ENSM
ÉCOLE NATIONALE SUPÉRIEURE MARITIME

Eléments de calculs

Nautical Almanac
et
HO229 – Sight reductiontables for Marine Naviataion

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Première partie

Nautical Almanac - Extraits

ALTITUDE CORRECTION TABLES 10°-90°—SUN, STARS, PLANETS

OCT.—MAR. SUN			APR.—SEPT.		
App. Alt.	Lower Limb	Upper Limb	App. Alt.	Lower Limb	Upper Limb
° ′	′	′	° ′	′	′
9 34	+10·8	−21·5	9 39	+10·6	−21·2
9 45	+10·9	−21·4	9 51	+10·7	−21·1
9 56	+11·0	−21·3	10 03	+10·8	−21·0
10 08	+11·1	−21·2	10 15	+10·9	−20·9
10 21	+11·2	−21·1	10 27	+11·0	−20·8
10 34	+11·3	−21·0	10 40	+11·1	−20·7
10 47	+11·4	−20·9	10 54	+11·2	−20·6
11 01	+11·5	−20·8	11 08	+11·3	−20·5
11 15	+11·6	−20·7	11 23	+11·4	−20·4
11 30	+11·7	−20·6	11 38	+11·5	−20·3
11 46	+11·8	−20·5	11 54	+11·6	−20·2
12 02	+11·9	−20·4	12 10	+11·7	−20·1
12 19	+12·0	−20·3	12 28	+11·8	−20·0
12 37	+12·1	−20·2	12 46	+11·9	−19·9
12 55	+12·2	−20·1	13 05	+12·0	−19·8
13 14	+12·3	−20·0	13 24	+12·1	−19·7
13 35	+12·4	−19·9	13 45	+12·2	−19·6
13 56	+12·5	−19·8	14 07	+12·3	−19·5
14 18	+12·6	−19·7	14 30	+12·4	−19·4
14 42	+12·7	−19·6	14 54	+12·5	−19·3
15 06	+12·8	−19·5	15 19	+12·6	−19·2
15 32	+12·9	−19·4	15 46	+12·7	−19·1
15 59	+13·0	−19·3	16 14	+12·8	−19·0
16 28	+13·1	−19·2	16 44	+12·9	−18·9
16 59	+13·2	−19·1	17 15	+13·0	−18·8
17 32	+13·3	−19·0	17 48	+13·1	−18·7
18 06	+13·4	−18·9	18 24	+13·2	−18·6
18 42	+13·5	−18·8	19 01	+13·3	−18·5
19 21	+13·6	−18·7	19 42	+13·4	−18·4
20 03	+13·7	−18·6	20 25	+13·5	−18·3
20 48	+13·8	−18·5	21 11	+13·6	−18·2
21 35	+13·9	−18·4	22 00	+13·7	−18·1
22 26	+14·0	−18·3	22 54	+13·8	−18·0
23 22	+14·1	−18·2	23 51	+13·9	−17·9
24 21	+14·2	−18·1	24 53	+14·0	−17·8
25 26	+14·3	−18·0	26 00	+14·1	−17·7
26 36	+14·4	−17·9	27 13	+14·2	−17·6
27 52	+14·5	−17·8	28 33	+14·3	−17·5
29 15	+14·6	−17·7	30 00	+14·4	−17·4
30 46	+14·7	−17·6	31 35	+14·5	−17·3
32 26	+14·8	−17·5	33 20	+14·6	−17·2
34 17	+14·9	−17·4	35 17	+14·7	−17·1
36 20	+15·0	−17·3	37 26	+14·8	−17·0
38 36	+15·1	−17·2	39 50	+14·9	−16·9
41 08	+15·2	−17·1	42 31	+15·0	−16·8
43 59	+15·3	−17·0	45 31	+15·1	−16·7
47 10	+15·4	−16·9	48 55	+15·2	−16·6
50 46	+15·5	−16·8	52 44	+15·3	−16·5
54 49	+15·6	−16·7	57 02	+15·4	−16·4
59 23	+15·7	−16·6	61 51	+15·5	−16·3
64 30	+15·8	−16·5	67 17	+15·6	−16·2
70 12	+15·9	−16·4	73 16	+15·7	−16·1
76 26	+16·0	−16·3	79 43	+15·8	−16·0
83 05	+16·1	−16·2	86 32	+15·9	−15·9
90 00			90 00		

STARS AND PLANETS	
App. Alt.	Corrⁿ
° ′	′
9 56	−5·3
10 08	−5·2
10 20	−5·1
10 33	−5·0
10 46	−4·9
11 00	−4·8
11 14	−4·7
11 29	−4·6
11 45	−4·5
12 01	−4·4
12 18	−4·3
12 35	−4·2
12 54	−4·1
13 13	−4·0
13 33	−3·9
13 54	−3·8
14 16	−3·7
14 40	−3·6
15 04	−3·5
15 30	−3·4
15 57	−3·3
16 26	−3·2
16 56	−3·1
17 28	−3·0
18 02	−2·9
18 38	−2·8
19 17	−2·7
19 58	−2·6
20 42	−2·5
21 28	−2·4
22 19	−2·3
23 13	−2·2
24 11	−2·1
25 14	−2·0
26 22	−1·9
27 36	−1·8
28 56	−1·7
30 24	−1·6
32 00	−1·5
33 45	−1·4
35 40	−1·3
37 48	−1·2
40 08	−1·1
42 44	−1·0
45 36	−0·9
48 47	−0·8
52 18	−0·7
56 11	−0·6
60 28	−0·5
65 08	−0·4
70 11	−0·3
75 34	−0·2
81 13	−0·1
87 03	0·0
90 00	

App. Alt.	Additional Corrⁿ
2003	
VENUS	
Jan. 1–Feb. 20	
°	′
0	+0·2
41	+0·1
76	
Feb. 21–Dec. 31	
°	′
0	+0·1
60	
MARS	
Jan. 1–May 2	
Dec. 17–Dec. 31	
°	′
0	+0·1
60	
May 3–June 26	
Oct. 26–Dec. 16	
°	′
0	+0·2
41	+0·1
76	
June 27–Aug. 1	
Sept. 23–Oct. 25	
°	′
0	+0·3
34	+0·2
60	+0·1
80	
Aug. 2–Sept. 22	
°	′
0	+0·4
29	+0·3
51	+0·2
68	+0·1
83	

DIP				
Ht. of Eye	Corrⁿ	Ht. of Eye	Ht. of Eye	Corrⁿ
m	′	ft.	m	′
2·4	−2·8	8·0	1·0	−1·8
2·6	−2·9	8·6	1·5	−2·2
2·8	−3·0	9·2	2·0	−2·5
3·0	−3·1	9·8	2·5	−2·8
3·2	−3·2	10·5	3·0	−3·0
3·4	−3·3	11·2	See table ←	
3·6	−3·4	11·9		
3·8	−3·5	12·6		
4·0	−3·6	13·3	m	′
4·3	−3·7	14·1	20	−7·9
4·5	−3·8	14·9	22	−8·3
4·7	−3·9	15·7	24	−8·6
5·0	−4·0	16·5	26	−9·0
5·2	−4·1	17·4	28	−9·3
5·5	−4·2	18·3		
5·8	−4·3	19·1	30	−9·6
6·1	−4·4	20·1	32	−10·0
6·3	−4·5	21·0	34	−10·3
6·6	−4·6	22·0	36	−10·6
6·9	−4·7	22·9	38	−10·8
7·2	−4·8	23·9		
7·5	−4·9	24·9	40	−11·1
7·9	−5·0	26·0	42	−11·4
8·2	−5·1	27·1	44	−11·7
8·5	−5·2	28·1	46	−11·9
8·8	−5·3	29·2	48	−12·2
9·2	−5·4	30·4	ft.	′
9·5	−5·5	31·5	2	−1·4
9·9	−5·6	32·7	4	−1·9
10·3	−5·7	33·9	6	−2·4
10·6	−5·8	35·1	8	−2·7
11·0	−5·9	36·3	10	−3·1
11·4	−6·0	37·6	See table ←	
11·8	−6·1	38·9		
12·2	−6·2	40·1	ft.	′
12·6	−6·3	41·5	70	−8·1
13·0	−6·4	42·8	75	−8·4
13·4	−6·5	44·2	80	−8·7
13·8	−6·6	45·5	85	−8·9
14·2	−6·7	46·9	90	−9·2
14·7	−6·8	48·4	95	−9·5
15·1	−6·9	49·8		
15·5	−7·0	51·3	100	−9·7
16·0	−7·1	52·8	105	−9·9
16·5	−7·2	54·3	110	−10·2
16·9	−7·3	55·8	115	−10·4
17·4	−7·4	57·4	120	−10·6
17·9	−7·5	58·9	125	−10·8
18·4	−7·6	60·5		
18·8	−7·7	62·1	130	−11·1
19·3	−7·8	63·8	135	−11·3
19·8	−7·9	65·4	140	−11·5
20·4	−8·0	67·1	145	−11·7
20·9	−8·1	68·8	150	−11·9
21·4		70·5	155	−12·1

App. Alt. = Apparent altitude = Sextant altitude corrected for index error and dip.

App. Alt.	SUN OCT.—MAR. Lower Limb	SUN OCT.—MAR. Upper Limb	SUN APR.—SEPT. Lower Limb	SUN APR.—SEPT. Upper Limb	STARS PLANETS
° ′	′	′	′	′	′
0 00	−17·5	−49·8	−17·8	−49·6	−33·8
0 03	16·9	49·2	17·2	49·0	33·2
0 06	16·3	48·6	16·6	48·4	32·6
0 09	15·7	48·0	16·0	47·8	32·0
0 12	15·2	47·5	15·4	47·2	31·5
0 15	14·6	46·9	14·8	46·6	30·9
0 18	−14·1	−46·4	−14·3	−46·1	−30·4
0 21	13·5	45·8	13·8	45·6	29·8
0 24	13·0	45·3	13·3	45·1	29·3
0 27	12·5	44·8	12·8	44·6	28·8
0 30	12·0	44·3	12·3	44·1	28·3
0 33	11·6	43·9	11·8	43·6	27·9
0 36	−11·1	−43·4	−11·3	−43·1	−27·4
0 39	10·6	42·9	10·9	42·7	26·9
0 42	10·2	42·5	10·5	42·3	26·5
0 45	9·8	42·1	10·0	41·8	26·1
0 48	9·4	41·7	9·6	41·4	25·7
0 51	9·0	41·3	9·2	41·0	25·3
0 54	−8·6	−40·9	−8·8	−40·6	−24·9
0 57	8·2	40·5	8·4	40·2	24·5
1 00	7·8	40·1	8·0	39·8	24·1
1 03	7·4	39·7	7·7	39·5	23·7
1 06	7·1	39·4	7·3	39·1	23·4
1 09	6·7	39·0	7·0	38·8	23·0
1 12	−6·4	−38·7	−6·6	−38·4	−22·7
1 15	6·0	38·3	6·3	38·1	22·3
1 18	5·7	38·0	6·0	37·8	22·0
1 21	5·4	37·7	5·7	37·5	21·7
1 24	5·1	37·4	5·3	37·1	21·4
1 27	4·8	37·1	5·0	36·8	21·1
1 30	−4·5	−36·8	−4·7	−36·5	−20·8
1 35	4·0	36·3	4·3	36·1	20·3
1 40	3·6	35·9	3·8	35·6	19·9
1 45	3·1	35·4	3·4	35·2	19·4
1 50	2·7	35·0	2·9	34·7	19·0
1 55	2·3	34·6	2·5	34·3	18·6
2 00	−1·9	−34·2	−2·1	−33·9	−18·2
2 05	1·5	33·8	1·7	33·5	17·8
2 10	1·1	33·4	1·4	33·2	17·4
2 15	0·8	33·1	1·0	32·8	17·1
2 20	0·4	32·7	0·7	32·5	16·7
2 25	−0·1	32·4	−0·3	32·1	16·4
2 30	+0·2	−32·1	0·0	−31·8	−16·1
2 35	0·5	31·8	+0·3	31·5	15·8
2 40	0·8	31·5	0·6	31·2	15·4
2 45	1·1	31·2	0·9	30·9	15·2
2 50	1·4	30·9	1·2	30·6	14·9
2 55	1·7	30·6	1·4	30·4	14·6
3 00	+2·0	−30·3	+1·7	−30·1	−14·3
3 05	2·2	30·1	2·0	29·8	14·1
3 10	2·5	29·8	2·2	29·6	13·8
3 15	2·7	29·6	2·5	29·3	13·6
3 20	2·9	29·4	2·7	29·1	13·4
3 25	3·2	29·1	2·9	28·9	13·1
3 30	+3·4	−28·9	+3·1	−28·7	−12·9

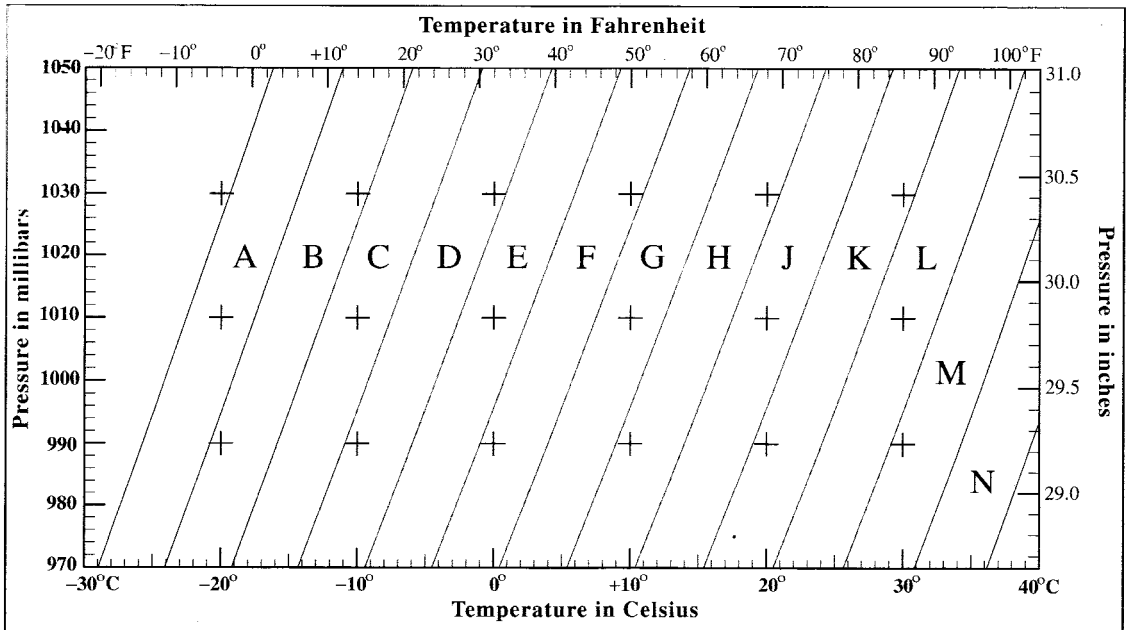
App. Alt.	SUN OCT.—MAR. Lower Limb	SUN OCT.—MAR. Upper Limb	SUN APR.—SEPT. Lower Limb	SUN APR.—SEPT. Upper Limb	STARS PLANETS
° ′	′	′	′	′	′
3 30	+3·4	−28·9	+3·1	−28·7	−12·9
3 35	3·6	28·7	3·3	28·5	12·7
3 40	3·8	28·5	3·6	28·2	12·5
3 45	4·0	28·3	3·8	28·0	12·3
3 50	4·2	28·1	4·0	27·8	12·1
3 55	4·4	27·9	4·1	27·7	11·9
4 00	+4·6	−27·7	+4·3	−27·5	−11·7
4 05	4·8	27·5	4·5	27·3	11·5
4 10	4·9	27·4	4·7	27·1	11·4
4 15	5·1	27·2	4·9	26·9	11·2
4 20	5·3	27·0	5·0	26·8	11·0
4 25	5·4	26·9	5·2	26·6	10·9
4 30	+5·6	−26·7	+5·3	−26·5	−10·7
4 35	5·7	26·6	5·5	26·3	10·6
4 40	5·9	26·4	5·6	26·2	10·4
4 45	6·0	26·3	5·8	26·0	10·3
4 50	6·2	26·1	5·9	25·9	10·1
4 55	6·3	26·0	6·1	25·7	10·0
5 00	+6·4	−25·9	+6·2	−25·6	−9·8
5 05	6·6	25·7	6·3	25·5	9·7
5 10	6·7	25·6	6·5	25·3	9·6
5 15	6·8	25·5	6·6	25·2	9·5
5 20	7·0	25·3	6·7	25·1	9·3
5 25	7·1	25·2	6·8	25·0	9·2
5 30	+7·2	−25·1	+6·9	−24·9	−9·1
5 35	7·3	25·0	7·1	24·7	9·0
5 40	7·4	24·9	7·2	24·6	8·9
5 45	7·5	24·8	7·3	24·5	8·8
5 50	7·6	24·7	7·4	24·4	8·7
5 55	7·7	24·6	7·5	24·3	8·6
6 00	+7·8	−24·5	+7·6	−24·2	−8·5
6 10	8·0	24·3	7·8	24·0	8·3
6 20	8·2	24·1	8·0	23·8	8·1
6 30	8·4	23·9	8·2	23·6	7·9
6 40	8·6	23·7	8·3	23·5	7·7
6 50	8·7	23·6	8·5	23·3	7·6
7 00	+8·9	−23·4	+8·7	−23·1	−7·4
7 10	9·1	23·2	8·8	23·0	7·2
7 20	9·2	23·1	9·0	22·8	7·1
7 30	9·3	23·0	9·1	22·7	6·9
7 40	9·5	22·8	9·2	22·6	6·8
7 50	9·6	22·7	9·4	22·4	6·7
8 00	+9·7	−22·6	+9·5	−22·3	−6·6
8 10	9·9	22·4	9·6	22·2	6·4
8 20	10·0	22·3	9·7	22·1	6·3
8 30	10·1	22·2	9·9	21·9	6·2
8 40	10·2	22·1	10·0	21·8	6·1
8 50	10·3	22·0	10·1	21·7	6·0
9 00	+10·4	−21·9	+10·2	−21·6	−5·9
9 10	10·5	21·8	10·3	21·5	5·8
9 20	10·6	21·7	10·4	21·4	5·7
9 30	10·7	21·6	10·5	21·3	5·6
9 40	10·8	21·5	10·6	21·2	5·5
9 50	10·9	21·4	10·6	21·2	5·4
10 00	+11·0	−21·3	+10·7	−21·1	−5·3

Additional corrections for temperature and pressure are given on the following page.

For bubble sextant observations ignore dip and use the star corrections for Sun, planets and stars.

A4 ALTITUDE CORRECTION TABLES—ADDITIONAL CORRECTIONS

ADDITIONAL REFRACTION CORRECTIONS FOR NON-STANDARD CONDITIONS



App. Alt.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	App. Alt.
° ′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	° ′
00 00	−7·3	−5·9	−4·6	−3·4	−2·2	−1·1	0·0	+1·0	+2·0	+3·0	+4·0	+4·9	+5·9	+6·9	00 00
00 30	5·5	4·5	3·5	2·6	1·7	0·8	0·0	0·8	1·6	2·3	3·1	3·8	4·5	5·3	00 30
01 00	4·4	3·5	2·8	2·0	1·3	0·7	0·0	0·6	1·2	1·8	2·4	3·0	3·6	4·2	01 00
01 30	3·5	2·9	2·2	1·7	1·1	0·5	0·0	0·5	1·0	1·5	2·0	2·5	2·9	3·4	01 30
02 00	2·9	2·4	1·9	1·4	0·9	0·4	0·0	0·4	0·8	1·3	1·7	2·0	2·4	2·8	02 00
02 30	−2·5	−2·0	−1·6	−1·2	−0·8	−0·4	0·0	+0·4	+0·7	+1·1	+1·4	+1·7	+2·1	+2·4	02 30
03 00	2·1	1·7	1·4	1·0	0·7	0·3	0·0	0·3	0·6	0·9	1·2	1·5	1·8	2·1	03 00
03 30	1·9	1·5	1·2	0·9	0·6	0·3	0·0	0·3	0·5	0·8	1·1	1·3	1·6	1·8	03 30
04 00	1·6	1·3	1·1	0·8	0·5	0·3	0·0	0·2	0·5	0·7	0·9	1·2	1·4	1·6	04 00
04 30	1·5	1·2	0·9	0·7	0·5	0·2	0·0	0·2	0·4	0·6	0·8	1·0	1·3	1·5	04 30
05 00	−1·3	−1·1	−0·9	−0·6	−0·4	−0·2	0·0	+0·2	+0·4	+0·6	+0·8	+0·9	+1·1	+1·3	05 00
06	1·1	0·9	0·7	0·5	0·3	0·2	0·0	0·2	0·3	0·5	0·6	0·8	0·9	1·1	06
07	1·0	0·8	0·6	0·5	0·3	0·1	0·0	0·1	0·3	0·4	0·5	0·7	0·8	0·9	07
08	0·8	0·7	0·5	0·4	0·3	0·1	0·0	0·1	0·2	0·4	0·5	0·6	0·7	0·8	08
09	0·7	0·6	0·5	0·4	0·2	0·1	0·0	0·1	0·2	0·3	0·4	0·5	0·6	0·7	09
10 00	−0·7	−0·5	−0·4	−0·3	−0·2	−0·1	0·0	+0·1	+0·2	+0·3	+0·4	+0·5	+0·6	+0·7	10 00
12	0·6	0·5	0·4	0·3	0·2	0·1	0·0	0·1	0·2	0·2	0·3	0·4	0·5	0·5	12
14	0·5	0·4	0·3	0·2	0·1	0·1	0·0	0·1	0·1	0·2	0·3	0·3	0·4	0·5	14
16	0·4	0·3	0·3	0·2	0·1	0·1	0·0	0·1	0·1	0·2	0·2	0·3	0·3	0·4	16
18	0·4	0·3	0·2	0·2	0·1	−0·1	0·0	+0·1	0·1	0·2	0·2	0·3	0·3	0·4	18
20 00	−0·3	−0·3	−0·2	−0·2	−0·1	0·0	0·0	0·0	+0·1	+0·1	+0·2	+0·2	+0·3	+0·3	20 00
25	0·3	0·2	0·2	0·1	0·1	0·0	0·0	0·0	0·1	0·1	0·1	0·2	0·2	0·2	25
30	0·2	0·2	0·1	0·1	0·1	0·0	0·0	0·0	+0·1	0·1	0·1	0·1	0·2	0·2	30
35	0·2	0·1	0·1	0·1	−0·1	0·0	0·0	0·0	0·0	0·1	0·1	0·1	0·1	0·2	35
40	0·1	0·1	0·1	−0·1	0·0	0·0	0·0	0·0	0·0	+0·1	0·1	0·1	0·1	0·1	40
50 00	−0·1	−0·1	−0·1	0·0	0·0	0·0	0·0	0·0	0·0	0·0	+0·1	+0·1	+0·1	+0·1	50 00

The graph is entered with arguments temperature and pressure to find a zone letter; using as arguments this zone letter and apparent altitude (sextant altitude corrected for index error and dip), a correction is taken from the table. This correction is to be applied to the sextant altitude in addition to the corrections for standard conditions (for the Sun, stars and planets from page A2-A3 and for the Moon from pages xxxiv and xxxv).

h Sun Moon

Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°54.7	18°11.2	107°28.2	9.5	16°08.1	-5.2	57.3
1	195°54.7	18°11.9	121°56.7	9.6	16°02.9	-5.3	57.3
2	210°54.7	18°12.5	136°25.3	9.6	15°57.5	-5.4	57.2
3	225°54.7	18°13.1	150°54.0	9.7	15°52.1	-5.4	57.2
4	240°54.7	18°13.7	165°22.7	9.8	15°46.6	-5.5	57.2
5	255°54.7	18°14.4	179°51.6	9.9	15°41.1	-5.6	57.1
6	270°54.7	18°15.0	194°20.5	9.9	15°35.4	-5.7	57.1
7	285°54.8	18°15.6	208°49.4	10.0	15°29.7	-5.8	57.0
8	300°54.8	18°16.2	223°18.5	10.1	15°23.9	-5.8	57.0
9	315°54.8	18°16.8	237°47.6	10.2	15°18.0	-5.9	57.0
10	330°54.8	18°17.5	252°16.8	10.2	15°12.1	-6.0	56.9
11	345°54.8	18°18.1	266°46.1	10.3	15°06.1	-6.1	56.9
12	0°54.8	18°18.7	281°15.4	10.4	14°60.0	-6.1	56.9
13	15°54.8	18°19.3	295°44.9	10.5	14°53.8	-6.2	56.8
14	30°54.8	18°19.9	310°14.4	10.5	14°47.6	-6.3	56.8
15	45°54.8	18°20.6	324°44.0	10.6	14°41.3	-6.3	56.7
16	60°54.8	18°21.2	339°13.6	10.7	14°34.9	-6.4	56.7
17	75°54.8	18°21.8	353°43.3	10.8	14°28.5	-6.5	56.7
18	90°54.8	18°22.4	8°13.2	10.8	14°22.0	-6.5	56.6
19	105°54.8	18°23.0	22°43.0	10.9	14°15.4	-6.6	56.6
20	120°54.8	18°23.6	37°13.0	11.0	14°08.8	-6.7	56.6
21	135°54.8	18°24.3	51°43.0	11.1	14°02.1	-6.7	56.5
22	150°54.9	18°24.9	66°13.1	11.1	13°55.3	-6.8	56.5
23	165°54.9	18°25.5	80°43.3	11.2	13°48.5	-6.9	56.5
	SD.=15.8	d=0.6	S.D.=15.6				

Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°54.9	18°26.1	95°13.5	11.3	13°41.6	-6.9	56.4
1	195°54.9	18°26.7	109°43.8	11.3	13°34.7	-7.0	56.4
2	210°54.9	18°27.3	124°14.2	11.4	13°27.6	-7.0	56.4
3	225°54.9	18°27.9	138°44.7	11.5	13°20.6	-7.1	56.3
4	240°54.9	18°28.6	153°15.2	11.6	13°13.5	-7.2	56.3
5	255°54.9	18°29.2	167°45.8	11.6	13°06.3	-7.2	56.3
6	270°54.9	18°29.8	182°16.5	11.7	12°59.0	-7.3	56.2
7	285°54.9	18°30.4	196°47.2	11.8	12°51.7	-7.3	56.2
8	300°54.9	18°31.0	211°18.0	11.8	12°44.4	-7.4	56.2
9	315°54.9	18°31.6	225°48.9	11.9	12°37.0	-7.4	56.1
10	330°54.9	18°32.2	240°19.8	12.0	12°29.5	-7.5	56.1
11	345°54.9	18°32.8	254°50.8	12.0	12°22.0	-7.5	56.1
12	0°54.9	18°33.4	269°21.9	12.1	12°14.5	-7.6	56.0
13	15°54.9	18°34.0	283°53.0	12.2	12°06.9	-7.6	56.0
14	30°54.9	18°34.6	298°24.2	12.2	11°59.2	-7.7	56.0
15	45°54.9	18°35.2	312°55.5	12.3	11°51.5	-7.7	55.9
16	60°54.9	18°35.9	327°26.8	12.4	11°43.8	-7.8	55.9
17	75°54.9	18°36.5	341°58.2	12.4	11°36.0	-7.8	55.9
18	90°54.9	18°37.1	356°29.7	12.5	11°28.1	-7.9	55.8
19	105°54.9	18°37.7	11°01.2	12.6	11°20.2	-7.9	55.8
20	120°54.9	18°38.3	25°32.8	12.6	11°12.3	-8.0	55.8
21	135°54.9	18°38.9	40°04.5	12.7	11°04.3	-8.0	55.8
22	150°54.9	18°39.5	54°36.2	12.7	10°56.3	-8.0	55.7
23	165°54.9	18°40.1	69°07.9	12.8	10°48.2	-8.1	55.7
	SD.=15.8	d=0.6	S.D.=15.4				

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	180°54.9	18°40.7	83°39.8	12.9	10°40.1	-8.1	55.7
1	195°54.9	18°41.3	98°11.6	12.9	10°31.9	-8.2	55.6
2	210°54.9	18°41.9	112°43.6	13.0	10°23.7	-8.2	55.6
3	225°54.9	18°42.5	127°15.6	13.0	10°15.5	-8.3	55.6
4	240°54.9	18°43.1	141°47.6	13.1	10°07.2	-8.3	55.5
5	255°54.9	18°43.7	156°19.8	13.1	9°58.9	-8.3	55.5
6	270°54.9	18°44.3	170°51.9	13.2	9°50.6	-8.4	55.5
7	285°54.9	18°44.9	185°24.2	13.3	9°42.2	-8.4	55.5
8	300°54.9	18°45.5	199°56.4	13.3	9°33.8	-8.4	55.4
9	315°54.9	18°46.1	214°28.8	13.4	9°25.3	-8.5	55.4
10	330°54.9	18°46.7	229°01.2	13.4	9°16.8	-8.5	55.4
11	345°54.9	18°47.2	243°33.6	13.5	9°08.3	-8.5	55.4
12	0°54.9	18°47.8	258°06.1	13.5	8°59.7	-8.6	55.3
13	15°54.8	18°48.4	272°38.6	13.6	8°51.1	-8.6	55.3
14	30°54.8	18°49.0	287°11.2	13.6	8°42.5	-8.6	55.3
15	45°54.8	18°49.6	301°43.9	13.7	8°33.9	-8.7	55.3
16	60°54.8	18°50.2	316°16.6	13.7	8°25.2	-8.7	55.2
17	75°54.8	18°50.8	330°49.3	13.8	8°16.5	-8.7	55.2
18	90°54.8	18°51.4	345°22.1	13.8	8°07.7	-8.8	55.2
19	105°54.8	18°52.0	359°54.9	13.9	7°58.9	-8.8	55.2
20	120°54.8	18°52.6	14°27.8	13.9	7°50.2	-8.8	55.1
21	135°54.8	18°53.2	29°00.8	13.9	7°41.3	-8.8	55.1
22	150°54.8	18°53.8	43°33.7	14.0	7°32.5	-8.9	55.1
23	165°54.8	18°54.3	58°06.7	14.0	7°23.6	-8.9	55.1
	SD.=15.8	d=0.6	S.D.=15.2				

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	01:01	23:03	–:–	–:–
68	–:–	–:–	01:56	22:01	–:–	–:–
66	–:–	–:–	02:29	21:27	–:–	–:–
64	–:–	01:19	02:52	21:03	22:39	–:–
62	–:–	01:58	03:11	20:44	21:58	–:–
60	–:–	02:24	03:26	20:28	21:31	–:–
58	01:11	02:45	03:39	20:15	21:10	22:47
56	01:47	03:01	03:50	20:04	20:53	22:09
54	02:11	03:15	04:00	19:54	20:39	21:44
52	02:30	03:27	04:09	19:45	20:27	21:24
50	02:46	03:37	04:17	19:37	20:16	21:08
45	03:16	03:59	04:33	19:20	19:55	20:38
40	03:38	04:16	04:46	19:07	19:37	20:15
35	03:56	04:30	04:58	18:55	19:23	19:57
30	04:10	04:42	05:08	18:45	19:11	19:43
20	04:33	05:01	05:25	18:28	18:52	19:20
10	04:51	05:17	05:39	18:14	18:36	19:02
0	05:06	05:31	05:53	17:60	18:22	18:47
-10	05:19	05:44	06:06	17:46	18:08	18:34
-20	05:31	05:57	06:21	17:32	17:55	18:22
-30	05:43	06:11	06:37	17:16	17:41	18:10
-35	05:49	06:19	06:46	17:06	17:33	18:04
-40	05:55	06:28	06:57	16:55	17:24	17:57
-45	06:02	06:38	07:09	16:43	17:15	17:50
-50	06:10	06:49	07:25	16:28	17:03	17:43
-52	06:13	06:54	07:32	16:21	16:58	17:39
-54	06:16	06:60	07:39	16:13	16:52	17:36
-56	06:20	07:06	07:48	16:04	16:46	17:32
-58	06:24	07:13	07:58	15:54	16:39	17:28
-60	06:29	07:21	08:10	15:42	16:31	17:23

	Moonrise			Moonset		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	07:15	09:05	10:48	02:57	02:50	02:45
70	07:52	09:28	11:02	02:19	02:26	02:29
68	08:18	09:46	11:14	01:52	02:07	02:16
66	08:38	10:01	11:23	01:32	01:52	02:05
64	08:53	10:12	11:31	01:16	01:39	01:56
62	09:07	10:22	11:38	01:02	01:28	01:49
60	09:18	10:31	11:44	00:50	01:19	01:42
58	09:27	10:38	11:49	00:40	01:11	01:36
56	09:36	10:45	11:54	00:31	01:04	01:31
54	09:43	10:51	11:58	00:24	00:58	01:26
52	09:50	10:56	12:02	00:17	00:52	01:22
50	09:56	11:01	12:05	00:10	00:47	01:18
45	10:09	11:11	12:12	–:–	00:36	01:10
40	10:20	11:20	12:18	–:–	00:26	01:03
35	10:29	11:27	12:24	–:–	00:18	00:57
30	10:37	11:33	12:28	–:–	00:11	00:51
20	10:51	11:44	12:36	23:59	–:–	00:42
10	11:03	11:54	12:43	23:48	–:–	00:34
0	11:14	12:03	12:50	23:38	–:–	00:26
-10	11:25	12:12	12:56	23:28	–:–	00:18
-20	11:37	12:22	13:03	23:17	–:–	00:09
-30	11:51	12:33	13:11	23:04	23:60	–:–
-35	11:59	12:39	13:15	22:57	23:54	–:–
-40	12:08	12:46	13:20	22:48	23:48	–:–
-45	12:18	12:55	13:26	22:39	23:40	–:–
-50	12:31	13:05	13:33	22:27	23:32	–:–
-52	12:37	13:09	13:37	22:21	23:27	–:–
-54	12:43	13:14	13:40	22:15	23:23	–:–
-56	12:51	13:20	13:44	22:08	23:18	–:–
-58	12:59	13:26	13:49	22:01	23:12	–:–
-60	13:08	13:33	13:54	21:52	23:06	–:–

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
12	03:39	03:39	11:56	17:25	05:00	6(38%)
13	03:39	03:40	11:56	18:14	05:50	7(48%)
14	03:40	03:39	11:56	19:00	06:37	8(58%)

May 15, 16 ,17 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	233°09.1	186°55.6	16°29.1	350°59.9	-21°45.3	68°01.2	7°48.3	339°44.8	-20°44.0
1	248°11.6	201°55.0	16°30.0	6°03.3	-21°45.3	83°03.7	7°48.3	354°47.5	-20°44.0
2	263°14.1	216°54.4	16°30.9	21°06.6	-21°45.3	98°06.1	7°48.2	9°50.1	-20°44.0
3	278°16.5	231°53.8	16°31.8	36°09.9	-21°45.3	113°08.5	7°48.2	24°52.8	-20°44.0
4	293°19.0	246°53.2	16°32.8	51°13.2	-21°45.2	128°10.9	7°48.2	39°55.4	-20°44.0
5	308°21.5	261°52.7	16°33.7	66°16.6	-21°45.2	143°13.4	7°48.2	54°58.0	-20°43.9
6	323°23.9	276°52.1	16°34.6	81°19.9	-21°45.2	158°15.8	7°48.1	70°00.7	-20°43.9
7	338°26.4	291°51.5	16°35.5	96°23.2	-21°45.2	173°18.2	7°48.1	85°03.3	-20°43.9
8	353°28.8	306°50.9	16°36.4	111°26.5	-21°45.2	188°20.7	7°48.1	100°06.0	-20°43.9
9	8°31.3	321°50.3	16°37.4	126°29.9	-21°45.1	203°23.1	7°48.1	115°08.6	-20°43.9
10	23°33.8	336°49.7	16°38.3	141°33.2	-21°45.1	218°25.5	7°48.0	130°11.3	-20°43.8
11	38°36.2	351°49.1	16°39.2	156°36.5	-21°45.1	233°27.9	7°48.0	145°13.9	-20°43.8
12	53°38.7	6°48.5	16°40.1	171°39.8	-21°45.1	248°30.4	7°48.0	160°16.5	-20°43.8
13	68°41.2	21°47.9	16°41.0	186°43.2	-21°45.1	263°32.8	7°48.0	175°19.2	-20°43.8
14	83°43.6	36°47.3	16°41.9	201°46.5	-21°45.0	278°35.2	7°47.9	190°21.8	-20°43.8
15	98°46.1	51°46.7	16°42.9	216°49.8	-21°45.0	293°37.6	7°47.9	205°24.5	-20°43.7
16	113°48.6	66°46.0	16°43.8	231°53.2	-21°45.0	308°40.1	7°47.9	220°27.1	-20°43.7
17	128°51.0	81°45.4	16°44.7	246°56.5	-21°45.0	323°42.5	7°47.9	235°29.8	-20°43.7
18	143°53.5	96°44.8	16°45.6	261°59.8	-21°45.0	338°44.9	7°47.8	250°32.4	-20°43.7
19	158°56.0	111°44.2	16°46.5	277°03.2	-21°44.9	353°47.3	7°47.8	265°35.0	-20°43.7
20	173°58.4	126°43.6	16°47.4	292°06.5	-21°44.9	8°49.7	7°47.8	280°37.7	-20°43.6
21	189°00.9	141°43.0	16°48.3	307°09.8	-21°44.9	23°52.2	7°47.8	295°40.3	-20°43.6
22	204°03.3	156°42.4	16°49.2	322°13.2	-21°44.9	38°54.6	7°47.7	310°43.0	-20°43.6
23	219°05.8	171°41.8	16°50.1	337°16.5	-21°44.8	53°57.0	7°47.7	325°45.6	-20°43.6
Mer.pass.:8:26:		v-0.6 d0.9 m-3.8		v3.3 d0.0 m-2.0		v2.4 d-0.0 m-2.0		v2.6 d0.0 m0.1	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	234°08.3	186°41.2	16°51.0	352°19.8	-21°44.8	68°59.4	7°47.7	340°48.3	-20°43.6
1	249°10.7	201°40.6	16°52.0	7°23.2	-21°44.8	84°01.9	7°47.7	355°50.9	-20°43.5
2	264°13.2	216°40.0	16°52.9	22°26.5	-21°44.8	99°04.3	7°47.6	10°53.5	-20°43.5
3	279°15.7	231°39.4	16°53.8	37°29.9	-21°44.7	114°06.7	7°47.6	25°56.2	-20°43.5
4	294°18.1	246°38.8	16°54.7	52°33.2	-21°44.7	129°09.1	7°47.6	40°58.8	-20°43.5
5	309°20.6	261°38.2	16°55.6	67°36.5	-21°44.7	144°11.5	7°47.5	56°01.5	-20°43.5
6	324°23.1	276°37.6	16°56.5	82°39.9	-21°44.7	159°14.0	7°47.5	71°04.1	-20°43.5
7	339°25.5	291°37.0	16°57.4	97°43.2	-21°44.6	174°16.4	7°47.5	86°06.8	-20°43.4
8	354°28.0	306°36.3	16°58.3	112°46.6	-21°44.6	189°18.8	7°47.5	101°09.4	-20°43.4
9	9°30.5	321°35.7	16°59.2	127°49.9	-21°44.6	204°21.2	7°47.4	116°12.1	-20°43.4
10	24°32.9	336°35.1	17°00.1	142°53.3	-21°44.6	219°23.6	7°47.4	131°14.7	-20°43.4
11	39°35.4	351°34.5	17°01.0	157°56.6	-21°44.5	234°26.1	7°47.4	146°17.4	-20°43.4
12	54°37.8	6°33.9	17°01.9	172°59.9	-21°44.5	249°28.5	7°47.4	161°20.0	-20°43.3
13	69°40.3	21°33.3	17°02.8	188°03.3	-21°44.5	264°30.9	7°47.3	176°22.6	-20°43.3
14	84°42.8	36°32.7	17°03.7	203°06.6	-21°44.5	279°33.3	7°47.3	191°25.3	-20°43.3
15	99°45.2	51°32.1	17°04.6	218°10.0	-21°44.4	294°35.7	7°47.3	206°27.9	-20°43.3
16	114°47.7	66°31.4	17°05.5	233°13.3	-21°44.4	309°38.1	7°47.2	221°30.6	-20°43.3
17	129°50.2	81°30.8	17°06.4	248°16.7	-21°44.4	324°40.6	7°47.2	236°33.2	-20°43.2
18	144°52.6	96°30.2	17°07.2	263°20.0	-21°44.4	339°43.0	7°47.2	251°35.9	-20°43.2
19	159°55.1	111°29.6	17°08.1	278°23.4	-21°44.3	354°45.4	7°47.2	266°38.5	-20°43.2
20	174°57.6	126°29.0	17°09.0	293°26.7	-21°44.3	9°47.8	7°47.1	281°41.2	-20°43.2
21	190°00.0	141°28.4	17°09.9	308°30.1	-21°44.3	24°50.2	7°47.1	296°43.8	-20°43.2
22	205°02.5	156°27.8	17°10.8	323°33.4	-21°44.2	39°52.6	7°47.1	311°46.5	-20°43.1
23	220°04.9	171°27.1	17°11.7	338°36.8	-21°44.2	54°55.1	7°47.0	326°49.1	-20°43.1
Mer.pass.:8:22:		v-0.6 d0.9 m-3.8		v3.3 d0.0 m-2.0		v2.4 d-0.0 m-2.0		v2.6 d0.0 m0.1	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	235°07.4	186°26.5	17°12.6	353°40.1	-21°44.2	69°57.5	7°47.0	341°51.7	-20°43.1
1	250°09.9	201°25.9	17°13.5	8°43.5	-21°44.2	84°59.9	7°47.0	356°54.4	-20°43.1
2	265°12.3	216°25.3	17°14.4	23°46.9	-21°44.1	100°02.3	7°46.9	11°57.0	-20°43.1
3	280°14.8	231°24.7	17°15.3	38°50.2	-21°44.1	115°04.7	7°46.9	26°59.7	-20°43.0
4	295°17.3	246°24.0	17°16.1	53°53.6	-21°44.1	130°07.1	7°46.9	42°02.3	-20°43.0
5	310°19.7	261°23.4	17°17.0	68°56.9	-21°44.1	145°09.5	7°46.9	57°05.0	-20°43.0
6	325°22.2	276°22.8	17°17.9	84°00.3	-21°44.0	160°12.0	7°46.8	72°07.6	-20°43.0
7	340°24.7	291°22.2	17°18.8	99°03.6	-21°44.0	175°14.4	7°46.8	87°10.3	-20°43.0
8	355°27.1	306°21.6	17°19.7	114°07.0	-21°44.0	190°16.8	7°46.8	102°12.9	-20°42.9
9	10°29.6	321°20.9	17°20.6	129°10.4	-21°43.9	205°19.2	7°46.7	117°15.6	-20°42.9
10	25°32.1	336°20.3	17°21.4	144°13.7	-21°43.9	220°21.6	7°46.7	132°18.2	-20°42.9
11	40°34.5	351°19.7	17°22.3	159°17.1	-21°43.9	235°24.0	7°46.7	147°20.9	-20°42.9
12	55°37.0	6°19.1	17°23.2	174°20.4	-21°43.8	250°26.4	7°46.6	162°23.5	-20°42.9
13	70°39.4	21°18.4	17°24.1	189°23.8	-21°43.8	265°28.8	7°46.6	177°26.1	-20°42.8
14	85°41.9	36°17.8	17°25.0	204°27.2	-21°43.8	280°31.2	7°46.6	192°28.8	-20°42.8
15	100°44.4	51°17.2	17°25.8	219°30.5	-21°43.8	295°33.7	7°46.5	207°31.4	-20°42.8
16	115°46.8	66°16.6	17°26.7	234°33.9	-21°43.7	310°36.1	7°46.5	222°34.1	-20°42.8
17	130°49.3	81°15.9	17°27.6	249°37.2	-21°43.7	325°38.5	7°46.5	237°36.7	-20°42.8
18	145°51.8	96°15.3	17°28.5	264°40.6	-21°43.7	340°40.9	7°46.5	252°39.4	-20°42.7
19	160°54.2	111°14.7	17°29.3	279°44.0	-21°43.6	355°43.3	7°46.4	267°42.0	-20°42.7
20	175°56.7	126°14.1	17°30.2	294°47.3	-21°43.6	10°45.7	7°46.4	282°44.7	-20°42.7
21	190°59.2	141°13.4	17°31.1	309°50.7	-21°43.6	25°48.1	7°46.4	297°47.3	-20°42.7
22	206°01.6	156°12.8	17°32.0	324°54.1	-21°43.5	40°50.5	7°46.3	312°50.0	-20°42.7
23	221°04.1	171°12.2	17°32.8	339°57.4	-21°43.5	55°52.9	7°46.3	327°52.6	-20°42.6
Mer.pass.:8:18:		v-0.6 d0.9 m-3.8		v3.4 d0.0 m-2.0		v2.4 d-0.0 m-2.0		v2.6 d0.0 m0.1	

