

NAUTICAL TABLES

HIGH LATITUDE EDITION

BURTON

TABLES 28 and 29.—pp. 208-219. **Ex-Meridian Tables I. and II.**
 The ex-meridian tables included here are extremely simple and convenient to use, and, supported when necessary by Table III, will be found wide of application and accurate in result.

From Godfray's Navigation.

$$\text{Reduction} = \frac{\text{Cos. Lat. Cos. Dec. Sin.}^2 15'}{2 \text{ Sin. Mer. z. dist. Sin. } 1''} \times (\text{H.A. in minutes})^2.$$

It will be found, however, that $\frac{\text{Sin.}^2 15'}{2 \text{ Sin. } 1''} = 1.96355$, which is a constant.

Ex-meridian Table I. is entered with latitude and declination and gives the value of the term $1.96355 \text{ Cos. Lat. Cos. Dec. Cosec. Mer. z. dist.} = "F"$ (Ex-meridian factor).

Ex-meridian Table II. is entered with hour angle and F, and gives the value of $\text{H.A.}^2 \times F$, which is the reduction in minutes of arc, to be added to the altitude (except when below Pole). This reduction is taken out in either two or three parts. Thus, given $\text{H.A.} = 35\frac{1}{2}^m$ and $F = 2.32$,

$$\begin{array}{r} \text{then, } 2. \quad = 42.0 \\ \quad .3 \quad = 6.3 \\ \quad .02 \quad = .4 \\ \hline 2.32 \quad = 48.7 \end{array}$$

The value of F can be noted down beforehand, of course, leaving Table II. only to be dealt with at the time of taking the sight.

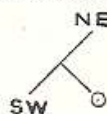
TABLES 33 and 34.—pp. 222-242. **A, B, and C Tables.**

Formulae for computation :

A=Cot. H.A. Tan. Lat. B=Cosec H.A. Tan. Dec. C=Cot. Az. Sec. Lat.

Table 32 contains the values designated "A" and "B," corresponding to the arguments H.A. and Lat. and H.A. and Dec., respectively. When combined according to their appropriate signs, given at the top of the page, these values form "C," the "Longitude Correction," which is the error of longitude corresponding to one minute error of latitude. It must, of course, be multiplied by the total error of latitude to obtain the total error of longitude.

To determine which way to apply the correction. The position-line runs at right-angles to the bearing of the body observed. Draw a short line to represent the bearing of the body, according to quadrant, and across the appropriate end of this line draw a second line to indicate the position-line. Thus, supposing the body bore SE, then by sketch it is obvious that the position-line runs NE and SW—which means that the further the observer is to the North, the further he will be to the East, or the further to the South the further to the West.

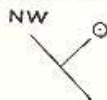


Example :

At 19.12 S.A.T., Lat. D.R. 22° 12' N. Long. obs. 37° 42' W. Sun in N.E. quadr. Dec. 18° 55' N.
Now, S.A.T. 19.12—H.A. 4^h 48^m.

With H.A. 4^h 48^m and $\begin{cases} \text{Lat. } 22^\circ 12' \text{ N.}, \\ \text{Dec. } 18^\circ 55' \text{ N.}, \end{cases}$ $\begin{matrix} A = .13+ \\ B = .36- \end{matrix}$

Therefore, Long. Corr. (C) = .23—



At noon, when the above sight brought forward gave Lat. D.R. 23° 05' N. Long. obs. 37° 13' W., the latitude was found by meridian altitude to be 23° 13' N. Then since the D.R. latitude, with which the sight was worked, is 8M. in error, it is obvious that the observed longitude must also be in error. The true latitude being more northerly, the sketch indicates that the true longitude will be further to the West—by the amount $8 \times .23 = 1'.84$.

Long. obs. (for D.R. Lat.),	-	-	37° 13' W.
			1.8 W.
Long. obs. (for True Lat.) -	-	-	37° 14.8 W.

The correct noon position is therefore Lat. 23° 13' N. Long. 37° 14.8 W.

Note.—Two decimal places are always sufficient for the Longitude Correction, for which purpose the sign of C is immaterial.

Table 34 contains values of C for arguments azimuth and latitude. It is therefore by itself a "Longitude Correction" table, and, in conjunction with the A and B Table may be used for solving time azimuths and great circle courses.

(i) As a "Longitude Correction Table." In this case the azimuths would first be obtained from Burdwood or Davis. The table is then entered with azimuth and latitude; the corresponding value from the table being the error of longitude caused by one minute error of latitude. The quantity is identical with that obtained by means of the A and B Table, and is applied in the manner described and exemplified under that head.

(ii) As a "Time Azimuth Table." In this case the value "C" is obtained from the A and B Table. Table C is then entered with latitude and value C, from which the azimuth results.

Examples :

Longitude Correction.

Lat. used for "chronometer" sight, $37^{\circ} 10' S$.
 Correct Lat. found to be $37^{\circ} 3' S$.
 Azimuth (at time of "chron." sight), $N58^{\circ}W$.

With Az. 58° and
 Lat. 37° , $C = .78$.



The Lat. Corr. being $7M$. Northerly, the
 total Long. Corr. is $7 \times .78 = 5.46$ Easterly.

For G.C. Initial Course—

D. Long. = Hour angle.
 "From" Lat. = Latitude.
 "To" Lat. = Declination.

Time Azimuth.

H.A. $5^h 36^m$ West, Lat. $6^{\circ} 30' S$, Dec. $1^{\circ} 20' N$.
 H.A. $5^h 36^m$ { Lat. $6^{\circ} 30' S$, A = .012 +
 { Dec. $1^{\circ} 18' N$, B = .023 +
 C = .035 +

Then in Table C, with Lat. $6\frac{1}{2}^{\circ}$, Az. = $N88^{\circ}W$.

Note.—Except when value C is small (less
 than .2) two decimal places are sufficient.
 Two decimal places in this case would give
 $\frac{1}{2}^{\circ}$ uncertainty.

Example of G.C. Initial Course.

From Lat. $58^{\circ} 10' N$, Long. $5^{\circ} 20' W$.
 To Lat. $20^{\circ} 05' N$, Long. $61^{\circ} 35' W$.

With H.A. $56\frac{1}{4}^{\circ}$ { Lat. $56^{\circ} 10' N$, A = 1.09 +
 { Dec. $20^{\circ} 05' N$, B = .44 +
 C = .65 +

Then in Table C, with Lat. 58° , Az. = $S71^{\circ}W$ = Initial Course.

Table C is also used for combining two simultaneous or successive
 "chronometer" sights in order to obtain a fix.* For this purpose the process
 is as follows:—

Calculate the two longitudes by any "chronometer" formula, and take
 out C for each sight. (If the sights have been successively obtained, the first
 sight is brought up to the time of the second sight by means of the Traverse
 Table).

Then—

$$\frac{\text{Difference between longitudes}}{\text{Sum or difference of C values}} = \text{Correction for latitude.}$$

Rule for C's—

Observations in ADJACENT quadrants, use SUM.
 " SAME or OPPOSITE quadrant(s), use DIFFERENCE.

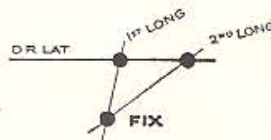
The latitude correction being known, each C is multiplied by this amount
 to obtain the respective longitude corrections. A rough sketch of the position
 lines is then made in order to show how these corrections are to be applied.

Example :

Successive observations, same quadrant.

1st Obs. 08.16	Lat. D.R. $33^{\circ} 27'.0 N$	Long. Obs. $26^{\circ} 13'.5 E$	⊙ Bg. $S83^{\circ}E$	C = .15
Run $S72^{\circ}E$. 36 M.	$11'.1 S$	$41'.0 E$		
1st Obs. 11.00	Lat. D.R. $33^{\circ} 15'.9 N$	Long. Obs. $26^{\circ} 54'.5 E$		
2nd Obs. 11.00	Lat. D.R. $33^{\circ} 15'.9 N$	Long. Obs. $26^{\circ} 59'.75 E$	⊙ Bg. $S38\frac{1}{2}^{\circ}E$	C = 1.50
		Diff. $5'.25$		Diff. 1.35

$\frac{5.25}{1.35} = 3.9 = \text{Lat. Corr.}$ $3.9 \times .15 = .595 = \text{Corr. for 1st Long.}$
 $3.9 \times 1.50 = 5.85 = \text{Corr. for 2nd Long.}$



11.00 D.R. Lat. $33^{\circ} 15'.9 N$	1st Long. Obs. $26^{\circ} 54'.5 E$	2nd Long. Obs. $26^{\circ} 59'.75 E$
Corr. $3.9 S$	Corr. $0.6 W$	Corr. $5.85 W$
11.00 True Lat. $33^{\circ} 12.0 N$	True Long. $26^{\circ} 53.9 E$	True Long. $26^{\circ} 53.9 E$

*The method introduced by Mr. A. C. Johnson, R.N., of "Cloudy Weather" fame. It
 was he who originated Table C. The A and B Table is much older, having been first
 published anonymously in the Nautical Magazine in 1846.

Note.—In the above example the bearings have been taken from the Azimuth Tables, and thence C. C could, however, have been equally conveniently taken from the A and B Table. The figure only requires to indicate the **relative** position of the two longitudes, and the angle of the position-lines relative to each other and the meridian. It can, however, be drawn to scale and the position arrived at, or checked, in that way. (See Man. of Mod. Nav. p. 53, and other text books).

SUPPLEMENT
TO
NAUTICAL TABLES

BY
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Containing Extension of
Ex-Meridian and A. B. C. Tables to Latitude 82°



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Table 28.

EX-MERIDIAN.

Containing Values of F (Ex-Meridian Factor).

Table I

Dec	LATITUDE, SAME name as declination.																Dec							
	60° 61°	62° 63°	64° 65°	66° 67°	68° 69°	70° 71°	72° 73°	74° 75°	76° 77°	78° 79°	80° 81°	82°												
0°	1.13	1.09	1.04	1.00	.96	.92	.87	.83	.79	.75	.71	.68	.64	.60	.56	.53	.49	.45	.42	.38	.35	.31	.28	0°
1	1.15	1.10	1.05	1.01	.97	.92	.88	.84	.80	.76	.72	.68	.64	.60	.57	.53	.49	.46	.42	.38	.35	.31	.28	1
2	1.16	1.11	1.06	1.02	.97	.93	.89	.85	.80	.76	.72	.68	.65	.61	.57	.53	.49	.46	.42	.38	.35	.31	.28	2
3	1.17	1.12	1.07	1.03	.98	.94	.90	.85	.81	.77	.73	.69	.65	.61	.57	.53	.50	.46	.42	.39	.35	.31	.28	3
4	1.18	1.13	1.08	1.04	.99	.95	.90	.86	.82	.77	.73	.69	.65	.61	.57	.54	.50	.46	.42	.39	.35	.31	.28	4
5	1.19	1.14	1.09	1.05	1.00	.95	.91	.87	.82	.78	.74	.70	.66	.62	.58	.54	.50	.46	.43	.39	.35	.32	.28	5
6	1.21	1.16	1.11	1.06	1.01	.96	.92	.87	.83	.79	.74	.70	.66	.62	.58	.54	.50	.46	.43	.39	.35	.32	.28	6
7	1.22	1.17	1.12	1.07	1.02	.97	.92	.88	.83	.79	.75	.71	.66	.62	.58	.54	.51	.47	.43	.39	.35	.32	.28	7
8	1.23	1.18	1.13	1.08	1.03	.98	.93	.89	.84	.80	.75	.71	.67	.63	.59	.55	.51	.47	.43	.39	.36	.32	.28	8
9	1.25	1.19	1.14	1.09	1.04	.99	.94	.89	.85	.80	.76	.72	.67	.63	.59	.55	.51	.47	.43	.39	.36	.32	.28	9
10	1.26	1.21	1.15	1.10	1.05	1.00	.95	.90	.85	.81	.76	.72	.68	.63	.59	.55	.51	.47	.43	.40	.36	.32	.28	10
11	1.28	1.22	1.16	1.11	1.06	1.01	.96	.91	.86	.81	.77	.72	.68	.64	.60	.56	.51	.47	.44	.40	.36	.32	.28	11
12	1.29	1.23	1.18	1.12	1.07	1.02	.97	.92	.87	.82	.77	.73	.69	.64	.60	.56	.52	.48	.44	.40	.36	.32	.28	12
13	1.31	1.25	1.19	1.13	1.08	1.03	.97	.92	.87	.83	.78	.73	.69	.65	.60	.56	.52	.48	.44	.40	.36	.32	.28	13
14	1.32	1.26	1.20	1.15	1.09	1.04	.98	.93	.88	.83	.79	.74	.70	.65	.61	.56	.52	.48	.44	.40	.36	.32	.28	14
15	1.34	1.28	1.22	1.16	1.10	1.05	.99	.94	.89	.84	.79	.75	.70	.65	.61	.57	.52	.48	.44	.40	.36	.32	.28	15
16	1.36	1.30	1.23	1.17	1.11	1.06	1.00	.95	.90	.85	.80	.75	.70	.66	.61	.57	.53	.49	.44	.40	.36	.33	.29	16
17	1.38	1.31	1.25	1.19	1.13	1.07	1.01	.96	.91	.85	.80	.76	.71	.66	.62	.57	.53	.49	.45	.41	.37	.33	.29	17
18	1.40	1.33	1.26	1.20	1.14	1.08	1.02	.97	.91	.86	.81	.76	.71	.67	.62	.58	.53	.49	.45	.41	.37	.33	.29	18
19	1.42	1.35	1.28	1.21	1.15	1.09	1.03	.98	.92	.87	.82	.77	.72	.67	.62	.58	.54	.49	.45	.41	.37	.33	.29	19
20	1.44	1.37	1.29	1.23	1.16	1.10	1.04	.99	.93	.88	.83	.77	.72	.68	.63	.58	.54	.49	.45	.41	.37	.33	.29	20
21	1.46	1.39	1.31	1.24	1.18	1.12	1.05	1.00	.94	.88	.83	.78	.73	.68	.63	.59	.54	.50	.45	.41	.37	.33	.29	21
22	1.48	1.41	1.33	1.26	1.19	1.13	1.07	1.01	.95	.89	.84	.79	.73	.68	.64	.59	.54	.50	.46	.41	.37	.33	.29	22
23	1.50	1.43	1.35	1.28	1.21	1.14	1.08	1.02	.96	.90	.85	.79	.74	.69	.64	.59	.55	.50	.46	.42	.37	.33	.29	23
24	1.53	1.45	1.37	1.30	1.22	1.16	1.09	1.03	.97	.91	.85	.80	.75	.69	.65	.60	.55	.51	.46	.42	.38	.33	.29	24
25	1.55	1.47	1.39	1.31	1.24	1.17	1.10	1.04	.98	.92	.86	.81	.75	.70	.65	.60	.55	.51	.46	.42	.38	.34	.30	25
26	1.58	1.49	1.41	1.33	1.26	1.19	1.12	1.05	.99	.93	.87	.81	.76	.71	.66	.61	.56	.51	.47	.42	.38	.34	.30	26
27	1.61	1.52	1.43	1.35	1.27	1.20	1.13	1.07	1.00	.94	.88	.82	.76	.71	.66	.61	.56	.51	.47	.42	.38	.34	.30	27
28	1.64	1.55	1.46	1.37	1.29	1.22	1.15	1.08	1.01	.95	.89	.83	.77	.72	.66	.61	.56	.52	.47	.43	.38	.34	.30	28
29	1.67	1.57	1.48	1.40	1.31	1.24	1.16	1.09	1.02	.96	.90	.84	.78	.72	.67	.62	.57	.52	.47	.43	.38	.34	.30	29
30	1.70	1.60	1.51	1.42	1.33	1.25	1.18	1.10	1.03	.97	.91	.85	.79	.73	.68	.62	.57	.52	.48	.43	.39	.34	.30	30
31	1.74	1.63	1.53	1.44	1.35	1.27	1.19	1.12	1.05	.98	.92	.85	.79	.74	.68	.63	.58	.53	.48	.43	.39	.34	.30	31
32	1.77	1.67	1.56	1.47	1.38	1.29	1.21	1.14	1.06	1.00	.93	.86	.80	.74	.69	.63	.58	.53	.48	.43	.39	.35	.31	32
33	1.81	1.70	1.59	1.50	1.40	1.32	1.23	1.15	1.08	1.01	.94	.87	.81	.75	.69	.64	.58	.53	.48	.44	.39	.35	.31	33
34	1.86	1.74	1.63	1.53	1.43	1.34	1.25	1.17	1.09	1.02	.95	.88	.82	.76	.70	.64	.59	.54	.49	.44	.39	.35	.31	34
35	1.90	1.78	1.66	1.56	1.45	1.36	1.27	1.19	1.11	1.03	.96	.89	.83	.77	.71	.65	.59	.54	.49	.44	.39	.35	.31	35
36	1.95	1.82	1.70	1.59	1.48	1.39	1.29	1.21	1.12	1.05	.97	.90	.83	.77	.71	.65	.60	.54	.49	.44	.40	.35	.31	36
37	2.00	1.87	1.74	1.62	1.51	1.41	1.32	1.23	1.14	1.06	.98	.91	.84	.78	.72	.66	.60	.55	.50	.45	.40	.35	.31	37
38	2.07	1.92	1.79	1.66	1.55	1.44	1.34	1.25	1.16	1.08	1.00	.93	.86	.79	.73	.67	.61	.55	.50	.45	.40	.35	.31	38
39	2.13	1.97	1.84	1.70	1.59	1.47	1.37	1.27	1.18	1.10	1.01	.94	.87	.80	.74	.67	.61	.55	.50	.45	.40	.36	.31	39
40	2.20	2.03	1.89	1.75	1.62	1.50	1.40	1.29	1.20	1.11	1.03	.95	.88	.81	.75	.68	.62	.56	.51	.46	.41	.36	.31	40
41	2.28	2.10	1.94	1.80	1.66	1.54	1.43	1.32	1.22	1.13	1.05	.97	.89	.82	.76	.69	.63	.57	.51	.46	.41	.36	.31	41
42	2.36	2.17	2.00	1.85	1.71	1.58	1.46	1.35	1.25	1.15	1.06	.98	.90	.84	.77	.69	.63	.57	.52	.46	.41	.36	.32	42
43	2.46	2.25	2.07	1.91	1.76	1.62	1.49	1.38	1.27	1.18	1.08	1.00	.92	.85	.78	.70	.64	.58	.52	.47	.41	.36	.32	43
44	2.56	2.34	2.15	1.97	1.81	1.67	1.53	1.41	1.30	1.20	1.10	1.02	.93	.86	.79	.71	.64	.58	.53	.47	.42	.37	.32	44
45	2.68	2.44	2.23	2.04	1.87	1.72	1.58	1.45	1.33	1.23	1.12	1.04	.95	.87	.80	.72	.65	.59	.53	.47	.42	.37	.32	45
46	2.82	2.55	2.32	2.12	1.93	1.77	1.62	1.49	1.36	1.25	1.15	1.06	.97	.89	.81	.73	.66	.60	.54	.48	.42	.37	.32	46
47	2.98	2.68	2.43	2.21	2.01	1.83	1.67	1.53	1.40	1.28	1.17	1.08	.98	.90	.82	.74	.67	.60	.54	.48	.42	.37	.32	47
48	3.16	2.83	2.55	2.30	2.09	1.90	1.73	1.58	1.44	1.32	1.20	1.10	1.00	.91	.83	.75	.68	.61	.55	.49	.43	.38	.33	48
49	3.38	3.00	2.69	2.42	2.18	1.98	1.79	1.63	1.48	1.35	1.23	1.12	1.02	.93	.84	.76	.69	.62	.55	.49	.43	.38	.33	49
50	3.63	3.21	2.85	2.55	2.29	2.06	1.86	1.69	1.53	1.39	1.26	1.15	1.04	.94	.86	.77	.70	.63	.56	.50	.44	.38	.33	50
51	3.96	3.45	3.04	2.70	2.41	2.16	1.94	1.75	1.58	1.40	1.30	1.18	1.07	.96	.87	.79	.71	.64	.57	.50	.44	.39	.33	51
52	4.34	3.75	3.27	2.88	2.55	2.27	2.03	1.82	1.64	1.48	1.34	1.21	1.09	.99	.89	.80	.72	.65	.57	.51	.45	.39	.34	52
53	4.85	4.12	3.55	3.09	2.71	2.40	2.14	1.91	1.71	1.54	1.38	1.24	1.12	1.01	.91	.82	.73	.66	.58	.52	.45	.39	.34	53
54	5.5	4.59	3.89	3.35	2.91	2.56	2.26	2.00	1.79	1.60	1.43	1.29	1.15	1.04	.93	.83	.75	.67	.59	.52	.46	.40	.34	54
55	6.5	5.2	4.34	3.67	3.16	2.74	2.40	2.12	1.88	1.67	1.49	1.33	1.19	1.07	.95	.85	.76	.68	.60	.53	.46	.40	.35	55
56		6.1	4.93	4.09	3.46	2.97	2.57	2.25	1.98	1.75	1.55	1.38	1.23	1.10	.98	.87	.78	.69	.61	.54	.47	.41	.35	56
57			5.80	4.65	3.85	3.25	2.78	2.41	2.10	1.84	1.63	1.44	1.28	1.13	1.01	.90	.79	.71	.62	.55	.48	.41	.35	57
58				5.4	4.36	3.61	3.04	2.60	2.24	1.95	1.71	1.51	1.33	1.18	1.04	.92	.81	.72	.63	.56	.48	.42	.36	58
59					5.1	4.09	3.38	2.84	2.42	2.09	1.81	1.58	1.39	1.22	1.08	.95	.84	.74	.65	.57	.49	.42	.36	59
60						4.76	3.82	3.15	2.64	2.25	1.93	1.68	1.46	1.28	1.12	.98	.86							

Table 28.

