	13	93	76.8	73 32.1	16	93	75.1	73 26.8	19	92	73.3	73 20.6	22	91	71.6	73 13.6	25	90	69.9	73 05.7	27	89	68.3	72 57.1	30	88	66.6	72 47.7	33	87	65.0	7
8	72 40.7	12	93	77.2	72 36.6	15	93	75.6	72 31.7	18	92	73.9	72 26.0	20	91	72.3	72 19.5	23	90	70.7	72 12.3	26	90	69.1	72 04.2	28	89	67.5	71 55.5	30	88	66.0	8
9	71 44.7	11	93	77.6	71 41.0	14	93	76.0	71 36.5	16	92	74.4	71 31.3	19	92	72.9	71 25.3	21	91	71.3	71 18.5	24	90	69.8	71 11.1	26	89	68.3	71 02.9	28	88	66.8	9
20	70 48.6	10	94	77.9	70 45.3	12	93	76.4	70 41.2	15	92	74.9	70 36.4	17	92	73.4	70 30.8	20	91	71.9	70 24.6	22	90	70.5	70 17.6	24	90	69.0	70 10.0	27	89	67.6	20
1	69 52.5	09	94	78.2	69 49.5	11	93	76.7	69 45.7	14	92	75.3	69 41.3	16	92	73.9	69 36.2	18	91	72.4	69 30.4	20	91	71.0	69 23.9	23	90	69.6	69 16.8	25	89	68.3	1
2	68 56.3	08	94	78.4	68 53.6	10	93	77.0	68 50.2	12	93	75.6	68 46.1	15	92	74.3	68 41.4	17	92	72.9	68 36.1	19	91	71.5	68 30.1	21	90	70.2	68 23.4	23	89	68.9	2
3	68 00.1	07	94	78.6	67 57.6	09	93	77.2	67 54.6	11	93	75.9	67 50.9	13	92	74.6	67 46.5	16	92	73.3	67 41.6	18	91	72.0	67 36.0	20	90	70.7	67 29.8	22	90	69.4	3
4	67 03.8	06	94	78.7	67 01.7	08	93	77.5	66 58.9	10	93	76.2	66 55.5	12	92	74.9	66 51.5	14	92	73.7	66 46.9	16	91	72.4	66 41.7	18	91	71.2	66 36.0	20	90	69.9	4
25	66 07.5	05	94	78.9	66 05.6	07	93	77.6	66 03.1	09	93	76.4	66 00.1	11	92	75.2	65 56.4	13	92	74.0	65 52.2	15	91	72.8	65 47.4	17	91	71.6	65 42.0	19	90	70.4	25
6	65 11.2	06	94	79.0	65 09.6	06	94	77.8	65 07.3	08	93	76.6	65 04.6	10	93	75.4	65 01.2	12	92	74.3	64 57.3	14	92	73.1	64 52.9	16	91	71.9	64 47.9	18	90	70.8	6
7	64 14.9	04	94	79.1	64 13.5	06	94	77.9	64 11.5	07	93	76.8	64 09.0	09	93	75.6	64 06.0	11	92	74.5	64 02.4	13	92	73.4	63 58.3	15	91	72.2	63 53.7	16	91	71.1	7
8	63 18.5	03	94	79.2	63 17.3	05	94	78.0	63 15.6	07	93	76.9	63 13.4	08	93	75.8	63 10.6	10	92	74.7	63 07.4	12	92	73.6	63 03.6	13	91	72.5	62 59.3	15	91	71.4	8
9	62 22.2	02	94	79.2	62 21.2	04	94	78.1	62 19.7	06	93	77.1	62 17.7	07	93	76.0	62 15.3	09	92	74.9	62 12.3	11	92	73.8	62 08.8	12	91	72.8	62 04.9	14	91	71.7	9
30	61 25.8	02	94	79.3	61 25.0	03	94	78.2	61 23.8	05	93	77.2	61 22.1	07	93	76.1	61 19.8	08	92	75.1	61 17.2	10	92	74.0	61 14.0	11	92	73.0	61 10.4	13	91	72.0	30
1	60 29.4	01	94	79.3	60 28.9	03	94	78.3	60 27.8	04	93	77.3	60 26.3	06	93	76.2	60 24.4	07	92	75.2	60 22.0	09	92	74.2	60 19.1	10	92	73.2	60 15.8	12	91	72.2	1
2	59 33.1	01	94	79.3	59 32.7	02	94	78.3	59 31.9	03	93	77.3	59 30.6	05	93	76.3	59 28.9	06	92	75.4	59 26.7	08	92	74.4	59 24.1	09	92	73.4	59 21.1	11	91	72.4	2
3	58 36.7	00	94	79.3	58 36.5	01	94	78.3	58 35.9	03	93	77.4	58 34.8	04	93	76.4	58 33.3	06	92	75.5	58 31.4	07	92	74.5	58 29.1	08	92	73.6	58 26.4	10	91	72.6	3
4	57 40.3	01	94	79.3	57 40.3	01	94	78.4	57 39.9	02	93	77.4	57 39.0	03	93	76.5	57 37.8	05	93	75.6	57 36.1	06	92	74.6	57 34.1	08	92	73.7	57 31.6	09	91	72.8	4
35	56 43.9	01	94	79.3	56 44.1	00	94	78.4	56 43.9	01	93	77.5	56 43.2	03	93	76.5	56 42.2	04	93	75.6	56 40.8	05	92	74.7	56 39.0	07	92	73.8	56 36.8	08	91	72.9	35
6	55 47.5	02	94	79.3	55 47.9	01	94	78.4	55 47.9	01	93	77.5	55 47.4	02	93	76.6	55 46.6	03	93	75.7	55 45.4	05	92	74.8	55 43.9	06	92	73.9	55 41.9	07	92	73.0	6
7	54 51.2	02	94	79.2	54 51.7	01	94	78.4	54 51.8	00	93	77.5	54 51.6	01	93	76.6	54 51.0	03	93	75.7	54 50.1	04	92	74.9	54 48.7	05	92	74.0	54 47.0	06	92	73.1	7
8	53 54.8	03	94	79.2	53 55.5	02	94	78.3	53 55.8	00	93	77.5	53 55.8	01	93	76.6	53 55.4	02	93	75.8	53 54.7	03	92	74.9	53 53.5	04	92	74.1	53 52.1	05	92	73.2	8
9	52 58.5	03	94	79.1	52 59.3	02	94	78.3	52 59.8	01	93	77.5	53 00.0	00	93	76.6	52 59.8	01	93	75.8	52 59.2	02	92	75.0	52 58.4	04	92	74.1	52 57.1	05	92	73.3	9
40	52 02.1	04	94	79.1	52 03.1	03	94	78.3	52 03.8	02	93	77.4	52 04.1	01	93	76.6	52 04.2	01	93	75.8	52 03.8	02	92	75.0	52 03.2	03	92	74.2	52 02.2	04	92	73.4	40
1	51 05.8	04	94	79.0	51 07.0	03	94	78.2	51 07.8	02	93	77.4	51 08.3	01	93	76.6	51 08.5	00	93	75.8	51 08.4	01	92	75.0	51 07.9	02	92	74.2	51 07.2	03	92	73.4	1
2	50 09.5	05	94	78.9	50 10.8	04	94	78.2	50 11.8	03	93	77.4	50 12.5	02	93	76.6	50 12.9	01	93	75.8	50 13.0	00	92	75.0	50 12.7	01	92	74.3	50 12.2	02	92	73.5	2
3	49 13.2	05	94	78.9	49 14.6	04	94	78.1	49 15.8	03	93	77.3	49 16.7	02	93	76.6	49 17.3	01	93	75.8	49 17.5	00	92	75.0	49 17.5	01	92	74.3	49 17.1	02	92	73.5	3
4	48 16.9	06	94	78.8	48 18.5	05	94	78.0	48 19.8	04	93	77.3	48 20.9	03	93	76.5	48 21.6	02	93	75.8	48 22.1	01	92	75.0	48 22.3	00	92	74.3	48 22.1	01	92	73.5	4
45	47 20.6	06	94	78.7	47 22.4	05	94	78.0	47 23.9	05	93	77.2	47 25.1	04	93	76.5	47 26.0	03	93	75.7	47 26.7	02	92	75.0	47 27.0	01	92	74.3	47 27.1	00	92	73.5	45
6	46 24.3	07	94	78.6	46 26.3	06	93	77.9	46 27.9	05	93	77.2	46 29.3	04	93	76.4	46 30.4	03	93	75.7	46 31.2	02	92	75.0	46 31.8	01	92	74.3	46 32.1	00	92	73.5	6
7	45 28.1	07	94	78.5	45 30.2	06	93	77.8	45 32.0	06	93	77.1	45 33.5	05	93	76.4	45 34.8	04	93	75.7	45 35.8	03	92	74.9	45 36.6	02	92	74.2	45 37.1	01	92	73.5	7
8	44 31.9	08	94	78.4	44 34.1	07	93	77.7	44 36.1	06	93	77.0	44 37.8	05	93	76.3	44 39.2	04	93	75.6	44 40.4	04	92	74.9	44 41.4	03	92	74.2	44 42.0	02	92	73.5	8
9	43 35.7	08	94	78.3	43 38.1	07	93	77.6	43 40.2	07	93	76.9	43 42.0	06	93	76.2	43 43.7	05	93	75.5	43 45.0	04	92	74.9	43 46.2	03	92	74.2	43 47.0	02	92	73.5	9
50	42 39.5	09	94	78.2	42 42.0	08	93	77.5	42 44.3	07	93	76.8	42 46.3	06	93	76.2	42 48.1	06	93	75.5	42 49.7	05	92	74.8	42 51.0	04	92	74.1	42 52.0	03	92	73.4	50
1	41 43.4	09	94	78.1	41 46.0	08	93	77.4	41 48.4	08	93	76.7	41 50.6	07	93	76.1	41 52.6	06	92	75.4	41 54.3	05	92	74.7	41 55.8	05	92	74.1	41 57.0	04	92	73.4	1
2	40 47.2	10	94	78.0	40 50.0	09	93	77.3	40 52.6	08	93	76.6	40 54.9	07	93	76.0	40 57.1	07	92	75.3	40 59.0	06	92	74.7	41 00.6	05	92	74.0	41 02.1	04	92	73.3	2
3	39 51.1	10	93	77.8	39 54.1	09	93	77.2	39 56.8	09	93	76.5	39 59.3	08	93	75.9	40 01.6	07	92	75.2	40 03.6	07	92	74.6	40 05.5	06	92	73.9	40 07.1	05	92	73.3	3
4	38 55.0	11	93	77.7	38 58.1	10	93	77.1	39 01.0	09	93	76.4	39 03.6	09	93	75.8	39 06.1	08	92	75.1	39 08.3	07	92	74.5	39 10.3	06	92	73.9	39 12.2	06	92	73.2	4
55	37 59.0	11	93	77.6	38 02.2	10	93	77.0	38 05.2	10	93	76.3	38 08.0	09	93	75.7	38 10.6	08	92	75.1	38 13.0	08	92	74.4	38 15.2	07	92	73.8	38 17.2	06	92	73.1	55
6	37 03.0	12	93	77.4	37 06.3	11	93	76.8	37 09.5	10	93	76.2	37 12.5	10	93	75.6	37 15.2	09	92	75.0	37 17.8	08	92	74.3	37 20.2	08	92	73.7	37 22.3	07	91	73.1	6
7	36 07.0	12	93	77.3	36 10.5	11	93	76.7	36 13.8	11	93	76.1	36 16.9	10	93	75.5	36 19.8	09	92	74.8	36 22.6	09	92	74.2	36 25.1	08	92	73.6	36 27.4	08	91	73.0	7
8	35 11.0	12	93	77.2	35 14.7	12	93	76.6	35 18.1	11	93	76.0	35 21.4	11	92	75.3	35 24.4	10	92	74.7	35 27.3	09	92	74.1	35 39.1	09	92	73.5	35 32.6	08	91	72.9	8
9	34 15.1	13	93	77.0	34 18.9	12	93	76.4	34 22.5	12	93	75.8	34 25.9	11	92	75.2	34 29.1	11	92	74.6	34 32.2	10	92	74.0	34 35.1	09	92	73.4	34 37.8	09	91	72.8	9
60	33 19.2	13	93	76.9	33 23.1	13	93	76.3	33 26.8	12	93	75.7	33 30.4	12	92	75.1	33 33.8	11	92	74.5	33 37.0	10	92	73.9	33 40.1	10	92	73.3	33 43.0	09	91	72.7	60
1	32 23.3	14	93	76.7	32 27.4	13	93	76.1	32 31.3	13	93	75.6	32 35.0	12	92	75.0	32 38.5	12	92	74.4	32 41.9	11	92	73.8	32 45.1	10	92	73.2	32 48.2	10	91	72.6	1
2	31 27.5	14	93	76.6	31 31.7	14	93	76.0	31 35.7	13	92	75.4	31 39.6	13	92	74.8	31 43.3	12	92	74.2	31 46.8	12	92	73.7	31 50.2	11	92	73.1	31 53.5	10	91	72.5	2
3	30 31.7	15	93	76.4	30 36.0	14	93	75.8	30 40.2	14	92	75.3	30 44.2	13	92	74.7	30 48.1	13	92	74.1	30 51.8	12	92	73.5	30 55.4	12	91	73.0	30 58.8	11	91	72.4	3
4	29 36.0	15	93	76.3	29 40.4	15	93	75.7	29 44.7	14	92	75.1	29 48.9	14	92	74.5	29 52.9	13	92	74.0	29 56.8	13	92	73.4	30 00.5	12	91	72.8	30 04.1	12	91	72.3	4
65	28 40.2	16	93	76.1	28 44.8	15	93	75.5	28 49.3	15	92	75.0	28 53.6	14	92	74.4	28 57.8	14	92	73.8	29 01.8	13	92	73.3	29 05.7	13	91	72.7	29 09.5	12	91	72.1	65
6	27 44.6	16	93	75.9	27 49.3	16	92	75.4	27 53.9	15	92	74.8	27 58.4	15	92	74.2	28 02.7	14	92	73.7	28 06.9	14	91	73.1	28 11.0	13	91	72.6	28 14.9	13	91	72.0	6
7	26 48.9	16	93	75.7	26 53.8	16	92	75.2	26 58.6	16	92	74.6	27 03.2	15	92	74.1	27 07.7	15	92	73.5	27 12.0	14	91	73.0	27 16.2	14	91	72.4	27 20.3	13	91	71.9	7
8	25 53.3	17	93	75.6	25 58.4	17	92	75.0	26 03.3	16	92	74.5	26 08.0	16	92	73.9	26 12.7	15	92	73.4	26 17.2	15	91	72.8	26 21.6	14	91	72.3	26 25.8	14	91	71.7	8
9	24 57.8	17	92	75.4	25 03.0	17	92	74.9	25 08.0	17	92	74.3	25 12.9	16	92	73.8	25 17.7	16	92	73.2	25 22.4	15	91	72.7	25 26.9	15	91	72.1	25 31.4	15	91	71.6	9
70	24 02.3	18	92	75.2	24 07.6	17	92	74.7	24 12.8	17	92	74.1	24 17.8	17	92	73.6	24 22.8	16	92	73.1	24 27.6	16	91	72.5	24 32.3	16	91	72.0	24 36.9	15	91	71.4	70
1	23 06.8	18	92	75.0	23 12.3	18	92	74.5	23 17.6	18	92	74.0	23 22.8	17	92	73.4	23 27.9	17	91	72.9	23 32.9	16	91	72.3	23 37.8	16	91	71.8	23 42.6	16	91	71.3	1
2	22 11.4	19	92	74.8	22 17.0	18	92	74.3	22 22.5	18	92	73.8	22 27.9	18	92	73.2	22 33.1	17	91	72.7	22 38.3	17	91	72.2	22 43.3	17	91	71.6	22 48.3	16	90	71.1	2
3	21 16.1	19	92	74.6	21 21.8	19	92	74.1	21 27.4	19	92	73.6	21 32.9	18	91	73.1	21 38.4	18	91	72.5	21 43.7	18	91	72.0	21 48.9	17	91	71.5	21 54.0	17	90	70.9	3
4	20 20.8	20	92	74.5	20 26.6	19	92	73.9	20 32.4	19	92	73.4	20 38.1	19	91	72.9	20 43.7	18	91	72.4	20 49.1	18	91	71.8	20 54.5	18	90	71.3	20 59.8	17	90	70.8	4
75	19 25.5	20	92	74.3	19 31.5	20	92	73.7	19 37.4	20	92	73.2	19 43.3	19	91	72.7	19 49.0	19	91	72.2	19 54.6	19	91	71.6	20 00.2	18	90	71.1	20 05.7	18	90	70.6	75
6	18 30.3	21	92	74.0	18 36.5	20	92	73.5	18 42.5	20	91	73.0	18 48.5	20	91	72.5	18 54.4	19	91	72.0	19 00.2	19	91	71.5	19 05.9	19	90	70.9	19 11.6	19	90	70.4	6
7	17 35.2	21	92	73.8	17 41.5	21	92	73.3	17 47.7	21	91	72.8	17 53.8	20	91	72.3	17 59.9	20	91	71.8	18 05.8	20	90	71.3	18 11.7	19	90	70.8	18 17.5	19	90	70.2	7
8	16 40.1	22	92	73.6	16 46.5	21	91	73.1	16 52.9	21	91	72.6	16 59.2	21	91	72.1	17 05.4	21	91	71.6	17 11.5	20	90	71.1	17 17.6	20	90	70.6	17 23.6	20	90	70.1	8
9	15 45.1	22	92	73.4	15 51.7	22	91	72.9	15 58.2	22	91	72.4	16 04.6	21	91	71.9	16 11.0	21	91	71.4	16 17.3	21	90	70.9	16 23.5	21	90	70.4	16 29.7	20	90	69.9	9
80	14 50.1	23	91	73.2	14 56.9	22	91	72.7	15 03.5	22	91	72.2	15 10.1	22	91	71.7	15 16.6	22	90	71.2	15 23.1	21	90	70.7	15 29.5	21	90	70.2	15 35.8	21	90	69.7	80
1	13 55.2	23	91	73.0	14 02.1	23	91	72.5	14 08.9	23	91	72.0	14 15.7	22	91	71.5	14 22.4	22	90	71.0	14 29.0	22	90	70.5	14 35.6	22	90	70.0	14 42.1	22	89	69.5	1
2	13 00.4	24	91	72.8	13 07.4	23	91	72.3	13 14.4	23	91	71.8	13 21.3	23	90	71.3	13 28.2	23	90	70.8	13 35.0	23	90	70.3	13 41.7	22	90	69.8	13 48.4	22	89	69.3	2
3	12 05.6	24	91	72.5	12 12.8	24	91	72.0	12 19.9	24	91	71.5	12 27.0	23	90	71.0	12 34.0	23	90	70.5	12 41.0	23	90	70.0	12 47.9	23	90	69.5	12 54.7	23	89	69.0	3
4	11 10.9	25	91	72.3	11 18.3	24	91	71.8	11 25.5	24	90	71.3	11 32.8	24	90	70.8	11 40.0	24	90	70.3	11 47.1	24	90	69.8	11 54.2	24	89	69.3	12 01.2	23	89	68.8	4
85	10 16.3	25	91	72.1	10 23.8	25	91	71.6	10 31.2	25	90	71.1	10 38.6	25	90	70.6	10 46.0	24	90	70.1	10 53.3	24	90	69.6	11 00.5	24	89	69.1	11 07.7	24	89	68.6	85
6	9 21.8	26	91	71.8	9 29.4	25	91	71.3	9 37.0	25	90	70.8	9 44.6	25	90	70.3	9 52.1	25	90	69.9	9 59.5	25	89	69.4	10 07.0	25	89	68.9	10 14.4	25	89	68.4	6
7	8 27.3	26	91	71.6	8 35.1	26	90	71.1	8 42.8	26	90	70.6	8 50.6	26	90	70.1	8 58.2	26	90	69.6	9 05.9	25	89	69.1	9 13.5	25	89	68.6	9 21.1	25	89	68.1	7
8	7 32.9	27	91	71.3	7 40.8	26	90	70.8	7 48.8	26	90	70.3	7 56.6	26	90	69.9	8 04.5	26	90	69.4	8 12.3	26	89	68.9	8 20.1	26	89	68.4	8 27.8	26	89	67.9	8
9	6 38.6	27	90	71.1	6 46.7	27	90	70.6	6 54.8	27	90	70.1	7 02.8	27	90	69.6	7 10.8	27	89	69.1	7 18.8	27	89	68.6	7 26.8	26	89	68.2	7 34.7	26	88	67.7	9
90	5 44.3	28	90	70.8	5 52.6	28	90	70.3	6 00.9	27	90	69.8	6 09.1	27	89	69.4	6 17.3	27	89	68.9	6 25.4	27	89	68.4	6 33.6	27	88	67.9	6 41.7	27	88	67.4	90

DECLINATION CONTRARY NAME TO LATITUDE

Lat. 17°

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	53 00.0	1.0 01	180.0	52 30.0	1.0 01	180.0	52 00.0	1.0 01	180.0	51 30.0	1.0 01	180.0	51 00.0	1.0 01	180.0	50 30.0	1.0 01	180.0	50 00.0	1.0 01	180.0	49 30.0	1.0 01	180.0	00
1	52 59.2	1.0 04	178.4	52 29.2	1.0 04	178.5	51 59.2	1.0 04	178.5	51 29.3	1.0 04	178.5	50 59.3	1.0 04	178.5	50 29.3	1.0 04	178.5	49 59.3	1.0 04	178.6	49 29.3	1.0 04	178.6	1
2	52 56.9	1.0 06	176.9	52 26.9	1.0 06	176.9	51 57.0	1.0 06	177.0	51 27.0	1.0 06	177.0	50 57.1	1.0 06	177.1	50 27.1	1.0 06	177.1	49 57.1	1.0 06	177.1	49 27.2	1.0 06	177.2	2
3	52 53.0	1.0 09	175.3	52 23.1	1.0 09	175.4	51 53.2	1.0 09	175.5	51 23.3	1.0 09	175.5	50 53.4	1.0 08	175.6	50 23.5	1.0 08	175.7	49 53.6	1.0 08	175.7	49 23.6	1.0 08	175.8	3
4	52 47.5	99 12	173.8	52 17.7	99 11	173.9	51 47.9	99 11	174.0	51 18.1	99 11	174.0	50 48.2	99 11	174.1	50 18.4	99 11	174.2	49 48.6	99 11	174.3	49 18.7	99 11	174.4	4
05	52 40.5	99 14	172.2	52 10.8	99 14	172.3	51 41.1	99 14	172.5	51 11.4	99 14	172.6	50 41.6	99 13	172.7	50 11.9	99 13	172.8	49 42.1	99 13	172.9	49 12.4	99 13	173.0	05
6	52 32.0	99 17	170.7	52 02.4	99 16	170.8	51 32.8	99 16	171.0	51 03.2	99 16	171.1	50 33.6	99 16	171.2	50 04.0	99 16	171.3	49 34.3	99 15	171.5	49 04.7	99 15	171.6	6
7	52 22.0	98 19	169.2	51 52.6	98 19	169.3	51 23.1	98 19	169.5	50 53.6	98 18	169.6	50 24.1	98 18	169.8	49 54.6	98 18	169.9	49 25.1	98 18	170.1	48 55.6	98 17	170.2	7
8	52 10.5	98 22	167.7	51 41.2	98 21	167.9	51 11.9	98 21	168.0	50 42.6	98 21	168.2	50 13.3	98 20	168.4	49 43.9	98 20	168.5	49 14.5	98 20	168.7	48 45.2	98 20	168.8	8
9	51 57.6	97 24	166.2	51 28.4	97 24	166.4	50 59.3	97 23	166.6	50 30.2	97 23	166.8	50 01.0	97 23	167.0	49 31.8	97 22	167.1	49 02.6	97 22	167.3	48 33.4	97 22	167.5	9
10	51 43.1	96 26	164.7	51 14.2	96 26	164.9	50 45.3	96 26	165.2	50 16.3	97 25	165.4	49 47.4	97 25	165.6	49 18.4	97 25	165.8	48 49.3	97 24	165.9	48 20.3	97 24	166.1	10
1	51 27.3	96 29	163.3	50 58.6	96 28	163.5	50 29.9	96 28	163.7	50 01.2	96 28	164.0	49 32.4	96 27	164.2	49 03.6	96 27	164.4	48 34.8	96 26	164.6	48 05.9	96 26	164.8	1
2	51 10.1	95 31	161.8	50 41.7	95 30	162.1	50 13.2	95 30	162.3	49 44.6	95 30	162.6	49 16.1	95 29	162.8	48 47.5	95 29	163.0	48 18.9	95 29	163.3	47 50.2	96 28	163.5	2
3	50 51.6	94 33	160.4	50 23.4	94 33	160.7	49 55.1	94 32	161.0	49 26.8	94 32	161.2	48 58.5	94 32	161.5	48 30.1	95 31	161.7	48 01.7	95 31	162.0	47 33.3	95 30	162.2	3
4	50 31.7	93 35	159.0	50 03.8	93 35	159.3	49 35.8	93 34	159.6	49 07.7	94 34	159.9	48 39.6	94 34	160.1	48 11.5	94 33	160.4	47 43.4	94 33	160.7	47 15.2	94 32	160.9	4
15	50 10.6	92 37	157.7	49 42.9	92 37	158.0	49 15.1	93 36	158.3	48 47.4	93 36	158.6	48 19.5	93 36	158.8	47 51.7	93 35	159.1	47 23.8	93 35	159.4	46 55.8	93 34	159.7	15
6	49 48.1	91 39	156.3	49 20.7	91 39	156.7	48 53.3	92 38	157.0	48 25.8	92 38	157.3	47 58.2	92 38	157.6	47 30.6	92 37	157.9	47 03.0	92 37	158.1	46 35.3	92 36	158.4	6
7	49 24.5	90 41	155.0	48 57.4	90 41	155.4	48 30.2	91 40	155.7	48 03.0	91 40	156.0	47 35.7	91 39	156.3	47 08.4	91 39	156.6	46 41.0	91 38	156.9	46 13.6	91 38	157.2	7
8	48 59.7	89 43	153.7	48 32.9	89 43	154.1	48 06.0	90 42	154.4	47 39.1	90 42	154.7	47 12.1	90 41	155.1	46 45.1	90 41	155.4	46 18.0	90 40	155.7	45 50.8	91 40	156.0	8
9	48 33.7	88 45	152.5	48 07.2	88 45	152.8	47 40.7	89 44	153.2	47 14.0	89 44	153.5	46 47.3	89 43	153.8	46 20.6	89 43	154.2	45 53.8	89 42	154.5	45 26.9	90 42	154.8	9
20	48 06.7	87 47	151.2	47 40.5	87 46	151.6	47 14.2	88 46	151.9	46 47.9	88 45	152.3	46 21.5	88 45	152.6	45 55.1	88 44	153.0	45 28.6	88 44	153.3	45 02.0	89 43	153.7	20
1	47 38.5	86 49	150.0	47 12.6	86 48	150.4	46 46.7	87 48	150.8	46 20.7	87 47	151.1	45 54.6	87 46	151.5	45 28.5	87 46	151.8	45 02.3	87 46	152.2	44 36.0	88 45	152.5	1
2	47 09.3	85 50	148.8	46 43.8	85 50	149.2	46 18.2	86 49	149.6	45 52.5	86 49	150.0	45 26.7	86 48	150.3	45 00.9	86 48	150.7	44 35.0	86 47	151.0	44 09.0	87 47	151.4	2
3	46 39.1	84 52	147.7	46 13.9	84 51	148.1	45 48.6	84 51	148.4	45 23.3	85 50	148.8	44 57.8	85 50	149.2	44 32.3	85 49	149.6	44 06.7	85 49	149.9	43 41.1	86 48	150.3	3
4	46 08.0	83 54	146.5	45 43.1	83 53	146.9	45 18.1	83 52	147.3	44 53.1	84 52	147.7	44 28.0	84 51	148.1	44 02.8	84 51	148.5	43 37.5	84 50	148.9	43 12.2	85 50	149.2	4
25	45 35.8	82 55	145.4	45 11.3	82 54	145.8	44 46.7	82 54	146.2	44 22.0	82 53	146.6	43 57.2	83 53	147.0	43 32.3	83 52	147.4	43 07.4	83 52	147.8	42 42.4	84 51	148.2	25
6	45 02.8	80 56	144.3	44 38.6	81 56	144.8	44 14.4	81 56	145.2	43 50.0	81 55	145.6	43 25.5	82 54	146.0	43 01.0	82 54	146.4	42 36.4	82 53	146.8	42 11.7	82 53	147.1	6
7	44 28.9	79 58	143.3	44 05.1	80 57	143.7	43 41.1	80 57	144.1	43 17.1	80 56	144.5	42 53.0	81 56	144.9	42 28.8	81 55	145.3	42 04.5	81 54	145.7	41 40.1	81 54	146.1	7
8	43 54.2	78 59	142.2	43 30.7	79 59	142.7	43 07.1	79 58	143.1	42 43.4	79 58	143.5	42 19.6	79 57	143.9	41 55.7	80 56	144.3	41 31.8	80 56	144.7	41 07.7	80 55	145.1	8
9	43 18.7	77 61	141.2	42 55.5	77 60	141.7	42 32.3	78 60	142.1	42 08.9	78 59	142.5	41 45.4	78 58	142.9	41 21.9	79 58	143.4	40 58.2	79 57	143.8	40 34.5	79 57	144.2	9
30	42 42.4	76 62	140.3	42 19.6	76 61	140.7	41 56.6	77 61	141.1	41 33.6	77 60	141.6	41 10.5	77 60	142.0	40 47.3	78 59	142.4	40 24.0	78 58	142.8	40 00.6	78 58	143.2	30
1	42 05.3	75 63	139.3	41 42.8	75 62	139.7	41 20.2	75 62	140.2	40 57.6	76 61	140.6	40 34.8	76 61	141.0	40 11.9	76 60	141.5	39 48.9	77 60	141.9	39 25.8	77 59	142.3	1
2	41 27.6	74 64	138.4	41 05.4	74 64	138.8	40 43.1	74 63	139.3	40 20.8	75 62	139.7	39 58.3	75 62	140.1	39 35.8	75 61	140.6	39 13.1	76 61	141.0	38 50.4	76 60	141.4	2
3	40 49.1	73 65	137.4	40 27.3	73 65	137.9	40 05.3	73 64	138.3	39 43.3	74 64	138.8	39 21.2	74 63	139.2	38 59.0	74 62	139.7	38 36.7	75 62	140.1	38 14.2	75 61	140.5	3
4	40 10.0	71 66	136.6	39 48.5	72 66	137.0	39 26.9	72 65	137.5	39 05.2	72 65	137.9	38 43.4	73 64	138.4	38 21.5	73 64	138.8	37 59.5	73 63	139.2	37 37.4	74 62	139.6	4
35	39 30.2	70 67	135.7	39 09.0	71 67	136.1	38 47.8	71 66	136.6	38 26.4	71 66	137.1	38 04.9	72 65	137.5	37 43.4	72 65	137.9	37 21.7	72 64	138.4	37 00.0	73 64	138.8	35
6	38 49.8	69 68	134.8	38 29.0	70 68	135.3	38 08.0	70 67	135.8	37 47.0	70 67	136.2	37 25.9	71 66	136.7	37 04.6	71 66	137.1	36 43.3	71 65	137.5	36 21.9	72 64	138.0	6
7	38 08.8	68 69	134.0	37 48.3	69 69	134.5	37 27.7	69 68	134.9	37 07.0	69 68	135.4	36 46.2	70 67	135.8	36 25.3	70 67	136.3	36 04.3	70 66	136.7	35 43.1	71 66	137.2	7
8	37 27.3	67 70	133.2	37 07.1	67 70	133.7	36 46.8	68 69	134.1	36 26.4	68 69	134.6	36 05.9	68 68	135.1	35 45.3	69 67	135.5	35 24.6	69 67	135.9	35 03.9	69 66	136.4	8
9	36 45.2	66 71	132.4	36 25.3	66 70	132.9	36 05.4	67 70	133.4	35 45.3	67 69	133.8	35 25.1	67 69	134.3	35 04.8	68 68	134.7	34 44.5	68 68	135.2	34 24.0	68 67	135.6	9
40	36 02.6	65 72	131.7	35 43.0	65 71	132.1	35 23.4	66 71	132.6	35 03.6	66 70	133.1	34 43.8	66 70	133.5	34 23.8	67 69	134.0	34 03.8	67 69	134.4	33 43.6	67 68	134.9	40
1	35 19.5	64 73	130.9	35 00.2	64 72	131.4	34 40.9	65 72	131.9	34 21.5	65 71	132.3	34 01.9	65 71	132.8	33 42.3	66 70	133.2	33 22.5	66 70	133.7	33 02.7	66 69	134.1	1
2	34 35.9	63 73	130.2	34 17.0	63 73	130.7	33 57.9	64 72	131.1	33 38.8	64 72	131.6	33 19.6	64 71	132.1	33 00.2	65 71	132.5	32 40.8	65 70	133.0	32 21.2	65 70	133.4	2
3	33 51.8	62 74	129.5	33 33.2	62 74	130.0	33 14.5	63 73	130.4	32 55.6	63 73	130.9	32 36.7	63 72	131.3	32 17.7	64 72	131.8	31 58.5	64 71	132.3	31 39.3	64 71	132.7	3
4	33 07.3	61 75	128.8	32 49.0	61 74	129.3	32 30.6	62 74	129.7	32 12.0	62 73	130.2	31 53.4	62 73	130.7	31 34.7	63 72	131.1	31 15.8	63 72	131.6	30 56.9	63 71	132.0	4
45	32 22.4	60 76	128.1	32 04.4	60 75	128.6	31 46.2	61 74	129.1	31 28.0	61 74	129.5	31 09.7	61 74	130.0	30 51.2	62 73	130.5	30 32.7	62 73	130.9	30 14.1	62 72	131.4	45
6	31 37.0	59 76	127.5	31 19.3	59 76	127.9	31 01.5	60 75	128.4	30 43.5	60 75	128.9	30 25.5	60 74	129.3	30 07.4	61 74	129.8	29 49.1	61 73	130.3	29 30.8	61 73	130.7	6
7	30 51.3	58 77	126.8	30 33.9	58 76	127.3	30 16.3	59 76	127.8	29 58.7	59 75	128.2	29 40.9	59 75	128.7	29 23.1	60 74	129.2	29 05.1	60 74	129.6	28 47.1	60 74	130.1	7
8	30 05.2	57 77	126.2	29 48.0	57 77	126.7	29 30.8	58 77	127.1	29 13.4	58 76	127.6	28 55.9	58 76	128.1	28 38.4	59 75	128.5	28 20.7	59 75	129.0	28 03.0	59 74	129.4	8
9	29 18.7	56 78	125.6	29 01.8	56 78	126.1	28 44.8	57 77	126.5	28 27.7	57 77	127.0	28 10.6	57 76	127.5	27 53.3	58 76	127.9	27 35.9	58 75	128.4	27 18.5	58 75	128.8	9
50	28 31.9	55 79	125.0	28 15.2	56 78	125.5	27 58.5	56 78	125.9	27 41.7	56 77	126.4	27 24.8	56 77	126.9	27 07.8	57 76	127.3	26 50.8	57 76	127.8	26 33.6	57 75	128.2	50
1	27 44.7	54 79	124.4	27 28.3	55 79	124.9	27 11.9	55 78	125.3	26 55.4	55 78	125.8	26 38.8	56 77	126.3	26 22.0	56 77	126.7	26 05.2	56 76	127.2	25 48.4	56 76	127.7	1
2	26 57.2	53 80	123.8	26 41.1	54 79	124.3	26 24.9	54 79	124.8	26 08.7	54 78	125.2	25 52.3	55 78	125.7	25 35.9	55 77	126.2	25 19.4	55 77	126.6	25 02.8	56 77	127.1	2
3	26 09.3	53 80	123.3	25 53.5	53 80	123.7	25 37.6	53 79	124.2	25 21.7	53 79	124.7	25 05.6	54 78	125.1	24 49.4	54 78	125.6	24 33.2	54 78	126.1	24 16.8	55 77	126.5	3
4	25 21.2	52 81	122.7	25 05.7	52 80	123.2	24 50.0	52 80	123.7	24 34.3	53 79	124.1	24 18.5	53 79	124.6	24 02.6	53 79	125.1	23 46.6	53 78	125.5	23 30.6	54 78	126.0	4
55	24 32.8	51 81	122.2	24 17.5	51 81	122.7	24 02.1	51 80	123.1	23 46.7	52 80	123.6	23 31.1	52 79	124.1	23 15.5	52 79	124.5	22 59.8	53 78	125.0	22 44.0	53 78	125.5	55
6	23 44.1	50 82	121.7	23 29.1	50 81	122.1	23 14.0	51 81	122.6	22 58.7	51 80	123.1	22 43.5	51 80	123.6	22 28.1	51 80	124.0	22 12.6	52 79	124.5	21 57.1	52 79	124.9	6
7	22 55.2	49 82	121.2	22 40.4	49 82	121.6	22 25.5	50 81	122.1	22 10.5	50 81	122.6	21 55.5	50 80	123.0	21 40.4	51 80	123.5	21 25.2	51 80	124.0	21 09.9	51 79	124.4	7
8	22 05.9	48 82	120.7	21 51.4	49 82	121.1	21 36.8	49 82	121.6	21 22.0	49 81	122.1	21 07.3	49 81	122.6	20 52.4	50 80	123.0	20 37.5	50 80	123.5	20 22.5	50 80	123.9	8
9	21 16.5	48 83	120.2	21 02.1	48 82	120.7	20 47.8	48 82	121.1	20 33.3	48 82	121.6	20 18.8	49 81	122.1	20 04.2	49 81	122.5	19 49.5	49 80	123.0	19 34.7	49 80	123.5	9
60	20 26.7	47 83	119.7	20 12.7	47 83	120.2	19 58.5	47 82	120.7	19 44.3	48 82	121.1	19 30.0	48 82	121.6	19 15.7	48 81	122.1	19 01.2	48 81	122.5	18 46.7	48 80	123.0	60
1	19 36.8	46 84	119.2	19 23.0	46 83	119.7	19 09.0	46 83	120.2	18 55.1	47 82	120.7	18 41.0	47 82	121.1	18 26.9	47 82	121.6	18 12.7	47 81	122.1	17 58.5	48 81	122.5	1
2	18 46.6	45 84	118.8	18 33.0	45 84	119.3	18 19.3	46 83	119.7	18 05.6	46 83	120.2	17 51.8	46 83	120.7	17 37.9	46 82	121.1	17 24.0	47 82	121.6	17 10.0	47 81	122.1	2
3	17 56.2	44 84	118.4	17 42.8	45 84	118.8	17 29.4	45 84	119.3	17 15.9	45 83	119.8	17 02.3	45 83	120.2	16 48.7	46 82	120.7	16 35.0	46 82	121.2	16 21.2	46 82	121.6	3
4	17 05.6	44 85	117.9	16 52.5	44 84	118.4	16 39.3	44 84	118.9	16 26.0	44 84	119.3	16 12.6	45 83	119.8	15 59.2	45 83	120.3	15 45.8	45 82	120.7	15 32.2	45 82	121.2	4
65	16 14.8	43 85	117.5	16 01.9	43 85	118.0	15 48.9	43 84	118.4	15 35.8	44 84	118.9	15 22.7	44 84	119.4	15 09.6	44 83	119.8	14 56.3	44 83	120.3	14 43.0	44 82	120.8	65
6	15 23.8	42 85	117.1	15 11.1	42 85	117.5	14 58.3	43 84	118.0	14 45.5	43 84	118.5	14 32.6	43 84	118.9	14 19.7	43 83	119.4	14 06.7	43 83	119.9	13 53.6	44 83	120.3	6
7	14 32.7	42 86	116.7	14 20.1	42 85	117.1	14 07.6	42 85	117.6	13 55.0	42 85	118.1	13 42.3	42 84	118.5	13 29.6	42 84	119.0	13 16.8	43 83	119.5	13 04.0	43 83	119.9	7
8	13 41.3	41 86	116.3	13 29.0	41 86	116.7	13 16.7	41 85	117.2	13 04.3	41 85	117.7	12 51.8	42 84	118.1	12 39.3	42 84	118.6	12 26.8	42 84	119.1	12 14.2	42 83	119.5	8
9	12 49.7	40 86	115.9	12 37.7	40 86	116.3	12 25.5	41 86	116.8	12 13.3	41 85	117.3	12 01.1	41 85	117.7	11 48.8	41 84	118.2	11 36.5	41 84	118.7	11 24.2	41 84	119.1	9
70	11 58.0	40 86	115.5	11 46.2	40 86	116.0	11 34.2	40 86	116.4	11 22.3	40 85	116.9	11 10.2	40 85	117.4	10 58.2	40 85	117.8	10 46.1	40 84	118.3	10 33.9	41 84	118.8	70
1	11 06.2	39 87	115.1	10 54.5	39 86	115.6	10 42.8	39 86	116.1	10 31.0	39 86	116.5	10 19.2	39 85	117.0	10 07.4	40 85	117.5	9 55.5	40 85	117.9	9 43.6	40 84	118.4	1
2	10 14.1	38 87	114.7	10 02.7	38 87	115.2	9 51.1	38 86	115.7	9 39.6	39 86	116.2	9 28.0	39 86	116.6	9 16.4	39 85	117.1	9 04.7	39 85	117.6	8 53.0	39 85	118.0	2
3	9 22.0	38 87	114.4	9 10.7	38 87	114.9	8 59.4	38 87	115.3	8 48.0	38 86	115.8	8 36.6	38 86	116.3	8 25.2	38 86	116.7	8 13.7	38 85	117.2	8 02.3	38 85	117.7	3
4	8 29.6	37 87	114.0	8 18.5	37 87	114.5	8 07.4	37 87	115.0	7 56.3	37 86	115.4	7 45.1	37 86	115.9	7 33.9	37 86	116.4	7 22.6	38 86	116.8	7 11.4	38 85	117.3	4
75	7 37.1	36 88	113.7	7 26.3	36 87	114.2	7 15.3	36 87	114.6	7 04.4	37 87	115.1	6 53.4	37 86	115.6	6 42.4	37 86	116.0	6 31.4	37 86	116.5	6 20.3	37 85	117.0	75
6	6 44.5	36 88	113.3	6 33.8	36 88	113.8	6 23.1	36 87	114.3	6 12.3	36 87	114.8	6 01.6	36 87	115.2	5 50.8	36 86	115.7	5 39.9	36 86	116.2	5 29.1	36 86	116.6	6
7	5 51.8	35 88	113.0	5 41.3	35 88	113.5	5 30.7	35 87	114.0	5 20.2	35 87	114.4	5 09.6	35 87	114.9										7

DECLINATION SAME NAME AS LATITUDE

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91							5 07.0	28 90	69.6	5 15.4	28 89	69.1	5 23.8	28 89	68.6	5 32.1	28 89	68.1	5 40.5	28 88	67.7	5 48.8	28 88	67.2	91

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	83 00.0	1.0 06	00.0	82 30.0	1.0 06	00.0	82 00.0	1.0 05	00.0	81 30.0	1.0 05	00.0	81 00.0	1.0 05	00.0	80 30.0	1.0 04	00.0	80 00.0	1.0 04	00.0	79 30.0	1.0 04	00.0	00
1	82 56.3	99 18	07.5	82 26.5	99 17	06.9	81 56.8	99 16	06.5	81 27.0	99 15	06.1	80 57.1	99 14	05.7	80 27.3	99 13	05.4	79 57.4	1.0 13	05.1	79 27.6	1.0 12	04.9	1
2	82 45.2	96 30	14.6	82 16.2	97 28	13.7	81 47.1	97 26	12.8	81 17.9	98 25	12.0	80 48.6	98 23	11.3	80 19.2	98 22	10.7	79 49.8	98 21	10.1	79 20.3	98 20	09.6	2
3	82 27.5	92 40	21.4	81 59.6	93 37	20.0	81 31.5	94 35	18.8	81 03.2	95 33	17.7	80 34.7	95 32	16.7	80 06.1	96 30	15.8	79 37.3	96 28	15.0	79 08.4	96 27	14.3	3
4	82 03.7	88 48	27.5	81 37.2	89 46	25.8	81 10.4	90 43	24.3	80 43.2	91 41	23.0	80 15.8	92 39	21.8	79 48.1	93 37	20.6	79 20.2	93 36	19.6	78 52.1	94 34	18.7	4
05	81 34.8	82 55	32.9	81 09.9	84 53	31.1	80 44.4	86 50	29.4	80 18.6	87 48	27.9	79 52.3	88 46	26.5	79 25.8	89 44	25.2	78 58.9	90 42	24.0	78 31.8	91 40	22.9	05
6	81 01.6	77 61	37.7	80 38.2	79 59	35.8	80 14.3	81 56	34.0	79 49.8	82 54	32.3	79 24.8	84 52	30.8	78 59.5	85 50	29.3	78 33.7	86 48	28.0	78 07.7	87 46	26.8	6
7	80 24.8	71 66	42.0	80 03.0	74 64	39.9	79 40.5	76 61	38.0	79 17.4	78 59	36.3	78 53.8	80 57	34.7	78 29.7	81 55	33.1	78 05.1	83 53	31.7	77 40.2	84 51	30.4	7
8	79 45.1	66 70	45.6	79 24.8	69 68	43.6	79 03.7	71 66	41.7	78 42.0	73 63	39.9	78 19.7	76 61	38.2	77 56.8	77 59	36.6	77 33.5	79 57	35.1	77 09.7	80 55	33.7	8
9	79 02.9	62 74	48.8	78 44.0	64 71	46.8	78 24.4	67 69	44.9	78 04.0	69 67	43.1	77 43.0	71 65	41.4	77 21.4	73 63	39.8	76 59.2	75 61	38.2	76 36.5	76 59	36.8	9
10	78 18.9	57 76	51.6	78 01.3	60 74	49.6	77 42.9	63 72	47.7	77 23.8	65 70	45.9	77 04.0	67 68	44.2	76 43.6	69 66	42.6	76 22.6	71 64	41.1	76 01.0	73 63	39.6	10
1	77 33.2	53 78	54.0	77 16.8	56 77	52.0	76 59.6	59 75	50.2	76 41.7	61 73	48.4	76 23.1	63 71	46.8	76 03.8	65 69	45.2	75 43.9	67 67	43.6	75 23.5	69 66	42.1	1
2	76 46.1	50 80	56.1	76 30.9	52 79	54.2	76 14.8	55 77	52.4	75 58.0	57 75	50.7	75 40.5	60 73	49.0	75 22.3	62 72	47.5	75 03.5	64 70	45.9	74 44.1	66 68	44.5	2
3	75 58.0	46 82	57.9	75 43.8	49 80	56.1	75 28.7	51 79	54.4	75 12.9	54 77	52.7	74 56.5	56 76	51.1	74 39.3	58 74	49.5	74 21.5	60 72	48.0	74 03.2	62 71	46.6	3
4	75 08.9	43 83	59.6	74 55.6	46 82	57.8	74 41.6	48 80	56.2	74 26.7	51 79	54.5	74 11.2	53 77	52.9	73 55.1	55 76	51.4	73 38.2	57 74	49.9	73 20.8	59 73	48.5	4
15	74 19.1	40 84	61.0	74 06.7	43 83	59.3	73 53.5	45 82	57.7	73 39.6	48 80	56.1	73 24.9	50 79	54.6	73 09.7	52 77	53.1	72 53.8	54 76	51.6	72 37.3	56 74	50.2	15
6	73 28.6	38 85	62.3	73 17.0	40 84	60.7	73 04.6	42 83	59.1	72 51.5	45 81	57.6	72 37.7	47 80	56.1	72 23.3	49 79	54.6	72 08.3	51 77	53.2	71 52.7	53 76	51.8	6
7	72 37.5	35 86	63.4	72 26.6	38 85	61.9	72 15.0	40 84	60.4	72 02.7	42 82	58.9	71 49.8	44 81	57.4	71 36.2	46 80	56.0	71 21.9	48 79	54.6	71 07.1	50 77	53.3	7
8	71 46.0	33 87	64.5	71 35.8	35 86	63.0	71 24.9	37 84	61.5	71 13.3	40 83	60.0	71 01.1	42 82	58.6	70 48.2	44 81	57.3	70 34.8	46 80	55.9	70 20.7	48 79	54.6	8
9	70 54.0	31 87	65.4	70 44.4	33 86	63.9	70 34.2	35 85	62.5	70 23.3	37 84	61.1	70 11.8	39 83	59.7	69 59.7	41 82	58.4	69 46.9	43 81	57.1	69 33.6	45 80	55.8	9
20	70 01.7	29 88	66.2	69 52.7	31 87	64.8	69 43.1	33 86	63.4	69 32.8	35 85	62.1	69 22.0	37 84	60.7	69 10.5	39 83	59.4	68 58.5	41 82	58.1	68 45.9	43 81	56.9	20
1	69 09.0	27 88	66.9	69 00.6	29 87	65.6	68 51.6	31 86	64.2	68 42.0	33 85	62.9	68 31.7	35 84	61.6	68 20.9	37 84	60.4	68 09.5	39 82	59.1	67 57.5	41 81	57.9	1
2	68 16.1	25 89	67.6	68 08.2	27 88	66.3	67 59.8	29 87	65.0	67 50.7	31 86	63.7	67 41.0	33 85	62.5	67 30.8	35 84	61.2	67 20.0	37 83	60.0	67 08.7	39 82	58.8	2
3	67 23.0	24 89	68.2	67 15.6	26 88	66.9	67 07.6	28 87	65.7	66 59.1	29 86	64.4	66 50.0	31 86	63.2	66 40.3	33 85	62.0	66 30.1	35 84	60.8	66 19.4	37 83	59.7	3
4	66 29.6	22 89	68.7	66 22.7	24 88	67.5	66 15.2	26 88	66.3	66 07.2	28 87	65.1	65 58.6	30 86	63.9	65 49.5	31 85	62.7	65 39.8	33 84	61.6	65 29.7	35 83	60.4	4
25	65 36.1	21 90	69.2	65 29.6	23 89	68.0	65 22.6	24 88	66.8	65 15.0	26 87	65.7	65 06.9	28 86	64.5	64 58.3	30 86	63.4	64 49.2	31 85	62.3	64 39.6	33 84	61.1	25
6	64 42.4	19 90	69.6	64 36.3	21 89	68.5	64 29.7	23 88	67.3	64 22.6	25 88	66.2	64 15.0	26 87	65.1	64 06.9	28 86	64.0	63 58.3	30 85	62.9	63 49.2	31 84	61.8	6
7	63 48.5	18 90	70.0	63 42.9	20 89	68.9	63 36.7	21 89	67.8	63 30.0	23 88	66.7	63 22.9	25 87	65.6	63 15.2	26 86	64.5	63 07.1	28 86	63.5	62 58.4	30 85	62.4	7
8	62 54.6	17 90	70.4	62 49.3	18 90	69.3	62 43.5	20 89	68.2	62 37.2	22 88	67.1	62 30.5	23 88	66.1	62 23.3	25 87	65.0	62 15.6	26 86	64.0	62 07.5	28 85	63.0	8
9	62 00.5	16 90	70.7	61 55.5	17 90	69.6	61 50.2	19 89	68.6	61 44.3	20 88	67.5	61 38.0	22 88	66.5	61 31.2	23 87	65.5	61 23.9	25 86	64.5	61 16.2	26 86	63.5	9
30	61 06.3	14 90	71.0	61 01.7	16 90	69.9	60 56.7	18 89	68.9	60 51.2	19 89	67.9	60 45.3	21 88	66.9	60 38.9	22 87	65.9	60 32.1	23 87	64.9	60 24.8	25 86	63.9	30
1	60 12.0	13 91	71.2	60 07.8	15 90	70.2	60 03.1	16 90	69.2	59 58.0	18 89	68.2	59 52.4	19 88	67.3	59 46.4	21 88	66.3	59 40.0	22 87	65.3	59 33.2	24 86	64.4	1
2	59 17.6	12 91	71.4	59 13.7	14 90	70.5	59 09.4	15 90	69.5	59 04.6	17 89	68.6	58 59.4	18 88	67.6	58 53.8	19 88	66.6	58 47.8	21 87	65.7	58 41.4	22 87	64.8	2
3	58 23.2	11 91	71.7	58 19.6	13 90	70.7	58 15.6	14 90	69.8	58 11.2	15 89	68.8	58 06.3	17 89	67.9	58 01.1	18 88	67.0	57 55.4	20 88	66.0	57 49.4	21 87	65.1	3
4	57 28.7	10 91	71.8	57 25.4	12 90	70.9	57 21.7	13 90	70.0	57 17.6	14 89	69.1	57 13.1	16 89	68.2	57 08.2	17 88	67.3	57 02.9	18 88	66.4	56 57.3	20 87	65.4	4
35	56 34.2	09 91	72.0	56 31.2	11 91	71.1	56 27.8	12 90	70.2	56 24.0	13 90	69.3	56 19.8	15 89	68.4	56 15.3	16 88	67.5	56 10.3	17 88	66.6	56 05.0	18 87	65.8	35
6	55 39.6	08 91	72.2	55 36.8	10 91	71.3	55 33.7	11 90	70.4	55 30.3	12 90	69.5	55 26.4	13 89	68.6	55 22.2	15 89	67.8	55 17.6	16 88	66.9	55 12.6	17 87	66.0	6
7	54 44.9	08 91	72.3	54 42.5	09 91	71.4	54 39.7	10 90	70.6	54 36.5	11 90	69.7	54 32.9	12 89	68.8	54 29.0	14 89	68.0	54 24.8	15 88	67.1	54 20.1	16 88	66.3	7
8	53 50.2	07 91	72.4	53 48.1	08 91	71.5	53 45.5	09 90	70.7	53 42.6	10 90	69.9	53 39.4	11 89	69.0	53 35.8	13 89	68.2	53 31.9	14 88	67.4	53 27.6	15 88	66.5	8
9	52 55.5	06 91	72.5	52 53.6	07 91	71.7	52 51.4	08 90	70.8	52 48.7	09 90	70.0	52 45.8	10 90	69.2	52 42.5	12 89	68.4	52 38.9	13 88	67.5	52 34.9	14 88	66.7	9
40	52 00.8	05 91	72.6	51 59.1	06 91	71.8	51 57.1	07 90	70.9	51 54.8	08 90	70.1	51 52.1	09 90	69.3	51 49.1	11 89	68.5	51 45.8	12 88	67.7	51 42.1	13 88	66.9	40
1	51 06.1	04 91	72.6	51 04.6	05 91	71.8	51 02.9	06 90	71.0	51 00.8	07 90	70.3	50 58.4	09 90	69.5	50 55.7	10 89	68.7	50 52.7	11 89	67.9	50 49.3	12 88	67.1	1
2	50 11.3	03 91	72.7	50 10.1	04 91	71.9	50 08.6	06 90	71.1	50 06.8	07 90	70.4	50 04.7	08 90	69.6	50 02.2	09 89	68.8	49 59.5	10 89	68.0	49 56.4	11 88	67.3	2
3	49 16.5	03 91	72.7	49 15.5	04 91	72.0	49 14.3	05 91	71.2	49 12.7	06 90	70.4	49 10.9	07 90	69.7	49 08.7	08 89	68.9	49 06.2	09 89	68.2	49 03.5	10 88	67.4	3
4	48 21.7	02 91	72.8	48 21.0	03 91	72.0	48 20.0	04 91	71.3	48 18.7	05 90	70.5	48 17.1	06 90	69.8	48 15.2	07 89	69.0	48 13.0	08 89	68.3	48 10.5	09 88	67.5	4
45	47 26.9	01 91	72.8	47 26.4	02 91	72.0	47 25.6	03 91	71.3	47 24.6	04 90	70.6	47 23.2	05 90	69.8	47 21.6	06 89	69.1	47 19.7	07 89	68.4	47 17.5	08 88	67.6	45
6	46 32.1	00 91	72.8	46 31.8	01 91	72.1	46 31.3	02 91	71.3	46 30.4	03 90	70.6	46 29.3	04 90	69.9	46 28.0	05 89	69.2	46 26.3	06 89	68.4	46 24.4	07 89	67.7	6
7	45 37.3	00 91	72.8	45 37.2	01 91	72.1	45 36.9	02 91	71.4	45 36.3	02 90	70.7	45 35.4	03 90	69.9	45 34.3	04 89	69.2	45 32.9	05 89	68.5	45 31.3	06 89	67.8	7
8	44 42.5	01 91	72.8	44 42.6	00 91	72.1	44 42.5	01 91	71.4	44 42.2	02 90	70.7	44 41.5	02 90	70.0	44 40.7	03 89	69.3	44 39.5	04 89	68.6	44 38.1	05 89	67.9	8
9	43 47.6	02 91	72.8	43 48.0	01 91	72.1	43 48.1	00 91	71.4	43 48.0	01 90	70.7	43 47.6	02 90	70.0	43 47.0	03 89	69.3	43 46.1	03 89	68.6	43 45.0	04 89	67.9	9
50	42 52.8	02 91	72.8	42 53.4	02 91	72.1	42 53.8	01 91	71.4	42 53.9	00 90	70.7	42 53.7	01 90	70.0	42 53.3	02 89	69.3	42 52.7	03 89	68.7	42 51.8	03 89	68.0	50
1	41 58.1	03 91	72.7	41 58.8	02 91	72.0	41 59.4	01 91	71.4	41 59.7	01 90	70.7	41 59.8	00 90	70.0	41 59.6	01 90	69.4	41 59.2	02 89	68.7	41 58.6	02 89	68.0	1
2	41 03.3	04 91	72.7	41 04.3	03 91	72.0	41 05.0	02 91	71.4	41 05.5	01 90	70.7	41 05.8	01 90	70.0	41 05.9	00 90	69.4	41 05.8	01 89	68.7	41 05.4	02 89	68.0	2
3	40 08.5	04 91	72.6	40 09.7	04 91	72.0	40 10.7	03 91	71.3	40 11.4	02 90	70.7	40 11.9	01 90	70.0	40 12.2	01 90	69.4	40 12.3	00 89	68.7	40 12.2	01 89	68.0	3
4	39 13.8	05 91	72.6	39 15.1	04 91	71.9	39 16.3	04 90	71.3	39 17.3	03 90	70.6	39 18.0	02 90	70.0	39 18.5	01 90	69.3	39 18.8	01 89	68.7	39 18.9	00 89	68.1	4
55	38 19.0	06 91	72.5	38 20.6	05 91	71.9	38 22.0	04 90	71.2	38 23.1	04 90	70.6	38 24.1	03 90	70.0	38 24.8	02 89	69.3	38 25.4	01 89	68.7	38 25.7	01 89	68.0	55
6	37 24.3	06 91	72.4	37 26.1	06 91	71.8	37 27.6	05 90	71.2	37 29.0	04 90	70.6	37 30.2	04 90	69.9	37 31.2	03 89	69.3	37 31.9	02 89	68.7	37 32.5	02 89	68.0	6
7	36 29.6	07 91	72.4	36 31.6	06 91	71.7	36 33.3	06 90	71.1	36 34.9	05 90	70.5	36 36.3	04 90	69.9	36 37.5	04 89	69.3	36 38.5	03 89	68.6	36 39.3	02 89	68.0	7
8	35 34.9	07 91	72.3	35 37.1	07 91	71.7	35 39.1	06 90	71.1	35 40.8	06 90	70.4	35 42.4	05 90	69.8	35 43.8	04 89	69.2	35 45.1	04 89	68.6	35 46.1	03 89	68.0	8
9	34 40.3	08 91	72.2	34 42.6	08 91	71.6	34 44.8	07 90	71.0	34 46.8	06 90	70.4	34 48.6	06 90	69.8	34 50.2	05 89	69.2	34 51.6	04 89	68.6	34 52.9	04 89	67.9	9
60	33 45.7	09 91	72.1	33 48.2	08 91	71.5	33 50.6	08 90	70.9	33 52.7	07 90	70.3	33 54.8	06 90	69.7	33 56.6	06 89	69.1	33 58.3	05 89	68.5	33 59.7	05 89	67.9	60
1	32 51.1	09 91	72.0	32 53.8	09 91	71.4	32 56.4	08 90	70.8	32 58.7	08 90	70.2	33 01.0	07 90	69.6	33 03.0	07 89	69.0	33 04.9	06 89	68.4	33 06.6	05 89	67.8	1
2	31 56.5	10 91	71.9	31 59.4	09 91	71.3	32 02.2	09 90	70.7	32 04.8	08 90	70.1	32 07.2	08 90	69.6	32 09.4	07 89	69.0	32 11.5	07 89	68.4	32 13.4	06 89	67.8	2
3	31 02.0	11 91	71.8	31 05.1	10 91	71.2	31 08.0	10 90	70.6	31 10.8	09 90	70.1	31 13.4	08 90	69.5	31 15.9	08 89	68.9	31 18.2	07 89	68.3	31 20.3	07 88	67.7	3
4	30 07.5	11 91	71.7	30 10.8	11 90	71.1	30 13.9	10 90	70.5	30 16.9	10 90	70.0	30 19.7	09 90	69.4	30 22.4	09 89	68.8	30 24.9	08 89	68.2	30 27.3	08 88	67.6	4
65	29 13.1	12 91	71.6	29 16.5	11 90	71.0	29 19.8	11 90	70.4	29 23.0	10 90	69.8	29 26.0	10 89	69.3	29 28.9	09 89	68.7	29 31.6	09 89	68.1	29 34.2	08 88	67.6	65
6	28 18.6	12 91	71.4	28 22.3	12 90	70.9	28 25.8	11 90	70.3	28 29.2	11 90	69.7	28 32.4	11 89	69.2	28 35.5	10 89	68.6	28 38.4	10 89	68.0	28 41.2	09 88	67.5	6
7	27 24.3	13 90	71.3	27 28.1	13 90	70.7	27 31.8	12 90	70.2	27 35.3	12 90	69.6	27 38.8	11 89	69.1	27 42.1	11 89	68.5	27 45.2	10 89	67.9	27 48.2	10 88	67.4	7
8	26 29.9	14 90	71.2	26 34.0	13 90	70.6	26 37.8	13 90	70.1	26 41.6	12 90	69.5	26 45.2	12 89	68.9	26 48.7	11 89	68.4	26 52.0	11 88	67.8	26 55.3	11 88	67.3	8
9	25 35.7	14 90	71.0	25 39.9	14 90	70.5	25 43.9	13 90	69.9	25 47.9	13 89	69.4	25 51.7	13 89	68.8	25 55.4	12 89	68.3	25 58.9	12 88	67.7	26 02.4	11 88	67.2	9
70	24 41.4	15 90	70.9	24 45.8	14 90	70.3	24 50.0	14 90	69.8	24 54.2	14 89	69.2	24 58.2	13 89	68.7	25 02.1	13 89	68.2	25 05.9	12 88	67.6	25 09.5	12 88	67.1	70
1	23 47.2	15 90	70.7	23 51.8	15 90	70.2	23 56.2	15 90	69.6	24 00.5	14 89	69.1	24 04.8	14 89	68.6	24 08.8	13 89	68.0	24 12.8	13 88	67.5	24 16.7	13 88	66.9	1
2	22 53.1	16 90	70.6	22 57.8	16 90	70.0	23 02.5	15 90	69.5	23 07.0	15 89	69.0	23 11.4	14 89	68.4	23 15.7	14 89	67.9	23 19.8	14 88	67.3	23 23.9	13 88	66.8	2
3	21 59.0	17 90	70.4	22 03.9	16 90	69.9	22 08.7	16 90	69.3	22 13.4	16 89	68.8	22 18.0	15 89	68.3	22 22.5	15 88	67.7	22 26.9	14 88	67.2	22 31.2	14 88	66.7	3
4	21 05.0	17 90	70.2	21 10.1	17 90	69.7	21 15.1	16 89	69.2	21 20.0	16 89	68.7	21 24.8	16 89	68.1	21 29.5	15 88	67.6	21 34.1	15 88	67.1	21 38.5	15 88	66.5	4
75	20 11.0	18 90	70.1	20 16.3	17 90	69.6	20 21.5	17 89	69.0	20 26.6	17 89	68.5	20 31.5	16 88	68.0	20 36.4	16 88	67.4	20 41.2	16 88	66.9	20 45.9	16 88	66.4	75
6	19 17.1	18 90	69.9	19 22.6	18 89	69.4	19 27.9	18 89	68.9	19 33.2	17 89	68.3	19 38.4	17 88	67.8	19 43.5	17 88	67.3	19 48.5	17 88	66.8	19 53.4	16 87	66.2	6
7	18 23.2	19 90	69.7	18 28.9	19 89	69.2	18 34.4	18 89	68.7	18 39.9	18 89	68.2	18 45.3	18 88	67.6	18 50.6	18 88	67.1	18 55.8	17 88	66.6	19 00.9	17 87	66.1	7
8	17 29.5	20 90	69.5	17 35.3	19 89	69.0	17 41.0	19 89	68.5	17 46.7	19 89	68.0	17 52.2	18 88	67.5	17 57.7	18 88	67.0	18 03.2	18 88	66.4	18 08.5	18 87	65.9	8
9	16 35.7	20 89	69.3	16 41.7	20 89	68.8	16 47.7	20 89	68.3	16 53.5	19 88	67.8	16 59.3	19 88	67.3	17 05.0	19 88	66.8	17 10.6	19 88	66.3	17 16.1	18 87	65.8	9
80	15 42.1	21 89	69.2	15 48.3	20 89	68.6	15 54.4	20 89	68.1	16 00.4	20 88	67.6	16 06.4	20 88	67.1	16 12.3	20 88	66.6	16 18.1	19 87	66.1	16 23.9	19 87	65.6	80
1	14 48.5	21 89	69.0	14 54.9	21 89	68.4	15 01.2	21 88	67.9	15 07.4	21 88	67.4	15 13.6	20 88	66.9	15 19.7	20 88	66.4	15 25.7	20 87	65.9	15 31.6	20 87	65.4	1
2	13 55.0	22 89	68.8	14 01.5	22 89	68.2	14 08.0	22 88	67.7	14 14.4	21 88	67.2	14 20.8	21 88	66.7	14 27.1	21 87	66.2	14 33.3	21 87	65.7	14 39.5	20 87	65.2	2
3	13 01.5	23 89	68.5	13 08.3	22 89	68.0	13 15.0	22 88	67.5	13 21.6	22 88	67.0	13 28.1	22 88	66.5	13 34.6	22 87	66.0	13 41.1	21 87	65.5	13 47.5	21 87	65.0	3
4	12 08.2	23 89	68.3	12 15.1	23 88	67.8	12 22.0	23 88	67.3	12 28.8	23 88	66.8	12 35.5	22 88	66.3	12 42.2	22 87	65.8	12 48.9	22 87	65.3	12 55.5	22 86	64.8	4
85	11 14.9	24 89	68.1	11 22.0	24 88	67.6	11 29.1	23 88	67.1	11 36.1	23 88	66.6	11 43.0	23 87	66.1	11 49.9	23 87	65.6	11 56.8	23 87	65.1	12 03.6	23 86	64.6	85
6	10 21.7	24 88	67.9	10 29.0	24 88	67.4	10 36.2	24 88	66.9	10 43.4	24 88	66.4	10 50.6	24 87	65.9	10 57.7	24 87	65.4	11 04.8	23 86	64.9	11 11.8	23 86	64.4	6
7	9 28.6	25 88	67.7	9 36.1	25 88	67.2	9 43.5	25 88	66.7	9 50.9	25 87	66.2	9 58.3	24 87	65.7	10 05.6	24 87	65.2	10 12.9	24 86	64.7	10 20.1	24 86	64.2	7
8	8 35.6	26 88	67.4	8 43.2	26 88	66.9	8 50.9	25 88	66.4	8 58.5	25 87	66.0	9 06.0	25 87	65.5	9 13.5	25 87	65.0	9 21.0	25 86	64.5	9 28.5	26 86	64.0	8
9	7 42.6	26 88	67.2	7 50.5	26 88	66.7	7 58.3	26 87	66.2	8 06.1	26 87	65.7	8 13.9	26 87	65.2	8 21.6	26 86	64.7	8 29.3	26 86	64.3	8 36.9	25 86	63.8	9
90	6 49.8	27 88	66.9	6 57.8	27 88	66.5	7 05.9	27 87	66.0	7 13.9	27 87	65.5	7 21.8	26 86	65.0	7 29.8	26 86	64.5	7 37.7	26 86	64.0	7 45.5	26 86	63.5	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	24° 00′			24° 30′			25° 00′			25° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	49 00.0	1.0 01	180.0	48 30.0	1.0 01	180.0	48 00.0	1.0 01	180.0	47 30.0	1.0 01	180.0
1	48 59.3	1.0 04	178.6	48 29.3	1.0 03	178.6	47 59.3	1.0 03	178.6	47 29.3	1.0 03	178.7
2	48 57.2	1.0 06	177.2	48 27.2	1.0 06	177.3	47 57.3	1.0 06	177.3	47 27.3	1.0 06	177.3
3	48 53.7	1.0 08	175.8	48 23.8	1.0 08	175.9	47 53.9	1.0 08	175.9	47 24.0	1.0 08	176.0
4	48 48.9	99 10	174.4	48 19.0	99 10	174.5	47 49.2	1.0 10	174.6	47 19.3	1.0 10	174.7
05	48 42.6	99 13	173.1	48 12.9	99 12	173.2	47 43.1	99 12	173.3	47 13.3	99 12	173.3
6	48 35.0	99 15	171.7	48 05.4	99 15	171.8	47 35.7	99 14	171.9	47 06.0	99 14	172.0
7	48 26.1	98 17	170.3	47 56.5	98 17	170.5	47 27.0	99 17	170.6	46 57.4	99 16	170.7
8	48 15.8	98 19	169.0	47 46.4	98 19	169.1	47 17.0	98 19	169.3	46 47.5	98 19	169.4
9	48 04.2	97 22	167.7	47 34.9	98 21	167.8	47 05.7	98 21	168.0	46 36.4	98 21	168.1
10	47 51.2	97 24	166.3	47 22.2	97 23	166.5	46 53.1	97 23	166.7	46 24.0	97 23	166.9
1	47 37.0	96 26	165.0	47 08.1	96 25	165.2	46 39.2	96 25	165.4	46 10.3	96 25	165.6
2	47 21.6	96 28	163.7	46 52.9	96 28	163.9	46 24.2	96 27	164.1	45 55.4	96 27	164.3
3	47 04.9	95 30	162.4	46 36.4	95 29	162.7	46 07.9	95 29	162.9	45 39.4	95 29	163.1
4	46 46.9	94 32	161.2	46 18.7	94 31	161.4	45 50.4	94 31	161.7	45 22.1	94 31	161.9
15	46 27.8	93 34	159.9	45 59.8	93 33	160.2	45 31.8	94 33	160.4	45 03.7	94 33	160.7
6	46 07.6	92 36	158.7	45 39.8	93 35	159.0	45 12.0	93 35	159.2	44 44.2	93 34	159.5
7	45 46.2	92 38	157.5	45 18.6	92 37	157.8	44 51.1	92 37	158.1	44 23.5	92 36	158.3
8	45 23.6	91 39	156.3	44 56.4	91 39	156.6	44 29.1	91 38	156.9	44 01.8	91 38	157.2
9	45 00.0	90 41	155.1	44 33.1	90 41	155.4	44 06.1	90 40	155.7	43 39.0	90 40	156.0
20	44 35.4	89 43	154.0	44 08.7	89 42	154.3	43 42.0	89 42	154.6	43 15.2	89 41	154.9
1	44 09.7	88 44	152.8	43 43.3	88 44	153.2	43 16.9	88 44	153.5	42 50.4	88 43	153.8
2	43 43.0	87 46	151.7	43 16.9	87 46	152.1	42 50.8	87 45	152.4	42 24.6	87 45	152.7
3	43 15.4	86 48	150.7	42 49.6	86 47	151.0	42 23.7	86 47	151.3	41 57.8	86 46	151.7
4	42 46.8	85 49	149.6	42 21.3	85 49	149.9	41 55.8	85 48	150.3	41 30.2	85 48	150.6
25	42 17.3	84 51	148.5	41 52.1	84 50	148.9	41 26.9	84 50	149.3	41 01.6	84 49	149.6
6	41 46.9	83 52	147.5	41 22.0	83 52	147.9	40 57.1	83 51	148.3	40 32.1	83 50	148.6
7	41 15.7	82 54	146.5	40 51.1	82 53	146.9	40 26.5	82 52	147.3	40 01.9	82 52	147.6
8	40 43.6	81 55	145.5	40 19.4	81 54	145.9	39 55.1	81 54	146.3	39 30.7	81 53	146.7
9	40 10.7	79 56	144.6	39 46.8	80 56	145.0	39 22.9	80 55	145.4	38 58.8	80 54	145.7
30	39 37.1	78 57	143.6	39 13.5	79 57	144.0	38 49.9	79 56	144.4	38 26.2	79 56	144.8
1	39 02.7	77 58	142.7	38 39.4	78 58	143.1	38 16.1	78 58	143.5	37 52.7	78 57	143.9
2	38 27.6	76 60	141.8	38 04.7	77 59	142.2	37 41.7	77 59	142.6	37 18.6	77 58	143.0
3	37 51.7	75 61	140.9	37 29.2	75 60	141.3	37 06.5	76 60	141.8	36 43.7	76 59	142.2
4	37 15.3	74 62	140.1	36 53.0	74 61	140.5	36 30.6	75 61	140.9	36 08.2	75 60	141.3
35	36 38.1	73 63	139.2	36 16.2	73 62	139.7	35 54.1	74 62	140.1	35 32.0	74 61	140.5
6	36 00.3	72 64	138.4	35 38.7	72 63	138.8	35 17.0	73 63	139.3	34 55.2	73 62	139.7
7	35 21.9	71 65	137.6	35 00.6	71 64	138.0	34 39.2	71 64	138.5	34 17.8	72 63	138.9
8	34 43.0	70 66	136.8	34 22.0	70 65	137.3	34 00.9	70 65	137.7	33 39.7	71 64	138.1
9	34 03.4	69 67	136.1	33 42.8	69 66	136.5	33 22.0	69 66	136.9	33 01.2	70 65	137.4
40	33 23.3	68 68	135.3	33 03.0	68 67	135.7	32 42.5	68 67	136.2	32 22.0	69 66	136.6
1	32 42.7	67 68	134.6	32 22.7	67 68	135.0	32 02.6	67 68	135.5	31 42.3	68 67	135.9
2	32 01.6	66 69	133.9	31 41.9	66 69	134.3	31 22.1	66 68	134.7	31 02.1	67 68	135.2
3	31 20.0	65 70	133.2	31 00.6	65 70	133.6	30 41.1	65 69	134.1	30 21.5	65 69	134.5
4	30 37.9	64 71	132.5	30 18.8	64 70	132.9	29 59.6	64 70	133.4	29 40.3	64 69	133.8
45	29 55.4	63 72	131.8	29 36.5	63 71	132.3	29 17.6	63 71	132.7	28 58.7	63 70	133.2
6	29 12.4	62 72	131.2	28 53.9	62 72	131.6	28 35.3	62 71	132.1	28 16.6	62 71	132.5
7	28 29.0	61 73	130.5	28 10.8	61 73	131.0	27 52.4	61 72	131.4	27 34.1	61 72	131.9
8	27 45.1	60 74	129.9	27 27.2	60 73	130.4	27 09.2	60 73	130.8	26 51.1	60 72	131.3
9	27 00.9	59 74	129.3	26 43.3	59 74	129.7	26 25.6	59 73	130.2	26 07.8	59 73	130.6
50	26 16.3	58 75	128.7	25 59.0	58 74	129.2	25 41.6	58 74	129.6	25 24.1	59 74	130.1
1	25 31.4	57 76	128.1	25 14.3	57 75	128.6	24 57.2	57 75	129.0	24 40.0	58 74	129.5
2	24 46.1	56 76	127.6	24 29.3	56 76	128.0	24 12.4	56 75	128.5	23 55.5	57 75	128.9
3	24 00.4	55 77	127.0	23 43.9	55 76	127.5	23 27.3	55 76	127.9	23 10.7	56 75	128.4
4	23 14.4	54 77	126.5	22 58.2	54 77	126.9	22 41.9	54 76	127.4	22 25.5	55 76	127.8
55	22 28.1	53 78	125.9	22 12.2	53 77	126.4	21 56.1	54 77	126.8	21 40.0	54 76	127.3
6	21 41.5	52 78	125.4	21 25.8	52 78	125.9	21 10.0	53 77	126.3	20 54.2	53 77	126.8
7	20 54.6	51 79	124.9	20 39.2	52 78	125.4	20 23.7	52 78	125.8	20 08.1	52 77	126.3
8	20 07.4	50 79	124.4	19 52.2	51 79	124.9	19 37.0	51 78	125.3	19 21.7	51 78	125.8
9	19 19.9	50 80	123.9	19 05.0	50 79	124.4	18 50.0	50 79	124.8	18 35.0	50 78	125.3
60	18 32.1	49 80	123.4	18 17.5	49 80	123.9	18 02.8	49 79	124.4	17 48.0	49 79	124.8
1	17 44.1	48 80	123.0	17 29.8	48 80	123.4	17 15.3	48 80	123.9	17 00.8	48 79	124.4
2	16 55.9	47 81	122.5	16 41.7	47 80	123.0	16 27.6	47 80	123.4	16 13.3	48 80	123.9
3	16 07.4	46 81	122.1	15 53.5	46 81	122.5	15 39.6	47 80	123.0	15 25.6	47 80	123.5
4	15 18.6	45 82	121.6	15 05.0	46 81	122.1	14 51.3	46 81	122.6	14 37.6	46 80	123.0
65	14 29.7	45 82	121.2	14 16.3	45 82	121.7	14 02.8	45 81	122.1	13 49.3	45 81	122.6
6	13 40.5	44 82	120.8	13 27.4	44 82	121.3	13 14.1	44 82	121.7	13 00.9	44 81	122.2
7	12 51.1	43 83	120.4	12 38.2	43 82	120.9	12 25.2	43 82	121.3	12 12.2	43 81	121.8
8	12 01.5	42 83	120.0	11 48.9	42 83	120.5	11 36.1	43 82	120.9	11 23.3	43 82	121.4
9	11 11.7	41 83	119.6	10 59.3	42 83	120.1	10 46.8	42 82	120.5	10 34.3	42 82	121.0
70	10 21.8	41 84	119.2	10 09.5	41 83	119.7	9 57.3	41 83	120.2	9 45.0	41 82	120.6
1	9 31.6	40 84	118.9	9 19.6	40 84	119.3	9 07.6	40 83	119.8	8 55.5	40 83	120.2
2	8 41.3	39 84	118.5	8 29.5	39 84	119.0	8 17.7	39 84	119.4	8 05.8	40 83	119.9
3	7 50.7	38 84	118.1	7 39.2	39 84	118.6	7 27.6	39 84	119.1	7 16.0	39 83	119.5
4	7 00.1	38 85	117.8	6 48.7	38 84	118.2	6 37.4	38 84	118.7	6 26.0	38 84	119.2
75	6 09.2	37 85	117.4	5 58.1	37 85	117.9	5 47.0	37 84	118.4	5 35.8	37 84	118.8
6	5 18.2	36 85	117.1	5 07.3	36 85	117.6						

26° 00′			26° 30′			27° 00′			27° 30′			H.A.
Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
47 00.0	1.0 01	180.0	46 30.0	1.0 01	180.0	46 00.0	1.0 01	180.0	45 30.0	1.0 01	180.0	00
46 59.3	1.0 03	178.7	46 29.3	1.0 03	178.7	45 59.4	1.0 03	178.7	45 29.4	1.0 03	178.7	1
46 57.4	1.0 06	177.4	46 27.4	1.0 05	177.4	45 57.4	1.0 05	177.4	45 27.5	1.0 05	177.5	2
46 54.1	1.0 08	176.1	46 24.1	1.0 08	176.1	45 54.2	1.0 08	176.2	45 24.3	1.0 07	176.2	3
46 49.5	1.0 10	174.7	46 19.6	1.0 10	174.8	45 49.7	1.0 10	174.9	45 19.9	1.0 09	175.0	4
46 43.6	99 12	173.4	46 13.8	99 12	173.5	45 44.0	99 12	173.6	45 14.2	99 12	173.7	05
46 36.4	99 14	172.1	46 06.7	99 14	172.2	45 37.0	99 14	172.3	45 07.3	99 14	172.4	6
46 27.9	99 16	170.8	45 58.3	99 16	171.0	45 28.7	99 16	171.1	44 59.1	99 16	171.2	7
46 18.1	98 18	169.6	45 48.7	98 18	169.7	45 19.2	98 18	169.8	44 49.8	98 18	170.0	8
46 07.1	98 20	168.3	45 37.8	98 20	168.5	45 08.5	98 20	168.6	44 39.2	98 20	168.8	9
45 54.8	97 22	167.0	45 25.7	97 22	167.2	44 56.5	97 22	167.4	44 27.4	97 22	167.5	10
45 41.4	97 24	165.8	45 12.4	97 24	166.0	44 43.4	97 24	166.2	44 14.4	97 24	166.3	1
45 26.7	96 26	164.6	44 57.9	96 26	164.8	44 29.1	96 26	165.0	44 00.3	95 25	165.1	2
45 10.8	95 28	163.3	44 42.2	95 28	163.5	44 13.6	95 28	163.8	43 45.0	95 27	164.0	3
44 53.8	95 30	162.1	44 25.4	95 30	162.4	43 57.0	95 30	162.6	43 28.6	95 29	162.8	4
44 35.6	94 32	160.9	44 07.4	94 32	161.2	43 39.3	94 31	161.4	43 11.1	94 31	161.6	15
44 16.3	93 34	159.8	43 48.4	93 34	160.0	43 20.4	93 33	160.3	42 52.5	93 33	160.5	6
43 55.9	92 36	158.6	43 28.2	92 35	158.9	43 00.5	92 35	159.1	42 32.8	93 35	159.4	7
43 34.4	91 38	157.5	43 07.0	91 37	157.7	42 39.6	92 37	158.0	42 12.1	92 36	158.3	8
43 11.9	90 39	156.3	42 44.8	91 39	156.6	42 17.6	91 38	156.9	41 50.3	91 38	157.2	9
42 48.4	90 41	155.2	42 21.5	90 40	155.5	41 54.6	90 40	155.8	41 27.6	90 40	156.1	20
42 23.8	89 42	154.1	41 57.2	89 42	154.5	41 30.6	89 42	154.8	41 03.9	89 41	155.1	1
41 58.3	88 44	153.1	41 32.0	88 44	153.4	41 05.6	88 43	153.7	40 39.2	88 43	154.0	2
41 31.9	87 46	152.0	41 05.8	87 45	152.4	40 39.8	87 45	152.7	40 13.6	87 44	153.0	3
41 04.5	86 47	151.0	40 38.8	86 47	151.3	40 13.0	86 46	151.7	39 47.1	86 46	152.0	4
40 36.2	85 48	150.0	40 10.8	85 48	150.3	39 45.3	85 48	150.7	39 19.8	85 47	151.0	25
40 07.1	84 50	149.0	39 42.0	84 49	149.3	39 16.8	84 49	149.7	38 51.5	84 48	150.0	6
39 37.1	83 51	148.0	39 12.3	83 51	148.4	38 47.4	83 50	148.7	38 22.5	83 50	149.1	7
39 06.3	82 53	147.1	38 41.8	82 52	147.4	38 17.2	82 52	147.8	37 52.6	82 51	148.2	8
38 34.7	81 54	146.1	38 10.5	81 53	146.5	37 46.3	81 53	146.9	37 21.9	81 52	147.2	9
38 02.3	79 55	145.2	37 38.5	80 55	145.6	37 14.5	80 54	146.0	36 50.5	80 54	146.3	30
37 29.2	78 56	144.3	37 05.7	79 56	144.7	36 42.0	79 55	145.1	36 18.3	79 55	145.5	1
36 55.4	77 58	143.4	36 32.2	78 57	143.8	36 08.8	78 56	144.2	35 45.5	78 56	144.6	2
36 20.9	76 59	142.6	35 58.0	77 58	143.0	35 35.0	77 58	143.4	35 11.9	77 57	143.8	3
35 45.7	75 60	141.7	35 23.1	75 59	142.1	35 00.4	76 59	142.5	34 37.6	76 58	142.9	4
35 09.8	74 61	140.9	34 47.5	74 60	141.3	34 25.2	75 60	141.7	34 02.7	75 59	142.1	35
34 33.3	73 62	140.1	34 11.3	73 61	140.5	33 49.3	74 61	140.9	33 27.2	74 60	141.3	6
33 56.2	72 63	139.3	33 34.6	72 62	139.7	33 12.8	73 62	140.1	32 51.0	73 61	140.5	7
33 18.5	71 64	138.5	32 57.2	71 63	139.0	32 35.8	72 63	139.4	32 14.3	72 62	139.8	8
32 40.2	70 65	137.8	32 19.2	70 64	138.2	31 58.1	70 64	138.6	31 36.9	71 63	139.0	9
32 01.4	69 66	137.0	31 40.7	69 65	137.5	31 19.9	69 64	137.9	30 59.0	70 64	138.3	40
31 22.0	68 66	136.3	31 01.6	68 66	136.8	30 41.2	68 65	137.2	30 20.6	69 65	137.6	1
30 42.2	67 67	135.6	30 22.1	67 67	136.0	30 01.9	67 66	136.5	29 41.7	68 66	136.9	2
30 01.8	66 68	134.9	29 42.0	66 68	135.4	29 22.1	66 67	135.8	29 02.2	67 67	136.2	3
29 20.9	65 69	134.3	29 01.4	65 68	134.7	28 41.9	65 68	135.1	28 22.3	66 67	135.6	4
28 39.6	64 70	133.6	28 20.4	64 69	134.0	28 01.2	64 69	134.5	27 41.8	65 68	134.9	45
27 57.8	63 70	132.9	27 38.9	63 70	133.4	27 20.0	63 69	133.8	27 01.0	64 69	134.3	6
27 15.6	62 71	132.3	26 57.0	62 71	132.8	26 38.4	62 70	133.2	26 19.7	63 70	133.6	7
26 32.9	61 72	131.7	26 14.7	61 71	132.1	25 56.3	61 71	132.6	25 37.9	62 70	133.0	8
25 49.9	60 72	131.1	25 31.9	60 72	131.5	25 13.9	60 72	132.0	24 55.8	61 71	132.4	9
25 06.5	59 73	130.5	24 48.8	59 73	130.9	24 31.0	59 72	131.4	24 13.2	60 72	131.8	50
24 22.6	58 74	129.9	24 05.3	58 73	130.4	23 47.8	58 73	130.8	23 30.3	59 72	131.3	1
23 38.5	57 74	129.4	23 21.4	57 74	129.8	23 04.2	57 73	130.3	22 47.0	58 73	130.7	2
22 53.9	56 75	128.8	22 37.1	56 74	129.3	22 20.2	56 74	129.7	22 03.3	57 73	130.2	3
22 09.1	55 75	128.3	21 52.5	55 75	128.7	21 35.9	55 74	129.2	21 19.2	56 74	129.6	4
21 23.8	54 76	127.7	21 07.6	54 75	128.2	20 51.3	55 75	128.6	20 34.9	55 74	129.1	55
20 38.3	53 76	127.2	20 22.3	53 76	127.7	20 06.3	54 76	128.1	19 50.2	54 75	128.6	6
19 52.5	52 77	126.7	19 36.8	52 76	127.2	19 21.0	53 76	127.6	19 05.2	53 76	128.1	7
19 06.3	51 77	126.2	18 50.9	52 77	126.7	18 35.4	52 76	127.1	18 19.8	52 76	127.6	8
18 19.9	50 78	125.7	18 04.7	51 77	126.2	17 49.5	51 77	126.7	17 34.2	51 76	127.1	9
17 33.2	50 78	125.3	17 18.3	50 78	125.7	17 03.3	50 77	126.2	16 48.3	50 77	126.6	60
16 46.2	49 79	124.8	16 31.6	49 78	125.3	16 16.9	49 78	125.7	16 02.2	49 77	126.2	1
15 59.0	48 79	124.4	15 44.6	48 79	124.8	15 30.2	48 78	125.3	15 15.7	48 78	125.7	2
15 11.5	47 80	123.9	14 57.4	47 79	124.4	14 43.2	47 79	124.8	14 29.0	47 78	125.3	3
14 23.8	46 80	123.5	14 09.9	46 80	123.9	13 56.0	46 79	124.4	13 42.0	47 79	124.9	4
13 35.8	45 80	123.1	13 22.2	45 80	123.5	13 08.5	46 80	124.0	12 54.8	46 79	124.4	65
12 47.6	44 81	122.6	12 34.2	45 80	123.1	12 20.8	45 80	123.6	12 07.4	45 79	124.0	6
11 59.2	44 81	122.2	11 46.1	44 81	122.7	11 32.9	44 80	123.2	11 19.7	44 80	123.6	7
11 10.5	43 81	121.8	10 57.7	43 81	122.3	10 44.8	43 81	122.8	10 31.8	43 80	123.2	8
10 21.7	42 82	121.5	10 09.1	42 81	121.9	9 56.4	42 81	122.4	9 43.7	42 81	122.8	9
9 32.6	41 82	121.1	9 20.3	41 82	121.5	9 07.9	41 81	122.0	8 55.4	42 81	122.5	70
8 43.4	40 82	120.7	8 31.3	41 82	121.2	8 19.1	41 82	121.6	8 06.9	41 81	122.1	1
7 54.0	40 83	120.3	7 42.1	40 82	120.8	7 30.2	40 82	121.3	7 18.2	40 82	121.7	2
7 04.4	39 83	120.0	6 52.7	39 83	120.5	6 41.0	39 82	120.9	6 29.3	39 82	121.4	3
6 14.6	38 83	119.6	6 03.2	38 83	120.1	5 51.7	38 82	120.6	5 40.2	38 82	121.0	4
5 24.6	37 84	119.3	5 13.4	37 83	119.8	5 02.2	37 83	120.2				75
												6

DECLINATION SAME NAME AS LATITUDE

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	5 57.0	28 88	66.7	6 05.3	27 87	66.2	6 13.5	27 87	65.7	6 21.7	27 87	65.2	6 29.9	27 86	64.8	6 38.0	27 86	64.3	6 46.1	27 86	63.8	6 54.2	27 85	63.3	91
2	5 04.4	28 88	66.4	5 12.8	28 87	65.9	5 21.3	28 87	65.5	5 29.7	28 87	65.0	5 38.0	28 86	64.5	5 46.4	28 86	64.0	5 54.7	28 86	63.5	6 03.0	28 85	63.1	2
3																			5 03.4	28 85	63.3	5 11.9	28 85	62.8	3

Lat. 17°

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	79 00.0	1.0 04	00.0	78 30.0	1.0 04	00.0	78 00.0	1.0 04	00.0	77 00.0	1.0 03	00.0	75 00.0	1.0 03	00.0	73 00.0	1.0 02	00.0	72 30.0	1.0 02	00.0	71 30.0	1.0 02	00.0	00
1	78 57.7	1.0 12	04.6	78 27.8	1.0 11	04.4	77 57.9	1.0 10	04.2	76 58.1	1.0 10	03.8	74 58.4	1.0 08	03.3	72 58.6	1.0 07	02.8	72 28.6	1.0 07	02.7	71 28.7	1.0 06	02.6	1
2	78 50.8	99 19	09.2	78 21.2	99 18	08.7	77 51.6	99 17	08.3	76 52.3	99 16	07.6	74 53.5	99 14	06.5	72 54.3	99 12	05.6	72 24.5	99 11	05.5	71 24.9	99 11	05.1	2
3	78 39.5	97 26	13.6	78 10.4	97 25	13.0	77 41.3	97 24	12.4	76 42.8	98 22	11.4	74 45.4	98 19	09.7	72 47.3	99 16	08.4	72 17.7	99 16	08.2	71 18.5	99 15	07.6	3
4	78 23.9	94 32	17.8	77 55.5	95 31	17.0	77 27.1	95 30	16.3	76 29.7	96 28	15.0	74 34.1	97 24	12.8	72 37.5	97 21	11.2	72 08.3	98 20	10.8	71 09.6	98 19	10.1	4
05	78 04.4	92 38	21.9	77 36.9	92 37	20.9	77 09.1	93 36	20.0	76 13.2	94 33	18.5	74 19.9	95 29	15.9	72 25.1	96 25	13.8	71 56.2	96 24	13.4	70 58.3	97 23	12.6	05
6	77 41.3	88 44	25.6	77 14.7	89 42	24.6	76 47.8	90 41	23.6	75 53.5	91 38	21.8	74 02.8	93 33	18.8	72 10.1	95 29	16.4	71 41.7	95 28	15.9	70 44.7	96 27	15.0	6
7	77 14.9	85 49	29.2	76 49.2	86 47	28.0	76 23.3	87 46	26.9	75 30.7	88 43	25.0	73 42.9	91 37	21.6	71 52.7	93 33	19.0	71 24.8	93 32	18.4	70 28.8	94 30	17.3	7
8	76 45.5	81 53	32.4	76 20.9	83 52	31.2	75 55.9	84 50	30.1	75 05.1	86 47	27.9	73 20.5	89 41	24.3	71 32.9	91 37	21.4	71 05.6	91 36	20.7	70 10.6	92 34	19.5	8
9	76 13.4	78 57	35.5	75 49.9	79 56	34.2	75 25.9	80 54	33.0	74 37.0	83 51	30.7	72 55.7	86 45	26.9	71 10.9	89 40	23.7	70 44.2	89 39	23.0	69 50.4	90 37	21.7	9
10	75 39.0	74 61	38.2	75 16.5	76 59	36.9	74 53.6	77 57	35.6	74 06.6	80 54	33.3	72 28.7	83 48	29.3	70 46.8	86 43	25.9	70 20.8	87 42	25.2	69 28.3	88 40	23.8	10
1	75 02.5	71 64	40.7	74 41.0	72 62	39.4	74 19.1	74 60	38.1	73 34.1	76 57	35.7	71 59.7	81 52	31.6	70 20.7	84 46	28.1	69 55.4	85 45	27.3	69 04.2	86 43	25.8	1
2	74 24.2	67 67	43.1	74 03.7	69 65	41.7	73 42.8	71 63	40.4	72 59.6	73 60	38.0	71 28.7	78 54	33.7	69 52.9	82 49	30.1	69 28.3	82 48	29.2	68 38.4	84 46	27.7	2
3	73 44.2	64 69	45.2	73 24.7	66 67	43.8	73 04.8	67 66	42.5	72 23.5	70 63	40.1	70 56.0	75 57	35.7	69 23.3	79 52	32.0	68 59.4	80 51	31.1	68 10.9	82 48	29.5	3
4	73 02.8	61 71	47.1	72 44.3	63 70	45.8	72 25.3	64 68	44.5	71 45.8	67 65	42.0	70 21.7	73 60	37.6	68 52.1	77 54	33.8	68 29.0	78 53	32.9	67 41.9	79 51	31.3	4
15	72 20.2	58 73	48.9	72 02.6	60 71	47.5	71 44.4	61 70	46.3	71 06.7	64 67	43.8	69 46.0	70 62	39.4	68 19.5	74 57	35.5	67 57.1	75 55	34.6	67 11.4	77 53	32.9	15
6	71 36.5	55 74	50.5	71 19.7	57 73	49.2	71 02.4	58 72	47.9	70 26.4	62 69	45.5	69 08.9	67 64	41.0	67 45.5	72 59	37.1	67 23.8	73 58	36.2	66 39.5	75 55	34.5	6
7	70 51.7	52 76	51.9	70 35.8	54 75	50.7	70 19.3	56 73	49.4	69 44.9	59 71	47.0	68 30.7	65 66	42.6	67 10.2	69 61	38.7	66 49.3	70 60	37.7	66 06.4	72 57	36.0	7
8	70 06.1	50 77	53.3	69 51.0	51 76	52.0	69 35.3	53 75	50.8	69 02.5	56 72	48.4	67 51.3	62 67	44.0	66 33.8	67 62	40.1	66 13.6	68 61	39.2	65 32.1	70 59	37.4	8
9	69 19.8	47 78	54.5	69 05.4	49 77	53.3	68 50.4	51 76	52.1	68 19.1	54 74	49.7	67 10.9	60 69	45.4	65 56.3	65 64	41.5	65 36.8	66 63	40.5	64 56.7	68 61	38.7	9
20	68 32.7	45 80	55.7	68 19.0	47 78	54.4	68 04.8	48 77	53.3	67 34.9	51 75	51.0	66 29.6	57 70	46.7	65 17.9	62 66	42.7	64 59.0	63 64	41.8	64 20.3	66 62	40.0	20
1	67 45.0	43 80	56.7	67 32.0	44 79	55.5	67 18.5	46 78	54.3	66 50.0	49 76	52.1	65 47.5	55 72	47.8	64 38.5	60 67	43.9	64 20.3	61 66	43.0	63 43.0	63 64	41.2	1
2	66 56.8	40 81	57.6	66 44.5	42 80	56.5	66 31.6	44 79	55.3	66 04.4	47 77	53.1	65 04.6	53 73	48.9	63 58.3	58 68	45.0	63 40.8	59 67	44.1	63 04.8	61 65	42.3	2
3	66 08.1	38 82	58.5	65 56.4	40 81	57.4	65 44.1	42 80	56.3	65 18.2	45 78	54.1	64 21.0	50 74	50.0	63 17.3	56 70	46.1	63 00.4	57 68	45.2	62 25.7	59 66	43.4	3
4	65 19.0	36 82	59.3	65 07.8	38 82	58.2	64 56.2	40 81	57.1	64 31.5	43 79	55.0	63 36.8	48 75	50.9	62 35.6	53 71	47.1	62 19.4	55 70	46.2	61 45.9	57 68	44.4	4
25	64 29.5	35 83	60.1	64 18.8	36 82	59.0	64 07.8	38 81	57.9	63 44.2	41 79	55.8	62 52.0	46 76	51.8	61 53.3	51 72	48.0	61 37.6	53 71	47.1	61 05.4	55 69	45.4	25
6	63 39.6	33 84	60.7	63 29.5	34 83	59.7	63 19.0	36 82	58.6	62 56.6	39 80	56.6	62 06.6	44 76	52.6	61 10.3	49 73	48.9	60 55.3	51 72	48.0	60 24.2	53 70	46.3	6
7	62 49.4	31 84	61.4	62 39.8	33 83	60.3	62 29.8	34 82	59.3	62 08.5	37 81	57.3	61 20.8	42 77	53.4	60 26.8	47 73	49.7	60 12.4	49 72	48.8	59 42.5	51 71	47.1	7
8	61 58.9	29 85	61.9	61 49.8	31 84	60.9	61 40.3	32 83	59.9	61 20.0	35 81	57.9	60 34.5	41 78	54.1	59 42.7	46 74	50.5	59 28.9	47 73	49.6	59 00.2	49 71	47.9	8
9	61 08.1	28 85	62.5	60 59.5	29 84	61.5	60 50.5	31 84	60.5	60 31.2	34 82	58.6	59 47.8	39 78	54.8	58 58.2	44 75	51.2	58 44.9	45 74	50.4	58 17.3	47 72	48.7	9
30	60 17.1	26 85	63.0	60 09.0	28 85	62.0	60 00.5	29 84	61.0	59 42.1	32 82	59.1	59 00.7	37 79	55.4	58 13.3	42 76	51.9	58 00.5	43 75	51.1	57 34.0	45 73	49.4	30
1	59 25.9	25 86	63.4	59 18.2	26 85	62.5	59 10.1	28 84	61.5	58 52.7	30 83	59.7	58 13.3	35 80	56.0	57 27.9	40 76	52.6	57 15.7	41 75	51.7	56 50.2	44 74	50.0	1
2	58 34.5	24 86	63.8	58 27.2	25 85	62.9	58 19.6	26 84	62.0	58 03.1	29 83	60.1	57 25.5	34 80	56.6	56 42.2	38 77	53.2	56 30.5	40 76	52.3	56 06.1	42 74	50.7	2
3	57 42.9	22 86	64.2	57 36.1	23 86	63.3	57 28.8	25 85	62.4	57 13.2	27 84	60.6	56 37.5	32 80	57.1	55 56.1	37 77	53.7	55 44.9	38 77	52.9	55 21.5	40 75	51.3	3
4	56 51.2	21 86	64.6	56 44.7	22 86	63.7	56 37.9	23 85	62.8	56 23.1	26 84	61.0	55 49.2	31 81	57.6	55 09.7	35 78	54.2	54 59.0	36 77	53.4	54 36.6	38 75	51.8	4
35	55 59.3	20 87	64.9	55 53.2	21 86	64.0	55 46.8	22 86	63.1	55 32.8	24 84	61.4	55 00.6	29 81	58.0	54 23.0	34 78	54.7	54 12.7	35 78	53.9	53 51.3	37 76	52.3	35
6	55 07.3	18 87	65.2	55 01.6	20 86	64.3	54 55.6	21 86	63.5	54 42.4	23 84	61.8	54 11.9	28 82	58.4	53 36.0	32 79	55.2	53 26.2	33 78	54.4	53 05.7	35 76	52.8	6
7	54 15.2	17 87	65.4	54 09.8	18 86	64.6	54 04.1	20 86	63.8	53 51.7	22 85	62.1	53 22.9	26 82	58.8	52 48.7	31 79	55.6	52 39.4	32 78	54.8	52 19.9	34 77	53.3	7
8	53 22.9	16 87	65.7	53 17.9	17 87	64.9	53 12.6	18 86	64.0	53 01.0	21 85	62.4	52 33.7	25 82	59.2	52 01.3	29 80	56.0	51 52.4	30 79	55.3	51 33.7	32 77	53.7	8
9	52 30.6	15 87	65.9	52 25.9	16 87	65.1	52 21.0	17 86	64.3	52 10.0	19 85	62.7	51 44.3	24 83	59.5	51 13.6	28 80	56.4	51 05.1	29 79	55.7	50 47.3	31 78	54.1	9
40	51 38.2	14 88	66.1	51 33.8	15 87	65.3	51 29.2	16 86	64.5	51 19.0	18 85	63.0	50 54.8	22 83	59.8	50 25.7	26 80	56.8	50 17.6	27 79	56.0	50 00.7	29 78	54.5	40
1	50 45.6	13 88	66.3	50 41.7	14 87	65.5	50 37.4	15 86	64.7	50 27.8	17 85	63.2	50 05.1	21 83	60.1	49 37.6	25 80	57.1	49 30.0	26 80	56.4	49 13.9	28 78	54.9	1
2	49 53.1	12 88	66.5	49 49.4	13 87	65.7	49 45.4	14 87	64.9	49 36.6	16 86	63.4	49 15.3	20 83	60.4	48 49.3	24 81	57.4	48 42.1	24 80	56.7	48 26.9	26 79	55.2	2
3	49 08.4	11 88	66.6	48 57.1	12 87	65.9	48 53.4	13 87	65.1	48 45.2	15 86	63.6	48 25.3	18 83	60.6	48 00.9	22 81	57.7	47 54.1	23 80	57.0	47 39.7	25 79	55.5	3
4	48 07.7	10 88	66.8	48 04.7	11 87	66.0	48 01.3	12 87	65.3	47 53.8	14 86	63.8	47 35.3	17 84	60.9	47 12.3	21 81	58.0	47 05.9	22 81	57.2	46 52.3	24 79	55.8	4
45	47 15.0	09 88	66.9	47 12.2	10 88	66.2	47 09.2	11 87	65.4	47 02.3	12 86	64.0	46 45.1	16 84	61.1	46 23.6	20 81	58.2	46 17.6	21 81	57.5	46 04.7	22 80	56.1	45
6	46 22.2	08 88	67.0	46 19.7	09 88	66.3	46 17.0	10 87	65.6	46 10.7	11 86	64.1	45 54.8	15 84	61.3	45 34.8	18 82	58.4	45 29.1	19 81	57.7	45 17.0	21 80	56.3	6
7	45 29.3	07 88	67.1	45 27.2	08 88	66.4	45 24.7	09 87	65.7	45 19.0	10 86	64.3	45 04.5	14 84	61.4	44 45.8	17 82	58.6	44 40.6	18 81	58.0	44 29.2	20 80	56.6	7
8	44 36.5	06 88	67.2	44 34.6	07 88	66.5	44 32.4	08 87	65.8	44 27.3	09 86	64.4	44 14.1	13 84	61.6	43 56.8	16 82	58.8	43 51.9	17 81	58.2	43 41.3	18 80	56.8	8
9	43 43.6	05 88	67.2	43 41.9	06 88	66.5	43 40.1	07 87	65.9	43 35.5	08 86	64.5	43 23.6	12 84	61.7	43 07.6	15 82	59.0	43 03.1	16 81	58.3	42 53.2	17 80	57.0	9
50	42 50.7	04 88	67.3	42 49.3	05 88	66.6	42 47.7	06 87	65.9	42 43.7	07 86	64.6	42 33.0	11 84	61.9	42 18.4	14 82	59.2	42 14.2	14 82	58.5	42 05.0	16 80	57.2	50
1	41 57.7	03 88	67.3	41 56.6	04 88	66.7	41 55.3	05 87	66.0	41 51.9	06 86	64.7	41 42.4	10 84	62.0	41 29.1	13 82	59.3	41 25.2	13 82	58.7	41 16.8	15 81	57.3	1
2	41 04.8	02 88	67.4	41 03.9	03 88	66.7	41 02.9	04 87	66.0	41 00.0	05 86	64.7	40 51.7	08 85	62.1	40 39.7	11 82	59.5	40 36.2	12 82	58.8	40 28.4	14 81	57.5	2
3	40 11.8	02 88	67.4	40 11.2	02 88	66.7	40 10.4	03 87	66.1	40 08.1	05 87	64.8	40 01.0	07 85	62.2	39 50.3	10 83	59.6	39 47.1	11 82	58.9	39 40.0	12 81	57.6	3
4	39 18.8	01 88	67.4	39 18.5	01 88	66.8	39 18.0	02 87	66.1	39 16.2	04 87	64.8	39 10.2	06 85	62.2	39 00.8	09 83	59.7	38 57.9	10 82	59.0	38 51.5	11 81	57.8	4
55	38 25.8	00 88	67.4	38 25.8	01 88	66.8	38 25.5	01 87	66.1	38 24.3	03 87	64.9	38 19.4	05 85	62.3	38 11.2	08 83	59.8	38 08.7	09 82	59.1	38 02.9	10 81	57.9	55
6	37 32.9	01 88	67.4	37 33.0	00 88	66.8	37 33.0	00 87	66.1	37 32.3	02 87	64.9	37 28.6	04 85	62.4	37 21.6	07 83	59.9	37 19.4	08 82	59.2	37 14.3	09 81	58.0	6
7	36 39.9	02 88	67.4	36 40.3	01 88	66.8	36 40.5	00 87	66.1	36 40.4	01 87	64.9	36 37.7	03 85	62.4	36 32.0	06 83	59.9	36 30.1	07 82	59.3	36 25.7	08 81	58.1	7
8	35 46.9	02 88	67.4	35 47.6	02 88	66.8	35 48.1	01 87	66.1	35 48.4	00 87	64.9	35 46.9	03 85	62.4	35 42.3	05 83	60.0	35 40.7	06 82	59.4	35 36.9	07 81	58.1	8
9	34 54.0	03 88	67.3	34 54.9	03 88	66.7	34 55.6	02 87	66.1	34 56.5	01 87	64.9	34 56.0	02 85	62.5	34 52.6	04 83	60.0	34 51.3	05 82	59.4	34 48.2	06 81	58.2	9
60	34 01.0	04 88	67.3	34 02.2	03 88	66.7	34 03.1	03 87	66.1	34 04.5	02 87	64.9	34 05.1	01 85	62.5	34 02.9	03 83	60.1	34 01.9	04 82	59.5	33 59.4	05 81	58.2	60
1	33 08.1	05 88	67.3	33 09.5	04 88	66.7	33 10.7	04 87	66.1	33 12.6	03 87	64.9	33 14.2	00 85	62.5	33 13.2	02 83	60.1	33 12.5	03 82	59.5	33 10.6	04 81	58.3	1
2	32 15.2	06 88	67.2	32 16.8	05 88	66.6	32 18.2	05 87	66.0	32 20.6	03 87	64.8	32 23.4	01 85	62.5	32 23.5	01 83	60.1	32 23.1	02 82	59.5	32 21.8	03 81	58.3	2
3	31 22.3	06 88	67.1	31 24.2	06 88	66.6	31 25.8	05 87	66.0	31 28.7	04 86	64.8	31 32.5	02 85	62.4	31 33.7	00 83	60.1	31 33.6	01 82	59.5	31 33.0	02 81	58.3	3
4	30 29.5	07 88	67.1	30 31.5	07 88	66.5	30 33.4	06 87	65.9	30 36.8	05 86	64.7	30 41.6	03 85	62.4	30 44.0	01 83	60.1	30 44.2	00 82	59.5	30 44.1	01 81	58.4	4
65	29 36.6	08 88	67.0	29 38.9	07 88	66.4	29 41.1	07 87	65.8	29 44.9	06 86	64.7	29 50.8	04 85	62.4	29 54.2	02 83	60.1	29 54.7	01 82	59.5	29 55.3	00 81	58.4	65
6	28 43.8	09 88	66.9	28 46.4	08 88	66.3	28 48.7	08 87	65.8	28 53.0	07 86	64.6	28 59.9	05 85	62.3	29 04.5	03 83	60.1	29 05.3	02 82	59.5	29 06.4	01 81	58.3	6
7	27 51.1	09 88	66.8	27 53.8	09 88	66.3	27 56.4	08 87	65.7	28 01.2	08 86	64.6	28 09.1	06 85	62.3	28 14.8	04 83	60.0	28 15.9	03 82	59.5	28 17.6	02 81	58.3	7
8	26 58.4	10 88	66.7	27 01.3	10 87	66.2	27 04.2	09 87	65.6	27 09.4	08 86	64.5	27 18.3	07 85	62.2	27 25.1	05 83	60.0	27 26.5	04 82	59.4	27 28.8	03 81	58.3	8
9	26 05.7	11 88	66.6	26 08.9	10 87	66.1	26 11.9	10 87	65.5	26 17.7	09 86	64.4	26 27.6	07 85	62.2	26 35.4	06 83	59.9	26 37.1	05 82	59.4	26 39.9	04 81	58.3	9
70	25 13.0	12 88	66.5	25 16.4	11 87	66.0	25 19.7	11 87	65.4	25 25.9	10 86	64.3	25 36.9	08 84	62.1	25 45.8	07 83	59.9	25 47.7	06 82	59.3	25 51.2	06 81	58.2	70
1	24 20.4	12 88	66.4	24 24.1	12 87	65.8	24 27.6	12 87	65.3	24 34.2	11 86	64.2	24 46.2	09 84	62.0	24 56.2	08 83	59.8	24 58.4	07 82	59.3	25 02.4	06 81	58.2	1
2	23 27.9	13 88	66.3	23 31.7	13 87	65.7	23 35.5	12 87	65.2	23 42.6	12 86	64.1	23 55.5	10 84	61.9	24 06.6	08 83	59.7	24 09.1	08 82	59.2	24 13.7	07 81	58.1	2
3	22 35.4	14 87	66.1	22 39.5	13 87	65.6	22 43.4	13 87	65.1	22 51.0	12 86	64.0	23 04.9	11 84	61.8	23 17.0	09 82	59.7	23 19.8	09 82	59.1	23 25.0	08 81	58.0	3
4	21 42.9	14 87	66.0	21 47.2	14 87	65.5	21 51.4	14 87	64.9	21 59.5	13 86	63.9	22 14.3	12 84	61.7	22 27.5	10 82	59.6	22 30.6	10 82	59.0	22 36.3	09 81	58.0	4
75	20 50.5	15 87	65.9	20 55.1	15 87	65.3	20 59.5	15 86	64.8	21 08.0	14 86	63.7	21 23.8	13 84	61.6	21 38.1	11 82	59.5	21 41.4	11 82	58.9	21 47.7	10 81	57.9	75
6	19 58.2	16 87	65.7	20 02.9	16 87	65.2	20 07.6	15 86	64.7	20 16.6	15 86	63.6	20 33.4	13 84	61.5	20 48.7	12 82	59.4	20 52.3	12 82	58.8	20 59.1	11 81	57.8	6
7	19 05.9	17 87	65.6	19 10.9	16 87	65.0	19 15.7	16 86	64.5	19 25.2	15 86	63.5	19 43.0	14 84	61.4	19 59.3	13 82	59.3	20 03.2	13 82	58.7	20 10.6	12 81	57.7	7
8	18 13.7	17 87	65.4	18 18.9	17 87	64.9	18 24.0	17 86	64.4	18 33.9	16 85	63.3	18 52.7	15 84	61.2	19 10.0	14 82	59.2	19 14.2	14 82	58.6	19 22.1	13 81	57.6	8
9	17 21.6	18 87	65.2	17 27.0	18 86	64.7	17 32.3	18 86	64.2	17 42.6	17 85	63.2	18 02.4	16 84	61.1	18 20.8	15 82	59.0	18 25.2	15 81	58.5	18 33.7	14 81	57.5	9
80	16 29.5	19 87	65.1	16 35.1	19 86	64.6	16 40.7	18 86	64.0	16 51.5	18 85	63.0	17 12.2	17 84	61.0	17 31.6	16 82	58.9	17 36.3	15 81	58.4	17 45.4	15 80	57.3	80
1	15 37.5	20 86	64.9	15 43.3	19 86	64.4	15 49.1	19 86	63.9	16 00.4	19 85	62.9	16 22.1	18 83	60.8	16 42.6	17 82	58.8	16 47.5	16 81	58.2	16 57.1	16 80	57.2	1
2	14 45.6	20 86	64.7	14 51.6	20 86	64.2	14 57.6	20 86	63.7	15 09.4	10 85	62.7	15 32.0	18 83	60.6	15 53.5	17 82	58.6	15 58.7	17 81	58.1	16 08.9	17 80	57.1	2
3	13 53.8	21 86	64.5	14 00.0	21 86	64.0	14 06.2	21 86	63.5	14 18.4	20 85	62.5	14 42.0	19 83	60.5	15 04.6	18 81	58.5	15 10.1	18 81	57.9	15 20.8	18 80	56.9	3
4	13 02.0	22 86	64.3	13 08.5	21 86	63.8	13 14.9	21 85	63.3	13 27.6	21 85	62.3	13 52.1	20 83	60.3	14 15.7	19 81	58.3	14 21.5	19 81	57.8	14 32.8	19 80	56.8	4
85	12 10.3	22 86	64.1	12 17.0	22 86	63.6	12 23.7	22 85	63.1	12 36.8	22 84	62.1	13 02.3	21 83	60.1	13 27.0	20 81	58.1	13 33.0	20 81	57.6	13 44.8	20 80	56.6	85
6	11 18.8	23 86	63.9	11 25.7	23 85	63.4	11 32.5	23 85	62.9	11 46.1	22 84	61.9	12 12.6	22 83	59.9	12 38.3	21 81	57.9	12 44.6	21 81	57.4	12 57.0	20 80	56.4	6
7	10 27.3	24 86	63.7	10 34.4	24 85	63.2	10 41.5	24 85	62.7	10 55.5	23 84	61.7	11 23.0	23 83	59.8	11 49.7	22 81	57.8	11 56.3	22 80	57.3	12 69.2	21 79	56.3	7
8	9 35.9	25 86	63.5	9 43.2	24 85	63.0	9 50.5	24 85	62.5	10 05.0	24 84	61.5	10 33.5	23 82	59.6	11 01.2	23 81	57.6	11 08.0	23 80	57.1	11 21.5	22 79	56.1	8
9	8 44.6	25 85	63.3	8 52.1	25 85	62.8	8 59.7	25 85	62.3	9 14.6	25 84	61.3	9 44.1	24 82	59.4	10 12.9	24 80	57.4	10 19.9	24 80	56.9	10 34.0	23 79	55.9	9
90	7 53.4	26 85	63.0	8 01.2	26 85	62.6	8 08.9	26 84	62.1	8 24.4	26 84	61.1	8 54.8	25 82	59.1	9 24.6	25 80	57.2	9 31.9	24 80	56.7	9 46.5	24 79	55.7	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	28° 00′				28° 30′				29° 00′				30° 00′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	45 00.0	1.0	01	180.0	44 30.0	1.0	01	180.0	44 00.0	1.0	01	180.0	43 00.0	1.0	01	180.0
1	44 59.4	1.0	03	178.8	44 29.4	1.0	03	178.8	43 59.4	1.0	03	178.8	42 59.4	1.0	03	178.8
2	44 57.5	1.0	05	177.5	44 27.5	1.0	05	177.5	43 57.6	1.0	05	177.6	42 57.6	1.0	05	177.6
3	44 54.4	1.0	07	176.3	44 24.5	1.0	07	176.3	43 54.5	1.0	07	176.4	42 54.7	1.0	07	176.5
4	44 50.0	1.0	09	175.0	44 20.1	1.0	09	175.1	43 50.3	1.0	09	175.1	42 50.5	1.0	09	175.3
05	44 44.4	99	11	173.8	44 14.6	99	11	173.9	43 44.8	99	11	173.9	42 45.2	99	11	174.1
6	44 37.6	99	13	172.5	44 07.9	99	13	172.6	43 38.2	99	13	172.7	42 38.7	99	13	172.9
7	44 29.5	99	15	171.3	43 59.9	99	15	171.4	43 30.3	99	15	171.5	42 31.1	99	15	171.8
8	44 20.3	98	18	170.1	43 50.8	98	17	170.2	43 21.3	98	17	170.4	42 22.3	98	17	170.6
9	44 09.8	98	19	168.9	43 40.5	98	19	169.0	43 11.1	98	19	169.2	42 12.4	98	18	169.5
10	43 58.2	97	21	167.7	43 29.0	97	21	167.9	42 59.8	97	21	168.0	42 01.3	97	20	168.3
1	43 45.4	97	23	166.5	43 16.3	97	23	166.7	42 47.3	97	23	166.9	41 49.2	97	22	167.2
2	43 31.4	96	25	165.3	43 02.6	96	25	165.5	42 33.7	96	24	165.7	41 35.9	96	24	166.1
3	43 16.3	96	27	164.2	42 47.7	96	27	164.4	42 19.0	96	26	164.6	41 21.5	96	26	165.0
4	43 00.1	95	29	163.0	42 31.7	95	28	163.2	42 03.2	95	28	163.4	41 06.1	95	27	163.9
15	42 42.8	94	31	161.9	42 14.6	94	30	162.1	41 46.3	94	30	162.3	40 49.6	94	29	162.8
6	42 24.4	93	32	160.8	41 56.4	94	32	161.0	41 28.3	94	32	161.2	40 32.1	94	31	161.7
7	42 05.0	93	34	159.6	41 37.2	93	34	159.9	41 09.4	93	33	160.1	40 13.6	93	33	160.6
8	41 44.5	92	36	158.6	41 17.0	92	35	158.8	40 49.4	92	35	159.1	39 54.1	92	34	159.6
9	41 23.1	91	38	157.5	40 55.7	91	37	157.7	40 28.4	91	37	158.0	39 33.6	91	36	158.5
20	41 00.6	90	39	156.4	40 33.5	90	39	156.7	40 06.4	90	38	157.0	39 12.1	91	37	157.5
1	40 37.1	89	41	155.4	40 10.3	89	40	155.7	39 43.5	90	40	156.0	38 49.7	90	39	156.5
2	40 12.7	88	42	154.3	39 46.2	88	42	154.6	39 19.7	89	41	154.9	38 26.4	89	40	155.5
3	39 47.4	87	44	153.3	39 21.2	88	43	153.6	38 54.9	88	43	153.9	38 02.2	88	42	154.6
4	39 21.2	86	45	152.3	38 55.3	87	45	152.6	38 29.3	87	44	153.0	37 37.1	87	43	153.6
25	38 54.1	85	46	151.3	38 28.5	86	46	151.7	38 02.8	86	46	152.0	37 11.2	86	45	152.7
6	38 26.2	84	48	150.4	38 00.8	85	47	150.7	37 35.4	85	47	151.1	36 44.4	85	46	151.7
7	37 57.4	83	49	149.4	37 32.4	84	49	149.8	37 07.2	84	48	150.1	36 16.8	84	47	150.8
8	37 27.9	82	51	148.5	37 03.1	83	50	148.9	36 38.3	83	50	149.2	35 48.4	83	49	149.9
9	36 57.5	81	52	147.6	36 33.1	82	51	148.0	36 08.5	82	51	148.3	35 19.3	82	50	149.0
30	36 26.4	80	53	146.7	36 02.3	81	53	147.1	35 38.0	81	52	147.4	34 49.4	81	51	148.2
1	35 54.6	79	54	145.8	35 30.7	80	54	146.2	35 06.8	80	53	146.6	34 18.8	80	52	147.3
2	35 22.0	78	56	145.0	34 58.4	79	55	145.4	34 34.8	79	54	145.7	33 47.4	79	53	146.5
3	34 48.7	77	56	144.1	34 25.5	78	56	144.5	34 02.2	78	56	144.9	33 15.4	78	54	145.7
4	34 14.8	76	58	143.3	33 51.9	77	57	143.7	33 28.9	77	57	144.1	32 42.7	77	56	144.9
35	33 40.2	75	59	142.5	33 17.6	75	58	142.9	32 54.9	76	58	143.3	32 09.3	76	57	144.1
6	33 05.0	74	60	141.7	32 42.7	74	59	142.1	32 20.3	75	59	142.5	31 35.4	75	58	143.3
7	32 29.1	73	61	141.0	32 07.1	73	60	141.4	31 45.1	74	60	141.8	31 00.8	74	59	142.5
8	31 52.7	72	62	140.2	31 31.0	72	61	140.6	31 09.3	73	61	141.0	30 25.6	73	60	141.8
9	31 15.7	71	63	139.5	30 54.3	71	62	139.9	30 32.9	72	62	140.3	29 49.8	72	61	141.1
40	30 38.1	70	64	138.7	30 17.1	70	63	139.1	29 55.9	70	62	139.6	29 13.5	71	61	140.4
1	30 00.0	69	64	138.0	29 39.2	69	64	138.4	29 18.4	69	63	138.9	28 36.6	70	62	139.7
2	29 21.3	68	65	137.3	29 00.9	68	65	137.7	28 40.4	68	64	138.2	27 59.2	69	63	139.0
3	28 42.2	67	66	136.6	28 22.1	67	66	137.1	28 01.9	67	65	137.5	27 21.3	68	64	138.3
4	28 02.6	66	67	136.0	27 42.8	66	66	136.4	27 22.9	66	66	136.8	26 42.9	67	65	137.7
45	27 22.4	65	68	135.3	27 03.0	65	67	135.8	26 43.4	65	67	136.2	26 04.0	66	66	137.0
6	26 41.9	64	68	134.7	26 22.7	64	68	135.1	26 03.4	64	67	135.5	25 24.7	65	66	136.4
7	26 00.9	63	69	134.1	25 42.0	63	69	134.5	25 23.0	63	68	134.9	24 44.9	64	67	135.8
8	25 19.4	62	70	133.5	25 00.8	62	69	133.9	24 42.2	62	69	134.3	24 04.7	63	68	135.2
9	24 37.6	61	70	132.9	24 19.3	61	70	133.3	24 00.9	61	70	133.7	23 24.0	62	68	134.6
50	23 55.3	60	71	132.3	23 37.3	60	71	132.7	23 19.3	60	70	133.1	22 42.9	61	69	134.0
1	23 12.7	59	72	131.7	22 55.0	59	71	132.1	22 37.2	59	71	132.6	22 01.5	60	70	133.4
2	22 29.6	58	72	131.1	22 12.2	58	72	131.6	21 54.8	58	71	132.0	21 19.6	59	70	132.9
3	21 46.2	57	73	130.6	21 29.1	57	72	131.0	21 12.0	57	72	131.5	20 37.4	58	71	132.4
4	21 02.5	56	74	130.1	20 45.7	56	73	130.5	20 28.8	56	72	130.9	19 54.8	57	72	131.8
55	20 18.4	55	74	129.5	20 01.9	55	74	130.0	19 45.3	55	73	130.4	19 11.9	56	72	131.3
6	19 34.0	54	75	129.0	19 17.8	54	74	129.5	19 01.4	54	74	129.9	18 28.6	55	73	130.8
7	18 49.3	53	75	128.5	18 33.3	53	75	129.0	18 17.3	54	74	129.4	17 45.0	54	73	130.3
8	18 04.2	52	76	128.0	17 48.5	52	75	128.5	17 32.8	53	75	128.9	17 01.1	53	74	129.8
9	17 18.9	51	76	127.6	17 03.5	51	76	128.0	16 48.0	52	75	128.5	16 16.9	52	74	129.3
60	16 33.3	50	76	127.1	16 18.1	51	76	127.5	16 02.9	51	76	128.0	15 32.4	51	75	128.9
1	15 47.4	49	77	126.6	15 32.5	50	77	127.1	15 17.6	50	76	127.5	14 47.6	50	75	128.4
2	15 01.2	49	77	126.2	14 46.6	49	77	126.6	14 31.9	49	76	127.1	14 02.5	49	76	128.0
3	14 14.7	48	78	125.7	14 00.4	48	77	126.2	13 46.0	48	77	126.6	13 17.1	48	76	127.5
4	13 28.0	47	78	125.3	13 14.0	47	78	125.8	12 59.9	47	77	126.2	12 31.5	47	76	127.1
65	12 41.1	46	79	124.9	12 27.3	46	78	125.3	12 13.4	46	78	125.8	11 45.6	47	77	126.7
6	11 53.9	45	79	124.5	11 40.4	45	79	124.9	11 26.8	45	78	125.4	10 59.5	46	77	126.3
7	11 06.5	44	79	124.1	10 53.2	44	79	124.5	10 39.9	44	78	125.0	10 13.1	45	78	125.9
8	10 18.8	43	80	123.7	10 05.8	43	79	124.1	9 52.8	44	79	124.6	9 26.5	44	78	125.5
9	9 31.0	42	80	123.3	9 18.2	43	80	123.8	9 05.4	43	79	124.2	8 39.7	43	78	125.1
70	8 42.9	42	80	122.9	8 30.4	42	80	123.4	8 17.9	42	80	123.8	7 52.7	42	79	124.8
1	7 54.7	41	81	122.6	7 42.4	41	80	123.0	7 30.1	41	80	123.5	7 05.5	41	79	124.4
2	7 06.2	40	81	122.2	6 54.2	40	81	122.7	6 42.2	40	80	123.1	6 18.0	40	79	124.0
3	6 17.6	39	81	121.8	6 05.8	39	81	122.3	5 54.0	39	81	122.8	5 30.4	39	80	123.7
4	5 28.7	38	82	121.5	5 17.2	38	81	122.0	5 05.7	39	81	122.4				

32° 00′				34° 00′				34° 30′				35° 30′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
41 00.0	1.0	01	180.0	39 00.0	1.0	01	180.0	38 30.0	1.0	01	180.0	37 30.0	1.0	01	180.0	00
40 59.4	1.0	03	178.9	38 59.5	1.0	03	178.9	38 29.5	1.0	03	178.9	37 29.5	1.0	03	179.0	1
40 57.7	1.0	05	177.8	38 57.9	1.0	04	177.9	38 27.9	1.0	04	177.9	37 27.9	1.0	04	177.9	2
40 54.9	1.0	07	176.6	38 55.2	1.0	06	176.8	38 25.3	1.0	06	176.8	37 25.4	1.0	06	176.9	3
40 51.0	1.0	08	175.5	38 51.5	1.0	08	175.7	38 21.6	1.0	08	175.8	37 21.8	1.0	08	175.9	4
40 46.0	99	10	174.4	38 46.7	99	10	174.7	38 16.8	99	10	174.8	37 17.2	99	09	174.9	05
40 39.8	99	12	173.3	38 40.8	99	12	173.6	38 11.1	99	11	173.7	37 11.6	99	11	173.9	6
40 32.6	99	14	172.2	38 33.9	99	13	172.6	38 04.3	99	13	172.7	37 04.9	99	13	172.9	7
40 24.2	98	16	171.1	38 26.0	99	15	171.5	37 56.4	99	15	171.6	36 57.3	99	14	171.8	8
40 14.8	98	18	170.0	38 17.0	98	17	170.5	37 47.6	98	16	170.6	36 48.7	98	16	170.8	9
40 04.3	98	19	168.9	38 07.0	98	18	169.5	37 37.7	98	18	169.6	36 39.0	98	18	169.9	10
39 52.7	97	21	167.8	37 56.0	97	20	168.4	37 26.9	97	20	168.6	36 28.4	97	19	168.9	1
39 40.1	97	23	166.8	37 44.0	97	22	167.4	37 15.0	97	21	167.6	36 16.9	97	21	167.9	2
39 26.4	96	24	165.7	37 31.0	96	23	166.4	37 02.2	96	23	166.6	36 04.3	96	22	166.9	3
39 11.7	95	26	164.6	37 17.1	96	25	165.4	36 48.3	96	25	165.6	35 50.9	96	24	165.9	4
38 56.0	95	28	163.6	37 02.1	95	26	164.4	36 33.6	95	26	164.6	35 36.5	96	26	165.0	15
38 39.4	94	29	162.6	36 46.2	94	28	163.4	36 17.9	95	28	163.6	35 21.1	95	27	164.0	6
38 21.7	93	31	161.6	36 29.4	94	30	162.5	36 01.2	94	29	162.7	35 04.9	94	29	163.1	7
38 03.1	93	33	160.6	36 11.6	93	31	161.5	35 43.7	93	31	161.7	34 47.8	93	30	162.2	8
37 43.5	92	34	159.6	35 53.0	92	33	160.5	35 25.2	92	32	160.8	34 29.7	93	31	161.2	9
37 23.0	91	36	158.6	35 33.4	92	34	159.6	35 05.9	92	34	159.8	34 10.9	92	33	160.3	20
37 01.6	90	37	157.6	35 13.0	91	36	158.7	34 45.7	91	35	158.9	33 51.1	91	34	159.4	1
36 39.3	89	39	156.7	34 51.7	90	37	157.8	34 24.7	90	36	158.0	33 30.6	90	36	158.5	2
36 16.2	89	40	155.7	34 29.5	89	38	156.9	34 02.8	89	38	157.1	33 09.2	89	37	157.7	3
35 52.2	88	41	154.8	34 06.6	88	40	156.0	33 40.1	88	39	156.2	32 47.0	89	38	156.8	4
35 27.4	87	43	153.9	33 42.8	87	41	155.1	33 16.6	88	40	155.4	32 24.0	88	40	156.0	25
35 01.7	86	44	153.0	33 18.2	87	42	154.2	32 52.3	87	42	154.5	32 00.2	87	41	155.1	6
34 35.3	85	45	152.1	32 52.9	86	44	153.4	32 27.2	86	43	153.7	31 35.7	86	42	154.3	7
34 08.0	84	47	151.2	32 26.8	85	45	152.5	32 01.4	85	44	152.8	31 10.4	85	43	153.5	8
33 40.1	83	48	150.4	32 00.0	84	46	151.7	31 34.8	84	45	152.0	30 44.4	84	44	152.7	9
33 11.4	82	49	149.6	31 32.4	83	47	150.9	31 07.6	83	47	151.2	30 17.7	83	46	151.9	30
32 41.9	81	50	148.7	31 04.2	82	48	150.1	30 39.6	82	48	150.4	29 50.3	82	47	151.1	1
32 11.8	80	51	147.9	30 35.2	81	49	149.3	30 11.0	81	49	149.7	29 22.2	81	48	150.3	2
31 41.0	79	52	147.1	39 05.6	80	50	148.5	29 41.6	80	50	148.9	28 53.5	80	49	149.6	3
31 09.5	78	54	146.3	29 35.4	79	52	147.8	29 11.7	79	51	148.1	28 24.1	79	50	148.8	4
30 37.4	77	55	145.6	29 04.5	78	53	147.0	28 41.1	78	52	147.4	27 54.1	78	51	148.1	35
30 04.7	76	56	144.8	28 32.9	77	54	146.3	28 09.8	77	53	146.7	27 23.5	77	52	147.4	6
29 31.3	75	57	144.1	28 00.8	76	55	145.6	27 38.0	76	54	146.0	26 52.3	76	53	146.7	7
28 57.4	74	58	143.4	27 28.1	75	56	144.9	27 05.6	75	55	145.3	26 20.5	75	54	146.0	8
28 22.8	73	58	142.7	26 54.8	74	56	144.2	26 32.6	74	56	144.6	25 48.1	74	55	145.3	9
27 47.8	72	59	142.0	26 20.9	73	57	143.5	25 59.1	73	57	143.9	25 15.2	73	56	144.6	40
27 12.1	71	60	141.3	25 46.5	72	58	142.8	25 25.0	72	58	143.2	24 41.7	72	57	144.0	1
26 36.0	70	61	140.6	25 11.6	71	59	142.2	24 50.4	71	59	142.6	24 07.7	71	58	143.4	2
25 59.3	69	62	140.0	24 36.2	70	60	141.5	24 15.3	70	59	141.9	23 33.2	70	58	142.7	3
25 22.1	68	63	139.3	24 00.3	69	61	140.9	23 39.7	69	60	141.3	22 58.2	69	59	142.1	4
24 44.5	67	64	138.7	23 23.9	68	61	140.3	23 03.5	68	61	140.7	22 22.7	68	60	141.5	45
24 06.4	66	64	138.1	22 47.0	67	62	139.7	22 27.0	67	62	140.1	21 46.8	67	61	140.9	6
23 27.8	65	65	137.5	22 09.6	66	63	139.1	21 49.9	66	62	139.5	21 10.4	66	61	140.3	7
22 48.8	64	66	136.9	21 31.9	65	64	138.5	21 12.5	65	63	138.9	20 33.5	65	62	139.7	8
22 09.3	63	66	136.3	20 53.6	63	64	138.0	20 34.6	64	64	138.4	19 56.2	64	63	139.2	9
21 29.5	62	67	135.7	20 15.0	62	65	137.4	19 56.2	63	65	137.8	19 18.5	63	64	138.6	50
20 49.2	61	68	135.2	19 36.0	61	66	136.8	19 17.5	62	65	137.3	18 40.4	62	64	138.1	1
20 08.6	60	68	134.6	18 56.5	60	66	136.3	18 38.4	61	66	136.7	18 01.9	61	65	137.6	2
19 27.5	59	69	134.1	18 16.7	59	67	135.8	17 58.8	60	66	136.2	17 23.0	60	65	137.1	3
18 46.1	58	70	133.6	17 36.5	58	68	135.3	17 19.0	59	67	135.7	16 43.7	59	66	136.5	4
18 04.4	57	70	133.1	16 56.0	57	68	134.8	16 38.7	58	68	135.2	16 04.1	58	67	136.1	55
17 22.3	56	71	132.6	16 15.0	56	69	134.3	15 58.1	57	68	134.7	15 24.1	57	67	135.6	6
16 39.9	55	71	132.1	15 33.8	55	69	133.8	15 17.2	56	69	134.2	14 43.7	56	68	135.1	7
15 57.1	54	72	131.6	14 52.2	54	70	133.3	14 35.9	55	69	133.8	14 03.1	55	68	134.6	8
15 14.0	53	72	131.1	14 10.3	53	70	132.9	13 54.3	54	70	133.3	13 22.1	54	69	134.2	9
14 30.6	52	73	130.7	13 28.1	52	71	132.4	13 12.4	53	70	132.9	12 40.7	53	69	133.7	60
13 47.0	51	73	130.2	12 45.6	51	71	132.0	12 30.2	52	71	132.4	11 59.1	52	70	133.3	1
13 03.0	50	74	129.8	12 02.8	50	72	131.5	11 47.7	51	71	132.0	11 17.2	51	70	132.9	2
12 18.8	49	74	129.3	11 19.7	49	72	131.1	11 04.9	50	72	131.6	10 35.0	50	71	132.4	3
11 34.3	48	75	128.9	10 36.4	49	73	130.7	10 21.8	49	72	131.1	9 52.5	49	71	132.0	4
10 49.5	47	75	128.5	9 52.7	48	73	130.3	9 38.4	48	73	130.7	9 09.8	48	72	131.6	65
10 04.5	46	75	128.1	9 08.8	47	74	129.9	8 54.8	47	73	130.4	8 26.8	47	72	131.2	6
9 19.2	45	76	127.7	8 24.7	46	74	129.5	8 11.0	46	74	130.0	7 43.5	46	73	130.9	7
8 33.7	44	76	127.3	7 40.3	45	74	129.1	7 26.9	45	74	129.6	7 00.0	45	73	130.5	8
7 47.9	43	77	127.0	6 55.7	44	75	128.8	6 42.6	44	74	129.2	6 16.2	44	73	130.1	9
7 02.0	42	77	126.6	6 10.8	43	75	128.4	5 58.0	43	75	128.9	5 32.2	43	74	129.8	70
6 15.8	42	77	126.2	5 25.8	42	76	128.1	5 13.2	42	75	128.5					1
5 29.4	41	78	125.9													2
																3
																4

DECLINATION SAME NAME AS LATITUDE

H.A.	28° 00′				28° 30′				29° 00′				30° 00′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
91	7 02.3	27	85	62.8	7 10.3	27	85	62.3	7 18.3	27	84	61.8	7 34.2	26	83	60.9
2	6 11.3	28	85	62.6	6 19.5	27	84	62.1	6 27.8	27	84	61.6	6 44.1	27	83	60.6
3	5 20.4	28	85	62.3	5 28.9	28	84	61.8	5 37.3	28	84	61.4	5 54.2	28	83	60.4
4													5 04.3	29	83	60.1
95																
6																

32° 00′				34° 00′				34° 30′				35° 30′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
8 05.6	26	82	58.9	8 36.4	25	80	57.0	8 44.0	25	80	56.5	8 59.2	25	79	55.5	91
7 16.5	27	82	58.7	7 48.4	26	80	56.8	7 56.3	26	79	56.3	8 11.9	26	78	55.3	2
6 27.5	28	81	58.5	7 00.5	27	80	56.5	7 08.6	27	79	56.0	7 24.8	27	78	55.1	3
5 38.7	28	81	58.2	6 12.7	28	79	56.3	6 21.1	28	79	55.8	6 37.9	28	78	54.8	4
				5 25.0	29	79	56.1	5 33.7	29	79	55.6	5 51.0	29	78	54.6	95
												5 04.3	30	78	54.4	6

H.A.	36° 00′				37° 00′				38° 30′				40° 00′				42° 00′				42° 30′				43° 00′				45° 00′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	71 00.0	1.0	02	00.0	70 00.0	1.0	02	00.0	68 30.0	1.0	02	00.0	67 00.0	1.0	02	00.0	65 00.0	1.0	01	00.0	64 30.0	1.0	01	00.0	64 00.0	1.0	01	00.0	62 00.0	1.0	01	00.0	00
1	70 58.8	1.0	06	02.5	69 58.8	1.0	06	02.3	68 28.9	1.0	05	02.1	66 59.0	1.0	06	02.0	64 59.1	1.0	04	01.8	64 29.1	1.0	04	01.7	63 59.2	1.0	04	01.7	61 59.2	1.0	04	01.5	1
2	70 55.0	99	10	05.0	69 55.3	1.0	10	04.7	68 25.7	1.0	09	04.3	66 56.1	1.0	08	03.9	64 56.5	1.0	07	03.5	64 26.6	1.0	07	03.4	63 56.7	1.0	07	03.3	61 57.0	1.0	06	03.0	2
3	70 48.9	99	14	07.4	69 49.5	99	13	07.0	68 20.4	99	12	06.4	66 51.2	99	11	05.9	64 52.1	99	10	05.3	64 22.3	99	10	05.1	63 52.5	99	10	05.0	61 53.2	99	09	04.5	3
4	70 40.3	98	18	09.8	69 41.4	98	17	09.2	68 13.0	98	16	08.5	66 44.4	99	14	07.8	64 46.0	99	13	07.0	64 16.3	99	13	06.8	63 46.7	99	12	06.6	61 48.0	99	11	06.0	4
05	70 29.3	97	22	12.2	69 31.1	97	21	11.5	68 03.5	97	19	10.5	66 35.7	98	18	09.7	64 38.2	98	16	08.7	64 08.7	98	15	08.5	63 39.3	98	15	08.3	61 41.3	98	14	07.5	05
6	70 16.1	96	26	14.5	69 18.6	96	24	13.7	67 52.1	96	22	12.5	66 25.1	97	21	11.5	64 28.6	97	19	10.4	63 59.4	97	18	10.1	63 30.2	97	18	09.9	61 33.1	98	16	08.9	6
7	70 00.6	94	29	16.8	69 04.0	95	28	15.8	67 38.6	95	26	14.5	66 12.7	96	24	13.4	64 17.5	96	21	12.1	63 48.6	96	21	11.7	63 19.6	97	20	11.5	61 23.5	97	18	10.4	7
8	69 43.0	92	33	19.0	68 47.4	93	31	17.9	67 23.3	94	29	16.5	65 58.6	95	26	15.2	64 04.7	95	24	13.7	63 36.1	95	23	13.3	63 07.4	96	23	13.0	61 12.4	96	21	11.8	8
9	69 23.4	91	36	21.1	68 28.8	91	34	19.9	67 06.2	92	32	18.3	65 42.7	93	29	16.9	63 50.3	94	26	15.3	63 22.1	94	26	14.9	62 53.8	94	25	14.5	61 00.0	95	23	13.2	9
10	69 01.8	89	39	23.1	68 08.3	90	37	21.9	66 47.2	91	34	20.2	65 25.2	92	32	18.6	63 34.4	93	29	16.9	63 06.6	93	28	16.4	62 38.6	93	28	16.0	60 46.3	94	25	14.6	10
1	68 38.3	87	42	25.1	67 46.1	88	40	23.8	66 26.6	89	37	21.9	65 06.0	90	34	20.3	63 17.1	91	31	18.4	62 49.6	92	31	17.9	62 22.1	92	30	17.5	60 31.2	93	27	15.9	1
2	68 13.2	84	45	27.0	67 22.1	86	43	25.6	66 04.4	87	40	23.7	64 45.3	88	37	21.9	62 58.3	90	34	19.9	62 31.2	90	33	19.4	62 04.1	91	32	18.9	60 14.8	92	29	17.2	2
3	67 46.4	82	47	28.8	66 56.6	84	45	27.3	65 40.6	85	42	25.3	64 23.2	87	39	23.5	62 38.1	88	36	21.3	62 11.5	89	35	20.8	61 44.8	89	34	20.3	59 57.2	90	31	18.5	3
4	67 18.0	80	50	30.5	66 29.5	81	47	29.0	65 15.4	83	44	26.9	63 59.6	85	42	25.0	62 16.6	87	38	22.7	61 50.5	87	37	22.2	61 24.3	88	36	21.7	59 38.4	89	33	19.8	4
15	66 48.2	78	52	32.1	66 01.0	79	50	30.6	64 48.7	81	47	28.4	63 34.7	83	44	26.5	61 53.7	85	40	24.1	61 28.2	86	39	23.5	61 02.4	86	38	23.0	59 18.4	87	35	21.0	15
6	66 17.0	76	54	33.7	65 31.2	77	52	32.1	64 20.8	79	49	29.9	63 08.5	81	46	27.9	61 29.7	83	42	25.4	61 04.6	84	41	24.8	60 39.4	84	40	24.3	58 57.2	86	37	22.2	6
7	65 44.6	73	56	35.2	65 00.1	75	54	33.5	63 51.6	77	51	31.3	62 41.1	79	48	29.2	61 04.5	82	44	26.7	60 40.0	82	43	26.1	60 15.2	83	42	25.5	58 35.0	84	39	23.4	7
8	65 11.0	71	58	36.6	64 27.8	73	56	34.9	63 21.2	75	52	32.6	62 12.5	77	49	30.5	60 38.2	80	46	27.9	60 14.2	80	45	27.3	59 50.0	81	44	26.7	58 11.7	83	40	24.5	8
9	64 36.3	69	60	37.9	63 54.4	71	57	36.2	62 49.7	73	54	33.9	61 42.8	75	51	31.8	60 10.8	78	47	29.1	59 47.3	79	46	28.5	59 23.6	79	46	27.9	57 47.4	81	42	25.6	9
20	64 00.5	67	61	39.2	63 20.0	68	59	37.5	62 17.2	71	56	35.1	61 12.1	73	53	32.9	59 42.4	76	49	30.3	59 19.4	77	48	29.6	58 56.3	77	47	29.0	57 22.2	80	44	26.6	20
1	63 23.8	64	63	40.3	62 44.6	66	60	38.7	61 43.7	69	57	36.3	60 40.4	71	54	34.1	59 13.0	74	50	31.4	58 50.6	75	50	30.7	58 28.0	76	49	30.1	56 56.0	78	45	27.7	1
2	62 46.2	62	64	41.5	62 08.3	64	62	39.8	61 09.2	67	59	37.4	60 07.8	69	56	35.2	58 42.7	72	52	32.4	58 20.8	73	51	31.8	57 58.8	74	50	31.1	56 28.9	76	47	28.7	2
3	62 07.8	60	65	42.5	61 31.2	62	63	40.9	60 34.0	65	60	38.5	59 34.3	68	57	36.2	58 11.5	71	53	33.4	57 50.2	71	52	32.8	57 28.7	72	52	32.1	56 01.0	74	48	29.6	3
4	61 28.7	58	66	43.6	60 53.2	60	64	41.9	59 57.9	63	61	39.5	59 00.0	66	58	37.2	57 39.5	69	55	34.4	57 18.8	69	54	33.7	56 57.8	70	53	33.1	55 32.2	73	49	30.5	4
25	60 48.8	56	68	44.5	60 14.6	58	66	42.8	59 21.0	61	63	40.5	58 24.9	64	60	38.2	57 06.7	67	56	35.3	56 46.5	68	55	34.7	56 26.1	68	54	34.0	55 02.6	71	50	31.4	25
6	60 08.2	54	69	45.4	59 35.2	56	67	43.8	58 43.4	59	64	41.4	57 49.1	62	61	39.1	56 33.1	65	57	36.2	56 13.5	66	56	35.5	55 53.7	66	55	34.9	54 32.3	69	52	32.3	6
7	59 27.1	52	70	46.3	58 55.2	54	68	44.6	58 05.2	57	65	42.2	57 12.6	60	62	40.0	55 58.8	63	58	37.1	55 39.8	64	57	36.4	55 20.5	65	56	35.7	54 01.3	67	53	33.1	7
8	58 45.3	50	70	47.1	58 14.6	52	69	45.4	57 26.3	55	66	43.1	56 35.4	58	63	40.8	55 23.9	61	59	37.9	55 05.4	62	58	37.2	54 46.7	63	57	36.5	53 29.6	66	54	33.9	8
9	58 03.0	48	71	47.8	57 33.5	50	69	46.2	56 46.9	53	67	43.8	55 57.6	56	64	41.6	54 48.4	59	60	38.7	54 30.4	60	59	38.0	54 12.2	61	58	37.3	52 57.3	64	55	34.7	9
30	57 20.3	46	72	48.5	56 51.8	48	70	46.9	56 06.8	51	68	44.6	55 19.3	54	65	42.3	54 12.2	58	61	39.4	53 54.8	58	60	38.7	53 37.2	59	59	38.1	52 24.4	62	56	35.4	30
1	56 37.0	45	73	49.2	56 09.7	47	71	47.6	55 26.3	50	68	45.3	54 40.4	52	66	43.0	53 35.5	56	62	40.2	53 18.6	57	61	39.5	53 01.5	57	60	38.8	51 50.8	60	57	36.1	1
2	55 53.4	43	73	49.9	55 27.1	45	72	48.3	54 45.3	48	69	45.9	54 01.0	51	66	43.7	52 58.2	54	63	40.8	52 41.9	55	62	40.1	52 25.3	56	61	39.5	51 16.7	59	58	36.8	2
3	55 09.3	41	74	50.5	54 44.0	43	72	48.9	54 03.9	46	70	46.6	53 21.1	49	67	44.3	52 20.4	52	64	41.5	52 04.6	53	63	40.8	51 48.6	54	62	40.1	50 42.1	57	59	37.4	3
4	54 24.9	39	75	51.0	54 00.6	41	73	49.5	53 22.0	44	70	47.2	52 40.8	47	68	45.0	51 42.2	51	64	42.1	51 26.9	51	64	41.4	51 11.4	52	63	40.7	50 06.9	55	59	38.1	4
35	53 40.1	38	75	51.6	53 16.8	40	74	50.0	52 39.7	43	71	47.7	52 00.1	45	69	45.5	51 03.5	49	65	42.7	50 48.7	50	64	42.0	50 33.7	50	64	41.3	49 31.3	53	60	38.7	35
6	52 55.0	36	76	52.1	52 32.7	38	74	50.5	51 57.1	41	72	48.3	51 18.9	44	69	46.1	50 24.4	47	66	43.3	50 10.1	48	65	42.6	49 55.6	49	64	41.9	48 55.3	52	61	39.2	6
7	52 09.6	35	76	52.5	51 48.3	37	75	51.0	51 14.1	39	72	48.8	50 37.4	42	70	46.6	49 44.8	45	66	43.8	49 31.1	46	66	43.1	49 17.1	47	65	42.4	48 18.7	50	62	39.8	7
8	51 23.9	33	77	53.0	51 03.5	35	75	51.5	50 30.7	38	73	49.3	49 55.5	40	70	47.1	49 04.9	44	67	44.3	48 51.7	45	66	43.6	48 38.2	45	65	42.9	47 41.8	48	62	40.3	8
9	50 38.0	32	77	53.4	50 18.5	33	75	51.9	49 47.1	36	73	49.7	49 13.3	39	71	47.6	48 24.7	42	68	44.8	48 11.9	43	67	44.1	47 58.9	44	66	43.4	47 04.5	47	63	40.8	9
40	49 51.8	30	77	53.8	49 33.2	32	76	52.3	49 03.2	35	74	50.1	48 30.8	37	71	48.0	47 44.1	41	68	45.3	47 31.8	41	67	44.6	47 19.3	42	67	43.9	46 26.9	45	63	41.3	40
1	49 05.4	29	78	54.1	48 47.7	30	76	52.7	48 19.0	33	74	50.5	47 48.0	36	72	48.4	47 03.2	39	69	45.7	46 51.4	40	68	45.0	46 39.3	41	67	44.4	45 48.8	44	64	41.7	1
2	48 18.8	27	78	54.5	48 01.9	29	77	53.0	47 34.6	32	74	50.9	47 05.0	34	72	48.8	46 22.0	37	69	46.1	46 10.6	38	68	45.4	45 59.1	39	68	44.8	45 10.5	42	64	42.2	2
3	47 32.0	26	78	54.8	47 16.0	28	77	53.4	46 50.0	30	75	51.3	46 21.7	33	73	49.2	45 40.5	36	70	46.5	45 29.6	37	69	45.8	45 18.5	37	68	45.2	44 31.8	40	65	42.6	3
4	46 45.1	24	79	55.1	46 29.8	26	77	53.7	46 05.1	29	75	51.6	45 38.1	31	73	49.6	44 58.8	34	70	46.9	44 48.3	35	69	46.2	44 37.7	36	68	45.5	43 52.9	39	65	43.0	4
45	45 57.9	23	79	55.4	45 43.5	25	77	54.0	45 20.0	27	75	51.9	44 54.3	30	73	49.9	44 16.8	33	70	47.2	44 06.8	34	70	46.6	43 56.6	34	69	45.9	43 13.6	37	66	43.3	45
6	45 10.6	22	79	55.6	44 57.0	23	78	54.3	44 34.8	26	76	52.2	44 10.3	28	74	50.2	43 34.5	31	71	47.6	43 25.0	32	70	46.9	43 15.3	33	69	46.2	42 34.1	36	66	43.7	6
7	44 23.2	21	79	55.9	44 10.4	22	78	54.5	43 49.3	25	76	52.5	43 26.2	27	74	50.5	42 52.1	30	71	47.9	42 43.0	31	70	47.2	42 33.7	31	70	46.6	41 54.4	34	67	44.0	7
8	43 35.6	19	79	56.1	43 23.6	21	78	54.8	43 03.7	23	76	52.8	42 41.8	25	74	50.8	42 09.4	28	71	48.2	42 00.8	29	71	47.5	41 51.9	30	70	46.9	41 14.4	33	67	44.3	8
9	42 47.9	18	80	56.3	42 36.6	20	78	55.0	42 18.0	22	76	53.0	41 57.3	24	74	51.0	41 26.6	27	72	48.4	41 18.4	28	71	47.8	41 10.0	28	70	47.2	40 34.2	31	67	44.6	9
50	42 00.1	17	80	56.5	41 49.6	18	79	55.2	41 32.1	21	77	53.2	41 12.6	23	75	51.3	40 43.6	26	72	48.7	40 35.8	26	71	48.1	40 27.8	27	71	47.4	39 53.8	30	68	44.9	50
1	41 12.2	16	80	56.7	41 02.4	17	79	55.4	40 46.1	19	77	53.4	40 27.8	21	75	51.5	40 00.4	24	72	48.9	39 53.0	25	72	48.3	39 45.5	26	71	47.7	39 13.2	28	68	45.2	1
2	40 24.2	14	80	56.8	40 15.2	16	79	55.5	39 59.9	18	77	53.6	39 42.8	20	75	51.7	39 17.1	23	72	49.2	39 10.1	24	72	48.5	39 03.0	24	71	47.9	38 32.4	27	68	45.4	2
3	39 36.1	13	80	57.0	39 27.8	15	79	55.7	39 13.7	17	77	53.8	38 57.7	19	75	51.9	38 33.6	21	73	49.4	38 27.0	22	72	48.8	38 20.3	23	71	48.1	37 51.4	25	69	45.7	3
4	38 48.0	12	80	57.1	38 40.4	13	79	55.8	38 27.3	15	77	54.0	38 12.5	17	76	52.1	37 50.0	20	73	49.6	37 43.8	21	72	49.0	37 37.5	21	72	48.3	37 10.3	24	69	45.9	4
55	37 59.8	11	80	57.2	37 52.8	12	79	56.0	37 40.9	14	78	54.1	37 27.2	16	76	52.2	37 06.2	19	73	49.8	37 00.5	19	72	49.1	36 54.6	20	72	48.5	36 29.0	23	69	46.1	55
6	37 11.5	10	81	57.3	37 05.2	11	79	56.1	36 54.4	13	78	54.2	36 41.8	15	76	52.4	36 22.4	17	73	49.9	36 17.0	18	73	49.3	36 11.5	19	72	48.7	35 47.6	21	69	46.3	6
7	36 23.2	09	81	57.4	36 17.6	10	80	56.2	36 07.8	12	78	54.4	35 56.3	14	76	52.5	35 38.4	16	73	50.1	35 33.5	17	73	49.5	35 28.4	17	72	48.9	35 06.1	20	69	46.5	7
8	35 34.8	08	81	57.5	35 29.9	09	80	56.3	35 21.1	11	78	54.5	35 10.8	12	76	52.6	34 54.4	15	74	50.2	34 49.8	15	73	49.6	34 45.1	16	72	49.0	34 24.4	18	70	46.6	8
9	34 46.4	06	81	57.6	34 42.1	08	80	56.4	34 34.4	09	78	54.6	34 25.1	11	76	52.7	34 10.2	14	74	50.3	34 06.1	14	73	49.7	34 01.7	15	72	49.2	33 42.7	17	70	46.8	9
60	33 57.9	05	81	57.6	33 54.3	07	80	56.4	33 47.7	08	78	54.6	33 39.4	10	76	52.8	33 26.0	12	74	50.5	33 22.2	13	73	49.9	33 18.3	13	73	49.3	33 00.8	16	70	46.9	60
1	33 09.4	04	81	57.7	33 06.5	05	80	56.5	33 00.8	07	78	54.7	32 53.7	09	76	52.9	32 41.7	11	74	50.6	32 38.3	12	73	50.0	32 34.8	12	73	49.4	32 18.9	14	70	47.0	1
2	32 20.9	03	81	57.7	32 18.6	04	80	56.5	32 14.0	06	78	54.8	32 07.9	08	76	53.0	31 57.4	10	74	50.7	31 54.4	10	73	50.1	31 51.2	11	73	49.5	31 36.9	13	70	47.1	2
3	31 32.4	02	81	57.8	31 30.7	03	80	56.6	31 27.1	05	78	54.8	31 22.0	06	76	53.1	31 13.0	09	74	50.7	31 10.3	09	73	50.2	31 07.5	10	73	49.6	30 54.8	12	70	47.3	3
4	30 43.8	01	81	57.8	30 42.8	02	80	56.6	30 40.2	04	78	54.9	30 36.1	05	77	53.1	30 28.5	07	74	50.8	30 26.3	08	74	50.2	30 23.8	08	73	49.6	30 12.6	10	70	47.3	4
65	29 55.3	00	81	57.8	29 54.9	01	80	56.6	29 53.2	03	78	54.9	29 50.2	04	77	53.2	29 44.1	06	74	50.9	29 42.1	07	74	50.3	29 40.1	07	73	49.7	29 30.4	09	70	47.4	65
6	29 06.8	01	81	57.8	29 07.0	00	80	56.6	29 06.3	02	78	54.9	29 04.3	03	77	53.2	28 59.5	05	74	50.9	28 58.0	05	74	50.3	28 56.3	06	73	49.8	28 48.1	08	71	47.5	6
7	28 18.2	02	81	57.8	28 19.1	01	80	56.6	28 19.3	00	78	54.9	28 18.3	02	77	53.2	28 15.0	04	74	50.9	28 13.8	04	74	50.4	28 12.5	05	73	49.8	28 05.8	07	71	47.5	7
8	27 29.7	03	81	57.7	27 31.2	02	80	56.6	27 32.4	01	78	54.9	27 32.4	01	77	53.2	27 30.4	03	74	51.0	27 29.6	03	74	50.4	27 28.6	03	73	49.8	27 23.4	05	71	47.6	8
9	26 41.2	04	81	57.7	26 43.3	03	80	56.6	26 45.4	02	78	54.9	26 46.4	00	77	53.2	26 45.8	01	74	51.0	26 45.4	02	74	50.4	26 44.8	02	73	49.9	26 41.0	04	71	47.6	9
70	25 52.7	05	81	57.7	25 55.4	04	80	56.6	25 58.5	03	78	54.9	26 00.4	02	77	53.2	26 01.3	00	74	51.0	26 01.1	01	74	50.4	26 00.9	01	73	49.9	25 58.6	03	71	47.7	70
1	25 04.2	06	81	57.6	25 07.5	06	80	56.5	25 11.6	04	78	54.9	25 14.5	03	77	53.2	25 16.7	01	74	51.0	25 16.9	01	74	50.4	25 17.0	00	73	49.9	25 16.2	01	71	47.7	1
2	24 15.8	07	81	57.6	24 19.7	06	80	56.5	24 24.7	05	78	54.8	24 28.6	04	77	53.2	24 32.1	02	74	51.0	24 32.7	02	74	50.4	24 33.1	01	73	49.9	24 33.8	00	71	47.7	2
3	23 27.4	08	81	57.5	23 31.9	07	80	56.4	23 37.8	06	78	54.8	23 42.6	05	76	53.1	23 47.5	03	74	51.0	23 48.4	03	74	50.4	23 49.3	03	73	49.9	23 51.4	01	71	47.7	3
4	22 39.0	09	81	57.4	22 44.1	08	80	56.3	22 50.9	07	78	54.7	22 56.7	06	76	53.1	23 03.0	04	74	50.9	23 04.2	04	74	50.4	23 05.4	04	73	49.8	23 09.0	02	71	47.7	4
75	21 50.7	10	80	57.3	21 56.4	09	79	56.3	22 04.1	08	78	54.7	22 10.9	07	76	53.0	22 18.4	06	74	50.9	22 20.0	05	74	50.3	22 21.6	05	73	49.8	22 26.5	03	71	47.6	75
6	21 02.4	11	80	57.3	21 08.7	10	79	56.2	21 17.3	09	78	54.6	21 25.0	08	76	53.0	21 33.9	07	74	50.8	21 35.9	06	74	50.3	21 37.7	06	73	49.8	21 44.2	05	71	47.6	6
7	20 14.2	12	80	57.2	20 21.0	11	79	56.1	20 30.6	10	78	54.5	20 39.2	09	76	52.9	20 49.5	08	74	50.8	20 51.8	08	73	50.2	20 54.0	07	73	49.7	21 01.8	06	71	47.6	7
8	19 26.0	13	80	57.0	19 33.4	12	79	56.0	19 43.9	11	78	54.4	19 53.5	10	76	52.8	20 05.0	09	74	50.7	20 07.7	09	73	50.2	20 10.2	08	73	49.7	20 19.4	07	70	47.5	8
9	18 37.9	14	80	56.9	18 45.9	13	79	55.9	18 57.2	12	78	54.3	19 07.8	11	76	52.7	19 20.6	10	74	50.6	19 23.6	10	73	50.1	19 26.5	09	73	49.6	19 37.1	08	70	47.5	9
80	17 49.8	15	80	56.8	17 58.4	14	79	55.8	18 10.7	13	78	54.2	18 22.2	12	76	52.6	18 36.3	11	74	50.6	18 39.6	11	73	50.0	18 42.8	11	73	49.5	18 54.9	09	70	47.4	80
1	17 01.8	16	80	56.7	17 11.0	15	79	55.7	17 24.2	14	77	54.1	17 36.6	13	76	52.5	17 52.0	12	74	50.5	17 55.7	12	73	49.9	17 59.2	12	73	49.4	18 12.7	11	70	47.3	1
2	16 13.9	16	80	56.6	16 23.7	16	79	55.5	16 37.7	15	77	54.0	16 51.1	14	76	52.4	17 07.8	13	74	50.4	17 11.8	13	73	49.8	17 15.7	13	72	49.3	17 30.5	12	70	47.2	2
3	15 26.1	17	80	56.4	15 36.4	17	79	55.4	15 51.3	16	77	53.9	16 05.6	16	76	52.3	16 23.7	15	73	50.3	16 28.0	14	73	49.7	16 32.2	14	72	49.2	16 48.4	13	70	47.2	3
4	14 38.3	18	79	56.3	14 49.2	18	78	55.2	15 05.0	17	77	53.7	15 20.3	17	76	52.2	15 39.6	16	73	50.1	15 44.2	15	73	49.6	15 48.8	15	72	49.1	16 06.4	14	70	47.1	4
85	13 50.6	19	79	56.1	14 02.1	19	78	55.1	14 18.8	18	77	53.6	14 35.0	18	75	52.0	14 55.6	17	73	50.0	15 00.6	16	73	49.5	15 05.5	16	72	49.0	15 24.4	15	70	46.9	85
6	13 03.1	20	79	55.9	13 15.1	20	78	54.9	13 32.7	19	77	53.4	13 49.8	19	75	51.9	14 11.7	18	73	49.9	14 17.0	18	72	49.4	14 22.2	17	72	48.9	14 42.5	16	70	46.8	6
7	12 15.6	21	79	55.8	12 28.2	21	78	54.8	12 46.7	20	77	53.3	13 04.7	20	75	51.8	13 27.8	19	73	49.7	13 33.5	19	72	49.2	13 39.0	18	72	48.7	14 00.7	18	70	46.7	7
8	11 28.2	22	79	55.6	11 41.4	22	78	54.6	12 00.7	21	76	53.1	12 19.6	21	75	51.6	12 44.1	20	73	49.6	12 50.0	20	72	49.1	12 56.0	20	72	48.6	13 19.0	19	69	46.6	8
9	10 40.9	23	79	55.4	10 54.7	23	78	54.4	11 14.9	22	76	52.9	11 34.7	22	75	51.4	12 00.4	21	73	49.4	12 06.7	21	72	48.9	12 13.0	21	71	48.4	12 37.4	20	69	46.4	9
90	9 53.7	24	78	55.2	10 08.0	24	78	54.2	10 29.2	23	76	52.7	10 49.9	23	74	51.3	11 16.9	22	72	49.3	11 23.5	22	72	48.8	11 30.1	22	71	48.3	11 55.9	21	69	46.3	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	36° 00′			37° 00′			38° 30′			40° 00′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	37 00.0	1.0 01	180.0	36 00.0	1.0 01	180.0	34 39.0	1.0 01	180.0	33 00.0	1.0 01	180.0
1	36 59.5	1.0 03	179.0	35 59.5	1.0 02	179.0	34 29.5	1.0 02	179.1	32 59.5	1.0 02	179.1
2	36 58.0	1.0 04	178.0	35 58.0	1.0 04	178.0	34 28.1	1.0 04	178.1	32 58.2	1.0 04	178.2
3	36 55.4	1.0 06	177.0	35 55.6	1.0 06	177.0	34 25.7	1.0 06	177.2	32 55.9	1.0 05	177.3
4	36 51.9	1.0 08	176.0	35 52.1	1.0 07	176.1	34 22.4	1.0 07	176.2	32 52.7	1.0 07	176.4
05	36 47.3	99 09	174.9	35 47.7	99 09	175.1	34 18.1	99 09	175.3	32 48.6	1.0 08	175.4
6	36 41.8	99 11	173.9	35 42.3	99 11	174.1	34 12.9	99 10	174.3	32 43.6	99 10	174.5
7	36 35.2	99 13	172.9	35 35.9	99 12	173.1	34 06.8	99 12	173.4	32 37.7	99 11	173.6
8	36 27.7	99 14	172.0	35 28.5	99 14	172.2	33 59.7	99 13	172.5	32 30.9	99 13	172.7
9	36 19.2	98 16	171.0	35 20.2	98 15	171.2	33 51.7	98 15	171.5	32 23.2	98 14	171.8
10	36 09.7	98 17	170.0	35 10.9	98 17	170.2	33 42.8	98 16	170.6	32 14.6	98 16	171.0
1	35 59.2	97 19	169.0	35 00.7	97 19	169.3	33 33.0	98 18	169.7	32 05.1	98 17	170.1
2	35 47.8	97 21	168.0	34 49.6	97 20	168.3	33 22.2	97 19	168.8	31 54.8	97 19	169.2
3	35 35.4	96 22	167.1	34 37.5	97 22	167.4	33 10.6	97 21	167.9	31 43.6	97 20	168.3
4	35 22.1	96 24	166.1	34 24.5	96 23	166.5	32 58.1	96 22	167.0	31 31.5	96 22	167.4
15	35 07.9	95 25	165.2	34 10.7	95 25	165.5	32 44.7	96 24	166.1	31 18.6	96 23	166.6
6	34 52.7	95 27	164.2	33 55.9	95 26	164.6	32 30.5	95 25	165.2	31 04.9	95 24	165.7
7	34 36.7	94 28	163.3	33 40.2	94 28	163.7	32 15.4	94 27	164.3	30 50.3	95 26	164.9
8	34 19.8	93 30	162.4	33 23.7	94 29	162.8	31 59.4	94 28	163.4	30 35.0	94 27	164.0
9	34 02.0	93 31	161.5	33 06.3	93 30	161.9	31 42.6	93 29	162.6	30 18.8	93 28	163.2
20	33 43.3	92 33	160.6	32 48.1	92 32	161.0	31 25.1	92 31	161.7	30 01.8	93 30	162.4
1	33 23.8	91 34	159.7	32 29.0	91 33	160.2	31 06.7	92 32	160.9	29 44.1	92 31	161.6
2	33 03.4	90 35	158.8	32 09.1	91 34	159.3	30 47.5	91 33	160.0	29 25.5	91 32	160.8
3	32 42.3	90 37	157.9	31 48.5	90 36	158.5	30 27.5	90 35	159.2	29 06.3	90 33	160.0
4	32 20.3	89 38	157.1	31 27.0	89 37	157.6	30 06.8	89 36	158.4	28 46.2	90 35	159.2
25	31 57.6	88 39	156.2	31 04.8	88 38	156.8	29 45.3	89 37	157.6	28 25.5	89 36	158.4
6	31 34.1	87 40	155.4	30 41.8	87 40	156.0	29 23.0	88 38	156.8	28 04.0	88 37	157.6
7	31 09.8	86 42	154.6	30 18.1	86 41	155.2	29 00.1	87 39	156.0	27 41.8	87 38	156.9
8	30 44.8	85 43	153.8	29 53.6	86 42	154.4	28 36.4	86 41	155.3	27 18.9	86 39	156.1
9	30 19.1	84 44	153.0	29 28.4	85 43	153.6	28 12.1	85 42	154.5	26 55.4	85 40	155.4
30	29 52.7	83 45	152.2	29 02.6	84 44	152.8	27 47.0	84 43	153.8	26 31.1	85 41	154.7
1	29 25.6	82 46	151.4	28 36.0	83 45	152 1	27 21.3	83 44	153.0	26 06.2	84 43	153.9
2	28 57.8	82 47	150.7	28 08.8	82 46	151.3	26 55.0	82 45	152.3	25 40.7	83 44	153.2
3	28 29.4	81 48	149.9	27 41.0	81 48	150.6	26 28.0	81 46	151.6	25 14.6	82 45	152.5
4	28 00.3	80 50	149.2	27 12.5	80 49	149.9	26 00.3	80 47	150.9	24 47.8	81 46	151.8
35	27 30.6	79 51	148.5	26 43.3	79 50	149.1	25 32.1	79 48	150.2	24 20.4	80 47	151.2
6	27 00.3	78 52	147.7	26 13.6	78 51	148.4	25 03.2	78 49	149.5	23 52.5	79 48	150.5
7	26 29.3	77 52	147.0	25 43.3	77 52	147.8	24 33.8	77 50	148.8	23 23.9	78 48	149.8
8	25 57.8	76 53	146.4	25 12.4	76 52	147.1	24 03.8	76 51	148.2	22 54.8	77 49	149.2
9	25 25.8	75 54	145.7	24 40.9	75 53	146.4	23 33.3	75 52	147.5	22 25.2	76 50	148.6
40	24 53.2	74 55	145.0	24 08.9	74 54	145.8	23 02.2	74 53	146.9	21 55.0	75 51	147.9
1	24 20.0	73 56	144.4	23 36.4	73 55	145.1	22 30.5	73 54	146.2	21 24.3	74 52	147.3
2	23 46.3	71 57	143.7	23 03.3	72 56	144.5	21 58.4	72 54	145.6	20 53.0	73 53	146.7
3	23 12.1	70 58	143.1	22 29.7	71 57	143.9	21 25.7	71 55	145.0	20 21.3	72 54	146.1
4	22 37.4	69 59	142.5	21 55.7	70 58	143.3	20 52.6	70 56	144.4	19 49.1	71 54	145.6
45	22 02.2	68 59	141.9	21 21.1	69 58	142.7	20 19.0	69 57	143.8	19 16.4	70 55	145.0
6	21 26.6	67 60	141.3	20 46.1	68 59	142.1	19 44.9	68 58	143.3	18 43.2	69 56	144.4
7	20 50.5	66 61	140.7	20 10.6	67 60	141.5	19 10.3	67 58	142.7	18 09.6	68 57	143.9
8	20 14.0	65 62	140.2	19 34.7	66 61	141.0	18 35.3	66 59	142.2	17 35.6	67 57	143.3
9	19 37.0	64 62	139.6	18 58.3	65 61	140.4	17 59.9	65 60	141.6	17 01.1	66 58	142.8
50	18 59.6	63 63	139.0	18 21.5	64 62	139.9	17 24.1	64 60	141.1	16 26.2	65 59	142.3
1	18 21.8	62 64	138.5	17 44.3	63 63	139.3	16 47.8	63 61	140.6	15 50.9	63 60	141.8
2	17 43.6	61 64	138.0	17 06.8	62 63	138.8	16 11.2	62 62	140.0	15 15.2	62 60	141.3
3	17 05.0	60 65	137.5	16 28.8	60 64	138.3	15 34.1	61 62	139.5	14 39.1	61 61	140.8
4	16 26.0	59 66	137.0	15 50.4	59 65	137.8	14 56.7	60 63	139.1	14 02.6	60 61	140.3
55	15 46.7	58 66	136.5	15 11.7	58 65	137.3	14 18.9	59 64	138.6	13 25.8	59 62	139.8
6	15 07.0	57 67	136.0	14 32.6	57 66	136.8	13 40.8	58 64	138.1	12 48.6	58 63	139.4
7	14 26.9	56 67	135.5	13 53.2	56 66	136.4	13 02.3	57 65	137.6	12 11.0	57 63	138.9
8	13 46.6	55 68	135.1	13 13.5	55 67	135.9	12 23.5	56 65	137.2	11 33.2	56 64	138.5
9	13 05.9	54 68	134.6	12 33.4	54 67	135.5	11 44.3	55 66	136.8	10 55.0	55 64	138.0
60	12 24.9	53 69	134.2	11 53.0	53 68	135.0	11 04.9	54 66	136.3	10 16.4	54 65	137.6
1	11 43.6	52 69	133.7	11 12.3	52 68	134.6	10 25.1	53 67	135.9	9 37.6	53 65	137.2
2	11 01.9	51 70	133.3	10 31.3	51 69	134.2	9 45.0	52 67	135.5	8 58.4	52 66	136.8
3	10 20.0	50 70	132.9	9 50.0	50 69	133.8	9 04.6	51 68	135.1	8 19.0	51 66	136.4
4	9 37.9	49 71	132.5	9 08.4	49 70	133.4	8 24.0	50 68	134.7	7 39.3	50 67	136.0
65	8 55.4	48 71	132.1	8 26.5	48 70	133.0	7 43.0	48 69	134.3	6 59.3	49 67	135.6
6	8 12.7	47 72	131.7	7 44.4	47 71	132.6	7 01.8	47 69	133.9	6 19.0	48 68	135.2
7	7 29.7	46 72	131.3	7 02.1	46 71	132.2	6 20.4	46 70	133.5	5 38.5	47 68	134.9
8	6 46.5	45 72	130.9	6 19.4	45 71	131.8	5 38.7	45 70	133.2			
9	6 03.0	44 73	130.6	5 36.6	44 72	131.5						
70	5 19.3	43 73	130.2									

42° 00′			42° 30′			43° 00′			45° 00′			H.A.
Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
31 00.0	1.0 01	180.0	30 30.0	1.0 01	180.0	30 00.0	1.0 01	180.0	28 00.0	1.0 01	180.0	00
30 59.6	1.0 02	179.1	30 29.6	1.0 02	179.1	29 59.6	1.0 02	179.2	27 59.6	1.0 02	179.2	1
30 58.3	1.0 04	178.3	30 28.3	1.0 04	178.3	29 58.3	1.0 04	178.3	27 58.4	1.0 03	178.4	2
30 56.1	1.0 05	177.4	30 26.1	1.0 05	177.4	29 56.2	1.0 05	177.5	27 56.4	1.0 05	177.6	3
30 53.1	1.0 06	176.5	30 23.2	1.0 06	176.6	29 53.2	1.0 06	176.6	27 53.6	1.0 06	176.8	4
30 49.2	1.0 08	175.7	30 19.3	1.0 08	175.7	29 49.4	1.0 08	175.8	27 50.0	1.0 07	176.0	05
30 44.4	99 09	174.8	30 14.6	99 09	174.9	29 44.8	99 09	174.9	27 45.6	99 09	175.2	6
30 38.8	99 11	174.0	30 09.1	99 11	174.0	29 39.3	99 11	174.1	27 40.4	99 10	174.4	7
30 32.3	99 12	173.1	30 02.7	99 12	173.2	29 33.0	99 12	173.3	27 34.4	99 11	173.6	8
30 25.0	98 14	172.3	29 55.5	98 13	172.4	29 25.9	99 13	172.5	27 27.7	99 13	172.8	9
30 16.9	98 15	171.4	29 47.4	98 15	171.5	29 18.0	98 15	171.6	27 20.1	98 14	172.1	10
30 07.9	98 16	170.6	29 38.5	98 16	170.7	29 09.2	98 16	170.8	27 11.8	98 15	171.3	1
29 58.0	97 18	169.7	29 28.8	97 18	169.9	28 59.6	97 17	170.0	27 02.7	97 16	170.5	2
29 47.4	97 19	168.9	29 18.3	97 19	169.0	28 49.3	97 19	169.2	26 52.9	97 18	169.7	3
29 35.9	96 20	168.1	29 07.0	96 20	168.2	28 38.1	96 20	168.4	26 42.3	97 19	169.0	4
29 23.7	96 22	167.2	28 54.9	96 22	167.4	28 26.1	96 21	167.6	26 30.9	96 20	168.2	15
29 10.6	95 23	166.4	28 42.0	95 23	166.6	28 13.4	95 22	166.8	26 18.8	96 21	167.4	6
28 56.8	95 24	165.6	28 28.3	95 24	165.8	27 59.9	95 24	166.0	26 05.9	95 23	166.7	7
28 42.1	94 26	164.8	28 13.9	94 25	165.0	27 45.6	94 25	165.2	25 52.4	94 24	165.9	8
28 26.7	94 27	164.0	27 58.7	94 27	164.2	27 30.6	94 26	164.4	25 38.1	94 25	165.2	9
28 10.6	93 28	163.2	27 42.7	93 28	163.5	27 14.8	93 28	163.7	25 23.1	93 26	164.5	20
27 53.6	92 29	162.5	27 26.0	92 29	162.7	26 58.3	92 29	162.9	25 07.4	93 27	163.7	1
27 36.0	91 31	161.7	27 08.5	92 30	161.9	26 41.1	92 30	162.1	24 51.0	92 28	163.0	2
27 17.6	91 32	160.9	26 50.4	91 31	161.2	26 23.1	91 31	161.4	24 33.9	91 30	162.3	3
26 58.5	90 33	160.2	26 31.5	90 33	160.4	26 04.4	90 32	160.7	24 16.1	90 31	161.6	4
26 38.7	89 34	159.4	26 11.9	89 34	159.7	25 45.1	89 33	159.9	23 57.7	90 32	160.9	25
26 18.2	88 35	158.7	25 51.6	88 35	159.0	25 25.1	89 34	159.2	23 38.6	89 33	160.2	6
25 57.0	88 36	158.0	25 30.7	88 36	158.2	25 04.4	88 36	158.5	23 18.8	88 34	159.5	7
25 35.1	87 38	157.2	25 09.1	87 37	157.5	24 43.0	87 37	157.8	22 58.5	87 35	158.9	8
25 12.6	86 39	156.5	24 46.8	86 38	156.8	24 21.0	86 38	157.1	22 37.5	86 36	158.2	9
24 49.4	85 40	155.8	24 23.9	85 39	156.1	23 58.4	85 39	156.4	22 15.8	86 37	157.5	30
24 25.6	84 41	155.1	24 00.4	84 40	155.4	23 35.1	84 40	155.7	21 53.6	85 38	156.9	1
24 01.2	83 42	154.5	23 36.2	83 41	154.8	23 11.2	83 41	155.1	21 30.8	84 39	156.2	2
23 36.1	82 43	153.8	23 11.4	82 42	154.1	22 46.7	83 42	154.4	21 07.4	83 40	155.6	3
23 10.5	81 44	153.1	22 46.1	81 43	153.4	22 21.6	82 43	153.8	20 43.4	82 41	155.0	4
22 44.3	80 45	152.5	22 20.1	81 44	152.8	21 56.0	81 44	153.1	20 18.9	81 42	154.4	35
22 17.5	79 46	151.8	21 53.6	80 45	152.2	21 29.7	80 45	152.5	19 53.8	80 43	153.8	6
21 50.1	78 47	151.2	21 26.5	79 46	151.5	21 02.9	79 46	151.9	19 28.2	79 44	153.2	7
21 22.2	77 47	150.6	20 58.9	78 47	150.9	20 35.6	78 46	151.2	19 02.0	78 44	152.6	8
20 53.7	76 48	150.0	20 30.8	77 48	150.3	20 07.7	77 47	150.6	18 35.3	77 45	152.0	9
20 24.7	75 49	149.4	20 02.1	76 49	149.7	19 39.4	76 48	150.1	18 08.1	76 46	151.4	40
19 55.2	74 50	148.8	19 32.9	75 49	149.1	19 10.5	75 49	149.5	17 40.5	75 47	150.9	1
19 25.2	73 51	148.2	19 03.2	74 50	148.5	18 41.1	74 50	148.9	17 12.3	74 48	150.3	2
18 54.7	72 52	147.6	18 33.0	73 51	148.0	18 11.2	73 51	148.3	16 43.6	73 49	149.8	3
18 23.8	71 52	147.0	18 02.3	72 52	147.4	17 40.8	72 51	147.8	16 14.5	72 49	149.2	4
17 52.3	70 53	146.5	17 31.2	71 53	146.9	17 10.0	71 52	147.2	15 44.9	71 50	148.7	45
17 20.4	69 54	145.9	16 59.6	69 53	146.3	16 38.7	70 53	146.7	15 14.9	70 51	148.2	6
16 48.0	68 55	145.4	16 27.5	68 54	145.8	16 07.0	69 54	146.2	14 44.4	69 52	147.7	7
16 15.2	67 55	144.9	15 55.1	67 55	145.3	15 34.8	68 54	145.7	14 13.5	68 52	147.2	8
15 42.0	66 56	144.4	15 22.2	66 56	144.8	15 02.2	66 55	145.1	13 42.2	67 53	146.7	9
15 08.4	65 57	143.9	14 48.8	65 56	144.3	14 29.2	65 56	144.6	13 10.5	66 54	146.2	50
14 34.4	64 57	143.4	14 15.1	64 57	143.8	13 55.8	64 56	144.2	12 38.4	65 54	145.7	1
13 59.9	63 58	142.9	13 41.0	63 58	143.3	13 22.0	63 57	143.7	12 05.9	64 55	145.3	2
13 25.1	62 59	142.4	13 06.5	62 58	142.8	12 47.9	62 58	143.2	11 33.0	63 55	144.8	3
12 49.9	61 59	141.9	12 31.6	61 59	142.3	12 13.3	61 58	142.7	10 59.7	62 56	144.4	4
12 14.3	60 60	141.5	11 56.4	60 59	141.9	11 38.4	60 59	142.3	10 26.1	60 57	143.9	55
11 38.4	59 60	141.0	11 20.8	59 60	141.4	11 03.1	59 59	141.8	9 52.1	59 57	143.5	6
11 02.2	58 61	140.6	10 44.8	58 60	141.0	10 27.5	58 60	141.4	9 17.8	58 58	143.1	7
10 25.6	57 62	140.1	10 08.6	57 61	140.6	9 51.6	57 60	141.0	8 43.2	57 58	142.7	8
9 48.6	55 62	139.7	9 32.0	56 62	140.1	9 15.3	56 61	140.6	8 08.2	56 59	142.2	9
9 11.4	54 63	139.3	8 55.0	55 62	139.7	8 38.7	55 62	140.2	7 32.9	55 59	141.8	60
8 33.8	53 63	138.9	8 17.8	53 63	139.3	8 01.7	54 62	139.8	6 57.3	54 60	141.5	1
7 55.9	52 64	138.5	7 40.3	52 63	138.9	7 24.5	52 62	139.4	6 21.4	53 60	141.1	2
7 17.8	51 64	138.1	7 02.4	51 64	138.6	6 47.0	51 63	139.0	5 45.2	52 61	140.7	3
6 39.3	50 65	137.7	6 24.3	50 64	138.2	6 09.2	50 63	138.6	5 08.8	51 61	140.3	4
6 00.6	49 65	137.4	5 45.9	49 64	137.8	5 31.2	49 64	138.2				65
5 21.6	48 65	137.0	5 07.2	48 65	137.4							6
												7
												8
												9
												70