Stars

	SHA	**Dec**
Alpheratz	357°41.7	29°10.6
Ankaa	353°14.1	-42°13.0
Schedar	349°38.6	56°37.3
Diphda	348°54.1	-17°53.9
Achernar	335°26.0	-57°09.2
Hamal	327°58.9	23°32.1
Polaris	317°19.4	89°19.8
Akamar	315°17.3	-40°14.5
Menkar	314°13.3	4°09.0
Mirfak	308°38.0	49°54.9
Aldebaran	290°47.5	16°32.3
Rigel	281°10.5	-8°11.3
Capella	280°32.0	46°00.7
Bellatrix	278°30.2	6°21.6
Elnath	278°10.5	28°37.1
Alnilam	275°44.7	-1°11.8
Betelgeuse	270°59.5	7°24.3
Canopus	263°55.7	-52°42.7
Sirius	258°32.2	-16°44.5
Adara	255°11.2	-29°00.1
Procyon	244°57.8	5°10.9
Pollux	243°25.5	27°59.1
Avior	234°17.4	-59°34.2
Suhail	222°51.0	-43°30.3
Miaplacidus	221°39.3	-69°47.5
Alphard	217°54.2	-8°44.0
Regulus	207°41.4	11°53.1
Dubhe	193°49.2	61°40.0
Denebola	182°31.4	14°28.9
Gienah	175°50.0	-17°38.1
Acrux	173°06.5	-63°11.6
Gacrux	171°58.2	-57°12.5
Alioth	166°18.7	55°52.5
Spica	158°28.9	-11°14.8
Alcaid	152°57.0	49°14.1
Hadar	148°44.4	-60°27.1
Menkent	148°04.8	-36°27.0
Arcturus	145°53.5	19°06.2
Rigil Kent.	139°48.3	-60°54.1
Zubenelg.	137°02.9	-16°06.5
Kochab	137°19.1	74°05.5
Alphecca	126°09.0	26°39.7
Antares	112°23.5	-26°27.9
Atria	107°22.9	-69°03.1
Sabik	102°10.0	-15°44.5
Shaula	96°18.9	-37°06.7
Rasalhague	96°04.4	12°33.0
Etamin	90°44.8	51°29.2
Kaus Aust.	83°40.9	-34°22.3
Vega	80°37.3	38°47.9
Nunki	75°55.7	-26°16.3
Altair	62°06.2	8°54.7
Peacock	53°16.0	-56°40.5
Deneb	49°30.0	45°20.2
Enif	33°45.2	9°57.0
Alnair	27°41.4	-46°52.6
Fomalhaut	15°22.1	-29°32.0
Scheat	13°51.6	28°10.1
Markab	13°36.5	15°17.5

2016/5/1	**SHA**	**Mer.pass**
Venus	313°46.5	11:33
Mars	117°50.8	00:36
Jupiter	194°52.1	19:25
Saturn	106°35.7	01:21

2016/5/1	**SHA**	**Mer.pass**
Venus	312°32.9	11:34
Mars	118°11.6	00:31
Jupiter	194°51.2	19:21
Saturn	106°40.0	01:17

2016/5/1	**SHA**	**Mer.pass**
Venus	311°19.1	11:35
Mars	118°32.7	00:25
Jupiter	194°50.1	19:17
Saturn	106°44.3	01:12

Horizontal paralax	
Venus:	0.1
Mars:	0.3

June 14, 15 ,16 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	262°43.3	177°50.6	23°37.5	30°50.1	-21°04.4	95°58.7	7°01.7	11°37.2	-20°29.7
1	277°45.8	192°49.7	23°37.7	45°53.1	-21°04.3	111°00.9	7°01.6	26°39.9	-20°29.7
2	292°48.2	207°48.8	23°37.9	60°56.2	-21°04.3	126°03.1	7°01.5	41°42.5	-20°29.7
3	307°50.7	222°47.9	23°38.1	75°59.2	-21°04.2	141°05.4	7°01.4	56°45.2	-20°29.6
4	322°53.2	237°47.1	23°38.4	91°02.3	-21°04.2	156°07.6	7°01.3	71°47.8	-20°29.6
5	337°55.6	252°46.2	23°38.6	106°05.3	-21°04.1	171°09.9	7°01.2	86°50.5	-20°29.6
6	352°58.1	267°45.3	23°38.8	121°08.3	-21°04.1	186°12.1	7°01.1	101°53.2	-20°29.6
7	8°00.6	282°44.4	23°39.0	136°11.4	-21°04.1	201°14.3	7°01.0	116°55.8	-20°29.6
8	23°03.0	297°43.5	23°39.1	151°14.4	-21°04.0	216°16.6	7°00.9	131°58.5	-20°29.6
9	38°05.5	312°42.6	23°39.3	166°17.4	-21°04.0	231°18.8	7°00.8	147°01.1	-20°29.5
10	53°07.9	327°41.8	23°39.5	181°20.5	-21°03.9	246°21.0	7°00.7	162°03.8	-20°29.5
11	68°10.4	342°40.9	23°39.7	196°23.5	-21°03.9	261°23.3	7°00.6	177°06.4	-20°29.5
12	83°12.9	357°40.0	23°39.9	211°26.5	-21°03.8	276°25.5	7°00.5	192°09.1	-20°29.5
13	98°15.3	12°39.1	23°40.1	226°29.6	-21°03.8	291°27.7	7°00.4	207°11.7	-20°29.5
14	113°17.8	27°38.2	23°40.3	241°32.6	-21°03.7	306°30.0	7°00.3	222°14.4	-20°29.4
15	128°20.3	42°37.3	23°40.5	256°35.6	-21°03.7	321°32.2	7°00.2	237°17.0	-20°29.4
16	143°22.7	57°36.5	23°40.7	271°38.6	-21°03.6	336°34.4	7°00.1	252°19.7	-20°29.4
17	158°25.2	72°35.6	23°40.9	286°41.7	-21°03.6	351°36.7	6°60.0	267°22.4	-20°29.4
18	173°27.7	87°34.7	23°41.1	301°44.7	-21°03.6	6°38.9	6°59.9	282°25.0	-20°29.4
19	188°30.1	102°33.8	23°41.2	316°47.7	-21°03.5	21°41.1	6°59.8	297°27.7	-20°29.3
20	203°32.6	117°32.9	23°41.4	331°50.7	-21°03.5	36°43.4	6°59.7	312°30.3	-20°29.3
21	218°35.1	132°32.0	23°41.6	346°53.7	-21°03.4	51°45.6	6°59.6	327°33.0	-20°29.3
22	233°37.5	147°31.1	23°41.8	1°56.8	-21°03.4	66°47.8	6°59.4	342°35.6	-20°29.3
23	248°40.0	162°30.3	23°42.0	16°59.8	-21°03.3	81°50.1	6°59.3	357°38.3	-20°29.3
Mer.pass.:6:28:		v-0.9 d0.2 m-3.8		v3.0 d0.0 m-1.8		v2.2 d-0.1 m-1.8		v2.7 d0.0 m0.0	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	263°42.4	177°29.4	23°42.1	32°02.8	-21°03.3	96°52.3	6°59.2	12°40.9	-20°29.3
1	278°44.9	192°28.5	23°42.3	47°05.8	-21°03.3	111°54.5	6°59.1	27°43.6	-20°29.2
2	293°47.4	207°27.6	23°42.5	62°08.8	-21°03.2	126°56.8	6°59.0	42°46.2	-20°29.2
3	308°49.8	222°26.7	23°42.7	77°11.8	-21°03.2	141°59.0	6°58.9	57°48.9	-20°29.2
4	323°52.3	237°25.8	23°42.8	92°14.8	-21°03.1	157°01.2	6°58.8	72°51.5	-20°29.2
5	338°54.8	252°24.9	23°43.0	107°17.8	-21°03.1	172°03.5	6°58.7	87°54.2	-20°29.2
6	353°57.2	267°24.0	23°43.2	122°20.8	-21°03.0	187°05.7	6°58.6	102°56.9	-20°29.1
7	8°59.7	282°23.2	23°43.4	137°23.8	-21°03.0	202°07.9	6°58.5	117°59.5	-20°29.1
8	24°02.2	297°22.3	23°43.5	152°26.8	-21°03.0	217°10.2	6°58.4	133°02.2	-20°29.1
9	39°04.6	312°21.4	23°43.7	167°29.8	-21°02.9	232°12.4	6°58.3	148°04.8	-20°29.1
10	54°07.1	327°20.5	23°43.9	182°32.8	-21°02.9	247°14.6	6°58.2	163°07.5	-20°29.1
11	69°09.5	342°19.6	23°44.0	197°35.8	-21°02.8	262°16.9	6°58.1	178°10.1	-20°29.0
12	84°12.0	357°18.7	23°44.2	212°38.8	-21°02.8	277°19.1	6°58.0	193°12.8	-20°29.0
13	99°14.5	12°17.8	23°44.4	227°41.8	-21°02.8	292°21.3	6°57.9	208°15.4	-20°29.0
14	114°16.9	27°16.9	23°44.5	242°44.8	-21°02.7	307°23.6	6°57.8	223°18.1	-20°29.0
15	129°19.4	42°16.1	23°44.7	257°47.8	-21°02.7	322°25.8	6°57.7	238°20.7	-20°29.0
16	144°21.9	57°15.2	23°44.8	272°50.8	-21°02.6	337°28.0	6°57.5	253°23.4	-20°29.0
17	159°24.3	72°14.3	23°45.0	287°53.8	-21°02.6	352°30.2	6°57.4	268°26.0	-20°28.9
18	174°26.8	87°13.4	23°45.1	302°56.8	-21°02.6	7°32.5	6°57.3	283°28.7	-20°28.9
19	189°29.3	102°12.5	23°45.3	317°59.8	-21°02.5	22°34.7	6°57.2	298°31.3	-20°28.9
20	204°31.7	117°11.6	23°45.5	333°02.8	-21°02.5	37°36.9	6°57.1	313°34.0	-20°28.9
21	219°34.2	132°10.7	23°45.6	348°05.7	-21°02.4	52°39.2	6°57.0	328°36.7	-20°28.9
22	234°36.7	147°09.8	23°45.8	3°08.7	-21°02.4	67°41.4	6°56.9	343°39.3	-20°28.8
23	249°39.1	162°08.9	23°45.9	18°11.7	-21°02.4	82°43.6	6°56.8	358°42.0	-20°28.8
Mer.pass.:6:24:		v-0.9 d0.2 m-3.8		v3.0 d0.0 m-1.8		v2.2 d-0.1 m-1.8		v2.7 d0.0 m0.0	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	264°41.6	177°08.1	23°46.1	33°14.7	-21°02.3	97°45.8	6°56.7	13°44.6	-20°28.8
1	279°44.0	192°07.2	23°46.2	48°17.7	-21°02.3	112°48.1	6°56.6	28°47.3	-20°28.8
2	294°46.5	207°06.3	23°46.4	63°20.6	-21°02.2	127°50.3	6°56.5	43°49.9	-20°28.8
3	309°49.0	222°05.4	23°46.5	78°23.6	-21°02.2	142°52.5	6°56.4	58°52.6	-20°28.7
4	324°51.4	237°04.5	23°46.6	93°26.6	-21°02.2	157°54.7	6°56.3	73°55.2	-20°28.7
5	339°53.9	252°03.6	23°46.8	108°29.6	-21°02.1	172°57.0	6°56.2	88°57.9	-20°28.7
6	354°56.4	267°02.7	23°46.9	123°32.5	-21°02.1	187°59.2	6°56.1	104°00.5	-20°28.7
7	9°58.8	282°01.8	23°47.1	138°35.5	-21°02.1	203°01.4	6°55.9	119°03.2	-20°28.7
8	25°01.3	297°00.9	23°47.2	153°38.5	-21°02.0	218°03.6	6°55.8	134°05.8	-20°28.7
9	40°03.8	312°00.1	23°47.3	168°41.4	-21°02.0	233°05.9	6°55.7	149°08.5	-20°28.6
10	55°06.2	326°59.2	23°47.5	183°44.4	-21°02.0	248°08.1	6°55.6	164°11.1	-20°28.6
11	70°08.7	341°58.3	23°47.6	198°47.4	-21°01.9	263°10.3	6°55.5	179°13.8	-20°28.6
12	85°11.2	356°57.4	23°47.8	213°50.3	-21°01.9	278°12.5	6°55.4	194°16.4	-20°28.6
13	100°13.6	11°56.5	23°47.9	228°53.3	-21°01.8	293°14.8	6°55.3	209°19.1	-20°28.6
14	115°16.1	26°55.6	23°48.0	243°56.2	-21°01.8	308°17.0	6°55.2	224°21.7	-20°28.5
15	130°18.5	41°54.7	23°48.2	258°59.2	-21°01.8	323°19.2	6°55.1	239°24.4	-20°28.5
16	145°21.0	56°53.8	23°48.3	274°02.2	-21°01.7	338°21.4	6°55.0	254°27.0	-20°28.5
17	160°23.5	71°52.9	23°48.4	289°05.1	-21°01.7	353°23.7	6°54.9	269°29.7	-20°28.5
18	175°25.9	86°52.0	23°48.5	304°08.1	-21°01.7	8°25.9	6°54.8	284°32.3	-20°28.5
19	190°28.4	101°51.1	23°48.7	319°11.0	-21°01.6	23°28.1	6°54.6	299°35.0	-20°28.5
20	205°30.9	116°50.2	23°48.8	334°14.0	-21°01.6	38°30.3	6°54.5	314°37.7	-20°28.4
21	220°33.3	131°49.4	23°48.9	349°16.9	-21°01.6	53°32.6	6°54.4	329°40.3	-20°28.4
22	235°35.8	146°48.5	23°49.0	4°19.9	-21°01.5	68°34.8	6°54.3	344°43.0	-20°28.4
23	250°38.3	161°47.6	23°49.2	19°22.8	-21°01.5	83°37.0	6°54.2	359°45.6	-20°28.4
Mer.pass.:6:20:		v-0.9 d0.1 m-3.8		v3.0 d0.0 m-1.8		v2.2 d-0.1 m-1.8		v2.7 d0.0 m0.0	

Stars

	SHA	**Dec**
Alpheratz	357°41.4	29°10.7
Ankaa	353°13.9	-42°12.8
Schedar	349°38.3	56°37.3
Diphda	348°53.9	-17°53.8
Achernar	335°25.7	-57°09.1
Hamal	327°58.7	23°32.2
Polaris	317°11.6	89°19.7
Akamar	315°17.2	-40°14.4
Menkar	314°13.2	4°09.1
Mirfak	308°37.8	49°54.8
Aldebaran	290°47.4	16°32.3
Rigel	281°10.5	-8°11.2
Capella	280°32.0	46°00.7
Bellatrix	278°30.2	6°21.6
Elnath	278°10.5	28°37.0
Alnilam	275°44.7	-1°11.7
Betelgeuse	270°59.5	7°24.4
Canopus	263°55.8	-52°42.5
Sirius	258°32.2	-16°44.4
Adara	255°11.3	-28°59.9
Procyon	244°57.8	5°10.9
Pollux	243°25.5	27°59.1
Avior	234°17.6	-59°34.1
Suhail	222°51.2	-43°30.3
Miaplacidus	221°39.7	-69°47.5
Alphard	217°54.3	-8°44.0
Regulus	207°41.5	11°53.2
Dubhe	193°49.5	61°40.0
Denebola	182°31.5	14°28.9
Gienah	175°50.1	-17°38.1
Acrux	173°06.7	-63°11.7
Gacrux	171°58.4	-57°12.5
Alioth	166°18.9	55°52.6
Spica	158°28.9	-11°14.8
Alcaid	152°57.1	49°14.2
Hadar	148°44.5	-60°27.2
Menkent	148°04.9	-36°27.1
Arcturus	145°53.5	19°06.3
Rigil Kent.	139°48.3	-60°54.2
Zubenelg.	137°02.9	-16°06.5
Kochab	137°19.4	74°05.6
Alphecca	126°09.0	26°39.8
Antares	112°23.4	-26°27.9
Atria	107°22.8	-69°03.2
Sabik	102°09.9	-15°44.5
Shaula	96°18.7	-37°06.7
Rasalhague	96°04.3	12°33.1
Etamin	90°44.6	51°29.4
Kaus Aust.	83°40.7	-34°22.3
Vega	80°37.2	38°48.0
Nunki	75°55.5	-26°16.3
Altair	62°06.1	8°54.8
Peacock	53°15.7	-56°40.6
Deneb	49°29.7	45°20.3
Enif	33°45.0	9°57.1
Alnair	27°41.1	-46°52.5
Fomalhaut	15°21.8	-29°31.9
Scheat	13°51.4	28°10.2
Markab	13°36.3	15°17.6

2016/6/1	**SHA**	**Mer.pass**
Venus	275°07.3	12:09
Mars	128°06.8	21:52
Jupiter	193°15.4	17:33
Saturn	108°53.9	23:09

2016/6/1	**SHA**	**Mer.pass**
Venus	273°46.9	12:11
Mars	128°20.3	21:47
Jupiter	193°09.9	17:30
Saturn	108°58.5	23:05

2016/6/1	**SHA**	**Mer.pass**
Venus	272°26.5	12:12
Mars	128°33.1	21:43
Jupiter	193°04.3	17:26
Saturn	109°03.0	23:01

Horizontal paralax	
Venus:	0.1
Mars:	0.3

h Sun Moon

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	179°56.1	23°16.1	71°12.2	15.3	-2°38.5	-9.4	54.3
1	194°56.0	23°16.3	85°46.4	15.3	-2°47.8	-9.3	54.3
2	209°55.9	23°16.4	100°20.7	15.3	-2°57.2	-9.3	54.3
3	224°55.7	23°16.5	114°54.9	15.3	-3°06.5	-9.3	54.3
4	239°55.6	23°16.6	129°29.2	15.3	-3°15.8	-9.3	54.3
5	254°55.5	23°16.7	144°03.4	15.3	-3°25.1	-9.3	54.3
6	269°55.3	23°16.8	158°37.7	15.3	-3°34.4	-9.3	54.3
7	284°55.2	23°17.0	173°11.9	15.2	-3°43.6	-9.3	54.2
8	299°55.1	23°17.1	187°46.2	15.2	-3°52.9	-9.2	54.2
9	314°54.9	23°17.2	202°20.4	15.2	-4°02.1	-9.2	54.2
10	329°54.8	23°17.3	216°54.7	15.2	-4°11.3	-9.2	54.2
11	344°54.7	23°17.4	231°28.9	15.2	-4°20.5	-9.2	54.2
12	359°54.5	23°17.5	246°03.1	15.2	-4°29.7	-9.2	54.2
13	14°54.4	23°17.6	260°37.3	15.2	-4°38.8	-9.1	54.2
14	29°54.3	23°17.7	275°11.6	15.2	-4°48.0	-9.1	54.2
15	44°54.1	23°17.8	289°45.8	15.2	-4°57.1	-9.1	54.2
16	59°54.0	23°18.0	304°20.0	15.2	-5°06.2	-9.1	54.2
17	74°53.9	23°18.1	318°54.1	15.2	-5°15.2	-9.1	54.2
18	89°53.7	23°18.2	333°28.3	15.2	-5°24.3	-9.0	54.2
19	104°53.6	23°18.3	348°02.5	15.2	-5°33.3	-9.0	54.2
20	119°53.5	23°18.4	2°36.6	15.1	-5°42.3	-9.0	54.2
21	134°53.3	23°18.5	17°10.8	15.1	-5°51.3	-9.0	54.2
22	149°53.2	23°18.6	31°44.9	15.1	-6°00.2	-8.9	54.2
23	164°53.1	23°18.7	46°19.0	15.1	-6°09.2	-8.9	54.2
	SD.=15.7	d=0.1	S.D.=14.8				

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	179°52.9	23°18.8	60°53.1	15.1	-6°18.1	-8.9	54.2
1	194°52.8	23°18.9	75°27.2	15.1	-6°27.0	-8.9	54.2
2	209°52.7	23°19.0	90°01.3	15.1	-6°35.8	-8.8	54.1
3	224°52.5	23°19.1	104°35.3	15.0	-6°44.6	-8.8	54.1
4	239°52.4	23°19.2	119°09.3	15.0	-6°53.4	-8.8	54.1
5	254°52.3	23°19.3	133°43.4	15.0	-7°02.2	-8.8	54.1
6	269°52.1	23°19.4	148°17.4	15.0	-7°10.9	-8.7	54.1
7	284°52.0	23°19.5	162°51.3	15.0	-7°19.6	-8.7	54.1
8	299°51.9	23°19.6	177°25.3	15.0	-7°28.3	-8.7	54.1
9	314°51.7	23°19.7	191°59.2	14.9	-7°37.0	-8.6	54.1
10	329°51.6	23°19.8	206°33.2	14.9	-7°45.6	-8.6	54.1
11	344°51.5	23°19.9	221°07.1	14.9	-7°54.2	-8.6	54.1
12	359°51.3	23°20.0	235°40.9	14.9	-8°02.8	-8.5	54.1
13	14°51.2	23°20.1	250°14.8	14.8	-8°11.3	-8.5	54.1
14	29°51.1	23°20.2	264°48.6	14.8	-8°19.8	-8.5	54.1
15	44°50.9	23°20.2	279°22.4	14.8	-8°28.2	-8.4	54.1
16	59°50.8	23°20.3	293°56.2	14.8	-8°36.7	-8.4	54.1
17	74°50.7	23°20.4	308°30.0	14.7	-8°45.1	-8.4	54.1
18	89°50.5	23°20.5	323°03.7	14.7	-8°53.4	-8.3	54.1
19	104°50.4	23°20.6	337°37.4	14.7	-9°01.7	-8.3	54.1
20	119°50.3	23°20.7	352°11.1	14.7	-9°10.0	-8.3	54.1
21	134°50.1	23°20.8	6°44.8	14.6	-9°18.3	-8.2	54.1
22	149°50.0	23°20.9	21°18.4	14.6	-9°26.5	-8.2	54.1
23	164°49.9	23°21.0	35°52.0	14.6	-9°34.7	-8.2	54.2
	SD.=15.7	d=0.1	S.D.=14.8				

Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	179°49.7	23°21.0	50°25.6	14.6	-9°42.8	-8.1	54.2
1	194°49.6	23°21.1	64°59.1	14.5	-9°50.9	-8.1	54.2
2	209°49.5	23°21.2	79°32.6	14.5	-9°59.0	-8.0	54.2
3	224°49.3	23°21.3	94°06.1	14.5	-10°07.0	-8.0	54.2
4	239°49.2	23°21.4	108°39.6	14.4	-10°15.0	-8.0	54.2
5	254°49.1	23°21.5	123°13.0	14.4	-10°22.9	-7.9	54.2
6	269°48.9	23°21.5	137°46.4	14.4	-10°30.8	-7.9	54.2
7	284°48.8	23°21.6	152°19.8	14.3	-10°38.7	-7.8	54.2
8	299°48.7	23°21.7	166°53.1	14.3	-10°46.5	-7.8	54.2
9	314°48.5	23°21.8	181°26.4	14.3	-10°54.3	-7.8	54.2
10	329°48.4	23°21.9	195°59.7	14.2	-11°02.0	-7.7	54.2
11	344°48.3	23°21.9	210°32.9	14.2	-11°09.7	-7.7	54.2
12	359°48.1	23°22.0	225°06.1	14.2	-11°17.3	-7.6	54.2
13	14°48.0	23°22.1	239°39.2	14.1	-11°24.9	-7.6	54.2
14	29°47.9	23°22.2	254°12.4	14.1	-11°32.5	-7.5	54.2
15	44°47.7	23°22.2	268°45.5	14.1	-11°40.0	-7.5	54.2
16	59°47.6	23°22.3	283°18.5	14.0	-11°47.4	-7.4	54.2
17	74°47.5	23°22.4	297°51.5	14.0	-11°54.8	-7.4	54.2
18	89°47.3	23°22.5	312°24.5	14.0	-12°02.2	-7.3	54.2
19	104°47.2	23°22.5	326°57.5	13.9	-12°09.5	-7.3	54.3
20	119°47.1	23°22.6	341°30.4	13.9	-12°16.8	-7.2	54.3
21	134°46.9	23°22.7	356°03.2	13.9	-12°24.0	-7.2	54.3
22	149°46.8	23°22.7	10°36.1	13.8	-12°31.1	-7.1	54.3
23	164°46.7	23°22.8	25°08.9	13.8	-12°38.2	-7.1	54.3
	SD.=15.7	d=0.1	S.D.=14.8				

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	–:–	–:–	–:–	–:–
64	–:–	–:–	01:33	22:29	–:–	–:–
62	–:–	–:–	02:10	21:51	–:–	–:–
60	–:–	00:53	02:36	21:25	23:10	–:–
58	–:–	01:41	02:56	21:05	22:20	–:–
56	–:–	02:11	03:13	20:48	21:51	–:–
54	00:48	02:33	03:27	20:34	21:29	23:14
52	01:33	02:51	03:39	20:22	21:11	22:29
50	02:01	03:06	03:50	20:11	20:56	22:01
45	02:46	03:35	04:13	19:49	20:26	21:16
40	03:16	03:58	04:31	19:31	20:03	20:45
35	03:39	04:16	04:46	19:16	19:45	20:22
30	03:58	04:31	04:59	19:03	19:30	20:03
20	04:27	04:56	05:21	18:41	19:05	19:34
10	04:49	05:16	05:39	18:22	18:45	19:12
0	05:08	05:34	05:57	18:04	18:27	18:53
-10	05:25	05:51	06:14	17:47	18:10	18:36
-20	05:41	06:09	06:33	17:28	17:52	18:20
-30	05:58	06:28	06:54	17:07	17:34	18:03
-35	06:06	06:38	07:06	16:55	17:23	17:55
-40	06:16	06:50	07:20	16:41	17:11	17:45
-45	06:26	07:03	07:37	16:24	16:58	17:35
-50	06:38	07:19	07:58	16:03	16:42	17:23
-52	06:43	07:27	08:08	15:53	16:34	17:18
-54	06:49	07:35	08:19	15:42	16:26	17:12
-56	06:55	07:44	08:31	15:30	16:17	17:06
-58	07:01	07:54	08:46	15:15	16:07	16:60
-60	07:09	08:06	09:03	14:58	15:55	16:52

	Moonrise			Moonset		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	14:43	16:18	17:56	00:41	00:36	00:30
70	14:36	16:04	17:34	00:45	00:45	00:45
68	14:30	15:53	17:17	00:48	00:52	00:57
66	14:25	15:44	17:03	00:51	00:58	01:07
64	14:21	15:36	16:52	00:53	01:04	01:16
62	14:17	15:30	16:42	00:55	01:08	01:23
60	14:14	15:24	16:34	00:57	01:12	01:30
58	14:11	15:19	16:27	00:58	01:16	01:35
56	14:09	15:15	16:20	00:60	01:19	01:40
54	14:07	15:11	16:15	01:01	01:22	01:45
52	14:05	15:07	16:10	01:02	01:25	01:49
50	14:03	15:04	16:05	01:03	01:27	01:53
45	13:59	14:57	15:55	01:05	01:32	02:01
40	13:56	14:51	15:47	01:07	01:37	02:08
35	13:53	14:46	15:40	01:09	01:40	02:13
30	13:50	14:42	15:34	01:10	01:44	02:19
20	13:46	14:34	15:23	01:13	01:50	02:27
10	13:42	14:28	15:14	01:15	01:55	02:35
0	13:39	14:22	15:06	01:17	01:60	02:43
-10	13:36	14:16	14:57	01:19	02:04	02:50
-20	13:32	14:09	14:48	01:21	02:09	02:58
-30	13:28	14:02	14:37	01:24	02:15	03:07
-35	13:25	13:58	14:31	01:25	02:19	03:12
-40	13:23	13:53	14:25	01:27	02:23	03:18
-45	13:20	13:47	14:17	01:29	02:27	03:25
-50	13:16	13:41	14:08	01:31	02:32	03:33
-52	13:14	13:38	14:03	01:32	02:35	03:37
-54	13:13	13:34	13:58	01:33	02:38	03:42
-56	13:11	13:31	13:53	01:34	02:41	03:46
-58	13:08	13:27	13:47	01:36	02:44	03:52
-60	13:06	13:22	13:41	01:37	02:48	03:58

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
14	00:15	00:22	12:00	19:49	07:28	9(70%)
15	00:28	00:35	12:00	20:32	08:10	10(78%)
16	00:41	00:47	12:00	21:16	08:54	11(86%)

June 26, 27 ,28 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	274°33.0	173°33.4	23°46.4	44°27.2	-20°59.9	106°34.2	6°28.4	24°19.4	-20°24.7
1	289°35.4	188°32.5	23°46.2	59°29.8	-20°59.9	121°36.4	6°28.3	39°22.0	-20°24.6
2	304°37.9	203°31.6	23°46.1	74°32.4	-20°59.9	136°38.6	6°28.2	54°24.7	-20°24.6
3	319°40.4	218°30.7	23°46.0	89°35.0	-20°59.9	151°40.7	6°28.1	69°27.3	-20°24.6
4	334°42.8	233°29.9	23°45.8	104°37.7	-20°60.0	166°42.9	6°27.9	84°30.0	-20°24.6
5	349°45.3	248°29.0	23°45.6	119°40.3	-20°60.0	181°45.1	6°27.8	99°32.6	-20°24.6
6	4°47.8	263°28.1	23°45.5	134°42.9	-20°60.0	196°47.3	6°27.7	114°35.2	-20°24.6
7	19°50.2	278°27.2	23°45.3	149°45.5	-21°00.0	211°49.4	6°27.5	129°37.9	-20°24.5
8	34°52.7	293°26.3	23°45.2	164°48.1	-21°00.0	226°51.6	6°27.4	144°40.5	-20°24.5
9	49°55.2	308°25.4	23°45.0	179°50.7	-21°00.1	241°53.8	6°27.3	159°43.1	-20°24.5
10	64°57.6	323°24.5	23°44.9	194°53.3	-21°00.1	256°56.0	6°27.2	174°45.8	-20°24.5
11	80°00.1	338°23.6	23°44.7	209°55.9	-21°00.1	271°58.1	6°27.0	189°48.4	-20°24.5
12	95°02.5	353°22.7	23°44.6	224°58.5	-21°00.1	287°00.3	6°26.9	204°51.0	-20°24.5
13	110°05.0	8°21.9	23°44.4	240°01.1	-21°00.2	302°02.5	6°26.8	219°53.7	-20°24.4
14	125°07.5	23°21.0	23°44.2	255°03.7	-21°00.2	317°04.7	6°26.6	234°56.3	-20°24.4
15	140°09.9	38°20.1	23°44.1	270°06.3	-21°00.2	332°06.8	6°26.5	249°58.9	-20°24.4
16	155°12.4	53°19.2	23°43.9	285°08.9	-21°00.2	347°09.0	6°26.4	265°01.6	-20°24.4
17	170°14.9	68°18.3	23°43.7	300°11.5	-21°00.3	2°11.2	6°26.3	280°04.2	-20°24.4
18	185°17.3	83°17.4	23°43.6	315°14.1	-21°00.3	17°13.4	6°26.1	295°06.8	-20°24.4
19	200°19.8	98°16.5	23°43.4	330°16.7	-21°00.3	32°15.5	6°26.0	310°09.5	-20°24.4
20	215°22.3	113°15.6	23°43.2	345°19.3	-21°00.3	47°17.7	6°25.9	325°12.1	-20°24.3
21	230°24.7	128°14.8	23°43.1	0°21.9	-21°00.4	62°19.9	6°25.7	340°14.7	-20°24.3
22	245°27.2	143°13.9	23°42.9	15°24.5	-21°00.4	77°22.0	6°25.6	355°17.4	-20°24.3
23	260°29.7	158°13.0	23°42.7	30°27.1	-21°00.4	92°24.2	6°25.5	10°20.0	-20°24.3
Mer.pass.:5:40:		v-0.9 d-0.1 m-3.8		v2.6 d-0.0 m-1.6		v2.2 d-0.1 m-1.8		v2.6 d0.0 m0.1	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	275°32.1	173°12.1	23°42.5	45°29.7	-21°00.4	107°26.4	6°25.3	25°22.6	-20°24.3
1	290°34.6	188°11.2	23°42.4	60°32.3	-21°00.5	122°28.6	6°25.2	40°25.3	-20°24.3
2	305°37.0	203°10.3	23°42.2	75°34.9	-21°00.5	137°30.7	6°25.1	55°27.9	-20°24.2
3	320°39.5	218°09.4	23°42.0	90°37.4	-21°00.5	152°32.9	6°25.0	70°30.5	-20°24.2
4	335°42.0	233°08.6	23°41.8	105°40.0	-21°00.5	167°35.1	6°24.8	85°33.2	-20°24.2
5	350°44.4	248°07.7	23°41.6	120°42.6	-21°00.6	182°37.3	6°24.7	100°35.8	-20°24.2
6	5°46.9	263°06.8	23°41.5	135°45.2	-21°00.6	197°39.4	6°24.6	115°38.4	-20°24.2
7	20°49.4	278°05.9	23°41.3	150°47.7	-21°00.6	212°41.6	6°24.4	130°41.1	-20°24.2
8	35°51.8	293°05.0	23°41.1	165°50.3	-21°00.7	227°43.8	6°24.3	145°43.7	-20°24.1
9	50°54.3	308°04.1	23°40.9	180°52.9	-21°00.7	242°45.9	6°24.2	160°46.3	-20°24.1
10	65°56.8	323°03.2	23°40.7	195°55.5	-21°00.7	257°48.1	6°24.0	175°49.0	-20°24.1
11	80°59.2	338°02.4	23°40.5	210°58.0	-21°00.7	272°50.3	6°23.9	190°51.6	-20°24.1
12	96°01.7	353°01.5	23°40.3	226°00.6	-21°00.8	287°52.4	6°23.8	205°54.2	-20°24.1
13	111°04.1	8°00.6	23°40.1	241°03.2	-21°00.8	302°54.6	6°23.6	220°56.9	-20°24.1
14	126°06.6	22°59.7	23°40.0	256°05.7	-21°00.8	317°56.8	6°23.5	235°59.5	-20°24.1
15	141°09.1	37°58.8	23°39.8	271°08.3	-21°00.9	332°59.0	6°23.4	251°02.1	-20°24.0
16	156°11.5	52°57.9	23°39.6	286°10.9	-21°00.9	348°01.1	6°23.3	266°04.8	-20°24.0
17	171°14.0	67°57.1	23°39.4	301°13.4	-21°00.9	3°03.3	6°23.1	281°07.4	-20°24.0
18	186°16.5	82°56.2	23°39.2	316°16.0	-21°01.0	18°05.5	6°23.0	296°10.0	-20°24.0
19	201°18.9	97°55.3	23°39.0	331°18.5	-21°01.0	33°07.6	6°22.9	311°12.7	-20°24.0
20	216°21.4	112°54.4	23°38.8	346°21.1	-21°01.0	48°09.8	6°22.7	326°15.3	-20°24.0
21	231°23.9	127°53.5	23°38.6	1°23.6	-21°01.1	63°12.0	6°22.6	341°17.9	-20°23.9
22	246°26.3	142°52.6	23°38.4	16°26.2	-21°01.1	78°14.1	6°22.5	356°20.6	-20°23.9
23	261°28.8	157°51.8	23°38.2	31°28.8	-21°01.1	93°16.3	6°22.3	11°23.2	-20°23.9
Mer.pass.:5:36:		v-0.9 d-0.2 m-3.8		v2.6 d-0.0 m-1.5		v2.2 d-0.1 m-1.7		v2.6 d0.0 m0.1	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	276°31.3	172°50.9	23°38.0	46°31.3	-21°01.2	108°18.5	6°22.2	26°25.8	-20°23.9
1	291°33.7	187°50.0	23°37.8	61°33.9	-21°01.2	123°20.6	6°22.1	41°28.5	-20°23.9
2	306°36.2	202°49.1	23°37.6	76°36.4	-21°01.2	138°22.8	6°21.9	56°31.1	-20°23.9
3	321°38.6	217°48.2	23°37.4	91°38.9	-21°01.3	153°25.0	6°21.8	71°33.7	-20°23.9
4	336°41.1	232°47.3	23°37.1	106°41.5	-21°01.3	168°27.1	6°21.7	86°36.4	-20°23.8
5	351°43.6	247°46.5	23°36.9	121°44.0	-21°01.3	183°29.3	6°21.5	101°39.0	-20°23.8
6	6°46.0	262°45.6	23°36.7	136°46.6	-21°01.4	198°31.5	6°21.4	116°41.6	-20°23.8
7	21°48.5	277°44.7	23°36.5	151°49.1	-21°01.4	213°33.6	6°21.3	131°44.2	-20°23.8
8	36°51.0	292°43.8	23°36.3	166°51.6	-21°01.4	228°35.8	6°21.1	146°46.9	-20°23.8
9	51°53.4	307°42.9	23°36.1	181°54.2	-21°01.5	243°38.0	6°21.0	161°49.5	-20°23.8
10	66°55.9	322°42.1	23°35.9	196°56.7	-21°01.5	258°40.1	6°20.9	176°52.1	-20°23.8
11	81°58.4	337°41.2	23°35.6	211°59.3	-21°01.5	273°42.3	6°20.7	191°54.8	-20°23.7
12	97°00.8	352°40.3	23°35.4	227°01.8	-21°01.6	288°44.5	6°20.6	206°57.4	-20°23.7
13	112°03.3	7°39.4	23°35.2	242°04.3	-21°01.6	303°46.6	6°20.5	222°00.0	-20°23.7
14	127°05.7	22°38.5	23°35.0	257°06.8	-21°01.6	318°48.8	6°20.3	237°02.7	-20°23.7
15	142°08.2	37°37.7	23°34.8	272°09.4	-21°01.7	333°51.0	6°20.2	252°05.3	-20°23.7
16	157°10.7	52°36.8	23°34.5	287°11.9	-21°01.7	348°53.1	6°20.1	267°07.9	-20°23.7
17	172°13.1	67°35.9	23°34.3	302°14.4	-21°01.8	3°55.3	6°19.9	282°10.6	-20°23.6
18	187°15.6	82°35.0	23°34.1	317°16.9	-21°01.8	18°57.4	6°19.8	297°13.2	-20°23.6
19	202°18.1	97°34.1	23°33.9	332°19.5	-21°01.8	33°59.6	6°19.7	312°15.8	-20°23.6
20	217°20.5	112°33.3	23°33.6	347°22.0	-21°01.9	49°01.8	6°19.5	327°18.4	-20°23.6
21	232°23.0	127°32.4	23°33.4	2°24.5	-21°01.9	64°03.9	6°19.4	342°21.1	-20°23.6
22	247°25.5	142°31.5	23°33.2	17°27.0	-21°02.0	79°06.1	6°19.3	357°23.7	-20°23.6
23	262°27.9	157°30.6	23°32.9	32°29.5	-21°02.0	94°08.3	6°19.1	12°26.3	-20°23.6
Mer.pass.:5:33:		v-0.9 d-0.2 m-3.8		v2.5 d-0.0 m-1.5		v2.2 d-0.1 m-1.7		v2.6 d0.0 m0.1	

Stars

	SHA	**Dec**
Alpheratz	357°41.3	29°10.7
Ankaa	353°13.8	-42°12.8
Schedar	349°38.1	56°37.3
Diphda	348°53.8	-17°53.7
Achernar	335°25.6	-57°09.0
Hamal	327°58.6	23°32.2
Polaris	317°06.8	89°19.6
Akamar	315°17.1	-40°14.3
Menkar	314°13.1	4°09.1
Mirfak	308°37.7	49°54.8
Aldebaran	290°47.4	16°32.3
Rigel	281°10.4	-8°11.2
Capella	280°31.9	46°00.6
Bellatrix	278°30.1	6°21.6
Elnath	278°10.4	28°37.0
Alnilam	275°44.6	-1°11.7
Betelgeuse	270°59.4	7°24.4
Canopus	263°55.8	-52°42.5
Sirius	258°32.2	-16°44.4
Adara	255°11.3	-28°59.9
Procyon	244°57.8	5°10.9
Pollux	243°25.5	27°59.1
Avior	234°17.7	-59°34.0
Suhail	222°51.2	-43°30.2
Miaplacidus	221°39.8	-69°47.4
Alphard	217°54.3	-8°43.9
Regulus	207°41.5	11°53.2
Dubhe	193°49.6	61°40.0
Denebola	182°31.6	14°28.9
Gienah	175°50.1	-17°38.1
Acrux	173°06.8	-63°11.7
Gacrux	171°58.4	-57°12.6
Alioth	166°19.0	55°52.6
Spica	158°29.0	-11°14.8
Alcaid	152°57.2	49°14.2
Hadar	148°44.5	-60°27.3
Menkent	148°04.9	-36°27.1
Arcturus	145°53.6	19°06.3
Rigil Kent.	139°48.4	-60°54.2
Zubenelg.	137°02.9	-16°06.5
Kochab	137°19.5	74°05.7
Alphecca	126°09.0	26°39.9
Antares	112°23.4	-26°27.9
Atria	107°22.8	-69°03.3
Sabik	102°09.8	-15°44.5
Shaula	96°18.7	-37°06.7
Rasalhague	96°04.2	12°33.2
Etamin	90°44.6	51°29.4
Kaus Aust.	83°40.7	-34°22.3
Vega	80°37.2	38°48.1
Nunki	75°55.4	-26°16.3
Altair	62°06.0	8°54.8
Peacock	53°15.6	-56°40.6
Deneb	49°29.6	45°20.4
Enif	33°44.9	9°57.1
Alnair	27°41.0	-46°52.5
Fomalhaut	15°21.7	-29°31.9
Scheat	13°51.3	28°10.2
Markab	13°36.2	15°17.6

2016/6/2	**SHA**	**Mer.pass**
Venus	259°00.4	12:27
Mars	129°54.2	20:59
Jupiter	192°01.2	16:51
Saturn	109°46.4	22:19

2016/6/2	**SHA**	**Mer.pass**
Venus	257°40.0	12:28
Mars	129°57.6	20:54
Jupiter	191°54.3	16:48
Saturn	109°50.5	22:15

2016/6/2	**SHA**	**Mer.pass**
Venus	256°19.6	12:29
Mars	130°00.0	20:50
Jupiter	191°47.2	16:44
Saturn	109°54.6	22:10

Horizontal paralax	
Venus:	0.1
Mars:	0.3

h Sun Moon

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	179°17.6	23°20.8	291°07.9	10.6	-6°45.2	10.2	58.2
1	194°17.5	23°20.7	305°37.5	10.6	-6°35.0	10.2	58.3
2	209°17.3	23°20.6	320°07.0	10.6	-6°24.7	10.3	58.3
3	224°17.2	23°20.5	334°36.6	10.6	-6°14.4	10.3	58.3
4	239°17.1	23°20.4	349°06.2	10.6	-6°04.0	10.4	58.3
5	254°16.9	23°20.3	3°35.7	10.6	-5°53.7	10.4	58.3
6	269°16.8	23°20.3	18°05.3	10.6	-5°43.2	10.4	58.4
7	284°16.7	23°20.2	32°34.9	10.6	-5°32.8	10.5	58.4
8	299°16.5	23°20.1	47°04.4	10.6	-5°22.3	10.5	58.4
9	314°16.4	23°20.0	61°34.0	10.6	-5°11.7	10.6	58.4
10	329°16.3	23°19.9	76°03.5	10.6	-5°01.1	10.6	58.4
11	344°16.2	23°19.8	90°33.1	10.6	-4°50.5	10.6	58.5
12	359°16.0	23°19.7	105°02.7	10.6	-4°39.9	10.7	58.5
13	14°15.9	23°19.6	119°32.2	10.5	-4°29.2	10.7	58.5
14	29°15.8	23°19.5	134°01.7	10.5	-4°18.5	10.7	58.5
15	44°15.6	23°19.4	148°31.3	10.5	-4°07.8	10.8	58.5
16	59°15.5	23°19.3	163°00.8	10.5	-3°57.0	10.8	58.6
17	74°15.4	23°19.2	177°30.3	10.5	-3°46.2	10.8	58.6
18	89°15.2	23°19.1	191°59.9	10.5	-3°35.4	10.8	58.6
19	104°15.1	23°19.0	206°29.4	10.5	-3°24.5	10.9	58.6
20	119°15.0	23°18.9	220°58.9	10.5	-3°13.7	10.9	58.6
21	134°14.9	23°18.8	235°28.4	10.5	-3°02.8	10.9	58.7
22	149°14.7	23°18.7	249°57.9	10.5	-2°51.9	10.9	58.7
23	164°14.6	23°18.6	264°27.3	10.5	-2°40.9	11.0	58.7
	SD.=15.7	d=-0.1	S.D.=15.9				

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	179°14.5	23°18.5	278°56.8	10.5	-2°30.0	11.0	58.7
1	194°14.3	23°18.4	293°26.3	10.4	-2°19.0	11.0	58.7
2	209°14.2	23°18.3	307°55.7	10.4	-2°08.0	11.0	58.8
3	224°14.1	23°18.2	322°25.1	10.4	-1°56.9	11.0	58.8
4	239°14.0	23°18.1	336°54.6	10.4	-1°45.9	11.0	58.8
5	254°13.8	23°18.0	351°24.0	10.4	-1°34.8	11.1	58.8
6	269°13.7	23°17.9	5°53.4	10.4	-1°23.8	11.1	58.8
7	284°13.6	23°17.8	20°22.7	10.4	-1°12.7	11.1	58.8
8	299°13.4	23°17.6	34°52.1	10.4	-1°01.6	11.1	58.9
9	314°13.3	23°17.5	49°21.4	10.3	-0°50.5	11.1	58.9
10	329°13.2	23°17.4	63°50.8	10.3	-0°39.3	11.1	58.9
11	344°13.1	23°17.3	78°20.1	10.3	-0°28.2	11.1	58.9
12	359°12.9	23°17.2	92°49.4	10.3	-0°17.1	11.1	58.9
13	14°12.8	23°17.1	107°18.6	10.3	-0°05.9	11.2	59.0
14	29°12.7	23°17.0	121°47.9	10.2	0°05.2	11.2	59.0
15	44°12.5	23°16.9	136°17.1	10.2	0°16.4	11.2	59.0
16	59°12.4	23°16.7	150°46.3	10.2	0°27.6	11.2	59.0
17	74°12.3	23°16.6	165°15.5	10.2	0°38.8	11.2	59.0
18	89°12.2	23°16.5	179°44.7	10.2	0°49.9	11.2	59.0
19	104°12.0	23°16.4	194°13.8	10.1	1°01.1	11.2	59.1
20	119°11.9	23°16.3	208°42.9	10.1	1°12.3	11.2	59.1
21	134°11.8	23°16.2	223°12.0	10.1	1°23.5	11.2	59.1
22	149°11.6	23°16.0	237°41.1	10.1	1°34.7	11.2	59.1
23	164°11.5	23°15.9	252°10.1	10.0	1°45.8	11.2	59.1
	SD.=15.7	d=-0.1	S.D.=16.0				