EX-MERIDIAN.

Containing Values of F (Ex-Meridian Factor).

Table I

Dec	LATITUDE, CONTRARY name to declination.																Dec							
	60° 61°	62° 63°	64° 65°	66° 67°	68° 69°	70° 71°	72° 73°	74° 75°	76° 77°	78° 79°	80° 81°	82°												
0°	1.13	1.09	1.04	1.00	.96	.92	.87	.83	.79	.75	.71	.68	.64	.60	.56	.53	.49	.45	.42	.38	.35	.31	.28	0°
1	1.12	1.08	1.03	.99	.95	.91	.87	.83	.79	.75	.71	.67	.63	.60	.56	.52	.49	.45	.42	.38	.35	.31	.28	1
2	1.11	1.07	1.02	.98	.94	.90	.86	.82	.78	.74	.71	.67	.63	.59	.56	.52	.49	.45	.41	.38	.34	.31	.27	2
3	1.10	1.06	1.02	.97	.93	.89	.85	.82	.78	.74	.70	.66	.63	.59	.55	.52	.48	.45	.41	.38	.34	.31	.27	3
4	1.09	1.05	1.01	.97	.93	.89	.85	.81	.77	.73	.70	.66	.62	.59	.55	.52	.48	.45	.41	.38	.34	.31	.27	4
5	1.08	1.04	1.00	.96	.92	.88	.84	.80	.77	.73	.69	.66	.62	.58	.55	.51	.48	.44	.41	.38	.34	.31	.27	5
6	1.07	1.03	.99	.95	.91	.87	.84	.80	.76	.72	.69	.65	.62	.58	.55	.51	.48	.44	.41	.37	.34	.31	.27	6
7	1.06	1.02	.98	.94	.90	.87	.83	.79	.76	.72	.68	.65	.61	.58	.54	.51	.48	.44	.41	.37	.34	.31	.27	7
8	1.05	1.01	.97	.93	.90	.86	.82	.79	.75	.72	.68	.64	.61	.57	.54	.51	.47	.44	.41	.37	.34	.31	.27	8
9	1.04	1.00	.96	.93	.89	.85	.82	.78	.75	.71	.68	.64	.61	.57	.54	.50	.47	.44	.41	.37	.34	.31	.27	9
10	1.03	.99	.95	.92	.88	.85	.81	.78	.74	.71	.67	.64	.60	.57	.54	.50	.47	.44	.41	.37	.34	.31	.27	10
11	1.02	.98	.95	.91	.87	.84	.80	.77	.74	.70	.67	.63	.60	.57	.53	.50								11
12	1.01	.97	.94	.90	.87	.83	.80	.76	.73	.70	.66	.63	.60	.56	.53									12
13	1.00	.96	.93	.90	.86	.83	.79	.76	.73	.69	.66	.63	.59	.56								.30	.27	13
14	.99	.96	.92	.89	.85	.82	.79	.75	.72	.69	.66	.62	.59									.33	.30	14
15	.98	.95	.91	.88	.85	.81	.78	.75	.72	.68	.65	.62									.36	.33	.30	15
16	.97	.94	.91	.87	.84	.81	.78	.74	.71	.68	.65									.39	.36	.33	.30	16
17	.96	.93	.90	.87	.83	.80	.77	.74	.71	.67									.42	.39	.36	.33	.30	17
18	.95	.92	.89	.86	.83	.80	.76	.73	.70									.45	.42	.39	.36	.33	.30	18
19	.95	.91	.88	.85	.82	.79	.76	.73									.48	.45	.42	.39	.36	.33	.29	19
20	.94	.91	.87	.84	.81	.78	.75						.51	.48	.45	.42	.39	.36	.33	.29	.26			20
21	.93	.90	.87	.84	.81	.78								.54	.51	.48	.45	.42	.39	.36	.32	.29	.26	21
22	.92	.89	.86	.83	.80								.56	.53	.50	.47	.44	.41	.38	.35	.32	.29	.26	22
23	.91	.88	.85	.82						.59	.56	.53	.50	.47	.44	.41	.38	.35	.32	.29	.26	.23	.20	23
24	.90	.87	.84					.64	.61	.59	.56	.53	.50	.47	.44	.41	.38	.35	.32	.29	.26	.23	.20	24
25	.89	.86						.66	.63	.61	.58	.55	.52	.49	.47	.44	.41	.38	.35	.32	.29	.26	.23	25
26		.88						.66	.63	.61	.58	.55	.52	.49	.47	.44	.41	.38	.35	.32	.29	.26	.23	26
27							.69	.66	.63	.60	.58	.55	.52	.49	.46	.43	.41	.38	.35	.32	.29	.26	.23	27
28						.71	.68	.65	.63	.60	.57	.54	.52	.49	.46	.43	.40	.37	.35	.32	.29	.26	.23	28
29					.73	.70	.67	.65	.62	.59	.57	.54	.51	.49	.46	.43	.40	.37	.34	.32	.29	.26	.23	29
30				.75	.72	.70	.67	.64	.62	.59	.56	.54	.51	.48	.46	.43	.40	.37	.34	.31	.28	.26	.23	30
31			.77	.74	.72	.69	.66	.64	.61	.59	.56	.53	.51	.48	.45	.43	.40	.37	.34	.31	.28	.25	.23	31
32			.78	.76	.73	.71	.68	.66	.63	.61	.58	.56	.53	.50	.48	.45	.42	.40	.37	.34	.31	.28	.25	32
33		.80		.77	.75	.73	.70	.68	.65	.63	.60	.58	.55	.53	.50	.47	.45	.42	.39	.37	.34	.31	.28	33
34	.81	.79	.77	.74	.72	.70	.67	.65	.62	.60	.57	.55	.52	.50	.47	.45	.42	.39	.37	.34	.31	.28	.25	34
35	.80	.78	.76	.74	.71	.69	.67	.64	.62	.59	.57	.54	.52	.49	.47	.44	.42	.39	.36	.34	.31	.28	.25	35
36	.79	.78	.75	.73	.71	.68	.66	.64	.61	.59	.57	.54	.52	.49	.47	.44	.41	.39	.36	.33	.31	.28	.25	36
37	.79	.77	.75	.72	.70	.68	.65	.63	.61	.58	.56	.54	.51	.49	.46	.44	.41	.39	.36	.33	.31	.28	.25	37
38	.78	.76	.74	.72	.69	.67	.65	.63	.60	.58	.56	.53	.51	.48	.46	.44	.41	.38	.36	.33	.30	.28	.25	38
39	.77	.75	.73	.71	.69	.66	.64	.62	.60	.57	.55	.53	.51	.48	.46	.43	.41	.38	.36	.33	.30	.28	.25	39
40	.77	.74	.72	.70	.68	.66	.64	.61	.59	.57	.55	.52	.50	.48	.45	.43	.40	.38	.35	.33	.30	.27	.25	40
41	.76	.73	.71	.69	.67	.65	.63	.61	.59	.57	.54	.52	.50	.47	.45	.43	.40	.38	.35	.33	.30	.27	.25	41
42	.75	.73	.71	.69	.67	.64	.62	.60	.58	.56	.54	.52	.49	.47	.45	.42	.40	.38	.35	.32	.30	.27	.25	42
43	.74	.72	.70	.68	.66	.64	.62	.60	.58	.56	.53	.51	.49	.47	.44	.42	.40	.37	.35	.32	.30	.27	.24	43
44	.73	.71	.69	.67	.65	.63	.61	.59	.57	.55	.53	.51	.49	.46	.44	.42	.39	.37	.35	.32	.30	.27	.24	44
45	.72	.70	.68	.66	.64	.62	.60	.59	.57	.54	.52	.50	.48	.46	.44	.41	.39	.37	.34	.32	.29	.27	.24	45
46	.71	.69	.67	.65	.64	.62	.60	.58	.56	.54	.52	.50	.48	.46	.43	.41	.39	.37	.34	.32	.29	.27	.24	46
47	.70	.68	.66	.65	.63	.61	.59	.57	.55	.53	.51	.49	.47	.45	.43	.41	.39	.36	.34	.32	.29	.27	.24	47
48	.70	.67	.66	.64	.62	.60	.58	.57	.55	.53	.51	.49	.47	.45	.43	.41	.38	.36	.34	.31	.29	.26	.24	48
49	.69	.66	.65	.63	.61	.60	.58	.56	.54	.52	.50	.48	.46	.44	.42	.40	.38	.36	.34	.31	.29	.26	.24	49
50	.68	.66	.64	.62	.61	.59	.57	.55	.54	.52	.50	.48	.46	.44	.42	.40	.38	.36	.33	.31	.29	.26	.24	50
51	.67	.65	.63	.61	.60	.58	.56	.55	.53	.51	.49	.47	.46	.44	.42	.40	.37	.35	.33	.31	.28	.26	.24	51
52	.66	.64	.62	.61	.59	.57	.56	.54	.52	.51	.49	.47	.45	.43	.41	.39	.37	.35	.33	.31	.28	.26	.23	52
53	.64	.63	.61	.60	.58	.57	.55	.53	.52	.50	.48	.46	.45	.43	.41	.39	.37	.35	.33	.30	.28	.26	.23	53
54	.63	.62	.60	.59	.57	.56	.54	.53	.51	.49	.48	.46	.44	.42	.40	.38	.36	.34	.32	.30	.28	.26	.23	54
55	.62	.61	.59	.58	.56	.55	.53	.52	.50	.49	.47	.45	.44	.42	.40	.38	.36	.34	.32	.30	.28	.25	.23	55
56	.61	.60	.58	.57	.56	.54	.53	.51	.50	.48	.46	.45	.43	.41	.40	.38	.36	.34	.32	.30	.27	.25	.23	56
57	.60	.59	.57	.56	.55	.53	.52	.50	.49	.47	.46	.44	.43	.41	.39	.37	.35	.33	.31	.29	.27	.25	.23	57
58	.59	.58	.56	.55	.54	.52	.51	.50	.48	.47	.45	.44	.42	.40	.39	.37	.35	.33	.31	.29	.27	.25	.23	58
59	.58	.57	.55	.54	.53	.52	.50	.49	.47	.46	.45	.43	.41	.40	.38	.36	.35	.33	.31	.29	.27	.25	.22	59
60	.57	.56	.54	.53	.52	.51	.49	.48	.47	.45	.44	.42	.41	.39	.38	.36	.34	.32	.31	.29	.27	.24	.22	60
61	.56	.54	.53	.52	.51	.50	.48	.47	.46	.45	.43	.42	.40	.39	.37	.35	.34	.32	.30	.28	.26	.24	.22	61
62	.55	.53	.52	.51	.50	.49	.48	.46	.45	.44	.42	.41	.40	.38	.37	.35	.33	.32	.30	.28	.26	.24	.22	62
63	.53	.52	.51	.50	.49	.48	.47	.45	.44	.43	.42	.40	.39	.38	.36	.34	.33	.31	.29	.28	.26	.24	.22	63
64	.52	.51	.50	.49	.48	.47	.46	.45	.43	.42	.41	.40	.38	.37	.35	.34	.32	.31	.29	.27	.25	.23	.21	64
68	.47	.46	.45	.44	.43	.42	.41	.40	.39	.38	.37	.36	.35	.34	.33	.32	.30	.29	.27	.26	.24	.22	.20	68
69	.45	.45	.44	.43	.42	.41	.40	.40	.39	.38	.37	.36	.35	.33	.32	.31	.30	.28	.27	.25	.24	.22	.20	69
70	.44	.43	.42	.42	.41	.40	.39	.38	.37	.36	.35	.34	.33	.31	.30	.29	.28	.26	.25	.23	.22	.20	.20	70
74	.38	.37	.36	.35	.35	.34	.34	.34	.33	.32</														

Table 33.

A

Sign always +

(Except when Hour Angle exceeds 6 hours).

0 hrs.

LAT.	02m	04m	06m	08m	10m	12m	14m	16m	18m	20m	22m	24m	26m	28m	30m	LAT.
	30'	1"	30'	2"	30'	3"	30'	4"	30'	5"	30'	6"	30'	7"	30'	
60°	198.	99.2	66.1	49.6	39.7	33.0	28.3	24.8	22.0	19.8	18.0	16.5	15.2	14.1	13.2	60°
61	207.	103.	68.9	51.7	41.3	34.4	29.5	25.8	22.9	20.6	18.7	17.2	15.8	14.7	13.7	61
62	216.	108.	71.8	53.9	43.1	35.9	30.7	26.9	23.9	21.5	19.5	17.9	16.5	15.3	14.3	62
63	225.	112.	74.9	56.2	45.0	37.4	32.1	28.1	24.9	22.4	20.4	18.7	17.2	16.0	14.9	63
64	235.	117.	78.3	58.7	47.0	39.1	33.5	29.3	26.1	23.4	21.3	19.5	18.0	16.7	15.6	64
65	246.	123.	81.9	61.4	49.1	40.9	35.1	30.7	27.2	24.5	22.3	20.4	18.8	17.5	16.3	65
66	257.	129.	85.8	64.3	51.4	42.9	36.7	32.1	28.5	25.7	23.3	21.4	19.7	18.3	17.1	66
67	270.	135.	90.0	67.5	54.0	45.0	38.5	33.7	29.9	26.9	24.5	22.4	20.7	19.2	17.9	67
68	284.	142.	94.5	70.9	56.7	47.2	40.5	35.4	31.4	28.3	25.7	23.5	21.7	20.2	18.8	68
69	299.	149.	99.5	74.6	59.7	49.7	42.6	37.3	33.1	29.8	27.1	24.8	22.9	21.2	19.8	69
70	315.	157.	105.	78.7	62.9	52.4	44.9	39.3	34.9	31.4	28.5	26.1	24.1	22.4	20.9	70
71	333.	166.	111.	83.2	66.5	55.4	47.5	41.5	36.9	33.2	30.2	27.6	25.5	23.7	22.1	71
72	353.	176.	118.	88.1	70.5	58.7	50.3	44.0	39.1	35.2	32.0	29.3	27.0	25.1	23.4	72
73	375.	187.	125.	93.7	74.9	62.4	53.5	46.8	41.6	37.4	34.0	31.1	28.7	26.6	24.8	73
74	400.	200.	133.	100.	79.9	66.5	57.0	49.9	44.3	39.9	36.2	33.2	30.6	28.4	26.5	74
75	428.	214.	143.	107.	85.5	71.2	61.0	53.4	47.4	42.7	38.8	35.5	32.8	30.4	28.3	75
76	460.	230.	153.	115.	91.9	76.5	65.6	57.4	51.0	45.8	41.7	38.2	35.2	32.7	30.5	76
77	496.	248.	165.	124.	99.2	82.6	70.8	61.9	55.0	49.5	45.0	41.2	38.0	35.3	32.9	77
78	539.	270.	180.	135.	108.	89.8	76.9	67.3	59.8	53.8	48.9	44.8	41.3	38.3	35.7	78
79	590.	295.	197.	147.	118.	98.2	84.1	73.6	65.4	58.8	53.4	48.9	45.2	41.9	39.1	79
80	650.	325.	217.	162.	130.	108.	92.7	81.1	72.1	64.8	58.9	54.0	49.8	46.2	43.1	80
81	723.	362.	241.	181.	145.	120.	103.	90.3	80.2	72.2	65.6	60.1	55.4	51.4	48.0	81
82	815.	408.	272.	204.	163.	136.	116.	102.	90.4	81.3	73.9	67.7	62.5	58.0	54.0	82
LAT.	58m	56m	54m	52m	50m	48m	46m	44m	42m	40m	38m	36m	34m	32m	30m	LAT.

Sign - when Hour Angle exceeds 6 hours.

11 hrs.

Table 33.

B

Lat. and Dec. SAME name, sign —

0 hrs.

„ „ DIFF. names, „ +

DEC.	02m	04m	06m	08m	10m	12m	14m	16m	18m	20m	22m	24m	26m	28m	30m	DEC.
	30'	1°	30'	2°	30'	3°	30'	4°	30'	5°	30'	6°	30'	7°	30'	
0°	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	0°
1	2.00	1.00	.667	.500	.400	.334	.286	.250	.222	.200	.182	.167	.154	.143	.134	1
2	4.00	2.00	1.33	1.00	.801	.667	.572	.501	.445	.401	.364	.334	.308	.287	.268	2
3	6.01	3.00	2.00	1.50	1.20	1.00	.858	.751	.668	.601	.547	.501	.463	.430	.402	3
4	8.01	4.01	2.67	2.00	1.60	1.34	1.15	1.00	.891	.802	.730	.669	.618	.574	.536	4
5	10.0	5.01	3.34	2.51	2.01	1.67	1.43	1.25	1.12	1.00	.913	.837	.773	.718	.670	5
6	12.0	6.02	4.02	3.01	2.41	2.01	1.72	1.51	1.34	1.21	1.10	1.01	.928	.862	.805	6
7	14.1	7.04	4.69	3.52	2.81	2.35	2.01	1.76	1.56	1.41	1.28	1.17	1.08	1.01	.941	7
8	16.1	8.05	5.37	4.03	3.22	2.69	2.30	2.01	1.79	1.61	1.47	1.34	1.24	1.15	1.08	8
9	18.1	9.08	6.05	4.54	3.63	3.03	2.59	2.27	2.02	1.82	1.65	1.52	1.40	1.30	1.21	9
10	20.2	10.1	6.74	5.05	4.04	3.37	2.89	2.53	2.25	2.02	1.84	1.69	1.56	1.45	1.35	10
11	22.3	11.1	7.43	5.57	4.46	3.71	3.18	2.79	2.48	2.23	2.03	1.86	1.72	1.59	1.49	11
12	24.4	12.2	8.12	6.09	4.87	4.06	3.48	3.05	2.71	2.44	2.22	2.03	1.88	1.74	1.63	12
13	26.5	13.2	8.82	6.62	5.29	4.41	3.78	3.31	2.94	2.65	2.41	2.21	2.04	1.89	1.77	13
14	28.6	14.3	9.52	7.14	5.72	4.76	4.08	3.57	3.18	2.86	2.60	2.39	2.20	2.05	1.91	14
15	30.7	15.4	10.2	7.68	6.14	5.12	4.39	3.84	3.42	3.07	2.80	2.56	2.37	2.20	2.05	15
16	32.9	16.4	11.0	8.22	6.57	5.48	4.70	4.11	3.65	3.29	2.99	2.74	2.53	2.35	2.20	16
17	35.0	17.5	11.7	8.76	7.01	5.84	5.01	4.38	3.90	3.51	3.19	2.92	2.70	2.51	2.34	17
18	37.2	18.6	12.4	9.31	7.45	6.21	5.32	4.66	4.14	3.73	3.39	3.11	2.87	2.67	2.49	18
19	39.5	19.7	13.2	9.87	7.89	6.58	5.64	4.94	4.39	3.95	3.59	3.29	3.04	2.83	2.64	19
20	41.7	20.9	13.9	10.4	8.34	6.95	5.96	5.22	4.64	4.18	3.80	3.48	3.22	2.99	2.79	20
21	44.0	22.0	14.7	11.0	8.80	7.33	6.29	5.50	4.89	4.40	4.01	3.67	3.39	3.15	2.94	21
22	46.3	23.2	15.4	11.6	9.26	7.72	6.62	5.79	5.15	4.64	4.22	3.87	3.57	3.32	3.10	22
23	48.6	24.3	16.2	12.2	9.73	8.11	6.95	6.09	5.41	4.87	4.43	4.06	3.75	3.48	3.25	23
24	51.0	25.5	17.0	12.8	10.2	8.51	7.29	6.38	5.67	5.11	4.65	4.26	3.93	3.65	3.41	24
25	53.4	26.7	17.8	13.4	10.7	8.91	7.64	6.68	5.94	5.35	4.87	4.46	4.12	3.83	3.57	25
26	55.9	27.9	18.6	14.0	11.2	9.32	7.99	6.99	6.22	5.60	5.09	4.67	4.31	4.00	3.74	26
27	58.4	29.2	19.5	14.6	11.7	9.74	8.35	7.30	6.49	5.85	5.32	4.87	4.50	4.18	3.90	27
28	60.9	30.5	20.3	15.2	12.2	10.2	8.71	7.62	6.78	6.10	5.55	5.09	4.70	4.36	4.07	28
29	63.5	31.8	21.2	15.9	12.7	10.6	9.08	7.95	7.06	6.36	5.78	5.30	4.90	4.55	4.25	29
30	66.2	33.1	22.1	16.5	13.2	11.0	9.46	8.28	7.36	6.62	6.02	5.52	5.10	4.74	4.42	30
31	68.9	34.4	23.0	17.2	13.8	11.5	9.84	8.61	7.66	6.89	6.27	5.75	5.31	4.93	4.60	31
32	71.6	35.8	23.9	17.9	14.3	11.9	10.2	8.96	7.96	7.17	6.52	5.98	5.52	5.13	4.79	32
33	74.4	37.2	24.8	18.6	14.9	12.4	10.6	9.31	8.28	7.45	6.78	6.21	5.74	5.33	4.98	33
34	77.3	38.6	25.8	19.3	15.5	12.9	11.0	9.67	8.60	7.74	7.04	6.45	5.96	5.53	5.17	34
35	80.2	40.1	26.7	20.1	16.1	13.4	11.5	10.0	8.92	8.03	7.31	6.70	6.19	5.75	5.36	35
36	83.3	41.6	27.8	20.8	16.7	13.9	11.9	10.4	9.26	8.34	7.58	6.95	6.42	5.96	5.57	36
37	86.4	43.2	28.8	21.6	17.3	14.4	12.3	10.8	9.60	8.65	7.86	7.21	6.66	6.18	5.77	37
38	89.5	44.8	29.8	22.4	17.9	14.9	12.8	11.2	9.96	8.96	8.15	7.47	6.90	6.41	5.99	38
39	92.8	46.4	30.9	23.2	18.6	15.5	13.3	11.6	10.3	9.29	8.45	7.75	7.15	6.64	6.20	39
40	96.2	48.1	32.1	24.0	19.2	16.0	13.7	12.0	10.7	9.63	8.75	8.03	7.41	6.89	6.43	40
41	99.6	49.8	33.2	24.9	19.9	16.6	14.2	12.5	11.1	9.97	9.07	8.32	7.68	7.13	6.66	41
42	103.	51.6	34.4	25.8	20.6	17.2	14.7	12.9	11.5	10.3	9.39	8.61	7.95	7.39	6.90	42
43	107.	53.4	35.6	26.7	21.4	17.8	15.3	13.4	11.9	10.7	9.73	8.92	8.24	7.65	7.14	43
44	111.	55.3	36.9	27.7	22.1	18.5	15.8	13.8	12.3	11.1	10.1	9.24	8.53	7.92	7.40	44
45	115.	57.3	38.2	28.7	22.9	19.1	16.4	14.3	12.7	11.5	10.4	9.57	8.83	8.21	7.66	45
46	119.	59.3	39.6	29.7	23.7	19.8	17.0	14.8	13.2	11.9	10.8	9.91	9.15	8.50	7.93	46
47	123.	61.4	41.0	30.7	24.6	20.5	17.6	15.4	13.7	12.3	11.2	10.3	9.47	8.80	8.22	47
48	127.	63.6	42.4	31.8	25.5	21.2	18.2	15.9	14.2	12.7	11.6	10.6	9.81	9.11	8.51	48
49	132.	65.9	43.9	33.0	26.4	22.0	18.8	16.5	14.7	13.2	12.0	11.0	10.2	9.44	8.81	49
50	137.	68.3	45.5	34.1	27.3	22.8	19.5	17.1	15.2	13.7	12.4	11.4	10.5	9.78	9.13	50
51	142.	70.8	47.2	35.4	28.3	23.6	20.2	17.7	15.7	14.2	12.9	11.8	10.9	10.1	9.46	51
52	147.	73.3	48.9	36.7	29.3	24.5	21.0	18.3	16.3	14.7	13.4	12.2	11.3	10.5	9.81	52
53	152.	76.0	50.7	38.0	30.4	25.4	21.7	19.0	16.9	15.2	13.9	12.7	11.7	10.9	10.2	53
54	158.	78.9	52.6	39.4	31.6	26.3	22.5	19.7	17.5	15.8	14.4	13.2	12.2	11.3	10.5	54
55	164.	81.8	54.6	40.9	32.7	27.3	23.4	20.5	18.2	16.4	14.9	13.7	12.6	11.7	10.9	55
56	170.	84.9	56.6	42.5	34.0	28.3	24.3	21.3	18.9	17.0	15.5	14.2	13.1	12.2	11.4	56
57	176.	88.2	58.8	44.1	35.3	29.4	25.2	22.1	19.6	17.7	16.1	14.7	13.6	12.6	11.8	57
58	183.	91.7	61.1	45.9	36.7	30.6	26.2	22.9	20.4	18.4	16.7	15.3	14.1	13.1	12.3	58
59	191.	95.4	63.6	47.7	38.2	31.8	27.3	23.9	21.2	19.1	17.4	15.9	14.7	13.7	12.8	59
60	198.	99.2	66.2	49.6	39.7	33.1	28.4	24.8	22.1	19.9	18.1	16.6	15.3	14.2	13.3	60
61	207.	103.	68.9	51.7	41.4	34.5	29.6	25.9	23.0	20.7	18.8	17.3	15.9	14.8	13.8	61
62	216.	108.	71.8	53.9	43.1	35.9	30.8	27.0	24.0	21.6	19.6	18.0	16.6	15.4	14.4	62
63	225.	112.	75.0	56.2	45.0	37.5	32.1	28.1	25.0	22.5	20.5	18.8	17.3	16.1	15.0	63
DEC.	58m	56m	54m	52m	50m	48m	46m	44m	42m	40m	38m	36m	34m	32m	30m	DEC.