DECLINATION SAME NAME AS LATITUDE

H.A.	36° 00′			37° 00′			38° 30′			40° 00′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
91	9 06.7	25 78	55.0	9 21.6	25 77	54.0	9 43.6	24 76	52.6	10 05.2	24 74	51.1
2	8 19.7	26 78	54.8	8 35.2	26 77	53.8	8 58.1	25 76	52.4	9 20.7	25 74	50.9
3	7 32.9	27 78	54.6	7 48.9	27 77	53.6	8 12.7	26 75	52.2	8 36.2	26 74	50.7
4	6 46.2	28 78	54.4	7 02.8	28 77	53.4	7 27.5	27 75	51.9	7 51.9	27 74	50.5
95	5 59.6	29 77	54.1	6 16.8	29 76	53.2	6 42.4	28 75	51.7	7 07.7	28 73	50.3
6	5 13.2	30 77	53.9	5 31.0	30 76	52.9	5 57.4	29 75	51.5	6 23.6	29 73	50.1
7							5 12.6	30 74	51.3	5 39.7	30 73	49.8
8												
9												
100												

42° 00′			42° 30′			43° 00′			45° 00′			H.A.
Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
10 33.5	23 72	49.1	10 40.4	23 72	48.6	10 47.3	23 71	48.1	11 14.5	22 69	46.1	91
9 50.2	24 72	48.9	9 57.4	24 71	48.4	10 04.7	24 71	47.9	10 33.2	23 69	46.0	2
9 07.0	25 72	48.7	9 14.6	25 71	48.2	9 22.1	25 71	47.8	9 52.0	25 68	45.8	3
8 23.9	26 72	48.5	8 31.8	26 71	48.0	8 39.7	26 70	47.6	9 10.9	26 68	45.6	4
7 41.0	28 71	48.3	7 49.2	27 71	47.8	7 57.5	27 70	47.4	8 30.0	27 68	45.4	95
6 58.2	29 71	48.1	7 06.8	29 71	47.6	7 15.3	28 70	47.2	7 49.2	28 68	45.2	6
6 15.5	30 71	47.9	6 24.4	30 70	47.4	6 33.3	30 70	46.9	7 08.5	29 68	45.0	7
5 33.0	31 71	47.7	5 42.3	31 70	47.2	5 51.5	31 70	46.7	6 28.0	30 67	44.8	8
			5 00.2	32 70	47.0	5 09.8	32 69	46.5	5 47.7	31 67	44.6	9
									5 07.5	33 67	44.4	100

Lat. 17°

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	61 00.0	1.0 01	00.0	60 00.0	1.0 01	00.0	58 30.0	1.0 01	00.0	57 30.0	1.0 01	00.0	56 30.0	1.0 01	00.0	55 30.0	1.0 01	00.0	54 30.0	1.0 01	00.0	53 00.0	1.0 01	00.0	00
1	60 59.3	1.0 04	01.4	59 59.3	1.0 03	01.4	58 29.4	1.0 03	01.3	57 29.4	1.0 03	01.2	56 29.4	1.0 03	01.2	55 29.4	1.0 03	01.1	54 29.5	1.0 03	01.0	52 59.5	1.0 02	01.0	1
2	60 57.1	1.0 06	02.9	59 57.3	1.0 06	02.7	58 27.5	1.0 05	02.5	57 27.6	1.0 05	02.4	56 27.7	1.0 05	02.3	55 27.8	1.0 05	02.2	54 27.9	1.0 04	02.1	52 58.0	1.0 04	02.0	2
3	60 53.6	99 08	04.3	59 53.9	1.0 08	04.1	58 24.3	1.0 07	03.8	57 24.6	1.0 07	03.6	56 24.8	1.0 07	03.4	55 25.1	1.0 06	03.3	54 25.3	1.0 06	03.1	52 55.6	1.0 06	02.9	3
4	60 48.6	99 11	05.7	59 49.1	99 10	05.4	58 19.9	99 09	05.1	57 20.3	99 09	04.8	56 20.8	99 09	04.6	55 21.2	99 08	04.4	54 21.6	99 08	04.2	52 52.2	99 07	03.9	4
05	60 42.2	99 13	07.1	59 43.0	99 12	06.8	58 14.2	99 12	06.3	57 14.9	99 11	06.0	56 15.6	99 10	05.7	55 16.3	99 10	05.5	54 16.9	99 10	05.2	52 47.8	99 09	04.9	05
6	60 34.4	98 15	08.5	59 35.6	98 15	08.1	58 07.3	98 14	07.5	57 08.3	98 13	07.2	56 09.3	98 12	06.9	55 10.3	98 12	06.5	54 11.2	99 11	06.2	52 42.5	99 10	05.8	6
7	60 25.2	97 18	09.9	59 26.9	97 17	09.4	57 59.1	98 16	08.8	57 00.6	98 15	08.4	56 01.9	98 14	08.0	55 03.2	98 14	07.6	54 04.4	98 13	07.3	52 36.2	98 12	06.8	7
8	60 14.7	96 20	11.2	59 16.8	97 19	10.7	57 49.8	97 18	10.0	56 51.7	97 17	09.5	55 53.4	97 16	09.1	54 55.1	97 15	08.7	53 56.7	97 15	08.3	52 28.9	98 14	07.7	8
9	60 02.9	96 22	12.6	59 05.5	96 21	12.0	57 39.3	96 20	11.2	56 41.6	96 19	10.7	55 43.8	96 18	10.2	54 45.9	97 17	09.7	53 47.9	97 16	09.3	52 20.8	97 15	08.7	9
10	59 49.7	94 24	13.9	58 53.0	95 23	13.2	57 27.6	95 21	12.4	56 30.4	95 20	11.8	55 33.1	96 20	11.3	54 35.7	96 19	10.8	53 38.2	96 18	10.3	52 11.7	96 17	09.6	10
1	59 35.3	93 26	15.2	58 39.2	94 25	14.5	57 14.7	94 23	13.5	56 18.2	94 22	12.9	55 21.4	95 21	12.3	54 24.5	95 20	11.8	53 27.5	95 19	11.2	52 01.7	96 18	10.5	1
2	59 19.7	92 28	16.4	58 24.3	93 27	15.7	57 00.8	93 25	14.7	56 04.8	93 24	14.0	55 08.7	94 23	13.4	54 12.3	94 22	12.8	53 15.8	94 21	12.2	51 50.8	95 20	11.4	2
3	59 02.8	91 30	17.7	58 08.2	91 29	16.9	56 45.7	92 27	15.8	55 50.4	92 26	15.1	54 54.9	93 25	14.4	53 59.1	93 24	13.8	53 03.2	93 23	13.2	51 39.0	94 21	12.3	3
4	58 44.8	90 32	18.9	57 51.0	90 31	18.1	56 29.6	91 29	16.9	55 35.0	91 27	16.1	54 40.1	92 26	15.4	53 45.0	92 25	14.8	52 49.7	92 24	14.1	51 26.3	93 23	13.2	4
15	58 25.7	88 34	20.1	57 32.6	89 32	19.2	56 12.4	90 30	18.0	55 18.5	90 29	17.2	54 24.3	91 28	16.4	53 29.9	91 27	15.7	52 35.2	91 26	15.0	51 12.8	92 24	14.1	15
6	58 05.4	87 36	21.2	57 13.2	87 34	20.3	55 54.2	88 32	19.0	55 01.1	89 31	18.2	54 07.6	89 29	17.4	53 13.9	90 28	16.7	52 19.9	90 27	15.9	50 58.4	91 25	14.9	6
7	57 44.1	85 37	22.4	56 52.8	86 36	21.4	55 35.0	87 34	20.0	54 42.7	88 32	19.2	53 50.0	88 31	18.4	52 57.0	89 30	17.6	52 03.7	89 28	16.8	50 43.3	90 27	15.8	7
8	57 21.8	84 39	23.5	56 31.4	84 37	22.5	55 14.9	86 35	21.1	54 23.4	86 34	20.2	53 31.5	87 32	19.3	52 39.3	87 31	18.5	51 46.7	88 30	17.7	50 27.3	89 28	16.6	8
9	56 58.5	82 40	24.5	56 09.0	83 39	23.5	54 53.8	84 37	22.0	54 03.1	85 35	21.1	53 12.1	85 34	20.2	52 20.6	86 32	19.4	51 28.8	87 31	18.6	50 10.5	87 29	17.4	9
20	56 34.2	80 42	25.5	55 45.6	81 40	24.5	54 31.8	83 38	23.0	53 42.0	83 37	22.0	52 51.8	84 35	21.1	52 01.2	85 34	20.2	51 10.2	85 32	19.4	49 53.0	86 30	18.2	20
1	56 09.0	79 43	26.5	55 21.4	80 42	25.5	54 09.0	81 39	23.9	53 20.1	82 38	22.9	52 30.7	83 36	22.0	51 40.9	83 35	21.1	50 50.7	84 34	20.2	49 34.7	85 32	19.0	1
2	55 42.9	77 45	27.5	54 56.3	78 43	26.4	53 45.3	80 41	24.8	52 57.3	80 39	23.8	52 08.8	81 38	22.8	51 19.9	82 36	21.9	50 30.5	83 35	21.0	49 15.7	84 33	19.7	2
3	55 16.0	75 46	28.4	54 30.4	77 45	27.3	53 20.8	78 42	25.7	52 33.8	79 41	24.7	51 46.2	80 39	23.7	50 58.1	80 38	22.7	50 09.6	81 36	21.8	48 56.0	82 34	20.5	3
4	54 48.3	74 48	29.4	54 03.6	75 46	28.2	52 55.6	76 43	26.6	52 09.4	77 42	25.5	51 22.8	78 40	24.5	50 35.6	79 39	23.5	49 47.9	80 37	22.6	48 35.6	81 35	21.2	4
25	54 19.7	72 49	30.2	53 36.1	73 47	29.1	52 29.5	75 45	27.4	51 44.4	76 43	26.3	50 58.6	77 41	25.3	50 12.4	78 40	24.3	49 25.6	78 38	23.3	48 14.6	79 36	21.9	25
6	53 50.5	70 50	31.1	53 07.9	72 48	29.9	52 02.8	73 46	28.2	51 18.6	74 44	27.1	50 33.8	75 43	26.0	49 48.4	76 41	25.0	49 02.6	77 39	24.0	47 52.8	78 37	22.6	6
7	53 20.5	69 51	31.9	52 39.0	70 49	30.7	51 35.3	72 47	29.0	50 52.1	73 45	27.9	50 08.3	74 44	26.8	49 23.8	74 42	25.7	48 38.9	75 40	24.7	47 30.5	77 38	23.3	7
8	52 49.9	67 52	32.7	52 09.4	68 50	31.5	51 07.2	70 48	29.7	50 25.0	71 46	28.6	49 42.1	72 45	27.5	48 58.6	73 43	26.4	48 14.6	74 42	25.4	47 07.5	75 39	23.9	8
9	52 18.6	65 53	33.4	51 39.1	66 51	32.2	50 38.5	68 49	30.4	49 57.2	69 47	29.3	49 15.3	70 46	28.2	48 32.8	71 44	27.1	47 49.6	72 43	26.1	46 43.9	74 40	24.6	9
30	51 46.7	63 54	34.2	51 08.2	65 52	32.9	50 09.1	67 50	31.1	49 28.8	68 48	30.0	48 47.9	69 47	28.9	48 06.3	70 45	27.8	47 24.1	71 43	26.7	46 19.8	72 41	25.2	30
1	51 14.2	62 55	34.8	50 36.7	63 53	33.6	49 39.2	65 51	31.8	48 59.9	66 49	30.7	48 19.9	67 48	29.5	47 39.3	68 46	28.4	46 58.0	69 44	27.4	45 55.1	71 42	25.8	1
2	50 41.1	60 56	35.5	50 04.7	61 54	34.3	49 08.6	63 52	32.5	48 30.3	64 50	31.3	47 51.3	66 48	30.2	47 11.7	67 47	29.0	46 31.4	68 45	28.0	45 29.9	69 43	26.4	2
3	50 07.5	58 57	36.2	49 32.1	60 55	34.9	48 37.6	62 53	33.1	48 00.3	63 51	31.9	47 22.2	64 49	30.8	46 43.6	65 48	29.6	46 04.2	66 46	28.5	45 04.1	68 44	27.0	3
4	49 33.4	57 58	36.8	48 59.0	58 56	35.5	48 06.0	60 53	33.7	47 29.7	61 52	32.5	46 52.6	62 50	31.4	46 14.9	63 49	30.2	45 36.6	64 47	29.1	44 37.9	66 45	27.5	4
35	48 58.8	55 58	37.4	48 25.4	56 57	36.1	47 33.9	58 54	34.3	46 58.6	59 53	33.1	46 22.5	61 51	31.9	45 45.8	62 49	30.8	45 08.4	63 48	29.7	44 11.1	64 45	28.0	35
6	48 23.7	53 59	37.9	47 51.4	55 57	36.7	47 01.3	57 55	34.8	46 27.0	58 53	33.6	45 52.0	59 52	32.5	45 16.2	60 50	31.3	44 39.8	61 48	30.2	43 43.9	63 46	28.6	6
7	47 48.2	52 60	38.5	47 16.9	53 58	37.2	46 28.3	55 56	35.4	45 55.0	56 54	34.2	45 20.9	57 52	33.0	44 46.1	59 51	31.8	44 10.7	60 49	30.7	43 16.3	61 47	29.1	7
8	47 12.3	50 61	39.0	46 42.0	51 59	37.8	45 54.9	53 56	35.9	45 22.6	55 55	34.7	44 49.5	56 53	33.5	44 15.7	57 52	32.4	43 41.2	58 50	31.2	42 48.2	60 48	29.6	8
9	46 36.0	48 61	39.5	46 06.6	50 60	38.2	45 21.1	52 57	36.4	44 49.7	53 55	35.2	44 17.6	54 54	34.0	43 44.7	55 52	32.8	43 11.2	56 51	31.7	42 19.7	58 48	30.0	9
40	45 59.3	47 62	40.0	45 30.9	48 60	38.7	44 46.8	50 58	36.9	44 16.4	51 56	35.7	43 45.3	53 54	34.5	43 13.4	54 53	33.3	42 40.9	55 51	32.2	41 50.8	56 49	30.5	40
1	45 22.3	45 62	40.4	44 54.9	46 61	39.2	44 12.2	48 58	37.3	43 42.8	50 57	36.1	43 12.6	51 55	34.9	42 41.7	52 53	33.8	42 10.1	53 52	32.6	41 21.5	55 49	30.9	1
2	44 44.9	43 63	40.9	44 18.4	45 61	39.6	43 37.2	47 59	37.8	43 08.8	48 57	36.6	42 39.6	49 56	35.4	42 09.7	50 54	34.2	41 39.0	52 52	33.0	40 51.8	53 50	31.3	2
3	44 07.2	42 63	41.3	43 41.7	43 62	40.0	43 01.9	45 59	38.2	42 34.4	46 58	37.0	42 06.2	48 56	35.8	41 37.2	49 55	34.6	41 07.6	50 53	33.4	40 21.8	52 51	31.7	3
4	43 29.2	40 64	41.7	43 04.6	42 62	40.4	42 26.3	44 60	38.6	41 59.8	45 58	37.4	41 32.5	46 57	36.2	41 04.5	47 55	35.0	40 35.8	48 54	33.8	39 51.4	50 51	32.1	4
45	42 50.8	39 64	42.1	42 27.3	40 63	40.8	41 50.4	42 60	39.0	41 24.8	43 59	37.8	40 58.5	44 57	36.6	40 31.4	46 56	35.4	40 03.7	47 54	34.2	39 20.8	49 52	32.5	45
6	42 12.3	37 65	42.4	41 49.6	38 63	41.2	41 14.1	40 61	39.3	40 49.5	42 59	38.1	40 24.1	43 58	36.9	39 58.0	44 56	35.8	39 31.2	45 55	34.6	38 49.8	47 52	32.9	6
7	41 33.4	36 65	42.8	41 11.7	37 64	41.5	40 37.6	39 61	39.7	40 13.9	40 60	38.5	39 49.5	41 58	37.3	39 24.4	43 57	36.1	38 58.5	44 55	34.9	38 18.5	45 53	33.2	7
8	40 54.4	34 66	43.1	40 33.6	35 64	41.8	40 00.9	37 62	40.0	39 38.1	39 60	38.8	39 14.6	40 59	37.6	38 50.4	41 57	36.4	38 25.5	42 55	35.3	37 46.9	44 53	33.6	8
9	40 15.1	33 66	43.4	39 55.2	34 64	42.2	39 23.8	36 62	40.3	39 02.0	37 61	39.1	38 39.5	38 59	37.9	38 16.2	39 57	36.8	37 52.3	41 56	35.6	37 15.0	42 54	33.9	9
50	39 35.5	31 66	43.7	39 16.5	32 65	42.4	38 46.6	34 62	40.6	38 25.7	35 61	39.4	38 04.1	37 59	38.2	37 41.8	38 58	37.1	37 18.7	39 56	35.9	36 42.9	41 54	34.2	50
1	38 55.8	30 66	43.9	38 37.7	31 65	42.7	38 09.1	33 63	40.9	37 49.2	34 61	39.7	37 28.5	35 60	38.5	37 07.1	36 58	37.4	36 45.0	37 57	36.2	36 10.6	39 54	34.5	1
2	38 15.9	28 67	44.2	37 58.7	29 65	43.0	37 31.5	31 63	41.2	37 12.4	32 62	40.0	36 52.6	34 60	38.8	36 32.1	35 59	37.6	36 11.0	36 57	36.5	35 38.0	37 55	34.7	2
3	37 35.8	27 67	44.4	37 19.5	28 66	43.2	36 53.6	30 63	41.4	36 35.4	31 62	40.2	36 16.6	32 60	39.1	35 57.0	33 59	37.9	35 36.8	34 57	36.7	35 05.2	36 55	35.0	3
4	36 55.6	25 67	44.7	36 40.1	26 66	43.5	36 15.5	28 64	41.7	35 58.3	29 62	40.5	35 40.3	30 61	39.3	35 21.7	32 59	38.1	35 02.4	33 58	37.0	34 32.2	34 55	35.3	4
55	36 15.1	24 68	44.9	36 00.5	25 66	43.7	35 37.3	27 64	41.9	35 20.9	28 63	40.7	35 03.9	29 61	39.5	34 46.1	30 60	38.4	34 27.8	31 58	37.2	33 59.0	33 56	35.5	55
6	35 34.6	22 68	45.1	35 20.8	24 66	43.9	34 58.9	25 64	42.1	34 43.4	26 63	40.9	34 27.3	27 61	39.8	34 10.4	29 60	38.6	33 53.0	30 58	37.4	33 25.6	31 56	35.7	6
7	34 53.9	21 68	45.3	34 41.0	22 67	44.1	34 20.4	24 64	42.3	34 05.8	25 63	41.1	33 50.5	26 62	40.0	33 34.6	27 60	38.8	33 18.0	28 59	37.7	32 52.0	30 56	35.9	7
8	34 13.1	20 68	45.4	34 01.0	21 67	44.2	33 41.7	22 65	42.5	33 27.9	23 63	41.3	33 13.6	25 62	40.2	32 58.5	26 60	39.0	32 42.9	27 59	37.8	32 18.2	28 57	36.1	8
9	33 32.1	18 68	45.6	33 20.9	19 67	44.4	33 02.9	21 65	42.7	32 50.0	22 63	41.5	32 36.5	23 62	40.3	32 22.4	24 61	39.2	32 07.6	25 59	38.0	31 44.3	27 57	36.3	9
60	32 51.1	17 69	45.7	32 40.7	18 67	44.6	32 23.9	19 65	42.8	32 11.9	21 64	41.7	31 59.3	22 62	40.5	31 46.0	23 61	39.4	31 32.2	24 59	38.2	31 10.2	25 57	36.5	60
1	32 10.0	15 69	45.9	32 00.4	16 67	44.7	31 44.9	18 65	43.0	31 33.7	19 64	41.8	31 22.0	20 62	40.7	31 09.6	21 61	39.5	30 56.6	22 59	38.4	30 36.0	24 57	36.7	1
2	31 28.7	14 69	46.0	31 20.0	15 68	44.8	31 05.7	17 65	43.1	30 55.4	18 64	41.9	30 44.5	19 63	40.8	30 33.0	20 61	39.7	30 29.9	21 60	38.5	30 01.7	22 57	36.8	2
3	30 47.4	13 69	46.1	30 39.5	14 68	44.9	30 26.5	16 66	43.2	30 17.0	16 64	42.1	30 07.0	17 63	40.9	29 56.3	18 61	39.8	29 45.1	19 60	38.7	29 27.2	21 58	37.0	3
4	30 06.1	11 69	46.2	29 58.9	12 68	45.0	29 47.1	14 66	43.3	29 38.5	15 64	42.2	29 29.3	16 63	41.1	29 19.6	17 61	39.9	29 09.2	18 60	38.8	28 52.7	19 58	37.1	4
65	29 24.6	10 69	46.3	29 18.3	11 68	45.1	29 07.7	12 66	43.4	29 00.0	13 64	42.3	28 51.6	14 63	41.2	28 42.7	15 62	40.0	28 33.2	16 60	38.9	28 18.0	18 58	37.2	65
6	28 43.1	09 69	46.4	28 37.6	10 68	45.2	28 28.2	11 66	43.5	28 21.3	12 65	42.4	28 13.8	13 63	41.3	28 05.8	14 62	40.1	27 57.2	15 60	39.0	27 43.2	16 58	37.3	6
7	28 01.6	07 69	46.4	27 56.8	08 68	45.3	27 48.7	10 66	43.6	27 42.6	11 65	42.5	27 35.9	12 63	41.4	27 28.7	12 62	40.2	27 21.0	13 60	39.1	27 08.4	15 58	37.4	7
8	27 20.0	06 69	46.5	27 16.0	07 68	45.3	27 09.1	08 66	43.7	27 03.8	09 65	42.5	26 58.0	10 63	41.4	26 51.6	11 62	40.3	26 44.8	12 60	39.2	26 33.5	13 58	37.5	8
9	26 38.4	05 69	46.5	26 35.2	06 68	45.4	26 29.5	07 66	43.7	26 25.0	08 65	42.6	26 20.0	09 63	41.5	26 14.5	10 62	40.4	26 08.5	10 61	39.3	25 58.5	12 58	37.6	9
70	25 56.7	04 69	46.5	25 54.3	04 68	45.4	25 49.8	06 66	43.8	25 46.1	07 65	42.7	25 42.0	07 63	41.6	25 37.3	08 62	40.4	25 32.1	09 61	39.3	25 23.4	10 58	37.7	70
1	25 15.1	02 69	46.6	25 13.5	03 68	45.5	25 10.1	04 66	43.8	25 07.2	05 65	42.7	25 03.9	06 64	41.6	25 00.0	07 62	40.5	24 55.7	08 61	39.4	24 48.3	09 59	37.8	1
2	24 33.4	01 69	46.6	24 32.5	02 68	45.5	24 30.4	03 66	43.8	24 28.3	04 65	42.7	24 25.8	05 64	41.6	24 22.8	05 62	40.5	24 19.3	06 61	39.4	24 13.2	07 59	37.8	2
3	23 51.7	00 69	46.6	23 51.6	01 68	45.5	23 50.6	02 66	43.9	23 49.3	02 65	42.8	23 47.6	03 64	41.7	23 45.4	04 62	40.6	23 42.8	05 61	39.5	23 38.0	06 59	37.8	3
4	23 10.1	01 69	46.6	23 10.7	01 68	45.5	23 10.9	00 66	43.9	23 10.4	01 65	42.8	23 09.5	02 64	41.7	23 08.1	03 62	40.6	23 06.3	03 61	39.5	23 02.8	06 59	37.9	4
75	22 28.4	03 69	46.6	22 29.8	02 68	45.5	22 31.1	01 66	43.9	22 31.4	00 65	42.8	22 31.3	01 64	41.7	22 30.8	01 62	40.6	22 29.8	02 61	39.5	22 27.5	03 59	37.9	75
6	21 46.7	04 69	46.5	21 48.9	03 68	45.5	21 51.3	02 66	43.8	21 52.5	02 65	42.8	21 53.2	01 64	41.7	21 53.4	00 62	40.6	21 53.3	01 61	39.5	21 52.3	02 59	37.9	6
7	21 05.1	05 69	46.5	21 08.0	05 68	45.4	21 11.6	03 66	43.8	21 13.5	03 65	42.8	21 15.0	02 64	41.7	21 16.1	01 62	40.6	21 16.7	01 61	39.5	21 17.0	00 59	37.9	7
8	20 23.5	06 69	46.5	20 27.1	06 68	45.4	20 31.9	05 66	43.8	20 34.6	04 65	42.7	20 36.8	03 64	41.7	20 38.7	03 62	40.6	20 40.2	02 61	39.5	20 41.7	01 59	37.9	8
9	19 41.9	08 69	46.4	19 46.3	07 68	45.3	19 52.2	06 66	43.8	19 55.6	05 65	42.7	19 58.7	05 64	41.6	20 01.4	04 62	40.6	20 03.7	04 61	39.5	20 06.5	03 59	37.9	9
80	19 00.4	09 69	46.3	19 05.5	08 68	45.3	19 12.5	07 66	43.7	19 16.7	07 65	42.7	19 20.6	06 63	41.6	19 24.1	06 62	40.5	19 27.2	05 61	39.5	19 31.2	04 59	37.9	80
1	18 18.9	10 69	46.3	18 24.7	09 68	45.2	18 32.9	09 66	43.7	18 37.9	08 65	42.6	18 42.5	07 63	41.6	18 46.8	07 62	40.5	18 50.8	06 61	39.4	18 56.0	05 59	37.9	1
2	17 37.4	11 69	46.2	17 44.0	11 68	45.2	17 53.3	10 66	43.6	17 59.1	09 65	42.5	18 04.5	09 63	41.5	18 09.6	08 62	40.4	18 14.3	08 61	39.4	18 20.8	07 59	37.8	2
3	16 56.1	12 69	46.1	17 03.4	12 68	45.1	17 13.8	11 66	43.5	17 20.3	11 65	42.5	17 26.5	10 63	41.4	17 32.4	10 62	40.4	17 37.9	09 61	39.3	17 45.6	08 59	37.8	3
4	16 14.7	14 69	46.0	16 22.8	13 68	45.0	16 34.3	12 66	43.4	16 41.6	12 64	42.4	16 48.5	11 63	41.4	16 55.2	11 62	40.3	17 01.6	10 60	39.3	17 10.5	10 58	37.7	4
85	15 33.5	15 69	45.9	15 42.2	14 67	44.9	15 54.9	14 66	43.3	16 02.9	13 64	42.3	16 10.7	13 63	41.3	16 18.1	12 62	40.2	16 25.3	12 60	39.2	16 35.4	11 58	37.7	85
6	14 52.3	16 68	45.8	15 01.8	16 67	44.8	15 15.5	15 65	43.2	15 24.3	14 64	42.2	15 32.8	14 63	41.2	15 41.1	13 62	40.2	15 49.0	13 60	39.1	16 00.4	12 58	37.6	6
7	14 11.2	17 68	45.7	14 21.4	17 67	44.7	14 36.2	16 65	43.1	14 45.8	16 64	42.1	14 55.1	15 63	41.1	15 04.1	15 62	40.1	15 12.8	14 60	39.1	15 25.4	14 58	37.5	7
8	13 30.2	18 68	45.6	13 41.1	18 67	44.5	13 57.0	17 65	43.0	14 07.4	17 64	42.0	14 17.4	17 63	41.0	14 27.2	16 61	40.0	14 36.7	16 60	39.0	14 50.5	15 58	37.4	8
9	12 49.3	20 68	45.4	13 00.9	19 67	44.4	13 17.9	19 65	42.9	13 29.0	18 64	41.9	13 39.8	18 62	40.9	13 50.4	17 61	39.9	14 00.7	17 60	38.9	14 15.7	16 58	37.3	9
90	12 08.4	21 68	45.3	12 20.8	20 67	44.3	12 38.9	20 65	42.8	12 50.7	19 64	41.8	13 02.3	19 62	40.8	13 13.6	19 61	39.8	13 24.7	18 60	38.7	13 40.9	18 58	37.2	90

Lat. 17°

H.A.	46° 00′				47° 00′				48° 30′				49° 30′				50° 30′				51° 30′				52° 30′				54° 00′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	27 00.0	1.0	01	180.0	26 00.0	1.0	01	180.0	24 30.0	1.0	01	180.0	23 30.0	1.0	01	180.0	22 30.0	1.0	01	180.0	21 30.0	1.0	01	180.0	20 30.0	1.0	01	180.0	19 00.0	1.0	01	180.0	00
1	26 59.6	1.0	02	179.2	25 59.6	1.0	02	179.2	24 29.6	1.0	02	179.3	23 29.6	1.0	02	179.3	22 29.7	1.0	02	179.3	21 29.7	1.0	02	179.3	20 29.7	1.0	02	179.4	18 59.7	1.0	02	179.4	1
2	26 58.4	1.0	03	178.4	25 58.5	1.0	03	178.5	24 28.5	1.0	03	178.5	23 28.6	1.0	03	178.6	22 28.6	1.0	03	178.6	21 28.7	1.0	03	178.7	20 28.7	1.0	03	178.7	18 58.8	1.0	03	178.8	2
3	26 56.5	1.0	05	177.7	25 56.6	1.0	04	177.7	24 26.7	1.0	04	177.8	23 26.8	1.0	04	177.9	22 26.9	1.0	04	177.9	21 27.0	1.0	04	178.0	20 27.1	1.0	04	178.1	18 57.2	1.0	04	178.1	3
4	26 53.8	1.0	06	176.9	25 53.9	1.0	06	177.0	24 24.2	1.0	05	177.1	23 24.3	1.0	05	177.2	22 24.5	1.0	05	177.2	21 24.6	1.0	05	177.3	20 24.8	1.0	05	177.4	18 55.0	1.0	05	177.5	4
05	26 50.3	1.0	07	176.1	25 50.5	1.0	07	176.2	24 20.9	1.0	07	176.4	23 21.1	1.0	06	176.5	22 21.4	1.0	06	176.6	21 21.6	1.0	06	176.7	20 21.9	1.0	06	176.8	18 52.2	1.0	06	176.9	05
6	26 46.0	99	08	175.3	25 46.3	99	08	175.5	24 16.9	99	08	175.6	23 17.3	99	08	175.8	22 17.6	99	07	175.9	21 18.0	99	07	176.0	20 18.3	99	07	176.1	18 48.8	99	07	176.3	6
7	26 40.9	99	10	174.6	25 41.4	99	09	174.7	24 12.2	99	09	174.9	23 12.7	99	09	175.1	22 13.1	99	09	175.2	21 13.6	99	08	175.3	20 14.1	99	08	175.5	18 44.8	99	08	175.7	7
8	26 35.1	99	11	173.8	25 35.8	99	11	174.0	24 06.7	99	10	174.2	23 07.4	99	10	174.4	22 08.0	99	10	174.5	21 08.6	99	09	174.7	20 09.2	99	09	174.8	18 40.1	99	09	175.0	8
9	26 28.5	99	12	173.0	25 29.4	99	12	173.2	24 00.6	99	11	173.5	23 01.4	99	11	173.7	22 02.2	99	11	173.8	21 03.0	99	11	174.0	20 03.7	99	10	174.2	18 34.9	99	10	174.4	9
10	26 21.2	98	14	172.3	25 22.2	98	13	172.5	23 53.7	98	13	172.8	22 54.7	98	12	173.0	21 55.7	98	12	173.2	20 56.6	98	12	173.4	19 57.6	98	11	173.5	18 29.0	98	11	173.8	10
1	26 13.1	98	15	171.5	25 14.3	98	14	171.7	23 46.1	98	14	172.1	22 47.3	98	13	172.3	21 48.5	98	13	172.5	20 49.7	98	13	172.7	19 50.8	98	12	172.9	18 22.5	98	12	173.2	1
2	26 04.2	98	16	170.7	25 05.7	98	16	171.0	23 37.9	98	15	171.4	22 39.3	98	15	171.6	21 40.7	98	14	171.8	20 42.1	98	14	172.0	19 43.4	98	13	172.3	18 15.4	98	13	172.6	2
3	25 54.6	97	17	170.0	24 56.3	97	17	170.3	23 28.9	97	16	170.6	22 30.5	97	16	170.9	21 32.2	97	15	171.2	20 33.8	97	15	171.4	19 35.4	97	14	171.6	18 07.8	97	14	172.0	3
4	25 44.3	97	18	169.2	24 46.3	97	18	169.5	23 19.2	97	17	169.9	22 21.1	97	17	170.2	21 23.0	97	16	170.5	20 24.9	97	16	170.8	19 26.7	97	15	171.0	17 59.5	97	15	171.4	4
15	25 33.2	96	20	168.5	24 35.5	96	19	168.8	23 08.9	96	18	169.3	22 11.1	96	18	169.5	21 13.2	96	17	169.8	20 15.4	96	17	170.1	19 17.5	97	16	170.4	17 50.6	97	16	170.8	15
6	25 21.4	96	21	167.8	24 24.0	96	20	168.1	22 57.8	96	20	168.6	22 00.3	96	19	168.9	21 02.8	96	18	169.2	20 05.2	96	18	169.5	19 07.6	96	18	169.8	17 41.1	96	17	170.2	6
7	25 08.9	95	22	167.0	24 11.8	95	22	167.4	22 46.1	95	21	167.9	21 48.9	95	20	168.2	20 51.7	95	20	168.5	19 54.4	95	19	168.8	18 57.1	96	18	169.2	17 31.1	96	18	169.6	7
8	24 55.7	95	23	166.3	23 58.9	95	23	166.7	22 33.7	95	22	167.2	21 36.8	95	21	167.5	20 39.9	95	21	167.9	19 43.0	95	20	168.2	18 46.0	95	20	168.5	17 20.5	95	19	169.0	8
9	24 41.7	94	24	165.6	23 45.3	94	24	166.0	22 20.7	94	23	166.5	21 24.1	94	22	166.9	20 27.6	94	22	167.2	19 31.0	94	21	167.6	18 34.3	94	20	167.9	17 09.3	95	20	168.4	9
20	24 27.1	93	26	164.9	23 31.1	93	25	165.3	22 06.9	94	24	165.8	21 10.8	94	23	166.2	20 14.6	94	23	166.6	19 18.3	94	22	167.0	18 22.0	94	21	167.3	16 57.5	94	21	167.9	20
1	24 11.8	93	27	164.2	23 16.2	93	26	164.6	21 52.6	93	25	165.2	20 56.8	93	24	165.6	20 01.0	93	24	166.0	19 05.1	93	23	166.3	18 09.1	93	22	166.7	16 45.1	93	22	167.3	1
2	23 55.8	92	28	163.5	23 00.6	92	27	163.9	21 37.6	92	26	164.5	20 42.2	92	25	164.9	19 46.7	92	25	165.3	18 51.2	93	24	165.7	17 55.7	93	23	166.1	16 32.2	93	22	166.7	2
3	23 39.1	91	29	162.8	22 44.3	91	28	163.2	21 21.9	92	27	163.9	20 27.0	92	26	164.3	19 31.9	92	26	164.7	18 36.8	92	25	165.1	17 41.6	92	24	165.5	16 18.8	92	23	166.2	3
4	23 21.8	91	30	162.1	22 27.4	91	29	162.5	21 05.7	91	28	163.2	20 11.1	91	27	163.7	19 16.5	91	27	164.1	18 21.8	91	26	164.5	17 27.0	91	25	165.0	16 04.8	91	24	165.6	4
25	23 03.8	90	31	161.4	22 09.9	90	30	161.9	20 48.8	90	29	162.6	19 54.7	90	28	163.0	19 00.4	90	28	163.5	18 06.2	91	27	163.9	17 11.8	91	26	164.4	15 50.2	91	25	165.0	25
6	22 45.2	89	32	160.7	21 51.7	89	31	161.2	20 31.3	89	30	161.9	19 37.6	90	29	162.4	18 43.8	90	29	162.9	17 50.0	90	28	163.3	16 56.1	90	27	163.8	15 35.1	90	26	164.5	6
7	22 25.9	88	33	160.1	21 32.9	88	32	160.6	20 13.2	89	31	161.3	19 20.0	89	30	161.8	18 26.7	89	30	162.3	17 33.3	89	29	162.8	16 39.8	89	28	163.2	15 19.5	89	27	163.9	7
8	22 06.0	87	34	159.4	21 13.5	88	33	159.9	19 54.5	88	32	160.7	19 01.8	88	31	161.2	18 08.9	88	31	161.7	17 16.0	88	30	162.2	16 23.0	88	29	162.7	15 03.4	89	28	163.4	8
9	21 45.5	87	35	158.7	20 53.5	87	34	159.3	19 35.2	87	33	160.1	18 43.0	87	32	160.6	17 50.6	87	31	161.1	16 58.2	87	31	161.6	16 05.6	88	30	162.1	14 46.7	88	29	162.9	9
30	21 24.4	86	36	158.1	20 32.9	86	35	158.6	19 15.4	86	34	159.5	18 23.6	86	33	160.0	17 31.7	87	32	160.5	16 39.8	87	32	161.0	15 47.8	87	31	161.6	14 29.6	87	29	162.3	30
1	21 02.7	85	37	157.5	20 11.7	85	36	158.0	18 55.0	85	35	158.9	18 03.7	86	34	159.4	17 12.3	86	33	159.9	16 20.9	86	32	160.5	15 29.3	86	32	161.0	14 11.9	86	30	161.8	1
2	20 40.4	84	38	156.8	19 49.9	84	37	157.4	18 34.0	85	36	158.3	17 43.2	85	35	158.8	16 52.4	85	34	159.4	16 01.4	85	33	159.9	15 10.4	85	32	160.5	13 53.7	85	31	161.3	2
3	20 17.6	83	39	156.2	19 27.6	83	38	156.8	18 12.5	84	37	157.7	17 22.2	84	36	158.2	16 31.9	84	35	158.8	15 41.5	84	34	159.4	14 51.0	84	33	159.9	13 35.1	84	32	160.8	3
4	19 54.1	82	40	155.6	19 04.7	82	39	156.2	17 50.4	83	38	157.1	17 00.7	83	37	157.7	16 10.9	83	36	158.3	15 21.0	83	35	158.8	14 31.1	83	34	159.4	13 16.0	84	33	160.3	4
35	19 30.2	81	41	155.0	18 41.3	82	40	155.6	17 27.8	82	39	156.5	16 38.7	82	38	157.1	15 49.4	82	37	157.7	15 00.1	82	36	158.3	14 10.6	82	35	158.9	12 56.3	83	33	159.8	35
6	19 05.6	80	42	154.4	18 17.3	81	41	155.0	17 04.7	81	39	156.0	16 16.1	81	38	156.6	15 27.4	81	38	157.2	14 38.6	81	37	157.8	13 49.7	82	36	158.4	12 36.3	82	34	159.3	6
7	18 40.6	79	43	153.8	17 52.9	80	42	154.5	16 41.0	80	40	155.4	15 53.0	80	39	156.0	15 04.9	80	38	156.6	14 16.7	80	37	157.3	13 28.4	81	36	157.9	12 15.7	81	35	158.8	7
8	18 15.0	78	43	153.2	17 27.9	79	43	153.9	16 16.9	79	41	154.8	15 29.5	79	40	155.5	14 41.9	79	39	156.1	13 54.3	80	38	156.7	13 06.5	80	37	157.4	11 54.7	80	36	158.3	8
9	17 48.9	77	44	152.7	17 02.4	78	43	153.3	15 52.3	78	42	154.3	15 05.4	78	41	155.0	14 18.4	78	40	155.6	13 31.4	79	39	156.2	12 44.2	79	38	156.9	11 33.3	79	36	157.8	9
40	17 22.3	76	45	152.1	16 36.4	77	44	152.8	15 27.2	77	43	153.8	14 40.9	77	42	154.4	13 54.5	77	41	155.1	13 08.0	78	40	155.7	12 21.4	78	39	156.4	11 11.4	78	37	157.3	40
1	16 55.2	75	46	151.6	16 09.9	76	45	152.2	15 01.6	76	43	153.2	14 15.9	76	42	153.9	13 30.1	76	41	154.6	12 44.2	77	40	155.2	11 58.2	77	39	155.9	10 49.1	77	38	156.9	1
2	16 27.7	74	47	151.0	15 42.9	75	46	151.7	14 35.5	75	44	152.7	13 50.4	75	43	153.4	13 05.3	75	42	154.1	12 20.0	76	41	154.8	11 34.6	76	40	155.4	10 26.3	76	39	156.4	2
3	15 59.6	73	48	150.5	15 15.5	74	46	151.2	14 09.0	74	45	152.2	13 24.5	74	44	152.9	12 40.0	74	43	153.6	11 55.3	75	42	154.3	11 10.5	75	41	155.0	10 03.2	75	39	156.0	3
4	15 31.1	72	48	149.9	14 47.6	73	47	150.7	13 42.0	73	46	151.7	12 58.2	73	45	152.4	12 14.2	73	44	153.1	11 30.2	74	43	153.8	10 46.0	74	42	154.5	9 39.6	74	40	155.5	4
45	15 02.1	71	49	149.4	14 19.2	72	48	150.2	13 14.6	72	46	151.2	12 31.4	72	45	151.9	11 48.1	72	44	152.6	11 04.7	72	43	153.4	10 21.1	73	42	154.0	9 15.7	73	41	155.1	45
6	14 32.7	70	50	148.9	13 50.5	71	49	149.7	12 46.8	71	47	150.7	12 04.2	71	46	151.5	11 21.5	71	45	152.2	10 38.7	71	44	152.9	9 55.8	72	43	153.6	8 51.3	72	41	154.7	6
7	14 02.9	69	50	148.4	13 21.3	70	49	149.2	12 18.5	70	48	150.3	11 36.6	70	47	151.0	10 54.5	70	46	151.7	10 12.4	70	45	152.4	9 30.1	71	44	153.2	8 26.6	71	42	154.2	7
8	13 32.6	68	51	147.9	12 51.6	68	50	148.7	11 49.9	69	48	149.8	11 08.6	69	47	150.5	10 27.2	69	46	151.3	9 45.6	69	45	152.0	9 04.0	69	44	152.7	8 01.4	70	42	153.8	8
9	13 02.0	67	52	147.4	12 21.6	67	51	148.2	11 20.8	68	49	149.3	10 40.1	68	48	150.1	9 59.4	68	47	150.8	9 18.5	68	46	151.6	8 37.5	68	45	152.3	7 35.9	69	43	153.4	9
50	12 30.9	66	52	147.0	11 51.2	66	51	147.7	10 51.4	67	50	148.9	10 11.3	67	49	149.6	9 31.2	67	48	150.4	8 51.0	67	46	151.1	8 10.7	67	45	151.9	7 10.1	67	44	153.0	50
1	11 59.4	65	53	146.5	11 20.3	65	52	147.3	10 21.5	66	50	148.4	9 42.1	66	49	149.2	9 02.7	66	48	150.0	8 23.1	66	47	150.7	7 43.5	66	46	151.5	6 43.9	66	44	152.6	1
2	11 27.6	64	54	146.0	10 49.1	64	53	146.8	9 51.3	64	51	148.0	9 12.6	65	50	148.8	8 33.8	65	49	149.5	7 54.9	65	48	150.3	7 15.9	65	47	151.1	6 17.3	65	45	152.2	2
3	10 55.3	63	54	145.6	10 17.6	63	53	146.4	9 20.7	63	52	147.6	8 42.7	63	50	148.4	8 04.5	64	49	149.1	7 26.3	64	48	149.9	6 48.0	64	47	150.7	5 50.4	64	45	151.8	3
4	10 22.7	62	55	145.2	9 45.6	62	54	146.0	8 49.7	62	52	147.1	8 12.4	62	51	147.9	7 34.9	63	50	148.7	6 57.3	63	49	149.5	6 19.7	63	48	150.3	5 23.1	63	46	151.5	4
55	9 49.8	61	56	144.7	9 13.3	61	54	145.5	8 18.4	61	53	146.7	7 41.7	61	52	147.5	7 04.9	61	50	148.3	6 28.1	62	49	149.1	5 51.1	62	48	149.9					55
6	9 16.5	60	56	144.3	8 40.7	60	55	145.1	7 46.8	60	53	146.3	7 10.8	60	52	147.1	6 34.7	60	51	147.9	5 58.5	60	50	148.7	5 22.2	60	49	149.5					6
7	8 42.8	58	57	143.9	8 07.7	59	56	144.7	7 14.8	59	54	145.9	6 39.5	59	53	146.7	6 04.0	59	52	147.6	5 28.5	59	50	148.4									7
8	8 08.8	57	57	143.5	7 34.4	58	56	144.3	6 42.5	58	54	145.5	6 07.8	58	53	146.4	5 33.1	58	52	147.2													8
9	7 34.5	56	58	143.1	7 00.7	56	57	143.9	6 09.9	57	55	145.2	5 35.9	57	54	146.0	5 01.8	57	52	146.8													9
60	6 59.9	55	58	142.7	6 26.8	55	57	143.5	5 37.0	55	55	144.8	5 03.7	56	54	145.6																	60
1	6 25.0	54	59	142.3	5 52.5	54	58	143.2	5 03.7	54	56	144.4																					1
2	5 49.7	53	59	141.9	5 18.0	53	58	142.8																									2
3	5 14.2	52	60	141.6																													3

DECLINATION SAME NAME AS LATITUDE

H.A.	46° 00′				47° 00′				48° 30′				49° 30′				50° 30′				51° 30′				52° 30′				54° 00′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
91	11 27.7	22	68	45.1	11 40.8	22	66	44.1	12 00.0	21	65	42.6	12 12.6	21	63	41.6	12 24.9	20	62	40.6	12 37.0	20	61	39.6	12 48.9	20	60	38.6	13 06.3	19	58	37.1	91
2	10 47.1	23	67	45.0	11 00.9	23	66	44.0	11 21.2	22	64	42.5	11 34.5	22	63	41.5	11 47.6	22	62	40.5	12 00.4	21	61	39.5	12 13.1	21	59	38.5	12 31.7	20	57	37.0	2
3	10 06.6	24	67	44.8	10 21.1	24	66	43.8	10 42.5	24	64	42.3	10 56.5	23	63	41.3	11 10.4	23	62	40.4	11 24.0	23	61	39.4	11 37.4	22	59	38.4	11 57.2	22	57	36.9	3
4	9 26.3	25	67	44.6	9 41.5	25	66	43.6	10 03.9	25	64	42.2	10 18.7	24	63	41.2	10 33.3	24	62	40.2	10 47.7	24	60	39.2	11 01.9	24	59	38.2	11 22.8	23	57	36.7	4
95	8 46.0	27	67	44.4	9 01.9	26	66	43.5	9 25.5	26	64	42.0	9 41.0	26	63	41.0	9 56.3	25	61	40.0	10 11.5	25	60	39.1	10 26.4	25	59	38.1	10 48.6	24	57	36.6	95
6	8 05.9	28	67	44.3	8 22.5	28	65	43.3	8 47.1	27	64	41.8	9 03.4	27	62	40.8	9 19.4	27	61	39.9	9 35.4	26	60	38.9	9 51.1	26	59	37.9	10 14.4	26	57	36.4	6
7	7 25.9	29	66	44.1	7 43.2	29	65	43.1	8 08.9	28	63	41.6	8 25.9	28	62	40.7	8 42.7	28	61	39.7	8 59.4	28	60	38.7	9 15.9	27	58	37.7	9 40.4	27	56	36.3	7
8	6 46.1	30	66	43.8	7 04.1	30	65	42.9	7 30.9	30	63	41.4	7 48.6	29	62	40.5	8 06.1	29	61	39.5	8 23.6	29	59	38.5	8 40.9	29	58	37.6	9 06.5	28	56	36.1	8
9	6 06.5	31	66	43.6	6 25.1	31	65	42.7	6 53.0	31	63	41.2	7 11.4	31	62	40.3	7 29.7	30	60	39.3	7 47.9	30	59	38.4	8 05.9	30	58	37.4	8 32.8	30	56	35.9	9
100	5 26.9	32	66	43.4	5 46.3	32	64	42.5	6 15.2	32	63	41.0	6 34.4	32	61	40.1	6 53.4	32	60	39.1	7 12.4	31	59	38.2	7 31.2	31	58	37.2	7 59.1	31	56	35.8	100
1					5 07.7	33	64	42.2	5 37.7	33	62	40.8	5 57.5	33	61	39.9	6 17.3	33	60	38.9	6 37.0	33	59	38.0	6 56.5	33	57	37.0	7 25.7	32	56	35.6	1
2									5 00.2	34	62	40.6	5 20.8	34	61	39.6	5 41.4	34	60	38.7	6 01.8	34	58	37.8	6 22.1	34	57	36.8	6 52.4	34	55	35.4	2
3																	5 05.6	35	60	38.5	5 26.7	35	58	37.5	5 47.8	35	57	36.6	6 19.2	35	55	35.2	3
4																									5 13.7	36	56	36.4	5 46.2	36	55	35.0	4
105																													5 13.4	37	54	34.8	105

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	52 30.0	1.0 01	00.0	52 00.0	1.0 01	00.0	51 00.0	1.0 01	00.0	50 30.0	1.0 01	00.0	50 00.0	1.0 01	00.0	49 30.0	1.0 01	00.0	48 00.0	1.0 01	00.0	47 30.0	1.0 01	00.0	00
1	52 29.5	1.0 02	01.0	51 59.5	1.0 02	00.9	50 59.6	1.0 02	00.9	50 29.6	1.0 02	00.9	49 59.6	1.0 02	00.8	49 29.6	1.0 02	00.8	47 59.6	1.0 02	00.8	47 29.6	1.0 02	00.8	1
2	52 28.1	1.0 04	01.9	51 58.1	1.0 04	01.9	50 58.2	1.0 04	01.8	50 28.3	1.0 04	01.7	49 58.3	1.0 04	01.7	49 28.3	1.0 03	01.7	47 58.5	1.0 03	01.5	47 28.5	1.0 03	01.5	2
3	52 25.7	1.0 06	02.9	51 55.8	1.0 05	02.8	50 56.0	1.0 05	02.7	50 26.1	1.0 05	02.6	49 56.2	1.0 05	02.5	49 26.3	1.0 05	02.5	47 56.5	1.0 04	02.3	47 26.6	1.0 04	02.3	3
4	52 22.4	99 07	03.8	51 52.5	99 07	03.7	50 52.9	99 07	03.5	50 23.1	99 06	03.5	49 53.2	99 06	03.4	49 23.4	99 06	03.3	47 53.8	1.0 06	03.1	47 24.0	1.0 06	03.0	4
05	52 18.1	99 09	04.7	51 48.4	99 08	04.6	50 48.9	99 08	04.4	50 19.2	99 08	04.3	49 49.4	99 08	04.2	49 19.7	99 08	04.1	47 50.4	99 07	03.8	47 20.6	99 07	03.7	05
6	52 12.9	99 10	05.7	51 43.3	99 10	05.6	50 44.0	99 10	05.3	50 14.4	99 09	05.2	49 44.8	99 09	05.1	49 15.1	99 09	04.9	47 46.2	99 08	04.6	47 16.5	99 08	04.5	6
7	52 06.7	98 12	06.6	51 37.3	98 12	06.5	50 38.3	98 11	06.2	50 08.8	98 11	06.0	49 39.3	98 10	05.9	49 09.8	98 10	05.7	47 41.2	98 10	05.4	47 11.6	99 09	05.2	7
8	51 59.7	98 13	07.5	51 30.4	98 13	07.4	50 31.7	98 12	07.0	50 02.4	98 12	06.9	49 33.0	98 12	06.7	49 03.6	98 12	06.6	47 35.5	98 11	06.1	47 06.1	98 11	06.0	8
9	51 51.7	97 15	08.5	51 22.6	97 14	08.3	50 24.3	97 14	07.9	49 55.1	97 14	07.7	49 25.9	97 13	07.5	48 56.7	97 13	07.4	47 29.0	98 12	06.8	46 59.7	98 12	06.7	9
10	51 42.8	96 16	09.4	51 13.9	96 16	09.2	50 16.0	97 15	08.7	49 47.0	97 15	08.5	49 18.0	97 15	08.3	48 49.0	97 14	08.1	47 21.8	97 13	07.6	46 52.7	97 13	07.4	10
1	51 33.0	96 18	10.3	51 04.3	96 17	10.0	50 06.8	96 17	09.6	49 38.1	96 16	09.4	49 09.3	96 16	09.1	48 40.4	96 16	08.9	47 13.9	96 14	08.3	46 44.9	96 14	08.1	1
2	51 22.3	95 19	11.2	50 53.9	95 19	10.9	49 56.9	95 18	10.4	49 28.3	95 18	10.2	48 59.8	95 17	09.9	48 31.2	95 17	09.7	47 05.2	96 16	09.0	46 36.5	96 15	08.8	2
3	51 10.8	94 21	12.0	50 42.6	94 20	11.8	49 46.1	94 19	11.2	49 17.8	94 19	11.0	48 49.5	95 18	10.7	48 21.1	95 18	10.5	46 55.8	95 17	09.8	46 27.3	95 16	09.5	3
4	50 58.4	93 22	12.9	50 30.5	93 22	12.6	49 34.5	93 21	12.0	49 06.5	94 20	11.8	48 38.4	94 20	11.5	48 10.3	94 19	11.2	46 45.7	94 18	10.5	46 17.5	94 18	10.2	4
15	50 45.2	92 23	13.7	50 17.6	92 23	13.4	49 22.2	92 22	12.8	48 54.4	93 21	12.6	48 26.6	93 21	12.3	47 58.7	93 20	12.0	46 34.9	93 19	11.2	46 06.9	93 19	10.9	15
6	50 31.2	91 25	14.6	50 03.8	91 24	14.3	49 09.0	92 23	13.6	48 41.5	92 23	13.3	48 14.0	92 22	13.0	47 46.4	92 22	12.7	46 23.5	92 20	11.9	45 55.7	93 20	11.6	6
7	50 16.3	90 26	15.4	49 49.3	90 26	15.1	48 55.1	90 24	14.4	48 28.0	91 24	14.1	48 00.7	91 23	13.8	47 33.4	91 23	13.5	46 11.3	91 21	12.6	45 43.9	92 21	12.3	7
8	50 00.7	89 27	16.2	49 34.0	89 27	15.9	48 40.5	89 26	15.2	48 13.6	90 25	14.8	47 46.7	90 25	14.5	47 19.7	90 24	14.2	45 58.5	91 22	13.2	45 31.3	91 22	12.9	8
9	49 44.3	88 29	17.0	49 18.0	88 28	16.6	48 25.1	88 27	15.9	47 58.6	89 26	15.6	47 32.0	89 26	15.2	47 05.3	89 25	14.9	45 45.0	89 24	13.9	45 18.2	90 23	13.6	9
20	49 27.1	86 30	17.8	49 01.2	87 29	17.4	48 09.0	87 28	16.7	47 42.8	87 27	16.3	47 16.6	88 27	15.9	46 50.3	88 26	15.6	45 30.9	88 25	14.6	45 04.4	89 24	14.2	20
1	49 09.2	85 31	18.6	48 43.6	85 30	18.2	47 52.2	86 29	17.4	47 26.4	86 29	17.0	47 00.5	86 28	16.6	46 34.5	87 27	16.3	45 16.2	87 26	15.2	44 50.0	88 25	14.9	1
2	48 50.6	84 32	19.3	48 25.4	84 32	18.9	47 34.7	85 30	18.1	47 09.3	85 30	17.7	46 43.7	85 29	17.3	46 18.1	86 28	16.9	45 00.8	86 27	15.8	44 34.9	86 26	15.5	2
3	48 31.3	83 33	20.0	48 06.5	83 33	19.6	47 16.6	83 31	18.8	46 51.5	84 31	18.4	46 26.3	84 30	18.0	46 01.1	84 29	17.6	44 44.9	85 28	16.5	44 19.3	85 27	16.1	3
4	48 11.3	81 34	20.7	47 46.9	82 34	20.3	46 57.8	82 32	19.5	46 33.1	82 32	19.1	46 08.3	83 31	18.6	45 43.4	83 30	18.2	44 28.3	84 29	17.1	44 03.1	84 28	16.7	4
25	47 50.7	80 36	21.4	47 26.7	80 35	21.0	46 38.3	81 33	20.1	46 14.0	81 33	19.7	45 49.7	81 32	19.3	45 25.2	82 31	18.9	44 11.2	83 30	17.7	43 46.4	83 29	17.3	25
6	47 29.4	78 37	22.1	47 05.8	79 36	21.7	46 18.3	79 34	20.8	45 54.4	80 34	20.3	45 30.4	80 33	19.9	45 06.3	80 32	19.5	43 53.5	81 30	18.3	43 29.1	82 30	17.9	6
7	47 07.4	77 38	22.8	46 44.3	77 37	22.3	45 57.6	78 35	21.4	45 34.1	78 35	21.0	45 10.6	79 34	20.5	44 46.9	79 33	20.1	43 35.3	80 31	18.8	43 11.2	80 31	18.4	7
8	46 44.9	76 39	23.4	46 22.2	76 38	23.0	45 36.4	77 36	22.0	45 13.3	77 36	21.6	44 50.2	77 35	21.1	44 26.9	78 34	20.7	43 16.5	79 32	19.4	42 52.8	79 32	19.0	8
9	46 21.8	74 40	24.1	45 59.5	74 39	23.6	45 14.6	75 37	22.6	44 51.9	76 37	22.2	44 29.2	76 36	21.7	44 06.3	76 35	21.3	42 57.1	77 33	19.9	42 33.9	78 32	19.5	9
30	45 58.1	73 40	24.7	45 36.3	73 40	24.2	44 52.2	74 38	23.2	44 30.0	74 37	22.8	44 07.7	75 37	22.3	43 45.3	75 36	21.8	42 37.3	76 34	20.5	42 14.5	76 33	20.0	30
1	45 33.8	71 41	25.3	45 12.5	72 41	24.8	44 29.3	72 39	23.8	44 07.5	73 38	23.3	43 45.7	73 38	22.9	43 23.7	74 37	22.4	42 17.0	75 35	21.0	41 54.6	75 34	20.6	1
2	45 09.1	70 42	25.9	44 48.1	70 41	25.4	44 05.9	71 40	24.4	43 44.6	71 39	23.9	43 23.1	72 38	23.4	43 01.6	72 38	22.9	41 56.2	73 36	21.5	41 34.2	74 35	21.1	2
3	44 43.8	68 43	26.4	44 23.3	68 42	25.9	43 42.0	69 41	24.9	43 21.1	70 40	24.4	43 00.1	70 39	23.9	42 39.0	71 38	23.4	41 34.9	72 36	22.0	41 13.3	72 36	21.6	3
4	44 18.0	66 44	27.0	43 58.0	67 43	26.5	43 17.5	68 41	25.4	42 57.1	68 41	24.9	42 36.6	69 40	24.4	42 15.9	69 39	24.0	41 13.1	70 37	22.5	40 52.0	71 36	22.0	4
35	43 51.7	65 45	27.5	43 32.2	65 44	27.0	42 52.7	66 42	26.0	42 32.7	67 41	25.4	42 12.6	67 41	24.9	41 52.4	68 40	24.4	40 51.0	69 38	23.0	40 30.2	69 37	22.5	35
6	43 25.0	63 45	28.0	43 05.9	64 44	27.5	42 27.3	65 43	26.5	42 07.8	65 42	25.9	41 48.2	66 41	25.4	41 28.4	66 41	24.9	40 28.3	67 38	23.5	40 08.1	68 38	23.0	6
7	42 57.8	62 46	28.5	42 39.2	62 45	28.0	42 01.5	63 44	26.9	41 42.5	64 43	26.4	41 23.3	64 42	25.9	41 04.0	65 41	25.4	40 05.3	66 39	23.9	39 45.5	66 38	23.4	7
8	42 30.2	60 47	29.0	42 12.1	61 46	28.5	41 35.3	62 44	27.4	41 16.8	62 44	26.9	40 58.1	63 43	26.4	40 39.2	63 42	25.9	39 41.8	64 40	24.3	39 22.5	65 39	23.8	8
9	42 02.2	59 47	29.5	41 44.5	59 47	28.9	41 08.7	60 45	27.9	40 50.6	61 44	27.3	40 32.4	61 43	26.8	40 14.0	62 43	26.3	39 18.0	63 40	24.8	38 59.1	63 40	24.3	9
40	41 33.7	57 48	29.9	41 16.5	58 47	29.4	40 41.7	59 46	28.3	40 24.1	59 45	27.8	40 06.3	60 44	27.2	39 48.4	60 43	26.7	38 53.8	61 41	25.2	38 35.3	62 40	24.7	40
1	41 04.9	55 49	30.4	40 48.2	56 48	29.8	40 14.3	57 46	28.7	39 57.2	57 45	28.2	39 39.9	58 45	27.7	39 22.4	58 44	27.1	38 29.2	60 42	25.6	38 11.2	60 41	25.1	1
2	40 35.7	54 49	30.8	40 19.5	54 48	30.2	39 46.6	55 47	29.1	39 29.9	56 46	28.6	39 13.0	56 45	28.1	38 56.1	57 44	27.5	38 04.2	58 42	26.0	37 46.7	59 41	25.4	2
3	40 06.2	52 50	31.2	39 50.4	53 49	30.6	39 18.5	54 47	29.5	39 02.2	54 47	29.0	38 45.9	55 46	28.4	38 29.4	55 45	27.9	37 39.0	57 43	26.3	37 21.9	57 42	25.8	3
4	39 36.3	51 50	31.6	39 21.0	51 50	31.0	38 50.0	52 48	29.9	38 34.3	53 47	29.4	38 18.4	53 46	28.8	38 02.3	54 46	28.3	37 13.3	55 43	26.7	36 56.7	56 42	26.2	4
45	39 06.1	49 51	31.9	38 51.3	50 50	31.4	38 21.2	51 48	30.3	38 06.0	51 48	29.7	37 50.6	52 47	29.2	37 35.0	52 46	28.6	36 47.4	54 44	27.0	36 31.3	54 43	26.5	45
6	38 35.6	47 51	32.3	38 21.3	48 51	31.7	37 52.2	49 49	30.6	37 37.4	50 48	30.1	37 22.4	50 47	29.5	37 07.3	51 47	29.0	36 21.2	52 44	27.4	36 05.5	52 43	26.9	6
7	38 04.8	46 52	32.7	37 50.9	46 51	32.1	37 22.8	47 49	31.0	37 08.5	48 49	30.4	36 54.0	48 48	29.9	36 39.4	49 47	29.3	35 54.6	50 45	27.7	35 39.4	51 44	27.2	7
8	37 33.7	44 52	33.0	37 20.3	45 52	32.4	36 53.1	46 50	31.3	36 39.3	46 49	30.7	36 25.3	47 48	30.2	36 11.1	47 48	29.7	35 27.8	49 45	28.0	35 13.1	49 44	27.5	8
9	37 02.3	43 53	33.3	36 49.4	43 52	32.7	36 23.2	44 50	31.6	36 09.8	45 50	31.1	35 56.3	45 49	30.5	35 42.6	46 48	30.0	35 00.7	47 46	28.3	34 46.4	48 45	27.8	9
50	36 30.7	41 53	33.6	36 18.3	42 52	33.0	35 52.9	43 51	31.9	35 40.1	43 50	31.4	35 27.0	44 49	30.8	35 13.8	44 48	30.3	34 33.3	46 46	28.6	34 19.6	46 45	28.1	50
1	35 58.8	40 54	33.9	35 46.9	40 53	33.3	35 22.5	41 51	32.2	35 10.1	42 50	31.6	34 57.5	42 50	31.1	34 44.8	43 49	30.5	34 05.7	44 46	28.9	33 52.4	45 46	28.4	1
2	35 26.7	38 54	34.2	35 15.2	39 53	33.6	34 51.8	40 52	32.5	34 39.8	40 51	31.9	34 27.7	41 50	31.4	34 15.5	41 49	30.8	33 37.9	43 47	29.2	33 25.0	43 46	28.6	2
3	34 54.4	36 54	34.4	34 43.3	37 53	33.9	34 20.9	38 52	32.7	34 09.4	38 51	32.2	33 57.8	39 50	31.6	33 46.0	39 50	31.1	33 09.8	41 47	29.4	32 57.4	41 46	28.9	3
4	34 21.8	35 55	34.7	34 11.3	35 54	34.1	33 49.7	36 52	33.0	33 38.7	37 51	32.4	33 27.6	37 51	31.9	33 16.3	38 50	31.3	32 41.5	39 48	29.7	32 29.6	40 47	29.1	4
55	33 49.0	33 55	34.9	33 39.0	34 54	34.4	33 18.4	35 53	33.2	33 07.8	35 52	32.7	32 57.2	36 51	32.1	32 46.3	36 50	31.6	32 13.0	38 48	29.9	32 01.6	38 47	29.4	55
6	33 16.1	32 55	35.2	33 06.5	32 54	34.6	32 46.8	33 53	33.5	32 36.8	34 52	32.9	32 26.6	34 51	32.3	32 16.2	35 51	31.8	31 44.3	36 48	30.1	31 33.3	37 47	29.6	6
7	32 43.0	30 56	35.4	32 33.8	31 55	34.8	32 15.1	32 53	33.7	32 05.5	32 52	33.1	31 55.8	33 52	32.6	31 45.9	33 51	32.0	31 15.4	35 48	30.4	31 04.9	35 48	29.8	7
8	32 09.7	29 56	35.6	32 01.0	29 55	35.0	31 43.2	30 53	33.9	31 34.1	31 53	33.3	31 24.8	31 52	32.8	31 15.4	32 51	32.2	30 46.3	33 49	30.6	30 36.3	33 48	30.0	8
9	31 36.2	27 56	35.8	31 28.0	28 55	35.2	31 11.1	29 54	34.1	31 02.5	29 53	33.5	30 53.7	30 52	33.0	30 44.7	30 51	32.4	30 17.0	31 49	30.7	30 07.5	32 48	30.2	9
60	31 02.6	26 56	35.9	30 54.9	26 55	35.4	30 38.9	27 54	34.3	30 30.7	28 53	33.7	30 22.4	28 52	33.1	30 13.9	28 52	32.6	29 47.6	30 49	30.9	29 38.6	30 48	30.4	60
1	30 28.9	24 56	36.1	30 21.6	25 56	35.5	30 06.5	26 54	34.4	29 58.8	26 53	33.9	29 50.9	26 53	33.3	29 42.9	27 52	32.8	29 18.1	28 50	31.1	29 09.5	29 49	30.6	1
2	29 55.0	23 57	36.3	29 48.1	23 56	35.7	29 34.0	24 54	34.6	29 26.8	24 54	34.0	29 19.3	25 53	33.5	29 11.8	25 52	32.9	28 48.3	27 50	31.3	28 40.3	27 49	30.7	2
3	29 21.0	21 57	36.4	29 14.6	22 56	35.9	29 01.4	22 55	34.7	28 54.6	23 54	34.2	28 47.6	23 53	33.6	28 40.6	24 52	33.1	28 18.5	26 50	31.4	28 10.9	26 49	30.9	3
4	28 46.9	20 57	36.5	28 40.9	20 56	36.0	28 28.6	21 55	34.9	28 22.3	21 54	34.3	28 15.8	22 53	33.8	28 09.2	22 52	33.2	27 48.5	24 50	31.6	27 41.4	24 49	31.0	4
65	28 12.6	18 57	36.7	28 07.2	19 56	36.1	27 55.8	19 55	35.0	27 49.9	20 54	34.4	27 43.9	20 53	33.9	27 37.7	21 53	33.3	27 18.4	22 50	31.7	27 11.8	22 50	31.1	65
6	27 38.3	17 57	36.8	27 33.3	17 57	36.2	27 22.8	18 55	35.1	27 17.4	18 54	34.6	27 11.8	19 54	34.0	27 06.1	19 53	33.5	26 48.3	20 50	31.8	26 42.0	21 50	31.3	6
7	27 03.9	15 57	36.9	26 59.3	16 57	36.3	26 49.8	16 55	35.2	26 44.8	17 54	34.7	26 39.7	17 54	34.1	26 34.4	18 53	33.6	26 18.0	19 51	31.9	26 12.2	19 50	31.4	7
8	26 29.4	14 58	37.0	26 25.3	14 57	36.4	26 16.6	15 55	35.3	26 12.1	15 55	34.8	26 07.4	16 54	34.2	26 02.7	16 53	33.7	25 47.6	17 51	32.0	25 42.3	18 50	31.5	8
9	25 54.9	12 58	37.1	25 51.2	13 57	36.5	25 43.4	13 55	35.4	25 39.3	14 55	34.9	25 35.1	14 54	34.3	25 30.8	15 53	33.8	25 17.1	16 51	32.1	25 12.3	16 50	31.6	9
70	25 20.3	11 58	37.1	25 17.0	11 57	36.6	25 10.1	12 56	35.5	25 06.5	12 55	34.9	25 02.7	13 54	34.4	24 58.9	13 53	33.8	24 46.5	14 51	32.2	24 42.2	15 50	31.7	70
1	24 45.6	09 58	37.2	24 42.8	10 57	36.7	24 36.8	10 56	35.6	24 33.6	11 55	35.0	24 30.3	11 54	34.5	24 26.9	12 53	33.9	24 15.9	13 51	32.3	24 12.0	13 50	31.7	1
2	24 10.9	08 58	37.3	24 08.5	08 57	36.7	24 03.4	09 56	35.6	24 00.7	09 55	35.1	23 57.8	10 54	34.5	23 54.8	10 54	34.0	23 45.2	11 51	32.4	23 41.8	12 50	31.8	2
3	23 36.1	06 58	37.3	23 34.2	07 57	36.8	23 29.9	07 56	35.7	23 27.7	08 55	35.1	23 25.3	08 54	34.6	23 22.7	09 54	34.0	23 14.5	10 51	32.4	23 11.6	10 51	31.9	3
4	23 01.4	05 58	37.3	22 59.8	05 57	36.8	22 56.5	06 56	35.7	22 54.6	06 55	35.2	22 52.7	07 54	34.6	22 50.6	07 54	34.1	22 43.7	08 51	32.5	22 41.2	09 51	31.9	4
75	22 26.5	03 58	37.4	22 25.5	04 57	36.8	22 23.0	05 56	35.7	22 21.6	05 55	35.2	22 20.0	05 54	34.7	22 18.4	06 54	34.1	22 12.9	07 51	32.5	22 10.9	07 51	32.0	75
6	21 51.7	02 58	37.4	21 51.1	02 57	36.8	21 49.4	03 56	35.8	21 48.5	03 55	35.2	21 47.4	04 54	34.7	21 46.2	04 54	34.2	21 42.1	05 51	32.5	21 40.5	05 51	32.0	6
7	21 16.9	01 58	37.4	21 16.7	01 57	36.9	21 15.9	02 56	35.8	21 15.4	02 55	35.2	21 14.7	02 54	34.7	21 14.0	03 54	34.2	21 11.2	04 51	32.6	21 10.1	04 51	32.0	7
8	20 42.0	01 58	37.4	20 42.2	01 57	36.9	20 42.3	00 56	35.8	20 42.3	00 55	35.2	20 42.1	01 54	34.7	20 41.8	01 54	34.2	20 40.3	02 52	32.6	20 39.6	02 51	32.0	8
9	20 07.2	02 58	37.4	20 07.8	02 57	36.8	20 08.8	01 56	35.8	20 09.1	01 55	35.2	20 09.4	01 54	34.7	20 09.5	00 54	34.2	20 09.4	01 52	32.6	20 09.2	01 51	32.1	9
80	19 32.4	04 58	37.4	19 33.4	03 57	36.8	19 35.3	03 56	35.8	19 36.0	02 55	35.2	19 36.7	02 54	34.7	19 37.3	02 54	34.2	19 38.5	01 52	32.6	19 38.7	01 51	32.1	80
1	18 57.6	05 58	37.3	18 59.0	05 57	36.8	19 01.7	04 56	35.7	19 02.9	04 55	35.2	19 04.0	04 54	34.7	19 05.1	03 54	34.2	19 07.6	02 52	32.6	19 08.3	02 51	32.0	1
2	18 22.8	06 58	37.3	18 24.7	06 57	36.8	18 28.2	06 56	35.7	18 29.8	05 55	35.2	18 31.4	05 54	34.7	18 32.9	05 54	34.1	18 36.7	04 51	32.6	18 37.8	04 51	32.0	2
3	17 48.0	08 58	37.3	17 50.3	08 57	36.7	17 54.7	07 56	35.7	17 56.8	07 55	35.2	17 58.8	06 54	34.6	18 00.7	06 54	34.1	18 05.9	05 51	32.5	18 07.4	05 51	32.0	3
4	17 13.3	09 58	37.2	17 16.0	09 57	36.7	17 21.3	08 56	35.6	17 23.8	08 55	35.1	17 26.2	08 54	34.6	17 28.5	08 54	34.1	17 35.0	07 51	32.5	17 37.0	07 51	32.0	4
85	16 38.6	11 58	37.1	16 41.8	10 57	36.6	16 47.9	10 56	35.6	16 50.8	10 55	35.1	16 53.6	09 54	34.5	16 56.4	09 53	34.0	17 04.2	08 51	32.5	17 06.6	08 51	31.9	85
6	16 04.0	12 58	37.1	16 07.6	12 57	36.6	16 14.5	11 56	35.5	16 17.8	11 55	35.0	16 21.1	11 54	34.5	16 24.3	11 53	34.0	16 33.4	10 51	32.4	16 36.3	09 50	31.9	6
7	15 29.5	13 58	37.0	15 33.4	13 57	36.5	15 41.2	13 55	35.5	15 45.0	12 55	34.9	15 48.6	12 54	34.4	15 52.3	12 53	33.9	16 02.7	11 51	32.4	16 06.0	11 50	31.8	7
8	14 55.0	15 57	36.9	14 59.4	15 57	36.4	15 07.9	14 55	35.4	15 12.1	14 55	34.9	15 16.2	14 54	34.3	15 20.3	13 53	33.8	15 32.0	13 51	32.3	15 35.8	12 50	31.8	8
9	14 20.5	16 57	36.8	14 25.3	16 57	36.3	14 34.8	15 55	35.3	14 39.4	15 54	34.8	14 43.9	15 54	34.3	14 48.4	15 53	33.8	15 01.4	14 51	32.2	15 05.6	14 50	31.7	9
90	13 46.2	17 57	36.7	13 51.4	17 56	36.2	14 01.6	17 55	35.2	14 06.7	17 54	34.7	14 11.6	16 54	34.2	14 16.5	16 53	33.7	14 30.8	16 51	32.1	14 35.5	15 50	31.6	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	54° 30′				55° 00′				56° 00′				56° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	18 30.0	1.0	00	180.0	18 00.0	1.0	00	180.0	17 00.0	1.0	00	180.0	16 30.0	1.0	00	180.0
1	18 29.7	1.0	02	179.4	17 59.7	1.0	02	179.4	16 59.7	1.0	01	179.4	16 29.7	1.0	01	179.4
2	18 28.8	1.0	03	178.8	17 58.8	1.0	02	178.8	16 58.8	1.0	02	178.8	16 28.8	1.0	02	178.8
3	18 27.2	1.0	04	178.2	17 57.3	1.0	04	178.2	16 57.4	1.0	03	178.2	16 27.4	1.0	03	178.3
4	18 25.1	1.0	05	177.6	17 55.2	1.0	05	177.6	16 55.3	1.0	04	177.7	16 25.4	1.0	04	177.7
05	18 22.3	1.0	06	176.9	17 52.5	1.0	06	177.0	16 52.7	1.0	05	177.1	16 22.8	1.0	05	177.1
6	18 19.0	99	07	176.3	17 49.1	99	07	176.4	16 49.5	99	06	176.5	16 19.6	99	06	176.6
7	18 15.0	99	08	175.7	17 45.2	99	08	175.8	16 45.7	99	07	175.9	16 15.9	99	07	176.0
8	18 10.4	99	09	175.1	17 40.7	99	08	175.2	16 41.3	99	08	175.3	16 11.6	99	08	175.4
9	18 05.2	99	10	174.5	17 35.6	99	10	174.6	16 36.4	99	09	174.8	16 06.7	99	09	174.8
10	17 59.5	98	11	173.9	17 29.9	98	10	174.0	16 30.8	98	10	174.2	16 01.3	98	10	174.3
1	17 53.1	98	12	173.3	17 23.6	98	11	173.4	16 24.7	98	11	173.6	15 55.3	98	11	173.7
2	17 46.1	98	13	172.7	17 16.8	98	12	172.8	16 18.1	98	12	173.0	15 48.7	98	12	173.2
3	17 38.5	97	14	172.1	17 09.3	97	13	172.2	16 10.8	97	13	172.5	15 41.6	97	13	172.6
4	17 30.4	97	15	171.5	17 01.3	97	14	171.7	16 03.0	97	14	171.9	15 33.9	97	14	172.0
15	17 21.6	97	16	170.9	16 52.7	97	15	171.1	15 54.7	97	15	171.3	15 25.7	97	15	171.5
6	17 12.3	96	16	170.4	16 43.5	96	16	170.5	15 45.8	96	16	170.8	15 16.9	96	16	170.9
7	17 02.4	96	17	169.8	16 33.7	96	17	169.9	15 36.3	96	17	170.2	15 07.6	96	16	170.4
8	16 51.9	95	18	169.2	16 23.4	95	18	169.4	15 26.3	95	18	169.7	14 57.7	95	17	169.8
9	16 40.9	95	19	168.6	16 12.5	95	19	168.8	15 15.7	95	18	169.1	14 47.3	95	18	169.3
20	16 29.3	94	20	168.0	16 01.1	94	20	168.2	15 04.6	94	19	168.6	14 36.4	94	19	168.8
1	16 17.1	93	21	167.5	15 49.1	93	21	167.7	14 53.0	94	20	168.0	14 25.0	94	20	168.2
2	16 04.4	93	22	166.9	15 36.6	93	22	167.1	14 40.8	93	21	167.5	14 13.0	93	21	167.7
3	15 51.1	92	23	166.4	15 23.5	92	23	166.6	14 28.2	92	22	167.0	14 00.5	92	22	167.2
4	15 37.3	91	24	165.8	15 09.9	92	24	166.0	14 15.0	92	23	166.4	13 47.5	92	23	166.6
25	15 23.0	91	25	165.3	14 55.8	91	24	165.5	14 01.2	91	24	165.9	13 34.0	91	23	166.1
6	15 08.1	90	26	164.7	14 41.1	90	25	164.9	13 47.0	90	25	165.4	13 19.9	90	24	165.6
7	14 52.7	89	26	164.2	14 25.9	89	26	164.4	13 32.3	89	25	164.9	13 05.4	90	25	165.1
8	14 36.8	89	27	163.6	14 10.2	89	27	163.9	13 17.0	89	26	164.4	12 50.4	89	26	164.6
9	14 20.4	88	28	163.1	13 54.1	88	28	163.4	13 01.3	88	27	163.8	12 34.9	88	27	164.1
30	14 03.5	87	29	162.6	13 37.4	87	29	162.8	12 45.1	87	28	163.3	12 19.0	87	27	163.6
1	13 46.1	86	30	162.1	13 20.2	86	29	162.3	12 28.4	86	29	162.8	12 02.5	86	28	163.1
2	13 28.1	85	31	161.6	13 02.5	85	30	161.8	12 11.3	86	29	162.4	11 45.6	86	29	162.6
3	13 09.8	84	31	161.0	12 44.4	85	31	161.3	11 53.6	85	30	161.9	11 28.2	85	30	162.1
4	12 50.9	84	32	160.5	12 25.8	84	32	160.8	11 35.5	84	31	161.4	11 10.4	84	30	161.7
35	12 31.5	83	33	160.1	12 06.7	83	33	160.3	11 17.0	83	32	160.9	10 52.1	83	31	161.2
6	12 11.7	82	34	159.6	11 47.2	82	33	159.9	10 58.0	82	32	160.4	10 33.4	82	32	160.7
7	11 51.5	81	35	159.1	11 27.2	81	34	159.4	10 38.6	81	33	160.0	10 14.3	81	33	160.3
8	11 30.7	80	35	158.6	11 06.8	80	35	158.9	10 18.7	80	34	159.5	9 54.7	80	33	159.8
9	11 09.6	79	36	158.1	10 45.9	79	35	158.4	9 58.4	79	35	159.1	9 34.7	79	34	159.4
40	10 48.0	78	37	157.7	10 24.6	78	36	158.0	9 37.7	78	35	158.6	9 14.3	78	35	158.9
1	10 26.0	77	37	157.2	10 02.9	77	37	157.5	9 16.6	77	36	158.2	8 53.4	77	35	158.5
2	10 03.6	76	38	156.8	9 40.7	76	38	157.1	8 55.1	76	37	157.7	8 32.2	76	36	158.1
3	9 40.7	75	39	156.3	9 18.2	75	38	156.6	8 33.1	75	37	157.3	8 10.6	75	37	157.6
4	9 17.4	74	39	155.9	8 55.3	74	39	156.2	8 10.8	74	38	156.9	7 48.6	74	37	157.2
45	8 53.8	73	40	155.4	8 31.9	73	40	155.8	7 48.1	73	38	156.5	7 26.2	73	38	156.8
6	8 29.8	72	41	155.0	8 08.2	72	40	155.4	7 25.0	72	39	156.1	7 03.4	72	39	156.4
7	8 05.3	71	41	154.6	7 44.1	71	41	155.0	7 01.6	71	40	155.7	6 40.3	71	39	156.0
8	7 40.5	70	42	154.2	7 19.6	70	41	154.5	6 37.7	70	40	155.3	6 16.8	70	40	155.6
9	7 15.4	69	43	153.8	6 54.8	69	42	154.1	6 13.5	69	41	154.9	5 52.9	69	40	155.2
50	6 49.8	68	43	153.4	6 29.6	68	43	153.8	5 49.0	68	41	154.5	5 28.7	68	41	154.9
1	6 24.0	66	44	153.0	6 04.0	66	43	153.4	5 24.1	67	42	154.1	5 04.2	67	41	154.5
2	5 57.7	65	44	152.6	5 38.1	65	44	153.0								
3	5 31.2	64	45	152.2	5 11.9	64	44	152.6								
4	5 04.3	63	45	151.9												

57° 00′				57° 30′				59° 00′				59° 30′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
16 00.0	1.0	00	180.0	15 30.0	1.0	00	180.0	14 00.0	1.0	00	180.0	13 30.0	1.0	00	180.0	*00*
15 59.7	1.0	01	179.4	15 29.7	1.0	01	179.4	13 59.7	1.0	01	179.5	13 29.7	1.0	01	179.5	*1*
15 58.9	1.0	02	178.9	15 28.9	1.0	02	178.9	13 58.9	1.0	02	178.9	13 29.0	1.0	02	179.0	*2*
15 57.4	1.0	03	178.3	15 27.5	1.0	03	178.3	13 57.6	1.0	03	178.4	13 27.6	1.0	03	178.4	*3*
15 55.5	1.0	04	177.7	15 25.5	1.0	04	177.8	13 55.7	1.0	04	177.9	13 25.8	1.0	04	177.9	*4*
15 52.9	1.0	05	177.2	15 23.0	1.0	05	177.2	13 53.4	1.0	05	177.3	13 23.5	1.0	05	177.4	*05*
15 49.8	99	06	176.6	15 20.0	99	06	176.7	13 50.4	99	06	176.8	13 20.6	99	06	176.9	*6*
15 46.1	99	07	176.0	15 16.3	99	07	176.1	13 47.0	99	07	176.3	13 17.2	99	06	176.4	*7*
15 41.9	99	08	175.5	15 12.2	99	08	175.6	13 43.0	99	08	175.8	13 13.3	99	07	175.8	*8*
15 37.1	99	09	174.9	15 07.5	99	09	175.0	13 38.5	99	08	175.2	13 08.9	99	08	175.3	*9*
15 31.7	99	10	174.4	15 02.2	99	10	174.5	13 33.5	99	09	174.7	13 04.0	99	09	174.8	*10*
15 25.8	98	11	173.8	14 56.4	98	11	173.9	13 28.0	98	10	174.2	12 58.5	98	10	174.3	*1*
15 19.4	98	12	173.3	14 50.0	98	12	173.4	13 21.9	98	11	173.7	12 52.6	98	11	173.8	*2*
15 12.4	97	13	172.7	14 43.1	97	12	172.8	13 15.3	98	12	173.2	12 46.1	98	12	173.3	*3*
15 04.8	97	14	172.2	14 35.7	97	13	172.3	13 08.3	97	13	172.6	12 39.1	97	12	172.8	*4*
14 56.7	97	14	171.6	14 27.7	97	14	171.7	13 00.7	97	14	172.1	12 31.6	97	13	172.3	*15*
14 48.1	96	15	171.1	14 19.2	96	15	171.2	12 52.6	96	14	171.6	12 23.7	96	14	171.8	*6*
14 38.9	96	16	170.5	14 10.2	96	16	170.7	12 44.0	96	15	171.1	12 15.2	96	15	171.3	*7*
14 29.2	95	17	170.0	14 00.6	95	17	170.1	12 34.8	95	16	170.6	12 06.3	95	16	170.8	*8*
14 18.9	95	18	169.5	13 50.5	95	18	169.6	12 25.2	95	17	170.1	11 56.8	95	17	170.3	*9*
14 08.2	94	19	168.9	13 39.9	94	18	169.1	12 15.1	94	18	169.6	11 46.9	94	17	169.8	*20*
13 56.9	94	20	168.4	13 28.8	94	19	168.6	12 04.6	94	18	169.1	11 36.5	94	18	169.3	*1*
13 45.1	93	20	167.9	13 17.2	93	20	168.1	11 53.5	93	19	168.6	11 25.6	93	19	168.8	*2*
13 32.8	92	21	167.4	13 05.1	92	21	167.6	11 41.9	92	20	168.1	11 14.2	92	20	168.3	*3*
13 20.0	92	22	166.8	12 52.5	92	22	167.0	11 29.9	92	21	167.7	11 02.4	92	20	167.9	*4*
13 06.7	91	23	166.3	12 39.4	91	23	166.5	11 17.4	91	22	167.2	10 50.1	91	21	167.4	*25*
12 52.9	90	24	165.8	12 25.8	90	23	166.0	11 04.4	90	22	166.7	10 37.3	90	22	166.9	*6*
12 38.6	90	25	165.3	12 11.7	90	24	165.5	10 51.0	90	23	166.2	10 24.1	90	23	166.5	*7*
12 23.8	89	25	164.8	11 57.1	89	25	165.1	10 37.1	89	24	165.8	10 10.4	89	24	166.0	*8*
12 08.5	88	26	164.3	11 42.1	88	26	164.6	10 22.8	88	25	165.3	9 56.3	88	24	165.5	*9*
11 52.8	87	27	163.8	11 26.6	87	27	164.1	10 08.0	87	25	164.8	9 41.8	87	25	165.1	*30*
11 36.6	86	28	163.4	11 10.6	86	27	163.6	9 52.8	87	26	164.4	9 26.8	87	26	164.6	*1*
11 19.9	86	29	162.9	10 54.2	86	28	163.1	9 37.1	86	27	163.9	9 11.3	86	26	164.2	*2*
11 02.8	85	29	162.4	10 37.4	85	29	162.7	9 21.0	85	28	163.5	8 55.5	85	27	163.8	*3*
10 45.2	84	30	161.9	10 20.1	84	30	162.2	9 04.5	84	28	163.0	8 39.2	84	28	163.3	*4*
10 27.2	83	31	161.5	10 02.3	83	30	161.8	8 47.5	83	29	162.6	8 22.6	83	28	162.9	*35*
10 08.8	82	31	161.0	9 44.2	82	31	161.3	8 30.2	82	30	162.2	8 05.5	82	29	162.5	*6*
9 49.9	81	32	160.6	9 25.6	81	32	160.9	8 12.4	81	30	161.8	7 48.0	81	30	162.0	*7*
9 30.6	80	33	160.1	9 06.5	80	32	160.4	7 54.2	80	31	161.3	7 30.1	80	30	161.6	*8*
9 10.9	79	34	159.7	8 47.1	79	33	160.0	7 35.7	79	32	160.9	7 11.8	80	31	161.2	*9*
8 50.8	78	34	159.2	8 27.3	78	34	159.6	7 16.7	78	32	160.5	6 53.2	79	32	160.8	*40*
8 30.2	77	35	158.8	8 07.0	77	34	159.1	6 57.4	77	33	160.1	6 34.1	78	32	160.4	*1*
8 09.3	76	36	158.4	7 46.4	76	35	158.7	6 37.6	76	34	159.7	6 14.7	77	33	160.0	*2*
7 48.0	75	36	158.0	7 25.4	75	36	158.3	6 17.6	75	34	159.3	5 54.9	76	34	159.6	*3*
7 26.3	74	37	157.6	7 04.0	74	36	157.9	5 57.1	74	35	158.9	5 34.8	74	34	159.3	*4*
7 04.2	73	37	157.2	6 42.3	73	37	157.5	5 36.3	73	35	158.5	5 14.3	73	35	158.9	*45*
6 41.8	72	38	156.8	6 20.1	72	37	157.1	5 15.1	72	36	158.2					*6*
6 19.0	71	39	156.4	5 57.6	71	38	156.7									*7*
5 55.8	70	39	156.0	5 34.8	70	39	156.3									*8*
5 32.3	69	40	155.6	5 11.6	69	39	156.0									*9*
5 08.4	68	40	155.2													*50*
																1
																2
																3
																4

DECLINATION SAME NAME AS LATITUDE

H.A.	54° 30′				55° 00′				56° 00′				56° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
91	13 11.9	19	57	36.6	13 17.6	19	56	36.1	13 28.6	18	55	35.1	13 34.1	18	54	34.6
2	12 37.8	20	57	36.5	12 43.8	20	56	36.0	12 55.7	20	55	35.0	13 01.5	19	54	34.5
3	12 03.7	22	57	36.4	12 10.1	21	56	35.9	12 22.8	21	55	34.9	12 29.1	21	54	34.4
4	11 29.7	23	56	36.2	11 36.5	23	56	35.7	11 50.1	22	54	34.7	11 56.7	22	54	34.2
95	10 55.9	24	56	36.1	11 03.1	24	56	35.6	11 17.4	24	54	34.6	11 24.5	24	54	34.1
6	10 22.1	26	56	36.0	10 29.7	25	55	35.5	10 44.9	25	54	34.5	10 52.4	25	53	34.0
7	9 48.5	27	56	35.8	9 56.5	27	55	35.3	10 12.5	26	54	34.3	10 20.4	26	53	33.8
8	9 15.0	28	56	35.6	9 23.4	28	55	35.1	9 40.2	28	54	34.2	9 48.5	28	53	33.7
9	8 41.6	29	55	35.5	8 50.5	29	55	35.0	9 08.0	29	53	34.0	9 16.7	29	53	33.5
100	8 08.4	31	55	35.3	8 17.6	31	54	34.8	8 36.0	30	53	33.8	8 45.1	30	52	33.4
1	7 35.3	32	55	35.1	7 44.9	32	54	34.6	8 04.1	32	53	33.7	8 13.6	32	52	33.2
2	7 02.4	33	55	34.9	7 12.4	33	54	34.4	7 32.4	33	53	33.5	7 42.3	33	52	33.0
3	6 29.7	35	54	34.7	6 40.1	35	54	34.2	7 00.8	34	52	33.3	7 11.1	34	52	32.8
4	5 57.1	36	54	34.5	6 07.9	36	53	34.0	6 29.4	36	52	33.1	6 40.1	36	51	32.6
105	5 24.6	37	54	34.3	5 35.8	37	53	33.8	5 58.1	37	52	32.9	6 09.2	37	51	32.4
6					5 04.0	39	53	33.6	5 27.0	38	52	32.7	5 38.5	38	51	32.2
7													5 08.0	40	51	32.0
8																
9																

57° 00′				57° 30′				59° 00′				59° 30′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
13 39.4	18	54	34.1	13 44.8	18	53	33.6	14 00.3	17	51	32.1	14 05.4	17	50	31.5	91
13 07.3	19	53	34.0	13 13.1	19	53	33.5	13 29.9	18	51	32.0	13 35.4	18	50	31.5	2
12 35.3	21	53	33.9	12 41.5	20	52	33.4	12 59.6	20	50	31.9	13 05.5	20	50	31.4	3
12 03.4	22	53	33.8	12 09.9	22	52	33.3	12 29.3	21	50	31.8	12 35.7	21	50	31.3	4
11 31.5	23	53	33.6	11 38.5	23	52	33.1	11 59.2	23	50	31.6	12 06.0	23	49	31.1	95
10 59.8	25	53	33.5	11 07.2	25	52	33.0	11 29.2	24	50	31.5	11 36.4	24	49	31.0	6
10 28.2	26	52	33.3	10 36.0	26	52	32.9	10 59.2	26	50	31.4	11 06.9	25	49	30.9	7
9 56.7	27	52	33.2	10 05.0	27	52	32.7	10 29.4	27	50	31.2	10 37.5	27	49	30.8	8
9 25.4	29	52	33.0	9 34.0	29	51	32.6	9 59.7	28	49	31.1	10 08.2	28	49	30.6	9
8 54.2	30	52	32.9	9 03.2	30	51	32.4	9 30.1	30	49	30.9	9 39.0	30	48	30.5	100
8 23.1	32	52	32.7	8 32.5	31	51	32.2	9 00.7	31	49	30.8	9 10.0	31	48	30.3	1
7 52.2	33	51	32.5	8 02.0	33	51	32.1	8 31.4	32	49	30.6	8 41.1	32	48	30.1	2
7 21.4	34	51	32.4	7 31.6	34	50	31.9	8 02.2	34	48	30.5	8 12.4	34	48	30.0	3
6 50.8	36	51	32.2	7 01.4	35	50	31.7	7 33.2	35	48	30.3	7 43.8	35	47	29.8	4
6 20.3	37	50	32.0	6 31.4	37	50	31.5	7 04.4	37	48	30.1	7 15.3	36	47	29.6	105
5 50.0	38	50	31.8	6 01.5	38	50	31.3	6 35.7	38	48	29.9	6 47.1	38	47	29.4	6
5 19.9	40	50	31.5	5 31.8	39	49	31.1	6 07.2	39	47	29.7	6 19.0	39	47	29.2	7
				5 02.2	41	49	30.9	5 38.9	41	47	29.5	5 51.0	41	46	29.0	8
								5 10.7	42	47	29.3	5 23.3	42	46	28.8	9

Lat. 17°

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	47 09.0	1.0 01	00.0	46 30.0	1.0 01	00.0	45 00.0	1.0 01	00.0	44 30.0	1.0 01	00.0	44 00.0	1.0 01	00.0	38 00.0	1.0 00	00.0	37 30.0	1.0 00	00.0	32 39.0	1.0 00	00.0	00
1	46 59.6	1.0 02	00.7	46 29.6	1.0 02	00.7	44 59.7	1.0 02	00.7	44 29.7	1.0 02	00.6	43 59.7	1.0 02	00.6	37 59.8	1.0 01	00.5	37 29.8	1.0 01	00.4	32 29.8	1.0 01	00.3	1
2	46 58.5	1.0 03	01.5	46 28.6	1.0 03	01.4	44 58.7	1.0 03	01.3	44 28.7	1.0 03	01.3	43 58.7	1.0 03	01.3	37 59.1	1.0 02	00.9	37 29.1	1.0 02	00.9	32 29.4	1.0 01	00.6	2
3	46 56.7	1.0 04	02.2	46 26.8	1.0 04	02.1	44 57.0	1.0 04	02.0	44 27.1	1.0 04	01.9	43 57.2	1.0 04	01.9	37 58.0	1.0 03	01.4	37 28.0	1.0 03	01.3	32 28.6	1.0 02	01.0	3
4	46 54.1	1.0 06	02.9	46 24.3	1.0 05	02.9	44 54.7	1.0 05	02.7	44 24.8	1.0 05	02.6	43 54.9	1.0 05	02.5	37 56.4	1.0 03	01.8	37 26.5	1.0 03	01.8	32 27.5	1.0 02	01.3	4
05	46 50.8	99 07	03.7	46 21.1	99 07	03.6	44 51.7	99 06	03.3	44 21.9	99 06	03.2	43 52.1	99 06	03.1	37 54.3	99 04	02.3	37 24.5	99 04	02.2	32 26.0	1.0 03	01.6	05
6	46 46.8	99 08	04.4	46 17.1	99 08	04.3	44 48.1	99 07	04.0	44 18.4	99 07	03.9	43 48.7	99 07	03.8	37 51.8	99 05	02.7	37 22.1	99 05	02.6	32 24.3	99 03	01.9	6
7	46 42.1	99 09	05.1	46 12.5	99 09	05.0	44 43.8	99 08	04.6	44 14.2	99 08	04.5	43 44.6	99 08	04.4	37 48.9	99 06	03.2	37 19.2	99 06	03.1	32 22.2	99 04	02.2	7
8	46 36.6	98 10	05.8	46 07.2	98 10	05.7	44 38.8	98 09	05.3	44 09.3	98 09	05.1	43 39.9	98 09	05.0	37 45.5	99 06	03.6	37 15.9	99 06	03.5	32 19.9	99 04	02.5	8
9	46 30.5	98 11	06.5	46 01.2	98 11	06.4	44 33.2	98 10	05.9	44 03.9	98 10	05.8	43 34.5	98 10	05.6	37 41.6	98 07	04.1	37 12.2	98 07	03.9	32 17.2	98 05	02.8	9
10	46 23.6	97 13	07.2	45 54.5	97 12	07.1	44 27.0	97 11	06.6	43 57.8	97 11	06.4	43 28.6	97 11	06.2	37 37.3	98 08	04.5	37 08.0	98 08	04.4	32 14.2	98 06	03.1	10
1	46 16.0	96 14	07.9	45 47.1	97 13	07.7	44 20.1	97 12	07.2	43 51.1	97 12	07.0	43 22.1	97 12	06.8	37 32.6	97 09	04.9	37 03.4	97 08	04.8	32 10.9	98 06	03.5	1
2	46 07.8	96 15	08.6	45 39.0	96 15	08.4	44 12.6	96 14	07.8	43 43.8	96 13	07.6	43 14.9	96 13	07.4	37 27.4	97 09	05.4	36 58.4	97 09	05.2	32 07.3	97 07	03.8	2
3	45 58.8	96 16	09.3	45 30.3	96 16	09.1	44 04.5	95 15	08.5	43 35.9	96 14	08.2	43 07.2	96 14	08.0	37 21.8	96 10	05.8	36 53.0	96 10	05.7	32 03.4	97 07	04.1	3
4	45 49.2	94 17	10.0	45 20.9	94 17	09.8	43 55.8	95 16	09.1	43 27.3	96 15	08.9	42 58.9	95 15	08.6	37 15.8	96 11	06.3	36 47.1	96 10	06.1	31 59.1	96 08	04.4	4
15	45 38.9	94 18	10.7	45 10.8	94 18	10.4	43 46.4	94 17	09.7	43 18.2	94 16	09.5	42 50.0	94 16	09.2	37 09.3	95 12	06.7	36 40.8	95 11	06.5	31 54.6	96 08	04.7	15
6	45 27.9	93 19	11.3	45 00.1	93 19	11.1	43 36.5	93 18	10.3	43 08.5	93 17	10.0	42 40.5	93 17	09.8	37 02.5	94 12	07.1	36 34.1	94 12	06.9	31 49.8	95 09	05.0	6
7	45 16.3	92 20	12.0	44 48.8	92 20	11.7	43 25.9	92 19	10.9	42 58.2	92 18	10.6	42 30.5	93 18	10.4	36 55.1	94 13	07.5	36 27.0	94 13	07.3	31 44.7	94 09	05.3	7
8	45 04.1	91 21	12.6	44 36.8	91 21	12.3	43 14.8	91 20	11.5	42 47.3	92 19	11.2	42 19.8	92 19	10.9	36 47.4	93 14	07.9	36 19.5	93 13	07.7	31 39.3	94 10	05.6	8
9	44 51.2	90 22	13.3	44 24.3	90 22	13.0	43 03.0	90 20	12.1	42 35.9	91 20	11.8	42 08.7	91 20	11.5	36 39.3	92 14	08.4	36 11.6	92 14	08.1	31 33.5	93 10	05.9	9
20	44 37.8	89 24	13.9	44 11.1	89 23	13.6	42 50.8	89 21	12.7	42 23.9	90 21	12.3	41 57.0	90 20	12.1	36 30.7	91 15	08.8	36 03.3	91 14	08.5	31 27.5	92 10	06.2	20
1	44 23.7	88 24	14.5	43 57.3	88 24	14.2	42 37.9	88 22	13.2	42 11.3	89 22	12.9	41 44.7	89 21	12.6	36 21.8	90 16	09.2	35 54.6	91 15	08.9	31 21.2	92 11	06.4	1
2	44 09.0	87 25	15.1	43 43.0	87 25	14.8	42 24.5	87 23	13.8	41 58.3	88 23	13.5	41 32.0	88 22	13.1	36 12.4	90 16	09.6	35 45.5	90 16	09.3	31 14.7	91 11	06.7	2
3	43 53.7	86 26	15.7	43 28.0	86 26	15.4	42 10.6	86 24	14.3	41 44.7	87 24	14.0	41 18.7	87 23	13.7	36 02.7	89 17	10.0	35 36.1	89 16	09.7	31 07.8	90 12	07.0	3
4	43 37.9	84 27	16.3	43 12.5	85 27	15.9	41 56.1	85 25	14.9	41 30.5	85 24	14.5	41 04.9	86 24	14.2	35 52.6	88 18	10.4	35 26.2	88 17	10.1	31 00.7	89 12	07.3	4
25	43 21.5	83 28	16.9	42 56.5	83 28	16.5	41 41.1	84 26	15.4	41 15.9	84 25	15.0	40 50.5	85 25	14.7	35 42.0	87 18	10.7	35 16.0	87 18	10.4	30 53.3	88 13	07.6	25
6	43 04.5	82 29	17.5	42 39.9	82 28	17.1	41 25.6	83 27	15.9	41 00.7	83 26	15.6	40 35.8	83 25	15.2	35 31.2	86 19	11.1	35 05.4	86 18	10.8	30 45.6	87 13	07.8	6
7	42 47.0	81 30	18.0	42 22.8	81 29	17.6	41 09.6	82 28	16.4	40 45.1	82 27	16.1	40 20.5	82 26	15.7	35 19.9	85 19	11.5	34 54.5	85 19	11.2	30 37.6	86 14	08.1	7
8	42 29.0	79 31	18.6	42 05.2	80 30	18.1	40 53.2	80 28	17.0	40 29.0	81 28	16.6	40 04.7	81 27	16.2	35 08.3	84 20	11.9	34 43.2	84 19	11.5	30 29.4	85 14	08.4	8
9	42 10.5	78 32	19.1	41 47.1	78 31	18.7	40 36.2	79 29	17.4	40 12.4	79 28	17.0	39 48.5	80 28	16.6	34 56.3	82 21	12.2	34 31.5	83 20	11.9	30 20.9	84 15	08.6	9
30	41 51.5	77 32	19.6	41 28.5	77 32	19.2	40 18.8	78 30	17.9	39 55.3	78 29	17.5	39 31.8	78 28	17.1	34 44.0	81 21	12.6	34 19.5	82 21	12.2	30 12.2	83 15	08.9	30
1	41 32.0	75 33	20.1	41 09.4	76 33	19.7	40 00.9	77 31	18.4	39 37.8	77 30	18.0	39 14.7	77 29	17.6	34 31.3	80 22	12.9	34 07.2	80 21	12.6	30 03.2	82 15	09.2	1
2	41 12.0	74 34	20.6	40 49.8	74 33	20.2	39 42.5	75 31	18.9	39 19.9	76 31	18.4	38 57.2	76 30	18.0	34 18.3	79 22	13.3	33 54.5	79 22	12.9	29 53.9	81 16	09.4	2
3	40 51.6	73 35	21.1	40 29.8	73 34	20.7	39 23.8	74 32	19.3	39 01.5	74 31	18.9	38 39.2	75 31	18.5	34 04.9	78 23	13.6	33 41.5	78 22	13.3	29 44.4	80 16	09.6	3
4	40 30.7	71 36	21.6	40 09.3	71 35	21.1	39 04.6	72 33	19.8	38 42.8	73 32	19.3	38 20.9	73 31	18.9	33 51.2	77 23	14.0	33 28.2	77 23	13.6	29 34.7	79 17	09.9	4
35	40 09.4	70 36	22.0	39 48.5	70 36	21.6	38 45.0	71 33	20.2	38 23.6	71 33	19.8	38 02.1	72 32	19.3	33 37.2	75 24	14.3	33 14.6	75 23	13.9	29 24.7	78 17	10.1	35
6	39 47.7	68 37	22.5	39 27.2	69 36	22.0	38 24.9	70 34	20.6	38 04.0	70 33	20.2	37 42.9	70 33	19.7	33 22.9	74 24	14.6	33 00.7	74 24	14.2	29 14.5	76 17	10.4	6
7	39 25.5	67 38	22.9	39 05.4	67 37	22.4	38 04.5	68 35	21.0	37 44.0	69 34	20.6	37 23.4	69 33	20.1	33 08.3	73 25	14.9	32 46.4	73 24	14.5	29 04.0	75 18	10.6	7
8	39 03.0	65 38	23.4	38 43.3	66 37	22.9	37 43.8	67 35	21.4	37 23.7	67 34	21.0	37 03.5	68 34	20.5	32 53.3	71 25	15.2	32 31.9	72 25	14.8	28 53.4	74 18	10.8	8
9	38 40.0	64 39	23.8	38 20.9	64 38	23.3	37 22.6	65 36	21.8	37 03.0	66 35	21.4	36 43.2	66 34	20.9	32 38.1	70 26	15.5	32 17.1	70 25	15.1	28 42.5	73 19	11.1	9
40	38 16.7	62 39	24.2	37 58.0	63 39	23.7	37 01.1	64 36	22.2	36 41.9	64 36	21.7	36 22.6	65 35	21.2	32 22.6	69 26	15.8	32 02.0	69 26	15.4	28 31.4	71 19	11.3	40
1	37 53.1	61 40	24.6	37 34.8	61 39	24.1	36 39.2	62 37	22.6	36 20.5	63 36	22.1	36 01.6	63 36	21.6	32 06.8	67 27	16.1	31 46.6	67 26	15.7	28 20.0	70 19	11.5	1
2	37 29.0	59 41	24.9	37 11.2	60 40	24.4	36 17.0	61 38	22.9	35 58.7	61 37	22.4	35 40.3	62 36	22.0	31 50.7	66 27	16.4	31 31.0	66 26	16.0	28 08.5	69 20	11.7	2
3	37 04.7	58 41	25.3	36 47.3	58 40	24.8	35 54.5	59 38	23.3	35 36.7	60 37	22.8	35 18.7	60 37	22.3	31 34.4	64 28	16.7	31 15.1	65 27	16.2	27 56.8	67 20	11.9	3
4	36 40.0	56 42	25.7	36 23.1	56 41	25.1	35 31.7	58 39	23.6	35 14.3	58 38	23.1	34 56.8	59 37	22.6	31 17.8	63 28	16.9	30 58.9	63 27	16.5	27 44.8	66 20	12.1	4
45	36 15.0	54 42	26.0	35 58.6	55 41	25.5	35 08.5	56 39	24.0	34 51.6	57 38	23.4	34 34.6	57 38	22.9	31 01.0	61 28	17.2	30 42.5	62 28	16.7	27 32.7	65 21	12.3	45
6	35 49.7	53 43	26.3	35 33.7	53 42	25.8	34 45.1	55 40	24.3	34 28.6	55 39	23.8	34 12.0	56 38	23.3	30 43.9	60 29	17.5	30 25.9	60 28	17.0	27 20.4	63 21	12.5	6
7	35 24.1	51 43	26.7	35 08.6	52 42	26.1	34 21.4	53 40	24.6	34 05.4	54 39	24.1	33 49.2	54 38	23.6	30 26.6	58 29	17.7	30 09.0	59 29	17.2	27 07.9	62 21	12.7	7
8	34 58.2	50 44	27.0	34 43.2	50 43	26.4	33 57.4	52 40	24.9	33 41.8	52 40	24.4	33 26.2	52 39	23.8	30 09.0	57 30	17.9	29 51.9	57 29	17.5	26 55.2	60 21	12.9	8
9	34 32.0	48 44	27.3	34 17.5	49 43	26.7	33 33.1	50 41	25.2	33 18.0	50 40	24.6	33 02.9	51 39	24.1	29 51.2	55 30	18.2	29 34.5	56 29	17.7	26 42.3	59 22	13.0	9
50	34 05.6	47 44	27.5	33 51.6	47 44	27.0	33 08.6	48 41	25.4	32 54.0	49 40	24.9	32 39.3	49 40	24.4	29 33.2	54 30	18.4	29 17.0	54 30	17.9	26 29.3	57 22	13.2	50
1	33 39.0	45 45	27.8	33 25.4	46 44	27.3	32 43.8	47 42	25.7	32 29.7	47 41	25.2	32 15.5	48 40	24.7	29 15.0	52 31	18.6	28 59.2	53 30	18.1	26 16.1	56 22	13.4	1
2	33 12.1	43 45	28.1	32 59.0	44 44	27.6	32 18.8	45 42	26.0	32 05.2	46 41	25.4	31 51.4	46 40	24.9	28 56.6	51 31	18.8	28 41.3	51 30	18.3	26 02.7	54 23	13.6	2
3	32 44.9	42 46	28.3	32 32.3	42 45	27.8	31 53.6	44 42	26.2	31 40.4	44 42	25.7	31 27.1	45 41	25.2	28 38.0	49 31	19.0	28 23.2	50 31	18.5	25 49.2	53 23	13.7	3
4	32 17.6	40 46	28.6	32 05.4	41 45	28.0	31 28.2	42 43	26.4	31 15.5	43 42	25.9	31 02.6	43 41	25.4	28 19.2	48 32	19.2	28 04.8	48 31	18.7	25 35.5	51 23	13.9	4
55	31 50.0	39 46	28.8	31 38.4	39 45	28.3	31 02.5	41 43	26.7	30 50.3	41 42	26.1	30 37.9	41 42	25.6	28 00.2	46 32	19.4	27 46.3	46 31	18.9	25 21.7	50 23	14.0	55
6	31 22.3	37 47	29.0	31 11.1	38 46	28.5	30 36.6	39 43	26.9	30 24.9	39 43	26.4	30 13.0	40 42	25.8	27 41.0	45 32	19.6	27 27.6	45 31	19.1	25 07.7	48 24	14.2	6
7	30 54.3	36 47	29.3	30 43.6	36 46	28.7	30 10.6	37 44	27.1	29 59.3	38 43	26.6	29 48.0	38 42	26.0	27 21.7	43 32	19.8	27 08.8	43 32	19.3	24 53.6	47 24	14.3	7
8	30 26.2	34 47	29.5	30 15.9	34 46	28.9	29 44.4	36 44	27.3	29 33.6	36 43	26.8	29 22.7	37 42	26.2	27 02.2	41 33	20.0	26 49.7	42 32	19.4	24 39.3	45 24	14.4	8
9	29 57.9	32 47	29.6	29 48.1	33 47	29.1	29 18.0	34 44	27.5	29 07.7	35 43	26.9	28 57.3	35 43	26.4	26 42.5	40 33	20.1	26 30.6	40 32	19.6	24 25.0	44 24	14.6	9
60	29 29.4	31 48	29.8	29 20.1	31 47	29.3	28 51.4	33 45	27.7	28 41.6	33 44	27.1	28 31.7	33 43	26.6	26 22.7	38 33	20.3	26 11.2	39 32	19.8	24 10.5	42 24	14.7	60
1	29 00.8	29 48	30.0	28 52.0	30 47	29.5	28 24.7	31 45	27.8	28 15.4	31 44	27.3	28 05.9	32 43	26.8	26 02.8	37 34	20.4	25 51.8	37 33	19.9	23 55.9	40 25	14.8	1
2	28 32.0	28 48	30.2	28 23.7	28 47	29.6	27 57.9	29 45	28.0	27 49.0	30 44	27.4	27 40.0	30 43	26.9	25 42.7	35 34	20.6	25 32.2	35 33	20.0	23 41.1	39 25	14.9	2
3	28 03.1	26 48	30.3	27 55.3	26 48	29.8	27 30.9	28 45	28.1	27 22.5	28 44	27.6	27 14.0	29 44	27.1	25 22.5	33 34	20.7	25 12.5	34 33	20.2	23 26.3	37 25	15.0	3
4	27 34.1	24 49	30.5	27 26.7	25 48	29.9	27 03.7	26 45	28.3	26 55.8	27 45	27.7	26 47.8	27 44	27.2	25 02.2	32 34	20.8	24 52.6	32 33	20.3	23 11.4	35 25	15.1	4
65	27 05.0	23 49	30.6	26 58.0	23 48	30.0	26 36.5	25 46	28.4	26 29.1	25 45	27.9	26 21.5	25 44	27.3	24 41.7	30 34	20.9	24 32.6	30 33	20.4	22 56.3	34 25	15.2	65
6	26 35.7	21 49	30.7	26 29.2	22 48	30.2	26 09.1	23 46	28.5	26 02.2	23 45	28.0	25 55.1	24 44	27.5	24 21.1	28 34	21.1	24 12.6	29 34	20.5	22 41.2	32 25	15.3	6
7	26 06.3	20 49	30.8	26 00.4	20 48	30.3	25 41.7	21 46	28.7	25 35.2	22 45	28.1	25 28.6	22 44	27.6	24 00.5	27 35	21.2	23 52.4	27 34	20.6	22 25.9	31 26	15.4	7
8	25 36.9	18 49	30.9	25 31.4	19 48	30.4	25 14.1	20 46	28.8	25 08.1	20 45	28.2	25 02.0	21 44	27.7	23 39.7	25 35	21.3	23 32.1	25 34	20.7	22 10.6	29 26	15.5	8
9	25 07.4	17 49	31.0	25 02.3	17 49	30.5	24 46.4	18 46	28.9	24 40.9	19 45	28.3	24 35.3	19 45	27.8	23 18.8	23 35	21.4	23 11.8	24 34	20.8	21 55.2	27 26	15.6	9
70	24 37.7	15 50	31.1	24 33.2	15 49	30.6	24 18.7	17 46	29.0	24 13.7	17 46	28.4	24 08.5	17 45	27.9	22 57.9	22 35	21.5	22 51.3	22 34	20.9	21 39.8	26 26	15.7	70
1	24 08.0	14 50	31.2	24 03.9	14 49	30.7	23 50.9	15 46	29.0	23 46.3	15 46	28.5	23 41.6	16 45	28.0	22 36.9	20 35	21.5	22 30.8	20 34	21.0	21 24.2	24 26	15.7	1
2	23 38.3	12 50	31.3	23 34.6	12 49	30.7	23 23.0	13 47	29.1	23 18.9	14 46	28.6	23 14.7	14 45	28.0	22 15.8	18 35	21.6	22 10.2	19 34	21.1	21 08.6	22 26	15.8	2
3	23 08.5	10 50	31.3	23 05.3	11 49	30.8	22 55.1	12 47	29.2	22 51.4	12 46	28.6	22 47.7	13 45	28.1	21 54.6	17 35	21.7	21 49.5	17 35	21.1	20 53.0	20 26	15.9	3
4	22 38.6	09 50	31.4	22 35.9	09 49	30.8	22 27.1	10 47	29.2	22 23.9	11 46	28.7	22 20.7	11 45	28.2	21 33.4	15 35	21.7	21 28.8	16 35	21.2	20 37.2	19 26	15.9	4
75	22 08.7	07 50	31.4	22 06.5	08 49	30.9	21 59.0	09 47	29.3	21 56.4	09 46	28.7	21 53.6	09 45	28.2	21 12.1	14 36	21.8	21 08.0	14 35	21.3	20 21.5	17 26	16.0	75
6	21 38.8	06 50	31.5	21 37.0	06 49	30.9	21 31.0	07 47	29.3	21 28.8	08 46	28.8	21 26.4	08 45	28.2	20 50.8	12 36	21.8	20 47.2	12 35	21.3	20 05.6	15 26	16.0	6
7	21 08.8	04 50	31.5	21 07.5	05 49	31.0	21 02.9	06 47	29.4	21 01.1	06 46	28.8	20 59.3	06 45	28.3	20 29.4	10 36	21.9	20 26.3	11 35	21.4	19 49.8	14 26	16.1	7
8	20 38.8	03 50	31.5	20 38.0	03 49	31.0	20 34.7	04 47	29.4	20 33.4	04 46	28.8	20 32.1	05 45	28.3	20 08.0	09 36	21.9	20 05.4	09 35	21.4	19 33.9	12 27	16.1	8
9	20 08.8	01 50	31.5	20 08.4	02 49	31.0	20 06.6	03 47	29.4	20 05.8	03 46	28.9	20 04.8	03 45	28.3	19 46.6	07 36	22.0	19 44.4	07 35	21.4	19 18.0	10 27	16.1	9
80	19 38.8	00 50	31.5	19 38.9	00 49	31.0	19 38.4	01 47	29.4	19 38.1	01 46	28.9	19 37.6	02 45	28.3	19 25.1	05 36	22.0	19 23.5	06 35	21.4	19 02.0	09 27	16.2	80
1	19 08.8	02 50	31.5	19 09.3	01 49	31.0	19 10.2	01 47	29.4	19 10.4	00 46	28.9	19 10.4	00 45	28.3	19 03.6	04 36	22.0	19 02.5	04 35	21.5	18 46.0	07 27	16.2	1
2	18 38.9	03 50	31.5	18 39.8	03 49	31.0	18 42.1	02 47	29.4	18 42.6	02 46	28.9	18 43.1	01 45	28.3	18 42.1	02 36	22.0	18 41.5	02 35	21.5	18 30.0	05 27	16.2	2
3	18 08.9	05 50	31.5	18 10.3	04 49	31.0	18 13.9	04 47	29.4	18 15.0	03 46	28.9	18 15.9	03 45	28.3	18 20.6	00 36	22.0	18 20.5	01 35	21.5	18 14.0	04 27	16.2	3
4	17 38.9	06 50	31.5	17 40.8	06 49	30.9	17 45.8	05 47	29.4	17 47.3	05 46	28.8	17 48.7	05 45	28.3	17 59.1	01 36	22.0	17 59.4	01 35	21.5	17 58.0	02 27	16.2	4
85	17 09.0	08 50	31.4	17 11.3	07 49	30.9	17 17.7	07 47	29.3	17 19.6	06 46	28.8	17 21.5	06 45	28.3	17 37.6	03 36	22.0	17 38.4	03 35	21.5	17 41.9	00 27	16.2	85
6	16 39.1	09 50	31.4	16 41.8	09 49	30.9	16 49.6	08 47	29.3	16 52.0	08 46	28.8	16 54.3	08 45	28.3	17 16.1	04 36	22.0	17 17.4	04 35	21.5	17 25.9	01 27	16.2	6
7	16 09.3	11 50	31.3	16 12.4	10 49	30.8	16 21.5	10 47	29.2	16 24.4	09 46	28.7	16 27.2	09 45	28.2	16 54.7	06 36	22.0	16 56.4	06 35	21.4	17 09.9	03 27	16.2	7
8	15 39.5	12 50	31.3	15 43.1	12 49	30.7	15 53.5	11 47	29.2	15 56.8	11 46	28.7	16 00.1	11 45	28.2	16 33.2	08 36	21.9	16 35.5	07 35	21.4	16 53.8	05 27	16.2	8
9	15 09.7	14 50	31.2	15 13.8	13 49	30.7	15 25.5	13 47	29.1	15 29.3	12 46	28.6	15 33.0	12 45	28.1	16 11.8	09 36	21.9	16 14.5	09 35	21.4	16 37.8	06 27	16.2	9
90	14 40.0	15 49	31.1	14 44.5	15 49	30.6	14 57.6	14 46	29.1	15 01.8	14 46	28.6	15 06.0	14 45	28.0	15 50.4	11 36	21.9	15 53.6	11 35	21.4	16 21.8	08 27	16.2	90

DECLINATION SAME NAME AS LATITUDE

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	14 10.4	17 49	31.0	14 15.3	16 48	30.5	14 29.8	16 46	29.0	14 34.4	15 46	28.5	14 39.1	15 45	28.0	15 29.0	12 36	21.8	15 32.8	12 35	21.3	16 05.9	10 27	16.1	91
2	13 40.9	18 49	30.9	13 46.2	18 48	30.4	14 02.0	17 46	28.9	14 07.1	17 45	28.4	14 12.2	17 45	27.9	15 07.7	14 35	21.8	15 11.9	14 35	21.3	15 49.9	11 27	16.1	2
3	13 11.4	19 49	30.9	13 17.2	19 48	30.3	13 34.3	19 46	28.8	13 39.8	18 45	28.3	13 45.3	18 45	27.8	14 46.5	16 35	21.7	14 51.1	15 35	21.2	15 34.0	13 26	16.1	3
4	12 42.0	21 49	30.7	12 48.2	21 48	30.2	13 06.6	20 46	28.7	13 12.6	20 45	28.2	13 18.6	20 44	27.7	14 25.3	17 35	21.7	14 30.4	17 34	21.2	15 18.1	15 26	16.0	4
95	12 12.7	22 49	30.6	12 19.4	22 48	30.1	12 39.1	22 46	28.6	12 45.5	21 45	28.1	12 51.9	21 44	27.6	14 04.1	19 35	21.6	14 09.7	19 34	21.1	15 02.3	16 26	16.0	95
6	11 43.5	24 48	30.5	11 50.6	24 48	30.0	12 11.6	23 46	28.5	12 18.5	23 45	28.0	12 25.4	23 44	27.5	13 43.0	20 35	21.5	13 49.1	20 34	21.0	14 46.5	18 26	16.0	6
7	11 14.4	25 48	30.4	11 22.0	25 48	29.9	11 44.3	25 45	28.4	11 51.6	24 45	27.9	11 58.9	24 44	27.4	13 22.0	22 35	21.4	13 28.6	22 34	20.9	14 30.8	20 26	15.9	7
8	10 45.5	27 48	30.3	10 53.4	26 47	29.8	11 17.0	26 45	28.3	11 24.8	26 44	27.8	11 32.5	26 44	27.3	13 01.1	24 35	21.4	13 08.1	23 34	20.9	14 15.1	21 26	15.8	8
9	10 16.6	28 48	30.1	10 25.0	28 47	29.6	10 49.9	27 45	28.2	10 58.1	27 44	27.7	11 06.2	27 44	27.2	12 40.2	25 35	21.3	12 47.7	25 34	20.8	13 59.4	23 26	15.8	9
100	9 47.9	29 48	30.0	9 56.7	29 47	29.5	10 22.8	29 45	28.0	10 31.5	29 44	27.5	10 40.1	29 43	27.1	12 19.4	27 34	21.2	12 27.4	26 34	20.7	13 43.8	25 26	15.7	100
1	9 19.3	31 47	29.8	9 28.5	31 47	29.3	9 55.9	30 45	27.9	10 05.0	30 44	27.4	10 14.0	30 43	26.9	11 58.8	28 34	21.1	12 07.2	28 34	20.6	13 28.3	26 26	15.6	1
2	8 50.8	32 47	29.7	9 00.4	32 46	29.2	9 29.2	32 44	27.7	9 38.6	32 44	27.3	9 48.1	31 43	26.8	11 38.2	30 34	21.0	11 47.1	29 33	20.5	13 12.9	28 26	15.6	2
3	8 22.5	34 47	29.5	8 32.5	33 46	29.0	9 02.5	33 44	27.6	9 12.4	33 43	27.1	9 22.3	33 43	26.6	11 17.7	31 34	20.9	11 27.0	31 33	20.4	12 57.5	29 26	15.5	3
4	7 54.3	35 47	29.3	8 04.8	35 46	28.9	8 36.0	35 44	27.4	8 46.3	34 43	27.0	8 56.7	34 42	26.5	10 57.3	33 34	20.7	11 07.1	33 33	20.3	12 42.2	31 25	15.4	4
105	7 26.3	36 46	29.1	7 37.1	36 46	28.7	8 09.6	36 44	27.3	8 20.4	36 43	26.8	8 31.1	36 42	26.3	10 37.1	34 34	20.6	10 47.3	34 33	20.1	12 27.0	32 25	15.3	105
6	6 58.4	38 46	29.0	7 09.7	38 46	28.5	7 43.4	37 43	27.1	7 54.6	37 43	26.6	8 05.8	37 42	26.2	10 16.9	36 33	20.5	10 27.6	36 33	20.0	12 11.9	34 25	15.2	6
7	6 30.7	39 46	28.8	6 42.4	39 45	28.3	7 17.4	39 43	26.9	7 29.0	39 42	26.4	7 40.6	39 42	26.0	9 56.9	37 33	20.4	10 08.0	37 32	19.9	11 56.9	36 25	15.1	7
8	6 03.2	40 46	28.6	6 15.3	40 45	28.1	6 51.5	40 43	26.7	7 03.5	40 42	26.3	7 15.5	40 41	25.8	9 37.0	39 33	20.2	9 48.5	38 32	19.8	11 41.9	37 25	15.0	8
9	5 35.8	42 45	28.4	5 48.3	42 45	27.9	6 25.8	41 43	26.5	6 38.2	41 42	26.1	6 50.6	41 41	25.6	9 17.2	40 33	20.1	9 29.2	40 32	19.6	11 27.1	39 25	14.9	9
110	5 08.7	43 45	28.1	5 21.6	43 44	27.7	6 00.2	43 42	26.3	6 13.1	43 42	25.9	6 25.9	43 41	25.4	8 57.6	42 32	19.9	9 10.0	41 32	19.5	11 12.3	40 24	14.8	110
1							5 34.9	44 42	26.1	5 48.1	44 41	25.7	6 01.3	44 41	25.2	8 38.1	43 32	19.8	8 51.0	43 32	19.3	10 57.7	42 24	14.7	1
2							5 09.7	46 42	25.9	5 23.4	45 41	25.5	5 37.0	45 40	25.0	8 18.7	44 32	19.6	8 32.0	44 31	19.2	10 43.2	43 24	14.6	2
3													5 12.8	47 40	24.8	7 59.6	46 32	19.5	8 13.3	46 31	19.0	10 28.8	45 24	14.5	3
4																7 40.5	47 31	19.3	7 54.7	47 31	18.8	10 14.5	46 24	14.4	4
115																7 21.6	49 31	19.1	7 36.2	49 30	18.7	10 00.3	47 23	14.2	115
6																7 02.9	50 31	18.9	7 17.9	50 30	18.5	9 46.2	49 23	14.1	6
7																6 44.4	51 31	18.8	6 59.8	51 30	18.3	9 32.3	50 23	14.0	7
8																6 26.0	53 30	18.6	6 41.9	53 30	18.1	9 18.5	52 23	13.8	8
9																6 07.9	54 30	18.4	6 24.1	54 29	18.0	9 04.9	53 23	13.7	9
120																5 49.9	55 30	18.2	6 06.5	55 29	17.8	8 51.4	55 22	13.5	120
1																5 32.1	57 29	18.0	5 49.1	57 29	17.6	8 38.0	56 22	13.4	1
2																5 14.5	58 29	17.8	5 31.9	58 28	17.4	8 24.8	57 22	13.2	2
3																			5 14.8	59 28	17.2	8 11.7	59 22	13.1	3
4																						7 58.8	60 21	12.9	4
																						7 46.1	61 21	12.8	125
																						7 33.5	63 21	12.6	6
																						7 21.0	64 20	12.4	7
																						7 08.8	65 20	12.3	8
																						6 56.7	66 20	12.1	9
																						6 44.8	68 20	11.9	130
																						6 33.0	69 19	11.7	1
																						6 21.5	70 19	11.5	2
																						6 10.1	71 19	11.3	3
																						5 58.9	72 18	11.1	4
																						5 47.9	73 18	10.9	135
																						5 37.1	74 18	10.8	6
																						5 26.5	76 17	10.5	7
																						5 16.1	77 17	10.3	8
																						5 05.9	78 17	10.1	9

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	13 00.0	1.0 00	180.0	12 30.0	1.0 00	180.0	11 00.0	1.0 00	180.0	10 30.0	1.0 00	180.0	10 00.0	1.0 00	180.0
1	12 59.7	1.0 01	179.5	12 29.7	1.0 01	179.5	10 59.8	1.0 01	179.5	10 29.8	1.0 01	179.5	9 59.8	1.0 01	179.5
2	12 59.0	1.0 02	179.0	12 29.0	1.0 02	179.0	10 59.0	1.0 02	179.0	10 29.1	1.0 02	179.1	9 59.1	1.0 02	179.1
3	12 57.7	1.0 03	178.5	12 27.7	1.0 03	178.5	10 57.8	1.0 03	178.6	10 27.9	1.0 03	178.6	9 57.9	1.0 03	178.6
4	12 55.9	1.0 04	177.9	12 26.0	1.0 04	178.0	10 56.2	1.0 04	178.1	10 26.2	1.0 04	178.1	9 56.3	1.0 03	178.2
05	12 53.6	1.0 05	177.4	12 23.7	1.0 05	177.5	10 54.0	1.0 04	177.6	10 24.1	1.0 04	177.7	9 54.2	1.0 04	177.7
6	12 50.8	99 06	176.9	12 20.9	99 05	177.0	10 51.4	99 05	177.1	10 21.5	99 05	177.2	9 51.7	99 05	177.2
7	12 47.4	99 06	176.4	12 17.6	99 06	176.5	10 48.3	99 06	176.7	10 18.5	99 06	176.7	9 48.7	99 06	176.8
8	12 43.6	99 07	175.9	12 13.9	99 07	176.0	10 44.7	99 07	176.2	10 15.0	99 07	176.3	9 45.3	99 06	176.3
9	12 39.2	99 08	175.4	12 09.6	99 08	175.5	10 40.7	99 08	175.7	10 11.0	99 07	175.8	9 41.4	99 07	175.9
10	12 34.4	99 09	174.9	12 04.8	99 09	175.0	10 36.1	99 08	175.2	10 06.6	99 08	175.3	9 37.0	99 08	175.4
1	12 29.0	98 10	174.4	11 59.6	98 10	174.5	10 31.1	98 09	174.8	10 01.7	98 09	174.9	9 32.2	98 09	175.0
2	12 23.2	98 11	173.9	11 53.8	98 10	174.0	10 25.7	98 10	174.3	9 56.3	98 10	174.4	9 26.9	98 10	174.5
3	12 16.8	98 11	173.4	11 47.6	98 11	173.5	10 19.7	98 11	173.8	9 50.5	98 10	173.9	9 21.2	98 10	174.1
4	12 10.0	97 12	172.9	11 40.8	97 12	173.0	10 13.4	97 11	173.4	9 44.2	97 11	173.5	9 15.0	97 11	173.6
15	12 02.6	97 13	172.4	11 33.6	97 13	172.5	10 06.5	97 12	172.9	9 37.5	97 12	173.0	9 08.4	97 12	173.2
6	11 54.8	96 14	171.9	11 25.9	96 14	172.0	9 59.2	96 13	172.4	9 30.3	96 13	172.6	9 01.4	96 12	172.7
7	11 46.5	96 15	171.4	11 17.7	96 14	171.6	9 51.4	96 14	172.0	9 22.7	96 13	172.1	8 53.9	96 13	172.3
8	11 37.7	95 15	170.9	11 09.0	95 15	171.1	9 43.2	96 14	171.5	9 14.6	95 14	171.7	8 46.0	95 14	171.8
9	11 28.4	95 16	170.4	10 59.9	95 16	170.6	9 34.5	95 15	171.1	9 06.1	95 15	171.2	8 37.6	95 15	171.4
20	11 18.6	94 17	170.0	10 50.3	94 17	170.1	9 25.4	94 16	170.6	8 57.1	94 16	170.8	8 28.8	94 15	171.0
1	11 08.3	94 18	169.5	10 40.2	94 18	169.7	9 15.9	94 17	170.2	8 47.7	94 16	170.4	8 19.6	94 16	170.5
2	10 57.6	93 19	169.0	10 29.7	93 18	169.2	9 05.9	93 17	169.7	8 37.9	93 17	169.9	8 09.9	93 17	170.1
3	10 46.5	92 19	168.5	10 18.7	93 19	168.7	8 55.4	93 18	169.3	8 27.6	93 18	169.5	7 59.9	93 17	169.7
4	10 34.8	92 20	168.1	10 07.3	92 20	168.3	8 44.6	92 19	168.9	8 17.0	92 18	169.1	7 49.4	92 18	169.3
25	10 22.7	91 21	167.6	9 55.4	91 21	167.8	8 33.3	91 20	168.4	8 05.9	91 19	168.6	7 38.5	91 19	168.8
6	10 10.2	90 22	167.1	9 43.0	91 21	167.3	8 21.5	91 20	168.0	7 54.4	91 20	168.2	7 27.2	91 20	168.4
7	9 57.2	90 22	166.7	9 30.2	90 22	166.9	8 09.4	90 21	167.6	7 42.4	90 21	167.8	7 15.4	90 20	168.0
8	9 43.7	89 23	166.2	9 17.0	89 23	166.5	7 56.8	89 22	167.1	7 30.1	89 21	167.4	7 03.3	89 21	167.6
9	9 29.8	88 24	165.8	9 03.4	88 23	166.0	7 43.8	88 22	166.7	7 17.3	88 22	167.0	6 50.8	88 22	167.2
30	9 15.5	87 25	165.3	8 49.3	88 24	165.6	7 30.5	88 23	166.3	7 04.2	88 23	166.5	6 37.9	88 22	166.8
1	9 00.8	87 25	164.9	8 34.8	87 25	165.1	7 16.7	87 24	165.9	6 50.6	87 23	166.1	6 24.6	87 23	166.4
2	8 45.6	86 26	164.4	8 19.8	86 26	164.7	7 02.5	86 24	165.5	6 36.7	86 24	165.7	6 10.9	86 23	166.0
3	8 30.0	85 27	164.0	8 04.5	85 26	164.3	6 47.9	85 25	165.1	6 22.4	85 25	165.3	5 56.8	85 24	165.6
4	8 14.0	84 27	163.6	7 48.8	84 27	163.9	6 32.9	84 26	164.7	6 07.7	84 25	164.9	5 42.4	84 25	165.2
35	7 57.6	83 28	163.2	7 32.6	83 28	163.4	6 17.6	83 26	164.3	5 52.6	83 26	164.6	5 27.5	83 25	164.8
6	7 40.8	82 29	162.7	7 16.1	82 28	163.0	6 01.9	82 27	163.9	5 37.1	83 26	164.2	5 12.3	83 26	164.5
7	7 23.6	81 29	162.3	6 59.1	81 29	162.6	5 45.7	82 27	163.5	5 21.3	82 27	163.8			
8	7 06.0	80 30	161.9	6 41.8	81 30	162.2	5 29.3	81 28	163.1	5 05.1	81 28	163.4			
9	6 48.0	80 31	161.5	6 24.1	80 30	161.8	5 12.4	80 29	162.7						
40	6 29.6	79 31	161.1	6 06.0	79 31	161.4									
1	6 10.8	78 32	160.7	5 47.6	78 31	161.1									
2	5 51.7	77 32	160.3	5 28.8	77 32	160.7									
3	5 32.2	76 33	160.0	5 09.6	76 33	160.3									
4	5 12.4	75 34	159.6												

STAR IDENTIFICATION TABLE

Lat. 17°

ALTITUDE

AZ.	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		AZ.
	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	Dec.	H.A.	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
00	77	180	81	180	85	180	89	180	87	00	83	00	79	00	75	00	71	00	67	00	63	00	00
4	76	163	80	156	84	142	86	104	85	51	82	27	78	18	75	13	71	10	67	08	63	06	4
8	75	148	78	138	81	122	82	96	82	67	80	46	77	32	73	24	70	19	66	15	62	12	8
12	72	137	75	126	77	112	78	93	78	73	77	56	74	43	71	34	68	27	65	22	61	18	12
16	70	128	72	118	74	106	75	91	75	76	73	62	72	50	69	41	66	34	63	28	60	23	16
20	66	121	69	112	70	102	71	90	71	78	70	66	69	56	66	47	64	39	61	33	58	28	20
24	63	116	65	108	66	99	67	89	67	79	66	69	65	59	64	51	61	44	59	37	56	32	24
28	60	112	61	105	62	97	63	88	63	79	63	70	62	62	61	54	59	47	57	41	54	35	28
32	56	109	58	102	59	95	59	87	60	79	59	71	59	64	57	57	56	50	54	44	52	38	32
36	52	106	54	100	55	93	56	86	56	79	56	72	55	65	54	58	53	52	51	46	49	41	36
40	49	104	50	98	51	92	52	86	52	79	52	73	52	66	51	60	50	54	49	48	47	43	40
44	45	102	46	96	47	91	48	85	48	79	48	73	48	67	48	61	47	55	46	50	44	44	44
48	41	100	42	95	43	89	44	84	45	78	45	73	45	67	44	62	44	56	43	51	42	46	48
52	37	98	39	93	40	88	40	83	41	78	41	73	41	67	41	62	40	57	40	52	39	47	52
56	34	97	35	92	36	87	36	82	37	77	37	72	38	67	37	62	37	57	37	52	36	47	56
60	30	95	31	91	32	86	33	82	33	77	34	72	34	67	34	62	34	58	34	53	33	48	60
64	26	94	27	90	28	85	29	81	30	76	30	72	30	67	31	62	31	58	31	53	30	48	64
68	22	93	23	88	24	84	25	80	26	76	26	71	27	67	27	62	27	58	28	53	27	49	68
72	18	91	19	87	20	83	21	79	22	75	23	71	23	66	24	62	24	58	24	53	25	49	72
76	15	90	16	86	17	82	18	78	19	74	19	70	20	66	21	61	21	57	21	53	22	49	76
80	11	89	12	85	13	81	14	77	15	73	16	69	16	65	17	61	18	57	18	53	19	48	80
84	07	88	08	84	09	80	10	76	11	72	12	68	13	64	14	60	15	56	15	52	16	48	84
88	03	87	04	83	05	79	06	75	08	71	09	67	10	64	11	60	11	56	12	52	13	48	88
92	*01*	86	00	82	02	78	03	74	04	70	05	66	06	63	07	59	08	55	09	51	10	47	92
96	*05*	84	*03*	81	*02*	77	*01*	73	00	69	02	65	03	62	04	58	05	54	06	50	08	46	96
100	*08*	83	*07*	79	*06*	76	*05*	72	*03*	68	*02*	64	*01*	60	01	57	02	53	03	49	05	45	100
104	*12*	82	*11*	78	*10*	74	*08*	70	*07*	67	*05*	63	*04*	59	*02*	55	*01*	52	01	48	02	44	104
108	*16*	81	*15*	77	*13*	73	*12*	69	*10*	65	*09*	62	*07*	58	*05*	54	*04*	50	*02*	47	*01*	43	108
112	*20*	79	*18*	75	*17*	71	*15*	68	*14*	64	*12*	60	*10*	56	*09*	53	*07*	49	*05*	45	*03*	42	112
116	*23*	78	*22*	74	*20*	70	*19*	66	*17*	62	*15*	58	*13*	55	*12*	51	*10*	48	*08*	44	*06*	41	116
120	*27*	76	*26*	72	*24*	68	*22*	64	*20*	60	*19*	57	*17*	53	*15*	49	*12*	46	*10*	42	*08*	39	120
124	*31*	74	*29*	70	*28*	66	*26*	62	*24*	58	*22*	55	*20*	51	*17*	47	*15*	44	*13*	41	*10*	37	124
128	*35*	73	*33*	68	*31*	64	*29*	60	*27*	56	*25*	52	*22*	49	*20*	45	*18*	42	*15*	39	*13*	36	128
132	*38*	71	*36*	66	*34*	62	*32*	58	*30*	54	*28*	50	*25*	47	*23*	43	*20*	40	*18*	37	*15*	34	132
136	*42*	68	*40*	64	*38*	59	*35*	55	*33*	51	*31*	48	*28*	44	*25*	41	*23*	38	*20*	34	*17*	31	136
140	*45*	66	*43*	61	*41*	56	*39*	52	*36*	48	*33*	45	*31*	41	*28*	38	*25*	35	*22*	32	*19*	29	140
144	*49*	63	*47*	58	*44*	53	*42*	49	*39*	45	*36*	42	*33*	38	*30*	35	*27*	32	*24*	29	*21*	27	144
148	*52*	59	*50*	54	*47*	50	*44*	45	*41*	42	*38*	38	*35*	35	*32*	32	*29*	29	*26*	27	*22*	24	148
152	*55*	55	*53*	50	*50*	45	*47*	41	*44*	38	*41*	34	*37*	31	*34*	29	*31*	26	*27*	24	*24*	22	152
156	*58*	51	*56*	45	*53*	41	*49*	37	*46*	33	*43*	30	*39*	28	*36*	25	*32*	23	*29*	21	*25*	19	156
160	*61*	45	*58*	40	*55*	36	*52*	32	*48*	29	*45*	26	*41*	24	*37*	21	*34*	19	*30*	18	*26*	16	160
164	*64*	38	*60*	34	*57*	30	*53*	26	*50*	24	*46*	21	*42*	19	*39*	17	*35*	16	*31*	14	*27*	13	164
168	*66*	31	*62*	26	*59*	23	*55*	20	*51*	18	*47*	16	*44*	15	*40*	13	*36*	12	*32*	11	*28*	10	168
172	*68*	21	*64*	18	*60*	16	*56*	14	*52*	12	*48*	11	*44*	10	*40*	09	*36*	08	*33*	07	*29*	07	172
176	*69*	11	*65*	09	*61*	08	*57*	07	*53*	06	*49*	06	*45*	05	*41*	04	*37*	04	*33*	04	*29*	03	176
180	*69*	00	*65*	00	*61*	00	*57*	00	*53*	00	*49*	00	*45*	00	*41*	00	*37*	00	*33*	00	*29*	00	180
	4°		8°		12°		16°		20°		24°		28°		32°		36°		40°		44°		

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

10—8472

STAR IDENTIFICATION TABLE

Lat. 17°

ALTITUDE

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

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

Lat. 18°

H.A.	0° 00′				0° 30′				1° 00′				1° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	72 00.0	1.0	03	180.0	72 30.0	1.0	03	180.0	73 00.0	1.0	03	180.0	73 30.0	1.0	03	180.0
1	71 58.4	1.0	08	176.8	72 28.3	1.0	08	176.7	72 58.3	1.0	08	176.6	73 28.3	1.0	09	176.5
2	71 53.6	99	13	173.6	72 23.4	99	14	173.4	72 53.2	99	14	173.2	73 23.0	99	14	173.0
3	71 45.6	99	18	170.4	72 15.2	99	19	170.1	72 44.8	99	19	169.8	73 14.4	98	20	169.5
4	71 34.5	98	23	167.2	72 03.8	98	24	166.9	72 33.1	98	25	166.5	73 02.3	97	25	166.2
05	71 20.4	97	28	164.2	71 49.4	96	29	163.8	72 18.3	96	30	163.3	72 47.1	96	31	162.9
6	71 03.5	95	33	161.2	71 32.0	95	34	160.7	72 00.4	95	35	160.2	72 28.8	94	35	159.7
7	70 43.7	94	37	158.3	71 11.8	93	38	157.8	71 39.7	93	39	157.2	72 07.6	93	40	156.6
8	70 21.4	92	41	155.5	70 48.9	92	42	154.9	71 16.3	91	43	154.3	71 43.6	91	44	153.7
9	69 56.5	90	45	152.9	70 23.5	90	46	152.2	70 50.3	89	47	151.5	71 17.0	89	48	150.8
10	69 29.4	88	49	150.3	69 55.7	88	50	149.6	70 22.0	87	51	148.9	70 48.0	86	52	148.1
1	69 00.0	86	52	147.8	69 25.8	86	53	147.1	69 51.4	85	54	146.4	70 16.8	84	55	145.6
2	68 28.6	84	55	145.5	68 53.8	84	56	144.7	69 18.8	83	58	144.0	69 43.5	82	59	143.1
3	67 55.4	82	58	143.2	68 20.0	82	59	142.5	68 44.3	81	60	141.7	69 08.4	80	61	140.8
4	67 20.4	80	61	141.1	67 44.3	79	62	140.3	68 08.0	79	63	139.5	68 31.5	78	64	138.7
15	66 43.8	78	64	139.1	67 07.1	77	64	138.3	67 30.2	77	66	137.4	67 53.0	76	67	136.6
6	66 05.7	76	66	137.1	66 28.4	75	67	136.3	06 50.9	75	68	135.5	67 13.1	74	69	134.6
7	65 26.2	74	68	135.3	65 48.4	73	69	134.5	66 10.3	73	70	133.7	66 31.9	72	71	132.8
8	64 45.4	72	70	133.6	65 07.0	72	71	132.7	65 28.4	71	72	131.9	65 49.4	70	73	131.0
9	64 03.5	71	72	131.9	64 24.6	70	73	131.1	64 45.3	69	73	130.2	65 05.8	68	74	129.4
20	63 20.5	69	73	130.3	63 41.0	68	74	129.5	64 01.3	67	75	128.7	64 21.2	66	76	127.8
1	62 36.5	67	75	128.8	62 56.6	66	76	128.0	63 16.3	65	76	127.2	63 35.7	64	77	126.3
2	61 51.6	66	76	127.4	62 11.2	65	77	126.6	62 30.4	64	78	125.8	62 49.3	63	79	124.9
3	61 05.9	64	78	126.1	61 25.0	63	78	125.3	61 43.7	62	79	124.4	62 02.2	61	80	123.6
4	60 19.4	62	79	124.8	60 38.0	61	79	124.0	60 56.3	60	80	123.2	61 14.3	59	81	122.3
25	59 32.2	61	80	123.5	59 50.3	60	80	122.7	60 08.2	59	81	121.9	60 25.7	58	82	121.1
6	58 44.3	60	81	122.4	59 02.0	59	82	121.6	59 19.4	58	82	120.8	59 36.6	57	83	120.0
7	57 55.8	58	82	121.2	58 13.1	57	82	120.5	58 30.1	56	83	119.7	58 46.9	55	84	118.9
8	57 06.7	57	83	120.2	57 23.7	56	83	119.4	57 40.3	55	84	118.6	57 56.7	54	84	117.8
9	56 17.1	56	83	119.1	56 33.7	55	84	118.4	56 50.0	54	85	117.6	57 06.0	53	85	116.8
30	55 27.0	54	84	118.2	55 43.3	54	85	117.4	55 59.2	53	85	116.7	56 14.9	52	86	115.9
1	54 36.5	53	85	117.2	54 52.4	52	85	116.5	55 08.0	52	86	115.7	55 23.3	51	86	115.0
2	53 45.6	52	86	116.3	54 01.1	51	86	115.6	54 16.4	51	87	114.9	54 31.4	50	87	114.1
3	52 54.2	51	86	115.4	53 09.5	50	87	114.7	53 24.4	49	87	114.0	53 39.2	49	88	113.3
4	52 02.5	50	87	114.6	52 17.5	49	87	113.9	52 32.2	49	88	113.2	52 46.6	48	88	112.5
35	51 10.5	49	87	113.8	51 25.1	48	88	113.1	51 39.5	48	88	112.4	51 53.7	47	89	111.7
6	50 18.1	48	88	113.0	50 32.5	48	88	112.4	50 46.7	47	89	111.7	51 00.5	46	89	111.0
7	49 25.5	48	88	112.3	49 39.6	47	89	111.6	49 53.5	46	89	110.9	50 07.1	45	89	110.2
8	48 32.5	47	89	111.6	48 46.4	46	89	110.9	49 00.1	45	89	110.2	49 13.5	44	90	109.5
9	47 39.3	46	89	110.9	47 53.0	45	89	110.2	48 06.4	44	90	109.6	48 19.6	44	90	108.9
40	46 45.9	45	89	110.2	46 59.3	44	90	109.6	47 12.5	44	90	108.9	47 25.5	43	90	108.2
1	45 52.2	44	90	109.6	46 05.5	44	90	108.9	46 18.4	43	90	108.3	46 31.2	42	91	107.6
2	44 58.4	44	90	108.9	45 11.4	43	90	108.3	45 24.2	42	91	107.7	45 36.7	42	91	107.0
3	44 04.3	43	90	108.3	44 17.1	42	91	107.7	44 29.7	42	91	107.1	44 42.1	41	91	106.4
4	43 10.0	42	91	107.7	43 22.7	42	91	107.1	43 35.1	41	91	106.5	43 47.3	40	92	105.9
45	42 15.6	42	91	107.2	42 28.0	41	91	106.6	42 40.3	40	92	105.9	42 52.3	40	92	105.3
6	41 21.0	41	91	106.6	41 33.3	41	92	106.0	41 45.3	40	92	105.4	41 57.2	39	92	104.8
7	40 26.3	41	92	106.1	40 38.3	40	92	105.5	40 50.2	39	92	104.9	41 01.9	39	92	104.3
8	39 31.3	40	92	105.5	39 43.3	39	92	105.0	39 55.0	39	92	104.4	40 06.6	38	92	103.8
9	38 36.3	40	92	105.0	38 48.1	39	92	104.4	38 59.7	38	92	103.9	39 11.1	38	93	103.3
50	37 41.1	39	92	104.5	37 52.8	38	92	104.0	38 04.2	38	93	103.4	38 15.5	37	93	102.8
1	36 45.8	39	92	104.0	36 57.3	38	93	103.5	37 08.6	37	93	102.9	37 19.8	37	93	102.3
2	35 50.4	38	93	103.6	36 01.8	38	93	103.0	36 13.0	37	93	102.4	36 24.0	36	93	101.9
3	34 54.9	38	93	103.1	35 06.1	37	93	102.5	35 17.2	37	93	102.0	35 28.1	36	93	101.4
4	33 59.3	37	93	102.7	34 10.4	37	93	102.1	34 21.3	36	93	101.5	34 32.1	36	93	101.0
55	33 03.5	37	93	102.2	33 14.5	36	93	101.7	33 25.4	36	93	101.1	33 36.1	35	94	100.5
6	32 07.7	36	93	101.8	32 18.6	36	93	101.2	32 29.3	36	94	100.7	32 39.9	35	94	100.1
7	31 11.8	36	93	101.3	31 22.6	36	93	100.8	31 33.2	35	94	100.3	31 43.7	35	94	99.7
8	30 15.8	36	93	100.9	30 26.5	35	94	100.4	30 37.0	35	94	99.8	30 47.4	34	94	99.3
9	29 19.8	35	94	100.5	29 30.3	35	94	100.0	29 40.8	35	94	99.4	29 51.1	34	94	98.9
60	28 23.6	35	94	100.1	28 34.1	35	94	99.6	28 44.5	34	94	99.0	28 54.7	34	94	98.5
1	27 27.4	35	94	99.7	27 37.8	34	94	99.2	27 48.1	34	94	98.7	27 58.2	34	94	98.1
2	26 31.1	35	94	99.3	26 41.4	34	94	98.8	26 51.6	34	94	98.3	27 01.7	33	94	97.8
3	25 34.8	34	94	98.9	25 45.0	34	94	98.4	25 55.1	34	94	97.9	26 05.1	33	94	97.4
4	24 38.4	34	94	98.6	24 48.5	34	94	98.1	24 58.6	33	94	97.5	25 08.5	33	94	97.0
65	23 41.9	34	94	98.2	23 52.0	33	94	97.7	24 02.0	33	94	97.2	24 11.9	33	94	96.7
6	22 45.4	34	94	97.8	22 55.4	33	94	97.3	23 05.4	33	94	96.8	23 15.2	33	95	96.3
7	21 48.9	33	94	97.5	21 58.8	33	94	97.0	22 08.7	33	95	96.5	22 18.4	32	95	95.9
8	20 52.3	33	94	97.1	21 02.2	33	94	96.6	21 11.9	32	95	96.1	21 21.6	32	95	95.6
9	19 55.6	33	94	96.8	20 05.5	33	95	96.3	20 15.2	32	95	95.8	20 24.8	32	95	95.3
70	18 59.0	33	95	96.4	19 08.7	32	95	95.9	19 18.4	32	95	95.4	19 28.0	32	95	94.9
1	18 02.2	32	95	96.1	18 11.9	32	95	95.6	18 21.6	32	95	95.1	18 31.1	32	95	94.6
2	17 05.5	32	95	95.7	17 15.1	32	95	95.2	17 24.7	32	95	94.7	17 34.2	32	95	94.2
3	16 08.7	32	95	95.4	16 18.3	32	95	94.9	16 27.8	32	95	94.4	16 37.3	31	95	93.9
4	15 11.8	32	95	95.1	15 21.4	32	96	94.6	15 30.9	32	95	94.1	15 40.4	31	95	93.6
75	14 15.0	32	95	94.7	14 24.5	32	95	94.2	14 34.0	31	95	93.8	14 43.4	31	95	93.3
6	13 18.1	32	95	94.4	13 27.6	32	95	93.9	13 37.1	31	95	93.4	13 46.4	31	95	92.9
7	12 21.2	32	96	94.1	12 30.7	31	95	93.6	12 40.1	31	95	93.1	12 49.4	31	95	92.6
8	11 24.3	32	95	93.8	11 33.7	31	95	93.3	11 43.1	31	95	92.8	11 52.4	31	95	92.3
9	10 27.3	31	95	93.4	10 36.7	31	95	93.0	10 46.1	31	95	92.5	10 55.4	31	95	92.0
80	9 30.4	31	95	93.1	9 39.7	31	95	92.6	9 49.1	31	95	92.2	9 58.4	31	95	91.7
1	8 33.4	31	95	92.8	8 42.7	31	96	92.3	8 52.0	31	95	91.8	9 01.3	31	95	91.4
2	7 36.4	31	95	92.5	7 45.7	31	95	92.0	7 55.0	31	95	91.5	8 04.3	31	95	91.0
3	6 39.3	31	95	92.2	6 48.7	31	95	91.7	6 58.0	31	95	91.2	7 07.2	31	95	90.7
4	5 42.3	31	95	91.9	5 51.6	31	95	91.4	6 00.9	31	95	90.9	6 10.2	31	95	90.4
85									5 03.8	31	95	90.6	5 13.1	31	95	90.1

2° 00′				2° 30′				3° 00′				3° 30′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
74 00.0	1.0	03	180.0	74 30.0	1.0	03	180.0	75 00.0	1.0	03	180.0	75 30.0	1.0	03	180.0	00
73 58.2	1.0	09	176.4	74 28.1	1.0	09	176.3	74 58.1	1.0	10	176.1	75 28.0	1.0	10	176.0	1
73 52.8	99	15	172.8	74 22.6	99	15	172.6	74 52.3	99	16	172.3	75 22.1	99	16	172.1	2
73 43.9	98	21	169.2	74 13.4	98	21	168.9	74 42.9	98	22	168.6	75 12.3	98	23	168.2	3
73 31.5	97	26	165.8	74 00.7	97	27	165.3	74 29.8	97	28	164.9	74 58.8	97	28	164.4	4
73 15.9	96	31	162.4	73 44.6	96	32	161.9	74 13.2	95	33	161.3	74 41.7	95	34	160.8	05
72 57.1	94	36	159.1	73 25.2	94	37	158.5	73 53.3	93	38	157.9	74 21.3	93	39	157.2	6
72 35.3	92	41	156.0	73 02.9	92	42	155.3	73 30.3	91	43	154.6	73 57.6	91	44	153.9	7
72 10.7	90	45	153.0	72 37.6	90	46	152.2	73 04.5	89	48	151.5	73 31.1	88	49	150.7	8
71 43.5	88	49	150.1	72 09.8	87	50	149.3	72 35.9	87	52	148.5	73 01.8	86	53	147.7	9
71 13.8	86	53	147.4	71 39.5	85	54	146.5	72 04.9	84	55	145.7	72 30.1	84	57	144.8	10
70 42.0	84	57	144.8	71 06.9	83	58	143.9	71 31.6	82	59	143.0	71 56.1	81	60	142.1	1
70 08.1	81	60	142.3	70 32.3	80	61	141.4	70 56.3	80	62	140.5	71 20.1	79	63	139.6	2
69 32.2	79	63	140.0	69 55.8	78	64	139.1	70 19.2	77	65	138.2	70 42.2	76	66	137.2	3
68 54.7	77	65	137.8	69 17.6	76	66	136.9	69 40.3	75	67	135.9	70 02.6	74	68	135.0	4
68 15.6	75	68	135.7	68 37.9	74	69	134.8	68 59.8	73	70	133.9	69 21.5	72	71	132.9	15
67 35.1	73	70	133.7	67 56.7	72	71	132.8	68 18.0	71	72	131.9	68 39.0	69	73	130.9	6
66 53.2	71	72	131.9	67 14.2	70	73	131.0	67 34.9	68	74	130.0	67 55.3	67	75	129.1	7
66 10.1	69	74	130.2	66 30.6	68	74	129.2	66 50.7	66	75	128.3	67 10.4	65	76	127.3	8
65 26.0	67	75	128.5	65 45.9	66	76	127.6	66 05.4	65	77	126.7	66 24.6	63	78	125.7	9
64 40.9	65	77	126.9	65 00.2	64	78	126.0	65 19.2	63	78	125.1	65 37.8	62	79	124.2	20
63 54.8	63	78	125.5	64 13.6	62	79	124.6	64 32.1	61	80	123.7	64 50.2	60	81	122.7	1
63 07.9	62	79	124.1	63 26.2	60	80	123.2	63 44.2	59	81	122.3	64 01.8	58	82	121.4	2
62 20.3	60	81	122.7	62 38.1	59	81	121.9	62 55.6	58	82	121.0	63 12.8	57	83	120.1	3
61 32.0	58	82	121.5	61 49.3	57	82	120.6	62 06.4	56	83	119.7	62 23.1	55	84	118.9	4
60 43.0	57	83	120.3	60 59.9	56	83	119.4	61 16.5	55	84	118.6	61 32.8	54	85	117.7	25
59 53.4	56	84	119.2	60 10.0	55	84	118.3	60 26.2	53	85	117.5	60 42.0	52	85	116.6	6
59 03.3	54	84	118.1	59 19.5	53	85	117.2	59 35.3	52	86	116.4	59 50.8	51	86	115.6	7
58 12.7	53	85	117.0	58 28.5	52	86	116.2	58 44.0	51	86	115.4	58 59.1	50	87	114.6	8
57 21.7	52	86	116.1	57 37.1	51	86	115.3	57 52.2	50	87	114.4	58 07.0	49	87	113.6	9
56 30.2	51	86	115.1	56 45.3	50	87	114.3	57 00.1	49	88	113.5	57 14.5	48	88	112.7	30
55 38.4	50	87	114.2	55 53.1	49	88	113.4	56 07.6	48	88	112.7	56 21.8	47	89	111.9	1
54 46.2	49	88	113.4	55 00.6	48	88	112.6	55 14.8	47	89	111.8	55 28.6	46	89	111.0	2
53 53.6	48	88	112.5	54 07.8	47	89	111.8	54 21.7	46	89	111.0	54 35.2	45	89	110.3	3
53 00.7	47	89	111.7	53 14.6	46	89	111.0	53 28.2	45	89	110.3	53 41.6	44	90	109.5	4
52 07.6	46	89	111.0	52 21.2	45	89	110.3	52 34.6	44	90	109.5	52 47.7	43	90	108.8	35
51 14.2	45	89	110.2	51 27.6	44	90	109.5	51 40.7	43	90	108.8	51 53.5	42	91	108.1	6
50 20.5	44	90	109.5	50 33.7	43	90	108.8	50 46.6	43	91	108.1	50 59.2	42	91	107.4	7
49 26.6	43	90	108.9	49 39.6	43	91	108.2	49 52.2	42	91	107.5	50 04.6	41	91	106.8	8
48 32.5	43	90	108.2	48 45.2	42	91	107.5	48 57.7	41	91	106.8	49 09.9	40	92	106.1	9
47 38.2	42	91	107.6	47 50.7	41	91	106.9	48 03.0	40	91	106.2	48 15.0	40	92	105.5	40
46 43.7	41	91	107.0	46 56.0	41	91	106.3	47 08.1	40	92	105.6	47 19.9	39	92	104.9	1
45 49.1	41	91	106.4	46 01.2	40	92	105.7	46 13.1	39	92	105.0	46 24.7	38	92	104.4	2
44 54.2	40	92	105.8	45 06.2	39	92	105.1	45 17.9	39	92	104.5	45 29.4	38	92	103.8	3
43 59.2	40	92	105.2	44 11.0	39	92	104.6	44 22.6	38	92	103.9	44 33.9	37	93	103.3	4
43 04.1	39	92	104.7	43 15.7	38	92	104.1	43 27.1	38	93	103.4	43 38.3	37	93	102.8	45
42 08.8	39	92	104.2	42 20.3	38	93	103.5	42 31.6	37	93	102.9	42 42.6	36	93	102.3	6
41 13.5	38	92	103.6	41 24.8	37	93	103.0	41 35.9	37	93	102.4	41 46.8	36	93	101.8	7
40 17.9	38	93	103.1	40 29.1	37	93	102.5	40 40.1	36	93	101.9	40 50.9	36	93	101.3	8
39 22.3	37	93	102.7	39 33.4	37	93	102.1	39 44.2	36	93	101.5	39 54.9	35	93	100.8	9
38 26.6	37	93	102.2	38 37.5	36	93	101.6	38 48.3	35	93	101.0	38 58.8	35	94	100.4	50
37 30.8	36	93	101.7	37 41.6	36	93	101.1	37 52.2	35	94	100.5	38 02.6	35	94	99.9	1
36 34.9	36	93	101.3	36 45.5	35	94	100.7	36 56.1	35	94	100.1	37 06.4	34	94	99.5	2
35 38.8	36	93	100.8	35 49.4	35	94	100.3	35 59.8	34	94	99.7	36 10.1	34	94	99.1	3
34 42.8	35	94	100.4	34 53.2	35	94	99.8	35 03.6	34	94	99.3	35 13.7	34	94	98.7	4
33 46.6	35	94	100.0	33 57.0	34	94	99.4	34 07.2	34	94	98.8	34 17.3	33	94	98.3	55
32 50.4	35	94	99.6	33 00.6	34	94	99.0	33 10.8	34	94	98.4	33 20.8	33	94	97.9	6
31 54.1	34	94	99.2	32 04.3	34	94	98.6	32 14.3	33	94	98.0	32 24.2	33	94	97.5	7
30 57.7	34	94	98.8	31 07.8	33	94	98.2	31 17.8	33	94	97.7	31 27.6	33	94	97.1	8
30 01.3	34	94	98.4	30 11.3	33	94	97.8	30 21.2	33	94	97.3	30 31.0	32	94	96.7	9
29 04.8	33	94	98.0	29 14.7	33	94	97.4	29 24.6	33	94	96.9	29 34.3	32	95	96.3	60
28 08.2	33	94	97.6	28 18.1	33	94	97.1	28 27.9	32	95	96.5	28 37.5	32	95	96.0	1
27 11.6	33	94	97.2	27 21.5	33	94	96.7	27 31.2	32	95	96.2	27 40.8	32	95	95.6	2
26 15.0	33	94	96.9	26 24.8	32	95	96.3	26 34.4	32	95	95.8	26 44.0	32	95	95.3	3
25 18.3	33	95	96.5	25 28.0	32	95	96.0	25 37.6	32	95	95.4	25 47.1	31	95	94.9	4
24 21.6	32	95	96.1	24 31.3	32	95	95.6	24 40.8	32	95	95.1	24 50.3	31	95	94.6	65
23 24.9	32	95	95.8	23 34.5	32	95	95.3	23 44.0	31	95	94.7	23 53.4	31	96	94.2	6
22 28.1	32	95	95.4	22 37.6	32	95	94.9	22 47.1	31	95	94.4	22 56.4	31	96	93.9	7
21 31.2	32	95	95.1	21 40.8	32	95	94.6	21 50.2	31	95	94.1	21 59.5	31	95	93.6	8
20 34.4	32	95	94.7	20 43.9	31	95	94.2	20 53.2	31	95	93.7	21 02.5	31	95	93.2	9
19 37.5	32	96	94.4	19 46.9	31	95	93.9	19 56.3	31	95	93.4	20 05.6	31	95	92.9	70
18 40.6	31	95	94.1	18 50.0	31	95	93.6	18 59.3	31	95	93.1	19 08.6	31	95	92.6	1
17 43.7	31	95	93.7	17 53.0	31	95	93.2	18 02.3	31	95	92.7	18 11.5	31	96	92.2	2
16 46.7	31	95	93.4	16 56.1	31	95	92.9	17 05.3	31	95	92.4	17 14.5	31	95	91.9	3
15 49.8	31	95	93.1	15 59.1	31	95	92.6	16 08.3	31	95	92.1	16 17.5	30	95	91.6	4
14 52.8	31	95	92.8	15 02.1	31	95	92.3	15 11.3	31	95	91.8	15 20.4	30	95	91.3	75
13 55.8	31	95	92.5	14 05.0	31	95	92.0	14 14.2	31	95	91.5	14 23.4	30	95	91.0	6
12 58.7	31	95	92.1	13 08.0	31	95	91.6	13 17.2	31	95	91.2	13 26.3	30	95	90.7	7
12 01.7	31	95	91.8	12 11.0	31	95	91.3	12 20.1	31	95	90.8	12 29.3	30	95	90.4	8
11 04.7	31	95	91.5	11 13.9	31	95	91.0	11 23.1	31	95	90.5	11 32.2	30	95	90.0	9
10 07.6	31	95	91.2	10 16.8	31	95	90.7	10 26.0	30	95	90.2	10 35.1	30	95	89.7	80
9 10.6	31	95	90.9	9 19.8	31	95	90.4	9 29.0	30	95	89.9	9 38.1	30	95	89.4	1
8 13.5	31	95	90.6	8 22.7	31	95	90.1	8 31.9	31	95	89.6	8 41.0	30	95	89.1	2
7 16.5	31	95	90.3	7 25.7	31	95	89.8	7 34.8	31	95	89.3	7 44.0	30	95	88.8	3
6 19.4	31	95	89.9	6 28.6	31	95	89.5	6 37.8	31	95	89.0	6 46.9	30	95	88.5	4
5 22.3	31	95	89.6	5 31.5	31	95	89.2	5 40.7	31	95	88.7	5 49.9	30	95	88.2	85

H.A.	0° 00′				0° 30′				1° 00′				1° 30′				2° 00′				2° 30′				3° 00′				3° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	72 00.0	1.0	03	180.0	71 30.0	1.0	03	180.0	71 00.0	1.0	03	180.0	70 30.0	1.0	02	180.0	70 00.0	1.0	02	180.0	69 30.0	1.0	02	180.0	69 00.0	1.0	02	180.0	68 30.0	1.0	02	180.0	00
1	71 58.4	1.0	08	176.8	71 28.4	1.0	08	176.9	70 58.5	1.0	08	176.9	70 28.5	1.0	07	177.0	69 58.5	1.0	07	177.1	69 28.6	1.0	07	177.1	68 58.6	1.0	07	177.2	68 28.6	1.0	07	177.3	1
2	71 53.6	99	13	173.6	71 23.7	99	13	173.7	70 53.9	99	13	173.9	70 24.1	1.0	12	174.0	69 54.2	1.0	12	174.2	69 24.3	1.0	12	174.3	68 54.5	1.0	12	174.4	68 24.6	1.0	11	174.6	2
3	71 45.6	99	18	170.4	71 16.0	99	18	170.6	70 46.3	99	18	170.9	70 16.7	99	17	171.1	69 47.0	99	17	171.3	69 17.3	99	16	171.5	68 47.6	99	16	171.7	68 17.9	99	16	171.9	3
4	71 34.5	98	23	167.2	71 05.2	98	23	167.6	70 35.8	98	22	167.9	70 06.4	98	22	168.2	69 36.9	98	21	168.5	69 07.5	98	21	168.7	68 38.0	98	20	169.0	68 08.5	98	20	169.2	4
05	71 20.4	97	28	164.2	70 51.4	97	28	164.6	70 22.4	97	27	165.0	69 53.3	97	26	165.3	69 24.2	97	26	165.7	68 55.0	97	25	166.0	68 25.8	97	25	166.3	67 56.5	98	24	166.6	05
6	71 03.5	95	33	161.2	70 34.9	95	32	161.7	70 06.2	96	31	162.1	69 37.5	96	31	162.5	69 08.7	96	30	162.9	68 39.9	96	29	163.3	68 11.0	96	29	163.7	67 42.1	97	28	164.0	6
7	70 43.7	94	37	158.3	70 15.6	94	36	158.8	69 47.4	94	36	159.3	69 19.1	94	35	159.8	68 50.7	95	34	160.3	68 22.3	95	33	160.7	67 53.8	95	33	161.1	67 25.2	95	32	161.5	7
8	70 21.4	92	41	155.5	69 53.7	92	41	156.1	69 26.0	93	40	156.7	68 58.2	93	39	157.2	68 30.2	93	38	157.7	68 02.2	94	37	158.2	67 34.1	94	36	158.6	67 05.9	94	36	159.1	8
9	69 56.5	90	45	152.9	69 29.4	91	44	153.5	69 02.2	91	43	154.1	68 34.9	91	43	154.6	68 07.4	92	42	155.2	67 39.9	92	41	155.7	67 12.2	92	40	156.2	66 44.5	93	39	156.7	9
10	69 29.4	88	49	150.3	69 02.8	89	48	150.9	68 36.2	89	47	151.6	68 09.3	90	46	152.2	67 42.4	90	45	152.8	67 15.3	90	44	153.3	66 48.1	91	44	153.9	66 20.9	91	43	154.4	10
1	69 00.0	86	52	147.8	68 34.1	87	51	148.5	68 07.9	87	50	149.2	67 41.7	88	49	149.8	67 15.3	88	48	150.4	66 48.7	89	48	151.0	66 22.0	89	47	151.6	65 55.2	90	46	152.2	1
2	68 28.6	84	55	145.5	68 03.3	85	54	146.2	67 37.7	85	53	146.9	67 12.0	86	53	147.6	66 46.1	87	52	148.2	66 20.1	87	51	148.8	65 53.9	87	50	149.4	65 27.6	88	49	150.0	2
3	67 55.4	82	58	143.2	67 30.6	83	57	144.0	67 05.7	84	56	144.7	66 40.5	84	55	145.4	66 15.2	85	54	146.1	65 49.7	85	54	146.7	65 24.0	86	53	147.3	64 58.2	86	52	147.9	3
4	67 20.4	80	61	141.1	66 56.2	81	60	141.9	66 31.8	82	59	142.6	66 07.2	82	58	143.3	65 42.5	83	57	144.0	65 17.5	83	56	144.7	64 52.4	84	55	145.3	64 27.1	85	55	146.0	4
15	66 43.8	78	64	139.1	66 20.2	79	63	139.8	65 56.4	80	62	140.6	65 32.4	80	61	141.3	65 08.1	81	60	142.0	64 43.7	82	59	142.7	64 19.1	82	58	143.4	63 54.3	83	57	144.0	15
6	66 05.7	76	66	137.1	65 42.7	77	65	137.9	65 19.4	78	64	138.7	64 56.0	79	63	139.4	64 32.3	79	62	140.2	64 08.4	80	61	140.9	63 44.3	81	60	141.5	63 20.1	81	59	142.2	6
7	65 26.2	74	68	135.3	65 03.8	75	67	136.1	64 41.1	76	66	136.9	64 18.2	77	65	137.6	63 55.0	77	64	138.4	63 31.7	78	63	139.1	63 08.2	79	63	139.7	62 44.4	79	62	140.4	7
8	64 45.4	72	70	133.6	64 23.6	73	69	134.4	64 01.4	74	68	135.1	63 39.1	75	67	135.9	63 16.5	76	66	136.6	62 53.7	76	65	137.3	62 30.6	77	65	138.0	62 07.4	78	64	138.7	8
9	64 03.5	71	72	131.9	63 42.2	72	71	132.7	63 20.6	72	70	133.5	62 58.8	73	69	134.2	62 36.7	74	68	135.0	62 14.4	75	67	135.7	61 51.9	75	67	136.4	61 29.2	76	66	137.1	9
20	63 20.5	69	73	130.3	62 59.7	70	72	131.1	62 38.7	71	72	131.9	62 17.3	71	71	132.7	61 55.8	72	70	133.4	61 34.0	73	69	134.1	61 12.0	74	68	134.8	60 49.7	74	67	135.5	20
1	62 36.5	67	75	128.8	62 16.3	68	74	129.6	61 55.7	69	73	130.4	61 34.9	70	72	131.2	61 13.8	71	72	131.9	60 52.5	71	71	132.6	60 31.0	72	70	133.4	60 09.2	73	69	134.0	1
2	61 51.6	66	76	127.4	61 31.9	66	75	128.2	61 11.8	67	75	129.0	60 51.5	68	74	129.7	60 30.9	69	73	130.5	60 10.1	70	72	131.2	59 49.0	71	72	131.9	59 27.7	71	71	132.6	2
3	61 05.9	64	78	126.1	60 46.6	65	77	126.8	60 27.0	66	76	127.6	60 07.1	67	75	128.4	59 47.0	67	74	129.1	59 26.7	68	74	129.8	59 06.1	69	73	130.5	58 45.3	70	72	131.2	3
4	60 19.4	62	79	124.8	60 00.5	63	78	125.5	59 41.4	64	77	126.3	59 22.0	65	76	127.1	59 02.4	66	76	127.8	58 42.5	67	75	128.5	58 22.3	68	74	129.2	58 01.9	68	74	129.9	4
25	59 32.2	61	80	123.5	59 13.8	62	79	124.3	58 55.1	63	78	125.1	58 36.1	64	78	125.8	58 16.9	64	77	126.5	57 57.4	65	76	127.3	57 37.7	66	76	128.0	57 17.8	67	75	128.7	25
6	58 44.3	60	81	122.4	58 26.3	60	80	123.1	58 08.0	61	80	123.9	57 49.5	62	79	124.6	57 30.7	63	78	125.4	57 11.6	64	77	126.1	56 52.4	65	77	126.8	56 32.9	65	76	127.5	6
7	57 55.8	58	82	121.2	57 38.2	59	81	122.0	57 20.3	60	80	122.7	57 02.2	61	80	123.5	56 43.8	62	79	124.2	56 25.2	62	78	124.9	56 06.3	63	78	125.6	55 47.2	64	77	126.3	7
8	57 06.7	57	83	120.2	56 49.5	58	82	120.9	56 32.0	59	81	121.7	56 14.3	60	81	122.4	55 56.3	60	80	123.1	55 38.1	61	80	123.8	55 19.6	62	79	124.5	55 00.9	63	78	125.2	8
9	56 17.1	56	83	119.1	56 00.3	57	83	119.9	55 43.2	57	82	120.6	55 25.8	58	82	121.3	55 08.2	59	81	122.0	54 50.4	60	80	122.7	54 32.3	61	80	123.4	54 14.0	61	79	124.1	9
30	55 27.0	54	84	118.2	55 10.6	55	84	118.9	54 53.8	56	83	119.6	54 36.8	57	82	120.3	54 19.6	58	82	121.0	54 02.1	59	81	121.7	53 44.4	59	81	122.4	53 26.4	60	80	123.1	30
1	54 36.5	53	85	117.2	54 20.4	54	84	117.9	54 04.0	55	84	118.7	53 47.3	56	83	119.4	53 30.4	57	83	120.1	53 13.3	58	82	120.7	52 55.9	58	82	121.4	52 38.3	59	81	122.1	1
2	53 45.6	52	86	116.3	53 29.8	53	85	117.0	53 13.7	54	84	117.7	52 57.4	55	84	118.4	52 40.8	56	83	119.1	52 24.0	56	83	119.8	52 07.0	57	82	120.5	51 49.8	58	82	121.1	2
3	52 54.2	51	86	115.4	52 38.7	52	86	116.2	52 23.0	53	85	116.9	52 07.0	54	85	117.5	51 50.8	54	84	118.2	51 34.3	55	84	118.9	51 17.6	56	83	119.6	51 00.7	57	83	120.2	3
4	52 02.5	50	87	114.6	51 47.3	51	86	115.3	51 31.9	52	86	116.0	51 16.2	53	85	116.7	51 00.3	53	85	117.4	50 44.1	54	84	118.0	50 27.8	55	84	118.7	50 11.2	56	83	119.3	4
35	51 10.5	49	87	113.8	50 55.6	50	87	114.5	50 40.4	51	86	115.2	50 25.0	52	86	115.9	50 09.4	52	85	116.5	49 53.6	53	85	117.2	49 37.5	54	84	117.8	49 21.2	55	84	118.5	35
6	50 18.1	48	88	113.0	50 03.5	49	87	113.7	49 48.6	50	87	114.4	49 33.5	51	86	115.1	49 18.2	51	86	115.7	49 02.6	52	85	116.4	48 46.8	53	85	117.0	48 30.9	54	85	117.7	6
7	49 25.5	48	88	112.3	49 11.1	48	88	113.0	48 56.5	49	87	113.6	48 41.7	50	87	114.3	48 26.6	51	86	115.0	48 11.3	51	86	115.6	47 55.8	52	86	116.2	47 40.1	53	85	116.9	7
8	48 32.5	47	89	111.6	48 18.4	47	88	112.2	48 04.1	48	88	112.9	47 49.5	49	87	113.6	47 34.7	50	87	114.2	47 19.7	50	87	114.8	47 04.5	51	86	115.5	46 49.1	52	86	116.1	8
9	47 39.3	46	89	110.9	47 25.5	47	89	111.5	47 11.4	47	88	112.2	46 57.0	48	88	112.8	46 42.5	49	87	113.5	46 27.8	49	87	114.1	46 12.8	50	87	114.7	45 57.7	51	86	115.4	9
40	46 45.9	45	89	110.2	46 32.3	46	89	110.9	46 18.4	47	89	111.5	46 04.3	47	88	112.1	45 50.0	48	88	112.8	45 35.5	49	88	113.4	45 20.8	49	87	114.0	45 05.9	50	87	114.6	40
1	45 52.2	44	90	109.6	45 38.8	45	89	110.2	45 25.2	46	89	110.8	45 11.3	46	89	111.5	44 57.3	47	88	112.1	44 43.0	48	88	112.7	44 28.6	49	88	113.3	44 13.9	49	87	113.9	1
2	44 58.4	44	90	108.9	44 45.2	44	90	109.6	44 31.7	45	89	110.2	44 18.1	46	89	110.8	44 04.3	46	89	111.4	43 50.3	47	88	112.1	43 36.1	48	88	112.7	43 21.6	48	88	113.3	2
3	44 04.3	43	90	108.3	43 51.3	44	90	109.0	43 38.1	44	90	109.6	43 24.7	45	89	110.2	43 11.1	46	89	110.8	42 57.3	46	89	111.4	42 43.3	47	88	112.0	42 29.1	48	88	112.6	3
4	43 10.0	42	91	107.7	42 57.2	43	90	108.4	42 44.2	44	90	109.0	42 31.0	44	90	109.6	42 17.6	45	89	110.2	42 04.0	46	89	110.8	41 50.3	46	89	111.4	41 36.3	47	88	112.0	4
45	42 15.6	42	91	107.2	42 03.0	42	91	107.8	41 50.2	43	90	108.4	41 37.2	44	90	109.0	41 24.0	44	90	109.6	41 10.6	45	89	110.2	40 57.0	46	89	110.8	40 43.3	46	89	111.4	45
6	41 21.0	41	91	106.6	41 08.6	42	91	107.2	40 55.9	42	91	107.8	40 43.1	43	90	108.4	40 30.1	44	90	109.0	40 16.9	44	90	109.6	40 03.6	45	89	110.2	39 50.0	45	89	110.8	6
7	40 26.3	41	92	106.1	40 14.0	41	91	106.7	40 01.5	42	91	107.3	39 48.9	42	91	107.9	39 36.1	43	90	108.4	39 23.1	44	90	109.0	39 09.9	44	90	109.6	38 56.6	45	89	110.2	7
8	39 31.3	40	92	105.5	39 19.2	41	91	106.1	39 07.0	41	91	106.7	38 54.5	42	91	107.3	38 41.9	42	91	107.9	38 29.0	43	90	108.5	38 16.1	44	90	109.1	38 02.9	44	90	109.6	8
9	38 36.3	40	92	105.0	38 24.4	40	92	105.6	38 12.2	41	91	106.2	37 59.9	41	91	106.8	37 47.5	42	91	107.4	37 34.8	42	91	107.9	37 22.0	43	90	108.5	37 09.1	43	90	109.1	9
50	37 41.1	39	92	104.5	37 29.3	40	92	105.1	37 17.4	40	92	105.7	37 05.2	41	91	106.3	36 52.9	41	91	106.8	36 40.5	42	91	107.4	36 27.8	42	91	108.0	36 15.1	43	90	108.5	50
1	36 45.8	39	92	104.0	36 34.2	39	92	104.6	36 22.4	40	92	105.2	36 10.4	40	92	105.8	35 58.2	41	91	106.3	35 45.9	41	91	106.9	35 33.5	42	91	107.5	35 20.9	42	91	108.0	1
2	35 50.4	38	93	103.6	35 38.9	39	92	104.1	35 27.2	39	92	104.7	35 15.4	40	92	105.3	35 03.4	40	92	105.8	34 51.3	41	91	106.4	34 39.0	41	91	106.9	34 26.5	42	91	107.5	2
3	34 54.9	38	93	103.1	34 43.5	38	92	103.7	34 32.0	39	92	104.2	34 20.3	39	92	104.8	34 08.4	40	92	105.3	33 56.4	40	92	105.9	33 44.3	41	91	106.4	33 32.0	41	91	107.0	3
4	33 59.3	37	93	102.7	33 48.0	38	93	103.2	33 36.6	38	92	103.8	33 25.1	39	92	104.3	33 13.4	39	92	104.9	33 01.5	40	92	105.4	32 49.5	40	92	106.0	32 37.4	41	91	106.5	4
55	33 03.5	37	93	102.2	32 52.4	37	93	102.8	32 41.1	38	93	103.3	32 29.7	38	92	103.9	32 18.1	39	92	104.4	32 06.4	39	92	105.0	31 54.6	40	92	105.5	31 42.6	40	92	106.0	55
6	32 07.7	36	93	101.8	31 56.7	37	93	102.3	31 45.6	37	93	102.9	31 34.3	38	93	103.4	31 22.8	38	92	104.0	31 11.2	39	92	104.5	30 59.5	39	92	105.0	30 47.7	40	92	105.6	6
7	31 11.8	36	93	101.3	31 00.9	37	93	101.9	30 49.9	37	93	102.4	30 38.7	37	93	103.0	30 27.4	38	93	103.5	30 15.9	38	92	104.0	30 04.4	39	92	104.6	29 52.7	39	92	105.1	7
8	30 15.8	36	93	100.9	30 05.0	36	93	101.5	29 54.1	37	93	102.0	29 43.0	37	93	102.5	29 31.8	38	93	103.1	29 20.5	38	93	103.6	29 09.1	38	92	104.1	28 57.5	39	92	104.7	8
9	29 19.8	35	94	100.5	29 09.1	36	93	101.1	28 58.2	36	93	101.6	28 47.3	37	93	102.1	28 36.2	37	93	102.6	28 25.0	38	93	103.2	28 13.7	38	92	103.7	28 02.3	38	92	104.2	9
60	28 23.6	35	94	100.1	28 13.0	36	94	100.6	28 02.3	36	93	101.2	27 51.5	36	93	101.7	27 40.5	37	93	102.2	27 29.4	37	93	102.8	27 18.2	38	93	103.3	27 06.9	38	92	103.8	60
1	27 27.4	35	94	99.7	27 16.9	35	94	100.2	27 06.3	36	94	100.8	26 55.5	36	93	101.3	26 44.7	36	93	101.8	26 33.7	37	93	102.3	26 22.6	37	93	102.9	26 11.4	38	93	103.4	1
2	26 31.1	35	94	99.3	26 20.7	35	94	99.9	26 10.2	35	94	100.4	25 59.5	36	93	100.9	25 48.8	36	93	101.4	25 37.9	36	93	101.9	25 26.9	37	93	102.4	25 15.9	37	93	103.0	2
3	25 34.8	34	94	98.9	25 24.5	35	94	99.5	25 14.0	35	94	100.0	25 03.5	35	94	100.5	24 52.8	36	93	101.0	24 42.1	36	93	101.5	24 31.2	36	93	102.0	24 20.2	37	93	102.6	3
4	24 38.4	34	94	98.6	24 28.1	34	94	99.1	24 17.8	35	94	99.6	24 07.3	35	94	100.1	23 56.8	35	94	100.6	23 46.1	36	93	101.1	23 35.3	36	93	101.6	23 24.5	36	93	102.2	4
65	23 41.9	34	94	98.2	23 31.8	34	94	98.7	23 21.5	34	94	99.2	23 11.1	35	94	99.7	23 00.6	35	94	100.2	22 50.1	35	94	100.8	22 39.4	36	93	101.3	22 28.6	36	93	101.8	65
6	22 45.4	34	94	97.8	22 35.3	34	94	98.3	22 25.1	34	94	98.9	22 14.8	34	94	99.4	22 04.5	35	94	99.9	21 54.0	35	94	100.4	21 43.4	35	93	100.9	21 32.7	36	93	101.4	6
7	21 48.9	33	94	97.5	21 38.9	34	94	98.0	21 28.7	34	94	98.5	21 18.5	34	94	99.0	21 08.2	35	94	99.5	20 57.8	35	94	100.0	20 47.3	35	94	100.5	20 36.8	35	93	101.0	7
8	20 52.3	33	94	97.1	20 42.3	33	94	97.6	20 32.3	34	94	98.1	20 22.1	34	94	98.6	20 11.9	34	94	99.1	20 01.6	35	94	99.6	19 51.2	35	94	100.1	19 40.7	35	94	100.6	8
9	19 55.6	33	94	96.8	19 45.7	33	94	97.3	19 35.8	33	94	97.8	19 25.7	34	94	98.3	19 15.5	34	94	98.8	19 05.3	34	94	99.3	18 55.0	35	94	99.8	18 44.6	35	94	100.3	9
70	18 59.0	33	95	96.4	18 49.1	33	94	96.9	18 39.2	33	94	97.4	18 29.2	33	94	97.9	18 19.1	34	94	98.4	18 08.9	34	94	98.9	17 58.7	34	94	99.4	17 48.4	34	94	99.9	70
1	18 02.2	32	95	96.1	17 52.4	33	94	96.6	17 42.6	33	94	97.1	17 32.6	33	94	97.6	17 22.6	33	94	98.1	17 12.5	34	94	98.5	17 02.4	34	94	99.0	16 52.2	34	94	99.5	1
2	17 05.5	32	95	95.7	16 55.7	33	95	96.2	16 45.9	33	94	96.7	16 36.1	33	94	97.2	16 26.1	33	94	97.7	16 16.1	33	94	98.2	16 06.0	34	94	98.7	15 55.9	34	94	99.2	2
3	16 08.7	32	95	95.4	15 59.0	32	95	95.9	15 49.2	33	95	96.4	15 39.4	33	94	96.9	15 29.5	33	94	97.4	15 19.6	33	94	97.9	15 09.6	33	94	98.3	14 59.5	34	94	98.8	3
4	15 11.8	32	95	95.1	15 02.2	32	95	95.6	14 52.5	32	95	96.0	14 42.7	33	95	96.5	14 32.9	33	94	97.0	14 23.0	33	94	97.5	14 13.1	33	94	98.0	14 03.1	33	94	98.5	4
75	14 15.0	32	95	94.7	14 05.4	32	95	95.2	13 55.7	32	95	95.7	13 46.0	32	95	96.2	13 36.3	33	94	96.7	13 26.4	33	94	97.2	13 16.6	33	94	97.7	13 06.6	33	94	98.1	75
6	13 18.1	32	95	94.4	13 08.6	32	95	94.9	12 58.9	32	95	95.4	12 49.3	32	95	95.9	12 39.6	32	95	96.3	12 29.8	33	94	96.8	12 20.0	33	94	97.3	12 10.1	33	94	97.8	6
7	12 21.2	32	95	94.1	12 11.7	32	95	94.6	12 02.1	32	95	95.1	11 52.5	32	95	95.5	11 42.8	32	95	96.0	11 33.1	32	94	96.5	11 23.4	33	94	97.0	11 13.6	33	94	97.5	7
8	11 24.3	32	95	93.8	11 14.8	32	95	94.2	11 05.3	32	95	94.7	10 55.7	32	95	95.2	10 46.1	32	95	95.7	10 36.4	32	95	96.2	10 26.7	32	94	96.7	10 17.0	33	94	97.1	8
9	10 27.3	31	95	93.4	10 17.9	32	95	93.9	10 08.4	32	95	94.4	9 58.9	32	95	94.9	9 49.3	32	95	95.4	9 39.7	32	95	95.8	9 30.0	32	95	96.3	9 20.3	32	94	96.8	9
80	9 30.4	31	95	93.1	9 20.9	31	95	93.6	9 11.5	32	95	94.1	9 02.0	32	95	94.6	8 52.4	32	95	95.0	8 42.9	32	95	95.5	8 33.3	32	95	96.0	8 23.6	32	95	96.5	80
1	8 33.4	31	95	92.8	8 24.0	31	95	93.3	8 14.5	31	95	93.8	8 05.1	32	95	94.2	7 55.6	32	95	94.7	7 46.1	32	95	95.2	7 36.5	32	95	95.7	7 26.9	32	95	96.2	1
2	7 36.4	31	95	92.5	7 27.0	31	95	93.0	7 17.6	31	95	93.4	7 08.2	31	95	93.9	6 58.7	32	95	94.4	6 49.2	32	95	94.9	6 39.7	32	95	95.4	6 30.2	32	95	95.8	2
3	6 39.3	31	95	92.2	6 30.0	31	95	92.7	6 20.6	31	95	93.1	6 11.2	31	95	93.6	6 01.8	31	95	94.1	5 52.4	32	95	94.6	5 42.9	32	95	95.0	5 33.4	32	95	95.5	3
4	5 42.3	31	95	91.9	5 33.0	31	95	92.3	5 23.6	31	95	92.8	5 14.3	31	95	93.3	5 04.9	31	95	93.8													4