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	179°11.4	23°15.8	266°39.2	10.0	1°57.0	11.2	59.1
1	194°11.3	23°15.7	281°08.2	10.0	2°08.2	11.2	59.2
2	209°11.1	23°15.6	295°37.1	10.0	2°19.3	11.2	59.2
3	224°11.0	23°15.4	310°06.1	9.9	2°30.5	11.2	59.2
4	239°10.9	23°15.3	324°35.0	9.9	2°41.6	11.1	59.2
5	254°10.8	23°15.2	339°03.9	9.9	2°52.8	11.1	59.2
6	269°10.6	23°15.1	353°32.7	9.8	3°03.9	11.1	59.2
7	284°10.5	23°14.9	8°01.5	9.8	3°15.0	11.1	59.3
8	299°10.4	23°14.8	22°30.3	9.8	3°26.1	11.1	59.3
9	314°10.2	23°14.7	36°59.1	9.7	3°37.2	11.1	59.3
10	329°10.1	23°14.6	51°27.8	9.7	3°48.3	11.1	59.3
11	344°10.0	23°14.4	65°56.5	9.7	3°59.4	11.1	59.3
12	359°09.9	23°14.3	80°25.2	9.6	4°10.4	11.0	59.3
13	14°09.7	23°14.2	94°53.8	9.6	4°21.4	11.0	59.4
14	29°09.6	23°14.0	109°22.4	9.6	4°32.4	11.0	59.4
15	44°09.5	23°13.9	123°50.9	9.5	4°43.4	11.0	59.4
16	59°09.4	23°13.8	138°19.5	9.5	4°54.4	11.0	59.4
17	74°09.2	23°13.6	152°47.9	9.5	5°05.3	10.9	59.4
18	89°09.1	23°13.5	167°16.4	9.4	5°16.2	10.9	59.4
19	104°09.0	23°13.4	181°44.8	9.4	5°27.1	10.9	59.4
20	119°08.9	23°13.2	196°13.2	9.4	5°38.0	10.9	59.5
21	134°08.7	23°13.1	210°41.5	9.3	5°48.8	10.8	59.5
22	149°08.6	23°13.0	225°09.8	9.3	5°59.6	10.8	59.5
23	164°08.5	23°12.8	239°38.0	9.2	6°10.4	10.8	59.5
	SD.=15.7	d=-0.1	S.D.=16.1				

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	–:–	–:–	–:–	–:–
64	–:–	–:–	01:36	22:29	–:–	–:–
62	–:–	–:–	02:13	21:53	–:–	–:–
60	–:–	00:56	02:39	21:27	23:09	–:–
58	–:–	01:44	02:59	21:07	22:21	–:–
56	–:–	02:14	03:16	20:50	21:52	–:–
54	00:51	02:36	03:30	20:36	21:30	23:14
52	01:36	02:53	03:42	20:24	21:12	22:30
50	02:03	03:08	03:53	20:13	20:58	22:03
45	02:48	03:38	04:15	19:51	20:28	21:18
40	03:19	04:00	04:33	19:33	20:06	20:47
35	03:42	04:19	04:48	19:18	19:48	20:24
30	04:00	04:34	05:01	19:05	19:32	20:06
20	04:29	04:59	05:23	18:43	19:08	19:37
10	04:52	05:19	05:42	18:24	18:47	19:14
0	05:11	05:37	05:59	18:07	18:29	18:56
-10	05:28	05:54	06:17	17:49	18:12	18:39
-20	05:44	06:11	06:35	17:31	17:55	18:23
-30	06:00	06:30	06:56	17:10	17:36	18:06
-35	06:09	06:41	07:09	16:58	17:26	17:57
-40	06:18	06:52	07:23	16:44	17:14	17:48
-45	06:28	07:06	07:40	16:27	17:01	17:38
-50	06:40	07:22	08:00	16:06	16:45	17:26
-52	06:45	07:29	08:10	15:56	16:37	17:21
-54	06:51	07:37	08:21	15:45	16:29	17:15
-56	06:57	07:46	08:34	15:33	16:20	17:09
-58	07:04	07:56	08:48	15:18	16:10	17:03
-60	07:11	08:08	09:05	15:01	15:58	16:55

	Moonrise			Moonset		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	00:03	23:51	23:46	09:50	11:42	13:35
70	23:53	23:54	23:54	09:58	11:43	13:29
68	23:51	23:56	–:–	10:04	11:43	13:24
66	23:48	23:57	–:–	10:09	11:44	13:20
64	23:46	23:59	–:–	10:14	11:44	13:16
62	23:44	23:60	–:–	10:18	11:44	13:13
60	23:42	–:–	00:01	10:21	11:45	13:10
58	23:41	–:–	00:02	10:24	11:45	13:08
56	23:40	–:–	00:03	10:26	11:45	13:06
54	23:39	–:–	00:04	10:28	11:45	13:04
52	23:38	–:–	00:04	10:31	11:46	13:02
50	23:37	–:–	00:05	10:32	11:46	13:00
45	23:34	–:–	00:07	10:36	11:46	12:57
40	23:33	–:–	00:08	10:40	11:46	12:54
35	23:31	–:–	00:09	10:43	11:47	12:52
30	23:30	–:–	00:10	10:45	11:47	12:49
20	23:28	–:–	00:12	10:50	11:47	12:46
10	23:25	–:–	00:13	10:54	11:47	12:42
0	23:24	–:–	00:14	10:57	11:48	12:39
-10	23:22	–:–	00:16	11:01	11:48	12:36
-20	23:20	–:–	00:18	11:04	11:48	12:33
-30	23:17	–:–	00:19	11:09	11:48	12:29
-35	23:16	–:–	00:20	11:11	11:48	12:27
-40	23:15	–:–	00:22	11:14	11:49	12:24
-45	23:13	–:–	00:23	11:17	11:49	12:21
-50	23:11	–:–	00:25	11:20	11:49	12:18
-52	23:10	–:–	00:26	11:22	11:49	12:16
-54	23:09	–:–	00:27	11:24	11:49	12:14
-56	23:08	–:–	00:27	11:26	11:49	12:13
-58	23:06	–:–	00:29	11:28	11:49	12:11
-60	23:05	–:–	00:30	11:31	11:49	12:08

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
26	02:50	02:56	12:02	04:45	17:10	21(64%)
27	03:02	03:08	12:03	05:35	18:01	22(53%)
28	03:14	03:21	12:03	06:26	18:52	23(42%)

ALTITUDE CORRECTION TABLES 0°–35°— MOON

App. Alt.	0°–4°	5°–9°	10°–14°	15°–19°	20°–24°	25°–29°	30°–34°	App. Alt.
	Corrⁿ	Corrⁿ	Corrⁿ	Corrⁿ	Corrⁿ	Corrⁿ	Corrⁿ	
′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	′
00	0 34·5	5 58·2	10 62·1	15 62·8	20 62·2	25 60·8	30 58·9	00
10	36·5	58·5	62·2	62·8	62·2	60·8	58·8	10
20	38·3	58·7	62·2	62·8	62·1	60·7	58·8	20
30	40·0	58·9	62·3	62·8	62·1	60·7	58·7	30
40	41·5	59·1	62·3	62·8	62·0	60·6	58·6	40
50	42·9	59·3	62·4	62·7	62·0	60·6	58·5	50
00	1 44·2	6 59·5	11 62·4	16 62·7	21 62·0	26 60·5	31 58·5	00
10	45·4	59·7	62·4	62·7	61·9	60·4	58·4	10
20	46·5	59·9	62·5	62·7	61·9	60·4	58·3	20
30	47·5	60·0	62·5	62·7	61·9	60·3	58·2	30
40	48·4	60·2	62·5	62·7	61·8	60·3	58·2	40
50	49·3	60·3	62·6	62·7	61·8	60·2	58·1	50
00	2 50·1	7 60·5	12 62·6	17 62·7	22 61·7	27 60·1	32 58·0	00
10	50·8	60·6	62·6	62·6	61·7	60·1	57·9	10
20	51·5	60·7	62·6	62·6	61·6	60·0	57·8	20
30	52·2	60·9	62·7	62·6	61·6	59·9	57·8	30
40	52·8	61·0	62·7	62·6	61·6	59·9	57·7	40
50	53·4	61·1	62·7	62·6	61·5	59·8	57·6	50
00	3 53·9	8 61·2	13 62·7	18 62·5	23 61·5	28 59·7	33 57·5	00
10	54·4	61·3	62·7	62·5	61·4	59·7	57·4	10
20	54·9	61·4	62·7	62·5	61·4	59·6	57·4	20
30	55·3	61·5	62·8	62·5	61·3	59·5	57·3	30
40	55·7	61·6	62·8	62·4	61·3	59·5	57·2	40
50	56·1	61·6	62·8	62·4	61·2	59·4	57·1	50
00	4 56·4	9 61·7	14 62·8	19 62·4	24 61·2	29 59·3	34 57·0	00
10	56·8	61·8	62·8	62·4	61·1	59·3	56·9	10
20	57·1	61·9	62·8	62·3	61·1	59·2	56·9	20
30	57·4	61·9	62·8	62·3	61·0	59·1	56·8	30
40	57·7	62·0	62·8	62·3	61·0	59·1	56·7	40
50	58·0	62·1	62·8	62·2	60·9	59·0	56·6	50

HP	L	U	L	U	L	U	L	U	L	U	L	U	L	U	HP
′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′
54·0	0·3	0·9	0·3	0·9	0·4	1·0	0·5	1·1	0·6	1·2	0·7	1·3	0·9	1·5	54·0
54·3	0·7	1·1	0·7	1·2	0·8	1·2	0·8	1·3	0·9	1·4	1·1	1·5	1·2	1·7	54·3
54·6	1·1	1·4	1·1	1·4	1·1	1·4	1·2	1·5	1·3	1·6	1·4	1·7	1·5	1·8	54·6
54·9	1·4	1·6	1·5	1·6	1·5	1·6	1·6	1·7	1·6	1·8	1·8	1·9	1·9	2·0	54·9
55·2	1·8	1·8	1·8	1·8	1·9	1·8	1·9	1·9	2·0	2·0	2·1	2·1	2·2	2·2	55·2
55·5	2·2	2·0	2·2	2·0	2·3	2·1	2·3	2·1	2·4	2·2	2·4	2·3	2·5	2·4	55·5
55·8	2·6	2·2	2·6	2·2	2·6	2·3	2·7	2·3	2·7	2·4	2·8	2·4	2·9	2·5	55·8
56·1	3·0	2·4	3·0	2·5	3·0	2·5	3·0	2·5	3·1	2·6	3·1	2·6	3·2	2·7	56·1
56·4	3·3	2·7	3·4	2·7	3·4	2·7	3·4	2·7	3·4	2·8	3·5	2·8	3·5	2·9	56·4
56·7	3·7	2·9	3·7	2·9	3·8	2·9	3·8	2·9	3·8	3·0	3·8	3·0	3·9	3·0	56·7
57·0	4·1	3·1	4·1	3·1	4·1	3·1	4·1	3·1	4·2	3·2	4·2	3·2	4·2	3·2	57·0
57·3	4·5	3·3	4·5	3·3	4·5	3·3	4·5	3·3	4·5	3·3	4·5	3·4	4·6	3·4	57·3
57·6	4·9	3·5	4·9	3·5	4·9	3·5	4·9	3·5	4·9	3·5	4·9	3·5	4·9	3·6	57·6
57·9	5·3	3·8	5·3	3·8	5·2	3·8	5·2	3·7	5·2	3·7	5·2	3·7	5·2	3·7	57·9
58·2	5·6	4·0	5·6	4·0	5·6	4·0	5·6	4·0	5·6	3·9	5·6	3·9	5·6	3·9	58·2
58·5	6·0	4·2	6·0	4·2	6·0	4·2	6·0	4·2	6·0	4·1	5·9	4·1	5·9	4·1	58·5
58·8	6·4	4·4	6·4	4·4	6·4	4·4	6·3	4·4	6·3	4·3	6·3	4·3	6·2	4·2	58·8
59·1	6·8	4·6	6·8	4·6	6·7	4·6	6·7	4·6	6·7	4·5	6·6	4·5	6·6	4·4	59·1
59·4	7·2	4·8	7·1	4·8	7·1	4·8	7·1	4·8	7·0	4·7	7·0	4·7	6·9	4·6	59·4
59·7	7·5	5·1	7·5	5·0	7·5	5·0	7·5	5·0	7·4	4·9	7·3	4·8	7·2	4·8	59·7
60·0	7·9	5·3	7·9	5·3	7·9	5·2	7·8	5·2	7·8	5·1	7·7	5·0	7·6	4·9	60·0
60·3	8·3	5·5	8·3	5·5	8·2	5·4	8·2	5·4	8·1	5·3	8·0	5·2	7·9	5·1	60·3
60·6	8·7	5·7	8·7	5·7	8·6	5·7	8·6	5·6	8·5	5·5	8·4	5·4	8·2	5·3	60·6
60·9	9·1	5·9	9·0	5·9	9·0	5·9	8·9	5·8	8·8	5·7	8·7	5·6	8·6	5·4	60·9
61·2	9·5	6·2	9·4	6·1	9·4	6·1	9·3	6·0	9·2	5·9	9·1	5·8	8·9	5·6	61·2
61·5	9·8	6·4	9·8	6·3	9·7	6·3	9·7	6·2	9·5	6·1	9·4	5·9	9·2	5·8	61·5

DIP					
Ht. of Eye	Corrⁿ	Ht. of Eye	Ht. of Eye	Corrⁿ	Ht. of Eye
m	′	ft.	m	′	ft.
2·4	−2·8	8·0	9·5	−5·5	31·5
2·6	−2·9	8·6	9·9	−5·6	32·7
2·8	−3·0	9·2	10·3	−5·7	33·9
3·0	−3·1	9·8	10·6	−5·8	35·1
3·2	−3·2	10·5	11·0	−5·9	36·3
3·4	−3·3	11·2	11·4	−6·0	37·6
3·6	−3·4	11·9	11·8	−6·1	38·9
3·8	−3·5	12·6	12·2	−6·2	40·1
4·0	−3·6	13·3	12·6	−6·3	41·5
4·3	−3·7	14·1	13·0	−6·4	42·8
4·5	−3·8	14·9	13·4	−6·5	44·2
4·7	−3·9	15·7	13·8	−6·6	45·5
5·0	−4·0	16·5	14·2	−6·7	46·9
5·2	−4·1	17·4	14·7	−6·8	48·4
5·5	−4·2	18·3	15·1	−6·9	49·8
5·8	−4·3	19·1	15·5	−7·0	51·3
6·1	−4·4	20·1	16·0	−7·1	52·8
6·3	−4·5	21·0	16·5	−7·2	54·3
6·6	−4·6	22·0	16·9	−7·3	55·8
6·9	−4·7	22·9	17·4	−7·4	57·4
7·2	−4·8	23·9	17·9	−7·5	58·9
7·5	−4·9	24·9	18·4	−7·6	60·5
7·9	−5·0	26·0	18·8	−7·7	62·1
8·2	−5·1	27·1	19·3	−7·8	63·8
8·5	−5·2	28·1	19·8	−7·9	65·4
8·8	−5·3	29·2	20·4	−8·0	67·1
9·2	−5·4	30·4	20·9	−8·1	68·8
9·5		31·5	21·4		70·5

MOON CORRECTION TABLE

The correction is in two parts; the first correction is taken from the upper part of the table with argument apparent altitude, and the second from the lower part, with argument HP, in the same column as that from which the first correction was taken. Separate corrections are given in the lower part for lower (L) and upper(U) limbs. All corrections are to be **added** to apparent altitude, *but 30′ is to be subtracted from the altitude of the upper limb.*

For corrections for pressure and temperature see page A4.

For bubble sextant observations ignore dip, take the mean of upper and lower limb corrections and subtract 15′ from the altitude.

App. Alt. = Apparent altitude = Sextant altitude corrected for index error and dip.

ALTITUDE CORRECTION TABLES 35°–90°— MOON

App. Alt.	35°–39°	40°–44°	45°–49°	50°–54°	55°–59°	60°–64°	65°–69°	70°–74°	75°–79°	80°–84°	85°–89°	App. Alt.
	Corrⁿ	Corrⁿ	Corrⁿ	Corrⁿ	Corrⁿ	Corrⁿ	Corrⁿ	Corrⁿ	Corrⁿ	Corrⁿ	Corrⁿ	
′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	′
00	35 56·5	40 53·7	45 50·5	50 46·9	55 43·1	60 38·9	65 34·6	70 30·0	75 25·3	80 20·5	85 15·6	00
10	56·4	53·6	50·4	46·8	42·9	38·8	34·4	29·9	25·2	20·4	15·5	10
20	56·3	53·5	50·2	46·7	42·8	38·7	34·3	29·7	25·0	20·2	15·3	20
30	56·2	53·4	50·1	46·5	42·7	38·5	34·1	29·6	24·9	20·0	15·1	30
40	56·2	53·3	50·0	46·4	42·5	38·4	34·0	29·4	24·7	19·9	15·0	40
50	56·1	53·2	49·9	46·3	42·4	38·2	33·8	29·3	24·5	19·7	14·8	50
00	36 56·0	41 53·1	46 49·8	51 46·2	56 42·3	61 38·1	66 33·7	71 29·1	76 24·4	81 19·6	86 14·6	00
10	55·9	53·0	49·7	46·0	42·1	37·9	33·5	29·0	24·2	19·4	14·5	10
20	55·8	52·9	49·5	45·9	42·0	37·8	33·4	28·8	24·1	19·2	14·3	20
30	55·7	52·8	49·4	45·8	41·9	37·7	33·2	28·7	23·9	19·1	14·2	30
40	55·6	52·6	49·3	45·7	41·7	37·5	33·1	28·5	23·8	18·9	14·0	40
50	55·5	52·5	49·2	45·5	41·6	37·4	32·9	28·3	23·6	18·7	13·8	50
00	37 55·4	42 52·4	47 49·1	52 45·4	57 41·4	62 37·2	67 32·8	72 28·2	77 23·4	82 18·6	87 13·7	00
10	55·3	52·3	49·0	45·3	41·3	37·1	32·6	28·0	23·3	18·4	13·5	10
20	55·2	52·2	48·8	45·2	41·2	36·9	32·5	27·9	23·1	18·2	13·3	20
30	55·1	52·1	48·7	45·0	41·0	36·8	32·3	27·7	22·9	18·1	13·2	30
40	55·0	52·0	48·6	44·9	40·9	36·6	32·2	27·6	22·8	17·9	13·0	40
50	55·0	51·9	48·5	44·8	40·8	36·5	32·0	27·4	22·6	17·8	12·8	50
00	38 54·9	43 51·8	48 48·4	53 44·6	58 40·6	63 36·4	68 31·9	73 27·2	78 22·5	83 17·6	88 12·7	00
10	54·8	51·7	48·3	44·5	40·5	36·2	31·7	27·1	22·3	17·4	12·5	10
20	54·7	51·6	48·1	44·4	40·3	36·1	31·6	26·9	22·1	17·3	12·3	20
30	54·6	51·5	48·0	44·2	40·2	35·9	31·4	26·8	22·0	17·1	12·2	30
40	54·5	51·4	47·9	44·1	40·1	35·8	31·3	26·6	21·8	16·9	12·0	40
50	54·4	51·2	47·8	44·0	39·9	35·6	31·1	26·5	21·7	16·8	11·8	50
00	39 54·3	44 51·1	49 47·7	54 43·9	59 39·8	64 35·5	69 31·0	74 26·3	79 21·5	84 16·6	89 11·7	00
10	54·2	51·0	47·5	43·7	39·6	35·3	30·8	26·1	21·3	16·4	11·5	10
20	54·1	50·9	47·4	43·6	39·5	35·2	30·7	26·0	21·2	16·3	11·4	20
30	54·0	50·8	47·3	43·5	39·4	35·0	30·5	25·8	21·0	16·1	11·2	30
40	53·9	50·7	47·2	43·3	39·2	34·9	30·4	25·7	20·9	16·0	11·0	40
50	53·8	50·6	47·0	43·2	39·1	34·7	30·2	25·5	20·7	15·8	10·9	50
HP	L U	L U	L U	L U	L U	L U	L U	L U	L U	L U	L U	HP
′	′ ′	′ ′	′ ′	′ ′	′ ′	′ ′	′ ′	′ ′	′ ′	′ ′	′ ′	′
54·0	1·1 1·7	1·3 1·9	1·5 2·1	1·7 2·4	2·0 2·6	2·3 2·9	2·6 3·2	2·9 3·5	3·2 3·8	3·5 4·1	3·8 4·5	54·0
54·3	1·4 1·8	1·6 2·0	1·8 2·2	2·0 2·5	2·2 2·7	2·5 3·0	2·8 3·2	3·1 3·5	3·3 3·8	3·6 4·1	3·9 4·4	54·3
54·6	1·7 2·0	1·9 2·2	2·1 2·4	2·3 2·6	2·5 2·8	2·7 3·0	3·0 3·3	3·2 3·5	3·5 3·8	3·8 4·0	4·0 4·3	54·6
54·9	2·0 2·2	2·2 2·3	2·3 2·5	2·5 2·7	2·7 2·9	2·9 3·1	3·2 3·3	3·4 3·5	3·6 3·8	3·9 4·0	4·1 4·3	54·9
55·2	2·3 2·3	2·5 2·4	2·6 2·6	2·8 2·8	3·0 2·9	3·2 3·1	3·4 3·3	3·6 3·5	3·8 3·7	4·0 4·0	4·2 4·2	55·2
55·5	2·7 2·5	2·8 2·6	2·9 2·7	3·1 2·9	3·2 3·0	3·4 3·2	3·6 3·4	3·7 3·5	3·9 3·7	4·1 3·9	4·3 4·1	55·5
55·8	3·0 2·6	3·1 2·7	3·2 2·8	3·3 3·0	3·5 3·1	3·6 3·3	3·8 3·4	3·9 3·6	4·1 3·7	4·2 3·9	4·4 4·0	55·8
56·1	3·3 2·8	3·4 2·9	3·5 3·0	3·6 3·1	3·7 3·2	3·8 3·3	4·0 3·4	4·1 3·6	4·2 3·7	4·4 3·8	4·5 4·0	56·1
56·4	3·6 2·9	3·7 3·0	3·8 3·1	3·9 3·2	3·9 3·3	4·0 3·4	4·1 3·5	4·3 3·6	4·4 3·7	4·5 3·8	4·6 3·9	56·4
56·7	3·9 3·1	4·0 3·1	4·1 3·2	4·1 3·3	4·2 3·3	4·3 3·4	4·3 3·5	4·4 3·6	4·5 3·7	4·6 3·8	4·7 3·8	56·7
57·0	4·3 3·2	4·3 3·3	4·3 3·3	4·4 3·4	4·4 3·4	4·5 3·5	4·5 3·5	4·6 3·6	4·7 3·6	4·7 3·7	4·8 3·8	57·0
57·3	4·6 3·4	4·6 3·4	4·6 3·4	4·6 3·5	4·7 3·5	4·7 3·5	4·7 3·6	4·8 3·6	4·8 3·6	4·8 3·7	4·9 3·7	57·3
57·6	4·9 3·6	4·9 3·6	4·9 3·6	4·9 3·6	4·9 3·6	4·9 3·6	4·9 3·6	4·9 3·6	5·0 3·6	5·0 3·6	5·0 3·6	57·6
57·9	5·2 3·7	5·2 3·7	5·2 3·7	5·2 3·7	5·2 3·7	5·1 3·6	5·1 3·6	5·1 3·6	5·1 3·6	5·1 3·6	5·1 3·6	57·9
58·2	5·5 3·9	5·5 3·8	5·5 3·8	5·4 3·8	5·4 3·7	5·4 3·7	5·3 3·7	5·3 3·6	5·2 3·6	5·2 3·5	5·2 3·5	58·2
58·5	5·9 4·0	5·8 4·0	5·8 3·9	5·7 3·9	5·6 3·8	5·6 3·8	5·5 3·7	5·5 3·6	5·4 3·6	5·3 3·5	5·3 3·4	58·5
58·8	6·2 4·2	6·1 4·1	6·0 4·1	6·0 4·0	5·9 3·9	5·8 3·8	5·7 3·7	5·6 3·6	5·5 3·5	5·4 3·5	5·3 3·4	58·8
59·1	6·5 4·3	6·4 4·3	6·3 4·2	6·2 4·1	6·1 4·0	6·0 3·9	5·9 3·8	5·8 3·6	5·7 3·5	5·6 3·4	5·4 3·3	59·1
59·4	6·8 4·5	6·7 4·4	6·6 4·3	6·5 4·2	6·4 4·1	6·2 3·9	6·1 3·8	6·0 3·7	5·8 3·5	5·7 3·4	5·5 3·2	59·4
59·7	7·1 4·7	7·0 4·5	6·9 4·4	6·8 4·3	6·6 4·1	6·5 4·0	6·3 3·8	6·1 3·7	6·0 3·5	5·8 3·3	5·6 3·2	59·7
60·0	7·5 4·8	7·3 4·7	7·2 4·5	7·0 4·4	6·9 4·2	6·7 4·0	6·5 3·9	6·3 3·7	6·1 3·5	5·9 3·3	5·7 3·1	60·0
60·3	7·8 5·0	7·6 4·8	7·5 4·7	7·3 4·5	7·1 4·3	6·9 4·1	6·7 3·9	6·5 3·7	6·3 3·5	6·0 3·2	5·8 3·0	60·3
60·6	8·1 5·1	7·9 5·0	7·7 4·8	7·6 4·6	7·3 4·4	7·1 4·2	6·9 3·9	6·7 3·7	6·4 3·4	6·2 3·2	5·9 2·9	60·6
60·9	8·4 5·3	8·2 5·1	8·0 4·9	7·8 4·7	7·6 4·5	7·3 4·2	7·1 4·0	6·8 3·7	6·6 3·4	6·3 3·2	6·0 2·9	60·9
61·2	8·7 5·4	8·5 5·2	8·3 5·0	8·1 4·8	7·8 4·5	7·6 4·3	7·3 4·0	7·0 3·7	6·7 3·4	6·4 3·1	6·1 2·8	61·2
61·5	9·1 5·6	8·8 5·4	8·6 5·1	8·3 4·9	8·1 4·6	7·8 4·3	7·5 4·0	7·2 3·7	6·9 3·4	6·5 3·1	6·2 2·7	61·5

S	Sun Planets	Aries	Moon	v or d	Corr'n	v or d	Corr'n	v or d	Corr'n
00	1° 30'.0	1° 30'.3	1° 25'.9	0.0	0.0	6.0	0.7	12.0	1.3
01	1° 30'.3	1° 30'.5	1° 26'.1	0.1	0.0	6.1	0.7	12.1	1.3
02	1° 30'.5	1° 30'.8	1° 26'.4	0.2	0.0	6.2	0.7	12.2	1.3
03	1° 30'.8	1° 31'.0	1° 26'.6	0.3	0.0	6.3	0.7	12.3	1.3
04	1° 31'.0	1° 31'.3	1° 26'.9	0.4	0.0	6.4	0.7	12.4	1.3
05	1° 31'.2	1° 31'.5	1° 27'.1	0.5	0.1	6.5	0.7	12.5	1.4
06	1° 31'.5	1° 31'.8	1° 27'.3	0.6	0.1	6.6	0.7	12.6	1.4
07	1° 31'.7	1° 32'.0	1° 27'.6	0.7	0.1	6.7	0.7	12.7	1.4
08	1° 32'.0	1° 32'.3	1° 27'.8	0.8	0.1	6.8	0.7	12.8	1.4
09	1° 32'.3	1° 32'.5	1° 28'.0	0.9	0.1	6.9	0.7	12.9	1.4
10	1° 32'.5	1° 32'.8	1° 28'.3	1.0	0.1	7.0	0.8	13.0	1.4
11	1° 32'.8	1° 33'.0	1° 28'.5	1.1	0.1	7.1	0.8	13.1	1.4
12	1° 33'.0	1° 33'.3	1° 28'.8	1.2	0.1	7.2	0.8	13.2	1.4
13	1° 33'.2	1° 33'.5	1° 29'.0	1.3	0.1	7.3	0.8	13.3	1.4
14	1° 33'.5	1° 33'.8	1° 29'.2	1.4	0.2	7.4	0.8	13.4	1.5
15	1° 33'.8	1° 34'.0	1° 29'.5	1.5	0.2	7.5	0.8	13.5	1.5
16	1° 34'.0	1° 34'.3	1° 29'.7	1.6	0.2	7.6	0.8	13.6	1.5
17	1° 34'.3	1° 34'.5	1° 30'.0	1.7	0.2	7.7	0.8	13.7	1.5
18	1° 34'.5	1° 34'.8	1° 30'.2	1.8	0.2	7.8	0.8	13.8	1.5
19	1° 34'.7	1° 35'.0	1° 30'.4	1.9	0.2	7.9	0.9	13.9	1.5
20	1° 35'.0	1° 35'.3	1° 30'.7	2.0	0.2	8.0	0.9	14.0	1.5
21	1° 35'.2	1° 35'.5	1° 30'.9	2.1	0.2	8.1	0.9	14.1	1.5
22	1° 35'.5	1° 35'.8	1° 31'.1	2.2	0.2	8.2	0.9	14.2	1.5
23	1° 35'.8	1° 36'.0	1° 31'.4	2.3	0.2	8.3	0.9	14.3	1.5
24	1° 36'.0	1° 36'.3	1° 31'.6	2.4	0.3	8.4	0.9	14.4	1.6
25	1° 36'.2	1° 36'.5	1° 31'.9	2.5	0.3	8.5	0.9	14.5	1.6
26	1° 36'.5	1° 36'.8	1° 32'.1	2.6	0.3	8.6	0.9	14.6	1.6
27	1° 36'.7	1° 37'.0	1° 32'.3	2.7	0.3	8.7	0.9	14.7	1.6
28	1° 37'.0	1° 37'.3	1° 32'.6	2.8	0.3	8.8	1.0	14.8	1.6
29	1° 37'.3	1° 37'.5	1° 32'.8	2.9	0.3	8.9	1.0	14.9	1.6
30	1° 37'.5	1° 37'.8	1° 33'.1	3.0	0.3	9.0	1.0	15.0	1.6
31	1° 37'.8	1° 38'.0	1° 33'.3	3.1	0.3	9.1	1.0	15.1	1.6
32	1° 38'.0	1° 38'.3	1° 33'.5	3.2	0.3	9.2	1.0	15.2	1.6
33	1° 38'.2	1° 38'.5	1° 33'.8	3.3	0.4	9.3	1.0	15.3	1.7
34	1° 38'.5	1° 38'.8	1° 34'.0	3.4	0.4	9.4	1.0	15.4	1.7
35	1° 38'.7	1° 39'.0	1° 34'.3	3.5	0.4	9.5	1.0	15.5	1.7
36	1° 39'.0	1° 39'.3	1° 34'.5	3.6	0.4	9.6	1.0	15.6	1.7
37	1° 39'.3	1° 39'.5	1° 34'.7	3.7	0.4	9.7	1.1	15.7	1.7
38	1° 39'.5	1° 39'.8	1° 35'.0	3.8	0.4	9.8	1.1	15.8	1.7
39	1° 39'.7	1° 40'.0	1° 35'.2	3.9	0.4	9.9	1.1	15.9	1.7
40	1° 40'.0	1° 40'.3	1° 35'.4	4.0	0.4	10.0	1.1	16.0	1.7
41	1° 40'.2	1° 40'.5	1° 35'.7	4.1	0.4	10.1	1.1	16.1	1.7
42	1° 40'.5	1° 40'.8	1° 35'.9	4.2	0.5	10.2	1.1	16.2	1.8
43	1° 40'.8	1° 41'.0	1° 36'.2	4.3	0.5	10.3	1.1	16.3	1.8
44	1° 41'.0	1° 41'.3	1° 36'.4	4.4	0.5	10.4	1.1	16.4	1.8
45	1° 41'.3	1° 41'.5	1° 36'.6	4.5	0.5	10.5	1.1	16.5	1.8
46	1° 41'.5	1° 41'.8	1° 36'.9	4.6	0.5	10.6	1.1	16.6	1.8
47	1° 41'.7	1° 42'.0	1° 37'.1	4.7	0.5	10.7	1.2	16.7	1.8
48	1° 42'.0	1° 42'.3	1° 37'.4	4.8	0.5	10.8	1.2	16.8	1.8
49	1° 42'.3	1° 42'.5	1° 37'.6	4.9	0.5	10.9	1.2	16.9	1.8
50	1° 42'.5	1° 42'.8	1° 37'.8	5.0	0.5	11.0	1.2	17.0	1.8
51	1° 42'.8	1° 43'.0	1° 38'.1	5.1	0.6	11.1	1.2	17.1	1.9
52	1° 43'.0	1° 43'.3	1° 38'.3	5.2	0.6	11.2	1.2	17.2	1.9
53	1° 43'.2	1° 43'.5	1° 38'.5	5.3	0.6	11.3	1.2	17.3	1.9
54	1° 43'.5	1° 43'.8	1° 38'.8	5.4	0.6	11.4	1.2	17.4	1.9
55	1° 43'.7	1° 44'.0	1° 39'.0	5.5	0.6	11.5	1.2	17.5	1.9
56	1° 44'.0	1° 44'.3	1° 39'.3	5.6	0.6	11.6	1.3	17.6	1.9
57	1° 44'.3	1° 44'.5	1° 39'.5	5.7	0.6	11.7	1.3	17.7	1.9
58	1° 44'.5	1° 44'.8	1° 39'.7	5.8	0.6	11.8	1.3	17.8	1.9
59	1° 44'.8	1° 45'.0	1° 40'.0	5.9	0.6	11.9	1.3	17.9	1.9
60	1° 45'.0	1° 45'.3	1° 40'.2	6.0	0.7	12.0	1.3	18.0	2.0

S	Sun Planets	Aries	Moon	v or d	Corr'n	v or d	Corr'n	v or d	Corr'n
00	1° 45'.0	1° 45'.3	1° 40'.2	0.0	0.0	6.0	0.8	12.0	1.5
01	1° 45'.2	1° 45'.5	1° 40'.5	0.1	0.0	6.1	0.8	12.1	1.5
02	1° 45'.5	1° 45'.8	1° 40'.7	0.2	0.0	6.2	0.8	12.2	1.5
03	1° 45'.8	1° 46'.0	1° 40'.9	0.3	0.0	6.3	0.8	12.3	1.5
04	1° 46'.0	1° 46'.3	1° 41'.2	0.4	0.1	6.4	0.8	12.4	1.6
05	1° 46'.3	1° 46'.5	1° 41'.4	0.5	0.1	6.5	0.8	12.5	1.6
06	1° 46'.5	1° 46'.8	1° 41'.6	0.6	0.1	6.6	0.8	12.6	1.6
07	1° 46'.7	1° 47'.0	1° 41'.9	0.7	0.1	6.7	0.8	12.7	1.6
08	1° 47'.0	1° 47'.3	1° 42'.1	0.8	0.1	6.8	0.9	12.8	1.6
09	1° 47'.2	1° 47'.5	1° 42'.4	0.9	0.1	6.9	0.9	12.9	1.6
10	1° 47'.5	1° 47'.8	1° 42'.6	1.0	0.1	7.0	0.9	13.0	1.6
11	1° 47'.7	1° 48'.0	1° 42'.8	1.1	0.1	7.1	0.9	13.1	1.6
12	1° 48'.0	1° 48'.3	1° 43'.1	1.2	0.2	7.2	0.9	13.2	1.7
13	1° 48'.3	1° 48'.6	1° 43'.3	1.3	0.2	7.3	0.9	13.3	1.7
14	1° 48'.5	1° 48'.8	1° 43'.6	1.4	0.2	7.4	0.9	13.4	1.7
15	1° 48'.7	1° 49'.1	1° 43'.8	1.5	0.2	7.5	0.9	13.5	1.7
16	1° 49'.0	1° 49'.3	1° 44'.0	1.6	0.2	7.6	1.0	13.6	1.7
17	1° 49'.2	1° 49'.6	1° 44'.3	1.7	0.2	7.7	1.0	13.7	1.7
18	1° 49'.5	1° 49'.8	1° 44'.5	1.8	0.2	7.8	1.0	13.8	1.7
19	1° 49'.8	1° 50'.1	1° 44'.8	1.9	0.2	7.9	1.0	13.9	1.7
20	1° 50'.0	1° 50'.3	1° 45'.0	2.0	0.3	8.0	1.0	14.0	1.8
21	1° 50'.2	1° 50'.6	1° 45'.2	2.1	0.3	8.1	1.0	14.1	1.8
22	1° 50'.5	1° 50'.8	1° 45'.5	2.2	0.3	8.2	1.0	14.2	1.8
23	1° 50'.8	1° 51'.1	1° 45'.7	2.3	0.3	8.3	1.0	14.3	1.8
24	1° 51'.0	1° 51'.3	1° 45'.9	2.4	0.3	8.4	1.1	14.4	1.8
25	1° 51'.3	1° 51'.6	1° 46'.2	2.5	0.3	8.5	1.1	14.5	1.8
26	1° 51'.5	1° 51'.8	1° 46'.4	2.6	0.3	8.6	1.1	14.6	1.8
27	1° 51'.7	1° 52'.1	1° 46'.7	2.7	0.3	8.7	1.1	14.7	1.8
28	1° 52'.0	1° 52'.3	1° 46'.9	2.8	0.4	8.8	1.1	14.8	1.9
29	1° 52'.3	1° 52'.6	1° 47'.1	2.9	0.4	8.9	1.1	14.9	1.9
30	1° 52'.5	1° 52'.8	1° 47'.4	3.0	0.4	9.0	1.1	15.0	1.9
31	1° 52'.8	1° 53'.1	1° 47'.6	3.1	0.4	9.1	1.1	15.1	1.9
32	1° 53'.0	1° 53'.3	1° 47'.9	3.2	0.4	9.2	1.2	15.2	1.9
33	1° 53'.2	1° 53'.6	1° 48'.1	3.3	0.4	9.3	1.2	15.3	1.9
34	1° 53'.5	1° 53'.8	1° 48'.3	3.4	0.4	9.4	1.2	15.4	1.9
35	1° 53'.8	1° 54'.1	1° 48'.6	3.5	0.4	9.5	1.2	15.5	1.9
36	1° 54'.0	1° 54'.3	1° 48'.8	3.6	0.5	9.6	1.2	15.6	2.0
37	1° 54'.3	1° 54'.6	1° 49'.0	3.7	0.5	9.7	1.2	15.7	2.0
38	1° 54'.5	1° 54'.8	1° 49'.3	3.8	0.5	9.8	1.2	15.8	2.0
39	1° 54'.7	1° 55'.1	1° 49'.5	3.9	0.5	9.9	1.2	15.9	2.0
40	1° 55'.0	1° 55'.3	1° 49'.8	4.0	0.5	10.0	1.3	16.0	2.0
41	1° 55'.3	1° 55'.6	1° 50'.0	4.1	0.5	10.1	1.3	16.1	2.0
42	1° 55'.5	1° 55'.8	1° 50'.2	4.2	0.5	10.2	1.3	16.2	2.0
43	1° 55'.7	1° 56'.1	1° 50'.5	4.3	0.5	10.3	1.3	16.3	2.0
44	1° 56'.0	1° 56'.3	1° 50'.7	4.4	0.6	10.4	1.3	16.4	2.1
45	1° 56'.2	1° 56'.6	1° 51'.0	4.5	0.6	10.5	1.3	16.5	2.1
46	1° 56'.5	1° 56'.8	1° 51'.2	4.6	0.6	10.6	1.3	16.6	2.1
47	1° 56'.8	1° 57'.1	1° 51'.4	4.7	0.6	10.7	1.3	16.7	2.1
48	1° 57'.0	1° 57'.3	1° 51'.7	4.8	0.6	10.8	1.4	16.8	2.1
49	1° 57'.2	1° 57'.6	1° 51'.9	4.9	0.6	10.9	1.4	16.9	2.1
50	1° 57'.5	1° 57'.8	1° 52'.1	5.0	0.6	11.0	1.4	17.0	2.1
51	1° 57'.7	1° 58'.1	1° 52'.4	5.1	0.6	11.1	1.4	17.1	2.1
52	1° 58'.0	1° 58'.3	1° 52'.6	5.2	0.7	11.2	1.4	17.2	2.2
53	1° 58'.3	1° 58'.6	1° 52'.9	5.3	0.7	11.3	1.4	17.3	2.2
54	1° 58'.5	1° 58'.8	1° 53'.1	5.4	0.7	11.4	1.4	17.4	2.2
55	1° 58'.7	1° 59'.1	1° 53'.3	5.5	0.7	11.5	1.4	17.5	2.2
56	1° 59'.0	1° 59'.3	1° 53'.6	5.6	0.7	11.6	1.5	17.6	2.2
57	1° 59'.3	1° 59'.6	1° 53'.8	5.7	0.7	11.7	1.5	17.7	2.2
58	1° 59'.5	1° 59'.8	1° 54'.1	5.8	0.7	11.8	1.5	17.8	2.2
59	1° 59'.8	2° 00'.1	1° 54'.3	5.9	0.7	11.9	1.5	17.9	2.2
60	2° 00'.0	2° 00'.3	1° 54'.5	6.0	0.8	12.0	1.5	18.0	2.3