Table 33.

A

Sign always +

(Except when Hour Angle exceeds 6 hours).

0 hrs.

LAT.	30m	32m	34m	36m	38m	40m	42m	44m	46m	48m	50m	52m	54m	56m	58m	60m	LAT.
	7°30'	8°	30'	9°	30'	10°	30'	11°	30'	12°	30'	13°	30'	14°	30'	15°	
60°	13.2	12.3	11.6	10.9	10.4	9.82	9.35	8.91	8.51	8.15	7.81	7.50	7.21	6.95	6.70	6.46	60°
61	13.7	12.8	12.1	11.4	10.8	10.2	9.73	9.28	8.87	8.49	8.14	7.81	7.51	7.24	6.98	6.73	61
62	14.3	13.4	12.6	11.9	11.2	10.7	10.1	9.68	9.24	8.85	8.48	8.15	7.83	7.54	7.27	7.02	62
63	14.9	14.0	13.1	12.4	11.7	11.1	10.6	10.1	9.65	9.23	8.85	8.50	8.17	7.87	7.59	7.32	63
64	15.6	14.6	13.7	12.9	12.3	11.6	11.1	10.5	10.1	9.65	9.25	8.88	8.54	8.22	7.93	7.65	64
65	16.3	15.3	14.3	13.5	12.8	12.2	11.6	11.0	10.5	10.1	9.67	9.29	8.93	8.60	8.29	8.00	65
66	17.1	16.0	15.0	14.2	13.4	12.7	12.1	11.6	11.0	10.6	10.1	9.72	9.36	9.01	8.68	8.38	66
67	17.9	16.8	15.8	14.9	14.1	13.4	12.7	12.1	11.6	11.1	10.6	10.2	9.81	9.45	9.11	8.79	67
68	18.8	17.6	16.6	15.6	14.8	14.0	13.4	12.7	12.2	11.6	11.2	10.7	10.4	9.93	9.57	9.24	68
69	19.8	18.5	17.4	16.4	15.6	14.8	14.1	13.4	12.8	12.3	11.8	11.3	10.9	10.4	10.1	9.72	69
70	20.9	19.5	18.4	17.3	16.4	15.6	14.8	14.1	13.5	12.9	12.4	11.9	11.4	11.0	10.6	10.3	70
71	22.1	20.7	19.4	18.3	17.4	16.5	15.7	14.9	14.3	13.7	13.1	12.6	12.1	11.6	11.2	10.8	71
72	23.4	21.9	20.6	19.4	18.4	17.5	16.6	15.8	15.1	14.5	13.9	13.3	12.8	12.3	11.9	11.5	72
73	24.8	23.3	21.9	20.7	19.5	18.5	17.6	16.8	16.1	15.4	14.8	14.2	13.6	13.1	12.6	12.2	73
74	26.5	24.8	23.3	22.0	20.8	19.8	18.8	17.9	17.1	16.4	15.7	15.1	14.5	14.0	13.5	13.0	74
75	28.3	26.6	25.0	23.6	22.3	21.2	20.1	19.2	18.3	17.6	16.8	16.2	15.6	15.0	14.4	13.9	75
76	30.5	28.5	26.8	25.3	24.0	22.7	21.6	20.6	19.7	18.9	18.1	17.4	16.7	16.1	15.5	15.0	76
77	32.9	30.8	29.0	27.3	25.9	24.6	23.4	22.3	21.3	20.4	19.5	18.8	18.0	17.4	16.7	16.2	77
78	35.7	33.5	31.5	29.7	28.1	26.7	25.4	24.2	23.1	22.1	21.2	20.4	19.6	18.9	18.2	17.6	78
79	39.1	36.6	34.4	32.5	30.7	29.2	27.8	26.5	25.3	24.2	23.1	22.2	21.4	20.6	19.9	19.2	79
80	43.1	40.4	37.9	35.8	33.9	32.2	30.6	29.2	27.9	26.7	25.6	24.6	23.6	22.7	21.9	21.1	80
81	46.0	44.9	42.2	39.9	37.7	35.8	34.1	32.5	31.0	29.7	28.5	27.3	26.3	25.3	24.4	23.6	81
82	54.0	50.6	47.6	44.9	42.5	40.4	38.4	36.6	35.0	33.5	32.1	30.8	29.6	28.5	27.5	26.6	82

11 hrs.

Sign — when Hour Angle exceeds 6 hours.

Table 33.

B

Lat. and Dec. SAME name, sign —

0 hrs.

.. .. DIFF. names, .. +

DEC.	30m	32m	34m	36m	38m	40m	42m	44m	46m	48m	50m	52m	54m	56m	58m	60m	DEC.
	7°30'	8°	30'	9°	30'	10°	30'	11°	30'	12°	30'	13°	30'	14°	30'	15°	
0°	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	0°
1	.134	.125	.118	.112	.106	.101	.096	.091	.088	.084	.081	.078	.075	.072	.070	.067	1
2	.268	.251	.236	.223	.212	.201	.192	.183	.175	.168	.161	.155	.150	.144	.140	.135	2
3	.402	.377	.355	.335	.318	.302	.288	.275	.263	.252	.242	.233	.224	.217	.209	.202	3
4	.536	.502	.473	.447	.424	.403	.384	.366	.351	.336	.323	.311	.300	.289	.279	.270	4
5	.670	.629	.592	.559	.530	.504	.480	.459	.439	.421	.404	.389	.375	.363	.349	.338	5
6	.805	.755	.711	.672	.637	.605	.577	.551	.527	.506	.486	.467	.450	.434	.420	.406	6
7	.941	.882	.831	.785	.744	.707	.674	.643	.616	.591	.567	.546	.526	.508	.490	.474	7
8	1.08	1.01	.951	.898	.852	.809	.771	.737	.705	.676	.649	.625	.602	.581	.561	.543	8
9	1.21	1.14	1.07	1.01	.960	.912	.869	.830	.794	.762	.732	.704	.678	.655	.633	.612	9
10	1.35	1.27	1.19	1.13	1.07	1.02	.968	.924	.884	.848	.815	.784	.755	.729	.704	.681	10
11	1.49	1.40	1.32	1.24	1.18	1.12	1.07	1.02	.975	.935	.898	.864	.833	.803	.776	.751	11
12	1.63	1.53	1.44	1.36	1.29	1.22	1.17	1.11	1.07	1.02	.982	.945	.911	.879	.849	.821	12
13	1.77	1.66	1.56	1.48	1.40	1.33	1.27	1.21	1.16	1.11	1.07	1.03	.989	.954	.922	.892	13
14	1.91	1.79	1.69	1.59	1.51	1.44	1.37	1.31	1.25	1.20	1.15	1.11	1.07	1.03	.996	.963	14
15	2.05	1.93	1.81	1.71	1.62	1.54	1.47	1.40	1.34	1.29	1.24	1.19	1.15	1.11	1.07	1.04	15
16	2.20	2.06	1.94	1.83	1.74	1.65	1.57	1.50	1.44	1.38	1.32	1.27	1.23	1.19	1.15	1.11	16
17	2.34	2.20	2.07	1.95	1.85	1.76	1.68	1.60	1.53	1.47	1.41	1.36	1.31	1.26	1.22	1.18	17
18	2.49	2.33	2.20	2.08	1.97	1.87	1.78	1.70	1.63	1.56	1.50	1.44	1.39	1.34	1.30	1.26	18
19	2.64	2.47	2.33	2.20	2.09	1.98	1.89	1.80	1.73	1.66	1.59	1.53	1.47	1.42	1.38	1.33	19
20	2.79	2.62	2.46	2.33	2.21	2.10	2.00	1.91	1.83	1.75	1.68	1.62	1.56	1.50	1.45	1.41	20
21	2.94	2.76	2.60	2.45	2.33	2.21	2.11	2.01	1.93	1.85	1.77	1.71	1.64	1.59	1.53	1.48	21
22	3.10	2.90	2.73	2.58	2.45	2.33	2.22	2.12	2.03	1.94	1.87	1.80	1.73	1.67	1.61	1.56	22
23	3.25	3.05	2.87	2.71	2.57	2.44	2.33	2.22	2.13	2.04	1.96	1.89	1.82	1.75	1.70	1.64	23
24	3.41	3.20	3.01	2.85	2.70	2.56	2.44	2.33	2.23	2.14	2.06	1.98	1.91	1.84	1.78	1.72	24
25	3.57	3.35	3.15	2.98	2.83	2.69	2.56	2.44	2.34	2.24	2.15	2.07	2.00	1.93	1.86	1.80	25
26	3.74	3.50	3.30	3.12	2.96	2.81	2.68	2.56	2.45	2.35	2.25	2.17	2.09	2.02	1.95	1.88	26
27	3.90	3.66	3.45	3.26	3.09	2.93	2.80	2.67	2.56	2.45	2.35	2.27	2.18	2.11	2.04	1.97	27
28	4.07	3.82	3.60	3.40	3.22	3.06	2.92	2.79	2.67	2.56	2.46	2.36	2.28	2.20	2.12	2.05	28
29	4.25	3.98	3.75	3.54	3.36	3.19	3.04	2.91	2.78	2.67	2.56	2.46	2.37	2.29	2.21	2.14	29
30	4.42	4.15	3.91	3.69	3.50	3.32	3.17	3.03	2.90	2.78	2.67	2.57	2.47	2.39	2.31	2.23	30
31	4.60	4.32	4.07	3.84	3.64	3.46	3.30	3.15	3.01	2.89	2.78	2.67	2.57	2.48	2.40	2.32	31
32	4.79	4.49	4.23	3.99	3.79	3.60	3.43	3.27	3.13	3.01	2.89	2.78	2.68	2.58	2.50	2.41	32
33	4.98	4.67	4.39	4.15	3.93	3.74	3.56	3.40	3.26	3.12	3.00	2.89	2.78	2.68	2.59	2.51	33
34	5.17	4.85	4.56	4.31	4.09	3.88	3.70	3.53	3.38	3.24	3.12	3.00	2.89	2.79	2.69	2.61	34
35	5.36	5.03	4.74	4.48	4.24	4.03	3.84	3.67	3.51	3.37	3.24	3.11	3.00	2.89	2.80	2.71	35
36	5.57	5.22	4.92	4.64	4.40	4.18	3.99	3.81	3.64	3.49	3.36	3.23	3.11	3.00	2.90	2.81	36
37	5.77	5.41	5.10	4.82	4.57	4.34	4.14	3.95	3.78	3.62	3.48	3.35	3.23	3.11	3.01	2.91	37
38	5.99	5.61	5.29	4.99	4.73	4.50	4.29	4.09	3.92	3.76	3.61	3.47	3.35	3.23	3.12	3.02	38
39	6.20	5.82	5.48	5.18	4.91	4.66	4.44	4.24	4.06	3.89	3.74	3.60	3.47	3.35	3.23	3.13	39
40	6.43	6.03	5.68	5.36	5.08	4.83	4.60	4.40	4.21	4.04	3.88	3.73	3.59	3.47	3.35	3.24	40
41	6.66	6.25	5.88	5.56	5.27	5.01	4.77	4.56	4.36	4.18	4.02	3.86	3.72	3.59	3.47	3.36	41
42	6.90	6.47	6.09	5.76	5.46	5.19	4.94	4.72	4.52	4.33	4.16	4.00	3.86	3.72	3.60	3.48	42
43	7.14	6.70	6.31	5.96	5.65	5.37	5.12	4.89	4.68	4.49	4.31	4.15	3.99	3.85	3.72	3.60	43
44	7.40	6.94	6.53	6.17	5.85	5.56	5.30	5.06	4.84	4.64	4.46	4.29	4.14	3.99	3.86	3.73	44
45	7.66	7.19	6.77	6.39	6.06	5.76	5.49	5.24	5.02	4.81	4.62	4.45	4.28	4.13	3.99	3.86	45
46	7.93	7.44	7.01	6.62	6.27	5.96	5.68	5.43	5.19	4.98	4.78	4.60	4.44	4.28	4.14	4.00	46
47	8.22	7.71	7.26	6.86	6.50	6.18	5.19	5.62	5.38	5.16	4.95	4.77	4.59	4.43	4.28	4.14	47
48	8.51	7.98	7.51	7.10	6.73	6.40	6.09	5.82	5.57	5.34	5.13	4.94	4.76	4.59	4.44	4.29	48
49	8.81	8.27	7.78	7.35	6.97	6.62	6.31	6.03	5.77	5.53	5.31	5.11	4.93	4.76	4.59	4.44	49
50	9.13	8.56	8.06	7.62	7.22	6.86	6.54	6.25	5.98	5.73	5.51	5.30	5.11	4.93	4.76	4.60	50
51	9.46	8.87	8.35	7.89	7.48	7.11	6.78	6.47	6.19	5.94	5.71	5.49	5.29	5.10	4.93	4.77	51
52	9.81	9.20	8.66	8.18	7.75	7.37	7.02	6.71	6.42	6.16	5.91	5.69	5.48	5.29	5.11	4.94	52
53	10.2	9.54	8.98	8.48	8.04	7.64	7.28	6.95	6.66	6.38	6.13	5.90	5.68	5.49	5.30	5.13	53
54	10.5	9.89	9.31	8.80	8.34	7.93	7.55	7.21	6.90	6.62	6.36	6.12	5.90	5.69	5.50	5.32	54
55	10.9	10.3	9.66	9.13	8.65	8.22	7.84	7.48	7.16	6.87	6.60	6.35	6.12	5.90	5.70	5.52	55
56	11.4	10.7	10.0	9.48	8.98	8.54	8.14	7.77	7.44	7.13	6.85	6.59	6.35	6.13	5.92	5.73	56
57	11.8	11.1	10.4	9.84	9.33	8.87	8.45	8.07	7.72	7.41	7.11	6.85	6.60	6.37	6.15	5.95	57
58	12.3	11.5	10.8	10.2	9.70	9.22	8.78	8.39	8.03	7.70	7.39	7.11	6.86	6.62	6.39	6.18	58
59	12.8	12.0	11.3	10.6	10.1	9.58	9.13	8.72	8.35	8.00	7.69	7.40	7.13	6.88	6.65	6.43	59
60	13.3	12.5	11.7	11.1	10.5	9.97	9.50	9.08	8.69	8.33	8.00	7.70	7.42	7.16	6.92	6.69	60
61	13.8	13.0	12.2	11.5	10.9	10.4	9.90	9.45	9.05	8.68	8.34	8.02	7.73	7.46	7.21	6.97	61
62	14.4	13.5	12.7	12.0	11.4	10.8	10.3	9.86	9.43	9.05	8.69	8.36	8.06	7.77	7.51	7.27	62
63	15.0	14.1	13.3	12.5	11.9	11.3	10.8	10.3	9.84	9.44	9.07	8.72	8.41	8.11	7.84	7.58	63
DEC.	30m	28m	26m	24m	22m	20m	18m	16m	14m	12m	10m	08m	06m	04m	02m	00m	DEC.

|| hrs.

Table 33.

A

Sign always +

(Except when Hour Angle exceeds 6 hours)

1 hr.