Lat. 18°

H.A.	4° 00′				4° 30′				5° 00′				5° 30′				6° 00′				6° 30′				7° 00′				7° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	76 00.0	1.0	03	180.0	76 30.0	1.0	04	180.0	77 00.0	1.0	04	180.0	77 30.0	1.0	04	180.0	78 00.0	1.0	04	180.0	78 30.0	1.0	04	180.0	79 00.0	1.0	04	180.0	79 30.0	1.0	04	180.0	00
1	75 58.0	1.0	10	175.9	76 27.9	1.0	11	175.7	76 57.8	1.0	11	175.6	77 27.7	1.0	11	175.4	77 57.6	1.0	12	175.2	78 27.5	1.0	12	175.0	78 57.4	1.0	13	174.8	79 27.3	1.0	13	174.6	1
2	75 51.8	99	17	171.8	76 21.5	99	17	171.5	76 51.2	99	18	171.2	77 20.9	99	19	170.9	77 50.5	99	19	170.5	78 20.1	99	20	170.1	78 49.7	99	21	169.7	79 19.3	98	22	169.2	2
3	75 41.7	98	23	167.8	76 11.1	98	24	167.4	76 40.4	98	26	166.9	77 09.7	97	26	166.4	77 38.9	97	27	165.9	78 08.0	97	28	165.4	78 37.1	97	29	164.7	79 06.1	96	30	164.1	3
4	75 27.8	96	29	163.9	75 56.7	96	30	163.4	76 25.5	96	31	162.8	76 54.2	96	32	162.2	77 22.8	95	34	161.5	77 51.4	95	35	160.8	78 19.8	94	36	160.0	78 48.1	94	37	159.1	4
05	75 10.1	95	35	160.1	75 38.5	94	36	159.5	76 06.7	94	37	158.8	76 34.8	93	39	158.1	77 02.7	93	40	157.3	77 30.5	92	41	156.4	77 58.1	92	43	155.5	78 25.6	91	44	154.5	05
6	74 49.1	93	40	156.5	75 16.8	92	42	155.8	75 44.3	91	43	155.0	76 11.7	91	44	154.2	76 38.8	90	46	153.2	77 05.8	90	47	152.3	77 32.5	89	49	151.3	77 59.0	88	50	150.1	6
7	74 24.8	90	45	153.1	74 51.8	90	47	152.3	75 18.5	89	48	151.4	75 45.1	88	49	150.5	76 11.5	87	51	149.5	76 37.6	87	52	148.4	77 03.4	86	54	147.3	77 28.9	85	56	146.1	7
8	73 57.5	88	50	149.8	74 23.7	87	51	149.0	74 49.8	86	53	148.0	75 15.5	85	54	147.0	75 41.0	84	55	146.0	76 06.2	83	57	144.8	76 31.0	82	59	143.7	76 55.6	81	60	142.4	8
9	73 27.5	85	54	146.8	73 53.0	84	55	145.8	74 18.2	84	57	144.8	74 43.1	83	58	143.8	75 07.7	81	60	142.7	75 32.0	80	61	141.5	75 55.9	79	63	140.3	76 19.4	78	64	139.0	9
10	72 55.0	83	58	143.9	73 19.7	82	59	142.9	73 44.1	81	61	141.9	74 08.2	80	62	140.8	74 31.9	79	63	139.6	74 55.3	77	65	138.5	75 18.2	76	66	137.2	75 40.8	74	68	135.9	10
1	72 20.3	80	61	141.1	72 44.2	79	63	140.1	73 07.8	78	64	139.1	73 31.0	77	65	138.0	73 53.9	76	67	136.8	74 16.4	74	68	135.6	74 38.4	73	70	134.4	75 00.1	71	71	133.0	1
2	71 43.5	78	64	138.6	72 06.6	77	66	137.6	72 29.4	75	67	136.5	72 51.8	74	68	135.4	73 13.9	73	70	134.2	73 35.5	71	71	133.0	73 56.7	70	72	131.7	74 17.5	68	74	130.4	2
3	71 04.9	75	67	136.2	71 27.2	74	68	135.2	71 49.3	73	70	134.1	72 10.9	71	71	133.0	72 32.2	70	72	131.8	72 53.0	69	73	130.6	73 13.4	67	75	129.3	73 33.2	65	76	128.0	3
4	70 24.6	73	70	134.0	70 46.2	72	71	132.9	71 07.5	70	72	131.8	71 28.4	69	73	130.7	71 48.9	68	74	129.6	72 08.9	66	76	128.4	72 28.5	65	77	127.1	72 47.6	63	78	125.8	4
15	69 42.8	70	72	131.9	70 03.7	69	73	130.8	70 24.3	68	74	129.8	70 44.5	67	75	128.6	71 04.2	65	76	127.5	71 23.6	64	78	126.3	71 42.4	62	79	125.1	72 00.8	60	80	123.8	15
6	68 59.6	68	74	129.9	69 19.9	67	75	128.9	69 39.8	66	76	127.8	69 59.3	64	77	126.7	70 18.4	63	78	125.6	70 37.0	61	79	124.4	70 55.2	60	80	123.2	71 12.8	58	81	121.9	6
7	68 15.3	66	76	128.1	68 34.9	65	77	127.0	68 54.2	64	78	126.0	69 13.0	62	79	124.9	69 31.4	61	80	123.8	69 49.4	59	81	122.6	70 06.9	58	82	121.4	70 24.0	56	83	120.2	7
8	67 29.8	64	77	126.3	67 48.9	63	78	125.3	68 07.5	61	79	124.3	68 25.7	60	80	123.2	68 43.5	59	81	122.1	69 00.9	57	82	121.0	69 17.8	56	83	119.8	69 34.3	54	84	118.6	8
9	66 43.4	62	79	124.7	67 01.8	61	80	123.7	67 19.9	60	81	122.7	67 37.6	58	82	121.6	67 54.8	57	82	120.6	68 11.6	55	83	119.4	68 27.9	54	84	118.3	68 43.8	52	85	117.2	9
20	65 56.1	60	80	123.2	66 14.0	59	81	122.2	66 31.5	58	82	121.2	66 48.6	56	83	120.2	67 05.3	55	84	119.1	67 21.6	53	84	118.0	67 37.4	52	85	116.9	67 52.7	50	86	115.8	20
1	65 07.9	59	81	121.8	65 25.3	57	82	120.8	65 42.3	56	83	119.8	65 58.9	55	84	118.8	66 15.1	53	85	117.7	66 30.9	52	85	116.7	66 46.2	50	86	115.6	67 01.1	49	87	114.5	1
2	64 19.1	57	83	120.4	64 36.0	56	83	119.5	64 52.5	54	84	118.5	65 08.6	53	85	117.5	65 24.3	52	86	116.5	65 39.6	50	86	115.4	65 54.5	49	87	114.4	66 08.9	47	88	113.3	2
3	63 29.5	55	84	119.2	63 46.0	54	84	118.2	64 02.0	53	85	117.3	64 17.7	52	86	116.3	64 33.0	50	86	115.3	64 47.8	49	87	114.3	65 02.3	47	88	113.2	65 16.3	46	88	112.2	3
4	62 39.4	54	84	117.9	62 55.4	53	85	117.0	63 11.0	51	86	116.1	63 26.3	50	86	115.1	63 41.1	49	87	114.1	63 55.6	47	88	113.2	64 09.6	46	88	112.1	64 23.2	45	89	111.1	4
25	61 48.7	53	85	116.8	62 04.3	51	86	115.9	62 19.5	50	87	115.0	62 34.4	49	87	114.0	62 48.8	48	88	113.1	63 02.9	46	88	112.1	63 16.6	45	89	111.1	63 29.8	43	90	110.1	25
6	60 57.6	51	86	115.7	61 12.8	50	87	114.8	61 27.6	49	87	113.9	61 42.1	48	88	113.0	61 56.2	46	88	112.1	62 09.9	45	89	111.1	62 23.2	44	90	110.2	62 36.1	42	90	109.2	6
7	60 06.0	50	87	114.7	60 20.8	49	87	113.8	60 35.2	48	88	112.9	60 49.4	46	88	112.0	61 03.1	45	89	111.1	61 16.5	44	90	110.2	61 29.5	43	90	109.3	61 42.0	41	90	108.3	7
8	59 13.9	49	87	113.7	59 28.4	48	88	112.9	59 42.5	47	88	112.0	59 56.3	45	89	111.1	60 09.7	44	89	110.2	60 22.8	43	90	109.3	60 35.4	42	90	108.4	60 47.7	40	91	107.5	8
9	58 21.5	48	88	112.8	58 35.6	47	88	112.0	58 49.4	45	89	111.1	59 02.9	44	89	110.2	59 16.0	43	90	109.4	59 28.8	42	90	108.5	59 41.2	41	91	107.6	59 53.2	39	91	106.7	9
30	57 28.7	47	88	111.9	57 42.5	46	89	111.1	57 56.0	44	89	110.2	58 09.2	43	90	109.4	58 22.0	42	90	108.5	58 34.5	41	91	107.7	58 46.6	40	91	106.8	58 58.4	39	92	105.9	30
1	56 35.6	46	89	111.1	56 49.1	45	89	110.3	57 02.4	44	90	109.4	57 15.3	42	90	108.6	57 27.8	41	91	107.8	57 40.0	40	91	106.9	57 51.9	39	92	106.0	58 03.4	38	92	105.2	1
2	55 42.2	45	89	110.3	55 55.5	44	90	109.5	56 08.4	43	90	108.7	56 21.1	42	91	107.8	56 33.4	40	91	107.0	56 45.3	39	92	106.2	56 57.0	38	92	105.3	57 08.3	37	92	104.5	2
3	54 48.5	44	90	109.5	55 01.5	43	90	108.7	55 14.2	42	91	107.9	55 26.6	41	91	107.1	55 38.7	40	91	106.3	55 50.4	39	92	105.5	56 01.8	37	92	104.7	56 12.9	36	92	103.8	3
4	53 54.6	43	90	108.7	54 07.4	42	91	108.0	54 19.8	41	91	107.2	54 32.0	40	91	106.4	54 43.8	39	92	105.6	54 55.3	38	92	104.8	55 06.6	37	92	104.0	55 17.4	36	93	103.2	4
35	53 00.5	42	91	108.0	53 13.0	41	91	107.3	53 25.2	40	91	106.5	53 37.1	39	92	105.7	53 48.8	38	92	105.0	54 00.1	37	92	104.2	54 11.1	36	93	103.4	54 21.8	35	93	102.6	35
6	52 06.1	41	91	107.3	52 18.4	41	91	106.6	52 30.4	40	92	105.8	52 42.1	39	92	105.1	52 53.6	38	92	104.3	53 04.7	37	93	103.5	53 15.5	36	93	102.8	53 26.1	35	93	102.0	6
7	51 11.5	41	91	106.7	51 23.6	40	92	105.9	51 35.4	39	92	105.2	51 47.0	38	92	104.5	51 58.2	37	93	103.7	52 09.2	36	93	103.0	52 19.8	35	93	102.2	52 30.2	34	93	101.4	7
8	50 16.8	40	92	106.0	50 28.7	39	92	105.3	50 40.3	38	92	104.6	50 51.6	37	92	103.9	51 02.7	36	93	103.1	51 13.5	35	93	102.4	51 24.0	35	93	101.6	51 34.2	34	93	100.9	8
9	49 21.9	39	92	105.4	49 33.6	39	92	104.7	49 45.0	38	92	104.0	49 56.2	37	93	103.3	50 07.1	36	93	102.6	50 17.7	35	93	101.8	50 28.0	34	93	101.1	50 38.1	33	94	100.4	9
40	48 26.8	39	92	104.8	48 38.3	38	92	104.1	48 49.6	37	93	103.4	49 00.6	36	93	102.7	49 11.3	35	93	102.0	49 21.8	34	93	101.3	49 32.0	34	94	100.6	49 41.9	33	94	99.8	40
1	47 31.5	38	92	104.3	47 42.9	37	93	103.6	47 54.0	37	93	102.9	48 04.8	36	93	102.2	48 15.4	35	93	101.5	48 25.8	34	94	100.8	48 35.8	33	94	100.1	48 45.7	32	94	99.3	1
2	46 36.2	38	92	103.7	46 47.4	37	93	103.0	46 58.3	36	93	102.3	47 09.0	35	93	101.7	47 19.5	34	93	101.0	47 29.7	34	94	100.3	47 39.6	33	94	99.6	47 49.3	32	94	98.9	2
3	45 40.7	37	93	103.2	45 51.7	36	93	102.5	46 02.5	36	93	101.8	46 13.1	35	93	101.2	46 23.4	34	94	100.5	46 33.5	33	94	99.8	46 43.3	32	94	99.1	46 52.9	32	94	98.4	3
4	44 45.0	37	93	102.6	44 55.9	36	93	102.0	45 06.6	35	93	101.3	45 17.0	34	94	100.7	45 27.2	34	94	100.0	45 37.2	33	94	99.3	45 46.9	32	94	98.6	45 56.4	31	94	98.0	4
45	43 49.3	36	93	102.1	44 00.1	35	93	101.5	44 10.6	35	94	100.8	44 20.9	34	94	100.2	44 31.0	33	94	99.5	44 40.9	32	94	98.9	44 50.5	32	94	98.2	44 59.9	31	94	97.5	45
6	42 53.5	36	93	101.6	43 04.1	35	93	101.0	43 14.5	34	94	100.4	43 24.7	34	94	99.7	43 34.7	33	94	99.1	43 44.4	32	94	98.4	43 54.0	31	94	97.7	44 03.3	31	94	97.1	6
7	41 57.5	35	93	101.2	42 08.0	35	94	100.5	42 18.3	34	94	99.9	42 28.4	33	94	99.3	42 38.3	33	94	98.6	42 48.0	32	94	98.0	42 57.4	31	94	97.3	43 06.6	30	94	96.7	7
8	41 01.5	35	94	100.7	41 11.9	34	94	100.1	41 22.1	34	94	99.4	41 32.1	33	94	98.8	41 41.8	32	94	98.2	41 51.4	32	94	97.5	42 00.8	31	94	96.9	42 09.9	30	95	96.3	8
9	40 05.4	35	94	100.2	40 15.7	34	94	99.6	40 25.8	33	94	99.0	40 35.6	33	94	98.4	40 45.3	32	94	97.8	40 54.8	31	94	97.1	41 04.1	31	95	96.5	41 13.2	30	95	95.9	9
50	39 09.2	34	94	99.8	39 19.4	34	94	99.2	39 29.4	33	94	98.6	39 39.2	32	94	98.0	39 48.8	32	94	97.3	39 58.2	31	94	96.7	40 07.4	30	95	96.1	40 16.4	30	95	95.5	50
1	38 12.9	34	94	99.4	38 23.0	33	94	98.8	38 32.9	33	94	98.1	38 42.6	32	94	97.5	38 52.1	31	94	96.9	39 01.5	31	95	96.3	39 10.6	30	95	95.7	39 19.6	30	95	95.1	1
2	37 16.6	34	94	98.9	37 26.6	33	94	98.3	37 36.4	32	94	97.7	37 46.0	32	94	97.1	37 55.5	31	95	96.5	38 04.7	31	95	95.9	38 13.8	30	95	95.3	38 22.7	29	95	94.7	2
3	36 20.2	33	94	98.5	36 30.1	33	94	97.9	36 39.8	32	94	97.3	36 49.4	32	94	96.7	36 58.8	31	95	96.1	37 08.0	30	95	95.6	37 17.0	30	95	95.0	37 25.8	29	95	94.4	3
4	35 23.7	33	94	98.1	35 33.5	32	94	97.5	35 43.2	32	94	96.9	35 52.7	31	95	96.4	36 02.0	31	95	95.8	36 11.1	30	95	95.2	36 20.1	30	95	94.6	36 28.9	29	95	94.0	4
55	34 27.2	33	94	97.7	34 36.9	32	94	97.1	34 46.5	32	94	96.5	34 55.9	31	95	96.0	35 05.2	31	95	95.4	35 14.3	30	95	94.8	35 23.2	29	95	94.2	35 32.0	29	95	93.6	55
6	33 30.6	33	94	97.3	33 40.3	32	94	96.7	33 49.8	31	95	96.2	33 59.2	31	95	95.6	34 08.4	30	95	95.0	34 17.4	30	95	94.4	34 26.3	29	95	93.9	34 35.0	29	95	93.3	6
7	32 34.0	32	94	96.9	32 43.6	32	95	96.4	32 53.1	31	95	95.8	33 02.4	31	95	95.2	33 11.5	30	95	94.7	33 20.5	30	95	94.1	33 29.4	29	95	93.5	33 38.0	29	95	92.9	7
8	31 37.3	32	95	96.5	31 46.9	32	95	96.0	31 56.3	31	95	95.4	32 05.5	31	95	94.9	32 14.6	30	95	94.3	32 23.6	30	95	93.7	32 32.4	29	95	93.2	32 41.0	29	95	92.6	8
9	30 40.6	32	95	96.2	30 50.1	31	95	95.6	30 59.4	31	95	95.1	31 08.6	30	95	94.5	31 17.7	30	95	94.0	31 26.6	29	95	93.4	31 35.4	29	95	92.8	31 44.0	29	95	92.3	9
60	29 43.8	32	95	95.8	29 53.3	31	95	95.3	30 02.6	31	95	94.7	30 11.7	30	95	94.2	30 20.8	30	95	93.6	30 29.7	29	95	93.1	30 38.4	29	95	92.5	30 47.0	28	95	91.9	60
1	28 47.1	32	95	95.4	28 56.4	31	95	94.9	29 05.7	31	95	94.4	29 14.8	30	95	93.8	29 23.8	30	95	93.3	29 32.7	29	95	92.7	29 41.4	29	95	92.2	29 50.0	28	95	91.6	1
2	27 50.2	31	95	95.1	27 59.6	31	95	94.5	28 08.8	30	95	94.0	28 17.9	30	95	93.5	28 26.8	30	95	92.9	28 35.7	29	95	92.4	28 44.4	29	95	91.8	28 52.9	28	95	91.3	2
3	26 53.4	31	95	94.7	27 02.7	31	95	94.2	27 11.9	30	95	93.7	27 20.9	30	95	93.1	27 29.8	30	95	92.6	27 38.6	29	95	92.1	27 47.3	29	95	91.5	27 55.9	28	95	91.0	3
4	25 56.5	31	95	94.4	26 05.8	31	95	93.9	26 14.9	30	95	93.3	26 23.9	30	95	92.8	26 32.8	29	95	92.3	26 41.6	29	95	91.7	26 50.3	29	95	91.2	26 58.8	28	95	90.7	4
65	24 59.6	31	95	94.0	25 08.8	31	95	93.5	25 17.9	30	95	93.0	25 26.9	30	95	92.5	25 35.8	29	95	91.9	25 44.6	29	95	91.4	25 53.2	29	95	90.9	26 01.8	28	95	90.3	65
6	24 02.7	31	95	93.7	24 11.8	30	95	93.2	24 20.9	30	95	92.7	24 29.9	30	95	92.1	24 38.8	29	95	91.6	24 47.5	29	95	91.1	24 56.2	29	95	90.6	25 04.7	28	95	90.0	6
7	23 05.7	31	95	93.4	23 14.9	30	95	92.9	23 23.9	30	95	92.3	23 32.9	30	95	91.8	23 41.7	29	95	91.3	23 50.5	29	95	90.8	23 59.1	29	95	90.2	24 07.6	28	95	89.7	7
8	22 08.7	31	95	93.0	22 17.9	30	95	92.5	22 26.9	30	95	92.0	22 35.8	30	95	91.5	22 44.7	29	95	91.0	22 53.4	29	95	90.5	23 02.0	29	95	89.9	23 10.6	28	95	89.4	8
9	21 11.7	31	95	92.7	21 20.8	30	95	92.2	21 29.9	30	95	91.7	21 38.8	30	95	91.2	21 47.6	29	95	90.7	21 56.3	29	95	90.1	22 05.0	29	95	89.6	22 13.5	28	95	89.1	9
70	20 14.7	30	95	92.4	20 23.8	30	95	91.9	20 32.8	30	95	91.4	20 41.7	30	95	90.9	20 50.5	29	95	90.3	20 59.3	29	95	89.8	21 07.9	29	95	89.3	21 16.5	28	95	88.8	70
1	19 17.7	30	95	92.1	19 26.8	30	95	91.6	19 35.8	30	95	91.1	19 44.7	30	95	90.5	19 53.5	29	95	90.0	20 02.2	29	95	89.5	20 10.9	29	95	89.0	20 19.4	28	95	88.5	1
2	18 20.7	30	95	91.7	18 29.7	30	95	91.2	18 38.7	30	95	90.7	18 47.6	30	95	90.2	18 56.4	29	95	89.7	19 05.2	29	95	89.2	19 13.8	29	95	88.7	19 22.4	28	95	88.2	2
3	17 23.6	30	95	91.4	17 32.7	30	95	90.9	17 41.7	30	95	90.4	17 50.5	30	95	89.9	17 59.4	29	95	89.4	18 08.1	29	95	88.9	18 16.8	29	95	88.4	18 25.3	28	95	87.9	3
4	16 26.6	30	95	91.1	16 35.6	30	95	90.6	16 44.6	30	95	90.1	16 53.5	30	95	89.6	17 02.3	29	95	89.1	17 11.0	29	95	88.6	17 19.7	29	95	88.1	17 28.3	29	95	87.6	4
75	15 29.5	30	95	90.8	15 38.6	30	95	90.3	15 47.5	30	95	89.8	15 56.4	30	95	89.3	16 05.2	29	95	88.8	16 14.0	29	95	88.3	16 22.7	29	95	87.8	16 31.3	29	95	87.3	75
6	14 32.5	30	95	90.5	14 41.5	30	95	90.0	14 50.5	30	95	89.5	14 59.4	30	95	89.0	15 08.2	29	95	88.5	15 17.0	29	95	88.0	15 25.7	29	95	87.5	15 34.3	29	95	87.0	6
7	13 35.4	30	95	90.2	13 44.4	30	95	89.7	13 53.4	30	95	89.2	14 02.3	30	95	88.7	14 11.2	29	95	88.2	14 19.9	29	95	87.7	14 28.7	29	95	87.2	14 37.3	29	95	86.7	7
8	12 38.3	30	95	89.9	12 47.4	30	95	89.4	12 56.3	30	95	88.9	13 05.3	30	95	88.4	13 14.1	29	95	87.9	13 22.9	29	95	87.4	13 31.7	29	95	86.9	13 40.4	29	95	86.4	8
9	11 41.3	30	95	89.6	11 50.3	30	95	89.1	11 59.3	30	95	88.6	12 08.2	30	95	88.1	12 17.1	30	95	87.6	12 25.9	29	95	87.1	12 34.7	29	95	86.6	12 43.4	29	95	86.1	9
80	10 44.2	30	95	89.3	10 53.3	30	95	88.8	11 02.3	30	95	88.3	11 11.2	30	95	87.8	11 20.1	30	95	87.3	11 29.0	29	95	86.8	11 37.8	29	95	86.3	11 46.5	29	95	85.8	80
1	9 47.2	30	95	88.9	9 56.2	30	95	88.5	10 05.2	30	95	88.0	10 14.2	30	95	87.5	10 23.1	30	95	87.0	10 32.0	30	95	86.5	10 40.8	29	95	86.0	10 49.6	29	95	85.5	1
2	8 50.1	30	95	88.6	8 59.2	30	95	88.2	9 08.2	30	95	87.7	9 17.2	30	95	87.2	9 26.1	30	95	86.7	9 35.0	30	95	86.2	9 43.9	29	95	85.7	9 52.7	29	95	85.3	2
3	7 53.1	30	95	88.3	8 02.2	30	95	87.9	8 11.2	30	95	87.4	8 20.2	30	95	86.9	8 29.2	30	95	86.4	8 38.1	30	95	85.9	8 47.0	30	95	85.4	8 55.9	29	95	85.0	3
4	6 56.0	30	95	88.0	7 05.1	30	95	87.6	7 14.2	30	95	87.1	7 23.2	30	95	86.6	7 32.2	30	95	86.1	7 41.2	30	95	85.6	7 50.1	30	95	85.1	7 59.0	30	95	84.7	4
85	5 59.0	30	95	87.7	6 08.1	30	95	87.2	6 17.2	30	95	86.8	6 26.3	30	95	86.3	6 35.3	30	95	85.8	6 44.3	30	95	85.3	6 53.3	30	95	84.8	7 02.2	30	95	84.4	85
6	5 02.0	30	95	87.4	5 11.1	30	95	86.9	5 20.3	30	95	86.5	5 29.3	30	95	86.0	5 38.4	30	95	85.5	5 47.5	30	95	85.0	5 56.5	30	95	84.5	6 05.5	30	95	84.1	6
7																													5 08.7	30	95	83.8	7

Lat. 18°

H.A.	4° 00′				4° 30′				5° 00′				5° 30′				6° 00′				6° 30′				7° 00′				7° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	68 00.0	1.0	02	180.0	67 30.0	1.0	02	180.0	67 00.0	1.0	02	180.0	66 30.0	1.0	02	180.0	66 00.0	1.0	02	180.0	65 30.0	1.0	02	180.0	65 00.0	1.0	02	180.0	64 30.0	1.0	02	180.0	00
1	67 58.7	1.0	07	177.3	67 28.7	1.0	06	177.4	66 58.7	1.0	06	177.5	66 28.8	1.0	06	177.5	65 58.8	1.0	06	177.6	65 28.8	1.0	06	177.6	64 58.8	1.0	06	177.7	64 28.9	1.0	06	177.7	1
2	67 54.7	1.0	11	174.7	67 24.8	1.0	11	174.8	66 54.9	1.0	11	174.9	66 25.0	1.0	10	175.0	65 55.1	1.0	10	175.1	65 25.2	1.0	10	175.2	64 55.3	1.0	10	175.3	64 25.4	1.0	10	175.4	2
3	67 48.1	99	15	172.1	67 18.4	99	15	172.2	66 48.6	99	15	172.4	66 18.9	99	14	172.5	65 49.1	99	14	172.7	65 19.3	99	14	172.8	64 49.5	99	14	173.0	64 19.7	99	13	173.1	3
4	67 39.0	98	20	169.5	67 09.4	99	19	169.7	66 39.8	99	19	169.9	66 10.2	99	18	170.1	65 40.6	99	18	170.3	65 11.0	99	18	170.5	64 41.4	99	17	170.7	64 11.8	99	17	170.9	4
05	67 27.3	98	24	166.9	66 58.0	98	23	167.2	66 28.6	98	23	167.4	65 59.3	98	22	167.7	65 29.9	98	22	167.9	65 00.5	98	21	168.2	64 31.0	98	21	168.4	64 01.6	98	21	168.6	05
6	67 13.1	97	28	164.4	66 44.1	97	27	164.7	66 15.0	97	26	165.0	65 45.9	97	26	165.3	65 16.8	97	25	165.6	64 47.7	97	25	165.9	64 18.5	97	26	166.2	63 49.3	97	24	166.4	6
7	66 56.6	96	31	161.9	66 27.9	96	31	162.3	65 59.1	96	30	162.6	65 30.4	96	30	163.0	65 01.5	96	29	163.3	64 32.7	96	29	163.6	64 03.8	96	28	163.9	63 34.8	97	28	164.2	7
8	66 37.7	94	35	159.5	66 09.4	94	34	159.9	65 41.0	95	34	160.3	65 12.6	95	33	160.7	64 44.1	95	33	161.1	64 15.5	95	32	161.4	63 46.9	95	31	161.8	63 18.3	96	31	162.1	8
9	66 16.6	93	39	157.2	65 48.7	93	38	157.6	65 20.7	93	37	158.1	64 52.7	94	37	158.5	64 24.5	94	36	158.9	63 56.3	94	35	159.3	63 28.1	94	35	159.7	62 59.8	94	34	160.0	9
10	65 53.5	91	42	154.9	65 26.0	92	41	155.4	64 58.4	92	40	155.9	64 30.7	92	40	156.3	64 03.0	93	39	156.8	63 35.2	93	38	157.2	63 07.3	93	38	157.6	62 39.3	93	37	158.0	10
1	65 28.3	90	45	152.7	65 01.2	90	44	153.2	64 34.1	91	44	153.7	64 06.9	91	43	154.2	63 39.5	91	42	154.7	63 12.1	92	41	155.1	62 44.6	92	41	155.6	62 17.0	92	40	156.0	1
2	65 01.2	88	48	150.6	64 34.6	89	47	151.1	64 07.9	89	47	151.7	63 41.1	90	46	152.2	63 14.2	90	45	152.7	62 47.2	90	44	153.1	62 20.1	90	44	153.6	61 52.9	91	43	154.1	2
3	64 32.3	87	51	148.5	64 06.2	87	50	149.1	63 40.0	88	49	149.7	63 13.6	88	49	150.2	62 47.2	88	48	150.7	62 20.6	89	47	151.2	61 53.9	89	46	151.7	61 27.1	89	46	152.2	3
4	64 01.6	85	54	146.6	63 36.0	86	53	147.2	63 10.3	86	52	147.7	62 44.4	86	51	148.3	62 18.4	87	51	148.8	61 52.3	87	50	149.3	61 26.0	88	49	149.9	60 59.7	88	48	150.4	4
15	63 29.4	83	56	144.7	63 04.3	84	55	145.3	62 39.0	84	55	145.9	62 13.6	85	54	146.4	61 48.1	85	53	147.0	61 22.4	86	52	147.5	60 56.6	86	52	148.1	60 30.7	87	51	148.6	15
6	62 55.6	82	59	142.8	62 31.0	82	58	143.5	62 06.3	83	57	144.1	61 41.3	83	56	144.7	61 16.3	84	55	145.2	60 51.1	84	55	145.8	60 25.7	85	54	146.3	60 00.2	85	53	146.9	6
7	62 20.5	80	61	141.1	61 56.4	81	60	141.7	61 32.1	81	59	142.3	61 07.6	82	58	142.9	60 43.0	82	58	143.5	60 18.3	83	57	144.1	59 53.4	83	56	144.7	59 28.3	84	55	145.2	7
8	61 44.0	78	63	139.4	61 20.4	79	62	140.0	60 56.6	80	61	140.7	60 32.6	80	60	141.3	60 08.5	81	60	141.9	59 44.2	81	59	142.5	59 19.7	82	58	143.0	58 55.1	82	57	143.6	8
9	61 06.2	77	65	137.8	60 43.1	77	64	138.4	60 19.8	78	63	139.1	59 56.3	79	62	139.7	59 32.6	79	62	140.3	59 08.8	80	61	140.9	58 44.8	80	60	141.5	58 20.6	81	59	142.0	9
20	60 27.3	75	67	136.2	60 04.6	76	66	136.9	59 41.8	76	65	137.5	59 18.8	77	64	138.2	58 55.6	78	64	138.8	58 32.2	78	63	139.4	58 08.7	79	62	140.0	57 45.0	79	61	140.5	20
1	59 47.3	74	68	134.7	59 25.1	74	68	135.4	59 02.7	75	67	136.0	58 40.2	76	66	136.7	58 17.4	76	65	137.3	57 54.5	77	65	137.9	57 31.4	77	64	138.5	57 08.1	78	63	139.1	1
2	59 06.2	72	70	133.3	58 44.5	73	69	134.0	58 22.6	73	68	134.6	58 00.5	74	68	135.3	57 38.2	75	67	135.9	57 15.7	75	66	136.5	56 53.1	76	66	137.1	56 30.2	76	65	137.7	2
3	58 24.2	70	71	131.9	58 03.0	71	71	132.6	57 41.5	72	70	133.3	57 19.9	73	69	133.9	56 58.0	73	69	134.5	56 36.0	74	68	135.2	56 13.7	74	67	135.8	55 51.3	75	66	136.4	3
4	57 41.4	69	73	130.6	57 20.5	70	72	131.3	56 59.5	70	71	131.9	56 38.3	71	71	132.6	56 16.9	72	70	133.2	55 55.3	72	69	133.8	55 33.5	73	69	134.5	55 11.5	74	68	135.1	4
25	56 57.6	68	74	129.4	56 37.2	68	73	130.0	56 16.7	69	73	130.7	55 55.9	70	72	131.3	55 34.9	70	71	132.0	55 13.7	71	71	132.6	54 52.3	72	70	133.2	54 30.7	72	69	133.8	25
6	56 13.1	66	75	128.1	55 53.2	67	75	128.8	55 33.0	68	74	129.5	55 12.6	68	73	130.1	54 52.0	69	73	130.7	54 31.3	70	72	131.4	54 10.3	70	71	132.0	53 49.1	71	71	132.6	6
7	55 27.9	65	77	127.0	55 08.3	66	76	127.6	54 48.6	66	75	128.3	54 28.6	67	75	128.9	54 08.4	68	74	129.6	53 48.0	68	73	130.2	53 27.5	69	73	130.8	53 06.7	69	72	131.4	7
8	54 42.0	63	78	125.9	54 22.8	64	77	126.5	54 03.4	65	76	127.2	53 43.9	66	76	127.8	53 24.1	66	75	128.5	53 04.1	67	74	129.1	52 43.9	68	74	129.7	52 23.6	68	73	130.3	8
9	53 55.4	62	79	124.8	53 36.6	63	78	125.4	53 17.6	64	77	126.1	52 58.5	64	77	126.7	52 39.1	65	76	127.4	52 19.5	66	76	128.0	51 59.7	66	75	128.6	51 39.7	67	74	129.2	9
30	53 08.2	61	80	123.8	52 49.8	62	79	124.4	52 31.2	62	78	125.1	52 12.4	63	78	125.7	51 53.4	64	77	126.3	51 34.2	64	76	126.9	51 14.8	65	76	127.6	50 55.2	66	75	128.2	30
1	52 20.5	60	80	122.8	52 02.5	60	80	123.4	51 44.2	61	79	124.1	51 25.8	62	79	124.7	51 07.1	63	78	125.3	50 48.3	63	78	125.9	50 29.2	64	77	126.5	50 10.0	64	76	127.1	1
2	51 32.3	59	81	121.8	51 14.6	59	81	122.4	50 56.7	60	80	123.1	50 38.6	61	80	123.7	50 20.3	61	79	124.3	50 01.8	62	78	125.0	49 43.1	63	78	125.6	49 24.2	63	77	126.2	2
3	50 43.5	57	82	120.9	50 26.2	58	81	121.5	50 08.6	59	81	122.2	49 50.9	60	80	122.8	49 32.9	60	80	123.4	49 14.7	61	79	124.0	48 56.4	61	79	124.6	48 37.8	62	78	125.2	3
4	49 54.3	56	83	120.0	49 37.3	57	82	120.6	49 20.1	58	82	121.3	49 02.6	58	81	121.9	48 45.0	59	81	122.5	48 27.2	60	80	123.1	48 09.2	60	80	123.7	47 51.0	61	79	124.3	4
35	49 04.7	55	83	119.1	48 48.0	56	83	119.8	48 31.1	57	82	120.4	48 14.0	57	82	121.0	47 56.6	58	81	121.6	47 39.1	59	81	122.2	47 21.4	59	80	122.8	47 03.6	60	80	123.4	35
6	48 14.7	54	84	118.3	47 58.2	55	84	118.9	47 41.6	56	83	119.5	47 24.8	56	83	120.2	47 07.8	57	82	120.8	46 50.6	58	82	121.4	46 33.3	58	81	122.0	46 15.7	59	81	122.6	6
7	47 24.2	53	85	117.5	47 08.1	54	84	118.1	46 51.8	55	84	118.7	46 35.3	55	83	119.3	46 18.6	56	83	120.0	46 01.7	57	82	120.5	45 44.6	57	82	121.1	45 27.4	58	81	121.7	7
8	46 33.4	52	85	116.7	46 17.6	53	85	117.3	46 01.6	54	84	118.0	45 45.4	54	84	118.6	45 28.9	55	83	119.2	45 12.4	56	83	119.7	44 55.6	56	82	120.3	44 38.6	57	82	120.9	8
9	45 42.3	52	86	116.0	45 26.7	52	85	116.6	45 11.0	53	85	117.2	44 55.1	53	84	117.8	44 38.9	54	84	118.4	44 22.6	55	84	119.0	44 06.1	55	83	119.6	43 49.5	56	83	120.1	9
40	44 50.8	51	86	115.3	44 35.6	51	86	115.9	44 20.1	52	85	116.5	44 04.4	53	85	117.1	43 48.6	53	85	117.6	43 32.5	54	84	118.2	43 16.3	54	84	118.8	42 59.9	55	83	119.4	40
1	43 59.1	50	87	114.6	43 44.1	50	86	115.2	43 28.8	51	86	115.7	43 13.4	52	85	116.3	42 57.8	52	85	116.9	42 42.1	53	85	117.5	42 26.1	53	84	118.1	42 10.0	54	84	118.6	1
2	43 07.0	49	87	113.9	42 52.3	50	87	114.5	42 37.3	50	86	115.1	42 22.1	51	86	115.6	42 06.8	51	86	116.2	41 51.3	52	85	116.8	41 35.6	53	85	117.4	41 19.8	53	84	117.9	2
3	42 14.7	48	88	113.2	42 00.2	49	87	113.8	41 45.5	49	87	114.4	41 30.5	50	86	115.0	41 15.5	51	86	115.5	41 00.2	51	86	116.1	40 44.8	52	85	116.7	40 29.2	52	85	117.2	3
4	41 22.2	47	88	112.6	41 07.8	48	88	113.2	40 53.3	49	87	113.7	40 38.7	49	87	114.3	40 23.8	50	86	114.9	40 08.8	50	86	115.5	39 53.7	51	86	116.0	39 38.3	51	85	116.6	4
45	40 29.4	47	88	112.0	40 15.3	47	88	112.5	40 01.0	48	88	113.1	39 46.5	48	87	113.7	39 31.9	49	87	114.2	39 17.2	50	87	114.8	39 02.2	50	86	115.4	38 47.1	51	86	115.9	45
6	39 36.3	46	89	111.3	39 22.4	47	88	111.9	39 08.4	47	88	112.5	38 54.2	48	88	113.1	38 39.8	48	87	113.6	38 25.2	49	87	114.2	38 10.5	49	87	114.7	37 55.7	50	86	115.3	6
7	38 43.1	45	89	110.8	38 29.4	46	89	111.3	38 15.5	46	88	111.9	38 01.5	47	88	112.5	37 47.4	47	88	113.0	37 33.1	48	87	113.6	37 18.6	49	87	114.1	37 04.0	49	87	114.7	7
8	37 49.6	45	89	110.2	37 36.1	45	89	110.8	37 22.5	46	89	111.3	37 08.7	46	88	111.9	36 54.7	47	88	112.4	36 40.6	47	88	113.0	36 26.4	48	87	113.5	36 12.0	48	87	114.1	8
9	36 55.9	44	90	109.6	36 42.7	45	89	110.2	36 29.2	45	89	110.8	36 15.6	46	89	111.3	36 01.9	46	88	111.9	35 48.0	47	88	112.4	35 34.0	47	88	112.9	35 19.8	48	87	113.5	9
50	36 02.1	43	90	109.1	35 49.0	44	90	109.6	35 35.8	44	89	110.2	35 22.4	45	89	110.7	35 08.8	45	89	111.3	34 55.1	46	88	111.8	34 41.3	46	88	112.4	34 27.3	47	88	112.9	50
1	35 08.1	43	90	108.6	34 55.2	43	90	109.1	34 42.1	44	90	109.7	34 28.9	44	89	110.2	34 15.6	45	89	110.7	34 02.1	45	89	111.3	33 48.4	46	88	111.8	33 34.6	46	88	112.4	1
2	34 13.9	42	91	108.0	34 01.2	43	90	108.6	33 48.3	43	90	109.1	33 35.3	44	90	109.7	33 22.1	44	89	110.2	33 08.8	45	89	110.8	32 55.4	45	89	111.3	32 41.8	45	88	111.8	2
3	33 19.6	42	91	107.5	33 07.0	42	91	108.1	32 54.3	43	90	108.6	32 41.5	43	90	109.2	32 28.5	44	90	109.7	32 15.3	44	89	110.2	32 02.1	44	89	110.8	31 48.7	45	89	111.3	3
4	32 25.1	41	91	107.1	32 12.7	42	91	107.6	32 00.2	42	90	108.1	31 47.5	42	90	108.7	31 34.7	43	90	109.2	31 21.7	43	90	109.7	31 08.6	44	89	110.2	30 55.4	44	89	110.8	4
55	31 30.5	41	91	106.6	31 18.2	41	91	107.1	31 05.8	42	91	107.6	30 53.3	42	90	108.2	30 40.7	42	90	108.7	30 27.9	43	90	109.2	30 15.0	43	90	109.7	30 02.0	44	89	110.3	55
6	30 35.7	40	92	106.1	30 23.6	41	91	106.6	30 11.4	41	91	107.2	29 59.0	41	91	107.7	29 46.6	42	90	108.2	29 34.0	42	90	108.7	29 21.2	43	90	109.3	29 08.4	43	90	109.8	6
7	29 40.8	40	92	105.6	29 28.9	40	91	106.2	29 16.8	40	91	106.7	29 04.6	41	91	107.2	28 52.3	41	91	107.7	28 39.8	42	90	108.3	28 27.3	42	90	108.8	28 14.6	42	90	109.3	7
8	28 45.8	39	92	105.2	28 34.0	40	92	105.7	28 22.1	40	91	106.2	28 10.0	40	91	106.8	27 57.9	41	91	107.3	27 45.6	41	91	107.8	27 33.2	42	90	108.3	27 20.7	42	90	108.8	8
9	27 50.7	39	92	104.7	27 39.0	39	92	105.3	27 27.2	40	92	105.8	27 15.3	40	91	106.3	27 03.3	40	91	106.8	26 51.2	41	91	107.3	26 38.9	41	91	107.8	26 26.6	41	90	108.4	9
60	26 55.5	38	92	104.3	26 43.9	39	92	104.8	26 32.3	39	92	105.3	26 20.5	39	92	105.9	26 08.6	40	91	106.4	25 56.6	40	91	106.9	25 44.5	40	91	107.4	25 32.3	41	91	107.9	60
1	26 00.1	38	92	103.9	25 48.7	38	92	104.4	25 37.2	39	92	104.9	25 25.5	39	92	105.4	25 13.8	39	92	105.9	25 02.0	40	91	106.4	24 50.0	40	91	107.0	24 38.0	40	91	107.5	1
2	25 04.7	37	93	103.5	24 53.4	38	92	104.0	24 42.0	38	92	104.5	24 30.5	39	92	105.0	24 18.9	39	92	105.5	24 07.2	39	92	106.0	23 55.4	40	91	106.5	23 43.5	40	91	107.0	2
3	24 09.1	37	93	103.1	23 58.0	37	93	103.6	23 46.7	38	92	104.1	23 35.3	38	92	104.6	23 23.8	38	92	105.1	23 12.3	39	92	105.6	23 00.6	39	91	106.1	22 48.8	39	91	106.6	3
4	23 13.5	37	93	102.7	23 02.4	37	93	103.2	22 51.3	37	92	103.7	22 40.0	38	92	104.2	22 28.7	38	92	104.7	22 17.2	38	92	105.2	22 05.7	39	92	105.7	21 54.1	39	91	106.2	4
65	22 17.8	36	93	102.3	22 06.8	37	93	102.8	21 55.8	37	93	103.3	21 44.7	37	92	103.8	21 33.4	38	92	104.3	21 22.1	38	92	104.8	21 10.7	38	92	105.3	20 59.2	38	92	105.8	65
6	21 22.0	36	93	101.9	21 11.1	36	93	102.4	21 00.2	37	93	102.9	20 49.2	37	93	103.4	20 38.1	37	92	103.9	20 26.9	37	92	104.4	20 15.6	38	92	104.9	20 04.3	38	92	105.4	6
7	20 26.1	36	93	101.5	20 15.4	36	93	102.0	20 04.5	36	93	102.5	19 53.6	36	93	103.0	19 42.6	37	93	103.5	19 31.6	37	92	104.0	19 20.4	37	92	104.5	19 09.2	38	92	105.0	7
8	19 30.2	35	93	101.1	19 19.5	36	93	101.6	19 08.8	36	93	102.1	18 58.0	36	93	102.6	18 47.1	36	93	103.1	18 36.1	37	93	103.6	18 25.1	37	92	104.1	18 14.0	37	92	104.6	8
9	18 34.1	35	93	100.8	18 23.6	35	93	101.2	18 13.0	36	93	101.7	18 02.3	36	93	102.2	17 51.5	36	93	102.7	17 40.6	36	93	103.2	17 29.7	37	92	103.7	17 18.7	37	92	104.2	9
70	17 38.0	35	94	100.4	17 27.6	35	93	100.9	17 17.0	35	93	101.4	17 06.4	35	93	101.9	16 55.8	36	93	102.3	16 45.0	36	93	102.8	16 34.2	36	93	103.3	16 23.4	36	92	103.8	70
1	16 41.9	34	94	100.0	16 31.5	35	94	100.5	16 21.1	35	93	101.0	16 10.6	35	93	101.5	16 00.0	35	93	102.0	15 49.4	36	93	102.5	15 38.7	36	93	102.9	15 27.9	36	93	103.4	1
2	15 45.6	34	94	99.7	15 35.4	34	94	100.2	15 25.0	35	94	100.6	15 14.6	35	93	101.1	15 04.1	35	93	101.6	14 53.6	35	93	102.1	14 43.0	35	93	102.6	14 32.4	36	93	103.1	2
3	14 49.4	34	94	99.3	14 39.2	34	94	99.8	14 28.9	34	94	100.3	14 18.6	34	93	100.8	14 08.2	35	93	101.3	13 57.8	35	93	101.7	13 47.3	35	93	102.2	13 36.7	35	93	102.7	3
4	13 53.0	34	94	99.0	13 42.9	34	94	99.5	13 32.7	34	94	99.9	13 22.5	34	94	100.4	13 12.2	34	93	100.9	13 01.9	35	93	101.4	12 51.5	35	93	101.9	12 41.0	35	93	102.3	4
75	12 56.6	33	94	98.6	12 46.6	34	94	99.1	12 36.5	34	94	99.6	12 26.3	34	94	100.1	12 16.1	34	94	100.6	12 05.9	34	93	101.0	11 55.6	34	93	101.5	11 45.2	35	93	102.0	75
6	12 00.2	33	94	98.3	11 50.2	33	94	98.8	11 40.2	33	94	99.2	11 30.1	34	94	99.7	11 20.0	34	94	100.2	11 09.8	34	94	100.7	10 59.6	34	93	101.2	10 49.4	34	93	101.6	6
7	11 03.7	33	94	97.9	10 53.8	33	94	98.4	10 43.8	33	94	98.9	10 33.9	33	94	99.4	10 23.8	34	94	99.9	10 13.7	34	94	100.3	10 03.6	34	93	100.8	9 53.5	34	93	101.3	7
8	10 07.2	33	94	97.6	9 57.3	33	94	98.1	9 47.4	33	94	98.6	9 37.5	33	94	99.1	9 27.6	33	94	99.5	9 17.6	33	94	100.0	9 07.5	34	94	100.5	8 57.5	34	93	101.0	8
9	9 10.6	33	94	97.3	9 00.8	33	94	97.8	8 51.0	33	94	98.2	8 41.2	33	94	98.7	8 31.3	33	94	99.2	8 21.4	33	94	99.7	8 11.4	33	94	100.2	8 01.4	33	94	100.6	9
80	8 14.0	32	94	97.0	8 04.2	32	94	97.4	7 54.5	33	94	97.9	7 44.7	33	94	98.4	7 34.9	33	94	98.9	7 25.1	33	94	99.3	7 15.2	33	94	99.8	7 05.3	33	94	100.3	80
1	7 17.3	32	94	96.6	7 07.6	32	94	97.1	6 58.0	32	94	97.6	6 48.2	32	94	98.1	6 38.5	33	94	98.5	6 28.7	33	94	99.0	6 19.0	33	94	99.5	6 09.1	33	94	100.0	1
2	6 20.6	32	95	96.3	6 11.0	32	94	96.8	6 01.4	32	94	97.3	5 51.7	32	94	97.7	5 42.1	32	94	98.2	5 32.4	32	94	98.7	5 22.6	32	94	99.2	5 12.9	32	94	99.6	2
3	5 23.9	32	95	96.0	5 14.3	32	95	96.5	5 04.7	32	94	96.9																					3

H.A.	8° 00′				8° 30′				9° 00′				9° 30′				10° 00′				10° 30′				11° 00′				11° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	80 00.0	1.0	05	180.0	80 30.0	1.0	06	180.0	81 00.0	1.0	06	180.0	81 30.0	1.0	06	180.0	82 00.0	1.0	06	180.0	82 30.0	1.0	06	180.0	83 00.0	1.0	07	180.0	83 30.0	1.0	07	180.0	00
1	79 57.2	1.0	14	174.3	80 27.0	99	15	174.0	80 56.9	99	16	173.7	81 26.7	99	16	173.4	81 56.5	99	17	173.0	82 26.3	99	18	172.5	82 56.0	99	20	172.0	83 25.7	99	21	171.4	1
2	79 48.7	98	23	168.7	80 18.2	98	24	168.2	80 47.6	98	26	167.6	81 16.9	98	27	166.9	81 46.1	97	28	166.1	82 15.2	97	30	165.3	82 44.2	96	32	164.3	83 13.1	96	34	163.2	2
3	79 35.0	96	31	163.3	80 03.8	96	33	162.5	80 32.4	95	34	161.7	81 00.9	96	36	160.7	81 29.3	94	38	159.6	81 57.4	93	40	158.4	82 25.3	93	42	157.1	82 53.0	92	45	155.5	3
4	79 16.2	93	39	158.2	79 44.1	93	41	157.2	80 11.8	92	42	156.1	80 39.4	91	44	154.9	81 06.6	90	46	153.6	81 33.5	89	49	152.1	82 00.1	88	51	150.5	82 26.2	86	54	148.7	4
05	78 52.8	90	46	153.4	79 19.7	89	48	152.3	79 46.4	88	50	151.0	80 12.8	87	52	149.6	80 38.8	86	54	148.1	81 04.4	85	56	146.5	81 29.5	83	58	144.7	81 54.0	81	61	142.7	05
6	78 25.3	87	52	149.0	78 51.2	86	54	147.7	79 16.7	85	56	146.3	79 41.9	83	58	144.8	80 06.6	82	60	143.2	80 30.8	80	62	141.4	80 54.4	78	65	139.5	81 17.4	75	67	137.4	6
7	77 54.1	83	57	144.8	78 18.9	82	59	143.5	78 43.3	81	61	142.0	79 07.2	79	63	140.4	79 30.6	77	65	138.8	79 53.4	75	67	136.9	80 15.6	73	70	135.0	80 37.1	70	72	132.9	7
8	77 19.7	80	62	141.1	77 43.4	78	64	139.7	78 06.6	77	66	138.1	78 29.4	75	68	136.5	78 51.5	73	70	134.8	79 13.0	71	72	133.0	79 33.9	68	74	131.0	79 54.0	66	76	129.0	8
9	76 42.5	76	66	137.6	77 05.1	75	68	136.2	77 27.3	73	69	134.7	77 48.8	71	71	133.0	78 09.8	69	73	131.3	78 30.1	67	75	129.5	78 49.7	64	77	127.6	79 08.5	61	79	125.5	9
10	76 02.9	73	70	134.5	76 24.5	71	71	133.0	76 45.6	69	73	131.5	77 06.1	67	74	129.9	77 25.9	65	76	128.2	77 45.1	63	78	126.4	78 03.6	60	80	124.5	78 21.2	58	81	122.5	10
1	75 21.2	70	72	131.6	75 41.8	68	74	130.2	76 01.9	66	76	128.7	76 21.4	64	77	127.1	76 40.2	62	79	125.4	76 58.4	59	80	123.7	77 15.8	57	82	121.8	77 32.4	54	83	119.9	1
2	74 37.7	67	75	129.0	74 57.4	65	77	127.6	75 16.6	63	78	126.1	75 35.1	61	79	124.5	75 53.0	59	81	122.9	76 10.2	56	82	121.2	76 26.7	54	84	119.5	76 42.4	51	85	117.6	2
3	73 52.6	64	77	126.7	74 11.5	62	79	125.2	74 29.8	60	80	123.8	74 47.4	58	81	122.3	75 04.5	56	83	120.7	75 20.8	53	84	119.0	75 36.5	51	85	117.3	75 51.4	48	86	115.6	3
4	73 06.2	61	79	124.5	73 24.3	59	81	123.1	73 41.8	57	82	121.7	73 58.6	55	83	120.2	74 14.9	53	84	118.6	74 30.5	51	85	117.1	74 45.4	48	87	115.4	74 59.5	46	88	113.7	4
15	72 18.6	59	81	122.5	72 35.9	57	82	121.1	72 52.7	55	83	119.7	73 08.8	53	84	118.3	73 24.4	51	86	116.8	73 39.3	48	87	115.3	73 53.5	46	88	113.7	74 06.9	44	89	112.1	15
6	71 30.0	56	83	120.7	71 46.6	55	84	119.3	72 02.7	53	85	118.0	72 18.2	51	86	116.6	72 33.1	49	87	115.1	72 47.3	46	88	113.7	73 00.9	44	89	112.1	73 13.8	42	89	110.6	6
7	70 40.5	54	84	119.0	70 56.5	52	85	117.7	71 11.9	51	86	116.4	71 26.8	49	87	115.0	71 41.1	47	88	113.6	71 54.8	44	88	112.2	72 07.8	42	89	110.7	72 20.1	40	90	109.2	7
8	69 50.2	52	85	117.4	70 05.6	50	86	116.2	70 20.5	49	87	114.9	70 34.8	47	88	113.6	70 48.5	45	88	112.2	71 01.7	43	89	110.8	71 14.2	41	90	109.4	71 26.0	38	91	108.0	8
9	68 59.2	50	86	116.0	69 14.1	49	87	114.7	69 28.4	47	88	113.5	69 42.2	45	88	112.2	69 55.5	43	89	110.9	70 08.1	41	90	109.6	70 20.2	39	91	108.2	70 31.6	37	91	106.9	9
20	68 07.6	49	87	114.6	68 22.0	47	88	113.4	68 35.8	45	88	112.2	68 49.2	44	89	111.0	69 02.0	42	90	109.7	69 14.2	40	90	108.5	69 25.8	38	91	107.1	69 36.8	36	92	105.8	20
1	67 15.5	47	88	113.4	67 29.4	46	88	112.2	67 42.8	44	89	111.0	67 55.7	42	90	109.8	68 08.1	40	90	108.6	68 19.9	38	91	107.4	68 31.1	37	92	106.1	68 41.8	35	92	104.8	1
2	66 22.9	46	88	112.2	66 36.3	44	89	111.1	66 49.3	42	90	109.9	67 01.8	41	90	108.8	67 13.8	39	91	107.6	67 25.3	37	91	106.4	67 36.2	35	92	105.2	67 46.5	34	92	103.9	2
3	65 29.8	44	89	111.1	65 42.9	43	90	110.0	65 55.5	41	90	108.9	66 07.6	40	91	107.8	66 19.3	38	91	106.6	66 30.4	36	92	105.5	66 41.0	34	92	104.3	66 51.1	33	93	103.1	3
4	64 36.4	43	90	110.1	64 49.1	42	90	109.0	65 01.4	40	91	107.9	65 13.2	39	91	106.8	65 24.5	37	92	105.7	65 35.3	35	92	104.6	65 45.6	34	93	103.5	65 55.4	32	93	102.3	4
25	63 42.6	42	90	109.1	63 55.0	41	91	108.1	64 07.0	39	91	107.0	64 18.4	37	92	106.0	64 29.4	36	92	104.9	64 40.0	34	92	103.8	64 50.0	33	93	102.7	64 59.6	31	93	101.6	25
6	62 48.6	41	91	108.2	63 00.6	40	91	107.2	63 12.3	38	92	106.2	63 23.5	37	92	105.1	63 34.2	35	92	104.1	63 44.5	33	93	103.0	63 54.3	32	93	102.0	64 03.6	30	94	100.9	6
7	61 54.2	40	91	107.3	62 06.0	39	91	106.4	62 17.3	37	92	105.4	62 28.3	36	92	104.4	62 38.8	34	93	103.3	62 48.8	33	93	102.3	62 58.4	31	93	101.3	63 07.5	30	94	100.2	7
8	60 59.6	39	91	106.5	61 11.1	38	92	105.6	61 22.2	36	92	104.6	61 32.9	35	93	103.6	61 43.1	33	93	102.6	61 53.0	32	93	101.6	62 02.4	31	94	100.6	62 11.3	29	94	99.6	8
9	60 04.8	38	92	105.7	60 16.1	37	92	104.8	60 26.9	36	92	103.9	60 37.4	34	93	102.9	60 47.4	33	93	101.9	60 57.0	31	93	101.0	61 06.2	30	94	100.0	61 15.0	28	94	99.0	9
30	59 09.8	37	92	105.0	59 20.8	36	92	104.1	59 31.4	35	93	103.2	59 41.7	33	93	102.2	59 51.5	32	93	101.3	60 00.9	31	94	100.4	60 10.0	29	94	99.4	60 18.6	28	94	98.4	30
1	58 14.6	37	92	104.3	58 25.4	35	93	103.4	58 35.8	34	93	102.5	58 45.8	33	93	101.6	58 55.5	32	94	100.7	59 04.7	30	94	99.8	59 13.6	29	94	98.8	59 22.1	28	94	97.9	1
2	57 19.2	36	93	103.6	57 29.8	35	93	102.8	57 40.0	33	93	101.9	57 49.9	32	93	101.0	57 59.4	31	94	100.1	58 08.5	30	94	99.2	58 17.2	28	94	98.3	58 25.5	27	94	97.4	2
3	56 23.7	35	93	103.0	56 34.1	34	93	102.1	56 44.1	33	93	101.3	56 53.8	32	94	100.4	57 03.1	30	94	99.5	57 12.1	29	94	98.7	57 20.7	28	94	97.8	57 28.9	27	94	96.9	3
4	55 28.0	35	93	102.4	55 38.2	33	93	101.5	55 48.1	32	94	100.7	55 57.6	31	94	99.8	56 06.8	30	94	99.0	56 15.6	29	94	98.1	56 24.1	28	94	97.3	56 32.2	26	95	96.4	4
35	54 32.2	34	93	101.8	54 42.2	33	93	101.0	54 52.0	32	94	100.1	55 01.4	31	94	99.3	55 10.4	30	94	98.5	55 19.1	28	94	97.6	55 27.5	27	94	96.8	55 35.5	26	95	95.9	35
6	53 36.3	34	93	101.2	53 46.2	32	94	100.4	53 55.7	31	94	99.6	54 05.0	30	94	98.8	54 13.9	29	94	98.0	54 22.5	28	94	97.1	54 30.8	27	95	96.3	54 38.7	26	95	95.5	6
7	52 40.2	33	94	100.6	52 50.0	32	94	99.9	52 59.4	31	94	99.1	53 08.6	30	94	98.3	53 17.4	29	94	97.5	53 25.9	28	95	96.7	53 34.0	27	95	95.9	53 41.9	26	95	95.1	7
8	51 44.1	33	94	100.1	51 53.7	32	94	99.4	52 03.0	31	94	98.6	52 12.1	30	94	97.8	52 20.8	29	94	97.0	52 29.2	27	95	96.2	52 37.3	26	95	95.4	52 45.0	25	95	94.6	8
9	50 47.9	32	94	99.6	50 57.4	31	94	98.9	51 06.6	30	94	98.1	51 15.5	29	94	97.3	51 24.1	28	95	96.6	51 32.4	27	95	95.8	51 40.4	26	95	95.0	51 48.1	25	95	94.2	9
40	49 51.6	32	94	99.1	50 01.0	31	94	98.4	50 10.1	30	94	97.6	50 18.9	29	94	96.9	50 27.4	28	95	96.1	50 35.6	27	95	95.4	50 43.6	26	95	94.6	50 51.2	25	95	93.8	40
1	48 55.2	31	94	98.6	49 04.5	30	94	97.9	49 13.5	30	94	97.2	49 22.2	29	95	96.4	49 30.6	28	95	95.7	49 38.8	27	95	95.0	49 46.7	26	95	94.2	49 54.3	25	95	93.5	1
2	47 58.8	31	94	98.2	48 07.9	30	94	97.5	48 16.8	29	94	96.7	48 25.5	28	95	96.0	48 33.8	27	95	95.3	48 41.9	27	95	94.6	48 49.8	26	95	93.8	48 57.3	25	95	93.1	2
3	47 02.2	31	94	97.7	47 11.3	30	94	97.0	47 20.1	29	95	96.3	47 28.7	28	95	95.6	47 37.0	27	95	94.9	47 45.0	26	95	94.2	47 52.8	25	95	93.5	48 00.3	25	95	92.7	3
4	46 05.7	30	94	97.3	46 14.7	30	95	96.6	46 23.4	29	95	95.9	46 31.9	28	95	95.2	46 40.1	27	95	94.5	46 48.1	26	95	93.8	46 55.8	25	95	93.1	47 03.3	24	95	92.4	4
45	45 09.0	30	94	96.8	45 17.9	29	95	96.2	45 26.6	29	95	95.5	45 35.0	28	95	94.8	45 43.2	27	95	94.1	45 51.2	26	95	93.4	45 58.8	25	95	92.7	46 06.3	24	95	92.0	45
6	44 12.3	30	95	96.4	44 21.2	29	95	95.8	44 29.8	28	95	95.1	44 38.2	28	95	94.4	44 46.3	27	95	93.7	44 54.2	26	95	93.1	45 01.8	25	95	92.4	45 09.2	24	95	91.7	6
7	43 15.6	30	95	96.0	43 24.4	29	95	95.4	43 32.9	28	95	94.7	43 41.3	27	95	94.0	43 49.3	27	95	93.4	43 57.2	26	95	92.7	44 04.8	25	95	92.0	44 12.2	24	95	91.4	7
8	42 18.8	29	95	95.6	42 27.6	29	95	95.0	42 36.1	28	95	94.3	42 44.3	27	95	93.7	42 52.4	26	95	93.0	43 00.2	26	95	92.4	43 07.8	25	95	91.7	43 15.1	24	95	91.0	8
9	41 22.0	29	95	95.2	41 30.7	28	95	94.6	41 39.1	28	95	93.9	41 47.4	27	95	93.3	41 55.4	26	95	92.7	42 03.2	26	95	92.0	42 10.7	25	95	91.4	42 18.1	24	95	90.7	9
50	40 25.2	29	95	94.8	40 33.8	28	95	94.2	40 42.2	28	95	93.6	40 50.4	27	95	93.0	40 58.4	26	95	92.3	41 06.1	26	95	91.7	41 13.7	25	95	91.0	41 21.0	24	95	90.4	50
1	39 28.3	29	95	94.5	39 36.9	28	95	93.9	39 45.2	28	95	93.2	39 53.4	27	95	92.6	40 01.3	26	95	92.0	40 09.1	25	95	91.3	40 16.6	25	95	90.7	40 24.0	24	95	90.1	1
2	38 31.4	29	95	94.1	38 39.9	28	95	93.5	38 48.3	27	95	92.9	38 56.4	27	95	92.3	39 04.3	26	95	91.6	39 12.0	25	96	91.0	39 19.6	25	95	90.4	39 26.9	24	95	89.8	2
3	37 34.5	29	95	93.7	37 43.0	28	95	93.1	37 51.3	27	95	92.5	37 59.4	27	95	91.9	38 07.3	26	95	91.3	38 15.0	25	95	90.7	38 22.5	25	95	90.1	38 29.8	24	95	89.5	3
4	36 37.5	28	95	93.4	36 46.0	28	95	92.8	36 54.2	27	95	92.2	37 02.3	27	95	91.6	37 10.2	26	95	91.0	37 17.9	25	95	90.4	37 25.4	25	95	89.8	37 32.8	24	96	89.2	4
55	35 40.6	28	95	93.0	35 49.0	28	95	92.5	35 57.2	27	95	91.9	36 05.3	27	95	91.3	36 13.2	26	95	90.7	36 20.9	25	95	90.1	36 28.4	25	95	89.5	36 35.7	24	95	88.9	55
6	34 43.6	28	95	92.7	34 52.0	28	95	92.1	35 00.2	27	95	91.5	35 08.2	27	95	90.9	35 16.1	26	95	90.4	35 23.8	25	95	89.8	35 31.3	25	95	89.2	35 38.7	24	95	88.6	6
7	33 46.6	28	95	92.4	33 54.9	28	95	91.8	34 03.1	27	95	91.2	34 11.2	27	95	90.6	34 19.0	26	95	90.0	34 26.7	25	95	89.5	34 34.3	25	95	88.9	34 41.6	24	95	88.3	7
8	32 49.5	28	96	92.0	32 57.9	28	95	91.5	33 06.1	27	95	90.9	33 14.1	26	95	90.3	33 22.0	26	95	89.7	33 29.7	25	95	89.2	33 37.2	25	95	88.6	33 44.6	24	95	88.0	8
9	31 52.5	28	95	91.7	32 00.8	28	95	91.1	32 09.0	27	95	90.6	32 17.0	26	95	90.0	32 24.9	26	95	89.4	32 32.6	25	95	88.9	32 40.2	25	95	88.3	32 47.6	24	95	87.7	9
60	30 55.5	28	95	91.4	31 03.8	27	95	90.8	31 12.0	27	95	90.3	31 20.0	26	95	89.7	31 27.8	26	95	89.1	31 35.6	25	95	88.6	31 43.1	25	95	88.0	31 50.6	24	95	87.4	60
1	29 58.4	28	95	91.1	30 06.7	27	95	90.5	30 14.9	27	95	89.9	30 22.9	27	95	89.4	30 30.8	26	95	88.8	30 38.5	26	95	88.3	30 46.1	25	95	87.7	30 53.6	25	96	87.1	1
2	29 01.4	28	95	90.7	29 09.7	27	95	90.2	29 17.8	27	95	89.6	29 25.9	27	95	89.1	29 33.7	26	95	88.5	29 41.5	26	95	88.0	29 49.1	25	95	87.4	29 56.6	25	95	86.9	2
3	28 04.3	28	95	90.4	28 12.6	27	95	89.9	28 20.8	27	95	89.3	28 28.8	27	95	88.8	28 36.7	26	95	88.2	28 44.5	26	95	87.7	28 52.1	25	95	87.1	28 59.6	25	95	86.6	3
4	27 07.2	28	96	90.1	27 15.5	27	95	89.6	27 23.7	27	95	89.0	27 31.8	27	95	88.5	27 39.7	26	95	87.9	27 47.5	26	95	87.4	27 55.1	25	95	86.9	28 02.7	25	95	86.3	4
65	26 10.2	28	95	89.8	26 18.5	27	95	89.3	26 26.7	27	95	88.7	26 34.7	27	95	88.2	26 42.6	26	95	87.7	26 50.5	26	95	87.1	26 58.2	25	95	86.6	27 05.7	25	96	86.0	65
6	25 13.1	28	95	89.5	25 21.4	27	95	89.0	25 29.6	27	95	88.4	25 37.7	27	95	87.9	25 45.6	26	95	87.4	25 53.5	26	95	86.8	26 01.2	26	95	86.3	26 08.8	25	96	85.8	6
7	24 16.1	28	95	89.2	24 24.4	28	95	88.7	24 32.6	27	95	88.1	24 40.7	27	95	87.6	24 48.6	26	95	87.1	24 56.5	26	95	86.5	25 04.3	26	95	86.0	25 11.9	25	95	85.5	7
8	23 19.0	28	95	88.9	23 27.3	28	95	88.4	23 35.5	27	95	87.8	23 43.7	27	95	87.3	23 51.7	27	95	86.8	23 59.6	26	95	86.3	24 07.4	26	95	85.7	24 15.0	25	96	85.2	8
9	22 21.9	28	95	88.6	22 30.3	28	95	88.1	22 38.5	27	95	87.6	22 46.7	27	95	87.0	22 54.7	27	95	86.5	23 02.6	26	95	86.0	23 10.5	26	95	85.5	23 18.2	26	95	84.9	9
70	21 24.9	28	95	88.3	21 33.3	28	95	87.8	21 41.5	27	95	87.3	21 49.7	27	95	86.7	21 57.7	27	95	86.2	22 05.7	26	95	85.7	22 13.6	26	95	85.2	22 21.4	26	95	84.7	70
1	20 27.9	28	95	88.0	20 36.2	28	95	87.5	20 44.5	27	95	87.0	20 52.7	27	95	86.5	21 00.8	27	95	85.9	21 08.8	27	95	85.4	21 16.7	26	95	84.9	21 24.6	26	95	84.4	1
2	19 30.8	28	96	87.7	19 39.2	28	96	87.2	19 47.6	28	95	86.7	19 55.8	27	95	86.2	20 03.9	27	95	85.7	20 12.0	27	95	85.1	20 19.9	26	95	84.6	20 27.8	26	95	84.1	2
3	18 33.8	28	96	87.4	18 42.3	28	95	86.9	18 50.6	28	95	86.4	18 58.8	27	95	85.9	19 07.0	27	95	85.4	19 15.1	27	95	84.9	19 23.1	27	95	84.4	19 31.0	26	95	83.8	3
4	17 36.8	28	96	87.1	17 45.3	28	95	86.6	17 53.7	28	95	86.1	18 01.9	28	95	85.6	18 10.2	27	95	85.1	18 18.3	27	95	84.6	18 26.3	27	95	84.1	18 34.3	26	94	83.6	4
75	16 39.9	28	96	86.8	16 48.3	28	95	86.3	16 56.7	28	95	85.8	17 05.1	28	95	85.3	17 13.3	27	95	84.8	17 21.5	27	95	84.3	17 29.6	27	94	83.8	17 37.6	27	94	83.3	75
6	15 42.9	28	95	86.5	15 51.4	28	95	86.0	15 59.8	28	95	85.5	16 08.2	28	95	85.0	16 16.5	28	95	84.5	16 24.7	27	95	84.0	16 32.9	27	94	83.5	16 41.0	27	94	83.0	6
7	14 45.9	29	95	86.2	14 54.5	28	95	85.7	15 03.0	28	95	85.2	15 11.4	28	95	84.7	15 19.7	28	95	84.2	15 28.0	27	95	83.7	15 36.2	27	94	83.2	15 44.3	27	94	82.7	7
8	13 49.0	29	95	85.9	13 57.6	28	95	85.4	14 06.1	28	95	85.0	14 14.6	28	95	84.5	14 22.9	28	95	84.0	14 31.3	28	94	83.5	14 39.5	27	94	83.0	14 47.7	27	94	82.5	8
9	12 52.1	29	95	85.6	13 00.7	29	95	85.2	13 09.3	28	95	84.7	13 17.8	28	95	84.2	13 26.2	28	94	83.7	13 34.6	28	94	83.2	13 42.9	28	94	82.7	13 51.2	27	94	82.2	9
80	11 55.2	29	95	85.4	12 03.9	29	95	84.9	12 12.5	29	95	84.4	12 21.0	28	95	83.9	12 29.5	28	94	83.4	12 38.0	28	94	82.9	12 46.3	28	94	82.4	12 54.7	28	94	81.9	80
1	10 58.3	29	95	85.1	11 07.0	29	95	84.6	11 15.7	29	95	84.1	11 24.3	29	94	83.6	11 32.8	28	94	83.1	11 41.3	28	94	82.6	11 49.8	28	94	82.1	11 58.2	28	94	81.6	1
2	10 01.5	29	96	84.8	10 10.2	29	95	84.3	10 18.9	29	95	83.8	10 27.6	29	94	83.3	10 36.2	29	94	82.8	10 44.8	28	94	82.3	10 53.3	28	94	81.8	11 01.8	28	94	81.4	2
3	9 04.7	29	96	84.5	9 13.5	29	95	84.0	9 22.2	29	94	83.5	9 30.9	29	94	83.0	9 39.6	29	94	82.5	9 48.2	29	94	82.0	9 56.8	29	94	81 6	10 05.4	28	94	81.1	3
4	8 07.9	30	96	84.2	8 16.7	29	94	83.7	8 25.6	29	94	83.2	8 34.3	29	94	82.7	8 43.0	29	94	82.2	8 51.7	29	94	81.8	9 00.4	29	94	81.3	9 09.0	29	94	80.8	4
85	7 11.2	30	95	83.9	7 20.0	30	94	83.4	7 28.9	29	94	82.9	7 37.7	29	94	82.4	7 46.5	29	94	82.0	7 55.3	29	94	81.5	8 04.0	29	94	81.0	8 12.7	29	94	80.5	85
6	6 14.4	30	94	83.6	6 23.4	30	94	83.1	6 32.3	30	94	82.6	6 41.2	30	94	82.1	6 50.0	29	94	81.7	6 58.9	29	94	81.2	7 07.7	29	94	80.7	7 16.5	29	94	80.2	6
7	5 17.7	30	94	83.3	5 26.7	30	94	82.8	5 35.7	30	94	82.3	5 44.7	30	94	81.9	5 53.6	30	94	81.4	6 02.5	30	94	80.9	6 11.4	30	94	80.4	6 20.2	29	94	79.9	7
8																					5 06.2	30	94	80.6	5 15.1	30	94	80.1	5 24.1	30	94	79.6	8

H.A.	8° 00′				8° 30′				9° 00′				9° 30′				10° 00′				10° 30′				11° 00′				11° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	64 00.0	1.0	02	180.0	63 30.0	1.0	02	180.0	63 00.0	1.0	02	180.0	62 30.0	1.0	02	180.0	62 00.0	1.0	02	180.0	61 30.0	1.0	02	180.0	61 00.0	1.0	02	180.0	60 30.0	1.0	02	180.0	00
1	63 58.9	1.0	06	177.7	63 28.9	1.0	06	177.8	62 58.9	1.0	05	177.8	62 28.9	1.0	05	177.9	61 59.0	1.0	05	177.9	61 29.0	1.0	05	177.9	60 59.0	1.0	05	178.0	60 29.0	1.0	05	178.0	1
2	63 55.5	1.0	09	175.6	63 25.6	1.0	09	175.6	62 55.7	1.0	09	175.7	62 25.8	1.0	09	175.7	61 55.8	1.0	09	175.8	61 25.9	1.0	09	175.9	60 56.0	1.0	08	176.0	60 26.0	1.0	08	176.0	2
3	63 49.9	99	13	173.3	63 20.1	99	13	173.4	62 50.3	99	13	173.5	62 20.5	99	12	173.6	61 50.6	99	12	173.7	61 20.8	99	12	173.8	60 51.0	99	12	173.9	60 21.1	99	11	174.0	3
4	63 42.1	99	17	171.0	63 12.4	99	16	171.2	62 42.8	99	16	171.4	62 13.1	99	16	171.5	61 43.4	99	15	171.7	61 13.7	99	15	171.8	60 43.9	99	15	171.9	60 14.2	99	15	172.1	4
05	63 32.1	98	20	168.8	63 02.6	98	20	169.0	62 33.1	98	19	169.2	62 03.6	98	19	169.4	61 34.1	98	19	169.6	61 04.5	99	18	169.8	60 35.0	99	18	170.0	60 05.4	99	18	170.1	05
6	63 20.0	98	24	166.7	62 50.7	98	23	166.9	62 21.5	98	23	167.1	61 52.1	98	22	167.4	61 22.8	98	22	167.6	60 53.4	98	22	167.8	60 24.1	98	21	168.0	59 54.7	98	21	168.2	6
7	63 05.8	97	27	164.5	62 36.8	97	27	164.8	62 07.8	97	26	165.1	61 38.7	97	26	165.3	61 09.6	97	25	165.6	60 40.4	97	25	165.8	60 11.3	97	24	166.1	59 42.1	97	24	166.3	7
8	62 49.6	96	30	162.4	62 20.9	96	30	162.7	61 52.1	96	29	163.1	61 23.3	96	29	163.3	60 54.4	96	28	163.6	60 25.5	96	28	163.9	59 56.6	96	27	164.2	59 27.7	97	27	164.4	8
9	62 31.4	95	34	160.4	62 03.0	95	33	160.7	61 34.5	95	32	161.1	61 06.0	95	32	161.4	60 37.4	95	31	161.7	60 08.8	95	31	162.0	59 40.2	96	30	162.3	59 11.5	96	30	162.6	9
10	62 11.3	94	37	158.4	61 43.2	94	36	158.7	61 15.1	94	35	159.1	60 46.9	94	35	159.5	60 18.6	94	34	159.8	59 50.3	94	34	160.1	59 21.9	95	33	160.5	58 53.5	95	33	160.8	10
1	61 49.4	92	40	156.4	61 21.6	93	39	156.8	60 53.8	93	38	157.2	60 26.0	93	38	157.6	59 58.0	93	37	157.9	59 30.0	93	37	158.3	59 02.0	94	36	158.7	58 33.9	94	35	159.0	1
2	61 25.7	91	42	154.5	60 58.3	91	42	154.9	60 30.9	92	41	155.3	60 03.4	92	40	155.7	59 35.8	92	40	156.1	59 08.1	92	39	156.5	58 40.4	92	39	156.9	58 12.6	93	38	157.2	2
3	61 00.3	90	45	152.6	60 33.3	90	44	153.1	60 06.2	90	44	153.5	59 39.1	91	43	154.0	59 11.9	91	42	154.4	58 44.6	91	42	154.8	58 17.2	91	41	155.2	57 49.8	92	41	155.5	3
4	60 33.2	88	48	150.8	60 06.7	89	47	151.3	59 40.0	89	46	151.8	59 13.3	89	46	152.2	58 46.4	90	45	152.6	58 19.5	90	44	153.1	57 52.5	90	44	153.5	57 25.4	90	43	153.9	4
15	60 04.7	87	50	149.1	59 38.5	87	49	149.6	59 12.3	88	49	150.0	58 45.9	88	48	150.5	58 19.5	88	47	151.0	57 52.9	89	47	151.4	57 26.3	89	46	151.8	56 59.6	89	45	152.3	15
6	59 34.6	86	52	147.4	59 08.9	86	52	147.9	58 43.1	86	51	148.4	58 17.1	87	50	148.9	57 51.0	87	50	149.3	57 24.9	87	49	149.8	56 58.6	88	48	150.2	56 32.3	88	48	150.7	6
7	59 03.2	84	55	145.7	58 37.9	85	54	146.3	58 12.4	85	53	146.8	57 46.9	85	53	147.3	57 21.3	86	52	147.7	56 55.5	86	51	148.2	56 29.6	86	51	148.7	56 03.7	87	50	149.1	7
8	58 30.4	83	57	144.1	58 05.5	83	56	144.7	57 40.5	84	55	145.2	57 15.4	84	55	145.7	56 50.2	84	54	146.2	56 24.8	85	53	146.7	55 59.3	85	53	147.2	55 33.7	85	52	147.6	8
9	57 56.3	81	59	142.6	57 31.9	82	58	143.1	57 07.3	82	57	143.7	56 42.6	83	57	144.2	56 17.8	83	56	144.7	55 52.8	83	55	145.2	55 27.8	84	55	145.7	55 02.6	84	54	146.2	9
20	57 21.1	80	61	141.1	56 57.1	80	60	141.7	56 32.9	81	59	142.2	56 08.6	81	59	142.7	55 44.2	82	58	143.3	55 19.7	82	57	143.8	54 55.0	82	56	144.3	54 30.2	83	56	144.7	20
1	56 44.7	78	62	139.7	56 21.1	79	62	140.2	55 57.4	79	61	140.8	55 33.5	80	60	141.3	55 09.5	80	60	141.8	54 45.4	81	59	142.4	54 21.1	81	58	142.9	53 56.7	82	58	143.4	1
2	56 07.3	77	64	138.3	55 44.1	77	63	138.8	55 20.8	78	63	139.4	54 57.3	78	62	140.0	54 33.7	79	61	140.5	54 10.0	79	61	141.0	53 46.1	80	60	141.5	53 22.1	80	59	142.0	2
3	55 28.8	75	66	136.9	55 06.1	76	65	137.5	54 43.2	77	64	138.1	54 20.1	77	64	138.6	53 56.9	78	63	139.2	53 33.6	78	62	139.7	53 10.1	78	62	140.2	52 46.5	79	61	140.7	3
4	54 49.4	74	67	135.6	54 27.0	75	67	136.2	54 04.6	75	66	136.8	53 41.9	76	65	137.3	53 19.1	76	65	137.9	52 56.2	77	64	138.4	52 33.1	77	63	139.0	52 09.9	78	63	139.5	4
25	54 09.0	73	69	134.4	53 47.1	73	68	135.0	53 25.0	74	67	135.5	53 02.8	74	67	136.1	52 40.4	75	66	136.7	52 17.9	75	65	137.2	51 55.2	76	65	137.7	51 32.4	76	64	138.3	25
6	53 27.8	71	70	133.2	53 06.3	72	69	133.8	52 44.6	73	69	134.3	52 22.8	73	68	134.9	52 00.8	74	67	135.5	51 38.7	74	67	136.0	51 16.4	75	66	136.5	50 53.9	75	65	137.1	6
7	52 45.8	70	71	132.0	52 24.7	71	71	132.6	52 03.4	71	70	133.2	51 42.0	72	69	133.7	51 20.4	72	69	134.3	50 58.6	73	68	134.8	50 36.7	73	67	135.4	50 14.7	74	67	135.9	7
8	52 03.0	69	72	130.9	51 42.3	69	72	131.5	51 21.4	70	71	132.1	51 00.4	70	71	132.6	50 39.2	71	70	133.2	50 17.8	72	69	133.7	49 56.2	72	69	134.3	49 34.6	73	68	134.8	8
9	51 19.5	67	74	129.8	50 59.2	68	73	130.4	50 38.7	69	72	131.0	50 18.0	69	72	131.5	49 57.2	70	71	132.1	49 36.2	70	71	132.6	49 15.0	71	70	133.2	48 53.7	71	69	133.7	9
30	50 35.4	66	75	128.7	50 15.4	67	74	129.3	49 55.3	67	74	129.9	49 35.0	68	73	130.5	49 14.5	69	72	131.0	48 53.8	69	72	131.6	48 33.1	70	71	132.1	48 12.1	70	70	132.7	30
1	49 50.5	65	76	127.7	49 30.9	66	75	128.3	49 11.2	66	75	128.9	48 51.2	67	74	129.5	48 31.1	67	73	130.0	48 10.8	68	73	130.6	47 50.4	68	72	131.1	47 29.8	69	72	131.7	1
2	49 05.1	64	77	126.8	48 45.9	64	76	127.3	48 26.4	65	76	127.9	48 06.9	66	75	128.5	47 47.1	66	74	129.0	47 27.2	67	74	129.6	47 07.1	67	73	130.1	46 46.9	68	73	130.7	2
3	48 19.1	63	78	125.8	48 00.2	63	77	126.4	47 41.1	64	76	127.0	47 21.9	64	76	127.5	47 02.5	65	75	128.1	46 42.9	66	75	128.6	46 23.2	66	74	129.2	46 03.3	67	74	129.7	3
4	47 32.6	62	78	124.9	47 14.0	62	78	125.5	46 55.3	63	77	126.0	46 36.4	63	77	126.6	46 17.3	64	76	127.2	45 58.0	64	76	127.7	45 38.7	65	75	128.3	45 19.1	65	75	128.8	4
35	46 45.5	60	79	124.0	46 27.3	61	79	124.6	46 08.9	62	78	125.1	45 50.3	62	78	125.7	45 31.5	63	77	126.3	45 12.6	63	77	126.8	44 53.6	64	76	127.4	44 34.4	64	75	127.9	35
6	45 58.0	59	80	123.1	45 40.0	60	80	123.7	45 21.9	61	79	124.3	45 03.7	61	78	124.8	44 45.3	62	78	125.4	44 26.7	62	77	126.0	44 08.0	63	77	126.5	43 49.1	63	76	127.0	6
7	45 09.9	58	81	122.3	44 52.3	59	80	122.9	44 34.6	60	80	123.4	44 16.6	60	79	124.0	43 58.5	61	79	124.6	43 40.3	61	78	125.1	43 21.8	62	78	125.7	43 03.3	62	77	126.2	7
8	44 21.5	57	81	121.5	44 04.2	58	81	122.1	43 46.7	59	80	122.6	43 29.1	59	80	123.2	43 11.3	60	79	123.7	42 53.3	60	79	124.3	42 35.2	61	78	124.8	42 17.0	61	78	125.4	8
9	43 32.6	56	82	120.7	43 15.6	57	82	121.3	42 58.5	58	81	121.8	42 41.1	58	81	122.4	42 23.6	59	80	122.9	42 06.0	59	80	123.5	41 48.2	60	79	124.0	41 30.2	60	79	124.6	9
40	42 43.4	55	83	120.0	42 26.7	56	82	120.5	42 09.8	57	82	121.1	41 52.7	57	81	121.6	41 35.5	58	81	122.2	41 18.2	58	80	122.7	41 00.7	59	80	123.3	40 43.0	59	79	123.8	40
1	41 53.8	55	83	119.2	41 37.3	55	83	119.8	41 20.7	56	82	120.3	41 03.9	56	82	120.9	40 47.0	57	81	121.4	40 30.0	57	81	122.0	40 12.7	58	81	122.5	39 55.4	58	80	123.0	1
2	41 03.8	54	84	118.5	40 47.6	54	83	119.1	40 31.3	55	83	119.6	40 14.8	55	83	120.2	39 58.1	56	82	120.7	39 41.4	56	82	121.2	39 24.4	57	81	121.8	39 07.3	57	81	122.3	2
3	40 13.5	53	84	117.8	39 57.6	53	84	118.4	39 41.5	54	84	118.9	39 25.3	54	83	119.5	39 08.9	55	83	120.0	38 52.4	55	82	120.5	38 35.7	56	82	121.1	38 18.9	56	81	121.6	3
4	39 22.8	52	85	117.1	39 07.2	52	84	117.7	38 51.4	53	84	118.2	38 35.4	53	84	118.8	38 19.3	54	83	119.3	38 03.1	54	83	119.8	37 46.7	55	82	120.4	37 30.1	55	82	120.9	4
45	38 31.9	51	85	116.5	38 16.5	52	85	117.0	38 00.9	52	85	117.6	37 45.2	53	84	118.1	37 29.4	53	84	118.6	37 13.4	54	83	119.2	36 57.3	54	83	119.7	36 41.0	54	82	120.2	45
6	37 40.7	50	86	115.8	37 25.5	51	85	116.4	37 10.2	51	85	116.9	36 54.8	52	85	117.5	36 39.2	52	84	118.0	36 23.4	53	84	118.5	36 07.5	53	83	119.0	35 51.5	54	83	119.6	6
7	36 49.2	50	86	115.2	36 34.3	50	86	115.8	36 19.2	50	86	116.3	36 04.0	51	85	116.8	35 48.6	51	85	117.4	35 33.1	52	84	117.9	35 17.5	52	84	118.4	35 01.7	53	83	118.9	7
8	35 57.4	49	87	114.6	35 42.7	49	86	115.2	35 27.9	50	86	115.7	35 12.9	50	86	116.2	34 57.8	51	85	116.7	34 42.5	51	85	117.3	34 27.2	52	84	117.8	34 11.6	52	84	118.3	8
9	35 05.4	48	87	114.0	34 51.0	48	87	114.6	34 36.3	49	86	115.1	34 21.6	49	86	115.6	34 06.7	50	86	116.1	33 51.7	50	85	116.7	33 36.5	51	85	117.2	33 21.3	51	84	117.7	9
50	34 13.2	47	87	113.5	33 58.9	48	87	114.0	33 44.5	48	87	114.5	33 30.0	49	86	115.0	33 15.4	49	86	115.6	33 00.6	50	86	116.1	32 45.6	50	85	116.6	32 30.6	50	85	117.1	50
1	33 20.7	47	88	112.9	33 06.7	47	87	113.4	32 52.5	47	87	113.9	32 38.2	48	87	114.5	32 23.8	48	86	115.0	32 09.2	49	86	115.5	31 54.5	49	86	116.0	31 39.7	50	85	116.5	1
2	32 28.1	46	88	112.3	32 14.2	46	88	112.9	32 00.2	47	87	113.4	31 46.1	47	87	113.9	31 31.9	48	87	114.4	31 17.6	48	86	114.9	31 03.1	48	86	115.5	30 48.5	49	86	116.0	2
3	31 35.2	45	88	111.8	31 21.5	46	88	112.3	31 07.8	46	88	112.9	30 53.9	47	87	113.4	30 39.8	47	87	113.9	30 25.7	47	87	114.4	30 11.4	48	86	114.9	29 57.1	48	86	115.4	3
4	30 42.1	45	89	111.3	30 28.7	45	88	111.8	30 15.1	45	88	112.3	30 01.4	46	88	112.8	29 47.6	46	88	113.4	29 33.6	47	87	113.9	29 19.6	47	87	114.4	29 05.4	47	86	114.9	4
55	29 48.8	44	89	110.8	29 35.6	44	89	111.3	29 22.2	45	88	111.8	29 08.7	45	88	112.3	28 55.1	46	88	112.8	28 41.3	46	87	113.3	28 27.5	46	87	113.8	28 13.5	47	87	114.4	55
6	28 55.4	43	89	110.3	28 42.3	44	89	110.8	28 29.1	44	89	111.3	28 15.8	45	88	111.8	28 02.4	45	88	112.3	27 48.8	45	88	112.8	27 35.2	46	88	113.3	27 21.4	46	87	113.8	6
7	28 01.8	43	90	109.8	27 48.9	43	89	110.3	27 35.9	44	89	110.8	27 22.7	44	89	111.3	27 09.5	44	88	111.8	26 56.2	45	88	112.3	26 42.7	45	88	112.8	26 29.1	45	88	113.3	7
8	27 08.0	42	90	109.3	26 55.3	43	90	109.8	26 42.5	43	89	110.3	26 29.5	43	89	110.8	26 16.4	44	89	111.3	26 03.3	44	88	111.8	25 50.0	44	88	112.3	25 36.7	45	88	112.8	8
9	26 14.1	42	90	108.9	26 01.5	42	90	109.4	25 48.9	42	90	109.9	25 36.1	43	89	110.4	25 23.2	43	89	110.9	25 10.2	43	89	111.4	24 57.2	44	88	111.9	24 44.0	44	88	112.4	9
60	25 20.0	41	90	108.4	25 07.6	42	90	108.9	24 55.1	42	90	109.4	24 42.5	42	90	109.9	24 29.8	43	89	110.4	24 17.0	43	89	110.9	24 04.1	43	89	111.4	23 51.1	43	88	111.9	60
1	24 25.8	41	91	108.0	24 13.6	41	90	108.5	24 01.2	41	90	109.0	23 48.8	42	90	109.5	23 36.3	42	90	110.0	23 23.6	42	89	110.4	23 10.9	43	89	110.9	22 58.1	43	89	111.4	1
2	23 31.5	40	91	107.5	23 19.4	40	91	108.0	23 07.2	41	90	108.5	22 54.9	41	90	109.0	22 42.5	41	90	109.5	22 30.1	42	90	110.0	22 17.5	42	89	110.5	22 04.9	42	89	111.0	2
3	22 37.0	40	91	107.1	22 25.0	40	91	107.6	22 13.0	40	91	108.1	22 00.9	41	90	108.6	21 48.7	41	90	109.1	21 36.4	41	90	109.6	21 24.0	41	89	110.0	21 11.5	42	89	110.5	3
4	21 42.4	39	91	106.7	21 30.6	39	91	107.2	21 18.7	40	91	107.7	21 06.7	40	90	108.1	20 54.7	40	90	108.6	20 42.5	41	90	109.1	20 30.3	41	90	109.6	20 18.0	41	89	110.1	4
65	20 47.7	39	91	106.3	20 36.0	39	91	106.7	20 24.3	39	91	107.2	20 12.4	40	91	107.7	20 00.5	40	90	108.2	19 48.6	40	90	108.7	19 36.5	40	90	109.2	19 24.3	41	90	109.7	65
6	19 52.8	38	92	105.8	19 41.3	39	91	106.3	19 29.7	39	91	106.8	19 18.0	39	91	107.3	19 06.3	39	91	107.8	18 54.4	40	90	108.3	18 42.5	40	90	108.8	18 30.5	40	90	109.3	6
7	18 57.9	38	92	105.4	18 46.5	38	92	105.9	18 35.0	38	91	106.4	18 23.5	39	91	106.9	18 11.9	39	91	107.4	18 00.2	39	91	107.9	17 48.4	39	90	108.4	17 36.6	40	90	108.8	7
8	18 02.8	37	92	105.1	17 51.6	38	92	105.5	17 40.2	38	92	106.0	17 28.8	38	91	106.5	17 17.4	38	91	107.0	17 05.8	39	91	107.5	16 54.2	39	91	108.0	16 42.5	39	90	108.4	8
9	17 07.7	37	92	104.7	16 56.5	37	92	105.2	16 45.3	37	92	105.6	16 34.1	38	91	106.1	16 22.7	38	91	106.6	16 11.3	38	91	107.1	15 59.9	38	91	107.6	15 48.3	39	91	108.0	9
70	16 12.4	37	92	104.3	16 01.4	37	92	104.8	15 50.3	37	92	105.3	15 39.2	37	92	105.7	15 28.0	37	91	106.2	15 16.7	38	91	106.7	15 05.4	38	91	107.2	14 54.0	38	91	107.7	70
1	15 17.1	36	92	103.9	15 06.2	36	92	104.4	14 55.2	37	92	104.9	14 44.2	37	92	105.4	14 33.2	37	92	105.8	14 22.0	37	91	106.3	14 10.8	37	91	106.8	13 59.6	38	91	107.3	1
2	14 21.6	36	93	103.5	14 10.9	36	92	104.0	14 00.0	36	92	104.5	13 49.2	36	92	105.0	13 38.2	37	92	105.5	13 27.2	37	92	105.9	13 16.2	37	91	106.4	13 05.1	37	91	106.9	2
3	13 26.1	35	93	103.2	13 15.5	36	92	103.7	13 04.8	36	92	104.1	12 54.0	36	92	104.6	12 43.2	36	92	105.1	12 32.3	36	92	105.6	12 21.4	36	92	106.1	12 10.4	37	91	106.5	3
4	12 30.5	35	93	102.8	12 20.0	35	93	103.3	12 09.4	35	92	103.8	11 58.7	36	92	104.3	11 48.0	36	92	104.7	11 37.3	36	92	105.2	11 26.5	36	92	105.7	11 15.7	36	91	106.2	4
75	11 34.8	35	93	102.5	11 24.4	35	93	103.0	11 13.9	35	93	103.4	11 03.4	35	92	103.9	10 52.8	35	92	104.4	10 42.2	35	92	104.9	10 31.5	36	92	105.3	10 20.8	36	92	105.8	75
6	10 39.1	34	93	102.1	10 28.8	35	93	102.6	10 18.4	35	93	103.1	10 07.9	35	93	103.6	9 57.5	35	92	104.0	9 47.0	35	92	104.5	9 36.4	35	92	105.0	9 25.8	35	92	105.5	6
7	9 43.3	34	93	101.8	9 33.0	34	93	102.3	9 22.7	34	93	102.7	9 12.4	34	93	103.2	9 02.1	35	92	103.7	8 51.7	35	92	104.2	8 41.3	35	92	104.6	8 30.8	35	92	105.1	7
8	8 47.4	34	93	101.4	8 37.2	34	93	101.9	8 27.0	34	93	102.4	8 16.8	34	93	102.9	8 06.6	34	93	103.3	7 56.3	34	92	103.8	7 46.0	34	92	104.3	7 35.7	35	92	104.8	8
9	7 51.4	33	93	101.1	7 41.4	34	93	101.6	7 31.3	34	93	102.1	7 21.2	34	93	102.5	7 11.0	34	93	103.0	7 00.9	34	93	103.5	6 50.7	34	92	103.9	6 40.4	34	92	104.4	9
80	6 55.4	33	94	100.8	6 45.4	33	93	101.2	6 35.4	33	93	101.7	6 25.4	33	93	102.2	6 15.4	34	93	102.7	6 05.3	34	93	103.1	5 55.2	34	92	103.6	5 45.1	34	92	104.1	80
1	5 59.3	33	94	100.4	5 49.4	33	93	100.9	5 39.5	33	93	101.4	5 29.6	33	93	101.9	5 19.7	33	93	102.3	5 09.7	33	93	102.8									1
2	5 03.1	33	94	100.1																													2

Lat. 18°

H.A.	12° 00′			12° 30′			13° 00′			13° 30′			14° 00′			14° 30′			15° 00′			15° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	84 00.0	1.0 08	180.0	84 30.0	1.0 08	180.0	85 00.0	1.0 09	180.0	85 30.0	1.0 10	180.0	86 00.0	1.0 11	180.0	86 30.0	1.0 13	180.0	87 00.0	1.0 15	180.0	87 30.0	1.0 18	180.0	00
1	83 55.4	99 23	170.7	84 25.0	99 24	169.9	84 54.5	98 27	169.0	85 23.9	98 29	167.8	85 53.2	97 32	166.3	86 22.2	97 36	164.5	86 51.0	95 41	162.1	87 19.4	93 47	158.9	1
2	83 41.8	95 36	161.9	84 10.3	95 39	160.4	84 38.5	93 42	158.6	85 06.3	92 45	156.6	85 33.7	90 49	154.0	86 00.5	88 54	151.0	86 26.4	85 60	147.1	86 51.0	80 66	142.3	2
3	83 20.3	90 47	153.8	83 47.1	89 50	151.8	84 13.5	87 54	149.5	84 39.2	85 58	146.9	85 04.2	82 62	143.8	85 28.1	78 66	140.1	85 50.6	73 71	135.8	86 11.5	66 77	130.6	3
4	82 51.9	85 57	146.7	83 16.9	82 60	144.4	83 41.3	80 63	141.8	84 04.7	77 67	138.9	84 27.1	73 70	135.6	84 48.3	68 74	131.8	85 07.9	62 79	127.5	85 25.6	55 83	122.5	4
05	82 18.0	79 64	140.5	82 41.2	76 67	138.1	83 03.5	73 70	135.4	83 24.8	69 73	132.4	83 44.9	65 77	129.1	84 03.6	60 80	125.4	84 20.7	54 83	121.3	84 36.0	47 86	116.8	05
6	81 39.6	73 70	135.2	82 01.0	70 72	132.7	82 21.5	66 75	130.0	82 40.8	63 78	127.1	82 59.0	58 81	123.9	83 15.6	53 84	120.4	83 30.8	48 86	116.7	83 44.1	41 89	112.6	6
7	80 57.8	67 74	130.6	81 17.6	64 77	128.2	81 36.4	61 79	125.6	81 54.0	57 82	122.7	82 10.4	52 84	119.7	82 25.5	48 86	116.5	82 39.0	42 88	113.1	82 50.8	37 90	109.4	7
8	80 13.2	63 78	126.7	80 31.6	59 80	124.4	80 48.9	56 82	121.8	81 05.1	52 84	119.2	81 20.0	48 86	116.3	81 33.7	43 88	113.3	81 45.9	38 90	110.2	81 56.6	33 92	106.9	8
9	79 26.5	58 81	123.4	79 43.5	55 83	121.1	79 59.6	52 84	118.7	80 14.5	48 86	116.2	80 28.3	44 88	113.5	80 40.8	40 90	110.7	80 52.0	35 91	107.9	81 01.7	30 92	104.8	9
10	78 38.0	55 83	120.5	78 54.0	51 85	118.3	79 08.9	48 86	116.0	79 22.7	44 88	113.6	79 35.5	41 89	111.2	79 47.0	36 91	108.6	79 57.3	32 92	105.9	80 06.3	28 93	103.2	10
1	77 48.2	51 85	117.9	78 03.1	48 86	115.9	78 17.1	45 88	113.7	78 30.0	41 89	111.5	78 41.9	38 90	109.1	78 52.7	34 91	106.7	79 02.2	30 92	104.3	79 10.6	26 93	101.7	1
2	76 57.3	48 86	115.7	77 11.3	45 88	113.7	77 24.4	42 89	111.7	77 36.6	39 90	109.6	77 47.7	35 91	107.4	77 57.8	32 92	105.2	78 06.8	28 93	102.9	78 14.6	24 94	100.5	2
3	76 05.5	46 88	113.7	76 18.7	43 89	111.9	76 31.1	40 90	109.9	76 42.5	37 91	107.9	76 53.0	33 92	105.9	77 02.5	30 93	103.8	77 11.0	26 93	101.6	77 18.4	23 94	99.4	3
4	75 12.9	43 89	112.0	75 25.4	41 90	110.2	75 37.2	38 91	108.4	75 48.0	35 92	106.5	75 58.0	32 92	104.5	76 07.0	28 93	102.6	76 15.0	25 94	100.5	76 22.0	22 94	98.5	4
15	74 19.7	41 90	110.4	74 31.6	39 90	108.7	74 42.8	36 91	107.0	74 53.1	33 92	105.2	75 02.6	30 93	103.3	75 11.2	27 93	101.5	75 18.8	24 94	99.6	75 25.5	21 94	97.6	15
6	73 26.0	39 90	109.0	73 37.4	37 91	107.4	73 48.0	34 92	105.7	73 57.9	32 92	104.0	74 06.9	29 93	102.3	74 15.1	26 94	100.5	74 22.5	23 94	98.7	74 28.9	20 94	96.9	6
7	72 31.8	38 91	107.7	72 42.7	35 92	106.2	72 53.0	33 92	104.6	73 02.4	30 93	102.9	73 11.1	28 93	101.3	73 19.0	25 94	99.6	73 26.0	22 94	97.9	73 32.2	19 95	96.2	7
8	71 37.3	36 91	106.5	71 47.8	34 92	105.0	71 57.6	32 93	103.5	72 06.7	29 93	102.0	72 15.0	27 94	100.4	72 22.6	24 94	98.8	72 29.4	21 94	97.2	72 35.5	19 95	95.6	8
9	70 42.4	35 92	105.5	70 52.5	33 92	104.0	71 02.0	30 93	102.6	71 10.8	28 93	101.1	71 18.8	26 94	99.6	71 26.2	23 94	98.1	71 32.8	21 95	96.5	71 38.6	18 95	95.0	9
20	69 47.3	34 92	104.5	69 57.1	32 93	103.1	70 06.2	29 93	101.7	70 14.7	27 94	100.3	70 22.5	25 94	98.9	70 29.6	23 94	97.4	70 36.1	20 95	95.9	70 41.8	18 96	94.5	20
1	68 51.9	33 93	103.5	69 01.4	31 93	102.2	69 10.3	29 94	100.9	69 18.5	26 94	99.5	69 26.1	24 94	98.2	69 33.0	22 94	96.8	69 39.3	20 96	95.4	69 44.9	17 95	93.9	1
2	67 56.3	32 93	102.7	68 05.5	30 93	101.4	68 14.1	28 94	100.1	68 22.2	26 94	98.8	68 29.5	24 94	97.5	68 36.3	21 96	96.2	68 42.4	19 95	94.8	68 47.9	17 96	93.5	2
3	67 00.6	31 93	101.9	67 09.5	29 94	100.7	67 17.9	27 94	99.4	67 25.7	25 94	98.2	67 32.9	23 94	96.9	67 39.5	21 96	95.6	67 45.6	19 95	94.3	67 50.9	17 96	93.0	3
4	66 04.7	30 93	101.1	66 13.4	28 94	100.0	66 21.6	26 94	98.8	66 29.2	24 94	97.6	66 36.2	23 95	96.3	66 42.7	21 95	95.1	66 48.6	19 95	93.9	66 53.9	17 95	92.6	4
25	65 08.6	29 94	100.4	65 17.1	28 94	99.3	65 25.1	26 94	98.1	65 32.6	24 94	97.0	65 39.5	22 95	95.8	65 45.9	20 95	94.6	65 51.7	18 95	93.4	65 56.9	17 95	92.2	25
6	64 12.4	29 94	99.8	64 20.8	27 94	98.7	64 28.6	25 94	97.6	64 35.9	24 95	96.4	64 42.7	22 95	95.3	64 49.0	20 96	94.1	64 54.7	18 95	93.0	64 59.9	16 95	91.8	6
7	63 16.1	28 94	99.2	63 24.3	26 94	98.1	63 32.0	25 94	97.0	63 39.2	23 95	95.9	63 45.9	21 95	94.8	63 52.0	20 96	93.7	63 57.7	18 95	92.6	64 02.9	16 95	91.5	7
8	62 19.8	27 94	98.6	62 27.8	26 94	97.5	62 35.3	24 95	96.5	62 42.4	23 95	95.4	62 49.0	21 95	94.4	62 55.1	20 95	93.3	63 00.7	18 95	92.2	63 05.8	16 96	91.1	8
9	61 23.3	27 94	98.0	61 3.12	26 94	97.0	61 38.6	24 95	96.0	61 45.6	22 95	94.9	61 52.1	21 95	93.9	61 58.1	19 95	92.9	62 03.7	18 95	91.8	62 08.8	16 96	90.8	9
30	60 26.7	27 94	97.5	60 34.5	25 95	96.5	60 41.8	24 95	95.5	60 48.7	22 95	94.5	60 55.1	21 95	93.5	61 01.1	19 95	92.5	61 06.6	18 95	91.5	61 11.7	16 95	90.4	30
1	59 30.1	26 94	96.9	59 37.8	25 95	96.0	59 45.0	23 95	95.0	59 51.8	22 95	94.1	59 58.2	21 96	93.1	60 04.1	19 95	92.1	60 09.6	18 96	91.1	60 14.6	16 96	90.1	1
2	58 33.5	26 95	96.4	58 41.0	24 95	95.5	58 48.1	23 95	94.6	58 54.9	22 95	93.6	59 01.2	20 96	92.7	59 07.1	19 95	91.7	59 12.5	18 95	90.8	59 17.6	16 96	89.8	2
3	57 36.7	25 95	96.0	57 44.2	24 95	95.1	57 51.2	23 95	94.2	57 57.9	22 95	93.2	58 04.2	20 95	92.3	58 10.0	19 95	91.4	58 15.5	17 96	90.5	58 20.5	16 95	89.5	3
4	56 40.0	25 95	95.5	56 47.3	24 95	94.6	56 54.3	23 95	93.7	57 00.9	21 95	92.9	57 07.1	20 95	92.0	57 13.0	19 95	91.0	57 18.4	17 95	90.1	57 23.5	16 96	89.2	4
35	55 43.1	25 95	95.1	55 50.4	24 95	94.2	55 57.4	22 95	93.3	56 03.9	21 95	92.5	56 10.1	20 95	91.6	56 15.9	19 95	90.7	56 21.3	17 95	89.8	56 26.4	16 95	88.9	35
6	54 46.3	25 95	94.7	54 53.5	24 95	93.8	55 00.4	22 95	93.0	55 06.9	21 95	92.1	55 13.1	20 95	91.3	55 18.8	19 95	90.4	55 24.3	17 96	89.5	55 29.3	16 96	88.7	6
7	53 49.4	24 95	94.2	53 56.6	23 96	93.4	54 03.4	22 95	92.6	54 09.9	21 95	91.8	54 16.0	20 95	90.9	54 21.8	19 96	90.1	54 27.2	18 95	89.2	54 32.3	16 95	88.4	7
8	52 52.5	24 95	93.8	52 59.6	23 95	93.0	53 06.4	22 95	92.2	53 12.8	21 95	91.4	53 18.9	20 95	90.6	53 24.7	19 95	89.8	53 30.2	18 95	88.9	53 35.3	16 95	88.1	8
9	51 55.5	24 95	93.5	52 02.6	23 95	92.7	52 09.3	22 95	91.9	52 15.8	21 95	91.1	52 21.9	20 95	90.3	52 27.7	19 95	89 5	52 33.1	18 95	88.7	52 38.2	17 95	87.9	9
40	50 58.5	24 95	93.1	51 05.6	23 95	92.3	51 12.3	22 95	91.5	51 18.7	21 95	90.7	51 24.8	20 95	90.0	51 30.6	19 95	89.2	51 36.1	18 95	88.4	51 41.2	17 95	87.6	40
1	50 01.6	24 95	92.7	50 08.6	23 95	92.0	50 15.3	22 95	91.2	50 21.7	21 95	90.4	50 27.8	20 96	89.7	50 33.5	19 95	88.9	50 39.0	18 95	88.1	50 44.2	17 95	87.3	1
2	49 04.5	24 96	92.4	49 11.5	23 96	91.6	49 18.2	22 95	90.9	49 24.6	21 96	90.1	49 30.7	20 95	89.4	49 36.5	19 95	88.6	49 42.0	18 95	87.8	49 47.2	17 95	87.1	2
3	48 07.5	24 96	92.0	48 14.5	23 96	91.3	48 21.1	22 96	90.5	48 27.5	21 95	89.8	48 33.6	20 95	89.1	48 39.5	19 95	88.3	48 45.0	18 95	87.6	48 50.2	17 96	86.8	3
4	47 10.5	24 95	91.7	47 17.4	23 96	90.9	47 24.1	22 95	90.2	47 30.5	21 95	89.5	47 36.6	20 95	88.8	47 42.4	19 95	88.0	47 48.0	18 95	87.3	47 53.3	17 95	86.6	4
45	46 13.4	23 95	91.3	46 20.4	23 95	90.6	46 27.0	22 95	89.9	46 33.4	21 95	89.2	46 39.5	20 95	88.5	46 45.4	19 95	87.8	46 51.0	18 95	87.1	46 56.3	17 95	86.3	45
6	45 16.4	23 95	91.0	45 23.3	23 95	90.3	45 30.0	22 95	89.6	45 36.4	21 95	88.9	45 42.5	20 95	88.2	45 48.4	19 95	87.5	45 54.0	18 95	86.8	45 59.4	17 95	86.1	6
7	44 19.3	23 95	90.7	44 26.2	23 95	90.0	44 32.9	22 95	89.3	44 39.3	21 96	88.6	44 45.5	20 95	87.9	44 51.4	19 95	87.2	44 57.0	18 95	86.6	45 02.4	18 95	85.9	7
8	43 22.3	23 95	90.4	43 29.2	23 95	89.7	43 35.8	22 95	89.0	43 42.3	21 96	88.3	43 48.4	20 95	87.7	43 54.4	19 95	87.0	44 00.1	19 95	86.3	44 05.5	18 95	85.6	8
9	42 25.2	23 95	90.0	42 32.1	23 95	89.4	42 38.8	22 95	88.7	42 45.2	21 95	88.1	42 51.4	20 95	87.4	42 57.4	20 95	86.7	43 03.2	19 95	86.1	43 08.7	18 95	85.4	9
50	41 28.1	23 95	89.7	41 35.1	23 95	89.1	41 41.7	22 96	88.4	41 48.2	21 95	87.8	41 54.4	20 95	87.1	42 00.4	20 95	86.5	42 06.2	19 95	85.8	42 11.8	18 96	85.1	50
1	40 31.1	23 96	89.4	40 38.0	23 95	88.8	40 44.7	22 96	88.2	40 51.2	21 95	87.5	40 57.4	21 95	86.9	41 03.5	20 95	86.2	41 09.3	19 96	85.6	41 14.9	18 95	84.9	1
2	39 34.0	23 96	89.1	39 41.0	23 95	88.5	39 47.7	22 95	87.9	39 54.2	21 95	87.2	40 00.5	21 95	86.6	40 06.6	20 95	86.0	40 12.4	19 95	85.3	40 18.1	19 96	84.7	2
3	38 37.0	23 96	88.8	38 43.9	23 95	88.2	38 50.6	22 95	87.6	38 57.2	21 95	87.0	39 03.5	21 95	86.3	39 09.7	20 95	85.7	39 15.6	19 96	85.1	39 21.3	19 96	84.4	3
4	37 39.9	24 95	88.5	37 46.9	23 95	87.9	37 53.6	22 95	87.3	38 00.2	22 95	86.7	38 06.6	21 95	86.1	38 12.8	20 95	85.5	38 18.7	20 96	84.8	38 24.5	19 95	84.2	4
55	36 42.9	24 95	88.3	36 49.9	23 95	87.7	36 56.6	22 95	87.0	37 03.3	22 95	86.4	37 09.7	21 95	85.8	37 15.9	20 95	85.2	37 21.9	20 96	84.6	37 27.8	19 95	84.0	55
6	35 45.9	24 95	88.0	35 52.8	23 95	87.4	35 59.7	22 95	86.8	36 06.3	22 96	86.2	36 12.8	21 95	85.6	36 19.0	21 95	85.0	36 25.1	20 95	84.3	36 31.0	19 96	83.7	6
7	34 48.8	24 95	87.7	34 55.9	23 96	87.1	35 02.7	23 95	86.5	35 09.4	22 96	85.9	35 15.9	21 96	85.3	35 22.2	21 96	84.7	35 28.4	20 95	84.1	35 34.3	20 94	83.5	7
8	33 51.8	24 96	87.4	33 58.9	23 95	86.8	34 05.8	23 96	86.2	34 12.5	22 96	85.6	34 19.0	22 96	85.1	34 25.4	21 96	84.5	34 31.6	20 96	83.9	34 37.6	20 94	83.3	8
9	32 54.8	24 96	87.1	33 01.9	23 95	86.5	33 08.8	23 95	86.0	33 15.6	22 95	85.4	33 22.2	22 95	84.8	33 28.6	21 96	84.2	33 34.9	21 94	83.6	33 41.0	20 94	83.0	9
60	31 57.8	24 95	86.9	32 05.0	23 95	86.3	32 11.9	23 95	85.7	32 18.7	22 95	85.1	32 25.4	22 95	84.6	32 31.8	21 96	84.0	32 38.2	21 94	83.4	32 44.3	20 94	82.8	60
1	31 00.9	24 96	86.6	31 08.0	24 95	86.0	31 15.0	23 96	85.4	31 21.9	23 95	84.9	31 28.6	22 96	84.3	31 35.1	22 95	83.7	31 41.5	21 94	83.2	31 47.7	21 94	82.6	1
2	30 03.9	24 95	86.3	30 11.1	24 96	85.7	30 18.1	23 95	85.2	30 25.0	23 95	84.6	30 31.8	22 95	84.0	30 38.4	22 94	83.5	30 44.9	21 94	82.9	30 51.2	21 94	82.3	2
3	29 07.0	24 95	86.0	29 14.2	24 95	85.5	29 21.3	23 95	84.9	29 28.2	23 95	84.4	29 35.1	22 96	83.8	29 41.7	22 94	83.2	29 48.3	22 94	82.7	29 54.6	21 94	82.1	3
4	28 10.1	24 95	85.8	28 17.3	24 96	85.2	28 24.5	24 95	84.7	28 31.5	23 95	84.1	28 38.3	23 94	83.5	28 45.1	22 94	83.0	28 51.7	22 94	82.4	28 58.1	21 94	81.9	4
65	27 13.2	25 96	85.5	27 20.5	24 95	84.9	27 27.7	24 95	84.4	27 34.7	23 95	83.8	27 41.7	23 94	83.3	27 48.5	22 94	82.7	27 55.1	22 94	82.2	28 01.7	22 94	81.6	65
6	26 16.3	25 96	85.2	26 23.6	24 95	84.7	26 30.9	24 95	84.1	26 38.0	24 94	83.6	26 45.0	23 94	83.0	26 51.9	23 94	82.5	26 58.6	22 94	82.0	27 05.2	22 94	81.4	6
7	25 19.4	25 95	84.9	25 26.8	25 95	84.4	25 34.1	24 95	83.9	25 41.3	24 94	83.3	25 48.4	23 94	82.8	25 55.3	23 94	82.3	26 02.1	23 94	81.7	26 08.8	22 94	81.2	7
8	24 22.6	25 96	84.7	24 30.1	25 95	84.1	24 37.4	24 94	83.6	24 44.6	24 94	83.1	24 51.8	24 94	82.5	24 58.8	23 94	82.0	25 05.7	23 94	81.5	25 12.4	22 94	80.9	8
9	23 25.8	25 95	84.4	23 33.3	25 95	83.9	23 40.7	25 94	83.4	23 48.0	24 94	82.8	23 55.2	24 94	82.3	24 02.3	23 94	81.8	24 09.3	23 94	81.2	24 16.1	23 94	80.7	9
70	22 29.0	25 96	84.1	22 36.6	25 94	83.6	22 44.1	25 94	83.1	22 51.4	24 94	82.6	22 58.7	24 94	82.0	23 05.8	24 94	81.5	23 12.9	23 94	81.0	23 19.8	23 94	80.5	70
1	21 32.3	26 95	83.9	21 39.9	25 94	83.3	21 47.4	25 94	82.8	21 54.8	25 94	82.3	22 02.2	24 94	81.8	22 09.4	24 94	81.3	22 16.5	24 94	80.7	22 23.6	23 94	80.2	1
2	20 35.5	26 94	83.6	20 43.2	25 94	83.1	20 50.8	25 94	82.6	20 58.3	25 94	82.0	21 05.7	25 94	81.5	21 13.0	24 94	81.0	21 20.2	24 94	80.5	21 27.4	24 94	80.0	2
3	19 38.9	26 94	83.3	19 46.6	26 94	82.8	19 54.3	25 94	82.3	20 01.8	25 94	81.8	20 09.3	25 94	81.3	20 16.7	24 94	80.8	20 24.0	24 94	80.2	20 31.2	24 94	79.7	3
4	18 42.2	26 94	83.1	18 50.0	26 94	82.6	18 57.7	26 94	82.0	19 05.4	25 94	81.5	19 12.9	25 94	81.0	19 20.4	25 94	80.5	19 27.8	24 94	80.0	19 35.1	24 93	79.5	4
75	17 45.6	26 94	82.8	17 53.4	26 94	82.3	18 01.2	26 94	81.8	18 08.9	26 94	81.3	18 16.6	25 94	80.8	18 24.1	25 94	80.3	18 31.6	25 94	79.7	18 39.0	24 93	79.2	75
6	16 49.0	27 94	82.5	16 56.9	26 94	82.0	17 04.8	26 94	81.5	17 12.6	26 94	81.0	17 20.3	26 94	80.5	17 27.9	25 94	80.0	17 35.5	25 93	79.5	17 42.9	25 93	79.0	6
7	15 52.4	27 94	82.2	16 00.4	27 94	81.7	16 08.4	26 94	81.2	16 16.2	26 94	80.7	16 24.0	26 94	80.2	16 31.7	26 94	79.7	16 39.4	25 93	79.2	16 47.0	25 93	78.7	7
8	14 55.9	27 94	82.0	15 04.0	27 94	81.5	15 12.0	27 94	81.0	15 19.9	26 94	80.5	15 27.8	26 94	80.0	15 35.6	26 93	79.5	15 43.3	26 93	79.0	15 51.0	25 93	78.5	8
9	13 59.4	27 94	81.7	14 07.5	27 94	81.2	14 15.6	27 94	80.7	14 23.7	27 94	80.2	14 31.6	26 94	79.7	14 39.5	26 93	79.2	14 47.4	26 93	78.7	14 55.1	26 93	78.2	9
80	13 03.0	28 94	81.4	13 11.2	27 94	80.9	13 19.3	27 94	80.4	13 27.5	27 94	79.9	13 35.5	27 93	79.4	13 43.5	27 93	79.0	13 51.4	26 93	78.5	13 59.3	26 93	78.0	80
1	12 06.6	28 94	81.1	12 14.8	28 94	80.7	12 23.1	27 94	80.2	12 31.3	27 94	79.7	12 39.4	27 93	79.2	12 47.5	27 93	78.7	12 55.5	27 93	78.2	13 03.5	26 93	77.7	1
2	11 10.2	28 94	80.9	11 18.6	28 94	80.4	11 26.9	28 94	79.9	11 35.2	28 93	79.4	11 43.4	27 93	78.9	11 51.6	27 93	78.4	11 59.7	27 93	77.9	12 07.8	27 93	77.4	2
3	10 13.9	28 94	80.6	10 22.3	28 94	80.1	10 30.7	28 94	79.6	10 39.1	28 93	79.1	10 47.4	28 93	78.6	10 55.7	28 93	78.1	11 03.9	27 93	77.7	11 12.1	27 93	77.2	3
4	9 17.6	29 94	80.3	9 26.1	28 94	79.8	9 34.6	28 93	79.3	9 43.1	28 93	78.8	9 51.5	28 93	78.4	9 59.9	28 93	77.9	10 08.2	28 93	77.4	10 16.5	28 93	76.9	4
85	8 21.4	29 94	80.0	8 30.0	29 94	79.5	8 38.6	29 93	79.1	8 47.1	28 93	78.6	8 55.7	28 93	78.1	9 04.1	28 93	77.6	9 12.6	28 93	77.1	9 21.0	28 92	76.6	85
6	7 25.2	29 94	79.7	7 33.9	29 93	79.3	7 42.6	29 93	78.8	7 51.2	29 93	78.3	7 59.8	29 93	77.8	8 08.4	29 93	77.3	8 17.0	28 93	76.8	8 25.5	28 92	76.4	6
7	6 29.1	29 93	79.4	6 37.9	29 93	79.0	6 46.6	29 93	78.5	6 55.4	29 93	78.0	7 04.1	29 93	77.5	7 12.8	29 93	77.0	7 21.4	29 92	76.6	7 30.1	29 92	76.1	7
8	5 33.0	30 93	79.2	5 41.9	30 93	78.7	5 50.8	30 93	78.2	5 59.6	29 93	77.7	6 08.4	29 93	77.2	6 17.2	29 93	76.8	6 26.0	29 92	76.3	6 34.7	29 92	75.8	8
9										5 03.9	30 93	77.4	5 12.8	30 93	77.0	5 21.7	30 92	76.5	5 30.6	30 92	76.0	5 39.4	29 92	75.5	9

H.A.	12° 00′				12° 30′				13° 00′				13° 30′				14° 00′				14° 30′				15° 00′				15° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	60 00.0	1.0	02	180.0	59 30.0	1.0	02	180.0	59 00.0	1.0	02	180.0	58 30.0	1.0	02	180.0	58 00.0	1.0	02	180.0	57 30.0	1.0	02	180.0	57 00.0	1.0	01	180.0	56 30.0	1.0	01	180.0	00
1	59 59.0	1.0	05	178.0	59 29.0	1.0	05	178.1	58 59.1	1.0	05	178.1	58 29.1	1.0	05	178.1	57 59.1	1.0	05	178.2	57 29.1	1.0	04	178.2	56 59.1	1.0	04	178.2	56 29.1	1.0	04	178.3	1
2	59 56.1	1.0	08	176.1	59 26.2	1.0	08	176.2	58 56.2	1.0	08	176.2	58 26.3	1.0	08	176.3	57 56.4	1.0	08	176.3	57 26.4	1.0	07	176.4	56 56.5	1.0	07	176.5	56 26.5	1.0	07	176.5	2
3	59 51.3	1.0	11	174.1	59 21.4	1.0	11	174.2	58 51.5	1.0	11	174.3	58 21.7	1.0	11	174.4	57 51.8	1.0	11	174.5	57 21.9	1.0	10	174.6	56 52.1	1.0	10	174.7	56 22.2	1.0	10	174.8	3
4	59 44.5	99	14	172.2	59 14.7	99	14	172.3	58 45.0	99	14	172.5	58 15.2	99	14	172.6	57 45.5	99	14	172.7	57 15.7	99	13	172.8	56 45.9	99	13	172.9	56 16.1	99	13	173.0	4
05	59 35.8	99	18	170.3	59 06.2	99	17	170.5	58 36.6	99	17	170.6	58 07.0	99	17	170.8	57 37.3	99	16	170.9	57 07.7	99	16	171.1	56 38.0	99	16	171.2	56 08.4	99	16	171.3	05
6	59 25.3	98	21	168.4	58 55.8	98	20	168.6	58 26.4	98	20	168.8	57 56.9	98	20	169.0	57 27.5	98	19	169.1	56 58.0	98	19	169.3	56 28.5	98	19	169.5	55 58.9	98	18	169.6	6
7	59 12.9	97	24	166.5	58 43.7	97	23	166.8	58 14.4	98	23	167.0	57 45.1	98	23	167.2	57 15.8	98	22	167.4	56 46.5	98	22	167.6	56 17.2	98	22	167.8	55 47.8	98	21	167.9	7
8	58 58.7	97	27	164.7	58 29.7	97	26	164.9	58 00.7	97	26	165.2	57 31.6	97	25	165.4	57 02.5	97	25	165.6	56 33.4	97	25	165.8	56 04.3	97	24	166.1	55 35.1	97	24	166.3	8
9	58 42.8	96	29	162.9	58 14.0	96	29	163.1	57 45.2	96	29	163.4	57 16.4	96	28	163.7	56 47.5	96	28	163.9	56 18.6	96	27	164.2	55 49.7	96	27	164.4	55 20.8	97	26	164.6	9
10	58 25.1	95	32	161.1	57 56.6	95	32	161.4	57 28.1	95	31	161.7	56 59.5	95	31	161.9	56 30.9	95	30	162.2	56 02.2	96	30	162.5	55 33.6	96	29	162.7	55 04.9	96	29	163.0	10
1	58 05.8	94	35	159.3	57 37.6	94	34	159.6	57 09.3	94	34	160.0	56 41.0	94	33	160.3	56 12.7	95	33	160.6	55 44.3	95	32	160.8	55 15.9	95	32	161.1	54 47.4	95	32	161.4	1
2	57 44.8	93	38	157.6	57 16.9	93	37	157.9	56 49.0	93	36	158.3	56 21.0	93	36	158.6	55 52.9	94	35	158.9	55 24.8	94	35	159.2	54 56.7	94	34	159.5	54 28.5	94	34	159.8	2
3	57 22.3	92	40	155.9	56 54.7	92	40	156.3	56 27.1	92	39	156.6	55 59.4	92	38	157.0	55 31.6	93	38	157.3	55 03.8	93	37	157.6	54 36.0	93	37	158.0	54 08.1	93	36	158.3	3
4	56 58.2	91	42	154.3	56 31.0	91	42	154.7	56 03.7	91	41	155.0	55 36.3	91	41	155.4	55 08.9	92	40	155.7	54 41.4	92	40	156.1	54 13.9	92	39	156.4	53 46.3	92	39	156.8	4
15	56 32.8	89	45	152.7	56 05.9	90	44	153.1	55 38.9	90	44	153.5	55 11.9	90	43	153.8	54 44.8	90	42	154.2	54 17.6	91	42	154.6	53 50.4	91	41	154.9	53 23.1	91	41	155.3	15
6	56 05.9	88	47	151.1	55 39.3	89	46	151.5	55 12.7	89	46	151.9	54 46.0	89	45	152.3	54 19.3	89	45	152.7	53 52.4	90	44	153.1	53 25.5	90	44	153.5	52 58.6	90	43	153.8	6
7	55 37.6	87	49	149.6	55 11.4	87	49	150.0	54 45.2	88	48	150.4	54 18.9	88	47	150.8	53 52.5	88	47	151.2	53 26.0	88	46	151.6	52 59.4	89	46	152.0	52 32.8	89	45	152.4	7
8	55 08.1	86	51	148.1	54 42.3	86	51	148.5	54 16.4	86	50	149.0	53 50.4	87	49	149.4	53 24.4	87	49	149.8	52 58.2	87	48	150.2	52 32.0	88	48	150.6	52 05.7	88	47	151.0	8
9	54 37.3	84	53	146.6	54 11.9	85	53	147.1	53 46.4	85	52	147.5	53 20.8	85	51	148.0	52 55.1	86	51	148.4	52 29.3	86	50	148.8	52 03.4	86	50	149.2	51 37.5	87	49	149.6	9
20	54 05.3	83	55	145.2	53 40.3	84	55	145.7	53 15.2	84	54	146.2	52 49.9	84	53	146.6	52 24.6	85	53	147.0	51 59.2	85	52	147.5	51 33.7	85	51	147.9	51 08.0	86	51	148.3	20
1	53 32.2	82	57	143.9	53 07.6	82	56	144.3	52 42.8	83	56	144.8	52 18.0	83	55	145.3	51 53.0	83	54	145.7	51 27.9	84	54	146.2	51 02.8	84	53	146.6	50 37.5	84	53	147.0	1
2	52 58.0	81	59	142.5	52 33.8	81	58	143.0	52 09.4	81	57	143.5	51 44.9	82	57	144.0	51 20.3	82	56	144.4	50 55.6	82	56	144.9	50 30.8	83	55	145.3	50 05.9	83	54	145.8	2
3	52 22.8	79	60	141.2	51 58.9	80	60	141.7	51 34.9	80	59	142.2	51 10.8	81	58	142.7	50 46.6	81	58	143.2	50 22.3	81	57	143.6	49 57.8	82	57	144.1	49 33.3	82	56	144.5	3
4	51 46.6	78	62	140.0	51 23.1	78	61	140.5	50 59.5	79	61	141.0	50 35.8	79	60	141.5	50 11.9	80	59	141.9	49 48.0	80	59	142.4	49 23.9	80	58	142.9	48 59.7	81	58	143.3	4
25	51 09.4	77	63	138.8	50 46.3	77	63	139.3	50 23.1	78	62	139.8	49 59.7	78	62	140.3	49 36.3	78	61	140.7	49 12.7	79	60	141.2	48 49.0	79	60	141.7	48 25.2	80	59	142.1	25
6	50 31.4	75	65	137.6	50 08.6	76	64	138.1	49 45.8	76	64	138.6	49 22.8	77	63	139.1	48 59.7	77	62	139.6	48 36.5	78	62	140.1	48 13.1	78	61	140.5	47 49.7	78	61	141.0	6
7	49 52.5	74	66	136.4	49 30.1	75	66	137.0	49 07.6	75	65	137.5	48 45.0	76	64	138.0	48 22.3	76	64	138.5	47 59.4	76	63	138.9	47 36.5	77	63	139.4	47 13.4	77	62	139.9	7
8	49 12.7	73	68	135.3	48 50.8	73	67	135.9	48 28.7	74	66	136.4	48 06.4	74	66	136.9	47 44.0	75	65	137.4	47 21.5	75	64	137.9	46 58.9	76	64	138.3	46 36.2	76	63	138.8	8
9	48 32.2	72	69	134.3	48 10.6	72	68	134.8	47 48.9	73	68	135.3	47 27.0	73	67	135.8	47 05.0	74	66	136.3	46 42.9	74	66	136.8	46 20.6	74	65	137.3	45 58.2	75	65	137.8	9
30	47 51.0	71	70	133.2	47 29.8	71	69	133.7	47 08.4	72	69	134.3	46 46.9	72	68	134.8	46 25.2	72	68	135.3	46 03.4	73	67	135.8	45 41.5	73	66	136.3	45 19.5	74	66	136.7	30
1	47 09.1	69	71	132.2	46 48.2	70	70	132.7	46 27.2	70	70	133.2	46 06.0	71	69	133.8	45 44.7	71	69	134.3	45 23.3	72	68	134.8	45 01.7	72	68	135.3	44 40.0	73	67	135.7	1
2	46 26.5	68	72	131.2	46 05.9	69	72	131.7	45 45.3	69	71	132.3	45 24.5	70	70	132.8	45 03.5	70	70	133.3	44 42.4	71	69	133.8	44 21.2	71	69	134.3	43 59.8	71	68	134.8	2
3	45 43.2	67	73	130.3	45 23.1	68	72	130.8	45 02.7	68	72	131.3	44 42.2	68	71	131.8	44 21.6	69	71	132.3	44 00.9	69	70	132.8	43 40.0	70	70	133.3	43 19.0	70	69	133.8	3
4	44 59.4	66	74	129.3	44 39.6	66	73	129.9	44 19.6	67	73	130.4	43 59.4	67	72	130.9	43 39.2	68	72	131.4	43 18.7	68	71	131.9	42 58.2	69	71	132.4	42 37.5	69	70	132.9	4
35	44 15.0	65	75	128.4	43 55.5	65	74	129.0	43 35.8	66	74	129.5	43 16.0	66	73	130.0	42 56.1	67	73	130.5	42 36.0	67	72	131.0	42 15.8	68	72	131.5	41 55.4	68	71	132.0	35
6	43 30.0	64	76	127.6	43 10.8	64	75	128.1	42 51.5	65	75	128.6	42 32.0	65	74	129.1	42 12.4	66	74	129.6	41 52.7	66	73	130.2	41 32.8	66	73	130.7	41 12.8	67	72	131.2	6
7	42 44.5	63	77	126.7	42 25.7	63	76	127.3	42 06.6	64	76	127.8	41 47.5	64	75	128.3	41 28.2	65	75	128.8	41 08.8	65	74	129.3	40 49.2	65	74	129.8	40 29.5	66	73	130.3	7
8	41 58.6	62	77	125.9	41 40.0	62	77	126.4	41 21.3	63	76	126.9	41 02.5	63	76	127.5	40 43.5	63	75	128.0	40 24.4	64	75	128.5	40 05.1	64	74	129.0	39 45.7	65	74	129.5	8
9	41 12.1	61	78	125.1	40 53.8	61	78	125.6	40 35.4	62	77	126.1	40 16.9	62	77	126.7	39 58.2	62	76	127.2	39 39.4	63	76	127.7	39 20.5	63	75	128.2	39 01.4	64	75	128.7	9
40	40 25.2	60	79	124.3	40 07.2	60	78	124.8	39 49.1	61	78	125.4	39 30.9	61	77	125.9	39 12.5	61	77	126.4	38 54.0	62	76	126.9	38 35.4	62	76	127.4	38 16.7	63	75	127.9	40
1	39 37.8	59	80	123.6	39 20.2	59	79	124.1	39 02.4	60	79	124.6	38 44.5	60	78	125.1	38 26.4	60	78	125.6	38 08.2	61	77	126.1	37 49.9	61	77	126.6	37 31.4	62	76	127.1	1
2	38 50.1	58	80	122.8	38 32.7	58	80	123.4	38 15.2	59	79	123.9	37 57.6	59	79	124.4	37 39.8	59	78	124.9	37 21.9	60	78	125.4	37 03.9	60	77	125.9	36 45.7	61	77	126.4	2
3	38 02.0	57	81	122.1	37 44.9	57	80	122.6	37 27.6	58	80	123.2	37 10.3	58	79	123.7	36 52.8	59	79	124.2	36 35.2	59	79	124.7	36 17.4	59	78	125.2	35 59.6	60	78	125.7	3
4	37 13.4	56	81	121.4	36 56.6	56	81	121.9	36 39.7	57	81	122.5	36 22.6	57	80	123.0	36 05.4	58	80	123.5	35 48.1	58	79	124.0	35 30.6	58	79	124.5	35 13.0	59	78	125.0	4
45	36 24.6	55	82	120.7	36 08.0	55	82	121.3	35 51.4	56	81	121.8	35 34.5	56	81	122.3	35 17.6	57	80	122.8	35 00.5	57	80	123.3	34 43.4	57	79	123.8	34 26.0	58	79	124.3	45
6	35 35.4	54	83	120.1	35 19.1	54	82	120.6	35 02.7	55	82	121.1	34 46.1	55	81	121.6	34 29.5	56	81	122.1	34 12.7	56	80	122.6	33 55.8	57	80	123.1	33 38.7	57	79	123.6	6
7	34 45.8	53	83	119.4	34 29.8	54	83	120.0	34 13.7	54	82	120.5	33 57.4	54	82	121.0	33 41.0	55	81	121.5	33 24.4	55	81	122.0	33 07.8	56	80	122.5	32 51.0	56	80	123.0	7
8	33 56.0	52	84	118.8	33 40.2	53	83	119.3	33 24.3	53	83	119.8	33 08.3	54	82	120.3	32 52.1	54	82	120.9	32 35.9	54	81	121.3	32 19.5	55	81	121.8	32 03.0	55	81	122.3	8
9	33 05.9	52	84	118.2	32 50.3	52	84	118.7	32 34.7	52	83	119.2	32 18.9	53	83	119.7	32 03.0	53	82	120.2	31 47.0	54	82	120.7	31 30.8	54	82	121.2	31 14.6	54	81	121.7	9
50	32 15.4	51	84	117.6	32 00.1	51	84	118.1	31 44.7	52	84	118.6	31 29.2	52	83	119.1	31 13.5	52	83	119.6	30 57.8	53	82	120.1	30 41.9	53	82	120.6	30 25.9	53	82	121.1	50
1	31 24.7	50	85	117.0	31 09.7	50	85	117.5	30 54.5	51	84	118.0	30 39.2	51	84	118.5	30 23.8	52	83	119.0	30 08.3	52	83	119.5	29 52.6	52	83	120.0	29 36.9	53	82	120.5	1
2	30 33.8	49	85	116.5	30 18.9	50	85	117.0	30 04.0	50	85	117.5	29 48.9	50	84	118.0	29 33.8	51	84	118.5	29 18.5	51	83	119.0	29 03.1	51	83	119.5	28 47.6	52	83	119.9	2
3	29 42.6	49	86	115.9	29 28.0	49	85	116.4	29 13.2	49	85	116.9	28 58.4	50	85	117.4	28 43.5	50	84	117.9	28 28.4	50	84	118.4	28 13.3	51	84	118.9	27 58.0	51	83	119.4	3
4	28 51.1	48	86	115.4	28 36.7	48	86	115.9	28 22.2	49	85	116.4	28 07.6	49	85	116.9	27 52.9	49	85	117.4	27 38.1	50	84	117.9	27 23.2	50	84	118.3	27 08.2	50	84	118.8	4
55	27 59.5	47	86	114.9	27 45.3	47	86	115.4	27 31.0	48	86	115.8	27 16.6	48	85	116.3	27 02.1	48	85	116.8	26 47.5	49	85	117.3	26 32.8	49	84	117.8	26 18.0	49	84	118.3	55
6	27 07.6	46	87	114.3	26 53.6	47	86	114.8	26 39.5	47	86	115.3	26 25.4	47	86	115.8	26 11.1	48	85	116.3	25 56.7	48	85	116.8	25 42.2	48	85	117.3	25 27.7	49	84	117.8	6
7	26 15.5	46	87	113.8	26 01.7	46	87	114.3	25 47.9	46	86	114.8	25 33.9	47	86	115.3	25 19.8	47	86	115.8	25 05.7	47	85	116.3	24 51.4	48	85	116.8	24 37.1	48	85	117.3	7
8	25 23.2	45	87	113.3	25 09.6	45	87	113.8	24 56.0	46	87	114.3	24 42.2	46	86	114.8	24 28.3	46	86	115.3	24 14.4	47	86	115.8	24 00.4	47	85	116.3	23 46.2	47	85	116.8	8
9	24 30.7	44	88	112.9	24 17.3	45	87	113.3	24 03.9	45	87	113.8	23 50.3	45	87	114.3	23 36.7	46	86	114.8	23 22.9	46	86	115.3	23 09.1	46	86	115.8	22 55.2	47	85	116.3	9
60	23 38.0	44	88	112.4	23 24.8	44	88	112.9	23 11.6	44	87	113.4	22 58.2	45	87	113.8	22 44.8	45	87	114.3	22 31.2	45	86	114.8	22 17.6	46	86	115.3	22 03.9	46	86	115.8	60
1	22 45.2	43	88	111.9	22 32.2	43	88	112.4	22 19.1	44	88	112.9	22 05.9	44	87	113.4	21 52.7	44	87	113.9	21 39.3	45	87	114.3	21 25.9	45	86	114.8	21 12.4	45	86	115.3	1
2	21 52.2	43	89	111.5	21 39.3	43	88	112.0	21 26.4	43	88	112.4	21 13.5	43	88	112.9	21 00.4	44	87	113.4	20 47.2	44	87	113.9	20 34.0	44	87	114.4	20 20.7	44	86	114.8	2
3	20 59.0	42	89	111.0	20 46.3	42	89	111.5	20 33.6	43	88	112.0	20 20.8	43	88	112.5	20 07.9	43	88	113.0	19 55.0	43	87	113.4	19 41.9	44	87	113.9	19 28.8	44	87	114.4	3
4	20 05.6	41	89	110.6	19 53.2	42	89	111.1	19 40.6	42	89	111.6	19 28.0	42	88	112.0	19 15.3	42	88	112.5	19 02.5	43	88	113.0	18 49.7	43	87	113.5	18 36.8	43	87	113.9	4
65	19 12.1	41	89	110.2	18 59.8	41	89	110.6	18 47.5	41	89	111.1	18 35.0	42	89	111.6	18 22.5	42	88	112.1	18 09.9	42	88	112.6	17 57.3	42	88	113.0	17 44.5	43	87	113.5	65
6	18 18.5	40	90	109.7	18 06.4	41	89	110.2	17 54.2	41	89	110.7	17 41.9	41	89	111.2	17 29.6	41	89	111.7	17 17.1	41	88	112.1	17 04.7	42	88	112.6	16 52.1	42	88	113.1	6
7	17 24.7	40	90	109.3	17 12.7	40	90	109.8	17 00.7	40	89	110.3	16 48.6	40	89	110.8	16 36.4	41	89	111.2	16 24.2	41	88	111.7	16 11.9	41	88	112.2	15 59.5	41	88	112.7	7
8	16 30.8	39	90	108.9	16 19.0	39	90	109.4	16 07.1	40	90	109.9	15 55.2	40	89	110.4	15 43.2	40	89	110.8	15 31.1	40	89	111.3	15 19.0	41	88	111.8	15 06.8	41	88	112.3	8
9	15 36.8	39	90	108.5	15 25.1	39	90	109.0	15 13.4	39	90	109.5	15 01.6	39	90	110.0	14 49.8	40	89	110.4	14 37.9	40	89	110.9	14 25.9	40	89	111.4	14 13.9	40	88	111.9	9
70	14 42.6	38	90	108.1	14 31.1	38	90	108.6	14 19.5	39	90	109.1	14 07.9	39	90	109.6	13 56.2	39	89	110.0	13 44.5	39	89	110.5	13 32.7	39	89	111.0	13 20.9	40	89	111.5	70
1	13 48.3	38	91	107.8	13 36.9	38	90	108.2	13 25.5	38	90	108.7	13 14.1	38	90	109.2	13 02.6	38	90	109.7	12 51.0	39	89	110.1	12 39.4	39	89	110.6	12 27.7	39	89	111.1	1
2	12 53.9	37	91	107.4	12 42.7	37	91	107.9	12 31.4	38	90	108.3	12 20.1	38	90	108.8	12 08.8	38	90	109.3	11 57.4	38	90	109.7	11 45.9	38	89	110.2	11 34.4	38	89	110.7	2
3	11 59.4	37	91	107.0	11 48.3	37	91	107.5	11 37.2	37	91	108.0	11 26.0	37	90	108.4	11 14.8	37	90	108.9	11 03.6	38	90	109.4	10 52.3	38	90	109.8	10 41.0	38	89	110.3	3
4	11 04.8	36	91	106.6	10 53.8	37	91	107.1	10 42.9	37	91	107.6	10 31.9	37	90	108.1	10 20.8	37	90	108.5	10 09.7	37	90	109.0	9 58.6	37	90	109.5	9 47.4	37	90	110.0	4
75	10 10.0	36	91	106.3	9 59.2	36	91	106.8	9 48.4	36	91	107.2	9 37.5	36	91	107.7	9 26.6	36	90	108.2	9 15.7	37	90	108.6	9 04.7	37	90	109.1	8 53.7	37	90	109.6	75
6	9 15.2	35	92	105.9	9 04.6	36	91	106.4	8 53.9	36	91	106.9	8 43.1	36	91	107.3	8 32.4	36	91	107.8	8 21.6	36	90	108.3	8 10.7	36	90	108.8	7 59.9	36	90	109.2	6
7	8 20.3	35	92	105.6	8 09.8	35	91	106.1	7 59.2	35	91	106.5	7 48.6	35	91	107.0	7 38.0	35	91	107.5	7 27.3	36	91	107.9	7 16.6	36	90	108.4	7 05.9	36	90	108.9	7
8	7 25.3	35	92	105.2	7 14.9	35	92	105.7	7 04.5	35	91	106.2	6 54.0	35	91	106.7	6 43.5	35	91	107.1	6 33.0	35	91	107.6	6 22.4	35	91	108.1	6 11.9	35	90	108.5	8
9	6 30.2	34	92	104.9	6 19.9	34	92	105.4	6 09.6	34	92	105.8	5 59.3	34	91	106.3	5 48.9	35	91	106.8	5 38.5	35	91	107.3	5 28.1	35	91	107.7	5 17.7	35	90	108.2	9
80	5 35.0	34	92	104.6	5 24.8	34	92	105.0	5 14.7	34	92	105.5	5 04.5	34	92	106.0																	80

H.A.	16° 00'				16° 30'				17° 00'				17° 30'				18° 00'				18° 30'				19° 00'				19° 30'				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° '	Δd	Δt	°	° '	Δd	Δt	°	° '	Δd	Δt	°	° '	Δd	Δt	°	° '	Δd	Δt	°	° '	Δd	Δt	°	° '	Δd	Δt	°	° '	Δd	Δt	°	°
00	88 00.0	1.0	22	180.0	88 30.0	1.0	28	180.0	89 00.0	1.0	88	180.0	89 30.0	1.0	58	180.0	90 00.0	..	95	....	89 30.0	1.0	57	00.0	89 00.0	1.0	38	00.0	88 30.0	1.0	27	00.0	00
1	87 47.0	90	55	154.3	88 13.3	84	65	147.4	88 37.1	73	77	136.2	88 55.5	47	89	117.5	89 03.0	00	95	89.8	88 55.6	46	89	62.1	88 37.3	72	77	43.3	88 13.6	84	64	32.1	1
2	87 14.0	73	73	136.0	87 34.3	62	81	127.8	87 50.8	47	88	117.4	88 01.8	26	93	104.4	88 05.9	01	95	89.7	88 02.1	25	93	74.9	87 51.4	46	87	61.9	87 35.0	62	80	51.3	2
3	86 30.2	58	82	124.4	86 46.0	47	87	117.2	86 58.2	34	91	108.8	87 06.0	18	94	99.5	87 08.8	01	95	89.5	87 06.5	16	94	79.6	86 59.1	32	91	70.2	86 47.3	46	86	61.7	3
4	85 41.0	47	87	117.0	85 53.8	37	90	110.8	86 03.4	26	93	104.1	86 09.5	14	95	96.9	86 11.8	01	95	89.4	86 10.1	12	94	81.9	86 04.6	24	92	74.6	85 55.6	36	89	67.8	4
05	84 49.0	40	89	112.0	84 59.7	31	92	106.7	85 07.7	22	94	101.1	85 12.7	12	95	95.2	85 14.7	01	95	89.2	85 13.5	09	95	83.2	85 09.3	19	93	77.3	85 02.0	29	91	71.6	05
6	83 55.4	34	91	108.3	84 04.6	27	93	103.8	84 11.5	19	94	99.0	84 15.8	10	95	94.1	84 17.6	02	95	89.1	84 16.8	07	95	84.0	84 13.4	16	94	79.1	84 07.5	24	92	74.3	6
7	83 00.8	30	92	105.6	83 09.0	24	93	101.6	83 15.0	17	94	97.5	83 18.9	09	95	93.2	83 20.6	02	95	88.9	83 20.0	06	95	84.6	83 17.2	13	94	80.3	83 12.3	20	93	76.1	7
8	82 05.6	27	93	103.5	82 12.9	21	94	99.9	82 18.3	15	95	96.3	82 21.9	09	95	92.5	82 23.5	02	95	88.8	82 23.2	04	95	85.0	82 20.9	11	94	81.2	82 16.7	17	93	77.5	8
9	81 09.9	25	93	101.7	81 16.6	19	94	98.5	81 21.6	14	95	95.3	81 24.9	08	95	92.0	81 26.5	02	95	88.6	81 26.3	03	95	85.2	81 24.5	09	94	81.9	81 20.9	15	93	78.6	9
10	80 13.9	23	94	100.3	80 20.0	18	94	97.4	80 24.7	13	95	94.5	80 27.8	08	95	91.5	80 29.4	03	95	88.5	80 29.5	03	95	85.4	80 27.9	08	94	82.4	80 24.9	13	94	79.4	10
1	79 17.6	21	94	99.1	79 23.4	17	95	96.5	79 27.8	12	95	93.8	79 30.8	08	95	91.0	79 32.4	03	95	88.3	79 32.6	02	95	85.5	79 31.3	06	94	82.8	79 28.7	11	94	80.1	1
2	78 21.2	20	94	98.1	78 26.7	16	95	95.6	78 30.8	12	95	93.2	78 33.7	08	95	90.7	78 35.4	03	95	88.1	78 35.7	01	95	85.6	78 34.7	05	94	83.1	78 32.4	10	94	80.6	2
3	77 24.7	19	94	97.2	77 29.8	15	95	94.9	77 33.8	11	95	92.6	77 36.7	07	95	90.3	77 38.3	04	95	88.0	77 38.8	00	95	85.6	77 38.0	04	94	83.3	77 36.1	08	94	81.0	3
4	76 28.0	18	95	96.4	76 33.0	15	95	94.3	76 36.8	11	95	92.1	76 39.6	07	95	90.0	76 41.3	04	95	87.8	76 41.9	00	95	85.7	76 41.4	04	94	83.5	76 39.7	07	94	81.3	4
15	75 31.3	18	95	95.7	75 36.0	14	95	93.7	75 39.8	11	95	91.7	75 42.6	07	95	89.7	75 44.3	04	95	87.7	75 45.0	01	95	85.6	75 44.7	03	95	83.6	75 43.3	06	94	81.6	15
6	74 34.5	17	95	95.0	74 39.1	14	95	93.2	74 42.8	11	95	91.3	74 45.5	08	95	89.4	74 47.3	04	95	87.5	74 48.1	01	95	85.6	74 48.0	02	95	83.7	74 46.8	05	94	81.8	6
7	73 37.6	16	95	94.5	73 42.1	14	95	92.7	73 45.7	11	95	90.9	73 48.4	08	95	89.1	73 50.3	05	95	87.4	73 51.2	02	95	85.6	73 51.2	01	95	83.8	73 50.4	04	94	82.0	7
8	72 40.7	16	95	93.9	72 45.1	13	95	92.3	72 48.6	11	95	90.6	72 51.4	08	95	88.9	72 53.3	05	95	87.2	72 54.3	02	95	85.5	72 54.5	01	95	83.8	72 53.8	04	94	82.1	8
9	71 43.7	16	95	93.4	71 48.0	13	95	91.8	71 51.6	10	95	90.2	71 54.3	08	95	88.6	71 56.3	05	95	87.0	71 57.4	02	95	85.4	71 57.8	00	95	83.8	71 57.3	03	94	82.2	9
20	70 46.8	15	95	93.0	70 51.0	13	95	91.5	70 54.5	10	95	89.9	70 57.3	08	95	88.4	70 59.3	05	95	86.9	71 00.5	03	95	85.3	71 01.0	00	95	83.8	71 00.8	02	94	82.3	20
1	69 49.8	15	95	92.5	69 54.0	13	95	91.1	69 57.5	10	95	89.6	70 00.2	08	95	88.2	70 02.3	06	95	86.7	70 03.7	03	95	85.3	70 04.3	01	95	83.8	70 04.2	01	94	82.3	1
2	68 52.7	15	95	92.1	68 56.9	13	95	90.7	69 00.4	11	95	89.3	69 03.2	08	95	88.0	69 05.4	06	95	86.6	69 06.8	04	95	85.2	69 07.6	01	95	83.8	69 07.7	01	94	82.4	2
3	67 55.7	15	95	91.7	67 59.8	13	95	90.4	68 03.3	11	95	89.1	68 06.2	08	95	87.7	68 08.4	06	95	86.4	68 10.0	04	95	85.1	68 10.9	02	95	83.7	68 11.1	00	94	82.4	3
4	66 58.7	15	95	91.4	67 02.8	13	95	90.1	67 06.3	11	95	88.8	67 09.2	09	95	87.5	67 11.5	07	95	86.2	67 13.1	04	95	85.0	67 14.1	02	94	83.7	67 14.6	00	94	82.4	4
25	66 01.6	15	95	91.0	66 05.7	13	95	89.8	66 09.2	11	95	88.5	66 12.2	09	95	87.3	66 14.5	07	95	86.1	66 16.3	05	95	84.8	66 17.4	03	94	83.6	66 18.0	01	94	82.4	25
6	65 04.6	15	95	90.7	65 08.7	13	95	89.5	65 12.2	11	95	88.3	65 15.2	09	95	87.1	65 17.6	07	95	85.9	65 19.4	06	95	84.7	65 20.7	03	94	83.5	65 21.4	01	94	82.3	6
7	64 07.5	15	95	90.3	64 11.6	13	95	89.2	64 15.2	11	95	88.1	64 18.2	09	95	86.9	64 20.7	07	95	85.8	64 22.6	06	95	84.6	64 24.0	04	94	83.4	64 24.9	02	94	82.3	7
8	63 10.4	15	95	90.0	63 14.5	13	95	88.9	63 18.1	11	95	87.8	63 21.2	09	95	86.7	63 23.8	08	95	85.6	63 25.8	06	95	84.5	63 27.3	04	94	83.4	63 28.3	02	94	82.2	8
9	62 13.4	15	95	89.7	62 17.5	13	95	88.6	62 21.1	11	95	87.6	62 24.2	10	95	86.5	62 26.9	08	95	85.4	62 29.0	06	95	84.4	62 30.7	05	94	83.3	62 31.8	03	94	82.2	9
30	61 16.3	15	95	89.4	61 20.4	13	95	88.4	61 24.1	11	95	87.3	61 27.3	10	95	86.3	61 30.0	08	95	85.3	61 32.2	07	95	84.2	61 34.0	05	94	83.2	61 35.3	03	94	82.1	30
1	60 19.2	15	95	89.1	60 23.4	13	95	88.1	60 27.1	12	95	87.1	60 30.4	10	95	86.1	60 33.2	09	95	85.1	60 35.5	07	95	84.1	60 37.4	05	94	83.1	60 38.8	04	94	82.1	1
2	59 22.2	15	95	88.8	59 26.4	13	95	87.9	59 30.1	12	95	86.9	59 33.4	10	95	85.9	59 36.3	09	95	84.9	59 38.7	07	95	84.0	59 40.7	06	94	83.0	59 42.2	04	94	82.0	2
3	58 25.1	15	95	88.6	58 29.4	13	95	87.6	58 33.2	12	95	86.7	58 36.5	11	95	85.7	58 39.5	09	95	84.8	58 42.0	08	95	83.8	58 44.1	06	94	82.9	58 45.7	05	94	81.9	3
4	57 28.1	15	95	88.3	57 32.3	13	95	87.4	57 36.2	12	95	86.5	57 39.6	11	95	85.5	57 42.7	09	95	84.6	57 45.3	08	94	83.7	57 47.5	07	94	82.7	57 49.3	05	94	81.8	4
35	56 31.1	15	95	88.0	56 35.3	14	96	87.1	56 39.2	12	95	86.2	56 42.7	11	95	85.3	56 45.8	10	95	84.4	56 48.6	08	94	83.5	56 50.9	07	94	82.6	56 52.8	06	94	81.7	35
6	55 34.0	15	95	87.8	55 38.4	14	95	86.9	55 42.3	13	95	86.0	55 45.9	11	95	85.2	55 49.1	10	95	84.3	55 51.9	09	94	83.4	55 54.3	07	94	82.5	55 56.3	06	94	81.6	6
7	54 37.0	15	95	87.5	54 41.4	14	95	86.7	54 45.4	13	95	85.8	54 49.0	12	95	85.0	54 52.3	10	95	84.1	54 55.2	09	94	83.2	54 57.7	08	94	82.4	54 59.9	07	94	81.5	7
8	53 40.0	15	95	87.3	53 44.4	14	95	86.4	53 48.5	13	95	85.6	53 52.2	12	95	84.8	53 55.5	11	95	83.9	53 58.5	09	94	83.1	54 01.2	08	94	82.2	54 03.5	07	94	81.4	8
9	52 43.0	15	95	87.0	52 47.5	14	95	86.2	52 51.6	13	95	85.4	52 55.4	12	95	84.6	52 58.8	11	94	83.8	53 01.9	10	94	82.9	53 04.6	09	94	82.1	53 07.0	07	94	81.3	9
40	51 46.0	16	95	86.8	51 50.5	14	95	86.0	51 54.7	13	95	85.2	51 58.6	12	95	84.4	52 02.1	11	94	83.6	52 05.3	10	94	82.8	52 08.1	09	94	82.0	52 10.7	08	94	81.2	40
1	50 49.1	16	95	86.6	50 53.6	15	95	85.8	59 57.9	14	95	85.0	51 01.8	13	95	84.2	51 05.4	11	94	83.4	51 08.7	10	94	82.6	51 11.6	09	94	81.8	51 14.3	08	94	81.0	1
2	49 52.1	16	95	86.3	49 56.7	15	95	85.6	50 01.0	14	95	84.8	50 05.0	13	95	84.0	50 08.7	12	94	83.2	50 12.1	11	94	82.5	50 15.2	10	94	81.7	50 17.9	09	94	80.9	2
3	48 55.2	16	95	86.1	48 59.8	15	95	85.3	49 04.2	14	95	84.6	49 08.3	13	95	83.8	49 12.1	12	94	83.1	49 15.5	11	94	82.3	49 18.7	10	94	81.5	49 21.6	09	94	80.8	3
4	47 58.3	16	95	85.8	48 03.0	15	95	85.1	48 07.4	14	95	84.4	48 11.6	13	94	83.6	48 15.4	12	94	82.9	48 19.0	11	94	82.1	48 22.3	10	94	81.4	48 25.3	09	94	80.6	4
45	47 01.4	16	95	85.6	47 06.1	15	95	84.9	47 10.6	15	95	84.2	47 14.9	14	94	83.4	47 18.8	13	94	82.7	47 22.5	12	94	82.0	47 25.9	11	94	81.2	47 29.0	10	94	80.5	45
6	46 04.5	17	95	85.4	46 09.3	16	95	84.7	46 13.9	15	95	84.0	46 18.2	14	94	83.2	46 22.2	13	94	82.5	46 26.0	12	94	81.8	46 29.5	11	94	81.1	46 32.7	10	94	80.4	6
7	45 07.6	17	95	85.2	45 12.5	16	95	84.5	45 17.1	15	95	83.8	45 21.5	14	94	83.1	45 25.7	13	94	82.3	45 29.5	12	94	81.6	45 33.1	12	94	80.9	45 36.5	11	94	80.2	7
8	44 10.8	17	95	84.9	44 15.7	16	95	84.2	44 20.4	15	94	83.6	44 24.9	14	94	82.9	44 29.1	14	94	82.2	44 33.1	13	94	81.5	44 36.8	12	94	80.8	44 40.2	11	94	80.1	8
9	43 13.9	17	95	84.7	43 19.0	16	95	84.0	43 23.7	16	94	83.3	43 28.3	15	94	82.7	43 32.6	14	94	82.0	43 36.7	13	94	81.3	43 40.5	12	94	80.6	43 44.0	11	94	79.9	9
50	42 17.1	17	95	84.5	42 22.2	17	95	83.8	42 27.1	16	94	83.1	42 31.7	15	94	82.5	42 36.1	14	94	81.8	42 40.3	13	94	81.1	42 44.2	13	94	80.5	42 47.9	12	94	79.8	50
1	41 20.3	18	95	84.3	41 25.5	17	94	83.6	41 30.4	16	94	82.9	41 35.1	15	94	82.3	41 39.6	15	94	81.6	41 43.9	14	94	81.0	41 47.9	13	94	80.3	41 51.7	12	94	79.6	1
2	40 23.6	18	95	84.0	40 28.8	17	94	83.4	40 33.8	16	94	82.7	40 38.6	16	94	82.1	40 43.2	15	94	81.4	40 47.6	14	94	80.8	40 51.7	13	94	80.1	40 55.6	13	93	79.5	2
3	39 26.8	18	95	83.8	39 32.1	17	94	83.2	39 37.2	17	94	82.5	39 42.1	16	94	81.9	39 46.8	15	94	81.2	39 51.2	15	94	80.6	39 55.5	14	94	80.0	39 59.5	13	93	79.3	3
4	38 30.1	18	94	83.6	38 35.5	18	94	82.9	38 40.7	17	94	82.3	38 45.6	16	94	81.7	38 50.4	16	94	81.1	38 55.0	15	94	80.4	38 59.3	14	94	79.8	39 03.5	13	93	79.1	4
55	37 33.4	19	94	83.4	37 38.9	18	94	82.7	37 44.1	17	94	82.1	37 49.2	17	94	81.5	37 54.0	16	94	80.9	37 58.7	15	94	80.2	38 03.2	15	94	79.6	38 07.4	14	93	79.0	55
6	36 36.7	19	94	83.1	36 42.3	18	94	82.5	36 47.6	17	94	81.9	36 52.8	17	94	81.3	36 57.7	16	94	80.7	37 02.5	16	94	80.1	37 07.1	15	93	79.4	37 11.4	14	93	78.8	6
7	35 40.1	19	94	82.9	35 45.7	18	94	82.3	35 51.1	18	94	81.7	35 56.4	17	94	81.1	36 01.4	17	94	80.5	36 06.3	16	94	79.9	36 11.0	15	93	79.3	36 15.5	15	93	78.6	7
8	34 43.5	19	94	82.7	34 49.2	19	94	82.1	34 54.7	18	94	81.5	35 00.0	17	94	80.9	35 05.2	17	94	80.3	35 10.1	16	94	79.7	35 14.9	16	93	79.1	35 19.6	15	93	78.5	8
9	33 46.9	19	94	82.5	33 52.7	19	94	81.9	33 58.3	18	94	81.3	34 03.7	18	94	80.7	34 08.9	17	94	80.1	34 14.0	17	93	79.5	34 18.9	16	93	78.9	34 23.7	15	93	78.3	9
60	32 50.4	20	94	82.2	32 56.2	19	94	81.6	33 01.9	19	94	81.1	33 07.4	18	94	80.5	33 12.8	18	94	79.9	33 17.9	17	93	79.3	33 23.0	16	93	78.7	33 27.8	16	93	78.1	60
1	31 53.8	20	94	82.0	31 59.8	19	94	81.4	32 05.5	19	94	80.8	32 11.1	18	94	80.3	32 16.6	18	94	79.7	32 21.9	17	93	79.1	32 27.0	17	93	78.5	32 32.0	16	93	77.9	1
2	30 57.3	20	94	81.8	31 03.3	20	94	81.2	31 09.2	19	94	80.6	31 14.9	19	94	80.1	31 20.5	18	93	79.5	31 25.9	18	93	78.9	31 31.1	17	93	78.3	31 36.2	17	93	77.7	2
3	30 00.9	21	94	81.5	30 07.0	20	94	81.0	30 12.9	20	94	80.4	30 18.7	19	94	79.8	30 24.4	19	93	79.3	30 29.9	18	93	78.7	30 35.2	18	93	78.1	30 40.5	17	93	77.6	3
4	29 04.5	21	94	81.3	29 10.6	20	94	80.8	29 16.7	20	94	80.2	29 22.6	19	94	79.6	29 28.3	19	93	79.1	29 34.0	18	93	78.5	29 39.4	18	93	77.9	29 44.8	18	93	77.4	4
65	28 08.1	21	94	81.1	28 14.3	21	94	80.5	28 20.5	20	94	80.0	28 26.5	20	93	79.4	28 32.3	19	93	78.9	28 38.1	19	93	78.3	28 43.6	18	93	77.7	28 49.1	18	93	77.2	65
6	27 11.7	21	94	80.9	27 18.1	21	94	80.3	27 24.3	21	94	79.8	27 30.4	20	93	79.2	27 36.4	20	93	78.7	27 42.2	19	93	78.1	27 47.9	19	93	77.5	27 53.5	18	93	77.0	6
7	26 15.4	22	94	80.6	26 21.8	21	94	80.1	26 28.2	21	93	79.5	26 34.4	20	93	79.0	26 40.4	20	93	78.4	26 46.4	20	93	77.9	26 52.2	19	93	77.3	26 57.9	19	93	76.8	7
8	25 19.1	22	94	80.4	25 25.6	22	94	79.9	25 32.1	21	93	79.3	25 38.4	21	93	78.8	25 44.5	20	93	78.2	25 50.6	20	93	77.7	25 56.5	20	93	77.1	26 02.4	19	92	76.6	8
9	24 22.9	22	94	80.2	24 29.5	22	94	79.6	24 36.0	22	93	79.1	24 42.4	21	93	78.5	24 48.7	21	93	78.0	24 54.9	20	93	77.5	25 00.9	20	93	76.9	25 06.9	20	92	76.4	9
70	23 26.7	23	94	79.9	23 33.4	22	93	79.4	23 40.0	22	93	78.9	23 46.5	22	93	78.3	23 52.9	21	93	77.8	23 59.2	21	93	77.3	24 05.4	20	93	76.7	24 11.4	20	92	76.2	70
1	22 30.5	23	94	79.7	22 37.3	23	93	79.2	22 44.0	22	93	78.6	22 50.6	22	93	78.1	22 57.2	22	93	77.6	23 03.6	21	93	77.0	23 09.9	21	92	76.5	23 16.1	20	92	76.0	1
2	21 34.4	23	93	79.4	21 41.3	23	93	78.9	21 48.1	23	93	78.4	21 54.8	22	93	77.9	22 01.5	22	93	77.3	22 08.0	22	93	76.8	22 14.4	21	92	76.3	22 20.7	21	92	75.8	2
3	20 38.3	24	93	79.2	20 45.3	23	93	78.7	20 52.2	23	93	78.2	20 59.1	23	93	77.6	21 05.8	22	93	77.1	21 12.4	22	92	76.6	21 19.0	22	92	76.1	21 25.4	21	92	75.5	3
4	19 42.3	24	93	79.0	19 49.4	24	93	78.4	19 56.4	23	93	77.9	20 03.4	23	93	77.4	20 10.2	23	93	76.9	20 17.0	22	92	76.4	20 23.6	22	92	75.9	20 30.2	22	92	75.3	4
75	18 46.3	24	93	78.7	18 53.5	24	93	78.2	19 00.6	24	93	77.7	19 07.7	23	93	77.2	19 14.7	23	92	76.7	19 21.5	23	92	76.1	19 28.3	22	92	75.6	19 35.0	22	92	75.1	75
6	17 50.3	25	93	78.5	17 57.7	24	93	78.0	18 04.9	24	93	77.4	18 12.1	24	93	76.9	18 19.2	23	92	76.4	18 26.2	23	92	75.9	18 33.1	23	92	75.4	18 39.9	23	92	74.9	6
7	16 54.5	25	93	78.2	17 01.9	25	93	77.7	17 09.2	24	93	77.2	17 16.5	24	92	76.7	17 23.7	24	92	76.2	17 30.8	24	92	75.7	17 37.9	23	92	75.2	17 44.8	23	92	74.7	7
8	15 58.6	25	93	78.0	16 06.2	25	93	77.5	16 13.6	25	93	77.0	16 21.0	25	92	76.5	16 28.3	24	92	76.0	16 35.6	24	92	75.4	16 42.7	24	92	74.9	16 49.8	24	92	74.4	8
9	15 02.8	26	93	77.7	15 10.5	25	93	77.2	15 18.1	25	92	76.7	15 25.6	25	92	76.2	15 33.0	25	92	75.7	15 40.4	24	92	75.2	15 47.7	24	92	74.7	15 54.9	24	91	74.2	9
80	14 07.1	26	93	77.5	14 14.9	26	93	77.0	14 22.5	26	92	76.5	14 30.2	25	92	76.0	14 37.7	25	92	75.5	14 45.2	25	92	75.0	14 52.7	25	92	74.5	15 00.0	24	91	74.0	80
1	13 11.4	26	93	77.2	13 19.3	26	92	76.7	13 27.1	26	92	76.2	13 34.8	26	92	75.7	13 42.5	26	92	75.2	13 50.2	25	92	74.7	13 57.7	25	91	74.2	14 05.2	25	91	73.7	1
2	12 15.8	27	93	76.9	12 23.8	26	92	76.4	12 31.7	26	92	76.0	12 39.6	26	92	75.5	12 47.4	26	92	75.0	12 55.1	26	92	74.5	13 02.8	26	91	74.0	13 10.5	25	91	73.5	2
3	11 20.3	27	92	76.7	11 28.3	27	92	76.2	11 36.4	27	92	75.7	11 44.4	27	92	75.2	11 52.3	26	92	74.7	12 00.2	26	91	74.2	12 08.0	26	91	73.7	12 15.8	26	91	73.2	3
4	10 24.8	27	92	76.4	10 33.0	27	92	75.9	10 41.1	27	92	75.4	10 49.2	27	92	74.9	10 57.3	27	92	74.5	11 05.3	27	91	74.0	11 13.3	26	91	73.5	11 21.2	26	91	73.0	4
85	9 29.3	28	92	76.1	9 37.7	28	92	75.7	9 45.9	28	92	75.2	9 54.2	27	92	74.7	10 02.4	27	91	74.2	10 10.5	27	91	73.7	10 18.6	27	91	73.2	10 26.7	27	91	72.7	85
6	8 34.0	28	92	75.9	8 42.4	28	92	75.4	8 50.8	28	92	74.9	8 59.2	28	92	74.4	9 07.5	28	91	73.9	9 15.8	28	91	73.4	9 24.0	27	91	73.0	9 32.2	27	91	72.5	6
7	7 38.7	29	92	75.6	7 47.2	28	92	75.1	7 55.7	28	92	74.6	8 04.2	28	91	74.1	8 12.7	28	91	73.7	8 21.1	28	91	73.2	8 29.5	28	91	72.7	8 37.9	28	90	72.2	7
8	6 43.4	29	92	75.3	6 52.1	29	92	74.8	7 00.8	29	92	74.3	7 09.4	29	91	73.9	7 18.0	29	91	73.4	7 26.5	28	91	72.9	7 35.1	28	91	72.4	7 43.6	28	90	71.9	8
9	5 48.3	29	92	75.0	5 57.1	29	92	74.6	6 05.9	29	91	74.1	6 14.6	29	91	73.6	6 23.3	29	91	73.1	6 32.0	29	91	72.6	6 40.7	29	90	72.1	6 49.4	29	90	71.7	9
90					5 02.1	30	92	74.3	5 11.0	30	91	73.8	5 19.9	30	91	73.3	5 28.8	30	91	72.8	5 37.6	29	91	72.3	5 46.4	29	90	71.9	5 55.2	29	90	71.4	90