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S	Sun Planets	Aries	Moon	v or d	Corr'n	v or d	Corr'n	v or d	Corr'n
00	2° 30'.0	2° 30'.4	2° 23'.2	0.0	0.0	6.0	1.1	12.0	2.1
01	2° 30'.3	2° 30'.7	2° 23'.4	0.1	0.0	6.1	1.1	12.1	2.1
02	2° 30'.5	2° 30'.9	2° 23'.6	0.2	0.0	6.2	1.1	12.2	2.1
03	2° 30'.8	2° 31'.2	2° 23'.9	0.3	0.1	6.3	1.1	12.3	2.2
04	2° 31'.0	2° 31'.4	2° 24'.1	0.4	0.1	6.4	1.1	12.4	2.2
05	2° 31'.2	2° 31'.7	2° 24'.4	0.5	0.1	6.5	1.1	12.5	2.2
06	2° 31'.5	2° 31'.9	2° 24'.6	0.6	0.1	6.6	1.2	12.6	2.2
07	2° 31'.8	2° 32'.2	2° 24'.8	0.7	0.1	6.7	1.2	12.7	2.2
08	2° 32'.0	2° 32'.4	2° 25'.1	0.8	0.1	6.8	1.2	12.8	2.2
09	2° 32'.3	2° 32'.7	2° 25'.3	0.9	0.2	6.9	1.2	12.9	2.3
10	2° 32'.5	2° 32'.9	2° 25'.6	1.0	0.2	7.0	1.2	13.0	2.3
11	2° 32'.7	2° 33'.2	2° 25'.8	1.1	0.2	7.1	1.2	13.1	2.3
12	2° 33'.0	2° 33'.4	2° 26'.0	1.2	0.2	7.2	1.3	13.2	2.3
13	2° 33'.3	2° 33'.7	2° 26'.3	1.3	0.2	7.3	1.3	13.3	2.3
14	2° 33'.5	2° 33'.9	2° 26'.5	1.4	0.2	7.4	1.3	13.4	2.3
15	2° 33'.8	2° 34'.2	2° 26'.7	1.5	0.3	7.5	1.3	13.5	2.4
16	2° 34'.0	2° 34'.4	2° 27'.0	1.6	0.3	7.6	1.3	13.6	2.4
17	2° 34'.2	2° 34'.7	2° 27'.2	1.7	0.3	7.7	1.3	13.7	2.4
18	2° 34'.5	2° 34'.9	2° 27'.5	1.8	0.3	7.8	1.4	13.8	2.4
19	2° 34'.8	2° 35'.2	2° 27'.7	1.9	0.3	7.9	1.4	13.9	2.4
20	2° 35'.0	2° 35'.4	2° 27'.9	2.0	0.4	8.0	1.4	14.0	2.5
21	2° 35'.2	2° 35'.7	2° 28'.2	2.1	0.4	8.1	1.4	14.1	2.5
22	2° 35'.5	2° 35'.9	2° 28'.4	2.2	0.4	8.2	1.4	14.2	2.5
23	2° 35'.7	2° 36'.2	2° 28'.7	2.3	0.4	8.3	1.5	14.3	2.5
24	2° 36'.0	2° 36'.4	2° 28'.9	2.4	0.4	8.4	1.5	14.4	2.5
25	2° 36'.3	2° 36'.7	2° 29'.1	2.5	0.4	8.5	1.5	14.5	2.5
26	2° 36'.5	2° 36'.9	2° 29'.4	2.6	0.5	8.6	1.5	14.6	2.6
27	2° 36'.7	2° 37'.2	2° 29'.6	2.7	0.5	8.7	1.5	14.7	2.6
28	2° 37'.0	2° 37'.4	2° 29'.8	2.8	0.5	8.8	1.5	14.8	2.6
29	2° 37'.2	2° 37'.7	2° 30'.1	2.9	0.5	8.9	1.6	14.9	2.6
30	2° 37'.5	2° 37'.9	2° 30'.3	3.0	0.5	9.0	1.6	15.0	2.6
31	2° 37'.8	2° 38'.2	2° 30'.6	3.1	0.5	9.1	1.6	15.1	2.6
32	2° 38'.0	2° 38'.4	2° 30'.8	3.2	0.6	9.2	1.6	15.2	2.7
33	2° 38'.2	2° 38'.7	2° 31'.0	3.3	0.6	9.3	1.6	15.3	2.7
34	2° 38'.5	2° 38'.9	2° 31'.3	3.4	0.6	9.4	1.6	15.4	2.7
35	2° 38'.8	2° 39'.2	2° 31'.5	3.5	0.6	9.5	1.7	15.5	2.7
36	2° 39'.0	2° 39'.4	2° 31'.8	3.6	0.6	9.6	1.7	15.6	2.7
37	2° 39'.3	2° 39'.7	2° 32'.0	3.7	0.6	9.7	1.7	15.7	2.7
38	2° 39'.5	2° 39'.9	2° 32'.2	3.8	0.7	9.8	1.7	15.8	2.8
39	2° 39'.7	2° 40'.2	2° 32'.5	3.9	0.7	9.9	1.7	15.9	2.8
40	2° 40'.0	2° 40'.4	2° 32'.7	4.0	0.7	10.0	1.8	16.0	2.8
41	2° 40'.3	2° 40'.7	2° 32'.9	4.1	0.7	10.1	1.8	16.1	2.8
42	2° 40'.5	2° 40'.9	2° 33'.2	4.2	0.7	10.2	1.8	16.2	2.8
43	2° 40'.8	2° 41'.2	2° 33'.4	4.3	0.8	10.3	1.8	16.3	2.9
44	2° 41'.0	2° 41'.4	2° 33'.7	4.4	0.8	10.4	1.8	16.4	2.9
45	2° 41'.2	2° 41'.7	2° 33'.9	4.5	0.8	10.5	1.8	16.5	2.9
46	2° 41'.5	2° 41'.9	2° 34'.1	4.6	0.8	10.6	1.9	16.6	2.9
47	2° 41'.8	2° 42'.2	2° 34'.4	4.7	0.8	10.7	1.9	16.7	2.9
48	2° 42'.0	2° 42'.5	2° 34'.6	4.8	0.8	10.8	1.9	16.8	2.9
49	2° 42'.2	2° 42'.7	2° 34'.9	4.9	0.9	10.9	1.9	16.9	3.0
50	2° 42'.5	2° 43'.0	2° 35'.1	5.0	0.9	11.0	1.9	17.0	3.0
51	2° 42'.7	2° 43'.2	2° 35'.3	5.1	0.9	11.1	1.9	17.1	3.0
52	2° 43'.0	2° 43'.5	2° 35'.6	5.2	0.9	11.2	2.0	17.2	3.0
53	2° 43'.3	2° 43'.7	2° 35'.8	5.3	0.9	11.3	2.0	17.3	3.0
54	2° 43'.5	2° 44'.0	2° 36'.1	5.4	0.9	11.4	2.0	17.4	3.0
55	2° 43'.7	2° 44'.2	2° 36'.3	5.5	1.0	11.5	2.0	17.5	3.1
56	2° 44'.0	2° 44'.5	2° 36'.5	5.6	1.0	11.6	2.0	17.6	3.1
57	2° 44'.2	2° 44'.7	2° 36'.8	5.7	1.0	11.7	2.0	17.7	3.1
58	2° 44'.5	2° 45'.0	2° 37'.0	5.8	1.0	11.8	2.1	17.8	3.1
59	2° 44'.8	2° 45'.2	2° 37'.2	5.9	1.0	11.9	2.1	17.9	3.1
60	2° 45'.0	2° 45'.5	2° 37'.5	6.0	1.1	12.0	2.1	18.0	3.2

S	Sun Planets	Aries	Moon	v or d	Corr'n	v or d	Corr'n	v or d	Corr'n
00	2° 45'.0	2° 45'.5	2° 37'.5	0.0	0.0	6.0	1.2	12.0	2.3
01	2° 45'.2	2° 45'.7	2° 37'.7	0.1	0.0	6.1	1.2	12.1	2.3
02	2° 45'.5	2° 46'.0	2° 38'.0	0.2	0.0	6.2	1.2	12.2	2.3
03	2° 45'.8	2° 46'.2	2° 38'.2	0.3	0.1	6.3	1.2	12.3	2.4
04	2° 46'.0	2° 46'.5	2° 38'.4	0.4	0.1	6.4	1.2	12.4	2.4
05	2° 46'.3	2° 46'.7	2° 38'.7	0.5	0.1	6.5	1.2	12.5	2.4
06	2° 46'.5	2° 47'.0	2° 38'.9	0.6	0.1	6.6	1.3	12.6	2.4
07	2° 46'.7	2° 47'.2	2° 39'.2	0.7	0.1	6.7	1.3	12.7	2.4
08	2° 47'.0	2° 47'.5	2° 39'.4	0.8	0.2	6.8	1.3	12.8	2.5
09	2° 47'.3	2° 47'.7	2° 39'.6	0.9	0.2	6.9	1.3	12.9	2.5
10	2° 47'.5	2° 48'.0	2° 39'.9	1.0	0.2	7.0	1.3	13.0	2.5
11	2° 47'.8	2° 48'.2	2° 40'.1	1.1	0.2	7.1	1.4	13.1	2.5
12	2° 48'.0	2° 48'.5	2° 40'.3	1.2	0.2	7.2	1.4	13.2	2.5
13	2° 48'.2	2° 48'.7	2° 40'.6	1.3	0.2	7.3	1.4	13.3	2.5
14	2° 48'.5	2° 49'.0	2° 40'.8	1.4	0.3	7.4	1.4	13.4	2.6
15	2° 48'.8	2° 49'.2	2° 41'.1	1.5	0.3	7.5	1.4	13.5	2.6
16	2° 49'.0	2° 49'.5	2° 41'.3	1.6	0.3	7.6	1.5	13.6	2.6
17	2° 49'.3	2° 49'.7	2° 41'.5	1.7	0.3	7.7	1.5	13.7	2.6
18	2° 49'.5	2° 50'.0	2° 41'.8	1.8	0.3	7.8	1.5	13.8	2.6
19	2° 49'.7	2° 50'.2	2° 42'.0	1.9	0.4	7.9	1.5	13.9	2.7
20	2° 50'.0	2° 50'.5	2° 42'.3	2.0	0.4	8.0	1.5	14.0	2.7
21	2° 50'.3	2° 50'.7	2° 42'.5	2.1	0.4	8.1	1.6	14.1	2.7
22	2° 50'.5	2° 51'.0	2° 42'.7	2.2	0.4	8.2	1.6	14.2	2.7
23	2° 50'.7	2° 51'.2	2° 43'.0	2.3	0.4	8.3	1.6	14.3	2.7
24	2° 51'.0	2° 51'.5	2° 43'.2	2.4	0.5	8.4	1.6	14.4	2.8
25	2° 51'.2	2° 51'.7	2° 43'.4	2.5	0.5	8.5	1.6	14.5	2.8
26	2° 51'.5	2° 52'.0	2° 43'.7	2.6	0.5	8.6	1.6	14.6	2.8
27	2° 51'.8	2° 52'.2	2° 43'.9	2.7	0.5	8.7	1.7	14.7	2.8
28	2° 52'.0	2° 52'.5	2° 44'.2	2.8	0.5	8.8	1.7	14.8	2.8
29	2° 52'.2	2° 52'.7	2° 44'.4	2.9	0.6	8.9	1.7	14.9	2.9
30	2° 52'.5	2° 53'.0	2° 44'.6	3.0	0.6	9.0	1.7	15.0	2.9
31	2° 52'.7	2° 53'.2	2° 44'.9	3.1	0.6	9.1	1.7	15.1	2.9
32	2° 53'.0	2° 53'.5	2° 45'.1	3.2	0.6	9.2	1.8	15.2	2.9
33	2° 53'.3	2° 53'.7	2° 45'.4	3.3	0.6	9.3	1.8	15.3	2.9
34	2° 53'.5	2° 54'.0	2° 45'.6	3.4	0.7	9.4	1.8	15.4	3.0
35	2° 53'.7	2° 54'.2	2° 45'.8	3.5	0.7	9.5	1.8	15.5	3.0
36	2° 54'.0	2° 54'.5	2° 46'.1	3.6	0.7	9.6	1.8	15.6	3.0
37	2° 54'.3	2° 54'.7	2° 46'.3	3.7	0.7	9.7	1.9	15.7	3.0
38	2° 54'.5	2° 55'.0	2° 46'.6	3.8	0.7	9.8	1.9	15.8	3.0
39	2° 54'.8	2° 55'.2	2° 46'.8	3.9	0.7	9.9	1.9	15.9	3.0
40	2° 55'.0	2° 55'.5	2° 47'.0	4.0	0.8	10.0	1.9	16.0	3.1
41	2° 55'.2	2° 55'.7	2° 47'.3	4.1	0.8	10.1	1.9	16.1	3.1
42	2° 55'.5	2° 56'.0	2° 47'.5	4.2	0.8	10.2	2.0	16.2	3.1
43	2° 55'.8	2° 56'.2	2° 47'.7	4.3	0.8	10.3	2.0	16.3	3.1
44	2° 56'.0	2° 56'.5	2° 48'.0	4.4	0.8	10.4	2.0	16.4	3.1
45	2° 56'.3	2° 56'.7	2° 48'.2	4.5	0.9	10.5	2.0	16.5	3.2
46	2° 56'.5	2° 57'.0	2° 48'.5	4.6	0.9	10.6	2.0	16.6	3.2
47	2° 56'.7	2° 57'.2	2° 48'.7	4.7	0.9	10.7	2.1	16.7	3.2
48	2° 57'.0	2° 57'.5	2° 48'.9	4.8	0.9	10.8	2.1	16.8	3.2
49	2° 57'.3	2° 57'.7	2° 49'.2	4.9	0.9	10.9	2.1	16.9	3.2
50	2° 57'.5	2° 58'.0	2° 49'.4	5.0	1.0	11.0	2.1	17.0	3.3
51	2° 57'.7	2° 58'.2	2° 49'.7	5.1	1.0	11.1	2.1	17.1	3.3
52	2° 58'.0	2° 58'.5	2° 49'.9	5.2	1.0	11.2	2.1	17.2	3.3
53	2° 58'.2	2° 58'.7	2° 50'.1	5.3	1.0	11.3	2.2	17.3	3.3
54	2° 58'.5	2° 59'.0	2° 50'.4	5.4	1.0	11.4	2.2	17.4	3.3
55	2° 58'.8	2° 59'.2	2° 50'.6	5.5	1.1	11.5	2.2	17.5	3.4
56	2° 59'.0	2° 59'.5	2° 50'.8	5.6	1.1	11.6	2.2	17.6	3.4
57	2° 59'.2	2° 59'.7	2° 51'.1	5.7	1.1	11.7	2.2	17.7	3.4
58	2° 59'.5	3° 00'.0	2° 51'.3	5.8	1.1	11.8	2.3	17.8	3.4
59	2° 59'.7	3° 00'.2	2° 51'.6	5.9	1.1	11.9	2.3	17.9	3.4
60	3° 00'.0	3° 00'.5	2° 51'.8	6.0	1.2	12.0	2.3	18.0	3.5

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S	Sun Planets	Aries	Moon	v or d	Corr'n	v or d	Corr'n	v or d	Corr'n
00	3° 30'.0	3° 30'.6	3° 20'.4	0.0	0.0	6.0	1.5	12.0	2.9
01	3° 30'.2	3° 30'.8	3° 20'.7	0.1	0.0	6.1	1.5	12.1	2.9
02	3° 30'.5	3° 31'.1	3° 20'.9	0.2	0.0	6.2	1.5	12.2	2.9
03	3° 30'.7	3° 31'.3	3° 21'.1	0.3	0.1	6.3	1.5	12.3	3.0
04	3° 31'.0	3° 31'.6	3° 21'.4	0.4	0.1	6.4	1.5	12.4	3.0
05	3° 31'.3	3° 31'.8	3° 21'.6	0.5	0.1	6.5	1.6	12.5	3.0
06	3° 31'.5	3° 32'.1	3° 21'.9	0.6	0.1	6.6	1.6	12.6	3.0
07	3° 31'.7	3° 32'.3	3° 22'.1	0.7	0.2	6.7	1.6	12.7	3.1
08	3° 32'.0	3° 32'.6	3° 22'.3	0.8	0.2	6.8	1.6	12.8	3.1
09	3° 32'.2	3° 32'.8	3° 22'.6	0.9	0.2	6.9	1.7	12.9	3.1
10	3° 32'.5	3° 33'.1	3° 22'.8	1.0	0.2	7.0	1.7	13.0	3.1
11	3° 32'.8	3° 33'.3	3° 23'.1	1.1	0.3	7.1	1.7	13.1	3.2
12	3° 33'.0	3° 33'.6	3° 23'.3	1.2	0.3	7.2	1.7	13.2	3.2
13	3° 33'.2	3° 33'.8	3° 23'.5	1.3	0.3	7.3	1.8	13.3	3.2
14	3° 33'.5	3° 34'.1	3° 23'.8	1.4	0.3	7.4	1.8	13.4	3.2
15	3° 33'.8	3° 34'.3	3° 24'.0	1.5	0.4	7.5	1.8	13.5	3.3
16	3° 34'.0	3° 34'.6	3° 24'.3	1.6	0.4	7.6	1.8	13.6	3.3
17	3° 34'.3	3° 34'.8	3° 24'.5	1.7	0.4	7.7	1.9	13.7	3.3
18	3° 34'.5	3° 35'.1	3° 24'.7	1.8	0.4	7.8	1.9	13.8	3.3
19	3° 34'.7	3° 35'.3	3° 25'.0	1.9	0.5	7.9	1.9	13.9	3.4
20	3° 35'.0	3° 35'.6	3° 25'.2	2.0	0.5	8.0	1.9	14.0	3.4
21	3° 35'.3	3° 35'.8	3° 25'.4	2.1	0.5	8.1	2.0	14.1	3.4
22	3° 35'.5	3° 36'.1	3° 25'.7	2.2	0.5	8.2	2.0	14.2	3.4
23	3° 35'.8	3° 36'.3	3° 25'.9	2.3	0.6	8.3	2.0	14.3	3.5
24	3° 36'.0	3° 36'.6	3° 26'.2	2.4	0.6	8.4	2.0	14.4	3.5
25	3° 36'.2	3° 36'.9	3° 26'.4	2.5	0.6	8.5	2.1	14.5	3.5
26	3° 36'.5	3° 37'.1	3° 26'.6	2.6	0.6	8.6	2.1	14.6	3.5
27	3° 36'.7	3° 37'.4	3° 26'.9	2.7	0.7	8.7	2.1	14.7	3.6
28	3° 37'.0	3° 37'.6	3° 27'.1	2.8	0.7	8.8	2.1	14.8	3.6
29	3° 37'.3	3° 37'.9	3° 27'.4	2.9	0.7	8.9	2.2	14.9	3.6
30	3° 37'.5	3° 38'.1	3° 27'.6	3.0	0.7	9.0	2.2	15.0	3.6
31	3° 37'.8	3° 38'.4	3° 27'.8	3.1	0.7	9.1	2.2	15.1	3.6
32	3° 38'.0	3° 38'.6	3° 28'.1	3.2	0.8	9.2	2.2	15.2	3.7
33	3° 38'.3	3° 38'.9	3° 28'.3	3.3	0.8	9.3	2.2	15.3	3.7
34	3° 38'.5	3° 39'.1	3° 28'.5	3.4	0.8	9.4	2.3	15.4	3.7
35	3° 38'.7	3° 39'.4	3° 28'.8	3.5	0.8	9.5	2.3	15.5	3.7
36	3° 39'.0	3° 39'.6	3° 29'.0	3.6	0.9	9.6	2.3	15.6	3.8
37	3° 39'.2	3° 39'.9	3° 29'.3	3.7	0.9	9.7	2.3	15.7	3.8
38	3° 39'.5	3° 40'.1	3° 29'.5	3.8	0.9	9.8	2.4	15.8	3.8
39	3° 39'.7	3° 40'.4	3° 29'.7	3.9	0.9	9.9	2.4	15.9	3.8
40	3° 40'.0	3° 40'.6	3° 30'.0	4.0	1.0	10.0	2.4	16.0	3.9
41	3° 40'.3	3° 40'.9	3° 30'.2	4.1	1.0	10.1	2.4	16.1	3.9
42	3° 40'.5	3° 41'.1	3° 30'.5	4.2	1.0	10.2	2.5	16.2	3.9
43	3° 40'.8	3° 41'.4	3° 30'.7	4.3	1.0	10.3	2.5	16.3	3.9
44	3° 41'.0	3° 41'.6	3° 30'.9	4.4	1.1	10.4	2.5	16.4	4.0
45	3° 41'.3	3° 41'.9	3° 31'.2	4.5	1.1	10.5	2.5	16.5	4.0
46	3° 41'.5	3° 42'.1	3° 31'.4	4.6	1.1	10.6	2.6	16.6	4.0
47	3° 41'.7	3° 42'.4	3° 31'.6	4.7	1.1	10.7	2.6	16.7	4.0
48	3° 42'.0	3° 42'.6	3° 31'.9	4.8	1.2	10.8	2.6	16.8	4.1
49	3° 42'.2	3° 42'.9	3° 32'.1	4.9	1.2	10.9	2.6	16.9	4.1
50	3° 42'.5	3° 43'.1	3° 32'.4	5.0	1.2	11.0	2.7	17.0	4.1
51	3° 42'.7	3° 43'.4	3° 32'.6	5.1	1.2	11.1	2.7	17.1	4.1
52	3° 43'.0	3° 43'.6	3° 32'.8	5.2	1.3	11.2	2.7	17.2	4.2
53	3° 43'.3	3° 43'.9	3° 33'.1	5.3	1.3	11.3	2.7	17.3	4.2
54	3° 43'.5	3° 44'.1	3° 33'.3	5.4	1.3	11.4	2.8	17.4	4.2
55	3° 43'.8	3° 44'.4	3° 33'.6	5.5	1.3	11.5	2.8	17.5	4.2
56	3° 44'.0	3° 44'.6	3° 33'.8	5.6	1.4	11.6	2.8	17.6	4.3
57	3° 44'.3	3° 44'.9	3° 34'.0	5.7	1.4	11.7	2.8	17.7	4.3
58	3° 44'.5	3° 45'.1	3° 34'.3	5.8	1.4	11.8	2.9	17.8	4.3
59	3° 44'.7	3° 45'.4	3° 34'.5	5.9	1.4	11.9	2.9	17.9	4.3
60	3° 45'.0	3° 45'.6	3° 34'.7	6.0	1.5	12.0	2.9	18.0	4.4

S	Sun Planets	Aries	Moon	v or d	Corr'n	v or d	Corr'n	v or d	Corr'n
00	3° 45'.0	3° 45'.6	3° 34'.7	0.0	0.0	6.0	1.6	12.0	3.1
01	3° 45'.2	3° 45'.9	3° 35'.0	0.1	0.0	6.1	1.6	12.1	3.1
02	3° 45'.5	3° 46'.1	3° 35'.2	0.2	0.1	6.2	1.6	12.2	3.2
03	3° 45'.8	3° 46'.4	3° 35'.5	0.3	0.1	6.3	1.6	12.3	3.2
04	3° 46'.0	3° 46'.6	3° 35'.7	0.4	0.1	6.4	1.7	12.4	3.2
05	3° 46'.3	3° 46'.9	3° 35'.9	0.5	0.1	6.5	1.7	12.5	3.2
06	3° 46'.5	3° 47'.1	3° 36'.2	0.6	0.2	6.6	1.7	12.6	3.3
07	3° 46'.8	3° 47'.4	3° 36'.4	0.7	0.2	6.7	1.7	12.7	3.3
08	3° 47'.0	3° 47'.6	3° 36'.7	0.8	0.2	6.8	1.8	12.8	3.3
09	3° 47'.2	3° 47'.9	3° 36'.9	0.9	0.2	6.9	1.8	12.9	3.3
10	3° 47'.5	3° 48'.1	3° 37'.1	1.0	0.3	7.0	1.8	13.0	3.4
11	3° 47'.7	3° 48'.4	3° 37'.4	1.1	0.3	7.1	1.8	13.1	3.4
12	3° 48'.0	3° 48'.6	3° 37'.6	1.2	0.3	7.2	1.9	13.2	3.4
13	3° 48'.2	3° 48'.9	3° 37'.9	1.3	0.3	7.3	1.9	13.3	3.4
14	3° 48'.5	3° 49'.1	3° 38'.1	1.4	0.4	7.4	1.9	13.4	3.5
15	3° 48'.8	3° 49'.4	3° 38'.3	1.5	0.4	7.5	1.9	13.5	3.5
16	3° 49'.0	3° 49'.6	3° 38'.6	1.6	0.4	7.6	2.0	13.6	3.5
17	3° 49'.3	3° 49'.9	3° 38'.8	1.7	0.4	7.7	2.0	13.7	3.5
18	3° 49'.5	3° 50'.1	3° 39'.0	1.8	0.5	7.8	2.0	13.8	3.6
19	3° 49'.8	3° 50'.4	3° 39'.3	1.9	0.5	7.9	2.0	13.9	3.6
20	3° 50'.0	3° 50'.6	3° 39'.5	2.0	0.5	8.0	2.1	14.0	3.6
21	3° 50'.2	3° 50'.9	3° 39'.8	2.1	0.5	8.1	2.1	14.1	3.6
22	3° 50'.5	3° 51'.1	3° 40'.0	2.2	0.6	8.2	2.1	14.2	3.7
23	3° 50'.7	3° 51'.4	3° 40'.2	2.3	0.6	8.3	2.1	14.3	3.7
24	3° 51'.0	3° 51'.6	3° 40'.5	2.4	0.6	8.4	2.2	14.4	3.7
25	3° 51'.2	3° 51'.9	3° 40'.7	2.5	0.6	8.5	2.2	14.5	3.7
26	3° 51'.5	3° 52'.1	3° 41'.0	2.6	0.7	8.6	2.2	14.6	3.8
27	3° 51'.8	3° 52'.4	3° 41'.2	2.7	0.7	8.7	2.2	14.7	3.8
28	3° 52'.0	3° 52'.6	3° 41'.4	2.8	0.7	8.8	2.3	14.8	3.8
29	3° 52'.3	3° 52'.9	3° 41'.7	2.9	0.7	8.9	2.3	14.9	3.8
30	3° 52'.5	3° 53'.1	3° 41'.9	3.0	0.8	9.0	2.3	15.0	3.9
31	3° 52'.7	3° 53'.4	3° 42'.1	3.1	0.8	9.1	2.4	15.1	3.9
32	3° 53'.0	3° 53'.6	3° 42'.4	3.2	0.8	9.2	2.4	15.2	3.9
33	3° 53'.2	3° 53'.9	3° 42'.6	3.3	0.9	9.3	2.4	15.3	4.0
34	3° 53'.5	3° 54'.1	3° 42'.9	3.4	0.9	9.4	2.4	15.4	4.0
35	3° 53'.7	3° 54'.4	3° 43'.1	3.5	0.9	9.5	2.5	15.5	4.0
36	3° 54'.0	3° 54'.6	3° 43'.3	3.6	0.9	9.6	2.5	15.6	4.0
37	3° 54'.3	3° 54'.9	3° 43'.6	3.7	1.0	9.7	2.5	15.7	4.1
38	3° 54'.5	3° 55'.2	3° 43'.8	3.8	1.0	9.8	2.5	15.8	4.1
39	3° 54'.8	3° 55'.4	3° 44'.1	3.9	1.0	9.9	2.6	15.9	4.1
40	3° 55'.0	3° 55'.7	3° 44'.3	4.0	1.0	10.0	2.6	16.0	4.1
41	3° 55'.3	3° 55'.9	3° 44'.5	4.1	1.1	10.1	2.6	16.1	4.2
42	3° 55'.5	3° 56'.2	3° 44'.8	4.2	1.1	10.2	2.6	16.2	4.2
43	3° 55'.7	3° 56'.4	3° 45'.0	4.3	1.1	10.3	2.7	16.3	4.2
44	3° 56'.0	3° 56'.7	3° 45'.2	4.4	1.1	10.4	2.7	16.4	4.2
45	3° 56'.2	3° 56'.9	3° 45'.5	4.5	1.2	10.5	2.7	16.5	4.3
46	3° 56'.5	3° 57'.2	3° 45'.7	4.6	1.2	10.6	2.7	16.6	4.3
47	3° 56'.7	3° 57'.4	3° 46'.0	4.7	1.2	10.7	2.8	16.7	4.3
48	3° 57'.0	3° 57'.7	3° 46'.2	4.8	1.2	10.8	2.8	16.8	4.3
49	3° 57'.3	3° 57'.9	3° 46'.4	4.9	1.3	10.9	2.8	16.9	4.4
50	3° 57'.5	3° 58'.2	3° 46'.7	5.0	1.3	11.0	2.8	17.0	4.4
51	3° 57'.8	3° 58'.4	3° 46'.9	5.1	1.3	11.1	2.9	17.1	4.4
52	3° 58'.0	3° 58'.7	3° 47'.2	5.2	1.3	11.2	2.9	17.2	4.4
53	3° 58'.3	3° 58'.9	3° 47'.4	5.3	1.4	11.3	2.9	17.3	4.5
54	3° 58'.5	3° 59'.2	3° 47'.6	5.4	1.4	11.4	2.9	17.4	4.5
55	3° 58'.7	3° 59'.4	3° 47'.9	5.5	1.4	11.5	3.0	17.5	4.5
56	3° 59'.0	3° 59'.7	3° 48'.1	5.6	1.4	11.6	3.0	17.6	4.5
57	3° 59'.2	3° 59'.9	3° 48'.4	5.7	1.5	11.7	3.0	17.7	4.6
58	3° 59'.5	4° 00'.2	3° 48'.6	5.8	1.5	11.8	3.0	17.8	4.6
59	3° 59'.7	4° 00'.4	3° 48'.8	5.9	1.5	11.9	3.1	17.9	4.6
60	4° 00'.0	4° 00'.7	3° 49'.1	6.0	1.6	12.0	3.1	18.0	4.7

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S	Sun Planets	Aries	Moon	v or d	Corr'n	v or d	Corr'n	v or d	Corr'n
00	4° 00'.0	4° 00'.7	3° 49'.1	0.0	0.0	6.0	1.7	12.0	3.3
01	4° 00'.3	4° 00'.9	3° 49'.3	0.1	0.0	6.1	1.7	12.1	3.3
02	4° 00'.5	4° 01'.2	3° 49'.5	0.2	0.1	6.2	1.7	12.2	3.4
03	4° 00'.8	4° 01'.4	3° 49'.8	0.3	0.1	6.3	1.7	12.3	3.4
04	4° 01'.0	4° 01'.7	3° 50'.0	0.4	0.1	6.4	1.8	12.4	3.4
05	4° 01'.2	4° 01'.9	3° 50'.3	0.5	0.1	6.5	1.8	12.5	3.4
06	4° 01'.5	4° 02'.2	3° 50'.5	0.6	0.2	6.6	1.8	12.6	3.5
07	4° 01'.7	4° 02'.4	3° 50'.7	0.7	0.2	6.7	1.8	12.7	3.5
08	4° 02'.0	4° 02'.7	3° 51'.0	0.8	0.2	6.8	1.9	12.8	3.5
09	4° 02'.2	4° 02'.9	3° 51'.2	0.9	0.2	6.9	1.9	12.9	3.5
10	4° 02'.5	4° 03'.2	3° 51'.5	1.0	0.3	7.0	1.9	13.0	3.6
11	4° 02'.8	4° 03'.4	3° 51'.7	1.1	0.3	7.1	2.0	13.1	3.6
12	4° 03'.0	4° 03'.7	3° 51'.9	1.2	0.3	7.2	2.0	13.2	3.6
13	4° 03'.3	4° 03'.9	3° 52'.2	1.3	0.4	7.3	2.0	13.3	3.7
14	4° 03'.5	4° 04'.2	3° 52'.4	1.4	0.4	7.4	2.0	13.4	3.7
15	4° 03'.8	4° 04'.4	3° 52'.6	1.5	0.4	7.5	2.1	13.5	3.7
16	4° 04'.0	4° 04'.7	3° 52'.9	1.6	0.4	7.6	2.1	13.6	3.7
17	4° 04'.2	4° 04'.9	3° 53'.1	1.7	0.5	7.7	2.1	13.7	3.8
18	4° 04'.5	4° 05'.2	3° 53'.4	1.8	0.5	7.8	2.1	13.8	3.8
19	4° 04'.7	4° 05'.4	3° 53'.6	1.9	0.5	7.9	2.2	13.9	3.8
20	4° 05'.0	4° 05'.7	3° 53'.8	2.0	0.6	8.0	2.2	14.0	3.9
21	4° 05'.2	4° 05'.9	3° 54'.1	2.1	0.6	8.1	2.2	14.1	3.9
22	4° 05'.5	4° 06'.2	3° 54'.3	2.2	0.6	8.2	2.3	14.2	3.9
23	4° 05'.8	4° 06'.4	3° 54'.6	2.3	0.6	8.3	2.3	14.3	3.9
24	4° 06'.0	4° 06'.7	3° 54'.8	2.4	0.7	8.4	2.3	14.4	4.0
25	4° 06'.3	4° 06'.9	3° 55'.0	2.5	0.7	8.5	2.3	14.5	4.0
26	4° 06'.5	4° 07'.2	3° 55'.3	2.6	0.7	8.6	2.4	14.6	4.0
27	4° 06'.8	4° 07'.4	3° 55'.5	2.7	0.7	8.7	2.4	14.7	4.0
28	4° 07'.0	4° 07'.7	3° 55'.7	2.8	0.8	8.8	2.4	14.8	4.1
29	4° 07'.2	4° 07'.9	3° 56'.0	2.9	0.8	8.9	2.4	14.9	4.1
30	4° 07'.5	4° 08'.2	3° 56'.2	3.0	0.8	9.0	2.5	15.0	4.1
31	4° 07'.7	4° 08'.4	3° 56'.5	3.1	0.9	9.1	2.5	15.1	4.2
32	4° 08'.0	4° 08'.7	3° 56'.7	3.2	0.9	9.2	2.5	15.2	4.2
33	4° 08'.2	4° 08'.9	3° 56'.9	3.3	0.9	9.3	2.6	15.3	4.2
34	4° 08'.5	4° 09'.2	3° 57'.2	3.4	0.9	9.4	2.6	15.4	4.2
35	4° 08'.8	4° 09'.4	3° 57'.4	3.5	1.0	9.5	2.6	15.5	4.3
36	4° 09'.0	4° 09'.7	3° 57'.7	3.6	1.0	9.6	2.6	15.6	4.3
37	4° 09'.3	4° 09'.9	3° 57'.9	3.7	1.0	9.7	2.7	15.7	4.3
38	4° 09'.5	4° 10'.2	3° 58'.1	3.8	1.0	9.8	2.7	15.8	4.3
39	4° 09'.7	4° 10'.4	3° 58'.4	3.9	1.1	9.9	2.7	15.9	4.4
40	4° 10'.0	4° 10'.7	3° 58'.6	4.0	1.1	10.0	2.8	16.0	4.4
41	4° 10'.2	4° 10'.9	3° 58'.8	4.1	1.1	10.1	2.8	16.1	4.4
42	4° 10'.5	4° 11'.2	3° 59'.1	4.2	1.2	10.2	2.8	16.2	4.5
43	4° 10'.7	4° 11'.4	3° 59'.3	4.3	1.2	10.3	2.8	16.3	4.5
44	4° 11'.0	4° 11'.7	3° 59'.6	4.4	1.2	10.4	2.9	16.4	4.5
45	4° 11'.3	4° 11'.9	3° 59'.8	4.5	1.2	10.5	2.9	16.5	4.5
46	4° 11'.5	4° 12'.2	4° 00'.0	4.6	1.3	10.6	2.9	16.6	4.6
47	4° 11'.8	4° 12'.4	4° 00'.3	4.7	1.3	10.7	2.9	16.7	4.6
48	4° 12'.0	4° 12'.7	4° 00'.5	4.8	1.3	10.8	3.0	16.8	4.6
49	4° 12'.3	4° 13'.0	4° 00'.8	4.9	1.3	10.9	3.0	16.9	4.6
50	4° 12'.5	4° 13'.2	4° 01'.0	5.0	1.4	11.0	3.0	17.0	4.7
51	4° 12'.7	4° 13'.5	4° 01'.2	5.1	1.4	11.1	3.1	17.1	4.7
52	4° 13'.0	4° 13'.7	4° 01'.5	5.2	1.4	11.2	3.1	17.2	4.7
53	4° 13'.2	4° 14'.0	4° 01'.7	5.3	1.5	11.3	3.1	17.3	4.8
54	4° 13'.5	4° 14'.2	4° 02'.0	5.4	1.5	11.4	3.1	17.4	4.8
55	4° 13'.7	4° 14'.5	4° 02'.2	5.5	1.5	11.5	3.2	17.5	4.8
56	4° 14'.0	4° 14'.7	4° 02'.4	5.6	1.5	11.6	3.2	17.6	4.8
57	4° 14'.3	4° 15'.0	4° 02'.7	5.7	1.6	11.7	3.2	17.7	4.9
58	4° 14'.5	4° 15'.2	4° 02'.9	5.8	1.6	11.8	3.2	17.8	4.9
59	4° 14'.8	4° 15'.5	4° 03'.1	5.9	1.6	11.9	3.3	17.9	4.9
60	4° 15'.0	4° 15'.7	4° 03'.4	6.0	1.7	12.0	3.3	18.0	5.0

S	Sun Planets	Aries	Moon	v or d	Corr'n	v or d	Corr'n	v or d	Corr'n
00	4° 15'.0	4° 15'.7	4° 03'.4	0.0	0.0	6.0	1.8	12.0	3.5
01	4° 15'.3	4° 16'.0	4° 03'.6	0.1	0.0	6.1	1.8	12.1	3.5
02	4° 15'.5	4° 16'.2	4° 03'.9	0.2	0.1	6.2	1.8	12.2	3.6
03	4° 15'.7	4° 16'.5	4° 04'.1	0.3	0.1	6.3	1.8	12.3	3.6
04	4° 16'.0	4° 16'.7	4° 04'.3	0.4	0.1	6.4	1.9	12.4	3.6
05	4° 16'.2	4° 17'.0	4° 04'.6	0.5	0.1	6.5	1.9	12.5	3.6
06	4° 16'.5	4° 17'.2	4° 04'.8	0.6	0.2	6.6	1.9	12.6	3.7
07	4° 16'.8	4° 17'.5	4° 05'.1	0.7	0.2	6.7	2.0	12.7	3.7
08	4° 17'.0	4° 17'.7	4° 05'.3	0.8	0.2	6.8	2.0	12.8	3.7
09	4° 17'.3	4° 18'.0	4° 05'.5	0.9	0.3	6.9	2.0	12.9	3.8
10	4° 17'.5	4° 18'.2	4° 05'.8	1.0	0.3	7.0	2.0	13.0	3.8
11	4° 17'.8	4° 18'.5	4° 06'.0	1.1	0.3	7.1	2.1	13.1	3.8
12	4° 18'.0	4° 18'.7	4° 06'.2	1.2	0.4	7.2	2.1	13.2	3.9
13	4° 18'.2	4° 19'.0	4° 06'.5	1.3	0.4	7.3	2.1	13.3	3.9
14	4° 18'.5	4° 19'.2	4° 06'.7	1.4	0.4	7.4	2.2	13.4	3.9
15	4° 18'.7	4° 19'.5	4° 07'.0	1.5	0.4	7.5	2.2	13.5	3.9
16	4° 19'.0	4° 19'.7	4° 07'.2	1.6	0.5	7.6	2.2	13.6	4.0
17	4° 19'.2	4° 20'.0	4° 07'.4	1.7	0.5	7.7	2.2	13.7	4.0
18	4° 19'.5	4° 20'.2	4° 07'.7	1.8	0.5	7.8	2.3	13.8	4.0
19	4° 19'.8	4° 20'.5	4° 07'.9	1.9	0.6	7.9	2.3	13.9	4.1
20	4° 20'.0	4° 20'.7	4° 08'.2	2.0	0.6	8.0	2.3	14.0	4.1
21	4° 20'.3	4° 21'.0	4° 08'.4	2.1	0.6	8.1	2.4	14.1	4.1
22	4° 20'.5	4° 21'.2	4° 08'.6	2.2	0.6	8.2	2.4	14.2	4.1
23	4° 20'.8	4° 21'.5	4° 08'.9	2.3	0.7	8.3	2.4	14.3	4.2
24	4° 21'.0	4° 21'.7	4° 09'.1	2.4	0.7	8.4	2.5	14.4	4.2
25	4° 21'.2	4° 22'.0	4° 09'.3	2.5	0.7	8.5	2.5	14.5	4.2
26	4° 21'.5	4° 22'.2	4° 09'.6	2.6	0.8	8.6	2.5	14.6	4.3
27	4° 21'.7	4° 22'.5	4° 09'.8	2.7	0.8	8.7	2.5	14.7	4.3
28	4° 22'.0	4° 22'.7	4° 10'.1	2.8	0.8	8.8	2.6	14.8	4.3
29	4° 22'.2	4° 23'.0	4° 10'.3	2.9	0.8	8.9	2.6	14.9	4.3
30	4° 22'.5	4° 23'.2	4° 10'.5	3.0	0.9	9.0	2.6	15.0	4.4
31	4° 22'.8	4° 23'.5	4° 10'.8	3.1	0.9	9.1	2.7	15.1	4.4
32	4° 23'.0	4° 23'.7	4° 11'.0	3.2	0.9	9.2	2.7	15.2	4.4
33	4° 23'.3	4° 24'.0	4° 11'.3	3.3	1.0	9.3	2.7	15.3	4.5
34	4° 23'.5	4° 24'.2	4° 11'.5	3.4	1.0	9.4	2.7	15.4	4.5
35	4° 23'.8	4° 24'.5	4° 11'.7	3.5	1.0	9.5	2.8	15.5	4.5
36	4° 24'.0	4° 24'.7	4° 12'.0	3.6	1.1	9.6	2.8	15.6	4.6
37	4° 24'.2	4° 25'.0	4° 12'.2	3.7	1.1	9.7	2.8	15.7	4.6
38	4° 24'.5	4° 25'.2	4° 12'.5	3.8	1.1	9.8	2.9	15.8	4.6
39	4° 24'.7	4° 25'.5	4° 12'.7	3.9	1.1	9.9	2.9	15.9	4.6
40	4° 25'.0	4° 25'.7	4° 12'.9	4.0	1.2	10.0	2.9	16.0	4.7
41	4° 25'.3	4° 26'.0	4° 13'.2	4.1	1.2	10.1	2.9	16.1	4.7
42	4° 25'.5	4° 26'.2	4° 13'.4	4.2	1.2	10.2	3.0	16.2	4.7
43	4° 25'.8	4° 26'.5	4° 13'.6	4.3	1.3	10.3	3.0	16.3	4.8
44	4° 26'.0	4° 26'.7	4° 13'.9	4.4	1.3	10.4	3.0	16.4	4.8
45	4° 26'.3	4° 27'.0	4° 14'.1	4.5	1.3	10.5	3.1	16.5	4.8
46	4° 26'.5	4° 27'.2	4° 14'.4	4.6	1.3	10.6	3.1	16.6	4.8
47	4° 26'.7	4° 27'.5	4° 14'.6	4.7	1.4	10.7	3.1	16.7	4.9
48	4° 27'.0	4° 27'.7	4° 14'.8	4.8	1.4	10.8	3.2	16.8	4.9
49	4° 27'.2	4° 28'.0	4° 15'.1	4.9	1.4	10.9	3.2	16.9	4.9
50	4° 27'.5	4° 28'.2	4° 15'.3	5.0	1.5	11.0	3.2	17.0	5.0
51	4° 27'.7	4° 28'.5	4° 15'.6	5.1	1.5	11.1	3.2	17.1	5.0
52	4° 28'.0	4° 28'.7	4° 15'.8	5.2	1.5	11.2	3.3	17.2	5.0
53	4° 28'.3	4° 29'.0	4° 16'.0	5.3	1.5	11.3	3.3	17.3	5.0
54	4° 28'.5	4° 29'.2	4° 16'.3	5.4	1.6	11.4	3.3	17.4	5.1
55	4° 28'.8	4° 29'.5	4° 16'.5	5.5	1.6	11.5	3.4	17.5	5.1
56	4° 29'.0	4° 29'.7	4° 16'.7	5.6	1.6	11.6	3.4	17.6	5.1
57	4° 29'.3	4° 30'.0	4° 17'.0	5.7	1.7	11.7	3.4	17.7	5.2
58	4° 29'.5	4° 30'.2	4° 17'.2	5.8	1.7	11.8	3.4	17.8	5.2
59	4° 29'.7	4° 30'.5	4° 17'.5	5.9	1.7	11.9	3.5	17.9	5.2
60	4° 30'.0	4° 30'.7	4° 17'.7	6.0	1.8	12.0	3.5	18.0	5.3