LAT.	00m	02m	04m	06m	08m	10m	12m	14m	16m	18m	20m	22m	24m	26m	28m	30m	LAT.
	15° 30'	16° 30'	17° 30'	18° 30'	19° 30'	20° 30'	21° 30'	22° 30'	23° 30'	24° 30'	25° 30'	26° 30'	27° 30'	28° 30'	29° 30'		
60°	6.46	6.25	6.04	5.85	5.67	5.49	5.33	5.18	5.03	4.89	4.76	4.63	4.51	4.40	4.29	4.18	60°
61	6.73	6.51	6.29	6.09	5.90	5.72	5.55	5.39	5.24	5.09	4.96	4.83	4.70	4.58	4.47	4.36	61
62	7.02	6.78	6.56	6.35	6.15	5.96	5.79	5.62	5.46	5.31	5.17	5.03	4.90	4.77	4.65	4.54	62
63	7.32	7.08	6.84	6.63	6.42	6.23	6.04	5.87	5.70	5.54	5.39	5.25	5.11	4.98	4.86	4.74	63
64	7.65	7.39	7.15	6.92	6.71	6.50	6.31	6.13	5.95	5.79	5.63	5.48	5.34	5.21	5.07	4.95	64
65	8.00	7.73	7.48	7.24	7.01	6.80	6.60	6.41	6.23	6.06	5.89	5.74	5.59	5.44	5.31	5.18	65
66	8.38	8.10	7.83	7.58	7.35	7.12	6.91	6.71	6.52	6.34	6.17	6.01	5.85	5.70	5.56	5.42	66
67	8.79	8.49	8.22	7.95	7.71	7.47	7.25	7.04	6.84	6.65	6.47	6.30	6.14	5.98	5.83	5.69	67
68	9.24	8.92	8.63	8.36	8.10	7.85	7.62	7.40	7.19	6.99	6.80	6.62	6.45	6.28	6.13	5.98	68
69	9.72	9.39	9.09	8.79	8.52	8.26	8.02	7.79	7.57	7.36	7.16	6.97	6.79	6.61	6.45	6.29	69
70	10.3	9.91	9.58	9.28	8.99	8.71	8.46	8.21	7.98	7.76	7.55	7.35	7.16	6.97	6.80	6.63	70
71	10.8	10.5	10.1	9.80	9.50	9.21	8.94	8.68	8.43	8.20	7.98	7.77	7.57	7.37	7.19	7.01	71
72	11.5	11.1	10.7	10.4	10.1	9.76	9.47	9.20	8.94	8.69	8.46	8.23	8.02	7.81	7.62	7.43	72
73	12.2	11.8	11.4	11.0	10.7	10.4	10.1	9.78	9.50	9.24	8.99	8.73	8.52	8.30	8.10	7.90	73
74	13.0	12.6	12.2	11.8	11.4	11.1	10.7	10.4	10.1	9.85	9.59	9.33	9.09	8.85	8.63	8.42	74
75	13.9	13.5	13.0	12.6	12.2	11.8	11.5	11.2	10.8	10.5	10.3	9.98	9.72	9.47	9.24	9.01	75
76	15.0	14.5	14.0	13.5	13.1	12.7	12.3	12.0	11.6	11.3	11.0	10.7	10.4	10.2	9.93	9.68	76
77	16.2	15.6	15.1	14.6	14.2	13.7	13.3	12.9	12.6	12.2	11.9	11.6	11.3	11.0	10.7	10.5	77
78	17.6	17.0	16.4	15.9	15.4	14.9	14.5	14.1	13.7	13.3	12.9	12.6	12.3	11.9	11.6	11.4	78
79	19.2	18.6	17.9	17.4	16.8	16.3	15.8	15.4	14.9	14.5	14.1	13.8	13.4	13.1	12.7	12.4	79
80	21.1	20.5	19.8	19.1	18.5	18.0	17.5	16.9	16.5	16.0	15.6	15.2	14.8	14.4	14.0	13.7	80
81	23.6	22.8	22.0	21.3	20.7	20.0	19.4	18.9	18.3	17.8	17.3	16.9	16.4	16.0	15.6	15.2	81
82	26.6	25.7	24.8	24.0	23.3	22.6	21.9	21.3	20.7	20.1	19.5	19.0	18.5	18.1	17.6	17.2	82
LAT.	60m	58m	56m	54m	52m	50m	48m	46m	44m	42m	40m	38m	36m	34m	32m	30m	LAT.
Sign — when Hour Angle exceeds 6 hours.																	
10 hrs.																	

Table 33.

B

Lat. and Dec. **SAME** name, sign —

1 hr.

DIFF. names, .. **+**

DEC.	00m		04m		08m		12m		16m		20m		24m		28m		DEC.																
	15°	30'	16°	30'	17°	30'	18°	30'	19°	30'	20°	30'	21°	30'	22°	30'																	
0	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	0																
1	.067	.065	.063	.061	.060	.058	.057	.055	.054	.052	.051	.050	.049	.048	.047	.046	1																
2	.135	.131	.127	.123	.119	.116	.113	.110	.107	.105	.102	.100	.097	.095	.093	.091	2																
3	.202	.196	.190	.185	.179	.174	.170	.165	.161	.157	.153	.150	.146	.143	.140	.137	3																
4	.270	.262	.254	.246	.239	.233	.226	.220	.215	.209	.204	.200	.195	.191	.187	.183	4																
5	.338	.327	.317	.308	.299	.291	.283	.276	.269	.262	.256	.250	.244	.239	.234	.229	5																
6	.406	.393	.381	.370	.359	.350	.340	.331	.323	.315	.307	.300	.293	.287	.281	.275	6																
7	.474	.459	.445	.432	.420	.408	.397	.387	.377	.368	.359	.351	.343	.335	.328	.321	7																
8	.543	.526	.510	.495	.481	.467	.455	.443	.432	.421	.411	.401	.392	.383	.375	.367	8																
9	.612	.593	.575	.558	.542	.527	.513	.499	.486	.474	.463	.452	.442	.432	.423	.414	9																
10	.681	.660	.640	.621	.603	.586	.571	.556	.542	.528	.516	.504	.492	.481	.471	.461	10																
11	.751	.727	.705	.684	.665	.646	.629	.613	.597	.582	.568	.555	.542	.530	.519	.508	11																
12	.821	.795	.771	.748	.727	.707	.688	.670	.653	.637	.621	.607	.593	.580	.567	.555	12																
13	.892	.864	.838	.813	.790	.768	.747	.728	.709	.692	.675	.659	.644	.630	.616	.603	13																
14	.963	.933	.905	.878	.853	.829	.807	.786	.766	.747	.729	.712	.696	.680	.666	.652	14																
15	1.04	1.00	.972	.953	.916	.891	.867	.844	.823	.803	.783	.765	.748	.731	.715	.700	15																
16	1.11	1.07	1.04	1.01	.981	.954	.928	.904	.881	.859	.838	.819	.800	.782	.765	.749	16																
17	1.18	1.14	1.11	1.08	1.05	1.02	.989	.964	.939	.916	.894	.873	.853	.834	.816	.799	17																
18	1.26	1.22	1.18	1.14	1.11	1.08	1.05	1.02	.998	.973	.950	.928	.907	.887	.867	.849	18																
19	1.33	1.29	1.25	1.21	1.18	1.15	1.11	1.09	1.06	1.03	1.01	.983	.961	.939	.919	.900	19																
20	1.41	1.36	1.32	1.28	1.24	1.21	1.18	1.15	1.12	1.09	1.06	1.04	1.02	.993	.972	.951	20																
21	1.48	1.44	1.39	1.35	1.31	1.28	1.24	1.21	1.18	1.15	1.12	1.10	1.07	1.05	1.02	1.00	21																
22	1.56	1.51	1.47	1.42	1.38	1.34	1.31	1.27	1.24	1.21	1.18	1.15	1.13	1.10	1.08	1.06	22																
23	1.64	1.59	1.54	1.49	1.45	1.41	1.37	1.34	1.30	1.27	1.24	1.21	1.18	1.16	1.13	1.11	23																
24	1.72	1.67	1.62	1.57	1.52	1.48	1.44	1.40	1.37	1.33	1.30	1.27	1.24	1.21	1.19	1.16	24																
25	1.80	1.74	1.69	1.64	1.59	1.55	1.51	1.47	1.43	1.40	1.36	1.33	1.30	1.27	1.24	1.22	25																
26	1.88	1.83	1.77	1.72	1.67	1.62	1.58	1.54	1.50	1.46	1.43	1.39	1.36	1.33	1.30	1.27	26																
27	1.97	1.91	1.85	1.79	1.74	1.69	1.65	1.61	1.57	1.53	1.49	1.45	1.42	1.39	1.36	1.33	27																
28	2.05	1.99	1.93	1.87	1.82	1.77	1.72	1.68	1.63	1.59	1.55	1.52	1.48	1.45	1.42	1.39	28																
29	2.14	2.07	2.01	1.95	1.90	1.84	1.79	1.75	1.70	1.66	1.62	1.58	1.55	1.51	1.48	1.45	29																
30	2.23	2.16	2.09	2.03	1.97	1.92	1.87	1.82	1.77	1.73	1.69	1.65	1.61	1.58	1.54	1.51	30																
31	2.32	2.25	2.18	2.12	2.06	2.00	1.94	1.89	1.85	1.80	1.76	1.72	1.68	1.64	1.60	1.57	31																
32	2.41	2.34	2.27	2.20	2.14	2.08	2.02	1.97	1.92	1.87	1.83	1.78	1.74	1.71	1.67	1.63	32																
33	2.51	2.43	2.36	2.29	2.22	2.16	2.10	2.05	1.99	1.95	1.90	1.85	1.81	1.77	1.73	1.70	33																
34	2.61	2.52	2.45	2.37	2.31	2.24	2.18	2.13	2.07	2.02	1.97	1.93	1.88	1.84	1.80	1.76	34																
35	2.71	2.62	2.54	2.47	2.39	2.33	2.27	2.21	2.15	2.10	2.05	2.00	1.95	1.91	1.87	1.83	35																
36	2.81	2.72	2.64	2.56	2.48	2.42	2.35	2.29	2.23	2.18	2.12	2.08	2.03	1.98	1.94	1.90	36																
37	2.91	2.82	2.73	2.65	2.58	2.51	2.44	2.37	2.31	2.26	2.20	2.15	2.10	2.06	2.01	1.97	37																
38	3.02	2.92	2.83	2.75	2.67	2.60	2.53	2.46	2.40	2.34	2.28	2.23	2.18	2.13	2.09	2.04	38																
39	3.13	3.03	2.94	2.85	2.77	2.69	2.62	2.55	2.49	2.43	2.37	2.31	2.26	2.21	2.16	2.12	39																
40	3.24	3.14	3.04	2.95	2.87	2.79	2.72	2.64	2.58	2.51	2.45	2.40	2.34	2.29	2.24	2.19	40																
41	3.36	3.25	3.15	3.06	2.97	2.89	2.81	2.74	2.67	2.60	2.54	2.48	2.43	2.37	2.32	2.27	41																
42	3.48	3.37	3.27	3.17	3.08	2.99	2.91	2.84	2.77	2.70	2.63	2.57	2.51	2.46	2.40	2.35	42																
43	3.60	3.49	3.38	3.28	3.19	3.10	3.02	2.94	2.86	2.79	2.73	2.66	2.60	2.54	2.49	2.44	43																
44	3.73	3.61	3.50	3.40	3.30	3.21	3.13	3.04	2.97	2.89	2.82	2.76	2.69	2.64	2.58	2.52	44																
45	3.86	3.74	3.63	3.52	3.42	3.33	3.24	3.15	3.07	3.00	2.92	2.86	2.79	2.73	2.67	2.61	45																
46	4.00	3.87	3.76	3.65	3.54	3.44	3.35	3.26	3.18	3.10	3.03	2.96	2.89	2.83	2.76	2.71	46																
47	4.14	4.01	3.89	3.78	3.67	3.57	3.47	3.38	3.29	3.21	3.14	3.06	2.99	2.93	2.86	2.80	47																
48	4.29	4.16	4.03	3.91	3.80	3.69	3.59	3.50	3.41	3.33	3.25	3.17	3.10	3.03	2.97	2.90	48																
49	4.44	4.30	4.17	4.05	3.93	3.83	3.72	3.63	3.53	3.45	3.36	3.28	3.21	3.14	3.07	3.01	49																
50	4.60	4.46	4.32	4.20	4.08	3.96	3.86	3.76	3.66	3.57	3.48	3.40	3.33	3.25	3.18	3.11	50																
51	4.77	4.62	4.48	4.35	4.22	4.11	4.00	3.89	3.79	3.70	3.61	3.53	3.45	3.37	3.30	3.23	51																
52	4.95	4.79	4.64	4.51	4.38	4.26	4.14	4.03	3.93	3.83	3.74	3.65	3.57	3.49	3.42	3.34	52																
53	5.13	4.97	4.81	4.67	4.54	4.41	4.29	4.18	4.08	3.98	3.88	3.79	3.70	3.62	3.54	3.47	53																
54	5.32	5.15	4.99	4.85	4.71	4.58	4.45	4.34	4.23	4.12	4.02	3.93	3.84	3.76	3.67	3.60	54																
55	5.52	5.34	5.18	5.03	4.88	4.75	4.62	4.50	4.39	4.28	4.18	4.08	3.99	3.90	3.81	3.73	55																
56	5.73	5.55	5.38	5.22	5.07	4.93	4.80	4.67	4.55	4.44	4.33	4.23	4.14	4.05	3.96	3.87	56																
57	5.95	5.76	5.59	5.42	5.27	5.12	4.98	4.85	4.73	4.61	4.50	4.40	4.30	4.20	4.11	4.02	57																
58	6.18	5.99	5.81	5.63	5.47	5.32	5.18	5.04	4.92	4.79	4.68	4.57	4.47	4.37	4.27	4.18	58																
59	6.43	6.23	6.04	5.86	5.69	5.53	5.39	5.25	5.11	4.99	4.87	4.75	4.64	4.54	4.44	4.35	59																
60	6.69	6.48	6.28	6.10	5.92	5.76	5.61	5.46	5.32	5.19	5.06	4.95	4.83	4.73	4.62	4.53	60																
61	6.97	6.75	6.55	6.35	6.17	6.00	5.84	5.69	5.54	5.40	5.27	5.15	5.03	4.92	4.82	4.71	61																
62	7.27	7.04	6.82	6.62	6.43	6.25	6.09	5.93	5.78	5.63	5.50	5.37	5.25	5.13	5.02	4.91	62																
63	7.58	7.34	7.12	6.91	6.71	6.53	6.35	6.19	6.03	5.88	5.74	5.60	5.48	5.36	5.24	5.13	63																
DEC.	60m		58m		56m		54m		52m		50m		48m		46m		44m		42m		40m		38m		36m		34m		32m		30m		DEC.

Table 33.

A

Sign always +

(Except when Hour Angle exceeds 6 hours).

1 hr.

LAT.	30m	32m	34m	36m	38m	40m	42m	44m	46m	48m	50m	52m	54m	56m	58m	60m	LAT.
	22°30'	23°	30'	24°	30'	25°	30'	26°	30'	27°	30'	28°	30'	29°	30'	30°	
60 ^o	4.18	4.08	3.98	3.89	3.80	3.71	3.63	3.55	3.47	3.40	3.33	3.26	3.19	3.12	3.06	3.00	60 ^o
61	4.36	4.25	4.15	4.05	3.96	3.87	3.78	3.70	3.62	3.54	3.47	3.39	3.32	3.25	3.19	3.12	61
62	4.54	4.43	4.33	4.22	4.13	4.03	3.94	3.86	3.77	3.69	3.61	3.54	3.46	3.39	3.32	3.26	62
63	4.74	4.62	4.51	4.41	4.31	4.21	4.11	4.02	3.94	3.85	3.77	3.69	3.61	3.54	3.47	3.40	63
64	4.95	4.83	4.72	4.61	4.50	4.40	4.30	4.20	4.11	4.02	3.94	3.86	3.78	3.70	3.62	3.55	64
65	5.18	5.05	4.93	4.82	4.71	4.60	4.50	4.40	4.30	4.21	4.12	4.03	3.95	3.87	3.79	3.71	65
66	5.42	5.29	5.17	5.04	4.93	4.82	4.71	4.61	4.50	4.41	4.31	4.22	4.14	4.05	3.97	3.89	66
67	5.69	5.55	5.42	5.29	5.17	5.05	4.94	4.83	4.73	4.62	4.53	4.43	4.34	4.25	4.16	4.08	67
68	5.98	5.83	5.69	5.56	5.43	5.31	5.19	5.07	4.96	4.86	4.75	4.65	4.56	4.47	4.37	4.29	68
69	6.29	6.14	5.99	5.85	5.72	5.59	5.46	5.34	5.23	5.11	5.00	4.90	4.80	4.70	4.60	4.51	69
70	6.63	6.47	6.32	6.17	6.03	5.89	5.76	5.63	5.51	5.39	5.28	5.17	5.06	4.96	4.86	4.76	70
71	7.01	6.84	6.68	6.52	6.37	6.23	6.09	5.95	5.82	5.70	5.58	5.46	5.35	5.24	5.13	5.03	71
72	7.43	7.25	7.08	6.91	6.75	6.60	6.45	6.31	6.17	6.04	5.91	5.79	5.67	5.55	5.44	5.33	72
73	7.90	7.71	7.52	7.35	7.18	7.01	6.86	6.71	6.56	6.42	6.28	6.15	6.02	5.90	5.78	5.67	73
74	8.42	8.22	8.02	7.83	7.65	7.48	7.31	7.15	6.99	6.84	6.70	6.56	6.42	6.29	6.16	6.04	74
75	9.01	8.79	8.58	8.38	8.19	8.00	7.82	7.65	7.49	7.32	7.17	7.02	6.87	6.73	6.60	6.46	75
76	9.68	9.45	9.22	9.01	8.80	8.60	8.41	8.22	8.04	7.87	7.70	7.54	7.39	7.24	7.09	6.95	76
77	10.5	10.2	9.96	9.71	9.50	9.29	9.08	8.88	8.69	8.50	8.32	8.15	7.98	7.81	7.66	7.50	77
78	11.4	11.1	10.8	10.6	10.3	10.1	9.86	9.65	9.44	9.23	9.04	8.85	8.66	8.49	8.32	8.15	78
79	12.4	12.1	11.8	11.6	11.3	11.0	10.8	10.5	10.3	10.1	9.88	9.68	9.48	9.28	9.09	8.91	79
80	13.7	13.4	13.0	12.7	12.4	12.2	11.9	11.6	11.4	11.1	10.9	10.7	10.4	10.2	10.0	9.82	80
81	15.2	14.9	14.5	14.2	13.9	13.5	13.2	12.9	12.7	12.4	12.1	11.9	11.6	11.4	11.2	10.9	81
82	17.2	16.8	16.4	16.0	15.6	15.3	14.9	14.6	14.3	14.0	13.7	13.4	13.1	12.8	12.6	12.3	82

10 hrs.

Sign — when Hour Angle exceeds 6 hours.

Table 33.

B

Lat. and Dec. SAME name, sign —

1 hr.