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	56 00.0	1.0 01	180.0	55 30.0	1.0 01	180.0	55 00.0	1.0 01	180.0	54 30.0	1.0 01	180.0	54 00.0	1.0 01	180.0	53 30.0	1.0 01	180.0	53 00.0	1.0 01	180.0	52 30.0	1.0 01	180.0	00
1	55 59.1	1.0 04	178.3	55 29.2	1.0 04	178.3	54 59.2	1.0 04	178.3	54 29.2	1.0 04	178.4	53 59.2	1.0 04	178.4	53 29.2	1.0 04	178.4	52 59.2	1.0 04	178.4	52 29.2	1.0 04	178.5	1
2	55 56.6	1.0 07	176.6	55 26.6	1.0 07	176.6	54 56.7	1.0 07	176.7	54 26.7	1.0 07	176.7	53 56.8	1.0 07	176.8	53 26.8	1.0 07	176.8	52 56.9	1.0 06	176.9	52 26.9	1.0 06	176.9	2
3	55 52.3	1.0 10	174.9	55 22.4	1.0 10	174.9	54 52.5	1.0 10	175.0	54 22.7	1.0 10	175.1	53 52.8	1.0 09	175.2	53 22.9	1.0 09	175.2	52 53.0	1.0 09	175.3	52 23.1	1.0 09	175.4	3
4	55 46.3	99 13	173.2	55 16.6	99 13	173.3	54 46.8	99 12	173.4	54 17.0	99 12	173.5	53 47.1	99 12	173.6	53 17.3	99 12	173.6	52 47.5	99 12	173.7	52 17.7	99 12	173.8	4
05	55 38.7	99 16	171.5	55 09.0	99 15	171.6	54 39.3	99 15	171.7	54 09.7	99 15	171.8	53 40.0	99 15	172.0	53 10.2	99 14	172.1	52 40.5	99 14	172.2	52 10.8	99 14	172.3	05
6	55 29.4	98 18	169.8	54 59.9	98 18	169.9	54 30.3	99 18	170.1	54 00.8	99 17	170.2	53 31.2	99 17	170.4	53 01.6	99 17	170.5	52 32.0	99 17	170.6	52 02.4	99 16	170.8	6
7	55 18.5	98 21	168.1	54 49.1	98 21	168.3	54 19.7	98 20	168.5	53 50.3	98 20	168.6	53 20.9	98 20	168.8	52 51.4	98 19	169.0	52 22.0	98 19	169.1	51 52.5	98 19	169.3	7
8	55 05.9	97 24	166.5	54 36.7	97 23	166.7	54 07.5	97 23	166.9	53 38.3	97 23	167.1	53 09.0	98 22	167.2	52 39.8	98 22	167.4	52 10.5	98 22	167.6	51 41.2	98 21	167.8	8
9	54 51.8	97 26	164.9	54 22.8	97 26	165.1	53 53.8	97 25	165.3	53 24.8	97 25	165.5	52 55.7	97 25	165.7	52 26.6	97 24	165.9	51 57.5	97 24	166.1	51 28.4	97 24	166.3	9
10	54 36.1	96 29	163.3	54 07.4	96 28	163.5	53 38.6	96 28	163.7	53 09.7	96 28	164.0	52 40.9	96 27	164.2	52 12.0	96 27	164.4	51 43.1	96 26	164.6	51 14.2	96 26	164.8	10
1	54 18.9	95 31	161.7	53 50.4	95 31	161.9	53 21.8	95 30	162.2	52 53.2	95 30	162.4	52 24.6	95 29	162.7	51 56.0	96 29	162.9	51 27.3	96 29	163.2	50 58.6	96 28	163.4	1
2	54 00.2	94 34	160.1	53 32.0	94 33	160.4	53 03.7	94 33	160.7	52 35.3	95 32	161.0	52 06.9	95 32	161.2	51 38.5	95 31	161.5	51 10.1	95 31	161.7	50 41.6	95 31	162.0	2
3	53 40.1	93 36	158.6	53 12.1	93 35	158.9	52 44.1	94 35	159.2	52 16.0	94 34	159.5	51 47.9	94 34	159.8	51 19.7	94 34	160.0	50 51.5	94 33	160.3	50 23.3	94 33	160.6	3
4	53 18.6	92 38	157.1	52 50.9	92 38	157.4	52 23.1	93 37	157.7	51 55.3	93 37	158.0	51 27.5	93 36	158.3	50 59.6	93 36	158.6	50 31.6	93 35	158.9	50 03.6	93 35	159.2	4
15	52 55.7	91 40	155.6	52 28.3	91 40	156.0	52 00.8	92 39	156.3	51 33.3	92 39	156.6	51 05.7	92 38	156.9	50 38.1	92 38	157.2	50 10.4	92 37	157.5	49 42.7	92 37	157.8	15
6	52 31.5	90 42	154.2	52 04.4	90 42	154.5	51 37.3	91 41	154.9	51 10.0	91 41	155.2	50 42.7	91 40	155.5	50 15.4	91 40	155.9	49 48.0	91 39	156.2	49 20.6	92 39	156.5	6
7	52 06.0	89 45	152.8	51 39.3	89 44	153.1	51 12.4	90 43	153.5	50 45.5	90 43	153.8	50 18.5	90 42	154.2	49 51.5	90 42	154.5	49 24.4	90 41	154.9	48 57.2	91 41	155.2	7
8	51 39.3	88 47	151.4	51 12.9	88 46	151.8	50 46.3	89 45	152.1	50 19.7	89 45	152.5	49 53.1	89 44	152.9	49 26.3	89 44	153.2	48 59.6	89 43	153.6	48 32.7	90 43	153.9	8
9	51 11.4	87 48	150.0	50 45.3	87 48	150.4	50 19.1	87 47	150.8	49 52.8	88 47	151.2	49 26.5	88 46	151.6	49 00.1	88 46	151.9	48 33.6	88 45	152.3	48 07.0	89 45	152.6	9
20	50 42.3	86 50	148.7	50 16.6	86 50	149.1	49 50.7	86 49	149.5	49 24.8	87 49	149.9	48 58.7	87 48	150.3	48 32.6	87 48	150.7	48 06.5	87 47	151.0	47 40.2	88 46	151.4	20
1	50 12.2	85 52	147.4	49 46.7	85 51	147.9	49 21.2	85 51	148.3	48 55.6	85 50	148.7	48 29.9	86 50	149.0	48 04.2	86 49	149.4	47 38.3	86 49	149.8	47 12.4	87 48	150.2	1
2	49 40.9	83 54	146.2	49 15.8	84 53	146.6	48 50.7	84 53	147.0	48 25.4	84 52	147.4	48 00.0	85 51	147.8	47 34.6	85 51	148.2	47 09.1	85 50	148.6	46 43.5	85 50	149.0	2
3	49 08.7	82 55	145.0	48 43.9	83 55	145.4	48 19.1	83 54	145.8	47 54.2	83 54	146.2	47 29.2	84 53	146.6	47 04.1	84 53	147.0	46 38.9	84 52	147.4	46 13.6	84 51	147.8	3
4	48 35.4	81 57	143.8	48 11.0	81 56	144.2	47 46.6	82 56	144.6	47 22.0	82 55	145.1	46 57.3	82 55	145.5	46 32.5	83 54	145.9	46 07.7	83 54	146.3	45 42.8	83 53	146.7	4
25	48 01.2	80 58	142.6	47 37.2	80 58	143.0	47 13.1	81 57	143.5	46 48.8	81 57	143.9	46 24.5	81 56	144.3	46 00.1	82 56	144.8	45 35.6	82 55	145.2	45 11.0	82 54	145.6	25
6	47 26.1	79 60	141.5	47 02.4	79 59	141.9	46 38.7	79 59	142.4	46 14.8	80 58	142.8	45 50.8	80 58	143.2	45 26.7	80 57	143.7	45 02.5	81 56	144.1	44 38.3	81 56	144.5	6
7	46 50.1	78 61	140.4	46 26.8	78 61	140.8	46 03.4	78 60	141.3	45 39.8	79 60	141.7	45 16.2	79 59	142.2	44 52.5	79 58	142.6	44 28.6	80 58	143.0	44 04.7	80 57	143.4	7
8	46 13.3	76 63	139.3	45 50.4	77 62	139.8	45 27.3	77 62	140.2	45 04.1	77 61	140.7	44 40.8	78 60	141.1	44 17.4	78 60	141.5	43 53.9	78 59	142.0	43 30.3	79 59	142.4	8
9	45 35.7	75 64	138.2	45 13.1	76 63	138.7	44 50.3	76 63	139.2	44 27.5	76 62	139.6	44 04.5	77 62	140.1	43 41.5	77 61	140.5	43 18.3	77 61	141.0	42 55.1	78 60	141.4	9
30	44 57.3	74 65	137.2	44 35.0	74 65	137.7	44 12.7	75 64	138.2	43 50.2	75 63	138.6	43 27.5	76 63	139.1	43 04.8	76 62	139.5	42 42.0	76 62	140.0	42 19.1	77 61	140.4	30
1	44 18.2	73 66	136.2	43 56.3	73 66	136.7	43 34.2	74 65	137.2	43 12.1	74 65	137.6	42 49.8	74 64	138.1	42 27.4	75 64	138.5	42 04.9	75 63	139.0	41 42.3	75 62	139.4	1
2	43 38.4	72 68	135.3	43 16.8	72 67	135.7	42 55.1	73 66	136.2	42 33.3	73 66	136.7	42 11.3	73 65	137.1	41 49.3	74 65	137.6	41 27.1	74 64	138.0	41 04.9	74 64	138.5	2
3	42 57.9	71 69	134.3	42 36.6	71 68	134.8	42 15.3	71 67	135.3	41 53.8	72 67	135.7	41 32.2	72 66	136.2	41 10.5	73 66	136.7	40 48.6	73 65	137.1	40 26.7	73 65	137.6	3
4	42 16.7	70 70	133.4	41 55.8	70 69	133.9	41 34.8	70 68	134.4	41 13.6	71 68	134.8	40 52.4	71 67	135.3	40 31.0	71 67	135.8	40 09.5	72 66	136.2	39 47.9	72 66	136.7	4
35	41 35.0	68 71	132.5	41 14.4	69 70	133.0	40 53.7	69 69	133.5	40 32.9	70 69	134.0	40 11.9	70 68	134.4	39 50.9	70 68	134.9	39 29.7	71 67	135.3	39 08.4	71 67	135.8	35
6	40 52.6	67 72	131.6	40 32.4	68 71	132.1	40 12.0	68 70	132.6	39 51.5	69 70	133.1	39 30.9	69 69	133.6	39 10.1	69 69	134.0	38 49.3	70 68	134.5	38 28.3	70 68	135.0	6
7	40 09.7	66 72	130.8	39 49.8	67 72	131.3	39 29.7	67 71	131.8	39 09.5	67 71	132.3	38 49.2	68 70	132.7	38 28.8	68 70	133.2	38 08.3	69 69	133.7	37 47.7	69 69	134.1	7
8	39 26.2	65 73	130.0	39 06.6	66 73	130.5	38 46.9	66 72	131.0	38 27.0	66 72	131.4	38 07.0	67 71	131.9	37 46.9	67 71	132.4	37 26.7	68 70	132.8	37 06.4	68 70	133.3	8
9	38 42.3	64 74	129.2	38 22.9	65 74	129.7	38 03.5	65 73	130.2	37 44.0	65 73	130.6	37 24.3	66 72	131.1	37 04.5	66 72	131.6	36 44.6	66 71	132.0	36 24.6	67 71	132.5	9
40	37 57.8	63 75	128.4	37 38.8	64 74	128.9	37 19.6	64 74	129.4	37 00.4	64 73	129.9	36 41.0	65 73	130.3	36 21.6	65 72	130.8	36 02.0	65 72	131.3	35 42.3	66 71	131.7	40
1	37 12.8	62 76	127.6	36 54.1	63 75	128.1	36 35.3	63 75	128.6	36 16.4	63 74	129.1	35 57.3	64 74	129.6	35 38.1	64 73	130.0	35 18.9	64 73	130.5	34 59.5	65 72	131.0	1
2	36 27.4	61 76	126.9	36 09.0	62 76	127.4	35 50.5	62 75	127.9	35 31.8	62 75	128.4	35 13.1	63 74	128.8	34 54.2	63 74	129.3	34 35.2	63 73	129.8	34 16.2	64 73	130.2	2
3	35 41.6	60 77	126.2	35 23.4	61 77	126.7	35 05.2	61 76	127.2	34 46.9	61 76	127.6	34 28.4	62 75	128.1	34 09.8	62 75	128.6	33 51.2	62 74	129.1	33 32.4	63 74	129.5	3
4	34 55.3	59 78	125.5	34 37.5	60 77	126.0	34 19.5	60 77	126.4	34 01.5	60 76	126.9	33 43.3	61 76	127.4	33 25.0	61 75	127.9	33 06.6	61 75	128.4	32 48.1	62 74	128.8	4
45	34 08.6	58 78	124.8	33 51.1	59 78	125.3	33 33.4	59 78	125.8	33 15.6	59 77	126.2	32 57.8	60 77	126.7	32 39.8	60 76	127.2	32 21.7	61 76	127.7	32 03.5	61 75	128.1	45
6	33 21.6	57 79	124.1	33 04.3	58 79	124.6	32 46.9	58 78	125.1	32 29.4	58 78	125.6	32 11.8	59 77	126.1	31 54.1	59 77	126.5	31 36.3	60 76	127.0	31 18.4	60 76	127.5	6
7	32 34.1	56 80	123.5	32 17.1	57 79	124.0	32 00.0	57 79	124.4	31 42.8	58 78	124.9	31 25.5	58 78	125.4	31 08.1	58 77	125.9	30 50.5	59 77	126.4	30 32.9	59 76	126.8	7
8	31 46.4	56 80	122.8	31 29.6	56 80	123.3	31 12.8	56 79	123.8	30 55.9	57 79	124.3	30 38.8	57 78	124.8	30 21.6	57 78	125.2	30 04.4	58 78	125.7	29 47.0	58 77	126.2	8
9	30 58.3	55 81	122.2	30 41.8	55 80	122.7	30 25.2	55 80	123.2	30 08.5	56 79	123.7	29 51.7	56 79	124.1	29 34.9	56 79	124.6	29 17.9	57 78	125.1	29 00.8	57 78	125.6	9
50	30 09.8	54 81	121.6	29 53.6	54 81	122.1	29 37.3	55 80	122.6	29 20.9	55 80	123.1	29 04.3	55 80	123.5	28 47.7	56 79	124.0	28 31.0	56 79	124.5	28 14.2	56 78	125.0	50
1	29 21.1	53 82	121.0	29 05.1	53 81	121.5	28 49.0	54 81	122.0	28 32.9	54 80	122.5	28 16.6	54 80	122.9	28 00.3	55 80	123.4	27 43.8	55 79	123.9	27 27.2	55 79	124.4	1
2	28 32.0	52 82	120.4	28 16.3	53 82	120.9	28 00.5	53 81	121.4	27 44.6	53 81	121.9	27 28.6	54 81	122.4	27 12.5	54 80	122.8	26 56.3	54 80	123.3	26 40.0	54 79	123.8	2
3	27 42.7	51 83	119.9	27 27.2	52 82	120.4	27 11.6	52 82	120.8	26 56.0	52 81	121.3	26 40.2	53 81	121.8	26 24.4	53 81	122.3	26 08.4	53 80	122.7	25 52.4	54 80	123.2	3
4	26 53.0	51 83	119.3	26 37.8	51 83	119.8	26 22.5	51 82	120.3	26 07.1	52 82	120.8	25 51.6	52 82	121.2	25 36.0	52 81	121.7	25 20.3	52 81	122.2	25 04.5	53 80	122.7	4
55	26 03.2	50 84	118.8	25 48.2	50 83	119.3	25 33.1	50 83	119.7	25 17.9	51 82	120.2	25 02.6	51 82	120.7	24 47.3	51 82	121.2	24 31.8	52 81	121.6	24 16.3	52 81	122.1	55
6	25 13.0	49 84	118.3	24 58.3	49 84	118.7	24 43.4	50 83	119.2	24 28.5	50 83	119.7	24 13.4	50 82	120.2	23 58.3	51 82	120.6	23 43.1	51 82	121.1	23 27.8	51 81	121.6	6
7	24 22.6	48 84	117.7	24 08.1	49 84	118.2	23 53.5	49 84	118.7	23 38.8	49 83	119.2	23 24.0	49 83	119.6	23 09.1	50 82	120.1	22 54.1	50 82	120.6	22 39.1	50 82	121.1	7
8	23 32.0	48 85	117.2	23 17.7	48 84	117.7	23 03.3	48 84	118.2	22 48.8	48 84	118.7	22 34.2	49 83	119.1	22 19.6	49 83	119.6	22 04.9	49 82	120.1	21 50.1	50 82	120.6	8
9	22 41.2	47 85	116.7	22 27.1	47 85	117.2	22 12.9	47 84	117.7	21 58.6	48 84	118.2	21 44.3	48 84	118.6	21 29.9	48 83	119.1	21 15.4	48 83	119.6	21 00.8	49 82	120.1	9
60	21 50.1	46 85	116.3	21 36.2	46 85	116.7	21 22.2	47 85	117.2	21 08.2	47 84	117.7	20 54.1	47 84	118.2	20 39.9	47 84	118.6	20 25.6	48 83	119.1	20 11.3	48 83	119.6	60
1	20 58.8	45 86	115.8	20 45.1	46 85	116.3	20 31.4	46 85	116.7	20 17.6	46 85	117.2	20 03.7	46 84	117.7	19 49.7	47 84	118.2	19 35.6	47 84	118.6	19 21.5	47 83	119.1	1
2	20 07.3	45 86	115.3	19 53.9	45 86	115.8	19 40.3	45 85	116.3	19 26.7	45 85	116.7	19 13.0	46 85	117.2	18 59.3	46 84	117.7	18 45.4	46 84	118.2	18 31.5	46 84	118.6	2
3	19 15.6	44 86	114.9	19 02.4	44 86	115.3	18 49.1	45 86	115.8	18 35.7	45 85	116.3	18 22.2	45 85	116.8	18 08.6	45 85	117.2	17 55.0	45 84	117.7	17 41.3	46 84	118.2	3
4	18 23.8	43 87	114.4	18 10.7	44 86	114.9	17 57.6	44 86	115.4	17 44.4	44 86	115.8	17 31.1	44 85	116.3	17 17.8	45 85	116.8	17 04.4	45 85	117.3	16 50.9	45 84	117.7	4
65	17 31.7	43 87	114.0	17 18.9	43 87	114.5	17 05.9	43 86	114.9	16 52.9	43 86	115.4	16 39.9	44 86	115.9	16 26.8	44 85	116.3	16 13.6	44 85	116.8	16 00.3	44 85	117.3	65
6	16 39.5	42 87	113.6	16 26.8	42 87	114.0	16 14.1	43 87	114.5	16 01.3	43 86	115.0	15 48.4	43 86	115.4	15 35.5	43 86	115.9	15 22.5	43 85	116.4	15 09.5	44 85	116.9	6
7	15 47.1	42 88	113.1	15 34.6	42 87	113.6	15 22.1	42 87	114.1	15 09.5	42 87	114.6	14 56.8	42 86	115.0	14 44.1	42 86	115.5	14 31.3	43 86	116.0	14 18.5	43 85	116.4	7
8	14 54.6	41 88	112.7	14 42.3	41 88	113.2	14 29.9	41 87	113.7	14 17.5	41 87	114.1	14 05.0	42 87	114.6	13 52.5	42 86	115.1	13 39.9	42 86	115.6	13 27.3	42 86	116.0	8
9	14 01.9	40 88	112.3	13 49.7	40 88	112.8	13 37.6	41 88	113.3	13 25.4	41 87	113.7	13 13.1	41 87	114.2	13 00.7	41 87	114.7	12 48.4	41 86	115.1	12 35.9	42 86	115.6	9
70	13 09.0	40 88	111.9	12 57.1	40 88	112.4	12 45.1	40 88	112.9	12 33.0	40 87	113.3	12 20.9	40 87	113.8	12 08.8	41 87	114.3	11 56.6	41 86	114.7	11 44.4	41 86	115.2	70
1	12 16.0	39 89	111.5	12 04.2	39 88	112.0	11 52.4	39 88	112.5	11 40.6	40 88	113.0	11 28.7	40 87	113.4	11 16.7	40 87	113.9	11 04.7	40 87	114.4	10 52.7	40 86	114.8	1
2	11 22.9	39 89	111.2	11 11.3	39 89	111.6	10 59.6	39 88	112.1	10 48.0	39 88	112.6	10 36.2	39 88	113.0	10 24.5	39 87	113.5	10 12.7	39 87	114.0	10 00.8	40 87	114.4	2
3	10 29.6	38 89	110.8	10 18.2	38 89	111.3	10 06.7	38 88	111.7	9 55.2	38 88	112.2	9 43.6	39 88	112.7	9 32.1	39 88	113.1	9 20.4	39 87	113.6	9 08.8	39 87	114.1	3
4	9 36.2	37 89	110.4	9 24.9	38 89	110.9	9 13.6	38 89	111.4	9 02.3	38 88	111.8	8 50.9	38 88	112.3	8 39.5	38 88	112.8	8 28.1	38 88	113.2	8 16.6	38 87	113.7	4
75	8 42.6	37 89	110.1	8 31.5	37 89	110.5	8 20.4	37 89	111.0	8 09.2	37 89	111.5	7 58.1	37 88	111.9	7 46.8	37 88	112.4	7 35.6	38 88	112.9	7 24.3	38 87	113.3	75
6	7 49.0	36 90	109.7	7 38.0	36 89	110.2	7 27.1	37 89	110.6	7 16.1	37 89	111.1	7 05.1	37 89	111.6	6 54.0	37 88	112.0	6 42.9	37 88	112.5	6 31.8	37 88	113.0	6
7	6 55.2	36 90	109.4	6 44.4	36 90	109.8	6 33.6	36 89	110.3	6 22.8	36 89	110.8	6 11.9	36 89	111.2	6 01.1	36 88	111.7	5 50.2	36 88	112.2	5 39.2	36 88	112.6	7
8	6 01.3	35 90	109.0	5 50.7	35 90	109.5	5 40.0	36 90	109.9	5 29.4	36 89	110.4	5 18.7	36 89	110.9	5 08.0	36 89	111.4							8
9	5 07.3	35 90	108.7																						9

DECLINATION SAME NAME AS LATITUDE

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91																						5 01.2	30 90	71.1	91

Lat. 18°

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	88 00.0	1.0 21	00.0	87 30.0	1.0 17	00.0	87 00.0	1.0 14	00.0	86 30.0	1.0 12	00.0	86 00.0	1.0 11	00.0	85 30.0	1.0 10	00.0	85 00.0	1.0 09	00.0	84 30.0	1.0 08	00.0	00
1	87 47.3	90 54	25.1	87 19.7	93 46	20.5	86 51.3	95 40	17.3	86 22.6	96 35	14.9	85 53.5	97 31	13.1	85 24.2	98 28	11.6	84 54.8	98 25	10.4	84 25.3	99 23	09.5	1
2	87 14.8	72 72	43.1	86 52.0	79 64	36.7	86 27.4	84 58	31.8	86 01.6	88 52	27.9	85 34.8	90 47	24.8	85 07.5	92 43	22.3	84 39.7	93 40	20.2	84 11.5	94 36	18.4	2
3	86 31.8	57 81	54.3	86 13.4	66 75	48.1	85 52.7	72 70	42.8	85 30.2	77 64	38.4	85 06.4	81 60	34.7	84 41.6	84 55	31.5	84 15.9	87 51	28.8	83 49.6	89 48	26.5	3
4	85 43.3	46 85	61.5	85 28.3	54 81	55.8	85 10.9	61 77	50.8	84 51.6	67 72	46.4	84 30.7	72 68	42.6	84 08.5	76 64	39.2	83 45.2	79 60	36.2	83 21.0	82 57	33.5	4
05	84 52.0	38 88	66.3	84 39.5	45 85	61.3	84 24.8	52 82	56.7	84 08.2	58 78	52.5	83 49.8	64 74	48.8	83 30.1	68 71	45.3	83 09.0	72 67	42.3	82 47.0	75 64	39.5	05
6	83 59.1	32 90	69.6	83 48.6	39 87	65.2	83 35.9	45 84	61.1	83 21.4	51 82	57.2	83 05.3	56 78	53.6	82 47.7	61 75	50.4	82 28.8	65 72	47.3	82 08.7	69 69	44.5	6
7	83 05.2	27 91	72.1	82 56.1	33 89	68.1	82 45.2	39 87	64.4	82 32.5	45 84	60.9	82 18.2	50 82	57.5	82 02.5	55 79	54.4	81 45.4	59 76	51.5	81 27.2	63 73	48.8	7
8	82 10.6	23 92	73.9	82 02.7	29 90	70.4	81 53.1	35 88	67.0	81 41.9	40 86	63.8	81 29.2	45 84	60.7	81 15.1	49 82	57.7	80 59.7	53 79	54.9	80 43.1	57 77	52.3	8
9	81 15.6	20 92	75.3	81 08.7	26 91	72.2	81 00.2	31 89	69.1	80 50.2	36 88	66.1	80 38.9	40 86	63.2	80 26.1	45 84	60.4	80 12.2	49 82	57.8	79 57.0	52 79	55.3	9
10	80 20.2	18 93	76.5	80 14.2	23 92	73.6	80 06.6	27 90	70.7	79 57.7	32 89	68.0	79 47.5	36 87	65.3	79 35.9	40 85	62.7	79 23.2	44 83	60.2	79 09.4	48 81	57.8	10
1	79 24.7	16 93	77.4	79 19.3	20 92	74.7	79 12.5	25 91	72.1	79 04.5	29 89	69.5	78 55.3	33 88	67.0	78 44.8	37 86	64.6	78 33.2	40 85	62.3	78 20.5	44 83	60.0	1
2	78 28.9	14 93	78.1	78 24.1	18 92	75.6	78 18.1	22 91	73.2	78 10.8	26 90	70.8	78 02.4	30 89	68.5	77 52.9	34 87	66.2	77 42.3	37 86	64.0	77 30.7	40 84	61.8	2
3	77 33.0	12 93	78.7	77 28.7	16 93	76.4	77 23.3	20 92	74.1	77 16.8	24 91	71.9	77 09.1	27 90	69.7	77 00.4	31 88	67.6	76 50.7	34 87	65.5	76 40.0	37 86	63.4	3
4	76 37.0	11 93	79.2	76 33.2	15 93	77.0	76 28.3	18 92	74.9	76 22.4	22 91	72.8	76 15.4	25 90	70.8	76 07.4	28 89	68.7	75 58.5	31 88	66.8	75 48.6	35 87	64.8	4
15	75 40.9	10 94	79.6	75 37.5	13 93	77.6	75 33.1	16 92	75.6	75 27.7	20 91	73.6	75 21.4	23 90	71.7	75 14.1	26 90	69.8	75 05.8	29 88	67.9	74 56.7	32 87	66.0	15
6	74 44.8	08 94	79.9	74 41.8	12 93	78.0	74 37.8	15 92	76.1	74 32.9	18 92	74.3	74 27.1	21 91	72.4	74 20.4	24 90	70.6	74 12.8	27 89	68.8	74 04.4	30 88	67.1	6
7	73 48.6	07 94	80.2	73 45.9	10 93	78.4	73 42.3	13 92	76.6	73 37.9	16 92	74.9	73 32.6	19 91	73.1	73 26.4	22 90	71.4	73 19.4	25 89	69.7	73 11.6	27 88	68.0	7
8	72 52.3	06 94	80.4	72 50.0	09 93	78.7	72 46.8	12 93	77.0	72 42.8	15 92	75.4	72 37.9	18 91	73.7	72 32.2	20 91	72.1	72 25.8	23 90	70.4	72 18.5	25 89	68.8	8
9	71 56.0	06 94	80.6	71 54.0	08 93	79.0	71 51.1	11 93	77.4	71 47.5	13 92	75.8	71 43.1	16 92	74.2	71 37.9	19 91	72.6	71 31.9	21 90	71.1	71 25.2	24 89	69.6	9
20	70 59.7	05 94	80.7	70 58.0	07 93	79.2	70 55.4	10 93	77.7	70 52.1	12 92	76.2	70 48.1	15 92	74.7	70 43.3	17 91	73.2	70 37.8	20 90	71.7	70 31.6	22 90	70.2	20
1	70 03.4	04 94	80.9	70 01.9	06 94	79.4	69 59.6	09 93	77.9	69 56.7	11 93	76.5	69 53.0	13 92	75.0	69 48.6	16 91	73.6	69 43.6	18 91	72.2	69 37.8	20 90	70.8	1
2	69 07.1	03 94	81.0	69 05.8	05 94	79.6	69 03.8	08 93	78.2	69 01.2	10 93	76.8	68 57.8	12 92	75.4	68 53.8	14 92	74.0	68 49.2	17 91	72.6	68 43.9	19 90	71.3	2
3	68 10.7	02 94	81.0	68 09.6	05 94	79.7	68 07.9	07 93	78.3	68 05.6	09 93	77.0	68 02.6	11 92	75.7	67 58.9	13 92	74.3	67 54.7	15 91	73.0	67 49.7	17 90	71.7	3
4	67 14.3	02 94	81.1	67 13.5	04 94	79.8	67 12.0	06 93	78.5	67 10.0	08 93	77.2	67 07.3	10 92	75.9	67 03.9	12 92	74.7	67 00.0	14 91	73.4	66 55.5	16 91	72.1	4
25	66 18.0	01 94	81.1	66 17.3	03 94	79.9	66 16.1	05 93	78.6	66 14.3	07 93	77.4	66 11.9	09 92	76.2	66 08.9	11 92	74.9	66 05.3	13 91	73.7	66 01.1	15 91	72.5	25
6	65 21.6	00 94	81.1	65 21.2	02 94	79.9	65 20.2	04 93	78.7	65 18.6	06 93	77.5	65 16.5	08 92	76.3	65 13.8	10 92	75.2	65 10.5	12 92	74.0	65 06.7	14 91	72.8	6
7	64 25.2	00 94	81.1	64 25.0	02 94	80.0	64 24.2	04 93	78.8	64 22.9	05 93	77.7	64 21.0	07 92	76.5	64 18.6	09 92	75.4	64 15.6	11 92	74.2	64 12.1	13 91	73.1	7
8	63 28.8	01 94	81.1	63 28.8	01 94	80.0	63 28.2	03 93	78.9	63 27.1	05 93	77.8	63 25.5	06 93	76.7	63 23.3	08 92	75.5	63 20.7	10 92	74.4	63 17.5	11 91	73.3	8
9	62 32.4	01 94	81.1	62 32.6	00 94	80.0	62 32.2	02 93	78.9	62 31.3	04 93	77.9	62 29.9	05 93	76.8	62 28.1	07 92	75.7	62 25.7	09 92	74.6	62 22.8	10 91	73.5	9
30	61 36.1	02 94	81.1	61 36.4	00 94	80.0	61 36.2	01 93	79.0	61 35.5	03 93	77.9	61 34.4	05 93	76.9	61 32.8	06 92	75.8	61 30.6	08 92	74.8	61 28.1	09 91	73.7	30
1	60 39.7	02 94	81.0	60 40.2	01 94	80.0	60 40.2	01 93	79.0	60 39.7	02 93	78.0	60 38.8	04 93	77.0	60 37.4	05 92	75.9	60 35.6	07 92	74.9	60 33.2	08 91	73.9	1
2	59 43.3	03 94	81.0	59 44.0	01 94	80.0	59 44.2	00 93	79.0	59 43.9	02 93	78.0	59 43.2	03 93	77.0	59 42.1	05 92	76.0	59 40.4	06 92	75.0	59 38.4	08 91	74.0	2
3	58 47.0	03 94	80.9	58 47.8	02 94	80.0	58 48.2	01 93	79.0	58 48.1	01 93	78.0	58 47.6	02 93	77.1	58 46.7	04 92	76.1	58 45.3	05 92	75.1	58 43.5	07 92	74.2	3
4	57 50.6	04 94	80.9	57 51.6	03 94	79.9	57 52.1	01 93	79.0	57 52.3	00 93	78.0	57 52.0	02 93	77.1	57 51.3	03 92	76.2	57 50.1	04 92	75.2	57 48.6	06 92	74.3	4
35	56 54.3	04 94	80.8	56 55.4	03 94	79.9	56 56.1	02 93	79.0	56 56.4	00 93	78.0	56 56.3	01 93	77.1	56 55.9	02 92	76.2	56 55.0	04 92	75.3	56 53.7	05 92	74.4	35
6	55 58.0	05 94	80.7	55 59.2	04 94	79.8	56 00.1	02 93	78.9	56 00.6	01 93	78.0	56 00.7	00 93	77.1	56 00.4	02 92	76.2	55 59.8	03 92	75.3	55 58.7	04 92	74.5	6
7	55 01.7	05 94	80.6	55 03.1	04 94	79.8	55 04.1	03 93	78.9	55 04.8	02 93	78.0	55 05.1	00 93	77.1	55 05.0	01 92	76.3	55 04.5	02 92	75.4	55 03.7	03 92	74.5	7
8	54 05.4	06 94	80.5	54 06.9	05 94	79.7	54 08.1	03 93	78.8	54 09.0	02 93	78.0	54 09.5	01 93	77.1	54 09.6	00 92	76.3	54 09.3	01 92	75.4	54 08.7	03 92	74.6	8
9	53 09.1	06 94	80.4	53 10.8	05 94	79.6	53 12.2	04 93	78.8	53 13.2	03 93	77.9	53 13.8	02 93	77.1	53 14.1	00 92	76.3	53 14.1	01 92	75.4	53 13.7	02 92	74.6	9
40	52 12.8	07 94	80.3	52 14.7	06 94	79.5	52 16.2	04 93	78.7	52 17.4	03 93	77.9	52 18.2	02 93	77.1	52 18.7	01 92	76.3	52 18.9	00 92	75.4	52 18.7	01 92	74.6	40
1	51 16.6	07 94	80.2	51 18.6	06 93	79.4	51 20.2	05 93	78.6	51 21.6	04 93	77.8	51 22.6	03 93	77.0	51 23.3	02 92	76.2	51 23.6	01 92	75.4	51 23.7	00 92	74.6	1
2	50 20.4	08 94	80.1	50 22.5	07 93	79.3	50 24.3	06 93	78.6	50 25.8	04 93	77.8	50 27.0	03 93	77.0	50 27.9	02 92	76.2	50 28.4	01 92	75.4	50 28.6	00 92	74.6	2
3	49 24.2	08 94	80.0	49 26.4	07 93	79.2	49 28.4	06 93	78.5	49 30.0	05 93	77.7	49 31.4	04 93	76.9	49 32.4	03 92	76.2	49 33.2	02 92	75.4	49 33.6	01 92	74.6	3
4	48 28.0	09 94	79.9	48 30.4	08 93	79.1	48 32.5	07 93	78.4	48 34.3	06 93	77.6	48 35.8	05 93	76.9	48 37.0	04 92	76.1	48 38.0	03 92	75.4	48 38.6	02 92	74.6	4
45	47 31.8	09 94	79.8	47 34.3	08 93	79.0	47 36.6	07 93	78.3	47 38.6	06 93	77.5	47 40.3	05 93	76.8	47 41.7	04 92	76.1	47 42.8	03 92	75.3	47 43.6	02 92	74.6	45
6	46 35.7	09 94	79.6	46 38.3	08 93	78.9	46 40.7	08 93	78.2	46 42.9	07 93	77.5	46 44.7	06 92	76.7	46 46.3	05 92	76.0	46 47.6	04 92	75.3	46 48.6	03 92	74.5	6
7	45 39.5	10 94	79.5	45 42.3	09 93	78.8	45 44.9	08 93	78.1	45 47.2	07 93	77.4	45 49.2	06 92	76.7	45 50.9	05 92	75.9	45 52.4	04 92	75.2	45 53.6	04 92	74.5	7
8	44 43.4	10 93	79.4	44 46.4	09 93	78.7	44 49.1	09 93	78.0	44 51.5	08 93	77.3	44 53.7	07 92	76.6	44 55.6	06 92	75.9	44 57.2	05 92	75.2	44 58.6	04 92	74.5	8
9	43 47.4	11 93	79.2	43 50.4	10 93	78.6	43 53.3	09 93	77.9	43 55.8	08 93	77.2	43 58.2	07 92	76.5	44 00.2	06 92	75.8	44 02.1	06 92	75.1	44 03.6	05 92	74.4	9
50	42 51.3	11 93	79.1	42 54.5	10 93	78.4	42 57.5	09 93	77.7	43 00.2	09 93	77.1	43 02.7	08 92	76.4	43 04.9	07 92	75.7	43 06.9	06 92	75.0	43 08.7	05 92	74.3	50
1	41 55.3	12 93	79.0	41 58.6	11 93	78.3	42 01.7	10 93	77.6	42 04.6	09 93	76.9	42 07.3	08 92	76.3	42 09.7	08 92	75.6	42 11.8	07 92	74.9	42 13.8	06 92	74.3	1
2	40 59.3	12 93	78.8	41 02.8	11 93	78.2	41 06.0	10 93	77.5	41 09.0	10 93	76.8	41 11.8	09 92	76.2	41 14.4	08 92	75.5	41 16.7	07 92	74.8	41 18.8	07 91	74.2	2
3	40 03.3	12 93	78.7	40 06.9	12 93	78.0	40 10.3	11 93	77.4	40 13.5	10 93	76.7	40 16.4	09 92	76.1	40 19.2	09 92	75.4	40 21.7	08 92	74.8	40 24.0	07 91	74.1	3
4	39 07.4	13 93	78.5	39 11.1	12 93	77.9	39 14.7	11 93	77.2	39 18.0	11 92	76.6	39 21.1	10 92	75.9	39 24.0	09 92	75.3	39 26.6	09 92	74.7	39 29.1	08 91	74.0	4
55	38 11.5	13 93	78.3	38 15.4	13 93	77.7	38 19.0	12 93	77.1	38 22.5	11 92	76.5	38 25.7	10 92	75.8	38 28.8	10 92	75.2	38 31.6	09 92	74.5	38 34.2	08 91	73.9	55
6	37 15.6	14 93	78.2	37 19.6	13 93	77.6	37 23.4	12 93	76.9	37 27.0	12 92	76.3	37 30.4	11 92	75.7	37 33.6	10 92	75.1	37 36.6	10 92	74.4	37 39.4	09 91	73.8	6
7	36 19.8	14 93	78.0	36 23.9	13 93	77.4	36 27.9	13 93	76.8	36 31.6	12 92	76.2	36 35.1	12 92	75.6	36 38.5	11 92	74.9	36 41.7	10 92	74.3	36 44.6	10 91	73.7	7
8	35 24.0	14 93	77.9	35 28.2	14 93	77.3	35 32.3	13 92	76.6	35 36.2	13 92	76.0	35 39.9	12 92	75.4	35 43.4	11 92	74.8	35 46.7	11 92	74.2	35 49.9	10 91	73.6	8
9	34 28.2	15 93	77.7	34 32.6	14 93	77.1	34 36.8	14 92	76.5	34 40.8	13 92	75.9	34 44.7	13 92	75.3	34 48.4	12 92	74.7	34 51.9	11 92	74.1	34 55.2	11 91	73.5	9
60	33 32.5	15 93	77.5	33 37.0	15 93	76.9	33 41.3	14 92	76.3	33 45.5	14 92	75.7	33 49.5	13 92	75.1	33 53.3	12 92	74.5	33 57.0	12 91	73.9	34 00.5	11 91	73.3	60
1	32 36.8	16 93	77.3	32 41.4	15 93	76.8	32 45.9	15 92	76.2	32 50.2	14 92	75.6	32 54.4	14 92	75.0	32 58.4	13 92	74.4	33 02.2	12 91	73.8	33 05.8	12 91	73.2	1
2	31 41.1	16 93	77.2	31 45.9	16 92	76.6	31 50.5	15 92	76.0	31 55.0	15 92	75.4	31 59.3	14 92	74.8	32 03.4	14 92	74.3	32 07.4	13 91	73.7	32 11.2	12 91	73.1	2
3	30 45.5	17 93	77.0	30 50.4	16 92	76.4	30 55.2	16 92	75.8	30 59.8	15 92	75.3	31 04.2	15 92	74.7	31 08.5	14 91	74.1	31 12.7	14 91	73.5	31 16.6	13 91	73.0	3
4	29 49.9	17 93	76.8	29 55.0	17 92	76.2	29 59.9	16 92	75.7	30 04.6	16 92	75.1	30 09.2	15 92	74.5	30 13.7	15 91	74.0	30 18.0	14 91	73.4	30 22.1	14 91	72.8	4
65	28 54.4	17 92	76.6	28 59.6	17 92	76.1	29 04.6	17 92	75.5	29 09.5	16 92	74.9	29 14.2	16 92	74.4	29 18.8	15 91	73.8	29 23.3	15 91	73.2	29 27.6	14 91	72.7	65
6	27 58.9	18 92	76.4	28 04.2	17 92	75.9	28 09.4	17 92	75.3	28 14.4	17 92	74.8	28 19.3	16 91	74.2	28 24.1	16 91	73.6	28 28.7	15 91	73.1	28 33.2	15 91	72.5	6
7	27 03.5	18 92	76.2	27 08.9	18 92	75.7	27 14.2	17 92	75.1	27 19.4	17 92	74.6	27 24.4	17 91	74.0	27 29.3	16 91	73.5	27 34.1	16 91	72.9	27 38.8	15 91	72.4	7
8	26 08.1	19 92	76.0	26 13.6	18 92	75.5	26 19.1	18 92	74.9	26 24.4	18 92	74.4	26 29.6	17 91	73.9	26 34.7	17 91	73.3	26 39.6	16 91	72.7	26 44.4	16 90	72.2	8
9	25 12.7	19 92	75.8	25 18.4	19 92	75.3	25 24.0	18 92	74.8	25 29.5	18 91	74.2	25 34.8	18 91	73.7	25 40.0	17 91	73.1	25 45.1	17 91	72.6	25 50.1	16 90	72.0	9
70	24 17.4	20 92	75.6	24 23.2	19 92	75.1	24 29.0	19 92	74.6	24 34.6	19 91	74.0	24 40.1	18 91	73.5	24 45.4	18 91	72.9	24 50.7	17 91	72.4	24 55.8	17 90	71.9	70
1	23 22.1	20 92	75.4	23 28.1	20 92	74.9	23 34.0	19 92	74.4	23 39.7	19 91	73.8	23 45.4	19 91	73.3	23 50.9	18 91	72.8	23 56.3	18 90	72.2	24 01.6	18 90	71.7	1
2	22 26.9	21 92	75.2	22 33.0	20 92	74.7	22 39.1	20 92	74.2	22 45.0	19 91	73.6	22 50.7	19 91	73.1	22 56.4	19 91	72.6	23 02.0	18 90	72.0	23 07.5	18 90	71.5	2
3	21 31.8	21 92	75.0	21 38.0	21 92	74.5	21 44.2	20 91	74.0	21 50.2	20 91	73.4	21 56.2	20 91	72.9	22 02.0	19 91	72.4	22 07.8	19 90	71.9	22 13.4	19 90	71.3	3
4	20 36.7	21 92	74.8	20 43.1	21 92	74.3	20 49.4	21 91	73.8	20 55.6	20 91	73.2	21 01.7	20 91	72.7	21 07.7	20 90	72.2	21 13.6	20 90	71.7	21 19.4	19 90	71.1	4
75	19 41.6	22 92	74.6	19 48.2	22 91	74.1	19 54.6	21 91	73.6	20 00.9	21 91	73.0	20 07.2	21 91	72.5	20 13.4	20 90	72.0	20 19.4	20 90	71.5	20 25.4	20 90	70.9	75
6	18 46.7	22 92	74.4	18 53.3	22 91	73.9	18 59.9	22 91	73.3	19 06.4	22 91	72.8	19 12.8	21 91	72.3	19 19.1	21 90	71.8	19 25.4	21 90	71.3	19 31.5	20 90	70.8	6
7	17 51.7	23 91	74.1	17 58.5	23 91	73.6	18 05.3	22 91	73.1	18 11.9	22 91	72.6	18 18.5	22 90	72.1	18 25.0	21 90	71.6	18 31.3	21 90	71.1	18 37.7	21 90	70.6	7
8	16 56.9	23 91	73.9	17 03.8	23 91	73.4	17 10.7	23 91	72.9	17 17.5	23 91	72.4	17 24.2	22 90	71.9	17 30.8	22 90	71.4	17 37.4	22 90	70.9	17 43.9	21 90	70.3	8
9	16 02.1	24 91	73.7	16 09.2	24 91	73.2	16 16.2	23 91	72.7	16 23.1	23 90	72.2	16 30.0	23 90	71.7	16 36.8	23 90	71.2	16 43.5	22 90	70.6	16 50.2	22 89	70.1	9
80	15 07.3	24 91	73.5	15 14.6	24 91	73.0	15 21.7	24 90	72.5	15 28.8	24 90	71.9	15 35.9	23 90	71.4	15 42.8	23 90	70.9	15 49.7	23 90	70.4	15 56.5	23 89	69.9	80
1	14 12.7	25 91	73.2	14 20.0	24 91	72.7	14 27.4	24 90	72.2	14 34.6	24 90	71.7	14 41.8	24 90	71.2	14 48.9	24 90	70.7	14 56.0	23 90	70.2	15 03.0	23 89	69.7	1
2	13 18.1	25 91	73.0	13 25.6	25 91	72.5	13 33.1	25 90	72.0	13 40.5	25 90	71.5	13 47.8	24 90	71.0	13 55.1	24 90	70.5	14 02.3	24 89	70.0	14 09.5	24 89	69.5	2
3	12 23.5	26 91	72.7	12 31.2	25 90	72.2	12 38.8	25 90	71.7	12 46.4	25 90	71.2	12 53.9	25 90	70.8	13 01.4	25 89	70.3	13 08.8	25 89	69.8	13 16.1	24 89	69.3	3
4	11 29.1	26 91	72.5	11 36.9	26 90	72.0	11 44.7	26 90	71.5	11 52.4	26 90	71.0	12 00.1	25 90	70.5	12 07.7	25 89	70.0	12 15.3	25 89	69.5	12 22.8	25 89	69.0	4
85	10 34.7	27 90	72.2	10 42.7	27 90	71.7	10 50.6	26 90	71.3	10 58.5	26 90	70.8	11 06.3	26 89	70.3	11 14.1	26 89	69.8	11 21.8	26 89	69.3	11 29.5	26 89	68.8	85
6	9 40.4	27 90	72.0	9 48.5	27 90	71.5	9 56.6	27 90	71.0	10 04.7	27 90	70.5	10 12.7	27 89	70.0	10 20.6	26 89	69.5	10 28.5	26 89	69.0	10 36.4	26 88	68.5	6
7	8 46.2	28 90	71.7	8 54.5	28 90	71.2	9 02.7	27 90	70.7	9 10.9	27 89	70.3	9 19.1	27 89	69.8	9 27.2	27 89	69.3	9 35.3	27 89	68.8	9 43.3	27 88	68.3	7
8	7 52.0	28 90	71.4	8 00.5	28 90	71.0	8 08.9	28 90	70.5	8 17.2	28 89	70.0	8 25.6	28 89	69.5	8 33.9	28 89	69.0	8 42.1	27 88	68.5	8 50.3	27 88	68.1	8
9	6 58.0	29 90	71.2	7 06.6	29 90	70.7	7 15.1	28 89	70.2	7 23.7	28 89	69.7	7 32.2	28 89	69.2	7 40.6	28 89	68.8	7 49.1	28 88	68.3	7 57.5	28 88	67.8	9
90	6 04.0	29 90	70.9	6 12.8	29 90	70.4	6 21.5	29 89	69.9	6 30.2	29 89	69.5	6 38.8	29 89	69.0	6 47.5	29 88	68.5	6 56.1	29 88	68.0	7 04.7	29 88	67.5	90

DECLINATION CONTRARY NAME TO LATITUDE

Lat. 18°

H.A.	20° 00′				20° 30′				21° 00′				21° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	52 00.0	1.0	01	180.0	51 30.0	1.0	01	180.0	51 00.0	1.0	01	180.0	50 30.0	1.0	01	180.0
1	51 59.2	1.0	04	178.5	51 29.3	1.0	04	178.5	50 59.3	1.0	04	178.5	50 29.3	1.0	04	178.5
2	51 57.0	1.0	06	177.0	51 27.0	1.0	06	177.0	50 57.0	1.0	06	177.0	50 27.1	1.0	06	177.1
3	51 53.2	1.0	09	175.4	51 23.3	1.0	09	175.5	50 53.4	1.0	09	175.6	50 23.5	1.0	08	175.6
4	51 47.9	99	11	173.9	51 18.0	99	11	174.0	50 48.2	99	11	174.1	50 18.4	99	11	174.2
05	51 41.1	99	14	172.4	51 11.3	99	14	172.5	50 41.6	99	13	172.6	50 11.9	99	13	172.7
6	51 32.8	99	16	170.9	51 03.2	99	16	171.0	50 33.6	99	16	171.2	50 03.9	99	16	171.3
7	51 23.1	98	19	169.4	50 53.6	98	18	169.6	50 24.1	98	18	169.7	49 54.6	98	18	169.9
8	51 11.9	98	21	168.0	50 42.5	98	21	168.1	50 13.2	98	20	168.3	49 43.8	98	20	168.4
9	50 59.2	97	23	166.5	50 30.1	97	23	166.7	50 00.9	97	23	166.9	49 31.7	97	22	167.0
10	50 45.2	97	26	165.1	50 16.2	97	25	165.3	49 47.3	97	25	165.5	49 18.2	97	25	165.7
1	50 29.8	96	28	163.6	50 01.1	96	28	163.9	49 32.3	96	27	164.1	49 03.4	96	27	164.3
2	50 13.1	95	30	162.2	49 44.5	95	30	162.5	49 15.9	95	29	162.7	48 47.3	95	29	162.9
3	49 55.0	94	32	160.8	49 26.7	94	32	161.1	48 58.3	95	32	161.3	48 29.9	95	31	161.6
4	49 35.6	93	34	159.5	49 07.5	94	34	159.7	48 39.4	94	34	160.0	48 11.3	94	33	160.3
15	49 15.0	93	36	158.1	48 47.2	93	36	158.4	48 19.3	93	36	158.7	47 51.4	93	35	159.0
6	48 53.1	92	38	156.8	48 25.6	92	38	157.1	47 58.0	92	38	157.4	47 30.3	92	37	157.7
7	48 30.0	91	40	155.5	48 02.8	91	40	155.8	47 35.5	91	40	156.1	47 08.1	91	39	156.4
8	48 05.8	90	42	154.2	47 38.8	90	42	154.6	47 11.8	90	41	154.9	46 44.7	90	41	155.2
9	47 40.4	89	44	153.0	47 13.7	89	44	153.3	46 47.0	89	43	153.6	46 20.2	89	43	154.0
20	47 13.9	88	46	151.8	46 47.6	88	45	152.1	46 21.1	88	45	152.4	45 54.7	88	44	152.8
1	46 46.4	87	48	150.5	46 20.4	87	47	150.9	45 54.2	87	46	151.3	45 28.0	87	46	151.6
2	46 17.8	86	49	149.4	45 52.1	86	49	149.7	45 26.3	86	48	150.1	45 00.4	86	48	150.5
3	45 48.3	85	51	148.2	45 22.9	85	50	148.6	44 57.4	85	50	149.0	44 31.8	85	49	149.3
4	45 17.7	84	52	147.1	44 52.6	84	52	147.5	44 27.5	84	51	147.9	44 02.2	84	51	148.2
25	44 46.3	82	54	146.0	44 21.5	83	53	146.4	43 56.7	83	53	146.8	43 31.7	83	52	147.2
6	44 13.9	81	55	144.9	43 49.5	82	55	145.3	43 24.9	82	54	145.7	43 00.3	82	54	146.1
7	43 40.7	80	57	143.9	43 16.6	81	56	144.3	42 52.4	81	56	144.7	42 28.1	81	55	145.1
8	43 06.6	79	58	142.8	42 42.8	79	58	143.2	42 18.9	80	57	143.6	41 55.0	80	56	144.1
9	42 31.7	78	59	141.8	42 08.3	78	59	142.2	41 44.7	79	58	142.7	41 21.1	79	58	143.1
30	41 56.1	77	61	140.8	41 32.9	77	60	141.3	41 09.7	78	60	141.7	40 46.4	78	59	142.1
1	41 19.6	76	62	139.9	40 56.9	76	61	140.3	40 34.0	76	61	140.7	40 11.0	77	60	141.2
2	40 42.5	75	63	138.9	40 20.1	75	62	139.4	39 57.5	75	62	139.8	39 34.8	76	61	140.2
3	40 04.7	74	64	138.0	39 42.6	74	64	138.5	39 20.3	74	63	138.9	38 58.0	75	63	139.3
4	39 26.2	73	65	137.1	39 04.4	73	65	137.6	38 42.5	73	64	138.0	38 20.5	74	64	138.4
35	38 47.0	71	66	136.3	38 25.6	72	66	136.7	38 04.0	72	65	137.1	37 42.3	72	65	137.6
6	38 07.3	70	67	135.4	37 46.1	71	67	135.9	37 24.9	71	66	136.3	37 03.5	71	66	136.7
7	37 26.9	69	68	134.6	37 06.1	70	68	135.0	36 45.1	70	67	135.5	36 24.1	70	67	135.9
8	36 46.0	68	69	133.8	36 25.5	69	69	134.2	36 04.8	69	68	134.7	35 44.1	69	68	135.1
9	36 04.5	67	70	133.0	35 44.3	68	70	133.4	35 24.0	68	69	133.9	35 03.6	68	68	134.3
40	35 22.5	66	71	132.2	35 02.6	67	70	132.7	34 42.6	67	70	133.1	34 22.5	67	69	133.6
1	34 40.0	65	72	131.4	34 20.4	65	71	131.9	34 00.7	66	71	132.4	33 40.9	66	70	132.8
2	33 57.0	64	72	130.7	33 37.7	64	72	131.2	33 18.3	65	72	131.6	32 58.8	65	71	132.1
3	33 13.5	63	73	130.0	32 54.5	63	73	130.5	32 35.4	64	72	130.9	32 16.2	64	72	131.4
4	32 29.5	62	74	129.3	32 10.8	63	73	129.8	31 52.0	63	73	130.2	31 33.1	63	72	130.7
45	31 45.2	61	75	128.6	31 26.7	62	74	129.1	31 08.2	62	74	129.5	30 49.6	62	73	130.0
6	31 00.4	60	75	127.9	30 42.2	61	75	128.4	30 24.0	61	74	128.9	30 05.7	61	74	129.3
7	30 15.2	59	76	127.3	29 57.3	60	76	127.8	29 39.4	60	75	128.2	29 21.3	60	75	128.7
8	29 29.6	58	77	126.7	29 12.0	59	76	127.1	28 54.3	59	76	127.6	28 36.6	59	75	128.0
9	28 43.6	57	77	126.0	28 26.3	58	77	126.5	28 08.9	58	76	127.0	27 51.5	58	76	127.4
50	27 57.3	57	78	125.4	27 40.3	57	77	125.9	27 23.2	57	77	126.3	27 06.0	57	76	126.8
1	27 10.6	56	78	124.8	26 53.9	56	78	125.3	26 37.0	56	78	125.8	26 20.1	57	77	126.2
2	26 23.6	55	79	124.2	26 07.1	55	78	124.7	25 50.5	55	78	125.2	25 33.9	56	78	125.6
3	25 36.3	54	79	123.7	25 20.0	54	79	124.1	25 03.7	54	78	124.6	24 47.3	55	78	125.1
4	24 48.6	53	80	123.1	24 32.7	53	79	123.6	24 16.6	54	79	124.0	24 00.5	54	79	124.5
55	24 00.7	52	80	122.6	23 45.0	52	80	123.0	23 29.2	53	80	123.5	23 13.3	53	79	124.0
6	23 12.4	51	81	122.0	22 57.0	52	80	122.5	22 41.5	52	80	123.0	22 25.8	52	80	123.4
7	22 23.9	51	81	121.5	22 08.7	51	81	122.0	21 53.4	51	80	122.5	21 38.1	51	80	122.9
8	21 35.2	50	82	121.0	21 20.2	50	81	121.5	21 05.2	50	81	121.9	20 50.0	51	81	122.4
9	20 46.1	49	82	120.5	20 31.4	49	82	121.0	20 16.6	49	81	121.4	20 01.7	50	81	121.9
60	19 56.9	48	83	120.0	19 42.4	48	82	120.5	19 27.8	49	82	121.0	19 13.2	49	81	121.4
1	19 07.3	47	83	119.6	18 53.1	48	83	120.0	18 38.7	48	82	120.5	18 24.3	48	82	120.9
2	18 17.6	47	83	119.1	18 03.5	47	83	119.6	17 49.4	47	82	120.0	17 35.3	47	82	120.5
3	17 27.6	46	84	118.6	17 13.8	46	83	119.1	16 59.9	46	83	119.6	16 46.0	47	83	120.0
4	16 37.4	45	84	118.2	16 23.8	45	84	118.6	16 10.2	46	83	119.1	15 56.5	46	83	119.6
65	15 47.0	44	84	117.7	15 33.6	45	84	118.2	15 20.2	45	84	118.7	15 06.7	45	83	119.1
6	14 56.4	44	85	117.3	14 43.3	44	84	117.8	14 30.1	44	84	118.2	14 16.8	44	84	118.7
7	14 05.6	43	85	116.9	13 52.7	43	85	117.4	13 39.7	43	84	117.8	13 26.6	44	84	118.3
8	13 14.6	42	85	116.5	13 01.9	43	85	116.9	12 49.1	43	84	117.4	12 36.3	43	84	117.9
9	12 23.5	42	86	116.1	12 10.9	42	85	116.5	11 58.4	42	85	117.0	11 45.8	42	85	117.5
70	11 32.1	41	86	115.7	11 19.8	41	86	116.1	11 07.4	41	85	116.6	10 55.0	41	85	117.1
1	10 40.6	40	86	115.3	10 28.5	40	86	115.8	10 16.3	41	85	116.2	10 04.1	41	85	116.7
2	9 48.9	40	86	114.9	9 37.0	40	86	115.4	9 25.1	40	86	115.8	9 13.1	40	85	116.3
3	8 57.1	39	87	114.5	8 45.4	39	86	115.0	8 33.6	39	86	115.5	8 21.8	39	86	115.9
4	8 05.1	38	87	114.2	7 53.6	38	87	114.6	7 42.0	39	86	115.1	7 30.4	39	86	115.6
75	7 13.0	38	87	113.8	7 01.6	38	87	114.3	6 50.3	38	86	114.7	6 38.9	38	86	115.2
6	6 20.7	37	87	113.5	6 09.6	37	87	113.9	5 58.4	37	87	114.4	5 47.2	37	86	114.9
7	5 28.3	37	88	113.1	5 17.3	37	87	113.6	5 06.3	37	87	114.0				

H.A.	22° 00′				22° 30′				23° 00′				23° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	50 00.0	1.0	01	180.0	49 30.0	1.0	01	180.0	49 00.0	1.0	01	180.0	48 30.0	1.0	01	180.0
1	49 59.3	1.0	04	178.6	49 29.3	1.0	04	178.6	48 59.3	1.0	04	178.6	48 29.3	1.0	03	178.6
2	49 57.1	1.0	06	177.1	49 27.2	1.0	06	177.2	48 57.2	1.0	06	177.2	48 27.2	1.0	06	177.2
3	49 53.5	1.0	08	175.7	49 23.6	1.0	08	175.7	48 53.7	1.0	08	175.8	48 23.8	1.0	08	175.9
4	49 48.5	99	11	174.2	49 18.7	99	11	174.3	48 48.8	99	10	174.4	48 19.0	1.0	10	174.5
05	49 42.1	99	13	172.8	49 12.4	99	13	172.9	48 42.6	99	13	173.0	48 12.8	99	13	173.1
6	49 34.3	99	15	171.4	49 04.6	99	15	171.5	48 35.0	99	15	171.6	48 05.3	99	15	171.7
7	49 25.1	98	18	170.0	48 55.5	98	17	170.1	48 26.0	98	17	170.3	47 56.5	98	17	170.4
8	49 14.5	98	20	168.6	48 45.1	98	20	168.8	48 15.7	98	19	168.9	47 46.3	98	19	169.1
9	49 02.5	97	22	167.2	48 33.3	97	22	167.4	48 04.0	97	22	167.6	47 34.8	98	21	167.7
10	48 49.2	97	24	165.8	48 20.2	97	24	166.0	47 51.1	97	24	166.2	47 22.0	97	23	166.4
1	48 34.6	96	26	164.5	48 05.7	96	26	164.7	47 36.9	96	26	164.9	47 08.0	96	26	165.1
2	48 18.7	95	29	163.2	47 50.0	96	28	163.4	47 21.4	96	28	163.6	46 52.7	96	28	163.8
3	48 01.5	95	31	161.8	47 33.1	95	30	162.1	47 04.6	95	30	162.3	46 36.1	95	30	162.5
4	47 43.1	94	33	160.5	47 14.9	94	32	160.8	46 46.7	94	32	161.0	46 18.4	94	32	161.3
15	47 23.5	93	35	159.2	46 55.5	93	34	159.5	46 27.5	93	34	159.8	45 59.5	94	33	160.0
6	47 02.7	92	37	158.0	46 35.0	92	36	158.3	46 07.2	93	36	158.5	45 39.4	93	35	158.8
7	46 40.7	91	38	156.7	46 13.3	92	38	157.0	45 45.8	92	38	157.3	45 18.2	92	37	157.6
8	46 17.6	91	40	155.5	45 50.4	91	40	155.8	45 23.2	91	40	156.1	44 55.9	91	39	156.4
9	45 53.4	90	42	154.3	45 26.5	90	42	154.6	44 59.5	90	41	154.9	44 32.6	90	41	155.2
20	45 28.1	89	44	153.1	45 01.5	89	43	153.4	44 34.8	89	43	153.8	44 08.1	89	42	154.1
1	45 01.8	88	46	152.0	44 35.5	88	45	152.3	44 09.1	88	44	152.6	43 42.7	88	44	153.0
2	44 34.5	87	47	150.8	44 08.5	87	47	151.2	43 42.4	87	46	151.5	43 16.2	87	46	151.8
3	44 06.2	86	49	149.7	43 40.5	86	48	150.1	43 14.7	86	48	150.4	42 48.8	86	47	150.8
4	43 36.9	85	50	148.6	43 11.5	85	50	149.0	42 46.0	85	49	149.3	42 20.5	85	49	149.7
25	43 06.7	83	52	147.5	42 41.6	84	51	147.9	42 16.5	84	51	148.3	41 51.3	84	50	148.6
6	42 35.6	82	53	146.5	42 10.9	83	53	146.9	41 46.0	83	52	147.2	41 21.1	83	52	147.6
7	42 03.7	81	55	145.5	41 39.3	82	54	145.8	41 14.8	82	54	146.2	40 50.2	82	53	146.6
8	41 31.0	80	56	144.5	41 06.8	81	55	144.9	40 42.6	81	55	145.2	40 18.3	81	54	145.6
9	40 57.4	79	57	143.5	40 33.6	79	57	143.9	40 09.7	80	56	144.3	39 45.7	80	56	144.7
30	40 23.0	78	58	142.5	39 59.6	78	58	142.9	39 36.0	79	57	143.3	39 12.3	79	57	143.7
1	39 47.9	77	60	141.6	39 24.8	77	59	142.0	39 01.5	78	59	142.4	38 38.2	78	58	142.8
2	39 12.1	76	61	140.7	38 49.3	76	60	141.1	38 26.3	77	60	141.5	38 03.3	77	59	141.9
3	38 35.6	75	62	139.8	38 13.1	75	61	140.2	37 50.5	75	61	140.6	37 27.8	76	60	141.0
4	37 58.4	74	63	138.9	37 36.2	74	63	139.3	37 13.9	74	62	139.7	36 51.5	75	62	140.1
35	37 20.5	73	64	138.0	36 58.7	73	64	138.4	36 36.7	73	63	138.9	36 14.6	74	63	139.3
6	36 42.0	72	65	137.2	36 20.5	72	65	137.6	35 58.8	72	64	138.0	35 37.1	73	64	138.5
7	36 03.0	71	66	136.4	35 41.7	71	66	136.8	35 20.4	71	65	137.2	34 59.0	72	65	137.7
8	35 23.3	70	67	135.6	35 02.4	70	67	136.0	34 41.3	70	66	136.4	34 20.2	71	66	136.9
9	34 43.1	69	68	134.8	34 22.4	69	67	135.2	34 01.7	69	67	135.7	33 40.9	69	66	136.1
40	34 02.3	68	69	134.0	33 42.0	68	68	134.5	33 21.6	68	68	134.9	33 01.1	68	67	135.3
1	33 21.0	66	70	133.3	33 01.0	67	69	133.7	32 40.9	67	69	134.2	32 20.7	67	68	134.6
2	32 39.2	65	70	132.5	32 19.5	66	70	133.0	31 59.7	66	70	133.4	31 39.8	66	69	133.9
3	31 56.9	64	71	131.8	31 37.5	65	71	132.3	31 18.0	65	70	132.7	30 58.4	65	70	133.2
4	31 14.1	63	72	131.1	30 55.0	64	72	131.6	30 35.9	64	71	132.0	30 16.6	64	71	132.5
45	30 30.9	62	73	130.4	30 12.1	63	72	130.9	29 53.2	63	72	131.3	29 34.3	63	71	131.8
6	29 47.3	62	74	129.8	29 28.8	62	73	130.2	29 10.2	62	72	130.7	28 51.5	62	72	131.1
7	29 03.2	61	74	129.1	28 45.0	61	74	129.6	28 26.7	61	73	130.0	28 08.3	61	73	130.5
8	28 18.8	60	75	128.5	28 00.8	60	74	128.9	27 42.8	60	74	129.4	27 24.7	61	73	129.9
9	27 33.9	59	75	127.9	27 16.3	59	75	128.3	26 58.5	59	74	128.8	26 40.7	60	74	129.2
50	26 48.7	58	76	127.3	26 31.3	58	76	127.7	26 13.8	58	75	128.2	25 56.3	59	75	128.6
1	26 03.1	57	76	126.7	25 46.0	57	76	127.1	25 28.8	57	76	127.6	25 11.5	58	75	128.0
2	25 17.1	56	77	126.1	25 00.3	56	77	126.6	24 43.4	57	76	127.0	24 26.4	57	76	127.5
3	24 30.9	55	78	125.5	24 14.3	55	77	126.0	23 57.7	56	77	126.4	23 41.0	56	76	126.9
4	23 44.3	54	78	125.0	23 28.0	54	78	125.4	23 11.6	55	77	125.9	22 55.1	55	77	126.3
55	22 57.4	53	79	124.4	22 41.3	54	78	124.9	22 25.2	54	78	125.3	22 09.0	54	77	125.8
6	22 10.1	52	79	123.9	21 54.4	53	79	124.4	21 38.5	53	78	124.8	21 22.6	53	78	125.3
7	21 22.6	52	80	123.4	21 07.1	52	79	123.8	20 51.5	52	79	124.3	20 35.8	52	78	124.8
8	20 34.8	51	80	122.9	20 19.6	51	80	123.3	20 04.2	51	79	123.8	19 48.8	51	79	124.2
9	19 46.8	50	80	122.4	19 31.8	50	80	122.8	19 16.7	50	80	123.3	19 01.5	51	79	123.7
60	18 58.5	49	81	121.9	18 43.7	49	81	122.3	18 28.8	50	80	122.8	18 13.9	50	80	123.3
1	18 09.9	48	81	121.4	17 55.3	49	81	121.9	17 40.7	49	81	122.3	17 26.1	49	80	122.8
2	17 21.1	48	82	120.9	17 06.8	48	81	121.4	16 52.4	48	81	121.9	16 38.0	48	81	122.3
3	16 32.0	47	82	120.5	16 17.9	47	82	120.9	16 03.8	47	81	121.4	15 49.6	47	81	121.9
4	15 42.7	46	82	120.0	15 28.9	46	82	120.5	15 15.0	46	82	121.0	15 01.1	47	81	121.4
65	14 53.2	45	83	119.6	14 39.6	45	82	120.1	14 26.0	46	82	120.5	14 12.2	46	82	121.0
6	14 03.5	44	83	119.2	13 50.1	45	83	119.6	13 36.7	45	82	120.1	13 23.2	45	82	120.6
7	13 13.5	44	84	118.7	13 00.4	44	83	119.2	12 47.2	44	83	119.7	12 34.0	44	82	120.1
8	12 23.4	43	84	118.3	12 10.5	43	84	118.8	11 57.5	43	83	119.3	11 44.5	43	83	119.7
9	11 33.1	42	84	117.9	11 20.4	42	84	118.4	11 07.6	43	84	118.9	10 54.9	43	83	119.3
70	10 42.6	42	84	117.5	10 30.1	42	84	118.0	10 17.6	42	84	118.5	10 05.0	42	83	118.9
1	9 51.9	41	85	117.1	9 39.6	41	84	117.6	9 27.3	41	84	118.1	9 15.0	41	84	118.5
2	9 01.0	40	85	116.8	8 49.0	40	85	117.2	8 36.9	40	84	117.7	8 24.7	40	84	118.2
3	8 10.0	39	85	116.4	7 58.1	40	85	116.9	7 46.3	40	85	117.3	7 34.3	40	84	117.8
4	7 18.8	39	86	116.0	7 07.2	39	85	116.5	6 55.5	39	85	117.0	6 43.8	39	85	117.4
75	6 27.5	38	86	115.7	6 16.0	38	86	116.1	6 04.5	38	85	116.6	5 53.0	38	85	117.1
6	5 35.9	37	86	115.3	5 24.7	38	86	115.8	5 13.4	38	86	116.2	5 02.1	38	85	116.7
7																

DECLINATION SAME NAME AS LATITUDE

H.A.	20° 00′				20° 30′				21° 00′				21° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
91	5 10.1	30	90	70.6	5 19.0	30	89	70.1	5 27.9	30	89	69.7	5 36.8	30	89	69.2
2																

H.A.	22° 00′				22° 30′				23° 00′				23° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
91	5 45.6	29	88	68.7	5 54.4	29	88	68.2	6 03.2	29	88	67.7	6 12.0	29	88	67.3
2					5 01.5	30	88	68.0	5 10.5	30	88	67.5	5 19.4	30	88	67.0

Lat. 18°

H.A.	24° 00′			24° 30′			25° 00′			25° 30′			26° 00′			26° 30′			27° 00′			27° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	84 00.0	1.0 07	00.0	83 30.0	1.0 07	00.0	83 00.0	1.0 06	00.0	82 30.0	1.0 06	00.0	82 00.0	1.0 05	00.0	81 30.0	1.0 05	00.0	81 00.0	1.0 05	00.0	80 30.0	1.0 04	00.0	00
1	83 55.7	99 21	08.7	83 26.0	99 20	08.0	82 56.3	99 18	07.4	82 26.6	99 17	06.9	81 56.8	99 16	06.4	81 27.0	99 15	06.0	80 57.2	99 14	05.7	80 27.3	99 13	05.4	1
2	83 43.0	95 34	16.9	83 14.3	96 31	15.6	82 45.4	96 29	14.5	82 16.4	97 27	13.6	81 47.3	97 26	12.7	81 18.1	98 24	11.9	80 48.8	98 23	11.2	80 19.4	98 22	10.6	2
3	83 22.8	90 44	24.5	82 55.5	91 42	22.7	82 27.9	93 39	21.2	82 00.0	93 37	19.8	81 31.9	94 35	18.6	81 03.6	95 33	17.5	80 35.0	95 31	16.6	80 06.4	96 30	15.7	3
4	82 56.1	84 53	31.2	82 30.5	86 50	29.1	82 04.4	88 48	27.3	81 37.9	89 45	25.6	81 11.0	90 43	24.1	80 43.8	91 41	22.8	80 16.4	92 39	21.6	79 48.7	93 37	20.5	4
05	82 24.0	78 60	37.0	82 00.3	80 58	34.8	81 35.9	82 55	32.7	81 10.9	84 52	30.9	80 45.4	86 50	29.2	80 19.5	87 47	27.7	79 53.2	88 45	26.2	79 26.6	89 43	25.0	05
6	81 47.7	72 66	42.0	81 25.7	75 63	39.7	81 03.0	77 61	37.5	80 39.6	79 58	35.5	80 15.6	81 56	33.7	79 51.1	83 53	32.1	79 26.1	84 51	30.5	79 00.7	85 49	29.1	6
7	81 07.9	66 71	46.2	80 47.7	69 68	43.9	80 26.6	72 66	41.7	80 04.7	74 63	39.7	79 42.2	76 61	37.8	79 19.1	78 58	36.0	78 55.4	80 56	34.4	78 31.3	81 54	32.9	7
8	80 25.4	61 74	49.8	80 06.8	64 72	47.5	79 47.3	67 70	45.4	79 26.9	69 67	43.3	79 05.8	71 65	41.4	78 44.1	74 63	39.6	78 21.7	75 60	37.9	77 58.8	77 58	36.4	8
9	79 40.8	56 77	52.9	79 23.7	59 75	50.7	79 05.6	62 73	48.5	78 46.6	64 71	46.5	78 26.9	67 68	44.6	78 06.5	69 66	42.8	77 45.4	71 64	41.1	77 23.7	73 62	39.5	9
10	78 54.5	51 80	55.6	78 38.7	54 78	53.4	78 21.9	57 76	51.3	78 04.2	60 73	49.3	77 45.8	63 71	47.4	77 26.7	65 69	45.6	77 06.8	67 68	43.9	76 46.4	69 66	42.3	10
1	78 06.8	47 81	57.8	77 52.2	50 80	55.7	77 36.6	53 78	53.7	77 20.2	56 76	51.8	77 03.0	59 74	49.9	76 45.0	61 72	48.2	76 26.3	63 70	46.5	76 07.0	65 68	44.9	1
2	77 18.0	44 83	59.8	77 04.4	47 81	57.8	76 50.0	50 80	55.8	76 34.7	52 78	53.9	76 18.6	55 76	52.1	76 01.7	57 74	50.4	75 44.2	60 73	48.8	75 25.9	62 71	47.2	2
3	76 28.3	40 84	61.5	76 15.7	43 83	59.5	76 02.3	46 81	57.7	75 48.0	49 80	55.9	75 32.9	51 78	54.1	75 17.1	54 76	52.4	75 00.6	56 75	50.8	74 43.4	58 73	49.2	3
4	75 37.8	37 85	62.9	75 26.1	40 84	61.1	75 13.6	43 82	59.3	75 00.3	46 81	57.6	74 46.2	48 80	55.9	74 31.3	51 78	54.2	74 15.8	53 76	52.6	73 59.6	55 75	51.1	4
15	74 46.7	35 86	64.2	74 35.8	38 85	62.5	74 24.2	40 84	60.7	74 11.7	43 82	59.1	73 58.5	45 81	57.4	73 44.6	48 79	55.8	73 29.9	50 78	54.3	73 14.6	52 76	52.8	15
6	73 55.1	32 87	65.4	73 45.0	35 86	63.7	73 34.1	38 84	62.0	73 22.4	40 83	60.4	73 10.0	42 82	58.8	72 56.9	45 81	57.3	72 43.2	47 79	55.8	72 28.7	49 78	54.3	6
7	73 03.0	30 88	66.4	72 53.6	33 86	64.7	72 43.4	35 85	63.2	72 32.5	38 84	61.6	72 20.9	40 83	60.1	72 08.6	42 82	58.6	71 55.6	44 80	57.1	71 42.0	46 79	55.7	7
8	72 10.5	28 88	67.3	72 01.8	30 87	65.7	71 52.3	33 86	64.2	71 42.1	35 85	62.7	71 31.2	37 84	61.2	71 19.6	40 83	59.7	71 07.4	42 82	58.3	70 54.5	44 80	56.9	8
9	71 17.7	26 88	68.0	71 09.6	28 88	66.5	71 00.7	31 86	65.1	70 51.2	33 86	63.6	70 40.9	35 84	62.2	70 30.0	37 83	60.8	70 18.5	39 82	59.4	70 06.4	41 81	58.1	9
20	70 24.7	24 89	68.7	70 17.1	27 88	67.3	70 08.8	29 87	65.9	69 59.8	31 86	64.5	69 50.2	33 85	63.1	69 40.0	35 84	61.7	69 29.1	37 83	60.4	69 17.7	39 82	59.1	20
1	69 31.4	23 89	69.4	69 24.3	25 88	68.0	69 16.6	27 88	66.6	69 08.2	29 87	65.3	68 59.2	31 86	63.9	68 49.5	33 85	62.6	68 39.3	35 84	61.3	68 28.5	37 83	60.0	1
2	68 37.9	21 90	69.9	68 31.3	23 89	68.6	68 24.1	25 88	67.3	68 16.2	27 87	66.0	68 07.7	29 86	64.7	67 58.7	31 85	63.4	67 49.0	33 84	62.1	67 38.8	35 83	60.9	2
3	67 44.2	19 90	70.4	67 38.1	22 89	69.1	67 31.3	24 88	67.9	67 24.0	25 87	66.6	67 16.0	27 87	65.3	67 07.5	29 86	64.1	66 58.4	31 85	62.9	66 48.8	33 84	61.7	3
4	66 50.4	18 90	70.9	66 44.7	20 89	69.6	66 38.4	22 88	68.4	66 31.5	24 88	67.2	66 24.0	26 87	65.9	66 16.0	28 86	64.7	66 07.5	29 85	63.6	65 58.4	31 84	62.4	4
25	65 56.4	17 90	71.3	65 51.1	19 90	70.1	65 45.2	21 89	68.9	65 38.8	22 88	67.7	65 31.8	24 87	66.5	65 24.3	26 87	65.3	65 16.2	28 86	64.2	65 07.7	29 85	63.0	25
6	65 02.3	15 90	71.6	64 57.4	17 90	70.4	64 51.9	19 89	69.3	64 45.9	21 88	68.1	64 39.4	23 88	67.0	64 32.3	24 87	65.9	64 24.7	26 86	64.7	64 16.7	28 85	63.6	6
7	64 08.1	14 90	71.9	64 03.6	16 90	70.8	63 58.5	18 89	69.7	63 52.9	20 89	68.6	63 46.8	21 88	67.4	63 40.2	23 87	66.3	63 33.0	25 86	65.3	63 25.4	26 86	64.2	7
8	63 13.8	13 91	72.2	63 09.6	15 90	71.1	63 04.9	17 90	70.0	62 59.7	18 89	68.9	62 54.0	20 88	67.9	62 47.8	21 88	66.8	62 41.1	23 87	65.7	62 33.9	25 86	64.7	8
9	62 19.4	12 91	72.5	62 15.6	14 90	71.4	62 11.2	15 90	70.3	62 06.4	17 89	69.3	62 01.1	19 88	68.2	61 55.3	20 88	67.2	61 49.0	22 87	66.2	61 42.3	23 86	65.1	9
30	61 25.0	11 91	72.7	61 21.4	13 90	71.7	61 17.4	14 90	70.6	61 12.9	16 89	69.6	61 08.0	17 89	68.6	61 02.6	19 88	67.6	60 56.7	20 87	66.5	60 50.4	22 87	65.5	30
1	60 30.5	10 91	72.9	60 27.2	12 90	71.9	60 23.6	13 90	70.9	60 19.4	15 89	69.9	60 14.8	16 89	68.9	60 09.8	18 88	67.9	60 04.3	19 88	66.9	59 58.4	20 87	65.9	1
2	59 35.9	09 91	73.1	59 33.0	11 91	72.1	59 29.6	12 90	71.1	59 25.8	13 90	70.1	59 21.5	15 89	69.2	59 16.9	16 88	68.2	59 11.8	18 88	67.2	59 06.2	19 87	66.3	2
3	58 41.3	08 91	73.2	58 38.7	10 91	72.3	58 35.6	11 90	71.3	58 32.1	12 90	70.4	58 28.2	14 89	69.4	58 23.8	15 89	68.5	58 19.1	17 88	67.5	58 13.9	18 87	66.6	3
4	57 46.6	07 91	73.3	57 44.3	09 91	72.4	57 41.5	10 90	71.5	57 38.3	11 90	70.6	57 34.7	13 89	69.6	57 30.7	14 89	68.7	57 26.3	15 88	67.8	57 21.5	17 88	66.9	4
35	56 52.0	06 91	73.5	56 49.9	08 91	72.6	56 47.4	09 90	71.6	56 44.5	10 90	70.7	56 41.2	12 89	69.8	56 37.5	13 89	68.9	56 33.4	14 88	68.0	56 29.0	16 88	67.1	35
6	55 57.2	05 91	73.6	55 55.4	07 91	72.7	55 53.2	08 90	71.8	55 50.6	09 90	70.9	55 47.6	11 90	70.0	55 44.2	12 89	69.1	55 40.5	13 88	68.2	55 36.4	14 88	67.4	6
7	55 02.5	05 91	73.6	55 00.9	06 91	72.8	54 59.0	07 90	71.9	54 56.6	08 90	71.0	54 53.9	10 90	70.2	54 50.9	11 89	69.3	54 47.4	12 88	68.4	54 43.7	13 88	67.6	7
8	54 07.7	04 91	73.7	54 06.4	05 91	72.9	54 04.7	06 90	72.0	54 02.7	07 90	71.2	54 00.2	09 90	70.3	53 57.5	10 89	69.5	53 54.3	11 89	68.6	53 50.9	12 88	67.8	8
9	53 13.0	03 91	73.8	53 11.9	04 91	72.9	53 10.4	05 90	72.1	53 08.6	07 90	71.3	53 06.5	08 90	70.4	53 04.0	09 89	69.6	53 01.2	10 89	68.8	52 58.0	11 88	67.9	9
40	52 18.2	02 91	73.8	52 17.3	03 91	73.0	52 16.1	05 90	72.2	52 14.6	06 90	71.4	52 12.7	07 90	70.5	52 10.5	08 89	69.7	52 08.0	09 89	68.9	52 05.1	10 88	68.1	40
1	51 23.4	02 91	73.8	51 22.7	03 91	73.0	51 21.8	04 91	72.2	51 20.5	05 90	71.4	51 18.9	06 90	70.6	51 17.0	07 89	69.8	51 14.7	08 89	69.0	51 12.1	09 88	68.2	1
2	50 28.6	01 91	73.8	50 28.2	02 91	73.1	50 27.4	03 91	72.3	50 26.4	04 90	71.5	50 25.0	05 90	70.7	50 23.4	06 89	69.9	50 21.4	07 89	69.1	50 19.1	08 88	68.4	2
3	49 33.7	00 91	73.9	49 33.6	01 91	73.1	49 33.1	02 91	72.3	49 32.3	03 90	71.5	49 31.2	04 90	70.8	49 29.8	05 89	70.0	49 28.1	06 89	69.2	49 26.0	07 88	68.5	3
4	48 38.9	01 91	73.9	48 39.0	00 91	73.1	48 38.7	01 91	72.3	48 38.1	02 90	71.6	48 37.3	03 90	70.8	48 36.1	04 89	70.1	48 34.7	05 89	69.3	48 32.9	06 89	68.6	4
45	47 44.1	01 91	73.8	47 44.4	00 91	73.1	47 44.3	01 91	72.4	47 44.0	02 90	71.6	47 43.4	03 90	70.9	47 42.5	03 89	70.1	47 41.3	04 89	69.4	47 39.8	05 89	68.6	45
6	46 49.3	02 91	73.8	46 49.8	01 91	73.1	46 50.0	00 91	72.4	46 49.8	01 90	71.6	46 49.5	02 90	70.9	46 48.8	03 89	70.2	46 47.9	04 89	69.4	46 46.7	05 89	68.7	6
7	45 54.5	03 91	73.8	45 55.2	02 91	73.1	45 55.6	01 91	72.3	45 55.7	00 90	71.6	45 55.5	01 90	70.9	45 55.1	02 90	70.2	45 54.4	03 89	69.5	45 53.5	04 89	68.8	7
8	44 59.7	03 91	73.7	45 00.6	02 91	73.0	45 01.2	02 91	72.3	45 01.5	01 90	71.6	45 01.6	00 90	70.9	45 01.4	01 90	70.2	45 01.0	02 89	69.5	45 00.3	03 89	68.8	8
9	44 05.0	04 91	73.7	44 06.0	03 91	73.0	44 06.8	02 91	72.3	44 07.4	01 90	71.6	44 07.7	01 90	70.9	44 07.7	00 89	70.2	44 07.5	01 89	69.5	44 07.1	02 89	68.8	9
50	43 10.2	05 91	73.6	43 11.5	04 91	73.0	43 12.5	03 91	72.3	43 13.2	02 90	71.6	43 13.8	01 90	70.9	43 14.0	01 89	70.2	43 14.1	00 89	69.5	43 13.9	01 89	68.8	50
1	42 15.4	05 91	73.6	42 16.9	04 91	72.9	42 18.1	04 90	72.2	42 19.1	03 90	71.6	42 19.8	02 90	70.9	42 20.4	01 89	70.2	42 20.6	00 89	69.5	42 20.6	00 89	68.9	1
2	41 20.7	06 91	73.5	41 22.4	05 91	72.9	41 23.8	04 90	72.2	41 25.0	04 90	71.5	41 25.9	03 90	70.9	41 26.7	02 89	70.2	41 27.2	01 89	69.5	41 27.4	00 89	68.9	2
3	40 26.0	07 91	73.4	40 27.9	06 91	72.8	40 29.5	05 90	72.1	40 30.9	04 90	71.5	40 32.0	04 90	70.8	40 33.0	03 89	70.2	40 33.7	02 89	69.5	40 34.2	01 89	68.8	3
4	39 31.3	07 91	73.4	39 33.4	06 91	72.7	39 35.2	06 90	72.1	39 36.8	05 90	71.4	39 38.1	04 90	70.8	39 39.3	04 89	70.1	39 40.3	03 89	69.5	39 41.0	02 89	68.8	4
55	38 36.7	08 91	73.3	38 38.9	07 91	72.6	38 40.9	06 90	72.0	38 42.7	06 90	71.4	38 44.3	05 90	70.7	38 45.7	04 89	70.1	38 46.8	04 89	69.4	38 47.8	03 89	68.8	55
6	37 42.0	08 91	73.2	37 44.4	08 91	72.5	37 46.6	07 90	71.9	37 48.6	06 90	71.3	37 50.4	06 90	70.7	37 52.0	05 89	70.0	37 53.4	04 89	69.4	37 54.6	04 89	68.8	6
7	36 47.4	09 91	73.1	36 50.0	08 91	72.5	36 52.4	08 90	71.8	36 54.6	07 90	71.2	36 56.6	06 90	70.6	36 58.4	06 89	70.0	37 00.0	05 89	69.3	37 01.4	04 89	68.7	7
8	35 52.8	10 91	73.0	35 55.6	09 91	72.4	35 58.2	08 90	71.7	36 00.6	08 90	71.1	36 02.8	07 90	70.5	36 04.8	06 89	69.9	36 06.6	06 89	69.3	36 08.3	05 89	68.7	8
9	34 58.3	10 91	72.9	35 01.2	10 91	72.3	35 04.0	09 90	71.6	35 06.6	08 90	71.0	35 09.0	08 90	70.4	35 11.2	07 89	69.8	35 13.3	06 89	69.2	35 15.1	06 89	68.6	9
60	34 03.8	11 91	72.7	34 06.9	10 90	72.1	34 09.9	10 90	71.5	34 12.7	09 90	70.9	34 15.3	08 90	70.3	34 17.7	08 89	69.7	34 19.9	07 89	69.1	34 22.0	07 88	68.5	60
1	33 09.3	11 91	72.6	33 12.6	11 90	72.0	33 15.8	10 90	71.4	33 18.7	10 90	70.8	33 21.5	09 90	70.2	33 24.2	08 89	69.7	33 26.6	08 89	69.1	33 28.9	07 88	68.5	1
2	32 14.9	12 91	72.5	32 18.4	11 90	71.9	32 21.7	11 90	71.3	32 24.8	10 90	70.7	32 27.8	10 89	70.1	32 30.7	09 89	69.6	32 33.3	09 89	69.0	32 35.8	08 88	68.4	2
3	31 20.5	12 91	72.4	31 24.1	12 90	71.8	31 27.6	11 90	71.2	31 31.0	11 90	70.6	31 34.2	10 89	70.0	31 37.2	10 89	69.5	31 40.1	09 89	68.9	31 42.8	09 88	68.3	3
4	30 26.1	13 90	72.2	30 29.9	13 90	71.7	30 33.6	12 90	71.1	30 37.2	12 90	70.5	30 40.6	11 89	69.9	30 43.8	11 89	69.4	30 46.9	10 89	68.8	30 49.8	10 88	68.2	4
65	29 31.8	14 90	72.1	29 35.8	13 90	71.5	29 39.7	13 90	71.0	29 43.4	12 90	70.4	29 47.0	12 89	69.8	29 50.4	11 89	69.2	29 53.7	11 88	68.7	29 56.9	10 88	68.1	65
6	28 37.5	14 90	71.9	28 41.7	14 90	71.4	28 45.8	13 90	70.8	28 49.7	13 89	70.3	28 53.5	12 89	69.7	28 57.1	12 89	69.1	29 00.6	11 88	68.6	29 03.9	11 88	68.0	6
7	27 43.3	15 90	71.8	27 47.6	14 90	71.2	27 51.9	14 90	70.7	27 56.0	13 89	70.1	28 00.0	13 89	69.6	28 03.8	13 89	69.0	28 07.5	12 88	68.4	28 11.1	12 88	67.9	7
8	26 49.1	15 90	71.6	26 53.6	15 90	71.1	26 58.1	15 90	70.5	27 02.4	14 89	70.0	27 06.5	14 89	69.4	27 10.6	13 89	68.9	27 14.4	13 88	68.3	27 18.2	12 88	67.7	8
9	25 55.0	16 90	71.5	25 59.7	16 90	70.9	26 04.3	15 90	70.4	26 08.8	15 89	69.8	26 13.1	14 89	69.3	26 17.3	14 89	68.7	26 21.5	13 88	68.2	26 25.4	13 88	67.6	9
70	25 00.9	17 90	71.3	25 05.8	16 90	70.8	25 10.6	16 90	70.2	25 15.2	15 89	69.7	25 19.8	15 89	69.1	25 24.2	15 88	68.6	25 28.5	14 88	68.0	25 32.7	14 88	67.5	70
1	24 06.8	17 90	71.1	24 11.9	17 90	70.6	24 16.9	16 89	70.1	24 21.7	16 89	69.5	24 26.5	16 89	69.0	24 31.1	15 88	68.4	24 35.6	15 88	67.9	24 40.0	14 88	67.4	1
2	23 12.9	18 90	71.0	23 18.1	17 90	70.4	23 23.3	17 89	69.9	23 28.3	17 89	69.4	23 33.2	16 89	68.8	23 38.1	16 88	68.3	23 42.8	16 88	67.8	23 47.4	15 88	67.2	2
3	22 18.9	18 90	70.8	22 24.4	18 89	70.3	22 29.7	18 89	69.7	22 34.9	17 89	69.2	22 40.1	17 89	68.7	22 45.1	17 88	68.1	22 50.0	16 88	67.6	22 54.8	16 88	67.1	3
4	21 25.1	19 90	70.6	21 30.7	19 89	70.1	21 36.2	18 89	69.6	21 41.6	18 89	69.0	21 46.9	18 88	68.5	21 52.1	17 88	68.0	21 57.3	17 88	67.4	22 02.3	17 87	66.9	4
75	20 31.3	19 90	70.4	20 37.1	19 89	69.9	20 42.8	19 89	69.4	20 48.4	19 89	68.9	20 53.9	18 88	68.3	20 59.3	18 88	67.8	21 04.6	18 88	67.3	21 09.8	17 87	66.7	75
6	19 37.6	20 90	70.2	19 43.5	20 89	69.7	19 49.4	19 89	69.2	19 55.2	19 89	68.7	20 00.9	19 88	68.1	20 06.5	19 88	67.6	20 12.0	18 88	67.1	20 17.4	18 87	66.6	6
7	18 43.9	21 89	70.0	18 50.0	20 89	69.5	18 56.1	20 89	69.0	19 02.1	20 88	68.5	19 07.9	19 88	68.0	19 13.7	19 88	67.4	19 19.5	19 88	66.9	19 25.1	19 87	66.4	7
8	17 50.3	21 89	69.8	17 56.6	21 89	69.3	18 02.9	21 89	68.8	18 09.0	20 88	68.3	18 15.1	20 88	67.8	18 21.1	20 88	67.3	18 27.0	20 87	66.7	18 32.8	19 87	66.2	8
9	16 56.8	22 89	69.6	17 03.3	22 89	69.1	17 09.7	21 88	68.6	17 16.0	21 88	68.1	17 22.3	21 88	67.6	17 28.5	21 88	67.1	17 34.6	20 87	66.6	17 40.6	20 87	66.0	9
80	16 03.3	22 89	69.4	16 10.0	22 89	68.9	16 16.6	22 88	68.4	16 23.1	22 88	67.9	16 29.6	21 88	67.4	16 36.0	21 87	66.9	16 42.3	21 87	66.4	16 48.5	21 87	65.9	80
1	15 09.9	23 89	69.2	15 16.8	23 89	68.7	15 23.6	23 88	68.2	15 30.3	22 88	67.7	15 36.9	22 88	67.2	15 43.5	22 87	66.7	15 50.0	22 87	66.2	15 56.5	21 87	65.7	1
2	14 16.6	24 89	69.0	14 23.6	23 88	68.5	14 30.6	23 88	68.0	14 37.5	23 88	67.5	14 44.4	23 88	67.0	14 51.2	23 87	66.5	14 57.9	22 87	66.0	15 04.5	22 86	65.5	2
3	13 23.4	24 89	68.8	13 30.6	24 88	68.3	13 37.8	24 88	67.8	13 44.9	24 88	67.3	13 51.9	23 87	66.8	13 58.9	23 87	66.3	14 05.8	23 87	65.8	14 12.7	23 86	65.3	3
4	12 30.2	25 88	68.5	12 37.6	25 88	68.0	12 45.0	24 88	67.5	12 52.3	24 88	67.0	12 59.5	24 87	66.5	13 06.7	24 87	66.0	13 13.8	24 86	65.5	13 20.9	23 86	65.0	4
85	11 37.2	25 88	68.3	11 44.8	25 88	67.8	11 52.3	25 88	67.3	11 59.8	25 87	66.8	12 07.2	25 87	66.3	12 14.6	25 87	65.8	12 21.9	24 86	65.3	12 29.2	24 86	64.8	85
6	10 44.2	26 88	68.1	10 52.0	26 88	67.6	10 59.7	26 88	67.1	11 07.4	26 87	66.6	11 15.0	25 87	66.1	11 22.6	25 87	65.6	11 30.1	25 86	65.1	11 37.6	25 86	64.6	6
7	9 51.3	27 88	67.8	9 59.3	26 88	67.3	10 07.2	26 87	66.8	10 15.1	26 87	66.3	10 22.9	26 87	65.9	10 30.7	26 86	65.4	10 38.4	26 86	64.9	10 46.1	26 86	64.4	7
8	8 58.5	27 88	67.6	9 06.7	27 88	67.1	9 14.8	27 87	66.6	9 22.8	27 87	66.1	9 30.9	27 87	65.6	9 38.9	27 86	65.1	9 46.8	26 86	64.6	9 54.7	26 86	64.1	8
9	8 05.8	28 88	67.3	8 14.2	28 87	66.8	8 22.5	28 87	66.3	8 30.7	27 87	65.9	8 38.9	27 86	65.4	8 47.1	27 86	64.9	8 55.3	27 86	64.4	9 03.4	27 85	63.9	9
90	7 13.2	28 88	67.1	7 21.8	28 87	66.6	7 30.2	28 87	66.1	7 38.7	28 87	65.6	7 47.1	28 86	65.1	7 55.5	28 86	64.6	8 03.9	28 86	64.1	8 12.2	28 85	63.7	90

Lat. 18°

H.A.	24° 00′				24° 30′				25° 00′				25° 30′				26° 00′				26° 30′				27° 00′				27° 30′				H.A.
°	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	°
00	48 00.0	1.0	01	180.0	47 30.0	1.0	01	180.0	47 00.0	1.0	01	180.0	46 30.0	1.0	01	180.0	46 00.0	1.0	01	180.0	45 30.0	1.0	01	180.0	45 00.0	1.0	01	180.0	44 30.0	1.0	01	180.0	00
1	47 59.3	1.0	03	178.6	47 29.3	1.0	03	178.7	46 59.3	1.0	03	178.7	46 29.3	1.0	03	178.7	45 59.4	1.0	03	178.7	45 29.4	1.0	03	178.7	44 59.4	1.0	03	178.7	44 29.4	1.0	03	178.8	1
2	47 57.3	1.0	06	177.3	47 27.3	1.0	06	177.3	46 57.4	1.0	06	177.3	46 27.4	1.0	05	177.4	45 57.4	1.0	05	177.4	45 27.5	1.0	05	177.4	44 57.5	1.0	05	177.5	44 27.5	1.0	05	177.5	2
3	47 53.9	1.0	08	175.9	47 24.0	1.0	08	176.0	46 54.1	1.0	08	176.0	46 24.1	1.0	08	176.1	45 54.2	1.0	08	176.1	45 24.3	1.0	07	176.2	44 54.4	1.0	07	176.2	44 24.4	1.0	07	176.3	3
4	47 49.1	1.0	10	174.6	47 19.3	1.0	10	174.6	46 49.4	1.0	10	174.7	46 19.6	1.0	10	174.8	45 49.7	1.0	10	174.8	45 19.8	1.0	10	174.9	44 50.0	1.0	09	175.0	44 20.1	1.0	09	175.0	4
05	47 43.1	99	12	173.2	47 13.3	99	12	173.3	46 43.5	99	12	173.4	46 13.7	99	12	173.5	45 43.9	99	12	173.6	45 14.2	99	12	173.6	44 44.4	99	11	173.7	44 14.6	99	11	173.8	05
6	47 35.6	99	14	171.9	47 06.0	99	14	172.0	46 36.3	99	14	172.1	46 06.6	99	14	172.2	45 36.9	99	14	172.3	45 07.2	99	14	172.4	44 37.5	99	14	172.5	44 07.8	99	13	172.6	6
7	47 26.9	99	17	170.5	46 57.3	99	17	170.6	46 27.8	99	16	170.8	45 58.2	99	16	170.9	45 28.6	99	16	171.0	44 59.0	99	16	171.1	44 29.4	99	16	171.2	43 59.8	99	15	171.4	7
8	47 16.9	98	19	169.2	46 47.4	98	19	169.3	46 18.0	98	18	169.5	45 48.5	98	18	169.6	45 19.1	98	18	169.8	44 49.6	98	18	169.9	44 20.1	98	18	170.0	43 50.7	98	17	170.1	8
9	47 05.5	98	21	167.9	46 36.2	98	21	168.0	46 06.9	98	20	168.2	45 37.6	98	20	168.4	45 08.3	98	20	168.5	44 39.0	98	20	168.7	44 09.6	98	20	168.8	43 40.3	98	19	168.9	9
10	46 52.9	97	23	166.6	46 23.8	97	23	166.8	45 54.7	97	22	166.9	45 25.5	97	22	167.1	44 56.3	97	22	167.3	44 27.2	97	22	167.4	43 58.0	97	22	167.6	43 28.8	97	21	167.7	10
1	46 39.0	96	25	165.3	46 10.1	97	25	165.5	45 41.1	97	24	165.7	45 12.2	97	24	165.9	44 43.2	97	24	166.0	44 14.1	97	24	166.2	43 45.1	97	23	166.4	43 16.1	97	23	166.6	1
2	46 23.9	96	27	164.0	45 55.2	96	27	164.2	45 26.4	96	26	164.4	44 57.6	96	26	164.6	44 28.8	96	26	164.8	44 00.0	96	26	165.0	43 31.1	96	25	165.2	43 02.2	96	25	165.4	2
3	46 07.6	95	29	162.8	45 39.1	95	29	163.0	45 10.5	95	28	163.2	44 41.9	95	28	163.4	44 13.3	95	28	163.6	43 44.6	96	27	163.8	43 16.0	96	27	164.0	42 47.3	96	27	164.2	3
4	45 50.1	94	31	161.5	45 21.8	94	31	161.7	44 53.4	95	30	162.0	44 25.0	95	30	162.2	43 56.6	95	30	162.4	43 28.2	95	29	162.6	42 59.7	95	29	162.9	42 31.2	95	29	163.1	4
15	45 31.4	94	33	160.3	45 03.3	94	33	160.5	44 35.2	94	32	160.8	44 07.0	94	32	161.0	43 38.8	94	32	161.2	43 10.6	94	31	161.5	42 42.3	94	31	161.7	42 14.1	94	30	161.9	15
6	45 11.6	93	35	159.1	44 43.7	93	34	159.3	44 15.8	93	34	159.6	43 47.9	93	34	159.8	43 19.9	93	33	160.1	42 51.9	93	33	160.3	42 23.9	93	32	160.6	41 55.8	94	32	160.8	6
7	44 50.6	92	37	157.9	44 23.0	92	36	158.1	43 55.4	92	36	158.4	43 27.7	92	35	158.7	43 00.0	92	35	158.9	42 32.2	93	35	159.2	42 04.4	93	34	159.5	41 36.6	93	34	159.7	7
8	44 28.6	91	38	156.7	44 01.3	91	38	157.0	43 33.9	91	38	157.3	43 06.4	92	37	157.5	42 38.9	92	37	157.8	42 11.4	92	36	158.1	41 43.9	92	36	158.3	41 16.3	92	36	158.6	8
9	44 05.5	90	40	155.5	43 38.4	90	40	155.8	43 11.3	91	39	156.1	42 44.1	91	39	156.4	42 16.9	91	38	156.7	41 49.6	91	38	157.0	41 22.3	91	38	157.3	40 54.9	91	37	157.5	9
20	43 41.4	89	42	154.4	43 14.5	89	41	154.7	42 47.7	90	41	155.0	42 20.8	90	41	155.3	41 53.8	90	40	155.6	41 26.8	90	40	155.9	40 59.7	90	39	156.2	40 32.6	90	39	156.5	20
1	43 16.2	88	44	153.3	42 49.7	89	43	153.6	42 23.1	89	43	153.9	41 56.4	89	42	154.2	41 29.7	89	42	154.5	41 03.0	89	41	154.8	40 36.2	89	41	155.1	40 09.4	90	40	155.4	1
2	42 50.1	87	45	152.2	42 23.8	88	45	152.5	41 57.5	88	44	152.8	41 31.1	88	44	153.2	41 04.7	88	43	153.5	40 38.3	88	43	153.8	40 11.8	88	42	154.1	39 45.2	89	42	154.4	2
3	42 23.0	86	47	151.1	41 57.0	87	46	151.4	41 31.0	87	46	151.8	41 04.9	87	45	152.1	40 38.8	87	45	152.4	40 12.6	87	44	152.8	39 46.4	88	44	153.1	39 20.1	88	43	153.4	3
4	41 54.9	85	48	150.0	41 29.3	86	48	150.4	41 03.5	86	47	150.7	40 37.8	86	47	151.1	40 11.9	86	46	151.4	39 46.0	86	46	151.7	39 20.1	87	45	152.1	38 54.1	87	45	152.4	4
25	41 26.0	84	50	149.0	41 00.6	85	49	149.4	40 35.2	85	49	149.7	40 09.7	85	48	150.1	39 44.2	85	48	150.4	39 18.6	85	47	150.7	38 52.9	86	47	151.1	38 27.2	86	46	151.4	25
6	40 56.2	83	51	148.0	40 31.1	84	51	148.3	40 06.0	84	50	148.7	39 40.8	84	50	149.1	39 15.5	84	49	149.4	38 50.2	84	49	149.8	38 24.9	85	48	150.1	37 59.4	85	48	150.4	6
7	40 25.5	82	52	147.0	40 00.7	83	52	147.4	39 35.9	83	52	147.7	39 11.0	83	51	148.1	38 46.1	83	50	148.4	38 21.1	83	50	148.8	37 56.0	84	50	149.1	37 30.9	84	49	149.5	7
8	39 54.0	81	54	146.0	39 29.6	82	53	146.4	39 05.0	82	53	146.8	38 40.5	82	52	147.1	38 15.8	82	52	147.5	37 51.1	82	51	147.9	37 26.3	83	51	148.2	37 01.5	83	50	148.6	8
9	39 21.7	80	55	145.1	38 57.6	81	55	145.4	38 33.4	81	54	145.8	38 09.1	81	54	146.2	37 44.8	81	53	146.6	37 20.4	81	53	146.9	36 55.9	82	52	147.3	36 31.4	82	52	147.6	9
30	38 48.6	79	56	144.1	38 24.8	79	56	144.5	38 00.9	80	55	144.9	37 37.0	80	55	145.3	37 12.9	80	54	145.6	36 48.8	80	54	146.0	36 24.7	81	53	146.4	36 00.4	81	53	146.8	30
1	38 14.8	78	58	143.2	37 51.3	78	57	143.6	37 27.7	79	56	144.0	37 04.1	79	56	144.4	36 40.4	79	56	144.7	36 16.6	79	55	145.1	35 52.7	80	54	145.5	35 28.8	80	54	145.9	1
2	37 40.2	77	59	142.3	37 17.1	77	58	142.7	36 53.8	78	58	143.1	36 30.5	78	57	143.5	36 07.1	78	57	143.9	35 43.6	78	56	144.3	35 20.0	79	56	144.6	34 56.4	79	55	145.0	2
3	37 05.0	76	60	141.4	36 42.1	76	59	141.8	36 19.2	77	59	142.2	35 56.2	77	58	142.6	35 33.1	77	58	143.0	35 09.9	77	57	143.4	34 46.7	78	57	143.8	34 23.4	78	56	144.2	3
4	36 29.1	75	61	140.6	36 06.5	75	60	141.0	35 43.9	76	60	141.4	35 21.2	76	59	141.8	34 58.4	76	59	142.2	34 35.6	76	58	142.6	34 12.6	77	58	143.0	33 49.6	77	57	143.3	4
35	35 52.5	74	62	139.7	35 30.3	74	62	140.1	35 08.0	75	61	140.5	34 45.6	75	60	140.9	34 23.1	75	60	141.3	34 00.5	75	59	141.7	33 37.9	76	59	142.1	33 15.2	76	58	142.5	35
6	35 15.3	73	63	138.9	34 53.4	73	62	139.3	34 31.4	73	62	139.7	34 09.3	74	61	140.1	33 47.1	74	61	140.5	33 24.9	74	60	140.9	33 02.6	75	60	141.3	32 40.2	75	59	141.7	6
7	34 37.5	72	64	138.1	34 15.9	72	64	138.5	33 54.2	72	63	138.9	33 32.4	73	62	139.3	33 10.6	73	62	139.7	32 48.6	73	61	140.1	32 26.6	73	61	140.6	32 04.5	74	60	141.0	7
8	33 59.0	71	65	137.3	33 37.8	71	64	137.7	33 16.4	71	64	138.1	32 54.9	72	63	138.6	32 33.4	72	63	139.0	32 11.8	72	62	139.4	31 50.1	72	62	139.8	31 28.3	73	61	140.2	8
9	33 20.1	70	66	136.5	32 59.1	70	65	136.9	32 38.0	70	65	137.4	32 16.9	71	64	137.8	31 55.6	71	64	138.2	31 34.3	71	63	138.6	31 12.9	71	63	139.0	30 51.5	72	62	139.4	9
40	32 40.5	69	67	135.8	32 19.8	69	66	136.2	31 59.1	69	66	136.6	31 38.3	70	65	137.0	31 17.3	70	65	137.5	30 56.3	70	64	137.9	30 35.2	70	64	138.3	30 14.1	71	63	138.7	40
1	32 00.4	68	68	135.0	31 40.1	68	67	135.5	31 19.6	68	67	135.9	30 59.1	69	66	136.3	30 38.5	69	66	136.7	30 17.8	69	65	137.2	29 57.0	69	64	137.6	29 36.2	70	64	138.0	1
2	31 19.9	67	68	134.3	30 59.8	67	68	134.7	30 39.7	67	68	135.2	30 19.4	68	67	135.6	29 59.1	68	66	136.0	29 38.7	68	66	136.4	29 18.3	68	66	136.9	28 57.7	69	65	137.3	2
3	30 38.8	66	69	133.6	30 19.0	66	69	134.0	29 59.2	66	68	134.5	29 39.3	67	68	134.9	29 19.3	67	67	135.3	28 59.2	67	67	135.8	28 39.0	67	66	136.2	28 18.7	68	66	136.6	3
4	29 57.2	65	70	132.9	29 37.8	65	70	133.3	29 18.2	65	69	133.8	28 58.6	66	69	134.2	28 38.9	66	68	134.6	28 19.1	66	68	135.1	27 59.2	66	67	135.5	27 39.3	67	67	135.9	4
45	29 15.2	64	71	132.2	28 56.0	64	70	132.7	28 36.8	64	70	133.1	28 17.5	65	69	133.5	27 58.1	65	69	134.0	27 38.6	65	68	134.4	27 19.0	65	68	134.8	26 59.4	66	67	135.3	45
6	28 32.7	63	72	131.6	28 13.9	63	71	132.0	27 54.9	63	70	132.5	27 35.9	64	70	132.9	27 16.8	64	70	133.3	26 57.6	64	69	133.8	26 38.3	64	68	134.2	26 19.0	65	68	134.6	6
7	27 49.8	62	72	130.9	27 31.2	62	72	131.4	27 12.6	62	71	131.8	26 53.9	63	71	132.3	26 35.0	63	70	132.7	26 16.2	63	70	133.1	25 57.2	63	69	133.6	25 38.1	64	69	134.0	7
8	27 06.5	61	73	130.3	26 48.2	61	72	130.7	26 29.9	61	72	131.2	26 11.4	62	71	131.6	25 52.9	62	71	132.1	25 34.3	62	70	132.5	25 15.6	62	70	132.9	24 56.9	63	69	133.4	8
9	26 22.8	60	74	129.7	26 04.8	60	73	130.1	25 46.7	60	72	130.6	25 28.6	61	72	131.0	25 10.3	61	72	131.5	24 52.0	61	71	131.9	24 33.6	61	71	132.3	24 15.2	62	70	132.8	9
50	25 38.7	59	74	129.1	25 21.0	59	74	129.5	25 03.2	59	73	130.0	24 45.3	60	73	130.4	24 27.4	60	72	130.9	24 09.3	60	72	131.3	23 51.2	60	71	131.7	23 33.1	61	71	132.2	50
1	24 54.2	58	75	128.5	24 36.8	58	74	128.9	24 19.3	58	74	129.4	24 01.7	59	73	129.8	23 44.0	59	73	130.3	23 26.3	59	72	130.7	23 08.5	59	72	131.1	22 50.6	60	71	131.6	1
2	24 09.3	57	75	127.9	23 52.2	57	75	128.4	23 35.0	58	74	128.8	23 17.7	58	74	129.3	23 00.3	58	74	129.7	22 42.8	58	73	130.1	22 25.3	59	72	130.6	22 07.7	59	72	131.0	2
3	23 24.2	56	76	127.3	23 07.3	56	75	127.8	22 50.3	57	75	128.2	22 33.3	57	75	128.7	22 16.2	57	74	129.1	21 59.0	57	74	129.6	21 41.8	58	73	130.0	21 24.5	58	73	130.5	3
4	22 38.6	55	76	126.8	22 22.0	55	76	127.2	22 05.3	56	76	127.7	21 48.6	56	75	128.1	21 31.8	56	75	128.6	21 14.9	56	74	129.0	20 57.9	57	74	129.5	20 40.9	57	73	129.9	4
55	21 52.8	54	77	126.3	21 36.4	55	77	126.7	21 20.0	55	76	127.2	21 03.5	55	76	127.6	20 47.0	55	75	128.0	20 30.4	56	75	128.5	20 13.7	56	74	128.9	19 56.9	56	74	129.4	55
6	21 06.6	53	78	125.7	20 50.5	54	77	126.2	20 34.4	54	76	126.6	20 18.2	54	76	127.1	20 01.9	54	76	127.5	19 45.5	55	75	128.0	19 29.1	55	75	128.4	19 12.7	55	74	128.9	6
7	20 20.1	53	78	125.2	20 04.3	53	78	125.7	19 48.4	53	77	126.1	19 32.5	53	77	126.6	19 16.5	53	76	127.0	19 00.4	54	76	127.5	18 44.3	54	75	127.9	18 28.1	54	75	128.3	7
8	19 33.3	52	78	124.7	19 17.8	52	78	125.2	19 02.2	52	78	125.6	18 46.5	52	77	126.1	18 30.8	53	77	126.5	18 14.9	53	76	127.0	17 59.1	53	76	127.4	17 43.1	53	75	127.8	8
9	18 46.3	51	79	124.2	18 31.0	51	78	124.7	18 15.6	51	78	125.1	18 00.2	52	78	125.6	17 44.7	52	77	126.0	17 29.2	52	77	126.5	17 13.6	52	76	126.9	16 57.9	52	76	127.4	9
60	17 59.0	50	79	123.7	17 43.9	50	79	124.2	17 28.8	50	78	124.6	17 13.7	51	78	125.1	16 58.4	51	78	125.5	16 43.2	51	77	126.0	16 27.8	51	77	126.4	16 12.4	51	76	126.9	60
1	17 11.4	49	80	123.2	16 56.6	49	79	123.7	16 41.7	50	79	124.2	16 26.8	50	78	124.6	16 11.9	50	78	125.1	15 56.8	50	78	125.5	15 41.8	50	77	126.0	15 26.6	51	77	126.4	1
2	16 23.5	48	80	122.8	16 09.0	49	80	123.2	15 54.4	49	79	123.7	15 39.7	49	79	124.1	15 25.0	49	78	124.6	15 10.3	49	78	125.0	14 55.4	49	78	125.5	14 40.6	50	77	125.9	2
3	15 35.4	48	80	122.3	15 21.1	48	80	122.8	15 06.8	48	80	123.2	14 52.4	48	79	123.7	14 37.9	48	79	124.1	14 23.4	48	78	124.6	14 08.9	49	78	125.0	13 54.2	49	78	125.5	3
4	14 47.1	47	81	121.9	14 33.0	47	81	122.3	14 18.9	47	80	122.8	14 04.8	47	80	123.2	13 50.6	47	79	123.7	13 36.3	48	79	124.1	13 22.0	48	78	124.6	13 07.7	48	78	125.1	4
65	13 58.5	46	81	121.4	13 44.7	46	81	121.9	13 30.8	46	80	122.4	13 16.9	46	80	122.8	13 03.0	47	80	123.3	12 49.0	47	79	123.7	12 34.9	47	79	124.2	12 20.8	47	78	124.6	65
6	13 09.7	45	82	121.0	12 56.1	45	81	121.5	12 42.5	45	81	121.9	12 28.8	46	80	122.4	12 15.1	46	80	122.8	12 01.4	46	80	123.3	11 47.6	46	79	123.7	11 33.7	46	79	124.2	6
7	12 20.7	44	82	120.6	12 07.3	45	82	121.0	11 54.0	45	81	121.5	11 40.5	45	81	122.0	11 27.1	45	80	122.4	11 13.6	45	80	122.9	11 00.0	45	80	123.3	10 46.4	45	79	123.8	7
8	11 31.5	44	82	120.2	11 18.4	44	82	120.6	11 05.2	44	82	121.1	10 52.0	44	81	121.6	10 38.8	44	81	122.0	10 25.5	44	80	122.5	10 12.2	44	80	122.9	9 58.9	45	80	123.4	8
9	10 42.0	43	83	119.8	10 29.2	43	82	120.2	10 16.2	43	82	120.7	10 03.3	43	82	121.2	9 50.3	43	81	121.6	9 37.3	43	81	122.1	9 24.2	44	80	122.5	9 11.1	44	80	123.0	9
70	9 52.4	42	83	119.4	9 39.8	42	83	119.8	9 27.1	42	82	120.3	9 14.4	42	82	120.8	9 01.6	43	81	121.2	8 48.8	43	81	121.7	8 36.0	43	81	122.1	8 23.2	43	80	122.6	70
1	9 02.6	41	83	119.0	8 50.2	41	83	119.5	8 37.7	42	83	119.9	8 25.2	42	82	120.4	8 12.7	42	82	120.8	8 00.2	42	81	121.3	7 47.6	42	81	121.8	7 35.0	42	81	122.2	1
2	8 12.6	41	84	118.6	8 00.4	41	83	119.1	7 48.2	41	83	119.5	7 35.9	41	83	120.0	7 23.6	41	82	120.5	7 11.3	41	82	120.9	6 59.0	41	81	121.4	6 46.6	41	81	121.8	2
3	7 22.4	40	84	118.2	7 10.4	40	84	118.7	6 58.4	40	83	119.2	6 46.4	40	83	119.6	6 34.3	40	82	120.1	6 22.3	40	82	120.6	6 10.2	40	82	121.0	5 58.0	40	81	121.5	3
4	6 32.0	39	84	117.9	6 20.3	39	84	118.3	6 08.5	39	84	118.8	5 56.7	39	83	119.3	5 44.9	39	83	119.7	5 33.0	40	82	120.2	5 21.2	40	82	120.7	5 09.3	40	82	121.1	4
75	5 41.5	38	84	117.5	5 30.0	39	84	118.0	5 18.4	39	84	118.5	5 06.8	39	84	118.9																	75

DECLINATION SAME NAME AS LATITUDE

H.A.	24° 00′				24° 30′				25° 00′				25° 30′				26° 00′				26° 30′				27° 00′				27° 30′				H.A.
°	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	Alt. ° ′	Δd	Δt	Az. °	°
91	6 20.7	29	87	66.8	6 29.4	29	87	66.3	6 38.1	29	87	65.8	6 46.8	29	86	65.3	6 55.4	29	86	64.9	7 04.0	29	86	64.4	7 12.6	29	85	63.9	7 21.1	28	85	63.4	91
2	5 28.3	30	87	66.5	5 37.2	30	87	66.0	5 46.1	30	86	65.6	5 55.0	29	86	65.1	6 03.8	29	86	64.6	6 12.6	29	85	64.1	6 21.4	29	85	63.6	6 30.2	29	85	63.2	2
3													5 03.3	30	86	64.8	5 12.3	30	86	64.3	5 21.3	30	85	63.8	5 30.3	30	85	63.4	5 39.3	30	85	62.9	3

Lat. 18°

H.A.	28° 00′				28° 30′				29° 00′				30° 00′				32° 00′				34° 00′				34° 30′				35° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	80 00.0	1.0	04	00.0	79 30.0	1.0	04	00.0	79 00.0	1.0	04	00.0	78 00.0	1.0	03	00.0	76 00.0	1.0	03	00.0	74 00.0	1.0	02	00.0	73 30.0	1.0	02	00.0	72 30.0	1.0	02	00.0	00
1	79 57.5	1.0	12	05.1	79 27.6	1.0	12	04.8	78 57.7	1.0	11	04.6	77 57.9	1.0	10	04.2	75 58.3	1.0	09	03.5	73 58.5	1.0	07	03.0	73 28.6	1.0	07	02.9	72 28.7	1.0	07	02.7	1
2	79 50.0	98	20	10.1	79 20.5	98	20	09.5	78 50.9	99	19	09.1	77 51.7	99	17	08.3	75 53.0	99	14	07.0	73 54.0	99	12	06.0	73 24.2	99	12	05.8	72 24.6	99	11	05.4	2
3	79 37.6	96	28	14.9	79 08.8	96	27	14.1	78 39.8	97	26	13.5	77 41.6	97	23	12.3	75 44.4	98	20	10.4	73 46.6	98	17	08.9	73 17.1	98	17	08.6	72 17.9	99	15	08.1	3
4	79 20.8	93	35	19.5	78 52.7	94	34	18.5	78 24.4	94	32	17.7	77 27.5	95	29	16.2	75 32.5	96	25	13.7	73 36.3	97	22	11.8	73 07.1	97	21	11.4	72 08.6	98	20	10.7	4
05	78 59.7	90	41	23.8	78 32.6	91	40	22.7	78 05.2	92	38	21.7	77 09.9	93	35	19.9	75 17.4	95	30	16.9	73 23.3	96	26	14.6	72 54.5	96	25	14.1	71 56.8	96	24	13.2	05
6	78 34.9	86	47	27.8	78 08.8	88	45	26.6	77 42.4	88	44	25.4	76 48.9	90	40	23.4	74 59.4	92	35	20.0	73 07.5	94	30	17.4	72 39.3	94	30	16.8	71 42.5	95	28	15.7	6
7	78 06.7	83	52	31.5	77 41.7	84	50	30.2	77 16.3	85	48	28.9	76 24.7	87	45	26.7	74 38.4	90	39	23.0	72 49.2	92	34	20.0	72 21.6	92	33	19.4	71 25.9	93	32	18.2	7
8	77 35.4	79	56	34.9	77 11.6	80	55	33.5	76 47.3	82	53	32.2	75 57.7	84	49	29.8	74 14.9	87	43	25.8	72 28.5	90	38	22.5	72 01.5	90	37	21.8	71 07.0	91	35	20.5	8
9	77 01.5	75	60	38.0	76 38.8	76	58	36.5	76 15.6	78	57	35.2	75 28.1	81	53	32.7	73 48.9	85	47	28.4	72 05.6	88	42	24.9	71 39.2	88	41	24.2	70 46.0	89	38	22.7	9
10	76 25.3	71	64	40.8	76 03.7	73	62	39.3	75 41.6	74	60	37.9	74 56.1	77	57	35.4	73 20.6	82	51	30.9	71 40.4	85	45	27.2	71 14.8	86	44	26.4	70 22.9	87	42	24.9	10
1	75 47.1	67	67	43.3	75 26.6	69	65	41.8	75 05.6	71	63	40.4	74 22.1	74	60	37.8	72 50.3	79	54	33.3	71 13.3	83	48	29.4	70 48.4	83	47	28.6	69 58.0	85	45	27.0	1
2	75 07.1	64	69	45.6	74 47.7	66	68	44.2	74 27.7	67	66	42.8	73 46.2	71	63	40.1	72 18.1	76	57	35.5	70 44.4	80	51	31.5	70 20.3	81	50	30.6	69 31.2	82	47	28.9	2
3	74 25.6	60	71	47.7	74 07.2	62	70	46.3	73 48.2	64	68	44.9	73 08.7	67	65	42.2	71 44.2	73	59	37.5	70 13.8	77	54	33.5	69 50.4	78	52	32.5	69 02.8	80	50	30.8	3
4	73 42.7	57	73	49.6	73 25.3	59	72	48.2	73 07.2	61	70	46.8	72 29.6	64	67	44.1	71 08.7	70	62	39.4	69 41.5	75	56	35.3	69 18.9	76	55	34.4	68 32.8	78	52	32.6	4
15	72 58.7	54	75	51.3	72 42.2	56	74	49.9	72 25.1	58	72	48.5	71 49.2	61	69	45.9	70 31.8	67	64	41.2	69 07.8	72	58	37.0	68 46.0	73	57	36.1	68 01.4	75	55	34.3	15
6	72 13.7	51	76	52.9	71 58.0	53	75	51.5	71 41.8	55	74	50.1	71 07.7	59	71	47.6	69 53.6	65	66	42.8	68 32.8	70	60	38.7	68 11.7	71	59	37.7	67 28.6	73	57	35.9	6
7	71 27.7	48	78	54.3	71 12.9	50	77	52.9	70 57.5	52	75	51.6	70 25.0	56	73	49.1	69 14.2	62	67	44.4	67 56.6	67	62	40.2	67 36.2	68	61	39.2	66 54.6	71	59	37.4	7
8	70 41.0	46	79	55.6	70 27.0	48	78	54.2	70 12.4	50	76	53.0	69 41.5	53	74	50.4	68 33.8	59	69	45.8	67 19.2	65	64	41.6	66 59.6	66	63	40.7	66 19.4	68	60	38.8	8
9	69 53.6	43	80	56.7	69 40.3	45	79	55.4	69 26.4	47	78	54.2	68 57.1	51	75	51.7	67 52.4	57	70	47.1	66 40.8	62	66	43.0	66 21.9	64	64	42.0	65 43.1	66	62	40.1	9
20	69 05.6	41	81	57.8	68 53.0	43	80	56.5	68 39.8	45	79	55.3	68 11.9	48	76	52.9	67 10.2	55	72	48.4	66 01.4	60	67	44.2	65 43.2	61	66	43.3	65 05.8	64	64	41.4	20
1	68 17.1	39	82	58.8	68 05.1	41	81	57.5	67 52.6	43	80	56.3	67 26.1	46	77	54.0	66 27.1	52	73	49.5	65 21.2	58	68	45.4	65 03.7	59	67	44.5	64 27.6	61	65	42.6	1
2	67 28.0	37	82	59.7	67 16.7	39	81	58.5	67 04.9	40	80	57.3	66 39.6	44	78	55.0	65 43.4	50	74	50.6	64 40.1	55	70	46.5	64 23.3	57	69	45.6	63 48.6	59	66	43.7	2
3	66 38.6	35	83	60.5	66 27.9	37	82	59.3	66 16.6	38	81	58.2	65 52.6	42	79	55.9	64 59.0	48	75	51.6	63 58.3	53	71	47.6	63 42.2	54	70	46.6	63 08.8	57	68	44.8	3
4	65 48.7	33	84	61.2	65 38.6	35	83	60.1	65 27.9	36	82	59.0	65 05.2	40	80	56.7	64 14.0	46	76	52.5	63 15.9	51	72	48.6	63 00.4	52	71	47.6	62 28.3	55	69	45.8	4
25	64 58.6	31	84	61.9	64 49.0	33	83	60.8	64 38.9	34	82	59.7	64 17.2	38	81	57.5	63 28.4	44	77	53.4	62 32.8	49	73	49.5	62 17.9	50	72	48.5	61 47.1	53	70	46.7	25
6	64 08.1	29	85	62.5	63 59.0	31	84	61.4	63 49.4	33	83	60.4	63 28.9	36	81	58.2	62 42.4	42	77	54.2	61 49.2	47	74	50.3	61 34.9	48	73	49.4	61 05.2	51	71	47.6	6
7	63 17.3	28	85	63.1	63 08.7	29	84	62.0	62 59.7	31	83	61.0	62 40.2	34	82	58.9	61 55.9	40	78	54.9	61 05.0	45	74	51.1	60 51.3	46	73	50.2	60 22.8	49	72	48.4	7
8	62 26.3	26	85	63.6	62 18.2	28	85	62.6	62 09.6	29	84	61.6	61 51.2	32	82	59.5	61 09.0	38	79	55.6	60 20.4	43	75	51.9	60 07.2	44	74	51.0	59 39.9	47	72	49.2	8
9	61 35.1	25	86	64.1	61 27.4	26	85	63.1	61 19.3	28	84	62.1	61 01.8	31	83	60.1	60 21.7	36	79	56.2	59 35.3	41	76	52.6	59 22.7	42	75	51.7	58 56.5	45	73	49.9	9
30	60 43.7	23	86	64.5	60 36.5	25	85	63.5	60 28.8	26	84	62.6	60 12.2	29	83	60.6	59 34.1	34	80	56.8	58 49.8	39	76	53.2	58 37.7	41	76	52.3	58 12.6	43	74	50.6	30
1	59 52.0	22	86	64.9	59 45.3	23	86	64.0	59 38.1	25	85	63.0	59 22.4	27	83	61.1	58 46.2	33	80	57.4	58 03.9	38	77	53.8	57 52.4	39	76	53.0	57 28.3	41	74	51.2	1
2	59 00.3	21	86	65.3	58 53.9	22	86	64.4	58 47.1	23	85	63.4	58 32.3	26	84	61.6	57 58.0	31	81	57.9	57 17.6	36	78	54.4	57 06.6	37	77	53.5	56 43.6	40	75	51.8	2
3	58 08.4	19	87	65.6	58 02.4	21	86	64.7	57 56.0	22	86	63.8	57 42.1	25	84	62.0	57 09.5	30	81	58.4	56 31.1	34	78	54.9	56 20.6	36	77	54.1	55 58.6	38	76	52.4	3
4	57 16.3	18	87	66.0	57 10.7	19	86	65.0	57 04.7	21	86	64.1	56 51.6	23	84	62.4	56 20.8	28	82	58.8	55 44.2	33	79	55.4	55 34.2	34	78	54.6	55 13.2	36	76	52.9	4
35	56 24.1	17	87	66.2	56 18.9	18	87	65.3	56 13.3	19	86	64.5	56 01.0	22	85	62.7	55 31.9	27	82	59.3	54 57.1	31	79	55.9	54 47.6	32	78	55.1	54 27.5	35	77	53.4	35
6	55 31.9	16	87	66.5	55 27.0	17	87	65.6	55 21.8	18	86	64.8	55 10.2	21	85	63.0	54 42.7	25	82	59.6	54 09.7	30	79	56.3	54 00.7	31	79	55.5	53 41.5	33	77	53.9	6
7	54 39.5	14	88	66.7	54 35.0	16	87	65.9	54 30.1	17	86	65.0	54 19.3	19	85	63.3	53 53.4	24	82	60.0	53 22.1	28	80	56.7	53 13.5	29	79	55.9	52 55.3	31	77	54.4	7
8	53 47.0	13	88	66.9	53 42.8	15	87	66.1	53 38.3	16	86	65.3	53 28.2	18	85	63.6	53 03.9	22	83	60.3	52 34.3	27	80	57.1	52 26.1	28	79	56.3	52 08.8	30	78	54.8	8
9	52 54.5	12	88	67.1	52 50.6	13	87	66.3	52 46.4	15	87	65.5	52 37.0	17	85	63.9	52 14.2	21	83	60.6	51 46.3	25	80	57.5	51 38.5	26	80	56.7	51 22.1	28	78	55.1	9
40	52 01.9	11	88	67.3	51 58.3	12	87	66.5	51 54.5	13	87	65.7	51 45.8	16	86	64.1	51 24.4	20	83	60.9	50 58.1	24	81	57.8	50 50.7	25	80	57.0	50 35.1	27	79	55.5	40
1	51 09.2	10	88	67.4	51 06.0	11	87	66.7	51 02.4	12	87	65.9	50 54.4	14	86	64.3	50 34.5	19	83	61.2	50 09.7	23	81	58.1	50 02.8	24	80	57.3	49 48.0	26	79	55.8	1
2	50 16.5	09	88	67.6	50 13.6	10	87	66.8	50 10.3	11	87	66.0	50 02.9	13	86	64.5	49 44.5	17	84	61.4	49 21.2	21	81	58.4	49 14.7	22	80	57.6	49 00.7	24	79	56.2	2
3	49 23.7	08	88	67.7	49 21.1	09	88	66.9	49 18.2	10	87	66.2	49 11.4	12	86	64.7	48 54.3	16	84	61.6	48 32.5	20	81	58.6	48 26.4	21	81	57.9	48 13.2	23	79	56.4	3
4	48 30.9	07	88	67.8	48 28.6	08	88	67.1	48 25.9	09	87	66.3	48 19.8	11	86	64.8	48 04.0	15	84	61.8	47 43.7	19	82	58.9	47 38.0	20	81	58.2	47 25.6	22	80	56.7	4
45	47 38.0	06	88	67.9	47 36.0	07	88	67.2	47 33.7	08	87	66.4	47 28.1	10	86	64.9	47 13.7	14	84	62.0	46 54.8	18	82	59.1	46 49.4	18	81	58.4	46 37.8	20	80	57.0	45
6	46 45.2	05	88	68.0	46 43.4	06	88	67.2	46 41.3	07	87	66.5	46 36.4	09	86	65.1	46 23.3	13	84	62.2	46 05.8	16	82	59.3	46 00.8	17	81	58.6	45 49.9	19	80	57.2	6
7	45 52.2	05	88	68.0	45 50.7	05	88	67.3	45 49.0	06	87	66.6	45 44.6	08	86	65.2	45 32.8	12	84	62.3	45 16.7	15	82	59.5	45 12.0	16	81	58.8	45 01.9	18	80	57.4	7
8	44 59.3	04	88	68.1	44 58.1	05	88	67.4	44 56.6	05	87	66.7	44 52.8	07	86	65.3	44 42.2	11	84	62.5	44 27.5	14	82	59.7	44 23.2	15	82	59.0	44 13.8	16	80	57.6	8
9	44 06.4	03	88	68.1	44 05.4	04	88	67.4	44 04.2	04	87	66.7	44 01.0	06	86	65.3	43 51.6	10	84	62.6	43 38.2	13	82	59.8	43 34.2	14	82	59.1	43 25.5	15	81	57.8	9
50	43 13.4	02	88	68.2	43 12.7	03	88	67.5	43 11.7	04	87	66.8	43 09.1	05	86	65.4	43 00.9	08	85	62.7	42 48.8	12	82	60.0	42 45.2	12	82	59.3	42 37.2	14	81	57.9	50
1	42 20.4	01	88	68.2	42 20.0	02	88	67.5	42 19.3	03	87	66.8	42 17.2	04	87	65.5	42 10.2	07	85	62.8	41 59.4	11	82	60.1	41 56.1	11	82	59.4	41 48.8	13	81	58.1	1
2	41 27.5	00	88	68.2	41 27.3	01	88	67.5	41 26.8	02	87	66.9	41 25.3	03	87	65.5	41 19.4	06	85	62.9	41 09.9	09	83	60.2	41 06.9	10	82	59.5	41 00.3	12	81	58.2	2
3	40 34.5	01	88	68.2	40 34.5	00	88	67.5	40 34.4	01	87	66.9	40 33.3	02	87	65.5	40 28.6	05	85	62.9	40 20.3	08	83	60.3	40 17.7	09	82	59.6	40 11.8	11	81	58.3	3
4	39 41.5	01	88	68.2	39 41.8	01	88	67.5	39 41.9	00	87	66.9	39 41.4	02	87	65.6	39 37.8	04	85	63.0	39 30.7	07	83	60.4	39 28.4	08	82	59.7	39 23.2	09	81	58.4	4
55	38 48.5	02	88	68.2	38 49.1	01	88	67.5	38 49.4	01	87	66.9	38 49.4	01	87	65.6	38 47.0	03	85	63.0	38 41.1	06	83	60.5	38 39.1	07	82	59.8	38 34.6	08	81	58.5	55
6	37 55.6	03	88	68.1	37 56.4	02	88	67.5	37 56.9	02	87	66.9	37 57.5	00	87	65.6	37 56.1	03	85	63.1	37 51.5	05	83	60.5	37 49.8	06	82	59.9	37 45.9	07	81	58.6	6
7	37 02.6	04	88	68.1	37 03.6	03	88	67.5	37 04.5	02	87	66.8	37 05.5	01	87	65.6	37 05.2	02	85	63.1	37 01.8	04	83	60.6	37 00.4	05	82	59.9	36 57.1	06	81	58.7	7
8	36 09.7	04	88	68.0	36 11.0	04	88	67.4	36 12.0	03	87	66.8	36 13.6	02	87	65.6	36 14.3	01	85	63.1	36 12.1	03	83	60.6	36 11.0	04	82	60.0	36 08.3	05	81	58.7	8
9	35 16.8	05	88	68.0	35 18.3	05	88	67.4	35 19.6	04	87	66.8	35 21.6	03	87	65.5	35 23.5	00	85	63.1	35 22.3	02	83	60.6	35 21.6	03	82	60.0	35 19.5	04	81	58.8	9
60	34 23.9	06	88	67.9	34 25.6	05	88	67.3	34 27.1	05	87	66.7	34 29.7	04	87	65.5	34 32.6	01	85	63.1	34 32.6	01	83	60.6	34 32.2	02	82	60.0	34 30.7	03	81	58.8	60
1	33 31.0	07	88	67.9	33 33.0	06	88	67.3	33 34.7	06	87	66.7	33 37.8	04	86	65.5	33 41.7	02	85	63.1	33 42.9	00	83	60.7	33 42.7	01	82	60.1	33 41.9	02	81	58.9	1
2	32 38.2	08	88	67.8	32 40.4	07	88	67.2	32 42.4	06	87	66.6	32 45.9	05	86	65.4	32 50.8	03	85	63.0	32 53.1	01	83	60.7	32 53.3	00	82	60.1	32 53.1	01	81	58.9	2
3	31 45.4	08	88	67.7	31 47.8	08	88	67.1	31 50.0	07	87	66.5	31 54.0	06	86	65.4	32 00.0	04	85	63.0	32 03.4	02	83	60.6	32 03.8	01	82	60.1	32 04.2	00	81	58.9	3
4	30 52.6	09	88	67.6	30 55.2	08	88	67.0	30 57.7	08	87	66.5	31 02.1	07	86	65.3	31 09.2	05	85	63.0	31 13.7	03	83	60.6	31 14.4	02	82	60.0	31 15.4	01	81	58.9	4
65	29 59.8	10	88	67.5	30 02.7	09	87	66.9	30 05.4	09	87	66.4	30 10.3	08	86	65.2	30 18.3	06	85	62.9	30 23.9	04	83	60.6	30 25.0	03	82	60.0	30 26.5	02	81	58.9	65
6	29 07.1	10	88	67.4	29 10.2	10	87	66.8	29 13.1	09	87	66.3	29 18.5	09	86	65.1	29 27.6	07	85	62.8	29 34.2	05	83	60.6	29 35.5	04	82	60.0	29 37.7	03	81	58.8	6
7	28 14.5	11	88	67.3	28 17.8	11	87	66.7	28 20.9	10	87	66.2	28 26.8	09	86	65.0	28 36.8	07	85	62.8	28 44.6	06	83	60.5	28 46.1	05	82	59.9	28 48.9	04	81	58.8	7
8	27 21.8	12	88	67.2	27 25.3	11	87	66.6	27 28.7	11	87	66.1	27 35.0	10	86	65.0	27 46.1	08	84	62.7	27 54.9	06	83	60.4	27 56.8	06	82	59.9	28 00.1	05	81	58.8	8
9	26 29.3	13	88	67.1	26 33.0	12	87	66.5	26 36.6	12	87	66.0	26 43.4	11	86	64.8	26 55.4	09	84	62.6	27 05.3	07	83	60.4	27 07.4	07	82	59.8	27 11.3	06	81	58.7	9
70	25 36.7	13	88	66.9	25 40.7	13	87	66.4	25 44.5	12	87	65.8	25 51.7	12	86	64.7	26 04.7	10	84	62.5	26 15.7	08	83	60.3	26 18.1	08	82	59.8	26 22.6	07	81	58.6	70
1	24 44.3	14	87	66.8	24 48.4	14	87	66.3	24 52.4	13	87	65.7	25 00.2	12	86	64.6	25 14.1	11	84	62.4	25 26.1	09	83	60.2	25 28.8	09	82	59.7	25 33.9	08	81	58.6	1
2	23 51.8	15	87	66.7	23 56.2	14	87	66.1	24 00.5	14	86	65.6	24 08.6	13	86	64.5	24 23.6	12	84	62.3	24 36.6	10	82	60.1	24 39.6	10	82	59.6	24 45.2	09	81	58.5	2
3	22 59.5	15	87	66.5	23 04.1	15	87	66.0	23 08.5	15	86	65.4	23 17.1	14	86	64.4	23 33.1	13	84	62.2	23 47.2	11	82	60.0	23 50.4	11	82	59.5	23 56.6	10	81	58.4	3
4	22 07.2	16	87	66.4	22 12.0	16	87	65.8	22 16.7	15	86	65.3	22 25.7	15	86	64.2	22 42.6	13	84	62.1	22 57.8	12	82	59.9	23 01.3	12	82	59.4	23 08.0	11	81	58.3	4
75	21 14.9	17	87	66.2	21 19.9	17	87	65.7	21 24.8	16	86	65.2	21 34.4	16	86	64.1	21 52.2	14	84	62.0	22 08.4	13	82	59.8	22 12.2	12	82	59.3	22 19.4	12	81	58.2	75
6	20 22.7	18	87	66.1	20 28.0	17	86	65.5	20 33.1	17	86	65.0	20 43.1	16	85	63.9	21 01.9	15	84	61.8	21 19.1	14	82	59.7	21 23.1	13	82	59.2	21 31.0	13	81	58.1	6
7	19 30.6	18	87	65.9	19 36.0	18	86	65.4	19 41.4	18	86	64.8	19 51.8	17	85	63.8	20 11.6	16	84	61.7	20 29.8	15	82	59.6	20 34.2	14	82	59.1	20 42.5	14	81	58.0	7
8	18 38.6	19	87	65.7	18 44.2	19	86	65.2	18 49.8	18	86	64.7	19 00.7	18	85	63.6	19 21.4	17	84	61.5	19 40.7	15	82	59.5	19 45.3	15	81	58.9	19 54.2	15	80	57.9	8
9	17 46.6	20	86	65.5	17 52.5	19	86	65.0	17 58.2	19	86	64.5	18 09.6	19	85	63.5	18 31.2	17	83	61.4	18 51.6	16	82	59.3	18 56.4	16	81	58.8	19 05.9	15	80	57.7	9
80	16 54.7	20	86	65.3	17 00.8	20	86	64.8	17 06.8	20	86	64.3	17 18.6	19	85	63.3	17 41.2	18	83	61.2	18 02.5	17	82	59.2	18 07.7	17	81	58.6	18 17.7	16	80	57.6	80
1	16 02.9	21	86	65.2	16 09.2	21	86	64.6	16 15.4	21	86	64.1	16 27.6	20	85	63.1	16 51.2	19	83	61.1	17 13.6	18	81	59.0	17 19.0	18	81	58.5	17 29.5	17	80	57.5	1
2	15 11.1	22	86	65.0	15 17.6	22	86	64.5	15 24.1	21	85	63.9	15 36.8	21	85	62.9	16 01.3	20	83	60.9	16 24.7	19	81	58.9	16 30.3	19	81	58.3	16 41.4	18	80	57.3	2
3	14 19.5	23	86	64.8	14 26.2	22	86	64.3	14 32.9	22	85	63.7	14 46.0	22	84	62.7	15 11.5	21	83	60.7	15 35.9	20	81	58.7	15 41.8	20	81	58.2	15 53.5	19	80	57.2	3
4	13 27.9	23	86	64.5	13 34.8	23	85	64.0	13 41.7	23	85	63.5	13 55.3	22	84	62.5	14 21.8	22	83	60.5	14 47.2	21	81	58.5	14 53.4	21	81	58.0	15 05.6	20	80	57.0	4
85	12 36.4	24	86	64.3	12 43.6	24	85	63.8	12 50.7	24	85	63.3	13 04.7	23	84	62.3	13 32.1	22	83	60.3	13 58.6	22	81	58.3	14 05.0	21	80	57.8	14 17.8	21	80	56.8	85
6	11 45.0	25	86	64.1	11 52.4	25	85	63.6	11 59.7	24	85	63.1	12 14.2	24	84	62.1	12 42.6	23	82	60.1	13 10.1	23	81	58.1	13 16.8	22	80	57.6	13 30.0	22	79	56.6	6
7	10 53.7	25	85	63.9	11 01.3	25	85	63.4	11 08.9	25	84	62.9	11 23.8	25	84	61.9	11 53.2	24	82	59.9	12 21.6	23	80	57.9	12 28.6	23	80	57.4	12 42.4	23	79	56.5	7
8	10 02.6	26	85	63.7	10 10.4	26	85	63.2	10 18.1	26	84	62.7	10 33.6	26	84	61.7	11 03.8	25	82	59.7	11 33.3	24	80	57.7	11 40.6	24	80	57.2	11 54.9	24	79	56.3	8
9	9 11.5	27	85	63.4	9 19.5	27	85	62.9	9 27.5	27	84	62.4	9 43.4	26	83	61.5	10 14.6	26	82	59.5	10 45.1	25	80	57.5	10 52.6	25	80	57.0	11 07.5	26	79	56.1	9
90	8 20.5	28	85	63.2	8 28.8	27	84	62.7	8 37.0	27	84	62.2	8 53.3	27	83	61.2	9 25.5	27	82	59.3	9 57.0	26	80	57.3	10 04.8	26	80	56.8	10 20.3	26	79	55.8	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	44 00.0	1.0 01	180.0	43 30.0	1.0 01	180.0	43 00.0	1.0 01	180.0	42 00.0	1.0 01	180.0	40 00.0	1.0 01	180.0	38 00.0	1.0 01	180.0	37 30.0	1.0 01	180.0	36 30.0	1.0 01	180.0	00
1	43 59.4	1.0 03	178.8	43 29.4	1.0 03	178.8	42 59.4	1.0 03	178.8	41 59.4	1.0 03	178.8	39 59.4	1.0 03	178.9	37 59.5	1.0 03	178.9	37 29.5	1.0 03	179.0	36 29.5	1.0 03	179.0	1
2	43 57.6	1.0 05	177.5	43 27.6	1.0 05	177.6	42 57.6	1.0 05	177.6	41 57.7	1.0 05	177.7	39 57.8	1.0 05	177.8	37 57.9	1.0 04	177.9	37 27.9	1.0 04	177.9	36 28.0	1.0 04	178.0	2
3	43 54.5	1.0 07	176.3	43 24.6	1.0 07	176.4	42 54.6	1.0 07	176.4	41 54.8	1.0 07	176.5	39 55.0	1.0 06	176.7	37 55.3	1.0 06	176.8	37 25.3	1.0 06	176.9	36 25.5	1.0 06	177.0	3
4	43 50.2	1.0 09	175.1	43 20.4	1.0 09	175.2	42 50.5	1.0 09	175.2	41 50.7	1.0 09	175.3	39 51.2	1.0 08	175.6	37 51.6	1.0 08	175.8	37 21.7	1.0 08	175.9	36 21.9	1.0 08	176.0	4
05	43 44.8	99 11	173.9	43 15.0	99 11	174.0	42 45.2	99 11	174.0	41 45.5	99 11	174.2	39 46.2	99 10	174.5	37 46.9	99 10	174.8	37 17.1	99 09	174.8	36 17.4	99 09	174.9	05
6	43 38.1	99 13	172.7	43 08.4	99 13	172.8	42 38.6	99 13	172.9	41 39.2	99 12	173.0	39 40.2	99 12	173.4	37 41.2	99 11	173.7	37 11.4	99 11	173.8	36 11.9	99 11	173.9	6
7	43 30.2	99 15	171.5	43 00.6	99 15	171.6	42 31.0	99 15	171.7	41 31.7	99 14	171.9	39 33.1	99 14	172.3	37 34.4	99 13	172.7	37 04.8	99 13	172.8	36 05.4	99 12	172.9	7
8	43 21.2	98 17	170.3	42 51.7	98 17	170.4	42 22.1	98 17	170.5	41 23.1	98 16	170.8	39 24.9	99 15	171.2	37 26.7	99 15	171.6	36 57.1	99 14	171.7	35 57.9	99 14	172.0	8
9	43 10.9	98 19	169.1	42 41.6	98 19	169.2	42 12.2	98 18	169.4	41 13.4	98 18	169.6	39 15.7	98 17	170.1	37 17.9	98 16	170.6	36 48.4	98 16	170.7	35 49.4	98 16	171.0	9
10	42 59.5	97 21	167.9	42 30.3	97 21	168.1	42 01.1	97 20	168.2	41 02.5	98 20	168.5	39 05.4	98 19	169.1	37 08.0	98 18	169.6	36 38.7	98 18	169.7	35 40.0	98 17	170.0	10
1	42 47.0	97 23	166.7	42 17.9	97 22	166.9	41 48.8	97 22	167.1	40 50.6	97 22	167.4	38 54.0	97 21	168.0	36 57.2	97 20	168.6	36 28.0	97 19	168.7	35 29.6	97 19	169.0	1
2	42 33.4	96 25	165.6	42 04.4	96 24	165.8	41 35.5	96 24	165.9	40 37.6	97 23	166.3	38 41.6	97 22	166.9	36 45.5	97 21	167.6	36 16.4	97 21	167.7	35 18.2	97 20	168.0	2
3	42 18.6	96 26	164.4	41 49.8	96 26	164.6	41 21.1	96 26	164.8	40 23.6	96 25	165.2	38 28.2	96 24	165.9	36 32.7	96 23	166.6	36 03.8	96 23	166.7	35 05.9	97 22	167.1	3
4	42 02.7	95 28	163.3	41 34.2	95 28	163.5	41 05.6	95 28	163.7	40 08.4	95 27	164.1	38 13.8	96 26	164.9	36 19.0	96 24	165.6	35 50.2	96 24	165.8	34 52.6	96 24	166.1	4
15	41 45.8	94 30	162.2	41 17.4	94 30	162.4	40 49.1	95 29	162.6	39 52.3	95 29	163.0	37 58.4	95 27	163.8	36 04.3	95 26	164.6	35 35.7	95 26	164.8	34 38.5	95 25	165.2	15
6	41 27.7	94 32	161.0	40 59.6	94 31	161.3	40 31.5	94 31	161.5	39 35.1	94 30	162.0	37 42.1	94 29	162.8	35 48.7	95 28	163.6	35 20.3	95 27	163.8	34 23.4	95 27	164.2	6
7	41 08.7	93 34	160.0	40 40.8	93 33	160.2	40 12.9	93 33	160.4	39 16.9	93 32	160.9	37 24.7	94 30	161.8	35 32.1	94 29	162.7	35 03.9	94 29	162.9	34 07.5	94 28	163.3	7
8	40 48.6	92 35	158.9	40 21.0	92 35	159.1	39 53.3	92 34	159.4	38 57.8	93 34	159.9	37 06.5	93 32	160.8	35 14.7	93 31	161.7	34 46.7	93 30	161.9	33 50.6	94 30	162.4	8
9	40 27.6	91 37	157.8	40 00.1	91 36	158.1	39 32.7	92 36	158.3	38 37.7	92 35	158.8	36 47.2	92 34	159.8	34 56.3	93 32	160.8	34 28.6	93 32	161.0	33 32.9	93 31	161.5	9
20	40 05.5	91 38	156.8	39 38.3	91 38	157.0	39 11.1	91 38	157.3	38 16.6	91 37	157.8	36 27.1	91 35	158.9	34 37.1	92 33	159.8	34 09.5	92 33	160.1	33 14.3	92 32	160.6	20
1	39 42.5	90 40	155.7	39 15.6	90 39	156.0	38 48.6	90 39	156.3	37 54.6	90 38	156.8	36 06.1	91 36	157.9	34 17.0	91 35	158.9	33 49.7	91 34	159.2	32 54.9	91 34	159.7	1
2	39 18.6	89 41	154.7	38 51.9	89 41	155.0	38 25.2	89 40	155.3	37 31.7	89 40	155.9	35 44.2	90 38	157.0	33 56.1	90 36	158.0	33 29.0	90 36	158.3	32 34.7	91 35	158.8	2
3	38 53.7	88 43	153.7	38 27.4	88 42	154.0	38 00.9	88 42	154.3	37 07.9	88 41	154.9	35 21.4	89 39	156.0	33 34.3	90 38	157.1	33 07.4	90 37	157.4	32 13.6	90 36	157.9	3
4	38 28.0	87 44	152.7	38 01.9	87 44	153.0	37 35.7	87 44	153.3	36 43.3	88 42	153.9	34 57.8	88 41	155.1	33 11.7	89 39	156.2	32 45.1	89 39	156.5	31 51.8	89 38	157.1	4
25	38 01.4	86 46	151.7	37 35.6	86 45	152.0	37 09.7	86 45	152.4	36 17.8	87 44	153.0	34 33.4	87 42	154.2	32 48.3	88 40	155.4	32 22.0	88 40	155.6	31 29.1	88 39	156.2	25
6	37 33.9	85 47	150.8	37 08.4	85 47	151.1	36 42.8	85 46	151.4	35 51.5	86 45	152.1	34 08.2	86 43	153.3	32 24.2	87 42	154.5	31 58.0	87 41	154.8	31 05.7	87 40	155.4	6
7	37 05.7	84 48	149.8	36 40.4	84 48	150.2	36 15.1	84 48	150.5	35 24.3	85 47	151.2	33 42.1	85 45	152.4	31 59.2	86 43	153.7	31 33.4	86 42	154.0	30 41.6	86 41	154.5	7
8	36 36.6	83 50	148.9	36 11.6	83 49	149.3	35 46.6	83 49	149.6	34 56.4	84 48	150.3	33 15.4	85 46	151.6	31 33.5	85 44	152.8	31 07.9	85 44	153.1	30 16.7	86 43	153.7	8
9	36 06.8	82 51	148.0	35 42.1	82 51	148.4	35 17.4	83 50	148.7	34 27.7	83 49	149.4	32 47.8	84 47	150.7	31 07.1	84 45	152.0	30 41.8	84 45	152.3	29 51.1	85 44	152.9	9
30	35 36.1	81 52	147.1	35 11.8	81 52	147.5	34 47.3	82 51	147.8	33 58.3	82 50	148.5	32 19.5	83 48	149.9	30 39.9	83 46	151.2	30 14.9	83 46	151.5	29 24.7	84 45	152.1	30
1	35 04.8	80 54	146.2	34 40.7	80 53	146.6	34 16.6	81 52	147.0	33 28.1	81 51	147.7	31 50.6	82 49	149.1	30 12.1	82 48	150.4	29 47.4	83 47	150.7	28 57.7	83 46	151.4	1
2	34 32.7	79 55	145.4	34 09.0	79 54	145.8	33 45.1	80 54	146.1	32 57.3	80 53	146.8	31 20.9	81 51	148.2	29 43.6	81 49	149.6	29 19.1	82 48	149.9	28 30.0	82 47	150.6	2
3	34 00.0	78 56	144.5	33 36.5	78 55	144.9	33 13.0	79 55	145.3	32 25.7	79 54	146.0	30 50.5	80 52	147.5	29 14.4	80 50	148.8	28 50.2	81 49	149.2	28 01.7	81 48	149.8	3
4	33 26.5	77 57	143.7	33 03.4	77 56	144.1	32 40.2	78 56	144.5	31 53.5	78 55	145.2	30 19.5	79 53	146.7	28 44.5	80 51	148.1	28 20.6	80 50	148.4	27 32.7	80 49	149.1	4
35	32 52.4	76 58	142.9	32 29.6	76 57	143.3	32 06.7	77 57	143.7	31 20.6	77 56	144.4	29 47.8	78 54	145.9	28 14.0	79 52	147.3	27 50.4	79 51	147.7	27 03.1	79 50	148.4	35
6	32 17.7	75 59	142.1	31 55.2	75 58	142.5	31 32.6	75 58	142.9	30 47.1	76 57	143.7	29 15.5	77 55	145.2	27 42.9	78 53	146.6	27 19.6	78 52	147.0	26 32.9	78 51	147.7	6
7	31 42.4	74 60	141.3	31 20.1	74 59	141.7	30 57.8	74 59	142.1	30 13.0	75 58	142.9	28 42.6	76 56	144.4	27 11.2	77 54	145.9	26 48.2	77 53	146.2	26 02.1	77 52	147.0	7
8	31 06.4	73 61	140.6	30 44.5	73 60	141.0	30 22.5	73 60	141.4	29 38.3	74 59	142.2	28 09.1	75 57	143.7	26 38.9	76 55	145.2	26 16.2	76 54	145.5	25 30.7	76 53	146.3	8
9	30 29.9	72 62	139.8	30 08.3	72 61	140.2	29 46.6	72 61	140.6	29 03.0	73 60	141.4	27 35.0	74 58	143.0	26 06.0	75 56	144.5	25 43.6	75 55	144.9	24 58.7	75 54	145.6	9
40	29 52.9	71 63	139.1	29 31.5	71 62	139.5	29 10.2	71 62	139.9	28 27.2	72 61	140.7	27 00.4	73 59	142.3	25 32.6	74 57	143.8	25 10.5	74 56	144.2	24 26.2	74 55	144.9	40
1	29 15.2	70 64	138.4	28 54.2	70 63	138.8	28 33.1	70 62	139.2	27 50.8	71 62	140.0	26 25.2	72 60	141.6	24 58.6	73 58	143.1	24 36.8	73 57	143.5	23 53.1	73 56	144.3	1
2	28 37.1	69 64	137.7	28 16.4	69 64	138.1	27 55.6	69 63	138.5	27 13.8	70 62	139.3	25 49.5	71 60	140.9	24 24.1	72 58	142.5	24 02.7	72 58	142.9	23 19.5	72 57	143.6	2
3	27 58.4	68 65	137.0	27 38.0	68 65	137.4	27 17.6	68 64	137.8	26 36.4	69 63	138.7	25 13.3	70 61	140.3	23 49.1	71 59	141.8	23 27.9	71 59	142.2	22 45.4	71 58	143.0	3
4	27 19.3	67 66	136.3	26 59.2	67 66	136.8	26 39.0	67 65	137.2	25 58.5	68 64	138.0	24 36.5	69 62	139.6	23 13.6	70 60	141.2	22 52.7	70 60	141.6	22 10.8	70 58	142.4	4
45	26 39.6	66 67	135.7	26 19.8	66 66	136.1	26 00.0	66 66	136.5	25 20.0	67 65	137.3	23 59.3	68 63	139.0	22 37.6	68 61	140.6	22 17.0	69 60	141.0	21 35.7	69 59	141.7	45
6	25 59.5	65 68	135.0	25 40.1	65 67	135.5	25 20.5	65 67	135.9	24 41.1	66 66	136.7	23 21.6	67 64	138.4	22 01.1	67 62	140.0	21 40.9	68 61	140.4	21 00.1	68 60	141.1	6
7	25 19.0	64 68	134.4	24 59.8	64 68	134.8	24 40.5	64 67	135.3	24 01.8	65 66	136.1	22 43.5	66 64	137.7	21 24.2	66 62	139.4	21 04.2	67 62	139.8	20 24.1	67 61	140.6	7
8	24 38.0	63 69	133.8	24 19.1	63 68	134.2	24 00.2	63 68	134.6	23 22.0	64 67	135.5	22 04.9	65 65	137.1	20 46.8	65 63	138.8	20 27.1	66 63	139.2	19 47.6	66 62	140.0	8
9	23 56.6	62 70	133.2	23 38.0	62 69	133.6	23 19.3	62 69	134.0	22 41.8	63 68	134.9	21 25.9	64 66	136.6	20 09.0	64 64	138.2	19 49.6	65 63	138.6	19 10.7	65 62	139.4	9
50	23 14.8	61 70	132.6	22 56.5	61 70	133.0	22 38.1	61 69	133.5	22 01.1	62 68	134.3	20 46.4	63 66	136.0	19 30.8	63 64	137.6	19 11.7	64 64	138.1	18 33.4	64 63	138.9	50
1	22 32.6	60 71	132.0	22 14.6	60 70	132.4	21 56.5	60 70	132.9	21 20.1	61 69	133.7	20 06.6	62 67	135.4	18 52.1	62 65	137.1	18 33.3	63 65	137.5	17 55.7	63 64	138.3	1
2	21 50.0	59 72	131.4	21 32.3	59 71	131.9	21 14.5	59 71	132.3	20 38.7	60 70	133.2	19 26.3	61 68	134.9	18 13.1	61 66	136.5	17 54.6	62 65	137.0	17 17.5	62 64	137.8	2
3	21 07.1	58 72	130.9	20 49.6	58 72	131.3	20 32.1	58 71	131.8	19 56.9	59 70	132.6	18 45.7	60 68	134.3	17 33.6	60 66	136.0	17 15.5	61 66	136.4	16 39.0	61 65	137.3	3
4	20 23.8	57 73	130.4	20 06.6	57 72	130.8	19 49.4	58 72	131.2	19 14.7	58 71	132.1	18 04.7	59 69	133.8	16 53.8	59 67	135.5	16 35.9	60 66	135.9	16 00.1	60 65	136.7	4
55	19 40.1	56 73	129.8	19 23.2	56 73	130.3	19 06.3	57 72	130.7	18 32.2	57 71	131.6	17 23.3	58 70	133.3	16 13.6	58 68	135.0	15 56.1	59 67	135.4	15 20.8	59 66	136.2	55
6	18 56.1	55 74	129.3	18 39.5	55 73	129.7	18 22.8	56 73	130.2	17 49.3	56 72	131.0	16 41.6	57 70	132.8	15 33.1	57 68	134.5	15 15.8	58 68	134.9	14 41.2	58 67	135.8	6
7	18 11.8	54 74	128.8	17 55.5	55 74	129.2	17 39.1	55 74	129.7	17 06.1	55 73	130.5	15 59.6	56 71	132.3	14 52.2	56 69	134.0	14 35.2	57 68	134.4	14 01.2	57 67	135.3	7
8	17 27.2	53 75	128.3	17 11.1	54 74	128.7	16 55.0	54 74	129.2	16 22.6	54 73	130.0	15 17.2	55 71	131.8	14 11.0	55 69	133.5	13 54.3	56 69	133.9	13 20.8	56 68	134.8	8
9	16 42.2	52 75	127.8	16 26.4	53 75	128.2	16 10.6	53 74	128.7	15 38.8	53 74	129.6	14 34.5	54 72	131.3	13 29.4	55 70	133.0	13 13.1	55 69	133.5	12 40.2	55 68	134.3	9
60	15 57.0	52 76	127.3	15 41.5	52 75	127.8	15 25.9	52 75	128.2	14 54.6	52 74	129.1	13 51.5	53 72	130.8	12 47.6	54 70	132.6	12 31.5	54 70	133.0	11 59.2	54 69	133.9	60
1	15 11.5	51 76	126.9	14 56.2	51 76	127.3	14 40.9	51 76	127.7	14 10.2	51 75	128.6	13 08.2	52 73	130.4	12 05.4	53 71	132.1	11 49.6	53 70	132.6	11 17.9	53 69	133.4	1
2	14 25.7	50 77	126.4	14 10.7	50 76	126.8	13 55.7	50 76	127.3	13 25.5	50 75	128.2	12 24.6	51 73	129.9	11 23.0	52 71	131.7	11 07.5	52 71	132.1	10 36.3	52 70	133.0	2
3	13 39.6	49 77	125.9	13 24.9	49 77	126.4	13 10.1	49 76	126.8	12 40.5	50 75	127.7	11 40.7	50 74	129.5	10 40.2	51 72	131.3	10 25.0	51 71	131.7	9 54.5	51 70	132.6	3
4	12 53.3	48 78	125.5	12 38.8	48 77	126.0	12 24.3	48 77	126.4	11 55.2	49 76	127.3	10 56.5	49 74	129.1	9 57.2	50 72	130.8	9 42.3	50 72	131.3	9 12.3	50 71	132.2	4
65	12 06.7	47 78	125.1	11 52.5	47 78	125.5	11 38.3	47 77	126.0	11 09.7	48 76	126.9	10 12.1	48 74	128.7	9 13.9	49 73	130.4	8 59.2	49 72	130.9	8 29.9	49 71	131.8	65
6	11 19.9	46 78	124.6	11 05.9	46 78	125.1	10 52.0	47 78	125.6	10 23.9	47 77	126.5	9 27.4	47 75	128.2	8 30.3	48 73	130.0	8 16.0	48 73	130.5	7 47.2	48 72	131.4	6
7	10 32.8	46 79	124.2	10 19.1	46 78	124.7	10 05.4	46 78	125.1	9 37.9	46 77	126.0	8 42.4	46 75	127.8	7 46.5	47 73	129.6	7 32.4	47 73	130.1	7 04.2	47 72	131.0	7
8	9 45.5	45 79	123.8	9 32.1	45 79	124.3	9 18.6	45 78	124.7	8 51.6	45 77	125.6	7 57.3	46 76	127.4	7 02.4	46 74	129.2	6 48.6	46 73	129.7	6 21.0	46 72	130.6	8
9	8 58.0	44 80	123.4	8 44.8	44 79	123.9	8 31.6	44 79	124.3	8 05.2	44 78	125.3	7 11.8	45 76	127.1	6 18.1	45 74	128.9	6 04.6	45 74	129.3	5 37.5	45 73	130.2	9
70	8 10.3	43 80	123.0	7 57.4	43 79	123.5	7 44.4	43 79	124.0	7 18.4	43 78	124.9	6 26.2	44 76	126.7	5 33.5	44 75	128.5	5 20.3	44 74	128.9				70
1	7 22.3	42 80	122.7	7 09.7	42 80	123.1	6 57.0	42 79	123.6	6 31.5	43 79	124.5	5 40.3	43 77	126.3										1
2	6 34.2	41 80	122.3	6 21.8	41 80	122.8	6 09.3	42 80	123.2	5 44.4	42 79	124.1													2
3	5 45.9	41 81	121.9	5 33.7	41 80	122.4	5 21.5	41 80	122.9																3

DECLINATION SAME NAME AS LATITUDE

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	7 29.6	28 85	62.9	7 38.1	28 84	62.4	7 46.5	28 84	62.0	8 03.3	28 83	61.0	8 36.5	27 81	59.0	9 09.1	27 80	57.1	9 17.1	27 79	56.6	9 33.1	26 78	55.6	91
2	6 38.9	29 84	62.7	6 47.6	29 84	62.2	6 56.2	29 84	61.7	7 13.5	29 83	60.7	7 47.6	28 81	58.8	8 21.2	28 80	56.9	8 29.5	28 79	56.4	8 46.1	27 78	55.4	2
3	5 48.2	30 84	62.4	5 57.2	30 84	61.9	6 06.1	30 84	61.4	6 23.8	29 83	60.5	6 58.9	29 81	58.6	7 33.5	29 79	56.6	7 42.1	29 79	56.1	7 59.1	28 78	55.2	3
4				5 06.9	30 84	61.7	5 16.0	30 83	61.2	5 34.2	30 82	60.2	6 10.2	30 81	58.3	6 45.9	30 79	56.4	6 54.8	29 79	55.9	7 12.4	29 78	54.9	4
95													5 21.8	31 81	58.1	5 58.5	30 79	56.1	6 07.6	30 78	55.7	6 25.7	30 78	54.7	95
6																5 11.1	31 79	55.9	5 20.5	31 78	55.4	5 39.2	31 77	54.5	6

Lat. 18°

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	72 00.0	1.0 02	00.0	71 00.0	1.0 02	00.0	69 30.0	1.0 02	00.0	68 00.0	1.0 02	00.0	66 00.0	1.0 02	00.0	65 30.0	1.0 01	00.0	65 00.0	1.0 01	00.0	63 00.0	1.0 01	00.0	00
1	71 58.7	1.0 06	02.6	70 58.8	1.0 06	02.5	69 28.9	1.0 06	02.2	67 59.0	1.0 05	02.0	65 59.1	1.0 05	01.8	65 29.1	1.0 04	01.8	64 59.1	1.0 04	01.7	62 59.2	1.0 04	01.6	1
2	71 54.8	99 11	05.2	70 55.1	99 10	04.9	69 25.6	1.0 09	04.5	67 55.9	1.0 08	04.1	65 56.4	1.0 08	03.6	65 26.5	1.0 07	03.5	64 56.6	1.0 07	03.5	62 56.9	1.0 06	03.1	2
3	71 48.3	99 15	07.8	70 49.1	99 14	07.3	69 20.0	99 13	06.7	67 50.9	99 12	06.1	65 51.8	99 11	05.5	65 22.1	99 10	05.3	64 52.3	99 10	05.2	62 53.0	99 09	04.7	3
4	71 39.3	98 19	10.3	70 40.6	98 18	09.7	69 12.3	98 16	08.8	67 43.8	98 15	08.1	65 45.5	99 13	07.3	65 15.9	99 13	07.1	64 46.3	99 13	06.9	62 47.6	99 12	06.2	4
05	71 27.9	97 23	12.8	70 29.9	97 22	12.0	69 02.5	97 20	11.0	67 34.8	98 18	10.1	65 37.4	98 16	09.0	65 08.0	98 16	08.8	64 38.6	98 16	08.6	62 40.7	98 14	07.7	05
6	71 14.1	95 27	15.2	70 16.8	96 25	14.3	68 50.6	96 23	13.1	67 23.8	97 21	12.0	65 27.6	97 19	10.8	64 58.5	97 19	10.5	64 29.3	97 18	10.2	62 32.3	98 16	09.2	6
7	70 57.9	93 31	17.6	70 01.7	94 29	16.6	68 36.6	95 26	15.2	67 11.0	95 24	13.9	65 16.1	96 22	12.5	64 47.3	96 21	12.2	64 18.4	96 21	11.9	62 22.4	97 19	10.7	7
8	70 39.6	92 34	19.9	69 44.4	92 32	18.7	68 20.8	93 30	17.2	66 56.4	94 27	15.8	65 02.9	95 25	14.2	64 34.4	95 24	13.8	64 05.8	95 23	13.5	62 11.1	96 21	12.2	8
9	70 19.2	90 37	22.1	69 25.1	91 35	20.8	68 03.0	92 33	19.1	66 40.0	93 30	17.6	64 48.1	94 27	15.8	64 20.0	94 27	15.4	63 51.8	94 26	15.1	61 58.4	95 24	13.6	9
10	69 56.7	88 40	24.2	69 03.8	89 38	22.8	67 43.4	90 36	21.0	66 21.9	91 33	19.4	64 31.8	92 30	17.5	64 04.0	93 29	17.0	63 36.2	93 28	16.6	61 44.3	94 26	15.0	10
1	69 32.4	85 43	26.2	68 40.8	87 41	24.8	67 22.1	88 38	22.8	66 02.1	89 36	21.1	64 13.9	91 32	19.0	63 46.6	91 31	18.6	63 19.2	91 31	18.1	61 28.8	92 28	16.4	1
2	69 06.4	83 46	28.1	68 16.0	85 44	26.6	66 59.1	86 41	24.6	65 40.8	88 38	22.8	63 54.6	89 35	20.6	63 27.7	90 34	20.1	63 00.8	90 33	19.6	61 12.0	91 30	17.8	2
3	68 38.6	81 49	30.0	67 49.6	82 47	28.4	66 34.6	84 43	26.3	65 18.0	86 40	24.4	63 33.8	88 37	22.1	63 07.5	88 36	21.5	62 41.0	88 35	21.0	60 54.0	90 32	19.1	3
4	68 09.4	79 51	31.7	67 21.7	80 49	30.1	66 08.6	82 46	27.9	64 53.8	84 43	25.9	63 11.7	86 39	23.5	62 45.9	86 38	22.9	62 19.9	87 37	22.4	60 34.7	88 34	20.4	4
15	67 38.6	76 53	33.4	66 52.4	78 51	31.8	65 41.2	80 48	29.5	64 28.2	82 45	27.4	62 48.3	84 41	24.9	62 23.0	85 40	24.3	61 57.5	85 39	23.7	60 14.3	87 36	21.6	15
6	67 06.6	74 56	35.0	66 21.7	76 53	33.3	65 12.5	78 50	31.0	64 01.3	80 47	28.8	62 23.7	82 43	26.2	61 58.9	83 42	25.6	61 33.9	83 41	25.0	59 52.7	85 38	22.9	6
7	66 33.2	72 57	36.5	65 49.8	73 55	34.8	64 42.5	76 52	32.4	63 33.2	78 49	30.2	61 57.9	81 45	27.5	61 33.6	81 44	26.9	61 09.2	82 43	26.3	59 29.9	84 40	24.0	7
8	65 58.8	69 59	37.9	65 16.6	71 57	36.2	64 11.4	74 54	33.7	63 03.9	76 51	31.5	61 31.0	79 47	28.8	61 07.3	79 46	28.1	60 43.4	80 45	27.5	59 06.2	82 41	25.2	8
9	65 23.2	67 61	39.2	64 42.4	69 59	37.5	63 39.2	72 55	35.0	62 33.6	74 52	32.8	61 03.0	77 48	30.0	60 39.8	77 47	29.3	60 16.5	78 46	28.7	58 41.4	80 43	26.3	9
20	64 46.6	65 63	40.5	64 07.2	67 60	38.7	63 05.9	70 57	36.3	62 02.2	72 54	34.0	60 34.0	75 50	31.1	60 11.4	76 49	30.5	59 48.6	76 48	29.8	58 15.6	79 44	27.4	20
1	64 09.1	62 64	41.7	63 31.0	64 62	39.9	62 31.7	67 59	37.4	61 29.8	70 55	35.1	60 04.0	73 52	32.3	59 42.0	74 51	31.6	59 19.7	74 50	30.9	57 48.9	77 46	28.4	1
2	63 30.7	60 65	42.8	62 54.0	62 63	41.1	61 56.5	65 60	38.6	60 56.6	68 57	36.2	59 33.1	71 53	33.3	59 11.6	72 52	32.6	58 50.0	73 51	32.0	57 21.4	75 47	29.4	2
3	62 51.6	58 66	43.9	62 16.1	60 64	42.1	61 20.6	63 61	39.6	60 22.4	66 58	37.3	59 01.3	69 54	34.3	58 40.4	70 53	33.6	58 19.3	71 52	33.0	56 52.9	73 49	30.4	3
4	62 11.7	56 68	44.9	61 37.5	58 66	43.1	60 43.8	61 63	40.6	59 47.5	64 60	38.3	58 28.7	67 56	35.3	58 08.4	68 55	34.6	57 47.9	69 54	33.9	56 23.7	72 50	31.3	4
25	61 31.1	54 69	45.8	60 58.1	56 67	44.1	60 06.3	59 64	41.6	59 11.8	62 61	39.2	57 55.3	65 57	36.3	57 35.6	66 56	35.5	57 15.6	67 55	34.9	55 53.6	70 51	32.2	25
6	60 49.9	52 70	46.7	60 18.1	54 68	45.0	59 28.1	57 65	42.5	58 35.3	60 62	40.1	57 21.2	63 58	37.1	57 02.1	64 57	36.4	56 42.7	65 56	35.7	55 22.8	68 52	33.1	6
7	60 08.1	50 71	47.5	59 37.5	52 69	45.8	58 49.2	55 66	43.3	57 58.2	58 63	41.0	56 46.4	62 59	38.0	56 27.8	62 58	37.3	56 09.0	63 57	36.6	54 51.4	66 54	33.9	7
8	59 25.7	48 71	48.3	58 56.3	50 70	46.6	58 09.8	53 67	44.1	57 20.5	56 64	41.8	56 11.0	60 60	38.8	55 52.9	61 59	38.1	55 34.6	61 58	37.4	54 19.2	64 55	34.7	8
9	58 42.8	46 72	49.0	58 14.6	48 70	47.4	57 29.7	51 68	44.9	56 42.2	54 65	42.6	55 34.9	58 61	39.6	55 17.4	59 60	38.9	54 59.7	59 59	38.2	53 46.4	63 56	35.5	9
30	57 59.5	44 73	49.7	57 32.3	46 71	48.1	56 49.2	49 68	45.6	56 03.3	52 66	43.3	54 58.2	56 62	40.3	54 41.3	57 61	39.6	54 24.1	58 60	38.9	53 13.0	61 57	36.2	30
1	57 15.8	42 74	50.4	56 49.7	45 72	48.7	56 08.2	48 69	46.3	55 23.9	51 66	44.0	54 21.0	54 63	41.0	54 04.6	55 62	40.3	53 48.0	56 61	39.6	52 39.0	59 58	36.9	1
2	56 31.6	41 74	51.0	56 06.6	43 72	49.4	55 26.6	46 70	47.0	54 44.0	49 67	44.7	53 43.3	52 64	41.7	53 27.4	53 63	41.0	53 11.3	54 62	40.3	52 04.5	57 58	37.6	2
3	55 47.1	39 75	51.6	55 23.1	41 73	50.0	54 44.7	44 71	47.6	54 03.7	47 68	45.3	53 05.1	51 64	42.4	52 49.8	51 64	41.7	52 34.2	52 63	40.9	51 29.5	55 59	38.2	3
4	55 02.2	37 75	52.1	54 39.2	39 74	50.5	54 02.4	42 71	48.2	53 22.9	45 69	45.9	52 26.4	49 65	43.0	52 11.6	50 64	42.3	51 56.6	51 63	41.6	50 53.9	54 60	38.8	4
35	54 17.0	36 76	52.6	53 55.0	38 74	51.1	53 19.7	41 72	48.7	52 41.7	44 69	46.5	51 47.3	47 66	43.6	51 33.0	48 65	42.8	51 18.5	49 64	42.1	50 17.9	52 61	39.4	35
6	53 31.5	34 76	53.1	53 10.4	36 75	51.6	52 36.6	39 72	49.2	52 00.2	42 70	47.0	51 07.8	45 66	44.1	50 54.0	46 66	43.4	50 40.0	47 65	42.7	49 41.5	50 61	40.0	6
7	52 45.7	32 77	53.6	52 25.6	34 75	52.0	51 53.2	37 73	49.7	51 18.3	40 70	47.5	50 27.8	44 67	44.6	50 14.6	45 66	43.9	50 01.1	45 65	43.2	49 04.6	49 62	40.5	7
8	51 59.6	31 77	54.0	51 40.5	33 76	52.5	51 09.5	36 73	50.2	50 36.0	39 71	48.0	49 47.6	42 68	45.1	49 34.8	43 67	44.4	49 21.8	44 66	43.7	48 27.3	47 63	41.0	8
9	51 13.4	29 77	54.4	50 55.1	31 76	52.9	50 25.6	34 74	50.6	49 53.5	37 71	48.4	49 07.0	40 68	45.6	48 54.7	41 67	44.9	48 42.2	42 67	44.2	47 49.7	45 63	41.5	9
40	50 26.9	28 78	54.8	50 09.5	30 76	53.3	49 41.3	33 74	51.0	49 10.6	35 72	48.9	48 26.0	39 69	46.1	48 14.3	40 68	45.4	48 02.2	41 67	44.7	47 11.7	44 64	42.0	40
1	49 40.2	27 78	55.1	49 23.7	28 77	53.6	48 56.8	31 75	51.4	48 27.5	34 72	49.3	47 44.8	37 69	46.5	47 33.5	38 68	45.8	47 22.0	39 68	45.1	46 33.4	42 64	42.4	1
2	48 53.3	25 78	55.4	48 37.6	27 77	54.0	48 12.1	30 75	51.8	47 44.1	32 73	49.7	47 03.3	36 70	46.9	46 52.5	37 69	46.2	46 41.4	37 68	45.5	45 54.7	40 65	42.8	2
3	48 06.2	24 79	55.7	47 51.4	26 77	54.3	47 27.2	28 75	52.1	47 00.5	31 73	50.0	46 21.5	34 70	47.3	46 11.1	35 69	46.6	46 00.5	36 69	45.9	45 15.8	39 65	43.2	3
4	47 19.0	22 79	56.0	47 05.0	24 78	54.6	46 42.0	27 76	52.4	46 16.7	29 73	50.3	45 39.5	33 70	47.6	45 29.6	33 70	46.9	45 19.4	34 69	46.3	44 36.5	37 66	43.6	4
45	46 31.6	21 79	56.2	46 18.4	23 78	54.8	45 56.7	25 76	52.7	45 32.7	28 74	50.7	44 57.2	31 71	47.9	44 47.8	32 70	47.3	44 38.1	33 69	46.6	43 57.0	36 66	44.0	45
6	45 44.1	20 79	56.5	45 31.7	22 78	55.1	45 11.2	24 76	53.0	44 48.4	26 74	51.0	44 14.8	30 71	48.3	44 05.7	30 70	47.6	43 56.5	31 70	46.9	43 17.3	34 67	44.3	6
7	44 56.5	19 80	56.7	44 44.8	20 78	55.3	44 25.5	23 76	53.3	44 04.0	25 74	51.2	43 32.1	28 71	48.6	43 23.5	29 71	47.9	43 14.7	30 70	47.2	42 37.3	33 67	44.7	7
8	44 08.7	17 80	56.9	43 57.8	19 79	55.5	43 39.7	21 77	53.5	43 19.5	24 75	51.5	42 49.2	27 72	48.8	42 41.1	27 71	48.2	42 32.7	28 70	47.5	41 57.1	31 67	45.0	8
9	43 20.8	16 80	57.1	43 10.7	18 79	55.7	42 53.8	20 77	53.7	42 34.7	22 75	51.7	42 06.1	25 72	49.1	41 58.4	26 71	48.5	41 50.5	27 71	47.8	41 16.7	30 68	45.2	9
50	42 32.9	15 80	57.3	42 23.5	16 79	55.9	42 07.7	19 77	53.9	41 49.9	21 75	52.0	41 22.9	24 72	49.4	41 15.6	25 72	48.7	41 08.1	25 71	48.1	40 36.0	28 68	45.5	50
1	41 44.8	14 80	57.4	41 36.2	15 79	56.1	41 21.5	17 77	54.1	41 04.9	20 75	52.2	40 39.6	23 72	49.6	40 32.7	23 72	48.9	40 25.6	24 71	48.3	39 55.2	27 68	45.8	1
2	40 56.7	12 80	57.6	40 48.8	14 79	56.3	40 35.2	16 77	54.3	40 19.7	18 75	52.4	39 56.0	21 73	49.8	39 49.6	22 72	49.2	39 42.9	23 71	48.5	39 14.3	25 69	46.0	2
3	40 08.5	11 80	57.7	40 01.3	13 79	56.4	39 48.9	15 77	54.5	39 34.5	17 76	52.5	39 12.4	20 73	50.0	39 06.4	20 72	49.4	39 00.1	21 72	48.7	38 33.1	24 69	46.2	3
4	39 20.3	10 81	57.8	39 13.7	12 79	56.5	39 02.4	14 78	54.6	38 49.1	16 76	52.7	38 28.6	18 73	50.2	38 23.0	19 72	49.5	38 17.2	20 72	48.9	37 51.9	22 69	46.4	4
55	38 31.9	09 81	57.9	38 26.1	10 79	56.6	38 15.8	12 78	54.7	38 03.7	14 76	52.8	37 44.8	17 73	50.3	37 39.5	18 73	49.7	37 34.1	18 72	49.1	37 10.4	21 69	46.6	55
6	37 43.6	08 81	58.0	37 38.4	09 80	56.7	37 29.2	11 78	54.9	37 18.2	13 76	53.0	37 00.8	16 73	50.5	36 55.9	16 73	49.9	36 50.9	17 72	49.3	36 28.9	20 69	46.8	6
7	36 55.2	07 81	58.1	36 50.7	08 80	56.8	36 42.5	10 78	55.0	36 32.6	12 76	53.1	36 16.7	15 74	50.6	36 12.3	15 73	50.0	36 07.6	16 72	49.4	35 47.2	18 70	47.0	7
8	36 06.7	06 81	58.1	36 02.9	07 80	56.9	35 55.8	09 78	55.0	35 46.9	11 76	53.2	35 32.5	13 74	50.8	35 28.5	14 73	50.2	35 24.2	14 72	49.5	35 05.5	17 70	47.1	8
9	35 18.2	05 81	58.2	35 15.1	06 80	57.0	35 09.0	08 78	55.1	35 01.2	10 76	53.3	34 48.3	12 74	50.9	34 44.6	13 73	50.3	34 40.8	13 73	49.7	34 23.6	15 70	47.3	9
60	34 29.7	04 81	58.2	34 27.2	05 80	57.0	34 22.1	07 78	55.2	34 15.4	08 76	53.4	34 04.0	11 74	51.0	34 00.7	11 73	50.4	33 57.2	12 73	49.8	33 41.6	14 70	47.4	60
1	33 41.2	03 81	58.3	33 39.4	04 80	57.1	33 35.3	05 78	55.3	33 29.6	07 76	53.5	33 19.6	09 74	51.1	33 16.7	10 73	50.5	33 13.6	11 73	49.9	32 59.6	13 70	47.5	1
2	32 52.7	01 81	58.3	32 51.5	03 80	57.1	32 48.4	04 78	55.3	32 43.7	06 76	53.5	32 35.2	08 74	51.1	32 32.7	09 73	50.6	32 30.0	09 73	50.0	32 17.5	11 70	47.6	2
3	32 04.2	00 81	58.3	32 03.6	02 80	57.1	32 01.4	03 78	55.3	31 57.8	05 77	53.6	31 50.8	07 74	51.2	31 48.6	08 74	50.6	31 46.3	08 73	50.0	31 35.3	10 70	47.7	3
4	31 15.6	01 81	58.3	31 15.6	00 80	57.1	31 14.5	02 78	55.4	31 11.9	04 77	53.6	31 06.3	06 74	51.3	31 04.5	06 74	50.7	31 02.5	07 73	50.1	30 53.1	09 70	47.8	4
65	30 27.1	02 81	58.3	30 27.7	01 80	57.1	30 27.6	01 78	55.4	30 26.0	03 77	53.6	30 21.7	05 74	51.3	30 20.3	05 74	50.7	30 18.7	06 73	50.2	30 10.8	08 71	47.8	65
6	29 38.6	03 81	58.3	29 39.8	02 80	57.1	29 40.6	00 78	55.4	29 40.0	01 77	53.6	29 37.2	03 74	51.3	29 36.1	04 74	50.8	29 34.9	04 73	50.2	29 28.5	06 71	47.9	6
7	28 50.0	04 81	58.2	28 51.9	03 80	57.1	28 53.6	01 78	55.4	28 54.1	00 77	53.7	28 52.6	02 74	51.4	28 51.9	03 74	50.8	28 51.0	03 73	50.2	28 46.1	05 71	47.9	7
8	28 01.5	05 81	58.2	28 04.0	04 80	57.1	28 06.7	02 78	55.4	28 08.1	01 77	53.7	28 08.0	01 74	51.4	28 07.7	01 74	50.8	28 07.2	02 73	50.3	28 03.7	04 71	48.0	8
9	27 13.1	06 81	58.1	27 16.1	05 80	57.0	27 19.8	03 78	55.3	27 22.1	02 77	53.6	27 23.4	00 74	51.4	27 23.4	00 74	50.8	27 23.3	01 73	50.3	27 21.3	03 71	48.0	9
70	26 24.6	07 81	58.1	26 28.3	06 80	57.0	26 32.8	04 78	55.3	26 36.2	03 77	53.6	26 38.9	01 74	51.4	26 39.2	01 74	50.8	26 39.4	00 73	50.3	26 38.9	01 71	48.0	70
1	25 36.2	08 81	58.0	25 40.5	07 80	56.9	25 45.9	05 78	55.3	25 50.3	04 76	53.6	25 54.3	02 74	51.4	25 55.0	02 74	50.8	25 55.5	02 73	50.3	25 56.5	00 71	48.0	1
2	24 47.8	09 81	57.9	24 52.7	08 80	56.8	24 59.1	06 78	55.2	25 04.4	05 76	53.5	25 09.7	04 74	51.3	25 10.7	03 74	50.8	25 11.7	03 73	50.2	25 14.1	01 71	48.0	2
3	23 59.5	09 80	57.9	24 04.9	09 80	56.8	24 12.2	08 78	55.1	24 18.5	06 76	53.5	24 25.2	05 74	51.3	24 26.5	04 74	50.8	24 27.8	04 73	50.2	24 31.6	02 71	48.0	3
4	23 11.2	10 80	57.8	23 17.2	10 79	56.7	23 25.4	09 78	55.1	23 32.6	07 76	53.4	23 40.6	06 74	51.3	23 42.4	06 74	50.7	23 44.0	05 73	50.2	23 49.2	04 71	48.0	4
75	22 22.9	11 80	57.7	22 29.5	11 79	56.6	22 38.7	10 78	55.0	22 46.8	09 76	53.4	22 56.1	07 74	51.2	22 58.2	07 74	50.7	23 00.2	06 73	50.1	23 06.8	05 71	48.0	75
6	21 34.7	12 80	57.6	21 41.9	12 79	56.5	21 51.9	11 78	54.9	22 01.0	10 76	53.3	22 11.7	08 74	51.1	22 14.1	08 73	50.6	22 16.4	07 73	50.1	22 24.5	06 71	47.9	6
7	20 46.6	13 80	57.5	20 54.3	13 79	56.4	21 05.3	12 78	54.8	21 15.3	11 76	53.2	21 27.3	09 74	51.1	21 30.0	09 73	50.5	21 32.6	09 73	50.0	21 42.2	07 70	47.9	7
8	19 58.5	14 80	57.4	20 06.8	14 79	56.3	20 18.7	13 78	54.7	20 29.6	12 76	53.1	20 42.9	10 74	51.0	20 46.0	10 73	50.5	20 48.9	10 73	49.9	20 59.9	08 70	47.8	8
9	19 10.5	15 80	57.2	19 19.4	15 79	56.2	19 32.1	14 77	54.6	19 44.0	13 76	53.0	19 58.6	12 74	50.9	20 02.0	11 73	50.4	20 05.3	11 73	49.9	20 17.6	10 70	47.7	9
80	18 22.5	16 80	57.1	18 32.0	16 79	56.0	18 45.6	15 77	54.5	18 58.5	14 76	52.9	19 14.3	13 74	50.8	19 18.1	12 73	50.3	19 21.7	12 73	49.8	19 35.4	11 70	47.7	80
1	17 34.7	17 80	57.0	17 44.7	17 79	55.9	17 59.2	16 77	54.4	18 13.0	15 76	52.8	18 30.1	14 74	50.7	18 34.2	13 73	50.2	18 38.2	13 72	49.7	18 53.2	12 70	47.6	1
2	16 46.9	18 80	56.8	16 57.5	17 79	55.8	17 12.9	17 77	54.2	17 27.6	16 76	52.7	17 46.0	15 73	50.6	17 50.4	15 73	50.1	17 54.7	14 72	49.6	18 11.2	13 70	47.5	2
3	15 59.2	19 79	56.6	16 10.4	18 78	55.6	16 26.6	18 77	54.1	16 42.2	17 75	52.5	17 01.9	16 73	50.5	17 06.7	16 73	50.0	17 11.3	15 72	49.4	17 29.1	14 70	47.4	3
4	15 11.5	20 79	56.5	15 23.3	19 78	55.5	15 40.5	19 77	53.9	15 57.0	18 75	52.4	16 17.9	17 73	50.4	16 23.0	17 73	49.8	16 28.0	16 72	49.3	16 47.2	15 70	47.3	4
85	14 24.0	21 79	56.3	14 36.4	20 78	55.3	14 54.4	20 77	53.8	15 11.8	19 75	52.3	15 34.0	18 73	50.2	15 39.4	18 72	49.7	15 44.8	18 72	49.2	16 05.3	17 70	47.1	85
6	13 36.6	22 79	56.1	13 49.5	21 78	55.1	14 08.4	21 76	53.6	14 26.7	20 75	52.1	14 50.2	19 73	50.1	14 56.0	19 72	49.6	15 01.6	19 72	49.1	15 23.5	18 70	47.0	6
7	12 49.3	23 79	56.0	13 02.7	22 78	55.0	13 22.5	22 76	53.4	13 41.7	21 75	51.9	14 06.5	20 73	49.9	14 12.6	20 72	49.4	14 18.5	20 72	48.9	14 41.8	19 69	46.9	7
8	12 02.0	24 79	55.8	12 16.1	23 78	54.8	12 36.7	23 76	53.3	12 56.9	22 75	51.8	13 22.9	21 72	49.8	13 29.3	21 72	49.3	13 35.6	21 71	48.8	14 00.2	20 69	46.7	8
9	11 14.9	24 78	55.6	11 29.5	24 77	54.6	11 51.0	24 76	53.1	12 12.1	23 74	51.6	12 39.4	22 72	49.6	12 46.1	22 72	49.1	12 52.7	22 71	48.6	13 18.7	21 69	46.6	9
90	10 27.9	25 78	55.4	10 43.1	25 77	54.4	11 05.5	25 76	52.9	11 27.4	24 74	51.4	11 56.0	23 72	49.4	12 03.0	23 72	48.9	12 10.0	23 71	48.4	12 37.3	22 69	46.4	90