NavSoft.Com

Deuxième partie

Table HO229 - Extraits

INTERPOLATION TABLE

Dec. Inc.	Altitude Difference (d)																Double Second Diff. and Corr.
	Tens					Decimals ⇩	Units										
	10′	20′	30′	40′	50′		0′	1′	2′	3′	4′	5′	6′	7′	8′	9′	
′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′ ′
0.0	0.0	0.0	0.0	0.0	0.0	**.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	
0.1	0.0	0.0	0.0	0.0	0.1	**.1**	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0 0.0
0.2	0.0	0.0	0.1	0.1	0.1	**.2**	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	48.2
0.3	0.0	0.1	0.1	0.2	0.2	**.3**	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	
0.4	0.1	0.1	0.2	0.3	0.3	**.4**	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	
0.5	0.1	0.2	0.3	0.3	0.4	**.5**	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	
0.6	0.1	0.2	0.3	0.4	0.5	**.6**	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	16.2 0.1
0.7	0.1	0.3	0.4	0.5	0.6	**.7**	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	48.6
0.8	0.2	0.3	0.4	0.6	0.7	**.8**	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	
0.9	0.2	0.3	0.5	0.6	0.8	**.9**	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	
1.0	0.1	0.3	0.5	0.6	0.8	**.0**	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	
1.1	0.2	0.3	0.5	0.7	0.9	**.1**	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	
1.2	0.2	0.4	0.6	0.8	1.0	**.2**	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	
1.3	0.2	0.4	0.6	0.9	1.1	**.3**	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	
1.4	0.2	0.5	0.7	0.9	1.2	**.4**	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	8.2 0.1
1.5	0.3	0.5	0.8	1.0	1.3	**.5**	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	24.6 0.2
1.6	0.3	0.5	0.8	1.1	1.3	**.6**	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	41.0
1.7	0.3	0.6	0.9	1.2	1.4	**.7**	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	
1.8	0.3	0.6	0.9	1.2	1.5	**.8**	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	
1.9	0.4	0.7	1.0	1.3	1.6	**.9**	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	
2.0	0.3	0.6	1.0	1.3	1.6	**.0**	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	
2.1	0.3	0.7	1.0	1.4	1.7	**.1**	0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.4	
2.2	0.3	0.7	1.1	1.4	1.8	**.2**	0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.4	
2.3	0.4	0.8	1.1	1.5	1.9	**.3**	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.4	5.0 0.1
2.4	0.4	0.8	1.2	1.6	2.0	**.4**	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.4	15.0 0.2
2.5	0.4	0.8	1.3	1.7	2.1	**.5**	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	25.0 0.3
2.6	0.4	0.9	1.3	1.7	2.2	**.6**	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	35.1
2.7	0.5	0.9	1.4	1.8	2.3	**.7**	0.0	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.4	
2.8	0.5	1.0	1.4	1.9	2.4	**.8**	0.0	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.4	
2.9	0.5	1.0	1.5	2.0	2.5	**.9**	0.0	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.4	
3.0	0.5	1.0	1.5	2.0	2.5	**.0**	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.5	0.5	
3.1	0.5	1.0	1.5	2.0	2.6	**.1**	0.0	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.5	
3.2	0.5	1.0	1.6	2.1	2.6	**.2**	0.0	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.5	3.6 0.1
3.3	0.5	1.1	1.6	2.2	2.7	**.3**	0.0	0.1	0.1	0.2	0.3	0.3	0.4	0.4	0.5	0.5	10.9 0.2
3.4	0.6	1.1	1.7	2.3	2.8	**.4**	0.0	0.1	0.1	0.2	0.3	0.3	0.4	0.4	0.5	0.5	18.2 0.3
3.5	0.6	1.2	1.8	2.3	2.9	**.5**	0.0	0.1	0.1	0.2	0.3	0.3	0.4	0.4	0.5	0.6	25.5 0.4
3.6	0.6	1.2	1.8	2.4	3.0	**.6**	0.0	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.6	32.8 0.5
3.7	0.6	1.3	1.9	2.5	3.1	**.7**	0.0	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.6	40.1
3.8	0.7	1.3	1.9	2.6	3.2	**.8**	0.0	0.1	0.2	0.2	0.3	0.3	0.4	0.5	0.5	0.6	
3.9	0.7	1.3	2.0	2.6	3.3	**.9**	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.5	0.5	0.6	
4.0	0.6	1.3	2.0	2.6	3.3	**.0**	0.0	0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	
4.1	0.7	1.3	2.0	2.7	3.4	**.1**	0.0	0.1	0.2	0.2	0.3	0.4	0.5	0.5	0.6	0.7	
4.2	0.7	1.4	2.1	2.8	3.5	**.2**	0.0	0.1	0.2	0.2	0.3	0.4	0.5	0.5	0.6	0.7	2.9 0.1
4.3	0.7	1.4	2.1	2.9	3.6	**.3**	0.0	0.1	0.2	0.2	0.3	0.4	0.5	0.5	0.6	0.7	8.6 0.2
4.4	0.7	1.5	2.2	2.9	3.7	**.4**	0.0	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.6	0.7	14.4 0.3
4.5	0.8	1.5	2.3	3.0	3.8	**.5**	0.0	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.6	0.7	20.2 0.4
4.6	0.8	1.5	2.3	3.1	3.8	**.6**	0.0	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.6	0.7	25.9 0.5
4.7	0.8	1.6	2.4	3.2	3.9	**.7**	0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.7	31.7 0.6
4.8	0.8	1.6	2.4	3.2	4.0	**.8**	0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.7	37.5
4.9	0.9	1.7	2.5	3.3	4.1	**.9**	0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.7	
5.0	0.8	1.6	2.5	3.3	4.1	**.0**	0.0	0.1	0.2	0.3	0.4	0.5	0.5	0.6	0.7	0.8	
5.1	0.8	1.7	2.5	3.4	4.2	**.1**	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.7	0.8	
5.2	0.8	1.7	2.6	3.4	4.3	**.2**	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.8	2.4 0.1
5.3	0.9	1.8	2.6	3.5	4.4	**.3**	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	7.2 0.2
5.4	0.9	1.8	2.7	3.6	4.5	**.4**	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	12.0 0.3
5.5	0.9	1.8	2.8	3.7	4.6	**.5**	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	16.8 0.4
5.6	0.9	1.9	2.8	3.7	4.7	**.6**	0.1	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	21.6 0.5
5.7	1.0	1.9	2.9	3.8	4.8	**.7**	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	26.4 0.6
5.8	1.0	2.0	2.9	3.9	4.9	**.8**	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	31.2 0.7
5.9	1.0	2.0	3.0	4.0	5.0	**.9**	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.8	0.9	36.0
6.0	1.0	2.0	3.0	4.0	5.0	**.0**	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.8	0.9	1.0	
6.1	1.0	2.0	3.0	4.0	5.1	**.1**	0.0	0.1	0.2	0.3	0.4	0.6	0.7	0.8	0.9	1.0	2.1 0.1
6.2	1.0	2.0	3.1	4.1	5.1	**.2**	0.0	0.1	0.2	0.3	0.5	0.6	0.7	0.8	0.9	1.0	6.2 0.2
6.3	1.0	2.1	3.1	4.2	5.2	**.3**	0.0	0.1	0.2	0.4	0.5	0.6	0.7	0.8	0.9	1.0	10.4 0.3
6.4	1.1	2.1	3.2	4.3	5.3	**.4**	0.0	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	14.5 0.4
6.5	1.1	2.2	3.3	4.3	5.4	**.5**	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	18.6 0.5
6.6	1.1	2.2	3.3	4.4	5.5	**.6**	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	22.8 0.6
6.7	1.1	2.3	3.4	4.5	5.6	**.7**	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.1	26.9 0.7
6.8	1.2	2.3	3.4	4.6	5.7	**.8**	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1.0	1.1	31.1 0.8
6.9	1.2	2.3	3.5	4.6	5.8	**.9**	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.0	1.1	35.2
7.0	1.1	2.3	3.5	4.6	5.8	**.0**	0.0	0.1	0.2	0.4	0.5	0.6	0.7	0.9	1.0	1.1	
7.1	1.2	2.3	3.5	4.7	5.9	**.1**	0.0	0.1	0.3	0.4	0.5	0.6	0.8	0.9	1.0	1.1	1.8 0.1
7.2	1.2	2.4	3.6	4.8	6.0	**.2**	0.0	0.1	0.3	0.4	0.5	0.6	0.8	0.9	1.0	1.1	5.5 0.2
7.3	1.2	2.4	3.6	4.9	6.1	**.3**	0.0	0.2	0.3	0.4	0.5	0.7	0.8	0.9	1.0	1.2	9.1 0.3
7.4	1.2	2.5	3.7	4.9	6.2	**.4**	0.0	0.2	0.3	0.4	0.5	0.7	0.8	0.9	1.0	1.2	12.8 0.4
7.5	1.3	2.5	3.8	5.0	6.3	**.5**	0.1	0.2	0.3	0.4	0.6	0.7	0.8	0.9	1.1	1.2	16.5 0.5
7.6	1.3	2.5	3.8	5.1	6.3	**.6**	0.1	0.2	0.3	0.4	0.6	0.7	0.8	0.9	1.1	1.2	20.1 0.6
7.7	1.3	2.6	3.9	5.2	6.4	**.7**	0.1	0.2	0.3	0.5	0.6	0.7	0.8	1.0	1.1	1.2	23.8 0.7
7.8	1.3	2.6	3.9	5.2	6.5	**.8**	0.1	0.2	0.3	0.5	0.6	0.7	0.8	1.0	1.1	1.2	27.4 0.8
7.9	1.4	2.7	4.0	5.3	6.6	**.9**	0.1	0.2	0.4	0.5	0.6	0.7	0.9	1.0	1.1	1.2	31.1 0.9
	10′	20′	30′	40′	50′		0′	1′	2′	3′	4′	5′	6′	7′	8′	9′	34.7

Dec. Inc.	Altitude Difference (d)																Double Second Diff. and Corr.
	Tens					Decimals ⇩	Units										
	10′	20′	30′	40′	50′		0′	1′	2′	3′	4′	5′	6′	7′	8′	9′	
′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′ ′
8.0	1.3	2.6	4.0	5.3	6.6	**.0**	0.0	0.1	0.3	0.4	0.6	0.7	0.8	1.0	1.1	1.3	
8.1	1.3	2.7	4.0	5.4	6.7	**.1**	0.0	0.2	0.3	0.4	0.6	0.7	0.9	1.0	1.1	1.3	
8.2	1.3	2.7	4.1	5.4	6.8	**.2**	0.0	0.2	0.3	0.5	0.6	0.7	0.9	1.0	1.2	1.3	1.6 0.1
8.3	1.4	2.8	4.1	5.5	6.9	**.3**	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.0	1.2	1.3	4.8 0.2
8.4	1.4	2.8	4.2	5.6	7.0	**.4**	0.1	0.2	0.3	0.5	0.6	0.8	0.9	1.0	1.2	1.3	8.0 0.3
8.5	1.4	2.8	4.3	5.7	7.1	**.5**	0.1	0.2	0.4	0.5	0.6	0.8	0.9	1.1	1.2	1.3	11.2 0.4
8.6	1.4	2.9	4.3	5.7	7.2	**.6**	0.1	0.2	0.4	0.5	0.7	0.8	0.9	1.1	1.2	1.4	14.5 0.5
8.7	1.5	2.9	4.4	5.8	7.3	**.7**	0.1	0.2	0.4	0.5	0.7	0.8	0.9	1.1	1.2	1.4	17.7 0.6
8.8	1.5	3.0	4.4	5.9	7.4	**.8**	0.1	0.3	0.4	0.5	0.7	0.8	1.0	1.1	1.2	1.4	20.9 0.7
8.9	1.5	3.0	4.5	6.0	7.5	**.9**	0.1	0.3	0.4	0.6	0.7	0.8	1.0	1.1	1.3	1.4	24.1 0.8
9.0	1.5	3.0	4.5	6.0	7.5	**.0**	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.3	1.4	27.3 0.9
9.1	1.5	3.0	4.5	6.0	7.6	**.1**	0.0	0.2	0.3	0.5	0.6	0.8	1.0	1.1	1.3	1.4	30.5 1.0
9.2	1.5	3.0	4.6	6.1	7.6	**.2**	0.0	0.2	0.3	0.5	0.7	0.8	1.0	1.1	1.3	1.5	33.7 1.1
9.3	1.5	3.1	4.6	6.2	7.7	**.3**	0.0	0.2	0.4	0.5	0.7	0.8	1.0	1.2	1.3	1.5	36.9
9.4	1.6	3.1	4.7	6.3	7.8	**.4**	0.1	0.2	0.4	0.5	0.7	0.9	1.0	1.2	1.3	1.5	
9.5	1.6	3.2	4.8	6.3	7.9	**.5**	0.1	0.2	0.4	0.6	0.7	0.9	1.0	1.2	1.3	1.5	
9.6	1.6	3.2	4.8	6.4	8.0	**.6**	0.1	0.3	0.4	0.6	0.7	0.9	1.0	1.2	1.4	1.5	1.4 0.1
9.7	1.6	3.3	4.9	6.5	8.1	**.7**	0.1	0.3	0.4	0.6	0.7	0.9	1.1	1.2	1.4	1.5	4.2 0.2
9.8	1.7	3.3	4.9	6.6	8.2	**.8**	0.1	0.3	0.4	0.6	0.8	0.9	1.1	1.2	1.4	1.6	7.1 0.3
9.9	1.7	3.3	5.0	6.6	8.3	**.9**	0.1	0.3	0.5	0.6	0.8	0.9	1.1	1.3	1.4	1.6	9.9 0.4
10.0	1.6	3.3	5.0	6.6	8.3	**.0**	0.0	0.2	0.3	0.5	0.7	0.9	1.0	1.2	1.4	1.6	12.7 0.5
10.1	1.7	3.3	5.0	6.7	8.4	**.1**	0.0	0.2	0.4	0.5	0.7	0.9	1.1	1.2	1.4	1.6	15.5 0.6
10.2	1.7	3.4	5.1	6.8	8.5	**.2**	0.0	0.2	0.4	0.6	0.7	0.9	1.1	1.3	1.4	1.6	18.4 0.7
10.3	1.7	3.4	5.1	6.9	8.6	**.3**	0.1	0.2	0.4	0.6	0.8	0.9	1.1	1.3	1.5	1.6	21.2 0.8
10.4	1.7	3.5	5.2	6.9	8.7	**.4**	0.1	0.2	0.4	0.6	0.8	0.9	1.1	1.3	1.5	1.6	24.0 0.9
10.5	1.8	3.5	5.3	7.0	8.8	**.5**	0.1	0.3	0.4	0.6	0.8	1.0	1.1	1.3	1.5	1.7	26.8 1.0
10.6	1.8	3.5	5.3	7.1	8.8	**.6**	0.1	0.3	0.5	0.6	0.8	1.0	1.2	1.3	1.5	1.7	29.7 1.1
10.7	1.8	3.6	5.4	7.2	8.9	**.7**	0.1	0.3	0.5	0.6	0.8	1.0	1.2	1.3	1.5	1.7	32.5 1.2
10.8	1.8	3.6	5.4	7.2	9.0	**.8**	0.1	0.3	0.5	0.7	0.8	1.0	1.2	1.4	1.5	1.7	35.3
10.9	1.9	3.7	5.5	7.3	9.1	**.9**	0.2	0.3	0.5	0.7	0.9	1.0	1.2	1.4	1.6	1.7	
11.0	1.8	3.6	5.5	7.3	9.1	**.0**	0.0	0.2	0.4	0.6	0.8	1.0	1.1	1.3	1.5	1.7	
11.1	1.8	3.7	5.5	7.4	9.2	**.1**	0.0	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.7	1.3 0.1
11.2	1.8	3.7	5.6	7.4	9.3	**.2**	0.0	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	3.8 0.2
11.3	1.9	3.8	5.6	7.5	9.4	**.3**	0.1	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	6.3 0.3
11.4	1.9	3.8	5.7	7.6	9.5	**.4**	0.1	0.3	0.5	0.7	0.8	1.0	1.2	1.4	1.6	1.8	8.9 0.4
11.5	1.9	3.8	5.8	7.7	9.6	**.5**	0.1	0.3	0.5	0.7	0.9	1.1	1.2	1.4	1.6	1.8	11.4 0.5
11.6	1.9	3.9	5.8	7.7	9.7	**.6**	0.1	0.3	0.5	0.7	0.9	1.1	1.3	1.5	1.6	1.8	14.0 0.6
11.7	2.0	3.9	5.9	7.8	9.8	**.7**	0.1	0.3	0.5	0.7	0.9	1.1	1.3	1.5	1.7	1.9	16.5 0.7
11.8	2.0	4.0	5.9	7.9	9.9	**.8**	0.2	0.3	0.5	0.7	0.9	1.1	1.3	1.5	1.7	1.9	19.0 0.8
11.9	2.0	4.0	6.0	8.0	10.0	**.9**	0.2	0.4	0.6	0.7	0.9	1.1	1.3	1.5	1.7	1.9	21.6 0.9
12.0	2.0	4.0	6.0	8.0	10.0	**.0**	0.0	0.2	0.4	0.6	0.8	1.0	1.2	1.5	1.7	1.9	24.1 1.0
12.1	2.0	4.0	6.0	8.0	10.1	**.1**	0.0	0.2	0.4	0.6	0.9	1.1	1.3	1.5	1.7	1.9	26.7 1.1
12.2	2.0	4.0	6.1	8.1	10.1	**.2**	0.0	0.2	0.5	0.7	0.9	1.1	1.3	1.5	1.7	1.9	29.2 1.2
12.3	2.0	4.1	6.1	8.2	10.2	**.3**	0.1	0.3	0.5	0.7	0.9	1.1	1.3	1.5	1.7	1.9	31.7 1.3
12.4	2.1	4.1	6.2	8.3	10.3	**.4**	0.1	0.3	0.5	0.7	0.9	1.1	1.3	1.5	1.7	2.0	34.3
12.5	2.1	4.2	6.3	8.3	10.4	**.5**	0.1	0.3	0.5	0.7	0.9	1.1	1.4	1.6	1.8	2.0	
12.6	2.1	4.2	6.3	8.4	10.5	**.6**	0.1	0.3	0.5	0.7	1.0	1.2	1.4	1.6	1.8	2.0	1.2 0.1
12.7	2.1	4.3	6.4	8.5	10.6	**.7**	0.1	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	3.5 0.2
12.8	2.2	4.3	6.4	8.6	10.7	**.8**	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	5.8 0.3
12.9	2.2	4.3	6.5	8.6	10.8	**.9**	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.9	2.1	8.1 0.4
13.0	2.1	4.3	6.5	8.6	10.8	**.0**	0.0	0.2	0.4	0.7	0.9	1.1	1.3	1.6	1.8	2.0	10.5 0.5
13.1	2.2	4.3	6.5	8.7	10.9	**.1**	0.0	0.2	0.5	0.7	0.9	1.1	1.4	1.6	1.8	2.0	12.8 0.6
13.2	2.2	4.4	6.6	8.8	11.0	**.2**	0.0	0.3	0.5	0.7	0.9	1.2	1.4	1.6	1.8	2.1	15.1 0.7
13.3	2.2	4.4	6.6	8.9	11.1	**.3**	0.1	0.3	0.5	0.7	1.0	1.2	1.4	1.6	1.9	2.1	17.4 0.8
13.4	2.2	4.5	6.7	8.9	11.2	**.4**	0.1	0.3	0.5	0.8	1.0	1.2	1.4	1.7	1.9	2.1	19.8 0.9
13.5	2.3	4.5	6.8	9.0	11.3	**.5**	0.1	0.3	0.6	0.8	1.0	1.2	1.5	1.7	1.9	2.1	22.1 1.0
13.6	2.3	4.5	6.8	9.1	11.3	**.6**	0.1	0.4	0.6	0.8	1.0	1.3	1.5	1.7	1.9	2.2	24.4 1.1
13.7	2.3	4.6	6.9	9.2	11.4	**.7**	0.2	0.4	0.6	0.8	1.1	1.3	1.5	1.7	2.0	2.2	26.7 1.2
13.8	2.3	4.6	6.9	9.2	11.5	**.8**	0.2	0.4	0.6	0.9	1.1	1.3	1.5	1.8	2.0	2.2	29.1 1.3

INTERPOLATION TABLE

Dec. Inc.	Altitude Difference (d)																Double Second Diff. and Corr.
	Tens					Decimals ⇩	Units										
	10′	20′	30′	40′	50′		0′	1′	2′	3′	4′	5′	6′	7′	8′	9′	
′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′ ′
16.0	2.6	5.3	8.0	10.6	13.3	**.0**	0.0	0.3	0.5	0.8	1.1	1.4	1.6	1.9	2.2	2.5	
16.1	2.7	5.3	8.0	10.7	13.4	**.1**	0.0	0.3	0.6	0.9	1.1	1.4	1.7	2.0	2.2	2.5	
16.2	2.7	5.4	8.1	10.8	13.5	**.2**	0.1	0.3	0.6	0.9	1.2	1.4	1.7	2.0	2.3	2.5	1.0 0.1
16.3	2.7	5.4	8.1	10.9	13.6	**.3**	0.1	0.4	0.6	0.9	1.2	1.5	1.7	2.0	2.3	2.6	3.0 0.2
16.4	2.7	5.5	8.2	10.9	13.7	**.4**	0.1	0.4	0.7	0.9	1.2	1.5	1.8	2.0	2.3	2.6	4.9 0.3
																	6.9 0.4
16.5	2.8	5.5	8.3	11.0	13.8	**.5**	0.1	0.4	0.7	1.0	1.2	1.5	1.8	2.1	2.3	2.6	8.9 0.5
16.6	2.8	5.5	8.3	11.1	13.8	**.6**	0.2	0.4	0.7	1.0	1.3	1.5	1.8	2.1	2.4	2.6	10.8 0.6
16.7	2.8	5.6	8.4	11.2	13.9	**.7**	0.2	0.5	0.7	1.0	1.3	1.6	1.8	2.1	2.4	2.7	12.8 0.7
16.8	2.8	5.6	8.4	11.2	14.0	**.8**	0.2	0.5	0.8	1.0	1.3	1.6	1.9	2.1	2.4	2.7	14.8 0.8
16.9	2.9	5.7	8.5	11.3	14.1	**.9**	0.2	0.5	0.8	1.1	1.3	1.6	1.9	2.2	2.4	2.7	16.7 0.9
																	18.7 1.0
17.0	2.8	5.6	8.5	11.3	14.1	**.0**	0.0	0.3	0.6	0.9	1.2	1.5	1.7	2.0	2.3	2.6	20.7 1.1
17.1	2.8	5.7	8.5	11.4	14.2	**.1**	0.0	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	22.7 1.2
17.2	2.8	5.7	8.6	11.4	14.3	**.2**	0.1	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	24.6 1.3
17.3	2.9	5.8	8.6	11.5	14.4	**.3**	0.1	0.4	0.7	1.0	1.3	1.5	1.8	2.1	2.4	2.7	26.6 1.4
17.4	2.9	5.8	8.7	11.6	14.5	**.4**	0.1	0.4	0.7	1.0	1.3	1.6	1.9	2.2	2.4	2.7	28.6 1.5
																	30.5 1.6
17.5	2.9	5.8	8.8	11.7	14.6	**.5**	0.1	0.4	0.7	1.0	1.3	1.6	1.9	2.2	2.5	2.8	32.5 1.7
17.6	2.9	5.9	8.8	11.7	14.7	**.6**	0.2	0.5	0.8	1.0	1.3	1.6	1.9	2.2	2.5	2.8	34.5
17.7	3.0	5.9	8.9	11.8	14.8	**.7**	0.2	0.5	0.8	1.1	1.4	1.7	2.0	2.2	2.5	2.8	
17.8	3.0	6.0	8.9	11.9	14.9	**.8**	0.2	0.5	0.8	1.1	1.4	1.7	2.0	2.3	2.6	2.9	
17.9	3.0	6.0	9.0	12.0	15.0	**.9**	0.3	0.6	0.8	1.1	1.4	1.7	2.0	2.3	2.6	2.9	
18.0	3.0	6.0	9.0	12.0	15.0	**.0**	0.0	0.3	0.6	0.9	1.2	1.5	1.8	2.2	2.5	2.8	
18.1	3.0	6.0	9.0	12.0	15.1	**.1**	0.0	0.3	0.6	1.0	1.3	1.6	1.9	2.2	2.5	2.8	0.9
18.2	3.0	6.0	9.1	12.1	15.1	**.2**	0.1	0.4	0.7	1.0	1.3	1.6	1.9	2.2	2.5	2.8	2.8 0.1
18.3	3.0	6.1	9.1	12.2	15.2	**.3**	0.1	0.4	0.7	1.0	1.3	1.6	1.9	2.3	2.6	2.9	4.6 0.2
18.4	3.1	6.1	9.2	12.3	15.3	**.4**	0.1	0.4	0.7	1.0	1.4	1.7	2.0	2.3	2.6	2.9	6.5 0.3
																	8.3 0.4
18.5	3.1	6.2	9.3	12.3	15.4	**.5**	0.2	0.5	0.8	1.1	1.4	1.7	2.0	2.3	2.6	2.9	10.2 0.5
18.6	3.1	6.2	9.3	12.4	15.5	**.6**	0.2	0.5	0.8	1.1	1.4	1.7	2.0	2.3	2.7	3.0	12.0 0.6
18.7	3.1	6.3	9.4	12.5	15.6	**.7**	0.2	0.5	0.8	1.1	1.4	1.8	2.1	2.4	2.7	3.0	13.9 0.7
18.8	3.2	6.3	9.4	12.6	15.7	**.8**	0.2	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0	15.7 0.8
18.9	3.2	6.3	9.5	12.6	15.8	**.9**	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.1	17.6 0.9
																	19.4 1.0
19.0	3.1	6.3	9.5	12.6	15.8	**.0**	0.0	0.3	0.6	1.0	1.3	1.6	1.9	2.3	2.6	2.9	21.3 1.1
19.1	3.2	6.3	9.5	12.7	15.9	**.1**	0.0	0.4	0.7	1.0	1.3	1.7	2.0	2.3	2.6	3.0	23.1 1.2
19.2	3.2	6.4	9.6	12.8	16.0	**.2**	0.1	0.4	0.7	1.0	1.4	1.7	2.0	2.3	2.7	3.0	25.0 1.3
19.3	3.2	6.4	9.6	12.9	16.1	**.3**	0.1	0.4	0.7	1.1	1.4	1.7	2.0	2.4	2.7	3.0	26.8 1.4
19.4	3.2	6.5	9.7	12.9	16.2	**.4**	0.1	0.5	0.8	1.1	1.4	1.8	2.1	2.4	2.7	3.1	28.7 1.5
																	30.5 1.6
19.5	3.3	6.5	9.8	13.0	16.3	**.5**	0.2	0.5	0.8	1.1	1.5	1.8	2.1	2.4	2.8	3.1	32.3 1.7
19.6	3.3	6.5	9.8	13.1	16.3	**.6**	0.2	0.5	0.8	1.2	1.5	1.8	2.1	2.5	2.8	3.1	34.2 1.8
19.7	3.3	6.6	9.9	13.2	16.4	**.7**	0.2	0.6	0.9	1.2	1.5	1.9	2.2	2.5	2.8	3.2	
19.8	3.3	6.6	9.9	13.2	16.5	**.8**	0.3	0.6	0.9	1.2	1.6	1.9	2.2	2.5	2.9	3.2	
19.9	3.4	6.7	10.0	13.3	16.6	**.9**	0.3	0.6	0.9	1.3	1.6	1.9	2.2	2.6	2.9	3.2	
20.0	3.3	6.6	10.0	13.3	16.6	**.0**	0.0	0.3	0.7	1.0	1.4	1.7	2.0	2.4	2.7	3.1	
20.1	3.3	6.7	10.0	13.4	16.7	**.1**	0.0	0.4	0.7	1.1	1.4	1.7	2.1	2.4	2.8	3.1	0.9
20.2	3.3	6.7	10.1	13.4	16.8	**.2**	0.1	0.4	0.8	1.1	1.4	1.8	2.1	2.5	2.8	3.1	2.6 0.1
20.3	3.4	6.8	10.1	13.5	16.9	**.3**	0.1	0.4	0.8	1.1	1.5	1.8	2.2	2.5	2.8	3.2	4.4 0.2
20.4	3.4	6.8	10.2	13.6	17.0	**.4**	0.1	0.5	0.8	1.2	1.5	1.8	2.2	2.5	2.9	3.2	6.2 0.3
																	7.9 0.4
20.5	3.4	6.8	10.3	13.7	17.1	**.5**	0.2	0.5	0.9	1.2	1.5	1.9	2.2	2.6	2.9	3.2	9.7 0.5
20.6	3.4	6.9	10.3	13.7	17.2	**.6**	0.2	0.5	0.9	1.2	1.6	1.9	2.3	2.6	2.9	3.3	11.4 0.6
20.7	3.5	6.9	10.4	13.8	17.3	**.7**	0.2	0.6	0.9	1.3	1.6	1.9	2.3	2.6	3.0	3.3	13.2 0.7
20.8	3.5	7.0	10.4	13.9	17.4	**.8**	0.3	0.6	1.0	1.3	1.6	2.0	2.3	2.7	3.0	3.3	14.9 0.8
20.9	3.5	7.0	10.5	14.0	17.5	**.9**	0.3	0.6	1.0	1.3	1.7	2.0	2.4	2.7	3.0	3.4	16.7 0.9
																	18.5 1.0
21.0	3.5	7.0	10.5	14.0	17.5	**.0**	0.0	0.4	0.7	1.1	1.4	1.8	2.1	2.5	2.9	3.2	20.2 1.1
21.1	3.5	7.0	10.5	14.0	17.6	**.1**	0.0	0.4	0.8	1.1	1.5	1.8	2.2	2.5	2.9	3.3	22.0 1.2
21.2	3.5	7.0	10.6	14.1	17.6	**.2**	0.1	0.4	0.8	1.1	1.5	1.9	2.2	2.6	2.9	3.3	23.7 1.3
21.3	3.5	7.1	10.6	14.2	17.7	**.3**	0.1	0.5	0.8	1.2	1.5	1.9	2.3	2.6	3.0	3.3	25.5 1.4
21.4	3.6	7.1	10.7	14.3	17.8	**.4**	0.1	0.5	0.9	1.2	1.6	1.9	2.3	2.7	3.0	3.4	27.3 1.5
																	29.0 1.6
21.5	3.6	7.2	10.8	14.3	17.9	**.5**	0.2	0.5	0.9	1.3	1.6	2.0	2.3	2.7	3.0	3.4	30.8 1.7
21.6	3.6	7.2	10.8	14.4	18.0	**.6**	0.2	0.6	0.9	1.3	1.6	2.0	2.4	2.7	3.1	3.4	32.5 1.8
21.7	3.6	7.3	10.9	14.5	18.1	**.7**	0.3	0.6	1.0	1.3	1.7	2.0	2.4	2.8	3.1	3.5	34.3 1.9
21.8	3.7	7.3	10.9	14.6	18.2	**.8**	0.3	0.6	1.0	1.4	1.7	2.1	2.4	2.8	3.2	3.5	
21.9	3.7	7.3	11.0	14.6	18.3	**.9**	0.3	0.7	1.0	1.4	1.8	2.1	2.5	2.8	3.2	3.5	
22.0	3.6	7.3	11.0	14.6	18.3	**.0**	0.0	0.4	0.7	1.1	1.5	1.9	2.2	2.6	3.0	3.4	
22.1	3.7	7.3	11.0	14.7	18.4	**.1**	0.0	0.4	0.8	1.2	1.5	1.9	2.3	2.7	3.0	3.4	0.8
22.2	3.7	7.4	11.1	14.8	18.5	**.2**	0.1	0.4	0.8	1.2	1.6	1.9	2.3	2.7	3.1	3.4	2.5 0.1
22.3	3.7	7.4	11.1	14.9	18.6	**.3**	0.1	0.5	0.9	1.2	1.6	2.0	2.4	2.7	3.1	3.5	4.2 0.2
22.4	3.7	7.5	11.2	14.9	18.7	**.4**	0.1	0.5	0.9	1.3	1.6	2.0	2.4	2.8	3.1	3.5	5.9 0.3
																	7.6 0.4
22.5	3.8	7.5	11.3	15.0	18.8	**.5**	0.2	0.6	0.9	1.3	1.7	2.1	2.4	2.8	3.2	3.6	9.3 0.5
22.6	3.8	7.5	11.3	15.1	18.8	**.6**	0.2	0.6	1.0	1.3	1.7	2.1	2.5	2.8	3.2	3.6	11.0 0.6
22.7	3.8	7.6	11.4	15.2	18.9	**.7**	0.3	0.6	1.0	1.4	1.8	2.1	2.5	2.9	3.3	3.6	12.7 0.7
22.8	3.8	7.6	11.4	15.2	19.0	**.8**	0.3	0.7	1.0	1.4	1.8	2.2	2.5	2.9	3.3	3.7	14.4 0.8
22.9	3.9	7.7	11.5	15.3	19.1	**.9**	0.3	0.7	1.1	1.5	1.8	2.2	2.6	3.0	3.3	3.7	16.1 0.9
																	17.8 1.0
23.0	3.8	7.6	11.5	15.3	19.1	**.0**	0.0	0.4	0.8	1.2	1.6	2.0	2.3	2.7	3.1	3.5	19.5 1.1
23.1	3.8	7.7	11.5	15.4	19.2	**.1**	0.0	0.4	0.8	1.2	1.6	2.0	2.4	2.8	3.2	3.6	21.2 1.2
23.2	3.8	7.7	11.6	15.4	19.3	**.2**	0.1	0.5	0.9	1.3	1.6	2.0	2.4	2.8	3.2	3.6	22.8 1.3
23.3	3.9	7.8	11.6	15.5	19.4	**.3**	0.1	0.5	0.9	1.3	1.7	2.1	2.5	2.9	3.3	3.6	24.5 1.4
23.4	3.9	7.8	11.7	15.6	19.5	**.4**	0.2	0.5	0.9	1.3	1.7	2.1	2.5	2.9	3.3	3.7	26.2 1.5
																	27.9 1.6
23.5	3.9	7.8	11.8	15.7	19.6	**.5**	0.2	0.6	1.0	1.4	1.8	2.2	2.5	2.9	3.3	3.7	29.6 1.7
23.6	3.9	7.9	11.8	15.7	19.7	**.6**	0.2	0.6	1.0	1.4	1.8	2.2	2.6	3.0	3.4	3.8	31.3 1.8
23.7	4.0	7.9	11.9	15.8	19.8	**.7**	0.3	0.7	1.1	1.4	1.8	2.2	2.6	3.0	3.4	3.8	33.0 1.9
23.8	4.0	8.0	11.9	15.9	19.9	**.8**	0.3	0.7	1.1	1.5	1.9	2.3	2.7	3.1	3.4	3.8	34.7 2.0
23.9	4.0	8.0	12.0	16.0	20.0	**.9**	0.4	0.7	1.1	1.5	1.9	2.3	2.7	3.1	3.5	3.9	
	10′	20′	30′	40′	50′		0′	1′	2′	3′	4′	5′	6′	7′	8′	9′	

Dec. Inc.	Altitude Difference (d)																Double Second Diff. and Corr.
	Tens					Decimals ⇩	Units										
	10′	20′	30′	40′	50′		0′	1′	2′	3′	4′	5′	6′	7′	8′	9′	
′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′ ′
24.0	4.0	8.0	12.0	16.0	20.0	**.0**	0.0	0.4	0.8	1.2	1.6	2.0	2.4	2.9	3.3	3.7	
24.1	4.0	8.0	12.0	16.0	20.1	**.1**	0.0	0.4	0.9	1.3	1.7	2.1	2.5	2.9	3.3	3.7	0.8
24.2	4.0	8.0	12.1	16.1	20.1	**.2**	0.1	0.5	0.9	1.3	1.7	2.1	2.5	2.9	3.3	3.8	2.5 0.1
24.3	4.0	8.1	12.1	16.2	20.2	**.3**	0.1	0.5	0.9	1.3	1.8	2.2	2.6	3.0	3.4	3.8	4.1 0.2
24.4	4.1	8.1	12.2	16.3	20.3	**.4**	0.2	0.6	1.0	1.4	1.8	2.2	2.6	3.0	3.4	3.8	5.8 0.3
																	7.4 0.4
24.5	4.1	8.2	12.3	16.3	20.4	**.5**	0.2	0.6	1.0	1.4	1.8	2.2	2.7	3.1	3.5	3.9	9.1 0.5
24.6	4.1	8.2	12.3	16.4	20.5	**.6**	0.2	0.7	1.1	1.5	1.9	2.3	2.7	3.1	3.5	3.9	10.7 0.6
24.7	4.1	8.3	12.4	16.5	20.6	**.7**	0.3	0.7	1.1	1.5	1.9	2.3	2.7	3.1	3.6	4.0	12.3 0.7
24.8	4.2	8.3	12.4	16.6	20.7	**.8**	0.3	0.7	1.1	1.6	2.0	2.4	2.8	3.2	3.6	4.0	14.0 0.8
24.9	4.2	8.3	12.5	16.6	20.8	**.9**	0.4	0.8	1.2	1.6	2.0	2.4	2.8	3.2	3.6	4.0	15.6 0.9
																	17.3 1.0
25.0	4.1	8.3	12.5	16.6	20.8	**.0**	0.0	0.4	0.8	1.3	1.7	2.1	2.5	3.0	3.4	3.8	18.9 1.1
25.1	4.2	8.3	12.5	16.7	20.9	**.1**	0.0	0.5	0.9	1.3	1.7	2.2	2.6	3.0	3.4	3.9	20.6 1.2
25.2	4.2	8.4	12.6	16.8	21.0	**.2**	0.1	0.5	0.9	1.4	1.8	2.2	2.6	3.1	3.5	3.9	22.2 1.3
25.3	4.2	8.4	12.6	16.9	21.1	**.3**	0.1	0.6	1.0	1.4	1.8	2.3	2.7	3.1	3.5	4.0	23.9 1.4
25.4	4.2	8.5	12.7	16.9	21.2	**.4**	0.2	0.6	1.0	1.4	1.9	2.3	2.7	3.1	3.6	4.0	25.5 1.5
																	27.2 1.6
25.5	4.3	8.5	12.8	17.0	21.3	**.5**	0.2	0.6	1.1	1.5	1.9	2.3	2.8	3.2	3.6	4.0	28.8 1.7
25.6	4.3	8.5	12.8	17.1	21.3	**.6**	0.3	0.7	1.1	1.5	2.0	2.4	2.8	3.2	3.7	4.1	30.4 1.8
25.7	4.3	8.6	12.9	17.2	21.4	**.7**	0.3	0.7	1.1	1.6	2.0	2.4	2.8	3.3	3.7	4.1	32.1 1.9
25.8	4.3	8.6	12.9	17.2	21.5	**.8**	0.3	0.8	1.2	1.6	2.0	2.5	2.9	3.3	3.7	4.2	33.7 2.0
25.9	4.4	8.7	13.0	17.3	21.6	**.9**	0.4	0.8	1.2	1.7	2.1	2.5	2.9	3.4	3.8	4.2	35.4 2.1
26.0	4.3	8.6	13.0	17.3	21.6	**.0**	0.0	0.4	0.9	1.3	1.8	2.2	2.6	3.1	3.5	4.0	
26.1	4.3	8.7	13.0	17.4	21.7	**.1**	0.0	0.5	0.9	1.4	1.8	2.3	2.7	3.1	3.6	4.0	0.8
26.2	4.3	8.7	13.1	17.4	21.8	**.2**	0.1	0.5	1.0	1.4	1.9	2.3	2.7	3.2	3.6	4.1	2.4 0.1
26.3	4.4	8.8	13.1	17.5	21.9	**.3**	0.1	0.6	1.0	1.5	1.9	2.3	2.8	3.2	3.7	4.1	4.0 0.2
26.4	4.4	8.8	13.2	17.6	22.0	**.4**	0.2	0.6	1.1	1.5	1.9	2.4	2.8	3.3	3.7	4.2	5.7 0.3
																	7.3 0.4
26.5	4.4	8.8	13.3	17.7	22.1	**.5**	0.2	0.7	1.1	1.5	2.0	2.4	2.9	3.3	3.8	4.2	8.9 0.5
26.6	4.4	8.9	13.3	17.7	22.2	**.6**	0.3	0.7	1.1	1.6	2.0	2.5	2.9	3.4	3.8	4.2	10.5 0.6
26.7	4.5	8.9	13.4	17.8	22.3	**.7**	0.3	0.8	1.2	1.6	2.1	2.5	3.0	3.4	3.8	4.3	12.1 0.7
26.8	4.5	9.0	13.4	17.9	22.4	**.8**	0.4	0.8	1.2	1.7	2.1	2.6	3.0	3.4	3.9	4.3	13.7 0.8
26.9	4.5	9.0	13.5	18.0	22.5	**.9**	0.4	0.8	1.3	1.7	2.2	2.6	3.0	3.5	3.9	4.4	15.4 0.9
																	17.0 1.0
27.0	4.5	9.0	13.5	18.0	22.5	**.0**	0.0	0.5	0.9	1.4	1.8	2.3	2.7	3.2	3.7	4.1	18.6 1.1
27.1	4.5	9.0	13.5	18.0	22.6	**.1**	0.0	0.5	1.0	1.4	1.9	2.3	2.8	3.3	3.7	4.2	20.2 1.2
27.2	4.5	9.0	13.6	18.1	22.6	**.2**	0.1	0.5	1.0	1.5	1.9	2.4	2.8	3.3	3.8	4.2	21.8 1.3
27.3	4.5	9.1	13.6	18.2	22.7	**.3**	0.1	0.6	1.1	1.5	2.0	2.4	2.9	3.3	3.8	4.3	23.4 1.4
27.4	4.6	9.1	13.7	18.3	22.8	**.4**	0.2	0.6	1.1	1.6	2.0	2.5	2.9	3.4	3.8	4.3	25.1 1.5
																	26.7 1.6
27.5	4.6	9.2	13.8	18.3	22.9	**.5**	0.2	0.7	1.1	1.6	2.1	2.5	3.0	3.4	3.9	4.4	28.3 1.7
27.6	4.6	9.2	13.8	18.4	23.0	**.6**	0.3	0.7	1.2	1.6	2.1	2.6	3.0	3.5	3.9	4.4	29.9 1.8
27.7	4.6	9.3	13.9	18.5	23.1	**.7**	0.3	0.8	1.2	1.7	2.2	2.6	3.1	3.5	4.0	4.4	31.5 1.9
27.8	4.7	9.3	13.9	18.6	23.2	**.8**	0.4	0.8	1.3	1.7	2.2	2.7	3.1	3.6	4.0	4.5	33.1 2.0
27.9	4.7	9.3	14.0	18.6	23.3	**.9**	0.4	0.9	1.3	1.8	2.2	2.7	3.2	3.6	4.1	4.5	34.7 2.1
28.0	4.6	9.3	14.0	18.6	23.3	**.0**	0.0	0.5	0.9	1.4	1.9	2.4	2.8	3.3	3.8	4.3	
28.1	4.7	9.3	14.0	18.7	23.4	**.1**	0.0	0.5	1.0	1.5	1.9	2.4	2.9	3.4	3.8	4.3	0.8
28.2	4.7	9.4	14.1	18.8	23.5	**.2**	0.1	0.6	1.0	1.5	2.0	2.5	2.9	3.4	3.9	4.4	2.4 0.1
28.3	4.7	9.4	14.1	18.9	23.6	**.3**	0.1	0.6	1.1	1.6	2.0	2.5	3.0	3.5	3.9	4.4	4.0 0.2
28.4	4.7	9.5	14.2	18.9	23.7	**.4**	0.2	0.7	1.1	1.6	2.1	2.6	3.0	3.5	4.0	4.5	5.6 0.3
																	7.2 0.4
28.5	4.8	9.5	14.3	19.0	23.8	**.5**	0.2	0.7	1.2	1.7	2.1	2.6	3.1	3.6	4.0	4.5	8.8 0.5
28.6	4.8	9.5	14.3	19.1	23.8	**.6**	0.3	0.8	1.2	1.7	2.2	2.7	3.1	3.6	4.1	4.6	10.4 0.6
28.7	4.8	9.6	14.4	19.2	23.9	**.7**	0.3	0.8	1.3	1.8	2.2	2.7	3.2	3.7	4.1	4.6	12.0 0.7
28.8	4.8	9.6	14.4	19.2	24.0	**.8**	0.4	0.9	1.3	1.8	2.3	2.8	3.2	3.7	4.2	4.7	13.6 0.8
28.9	4.9	9.7	14.5	19.3	24.1	**.9**	0.4	0.9	1.4	1.9	2.3	2.8	3.3	3.8	4.2	4.7	15.2 0.9
																	16.8 1.0
29.0	4.8	9.6	14.5	19.3	24.1	**.0**	0.0	0.5	1.0	1.5	2.0	2.5	2.9	3.4	3.9	4.4	18.4 1.1
29.1	4.8	9.7	14.5	19.4	24.2	**.1**	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	20.0 1.2
29.2	4.8	9.7