„ „ DIFF. names, „ +

DEC.	30m		32m		34m		36m		38m		40m		42m		44m		46m		48m		50m		52m		54m		56m		58m		60m		DEC.
	22°30'	23°	30'	24°	30'	25°	30'	26°	30'	27°	30'	28°	30'	29°	30'	30°	DEC.																
0°	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	0°		
1	.046	.045	.044	.043	.042	.041	.041	.040	.039	.038	.038	.037	.037	.036	.035	.035	.034	.034	.033	.033	.032	.032	.031	.031	.030	.030	.029	.029	.028	.028	.027	1	
2	.091	.089	.088	.086	.084	.083	.081	.080	.078	.077	.076	.074	.073	.072	.071	.070	.069	.068	.067	.066	.065	.064	.063	.062	.061	.060	.059	.058	.057	.056	.055	2	
3	.137	.134	.131	.129	.126	.124	.122	.120	.117	.115	.113	.112	.110	.108	.106	.105	.104	.103	.102	.101	.100	.099	.098	.097	.096	.095	.094	.093	.092	.091	.090	3	
4	.183	.179	.175	.172	.169	.165	.162	.160	.157	.154	.151	.149	.147	.144	.142	.140	.139	.138	.137	.136	.135	.134	.133	.132	.131	.130	.129	.128	.127	.126	.125	4	
5	.229	.224	.219	.215	.211	.207	.203	.200	.196	.193	.189	.186	.183	.180	.178	.175	.174	.173	.172	.171	.170	.169	.168	.167	.166	.165	.164	.163	.162	.161	.160	5	
6	.275	.269	.264	.258	.253	.249	.244	.240	.236	.232	.228	.224	.220	.217	.213	.210	.209	.208	.207	.206	.205	.204	.203	.202	.201	.200	.199	.198	.197	.196	.195	6	
7	.321	.314	.308	.302	.296	.291	.285	.280	.275	.270	.266	.262	.257	.253	.249	.246	.245	.244	.243	.242	.241	.240	.239	.238	.237	.236	.235	.234	.233	.232	.231	7	
8	.367	.360	.352	.346	.339	.333	.326	.321	.315	.310	.304	.299	.295	.290	.285	.281	.280	.279	.278	.277	.276	.275	.274	.273	.272	.271	.270	.269	.268	.267	.266	8	
9	.414	.405	.397	.389	.382	.375	.368	.361	.355	.349	.343	.337	.332	.327	.322	.317	.316	.315	.314	.313	.312	.311	.310	.309	.308	.307	.306	.305	.304	.303	.302	9	
10	.461	.451	.442	.434	.425	.417	.410	.402	.395	.388	.382	.376	.370	.364	.358	.353	.352	.351	.350	.349	.348	.347	.346	.345	.344	.343	.342	.341	.340	.339	.338	10	
11	.508	.497	.487	.478	.469	.460	.452	.443	.436	.428	.421	.414	.407	.401	.395	.389	.388	.387	.386	.385	.384	.383	.382	.381	.380	.379	.378	.377	.376	.375	.374	11	
12	.555	.544	.533	.523	.513	.503	.494	.485	.476	.468	.460	.453	.445	.438	.432	.425	.424	.423	.422	.421	.420	.419	.418	.417	.416	.415	.414	.413	.412	.411	.410	12	
13	.603	.591	.579	.568	.557	.546	.536	.527	.517	.509	.500	.492	.484	.476	.469	.462	.461	.460	.459	.458	.457	.456	.455	.454	.453	.452	.451	.450	.449	.448	.447	13	
14	.652	.638	.625	.613	.601	.590	.579	.569	.559	.549	.540	.531	.523	.514	.506	.499	.498	.497	.496	.495	.494	.493	.492	.491	.490	.489	.488	.487	.486	.485	.484	14	
15	.700	.686	.672	.659	.646	.634	.622	.611	.601	.590	.580	.571	.562	.553	.544	.536	.535	.534	.533	.532	.531	.530	.529	.528	.527	.526	.525	.524	.523	.522	.521	15	
16	.749	.734	.719	.705	.691	.678	.666	.654	.643	.632	.621	.611	.601	.591	.582	.573	.572	.571	.570	.569	.568	.567	.566	.565	.564	.563	.562	.561	.560	.559	.558	16	
17	.799	.782	.767	.752	.737	.723	.710	.697	.685	.673	.662	.651	.641	.631	.621	.611	.610	.609	.608	.607	.606	.605	.604	.603	.602	.601	.600	.599	.598	.597	.596	17	
18	.849	.832	.815	.799	.784	.769	.755	.741	.728	.716	.704	.692	.681	.670	.660	.650	.649	.648	.647	.646	.645	.644	.643	.642	.641	.640	.639	.638	.637	.636	.635	18	
19	.900	.881	.864	.847	.830	.815	.800	.785	.772	.758	.746	.733	.722	.710	.699	.689	.688	.687	.686	.685	.684	.683	.682	.681	.680	.679	.678	.677	.676	.675	.674	19	
20	.951	.932	.913	.895	.878	.861	.845	.830	.816	.802	.788	.775	.763	.751	.739	.728	.727	.726	.725	.724	.723	.722	.721	.720	.719	.718	.717	.716	.715	.714	.713	20	
21	1.00	.982	.963	.944	.926	.908	.892	.876	.860	.846	.831	.818	.804	.792	.780	.768	.767	.766	.765	.764	.763	.762	.761	.760	.759	.758	.757	.756	.755	.754	.753	21	
22	1.06	1.03	1.01	.993	.974	.956	.938	.922	.905	.890	.875	.861	.847	.833	.820	.808	.807	.806	.805	.804	.803	.802	.801	.800	.799	.798	.797	.796	.795	.794	.793	22	
23	1.11	1.09	1.06	1.04	1.02	1.00	.986	.968	.951	.935	.919	.904	.890	.876	.862	.849	.848	.847	.846	.845	.844	.843	.842	.841	.840	.839	.838	.837	.836	.835	.834	23	
24	1.16	1.14	1.12	1.09	1.07	1.05	1.03	1.02	.998	.981	.964	.948	.933	.918	.904	.890	.889	.888	.887	.886	.885	.884	.883	.882	.881	.880	.879	.878	.877	.876	.875	24	
25	1.22	1.19	1.17	1.15	1.12	1.10	1.08	1.06	1.05	1.03	1.01	.993	.977	.962	.947	.933	.932	.931	.930	.929	.928	.927	.926	.925	.924	.923	.922	.921	.920	.919	.918	25	
26	1.27	1.25	1.22	1.20	1.18	1.15	1.13	1.11	1.09	1.07	1.06	1.04	1.02	1.01	.990	.975	.974	.973	.972	.971	.970	.969	.968	.967	.966	.965	.964	.963	.962	.961	.960	26	
27	1.33	1.30	1.28	1.25	1.23	1.21	1.18	1.16	1.14	1.12	1.10	1.09	1.07	1.05	1.03	1.02	.999	.998	.997	.996	.995	.994	.993	.992	.991	.990	.989	.988	.987	.986	.985	27	
28	1.39	1.36	1.33	1.31	1.28	1.26	1.24	1.21	1.19	1.17	1.15	1.13	1.11	1.10	1.08	1.06	.999	.998	.997	.996	.995	.994	.993	.992	.991	.990	.989	.988	.987	.986	.985	28	
29	1.45	1.42	1.39	1.36	1.34	1.31	1.29	1.26	1.24	1.22	1.20	1.18	1.16	1.14	1.13	1.11	.999	.998	.997	.996	.995	.994	.993	.992	.991	.990	.989	.988	.987	.986	.985	29	
30	1.51	1.48	1.45	1.42	1.39	1.37	1.34	1.32	1.29	1.27	1.25	1.23	1.21	1.19	1.17	1.15	.999	.998	.997	.996	.995	.994	.993	.992	.991	.990	.989	.988	.987	.986	.985	30	
31	1.57	1.54	1.51	1.48	1.45	1.42	1.40	1.37	1.35	1.32	1.30	1.28	1.26	1.24	1.22	1.20	.999	.998	.997	.996	.995	.994	.993	.992	.991	.990	.989	.988	.987	.986	.985	31	
32	1.63	1.60	1.57	1.54	1.51	1.48	1.45	1.43	1.40	1.38	1.35	1.33	1.31	1.29	1.27	1.25	.999	.998	.997	.996	.995	.994	.993	.992	.991	.990	.989	.988	.987	.986	.985	32	
33	1.70	1.66	1.63	1.60	1.57	1.54	1.51	1.48	1.46	1.43	1.41	1.38	1.36	1.34	1.32	1.30	.999	.998	.997	.996	.995	.994	.993	.992	.991	.990	.989	.988	.987	.986	.985	33	
34	1.76	1.73	1.69	1.66	1.63	1.60	1.57	1.54	1.51	1.49	1.46	1.44	1.41	1.39	1.37	1.35	.999	.998	.997	.996	.995	.994	.993	.992	.991	.990	.989	.988	.987	.986	.985	34	
35	1.83	1.79	1.76	1.72	1.69	1.66	1.63	1.60	1.57	1.54	1.52	1.49	1.47	1.44	1.42	1.40	.999	.998	.997	.996	.995	.994	.993	.992	.991	.990	.989	.988	.987	.986	.985	35	
36	1.90	1.86	1.82	1.79	1.75	1.72	1.69	1.66	1.63	1.60	1.57	1.55	1.52	1.50	1.48	1.45	.999	.998	.997	.996	.995	.994	.993	.992	.991	.990	.989	.988	.987	.986	.985	36	
37	1.97	1.93	1.89	1.85	1.82	1.78	1.75	1.72	1.69	1.66	1.63	1.61	1.58	1.55	1.53	1.51	.999	.998	.997	.996	.995	.994	.993	.992	.991	.990	.989	.988	.987	.986	.985	37	
38	2.04	2.00	1.96	1.92	1.88	1.85	1.81	1.78	1.75	1.72	1.69	1.66	1.64	1.61	1.59	1.56	.999	.998	.997	.996	.995	.994	.993	.992	.991	.990	.989	.988	.987	.986	.985	38	
39	2.12	2.07	2.03	1.99	1.95	1.92	1.88	1.83	1.81	1.78	1.75	1.72	1.70	1.67	1.64	1.62	.999	.998	.997	.996	.995	.994	.993	.992	.991	.990	.989	.988	.987	.986	.985	39	
40	2.19	2.15	2.10	2.06	2.02	1.99	1.95	1.91	1.88	1.85	1.82	1.79	1.76	1.73	1.70	1.68	.999	.998	.997	.996	.995	.994	.993	.992	.991	.990	.989	.988	.987	.986	.985	40	
41	2.27	2.22	2.18	2.14	2.10	2.06	2.02	1.98	1.95	1.91	1.88	1.85	1.82	1.79	1.77	1.74	.999	.998	.997	.996	.995	.994	.993	.992	.991	.990	.989	.988	.987	.986	.985	41	
42	2.35	2.30	2.26	2.21	2.17	2.13	2.09	2.05	2.02	1.98	1.95	1.92	1.89	1.86	1.83	1.80	.999	.998	.997	.996	.995	.994	.993	.992	.991	.990	.989	.988	.987	.986	.985	42	

Table 33.

2 hrs.

A

Sign always +

(Except when Hour Angle exceeds 6 hours).

LAT.	00m	04m	08m	12m	16m	20m	24m	28m	32m	36m	40m	44m	48m	52m	56m	60m	LAT.
	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	41°	42°	43°	44°	45°	
60	3.00	2.88	2.77	2.67	2.57	2.47	2.38	2.30	2.22	2.14	2.06	1.99	1.92	1.86	1.79	1.73	60
61	3.12	3.00	2.89	2.78	2.67	2.58	2.48	2.39	2.31	2.23	2.15	2.08	2.00	1.93	1.87	1.80	61
62	3.26	3.13	3.01	2.90	2.79	2.69	2.59	2.50	2.41	2.32	2.24	2.16	2.09	2.02	1.95	1.88	62
63	3.40	3.27	3.14	3.02	2.91	2.80	2.70	2.60	2.51	2.42	2.34	2.26	2.18	2.10	2.03	1.96	63
64	3.55	3.41	3.28	3.16	3.04	2.93	2.82	2.72	2.62	2.53	2.44	2.36	2.28	2.20	2.12	2.05	64
65	3.71	3.57	3.43	3.30	3.18	3.06	2.95	2.85	2.74	2.65	2.56	2.47	2.38	2.30	2.21	2.14	65
66	3.89	3.74	3.59	3.46	3.33	3.21	3.09	2.98	2.87	2.77	2.68	2.58	2.49	2.41	2.33	2.25	66
67	4.08	3.92	3.77	3.63	3.49	3.36	3.24	3.13	3.02	2.91	2.81	2.71	2.62	2.53	2.44	2.36	67
68	4.29	4.12	3.96	3.81	3.67	3.53	3.41	3.28	3.17	3.06	2.95	2.85	2.75	2.65	2.56	2.48	68
69	4.51	4.34	4.17	4.01	3.86	3.72	3.59	3.46	3.33	3.22	3.10	3.00	2.89	2.79	2.70	2.61	69
70	4.76	4.57	4.40	4.23	4.07	3.92	3.78	3.65	3.52	3.39	3.27	3.16	3.05	2.95	2.85	2.75	70
71	5.03	4.83	4.65	4.47	4.31	4.15	4.00	3.85	3.72	3.59	3.46	3.34	3.23	3.11	3.01	2.90	71
72	5.33	5.12	4.93	4.74	4.56	4.40	4.24	4.08	3.94	3.80	3.67	3.54	3.42	3.30	3.19	3.08	72
73	5.67	5.44	5.23	5.04	4.85	4.67	4.50	4.34	4.19	4.04	3.90	3.76	3.63	3.51	3.39	3.27	73
74	6.04	5.80	5.58	5.37	5.17	4.98	4.80	4.63	4.46	4.31	4.16	4.01	3.87	3.74	3.61	3.49	74
75	6.46	6.21	5.97	5.75	5.53	5.33	5.14	4.95	4.78	4.61	4.45	4.29	4.14	4.00	3.86	3.73	75
76	6.95	6.68	6.42	6.18	5.95	5.73	5.52	5.32	5.13	4.95	4.78	4.61	4.45	4.30	4.15	4.01	76
77	7.50	7.21	6.93	6.67	6.42	6.19	5.96	5.75	5.54	5.35	5.16	4.98	4.81	4.64	4.49	4.33	77
78	8.15	7.83	7.53	7.24	6.97	6.72	6.48	6.24	6.02	5.81	5.61	5.41	5.23	5.05	4.87	4.70	78
79	8.91	8.56	8.23	7.92	7.63	7.35	7.08	6.83	6.58	6.35	6.13	5.92	5.71	5.52	5.33	5.14	79
80	9.82	9.44	9.08	8.73	8.41	8.10	7.81	7.53	7.26	7.00	6.76	6.52	6.30	6.08	5.87	5.67	80
81	10.9	10.5	10.1	9.72	9.36	9.02	8.69	8.38	8.08	7.80	7.52	7.26	7.01	6.77	6.54	6.31	81
82	12.3	11.8	11.4	11.0	10.5	10.2	9.79	9.44	9.11	8.79	8.48	8.19	7.90	7.63	7.37	7.12	82

9 hrs.

Sign — when Hour Angle exceeds 6 hours.

Table 33.

2 hrs.

B

Lat. and Dec. **SAME** name, sign —
 **DIFF.** names, .. +

DEC.	00m 04m		08m 12m		16m 20m		24m 28m		32m 36m		40m 44m		48m 52m		56m 60m		DEC.
	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	41°	42°	43°	44°	45°	
0°	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	0°
1	.035	.034	.033	.032	.031	.030	.029	.028	.028	.027	.027	.026	.026	.025	.025	.025	1
2	.070	.068	.066	.064	.062	.061	.059	.058	.057	.055	.054	.053	.052	.051	.050	.049	2
3	.105	.102	.099	.096	.094	.091	.089	.087	.085	.083	.082	.080	.078	.077	.075	.074	3
4	.140	.136	.132	.128	.125	.122	.119	.116	.114	.111	.109	.107	.105	.103	.101	.099	4
5	.175	.170	.165	.161	.157	.153	.149	.145	.142	.139	.136	.133	.131	.128	.126	.124	5
6	.210	.204	.198	.193	.188	.183	.179	.175	.171	.167	.164	.160	.157	.154	.151	.149	6
7	.246	.238	.232	.225	.220	.214	.209	.204	.199	.195	.191	.187	.183	.180	.177	.174	7
8	.281	.273	.265	.258	.251	.245	.239	.234	.228	.223	.219	.214	.210	.206	.202	.199	8
9	.317	.308	.299	.291	.283	.276	.269	.263	.257	.252	.246	.241	.237	.232	.228	.224	9
10	.353	.342	.333	.324	.315	.307	.300	.293	.286	.280	.274	.269	.264	.259	.254	.249	10
11	.389	.377	.367	.357	.348	.339	.331	.323	.316	.309	.302	.296	.290	.285	.280	.275	11
12	.425	.413	.401	.390	.380	.371	.362	.353	.345	.338	.331	.324	.318	.312	.306	.301	12
13	.462	.448	.436	.424	.413	.403	.393	.384	.375	.367	.359	.352	.345	.339	.332	.326	13
14	.499	.484	.471	.458	.446	.435	.424	.414	.405	.396	.388	.380	.373	.366	.359	.353	14
15	.536	.520	.506	.492	.479	.467	.456	.445	.435	.426	.417	.408	.400	.393	.386	.379	15
16	.573	.557	.541	.527	.513	.500	.488	.476	.466	.456	.446	.437	.429	.420	.413	.406	16
17	.611	.594	.577	.561	.547	.533	.520	.508	.497	.486	.476	.466	.457	.448	.440	.432	17
18	.650	.631	.613	.597	.581	.566	.553	.540	.528	.516	.505	.495	.486	.476	.468	.460	18
19	.689	.669	.650	.632	.616	.600	.586	.572	.559	.547	.536	.525	.515	.505	.496	.487	19
20	.728	.707	.688	.668	.651	.635	.619	.605	.591	.578	.566	.555	.544	.534	.524	.515	20
21	.768	.745	.724	.705	.686	.669	.653	.638	.623	.610	.597	.585	.574	.563	.553	.543	21
22	.808	.784	.762	.742	.723	.704	.687	.671	.656	.642	.629	.616	.604	.592	.582	.571	22
23	.849	.824	.801	.779	.759	.740	.722	.705	.689	.674	.660	.647	.634	.622	.611	.600	23
24	.890	.864	.840	.817	.796	.776	.757	.740	.723	.707	.693	.679	.665	.653	.641	.630	24
25	.933	.905	.880	.856	.834	.813	.793	.775	.757	.741	.725	.711	.697	.684	.671	.659	25
26	.975	.947	.920	.896	.872	.850	.830	.810	.792	.775	.759	.743	.729	.715	.702	.690	26
27	1.02	.989	.962	.936	.911	.888	.867	.847	.828	.810	.793	.777	.761	.747	.733	.721	27
28	1.06	1.03	1.00	.976	.951	.927	.905	.884	.864	.845	.827	.810	.795	.780	.765	.752	28
29	1.11	1.08	1.05	1.02	.991	.966	.943	.921	.900	.881	.862	.845	.828	.813	.798	.784	29
30	1.15	1.12	1.09	1.06	1.03	1.01	.982	.959	.938	.917	.898	.880	.863	.847	.831	.816	30
31	1.20	1.17	1.13	1.10	1.07	1.05	1.02	.998	.976	.955	.935	.916	.898	.881	.865	.850	31
32	1.25	1.21	1.18	1.15	1.12	1.09	1.06	1.04	1.01	.993	.972	.952	.934	.916	.900	.884	32
33	1.30	1.26	1.23	1.19	1.16	1.13	1.10	1.08	1.05	1.03	1.01	.990	.971	.952	.935	.918	33
34	1.35	1.31	1.27	1.24	1.21	1.18	1.15	1.12	1.10	1.07	1.05	1.03	1.01	.989	.971	.954	34
35	1.40	1.36	1.32	1.29	1.25	1.22	1.19	1.16	1.14	1.11	1.09	1.07	1.05	1.03	1.01	.990	35
36	1.45	1.41	1.37	1.33	1.30	1.27	1.24	1.21	1.18	1.15	1.13	1.11	1.09	1.07	1.05	1.03	36
37	1.51	1.46	1.42	1.38	1.35	1.31	1.28	1.25	1.22	1.20	1.17	1.15	1.13	1.10	1.08	1.07	37
38	1.56	1.52	1.47	1.43	1.40	1.36	1.33	1.30	1.27	1.24	1.22	1.19	1.17	1.15	1.12	1.10	38
39	1.62	1.57	1.53	1.49	1.45	1.41	1.38	1.35	1.32	1.29	1.26	1.23	1.21	1.19	1.17	1.15	39
40	1.68	1.63	1.58	1.54	1.50	1.46	1.43	1.39	1.36	1.33	1.31	1.28	1.25	1.23	1.21	1.19	40
41	1.74	1.69	1.64	1.60	1.55	1.52	1.48	1.44	1.41	1.38	1.35	1.33	1.30	1.27	1.25	1.23	41
42	1.80	1.75	1.70	1.65	1.61	1.57	1.53	1.50	1.46	1.43	1.40	1.37	1.35	1.32	1.30	1.27	42
43	1.87	1.81	1.76	1.71	1.67	1.63	1.59	1.55	1.51	1.48	1.45	1.42	1.39	1.37	1.34	1.32	43
44	1.93	1.87	1.82	1.77	1.73	1.68	1.64	1.60	1.57	1.53	1.50	1.47	1.44	1.42	1.39	1.37	44
45	2.00	1.94	1.89	1.84	1.79	1.74	1.70	1.66	1.62	1.59	1.56	1.52	1.49	1.47	1.44	1.41	45
46	2.07	2.01	1.95	1.90	1.85	1.81	1.76	1.72	1.68	1.65	1.61	1.58	1.55	1.52	1.49	1.46	46
47	2.14	2.08	2.02	1.97	1.92	1.87	1.82	1.78	1.74	1.70	1.67	1.63	1.60	1.57	1.54	1.52	47
48	2.22	2.16	2.10	2.04	1.99	1.94	1.89	1.85	1.80	1.76	1.73	1.69	1.66	1.63	1.60	1.57	48
49	2.30	2.23	2.17	2.11	2.06	2.01	1.96	1.91	1.87	1.83	1.79	1.75	1.72	1.69	1.66	1.63	49
50	2.38	2.31	2.25	2.19	2.13	2.08	2.03	1.98	1.94	1.90	1.85	1.82	1.78	1.75	1.72	1.69	50
51	2.47	2.40	2.33	2.27	2.21	2.15	2.10	2.05	2.01	1.96	1.92	1.88	1.85	1.81	1.78	1.75	51
52	2.56	2.49	2.42	2.35	2.29	2.23	2.18	2.13	2.08	2.03	1.99	1.95	1.91	1.88	1.84	1.81	52
53	2.65	2.58	2.50	2.44	2.37	2.31	2.26	2.21	2.16	2.11	2.06	2.02	1.98	1.95	1.91	1.88	53
54	2.75	2.67	2.60	2.53	2.46	2.40	2.34	2.29	2.24	2.19	2.14	2.10	2.06	2.02	1.98	1.95	54
55	2.86	2.77	2.70	2.62	2.55	2.49	2.43	2.37	2.32	2.27	2.22	2.18	2.13	2.09	2.06	2.02	55
56	2.97	2.88	2.80	2.72	2.65	2.58	2.52	2.46	2.41	2.36	2.31	2.26	2.22	2.17	2.13	2.10	56
57	3.08	2.99	2.91	2.83	2.75	2.68	2.62	2.56	2.50	2.45	2.40	2.35	2.30	2.26	2.22	2.18	57
58	3.20	3.11	3.02	2.94	2.86	2.80	2.72	2.66	2.60	2.54	2.49	2.44	2.39	2.35	2.30	2.26	58
59	3.33	3.23	3.14	3.06	2.98	2.90	2.83	2.76	2.70	2.64	2.59	2.54	2.49	2.44	2.40	2.35	59
60	3.46	3.36	3.27	3.18	3.10	3.02	2.95	2.88	2.81	2.75	2.69	2.64	2.59	2.54	2.49	2.45	60
61	3.61	3.50	3.40	3.31	3.23	3.15	3.07	3.00	2.93	2.87	2.81	2.75	2.70	2.65	2.60	2.55	61
62	3.76	3.65	3.55	3.45	3.36	3.28	3.20	3.13	3.05	2.99	2.93	2.87	2.81	2.76	2.71	2.66	62
63	3.93	3.81	3.70	3.60	3.51	3.42	3.34	3.26	3.19	3.12	3.05	2.99	2.93	2.88	2.83	2.78	63
DEC.	60m	56m	52m	48m	44m	40m	36m	32m	28m	24m	20m	16m	12m	08m	04m	00m	DEC.

9 hrs.

Table 33.

A

Sign always +

(Except when Hour Angle exceeds 6 hours).

3 hrs.