Lat. 18°

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	36° 00′				37° 00′				38° 30′				40° 00′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	36 00.0	1.0	01	180.0	35 00.0	1.0	01	180.0	33 30.0	1.0	01	180.0	32 00.0	1.0	01	180.0
1	35 59.5	1.0	02	179.0	34 59.5	1.0	02	179.0	33 29.5	1.0	02	179.1	31 59.6	1.0	02	179.1
2	35 58.0	1.0	04	178.0	34 58.1	1.0	04	178.1	33 28.1	1.0	04	178.1	31 58.2	1.0	04	178.2
3	35 55.5	1.0	06	177.0	34 55.6	1.0	06	177.1	33 25.8	1.0	05	177.2	31 56.0	1.0	05	177.3
4	35 52.0	1.0	07	176.0	34 52.2	1.0	07	176.1	33 22.5	1.0	07	176.3	31 52.8	1.0	07	176.4
05	35 47.6	99	09	175.0	34 47.9	99	09	175.1	33 18.3	1.0	09	175.3	31 48.8	1.0	08	175.5
6	35 42.1	99	11	174.0	34 42.6	99	10	174.2	33 13.2	99	10	174.4	31 43.8	99	10	174.6
7	35 35.7	99	12	173.0	34 36.3	99	12	173.2	33 07.2	99	12	173.5	31 38.0	99	11	173.7
8	35 28.3	99	14	172.1	34 29.1	99	14	172.3	33 00.2	99	13	172.5	31 31.3	99	13	172.8
9	35 19.9	98	16	171.1	34 20.9	98	15	171.3	32 52.4	98	15	171.6	31 23.8	98	14	171.9
10	35 10.6	98	17	170.1	34 11.8	98	17	170.3	32 43.6	98	16	170.7	31 15.3	98	16	171.0
1	35 00.3	98	19	169.1	34 01.8	98	18	169.4	32 33.9	98	18	169.8	31 06.0	98	17	170.2
2	34 49.1	97	20	168.2	33 50.8	97	20	168.5	32 23.4	97	19	168.9	30 55.8	97	18	169.3
3	34 36.9	97	22	167.2	33 39.0	97	21	167.5	32 11.9	97	20	168.0	30 44.8	97	20	168.4
4	34 23.8	96	23	166.3	33 26.2	96	23	166.6	31 59.6	96	22	167.1	30 33.0	96	21	167.6
15	34 09.9	95	25	165.3	33 12.5	96	24	165.7	31 46.5	96	23	166.2	30 20.3	96	23	166.7
6	33 55.0	95	26	164.4	32 58.0	95	26	164.8	31 32.4	95	25	165.3	30 06.7	95	24	165.9
7	33 39.2	94	28	163.5	32 42.6	94	27	163.9	31 17.6	95	26	164.5	29 52.4	95	26	165.0
8	33 22.5	94	29	162.6	32 26.3	94	28	163.0	31 01.9	94	28	163.6	29 37.3	94	27	164.2
9	33 05.0	93	31	161.7	32 09.2	93	30	162.1	30 45.4	93	29	162.8	29 21.3	93	28	163.4
20	32 46.7	92	32	160.8	31 51.3	92	31	161.2	30 28.1	93	30	161.9	29 04.6	93	29	162.6
1	32 27.5	91	33	159.9	31 32.5	92	33	160.4	30 09.9	92	32	161.1	28 47.1	92	30	161.7
2	32 07.5	91	35	159.0	31 13.0	91	34	159.5	29 51.0	91	33	160.2	28 28.9	91	32	160.9
3	31 46.6	90	36	158.2	30 52.6	90	35	158.7	29 31.4	90	34	159.4	28 09.9	91	33	160.2
4	31 25.0	89	37	157.3	30 31.5	89	36	157.8	29 10.9	90	35	158.6	27 50.1	90	34	159.4
25	31 02.6	88	39	156.5	30 09.6	89	38	157.0	28 49.8	89	36	157.8	27 29.7	89	35	158.6
6	30 39.5	87	40	155.7	29 46.9	88	39	156.2	28 27.8	88	38	157.0	27 08.5	88	36	157.8
7	30 15.6	87	41	154.8	29 23.6	87	40	155.4	28 05.2	87	39	156.3	26 46.6	88	38	157.1
8	29 51.0	86	42	154.0	28 59.4	86	41	154.6	27 41.9	86	40	155.5	26 24.0	87	39	156.3
9	29 25.6	85	43	153.2	28 34.6	85	42	153.8	27 17.9	85	41	154.7	26 00.8	86	40	155.6
30	28 59.6	84	45	152.5	28 09.1	84	44	153.1	26 53.2	85	42	154.0	25 36.9	85	41	154.9
1	28 32.8	83	46	151.7	27 43.0	83	45	152.3	26 27.8	84	43	153.2	25 12.3	84	42	154.1
2	28 05.4	82	47	150.9	27 16.1	82	46	151.6	26 01.8	83	44	152.5	24 47.1	83	43	153.4
3	27 37.4	81	48	150.2	26 48.6	81	47	150.8	25 35.1	82	45	151.8	24 21.3	82	44	152.7
4	27 08.7	80	49	149.4	26 20.5	80	48	150.1	25 07.9	81	46	151.1	23 54.8	81	45	152.1
35	26 39.4	79	50	148.7	25 51.8	80	49	149.4	24 40.0	80	47	150.4	23 27.8	80	46	151.4
6	26 09.4	78	51	148.0	25 22.4	79	50	148.7	24 11.5	79	48	149.7	23 00.2	79	47	150.7
7	25 38.9	77	52	147.3	24 52.5	78	51	148.0	23 42.4	78	49	149.0	22 32.0	78	48	150.1
8	25 07.8	76	53	146.6	24 21.9	77	52	147.3	23 12.8	77	50	148.4	22 03.2	78	49	149.4
9	24 36.1	75	54	145.9	23 50.9	76	53	146.7	22 42.6	76	51	147.7	21 33.9	77	50	148.8
40	24 03.9	74	55	145.3	23 19.2	75	54	146.0	22 11.9	75	52	147.1	21 04.1	76	51	148.2
1	23 31.1	73	56	144.6	22 47.1	74	54	145.4	21 40.6	74	53	146.5	20 33.7	75	51	147.5
2	22 57.9	72	56	144.0	22 14.4	73	55	144.7	21 08.8	73	54	145.8	20 02.8	74	52	146.9
3	22 24.0	71	57	143.4	21 41.2	72	56	144.1	20 36.5	72	55	145.2	19 31.4	73	53	146.3
4	21 49.7	70	58	142.7	21 07.5	71	57	143.5	20 03.7	71	55	144.6	18 59.5	72	54	145.8
45	21 15.0	69	59	142.1	20 33.3	70	58	142.9	19 30.5	70	56	144.0	18 27.2	71	55	145.2
6	20 39.7	68	60	141.5	19 58.7	69	59	142.3	18 56.7	69	57	143.5	17 54.4	70	55	144.6
7	20 04.0	67	60	141.0	19 23.6	68	59	141.7	18 22.5	68	58	142.9	17 21.1	68	56	144.1
8	19 27.8	66	61	140.4	18 48.0	67	60	141.2	17 47.9	67	58	142.4	16 47.4	67	57	143.5
9	18 51.2	65	62	139.8	18 12.0	66	61	140.6	17 12.8	66	59	141.8	16 13.3	66	58	143.0
50	18 14.2	64	62	139.3	17 35.6	64	61	140.1	16 37.3	65	60	141.3	15 38.7	65	58	142.5
1	17 36.7	63	63	138.7	16 58.8	63	62	139.5	16 01.4	64	60	140.7	15 03.7	64	59	141.9
2	16 58.9	62	64	138.2	16 21.5	62	63	139.0	15 25.1	63	61	140.2	14 28.3	63	60	141.4
3	16 20.7	61	64	137.7	15 43.9	61	63	138.5	14 48.4	62	62	139.7	13 52.6	62	60	140.9
4	15 42.1	60	65	137.2	15 05.9	60	64	138.0	14 11.3	61	62	139.2	13 16.4	61	61	140.4
55	15 03.1	59	66	136.7	14 27.5	59	65	137.5	13 33.9	60	63	138.7	12 39.9	60	61	140.0
6	14 23.7	58	66	136.2	13 48.8	58	65	137.0	12 56.1	59	64	138.3	12 03.0	59	62	139.5
7	13 44.1	57	67	135.7	13 09.7	57	66	136.5	12 17.9	58	64	137.8	11 25.8	58	63	139.0
8	13 04.0	56	67	135.2	12 30.3	56	66	136.1	11 39.4	57	65	137.3	10 48.2	57	63	138.6
9	12 23.7	55	68	134.8	11 50.6	55	67	135.6	11 00.6	56	65	136.9	10 10.3	56	64	138.2
60	11 43.0	54	68	134.3	11 10.5	54	67	135.2	10 21.4	55	66	136.4	9 32.1	55	64	137.7
1	11 02.0	53	69	133.9	10 30.1	53	68	134.7	9 42.0	54	66	136.0	8 53.5	54	65	137.3
2	10 20.7	52	69	133.4	9 49.4	52	68	134.3	9 02.2	53	67	135.6	8 14.7	53	65	136.9
3	9 39.2	51	70	133.0	9 08.4	51	69	133.9	8 22.1	52	67	135.2	7 35.5	52	66	136.5
4	8 57.3	50	70	132.6	8 27.2	50	69	133.5	7 41.8	51	68	134.8	6 56.1	51	66	136.1
65	8 15.1	49	71	132.2	7 45.6	49	70	133.1	7 01.1	50	68	134.4	6 16.4	50	67	135.7
6	7 32.7	48	71	131.8	7 03.8	48	70	132.7	6 20.2	49	69	134.0	5 36.4	49	67	135.3
7	6 50.1	47	72	131.4	6 21.7	47	71	132.3	5 39.0	48	69	133.6				
8	6 07.1	46	72	131.0	5 39.4	46	71	131.9								
9	5 24.0	45	72	130.7												

42° 00′				42° 30′				43° 00′				45° 00′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
30 00.0	1.0	01	180.0	29 30.0	1.0	01	180.0	29 00.0	1.0	01	180.0	27 00.0	1.0	01	180.0	00
29 59.6	1.0	02	179.1	29 29.6	1.0	02	179.2	28 59.6	1.0	02	179.2	26 59.6	1.0	02	179.2	1
29 58.3	1.0	04	178.3	29 28.3	1.0	04	178.3	28 58.3	1.0	03	178.3	26 58.4	1.0	03	178.4	2
29 56.2	1.0	05	177.4	29 26.2	1.0	05	177.5	28 56.3	1.0	05	177.5	26 56.4	1.0	05	177.6	3
29 53.2	1.0	06	176.6	29 23.3	1.0	06	176.6	28 53.3	1.0	06	176.7	26 53.7	1.0	06	176.8	4
29 49.3	1.0	08	175.7	29 19.5	1.0	08	175.8	28 49.6	1.0	08	175.8	26 50.1	1.0	07	176.0	05
29 44.6	99	09	174.9	29 14.8	99	09	174.9	28 45.0	99	09	175.0	26 45.8	99	09	175.3	6
29 39.1	99	11	174.0	29 09.4	99	10	174.1	28 39.7	99	10	174.2	26 40.7	99	10	174.5	7
29 32.8	99	12	173.2	29 03.1	99	12	173.3	28 33.4	99	12	173.3	26 34.8	99	11	173.7	8
29 25.6	99	13	172.3	28 56.0	99	13	172.4	28 26.4	99	13	172.5	26 28.1	99	12	172.9	9
29 17.5	98	15	171.5	28 48.1	98	15	171.6	28 18.6	98	14	171.7	26 20.7	98	14	172.1	10
29 08.7	98	16	170.7	28 39.3	98	16	170.8	28 10.0	98	16	170.9	26 12.5	98	15	171.4	1
28 50.0	97	17	169.8	28 29.8	97	17	170.0	28 00.5	97	17	170.1	26 03.5	98	16	170.6	2
28 48.5	97	19	169.0	28 19.4	97	19	169.1	27 59.3	97	18	169.3	25 53.8	97	17	169.8	3
28 37.2	97	20	168.2	28 08.3	97	20	168.3	27 39.3	97	20	168.5	25 43.4	97	19	169.1	4
28 25.1	96	21	167.4	27 56.3	96	21	167.5	27 27.5	96	21	167.7	25 32.2	96	20	168.3	15
28 12.3	95	23	166.6	27 43.6	96	22	166.7	27 15.0	96	22	166.9	25 20.2	96	21	167.5	6
27 58.6	95	24	165.8	27 30.1	95	24	165.9	27 01.6	95	23	166.1	25 07.5	95	22	166.8	7
27 44.2	94	25	165.0	27 15.9	94	25	165.1	26 47.6	94	25	165.3	24 54.2	95	24	166.1	8
27 29.0	94	27	164.2	27 00.9	94	26	164.4	26 32.8	94	26	164.6	24 40.1	94	25	165.3	9
27 13.1	93	28	163.4	26 45.1	93	27	163.6	26 17.2	93	27	163.8	24 25.2	93	26	164.6	20
26 56.4	92	29	162.6	26 28.7	92	29	162.8	26 00.9	93	28	163.0	24 09.7	93	27	163.9	1
26 39.0	92	30	161.9	26 11.5	92	30	162.1	25 43.9	92	30	162.3	23 53.6	92	28	163.2	2
26 20.9	91	31	161.1	25 53.5	91	31	161.3	25 26.2	91	31	161.6	23 36.7	91	29	162.5	3
26 02.0	90	33	160.3	25 34.9	90	32	160.6	25 07.8	90	32	160.8	23 19.1	91	30	161.7	4
25 42.5	89	34	159.6	25 15.6	90	33	159.8	24 48.7	90	33	160.1	23 00.9	90	31	161.1	25
25 22.2	89	35	158.9	24 55.6	89	34	159.1	24 28.9	89	34	159.4	22 42.1	89	32	160.4	6
25 01.3	88	36	158.1	24 34.9	88	36	158.4	24 08.5	88	35	158.7	22 22.6	88	34	159.7	7
24 39.7	87	37	157.4	24 13.6	87	37	157.7	23 47.4	87	36	158.0	22 02.5	88	35	159.0	8
24 17.5	86	38	156.7	23 51.6	86	38	157.0	23 25.7	86	37	157.3	21 41.7	87	36	158.3	9
23 54.6	85	39	156.0	23 29.0	86	39	156.3	23 03.3	86	38	156.6	21 20.4	86	37	157.7	30
23 31.1	85	40	155.3	23 05.8	85	40	155.6	22 40.3	85	39	155.9	20 58.4	85	38	157.0	1
23 07.0	84	41	154.6	22 41.9	84	41	154.9	22 16.7	84	40	155.2	20 35.9	84	39	156.4	2
22 42.3	83	42	154.0	22 17.4	83	42	154.3	21 52.5	83	41	154.6	20 12.7	83	40	155.8	3
22 16.9	82	43	153.3	21 52.4	82	43	153.6	21 27.8	82	42	153.9	19 49.0	82	40	155.1	4
21 51.0	81	44	152.7	21 26.7	81	44	153.0	21 02.4	81	43	153.3	19 24.8	82	41	154.5	35
21 24.5	80	45	152.0	21 00.5	80	45	152.3	20 36.5	80	44	152.7	19 00.0	81	42	153.9	6
20 57.5	79	46	151.4	20 33.7	79	46	151.7	20 10.0	79	45	152.0	18 34.6	80	43	153.3	7
20 29.9	78	47	150.8	20 06.4	78	46	151.1	19 43.0	78	46	151.4	18 08.7	79	44	152.7	8
20 01.7	77	48	150.1	19 38.6	77	47	150.5	19 15.4	77	47	150.8	17 42.3	78	45	152.2	9
19 33.1	76	49	149.5	19 10.2	76	48	149.9	18 47.3	76	48	150.2	17 15.4	77	46	151.6	40
19 03.9	75	49	148.9	18 41.3	75	49	149.3	18 18.7	75	48	149.6	16 48.0	76	46	151.0	1
18 34.2	74	50	148.4	18 11.9	74	50	148.7	17 49.6	74	49	149.1	16 20.1	75	47	150.5	2
18 04.0	73	51	147.8	17 42.1	73	51	148.1	17 20.1	73	50	148.5	15 51.7	74	48	149.9	3
17 33.4	72	52	147.2	17 11.7	72	51	147.6	16 50.0	72	51	147.9	15 22.9	73	49	149.4	4
17 02.2	71	53	146.7	16 40.9	71	52	147.0	16 19.5	71	52	147.4	14 53.6	72	50	148.8	45
16 30.6	70	53	146.1	16 09.6	70	53	146.5	15 48.5	70	52	146.9	14 23.9	71	50	148.3	6
15 58.6	69	54	145.6	15 37.9	69	54	146.0	15 17.1	69	53	146.3	13 53.7	70	51	147.8	7
15 26.1	68	55	145.0	15 05.7	68	54	145.4	14 45.2	68	54	145.8	13 23.1	69	52	147.3	8
14 53.2	67	56	144.5	14 33.1	67	55	144.9	14 13.0	67	54	145.3	12 52.0	68	52	146.8	9
14 19.9	66	56	144.0	14 00.1	66	56	144.4	13 40.3	66	55	144.8	12 20.6	67	53	146.3	50
13 46.2	65	57	143.5	13 26.7	65	56	143.9	13 07.2	65	56	144.3	11 48.7	66	54	145.8	1
13 12.0	64	58	143.0	12 52.9	64	57	143.4	12 33.7	64	56	143.8	11 16.5	64	54	145.4	2
12 37.5	63	58	142.5	12 18.7	63	58	142.9	11 59.8	63	57	143.3	10 43.9	63	55	144.9	3
12 02.6	62	59	142.1	11 44.1	62	58	142.5	11 25.5	62	58	142.9	10 10.9	62	56	144.5	4
11 27.4	61	59	141.6	11 09.1	61	59	142.0	10 50.9	61	58	142.4	9 37.6	61	56	144.0	55
10 51.7	60	60	141.1	10 33.8	60	59	141.6	10 15.9	60	59	142.0	9 03.9	60	57	143.6	6
10 15.8	59	61	140.7	9 58.2	59	60	141.1	9 40.6	59	59	141.5	8 29.8	59	57	143.2	7
9 39.5	58	61	140.3	9 22.2	58	61	140.7	9 04.9	58	60	141.1	7 55.4	58	58	142.7	8
9 02.8	56	62	139.8	8 45.9	57	61	140.3	8 28.9	57	61	140.7	7 20.7	57	58	142.3	9
8 25.8	55	62	139.4	8 09.2	55	62	139.8	7 52.6	56	61	140.3	6 45.7	56	59	141.9	60
7 48.6	54	63	139.0	7 32.3	54	62	139.4	7 15.9	54	62	139.8	6 10.4	55	59	141.5	1
7 11.0	53	63	138.6	6 55.0	53	63	139.0	6 39.0	53	62	139.4	5 34.7	54	60	141.1	2
6 33.1	52	64	138.2	6 17.4	52	63	138.6	6 01.7	52	63	139.1					3
5 54.9	51	64	137.8	5 39.6	51	64	138.2	5 24.2	51	63	138.7					4
5 16.5	50	65	137.4	5 01.4	50	64	137.9									65
																6
																7
																8
																9

DECLINATION SAME NAME AS LATITUDE

H.A.	36° 00′				37° 00′				38° 30′				40° 00′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
91	9 41.0	26	78	55.1	9 56.7	26	77	54.2	10 20.0	26	76	52.7	10 42.9	25	74	51.2
2	8 54.3	27	78	54.9	9 10.5	27	77	53.9	9 34.7	27	75	52.5	9 58.5	26	74	51.0
3	8 07.6	28	78	54.7	8 24.5	28	77	53.7	8 49.5	28	75	52.3	9 14.2	27	74	50.8
4	7 21.1	29	77	54.5	7 38.5	29	76	53.5	8 04.4	29	75	52.0	8 30.0	28	73	50.6
95	6 34.8	30	77	54.2	6 52.7	30	76	53.3	7 19.5	30	75	51.8	7 46.0	29	73	50.4
6	5 48.5	31	77	54.0	6 07.1	31	76	53.0	6 34.7	31	74	51.6	7 02.1	30	73	50.1
7	5 02.5	32	77	53.7	5 21.6	32	76	52.8	5 50.1	32	74	51.3	6 18.4	31	73	49.9
8									5 05.6	33	74	51.1	5 34.8	32	72	49.7
9																
100																
1																

42° 00′				42° 30′				43° 00′				45° 00′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
11 12.7	25	72	49.2	11 20.1	24	71	48.7	11 27.3	24	71	48.3	11 56.0	24	69	46.3	91
10 29.5	26	72	49.1	10 37.2	25	71	48.6	10 44.8	25	71	48.1	11 14.8	25	68	46.1	2
9 46.5	27	72	48.9	9 54.5	27	71	48.4	10 02.4	26	70	47.9	10 33.8	26	68	45.9	3
9 03.6	28	71	48.7	9 11.9	28	71	48.2	9 20.2	27	70	47.7	9 52.8	27	68	45.7	4
8 20.8	29	71	48.4	8 29.5	29	70	48.0	8 38.1	29	70	47.5	9 12.1	28	68	45.5	95
7 38.2	30	71	48.2	7 47.2	30	70	47.7	7 56.1	30	70	47.3	8 31.4	29	68	45.3	6
6 55.7	31	71	48.0	7 05.0	31	70	47.5	7 14.2	31	69	47.0	7 50.9	30	67	45.1	7
6 13.4	32	70	47.8	6 23.0	32	70	47.3	6 32.6	32	69	46.8	7 10.5	31	67	44.9	8
5 31.3	33	70	47.5	5 41.2	33	69	47.0	5 51.1	33	69	46.6	6 30.4	33	67	44.7	9
								5 09.7	34	69	46.3	5 50.3	34	66	44.4	100
												5 10.5	35	66	44.2	1

Lat. 18°

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	62 00.0	1.0 01	00.0	61 00.0	1.0 01	00.0	59 30.0	1.0 01	00.0	58 30.0	1.0 01	00.0	57 30.0	1.0 01	00.0	56 30.0	1.0 01	00.0	55 30.0	1.0 01	00.0	54 00.0	1.0 01	00.0	00
1	61 59.3	1.0 04	01.5	60 59.3	1.0 04	01.4	59 29.4	1.0 03	01.3	58 29.4	1.0 03	01.2	57 29.4	1.0 03	01.2	56 29.4	1.0 03	01.1	55 29.5	1.0 03	01.1	53 59.5	1.0 02	01.0	1
2	61 57.1	1.0 06	03.0	60 57.2	1.0 06	02.8	59 27.4	1.0 05	02.6	58 27.5	1.0 05	02.5	57 27.6	1.0 05	02.4	56 27.8	1.0 05	02.3	55 27.9	1.0 04	02.1	53 58.0	1.0 04	02.0	2
3	61 53.4	99 09	04.4	60 53.7	99 08	04.2	59 24.2	1.0 08	03.9	58 24.4	1.0 07	03.7	57 24.7	1.0 07	03.5	56 25.0	1.0 07	03.4	55 25.2	1.0 06	03.2	53 55.5	1.0 06	03.0	3
4	61 48.3	99 11	05.9	60 48.8	99 10	05.6	59 19.6	99 10	05.2	58 20.1	99 09	05.0	57 20.6	99 09	04.7	56 21.0	99 08	04.5	55 21.5	99 08	04.3	53 52.0	99 07	04.0	4
05	61 41.7	98 13	07.3	60 42.6	99 13	07.0	59 13.8	99 12	06.5	58 14.6	99 11	06.2	57 15.3	99 11	05.9	56 16.0	99 10	05.6	55 16.7	99 10	05.3	53 47.6	99 09	05.0	05
6	61 33.7	98 16	08.8	60 35.0	98 15	08.3	59 06.8	98 14	07.8	58 07.9	98 13	07.4	57 08.9	98 13	07.0	56 09.9	98 12	06.7	55 10.8	98 11	06.4	53 42.2	99 11	06.0	6
7	61 24.3	97 18	10.2	60 26.0	97 17	09.7	58 58.4	97 16	09.0	57 59.9	98 15	08.6	57 01.3	98 14	08.2	56 02.7	98 14	07.8	55 04.0	98 13	07.4	53 35.7	98 12	06.9	7
8	61 13.5	96 20	11.6	60 15.8	96 19	11.0	58 48.9	97 18	10.3	57 50.8	97 17	09.8	56 52.7	97 16	09.3	55 54.4	97 16	08.9	54 56.0	97 15	08.5	53 28.4	97 14	07.9	8
9	61 01.4	95 22	13.0	60 04.2	95 21	12.3	58 38.1	96 20	11.5	57 40.5	96 19	11.0	56 42.9	96 18	10.4	55 45.0	96 17	10.0	54 47.1	97 17	09.5	53 20.1	97 15	08.9	9
10	60 47.9	94 25	14.3	59 51.4	94 23	13.6	58 26.2	95 22	12.7	57 29.1	95 21	12.1	56 32.0	95 20	11.6	55 34.6	96 19	11.0	54 37.2	96 18	10.5	53 10.8	96 17	09.8	10
1	60 33.2	93 27	15.6	59 37.3	93 25	14.9	58 13.0	94 24	13.9	57 16.6	94 23	13.3	56 20.0	94 22	12.6	55 23.2	95 21	12.1	54 26.3	95 20	11.5	53 00.6	95 18	10.7	1
2	60 17.2	92 29	16.9	59 22.0	92 27	16.2	57 58.8	93 26	15.1	57 03.0	93 24	14.4	56 07.0	93 23	13.7	55 10.8	94 22	13.1	54 14.4	94 21	12.5	52 49.5	94 20	11.7	2
3	59 59.9	90 31	18.2	59 05.5	91 29	17.4	57 43.4	92 27	16.2	56 48.3	92 26	15.5	55 52.9	92 25	14.8	54 57.4	93 24	14.1	54 01.6	93 23	13.5	52 37.6	94 21	12.6	3
4	59 41.5	89 33	19.5	58 47.9	90 31	18.6	57 26.9	90 29	17.3	56 32.5	91 28	16.6	55 37.9	91 27	15.8	54 43.0	92 26	15.1	53 47.8	92 24	14.4	52 24.7	93 23	13.5	4
15	59 21.9	88 34	20.7	58 29.2	88 33	19.7	57 09.4	89 31	18.4	56 15.8	90 30	17.6	55 21.8	90 28	16.8	54 27.6	91 27	16.1	53 33.1	91 26	15.4	52 11.0	92 24	14.4	15
6	59 01.3	86 36	21.8	58 09.4	87 35	20.9	56 50.8	88 33	19.5	55 58.0	88 31	18.7	55 04.8	89 30	17.8	54 11.3	89 29	17.1	53 17.6	90 27	16.3	51 56.4	91 26	15.2	6
7	58 39.5	85 38	23.0	57 48.5	85 36	22.0	56 31.3	86 34	20.6	55 39.3	87 33	19.7	54 46.9	88 31	18.8	53 54.2	88 30	18.0	53 01.1	89 29	17.2	51 41.0	89 27	16.1	7
8	58 16.7	83 40	24.1	57 26.7	84 38	23.1	56 10.8	85 36	21.6	55 19.6	86 34	20.7	54 28.0	86 33	19.8	53 36.1	87 32	18.9	52 43.8	87 30	18.1	51 24.8	88 28	16.9	8
9	57 52.9	81 41	25.2	57 03.9	82 40	24.1	55 49.3	83 37	22.6	54 59.0	84 36	21.6	54 08.3	85 34	20.7	53 17.2	86 33	19.8	52 25.7	86 32	19.0	51 07.7	87 30	17.8	9
20	57 28.2	80 43	26.2	56 40.1	81 41	25.1	55 27.0	82 39	23.6	54 37.6	83 37	22.6	53 47.7	83 36	21.6	52 57.4	84 34	20.7	52 06.7	85 33	19.8	50 50.0	86 31	18.6	20
1	57 02.5	78 44	27.2	56 15.4	79 43	26.1	55 03.7	80 40	24.5	54 15.2	81 39	23.5	53 26.3	82 37	22.5	52 36.8	83 36	21.6	51 47.0	83 34	20.6	50 31.4	84 32	19.3	1
2	56 36.0	76 46	28.2	55 49.9	77 44	27.1	54 39.6	79 42	25.4	53 52.1	80 40	24.4	53 04.0	81 38	23.4	52 15.5	81 37	22.4	51 26.5	82 35	21.5	50 12.2	83 33	20.1	2
3	56 08.6	75 47	29.2	55 23.5	76 45	28.0	54 14.8	77 43	26.3	53 28.2	78 41	25.2	52 41.0	79 40	24.2	51 53.4	80 38	23.2	51 05.2	81 37	22.3	49 52.2	82 34	20.9	3
4	55 40.4	73 48	30.1	54 56.4	74 47	28.9	53 49.1	76 44	27.2	53 03.5	77 42	26.1	52 17.3	77 41	25.0	51 30.5	78 39	24.0	50 43.3	79 38	23.0	49 31.5	80 36	21.6	4
25	55 11.4	71 50	30.9	54 28.4	72 48	29.7	53 22.7	74 45	28.0	52 38.0	75 44	26.9	51 52.8	76 42	25.8	51 06.9	77 40	24.8	50 20.6	78 39	23.8	49 10.1	79 37	22.3	25
6	54 41.7	69 51	31.8	53 59.8	70 49	30.6	52 55.5	72 46	28.8	52 11.9	73 45	27.7	51 27.6	74 43	26.6	50 42.7	75 42	25.5	49 57.3	76 40	24.5	48 48.1	77 38	23.0	6
7	54 11.3	67 52	32.6	53 30.4	69 50	31.4	52 27.7	71 48	29.6	51 45.0	72 46	28.4	51 01.7	73 44	27.3	50 17.8	74 43	26.3	49 33.3	75 41	25.2	48 25.5	76 39	23.7	7
8	53 40.2	66 53	33.4	53 00.4	67 51	32.1	51 59.2	69 49	30.3	51 17.5	70 47	29.2	50 35.2	71 45	28.1	49 52.2	72 44	27.0	49 08.6	73 42	25.9	48 02.3	74 40	24.4	8
9	53 08.5	64 54	34.2	52 29.7	65 52	32.9	51 30.0	67 50	31.1	50 49.4	68 48	29.9	50 08.0	69 46	28.8	49 26.0	71 45	27.7	48 43.4	72 43	26.6	47 38.4	73 41	25.0	9
30	52 36.1	62 55	34.9	51 58.4	64 53	33.6	51 00.3	65 51	31.8	50 20.6	67 49	30.6	49 40.3	68 47	29.4	48 59.3	69 46	28.3	48 17.6	70 44	27.2	47 14.0	71 42	25.6	30
1	52 03.2	60 56	35.6	51 26.5	62 54	34.3	50 30.0	64 52	32.4	49 51.3	65 50	31.3	49 11.9	66 48	30.1	48 31.9	67 46	29.0	47 51.2	68 45	27.9	46 49.0	70 42	26.3	1
2	51 29.7	59 57	36.2	50 54.1	60 55	35.0	49 59.1	62 52	33.1	49 21.4	63 51	31.9	48 43.1	65 49	30.7	48 04.0	66 47	29.6	47 24.3	67 46	28.5	46 23.5	68 43	26.8	2
3	50 55.7	57 58	36.9	50 21.1	58 56	35.6	49 27.6	60 53	33.7	48 51.0	62 52	32.5	48 13.6	63 50	31.3	47 35.6	64 48	30.2	46 56.8	65 47	29.1	45 57.5	67 44	27.4	3
4	50 21.2	55 58	37.5	49 47.6	57 57	36.2	48 55.7	59 54	34.3	48 20.1	60 52	33.1	47 43.7	61 51	31.9	47 06.6	62 49	30.8	46 28.9	64 47	29.6	45 31.0	65 45	28.0	4
35	49 46.3	54 59	38.1	49 13.7	55 57	36.8	48 23.3	57 55	34.9	47 48.7	58 53	33.7	47 13.3	60 51	32.5	46 37.2	61 50	31.3	46 00.4	62 48	30.2	45 04.0	64 46	28.5	35
6	49 10.8	52 60	38.7	48 39.3	53 58	37.4	47 50.4	55 56	35.5	47 16.8	57 54	34.2	46 42.4	58 52	33.0	46 07.3	59 51	31.9	45 31.5	60 49	30.7	44 36.5	62 46	29.0	6
7	48 35.0	50 60	39.2	48 04.5	52 59	37.9	47 17.1	54 56	36.0	46 44.5	55 55	34.8	46 11.1	56 53	33.6	45 37.0	57 51	32.4	45 02.1	59 50	31.2	44 08.6	60 47	29.5	7
8	47 58.7	48 61	39.7	47 29.2	50 59	38.4	46 43.3	52 57	36.5	46 11.7	53 55	35.3	45 39.3	55 54	34.1	45 06.2	56 52	32.9	44 32.3	57 50	31.7	43 40.2	59 48	30.0	8
9	47 22.1	47 62	40.2	46 53.5	48 60	38.9	46 09.2	50 58	37.0	45 38.6	52 56	35.8	45 07.2	53 54	34.6	44 35.0	54 53	33.4	44 02.1	55 51	32.2	43 11.5	57 49	30.5	9
40	46 45.1	45 62	40.7	46 17.5	47 61	39.4	45 34.6	49 58	37.5	45 05.0	50 57	36.2	44 34.6	51 55	35.0	44 03.4	53 53	33.8	43 31.5	54 52	32.7	42 42.3	55 49	30.9	40
1	46 07.7	44 63	41.1	45 41.1	45 61	39.8	44 59.7	47 59	37.9	44 31.1	48 57	36.7	44 01.7	50 56	35.5	43 31.5	51 54	34.3	43 00.5	52 52	33.1	42 12.8	54 50	31.4	1
2	45 30.0	42 63	41.5	45 04.4	43 62	40.3	44 24.5	45 59	38.4	43 56.8	47 58	37.1	43 28.4	48 56	35.9	42 59.1	49 54	34.7	42 29.2	51 53	33.5	41 42.9	52 50	31.8	2
3	44 52.0	40 64	41.9	44 27.4	42 62	40.7	43 48.9	44 60	38.8	43 22.2	45 58	37.5	42 54.7	46 57	36.3	42 26.5	48 55	35.1	41 57.5	49 53	33.9	41 12.7	51 51	32.2	3
4	44 13.7	39 64	42.3	43 50.1	40 63	41.1	43 13.0	42 60	39.2	42 47.3	44 59	37.9	42 20.8	45 57	36.7	41 53.5	46 56	35.5	41 25.5	47 54	34.3	40 42.1	49 52	32.6	4
45	43 35.2	37 65	42.7	43 12.5	39 63	41.4	42 36.8	41 61	39.5	42 12.0	42 59	38.3	41 46.5	43 58	37.1	41 20.2	44 56	35.9	40 53.1	46 54	34.7	40 11.2	47 52	33.0	45
6	42 56.3	36 65	43.0	42 34.6	37 64	41.8	42 00.3	39 61	39.9	41 36.5	40 60	38.7	41 11.9	42 58	37.5	40 46.6	43 56	36.3	40 20.5	44 55	35.1	39 40.0	46 52	33.3	6
7	42 17.3	34 66	43.4	41 56.4	35 64	42.1	41 23.6	37 62	40.2	41 00.7	39 60	39.0	40 37.1	40 58	37.8	40 12.7	41 57	36.6	39 47.6	42 55	35.4	39 08.5	44 53	33.7	7
8	41 38.0	33 66	43.7	41 18.0	34 64	42.4	40 46.6	36 62	40.6	40 24.7	37 60	39.3	40 02.0	38 59	38.1	39 38.6	40 57	36.9	39 14.4	41 56	35.7	38 36.8	43 53	34.0	8
9	40 58.5	31 66	44.0	40 39.4	32 65	42.7	40 09.4	34 62	40.9	39 48.4	36 61	39.6	39 26.6	37 59	38.4	39 04.1	38 58	37.2	38 40.9	39 56	36.1	38 04.7	41 54	34.3	9
50	40 18.7	30 67	44.3	40 00.6	31 65	43.0	39 32.0	33 63	41.2	39 11.9	34 61	39.9	38 51.1	35 60	38.7	38 29.5	37 58	37.5	38 07.2	38 57	36.4	37 32.5	39 54	34.6	50
1	39 38.8	28 67	44.5	39 21.6	29 65	43.3	38 54.3	31 63	41.4	38 35.1	33 62	40.2	38 15.2	34 60	39.0	37 54.6	35 58	37.8	37 33.3	36 57	36.6	36 59.9	38 55	34.9	1
2	38 58.7	27 67	44.8	38 42.4	28 66	43.5	38 16.4	30 63	41.7	37 58.2	31 62	40.5	37 39.2	32 60	39.3	37 19.5	33 59	38.1	36 59.1	35 57	36.9	36 27.2	36 55	35.2	2
3	38 18.5	25 67	45.0	38 03.0	26 66	43.8	37 38.4	28 64	41.9	37 21.1	30 62	40.7	37 03.0	31 61	39.5	36 44.2	32 59	38.3	36 24.7	33 58	37.2	35 54.2	35 55	35.4	3
4	37 38.0	24 68	45.2	37 23.5	25 66	44.0	37 00.2	27 64	42.2	36 43.7	28 62	41.0	36 26.6	29 61	39.8	36 08.7	30 59	38.6	35 50.2	32 58	37.4	35 21.1	33 56	35.7	4
55	36 57.5	22 68	45.4	36 43.8	23 66	44.2	36 21.8	25 64	42.4	36 06.2	26 63	41.2	35 50.0	28 61	40.0	35 33.0	29 60	38.8	35 15.4	30 58	37.6	34 47.7	32 56	35.9	55
6	36 16.8	21 68	45.6	36 03.9	22 67	44.4	35 43.3	24 64	42.6	35 28.6	25 63	41.4	35 13.2	26 62	40.2	34 57.2	27 60	39.0	34 40.5	28 58	37.9	34 14.1	30 56	36.1	6
7	35 35.9	19 68	45.8	35 23.9	21 67	44.6	35 04.6	22 65	42.8	34 50.8	24 63	41.6	34 36.3	25 62	40.4	34 21.2	26 60	39.2	34 05.4	27 59	38.1	33 40.4	29 56	36.3	7
8	34 55.0	18 68	45.9	34 43.8	19 67	44.7	34 25.8	21 65	42.9	34 12.9	22 63	41.8	33 59.3	23 62	40.6	33 45.0	24 60	39.4	33 30.1	25 59	38.3	33 06.5	27 57	36.5	8
9	34 14.0	17 69	46.1	34 03.6	18 67	44.9	33 46.8	20 65	43.1	33 34.8	21 64	41.9	33 22.1	22 62	40.8	33 08.7	23 61	39.6	32 54.7	24 59	38.4	32 32.5	25 57	36.7	9
60	33 32.8	15 69	46.2	33 23.3	16 67	45.0	33 07.8	18 65	43.3	32 56.6	19 64	42.1	32 44.8	20 62	40.9	32 32.3	21 61	39.8	32 19.2	22 59	38.6	31 58.3	24 57	36.9	60
1	32 51.6	14 69	46.3	32 42.9	15 68	45.1	32 28.6	17 65	43.4	32 18.3	18 64	42.2	32 07.3	19 63	41.1	31 55.7	20 61	39.9	31 43.5	21 60	38.8	31 24.0	22 57	37.0	1
2	32 10.3	13 69	46.4	32 02.4	14 68	45.3	31 49.4	15 66	43.5	31 39.9	16 64	42.4	31 29.8	17 63	41.2	31 19.1	18 61	40.0	31 07.7	19 60	38.9	30 49.6	21 58	37.2	2
3	31 28.9	11 69	46.5	31 21.8	12 68	45.4	31 10.0	14 66	43.6	31 01.4	15 64	42.5	30 52.2	16 63	41.3	30 42.3	17 61	40.2	30 31.9	18 60	39.0	30 15.1	19 58	37.3	3
4	30 47.4	10 69	46.6	30 41.2	11 68	45.5	30 30.6	12 66	43.7	30 22.8	13 64	42.6	30 14.5	14 63	41.4	30 05.5	15 62	40.3	29 55.9	16 60	39.1	29 40.4	18 58	37.4	4
65	30 05.9	09 69	46.7	30 00.5	10 68	45.5	29 51.2	11 66	43.8	29 44.2	12 65	42.7	29 36.7	13 63	41.5	29 28.5	14 62	40.4	29 19.8	15 60	39.3	29 05.7	16 58	37.6	65
6	29 24.4	07 69	46.8	29 19.7	08 68	45.6	29 11.6	10 66	43.9	29 05.5	11 65	42.8	28 58.8	12 63	41.6	28 51.5	13 62	40.5	28 43.7	14 60	39.4	28 30.8	15 58	37.7	6
7	28 42.8	06 69	46.8	28 38.9	07 68	45.7	28 32.0	08 66	44.0	28 26.7	09 65	42.8	28 20.8	10 63	41.7	28 14.4	11 62	40.6	28 07.4	12 60	39.4	27 55.9	13 58	37.8	7
8	28 01.2	05 69	46.9	27 58.1	06 68	45.7	27 52.4	07 66	44.0	27 47.9	08 65	42.9	27 42.9	09 63	41.8	27 37.3	10 62	40.6	27 31.1	11 61	39.5	27 20.9	12 58	37.8	8
9	27 19.5	03 69	46.9	27 17.2	04 68	45.8	27 12.7	06 66	44.1	27 09.0	07 65	43.0	27 04.8	07 63	41.8	27 00.1	08 62	40.7	26 54.8	09 61	39.6	26 45.9	11 58	37.9	9
70	26 37.9	02 69	46.9	26 36.3	03 68	45.8	26 33.0	04 66	44.1	26 30.1	05 65	43.0	26 26.7	06 64	41.9	26 22.8	07 62	40.8	26 18.4	08 61	39.7	26 10.8	09 59	38.0	70
1	25 56.2	01 69	46.9	25 55.4	02 68	45.8	25 53.3	03 66	44.1	25 51.2	04 65	43.0	25 48.6	05 64	41.9	25 45.6	06 62	40.8	25 42.0	06 61	39.7	25 35.7	08 59	38.0	1
2	25 14.5	00 69	46.9	25 14.5	00 68	45.8	25 13.5	02 66	44.2	25 12.3	03 65	43.1	25 10.5	03 64	41.9	25 08.2	04 62	40.8	25 05.5	05 61	39.7	25 00.5	06 59	38.1	2
3	24 32.8	02 69	46.9	24 33.6	01 68	45.8	24 33.8	00 66	44.2	24 33.3	01 65	43.1	24 32.3	02 64	42.0	24 30.9	03 62	40.9	24 29.0	04 61	39.8	24 25.3	05 59	38.1	3
4	23 51.2	03 69	46.9	23 52.7	02 68	45.8	23 54.0	01 66	44.2	23 54.3	00 65	43.1	23 54.2	01 64	42.0	23 53.6	01 62	40.9	23 52.5	02 61	39.8	23 50.0	03 59	38.1	4
75	23 09.5	04 69	46.9	23 11.8	03 68	45.8	23 14.3	02 66	44.2	23 15.4	01 65	43.1	23 16.0	01 64	42.0	23 16.2	00 62	40.9	23 16.0	01 61	39.8	23 14.8	02 59	38.2	75
6	22 27.9	05 69	46.8	22 30.9	05 68	45.8	22 34.5	04 66	44.1	22 36.4	03 65	43.0	22 37.9	02 64	42.0	22 38.9	01 62	40.9	22 39.5	01 61	39.8	22 39.5	00 59	38.2	6
7	21 46.3	07 69	46.8	21 50.0	06 68	45.7	21 54.8	05 66	44.1	21 57.5	04 65	43.0	21 59.7	03 64	41.9	22 01.5	03 62	40.9	22 02.9	02 61	39.8	22 04.2	01 59	38.2	7
8	21 04.7	08 69	46.7	21 09.2	07 68	45.7	21 15.1	06 66	44.1	21 18.5	05 65	43.0	21 21.6	05 64	41.9	21 24.2	04 62	40.8	21 26.4	03 61	39.8	21 29.0	02 59	38.2	8
9	20 23.2	09 69	46.7	20 28.4	08 68	45.6	20 35.4	07 66	44.0	20 39.6	07 65	42.9	20 43.5	06 63	41.9	20 46.9	05 62	40.8	20 49.9	05 61	39.7	20 53.7	04 59	38.1	9
80	19 41.7	10 69	46.6	19 47.6	10 68	45.5	19 55.8	09 66	44.0	20 00.8	08 65	42.9	20 05.4	07 63	41.8	20 09.6	07 62	40.8	20 13.5	06 61	39.7	20 18.5	05 59	38.1	80
1	19 00.3	11 69	46.5	19 06.9	11 68	45.5	19 16.2	10 66	43.9	19 22.0	09 65	42.8	19 27.3	09 63	41.8	19 32.4	08 62	40.7	19 37.0	07 61	39.7	19 43.3	07 59	38.1	1
2	18 18.9	13 69	46.4	18 26.3	12 68	45.4	18 36.7	11 66	43.8	18 43.2	11 65	42.8	18 49.3	10 63	41.7	18 55.2	09 62	40.7	19 00.6	09 61	39.6	19 08.1	08 59	38.0	2
3	17 37.6	14 69	46.3	17 45.7	13 68	45.3	17 57.2	12 66	43.7	18 04.5	12 64	42.7	18 11.4	11 63	41.6	18 18.0	11 62	40.6	18 24.2	10 61	39.6	18 33.0	09 58	38.0	3
4	16 56.3	15 69	46.2	17 05.1	14 67	45.2	17 17.8	14 66	43.6	17 25.8	13 64	42.6	17 33.5	13 63	41.6	17 40.9	12 62	40.5	17 47.9	11 60	39.5	17 57.9	11 58	37.9	4
85	16 15.1	16 68	46.1	16 24.7	16 67	45.1	16 38.4	15 65	43.5	16 47.2	14 64	42.5	16 55.7	14 63	41.5	17 03.8	13 62	40.4	17 11.7	13 60	39.4	17 22.8	12 58	37.8	85
6	15 34.1	17 68	46.0	15 44.3	17 67	45.0	15 59.2	16 65	43.4	16 08.7	16 64	42.4	16 17.9	15 63	41.4	16 26.9	15 62	40.4	16 35.5	14 60	39.3	16 47.9	13 58	37.8	6
7	14 53.0	19 68	45.9	15 04.0	18 67	44.9	15 20.0	17 65	43.3	15 30.2	17 64	42.3	15 40.2	16 63	41.3	15 49.9	16 61	40.3	15 59.4	15 60	39.2	16 13.0	15 58	37.7	7
8	14 12.1	20 68	45.7	14 23.8	19 67	44.7	14 40.8	19 65	43.2	14 51.9	18 64	42.2	15 02.6	18 63	41.2	15 13.1	17 61	40.1	15 23.3	17 60	39.1	15 38.1	16 58	37.6	8
9	13 31.3	21 68	45.6	13 43.7	20 67	44.6	14 01.8	20 65	43.1	14 13.6	19 64	42.1	14 25.1	19 62	41.0	14 36.4	19 61	40.0	14 47.4	18 60	39.0	15 03.3	17 58	37.5	9
90	12 50.6	22 68	45.4	13 03.7	22 66	44.4	13 22.9	21 65	42.9	13 35.4	21 63	41.9	13 47.7	20 62	40.9	13 59.7	20 61	39.9	14 11.5	19 60	38.9	14 28.7	19 58	37.4	90

Lat. 18°

H.A.	46° 00′				47° 00′				48° 30′				49° 30′				50° 30′				51° 30′				52° 30′				54° 00′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	26 00.0	1.0	01	180.0	25 00.0	1.0	01	180.0	23 30.0	1.0	01	180.0	22 30.0	1.0	01	180.0	21 30.0	1.0	01	180.0	20 30.0	1.0	01	180.0	19 30.0	1.0	01	180.0	18 00.0	1.0	00	180.0	00
1	25 59.6	1.0	02	179.2	24 59.6	1.0	02	179.2	23 29.6	1.0	02	179.3	22 29.7	1.0	02	179.3	21 29.7	1.0	02	179.3	20 29.7	1.0	02	179.3	19 29.7	1.0	02	179.4	17 59.7	1.0	02	179.4	1
2	25 58.5	1.0	03	178.5	24 58.5	1.0	03	178.5	23 28.6	1.0	03	178.6	22 28.6	1.0	03	178.6	21 28.6	1.0	03	178.6	20 28.7	1.0	03	178.7	19 28.7	1.0	03	178.7	17 58.8	1.0	03	178.8	2
3	25 56.5	1.0	04	177.7	24 56.6	1.0	04	177.7	23 26.8	1.0	04	177.8	22 26.9	1.0	04	177.9	21 26.9	1.0	04	178.0	20 27.0	1.0	04	178.0	19 27.1	1.0	04	178.1	17 57.2	1.0	04	178.1	3
4	25 53.8	1.0	06	176.9	24 54.0	1.0	06	177.0	23 24.2	1.0	05	177.1	22 24.4	1.0	05	177.2	21 24.6	1.0	05	177.3	20 24.7	1.0	05	177.3	19 24.9	1.0	05	177.4	17 55.1	1.0	05	177.5	4
05	25 50.4	1.0	07	176.1	24 50.6	1.0	07	176.2	23 21.0	1.0	07	176.4	22 21.3	1.0	06	176.5	21 21.5	1.0	06	176.6	20 21.7	1.0	06	176.7	19 22.0	1.0	06	176.8	17 52.3	1.0	06	176.9	05
6	25 46.2	99	08	175.4	24 46.5	99	08	175.5	23 17.1	99	08	175.7	22 17.4	99	08	175.8	21 17.8	99	07	175.9	20 18.1	99	07	176.0	19 18.4	99	07	176.1	17 48.9	99	07	176.3	6
7	25 41.2	99	10	174.6	24 41.7	99	09	174.8	23 12.4	99	09	175.0	22 12.9	99	09	175.1	21 13.4	99	08	175.2	20 13.8	99	08	175.4	19 14.3	99	08	175.5	17 44.9	99	08	175.7	7
8	25 35.5	99	11	173.8	24 36.1	99	11	174.0	23 07.0	99	10	174.2	22 07.7	99	10	174.4	21 08.3	99	10	174.6	20 08.9	99	09	174.7	19 09.5	99	09	174.9	17 40.4	99	09	175.1	8
9	25 29.0	99	12	173.1	24 29.8	99	12	173.3	23 01.0	99	11	173.5	22 01.8	99	11	173.7	21 02.5	99	11	173.9	20 03.3	99	10	174.0	19 04.0	99	10	174.2	17 35.2	99	10	174.5	9
10	25 21.7	98	13	172.3	24 22.7	98	13	172.5	22 54.2	98	12	172.8	21 55.2	98	12	173.0	20 56.1	98	12	173.2	19 57.0	98	11	173.4	18 58.0	98	11	173.6	17 29.3	98	11	173.9	10
1	25 13.7	98	15	171.6	24 14.9	98	14	171.8	22 46.7	98	14	172.1	21 47.9	98	13	172.3	20 49.0	98	13	172.5	19 50.2	98	13	172.7	18 51.3	98	12	172.9	17 22.9	98	12	173.3	1
2	25 05.0	98	16	170.8	24 06.4	98	15	171.1	22 38.5	98	15	171.4	21 39.9	98	14	171.6	20 41.3	98	14	171.9	19 42.6	98	14	172.1	18 44.0	98	13	172.3	17 15.9	98	13	172.6	2
3	24 55.5	97	17	170.1	23 57.2	97	17	170.3	22 29.7	97	16	170.7	21 31.3	97	16	171.0	20 32.9	97	15	171.2	19 34.5	97	15	171.5	18 36.0	97	14	171.7	17 08.3	97	14	172.0	3
4	24 45.3	97	18	169.3	23 47.3	97	18	169.6	22 20.1	97	17	170.0	21 22.0	97	17	170.3	20 23.9	97	16	170.6	19 25.7	97	16	170.8	18 27.5	97	15	171.1	17 00.1	97	15	171.4	4
15	24 34.4	96	19	168.6	23 36.6	96	19	168.9	22 09.9	96	18	169.3	21 12.0	96	18	169.6	20 14.2	96	17	169.9	19 16.2	97	17	170.2	18 18.3	97	16	170.4	16 51.4	97	16	170.9	15
6	24 22.8	96	21	167.9	23 25.3	96	20	168.2	21 59.0	96	19	168.6	21 01.4	96	19	168.9	20 03.8	96	18	169.2	19 06.2	96	18	169.5	18 08.5	96	17	169.8	16 42.0	96	17	170.3	6
7	24 10.4	95	22	167.1	23 13.3	95	21	167.5	21 47.4	95	20	168.0	20 50.2	95	20	168.3	19 52.9	96	19	168.6	18 55.5	96	19	168.9	17 58.2	96	18	169.2	16 32.1	96	18	169.7	7
8	23 57.4	95	23	166.4	23 00.5	95	22	166.8	21 35.2	95	21	167.3	20 38.2	95	21	167.6	19 41.3	95	20	168.0	18 44.2	95	20	168.3	17 47.2	95	19	168.6	16 21.5	96	18	169.1	8
9	23 43.6	94	24	165.7	22 47.1	94	23	166.1	21 22.3	94	23	166.6	20 25.7	94	22	167.0	19 29.0	94	21	167.3	18 32.3	95	21	167.7	17 35.6	95	20	168.0	16 10.5	95	19	168.5	9
20	23 29.2	93	25	165.0	22 33.0	94	25	165.4	21 08.8	94	24	165.9	20 12.5	94	23	166.3	19 16.2	94	22	166.7	18 19.8	94	22	167.0	17 23.5	94	21	167.4	15 58.8	94	20	167.9	20
1	23 14.1	93	26	164.3	22 18.3	93	26	164.7	20 54.6	93	25	165.3	19 58.7	93	24	165.7	19 02.7	93	33	166.0	18 06.8	93	23	166.4	17 10.7	93	22	166.8	15 46.6	94	21	167.4	1
2	22 58.3	92	27	163.6	22 02.9	92	27	164.0	20 39.7	92	26	164.6	19 44.2	93	25	165.0	18 48.7	93	24	165.4	17 53.1	93	24	165.8	16 57.4	93	23	166.2	15 33.8	93	22	166.8	2
3	22 41.8	92	29	162.9	21 46.8	92	28	163.3	20 24.3	92	27	164.0	19 29.2	92	26	164.4	18 34.0	92	25	164.8	17 38.8	92	25	165.2	16 43.5	92	24	165.6	15 20.5	92	23	166.2	3
4	22 24.7	91	30	162.2	21 30.2	91	29	162.7	20 08.2	91	28	163.3	19 13.5	91	27	163.8	18 18.8	91	26	164.2	17 23.9	91	26	164.6	16 29.1	92	25	165.0	15 00.7	92	24	165.7	4
25	22 06.9	90	31	161.5	21 12.8	90	30	162.0	19 51.5	90	29	162.7	18 57.3	91	28	163.1	18 02.9	91	27	163.6	17 08.5	91	27	164.0	16 14.0	91	26	164.5	14 52.3	91	25	165.1	25
6	21 48.5	89	32	160.9	20 54.9	89	31	161.3	19 34.2	90	30	162.0	18 40.4	90	29	162.5	17 46.5	90	28	163.0	16 52.5	90	28	163.4	15 58.5	90	27	163.9	14 37.3	90	26	164.6	6
7	21 29.5	89	33	160.2	20 36.3	89	32	160.7	19 16.4	89	31	161.4	18 23.0	89	30	161.9	17 29.5	89	29	162.4	16 36.0	89	28	162.8	15 42.4	89	28	163.3	14 21.9	90	27	164.0	7
8	21 09.8	88	34	159.5	20 17.1	88	33	160.0	18 57.9	88	32	160.8	18 04.9	88	31	161.3	17 11.9	88	30	161.8	16 18.9	89	29	162.3	15 25.7	89	29	162.8	14 05.9	89	27	163.5	8
9	20 49.6	87	35	158.9	19 57.3	87	34	159.4	18 38.8	87	33	160.2	17 46.4	87	32	160.7	16 53.8	88	31	161.2	16 01.2	88	30	161.7	15 08.5	88	30	162.2	13 49.4	88	28	162.9	9
30	20 28.7	86	36	158.2	19 37.0	86	35	158.8	18 19.2	87	34	159.6	17 27.2	87	33	160.1	16 35.2	87	32	160.6	15 43.0	87	31	161.1	14 50.8	87	30	161.6	13 32.4	87	29	162.4	30
1	20 07.3	85	37	157.6	19 16.0	85	36	158.2	17 59.0	86	35	159.0	17 07.5	86	34	159.5	16 16.0	86	33	160.0	15 24.3	86	32	160.6	14 32.6	86	31	161.1	13 14.9	86	30	161.9	1
2	19 45.2	84	38	157.0	18 54.5	85	37	157.5	17 38.2	85	35	158.4	16 47.3	85	35	158.9	15 56.2	85	34	159.5	15 05.1	85	33	160.0	14 13.9	85	32	160.6	12 56.9	86	31	161.4	2
3	19 22.6	84	39	156.4	18 32.4	84	38	156.9	17 16.9	84	36	157.8	16 26.5	84	36	158.4	15 35.9	84	35	158.9	14 45.3	84	34	159.5	13 54.6	85	33	160.0	12 38.4	85	32	160.8	3
4	18 59.5	83	40	155.7	18 09.8	83	39	156.3	16 55.1	83	37	157.2	16 05.2	83	36	157.8	15 15.2	83	35	158.4	14 25.1	84	35	158.9	13 34.9	84	34	159.5	12 19.5	84	32	160.3	4
35	18 35.8	82	40	155.1	17 46.6	82	40	155.7	16 32.7	82	38	156.6	15 43.4	82	37	157.2	14 53.9	83	36	157.8	14 04.3	83	35	158.4	13 14.7	83	34	159.0	12 00.0	83	33	159.8	35
6	18 11.5	81	41	154.5	17 22.9	81	40	155.2	16 09.9	81	39	156.1	15 21.0	81	38	156.7	14 32.1	82	37	157.3	13 43.1	82	36	157.9	12 53.9	82	35	158.5	11 40.1	82	34	159.3	6
7	17 46.7	80	42	154.0	16 58.7	80	41	154.6	15 46.5	80	40	155.5	14 58.2	81	39	156.1	14 09.8	81	38	156.7	13 21.3	81	37	157.4	12 32.8	81	36	158.0	11 19.8	81	35	158.9	7
8	17 21.4	79	43	153.4	16 34.0	79	42	154.0	15 22.6	79	41	155.0	14 34.9	80	40	155.6	13 47.0	80	39	156.2	12 59.1	80	38	156.8	12 11.1	80	37	157.5	10 59.0	80	35	158.4	8
9	16 55.6	78	44	152.8	16 08.7	78	43	153.5	14 58.2	78	41	154.4	14 11.0	79	40	155.1	13 23.8	79	40	155.7	12 36.4	79	39	156.3	11 49.0	79	38	157.0	10 37.7	79	36	157.9	9
40	16 29.3	77	45	152.2	15 43.0	77	44	152.9	14 33.3	78	42	153.9	13 46.7	78	41	154.5	13 00.1	78	40	155.2	12 13.3	78	39	155.8	11 26.4	78	38	156.5	10 16.0	78	37	157.4	40
1	16 02.4	76	46	151.7	15 16.7	76	44	152.4	14 08.0	77	43	153.4	13 22.0	77	42	154.0	12 35.9	77	41	154.7	11 49.7	77	40	155.3	11 03.4	77	39	156.0	9 53.9	77	38	157.0	1
2	15 35.1	75	46	151.1	14 50.0	75	45	151.8	13 42.2	76	44	152.8	12 56.8	76	43	153.5	12 11.3	76	42	154.2	11 25.7	76	41	154.9	10 40.0	76	40	155.5	9 31.3	76	38	156.5	2
3	15 07.4	74	47	150.6	14 22.9	74	76	151.3	13 15.9	75	45	152.3	12 31.1	75	44	153.0	11 46.2	75	42	153.7	11 01.2	75	42	154.4	10 16.1	75	40	155.0	9 08.4	75	39	156.0	3
4	14 39.1	73	48	150.1	13 55.2	73	47	150.8	12 49.2	74	45	151.8	12 05.0	74	44	152.5	11 20.7	74	43	153.2	10 36.3	74	42	153.9	9 51.9	74	41	154.6	8 45.0	74	40	155.6	4
45	14 10.4	72	49	149.6	13 27.2	72	48	150.3	12 22.0	73	46	151.3	11 38.4	73	45	152.0	10 54.8	73	44	152.7	10 11.0	73	43	153.4	9 27.2	73	42	154.1	8 21.2	73	40	155.2	45
6	13 41.3	71	49	149.0	12 58.6	71	48	149.8	11 54.4	71	47	150.8	11 11.5	72	46	151.6	10 28.4	72	45	152.3	9 45.3	72	44	153.0	9 02.1	72	42	153.7	7 57.1	72	41	154.7	6
7	13 11.8	70	50	148.5	12 29.7	70	49	149.3	11 26.4	70	47	150.4	10 44.1	71	46	151.1	10 01.7	71	45	151.8	9 19.2	71	44	152.5	8 36.6	71	43	153.2	7 32.5	71	42	154.3	7
8	12 41.8	69	51	148.1	12 00.3	69	50	148.8	10 58.0	69	48	149.9	10 16.3	70	47	150.6	9 34.5	70	46	151.4	8 52.6	70	45	152.1	8 10.7	70	44	152.8	7 07.6	70	42	153.9	8
9	12 11.4	68	51	147.6	11 30.6	68	50	148.3	10 29.2	68	49	149.4	9 48.1	69	48	150.2	9 07.0	69	47	150.9	8 25.7	69	45	151.6	7 44.4	69	44	152.4	6 42.3	69	43	153.5	9
50	11 40.6	67	52	147.1	11 00.4	67	51	147.8	10 00.0	67	49	149.0	9 19.5	67	48	149.7	8 39.0	68	47	150.5	7 58.4	68	46	151.2	7 17.8	68	45	152.0	6 16.6	68	43	153.1	50
1	11 09.3	66	53	146.6	10 29.8	66	52	147.4	9 30.4	66	50	148.5	8 50.6	66	49	149.3	8 10.7	67	48	150.0	7 30.8	67	47	150.8	6 50.7	67	46	151.5	5 50.6	67	44	152.7	1
2	10 37.8	65	53	146.2	9 58.9	65	52	146.9	9 00.4	65	51	148.1	8 21.3	65	50	148.9	7 42.0	65	48	149.6	7 02.7	66	47	150.4	6 23.4	66	46	151.1	5 24.2	66	44	152.3	2
3	10 05.8	64	54	145.7	9 27.6	64	53	146.5	8 30.0	64	51	147.7	7 51.6	64	50	148.4	7 13.0	64	49	149.2	6 34.4	64	48	150.0	5 55.7	65	47	150.7					3
4	9 33.5	63	54	145.3	8 55.9	63	53	146.0	7 59.3	63	52	147.2	7 21.5	63	51	148.0	6 43.6	63	50	148.8	6 05.6	63	48	149.6	5 27.6	63	47	150.3					4
55	9 00.8	61	55	144.8	8 23.8	62	54	145.6	7 28.3	62	52	146.8	6 51.1	62	51	147.6	6 13.9	62	50	148.4	5 36.6	62	49	149.2									55
6	8 27.7	60	56	144.4	7 51.4	61	55	145.2	6 56.8	61	53	146.4	6 20.4	61	52	147.2	5 43.8	61	51	148.0	5 07.2	61	50	148.8									6
7	7 54.3	59	56	144.0	7 18.7	59	55	144.8	6 25.1	60	53	146.0	5 49.3	60	52	146.8	5 13.4	60	51	147.6													7
8	7 20.6	58	57	143.6	6 45.6	58	56	144.4	5 53.0	59	54	145.6	5 17.9	59	53	146.4																	8
9	6 46.5	57	57	143.2	6 12.2	57	56	144.0	5 20.6	57	55	145.2																					9
60	6 12.1	56	58	142.8	5 38.5	56	57	143.6																									60
1	5 37.5	55	58	142.4	5 04.5	55	57	143.2																									1
2	5 02.5	54	59	142.0																													2

DECLINATION SAME NAME AS LATITUDE

H.A.	46° 00′				47° 00′				48° 30′				49° 30′				50° 30′				51° 30′				52° 30′				54° 00′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
91	12 10.0	23	67	45.3	12 23.8	23	66	44.3	12 44.1	22	64	42.8	12 57.3	22	63	41.8	13 10.4	22	62	40.8	13 23.1	21	61	39.8	13 35.7	21	59	38.8	13 54.1	20	58	37.3	91
2	11 29.5	24	67	45.1	11 44.0	24	66	44.1	12 05.4	23	64	42.6	12 19.4	23	63	41.6	12 33.1	23	62	40.6	12 46.7	22	61	39.6	13 00.0	22	59	38.6	13 19.6	21	57	37.1	2
3	10 49.2	26	67	44.9	11 04.4	25	66	43.9	11 26.8	25	64	42.5	11 41.5	24	63	41.5	11 56.0	24	62	40.5	12 10.3	24	60	39.5	12 24.4	23	59	38.5	12 45.2	23	57	37.0	3
4	10 08.9	27	67	44.7	10 24.8	26	66	43.8	10 48.3	26	64	42.3	11 03.8	26	63	41.3	11 19.1	25	61	40.3	11 34.1	25	60	39.3	11 49.0	25	59	38.3	12 10.9	24	57	36.9	4
95	9 28.8	28	67	44.6	9 45.4	28	65	43.6	10 10.0	27	64	42.1	10 26.2	27	62	41.1	10 42.2	27	61	40.2	10 58.0	26	60	39.2	11 13.6	26	59	38.2	11 36.7	25	57	36.7	95
6	8 48.9	29	66	44.4	9 06.2	29	65	43.4	9 31.8	28	63	41.9	9 48.7	28	62	41.0	10 05.5	28	61	40.0	10 22.0	27	60	39.0	10 38.4	27	58	38.0	11 02.7	27	57	36.6	6
7	8 09.0	30	66	44.1	8 27.0	30	65	43.2	8 53.8	30	63	41.7	9 11.4	29	62	40.8	9 28.9	29	61	39.8	9 46.2	29	60	38.8	10 03.3	28	58	37.9	10 28.7	28	56	36.4	7
8	7 29.4	31	66	43.9	7 48.1	31	65	43.0	8 15.8	31	63	41.5	8 34.2	30	62	40.6	8 52.4	30	60	39.6	9 10.5	30	59	38.6	9 28.4	30	58	37.7	9 54.9	29	56	36.2	8
9	6 49.8	32	66	43.7	7 09.2	32	64	42.8	7 38.1	32	63	41.3	7 57.2	32	61	40.4	8 16.1	31	60	39.4	8 34.9	31	59	38.4	8 53.6	31	58	37.5	9 21.3	31	56	36.0	9
100	6 10.5	34	65	43.5	6 30.6	33	64	42.5	7 00.5	33	62	41.1	7 20.3	33	61	40.2	7 40.0	33	60	39.2	7 59.5	32	59	38.2	8 18.9	32	58	37.3	8 47.8	32	56	35.9	100
1	5 31.3	35	65	43.2	5 52.1	35	64	42.3	6 23.0	34	62	40.9	6 43.6	34	61	39.9	7 04.0	34	60	39.0	7 24.3	34	58	38.0	7 44.4	34	57	37.1	8 14.5	33	55	35.7	1
2					5 13.8	36	64	42.1	5 45.8	35	62	40.6	6 07.0	35	61	39.7	6 28.2	35	59	38.8	6 49.2	35	58	37.8	7 10.1	35	57	36.9	7 41.3	34	55	35.5	2
3									5 08.7	37	62	40.4	5 30.7	37	60	39.5	5 52.5	36	59	38.5	6 14.3	36	58	37.6	6 35.9	36	57	36.7	7 08.2	36	55	35.3	3
4																	5 17.0	38	59	38.3	5 39.5	37	58	37.4	6 02.0	37	56	36.4	6 35.4	37	54	35.0	4
105																					5 05.0	39	57	37.1	5 28.2	39	56	36.2	6 02.7	38	54	34.8	105
6																													5 30.2	40	54	34.6	6

Lat. 18°

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	53 30.0	1.0 01	00.0	53 00.0	1.0 01	00.0	52 00.0	1.0 01	00.0	51 30.0	1.0 01	00.0	51 00.0	1.0 01	00.0	50 30.0	1.0 01	00.0	49 00.0	1.0 01	00.0	48 30.0	1.0 01	00.0	00
1	53 29.5	1.0 02	01.0	52 59.5	1.0 02	01.0	51 59.5	1.0 02	00.9	51 29.6	1.0 02	00.9	50 59.6	1.0 02	00.9	50 29.6	1.0 02	00.8	48 59.6	1.0 02	00.8	48 29.6	1.0 02	00.8	1
2	53 28.1	1.0 04	02.0	52 58.1	1.0 04	01.9	51 58.2	1.0 04	01.8	51 28.2	1.0 04	01.8	50 58.3	1.0 04	01.7	50 28.3	1.0 04	01.7	48 58.4	1.0 03	01.6	48 28.5	1.0 03	01.5	2
3	53 25.6	1.0 06	02.9	52 55.7	1.0 06	02.9	51 55.9	1.0 05	02.7	51 26.0	1.0 05	02.7	50 56.1	1.0 05	02.6	50 26.2	1.0 05	02.5	48 56.5	1.0 05	02.4	48 26.6	1.0 04	02.3	3
4	53 22.2	99 07	03.9	52 52.4	99 07	03.8	51 52.8	99 07	03.6	51 22.9	99 07	03.5	50 53.1	99 06	03.5	50 23.3	99 06	03.4	48 53.8	99 06	03.1	48 23.9	99 06	03.1	4
05	53 17.9	99 09	04.9	52 48.2	99 09	04.7	51 48.7	99 08	04.5	51 19.0	99 08	04.4	50 49.3	99 08	04.3	50 19.5	99 08	04.2	48 50.2	99 07	03.9	48 20.5	99 07	03.8	05
6	53 12.6	99 10	05.8	52 43.0	99 10	05.7	51 43.8	99 10	05.4	51 14.2	99 09	05.3	50 44.5	99 09	05.2	50 14.9	99 09	05.0	48 46.0	99 08	04.7	48 16.3	99 08	04.6	6
7	53 06.3	98 12	06.8	52 36.9	98 12	06.6	51 38.0	98 11	06.3	51 08.5	98 11	06.2	50 39.0	98 11	06.0	50 09.5	98 10	05.9	48 40.9	98 10	05.5	48 11.4	98 09	05.3	7
8	52 59.1	98 14	07.7	52 29.8	98 13	07.5	51 31.3	98 13	07.2	51 01.9	98 12	07.0	50 32.6	98 12	06.9	50 03.2	98 12	06.7	48 35.1	98 11	06.2	48 05.7	98 11	06.1	8
9	52 51.0	97 15	08.7	52 21.9	97 15	08.4	51 23.7	97 14	08.1	50 54.5	97 14	07.9	50 25.4	97 13	07.7	49 56.2	97 13	07.5	48 28.6	97 12	07.0	47 59.3	97 12	06.8	9
10	52 42.0	96 17	09.6	52 13.1	96 16	09.4	51 15.3	96 15	08.9	50 46.3	97 15	08.7	50 17.3	97 15	08.5	49 48.3	97 14	08.3	48 21.3	97 13	07.7	47 52.2	97 13	07.5	10
1	52 32.0	96 18	10.5	52 03.4	96 18	10.3	51 06.0	96 17	09.8	50 37.2	96 16	09.6	50 08.5	96 16	09.3	49 39.7	96 16	09.1	48 13.2	96 15	08.5	47 44.3	96 14	08.3	1
2	52 21.2	96 20	11.4	51 52.8	96 19	11.1	50 55.9	96 18	10.6	50 27.4	95 18	10.4	49 58.8	95 17	10.1	49 30.3	95 17	09.9	48 04.4	96 16	09.2	47 35.8	96 15	09.0	2
3	52 09.5	94 21	12.3	51 41.3	94 20	12.0	50 44.9	94 20	11.5	50 16.7	94 19	11.2	49 48.4	94 19	10.9	49 20.1	94 18	10.7	47 54.9	95 17	10.0	47 26.5	95 17	09.7	3
4	51 56.9	93 22	13.2	51 29.0	93 22	12.9	50 33.2	93 21	12.3	50 05.2	93 20	12.0	49 37.2	93 20	11.7	49 09.1	94 20	11.5	47 44.7	94 18	10.7	47 16.5	94 18	10.4	4
15	51 43.5	92 24	14.0	51 15.9	92 23	13.7	50 20.6	92 22	13.1	49 52.9	92 22	12.8	49 25.2	93 21	12.5	48 57.4	93 21	12.2	47 33.8	93 19	11.4	47 05.8	93 19	11.1	15
6	51 29.2	91 25	14.9	51 02.0	91 25	14.6	50 07.3	91 24	13.9	49 39.9	91 23	13.6	49 12.4	92 22	13.3	48 44.9	92 22	13.0	47 22.2	92 21	12.1	46 54.5	92 20	11.8	6
7	51 14.1	90 26	15.7	50 47.2	90 26	15.4	49 53.2	90 25	14.7	49 26.1	90 24	14.4	48 59.0	91 24	14.0	48 31.8	91 23	13.7	47 09.9	91 22	12.8	46 42.5	91 21	12.5	7
8	50 58.3	88 28	16.6	50 31.7	89 27	16.2	49 38.4	89 26	15.5	49 11.6	89 25	15.1	48 44.8	90 25	14.8	48 17.9	90 24	14.5	46 56.9	90 23	13.5	46 29.8	90 22	13.2	8
9	50 41.6	87 29	17.4	50 15.4	87 28	17.0	49 22.8	88 27	16.2	48 56.3	88 27	15.9	48 29.8	88 26	15.5	48 03.3	89 25	15.2	46 43.3	89 24	14.2	46 16.5	89 23	13.8	9
20	50 24.2	86 30	18.2	49 58.4	86 30	17.8	49 06.4	87 28	17.0	48 40.4	87 28	16.6	48 14.2	87 27	16.2	47 48.0	87 27	15.9	46 29.0	88 25	14.8	46 02.5	88 24	14.5	20
1	50 06.1	85 31	18.9	49 40.6	85 31	18.5	48 49.4	86 30	17.7	48 23.7	86 29	17.3	47 57.9	86 28	16.9	47 32.1	86 28	16.6	46 14.1	87 26	15.5	45 47.9	87 25	15.1	1
2	49 47.2	83 33	19.7	49 22.1	84 32	19.3	48 31.7	84 31	18.4	48 06.4	85 30	18.0	47 41.0	85 29	17.6	47 15.5	85 29	17.3	45 58.5	86 27	16.1	45 32.7	86 26	15.8	2
3	49 27.6	82 34	20.4	49 02.9	82 33	20.0	48 13.3	83 32	19.1	47 48.4	83 31	18.7	47 23.3	84 30	18.3	46 58.2	84 30	17.9	45 42.4	85 28	16.7	45 16.9	85 27	16.4	3
4	49 07.3	81 35	21.2	48 43.1	81 34	20.7	47 54.3	82 33	19.8	47 29.7	82 32	19.4	47 05.1	82 31	19.0	46 40.4	83 31	18.6	45 25.6	83 29	17.4	45 00.6	84 28	17.0	4
25	48 46.4	79 36	21.9	48 22.6	80 35	21.4	47 34.6	80 34	20.5	47 10.5	81 33	20.1	46 46.2	81 32	19.6	46 21.9	81 32	19.2	45 08.3	82 30	18.0	44 43.6	82 29	17.6	25
6	48 24.9	78 37	22.6	48 01.5	78 36	22.1	47 14.3	79 35	21.2	46 50.6	79 34	20.7	46 26.7	80 33	20.3	46 02.8	80 33	19.8	44 50.4	81 31	18.6	44 26.1	81 30	18.2	6
7	48 02.7	76 38	23.2	47 39.7	77 37	22.7	46 53.4	78 36	21.8	46 30.1	78 35	21.3	46 06.7	78 34	20.9	45 43.2	79 34	20.4	44 32.0	80 32	19.1	44 08.1	80 31	18.7	7
8	47 39.9	75 39	23.9	47 17.3	75 38	23.4	46 31.9	76 37	22.4	46 09.0	76 36	22.0	45 46.0	77 35	21.5	45 22.9	77 35	21.0	44 13.0	78 33	19.7	43 49.5	79 32	19.3	8
9	47 16.5	73 40	24.5	46 54.4	74 39	24.0	46 09.9	75 38	23.0	45 47.4	75 37	22.6	45 24.9	75 36	22.1	45 02.2	76 36	21.6	43 53.5	77 33	20.3	43 30.4	77 33	19.8	9
30	46 52.5	72 41	25.1	46 30.9	72 40	24.6	45 47.3	73 39	23.6	45 25.3	74 38	23.2	45 03.1	74 37	22.7	44 40.9	74 36	22.2	43 33.5	75 34	20.8	43 10.8	76 34	20.4	30
1	46 28.0	70 42	25.7	46 06.8	71 41	25.2	45 24.1	72 39	24.2	45 02.6	72 39	23.7	44 40.9	72 38	23.2	44 19.1	73 37	22.8	43 12.9	74 35	21.3	42 50.7	74 34	20.9	1
2	46 03.0	69 43	26.3	45 42.3	69 42	25.8	45 00.4	70 40	24.8	44 39.3	71 40	24.3	44 18.1	71 39	23.8	43 56.7	71 38	23.3	42 51.9	73 36	21.9	42 30.1	73 35	21.4	2
3	45 37.4	67 43	26.9	45 17.2	68 43	26.4	44 36.3	69 41	25.3	44 15.6	69 40	24.8	43 54.9	69 40	24.3	43 33.9	70 39	23.8	42 30.4	71 37	22.4	42 09.0	72 36	21.9	3
4	45 11.4	66 44	27.4	44 51.6	66 43	26.9	44 11.6	67 42	25.9	43 51.4	68 41	25.3	43 31.1	68 40	24.8	43 10.7	68 40	24.3	42 08.5	70 37	22.9	41 47.5	70 37	22.4	4
35	44 44.8	64 45	28.0	44 25.5	65 44	27.4	43 46.5	66 43	26.4	43 26.8	66 42	25.9	43 06.9	66 41	25.3	42 46.9	67 40	24.8	41 46.1	68 38	23.3	41 25.6	69 37	22.8	35
6	44 17.8	62 46	28.5	43 59.0	63 45	27.9	43 20.9	64 43	26.9	43 01.7	64 43	26.3	42 42.3	65 42	25.8	42 22.7	65 41	25.3	41 23.3	67 39	23.8	41 03.2	67 38	23.3	6
7	43 50.4	61 46	29.0	43 32.1	61 46	28.4	42 54.9	62 44	27.4	42 36.1	63 43	26.8	42 17.2	63 42	26.3	41 58.1	64 42	25.8	41 00.1	65 39	24.2	40 40.5	66 39	23.7	7
8	43 22.5	59 47	29.5	43 04.7	60 46	28.9	42 28.5	61 45	27.8	42 10.2	61 44	27.3	41 51.7	62 43	26.8	41 33.1	62 42	26.2	40 36.4	64 40	24.7	40 17.3	64 39	24.2	8
9	42 54.3	58 48	29.9	42 36.9	58 47	29.4	42 01.7	59 45	28.3	41 43.8	60 45	27.7	41 25.8	60 44	27.2	41 07.7	61 43	26.7	40 12.4	62 41	25.1	39 53.7	63 40	24.6	9
40	42 25.6	56 48	30.4	42 08.7	57 48	29.8	41 34.4	58 46	28.7	41 17.1	58 45	28.2	40 59.6	59 44	27.6	40 41.9	59 44	27.1	39 48.0	61 41	25.5	39 29.8	61 40	25.0	40
1	41 56.6	54 49	30.8	41 40.2	55 48	30.2	41 06.8	56 47	29.1	40 49.9	57 46	28.6	40 32.9	57 45	28.0	40 15.7	58 44	27.5	39 23.2	59 42	25.9	39 05.5	59 41	25.4	1
2	41 27.2	53 50	31.2	41 11.2	53 49	30.7	40 38.9	54 47	29.5	40 22.5	55 46	29.0	40 05.9	55 46	28.5	39 49.2	56 45	27.9	38 58.1	57 42	26.3	38 40.8	58 42	25.8	2
3	40 57.4	51 50	31.6	40 42.0	52 49	31.1	40 10.6	53 48	29.9	39 54.6	53 47	29.4	39 38.5	54 46	28.8	39 22.3	54 45	28.3	38 32.7	56 43	26.7	38 15.8	56 42	26.2	3
4	40 27.3	50 51	32.0	40 12.3	50 50	31.4	39 41.9	51 48	30.3	39 26.5	52 48	29.8	39 10.8	52 47	29.2	38 55.1	53 46	28.7	38 06.9	54 44	27.0	37 50.5	55 43	26.5	4
45	39 56.9	48 51	32.4	39 42.4	49 50	31.8	39 12.9	50 49	30.7	38 58.0	50 48	30.1	38 42.8	51 47	29.6	38 27.5	51 46	29.0	37 40.8	53 44	27.4	37 24.9	53 43	26.9	45
6	39 26.2	46 52	32.7	39 12.2	47 51	32.2	38 43.7	48 49	31.0	38 29.2	49 48	30.5	38 14.5	49 48	29.9	37 59.7	50 47	29.4	37 14.4	51 44	27.7	36 58.9	52 44	27.2	6
7	38 55.2	45 52	33.1	38 41.7	45 51	32.5	38 14.1	46 50	31.4	38 00.1	47 49	30.8	37 45.9	48 48	30.3	37 31.6	48 47	29.7	36 47.7	50 45	28.1	36 32.7	50 44	27.5	7
8	38 23.9	43 53	33.4	38 10.8	44 52	32.8	37 44.3	45 50	31.7	37 30.7	45 49	31.1	37 17.0	46 49	30.6	37 03.2	46 48	30.0	36 20.7	48 45	28.4	36 06.2	48 45	27.8	8
9	37 52.3	42 53	33.7	37 39.8	42 52	33.1	37 14.1	43 51	32.0	37 01.1	44 50	31.4	36 47.9	44 49	30.9	36 34.5	45 48	30.3	35 53.4	46 46	28.7	35 39.4	47 45	28.1	9
50	37 20.5	40 53	34.0	37 08.4	41 53	33.4	36 43.8	42 51	32.3	36 31.2	42 50	31.7	36 18.4	43 49	31.2	36 05.5	43 49	30.6	35 25.9	45 46	29.0	35 12.4	45 45	28.4	50
1	36 48.5	38 54	34.3	36 36.9	39 53	33.7	36 13.1	40 51	32.6	36 01.0	41 51	32.0	35 48.8	41 50	31.5	35 36.4	42 49	30.9	34 58.2	43 47	29.2	34 45.1	44 46	28.7	1
2	36 16.2	37 54	34.6	36 05.1	37 53	34.0	35 42.3	38 52	32.9	35 30.7	39 51	32.3	35 18.9	40 50	31.7	35 06.9	40 49	31.2	34 30.2	42 47	29.5	34 17.6	42 46	29.0	2
3	35 43.7	35 54	34.8	35 33.0	36 54	34.3	35 11.2	37 52	33.1	35 00.1	37 51	32.6	34 48.8	38 51	32.0	34 37.3	38 50	31.4	34 02.0	40 47	29.8	33 49.9	40 47	29.2	3
4	35 11.0	34 55	35.1	35 00.8	34 54	34.5	34 39.9	35 52	33.4	34 29.3	36 52	32.8	34 18.4	36 51	32.2	34 07.4	37 50	31.7	33 33.5	38 48	30.0	33 21.9	39 47	29.4	4
55	34 38.1	32 55	35.3	34 28.4	33 54	34.7	34 08.4	34 53	33.6	33 58.2	34 52	33.0	33 47.9	35 51	32.5	33 37.4	35 50	31.9	33 04.9	37 48	30.2	32 53.8	37 47	29.7	55
6	34 05.0	31 55	35.5	33 55.8	31 55	35.0	33 36.8	32 53	33.8	33 27.0	33 52	33.3	33 17.1	33 52	32.7	33 07.1	34 51	32.1	32 36.1	35 48	30.5	32 25.4	36 48	29.9	6
7	33 31.8	29 56	35.7	33 23.0	30 55	35.2	33 04.9	31 53	34.0	32 55.7	31 53	33.5	32 46.2	32 52	32.9	32 36.7	32 51	32.3	32 07.1	34 49	30.7	31 56.9	34 48	30.1	7
8	32 58.4	28 56	35.9	32 50.0	28 55	35.4	32 32.9	29 54	34.2	32 24.1	30 53	33.7	32 15.2	30 52	33.1	32 06.1	31 51	32.5	31 37.9	32 49	30.9	31 28.2	33 48	30.3	8
9	32 24.8	26 56	36.1	32 16.9	26 55	35.6	32 00.7	28 54	34.4	31 52.4	28 53	33.9	31 43.9	29 52	33.3	31 35.3	29 52	32.7	31 08.5	30 49	31.1	30 59.3	31 48	30.5	9
60	31 51.1	24 56	36.3	31 43.7	25 56	35.7	31 28.4	26 54	34.6	31 20.5	26 53	34.0	31 12.5	27 53	33.5	31 04.4	27 52	32.9	30 39.0	29 49	31.2	30 30.3	29 49	30.7	60
1	31 17.2	23 57	36.5	31 10.3	23 56	35.9	30 55.9	24 54	34.8	30 48.5	25 54	34.2	30 41.0	25 53	33.6	30 33.3	26 52	33.1	30 09.4	27 50	31.4	30 01.1	28 49	30.8	1
2	30 43.3	21 57	36.6	30 36.8	22 56	36.0	30 23.3	23 55	34.9	30 16.4	23 54	34.4	30 09.3	24 53	33.8	30 02.1	24 52	33.2	29 39.6	26 50	31.6	29 31.8	26 49	31.0	2
3	30 09.2	20 57	36.8	30 03.1	20 56	36.2	29 50.6	21 55	35.1	29 44.1	22 54	34.5	29 37.5	22 53	33.9	29 30.7	23 52	33.4	29 09.6	24 50	31.7	29 02.3	25 49	31.1	3
4	29 35.0	18 57	36.9	29 29.4	19 56	36.3	29 17.8	20 55	35.2	29 11.7	20 54	34.6	29 05.6	21 53	34.1	28 59.3	21 53	33.5	28 39.6	23 50	31.8	28 32.7	23 49	31.3	4
65	29 00.7	17 57	37.0	28 55.5	17 57	36.4	28 44.8	18 55	35.3	28 39.3	19 54	34.8	28 33.6	19 54	34.2	28 27.7	20 53	33.6	28 09.4	21 50	32.0	28 03.1	21 50	31.4	65
6	28 26.3	15 57	37.1	28 21.6	16 57	36.5	28 11.8	17 55	35.4	28 06.7	17 54	34.9	28 01.5	18 54	34.3	27 56.1	18 53	33.8	27 39.2	19 51	32.1	27 33.3	20 50	31.5	6
7	27 51.8	14 58	37.2	27 47.6	14 57	36.6	27 38.7	15 55	35.5	27 34.0	16 55	35.0	27 29.3	16 54	34.4	27 24.3	17 53	33.9	27 08.8	18 51	32.2	27 03.4	18 50	31.6	7
8	27 17.3	12 58	37.3	27 13.5	13 57	36.7	27 05.5	14 55	35.6	27 01.3	14 55	35.1	26 57.0	15 54	34.5	26 52.5	15 53	34.0	26 38.4	16 51	32.3	26 33.4	17 50	31.7	8
9	26 42.7	11 58	37.4	26 39.3	11 57	36.8	26 32.2	12 56	35.7	26 28.5	13 55	35.1	26 24.6	13 54	34.6	26 20.6	14 53	34.0	26 07.8	15 51	32.4	26 03.3	16 50	31.8	9
70	26 08.0	10 58	37.4	26 05.1	10 57	36.9	25 58.9	11 56	35.8	25 55.6	11 55	35.2	25 52.2	12 54	34.7	25 48.6	12 53	34.1	25 37.2	13 51	32.5	25 33.2	14 50	31.9	70
1	25 33.3	08 58	37.5	25 30.8	08 57	36.9	25 25.5	09 56	35.8	25 22.7	10 55	35.3	25 19.7	10 54	34.7	25 16.6	11 53	34.2	25 06.6	12 51	32.5	25 03.0	12 50	32.0	1
2	24 58.6	07 58	37.5	24 56.5	07 57	37.0	24 52.1	08 56	35.9	24 49.7	08 55	35.3	24 47.2	09 54	34.8	24 44.5	09 54	34.2	24 35.9	10 51	32.6	24 32.7	11 51	32.0	2
3	24 23.8	06 58	37.6	24 22.2	06 57	37.0	24 18.6	06 56	35.9	24 16.7	07 55	35.4	24 14.6	07 54	34.8	24 12.4	08 54	34.3	24 05.1	09 51	32.6	24 02.4	09 51	32.1	3
4	23 49.0	04 58	37.6	23 47.8	04 57	37.1	23 45.1	05 56	36.0	23 43.6	05 55	35.4	23 42.0	06 54	34.9	23 40.2	06 54	34.3	23 34.3	07 51	32.7	23 32.1	08 51	32.2	4
75	23 14.1	02 58	37.6	23 13.4	03 57	37.1	23 11.6	03 56	36.0	23 10.5	04 55	35.4	23 09.3	04 54	34.9	23 08.0	05 54	34.4	23 03.5	06 51	32.7	23 01.7	06 51	32.2	75
6	22 39.3	01 58	37.6	22 39.0	01 57	37.1	22 38.1	02 56	36.0	22 37.4	02 55	35.5	22 36.7	03 54	34.9	22 35.8	03 54	34.4	22 32.6	04 51	32.8	22 31.3	04 51	32.2	6
7	22 04.5	01 58	37.6	22 04.6	00 57	37.1	22 04.5	00 56	36.0	22 04.3	01 55	35.5	22 04.0	01 54	34.9	22 03.6	02 54	34.4	22 01.7	03 51	32.8	22 00.9	03 51	32.2	7
8	21 29.6	02 58	37.6	21 30.2	02 57	37.1	21 31.0	01 56	36.0	21 31.2	01 55	35.5	21 31.3	00 54	34.9	21 31.3	00 54	34.4	21 30.8	01 52	32.8	21 30.4	01 51	32.2	8
9	20 54.8	03 58	37.6	20 55.8	03 57	37.1	20 57.4	02 56	36.0	20 58.1	02 55	35.5	20 58.6	02 54	34.9	20 59.1	01 54	34.4	20 59.9	00 52	32.8	21 00.0	00 51	32.3	9
80	20 20.0	05 58	37.6	20 21.4	04 57	37.0	20 23.9	04 56	36.0	20 25.0	04 55	35.4	20 26.0	03 54	34.9	20 26.9	03 54	34.4	20 29.0	02 52	32.8	20 29.5	02 51	32.2	80
1	19 45.2	06 58	37.5	19 47.0	06 57	37.0	19 50.4	05 56	36.0	19 51.9	05 55	35.4	19 53.3	05 54	34.9	19 54.7	04 54	34.4	19 58.1	03 51	32.8	19 59.1	03 51	32.2	1
2	19 10.4	08 58	37.5	19 12.7	07 57	37.0	19 16.9	07 56	35.9	19 18.8	06 55	35.4	19 20.7	06 54	34.9	19 22.5	06 54	34.3	19 27.2	05 51	32.7	19 28.6	05 51	32.2	2
3	18 35.7	09 58	37.5	18 38.4	09 57	36.9	18 43.4	08 56	35.9	18 45.8	08 55	35.3	18 48.1	08 54	34.8	18 50.3	07 54	34.3	18 56.4	06 51	32.7	18 58.2	06 51	32.2	3
4	18 01.0	10 58	37.4	18 04.1	10 57	36.9	18 10.0	10 56	35.8	18 12.8	09 55	35.3	18 15.5	09 54	34.8	18 18.2	09 54	34.3	18 25.6	08 51	32.7	18 27.9	08 51	32.2	4
85	17 26.4	12 58	37.3	17 29.9	11 57	36.8	17 36.6	11 56	35.8	17 39.8	11 55	35.2	17 43.0	10 54	34.7	17 46.1	10 53	34.2	17 54.8	09 51	32.6	17 57.5	09 51	32.1	85
6	16 51.8	13 58	37.3	16 55.7	13 57	36.7	17 03.3	12 55	35.7	17 06.9	12 55	35.2	17 10.5	12 54	34.7	17 14.0	12 53	34.1	17 24.0	11 51	32.6	17 27.2	10 50	32.1	6
7	16 17.3	14 57	37.2	16 21.6	14 57	36.7	16 30.0	14 55	35.6	16 34.1	13 55	35.1	16 38.1	13 54	34.6	16 42.0	13 53	34.1	16 53.3	12 51	32.5	16 56.9	12 50	32.0	7
8	15 42.9	16 57	37.1	15 47.6	16 57	36.6	15 56.8	15 55	35.5	16 01.3	15 55	35.0	16 05.7	15 54	34.5	16 10.1	14 53	34.0	16 22.7	14 51	32.4	16 26.7	13 50	31.9	8
9	15 08.5	17 57	37.0	15 13.6	17 56	36.5	15 23.7	16 55	35.4	15 28.6	16 54	34.9	15 33.4	16 54	34.4	15 38.2	16 53	33.9	15 52.1	15 51	32.4	15 56.6	15 50	31.9	9
90	14 34.2	19 57	36.9	14 39.8	18 56	36.4	14 50.6	18 55	35.3	14 56.0	18 54	34.8	15 01.2	17 54	34.3	15 06.4	17 53	33.8	15 21.6	17 51	32.3	15 26.5	16 50	31.8	90

Lat. 18°

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	17 30.0	1.0 00	180.0	17 00.0	1.0 00	180.0	16 00.0	1.0 00	180.0	15 30.0	1.0 00	180.0	15 00.0	1.0 00	180.0	14 30.0	1.0 00	180.0	13 00.0	1.0 00	180.0	12 30.0	1.0 00	180.0	*00*
1	17 29.7	1.0 02	179.4	16 59.7	1.0 02	179.4	15 59.7	1.0 01	179.4	15 29.7	1.0 01	179.4	14 59.7	1.0 01	179.4	14 29.7	1.0 01	179.4	12 59.7	1.0 01	179.5	12 29.7	1.0 01	179.5	*1*
2	17 28.8	1.0 03	178.8	16 58.8	1.0 02	178.8	15 58.8	1.0 02	178.8	15 28.9	1.0 02	178.9	14 58.9	1.0 02	178.9	14 28.9	1.0 02	178.9	12 58.9	1.0 02	178.9	12 29.0	1.0 02	179.0	*2*
3	17 27.3	1.0 04	178.2	16 57.3	1.0 04	178.2	15 57.4	1.0 03	178.3	15 27.4	1.0 03	178.3	14 57.5	1.0 03	178.3	14 27.5	1.0 03	178.3	12 57.6	1.0 03	178.4	12 27.7	1.0 03	178.4	*3*
4	17 25.2	1.0 05	177.6	16 55.2	1.0 04	177.6	15 55.4	1.0 04	177.7	15 25.4	1.0 04	177.7	14 55.5	1.0 04	177.7	14 25.6	1.0 04	177.8	12 55.8	1.0 04	177.9	12 25.9	1.0 04	177.9	*4*
05	17 22.4	1.0 06	177.0	16 52.5	1.0 05	177.0	15 52.8	1.0 05	177.1	15 22.9	1.0 05	177.1	14 53.0	1.0 05	177.2	14 23.1	1.0 05	177.2	12 53.4	1.0 05	177.4	12 23.5	1.0 06	177.4	*05*
6	17 19.1	99 07	176.4	16 49.3	99 06	176.4	15 49.6	99 06	176.5	15 19.7	99 06	176.6	14 49.9	99 06	176.6	14 20.1	99 06	176.7	12 50.5	99 06	176.8	12 20.7	99 06	176.9	*6*
7	17 15.2	99 08	175.8	16 45.4	99 07	175.8	15 45.8	99 07	175.9	15 16.0	99 07	176.0	14 46.3	99 07	176.1	14 16.5	99 07	176.1	12 47.1	99 07	176.3	12 17.3	99 06	176.4	*7*
8	17 10.6	99 09	175.1	16 40.9	99 08	175.2	15 41.5	99 08	175.4	15 11.8	99 08	175.4	14 42.1	99 08	175.5	14 12.4	99 08	175.6	12 43.2	99 07	175.8	12 13.5	99 07	175.9	*8*
9	17 05.5	99 10	174.5	16 35.9	99 09	174.6	15 36.6	99 09	174.8	15 07.0	99 09	174.9	14 37.3	99 09	174.9	14 07.7	99 09	175.0	12 38.7	99 08	175.3	12 09.1	99 08	175.3	*9*
10	16 59.8	98 11	173.9	16 30.2	99 10	174.0	15 31.1	99 10	174.2	15 01.6	99 10	174.3	14 32.0	99 10	174.4	14 02.5	99 10	174.5	12 33.8	99 09	174.7	12 04.2	99 09	174.8	*10*
1	16 53.5	98 12	173.4	16 24.0	98 11	173.4	15 25.1	98 11	173.6	14 55.6	98 11	173.7	14 26.2	98 11	173.8	13 56.7	98 10	173.9	12 28.3	98 10	174.2	11 58.8	98 10	174.3	*1*
2	16 46.6	98 12	172.8	16 17.2	98 12	172.9	15 18.5	98 12	173.1	14 49.1	98 12	173.2	14 19.8	98 12	173.3	13 50.4	98 11	173.4	12 22.3	98 11	173.7	11 52.9	98 11	173.8	*2*
3	16 39.1	97 13	172.2	16 09.9	97 13	172.3	15 11.4	98 13	172.5	14 42.1	98 13	172.6	14 12.8	98 12	172.7	13 43.6	98 12	172.9	12 15.8	98 12	173.2	11 46.5	98 12	173.3	*3*
4	16 31.0	97 14	171.6	16 01.9	97 14	171.7	15 03.6	97 14	171.9	14 34.5	97 14	172.1	14 05.4	97 13	172.2	13 36.2	97 13	172.3	12 08.8	97 13	172.7	11 39.6	97 12	172.8	*4*
15	16 22.4	97 15	171.0	15 53.4	97 15	171.1	14 55.4	97 15	171.4	14 26.4	97 14	171.5	13 57.3	97 14	171.6	13 28.3	97 14	171.8	12 01.2	97 13	172.2	11 32.2	97 13	172.3	*15*
6	16 13.1	96 16	170.4	15 44.3	96 16	170.5	14 46.5	96 16	170.8	14 17.7	96 15	171.0	13 48.8	96 15	171.1	13 19.9	96 15	171.2	11 53.2	96 14	171.7	11 24.3	96 14	171.8	*6*
7	16 03.3	96 17	169.8	15 34.6	96 17	170.0	14 37.2	96 16	170.3	14 08.4	96 16	170.4	13 39.7	96 16	170.6	13 10.9	96 16	170.7	11 44.7	96 15	171.2	11 15.9	96 15	171.3	*7*
8	15 53.0	95 18	169.2	15 24.4	95 18	169.4	14 27.3	95 17	169.7	13 58.7	95 17	169.9	13 30.1	95 17	170.0	13 01.5	95 17	170.2	11 35.6	95 16	170.6	11 07.0	95 16	170.8	*8*
9	15 42.1	95 19	168.7	15 13.6	95 19	168.8	14 16.8	95 18	169.2	13 48.4	95 18	169.3	13 19.9	95 18	169.5	12 51.5	95 18	169.7	11 26.1	95 17	170.1	10 57.7	95 16	170.3	*9*
20	15 30.6	94 20	168.1	15 02.3	94 20	168.3	14 05.8	94 19	168.6	13 37.6	94 19	168.8	13 09.3	94 19	169.0	12 41.0	94 18	169.1	11 16.1	94 17	169.7	10 47.8	94 17	169.8	*20*
1	15 18.5	94 21	167.5	14 50.5	94 21	167.7	13 54.3	94 20	168.1	13 26.2	94 20	168.3	12 58.1	94 19	168.4	12 30.0	94 19	168.6	11 05.6	94 18	169.2	10 37.5	94 18	169.3	*1*
2	15 06.0	93 22	167.0	14 38.1	93 22	167.2	13 42.3	93 21	167.5	13 14.3	93 21	167.7	12 46.4	93 20	167.9	12 18.5	93 20	168.1	10 54.7	93 19	168.7	10 26.7	93 19	168.9	*2*
3	14 52.8	92 23	166.4	14 25.1	92 22	166.6	13 29.7	92 22	167.0	13 02.0	92 21	167.2	12 34.2	92 21	167.4	12 06.5	92 21	167.6	10 43.2	93 20	168.2	10 15.4	93 20	168.4	*3*
4	14 39.2	92 24	165.9	14 11.7	92 23	166.1	13 16.6	92 23	166.5	12 49.1	92 22	166.7	12 21.5	92 22	166.9	11 54.0	92 22	167.1	10 31.3	92 21	167.7	10 03.7	92 20	167.9	*4*
25	14 25.0	91 25	165.3	13 57.7	91 24	165.5	13 03.0	91 24	166.0	12 35.7	91 23	166.2	12 08.4	91 23	166.4	11 41.0	91 22	166.6	10 18.9	91 21	167.2	9 51.5	91 21	167.4	*25*
6	14 10.2	90 25	164.8	13 43.2	90 25	165.0	12 48.9	90 24	165.4	12 21.8	90 24	165.7	11 54.7	90 24	165.9	11 27.5	91 23	166.1	10 06.0	91 22	166.7	9 38.9	91 22	167.0	*6*
7	13 55.0	90 26	164.2	13 28.1	90 26	164.5	12 34.3	90 25	164.9	12 07.4	90 25	165.2	11 40.5	90 24	165.4	11 13.6	90 24	165.6	9 52.7	90 23	166.3	9 25.8	90 23	166.5	*7*
8	13 39.2	89 27	163.7	13 12.6	89 27	163.9	12 19.3	89 26	164.4	11 52.6	89 26	164.6	11 25.9	89 25	164.9	10 59.1	89 25	165.1	9 39.0	89 24	165.8	9 12.2	89 23	166.0	*8*
9	13 23.0	88 28	163.2	12 56.6	88 28	163.4	12 03.7	88 27	163.9	11 37.2	88 26	164.1	11 10.7	88 26	164.4	10 44.3	88 26	164.6	9 24.7	88 24	165.3	8 58.2	88 24	165.6	*9*
30	13 06.2	87 29	162.7	12 40.0	87 28	162.9	11 47.6	87 28	163.4	11 21.4	87 27	163.7	10 55.1	87 27	163.9	10 28.9	88 26	164.1	9 10.1	88 25	164.9	8 43.8	88 25	165.1	*30*
1	12 49.0	86 30	162.1	12 23.0	87 29	162.4	11 31.1	87 28	162.9	11 05.1	87 28	163.2	10 39.1	87 28	163.4	10 13.1	87 27	163.7	8 55.0	87 26	164.4	8 28.9	87 25	164.7	*1*
2	12 31.2	86 30	161.6	12 05.5	86 30	161.9	11 14.1	86 29	162.4	10 48.3	86 29	162.7	10 22.6	86 28	162.9	9 56.8	86 28	163.2	8 39.4	86 27	164.0	8 13.6	86 26	164.2	*2*
3	12 13.0	85 31	161.1	11 47.5	85 31	161.4	10 56.6	85 30	161.9	10 31.1	85 29	162.2	10 05.6	85 29	162.5	9 40.1	85 29	162.7	8 23.5	85 27	163.5	7 57.9	85 27	163.8	*3*
4	11 54.3	84 32	160.6	11 29.1	84 32	160.9	10 38.7	84 31	161.4	10 13.4	84 30	161.7	9 48.2	84 30	162.0	9 22.9	84 29	162.3	8 07.1	84 28	163.1	7 41.8	84 28	163.4	*4*
35	11 35.1	83 33	160.1	11 10.2	83 32	160.4	10 20.3	83 31	161.0	9 55.3	83 31	161.3	9 30.3	83 30	161.5	9 05.3	83 30	161.8	7 50.3	83 29	162.7	7 25.2	84 28	162.9	*35*
6	11 15.5	82 33	159.6	10 50.8	82 33	159.9	10 01.5	82 32	160.5	9 36.8	82 32	160.8	9 12.0	82 31	161.1	8 47.3	82 31	161.4	7 33.0	83 29	162.2	7 08.3	83 29	162.5	*6*
7	10 55.4	81 34	159.1	10 31.0	81 34	159.4	9 42.2	81 33	160.0	9 17.8	81 32	160.3	8 53.3	82 32	160.6	8 28.9	82 31	160.9	7 15.4	82 30	161.8	6 50.9	82 30	162.1	*7*
8	10 34.9	80 35	158.7	10 10.8	80 34	159.0	9 22.5	80 34	159.6	8 58.3	81 33	159.9	8 34.2	81 33	160.2	8 10.0	81 32	160.5	6 57.4	81 31	161.4	6 33.1	81 30	161.7	*8*
9	10 13.9	79 36	158.2	9 50.1	79 35	158.5	9 02.4	80 34	159.1	8 38.5	80 34	159.4	8 14.6	80 33	159.7	7 50.7	80 33	160.0	6 39.0	80 31	161.0	6 15.0	80 31	161.3	*9*
40	9 52.5	78 36	157.7	9 29.0	78 36	158.0	8 41.8	79 35	158.7	8 18.3	79 34	159.0	7 54.7	79 34	159.3	7 31.0	79 33	159.6	6 20.1	79 32	160.5	5 56.5	79 32	160.9	*40*
1	9 30.7	77 37	157.3	9 07.4	78 37	157.6	8 20.9	78 36	158.2	7 57.6	78 35	158.6	7 34.3	78 35	158.9	7 11.0	78 34	159.2	6 00.9	78 33	160.1	5 37.6	78 32	160.5	*1*
2	9 08.4	76 38	156.8	8 45.5	77 37	157.1	7 59.5	77 36	157.8	7 36.5	77 36	158.1	7 13.5	77 35	158.4	6 50.5	77 35	158.8	5 41.4	77 33	159.7	5 18.3	77 33	160.1	*2*
3	8 45.7	75 38	156.4	8 23.1	76 38	156.7	7 37.8	76 37	157.4	7 15.1	76 36	157.7	6 52.4	76 36	158.0	6 29.6	76 35	158.4	5 21.4	76 34	159.3				*3*
4	8 22.7	74 39	155.9	8 00.3	74 39	156.3	7 15.6	75 38	156.9	6 53.2	75 37	157.3	6 30.8	75 37	157.6	6 08.4	75 36	158.0	5 01.1	75 34	159.0				*4*
45	7 59.2	73 40	155.5	7 37.2	73 39	155.8	6 53.1	74 38	156.5	6 31.0	74 38	156.9	6 08.9	74 37	157.2	5 46.8	74 37	157.6							*45*
6	7 35.4	72 40	155.1	7 13.6	72 40	155.4	6 30.2	73 39	156.1	6 08.4	73 38	156.5	5 46.6	73 38	156.8	5 24.8	73 37	157.2							*6*
7	7 11.1	71 41	154.7	6 49.7	71 40	155.0	6 06.9	71 39	155.7	5 45.4	72 39	156.1	5 24.0	72 38	156.4	5 02.5	72 38	156.8							*7*
8	6 46.5	70 42	154.2	6 25.4	70 41	154.6	5 43.2	70 40	155.3	5 22.1	70 39	155.7	5 01.0	70 39	156.0										*8*
9	6 21.5	69 42	153.8	6 00.8	69 42	154.2	5 19.2	69 40	154.9																*9*
50	5 56.2	68 43	153.4	5 35.8	68 42	153.8																			*50*
1	5 30.5	67 43	153.0	5 10.4	67 43	153.4																			*1*
2	5 04.4	66 44	152.7																						*2*

DECLINATION SAME NAME AS LATITUDE

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	14 00.1	20 57	36.8	14 06.0	20 56	36.2	14 17.7	19 55	35.2	14 23.4	19 54	34.7	14 29.1	19 53	34.2	14 34.7	19 53	33.7	14 51.1	18 51	32.2	14 56.5	18 50	31.7	91
2	13 26.0	21 57	36.6	13 32.3	21 56	36.1	13 44.8	21 55	35.1	13 50.9	20 54	34.6	13 57.0	20 53	34.1	14 03.1	20 53	33.6	14 20.8	19 50	32.1	14 26.6	19 50	31.6	2
3	12 52.0	23 56	36.5	12 58.7	22 56	36.0	13 12.0	22 54	35.0	13 18.6	22 54	34.5	13 25.1	22 53	34.0	13 31.5	21 52	33.5	13 50.5	21 50	32.0	13 56.7	21 50	31.5	3
4	12 18.1	24 56	36.4	12 25.2	24 56	35.9	12 39.3	23 54	34.9	12 46.3	23 54	34.4	12 53.2	23 53	33.9	13 00.1	23 52	33.4	13 20.3	22 50	31.9	13 27.0	22 49	31.4	4
95	11 44.3	25 56	36.2	11 51.8	25 55	35.7	12 06.8	25 54	34.7	12 14.1	25 53	34.2	12 21.5	24 53	33.7	12 28.8	24 52	33.2	12 50.3	24 50	31.8	12 57.3	23 49	31.3	95
6	11 10.6	27 56	36.1	11 18.6	26 55	35.6	11 34.3	26 54	34.6	11 42.1	26 53	34.1	11 49.8	26 53	33.6	11 57.5	26 52	33.1	12 20.3	25 50	31.6	12 27.8	25 49	31.1	6
7	10 37.1	28 56	35.9	10 45.4	28 55	35.4	11 02.0	27 54	34.4	11 10.2	27 53	33.9	11 18.3	27 52	33.5	11 26.4	27 52	33.0	11 50.4	26 50	31.5	11 58.3	26 49	31.0	7
8	10 03.7	29 55	35.7	10 12.4	29 55	35.2	10 29.8	29 53	34.3	10 38.4	29 53	33.8	10 46.9	28 52	33.3	10 55.4	28 51	32.8	11 20.7	28 49	31.3	11 29.0	28 49	30.9	8
9	9 30.5	30 55	35.6	9 39.6	30 55	35.1	9 57.7	30 53	34.1	10 06.7	30 53	33.6	10 15.7	30 52	33.1	10 24.6	30 51	32.7	10 51.1	29 49	31.2	10 59.8	29 48	30.7	9
100	8 57.3	32 55	35.4	9 06.9	32 54	34.9	9 25.8	31 53	33.9	9 35.2	31 52	33.5	9 44.5	31 52	33.0	9 53.9	31 51	32.5	10 21.6	31 49	31.0	10 30.7	30 48	30.6	100
1	8 24.4	33 55	35.2	8 34.3	33 54	34.7	8 54.0	33 53	33.8	9 03.8	33 52	33.3	9 13.6	32 51	32.8	9 23.3	32 51	32.3	9 52.2	32 49	30.9	10 01.8	32 48	30.4	1
2	7 51.6	34 54	35.0	8 01.9	34 54	34.5	8 22.4	34 52	33.6	8 32.6	34 52	33.1	8 42.7	34 51	32.6	8 52.8	34 50	32.1	9 23.0	33 48	30.7	9 33.0	33 48	30.2	2
3	7 19.0	36 54	34.8	7 29.6	36 53	34.3	7 50.9	35 52	33.4	8 01.5	35 52	32.9	8 12.0	35 51	32.4	8 22.6	35 50	31.9	8 53.9	35 48	30.5	9 04.3	35 48	30.1	3
4	6 46.5	37 54	34.6	6 57.6	37 53	34.1	7 19.6	37 52	33.2	7 30.6	37 51	32.7	7 41.5	36 51	32.2	7 52.5	36 50	31.8	8 25.0	36 48	30.3	8 35.8	36 47	29.9	4
105	6 14.2	38 54	34.4	6 25.6	38 53	33.9	6 48.5	38 52	33.0	6 59.8	38 51	32.5	7 11.2	38 50	32.0	7 22.5	38 50	31.6	7 56.3	37 48	30.2	8 07.5	37 47	29.7	105
6	5 42.1	39 53	34.1	5 53.9	39 53	33.7	6 17.5	39 51	32.7	6 29.3	39 51	32.3	6 41.0	39 50	31.8	6 52.7	39 49	31.3	7 27.7	39 47	30.0	7 39.3	39 47	29.5	6
7	5 10.2	41 53	33.9	5 22.4	41 52	33.4	5 46.8	41 51	32.5	5 58.9	40 50	32.1	6 11.0	40 50	31.6	6 23.1	40 49	31.1	6 59.3	40 47	29.8	7 11.3	40 46	29.3	7
8							5 16.2	42 51	32.3	5 28.7	42 50	31.8	5 41.2	42 49	31.4	5 53.7	42 49	30.9	6 31.1	41 47	29.5	6 43.5	41 46	29.1	8
9													5 11.6	43 49	31.1	5 24.5	43 48	30.7	6 03.0	43 46	29.3	6 15.8	43 46	28.9	9
110																			5 35.2	44 46	29.1	5 48.4	44 45	28.6	110
1																			5 07.5	45 46	28.9	5 21.1	45 45	28.4	1

Lat. 18°

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	48 00.0	1.0 01	00.0	47 30.0	1.0 01	00.0	46 00.0	1.0 01	00.0	45 30.0	1.0 01	00.0	45 00.0	1.0 01	00.0	39 00.0	1.0 00	00.0	38 30.0	1.0 00	00.0	33 30.0	1.0 00	00.0	00
1	47 59.6	1.0 02	00.7	47 29.6	1.0 02	00.7	45 59.7	1.0 02	00.7	45 29.7	1.0 02	00.7	44 59.7	1.0 02	00.6	38 59.8	1.0 01	00.5	38 29.8	1.0 01	00.4	33 29.8	1.0 01	00.3	1
2	47 58.5	1.0 03	01.5	47 28.5	1.0 03	01.5	45 58.7	1.0 03	01.4	45 28.7	1.0 03	01.3	44 58.7	1.0 03	01.3	38 59.1	1.0 02	00.9	38 29.1	1.0 02	00.9	33 29.4	1.0 01	00.6	2
3	47 56.7	1.0 04	02.2	47 26.7	1.0 04	02.2	45 57.0	1.0 04	02.0	45 27.0	1.0 04	02.0	44 57.1	1.0 04	01.9	38 57.9	1.0 03	01.4	38 28.0	1.0 03	01.3	33 28.6	1.0 02	01.0	3
4	47 54.1	1.0 06	03.0	47 24.2	1.0 05	02.9	45 54.6	1.0 06	02.7	45 24.8	1.0 05	02.6	44 54.9	1.0 05	02.6	38 56.3	1.0 03	01.8	38 26.4	1.0 03	01.8	33 27.4	1.0 02	01.3	4
05	47 50.7	99 07	03.7	47 20.9	99 07	03.6	45 51.6	99 06	03.4	45 21.8	99 06	03.3	44 52.0	99 06	03.2	38 54.3	99 04	02.3	38 24.4	99 04	02.2	33 26.0	1.0 03	01.6	05
6	47 46.6	99 08	04.5	47 17.0	99 08	04.4	45 47.9	99 07	04.0	45 18.2	99 07	03.9	44 48.5	99 07	03.8	38 51.7	99 05	02.8	38 22.0	99 05	02.7	33 24.3	99 03	01.9	6
7	47 41.8	99 09	05.2	47 12.3	99 09	05.1	45 43.6	99 08	04.7	45 14.0	99 08	04.6	44 44.4	99 08	04.5	38 48.8	99 06	03.2	38 19.1	99 06	03.1	33 22.2	99 04	02.2	7
8	47 36.3	98 10	05.9	47 06.9	98 10	05.8	45 38.6	98 09	05.4	45 09.1	98 09	05.2	44 39.6	98 09	05.1	38 45.4	99 06	03.7	38 15.8	99 06	03.6	33 19.8	99 04	02.6	8
9	47 30.1	98 12	06.6	47 00.8	98 11	06.5	45 32.9	98 10	06.0	45 03.6	98 10	05.9	44 34.3	98 10	05.7	38 41.5	98 07	04.1	38 12.0	98 07	04.0	33 17.1	98 05	02.9	9
10	47 23.1	97 13	07.4	46 54.0	97 12	07.2	45 26.6	97 12	06.7	44 57.4	97 11	06.5	44 28.3	97 11	06.3	38 37.2	98 08	04.6	38 07.8	98 08	04.4	33 14.1	98 06	03.2	10
1	47 15.4	96 14	08.1	46 46.5	96 14	07.9	45 19.6	97 13	07.3	44 50.7	97 12	07.1	44 21.6	97 12	07.0	38 32.4	97 09	05.0	38 03.2	97 08	04.9	33 10.8	98 06	03.5	1
2	47 07.1	96 15	08.8	46 38.3	96 15	08.6	45 12.1	96 14	08.0	44 43.3	96 13	07.8	44 14.4	96 13	07.6	38 27.2	97 09	05.5	37 58.1	97 09	05.3	33 07.2	97 07	03.8	2
3	46 58.0	95 16	09.5	46 29.5	95 16	09.3	45 03.8	95 15	08.6	44 35.2	95 14	08.4	44 06.6	95 14	08.2	38 21.5	96 10	05.9	37 52.7	96 10	05.7	33 03.2	97 07	04.1	3
4	46 48.3	94 17	10.2	46 20.0	94 17	09.9	44 55.0	95 16	09.2	44 26.6	95 15	09.0	43 58.2	95 15	08.8	38 15.4	96 11	06.3	37 46.8	96 11	06.2	32 59.0	96 08	04.4	4
15	46 37.8	93 18	10.9	46 09.8	93 18	10.6	44 45.5	94 17	09.9	44 17.4	94 16	09.6	43 49.2	94 16	09.4	38 08.9	95 12	06.8	37 40.4	95 11	06.6	32 54.4	96 08	04.7	15
6	46 26.8	92 20	11.5	45 59.0	93 19	11.3	44 35.5	93 18	10.5	44 07.6	93 17	10.2	43 39.6	93 17	10.0	38 02.0	94 12	07.2	37 33.7	94 12	07.0	32 49.6	95 09	05.0	6
7	46 15.0	92 21	12.2	45 47.5	92 20	11.9	44 24.8	92 19	11.1	43 57.1	92 18	10.8	43 29.5	92 18	10.5	37 54.6	94 13	07.6	37 26.5	94 13	07.4	32 44.4	94 09	05.3	7
8	46 02.6	91 22	12.9	45 35.4	91 21	12.6	44 13.5	91 20	11.7	43 46.2	91 19	11.4	43 18.7	91 19	11.1	37 46.8	93 14	08.1	37 19.0	93 13	07.8	32 39.0	94 10	05.6	8
9	45 49.6	90 23	13.5	45 22.7	90 22	13.2	44 01.7	90 21	12.3	43 34.6	90 20	12.0	43 07.5	91 20	11.7	37 38.6	92 14	08.5	37 11.0	92 14	08.2	32 33.2	93 10	05.9	9
20	45 36.0	89 24	14.1	45 09.4	89 23	13.8	43 49.3	89 22	12.9	43 22.5	89 21	12.5	42 55.6	90 21	12.2	37 30.0	91 15	08.9	37 02.6	91 15	08.6	32 27.2	92 11	06.2	20
1	45 21.7	87 25	14.8	44 55.5	88 24	14.4	43 36.3	88 23	13.4	43 09.8	88 22	13.1	42 43.3	89 22	12.8	37 21.0	90 16	09.3	36 53.9	90 15	09.0	32 20.9	92 11	06.5	1
2	45 06.9	86 26	15.4	44 40.9	87 25	15.0	43 22.8	87 23	14.0	42 56.6	87 23	13.7	42 30.4	88 22	13.3	37 11.6	89 16	09.7	36 44.7	90 16	09.4	32 14.3	91 12	06.8	2
3	44 51.4	85 27	16.0	44 25.8	85 26	15.6	43 08.7	86 24	14.6	42 42.8	86 24	14.2	42 16.9	86 23	13.9	37 01.8	89 17	10.1	36 35.2	89 17	09.8	32 07.4	90 12	07.1	3
4	44 35.4	84 28	16.6	44 10.2	84 27	16.2	42 54.1	85 25	15.1	42 28.6	85 25	14.8	42 03.0	85 24	14.4	36 51.6	88 18	10.5	36 25.3	88 17	10.2	32 00.2	89 12	07.4	4
25	44 18.8	83 29	17.2	43 54.0	83 28	16.8	42 38.9	84 26	15.6	42 13.8	84 25	15.3	41 48.6	84 25	14.9	36 41.0	87 18	10.9	36 15.0	87 18	10.6	31 52.7	88 13	07.6	25
6	44 01.7	81 29	17.7	43 37.2	82 29	17.3	42 23.3	83 27	16.2	41 58.5	83 26	15.8	41 33.6	83 26	15.4	36 30.0	85 19	11.3	36 04.3	86 18	10.9	31 45.0	87 13	07.9	6
7	43 44.1	80 30	18.3	43 20.0	80 30	17.9	42 07.2	81 28	16.7	41 42.7	82 27	16.3	41 18.2	82 26	15.9	36 18.7	84 20	11.6	35 53.3	85 19	11.3	31 37.0	86 14	08.2	7
8	43 25.9	79 31	18.9	43 02.2	79 30	18.4	41 50.5	80 29	17.2	41 26.5	80 28	16.8	41 02.3	81 27	16.4	36 07.0	83 20	12.0	35 41.9	84 20	11.7	31 28.7	85 14	08.5	8
9	43 07.2	78 32	19.4	42 43.9	78 31	19.0	41 33.4	79 29	17.7	41 09.7	79 29	17.3	40 46.0	79 28	16.9	35 54.9	82 21	12.4	35 30.2	82 20	12.0	31 20.2	84 15	08.7	9
30	42 48.0	76 33	19.9	42 25.1	76 32	19.5	41 15.8	77 30	18.2	40 52.5	78 29	17.8	40 29.2	78 29	17.4	35 42.5	81 21	12.7	35 18.1	81 21	12.4	31 11.4	83 15	09.0	30
1	42 28.3	75 34	20.4	42 05.8	75 33	20.0	40 57.8	76 31	18.7	40 34.9	76 30	18.2	40 11.9	77 29	17.8	35 29.7	80 22	13.1	35 05.7	80 21	12.7	31 02.4	82 16	09.2	1
2	42 08.1	73 34	20.9	41 46.1	74 34	20.5	40 39.3	75 32	19.1	40 16.8	75 31	18.7	39 54.2	75 30	18.3	35 16.6	79 22	13.5	34 53.0	79 22	13.1	30 53.1	81 16	09.5	2
3	41 47.5	72 35	21.4	41 25.9	72 34	21.0	40 20.3	73 32	19.6	39 58.3	74 32	19.2	39 36.1	74 31	18.7	35 03.2	77 23	13.8	34 39.9	78 22	13.4	30 43.6	80 16	09.7	3
4	41 26.5	70 36	21.9	41 05.3	71 35	21.4	40 01.0	72 33	20.0	39 39.3	72 32	19.6	39 17.6	73 32	19.1	34 49.4	76 23	14.1	34 26.5	76 23	13.7	30 33.8	79 17	10.0	4
35	41 05.0	69 37	22.4	40 44.2	69 36	21.9	39 41.2	71 34	20.5	39 20.0	71 33	20.0	38 58.7	71 32	19.6	34 35.3	75 24	14.5	34 12.8	75 23	14.1	30 23.8	77 17	10.2	35
6	40 43.0	68 37	22.8	40 22.7	68 36	22.3	39 21.0	69 34	20.9	39 00.3	69 34	20.4	38 39.4	70 33	20.0	34 20.9	74 24	14.8	33 58.8	74 24	14.4	30 13.5	76 17	10.5	6
7	40 20.7	66 38	23.3	40 00.8	66 37	22.8	39 00.5	68 35	21.3	38 40.1	68 34	20.8	38 19.7	68 33	20.4	34 06.2	72 25	15.1	33 44.5	73 24	14.7	30 03.0	75 18	10.7	7
8	39 58.0	65 39	23.7	39 38.6	65 38	23.2	38 39.6	66 36	21.7	38 19.6	67 35	21.2	37 59.6	67 34	20.8	33 51.2	71 26	15.4	33 29.9	71 25	15.0	29 52.3	74 18	10.9	8
9	39 34.9	63 39	24.1	39 15.9	63 38	23.6	38 18.3	65 36	22.1	37 58.8	65 35	21.6	37 39.2	65 35	21.2	33 35.9	70 26	15.7	33 15.0	70 25	15.3	29 41.4	72 19	11.2	9
40	39 11.4	61 40	24.5	38 52.9	62 39	24.0	37 56.6	63 37	22.5	37 37.6	64 36	22.0	37 18.4	64 35	21.5	33 20.3	68 26	16.0	32 59.8	68 26	15.6	29 30.2	71 19	11.4	40
1	38 47.6	60 40	24.9	38 29.5	60 40	24.4	37 34.6	62 37	22.9	37 16.0	62 36	22.4	36 57.3	62 36	21.9	33 04.4	67 27	16.3	32 44.4	67 26	15.9	29 18.8	70 19	11.6	1
2	38 23.4	58 41	25.3	38 05.8	59 40	24.8	37 12.2	60 38	23.2	36 54.1	61 37	22.7	36 35.9	61 36	22.2	32 48.3	65 27	16.6	32 28.6	66 27	16.1	29 07.3	69 20	11.8	2
3	37 58.8	57 41	25.6	37 41.7	57 41	25.1	36 49.6	59 38	23.6	36 31.9	59 38	23.1	36 14.2	59 37	22.6	32 31.9	64 28	16.9	32 12.7	64 27	16.4	28 55.5	67 20	12.0	3
4	37 34.0	55 42	26.0	37 17.3	56 41	25.5	36 26.6	57 39	23.9	36 09.4	57 38	23.4	35 52.1	58 37	22.9	32 15.2	62 28	17.1	31 56.4	63 27	16.7	28 43.5	66 20	12.2	4
45	37 08.8	54 42	26.3	36 52.7	54 42	25.8	36 03.3	56 39	24.2	35 46.6	56 39	23.7	35 29.8	56 38	23.2	31 58.3	61 29	17.4	31 39.9	61 28	16.9	28 31.3	64 21	12.4	45
6	36 43.4	52 43	26.7	36 27.7	53 42	26.1	35 39.7	54 40	24.6	35 23.5	54 39	24.0	35 07.1	55 38	23.5	31 41.1	59 29	17.6	31 23.2	60 28	17.2	28 19.0	63 21	12.6	6
7	36 17.6	51 43	27.0	36 02.4	51 43	26.4	35 15.9	52 40	24.9	35 00.1	53 39	24.3	34 44.2	53 39	23.8	31 23.7	58 29	17.9	31 06.3	58 29	17.4	28 06.4	61 21	12.8	7
8	35 51.6	49 44	27.3	35 36.8	49 43	26.8	34 51.7	51 41	25.2	34 36.4	51 40	24.6	34 21.0	52 39	24.1	31 06.1	56 30	18.1	30 49.1	57 29	17.6	27 53.7	60 22	13.0	8
9	35 25.3	47 44	27.6	35 11.0	48 43	27.0	34 27.4	49 41	25.4	34 12.5	50 40	24.9	33 57.6	50 39	24.4	30 48.2	55 30	18.4	30 31.7	55 29	17.9	27 40.8	59 22	13.2	9
50	34 58.8	46 45	27.9	34 45.0	46 44	27.3	34 02.7	48 42	25.7	33 48.4	48 41	25.2	33 33.9	49 40	24.7	30 30.1	53 30	18.6	30 14.1	54 30	18.1	27 27.7	57 22	13.3	50
1	34 32.0	44 45	28.1	34 18.6	45 44	27.6	33 37.8	46 42	26.0	33 23.9	46 41	25.5	33 09.9	47 40	24.9	30 11.9	52 31	18.8	29 56.2	52 30	18.3	27 14.4	56 22	13.5	1
2	34 04.9	43 45	28.4	33 52.1	43 45	27.9	33 12.7	44 42	26.2	32 59.3	45 41	25.7	32 45.8	45 41	25.2	29 53.4	50 31	19.0	29 38.2	51 30	18.5	27 01.0	54 23	13.7	2
3	33 37.7	41 46	28.7	33 25.3	41 45	28.1	32 47.4	43 43	26.5	32 34.4	43 42	26.0	32 21.4	44 41	25.4	29 34.7	49 31	19.2	29 20.0	49 31	18.7	26 47.4	53 23	13.8	3
4	33 10.2	39 46	28.9	32 58.3	40 45	28.4	32 21.8	41 43	26.7	32 09.4	42 42	26.2	31 56.8	42 41	25.6	29 15.8	47 32	19.4	29 01.6	48 31	18.9	26 33.7	51 23	14.0	4
55	32 42.5	38 46	29.1	32 31.1	38 46	28.6	31 56.0	40 43	26.9	31 44.1	40 42	26.4	31 32.0	41 42	25.9	28 56.8	46 32	19.6	28 43.0	46 31	19.1	26 19.9	49 23	14.1	55
6	32 14.7	36 47	29.3	32 03.7	37 46	28.8	31 30.1	38 44	27.2	31 18.6	39 43	26.6	31 07.0	39 42	26.1	28 37.5	44 32	19.8	28 24.3	44 32	19.3	26 05.9	48 24	14.3	6
7	31 46.6	35 47	29.6	31 36.1	35 46	29.0	31 04.0	36 44	27.4	30 53.0	37 43	26.8	30 41.8	37 42	26.3	28 18.1	42 33	20.0	28 05.4	43 32	19.4	25 51.7	46 24	14.4	7
8	31 18.4	33 47	29.8	31 08.4	33 47	29.2	30 37.6	35 44	27.6	30 27.1	35 43	27.0	30 16.5	36 43	26.5	27 58.6	41 33	20.1	27 46.3	41 32	19.6	25 37.4	45 24	14.6	8
9	30 50.0	31 48	29.9	30 40.5	32 47	29.4	30 11.2	33 44	27.7	30 01.1	34 44	27.2	29 50.9	34 43	26.7	27 38.9	39 33	20.3	27 27.1	40 32	19.8	25 23.0	43 24	14.7	9
60	30 21.4	30 48	30.1	30 12.4	30 47	29.6	29 44.5	32 45	27.9	29 34.9	32 44	27.4	29 25.3	33 43	26.8	27 19.0	38 33	20.4	27 07.7	38 33	19.9	25 08.5	41 24	14.8	60
1	29 52.7	28 48	30.3	29 44.2	29 47	29.7	29 17.7	30 45	28.1	29 08.6	30 44	27.5	28 59.4	31 43	27.0	26 59.0	36 34	20.6	26 48.2	36 33	20.1	24 53.9	40 25	14.9	1
2	29 23.8	27 48	30.4	29 15.8	27 48	29.9	28 50.8	28 45	28.2	28 42.2	29 44	27.7	28 33.4	29 44	27.2	26 38.9	34 34	20.7	26 28.5	35 33	20.2	24 39.1	38 25	15.0	2
3	28 54.9	25 48	30.6	28 47.3	26 48	30.0	28 23.7	27 45	28.4	28 15.6	27 45	27.8	28 07.3	28 44	27.3	26 18.6	33 34	20.9	26 08.7	33 33	20.3	24 24.2	37 25	15.2	3
4	28 25.8	23 49	30.7	28 18.6	24 48	30.2	27 56.5	25 46	28.5	27 48.9	26 45	28.0	27 41.1	26 44	27.4	25 58.2	31 34	21.0	25 48.9	31 33	20.5	24 09.3	35 25	15.3	4
65	27 56.5	22 49	30.9	27 49.9	22 48	30.3	27 29.2	24 46	28.7	27 22.0	24 45	28.1	27 14.8	25 44	27.6	25 37.7	29 34	21.1	25 28.8	30 34	20.6	23 54.2	33 25	15.4	65
6	27 27.2	20 49	31.0	27 21.1	21 48	30.4	27 01.8	22 46	28.8	26 55.1	22 45	28.2	26 48.3	23 44	27.7	25 17.1	28 35	21.2	25 08.7	28 34	20.7	23 39.0	32 25	15.5	6
7	26 57.8	19 49	31.1	26 52.1	19 48	30.5	26 34.3	20 46	28.9	26 28.1	21 45	28.3	26 21.7	21 44	27.8	24 56.4	26 35	21.3	24 48.5	26 34	20.8	23 23.8	30 26	15.5	7
8	26 28.3	17 49	31.2	26 23.1	18 49	30.6	26 06.6	19 46	29.0	26 00.9	19 45	28.5	25 55.1	20 45	27.9	24 35.6	24 35	21.4	24 28.2	25 34	20.9	23 08.4	28 26	15.6	8
9	25 58.7	16 49	31.3	25 53.9	16 49	30.7	25 38.9	17 46	29.1	25 33.7	18 46	28.5	25 28.3	18 45	28.0	24 14.7	23 35	21.5	24 07.8	23 34	21.0	22 53.0	27 26	15.7	9
70	25 29.0	14 50	31.4	25 24.7	14 49	30.8	25 11.2	16 46	29.2	25 06.4	16 46	28.6	25 01.5	17 45	28.1	23 53.7	21 35	21.6	23 47.3	21 34	21.1	22 37.5	25 26	15.8	70
1	24 59.3	13 50	31.4	24 55.5	13 49	30.9	24 43.3	14 47	29.3	24 39.0	15 46	28.7	24 34.6	15 45	28.2	23 32.6	19 35	21.7	23 26.8	20 34	21.2	22 22.0	23 26	15.9	1
2	24 29.5	11 50	31.5	24 26.2	11 49	31.0	24 15.4	13 47	29.3	24 11.6	13 46	28.8	24 07.6	13 45	28.2	23 11.5	18 35	21.8	23 06.1	18 34	21.2	22 06.3	22 26	15.9	2
3	23 59.7	09 50	31.6	23 56.8	10 49	31.0	23 47.4	11 47	29.4	23 44.1	11 46	28.8	23 40.6	12 45	28.3	22 50.3	16 35	21.8	22 45.4	17 35	21.3	21 50.7	20 26	16.0	3
4	23 29.8	08 50	31.6	23 27.3	08 49	31.1	23 19.4	09 47	29.4	23 16.5	10 46	28.9	23 13.5	10 45	28.4	22 29.1	15 36	21.9	22 24.7	15 35	21.4	21 34.9	18 26	16.0	4
75	22 59.9	06 50	31.6	22 57.9	07 49	31.1	22 51.3	08 47	29.5	22 48.9	08 46	28.9	22 46.4	09 45	28.4	22 07.8	13 36	21.9	22 03.9	13 35	21.4	21 19.1	17 26	16.1	75
6	22 29.9	05 50	31.7	22 28.4	05 49	31.1	22 23.2	06 47	29.5	22 21.3	07 46	29.0	22 19.2	07 45	28.4	21 46.4	11 36	22.0	21 43.0	12 35	21.5	21 03.3	15 26	16.1	6
7	21 59.9	03 50	31.7	21 58.9	04 49	31.2	21 55.1	05 47	29.5	21 53.6	05 46	29.0	21 52.1	05 45	28.5	21 25.1	10 36	22.0	21 22.1	10 35	21.5	20 47.4	13 27	16.2	7
8	21 29.9	02 50	31.7	21 29.3	02 49	31.2	21 27.0	03 47	29.6	21 26.0	04 46	29.0	21 24.8	04 45	28.5	21 03.6	08 36	22.1	21 01.2	08 35	21.5	20 31.5	12 27	16.2	8
9	20 59.9	00 50	31.7	20 59.8	01 49	31.2	20 58.8	02 47	29.6	20 58.3	02 46	29.0	20 57.6	02 45	28.5	20 42.2	06 36	22.1	20 40.3	07 35	21.6	20 15.6	10 27	16.2	9
80	20 29.9	01 50	31.7	20 30.3	01 49	31.2	20 30.6	00 47	29.6	20 30.6	00 46	29.0	20 30.4	01 45	28.5	20 20.7	05 36	22.1	20 19.3	05 35	21.6	19 59.6	08 27	16.3	80
1	19 59.9	03 50	31.7	20 00.7	02 49	31.2	20 02.5	01 47	29.6	20 02.9	01 46	29.0	20 03.1	01 45	28.5	19 59.2	03 36	22.1	19 58.3	03 35	21.6	19 43.6	06 27	16.3	1
2	19 30.0	04 50	31.7	19 31.2	04 49	31.2	19 34.3	03 47	29.6	19 35.2	03 46	29.0	19 35.9	02 45	28.5	19 37.7	01 36	22.1	19 37.3	02 35	21.6	19 27.6	05 27	16.3	2
3	19 00.0	06 50	31.7	19 01.7	05 49	31.1	19 06.2	05 47	29.5	19 07.5	04 46	29.0	19 08.7	04 45	28.5	19 16.2	00 36	22.1	19 16.3	00 35	21.6	19 11.6	03 27	16.3	3
4	18 30.1	07 50	31.6	18 32.2	07 49	31.1	18 38.0	06 47	29.5	18 39.8	06 46	29.0	18 41.5	05 45	28.5	18 54.7	02 36	22.1	18 55.3	02 35	21.6	18 55.6	01 27	16.3	4
85	18 00.2	09 50	31.6	18 02.7	08 49	31.1	18 09.9	08 47	29.5	18 12.1	07 46	29.0	18 14.3	07 45	28.4	18 33.2	04 36	22.1	18 34.2	03 35	21.6	18 39.5	00 27	16.3	85
6	17 30.3	10 50	31.5	17 33.3	10 49	31.0	17 41.9	09 47	29.4	17 44.5	09 46	28.9	17 47.1	09 45	28.4	18 11.8	05 36	22.1	18 13.3	05 35	21.6	18 23.5	02 27	16.3	6
7	17 00.5	12 50	31.5	17 03.9	11 49	31.0	17 13.8	11 47	29.4	17 17.0	10 46	28.9	17 20.0	10 45	28.4	17 50.3	07 36	22.1	17 52.3	06 35	21.6	18 07.5	04 27	16.3	7
8	16 30.7	13 50	31.4	16 34.6	13 49	30.9	16 45.8	12 47	29.3	16 49.4	12 46	28.8	16 52.9	12 45	28.3	17 28.9	08 36	22.1	17 31.3	08 35	21.5	17 51.4	05 27	16.3	8
9	16 01.0	15 49	31.3	16 05.3	14 49	30.8	16 17.9	14 46	29.3	16 21.9	13 46	28.8	16 25.9	13 45	28.2	17 07.4	10 36	22.0	17 10.4	10 35	21.5	17 35.4	07 27	16.3	9
90	15 31.3	16 49	31.3	15 36.1	16 49	30.7	15 50.0	15 46	29.2	15 51.5	15 46	28.7	15 58.9	15 45	28.2	16 46.1	12 36	22.0	16 49.5	11 35	21.5	17 19.5	09 27	16.3	90

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′			69° 00′			69° 30′			74° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	15 01.8	17 49	31.2	15 07.0	17 48	30.7	15 22.2	17 46	29.1	15 27.1	16 46	28.6	15 32.0	16 45	28.1	16 24.7	13 36	21.9	16 28.6	13 35	21.4	17 03.5	10 27	16.2	91
2	14 32.3	19 49	31.1	14 37.9	19 48	30.6	14 54.5	18 46	29.0	14 59.8	18 45	28.5	15 05.2	18 45	28.0	16 03.4	15 35	21.9	16 07.8	15 35	21.4	16 47.6	12 26	16.2	2
3	14 02.9	20 49	31.0	14 08.9	20 48	30.5	14 26.8	20 46	29.0	14 32.6	19 45	28.4	14 38.4	19 44	27.9	15 42.2	16 35	21.8	15 47.1	16 34	21.3	16 31.7	14 26	16.2	3
4	13 33.5	22 49	30.9	13 40.0	22 48	30.4	13 59.2	21 46	28.9	14 05.5	21 45	28.4	14 11.7	21 44	27.9	15 21.0	18 35	21.8	15 26.3	18 34	21.2	16 15.8	15 26	16.1	4
95	13 04.3	23 49	30.8	13 11.2	23 48	30.3	13 31.7	22 46	28.8	13 38.4	22 45	28.3	13 45.1	22 44	27.8	14 59.9	19 35	21.7	15 05.7	19 34	21.2	16 00.0	17 26	16.1	95
6	12 35.2	25 48	30.6	12 42.5	24 48	30.1	13 04.3	24 46	28.6	13 11.5	24 45	28.1	13 18.5	24 44	27.6	14 38.8	21 35	21.6	14 45.1	21 34	21.1	15 44.2	19 26	16.0	6
7	12 06.2	26 48	30.5	12 14.0	26 47	30.0	12 37.0	25 45	28.5	12 44.6	25 45	28.0	12 52.1	25 44	27.5	14 17.8	23 35	21.5	14 24.6	22 34	21.0	15 28.5	20 26	16.0	7
8	11 37.3	27 48	30.4	11 45.5	27 47	29.9	12 09.8	27 45	28.4	12 17.8	27 44	27.9	12 25.8	26 44	27.4	13 56.9	24 35	21.4	14 04.2	24 34	20.9	15 12.8	22 26	15.9	8
9	11 08.5	29 48	30.2	11 17.1	29 47	29.7	11 42.7	28 45	28.3	11 51.2	28 44	27.8	11 59.6	28 44	27.3	13 36.1	26 35	21.4	13 43.8	25 34	20.9	14 57.2	23 26	15.9	9
100	10 39.8	30 48	30.1	10 48.9	30 47	29.6	11 15.8	30 45	28.1	11 24.7	30 44	27.6	11 33.5	29 43	27.2	13 15.4	27 34	21.3	13 23.5	27 34	20.8	14 41.6	25 26	15.8	100
1	10 11.3	32 47	29.9	10 20.8	32 47	29.4	10 48.9	31 45	28.0	10 58.2	31 44	27.5	11 07.5	31 43	27.0	12 54.7	29 34	21.2	13 03.3	29 33	20.7	14 26.1	27 26	15.7	1
2	9 42.9	33 47	29.7	9 52.8	33 46	29.3	10 22.2	32 44	27.8	10 32.0	32 44	27.3	10 41.6	32 43	26.9	12 34.2	30 34	21.0	12 43.2	30 33	20.6	14 10.7	28 26	15.6	2
3	9 14.7	34 47	29.6	9 25.0	34 46	29.1	9 55.7	34 44	27.7	10 05.8	34 43	27.2	10 15.9	34 43	26.7	12 13.8	32 34	20.9	12 23.3	32 33	20.4	13 55.3	30 25	15.6	3
4	8 46.6	36 47	29.4	8 57.3	36 46	28.9	9 29.2	35 44	27.5	9 39.8	35 43	27.0	9 50.3	35 42	26.6	11 53.4	33 34	20.8	12 03.4	33 33	20.3	13 40.1	31 25	15.5	4
105	8 18.6	37 46	29.2	8 29.8	37 46	28.7	9 03.0	37 44	27.3	9 14.0	37 43	26.9	9 24.9	36 42	26.4	11 33.2	35 34	20.7	11 43.6	35 33	20.2	13 24.9	33 25	15.4	105
6	7 50.9	39 46	29.0	8 02.4	38 45	28.6	8 36.8	38 43	27.2	8 48.2	38 43	26.7	8 59.6	38 42	26.2	11 13.1	36 33	20.6	11 23.9	36 33	20.1	13 09.8	34 25	15.3	6
7	7 23.3	40 46	28.8	7 35.2	40 45	28.4	8 10.9	39 43	27.0	8 22.7	39 42	26.5	8 34.5	39 42	26.0	10 53.1	38 33	20.4	11 04.4	38 32	20.0	12 54.8	36 25	15.2	7
8	6 55.8	41 45	28.6	7 08.2	41 45	28.2	7 45.1	41 43	26.8	7 57.3	41 42	26.3	8 09.5	41 41	25.9	10 33.3	39 33	20.3	10 45.0	39 32	19.8	12 39.9	37 25	15.1	8
9	6 28.6	43 45	28.4	6 41.4	42 44	28.0	7 19.4	42 42	26.6	7 32.1	42 42	26.1	7 44.7	42 41	25.7	10 13.6	41 33	20.1	10 25.7	40 32	19.7	12 25.0	39 25	15.0	9
110	6 01.5	44 45	28.2	6 14.7	44 44	27.7	6 54.0	44 42	26.4	7 07.0	43 41	25.9	7 20.1	43 41	25.5	9 54.0	42 32	20.0	10 06.6	42 32	19.5	12 10.3	41 24	14.9	110
1	5 34.7	45 44	28.0	5 48.2	45 44	27.5	6 28.7	45 42	26.2	6 42.2	45 41	25.7	6 55.6	45 40	25.3	9 34.5	44 32	19.8	9 47.6	43 31	19.4	11 55.7	42 24	14.8	1
2	5 08.0	46 44	27.7	5 22.0	46 44	27.3	6 03.7	46 41	26.0	6 17.5	46 41	25.5	6 31.3	46 40	25.1	9 15.3	45 32	19.7	9 28.7	45 31	19.2	11 41.2	43 24	14.7	2
3							5 38.8	48 41	25.7	5 53.0	47 40	25.3	6 07.3	47 40	24.9	8 56.1	46 32	19.5	9 10.0	46 31	19.1	11 26.9	45 24	14.5	3
4							5 14.1	49 41	25.5	5 28.7	49 40	25.1	5 43.4	49 39	24.6	8 37.1	48 31	19.3	8 51.4	48 31	18.9	11 12.6	46 24	14.4	4
115										5 04.7	50 40	24.8	5 19.7	50 39	24.4	8 18.3	49 31	19.2	8 33.1	49 30	18.7	10 58.4	48 23	14.3	115
6																7 59.7	50 31	19.0	8 14.8	50 30	18.5	10 44.4	49 23	14.2	6
7																7 41.2	52 30	18.8	7 56.8	52 30	18.4	10 30.5	51 23	14.0	7
8																7 22.9	53 30	18.6	7 38.9	53 30	18.2	10 16.8	52 23	13.9	8
9																7 04.8	55 30	18.4	7 21.2	54 29	18.0	10 03.2	54 22	13.7	9
120																6 46.9	56 30	18.2	7 03.6	56 29	17.8	9 49.7	55 22	13.6	120
1																6 29.1	57 29	18.0	6 46.3	57 29	17.6	9 36.4	56 22	13.4	1
2																6 11.6	58 29	17.8	6 29.1	58 28	17.4	9 23.2	58 22	13.3	2
3																5 54.2	60 29	17.6	6 12.2	60 28	17.2	9 10.2	59 21	13.1	3
4																5 37.1	61 28	17.4	5 55.4	61 28	17.0	8 57.3	60 21	13.0	4
125																5 20.2	62 28	17.1	5 38.9	62 27	16.8	8 44.6	62 21	12.8	125
6																5 03.5	64 28	16.9	5 22.5	63 27	16.5	8 32.0	63 21	12.6	6
7																			5 06.4	65 26	16.3	8 19.6	64 20	12.5	7
8																						8 07.4	65 20	12.3	8
9																						7 55.3	67 20	12.1	9
																						7 43.5	68 20	11.9	130
																						7 31.8	69 19	11.7	1
																						7 20.2	70 19	11.6	2
																						7 08.9	71 19	11.4	3
																						6 57.8	72 18	11.2	4
																						6 46.8	74 18	11.0	135
																						6 36.0	75 18	10.8	6
																						6 25.5	76 17	10.6	7
																						6 15.1	77 17	10.4	8
																						6 05.0	78 17	10.2	9
																						5 55.0	79 16	09.9	140
																						5 45.2	80 16	09.7	1
																						5 35.7	81 16	09.5	2
																						5 26.4	82 15	09.3	3
																						5 17.3	83 15	09.1	4
																						5 08.4	84 14	08.9	145

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	12 00.0	1.0 00	180.0	11 30.0	1.0 00	180.0	10 00.0	1.0 00	180.0	9 30.0	1.0 00	180.0	9 00.0	1.0 00	180.0
1	11 59.7	1.0 01	179.5	11 29.8	1.0 01	179.5	9 59.8	1.0 01	179.5	9 29.8	1.0 01	179.5	8 59.8	1.0 01	179.5
2	11 59.0	1.0 02	179.0	11 29.0	1.0 02	179.0	9 59.1	1.0 02	179.0	9 29.1	1.0 02	179.1	8 59.1	1.0 02	179.1
3	11 57.7	1.0 03	178.5	11 27.7	1.0 03	178.5	9 57.9	1.0 03	178.6	9 27.9	1.0 03	178.6	8 57.9	1.0 03	178.6
4	11 55.9	1.0 04	178.0	11 26.0	1.0 04	178.0	9 56.2	1.0 04	178.1	9 26.3	1.0 03	178.1	8 56.3	1.0 03	178.2
05	11 53.6	1.0 05	177.4	11 23.7	1.0 05	177.5	9 54.1	1.0 04	177.6	9 24.2	1.0 04	177.7	8 54.3	1.0 04	177.7
6	11 50.8	99 06	176.9	11 21.0	99 05	177.0	9 51.5	99 05	177.1	9 21.6	99 05	177.2	8 51.8	99 05	177.2
7	11 47.5	99 06	176.4	11 17.8	99 06	176.5	9 48.4	99 06	176.7	9 18.6	99 06	176.7	8 48.8	99 16	176.8
8	11 43.7	99 07	175.9	11 14.0	99 07	176.0	9 44.8	99 07	176.2	9 15.1	99 07	176.3	8 45.4	99 06	176.3
9	11 39.4	99 08	175.4	11 09.8	99 08	175.5	9 40.8	99 07	175.7	9 11.2	99 07	175.8	8 41.5	99 07	175.9
10	11 34.6	99 09	174.9	11 05.1	99 09	175.0	9 36.3	99 08	175.3	9 06.8	99 08	175.3	8 37.2	99 08	175.4
1	11 29.3	98 10	174.4	10 59.8	98 10	174.5	9 31.4	98 09	174.8	9 01.9	98 09	174.9	8 32.4	98 09	175.0
2	11 23.5	98 10	173.9	10 54.1	98 10	174.0	9 26.0	98 10	174.3	8 56.6	98 10	174.4	8 27.2	98 09	174.5
3	11 17.2	98 11	173.4	10 47.9	98 11	173.5	9 20.1	98 11	173.9	8 50.8	98 10	174.0	8 21.5	98 10	174.1
4	11 10.4	97 12	172.9	10 41.3	97 12	173.0	9 13.8	97 11	173.4	8 44.6	97 11	173.5	8 15.4	97 11	173.6
15	11 03.2	97 13	172.4	10 34.1	97 13	172.6	9 07.0	97 12	172.9	8 37.9	97 12	173.1	8 08.9	97 12	173.2
6	10 55.4	96 14	171.9	10 26.5	96 14	172.1	8 59.7	96 13	172.5	8 30.8	96 13	172.6	8 01.9	96 12	172.7
7	10 47.1	96 15	171.4	10 18.4	96 14	171.6	8 52.0	96 14	172.0	8 23.2	96 13	172.2	7 54.4	96 13	172.3
8	10 38.4	95 15	171.0	10 09.8	95 15	171.1	8 43.9	95 14	171.6	8 15.2	95 14	171.7	7 46.6	95 14	171.9
9	10 29.2	95 16	170.5	10 00.7	95 16	170.6	8 35.3	95 15	171.1	8 06.8	95 15	171.3	7 38.3	95 15	171.4
20	10 19.5	94 17	170.0	9 51.2	94 17	170.2	8 26.2	94 16	170.7	7 57.9	94 16	170.8	7 29.5	94 15	171.0
1	10 09.4	94 18	169.5	9 41.2	94 17	169.7	8 16.7	94 17	170.2	7 48.6	94 16	170.4	7 20.4	94 16	170.6
2	9 58.7	93 18	169.0	9 30.8	93 18	169.2	8 06.8	93 17	169.8	7 38.8	93 17	169.9	7 10.8	93 17	170.1
3	9 47.7	93 19	168.6	9 19.9	93 19	168.8	7 56.5	93 18	169.3	7 28.7	93 18	169.5	7 00.8	93 17	169.7
4	9 36.1	92 20	168.1	9 08.5	92 20	168.3	7 45.7	92 19	168.9	7 18.1	92 18	169.1	6 50.4	92 18	169.3
25	9 24.1	91 21	167.6	8 56.7	91 20	167.8	7 34.5	91 19	168.5	7 07.0	91 19	168.7	6 39.6	91 19	168.9
6	9 11.7	91 22	167.2	8 44.5	91 21	167.4	7 22.8	91 20	168.0	6 55.6	91 20	168.2	6 28.4	91 19	168.4
7	8 58.8	90 22	166.7	8 31.8	90 22	166.9	7 10.8	90 21	167.6	6 43.8	90 20	167.8	6 16.8	90 20	168.0
8	8 45.4	89 23	166.3	8 18.7	89 23	166.5	6 58.3	89 21	167.2	6 31.5	89 21	167.4	6 04.7	89 21	167.6
9	8 31.7	88 24	165.8	8 05.1	88 23	166.0	6 45.4	89 22	166.8	6 18.9	89 22	167.0	5 52.3	89 21	167.2
30	8 17.5	88 24	165.4	7 51.2	88 24	165.6	6 32.2	88 23	166.3	6 05.8	88 22	166.6	5 39.5	88 22	166.8
1	8 02.8	87 25	164.9	7 36.8	87 25	165.2	6 18.5	87 23	165.9	5 52.4	87 23	166.2	5 26.3	87 23	166.4
2	7 47.8	86 26	164.5	7 22.0	86 25	164.7	6 04.4	86 24	165.5	5 38.5	86 24	165.8	5 12.7	86 23	166.0
3	7 32.3	85 26	164.1	7 06.7	85 26	164.3	5 49.9	85 25	165.1	5 24.3	85 24	165.4			
4	7 16.4	84 27	163.6	6 51.1	84 27	163.9	5 35.1	85 25	164.7	5 09.7	85 25	165.0			
35	7 00.2	84 28	163.2	6 35.1	84 27	163.5	5 19.8	84 26	164.3						
6	6 43.5	83 28	162.8	6 18.7	83 28	163.1	5 04.2	83 27	163.9						
7	6 26.4	82 29	162.4	6 01.9	82 29	162.7									
8	6 08.9	81 30	162.0	5 44.7	81 29	162.3									
9	5 51.0	80 30	161.6	5 27.1	80 30	161.9									
40	5 32.8	79 31	161.2	5 09.1	79 31	161.5									
1	5 14.2	78 32	160.8												

STAR IDENTIFICATION TABLE

Lat. 18°

ALTITUDE

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

16—8472

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

STAR IDENTIFICATION TABLE

ALTITUDE

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

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

Lat. 19°

H.A.	0° 00′				0° 30′				1° 00′				1° 30′				2° 00′				2° 30′				3° 00′				3° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	71 00.0	1.0	03	180.0	71 30.0	1.0	03	180.0	72 00.0	1.0	03	180.0	72 30.0	1.0	03	180.0	73 00.0	1.0	03	180.0	73 30.0	1.0	03	180.0	74 00.0	1.0	03	180.0	74 30.0	1.0	03	180.0	00
1	70 58.5	1.0	08	176.9	71 28.4	1.0	08	176.9	71 58.4	1.0	08	176.8	72 28.4	1.0	08	176.7	72 58.3	1.0	08	176.6	73 28.3	1.0	09	176.5	73 58.2	1.0	09	176.4	74 28.2	1.0	09	176.3	1
2	70 53.9	99	13	173.9	71 23.8	99	13	173.7	71 53.6	99	13	173.6	72 23.4	99	14	173.4	72 53.3	99	14	173.2	73 23.1	99	14	173.0	73 52.9	99	15	172.8	74 22.6	99	15	172.6	2
3	70 46.4	99	17	170.9	71 16.0	99	18	170.6	71 45.7	99	18	170.4	72 15.3	99	19	170.1	72 44.9	99	19	169.8	73 14.4	99	20	169.6	73 44.0	98	20	169.2	74 13.5	98	21	168.9	3
4	70 35.9	98	22	167.9	71 05.3	98	23	167.6	71 34.7	98	23	167.2	72 04.0	98	24	166.9	72 33.3	98	25	166.6	73 02.5	97	25	166.2	73 31.7	97	26	165.8	74 00.9	97	27	165.4	4
05	70 22.6	97	27	165.0	70 51.7	97	27	164.6	71 20.7	97	28	164.2	71 49.6	96	29	163.8	72 18.5	96	30	163.3	72 47.4	96	30	162.9	73 16.2	96	31	162.4	73 44.9	96	32	161.9	05
6	70 06.5	96	31	162.1	70 35.2	95	32	161.7	71 03.8	95	33	161.2	71 32.3	95	34	160.7	72 00.8	95	34	160.2	72 29.2	94	35	159.7	72 57.5	94	36	159.1	73 25.7	94	37	158.5	6
7	69 47.8	94	35	159.3	70 16.0	94	36	158.8	70 44.2	94	37	158.3	71 12.2	93	38	157.8	71 40.2	93	39	157.2	72 08.1	93	40	156.6	72 35.8	92	41	156.0	73 03.4	92	42	155.3	7
8	69 26.5	93	39	156.7	69 54.3	92	40	156.1	70 21.9	92	41	155.5	70 49.5	92	42	154.9	71 16.9	91	43	154.3	71 44.2	91	44	153.7	72 11.4	90	45	153.0	72 38.4	90	46	152.3	8
9	69 02.9	91	43	154.1	69 30.1	91	44	153.5	69 57.2	90	45	152.9	70 24.2	90	46	152.2	70 51.1	89	47	151.5	71 17.8	89	48	150.8	71 44.3	88	49	150.1	72 10.7	88	50	149.3	9
10	68 36.9	89	47	151.6	69 03.6	89	48	150.9	69 30.2	88	49	150.3	69 56.6	88	50	149.6	70 22.9	87	51	148.9	70 49.0	87	52	148.1	71 14.9	86	53	147.4	71 40.5	85	54	146.5	10
1	68 08.9	87	50	149.2	68 35.0	87	51	148.5	69 01.0	86	52	147.8	69 26.9	86	53	147.1	69 52.5	85	54	146.3	70 17.9	84	55	145.6	70 43.2	84	56	144.8	71 08.2	83	57	143.9	1
2	67 38.8	86	53	146.9	68 04.4	85	54	146.2	68 29.8	84	55	145.4	68 55.0	84	56	144.7	69 20.1	83	57	143.9	69 44.9	82	58	143.1	70 09.4	82	59	142.3	70 33.8	81	60	141.4	2
3	67 06.9	84	56	144.7	67 31.9	83	57	143.9	67 56.7	82	58	143.2	68 21.3	82	59	142.4	68 45.7	81	60	141.6	69 09.9	80	61	140.8	69 33.8	79	62	140.0	69 57.5	78	63	139.1	3
4	66 33.2	82	59	142.6	66 57.7	81	60	141.8	67 21.9	80	61	141.1	67 45.9	80	62	140.3	68 09.7	79	63	139.5	68 33.2	78	64	138.6	68 56.5	77	65	137.8	69 19.5	76	66	136.8	4
15	65 57.9	80	61	140.5	66 21.8	79	62	139.8	66 45.5	78	63	139.0	67 08.9	78	64	138.2	67 32.0	77	65	137.4	67 55.0	76	66	136.5	68 17.6	75	67	135.7	68 39.9	74	68	134.8	15
6	65 21.2	78	64	138.6	65 44.5	77	65	137.9	66 07.5	77	66	137.1	66 30.4	76	66	136.3	66 52.9	75	67	135.4	67 15.2	74	68	134.6	67 37.2	73	69	133.7	67 59.0	72	70	132.8	6
7	64 43.0	76	66	136.8	65 05.7	75	67	136.0	65 28.2	75	68	135.2	65 50.5	74	69	134.4	66 12.5	73	69	133.6	66 34.2	72	70	132.7	66 55.6	71	71	131.8	67 16.7	70	72	130.9	7
8	64 03.5	74	68	135.1	64 25.7	74	69	134.3	64 47.7	73	70	133.5	65 09.4	72	70	132.7	65 30.8	71	71	131.8	65 51.9	70	72	131.0	66 12.8	69	73	130.1	66 33.3	68	74	129.2	8
9	63 22.9	73	70	133.4	63 44.5	72	70	132.6	64 05.9	71	71	131.8	64 27.1	70	72	131.0	64 48.0	69	73	130.2	65 08.5	68	74	129.3	65 28.8	67	75	128.4	65 48.8	66	76	127.5	9
20	62 41.1	71	71	131.8	63 02.3	70	72	131.0	63 23.2	69	73	130.2	63 43.8	68	74	129.4	64 04.1	67	75	128.6	64 24.2	66	76	127.7	64 43.9	65	76	126.9	65 03.3	64	77	126.0	20
1	61 58.3	69	73	130.3	62 19.0	68	74	129.5	62 39.4	68	74	128.7	62 59.5	67	75	127.9	63 19.3	66	76	127.1	63 38.8	65	77	126.2	63 58.1	64	78	125.4	64 17.0	62	79	124.5	1
2	61 14.6	68	74	128.9	61 34.8	67	75	128.1	61 54.7	66	76	127.3	62 14.3	65	77	126.5	62 33.6	64	77	125.7	62 52.7	63	78	124.8	63 11.4	62	79	124.0	63 29.8	61	80	123.1	2
3	60 30.0	66	76	127.5	60 49.7	65	76	126.7	61 09.1	64	77	125.9	61 28.3	63	78	125.1	61 47.1	62	79	124.3	62 05.7	61	79	123.5	62 24.0	60	80	122.6	62 41.9	59	81	121.8	3
4	59 44.6	65	77	126.2	60 03.8	64	78	125.4	60 22.8	63	78	124.6	60 41.5	62	79	123.8	60 59.9	61	80	123.0	61 18.0	60	81	122.2	61 35.9	59	81	121.4	61 53.4	58	82	120.5	4
25	58 58.4	63	78	124.9	59 17.2	62	79	124.2	59 35.8	61	79	123.4	59 54.1	60	80	122.6	60 12.0	59	81	121.8	60 29.7	58	82	121.0	60 47.1	57	82	120.2	61 04.2	56	83	119.3	25
6	58 11.6	62	79	123.7	58 30.0	61	80	123.0	58 48.1	60	80	122.2	59 06.0	59	81	121.4	59 23.5	58	82	120.6	59 40.8	57	82	119.8	59 57.8	56	83	119.0	60 14.4	55	84	118.2	6
7	57 24.1	60	80	122.6	57 42.1	60	81	121.8	57 59.8	59	81	121.1	58 17.3	58	82	120.3	58 34.4	57	83	119.5	58 51.3	56	83	118.7	59 07.9	55	84	117.9	59 24.2	54	85	117.1	7
8	56 36.0	59	81	121.5	56 53.6	58	82	120.7	57 10.9	57	82	120.0	57 28.0	56	83	119.2	57 44.8	56	84	118.5	58 01.3	55	84	117.7	58 17.5	54	85	116.9	58 33.4	53	85	116.1	8
9	55 47.3	58	82	120.4	56 04.6	57	83	119.7	56 21.5	56	83	119.0	56 38.3	55	84	118.2	56 54.7	54	84	117.4	57 10.8	53	85	116.7	57 26.7	52	85	115.9	57 42.3	51	86	115.1	9
30	54 58.1	57	83	119.4	55 15.0	56	83	118.7	55 31.7	55	84	118.0	55 48.0	54	84	117.2	56 04.1	53	85	116.5	56 19.9	52	86	115.7	56 35.5	51	86	114.9	56 50.7	50	87	114.1	30
1	54 08.5	56	84	118.5	54 25.0	55	84	117.7	54 41.3	54	85	117.0	54 57.4	53	85	116.3	55 13.1	52	86	115.5	55 28.6	51	86	114.8	55 43.8	50	87	114.0	55 58.7	49	87	113.2	1
2	53 18.4	54	84	117.5	53 34.6	54	85	116.8	53 50.6	53	85	116.1	54 06.3	52	86	115.4	54 21.7	51	86	114.6	54 36.9	50	87	113.9	54 51.8	49	87	113.1	55 06.4	48	88	112.4	2
3	52 27.9	53	85	116.6	52 43.8	53	85	115.9	52 59.5	52	86	115.2	53 14.9	51	86	114.5	53 30.0	50	87	113.8	53 44.9	49	87	113.1	53 59.5	48	88	112.3	54 13.8	47	88	111.6	3
4	51 37.0	52	85	115.8	51 52.6	52	86	115.1	52 08.0	51	86	114.4	52 23.1	50	87	113.7	52 37.9	49	87	113.0	52 52.5	48	88	112.2	53 06.9	47	88	111.5	53 20.9	46	89	110.8	4
35	50 45.7	51	86	114.9	51 01.0	51	86	114.3	51 16.1	50	87	113.6	51 31.0	49	87	112.9	51 45.5	48	88	112.2	51 59.9	47	88	111.5	52 13.9	46	89	110.7	52 27.7	46	89	110.0	35
6	49 54.1	51	87	114.1	50 09.2	50	87	113.5	50 24.0	49	87	112.8	50 38.5	48	88	112.1	50 52.9	47	88	111.4	51 06.9	46	89	110.7	51 20.8	46	89	110.0	51 34.3	45	89	109.3	6
7	49 02.2	50	87	113.4	49 17.0	49	87	112.7	49 31.5	48	88	112.0	49 45.8	47	88	111.4	49 59.9	47	89	110.7	50 13.7	46	89	110.0	50 27.3	45	89	109.3	50 40.7	44	90	108.6	7
8	48 10.0	49	88	112.6	48 24.5	48	88	112.0	48 38.8	47	88	111.3	48 52.9	47	89	110.6	49 06.7	46	89	110.0	49 20.3	45	89	109.3	49 33.7	44	90	108.6	49 46.8	43	90	107.9	8
9	47 17.4	48	88	111.9	47 31.7	47	88	111.3	47 45.8	47	89	110.6	47 59.6	46	89	109.9	48 13.3	45	89	109.3	48 26.6	44	90	108.6	48 39.8	43	90	107.9	48 52.7	43	90	107.2	9
40	46 24.7	47	88	111.2	46 38.7	47	89	110.6	46 52.6	46	89	109.9	47 06.2	45	89	109.3	47 19.6	44	90	108.6	47 32.8	44	90	107.9	47 45.7	43	90	107.3	47 58.4	42	91	106.6	40
1	45 31.7	46	89	110.5	45 45.5	46	89	109.9	45 59.1	45	89	109.3	46 12.5	44	90	108.6	46 25.7	44	90	108.0	46 38.7	43	90	107.3	46 51.4	42	91	106.6	47 03.9	41	91	106.0	1
2	44 38.4	46	89	109.9	44 52.1	45	89	109.3	45 05.5	44	90	108.6	45 18.7	44	90	108.0	45 31.7	43	90	107.3	45 44.4	42	91	106.7	45 57.0	41	91	106.0	46 09.3	41	91	105.4	2
3	43 45.0	45	89	109.2	43 58.4	44	90	108.6	44 11.6	44	90	108.0	44 24.6	43	90	107.4	44 37.4	42	91	106.7	44 50.0	42	91	106.1	45 02.4	41	91	105.5	45 14.6	40	92	104.8	3
4	42 51.3	44	90	108.6	43 04.5	44	90	108.0	43 17.6	43	90	107.4	43 30.4	42	91	106.8	43 43.0	42	91	106.2	43 55.4	41	91	105.5	44 07.6	40	92	104.9	44 19.6	40	92	104.2	4
45	41 57.5	44	90	108.0	42 10.5	43	90	107.4	42 23.3	42	91	106.8	42 36.0	42	91	106.2	42 48.5	41	91	105.6	43 00.7	40	91	105.0	43 12.7	40	92	104.3	43 24.6	39	92	103.7	45
6	41 03.4	43	90	107.5	41 16.3	43	91	106.9	41 29.0	42	91	106.2	41 41.4	41	91	105.6	41 53.7	41	91	105.0	42 05.8	40	92	104.4	42 17.7	39	92	103.8	42 29.4	39	92	103.2	6
7	40 09.2	43	91	106.9	40 21.9	42	91	106.3	40 34.4	41	91	105.7	40 46.7	41	91	105.1	40 58.9	40	92	104.5	41 10.8	39	92	103.9	41 22.6	39	92	103.3	41 34.1	38	92	102.7	7
8	39 14.9	42	91	106.3	39 27.4	41	91	105.8	39 39.7	41	91	105.2	39 51.9	40	92	104.6	40 03.9	40	92	104.0	40 15.7	39	92	103.4	40 27.3	38	92	102.8	40 38.7	38	92	102.2	8
9	38 20.4	42	91	105.8	38 32.7	41	91	105.2	38 44.9	40	92	104.6	38 56.9	40	92	104.0	39 08.8	39	92	103.5	39 20.4	39	92	102.9	39 31.9	38	92	102.3	39 43.2	37	93	101.7	9
50	37 25.7	41	91	105.3	37 37.9	40	92	104.7	37 50.0	40	92	104.1	38 01.8	39	92	103.5	38 13.5	39	92	103.0	38 25.1	38	92	102.4	38 36.4	38	93	101.8	38 47.6	37	93	101.2	50
1	36 30.9	41	92	104.8	36 43.0	40	92	104.2	36 54.9	39	92	103.6	37 06.6	39	92	103.0	37 18.2	38	92	102.5	37 29.6	38	93	101.9	37 40.8	37	93	101.3	37 51.9	37	93	100.7	1
2	35 36.0	40	92	104.3	35 47.9	40	92	103.7	35 59.7	39	92	103.1	36 11.3	38	92	102.6	36 22.8	38	93	102.0	36 34.0	37	93	101.4	36 45.2	37	93	100.8	36 56.1	36	93	100.3	2
3	34 40.9	40	92	103.8	34 52.7	39	92	103.2	35 04.4	39	92	102.7	35 15.9	38	93	102.1	35 27.2	38	93	101.5	35 38.4	37	93	101.0	35 49.4	36	93	100.4	36 00.2	36	93	99.8	3
4	33 45.8	39	92	103.3	33 57.5	39	92	102.8	34 09.0	38	92	102.2	34 20.4	38	93	101.6	34 31.6	37	93	101.1	34 42.6	37	93	100.5	34 53.6	36	93	99.9	35 04.3	36	93	99.4	4
55	32 50.5	39	92	102.8	33 02.1	38	92	102.3	33 13.5	38	93	101.7	33 24.8	37	93	101.2	33 35.9	37	93	100.6	33 46.8	36	93	100.1	33 57.6	36	93	99.5	34 08.3	35	93	98.9	55
6	31 55.2	38	92	102.4	32 06.6	38	93	101.8	32 17.9	37	93	101.3	32 29.1	37	93	100.7	32 40.1	36	93	100.2	32 50.9	36	93	99.6	33 01.6	35	93	99.1	33 12.2	35	94	98.5	6
7	30 59.7	38	93	101.9	31 11.0	38	93	101.4	31 22.2	37	93	100.9	31 33.3	37	93	100.3	31 44.2	36	93	99.8	31 55.0	36	93	99.2	32 05.6	35	94	98.7	32 16.1	35	94	98.1	7
8	30 04.2	38	93	101.5	30 15.4	37	93	101.0	30 26.5	37	93	100.4	30 37.4	36	93	99.9	30 48.3	36	93	99.3	30 58.9	35	94	98.8	31 09.5	35	94	98.3	31 19.9	34	94	97.7	8
9	29 08.5	37	93	101.1	29 19.6	37	93	100.5	29 30.6	36	93	100.0	29 41.5	36	93	99.5	29 52.2	36	93	98.9	30 02.8	35	94	98.4	30 13.3	35	94	97.8	30 23.6	34	94	97.3	9
60	28 12.8	37	93	100.6	28 23.8	37	93	100.1	28 34.7	36	93	99.6	28 45.5	36	93	99.1	28 56.2	35	94	98.5	29 06.7	35	94	98.0	29 17.1	34	94	97.4	29 27.4	34	94	96.9	60
1	27 17.0	37	93	100.2	27 28.0	36	93	99.7	27 38.8	36	93	99.2	27 49.5	35	94	98.7	28 00.0	35	94	98.1	28 10.5	35	94	97.6	28 20.8	34	94	97.1	28 31.0	34	94	96.5	1
2	26 21.2	36	93	99.8	26 32.0	36	93	99.3	26 42.7	36	94	98.8	26 53.3	35	94	98.3	27 03.8	35	94	97.7	27 14.2	34	94	97.2	27 24.5	34	94	96.7	27 34.6	34	94	96.1	2
3	25 25.2	36	93	99.4	25 36.0	36	93	98.9	25 46.6	35	94	98.4	25 57.2	35	94	97.9	26 07.6	35	94	97.3	26 17.9	34	94	96.8	26 28.1	34	94	96.3	26 38.2	33	94	95.8	3
4	24 29.2	36	93	99.0	24 39.9	35	94	98.5	24 50.5	35	94	98.0	25 00.9	35	94	97.5	25 11.3	34	94	97.0	25 21.6	34	94	96.4	25 31.7	34	94	95.9	25 41.7	33	94	95.4	4
65	23 33.2	36	94	98.6	23 43.8	35	94	98.1	23 54.3	35	94	97.6	24 04.7	35	94	97.1	24 15.0	34	94	96.6	24 25.2	34	94	96.1	24 35.3	33	94	95.5	24 45.2	33	94	95.0	65
6	22 37.0	35	94	98.2	22 47.6	35	94	97.7	22 58.0	35	94	97.2	23 08.4	34	94	96.7	23 18.6	34	94	96.2	23 28.7	34	94	95.7	23 38.8	33	94	95.2	23 48.7	33	94	94.7	6
7	21 40.9	35	94	97.9	21 51.3	35	94	97.4	22 01.7	34	94	96.9	22 12.0	34	94	96.4	22 22.2	34	94	95.8	22 32.3	33	94	95.3	22 42.3	33	94	94.8	22 52.2	33	94	94.3	7
8	20 44.7	35	94	97.5	20 55.1	35	94	97.0	21 05.4	34	94	96.5	21 15.6	34	94	96.0	21 25.7	34	94	95.5	21 35.8	33	94	95.0	21 45.7	33	94	94.5	21 55.6	33	94	94.0	8
9	19 48.4	35	94	97.1	19 58.7	34	94	96.6	20 09.0	34	94	96.1	20 19.2	34	94	95.6	20 29.2	33	94	95.1	20 39.2	33	94	94.6	20 49.1	33	94	94.1	20 59.0	33	94	93.6	9
70	18 52.1	34	94	96.8	19 02.4	34	94	96.3	19 12.6	34	94	95.8	19 22.7	34	94	95.3	19 32.7	33	94	94.8	19 42.7	33	94	94.3	19 52.5	33	94	93.8	20 02.3	32	94	93.3	70
1	17 55.7	34	94	96.4	18 05.9	34	94	95.9	18 16.1	34	94	95.4	18 26.2	33	94	94.9	18 36.2	33	94	94.4	18 46.1	33	94	93.9	18 55.9	33	94	93.4	19 05.7	32	94	92.9	1
2	16 59.3	34	94	96.0	17 09.5	34	94	95.5	17 19.6	34	94	95.1	17 29.6	33	94	94.6	17 39.6	33	94	94.1	17 49.5	33	94	93.6	17 59.3	33	94	93.1	18 09.0	32	94	92.6	2
3	16 02.9	34	94	95.7	16 13.0	34	94	95.2	16 23.1	33	94	94.7	16 33.1	33	94	94.2	16 43.0	33	94	93.7	16 52.8	33	94	93.2	17 02.6	32	94	92.7	17 12.3	32	94	92.2	3
4	15 06.4	34	94	95.3	15 16.5	34	94	94.8	15 26.5	33	94	94.4	15 36.5	33	94	93.9	15 46.4	33	94	93.4	15 56.2	33	94	92.9	16 06.0	32	94	92.4	16 15.6	32	94	91.9	4
75	14 09.9	34	94	95.0	14 20.0	33	94	94.5	14 29.9	33	94	94.0	14 39.9	33	94	93.5	14 49.7	33	94	93.0	14 59.5	33	94	92.5	15 09.3	32	94	92.1	15 18.9	32	95	91.6	75
6	13 13.4	33	94	94.6	13 23.4	33	94	94.2	13 33.3	33	94	93.7	13 43.2	33	94	93.2	13 53.1	33	94	92.7	14 02.8	32	94	92.2	14 12.6	32	95	91.7	14 22.2	32	95	91.2	6
7	12 16.8	33	94	94.3	12 26.8	33	94	93.8	12 36.7	33	94	93.3	12 46.6	33	94	92.8	12 56.4	33	94	92.4	13 06.2	32	94	91.9	13 15.9	32	95	91.4	13 25.5	32	95	90.9	7
8	11 20.2	33	94	94.0	11 30.2	33	94	93.5	11 40.1	33	94	93.0	11 49.9	33	94	92.5	11 59.7	33	94	92.0	12 09.4	32	95	91.5	12 19.1	32	95	91.1	12 28.8	32	95	90.6	8
9	10 23.6	33	94	93.6	10 33.5	33	94	93.1	10 43.4	33	94	92.7	10 53.2	33	94	92.2	11 03.0	33	95	91.7	11 12.7	32	95	91.2	11 22.4	32	95	90.7	11 32.1	32	95	90.3	9
80	9 27.0	33	94	93.3	9 36.9	33	94	92.8	9 46.7	33	94	92.3	9 56.5	33	95	91.8	10 06.3	32	95	91.4	10 16.0	32	95	90.9	10 25.7	32	95	90.4	10 35.3	32	95	89.9	80
1	8 30.4	33	94	93.0	8 40.2	33	94	92.5	8 50.0	33	94	92.0	8 59.8	33	95	91.5	9 09.6	32	95	91.0	9 19.3	32	95	90.6	9 29.0	32	95	90.1	9 38.6	32	95	89.6	1
2	7 33.7	33	94	92.6	7 43.5	33	94	92.1	7 53.3	33	95	91.7	8 03.1	33	95	91.2	8 12.8	32	95	90.7	8 22.6	32	95	90.2	8 32.2	32	95	89.8	8 41.9	32	95	89.3	2
3	6 37.0	33	94	92.3	6 46.8	33	95	91.8	6 56.6	33	95	91.3	7 06.4	32	95	90.9	7 16.1	32	95	90.4	7 25.8	32	95	89.9	7 35.5	32	95	89.4	7 45.1	32	95	89.0	3
4	5 40.3	33	95	92.0	5 50.1	33	95	91.5	5 59.9	33	95	91.0	6 09.7	32	95	90.5	6 19.4	32	95	90.1	6 29.1	32	95	89.6	6 38.8	32	95	89.1	6 48.4	32	95	88.6	4
85									5 03.2	33	95	90.7	5 12.9	32	95	90.2	5 22.7	32	95	89.7	5 32.4	32	95	89.3	5 42.0	32	95	88.8	5 51.7	32	95	88.3	85