31°, 329° L.H.A. LATITUDE SAME NAME AS DECLINATION

N. Lat. { L.H.A. greater than 180° .....Zn=Z
L.H.A. less than 180°.....Zn=360°–Z

Dec. °	30° Hc ° ′	d ′	Z °	31° Hc ° ′	d ′	Z °	32° Hc ° ′	d ′	Z °	33° Hc ° ′	d ′	Z °	34° Hc ° ′	d ′	Z °	35° Hc ° ′	d ′	Z °	36° Hc ° ′	d ′	Z °	37° Hc ° ′	d ′	Z °	Dec. °
0	47 55.8	+44.5	129.8	47 17.1	+45.3	130.6	46 37.7	+46.1	131.4	45 57.7	+46.8	132.2	45 17.1	+47.5	132.9	44 36.0	+48.1	133.7	43 54.3	+48.8	134.4	43 12.1	+49.4	135.0	0
1	48 40.3	+44.0	128.8	48 02.4	+44.8	129.6	47 23.8	+45.6	130.5	46 44.5	+46.4	131.3	46 04.6	+47.1	132.1	45 24.1	+47.8	132.8	44 43.1	+48.4	133.6	44 01.5	+49.0	134.3	1
2	49 24.3	+43.4	127.7	48 47.2	+44.3	128.6	48 09.4	+45.1	129.5	47 30.9	+45.9	130.4	46 51.7	+46.6	131.2	46 11.9	+47.4	132.0	45 31.5	+48.0	132.7	44 50.5	+48.7	133.5	2
3	50 07.7	+42.8	126.6	49 31.5	+43.7	127.6	48 54.5	+44.6	128.5	48 16.8	+45.4	129.4	47 38.3	+46.2	130.2	46 59.3	+46.9	131.1	46 19.5	+47.7	131.9	45 39.2	+48.3	132.6	3
4	50 50.5	+42.1	125.5	50 15.2	+43.1	126.5	49 39.1	+44.0	127.5	49 02.2	+44.8	128.4	48 24.5	+45.7	129.3	47 46.2	+46.5	130.1	47 07.2	+47.2	131.0	46 27.5	+47.9	131.8	4
5	51 32.6	+41.5	124.4	50 58.3	+42.4	125.4	50 23.1	+43.4	126.4	49 47.0	+44.3	127.4	49 10.2	+45.2	128.3	48 32.7	+46.0	129.2	47 54.4	+46.8	130.1	47 15.4	+47.6	130.9	5
6	52 14.1	+40.7	123.2	51 40.7	+41.8	124.3	51 06.5	+42.7	125.3	50 31.3	+43.8	126.3	49 55.4	+44.6	127.3	49 18.7	+45.4	128.2	48 41.2	+46.3	129.1	48 03.0	+47.0	130.0	6
7	52 54.8	+40.0	122.0	52 22.5	+41.1	123.1	51 49.2	+42.2	124.2	51 15.1	+43.1	125.2	50 40.0	+44.1	126.2	50 04.1	+45.0	127.2	49 27.5	+45.8	128.1	48 50.0	+46.6	129.0	7
8	53 34.8	+39.2	120.8	53 03.6	+40.3	121.9	52 31.4	+41.4	123.0	51 58.2	+42.4	124.1	51 24.1	+43.4	125.2	50 49.1	+44.4	126.2	50 13.3	+45.2	127.1	49 36.6	+46.1	128.1	8
9	54 14.0	+38.4	119.5	53 43.9	+39.6	120.7	53 12.8	+40.6	121.8	52 40.6	+41.8	123.0	52 07.5	+42.8	124.0	51 33.5	+43.7	125.1	50 58.5	+44.7	126.1	50 22.7	+45.6	127.1	9
10	54 52.4	+37.4	118.2	54 23.5	+38.6	119.4	53 53.4	+39.9	120.6	53 22.4	+41.0	121.8	52 50.3	+42.1	122.9	52 17.2	+43.1	124.0	51 43.2	+44.1	125.0	51 08.3	+45.1	126.1	10
11	55 29.8	+36.5	116.8	55 02.1	+37.9	118.1	54 33.3	+39.1	119.3	54 03.4	+40.2	120.5	53 32.4	+41.3	121.7	53 00.3	+42.5	122.8	52 27.3	+43.5	123.9	51 53.4	+44.4	125.0	11
12	56 06.3	+35.5	115.4	55 40.0	+36.8	116.7	55 12.4	+38.1	118.0	54 43.6	+39.4	119.3	54 13.7	+40.6	120.5	53 42.8	+41.7	121.7	53 10.8	+42.7	122.8	52 37.8	+43.8	123.9	12
13	56 41.8	+34.5	113.9	56 16.8	+35.9	115.3	55 50.5	+37.3	116.6	55 23.0	+38.5	117.9	54 54.3	+39.8	119.2	54 24.5	+40.9	120.4	53 53.5	+42.1	121.6	53 21.6	+43.1	122.8	13
14	57 16.3	+33.3	112.4	56 52.7	+34.8	113.9	56 27.8	+36.2	115.2	56 01.5	+37.6	116.6	55 34.1	+38.9	117.9	55 05.4	+40.1	119.2	54 35.6	+41.3	120.4	54 04.7	+42.4	121.6	14
15	57 49.6	+32.2	110.9	57 27.5	+33.7	112.4	57 04.0	+35.2	113.8	56 39.1	+36.6	115.2	56 13.0	+37.9	116.5	55 45.5	+39.3	117.9	55 16.9	+40.5	119.1	54 47.1	+41.7	120.4	15
16	58 21.8	+30.9	109.3	58 01.2	+32.6	110.8	57 39.2	+34.1	112.3	57 15.7	+35.6	113.7	56 50.9	+37.0	115.1	56 24.8	+38.3	116.5	55 57.4	+39.6	117.8	55 28.8	+40.9	119.1	16
17	58 52.7	+29.7	107.6	58 33.8	+31.3	109.2	58 13.3	+32.9	110.7	57 51.3	+34.5	112.2	57 27.9	+36.0	113.7	57 03.1	+37.4	115.1	56 37.0	+38.8	116.5	56 09.7	+40.0	117.8	17
18	59 22.4	+28.3	105.9	59 05.1	+30.0	107.6	58 46.2	+31.7	109.1	58 25.8	+33.3	110.7	58 03.9	+34.8	112.2	57 40.5	+36.3	113.6	57 15.8	+37.7	115.1	56 49.7	+39.1	116.5	18
19	59 50.7	+26.9	104.2	59 35.1	+28.7	105.9	59 17.9	+30.4	107.5	58 59.1	+32.1	109.1	58 38.7	+33.7	110.6	58 16.8	+35.3	112.1	57 53.5	+36.7	113.6	57 28.8	+38.1	115.1	19
20	60 17.6	+25.4	102.4	60 03.8	+27.3	104.1	59 48.3	+29.1	105.8	59 31.2	+30.8	107.4	59 12.4	+32.5	109.0	58 52.1	+34.1	110.6	58 30.2	+35.7	112.1	58 06.9	+37.1	113.6	20
21	60 43.0	+23.8	100.6	60 31.1	+25.7	102.3	60 17.4	+27.6	104.0	60 02.0	+29.4	105.7	59 44.9	+31.2	107.4	59 26.2	+32.9	109.0	59 05.9	+34.5	110.6	58 44.0	+36.1	112.1	21
22	61 06.8	+22.2	98.7	60 56.8	+24.2	100.5	60 45.0	+26.2	102.2	60 31.4	+28.0	104.0	60 16.1	+29.8	105.7	59 59.1	+31.5	107.3	59 40.4	+33.2	109.0	59 20.1	+34.9	110.6	22
23	61 29.0	+20.6	96.8	61 21.0	+22.6	98.6	61 11.2	+24.5	100.4	60 59.4	+26.6	102.1	60 45.9	+28.4	103.9	60 30.6	+30.3	105.6	60 13.6	+32.0	107.3	59 55.0	+33.6	109.0	23
24	61 49.6	+18.8	94.8	61 43.6	+20.9	96.6	61 35.7	+23.0	98.5	61 26.0	+24.9	100.3	61 14.3	+26.9	102.1	61 00.9	+28.7	103.8	60 45.6	+30.6	105.6	60 28.6	+32.4	107.3	24
25	62 08.4	+17.0	92.8	62 04.5	+19.1	94.6	61 58.7	+21.2	96.5	61 50.9	+23.3	98.4	61 41.2	+25.3	100.2	61 29.6	+27.3	102.0	61 16.2	+29.2	103.8	61 01.0	+31.0	105.6	25
26	62 25.4	+15.1	90.7	62 23.6	+17.3	92.6	62 19.9	+19.5	94.5	62 14.2	+21.6	96.4	62 06.5	+23.7	98.3	61 56.9	+25.7	100.1	61 45.4	+27.7	102.0	61 32.0	+29.6	103.8	26
27	62 40.5	+13.2	88.6	62 40.9	+15.5	90.5	62 39.4	+17.6	92.5	62 35.8	+19.8	94.4	62 30.2	+22.0	96.3	62 22.6	+24.1	98.2	62 13.1	+26.1	100.1	62 01.6	+28.1	101.9	27
28	62 53.7	+11.3	86.5	62 56.4	+13.5	88.4	62 57.0	+15.8	90.4	62 55.6	+18.0	92.3	62 52.2	+20.1	94.3	62 46.7	+22.3	96.2	62 39.2	+24.4	98.1	62 29.7	+26.5	100.0	28
29	63 05.0	+9.2	84.3	63 09.9	+11.5	86.3	63 12.8	+13.8	88.2	63 13.6	+16.0	90.2	63 12.3	+18.3	92.2	63 09.0	+20.5	94.2	63 03.6	+22.7	96.1	62 56.2	+24.8	98.1	29
30	63 14.2	+7.2	82.1	63 21.4	+9.5	84.1	63 26.6	+11.8	86.1	63 29.6	+14.1	88.1	63 30.6	+16.4	90.1	63 29.5	+18.6	92.1	63 26.3	+20.8	94.1	63 21.0	+23.0	96.1	30
31	63 21.4	+5.2	79.9	63 30.9	+7.5	81.9	63 38.4	+9.7	83.9	63 43.7	+12.1	85.9	63 47.0	+14.4	87.9	63 48.1	+16.7	89.9	63 47.1	+19.0	92.0	63 44.0	+21.2	94.0	31
32	63 26.6	+3.0	77.7	63 38.4	+5.3	79.6	63 48.1	+7.7	81.6	63 55.8	+10.0	83.7	64 01.4	+12.3	85.7	64 04.8	+14.7	87.8	64 06.1	+17.0	89.8	64 05.2	+19.3	91.9	32
33	63 29.6	+1.0	75.4	63 43.7	+3.3	77.4	63 55.8	+5.6	79.4	64 05.8	+7.9	81.4	64 13.7	+10.3	83.5	64 19.5	+12.6	85.5	64 23.1	+15.0	87.6	64 24.5	+17.3	89.7	33
34	63 30.6	−1.1	73.2	63 47.0	+1.1	75.1	64 01.4	+3.4	77.1	64 13.7	+5.8	79.1	64 24.0	+8.1	81.2	64 32.1	+10.5	83.3	64 38.1	+12.8	85.4	64 41.8	+15.3	87.5	34
35	63 29.5	−3.2	71.0	63 48.1	−1.0	72.9	64 04.8	+1.3	74.8	64 19.5	+3.6	76.8	64 32.1	+6.0	78.9	64 42.6	+8.3	81.0	64 50.9	+10.8	83.1	64 57.1	+13.1	85.2	35
36	63 26.3	−5.3	68.7	63 47.1	−3.1	70.6	64 06.1	−0.9	72.5	64 23.1	+1.4	74.5	64 38.1	+3.7	76.6	64 50.9	+6.2	78.6	65 01.7	+8.5	80.7	65 10.2	+11.0	82.9	36
37	63 21.0	−7.4	66.5	63 44.0	−5.2	68.3	64 05.2	−3.0	70.3	64 24.5	−0.8	72.2	64 41.8	+1.6	74.2	64 57.1	+3.9	76.3	65 10.2	+6.4	78.4	65 21.2	+8.8	80.5	37
38	63 13.6	−9.4	64.3	63 38.8	−7.4	66.1	64 02.2	−5.2	68.0	64 23.7	−2.9	69.9	64 43.4	−0.7	71.9	65 01.0	+1.7	73.9	65 16.6	+4.0	76.0	65 30.0	+6.5	78.1	38
39	63 04.2	−11.4	62.1	63 31.4	−9.3	63.9	63 57.0	−7.3	65.7	64 20.8	−5.1	67.6	64 42.7	−2.9	69.6	65 02.7	−0.6	71.6	65 20.6	+1.8	73.6	65 36.5	+4.2	75.7	39
40	62 52.8	−13.4	59.9	63 22.1	−11.5	61.7	63 49.7	−9.4	63.4	64 15.7	−7.3	65.3	64 39.8	−5.1	67.2	65 02.1	−2.8	69.2	65 22.4	−0.5	71.2	65 40.7	+1.9	73.3	40
41	62 39.4	−15.3	57.8	63 10.6	−13.4	59.5	63 40.3	−11.4	61.2	64 08.4	−9.4	63.0	64 34.7	−7.2	64.9	64 59.3	−5.1	66.8	65 21.9	−2.7	68.8	65 42.6	−0.4	70.9	41
42	62 24.1	−17.1	55.7	62 57.2	−15.3	57.3	63 28.9	−13.4	59.0	63 59.0	−11.5	60.8	64 27.5	−9.4	62.6	64 54.2	−7.2	64.5	65 19.2	−5.1	66.4	65 42.2	−2.8	68.5	42
43	62 07.0	−18.9	53.7	62 41.9	−17.2	55.2	63 15.5	−15.4	56.8	63 47.5	−13.5	58.5	64 18.1	−11.5	60.3	64 47.0	−9.5	62.1	65 14.1	−7.3	64.1	65 39.4	−5.0	66.0	43
44	61 48.1	−20.7	51.6	62 24.7	−19.0	53.1	63 00.1	−17.3	54.7	63 34.0	−15.4	56.3	64 06.6	−13.6	58.0	64 37.5	−11.6	59.8	65 06.8	−9.5	61.7	65 34.4	−7.3	63.6	44
45	61 27.4	−22.3	49.7	62 05.7	−20.8	51.1	62 42.8	−19.2	52.6	63 18.6	−17.5	54.2	63 53.0	−15.6	55.8	64 25.9	−13.6	57.5	64 57.3	−11.6	59.4	65 27.1	−9.6	61.2	45
46	61 05.1	−24.0	47.7	61 44.9	−22.5	49.1	62 23.6	−20.9	50.5	63 01.1	−19.2	52.1	63 37.4	−17.6	53.6	64 12.3	−15.8	55.3	64 45.7	−13.8	57.0	65 17.5	−11.8	58.9	46
47	60 41.1	−25.5	45.8	61 22.4	−24.1	47.2	62 02.7	−22.6	48.5	62 41.9	−21.1	50.0	63 19.8	−19.4	51.5	63 56.5	−17.6	53.1	64 31.9	−15.9	54.8	65 05.7	−13.9	56.5	47
48	60 15.6	−27.0	44.0	60 58.3	−25.7	45.3	61 40.1	−24.3	46.6	62 20.8	−22.8	47.9	63 00.4	−21.2	49.4	63 38.9	−19.6	50.9	64 16.0	−17.8	52.5	64 51.8	−16.0	54.2	48
49	59 48.6	−28.4	42.2	60 32.6	−27.1	43.4	61 15.8	−25.9	44.7	61 58.0	−24.5	46.0	62 39.2	−23.0	47.4	63 19.3	−21.5	48.8	63 58.2	−19.8	50.3	64 35.8	−18.0	52.0	49
50	59 20.2	−29.7	40.5	60 05.5	−28.6	41.6	60 49.9	−27.3	42.8	61 33.5	−26.0	44.0	62 16.2	−24.7	45.4	62 57.8	−23.2	46.7	63 38.4	−21.7	48.2	64 17.8	−20.0	49.8	50
51	58 50.5	−31.1	38.8	59 36.9	−30.0	39.9	60 22.6	−28.8	41.0	61 07.5	−27.6	42.2	61 51.5	−26.3	43.4	62 34.6	−24.9	44.7	63 16.7	−23.4	46.1	63 57.8	−21.9	47.6	51
52	58 19.4	−32.2	37.1	59 06.9	−31.2	38.2	59 53.8	−30.2	39.2	60 39.9	−29.0	40.3	61 25.2	−27.8	41.5	62 09.7	−26.5	42.8	62 53.3	−25.1	44.1	63 35.9	−23.7	45.5	52
53	57 47.2	−33.5	35.6	58 35.7	−32.5	36.5	59 23.6	−31.5	37.5	60 10.9	−30.4	38.6	60 57.4	−29.2	39.7	61 43.2	−28.1	40.9	62 28.2	−26.8	42.1	63 12.2	−25.4	43.4	53
54	57 13.7	−34.5	34.0	58 03.2	−33.6	34.9	58 52.1	−32.7	35.8	59 40.5	−31.8	36.8	60 28.2	−30.7	37.9	61 15.1	−29.5	39.0	62 01.4	−28.4	40.2	62 46.8	−27.1	41.4	54
55	56 39.2	−35.6	32.5	57 29.6	−34.8	33.3	58 19.4	−33.9	34.2	59 08.7	−32.9	35.2	59 57.5	−32.0	36.2	60 45.6	−30.9	37.2	61 33.0	−29.8	38.3	62 19.7	−28.6	39.5	55
56	56 03.6	−36.6	31.1	56 54.8	−35.8	31.8	57 45.5	−35.0	32.7	58 35.8	−34.1	33.6	59 25.5	−33.2	34.5	60 14.7	−32.3	35.5	61 03.2	−31.2	36.5	61 51.1	−30.1	37.6	56
57	55 27.0	−37.5	29.6	56 19.0	−36.8	30.4	57 10.5	−36.0	31.2	58 01.7	−35.3	32.0	58 52.3	−34.4	32.9	59 42.4	−33.5	33.8	60 32.0	−32.5	34.8	61 21.0	−31.5	35.8	57
58	54 49.5	−38.4	28.3	55 42.2	−37.8	29.0	56 34.5	−37.1	29.7	57 26.4	−36.3	30.5	58 17.9	−35.5	31.3	59 08.9	−34.7	32.2	59 59.5	−33.8	33.1	60 49.5	−32.9	34.0	58
59	54 11.1	−39.2	27.0	55 04.4	−38.6	27.6	55 57.4	−38.0	28.3	56 50.1	−37.3	29.0	57 42.4	−36.6	29.8	58 34.2	−35.8	30.6	59 25.7	−35.0	31.4	60 16.6	−34.1	32.3	59
60	53 31.9	−40.1	25.7	54 25.8	−39.5	26.3	55 19.4	−38.8	26.9	56 12.8	−38.3	27.6	57 05.8	−37.6	28.3	57 58.4	−36.8	29.1	58 50.7	−36.1	29.9	59 42.5	−35.3	30.7	60
61	52 51.8	−40.8	24.4	53 46.3	−40.3	25.0	54 40.6	−39.8	25.6	55 34.5	−39.1	26.2	56 28.2	−38.5	26.9	57 21.6	−37.9	27.6	58 14.6	−37.2	28.3	59 07.2	−36.4	29.1	61
62	52 11.0	−41.5	23.2	53 06.0	−41.0	23.7	54 00.8	−40.5	24.3	54 55.4	−40.0	24.9	55 49.7	−39.4	25.5	56 43.7	−38.8	26.2	57 37.4	−38.2	26.8	58 30.8	−37.5	27.6	62
63	51 29.5	−42.2	22.1	52 25.0	−41.8	22.5	53 20.3	−41.3	23.1	54 15.4	−40.8	23.6	55 10.3	−40.3	24.2	56 04.9	−39.7	24.8	56 59.2	−39.1	25.4	57 53.3	−38.5	26.1	63
64	50 47.3	−42.9	20.9	51 43.2	−42.4	21.4	52 39.0	−42.0	21.8	53 34.6	−41.5	22.3	54 30.0	−41.0	22.9	55 25.2	−40.6	23.4	56 20.1	−40.0	24.0	57 14.8	−39.5	24.7	64
65	50 04.4	−43.4	19.8	51 00.8	−43.0	20.2	51 57.0	−42.6	20.7	52 53.1	−42.3	21.1	53 49.0	−41.9	21.6	54 44.6	−41.3	22.2	55 40.1	−40.9	22.7	56 35.3	−40.3	23.3	65
66	49 21.0	−44.0	18.8	50 17.8	−43.7	19.1	51 14.4	−43.3	19.5	52 10.8	−42.9	20.0	53 07.1	−42.5	20.4	54 03.3	−42.1	20.9	54 59.2	−41.6	21.4	55 55.0	−41.2	22.0	66
67	48 37.0	−44.6	17.7	49 34.1	−44.2	18.1	50 31.1	−43.9	18.5	51 27.9	−43.5	18.8	52 24.6	−43.1	19.3	53 21.2	−42.8	19.7	54 17.6	−42.4	20.2	55 13.8	−41.9	20.7	67
68	47 52.4	−45.0	16.7	48 49.9	−44.8	17.0	49 47.2	−44.5	17.4	50 44.4	−44.2	17.8	51 41.5	−43.8	18.1	52 38.4	−43.4	18.5	53 35.2	−43.0	19.0	54 31.9	−42.7	19.4	68
69	47 07.4	−45.6	15.7	48 05.1	−45.3	16.0	49 02.7	−45.0	16.4	50 00.2	−44.7	16.7	50 57.7	−44.4	17.0	51 55.0	−44.1	17.4	52 52.2	−43.8	17.8	53 49.2	−43.4	18.2	69
70	46 21.8	−46.0	14.8	47 19.8	−45.8	15.1	48 17.7	−45.5	15.4	49 15.5	−45.2	15.7	50 13.3	−45.0	16.0	51 10.9	−44.7	16.3	52 08.4	−44.3	16.7	53 05.8	−44.0	17.1	70
71	45 35.8	−46.4	13.9	46 34.0	−46.2	14.1	47 32.2	−46.0	14.4	48 30.3	−45.8	14.7	49 28.3	−45.5	15.0	50 26.2	−45.2	15.3	51 24.1	−45.0	15.6	52 21.8	−44.6	15.9	71
72	44 49.4	−46.9	13.0	45 47.8	−46.6	13.2	46 46.2	−46.4	13.4	47 44.5	−46.2	13.7	48 42.8	−46.0	14.0	49 41.0	−45.7	14.2	50 39.1	−45.5	14.5	51 37.2	−45.3	14.9	72
73	44 02.5	−47.2	12.1	45 01.2	−47.1	12.3	45 59.8	−46.9	12.5	46 58.3	−46.6	12.7	47 56.8	−46.4	13.0	48 55.3	−46.3	13.2	49 53.6	−46.0	13.5	50 51.9	−45.7	13.8	73
74	43 15.3	−47.6	11.2	44 14.1	−47.4	11.4	45 12.9	−47.3	11.6	46 11.7	−47.1	11.8	47 10.4	−46.9	12.1	48 09.0	−46.7	12.3	49 07.6	−46.5	12.5	50 06.2	−46.3	12.8	74
75	42 27.7	−48.0	10.4	43 26.7	−47.8	10.6	44 25.6	−47.6	10.8	45 24.6	−47.5	10.9	46 23.5	−47.4	11.1	47 22.3	−47.2	11.4	48 21.1	−47.0	11.6	49 19.9	−46.8	11.8	75
76	41 39.7	−48.3	9.6	42 38.9	−48.2	9.8	43 38.0	−48.0	9.9	44 37.1	−47.9	10.1	45 36.1	−47.7	10.3	46 35.1	−47.5	10.4	47 34.1	−47.4	10.6	48 33.1	−47.3	10.8	76
77	40 51.4	−48.6	8.8	41 50.7	−48.5	8.9	42 50.0	−48.4	9.1	43 49.2	−48.2	9.2	44 48.4	−48.1	9.4	45 47.6	−48.0	9.6	46 46.7	−47.8	9.7	47 45.8	−47.6	9.9	77
78	40 02.8	−48.9	8.0	41 02.2	−48.8	8.2	42 01.6	−48.7	8.3	43 01.0	−48.6	8.4	44 00.3	−48.5	8.6	44 59.6	−48.3	8.7	45 58.9	−48.2	8.9	46 58.2	−48.1	9.0	78
79	39 13.9	−49.2	7.3	40 13.4	−49.1	7.4	41 12.9	−49.0	7.5	42 12.4	−48.9	7.6	43 11.8	−48.8	7.7	44 11.3	−48.7	7.9	45 10.7	−48.6	8.0	46 10.1	−48.5	8.2	79
80	38 24.7	−49.5	6.6	39 24.3	−49.4	6.6	40 23.9	−49.3	6.7	41 23.5	−49.2	6.8	42 23.0	−49.1	7.0	43 22.6	−49.0	7.1	44 22.1	−48.9	7.2	45 21.6	−48.8	7.3	80
81	37 35.2	−49.7	5.8	38 34.9	−49.6	5.9	39 34.6	−49.6	6.0	40 34.3	−49.5	6.1	41 33.9	−49.4	6.2	42 33.6	−49.4	6.3	43 33.2	−49.3	6.4	44 32.8	−49.1	6.5	81
82	36 45.5	−49.9	5.1	37 45.3	−49.9	5.2	38 45.0	−49.8	5.3	39 44.8	−49.8	5.3	40 44.5	−49.7	5.4	41 44.2	−49.6	5.5	42 43.9	−49.5	5.6	43 43.7	−49.5	5.7	82
83	35 55.6	−50.2	4.4	36 55.4	−50.2	4.5	37 55.2	−50.1	4.6	38 55.0	−50.0	4.6	39 54.8	−50.0	4.7	40 54.6	−49.9	4.8	41 54.4	−49.9	4.8	42 54.2	−49.8	4.9	83
84	35 05.4	−50.4	3.8	36 05.2	−50.3	3.8	37 05.1	−50.3	3.9	38 05.0	−50.3	3.9	39 04.8	−50.2	4.0	40 04.7	−50.2	4.0	41 04.5	−50.1	4.1	42 04.4	−50.1	4.2	84
85	34 15.0	−50.7	3.1	35 14.9	−50.6	3.2	36 14.8	−50.6	3.2	37 14.7	−50.5	3.2	38 14.6	−50.5	3.3	39 14.5	−50.5	3.3	40 14.4	−50.4	3.4	41 14.3	−50.4	3.4	85
86	33 24.3	−50.8	2.5	34 24.3	−50.8	2.5	35 24.2	−50.7	2.5	36 24.2	−50.8	2.6	37 24.1	−50.7	2.6	38 24.0	−50.6	2.6	39 24.0	−50.7	2.7	40 23.9	−50.6	2.7	86
87	32 33.5	−51.0	1.8	33 33.5	−51.0	1.9	34 33.5	−51.0	1.9	35 33.4	−50.9	1.9	36 33.4	−50.9	1.9	37 33.4	−50.9	1.9	38 33.3	−50.9	2.0	39 33.3	−50.9	2.0	87
88	31 42.5	−51.2	1.2	32 42.5	−51.2	1.2	33 42.5	−51.2	1.2	34 42.5	−51.2	1.3	35 42.5	−51.2	1.3	36 42.5	−51.2	1.3	37 42.4	−51.1	1.3	38 42.4	−51.1	1.3	88
89	30 51.3	−51.3	0.6	31 51.3	−51.3	0.6	32 51.3	−51.3	0.6	33 51.3	−51.3	0.6	34 51.3	−51.3	0.6	35 51.3	−51.3	0.6	36 51.3	−51.3	0.6	37 51.3	−51.3	0.7	89
90	30 00.0	−51.5	0.0	31 00.0	−51.5	0.0	32 00.0	−51.5	0.0	33 00.0	−51.5	0.0	34 00.0	−51.5	0.0	35 00.0	−51.5	0.0	36 00.0	−51.5	0.0	37 00.0	−51.5	0.0	90
	30°			31°			32°			33°			34°			35°			36°			37°			

31°, 329° L.H.A. LATITUDE SAME NAME AS DECLINATION

LATITUDE CONTRARY NAME TO DECLINATION L.H.A. 31°, 329°

Dec.	30° Hc	d	Z	31° Hc	d	Z	32° Hc	d	Z	33° Hc	d	Z	34° Hc	d	Z	35° Hc	d	Z	36° Hc	d	Z	37° Hc	d	Z	Dec.
°	° ′	′	°	° ′	′	°	° ′	′	°	° ′	′	°	° ′	′	°	° ′	′	°	° ′	′	°	° ′	′	°	°
0	47 55.8	−45.0	129.8	47 17.1	−45.8	130.6	46 37.7	−46.5	131.4	45 57.7	−47.2	132.2	45 17.1	−47.8	132.9	44 36.0	−48.5	133.7	43 54.3	−49.1	134.4	43 12.1	−49.7	135.0	0
1	47 10.8	−45.5	130.7	46 31.3	−46.2	131.5	45 51.2	−46.9	132.3	45 10.5	−47.6	133.1	44 29.3	−48.3	133.8	43 47.5	−48.9	134.5	43 05.2	−49.5	135.2	42 22.4	−50.0	135.8	1
2	46 25.3	−46.0	131.7	45 45.1	−46.7	132.5	45 04.3	−47.4	133.2	44 22.9	−48.0	133.9	43 41.0	−48.6	134.6	42 58.6	−49.2	135.3	42 15.7	−49.7	135.9	41 32.4	−50.3	136.6	2
3	45 39.3	−46.4	132.6	44 58.4	−47.1	133.4	44 16.9	−47.7	134.1	43 34.9	−48.3	134.8	42 52.4	−48.9	135.4	42 09.4	−49.4	136.1	41 26.0	−50.0	136.7	40 42.1	−50.5	137.3	3
4	44 52.9	−46.8	133.5	44 11.3	−47.5	134.2	43 29.2	−48.1	134.9	42 46.6	−48.7	135.6	42 03.5	−49.2	136.2	41 20.0	−49.8	136.8	40 36.0	−50.3	137.4	39 51.6	−50.8	138.0	4
5	44 06.1	−47.3	134.4	43 23.8	−47.8	135.1	42 41.1	−48.4	135.7	41 57.9	−49.0	136.4	41 14.3	−49.6	137.0	40 30.2	−50.1	137.6	39 45.7	−50.5	138.1	39 00.8	−51.0	138.7	5
6	43 18.8	−47.5	135.3	42 36.0	−48.2	135.9	41 52.7	−48.8	136.5	41 08.9	−49.3	137.1	40 24.7	−49.8	137.7	39 40.1	−50.3	138.3	38 55.2	−50.8	138.8	38 09.8	−51.2	139.3	6
7	42 31.3	−48.0	136.1	41 47.8	−48.5	136.7	41 03.9	−49.0	137.3	40 19.6	−49.6	137.9	39 34.9	−50.1	138.4	38 49.8	−50.5	139.0	38 04.4	−51.1	139.5	37 18.6	−51.5	140.0	7
8	41 43.3	−48.2	136.9	40 59.3	−48.8	137.5	40 14.9	−49.4	138.1	39 30.0	−49.8	138.6	38 44.8	−50.3	139.2	37 59.3	−50.8	139.7	37 13.3	−51.2	140.2	36 27.1	−51.7	140.6	8
9	40 55.1	−48.6	137.7	40 10.5	−49.1	138.3	39 25.5	−49.6	138.8	38 40.2	−50.1	139.3	37 54.5	−50.6	139.9	37 08.5	−51.1	140.3	36 22.1	−51.4	140.8	35 35.4	−51.8	141.3	9
10	40 06.5	−48.9	138.5	39 21.4	−49.4	139.0	38 35.9	−49.9	139.5	37 50.1	−50.4	140.0	37 03.9	−50.8	140.5	36 17.4	−51.2	141.0	35 30.7	−51.7	141.5	34 43.6	−52.0	141.9	10
11	39 17.6	−49.2	139.2	38 32.0	−49.7	139.7	37 46.0	−50.1	140.2	36 59.7	−50.6	140.7	36 13.1	−51.0	141.2	35 26.2	−51.4	141.6	34 39.0	−51.8	142.1	33 51.6	−52.2	142.5	11
12	38 28.4	−49.4	139.9	37 42.3	−49.9	140.4	36 55.9	−50.4	140.9	36 09.1	−50.8	141.4	35 22.1	−51.2	141.8	34 34.8	−51.6	142.3	33 47.2	−52.0	142.7	32 59.4	−52.4	143.1	12
13	37 39.0	−49.7	140.7	36 52.4	−50.2	141.1	36 05.5	−50.6	141.6	35 18.3	−51.0	142.1	34 30.9	−51.4	142.5	33 43.2	−51.8	142.9	32 55.2	−52.2	143.3	32 07.0	−52.5	143.7	13
14	36 49.3	−50.0	141.4	36 02.2	−50.3	141.8	35 14.9	−50.8	142.3	34 27.3	−51.2	142.7	33 39.5	−51.6	143.1	32 51.4	−52.0	143.5	32 03.0	−52.3	143.9	31 14.5	−52.7	144.2	14
15	35 59.3	−50.2	142.1	35 11.9	−50.6	142.5	34 24.1	−51.0	142.9	33 36.1	−51.4	143.3	32 47.9	−51.8	143.7	31 59.4	−52.1	144.1	31 10.7	−52.5	144.4	30 21.8	−52.8	144.8	15
16	35 09.1	−50.3	142.7	34 21.3	−50.8	143.2	33 33.1	−51.2	143.6	32 44.7	−51.5	143.9	31 56.1	−51.9	144.3	31 07.3	−52.3	144.7	30 18.2	−52.6	145.0	29 29.0	−53.0	145.3	16
17	34 18.8	−50.7	143.4	33 30.5	−51.0	143.8	32 41.9	−51.3	144.2	31 53.2	−51.8	144.5	31 04.2	−52.1	144.9	30 15.0	−52.4	145.2	29 25.6	−52.8	145.6	28 36.0	−53.0	145.9	17
18	33 28.1	−50.8	144.0	32 39.5	−51.2	144.4	31 50.6	−51.6	144.8	31 01.4	−51.9	145.1	30 12.1	−52.2	145.5	29 22.6	−52.6	145.8	28 32.8	−52.8	146.1	27 43.0	−53.2	146.4	18
19	32 37.3	−50.9	144.7	31 48.3	−51.4	145.0	30 59.0	−51.7	145.4	30 09.5	−52.0	145.7	29 19.9	−52.4	146.0	28 30.0	−52.7	146.3	27 40.0	−53.0	146.6	26 49.8	−53.3	146.9	19
20	31 46.4	−51.2	145.3	30 56.9	−51.5	145.6	30 07.3	−51.9	146.0	29 17.5	−52.2	146.3	28 27.5	−52.5	146.6	27 37.3	−52.8	146.9	26 47.0	−53.2	147.2	25 56.5	−53.4	147.4	20
21	30 55.2	−51.3	145.9	30 05.4	−51.7	146.2	29 15.4	−52.0	146.6	28 25.3	−52.4	146.9	27 35.0	−52.7	147.1	26 44.5	−53.0	147.4	25 53.8	−53.2	147.7	25 03.1	−53.5	147.9	21
22	30 03.9	−51.5	146.5	29 13.7	−51.8	146.8	28 23.4	−52.1	147.1	27 32.9	−52.4	147.4	26 42.3	−52.7	147.7	25 51.5	−53.0	147.9	25 00.6	−53.3	148.2	24 09.6	−53.7	148.4	22
23	29 12.4	−51.7	147.1	28 21.9	−52.0	147.4	27 31.3	−52.3	147.7	26 40.5	−52.6	148.0	25 49.6	−52.9	148.2	24 58.5	−53.2	148.5	24 07.3	−53.5	148.7	23 15.9	−53.6	148.9	23
24	28 20.7	−51.8	147.7	27 29.9	−52.1	148.0	26 39.0	−52.4	148.2	25 47.9	−52.7	148.5	24 56.7	−53.0	148.7	24 05.3	−53.2	149.0	23 13.8	−53.5	149.2	22 22.3	−53.8	149.4	24
25	27 28.9	−51.9	148.3	26 37.8	−52.2	148.5	25 46.6	−52.5	148.8	24 55.2	−52.8	149.0	24 03.7	−53.1	149.3	23 12.1	−53.4	149.5	22 20.3	−53.6	149.7	21 28.5	−53.9	149.9	25
26	26 37.0	−52.1	148.8	25 45.6	−52.4	149.1	24 54.1	−52.7	149.3	24 02.4	−52.9	149.5	23 10.6	−53.2	149.8	22 18.7	−53.4	150.0	21 26.7	−53.7	150.2	20 34.6	−53.9	150.4	26
27	25 44.9	−52.2	149.4	24 53.2	−52.4	149.6	24 01.4	−52.7	149.8	23 09.5	−53.0	150.1	22 17.4	−53.2	150.3	21 25.3	−53.6	150.5	20 33.0	−53.7	150.7	19 40.7	−54.0	150.8	27
28	24 52.7	−52.3	149.9	24 00.8	−52.6	150.1	23 08.7	−52.9	150.4	22 16.5	−53.1	150.6	21 24.2	−53.4	150.8	20 31.7	−53.6	150.9	19 39.3	−53.9	151.1	18 46.7	−54.1	151.3	28
29	24 00.4	−52.4	150.5	23 08.2	−52.7	150.7	22 15.8	−52.9	150.9	21 23.4	−53.2	151.1	20 30.8	−53.4	151.3	19 38.1	−53.6	151.4	18 45.4	−53.9	151.6	17 52.6	−54.1	151.8	29
30	23 08.0	−52.5	151.0	22 15.5	−52.8	151.2	21 22.9	−53.1	151.4	20 30.2	−53.3	151.6	19 37.4	−53.6	151.7	18 44.5	−53.8	151.9	17 51.5	−54.0	152.1	16 58.5	−54.2	152.2	30
31	22 15.5	−52.6	151.5	21 22.7	−52.9	151.7	20 29.8	−53.1	151.9	19 36.9	−53.4	152.1	18 43.8	−53.6	152.2	17 50.7	−53.8	152.4	16 57.5	−54.0	152.5	16 04.3	−54.3	152.6	31
32	21 22.9	−52.7	152.0	20 29.8	−52.9	152.2	19 36.7	−53.2	152.4	18 43.5	−53.4	152.5	17 50.2	−53.6	152.7	16 56.9	−53.9	152.8	16 03.5	−54.1	153.0	15 10.0	−54.3	153.1	32
33	20 30.2	−52.8	152.5	19 36.9	−53.1	152.7	18 43.5	−53.3	152.9	17 50.1	−53.5	153.0	16 56.6	−53.7	153.2	16 03.0	−53.9	153.3	15 09.4	−54.2	153.4	14 15.7	−54.3	153.5	33
34	19 37.4	−52.9	153.0	18 43.8	−53.1	153.2	17 50.2	−53.3	153.3	16 56.6	−53.6	153.5	16 02.9	−53.8	153.6	15 09.1	−54.0	153.7	14 15.2	−54.2	153.9	13 21.4	−54.4	154.0	34
35	18 44.5	−53.0	153.5	17 50.7	−53.2	153.7	16 56.9	−53.4	153.8	16 03.0	−53.6	154.0	15 09.1	−53.9	154.1	14 15.1	−54.1	154.2	13 21.0	−54.2	154.3	12 27.0	−54.5	154.4	35
36	17 51.5	−53.0	154.0	16 57.5	−53.2	154.2	16 03.5	−53.5	154.3	15 09.4	−53.7	154.4	14 15.2	−53.8	154.5	13 21.0	−54.0	154.6	12 26.8	−54.3	154.7	11 32.5	−54.5	154.8	36
37	16 58.5	−53.2	154.5	16 04.3	−53.4	154.7	15 10.0	−53.5	154.8	14 15.7	−53.7	154.9	13 21.4	−54.0	155.0	12 27.0	−54.2	155.1	11 32.5	−54.3	155.2	10 38.0	−54.5	155.3	37
38	16 05.3	−53.1	155.0	15 10.9	−53.3	155.1	14 16.5	−53.6	155.2	13 22.0	−53.8	155.3	12 27.4	−54.0	155.4	11 32.8	−54.1	155.5	10 38.2	−54.4	155.6	9 43.5	−54.5	155.7	38
39	15 12.2	−53.3	155.5	14 17.6	−53.5	155.6	13 22.9	−53.6	155.7	12 28.2	−53.9	155.8	11 33.4	−54.0	155.9	10 38.7	−54.3	156.0	9 43.8	−54.4	156.0	8 49.0	−54.6	156.1	39
40	14 18.9	−53.3	156.0	13 24.1	−53.5	156.1	12 29.3	−53.7	156.2	11 34.3	−53.8	156.3	10 39.4	−54.0	156.3	9 44.4	−54.2	156.4	8 49.4	−54.4	156.5	7 54.4	−54.6	156.5	40
41	13 25.6	−53.3	156.4	12 30.6	−53.5	156.5	11 35.6	−53.8	156.6	10 40.5	−53.9	156.7	9 45.4	−54.1	156.8	8 50.2	−54.3	156.8	7 55.0	−54.4	156.9	6 59.8	−54.6	156.9	41
42	12 32.3	−53.4	156.9	11 37.1	−53.6	157.0	10 41.8	−53.7	157.1	9 46.6	−54.0	157.1	8 51.3	−54.2	157.2	7 55.9	−54.3	157.3	7 00.6	−54.5	157.3	6 05.2	−54.6	157.4	42
43	11 38.9	−53.4	157.4	10 43.5	−53.6	157.5	9 48.1	−53.8	157.5	8 52.6	−54.0	157.6	7 57.1	−54.1	157.6	7 01.6	−54.3	157.7	6 06.1	−54.5	157.7	5 10.6	−54.7	157.8	43
44	10 45.5	−53.5	157.8	9 49.9	−53.7	157.9	8 54.3	−53.9	158.0	7 58.6	−54.0	158.0	7 03.0	−54.2	158.1	6 07.3	−54.3	158.1	5 11.6	−54.5	158.2	4 15.9	−54.6	158.2	44
45	9 52.0	−53.5	158.3	8 56.2	−53.7	158.4	8 00.4	−53.8	158.4	7 04.6	−54.0	158.5	6 08.8	−54.2	158.5	5 13.0	−54.4	158.5	4 17.1	−54.5	158.6	3 21.3	−54.7	158.6	45
46	8 58.5	−53.6	158.8	8 02.5	−53.7	158.8	7 06.6	−53.9	158.9	6 10.6	−54.0	158.9	5 14.6	−54.2	158.9	4 18.6	−54.4	159.0	3 22.6	−54.5	159.0	2 26.6	−54.7	159.0	46
47	8 04.9	−53.6	159.2	7 08.8	−53.7	159.3	6 12.7	−53.9	159.3	5 16.6	−54.1	159.3	4 20.4	−54.2	159.4	3 24.2	−54.3	159.4	2 28.1	−54.6	159.4	1 31.9	−54.7	159.4	47
48	7 11.3	−53.6	159.7	6 15.1	−53.8	159.7	5 18.8	−53.9	159.8	4 22.5	−54.1	159.8	3 26.2	−54.3	159.8	2 29.9	−54.4	159.8	1 33.5	−54.5	159.8	0 37.2	−54.7	159.8	48
49	6 17.7	−53.6	160.1	5 21.3	−53.8	160.2	4 24.9	−54.0	160.2	3 28.4	−54.1	160.2	2 31.9	−54.2	160.2	1 35.5	−54.4	160.2	0 39.0	−54.5	160.2	0 17.5	+54.7	19.7	49
50	5 24.1	−53.7	160.6	4 27.5	−53.8	160.6	3 30.9	−53.9	160.6	2 34.3	−54.1	160.6	1 37.7	−54.3	160.7	0 41.1	−54.4	160.7	0 15.5	+54.6	19.3	1 12.2	+54.6	19.3	50
51	4 30.4	−53.6	161.0	3 33.7	−53.8	161.0	2 37.0	−54.0	161.1	1 40.2	−54.1	161.1	0 43.4	−54.2	161.1	0 13.3	+54.4	18.9	1 10.1	+54.5	18.9	2 06.8	+54.7	18.9	51
52	3 36.8	−53.7	161.5	2 39.9	−53.8	161.5	1 43.0	−54.0	161.5	0 46.1	−54.1	161.5	0 10.8	+54.3	18.5	1 07.7	+54.4	18.5	2 04.6	+54.6	18.5	3 01.5	+54.7	18.5	52
53	2 43.1	−53.7	161.9	1 46.1	−53.9	161.9	0 49.0	−54.0	161.9	0 08.0	+54.1	18.1	1 05.1	+54.2	18.1	2 02.1	+54.4	18.1	2 59.2	+54.5	18.1	3 56.2	+54.6	18.1	53
54	1 49.4	−53.7	162.4	0 52.2	−53.8	162.4	0 05.0	+53.9	17.6	1 02.1	+54.1	17.6	1 59.3	+54.3	17.6	2 56.5	+54.4	17.6	3 53.7	+54.5	17.7	4 50.8	+54.7	17.7	54
55	0 55.7	−53.7	162.8	0 01.6	+53.8	17.2	0 58.9	+54.0	17.2	1 56.2	+54.2	17.2	2 53.6	+54.2	17.2	3 50.9	+54.3	17.2	4 48.2	+54.5	17.2	5 45.5	+54.6	17.3	55
56	0 02.0	−53.7	163.3	0 55.4	+53.9	16.7	1 52.9	+54.0	16.7	2 50.4	+54.0	16.8	3 47.8	+54.2	16.8	4 45.2	+54.4	16.8	5 42.7	+54.5	16.8	6 40.1	+54.6	16.9	56
57	0 51.7	+53.7	16.3	1 49.3	+53.8	16.3	2 46.9	+53.9	16.3	3 44.4	+54.1	16.3	4 42.0	+54.2	16.3	5 39.6	+54.3	16.4	6 37.2	+54.4	16.4	7 34.7	+54.6	16.4	57
58	1 45.4	+53.7	15.8	2 43.1	+53.8	15.9	3 40.8	+54.0	15.9	4 38.5	+54.1	15.9	5 36.2	+54.2	15.9	6 33.9	+54.3	15.9	7 31.6	+54.4	16.0	8 29.3	+54.5	16.0	58
59	2 39.1	+53.7	15.4	3 36.9	+53.8	15.4	4 34.8	+53.9	15.4	5 32.6	+54.0	15.5	6 30.4	+54.2	15.5	7 28.2	+54.3	15.5	8 26.0	+54.4	15.6	9 23.8	+54.6	15.6	59
60	3 32.8	+53.6	15.0	4 30.7	+53.8	15.0	5 28.7	+53.9	15.0	6 26.6	+54.1	15.0	7 24.6	+54.1	15.1	8 22.5	+54.3	15.1	9 20.4	+54.4	15.1	10 18.4	+54.4	15.2	60
61	4 26.4	+53.7	14.5	5 24.5	+53.8	14.5	6 22.6	+53.9	14.6	7 20.7	+54.0	14.6	8 18.7	+54.1	14.6	9 16.8	+54.2	14.7	10 14.8	+54.4	14.7	11 12.8	+54.5	14.7	61
62	5 20.1	+53.6	14.1	6 18.3	+53.7	14.1	7 16.5	+53.8	14.1	8 14.7	+53.9	14.1	9 12.8	+54.1	14.2	10 11.0	+54.2	14.2	11 09.2	+54.3	14.3	12 07.3	+54.4	14.3	62
63	6 13.7	+53.6	13.6	7 12.0	+53.7	13.6	8 10.3	+53.9	13.7	9 08.6	+54.0	13.7	10 06.9	+54.1	13.7	11 05.2	+54.1	13.8	12 03.5	+54.2	13.8	13 01.7	+54.4	13.9	63
64	7 07.3	+53.6	13.2	8 05.7	+53.7	13.2	9 04.2	+53.7	13.2	10 02.6	+53.9	13.3	11 01.0	+54.0	13.3	11 59.3	+54.2	13.3	12 57.7	+54.2	13.4	13 56.1	+54.3	13.5	64
65	8 00.9	+53.6	12.7	8 59.4	+53.7	12.7	9 57.9	+53.8	12.8	10 56.5	+53.8	12.8	11 55.0	+53.9	12.9	12 53.5	+54.0	12.9	13 51.9	+54.2	13.0	14 50.4	+54.3	13.0	65
66	8 54.5	+53.5	12.2	9 53.1	+53.6	12.3	10 51.7	+53.7	12.3	11 50.3	+53.8	12.4	12 48.9	+53.9	12.4	13 47.5	+54.0	12.5	14 46.1	+54.1	12.5	15 44.7	+54.2	12.6	66
67	9 48.0	+53.5	11.8	10 46.7	+53.6	11.8	11 45.4	+53.7	11.9	12 44.1	+53.8	11.9	13 42.8	+53.9	12.0	14 41.5	+54.0	12.0	15 40.2	+54.1	12.1	16 38.9	+54.1	12.1	67
68	10 41.5	+53.4	11.3	11 40.3	+53.5	11.4	12 39.1	+53.6	11.4	13 37.9	+53.7	11.5	14 36.7	+53.8	11.5	15 35.5	+53.9	11.6	16 34.3	+54.0	11.6	17 33.0	+54.1	11.7	68
69	11 34.9	+53.4	10.9	12 33.8	+53.5	10.9	13 32.7	+53.6	10.9	14 31.6	+53.7	11.0	15 30.5	+53.8	11.0	16 29.4	+53.9	11.1	17 28.3	+53.9	11.2	18 27.1	+54.1	11.2	69
70	12 28.3	+53.3	10.4	13 27.3	+53.4	10.4	14 26.3	+53.5	10.5	15 25.3	+53.6	10.5	16 24.3	+53.7	10.6	17 23.3	+53.7	10.6	18 22.2	+53.9	10.7	19 21.2	+53.9	10.8	70
71	13 21.6	+53.3	9.9	14 20.7	+53.4	10.0	15 19.8	+53.5	10.0	16 18.9	+53.6	10.1	17 18.0	+53.6	10.1	18 17.0	+53.8	10.2	19 16.1	+53.8	10.2	20 15.1	+53.9	10.3	71
72	14 14.9	+53.3	9.5	15 14.1	+53.3	9.5	16 13.3	+53.4	9.5	17 12.5	+53.4	9.6	18 11.6	+53.6	9.6	19 10.8	+53.6	9.7	20 09.9	+53.7	9.8	21 09.0	+53.8	9.8	72
73	15 08.2	+53.2	9.0	16 07.4	+53.3	9.0	17 06.7	+53.3	9.1	18 05.9	+53.5	9.1	19 05.2	+53.5	9.2	20 04.4	+53.6	9.2	21 03.6	+53.7	9.3	22 02.8	+53.8	9.3	73
74	16 01.4	+53.1	8.5	17 00.7	+53.2	8.5	18 00.0	+53.3	8.6	18 59.4	+53.3	8.6	19 58.7	+53.4	8.7	20 58.0	+53.5	8.7	21 57.3	+53.5	8.8	22 56.6	+53.6	8.9	74
75	16 54.5	+53.0	8.0	17 53.9	+53.1	8.1	18 53.3	+53.2	8.1	19 52.7	+53.2	8.1	20 52.1	+53.3	8.2	21 51.5	+53.4	8.3	22 50.8	+53.5	8.3	23 50.2	+53.5	8.4	75
76	17 47.5	+53.0	7.5	18 47.0	+53.0	7.6	19 46.5	+53.1	7.6	20 45.9	+53.2	7.7	21 45.4	+53.2	7.7	22 44.9	+53.3	7.8	23 44.3	+53.4	7.8	24 43.7	+53.5	7.9	76
77	18 40.5	+52.9	7.0	19 40.0	+53.0	7.1	20 39.6	+53.0	7.1	21 39.1	+53.1	7.2	22 38.6	+53.2	7.2	23 38.2	+53.2	7.3	24 37.7	+53.3	7.3	25 37.2	+53.3	7.4	77
78	19 33.4	+52.8	6.5	20 33.0	+52.9	6.6	21 32.6	+52.9	6.6	22 32.2	+53.0	6.7	23 31.8	+53.0	6.7	24 31.4	+53.1	6.8	25 31.0	+53.1	6.8	26 30.5	+53.3	6.9	78
79	20 26.2	+52.7	6.0	21 25.9	+52.7	6.1	22 25.5	+52.9	6.1	23 25.2	+52.9	6.1	24 24.8	+53.0	6.2	25 24.5	+53.0	6.2	26 24.1	+53.1	6.3	27 23.8	+53.1	6.4	79
80	21 18.9	+52.6	5.5	22 18.6	+52.7	5.5	23 18.4	+52.7	5.6	24 18.1	+52.7	5.6	25 17.8	+52.8	5.7	26 17.5	+52.9	5.7	27 17.2	+52.9	5.8	28 16.9	+53.0	5.8	80
81	22 11.5	+52.6	5.0	23 11.3	+52.6	5.0	24 11.1	+52.6	5.1	25 10.8	+52.7	5.1	26 10.6	+52.7	5.2	27 10.4	+52.7	5.2	28 10.1	+52.8	5.2	29 09.9	+52.8	5.3	81
82	23 04.1	+52.4	4.5	24 03.9	+52.5	4.5	25 03.7	+52.5	4.5	26 03.5	+52.6	4.6	27 03.3	+52.6	4.6	28 03.1	+52.7	4.7	29 02.9	+52.7	4.7	30 02.7	+52.7	4.7	82
83	23 56.5	+52.3	3.9	24 56.4	+52.3	4.0	25 56.2	+52.4	4.0	26 56.1	+52.4	4.0	27 55.9	+52.5	4.1	28 55.8	+52.5	4.1	29 55.6	+52.5	4.2	30 55.4	+52.6	4.2	83
84	24 48.8	+52.2	3.4	25 48.7	+52.2	3.4	26 48.6	+52.3	3.5	27 48.5	+52.3	3.5	28 48.4	+52.3	3.5	29 48.3	+52.3	3.6	30 48.1	+52.4	3.6	31 48.0	+52.5	3.6	84
85	25 41.0	+52.1	2.9	26 40.9	+52.1	2.9	27 40.9	+52.1	2.9	28 40.8	+52.1	2.9	29 40.7	+52.2	3.0	30 40.6	+52.2	3.0	31 40.5	+52.3	3.0	32 40.5	+52.2	3.1	85
86	26 33.1	+51.9	2.3	27 33.0	+52.0	2.3	28 33.0	+52.0	2.3	29 32.9	+52.0	2.4	30 32.9	+52.0	2.4	31 32.8	+52.1	2.4	32 32.8	+52.0	2.4	33 32.7	+52.1	2.5	86
87	27 25.0	+51.8	1.7	28 25.0	+51.8	1.8	29 25.0	+51.8	1.8	30 24.9	+51.9	1.8	31 24.9	+51.9	1.8	32 24.9	+51.9	1.8	33 24.8	+52.0	1.9	34 24.8	+51.9	1.9	87
88	28 16.8	+51.7	1.2	29 16.8	+51.7	1.2	30 16.8	+51.7	1.2	31 16.8	+51.7	1.2	32 16.8	+51.7	1.2	33 16.8	+51.7	1.2	34 16.8	+51.7	1.2	35 16.7	+51.8	1.3	88
89	29 08.5	+51.5	0.6	30 08.5	+51.5	0.6	31 08.5	+51.5	0.6	32 08.5	+51.5	0.6	33 08.5	+51.5	0.6	34 08.5	+51.5	0.6	35 08.5	+51.5	0.6	36 08.5	+51.5	0.6	89
90	30 00.0	+51.3	0.0	31 00.0	+51.3	0.0	32 00.0	+51.3	0.0	33 00.0	+51.3	0.0	34 00.0	+51.3	0.0	35 00.0	+51.3	0.0	36 00.0	+51.3	0.0	37 00.0	+51.3	0.0	90
	30°			31°			32°			33°			34°			35°			36°			37°			