LAT.	00m	04m	08m	12m	16m	20m	24m	28m	32m	36m	40m	44m	48m	52m	56m	60m	LAT.
	45°	46°	47°	48°	49°	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°	
60°	1.73	1.67	1.62	1.56	1.51	1.45	1.40	1.35	1.31	1.26	1.21	1.17	1.12	1.08	1.04	1.00	60°
61	1.80	1.74	1.68	1.62	1.57	1.51	1.46	1.41	1.36	1.31	1.26	1.22	1.17	1.13	1.08	1.04	61
62	1.88	1.82	1.75	1.69	1.63	1.58	1.52	1.47	1.42	1.37	1.32	1.27	1.22	1.18	1.13	1.09	62
63	1.96	1.90	1.83	1.77	1.71	1.65	1.59	1.53	1.48	1.43	1.37	1.32	1.27	1.23	1.18	1.13	63
64	2.05	1.98	1.91	1.85	1.78	1.72	1.66	1.60	1.55	1.49	1.44	1.38	1.33	1.28	1.23	1.18	64
65	2.14	2.07	2.00	1.93	1.86	1.80	1.74	1.68	1.62	1.56	1.50	1.45	1.39	1.34	1.29	1.24	65
66	2.25	2.17	2.09	2.02	1.95	1.88	1.82	1.75	1.69	1.63	1.57	1.51	1.46	1.40	1.35	1.30	66
67	2.36	2.28	2.20	2.12	2.05	1.98	1.91	1.84	1.78	1.71	1.65	1.59	1.53	1.47	1.42	1.36	67
68	2.48	2.39	2.31	2.23	2.15	2.08	2.00	1.93	1.87	1.80	1.73	1.67	1.61	1.55	1.49	1.43	68
69	2.61	2.52	2.43	2.35	2.26	2.19	2.11	2.04	1.96	1.89	1.82	1.76	1.69	1.63	1.57	1.50	69
70	2.75	2.65	2.56	2.47	2.39	2.31	2.22	2.15	2.07	2.00	1.92	1.85	1.78	1.72	1.65	1.59	70
71	2.90	2.80	2.71	2.61	2.52	2.44	2.35	2.27	2.19	2.11	2.03	1.96	1.89	1.81	1.75	1.68	71
72	3.08	2.97	2.87	2.77	2.68	2.58	2.49	2.40	2.32	2.24	2.15	2.08	2.00	1.92	1.85	1.78	72
73	3.27	3.16	3.05	2.95	2.84	2.74	2.65	2.56	2.46	2.38	2.29	2.21	2.12	2.04	1.97	1.89	73
74	3.49	3.37	3.25	3.14	3.03	2.93	2.82	2.72	2.63	2.53	2.44	2.35	2.26	2.18	2.10	2.01	74
75	3.73	3.60	3.48	3.36	3.24	3.13	3.02	2.92	2.81	2.71	2.61	2.52	2.42	2.33	2.24	2.15	75
76	4.01	3.87	3.74	3.61	3.49	3.37	3.25	3.13	3.02	2.91	2.81	2.71	2.60	2.51	2.41	2.32	76
77	4.33	4.18	4.04	3.90	3.77	3.63	3.51	3.38	3.26	3.15	3.03	2.92	2.81	2.71	2.60	2.50	77
78	4.70	4.54	4.39	4.24	4.09	3.95	3.81	3.68	3.55	3.42	3.29	3.17	3.06	2.94	2.83	2.72	78
79	5.14	4.97	4.80	4.63	4.47	4.32	4.17	4.02	3.88	3.74	3.60	3.47	3.34	3.21	3.09	2.97	79
80	5.67	5.48	5.29	5.11	4.93	4.76	4.59	4.43	4.27	4.12	3.97	3.83	3.68	3.54	3.41	3.27	80
81	6.31	6.10	5.89	5.68	5.49	5.30	5.11	4.93	4.76	4.59	4.42	4.26	4.10	3.95	3.79	3.65	81
82	7.12	6.87	6.64	6.41	6.19	5.97	5.76	5.56	5.36	5.17	4.98	4.80	4.62	4.45	4.28	4.11	82
LAT.	60m	56m	52m	48m	44m	40m	36m	32m	28m	24m	20m	16m	12m	08m	04m	00m	LAT.

8 hrs.

Sign — when Hour Angle exceeds 6 hours.

Table 33.

3 hrs.

B

Lat. and Dec. SAME name, sign —

.. .. DIFF. names, .. +

DEC	00m 04m		08m 12m		16m 20m		24m 28m		32m 36m		40m 44m		48m 52m		56m 60m		DEC
	45°	46°	47°	48°	49°	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°	
0°	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	0°
1	.025	.024	.024	.023	.023	.023	.022	.022	.022	.022	.021	.021	.021	.021	.020	.020	1
2	.049	.049	.048	.047	.046	.046	.045	.044	.044	.043	.043	.042	.042	.041	.041	.040	2
3	.074	.073	.072	.071	.069	.068	.067	.067	.066	.065	.064	.063	.062	.062	.061	.061	3
4	.099	.097	.096	.094	.093	.091	.090	.089	.088	.086	.085	.084	.083	.083	.082	.081	4
5	.124	.122	.120	.118	.116	.114	.113	.111	.110	.108	.107	.106	.104	.103	.102	.101	5
6	.149	.146	.144	.141	.139	.137	.135	.133	.132	.130	.128	.127	.125	.124	.123	.121	6
7	.174	.171	.168	.165	.163	.160	.158	.156	.154	.152	.150	.148	.146	.145	.143	.142	7
8	.199	.195	.192	.189	.186	.183	.181	.178	.176	.174	.172	.170	.168	.166	.164	.162	8
9	.224	.220	.217	.213	.210	.207	.204	.201	.198	.196	.193	.191	.189	.187	.185	.183	9
10	.249	.245	.241	.237	.234	.230	.227	.224	.221	.218	.215	.213	.210	.208	.206	.204	10
11	.275	.270	.266	.262	.258	.254	.250	.247	.243	.240	.237	.234	.232	.229	.227	.224	11
12	.301	.295	.291	.286	.282	.277	.274	.270	.266	.263	.259	.256	.253	.251	.248	.245	12
13	.326	.321	.316	.311	.306	.301	.297	.293	.289	.285	.282	.278	.275	.272	.269	.267	13
14	.353	.347	.341	.336	.330	.325	.321	.316	.312	.308	.304	.301	.297	.294	.291	.288	14
15	.379	.372	.366	.361	.355	.350	.345	.340	.336	.331	.327	.323	.319	.316	.313	.309	15
16	.406	.399	.392	.386	.380	.374	.369	.364	.359	.354	.350	.346	.342	.338	.335	.331	16
17	.432	.425	.418	.411	.405	.399	.393	.388	.383	.378	.373	.369	.365	.361	.357	.353	17
18	.460	.452	.444	.437	.431	.424	.418	.412	.407	.402	.397	.392	.387	.383	.379	.375	18
19	.487	.479	.471	.463	.456	.449	.443	.437	.431	.426	.420	.415	.411	.406	.402	.398	19
20	.515	.506	.498	.490	.482	.475	.468	.462	.456	.450	.444	.439	.434	.429	.425	.420	20
21	.543	.534	.525	.517	.509	.501	.494	.487	.481	.474	.469	.463	.458	.453	.448	.443	21
22	.571	.562	.552	.544	.535	.527	.520	.513	.506	.499	.493	.487	.482	.476	.471	.467	22
23	.600	.590	.580	.571	.562	.554	.546	.539	.532	.525	.518	.512	.506	.501	.495	.490	23
24	.630	.619	.609	.599	.590	.581	.573	.565	.557	.550	.544	.537	.531	.525	.519	.514	24
25	.659	.648	.638	.627	.618	.609	.600	.592	.584	.576	.569	.562	.556	.550	.544	.538	25
26	.690	.678	.667	.656	.646	.637	.628	.619	.611	.603	.595	.588	.582	.575	.569	.563	26
27	.721	.708	.697	.686	.675	.665	.656	.647	.638	.630	.622	.615	.608	.601	.594	.588	27
28	.752	.739	.727	.715	.705	.694	.684	.675	.666	.657	.649	.641	.634	.627	.620	.614	28
29	.784	.771	.758	.746	.734	.724	.713	.703	.694	.685	.677	.669	.661	.654	.647	.640	29
30	.816	.803	.789	.777	.765	.754	.743	.733	.723	.714	.705	.696	.688	.681	.674	.667	30
31	.850	.835	.822	.809	.796	.784	.773	.763	.752	.743	.734	.725	.716	.709	.701	.694	31
32	.884	.869	.854	.841	.828	.816	.804	.793	.782	.772	.763	.754	.745	.737	.729	.722	32
33	.918	.903	.888	.874	.860	.848	.836	.824	.813	.803	.793	.783	.774	.766	.758	.750	33
34	.954	.938	.922	.908	.894	.881	.868	.856	.845	.834	.823	.814	.804	.795	.787	.779	34
35	.990	.973	.957	.942	.928	.914	.901	.889	.877	.866	.855	.845	.835	.826	.817	.809	35
36	1.03	1.01	.993	.978	.963	.948	.935	.922	.910	.898	.887	.876	.866	.857	.848	.839	36
37	1.07	1.05	1.03	1.01	.998	.984	.970	.956	.944	.931	.920	.909	.899	.889	.879	.870	37
38	1.10	1.09	1.07	1.05	1.04	1.02	1.01	.991	.978	.966	.954	.942	.932	.921	.911	.902	38
39	1.15	1.13	1.11	1.09	1.07	1.06	1.04	1.03	1.01	1.00	.989	.977	.966	.955	.945	.935	39
40	1.19	1.17	1.15	1.13	1.11	1.10	1.08	1.06	1.05	1.04	1.02	1.01	1.00	.989	.979	.969	40
41	1.23	1.21	1.19	1.17	1.15	1.13	1.12	1.10	1.09	1.07	1.06	1.05	1.04	1.03	1.01	1.00	41
42	1.27	1.25	1.23	1.21	1.19	1.18	1.16	1.14	1.13	1.11	1.10	1.09	1.07	1.06	1.05	1.04	42
43	1.32	1.30	1.28	1.25	1.24	1.22	1.20	1.18	1.17	1.15	1.14	1.12	1.11	1.10	1.09	1.08	43
44	1.37	1.34	1.32	1.30	1.28	1.26	1.24	1.23	1.21	1.19	1.18	1.16	1.15	1.14	1.13	1.12	44
45	1.41	1.39	1.37	1.35	1.33	1.31	1.29	1.27	1.25	1.24	1.22	1.21	1.19	1.18	1.17	1.15	45
46	1.46	1.44	1.42	1.39	1.37	1.35	1.33	1.31	1.30	1.28	1.26	1.25	1.23	1.22	1.21	1.20	46
47	1.52	1.49	1.47	1.44	1.42	1.40	1.38	1.36	1.34	1.33	1.31	1.29	1.28	1.26	1.25	1.24	47
48	1.57	1.54	1.52	1.49	1.47	1.45	1.43	1.41	1.39	1.37	1.36	1.34	1.32	1.31	1.30	1.28	48
49	1.63	1.60	1.57	1.55	1.52	1.50	1.48	1.46	1.44	1.42	1.40	1.39	1.37	1.36	1.34	1.33	49
50	1.69	1.66	1.63	1.60	1.58	1.56	1.53	1.51	1.49	1.47	1.45	1.44	1.42	1.41	1.39	1.38	50
51	1.75	1.72	1.69	1.66	1.64	1.61	1.59	1.57	1.55	1.53	1.51	1.49	1.47	1.46	1.44	1.43	51
52	1.81	1.78	1.75	1.72	1.70	1.67	1.65	1.62	1.60	1.58	1.56	1.54	1.53	1.51	1.49	1.49	52
53	1.88	1.84	1.81	1.79	1.76	1.73	1.71	1.68	1.66	1.64	1.62	1.60	1.58	1.56	1.55	1.53	53
54	1.95	1.91	1.88	1.85	1.83	1.80	1.77	1.75	1.72	1.70	1.68	1.66	1.64	1.62	1.61	1.59	54
55	2.02	1.99	1.95	1.92	1.89	1.86	1.84	1.81	1.79	1.77	1.74	1.72	1.70	1.68	1.67	1.65	55
56	2.10	2.06	2.03	1.99	1.96	1.94	1.91	1.88	1.86	1.83	1.81	1.79	1.77	1.75	1.73	1.71	56
57	2.18	2.14	2.11	2.07	2.04	2.01	1.98	1.95	1.93	1.90	1.88	1.86	1.84	1.82	1.80	1.78	57
58	2.26	2.22	2.19	2.15	2.12	2.09	2.06	2.03	2.00	1.98	1.95	1.93	1.91	1.89	1.87	1.85	58
59	2.35	2.31	2.28	2.24	2.21	2.17	2.14	2.11	2.08	2.06	2.03	2.01	1.98	1.96	1.94	1.92	59
60	2.45	2.41	2.37	2.33	2.29	2.26	2.23	2.20	2.17	2.14	2.11	2.09	2.07	2.04	2.02	2.00	60
61	2.55	2.51	2.47	2.43	2.39	2.36	2.32	2.29	2.26	2.23	2.20	2.18	2.15	2.13	2.10	2.08	61
62	2.66	2.61	2.57	2.53	2.49	2.46	2.42	2.39	2.35	2.32	2.30	2.27	2.24	2.22	2.19	2.17	62
63	2.78	2.73	2.68	2.64	2.60	2.56	2.52	2.49	2.46	2.43	2.40	2.37	2.34	2.31	2.29	2.27	63

8 hrs.

Table 33.

A

Sign always +
(Except when Hour Angle exceeds 6 hours).

4 hrs.

LAT.	00m	04m	08m	12m	16m	20m	24m	28m	32m	36m	40m	44m	48m	52m	56m	60m	LAT.
	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	71°	72°	73°	74°	75°	
60°	1.00	.960	.921	.883	.845	.808	.771	.735	.700	.665	.630	.596	.563	.530	.497	.464	60°
61	1.04	1.00	.959	.919	.880	.841	.803	.766	.729	.693	.657	.621	.586	.552	.517	.483	61
62	1.09	1.04	1.00	.958	.917	.877	.837	.798	.760	.722	.685	.648	.611	.575	.539	.504	62
63	1.13	1.09	1.04	1.00	.957	.915	.874	.833	.793	.754	.714	.676	.638	.600	.563	.526	63
64	1.18	1.14	1.09	1.04	1.00	.956	.913	.870	.828	.787	.746	.706	.666	.627	.588	.549	64
65	1.24	1.19	1.14	1.09	1.05	1.00	.955	.910	.866	.823	.781	.738	.697	.656	.615	.575	65
66	1.30	1.25	1.19	1.14	1.10	1.05	1.00	.953	.907	.862	.817	.773	.730	.687	.644	.602	66
67	1.36	1.31	1.25	1.20	1.15	1.10	1.05	1.00	.952	.904	.857	.811	.766	.720	.676	.631	67
68	1.43	1.37	1.32	1.26	1.21	1.15	1.09	1.05	1.00	.950	.901	.852	.804	.757	.710	.663	68
69	1.50	1.44	1.39	1.33	1.27	1.21	1.16	1.11	1.05	1.00	.948	.897	.846	.796	.747	.698	69
70	1.59	1.52	1.46	1.40	1.34	1.28	1.22	1.17	1.11	1.05	1.00	.946	.893	.840	.788	.736	70
71	1.68	1.61	1.54	1.48	1.42	1.35	1.29	1.23	1.17	1.11	1.06	1.00	.944	.888	.833	.778	71
72	1.78	1.71	1.64	1.57	1.50	1.44	1.37	1.31	1.24	1.18	1.12	1.06	1.00	.941	.883	.825	72
73	1.89	1.81	1.74	1.67	1.60	1.53	1.46	1.39	1.32	1.26	1.19	1.13	1.06	1.00	.938	.876	73
74	2.01	1.93	1.85	1.78	1.70	1.63	1.55	1.48	1.41	1.34	1.27	1.20	1.13	1.07	1.00	.934	74
75	2.15	2.07	1.98	1.90	1.82	1.74	1.66	1.58	1.51	1.43	1.36	1.29	1.21	1.14	1.07	1.00	75
76	2.32	2.22	2.13	2.04	1.96	1.87	1.79	1.70	1.62	1.54	1.46	1.38	1.30	1.23	1.15	1.07	76
77	2.50	2.40	2.30	2.21	2.11	2.02	1.93	1.84	1.75	1.66	1.58	1.49	1.41	1.32	1.24	1.16	77
78	2.72	2.61	2.50	2.40	2.29	2.19	2.09	2.00	1.90	1.81	1.71	1.62	1.53	1.44	1.35	1.26	78
79	2.97	2.85	2.74	2.62	2.51	2.40	2.29	2.18	2.08	1.97	1.87	1.77	1.67	1.57	1.48	1.38	79
80	3.27	3.14	3.02	2.89	2.77	2.64	2.53	2.41	2.29	2.18	2.06	1.95	1.84	1.73	1.63	1.52	80
81	3.65	3.50	3.36	3.22	3.08	2.94	2.81	2.68	2.55	2.42	2.30	2.17	2.05	1.93	1.81	1.69	81
82	4.11	3.94	3.78	3.63	3.47	3.32	3.17	3.02	2.87	2.73	2.59	2.45	2.31	2.16	2.04	1.91	82
LAT.	60m	56m	52m	48m	44m	40m	36m	32m	28m	24m	20m	16m	12m	08m	04m	00m	LAT.
7 hrs.																	
Sign — when Hour Angle exceeds 6 hours.																	

Table 33.

4 hrs.