Lat. 19°

H.A.	0° 00′				0° 30′				1° 00′				1° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	71 00.0	1.0	03	180.0	70 30.0	1.0	02	180.0	70 00.0	1.0	02	180.0	69 30.0	1.0	02	180.0
1	70 58.5	1.0	08	176.9	70 28.5	1.0	07	177.0	69 58.6	1.0	07	177.1	69 28.6	1.0	07	177.1
2	70 53.9	99	13	173.9	70 24.1	1.0	12	174.0	69 54.2	1.0	12	174.2	69 24.4	1.0	12	174.3
3	70 46.4	99	17	170.9	70 16.7	99	17	171.1	69 47.0	99	17	171.3	69 17.3	99	16	171.5
4	70 35.9	98	22	167.9	70 06.5	98	22	168.2	69 37.1	98	21	168.4	69 07.6	98	21	168.7
05	70 22.6	97	27	165.0	69 53.5	97	26	165.3	69 24.3	97	26	165.7	68 55.2	97	25	166.0
6	70 06.5	96	31	162.1	69 37.8	96	31	162.5	69 09.0	96	30	162.9	68 40.1	96	29	163.3
7	69 47.8	94	35	159.3	69 19.5	95	35	159.8	68 51.1	95	34	160.3	68 22.6	95	33	160.7
8	69 26.5	93	39	156.7	68 58.7	93	39	157.2	68 30.7	93	38	157.7	68 02.7	94	37	158.2
9	69 02.9	91	43	154.1	68 35.5	91	42	154.6	68 08.0	92	42	155.2	67 40.4	92	41	155.7
10	68 36.9	89	47	151.6	68 10.1	90	46	152.2	67 43.1	90	45	152.7	67 16.0	91	44	153.3
1	68 08.9	87	50	149.2	67 42.6	88	49	149.8	67 16.1	88	48	150.4	66 49.5	89	47	151.0
2	67 38.8	86	53	146.9	67 13.0	86	52	147.5	66 47.1	87	51	148.2	66 21.0	87	50	148.8
3	67 06.9	84	56	144.7	66 41.7	84	55	145.3	66 16.3	85	54	146.0	65 50.7	85	53	146.7
4	66 33.2	82	59	142.6	66 08.6	82	58	143.3	65 43.7	83	57	144.0	65 18.7	84	56	144.6
15	65 57.9	80	61	140.5	65 33.8	81	60	141.3	65 09.6	81	59	142.0	64 45.1	82	59	142.7
6	65 21.2	78	64	138.6	64 57.6	79	63	139.4	64 33.9	79	62	140.1	64 09.9	80	61	140.8
7	64 43.0	76	66	136.8	64 20.0	77	65	137.5	63 56.8	78	64	138.3	63 33.4	78	63	139.0
8	64 03.5	74	68	135.1	63 41.1	75	67	135.8	63 18.4	76	66	136.5	62 55.5	77	65	137.3
9	63 22.9	73	70	133.4	63 00.9	73	69	134.2	62 38.8	74	68	134.9	62 16.4	75	67	135.6
20	62 41.1	71	71	131.8	62 19.7	72	70	132.6	61 58.0	73	70	133.3	61 36.2	73	69	134.0
1	61 58.3	69	73	130.3	61 37.4	70	72	131.1	61 16.2	71	71	131.8	60 54.9	72	70	132.5
2	61 14.6	68	74	128.9	60 54.2	69	74	129.6	60 33.5	69	73	130.4	60 12.6	70	72	131.1
3	60 30.0	66	76	127.5	60 10.0	67	75	128.2	59 49.8	68	74	129.0	59 29.4	69	73	129.7
4	59 44.6	65	77	126.2	59 25.1	65	76	126.9	59 05.3	66	75	127.7	58 45.3	67	75	128.4
25	58 58.4	63	78	124.9	58 39.3	64	77	125.7	58 20.0	65	77	126.4	58 00.4	66	76	127.1
6	58 11.6	62	79	123.7	57 52.9	63	78	124.5	57 34.0	63	78	125.2	57 14.8	64	77	125.9
7	57 24.1	60	80	122.6	57 05.8	61	80	123.3	56 47.3	62	79	124.0	56 28.5	63	78	124.7
8	56 36.0	59	81	121.5	56 18.1	60	80	122.2	56 00.0	61	80	122.9	55 41.6	62	79	123.6
9	55 47.3	58	82	120.4	55 29.8	59	81	121.1	55 12.1	60	81	121.9	54 54.1	60	80	122.6
30	54 58.1	57	83	119.4	54 41.0	58	82	120.1	54 23.6	58	82	120.8	54 06.0	59	81	121.5
1	54 08.5	56	84	118.5	53 51.7	56	83	119.2	53 34.7	57	82	119.9	53 17.4	58	82	120.5
2	53 18.4	54	84	117.5	53 01.9	55	84	118.2	52 45.2	56	83	118.9	52 28.3	57	83	119.6
3	52 27.9	53	85	116.6	52 11.7	54	84	117.3	51 55.3	55	84	118.0	51 38.7	56	83	118.7
4	51 37.0	52	85	115.8	51 21.1	53	85	116.4	51 05.0	54	84	117.1	50 48.7	55	84	117.8
35	50 45.7	51	86	114.9	50 30.2	52	86	115.6	50 14.4	53	85	116.3	49 58.3	54	85	116.9
6	49 54.1	51	87	114.1	49 38.8	51	86	114.8	49 23.3	52	86	115.5	49 07.6	53	85	116.1
7	49 02.2	50	87	113.4	48 47.2	50	87	114.0	48 31.9	51	86	114.7	48 16.5	52	86	115.3
8	48 10.0	49	88	112.6	47 55.2	50	87	113.3	47 40.2	50	87	113.9	47 25.0	51	86	114.6
9	47 17.4	48	88	111.9	47 02.9	49	88	112.5	46 48.2	49	87	113.2	46 33.3	50	87	113.8
40	46 24.7	47	88	111.2	46 10.4	48	88	111.8	45 55.9	49	88	112.5	45 41.2	49	87	113.1
1	45 31.7	46	89	110.5	45 17.6	47	88	111.2	45 03.4	48	88	111.8	44 48.9	49	88	112.4
2	44 38.4	46	89	109.9	44 24.6	46	89	110.5	44 10.6	47	88	111.1	43 56.3	48	88	111.7
3	43 45.0	45	89	109.2	43 31.4	46	89	109.9	43 17.5	46	89	110.5	43 03.5	47	88	111.1
4	42 51.3	44	90	108.6	42 37.9	45	89	109.2	42 24.3	46	89	109.8	42 10.5	46	89	110.4
45	41 57.5	44	90	108.0	41 44.2	44	90	108.6	41 30.8	45	89	109.2	41 17.2	46	89	109.8
6	41 03.4	43	90	107.5	40 50.4	44	90	108.0	40 37.2	44	90	108.6	40 23.8	45	89	109.2
7	40 09.2	43	91	106.9	39 56.4	43	90	107.5	39 43.3	44	90	108.1	39 30.1	44	90	108.6
8	39 14.9	42	91	106.3	39 02.2	43	91	106.9	38 49.3	43	90	107.5	38 36.2	44	90	108.1
9	38 20.4	42	91	105.8	38 07.8	42	91	106.4	37 55.1	43	91	107.0	37 42.2	43	90	107.5
50	37 25.7	41	91	105.3	37 13.3	42	91	105.9	37 00.8	42	91	106.4	36 48.1	43	91	107.0
1	36 30.9	41	92	104.8	36 18.7	41	91	105.3	36 06.3	42	91	105.9	35 53.7	42	91	106.5
2	35 36.0	40	92	104.3	35 23.9	41	92	104.8	35 11.6	41	91	105.4	34 59.2	42	91	105.9
3	34 40.9	40	92	103.8	34 29.0	40	92	104.3	34 16.9	41	91	104.9	34 04.6	41	91	105.4
4	33 45.8	39	92	103.3	33 34.0	40	92	103.9	33 22.0	40	92	104.4	33 09.9	41	91	105.0
55	32 50.5	39	92	102.8	32 38.8	39	92	103.4	32 27.0	40	92	103.9	32 15.0	40	92	104.5
6	31 55.2	38	92	102.4	31 43.6	39	92	102.9	31 31.9	39	92	103.5	31 20.0	40	92	104.0
7	30 59.7	38	93	101.9	30 48.3	38	92	102.5	30 36.7	39	92	103.0	30 24.9	39	92	103.5
8	30 04.2	38	93	101.5	29 52.8	38	93	102.0	29 41.3	38	92	102.6	29 29.7	39	92	103.1
9	29 08.5	37	93	101.1	28 57.3	38	93	101.6	28 45.9	38	93	102.1	28 34.4	39	92	102.7
60	28 12.8	37	93	100.6	28 01.7	37	93	101.2	27 50.4	38	93	101.7	27 39.0	38	92	102.2
1	27 17.0	37	93	100.2	27 06.0	37	93	100.8	26 54.8	37	93	101.3	26 43.5	38	93	101.8
2	26 21.2	36	93	99.8	26 10.2	37	93	100.3	25 59.1	37	93	100.9	25 48.0	37	93	101.4
3	25 25.2	36	93	99.4	25 14.4	36	93	99.9	25 03.4	37	93	100.4	24 52.3	37	93	101.0
4	24 29.2	36	93	99.0	24 18.4	36	93	99.5	24 07.6	36	93	100.0	23 56.6	37	93	100.6
65	23 33.2	36	94	98.6	23 22.5	36	93	99.1	23 11.7	36	93	99.6	23 00.8	36	93	100.2
6	22 37.0	35	94	98.2	22 26.4	36	94	98.8	22 15.7	36	93	99.3	22 04.9	36	93	99.8
7	21 40.9	35	94	97.9	21 30.3	35	94	98.4	21 19.7	36	93	98.9	21 08.9	36	93	99.4
8	20 44.7	35	94	97.5	20 34.2	35	94	98.0	20 23.6	35	94	98.5	20 12.9	36	93	99.0
9	19 48.4	35	94	97.1	19 38.0	35	94	97.6	19 27.5	35	94	98.1	19 16.9	35	94	98.6
70	18 52.1	34	94	96.8	18 41.7	35	94	97.3	18 31.3	35	94	97.7	18 20.8	35	94	98.2
1	17 55.7	34	94	96.4	17 45.4	34	94	96.9	17 35.0	35	94	97.4	17 24.6	35	94	97.9
2	16 59.3	34	94	96.0	16 49.1	34	94	96.5	16 38.8	35	94	97.0	16 28.4	35	94	97.5
3	16 02.9	34	94	95.7	15 52.7	34	94	96.2	15 42.4	34	94	96.7	15 32.1	35	94	97.1
4	15 06.4	34	94	95.3	14 56.3	34	94	95.8	14 46.1	34	94	96.3	14 35.8	34	94	96.8
75	14 09.9	34	94	95.0	13 59.8	34	94	95.5	13 49.6	34	94	96.0	13 39.4	34	94	96.4
6	13 13.4	33	94	94.6	13 03.3	34	94	95.1	12 53.2	34	94	95.6	12 43.0	34	94	96.1
7	12 16.8	33	94	94.3	12 06.8	33	94	94.8	11 56.7	34	94	95.3	11 46.6	34	94	95.7
8	11 20.2	33	94	94.0	11 10.3	33	94	94.4	11 00.2	34	94	94.9	10 50.1	34	94	95.4
9	10 23.6	33	94	93.6	10 13.7	33	94	94.1	10 03.7	33	94	94.6	9 53.7	34	94	95.1
80	9 27.0	33	94	93.3	9 17.1	33	94	93.8	9 07.1	33	94	94.2	8 57.1	33	94	94.7
1	8 30.4	33	94	93.0	8 20.5	33	94	93.4	8 10.5	33	94	93.9	8 00.6	33	94	94.4
2	7 33.7	33	94	92.6	7 23.8	33	94	93.1	7 13.9	33	94	93.6	7 04.0	33	94	94.0
3	6 37.0	33	94	92.3	6 27.2	33	94	92.8	6 17.3	33	94	93.2	6 07.4	33	94	93.7
4	5 40.3	33	95	92.0	5 30.5	33	94	92.4	5 20.6	33	94	92.9	5 10.8	33	94	93.4

2° 00′				2° 30′				3° 00′				3° 30′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
69 00.0	1.0	02	180.0	68 30.0	1.0	02	180.0	68 00.0	1.0	02	180.0	67 30.0	1.0	02	180.0	00
68 58.6	1.0	07	177.2	68 28.6	1.0	07	177.3	67 58.7	1.0	07	177.3	67 28.7	1.0	06	177.4	1
68 54.5	1.0	11	174.4	68 24.6	1.0	11	174.6	67 54.7	1.0	11	174.7	67 24.8	1.0	11	174.8	2
68 47.6	99	16	171.7	68 17.9	99	16	171.9	67 48.2	99	15	172.0	67 18.4	99	15	172.2	3
68 38.1	98	20	169.0	68 08.6	98	20	169.2	67 39.0	98	19	169.4	67 09.5	99	19	169.7	4
68 25.9	97	24	166.3	67 56.7	98	24	166.6	67 27.4	98	23	166.9	66 58.1	98	23	167.2	05
68 11.2	96	29	163.7	67 42.3	97	28	164.0	67 13.3	97	27	164.4	66 44.3	97	27	164.7	6
67 54.1	95	33	161.1	67 25.5	95	32	161.5	66 56.8	96	31	161.9	66 28.1	96	31	162.3	7
67 34.5	94	36	158.6	67 06.3	94	36	159.1	66 38.1	94	35	159.5	66 09.7	95	34	159.9	8
67 12.7	92	40	156.2	66 45.0	93	39	156.7	66 17.1	93	38	157.1	65 49.2	93	38	157.6	9
66 48.8	91	43	153.8	66 21.5	91	43	154.4	65 54.0	92	42	154.9	65 26.5	92	41	155.4	10
66 22.8	89	47	151.6	65 55.9	90	46	152.1	65 29.0	90	45	152.7	65 01.9	90	44	153.2	1
65 54.8	88	50	149.4	65 28.5	88	49	150.0	65 02.0	88	48	150.5	64 35.4	89	47	151.1	2
65 25.0	86	52	147.3	64 59.2	86	52	147.9	64 33.2	87	51	148.5	64 07.0	87	50	149.0	3
64 53.5	84	55	145.3	64 28.2	85	54	145.9	64 02.7	85	54	146.5	63 37.0	86	53	147.1	4
64 20.4	82	58	143.3	63 55.6	83	57	144.0	63 30.6	84	56	144.6	63 05.4	84	55	145.2	15
63 45.8	81	60	141.5	63 21.5	81	59	142.1	62 57.0	82	58	142.8	62 32.3	82	58	143.4	6
63 09.8	79	62	139.7	62 45.9	80	61	140.3	62 21.9	80	61	141.0	61 57.8	81	60	141.6	7
62 32.4	77	64	138.0	62 09.1	78	64	138.6	61 45.6	79	63	139.3	61 21.9	79	62	139.9	8
61 53.8	76	66	136.3	61 31.0	76	65	137.0	61 08.0	77	65	137.7	60 44.8	78	64	138.3	9
61 14.0	74	68	134.7	60 51.7	75	67	135.4	60 29.2	75	66	136.1	60 06.5	76	66	136.8	20
60 33.2	72	70	133.2	60 11.4	73	69	133.9	59 49.3	74	68	134.6	59 27.1	75	67	135.3	1
59 51.4	71	71	131.8	59 30.0	72	70	132.5	59 08.4	72	70	133.2	58 46.6	73	69	133.8	2
59 08.7	69	73	130.4	58 47.7	70	72	131.1	58 26.6	71	71	131.8	58 05.2	72	70	132.5	3
58 25.0	68	74	129.1	58 04.6	69	73	129.8	57 43.9	69	73	130.5	57 22.9	70	72	131.1	4
57 40.6	66	75	127.8	57 20.6	67	75	128.5	57 00.3	68	74	129.2	56 39.8	69	73	129.9	25
56 55.4	65	76	126.6	56 35.8	66	76	127.3	56 15.9	67	75	128.0	55 55.9	67	74	128.6	6
56 09.6	64	78	125.4	55 50.3	64	77	126.1	55 30.9	65	76	126.8	55 11.2	66	76	127.5	7
55 23.0	62	79	124.3	55 04.2	63	78	125.0	54 45.1	64	77	125.7	54 25.8	65	77	126.3	8
54 35.9	61	80	123.2	54 17.4	62	79	123.9	53 58.7	63	78	124.6	53 39.8	63	78	125.2	9
53 48.1	60	80	122.2	53 30.0	61	80	122.9	53 11.7	61	79	123.5	52 53.2	62	79	124.2	30
52 59.9	59	81	121.2	52 42.1	60	81	121.9	52 24.2	60	80	122.5	52 06.0	61	80	123.2	1
52 11.1	58	82	120.3	51 53.7	58	82	120.9	51 36.1	59	81	121.6	51 18.2	60	80	122.2	2
51 21.9	57	83	119.3	51 04.8	57	82	120.0	50 47.5	58	82	120.6	50 30.0	59	81	121.3	3
50 32.2	55	83	118.4	50 15.4	56	83	119.1	49 58.5	57	82	119.7	49 41.3	58	82	120.4	4
49 42.1	54	84	117.6	49 25.7	55	84	118.2	49 09.0	56	83	118.9	48 52.1	57	83	119.5	35
48 51.6	54	85	116.8	48 35.5	54	84	117.4	48 19.1	55	84	118.0	48 02.5	56	83	118.7	6
48 00.8	53	85	116.0	47 44.9	53	85	116.6	47 28.8	54	84	117.2	47 12.6	55	84	117.8	7
47 09.6	52	86	115.2	46 54.0	52	85	115.8	46 38.2	53	85	116.4	46 22.2	54	84	117.1	8
46 18.1	51	86	114.4	46 02.8	51	86	115.1	45 47.3	52	85	115.7	45 31.5	53	85	116.3	9
45 26.4	50	87	113.7	45 11.3	51	86	114.3	44 56.0	51	86	114.9	44 40.5	52	86	115.5	40
44 34.3	49	87	113.0	44 19.4	50	87	113.6	44 04.4	50	86	114.2	43 49.2	51	86	114.8	1
43 41.9	48	88	112.3	43 27.3	49	87	112.9	43 12.5	50	87	113.5	42 57.5	50	86	114.1	2
42 49.3	48	88	111.7	42 34.9	48	88	112.3	42 20.4	49	87	112.9	42 05.6	49	87	113.5	3
41 56.5	47	88	111.0	41 42.3	48	88	111.6	41 28.0	48	88	112.2	41 13.4	49	87	112.8	4
41 03.4	46	89	110.4	40 49.5	47	88	111.0	40 35.3	47	88	111.6	40 21.0	48	88	112.2	45
40 10.2	46	89	109.8	39 56.4	46	89	110.4	39 42.5	47	88	111.0	39 28.4	47	88	111.5	6
39 16.7	45	89	109.2	39 03.1	46	89	109.8	38 49.4	46	89	110.4	38 35.5	47	88	110.9	7
38 23.0	44	90	108.7	38 09.7	45	89	109.2	37 56.1	45	89	109.8	37 42.4	46	89	110.4	8
37 29.2	44	90	108.1	37 16.0	44	90	108.7	37 02.6	45	89	109.2	36 49.1	45	89	109.8	9
36 35.2	43	90	107.6	36 22.2	44	90	108.1	36 09.0	44	90	108.7	35 55.6	45	89	109.2	50
35 41.0	43	91	107.0	35 28.2	43	90	107.6	35 15.1	44	90	108.1	35 02.0	44	90	108.7	1
34 46.7	42	91	106.5	34 34.0	43	91	107.1	34 21.2	43	90	107.6	34 08.2	44	90	108.1	2
33 52.2	42	91	106.0	33 39.7	42	91	106.5	33 27.0	43	90	107.1	33 14.2	43	90	107.6	3
32 57.6	41	91	105.5	32 45.2	42	91	106.0	32 32.7	42	91	106.6	32 20.0	42	90	107.1	4
32 02.9	41	91	105.0	31 50.6	41	91	105.6	31 38.3	42	91	106.1	31 25.7	42	91	106.6	55
31 08.0	40	92	104.5	30 55.9	41	91	105.1	30 43.7	41	91	105.6	30 31.3	41	91	106.1	6
30 13.1	40	92	104.1	30 01.1	40	92	104.6	29 49.0	41	91	105.1	29 36.7	41	91	105.7	7
29 18.0	39	92	103.6	29 06.1	40	92	104.2	28 54.2	40	92	104.7	28 42.1	41	91	105.2	8
28 22.8	39	92	103.2	28 11.1	39	92	103.7	27 59.2	40	92	104.2	27 47.3	40	92	104.7	9
27 27.5	39	92	102.7	27 15.9	39	92	103.3	27 04.2	39	92	103.8	26 52.3	40	92	104.3	60
26 32.1	38	92	102.3	26 20.6	39	92	102.8	26 09.0	39	92	103.3	25 57.3	39	92	103.9	1
25 36.7	38	93	101.9	25 25.3	38	92	102.4	25 13.8	39	92	102.9	25 02.2	39	92	103.4	2
24 41.1	37	93	101.5	24 29.8	38	93	102.0	24 18.4	38	92	102.5	24 06.9	38	92	103.0	3
23 45.5	37	93	101.1	23 34.3	37	93	101.6	23 23.0	38	93	102.1	23 11.6	38	92	102.6	4
22 49.8	37	93	100.7	22 38.7	37	93	101.2	22 27.5	37	93	101.7	22 16.2	38	92	102.2	65
21 54.0	37	93	100.3	21 43.0	37	93	100.8	21 31.9	37	93	101.3	21 20.7	37	93	101.8	6
20 58.1	36	93	99.9	20 47.2	37	93	100.4	20 36.2	37	93	100.9	20 25.1	37	93	101.4	7
20 02.2	36	93	99.5	19 51.4	36	93	100.0	19 40.5	36	93	100.5	19 29.5	37	93	101.0	8
19 06.2	36	93	99.1	18 55.5	36	93	99.6	18 44.6	36	93	100.1	18 33.7	36	93	100.6	9
18 10.2	35	94	98.7	17 59.5	36	93	99.2	17 48.8	36	93	99.7	17 37.9	36	93	100.2	70
17 14.1	35	94	98.4	17 03.5	35	93	98.9	16 52.8	36	93	99.3	16 42.1	36	93	99.8	1
16 17.9	35	94	98.0	16 07.4	35	94	98.5	15 56.8	35	93	99.0	15 46.1	36	93	99.5	2
15 21.7	35	94	97.6	15 11.2	35	94	98.1	15 00.7	35	94	98.6	14 50.2	35	93	99.1	3
14 25.5	35	94	97.3	14 15.1	35	94	97.8	14 04.6	35	94	98.2	13 54.1	35	94	98.7	4
13 29.2	34	94	96.9	13 18.8	35	94	97.4	13 08.4	35	94	97.9	12 58.0	35	94	98.4	75
12 32.8	34	94	96.6	12 22.5	34	94	97.1	12 12.2	34	94	97.5	12 01.9	35	94	98.0	6
11 36.4	34	94	96.2	11 26.2	34	94	96.7	11 16.0	34	94	97.2	11 05.7	34	94	97.7	7
10 40.0	34	94	95.9	10 29.9	34	94	96.4	10 19.7	34	94	96.8	10 09.4	34	94	97.3	8
9 43.6	34	94	95.5	9 33.5	34	94	96.0	9 23.3	34	94	96.5	9 13.1	34	94	97.0	9
8 47.1	34	94	95.2	8 37.0	34	94	95.7	8 26.9	34	94	96.1	8 16.8	34	94	96.6	80
7 50.6	33	94	94.9	7 40.6	33	94	95.3	7 30.5	34	94	95.8	7 20.4	34	94	96.3	1
6 54.0	33	94	94.5	6 44.1	33	94	95.0	6 34.0	33	94	95.5	6 24.0	34	94	95.9	2
5 57.5	33	94	94.2	5 47.5	33	94	94.7	5 37.6	33	94	95.1	5 27.6	33	94	95.6	3
5 00.9	33	94	93.9													4

Lat. 19°

H.A.	4° 00′				4° 30′				5° 00′				5° 30′				6° 00′				6° 30′				7° 00′				7° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	75 00.0	1.0	03	180.0	75 30.0	1.0	03	180.0	76 00.0	1.0	03	180.0	76 30.0	1.0	04	180.0	77 00.0	1.0	04	180.0	77 30.0	1.0	04	180.0	78 00.0	1.0	04	180.0	78 30.0	1.0	04	180.0	00
1	74 58.1	1.0	10	176.2	75 28.0	1.0	10	176.0	75 58.0	1.0	10	175.9	76 27.9	1.0	10	175.7	76 57.8	1.0	11	175.6	77 27.7	1.0	11	175.4	77 57.6	1.0	12	175.2	78 27.5	1.0	12	175.0	1
2	74 52.4	99	16	172.3	75 22.2	99	16	172.1	75 51.9	99	17	171.8	76 21.6	99	17	171.5	76 51.3	99	18	171.2	77 21.0	99	19	170.9	77 50.6	99	19	170.5	78 20.2	99	20	170.1	2
3	74 43.6	98	22	168.6	75 12.4	98	22	168.2	75 41.8	98	23	167.8	76 11.2	98	24	167.4	76 40.5	98	25	166.9	77 09.8	97	26	166.5	77 39.0	97	26	165.9	78 08.2	97	28	165.4	3
4	74 30.0	97	27	164.9	74 59.0	97	28	164.4	75 28.0	96	29	163.9	75 56.9	96	30	163.4	76 25.7	96	31	162.8	76 54.5	96	32	162.2	77 23.1	95	33	161.5	77 51.7	95	34	160.8	4
05	74 13.5	96	33	161.3	74 42.0	95	34	160.8	75 10.5	95	35	160.2	75 38.8	94	36	159.5	76 07.1	94	37	158.8	76 35.2	93	38	158.1	77 03.2	93	40	157.3	77 31.0	92	41	156.4	05
6	73 53.7	93	38	157.9	74 21.7	93	39	157.3	74 49.6	93	40	156.6	75 17.3	92	41	155.8	75 44.8	92	43	155.0	76 12.2	91	44	154.2	76 39.4	90	45	153.3	77 06.4	90	47	152.3	6
7	73 30.9	91	43	154.6	73 58.3	91	44	153.9	74 25.4	90	45	153.1	74 52.4	90	46	152.3	75 19.3	89	48	151.4	75 45.9	88	49	150.5	76 12.3	88	50	149.5	76 38.4	87	52	148.5	7
8	73 05.2	89	47	151.5	73 31.9	89	48	150.7	73 58.3	88	50	149.9	74 24.6	87	51	149.0	74 50.7	86	52	148.0	75 16.5	86	54	147.0	75 42.0	85	55	146.0	76 07.2	84	57	144.9	8
9	72 36.8	87	51	148.5	73 02.8	86	53	147.7	73 28.5	85	54	146.8	73 54.0	85	55	145.8	74 19.3	84	56	144.9	74 44.2	83	58	143.8	75 08.9	82	59	142.7	75 33.2	81	61	141.6	9
10	72 06.0	86	55	145.7	72 31.3	84	56	144.8	72 56.3	83	58	143.9	73 21.0	82	59	142.9	73 45.4	81	60	141.9	74 09.6	80	62	140.8	74 33.3	79	63	139.7	74 56.8	77	64	138.5	10
1	71 33.0	82	59	143.0	71 57.5	81	60	142.1	72 21.7	80	61	141.1	72 45.7	79	62	140.1	73 09.3	78	64	139.1	73 32.6	77	65	138.0	73 55.6	76	66	136.8	74 18.1	75	68	135.6	1
2	70 57.8	80	62	140.5	71 21.6	79	63	139.6	71 45.1	78	64	138.6	72 08.3	77	65	137.6	72 31.2	76	67	136.5	72 53.7	74	68	135.4	73 15.8	73	69	134.2	73 37.5	72	70	133.0	2
3	70 20.9	77	64	138.1	70 44.0	76	66	137.2	71 06.7	75	67	136.2	71 29.2	74	68	135.2	71 51.3	73	69	134.1	72 13.0	72	70	133.0	72 34.3	70	72	131.8	72 55.2	69	73	130.6	3
4	69 42.2	75	67	135.9	70 04.6	74	68	134.9	70 26.7	73	69	133.9	70 48.4	72	70	132.9	71 09.8	71	72	131.8	71 30.7	69	73	130.7	71 51.3	68	74	129.6	72 11.4	66	75	128.4	4
15	69 02.0	73	69	133.8	69 23.7	72	70	132.8	69 45.1	71	72	131.8	70 06.1	69	73	130.8	70 26.8	68	74	129.7	70 47.0	67	75	128.6	71 06.9	65	76	127.5	71 26.3	64	77	126.3	15
6	68 20.4	71	71	131.8	68 41.4	70	72	130.9	69 02.2	69	74	129.9	69 22.5	67	75	128.8	69 42.5	66	76	127.8	70 02.1	65	77	126.7	70 21.3	63	78	125.5	70 40.0	62	79	124.4	6
7	67 37.5	69	73	130.0	67 58.0	68	74	129.0	68 18.1	66	75	128.0	68 37.8	65	76	127.0	68 57.1	64	77	125.9	69 16.1	62	78	124.9	69 34.6	61	79	123.7	69 52.7	60	80	122.6	7
8	66 53.5	67	75	128.2	67 13.3	66	76	127.3	67 32.8	64	77	126.3	67 52.0	63	78	125.3	68 10.7	62	79	124.2	68 29.1	60	80	123.2	68 47.0	59	81	122.1	69 04.4	58	82	120.9	8
9	66 08.4	65	77	126.6	66 27.7	64	78	125.6	66 46.6	62	78	124.7	67 05.2	61	79	123.7	67 23.4	60	80	122.6	67 41.1	59	81	121.6	67 58.5	57	82	120.5	68 15.4	56	83	119.4	9
20	65 22.4	63	78	125.0	65 41.2	62	79	124.1	65 59.5	61	80	123.1	66 17.6	59	81	122.1	66 35.2	58	82	121.1	66 52.4	57	82	120.1	67 09.2	55	83	119.0	67 25.6	54	84	117.9	20
1	64 35.5	61	79	123.6	64 53.8	60	80	122.6	65 11.6	59	81	121.7	65 29.1	58	82	120.7	65 46.3	56	83	119.7	66 03.0	55	83	118.7	66 19.3	54	84	117.7	66 35.2	52	85	116.6	1
2	63 47.9	60	81	122.2	64 05.6	59	81	121.3	64 23.0	57	82	120.3	64 40.0	56	83	119.4	64 56.7	55	84	118.4	65 12.9	53	84	117.4	65 28.8	52	85	116.4	65 44.2	51	86	115.3	2
3	62 59.5	58	82	120.9	63 16.8	57	82	120.0	63 33.7	56	83	119.0	63 50.3	55	84	118.1	64 06.5	53	85	117.1	64 22.3	52	85	116.2	64 37.7	51	86	115.2	64 52.7	49	87	114.2	3
4	62 10.5	57	83	119.6	62 27.4	56	83	118.7	62 43.8	54	84	117.8	63 00.0	53	85	116.9	63 15.7	52	85	116.0	63 31.1	51	86	115.0	63 46.1	49	87	114.0	64 00.7	48	87	113.0	4
25	61 20.9	55	84	118.4	61 37.3	54	84	117.6	61 53.4	53	85	116.7	62 09.1	52	86	115.8	62 24.5	51	86	114.8	62 39.5	49	87	113.9	62 54.1	48	87	113.0	63 08.3	47	88	112.0	25
6	60 30.8	54	84	117.3	60 46.8	53	85	116.5	61 02.5	52	86	115.6	61 17.8	51	86	114.7	61 32.8	49	87	113.8	61 47.4	48	87	112.9	62 01.6	47	88	111.9	62 15.5	46	89	111.0	6
7	59 40.1	53	85	116.3	59 55.8	52	86	115.4	60 11.1	50	86	114.5	60 26.0	49	87	113.7	60 40.7	48	87	112.8	60 54.9	47	88	111.9	61 08.8	46	89	111.0	61 22.3	44	89	110.0	7
8	58 49.0	51	86	115.2	59 04.3	50	86	114.4	59 19.3	49	87	113.6	59 33.9	48	88	112.7	59 48.2	47	88	111.8	60 02.1	46	89	110.9	60 15.7	45	89	110.1	60 28.9	43	90	109.1	8
9	57 57.5	50	86	114.3	58 12.5	49	87	113.5	58 27.1	48	88	112.6	58 41.4	47	88	111.8	58 55.4	46	89	110.9	59 09.0	45	89	110.1	59 22.2	44	90	109.2	59 35.2	42	90	108.3	9
30	57 05.6	49	87	113.3	57 20.2	48	88	112.5	57 34.6	47	88	111.7	57 48.5	46	89	110.9	58 02.2	45	89	110.1	58 15.5	44	90	109.2	58 28.5	43	90	108.4	58 41.2	42	90	107.5	30
1	56 13.4	48	88	112.5	56 27.7	47	88	111.7	56 41.7	46	89	110.9	56 55.4	45	89	110.1	57 08.8	44	90	109.2	57 21.8	43	90	108.4	57 34.6	42	90	107.6	57 46.9	41	91	106.7	1
2	55 20.8	47	88	111.6	55 34.8	46	89	110.8	55 48.5	45	89	110.0	56 02.0	44	89	109.2	56 15.1	43	90	108.4	56 27.9	42	90	107.6	56 40.4	41	91	106.8	56 52.5	40	91	106.0	2
3	54 27.9	46	89	110.8	54 41.6	45	89	110.0	54 55.1	44	89	109.3	55 08.3	43	90	108.5	55 21.2	42	90	107.7	55 33.7	41	91	106.9	55 45.9	40	91	106.1	55 57.9	39	91	105.3	3
4	53 34.7	45	89	110.0	53 48.2	45	89	109.3	54 01.4	44	90	108.5	54 14.4	43	90	107.7	54 27.0	42	91	107.0	54 39.3	41	91	106.2	54 51.3	40	91	105.4	55 03.0	38	92	104.6	4
35	52 41.3	45	89	109.3	52 54.5	44	90	108.5	53 07.5	43	90	107.8	53 20.2	42	91	107.0	53 32.6	41	91	106.3	53 44.7	40	91	105.5	53 56.6	39	92	104.7	54 08.1	38	92	103.9	35
6	51 47.6	44	90	108.6	52 00.6	43	90	107.8	52 13.4	42	91	107.1	52 25.9	41	91	106.3	52 38.1	40	91	105.6	52 50.0	39	92	104.8	53 01.6	38	92	104.1	53 12.9	37	92	103.3	6
7	50 53.7	43	90	107.9	51 06.5	42	90	107.1	51 19.1	41	91	106.4	51 31.3	40	91	105.7	51 43.3	40	92	104.9	51 55.1	39	92	104.2	52 06.5	38	92	103.4	52 17.6	37	92	102.7	7
8	49 59.6	42	90	107.2	50 12.2	42	91	106.5	50 24.6	41	91	105.8	50 36.6	40	91	105.0	50 48.5	39	92	104.3	51 00.0	38	92	103.6	51 11.3	37	92	102.9	51 22.2	36	93	102.1	8
9	49 05.3	42	91	106.5	49 17.7	41	91	105.8	49 29.9	40	91	105.1	49 41.8	39	92	104.4	49 53.4	38	92	103.7	50 04.8	37	92	103.0	50 15.9	37	92	102.3	50 26.7	36	93	101.5	9
40	48 10.9	41	91	105.9	48 23.1	40	91	105.2	48 35.0	39	92	104.5	48 46.8	39	92	103.8	48 58.2	38	92	103.1	49 09.4	37	92	102.4	49 20.4	36	93	101.7	49 31.1	35	93	101.0	40
1	47 16.2	41	91	105.3	47 28.3	40	92	104.6	47 40.1	39	92	104.0	47 51.6	38	92	103.3	48 02.9	37	92	102.6	48 14.0	36	93	101.9	48 24.8	36	93	101.2	48 35.3	35	93	100.5	1
2	46 21.4	40	92	104.7	46 33.3	39	92	104.1	46 44.9	38	92	103.4	46 56.3	38	92	102.7	47 07.5	37	93	102.0	47 18.4	36	93	101.3	47 29.1	35	93	100.7	47 39.5	34	93	100.0	2
3	45 26.5	39	92	104.2	45 38.2	39	92	103.5	45 49.7	38	92	102.8	46 00.9	37	92	102.2	46 12.0	36	93	101.5	46 22.7	36	93	100.8	46 33.3	35	93	100.1	46 43.6	34	93	99.5	3
4	44 31.4	39	92	103.6	44 43.0	38	92	103.0	44 54.3	37	92	102.3	45 05.4	37	93	101.6	45 16.3	36	93	101.0	45 27.0	35	93	100.3	45 37.4	34	93	99.6	45 47.6	34	93	99.0	4
45	43 36.2	38	92	103.1	43 47.6	38	92	102.4	43 58.8	37	93	101.8	44 09.8	36	93	101.1	44 20.6	36	93	100.5	44 31.1	35	93	99.8	44 41.4	34	93	99.2	44 51.5	33	94	98.5	45
6	42 40.9	38	92	102.5	42 52.2	37	93	101.9	43 03.2	37	93	101.3	43 14.1	36	93	100.6	43 24.7	35	93	100.0	43 35.2	34	93	99.3	43 45.4	34	94	98.7	43 55.4	33	94	98.0	6
7	41 45.5	38	93	102.0	41 56.6	37	93	101.4	42 07.6	36	93	100.8	42 18.3	35	93	100.2	42 28.8	35	93	99.5	42 39.2	34	94	98.9	42 49.3	33	94	98.2	42 59.2	33	94	97.6	7
8	40 49.9	37	93	101.5	41 01.0	36	93	100.9	41 11.8	36	93	100.3	41 22.4	35	93	99.7	41 32.8	34	93	99.1	41 43.1	34	94	98.4	41 53.1	33	94	97.8	42 02.9	32	94	97.2	8
9	39 54.3	37	93	101.1	40 05.2	36	93	100.4	40 15.9	35	93	99.8	40 26.5	35	93	99.2	40 36.8	34	94	98.6	40 46.9	33	94	98.0	40 56.9	33	94	97.4	41 06.6	32	94	96.7	9
50	38 58.6	36	93	100.6	39 09.4	36	93	100.0	39 20.0	35	93	99.4	39 30.4	34	94	98.8	39 40.7	34	94	98.2	39 50.7	33	94	97.6	40 00.6	33	94	96.9	40 10.2	32	94	96.3	50
1	38 02.8	36	93	100.1	38 13.5	35	93	99.5	38 24.0	35	93	98.9	38 34.3	34	94	98.3	38 44.5	34	94	97.7	38 54.4	33	94	97.1	39 04.2	32	94	96.5	39 13.8	32	94	95.9	1
2	37 06.9	36	93	99.7	37 17.5	35	93	99.1	37 27.9	34	94	98.5	37 38.2	34	94	97.9	37 48.2	33	94	97.3	37 58.1	33	94	96.7	38 07.8	32	94	96.1	38 17.4	31	94	95.5	2
3	36 10.9	35	93	99.2	36 21.4	35	94	98.7	36 31.8	34	94	98.1	36 41.9	34	94	97.5	36 51.9	33	94	96.9	37 01.8	32	94	96.3	37 11.4	32	94	95.7	37 20.9	31	94	95.1	3
4	35 14.9	36	93	98.8	35 25.3	34	94	98.2	35 35.6	34	94	97.6	35 45.7	33	94	97.1	35 55.6	33	94	96.5	36 05.4	32	94	95.9	36 14.9	32	94	95.3	36 24.4	31	94	94.7	4
55	34 18.8	35	94	98.4	34 29.1	34	94	97.8	34 39.3	34	94	97.2	34 49.3	33	94	96.7	34 59.2	33	94	96.1	35 08.9	32	94	95.5	35 18.4	31	94	94.9	35 27.8	31	94	94.3	55
6	33 22.6	34	94	98.0	33 32.9	34	94	97.4	33 43.0	33	94	96.8	33 53.0	33	94	96.3	34 02.8	32	94	95.7	34 12.4	32	94	95.1	34 21.9	31	94	94.5	34 31.2	31	94	94.0	6
7	32 26.4	34	94	97.6	32 36.6	34	94	97.0	32 46.7	33	94	96.4	32 56.6	33	94	95.9	33 06.3	32	94	95.3	33 15.9	32	94	94.7	33 25.3	31	94	94.2	33 34.6	31	94	93.6	7
8	31 30.2	34	94	97.2	31 40.3	34	94	96.6	31 50.3	33	94	96.0	32 00.1	33	94	95.5	32 09.8	32	94	94.9	32 19.3	32	94	94.4	32 28.7	31	94	93.8	32 38.0	31	94	93.2	8
9	30 33.8	34	94	96.8	30 43.9	33	94	96.2	30 53.8	33	94	95.7	31 03.6	32	94	95.1	31 13.3	32	94	94.6	31 22.8	31	94	94.0	31 32.1	31	94	93.4	31 41.3	30	94	92.9	9
60	29 37.5	34	94	96.4	29 47.5	33	94	95.8	29 57.4	33	94	95.3	30 07.1	32	94	94.7	30 16.7	32	94	94.2	30 26.2	31	94	93.6	30 35.5	31	94	93.1	30 44.7	30	94	92.5	60
1	28 41.1	33	94	96.0	28 51.0	33	94	95.4	29 00.9	33	94	94.9	29 10.5	32	94	94.4	29 20.1	32	94	93.8	29 29.5	31	94	93.3	29 38.8	31	94	92.7	29 48.0	30	94	92.2	1
2	27 44.6	33	94	95.6	27 54.5	33	94	95.1	28 04.3	32	94	94.5	28 14.0	32	94	94.0	28 23.5	32	94	93.5	28 32.9	31	94	92.9	28 42.2	31	94	92.4	28 51.3	30	94	91.8	2
3	26 48.2	33	94	95.2	26 58.0	33	94	94.7	27 07.8	32	94	94.2	27 17.4	32	94	93.6	27 26.9	31	94	93.1	27 36.2	31	94	92.6	27 45.5	31	94	92.0	27 54.6	30	95	91.5	3
4	25 51.7	33	94	94.9	26 01.5	32	94	94.3	26 11.2	32	94	93.8	26 20.7	32	94	93.3	26 30.2	31	94	92.8	26 39.5	31	94	92.2	26 48.8	31	95	91.7	26 57.9	30	95	91.2	4
65	24 55.1	33	94	94.5	25 04.9	32	94	94.0	25 14.5	32	94	93.5	25 24.1	32	94	92.9	25 33.5	31	94	92.4	25 42.8	31	95	91.9	25 52.1	31	95	91.4	26 01.1	30	95	90.8	65
6	23 58.5	33	94	94.2	24 08.3	32	94	93.6	24 17.9	32	94	93.1	24 27.4	32	94	92.6	24 36.8	31	94	92.1	24 46.1	31	95	91.5	24 55.3	30	95	91.0	25 04.4	30	95	90.5	6
7	23 02.0	32	94	93.8	23 11.7	32	94	93.3	23 21.2	32	94	92.8	23 30.7	31	94	92.3	23 40.1	31	95	91.7	23 49.4	31	95	91.2	23 58.6	30	95	90.7	24 07.7	30	95	90.2	7
8	22 05.3	32	94	93.4	22 15.0	32	94	92.9	22 24.6	32	94	92.4	22 34.0	31	94	91.9	22 43.4	31	95	91.4	22 52.7	31	95	90.9	23 01.9	30	95	90.4	23 11.0	30	96	89.8	8
9	21 08.7	32	94	93.1	21 18.3	32	94	92.6	21 27.9	32	94	92.1	21 37.3	31	95	91.6	21 46.7	31	95	91.1	21 56.0	31	95	90.5	22 05.1	30	95	90.0	22 14.2	30	95	89.5	9
70	20 12.0	32	94	92.8	20 21.7	32	94	92.3	20 31.2	32	94	91.7	20 40.6	31	95	91.2	20 50.0	31	95	90.7	20 59.2	31	95	90.2	21 08.4	30	95	89.7	21 17.5	30	95	89.2	70
1	19 15.4	32	94	92.4	19 25.0	32	94	91.9	19 34.5	32	95	91.4	19 43.9	31	95	90.9	19 53.3	31	95	90.4	20 02.5	31	95	89.9	20 11.7	30	95	89.4	20 20.8	30	96	88.9	1
2	18 18.7	32	94	92.1	18 28.3	32	95	91.6	18 37.8	32	95	91.1	18 47.2	31	95	90.6	18 56.5	31	95	90.1	19 05.8	31	95	89.6	19 15.0	30	95	89.1	19 24.1	30	94	88.6	2
3	17 22.0	32	96	91.7	17 31.5	32	95	91.2	17 41.0	32	95	90.7	17 50.5	31	95	90.2	17 59.8	31	95	89.7	18 09.1	31	95	89.2	18 18.2	30	95	88.7	18 27.3	30	94	88.2	3
4	16 25.3	32	95	91.4	16 34.8	32	95	90.9	16 44.3	31	95	90.4	16 53.7	31	95	89.9	17 03.1	31	95	89.4	17 12.3	31	95	88.9	17 21.5	31	95	88.4	17 30.6	30	94	87.9	4
75	15 28.6	32	96	91.1	15 38.1	32	95	90.6	15 47.6	31	95	90.1	15 57.0	31	95	89.6	16 06.3	31	95	89.1	16 15.6	31	95	88.6	16 24.8	31	94	88.1	16 34.0	30	94	87.6	75
6	14 31.8	32	96	90.7	14 41.4	32	95	90.3	14 50.8	31	95	89.8	15 00.3	31	95	89.3	15 09.6	31	95	88.8	15 18.9	31	94	88.3	15 28.1	31	94	87.8	15 37.3	30	94	87.3	6
7	13 35.1	32	96	90.4	13 44.6	32	96	89.9	13 54.1	32	95	89.4	14 03.5	31	95	89.0	14 12.9	31	94	88.5	14 22.2	31	94	88.0	14 31.4	31	94	87.5	14 40.6	30	94	87.0	7
8	12 38.4	32	96	90.1	12 47.9	32	96	89.6	12 57.4	32	96	89.1	13 06.8	31	95	88.6	13 16.2	31	94	88.1	13 25.5	31	94	87.7	13 34.8	31	94	87.2	13 44.0	31	94	86.7	8
9	11 41.6	32	95	89.8	11 51.2	32	95	89.3	12 00.7	32	95	88.8	12 10.1	31	95	88.3	12 10.5	31	94	87.8	12 28.8	31	94	87.3	12 38.1	31	94	86.9	12 47.4	31	94	86.4	9
80	10 44.9	32	96	89.4	10 54.5	32	96	89.0	11 04.0	32	94	88.5	11 13.4	31	94	88.0	11 22.8	31	94	87.5	11 32.2	31	94	87.0	11 41.5	31	94	86.5	11 50.7	31	94	86.1	80
1	9 48.2	32	96	89.1	9 57.7	32	95	88.6	10 07.2	32	94	88.2	10 16.7	31	94	87.7	10 26.1	31	94	87.2	10 35.5	31	94	86.7	10 44.9	31	94	86.2	10 54.2	31	94	85.7	1
2	8 51.5	32	95	88.8	9 01.0	32	94	88.3	9 10.6	32	94	87.8	9 20.0	32	94	87.4	9 29.5	31	94	86.9	9 38.9	31	94	86.4	9 48.3	31	94	85.9	9 57.6	31	94	85.4	2
3	7 54.7	32	96	88.5	8 04.3	32	94	88.0	8 13.9	32	94	87.5	8 23.4	32	94	87.0	8 32.9	32	94	86.6	8 42.3	31	94	86.1	8 51.7	31	94	85.6	9 01.1	31	94	85.1	3
4	6 58.0	32	94	88.2	7 07.6	32	94	87.7	7 17.2	32	94	87.2	7 26.7	32	94	86.7	7 36.2	32	94	86.2	7 45.7	32	94	85.8	7 55.1	31	94	85.3	8 04.5	31	94	84.8	4
85	6 01.3	32	94	87.8	6 11.0	32	94	87.4	6 20.5	32	94	86.9	6 30.1	32	94	86.4	6 39.6	32	94	85.9	6 49.1	32	94	85.4	6 58.6	32	94	85.0	7 08.1	31	94	84.5	85
6	5 04.7	32	94	87.5	5 14.3	32	94	87.0	5 23.9	32	94	86.6	5 33.5	32	94	86.1	5 43.1	32	94	85.6	5 52.6	32	94	85.1	6 02.1	32	94	84.7	6 11.6	32	94	84.2	6
7																									5 05.6	32	94	84.3	5 15.2	32	94	83.9	7

H.A.	4° 00′			4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′			7° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	67 00.0	1.0 02	180.0	66 30.0	1.0 02	180.0	66 00.0	1.0 02	180.0	65 30.0	1.0 02	180.0	65 00.0	1.0 02	180.0	64 30.0	1.0 02	180.0	64 00.0	1.0 02	180.0	63 30.0	1.0 02	180.0	00
1	66 58.7	1.0 06	177.4	66 28.8	1.0 06	177.5	65 58.8	1.0 06	177.6	65 28.8	1.0 06	177.6	64 58.8	1.0 06	177.6	64 28.9	1.0 06	177.7	63 58.9	1.0 06	177.7	63 28.9	1.0 06	177.8	1
2	66 55.0	1.0 10	174.9	66 25.1	1.0 10	175.0	65 55.2	1.0 10	175.1	65 25.3	1.0 10	175.2	64 55.3	1.0 10	175.3	64 25.4	1.0 09	175.4	63 55.5	1.0 09	175.5	63 25.6	1.0 09	175.6	2
3	66 48.7	99 15	172.4	66 18.9	99 14	172.5	65 49.1	99 14	172.7	65 19.3	99 14	172.8	64 49.6	99 13	173.0	64 19.8	99 13	173.1	63 49.9	99 13	173.2	63 20.1	99 13	173.4	3
4	66 39.9	99 19	169.9	66 10.3	99 18	170.1	65 40.7	99 18	170.3	65 11.1	99 18	170.5	64 41.5	99 17	170.7	64 11.8	99 17	170.8	63 42.2	99 17	171.0	63 12.5	99 16	171.2	4
05	66 28.8	98 23	167.4	65 59.4	98 22	167.7	65 30.0	98 22	167.9	65 00.6	98 21	168.2	64 31.2	98 21	168.4	64 01.7	98 20	168.6	63 32.2	98 20	168.8	63 02.7	98 20	169.0	05
6	66 15.2	97 26	165.0	65 46.1	97 26	165.3	65 17.0	97 25	165.6	64 47.8	97 25	165.9	64 18.6	97 24	166.1	63 49.4	97 24	166.4	63 20.2	98 24	166.6	62 50.9	98 23	166.9	6
7	65 59.4	96 30	162.6	65 30.6	96 30	163.0	65 01.8	96 29	163.3	64 32.9	96 28	163.6	64 04.0	96 28	163.9	63 35.0	97 27	164.2	63 06.0	97 27	164.5	62 37.0	97 26	164.8	7
8	65 41.4	95 34	160.3	65 12.9	95 33	160.7	64 44.4	95 32	161.0	64 15.8	95 32	161.4	63 47.2	95 31	161.7	63 18.5	96 31	162.1	62 49.8	96 30	162.4	62 21.1	96 30	162.7	8
9	65 21.2	93 37	158.0	64 53.1	94 36	158.4	64 24.9	94 36	158.8	63 56.7	94 35	159.2	63 28.4	94 35	159.6	63 00.1	96 34	160.0	62 31.7	95 33	160.3	62 03.3	95 33	160.7	9
10	64 58.9	92 40	155.8	64 31.2	92 40	156.3	64 03.5	93 39	156.7	63 35.6	93 38	157.1	63 07.7	93 38	157.5	62 39.7	93 37	157.9	62 11.7	94 36	158.3	61 43.6	94 36	158.7	10
1	64 34.7	91 43	153.7	64 07.4	91 43	154.2	63 40.1	91 42	154.6	63 12.6	92 41	155.1	62 45.1	92 41	155.5	62 17.5	92 40	155.9	61 49.8	92 39	156.3	61 22.0	93 39	156.7	1
2	64 08.6	89 46	151.6	63 41.8	90 46	152.1	63 14.9	90 45	152.6	62 47.8	90 44	153.1	62 20.7	91 44	153.5	61 53.5	91 43	154.0	61 26.2	91 42	154.4	60 58.8	91 42	154.9	2
3	63 40.8	88 49	149.6	63 14.4	88 48	150.1	62 47.9	89 48	150.6	62 21.3	89 47	151.1	61 54.6	89 46	151.6	61 27.8	90 46	152.1	61 00.9	90 45	152.6	60 33.9	90 44	153.0	3
4	63 11.2	86 52	147.7	62 45.3	87 51	148.2	62 19.3	87 50	148.7	61 53.1	87 50	149.3	61 26.8	88 49	149.8	61 00.4	88 48	150.3	60 33.9	89 47	150.8	60 07.3	89 47	151.2	4
15	62 40.1	85 54	145.8	62 14.7	85 54	146.4	61 49.1	86 53	146.9	61 23.3	86 52	147.5	60 57.5	86 51	148.0	60 31.5	87 51	148.5	60 05.4	87 50	149.0	59 39.3	87 49	149.5	15
6	62 07.5	83 57	144.0	61 42.5	84 56	144.6	61 17.4	84 55	145.1	60 52.1	84 54	145.7	60 26.7	85 54	146.2	60 01.2	85 53	146.8	59 35.5	86 52	147.3	59 09.7	86 52	147.8	6
7	61 33.4	81 59	142.2	61 08.9	82 58	142.8	60 44.2	82 57	143.4	60 19.4	83 57	144.0	59 54.5	83 56	144.6	59 29.4	84 55	145.1	59 04.1	84 54	145.6	58 38.8	85 54	146.1	7
8	60 58.0	80 61	140.6	60 34.0	80 60	141.2	60 09.8	81 60	141.8	59 45.4	81 59	142.4	59 20.9	82 58	142.9	58 56.3	82 57	143.5	58 31.5	83 57	144.0	58 06.5	83 56	144.6	8
9	60 21.4	78 63	139.0	59 57.8	79 62	139.6	59 34.1	79 62	140.2	59 10.2	80 61	140.8	58 46.1	80 60	141.4	58 21.9	81 59	141.9	57 57.5	81 59	142.5	57 33.0	82 58	143.0	9
20	59 43.5	77 65	137.4	59 20.4	77 64	138.0	58 57.2	78 63	138.7	58 33.7	78 63	139.3	58 10.1	79 62	139.8	57 46.3	80 61	140.4	57 22.4	80 60	141.0	56 58.3	80 60	141.5	20
1	59 04.6	75 67	135.9	58 42.0	76 66	136.6	58 19.1	76 65	137.2	57 56.1	77 64	137.8	57 32.9	78 64	138.4	57 09.6	78 63	139.0	56 46.1	79 62	139.5	56 22.4	79 62	140.1	1
2	58 24.6	74 68	134.5	58 02.4	74 68	135.1	57 40.0	75 67	135.8	57 17.5	76 66	136.4	56 54.7	76 65	137.0	56 31.8	77 65	137.6	56 08.8	77 64	138.1	55 45.5	78 63	138.7	2
3	57 43.7	72 70	133.1	57 21.9	73 69	133.8	57 00.0	73 68	134.4	56 37.8	74 68	135.0	56 15.5	75 67	135.6	55 53.0	75 66	136.2	55 30.4	76 66	136.8	55 07.6	76 65	137.4	3
4	57 01.8	71 71	131.8	56 40.5	71 70	132.4	56 19.0	72 70	133.1	55 57.3	73 69	133.7	55 35.4	73 68	134.3	55 13.3	74 68	134.9	54 51.1	74 67	135.5	54 28.7	75 66	136.0	4
25	56 19.1	69 73	130.5	55 58.2	70 72	131.2	55 37.1	71 71	131.8	55 15.8	71 70	132.4	54 54.3	72 70	133.0	54 32.7	72 69	133.6	54 10.8	73 68	134.2	53 48.8	74 68	134.8	25
6	55 35.6	68 74	129.3	55 15.1	69 73	129.9	54 54.4	69 72	130.6	54 33.5	70 72	131.2	54 12.4	71 71	131.8	53 51.2	71 70	132.4	53 29.8	72 70	133.0	53 08.2	72 69	133.6	6
7	54 51.3	67 75	128.1	54 31.2	67 74	128.8	54 10.9	68 74	129.4	53 50.4	69 73	130.0	53 29.8	69 72	130.6	53 08.9	70 72	131.2	52 47.9	70 71	131.8	52 26.7	71 70	132.4	7
8	54 06.3	65 76	127.0	53 46.6	66 75	127.6	53 26.7	67 75	128.3	53 06.6	67 74	128.9	52 46.3	68 74	129.5	52 25.9	69 73	130.1	52 05.2	69 72	130.7	51 44.4	70 72	131.3	8
9	53 20.7	64 77	125.9	53 01.4	65 76	126.5	52 41.9	65 76	127.2	52 22.1	66 75	127.8	52 02.2	67 75	128.4	51 42.1	67 74	129.0	51 21.8	68 73	129.6	51 01.4	68 73	130.2	9
30	52 34.4	63 78	124.8	52 15.5	64 78	125.5	51 56.3	64 77	126.1	51 37.0	65 76	126.7	51 17.4	65 76	127.3	50 57.7	66 75	127.9	50 37.8	67 74	128.5	50 17.7	67 74	129.1	30
1	51 47.6	62 79	123.8	51 29.0	62 78	124.5	51 10.2	63 78	125.1	50 51.2	64 77	125.7	50 32.0	64 77	126.3	50 12.6	65 76	126.9	49 53.1	65 76	127.5	49 33.4	66 75	128.1	1
2	51 00.2	60 80	122.9	50 41.9	61 79	123.5	50 23.5	62 79	124.1	50 04.8	62 78	124.7	49 46.0	63 78	125.3	49 27.0	64 77	125.9	49 07.8	64 76	126.5	48 48.4	65 76	127.1	2
3	50 12.3	59 81	121.9	49 54.4	60 80	122.5	49 36.3	61 80	123.2	49 17.9	61 79	123.8	48 59.4	62 78	124.4	48 40.8	63 78	125.0	48 21.9	63 77	125.5	48 02.8	64 77	126.1	3
4	49 23.9	58 81	121.0	49 06.3	59 81	121.6	48 48.5	60 80	122.2	48 30.5	60 80	122.8	48 12.4	61 79	123.4	47 54.0	61 79	124.0	47 35.5	62 78	124.6	47 16.8	63 78	125.2	4
35	48 35.0	57 82	120.1	48 17.8	58 82	120.7	48 00.3	59 81	121.3	47 42.6	59 81	122.0	47 24.8	60 80	122.5	47 06.7	60 80	123.1	46 48.5	61 79	123.7	46 30.1	62 78	124.3	35
6	47 45.8	56 83	119.3	47 28.8	57 82	119.9	47 11.6	58 82	120.5	46 54.3	58 81	121.1	46 36.7	59 81	121.7	46 19.0	59 80	122.3	46 01.1	60 80	122.8	45 43.0	61 79	123.4	6
7	46 56.1	55 83	118.5	46 39.4	56 83	119.1	46 22.5	57 82	119.7	46 05.5	57 82	120.3	45 48.2	58 82	120.8	45 30.8	58 81	121.4	45 13.2	59 81	122.0	44 55.4	60 80	122.6	7
8	46 06.0	54 84	117.7	45 49.6	55 84	118.3	45 33.0	56 83	118.9	45 16.3	56 83	119.4	44 59.3	57 82	120.0	44 42.2	57 82	120.6	44 24.9	58 81	121.2	44 07.4	59 81	121.8	8
9	45 15.6	53 85	116.9	44 59.5	54 84	117.5	44 43.2	55 84	118.1	44 26.7	55 83	118.7	44 10.0	56 83	119.2	43 53.2	56 82	119.8	43 36.2	57 82	120.4	43 19.0	58 81	121.0	9
40	44 24.8	53 85	116.1	44 09.0	53 85	116.7	43 52.9	54 84	117.3	43 36.7	54 84	117.9	43 20.3	55 83	118.5	43 03.8	55 83	119.1	42 47.0	56 82	119.6	42 30.1	57 82	120.2	40
1	43 33.7	52 86	115.4	43 18.1	52 85	116.0	43 02.4	53 85	116.6	42 46.4	53 84	117.2	42 30.3	54 84	117.7	42 14.0	55 84	118.3	41 57.5	55 83	118.9	41 40.9	56 83	119.4	1
2	42 42.4	51 86	114.7	42 27.0	51 86	115.3	42 11.5	52 85	115.9	41 55.8	53 85	116.5	41 39.9	53 84	117.0	41 23.9	54 84	117.6	41 07.7	54 84	118.2	40 51.3	55 83	118.7	2
3	41 50.7	50 87	114.0	41 35.6	51 86	114.6	41 20.3	51 86	115.2	41 04.8	52 85	115.8	40 49.2	52 85	116.3	40 33.4	53 85	116.9	40 17.5	53 84	117.4	40 01.4	54 84	118.0	3
4	40 58.7	49 87	113.4	40 43.9	50 87	114.0	40 28.8	50 86	114.5	40 13.6	51 86	115.1	39 58.2	52 85	115.7	39 42.7	52 85	116.2	39 27.0	53 85	116.8	39 11.1	53 84	117.3	4
45	40 06.5	49 87	112.7	39 51.9	49 87	113.3	39 37.1	50 87	113.9	39 22.1	50 86	114.4	39 06.9	51 86	115.0	38 51.6	51 86	115.5	38 36.2	52 85	116.1	38 20.6	52 85	116.6	45
6	39 14.1	48 88	112.1	38 59.7	48 87	112.7	38 45.1	49 87	113.2	38 30.3	49 87	113.8	38 15.4	50 86	114.3	38 00.3	50 86	114.9	37 45.1	51 86	115.4	37 29.7	51 85	116.0	6
7	38 21.4	47 88	111.5	38 07.2	48 88	112.1	37 52.8	48 87	112.6	37 38.3	49 87	113.2	37 23.6	49 87	113.7	37 08.7	50 86	114.3	36 53.7	50 86	114.8	36 38.6	51 86	115.4	7
8	37 28.5	46 88	110.9	37 14.5	47 88	111.5	37 00.3	48 88	112.0	36 46.0	48 88	112.6	36 31.5	49 87	113.1	36 16.9	49 87	113.7	36 02.1	49 86	114.2	35 47.2	50 86	114.7	8
9	36 35.4	46 89	110.3	36 21.6	46 88	110.9	36 07.6	47 88	111.4	35 53.5	47 88	112.0	35 39.2	48 88	112.5	35 24.8	48 87	113.1	35 10.2	49 87	113.6	34 55.5	49 86	114.1	9
50	35 42.2	45 89	109.8	35 28.5	46 89	110.3	35 14.7	46 89	110.9	35 00.8	47 88	111.4	34 46.7	47 88	111.9	34 32.5	48 88	112.5	34 18.1	48 87	113.0	34 03.7	49 87	113.5	50
1	34 48.7	45 89	109.2	34 35.2	45 89	109.8	34 21.6	46 89	110.3	34 07.9	46 88	110.8	33 54.0	47 88	111.4	33 40.0	47 88	111.9	33 25.8	47 88	112.4	33 11.5	48 87	113.0	1
2	33 55.0	44 90	108.7	33 41.7	45 89	109.2	33 28.3	45 89	109.8	33 14.8	45 89	110.3	33 01.1	46 89	110.8	32 47.2	46 88	111.4	32 33.3	47 88	111.9	32 19.2	47 88	112.4	2
3	33 01.2	43 90	108.2	32 48.1	44 90	108.7	32 34.8	44 89	109.2	32 21.5	45 89	109.8	32 08.0	45 89	110.3	31 54.3	46 89	110.8	31 40.5	46 88	111.3	31 26.6	47 88	111.9	3
4	32 07.2	43 90	107.7	31 54.3	43 90	108.2	31 41.2	44 90	108.7	31 28.0	44 89	109.2	31 14.6	45 89	109.8	31 01.2	45 89	110.3	30 47.6	46 89	110.8	30 33.9	46 88	111.3	4
55	31 13.1	42 90	107.2	31 00.3	43 90	107.7	30 47.4	43 90	108.2	30 34.3	44 90	108.7	30 21.2	44 89	109.3	30 07.9	44 89	109.8	29 54.5	45 89	110.3	29 40.9	45 89	110.8	55
6	30 18.8	42 91	106.7	30 06.2	42 90	107.2	29 53.4	43 90	107.7	29 40.5	43 90	108.2	29 27.5	44 90	108.8	29 14.4	44 89	109.3	29 01.2	44 89	109.8	28 47.8	45 89	110.3	6
7	29 24.4	41 91	106.2	29 11.9	42 91	106.7	28 59.3	42 90	107.2	28 46.6	43 90	107.7	28 33.7	43 90	108.3	28 20.8	43 90	108.8	28 07.7	44 89	109.3	27 54.5	44 89	109.8	7
8	28 29.8	41 91	105.7	28 17.5	41 91	106.2	28 05.0	42 91	106.8	27 52.5	42 90	107.3	27 39.8	42 90	107.8	27 27.0	43 90	108.3	27 14.1	43 90	108.8	27 01.1	44 89	109.3	8
9	27 35.2	40 91	105.3	27 23.0	41 91	105.8	27 10.7	41 91	106.3	26 58.2	42 91	106.8	26 45.7	42 90	107.3	26 33.1	42 90	107.8	26 20.3	43 90	108.3	26 07.4	43 90	108.8	9
60	26 40.4	40 92	104.8	26 28.3	40 91	105.3	26 16.1	41 91	105.8	26 03.9	41 91	106.3	25 51.5	41 91	106.8	25 39.0	42 90	107.3	25 26.4	42 90	107.8	25 13.7	43 90	108.4	60
1	25 45.5	40 92	104.4	25 33.5	40 91	104.9	25 21.5	40 91	105.4	25 09.4	41 91	105.9	24 57.1	41 91	106.4	24 44.8	41 91	106.9	24 32.3	42 90	107.4	24 19.8	42 90	107.9	1
2	24 50.5	39 92	103.9	24 38.7	40 92	104.4	24 26.7	40 91	104.9	24 14.7	40 91	105.4	24 02.6	41 91	105.9	23 50.4	41 91	106.4	23 38.1	41 91	106.9	23 25.7	41 90	107.4	2
3	23 55.3	39 92	103.5	23 43.7	39 92	104.0	23 31.9	39 92	104.5	23 20.0	40 91	105.0	23 08.0	40 91	105.5	22 55.9	40 91	106.0	22 43.8	41 91	106.5	22 31.5	41 91	107.0	3
4	23 00.1	38 92	103.1	22 48.6	39 92	103.6	22 36.9	39 92	104.1	22 25.1	39 92	104.6	22 13.3	40 91	105.1	22 01.3	40 91	105.6	21 49.3	40 91	106.1	21 37.2	41 91	106.6	4
65	22 04.8	38 92	102.7	21 53.4	38 92	103.2	21 41.8	39 92	103.7	21 30.2	39 92	104.2	21 18.4	39 92	104.7	21 06.6	40 91	105.1	20 54.7	40 91	105.6	20 42.8	40 91	106.1	65
6	21 09.4	38 92	102.3	20 58.1	38 92	102.8	20 46.6	38 92	103.3	20 35.1	39 92	103.7	20 23.5	39 92	104.2	20 11.8	39 92	104.7	20 00.0	39 91	105.2	19 48.2	40 91	105.7	6
7	20 14.0	37 93	101.9	20 02.7	38 92	102.4	19 51.4	38 92	102.8	19 40.0	38 92	103.3	19 28.5	38 92	103.8	19 16.9	39 92	104.3	19 05.3	39 92	104.8	18 53.5	39 91	105.3	7
8	19 18.4	37 93	101.5	19 07.3	37 93	102.0	18 56.0	38 92	102.4	18 44.7	38 92	102.9	18 33.3	38 92	103.4	18 21.9	38 92	103.9	18 10.4	39 92	104.4	17 58.8	39 91	104.9	8
9	18 22.8	37 93	101.1	18 11.7	37 93	101.6	18 00.6	37 93	102.1	17 49.4	37 92	102.5	17 38.1	38 92	103.0	17 26.8	38 92	103.5	17 15.4	38 92	104.0	17 03.9	38 92	104.5	9
70	17 27.1	36 93	100.7	17 16.1	37 93	101.2	17 05.1	37 93	101.7	16 54.0	37 92	102.2	16 42.8	37 92	102.6	16 31.6	38 92	103.1	16 20.3	38 92	103.6	16 08.9	38 92	104.1	70
1	16 31.3	36 93	100.3	16 20.4	36 93	100.8	16 09.5	37 93	101.3	15 58.5	37 93	101.8	15 47.4	37 92	102.3	15 36.3	37 92	102.7	15 25.1	37 92	103.2	15 13.8	38 92	103.7	1
2	15 35.4	36 93	99.9	15 24.6	36 93	100.4	15 13.8	36 93	100.9	15 02.9	36 93	101.4	14 51.9	37 93	101.9	14 40.9	37 92	102.4	14 29.8	37 92	102.8	14 18.7	37 92	103.3	2
3	14 39.5	36 93	99.6	14 28.8	36 93	100.1	14 18.1	36 93	100.5	14 07.2	36 93	101.0	13 56.4	36 93	101.5	13 45.4	37 93	102.0	13 34.5	37 92	102.5	13 23.4	37 92	102.9	3
4	13 43.5	35 93	99.2	13 32.9	35 93	99.7	13 22.3	36 93	100.2	13 11.5	36 93	100.7	13 00.7	36 93	101.1	12 49.9	36 93	101.6	12 39.0	36 92	102.1	12 28.1	37 92	102.6	4
75	12 47.5	35 93	98.8	12 37.0	35 93	99.3	12 26.4	35 93	99.8	12 15.7	36 93	100.3	12 05.0	36 93	100.8	11 54.3	36 93	101.2	11 43.5	36 93	101.7	11 32.7	36 92	102.2	75
6	11 51.4	35 94	98.5	11 41.0	35 93	99.0	11 30.4	35 93	99.4	11 19.9	35 93	99.9	11 09.3	35 93	100.4	10 58.6	36 93	100.9	10 47.9	36 93	101.4	10 37.2	36 93	101.8	6
7	10 55.3	35 94	98.1	10 44.9	35 94	98.6	10 34.5	35 93	99.1	10 24.0	35 93	99.6	10 13.4	35 93	100.0	10 02.9	35 93	100.5	9 52.3	35 93	101.0	9 41.6	36 93	101.5	7
8	9 59.1	34 94	97.8	9 48.8	35 94	98.3	9 38.4	35 94	98.7	9 28.0	35 93	99.2	9 17.6	35 93	99.7	9 07.1	35 93	100.2	8 56.5	35 93	100.6	8 46.0	35 93	101.1	8
9	9 02.9	34 94	97.4	8 52.6	34 94	97.9	8 42.3	34 94	98.4	8 32.0	35 93	98.9	8 21.6	35 93	99.3	8 11.2	35 93	99.8	8 00.8	35 93	100.3	7 50.3	35 93	100.8	9
80	8 06.6	34 94	97.1	7 56.4	34 94	97.6	7 46.2	34 94	98.0	7 35.9	34 94	98.5	7 25.6	34 93	99.0	7 15.3	34 93	99.5	7 04.9	35 93	99.9	6 54.5	35 93	100.4	80
1	7 10.3	34 94	96.8	7 00.1	34 94	97.2	6 50.0	34 94	97.7	6 39.8	34 94	98.2	6 29.5	34 94	98.7	6 19.3	34 93	99.1	6 09.0	34 93	99.6	5 58.7	34 93	100.1	1
2	6 13.9	34 94	96.4	6 03.8	34 94	96.9	5 53.7	34 94	97.4	5 43.6	34 94	97.8	5 33.4	34 94	98.3	5 23.2	34 93	98.8	5 13.0	34 93	99.3	5 02.8	34 93	99.7	2
3	5 17.5	33 94	96.1	5 07.5	33 94	96.6																			3

DECLINATION SAME NAME AS LATITUDE

Lat. 19°

H.A.	8° 00′				8° 30′				9° 00′				9° 30′				10° 00′				10° 30′				11° 00′				11° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	79 00.0	1.0	04	180.0	79 30.0	1.0	04	180.0	80 00.0	1.0	05	180.0	80 30.0	1.0	05	180.0	81 00.0	1.0	05	180.0	81 30.0	1.0	05	180.0	82 00.0	1.0	06	180.0	82 30.0	1.0	06	180.0	00
1	78 57.4	1.0	13	174.8	79 27.3	1.0	13	174.6	79 57.2	1.0	14	174.3	80 27.0	1.0	15	174.0	80 56.9	99	15	173.7	81 26.7	99	16	173.4	81 56.5	99	17	173.0	82 26.3	99	18	172.5	1
2	78 49.8	99	21	169.7	79 19.3	98	22	169.3	79 48.8	98	23	168.8	80 18.3	98	24	168.2	80 47.7	98	25	167.6	81 17.0	98	26	166.9	81 46.2	97	28	166.2	82 15.4	97	29	165.3	2
3	78 37.3	97	29	164.8	79 06.3	97	30	164.1	79 35.2	96	31	163.4	80 04.0	96	32	162.6	80 32.6	95	34	161.7	81 01.2	95	36	160.8	81 29.5	94	37	159.7	81 57.7	94	40	158.5	3
4	78 20.1	96	36	160.0	78 48.4	94	37	159.2	79 16.5	94	39	158.3	79 44.5	93	40	157.3	80 12.2	92	42	156.2	80 39.8	91	44	155.0	81 07.0	90	46	153.7	81 34.0	89	48	152.2	4
05	77 58.6	92	42	155.5	78 26.1	91	44	154.5	78 53.3	90	46	153.5	79 20.3	90	47	152.3	79 47.0	89	49	151.1	80 13.4	87	51	149.7	80 39.5	86	53	148.2	81 05.1	85	56	146.6	05
6	77 33.2	89	48	151.3	77 59.7	88	50	150.2	78 26.0	87	52	149.0	78 51.9	86	53	147.7	79 17.5	85	55	146.4	79 42.7	83	57	144.9	80 07.5	82	59	143.3	80 31.8	80	62	141.5	6
7	77 04.3	86	54	147.4	77 29.8	85	55	146.2	77 55.0	83	57	144.9	78 19.9	82	59	143.5	78 44.3	81	61	142.1	79 08.3	79	63	140.5	79 31.8	77	65	138.8	79 54.7	75	67	137.0	7
8	76 32.1	82	58	143.7	76 56.7	81	60	142.5	77 20.9	80	62	141.1	77 44.7	78	63	139.7	78 08.0	77	65	138.2	78 30.8	75	67	136.6	78 53.0	73	69	134.9	79 14.6	71	71	133.1	8
9	75 57.2	79	62	140.3	76 20.8	78	64	139.0	76 44.0	76	66	137.7	77 06.7	75	67	136.2	77 28.9	73	69	134.7	77 50.5	71	71	133.1	78 11.6	69	73	131.4	78 31.9	67	75	129.6	9
10	75 19.8	76	66	137.2	75 42.4	75	67	135.9	76 04.6	73	69	134.5	76 26.3	71	71	133.1	76 47.4	70	72	131.6	77 08.0	68	74	129.9	77 28.0	65	76	128.2	77 47.2	63	77	126.4	10
1	74 40.3	73	69	134.4	75 02.0	72	71	133.1	75 23.2	70	72	131.7	75 43.9	68	74	130.2	76 04.0	66	75	128.7	76 23.6	64	77	127.1	76 42.5	62	78	125.4	77 00.8	60	80	123.7	1
2	73 58.8	70	72	131.8	74 19.6	69	73	130.4	74 40.0	67	75	129.1	74 59.8	65	76	127.6	75 19.0	63	78	126.1	75 37.6	61	79	124.6	75 55.6	59	80	122.9	76 12.9	57	82	121.2	2
3	73 15.7	67	74	129.3	73 35.7	66	76	128.0	73 55.2	64	77	126.7	74 14.1	62	78	125.3	74 32.5	60	80	123.8	74 50.3	58	81	122.3	75 07.4	56	82	120.7	75 23.8	54	83	119.0	3
4	72 31.1	65	76	127.1	72 50.3	63	78	125.8	73 09.0	61	79	124.5	73 27.2	60	80	123.1	73 44.7	58	81	121.7	74 01.7	56	83	120.2	74 18.1	53	84	118.6	74 33.8	51	85	117.1	4
15	71 45.3	62	78	125.1	72 03.7	61	79	123.8	72 21.7	59	81	122.5	72 39.1	57	82	121.1	72 56.0	55	83	119.7	73 12.2	53	84	118.3	73 27.9	51	85	116.8	73 42.8	49	86	115.3	15
6	70 58.3	60	80	123.2	71 16.1	58	81	121.9	71 33.3	57	82	120.6	71 50.1	55	83	119.3	72 06.2	53	84	117.9	72 21.9	51	85	116.5	72 36.8	49	86	115.1	72 51.2	47	87	113.6	6
7	70 10.3	58	81	121.4	70 27.5	56	82	120.2	70 44.1	55	83	118.9	71 00.2	53	84	117.6	71 15.8	51	85	116.3	71 30.8	49	86	115.0	71 45.1	47	87	113.6	71 58.9	45	88	112.1	7
8	69 21.5	56	83	119.8	69 38.0	54	84	118.6	69 54.1	53	85	117.4	70 09.6	51	85	116.1	70 24.6	49	86	114.8	70 39.0	47	87	113.5	70 52.9	45	88	112.2	71 06.1	43	89	110.8	8
9	68 31.9	54	84	118.3	68 47.8	52	85	117.1	69 03.3	51	86	115.9	69 18.3	49	86	114.7	69 32.8	47	87	113.4	69 46.7	45	88	112.2	70 00.1	44	89	110.9	70 12.9	42	89	109.5	9
20	67 41.6	52	85	116.8	67 57.0	51	86	115.7	68 12.0	49	86	114.5	68 26.5	47	87	113.4	68 40.5	46	88	112.1	68 54.0	44	89	110.9	69 06.9	42	89	109.7	69 19.2	40	90	108.4	20
1	66 50.6	51	86	115.5	67 05.6	49	86	114.4	67 20.2	48	87	113.3	67 34.2	46	88	112.1	67 47.7	44	89	111.0	68 00.8	43	89	109.8	68 13.3	41	90	108.5	68 25.2	39	91	107.3	1
2	65 59.2	49	87	114.3	66 13.7	48	87	113.2	66 27.8	46	88	112.1	66 41.4	45	89	111.0	66 54.6	43	89	109.8	67 07.2	41	90	108.7	67 19.3	40	90	107.5	67 30.9	38	91	106.3	2
3	65 07.2	48	87	113.1	65 21.4	46	88	112.1	65 35.0	45	89	111.0	65 48.3	43	89	109.9	66 01.0	42	90	108.8	66 13.3	40	90	107.7	66 25.0	38	91	106.5	66 36.3	37	91	105.4	3
4	64 14.8	47	88	112.0	64 28.6	45	89	111.0	64 41.9	44	89	110.0	64 54.8	42	90	108.9	65 07.2	41	90	107.8	65 19.1	39	91	106.7	65 30.5	37	91	105.6	65 41.5	36	92	104.5	4
25	63 22.1	45	89	111.0	63 35.4	44	89	110.0	63 48.4	42	90	109.0	64 00.9	41	90	107.9	64 13.0	40	91	106.9	64 24.6	38	91	105.8	64 35.8	36	92	104.8	64 46.5	35	92	103.7	25
6	62 28.9	44	89	110.0	62 42.0	43	90	109.0	62 54.6	41	90	108.1	63 06.8	40	91	107.0	63 18.6	39	91	106.0	63 29.9	37	92	105.0	63 40.8	36	92	103.9	63 51.2	34	92	102.9	6
7	61 35.5	43	90	109.1	61 48.2	42	90	108.1	62 00.5	40	91	107.2	62 12.5	39	91	106.2	62 24.0	38	91	105.2	62 35.0	36	92	104.2	62 45.7	35	92	103.2	62 55.9	33	93	102.1	7
8	60 41.7	42	90	108.2	60 54.2	41	90	107.3	61 06.2	40	91	106.3	61 17.9	38	91	105.4	61 29.1	37	92	104.4	61 39.9	35	92	103.4	61 50.4	34	92	102.5	62 00.3	33	93	101.5	8
9	59 47.7	41	90	107.4	59 59.9	40	91	106.5	60 11.7	39	91	105.6	60 23.1	37	92	104.6	60 34.1	36	92	103.7	60 44.7	35	92	102.7	60 54.9	33	93	101.8	61 04.7	32	93	100.8	9
30	58 53.5	40	91	106.6	59 05.4	39	91	105.7	59 16.9	38	92	104.8	59 28.1	37	92	103.9	59 38.9	35	92	103.0	59 49.3	34	93	102.0	59 59.3	33	93	101.1	60 08.9	31	93	100.2	30
1	57 59.0	40	91	105.8	58 10.7	38	92	105.0	58 22.0	37	92	104.1	58 32.9	36	92	103.2	58 43.5	35	92	102.3	58 53.7	33	93	101.4	59 03.5	32	93	100.5	59 13.0	31	93	99.6	1
2	57 04.3	39	91	105.1	57 15.8	38	92	104.3	57 26.9	36	92	103.4	57 37.6	35	92	102.5	57 48.0	34	93	101.7	57 58.1	33	93	100.8	58 07.7	32	93	99.9	58 17.0	30	93	99.0	2
3	56 09.4	38	92	104.4	56 20.7	37	92	103.6	56 31.6	36	92	102.8	56 42.2	35	93	101.9	56 52.4	33	93	101.0	57 02.3	32	93	100.2	57 11.8	31	93	99.3	57 20.9	30	94	98.4	3
4	55 14.4	37	92	103.8	55 25.5	36	92	103.0	55 36.2	35	93	102.1	55 46.6	34	93	101.3	55 56.7	33	93	100.5	56 06.4	32	93	99.6	56 15.7	31	94	98.8	56 24.7	29	94	97.9	4
35	54 19.3	37	92	103.1	54 30.1	36	92	102.3	54 40.7	35	93	101.5	54 50.9	34	93	100.7	55 00.8	32	93	99.9	55 10.4	31	93	99.1	55 19.6	30	94	98.2	55 28.5	29	94	97.4	35
6	53 23.9	36	92	102.5	53 34.6	35	93	101.7	53 45.0	34	93	100.9	53 55.1	33	93	100.1	54 04.9	32	93	99.3	54 14.3	31	94	98.5	54 23.5	30	94	97.7	54 32.2	29	94	96.9	6
7	52 28.5	36	93	101.9	52 39.0	35	93	101.2	52 49.3	34	93	100.4	52 59.2	33	93	99.6	53 08.9	32	94	98.8	53 18.2	31	94	98.0	53 27.2	29	94	97.2	53 35.9	28	94	96.4	7
8	51 32.9	35	93	101.4	51 43.3	34	93	100.6	51 53.4	33	93	99.8	52 03.3	32	93	99.1	52 12.8	31	94	98.3	52 22.0	30	94	97.5	52 30.9	29	94	96.7	52 39.5	28	94	96.0	8
9	50 37.3	35	93	100.8	50 47.5	34	93	100.1	50 57.5	33	93	99.3	51 07.2	32	94	98.6	51 16.6	31	94	97.8	51 25.7	30	94	97.0	51 34.5	29	94	96.3	51 43.0	28	94	95.5	9
40	49 41.5	34	93	100.3	49 51.6	33	93	99.5	50 01.5	32	94	98.8	50 11.1	31	94	98.1	50 20.4	31	94	97.3	50 29.4	30	94	96.6	50 38.1	29	94	95.8	50 46.5	28	94	95.1	40
1	48 45.6	34	93	99.8	48 55.6	33	93	99.0	49 05.4	32	94	98.3	49 14.9	31	94	97.6	49 24.1	30	94	96.9	49 33.0	29	94	96.1	49 41.7	28	94	95.4	49 50.0	27	94	94.6	1
2	47 49.7	33	93	99.3	47 59.6	33	94	98.6	48 09.2	32	94	97.8	48 18.6	31	94	97.1	48 27.7	30	94	96.4	48 36.6	29	94	95.7	48 45.2	28	94	95.0	48 53.5	27	94	94.2	2
3	46 53.6	33	94	98.8	47 03.4	32	94	98.1	47 13.0	31	94	97.4	47 22.3	31	94	96.7	47 31.3	30	94	96.0	47 40.1	29	94	95.3	47 48.6	28	94	94.6	47 56.9	27	94	93.8	3
4	45 57.5	33	94	98.3	46 07.2	32	94	97.6	46 16.7	31	94	96.9	46 25.9	30	94	96.2	46 34.9	29	94	95.5	46 43.6	29	94	94.9	46 52.0	28	94	94.2	47 00.2	27	94	93.4	4
45	45 01.4	32	94	97.8	45 11.0	32	94	97.2	45 20.4	31	94	96.5	45 29.5	30	94	95.8	45 38.4	29	94	95.1	45 47.0	28	94	94.4	45 55.5	28	94	93.8	46 03.6	27	94	93.1	45
6	44 05.1	32	94	97.4	44 14.7	31	94	96.7	44 24.0	31	94	96.1	44 33.0	30	94	95.4	44 41.9	29	94	94.7	44 50.5	28	94	94.0	44 58.8	27	94	93.4	45 06.9	27	94	92.7	6
7	43 08.8	32	94	97.0	43 18.3	31	94	96.3	43 27.5	30	94	95.6	43 36.5	30	94	95.0	43 45.3	29	94	94.3	43 53.9	28	94	93.7	44 02.2	27	94	93.0	44 10.3	27	94	92.3	7
8	42 12.5	32	94	96.5	42 21.9	31	94	95.9	42 31.1	30	94	95.2	42 40.0	29	94	94.6	42 48.7	29	94	93.9	42 57.2	28	94	93.3	43 05.5	27	94	92.6	43 13.6	26	94	92.0	8
9	41 16.1	31	94	96.1	41 25.4	31	94	95.5	41 34.5	30	94	94.8	41 43.4	29	94	94.2	41 52.1	29	94	93.6	42 00.6	28	94	92.9	42 08.8	27	94	92.3	42 16.9	26	95	91.6	9
50	40 19.7	31	94	95.7	40 28.9	31	94	95.1	40 38.0	30	94	94.4	40 46.8	29	94	93.8	40 55.5	28	94	93.2	41 03.9	28	94	92.5	41 12.2	27	94	91.9	41 20.2	26	95	91.3	50
1	39 23.2	31	94	95.3	39 32.4	30	94	94.7	39 41.4	30	94	94.1	39 50.2	29	94	93.4	39 58.8	28	94	92.8	40 07.2	28	94	92.2	40 15.4	27	95	91.6	40 23.4	26	95	90.9	1
2	38 26.7	31	94	94.9	38 35.9	30	94	94.3	38 44.8	30	94	93.7	38 53.6	29	94	93.1	39 02.2	28	94	92.5	39 10.5	28	95	91.8	39 18.7	27	95	91.2	39 26.7	26	95	90.6	2
3	37 30.2	31	94	94.5	37 39.3	30	94	93.9	37 48.2	29	94	93.3	37 56.9	29	94	92.7	38 05.5	28	94	92.1	38 13.8	28	95	91.5	38 22.0	27	95	90.9	38 30.0	26	95	90.3	3
4	36 33.6	31	94	94.1	36 42.7	30	94	93.5	36 51.5	29	94	92.9	37 00.3	29	94	92.3	37 08.8	28	95	91.7	37 17.1	28	95	91.1	37 25.3	27	95	90.5	37 33.3	26	95	89.9	4
55	35 37.0	30	94	93.8	35 46.0	30	94	93.2	35 54.9	29	94	92.6	36 03.6	29	94	92.0	36 12.1	28	95	91.4	36 20.4	27	95	90.8	36 28.6	27	95	90.2	36 36.5	26	95	89.6	55
6	34 40.4	30	94	93.4	34 49.4	30	94	92.8	34 58.2	29	94	92.2	35 06.9	29	95	91.6	35 15.4	28	95	91.1	35 23.7	27	95	90.5	35 31.8	27	95	89.9	35 39.8	26	95	89.3	6
7	33 43.7	30	94	93.0	33 52.7	30	94	92.5	34 01.5	29	94	91.9	34 10.2	29	95	91.3	34 18.6	28	95	90.7	34 26.9	27	95	90.1	34 35.1	27	95	89.6	34 43.1	26	95	89.0	7
8	32 47.1	30	94	92.7	32 56.0	30	94	92.1	33 04.8	29	95	91.5	33 13.4	28	95	91.0	33 21.9	28	95	90.4	33 30.2	27	95	89.8	33 38.4	27	95	89.2	33 46.4	26	95	88.7	8
9	31 50.4	30	94	92.3	31 59.3	29	94	91.8	32 08.1	29	95	91.2	32 16.7	28	95	90.6	32 25.2	28	95	90.1	32 33.5	27	95	89.5	32 41.6	27	95	88.9	32 49.6	26	95	88.4	9
60	30 53.7	30	95	92.0	31 02.6	29	95	91.4	31 11.4	29	95	90.9	31 20.0	28	95	90.3	31 28.4	28	95	89.7	31 36.8	27	95	89.2	31 44.9	27	94	88.6	31 52.9	26	94	88.0	60
1	29 57.0	30	95	91.6	30 05.9	29	95	91.1	30 14.6	29	95	90.5	30 23.2	28	95	90.0	30 31.7	28	95	89.4	30 40.0	28	95	88.9	30 48.2	27	94	88.3	30 56.2	27	94	87.7	1
2	29 00.3	30	95	91.3	29 09.2	29	95	90.7	29 17.9	29	95	90.2	29 26.5	28	95	89.7	29 35.0	28	95	89.1	29 43.3	28	95	88.5	29 51.5	27	94	88.0	29 59.6	27	94	87.4	2
3	28 03.6	30	95	91.0	28 12.4	29	95	90.4	28 21.2	29	95	89.9	28 29.8	28	95	89.3	28 38.3	28	95	88.8	28 46.6	28	94	88.2	28 54.8	27	94	87.7	29 02.9	27	94	87.1	3
4	27 06.8	30	95	90.6	27 15.7	29	95	90.1	27 24.4	29	95	89.6	27 33.1	29	95	89.0	27 41.5	28	95	88.5	27 49.9	28	94	87.9	27 58.1	27	94	87.4	28 06.2	27	94	86.8	4
65	26 10.1	30	95	90.3	26 19.0	29	95	89.8	26 27.7	29	95	89.2	26 36.3	29	95	88.7	26 44.8	28	94	88.2	26 53.2	28	94	87.6	27 01.5	27	94	87.1	27 09.6	27	94	86.5	65
6	25 13.4	30	95	90.0	25 22.2	29	95	89.4	25 31.0	29	95	88.9	25 39.6	29	95	88.4	25 48.1	28	94	87.8	25 56.5	28	94	87.3	26 04.8	27	94	86.8	26 13.0	27	94	86.2	6
7	24 16.7	30	95	89.6	24 25.5	29	95	89.1	24 34.3	29	95	88.6	24 42.9	29	94	88.1	24 51.5	28	94	87.5	24 59.9	28	94	87.0	25 08.2	28	94	86.5	25 16.4	27	94	86.0	7
8	23 19.9	30	95	89.3	23 28.8	29	95	88.8	23 37.6	29	94	88.3	23 46.2	29	94	87.8	23 54.8	28	94	87.2	24 03.2	28	94	86.7	24 11.6	28	94	86.2	24 19.8	27	94	85.7	8
9	22 23.2	30	95	89.0	22 32.1	29	94	88.5	22 40.9	29	94	88.0	22 49.5	29	94	87.5	22 58.1	28	94	86.9	23 06.6	28	94	86.4	23 15.0	28	94	85.9	23 23.3	27	94	85.4	9
70	21 26.5	30	95	88.7	21 35.4	29	94	88.2	21 44.2	29	94	87.7	21 52.9	29	94	87.1	22 01.5	29	94	86.6	22 10.0	28	94	86.1	22 18.4	28	94	85.6	22 26.7	28	94	85.1	70
1	20 29.8	30	94	88.4	20 38.7	30	94	87.9	20 47.5	29	94	87.4	20 56.2	29	94	86.8	21 04.9	29	94	86.3	21 13.4	28	94	85.8	21 21.9	28	94	85.3	21 30.2	28	94	84.8	1
2	19 33.1	30	94	88.1	19 42.0	30	94	87.5	19 50.8	29	94	87.0	19 59.6	29	94	86.5	20 08.3	29	94	86.0	20 16.8	28	94	85.5	20 25.3	28	94	85.0	20 33.7	28	94	84.5	2
3	18 36.4	30	94	87.7	18 45.3	30	94	87.2	18 54.2	29	94	86.7	19 03.0	29	94	86.2	19 11.7	29	94	85.7	19 20.3	29	94	85.2	19 28.8	28	94	84.7	19 37.3	28	94	84.2	3
4	17 39.7	30	94	87.4	17 48.7	30	94	86.9	17 57.6	30	94	86.4	18 06.4	29	94	85.9	18 15.1	29	94	85.4	18 23.8	29	94	84.9	18 32.4	28	94	84.4	18 40.8	28	94	83.9	4
75	16 43.0	30	94	87.1	16 52.0	30	94	86.6	17 00.9	30	94	86.1	17 09.8	29	94	85.6	17 18.6	29	94	85.1	17 27.3	29	94	84.6	17 35.9	29	94	84.1	17 44.5	28	94	83.6	75
6	15 46.4	30	94	86.8	15 55.4	30	94	86.3	16 04.4	30	94	85.8	16 13.2	30	94	85.3	16 22.1	29	94	84.8	16 30.8	29	94	84.3	16 39.5	29	94	83.8	16 48.1	29	94	83.3	6
7	14 49.7	30	94	86.5	14 58.8	30	94	86.0	15 07.8	30	94	85.5	15 16.7	30	94	85.0	15 25.6	29	94	84.5	15 34.4	29	94	84.0	15 43.1	29	94	83.5	15 51.8	29	94	83.0	7
8	13 53.1	30	94	86.2	14 02.2	30	94	85.7	14 11.2	30	94	85.2	14 20.2	30	94	84.7	14 29.1	30	94	84.2	14 38.0	29	94	83.7	14 46.7	29	94	83.2	14 55.5	29	94	82.7	8
9	12 56.5	31	94	85.9	13 05.7	30	94	85.4	13 14.7	30	94	84.9	13 23.7	30	94	84.4	13 32.7	30	94	83.9	13 41.6	30	94	83.4	13 50.4	29	94	82.9	13 59.2	29	94	82.4	9
80	12 00.0	31	94	85.6	12 09.1	30	94	85.1	12 18.2	30	94	84.6	12 27.3	30	94	84.1	12 36.3	30	94	83.6	12 45.2	30	94	83.1	12 54.1	30	94	82.6	13 03.0	29	94	82.1	80
1	11 03.4	31	94	85.3	11 12.6	31	94	84.8	11 21.8	30	94	84.3	11 30.9	30	94	83.8	11 39.9	30	94	83.3	11 48.9	30	94	82.8	11 57.9	30	94	82.3	12 06.8	30	94	81.9	1
2	10 06.9	31	94	84.9	10 16.1	31	94	84.5	10 25.3	31	94	84.0	10 34.5	30	94	83.5	10 43.6	30	94	83.0	10 52.7	30	94	82.5	11 01.7	30	94	82.0	11 10.7	30	94	81.6	2
3	9 10.4	31	94	84.6	9 19.7	31	94	84.2	9 28.9	31	94	83.7	9 38.1	31	94	83.2	9 47.3	31	94	82.7	9 56.4	30	94	82.2	10 05.5	30	94	81.7	10 14.6	30	93	81.3	3
4	8 13.9	31	94	84.3	8 23.3	31	94	83.8	8 32.6	31	94	83.4	8 41.8	31	94	82.9	8 51.1	31	94	82.4	9 00.3	31	94	81.9	9 09.4	30	93	81.4	9 18.5	30	93	81.0	4
85	7 17.5	31	94	84.0	7 26.9	31	94	83.5	7 36.2	31	94	83.1	7 45.6	31	94	82.6	7 54.9	31	94	82.1	8 04.1	31	94	81.6	8 13.3	31	93	81.1	8 22.5	31	93	80.7	85
6	6 21.1	32	94	83.7	6 30.5	31	94	83.2	6 39.9	31	94	82.7	6 49.3	31	94	82.3	6 58.7	31	94	81.8	7 08.0	31	93	81.3	7 17.3	31	93	80.8	7 26.6	31	93	80.3	6
7	5 24.7	32	94	83.4	5 34.2	32	94	82.9	5 43.7	32	94	82.4	5 53.1	31	94	82.0	6 02.6	31	93	81.5	6 12.0	31	93	81.0	6 21.3	31	93	80.5	6 30.7	31	93	80.0	7
8																	5 06.5	32	93	81.2	5 15.9	32	93	80.7	5 25.4	31	93	80.2	5 34.8	31	93	79.7	8

H.A.	8° 00′				8° 30′				9° 00′				9° 30′				10° 00′				10° 30′				11° 00′				11° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	63 00.0	1.0	02	180.0	62 30.0	1.0	02	180.0	62 00.0	1.0	02	180.0	61 30.0	1.0	02	180.0	61 00.0	1.0	02	180.0	60 30.0	1.0	02	180.0	60 00.0	1.0	02	180.0	59 30.0	1.0	02	180.0	00
1	62 58.9	1.0	05	177.8	62 28.9	1.0	05	177.9	61 59.0	1.0	05	177.9	61 29.0	1.0	05	177.9	60 59.0	1.0	05	178.0	60 29.0	1.0	05	178.0	59 59.0	1.0	05	178.0	59 29.0	1.0	05	178.1	1
2	62 55.7	1.0	09	175.6	62 25.8	1.0	09	175.7	61 55.8	1.0	09	175.8	61 25.9	1.0	08	175.9	60 56.0	1.0	08	175.9	60 26.0	1.0	08	176.0	59 56.1	1.0	08	176.1	59 26.2	1.0	08	176.1	2
3	62 50.3	99	12	173.5	62 20.5	99	12	173.6	61 50.7	99	12	173.7	61 20.8	99	12	173.8	60 51.0	99	12	173.9	60 21.1	99	11	174.0	59 51.3	1.0	11	174.1	59 21.4	1.0	11	174.2	3
4	62 42.8	99	16	171.3	62 13.1	99	16	171.5	61 43.4	99	15	171.6	61 13.7	99	15	171.8	60 44.0	99	15	171.9	60 14.3	99	15	172.1	59 44.5	99	14	172.2	59 14.8	99	14	172.3	4
05	62 33.2	98	19	169.2	62 03.7	98	19	169.4	61 34.2	98	19	169.6	61 04.6	99	18	169.8	60 35.0	99	18	169.9	60 05.5	99	18	170.1	59 35.9	99	18	170.3	59 06.3	99	17	170.4	05
6	62 21.6	98	23	167.1	61 52.3	98	22	167.3	61 22.9	98	22	167.6	60 53.6	98	22	167.8	60 24.2	98	21	168.0	59 54.8	98	21	168.2	59 25.3	98	21	168.4	58 55.9	98	20	168.6	6
7	62 07.9	97	26	165.0	61 38.8	97	26	165.3	61 09.7	97	25	165.5	60 40.6	97	25	165.8	60 11.4	97	24	166.0	59 42.2	97	24	166.3	59 13.0	97	24	166.5	58 43.7	98	23	166.7	7
8	61 52.3	96	29	163.0	61 23.5	96	29	163.3	60 54.6	96	28	163.6	60 25.7	96	28	163.9	59 56.8	96	27	164.1	59 27.8	97	27	164.4	58 58.8	97	27	164.6	58 29.8	97	26	164.9	8
9	61 34.8	95	32	161.0	61 06.2	95	32	161.3	60 37.7	95	31	161.6	60 09.0	95	31	161.9	59 40.4	96	30	162.2	59 11.7	96	30	162.5	58 42.9	96	29	162.8	58 14.1	96	29	163.1	9
10	61 15.4	94	35	159.0	60 47.2	94	35	159.4	60 18.9	94	34	159.7	59 50.6	95	34	160.1	59 22.2	95	33	160.4	58 53.8	95	33	160.7	58 25.3	95	32	161.0	57 56.8	95	32	161.3	10
1	60 54.2	93	38	157.1	60 26.3	93	38	157.5	59 58.4	93	37	157.9	59 30.4	93	36	158.2	59 02.3	94	36	158.6	58 34.2	94	35	158.9	58 06.0	94	35	159.2	57 37.8	94	34	159.6	1
2	60 31.3	92	41	155.3	60 03.8	92	40	155.7	59 36.2	92	40	156.1	59 08.5	92	39	156.4	58 40.8	93	39	156.8	58 13.0	93	38	157.2	57 45.1	93	37	157.5	57 17.2	93	37	157.9	2
3	60 06.8	90	44	153.4	59 39.6	91	43	153.9	59 12.4	91	42	154.3	58 45.0	91	42	154.7	58 17.6	91	41	155.1	57 50.2	92	41	155.4	57 22.6	92	40	155.8	56 55.0	92	39	156.2	3
4	59 40.6	89	46	151.7	59 13.8	89	45	152.1	58 47.0	90	45	152.5	58 20.0	90	44	153.0	57 53.0	90	44	153.4	57 25.8	91	43	153.8	56 58.6	91	42	154.2	56 31.4	91	42	154.5	4
15	59 13.0	88	49	149.9	58 46.6	88	48	150.4	58 20.1	88	47	150.9	57 53.5	89	47	151.3	57 26.8	89	46	151.7	57 00.0	89	45	152.1	56 33.2	90	45	152.6	56 06.3	90	44	152.9	15
6	58 43.8	86	51	148.3	58 17.8	87	50	148.8	57 51.7	87	50	149.2	57 25.5	88	49	149.7	56 59.2	88	48	150.1	56 32.8	88	48	150.6	56 06.4	88	47	151.0	55 39.8	89	46	151.4	6
7	58 13.3	85	53	146.6	57 47.7	85	52	147.1	57 22.0	86	52	147.6	56 56.2	86	51	148.1	56 30.3	87	50	148.6	56 04.3	87	50	149.0	55 38.2	87	49	149.4	55 12.0	87	49	149.9	7
8	57 41.5	84	55	145.1	57 16.3	84	54	145.6	56 51.0	85	54	146.1	56 25.6	85	53	146.6	56 00.0	85	52	147.0	55 34.4	86	52	147.5	55 08.7	86	51	147.9	54 42.9	86	51	148.4	8
9	57 08.4	82	57	143.5	56 43.6	83	56	144.1	56 18.7	83	56	144.6	55 53.7	84	55	145.1	55 28.6	84	54	145.5	55 03.3	84	54	146.0	54 38.0	85	53	146.5	54 12.5	85	53	146.9	9
20	56 34.1	81	59	142.1	56 09.7	81	58	142.6	55 45.2	82	58	143.1	55 20.6	82	57	143.6	54 55.9	83	56	144.1	54 31.0	83	56	144.6	54 06.1	83	55	145.1	53 41.0	84	54	145.5	20
1	55 58.6	80	61	140.6	55 34.7	80	60	141.2	55 10.6	80	60	141.7	54 46.4	81	59	142.2	54 22.1	81	58	142.7	53 57.6	82	58	143.2	53 33.0	82	57	143.7	53 08.3	83	56	144.2	1
2	55 22.1	78	63	139.2	54 58.6	79	62	139.8	54 34.9	79	61	140.3	54 11.1	80	61	140.8	53 47.2	80	60	141.4	53 23.1	80	59	141.9	52 58.9	81	59	142.4	52 34.6	81	58	142.8	2
3	54 44.6	77	64	137.9	54 21.5	77	64	138.5	53 58.2	78	63	139.0	53 34.8	78	62	139.5	53 11.2	79	62	140.0	52 47.5	79	61	140.6	52 23.7	80	60	141.1	51 59.8	80	60	141.5	3
4	54 06.1	75	66	136.6	53 43.4	76	65	137.2	53 20.5	76	64	137.7	52 57.5	77	64	138.2	52 34.3	77	63	138.8	52 11.0	78	62	139.3	51 47.6	78	62	139.8	51 24.0	79	61	140.3	4
25	53 26.7	74	67	135.4	53 04.3	75	66	135.9	52 41.9	75	66	136.5	52 19.2	76	65	137.0	51 56.5	76	65	137.5	51 33.6	77	64	138.1	51 10.5	77	63	138.6	50 47.3	77	63	139.1	25
6	52 46.4	73	69	134.1	52 24.5	73	68	134.7	52 02.4	74	67	135.3	51 40.1	74	67	135.8	51 17.7	75	66	136.3	50 55.2	75	65	136.9	50 32.5	76	65	137.4	50 09.7	76	64	137.9	6
7	52 05.3	72	70	133.0	51 43.7	72	69	133.5	51 22.0	73	69	134.1	51 00.2	73	68	134.6	50 38.1	74	67	135.2	50 16.0	74	67	135.7	49 53.7	75	66	136.2	49 31.3	75	65	136.7	7
8	51 23.4	70	71	131.8	51 02.2	71	70	132.4	50 40.9	71	70	133.0	50 19.4	72	69	133.5	49 57.8	72	69	134.1	49 36.0	73	68	134.6	49 14.0	73	67	135.1	48 52.0	74	67	135.6	8
9	50 40.8	69	72	130.7	50 20.0	70	72	131.3	49 59.0	70	71	131.9	49 37.9	71	70	132.4	49 16.6	71	70	133.0	48 55.2	72	69	133.5	48 33.6	72	69	134.0	48 11.9	73	68	134.5	9
30	49 57.4	68	73	129.7	49 37.0	68	73	130.2	49 16.4	69	72	130.8	48 55.7	69	72	131.4	48 34.7	70	71	131.9	48 13.7	70	70	132.4	47 52.5	71	70	133.0	47 31.1	71	69	133.5	30
1	49 13.4	67	74	128.7	48 53.4	67	74	129.2	48 33.1	68	73	129.8	48 12.7	68	73	130.3	47 52.2	69	72	130.9	47 31.5	69	71	131.4	47 10.6	70	71	131.9	46 49.6	70	70	132.5	1
2	48 28.8	65	75	127.7	48 09.1	66	75	128.2	47 49.2	67	74	128.8	47 29.2	67	74	129.3	47 09.0	68	73	129.9	46 48.6	68	72	130.4	46 28.1	69	72	131.0	46 07.4	69	71	131.5	2
3	47 43.6	64	76	126.7	47 24.2	65	76	127.3	47 04.7	65	75	127.8	46 45.0	66	75	128.4	46 25.1	66	74	128.9	46 05.1	67	74	129.5	45 44.9	67	73	130.0	45 24.6	68	72	130.5	3
4	46 57.9	63	77	125.8	46 38.8	64	77	126.3	46 19.6	64	76	126.9	46 00.2	65	76	127.4	45 40.7	65	75	128.0	45 21.0	66	74	128.5	45 01.2	66	74	129.1	44 41.2	67	73	129.6	4
35	46 11.6	62	78	124.9	45 52.9	63	77	125.4	45 34.0	63	77	126.0	45 14.9	64	76	126.5	44 55.7	64	76	127.1	44 36.3	65	75	127.6	44 16.8	65	75	128.1	43 57.2	66	74	128.7	35
6	45 24.8	61	79	124.0	45 06.4	62	78	124.5	44 47.8	62	78	125.1	44 29.1	63	77	125.7	44 10.2	63	77	126.2	43 51.1	64	76	126.7	43 31.9	64	76	127.3	43 12.6	65	75	127.8	6
7	44 37.5	60	80	123.1	44 19.4	61	79	123.7	44 01.1	61	79	124.3	43 42.7	62	78	124.8	43 24.1	62	78	125.3	43 05.4	63	77	125.9	42 46.5	63	76	126.4	42 27.5	64	76	126.9	7
8	43 49.8	59	80	122.3	43 32.0	60	80	122.9	43 14.0	60	79	123.4	42 55.9	61	79	124.0	42 37.6	61	78	124.5	42 19.2	62	78	125.0	42 00.6	62	77	125.6	41 41.9	63	77	126.1	8
9	43 01.6	58	81	121.5	42 44.1	59	80	122.1	42 26.5	59	80	122.6	42 08.6	60	80	123.2	41 50.7	60	79	123.7	41 32.5	61	79	124.2	41 14.3	61	78	124.8	40 55.8	62	78	125.3	9
40	42 13.1	57	82	120.7	41 55.8	58	81	121.3	41 38.5	58	81	121.8	41 20.9	59	80	122.4	41 03.2	59	80	122.9	40 45.4	60	79	123.4	40 27.4	60	79	124.0	40 09.3	61	78	124.5	40
1	41 24.1	56	82	120.0	41 07.2	57	82	120.5	40 50.1	57	81	121.1	40 32.8	58	81	121.6	40 15.4	58	80	122.2	39 57.9	59	80	122.7	39 40.2	59	79	123.2	39 22.3	60	79	123.7	1
2	40 34.8	55	83	119.3	40 18.1	56	82	119.8	40 01.3	56	82	120.3	39 44.3	57	81	120.9	39 27.2	57	81	121.4	39 09.9	58	81	121.9	38 52.5	58	80	122.5	38 35.0	59	80	123.0	2
3	39 45.1	54	83	118.5	39 28.7	55	83	119.1	39 12.2	55	82	119.6	38 55.4	56	82	120.2	38 38.6	56	82	120.7	38 21.6	57	81	121.2	38 04.5	57	81	121.7	37 47.2	58	80	122.3	3
4	38 55.1	54	84	117.9	38 39.0	54	83	118.4	38 22.7	55	83	118.9	38 06.2	55	83	119.5	37 49.6	56	82	120.0	37 32.9	56	82	120.5	37 16.0	56	81	121.0	36 59.0	57	81	121.6	4
45	38 04.8	53	84	117.2	37 48.9	53	84	117.7	37 32.9	54	84	118.3	37 16.7	54	83	118.8	37 00.3	55	83	119.3	36 43.9	55	82	119.8	36 27.2	56	82	120.3	36 10.5	56	81	120.9	45
6	37 14.2	52	85	116.5	36 58.5	52	84	117.1	36 42.7	53	84	117.6	36 26.8	53	84	118.1	36 10.7	54	83	118.6	35 54.5	54	83	119.2	35 38.1	55	82	119.7	35 21.6	55	82	120.2	6
7	36 23.3	51	85	115.9	36 07.9	52	85	116.4	35 52.3	52	84	116.9	35 36.6	53	84	117.5	35 20.8	53	84	118.0	35 04.8	53	83	118.5	34 48.7	54	83	119.0	34 32.4	54	83	119.5	7
8	35 32.1	50	86	115.3	35 16.9	51	85	115.8	35 01.6	51	85	116.3	34 46.1	52	85	116.8	34 30.5	52	84	117.4	34 14.8	53	84	117.9	33 58.9	53	83	118.4	33 42.9	54	83	118.9	8
9	34 40.7	50	86	114.7	34 25.7	50	86	115.2	34 10.6	51	85	115.7	33 55.4	51	85	116.2	33 40.0	51	85	116.7	33 24.5	52	84	117.3	33 08.9	52	84	117.8	32 53.1	53	84	118.3	9
50	33 49.0	49	87	114.1	33 34.3	49	86	114.6	33 19.4	50	86	115.1	33 04.3	50	85	115.6	32 49.2	51	85	116.1	32 33.9	51	85	116.7	32 18.5	52	84	117.2	32 03.0	52	84	117.7	50
1	32 57.1	48	87	113.5	32 42.6	49	87	114.0	32 27.9	49	86	114.5	32 13.1	50	86	115.0	31 58.1	50	86	115.6	31 43.1	50	85	116.1	31 27.9	51	85	116.6	31 12.6	51	84	117.1	1
2	32 05.0	48	87	112.9	31 50.6	48	87	113.4	31 36.1	48	87	114.0	31 21.6	49	86	114.5	31 06.8	49	86	115.0	30 52.0	50	86	115.5	30 37.0	50	85	116.0	30 22.0	50	85	116.5	2
3	31 12.6	47	88	112.4	30 58.5	47	87	112.9	30 44.2	48	87	113.4	30 29.8	48	87	113.9	30 15.3	49	86	114.4	30 00.7	49	86	114.9	29 45.9	49	86	115.4	29 31.1	50	85	115.9	3
4	30 20.1	46	88	111.8	30 06.1	47	88	112.4	29 52.0	47	87	112.9	29 37.8	47	87	113.4	29 23.5	48	87	113.9	29 09.1	48	86	114.4	28 54.6	49	86	114.9	28 39.9	49	86	115.4	4
55	29 27.3	46	88	111.3	29 13.5	46	88	111.8	28 59.6	46	88	112.3	28 45.7	47	87	112.8	28 31.5	47	87	113.3	28 17.3	48	87	113.8	28 03.0	48	86	114.3	27 48.6	48	86	114.8	55
6	28 34.4	45	89	110.8	28 20.8	45	88	111.3	28 07.1	46	88	111.8	27 53.3	46	88	112.3	27 39.4	47	87	112.8	27 25.3	47	87	113.3	27 11.2	47	87	113.8	26 57.0	48	86	114.3	6
7	27 41.2	45	89	110.3	27 27.8	45	89	110.8	27 14.3	45	88	111.3	27 00.7	46	88	111.8	26 47.0	46	88	112.3	26 33.1	46	87	112.8	26 19.2	47	87	113.3	26 05.2	47	87	113.8	7
8	26 47.9	44	89	109.8	26 34.7	44	89	110.3	26 21.4	45	89	110.8	26 07.9	45	88	111.3	25 54.4	45	88	111.8	25 40.7	46	88	112.3	25 27.0	46	87	112.8	25 13.2	46	87	113.3	8
9	25 54.5	43	89	109.3	25 41.4	44	89	109.8	25 28.3	44	89	110.3	25 15.0	44	88	110.8	25 01.6	45	88	111.3	24 48.2	45	88	111.8	24 34.6	45	88	112.3	24 20.9	46	87	112.8	9
60	25 00.9	43	90	108.9	24 48.0	43	89	109.3	24 35.0	43	89	109.8	24 21.9	44	89	110.3	24 08.7	44	88	110.8	23 55.4	44	88	111.3	23 42.0	45	88	111.8	23 28.5	45	88	112.3	60
1	24 07.1	42	90	108.4	23 54.4	43	90	108.9	23 41.5	43	89	109.4	23 28.6	43	89	109.9	23 15.6	44	89	110.4	23 02.5	44	88	110.8	22 49.3	44	88	111.3	22 36.0	44	88	111.8	1
2	23 13.2	42	90	107.9	23 00.6	42	90	108.4	22 47.9	42	90	108.9	22 35.2	43	89	109.4	22 22.3	43	89	109.9	22 09.4	43	89	110.4	21 56.3	44	88	110.9	21 43.2	44	88	111.4	2
3	22 19.2	41	90	107.5	22 06.7	42	90	108.0	21 54.2	42	90	108.5	21 41.6	42	90	109.0	21 28.9	42	89	109.4	21 16.1	43	89	109.9	21 03.2	43	89	110.4	20 50.3	43	88	110.9	3
4	21 25.0	41	90	107.0	21 12.7	41	90	107.5	21 00.3	41	90	108.0	20 47.9	42	90	108.5	20 35.3	42	90	109.0	20 22.7	42	89	109.5	20 10.0	42	89	110.0	19 57.2	43	89	110.4	4
65	20 30.7	40	91	106.6	20 18.5	41	90	107.1	20 06.3	41	90	107.6	19 54.0	41	90	108.1	19 41.6	41	90	108.6	19 29.1	42	90	109.0	19 16.6	42	89	109.5	19 04.0	42	89	110.0	65
6	19 36.3	40	91	106.2	19 24.3	40	91	106.7	19 12.2	40	90	107.2	19 00.0	41	90	107.6	18 47.8	41	90	108.1	18 35.4	41	90	108.6	18 23.1	41	89	109.1	18 10.6	42	89	109.6	6
7	18 41.7	39	91	105.8	18 29.9	40	91	106.3	18 17.9	40	91	106.7	18 05.9	40	90	107.2	17 53.8	40	90	107.7	17 41.6	41	90	108.2	17 29.4	41	90	108.7	17 17.1	41	89	109.1	7
8	17 47.1	39	91	105.4	17 35.3	39	91	105.9	17 23.5	40	91	106.3	17 11.6	40	91	106.8	16 59.7	40	90	107.3	16 47.7	40	90	107.8	16 35.6	40	90	108.3	16 23.4	41	90	108.7	8
9	16 52.3	39	91	105.0	16 40.7	39	91	105.4	16 29.0	39	91	105.9	16 17.3	39	91	106.4	16 05.5	39	91	106.9	15 53.6	40	90	107.4	15 41.6	40	90	107.8	15 29.6	40	90	108.3	9
70	15 57.5	38	92	104.6	15 46.0	38	91	105.0	15 34.4	39	91	105.5	15 22.8	39	91	106.0	15 11.1	39	91	106.5	14 59.4	39	91	107.0	14 47.6	39	90	107.4	14 35.7	40	90	107.9	70
1	15 02.5	38	92	104.2	14 51.1	38	92	104.7	14 39.7	38	91	105.1	14 28.2	38	91	105.6	14 16.7	39	91	106.1	14 05.0	39	91	106.6	13 53.4	39	90	107.0	13 41.7	39	90	107.5	1
2	14 07.5	37	92	103.8	13 56.2	38	92	104.3	13 44.9	38	92	104.7	13 33.5	38	91	105.2	13 22.1	38	91	105.7	13 10.6	38	91	106.2	12 59.1	39	91	106.6	12 47.5	39	90	107.1	2
3	13 12.3	37	92	103.4	13 01.2	37	92	103.9	12 50.0	37	92	104.4	12 38.7	38	92	104.8	12 27.4	38	91	105.3	12 16.1	38	91	105.8	12 04.7	38	91	106.3	11 53.2	38	91	106.7	3
4	12 17.1	37	92	103.0	12 06.1	37	92	103.5	11 55.0	37	92	104.0	11 43.8	37	92	104.5	11 32.7	37	91	104.9	11 21.4	37	91	105.4	11 10.2	38	91	105.9	10 58.8	38	91	106.4	4
75	11 21.8	36	92	102.7	11 10.9	37	92	103.1	10 59.9	37	92	103.6	10 48.9	37	92	104.1	10 37.8	37	92	104.6	10 26.7	37	91	105.0	10 15.5	37	91	105.5	10 04.4	37	91	106.0	75
6	10 26.4	36	92	102.3	10 15.6	36	92	102.8	10 04.7	36	92	103.3	9 53.8	36	92	103.7	9 42.8	37	92	104.2	9 31.9	37	92	104.7	9 20.8	37	91	105.1	9 09.8	37	91	105.6	6
7	9 30.9	36	93	101.9	9 20.2	36	92	102.4	9 09.4	36	92	102.9	8 58.6	36	92	103.4	8 47.8	36	92	103.8	8 36.9	36	92	104.3	8 26.0	36	92	104.8	8 15.1	37	91	105.2	7
8	8 35.4	35	93	101.6	8 24.8	35	93	102.1	8 14.1	36	92	102.5	8 03.4	36	92	103.0	7 52.7	36	92	103.5	7 41.9	36	92	103.9	7 31.1	36	92	104.4	7 20.3	36	91	104.9	8
9	7 39.8	35	93	101.2	7 29.2	35	93	101.7	7 18.7	35	92	102.2	7 08.1	35	92	102.7	6 57.5	35	92	103.1	6 46.8	36	92	103.6	6 36.1	36	92	104.1	6 25.4	36	92	104.5	9
80	6 44.1	35	93	100.9	6 33.7	35	93	101.4	6 23.2	35	93	101.8	6 12.7	35	92	102.3	6 02.2	35	92	102.8	5 51.6	35	92	103.2	5 41.1	35	92	103.7	5 30.5	35	92	104.2	80
1	5 48.4	34	93	100.5	5 38.0	35	93	101.0	5 27.6	35	93	101.5	5 17.2	35	93	102.0	5 06.8	35	92	102.4													1

Lat. 19°

H.A.	12° 00′			12° 30′			13° 00′			13° 30′			14° 00′			14° 30′			15° 00′			15° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	83 00.0	1.0 07	180.0	83 30.0	1.0 07	180.0	84 00.0	1.0 08	180.0	84 30.0	1.0 08	180.0	85 00.0	1.0 09	180.0	85 30.0	1.0 10	180.0	86 00.0	1.0 11	180.0	86 30.0	1.0 13	180.0	00
1	82 56.0	99 19	172.0	83 25.8	99 21	171.4	83 55.4	99 22	170.8	84 25.0	99 24	170.0	84 54.5	98 26	169.0	85 24.0	98 29	167.8	85 53.2	97 32	166.4	86 22.3	97 36	164.6	1
2	82 44.4	97 31	164.3	83 13.3	96 33	163.2	83 42.0	95 36	161.9	84 10.5	95 38	160.5	84 38.7	94 41	158.7	85 06.6	92 45	156.7	85 34.0	90 49	154.1	86 00.8	88 54	151.1	2
3	82 25.6	93 42	157.1	82 53.3	92 44	155.6	83 20.6	90 47	153.9	83 47.5	89 50	151.9	84 13.9	87 53	149.6	84 39.7	85 57	147.0	85 04.7	82 61	143.9	85 28.6	78 66	140.2	3
4	82 00.6	88 51	150.6	82 26.8	87 53	148.8	82 52.5	85 56	146.8	83 17.6	83 59	144.5	83 42.0	80 62	141.9	84 05.5	77 66	139.0	84 28.0	73 70	135.7	84 49.2	68 74	131.9	4
05	81 30.3	83 58	144.8	81 54.9	81 61	142.8	82 18.8	79 63	140.6	82 42.1	76 66	138.2	83 04.5	73 69	135.5	83 25.8	69 73	132.5	83 46.0	65 76	129.2	84 04.8	60 79	125.5	05
6	80 55.4	78 64	139.6	81 18.5	76 67	137.5	81 40.8	73 69	135.3	82 02.3	70 72	132.8	82 22.8	67 75	130.1	82 42.2	63 78	127.2	83 00.4	58 80	124.0	83 17.2	53 83	120.5	6
7	80 17.0	73 69	135.1	80 38.5	71 71	133.0	80 59.3	68 74	130.7	81 19.1	65 76	128.3	81 38.0	61 79	125.6	81 55.7	57 81	122.8	82 12.2	53 83	119.8	82 27.3	48 86	116.6	7
8	79 35.5	69 73	131.1	79 55.7	66 75	129.0	80 15.0	63 77	126.8	80 33.4	60 80	124.4	80 50.8	56 82	121.9	81 07.1	52 84	119.2	81 22.2	48 86	116.4	81 35.9	43 88	113.4	8
9	78 51.6	64 76	127.6	79 10.5	62 78	125.6	79 28.6	59 80	123.4	79 45.7	55 82	121.2	80 01.8	52 84	118.7	80 16.9	48 86	116.2	80 30.7	44 87	113.6	80 43.3	40 89	110.8	9
10	78 05.8	61 79	124.6	78 23.5	58 81	122.6	78 40.4	55 82	120.5	78 56.4	52 84	118.3	79 11.4	48 86	116.0	79 25.4	45 87	113.7	79 38.2	41 89	111.2	79 49.9	37 90	108.6	10
1	77 18.3	57 81	121.9	77 35.0	54 83	120.0	77 50.9	52 84	118.0	78 05.9	48 86	115.9	78 20.0	45 87	113.7	78 33.0	42 89	111.5	78 45.0	38 90	109.1	78 55.8	34 91	106.7	1
2	76 29.5	54 83	119.5	76 45.3	51 85	117.6	77 00.3	49 86	115.7	77 14.4	46 87	113.7	77 27.6	42 88	111.7	77 39.9	39 90	109.6	77 51.1	36 91	107.4	78 01.3	32 92	105.1	2
3	75 39.6	51 85	117.3	75 54.6	49 86	115.6	76 08.8	46 87	113.7	76 22.1	43 88	111.9	76 34.6	40 89	109.9	76 46.1	37 90	107.9	76 56.7	34 91	105.9	77 06.3	30 92	103.7	3
4	74 48.8	49 86	115.4	75 03.0	46 87	113.7	75 16.5	44 88	112.0	75 29.2	41 89	110.2	75 41.0	38 90	108.3	75 51.9	35 91	106.4	76 02.0	32 92	104.5	76 11.1	29 92	102.5	4
15	73 57.1	47 87	113.7	74 10.7	44 88	112.1	74 23.6	42 89	110.4	74 35.7	39 90	108.7	74 46.9	36 91	106.9	74 57.3	33 92	105.1	75 06.9	30 92	103.3	75 15.6	27 93	101.4	15
6	73 04.9	44 88	112.1	73 17.9	42 89	110.6	73 30.2	40 90	109.0	73 41.7	37 91	107.3	73 52.5	35 91	105.6	74 02.4	32 92	103.9	74 11.6	29 93	102.2	74 19.9	26 93	100.4	6
7	72 12.1	43 89	110.7	72 24.5	40 90	109.2	72 36.3	38 90	107.7	72 47.4	36 91	106.1	72 57.7	33 92	104.5	73 07.2	31 92	102.9	73 16.0	28 93	101.2	73 24.0	25 93	99.5	7
8	71 18.8	41 90	109.4	71 30.7	39 90	107.9	71 42.1	37 91	106.5	71 52.7	34 92	105.0	72 02.6	32 92	103.4	72 11.8	29 93	101.9	72 20.3	27 93	100.3	72 28.0	24 94	98.7	8
9	70 25.0	40 90	108.2	70 36.6	37 91	106.8	70 47.5	35 91	105.4	70 57.8	33 92	103.9	71 07.3	31 92	102.5	71 16.2	28 93	101.0	71 24.4	26 93	99.5	71 31.9	24 94	98.0	9
20	69 31.0	38 91	107.1	69 42.1	36 91	105.7	69 52.7	34 92	104.4	70 02.6	32 92	103.0	70 11.9	30 93	101.6	70 20.5	28 93	100.2	70 28.4	25 94	98.7	70 35.6	23 94	97.3	20
1	68 36.6	37 91	106.0	68 47.4	35 92	104.7	68 57.6	33 92	103.4	69 07.2	31 93	102.1	69 16.2	29 93	100.8	69 24.6	27 93	99.4	69 32.3	25 94	98.0	69 39.3	22 94	96.6	1
2	67 41.9	36 92	105.1	67 52.4	34 92	103.8	68 02.3	32 92	102.6	68 11.7	30 93	101.3	68 20.4	28 93	100.0	68 28.5	26 94	98.7	68 36.0	24 94	97.4	68 42.9	22 94	96.0	2
3	66 47.0	35 92	104.2	66 57.2	33 92	103.0	67 06.9	31 93	101.8	67 16.0	29 93	100.5	67 24.5	27 93	99.3	67 32.4	25 94	98.0	67 39.8	23 94	96.8	67 46.5	21 94	95.5	3
4	65 51.9	34 92	103.3	66 01.9	32 93	102.2	66 11.3	30 93	101.0	66 20.1	29 93	99.8	66 28.4	27 94	98.6	66 36.2	25 94	97.4	66 43.4	23 94	96.2	66 50.0	21 94	94.9	4
25	64 56.6	33 92	102.6	65 06.3	31 93	101.4	65 15.5	30 93	100.3	65 24.2	28 93	99.1	65 32.3	26 94	98.0	65 39.9	24 94	96.8	65 47.0	23 94	95.6	65 53.5	21 94	94.4	25
6	64 01.2	32 93	101.8	64 10.7	31 93	100.7	64 19.6	29 93	99.6	64 28.1	27 94	98.5	64 36.1	26 94	97.4	64 43.5	24 94	96.3	64 50.5	22 94	95.1	64 56.9	20 94	94.0	6
7	63 05.6	32 93	101.1	63 14.8	30 93	100.1	63 23.6	29 93	99.0	63 32.0	27 94	97.9	63 39.8	25 94	96.8	63 47.1	24 94	95.7	63 53.9	22 94	94.6	64 00.3	20 94	93.5	7
8	62 09.9	31 93	100.4	62 18.9	30 93	99.4	62 27.6	28 94	98.4	62 35.7	26 94	97.3	62 43.4	25 94	96.3	62 50.6	23 94	95.2	62 57.4	22 94	94.2	63 03.6	20 94	93.1	8
9	61 14.0	30 93	99.8	61 22.9	29 94	98.8	61 31.4	28 94	97.8	61 39.4	26 94	96.8	61 47.0	24 94	95.8	61 54.1	23 94	94.7	62 00.8	21 94	93.7	62 07.0	20 94	92.7	9
30	60 18.0	30 93	99.2	60 26.8	29 94	98.2	60 35.2	27 94	97.3	60 43.1	26 94	96.3	60 50.5	24 94	95.3	60 57.6	23 94	94.3	61 04.2	21 94	93.3	61 10.3	20 94	92.3	30
1	59 22.0	29 94	98.6	59 30.6	28 94	97.7	59 38.8	27 94	96.7	59 46.6	25 94	95.8	59 54.0	24 94	94.8	60 01.0	22 94	93.8	60 07.5	21 94	92.9	60 13.6	20 94	91.9	1
2	58 25.9	29 94	98.1	58 34.4	28 94	97.2	58 42.5	26 94	96.2	58 50.2	25 94	95.3	58 57.5	24 94	94.4	59 04.4	22 94	93.4	59 10.8	21 94	92.5	59 16.9	19 95	91.5	2
3	57 29.7	29 94	97.5	57 38.1	27 94	96.6	57 46.1	26 94	95.7	57 53.7	25 94	94.8	58 00.9	23 94	93.9	58 07.7	22 94	93.0	58 14.1	21 94	92.1	58 20.2	19 95	91.1	3
4	56 33.4	28 94	97.0	56 41.7	27 94	96.2	56 49.6	26 94	95.3	56 57.1	24 94	94.4	57 04.3	23 94	93.5	57 11.1	22 94	92.6	57 17.4	21 95	91.7	57 23.4	19 95	90.8	4
35	55 37.1	28 94	96.5	55 45.2	27 94	95.7	55 53.1	25 94	94.8	56 00.5	24 94	94.0	56 07.6	23 94	93.1	56 14.4	22 94	92.2	56 20.7	21 95	91.3	56 26.7	19 95	90.4	35
6	54 40.7	28 94	96.1	54 48.8	26 94	95.2	54 56.5	25 94	94.4	55 03.9	24 94	93.5	55 11.0	23 94	92.7	55 17.7	22 95	91.8	55 24.0	21 95	91.0	55 30.0	19 95	90.1	6
7	53 44.2	27 94	95.6	53 52.3	26 94	94.8	53 59.9	25 94	94.0	54 07.3	24 94	93.1	54 14.3	23 94	92.3	54 21.0	22 95	91.5	54 27.3	20 95	90.6	54 33.3	19 95	89.8	7
8	52 47.8	27 94	95.2	52 55.7	26 94	94.4	53 03.3	25 94	93.6	53 10.6	24 94	92.7	53 17.6	23 94	91.9	53 24.3	22 95	91.1	53 30.6	20 95	90.3	53 36.5	19 95	89.5	8
9	51 51.2	27 94	94.7	51 59.1	26 94	93.9	52 06.7	25 94	93.2	52 14.0	24 94	92.4	52 20.9	23 95	91.6	52 27.5	22 95	90.8	52 33.8	20 95	90.0	52 39.8	19 95	89.2	9
40	50 54.7	27 94	94.3	51 02.5	26 94	93.5	51 10.0	25 94	92.8	51 17.3	24 95	92.0	51 24.2	23 95	91.2	51 30.8	22 95	90.4	51 37.1	20 95	89.6	51 43.1	19 95	88.9	40
1	49 58.1	26 94	93.9	50 05.9	25 94	93.1	50 13.4	24 94	92.4	50 20.6	24 95	91.6	50 27.5	23 95	90.9	50 34.1	21 95	90.1	50 40.4	20 95	89.3	50 46.4	19 95	88.6	1
2	49 01.5	26 94	93.5	49 09.2	25 94	92.8	49 16.7	24 94	92.0	49 23.9	23 95	91.3	49 30.7	22 95	90.5	49 37.3	21 95	89.8	49 43.6	21 95	89.0	49 49.7	20 94	88.3	2
3	48 04.8	26 94	93.1	48 12.6	25 94	92.4	48 20.0	24 95	91.7	48 27.1	23 95	90.9	48 34.0	22 95	90.2	48 40.6	22 95	89.5	48 46.9	21 95	88.7	48 53.0	20 94	88.0	3
4	47 08.2	26 94	92.7	47 15.9	25 94	92.0	47 23.3	24 95	91.3	47 30.4	23 95	90.6	47 37.3	22 95	89.9	47 43.9	22 95	89.1	47 50.2	21 95	88.4	47 56.3	20 94	87.7	4
45	46 11.5	26 94	92.4	46 19.2	25 95	91.7	46 26.6	24 95	91.0	46 33.7	23 95	90.3	46 40.6	22 95	89.6	46 47.2	22 95	88.8	46 53.5	21 94	88.1	46 59.6	20 94	87.4	45
6	45 14.8	26 94	92.0	45 22.4	25 95	91.3	45 29.8	24 95	90.6	45 37.0	23 95	89.9	45 43.8	22 95	89.2	45 50.4	22 95	88.5	45 56.8	21 94	87.8	46 02.9	20 94	87.1	6
7	44 18.1	26 95	91.6	44 25.7	25 95	91.0	44 33.1	24 95	90.3	44 40.2	23 95	89.6	44 47.1	23 95	88.9	44 53.7	22 94	88.2	45 00.1	21 94	87.5	45 06.3	20 94	86.9	7
8	43 21.4	26 95	91.3	43 29.0	25 95	90.6	43 36.4	24 95	90.0	43 43.5	23 95	89.3	43 50.4	23 94	88.6	43 57.0	22 94	87.9	44 03.5	21 94	87.3	44 09.6	20 94	86.6	8
9	42 24.7	26 95	91.0	42 32.3	25 95	90.3	42 39.6	24 95	89.6	42 46.8	23 95	89.0	42 53.7	23 94	88.3	43 00.4	22 94	87.7	43 06.8	21 94	87.0	43 13.0	20 94	86.3	9
50	41 28.0	26 95	90.6	41 35.5	25 95	90.0	41 42.9	24 95	89.3	41 50.1	23 95	88.7	41 57.0	23 94	88.0	42 03.7	22 94	87.4	42 10.1	21 94	86.7	42 16.4	20 94	86.0	50
1	40 31.2	26 95	90.3	40 38.8	25 95	89.7	40 46.2	24 95	89.0	40 53.3	24 94	88.4	41 00.3	23 94	87.7	41 07.0	22 94	87.1	41 13.5	21 94	86.4	41 19.8	21 94	85.8	1
2	39 34.5	26 95	90.0	39 42.1	25 95	89.3	39 49.5	24 95	88.7	39 56.6	24 94	88.1	40 03.6	23 94	87.4	40 10.4	22 94	86.8	40 16.9	21 94	86.2	40 23.2	21 94	85.5	2
3	38 37.8	26 95	89.6	38 45.4	25 95	89.0	38 52.8	24 94	88.4	38 59.9	24 94	87.8	39 06.9	23 94	87.1	39 13.7	22 94	86.5	39 20.3	22 94	85.9	39 26.7	21 94	85.3	3
4	37 41.0	26 95	89.3	37 48.6	25 95	88.7	37 56.0	24 94	88.1	38 03.3	24 94	87.5	38 10.3	23 94	86.9	38 17.1	22 94	86.2	38 23.7	22 94	85.6	38 30.2	21 94	85.0	4
55	36 44.3	26 95	89.0	36 51.9	25 95	88.4	36 59.4	24 94	87.8	37 06.6	24 94	87.2	37 13.6	23 94	86.6	37 20.5	23 94	86.0	37 27.2	22 94	85.4	37 33.7	21 94	84.7	55
6	35 47.6	26 95	88.7	35 55.2	25 94	88.1	36 02.7	25 94	87.5	36 09.9	24 94	86.9	36 17.0	23 94	86.3	36 23.9	23 94	85.7	36 30.6	22 94	85.1	36 37.2	21 94	84.5	6
7	34 50.9	26 94	88.4	34 58.5	25 94	87.8	35 06.0	25 94	87.2	35 13.3	24 94	86.6	35 20.4	23 94	86.0	35 27.4	23 94	85.4	35 34.1	22 94	84.8	35 40.7	22 94	84.2	7
8	33 54.2	26 94	88.1	34 01.8	25 94	87.5	34 09.3	25 94	86.9	34 16.7	24 94	86.3	34 23.8	24 94	85.7	34 30.8	23 94	85.1	34 37.7	22 94	84.6	34 44.3	22 94	84.0	8
9	32 57.5	26 94	87.8	33 05.2	25 94	87.2	33 12.7	25 94	86.6	33 20.1	24 94	86.0	33 27.3	24 94	85.5	33 34.3	23 94	84.9	33 41.2	23 94	84.3	33 47.9	22 94	83.7	9
60	32 00.8	26 94	87.5	32 08.5	25 94	86.9	32 16.1	25 94	86.3	32 23.5	24 94	85.8	32 30.7	24 94	85.2	32 37.8	23 94	84.6	32 44.8	23 94	84.0	32 51.5	22 94	83.5	60
1	31 04.1	26 94	87.2	31 11.9	26 94	86.6	31 19.5	25 94	86.0	31 26.9	25 94	85.5	31 34.2	24 94	84.9	31 41.4	24 94	84.3	31 48.3	23 94	83.8	31 55.2	23 94	83.2	1
2	30 07.5	26 94	86.9	30 15.3	26 94	86.3	30 22.9	25 94	85.8	30 30.4	25 94	85.2	30 37.7	24 94	84.6	30 44.9	24 94	84.1	30 52.0	23 94	83.5	30 58.9	23 94	82.9	2
3	29 10.8	26 94	86.6	29 18.6	26 94	86.0	29 26.3	25 94	85.5	29 33.9	25 94	84.9	29 41.2	24 94	84.4	29 48.5	24 94	83.8	29 55.6	23 94	83.2	30 02.6	23 94	82.7	3
4	28 14.2	26 94	86.3	28 22.1	26 94	85.7	28 29.8	25 94	85.2	28 37.4	25 94	84.6	28 44.8	25 94	84.1	28 52.1	24 94	83.5	28 59.3	24 94	83.0	29 06.3	23 94	82.4	4
65	27 17.6	26 94	86.0	27 25.5	26 94	85.5	27 33.3	26 94	84.9	27 40.9	25 94	84.4	27 48.4	25 94	83.8	27 55.8	24 94	83.3	28 03.0	24 94	82.7	28 10.1	23 94	82.2	65
6	26 21.0	27 94	85.7	26 29.0	26 94	85.2	26 36.8	26 94	84.6	26 44.4	25 94	84.1	26 52.0	25 94	83.5	26 59.4	25 94	83.0	27 06.7	24 94	82.5	27 13.9	24 94	81.9	6
7	25 24.5	27 94	85.4	25 32.4	26 94	84.9	25 40.3	26 94	84.3	25 48.0	26 94	83.8	25 55.6	25 94	83.3	26 03.1	25 94	82.7	26 10.5	24 94	82.2	26 17.8	24 94	81.7	7
8	24 27.9	27 94	85.1	24 35.9	27 94	84.6	24 43.9	26 94	84.1	24 51.6	26 94	83.5	24 59.3	25 94	83.0	25 06.9	25 94	82.5	25 14.3	25 94	81.9	25 21.7	24 93	81.4	8
9	23 31.4	27 94	84.8	23 39.5	27 94	84.3	23 47.4	26 94	83.8	23 55.3	26 94	83.3	24 03.0	26 94	82.7	24 10.7	25 94	82.2	24 18.2	25 94	81.7	24 25.6	25 93	81.1	9
70	22 34.9	27 94	84.6	22 43.0	27 94	84.0	22 51.1	27 94	83.5	22 59.0	26 94	83.0	23 06.8	26 94	82.5	23 14.5	25 94	81.9	23 22.1	25 93	81.4	23 29.6	25 93	80.9	70
1	21 38.5	27 94	84.3	21 46.6	27 94	83.7	21 54.7	27 94	83.2	22 02.7	26 94	82.7	22 10.5	26 94	82.2	22 18.3	26 94	81.7	22 26.0	25 93	81.1	22 33.6	25 93	80.6	1
2	20 42.0	28 94	84.0	20 50.3	27 94	83.5	20 58.4	27 94	82.9	21 06.4	27 94	82.4	21 14.4	26 94	81.9	21 22.2	26 93	81.4	21 30.0	26 93	80.9	21 37.6	25 93	80.4	2
3	19 45.6	28 94	83.7	19 53.9	27 94	83.2	20 02.1	27 94	82.7	20 10.2	27 94	82.2	20 18.2	27 94	81.6	20 26.1	26 93	81.1	20 34.0	26 93	80.6	20 41.7	26 93	80.1	3
4	18 49.3	28 94	83.4	18 57.6	28 94	82.9	19 05.9	27 94	82.4	19 14.0	27 94	81.9	19 22.1	27 93	81.4	19 30.1	27 93	80.9	19 38.0	26 93	80.3	19 45.8	26 93	79.8	4
75	17 52.9	28 94	83.1	18 01.3	28 94	82.6	18 09.6	28 94	82.1	18 17.9	27 94	81.6	18 26.0	27 93	81.1	18 34.1	27 93	80.6	18 42.1	27 93	80.1	18 50.0	26 93	79.6	75
6	16 56.6	28 94	82.8	17 05.1	28 94	82.3	17 13.5	28 94	81.8	17 21.8	28 93	81.3	17 30.0	27 93	80.8	17 38.2	27 93	80.3	17 46.3	27 93	79.8	17 54.3	27 93	79.3	6
7	16 00.4	29 94	82.5	16 08.9	28 94	82.0	16 17.3	28 93	81.5	16 25.7	28 93	81.0	16 34.0	28 93	80.5	16 42.3	27 93	80.0	16 50.4	27 93	79.5	16 58.5	27 93	79.0	7
8	15 04.1	29 94	82.2	15 12.7	29 94	81.7	15 21.2	28 93	81.2	15 29.7	28 93	80.7	15 38.1	28 93	80.3	15 46.4	28 93	79.8	15 54.7	27 93	79.3	16 02.9	27 93	78.8	8
9	14 07.9	29 94	81.9	14 16.6	29 93	81.5	14 25.2	29 93	81.0	14 33.7	28 93	80.5	14 42.2	28 93	80.0	14 50.6	28 93	79.5	14 59.0	28 93	79.0	15 07.3	28 93	78.5	9
80	13 11.8	29 94	81.7	13 20.5	29 93	81.2	13 29.2	29 93	80.7	13 37.8	29 93	80.2	13 46.4	28 93	79.7	13 54.9	28 93	79.2	14 03.3	28 93	78.7	14 11.7	28 92	78.2	80
1	12 15.7	29 93	81.4	12 24.5	29 93	80.9	12 33.2	29 93	80.4	12 41.9	29 93	79.9	12 50.6	29 93	79.4	12 59.2	29 93	78.9	13 07.7	28 93	78.4	13 16.2	28 92	77.9	1
2	11 19.6	30 93	81.1	11 28.5	30 93	80.6	11 37.3	29 93	80.1	11 46.1	29 93	79.6	11 54.8	29 93	79.1	12 03.5	29 93	78.6	12 12.2	29 92	78.1	12 20.7	29 92	77.6	2
3	10 23.6	30 93	80.8	10 32.5	30 93	80.3	10 41.5	30 93	79.8	10 50.3	29 93	79.3	10 59.2	29 93	78.8	11 07.9	29 93	78.3	11 16.7	29 92	77.9	11 25.4	29 92	77.4	3
4	9 27.6	30 93	80.5	9 36.7	30 93	80.0	9 45.7	30 93	79.5	9 54.6	30 93	79.0	10 03.5	30 93	78.5	10 12.4	30 92	78.0	10 21.2	29 92	77.6	10 30.0	29 92	77.1	4
85	8 31.7	30 93	80.2	8 40.8	30 93	79.7	8 49.9	30 93	79.2	8 59.0	30 93	78.7	9 08.0	30 93	78.2	9 16.9	30 92	77.8	9 25.9	30 92	77.3	9 34.8	30 92	76.8	85
6	7 35.8	31 93	79.9	7 45.0	31 93	79.4	7 54.2	31 93	78.9	8 03.3	30 93	78.4	8 12.5	30 92	77.9	8 21.5	30 92	77.5	8 30.6	30 92	77.0	8 39.6	30 92	76.5	6
7	6 40.0	31 93	79.6	6 49.3	31 93	79.1	6 58.6	31 93	78.6	7 07.8	31 92	78.1	7 17.0	31 92	77.6	7 26.2	31 92	77.2	7 35.3	30 92	76.7	7 44.4	30 92	76.2	7
8	5 44.2	31 93	79.3	5 53.6	31 93	78.8	6 03.0	31 93	78.3	6 12.3	31 92	77.8	6 21.6	31 92	77.3	6 30.9	31 92	76.9	6 40.2	31 92	76.4	6 49.4	31 92	75.9	8
9							5 07.5	31 92	78.0	5 16.9	31 92	77.5	5 26.3	31 92	77.0	5 35.7	31 92	76.6	5 45.1	31 92	76.1	5 54.4	31 92	75.6	9

Lat. 19°

H.A.	12° 00′			12° 30′			13° 00′			13° 30′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	59 00.0	1.0 02	180.0	58 30.0	1.0 02	180.0	58 00.0	1.0 02	180.0	57 30.0	1.0 02	180.0
1	58 59.1	1.0 05	178.1	58 29.1	1.0 05	178.1	57 59.1	1.0 05	178.2	57 29.1	1.0 04	178.2
2	58 56.2	1.0 08	176.2	58 26.3	1.0 08	176.3	57 56.4	1.0 08	176.3	57 26.4	1.0 07	176.4
3	58 51.6	1.0 11	174.3	58 21.7	1.0 11	174.4	57 51.8	1.0 11	174.5	57 22.0	1.0 10	174.6
4	58 45.0	99 14	172.4	58 15.3	99 14	172.6	57 45.5	99 14	172.7	57 15.7	99 13	172.8
05	58 36.6	99 17	170.6	58 07.0	99 17	170.7	57 37.4	99 16	170.9	57 07.7	99 16	171.0
6	58 26.5	98 20	168.7	57 57.0	98 20	168.9	57 27.5	98 19	169.1	56 58.0	98 19	169.3
7	58 14.5	98 23	166.9	57 45.2	98 22	167.1	57 15.9	98 22	167.3	56 46.6	98 22	167.5
8	58 00.8	97 26	165.1	57 31.7	97 25	165.3	57 02.6	97 25	165.6	56 33.5	97 25	165.8
9	57 45.3	96 28	163.3	57 16.5	96 28	163.6	56 47.6	96 28	163.8	56 18.7	96 27	164.1
10	57 28.2	95 31	161.6	56 59.7	95 31	161.9	56 31.0	95 30	162.1	56 02.4	96 30	162.4
1	57 09.5	94 34	159.9	56 41.2	94 33	160.2	56 12.8	95 33	160.5	55 44.4	95 32	160.8
2	56 49.2	93 36	158.2	56 21.2	93 36	158.5	55 53.1	94 35	158.8	55 25.0	94 35	159.1
3	56 27.4	92 39	156.5	55 59.7	92 38	156.9	55 31.9	93 38	157.2	55 04.1	93 37	157.5
4	56 04.0	91 41	154.9	55 36.6	91 41	155.3	55 09.2	92 40	155.6	54 41.7	92 40	156.0
15	55 39.3	90 44	153.3	55 12.2	90 43	153.7	54 45.1	91 42	154.1	54 17.9	91 42	154.5
6	55 13.1	89 46	151.8	54 46.4	89 45	152.2	54 19.6	89 45	152.6	53 52.8	90 44	153.0
7	54 45.7	88 48	150.3	54 19.3	88 47	150.7	53 52.8	88 47	151.1	53 26.3	89 46	151.5
8	54 16.9	87 50	148.8	53 50.9	87 49	149.2	53 24.8	87 49	149.7	52 58.6	87 48	150.1
9	53 46.9	85 52	147.4	53 21.3	86 51	147.8	52 55.5	86 51	148.3	52 29.7	86 50	148.7
20	53 15.8	84 54	146.0	52 50.5	84 53	146.4	52 25.1	85 53	146.9	51 59.6	85 52	147.3
1	52 43.5	83 56	144.6	52 18.6	83 55	145.1	51 53.6	84 54	145.5	51 28.4	84 54	146.0
2	52 10.1	82 57	143.3	51 45.6	82 57	143.8	51 20.9	82 56	144.2	50 56.2	83 56	144.7
3	51 35.7	80 59	142.0	51 11.6	81 58	142.5	50 47.3	81 58	143.0	50 22.9	82 57	143.4
4	51 00.3	79 61	140.8	50 36.5	80 60	141.3	50 12.6	80 59	141.7	49 48.6	80 59	142.2
25	50 24.0	78 62	139.6	50 00.6	78 61	140.1	49 37.0	79 61	140.5	49 13.3	79 60	141.0
6	49 46.8	77 64	138.4	49 23.7	77 63	138.9	49 00.5	78 62	139.4	48 37.2	78 62	139.8
7	49 08.7	75 65	137.2	48 46.0	76 64	137.7	48 23.2	76 64	138.2	48 00.2	77 63	138.7
8	48 29.8	74 66	136.1	48 07.4	75 66	136.6	47 45.0	75 65	137.1	47 22.4	76 64	137.6
9	47 50.1	73 67	135.1	47 28.1	73 67	135.6	47 06.0	74 66	136.1	46 43.7	74 66	136.5
30	47 09.6	72 69	134.0	46 48.0	72 68	134.5	46 26.2	73 67	135.0	46 04.3	73 67	135.5
1	46 28.5	71 70	133.0	46 07.2	71 69	133.5	45 45.8	72 69	134.0	45 24.2	72 68	134.5
2	45 46.6	70 71	132.0	45 25.7	70 70	132.5	45 04.6	70 70	133.0	44 43.4	71 69	133.5
3	45 04.2	68 72	131.0	44 43.6	69 71	131.5	44 22.8	69 71	132.1	44 01.9	70 70	132.6
4	44 21.1	67 73	130.1	44 00.8	68 72	130.6	43 40.4	68 72	131.1	43 19.8	69 71	131.6
35	43 37.4	66 74	129.2	43 17.4	67 73	129.7	42 57.4	67 73	130.2	42 37.1	68 72	130.7
6	42 53.1	65 75	128.3	42 33.5	66 74	128.8	42 13.8	66 74	129.3	41 53.9	67 73	129.8
7	42 08.4	64 75	127.5	41 49.0	65 75	128.0	41 29.6	65 74	128.5	41 10.0	66 74	129.0
8	41 23.1	63 76	126.6	41 04.1	64 76	127.1	40 44.9	64 75	127.6	40 25.7	64 75	128.1
9	40 37.3	62 77	125.8	40 18.6	63 77	126.3	39 59.8	63 76	126.8	39 40.8	63 76	127.3
40	39 51.1	61 78	125.0	39 32.7	62 77	125.5	39 14.1	62 77	126.0	38 55.5	62 76	126.5
1	39 04.4	60 78	124.2	38 46.3	61 78	124.8	38 28.0	61 78	125.3	38 09.7	61 77	125.8
2	38 17.3	59 79	123.5	37 59.5	60 79	124.0	37 41.5	60 78	124.5	37 23.4	60 78	125.0
3	37 29.8	58 80	122.8	37 12.2	59 79	123.3	36 54.6	59 79	123.8	36 36.7	60 78	124.3
4	36 41.9	57 80	122.1	36 24.6	58 80	122.6	36 07.2	58 80	123.1	35 49.7	59 79	123.6
45	35 53.6	56 81	121.4	35 36.6	57 81	121.9	35 19.5	57 80	122.4	35 02.2	58 80	122.9
6	35 05.0	56 82	120.7	34 48.3	56 81	121.2	34 31.4	56 81	121.7	34 14.4	57 80	122.2
7	34 16.1	55 82	120.0	33 59.6	55 82	120.5	33 43.0	56 81	121.1	33 26.2	56 81	121.5
8	33 26.8	54 83	119.4	33 10.6	54 82	119.9	32 54.2	55 82	120.4	32 37.7	55 81	120.9
9	32 37.2	53 83	118.8	32 21.2	54 83	119.3	32 05.1	54 82	119.8	31 48.9	54 82	120.3
50	31 47.4	52 84	118.2	31 31.6	53 83	118.7	31 15.7	53 83	119.2	30 59.7	53 82	119.7
1	30 57.2	52 84	117.6	30 41.7	52 84	118.1	30 26.0	52 83	118.6	30 10.3	53 83	119.1
2	30 06.8	51 84	117.0	29 51.5	51 84	117.5	29 36.1	52 84	118.0	29 20.6	52 83	118.5
3	29 16.1	50 85	116.4	29 01.0	50 84	116.9	28 45.9	51 84	117.4	28 30.6	51 84	117.9
4	28 25.2	49 85	115.9	28 10.3	50 85	116.4	27 55.4	50 85	116.9	27 40.3	50 84	117.3
55	27 34.0	49 86	115.3	27 19.4	49 85	115.8	27 04.6	49 85	116.3	26 49.8	50 85	116.8
6	26 42.6	48 86	114.8	26 28.2	48 86	115.3	26 13.7	49 85	115.8	25 59.0	49 85	116.3
7	25 51.0	47 86	114.3	25 36.8	48 86	114.8	25 22.5	48 86	115.3	25 08.0	48 85	115.7
8	24 59.2	47 87	113.8	24 45.2	47 86	114.3	24 31.0	47 86	114.7	24 16.8	48 86	115.2
9	24 07.2	46 87	113.3	23 53.4	46 87	113.8	23 39.4	47 86	114.2	23 25.4	47 86	114.7
60	23 15.0	45 87	112.8	23 01.3	46 87	113.3	22 47.6	46 87	113.8	22 33.8	46 86	114.2
1	22 22.6	45 88	112.3	22 09.1	45 87	112.8	21 55.6	45 87	113.3	21 41.9	46 87	113.7
2	21 30.0	44 88	111.8	21 16.7	44 88	112.3	21 03.4	45 87	112.8	20 49.9	45 87	113.3
3	20 37.3	44 88	111.4	20 24.2	44 88	111.9	20 11.0	44 88	112.3	19 57.7	44 87	112.8
4	19 44.4	43 88	110.9	19 31.4	43 88	111.4	19 18.4	43 88	111.9	19 05.3	44 88	112.4
65	18 51.3	42 89	110.5	18 38.5	43 88	111.0	18 25.7	43 88	111.4	18 12.8	43 88	111.9
6	17 58.1	42 89	110.0	17 45.5	42 89	110.5	17 32.8	42 88	111.0	17 20.1	43 88	111.5
7	17 04.7	41 89	109.6	16 52.3	42 89	110.1	16 39.8	42 89	110.6	16 27.2	42 88	111.0
8	16 11.2	41 89	109.2	15 58.9	41 89	109.7	15 46.6	41 89	110.2	15 34.2	41 89	110.6
9	15 17.6	40 90	108.8	15 05.4	41 89	109.3	14 53.3	41 89	109.7	14 41.0	41 89	110.2
70	14 23.8	40 90	108.4	14 11.8	40 90	108.9	13 59.8	40 89	109.3	13 47.7	40 89	109.8
1	13 29.9	39 90	108.0	13 18.1	40 90	108.5	13 06.2	40 90	108.9	12 54.3	40 89	109.4
2	12 35.9	39 90	107.6	12 24.2	39 90	108.1	12 12.5	39 90	108.5	12 00.7	39 90	109.0
3	11 41.7	38 90	107.2	11 30.2	39 90	107.7	11 18.6	39 90	108.1	11 07.0	39 90	108.6
4	10 47.5	38 91	106.8	10 36.1	38 90	107.3	10 24.6	38 90	107.8	10 13.2	38 90	108.2
75	9 53.1	37 91	106.5	9 41.9	38 91	106.9	9 30.6	38 90	107.4	9 19.2	38 90	107.9
6	8 58.7	37 91	106.1	8 47.5	37 91	106.6	8 36.4	37 90	107.0	8 25.2	37 90	107.5
7	8 04.1	37 91	105.7	7 53.1	37 91	106.2	7 42.1	37 91	106.7	7 31.0	37 90	107.1
8	7 09.5	36 91	105.4	6 58.6	36 91	105.8	6 47.7	36 91	106.3	6 36.7	36 91	106.8
9	6 14.7	36 91	105.0	6 03.9	36 91	105.5	5 53.2	36 91	105.9	5 42.4	36 91	106.4
80	5 19.9	35 92	104.7	5 09.2	35 91	105.1						

14° 00′			14° 30′			15° 00′			15° 30′			H.A.
Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
57 00.0	1.0 01	180.0	56 30.0	1.0 01	180.0	56 00.0	1.0 01	180.0	55 30.0	1.0 01	180.0	00
56 59.1	1.0 04	178.2	56 29.1	1.0 04	178.2	55 59.1	1.0 04	178.3	55 29.2	1.0 04	178.3	1
56 56.5	1.0 07	176.4	56 26.5	1.0 07	176.5	55 56.6	1.0 07	176.5	55 26.6	1.0 07	176.6	2
56 52.1	1.0 10	174.7	56 22.2	1.0 10	174.8	55 52.3	1.0 10	174.8	55 22.4	1.0 10	174.9	3
56 45.9	99 13	172.9	56 16.2	99 13	173.0	55 46.4	99 13	173.1	55 16.6	99 13	173.2	4
56 38.1	99 16	171.2	56 08.4	99 16	171.3	55 38.7	99 15	171.4	55 09.0	99 15	171.5	05
56 28.5	98 19	169.4	55 59.0	98 18	169.6	55 29.4	98 18	169.7	54 59.9	99 18	169.9	6
56 17.2	98 22	167.7	55 47.9	98 21	167.9	55 18.5	98 21	168.1	54 49.1	98 21	168.2	7
56 04.3	97 24	166.0	55 35.2	97 24	166.2	55 06.0	97 24	166.4	54 36.8	97 23	166.6	8
55 49.8	96 27	164.3	55 20.8	97 26	164.6	54 51.9	97 26	164.8	54 22.9	97 26	165.0	9
55 33.7	96 29	162.7	55 05.0	96 29	162.9	54 36.2	96 29	163.2	54 07.4	96 28	163.4	10
55 16.0	95 32	161.0	54 47.5	95 32	161.3	54 19.0	95 31	161.6	53 50.5	95 31	161.8	1
54 56.8	94 34	159.4	54 28.6	94 34	159.7	54 00.4	94 34	160.0	53 32.1	94 33	160.3	2
54 36.2	93 37	157.9	54 08.2	93 36	158.2	53 40.3	93 36	158.5	53 12.2	93 35	158.8	3
54 14.1	92 39	156.3	53 46.5	92 39	156.7	53 18.8	92 38	157.0	52 51.0	93 38	157.3	4
53 50.6	91 41	154.8	53 23.3	91 41	155.2	52 55.9	91 40	155.5	52 28.5	92 40	155.8	15
53 25.8	90 44	153.3	52 58.8	90 43	153.7	52 31.7	90 42	154.0	52 04.6	91 42	154.4	6
52 59.7	89 46	151.9	52 33.0	89 45	152.3	52 06.3	89 44	152.6	51 39.4	90 44	153.0	7
52 32.3	88 48	150.5	52 06.0	88 47	150.9	51 39.6	88 46	151.2	51 13.1	88 46	151.6	8
52 03.8	87 50	149.1	51 37.8	87 49	149.5	51 11.7	87 48	149.9	50 45.5	87 48	150.3	9
51 34.1	85 51	147.7	51 08.4	86 51	148.1	50 42.6	86 50	148.6	50 16.8	86 50	149.0	20
51 03.2	84 53	146.4	50 37.9	85 53	146.8	50 12.5	85 52	147.3	49 47.0	85 51	147.7	1
50 31.3	83 55	145.1	50 06.3	83 54	145.6	49 41.3	84 54	146.0	49 16.1	84 53	146.4	2
49 58.4	82 57	143.9	49 33.8	82 56	144.3	49 09.1	83 55	144.8	48 44.2	83 55	145.2	3
49 24.4	81 58	142.7	49 00.2	81 58	143.1	48 35.8	81 57	143.6	48 11.4	82 56	144.0	4
48 49.6	79 60	141.5	48 25.7	80 59	141.9	48 01.7	80 58	142.4	47 37.6	81 58	142.8	25
48 13.8	78 61	140.3	47 50.2	79 60	140.8	47 26.6	79 60	141.2	47 02.8	79 59	141.7	6
47 37.1	77 62	139.2	47 13.9	77 62	139.7	46 50.6	78 61	140.1	46 27.2	78 61	140.6	7
46 59.6	76 64	138.1	46 36.8	76 63	138.6	46 13.9	77 63	139.0	45 50.8	77 62	139.5	8
46 21.4	75 65	137.0	45 58.9	75 64	137.5	45 36.3	76 64	138.0	45 13.6	76 63	138.4	9
45 42.3	74 66	136.0	45 20.2	74 66	136.5	44 57.9	74 65	137.0	44 35.5	75 65	137.4	30
45 02.6	72 67	135.0	44 40.8	73 67	135.5	44 18.8	73 66	136.0	43 56.8	74 66	136.4	1
44 22.1	71 69	134.0	44 00.6	72 68	134.5	43 39.0	72 67	135.0	43 17.3	73 67	135.5	2
43 41.0	70 70	133.1	43 19.8	71 69	133.5	42 58.6	71 69	134.0	42 37.2	71 68	134.5	3
42 59.2	69 71	132.1	42 38.4	70 70	132.6	42 17.5	70 70	133.1	41 56.4	70 69	133.6	4
42 16.8	68 72	131.2	41 56.3	68 71	131.7	41 35.7	69 71	132.2	41 15.0	69 70	132.7	35
41 33.8	67 73	130.3	41 13.7	67 72	130.8	40 53.4	68 71	131.3	40 33.0	68 71	131.8	6
40 50.3	66 73	129.5	40 30.5	66 73	130.0	40 10.5	67 72	130.5	39 50.4	67 72	131.0	7
40 06.3	65 74	128.6	39 46.8	65 74	129.1	39 27.1	66 73	129.6	39 07.3	66 73	130.1	8
39 21.7	64 75	127.8	39 02.5	64 75	128.3	38 43.2	65 74	128.8	38 23.7	65 74	129.3	9
38 36.7	63 76	127.0	38 17.8	63 75	127.5	37 58.7	64 75	128.0	37 39.5	64 74	128.5	40
37 51.2	62 77	126.3	37 32.5	62 76	126.8	37 13.8	63 76	127.3	36 54.9	63 75	127.7	1
37 05.2	61 77	125.5	36 46.9	61 77	126.0	36 28.4	62 76	126.5	36 09.8	62 76	127.0	2
36 18.8	60 78	124.8	36 00.8	60 78	125.3	35 42.6	61 77	125.8	35 24.3	61 77	126.3	3
35 32.0	59 79	124.1	35 14.3	59 78	124.6	34 56.4	60 78	125.1	34 38.4	60 77	125.6	4
34 44.8	58 79	123.4	34 27.4	59 79	123.9	34 09.7	59 78	124.4	33 52.0	59 78	124.9	45
33 57.3	57 80	122.7	33 40.1	58 79	123.2	33 22.7	58 79	123.7	33 05.3	58 79	124.2	6
33 09.4	56 80	122.0	32 52.4	57 80	122.5	32 35.3	57 80	123.0	32 18.1	58 79	123.5	7
32 21.1	56 81	121.4	32 04.4	56 81	121.9	31 47.6	56 80	122.4	31 30.7	57 80	122.9	8
31 32.5	55 82	120.8	31 16.1	55 81	121.3	30 59.5	55 81	121.7	30 42.8	56 80	122.2	9
30 43.6	54 82	120.2	30 27.4	54 82	120.6	30 11.1	55 81	121.1	29 54.7	55 81	121.6	50
29 54.4	53 82	119.6	29 38.5	53 82	120.0	29 22.4	54 82	120.5	29 06.2	54 81	121.0	1
29 04.9	52 83	119.0	28 49.2	53 83	119.5	28 33.4	53 82	119.9	28 17.4	53 82	120.4	2
28 15.2	51 83	118.4	27 59.7	52 83	118.9	27 44.1	52 83	119.4	27 28.4	52 82	119.8	3
27 25.1	51 84	117.8	27 09.9	51 83	118.3	26 54.5	51 83	118.8	26 39.0	52 83	119.3	4
26 34.8	50 84	117.3	26 19.8	50 84	117.8	26 04.6	51 84	118.2	25 49.4	51 83	118.7	55
25 44.3	49 85	116.7	25 29.5	50 84	117.2	25 14.5	50 84	117.7	24 59.5	50 84	118.2	6
24 53.5	49 85	116.2	24 38.9	49 85	116.7	24 24.2	49 84	117.2	24 09.4	49 84	117.7	7
24 02.5	48 85	115.7	23 48.1	48 85	116.2	23 33.6	48 85	116.7	23 19.0	49 84	117.1	8
23 11.3	47 86	115.2	22 57.1	47 85	115.7	22 42.8	48 85	116.2	22 28.4	48 85	116.6	9
22 19.9	47 86	114.7	22 05.9	47 86	115.2	21 51.8	47 85	115.7	21 37.6	47 85	116.1	60
21 28.2	46 86	114.2	21 14.4	46 86	114.7	21 00.5	46 86	115.2	20 46.6	47 85	115.7	1
20 36.4	45 87	113.8	20 22.8	45 86	114.2	20 09.1	46 86	114.7	19 55.3	46 86	115.2	2
19 44.4	45 87	113.3	19 31.0	45 87	113.8	19 17.5	45 86	114.2	19 03.9	45 86	114.7	3
18 52.2	44 87	112.8	18 38.9	44 87	113.3	18 25.6	44 87	113.8	18 12.3	45 86	114.3	4
17 59.8	43 88	112.4	17 46.8	44 87	112.9	17 33.6	44 87	113.3	17 20.5	44 87	113.8	65
17 07.3	43 88	111.9	16 54.4	43 88	112.4	16 41.5	43 87	112.9	16 28.5	43 87	113.4	6
16 14.6	42 88	111.5	16 01.9	42 88	112.0	15 49.1	43 88	112.5	15 36.3	43 87	112.9	7
15 21.7	42 88	111.1	15 09.2	42 88	111.6	14 56.6	42 88	112.0	14 44.0	42 87	112.5	8
14 28.7	41 89	110.7	14 16.4	41 88	111.2	14 03.9	41 88	111.6	13 51.5	42 88	112.1	9
13 35.6	41 89	110.3	13 23.4	41 89	110.7	13 11.1	41 88	111.2	12 58.8	41 88	111.7	70
12 42.3	40 89	109.9	12 30.2	40 89	110.3	12 18.2	40 88	110.8	12 06.0	40 88	111.3	1
11 48.9	39 89	109.5	11 37.0	40 89	109.9	11 25.1	40 89	110.4	11 13.1	40 88	110.9	2
10 55.3	39 89	109.1	10 43.6	39 89	109.6	10 31.8	39 89	110.0	10 20.0	39 89	110.5	3
10 01.6	38 90	108.7	9 50.1	39 89	109.2	9 38.5	39 89	109.6	9 26.8	39 89	110.1	4
9 07.8	38 90	108.3	8 56.4	38 90	108.8	8 45.0	38 89	109.3	8 33.5	38 89	109.7	75
8 13.9	38 90	108.0	8 02.7	38 90	108.4	7 51.4	38 90	108.9	7 40.0	38 89	109.4	6
7 19.9	37 90	107.6	7 08.8	37 90	108.1	6 57.6	37 90	108.5	6 46.4	37 90	109.0	7
6 25.8	37 90	107.2	6 14.8	37 90	107.7	6 03.8	37 90	108.2	5 52.7	37 90	108.6	8
5 31.5	36 90	106.9	5 20.7	36 90	107.3	5 09.8	36 90	107.8				9
												80

Lat. 19°

H.A.	16° 00′				16° 30′				17° 00′				17° 30′				18° 00′				18° 30′				19° 00′				19° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	87 00.0	1.0	15	180.0	87 30.0	1.0	18	180.0	88 00.0	1.0	21	180.0	88 30.0	1.0	28	180.0	89 00.0	1.0	38	180.0	89 30.0	1.0	57	180.0	90 00.0	..	95	....	89 30.0	1.0	57	00.0	00
1	86 51.1	95	41	162.2	87 19.5	94	47	159.0	87 47.1	90	55	154.4	88 13.5	85	64	147.5	88 37.3	73	77	136.4	88 55.8	47	80	117.7	89 03.3	00	95	89.8	88 55.9	47	88	61.9	1
2	86 26.7	85	59	147.2	86 51.4	80	65	142.4	87 14.4	73	72	136.1	87 34.8	62	80	128.0	87 51.4	47	87	117.5	88 02.5	26	93	104.5	88 06.5	01	95	89.7	88 02.8	25	92	74.8	2
3	85 51.3	73	71	135.9	86 12.2	66	76	130.7	86 31.0	58	81	124.6	86 46.8	47	86	117.3	86 59.1	34	91	108.9	87 06.9	18	94	99.5	87 09.8	01	95	89.5	87 07.4	17	93	79.5	3
4	85 08.8	63	78	127.6	85 26.6	56	82	122.7	85 42.1	47	86	117.1	85 55.0	38	90	110.9	86 04.6	27	92	104.1	86 10.8	14	94	96.9	86 13.1	01	95	89.3	86 11.4	12	94	81.8	4
05	84 22.0	54	83	121.4	84 37.3	48	86	116.9	84 50.5	40	89	112.0	85 01.2	31	91	106.7	85 09.3	22	93	101.1	85 14.4	12	94	95.2	85 16.4	01	95	89.2	85 15.2	09	94	83.1	05
6	83 32.4	48	86	116.7	83 45.8	42	88	112.7	83 57.2	35	90	108.4	84 06.5	27	92	103.8	84 13.4	19	94	99.0	84 17.8	10	94	94.1	84 19.6	02	95	89.0	84 18.8	07	94	84.0	6
7	82 40.9	43	88	113.1	82 52.9	37	90	109.5	83 03.0	31	92	105.6	83 11.1	24	93	101.6	83 17.2	17	94	97.4	83 21.2	09	94	93.2	83 22.9	02	95	88.9	83 22.4	06	94	84.5	7
8	81 48.2	38	89	110.2	81 59.0	33	91	106.9	82 08.0	27	92	103.5	82 15.4	21	93	99.9	82 20.9	15	94	96.2	82 24.5	09	94	92.5	82 26.2	02	95	88.7	82 25.9	04	94	84.9	8
9	80 54.6	35	90	107.9	81 04.4	30	92	104.9	81 12.7	25	93	101.7	81 19.4	20	94	98.5	81 24.5	14	94	95.2	81 27.8	08	94	91.9	81 29.5	03	94	88.5	81 29.4	03	94	85.2	9
10	80 00.3	32	91	105.9	80 09.3	28	92	103.1	80 17.0	23	93	100.3	80 23.2	18	94	97.4	80 27.9	13	94	94.4	80 31.1	08	96	91.4	80 32.8	03	94	88.4	80 32.8	02	94	85.3	10
1	79 05.5	30	92	104.3	79 13.9	26	93	101.7	79 21.1	22	94	99.1	79 26.9	17	94	96.4	79 31.3	13	94	93.7	79 34.4	08	96	91.0	79 36.1	03	94	88.2	79 36.3	02	94	85.4	1
2	78 10.3	28	92	102.8	78 18.2	24	93	100.5	78 25.0	20	94	98.0	78 30.5	16	94	95.6	78 34.7	12	94	93.1	78 37.7	08	95	90.6	78 39.4	03	94	88.0	78 39.7	01	94	85.5	2
3	77 14.9	27	93	101.6	77 22.4	23	93	99.4	77 28.7	19	94	97.1	77 34.0	16	94	94.9	77 38.0	12	94	92.5	77 41.0	08	95	90.2	77 42.7	04	94	87.9	77 43.2	00	94	85.5	3
4	76 19.2	25	93	100.5	76 26.3	22	94	98.4	76 32.4	19	94	96.3	76 37.4	15	94	94.2	76 41.4	11	94	92.1	76 44.2	08	95	89.9	76 46.0	04	94	87.7	76 46.6	00	94	85.5	4
15	75 23.3	24	93	99.5	75 30.1	21	94	97.6	75 36.0	18	94	95.6	75 40.8	15	94	93.6	75 44.7	11	95	91.6	75 47.5	08	95	89.6	75 49.3	04	94	87.5	75 50.1	01	94	85.5	15
6	74 27.3	23	94	98.6	74 33.8	20	94	96.8	74 39.5	17	94	95.0	74 44.2	14	94	93.1	74 48.0	11	95	91.2	74 50.8	08	95	89.3	74 52.6	05	94	87.4	74 53.5	01	94	85.5	6
7	73 31.2	22	94	97.8	73 37.5	20	94	96.1	73 42.9	17	94	94.4	73 47.5	14	94	92.6	73 51.2	11	95	90.8	73 54.0	08	96	89.0	73 56.0	05	94	87.2	73 57.0	02	94	85.4	7
8	72 34.9	22	94	97.1	72 41.0	19	94	95.5	72 46.3	16	94	93.8	72 50.8	14	94	92.1	72 54.5	11	95	90.4	72 57.3	08	95	88.8	72 59.3	05	94	87.0	73 00.4	02	94	85.3	8
9	71 38.6	21	94	96.4	71 44.5	19	94	94.9	71 49.7	16	94	93.3	71 54.1	13	94	91.7	71 57.8	11	95	90.1	72 00.6	08	94	88.5	72 02.6	05	94	86.9	72 03.9	03	94	85.3	9
20	70 42.2	21	94	95.8	70 48.0	18	94	94.3	70 53.1	16	94	92.8	70 57.4	13	95	91.3	71 01.0	11	95	89.8	71 03.9	08	94	88.3	71 06.0	06	94	86.7	71 07.3	03	94	85.2	20
1	69 45.7	20	94	95.2	69 51.4	18	94	93.8	69 56.4	16	94	92.4	70 00.7	13	95	90.9	70 04.3	11	95	89.5	70 07.2	08	94	88.0	70 09.4	06	94	86.5	70 10.8	04	94	85.1	1
2	68 49.2	20	94	94.7	68 54.8	18	94	93.3	68 59.7	15	94	92.0	69 04.0	13	95	90.6	69 07.6	11	95	89.2	69 10.5	09	94	87.8	69 12.7	06	94	86.4	69 14.3	04	94	85.0	2
3	67 52.6	19	94	94.2	67 58.1	17	94	92.9	68 03.0	15	95	91.6	68 07.3	13	95	90.2	68 10.9	11	95	88.9	68 13.8	09	94	87.6	68 16.1	07	94	86.2	68 17.8	04	94	84.9	3
4	66 56.0	19	94	93.7	67 01.5	17	94	92.4	67 06.3	15	95	91.2	67 10.5	13	95	89.9	67 14.1	11	94	88.6	67 17.1	09	94	87.3	67 19.5	07	94	86.0	67 21.3	05	94	84.7	4
25	65 59.4	19	94	93.2	66 04.8	17	94	92.0	66 09.6	15	95	90.8	66 13.8	13	95	89.6	66 17.4	11	94	88.4	66 20.5	09	94	87.1	66 22.9	07	94	85.9	66 24.8	05	94	84.6	25
6	65 02.7	19	94	92.8	65 08.1	17	95	91.6	65 12.8	15	95	90.5	65 17.1	13	95	89.3	65 20.7	11	94	88.1	65 23.8	09	94	86.9	65 26.4	07	94	85.7	65 28.3	06	94	84.5	6
7	64 06.1	18	94	92.4	64 11.4	17	95	91.3	64 16.1	15	95	90.1	64 20.3	13	95	89.0	64 24.0	11	94	87.8	64 27.2	10	94	86.7	64 29.8	08	94	85.5	64 31.9	06	94	84.4	7
8	63 09.4	18	95	92.0	63 14.6	17	95	90.9	63 19.4	15	95	89.8	63 23.6	13	95	88.7	63 27.3	12	94	87.6	63 30.6	10	94	86.5	63 33.2	08	94	85.4	63 35.4	06	94	84.2	8
9	62 12.7	18	95	91.6	62 17.9	17	95	90.6	62 22.6	15	95	89.5	62 26.9	13	94	88.4	62 30.7	12	94	87.3	62 33.9	10	94	86.3	62 36.7	08	94	85.2	62 39.0	07	94	84.1	9
30	61 16.0	18	95	91.2	61 21.2	17	95	90.2	61 25.9	15	95	89.2	61 30.2	13	94	88.1	61 34.0	12	94	87.1	61 37.3	10	94	86.1	61 40.2	09	94	85.0	61 42.5	07	94	84.0	30
1	60 19.2	18	95	90.9	60 24.4	17	95	89.9	60 29.2	15	95	88.9	60 33.5	14	94	87.9	60 37.4	12	94	86.9	60 40.7	11	94	85.9	60 43.7	09	94	84.8	60 46.1	07	94	83.8	1
2	59 22.5	18	95	90.5	59 27.7	17	95	89.6	59 32.5	15	95	88.6	59 36.8	14	94	87.6	59 40.7	12	94	86.6	59 44.2	11	94	85.7	59 47.2	09	94	84.7	59 49.7	08	94	83.7	2
3	58 25.8	18	95	90.2	58 31.0	17	95	89.3	58 35.8	15	94	88.3	58 40.1	14	94	87.4	58 44.1	12	94	86.4	58 47.6	11	94	85.5	58 50.7	10	94	84.5	58 53.4	08	94	83.5	3
4	57 29.1	18	95	89.9	57 34.3	17	95	89.0	57 39.1	15	94	88.0	57 43.5	14	94	87.1	57 47.5	13	94	86.2	57 51.1	11	94	85.3	57 54.2	10	94	84.3	57 57.0	09	94	83.4	4
35	56 32.3	18	95	89.6	56 37.5	17	94	88.7	56 42.4	15	94	87.8	56 46.8	14	94	86.9	56 50.9	13	94	86.0	56 54.5	12	94	85.0	56 57.8	10	94	84.1	57 00.7	09	94	83.2	35
6	55 35.6	18	95	89.2	55 40.8	17	94	88.4	55 45.7	16	94	87.5	55 50.2	14	94	86.6	55 54.3	13	94	85.7	55 58.0	12	94	84.8	56 01.4	11	94	84.0	56 04.3	09	94	83.1	6
7	54 38.9	18	95	88.9	54 44.1	17	94	88.1	54 49.0	16	94	87.2	54 53.6	15	94	86.4	54 57.7	13	94	85.5	55 01.5	12	94	84.7	55 05.0	11	94	83.8	55 08.0	10	94	82.9	7
8	53 42.2	18	95	88.6	53 47.4	17	94	87.8	53 52.4	16	94	87.0	53 56.9	15	94	86.1	54 01.2	14	94	85.3	54 05.1	12	94	84.5	54 08.6	11	94	83.6	54 11.7	10	94	82.8	8
9	52 45.4	18	94	88.4	52 50.7	17	94	87.5	52 55.7	16	94	86.7	53 00.4	15	94	85.9	53 04.6	14	94	85.1	53 08.6	13	94	84.3	53 12.2	11	94	83.4	53 15.5	10	94	82.6	9
40	51 48.7	18	94	88.1	51 54.1	17	94	87.3	51 59.1	16	94	86.5	52 03.8	15	94	85.7	52 08.1	14	94	84.9	52 12.2	13	94	84.1	52 15.9	12	94	83.2	52 19.2	11	94	82.4	40
1	50 52.0	18	94	87.8	50 57.4	17	94	87.0	51 02.5	16	94	86.2	51 07.2	15	94	85.4	51 11.6	14	94	84.6	51 15.7	13	94	83.9	51 19.5	12	94	83.1	51 23.0	11	94	82.3	1
2	49 55.4	19	94	87.5	50 00.8	18	94	86.7	50 05.9	17	94	86.0	50 10.7	15	94	85.2	50 15.2	14	94	84.4	50 19.4	13	94	83.7	50 23.2	12	94	82.9	50 26.8	11	94	82.1	2
3	48 58.7	19	94	87.2	49 04.1	18	94	86.5	49 09.3	17	94	85.7	49 14.2	16	94	85.0	49 18.7	15	94	84.2	49 23.0	14	94	83.5	49 26.9	13	94	82.7	49 30.6	12	94	81.9	3
4	48 02.0	19	94	87.0	48 07.5	18	94	86.2	48 12.7	17	94	85.5	48 17.6	16	94	84.7	48 22.3	15	94	84.0	48 26.6	14	94	83.3	48 30.7	13	94	82.5	48 34.5	12	94	81.8	4
45	47 05.4	19	94	86.7	47 10.9	18	94	86.0	47 16.2	17	94	85.2	47 21.2	16	94	84.5	47 25.9	15	94	83.8	47 30.3	14	94	83.1	47 34.5	13	94	82.3	47 38.3	12	94	81.6	45
6	46 08.8	19	94	86.4	46 14.3	18	94	85.7	46 19.7	17	94	85.0	46 24.7	16	94	84.3	46 29.5	15	94	83.6	46 34.0	15	94	82.9	46 38.2	14	94	82.1	46 42.2	13	93	81.4	6
7	45 12.1	19	94	86.2	45 17.8	18	94	85.5	45 23.2	17	94	84.8	45 28.3	17	94	84.1	45 33.1	16	94	83.4	45 37.7	15	94	82.7	45 42.1	14	94	81.9	45 46.1	13	93	81.2	7
8	44 15.6	19	94	85.9	44 21.2	19	94	85.2	44 26.7	18	94	84.5	44 31.9	17	94	83.8	44 36.8	16	94	83.1	44 41.5	15	94	82.4	44 45.9	14	94	81.8	44 50.1	13	93	81.1	8
9	43 19.0	20	94	85.6	43 24.7	19	94	85.0	43 30.2	18	94	84.3	43 35.5	17	94	83.6	43 40.5	16	94	82.9	43 45.2	15	94	82.2	43 49.8	15	94	81.6	43 54.1	14	93	80.9	9
50	42 22.4	20	94	85.4	42 28.2	19	94	84.7	42 33.8	18	94	84.1	42 39.1	17	94	83.4	42 44.2	17	94	82.7	42 49.0	16	94	82.0	42 53.7	15	93	81.4	42 58.1	14	93	80.7	50
1	41 25.9	20	94	85.1	41 31.7	19	94	84.5	41 37.4	18	94	83.8	41 42.8	18	94	83.2	41 47.9	17	94	82.5	41 52.9	16	94	81.8	41 57.6	15	93	81.2	42 02.1	15	93	80.5	1
2	40 29.4	20	94	84.9	40 35.3	19	94	84.2	40 41.0	19	94	83.6	40 46.4	18	94	82.9	40 51.7	17	94	82.3	40 56.7	16	94	81.6	41 01.6	16	93	81.0	41 06.1	15	93	80.3	2
3	39 32.9	20	94	84.6	39 38.8	20	94	84.0	39 44.6	19	94	83.3	39 50.2	18	94	82.7	39 55.5	17	94	82.1	40 00.6	17	93	81.4	40 05.5	16	93	80.8	40 10.2	15	93	80.1	3
4	38 36.4	20	94	84.4	38 42.4	20	94	83.7	38 48.3	19	94	83.1	38 53.9	18	94	82.5	38 59.3	18	94	81.9	39 04.5	17	93	81.2	39 09.6	16	93	80.6	39 14.4	16	93	79.9	4
55	37 40.0	21	94	84.1	37 46.1	20	94	83.5	37 52.0	19	94	82.9	37 57.7	19	94	82.3	38 03.2	18	94	81.6	38 08.5	17	93	81.0	38 13.6	17	93	80.4	38 18.5	16	93	79.8	55
6	36 43.5	21	94	83.9	36 49.7	20	94	83.3	36 55.7	20	94	82.6	37 01.5	19	94	82.0	37 07.1	18	93	81.4	37 12.5	18	93	80.8	37 17.7	17	93	80.2	37 22.7	16	93	79.6	6
7	35 47.1	21	94	83.6	35 53.4	20	94	83.0	35 59.4	20	94	82.4	36 05.3	19	94	81.8	36 11.0	19	93	81.2	36 16.5	18	93	80.6	36 21.8	17	93	80.0	36 26.9	17	93	79.4	7
8	34 50.8	21	94	83.4	34 57.1	21	94	82.8	35 03.2	20	94	82.2	35 09.2	20	94	81.6	35 14.9	19	93	81.0	35 20.5	18	93	80.4	35 26.0	18	93	79.8	35 31.2	17	93	79.2	8
9	33 54.4	22	94	83.1	34 00.8	21	94	82.5	34 07.0	20	94	81.9	34 13.1	20	93	81.3	34 18.9	19	93	80.8	34 24.6	19	93	80.2	34 30.1	18	93	79.6	34 35.5	18	93	79.0	9
60	32 58.1	22	94	82.9	33 04.6	21	94	82.3	33 10.9	21	94	81.7	33 17.0	20	93	81.1	33 23.0	20	93	80.5	33 28.7	19	93	79.9	33 34.4	18	93	79.4	33 39.8	18	93	78.8	60
1	32 01.9	22	94	82.6	32 08.4	21	94	82.0	32 14.8	21	93	81.5	32 21.0	20	93	80.9	32 27.0	20	93	80.3	32 32.9	19	93	79.7	32 38.6	19	93	79.1	32 44.2	18	93	78.6	1
2	31 05.6	22	94	82.4	31 12.2	22	94	81.8	31 18.7	21	93	81.2	31 25.0	21	93	80.7	31 31.1	20	93	80.1	31 37.1	20	93	79.5	31 42.9	19	93	78.9	31 48.6	19	93	78.4	2
3	30 09.4	23	94	82.1	30 16.1	22	94	81.6	30 22.6	22	93	81.0	30 29.0	21	93	80.4	30 35.2	21	93	79.9	30 41.3	20	93	79.3	30 47.3	20	93	78.7	30 53.1	19	92	78.1	3
4	29 13.2	23	94	81.9	29 20.0	22	93	81.3	29 26.6	22	93	80.8	29 33.1	21	93	80.2	29 39.4	21	93	79.6	29 45.6	20	93	79.1	29 51.7	20	93	78.5	29 57.6	19	92	77.9	4
65	28 17.1	23	94	81.6	28 23.9	23	93	81.1	28 30.6	22	93	80.5	28 37.2	22	93	80.0	28 43.6	21	93	79.4	28 49.9	21	93	78.8	28 56.1	20	93	78.3	29 02.1	20	92	77.7	65
6	27 21.0	23	93	81.4	27 27.9	23	93	80.8	27 34.7	22	93	80.3	27 41.4	22	93	79.7	27 47.9	22	93	79.2	27 54.3	21	93	78.6	28 00.6	21	92	78.1	28 06.7	20	92	77.5	6
7	26 24.9	24	93	81.1	26 31.9	23	93	80.6	26 38.8	23	93	80.0	26 45.6	22	93	79.5	26 52.2	22	93	78.9	26 58.7	21	93	78.4	27 05.1	21	92	77.8	27 11.4	21	92	77.3	7
8	25 28.9	24	93	80.9	25 36.0	23	93	80.3	25 42.9	23	93	79.8	25 49.8	23	93	79.2	25 56.5	22	93	78.7	26 03.2	22	92	78.2	26 09.7	21	92	77.6	26 16.0	21	92	77.1	8
9	24 32.9	24	93	80.6	24 40.1	24	93	80.1	24 47.1	23	93	79.5	24 54.1	23	93	79.0	25 00.9	23	93	78.5	25 07.7	22	92	77.9	25 14.3	22	92	77.4	25 20.8	21	92	76.8	9
70	23 36.9	24	93	80.4	23 44.2	24	93	79.8	23 51.4	24	93	79.3	23 58.4	23	93	78.8	24 05.4	23	93	78.2	24 12.2	23	92	77.7	24 18.9	22	92	77.2	24 25.5	22	92	76.6	70
1	22 41.0	25	93	80.1	22 48.4	24	93	79.6	22 55.7	24	93	79.0	23 02.8	24	93	78.5	23 09.9	23	92	78.0	23 16.8	23	92	77.5	23 23.6	23	92	76.9	23 30.4	22	92	76.4	1
2	21 45.2	25	93	79.8	21 52.6	25	93	79.3	22 00.0	24	93	78.8	22 07.2	24	93	78.3	22 14.4	24	92	77.7	22 21.5	23	92	77.2	22 28.4	23	92	76.7	22 35.3	23	92	76.2	2
3	20 49.3	25	93	79.6	20 56.9	25	93	79.1	21 04.4	25	93	78.5	21 11.7	24	92	78.0	21 19.0	24	92	77.5	21 26.2	24	92	77.0	21 33.2	23	92	76.5	21 40.2	23	92	75.9	3
4	19 53.6	26	93	79.3	20 01.2	25	93	78.8	20 08.8	25	93	78.3	20 16.2	25	92	77.8	20 23.6	24	92	77.3	20 30.9	24	92	76.7	20 38.1	24	92	76.2	20 45.2	24	92	75.7	4
75	18 57.9	26	93	79.1	19 05.6	26	93	78.5	19 13.3	25	92	78.0	19 20.8	25	92	77.5	19 28.3	25	92	77.0	19 35.7	25	92	76.5	19 43.0	24	92	76.0	19 50.3	24	91	75.5	75
6	18 02.2	26	93	78.8	18 10.0	26	93	78.3	18 17.8	26	92	77.8	18 25.5	25	92	77.3	18 33.1	25	92	76.8	18 40.6	25	92	76.2	18 48.0	25	92	75.7	18 55.4	24	91	75.2	6
7	17 06.6	27	93	78.5	17 14.5	26	92	78.0	17 22.4	26	92	77.5	17 30.2	26	92	77.0	17 37.9	26	92	76.5	17 45.5	25	92	76.0	17 53.1	25	91	75.5	18 00.6	25	91	75.0	7
8	16 11.0	27	93	78.3	16 19.0	27	92	77.7	16 27.0	26	92	77.2	16 34.9	26	92	76.7	16 42.7	26	92	76.2	16 50.5	26	92	75.7	16 58.2	25	91	75.2	17 05.8	25	91	74.7	8
9	15 15.5	27	92	78.0	15 23.6	27	92	77.5	15 31.7	27	92	77.0	15 39.7	27	92	76.5	15 47.7	26	92	76.0	15 55.6	26	91	75.5	16 03.4	26	91	75.0	16 11.1	26	91	74.5	9
80	14 20.0	28	92	77.7	14 28.3	27	92	77.2	14 36.5	27	92	76.7	14 44.6	27	92	76.2	14 52.7	27	92	75.7	15 00.7	27	91	75.2	15 08.6	26	91	74.7	15 16.5	26	91	74.2	80
1	13 24.6	28	92	77.4	13 33.0	28	92	76.9	13 41.3	28	92	76.4	13 49.5	27	92	75.9	13 57.7	27	91	75.5	14 05.8	27	91	75.0	14 13.9	27	91	74.5	14 21.9	27	91	74.0	1
2	12 29.3	28	92	77.2	12 37.7	28	92	76.7	12 46.2	28	92	76.2	12 54.5	28	92	75.7	13 02.8	28	91	75.2	13 11.1	27	91	74.7	13 19.3	27	91	74.2	13 27.4	27	91	73.7	2
3	11 34.0	29	92	76.9	11 42.6	29	92	76.4	11 51.1	28	92	75.9	11 59.6	28	91	75.4	12 08.0	28	91	74.9	12 16.4	28	91	74.4	12 24.7	28	91	73.9	12 33.0	28	91	73.4	3
4	10 38.8	29	92	76.6	10 47.5	29	92	76.1	10 56.1	29	92	75.6	11 04.7	29	91	75.1	11 13.3	28	91	74.6	11 21.8	28	91	74.2	11 30.3	28	91	73.7	11 38.7	28	90	73.2	4
85	9 43.6	29	92	76.3	9 52.4	29	92	75.8	10 01.2	29	91	75.3	10 09.9	29	91	74.8	10 18.6	29	91	74.4	10 27.3	29	91	73.9	10 35.9	29	91	73.4	10 44.4	28	90	72.9	85
6	8 48.5	30	92	76.0	8 57.5	30	92	75.5	9 06.4	30	91	75.0	9 15.2	29	91	74.6	9 24.0	29	91	74.1	9 32.8	29	91	73.6	9 41.5	29	90	73.1	9 50.2	29	90	72.6	6
7	7 53.5	30	92	75.7	8 02.6	30	91	75.2	8 11.6	30	91	74.8	8 20.6	30	91	74.3	8 29.5	30	91	73.8	8 38.4	30	90	73.3	8 47.3	30	90	72.8	8 56.1	29	90	72.3	7
8	6 58.6	31	91	75.4	7 07.7	31	91	75.0	7 16.9	30	91	74.5	7 26.0	30	91	74.0	7 35.1	30	91	73.5	7 44.1	30	90	73.0	7 53.1	30	90	72.5	8 02.1	30	90	72.1	8
9	6 03.7	31	91	75.1	6 13.0	31	91	74.7	6 22.3	31	91	74.2	6 31.5	31	91	73.7	6 40.7	31	90	73.2	6 49.9	31	90	72.7	6 59.1	30	90	72.3	7 08.2	30	90	71.8	9
90	5 08.9	31	91	74.8	5 18.3	31	91	74.4	5 27.7	31	91	73.9	5 37.1	31	90	73.4	5 46.4	31	90	72.9	5 55.8	31	90	72.4	6 05.1	31	90	72.0	6 14.3	31	90	71.5	90