S. Lat. { L.H.A. greater than 180° ....Zn=180°–Z
L.H.A. less than 180°.....Zn=180°+Z

LATITUDE SAME NAME AS DECLINATION L.H.A. 149°, 211°

53°, 307° L.H.A. LATITUDE SAME NAME AS DECLINATION

N. Lat. { L.H.A. greater than 180° .....Zn=Z
L.H.A. less than 180°.....Zn=360°–Z

Dec. °	30° Hc ° ′	d ′	Z °	31° Hc ° ′	d ′	Z °	32° Hc ° ′	d ′	Z °	33° Hc ° ′	d ′	Z °	34° Hc ° ′	d ′	Z °	35° Hc ° ′	d ′	Z °	36° Hc ° ′	d ′	Z °	37° Hc ° ′	d ′	Z °	Dec. °
0	31 24.7	+35.0	110.6	31 03.3	+35.9	111.2	30 41.3	+36.8	111.8	30 18.8	+37.7	112.3	29 55.7	+38.6	112.8	29 32.2	+39.4	113.4	29 08.1	+40.3	113.9	28 43.6	+41.0	114.4	0
1	31 59.7	+34.5	109.7	31 39.2	+35.4	110.3	31 18.1	+36.4	110.8	30 56.5	+37.2	111.4	30 34.3	+38.1	112.0	30 11.6	+39.0	112.5	29 48.4	+39.8	113.0	29 24.6	+40.7	113.6	1
2	32 34.2	+34.0	108.7	32 14.6	+35.0	109.3	31 54.5	+35.9	109.9	31 33.7	+36.9	110.5	31 12.4	+37.8	111.1	30 50.6	+38.7	111.6	30 28.2	+39.6	112.2	30 05.3	+40.4	112.7	2
3	33 08.2	+33.6	107.7	32 49.6	+34.6	108.4	32 30.4	+35.6	109.0	32 10.6	+36.5	109.6	31 50.2	+37.4	110.2	31 29.3	+38.3	110.7	31 07.8	+39.1	111.3	30 45.7	+40.0	111.9	3
4	33 41.8	+33.1	106.7	33 24.2	+34.1	107.4	33 06.0	+35.0	108.0	32 47.1	+36.0	108.6	32 27.6	+37.0	109.2	32 07.6	+37.9	109.8	31 46.9	+38.8	110.4	31 25.7	+39.7	111.0	4
5	34 14.9	+32.6	105.7	33 58.3	+33.6	106.4	33 41.0	+34.7	107.0	33 23.1	+35.6	107.7	33 04.6	+36.6	108.3	32 45.5	+37.5	108.9	32 25.7	+38.5	109.5	32 05.4	+39.3	110.1	5
6	34 47.5	+32.1	104.7	34 31.9	+33.1	105.4	34 15.7	+34.1	106.1	33 58.7	+35.2	106.7	33 41.2	+36.1	107.3	33 23.0	+37.0	108.0	33 04.2	+38.0	108.6	32 44.7	+38.9	109.2	6
7	35 19.6	+31.6	103.7	35 05.0	+32.7	104.4	34 49.8	+33.7	105.1	34 33.9	+34.6	105.7	34 17.3	+35.7	106.4	34 00.0	+36.7	107.0	33 42.2	+37.5	107.7	33 23.6	+38.5	108.3	7
8	35 51.2	+31.0	102.6	35 37.7	+32.0	103.3	35 23.5	+33.1	104.0	35 08.5	+34.2	104.7	34 53.0	+35.1	105.4	34 36.7	+36.2	106.1	34 19.7	+37.2	106.7	34 02.1	+38.1	107.4	8
9	36 22.2	+30.4	101.6	36 09.7	+31.6	102.3	35 56.6	+32.6	103.0	35 42.7	+33.7	103.7	35 28.1	+34.7	104.4	35 12.9	+35.7	105.1	34 56.9	+36.7	105.8	34 40.2	+37.7	106.4	9
10	36 52.6	+29.8	100.5	36 41.3	+30.9	101.2	36 29.2	+32.0	102.0	36 16.4	+33.1	102.7	36 02.8	+34.2	103.4	35 48.6	+35.2	104.1	35 33.6	+36.2	104.8	35 17.9	+37.2	105.5	10
11	37 22.4	+29.3	99.4	37 12.2	+30.4	100.2	37 01.2	+31.5	100.9	36 49.5	+32.6	101.7	36 37.0	+33.7	102.4	36 23.8	+34.7	103.1	36 09.8	+35.7	103.8	35 55.1	+36.7	104.5	11
12	37 51.7	+28.6	98.3	37 42.6	+29.8	99.1	37 32.7	+30.9	99.8	37 22.1	+32.0	100.6	37 10.7	+33.1	101.4	36 58.5	+34.1	102.1	36 45.5	+35.2	102.8	36 31.8	+36.3	103.5	12
13	38 20.3	+28.0	97.2	38 12.4	+29.1	98.0	38 03.6	+30.3	98.8	37 54.1	+31.4	99.5	37 43.8	+32.5	100.3	37 32.6	+33.7	101.1	37 20.7	+34.7	101.8	37 08.1	+35.7	102.6	13
14	38 48.3	+27.3	96.1	38 41.5	+28.5	96.9	38 33.9	+29.7	97.7	38 25.5	+30.8	98.5	38 16.3	+31.9	99.2	38 06.3	+33.0	100.0	37 55.4	+34.2	100.8	37 43.8	+35.2	101.5	14
15	39 15.6	+26.6	94.9	39 10.0	+27.8	95.7	39 03.6	+29.0	96.5	38 56.3	+30.2	97.4	38 48.2	+31.4	98.2	38 39.3	+32.5	98.9	38 29.6	+33.6	99.7	38 19.0	+34.7	100.5	15
16	39 42.2	+25.9	93.8	39 37.8	+27.2	94.6	39 32.6	+28.4	95.4	39 26.5	+29.6	96.2	39 19.6	+30.7	97.1	39 11.8	+31.8	97.9	39 03.2	+32.9	98.7	38 53.7	+34.1	99.5	16
17	40 08.1	+25.2	92.6	40 05.0	+26.4	93.4	40 01.0	+27.6	94.3	39 56.1	+28.8	95.1	39 50.3	+30.0	95.9	39 43.6	+31.3	96.8	39 36.1	+32.4	97.6	39 27.8	+33.5	98.4	17
18	40 33.3	+24.5	91.4	40 31.4	+25.7	92.3	40 28.6	+27.0	93.1	40 24.9	+28.2	94.0	40 20.3	+29.4	94.8	40 14.9	+30.5	95.7	40 08.5	+31.8	96.5	40 01.3	+32.9	97.3	18
19	40 57.8	+23.7	90.2	40 57.1	+25.0	91.1	40 55.6	+26.2	91.9	40 53.1	+27.5	92.8	40 49.7	+28.7	93.7	40 45.4	+30.0	94.5	40 40.3	+31.1	95.4	40 34.2	+32.3	96.2	19
20	41 21.5	+22.9	89.0	41 22.1	+24.2	89.9	41 21.8	+25.5	90.7	41 20.6	+26.7	91.6	41 18.4	+28.0	92.5	41 15.4	+29.2	93.4	41 11.4	+30.4	94.2	41 06.5	+31.6	95.1	20
21	41 44.4	+22.1	87.7	41 46.3	+23.4	88.6	41 47.3	+24.7	89.5	41 47.3	+26.0	90.4	41 46.4	+27.2	91.3	41 44.6	+28.4	92.2	41 41.8	+29.7	93.1	41 38.1	+30.9	94.0	21
22	42 06.5	+21.3	86.5	42 09.7	+22.6	87.4	42 12.0	+23.9	88.3	42 13.3	+25.2	89.2	42 13.6	+26.5	90.1	42 13.0	+27.8	91.0	42 11.5	+29.0	91.9	42 09.0	+30.2	92.8	22
23	42 27.8	+20.5	85.2	42 32.3	+21.8	86.1	42 35.9	+23.1	87.1	42 38.5	+24.4	88.0	42 40.1	+25.7	88.9	42 40.8	+27.0	89.8	42 40.5	+28.3	90.7	42 39.2	+29.6	91.7	23
24	42 48.3	+19.5	83.9	42 54.1	+20.9	84.9	42 59.0	+22.2	85.8	43 02.9	+23.6	86.7	43 05.8	+24.9	87.7	43 07.8	+26.2	88.6	43 08.8	+27.4	89.5	43 08.8	+28.7	90.5	24
25	43 07.8	+18.7	82.7	43 15.0	+20.1	83.6	43 21.2	+21.4	84.5	43 26.5	+22.7	85.5	43 30.7	+24.1	86.4	43 34.0	+25.4	87.4	43 36.2	+26.7	88.3	43 37.5	+28.0	89.3	25
26	43 26.5	+17.8	81.4	43 35.1	+19.1	82.3	43 42.6	+20.6	83.2	43 49.2	+21.9	84.2	43 54.8	+23.2	85.1	43 59.4	+24.5	86.1	44 02.9	+25.9	87.1	44 05.5	+27.2	88.0	26
27	43 44.3	+16.9	80.0	43 54.2	+18.3	81.0	44 03.2	+19.6	81.9	44 11.1	+21.0	82.9	44 18.0	+22.3	83.9	44 23.9	+23.7	84.8	44 28.8	+25.0	85.8	44 32.7	+26.3	86.8	27
28	44 01.2	+16.0	78.7	44 12.5	+17.3	79.7	44 22.8	+18.7	80.6	44 32.1	+20.0	81.6	44 40.3	+21.5	82.6	44 47.6	+22.8	83.5	44 53.8	+24.2	84.5	44 59.0	+25.5	85.5	28
29	44 17.2	+15.0	77.4	44 29.8	+16.4	78.3	44 41.5	+17.7	79.3	44 52.1	+19.2	80.3	45 01.8	+20.5	81.2	45 10.4	+21.9	82.2	45 18.0	+23.3	83.2	45 24.5	+24.7	84.2	29
30	44 32.2	+14.0	76.0	44 46.2	+15.4	77.0	44 59.2	+16.8	77.9	45 11.3	+18.2	78.9	45 22.3	+19.6	79.9	45 32.3	+21.0	80.9	45 41.3	+22.3	81.9	45 49.2	+23.7	82.9	30
31	44 46.2	+13.0	74.6	45 01.6	+14.4	75.6	45 16.0	+15.9	76.6	45 29.5	+17.2	77.6	45 41.9	+18.6	78.6	45 53.3	+20.0	79.6	46 03.6	+21.4	80.6	46 12.9	+22.8	81.6	31
32	44 59.2	+12.1	73.3	45 16.0	+13.5	74.2	45 31.9	+14.8	75.2	45 46.7	+16.2	76.2	46 00.5	+17.6	77.2	46 13.3	+19.0	78.2	46 25.0	+20.5	79.2	46 35.7	+21.8	80.3	32
33	45 11.3	+11.0	71.9	45 29.5	+12.4	72.8	45 46.7	+13.8	73.8	46 02.9	+15.2	74.8	46 18.1	+16.7	75.8	46 32.3	+18.1	76.8	46 45.5	+19.4	77.9	46 57.5	+20.9	78.9	33
34	45 22.3	+10.0	70.5	45 41.9	+11.4	71.4	46 00.5	+12.8	72.4	46 18.1	+14.2	73.4	46 34.8	+15.6	74.4	46 50.4	+17.0	75.4	47 04.9	+18.4	76.5	47 18.4	+19.9	77.5	34
35	45 32.3	+9.0	69.1	45 53.3	+10.3	70.0	46 13.3	+11.7	71.0	46 32.3	+13.2	72.0	46 50.4	+14.5	73.0	47 07.4	+15.9	74.0	47 23.3	+17.4	75.1	47 38.3	+18.8	76.1	35
36	45 41.3	+7.9	67.7	46 03.6	+9.3	68.6	46 25.0	+10.7	69.6	46 45.5	+12.0	70.6	47 04.9	+13.5	71.6	47 23.3	+15.0	72.6	47 40.7	+16.4	73.7	47 57.1	+17.8	74.7	36
37	45 49.2	+6.8	66.2	46 12.9	+8.2	67.2	46 35.7	+9.6	68.2	46 57.5	+11.0	69.1	47 18.4	+12.4	70.2	47 38.3	+13.8	71.2	47 57.1	+15.2	72.2	48 14.9	+16.7	73.3	37
38	45 56.0	+5.8	64.8	46 21.1	+7.1	65.8	46 45.3	+8.5	66.7	47 08.5	+9.9	67.7	47 30.8	+11.3	68.7	47 52.1	+12.7	69.7	48 12.3	+14.2	70.8	48 31.6	+15.6	71.9	38
39	46 01.8	+4.7	63.4	46 28.2	+6.1	64.3	46 53.8	+7.4	65.3	47 18.4	+8.8	66.3	47 42.1	+10.2	67.3	48 04.8	+11.6	68.3	48 26.5	+13.0	69.3	48 47.2	+14.4	70.4	39
40	46 06.5	+3.6	61.9	46 34.3	+4.9	62.9	47 01.2	+6.3	63.8	47 27.2	+7.7	64.8	47 52.3	+9.1	65.8	48 16.4	+10.5	66.8	48 39.5	+11.9	67.8	49 01.6	+13.4	68.9	40
41	46 10.1	+2.5	60.5	46 39.2	+3.9	61.4	47 07.5	+5.2	62.4	47 34.9	+6.5	63.3	48 01.4	+7.9	64.3	48 26.9	+9.3	65.3	48 51.4	+10.8	66.4	49 15.0	+12.2	67.4	41
42	46 12.6	+1.4	59.1	46 43.1	+2.7	60.0	47 12.7	+4.0	60.9	47 41.4	+5.4	61.8	48 09.3	+6.8	62.8	48 36.2	+8.2	63.8	49 02.2	+9.6	64.9	49 27.2	+11.0	65.9	42
43	46 14.0	+0.4	57.6	46 45.8	+1.6	58.5	47 16.7	+3.0	59.4	47 46.8	+4.3	60.4	48 16.1	+5.6	61.3	48 44.4	+7.0	62.3	49 11.8	+8.3	63.4	49 38.2	+9.8	64.4	43
44	46 14.4	−0.8	56.2	46 47.4	+0.5	57.0	47 19.7	+1.7	57.9	47 51.1	+3.1	58.9	48 21.7	+4.4	59.8	48 51.4	+5.8	60.8	49 20.1	+7.2	61.8	49 48.0	+8.6	62.9	44
45	46 13.6	−1.8	54.7	46 47.9	−0.6	55.6	47 21.4	+0.7	56.5	47 54.2	+1.9	57.4	48 26.1	+3.3	58.3	48 57.2	+4.6	59.3	49 27.3	+6.0	60.3	49 56.6	+7.4	61.3	45
46	46 11.8	−3.0	53.3	46 47.3	−1.7	54.1	47 22.1	−0.5	55.0	47 56.1	+0.8	55.9	48 29.4	+2.1	56.8	49 01.8	+3.4	57.8	49 33.3	+4.8	58.8	50 04.0	+6.1	59.8	46
47	46 08.8	−4.0	51.8	46 45.6	−2.8	52.7	47 21.6	−1.6	53.5	47 56.9	−0.4	54.4	48 31.5	+0.9	55.3	49 05.2	+2.2	56.3	49 38.1	+3.5	57.2	50 10.1	+4.9	58.2	47
48	46 04.8	−5.1	50.4	46 42.8	−4.0	51.2	47 20.0	−2.7	52.0	47 56.5	−1.5	52.9	48 32.4	−0.3	53.8	49 07.4	+1.0	54.7	49 41.6	+2.3	55.7	50 15.0	+3.6	56.7	48
49	45 59.7	−6.2	49.0	46 38.8	−5.0	49.7	47 17.3	−3.9	50.6	47 55.0	−2.7	51.4	48 32.1	−1.5	52.3	49 08.4	−0.2	53.2	49 43.9	+1.1	54.2	50 18.6	+2.4	55.1	49
50	45 53.5	−7.2	47.5	46 33.8	−6.2	48.3	47 13.4	−5.0	49.1	47 52.3	−3.8	49.9	48 30.6	−2.7	50.8	49 08.2	−1.5	51.7	49 45.0	−0.2	52.6	50 21.0	+1.1	53.6	50
51	45 46.3	−8.3	46.1	46 27.6	−7.2	46.9	47 08.4	−6.2	47.6	47 48.5	−5.0	48.4	48 27.9	−3.8	49.3	49 06.7	−2.6	50.2	49 44.8	−1.4	51.1	50 22.1	−0.1	52.0	51
52	45 38.0	−9.3	44.7	46 20.4	−8.3	45.4	47 02.2	−7.2	46.2	47 43.5	−6.2	47.0	48 24.1	−5.0	47.8	49 04.1	−3.8	48.6	49 43.4	−2.6	49.5	50 22.0	−1.4	50.4	52
53	45 28.7	−10.4	43.3	46 12.1	−9.4	44.0	46 55.0	−8.3	44.7	47 37.3	−7.2	45.5	48 19.1	−6.2	46.3	49 00.3	−5.1	47.1	49 40.8	−3.9	48.0	50 20.6	−2.7	48.9	53
54	45 18.3	−11.4	41.9	46 02.7	−10.4	42.6	46 46.7	−9.5	43.3	47 30.1	−8.4	44.0	48 12.9	−7.3	44.8	48 55.2	−6.2	45.6	49 36.9	−5.1	46.4	50 17.9	−3.9	47.3	54
55	45 06.9	−12.5	40.5	45 52.3	−11.5	41.1	46 37.2	−10.5	41.8	47 21.7	−9.5	42.6	48 05.6	−8.5	43.3	48 49.0	−7.4	44.1	49 31.8	−6.3	44.9	50 14.0	−5.2	45.7	55
56	44 54.4	−13.4	39.1	45 40.8	−12.5	39.7	46 26.7	−11.6	40.4	47 12.2	−10.6	41.1	47 57.1	−9.6	41.8	48 41.6	−8.6	42.6	49 25.5	−7.5	43.4	50 08.8	−6.4	44.2	56
57	44 41.0	−14.4	37.7	45 28.3	−13.5	38.3	46 15.1	−12.6	39.0	47 01.6	−11.7	39.7	47 47.5	−10.7	40.3	48 33.0	−9.7	41.1	49 18.0	−8.7	41.8	50 02.4	−7.6	42.6	57
58	44 26.6	−15.3	36.4	45 14.8	−14.5	36.9	46 02.5	−13.6	37.6	46 49.9	−12.8	38.2	47 36.8	−11.8	38.9	48 23.3	−10.9	39.6	49 09.3	−9.9	40.3	49 54.8	−8.9	41.1	58
59	44 11.3	−16.3	35.0	45 00.3	−15.5	35.6	45 48.9	−14.7	36.2	46 37.1	−13.8	36.8	47 25.0	−13.0	37.4	48 12.4	−12.0	38.1	48 59.4	−11.1	38.8	49 45.9	−10.1	39.6	59
60	43 55.0	−17.3	33.7	44 44.8	−16.5	34.2	45 34.2	−15.7	34.8	46 23.3	−14.8	35.4	47 12.0	−14.0	36.0	48 00.4	−13.1	36.6	48 48.3	−12.2	37.3	49 35.8	−11.3	38.0	60
61	43 37.7	−18.1	32.3	44 28.3	−17.4	32.9	45 18.5	−16.6	33.4	46 08.5	−15.9	34.0	46 58.0	−15.0	34.6	47 47.3	−14.2	35.2	48 36.1	−13.3	35.8	49 24.5	−12.4	36.5	61
62	43 19.6	−19.0	31.0	44 10.9	−18.4	31.5	45 01.9	−17.6	32.0	45 52.6	−16.9	32.6	46 43.0	−16.1	33.2	47 33.1	−15.3	33.7	48 22.8	−14.5	34.4	49 12.1	−13.6	35.0	62
63	43 00.6	−20.0	29.7	43 52.5	−19.2	30.2	44 44.3	−18.6	30.7	45 35.7	−17.8	31.2	46 26.9	−17.1	31.8	47 17.8	−16.4	32.3	48 08.3	−15.6	32.9	48 58.5	−14.7	33.5	63
64	42 40.6	−20.7	28.4	43 33.3	−20.1	28.9	44 25.7	−19.5	29.4	45 17.9	−18.8	29.8	46 09.8	−18.1	30.4	47 01.4	−17.4	30.9	47 52.7	−16.6	31.5	48 43.8	−15.9	32.1	64
65	42 19.9	−21.6	27.2	43 13.2	−21.0	27.6	44 06.2	−20.4	28.0	44 59.1	−19.8	28.5	45 51.7	−19.1	29.0	46 44.0	−18.4	29.5	47 36.1	−17.7	30.0	48 27.9	−16.9	30.6	65
66	41 58.3	−22.4	25.9	42 52.2	−21.9	26.3	43 45.8	−21.2	26.7	44 39.3	−20.6	27.2	45 32.6	−20.0	27.6	46 25.6	−19.3	28.1	47 18.4	−18.7	28.6	48 11.0	−18.0	29.2	66
67	41 35.9	−23.2	24.7	42 30.3	−22.7	25.0	43 24.6	−22.1	25.4	44 18.7	−21.6	25.9	45 12.6	−21.0	26.3	46 06.3	−20.4	26.7	46 59.7	−19.7	27.2	47 53.0	−19.1	27.7	67
68	41 12.7	−24.0	23.4	42 07.6	−23.5	23.8	43 02.5	−23.0	24.2	43 57.1	−22.4	24.6	44 51.6	−21.9	25.0	45 45.9	−21.3	25.4	46 40.0	−20.7	25.8	47 33.9	−20.1	26.3	68
69	40 48.7	−24.8	22.2	41 44.1	−24.2	22.6	42 39.5	−23.8	22.9	43 34.7	−23.3	23.3	44 29.7	−22.7	23.7	45 24.6	−22.2	24.1	46 19.3	−21.7	24.5	47 13.8	−21.1	24.9	69
70	40 23.9	−25.5	21.0	41 19.9	−25.1	21.3	42 15.7	−24.6	21.7	43 11.4	−24.1	22.0	44 07.0	−23.7	22.4	45 02.4	−23.2	22.7	45 57.6	−22.6	23.1	46 52.7	−22.0	23.6	70
71	39 58.4	−26.1	19.8	40 54.8	−25.7	20.1	41 51.1	−25.3	20.4	42 47.3	−24.9	20.8	43 43.3	−24.4	21.1	44 39.2	−24.0	21.4	45 35.0	−23.5	21.8	46 30.7	−23.1	22.2	71
72	39 32.3	−26.9	18.7	40 29.1	−26.6	18.9	41 25.8	−26.2	19.2	42 22.4	−25.7	19.5	43 18.9	−25.3	19.8	44 15.2	−24.8	20.2	45 11.5	−24.4	20.5	46 07.6	−23.9	20.9	72
73	39 05.4	−27.6	17.5	40 02.5	−27.2	17.8	40 59.6	−26.8	18.0	41 56.7	−26.5	18.3	42 53.6	−26.1	18.6	43 50.4	−25.7	18.9	44 47.1	−25.2	19.2	45 43.7	−24.8	19.5	73
74	38 37.8	−28.2	16.4	39 35.3	−27.9	16.6	40 32.8	−27.6	16.8	41 30.2	−27.2	17.1	42 27.5	−26.9	17.4	43 24.7	−26.5	17.6	44 21.9	−26.1	17.9	45 18.9	−25.7	18.2	74
75	38 09.6	−28.9	15.2	39 07.4	−28.5	15.5	40 05.2	−28.2	15.7	41 03.0	−27.9	15.9	42 00.6	−27.6	16.2	42 58.2	−27.2	16.4	43 55.8	−26.9	16.7	44 53.2	−26.6	17.0	75
76	37 40.7	−29.4	14.1	38 38.9	−29.2	14.3	39 37.0	−28.9	14.5	40 35.1	−28.7	14.7	41 33.0	−28.3	15.0	42 31.0	−28.0	15.2	43 28.9	−27.7	15.4	44 26.6	−27.3	15.7	76
77	37 11.3	−30.1	13.0	38 09.7	−29.8	13.2	39 08.1	−29.6	13.4	40 06.4	−29.3	13.6	41 04.7	−29.0	13.8	42 03.0	−28.8	14.0	43 01.2	−28.5	14.2	43 59.3	−28.2	14.5	77
78	36 41.2	−30.7	12.0	37 39.9	−30.5	12.1	38 38.5	−30.2	12.3	39 37.1	−29.9	12.4	40 35.7	−29.7	12.6	41 34.2	−29.4	12.8	42 32.7	−29.2	13.0	43 31.1	−28.9	13.2	78
79	36 10.5	−31.2	10.9	37 09.4	−31.0	11.0	38 08.3	−30.8	11.2	39 07.2	−30.6	11.3	40 06.0	−30.4	11.5	41 04.8	−30.2	11.7	42 03.5	−29.9	11.8	43 02.2	−29.7	12.0	79
80	35 39.3	−31.7	9.8	36 38.4	−31.6	10.0	37 37.5	−31.4	10.1	38 36.6	−31.2	10.2	39 35.6	−31.0	10.4	40 34.6	−30.8	10.5	41 33.6	−30.6	10.7	42 32.5	−30.4	10.8	80
81	35 07.6	−32.3	8.8	36 06.8	−32.1	8.9	37 06.1	−32.0	9.0	38 05.4	−31.8	9.1	39 04.6	−31.6	9.3	40 03.8	−31.5	9.4	41 03.0	−31.3	9.5	42 02.1	−31.0	9.7	81
82	34 35.3	−32.8	7.8	35 34.7	−32.6	7.9	36 34.1	−32.5	8.0	37 33.6	−32.4	8.1	38 33.0	−32.3	8.2	39 32.3	−32.0	8.3	40 31.7	−31.9	8.4	41 31.1	−31.8	8.5	82
83	34 02.5	−33.3	6.7	35 02.1	−33.2	6.8	36 01.6	−33.0	6.9	37 01.2	−33.0	7.0	38 00.7	−32.8	7.1	39 00.3	−32.7	7.2	39 59.8	−32.6	7.3	40 59.3	−32.4	7.4	83
84	33 29.2	−33.8	5.7	34 28.9	−33.7	5.8	35 28.6	−33.6	5.9	36 28.2	−33.4	6.0	37 27.9	−33.3	6.0	38 27.6	−33.3	6.1	39 27.2	−33.1	6.2	40 26.9	−33.1	6.3	84
85	32 55.4	−34.2	4.8	33 55.2	−34.1	4.8	34 55.0	−34.1	4.9	35 54.8	−34.0	4.9	36 54.6	−34.0	5.0	37 54.3	−33.8	5.1	38 54.1	−33.7	5.1	39 53.8	−33.6	5.2	85
86	32 21.2	−34.7	3.8	33 21.1	−34.6	3.8	34 20.9	−34.5	3.9	35 20.8	−34.5	3.9	36 20.6	−34.4	4.0	37 20.5	−34.4	4.0	38 20.4	−34.3	4.1	39 20.2	−34.2	4.1	86
87	31 46.5	−35.1	2.8	32 46.5	−35.1	2.8	33 46.4	−35.0	2.9	34 46.3	−35.0	2.9	35 46.2	−34.9	3.0	36 46.1	−34.8	3.0	37 46.1	−34.9	3.0	38 46.0	−34.8	3.1	87
88	31 11.4	−35.5	1.9	32 11.4	−35.5	1.9	33 11.4	−35.5	1.9	34 11.3	−35.4	1.9	35 11.3	−35.4	2.0	36 11.3	−35.4	2.0	37 11.2	−35.3	2.0	38 11.2	−35.3	2.0	88
89	30 35.9	−35.9	0.9	31 35.9	−35.9	0.9	32 35.9	−35.9	0.9	33 35.9	−35.9	1.0	34 35.9	−35.9	1.0	35 35.9	−35.9	1.0	36 35.9	−35.9	1.0	37 35.9	−35.9	1.0	89
90	30 00.0	−36.3	0.0	31 00.0	−36.3	0.0	32 00.0	−36.3	0.0	33 00.0	−36.3	0.0	34 00.0	−36.3	0.0	35 00.0	−36.3	0.0	36 00.0	−36.3	0.0	37 00.0	−36.4	0.0	90
	30°			31°			32°			33°			34°			35°			36°			37°			