B

Lat. and Dec. **SAME** name, sign —
 **DIFF.** names, .. +

DEC.	00m	04m	08m	12m	16m	20m	24m	28m	32m	36m	40m	44m	48m	52m	56m	60m	DEC.
	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	71°	72°	73°	74°	75°	
0°	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	0°
1	.020	.020	.020	.020	.019	.019	.019	.019	.019	.019	.019	.018	.018	.018	.018	.018	1
2	.040	.040	.040	.039	.039	.039	.038	.038	.038	.037	.037	.037	.037	.037	.036	.036	2
3	.061	.060	.059	.059	.058	.058	.057	.057	.057	.056	.056	.055	.055	.055	.055	.054	3
4	.081	.080	.079	.078	.078	.077	.077	.076	.075	.075	.074	.074	.074	.073	.073	.072	4
5	.101	.100	.099	.098	.097	.097	.096	.095	.094	.094	.093	.093	.092	.091	.091	.091	5
6	.121	.120	.119	.118	.117	.116	.115	.114	.113	.113	.112	.111	.111	.110	.109	.109	6
7	.142	.140	.139	.138	.137	.135	.134	.133	.132	.132	.131	.130	.129	.128	.128	.127	7
8	.162	.161	.159	.158	.156	.155	.154	.153	.152	.151	.150	.149	.148	.147	.146	.145	8
9	.183	.181	.178	.178	.176	.175	.173	.172	.171	.170	.169	.168	.167	.166	.165	.164	9
10	.204	.202	.200	.198	.196	.195	.193	.192	.190	.189	.188	.186	.185	.184	.183	.183	10
11	.224	.222	.220	.218	.216	.214	.213	.211	.210	.208	.207	.206	.204	.203	.202	.201	11
12	.245	.243	.241	.239	.236	.235	.233	.231	.229	.228	.226	.225	.223	.222	.221	.220	12
13	.267	.264	.261	.259	.257	.255	.253	.251	.249	.247	.246	.244	.243	.241	.240	.239	13
14	.288	.285	.282	.280	.277	.275	.273	.271	.269	.267	.265	.264	.262	.261	.259	.258	14
15	.309	.306	.303	.301	.298	.296	.293	.291	.289	.287	.285	.283	.282	.280	.279	.277	15
16	.331	.328	.325	.322	.319	.316	.314	.312	.309	.307	.305	.303	.302	.300	.298	.297	16
17	.353	.350	.346	.343	.340	.337	.335	.332	.330	.327	.325	.323	.321	.320	.318	.317	17
18	.375	.371	.368	.365	.362	.359	.356	.353	.350	.348	.346	.344	.342	.340	.338	.336	18
19	.398	.394	.390	.386	.383	.380	.377	.374	.371	.369	.366	.364	.362	.360	.358	.356	19
20	.420	.416	.412	.408	.405	.402	.398	.395	.393	.390	.387	.385	.383	.381	.379	.377	20
21	.443	.439	.435	.431	.427	.424	.420	.417	.414	.411	.408	.406	.404	.401	.399	.397	21
22	.467	.462	.458	.453	.450	.446	.442	.439	.436	.433	.430	.427	.425	.422	.420	.418	22
23	.490	.485	.481	.476	.472	.468	.465	.461	.458	.455	.452	.449	.446	.444	.442	.439	23
24	.514	.509	.504	.500	.495	.491	.487	.484	.480	.477	.474	.471	.468	.466	.463	.461	24
25	.538	.533	.528	.523	.519	.515	.510	.507	.503	.499	.496	.493	.490	.488	.485	.483	25
26	.563	.558	.552	.547	.543	.538	.534	.530	.526	.522	.519	.516	.513	.510	.507	.505	26
27	.588	.583	.577	.572	.567	.562	.558	.554	.550	.546	.542	.539	.536	.533	.530	.527	27
28	.614	.608	.602	.597	.592	.587	.582	.578	.573	.570	.566	.562	.559	.556	.553	.550	28
29	.640	.634	.628	.622	.617	.612	.607	.602	.598	.594	.590	.586	.583	.580	.577	.574	29
30	.667	.660	.654	.648	.642	.637	.632	.627	.623	.618	.614	.611	.607	.604	.601	.598	30
31	.694	.687	.681	.674	.669	.663	.658	.653	.648	.644	.639	.635	.632	.628	.625	.622	31
32	.722	.714	.708	.701	.695	.689	.684	.679	.674	.669	.665	.661	.657	.653	.650	.647	32
33	.750	.743	.735	.729	.723	.717	.711	.705	.700	.696	.691	.687	.683	.679	.676	.672	33
34	.779	.771	.764	.757	.750	.744	.738	.733	.727	.722	.718	.713	.709	.705	.702	.698	34
35	.809	.801	.793	.786	.779	.773	.766	.761	.755	.750	.745	.741	.736	.732	.728	.725	35
36	.839	.831	.823	.815	.808	.802	.795	.789	.784	.778	.773	.768	.764	.760	.756	.752	36
37	.870	.862	.853	.846	.838	.831	.825	.819	.813	.807	.802	.797	.792	.788	.784	.780	37
38	.902	.893	.885	.877	.869	.862	.855	.849	.843	.837	.831	.826	.821	.817	.813	.809	38
39	.935	.926	.917	.909	.901	.893	.886	.880	.873	.867	.862	.856	.851	.847	.842	.838	39
40	.969	.959	.950	.942	.934	.926	.919	.912	.905	.899	.893	.887	.882	.877	.873	.869	40
41	1.00	.994	.985	.976	.967	.959	.952	.944	.938	.931	.925	.919	.914	.909	.904	.900	41
42	1.04	1.03	1.02	1.01	1.00	.993	.986	.978	.971	.964	.958	.952	.947	.942	.937	.932	42
43	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.01	.999	.992	.986	.981	.975	.970	.965	43
44	1.12	1.10	1.09	1.08	1.07	1.07	1.06	1.05	1.04	1.03	1.03	1.02	1.02	1.01	1.00	1.00	44
45	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.09	1.08	1.07	1.06	1.06	1.05	1.05	1.04	1.04	45
46	1.20	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.12	1.11	1.10	1.10	1.09	1.08	1.08	1.07	46
47	1.24	1.23	1.21	1.20	1.19	1.18	1.17	1.16	1.16	1.15	1.14	1.13	1.13	1.12	1.12	1.11	47
48	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.17	1.16	1.16	1.15	48
49	1.33	1.32	1.30	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.22	1.20	1.20	1.20	1.19	49
50	1.38	1.36	1.35	1.34	1.33	1.31	1.30	1.29	1.29	1.28	1.27	1.26	1.25	1.25	1.24	1.23	50
51	1.43	1.41	1.40	1.39	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.31	1.30	1.29	1.28	1.28	51
52	1.48	1.46	1.45	1.44	1.42	1.41	1.40	1.39	1.38	1.37	1.36	1.35	1.35	1.34	1.33	1.33	52
53	1.53	1.52	1.50	1.49	1.48	1.46	1.45	1.44	1.43	1.42	1.41	1.40	1.40	1.39	1.38	1.37	53
54	1.59	1.57	1.56	1.54	1.53	1.52	1.51	1.50	1.48	1.47	1.46	1.46	1.45	1.44	1.43	1.42	54
55	1.65	1.63	1.62	1.60	1.59	1.58	1.56	1.55	1.54	1.53	1.52	1.51	1.50	1.49	1.49	1.48	55
56	1.71	1.70	1.68	1.66	1.65	1.64	1.62	1.61	1.60	1.59	1.58	1.57	1.56	1.55	1.54	1.53	56
57	1.78	1.76	1.74	1.73	1.71	1.70	1.69	1.67	1.66	1.65	1.64	1.63	1.62	1.61	1.60	1.59	57
58	1.85	1.83	1.81	1.80	1.78	1.77	1.75	1.74	1.73	1.71	1.70	1.69	1.68	1.67	1.66	1.66	58
59	1.92	1.90	1.88	1.87	1.85	1.84	1.82	1.81	1.79	1.78	1.77	1.76	1.75	1.74	1.73	1.72	59
60	2.00	1.98	1.96	1.94	1.93	1.91	1.90	1.88	1.87	1.86	1.84	1.83	1.82	1.81	1.80	1.79	60
61	2.08	2.06	2.04	2.02	2.01	1.99	1.97	1.96	1.95	1.93	1.92	1.91	1.90	1.89	1.88	1.87	61
62	2.17	2.15	2.13	2.11	2.09	2.08	2.06	2.04	2.03	2.01	2.00	1.99	1.98	1.97	1.96	1.95	62
63	2.27	2.24	2.22	2.20	2.18	2.17	2.15	2.13	2.12	2.10	2.09	2.08	2.06	2.05	2.04	2.03	63
DEC.	60m	56m	52m	48m	44m	40m	36m	32m	28m	24m	20m	16m	12m	08m	04m	00m	DEC.

7 hrs.

Amount 4.10.0
 15.0.0
 Buttons Lace 2.4.0
 Trainers 6.0.0
 Suspenders 6.0.0
 39.14.0

Table 33.

A Sign always +
 (Except when Hour Angle exceeds 6 hours).

5 hrs.

LAT.	00m	04m	08m	12m	16m	20m	24m	28m	32m	36m	40m	44m	48m	52m	56m	60m	LAT.
	75°	76°	77°	78°	79°	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°	
60°	.464	.432	.400	.368	.337	.305	.274	.243	.213	.182	.152	.121	.091	.060	.030	.000	60°
61	.483	.450	.416	.384	.351	.318	.286	.254	.222	.190	.158	.126	.095	.063	.031	.000	61
62	.504	.469	.434	.400	.366	.332	.298	.264	.231	.198	.165	.132	.099	.066	.033	.000	62
63	.526	.489	.453	.417	.381	.346	.311	.276	.241	.206	.172	.137	.103	.069	.034	.000	63
64	.549	.511	.473	.436	.399	.362	.325	.288	.252	.215	.179	.143	.107	.072	.036	.000	64
65	.575	.535	.495	.456	.417	.378	.340	.301	.263	.225	.188	.150	.112	.075	.037	.000	65
66	.602	.560	.519	.477	.437	.396	.356	.316	.276	.236	.197	.157	.118	.078	.039	.000	66
67	.631	.587	.544	.501	.458	.415	.373	.331	.289	.248	.206	.165	.123	.082	.041	.000	67
68	.663	.617	.571	.526	.481	.436	.392	.348	.304	.260	.217	.173	.130	.086	.043	.000	68
69	.698	.650	.601	.554	.506	.459	.413	.366	.320	.274	.228	.182	.137	.090	.045	.000	69
70	.736	.685	.634	.584	.534	.484	.435	.386	.337	.289	.240	.192	.144	.096	.048	.000	70
71	.778	.724	.670	.617	.565	.512	.460	.408	.357	.305	.254	.203	.152	.101	.051	.000	71
72	.825	.767	.711	.654	.598	.543	.487	.433	.378	.323	.269	.215	.161	.107	.054	.000	72
73	.876	.816	.755	.695	.636	.577	.518	.460	.402	.344	.286	.229	.171	.114	.057	.000	73
74	.934	.870	.805	.741	.678	.615	.552	.490	.428	.367	.305	.244	.183	.122	.061	.000	74
75	1.00	.931	.862	.793	.725	.658	.591	.525	.458	.392	.327	.261	.196	.130	.065	.000	75
76	1.07	1.00	.926	.853	.780	.707	.635	.564	.492	.422	.351	.280	.210	.140	.070	.000	76
77	1.16	1.08	1.00	.921	.842	.764	.686	.609	.532	.455	.379	.303	.227	.151	.076	.000	77
78	1.26	1.17	1.09	1.00	.914	.830	.745	.661	.578	.494	.412	.329	.247	.164	.082	.000	78
79	1.38	1.28	1.19	1.09	1.00	.907	.815	.723	.632	.541	.450	.360	.270	.180	.090	.000	79
80	1.52	1.41	1.31	1.21	1.10	1.00	.898	.797	.696	.596	.496	.397	.297	.198	.099	.000	80
81	1.69	1.57	1.46	1.34	1.23	1.11	1.00	.887	.775	.664	.552	.442	.331	.220	.110	.000	81
82	1.91	1.77	1.64	1.51	1.38	1.25	1.13	1.00	.874	.748	.623	.498	.373	.248	.124	.000	82
LAT.	60m	56m	52m	48m	44m	40m	36m	32m	28m	24m	20m	16m	12m	08m	04m	00m	LAT.
6 hrs.																	
Sign — when Hour Angle exceeds 6 hours.																	

Table 33.

5 hrs.

B

Lat. and Dec. SAME name, sign —

.. .. DIFF. names, .. +

DEC.	00m 04m		08m 12m		16m 20m		24m 28m		32m 36m		40m 44m		48m 52m		56m 60m		DEC.
	75°	76°	77°	78°	79°	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°	
0°	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	0°
1	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.017	.017	.017	.017	.017	.017	1
2	.036	.036	.036	.036	.036	.035	.035	.035	.035	.035	.035	.035	.035	.035	.035	.035	2
3	.054	.054	.054	.054	.053	.053	.053	.053	.053	.053	.053	.053	.052	.052	.052	.052	3
4	.072	.072	.072	.071	.071	.071	.071	.071	.071	.070	.070	.070	.070	.070	.070	.070	4
5	.091	.090	.090	.089	.089	.089	.089	.088	.088	.088	.088	.088	.088	.088	.088	.087	5
6	.109	.108	.108	.107	.107	.107	.106	.106	.106	.106	.105	.105	.105	.105	.105	.105	6
7	.127	.127	.126	.126	.125	.125	.124	.124	.124	.123	.123	.123	.123	.123	.123	.123	7
8	.145	.145	.144	.144	.143	.143	.142	.142	.142	.141	.141	.141	.141	.141	.141	.141	8
9	.164	.163	.163	.162	.161	.161	.160	.160	.159	.159	.159	.159	.159	.158	.158	.158	9
10	.183	.182	.181	.180	.180	.179	.179	.178	.178	.177	.177	.177	.177	.176	.176	.176	10
11	.201	.200	.199	.199	.198	.197	.197	.196	.196	.195	.195	.195	.194	.194	.194	.194	11
12	.220	.219	.218	.217	.217	.216	.215	.215	.214	.214	.213	.213	.213	.213	.213	.213	12
13	.239	.238	.237	.236	.235	.234	.234	.233	.233	.232	.232	.231	.231	.231	.231	.231	13
14	.258	.257	.256	.255	.254	.253	.252	.252	.251	.251	.250	.250	.250	.249	.249	.249	14
15	.277	.276	.275	.274	.273	.272	.271	.271	.270	.269	.269	.269	.268	.268	.268	.268	15
16	.297	.296	.294	.293	.292	.291	.290	.290	.289	.288	.288	.287	.287	.287	.287	.287	16
17	.317	.315	.314	.313	.311	.310	.310	.309	.308	.307	.307	.306	.306	.306	.306	.306	17
18	.336	.335	.333	.332	.331	.330	.329	.328	.327	.327	.326	.326	.325	.325	.325	.325	18
19	.356	.355	.353	.352	.351	.350	.349	.348	.347	.346	.346	.345	.345	.345	.344	.344	19
20	.377	.375	.374	.372	.371	.370	.369	.368	.367	.366	.365	.365	.364	.364	.364	.364	20
21	.397	.396	.394	.392	.391	.390	.389	.388	.387	.386	.385	.385	.384	.384	.384	.384	21
22	.418	.416	.415	.413	.412	.410	.409	.408	.407	.406	.406	.405	.404	.404	.404	.404	22
23	.439	.437	.436	.434	.432	.431	.430	.429	.428	.427	.426	.426	.425	.425	.425	.424	23
24	.461	.459	.457	.455	.454	.452	.451	.450	.449	.448	.447	.446	.446	.445	.445	.445	24
25	.483	.481	.479	.477	.475	.474	.472	.471	.470	.469	.468	.467	.467	.466	.466	.466	25
26	.505	.503	.501	.499	.497	.495	.494	.493	.491	.490	.490	.489	.488	.488	.488	.488	26
27	.527	.525	.523	.521	.519	.517	.516	.515	.513	.512	.511	.511	.510	.510	.510	.510	27
28	.550	.548	.546	.544	.542	.540	.538	.537	.536	.535	.534	.533	.532	.532	.532	.532	28
29	.574	.571	.569	.567	.565	.563	.561	.560	.558	.557	.556	.556	.555	.555	.554	.554	29
30	.598	.595	.593	.590	.588	.586	.585	.583	.582	.581	.580	.579	.578	.578	.577	.577	30
31	.622	.619	.617	.614	.612	.610	.608	.607	.605	.604	.603	.602	.602	.601	.601	.601	31
32	.647	.644	.641	.639	.637	.635	.633	.631	.630	.628	.627	.626	.626	.625	.625	.625	32
33	.672	.669	.666	.664	.662	.659	.658	.656	.654	.653	.652	.651	.650	.650	.650	.649	33
34	.698	.695	.692	.690	.687	.685	.683	.681	.680	.678	.677	.676	.675	.675	.675	.675	34
35	.725	.722	.719	.716	.713	.711	.709	.707	.705	.704	.703	.702	.701	.701	.700	.700	35
36	.752	.749	.746	.743	.740	.738	.736	.734	.732	.731	.729	.728	.728	.727	.727	.727	36
37	.780	.777	.773	.770	.768	.765	.763	.761	.759	.758	.756	.755	.755	.754	.754	.754	37
38	.809	.805	.802	.799	.796	.793	.791	.789	.787	.786	.784	.783	.782	.782	.781	.781	38
39	.838	.835	.831	.828	.825	.822	.820	.818	.816	.814	.813	.812	.811	.810	.810	.810	39
40	.869	.865	.861	.858	.855	.852	.850	.847	.845	.844	.842	.841	.840	.840	.839	.839	40
41	.900	.896	.892	.889	.886	.883	.880	.878	.876	.874	.873	.871	.870	.870	.869	.869	41
42	.932	.928	.924	.921	.917	.914	.912	.909	.907	.905	.904	.903	.902	.901	.901	.900	42
43	.965	.961	.957	.953	.950	.947	.944	.942	.940	.938	.936	.935	.934	.933	.933	.933	43
44	1.00	.995	.991	.987	.984	.981	.978	.975	.973	.971	.969	.968	.967	.966	.966	.966	44
45	1.04	1.03	1.03	1.02	1.02	1.02	1.01	1.01	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00	45
46	1.07	1.07	1.06	1.06	1.05	1.05	1.05	1.05	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	46
47	1.11	1.11	1.10	1.10	1.09	1.09	1.09	1.08	1.08	1.08	1.08	1.07	1.07	1.07	1.07	1.07	47
48	1.15	1.14	1.14	1.14	1.13	1.13	1.12	1.12	1.12	1.12	1.11	1.11	1.11	1.11	1.11	1.11	48
49	1.19	1.19	1.18	1.18	1.17	1.17	1.16	1.16	1.16	1.16	1.15	1.15	1.15	1.15	1.15	1.15	49
50	1.23	1.23	1.22	1.22	1.21	1.21	1.21	1.20	1.20	1.20	1.20	1.19	1.19	1.19	1.19	1.19	50
51	1.28	1.27	1.27	1.26	1.26	1.25	1.25	1.25	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.23	51
52	1.33	1.32	1.31	1.31	1.30	1.30	1.30	1.29	1.29	1.29	1.28	1.28	1.28	1.28	1.28	1.28	52
53	1.37	1.37	1.36	1.36	1.35	1.35	1.34	1.34	1.34	1.33	1.33	1.33	1.33	1.33	1.33	1.33	53
54	1.42	1.42	1.41	1.41	1.40	1.40	1.39	1.39	1.39	1.38	1.38	1.38	1.38	1.38	1.38	1.38	54
55	1.48	1.47	1.47	1.46	1.46	1.45	1.45	1.44	1.44	1.44	1.43	1.43	1.43	1.43	1.43	1.43	55
56	1.53	1.53	1.52	1.52	1.51	1.51	1.50	1.50	1.49	1.49	1.49	1.49	1.48	1.48	1.48	1.48	56
57	1.59	1.59	1.58	1.57	1.57	1.56	1.56	1.55	1.55	1.55	1.55	1.54	1.54	1.54	1.54	1.54	57
58	1.66	1.65	1.64	1.64	1.63	1.63	1.62	1.62	1.61	1.61	1.61	1.60	1.60	1.60	1.60	1.60	58
59	1.72	1.72	1.71	1.70	1.70	1.69	1.69	1.68	1.68	1.67	1.67	1.67	1.67	1.66	1.66	1.66	59
60	1.79	1.79	1.78	1.77	1.76	1.76	1.75	1.75	1.75	1.74	1.74	1.74	1.73	1.73	1.73	1.73	60
61	1.87	1.86	1.85	1.84	1.84	1.83	1.83	1.82	1.82	1.81	1.81	1.81	1.81	1.81	1.80	1.80	61
62	1.95	1.94	1.93	1.92	1.92	1.91	1.90	1.90	1.89	1.89	1.89	1.89	1.88	1.88	1.88	1.88	62
63	2.03	2.02	2.01	2.01	2.00	1.99	1.99	1.98	1.98	1.97	1.97	1.97	1.97	1.96	1.96	1.96	63
DEC.	60m	56m	52m	48m	44m	40m	36m	32m	28m	24m	20m	16m	12m	08m	04m	00m	DEC.

6 hrs.

Table 34.

Longitude Correction
for 1' error of lat.



In North lat., Corr. +, Az. S. Corr. -, Az. N
 „ South „ „ +, „ N. „ -, „ S

AZIMUTH.														Incl.					
Lat.	5°	6°	7°	8°	9°	10°	11°	12°	13°	14°	15°	16°	17°		18°	19°	20°	21°	22°
60°	22.9	19.0	16.3	14.2	12.6	11.3	10.3	9.41	8.66	8.02	7.46	6.97	6.54	6.16	5.81	5.49	5.21	4.95	60°
61	23.6	19.6	16.8	14.7	13.0	11.7	10.6	9.70	8.93	8.27	7.70	7.19	6.75	6.35	5.99	5.67	5.37	5.11	61
62	24.3	20.3	17.3	15.2	13.4	12.1	11.0	10.0	9.23	8.54	7.95	7.43	6.97	6.56	6.19	5.85	5.55	5.27	62
63	25.2	21.0	17.9	15.7	13.9	12.5	11.3	10.4	9.54	8.83	8.22	7.68	7.20	6.78	6.40	6.05	5.74	5.45	63
64	26.1	21.7	18.6	16.2	14.4	12.9	11.7	10.7	9.88	9.15	8.51	7.96	7.46	7.02	6.63	6.27	5.94	5.65	64
65	27.0	22.5	19.3	16.8	14.9	13.4	12.2	11.1	10.2	9.49	8.83	8.25	7.74	7.28	6.87	6.50	6.16	5.86	65
66	28.1	23.4	20.0	17.5	15.5	13.9	12.6	11.6	10.6	9.86	9.18	8.57	8.04	7.57	7.14	6.75	6.40	6.09	66
67	29.2	24.3	20.8	18.2	16.2	14.5	13.2	12.0	11.1	10.3	9.55	8.93	8.37	7.88	7.43	7.03	6.67	6.33	67
68	30.5	25.4	21.7	19.0	16.9	15.1	13.7	12.6	11.6	10.7	9.96	9.31	8.73	8.22	7.75	7.33	6.95	6.61	68
69	31.9	26.6	22.7	19.9	17.6	15.8	14.4	13.1	12.1	11.2	10.4	9.73	9.13	8.59	8.10	7.67	7.27	6.91	69
70	33.4	27.8	23.8	20.8	18.5	16.6	15.0	13.8	12.7	11.7	10.9	10.2	9.56	9.00	8.49	8.03	7.62	7.24	70
71	35.1	29.2	25.0	21.9	19.4	17.4	15.8	14.5	13.3	12.3	11.5	10.7	10.0	9.45	8.92	8.44	8.00	7.60	71
72	37.0	30.8	26.4	23.0	20.4	18.4	16.6	15.2	14.0	13.0	12.1	11.3	10.6	9.96	9.40	8.89	8.43	8.01	72
73	39.1	32.5	27.9	24.3	21.6	19.4	17.6	16.1	14.8	13.7	12.8	11.9	11.2	10.5	9.93	9.40	8.91	8.47	73
74	41.5	34.5	29.6	25.8	22.9	20.6	18.7	17.1	15.7	14.6	13.5	12.7	11.9	11.2	10.5	9.97	9.45	8.98	74
75	44.2	36.8	31.5	27.5	24.4	21.9	19.9	18.2	16.7	15.5	14.4	13.5	12.6	11.9	11.2	10.6	10.1	9.56	75
76	47.2	39.3	33.7	29.4	26.1	23.4	21.3	19.4	17.9	16.6	15.4	14.4	13.5	12.7	12.0	11.4	10.8	10.2	76
77	50.8	42.3	36.2	31.6	28.1	25.1	22.9	20.9	19.3	17.8	16.6	15.5	14.5	13.7	12.9	12.2	11.6	11.0	77
78	55.0	45.8	39.2	34.2	30.4	27.3	24.7	22.6	20.8	19.3	18.0	16.8	15.7	14.8	14.0	13.2	12.5	11.9	78
79	59.9	49.9	42.7	37.3	33.1	29.7	27.0	24.7	22.7	21.0	19.6	18.3	17.1	16.1	15.2	14.4	13.7	13.0	79
80	65.8	54.8	46.9	41.0	36.4	32.7	29.6	27.1	24.9	23.1	21.5	20.1	18.8	17.7	16.7	15.8	15.0	14.3	80
81	73.0	60.8	52.1	45.5	40.4	36.3	32.9	30.1	27.7	25.6	23.9	22.3	20.9	19.7	18.6	17.6	16.7	15.8	81
82	82.1	68.4	58.5	51.1	45.4	40.7	37.0	33.8	31.1	28.8	26.8	25.1	23.5	22.1	20.9	19.7	18.7	17.8	82
Lat.	5°	6°	7°	8°	9°	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	21°	22°	Lat.