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	55 00.0	1.0 01	180.0	54 30.0	1.0 01	180.0	54 00.0	1.0 01	180.0	53 30.0	1.0 01	180.0	53 00.0	1.0 01	180.0	52 30.0	1.0 01	180.0	52 00.0	1.0 01	180.0	51 30.0	1.0 01	180.0	00
1	54 59.2	1.0 04	178.3	54 29.2	1.0 04	178.3	53 59.2	1.0 04	178.4	53 29.2	1.0 04	178.4	52 59.2	1.0 04	178.4	52 29.2	1.0 04	178.4	51 59.2	1.0 04	178.5	51 29.2	1.0 04	178.5	1
2	54 56.7	1.0 07	176.7	54 26.7	1.0 07	176.7	53 56.8	1.0 07	176.7	53 26.8	1.0 07	176.8	52 56.9	1.0 06	176.8	52 26.9	1.0 06	176.9	51 57.0	1.0 06	176.9	51 27.0	1.0 06	177.0	2
3	54 52.5	1.0 10	175.0	54 22.7	1.0 09	175.1	53 52.8	1.0 09	175.1	53 22.9	1.0 09	175.2	52 53.0	1.0 09	175.3	52 23.1	1.0 09	175.3	51 53.2	1.0 09	175.4	51 23.3	1.0 09	175.5	3
4	54 46.8	99 12	173.3	54 17.0	99 12	173.4	53 47.2	99 12	173.5	53 17.3	99 12	173.6	52 47.5	99 12	173.7	52 17.7	99 12	173.8	51 47.9	99 11	173.9	51 18.0	99 11	174.0	4
05	54 39.4	99 15	171.7	54 09.7	99 15	171.8	53 40.0	99 15	171.9	53 10.2	99 14	172.0	52 40.5	99 14	172.1	52 10.8	99 14	172.3	51 41.1	99 14	172.4	51 11.3	99 14	172.5	05
6	54 30.3	99 18	170.0	54 00.8	99 17	170.2	53 31.2	99 17	170.3	53 01.6	99 17	170.5	52 32.0	99 17	170.6	52 02.4	99 16	170.7	51 32.8	99 16	170.9	51 03.2	99 16	171.0	6
7	54 19.7	98 20	168.4	53 50.3	98 20	168.6	53 20.9	98 20	168.7	52 51.4	98 19	168.9	52 22.0	98 19	169.1	51 52.5	98 19	169.2	51 23.0	98 19	169.4	50 53.6	98 18	169.5	7
8	54 07.6	97 23	166.8	53 38.3	98 23	167.0	53 09.1	98 22	167.2	52 39.8	98 22	167.4	52 10.5	98 22	167.5	51 41.2	98 21	167.7	51 11.8	98 21	167.9	50 42.5	98 21	168.0	8
9	53 53.8	97 25	165.2	53 24.8	97 25	165.4	52 55.7	97 25	165.6	52 26.6	97 24	165.8	51 57.5	97 24	166.0	51 28.4	97 24	166.2	50 59.2	97 23	166.4	50 30.1	97 23	166.6	9
10	53 38.6	96 28	163.6	53 09.8	96 27	163.9	52 40.9	96 27	164.1	52 12.0	96 27	164.3	51 43.1	96 26	164.5	51 14.2	97 26	164.8	50 45.2	97 26	165.0	50 16.2	97 25	165.2	10
1	53 21.9	95 30	162.1	52 53.3	95 30	162.3	52 24.6	96 29	162.6	51 56.0	96 29	162.8	51 27.3	96 29	163.1	50 58.5	96 28	163.3	50 29.8	96 28	163.5	50 01.0	96 28	163.7	1
2	53 03.7	94 33	160.6	52 35.4	95 32	160.8	52 07.0	95 32	161.1	51 38.5	95 31	161.4	51 10.1	95 31	161.6	50 41.6	95 31	161.9	50 13.0	95 30	162.1	49 44.5	95 30	162.3	2
3	52 44.2	94 35	159.1	52 16.1	94 34	159.4	51 47.9	94 34	159.6	51 19.7	94 34	159.9	50 51.5	94 33	160.2	50 23.2	94 33	160.5	49 54.9	94 32	160.7	49 26.6	94 32	161.0	3
4	52 23.2	93 37	157.6	51 55.4	93 37	157.9	51 27.5	93 36	158.2	50 59.6	93 36	158.5	50 31.6	93 35	158.8	50 03.6	93 35	159.1	49 35.6	94 34	159.3	49 07.5	94 34	159.6	4
15	52 01.0	92 39	156.2	51 33.4	92 39	156.5	51 05.8	92 38	156.8	50 38.2	92 38	157.1	50 10.4	92 37	157.4	49 42.7	93 37	157.7	49 14.9	93 36	158.0	48 47.1	93 36	158.3	15
6	51 37.4	91 41	154.7	51 10.1	91 41	155.1	50 42.8	91 40	155.4	50 15.4	91 40	155.7	49 48.0	91 39	156.0	49 20.6	92 39	156.3	48 53.0	92 38	156.7	48 25.5	92 38	157.0	6
7	51 12.5	90 43	153.3	50 45.6	90 43	153.7	50 18.6	90 42	154.0	49 51.5	90 42	154.4	49 24.4	91 41	154.7	48 57.2	91 41	155.0	48 30.0	91 40	155.3	48 02.7	91 40	155.7	7
8	50 46.5	89 45	152.0	50 19.9	89 45	152.3	49 53.1	89 44	152.7	49 26.4	89 44	153.0	48 59.6	90 43	153.4	48 32.7	90 43	153.7	48 05.7	90 42	154.1	47 38.7	90 42	154.4	8
9	50 19.3	88 47	150.6	49 52.9	88 47	151.0	49 26.6	88 46	151.4	49 00.1	88 46	151.8	48 33.6	89 45	152.1	48 07.0	89 45	152.5	47 40.3	89 44	152.8	47 13.6	89 44	153.1	9
20	49 50.9	87 49	149.3	49 24.9	87 49	149.7	48 58.8	87 48	150.1	48 32.7	87 47	150.5	48 06.5	87 47	150.8	47 40.2	88 46	151.2	47 13.9	88 46	151.6	46 47.4	88 45	151.9	20
1	49 21.4	85 51	148.1	48 55.8	86 50	148.5	48 30.0	86 50	148.9	48 04.2	86 49	149.2	47 38.3	86 49	149.6	47 12.3	87 48	150.0	46 46.3	87 48	150.3	46 20.2	87 47	150.7	1
2	48 50.9	84 53	146.8	48 25.6	85 52	147.2	48 09.2	85 51	147.6	47 34.7	85 51	148.0	47 09.1	85 50	148.4	46 43.5	86 50	148.8	46 17.7	86 49	149.2	45 51.9	86 49	149.5	2
3	48 19.4	83 54	145.6	47 54.4	83 54	146.0	47 29.3	84 53	146.4	47 04.1	84 53	146.8	46 38.9	84 52	147.2	46 13.6	85 51	147.6	45 48.2	85 51	148.0	45 22.7	85 50	148.4	3
4	47 46.8	82 56	144.4	47 22.2	82 55	144.8	46 57.4	83 55	145.3	46 32.6	83 54	145.7	46 07.7	83 54	146.1	45 42.7	83 53	146.5	45 17.6	84 52	146.9	44 52.5	84 52	147.2	4
25	47 13.3	81 57	143.3	46 49.0	81 57	143.7	46 24.6	81 56	144.1	46 00.1	82 56	144.5	45 35.6	82 55	144.9	45 10.9	82 54	145.3	44 46.1	83 54	145.7	44 21.3	83 53	146.1	25
6	46 39.0	80 59	142.1	46 15.0	80 58	142.6	45 50.9	80 58	143.0	45 26.8	81 57	143.4	45 02.5	81 56	143.8	44 38.2	81 56	144.3	44 13.8	82 55	144.7	43 49.2	82 55	145.1	6
7	46 03.7	79 60	141.0	45 40.1	79 60	141.5	45 16.4	79 59	141.9	44 52.5	80 58	142.3	44 28.6	80 58	142.8	44 04.6	80 57	143.2	43 40.5	80 57	143.6	43 16.3	81 56	144.0	7
8	45 27.6	77 62	140.0	45 04.3	78 61	140.4	44 41.0	78 60	140.8	44 17.5	78 60	141.3	43 53.9	79 59	141.7	43 30.2	79 59	142.1	43 06.4	79 58	142.6	42 42.6	80 58	143.0	8
9	44 50.7	76 63	138.9	44 27.8	77 62	139.4	44 04.7	77 62	139.8	43 41.6	77 61	140.2	43 18.3	78 61	140.7	42 55.0	78 60	141.1	42 31.5	78 59	141.5	42 08.0	79 59	142.0	9
30	44 13.0	75 64	137.9	43 50.4	76 63	138.3	43 27.7	76 63	138.8	43 04.9	76 62	139.2	42 42.0	77 62	139.7	42 19.0	77 61	140.1	41 55.9	77 61	140.5	41 32.7	78 60	141.0	30
1	43 34.6	74 65	136.9	43 12.4	74 65	137.4	42 50.0	75 64	137.8	42 27.5	75 64	138.3	42 04.9	75 63	138.7	41 42.2	76 62	139.1	41 19.4	76 62	139.6	40 56.6	76 61	140.0	1
2	42 55.5	73 66	135.9	42 33.6	73 66	136.4	42 11.5	74 65	136.8	41 49.4	74 65	137.3	41 27.1	74 64	137.7	41 04.8	75 64	138.2	40 42.3	75 63	138.6	40 19.7	75 63	139.1	2
3	42 15.7	72 67	135.0	41 54.1	72 67	135.4	41 32.4	73 66	135.9	41 10.6	73 66	136.4	40 48.6	73 65	136.8	40 26.6	74 65	137.3	40 04.5	74 64	137.7	39 42.2	74 64	138.1	3
4	41 35.3	71 68	134.1	41 14.0	71 68	134.5	40 52.6	71 67	135.0	40 31.1	72 67	135.4	40 09.5	72 66	135.9	39 47.8	73 66	136.4	39 26.0	73 65	136.8	39 04.0	73 65	137.2	4
35	40 54.2	70 69	133.2	40 33.2	70 69	133.6	40 12.2	70 68	134.1	39 51.0	71 68	134.6	39 29.7	71 67	135.0	39 08.3	71 67	135.5	38 46.8	72 66	135.9	38 25.2	72 66	136.4	35
6	40 12.5	69 70	132.3	39 51.9	69 70	132.8	39 31.1	69 69	133.2	39 10.3	70 69	133.7	38 49.3	70 68	134.2	38 28.2	70 68	134.6	38 07.0	71 67	135.1	37 45.7	71 67	135.5	6
7	39 30.2	68 71	131.4	39 09.9	68 71	131.9	38 49.5	68 70	132.4	38 28.9	69 70	132.8	38 08.3	69 69	133.3	37 47.5	69 69	133.8	37 26.7	70 68	134.2	37 05.7	70 68	134.7	7
8	38 47.4	66 72	130.6	38 27.4	67 72	131.1	38 07.3	67 71	131.5	37 47.1	68 71	132.0	37 26.7	68 70	132.5	37 06.3	68 70	132.9	36 45.7	69 69	133.4	36 25.1	69 69	133.8	8
9	38 04.1	65 73	129.8	37 44.4	66 73	130.3	37 24.6	66 72	130.7	37 04.7	67 72	131.2	36 44.6	67 71	131.7	36 24.5	67 71	132.1	36 04.2	68 70	132.6	35 43.9	68 70	133.0	9
40	37 20.3	64 74	129.0	37 00.9	65 73	129.5	36 41.4	65 73	130.0	36 21.7	66 72	130.4	36 02.0	66 72	130.9	35 42.1	66 71	131.4	35 22.2	67 71	131.8	35 02.1	67 70	132.3	40
1	36 35.9	63 75	128.2	36 16.8	64 74	128.7	35 57.6	64 74	129.2	35 38.3	65 73	129.7	35 18.9	65 73	130.1	34 59.3	65 72	130.6	34 39.7	66 72	131.0	34 19.9	66 71	131.5	1
2	35 51.1	63 75	127.5	35 32.3	63 75	128.0	35 13.4	63 74	128.4	34 54.4	64 74	128.9	34 35.2	64 73	129.4	34 16.0	64 73	129.8	33 56.6	65 72	130.3	33 37.2	65 72	130.8	2
3	35 05.9	62 76	126.7	34 47.4	62 76	127.2	34 28.7	62 75	127.7	34 10.0	63 75	128.2	33 51.2	63 74	128.6	33 32.2	63 74	129.1	33 13.1	64 73	129.6	32 54.0	64 73	130.0	3
4	34 20.2	61 77	126.0	34 02.0	61 76	126.5	33 43.6	61 76	127.0	33 25.2	62 75	127.5	33 06.6	62 75	127.9	32 48.0	62 74	128.4	32 29.2	63 74	128.9	32 10.3	63 74	129.3	4
45	33 34.2	60 77	125.3	33 16.2	60 77	125.8	32 58.1	60 77	126.3	32 40.0	61 76	126.8	32 21.7	61 76	127.2	32 03.3	61 75	127.7	31 44.8	62 75	128.2	31 26.2	62 74	128.6	45
6	32 47.7	59 78	124.7	32 30.0	59 78	125.1	32 12.2	59 77	125.6	31 54.3	60 77	126.1	31 36.3	60 76	126.6	31 18.2	61 76	127.0	31 00.0	61 75	127.5	30 41.7	61 75	127.9	6
7	32 00.8	58 79	124.0	31 43.4	58 78	124.5	31 25.9	59 78	124.9	31 08.3	59 77	125.4	30 50.5	59 77	125.9	30 32.7	60 76	126.4	30 14.8	60 76	126.8	29 56.7	60 76	127.3	7
8	31 13.6	57 79	123.3	30 56.5	57 79	123.8	30 39.2	58 78	124.3	30 21.8	58 78	124.8	30 04.4	58 78	125.2	29 46.8	59 77	125.7	29 29.2	59 77	126.2	29 11.4	59 76	126.6	8
9	30 26.0	56 80	122.7	30 09.2	56 79	123.2	29 52.2	57 79	123.7	29 35.1	57 79	124.1	29 17.9	57 78	124.6	29 00.6	58 78	125.1	28 43.2	58 77	125.5	28 25.7	58 77	126.0	9
50	29 38.1	55 80	122.1	29 21.5	56 80	122.6	29 04.8	56 80	123.0	28 47.9	56 79	123.5	28 31.0	57 79	124.0	28 14.0	57 78	124.5	27 56.8	57 78	124.9	27 39.6	58 77	125.4	50
1	28 49.9	54 81	121.5	28 33.5	55 80	122.0	28 17.1	55 80	122.4	28 00.5	55 80	122.9	27 43.8	56 79	123.4	27 27.0	56 79	123.9	27 10.2	56 78	124.3	26 53.2	57 78	124.8	1
2	28 01.4	54 81	120.9	27 45.3	54 81	121.4	27 29.0	54 81	121.8	27 12.7	55 80	122.3	26 56.3	55 80	122.8	26 39.7	55 79	123.3	26 23.1	56 79	123.7	26 06.4	56 78	124.2	2
3	27 12.6	53 82	120.3	26 56.7	53 81	120.8	26 40.7	53 81	121.3	26 24.6	54 81	121.7	26 08.4	54 80	122.2	25 52.2	54 80	122.7	25 35.8	55 79	123.1	25 19.3	55 79	123.6	3
4	26 23.5	52 82	119.8	26 07.8	52 82	120.2	25 52.0	53 82	120.7	25 36.2	53 81	121.2	25 20.3	53 81	121.6	25 04.2	54 80	122.1	24 48.1	54 80	122.6	24 31.9	54 80	123.0	4
55	25 34.1	51 83	119.2	25 18.6	52 82	119.7	25 03.1	52 82	120.2	24 47.5	52 82	120.6	24 31.8	52 81	121.1	24 16.0	53 81	121.6	24 00.2	53 80	122.0	23 44.2	53 80	122.5	55
6	24 44.4	51 83	118.7	24 29.2	51 83	119.1	24 13.9	51 82	119.6	23 58.6	51 82	120.1	23 43.1	52 82	120.5	23 27.6	52 81	121.0	23 11.9	52 81	121.5	22 56.2	52 80	121.9	6
7	23 54.5	50 84	118.1	23 39.5	50 83	118.6	23 24.5	50 83	119.1	23 09.3	51 82	119.5	22 54.1	51 82	120.0	22 38.8	51 82	120.5	22 23.4	51 81	120.9	22 08.0	52 81	121.4	7
8	23 04.4	49 84	117.6	22 49.6	49 84	118.1	22 34.8	50 83	118.6	22 19.9	50 83	119.0	22 04.9	50 82	119.5	21 49.8	50 82	120.0	21 34.6	51 82	120.4	21 19.4	51 81	120.9	8
9	22 14.0	48 84	117.1	21 59.4	49 84	117.6	21 44.8	49 84	118.1	21 30.1	49 83	118.5	21 15.4	49 83	119.0	21 00.5	50 83	119.5	20 45.6	50 82	119.9	20 30.6	50 82	120.4	9
60	21 23.4	48 85	116.6	21 09.1	48 84	117.1	20 54.7	48 84	117.6	20 40.2	48 84	118.0	20 25.6	49 83	118.5	20 11.0	49 83	119.0	19 56.3	49 83	119.4	19 41.5	49 82	119.9	60
1	20 32.5	47 85	116.1	20 18.4	47 85	116.6	20 04.2	47 84	117.1	19 50.0	48 84	117.5	19 35.6	48 84	118.0	19 21.2	48 83	118.5	19 06.8	48 83	118.9	18 52.2	49 83	119.4	1
2	19 41.5	46 85	115.6	19 27.6	46 85	116.1	19 13.6	47 85	116.6	18 59.6	47 84	117.1	18 45.4	47 84	117.5	18 31.3	47 84	118.0	18 17.0	48 83	118.5	18 02.7	48 83	118.9	2
3	18 50.3	46 86	115.2	18 36.6	46 85	115.7	18 22.8	46 85	116.1	18 08.9	46 85	116.6	17 55.0	46 84	117.1	17 41.0	47 84	117.5	17 27.0	47 84	118.0	17 12.9	47 83	118.4	3
4	17 58.8	45 86	114.7	17 45.3	45 86	115.2	17 31.7	45 85	115.7	17 18.1	46 85	116.1	17 04.4	46 85	116.6	16 50.6	46 84	117.1	16 36.8	46 84	117.5	16 22.9	46 84	118.0	4
65	17 07.2	44 86	114.3	16 53.9	44 86	114.7	16 40.5	45 86	115.2	16 27.1	45 85	115.7	16 13.6	45 85	116.1	16 00.0	45 85	116.6	15 46.4	46 84	117.1	15 32.7	46 84	117.5	65
6	16 15.4	44 87	113.8	16 02.3	44 86	114.3	15 49.1	44 86	114.8	15 35.8	44 86	115.2	15 22.5	44 85	115.7	15 09.2	45 85	116.2	14 55.8	45 85	116.6	14 42.3	45 84	117.1	6
7	15 23.4	43 87	113.4	15 10.5	43 87	113.9	14 57.5	43 86	114.3	14 44.4	44 86	114.8	14 31.3	44 86	115.3	14 18.2	44 85	115.7	14 05.0	44 85	116.2	13 51.7	44 85	116.7	7
8	14 31.3	42 87	113.0	14 18.5	43 87	113.4	14 05.7	43 87	113.9	13 52.9	43 86	114.4	13 39.9	43 86	114.8	13 27.0	43 86	115.3	13 14.0	43 85	115.8	13 00.9	44 85	116.2	8
9	13 39.0	42 87	112.6	13 26.4	42 87	113.0	13 13.8	42 87	113.5	13 01.1	42 87	114.0	12 48.4	42 86	114.4	12 35.6	43 86	114.9	12 22.8	43 86	115.3	12 09.9	43 85	115.8	9
70	12 46.5	41 88	112.1	12 34.1	41 87	112.6	12 21.7	42 87	113.1	12 09.2	42 87	113.5	11 56.6	42 86	114.0	11 44.0	42 86	114.5	11 31.4	42 86	114.9	11 18.8	42 86	115.4	70
1	11 53.9	41 88	111.7	11 41.7	41 88	112.2	11 29.4	41 87	112.7	11 17.1	41 87	113.1	11 04.7	41 87	113.6	10 52.3	41 86	114.1	10 39.9	42 86	114.5	10 27.4	42 86	115.0	1
2	11 01.1	40 88	111.3	10 49.1	40 88	111.8	10 37.0	40 88	112.3	10 24.8	41 87	112.7	10 12.7	41 87	113.2	10 00.5	41 87	113.7	9 48.2	41 86	114.1	9 35.9	41 86	114.6	2
3	10 08.2	40 88	111.0	9 56.3	40 88	111.4	9 44.4	40 88	111.9	9 32.4	40 88	112.4	9 20.4	40 87	112.8	9 08.4	40 87	113.3	8 56.4	40 87	113.7	8 44.3	40 86	114.2	3
4	9 15.1	39 89	110.6	9 03.4	39 88	111.0	8 51.7	39 88	111.5	8 39.9	39 88	112.0	8 28.1	39 88	112.4	8 16.2	40 87	112.9	8 04.4	40 87	113.4	7 52.4	40 87	113.8	4
75	8 22.0	38 89	110.2	8 10.4	39 89	110.7	7 58.8	39 88	111.1	7 47.2	39 88	111.6	7 35.6	39 88	112.1	7 23.9	39 87	112.5	7 12.2	39 87	113.0	7 00.5	39 87	113.5	75
6	7 28.7	38 89	109.8	7 17.3	38 89	110.3	7 05.9	38 88	110.8	6 54.4	38 88	111.2	6 42.9	38 88	111.7	6 31.4	38 88	112.2	6 19.9	38 87	112.6	6 08.4	39 87	113.1	6
7	6 35.2	37 89	109.5	6 24.0	37 89	109.9	6 12.7	38 89	110.4	6 01.5	38 88	110.9	5 50.2	38 88	111.3	5 38.8	38 88	111.8	5 27.5	38 88	112.3	5 16.1	38 87	112.7	7
8	5 41.7	37 89	109.1	5 30.6	37 89	109.6	5 19.5	37 89	110.0	5 08.4	37 89	110.5													8

DECLINATION SAME NAME AS LATITUDE

H.A.	16° 00′			16° 30′			17° 00′			17° 30′			18° 00′			18° 30′			19° 00′			19° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91																5 01.7	32 90	72.1	5 11.2	31 90	71.7	5 20.6	31 90	71.2	91

Lat. 19°

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	89 00.0	1.0 37	00.0	88 30.0	1.0 27	00.0	88 00.0	1.0 21	00.0	87 30.0	1.0 17	00.0	87 00.0	1.0 14	00.0	86 30.0	1.0 12	00.0	86 00.0	1.0 11	00.0	85 30.0	1.0 10	00.0	00
1	88 37.6	73 76	43.1	88 13.8	85 64	31.9	87 47.4	90 54	25.0	87 19.8	94 46	20.4	86 51.4	95 39	17.2	86 22.6	97 35	14.8	85 53.6	97 31	13.0	85 24.3	98 28	11.5	1
2	87 52.0	46 87	61.7	87 35.6	62 79	51.1	87 15.3	72 71	42.9	86 52.4	80 64	36.5	86 27.8	84 57	31.6	86 01.9	88 52	27.8	85 35.2	90 47	24.7	85 07.8	92 43	22.1	2
3	87 00.0	33 90	70.0	86 48.2	46 86	61.5	86 32.6	57 80	54.1	86 14.1	66 74	47.9	85 53.4	72 69	42.6	85 30.9	77 64	38.2	85 07.0	81 59	34.5	84 42.2	84 55	31.3	3
4	86 06.0	24 92	74.5	85 56.9	36 89	67.6	85 44.6	46 85	61.3	85 29.5	54 81	55.6	85 12.0	62 76	50.6	84 52.7	67 72	46.2	84 31.7	72 68	42.3	84 09.4	76 63	38.9	4
05	85 10.9	19 92	77.2	85 03.7	29 90	71.5	84 53.6	38 88	66.1	84 41.1	46 84	61.1	84 26.3	53 81	56.5	84 09.6	59 77	52.3	83 51.2	64 74	48.5	83 31.4	68 70	45.1	05
6	84 15.4	16 93	79.0	84 09.5	24 91	74.1	84 01.1	32 89	69.5	83 50.5	39 87	65.0	83 37.8	45 84	60.9	83 23.3	51 81	57.0	83 07.1	57 78	53.4	82 49.4	61 75	50.1	6
7	83 19.6	13 93	80.2	83 14.6	20 92	76.0	83 07.5	27 90	71.9	82 58.4	34 88	68.0	82 47.5	40 86	64.2	82 34.7	45 84	60.7	82 20.4	50 81	57.3	82 04.6	55 78	54.2	7
8	82 23.6	11 94	81.1	82 19.4	17 92	77.4	82 13.3	23 91	73.8	82 05.4	29 89	70.2	81 55.8	35 88	66.8	81 44.6	40 86	63.5	81 31.8	45 83	60.4	81 17.7	49 81	57.5	8
9	81 27.5	09 94	81.8	81 23.9	15 93	78.5	81 18.7	20 92	75.2	81 11.8	26 90	72.0	81 03.3	31 89	68.9	80 53.3	36 87	65.9	80 41.8	40 85	63.0	80 29.1	45 83	60.2	9
10	80 31.3	08 94	82.3	80 28.3	13 93	79.3	80 23.7	18 92	76.3	80 17.6	23 91	73.4	80 10.0	27 90	70.5	80 01.1	32 88	67.8	79 50.8	36 86	65.1	79 39.3	41 85	62.5	10
1	79 35.1	06 94	82.7	79 32.5	11 93	79.9	79 28.5	16 92	77.2	79 23.1	20 91	74.5	79 16.3	25 90	71.9	79 08.3	29 89	69.3	78 59.0	33 87	66.8	78 48.6	37 86	64.4	1
2	78 38.8	05 94	83.0	78 36.6	10 93	80.4	78 33.1	14 93	77.9	78 28.3	18 92	75.4	78 22.2	22 91	73.0	78 15.0	26 89	70.6	78 06.6	30 88	68.3	77 57.1	34 87	66.0	2
3	77 42.5	04 94	83.2	77 40.6	08 93	80.8	77 37.5	12 93	78.5	77 33.3	16 92	76.2	77 27.9	20 91	73.9	77 21.3	24 90	71.7	77 13.7	27 89	69.5	77 05.0	31 88	67.3	3
4	76 46.1	03 94	83.3	76 44.6	07 93	81.2	76 41.9	11 93	79.0	76 38.1	14 92	76.8	76 33.2	18 91	74.7	76 27.3	21 90	72.6	76 20.4	25 89	70.5	76 12.4	28 88	68.5	4
15	75 49.8	03 94	83.5	75 48.5	06 94	81.4	75 46.2	09 93	79.4	75 42.8	13 92	77.4	75 38.4	16 92	75.4	75 33.0	20 91	73.4	75 26.7	23 90	71.4	75 19.4	26 89	69.5	15
6	74 53.4	02 94	83.5	74 52.4	05 94	81.6	74 50.4	08 93	79.7	74 47.4	12 92	77.8	74 43.4	15 92	75.9	74 38.6	18 91	74.1	74 32.8	21 90	72.2	74 26.1	24 89	70.4	6
7	73 57.0	01 94	83.6	73 56.2	04 94	81.8	73 54.5	07 93	80.0	73 51.9	10 93	78.2	73 48.4	13 92	76.4	73 44.0	16 91	74.6	73 38.7	19 90	72.9	73 32.5	22 90	71.2	7
8	73 00.7	01 94	83.6	73 00.1	03 94	81.9	72 58.6	06 93	80.2	72 56.3	09 93	78.5	72 53.2	12 92	76.8	72 49.2	15 91	75.1	72 44.4	17 91	73.5	72 38.7	20 90	71.8	8
9	72 04.3	00 94	83.6	72 03.9	03 94	82.0	72 02.7	05 93	80.4	72 00.7	08 93	78.8	71 57.9	11 92	77.2	71 54.3	13 92	75.6	71 49.9	16 91	74.0	71 44.8	18 90	72.4	9
20	71 07.9	01 94	83.6	71 07.7	02 94	82.1	71 06.8	04 93	80.5	71 05.0	07 93	79.0	71 02.6	10 92	77.5	70 59.3	12 92	75.9	70 55.3	15 91	74.4	70 50.6	17 90	72.9	20
1	70 11.5	01 94	83.6	70 11.5	01 94	82.1	70 10.8	04 93	80.6	70 09.3	06 93	79.2	70 07.1	08 92	77.7	70 04.2	11 92	76.2	70 00.6	13 91	74.8	69 56.3	16 91	73.3	1
2	69 15.2	02 94	83.6	69 15.3	01 94	82.1	69 14.8	03 93	80.7	69 13.6	05 93	79.3	69 11.7	07 92	77.9	69 09.1	10 92	76.5	69 05.8	12 92	75.1	69 01.9	14 91	73.7	2
3	68 18.8	02 94	83.5	68 19.1	00 94	82.2	68 18.8	02 93	80.8	68 17.8	04 93	79.5	68 16.2	07 93	78.1	68 13.9	09 92	76.8	68 11.0	11 92	75.4	68 07.4	13 91	74.1	3
4	67 22.4	03 94	83.4	67 22.9	01 94	82.1	67 22.8	01 93	80.8	67 22.0	04 93	79.5	67 20.7	06 93	78.3	67 18.7	08 92	77.0	67 16.0	10 92	75.7	67 12.8	12 91	74.4	4
25	66 26.1	03 94	83.4	66 26.7	01 94	82.1	66 26.8	01 93	80.9	66 26.3	03 93	79.6	66 25.1	05 93	78.4	66 23.4	07 92	77.1	66 21.0	09 92	75.9	66 18.1	11 91	74.6	25
6	65 29.7	04 94	83.3	65 30.5	02 94	82.1	65 30.8	00 93	80.9	65 30.4	02 93	79.7	65 29.5	04 93	78.5	65 28.1	06 92	77.3	65 26.0	08 92	76.1	65 23.4	10 91	74.9	6
7	64 33.4	04 94	83.2	64 34.3	02 94	82.0	64 34.8	00 93	80.9	64 34.6	01 93	79.7	64 33.9	03 93	78.6	64 32.7	05 92	77.4	64 30.9	07 92	76.2	64 28.6	09 91	75.1	7
8	63 37.0	05 94	83.1	63 38.2	03 94	82.0	63 38.7	01 93	80.9	63 38.8	01 93	79.7	63 38.3	02 93	78.6	63 37.3	04 92	77.5	63 35.8	06 92	76.4	63 33.8	08 91	75.2	8
9	62 40.7	05 94	83.0	62 42.0	03 94	81.9	62 42.7	02 93	80.8	62 43.0	00 93	79.7	62 42.7	02 93	78.7	62 41.9	03 92	77.6	62 40.7	05 92	76.5	62 38.9	07 92	75.4	9
30	61 44.4	05 94	82.9	61 45.8	04 94	81.9	61 46.7	02 93	80.8	61 47.2	01 93	79.7	61 47.1	01 93	78.7	61 46.5	03 92	77.6	61 45.5	04 92	76.6	61 44.0	06 92	75.5	30
1	60 48.1	06 94	82.8	60 49.7	04 94	81.8	60 50.7	03 93	80.7	60 51.3	01 93	79.7	60 51.5	00 93	78.7	60 51.1	02 92	77.7	60 50.3	03 92	76.6	60 49.0	05 92	75.6	1
2	59 51.9	06 94	82.7	59 53.5	05 94	81.7	59 54.7	03 93	80.7	59 55.5	02 93	79.7	59 55.8	00 93	78.7	59 55.7	01 92	77.7	59 55.1	03 92	76.7	59 54.1	04 92	75.7	2
3	58 55.6	07 94	82.6	58 57.4	05 94	81.6	58 58.8	04 93	80.6	58 59.7	02 93	79.7	59 00.2	01 93	78.7	59 00.3	01 92	77.7	58 59.9	02 92	76.7	58 59.1	03 92	75.8	3
4	57 59.4	07 94	82.4	58 01.3	06 94	81.5	58 02.8	04 93	80.6	58 03.9	03 93	79.6	58 04.6	02 93	78.7	58 04.8	00 92	77.7	58 04.7	01 92	76.8	58 04.1	03 92	75.8	4
35	57 03.1	08 94	82.3	57 05.2	06 93	81.4	57 06.8	05 93	80.5	57 08.1	04 93	79.6	57 08.9	02 93	78.6	57 09.4	01 92	77.7	57 09.4	01 92	76.8	57 09.1	02 92	75.9	35
6	56 06.9	08 94	82.2	56 09.1	07 93	81.3	56 10.9	05 93	80.4	56 12.3	04 93	79.5	56 13.3	03 93	78.6	56 14.0	01 92	77.7	56 14.2	00 92	76.8	56 14.1	01 92	75.9	6
7	55 10.7	08 94	82.0	55 13.0	07 93	81.2	55 15.0	06 93	80.3	55 16.5	05 93	79.4	55 17.7	03 93	78.5	55 18.5	02 92	77.7	55 19.0	01 92	76.8	55 19.0	00 92	75.9	7
8	54 14.5	09 94	81.9	54 17.0	08 93	81.0	54 19.1	06 93	80.2	54 20.8	05 93	79.3	54 22.1	04 93	78.5	54 23.1	03 92	77.6	54 23.7	01 92	76.8	54 24.0	00 92	75.9	8
9	53 18.4	09 94	81.8	53 21.0	08 93	80.9	53 23.2	07 93	80.1	53 25.0	06 93	79.3	53 26.6	04 93	78.4	53 27.7	03 92	77.6	53 28.5	02 92	76.7	53 29.0	01 92	75.9	9
40	52 22.3	10 94	81.6	52 24.9	08 93	80.8	52 27.3	07 93	80.0	52 29.3	06 93	79.2	52 31.0	05 93	78.3	52 32.3	04 92	77.5	52 33.3	03 92	76.7	52 34.0	02 92	75.9	40
1	51 26.1	10 93	81.5	51 29.0	09 93	80.7	51 31.4	08 93	79.9	51 33.6	07 93	79.1	51 35.4	06 93	78.3	51 36.9	04 92	77.5	51 38.1	03 92	76.7	51 39.0	02 92	75.8	1
2	50 30.0	10 93	81.3	50 33.0	09 93	80.5	50 35.6	08 93	79.7	50 37.9	07 93	79.0	50 39.9	06 93	78.2	50 41.6	05 92	77.4	50 42.9	04 92	76.6	50 43.9	03 92	75.8	2
3	49 34.0	11 93	81.2	49 37.0	10 93	80.4	49 39.8	09 93	79.6	49 42.2	08 93	78.9	49 44.4	07 92	78.1	49 46.2	06 92	77.3	49 47.7	05 92	76.5	49 49.0	04 92	75.8	3
4	48 37.9	11 93	81.0	48 41.1	10 93	80.3	48 44.0	09 93	79.5	48 46.6	08 93	78.7	48 48.9	07 92	78.0	48 50.9	06 92	77.2	48 52.6	05 92	76.5	48 54.0	04 92	75.7	4
45	47 41.9	11 93	80.8	47 45.2	11 93	80.1	47 48.2	10 93	79.4	47 51.0	09 93	78.6	47 53.4	08 92	77.9	47 55.6	07 92	77.1	47 57.4	06 92	76.4	47 59.0	05 92	75.6	45
6	46 45.9	12 93	80.7	46 49.3	11 93	80.0	46 52.5	10 93	79.2	46 55.4	09 93	78.5	46 57.9	08 92	77.8	47 00.3	07 92	77.0	47 02.3	06 92	76.3	47 04.0	05 92	75.6	6
7	45 49.9	12 93	80.5	45 53.5	11 93	79.8	45 56.8	10 93	79.1	45 59.8	10 93	78.4	46 02.5	09 92	77.7	46 05.0	08 92	76.9	46 07.2	07 92	76.2	46 09.1	06 92	75.5	7
8	44 54.0	13 93	80.4	44 57.7	12 93	79.7	45 01.1	11 93	79.0	45 04.2	10 93	78.2	45 07.1	09 92	77.5	45 09.7	08 92	76.8	45 12.1	07 92	76.1	45 14.2	07 92	75.4	8
9	43 58.1	13 93	80.2	44 01.9	12 93	79.5	44 05.4	11 93	78.8	44 08.7	11 92	78.1	44 11.7	10 92	77.4	44 14.5	09 92	76.7	44 17.0	08 92	76.0	44 19.3	07 91	75.3	9
50	43 02.2	13 93	80.0	43 06.1	13 93	79.3	43 09.8	12 93	78.7	43 13.2	11 92	78.0	43 16.4	10 92	77.3	43 19.3	09 92	76.6	43 22.0	09 92	75.9	43 24.4	08 91	75.2	50
1	42 06.3	14 93	79.8	42 10.4	13 93	79.2	42 14.2	12 93	78.5	42 17.7	11 92	77.8	42 21.0	11 92	77.2	42 24.1	10 92	76.5	42 27.0	09 92	75.8	42 29.6	08 91	75.1	1
2	41 10.5	14 93	79.7	41 14.7	13 93	79.0	41 18.6	13 93	78.3	41 22.3	12 92	77.7	41 25.7	11 92	77.0	41 29.0	10 92	76.4	41 32.0	10 92	75.7	41 34.8	09 91	75.0	2
3	40 14.7	15 93	79.5	40 19.0	14 93	78.8	40 23.0	13 92	78.2	40 26.9	12 92	77.5	40 30.5	12 92	76.9	40 33.9	11 92	76.2	40 37.0	10 92	75.6	40 40.0	09 91	74.9	3
4	39 19.0	15 93	79.3	39 23.3	14 93	78.7	39 27.5	14 92	78.0	39 31.5	13 92	77.4	39 35.2	12 92	76.7	39 38.8	11 92	76.1	39 42.1	11 92	75.4	39 45.2	10 91	74.8	4
55	38 23.2	15 93	79.1	38 27.7	15 93	78.5	38 32.0	14 92	77.9	38 36.1	13 92	77.2	38 40.0	13 92	76.6	38 43.7	12 92	76.0	38 47.2	11 92	75.3	38 50.5	11 91	74.7	55
6	37 27.5	16 93	78.9	37 32.2	15 93	78.3	37 36.6	14 92	77.7	37 40.8	14 92	77.1	37 44.9	13 92	76.4	37 48.7	12 92	75.8	37 52.3	12 91	75.2	37 55.8	11 91	74.6	6
7	36 31.9	16 93	78.7	36 36.6	16 92	78.1	36 41.2	15 92	77.5	36 45.6	14 92	76.9	36 49.7	14 92	76.3	36 53.7	13 92	75.7	36 57.5	12 91	75.0	37 01.1	12 91	74.4	7
8	35 36.3	17 93	78.6	35 41.1	16 92	78.0	35 45.8	15 92	77.3	35 50.3	15 92	76.7	35 54.6	14 92	76.1	35 58.8	13 92	75.5	36 02.7	13 91	74.9	36 06.5	12 91	74.3	8
9	34 40.7	17 93	78.4	34 45.7	16 92	77.8	34 50.5	16 92	77.2	34 55.1	15 92	76.6	34 59.6	15 92	76.0	35 03.9	14 91	75.4	35 08.0	13 91	74.8	35 11.9	13 91	74.1	9
60	33 45.1	17 92	78.2	33 50.2	17 92	77.6	33 55.2	16 92	77.0	34 00.0	16 92	76.4	34 04.6	15 92	75.8	34 09.0	14 91	75.2	34 13.3	14 91	74.6	34 17.3	13 91	74.0	60
1	32 49.6	18 92	78.0	32 54.9	17 92	77.4	32 59.9	17 92	76.8	33 04.8	16 92	76.2	33 09.6	16 92	75.6	33 14.2	15 91	75.0	33 18.6	14 91	74.4	33 22.8	14 91	73.8	1
2	31 54.1	18 92	77.8	31 59.5	18 92	77.2	32 04.7	17 92	76.6	32 09.8	17 92	76.0	32 14.7	16 92	75.4	32 19.4	15 91	74.9	32 24.0	15 91	74.3	32 28.4	14 91	73.7	2
3	30 58.7	19 92	77.6	31 04.2	18 92	77.0	31 09.6	18 92	76.4	31 14.7	17 92	75.8	31 19.8	17 91	75.3	31 24.6	16 91	74.7	31 29.4	15 91	74.1	31 33.9	15 91	73.5	3
4	30 03.3	19 92	77.4	30 09.0	18 92	76.8	30 14.4	18 92	76.2	30 19.8	17 92	75.7	30 24.9	17 91	75.1	30 30.0	16 91	74.5	30 34.8	16 91	73.9	30 39.6	15 91	73.4	4
65	29 08.0	19 82	77.2	29 13.8	19 92	76.6	29 19.4	18 92	76.0	29 24.8	18 92	75.5	29 30.1	17 91	74.9	29 35.3	17 91	74.3	29 40.3	17 91	73.8	29 45.2	16 90	73.2	65
6	28 12.7	20 92	77.0	28 18.6	19 92	76.4	28 24.3	19 92	75.8	28 29.9	18 91	75.3	28 35.4	18 91	74.7	28 40.7	18 91	74.2	28 45.9	17 91	73.6	28 50.9	17 90	73.0	6
7	27 17.5	20 92	76.7	27 23.5	20 92	76.2	27 29.3	19 92	75.6	27 35.1	19 91	75.1	27 40.7	18 91	74.5	27 46.2	18 91	74.0	27 51.5	18 90	73.4	27 56.7	17 90	72.9	7
8	26 22.3	21 92	76.5	26 28.4	20 92	76.0	26 34.4	20 92	75.4	26 40.3	19 91	74.9	26 46.0	19 91	74.3	26 51.7	19 91	73.8	26 57.1	18 90	73.2	27 02.5	18 90	72.7	8
9	25 27.1	21 92	76.3	25 33.4	21 92	75.8	25 39.5	20 91	75.2	25 45.5	20 91	74.7	25 51.4	19 91	74.1	25 57.2	19 91	73.6	26 02.9	19 90	73.0	26 08.4	18 90	72.5	9
70	24 32.0	21 92	76.1	24 38.4	21 92	75.5	24 44.7	21 91	75.0	24 50.9	20 91	74.5	24 56.9	20 91	73.9	25 02.8	20 91	73.4	25 08.6	19 90	72.8	25 14.3	19 90	72.3	70
1	23 37.0	22 92	75.9	23 43.5	22 91	75.3	23 49.9	21 91	74.8	23 56.2	21 91	74.3	24 02.4	20 91	73.7	24 08.5	20 90	73.2	24 14.4	20 90	72.7	24 20.3	19 90	72.1	1
2	22 42.0	22 92	75.6	22 48.7	22 91	75.1	22 55.2	22 91	74.6	23 01.6	21 91	74.0	23 08.0	21 91	73.5	23 14.2	21 90	73.0	23 20.3	20 90	72.5	23 26.3	20 90	71.9	2
3	21 47.1	23 91	75.4	21 53.9	22 91	74.9	22 00.6	22 91	74.4	22 07.1	22 91	73.8	22 13.6	21 90	73.3	22 20.0	21 90	72.8	22 26.3	21 90	72.2	22 32.4	20 90	71.7	3
4	20 52.2	23 91	75.2	20 59.1	23 91	74.7	21 05.9	23 91	74.1	21 12.7	22 91	73.6	21 19.3	22 90	73.1	21 25.8	22 90	72.6	21 32.3	21 90	72.0	21 38.6	21 90	71.5	4
75	19 57.4	24 91	74.9	20 04.5	23 91	74.4	20 11.4	23 91	73.9	20 18.3	23 91	73.4	20 25.1	22 90	72.9	20 31.7	22 90	72.3	20 38.3	22 90	71.8	20 44.8	21 90	71.3	75
6	19 02.7	24 91	74.7	19 09.8	24 91	74.2	19 16.9	24 91	73.7	19 23.9	23 90	73.2	19 30.9	23 90	72.6	19 37.7	23 90	72.1	19 44.5	22 90	71.6	19 51.1	22 89	71.1	6
7	18 08.0	25 91	74.5	18 15.3	24 91	74.0	18 22.5	24 90	73.4	18 29.7	24 90	72.9	18 36.8	23 90	72.4	18 43.7	23 90	71.9	18 50.7	23 90	71.4	18 57.5	23 89	70.9	7
8	17 13.3	25 91	74.2	17 20.8	25 91	73.7	17 28.2	24 90	73.2	17 35.5	24 90	72.7	17 42.7	24 90	72.2	17 49.9	24 90	71.7	17 56.9	23 90	71.2	18 03.9	23 89	70.7	8
9	16 18.8	25 91	74.0	16 26.4	25 91	73.5	16 33.9	25 90	73.0	16 41.4	25 90	72.5	16 48.7	24 90	72.0	16 56.0	24 90	71.4	17 03.3	24 89	70.9	17 10.4	24 89	70.4	9
80	15 24.3	26 91	73.7	15 32.0	26 90	73.2	15 39.7	25 90	72.7	15 47.3	25 90	72.2	15 54.8	25 90	71.7	16 02.3	25 89	71.2	16 09.7	25 89	70.7	16 17.0	24 89	70.2	80
1	14 29.9	26 91	73.5	14 37.7	26 90	73.0	14 45.6	26 90	72.5	14 53.3	26 90	72.0	15 01.0	26 90	71.5	15 08.6	25 89	71.0	15 16.2	25 89	70.5	15 23.7	25 89	70.0	1
2	13 35.5	27 90	73.2	13 43.5	27 90	72.7	13 51.5	26 90	72.2	13 59.4	26 90	71.7	14 07.3	26 89	71.2	14 15.0	26 89	70.7	14 22.8	26 89	70.2	14 30.4	25 89	69.7	2
3	12 41.2	27 90	72.9	12 49.4	27 90	72.5	12 57.5	27 90	72.0	13 05.6	27 90	71.5	13 13.6	27 89	71.0	13 21.5	26 89	70.5	13 29.4	26 89	70.0	13 37.2	26 88	69.5	3
4	11 47.0	28 90	72.7	11 55.4	28 90	72.2	12 03.6	27 90	71.7	12 11.8	27 89	71.2	12 20.0	27 89	70.7	12 28.1	27 89	70.2	12 36.2	27 89	69.7	12 44.2	27 88	69.2	4
85	10 52.9	28 90	72.4	11 01.4	28 90	71.9	11 09.8	28 90	71.4	11 18.2	28 89	70.9	11 26.5	28 89	70.5	11 34.8	27 89	70.0	11 43.0	27 88	69.5	11 51.1	27 88	69.0	85
6	9 58.9	29 90	72.1	10 07.5	29 90	71.7	10 16.1	28 90	71.2	10 24.6	28 89	70.7	10 33.1	28 89	70.2	10 41.5	28 89	69.7	10 49.9	28 88	69.2	10 58.2	28 88	68.7	6
7	9 04.9	29 90	71.9	9 13.7	29 90	71.4	9 22.4	29 89	70.9	9 31.1	29 89	70.4	9 39.7	29 89	69.9	9 48.3	29 88	69.4	9 56.9	28 88	69.0	10 05.4	28 88	68.5	7
8	8 11.1	30 90	71.6	8 20.0	30 89	71.1	8 28.9	30 89	70.6	8 37.7	29 89	70.1	8 46.5	29 89	69.7	8 55.3	29 88	69.2	9 04.0	29 88	68.7	9 12.7	29 88	68.2	8
9	7 17.3	30 90	71.3	7 26.3	30 89	70.8	7 35.4	30 89	70.3	7 44.4	30 89	69.9	7 53.4	30 88	69.4	8 02.3	30 88	68.9	8 11.2	30 88	68.4	8 20.1	30 88	67.9	9
90	6 23.6	31 89	71.0	6 32.8	31 89	70.5	6 42.0	31 89	70.1	6 51.2	31 89	69.6	7 00.3	30 88	69.1	7 09.4	30 88	68.6	7 18.5	30 88	68.1	7 27.6	30 87	67.7	90

DECLINATION CONTRARY NAME TO LATITUDE

Lat. 19°

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	51 00.0	1.0 01	180.0	50 30.0	1.0 01	180.0	50 00.0	1.0 01	180.0	49 30.0	1.0 01	180.0	49 00.0	1.0 01	180.0	48 30.0	1.0 01	180.0	48 00.0	1.0 01	180.0	47 30.0	1.0 01	180.0	00
1	50 59.3	1.0 04	178.5	50 29.3	1.0 04	178.5	49 59.3	1.0 04	178.5	49 29.3	1.0 04	178.6	48 59.3	1.0 04	178.6	48 29.3	1.0 03	178.6	47 59.3	1.0 03	178.6	47 29.3	1.0 03	178.6	1
2	50 57.0	1.0 06	177.0	50 27.1	1.0 06	177.1	49 57.1	1.0 06	177.1	49 27.2	1.0 06	177.1	48 57.2	1.0 06	177.2	48 27.2	1.0 06	177.2	47 57.3	1.0 06	177.3	47 27.3	1.0 06	177.3	2
3	50 53.4	1.0 09	175.5	50 23.4	1.0 08	175.6	49 53.5	1.0 08	175.7	49 23.6	1.0 08	175.7	48 53.7	1.0 08	175.8	48 23.8	1.0 08	175.8	47 53.9	1.0 08	175.9	47 24.0	1.0 08	175.9	3
4	50 48.2	99 11	174.0	50 18.4	99 11	174.1	49 48.5	99 11	174.2	49 18.7	99 11	174.3	48 48.8	99 10	174.4	48 19.0	1.0 10	174.4	47 49.1	1.0 10	174.5	47 19.3	1.0 10	174.6	4
05	50 41.6	99 13	172.6	50 11.8	99 13	172.7	49 42.1	99 13	172.8	49 12.3	99 13	172.9	48 42.6	99 13	173.0	48 12.8	99 13	173.1	47 43.0	99 12	173.2	47 13.3	99 12	173.2	05
6	50 33.5	99 16	171.1	50 03.9	99 16	171.2	49 34.3	99 16	171.3	49 04.6	99 15	171.5	48 34.9	99 15	171.6	48 05.3	99 15	171.7	47 35.6	99 14	171.8	47 05.9	99 14	171.9	6
7	50 24.1	98 18	169.6	49 54.5	98 18	169.8	49 25.0	98 18	169.9	48 55.5	98 17	170.1	48 26.0	98 17	170.2	47 56.4	99 17	170.3	47 26.8	99 17	170.5	46 57.3	99 17	170.6	7
8	50 13.2	98 20	168.2	49 43.8	98 20	168.4	49 14.4	98 20	168.5	48 45.0	98 20	168.7	48 15.6	98 19	168.8	47 46.2	98 19	169.0	47 16.8	98 19	169.1	46 47.3	98 19	169.3	8
9	50 00.9	97 23	166.8	49 31.7	97 22	167.0	49 02.5	97 22	167.1	48 33.2	97 22	167.3	48 04.0	98 22	167.5	47 34.7	98 21	167.6	47 05.4	98 21	167.8	46 36.1	98 21	167.9	9
10	49 47.2	97 26	165.4	49 18.2	97 25	165.6	48 49.1	97 24	165.7	48 20.1	97 24	165.9	47 51.0	97 24	166.1	47 21.9	97 23	166.3	46 52.8	97 23	166.5	46 23.7	97 23	166.6	10
1	49 32.2	96 27	164.0	49 03.4	96 27	164.2	48 34.5	96 26	164.4	48 05.6	96 26	164.6	47 36.8	96 26	164.8	47 07.8	96 26	165.0	46 38.9	96 25	165.2	46 09.9	97 25	165.4	1
2	49 15.9	96 29	162.6	48 47.3	96 29	162.8	48 18.6	96 29	163.0	47 49.9	96 28	163.3	47 21.2	96 28	163.5	46 52.5	96 28	163.7	46 23.8	96 27	163.9	45 55.0	96 27	164.1	2
3	48 58.2	96 32	161.2	48 29.8	95 31	161.5	48 01.4	95 31	161.7	47 33.0	95 30	161.9	47 04.5	95 30	162.2	46 36.0	95 30	162.4	46 07.4	95 29	162.6	45 38.9	95 29	162.8	3
4	48 39.3	94 34	159.9	48 11.2	94 33	160.1	47 43.0	94 33	160.4	47 14.8	94 32	160.6	46 46.5	94 32	160.9	46 18.2	94 32	161.1	45 49.9	94 31	161.4	45 21.5	95 31	161.6	4
15	48 19.2	93 36	158.5	47 51.3	93 35	158.8	47 23.3	93 35	159.1	46 55.3	93 34	159.4	46 27.3	93 34	159.6	45 59.3	94 34	159.9	45 31.2	94 33	160.1	45 03.0	94 33	160.4	15
6	47 57.9	92 38	157.2	47 30.2	92 37	157.5	47 02.5	92 37	157.8	46 34.8	93 36	158.1	46 07.0	93 36	158.4	45 39.2	93 35	158.6	45 11.3	93 35	158.9	44 43.4	93 35	159.2	6
7	47 35.3	91 39	156.0	47 07.9	91 39	156.3	46 40.5	92 38	156.6	46 13.0	92 38	156.8	45 45.5	92 38	157.1	45 17.9	92 37	157.4	44 50.3	92 37	157.7	44 22.7	92 36	158.0	7
8	47 11.6	90 41	154.7	46 44.5	90 41	155.0	46 17.4	91 40	155.3	45 50.2	91 40	155.6	45 22.9	91 40	155.9	44 55.6	91 39	156.2	44 28.3	91 38	156.5	44 00.9	91 38	156.8	8
9	46 46.8	89 43	153.5	46 20.0	90 43	153.8	45 53.1	90 42	154.1	45 26.2	90 42	154.4	44 59.2	90 41	154.7	44 32.2	90 41	155.0	44 05.1	90 40	155.3	43 38.0	91 40	155.6	9
20	46 21.0	88 45	152.3	45 54.4	89 44	152.6	45 27.8	89 44	152.9	45 01.2	89 43	153.2	44 34.5	89 43	153.6	44 07.7	89 42	153.9	43 40.9	89 42	154.2	43 14.1	90 42	154.5	20
1	45 54.0	87 47	151.1	45 27.8	88 46	151.4	45 01.5	88 46	151.7	44 35.1	88 45	152.1	44 08.7	88 45	152.4	43 42.3	88 44	152.7	43 15.7	89 44	153.1	42 49.1	89 43	153.4	1
2	45 26.1	86 48	149.9	45 00.1	87 48	150.2	44 34.1	87 47	150.6	44 08.1	87 47	150.9	43 42.0	87 46	151.3	43 15.8	87 46	151.6	42 49.5	88 45	152.0	42 23.2	88 45	152.3	2
3	44 57.1	85 50	148.7	44 31.5	86 49	149.1	44 05.8	86 49	149.5	43 40.0	86 48	149.8	43 14.2	86 48	150.2	42 48.3	86 47	150.5	42 22.4	87 47	150.9	41 56.4	87 46	151.2	3
4	44 27.2	84 51	147.6	44 01.9	84 51	148.0	43 36.5	85 50	148.4	43 11.1	85 50	148.7	42 45.6	85 49	149.1	42 20.0	85 49	149.4	41 54.3	86 48	149.8	41 28.6	86 48	150.1	4
25	43 56.4	83 53	146.5	43 31.4	83 52	146.9	43 06.3	84 52	147.3	42 41.2	84 51	147.7	42 16.0	84 51	148.0	41 50.7	84 50	148.4	41 25.3	85 50	148.7	40 59.9	85 49	149.1	25
6	43 24.6	82 54	145.5	43 00.0	82 54	145.8	42 35.2	83 53	146.2	42 10.4	83 53	146.6	41 45.5	83 52	147.0	41 20.5	83 52	147.4	40 55.5	84 51	147.7	40 30.3	84 51	148.1	6
7	42 52.1	81 56	144.4	42 27.7	81 55	144.8	42 03.3	82 55	145.2	41 38.7	82 54	145.6	41 14.1	82 54	146.0	40 49.5	82 53	146.3	40 24.7	83 52	146.7	39 59.9	83 52	147.1	7
8	42 18.6	80 57	143.4	41 54.6	80 57	143.8	41 30.5	81 56	144.2	41 06.3	81 55	144.6	40 42.0	81 55	145.0	40 17.6	81 54	145.3	39 53.2	82 54	145.7	39 28.7	82 53	146.1	8
9	41 44.4	79 58	142.4	41 20.7	79 58	142.8	40 56.9	79 57	143.2	40 33.0	80 57	143.6	40 09.0	80 56	144.0	39 45.0	80 56	144.4	39 20.8	81 55	144.8	38 56.6	81 55	145.1	9
30	41 09.4	78 60	141.4	40 46.0	78 59	141.8	40 22.5	78 59	142.2	39 58.9	79 58	142.6	39 35.3	79 58	143.0	39 11.5	79 57	143.4	38 47.7	80 56	143.8	38 23.8	80 56	144.2	30
1	40 33.6	77 61	140.4	40 10.5	77 60	140.8	39 47.3	77 60	141.3	39 24.1	78 59	141.7	39 00.8	78 59	142.1	38 37.3	78 58	142.5	38 13.8	78 58	142.9	37 50.3	79 57	143.3	1
2	39 57.1	76 62	139.5	39 34.3	76 61	139.9	39 11.5	76 61	140.3	38 48.6	77 60	140.7	38 25.5	77 60	141.2	38 02.4	77 59	141.6	37 39.2	77 59	142.0	37 16.0	78 58	142.4	2
3	39 19.9	75 63	138.6	38 57.5	75 63	139.0	38 34.9	75 62	139.4	38 12.3	76 62	139.8	37 49.6	76 61	140.3	37 26.8	76 60	140.7	37 03.9	76 60	141.1	36 41.0	77 59	141.5	3
4	38 42.0	74 64	137.7	38 19.9	74 64	138.1	37 57.7	74 63	138.5	37 35.4	74 63	139.0	37 13.0	75 62	139.4	36 50.5	75 62	139.8	36 28.0	75 61	140.2	36 05.3	76 61	140.6	4
35	38 03.5	72 65	136.8	37 41.7	73 65	137.2	37 19.8	73 64	137.7	36 57.8	73 64	138.1	36 35.7	74 63	138.5	36 13.6	74 63	138.9	35 51.3	74 62	139.4	35 29.0	75 62	139.8	35
6	37 24.4	71 66	135.9	37 02.9	72 66	136.4	36 41.3	72 65	136.8	36 19.6	72 65	137.2	35 57.9	73 64	137.7	35 36.0	73 64	138.1	35 14.1	73 63	138.5	34 52.0	74 63	138.9	6
7	36 44.6	70 67	135.1	36 23.4	71 67	135.6	36 02.2	71 66	136.0	35 40.8	71 66	136.4	35 19.4	72 65	136.9	34 57.8	72 65	137.3	34 36.2	72 64	137.7	34 14.5	73 64	138.1	7
8	36 04.3	69 68	134.3	35 43.4	70 68	134.7	35 22.5	70 67	135.2	35 01.4	70 67	135.6	34 40.3	71 66	136.0	34 19.0	71 66	136.5	33 57.7	71 65	136.9	33 36.3	72 65	137.3	8
9	35 23.4	68 69	133.5	35 02.9	69 69	133.9	34 42.2	69 68	134.4	34 21.5	69 68	134.8	34 00.6	70 67	135.3	33 39.7	70 66	135.7	33 18.7	70 66	136.1	32 57.5	71 66	136.5	9
40	34 42.0	67 70	132.7	34 21.7	68 69	133.2	34 01.4	68 69	133.6	33 40.9	68 68	134.1	33 20.4	69 68	134.5	32 59.8	69 67	134.9	32 39.1	69 67	135.4	32 18.3	69 66	135.8	40
1	34 00.1	66 71	132.0	33 40.1	67 70	132.4	33 20.1	67 70	132.9	32 59.9	67 69	133.3	32 39.7	68 69	133.7	32 19.3	68 68	134.2	31 58.9	68 68	134.6	31 38.4	68 67	135.0	1
2	33 17.6	65 72	131.2	32 58.0	66 71	131.7	32 38.2	66 70	132.1	32 18.4	66 70	132.6	31 58.4	67 70	133.0	31 38.4	67 69	133.4	31 18.3	67 68	133.9	30 58.1	67 68	134.3	2
3	32 34.7	64 72	130.5	32 15.3	65 72	130.9	31 55.9	65 71	131.4	31 36.3	65 71	131.8	31 16.7	66 70	132.3	30 57.0	66 70	132.7	30 37.1	66 69	133.2	30 17.2	67 69	133.6	3
4	31 51.3	63 73	129.8	31 32.3	64 73	130.2	31 13.1	64 72	130.7	30 53.8	64 72	131.1	30 34.5	65 71	131.6	30 15.0	65 71	132.0	29 55.5	65 70	132.5	29 35.9	66 70	132.9	4
45	31 07.5	62 74	129.1	30 48.7	63 73	129.5	30 29.9	63 73	130.0	30 10.9	63 72	130.4	29 51.8	64 72	130.9	29 32.7	64 71	131.3	29 13.4	64 71	131.8	28 54.1	65 70	132.2	45
6	30 23.3	62 74	128.4	30 04.8	62 74	128.9	29 46.2	62 74	129.3	29 27.5	62 73	129.8	29 08.7	63 72	130.2	28 49.9	63 72	130.7	28 30.9	63 72	131.1	28 11.9	64 71	131.5	6
7	29 38.6	61 75	127.7	29 20.4	61 75	128.2	29 02.1	61 74	128.7	28 43.7	61 74	129.1	28 25.2	62 73	129.6	28 06.6	62 73	130.0	27 47.9	62 72	130.4	27 29.2	63 72	130.9	7
8	28 53.6	60 76	127.1	28 35.6	60 75	127.6	28 17.6	60 75	128.0	27 59.5	61 74	128.5	27 41.2	61 74	128.9	27 22.9	61 73	129.4	27 04.6	61 73	129.8	26 46.1	62 72	130.2	8
9	28 08.1	59 76	126.5	27 50.4	59 76	126.9	27 32.7	59 76	127.4	27 14.8	60 75	127.8	26 56.9	60 74	128.3	26 38.9	60 74	128.7	26 20.8	60 74	129.2	26 02.6	61 73	129.6	9
50	27 22.3	58 77	125.8	27 04.9	58 76	126.3	26 47.4	58 76	126.8	26 29.8	59 76	127.2	26 12.2	59 75	127.7	25 54.4	59 75	128.1	25 36.6	60 74	128.6	25 18.7	60 74	129.0	50
1	26 36.2	57 78	125.2	26 19.0	57 77	125.7	26 01.8	58 77	126.2	25 44.5	58 76	126.6	25 27.1	58 76	127.1	25 09.6	58 75	127.5	24 52.1	59 75	128.0	24 34.4	59 74	128.4	1
2	25 49.6	56 78	124.6	25 32.8	56 78	125.1	25 15.8	57 77	125.6	24 58.8	57 77	126.0	24 41.6	57 76	126.5	24 24.4	57 76	126.9	24 07.1	58 76	127.4	23 49.8	58 75	127.8	2
3	25 02.8	55 79	124.1	24 46.2	56 78	124.5	24 29.5	56 78	125.0	24 12.7	56 77	125.4	23 55.8	56 77	125.9	23 38.9	57 76	126.3	23 21.9	57 76	126.8	23 04.8	57 76	127.2	3
4	24 15.7	54 79	123.5	23 59.3	55 79	124.0	23 42.9	55 78	124.4	23 26.3	55 78	124.9	23 09.7	55 77	125.3	22 53.0	56 77	125.8	22 36.3	56 76	126.2	22 19.5	56 76	126.7	4
55	23 28.2	54 80	122.9	23 12.1	54 79	123.4	22 55.9	54 79	123.9	22 39.6	54 78	124.3	22 23.3	55 78	124.8	22 06.9	55 77	125.2	21 50.4	55 77	125.7	21 33.8	55 77	126.1	55
6	22 40.5	53 80	122.4	22 24.6	53 80	122.9	22 08.6	53 79	123.3	21 52.6	54 79	123.8	21 36.5	54 78	124.2	21 20.4	54 78	124.7	21 04.1	54 78	125.1	20 47.8	54 77	125.6	6
7	21 52.4	52 81	121.9	21 36.8	52 80	122.3	21 21.1	52 80	122.8	21 05.3	53 79	123.2	20 49.5	53 79	123.7	20 33.6	53 78	124.2	20 17.6	53 78	124.6	20 01.5	54 78	125.1	7
8	21 04.1	51 81	121.4	20 48.7	51 81	121.8	20 33.3	52 80	122.3	20 17.7	52 80	122.7	20 02.1	52 79	123.2	19 46.5	52 79	123.6	19 30.7	53 78	124.1	19 14.9	53 78	124.5	8
9	20 15.5	50 81	120.8	20 00.4	51 81	121.3	19 45.2	51 81	121.8	19 29.9	51 80	122.2	19 14.5	51 80	122.7	18 59.1	52 79	123.1	18 43.6	52 79	123.6	18 28.1	52 79	124.0	9
60	19 26.7	50 82	120.3	19 11.8	50 81	120.8	18 56.8	50 81	121.3	18 41.7	50 81	121.7	18 26.6	50 80	122.2	18 11.5	51 80	122.6	17 56.2	51 80	123.1	17 40.9	51 79	123.5	60
1	18 37.6	49 82	119.9	18 22.9	49 82	120.3	18 08.2	49 82	120.8	17 53.4	49 81	121.2	17 38.5	50 81	121.7	17 23.5	50 80	122.1	17 08.5	50 80	122.6	16 53.5	50 79	123.0	1
2	17 48.3	48 83	119.4	17 33.8	48 82	119.8	17 19.3	49 82	120.3	17 04.7	49 81	120.7	16 50.1	49 81	121.2	16 35.4	49 81	121.7	16 20.6	49 80	122.1	16 05.8	49 80	122.6	2
3	16 58.7	47 83	118.9	16 44.5	48 83	119.4	16 30.2	48 82	119.8	16 15.9	48 82	120.3	16 01.4	48 81	120.7	15 47.0	48 81	121.2	15 32.4	49 81	121.6	15 17.9	49 80	122.1	3
4	16 09.0	47 83	118.4	15 54.9	47 83	118.9	15 40.9	47 83	119.4	15 26.7	47 82	119.8	15 12.6	47 82	120.3	14 58.3	48 81	120.7	14 44.0	48 81	121.2	14 29.7	48 81	121.6	4
65	15 19.0	46 84	118.0	15 05.2	46 83	118.5	14 51.3	46 83	118.9	14 37.4	46 83	119.4	14 23.5	47 82	119.8	14 09.4	47 82	120.3	13 55.4	47 82	120.7	13 41.3	47 81	121.2	65
6	14 28.8	45 84	117.5	14 15.2	45 84	118.0	14 01.6	46 83	118.5	13 47.9	46 83	118.9	13 34.1	46 82	119.4	13 20.3	46 82	119.8	13 06.5	46 82	120.3	12 52.6	46 81	120.8	6
7	13 38.4	44 84	117.1	13 25.0	45 84	117.6	13 11.6	45 84	118.0	12 58.1	45 83	118.5	12 44.6	45 83	119.0	12 31.0	45 83	119.4	12 17.4	45 82	119.9	12 03.8	46 82	120.3	7
8	12 47.8	44 85	116.7	12 34.6	44 84	117.1	12 21.4	44 84	117.6	12 08.2	44 84	118.1	11 54.8	44 83	118.5	11 41.5	45 83	119.0	11 28.1	45 82	119.4	11 14.7	45 82	119.9	8
9	11 57.0	43 85	116.3	11 44.0	43 85	116.7	11 31.0	43 84	117.2	11 18.0	44 84	117.7	11 04.9	44 83	118.1	10 51.8	44 83	118.6	10 38.6	44 83	119.0	10 25.4	44 82	119.5	9
70	11 06.0	42 85	115.9	10 53.3	43 85	116.3	10 40.5	43 84	116.8	10 27.6	43 84	117.2	10 14.8	43 84	117.7	10 01.9	43 84	118.2	9 48.9	43 83	118.6	9 35.9	43 83	119.1	70
1	10 14.9	42 86	115.5	10 02.3	42 85	115.9	9 49.8	42 85	116.4	9 37.1	42 84	116.8	9 24.5	42 84	117.3	9 11.7	42 84	117.8	8 59.0	43 84	118.2	8 46.2	43 83	118.7	1
2	9 23.6	41 86	115.1	9 11.2	41 85	115.5	8 58.8	41 85	116.0	8 46.4	41 85	116.4	8 34.0	42 84	116.9	8 21.5	42 84	117.4	8 08.9	42 84	117.8	7 56.4	42 83	118.3	2
3	8 32.1	40 86	114.7	8 20.0	41 86	115.1	8 07.8	41 86	115.6	7 55.5	41 85	116.1	7 43.3	41 85	116.5	7 31.0	41 84	117.0	7 18.7	41 84	117.4	7 06.3	41 84	117.9	3
4	7 40.5	40 86	114.3	7 28.5	40 86	114.8	7 16.5	40 86	115.2	7 04.5	40 85	115.7	6 52.4	40 85	116.1	6 40.3	40 85	116.6	6 28.2	40 84	117.1	6 16.1	40 84	117.5	4
75	6 48.7	39 87	113.9	6 36.9	39 86	114.4	6 25.1	39 86	114.8	6 13.3	39 86	115.3	6 01.4	40 85	115.8	5 49.5	40 85	116.2	5 37.6	40 85	116.7	5 25.7	40 84	117.2	75
6	5 56.8	39 87	113.6	5 45.2	39 86	114.0	5 33.6	39 86	114.5	5 21.9	39 86	114.9	5 10.2	39 86	115.4										6
7	5 04.7	38 87	113.2																						7

DECLINATION SAME NAME AS LATITUDE

H.A.	20° 00′			20° 30′			21° 00′			21° 30′			22° 00′			22° 30′			23° 00′			23° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	5 30.0	31 89	70.7	5 39.4	31 89	70.2	5 48.7	31 89	69.8	5 58.1	31 88	69.3	6 07.4	31 88	68.8	6 16.7	31 88	68.3	6 25.9	31 88	67.8	6 35.1	31 87	67.4	91
2										5 05.1	32 88	69.0	5 14.5	32 88	68.5	5 24.0	31 88	68.0	5 33.4	31 87	67.6	5 42.8	31 87	67.1	2

Lat. 19°

H.A.	24° 00′				24° 30′				25° 00′				25° 30′			
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°
00	85 00.0	1.0	08	00.0	84 30.0	1.0	08	00.0	84 00.0	1.0	07	00.0	83 30.0	1.0	07	00.0
1	84 54.9	98	25	10.4	84 25.3	99	23	09.4	83 55.7	99	21	08.6	83 26.1	99	19	07.9
2	84 39.9	93	39	20.1	84 11.7	95	36	18.3	83 43.2	95	33	16.8	83 14.5	96	31	15.5
3	84 16.5	87	51	28.6	83 50.1	89	47	26.3	83 23.2	90	44	24.3	82 56.0	92	41	22.6
4	83 46.1	79	60	35.9	83 21.8	82	56	33.3	82 56.9	84	53	31.0	82 31.3	86	50	28.9
05	83 10.3	72	66	42.0	82 48.2	75	63	39.3	82 25.2	78	60	36.8	82 01.4	80	57	34.5
6	82 30.5	65	72	47.1	82 10.4	69	69	44.3	81 49.2	72	66	41.7	81 27.2	75	63	39.4
7	81 47.5	59	76	51.2	81 29.2	63	73	48.5	81 09.9	66	70	46.0	80 49.6	69	67	43.6
8	81 02.2	54	78	54.7	80 45.6	57	76	52.1	80 27.8	61	74	49.6	80 09.2	64	71	47.3
9	80 15.1	49	81	57.6	79 59.9	52	79	55.0	79 43.7	56	76	52.7	79 26.4	59	74	50.4
10	79 26.6	44	83	60.0	79 12.7	48	81	57.6	78 57.8	51	79	55.3	78 41.9	55	77	53.1
1	78 36.9	41	84	62.0	78 24.2	44	82	59.7	78 10.5	47	81	57.6	77 55.8	51	79	55.4
2	77 46.4	37	85	63.8	77 34.8	41	84	61.6	77 22.1	44	82	59.5	77 08.5	47	81	57.5
3	76 55.2	34	86	65.2	76 44.5	37	85	63.2	76 32.8	41	84	61.2	76 20.2	44	82	59.3
4	76 03.4	31	87	66.5	75 53.5	35	86	64.6	75 42.7	38	84	62.7	75 31.0	40	83	60.8
15	75 11.2	29	88	67.6	75 02.0	32	87	65.8	74 52.0	35	85	64.0	74 41.2	38	84	62.2
6	74 18.5	27	88	68.6	74 10.1	30	87	66.8	74 00.8	32	86	65.1	73 50.7	35	85	63.4
7	73 25.6	25	89	69.4	73 17.7	27	88	67.8	73 09.1	30	87	66.1	72 59.7	33	86	64.5
8	72 32.3	23	89	70.2	72 25.1	25	88	68.6	72 17.1	28	87	67.0	72 08.3	30	86	65.4
9	71 38.8	21	90	70.8	71 32.1	24	89	69.3	71 24.7	26	88	67.8	71 16.6	28	87	66.3
20	70 45.1	19	90	71.4	70 39.0	22	89	69.9	70 32.1	24	88	68.5	70 24.5	26	87	67.0
1	69 51.3	18	90	71.9	69 45.6	20	89	70.5	69 39.2	22	88	69.1	69 32.1	25	88	67.7
2	68 57.3	16	90	72.4	68 52.0	19	90	71.0	68 46.1	21	89	69.6	68 39.5	23	88	68.3
3	68 03.2	15	90	72.8	67 58.3	17	90	71.4	67 52.8	19	89	70.1	67 46.7	21	88	68.8
4	67 08.9	14	90	73.1	67 04.5	16	90	71.8	66 59.4	18	89	70.6	66 53.7	20	89	69.3
25	66 14.6	13	91	73.4	66 10.5	15	90	72.2	66 05.8	17	90	71.0	66 00.6	18	89	69.7
6	65 20.2	12	91	73.7	65 16.5	13	90	72.5	65 12.1	15	90	71.3	65 07.3	17	89	70.1
7	64 25.7	10	91	73.9	64 22.3	12	90	72.8	64 18.4	14	90	71.6	64 13.9	16	89	70.5
8	63 31.2	09	91	74.1	63 28.1	11	90	73.0	63 24.5	13	90	71.9	63 20.3	15	89	70.8
9	62 36.6	08	91	74.3	62 33.8	10	91	73.2	62 30.5	12	90	72.1	62 26.7	13	90	71.1
30	61 42.0	08	91	74.5	61 39.5	09	91	73.4	61 36.5	11	90	72.4	61 33.0	12	90	71.3
1	60 47.3	07	91	74.6	60 45.1	08	91	73.6	60 42.4	10	90	72.6	60 39.2	11	90	71.5
2	59 52.6	06	91	74.7	59 50.6	07	91	73.7	59 48.2	09	90	72.7	59 45.4	10	90	71.7
3	58 57.8	05	91	74.8	58 56.2	06	91	73.8	58 54.0	08	90	72.9	58 51.5	09	90	71.9
4	58 03.1	04	91	74.9	58 01.7	05	91	73.9	57 59.8	07	90	73.0	57 57.6	08	90	72.1
35	57 08.3	03	91	74.9	57 07.1	05	91	74.0	57 05.5	06	90	73.1	57 03.6	07	90	72.2
6	56 13.5	02	91	75.0	56 12.6	04	91	74.1	56 11.2	05	90	73.2	56 09.5	06	90	72.3
7	55 18.7	02	91	75.0	55 18.0	03	91	74.1	55 16.9	04	90	73.3	55 15.5	05	90	72.4
8	54 23.9	01	91	75.0	54 23.4	02	91	74.2	54 22.6	03	90	73.3	54 21.4	05	90	72.5
9	53 29.1	00	91	75.1	53 28.8	01	91	74.2	53 28.2	03	91	73.4	53 27.3	04	90	72.5
40	52 34.3	00	91	75.1	52 34.2	01	91	74.2	52 33.9	02	91	73.4	52 33.2	03	90	72.6
1	51 39.5	01	91	75.0	51 39.6	00	91	74.2	51 39.5	01	91	73.4	51 39.0	02	90	72.6
2	50 44.7	02	91	75.0	50 45.0	01	91	74.2	50 45.1	00	91	73.4	50 44.9	01	90	72.7
3	49 49.9	03	91	75.0	49 50.5	01	91	74.2	49 50.7	00	91	73.4	49 50.7	01	90	72.7
4	48 55.1	03	91	75.0	48 55.9	02	91	74.2	48 56.4	01	91	73.4	48 56.6	00	90	72.7
45	48 00.3	04	91	74.9	48 01.3	03	91	74.2	48 02.0	02	91	73.4	48 02.4	01	90	72.7
6	47 05.5	04	91	74.8	47 06.7	04	91	74.1	47 07.6	03	91	73.4	47 08.3	02	90	72.6
7	46 10.8	05	91	74.8	46 12.2	04	91	74.1	46 13.3	03	90	73.3	46 14.1	02	90	72.6
8	45 16.0	06	91	74.7	45 17.6	05	91	74.0	45 18.9	04	90	73.3	45 20.0	03	90	72.6
9	44 21.3	06	91	74.6	44 23.1	05	91	73.9	44 24.6	05	90	73.2	44 25.9	04	90	72.5
50	43 26.6	07	91	74.6	43 28.6	06	91	73.9	43 30.3	05	90	73.2	43 31.7	04	90	72.5
1	42 32.0	08	91	74.5	42 34.1	07	91	73.8	42 36.0	06	90	73.1	42 37.7	05	90	72.4
2	41 37.3	08	91	74.4	41 39.6	07	91	73.7	41 41.7	07	90	73.0	41 43.6	06	90	72.4
3	40 42.7	09	91	74.3	40 45.2	08	91	73.6	40 47.5	07	90	72.9	40 49.5	06	90	72.3
4	39 48.1	09	91	74.2	39 50.8	09	91	73.5	39 53.3	08	90	72.9	39 55.5	07	90	72.2
55	38 53.5	10	91	74.0	38 56.4	09	91	73.4	38 59.1	08	90	72.8	39 01.5	08	90	72.1
6	37 59.0	10	91	73.9	38 02.1	10	91	73.3	38 04.9	09	90	72.7	38 07.5	08	90	72.0
7	37 04.5	11	91	73.8	37 07.7	10	90	73.2	37 10.7	10	90	72.6	37 13.6	09	90	71.9
8	36 10.1	12	91	73.7	36 13.4	11	90	73.1	36 16.6	10	90	72.4	36 19.6	10	90	71.8
9	35 15.6	12	91	73.5	35 19.2	12	90	72.9	35 22.6	11	90	72.3	35 25.8	10	90	71.7
60	34 21.3	13	91	73.4	34 25.0	12	90	72.8	34 28.5	12	90	72.2	34 31.9	11	90	71.6
1	33 26.9	13	90	73.3	33 30.8	13	90	72.7	33 34.5	12	90	72.1	33 38.1	12	90	71.5
2	32 32.6	14	90	73.1	32 36.7	13	90	72.5	32 40.6	13	90	71.9	32 44.3	12	90	71.3
3	31 38.3	14	90	73.0	31 42.6	14	90	72.4	31 46.7	13	90	71.8	31 50.6	13	89	71.2
4	30 44.1	15	90	72.8	30 48.5	14	90	72.2	30 52.8	14	90	71.6	30 56.9	13	89	71.1
65	29 50.0	16	90	72.6	29 54.5	15	90	72.1	29 59.0	15	90	71.5	30 03.3	14	89	70.9
6	28 55.8	16	90	72.5	29 00.6	16	90	71.9	29 05.2	15	90	71.3	29 09.7	15	89	70.8
7	28 01.8	17	90	72.3	28 06.7	16	90	71.7	28 11.5	16	90	71.2	28 16.2	15	89	70.6
8	27 07.7	17	90	72.1	27 12.8	17	90	71.6	27 17.8	16	89	71.0	27 22.7	16	89	70.5
9	26 13.8	18	90	71.9	26 19.1	17	90	71.4	26 24.2	17	89	70.8	26 29.2	17	89	70.3
70	25 19.9	18	90	71.8	25 25.3	18	89	71.2	25 30.6	18	89	70.7	25 35.8	17	89	70.1
1	24 26.0	19	90	71.6	24 31.6	19	89	71.0	24 37.1	18	89	70.5	24 42.5	18	89	70.0
2	23 32.2	19	90	71.4	23 38.0	19	89	70.8	23 43.7	19	89	70.3	23 49.3	18	89	69.8
3	22 38.5	20	90	71.2	22 44.4	20	89	70.7	22 50.3	19	89	70.1	22 56.1	19	89	69.6
4	21 44.8	21	89	71.0	21 51.0	20	89	70.5	21 57.0	20	89	69.9	22 02.9	20	88	69.4
75	20 51.2	21	89	70.8	20 57.5	21	89	70.3	21 03.7	21	89	69.7	21 09.8	20	88	69.2
6	19 57.7	22	89	70.6	20 04.2	21	89	70.1	20 10.5	21	88	69.5	20 16.8	21	88	69.0
7	19 04.2	22	89	70.4	19 10.9	22	89	69.8	19 17.4	22	88	69.3	19 23.9	21	88	68.8
8	18 10.8	23	89	70.1	18 17.6	23	89	69.6	18 24.4	22	88	69.1	18 31.1	22	88	68.6
9	17 17.5	23	89	69.9	17 24.5	23	88	69.4	17 31.4	23	88	68.9	17 38.3	23	88	68.4
80	16 24.3	24	89	69.7	16 31.4	24	88	69.2	16 38.5	24	88	68.7	16 45.6	23	88	68.2
1	15 31.1	25	88	69.5	15 38.4	24	88	69.0	15 45.7	24	88	68.5	15 52.9	24	88	67.9
2	14 38.0	25	88	69.2	14 45.5	25	88	68.7	14 53.0	25	88	68.2	15 00.4	25	87	67.7
3	13 45.0	26	88	69.0	13 52.7	26	88	68.5	14 00.4	25	88	68.0	14 08.0	25	87	67.5
4	12 52.1	26	88	68.7	13 00.0	26	88	68.2	13 07.8	26	88	67.7	13 15.6	26	87	67.3
85	11 59.3	27	88	68.5	12 07.3	27	88	68.0	12 15.4	27	87	67.5	12 23.3	26	87	67.0
6	11 06.5	28	88	68.2	11 14.8	27	87	67.7	11 23.0	27	87	67.3	11 31.1	27	87	66.8
7	10 13.9	28	88	68.0	10 22.3	28	87	67.5	10 30.7	28	87	67.0	10 39.1	28	87	66.5
8	9 21.4	29	88	67.7	9 30.0	29	87	67.2	9 38.5	29	87	66.7	9 47.1	28	86	66.3
9	8 28.9	29	87	67.4	8 37.7	29	87	67.0	8 46.5	29	87	66.5	8 55.2	29	86	66.0
90	7 36.6	30	87	67.2	7 45.6	30	87	66.7	7 54.5	30	86	66.2	8 03.4	30	86	65.7

26° 00′				26° 30′				27° 00′				27° 30′				H.A.
Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
83 00.0	1.0	06	00.0	82 30.0	1.0	06	00.0	82 00.0	1.0	05	00.0	81 30.0	1.0	05	00.0	00
82 56.4	99	18	07.3	82 26.6	99	17	06.8	81 56.8	99	16	06.4	81 27.0	99	15	06.0	1
82 45.6	97	29	14.4	82 16.6	97	27	13.4	81 47.5	97	25	12.6	81 18.2	98	24	11.8	2
82 28.3	93	38	21.0	82 00.4	93	36	19.7	81 32.3	94	34	18.5	81 03.9	95	32	17.4	3
82 05.2	88	47	27.1	81 38.6	89	45	25.4	81 11.7	90	42	24.0	80 44.5	91	40	22.6	4
81 36.9	82	54	32.5	81 11.9	84	52	30.6	80 46.4	86	49	29.0	80 20.5	87	47	27.4	05
81 04.5	77	60	37.3	80 41.0	79	57	35.3	80 17.0	81	55	33.5	79 52.4	83	53	31.8	6
80 28.5	72	65	41.4	80 06.6	74	62	39.4	79 44.0	76	60	37.5	79 20.8	78	58	35.8	7
79 49.6	67	69	45.1	79 29.2	69	66	43.0	79 08.0	72	64	41.1	78 46.2	74	62	39.3	8
79 08.3	62	72	48.3	78 49.3	65	70	46.2	78 29.5	67	68	44.3	78 09.0	69	66	42.5	9
78 25.0	58	75	51.0	78 07.3	60	73	49.0	77 48.9	63	71	47.1	77 29.7	65	69	45.3	10
77 40.2	54	77	53.4	77 23.7	56	75	51.5	77 06.4	59	73	49.6	76 48.4	61	71	47.9	1
76 54.0	50	79	55.5	76 38.6	53	77	53.7	76 22.5	55	75	51.9	76 05.6	58	74	50.1	2
76 06.7	46	80	57.4	75 52.4	49	79	55.6	75 37.3	52	77	53.8	75 21.4	54	76	52.1	3
75 18.5	43	82	59.0	75 05.1	46	80	57.3	74 51.0	48	79	55.6	74 36.1	51	77	53.9	4
74 29.5	40	83	60.5	74 17.0	43	81	58.8	74 03.8	45	80	57.1	73 49.8	48	79	55.5	15
73 39.8	38	84	61.7	73 28.1	40	82	60.1	73 15.7	43	81	58.5	73 02.6	45	80	57.0	6
72 49.6	35	85	62.9	72 38.7	38	83	61.3	72 27.0	40	82	59.8	72 14.7	42	81	58.3	7
71 58.8	33	85	63.9	71 48.6	35	84	62.4	71 37.7	37	83	60.9	71 26.2	40	82	59.4	8
71 07.7	31	86	64.8	70 58.2	33	85	63.3	70 47.9	35	84	61.9	70 37.0	37	83	60.5	9
70 16.2	29	86	65.6	70 07.3	31	85	64.2	69 57.7	33	84	62.8	69 47.4	35	83	61.4	20
69 24.4	27	87	66.3	69 16.0	29	86	65.0	69 07.0	31	85	63.6	68 57.4	33	84	62.3	1
68 32.3	25	87	67.0	68 24.5	27	86	65.6	68 16.1	29	86	64.3	68 07.0	31	85	63.1	2
67 40.0	23	88	67.5	67 32.7	25	87	66.3	67 24.8	27	86	65.0	67 16.3	29	85	63.8	3
66 47.5	22	88	68.1	66 40.6	24	87	66.8	66 33.2	26	86	65.6	66 25.2	28	86	64.4	4
65 54.8	20	88	68.5	65 48.4	22	87	67.4	65 41.4	24	87	66.2	65 34.0	26	86	65.0	25
65 01.9	19	88	69.0	64 55.9	21	88	67.8	64 49.4	23	87	66.7	64 42.4	24	86	65.5	6
64 08.9	18	89	69.4	64 03.3	19	88	68.2	63 57.3	21	87	67.1	63 50.7	23	87	66.0	7
63 15.7	16	89	69.7	63 10.6	18	88	68.6	63 04.9	20	88	67.5	62 58.8	21	87	66.4	8
62 22.5	15	89	70.0	62 17.7	17	88	68.9	62 12.4	18	88	67.9	62 06.7	20	87	66.8	9
61 29.1	14	89	70.3	61 24.7	15	88	69.2	61 19.8	17	88	68.2	61 14.5	19	87	67.2	30
60 35.6	13	89	70.5	60 31.6	14	89	69.5	60 27.1	16	88	68.5	60 22.1	17	87	67.5	1
59 42.1	12	89	70.7	59 38.4	13	89	69.8	59 34.2	15	88	68.8	59 29.6	16	88	67.8	2
58 48.5	11	89	70.9	58 45.1	12	89	70.0	58 41.3	13	88	69.0	58 37.1	15	88	68.1	3
57 54.9	10	90	71.1	57 51.8	11	89	70.2	57 48.3	12	88	69.3	57 44.4	14	88	68.3	4
57 01.2	09	90	71.3	56 58.4	10	89	70.4	56 55.2	11	89	69.4	56 51.6	13	88	68.5	35
56 07.4	08	90	71.4	56 04.9	09	89	70.5	56 02.1	10	89	69.6	55 58.8	12	88	68.7	6
55 13.6	07	90	71.5	55 11.4	08	89	70.6	55 08.9	09	89	69.8	55 05.9	10	88	68.9	7
54 19.8	06	90	71.6	54 17.9	07	89	70.8	54 15.6	08	89	69.9	54 12.9	09	88	69.1	8
53 26.0	05	90	71.7	53 24.3	06	89	70.9	53 22.3	07	89	70.0	53 19.9	08	88	69.2	9
52 32.1	04	90	71.8	52 30.7	05	89	70.9	52 29.0	06	89	70.1	52 26.9	07	88	69.3	40
51 38.2	03	90	71.8	51 37.1	04	89	71.0	51 35.6	05	89	70.2	51 33.8	07	89	69.4	1
50 44.3	02	90	71.9	50 43.4	04	89	71.1	50 42.2	05	89	70.3	50 40.7	06	89	69.5	2
49 50.4	02	90	71.9	49 49.7	03	89	71.1	49 48.8	04	89	70.3	49 47.5	05	89	69.6	3
48 56.5	01	90	71.9	48 56.1	02	89	71.1	48 55.4	03	89	70.4	48 54.4	04	89	69.6	4
48 02.5	00	90	71.9	48 02.4	01	90	71.2	48 01.9	02	89	70.4	48 01.2	03	89	69.7	45
47 08.6	01	90	71.9	47 08.7	00	89	71.2	47 08.5	01	89	70.4	47 08.0	02	89	69.7	6
46 14.7	01	90	71.9	46 15.0	01	89	71.2	46 15.0	00	89	70.4	46 14.7	01	89	69.7	7
45 20.8	02	90	71.9	45 21.3	01	89	71.2	45 21.5	00	89	70.4	45 21.5	00	89	69.7	8
44 26.9	03	90	71.8	44 27.6	02	89	71.1	44 28.1	01	89	70.4	44 28.3	00	89	69.7	9
43 33.0	04	90	71.8	43 33.9	03	89	71.1	43 34.6	02	89	70.4	43 35.1	01	89	69.7	50
42 39.1	04	90	71.7	42 40.2	04	89	71.1	42 41.2	03	89	70.4	42 41.9	02	89	69.7	1
41 45.2	05	90	71.7	41 46.6	04	89	71.0	41 47.7	03	89	70.4	41 48.7	03	89	69.7	2
40 51.4	06	90	71.6	40 53.0	05	89	71.0	40 54.3	04	89	70.3	40 55.5	03	89	69.6	3
39 57.5	06	90	71.6	39 59.3	06	89	70.9	40 00.9	05	89	70.3	40 02.3	04	89	69.6	4
39 03.7	07	90	71.5	39 05.7	06	89	70.8	39 07.5	06	89	70.2	39 09.1	05	89	69.5	55
38 09.9	08	90	71.4	38 12.2	07	89	70.8	38 14.2	06	89	70.1	38 16.0	06	89	69.5	6
37 16.2	08	90	71.3	37 18.6	08	89	70.7	37 20.8	07	89	70.0	37 22.9	06	88	69.4	7
36 22.5	09	90	71.2	36 25.1	08	89	70.6	36 27.5	08	89	70.0	36 29.8	07	88	69.3	8
35 28.8	10	90	71.1	35 31.6	09	89	70.5	35 34.2	08	89	69.9	35 36.7	08	88	69.3	9
34 35.1	10	89	71.0	34 38.1	10	89	70.4	34 41.0	09	89	69.8	34 43.6	09	88	69.2	60
33 41.5	11	89	70.9	33 44.7	10	89	70.3	33 47.8	10	89	69.7	33 50.6	09	88	69.1	1
32 47.9	12	89	70.8	32 51.3	11	89	70.2	32 54.6	11	88	69.6	32 57.7	10	88	69.0	2
31 54.4	12	89	70.6	31 58.0	12	89	70.0	32 01.4	11	88	69.5	32 04.7	11	88	68.9	3
31 00.9	13	89	70.5	31 04.7	12	89	69.9	31 08.3	12	88	69.3	31 11.8	11	88	68.8	4
30 07.4	14	89	70.4	30 11.4	13	89	69.8	30 15.3	13	88	69.2	30 19.0	12	88	68.6	65
29 14.0	14	89	70.2	29 18.2	14	89	69.6	29 22.3	13	88	69.1	29 26.2	13	88	68.5	6
28 20.7	15	89	70.1	28 25.1	14	89	69.5	28 29.3	14	88	68.9	28 33.4	13	88	68.4	7
27 27.4	15	89	69.9	27 31.9	15	88	69.3	27 36.4	15	88	68.8	27 40.7	14	88	68.2	8
26 34.1	16	89	69.7	26 38.9	16	88	69.2	26 43.5	15	88	68.6	26 48.0	15	88	68.1	9
25 40.9	17	88	69.6	25 45.9	16	88	69.0	25 50.7	16	88	68.5	25 55.4	16	88	67.9	70
24 47.8	17	88	69.4	24 52.9	17	88	68.9	24 58.0	17	88	68.3	25 02.9	16	87	67.8	1
23 54.7	18	88	69.2	24 00.1	18	88	68.7	24 05.3	17	88	68.2	24 10.4	17	87	67.6	2
23 01.7	19	88	69.1	23 07.2	18	88	68.5	23 12.7	18	88	68.0	23 18.0	18	87	67.5	3
22 08.7	19	88	68.9	22 14.5	19	88	68.3	22 20.1	19	88	67.8	22 25.6	18	87	67.3	4
21 15.9	20	88	68.7	21 21.8	20	88	68.2	21 27.6	19	87	67.6	21 33.3	19	87	67.1	75
20 23.0	21	88	68.5	20 29.2	20	88	68.0	20 35.2	20	87	67.4	20 41.1	20	87	66.9	6
19 30.3	21	88	68.3	19 36.6	21	87	67.8	19 42.8	21	87	67.3	19 48.9	20	87	66.7	7
18 37.6	22	88	68.1	18 44.1	22	87	67.6	18 50.5	21	87	67.1	18 56.9	21	87	66.5	8
17 45.0	22	88	67.9	17 51.7	22	87	67.4	17 58.3	22	87	66.9	18 04.9	22	87	66.3	9
16 52.5	23	87	67.7	16 59.4	23	87	67.2	17 06.2	23	87	66.6	17 12.9	22	86	66.1	80
16 00.1	24	87	67.4	16 07.2	23	87	66.9	16 14.2	23	87	66.4	16 21.1	23	86	65.9	1
15 07.7	24	87	67.2	15 15.0	24	87	66.7	15 22.2	24	86	66.2	15 29.3	24	86	65.7	2
14 15.5	25	87	67.0	14 22.9	25	87	66.5	14 30.3	25	86	66.0	14 37.7	24	86	65.5	3
13 23.3	26	87	66.8	13 31.0	25	86	66.3	13 38.6	25	86	65.8	13 46.1	25	86	65.3	4
12 31.2	26	87	66.5	12 39.1	26	86	66.0	12 46.9	26	86	65.5	12 54.6	26	86	65.0	85
11 39.2	27	86	66.3	11 47.3	27	86	65.8	11 55.3	27	86	65.3	12 03.2	26	85	64.8	6
10 47.4	28	86	66.0	10 55.6	27	86	65.5	11 03.8	27	86	65.0	11 12.0	27	85	64.6	7
9 55.6	28	86	65.8	10 04.0	28	86	65.3	10 12.4	28	86	64.8	10 20.8	28	85	64.3	8
9 03.9	29	86	65.5	9 12.5	29	86	65.0	9 21.1	29	85	64.5	9 29.7	29	85	64.1	9
8 12.3	30	86	65.2	8 21.2	29	85	64.8	8 30.0	29	85	64.3	8 38.8	29	85	63.8	90

H.A.	24° 00′	24° 30′	25° 00′	25° 30′	26° 00′	26° 30′	27° 00′	27° 30′	H.A.
	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	
°	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	°
00	47 00.0 1.0 01 180.0	46 30.0 1.0 01 180.0	46 00.0 1.0 01 180.0	45 30.0 1.0 01 180.0	45 00.0 1.0 01 180.0	44 30.0 1.0 01 180.0	44 00.0 1.0 01 180.0	43 30.0 1.0 01 180.0	00
1	46 59.3 1.0 03 178.7	46 29.3 1.0 03 178.7	45 59.4 1.0 03 178.7	45 29.4 1.0 03 178.7	44 59.4 1.0 03 178.7	44 29.4 1.0 03 178.7	43 59.4 1.0 03 178.8	43 29.4 1.0 03 178.8	1
2	46 57.4 1.0 06 177.3	46 27.4 1.0 05 177.4	45 57.4 1.0 05 177.4	45 27.5 1.0 05 177.4	44 57.5 1.0 05 177.5	44 27.5 1.0 05 177.5	43 57.5 1.0 05 177.5	43 27.6 1.0 05 177.6	2
3	46 54.0 1.0 08 176.0	46 24.1 1.0 08 176.0	45 54.2 1.0 08 176.1	45 24.3 1.0 07 176.1	44 54.3 1.0 07 176.2	44 24.4 1.0 07 176.2	43 54.5 1.0 07 176.3	43 24.6 1.0 07 176.3	3
4	46 49.4 1.0 10 174.7	46 19.6 1.0 10 174.7	45 49.7 1.0 10 174.8	45 19.8 1.0 10 174.9	44 49.9 1.0 09 174.9	44 20.1 1.0 09 175.0	43 50.2 1.0 09 175.1	43 20.3 1.0 09 175.1	4
05	46 43.5 99 12 173.3	46 13.7 99 12 173.4	45 43.9 99 12 173.5	45 14.1 99 12 173.6	44 44.3 99 12 173.7	44 14.5 99 11 173.7	43 44.7 99 11 173.8	43 14.9 99 11 173.9	05
6	46 36.2 99 14 172.0	46 06.5 99 14 172.1	45 36.8 99 14 172.2	45 07.1 99 14 172.3	44 37.4 99 14 172.4	44 07.7 99 13 172.5	43 38.0 99 13 172.6	43 08.3 99 13 172.7	6
7	46 27.7 99 16 170.7	45 58.1 99 16 170.8	45 28.5 99 16 170.9	44 58.9 99 16 171.1	44 29.3 99 16 171.2	43 59.7 99 15 171.3	43 30.1 99 15 171.4	43 00.5 99 15 171.5	7
8	46 17.9 98 18 169.4	45 48.4 98 18 169.5	45 19.0 98 18 169.7	44 49.5 98 18 169.8	44 20.0 98 18 169.9	43 50.5 98 17 170.1	43 21.0 98 17 170.2	42 51.5 98 17 170.3	8
9	46 06.8 98 20 168.1	45 37.5 98 20 168.3	45 08.2 98 20 168.4	44 38.9 98 20 168.6	44 09.5 98 20 168.7	43 40.1 98 19 168.8	43 10.8 98 19 169.0	42 41.4 98 19 169.1	9
10	45 54.5 97 22 166.8	45 25.4 97 22 167.0	44 56.2 97 22 167.2	44 27.0 97 22 167.3	43 57.8 97 22 167.5	43 28.6 97 21 167.6	42 59.3 97 21 167.8	42 30.1 97 21 167.9	10
1	45 41.0 97 24 165.6	45 12.0 97 24 165.7	44 43.0 97 24 165.9	44 13.9 97 24 166.1	43 44.9 97 23 166.3	43 15.8 97 23 166.4	42 46.8 97 23 166.6	42 17.7 97 23 166.8	1
2	45 26.2 96 26 164.3	44 57.4 96 26 164.5	44 28.6 96 26 164.7	43 59.7 96 26 164.9	43 30.9 96 25 165.1	43 02.0 96 25 165.3	42 33.1 96 25 165.4	42 04.2 96 24 165.6	2
3	45 10.3 95 28 163.1	44 41.7 95 28 163.3	44 13.0 95 28 163.5	43 44.4 96 28 163.7	43 15.7 96 27 163.9	42 47.0 96 27 164.1	42 18.2 96 26 164.3	41 49.5 96 26 164.5	3
4	44 53.1 95 30 161.8	44 24.7 95 30 162.1	43 56.3 95 30 162.3	43 27.8 95 29 162.5	42 59.4 95 29 162.7	42 30.9 95 29 162.9	42 02.3 95 28 163.1	41 33.8 95 28 163.3	4
15	44 34.9 94 32 160.6	44 06.7 94 32 160.9	43 38.5 94 32 161.1	43 10.2 94 31 161.3	42 42.0 94 31 161.5	42 13.7 94 30 161.8	41 45.3 94 30 162.0	41 17.0 95 30 162.2	15
6	44 15.5 93 34 159.4	43 47.5 93 34 159.7	43 19.5 93 33 159.9	42 51.5 93 33 160.2	42 23.5 94 33 160.4	41 55.4 94 32 160.6	41 27.3 94 32 160.9	40 59.1 94 31 161.1	6
7	43 55.0 92 36 158.2	43 27.3 92 36 158.5	42 59.5 93 35 158.8	42 31.7 93 35 159.0	42 03.9 93 34 159.3	41 36.0 93 34 159.5	41 08.2 93 34 159.8	40 40.2 93 33 160.0	7
8	43 33.4 92 38 157.1	43 06.0 92 37 157.3	42 38.4 92 37 157.6	42 10.9 92 36 157.9	41 43.3 92 36 158.2	41 15.7 92 36 158.4	40 48.0 92 35 158.7	40 20.3 92 35 158.9	8
9	43 10.8 91 39 155.9	42 43.6 91 39 156.2	42 16.3 91 38 156.5	41 49.0 91 38 156.8	41 21.7 91 38 157.1	40 54.3 91 37 157.3	40 26.9 91 37 157.6	39 59.4 92 36 157.9	9
20	42 47.2 90 41 154.8	42 20.2 90 41 155.1	41 53.2 90 40 155.4	41 26.2 90 40 155.7	40 59.1 90 39 156.0	40 31.9 90 39 156.3	40 04.8 91 38 156.5	39 37.6 91 38 156.8	20
1	42 22.5 89 43 153.7	41 55.8 89 42 154.0	41 29.1 89 42 154.3	41 02.3 89 41 154.6	40 35.5 89 41 154.9	40 08.6 90 40 155.2	39 41.7 90 40 155.5	39 14.8 90 40 155.8	1
2	41 56.9 88 44 152.6	41 30.5 88 44 152.9	41 04.0 88 43 153.2	40 37.5 88 43 153.5	40 11.0 89 42 153.9	39 44.4 89 42 154.2	39 17.7 89 42 154.5	38 51.0 89 41 154.7	2
3	41 30.3 87 46 151.5	41 04.2 87 45 151.9	40 38.0 87 45 152.2	40 11.8 88 44 152.5	39 45.5 88 44 152.8	39 19.2 88 44 153.1	38 52.8 88 43 153.4	38 26.4 88 43 153.7	3
4	41 02.8 86 47 150.5	40 37.0 86 47 150.8	40 11.1 86 46 151.2	39 45.1 87 46 151.5	39 19.1 87 45 151.8	38 53.1 87 45 152.1	38 27.0 87 44 152.4	38 00.8 87 44 152.7	4
25	40 34.4 85 49 149.4	40 08.9 85 48 149.8	39 43.3 85 48 150.1	39 17.6 86 47 150.5	38 51.9 86 47 150.8	38 26.1 86 46 151.1	38 00.3 86 46 151.5	37 34.4 86 45 151.8	25
6	40 05.2 84 50 148.4	39 39.9 84 50 148.8	39 14.6 84 49 149.1	38 49.2 85 49 149.5	38 23.8 85 48 149.8	37 58.3 85 48 150.2	37 32.8 85 47 150.5	37 07.2 85 47 150.8	6
7	39 35.0 83 52 147.4	39 10.1 83 51 147.8	38 45.1 83 50 148.2	38 20.0 84 50 148.5	37 54.9 84 50 148.9	37 29.7 84 49 149.2	37 04.4 84 49 149.5	36 39.1 84 48 149.9	7
8	39 04.1 82 53 146.5	38 39.5 82 52 146.8	38 14.7 82 52 147.2	37 50.0 83 51 147.6	37 25.1 83 51 147.9	37 00.2 83 50 148.3	36 35.2 83 50 148.6	36 10.2 84 49 148.9	8
9	38 32.4 81 54 145.5	38 08.0 81 54 145.9	37 43.6 81 53 146.3	37 19.1 82 53 146.6	36 54.6 82 52 147.0	36 30.0 82 52 147.3	36 05.3 82 51 147.7	35 40.6 83 51 148.0	9
30	37 59.9 80 56 144.6	37 35.8 80 55 145.0	37 11.7 80 54 145.3	36 47.5 81 54 145.7	36 23.3 81 53 146.1	35 59.0 81 53 146.4	35 34.6 81 52 146.8	35 10.1 82 52 147.1	30
1	37 26.6 79 57 143.7	37 02.9 79 56 144.0	36 39.1 79 56 144.4	36 15.2 80 55 144.8	35 51.2 80 54 145.2	35 27.2 80 54 145.5	35 03.2 80 54 145.9	34 39.0 81 53 146.3	1
2	36 52.6 78 58 142.8	36 29.2 78 57 143.1	36 05.7 78 57 143.5	35 42.1 79 56 143.9	35 18.5 79 56 144.3	34 54.8 79 55 144.7	34 31.0 79 55 145.0	34 07.1 80 54 145.4	2
3	36 17.9 77 59 141.9	35 54.8 77 58 142.3	35 31.6 77 58 142.7	35 08.4 78 57 143.0	34 45.0 78 57 143.4	34 21.6 78 56 143.8	33 58.1 78 56 144.2	33 34.6 79 55 144.6	3
4	35 42.6 76 60 141.0	35 19.8 76 60 141.4	34 56.9 76 59 141.8	34 33.9 77 58 142.2	34 10.9 77 58 142.6	33 47.8 77 57 143.0	33 24.6 77 57 143.4	33 01.4 78 56 143.7	4
35	35 06.6 75 61 140.2	34 44.1 75 61 140.6	34 21.5 75 60 141.0	33 58.8 76 60 141.4	33 36.1 76 59 141.8	33 13.3 76 59 142.1	32 50.4 76 58 142.5	32 27.5 77 58 142.9	35
6	34 29.9 74 62 139.3	34 07.7 74 62 139.7	33 45.5 74 61 140.2	33 23.1 75 61 140.6	33 00.7 75 60 140.9	32 38.2 75 60 141.3	32 15.6 75 59 141.7	31 53.0 76 59 142.1	6
7	33 52.7 73 63 138.5	33 30.8 73 63 138.9	33 08.8 73 62 139.4	32 46.8 74 62 139.8	32 24.6 74 61 140.2	32 02.4 74 61 140.6	31 40.2 74 60 140.9	31 17.8 75 60 141.3	7
8	33 14.8 72 64 137.7	32 53.2 72 64 138.2	32 31.5 72 63 138.6	32 09.8 73 63 139.0	31 48.0 73 62 139.4	31 26.1 73 62 139.8	31 04.1 73 61 140.2	30 42.1 74 61 140.6	8
9	32 36.4 71 65 137.0	32 15.1 71 64 137.4	31 53.7 71 64 137.8	31 32.3 72 63 138.2	31 10.8 72 63 138.6	30 49.2 72 62 139.0	30 27.5 72 62 139.4	30 05.8 73 61 139.8	9
40	31 57.4 70 66 136.2	31 36.4 70 65 136.6	31 15.3 70 65 137.0	30 54.2 71 64 137.5	30 33.0 71 64 137.9	30 11.7 71 63 138.3	29 50.3 71 63 138.7	29 28.9 72 62 139.1	40
1	31 17.8 69 67 135.5	30 57.2 69 66 135.9	30 36.4 69 66 136.3	30 15.6 70 65 136.7	29 54.7 70 65 137.1	29 33.7 70 64 137.5	29 12.6 70 64 138.0	28 51.5 71 63 138.4	1
2	30 37.8 68 68 134.7	30 17.4 68 67 135.2	29 57.0 68 67 135.6	29 36.4 69 66 136.0	29 15.8 69 66 136.4	28 55.1 69 65 136.8	28 34.3 69 65 137.2	28 13.5 70 64 137.7	2
3	29 57.2 67 68 134.0	29 37.2 67 68 134.4	29 17.0 67 68 134.9	28 56.8 68 67 135.3	28 36.4 68 66 135.7	28 16.0 68 66 136.1	27 55.6 68 66 136.5	27 35.0 69 65 137.0	3
4	29 16.2 66 69 133.3	28 56.4 66 69 133.8	28 36.6 66 68 134.2	28 16.6 67 68 134.6	27 56.6 67 67 135.0	27 36.5 67 67 135.4	27 16.3 67 66 135.9	26 56.1 68 66 136.3	4
45	28 34.7 65 70 132.6	28 15.2 65 69 133.1	27 55.6 65 69 133.5	27 36.0 66 68 133.9	27 16.3 66 68 134.4	26 56.4 66 68 134.8	26 36.6 66 67 135.2	26 16.6 67 67 135.6	45
6	27 52.7 64 71 132.0	27 33.5 64 70 132.4	27 14.3 64 70 132.8	26 54.9 65 69 133.3	26 35.5 65 69 133.7	26 15.9 65 68 134.1	25 56.4 65 68 134.5	25 36.7 66 67 135.0	6
7	27 10.4 63 71 131.3	26 51.4 63 71 131.8	26 32.4 63 70 132.2	26 13.4 64 70 132.6	25 54.2 64 69 133.1	25 35.0 64 69 133.5	25 15.7 64 68 133.9	24 56.3 65 68 134.3	7
8	26 27.5 62 72 130.7	26 08.9 62 72 131.1	25 50.2 62 71 131.6	25 31.4 63 71 132.0	25 12.6 63 70 132.4	24 53.6 63 70 132.8	24 34.6 63 69 133.3	24 15.5 64 69 133.7	8
9	25 44.3 61 73 130.1	25 26.0 61 72 130.5	25 07.5 62 72 130.9	24 49.0 62 71 131.4	24 30.5 62 71 131.8	24 11.8 62 70 132.2	23 53.1 63 70 132.7	23 34.3 63 69 133.1	9
50	25 00.7 60 73 129.4	24 42.6 60 73 129.9	24 24.5 61 72 130.3	24 06.3 61 72 130.8	23 48.0 61 72 131.2	23 29.6 61 71 131.6	23 11.2 62 70 132.1	22 52.7 62 70 132.5	50
1	24 16.7 59 74 128.8	23 58.9 59 74 129.3	23 41.0 60 73 129.7	23 23.1 60 73 130.2	23 05.1 60 72 130.6	22 47.0 60 72 131.0	22 28.8 61 71 131.5	22 10.6 61 71 131.9	1
2	23 32.3 58 74 128.3	23 14.8 59 74 128.7	22 57.2 59 74 129.1	22 39.6 59 73 129.6	22 21.8 59 73 130.0	22 04.0 59 72 130.5	21 46.1 60 72 130.9	21 28.2 60 71 131.3	2
3	22 47.6 57 75 127.7	22 30.4 58 75 128.1	22 13.0 58 74 128.6	21 55.7 58 74 129.0	21 38.2 58 73 129.4	21 20.7 59 73 129.9	21 03.1 59 72 130.3	20 45.4 59 72 130.8	3
4	22 02.5 56 76 127.1	21 45.6 57 75 127.6	21 28.5 57 75 128.0	21 11.4 57 74 128.4	20 54.2 57 74 128.9	20 37.0 58 73 129.3	20 19.6 58 73 129.8	20 02.3 58 72 130.2	4
55	21 17.1 56 76 126.6	21 00.4 56 76 127.0	20 43.7 56 75 127.5	20 26.8 56 75 127.9	20 09.9 56 74 128.3	19 52.9 57 74 128.8	19 35.9 57 74 129.2	19 18.7 57 73 129.7	55
6	20 31.4 55 77 126.0	20 15.0 55 76 126.5	19 58.5 55 76 126.9	19 41.9 55 75 127.4	19 25.2 56 75 127.8	19 08.5 56 75 128.2	18 51.7 56 74 128.7	18 34.9 56 74 129.1	6
7	19 45.4 54 77 125.5	19 29.2 54 77 126.0	19 12.9 54 76 126.4	18 56.6 55 76 126.8	18 40.2 55 75 127.3	18 23.8 55 75 127.7	18 07.3 55 75 128.2	17 50.7 55 74 128.6	7
8	18 59.1 53 78 125.0	18 43.1 53 77 125.4	18 27.1 53 77 125.9	18 11.1 54 76 126.3	17 55.0 54 76 126.8	17 38.8 54 76 127.2	17 22.5 54 75 127.7	17 06.2 54 75 128.1	8
9	18 12.4 52 78 124.5	17 56.8 52 78 124.9	17 41.0 53 77 125.4	17 25.2 53 77 125.8	17 09.4 53 76 126.3	16 53.4 53 76 126.7	16 37.5 53 76 127.2	16 21.4 54 75 127.6	9
60	17 25.5 51 79 124.0	17 10.1 52 78 124.4	16 54.6 52 78 124.9	16 39.1 52 77 125.3	16 23.5 52 77 125.8	16 07.8 52 77 126.2	15 52.1 52 76 126.7	15 36.3 53 76 127.1	60
1	16 38.4 51 79 123.5	16 23.2 51 79 123.9	16 07.9 51 78 124.4	15 52.6 51 78 124.8	15 37.3 51 77 125.3	15 21.9 51 77 125.7	15 06.4 52 76 126.2	14 50.9 52 76 126.6	1
2	15 50.9 50 80 123.0	15 36.0 50 79 123.5	15 21.0 50 79 123.9	15 06.0 50 78 124.4	14 50.9 50 78 124.8	14 35.7 51 77 125.3	14 20.5 51 77 125.7	14 05.3 51 77 126.2	2
3	15 03.2 49 80 122.6	14 48.5 49 80 123.0	14 33.8 49 79 123.5	14 19.0 49 79 123.9	14 04.2 50 78 124.4	13 49.3 50 78 124.8	13 34.3 50 78 125.2	13 19.3 50 77 125.7	3
4	14 15.3 48 80 122.1	14 00.8 48 80 122.5	13 46.3 48 80 123.0	13 31.8 49 79 123.4	13 17.2 49 79 123.9	13 02.5 49 78 124.3	12 47.9 49 78 124.8	12 33.1 49 77 125.2	4
65	13 27.1 47 81 121.6	13 12.9 47 80 122.1	12 58.6 48 80 122.6	12 44.3 48 80 123.0	12 30.0 48 79 123.5	12 15.6 48 79 123.9	12 01.1 48 78 124.3	11 46.7 48 78 124.8	65
6	12 38.7 47 81 121.2	12 24.7 47 81 121.7	12 10.7 47 80 122.1	11 56.6 47 80 122.6	11 42.5 47 80 123.0	11 28.4 47 79 123.5	11 14.2 47 79 123.9	10 59.9 48 78 124.4	6
7	11 50.1 46 81 120.8	11 36.3 46 81 121.2	11 22.5 46 81 121.7	11 08.7 46 80 122.1	10 54.8 46 80 122.6	10 40.9 46 79 123.0	10 27.0 47 79 123.5	10 13.0 47 79 123.9	7
8	11 01.2 45 82 120.4	10 47.7 45 81 120.8	10 34.1 45 81 121.3	10 20.6 45 81 121.7	10 06.9 45 80 122.2	9 53.3 46 80 122.6	9 39.6 46 79 123.1	9 25.8 46 79 123.5	8
9	10 12.2 44 82 119.9	9 58.9 44 82 120.4	9 45.5 44 81 120.8	9 32.2 45 81 121.3	9 18.8 45 81 121.8	9 05.4 45 80 122.2	8 51.9 45 80 122.7	8 38.4 45 79 123.1	9
70	9 22.9 43 82 119.5	9 09.8 44 82 120.0	8 56.7 44 82 120.4	8 43.6 44 81 120.9	8 30.4 44 81 121.4	8 17.3 44 81 121.8	8 04.0 44 80 122.3	7 50.8 44 80 122.7	70
1	8 33.4 43 83 119.1	8 20.6 43 82 119.6	8 07.7 43 82 120.0	7 54.8 43 82 120.5	7 41.9 43 81 121.0	7 28.9 43 81 121.4	7 16.0 43 80 121.9	7 02.9 43 80 122.3	1
2	7 43.8 42 83 118.7	7 31.2 42 83 119.2	7 18.5 42 82 119.7	7 05.8 42 82 120.1	6 53.1 42 82 120.6	6 40.4 42 81 121.0	6 27.7 43 81 121.5	6 14.9 43 80 121.9	2
3	6 54.0 41 83 118.4	6 41.6 41 83 118.8	6 29.1 41 83 119.3	6 16.7 42 82 119.7	6 04.2 42 82 120.2	5 51.7 42 82 120.6	5 39.2 42 81 121.1	5 26.7 42 81 121.6	3
4	6 03.9 41 84 118.0	5 51.8 41 83 118.4	5 39.6 41 83 118.9	5 27.3 41 83 119.4	5 15.1 41 82 119.8	5 02.8 41 82 120.3			4
75	5 13.8 40 84 117.6	5 01.8 40 84 118.1							75

DECLINATION SAME NAME AS LATITUDE

H.A.	24° 00′	24° 30′	25° 00′	25° 30′	26° 00′	26° 30′	27° 00′	27° 30′	H.A.
	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	Alt. Az.	
°	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	° ′ Δd Δt °	°
91	6 44.3 31 87 66.9	6 53.5 31 87 66.4	7 02.7 30 86 65.9	7 11.8 30 86 65.5	7 20.9 30 86 65.0	7 29.9 30 85 64.5	7 38.9 30 85 64.0	7 47.9 30 85 63.5	91
2	5 52.2 31 87 66.6	6 01.6 31 86 66.1	6 10.9 31 86 65.7	6 20.2 31 86 65.2	6 29.5 31 85 64.7	6 38.8 31 85 64.2	6 48.0 31 85 63.7	6 57.2 31 84 63.3	2
3	5 00.2 32 86 66.3	5 09.8 32 86 65.8	5 19.3 32 86 65.4	5 28.8 32 86 64.9	5 38.3 32 85 64.4	5 47.7 32 85 63.9	5 57.2 31 84 63.5	6 06.6 31 84 63.0	3
4							5 06.5 32 84 63.2	5 16.1 32 84 62.7	4

Lat. 19°

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	81 00.0	1.0 05	00.0	80 30.0	1.0 04	00.0	80 00.0	1.0 04	00.0	79 00.0	1.0 04	00.0	77 00.0	1.0 03	00.0	75 00.0	1.0 03	00.0	74 30.0	1.0 03	00.0	73 30.0	1.0 02	00.0	00
1	80 57.2	99 14	05.6	80 27.4	1.0 13	05.3	79 57.5	1.0 12	05.0	78 57.8	1.0 11	04.5	76 58.1	1.0 09	03.8	74 58.4	1.0 08	03.2	74 28.5	1.0 08	03.1	73 28.6	1.0 07	02.9	1
2	80 48.9	98 22	11.1	80 19.6	98 21	10.5	79 50.1	98 20	10.0	78 51.1	99 18	09.0	76 52.6	99 15	07.5	74 53.7	99 13	06.4	74 23.9	99 13	06.1	73 24.3	99 12	05.7	2
3	80 35.4	96 31	16.4	80 06.7	96 29	15.5	79 38.0	96 28	14.7	78 40.1	97 25	13.3	76 43.4	98 21	11.1	74 45.8	98 18	09.5	74 16.4	98 17	09.2	73 17.3	99 16	08.5	3
4	80 17.0	92 38	21.4	79 49.3	93 36	20.3	79 21.4	93 35	19.3	78 25.0	94 32	17.5	76 30.7	96 27	14.7	74 35.0	97 23	12.6	74 05.9	97 22	12.1	73 07.6	97 21	11.3	4
05	79 54.2	88 45	26.0	79 27.5	89 43	24.8	79 00.6	90 41	23.6	78 06.0	92 37	21.5	76 14.7	94 32	18.1	74 21.2	95 28	15.5	73 52.6	95 27	15.0	72 55.1	96 25	14.0	05
6	79 27.4	84 50	30.3	79 01.9	85 48	28.9	78 36.1	87 46	27.6	77 43.6	89 43	25.2	75 55.5	91 37	21.4	74 04.6	93 32	18.4	73 36.6	94 31	17.8	72 40.2	94 29	16.6	6
7	78 57.1	80 56	34.2	78 32.9	81 53	32.6	78 08.2	83 52	31.2	77 17.8	85 48	28.7	75 33.4	89 41	24.5	73 45.4	91 36	21.2	73 18.0	92 35	20.5	72 22.8	92 33	19.1	7
8	78 23.8	76 60	37.7	78 00.8	77 58	36.1	77 37.4	79 56	34.6	76 49.2	82 52	31.9	75 08.5	86 46	27.4	73 23.7	89 40	23.8	72 57.0	89 39	23.0	72 03.0	90 37	21.6	8
9	77 47.9	71 64	40.8	77 26.2	73 62	39.2	77 03.9	75 60	37.7	76 18.0	78 56	34.9	74 41.2	83 49	30.2	72 59.6	86 44	26.3	72 33.7	87 42	25.5	71 41.1	88 40	23.9	9
10	77 09.8	67 67	43.6	76 49.2	69 65	42.0	76 28.2	71 63	40.5	75 44.4	75 59	37.6	74 11.6	80 53	32.7	72 33.4	84 47	28.7	72 08.2	84 46	27.8	71 17.1	86 43	26.1	10
1	76 29.7	63 70	46.2	76 10.3	66 68	44.6	75 50.4	68 66	43.0	75 08.8	71 62	40.1	73 40.0	77 56	35.1	72 05.2	81 50	31.0	71 40.8	82 49	30.0	70 51.1	84 46	28.3	1
2	75 48.0	60 72	48.4	75 29.7	62 70	46.8	75 10.8	64 68	45.3	74 31.3	68 65	42.4	73 06.4	74 59	37.4	71 35.1	78 53	33.1	71 11.5	79 52	32.1	70 23.4	81 49	30.3	2
3	75 04.9	56 74	50.5	74 47.6	59 72	48.9	74 29.8	61 71	47.4	73 52.3	64 67	44.5	72 31.2	71 61	39.4	71 03.4	76 56	35.1	70 40.5	77 54	34.1	69 54.0	79 52	32.2	3
4	74 20.5	53 76	52.3	74 04.3	55 74	50.8	73 47.4	57 73	49.3	73 11.8	61 70	46.4	71 54.4	68 64	41.3	70 30.0	73 58	36.9	70 08.0	74 57	35.9	69 23.0	76 54	34.0	4
15	73 35.1	50 77	54.0	73 19.8	52 76	52.5	73 03.8	54 74	51.0	72 30.1	58 71	48.2	71 16.3	65 66	43.1	69 55.2	70 60	38.7	69 34.0	71 59	37.7	68 50.5	74 56	35.7	15
6	72 48.8	47 78	55.5	72 34.3	49 77	54.0	72 19.3	51 76	52.5	71 47.3	55 73	49.8	70 36.9	62 67	44.8	69 19.1	67 62	40.3	68 58.7	69 61	39.3	68 16.8	71 58	37.3	6
7	72 01.7	44 80	56.8	71 48.1	47 78	55.4	71 33.8	49 77	54.0	71 03.5	52 74	51.3	69 56.4	59 69	46.3	68 41.8	65 64	41.9	68 22.2	66 63	40.8	67 41.8	69 60	38.8	7
8	71 13.9	42 81	58.0	71 01.0	44 79	56.6	70 47.5	46 78	55.2	70 18.8	50 76	52.6	69 14.9	57 71	47.7	68 03.5	62 66	43.3	67 44.6	64 64	42.2	67 05.6	66 62	40.3	8
9	70 25.5	39 82	59.1	70 13.4	42 80	57.7	70 00.6	43 79	56.4	69 33.4	47 77	53.8	68 32.5	54 72	49.0	67 24.1	60 67	44.6	67 05.9	61 66	43.6	66 28.5	64 64	41.6	9
20	69 36.6	37 82	60.1	69 25.1	39 81	58.8	69 13.1	41 80	57.5	68 47.3	45 78	54.9	67 49.3	52 73	50.2	66 43.8	57 69	45.9	66 26.4	59 67	44.8	65 50.3	61 65	42.9	20
1	68 47.2	35 83	61.0	68 36.4	37 82	59.7	68 25.0	39 81	58.4	68 00.5	43 79	56.0	67 05.3	49 74	51.3	66 02.7	55 70	47.0	65 45.9	56 69	46.0	65 11.3	59 66	44.0	1
2	67 57.4	33 84	61.8	67 47.2	35 83	60.5	67 36.4	37 82	59.3	67 13.2	40 80	56.9	66 20.7	47 75	52.4	65 20.8	53 71	48.1	65 04.7	54 70	47.1	64 31.5	57 68	45.2	2
3	67 07.2	31 84	62.5	66 57.6	33 83	61.3	66 47.4	35 82	60.1	66 25.5	38 80	57.8	65 35.5	45 76	53.3	64 38.2	51 72	49.1	64 22.8	52 71	48.1	63 50.9	55 69	46.2	3
4	66 16.7	29 85	63.2	66 07.6	31 84	62.0	65 58.0	33 83	60.9	65 37.3	36 81	58.6	64 49.8	43 77	54.2	63 55.0	48 73	50.1	63 40.3	50 72	49.1	63 09.6	52 70	47.2	4
25	65 25.9	28 85	63.8	65 17.4	29 84	62.7	65 08.3	31 83	61.5	64 48.7	34 82	59.3	64 03.5	41 78	55.0	63 11.2	46 74	51.0	62 57.1	48 73	50.0	62 27.7	50 71	48.1	25
6	64 34.9	26 86	64.4	64 26.8	28 85	63.3	64 18.3	29 84	62.2	63 59.7	33 82	60.0	63 16.8	39 78	55.8	62 26.9	44 75	51.8	62 13.4	46 74	50.8	61 45.2	48 72	48.9	6
7	63 43.6	24 86	64.9	63 36.1	26 85	63.8	63 28.0	28 84	62.7	63 10.4	31 83	60.6	62 29.7	37 79	56.5	61 42.1	42 75	52.6	61 29.2	44 74	51.6	61 02.1	46 73	49.7	7
8	62 52.2	23 86	65.4	62 45.0	25 85	64.3	62 37.4	26 85	63.2	62 20.9	29 83	61.2	61 42.3	35 80	57.1	60 56.8	41 76	53.3	60 44.5	42 75	52.3	60 18.6	44 73	50.5	8
9	62 00.5	21 86	65.8	61 53.8	23 86	64.8	61 46.7	25 85	63.7	61 31.0	28 83	61.7	60 54.4	33 80	57.7	60 11.2	39 77	53.9	59 59.4	40 76	53.0	59 34.6	42 74	51.2	9
30	61 08.7	20 87	66.2	61 02.4	22 86	65.2	60 55.7	23 85	64.2	60 41.0	26 84	62.2	60 06.3	32 81	58.3	59 25.1	37 77	54.6	59 13.8	38 76	53.7	58 50.2	41 75	51.9	30
1	60 16.7	19 87	66.5	60 10.9	20 86	65.5	60 04.6	22 86	64.6	59 50.7	25 84	62.6	59 17.9	30 81	58.8	58 38.7	35 78	55.1	58 28.0	36 77	54.3	58 05.4	39 75	52.5	1
2	59 24.6	17 87	66.8	59 19.2	19 86	65.9	59 13.3	20 86	64.9	59 00.2	23 84	63.0	58 29.3	28 82	59.3	57 52.0	34 78	55.7	57 41.8	35 78	54.8	57 20.2	37 76	53.1	2
3	58 32.4	16 87	67.1	58 27.3	18 87	66.2	58 21.8	19 86	65.3	58 09.6	22 85	63.4	57 40.4	27 82	59.7	57 05.0	32 79	56.2	56 55.3	33 78	55.3	56 34.7	35 76	53.6	3
4	57 40.1	15 87	67.4	57 35.4	16 87	66.5	57 30.2	18 86	65.6	57 18.8	20 85	63.7	56 51.3	25 82	60.1	56 17.7	30 79	56.7	56 08.5	32 78	55.8	55 48.8	34 77	54.1	4
35	56 47.6	14 88	67.6	56 43.3	15 87	66.7	56 38.5	17 86	65.8	56 27.9	19 85	64.0	56 02.0	24 82	60.5	55 30.2	29 80	57.1	55 21.4	30 79	56.3	55 02.7	32 77	54.6	35
6	55 55.1	13 88	67.8	55 51.1	14 87	67.0	55 46.7	15 86	66.1	55 36.8	18 85	64.3	55 12.5	23 83	60.9	54 42.5	27 80	57.5	54 34.1	28 79	56.7	54 16.4	31 78	55.0	6
7	55 02.6	12 88	68.0	54 58.9	13 87	67.2	54 54.8	14 87	66.3	54 45.6	17 86	64.6	54 22.9	21 83	61.2	53 54.5	26 80	57.9	53 46.6	27 80	57.1	53 29.8	29 78	55.4	7
8	54 09.9	11 88	68.2	54 06.6	12 87	67.4	54 02.8	13 87	66.5	53 54.3	15 86	64.8	53 33.1	20 83	61.5	53 06.4	24 81	58.2	52 58.9	26 80	57.4	52 42.9	28 78	55.8	8
9	53 17.2	10 88	68.4	53 14.2	11 87	67.5	53 10.8	12 87	66.7	53 02.9	14 86	65.0	52 43.1	19 83	61.8	52 18.1	23 81	58.6	52 11.0	24 80	57.8	51 55.9	26 79	56.2	9
40	52 24.5	09 88	68.5	52 21.7	10 88	67.7	52 18.6	11 87	66.9	52 11.4	13 86	65.2	51 53.1	17 84	62.0	51 29.6	22 81	58.9	51 22.9	23 80	58.1	51 08.7	25 79	56.5	40
1	51 31.7	08 88	68.6	51 29.2	09 88	67.8	51 26.4	10 87	67.0	51 19.9	12 86	65.4	51 02.9	16 84	62.3	50 41.0	20 81	59.1	50 34.7	21 81	58.4	50 21.3	23 79	56.8	1
2	50 38.8	07 88	68.7	50 36.7	08 88	67.9	50 34.2	09 87	67.1	50 28.3	11 86	65.6	50 12.7	15 84	62.5	49 52.2	19 81	59.4	49 46.3	20 81	58.6	49 33.7	22 80	57.1	2
3	49 45.9	06 88	68.8	49 44.1	07 88	68.0	49 41.9	08 87	67.2	49 36.6	10 86	65.7	49 22.3	14 84	62.7	49 03.3	18 82	59.6	48 57.8	19 81	58.9	48 46.0	21 80	57.4	3
4	48 53.0	05 88	68.9	48 51.4	06 88	68.1	48 49.5	07 87	67.3	48 44.8	09 86	65.8	48 31.9	13 84	62.8	48 14.3	17 82	59.8	48 09.2	18 81	59.1	47 58.1	19 80	57.6	4
45	48 00.1	04 88	68.9	47 58.8	05 88	68.2	47 57.2	06 87	67.4	47 53.1	08 86	65.9	47 41.4	12 84	63.0	47 25.2	15 82	60.0	47 20.5	16 81	59.3	47 10.1	18 80	57.9	45
6	47 07.2	03 88	69.0	47 06.1	04 88	68.2	47 04.8	05 87	67.5	47 01.2	07 86	66.0	46 50.8	11 84	63.1	46 36.0	14 82	60.2	46 31.6	15 82	59.5	46 22.0	17 80	58.1	6
7	46 14.2	02 88	69.0	46 13.4	03 88	68.3	46 12.3	04 87	67.6	46 09.4	06 86	66.1	46 00.2	09 84	63.2	45 46.7	13 82	60.4	45 42.7	14 82	59.7	45 33.8	16 80	58.3	7
8	45 21.3	01 88	69.0	45 20.7	02 88	68.3	45 19.9	03 87	67.6	45 17.5	05 87	66.2	45 09.5	08 85	63.3	44 57.4	12 82	60.5	44 53.7	13 82	59.8	44 45.6	14 81	58.4	8
9	44 28.3	01 88	69.0	44 28.0	01 88	68.3	44 27.4	02 87	67.6	44 25.6	04 87	66.2	44 18.8	07 85	63.4	44 08.0	11 82	60.7	44 04.6	12 82	60.0	43 57.2	13 81	58.6	9
50	43 35.3	00 88	69.0	43 35.3	01 88	68.3	43 35.0	01 87	67.7	43 33.7	03 87	66.3	43 28.0	06 85	63.5	43 18.5	10 83	60.8	43 15.5	10 82	60.1	43 08.7	12 81	58.7	50
1	42 42.3	01 88	69.0	42 42.5	00 88	68.3	42 42.5	01 87	67.7	42 41.7	02 87	66.3	42 37.2	05 85	63.6	42 28.9	09 83	60.9	42 26.3	09 82	60.2	42 20.2	11 81	58.9	1
2	41 49.4	02 88	69.0	41 49.8	01 88	68.3	41 50.0	00 87	67.7	41 49.8	01 87	66.3	41 46.4	04 85	63.6	41 39.3	07 83	61.0	41 37.0	08 82	60.3	41 31.6	10 81	59.0	2
3	40 56.4	03 88	69.0	40 57.1	02 88	68.3	40 57.6	01 87	67.7	40 57.8	00 87	66.3	40 55.6	03 85	63.7	40 49.7	06 83	61.0	40 47.7	07 82	60.4	40 43.0	09 81	59.1	3
4	40 03.4	03 88	68.9	40 04.4	03 88	68.3	40 05.1	02 87	67.6	40 05.8	01 87	66.3	40 04.7	02 85	63.7	40 00.1	05 83	61.1	39 58.4	06 82	60.5	39 54.3	08 81	59.2	4
55	39 10.5	04 88	68.9	39 11.7	04 88	68.3	39 12.6	03 87	67.6	39 13.9	01 87	66.3	39 13.8	01 85	63.7	39 10.4	04 83	61.2	39 09.0	05 82	60.5	39 05.6	06 81	59.2	55
6	38 17.6	05 88	68.9	38 19.0	04 88	68.2	38 20.2	04 87	67.6	38 21.9	02 87	66.3	38 23.0	01 85	63.8	38 20.7	03 83	61.2	38 19.6	04 82	60.6	38 16.8	05 81	59.3	6
7	37 24.7	06 88	68.8	37 26.3	05 88	68.2	37 27.7	04 87	67.5	37 30.0	03 87	66.3	37 32.1	00 85	63.8	37 31.0	02 83	61.2	37 30.2	03 82	60.6	37 28.0	04 81	59.3	7
8	36 31.8	06 88	68.7	36 33.7	06 88	68.1	36 35.3	05 87	67.5	36 38.1	04 86	66.2	36 41.2	01 85	63.7	36 41.2	01 83	61.3	36 40.7	02 82	60.6	36 39.2	03 81	59.4	8
9	35 39.0	07 88	68.6	35 41.0	07 88	68.0	35 42.9	06 87	67.4	35 46.1	05 86	66.2	35 50.3	02 85	63.7	35 51.5	00 83	61.3	35 51.3	01 82	60.6	35 50.4	02 81	59.4	9
60	34 46.1	08 88	68.6	34 48.4	07 88	68.0	34 50.6	07 87	67.4	34 54.3	06 86	66.1	34 59.5	03 85	63.7	35 01.7	01 83	61.3	35 01.8	00 82	60.6	35 01.5	01 81	59.4	60
1	33 53.3	09 88	68.5	33 55.9	08 88	67.9	33 58.2	08 87	67.3	34 02.4	06 86	66.1	34 08.6	04 85	63.7	34 12.0	02 83	61.2	34 12.4	01 82	60.6	34 12.7	00 81	59.4	1
2	33 00.6	09 88	68.4	33 03.3	09 88	67.8	33 05.9	08 87	67.2	33 10.5	07 86	66.0	33 17.8	05 85	63.6	33 22.3	03 83	61.2	33 23.0	02 82	60.6	33 23.8	01 81	59.4	2
3	32 07.9	10 88	68.3	32 10.8	10 87	67.7	32 13.6	09 87	67.1	32 18.7	08 86	65.9	32 27.0	06 85	63.6	32 32.6	04 83	61.2	32 33.5	03 82	60.6	32 35.0	02 81	59.4	3
4	31 15.2	11 88	68.2	31 18.4	10 87	67.6	31 21.4	10 87	67.0	31 26.9	09 86	65.8	31 36.2	07 85	63.5	31 42.8	04 83	61.2	31 44.1	04 82	60.6	31 46.2	03 81	59.4	4
65	30 22.5	12 88	68.1	30 25.9	11 87	67.5	30 29.2	11 87	66.9	30 35.2	10 86	65.7	30 45.4	07 85	63.4	30 53.2	05 83	61.1	30 54.7	05 82	60.5	30 57.3	04 81	59.4	65
6	29 29.9	12 88	67.9	29 33.5	12 87	67.4	29 37.0	11 87	66.8	29 43.5	10 86	65.6	29 54.7	08 84	63.4	30 03.5	06 83	61.0	30 05.3	06 82	60.5	30 08.5	05 81	59.3	6
7	28 37.4	13 88	67.8	28 41.2	13 87	67.2	28 44.9	12 87	66.7	28 51.8	11 86	65.5	29 04.0	09 84	63.3	29 13.9	07 83	61.0	29 16.0	07 82	60.4	29 19.8	06 81	59.3	7
8	27 44.9	14 88	67.7	27 48.9	13 87	67.1	27 52.8	13 87	66.6	28 09.2	12 86	65.4	28 13.4	10 84	63.2	28 24.3	08 83	60.9	28 26.7	08 82	60.3	28 31.0	07 81	59.2	8
9	26 52.4	14 87	67.5	26 56.7	14 87	67.0	27 00.8	14 87	66.4	27 08.7	13 86	65.3	27 22.8	11 84	63.1	27 34.7	09 83	60.8	27 37.4	09 82	60.3	27 42.3	08 81	59.1	9
70	26 00.0	15 87	67.4	26 04.5	15 87	66.8	26 08.8	14 86	66.3	26 17.1	13 86	65.2	26 32.2	12 84	63.0	26 45.2	10 82	60.7	26 48.1	10 82	60.2	26 53.6	09 81	59.1	70
1	25 07.7	16 87	67.2	25 12.4	15 87	66.7	25 16.9	15 86	66.1	25 25.7	14 86	65.0	25 41.7	13 84	62.9	25 55.7	11 82	60.6	25 58.9	10 82	60.1	26 05.0	10 81	59.0	1
2	24 15.4	16 87	67.1	24 20.3	16 87	66.5	24 25.1	16 86	66.0	24 34.3	15 86	64.9	24 51.2	13 84	62.7	25 06.3	12 82	60.5	25 09.8	11 82	60.0	25 16.4	11 81	58.9	2
3	23 23.2	17 87	66.9	23 28.3	17 87	66.4	23 33.3	16 86	65.8	23 42.9	16 85	64.8	24 00.8	14 84	62.6	24 17.0	13 82	60.4	24 20.7	12 82	59.9	24 27.8	11 81	58.8	3
4	22 31.0	18 87	66.7	22 36.3	18 86	66.2	22 41.5	17 86	65.7	22 51.6	16 85	64.6	23 10.5	15 84	62.5	23 27.6	14 82	60.3	23 31.6	13 82	59.8	23 39.3	12 81	58.7	4
75	21 38.9	19 87	66.6	21 44.5	18 86	66.0	21 49.9	18 86	65.5	22 00.4	17 85	64.5	22 20.2	16 84	62.3	22 38.4	14 82	60.2	22 42.7	14 82	59.6	22 50.9	13 81	58.6	75
6	20 46.9	19 86	66.4	20 52.6	19 86	65.9	20 58.3	19 86	65.3	21 09.3	18 85	64.3	21 30.0	17 84	62.2	21 49.2	15 82	60.1	21 53.7	15 81	59.5	22 02.5	14 81	58.5	6
7	19 55.0	20 86	66.2	20 00.9	20 86	65.7	20 06.8	19 86	65.2	20 18.2	19 85	64.1	20 39.9	17 83	62.0	21 00.1	16 82	59.9	21 04.9	16 81	59.4	21 14.2	15 80	58.3	7
8	19 03.1	21 86	66.0	19 09.2	20 86	65.5	19 15.3	20 86	65.0	19 27.2	19 85	63.9	19 49.8	18 83	61.9	20 11.0	17 82	59.8	20 16.1	17 81	59.2	20 25.9	16 80	58.2	8
9	18 11.3	21 86	65.8	18 17.7	21 86	65.3	18 23.9	21 86	64.8	18 36.2	20 85	63.8	18 59.8	19 83	61.7	19 22.0	18 82	59.6	19 27.4	18 81	59.1	19 37.8	17 80	58.0	9
80	17 19.6	22 86	65.6	17 26.2	22 86	65.1	17 32.6	22 85	64.6	17 45.4	21 85	63.6	18 09.9	20 83	61.5	18 33.1	19 81	59.5	18 38.7	19 81	58.9	18 49.7	18 80	57.9	80
1	16 27.9	23 86	65.4	16 34.7	22 86	64.9	16 41.4	22 85	64.4	16 54.6	22 84	63.4	17 20.1	21 83	61.3	17 44.3	20 81	59.3	17 50.2	19 81	58.8	18 01.7	19 80	57.7	1
2	15 36.4	23 86	65.2	15 43.4	23 85	64.7	15 50.3	23 85	64.2	16 04.0	22 84	63.2	16 30.4	22 83	61.2	16 55.6	21 81	59.1	17 01.7	20 81	58.6	17 13.7	20 80	57.6	2
3	14 44.9	24 86	65.0	14 52.2	24 85	64.5	14 59.3	24 85	64.0	15 13.4	23 84	63.0	15 40.7	22 83	61.0	16 07.0	21 81	58.9	16 13.3	21 80	58.4	16 25.9	21 80	57.4	3
4	13 53.6	25 86	64.8	14 01.0	25 85	64.3	14 08.4	24 85	63.8	14 22.9	24 84	62.8	14 51.2	23 82	60.8	15 18.4	22 81	58.7	15 25.1	22 80	58.2	15 38.1	22 79	57.2	4
85	13 02.3	25 85	64.5	13 09.9	25 85	64.0	13 17.5	25 84	63.5	13 32.5	25 84	62.5	14 01.7	24 82	60.6	14 30.0	23 81	58.5	14 36.9	23 80	58.0	14 50.5	22 79	57.0	85
6	12 11.1	26 85	64.3	12 19.0	26 85	63.8	12 26.8	26 84	63.3	12 42.2	26 84	62.3	13 12.4	25 82	60.3	13 41.6	24 80	58.3	13 48.8	24 80	57.8	14 02.9	23 79	56.8	6
7	11 20.1	27 85	64.1	11 28.1	27 85	63.6	11 36.1	27 84	63.1	11 52.0	26 83	62.1	12 23.1	26 82	60.1	12 53.4	25 80	58.1	13 00.8	25 80	57.6	13 15.5	24 79	56.6	7
8	10 29.1	28 85	63.8	10 37.4	28 84	63.3	10 45.6	27 84	62.8	11 01.9	27 83	61.9	11 34.0	26 82	59.9	12 05.3	26 80	57.9	12 13.0	26 80	57.4	12 28.2	26 79	56.4	8
9	9 38.3	28 84	63.6	9 46.7	28 84	63.1	9 55.2	28 84	62.6	10 12.0	28 83	61.6	10 45.0	27 82	59.7	11 17.3	27 80	57.7	11 25.2	26 79	57.2	11 41.0	26 78	56.2	9
90	8 47.5	29 84	63.3	8 56.2	29 84	62.8	9 04.9	29 84	62.3	9 22.1	29 83	61.4	9 56.1	28 81	59.4	10 29.4	27 80	57.5	10 37.6	27 79	57.0	10 53.9	27 78	56.0	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	43 00.0	1.0 01	180.0	42 30.0	1.0 01	180.0	42 00.0	1.0 01	180.0	41 00.0	1.0 01	180.0	39 00.0	1.0 01	180.0	37 00.0	1.0 01	180.0	36 30.0	1.0 01	180.0	35 30.0	1.0 01	180.0	00
1	42 59.4	1.0 03	178.8	42 29.4	1.0 03	178.8	41 59.4	1.0 03	178.8	40 59.4	1.0 03	178.9	38 59.5	1.0 03	178.9	36 59.5	1.0 03	179.0	36 29.5	1.0 03	179.0	35 29.5	1.0 02	179.0	1
2	42 57.6	1.0 05	177.6	42 27.6	1.0 05	177.6	41 57.7	1.0 05	177.6	40 57.7	1.0 05	177.7	38 57.8	1.0 04	177.8	36 57.9	1.0 04	177.9	36 28.0	1.0 04	178.0	35 28.0	1.0 04	178.0	2
3	42 54.6	1.0 07	176.4	42 24.7	1.0 07	176.4	41 54.8	1.0 07	176.5	40 54.9	1.0 07	176.6	38 55.1	1.0 06	176.7	36 55.4	1.0 06	176.9	36 25.4	1.0 06	176.9	35 25.5	1.0 06	177.0	3
4	42 50.5	1.0 09	175.2	42 20.6	1.0 09	175.2	41 50.7	1.0 09	175.3	40 50.9	1.0 08	175.4	38 51.4	1.0 08	175.6	36 51.8	1.0 08	175.9	36 21.9	1.0 08	175.9	35 22.1	1.0 07	176.0	4
05	42 45.1	99 11	174.0	42 15.3	99 11	174.1	41 45.5	99 11	174.1	40 45.8	99 10	174.3	38 46.5	99 10	174.6	36 47.2	99 09	174.8	36 17.3	99 09	174.9	35 17.6	99 09	175.0	05
6	42 38.6	99 13	172.8	42 08.8	99 13	172.9	41 39.1	99 12	173.0	40 39.6	99 12	173.1	38 40.6	99 12	173.5	36 41.6	99 11	173.8	36 11.8	99 11	173.9	35 12.2	99 11	174.0	6
7	42 30.9	99 15	171.6	42 01.2	99 15	171.7	41 31.6	99 14	171.8	40 32.3	99 14	172.0	38 33.6	99 13	172.4	36 34.9	99 13	172.8	36 05.2	99 13	172.9	35 05.8	99 12	173.0	7
8	42 22.0	98 17	170.4	41 52.5	98 16	170.5	41 22.9	98 16	170.7	40 23.9	98 16	170.9	38 25.6	99 15	171.3	36 27.3	99 14	171.8	35 57.7	99 14	171.9	34 58.5	99 14	172.1	8
9	42 12.0	98 19	169.3	41 42.6	98 18	169.4	41 13.2	98 18	169.5	40 14.3	98 18	169.8	38 16.6	98 17	170.3	36 18.6	98 16	170.7	35 49.2	98 16	170.9	34 50.1	98 15	171.1	9
10	42 00.9	98 20	168.1	41 31.6	98 20	168.2	41 02.3	98 20	168.4	40 03.7	98 19	168.7	38 06.4	98 19	169.2	36 09.0	98 18	169.7	35 39.6	98 17	169.9	34 40.9	98 17	170.1	10
1	41 48.6	97 22	166.9	41 19.5	97 22	167.1	40 50.3	97 22	167.3	39 52.1	97 21	167.6	37 55.3	97 20	168.2	35 58.4	97 19	168.7	35 29.2	98 19	168.9	34 30.6	98 19	169.1	1
2	41 35.2	96 24	165.8	41 06.3	97 24	166.0	40 37.3	97 24	166.1	39 39.3	97 23	166.5	37 43.2	97 22	167.1	35 46.8	97 21	167.7	35 17.7	97 21	167.9	34 19.5	97 20	168.2	2
3	41 20.7	96 26	164.7	40 52.0	96 26	164.8	40 23.2	96 25	165.0	39 25.5	96 25	165.4	37 30.0	96 24	166.1	35 34.3	97 22	166.7	35 05.4	97 22	166.9	34 07.4	97 22	167.2	3
4	41 05.2	95 28	163.5	40 36.6	96 27	163.7	40 08.0	95 27	163.9	39 10.7	96 26	164.3	37 15.9	96 25	165.1	35 20.8	96 24	165.8	34 52.0	96 24	165.9	33 54.4	96 23	166.3	4
15	40 48.6	95 29	162.4	40 20.2	96 29	162.6	39 51.8	96 29	162.8	38 54.9	95 28	163.3	37 00.8	95 27	164.0	35 06.4	95 26	164.8	34 37.8	95 25	165.0	33 40.5	96 25	165.3	15
6	40 30.9	94 31	161.3	40 02.8	94 31	161.6	39 34.5	94 30	161.8	38 38.0	94 30	162.2	36 44.7	95 28	163.0	34 51.1	96 27	163.8	34 22.6	95 27	164.0	33 25.7	95 26	164.4	6
7	40 12.3	93 33	160.2	39 44.3	93 32	160.5	39 16.3	93 32	160.7	38 20.2	94 31	161.2	36 27.7	94 30	162.0	34 34.8	94 29	162.9	34 06.6	94 28	163.1	33 10.0	94 28	163.5	7
8	39 52.6	92 34	159.2	39 24.8	93 34	159.4	38 57.1	93 34	159.7	38 01.4	93 33	160.1	36 09.7	93 31	161.1	34 17.7	94 30	161.9	33 49.6	94 30	162.1	32 53.4	94 29	162.6	8
9	39 31.9	92 36	158.1	39 04.4	92 36	158.4	38 36.9	92 35	158.6	37 41.7	92 34	159.1	35 50.9	93 33	160.1	33 59.7	93 32	161.0	33 31.8	93 31	161.2	32 36.0	93 30	161.7	9
20	39 10.3	91 38	157.1	38 43.0	91 37	157.3	38 15.7	91 37	157.6	37 21.0	91 36	158.1	35 31.1	92 34	159.1	33 40.7	92 33	160.1	33 13.1	92 33	160.3	32 17.7	92 32	160.8	20
1	38 47.8	90 39	156.0	38 20.7	90 39	156.3	37 53.6	90 38	156.6	36 59.4	91 37	157.1	35 10.4	91 36	158.2	33 21.0	91 34	159.2	32 53.6	91 34	159.4	31 58.6	92 33	159.9	1
2	38 24.3	89 41	155.0	37 57.5	89 40	155.3	37 30.7	89 40	155.6	36 36.9	90 39	156.2	34 48.9	90 37	157.2	33 00.4	91 36	158.3	32 33.2	91 35	158.5	31 38.7	91 35	159.0	2
3	37 59.9	88 42	154.0	37 33.4	88 42	154.3	37 06.8	89 41	154.6	36 13.5	89 40	155.2	34 26.5	89 39	156.3	32 39.0	90 37	157.4	32 12.0	90 37	157.6	31 18.0	90 36	158.1	3
4	37 34.6	87 44	153.1	37 08.3	88 43	153.4	36 42.0	88 43	153.7	35 49.3	88 42	154.3	34 03.3	89 40	155.4	32 16.8	89 38	156.5	31 50.0	89 38	156.8	30 56.5	89 37	157.3	4
25	37 08.5	87 45	152.1	36 42.5	87 44	152.4	36 16.5	87 44	152.7	35 24.2	87 43	153.3	33 39.3	88 41	154.5	31 53.7	88 40	155.6	31 27.2	88 39	155.9	30 34.2	89 38	156.4	25
6	36 41.5	86 46	151.1	36 15.8	86 46	151.5	35 50.0	86 45	151.8	34 58.4	86 44	152.4	33 14.5	87 43	153.6	31 29.9	87 41	154.8	31 03.7	88 40	155.1	30 11.1	88 40	155.6	6
7	36 13.7	85 48	150.2	35 48.3	85 47	150.5	35 22.8	85 47	150.9	34 31.7	85 46	151.5	32 48.9	86 44	152.7	31 05.4	87 42	153.9	30 39.4	87 42	154.2	29 47.3	87 41	154.8	7
8	35 45.1	84 49	149.3	35 20.0	84 48	149.6	34 54.8	84 48	150.0	34 04.2	84 47	150.6	32 22.5	85 45	151.9	30 40.1	86 43	153.1	30 14.4	86 43	153.4	29 22.8	86 42	154.0	8
9	35 15.8	83 50	148.4	34 50.9	83 50	148.7	34 26.0	83 49	149.1	33 36.0	83 48	149.7	31 55.4	84 46	151.0	30 14.0	85 45	152.3	29 48.6	85 44	152.6	28 57.6	85 43	153.2	9
30	34 45.6	82 51	147.5	34 21.1	82 51	147.8	33 56.5	82 50	148.2	33 07.0	83 49	148.9	31 27.6	83 48	150.2	29 47.3	84 46	151.5	29 22.1	84 45	151.8	28 31.6	84 44	152.4	30
1	34 14.8	81 53	146.6	33 50.5	81 52	147.0	33 26.2	81 52	147.3	32 37.3	82 51	148.0	30 59.0	82 49	149.4	29 19.9	83 47	150.7	28 54.9	83 46	151.0	28 05.0	83 46	151.6	1
2	33 43.2	80 54	145.8	33 19.3	80 53	146.1	32 55.2	80 53	146.5	32 07.0	81 52	147.2	30 29.8	81 50	148.6	28 51.7	82 48	149.9	28 27.1	82 48	150.2	27 37.7	82 47	150.9	2
3	33 11.0	79 55	144.9	32 47.3	79 54	145.3	32 23.5	79 54	145.7	31 35.9	80 53	146.4	29 59.8	80 51	147.8	28 22.9	81 49	149.1	27 58.6	81 49	149.5	27 09.8	82 48	150.1	3
4	32 38.0	78 56	144.1	32 14.7	78 56	144.5	31 51.2	78 55	144.8	31 04.1	79 54	145.6	29 29.3	79 52	147.0	27 53.5	80 50	148.4	27 29.4	80 50	148.7	26 41.2	81 49	149.4	4
35	32 04.5	77 57	143.3	31 41.4	77 57	143.7	31 18.2	77 56	144.0	30 31.7	78 55	144.8	28 58.0	78 53	146.2	27 23.4	79 51	147.6	26 59.7	79 51	148.0	26 12.0	80 50	148.6	35
6	31 30.2	76 58	142.5	31 07.5	76 58	142.9	30 44.6	76 57	143.3	29 58.7	77 56	144.0	28 26.2	77 54	145.5	26 52.7	78 52	146.9	26 29.3	78 52	147.2	25 42.1	79 51	147.9	6
7	30 55.4	75 59	141.7	30 32.9	75 59	142.1	30 10.4	75 58	142.5	29 25.1	76 57	143.2	27 53.7	77 55	144.7	26 21.5	77 53	146.2	25 58.3	77 53	146.5	25 11.7	78 52	147.2	7
8	30 20.0	74 60	141.0	29 57.8	74 60	141.4	29 35.5	74 59	141.7	28 50.8	75 58	142.5	27 20.7	76 56	144.0	25 49.6	76 54	145.5	25 26.7	76 54	145.8	24 40.7	77 53	146.5	8
9	29 43.9	73 61	140.2	29 22.1	73 60	140.6	29 00.1	73 60	141.0	28 16.0	74 59	141.8	26 47.0	75 57	143.3	25 17.1	75 55	144.8	24 54.5	75 55	145.1	24 09.1	76 54	145.8	9
40	29 07.4	72 62	139.5	28 45.8	72 61	139.9	28 24.1	72 61	140.3	27 40.6	73 60	141.1	26 12.8	74 58	142.6	24 44.1	74 56	144.1	24 21.8	74 55	144.4	23 37.0	75 54	145.2	40
1	28 30.2	71 63	138.8	28 09.0	71 62	139.2	27 47.6	71 62	139.6	27 04.7	72 61	140.3	25 38.1	73 59	141.9	24 10.6	73 57	143.4	23 48.5	74 56	143.8	23 04.3	74 55	144.5	1
2	27 52.6	70 64	138.1	27 31.6	70 63	138.5	27 10.5	70 63	138.9	26 28.2	71 62	139.7	25 02.8	72 60	141.2	23 36.5	72 58	142.7	23 14.7	73 57	143.1	22 31.1	73 56	143.9	2
3	27 14.4	69 64	137.4	26 53.7	69 64	137.8	26 33.0	69 64	138.2	25 51.2	70 62	139.0	24 27.0	71 60	140.6	23 01.9	71 58	142.1	22 40.4	72 58	142.5	21 57.4	72 57	143.2	3
4	26 35.7	68 65	136.7	26 15.3	68 65	137.1	25 54.9	68 64	137.5	25 13.8	69 63	138.3	23 50.7	70 61	139.9	22 26.8	70 59	141.5	22 05.6	71 59	141.8	21 23.2	71 58	142.6	4
45	25 56.6	67 66	136.0	25 36.5	67 66	136.4	25 16.3	67 65	136.9	24 35.8	68 64	137.7	23 14.0	69 62	139.3	21 51.2	69 60	140.8	21 30.3	70 60	141.2	20 48.5	70 59	142.0	45
6	25 17.0	66 67	135.4	24 57.2	66 66	135.8	24 37.3	66 66	136.2	23 57.4	67 65	137.0	22 36.7	68 63	138.6	21 15.1	68 61	140.2	20 54.6	69 60	140.6	20 13.3	69 59	141.4	6
7	24 36.9	65 68	134.7	24 17.4	65 67	135.2	23 57.8	65 66	135.6	23 18.4	66 66	136.4	21 59.0	67 64	138.0	20 38.6	67 62	139.6	20 18.3	68 61	140.0	19 37.7	68 60	140.8	7
8	23 56.4	64 68	134.1	23 37.2	64 68	134.5	23 17.9	64 67	135.0	22 39.1	65 66	135.8	21 20.8	66 64	137.4	20 01.6	66 62	139.0	19 41.7	67 62	139.4	19 01.6	67 61	140.2	8
9	23 15.4	63 69	133.5	22 56.5	63 68	133.9	22 37.5	63 68	134.3	21 59.3	64 67	135.2	20 42.2	65 65	136.8	19 24.2	65 63	138.4	19 04.5	66 63	138.8	18 25.1	66 62	139.6	9
50	22 34.1	62 70	132.9	22 15.4	62 69	133.3	21 56.7	62 69	133.8	21 19.1	63 68	134.6	20 03.2	64 66	136.2	18 46.3	64 64	137.9	18 27.0	65 63	138.3	17 48.1	65 62	139.1	50
1	21 52.3	61 70	132.3	21 34.0	61 70	132.7	21 15.6	62 69	133.2	20 38.5	62 68	134.0	19 23.8	63 66	135.7	18 08.1	63 64	137.3	17 49.0	64 64	137.7	17 10.8	64 63	138.5	1
2	21 10.2	60 71	131.7	20 52.1	60 70	132.2	20 34.0	61 70	132.6	19 57.5	61 69	133.4	18 43.9	62 67	135.1	17 29.4	62 65	136.8	17 10.7	63 65	137.2	16 33.0	63 64	138.0	2
3	20 27.7	59 72	131.2	20 09.9	59 71	131.6	19 52.0	60 70	132.0	19 16.2	60 70	132.9	18 03.7	61 68	134.6	16 50.4	61 66	136.2	16 31.9	62 65	136.6	15 54.8	62 64	137.5	3
4	19 44.8	58 72	130.6	19 27.3	58 72	131.1	19 09.7	59 71	131.5	18 34.4	59 70	132.3	17 23.1	60 68	134.0	16 10.9	60 66	135.7	15 52.8	61 66	136.1	15 16.3	61 65	136.9	4
55	19 01.6	57 73	130.1	18 44.3	58 72	130.5	18 27.1	58 72	131.0	17 52.3	58 71	131.8	16 42.1	59 69	133.5	15 31.1	59 67	135.2	15 13.3	60 66	135.6	14 37.4	60 65	136.4	55
6	18 18.0	56 73	129.6	18 01.0	57 73	130.0	17 44.0	57 72	130.4	17 09.8	57 71	131.3	16 00.8	58 69	133.0	14 51.0	59 68	134.7	14 33.4	59 67	135.1	13 58.1	59 66	135.9	6
7	17 34.1	56 74	129.0	17 17.4	56 73	129.5	17 00.7	56 73	129.9	16 27.0	56 72	130.8	15 19.1	57 70	132.5	14 10.5	58 68	134.2	13 53.2	58 68	134.6	13 18.5	58 67	135.4	7
8	16 49.9	55 74	128.5	16 33.5	55 74	129.0	16 17.0	55 73	129.4	15 43.9	55 72	130.3	14 37.1	56 71	132.0	13 29.6	57 69	133.7	13 12.6	57 68	134.1	12 38.5	57 67	135.0	8
9	16 05.3	54 75	128.0	15 49.2	54 74	128.5	15 33.0	54 74	128.9	15 00.5	54 73	129.8	13 54.8	55 71	131.5	12 48.4	56 69	133.2	12 31.7	56 69	133.6	11 58.2	56 68	134.5	9
60	15 20.5	53 75	127.5	15 04.6	53 75	128.0	14 48.7	53 74	128.4	14 16.7	53 73	129.3	13 12.2	54 72	131.0	12 06.9	55 70	132.8	11 50.5	55 69	133.2	11 17.6	55 68	134.0	60
1	14 35.4	52 76	127.1	14 19.8	52 75	127.5	14 04.1	52 75	127.9	13 32.7	53 74	128.8	12 29.2	53 72	130.6	11 25.1	54 70	132.3	11 09.0	54 70	132.7	10 36.6	54 69	133.6	1
2	13 50.0	51 76	126.6	13 34.6	51 76	127.0	13 19.2	51 75	127.5	12 48.3	52 74	128.4	11 46.0	52 73	130.1	10 43.0	53 71	131.8	10 27.2	53 70	132.3	9 55.4	53 69	133.1	2
3	13 04.3	50 77	126.1	12 49.2	50 76	126.6	12 34.1	50 76	127.0	12 03.7	51 75	127.9	11 02.4	51 73	129.7	10 00.6	52 71	131.4	9 45.0	52 71	131.8	9 13.8	52 70	132.7	3
4	12 18.3	49 77	125.7	12 03.5	49 77	126.1	11 48.6	50 76	126.6	11 18.8	50 75	127.5	10 18.6	50 74	129.2	9 17.9	51 72	131.0	9 02.6	51 71	131.4	8 32.0	51 70	132.3	4
65	11 32.1	48 78	125.2	11 17.6	49 77	125.7	11 03.0	49 77	126.1	10 33.6	49 76	127.0	9 34.5	49 74	128.8	8 34.9	50 72	130.5	8 19.9	50 72	131.0	7 49.9	50 71	131.9	65
6	10 45.7	48 78	124.8	10 31.4	48 77	125.3	10 17.0	48 77	125.7	9 48.2	48 76	126.6	8 50.2	49 74	128.4	7 51.7	49 72	130.1	7 37.0	49 72	130.6	7 07.5	49 71	131.5	6
7	9 59.0	47 78	124.4	9 44.9	47 78	124.8	9 30.8	47 77	125.3	9 02.5	47 77	126.2	8 05.6	48 75	128.0	7 08.2	48 73	129.7	6 53.7	48 72	130.2	6 24.8	48 72	131.1	7
8	9 12.0	46 79	124.0	8 58.2	46 78	124.4	8 44.4	46 78	124.9	8 16.6	46 77	125.8	7 20.7	47 75	127.6	6 24.4	47 73	129.3	6 10.3	47 73	129.8	5 41.9	47 72	130.7	8
9	8 24.9	45 79	123.6	8 11.3	45 79	124.0	7 57.7	45 78	124.5	7 30.5	46 77	125.4	6 35.6	46 76	127.2	5 40.4	46 74	128.9	5 26.5	46 73	129.4				9
70	7 37.5	44 79	123.2	7 24.2	44 79	123.6	7 10.9	45 78	124.1	6 44.1	45 78	125.0	5 50.3	45 76	126.8										70
1	6 49.9	44 80	122.8	6 36.8	44 79	123.2	6 23.7	44 79	123.7	5 57.5	44 78	124.6	5 04.7	44 76	126.4										1
2	6 02.1	43 80	122.4	5 49.3	43 80	122.8	5 36.4	43 79	123.3	5 10.7	43 78	124.2													2
3	5 14.1	42 80	122.0	5 01.5	42 80	122.5																			3

DECLINATION SAME NAME AS LATITUDE

H.A.	28° 00′			28° 30′			29° 00′			30° 00′			32° 00′			34° 00′			34° 30′			35° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	7 56.9	30 84	63.0	8 05.8	30 84	62.6	8 14.7	30 84	62.1	8 32.4	29 83	61.1	9 07.3	29 81	59 2	9 41.6	28 79	57.2	9 50.1	28 79	56.8	10 06.9	28 78	55.8	91
2	7 06.4	31 84	62.8	7 15.5	30 84	62.3	7 24.6	30 83	61.8	7 42.8	30 82	60.9	8 18.6	30 81	58.9	8 54.0	29 79	57.0	9 02.7	29 79	56.5	9 20.1	29 78	55.5	2
3	6 16.0	31 84	62.5	6 25.4	31 83	62.0	6 34.7	31 83	61.5	6 53.3	31 82	60.6	7 30.1	30 81	58.7	8 06.4	30 79	56.7	8 15.5	30 79	56.3	8 33.3	30 78	55.3	3
4	5 25.7	32 84	62.2	5 35.3	32 83	61.7	5 44.9	32 83	61.3	6 03.9	32 82	60.3	6 41.7	31 80	58.4	7 19.1	31 79	56.5	7 28.3	31 78	56.0	7 46.8	31 77	55.1	4
95										5 14.7	32 82	60.0	5 53.5	32 80	58.1	6 31.8	32 78	56.2	6 41.4	32 78	55.8	7 00.3	32 77	54.8	95
6													5 05.4	33 80	57.9	5 44.8	33 78	56.0	5 54.6	33 78	55.5	6 14.1	32 77	54.5	6
7																			5 07.9	33 78	55.2	5 27.9	33 77	54.3	7