53°, 307° L.H.A. LATITUDE SAME NAME AS DECLINATION

LATITUDE CONTRARY NAME TO DECLINATION L.H.A. 53°, 307°

Dec.	30° Hc	d	Z	31° Hc	d	Z	32° Hc	d	Z	33° Hc	d	Z	34° Hc	d	Z	35° Hc	d	Z	36° Hc	d	Z	37° Hc	d	Z	Dec.
°	° ′	′	°	° ′	′	°	° ′	′	°	° ′	′	°	° ′	′	°	° ′	′	°	° ′	′	°	° ′	′	°	°
0	31 24.7	−35.3	110.6	31 03.3	−36.3	111.2	30 41.3	−37.2	111.8	30 18.8	−38.1	112.3	29 55.7	−38.8	112.8	29 32.2	−39.7	113.4	29 08.1	−40.5	113.9	28 43.6	−41.3	114.4	0
1	30 49.4	−35.8	111.6	30 27.0	−36.6	112.1	30 04.1	−37.5	112.7	29 40.7	−38.3	113.2	29 16.9	−39.3	113.7	28 52.5	−40.1	114.2	28 27.6	−40.8	114.7	28 02.3	−41.6	115.2	1
2	30 13.6	−36.2	112.5	29 50.4	−37.1	113.1	29 26.6	−37.9	113.6	29 02.4	−38.8	114.1	28 37.6	−39.5	114.6	28 12.4	−40.3	115.1	27 46.8	−41.2	115.6	27 20.7	−41.9	116.0	2
3	29 37.4	−36.5	113.4	29 13.3	−37.4	114.0	28 48.7	−38.2	114.5	28 23.6	−39.0	115.0	27 58.1	−39.9	115.4	27 32.1	−40.7	115.9	27 05.6	−41.4	116.4	26 38.8	−42.2	116.8	3
4	29 00.9	−36.9	114.4	28 35.9	−37.7	114.9	28 10.5	−38.6	115.3	27 44.6	−39.4	115.8	27 18.2	−40.2	116.3	26 51.4	−40.9	116.7	26 24.2	−41.7	117.2	25 56.6	−42.4	117.6	4
5	28 24.0	−37.2	115.3	27 58.2	−38.1	115.7	27 31.9	−38.9	116.2	27 05.2	−39.7	116.7	26 38.0	−40.4	117.1	26 10.5	−41.2	117.6	25 42.5	−41.9	118.0	25 14.2	−42.7	118.4	5
6	27 46.8	−37.6	116.1	27 20.1	−38.4	116.6	26 53.0	−39.2	117.1	26 25.5	−40.0	117.5	25 57.6	−40.7	117.9	25 29.3	−41.5	118.4	25 00.6	−42.2	118.8	24 31.5	−42.9	119.2	6
7	27 09.2	−37.9	117.0	26 41.7	−38.7	117.5	26 13.8	−39.5	117.9	25 45.5	−40.2	118.3	25 16.9	−41.0	118.8	24 47.8	−41.7	119.2	24 18.4	−42.4	119.6	23 48.6	−43.1	120.0	7
8	26 31.3	−38.3	117.9	26 03.0	−39.0	118.3	25 34.3	−39.7	118.7	25 05.3	−40.5	119.2	24 35.9	−41.3	119.6	24 06.1	−42.0	120.0	23 36.0	−42.7	120.3	23 05.5	−43.4	120.7	8
9	25 53.0	−38.5	118.7	25 24.0	−39.3	119.2	24 54.6	−40.1	119.6	24 24.8	−40.8	120.0	23 54.6	−41.5	120.4	23 24.1	−42.2	120.7	22 53.3	−42.9	121.1	22 22.1	−43.5	121.5	9
10	25 14.5	−38.8	119.6	24 44.7	−39.6	120.0	24 14.5	−40.3	120.4	23 44.0	−41.0	120.8	23 13.1	−41.7	121.1	22 41.9	−42.4	121.5	22 10.4	−43.1	121.9	21 38.6	−43.8	122.2	10
11	24 35.7	−39.1	120.4	24 05.1	−39.8	120.8	23 34.2	−40.5	121.2	23 03.0	−41.3	121.6	22 31.4	−41.9	121.9	21 59.5	−42.6	122.3	21 27.3	−43.3	122.6	20 54.8	−43.9	122.9	11
12	23 56.6	−39.3	121.3	23 25.3	−40.1	121.6	22 53.7	−40.8	122.0	22 21.7	−41.5	122.4	21 49.5	−42.2	122.7	21 16.9	−42.8	123.0	20 44.0	−43.4	123.4	20 10.9	−44.1	123.7	12
13	23 17.3	−39.6	122.1	22 45.2	−40.3	122.5	22 12.9	−41.0	122.8	21 40.2	−41.7	123.1	21 07.3	−42.4	123.5	20 34.1	−43.0	123.8	20 00.6	−43.7	124.1	19 26.8	−44.3	124.4	13
14	22 37.7	−39.9	122.9	22 04.9	−40.5	123.3	21 31.9	−41.3	123.6	20 58.5	−41.9	123.9	20 24.9	−42.5	124.2	19 51.1	−43.2	124.5	19 16.9	−43.8	124.8	18 42.5	−44.4	125.1	14
15	21 57.8	−40.1	123.7	21 24.4	−40.8	124.0	20 50.6	−41.4	124.4	20 16.6	−42.1	124.7	19 42.4	−42.8	125.0	19 07.9	−43.4	125.3	18 33.1	−44.0	125.5	17 58.1	−44.6	125.8	15
16	21 17.7	−40.3	124.5	20 43.6	−41.0	124.8	20 09.2	−41.7	125.1	19 34.5	−42.3	125.4	18 59.6	−42.9	125.7	18 24.5	−43.6	126.0	17 49.1	−44.1	126.3	17 13.5	−44.7	126.5	16
17	20 37.4	−40.5	125.3	20 02.6	−41.2	125.6	19 27.5	−41.8	125.9	18 52.2	−42.4	126.2	18 16.7	−43.1	126.5	17 40.9	−43.7	126.7	17 05.0	−44.3	127.0	16 28.8	−44.9	127.2	17
18	19 56.9	−40.7	126.1	19 21.4	−41.4	126.4	18 45.7	−42.0	126.7	18 09.8	−42.7	126.9	17 33.6	−43.2	127.2	16 57.2	−43.8	127.4	16 20.7	−44.5	127.7	15 43.9	−45.0	127.9	18
19	19 16.2	−41.0	126.9	18 40.0	−41.5	127.2	18 03.7	−42.2	127.4	17 27.1	−42.8	127.7	16 50.4	−43.4	127.9	16 13.4	−44.0	128.1	15 36.2	−44.5	128.4	14 58.9	−45.1	128.6	19
20	18 35.2	−41.1	127.6	17 58.5	−41.8	127.9	17 21.5	−42.4	128.2	16 44.3	−42.9	128.4	16 07.0	−43.6	128.6	15 29.4	−44.1	128.9	14 51.7	−44.7	129.1	14 13.8	−45.2	129.3	20
21	17 54.1	−41.3	128.4	17 16.7	−41.9	128.7	16 39.1	−42.5	128.9	16 01.4	−43.1	129.1	15 23.4	−43.7	129.3	14 45.3	−44.3	129.6	14 07.0	−44.8	129.8	13 28.6	−45.4	129.9	21
22	17 12.8	−41.5	129.2	16 34.8	−42.1	129.4	15 56.6	−42.6	129.6	15 18.3	−43.3	129.9	14 39.7	−43.8	130.1	14 01.0	−44.3	130.3	13 22.2	−44.9	130.4	12 43.2	−45.4	130.6	22
23	16 31.3	−41.6	129.9	15 52.7	−42.2	130.2	15 14.0	−42.8	130.4	14 35.0	−43.4	130.6	13 55.9	−43.9	130.8	13 16.7	−44.5	130.9	12 37.3	−45.0	131.1	11 57.8	−45.6	131.3	23
24	15 49.7	−41.8	130.7	15 10.5	−42.3	130.9	14 31.2	−43.0	131.1	13 51.6	−43.4	131.3	13 12.0	−44.1	131.5	12 32.2	−44.6	131.6	11 52.3	−45.1	131.8	11 12.2	−45.6	131.9	24
25	15 07.9	−41.9	131.4	14 28.2	−42.5	131.6	13 48.2	−43.0	131.8	13 08.2	−43.7	132.0	12 27.9	−44.1	132.2	11 47.6	−44.7	132.3	11 07.2	−45.2	132.5	10 26.6	−45.7	132.6	25
26	14 26.0	−42.1	132.2	13 45.7	−42.7	132.4	13 05.2	−43.2	132.5	12 24.5	−43.7	132.7	11 43.8	−44.3	132.9	11 02.9	−44.7	133.0	10 22.0	−45.3	133.1	9 40.9	−45.8	133.3	26
27	13 43.9	−42.2	132.9	13 03.0	−42.7	133.1	12 22.0	−43.3	133.2	11 40.8	−43.8	133.4	10 59.5	−44.3	133.5	10 18.2	−44.9	133.7	9 36.7	−45.4	133.8	8 55.1	−45.9	133.9	27
28	13 01.7	−42.3	133.6	12 20.3	−42.9	133.8	11 38.7	−43.4	133.9	10 57.0	−43.9	134.1	10 15.2	−44.4	134.2	9 33.3	−44.9	134.4	8 51.3	−45.4	134.5	8 09.2	−45.9	134.6	28
29	12 19.4	−42.4	134.4	11 37.4	−42.9	134.5	10 55.3	−43.5	134.7	10 13.1	−44.0	134.8	9 30.8	−44.5	134.9	8 48.4	−45.0	135.0	8 05.9	−45.5	135.1	7 23.3	−45.9	135.2	29
30	11 37.0	−42.5	135.1	10 54.5	−43.1	135.2	10 11.8	−43.6	135.4	9 29.1	−44.1	135.5	8 46.3	−44.6	135.6	8 03.4	−45.1	135.7	7 20.4	−45.6	135.8	6 37.4	−46.1	135.9	30
31	10 54.5	−42.7	135.8	10 11.4	−43.2	135.9	9 28.2	−43.6	136.1	8 45.0	−44.2	136.2	8 01.7	−44.7	136.3	7 18.3	−45.1	136.4	6 34.8	−45.6	136.4	5 51.3	−46.0	136.5	31
32	10 11.8	−42.7	136.5	9 28.2	−43.2	136.6	8 44.6	−43.8	136.7	8 00.8	−44.2	136.8	7 17.0	−44.7	136.9	6 33.2	−45.2	137.0	5 49.2	−45.6	137.1	5 05.3	−46.1	137.2	32
33	9 29.1	−42.8	137.2	8 45.0	−43.3	137.3	8 00.8	−43.8	137.4	7 16.6	−44.3	137.5	6 32.3	−44.7	137.6	5 48.0	−45.2	137.7	5 03.6	−45.7	137.7	4 19.2	−46.2	137.8	33
34	8 46.3	−42.9	137.9	8 01.7	−43.4	138.0	7 17.0	−43.8	138.1	6 32.3	−44.3	138.2	5 47.6	−44.8	138.3	5 02.8	−45.3	138.3	4 17.9	−45.7	138.4	3 33.0	−46.1	138.4	34
35	8 03.4	−43.0	138.6	7 18.3	−43.5	138.7	6 33.2	−44.0	138.8	5 48.0	−44.4	138.9	5 02.8	−44.9	138.9	4 17.5	−45.3	139.0	3 32.2	−45.7	139.0	2 46.9	−46.2	139.1	35
36	7 20.4	−43.0	139.3	6 34.8	−43.5	139.4	5 49.2	−43.9	139.5	5 03.6	−44.4	139.6	4 17.9	−44.9	139.6	3 32.2	−45.3	139.7	2 46.5	−45.8	139.7	2 00.7	−46.2	139.7	36
37	6 37.4	−43.1	140.1	5 51.3	−43.5	140.1	5 05.3	−44.0	140.2	4 19.2	−44.5	140.2	3 33.0	−44.9	140.3	2 46.9	−45.4	140.3	2 00.7	−45.8	140.3	1 14.5	−46.2	140.4	37
38	5 54.3	−43.2	140.8	5 07.8	−43.6	140.8	4 21.3	−44.1	140.9	3 34.7	−44.5	140.9	2 48.1	−44.9	140.9	2 01.5	−45.3	141.0	1 14.9	−45.8	141.0	0 28.3	−46.2	141.0	38
39	5 11.1	−43.2	141.4	4 24.2	−43.7	141.5	3 37.2	−44.1	141.5	2 50.2	−44.5	141.6	2 03.2	−45.0	141.6	1 16.2	−45.4	141.6	0 29.1	−45.8	141.6	0 17.9	+46.2	38.4	39
40	4 27.9	−43.2	142.1	3 40.5	−43.6	142.2	2 53.1	−44.1	142.2	2 05.7	−44.5	142.3	1 18.2	−44.9	142.3	0 30.8	−45.4	142.3	0 16.7	+45.8	37.7	1 04.1	+46.2	37.7	40
41	3 44.7	−43.3	142.8	2 56.9	−43.7	142.9	2 09.0	−44.1	142.9	1 21.2	−44.6	142.9	0 33.3	−45.0	142.9	0 14.6	+45.4	37.1	1 02.5	+45.8	37.1	1 50.3	+46.2	37.1	41
42	3 01.4	−43.3	143.5	2 13.2	−43.7	143.6	1 24.9	−44.1	143.6	0 36.6	−44.5	143.6	0 11.7	+44.9	36.4	1 00.0	+45.3	36.4	1 48.3	+45.7	36.4	2 36.5	+46.2	36.4	42
43	2 18.1	−43.3	144.2	1 29.5	−43.8	144.2	0 40.8	−44.2	144.3	0 07.9	+44.6	35.7	0 56.6	+45.0	35.7	1 45.3	+45.4	35.8	2 34.0	+45.8	35.8	3 22.7	+46.1	35.8	43
44	1 34.8	−43.3	144.9	0 45.7	−43.7	144.9	0 03.4	+44.1	35.1	0 52.5	+44.5	35.1	1 41.6	+44.9	35.1	2 30.7	+45.3	35.1	3 19.8	+45.7	35.1	4 08.8	+46.1	35.2	44
45	0 51.5	−43.3	145.6	0 02.0	−43.7	145.6	0 47.5	+44.2	34.4	1 37.0	+44.6	34.4	2 26.5	+45.0	34.4	3 16.0	+45.3	34.4	4 05.5	+45.7	34.5	4 54.9	+46.1	34.5	45
46	0 08.2	−43.4	146.3	0 41.7	+43.8	33.7	1 31.7	+44.1	33.7	2 21.6	+44.5	33.7	3 11.5	+44.9	33.8	4 01.3	+45.3	33.8	4 51.2	+45.6	33.8	5 41.0	+46.0	33.9	46
47	0 35.2	+43.3	33.0	1 25.5	+43.7	33.0	2 15.8	+44.1	33.0	3 06.1	+44.5	33.1	3 56.4	+44.8	33.1	4 46.6	+45.3	33.1	5 36.8	+45.7	33.2	6 27.0	+46.0	33.2	47
48	1 18.5	+43.3	32.3	2 09.2	+43.7	32.3	2 59.9	+44.1	32.4	3 50.6	+44.4	32.4	4 41.2	+44.9	32.4	5 31.9	+45.2	32.5	6 22.5	+45.5	32.5	7 13.0	+46.0	32.6	48
49	2 01.8	+43.3	31.6	2 52.9	+43.7	31.6	3 44.0	+44.0	31.7	4 35.0	+44.4	31.7	5 26.1	+44.7	31.8	6 17.1	+45.1	31.8	7 08.0	+45.5	31.9	7 59.0	+45.8	31.9	49
50	2 45.1	+43.3	30.9	3 36.6	+43.6	31.0	4 28.0	+44.0	31.0	5 19.4	+44.4	31.0	6 10.8	+44.8	31.1	7 02.2	+45.1	31.1	7 53.5	+45.5	31.2	8 44.8	+45.8	31.3	50
51	3 28.4	+43.2	30.2	4 20.2	+43.6	30.3	5 12.0	+44.0	30.3	6 03.8	+44.3	30.4	6 55.6	+44.6	30.4	7 47.3	+45.0	30.5	8 39.0	+45.4	30.6	9 30.6	+45.8	30.6	51
52	4 11.6	+43.2	29.5	5 03.8	+43.6	29.6	5 56.0	+43.9	29.6	6 48.1	+44.3	29.7	7 40.2	+44.7	29.7	8 32.3	+45.0	29.8	9 24.4	+45.3	29.9	10 16.4	+45.6	30.0	52
53	4 54.8	+43.2	28.8	5 47.4	+43.5	28.9	6 39.9	+43.9	28.9	7 32.4	+44.2	29.0	8 24.9	+44.5	29.1	9 17.3	+44.9	29.1	10 09.7	+45.2	29.2	11 02.0	+45.6	29.3	53
54	5 38.0	+43.1	28.1	6 30.9	+43.5	28.2	7 23.8	+43.8	28.3	8 16.6	+44.1	28.3	9 09.4	+44.5	28.4	10 02.2	+44.8	28.5	10 54.9	+45.1	28.6	11 47.6	+45.4	28.7	54
55	6 21.1	+43.1	27.4	7 14.4	+43.3	27.5	8 07.6	+43.7	27.6	9 00.7	+44.1	27.6	9 53.9	+44.4	27.7	10 47.0	+44.7	27.8	11 40.0	+45.1	27.9	12 33.0	+45.4	28.0	55
56	7 04.2	+43.0	26.7	7 57.7	+43.4	26.8	8 51.3	+43.6	26.9	9 44.8	+44.0	26.9	10 38.3	+44.2	27.0	11 31.7	+44.6	27.1	12 25.1	+44.9	27.2	13 18.4	+45.3	27.3	56
57	7 47.2	+42.9	26.0	8 41.1	+43.2	26.1	9 34.9	+43.6	26.2	10 28.8	+43.8	26.3	11 22.5	+44.2	26.3	12 16.3	+44.5	26.4	13 10.0	+44.8	26.5	14 03.7	+45.1	26.6	57
58	8 30.1	+42.8	25.3	9 24.3	+43.2	25.4	10 18.5	+43.5	25.5	11 12.6	+43.8	25.6	12 06.7	+44.1	25.6	13 00.8	+44.4	25.7	13 54.8	+44.8	25.8	14 48.8	+45.0	26.0	58
59	9 12.9	+42.8	24.6	10 07.5	+43.0	24.7	11 02.0	+43.3	24.8	11 56.4	+43.7	24.9	12 50.8	+44.0	25.0	13 45.2	+44.3	25.1	14 39.6	+44.5	25.2	15 33.8	+44.9	25.3	59
60	9 55.7	+42.7	23.9	10 50.5	+43.0	24.0	11 45.3	+43.3	24.1	12 40.1	+43.6	24.2	13 34.8	+43.9	24.3	14 29.5	+44.2	24.4	15 24.1	+44.5	24.5	16 18.7	+44.8	24.6	60
61	10 38.4	+42.6	23.2	11 33.5	+42.9	23.3	12 28.6	+43.2	23.4	13 23.7	+43.4	23.5	14 18.7	+43.7	23.6	15 13.7	+44.0	23.7	16 08.6	+44.3	23.8	17 03.5	+44.6	23.9	61
62	11 21.0	+42.4	22.5	12 16.4	+42.7	22.6	13 11.8	+43.0	22.7	14 07.1	+43.4	22.7	15 02.4	+43.7	22.8	15 57.7	+43.9	23.0	16 52.9	+44.2	23.1	17 48.1	+44.5	23.2	62
63	12 03.4	+42.4	21.8	12 59.1	+42.7	21.8	13 54.8	+42.9	21.9	14 50.5	+43.2	22.0	15 46.1	+43.4	22.1	16 41.6	+43.8	22.2	17 37.1	+44.1	22.4	18 32.6	+44.3	22.5	63
64	12 45.8	+42.2	21.0	13 41.8	+42.5	21.1	14 37.7	+42.8	21.2	15 33.7	+43.0	21.3	16 29.5	+43.4	21.4	17 25.4	+43.6	21.5	18 21.2	+43.8	21.6	19 16.9	+44.1	21.8	64
65	13 28.0	+42.2	20.3	14 24.3	+42.4	20.4	15 20.5	+42.7	20.5	16 16.7	+42.9	20.6	17 12.9	+43.1	20.7	18 09.0	+43.4	20.8	19 05.0	+43.7	20.9	20 01.0	+44.0	21.1	65
66	14 10.2	+41.9	19.6	15 06.7	+42.2	19.7	16 03.2	+42.4	19.8	16 59.6	+42.8	19.9	17 56.0	+43.0	20.0	18 52.4	+43.3	20.1	19 48.7	+43.6	20.2	20 45.0	+43.8	20.3	66
67	14 52.1	+41.9	18.8	15 48.9	+42.1	18.9	16 45.6	+42.4	19.0	17 42.4	+42.5	19.1	18 39.0	+42.9	19.2	19 35.7	+43.0	19.3	20 32.3	+43.3	19.5	21 28.8	+43.6	19.6	67
68	15 34.0	+41.7	18.1	16 31.0	+41.9	18.2	17 28.0	+42.1	18.3	18 24.9	+42.4	18.4	19 21.9	+42.6	18.5	20 18.7	+42.9	18.6	21 15.6	+43.1	18.7	22 12.4	+43.4	18.9	68
69	16 15.7	+41.5	17.3	17 12.9	+41.8	17.4	18 10.1	+42.0	17.5	19 07.3	+42.3	17.6	20 04.5	+42.5	17.7	21 01.6	+42.7	17.9	21 58.7	+43.0	18.0	22 55.8	+43.2	18.1	69
70	16 57.2	+41.4	16.6	17 54.7	+41.6	16.7	18 52.1	+41.8	16.8	19 49.6	+42.0	16.9	20 47.0	+42.2	17.0	21 44.3	+42.5	17.1	22 41.7	+42.7	17.2	23 39.0	+42.9	17.3	70
71	17 38.6	+41.1	15.8	18 36.3	+41.4	15.9	19 33.9	+41.7	16.0	20 31.6	+41.8	16.1	21 29.2	+42.1	16.2	22 26.8	+42.3	16.3	23 24.4	+42.5	16.5	24 21.9	+42.7	16.6	71
72	18 19.7	+41.0	15.1	19 17.7	+41.2	15.2	20 15.6	+41.4	15.3	21 13.4	+41.7	15.4	22 11.3	+41.8	15.5	23 09.1	+42.0	15.6	24 06.9	+42.2	15.7	25 04.6	+42.5	15.8	72
73	19 00.7	+40.9	14.3	19 58.9	+41.0	14.4	20 57.0	+41.2	14.5	21 55.1	+41.4	14.6	22 53.1	+41.6	14.7	23 51.1	+41.8	14.8	24 49.1	+42.1	14.9	25 47.1	+42.2	15.0	73
74	19 41.6	+40.6	13.5	20 39.9	+40.8	13.6	21 38.2	+41.0	13.7	22 36.5	+41.1	13.8	23 34.7	+41.4	13.9	24 32.9	+41.6	14.0	25 31.2	+41.7	14.1	26 29.3	+42.0	14.2	74
75	20 22.2	+40.4	12.7	21 20.7	+40.5	12.8	22 19.2	+40.7	12.9	23 17.6	+41.0	13.0	24 16.1	+41.1	13.1	25 14.5	+41.3	13.2	26 12.9	+41.5	13.3	27 11.3	+41.7	13.4	75
76	21 02.6	+40.1	11.9	22 01.2	+40.4	12.0	22 59.9	+40.5	12.1	23 58.6	+40.7	12.2	24 57.2	+40.9	12.3	25 55.8	+41.0	12.4	26 54.4	+41.2	12.5	27 53.0	+41.4	12.6	76
77	21 42.7	+40.0	11.1	22 41.6	+40.1	11.2	23 40.4	+40.3	11.3	24 39.3	+40.4	11.4	25 38.1	+40.5	11.5	26 36.8	+40.8	11.6	27 35.6	+40.9	11.7	28 34.4	+41.0	11.8	77
78	22 22.7	+39.7	10.3	23 21.7	+39.8	10.4	24 20.7	+40.0	10.5	25 19.7	+40.1	10.6	26 18.6	+40.4	10.7	27 17.6	+40.5	10.8	28 16.5	+40.7	10.9	29 15.4	+40.8	11.0	78
79	23 02.4	+39.4	9.5	24 01.5	+39.6	9.6	25 00.7	+39.7	9.7	25 59.8	+39.9	9.8	26 59.0	+40.0	9.8	27 58.1	+40.1	9.9	28 57.2	+40.3	10.0	29 56.2	+40.5	10.1	79
80	23 41.8	+39.2	8.7	24 41.1	+39.3	8.8	25 40.4	+39.5	8.9	26 39.7	+39.6	8.9	27 39.0	+39.7	9.0	28 38.2	+39.9	9.1	29 37.5	+39.9	9.2	30 36.7	+40.1	9.3	80
81	24 21.0	+38.9	7.9	25 20.4	+39.1	7.9	26 19.9	+39.1	8.0	27 19.3	+39.2	8.1	28 18.7	+39.4	8.2	29 18.1	+39.5	8.2	30 17.4	+39.7	8.3	31 16.8	+39.7	8.4	81
82	24 59.9	+38.7	7.0	25 59.5	+38.7	7.1	26 59.0	+38.8	7.2	27 58.5	+39.0	7.2	28 58.1	+39.0	7.3	29 57.6	+39.1	7.4	30 57.1	+39.2	7.4	31 56.5	+39.4	7.5	82
83	25 38.6	+38.3	6.2	26 38.2	+38.4	6.3	27 37.8	+38.6	6.3	28 37.5	+38.6	6.4	29 37.1	+38.7	6.4	30 36.7	+38.8	6.5	31 36.3	+38.9	6.6	32 35.9	+39.0	6.6	83
84	26 16.9	+38.0	5.3	27 16.6	+38.1	5.4	28 16.4	+38.1	5.4	29 16.1	+38.3	5.5	30 15.8	+38.4	5.5	31 15.5	+38.5	5.6	32 15.2	+38.6	5.7	33 14.9	+38.6	5.7	84
85	26 54.9	+37.7	4.5	27 54.7	+37.8	4.5	28 54.5	+37.9	4.6	29 54.4	+37.9	4.6	30 54.2	+37.9	4.7	31 54.0	+38.0	4.7	32 53.8	+38.1	4.8	33 53.5	+38.2	4.8	85
86	27 32.6	+37.4	3.6	28 32.5	+37.4	3.6	29 32.4	+37.5	3.7	30 32.3	+37.5	3.7	31 32.1	+37.6	3.7	32 32.0	+37.6	3.8	33 31.9	+37.7	3.8	34 31.7	+37.8	3.9	86
87	28 10.0	+37.0	2.7	29 09.9	+37.1	2.7	30 09.9	+37.1	2.8	31 09.8	+37.1	2.8	32 09.7	+37.2	2.8	33 09.6	+37.3	2.9	34 09.6	+37.2	2.9	35 09.5	+37.3	2.9	87
88	28 47.0	+36.7	1.8	29 47.0	+36.7	1.8	30 47.0	+36.7	1.9	31 46.9	+36.8	1.9	32 46.9	+36.8	1.9	33 46.9	+36.8	1.9	34 46.8	+36.9	1.9	35 46.8	+36.8	2.0	88
89	29 23.7	+36.3	0.9	30 23.7	+36.3	0.9	31 23.7	+36.3	0.9	32 23.7	+36.3	0.9	33 23.7	+36.3	1.0	34 23.7	+36.3	1.0	35 23.7	+36.3	1.0	36 23.6	+36.4	1.0	89
90	30 00.0	+35.9	0.0	31 00.0	+35.9	0.0	32 00.0	+35.9	0.0	33 00.0	+35.9	0.0	34 00.0	+35.9	0.0	35 00.0	+35.9	0.0	36 00.0	+35.9	0.0	37 00.0	+35.9	0.0	90
	30°			31°			32°			33°			34°			35°			36°			37°			

S. Lat. { L.H.A. greater than 180° ....Zn=180°–Z
L.H.A. less than 180°.....Zn=180°+Z

LATITUDE SAME NAME AS DECLINATION L.H.A. 127°, 233°

LATITUDE CONTRARY NAME TO DECLINATION L.H.A. 79°, 281°

Dec.	30° Hc	d	Z	31° Hc	d	Z	32° Hc	d	Z	33° Hc	d	Z	34° Hc	d	Z	35° Hc	d	Z	36° Hc	d	Z	37° Hc	d	Z	Dec.
°	° ′	′	°	° ′	′	°	° ′	′	°	° ′	′	°	° ′	′	°	° ′	′	°	° ′	′	°	° ′	′	°	°
0	9 30.7	−30.5	95.6	9 24.8	−31.4	95.7	9 18.7	−32.2	95.9	9 12.5	−33.2	96.0	9 06.1	−34.0	96.2	8 59.5	−34.9	96.4	8 52.8	−35.7	96.5	8 45.9	−36.6	96.7	0
1	9 00.2	−30.6	96.4	8 53.4	−31.5	96.6	8 46.5	−32.4	96.7	8 39.3	−33.2	96.9	8 32.1	−34.2	97.0	8 24.6	−35.0	97.2	8 17.1	−35.9	97.3	8 09.3	−36.6	97.5	1
2	8 29.6	−30.7	97.3	8 21.9	−31.6	97.4	8 14.1	−32.5	97.6	8 06.1	−33.4	97.7	7 57.9	−34.2	97.9	7 49.6	−35.1	98.0	7 41.2	−35.9	98.1	7 32.7	−36.8	98.3	2
3	7 58.9	−30.8	98.2	7 50.3	−31.7	98.3	7 41.6	−32.6	98.4	7 32.7	−33.5	98.6	7 23.7	−34.3	98.7	7 14.5	−35.1	98.8	7 05.3	−36.0	98.9	6 55.9	−36.9	99.1	3
4	7 28.1	−31.0	99.0	7 18.6	−31.8	99.2	7 09.0	−32.7	99.3	6 59.2	−33.5	99.4	6 49.4	−34.5	99.5	6 39.4	−35.3	99.6	6 29.3	−36.1	99.8	6 19.0	−36.9	99.9	4
5	6 57.1	−31.0	99.9	6 46.8	−32.0	100.0	6 36.3	−32.8	100.1	6 25.7	−33.7	100.2	6 14.9	−34.5	100.3	6 04.1	−35.3	100.5	5 53.2	−36.2	100.6	5 42.1	−37.0	100.7	5
6	6 26.1	−31.1	100.8	6 14.8	−31.9	100.9	6 03.5	−32.9	101.0	5 52.0	−33.7	101.1	5 40.4	−34.5	101.2	5 28.8	−35.4	101.3	5 17.0	−36.2	101.4	5 05.1	−37.0	101.4	6
7	5 55.0	−31.2	101.6	5 42.9	−32.1	101.7	5 30.6	−32.9	101.8	5 18.3	−33.8	101.9	5 05.9	−34.6	102.0	4 53.4	−35.5	102.1	4 40.8	−36.3	102.2	4 28.1	−37.1	102.2	7
8	5 23.8	−31.3	102.5	5 10.8	−32.1	102.6	4 57.7	−33.0	102.6	4 44.5	−33.8	102.7	4 31.3	−34.7	102.8	4 17.9	−35.5	102.9	4 04.5	−36.3	103.0	3 51.0	−37.1	103.0	8
9	4 52.5	−31.3	103.3	4 38.7	−32.2	103.4	4 24.7	−33.0	103.5	4 10.7	−33.9	103.6	3 56.6	−34.8	103.6	3 42.4	−35.5	103.7	3 28.2	−36.4	103.8	3 13.9	−37.2	103.8	9
10	4 21.2	−31.4	104.2	4 06.5	−32.3	104.3	3 51.7	−33.1	104.3	3 36.8	−34.0	104.4	3 21.8	−34.7	104.4	3 06.9	−35.6	104.5	2 51.8	−36.4	104.6	2 36.7	−37.2	104.6	10
11	3 49.8	−31.4	105.0	3 34.2	−32.3	105.1	3 18.6	−33.2	105.2	3 02.8	−33.9	105.2	2 47.1	−34.8	105.3	2 31.3	−35.7	105.3	2 15.4	−36.4	105.3	1 59.5	−37.2	105.4	11
12	3 18.4	−31.5	105.9	3 01.9	−32.3	105.9	2 45.4	−33.1	106.0	2 28.9	−34.0	106.0	2 12.3	−34.9	106.1	1 55.6	−35.6	106.1	1 39.0	−36.5	106.1	1 22.3	−37.3	106.2	12
13	2 46.9	−31.5	106.7	2 29.6	−32.4	106.8	2 12.3	−33.2	106.8	1 54.9	−34.1	106.9	1 37.4	−34.8	106.9	1 20.0	−35.7	106.9	1 02.5	−36.4	106.9	0 45.0	−37.2	107.0	13
14	2 15.4	−31.5	107.6	1 57.2	−32.3	107.6	1 39.1	−33.3	107.7	1 20.8	−34.0	107.7	1 02.6	−34.9	107.7	0 44.3	−35.6	107.7	0 26.1	−36.5	107.7	0 07.8	−37.3	107.7	14
15	1 43.9	−31.6	108.4	1 24.9	−32.5	108.5	1 05.8	−33.2	108.5	0 46.8	−34.1	108.5	0 27.7	−34.8	108.5	0 08.7	−35.7	108.5	0 10.4	+36.5	71.5	0 29.5	+37.2	71.5	15
16	1 12.3	−31.6	109.3	0 52.4	−32.4	109.3	0 32.6	−33.2	109.3	0 12.7	−34.0	109.3	0 07.1	+34.9	70.7	0 27.0	+35.7	70.7	0 46.9	+36.4	70.7	1 06.7	+37.2	70.7	16
17	0 40.7	−31.6	110.1	0 20.0	−32.4	110.2	0 00.6	+33.3	69.8	0 21.3	+34.1	69.8	0 42.0	+34.9	69.9	1 02.7	+35.6	69.9	1 23.3	+36.4	69.9	1 43.9	+37.2	69.9	17
18	0 09.1	−31.6	111.0	0 12.4	+32.4	69.0	0 33.9	+33.2	69.0	0 55.4	+34.0	69.0	1 16.9	+34.8	69.0	1 38.3	+35.6	69.1	1 59.7	+36.5	69.1	2 21.1	+37.2	69.1	18
19	0 22.5	+31.6	68.2	0 44.8	+32.4	68.2	1 07.1	+33.3	68.2	1 29.4	+34.0	68.2	1 51.7	+34.8	68.2	2 13.9	+35.6	68.3	2 36.2	+36.3	68.3	2 58.3	+37.2	68.3	19
20	0 54.1	+31.6	67.3	1 17.2	+32.4	67.3	1 40.4	+33.2	67.3	2 03.4	+34.0	67.4	2 26.5	+34.8	67.4	2 49.5	+35.6	67.5	3 12.5	+36.4	67.5	3 35.5	+37.1	67.6	20
21	1 25.7	+31.5	66.5	1 49.6	+32.4	66.5	2 13.6	+33.1	66.5	2 37.4	+34.0	66.5	3 01.3	+34.8	66.6	3 25.1	+35.6	66.6	3 48.9	+36.3	66.7	4 12.6	+37.0	66.8	21
22	1 57.2	+31.6	65.6	2 22.0	+32.3	65.6	2 46.7	+33.2	65.7	3 11.4	+33.9	65.7	3 36.1	+34.7	65.8	4 00.7	+35.4	65.8	4 25.2	+36.2	65.9	4 49.6	+37.0	66.0	22
23	2 28.8	+31.5	64.7	2 54.3	+32.3	64.8	3 19.9	+33.1	64.8	3 45.3	+33.9	64.9	4 10.8	+34.6	65.0	4 36.1	+35.5	65.0	5 01.4	+36.2	65.1	5 26.6	+37.0	65.2	23
24	3 00.3	+31.4	63.9	3 26.6	+32.3	63.9	3 53.0	+33.0	64.0	4 19.2	+33.9	64.1	4 45.4	+34.6	64.1	5 11.6	+35.3	64.2	5 37.6	+36.1	64.3	6 03.6	+36.9	64.4	24
25	3 31.7	+31.4	63.0	3 58.9	+32.2	63.1	4 26.0	+33.0	63.2	4 53.1	+33.7	63.2	5 20.0	+34.6	63.3	5 46.9	+35.3	63.4	6 13.7	+36.1	63.5	6 40.5	+36.8	63.6	25
26	4 03.1	+31.4	62.2	4 31.1	+32.1	62.3	4 59.0	+32.9	62.3	5 26.8	+33.7	62.4	5 54.6	+34.4	62.5	6 22.2	+35.2	62.6	6 49.8	+36.0	62.7	7 17.3	+36.7	62.8	26
27	4 34.5	+31.3	61.3	5 03.2	+32.1	61.4	5 31.9	+32.9	61.5	6 00.5	+33.6	61.6	6 29.0	+34.4	61.7	6 57.4	+35.2	61.8	7 25.8	+35.9	61.9	7 54.0	+36.6	62.0	27
28	5 05.8	+31.2	60.5	5 35.3	+32.0	60.6	6 04.8	+32.7	60.6	6 34.1	+33.6	60.7	7 03.4	+34.3	60.8	7 32.6	+35.0	61.0	8 01.7	+35.7	61.1	8 30.6	+36.5	61.2	28
29	5 37.0	+31.2	59.6	6 07.3	+31.9	59.7	6 37.5	+32.7	59.8	7 07.7	+33.4	59.9	7 37.7	+34.2	60.0	8 07.6	+35.0	60.1	8 37.4	+35.7	60.3	9 07.1	+36.5	60.4	29
30	6 08.2	+31.0	58.8	6 39.2	+31.9	58.9	7 10.2	+32.6	59.0	7 41.1	+33.4	59.1	8 11.9	+34.1	59.2	8 42.6	+34.8	59.3	9 13.1	+35.6	59.5	9 43.6	+36.3	59.6	30
31	6 39.2	+31.0	57.9	7 11.1	+31.7	58.0	7 42.8	+32.5	58.1	8 14.5	+33.2	58.2	8 46.0	+34.0	58.4	9 17.4	+34.7	58.5	9 48.7	+35.5	58.6	10 19.9	+36.2	58.8	31
32	7 10.2	+30.9	57.0	7 42.8	+31.7	57.1	8 15.3	+32.4	57.3	8 47.7	+33.2	57.4	9 20.0	+33.9	57.5	9 52.1	+34.7	57.7	10 24.2	+35.3	57.8	10 56.1	+36.0	58.0	32
33	7 41.1	+30.8	56.2	8 14.5	+31.5	56.3	8 47.7	+32.3	56.4	9 20.9	+33.0	56.5	9 53.9	+33.7	56.7	10 26.8	+34.4	56.8	10 59.5	+35.2	57.0	11 32.1	+35.9	57.2	33
34	8 11.9	+30.7	55.3	8 46.0	+31.4	55.4	9 20.0	+32.1	55.6	9 53.9	+32.9	55.7	10 27.6	+33.6	55.8	11 01.2	+34.4	56.0	11 34.7	+35.1	56.2	12 08.0	+35.8	56.3	34
35	8 42.6	+30.5	54.4	9 17.4	+31.3	54.6	9 52.1	+32.1	54.7	10 26.8	+32.7	54.9	11 01.2	+33.5	55.0	11 35.6	+34.2	55.2	12 09.8	+34.9	55.3	12 43.8	+35.6	55.5	35
36	9 13.1	+30.5	53.6	9 48.7	+31.2	53.7	10 24.2	+31.9	53.8	10 59.5	+32.6	54.0	11 34.7	+33.3	54.2	12 09.8	+34.0	54.3	12 44.7	+34.7	54.5	13 19.4	+35.5	54.7	36
37	9 43.6	+30.3	52.7	10 19.9	+31.0	52.8	10 56.1	+31.7	53.0	11 32.1	+32.5	53.1	12 08.0	+33.2	53.3	12 43.8	+33.9	53.5	13 19.4	+34.6	53.7	13 54.9	+35.3	53.9	37
38	10 13.9	+30.1	51.8	10 50.9	+30.9	52.0	11 27.8	+31.6	52.1	12 04.6	+32.3	52.3	12 41.2	+33.0	52.5	13 17.7	+33.7	52.6	13 54.0	+34.4	52.8	14 30.2	+35.1	53.0	38
39	10 44.0	+30.0	50.9	11 21.8	+30.7	51.1	11 59.4	+31.4	51.2	12 36.9	+32.1	51.4	13 14.2	+32.8	51.6	13 51.4	+33.5	51.8	14 28.4	+34.3	52.0	15 05.3	+34.9	52.2	39
40	11 14.0	+29.9	50.1	11 52.5	+30.5	50.2	12 30.8	+31.3	50.4	13 09.0	+32.0	50.6	13 47.0	+32.7	50.7	14 24.9	+33.4	50.9	15 02.7	+34.0	51.1	15 40.2	+34.8	51.4	40
41	11 43.9	+29.6	49.2	12 23.0	+30.4	49.3	13 02.1	+31.0	49.5	13 41.0	+31.7	49.7	14 19.7	+32.5	49.9	14 58.3	+33.1	50.1	15 36.7	+33.9	50.3	16 15.0	+34.5	50.5	41
42	12 13.5	+29.6	48.3	12 53.4	+30.2	48.4	13 33.1	+30.9	48.6	14 12.7	+31.6	48.8	14 52.2	+32.2	49.0	15 31.4	+33.0	49.2	16 10.6	+33.6	49.4	16 49.5	+34.3	49.7	42
43	12 43.1	+29.3	47.4	13 23.6	+30.0	47.6	14 04.0	+30.7	47.7	14 44.3	+31.4	47.9	15 24.4	+32.1	48.1	16 04.4	+32.7	48.3	16 44.2	+33.4	48.6	17 23.8	+34.1	48.8	43
44	13 12.4	+29.1	46.5	13 53.6	+29.9	46.7	14 34.7	+30.5	46.9	15 15.7	+31.2	47.0	15 56.5	+31.8	47.3	16 37.1	+32.6	47.5	17 17.6	+33.2	47.7	17 57.9	+33.9	47.9	44
45	13 41.5	+29.0	45.6	14 23.5	+29.6	45.8	15 05.2	+30.3	46.0	15 46.9	+30.9	46.2	16 28.3	+31.7	46.4	17 09.7	+32.3	46.6	17 50.8	+33.0	46.8	18 31.8	+33.6	47.1	45
46	14 10.5	+28.7	44.7	14 53.1	+29.4	44.9	15 35.5	+30.1	45.1	16 17.8	+30.8	45.3	17 00.0	+31.4	45.5	17 42.0	+32.0	45.7	18 23.8	+32.7	45.9	19 05.4	+33.4	46.2	46
47	14 39.2	+28.6	43.8	15 22.5	+29.2	44.0	16 05.6	+29.8	44.2	16 48.6	+30.5	44.4	17 31.4	+31.1	44.6	18 14.0	+31.8	44.8	18 56.5	+32.4	45.1	19 38.8	+33.1	45.3	47
48	15 07.8	+28.3	42.9	15 51.7	+28.9	43.1	16 35.4	+29.6	43.3	17 19.1	+30.2	43.5	18 02.5	+30.9	43.7	18 45.8	+31.6	43.9	19 28.9	+32.2	44.2	20 11.9	+32.8	44.4	48
49	15 36.1	+28.1	42.0	16 20.6	+28.8	42.2	17 05.0	+29.4	42.4	17 49.3	+30.0	42.6	18 33.4	+30.7	42.8	19 17.4	+31.3	43.0	20 01.1	+32.0	43.3	20 44.7	+32.6	43.5	49
50	16 04.2	+27.8	41.0	16 49.4	+28.4	41.2	17 34.4	+29.1	41.4	18 19.3	+29.8	41.7	19 04.1	+30.3	41.9	19 48.7	+31.0	42.1	20 33.1	+31.6	42.4	21 17.3	+32.3	42.6	50
51	16 32.0	+27.6	40.1	17 17.8	+28.3	40.3	18 03.5	+28.9	40.5	18 49.1	+29.4	40.7	19 34.4	+30.1	41.0	20 19.7	+30.7	41.2	21 04.7	+31.4	41.5	21 49.6	+32.0	41.7	51
52	16 59.6	+27.4	39.2	17 46.1	+27.9	39.4	18 32.4	+28.6	39.6	19 18.5	+29.2	39.8	20 04.5	+29.8	40.0	20 50.4	+30.4	40.3	21 36.1	+31.0	40.5	22 21.6	+31.6	40.8	52
53	17 27.0	+27.1	38.3	18 14.0	+27.7	38.5	19 01.0	+28.2	38.7	19 47.7	+28.9	38.9	20 34.3	+29.6	39.1	21 20.8	+30.1	39.4	22 07.1	+30.8	39.6	22 53.2	+31.4	39.9	53
54	17 54.1	+26.8	37.3	18 41.7	+27.4	37.5	19 29.2	+28.1	37.7	20 16.6	+28.6	38.0	21 03.9	+29.2	38.2	21 50.9	+29.8	38.4	22 37.9	+30.4	38.7	23 24.6	+31.0	39.0	54
55	18 20.9	+26.6	36.4	19 09.1	+27.2	36.6	19 57.3	+27.7	36.8	20 45.2	+28.3	37.0	21 33.1	+28.9	37.3	22 20.7	+29.5	37.5	23 08.3	+30.0	37.8	23 55.6	+30.7	38.0	55
56	18 47.5	+26.2	35.4	19 36.3	+26.8	35.6	20 25.0	+27.4	35.9	21 13.5	+28.0	36.1	22 02.0	+28.5	36.3	22 50.2	+29.2	36.6	23 38.3	+29.8	36.8	24 26.3	+30.3	37.1	56
57	19 13.7	+26.0	34.5	20 03.1	+26.5	34.7	20 52.4	+27.1	34.9	21 41.5	+27.7	35.1	22 30.5	+28.2	35.4	23 19.4	+28.8	35.6	24 08.1	+29.4	35.9	24 56.6	+30.0	36.1	57
58	19 39.7	+25.6	33.5	20 29.6	+26.2	33.7	21 19.5	+26.7	33.9	22 09.2	+27.3	34.2	22 58.7	+27.9	34.4	23 48.2	+28.4	34.6	24 37.5	+29.0	34.9	25 26.6	+29.6	35.2	58
59	20 05.3	+25.4	32.6	20 55.8	+25.9	32.8	21 46.2	+26.5	33.0	22 36.5	+27.0	33.2	23 26.6	+27.5	33.4	24 16.6	+28.1	33.7	25 06.5	+28.6	33.9	25 56.2	+29.2	34.2	59
60	20 30.7	+25.0	31.6	21 21.7	+25.6	31.8	22 12.7	+26.0	32.0	23 03.5	+26.6	32.2	23 54.1	+27.2	32.5	24 44.7	+27.7	32.7	25 35.1	+28.3	33.0	26 25.4	+28.8	33.2	60
61	20 55.7	+24.7	30.6	21 47.3	+25.2	30.8	22 38.7	+25.8	31.0	23 30.1	+26.2	31.3	24 21.3	+26.8	31.5	25 12.4	+27.3	31.7	26 03.4	+27.8	32.0	26 54.2	+28.4	32.3	61
62	21 20.4	+24.3	29.7	22 12.5	+24.8	29.9	23 04.5	+25.3	30.1	23 56.3	+25.9	30.3	24 48.1	+26.4	30.5	25 39.7	+26.9	30.7	26 31.2	+27.4	31.0	27 22.6	+27.9	31.3	62
63	21 44.7	+24.0	28.7	22 37.3	+24.5	28.9	23 29.8	+25.0	29.1	24 22.2	+25.5	29.3	25 14.5	+26.0	29.5	26 06.6	+26.5	29.8	26 58.6	+27.1	30.0	27 50.5	+27.6	30.3	63
64	22 08.7	+23.7	27.7	23 01.8	+24.1	27.9	23 54.8	+24.6	28.1	24 47.7	+25.1	28.3	25 40.5	+25.5	28.5	26 33.1	+26.1	28.8	27 25.7	+26.5	29.0	28 18.1	+27.1	29.3	64
65	22 32.4	+23.2	26.7	23 25.9	+23.8	26.9	24 19.4	+24.2	27.1	25 12.8	+24.6	27.3	26 06.0	+25.2	27.5	26 59.2	+25.6	27.7	27 52.2	+26.2	28.0	28 45.2	+26.6	28.2	65
66	22 55.6	+22.9	25.7	23 49.7	+23.3	25.9	24 43.6	+23.8	26.1	25 37.4	+24.3	26.3	26 31.2	+24.7	26.5	27 24.8	+25.2	26.7	28 18.4	+25.6	27.0	29 11.8	+26.1	27.2	66
67	23 18.5	+22.5	24.7	24 13.0	+22.9	24.9	25 07.4	+23.4	25.1	26 01.7	+23.8	25.3	26 55.9	+24.3	25.5	27 50.0	+24.8	25.7	28 44.0	+25.2	25.9	29 37.9	+25.7	26.2	67
68	23 41.0	+22.1	23.7	24 35.9	+22.6	23.9	25 30.8	+22.9	24.0	26 25.5	+23.4	24.2	27 20.2	+23.8	24.5	28 14.8	+24.2	24.7	29 09.2	+24.8	24.9	30 03.6	+25.2	25.1	68
69	24 03.1	+21.7	22.7	24 58.5	+22.1	22.8	25 53.7	+22.6	23.0	26 48.9	+23.0	23.2	27 44.0	+23.4	23.4	28 39.0	+23.8	23.6	29 34.0	+24.2	23.9	30 28.8	+24.6	24.1	69
70	24 24.8	+21.3	21.6	25 20.6	+21.7	21.8	26 16.3	+22.0	22.0	27 11.9	+22.4	22.2	28 07.4	+22.9	22.4	29 02.8	+23.3	22.6	29 58.2	+23.7	22.8	30 53.4	+24.2	23.0	70
71	24 46.1	+20.9	20.6	25 42.3	+21.2	20.8	26 38.3	+21.7	20.9	27 34.3	+22.0	21.1	28 30.3	+22.4	21.3	29 26.1	+22.8	21.5	30 21.9	+23.2	21.7	31 17.6	+23.6	22.0	71
72	25 07.0	+20.4	19.6	26 03.5	+20.8	19.7	27 00.0	+21.1	19.9	27 56.3	+21.6	20.1	28 52.7	+21.9	20.3	29 48.9	+22.3	20.5	30 45.1	+22.6	20.7	31 41.2	+23.0	20.9	72
73	25 27.4	+20.0	18.5	26 24.3	+20.3	18.7	27 21.1	+20.7	18.9	28 17.9	+21.0	19.0	29 14.6	+21.3	19.2	30 11.2	+21.7	19.4	31 07.7	+22.2	19.6	32 04.2	+22.5	19.8	73
74	25 47.4	+19.6	17.5	26 44.6	+19.9	17.6	27 41.8	+20.2	17.8	28 38.9	+20.5	18.0	29 35.9	+20.9	18.1	30 32.9	+21.2	18.3	31 29.9	+21.5	18.5	32 26.7	+22.0	18.7	74
75	26 07.0	+19.1	16.4	27 04.5	+19.4	16.6	28 02.0	+19.7	16.7	28 59.4	+20.0	16.9	29 56.8	+20.3	17.1	30 54.1	+20.7	17.2	31 51.4	+21.0	17.4	32 48.7	+21.3	17.6	75
76	26 26.1	+18.6	15.4	27 23.9	+18.9	15.5	28 21.7	+19.2	15.7	29 19.4	+19.5	15.8	30 17.1	+19.8	16.0	31 14.8	+20.1	16.1	32 12.4	+20.4	16.3	33 10.0	+20.7	16.5	76
77	26 44.7	+18.1	14.3	27 42.8	+18.4	14.4	28 40.9	+18.7	14.6	29 38.9	+19.0	14.7	30 36.9	+19.3	14.9	31 34.9	+19.5	15.0	32 32.8	+19.9	15.2	33 30.7	+20.1	15.4	77
78	27 02.8	+17.7	13.2	28 01.2	+17.9	13.4	28 59.6	+18.1	13.5	29 57.9	+18.4	13.6	30 56.2	+18.6	13.8	31 54.4	+19.0	13.9	32 52.7	+19.2	14.1	33 50.8	+19.5	14.2	78
79	27 20.5	+17.1	12.2	28 19.1	+17.4	12.3	29 17.7	+17.6	12.4	30 16.3	+17.8	12.5	31 14.8	+18.1	12.7	32 13.4	+18.3	12.8	33 11.9	+18.6	12.9	34 10.3	+18.9	13.1	79
80	27 37.6	+16.7	11.1	28 36.5	+16.8	11.2	29 35.3	+17.1	11.3	30 34.1	+17.3	11.4	31 32.9	+17.6	11.5	32 31.7	+17.8	11.7	33 30.5	+17.9	11.8	34 29.2	+18.2	11.9	80
81	27 54.3	+16.1	10.0	28 53.3	+16.4	10.1	29 52.4	+16.5	10.2	30 51.4	+16.7	10.3	31 50.5	+16.9	10.4	32 49.5	+17.1	10.5	33 48.4	+17.4	10.6	34 47.4	+17.5	10.8	81
82	28 10.4	+15.6	8.9	29 09.7	+15.7	9.0	30 08.9	+16.0	9.1	31 08.1	+16.2	9.2	32 07.4	+16.3	9.3	33 06.6	+16.5	9.4	34 05.8	+16.6	9.5	35 04.9	+16.9	9.6	82
83	28 26.0	+15.1	7.8	29 25.4	+15.3	7.9	30 24.9	+15.3	8.0	31 24.3	+15.5	8.1	32 23.7	+15.7	8.1	33 23.1	+15.8	8.2	34 22.4	+16.0	8.3	35 21.8	+16.2	8.4	83
84	28 41.1	+14.5	6.7	29 40.7	+14.6	6.8	30 40.2	+14.8	6.9	31 39.8	+14.9	6.9	32 39.4	+15.0	7.0	33 38.9	+15.2	7.1	34 38.4	+15.4	7.2	35 38.0	+15.5	7.3	84
85	28 55.6	+14.0	5.6	29 55.3	+14.1	5.7	30 55.0	+14.2	5.7	31 54.7	+14.3	5.8	32 54.4	+14.4	5.8	33 54.1	+14.5	5.9	34 53.8	+14.6	6.0	35 53.5	+14.7	6.1	85
86	29 09.6	+13.5	4.5	30 09.4	+13.6	4.5	31 09.2	+13.7	4.6	32 09.0	+13.7	4.6	33 08.8	+13.8	4.7	34 08.6	+13.9	4.7	35 08.4	+14.0	4.8	36 08.2	+14.1	4.9	86
87	29 23.1	+12.8	3.4	30 23.0	+12.9	3.4	31 22.9	+13.0	3.4	32 22.7	+13.1	3.5	33 22.6	+13.2	3.5	34 22.5	+13.2	3.6	35 22.4	+13.2	3.6	36 22.3	+13.3	3.7	87
88	29 35.9	+12.4	2.3	30 35.9	+12.3	2.3	31 35.9	+12.3	2.3	32 35.8	+12.4	2.3	33 35.8	+12.4	2.4	34 35.7	+12.5	2.4	35 35.6	+12.6	2.4	36 35.6	+12.6	2.4	88
89	29 48.3	+11.7	1.1	30 48.2	+11.8	1.1	31 48.2	+11.8	1.2	32 48.2	+11.8	1.2	33 48.2	+11.8	1.2	34 48.2	+11.8	1.2	35 48.2	+11.8	1.2	36 48.2	+11.8	1.2	89
90	30 00.0	+11.2	0.0	31 00.0	+11.1	0.0	32 00.0	+11.1	0.0	33 00.0	+11.1	0.0	34 00.0	+11.1	0.0	35 00.0	+11.1	0.0	36 00.0	+11.1	0.0	37 00.0	+11.1	0.0	90
	30°			31°			32°			33°			34°			35°			36°			37°			

S. Lat. { L.H.A. greater than 180° ....Zn=180°–Z
L.H.A. less than 180°.....Zn=180°+Z

LATITUDE SAME NAME AS DECLINATION L.H.A. 101°, 259°