AZIMUTH.														Incl.					
Lat.	22°	23°	24°	25°	26°	27°	28°	29°	30°	31°	32°	33°	34°		35°	36°	37°	38°	39°
60°	4.95	4.71	4.49	4.29	4.10	3.93	3.76	3.61	3.46	3.33	3.20	3.08	2.96	2.86	2.75	2.65	2.56	2.47	60°
61	5.11	4.86	4.63	4.42	4.23	4.05	3.88	3.72	3.57	3.43	3.30	3.18	3.06	2.95	2.84	2.74	2.64	2.55	61
62	5.27	5.02	4.78	4.57	4.37	4.18	4.01	3.84	3.69	3.55	3.41	3.28	3.16	3.04	2.93	2.83	2.73	2.63	62
63	5.45	5.19	4.95	4.72	4.52	4.32	4.14	3.97	3.82	3.67	3.53	3.39	3.27	3.15	3.03	2.92	2.82	2.72	63
64	5.65	5.37	5.12	4.89	4.68	4.48	4.29	4.12	3.95	3.80	3.65	3.51	3.38	3.26	3.14	3.03	2.92	2.82	64
65	5.86	5.57	5.31	5.07	4.85	4.64	4.45	4.27	4.10	3.94	3.79	3.64	3.51	3.38	3.26	3.14	3.03	2.92	65
66	6.09	5.79	5.52	5.27	5.04	4.83	4.62	4.44	4.26	4.09	3.93	3.79	3.64	3.51	3.38	3.26	3.15	3.04	66
67	6.33	6.03	5.75	5.49	5.25	5.02	4.81	4.62	4.43	4.26	4.10	3.94	3.79	3.65	3.52	3.40	3.28	3.16	67
68	6.61	6.29	6.00	5.72	5.47	5.24	5.02	4.82	4.62	4.44	4.27	4.11	3.96	3.81	3.67	3.54	3.42	3.30	68
69	6.91	6.57	6.27	5.98	5.72	5.48	5.25	5.03	4.83	4.64	4.47	4.30	4.14	3.99	3.84	3.70	3.57	3.45	69
70	7.24	6.89	6.57	6.27	5.99	5.74	5.50	5.27	5.06	4.87	4.68	4.50	4.33	4.18	4.02	3.88	3.74	3.61	70
71	7.60	7.24	6.90	6.59	6.30	6.03	5.78	5.54	5.32	5.11	4.92	4.73	4.55	4.39	4.23	4.08	3.93	3.79	71
72	8.01	7.62	7.26	6.94	6.64	6.35	6.09	5.84	5.60	5.39	5.18	4.98	4.80	4.62	4.45	4.29	4.14	4.00	72
73	8.47	8.06	7.68	7.33	7.01	6.71	6.43	6.17	5.92	5.69	5.47	5.27	5.07	4.88	4.71	4.54	4.38	4.22	73
74	8.98	8.55	8.15	7.78	7.44	7.12	6.82	6.54	6.28	6.04	5.81	5.59	5.38	5.18	4.99	4.81	4.64	4.48	74
75	9.56	9.10	8.68	8.29	7.92	7.58	7.27	6.97	6.69	6.43	6.18	5.95	5.73	5.52	5.32	5.13	4.95	4.77	75
76	10.2	9.74	9.28	8.86	8.48	8.11	7.77	7.46	7.16	6.88	6.62	6.36	6.13	5.90	5.69	5.49	5.29	5.10	76
77	11.0	10.5	9.98	9.53	9.11	8.72	8.36	8.02	7.70	7.40	7.11	6.85	6.59	6.35	6.12	5.90	5.69	5.49	77
78	11.9	11.3	10.8	10.3	9.86	9.44	9.05	8.68	8.33	8.00	7.70	7.41	7.13	6.87	6.62	6.38	6.16	5.94	78
79	13.0	12.3	11.8	11.2	10.7	10.3	9.86	9.45	9.08	8.72	8.39	8.07	7.77	7.48	7.21	6.95	6.71	6.47	79
80	14.3	13.6	12.9	12.3	11.8	11.3	10.8	10.4	9.97	9.58	9.22	8.87	8.54	8.22	7.93	7.64	7.37	7.11	80
81	15.8	15.1	14.4	13.7	13.1	12.5	12.0	11.5	11.1	10.6	10.2	9.84	9.48	9.13	8.80	8.48	8.18	7.89	81
82	17.8	16.9	16.1	15.4	14.7	14.1	13.5	13.0	12.4	12.0	11.5	11.1	10.7	10.3	9.89	9.54	9.20	8.87	82
Lat.	22°	23°	24°	25°	26°	27°	28°	29°	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	Lat.

Table 34.

Longitude Correction
for 1' error of lat.



In North lat., Corr. +, Az. S. Corr. -, Az. N
 „ South „ „ +, „ N. „ -, „ S

		AZIMUTH.																		
Lat.		39°	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	50°	51°	52°	53°	54°	55°	56°	Lat.
60°		2.47	2.38	2.30	2.22	2.14	2.07	2.00	1.93	1.87	1.80	1.74	1.68	1.62	1.56	1.51	1.45	1.40	1.35	60°
61		2.55	2.46	2.37	2.29	2.21	2.14	2.06	1.99	1.92	1.86	1.79	1.73	1.67	1.61	1.55	1.50	1.44	1.39	61
62		2.63	2.54	2.45	2.37	2.28	2.21	2.13	2.06	1.99	1.92	1.85	1.79	1.73	1.66	1.61	1.55	1.49	1.44	62
63		2.72	2.63	2.53	2.45	2.36	2.28	2.20	2.13	2.05	1.98	1.92	1.85	1.78	1.72	1.66	1.60	1.54	1.49	63
64		2.82	2.72	2.62	2.53	2.45	2.36	2.28	2.20	2.13	2.05	1.98	1.91	1.85	1.78	1.72	1.66	1.60	1.54	64
65		2.92	2.82	2.72	2.63	2.54	2.45	2.37	2.28	2.21	2.13	2.06	1.99	1.92	1.85	1.78	1.72	1.66	1.60	65
66		3.04	2.93	2.83	2.79	2.64	2.55	2.46	2.37	2.29	2.21	2.14	2.06	1.99	1.92	1.85	1.79	1.72	1.66	66
67		3.16	3.05	2.94	2.84	2.74	2.65	2.56	2.47	2.39	2.31	2.22	2.15	2.07	2.00	1.93	1.86	1.79	1.73	67
68		3.30	3.18	3.07	2.96	2.86	2.76	2.67	2.58	2.49	2.40	2.32	2.24	2.16	2.09	2.01	1.94	1.87	1.80	68
69		3.45	3.33	3.21	3.10	2.99	2.86	2.79	2.69	2.60	2.51	2.43	2.34	2.26	2.18	2.10	2.03	1.95	1.88	69
70		3.61	3.48	3.36	3.25	3.14	3.03	2.92	2.82	2.73	2.63	2.54	2.45	2.37	2.28	2.20	2.12	2.05	1.97	70
71		3.79	3.66	3.53	3.41	3.29	3.18	3.07	2.97	2.86	2.77	2.67	2.58	2.49	2.40	2.31	2.23	2.15	2.07	71
72		4.00	3.86	3.72	3.59	3.47	3.35	3.24	3.13	3.02	2.91	2.81	2.72	2.62	2.53	2.44	2.35	2.27	2.18	72
73		4.22	4.08	3.93	3.80	3.67	3.54	3.42	3.30	3.19	3.08	2.97	2.87	2.77	2.67	2.58	2.48	2.39	2.31	73
74		4.48	4.32	4.17	4.03	3.89	3.76	3.63	3.50	3.39	3.27	3.15	3.04	2.94	2.83	2.73	2.64	2.54	2.45	74
75		4.77	4.60	4.44	4.29	4.14	4.00	3.86	3.72	3.60	3.48	3.28	3.24	3.13	3.02	2.91	2.81	2.71	2.61	75
76		5.10	4.93	4.76	4.59	4.43	4.28	4.13	3.99	3.85	3.72	3.59	3.47	3.35	3.22	3.11	3.00	2.89	2.79	76
77		5.49	5.30	5.11	4.94	4.77	4.60	4.45	4.29	4.15	4.00	3.86	3.73	3.60	3.47	3.35	3.23	3.11	3.00	77
78		5.94	5.73	5.53	5.34	5.16	4.98	4.81	4.64	4.49	4.33	4.18	4.04	3.90	3.76	3.62	3.49	3.37	3.24	78
79		6.47	6.25	6.03	5.82	5.62	5.43	5.24	5.06	4.89	4.72	4.56	4.40	4.24	4.09	3.95	3.81	3.67	3.54	79
80		7.11	6.86	6.62	6.40	6.18	5.96	5.76	5.56	5.37	5.19	5.01	4.83	4.66	4.50	4.34	4.18	4.03	3.89	80
81		7.89	7.62	7.35	7.10	6.85	6.62	6.39	6.17	5.96	5.76	5.56	5.36	5.18	4.99	4.82	4.64	4.48	4.31	81
82		8.87	8.56	8.27	7.98	7.70	7.44	7.19	6.94	6.70	6.47	6.25	6.03	5.82	5.61	5.41	5.22	5.03	4.85	82
Lat.		39°	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	50°	51°	52°	53°	54°	55°	56°	Lat.

		AZIMUTH.																		
Lat.		56°	57°	58°	59°	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	71°	72°	73°	Lat.
60°		1.35	1.30	1.25	1.20	1.15	1.11	1.06	1.02	.98	.93	.89	.85	.81	.77	.73	.69	.65	.61	60°
61		1.39	1.34	1.29	1.24	1.19	1.14	1.10	1.05	1.01	.96	.92	.88	.83	.79	.75	.71	.67	.63	61
62		1.44	1.38	1.33	1.28	1.23	1.18	1.13	1.09	1.04	.99	.95	.90	.86	.82	.78	.73	.69	.65	62
63		1.49	1.43	1.38	1.32	1.27	1.22	1.17	1.12	1.07	1.03	.98	.93	.89	.85	.80	.76	.72	.67	63
64		1.54	1.48	1.43	1.37	1.32	1.26	1.21	1.16	1.11	1.06	1.02	.97	.92	.88	.83	.79	.74	.70	64
65		1.60	1.54	1.48	1.42	1.37	1.31	1.26	1.21	1.15	1.10	1.05	1.00	.96	.91	.86	.81	.77	.72	65
66		1.66	1.60	1.54	1.48	1.42	1.36	1.31	1.25	1.20	1.15	1.09	1.04	.99	.94	.89	.85	.80	.75	66
67		1.73	1.66	1.60	1.54	1.48	1.42	1.36	1.30	1.25	1.19	1.14	1.09	1.03	.98	.93	.88	.83	.78	67
68		1.80	1.73	1.67	1.60	1.54	1.48	1.42	1.36	1.30	1.24	1.19	1.13	1.08	1.02	.97	.92	.87	.82	68
69		1.88	1.81	1.74	1.68	1.61	1.55	1.48	1.42	1.36	1.30	1.24	1.18	1.13	1.07	1.02	.96	.91	.85	69
70		1.97	1.90	1.83	1.76	1.69	1.62	1.55	1.49	1.43	1.36	1.30	1.24	1.18	1.12	1.06	1.01	.95	.89	70
71		2.07	1.99	1.92	1.85	1.77	1.70	1.63	1.57	1.50	1.43	1.37	1.30	1.24	1.18	1.12	1.06	1.00	.94	71
72		2.18	2.10	2.02	1.94	1.87	1.79	1.72	1.65	1.58	1.51	1.44	1.37	1.31	1.24	1.18	1.11	1.05	.99	72
73		2.31	2.22	2.14	2.06	1.97	1.90	1.82	1.74	1.67	1.59	1.52	1.45	1.38	1.31	1.24	1.18	1.11	1.05	73
74		2.45	2.36	2.27	2.18	2.09	2.01	1.93	1.85	1.77	1.69	1.62	1.54	1.47	1.39	1.32	1.25	1.18	1.11	74
75		2.61	2.51	2.41	2.32	2.23	2.14	2.05	1.97	1.88	1.80	1.72	1.64	1.56	1.48	1.41	1.33	1.26	1.18	75
76		2.79	2.68	2.58	2.48	2.39	2.29	2.20	2.11	2.02	1.93	1.84	1.75	1.67	1.59	1.50	1.42	1.34	1.26	76
77		3.00	2.89	2.78	2.67	2.57	2.46	2.36	2.27	2.17	2.07	1.98	1.89	1.80	1.71	1.62	1.53	1.44	1.36	77
78		3.24	3.12	3.01	2.89	2.78	2.67	2.56	2.45	2.35	2.24	2.14	2.04	1.94	1.85	1.75	1.66	1.56	1.47	78
79		3.54	3.40	3.27	3.15	3.03	2.90	2.79	2.67	2.56	2.44	2.33	2.22	2.12	2.01	1.91	1.80	1.70	1.60	79
80		3.88	3.74	3.60	3.46	3.32	3.19	3.06	2.93	2.81	2.69	2.56	2.44	2.33	2.21	2.10	1.98	1.87	1.76	80
81		4.31	4.15	3.99	3.84	3.69	3.54	3.40	3.26	3.12	2.98	2.85	2.71	2.58	2.45	2.33	2.20	2.08	1.95	81
82		4.85	4.67	4.49	4.32	4.15	3.98	3.82	3.66	3.50	3.35	3.20	3.05	2.90	2.76	2.62	2.47	2.33	2.20	82
Lat.		56°	57°	58°	59°	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	71°	72°	73°	Lat.

Table 34.

Longitude Correction
for 1' error of lat.



In North lat., Corr. **+**, Az. S. Corr. **-**, Az. N
 „ South „ „ **+** „ N. „ **-** „ S

		AZIMUTH.																	
Lat.	73° 74°		75° 76°		77° 78°		79° 80°		81° 82°		83° 84°		85° 86°		87° 88°		89° 90°		Lat.
	60°	.61	.57	.54	.50	.46	.43	.39	.35	.32	.28	.25	.21	.18	.14	.10	.07	.03	
61	.63	.59	.55	.51	.48	.44	.40	.36	.33	.29	.25	.22	.18	.14	.11	.07	.04	0	61
62	.65	.61	.57	.53	.49	.45	.41	.38	.34	.30	.26	.22	.19	.15	.11	.07	.04	0	62
63	.67	.63	.59	.55	.51	.47	.43	.39	.35	.31	.27	.23	.19	.15	.12	.08	.04	0	63
64	.70	.65	.61	.57	.53	.49	.44	.40	.36	.32	.28	.24	.20	.16	.12	.08	.04	0	64
65	.72	.68	.63	.59	.55	.50	.46	.42	.37	.33	.29	.25	.21	.17	.12	.08	.04	0	65
66	.75	.71	.66	.61	.57	.52	.48	.43	.39	.35	.30	.26	.22	.17	.13	.09	.04	0	66
67	.78	.73	.69	.64	.59	.54	.50	.45	.41	.36	.31	.27	.22	.18	.13	.09	.04	0	67
68	.82	.77	.72	.67	.62	.57	.52	.47	.42	.38	.33	.28	.23	.19	.14	.09	.05	0	68
69	.85	.80	.75	.70	.64	.59	.54	.49	.44	.39	.34	.29	.24	.20	.15	.10	.05	0	69
70	.89	.84	.78	.73	.68	.62	.57	.52	.46	.41	.36	.31	.26	.20	.15	.10	.05	0	70
71	.94	.88	.82	.77	.71	.65	.60	.54	.49	.43	.38	.32	.27	.21	.16	.11	.05	0	71
72	.99	.93	.87	.81	.75	.69	.63	.57	.51	.45	.40	.34	.28	.23	.17	.11	.06	0	72
73	1.05	.98	.92	.85	.79	.73	.66	.60	.54	.48	.42	.36	.30	.24	.18	.12	.06	0	73
74	1.11	1.04	.97	.90	.84	.77	.71	.64	.57	.51	.45	.38	.32	.25	.19	.13	.06	0	74
75	1.18	1.11	1.04	.96	.89	.82	.75	.68	.61	.54	.47	.41	.34	.27	.20	.13	.07	0	75
76	1.26	1.19	1.11	1.03	.95	.88	.80	.73	.65	.58	.51	.43	.36	.29	.22	.14	.07	0	76
77	1.36	1.27	1.19	1.11	1.03	.94	.86	.78	.70	.62	.55	.47	.39	.31	.23	.16	.08	0	77
78	1.47	1.38	1.29	1.20	1.11	1.02	.93	.85	.76	.68	.59	.51	.42	.34	.25	.17	.08	0	78
79	1.60	1.50	1.40	1.31	1.21	1.11	1.02	.92	.83	.74	.64	.55	.46	.37	.27	.18	.09	8	79
80	1.76	1.65	1.54	1.44	1.33	1.22	1.12	1.02	.91	.81	.71	.61	.50	.40	.30	.20	.10	0	80
81	1.95	1.83	1.71	1.59	1.48	1.36	1.24	1.13	1.01	.90	.78	.67	.56	.45	.34	.22	.11	0	81
82	2.20	2.06	1.93	1.79	1.66	1.53	1.40	1.27	1.14	1.01	.88	.76	.63	.50	.38	.25	.13	0	82
Lat.	73° 74°	75° 76°	77° 78°	79° 80°	81° 82°	83° 84°	85° 86°	87° 88°	89° 90°	Lat.									

**TABLE OF
PROPORTIONAL PARTS**
for interpolating
A, B and C VALUES.

Diff. per Degree	Minutes of Latitude, Declination or Azimuth.											Diff. per Degree
	5	10	15	20	25	30	35	40	45	50	55	
2	0	0	0	1	1	1	1	1	1	2	2	2
4	0	1	1	1	1	2	2	3	3	3	4	4
6	0	1	1	2	2	3	3	4	4	5	6	6
8	1	1	2	3	3	4	5	5	6	7	7	8
10	1	2	2	3	4	5	6	7	7	8	9	10
12	1	2	3	4	5	6	7	8	9	10	11	12
14	1	2	3	5	6	7	8	9	10	12	13	14
16	1	3	4	5	7	8	9	11	12	13	15	16
18	1	3	4	6	7	9	10	12	13	15	16	18
20	2	3	5	7	8	10	12	13	15	17	18	20
22	2	4	5	7	9	11	13	15	16	18	20	22
24	2	4	6	8	10	12	14	16	18	20	22	24
26	2	4	6	9	11	13	15	17	19	22	24	26
28	2	5	7	9	12	14	16	19	21	23	25	28
30	2	5	7	10	12	15	17	20	22	25	27	30
32	3	5	8	10	13	16	19	21	24	27	29	32
34	3	6	8	11	14	17	20	23	25	28	31	34
36	3	6	9	12	15	18	21	24	27	30	33	36
38	3	6	9	13	16	19	22	25	28	32	35	38
40	3	7	10	13	17	20	23	27	30	33	37	40
42	3	7	10	14	17	21	24	28	31	35	38	42
44	4	7	11	15	18	22	26	29	33	37	40	44
46	4	8	11	15	19	23	27	31	34	38	42	46
48	4	8	12	16	20	24	28	32	36	40	44	48
50	4	8	12	17	21	25	29	33	37	42	46	50
Diff. per 4m	20s	40s	1m	20s	40s	2m	20s	40s	3m	20s	40s	Diff. per 4m
Minutes and Seconds of Time.												

For the general purposes of navigation it will be found sufficiently accurate to employ two decimal places only, when working the A, B, and C Tables; in which case interpolation presents no difficulty, and can generally be done at a glance.

Where, however, for academic or other purposes, a more exact result is required, the process of interpolation can be greatly facilitated by the use of the above table. The figures in the body of this table represent differences in the values A, B or C between the tabulated values and the actual values.

Example :

Given H.A. $4^{\circ}46^m$ Lat. $67^{\circ}15' N.$ Dec. $40^{\circ}20' N.$	From Tables					
	A	B				
	Lat.	44^m	48^m	Dec.	44^m	48^m
Then, reckoning from H.A. $4^{\circ}44^m$, Lat. 67° Dec. 40°	67°	.811	.766	40°	.887	.882
	68	.852	.804	41	.919	.914

$$A = .811 + 10 \text{ (for } 15') - 22 \text{ (for } 2^m) = .799 +$$

$$B = .887 + 10 \text{ (for } 20') - 2 \text{ (for } 2^m) = .895 -$$

$$C = .096 - = \text{Az. } N88^{\circ} -$$

In the above case C requires no interpolation. In cases where C does, however, the process is slightly different. Thus, the actual "Value C" must first be adjusted (by the Table) so as to correspond to an even degree of latitude. It is then easily interpolated for Azimuth.

Example :

Given Lat. $77^{\circ}25'$, $C = 3.88$

First Adjust C for Lat 77° —

Thus $3.88 - 13 \text{ (for } 25') = 3.75 \text{ (C for Lat } 77^{\circ})$.

Thence in Lat. 77° , $3.75 = 50^{\circ} - 10' = \text{Az. } 49^{\circ}50'$

From Tables

Lat.	49°	50°
77°	3.86	3.73
78	4.18	4.04