Lat. 19°

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	73 00.0	1.0 02	00.0	72 00.0	1.0 02	00.0	70 30.0	1.0 02	00.0	69 00.0	1.0 02	00.0	67 00.0	1.0 02	00.0	66 30.0	1.0 02	00.0	66 00.0	1.0 01	00.0	64 00.0	1.0 01	00.0	00
1	72 58.6	1.0 07	02.8	71 58.7	1.0 06	02.6	70 28.8	1.0 06	02.3	68 58.9	1.0 05	02.1	66 59.1	1.0 05	01.9	66 29.1	1.0 05	01.8	65 59.1	1.0 04	01.8	63 59.2	1.0 04	01.6	1
2	72 54.5	99 11	05.5	71 54.9	99 11	05.2	70 25.4	1.0 10	04.7	68 55.8	1.0 09	04.3	66 56.2	1.0 08	03.8	66 26.3	1.0 08	03.7	65 56.4	1.0 07	03.6	63 56.8	1.0 07	03.2	2
3	72 47.7	99 16	08.2	71 48.5	99 15	07.7	70 19.6	99 13	07.0	68 50.5	99 12	06.4	66 51.6	99 11	05.7	66 21.8	99 11	05.5	65 52.0	99 10	05.4	63 52.8	99 09	04.8	3
4	72 38.3	98 20	10.9	71 39.7	98 19	10.2	70 11.6	98 17	09.3	68 43.2	98 16	08.5	66 45.0	99 14	07.5	66 15.4	99 14	07.3	65 45.8	99 13	07.1	63 47.3	99 12	06.4	4
05	72 26.3	96 24	13.5	71 28.5	97 23	12.7	70 01.3	97 21	11.5	68 33.8	97 19	10.5	66 36.7	98 17	09.4	66 07.3	98 16	09.1	65 37.9	98 16	08.9	63 40.2	98 14	08.0	05
6	72 11.8	95 28	16.1	71 14.9	95 26	15.1	69 48.9	96 24	13.7	68 22.5	96 22	12.5	66 26.5	97 20	11.2	65 57.4	97 19	10.9	65 28.3	97 19	10.6	63 31.5	98 17	09.5	6
7	71 55.0	93 32	18.5	70 59.0	94 30	17.4	69 34.5	94 28	15.9	68 09.2	95 25	14.5	66 14.6	96 23	13.0	65 45.9	96 22	12.6	65 17.0	96 22	12.3	63 21.4	97 19	11.1	7
8	71 35.8	91 36	20.9	70 41.0	92 33	19.6	69 18.0	93 31	17.9	67 54.0	94 28	16.5	66 01.0	95 25	14.7	65 32.6	95 25	14.4	65 04.1	95 24	14.0	63 09.7	96 22	12.6	8
9	71 14.5	89 39	23.2	70 21.0	90 37	21.8	68 59.5	91 34	20.0	67 37.1	92 31	18.3	65 45.8	93 28	16.5	65 17.7	94 27	16.0	64 49.7	94 27	15.6	62 56.6	95 24	14.1	9
10	70 51.2	87 42	25.4	69 58.9	88 40	23.9	68 39.2	89 37	21.9	67 18.3	90 34	20.2	65 28.9	92 31	18.1	65 01.3	92 30	17.6	64 33.6	92 29	17.2	62 42.1	93 26	15.5	10
1	70 26.0	84 45	27.4	69 35.0	86 43	25.9	68 17.2	87 40	23.8	66 58.0	89 37	21.9	65 10.5	90 33	19.7	64 43.4	91 32	19.2	64 16.1	91 32	18.7	62 26.3	92 29	17.0	1
2	69 59.0	82 48	29.4	69 09.4	83 45	27.8	67 53.5	85 42	25.6	66 36.0	87 39	23.6	64 50.6	89 36	21.3	64 24.0	89 35	20.8	63 57.2	80 34	20.3	62 09.1	91 31	18.3	2
3	69 30.3	79 50	31.3	68 42.1	81 48	29.6	67 28.2	83 45	27.4	66 12.5	85 42	25.3	64 29.3	87 38	22.8	64 03.1	87 37	22.3	63 36.9	88 36	21.7	61 50.6	89 33	19.7	3
4	69 00.0	77 53	33.1	68 13.3	79 50	31.4	67 01.4	81 47	29.0	65 47.5	83 44	26.9	64 06.6	85 40	24.3	63 41.0	86 39	23.7	63 15.2	86 38	23.1	61 30.8	88 35	21.0	4
15	68 28.3	75 55	34.8	67 43.1	76 53	33.0	66 33.2	79 49	30.6	65 21.2	81 46	28.4	63 42.6	83 42	25.7	63 17.5	84 41	25.1	62 52.3	84 40	24.5	61 09.9	86 37	22.3	15
6	67 55.3	72 57	36.4	67 11.5	74 55	34.6	66 03.6	77 51	32.1	64 53.6	79 48	29.8	63 17.3	81 44	27.1	62 52.8	82 43	26.5	62 28.1	83 42	25.9	60 47.8	85 39	23.5	6
7	67 21.1	70 59	37.9	66 38.7	72 57	36.1	65 32.9	74 53	33.6	64 24.8	77 50	31.2	62 50.9	80 46	28.4	62 26.9	80 45	27.8	62 02.8	81 44	27.1	60 24.6	83 40	24.8	7
8	66 45.6	67 61	39.3	66 04.7	69 58	37.5	65 01.0	72 55	34.9	63 54.8	75 52	32.6	62 23.3	78 48	29.7	62 00.0	78 47	29.0	61 36.4	79 46	28.4	60 00.3	81 42	25.9	8
9	66 09.2	65 62	40.7	65 29.6	67 60	38.8	64 27.9	70 57	36.2	63 23.7	73 54	33.8	61 54.7	76 49	30.9	61 31.9	76 48	30.2	61 08.9	77 48	29.6	59 35.0	79 44	27.0	9
20	65 31.8	62 64	41.9	64 53.6	65 62	40.1	63 53.9	68 58	37.5	62 51.6	71 55	35.1	61 25.1	74 51	32.1	61 02.8	74 50	31.4	60 40.4	75 49	30.7	59 08.7	78 45	28.1	20
1	64 53.4	60 65	43.1	64 16.6	62 63	41.3	63 18.9	66 60	38.6	62 18.6	68 57	36.2	60 54.4	72 53	33.2	60 32.8	72 52	32.5	60 11.0	73 51	31.8	58 41.5	76 47	29.2	1
2	64 14.3	58 67	44.2	63 38.8	60 64	42.4	62 43.1	63 61	39.8	61 44.6	66 58	37.3	60 22.9	70 54	34.3	60 01.9	71 53	33.6	59 40.6	71 52	32.9	58 13.4	74 48	30.2	2
3	63 34.3	56 68	45.3	63 00.2	58 66	43.4	62 06.4	61 62	40.8	61 09.8	64 59	38.4	59 50.5	68 55	35.3	59 30.1	69 54	34.6	59 09.4	69 53	33.9	57 44.5	72 50	31.2	3
4	62 53.7	54 69	46.2	62 20.8	56 67	44.4	61 28.9	59 64	41.8	60 34.2	62 61	39.4	59 17.4	66 57	36.3	58 57.5	67 56	35.6	58 37.4	67 55	34.8	57 14.7	70 51	32.1	4
25	62 12.4	52 70	47.2	61 40.8	54 68	45.4	60 50.8	57 65	42.8	59 57.9	60 62	40.3	58 43.4	64 58	37.2	58 24.1	65 57	36.5	58 04.6	65 56	35.8	56 44.2	69 52	33.0	25
6	61 30.5	49 71	48.0	61 00.1	52 69	46.2	60 11.9	55 66	43.7	59 20.9	58 63	41.2	58 08.7	62 59	38.1	57 50.0	63 58	37.4	57 31.1	64 57	36.7	56 12.9	67 53	33.9	6
7	60 48.1	48 72	48.8	60 18.8	50 70	47.1	59 32.4	53 67	44.5	58 43.2	56 64	42.1	57 33.4	60 60	39.0	57 15.3	61 59	38.2	56 56.9	62 58	37.5	55 40.9	65 54	34.7	7
8	60 05.1	46 72	49.6	59 37.0	48 70	47.8	58 52.4	51 68	45.3	58 04.9	54 65	42.9	56 57.4	58 61	39.8	56 39.8	59 60	39.0	56 22.0	60 59	38.3	55 08.3	63 55	35.5	8
9	59 21.7	44 73	50.3	58 54.7	46 71	48.6	58 11.8	49 68	46.1	57 26.0	52 66	43.6	56 20.8	56 62	40.6	56 03.8	57 61	39.8	55 46.6	58 60	39.1	54 35.0	61 56	36.3	9
30	58 37.8	42 74	51.0	58 12.0	44 72	49.3	57 30.7	47 69	46.8	56 46.6	51 66	44.4	55 43.6	54 63	41.3	55 27.2	55 62	40.5	55 10.5	56 61	39.8	54 01.2	59 57	37.0	30
1	57 53.5	40 74	51.6	57 28.8	42 73	49.9	56 49.2	46 70	47.4	56 06.7	49 67	45.0	55 05.9	52 64	42.0	54 50.1	53 63	41.2	54 33.9	54 62	40.5	53 26.8	58 58	37.7	1
2	57 08.9	38 75	52.2	56 45.2	41 73	50.5	56 07.2	44 71	48.1	55 26.3	47 68	45.7	54 27.7	51 64	42.7	54 12.4	52 64	41.9	53 56.8	52 63	41.2	52 51.8	56 59	38.4	2
3	56 23.9	37 76	52.8	56 01.2	39 74	51.1	55 24.8	42 71	48.7	54 45.5	45 69	46.3	53 49.1	49 65	43.3	53 34.3	50 64	42.5	53 19.2	51 63	41.8	52 16.4	54 60	39.0	3
4	55 38.5	35 76	53.3	55 16.9	37 74	51.6	54 42.0	40 72	49.2	54 04.3	43 69	46.9	53 10.0	47 66	43.9	52 55.7	48 65	43.2	52 41.1	49 64	42.4	51 40.4	52 61	39.6	4
35	54 52.9	33 76	53.8	54 32.2	36 75	52.1	53 58.8	39 72	49.8	53 22.7	42 70	47.4	52 30.4	45 67	44.5	52 16.7	46 66	43.7	52 02.7	47 65	43.0	51 04.0	51 61	40.2	35
6	54 07.0	32 77	54.2	53 47.3	34 75	52.6	53 15.4	37 73	50.3	52 40.7	40 70	48.0	51 50.5	44 67	45.0	51 37.3	45 66	44.3	51 23.8	45 65	43.6	50 27.2	49 62	40.8	6
7	53 20.9	30 77	54.6	53 02.1	32 76	53.1	52 31.6	35 73	50.7	51 58.4	38 71	48.5	51 10.2	42 68	45.5	50 57.5	43 67	44.8	50 44.5	44 66	44.1	49 50.0	47 63	41.3	7
8	52 34.5	29 78	55.0	52 16.6	31 76	53.5	51 47.5	34 74	51.2	51 15.8	37 72	48.9	50 29.6	40 68	46.0	50 17.4	41 67	45.3	50 04.9	42 67	44.6	49 12.4	45 63	41.8	8
9	51 47.9	27 78	55.4	51 30.9	29 77	53.9	51 03.2	32 74	51.6	50 32.9	35 72	49.3	49 48.6	39 69	46.4	49 36.9	40 68	45.7	49 24.9	40 67	45.0	48 34.4	44 64	42.3	9
40	51 01.1	26 78	55.8	50 45.0	28 77	54.2	50 18.7	31 75	52.0	49 49.7	34 72	49.8	49 07.4	37 69	46.9	48 56.1	38 68	46.2	48 44.6	39 68	45.5	47 56.0	42 64	42.7	40
1	50 14.1	24 79	56.1	49 58.9	26 77	54.6	49 33.9	29 75	52.3	49 06.3	32 73	50.1	48 25.8	35 70	47.3	48 15.0	36 69	46.6	48 04.0	37 68	45.9	47 17.4	40 65	43.2	1
2	49 26.9	23 79	56.4	49 12.5	25 78	54.9	48 48.8	28 75	52.7	48 22.7	30 73	50.5	47 44.0	34 70	47.7	47 33.7	35 69	47.0	47 23.1	36 69	46.3	46 38.5	39 65	43.6	2
3	48 39.6	22 79	56.6	48 26.1	24 78	55.2	48 03.6	26 76	53.0	47 38.8	29 74	50.8	47 01.9	32 70	48.0	46 52.1	33 70	47.3	46 42.0	34 69	46.7	45 59.2	37 66	44.0	3
4	47 52.2	20 79	56.9	47 39.4	22 78	55.5	47 18.2	25 76	53.3	46 54.7	27 74	51.2	46 19.6	31 71	48.4	46 10.3	32 70	47.7	46 00.6	33 69	47.0	45 19.7	36 66	44.3	4
45	47 04.6	19 80	57.1	46 52.6	21 78	55.7	46 32.7	23 76	53.6	46 10.4	26 74	51.5	45 37.1	29 71	48.7	45 28.2	30 70	48.0	45 19.0	31 70	47.3	44 40.0	34 67	44.7	45
6	46 16.9	18 80	57.4	46 05.7	20 78	55.9	45 47.0	22 76	53.8	45 25.9	25 74	51.7	44 54.4	28 72	49.0	44 45.9	29 71	48.3	44 37.2	29 70	47.7	44 00.0	33 67	45.0	6
7	45 29.0	16 80	57.6	45 18.6	18 79	56.2	45 01.1	21 77	54.1	44 41.3	23 75	52.0	44 11.5	26 72	49.3	44 03.4	27 71	48.6	43 55.2	28 70	48.0	43 19.7	31 67	45.3	7
8	44 41.1	15 80	57.7	44 31.4	17 79	56.4	44 15.1	19 77	54.3	43 56.5	22 75	52.2	43 28.4	25 72	49.6	43 20.8	26 71	48.9	43 12.9	27 71	48.2	42 39.3	30 68	45.6	8
9	43 53.1	14 80	57.9	43 44.2	16 79	56.5	43 29.0	18 77	54.5	43 11.6	20 75	52.5	42 45.1	24 72	49.8	42 38.0	24 72	49.1	42 30.5	25 71	48.5	41 58.7	28 68	45.9	9
50	43 05.0	13 80	58.1	42 56.8	14 79	56.7	42 42.7	17 77	54.7	42 26.5	19 75	52.7	42 01.7	22 73	50.0	41 55.0	23 72	49.4	41 48.0	24 71	48.7	41 17.8	27 68	46.1	50
1	42 16.8	12 80	58.2	42 09.3	13 79	56.8	41 56.4	16 77	54.8	41 41.4	18 75	52.9	41 18.2	21 73	50.2	41 11.8	22 72	49.6	41 05.3	22 71	48.9	40 36.9	25 69	46.4	1
2	41 28.6	11 80	58.3	41 21.8	12 79	57.0	41 10.0	14 78	55.0	40 56.1	17 76	53.0	40 34.5	19 73	50.4	40 28.6	20 72	49.8	40 22.4	21 72	49.2	39 55.7	24 69	46.6	2
3	40 40.3	09 81	58.4	40 34.2	11 79	57.1	40 23.4	13 78	55.1	40 10.7	15 76	53.2	39 50.7	18 73	50.6	39 45.2	19 72	50.0	39 39.5	19 72	49.3	39 14.4	22 69	46.8	3
4	39 51.9	08 81	58.5	39 46.5	10 80	57.2	39 36.9	12 78	55.3	39 25.2	14 76	53.3	39 06.8	17 73	50.8	39 01.7	17 73	50.2	38 56.4	18 72	49.5	38 33.0	21 69	47.0	4
55	39 03.5	07 81	58.6	38 58.8	09 80	57.3	38 50.2	11 78	55.4	38 39.7	13 76	53.5	38 22.8	15 74	50.9	38 18.1	16 73	50.3	38 13.1	17 72	49.7	37 51.4	19 69	47.2	55
6	38 15.1	06 81	58.7	38 11.1	07 80	57.4	38 03.5	09 78	55.5	37 54.1	11 76	53.6	37 38.7	14 74	51.1	37 34.4	15 73	50.5	37 29.8	15 72	49.8	37 09.8	18 70	47.4	6
7	37 26.6	05 81	58.7	37 23.2	06 80	57.5	37 16.7	08 78	55.6	37 08.4	10 76	53.7	36 54.5	13 74	51.2	36 50.6	13 73	50.6	36 46.4	14 72	50.0	36 28.0	17 70	47.5	7
8	36 38.1	04 81	58.8	36 35.4	05 80	57.5	36 29.9	07 78	55.7	36 22.6	09 76	53.8	36 10.3	12 74	51.3	36 06.7	12 73	50.7	36 03.0	13 73	50.1	35 46.1	15 70	47.7	8
9	35 49.6	03 81	58.8	35 47.5	04 80	57.6	35 43.0	06 78	55.7	35 36.8	08 76	53.9	35 25.9	10 74	51.4	35 22.8	11 73	50.8	35 19.4	12 73	50.2	35 04.1	14 70	47.8	9
60	35 01.1	02 81	58.8	34 59.7	03 80	57.6	34 56.1	05 78	55.8	34 51.0	07 76	53.9	34 41.6	09 74	51.5	34 38.8	10 73	50.9	34 35.8	10 73	50.3	34 22.1	13 70	47.9	60
1	34 12.5	01 81	58.8	34 11.8	02 80	57.6	34 09.2	04 78	55.8	34 05.1	05 76	54.0	33 57.1	08 74	51.6	33 54.7	08 74	51.0	33 52.1	09 73	50.4	33 39.9	11 70	48.0	1
2	33 24.0	00 81	58.8	33 23.8	01 80	57.6	33 22.3	03 78	55.8	33 19.2	04 77	54.0	33 12.7	07 74	51.7	33 10.6	07 74	51.1	33 08.4	08 73	50.5	32 57.8	10 70	48.1	2
3	32 35.5	01 81	58.8	32 35.9	00 80	57.6	32 35.3	01 78	55.9	32 33.3	03 77	54.1	32 28.2	05 74	51.7	32 26.5	06 74	51.1	32 24.6	06 73	50.5	32 15.5	09 70	48.2	3
4	31 46.9	02 81	58.8	31 48.0	01 80	57.6	31 48.4	00 78	55.9	31 47.3	02 77	54.1	31 43.6	04 74	51.7	31 42.3	05 74	51.2	31 40.8	05 73	50.6	31 33.2	07 71	48.2	4
65	30 58.4	03 81	58.8	31 00.1	02 80	57.6	31 01.4	01 78	55.9	31 01.4	01 77	54.1	30 59.1	03 74	51.8	30 58.1	03 74	51.2	30 57.0	04 73	50.6	30 50.9	06 71	48.3	65
6	30 09.9	04 81	58.7	30 12.2	03 80	57.6	30 14.5	02 78	55.8	30 15.4	00 77	54.1	30 14.5	02 74	51.8	30 13.9	02 74	51.2	30 13.1	03 73	50.6	30 08.5	05 71	48.3	6
7	29 21.4	05 81	58.7	29 24.3	04 80	57.6	29 27.5	03 78	55.8	29 29.4	01 77	54.1	29 29.9	01 74	51.8	29 29.6	01 74	51.2	29 29.2	02 73	50.7	29 26.1	04 71	48.4	7
8	28 33.0	06 81	58.6	28 36.4	05 80	57.5	28 40.6	04 78	55.8	28 43.5	02 77	54.1	28 45.3	01 74	51.8	28 45.4	00 74	51.2	28 45.4	00 73	50.7	28 43.7	02 71	48.4	8
9	27 44.5	07 81	58.6	27 48.6	06 80	57.5	27 53.7	05 78	55.8	27 57.5	04 77	54.1	28 00.7	02 74	51.8	28 01.2	01 74	51.2	28 01.5	01 73	50.7	28 01.3	01 71	48.4	9
70	26 56.1	08 81	58.5	27 00.8	07 80	57.4	27 06.8	06 78	55.7	27 11.6	05 76	54.0	27 16.1	03 74	51.8	27 16.9	02 74	51.2	27 17.6	02 73	50.7	27 18.9	00 71	48.4	70
1	26 07.8	09 81	58.4	26 13.0	08 80	57.3	26 20.0	07 78	55.7	26 25.7	06 76	54.0	26 31.6	04 74	51.8	26 32.7	04 74	51.2	26 33.7	03 73	50.6	26 36.5	01 71	48.4	1
2	25 19.5	10 80	58.3	25 25.3	09 79	57.2	25 33.1	08 78	55.6	25 39.8	07 76	53.9	25 47.0	05 74	51.7	25 48.5	05 74	51.2	25 49.9	04 73	50.6	25 54.0	03 71	48.4	2
3	24 31.2	11 80	58.2	24 37.6	10 79	57.2	24 46.4	09 78	55.5	24 54.0	08 76	53.9	25 02.5	06 74	51.7	25 04.4	06 74	51.1	25 06.1	05 73	50.6	25 11.6	04 71	48.4	3
4	23 43.0	12 80	58.1	23 50.0	11 79	57.1	23 59.6	10 78	55.4	24 08.2	09 76	53.8	24 18.0	07 74	51.6	24 20.2	07 74	51.1	24 22.3	07 73	50.5	24 29.3	05 71	48.3	4
75	22 54.8	13 80	58.0	23 02.4	12 79	57.0	23 12.9	11 78	55.3	23 22.5	10 76	53.7	23 33.6	09 74	51.5	23 36.1	08 73	51.0	23 38.5	08 73	50.5	23 46.9	06 71	48.3	75
6	22 06.7	14 80	57.9	22 14.9	13 79	56.8	22 26.3	12 78	55.2	22 36.8	11 76	53.6	22 49.2	10 74	51.5	22 52.0	09 73	50.9	22 54.8	09 73	50.4	23 04.6	07 70	48.2	6
7	21 18.7	15 80	57.8	21 27.4	14 79	56.7	21 39.7	13 78	55.1	21 51.1	12 76	53.5	22 04.8	11 74	51.4	22 08.0	10 73	50.9	22 11.1	10 73	50.3	22 22.3	09 70	48.2	7
8	20 30.7	16 80	57.7	20 40.0	15 79	56.6	20 53.2	14 77	55.0	21 05.5	13 76	53.4	21 20.5	12 74	51.3	21 24.0	12 73	50.8	21 27.4	11 73	50.2	21 40.0	10 70	48.1	8
9	19 42.8	17 80	57.5	19 52.7	16 79	56.5	20 06.7	15 77	54.9	20 20.0	14 76	53.3	20 36.3	13 74	51.2	20 40.1	13 73	50.7	20 43.9	12 73	50.1	20 57.8	11 70	48.0	9
80	18 55.0	18 80	57.4	19 05.4	17 79	56.3	19 20.4	16 77	54.8	19 34.5	15 76	53.2	19 52.1	14 74	51.1	19 56.3	14 73	50.6	20 00.4	13 72	50.0	20 15.7	12 70	47.9	80
1	18 07.3	19 79	57.2	18 18.2	18 78	56.2	18 34.1	17 77	54.6	18 49.1	16 76	53.1	19 08.0	15 73	51.0	19 12.5	15 73	50.5	19 16.9	15 72	49.9	19 33.6	13 70	47.8	1
2	17 19.6	19 79	57.1	17 31.2	19 78	56.0	17 47.9	18 77	54.5	18 03.8	17 75	52.9	18 24.0	16 73	50.9	18 28.8	16 73	50.3	18 33.5	16 72	49.8	18 51.6	14 70	47.7	2
3	16 32.0	20 79	56.9	16 44.1	20 78	55.9	17 01.7	19 77	54.3	17 18.6	18 75	52.8	17 40.0	17 73	50.7	17 45.2	17 73	50.2	17 50.2	17 72	49.7	18 09.7	16 70	47.6	3
4	15 44.6	21 79	56.7	15 57.2	21 78	55.7	16 15.7	20 77	54.2	16 33.5	19 75	52.6	16 56.1	18 73	50.6	17 01.6	18 72	50.1	17 07.0	18 72	49.6	17 27.8	17 70	47.5	4
85	14 57.2	22 79	56.5	15 10.4	22 78	55.5	15 29.7	21 76	54.0	15 48.4	20 75	52.5	16 12.3	19 73	50.4	16 18.1	19 72	49.9	16 23.9	19 72	49.4	16 46.0	18 70	47.4	85
6	14 09.9	23 79	56.3	14 23.7	23 78	55.3	14 43.9	22 76	53.8	15 03.5	21 75	52.3	15 28.7	21 73	50.3	15 34.8	20 72	49.8	15 40.8	20 72	49.3	16 04.3	19 69	47.2	6
7	13 22.8	24 78	56.1	13 37.1	24 78	55.1	13 58.1	23 76	53.6	14 18.6	22 75	52.1	14 45.1	22 72	50.1	14 51.5	21 72	49.6	14 57.9	21 71	49.1	15 22.7	20 69	47.1	7
8	12 35.7	25 78	55.9	12 50.6	26 77	54.9	13 12.5	24 76	53.5	13 33.9	23 74	52.0	14 01.6	23 72	50.0	14 08.4	22 72	49.5	14 15.1	22 71	48.9	14 41.2	21 69	46.9	8
9	11 48.8	26 78	55.7	12 04.2	26 77	54.7	12 27.0	25 76	53.3	12 49.3	24 74	51.8	13 18.2	24 72	49.8	13 25.3	24 72	49.3	13 32.3	23 71	48.8	13 59.9	23 69	46.8	9
90	11 01.9	27 78	55.5	11 17.9	27 77	54.5	11 41.6	26 75	53.1	12 04.8	26 74	51.6	12 35.0	25 72	49.6	12 42.4	25 71	49.1	12 49.7	24 71	48.6	13 18.6	24 69	46.6	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	35 00.0	1.0 01	180.0	34 00.0	1.0 01	180.0	32 30.0	1.0 01	180.0	31 00.0	1.0 01	180.0	29 00.0	1.0 01	180.0	28 30.0	1.0 01	180.0	28 00.0	1.0 01	180.0	26 00.0	1.0 01	180.0	00
1	34 59.5	1.0 02	179.0	33 59.5	1.0 02	179.0	32 29.5	1.0 02	179.1	30 59.6	1.0 02	179.1	28 59.6	1.0 02	179.2	28 29.6	1.0 02	179.2	27 59.6	1.0 02	179.2	25 59.6	1.0 02	179.2	1
2	34 58.0	1.0 04	178.0	33 58.1	1.0 04	178.1	32 28.2	1.0 04	178.1	30 58.2	1.0 04	178.2	28 58.3	1.0 04	178.3	28 28.3	1.0 03	178.3	27 58.4	1.0 03	178.3	25 58.4	1.0 03	178.4	2
3	34 55.6	1.0 06	177.0	33 55.7	1.0 06	177.1	32 25.9	1.0 05	177.2	30 56.0	1.0 05	177.3	28 56.2	1.0 05	177.5	28 26.3	1.0 05	177.5	27 56.3	1.0 05	177.5	25 56.5	1.0 05	177.6	3
4	34 52.2	1.0 07	176.1	33 52.4	1.0 07	176.2	32 22.7	1.0 07	176.3	30 52.9	1.0 07	176.4	28 53.3	1.0 06	176.6	28 23.4	1.0 06	176.6	27 53.4	1.0 06	176.7	25 53.8	1.0 06	176.9	4
05	34 47.8	99 09	175.1	33 48.1	1.0 09	175.2	32 18.5	1.0 08	175.4	30 49.0	1.0 08	175.5	28 49.5	1.0 08	175.8	28 19.6	1.0 08	175.8	27 49.8	1.0 08	175.9	25 50.3	1.0 07	176.1	05
6	34 42.4	99 11	174.1	33 42.9	99 10	174.2	32 13.5	99 10	174.5	30 44.1	99 10	174.7	28 44.9	99 09	174.9	28 15.1	99 09	175.0	27 45.3	99 09	175.0	25 46.0	99 08	175.3	6
7	34 36.1	99 12	173.1	33 36.7	99 12	173.3	32 07.6	99 11	173.5	30 38.4	99 11	173.8	28 39.4	99 10	174.1	28 09.7	99 10	174.2	27 40.0	99 10	174.2	25 41.0	99 10	174.5	7
8	34 28.9	99 14	172.1	33 29.6	99 13	172.3	32 00.7	99 13	172.6	30 31.8	99 12	172.9	28 33.2	99 12	173.2	28 03.5	99 12	173.3	27 33.8	99 12	173.4	25 35.2	99 11	173.7	8
9	34 20.6	98 15	171.2	33 21.6	98 15	171.4	31 53.0	98 14	171.7	30 24.3	99 14	172.0	28 26.1	99 13	172.4	27 56.5	99 13	172.5	27 26.9	99 13	172.6	25 28.6	99 12	173.0	9
10	34 11.5	98 17	170.2	33 12.6	98 16	170.5	31 44.4	98 16	170.8	30 16.0	98 15	171.1	28 18.2	98 15	171.6	27 48.7	98 14	171.7	27 19.2	98 14	171.8	25 21.3	98 13	172.2	10
1	34 01.4	98 18	169.3	33 02.8	98 18	169.5	31 34.9	98 17	169.9	30 06.9	98 17	170.3	28 09.5	98 16	170.7	27 40.1	98 16	170.9	27 10.7	98 15	171.0	25 13.2	98 15	171.4	1
2	33 50.3	97 20	168.3	32 52.0	97 19	168.6	31 24.5	97 19	169.0	29 56.9	97 18	169.4	27 59.9	97 17	169.9	27 30.7	98 17	170.0	27 01.4	98 17	170.2	25 04.3	98 16	170.7	2
3	33 38.4	97 21	167.4	32 40.4	97 21	167.7	31 13.2	97 20	168.1	29 46.0	97 19	168.6	27 49.6	97 19	169.1	27 20.5	97 18	169.2	26 51.4	97 18	169.4	24 54.8	97 17	169.9	3
4	33 25.5	96 23	166.4	32 27.8	96 22	166.8	31 01.1	96 22	167.2	29 34.3	96 21	167.7	27 38.5	97 20	168.3	27 09.5	97 20	168.4	26 40.5	97 19	168.6	24 44.4	97 18	169.1	4
15	33 11.8	96 24	165.5	32 14.4	96 24	165.9	30 48.2	96 23	166.4	29 21.8	96 22	166.8	27 26.6	96 21	167.5	26 57.7	96 21	167.6	26 28.9	96 21	167.8	24 33.4	96 20	168.4	15
6	32 57.2	95 26	164.6	32 00.1	95 25	165.0	30 34.4	95 24	165.5	29 08.5	95 24	166.0	27 13.9	96 22	166.7	26 45.2	96 22	166.8	26 16.5	96 22	167.0	24 21.6	96 21	167.6	6
7	32 41.6	94 27	163.7	31 44.9	95 27	164.1	30 19.7	95 26	164.6	28 54.4	95 25	165.2	27 00.4	95 24	165.9	26 31.9	95 23	166.1	26 03.4	95 23	166.2	24 09.1	95 22	166.9	7
8	32 25.3	94 29	162.8	31 28.9	94 28	163.2	30 04.3	94 27	163.8	28 39.5	94 26	164.3	26 46.2	94 25	165.1	26 17.9	95 25	165.3	25 49.5	95 24	165.5	23 55.9	95 23	166.2	8
9	32 08.0	93 30	161.9	31 12.1	93 29	162.3	29 48.0	93 28	162.9	28 23.8	94 27	163.5	26 31.3	94 26	164.3	26 03.1	94 26	164.5	25 34.9	94 26	164.7	23 42.0	94 24	165.4	9
20	31 50.0	92 31	161.0	30 54.4	93 31	161.4	29 31.0	93 30	162.1	28 07.3	93 29	162.7	26 15.6	93 27	163.5	25 47.6	93 27	163.7	25 19.6	93 27	163.9	23 27.4	94 26	164.7	20
1	31 31.1	92 33	160.1	30 36.0	92 32	160.6	29 13.1	92 31	161.3	27 50.1	92 30	161.9	25 59.1	93 29	162.8	25 31.3	93 28	163.0	25 03.5	93 28	163.2	23 12.1	93 27	164.0	1
2	31 11.4	91 34	159.3	30 16.7	91 33	159.7	28 54.5	91 32	160.4	27 32.1	92 31	161.1	25 41.9	92 30	162.0	25 14.4	92 29	162.2	24 46.7	92 29	162.4	22 56.1	92 28	163.3	2
3	30 50.9	90 35	158.4	29 56.7	90 35	158.9	28 35.2	91 34	159.6	27 13.4	91 32	160.3	25 24.1	91 31	161.2	24 56.7	91 31	161.5	24 29.3	91 30	161.7	22 39.5	92 29	162.6	3
4	30 29.6	89 37	157.6	29 35.9	90 36	158.1	28 15.0	90 35	158.8	26 53.9	90 34	159.6	25 05.5	91 32	160.5	24 38.3	91 32	160.7	24 11.1	91 31	161.0	22 22.1	91 30	161.9	4
25	30 07.6	89 38	156.7	29 14.3	89 37	157.2	27 54.2	89 36	158.0	26 33.8	89 35	158.8	24 46.2	90 33	159.8	24 19.2	90 33	160.0	23 52.3	90 32	160.2	22 04.2	90 31	161.2	25
6	29 44.8	88 39	155.9	28 52.0	88 38	156.4	27 32.6	88 37	157.2	26 12.9	89 36	158.0	24 26.2	89 34	159.0	23 59.5	89 34	159.3	23 32.8	89 34	159.5	21 45.6	89 32	160.5	6
7	29 21.2	87 40	155.1	28 28.9	87 40	155.6	27 10.3	88 38	156.5	25 51.3	88 37	157.3	24 05.6	88 36	158.3	23 39.1	88 35	158.6	23 12.6	88 35	158.8	21 26.3	89 33	159.8	7
8	28 57.0	86 42	154.3	28 05.2	86 41	154.9	26 47.3	87 39	155.7	25 29.0	87 38	156.5	23 44.3	87 37	157.6	23 18.1	88 36	157.9	22 51.8	88 36	158.1	21 06.4	88 34	159.2	8
9	28 32.0	85 43	153.5	27 40.7	86 42	154.1	26 23.6	86 41	154.9	25 06.1	86 39	155.8	23 22.4	87 38	156.9	22 56.4	87 37	157.2	22 30.3	87 37	157.4	20 45.9	87 35	158.5	9
30	28 06.3	84 44	152.7	27 15.6	85 43	153.3	25 59.2	85 42	154.2	24 42.5	85 40	155.1	22 59.8	86 39	156.2	22 34.0	86 38	156.5	22 08.2	86 38	156.7	20 24.8	86 36	157.8	30
1	27 40.0	84 45	151.9	26 49.8	84 44	152.6	25 34.2	84 43	153.5	24 18.3	85 41	154.3	22 36.6	85 40	155.5	22 11.1	85 39	155.8	21 45.5	85 39	156.1	20 03.1	86 37	157.2	1
2	27 12.9	83 46	151.2	26 23.3	83 45	151.8	25 08.5	83 44	152.7	23 53.4	84 42	153.6	22 12.7	84 41	154.8	21 47.5	84 40	155.1	21 22.2	84 40	155.4	19 40.8	85 38	156.5	2
3	26 45.3	82 47	150.4	25 56.2	82 46	151.1	24 42.2	82 45	152.0	23 27.9	83 43	152.9	21 48.3	83 42	154.2	21 23.3	83 41	154.5	20 58.3	83 41	154.7	19 18.0	84 39	155.9	3
4	26 17.0	81 48	149.7	25 28.4	81 47	150.4	24 15.3	81 46	151.3	23 01.8	82 44	152.3	21 23.3	82 43	153.5	20 58.6	82 42	153.8	20 33.8	83 42	154.1	18 54.5	83 40	155.3	4
35	25 48.0	80 49	149.0	25 00.0	80 48	149.6	23 47.7	81 47	150.6	22 35.1	81 45	151.6	20 57.7	81 44	152.8	20 33.2	82 43	153.2	20 08.8	82 43	153.5	18 30.6	82 41	154.7	35
6	25 18.5	79 50	148.3	24 31.1	79 49	148.9	23 19.6	80 48	149.9	22 07.8	80 46	150.9	20 31.5	80 45	152.2	20 07.3	81 44	152.5	19 43.1	81 44	152.8	18 06.0	81 42	154.1	6
7	24 48.3	78 51	147.6	24 01.5	78 50	148.2	22 50.9	79 49	149.3	21 39.9	79 47	150.3	20 04.8	80 45	151.6	19 40.9	80 45	151.9	19 17.0	80 45	152.2	17 41.0	80 43	153.5	7
8	24 17.6	77 52	146.9	23 31.4	77 51	147.6	22 21.6	78 50	148.6	21 11.5	78 48	149.6	19 37.5	79 46	150.9	19 13.9	79 46	151.3	18 50.2	79 45	151.6	17 15.4	79 44	152.9	8
9	23 46.4	76 53	146.2	23 00.7	76 52	146.9	21 51.8	77 51	147.9	20 42.5	77 49	149.0	19 09.6	78 47	150.3	18 46.3	78 47	150.7	18 23.0	78 46	151.0	16 49.2	78 44	152.3	9
40	23 14.5	75 54	145.5	22 29.4	75 53	146.2	21 21.4	76 52	147.3	20 13.0	76 50	148.3	18 41.3	77 48	149.7	18 18.3	77 48	150.1	17 55.2	77 47	150.4	16 22.6	77 45	151.7	40
1	22 42.1	74 55	144.9	21 57.6	74 54	145.6	20 50.5	75 52	146.7	19 43.0	75 51	147.7	18 12.4	76 49	149.1	17 49.7	76 48	149.5	17 26.9	76 48	149.8	15 55.5	76 46	151.2	1
2	22 09.2	73 56	144.2	21 25.3	73 55	145.0	20 19.1	74 53	146.1	19 12.5	74 52	147.1	17 43.1	75 50	148.5	17 20.6	75 49	148.9	16 58.1	75 49	149.2	15 27.9	75 47	150.6	2
3	21 35.8	72 57	143.6	20 52.5	72 56	144.3	19 47.2	73 54	145.4	18 41.4	73 53	146.5	17 13.2	74 51	148.0	16 51.1	74 50	148.3	16 28.9	74 50	148.7	14 59.8	74 48	150.0	3
4	21 01.9	71 57	143.0	20 19.2	71 56	143.7	19 14.7	72 55	144.8	18 09.9	72 53	145.9	16 42.9	73 51	147.4	16 21.0	73 51	147.7	15 59.1	73 50	148.1	14 31.2	73 48	149.5	4
45	20 27.5	70 58	142.4	19 45.4	70 57	143.1	18 41.8	71 56	144.3	17 37.9	71 54	145.4	16 12.1	72 52	146.8	15 50.5	72 52	147.2	15 28.9	72 51	147.5	14 02.2	72 49	149.0	45
6	19 52.6	69 59	141.8	19 11.1	69 58	142.5	18 08.5	70 56	143.7	17 05.4	70 55	144.8	15 40.8	71 53	146.3	15 19.5	71 52	146.6	14 58.2	71 52	147.0	13 32.8	71 50	148.5	6
7	19 17.3	68 60	141.2	18 36.4	68 59	142.0	17 34.6	69 57	143.1	16 32.5	69 56	144.2	15 09.1	70 54	145.7	14 48.1	70 53	146.1	14 27.1	70 53	146.5	13 02.9	70 51	147.9	7
8	18 41.5	67 60	140.6	18 01.2	67 59	141.4	17 00.3	68 58	142.5	15 59.1	68 56	143.7	14 36.9	69 54	145.2	14 16.3	69 54	145.6	13 55.6	69 53	145.9	12 32.5	69 51	147.4	8
9	18 05.3	66 61	140.0	17 25.6	66 60	140.8	16 25.6	67 59	142.0	15 25.3	67 57	143.1	14 04.3	68 55	144.7	13 44.0	68 54	145.1	13 23.6	68 54	145.4	12 01.8	68 52	146.9	9
50	17 28.6	65 62	139.5	16 49.5	65 61	140.3	15 50.5	66 59	141.5	14 51.1	66 58	142.6	13 31.3	67 56	144.2	13 11.3	67 55	144.5	12 51.2	67 55	144.9	11 30.6	67 53	146.4	50
1	16 51.6	64 62	138.9	16 13.0	64 61	139.7	15 14.9	65 60	140.9	14 16.4	65 58	142.1	12 57.9	66 56	143.7	12 38.2	66 56	144.0	12 18.4	66 55	144.4	10 59.1	66 53	146.0	1
2	16 14.1	63 63	138.4	15 36.2	63 62	139.2	14 39.0	64 61	140.4	13 41.4	64 59	141.6	12 24.1	65 57	143.2	12 04.6	65 56	143.5	11 45.2	65 56	143.9	10 27.1	65 54	145.5	2
3	15 36.2	62 64	137.9	14 58.9	62 63	138.7	14 02.6	63 61	139.9	13 05.9	63 60	141.1	11 49.8	64 58	142.7	11 30.7	64 57	143.1	11 11.6	64 57	143.5	9 54.8	64 55	145.0	3
4	14 58.0	61 64	137.4	14 21.3	61 63	138.2	13 25.9	62 62	139.4	12 30.1	62 60	140.6	11 15.3	63 58	142.2	10 56.5	63 58	142.6	10 37.6	63 57	143.0	9 22.1	63 55	144.6	4
55	14 19.4	60 65	136.8	13 43.2	60 64	137.7	12 48.7	61 62	138.9	11 53.9	61 61	140.1	10 40.3	62 59	141.7	10 21.8	62 58	142.1	10 03.3	62 58	142.5	8 49.0	62 56	144.1	55
6	13 40.4	59 66	136.3	13 04.9	59 65	137.2	12 11.3	60 63	138.4	11 17.3	60 62	139.6	10 05.0	61 59	141.3	9 46.8	61 59	141.7	9 28.6	61 58	142.1	8 15.6	61 56	143.7	6
7	13 01.1	58 66	135.9	12 26.1	58 65	136.7	11 33.4	59 64	137.9	10 40.4	59 62	139.2	9 29.3	59 60	140.8	9 11.4	60 60	141.2	8 53.6	60 59	141.6	7 41.8	60 57	143.2	7
8	12 21.4	57 67	135.4	11 47.0	57 66	136.2	10 55.3	58 64	137.5	10 03.2	58 63	138.7	8 53.3	58 61	140.4	8 35.7	59 60	140.8	8 18.2	59 60	141.2	7 07.7	59 57	142.8	8
9	11 41.4	56 67	134.9	11 07.6	56 66	135.8	10 16.7	57 65	137.0	9 25.6	57 63	138.3	8 16.9	57 61	139.9	7 59.7	57 61	140.3	7 42.5	58 60	140.8	6 33.2	58 58	142.4	9
60	11 01.0	55 68	134.5	10 27.9	55 67	135.3	9 37.9	56 65	136.6	8 47.6	56 64	137.8	7 40.2	56 62	139.5	7 23.3	56 61	139.9	7 06.4	56 61	140.3	5 58.4	57 58	142.0	60
1	10 20.4	54 68	134.0	9 47.8	54 67	134.9	8 58.7	55 66	136.1	8 09.4	55 64	137.4	7 03.2	55 62	139.1	6 46.7	55 62	139.5	6 30.0	55 61	139.9	5 23.4	56 59	141.6	1
2	9 39.4	53 69	133.6	9 07.5	53 68	134.4	8 19.3	54 66	135.7	7 30.9	54 65	137.0	6 25.9	54 63	138.7	6 09.7	54 62	139.1	5 53.4	54 62	139.5				2
3	8 58.2	52 69	133.1	8 26.8	52 68	134.0	7 39.5	53 67	135.3	6 52.0	53 65	136.6	5 48.3	53 63	138.3	5 32.4	53 63	138.7	5 16.4	53 62	139.1				3
4	8 16.6	51 70	132.7	7 45.8	51 69	133.6	6 59.5	52 67	134.9	6 12.9	52 66	136.2	5 10.4	52 64	137.9										4
65	7 34.8	50 70	132.3	7 04.6	50 69	133.2	6 19.1	51 68	134.5	5 33.4	51 66	135.8													65
6	6 52.7	49 71	131.9	6 23.1	49 70	132.8	5 38.5	50 68	134.1																6
7	6 10.3	48 71	131.5	5 41.3	48 70	132.4																			7
8	5 27.7	47 71	131.1																						8

DECLINATION SAME NAME AS LATITUDE

H.A.	36° 00′			37° 00′			38° 30′			40° 00′			42° 00′			42° 30′			43° 00′			45° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	10 15.2	28 78	55.3	10 31.8	27 77	54.3	10 56.3	27 75	52.8	11 20.4	27 74	51.4	11 51.8	26 72	49.4	11 59.6	26 71	48.9	12 07.2	26 71	48.4	12 37.4	25 68	46.4	91
2	9 28.7	29 77	55.1	9 45.8	28 76	54.1	10 11.2	28 75	52.6	10 36.1	28 74	51.2	11 08.8	27 71	49.2	11 16.9	27 71	48.7	11 24.9	27 70	48.2	11 56.4	26 68	46.2	2
3	8 42.2	30 77	54.8	8 59.9	29 76	53.9	9 26.2	29 75	52.4	9 52.0	29 73	50.9	10 25.9	28 71	49.0	10 34.3	28 71	48.5	10 42.6	28 70	48.0	11 15.5	27 68	46.1	3
4	7 55.9	31 77	54.6	8 14.2	30 76	53.6	8 41.3	30 75	52.2	9 08.0	30 73	50.7	9 43.2	29 71	48.8	9 51.9	29 70	48.3	10 00.5	29 70	47.8	10 34.7	28 68	45.9	4
95	7 09.8	31 77	54.3	7 28.6	31 76	53.4	7 56.5	31 74	51.9	8 24.2	31 73	50.5	9 00.6	30 71	48.6	9 09.6	30 70	48.1	9 18.6	30 70	47.6	9 54.0	29 67	45.6	95
6	6 23.8	32 76	54.1	6 43.1	32 75	53.1	7 12.0	32 74	51.7	7 40.5	32 73	50.2	8 18.2	31 70	48.3	8 27.5	31 70	47.8	8 36.8	31 69	47.4	9 13.5	30 67	45.4	6
7	5 37.9	33 76	53.8	5 57.8	33 75	52.8	6 27.5	33 74	51.4	6 57.0	33 72	50.0	7 35.9	32 70	48.1	7 45.5	32 70	47.6	7 55.1	32 69	47.1	8 33.2	32 67	45.2	7
8				5 12.7	34 75	52.6	5 43.3	34 74	51.2	6 13.6	34 72	49.7	6 53.7	33 70	47.8	7 03.7	33 69	47.4	7 13.6	33 69	46.9	7 53.0	33 67	45.0	8
9										5 30.4	35 72	49.5	6 11.8	34 70	47.6	6 22.0	34 69	47.1	6 32.3	34 69	46.6	7 13.0	34 66	44.7	9
100													5 30.0	35 69	47.3	5 40.5	35 69	46.9	5 51.1	35 68	46.4	6 33.1	35 66	44.5	100
1																			5 10.1	36 68	46.1	5 53.5	36 66	44.3	1
2																						5 14.0	37 66	44.0	2

Lat. 19°

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	63 00.0	1.0 01	00.0	62 00.0	1.0 01	00.0	60 30.0	1.0 01	00.0	59 30.0	1.0 01	00.0	58 30.0	1.0 01	00.0	57 30.0	1.0 01	00.0	56 30.0	1.0 01	00.0	55 00.0	1.0 01	00.0	00
1	62 59.2	1.0 04	01.5	61 59.3	1.0 04	01.5	60 29.3	1.0 03	01.3	59 29.4	1.0 03	01.3	58 29.4	1.0 03	01.2	57 29.4	1.0 03	01.2	56 29.5	1.0 03	01.1	54 59.5	1.0 03	01.0	1
2	62 57.0	1.0 06	03.1	61 57.1	1.0 06	02.9	60 27.3	1.0 06	02.7	59 27.5	1.0 05	02.6	58 27.6	1.0 05	02.4	57 27.7	1.0 05	02.3	56 27.8	1.0 05	02.2	54 58.0	1.0 04	02.0	2
3	62 53.2	99 09	04.6	61 53.5	99 08	04.3	60 24.0	99 08	04.0	59 24.3	1.0 07	03.8	58 24.6	1.0 07	03.6	57 24.8	1.0 07	03.5	56 25.1	1.0 06	03.3	54 55.4	1.0 06	03.1	3
4	62 47.9	99 11	06.1	61 48.5	99 11	05.8	60 19.4	99 10	05.4	59 19.9	99 09	05.1	58 20.4	99 09	04.8	57 20.8	99 09	04.6	56 21.3	99 08	04.4	54 51.9	99 08	04.1	4
05	62 41.2	98 14	07.6	61 42.1	98 13	07.2	60 13.4	99 12	06.7	59 14.2	99 12	06.4	58 15.0	99 11	06.0	57 15.7	99 10	05.8	56 16.4	99 10	05.5	54 47.4	99 09	05.1	05
6	62 33.0	98 16	09.1	61 34.3	98 15	08.6	60 06.2	98 14	08.0	59 07.3	98 14	07.6	58 08.4	98 13	07.2	57 09.5	98 12	06.9	56 10.4	98 12	06.6	54 41.8	99 11	06.1	6
7	62 23.3	97 18	10.5	61 25.1	97 18	10.0	59 57.7	97 16	09.3	58 59.2	97 16	08.8	58 00.7	98 15	08.4	57 02.1	98 14	08.0	56 03.4	98 13	07.6	54 35.3	98 12	07.1	7
8	62 12.2	96 21	12.0	61 14.6	96 20	11.4	59 47.9	97 18	10.6	58 49.9	97 18	10.1	57 51.8	97 17	09.6	56 53.6	97 16	09.1	55 55.4	97 15	08.7	54 27.8	97 14	08.1	8
9	61 59.8	95 23	13.4	61 02.8	95 22	12.7	59 36.9	96 20	11.8	58 39.4	96 19	11.3	57 41.8	96 19	10.7	56 44.1	96 18	10.2	55 46.3	96 17	09.7	54 19.3	97 16	09.1	9
10	61 46.0	94 25	14.8	60 49.6	94 24	14.1	59 24.6	95 22	13.1	58 27.8	95 21	12.5	57 30.7	95 20	11.9	56 33.5	95 19	11.3	55 36.2	96 19	10.8	54 09.9	96 17	10.0	10
1	61 30.9	93 27	16.1	60 35.2	93 26	15.4	59 11.2	94 24	14.3	58 15.0	94 23	13.6	57 18.5	94 22	13.0	56 21.9	95 21	12.4	55 25.1	95 20	11.8	53 59.6	95 19	11.0	1
2	61 14.5	91 29	17.5	60 19.6	92 28	16.6	58 56.6	92 26	15.5	58 01.1	93 25	14.8	57 05.2	93 24	14.1	56 09.2	94 23	13.4	55 13.0	94 22	12.8	53 48.3	94 20	11.9	2
3	60 56.8	90 31	18.8	60 02.7	90 30	17.9	58 40.9	91 28	16.7	57 46.0	92 27	15.9	56 50.9	92 26	15.2	55 55.5	93 24	14.5	54 59.9	93 23	13.8	53 36.1	93 22	12.9	3
4	60 38.0	88 33	20.0	59 44.7	89 32	19.1	58 24.1	90 30	17.8	57 30.0	90 28	17.0	56 35.5	91 27	16.2	55 40.8	91 26	15.5	54 45.9	92 25	14.8	53 23.0	92 23	13.8	4
15	60 18.0	87 35	21.3	59 25.6	88 34	20.3	58 06.2	89 32	18.9	57 12.9	89 30	18.1	56 19.2	90 29	17.3	55 25.2	90 28	16.5	54 30.9	91 26	15.7	53 09.0	91 25	14.7	15
6	59 56.8	85 37	22.5	59 05.3	86 35	21.5	57 47.3	87 33	20.0	56 54.8	88 32	19.1	56 01.9	88 30	18.3	55 08.6	89 29	17.5	54 15.1	89 28	16.7	52 54.2	90 26	15.6	6
7	59 34.6	84 39	23.6	58 44.1	85 37	22.6	57 27.4	86 35	21.1	56 35.7	86 33	20.2	55 43.6	87 32	19.3	54 51.1	88 31	18.4	53 58.4	88 29	17.6	52 38.6	89 27	16.5	7
8	59 11.3	82 40	24.8	58 21.8	83 39	23.7	57 06.5	84 36	22.2	56 15.6	85 35	21.2	55 24.4	86 33	20.3	54 32.8	86 32	19.4	53 40.8	87 31	18.5	52 22.1	88 29	17.3	8
9	58 47.1	80 42	25.9	57 58.5	81 40	24.8	56 44.6	83 38	23.2	55 54.7	84 36	22.2	55 04.3	84 35	21.2	54 13.5	85 33	20.3	53 22.3	86 32	19.4	52 04.8	87 30	18.1	9
20	58 21.8	79 44	26.9	57 34.3	80 42	25.8	56 21.8	81 39	24.2	55 32.9	82 38	23.1	54 43.4	83 36	22.1	53 53.4	84 35	21.2	53 03.1	84 33	20.3	51 46.8	85 31	19.0	20
1	57 55.7	77 45	28.0	57 09.2	78 43	26.8	55 58.2	80 41	25.1	55 10.2	81 39	24.0	54 21.6	81 38	23.0	53 32.5	82 36	22.1	52 43.0	83 35	21.1	51 28.0	84 33	19.8	1
2	57 28.6	75 46	28.9	56 43.2	76 45	27.7	55 33.7	78 42	26.0	54 46.6	79 41	24.9	53 59.0	80 39	23.9	53 10.9	81 37	22.9	52 22.2	81 36	21.9	51 08.4	83 34	20.5	2
3	57 00.8	73 48	29.9	56 16.3	75 46	28.7	55 08.4	76 43	26.9	54 22.3	77 42	25.8	53 35.6	78 40	24.8	52 48.4	79 39	23.7	52 00.7	80 37	22.7	50 48.1	81 35	21.3	3
4	56 32.1	72 49	30.8	55 48.7	73 47	29.6	54 42.3	75 45	27.8	53 57.2	76 43	26.7	53 11.5	77 41	25.6	52 25.2	78 40	24.5	51 38.4	78 38	23.5	50 27.2	80 36	22.1	4
25	56 02.6	70 50	31.7	55 20.3	71 48	30.5	54 15.5	73 46	28.6	53 31.4	74 44	27.5	52 46.6	75 43	26.4	52 01.3	76 41	25.3	51 15.4	77 39	24.3	50 05.6	78 37	22.8	25
6	55 32.5	68 51	32.6	54 51.2	69 50	31.3	53 47.9	71 47	29.5	53 04.8	72 45	28.3	52 21.1	73 44	27.2	51 36.7	74 42	26.1	50 51.7	75 41	25.0	49 43.3	77 38	23.5	6
7	55 01.6	66 53	33.4	54 21.4	68 51	32.1	53 19.7	70 48	30.2	52 37.6	71 46	29.1	51 54.9	72 45	27.9	51 11.5	73 43	26.8	50 27.4	74 42	25.7	49 20.3	75 39	24.2	7
8	54 30.1	64 54	34.2	53 51.0	66 52	32.9	52 50.8	68 49	31.0	52 09.7	69 48	29.8	51 28.0	70 46	28.6	50 45.6	71 44	27.5	50 02.5	72 43	26.4	48 56.8	74 40	24.8	8
9	53 57.9	63 55	34.9	53 19.8	64 53	33.6	52 21.3	66 50	31.7	51 41.2	67 49	30.5	51 00.5	69 47	29.3	50 19.0	70 45	28.2	49 37.0	71 44	27.1	48 32.7	72 41	25.5	9
30	53 25.1	61 56	35.6	52 48.1	62 54	34.3	51 51.1	64 51	32.4	51 12.1	66 49	31.2	50 32.4	67 48	30.0	49 51.9	68 46	28.9	49 10.8	69 44	27.8	48 08.0	71 42	26.1	30
1	52 51.8	59 56	36.3	52 15.9	61 55	35.0	51 20.4	63 52	33.1	50 42.4	64 50	31.9	50 03.7	65 49	30.7	49 24.3	66 47	29.5	48 44.1	67 45	28.4	47 42.7	69 43	26.7	1
2	52 17.9	57 57	37.0	51 43.0	59 56	35.7	50 49.1	61 53	33.8	50 12.2	62 51	32.5	49 34.5	63 50	31.3	48 56.0	65 48	30.1	48 16.9	66 46	29.0	47 16.9	67 44	27.3	2
3	51 43.5	56 58	37.6	51 09.7	57 56	36.3	50 17.4	59 54	34.4	49 41.4	61 52	33.1	49 04.7	62 50	31.9	48 27.3	63 49	30.7	47 49.1	64 47	29.6	46 50.6	66 45	27.9	3
4	51 08.6	54 59	38.3	50 35.8	55 57	36.9	49 45.1	57 55	35.0	49 10.2	59 53	33.7	48 34.5	60 51	32.5	47 58.0	61 50	31.3	47 20.9	63 48	30.2	46 23.8	64 45	28.5	4
35	50 33.2	52 60	38.8	50 01.5	54 58	37.5	49 12.3	56 55	35.6	48 38.4	57 54	34.3	48 03.7	58 52	33.1	47 28.3	60 50	31.9	46 52.1	61 49	30.7	45 56.6	63 46	29.0	35
6	49 57.4	50 60	39.4	49 26.8	52 59	38.1	48 39.1	54 56	36.1	48 06.2	55 54	34.9	47 32.6	57 53	33.6	46 58.1	58 51	32.4	46 22.9	59 49	31.2	45 28.8	61 47	29.5	6
7	49 21.2	49 61	39.9	48 51.6	50 59	38.6	48 05.4	52 57	36.7	47 33.6	54 55	35.4	47 00.9	55 53	34.2	46 27.5	56 52	32.9	45 53.3	58 50	31.8	45 00.7	59 48	30.0	7
8	48 44.6	47 62	40.4	48 16.0	49 60	39.1	47 31.3	51 57	37.2	47 00.5	52 56	35.9	46 28.9	53 54	34.7	45 56.4	55 52	33.4	45 23.2	56 51	32.3	44 32.1	58 48	30.5	8
9	48 07.7	45 62	40.9	47 40.0	47 61	39.6	46 56.9	49 58	37.7	46 27.0	50 56	36.4	45 56.4	52 55	35.1	45 24.9	53 53	33.9	44 52.7	54 51	32.7	44 03.1	56 49	31.0	9
40	47 30.3	44 63	41.4	47 03.7	45 61	40.1	46 22.0	47 59	38.1	45 53.2	49 57	36.9	45 23.5	50 55	35.6	44 53.1	51 54	34.4	44 21.9	53 52	33.2	43 33.7	54 50	31.4	40
1	46 52.7	42 63	41.8	46 27.0	44 62	40.5	45 46.8	46 59	38.6	45 19.0	47 58	37.3	44 50.3	48 56	36.1	44 20.9	50 54	34.8	43 50.6	51 53	33.6	43 03.9	53 50	31.9	1
2	46 14.7	40 64	42.2	45 50.0	42 62	40.9	45 11.3	44 60	39.0	44 44.5	45 58	37.7	44 16.8	47 56	36.5	43 48.3	48 55	35.3	43 19.1	49 53	34.0	42 33.8	51 51	32.3	2
3	45 36.4	39 64	42.6	45 12.7	40 63	41.3	44 35.5	42 60	39.4	44 09.6	44 59	38.1	43 42.9	45 57	36.9	43 15.4	46 55	35.7	42 47.1	48 54	34.5	42 03.3	50 51	32.7	3
4	44 57.9	37 65	43.0	44 35.1	39 63	41.7	43 59.3	41 61	39.8	43 34.4	42 59	38.5	43 08.7	44 58	37.3	42 42.2	45 56	36.0	42 14.9	46 54	34.8	41 32.5	48 52	33.1	4
45	44 19.0	36 65	43.4	43 57.2	37 64	42.1	43 22.9	39 61	40.1	42 58.9	41 60	38.9	42 34.2	42 58	37.6	42 08.6	43 56	36.4	41 42.3	45 55	35.2	41 01.4	46 52	33.4	45
6	43 40.0	34 66	43.7	43 19.1	36 64	42.4	42 46.2	38 62	40.5	42 23.2	39 60	39.2	41 59.4	40 58	38.0	41 34.8	42 57	36.8	41 09.5	43 55	35.6	40 30.0	45 53	33.8	6
7	43 00.7	33 66	44.0	42 40.7	34 64	42.7	42 09.2	36 62	40.8	41 47.2	37 60	39.6	41 24.3	39 59	38.3	41 00.7	40 57	37.1	40 36.3	41 56	35.9	39 58.3	43 53	34.1	7
8	42 21.1	31 66	44.3	42 02.1	32 65	43.0	41 32.0	34 62	41.1	41 10.9	36 61	39.9	40 49.0	37 59	38.7	40 26.4	38 58	37.4	40 02.9	40 56	36.2	39 26.4	41 54	34.4	8
9	41 41.4	29 67	44.6	41 23.3	31 65	43.3	40 54.6	33 63	41.4	40 34.4	34 61	40.2	40 13.5	36 60	39.0	39 51.8	37 58	37.7	39 29.3	38 56	36.5	38 54.2	40 54	34.8	9
50	41 01.5	28 67	44.9	40 44.3	29 65	43.6	40 16.9	31 63	41.7	39 57.7	33 62	40.5	39 37.7	34 60	39.2	39 16.9	35 58	38.0	38 55.4	37 57	36.8	38 21.7	38 54	35.0	50
1	40 21.4	26 67	45.1	40 05.1	28 66	43.8	39 39.1	30 63	42.0	39 20.8	31 62	40.7	39 01.7	32 60	39.5	38 41.9	34 59	38.3	38 21.3	35 57	37.1	37 49.0	37 55	35.3	1
2	39 41.1	25 67	45.3	39 25.7	26 66	44.1	39 01.1	28 64	42.2	38 43.7	30 62	41.0	38 25.5	31 61	39.8	38 06.6	32 59	38.6	37 46.9	33 58	37.4	37 16.1	35 55	35.6	2
3	39 00.7	24 68	45.6	38 46.1	25 66	44.3	38 22.8	27 64	42.5	38 06.4	28 62	41.2	37 49.1	29 61	40.0	37 31.1	31 59	38.8	37 12.4	32 58	37.6	36 43.0	34 56	35.8	3
4	38 20.1	22 68	45.8	38 06.4	23 66	44.5	37 44.5	25 64	42.7	37 28.9	27 63	41.5	37 12.5	28 61	40.3	36 55.5	29 60	39.0	36 37.7	30 58	37.9	36 09.7	32 56	36.1	4
55	37 39.4	21 68	46.0	37 26.6	22 67	44.7	37 05.9	24 64	42.9	36 51.2	25 63	41.7	36 35.8	26 62	40.5	36 19.6	28 60	39.3	36 02.8	29 58	38.1	35 36.2	30 56	36.3	55
6	36 58.6	19 68	46.1	36 46.6	21 67	44.9	36 27.3	22 65	43.1	36 13.4	24 63	41.9	35 58.9	25 62	40.7	35 43.7	26 60	39.5	35 27.7	27 59	38.3	35 02.5	29 56	36.5	6
7	36 17.6	18 68	46.3	36 06.5	19 67	45.1	35 48.4	21 65	43.3	35 35.5	22 63	42.1	35 21.9	23 62	40.9	35 07.5	24 60	39.7	34 52.5	26 59	38.5	34 28.6	27 57	36.7	7
8	35 36.5	17 69	46.4	35 26.3	18 67	45.2	35 09.5	20 65	43.4	34 57.5	21 64	42.2	34 44.7	22 62	41.0	34 31.2	23 61	39.8	34 17.1	24 59	38.7	33 54.6	26 57	36.9	8
9	34 55.4	15 69	46.6	34 46.0	16 67	45.4	34 30.5	18 65	43.6	34 19.3	19 64	42.4	34 07.4	20 62	41.2	33 54.8	22 61	40.0	33 41.6	23 59	38.8	33 20.5	24 57	37.1	9
60	34 14.1	14 69	46.7	34 05.5	15 68	45.5	33 51.3	17 65	43.7	33 41.0	18 64	42.5	33 30.0	19 63	41.3	33 18.3	20 61	40.2	33 05.9	21 60	39.0	32 46.2	23 57	37.3	60
1	33 32.8	12 69	46.8	33 25.0	14 68	45.6	33 12.1	15 66	43.8	33 02.6	16 64	42.7	32 52.4	17 63	41.5	32 41.6	19 61	40.3	32 30.2	20 60	39.1	32 11.8	21 58	37.4	1
2	32 51.4	11 69	46.9	32 44.5	12 68	45.7	32 32.7	14 66	44.0	32 24.1	15 64	42.8	32 14.8	16 63	41.6	32 04.9	17 61	40.4	31 54.3	18 60	39.3	31 37.3	20 58	37.6	2
3	32 10.0	10 69	47.0	32 03.8	11 68	45.8	31 53.3	12 66	44.1	31 45.5	14 64	42.9	31 37.1	15 63	41.7	31 28.0	16 62	40.6	31 18.3	17 60	39.4	31 02.7	18 58	37.7	3
4	31 28.5	08 69	47.1	31 23.1	10 68	45.9	31 13.8	11 66	44.1	31 06.9	12 65	43.0	30 59.3	13 63	41.8	30 51.1	14 62	40.7	30 42.3	15 60	39.5	30 27.9	17 58	37.8	4
65	30 46.9	07 69	47.1	30 42.3	08 68	46.0	30 34.3	10 66	44.2	30 28.2	11 65	43.1	30 21.4	12 63	41.9	30 14.1	13 62	40.8	30 06.1	14 60	39.6	29 53.1	15 58	37.9	65
6	30 05.3	06 69	47.2	30 01.5	07 68	46.0	29 54.7	08 66	44.3	29 49.4	09 65	43.1	29 43.5	10 63	42.0	29 37.0	11 62	40.9	29 29.9	12 60	39.7	29 18.2	14 58	38.0	6
7	29 23.7	05 69	47.2	29 20.7	06 68	46.1	29 15.1	07 66	44.4	29 10.6	08 65	43.2	29 05.5	09 63	42.1	28 59.9	10 62	40.9	28 53.7	11 61	39.8	28 43.3	12 58	38.1	7
8	28 42.1	03 69	47.2	28 39.8	04 68	46.1	28 35.4	06 66	44.4	28 31.7	07 65	43.3	28 27.5	08 63	42.1	28 22.7	08 62	41.0	28 17.3	09 61	39.9	28 08.2	11 58	38.2	8
9	28 00.4	02 69	47.3	27 58.9	03 68	46.1	27 55.7	04 66	44.4	27 52.8	05 65	43.3	27 49.4	06 64	42.2	27 45.4	07 62	41.1	27 40.9	08 61	39.9	27 33.1	09 59	38.2	9
70	27 18.7	01 69	47.3	27 18.0	02 68	46.2	27 15.9	03 66	44.5	27 13.9	04 65	43.3	27 11.3	05 64	42.2	27 08.2	06 62	41.1	27 04.5	07 61	40.0	26 58.0	08 59	38.3	70
1	26 37.0	01 69	47.3	26 37.1	00 68	46.2	26 36.2	02 66	44.5	26 34.9	03 65	43.4	26 33.2	03 64	42.2	26 30.9	04 62	41.1	26 28.0	05 61	40.0	26 22.8	06 59	38.3	1
2	25 55.4	02 69	47.3	25 56.2	01 68	46.2	25 56.4	00 66	44.5	25 56.0	01 65	43.4	25 55.0	02 64	42.3	25 53.5	03 62	41.2	25 51.5	04 61	40.0	25 47.6	05 59	38.4	2
3	25 13.7	03 69	47.3	25 15.3	02 68	46.1	25 16.7	01 66	44.5	25 17.0	00 65	43.4	25 16.9	01 64	42.3	25 16.2	02 62	41.2	25 15.0	02 61	40.1	25 12.4	04 59	38.4	3
4	24 32.1	04 69	47.2	24 34.4	03 68	46.1	24 36.9	02 66	44.5	24 38.1	01 65	43.4	24 38.7	01 64	42.3	24 38.8	00 62	41.2	24 38.5	01 61	40.1	24 37.1	02 59	38.4	4
75	23 50.4	05 69	47.2	23 53.5	05 68	46.1	23 57.2	04 66	44.5	23 59.1	03 65	43.4	24 00.5	02 64	42.3	24 01.5	01 62	41.2	24 02.0	00 61	40.1	24 01.9	01 59	38.4	75
6	23 08.8	07 69	47.1	23 12.6	06 68	46.1	23 17.5	05 66	44.4	23 20.1	04 65	43.3	23 22.4	03 64	42.2	23 24.1	03 62	41.2	23 25.5	02 61	40.1	23 26.6	01 59	38.4	6
7	22 27.3	08 69	47.1	22 31.8	07 68	46.0	22 37.8	06 66	44.4	22 41.2	05 65	43.3	22 44.2	05 64	42.2	22 46.8	04 62	41.1	22 49.0	03 61	40.1	22 51.3	02 59	38.4	7
8	21 45.7	09 69	47.0	21 51.0	08 68	45.9	21 58.1	07 66	44.3	22 02.3	07 65	43.3	22 06.1	06 63	42.2	22 09.5	05 62	41.1	22 12.5	05 61	40.0	22 16.1	03 59	38.4	8
9	21 04.2	10 69	46.9	21 10.2	10 68	45.9	21 18.5	09 66	44.3	21 23.5	08 65	43.2	21 28.1	07 63	42.1	21 32.2	07 62	41.1	21 36.0	06 61	40.0	21 40.8	05 59	38.4	9
80	20 22.8	12 69	46.9	20 29.5	11 68	45.8	20 38.9	10 66	44.2	20 44.6	09 65	43.2	20 50.0	09 63	42.1	20 55.0	08 62	41.0	20 59.5	07 61	40.0	21 05.6	06 59	38.3	80
1	19 41.4	13 69	46.8	19 48.9	12 68	45.7	19 59.4	11 66	44.1	20 05.9	11 65	43.1	20 12.0	10 63	42.0	20 17.8	09 62	41.0	20 23.1	09 61	39.9	20 30.5	08 59	38.3	1
2	19 00.1	14 69	46.7	19 08.3	13 68	45.6	19 19.9	12 66	44.1	19 27.2	12 64	43.0	19 34.1	11 63	42.0	19 40.6	11 62	40.9	19 46.8	10 61	39.8	19 55.3	09 58	38.3	2
3	18 18.9	15 69	46.6	18 27.8	15 67	45.5	18 40.5	14 66	44.0	18 48.5	13 64	42.9	18 56.2	12 63	41.9	19 03.5	12 62	40.8	19 10.4	11 60	39.8	19 20.2	10 58	38.2	3
4	17 37.7	16 68	46.5	17 47.3	16 67	45.4	18 01.1	15 65	43.9	18 09.9	14 64	42.8	18 18.3	14 63	41.8	18 26.4	13 62	40.7	18 34.2	13 60	39.7	18 45.2	12 58	38.1	4
85	16 56.6	17 68	46.3	17 07.0	17 67	45.3	17 21.8	16 65	43.8	17 31.4	16 64	42.7	17 40.6	15 63	41.7	17 49.4	15 62	40.6	17 58.0	14 60	39.6	18 10.2	13 58	38.0	85
6	16 15.7	19 68	46.2	16 26.7	18 67	45.2	16 42.6	17 65	43.6	16 52.9	17 64	42.6	17 02.9	16 63	41.6	17 12.5	16 61	40.5	17 21.8	15 60	39.5	17 35.2	14 58	38.0	6
7	15 34.7	20 68	46.1	15 46.5	19 67	45.0	16 03.5	19 65	43.5	16 14.5	18 64	42.5	16 25.3	18 63	41.5	16 35.7	17 61	40.4	16 45.8	17 60	39.4	17 00.4	16 58	37.9	7
8	14 53.9	21 68	45.9	15 06.4	20 67	44.9	15 24.5	20 65	43.4	15 36.3	19 64	42.4	15 47.7	19 62	41.3	15 58.9	18 61	40.3	16 09.8	18 60	39.3	16 25.6	17 58	37.8	8
9	14 13.2	22 68	45.8	14 26.4	22 66	44.8	14 45.6	21 65	43.2	14 58.1	21 63	42.2	15 10.3	20 62	41.2	15 22.2	20 61	40.2	15 33.9	19 60	39.2	15 50.9	19 58	37.7	9
90	13 32.6	23 67	45.6	13 46.5	23 66	44.6	14 06.8	22 64	43.1	14 20.0	22 63	42.1	14 33.0	21 62	41.1	14 45.7	21 61	40.1	14 58.1	21 60	39.1	15 16.3	20 58	37.5	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	25 00.0	1.0 01	180.0	24 00.0	1.0 01	180.0	22 30.0	1.0 01	180.0	21 30.0	1.0 01	180.0	20 30.0	1.0 01	180.0	19 30.0	1.0 01	180.0	18 30.0	1.0 01	180.0	17 00.0	1.0 00	180.0	00
1	24 59.6	1.0 02	179.2	23 59.6	1.0 02	179.3	22 29.6	1.0 02	179.3	21 29.7	1.0 02	179.3	20 29.7	1.0 02	179.3	19 29.7	1.0 02	179.3	18 29.7	1.0 02	179.4	16 59.7	1.0 02	179.4	1
2	24 58.5	1.0 03	178.5	23 58.5	1.0 03	178.5	22 28.6	1.0 03	178.6	21 28.6	1.0 03	178.6	20 28.7	1.0 03	178.6	19 28.7	1.0 03	178.7	18 28.7	1.0 03	178.7	16 58.8	1.0 03	178.8	2
3	24 56.6	1.0 04	177.7	23 56.7	1.0 04	177.8	22 26.8	1.0 04	177.8	21 26.9	1.0 04	177.9	20 27.0	1.0 04	178.0	19 27.1	1.0 04	178.0	18 27.1	1.0 04	178.1	16 57.3	1.0 04	178.2	3
4	24 53.9	1.0 06	176.9	23 54.1	1.0 06	177.0	22 24.3	1.0 05	177.1	21 24.5	1.0 05	177.2	20 24.6	1.0 05	177.3	19 24.8	1.0 05	177.4	18 24.9	1.0 05	177.4	16 55.1	1.0 05	177.5	4
05	24 50.5	1.0 07	176.2	23 50.8	1.0 07	176.3	22 21.1	1.0 06	176.4	21 21.4	1.0 06	176.5	20 21.6	1.0 06	176.6	19 21.8	1.0 06	176.7	18 22.1	1.0 06	176.8	16 52.4	1.0 06	176.9	05
6	24 46.4	99 08	175.4	23 46.7	99 08	175.5	22 17.2	99 08	175.7	21 17.6	99 07	175.8	20 17.9	99 07	175.9	19 18.2	99 07	176.0	18 18.6	99 07	176.2	16 49.1	99 07	176.3	6
7	24 41.5	99 09	174.7	23 41.9	99 09	174.8	22 12.6	99 09	175.0	21 13.1	99 09	175.1	20 13.6	99 08	175.3	19 14.0	99 08	175.4	18 14.5	99 08	175.5	16 45.1	99 08	175.7	7
8	24 35.8	99 11	173.9	23 36.4	99 10	174.1	22 07.3	99 10	174.3	21 07.9	99 10	174.4	20 08.5	99 09	174.6	19 09.1	99 09	174.7	18 09.7	99 09	174.9	16 40.6	99 09	175.1	8
9	24 29.4	99 12	173.1	23 30.2	99 12	173.3	22 01.3	99 11	173.6	21 02.1	99 11	173.8	20 02.9	99 11	173.9	19 03.6	99 10	174.1	18 04.3	99 10	174.3	16 35.4	99 10	174.5	9
10	24 22.2	98 13	172.4	23 23.2	98 13	172.6	21 54.7	98 12	172.9	20 55.6	98 12	173.1	19 56.5	98 12	173.3	18 57.4	98 11	173.4	17 58.3	98 11	173.6	16 29.7	99 11	173.9	10
1	24 14.4	98 14	171.6	23 15.5	98 14	171.9	21 47.3	98 13	172.2	20 48.4	98 13	172.4	19 49.5	98 13	172.6	18 50.6	98 12	172.8	17 51.7	98 12	173.0	16 23.4	98 12	173.3	1
2	24 05.8	98 16	170.9	23 07.2	98 15	171.1	21 39.2	98 15	171.5	20 40.6	98 14	171.7	19 41.9	98 14	171.9	18 43.2	98 13	172.1	17 44.5	98 13	172.4	16 16.4	98 13	172.7	2
3	23 56.4	97 17	170.2	22 58.1	97 16	170.4	21 30.5	97 16	170.8	20 32.0	97 15	171.0	19 33.6	97 15	171.3	18 35.1	97 14	171.5	17 36.7	97 14	171.7	16 08.9	98 14	172.1	3
4	23 46.4	97 18	169.4	22 48.2	97 18	169.7	21 21.0	97 17	170.1	20 22.9	97 16	170.4	19 24.7	97 16	170.6	18 26.4	97 16	170.9	17 28.2	97 15	171.1	16 00.8	97 14	171.5	4
15	23 35.6	96 19	168.7	22 37.7	96 19	169.0	21 10.9	96 18	169.4	20 13.0	97 17	169.7	19 15.1	97 17	170.0	18 17.1	97 17	170.2	17 19.1	97 16	170.5	15 52.1	97 15	170.9	15
6	23 24.1	96 20	168.0	22 26.6	96 20	168.3	21 00.2	96 19	168.7	20 02.5	96 19	169.0	19 04.9	96 18	169.3	18 07.2	96 18	169.6	17 09.5	96 17	169.9	15 42.9	96 16	170.3	6
7	23 11.9	96 21	167.2	22 14.7	96 21	167.6	20 48.7	96 20	168.0	19 51.4	96 20	168.4	18 54.0	96 19	168.7	17 56.6	96 19	169.0	16 59.2	96 18	169.3	15 33.0	96 17	169.7	7
8	22 59.0	96 23	166.5	22 02.1	95 22	166.9	20 36.7	95 21	167.4	19 39.6	95 21	167.7	18 42.6	95 20	168.0	17 45.5	95 20	168.3	16 48.4	95 19	168.7	15 22.6	95 18	169.1	8
9	22 45.5	94 24	165.8	21 48.9	94 23	166.2	20 23.9	94 22	166.7	19 27.2	95 22	167.0	18 30.5	95 21	167.4	17 33.7	95 21	167.7	16 36.9	95 20	168.1	15 11.7	95 19	168.6	9
20	22 31.2	94 25	165.1	21 35.0	94 24	165.5	20 10.5	94 23	166.0	19 14.2	94 23	166.4	18 17.8	94 22	166.8	17 21.4	94 22	167.1	16 24.9	94 21	167.5	15 00.1	94 20	168.0	20
1	22 16.3	93 26	164.4	21 20.4	93 25	164.8	19 56.5	93 24	165.4	19 00.5	93 24	165.7	18 04.5	93 23	166.1	17 08.4	94 23	166.5	16 12.3	94 22	166.9	14 48.0	94 21	167.4	1
2	22 00.7	92 27	163.7	21 05.2	93 26	164.1	19 41.9	93 25	164.7	18 46.3	93 25	165.1	17 50.6	93 24	165.5	16 54.9	93 24	165.9	15 59.1	93 23	166.3	14 35.4	93 22	166.8	2
3	21 44.4	92 28	163.0	20 49.4	92 27	163.4	19 26.6	92 26	164.1	18 31.4	92 26	164.5	17 36.1	92 25	164.9	16 40.8	92 24	165.3	15 45.4	92 24	165.7	14 22.2	92 23	166.3	3
4	21 27.5	91 29	162.3	20 32.9	91 29	162.8	19 10.7	91 28	163.4	18 15.9	91 27	163.8	17 21.0	92 26	164.3	16 26.1	92 25	164.7	15 31.1	92 25	165.1	14 08.5	92 24	165.7	4
25	21 10.0	90 30	161.7	20 15.7	90 30	162.1	18 54.2	91 28	162.8	17 59.8	91 28	163.2	17 05.3	91 27	163.7	16 10.8	91 26	164.1	15 16.2	91 26	164.5	13 54.3	91 25	165.2	25
6	20 51.8	90 31	161.0	19 58.0	90 31	161.5	18 37.1	90 29	162.2	17 43.2	90 29	162.6	16 49.1	90 28	163.1	15 55.0	90 27	163.5	15 00.8	90 27	164.0	13 39.5	90 26	164.6	6
7	20 33.0	89 32	160.3	19 39.7	89 32	160.8	18 19.5	89 30	161.5	17 25.9	89 30	162.0	16 32.3	89 29	162.5	15 38.6	90 28	162.9	14 44.9	90 27	163.4	13 24.2	90 26	164.1	7
8	20 13.6	88 33	159.7	19 20.7	88 33	160.2	18 01.2	88 31	160.9	17 08.1	89 31	161.4	16 14.9	89 30	161.9	15 21.7	89 29	162.4	14 28.4	89 28	162.8	13 08.4	89 27	163.5	8
9	19 53.6	87 34	159.0	19 01.2	87 34	159.5	17 42.4	88 32	160.3	16 49.7	88 32	160.8	15 57.0	88 31	161.3	15 04.2	88 30	161.8	14 11.4	88 29	162.3	12 52.0	88 28	163.0	9
30	19 33.0	87 35	158.4	18 41.0	87 34	158.9	17 22.9	87 33	159.7	16 30.8	87 32	160.2	15 38.5	87 32	160.7	14 46.2	87 31	161.2	13 53.9	87 30	161.7	12 35.2	87 29	162.5	30
1	19 11.8	86 36	157.7	18 20.3	86 35	158.3	17 03.0	86 34	159.1	16 11.3	86 33	159.6	15 19.5	86 33	160.1	14 27.7	86 32	160.7	13 35.8	87 31	161.2	12 17.9	87 30	162.0	1
2	18 50.0	85 37	157.1	17 59.0	85 36	157.7	16 42.4	85 35	158.5	15 51.3	85 34	159.0	15 00.0	85 33	159.6	14 08.7	86 33	160.1	13 17.3	86 32	160.6	12 00.0	86 30	161.4	2
3	18 27.6	84 38	156.5	17 37.2	84 37	157.1	16 21.4	84 36	157.9	15 30.7	85 35	158.5	14 39.9	85 34	159.0	13 49.1	85 33	159.6	12 58.2	85 33	160.1	11 41.7	85 31	160.9	3
4	18 04.7	83 39	155.9	17 14.8	83 38	156.5	15 59.8	84 37	157.3	15 09.6	84 36	157.9	14 19.4	84 35	158.5	13 29.1	84 34	159.0	12 38.7	84 33	159.6	11 22.9	84 32	160.4	4
35	17 41.3	82 40	155.3	16 51.9	82 39	155.9	15 37.6	83 38	156.8	14 48.0	83 37	157.3	13 58.3	83 36	157.9	13 08.5	83 35	158.5	12 18.6	83 34	159.1	11 03.7	83 33	159.9	35
6	17 17.3	81 41	154.7	16 28.4	81 40	155.3	15 15.0	82 39	156.2	14 25.9	82 38	156.8	13 36.7	82 37	157.4	12 47.5	82 36	158.0	11 58.1	82 35	158.5	10 44.0	82 34	159.4	6
7	16 52.8	80 42	154.1	16 04.5	81 41	154.7	14 51.8	81 39	155.6	14 03.3	81 38	156.2	13 14.7	81 38	156.8	12 25.9	81 37	157.4	11 37.1	81 36	158.0	10 23.8	82 34	158.9	7
8	16 27.7	79 43	153.5	15 40.0	80 42	154.1	14 28.2	80 40	155.1	13 40.2	80 39	155.7	12 52.1	80 38	156.3	12 03.9	80 37	156.9	11 15.7	80 37	157.5	10 03.2	81 35	158.4	8
9	16 02.2	79 43	152.9	15 15.0	79 42	153.6	14 04.0	79 41	154.5	13 16.6	79 40	155.2	12 29.1	79 39	155.8	11 41.5	79 38	156.4	10 53.8	80 37	157.0	9 42.1	80 36	158.0	9
40	15 36.1	78 44	152.4	14 49.5	78 43	153.0	13 39.4	78 42	154.0	12 52.5	78 41	154.6	12 05.6	78 40	155.3	11 18.5	78 39	155.9	10 31.4	79 38	156.5	9 20.6	79 37	157.5	40
1	15 09.6	77 45	151.8	14 23.6	77 44	152.5	13 14.3	77 43	153.5	12 28.0	77 42	154.1	11 41.6	77 41	154.8	10 55.2	78 40	155.4	10 08.6	78 39	156.1	8 58.7	78 37	157.0	1
2	14 42.6	76 46	151.3	13 57.1	76 45	152.0	12 48.7	76 43	153.0	12 03.0	76 42	153.6	11 17.2	76 41	154.3	10 31.4	77 40	154.9	9 45.4	77 39	155.6	8 36.3	77 38	156.6	2
3	14 15.1	75 47	150.7	13 30.2	75 46	151.4	12 22.7	75 44	152.4	11 37.6	75 43	153.1	10 52.4	75 42	153.8	10 07.1	76 41	154.5	9 21.7	76 40	155.1	8 13.5	76 39	156.1	3
4	13 47.1	74 47	150.2	13 02.8	74 46	150.9	11 56.2	74 45	151.9	11 11.7	74 44	152.6	10 27.1	74 43	153.3	9 42.4	75 42	154.0	8 57.6	75 41	154.7	7 50.3	75 39	155.7	4
45	13 18.7	73 48	149.7	12 35.0	73 47	150.4	11 29.3	73 46	151.4	10 45.4	73 45	152.1	10 01.4	73 44	152.8	9 17.3	74 43	153.5	8 33.2	74 41	154.2	7 26.8	74 40	155.2	45
6	12 49.8	72 49	149.2	12 06.8	72 48	149.9	11 02.0	72 46	150.9	10 18.7	72 45	151.7	9 35.3	72 44	152.4	8 51.8	73 43	153.1	8 08.3	73 42	153.7	7 02.8	73 41	154.8	6
7	12 20.5	71 50	148.7	11 38.1	71 48	149.4	10 34.2	71 47	150.5	9 51.6	71 46	151.2	9 08.8	71 45	151.9	8 25.9	72 44	152.6	7 43.0	72 43	153.3	6 38.4	72 41	154.4	7
8	11 50.8	70 50	148.2	11 09.0	70 49	148.9	10 06.1	70 48	150.0	9 24.0	70 47	150.7	8 41.8	70 46	151.4	7 59.6	70 44	152.2	7 17.3	71 43	152.9	6 13.7	71 42	153.9	8
9	11 20.7	69 51	147.7	10 39.5	69 50	148.4	9 37.5	69 48	149.5	8 56.0	69 47	150.3	8 14.5	69 46	151.0	7 32.9	69 45	151.7	6 51.2	70 44	152.4	5 48.6	70 42	153.5	9
50	10 50.2	68 52	147.2	10 09.6	68 51	147.9	9 08.5	68 49	149.1	8 27.7	68 48	149.8	7 46.8	68 47	150.5	7 05.8	68 46	151.3	6 24.8	68 45	152.0	5 23.1	69 43	153.1	50
1	10 19.2	66 52	146.7	9 39.3	67 51	147.5	8 39.2	67 50	148.6	7 59.0	67 48	149.4	7 18.7	67 47	150.1	6 38.4	67 46	150.9	5 58.0	67 45	151.6				1
2	9 47.9	65 53	146.3	9 08.6	66 52	147.0	8 09.4	66 50	148.2	7 29.9	66 49	148.9	6 50.3	66 48	149.7	6 10.6	66 47	150.4	5 30.8	66 46	151.2				2
3	9 16.2	64 53	145.8	8 37.5	65 52	146.6	7 39.3	65 51	147.7	7 00.4	65 50	148.5	6 21.4	65 49	149.3	5 42.4	65 48	150.0	5 03.3	65 46	150.8				3
4	8 44.1	63 54	145.3	8 06.1	63 53	146.1	7 08.8	64 51	147.3	6 30.6	64 50	148.1	5 52.3	64 49	148.8	5 13.9	64 48	149.6							4
55	8 11.7	62 55	144.9	7 34.3	62 54	145.7	6 38.0	63 52	146 9	6 00.4	63 51	147.7	5 22.7	63 50	148.4										55
6	7 38.9	61 55	144.5	7 02.1	61 54	145.3	6 06.8	62 53	146.5	5 29.9	62 51	147.3													6
7	7 05.8	60 56	144.1	6 29.6	60 55	144.9	5 35.3	60 53	146.1																7
8	6 32.3	59 56	143.6	5 56.8	59 55	144.4	5 03.5	59 54	145.7																8
9	5 58.5	58 57	143.2	5 23.7	58 56	144.0																			9
60	5 24.4	57 57	142.8																						60

DECLINATION SAME NAME AS LATITUDE

H.A.	46° 00′			47° 00′			48° 30′			49° 30′			50° 30′			51° 30′			52° 30′			54° 00′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	12 52.2	24 67	45.4	13 06.7	24 66	44.4	13 28.1	23 64	42.9	13 42.0	23 63	41.9	13 55.7	23 62	40.9	14 09.2	22 61	39.9	14 22.4	22 59	38.9	14 41.8	21 57	37.4	91
2	12 11.8	26 67	45.3	12 27.0	25 66	44.3	12 49.5	25 64	42.8	13 04.2	24 63	41.8	13 18.6	24 62	40.8	13 32.8	24 60	39.8	13 46.8	23 59	38.8	14 07.3	22 57	37.3	2
3	11 31.6	27 67	45.1	11 47.5	26 66	44.1	12 11.0	26 64	42.6	12 26.4	26 63	41.6	12 41.6	25 61	40.6	12 56.6	25 60	39.6	13 11.3	24 59	38.6	13 33.0	24 57	37.1	3
4	10 51.5	28 67	44.9	11 08.1	28 65	43.9	11 32.7	27 64	42.4	11 48.8	27 62	41.4	12 04.8	26 61	40.5	12 20.5	26 60	39.5	12 36.0	26 59	38.5	12 58.8	25 57	37.0	4
95	10 11.5	29 66	44.7	10 28.8	29 65	43.7	10 54.5	28 63	42.2	11 11.3	28 62	41.3	11 28.0	28 61	40.3	11 44.5	27 60	39.3	12 00.7	27 59	38.3	12 24.8	26 57	36.8	95
6	9 31.7	30 66	44.5	9 49.7	30 65	43.5	10 16.4	29 63	42.0	10 34.0	29 62	41.1	10 51.4	29 61	40.1	11 08.6	29 60	39.1	11 25.6	28 58	38.1	11 50.8	28 56	36.7	6
7	8 52.0	31 66	44.3	9 10.7	31 65	43.3	9 38.5	31 63	41.8	9 56.8	30 62	40.9	10 14.9	30 61	39.9	10 32.9	30 59	38.9	10 50.7	29 58	38.0	11 17.0	29 56	36.5	7
8	8 12.5	32 66	44.0	8 31.9	32 64	43.1	9 00.7	32 63	41.6	9 19.7	32 61	40.7	9 38.6	31 60	39.7	9 57.3	31 59	38.7	10 15.8	31 58	37.8	10 43.3	30 56	36.3	8
9	7 33.2	34 65	43.8	7 53.3	33 64	42.8	8 23.1	33 62	41.4	8 42.8	33 61	40.5	9 02.4	33 60	39.5	9 21.9	32 59	38.5	9 41.2	32 58	37.6	10 09.8	32 56	36.1	9
100	6 54.0	35 65	43.6	7 14.8	34 64	42.6	7 45.7	34 62	41.2	8 06.1	34 61	40.2	8 26.4	34 60	39.3	8 46.6	34 59	38.3	9 06.6	33 57	37.4	9 36.4	33 55	36.0	100
1	6 15.0	36 65	43.3	6 36.4	36 64	42.4	7 08.4	35 62	41.0	7 29.5	35 61	40.0	7 50.6	35 59	39.1	8 11.5	35 58	38.1	8 32.3	35 57	37.2	9 03.2	34 55	35.8	1
2	5 36.2	37 64	43.1	5 58.3	37 63	42.1	6 31.3	37 62	40.7	6 53.2	36 60	39.8	7 14.9	36 59	38.8	7 36.6	36 58	37.9	7 58.1	36 57	37.0	8 30.1	35 55	35.5	2
3				5 20.3	38 63	41.9	5 54.4	38 61	40.5	6 16.9	38 60	39.5	6 39.4	37 59	38.6	7 01.8	37 58	37.7	7 24.0	37 56	36.7	7 57.2	37 55	35.3	3
4							5 17.6	39 61	40.2	5 40.9	39 60	39.3	6 04.1	39 59	38.4	6 27.2	38 57	37.4	6 50.2	38 56	36.5	7 24.5	38 54	35.1	4
105										5 05.1	40 59	39.0	5 29.0	40 58	38.1	5 52.8	40 57	37.2	6 16.6	39 56	36.3	6 52.0	39 54	34.9	105
6																5 18.6	41 57	36.9	5 43.1	41 55	36.0	6 19.6	40 54	34.6	6
7																			5 09.8	42 55	35.8	5 47.5	42 53	34.4	7
8																						5 15.5	43 53	34.2	8

Lat. 19°

H.A.	54° 30′				55° 00′				56° 00′				56° 30′				57° 00′				57° 30′				59° 00′				59° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	54 30.0	1.0	01	00.0	54 00.0	1.0	01	00.0	53 00.0	1.0	01	00.0	52 30.0	1.0	01	00.0	52 00.0	1.0	01	00.0	51 30.0	1.0	01	00.0	50 00.0	1.0	01	00.0	49 30.0	1.0	01	00.0	00
1	54 29.5	1.0	02	01.0	53 59.5	1.0	02	01.0	52 59.5	1.0	02	00.9	52 29.6	1.0	02	00.9	51 59.6	1.0	02	00.9	51 29.6	1.0	02	00.9	49 59.6	1.0	02	00.8	49 29.6	1.0	02	00.8	1
2	54 28.0	1.0	04	02.0	53 58.1	1.0	04	02.0	52 58.2	1.0	04	01.9	52 28.2	1.0	04	01.8	51 58.2	1.0	04	01.8	51 28.3	1.0	04	01.7	49 58.4	1.0	03	01.6	49 28.5	1.0	03	01.6	2
3	54 25.5	1.0	06	03.0	53 55.7	1.0	06	02.9	52 55.9	1.0	05	02.8	52 26.0	1.0	05	02.7	51 56.1	1.0	05	02.6	51 26.2	1.0	05	02.6	49 56.4	1.0	05	02.4	49 26.5	1.0	04	02.3	3
4	54 22.1	99	07	04.0	53 52.3	99	07	03.9	52 52.7	99	07	03.7	52 22.8	99	07	03.6	51 53.0	99	07	03.5	51 23.2	99	06	03.4	49 53.7	99	06	03.2	49 23.8	99	06	03.1	4
05	54 17.7	99	09	05.0	53 48.0	99	09	04.9	52 48.5	99	08	04.6	52 18.8	99	08	04.5	51 49.1	99	08	04.4	51 19.3	99	08	04.3	49 50.1	99	07	04.0	49 20.3	99	07	03.9	05
6	54 12.3	99	11	06.0	53 42.7	99	10	05.8	52 43.5	99	10	05.5	52 13.9	99	10	05.4	51 44.3	99	09	05.3	51 14.7	99	09	05.1	49 45.8	99	09	04.8	49 16.1	99	08	04.7	6
7	54 05.9	98	12	06.9	53 36.5	98	12	06.8	52 37.6	98	11	06.4	52 08.1	98	11	06.3	51 38.7	98	11	06.1	51 09.2	98	11	06.0	49 40.7	98	10	05.6	49 11.1	98	10	05.4	7
8	53 58.6	97	14	07.9	53 29.3	98	13	07.7	52 30.8	98	13	07.3	52 01.5	98	12	07.2	51 32.2	98	12	07.0	51 02.8	98	12	06.8	49 34.8	98	11	06.3	49 05.4	98	11	06.2	8
9	53 50.3	97	15	08.9	53 21.2	97	15	08.6	52 23.1	97	14	08.2	51 54.0	97	14	08.0	51 24.8	97	14	07.9	50 55.7	97	13	07.7	49 28.1	97	12	07.1	48 58.9	97	12	06.9	9
10	53 41.1	96	17	09.8	53 12.3	96	16	09.6	52 14.5	96	16	09.1	51 45.6	96	15	08.9	51 16.7	96	15	08.7	50 47.7	97	15	08.5	49 20.7	97	14	07.9	48 51.7	97	13	07.7	10
1	53 31.0	95	18	10.7	53 02.4	95	18	10.5	52 05.1	96	17	10.0	51 36.4	96	17	09.8	51 07.7	96	16	09.5	50 38.9	96	16	09.3	49 12.5	96	15	08.7	48 43.7	96	14	08.4	1
2	53 20.0	94	20	11.7	52 51.6	95	19	11.4	51 54.8	95	18	10.9	51 26.4	95	18	10.6	50 57.9	95	18	10.4	50 29.4	95	17	10.1	49 03.6	95	16	09.4	48 35.0	95	16	09.2	2
3	53 08.1	94	21	12.6	52 40.0	94	21	12.3	51 43.7	94	20	11.7	51 15.5	94	19	11.4	50 47.3	94	19	11.2	50 19.0	94	19	10.9	48 54.0	95	17	10.2	48 25.6	95	17	09.9	3
4	52 55.3	93	23	13.5	52 27.5	93	22	13.2	51 31.8	93	21	12.6	51 03.9	93	21	12.3	50 35.9	93	20	12.0	50 07.9	93	20	11.7	48 43.6	94	18	10.9	48 15.5	94	18	10.6	4
15	52 41.6	91	24	14.4	52 14.1	92	24	14.0	51 19.0	92	23	13.4	50 51.4	92	22	13.1	50 23.7	92	22	12.8	49 56.0	92	21	12.5	48 32.6	93	20	11.6	48 04.7	93	19	11.3	15
6	52 27.1	90	26	15.2	52 00.0	91	25	14.9	51 05.5	91	24	14.2	50 38.2	91	23	13.9	50 10.8	91	23	13.6	49 43.4	92	22	13.2	48 20.8	92	21	12.3	47 53.2	92	20	12.0	6
7	52 11.8	89	27	16.1	51 45.0	89	26	15.7	50 51.2	90	25	15.0	50 24.2	90	25	14.7	49 57.1	90	24	14.3	49 30.0	90	23	14.0	48 08.3	91	22	13.0	47 41.0	91	21	12.7	7
8	51 55.7	88	28	16.9	51 29.3	88	28	16.5	50 36.1	89	26	15.8	50 09.5	89	26	15.4	49 42.7	89	25	15.1	49 15.9	89	25	14.7	47 55.2	90	23	13.7	47 28.2	90	22	13.4	8
9	51 38.8	87	29	17.7	51 12.7	87	29	17.3	50 20.3	88	28	16.6	49 54.0	88	27	16.2	49 27.6	88	26	15.8	49 01.2	88	26	15.5	47 41.4	89	24	14.4	47 14.7	89	24	14.1	9
20	51 21.1	86	31	18.5	50 55.4	86	30	18.1	50 03.8	86	29	17.3	49 37.8	87	28	16.9	49 11.8	87	28	16.6	48 45.7	87	27	16.2	47 26.9	88	25	15.1	47 00.6	88	25	14.7	20
1	51 02.7	84	32	19.3	50 37.4	85	31	18.9	49 46.5	85	30	18.1	49 20.9	85	29	17.7	48 55.3	86	29	17.3	48 29.5	86	28	16.9	47 11.8	87	26	15.8	46 45.8	87	26	15.4	1
2	50 43.6	83	33	20.1	50 18.7	83	32	19.7	49 28.6	84	31	18.8	49 03.4	84	30	18.4	48 38.1	84	30	18.0	48 12.7	85	29	17.6	46 56.1	85	27	16.4	46 30.4	86	27	16.0	2
3	50 23.8	81	34	20.9	49 59.3	82	34	20.4	49 09.9	83	32	19.5	48 45.1	83	31	19.1	48 20.2	83	31	18.7	47 55.3	83	30	18.3	46 39.8	84	28	17.1	46 14.5	85	28	16.7	3
4	50 03.2	80	35	21.6	49 39.1	80	35	21.1	48 50.7	81	33	20.2	48 26.3	81	33	19.8	48 01.8	82	32	19.3	47 37.2	82	31	18.9	46 22.9	83	29	17.7	45 57.9	83	29	17.3	4
25	49 42.0	79	36	22.3	49 18.4	79	36	21.8	48 30.7	80	34	20.9	48 06.8	80	34	20.4	47 42.7	80	33	20.0	47 18.5	81	32	19.6	46 05.3	82	30	18.3	45 40.8	82	30	17.9	25
6	49 20.2	77	37	23.0	48 57.0	78	37	22.5	48 10.2	78	35	21.6	47 46.6	79	35	21.1	47 23.0	79	34	20.6	46 59.2	79	33	20.2	45 47.3	80	31	18.9	45 23.1	81	30	18.5	6
7	48 57.7	76	38	23.7	48 34.9	76	38	23.2	47 49.0	77	36	22.2	47 25.9	77	36	21.7	47 02.7	78	35	21.3	46 39.3	78	34	20.8	45 28.6	79	32	19.5	45 04.8	79	31	19.0	7
8	48 34.6	74	39	24.3	48 12.3	75	39	23.8	47 27.3	75	37	22.8	47 04.6	76	36	22.4	46 41.8	76	36	21.9	46 18.9	77	35	21.4	45 09.4	78	33	20.1	44 46.1	78	32	19.6	8
9	48 11.0	73	40	25.0	47 49.1	73	40	24.5	47 05.0	74	38	23.5	46 42.7	74	37	23.0	46 20.4	75	37	22.5	45 57.9	75	36	22.0	44 49.7	76	34	20.6	44 26.8	77	33	20.2	9
30	47 46.7	71	41	25.6	47 25.3	72	41	25.1	46 42.1	72	39	24.1	46 20.3	73	38	23.6	45 58.4	73	38	23.1	45 36.4	74	37	22.6	44 29.5	75	35	21.2	44 07.0	75	34	20.7	30
1	47 21.9	70	42	26.2	47 01.0	70	41	25.7	46 18.7	71	40	24.6	45 57.4	71	39	24.1	45 35.9	72	38	23.6	45 14.3	72	38	23.1	44 08.8	73	35	21.7	43 46.7	74	35	21.2	1
2	46 56.6	68	43	26.8	46 36.2	68	42	26.3	45 54.8	69	41	25.2	45 33.9	70	40	24.7	45 12.9	70	39	24.2	44 51.8	71	38	23.7	43 47.5	72	36	22.2	43 25.9	72	35	21.7	2
3	46 30.8	66	44	27.4	46 10.8	67	43	26.8	45 30.4	68	41	25.8	45 10.0	68	41	25.2	44 49.4	69	40	24.7	44 28.7	69	39	24.2	43 25.9	71	37	22.7	43 04.6	71	36	22.2	3
4	46 04.5	65	45	27.9	45 45.0	65	44	27.4	45 05.5	66	42	26.3	44 45.6	67	42	25.8	44 25.5	67	41	25.2	44 05.2	68	40	24.7	43 03.7	69	38	23.2	42 43.0	69	37	22.7	4
35	45 37.7	63	45	28.4	45 18.7	64	45	27.9	44 40.2	65	43	26.8	44 20.7	65	42	26.3	44 01.1	66	41	25.7	43 41.3	66	41	25.2	42 41.1	68	38	23.7	42 20.8	68	38	23.2	35
6	45 10.5	62	46	29.0	44 51.9	62	45	28.4	44 14.4	63	44	27.3	43 55.4	64	43	26.8	43 36.2	64	42	26.2	43 16.9	65	41	25.7	42 18.1	66	39	24.2	41 58.3	66	38	23.7	6
7	44 42.8	60	47	29.5	44 24.7	60	46	28.9	43 48.1	62	44	27.8	43 29.6	62	44	27.2	43 10.9	63	43	26.7	42 52.1	63	42	26.2	41 54.7	64	40	24.6	41 35.3	65	39	24.1	7
8	44 14.7	58	48	29.9	43 57.1	59	47	29.4	43 21.5	60	45	28.3	43 03.4	60	44	27.7	42 45.2	61	44	27.2	42 26.8	61	43	26.6	41 30.9	63	40	25.1	41 11.9	63	40	24.5	8
9	43 46.1	57	48	30.4	43 29.1	57	47	29.8	42 54.4	58	46	28.7	42 36.8	59	45	28.2	42 19.1	59	44	27.6	42 01.2	60	43	27.1	41 06.7	61	41	25.5	40 48.2	62	40	25.0	9
40	43 17.2	55	49	30.8	43 00.6	56	48	30.3	42 27.0	57	46	29.2	42 09.9	57	46	28.6	41 52.6	58	45	28.0	41 35.2	58	44	27.5	40 42.1	60	42	25.9	40 24.1	60	41	25.4	40
1	42 48.0	53	49	31.3	42 31.9	54	49	30.7	41 59.1	55	47	29.6	41 42.5	56	46	29.0	41 25.8	56	45	28.5	41 08.8	57	45	27.9	40 17.1	58	42	26.3	39 59.6	59	41	25.8	1
2	42 18.3	52	50	31.7	42 02.7	52	49	31.1	41 31.0	53	48	30.0	41 14.8	54	47	29.4	40 58.5	55	46	28.9	40 42.1	55	45	28.3	39 51.8	57	43	26.7	39 34.8	57	42	26.1	2
3	41 48.4	50	50	32.1	41 33.2	51	50	31.5	41 02.4	52	48	30.4	40 46.8	52	47	29.8	40 31.0	53	46	29.2	40 15.0	53	46	28.7	39 26.2	55	43	27.1	39 09.6	56	42	26.5	3
4	41 18.1	49	51	32.5	41 03.4	49	50	31.9	40 33.6	50	49	30.8	40 18.4	51	48	30.2	40 03.1	51	47	29.6	39 47.6	52	46	29.1	39 00.2	53	44	27.4	38 44.1	54	43	26.9	4
45	40 47.4	47	52	32.8	40 33.3	48	51	32.3	40 04.4	49	49	31.1	39 49.8	49	48	30.5	39 34.9	50	48	30.0	39 19.9	50	47	29.4	38 33.9	52	44	27.8	38 18.3	52	44	27.2	45
6	40 16.5	45	52	33.2	40 02.8	46	51	32.6	39 35.0	47	50	31.5	39 20.8	48	49	30.9	39 06.4	48	48	30.3	38 51.9	49	47	29.8	38 07.4	50	45	28.1	37 52.2	51	44	27.5	6
7	39 45.3	44	52	33.5	39 32.1	44	52	33.0	39 05.2	45	50	31.8	38 51.5	46	49	31.2	38 37.6	47	48	30.7	38 23.6	47	48	30.1	37 40.5	49	45	28.4	37 25.8	49	44	27.9	7
8	39 13.9	42	53	33.9	39 01.1	43	52	33.3	38 35.2	44	50	32.1	38 22.0	44	50	31.5	38 08.6	45	49	31.0	37 55.0	45	48	30.4	37 13.4	47	46	28.7	36 59.2	48	45	28.2	8
9	38 42.1	40	53	34.2	38 29.9	41	52	33.6	38 04.9	42	51	32.4	37 52.2	43	50	31.8	37 39.2	43	49	31.3	37 26.2	44	48	30.7	36 46.0	45	46	29.0	36 32.3	46	45	28.5	9
50	38 10.1	39	54	34.5	37 58.4	39	53	33.9	37 34.4	41	51	32.7	37 22.1	41	50	32.1	37 09.7	42	50	31.6	36 57.1	42	49	31.0	36 18.3	44	46	29.3	36 05.1	44	46	28.8	50
1	37 37.9	37	54	34.7	37 26.6	38	53	34.2	37 03.6	39	52	33.0	36 51.8	40	51	32.4	36 39.8	40	50	31.8	36 27.7	41	49	31.3	35 50.4	42	47	29.6	35 37.7	43	46	29.0	1
2	37 05.5	36	54	35.0	36 54.7	36	54	34.4	36 32.6	37	52	33.3	36 21.3	38	51	32.7	36 09.8	39	50	32.1	35 58.2	39	50	31.5	35 22.3	41	47	29.9	35 10.0	41	46	29.3	2
3	36 32.8	34	55	35.3	36 22.5	35	54	34.7	36 01.4	36	52	33.5	35 50.5	36	52	32.9	35 39.5	37	51	32.4	35 28.4	37	50	31.8	34 54.0	39	48	30.1	34 42.2	40	47	29.5	3
4	36 00.0	33	55	35.5	35 50.1	33	54	34.9	35 29.9	34	53	33.8	35 19.6	35	52	33.2	35 09.1	35	51	32.6	34 58.4	36	50	32.0	34 25.4	37	48	30.3	34 14.1	38	47	29.8	4
55	35 27.0	31	55	35.7	35 17.6	32	55	35.1	34 58.3	33	53	34.0	34 48.4	33	52	33.4	34 38.4	34	51	32.8	34 28.2	34	51	32.3	33 56.7	36	48	30.6	33 45.8	36	47	30.0	55
6	34 53.7	29	56	35.9	34 44.8	30	55	35.4	34 26.5	31	53	34.2	34 17.1	32	52	33.6	34 07.5	32	52	33.1	33 57.8	33	51	32.5	33 27.7	34	49	30.8	33 17.4	35	48	30.2	6
7	34 20.4	28	56	36.1	34 11.9	28	55	35.6	33 54.5	30	54	34.4	33 45.6	30	53	33.8	33 36.5	31	52	33.3	33 27.3	31	51	32.7	32 58.6	33	49	31.0	32 48.7	33	48	30.4	7
8	33 46.8	26	56	36.3	33 38.8	27	55	35.8	33 22.4	28	54	34.6	33 13.9	28	53	34.0	33 05.3	29	52	33.5	32 56.5	30	51	32.9	32 29.3	31	49	31.2	32 19.9	32	48	30.6	8
9	33 13.1	25	56	36.5	33 05.6	25	56	35.9	32 50.1	26	54	34.8	32 42.1	27	53	34.2	32 34.0	27	52	33.6	32 25.7	28	52	33.1	31 59.8	29	49	31.4	31 50.9	30	49	30.8	9
60	32 39.3	23	57	36.7	32 32.3	24	56	36.1	32 17.7	25	54	35.0	32 10.1	25	54	34.4	32 02.5	26	53	33.8	31 54.6	26	52	33.2	31 30.2	28	50	31.5	31 21.8	28	49	31.0	60
1	32 05.4	22	57	36.8	31 58.8	22	56	36.3	31 45.1	23	54	35.1	31 38.0	24	54	34.5	31 30.8	24	53	34.0	31 23.5	25	52	33.4	31 00.5	26	50	31.7	30 52.5	27	49	31.1	1
2	31 31.3	20	57	37.0	31 25.2	21	56	36.4	31 12.4	22	55	35.3	31 05.8	22	54	34.7	30 59.1	23	53	34.1	30 52.2	23	52	33.6	30 30.6	25	50	31.9	30 23.1	25	49	31.3	2
3	30 57.1	19	57	37.1	30 51.4	19	56	36.5	30 39.6	20	55	35.4	30 33.5	21	54	34.8	30 27.2	21	53	34.3	30 20.8	22	53	33.7	30 00.6	23	50	32.0	29 53.6	24	49	31.4	3
4	30 22.8	17	57	37.2	30 17.6	18	57	36.7	30 06.7	19	55	35.5	30 01.0	19	54	35.0	29 55.2	20	53	34.4	29 49.2	20	53	33.8	29 30.5	22	50	32.1	29 23.9	22	50	31.6	4
65	29 48.5	16	57	37.3	29 43.7	16	57	36.8	29 33.7	17	55	35.6	29 28.5	18	54	35.1	29 23.1	18	54	34.5	29 17.6	19	53	33.9	29 00.2	20	51	32.3	28 54.2	20	50	31.7	65
6	29 14.0	14	58	37.4	29 09.7	15	57	36.9	29 00.6	16	55	35.7	28 55.8	16	55	35.2	28 50.9	17	54	34.6	28 45.9	17	53	34.1	28 29.9	18	51	32.4	28 24.3	19	50	31.8	6
7	28 39.5	13	58	37.5	28 35.6	13	57	37.0	28 27.4	14	55	35.8	28 23.1	15	55	35.3	28 18.7	15	54	34.7	28 14.1	16	53	34.2	27 59.5	17	51	32.5	27 54.4	17	50	31.9	7
8	28 04.9	11	58	37.6	28 01.5	12	57	37.0	27 54.2	13	56	35.9	27 50.3	13	55	35.4	27 46.3	14	54	34.8	27 42.2	14	53	34.2	27 29.0	15	51	32.6	27 24.3	16	50	32.0	8
9	27 30.3	10	58	37.7	27 27.3	10	57	37.1	27 20.9	11	56	36.0	27 17.4	12	55	35.4	27 13.9	12	54	34.9	27 10.2	12	53	34.3	26 58.4	14	51	32.7	26 54.2	14	50	32.1	9
70	26 55.6	08	58	37.7	26 53.0	09	57	37.2	26 47.5	10	56	36.1	26 44.5	10	55	35.5	26 41.4	11	54	34.9	26 38.2	11	53	34.4	26 27.8	12	51	32.7	26 24.1	13	50	32.2	70
1	26 20.8	07	58	37.8	26 18.7	07	57	37.2	26 14.1	08	56	36.1	26 11.6	09	55	35.6	26 08.9	09	54	35.0	26 06.2	09	54	34.5	25 57.1	11	51	32.8	25 53.8	11	50	32.2	1
2	25 46.1	05	58	37.8	25 44.4	06	57	37.3	25 40.6	07	56	36.2	25 38.5	07	55	35.6	25 36.4	08	54	35.1	25 34.0	08	54	34.5	25 26.3	09	51	32.8	25 23.5	10	51	32.3	2
3	25 11.2	04	58	37.9	25 10.0	04	57	37.3	25 07.1	05	56	36.2	25 05.5	06	55	35.6	25 03.7	06	54	35.1	25 01.9	06	54	34.5	24 55.6	08	51	32.9	24 53.2	08	51	32.3	3
4	24 36.4	03	58	37.9	24 35.6	03	57	37.3	24 33.6	04	56	36.2	24 32.4	04	55	35.7	24 31.1	05	54	35.1	24 29.7	05	54	34.6	24 24.7	06	51	32.9	24 22.8	07	51	32.4	4
75	24 01.6	01	58	37.9	24 01.2	02	57	37.3	24 00.1	02	56	36.2	23 59.3	03	55	35.7	23 58.5	03	54	35.2	23 57.5	03	54	34.6	23 53.9	05	51	33.0	23 52.4	05	51	32.4	75
6	23 26.7	00	58	37.9	23 26.8	00	57	37.3	23 26.5	01	56	36.3	23 26.2	01	55	35.7	23 25.8	02	54	35.2	23 25.3	02	54	34.6	23 23.0	03	51	33.0	23 22.0	03	51	32.4	6
7	22 51.9	02	58	37.9	22 52.4	01	57	37.3	22 53.0	01	56	36.3	22 53.1	00	55	35.7	22 53.1	00	54	35.2	22 53.0	00	54	34.6	22 52.1	02	52	33.0	22 51.6	02	51	32.5	7
8	22 17.1	03	58	37.9	22 18.0	03	57	37.3	22 19.4	02	56	36.2	22 20.0	02	55	35.7	22 20.4	01	54	35.2	22 20.8	01	54	34.6	22 21.2	00	52	33.0	22 21.1	00	51	32.5	8
9	21 42.3	05	58	37.8	21 43.6	04	57	37.3	21 45.9	03	56	36.2	21 46.9	03	55	35.7	21 47.8	03	54	35.2	21 48.6	02	54	34.6	21 50.3	01	51	33.0	21 50.7	01	51	32.5	9
80	21 07.5	06	58	37.8	21 09.2	06	57	37.3	21 12.4	05	56	36.2	21 13.8	05	55	35.7	21 15.1	04	54	35.1	21 16.3	04	54	34.6	21 19.4	03	51	33.0	21 20.2	03	51	32.5	80
1	20 32.7	07	58	37.8	20 34.8	07	57	37.2	20 38.9	06	56	36.2	20 40.7	06	55	35.6	20 42.5	06	54	35.1	20 44.1	05	54	34.6	20 48.5	04	51	33.0	20 49.8	04	51	32.4	1
2	19 58.0	09	58	37.7	20 00.5	08	57	37.2	20 05.4	08	56	36.1	20 07.7	07	55	35.6	20 09.9	07	54	35.1	20 12.0	07	54	34.5	20 17.7	06	51	32.9	20 19.4	06	51	32.4	2
3	19 23.3	10	58	37.7	19 26.3	10	57	37.1	19 32.0	09	56	36.1	19 34.7	09	55	35.6	19 37.3	09	54	35.0	19 39.8	08	54	34.5	19 46.8	07	51	32.9	19 49.0	07	51	32.4	3
4	18 48.6	11	58	37.6	18 52.0	11	57	37.1	18 58.6	11	56	36.0	19 01.7	10	55	35.5	19 04.7	10	54	35.0	19 07.7	10	53	34.4	19 16.0	09	51	32.9	19 18.6	08	51	32.3	4
85	18 14.1	13	58	37.5	18 17.9	13	57	37.0	18 25.2	12	55	36.0	18 28.8	12	55	35.4	18 32.3	11	54	34.9	18 35.6	11	53	34.4	18 45.3	10	51	32.8	18 48.3	10	50	32.3	85
6	17 39.5	14	57	37.4	17 43.8	14	57	36.9	17 52.0	13	55	35.9	17 55.9	13	55	35.4	17 59.8	13	54	34.8	18 03.6	13	53	34.3	18 14.5	12	51	32.8	18 18.0	11	50	32.2	6
7	17 05.1	16	57	37.3	17 09.7	15	57	36.8	17 18.7	15	55	35.8	17 23.1	15	55	35.3	17 27.4	14	54	34.8	17 31.7	14	53	34.2	17 43.9	13	51	32.7	17 47.8	13	50	32.2	7
8	16 30.7	17	57	37.3	16 35.7	17	56	36.7	16 45.6	16	55	35.7	16 50.4	16	54	35.2	16 55.1	16	54	34.7	16 59.8	15	53	34.2	17 13.3	15	51	32.6	17 17.6	14	50	32.1	8
9	15 56.4	18	57	37.1	16 01.9	18	56	36.6	16 12.5	18	55	35.6	16 17.7	17	54	35.1	16 22.9	17	54	34.6	16 28.0	17	53	34.1	16 42.7	16	51	32.5	16 47.5	16	50	32.0	9
90	15 22.2	20	57	37.0	15 28.0	19	56	36.5	15 39.5	19	55	35.5	15 45.2	19	54	35.0	15 50.7	18	53	34.5	15 56.2	18	53	34.0	16 12.3	17	51	32.4	16 17.5	17	50	31.9	90

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
00	16 30.0	1.0 00	180.0	16 00.0	1.0 00	180.0	15 00.0	1.0 00	180.0	14 30.0	1.0 00	180.0	14 00.0	1.0 00	180.0	13 30.0	1.0 00	180.0	12 00.0	1.0 00	180.0	11 30.0	1.0 00	180.0	00
1	16 29.7	1.0 02	179.4	15 59.7	1.0 01	179.4	14 59.7	1.0 01	179.4	14 29.7	1.0 01	179.4	13 59.7	1.0 01	179.4	13 29.7	1.0 01	179.4	11 59.7	1.0 01	179.5	11 29.7	1.0 01	179.5	1
2	16 28.8	1.0 02	178.8	15 58.8	1.0 02	178.8	14 58.9	1.0 02	178.8	14 28.9	1.0 02	178.9	13 58.9	1.0 02	178.9	13 28.9	1.0 02	178.9	11 59.0	1.0 02	178.9	11 29.0	1.0 02	179.0	2
3	16 27.3	1.0 04	178.2	15 57.3	1.0 03	178.2	14 57.4	1.0 03	178.3	14 27.5	1.0 03	178.3	13 57.5	1.0 03	178.3	13 27.5	1.0 03	178.3	11 57.7	1.0 03	178.4	11 27.7	1.0 03	178.4	3
4	16 25.2	1.0 04	177.6	15 55.3	1.0 04	177.6	14 55.4	1.0 04	177.7	14 25.5	1.0 04	177.7	13 55.6	1.0 04	177.8	13 25.6	1.0 04	177.8	11 55.8	1.0 04	177.9	11 25.9	1.0 04	177.9	4
05	16 22.5	1.0 06	177.0	15 52.6	1.0 05	177.0	14 52.8	1.0 05	177.1	14 23.0	1.0 05	177.2	13 53.1	1.0 05	177.2	13 23.2	1.0 05	177.2	11 53.5	1.0 05	177.4	11 23.6	1.0 05	177.4	05
6	16 19.2	99 06	176.4	15 49.4	99 06	176.4	14 49.7	99 06	176.5	14 19.9	99 06	176.6	13 50.0	99 06	176.6	13 20.2	99 06	176.7	11 50.6	99 06	176.8	11 20.8	99 06	176.9	6
7	16 15.3	99 07	175.8	15 45.6	99 07	175.8	14 46.0	99 07	176.0	14 16.2	99 07	176.0	13 46.4	99 07	176.1	13 16.6	99 07	176.1	11 47.2	99 06	176.3	11 17.5	99 06	176.4	7
8	16 10.9	99 08	175.2	15 41.1	99 08	175.2	14 41.7	99 08	175.4	14 12.0	99 08	175.5	13 42.3	99 08	175.5	13 12.5	99 08	175.6	11 43.4	99 07	175.8	11 13.6	99 07	175.9	8
9	16 05.8	99 09	174.6	15 36.1	99 09	174.7	14 36.9	99 09	174.8	14 07.2	99 09	174.9	13 37.6	99 09	175.0	13 07.9	99 09	175.0	11 38.9	99 08	175.3	11 09.3	99 08	175.4	9
10	16 00.1	99 10	174.0	15 30.6	99 10	174.1	14 31.4	99 10	174.2	14 01.9	99 10	174.3	13 32.3	99 10	174.4	13 02.7	99 10	174.5	11 34.0	99 09	174.8	11 04.4	99 09	174.8	10
1	15 53.9	98 11	173.4	15 24.4	98 11	173.5	14 25.5	98 11	173.7	13 56.0	98 11	173.8	13 26.5	98 11	173.9	12 57.0	98 10	174.0	11 28.6	98 10	174.2	10 59.1	98 10	174.3	1
2	15 47.1	98 12	172.8	15 17.7	98 12	172.9	14 18.9	98 12	173.1	13 49.6	98 12	173.2	13 20.2	98 11	173.3	12 50.8	98 11	173.4	11 22.6	98 11	173.7	10 53.3	98 11	173.8	2
3	15 39.7	98 13	172.2	15 10.4	98 13	172.3	14 11.9	98 13	172.5	13 42.6	98 13	172.7	13 13.3	98 12	172.8	12 44.0	98 12	172.9	11 16.2	98 12	173.2	10 46.9	98 11	173.3	3
4	15 31.7	97 14	171.6	15 02.5	97 14	171.7	14 04.2	97 14	172.0	13 35.1	97 13	172.1	13 05.9	97 13	172.2	12 36.7	97 13	172.3	11 09.2	97 12	172.7	10 40.1	97 12	172.8	4
15	15 23.1	97 15	171.0	14 54.1	97 15	171.2	13 56.0	97 15	171.4	13 27.0	97 14	171.6	12 58.0	97 14	171.7	12 28.9	97 14	171.8	11 01.8	97 13	172.2	10 32.7	97 13	172.3	15
6	15 14.0	96 16	170.5	14 45.1	96 16	170.6	13 47.3	96 15	170.9	13 18.4	96 15	171.0	12 49.5	96 15	171.1	12 20.6	96 15	171.3	10 53.8	96 14	171.7	10 24.9	96 14	171.8	6
7	15 04.3	96 17	169.9	14 35.5	96 17	170.0	13 38.0	96 16	170.3	13 09.3	96 16	170.5	12 40.5	96 16	170.6	12 11.7	96 16	170.8	10 45.4	96 15	171.2	10 16.6	96 15	171.3	7
8	14 54.0	95 18	169.3	14 25.4	95 18	169.5	13 28.2	95 17	169.8	12 59.6	95 17	169.9	12 31.0	95 17	170.1	12 02.4	95 16	170.2	10 36.4	95 16	170.7	10 07.8	95 15	170.8	8
9	14 43.2	95 19	168.7	14 14.8	95 19	168.9	13 17.9	95 18	169.2	12 49.4	95 18	169.4	12 20.9	95 18	169.5	11 52.5	95 17	169.7	10 27.0	95 17	170.2	9 58.5	95 16	170.3	9
20	14 31.9	94 20	168.2	14 03.6	94 20	168.3	13 07.0	94 19	168.7	12 38.7	94 19	168.8	12 10.4	94 18	169.0	11 42.1	94 18	169.2	10 17.1	94 17	169.7	9 48.8	94 17	169.9	20
1	14 19.9	94 21	167.6	13 51.8	94 20	167.8	12 55.6	94 20	168.1	12 27.5	94 20	168.3	11 59.3	94 19	168.5	11 31.2	94 19	168.7	10 06.7	94 18	169.2	9 38.5	94 18	169.4	1
2	14 07.5	93 22	167.0	13 39.6	93 21	167.2	12 43.7	93 21	167.6	12 15.7	93 20	167.8	11 47.7	93 20	168.0	11 19.8	93 20	168.2	9 55.8	93 19	168.7	9 27.8	93 19	168.9	2
3	13 54.5	92 23	166.5	13 26.7	93 22	166.7	12 31.2	93 22	167.1	12 03.5	93 21	167.3	11 35.7	93 21	167.5	11 07.9	93 21	167.6	9 44.5	93 20	168.2	9 16.7	93 19	168.4	3
4	13 41.0	92 23	165.9	13 13.4	92 23	166.1	12 18.3	92 22	166.5	11 50.7	92 22	166.7	11 23.1	92 22	166.9	10 55.5	92 21	167.1	9 32.7	92 20	167.7	9 05.0	92 20	167.9	4
25	13 26.9	91 24	165.4	12 59.6	91 24	165.6	12 04.8	91 23	166.0	11 37.4	91 23	166.2	11 10.0	91 23	166.4	10 42.6	91 22	166.6	9 20.4	91 21	167.3	8 52.9	91 21	167.5	25
6	13 12.3	90 25	164.8	12 45.2	91 25	165.1	11 50.9	91 24	165.5	11 23.7	91 24	165.7	10 56.5	91 23	165.9	10 29.3	91 23	166.1	9 07.6	91 22	166.8	8 40.4	91 22	167.0	6
7	12 57.2	90 26	164.3	12 30.3	90 26	164.5	11 36.4	90 25	165.0	11 09.4	90 25	165.2	10 42.4	90 24	165.4	10 15.5	90 24	165.6	8 54.4	90 23	166.3	8 27.4	90 22	166.5	7
8	12 41.6	89 27	163.8	12 14.9	89 26	164.0	11 21.4	89 26	164.5	10 54.7	89 25	164.7	10 27.9	89 25	164.9	10 01.2	89 25	165.2	8 40.8	89 24	165.8	8 14.0	89 23	166.1	8
9	12 25.5	88 28	163.2	11 59.0	88 27	163.5	11 06.0	88 27	164.0	10 39.5	88 26	164.2	10 12.9	88 26	164.4	9 46.4	89 25	164.7	8 26.7	89 24	165.4	8 00.1	89 24	165.6	9
30	12 08.9	88 28	162.7	11 42.7	88 28	163.0	10 50.1	88 27	163.5	10 23.8	88 27	163.7	9 57.5	88 27	163.9	9 31.2	88 26	164.2	8 12.1	88 25	164.9	7 45.8	88 25	165.2	30
1	11 51.8	87 29	162.2	11 25.8	87 29	162.5	10 33.7	87 28	163.0	10 07.7	87 28	163.2	9 41.6	87 27	163.5	9 15.5	87 27	163.7	7 57.2	87 26	164.5	7 31.0	87 25	164.7	1
2	11 34.3	86 30	161.7	11 08.5	86 30	162.0	10 16.9	86 29	162.5	9 51.0	86 28	162.7	9 25.2	86 28	163.0	8 59.4	86 28	163.2	7 41.8	86 26	164.0	7 15.9	86 26	164.3	2
3	11 16.2	85 31	161.2	10 50.7	85 30	161.5	9 59.6	85 30	162.0	9 34.0	85 29	162.3	9 08.4	85 29	162.5	8 42.8	85 28	162.8	7 25.9	85 27	163.6	7 00.3	85 27	163.8	3
4	10 57.7	84 32	160.7	10 32.4	84 31	161.0	9 41.8	84 30	161.5	9 16.5	84 30	161.8	8 51.1	84 30	162.0	8 25.8	85 29	162.3	7 09.7	85 28	163.1	6 44.3	85 27	163.4	4
35	10 38.7	83 32	160.2	10 13.7	83 32	160.5	9 23.6	84 31	161.0	8 58.5	84 31	161.3	8 33.4	84 30	161.6	8 08.3	84 30	161.9	6 53.0	84 28	162.7	6 27.8	84 28	163.0	35
6	10 19.2	83 33	159.7	9 54.5	83 33	160.0	9 04.9	83 32	160.6	8 40.1	83 31	160.8	8 15.3	83 31	161.1	7 50.4	83 30	161.4	6 35.9	83 29	162.3	6 11.0	83 29	162.5	6
7	9 59.3	82 34	159.2	9 34.8	82 33	159.5	8 45.8	82 33	160.1	8 21.3	82 32	160.4	7 56.7	82 32	160.7	7 32.2	82 31	161.0	6 18.4	82 30	161.8	5 53.8	82 29	162.1	7
8	9 39.0	81 35	158.7	9 14.7	81 34	159.0	8 26.3	81 33	159.6	8 02.0	81 33	159.9	7 37.7	81 32	160.2	7 13.4	81 32	160.5	6 00.5	81 30	161.4	5 36.2	81 30	161.7	8
9	9 18.2	80 35	158.3	8 54.2	80 35	158.6	8 06.3	80 34	159.2	7 42.3	80 33	159.5	7 18.3	80 33	159.8	6 54.3	80 33	160.1	5 42.2	80 31	161.0	5 18.2	80 31	161.3	9
40	8 57.0	79 36	157.8	8 33.3	79 36	158.1	7 45.9	79 35	158.7	7 22.2	79 34	159.0	6 58.5	79 34	159.3	6 34.8	79 33	159.7	5 23.6	79 32	160.6				40
1	8 35.3	78 37	157.3	8 11.9	78 36	157.7	7 25.1	78 35	158.3	7 01.7	78 35	158.6	6 38.3	78 34	158.9	6 14.9	78 34	159.2	5 04.5	78 32	160.2				1
2	8 13.2	77 37	156.9	7 50.2	77 37	157.2	7 04.0	77 36	157.8	6 40.8	77 35	158.2	6 17.7	77 35	158.5	5 54.6	77 34	158.8							2
3	7 50.8	76 38	156.4	7 28.0	76 38	156.8	6 42.4	76 37	157.4	6 19.5	76 36	157.7	5 56.7	76 36	158.1	5 33.9	76 35	158.4							3
4	7 27.9	75 39	156.0	7 05.4	75 38	156.3	6 20.4	75 37	157.0	5 57.9	75 37	157.3	5 35.3	75 36	157.7	5 12.8	75 36	158.0							4
45	7 04.6	74 39	155.6	6 42.4	74 39	155.9	5 58.0	74 38	156.6	5 35.8	74 37	156.9	5 13.6	74 37	157.2										45
6	6 40.9	73 40	155.1	6 19.1	73 40	155.5	5 35.3	73 39	156.2	5 13.4	73 38	156.5													6
7	6 16.9	72 41	154.7	5 55.4	72 40	155.1	5 12.2	72 39	155.8																7
8	5 52.5	71 41	154.3	5 31.2	71 41	154.6																			8
9	5 27.7	70 42	153.9	5 06.7	70 41	154.2																			9
50	5 02.5	69 43	153.5																						50

DECLINATION SAME NAME AS LATITUDE

H.A.	54° 30′			55° 00′			56° 00′			56° 30′			57° 00′			57° 30′			59° 00′			59° 30′			H.A.
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
91	14 48.1	21 57	36.9	14 54.3	21 56	36.4	15 06.6	20 55	35.4	15 12.7	20 54	34.9	15 18.7	20 53	34.4	15 24.6	20 53	33.9	15 41.9	19 50	32.3	15 47.5	19 50	31.8	91
2	14 14.1	22 57	36.8	14 20.7	22 56	36.3	14 33.8	22 54	35.3	14 40.3	21 54	34.8	14 46.7	21 53	34.3	14 53.0	21 52	33.8	15 11.6	20 50	32.2	15 17.6	20 50	31.7	2
3	13 40.1	24 56	36.6	13 47.2	23 56	36.1	14 01.1	23 54	35.1	14 08.0	23 54	34.6	14 14.8	23 53	34.1	14 21.5	22 52	33.6	14 41.4	22 50	32.1	14 47.9	22 49	31.6	3
4	13 06.3	25 56	36.5	13 13.8	25 56	36.0	13 28.5	24 54	35.0	13 35.8	24 53	34.5	13 43.0	24 53	34.0	13 50.2	24 52	33.5	14 11.3	23 50	32.0	14 18.2	23 49	31.5	4
95	12 32.7	26 56	36.3	12 40.5	26 55	35.9	12 56.0	26 54	34.9	13 03.7	26 53	34.4	13 11.3	25 53	33.9	13 18.9	25 52	33.4	13 41.2	25 50	31.9	13 48.6	24 49	31.4	95
6	11 59.1	28 56	36.2	12 07.3	27 55	35.7	12 23.7	27 54	34.7	12 31.8	27 53	34.2	12 39.8	27 52	33.7	12 47.8	26 52	33.2	13 11.3	26 50	31.7	13 19.1	26 49	31.2	6
7	11 25.7	29 56	36.0	11 34.3	29 55	35.5	11 51.4	28 54	34.6	11 59.9	28 53	34.1	12 08.3	28 52	33.6	12 16.7	28 52	33.1	12 41.6	27 49	31.6	12 49.7	27 49	31.1	7
8	10 52.4	30 55	35.8	11 01.4	30 55	35.4	11 19.3	30 53	34.4	11 28.2	30 53	33.9	11 37.0	29 52	33.4	11 45.8	29 51	32.9	12 11.9	29 49	31.5	12 20.5	29 49	31.0	8
9	10 19.2	31 55	35.7	10 28.7	31 54	35.2	10 47.4	31 53	34.2	10 56.6	31 52	33.7	11 05.9	31 52	33.2	11 15.1	31 51	32.8	11 42.3	30 49	31.3	11 51.3	30 48	30.8	9
100	9 46.2	33 55	35.5	9 56.0	33 54	35.0	10 15.5	32 53	34.0	10 25.2	32 52	33.6	10 34.8	32 51	33.1	10 44.4	32 51	32.6	11 12.9	31 49	31.1	11 22.4	31 48	30.7	100
1	9 13.4	34 54	35.3	9 23.6	34 54	34.8	9 43.9	34 53	33.8	9 53.9	34 52	33.4	10 04.0	33 51	32.9	10 14.0	33 51	32.4	10 43.7	33 49	31.0	10 53.5	33 48	30.5	1
2	8 40.7	35 54	35.1	8 51.3	35 54	34.6	9 12.3	35 52	33.6	9 22.8	35 52	33.2	9 33.2	35 51	32.7	9 43.6	35 50	32.2	10 14.6	34 48	30.8	10 24.8	34 48	30.3	2
3	8 08.2	37 54	34.9	8 19.2	36 53	34.4	8 41.0	36 52	33.4	8 51.8	36 51	33.0	9 02.7	36 51	32.5	9 13.5	36 50	32.0	9 45.6	36 48	30.6	9 56.2	35 47	30.1	3
4	7 35.9	38 54	34.6	7 47.2	38 53	34.2	8 09.8	38 52	33.2	8 21.1	37 51	32.8	8 32.3	37 50	32.3	8 43.5	37 50	31.8	9 16.8	37 48	30.4	9 27.8	37 47	30.0	4
105	7 03.7	39 53	34.4	7 15.4	39 53	34.0	7 38.8	39 51	33.0	7 50.4	39 51	32.6	8 02.0	39 50	32.1	8 13.6	39 49	31.6	8 48.1	38 47	30.2	8 59.6	38 47	29.8	105
6	6 31.7	40 53	34.2	6 43.8	40 52	33.7	7 08.0	40 51	32.8	7 20.0	40 50	32.3	7 32.0	40 50	31.9	7 44.0	40 49	31.4	8 19.7	40 47	30.0	8 31.5	39 46	29.6	6
7	6 00.0	42 53	33.9	6 12.4	42 52	33.5	6 37.3	41 51	32.6	6 49.7	41 50	32.1	7 02.1	41 49	31.7	7 14.5	41 49	31.2	7 51.4	41 47	29.8	8 03.6	41 46	29.4	7
8	5 28.4	43 52	33.7	5 41.2	43 52	33.2	6 06.9	43 50	32.3	6 19.7	43 50	31.9	6 32.4	43 49	31.4	6 45.2	42 48	31.0	7 23.3	42 47	29.6	7 35.9	42 46	29.1	8
9				5 10.2	44 51	33.0	5 36.7	44 50	32.1	5 49.8	44 49	31.6	6 03.0	44 49	31.2	6 16.1	44 48	30.7	6 55.3	43 46	29.4	7 08.4	43 46	28.9	9
110							5 06.6	45 50	31.8	5 20.2	45 49	31.4	5 33.7	45 48	30.9	5 47.2	45 48	30.5	6 27.6	45 46	29.1	6 41.0	45 45	28.7	110
1													5 04.6	46 48	30.7	5 18.5	46 48	30.2	6 00.1	46 46	28.9	6 13.9	46 45	28.5	1
2																			5 32.7	47 45	28.7	5 46.9	47 45	28.2	2
3																			5 05.6	49 45	28.4	5 20.2	49 44	28.0	3

Lat. 19°

H.A.	60° 00′				60° 30′				62° 00′				62° 30′				63° 00′				69° 00′				69° 30′				74° 30′				H.A.
	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	Alt.			Az.	
°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	° ′	Δd	Δt	°	°
00	49 00.0	1.0	01	00.0	48 30.0	1.0	01	00.0	47 00.0	1.0	01	00.0	46 30.0	1.0	01	00.0	46 00.0	1.0	01	00.0	40 00.0	1.0	00	00.0	39 30.0	1.0	00	00.0	34 30.0	1.0	00	00.0	00
1	48 59.6	1.0	02	00.8	48 29.6	1.0	02	00.7	46 59.7	1.0	02	00.7	46 29.7	1.0	02	00.7	45 59.7	1.0	02	00.7	39 59.8	1.0	01	00.5	39 29.8	1.0	01	00.5	34 29.8	1.0	01	00.3	1
2	48 58.5	1.0	03	01.5	48 28.5	1.0	03	01.5	46 58.6	1.0	03	01.4	46 28.7	1.0	03	01.3	45 58.7	1.0	03	01.3	39 59.1	1.0	02	00.9	39 29.1	1.0	02	00.9	34 29.4	1.0	01	00.6	2
3	48 56.6	1.0	04	02.3	48 26.7	1.0	04	02.2	46 56.9	1.0	04	02.1	46 27.0	1.0	04	02.0	45 57.1	1.0	04	02.0	39 57.9	1.0	03	01.4	39 28.0	1.0	03	01.4	34 28.6	1.0	02	01.0	3
4	48 54.0	99	06	03.0	48 24.1	1.0	06	03.0	46 54.6	1.0	05	02.7	46 24.7	1.0	05	02.7	45 54.8	1.0	05	02.6	39 56.3	1.0	03	01.9	39 26.4	1.0	03	01.8	34 27.4	1.0	02	01.3	4
05	48 50.6	99	07	03.8	48 20.8	99	07	03.7	46 51.5	99	06	03.4	46 21.7	99	06	03.3	45 51.9	99	06	03.3	39 54.2	99	04	02.3	39 24.4	99	04	02.3	34 26.0	99	03	01.6	05
6	48 46.5	99	08	04.5	48 16.8	99	08	04.4	46 47.8	99	07	04.1	46 18.1	99	07	04.0	45 48.4	99	07	03.9	39 51.7	99	05	02.8	39 21.9	99	05	02.7	34 24.2	99	03	01.9	6
7	48 41.6	98	09	05.3	48 12.0	98	09	05.2	46 43.4	99	08	04.8	46 13.8	99	08	04.7	45 44.2	99	08	04.5	39 48.7	99	06	03.3	39 19.0	99	06	03.2	34 22.2	99	04	02.3	7
8	48 36.0	98	11	06.0	48 06.6	98	10	05.9	46 38.3	98	10	05.5	46 08.8	98	09	05.3	45 39.4	98	09	05.2	39 45.2	99	07	03.7	39 15.7	99	06	03.6	34 19.8	99	05	02.6	8
9	48 29.7	97	12	06.8	48 00.4	98	11	06.6	46 32.6	98	11	06.1	46 03.3	98	10	06.0	45 33.9	98	10	05.8	39 41.3	98	07	04.2	39 11.9	98	07	04.1	34 17.0	98	05	02.9	9
10	48 22.6	97	13	07.5	47 53.5	97	13	07.3	46 26.2	97	12	06.8	45 57.0	97	11	06.6	45 27.9	97	11	06.5	39 37.0	98	08	04.6	39 07.6	98	08	04.5	34 14.0	98	06	03.2	10
1	48 14.8	96	14	08.2	47 45.9	96	14	08.0	46 19.1	97	13	07.5	45 50.2	97	12	07.3	45 21.2	97	12	07.1	39 32.2	97	09	05.1	39 03.0	97	08	04.9	34 10.7	98	06	03.5	1
2	48 06.3	96	15	09.0	47 37.7	96	15	08.7	46 11.5	96	14	08.1	45 42.7	96	14	07.9	45 13.9	96	13	07.7	39 26.9	97	09	05.5	38 57.9	97	09	05.4	34 07.0	97	07	03.8	2
3	47 57.2	96	16	09.7	47 28.7	95	16	09.4	46 03.2	95	15	08.8	45 34.6	95	15	08.5	45 06.0	95	14	08.3	39 21.2	96	10	06.0	38 52.4	96	10	05.8	34 03.1	97	07	04.2	3
4	47 47.3	94	18	10.4	47 19.1	94	17	10.1	45 54.2	94	16	09.4	45 25.9	95	16	09.2	44 57.5	95	15	08.9	39 15.1	96	11	06.4	38 46.4	96	11	06.2	33 58.8	96	08	04.5	4
15	47 36.7	93	19	11.1	47 08.8	93	18	10.8	45 44.6	94	17	10.0	45 16.5	94	17	09.8	44 48.4	94	16	09.5	39 08.5	95	12	06.9	38 40.0	95	11	06.7	33 54.2	96	08	04.8	15
6	47 25.5	92	20	11.8	46 57.8	92	19	11.5	45 34.5	93	18	10.7	45 06.6	93	18	10.4	44 38.7	93	17	10.1	39 01.5	94	12	07.3	38 33.2	94	12	07.1	33 49.3	95	09	05.1	6
7	47 13.6	91	21	12.4	46 46.2	91	20	12.1	45 23.7	92	19	11.3	44 56.1	92	19	11.0	44 28.4	92	18	10.7	38 54.1	93	13	07.7	38 26.0	94	13	07.5	33 44.2	94	09	05.4	7
8	47 01.1	90	22	13.1	46 34.0	91	21	12.8	45 12.3	91	20	11.9	44 45.0	91	19	11.6	44 17.6	91	19	11.3	38 46.2	93	14	08.2	38 18.4	93	13	07.9	33 38.7	94	10	05.7	8
9	46 47.9	89	23	13.8	46 21.1	90	22	13.4	45 00.3	90	21	12.5	44 33.3	90	20	12.2	44 06.2	90	20	11.9	38 38.0	92	14	08.6	38 10.4	92	14	08.3	33 32.9	93	10	06.0	9
20	46 34.1	88	24	14.4	46 07.6	88	23	14.1	44 47.8	89	22	13.1	44 21.0	89	21	12.8	43 54.2	89	21	12.4	38 29.3	91	15	09.0	38 02.0	91	15	08.7	33 26.8	92	11	06.3	20
1	46 19.7	87	25	15.0	45 53.5	87	24	14.7	44 34.6	88	23	13.7	44 08.2	88	22	13.3	43 41.7	88	22	13.0	38 20.2	90	16	09.4	37 53.1	90	15	09.2	33 20.5	91	11	06.6	1
2	46 04.7	86	26	15.7	45 38.9	86	25	15.3	44 21.0	87	24	14.2	43 54.9	87	23	13.9	43 28.7	87	23	13.6	38 10.7	89	16	09.8	37 43.9	89	16	09.5	33 13.8	91	12	06.9	2
3	45 49.1	85	27	16.3	45 23.6	85	26	15.9	44 06.7	86	25	14.8	43 41.0	86	24	14.4	43 15.2	86	23	14.1	38 00.8	88	17	10.2	37 34.3	88	17	09.9	33 06.9	90	12	07.2	3
4	45 32.9	84	28	16.9	45 07.8	84	27	16.5	43 52.0	85	26	15.4	43 26.6	85	25	15.0	43 01.1	85	24	14.6	37 50.6	87	18	10.6	37 24.3	87	17	10.3	32 59.7	89	12	07.4	4
25	45 16.1	82	29	17.5	44 51.4	83	28	17.1	43 36.7	83	26	15.9	43 11.6	84	26	15.5	42 46.5	84	25	15.2	37 39.9	86	18	11.0	37 14.0	86	18	10.7	32 52.2	88	13	07.7	25
6	44 58.8	81	30	18.1	44 34.5	81	29	17.6	43 20.9	82	27	16.4	42 56.2	82	27	16.1	42 31.4	83	26	15.7	37 28.8	85	19	11.4	37 03.2	85	18	11.1	32 44.4	87	13	08.0	6
7	44 41.0	80	31	18.6	44 17.0	80	30	18.2	43 04.6	81	28	17.0	42 40.3	81	27	16.6	42 15.9	81	27	16.2	37 17.4	84	20	11.8	36 52.1	84	19	11.5	32 36.4	86	14	08.3	7
8	44 22.6	78	31	19.2	43 59.0	79	31	18.7	42 47.8	80	29	17.5	42 23.9	80	28	17.1	41 59.8	80	28	16.7	37 05.6	83	20	12.2	36 40.7	83	20	11.8	32 28.1	85	14	08.6	8
9	44 03.7	77	32	19.7	43 40.6	77	32	19.3	42 30.5	78	30	18.0	42 07.0	79	29	17.6	41 43.3	79	28	17.2	36 53.5	82	21	12.5	36 28.9	82	20	12.2	32 19.5	84	15	08.8	9
30	43 44.3	76	33	20.2	43 21.6	76	32	19.8	42 12.8	77	30	18.5	41 49.6	77	30	18.0	41 26.4	78	29	17.6	36 41.0	81	21	12.9	36 16.7	81	21	12.5	32 10.7	83	15	09.1	30
1	43 24.5	74	34	20.8	43 02.1	75	33	20.3	41 54.5	76	31	19.0	41 31.8	76	30	18.5	41 09.0	76	30	18.1	36 28.1	80	22	13.3	36 04.2	80	21	12.9	32 01.6	82	16	09.3	1
2	43 04.1	73	35	21.3	42 42.2	73	34	20.8	41 35.9	74	32	19.4	41 13.6	75	31	19.0	40 51.1	75	30	18.5	36 15.0	78	23	13.6	35 51.4	79	22	13.2	31 52.3	81	16	09.6	2
3	42 43.3	71	35	21.8	42 21.9	72	35	21.3	41 16.8	73	32	19.9	40 54.9	73	32	19.4	40 32.9	74	31	19.0	36 01.4	77	23	14.0	35 38.3	77	22	13.6	31 42.7	80	16	09.9	3
4	42 22.1	70	36	22.2	42 01.0	70	35	21.8	40 57.3	71	33	20.3	40 35.8	72	32	19.9	40 14.2	72	32	19.4	35 47.6	76	24	14.3	35 24.8	76	23	13.9	31 32.9	78	17	10.1	4
35	42 00.4	68	37	22.7	41 39.8	69	36	22.2	40 37.4	70	34	20.8	40 16.3	70	33	20.3	39 55.2	71	32	19.8	35 33.4	75	24	14.6	35 11.0	75	24	14.2	31 22.8	77	17	10.3	35
6	41 38.3	67	38	23.2	41 18.2	67	37	22.7	40 17.0	69	35	21.2	39 56.4	69	34	20.7	39 35.7	69	33	20.3	35 18.9	73	25	15.0	34 56.9	74	24	14.5	31 12.5	76	18	10.6	6
7	41 15.8	65	38	23.6	40 56.1	66	37	23.1	39 56.3	67	35	21.6	39 36.2	67	34	21.1	39 15.9	68	34	20.7	35 04.1	72	25	15.3	34 42.5	72	24	14.9	31 02.0	75	18	10.8	7
8	40 52.9	64	39	24.0	40 33.6	64	38	23.5	39 35.2	66	36	22.0	39 15.5	66	35	21.5	38 55.7	66	34	21.1	34 49.0	71	26	15.6	34 27.8	71	25	15.2	30 51.2	73	18	11.0	8
9	40 29.6	62	39	24.4	40 10.8	63	39	23.9	39 13.8	64	36	22.4	38 54.5	64	36	21.9	38 35.1	65	35	21.4	34 33.6	69	26	15.9	34 12.8	69	25	15.5	30 40.2	72	19	11.3	9
40	40 05.9	61	40	24.8	39 47.6	61	39	24.3	38 52.0	63	37	22.8	38 33.1	63	36	22.3	38 14.2	63	35	21.8	34 17.9	68	27	16.2	33 57.6	68	26	15.7	30 29.0	71	19	11.5	40
1	39 41.9	59	41	25.2	39 24.1	60	40	24.7	38 29.8	61	37	23.2	38 11.4	61	37	22.7	37 53.0	62	36	22.2	34 02.0	66	27	16.5	33 42.0	67	26	16.0	30 17.6	70	19	11.7	1
2	39 17.5	58	41	25.6	39 00.2	58	40	25.1	38 07.3	59	38	23.5	37 49.4	60	37	23.0	37 31.4	60	36	22.5	33 45.8	65	28	16.8	33 26.2	65	27	16.3	30 06.0	68	20	11.9	2
3	38 52.9	56	42	26.0	38 36.0	56	41	25.4	37 44.5	58	39	23.9	37 27.1	58	38	23.4	37 09.5	59	37	22.9	33 29.3	63	28	17.0	33 10.2	64	27	16.6	29 54.1	67	20	12.1	3
4	38 27.8	54	42	26.3	38 11.4	55	41	25.8	37 21.4	56	39	24.2	37 04.4	57	38	23.7	36 47.3	57	37	23.2	33 12.5	62	28	17.3	32 53.9	62	28	16.8	29 42.1	65	20	12.3	4
45	38 02.5	53	43	26.7	37 46.6	53	42	26.1	36 58.0	55	40	24.5	36 41.5	55	39	24.0	36 24.8	56	38	23.5	32 55.5	60	29	17.6	32 37.3	61	28	17.1	29 29.9	64	21	12.5	45
6	37 36.9	51	43	27.0	37 21.5	52	42	26.5	36 34.2	53	40	24.9	36 18.2	54	39	24.3	36 02.1	54	38	23.8	32 38.3	59	29	17.8	32 20.5	59	28	17.3	29 17.5	63	21	12.7	6
7	37 11.0	50	44	27.3	36 56.0	50	43	26.8	36 10.2	52	40	25.2	35 54.7	52	40	24.6	35 39.0	53	39	24.1	32 20.8	57	30	18.1	32 03.5	58	29	17.6	29 04.9	61	21	12.9	7
8	36 44.8	48	44	27.6	36 30.3	49	43	27.1	35 46.0	50	41	25.5	35 30.9	50	40	24.9	35 15.7	51	39	24.4	32 03.1	56	30	18.3	31 46.2	56	29	17.8	28 52.1	60	22	13.1	8
9	36 18.4	46	44	27.9	36 04.4	47	44	27.4	35 21.5	48	41	25.8	35 06.9	49	40	25.2	34 52.1	49	40	24.7	31 45.1	54	30	18.5	31 28.8	55	29	18.1	28 39.2	58	22	13.3	9
50	35 51.7	45	45	28.2	35 38.2	45	44	27.7	34 56.7	47	42	26.0	34 42.6	47	41	25.5	34 28.3	48	40	25.0	31 27.0	53	31	18.8	31 11.1	53	30	18.3	28 26.0	57	22	13.5	50
1	35 24.8	43	45	28.5	35 11.7	44	44	27.9	34 31.7	45	42	26.3	34 18.1	46	41	25.7	34 04.3	46	40	25.2	31 08.6	51	31	19.0	30 53.2	52	30	18.5	28 12.8	55	22	13.6	1
2	34 57.6	42	46	28.7	34 45.1	42	45	28.2	34 06.5	44	42	26.5	33 53.3	44	42	26.0	33 40.0	45	41	25.5	30 50.1	50	31	19.2	30 35.1	50	30	18.7	27 59.3	54	23	13.8	2
3	34 30.2	40	46	29.0	34 18.2	41	45	28.4	33 41.0	42	43	26.8	33 28.3	42	42	26.2	33 15.5	43	41	25.7	30 31.3	48	32	19.4	30 16.8	49	31	18.9	27 45.7	52	23	14.0	3
4	34 02.6	38	46	29.2	33 51.0	39	46	28.7	33 15.3	40	43	27.0	33 03.1	41	42	26.5	32 50.8	41	42	25.9	30 12.4	47	32	19.6	29 58.3	47	31	19.1	27 31.9	51	23	14.1	4
55	33 34.9	37	47	29.4	33 23.7	37	46	28.9	32 49.5	39	43	27.2	32 37.8	39	43	26.7	32 25.9	40	42	26.1	29 53.2	45	32	19.8	29 39.7	45	31	19.3	27 18.0	49	23	14.3	55
6	33 06.9	35	47	29.7	32 56.2	36	46	29.1	32 23.4	37	44	27.4	32 12.2	38	43	26.9	32 00.8	38	42	26.4	29 33.9	43	32	20.0	29 20.9	44	32	19.5	27 04.0	47	24	14.4	6
7	32 38.7	34	47	29.9	32 28.5	34	46	29.3	31 57.2	36	44	27.6	31 46.4	36	43	27.1	31 35.5	37	42	26.6	29 14.5	42	33	20.1	29 01.9	42	32	19.6	26 49.8	46	24	14.5	7
8	32 10.4	32	48	30.1	32 00.7	33	47	29.5	31 30.8	34	44	27.8	31 20.5	34	43	27.3	31 10.1	35	43	26.7	28 54.9	40	33	20.3	28 42.8	41	32	19.8	26 35.5	44	24	14.7	8
9	31 41.9	30	48	30.2	31 32.7	31	47	29.7	31 04.2	32	45	28.0	30 54.4	33	44	27.5	30 44.5	33	43	26.9	28 35.1	38	33	20.5	28 23.5	39	32	20.0	26 21.1	43	24	14.8	9
60	31 13.2	29	48	30.4	31 04.5	29	47	29.9	30 37.5	31	45	28.2	30 28.2	31	44	27.6	30 18.7	32	43	27.1	28 15.2	37	33	20.6	28 04.1	37	33	20.1	26 06.5	41	24	14.9	60
1	30 44.4	27	48	30.6	30 36.2	28	47	30.0	30 10.6	29	45	28.4	30 01.8	30	44	27.8	29 52.8	30	43	27.3	27 55.1	35	34	20.8	27 44.5	36	33	20.2	25 51.8	39	25	15.1	1
2	30 15.5	26	48	30.7	30 07.7	26	48	30.2	29 43.6	28	45	28.5	29 35.2	28	44	28.0	29 26.8	28	44	27.4	27 34.9	34	34	20.9	27 24.8	34	33	20.4	25 37.0	38	25	15.2	2
3	29 46.4	24	49	30.9	29 39.1	25	48	30.3	29 16.4	26	45	28.7	29 08.6	26	45	28.1	29 00.6	27	44	27.6	27 14.6	32	34	21.0	27 05.0	32	33	20.5	25 22.1	36	25	15.3	3
4	29 17.3	22	49	31.0	29 10.4	23	48	30.5	28 49.2	24	46	28.8	28 41.8	25	45	28.2	28 34.3	25	44	27.7	26 54.2	30	34	21.2	26 45.0	31	33	20.6	25 07.1	35	25	15.4	4
65	28 48.0	21	49	31.1	28 41.6	21	48	30.6	28 21.8	23	46	28.9	28 14.9	23	45	28.4	28 07.9	24	44	27.8	26 33.6	29	34	21.3	26 25.0	29	34	20.8	24 52.0	33	26	15.5	65
6	28 18.6	19	49	31.3	28 12.7	20	48	30.7	27 54.3	21	46	29.0	27 47.9	22	45	28.5	27 41.4	22	44	27.9	26 13.0	27	35	21.4	26 04.8	27	34	20.9	24 36.8	31	26	15.6	6
7	27 49.1	18	49	31.4	27 43.7	18	48	30.8	27 26.7	20	46	29.1	27 20.8	20	45	28.6	27 14.7	20	45	28.0	25 52.2	26	35	21.5	25 44.6	26	34	21.0	24 21.6	30	26	15.7	7
8	27 19.5	16	49	31.5	27 14.6	17	49	30.9	26 59.1	18	46	29.2	26 53.6	18	45	28.7	26 48.0	19	45	28.1	25 31.4	24	35	21.6	25 24.2	24	34	21.1	24 06.2	28	26	15.8	8
9	26 49.9	15	50	31.5	26 45.4	15	49	31.0	26 31.3	16	46	29.3	26 26.3	17	46	28.8	26 21.2	17	45	28.2	25 10.5	22	35	21.7	25 03.8	22	34	21.2	23 50.8	26	26	15.8	9
70	26 20.2	13	50	31.6	26 16.2	14	49	31.1	26 03.5	15	46	29.4	25 59.0	15	46	28.9	25 54.4	16	45	28.3	24 49.5	20	35	21.8	24 43.3	21	34	21.2	23 35.2	25	26	15.9	70
1	25 50.4	12	50	31.7	25 46.9	12	49	31.1	25 35.6	13	47	29.5	25 31.6	14	46	28.9	25 27.4	14	45	28.4	24 28.4	19	35	21.9	24 22.7	19	34	21.3	23 19.7	23	26	16.0	1
2	25 20.6	10	50	31.7	25 17.5	10	49	31.2	25 07.6	12	47	29.5	25 04.1	12	46	29.0	25 00.4	12	45	28.5	24 07.2	17	35	21.9	24 02.0	17	35	21.4	23 04.0	21	26	16.0	2
3	24 50.7	08	50	31.8	24 48.1	09	49	31.2	24 39.6	10	47	29.6	24 36.6	10	46	29.1	24 33.4	11	45	28.5	23 46.0	15	35	22.0	23 41.3	16	35	21.5	22 48.3	19	26	16.1	3
4	24 20.8	07	50	31.8	24 18.7	07	49	31.3	24 11.6	08	47	29.7	24 09.0	09	46	29.1	24 06.3	09	45	28.6	23 24.7	14	36	22.0	23 20.5	14	35	21.5	22 32.6	18	26	16.1	4
75	23 50.9	05	50	31.9	23 49.2	06	49	31.3	23 43.5	07	47	29.7	23 41.4	07	46	29.1	23 39.1	08	45	28.6	23 03.4	12	36	22.1	22 59.7	13	35	21.6	22 16.8	16	26	16.2	75
6	23 20.9	04	50	31.9	23 19.7	04	49	31.4	23 15.4	05	47	29.7	23 13.7	06	46	29.2	23 12.0	06	45	28.6	22 42.0	11	36	22.1	22 38.8	11	35	21.6	22 00.9	14	26	16.2	6
7	22 50.9	02	50	31.9	22 50.2	03	49	31.4	22 47.2	04	47	29.7	22 46.1	04	46	29.2	22 44.8	05	45	28.7	22 20.6	09	36	22.2	22 17.9	09	35	21.6	21 45.0	13	27	16.3	7
8	22 20.9	01	50	31.9	22 20.6	01	49	31.4	22 19.1	02	47	29.8	22 18.4	03	46	29.2	22 17.5	03	45	28.7	21 59.2	07	36	22.2	21 57.0	08	35	21.7	21 29.1	11	27	16.3	8
9	21 50.9	01	50	31.9	21 51.1	00	49	31.4	21 50.9	01	47	29.8	21 50.7	01	46	29.2	21 50.3	01	45	28.7	21 37.8	06	36	22.2	21 36.0	06	35	21.7	21 13.2	09	27	16.3	9
80	21 20.9	02	50	31.9	21 21.5	02	49	31.4	21 22.8	01	47	29.8	21 23.0	01	46	29.2	21 23.1	00	45	28.7	21 16.3	04	36	22.3	21 15.0	04	35	21.7	20 57.2	08	27	16.4	80
1	20 50.9	04	50	31.9	20 52.0	03	49	31.4	20 54.6	02	47	29.8	20 55.3	02	46	29.2	20 55.8	02	45	28.7	20 54.8	02	36	22.3	20 54.0	03	35	21.7	20 41.2	06	27	16.4	1
2	20 21.0	05	50	31.9	20 22.5	05	49	31.3	20 26.4	04	47	29.7	20 27.6	04	46	29.2	20 28.6	03	45	28.7	20 33.3	01	36	22.3	20 33.0	01	35	21.7	20 25.2	04	27	16.4	2
3	19 51.0	07	50	31.8	19 53.0	06	49	31.3	19 58.3	05	47	29.7	19 59.9	05	46	29.2	20 01.4	05	45	28.7	20 11.8	01	36	22.3	20 12.0	01	35	21.7	20 09.2	03	27	16.4	3
4	19 21.1	08	50	31.8	19 23.5	08	49	31.3	19 30.2	07	47	29.7	19 32.2	07	46	29.2	19 34.2	06	45	28.6	19 50.3	03	36	22.3	19 51.0	02	35	21.7	19 53.1	01	27	16.4	4
85	18 51.2	10	50	31.8	18 54.1	09	49	31.2	19 02.1	08	47	29.7	19 04.6	08	46	29.1	19 07.0	08	45	28.6	19 28.8	04	36	22.3	19 30.0	04	35	21.7	19 37.1	01	27	16.4	85
6	18 21.4	11	50	31.7	18 24.7	11	49	31.2	18 34.1	10	47	29.6	18 37.0	10	46	29.1	18 39.9	09	45	28.6	19 07.3	06	36	22.2	19 09.0	06	35	21.7	19 21.1	02	27	16.4	6
7	17 51.6	13	50	31.6	17 55.3	12	49	31.1	18 06.1	11	47	29.6	18 09.5	11	46	29.0	18 12.8	11	45	28.5	18 45.9	07	36	22.2	18 48.1	07	35	21.7	19 05.0	04	27	16.4	7
8	17 21.9	14	49	31.6	17 26.0	14	49	31.1	17 38.1	13	46	29.5	17 42.0	13	46	29.0	17 45.7	12	45	28.5	18 24.4	09	36	22.2	18 27.1	09	35	21.7	18 49.0	06	27	16.4	8
9	16 52.2	16	49	31.5	16 56.8	15	49	31.0	17 10.2	14	46	29.4	17 14.5	14	46	28.9	17 18.7	14	45	28.4	18 03.0	11	36	22.1	18 06.2	10	35	21.6	18 33.0	07	27	16.4	9
90	16 22.6	17	49	31.4	16 27.7	17	48	30.9	16 42.4	16	46	29.4	16 47.1	16	46	28.8	16 51.8	15	45	28.3	17 41.7	12	36	22.1	17 45.3	12	35	21.6	18 17.0	09	27	16.3	90

16—8472

DECLINATION SAME NAME AS LATITUDE

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
91	15 53.1	18 49	31.3	15 58.6	18 48	30.8	16 14.6	17 46	29.3	16 19.8	17 45	28.8	16 24.9	17 45	28.2
2	15 23.6	20 49	31.2	15 29.5	20 48	30.7	15 46.9	19 46	29.2	15 52.5	19 45	28.7	15 58.1	18 45	28.2
3	14 54.3	21 49	31.1	15 00.6	21 48	30.6	15 19.3	20 46	29.1	15 25.3	20 45	28.6	15 31.4	20 44	28.1
4	14 25.0	23 49	31.0	14 31.8	22 48	30.5	14 51.7	22 46	29.0	14 58.3	22 45	28.5	15 04.7	21 44	28.0
95	13 55.8	24 48	30.9	14 03.0	24 48	30.4	14 24.3	23 46	28.9	14 31.2	23 45	28.4	14 38.1	23 44	27.9
6	13 26.8	26 48	30.7	13 34.4	25 48	30.3	13 56.9	25 45	28.8	14 04.3	25 45	28.3	14 11.7	24 44	27.8
7	12 57.8	27 48	30.6	13 05.9	27 47	30.1	13 29.7	26 45	28.6	13 37.5	26 44	28.1	13 45.3	26 44	27.6
8	12 29.0	28 48	30.5	12 37.5	28 47	30.0	13 02.6	28 45	28.5	13 10.8	27 44	28.0	13 19.0	27 44	27.5
9	12 00.3	30 48	30.3	12 09.2	30 47	29.8	12 35.6	29 45	28.4	12 44.2	29 44	27.9	12 52.9	29 43	27.4
100	11 31.7	31 47	30.2	11 41.0	31 47	29.7	12 08.7	30 45	28.2	12 17.8	30 44	27.7	12 26.8	30 43	27.2
1	11 03.3	33 47	30.0	11 13.0	32 46	29.5	11 41.9	32 44	28.1	11 51.4	32 44	27.6	12 00.9	32 43	27.1
2	10 35.0	34 47	29.8	10 45.1	34 46	29.4	11 15.3	33 44	27.9	11 25.2	33 43	27.4	11 35.2	33 43	27.0
3	10 06.8	35 47	29.7	10 17.4	35 46	29.2	10 48.8	35 44	27.8	10 59.2	35 43	27.3	11 09.5	34 42	26.8
4	9 38.8	37 46	29.5	9 49.8	36 46	29.0	10 22.4	36 44	27.6	10 33.2	36 43	27.1	10 44.0	36 42	26.6
105	9 11.0	38 46	29.3	9 22.4	38 45	28.8	9 56.2	37 43	27.4	10 07.5	37 43	26.9	10 18.6	37 42	26.5
6	8 43.3	39 46	29.1	8 55.1	39 45	28.6	9 30.2	39 43	27.2	9 41.8	39 42	26.8	9 53.4	39 42	26.3
7	8 15.8	41 46	28.9	8 28.0	41 45	28.4	9 04.3	40 43	27.0	9 16.4	40 42	26.6	9 28.4	40 41	26.1
8	7 48.5	42 45	28.7	8 01.1	42 45	28.2	8 38.6	42 43	26.8	8 51.1	41 42	26.4	9 03.5	41 41	25.9
9	7 21.4	43 45	28.5	7 34.3	43 44	28.0	8 13.1	43 42	26.6	8 25.9	43 42	26.2	8 38.8	43 41	25.7
110	6 54.4	45 45	28.2	7 07.8	45 44	27.8	7 47.7	44 42	26.4	8 01.0	44 41	26.0	8 14.2	44 41	25.5
1	6 27.7	46 44	28.0	6 41.4	46 44	27.6	7 22.6	46 42	26.2	7 36.2	45 41	25.8	7 49.9	45 40	25.3
2	6 01.1	47 44	27.8	6 15.3	47 43	27.3	6 57.6	47 41	26.0	7 11.7	47 41	25.6	7 25.7	47 40	25.1
3	5 34.8	49 44	27.5	5 49.3	48 43	27.1	6 32.8	48 41	25.8	6 47.3	48 40	25.3	7 01.7	48 40	24.9
4	5 08.6	50 43	27.3	5 23.6	50 43	26.9	6 08.2	50 41	25.6	6 23.1	49 40	25.1	6 37.9	49 39	24.7
115							5 43.9	51 40	25.3	5 59.1	51 40	24.9	6 14.3	51 39	24.5
6							5 19.7	52 40	25.1	5 35.3	52 39	24.6	5 50.9	52 39	24.2
7										5 11.8	53 39	24.4	5 27.8	53 38	24.0
8													5 04.8	55 38	23.7
9															

69° 00′			69° 30′			74° 30′			H.A.
Alt.		Az.	Alt.		Az.	Alt.		Az.	
° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	°
17 20.4	14 35	22.0	17 24.5	14 35	21.5	18 01.1	11 27	16.3	91
16 59.1	15 35	22.0	17 03.7	15 35	21.5	17 45.2	12 26	16.3	2
16 37.9	17 35	21.9	16 42.9	17 34	21.4	17 29.3	14 26	16.2	3
16 16.7	19 35	21.9	16 22.2	18 34	21.4	17 13.4	16 26	16.2	4
15 55.6	20 35	21.8	16 01.6	20 34	21.3	16 57.6	17 26	16.2	95
15 34.6	22 35	21.7	15 41.1	21 34	21.2	16 41.8	19 26	16.1	6
15 13.6	23 35	21.6	15 20.6	23 34	21.1	16 26.1	21 26	16.1	7
14 52.8	25 35	21.5	15 00.2	25 34	21.0	16 10.5	22 26	16.0	8
14 32.0	26 34	21.4	14 39.8	26 34	20.9	15 54.9	24 26	15.9	9
14 11.3	28 34	21.3	14 19.6	28 34	20.9	15 39.3	25 26	15.9	100
13 50.7	29 34	21.2	13 59.5	29 33	20.7	15 23.8	27 26	15.8	1
13 30.2	31 34	21.1	13 39.4	31 33	20.6	15 08.5	29 26	15.7	2
13 09.8	32 34	21.0	13 19.5	32 33	20.5	14 53.1	30 25	15.6	3
12 49.5	34 34	20.9	12 59.6	34 33	20.4	14 37.9	32 25	15.5	4
12 29.3	35 33	20.8	12 39.9	35 33	20.3	14 22.7	33 25	15.5	105
12 09.3	37 33	20.6	12 20.3	37 32	20.2	14 07.6	35 25	15.4	6
11 49.3	38 33	20.5	12 00.8	38 32	20.0	13 52.7	36 25	15.3	7
11 29.5	40 33	20.4	11 41.4	40 32	19.9	13 37.8	38 25	15.2	8
11 09.9	41 33	20.2	11 22.2	41 32	19.7	13 23.0	39 24	15.1	9
10 50.4	43 32	20.1	11 03.1	42 32	19.6	13 08.3	41 24	14.9	110
10 31.0	44 32	19.9	10 44.2	44 31	19.4	12 53.7	42 24	14.8	1
10 11.7	45 32	19.7	10 25.4	45 31	19.3	12 39.3	44 24	14.7	2
9 52.7	47 32	19.6	10 06.7	47 31	19.1	12 24.9	45 24	14.6	3
9 33.8	48 31	19.4	9 48.2	48 31	18.9	12 10.7	47 24	14.5	4
9 15.0	50 31	19.2	9 29.9	50 30	18.8	11 56.6	48 23	14.3	115
8 56.4	51 31	19.0	9 11.7	51 30	18.6	11 42.6	50 23	14.2	6
8 38.0	52 30	18.8	8 53.7	52 30	18.4	11 28.8	51 23	14.1	7
8 19.8	54 30	18.7	8 35.9	54 29	18.2	11 15.0	52 23	13.9	8
8 01.7	55 30	18.5	8 18.2	55 29	18.0	11 01.5	54 22	13.8	9
7 43.9	56 29	18.3	8 00.7	56 29	17.8	10 48.0	55 22	13.6	120
7 26.2	58 29	18.0	7 43.5	58 28	17.6	10 34.7	57 22	13.5	1
7 08.7	59 29	17.8	7 26.4	59 28	17.4	10 21.6	58 22	13.3	2
6 51.4	60 28	17.6	7 09.5	60 28	17.2	10 08.6	59 21	13.2	3
6 34.4	61 28	17.4	6 52.8	61 27	17.0	9 55.8	61 21	13.0	4
6 17.5	63 28	17.2	6 36.3	63 27	16.8	9 43.1	62 21	12.8	125
6 00.9	64 27	16.9	6 20.0	64 27	16.6	9 30.6	63 21	12.7	6
5 44.4	65 27	16.7	6 04.0	65 26	16.3	9 18.2	64 20	12.5	7
5 28.2	66 27	16.5	5 48.1	66 26	16.1	9 06.0	66 20	12.3	8
5 12.2	67 26	16.2	5 32.5	67 26	15.9	8 54.0	67 20	12.1	9
			5 17.1	69 25	15.6	8 42.2	68 19	12.0	130
			5 01.9	70 25	15.4	8 30.5	69 19	11.8	1
						8 19.0	70 19	11.6	2
						8 07.7	72 18	11.4	3
						7 56.6	73 18	11.2	4
						7 45.7	74 18	11.0	135
						7 35.0	75 18	10.8	6
						7 24.5	76 17	10.6	7
						7 14.1	77 17	10.4	8
						7 04.0	78 17	10.2	9
						6 54.1	79 16	10.0	140
						6 44.4	80 16	09.8	1
						6 34.9	81 15	09.5	2
						6 25.6	82 15	09.3	3
						6 16.5	83 15	09.1	4
						6 07.7	84 14	08.9	145
						5 59.0	85 14	08.6	6
						5 50.6	86 14	08.4	7
						5 42.4	86 13	08.2	8
						5 34.5	87 13	07.9	9
						5 26.7	88 12	07.7	150
						5 19.2	89 12	07.5	1
						5 12.0	90 12	07.2	2
						5 04.9	90 11	07.0	3

DECLINATION CONTRARY NAME TO LATITUDE

H.A.	60° 00′			60° 30′			62° 00′			62° 30′			63° 00′		
	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.
°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°	° ′	Δd Δt	°
00	11 00.0	1.0 00	180.0	10 30.0	1.0 00	180.0	9 00.0	1.0 00	180.0	8 30.0	1.0 00	180.0	8 00.0	1.0 00	180.0
1	10 59.7	1.0 01	179.5	10 29.8	1.0 01	179.5	8 59.8	1.0 01	179.5	8 29.8	1.0 01	179.5	7 59.8	1.0 01	179.5
2	10 59.0	1.0 02	179.0	10 29.0	1.0 02	179.0	8 59.1	1.0 02	179.0	8 29.1	1.0 02	179.1	7 59.1	1.0 02	179.1
3	10 57.7	1.0 03	178.5	10 27.8	1.0 03	178.5	8 57.9	1.0 03	178.6	8 27.9	1.0 03	178.6	7 58.0	1.0 03	178.6
4	10 56.0	1.0 04	178.0	10 26.0	1.0 04	178.0	8 56.2	1.0 04	178.1	8 26.3	1.0 03	178.1	7 56.4	1.0 03	178.2
05	10 53.7	1.0 05	177.5	10 23.8	1.0 05	177.5	8 54.1	1.0 04	177.6	8 24.2	1.0 04	177.7	7 54.3	1.0 04	177.7
6	10 50.9	99 05	176.9	10 21.1	99 05	177.0	8 51.5	99 05	177.2	8 21.7	99 05	177.2	7 51.8	1.0 05	177.3
7	10 47.7	99 06	176.4	10 17.9	99 06	176.5	8 48.5	99 06	176.7	8 18.7	99 06	176.7	7 48.9	99 06	176.8
8	10 43.9	99 07	175.9	10 14.2	99 07	176.0	8 45.0	99 07	176.2	8 15.2	99 07	176.3	7 45.5	99 06	176.3
9	10 39.6	99 08	175.4	10 10.0	99 08	175.5	8 41.0	99 07	175.7	8 11.3	99 07	175.8	7 41.7	99 07	175.9
10	10 34.9	99 09	174.9	10 05.3	99 09	175.0	8 36.5	99 08	175.3	8 07.0	99 08	175.4	7 37.4	99 08	175.4
1	10 29.6	98 10	174.4	10 00.1	98 09	174.5	8 31.6	98 09	174.8	8 02.1	98 09	174.9	7 32.6	98 09	175.0
2	10 23.9	98 10	173.9	9 54.5	98 10	174.0	8 26.3	98 10	174.3	7 56.9	98 10	174.4	7 27.5	98 09	174.5
3	10 17.6	98 11	173.4	9 48.3	98 11	173.5	8 20.4	98 10	173.9	7 51.1	98 10	174.0	7 21.8	98 10	174.1
4	10 10.9	97 12	172.9	9 41.7	97 12	173.1	8 14.2	97 11	173.4	7 45.0	97 11	173.5	7 15.8	97 11	173.6
15	10 03.7	97 13	172.4	9 34.6	97 13	172.6	8 07.4	97 12	172.9	7 38.3	97 12	173.1	7 09.3	97 12	173.2
6	9 56.0	96 14	172.0	9 27.0	96 13	172.1	8 00.2	96 13	172.5	7 31.3	96 12	172.6	7 02.3	96 12	172.8
7	9 47.8	96 14	171.5	9 19.0	96 14	171.6	7 52.6	96 13	172.0	7 23.8	96 13	172.2	6 55.0	96 13	172.3
8	9 39.1	96 15	171.0	9 10.5	96 15	171.1	7 44.5	96 14	171.6	7 15.8	96 14	171.7	6 47.2	96 14	171.9
9	9 30.0	95 16	170.5	9 01.5	95 16	170.7	7 36.0	95 15	171.1	7 07.5	95 15	171.3	6 38.9	95 14	171.4
20	9 20.4	94 17	170.0	8 52.1	94 16	170.2	7 27.0	95 16	170.7	6 58.7	95 15	170.8	6 30.3	95 15	171.0
1	9 10.4	94 18	169.5	8 42.2	94 17	169.7	7 17.6	94 16	170.2	6 49.4	94 16	170.4	6 21.2	94 16	170.6
2	8 59.8	93 18	169.1	8 31.8	93 18	169.2	7 07.8	93 17	169.8	6 39.7	93 17	170.0	6 11.7	93 17	170.2
3	8 48.8	93 19	168.6	8 21.0	93 19	168.8	6 57.5	93 18	169.4	6 29.7	93 18	169.5	6 01.8	93 17	169.7
4	8 37.4	92 20	168.1	8 09.8	92 20	168.3	6 46.8	92 19	168.9	6 19.1	92 18	169.1	5 51.5	92 18	169.3
25	8 25.5	91 21	167.7	7 58.1	91 20	167.9	6 35.7	92 19	168.5	6 08.2	92 19	168.7	5 40.7	92 19	168.9
6	8 13.2	91 21	167.2	7 45.9	91 21	167.4	6 24.1	91 20	168.0	5 56.9	91 20	168.3	5 29.6	91 19	168.5
7	8 00.4	90 22	166.7	7 33.3	90 22	167.0	6 12.2	90 21	167.6	5 45.1	90 20	167.8	5 18.1	90 20	168.1
8	7 47.2	89 23	166.3	7 20.3	89 22	166.5	5 59.8	89 21	167.2	5 33.0	90 21	167.4	5 06.1	90 20	167.6
9	7 33.5	89 23	165.8	7 06.9	89 23	166.1	5 47.0	89 22	166.8	5 20.4	89 22	167.0			
30	7 19.4	88 24	165.4	6 53.0	88 24	165.6	5 33.9	88 23	166.4	5 07.5	88 22	166.6			
1	7 04.9	87 25	165.0	6 38.8	87 24	165.2	5 20.3	87 23	165.9						
2	6 50.0	86 26	164.5	6 24.1	86 25	164.8	5 06.3	86 24	165.5						
3	6 34.6	86 26	164.1	6 09.0	86 26	164.4									
4	6 18.9	85 27	163.7	5 53.5	85 27	163.9									
35	6 02.7	84 28	163.2	5 37.6	84 27	163.5									
6	5 46.1	83 28	162.8	5 21.3	83 28	163.1									
7	5 29.2	82 29	162.4	5 04.6	82 28	162.7									
8	5 11.8	81 30	162.0												

STAR IDENTIFICATION TABLE

Lat. 19°

ALTITUDE

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

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

STAR IDENTIFICATION TABLE

ALTITUDE

Lat. 19°

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

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

ALTITUDE CORRECTION FOR D. R. LATITUDE

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

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

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

Azimuth angle greater than 90°:

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

Azimuth angle less than 90°:

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

MULTIPLICATION TABLE

Δd or Δt

	DEC. DIFF. OR H. A. DIFF. (minutes of arc)															DEC. DIFF. OR H. A. DIFF. (tenths of minutes)										
Δ	1′	2′	3′	4′	5′	6′	7′	8′	9′	10′	11′	12′	13′	14′	15′	Δ	0.1′	0.2′	0.3′	0.4′	0.5′	0.6′	0.7′	0.8′	0.9′	Δ
01	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	01
2	.0	.0	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.3	.3	.3	2										2
3	.0	.1	.1	.1	.2	.2	.2	.2	.3	.3	.3	.4	.4	.4	.5	3										3
4	.0	.1	.1	.2	.2	.2	.3	.3	.4	.4	.4	.5	.5	.6	.6	4										4
05	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.8	05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	05
6	.1	.1	.2	.2	.3	.4	.4	.5	.5	.6	.7	.7	.8	.8	.9	6								0.0	0.1	6
7	.1	.1	.2	.3	.4	.4	.5	.6	.6	.7	.8	.8	.9	1.0	1.1	7							0.0	0.1		7
8	.1	.2	.2	.3	.4	.5	.6	.6	.7	.8	.9	1.0	1.0	1.1	1.2	8						0.0	0.1			8
9	.1	.2	.3	.4	.5	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4	9					0.0	0.1				9
10	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	10	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	10
1	.1	.2	.3	.4	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4	1.5	1.7	1										1
2	.1	.2	.4	.5	.6	.7	.8	1.0	1.1	1.2	1.3	1.4	1.6	1.7	1.8	2				0.0						2
3	.1	.3	.4	.5	.7	.8	.9	1.0	1.2	1.3	1.4	1.6	1.7	1.8	2.0	3				0.1						3
4	.1	.3	.4	.6	.7	.8	1.0	1.1	1.3	1.4	1.5	1.7	1.8	2.0	2.1	4										4
15	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	1.5	1.7	1.8	2.0	2.1	2.3	15	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	15
6	.2	.3	.5	.6	.8	1.0	1.1	1.3	1.4	1.6	1.8	1.9	2.1	2.2	2.4	6			0.0						0.1	6
7	.2	.3	.5	.7	.9	1.0	1.2	1.4	1.5	1.7	1.9	2.0	2.2	2.4	2.6	7			0.1						0.2	7
8	.2	.4	.5	.7	.9	1.1	1.3	1.4	1.6	1.8	2.0	2.2	2.3	2.5	2.7	8								0.1		8
9	.2	.4	.6	.8	1.0	1.1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	2.7	2.9	9								0.2		9
20	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	20	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	20
1	.2	.4	.6	.8	1.1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	2.7	2.9	3.2	1							0.1			1
2	.2	.4	.7	.9	1.1	1.3	1.5	1.8	2.0	2.2	2.4	2.6	2.9	3.1	3.3	2							0.2			2
3	.2	.5	.7	.9	1.2	1.4	1.6	1.8	2.1	2.3	2.5	2.8	3.0	3.2	3.5	3										3
4	.2	.5	.7	1.0	1.2	1.4	1.7	1.9	2.2	2.4	2.6	2.9	3.1	3.4	3.6	4		0.0				0.1				4
25	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.0	2.3	2.5	2.8	3.0	3.3	3.5	3.8	25	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	25
6	.3	.5	.8	1.0	1.3	1.6	1.8	2.1	2.3	2.6	2.9	3.1	3.4	3.6	3.9	6										6
7	.3	.5	.8	1.1	1.4	1.6	1.9	2.2	2.4	2.7	3.0	3.2	3.5	3.8	4.1	7									0.2	7
8	.3	.6	.8	1.1	1.4	1.7	2.0	2.2	2.5	2.8	3.1	3.4	3.6	3.9	4.2	8									0.3	8
9	.3	.6	.9	1.2	1.5	1.7	2.0	2.3	2.6	2.9	3.2	3.5	3.8	4.1	4.4	9					0.1					9
30	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.5	30	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	30
1	.3	.6	.9	1.2	1.6	1.9	2.2	2.5	2.8	3.1	3.4	3.7	4.0	4.3	4.7	1								0.2		1
2	.3	.6	1.0	1.3	1.6	1.9	2.2	2.6	2.9	3.2	3.5	3.8	4.2	4.5	4.8	2								0.3		2
3	.3	.7	1.0	1.3	1.7	2.0	2.3	2.6	3.0	3.3	3.6	4.0	4.3	4.6	5.0	3										3
4	.3	.7	1.0	1.4	1.7	2.0	2.4	2.7	3.1	3.4	3.7	4.1	4.4	4.8	5.1	4										4
35	0.4	0.7	1.1	1.4	1.8	2.1	2.5	2.8	3.2	3.5	3.9	4.2	4.6	4.9	5.3	35	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	35
6	.4	.7	1.1	1.4	1.8	2.2	2.5	2.9	3.2	3.6	4.0	4.3	4.7	5.0	5.4	6							0.3			6
7	.4	.7	1.1	1.5	1.9	2.2	2.6	3.0	3.3	3.7	4.1	4.4	4.8	5.2	5.6	7				0.1						7
8	.4	.8	1.1	1.5	1.9	2.3	2.7	3.0	3.4	3.8	4.2	4.6	4.9	5.3	5.7	8				0.2					0.3	8
9	.4	.8	1.2	1.6	2.0	2.3	2.7	3.1	3.5	3.9	4.3	4.7	5.1	5.5	5.9	9									0.4	9
40	0.4	0.8	1.2	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4	4.8	5.2	5.6	6.0	40	0.0	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	40
1	.4	.8	1.2	1.6	2.1	2.5	2.9	3.3	3.7	4.1	4.5	4.9	5.3	5.7	6.2	1						0.2				1
2	.4	.8	1.3	1.7	2.1	2.5	2.9	3.4	3.8	4.2	4.6	5.0	5.5	5.9	6.3	2						0.3				2
3	.4	.9	1.3	1.7	2.2	2.6	3.0	3.4	3.9	4.3	4.7	5.2	5.6	6.0	6.5	3								0.3		3
4	.4	.9	1.3	1.8	2.2	2.6	3.1	3.5	4.0	4.4	4.8	5.3	5.7	6.2	6.6	4								0.4		4
45	0.5	0.9	1.4	1.8	2.3	2.7	3.2	3.6	4.1	4.5	5.0	5.4	5.9	6.3	6.8	45	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	45
6	.5	.9	1.4	1.8	2.3	2.8	3.2	3.7	4.1	4.6	5.1	5.5	6.0	6.4	6.9	6										6
7	.5	.9	1.4	1.9	2.4	2.8	3.3	3.8	4.2	4.7	5.2	5.6	6.1	6.6	7.1	7										7
8	.5	1.0	1.4	1.9	2.4	2.9	3.4	3.8	4.3	4.8	5.3	5.8	6.2	6.7	7.2	8										8
9	.5	1.0	1.5	2.0	2.5	2.9	3.4	3.9	4.4	4.9	5.4	5.9	6.4	6.9	7.4	9	0.0		0.1		0.2		0.3		0.4	9
50	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	50	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	50
1	.5	1.0	1.5	2.0	2.6	3.1	3.6	4.1	4.6	5.1	5.6	6.1	6.6	7.1	7.7	1										1
2	.5	1.0	1.6	2.1	2.6	3.1	3.6	4.2	4.7	5.2	5.7	6.2	6.8	7.3	7.8	2										2
3	.5	1.1	1.6	2.1	2.7	3.2	3.7	4.2	4.8	5.3	5.8	6.4	6.9	7.4	8.0	3										3
4	.5	1.1	1.6	2.2	2.7	3.2	3.8	4.3	4.9	5.4	5.9	6.5	7.0	7.6	8.1	4										4
55	0.6	1.1	1.7	2.2	2.8	3.3	3.9	4.4	5.0	5.5	6.1	6.6	7.2	7.7	8.3	55	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	55
6	.6	1.1	1.7	2.2	2.8	3.4	3.9	4.5	5.0	5.6	6.2	6.7	7.3	7.8	8.4	6								0.4		6
7	.6	1.1	1.7	2.3	2.9	3.4	4.0	4.6	5.1	5.7	6.3	6.8	7.4	8.0	8.6	7								0.5		7
8	.6	1.2	1.7	2.3	2.9	3.5	4.1	4.6	5.2	5.8	6.4	7.0	7.5	8.1	8.7	8						0.3				8
9	.6	1.2	1.8	2.4	3.0	3.5	4.1	4.7	5.3	5.9	6.5	7.1	7.7	8.3	8.9	9						0.4				9
60	0.6	1.2	1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.6	7.2	7.8	8.4	9.0	60	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.5	60
1	.6	1.2	1.8	2.4	3.1	3.7	4.3	4.9	5.5	6.1	6.7	7.3	7.9	8.5	9.2	1									0.5	1
2	.6	1.2	1.9	2.5	3.1	3.7	4.3	5.0	5.6	6.2	6.8	7.4	8.1	8.7	9.3	2				0.2					0.6	2
3	.6	1.3	1.9	2.5	3.2	3.8	4.4	5.0	5.7	6.3	6.9	7.6	8.2	8.8	9.5	3				0.3						3
4	.6	1.3	1.9	2.6	3.2	3.8	4.5	5.1	5.8	6.4	7.0	7.7	8.3	9.0	9.6	4							0.4			4
65	0.7	1.3	2.0	2.6	3.3	3.9	4.6	5.2	5.9	6.5	7.2	7.8	8.5	9.1	9.8	65	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.5	0.6	65
6	.7	1.3	2.0	2.6	3.3	4.0	4.6	5.3	5.9	6.6	7.3	7.9	8.6	9.2	9.9	6										6
7	.7	1.3	2.0	2.7	3.4	4.0	4.7	5.4	6.0	6.7	7.4	8.0	8.7	9.4	10.1	7										7
8	.7	1.4	2.0	2.7	3.4	4.1	4.8	5.4	6.1	6.8	7.5	8.2	8.8	9.5	10.2	8								0.5		8
9	.7	1.4	2.1	2.8	3.5	4.1	4.8	5.5	6.2	6.9	7.6	8.3	9.0	9.7	10.4	9					0.3			0.6		9
70	0.7	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3	7.0	7.7	8.4	9.1	9.8	10.5	70	0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.6	70
1	.7	1.4	2.1	2.8	3.6	4.3	5.0	5.7	6.4	7.1	7.8	8.5	9.2	9.9	10.7	1										1
2	.7	1.4	2.2	2.9	3.6	4.3	5.0	5.8	6.5	7.2	7.9	8.6	9.4	10.1	10.8	2									0.6	2
3	.7	1.5	2.2	2.9	3.7	4.4	5.1	5.8	6.6	7.3	8.0	8.8	9.5	10.2	11.0	3									0.7	3
4	.7	1.5	2.2	3.0	3.7	4.4	5.2	5.9	6.7	7.4	8.1	8.9	9.6	10.4	11.1	4		0.1				0.4				4
75	0.8	1.5	2.3	3.0	3.8	4.5	5.3	6.0	6.8	7.5	8.3	9.0	9.8	10.5	11.3	75	0.1	0.2	0.2	0.3	0.4	0.5	0.5	0.6	0.7	75
6	.8	1.5	2.3	3.0	3.8	4.6	5.3	6.1	6.8	7.6	8.4	9.1	9.9	10.6	11.4	6										6
7	.8	1.5	2.3	3.1	3.9	4.6	5.4	6.2	6.9	7.7	8.5	9.2	10.0	10.8	11.6	7										7
8	.8	1.6	2.3	3.1	3.9	4.7	5.5	6.2	7.0	7.8	8.6	9.4	10.1	10.9	11.7	8							0.5			8
9	.8	1.6	2.4	3.2	4.0	4.7	5.5	6.3	7.1	7.9	8.7	9.5	10.3	11.1	11.9	9							0.6			9
80	0.8	1.6	2.4	3.2	4.0	4.8	5.6	6.4	7.2	8.0	8.8	9.6	10.4	11.2	12.0	80	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.6	0.7	80
1	.8	1.6	2.4	3.2	4.1	4.9	5.7	6.5	7.3	8.1	8.9	9.7	10.5	11.3	12.2	1								0.6		1
2	.8	1.6	2.5	3.3	4.1	4.9	5.7	6.6	7.4	8.2	9.0	9.8	10.7	11.5	12.3	2								0.7		2
3	.8	1.7	2.5	3.3	4.2	5.0	5.8	6.6	7.5	8.3	9.1	10.0	10.8	11.6	12.5	3			0.2						0.7	3
4	.8	1.7	2.5	3.4	4.2	5.0	5.9	6.7	7.6	8.4	9.2	10.1	10.9	11.8	12.6	4			0.3						0.8	4
85	0.9	1.7	2.6	3.4	4.3	5.1	6.0	6.8	7.7	8.5	9.4	10.2	11.1	11.9	12.8	85	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8	85
6	.9	1.7	2.6	3.4	4.3	5.2	6.0	6.9	7.7	8.6	9.5	10.3	11.2	12.0	12.9	6										6
7	.9	1.7	2.6	3.5	4.4	5.2	6.1	7.0	7.8	8.7	9.6	10.4	11.3	12.2	13.1	7				0.3						7
8	.9	1.8	2.6	3.5	4.4	5.3	6.2	7.0	7.9	8.8	9.7	10.6	11.4	12.3	13.2	8				0.4						8
9	.9	1.8	2.7	3.6	4.5	5.3	6.2	7.1	8.0	8.9	9.8	10.7	11.6	12.5	13.4	9					0.4					9
90	0.9	1.8	2.7	3.6	4.5	5.4	6.3	7.2	8.1	9.0	9.9	10.8	11.7	12.6	13.5	90	0.1	0.2	0.3	0.4	0.5	0.5	0.6	0.7	0.8	90
1	.9	1.8	2.7	3.6	4.6	5.5	6.4	7.3	8.2	9.1	10.0	10.9	11.8	12.7	13.7	1						0.5				1
2	.9	1.8	2.8	3.7	4.6	5.5	6.4	7.4	8.3	9.2	10.1	11.0	12.0	12.9	13.8	2						0.6	0.6			2
3	.9	1.9	2.8	3.7	4.7	5.6	6.5	7.4	8.4	9.3	10.2	11.2	12.1	13.0	14.0	3							0.7	0.7		3
4	.9	1.9	2.8	3.8	4.7	5.6	6.6	7.5	8.5	9.4	10.3	11.3	12.2	13.2	14.1	4								0.8	0.8	4
95	1.0	1.9	2.9	3.8	4.8	5.7	6.7	7.6	8.6	9.5	10.5	11.4	12.4	13.3	14.3	95	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	95
6	1.0	1.9	2.9	3.8	4.8	5.8	6.7	7.7	8.6	9.6	10.6	11.5	12.5	13.4	14.4	6										6
7	1.0	1.9	2.9	3.9	4.9	5.8	6.8	7.8	8.7	9.7	10.7	11.6	12.6	13.6	14.6	7										7
8	1.0	2.0	2.9	3.9	4.9	5.9	6.9	7.8	8.8	9.8	10.8	11.8	12.7	13.7	14.7	8										8
99	1.0	2.0	3.0	4.0	5.0	5.9	6.9	7.9	8.9	9.9	10.9	11.9	12.9	13.9	14.9	99										99
Δ	1′	2′	3′	4′	5′	6′	7′	8′	9′	10′	11′	12′	13′	14′	15′	Δ	0.1′	0.2′	0.3′	0.4′	0.5′	0.6′	0.7′	0.8′	0.9′	Δ

Δd or Δt

MULTIPLICATION TABLE

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

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